SANBORN HEAD

Building Trust. Engineering Success.

PERMIT APPLICATION
BWP SW 38
SITE SUITABILITY FOR A MAJOR MODIFICATION OF AN EXISTING SITE ASSIGNMENT

RESOURCE WARE C&D HANDLING FACILITY

Ware, Massachusetts

Prepared for ReSource Ware LLC
File No. 5094.10
April 2023

SANBORN HEAD

6 Bedford Farms Drive
Bedford, NH 03110

Mr. Daniel Hall, Section Chief
Department of Environmental Protection
Division of Solid Waste Management
Western Regional Office
436 Dwight Street
Springfield, Massachusetts 01103

April 28, 2023
File No. 5094.10

Re: ReSource Ware C&D Handling Facility
BWP SW38 Permit Application
Site Suitability Report for Major Modification of Existing Site Assignment

Dear Mr. Hall:

On behalf of ReSource Waste Services of Ware LLC (ReSource Ware), Sanborn Head is pleased to submit the enclosed BWP SW38 Site Suitability permit application for the proposed modification to the existing site assignment for the ReSource Ware C&D Handling Facility located in Ware, Massachusetts. The permit application consists of the Transmittal Form for Permit Application and Payment, the BWP SW38 Permit Application Form, and the Site Suitability Report.

If you or your staff have any questions regarding the permit application, please call me at (978) 577-1029 or email me at swright@sanbornhead.com.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

Stephen E. Wright, P.E.
Vice President

[SEW]/SEW:sew

Encl. BWP SW38 Permit Application

cc: Ware Board of Health (2 copies)
Ware Town Library (1 copy)
MassDEP Business Compliance Division, Boston (1 copy)
MA Dept. of Public Health, Bureau of Environmental Health Assessment (1 copy)
West Brookfield Board of Health (1 copy)
West Brookfield Town Library (1 copy)
Pioneer Valley Planning Commission (1 copy)
John Farese, ReSource Ware

Enter your transmittal number → Transmittal Number

Your unique Transmittal Number can be accessed online:
https://www.mass.gov/service-details/transmittal-form-number-for-massdep-permit-application-payment

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: MassDEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application. **Copy 2** must accompany your fee payment. **Copy 3** should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA 02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

1. Permit Code: 4-to-7-character code from permit instructions	2. Name of Permit Category
BWP SW38	Site Suitability for Major Modification

3. Type of Project or Activity: Modification of Existing Site Assignment

B. Applicant Information – Firm or Individual

1. Name of Firm - Or, if party needing this approval is an individual enter name below: ReSource Waste Services LLC

2. **Last Name** of Individual	3. **First Name** of Individual	4. MI

5. Street Address: 159 Wolf Road, Suite 301

6. City/Town	7. State	8. Zip Code	9. Telephone #	10. Ext. #
Albany	NY	12205	413 967-7046	

11. Contact Person	12. e-mail address
John Farese	jfarese@resource-waste.com

C. Facility, Site or Individual Requiring Approval

1. Name of Facility, Site or Individual: ReSource Waste Services of Ware LLC

2. Street Address: 198 East Street

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Ware	MA	01082	413 967-7046	

8. DEP Facility Number (if Known)	9. Federal I.D. Number (if Known)	10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

1. Name of Firm or Individual: Sanborn Head & Associates, Inc.

2. Address: 6 Bedford Farms Drive, Suite 201

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Bedford	NH	03110	978-577-1029	

8. Contact Person	9. LSP Number (BWSC Permits only)
Stephen E. Wright, P.E.	

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☒ yes ☐ no
   If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit: 12699 (EOEA File Number)

F. Amount Due

DEP Use Only

Permit No:

Rec'd Date:

Special Provisions:

1. ☐ **Fee** Exempt: city, town, county, or district of the Commonwealth; federally recognized Indian tribe housing authority; municipal housing authority; the MBTA; or state agency if fee is $100 or less. *There are no fee exemptions for BWSC permits, regardless of applicant status.*
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

Reviewer:

Check Number	Dollar Amount	Date
121332	$1,920.00	April 19, 2023

HOLD TO LIGHT TO VIEW TRUE WATERMARK IN PAPER. HEAT SENSITIVE RED LOCK DISAPPEARS WHEN HEATED

121332

SANBORN, HEAD & ASSOCIATES, INC.
20 FOUNDRY STREET
CONCORD, NH 03301
P (603) 229-1900

M&T Bank

10-4/220

CHECK DATE
April 19, 2023

PAY One Thousand Nine Hundred Twenty and 00/100 Dollars

AMOUNT 1,920.00

TO Commonwealth of Massachusetts

AUTHORIZED SIGNATURE

Security features. Details on back.

BWP-SW-38 [redacted]

SANBORN, HEAD & ASSOCIATES, INC.

121332

Check Date: 4/19/2023

Invoice Number	Date	Voucher	Amount	Discounts	Previous Pay	Net Amount
BWP SW-38 5094.10	4/18/2023	0136557	1,920.00			1,920.00
Commonwealth of Massachusetts		TOTAL	1,920.00			1,920.00
People's United Bank - 6		COMMMA				

Massachusetts Department of Environmental Protection
Bureau of Waste Prevention – Solid Waste Management

BWP SW 01 Site Suitability Report for a New Site Assignment

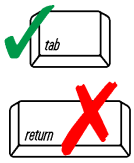
BWP SW 38 Site Suitability for a Major Modification of an Existing Site Assignment

Transmittal Number

Facility ID# (if known)

Instructions

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



BWP SW 01 Site Suitability Report for New Site Assignment:

The information requested on this application form must be supplied when filing an Application for a new Site Assignment pursuant to the provisions of the *Site Assignment Regulations for Solid Waste Management Facilities*, 310 CMR 16.00.

The form is divided into six parts that are to be completed as follows:

I. General Information: All Applicants complete Part I.

II. Facility Specific Criteria: Part II is divided into three sections,

II.A. For landfills,
II.B. For combustion facilities, and
II.C. For waste handling and processing facilities.

Applicants should complete only the appropriate section.

III. General Criteria: All Applicants complete Part III.

IV. Integrated Solid Waste Management: Complete Part IV only if the proposed facility is a landfill or combustion facility.

V. Waiver: Complete Part V only if a waiver is requested.

VI. Signatures and Certification: All Applicants must sign the application in Part VI.

BWP SW 38 Site Suitability Report for a Major Modification of a Site Assignment:

The information requested on this application form must be supplied when filing an Application for a major modification of an existing Site Assignment pursuant to the provisions of the *Site Assignment Regulations for Solid Waste Management Facilities* at 310 CMR 16. 22(2).

When applying for a Major Modification, the applicant need only complete those sections of the form that concern criteria affected by the major modification as determined in writing by the Department. The applicant shall obtain this written determination from the Solid Waste Section in the DEP Regional Office prior to completing and submitting this application.

General Information:

The Applicant should refer to the regulations themselves when completing the Application form. The Application form provides a format for presenting the information required to determine whether the site meets the criteria set forth in the Site Assignment Regulations themselves. The Application form is not a substitute for the regulations, and the Applicant is responsible for providing all the information relevant to evaluating the suitability of the site in accordance with 310 CMR 16.00.

Instructions (cont.)

The application form is annotated with section numbers, enclosed in {braces}, that reference sections in the regulations. These references are included to make it easier to consult the regulations for guidance in completing the application. The references are abbreviated in that, for example, 310 CMR 16.05(2) is written as {16.05(2)}.

Completing the Application Form:

This application form contains three types of questions or requests for information:

1) Requests that documents be attached (e.g., maps). Please attach these documents and note on the application form where these documents can be found.

2) Questions that require a written response. Questions that require a very brief response may be answered in the space provided on the form itself. Longer responses should be attached to the form and the location of the attachment identified in the space provided.

3) Questions that require a "yes" or "no" response. Put an “X” in the appropriate box and indicate in the space provided where additional information or information supporting the response can be found.

Massachusetts Department of Environmental Protection
Bureau of Waste Prevention – Solid Waste Management

BWP SW 01 Site Suitability Report for a New Site Assignment

BWP SW 38 Site Suitability for a Major Modification of an Existing Site Assignment

Transmittal Number

Facility ID# (if known)

Section I. General Information

Instructions: All Applicants should complete Part I.

A. Site Location and Project Description

Please provide the information requested.

1. Project name:

   ReSource Waste Services of Ware LLC - Modfication of Existing Site Assignment
   Name of Project

2. Site address:

   198 East Street
   Street

   Ware | MA | 01082
   City/Town | State | Zip Code

3. Type of facility:

   ☐ landfill
   ☐ combustion
   ☒ waste handling and processing

4. Total area of the site, including all buffer zones:

   25.1 acres
   acres

5. Total area to be site assigned for solid waste activities:

   8.9 acres
   acres

6. Capacity and expected life of proposed facility:

   a. State the maximum daily capacity of the proposed facility in tons per day. (This number should represent the maximum amount of waste to be accepted on any single day.):
   Stage 1: 1,125 TPD; Stage 2: 1,400 TPD
   tons per day

   b. State the average daily capacity of the proposed facility and describe how the average was computed:
   Stage 1: 1,070 TPD; Stage 2: 1,330 TPD
   average daily capacity (tons per day)
   Assumed average at 95% of maximum daily capacity
   how average was computed

A. Site Location and Project Description (cont.)

c. State the yearly capacity of the proposed facility and, if the capacity is expected to change over the life of the facility, indicate the capacity in each year the proposed facility is expected to operate:

Stage 1: 310,625 TPY;
Stage 2: 393,200 TPY

Expected change in capacity (if applicable):

Expected yearly capacity	Year
Stage 1: 310,625 TPY	Beginning summer 2024
Stage 2: 393,200 TPY	Beginning early 2026

d. State the number of years the facility is expected to operate:

30
years

e. State the total lifetime capacity of the proposed facility:

11,630,850 (Based on Stage 1 for 2 yrs and
Stage 2 for 28 yrs)

7. Type of Waste: What type of waste will be accepted at the proposed facility? (check all that apply)

☐ municipal solid waste
☒ construction and demolition waste
☐ industrial waste
☒ other, please specify: Street sweepings and catch basin cleanings

8. Project Description: describe the proposed project:

The existing facility is permitted to accept 750 TPD of C&D waste. The proposed project would increase the permitted capacity of the facility to a maximum of 1,400 TPD of C&D waste and also allow for the addition of street sweepings and catch basin cleanings to the type of material permissible for acceptance at the facility.

B. Applicant Identification

1. Identify the owner of the site:

ReSource Waste Services LLC
Name

159 Wolf Road, Suite 301
Street Address

Albany	NY	12205
City/Town	State	Zip Code

413 967-7046
Telephone

John Farese	413 967-7046
Contact Person	Contact Telephone

2. Identify the operator of the proposed facility if the owner has entered into an agreement with an operator:

ReSource Waste Services of Ware, LLC
Name

198 East Street
Street Address

Ware	MA	01082
City/Town	State	Zip Code

413 967-7046
Telephone

John Farese	413 967-7046
Contact Person	Contact Telephone

C. Fees {16.08(4)}

1. Proof of Payment: Documentation must be submitted showing that the requirements for paying the Technical Fee to the Board of Health as per 16.08(4) have been satisfied.

Proof of payment may be either (please check which one you have provided):

☐ Document from the Board of Health stating that the Board of Health has waived the technical fee or that the Applicant has satisfied the Technical Fee payment requirements; or

☒ Receipt showing that the Applicant has paid the Maximum Technical Fee to the municipality.

Location of Attachment:

Appendix A
section and/or page numbers

C. Fees {16.08(4)} (cont.)

2. Amount of Maximum Technical Fee: Enter the Maximum Technical Fee as computed using Appendix A of 310 CMR 16.99:
   Per Appendix A of 310 CMR 16.99, the maximum technical fee is $78,311.

D. Collection Center for Household Hazardous Waste

Does the applicant intend to apply, pursuant to 310 CMR 30.190, for approval to operate a collection center for hazardous waste from households on the proposed site?

☐ Yes ☒ No

If "yes," the Applicant should contact the Permitting Section of the Bureau of Waste Prevention in the appropriate DEP Regional Office.

E. Declaration of Waiver Request {16.08(5)(c)}

1. Is a waiver from any of the site suitability criteria being requested under provisions of 310 CMR 16.40(6)? (If "yes," complete Part V.A. of this application form.)

   ☐ Yes ☒ No *(Note: Waiver was obtained in 2003 for property line setback as part of original site assignment permitting for the project)*

2. Is a waiver from any of the requirements of Part I of 310 CMR 16.00 being requested under provisions of 310 CMR 16.18? (If "yes," complete Part V.B. of this application form.)

   ☐ Yes ☒ No

F. Massachusetts Environmental Policy Act (MEPA) {16.08(5)(d)}

Indicate which one of the following is attached to the application:

☐ Evidence that the project does not require MEPA review.

☒ Certificate from the Secretary of the Executive Office of Environmental Affairs stating that an Environmental Impact Report is **not** required.

☐ Evidence that the MEPA process does apply and the Secretary has determined that an EIR is required. (Note: The DEP will not complete its technical review of the application until the applicant submits the Certificate from the Secretary of the Executive Office of Environmental Affairs stating that the Final Environmental Impact Report is acceptable.)

☐ Certificate from the Secretary of the Executive Office of Environmental Affairs stating that the Final Environmental Impact Report is acceptable.

F. Massachusetts Environmental Policy Act (MEPA) {16.08(5)(d)} (cont.)

Location of Attachment:

Report Section 5.0 and Appendix E (E-4 for current project).
section and/or page numbers

G. Wetlands Resources

1. Buffer Zone: Is any part of the proposed site located within 100 feet of any wetlands?

   ☒ Yes ☐ No *(Stage 2 only)*

2. Riverfront Area: Is any part of the site located within a riverfront area?

   ☒ Yes ☐ No *(Stage 2 only)*

3. Floodplain: Is any part of the proposed site located within a 100-year floodplain?

   ☐ Yes ☒ No

   If the answer to question I.G.1, I.G.2 or I.G.3 is "yes," please describe what activities, if any, will occur within the 100-foot buffer zone, the riverfront area or the 100-year floodplain.

   Respond here or identify location of attached response:

   Report Section 6.1
   section and/or page numbers

4. Order of Conditions: Will an Order of Conditions under the Wetlands Protection Act (c.131, s.40) be required?

   ☒ Yes ☐ No *(Stage 2 only)*

5. Variance: Will a variance from the Wetlands regulations be required?

   ☐ Yes ☒ No

H. Maps

1. Ground Water Contour Map: Has a ground water contour map for the site been developed?

   ☒ Yes ☐ No

   If Yes, please attach the map and identify the location of the attachment:

   Report Section 6.2.2 and Figure 2
   section and/or page numbers

Please submit the following with the Application:

2. Locus Map: A US Geological Survey (USGS) topographic map of at least 8.5 x 11 inches in size (7.5 minute series scale) should be attached which clearly delineates the proposed site boundaries and shows all access roads to the proposed site.

   Identify the attachment:

   Report Section 6.2.1 and Figure 1
   section and/or page numbers

3. Water Resources Site Plan: The following information regarding water resources should be indicated on a site plan (scale no larger than one inch equals two hundred feet) that covers the site plus a one-half mile extension in all directions from the site boundary. Please refer to the definitions at 310 CMR 16.02 for guidance on the meaning of the terms.

   - All wetlands, associated buffer zones and riverfront areas as defined in 310 CMR 10.00
   - All 100-year flood plains
   - All surface water bodies (rivers, streams, ponds, lakes, reservoirs etc),
   - All perennial streams draining to surface drinking water supplies,
   - All private water supply wells
   - All public water supply wells
   - All or any fractions of Interim Wellhead Protection Areas (IWPA) or Zone II areas
   - All or any fractions of Proposed Drinking Water Source Areas
   - All or any fraction of a Zone A or B of a surface water supply

   Identify the location of the attachment:

   Report Section 6.2.3 and Figures 3, 4, 7, 9A and 9B
   section and/or page numbers

H. Maps (cont.)

4. Land Use Site Plan: The following information regarding land use should be indicated on a site plan (scale no larger than one inch equals two hundred feet) that covers the site plus a one-half mile extension in all directions from the site boundary:

    - All wildlife management areas,
    - All Areas of Critical Environmental Concern (ACEC) as established by the Secretary of the Executive Office of Environmental Affairs (EOEA),
    - All lands actively devoted to agricultural or horticultural uses and lands classified as Prime, Unique, or of State and Local Importance by the United States Department of Agriculture, Natural Resources Conservation Service;
    - All of the Following Open Space Protected Areas:
        - state forests
        - state or municipal parklands or conservation land, or other open space held for natural resource purposes in accordance with Article 97 of the Massachusetts Constitution
        - Department of Conservation & Recreation (DCR) reservations
        - lands with conservation. preservation, agricultural, or watershed protection restrictions approved by the Secretary of the Executive Office of Environmental Affairs
        - conservation land owned by private non-profit land conservation organizations that is open to the public
        - All residential dwellings on site and within 500 feet (1000 feet for landfills) of the property boundary,
        - All occupied commercial buildings within 500 feet of the property boundary,
        - All of the following:
            - health care facilities
            - prisons
            - Elementary Schools
            - middle schools
            - high schools
            - children's' pre-schools
            - licensed day care centers
            - senior centers
            - youth centers
    - Other Solid Waste Facilities
    - All proposed waste handling areas on the site,
    - All proposed areas of waste deposition on the site,
    - All buildings and other facilities proposed on the site,
    - All access roads on the site and traffic flow off the site,
    - All abutting properties and their appropriate zoning designation (include any zoning abbreviations in plan legend).
    - The zoning designation of the proposed site.

    Identify the location of the attachment:

    Report Section 6.2.4 and Figures 5, 6, 7, 9A and 9B
    section and/or page numbers

Section II. Facility Specific Criteria

Part II is divided into three sections. Complete only the appropriate section.

II.A. Landfills
II.B. Combustion Facilities
II.C. Waste Handling and Processing Facilities

A. Landfills {16.40(3)(a)}

Complete Part II.A., if Site Assignment is sought for a landfill.

1. Zone II of Existing Public Water Supply {16.40(3)(a)1.}: Will any area of waste deposition be located within the designated Zone II area of an existing public water supply well?

   ☐ Yes ☐ No

   Location of supporting information or comments:

   section and/or page numbers

2. IWPA of Existing Public Water Supply {16.40(3)(a)2.}: If the Zone II of an existing public water supply well has not been determined, will any area of waste deposition be within the Interim Wellhead Protection Area (IWPA) as defined at 310 CMR 22.02?

   ☐ Yes ☐ No

   If “Yes” see the note at Question II.A.4. and identify where additional information is attached:

   section and/or page numbers

3. Zone II or IWPA of a Proposed Drinking Water Source Area {16.40(3)(a)3.}: Will any area of waste deposition be within the area of a Zone II or Interim Well Head Protection Area (IWPA) of a proposed drinking water source area for which the documentation necessary to obtain a source approval has been submitted prior to the earlier of either the site assignment application, or if the MEPA process does apply, the Secretary’s Certificate on the Environmental Notification Form or Notice of Project Change, or where applicable, the Secretary's Certificate on the EIR or Final EIR;

   ☐ Yes ☐ No

   If “Yes” see the note at Question II.A.4. and identify where additional information is attached:

   section and/or page numbers

A. Landfills {16.40(3)(a)} (cont.)

4. 15,000 Feet Upgradient of Existing Public Water Source Well or Proposed Drinking Water Source Area {16.40(3)(a)4.}: In instances where the Zone II has not been calculated, will any area of waste deposition be 15,000 feet or less hydraulically upgradient of an existing public water source well or proposed drinking water source area?

   ☐ Yes ☐ No

   See the note and identify where additional information is attached:

   _____
   section and/or page numbers

   Note: If the answer to Questions II.A.2., 3, or 4 is "YES," the applicant may conduct and submit with this application a preliminary Zone II study, approved of by the Department, showing that the waste deposition area would be beyond the Zone II of the public water supply well or proposed drinking water source area in question. Alternatively, the applicant may prepare and submit, with this application, other evidence showing the well or proposed drinking water source area and the ground water under the proposed site are not hydraulically connected

   The Applicant should consult with the DEP Drinking Water Program in the Bureau of Resource Protection prior to conducting a preliminary Zone II investigation to determine the scope of the investigation. At a minimum, the preliminary Zone II submittal should consist of:

   1) A review and discussion of all available pertinent geologic and hydrologic data including bedrock and surficial geologic maps, hydrologic data reports and atlases, consultant reports, and pumping test reports;

   2) An estimate and orientation of the regional hydraulic gradient across the well site;

   3) A preliminary conceptual model of the aquifer, including a discussion of pertinent recharge and till boundaries; and

   4) A preliminary estimate of the Zone II area as defined in the Drinking Water Program's Water Supply Guidelines.

5. Danger to existing or proposed drinking water source area {16.40(3)(a)5.}: State why a discharge from the facility would not pose a danger to any existing or proposed drinking water source area.

   Respond here or identify where the response is attached:

   _____
   section and/or page numbers

A. Landfills {16.40(3)(a)} (cont.)

6. Sole Source Aquifer {16.40(3)(a)6.}: Will any area of waste deposition be located within the recharge area of a designated sole source aquifer? (Sole Source Aquifers are designated by the US Environmental Protection Agency. To inquire as to whether a site is located above a Sole Source Aquifer contact the US Environmental Protection Agency, Region I, Ground Water Management Section.)

   ☐ Yes ☐ No

   Identify location of attached information:

   section and/or page numbers

   If the answer to question II.A.6. is "yes," then the site is not suitable unless the criteria in 310 CMR 16.40(3)(a)6.a., b. and c. are met. Attach documentation showing that these criteria are satisfied.

   Identify location of attached information:

   section and/or page numbers

7. Zone of Contribution or Recharge Area {16.40(3)(a)7.}: Is any area of waste deposition within the zone of contribution of an existing public water supply or proposed drinking water source area, or the recharge area of a surface drinking water supply, pursuant to a municipal ordinance or by-law enacted in accordance with M.G.L. c. 40A, § 9?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

8. Zone A or B of Surface Drinking Water Supply {16.40(3)(a)8.}: Will any area of waste deposition be within the Zone A or Zone B of a surface water supply?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   .

   section and/or page numbers

A. Landfills {16.40(3)(a)} (cont.)

9. Perennial stream draining to Surface Drinking Water Supply {16.40(3)(a)9.} Will any area of waste deposition be located within 400 feet upgradient, as defined by groundwater flow or surface water drainage, of a perennial water course that drains to a surface water supply that itself is within one mile of the waste deposition area?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

10. Potentially Productive Aquifer {16.40(3)(a)10.}: Will any area of waste deposition be within a Potentially Productive Aquifer?

    ☐ Yes ☐ No

    Identify location of supporting information or comments:

    section and/or page numbers

    If the answer to question II.A.10. is "yes," then the site is not suitable unless documentation is attached showing that either 16.40(3)(a)10.a., b. or c. applies.

    Identify location of attached documentation:

    section and/or page numbers

11. Within 1000 feet Upgradient or Otherwise within 500 Feet of an Existing or Potential Private Water Supply Well {16.40(3)(a)11.}: Will any area of waste deposition be within 1000 feet upgradient, and where not upgradient, within 500 feet, of a private water supply well existing or established as a potential supply at the time of submittal of the application?

    ☐ Yes ☐ No

    Identify location of supporting information or comments

    section and/or page numbers

A. Landfills {16.40(3)(a)} (cont.)

If the answer to question II.A.11 is "yes," attach documentation showing a valid option to purchase each such supply. Also indicate whether a replacement drinking water supply will be provided.

Identify the location of attached documentation:

section and/or page numbers

12. Four Feet Depth to Ground Water {16.40(3)(a)12.}: Will the maximum high ground water level under any area of waste deposition be less than four (4) feet below the lowermost level of the waste or, if a liner system is employed, four feet below the bottom of the lower most liner?

☐ Yes ☐ No

Identify location of supporting information or comments:

section and/or page numbers

13. Wetlands 16.40(3)(a)13.}: Will any area of waste deposition or any leachate containment structure be within any resource area, including the 100 year floodplain, protected by the Wetlands Protection Act?

☐ Yes ☐ No

Identify location of supporting information or comments:

section and/or page numbers

14. 400 Feet to a Lake or 200 feet to a Riverfront Area {16.40(3)(a)14.}: Will any area of waste deposition or any leachate containment structure be within 400 feet of a lake or within 200 feet of a Riverfront Area as defined in 310 CMR 10.00, that is not a drinking water supply?

☐ Yes ☐ No

Identify location of supporting information or comments:

section and/or page numbers

A. Landfills {16.40(3)(a)} (cont.)

15. 1000 Feet to Various Occupied Facilities {16.40(3)(a)15.}: Will any area of waste deposition be within 1000 feet of any of the following (excluding equipment storage or maintenance structures):

    - an occupied residential dwelling,
    - health care facility
    - prison,
    - Elementary School
    - middle school
    - high school
    - children's' pre-school
    - licensed day care center
    - senior center
    - youth center

    ☐ Yes ☐ No

    Identify location of supporting information or comments:

    section and/or page numbers

    If the answer to II.A.15. is "yes", attach documentation showing evidence of a valid option to purchase the facility in question.

    Identify location of attached documentation:

    section and/or page numbers

16. Ground water Protection System {16.40(3)(a)16.}: Will a ground water protection system be employed?

    ☐ Yes ☐ No

    If a ground water protection system will be employed, describe the general features and components of the system which will prevent the migration of leachate and avoid adverse impact to the ground water.

    If a ground water protection system will not be employed, demonstrate that the facility will not discharge leachate that presents a threat of adverse impact to ground water.

    Identify location of attached explanation:

    section and/or page numbers

B. Combustion Facilities {16.40(3)(c)}

Complete Part II.B. if site assignment is sought for a combustion facility.

1. Zone I of Public Water Supply {16.40(3)(c)1.}: Will any waste handling area be within the Zone I of a public water supply?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

2. IWPA or Zone II of Existing Supply or Proposed Drinking Water Source Area {16.40(3)(c)2.}: Will any waste processing area be within:

   a) the Interim Wellhead Protection Area (IWPA) of an existing public supply

      ☐ Yes ☐ No

      Identify location of supporting information or comments:

      section and/or page numbers

   b) Zone II of an existing public water supply

      ☐ Yes ☐ No

      Identify location of supporting information or comments:

      section and/or page numbers

   c) a proposed drinking water source area, provided that the documentation necessary to obtain a source approval has been submitted prior to the earlier of either the site assignment application, or if the MEPA process does apply, the Secretary's Certificate on the Environmental Notification Form or Notice of Project Change, or where applicable, the Secretary's Certificate on the EIR or Final EIR,

      ☐ Yes ☐ No

B. Combustion Facilities {16.40(3)(c)} (cont.)

Identify location of supporting information or comments:

section and/or page numbers

If the answer to all the above is "No," do not respond to the following and go on to section II.B.3. If the answer to any of the above is "Yes," respond to the following requests:

Supply information to demonstrate to the Department that the risk of an adverse impact to the ground water will be minimized.

Identify location of attached information:

section and/or page numbers

Supply information to demonstrate to the Department that at least one of the following is true:

1) The proposed facility cannot reasonably be sited outside the IWPA or Zone II.

2) If the site has been previously used for solid waste management activities, there would be a net environmental benefit to the ground water by siting the facility within the Zone II or the IWPA.

Identify location of attached information:

section and/or page numbers

3. Zone A of Surface Water Supply {16.40(3)(c)3.}: Will the waste processing area be within the Zone A of a surface water supply?

☐ Yes ☐ No

Identify location of supporting information or comments:

section and/or page numbers

B. Combustion Facilities {16.40(3)(c)} (cont.)

4. Within 500 feet Upgradient or Otherwise within 250 Feet of an Existing or Potential Private Water Supply Well {16.40(3)(c)4.}: Will the waste processing area be within 500 feet upgradient, and where not upgradient, within 250 feet, of a private water supply well existing or established as a potential supply at the time of submittal of the application?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

   If the answer to question II.B.4 is "yes," attach documentation showing a valid option to purchase each such supply. Also indicate whether a replacement drinking water supply will be provided.

   Identify location of attached documentation:

   section and/or page numbers

5. Two Foot Depth to Ground Water {16.40(3)(c)5.}: Will the maximum high ground water level be less than 2 feet below the surface in any waste handling or processing area?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

   If "yes," indicate how the project can be designed to maintain a two foot separation.

   Identify location of explanation:

   section and/or page numbers

B. Combustion Facilities {16.40(3)(c)} (cont.)

6. 500 Feet to Various Occupied Facilities {16.40(3)(c)6.}: Will any waste handling or processing area be within 500 feet of any of the following (excluding equipment storage or maintenance structures):

   - an occupied residential dwelling,
   - health care facility
   - prison,
   - Elementary School
   - middle school
   - high school
   - children's' pre-school
   - licensed day care center
   - senior center
   - youth center

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

   If the answer to II.B.6. is "yes", attach documentation showing evidence of a valid option to purchase the facility in question.

   Identify location of attached documentation:

   section and/or page numbers

7. Riverfront Area {16.40(3)(c)7.}: Will the waste handling area be within the Riverfront Area as defined at 310 CMR 10.00?

   ☐ Yes ☐ No

   Identify location of supporting information or comments:

   section and/or page numbers

C. Waste Handling and Processing Facilities {16.40(3)(d)}

Complete Part II.C if site assignment is sought for a waste handling and processing facility (all facilities other than landfills and combustion facilities).

1. Zone I of Public Water Supply {16.40(3)(d)1.}: Will any waste handling area be within the Zone I of a public water supply?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:

   Report Section 7.1.1
   section and/or page numbers

2. IWPA or Zone II of Existing Supply or Proposed Drinking Water Source Area {16.40(3)(d)2.}: Will any waste handling or processing area be within:

   a) the Interim Wellhead Protection Area (IWPA) of an existing public supply

      ☐ Yes ☒ No

      Identify location of supporting information or comments:

      Report Section 7.1.2
      section and/or page numbers

   b) the Zone II of an existing public water supply

      ☐ Yes ☒ No

      Identify location of supporting information or comments:

      Report Section 7.1.2
      section and/or page numbers

   c) a proposed drinking water source area, provided that the documentation necessary to obtain a source approval has been submitted prior to the earlier of either the site assignment application, or if the MEPA process does apply, the Secretary's Certificate on the Environmental Notification Form or Notice of Project Change, or where applicable, the Secretary's Certificate on the EIR or Final EIR,

      ☐ Yes ☒ No

C. Waste Handling and Processing Facilities {16.40(3)(d)} (cont.)

Identify location of supporting information or comments:

Report Section 7.1.4
section and/or page numbers

If the answer to II.C.2.a, b and c is "No," do not respond to the following and go on to section II.C.3. If the answer to II.C.2.a, b or c is "Yes," respond to the following requests.

Supply information to demonstrate to the Department that the risk of an adverse impact to the ground water will be minimized.

Identify location of attached information:

section and/or page numbers

Supply information to demonstrate to the Department that at least one of the following is true:

1) The proposed facility cannot reasonably be sited outside the IWPA or Zone II.

2) If the site has been previously used for solid waste management activities, there would be a net environmental benefit to the ground water by siting the facility within the Zone II or the IWPA.

Identify location of attached information:

section and/or page numbers

3. Zone A of Surface Water Supply {16.40(3)(d)3.}: Will the waste handling or processing area be within the Zone A of a surface water supply?

☐ Yes ☒ No

Identify location of supporting information or comments:
Report Section 7.1.3
section and/or page numbers

C. Waste Handling and Processing Facilities {16.40(3)(d)} (cont.)

4. Within 500 feet Upgradient or Otherwise within 250 Feet of an Existing or Potential Private Water Supply Well {16.40(3)(d)4.}: Will the waste handling or processing area be within 500 feet upgradient, and where not upgradient, within 250 feet, of a private water supply well existing or established as a potential supply at the time of submittal of the application?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 7.1.5
   section and/or page numbers

   If the answer to question II.C.4 is "yes," attach documentation showing a valid option to purchase each such supply. Also indicate whether a replacement drinking water supply will be provided.

   Identify location of attached documentation:

   section and/or page numbers

5. Minimum Distances to Various Occupied Facilities {16.40(3)(d)5.}:

   a) Is the facility a transfer station using a fully enclosed storage system such as a compactor unit that proposes to receive less than or equal to 50 tons per day of solid waste

      ☐ Yes ☒ No

      Identify location of supporting information or comments:
      Report Section 2.4 and Section 7.1.6
      section and/or page numbers

Note: Respond to this question if the answer to question a) above is "Yes."

   b) Is the waste handling area 250 feet or less from any of the following (excluding equipment storage or maintenance structures)

      - an occupied residential dwelling,
      - health care facility
      - prison,
      - Elementary School
      - middle school
      - high school
      - children's' pre-school
      - licensed day care center
      - senior center
      - youth center

      ☐ Yes ☒ No

C. Waste Handling and Processing Facilities {16.40(3)(d)} (cont.)

Identify location of supporting information or comments:

Report Section 7.1.6
section and/or page numbers

Note: Respond to this question if the answer to question a) above is "No."

c) Is the waste handling area 500 feet or less from any of the following (excluding equipment storage or maintenance structures)

- an occupied residential dwelling,
- health care facility
- prison,
- Elementary School
- middle school
- high school
- children's' pre-school
- licensed day care center
- senior center
- youth center

☐ Yes ☒ No

Identify location of supporting information or comments:

Report Section 7.1.6
section and/or page numbers

6. Riverfront Area {16.40(3)(d)6.}: Will the waste handling area be within the Riverfront Area as defined at 310 CMR 10.00?

☐ Yes ☒ No

Identify location of supporting information or comments:
Report Section 7.1.7 and Figures 4, 7, 9A and 9B
section and/or page numbers

C. Waste Handling and Processing Facilities {16.40(3)(d)} (cont.)

7. Two Foot Depth to Ground Water {16.40(3)(d)7.}: Will the maximum high ground water level be less than 2 feet below the surface in any waste handling or processing area?

☐ Yes ☒ No

Identify location of supporting information or comments:
Report Section 7.1.8 and Figure 2
section and/or page numbers

If "yes," indicate how the project can be designed to maintain a two foot separation.

Identify location of explanation:

section and/or page numbers

Section III. General Criteria {16.40(4)}

All applicants should complete all sections of Part III.

Note: When a response includes a description of a potential adverse impact, the applicant should describe both the qualitative and quantitative aspects of the potential impact.

A. Agricultural Land {16.40(4)(a)}

1. Does the site contain any land classified as Prime, Unique, or of State and Local Importance by the United States Department of Agriculture, Natural Resources Conservation Service?

   ☒ Yes ☐ No

   Identify location of supporting information or comments:
   Report Section 8.1 and Figure 6
   section and/or page numbers

2. Does the site contain any land deemed Land Actively Devoted to Agricultural or Horticultural Uses, except where the facility is an agricultural composting facility?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 8.1
   section and/or page numbers

3. Will the facility be less than 100 feet from any land classified as Prime, Unique, or of State and Local Importance by the United States Department of Agriculture, Natural Resources Conservation Service?

   ☒ Yes ☐ No

   Identify location of supporting information or comments:

   Report Section 8.1 and Figure 6
   section and/or page numbers

A. Agricultural Land {16.40(4)(a)} (cont.)

4. Will the facility be less than 100 feet from any land deemed Land Actively Devoted to Agricultural or Horticultural Uses, except where the facility is an agricultural composting facility?

☐ Yes ☒ No

Identify location of supporting information or comments:
Report Section 8.1
section and/or page numbers

B. Traffic Impacts {16.40(4)(b)}

1. ENF/EIR Accepted by MEPA

If the applicant prepared an Environmental Notification Form (ENF) to comply with the requirements of the Massachusetts Environmental Policy Act (MEPA), please attach all portions of the ENF that are relevant to traffic impacts. If the applicant was also required to submit an Environmental Impact Report (EIR) to comply with MEPA, please attach all portions of the EIR relevant to traffic impacts.

☐ ENF/EIR traffic impacts attached
☒ ENF/EIR not required

Identify location of attachments or comments:

Report Section 5.0 and Appendix E (E-4 for current project)
section and/or page numbers

2. ENF/EIR Not Required by MEPA

If no ENF or EIR was required to comply with MEPA, please provide the following information in an attachment:

a) Maximum number of trips to the site per day by type of vehicle:

b) Indicate, by vehicle type, the anticipated number of trips that will be made on each of the roads serving the facility.

c) Identify any intersections, school zones, hospitals, or other locations on the roads serving the facility that may be adversely impacted by traffic accessing the site.

B. Traffic Impacts {16.40(4)(b)} (cont.)

Identify the location of the attached information or comments

Report Section 8.2 and Appendix G
section and/or page numbers

C. Wildlife and Wildlife Habitat {16.40(4)(c)}

The Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife administers the programs dealing with the Wildlife and Wildlife Habitats referred to in these questions. The NHESP should be contacted to obtain the information and documentation needed to respond to the questions in this section.

The applicant must obtain a specific response from NHESP regarding the proposed site and attach the response to this application.

1. Habitat of Endangered, Threatened, or Special Concern Animal or Plant: Is the proposed site within the habitat of a state-listed Endangered, Threatened, or Special Concern animal or plant, as documented by the Natural Heritage and Endangered Species Program in its database?

   ☒ Yes ☐ No

   Identify location of supporting information or comments:

   Report Section 8.3.1 and Appendix F
   section and/or page numbers

2. Ecologically Significant Natural Communities: Is the proposed site located in or adjacent to an area described on the most recent map of Ecologically Significant Natural Communities as documented by the Natural Heritage Program in its database?

   ☐ Yes ☒ No

   Identify location of supporting information:

   Report Section 8.3.2
   section and/or page numbers

C. Wildlife and Wildlife Habitat {16.40(4)(c)} (cont.)

3. Wildlife Management Area: Is the proposed site located in an area adjacent to or with the potential to impact upon a Wildlife Management Area designated and managed by the Division of Fisheries and Wildlife?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:

   Report Section 8.3.3
   section and/or page numbers

   Instructions: If the answer to any of the above questions (III.C.1., III.C.2. or III.C.3.) is "yes," and the proposed facility does have the potential to adversely impact one or more Endangered, Threatened, or Special Concern animals or plants or Wildlife Management Area, then answer questions III.C.4. and, if necessary, III.C.5. If the answer to each of the above questions (III.C.1., III.C.2. and III.C.3.) is "no," do not answer question III.C.4. or III.C.5.

4. Adverse Impact on Habitat: Will the proposed site have an adverse impact on the habitat of a state-listed Endangered, Threatened, or Special Concern animal or plant, Ecologically Significant Natural Community, or Wildlife Management Area, as determined by the Natural Heritage and Endangered Species Program? (Attach determination from NHESP.)

   Identify location of supporting information or comments:

   Report Section 8.3.4
   section and/or page numbers

   Instructions: If the Natural Heritage and Endangered Species Program has determined there will not be an adverse impact, do not answer question III.C.5. If NHESP determined there is a potential for an adverse impact, respond to question III.C.5.

5. Mitigation of Adverse Impacts: If there is a determination by the Natural Heritage and Endangered Species Program that the proposed facility may potentially impact the habitat of a state-listed Endangered, Threatened or Special Concern animal or plant, Ecologically Significant Natural Community, or Wildlife Management Area, are there any reasonable mitigation measures the proponent may use to minimize or eliminate any adverse impacts?

   ☐ Yes ☐ No

   If "no," then the site is unsuitable and the proposed facility shall not be sited.

   If "yes," then with regard to this criterion the site may be assigned with conditions which will meet Division of Fisheries and Wildlife approval for mitigation of the adverse impacts. The mitigation measures proposed shall be appended to this application.

C. Wildlife and Wildlife Habitat {16.40(4)(c)} (cont.)

Identify location of supporting information or comments:

section and/or page numbers

D. Areas of Critical Environmental Concern {16.40(4)(d)}

Programs for designating and protecting Areas of Critical Environmental Concern (ACEC) are administered by the Executive Office of Environmental Affairs (EOEA). EOEA should be contacted to obtain the information and documentation needed to respond to the questions in section III.D. Responses by EOEA should be appended to this application.

A specific response from EOEA is not required when EOEA's data show the site is not located near any ACEC.

1. Site Within ACEC: Is the proposed site located within the boundaries of an area designated as an Area of Critical Environmental Concern by the Secretary of EOEA?

☐ Yes ☒ No

Identify location of supporting information or comments:

Report Section 8.4

section and/or page numbers

If the answer to question III.D.1. is "yes, the site is not suitable.

2. Site Adjacent to ACEC: Is the proposed site adjacent to an ACEC with the potential to impact the resources designated by the Secretary of EOEA as worthy of protection? (As defined in 16.02, "adjacent" may include areas not contiguous to the boundaries of the site.)

☐ Yes ☒ No

Identify location of supporting information or comments:

Report Section 8.4

section and/or page numbers

D. Areas of Critical Environmental Concern {16.40(4)(d)} (cont.)

3. Mitigation Measures: If there is a determination by EOEA that the proposed facility may potentially adversely impact the ACEC, are there any reasonable mitigation measures the proponent may use to minimize or eliminate any adverse impacts?

   ☐ Yes ☐ No

   If "no," the site is not suitable.

   If "yes," then with regard to this criterion the site may be assigned with conditions which will meet EOEA approval for mitigation of the adverse impacts. The mitigation measures proposed shall be appended to this application.

   Identify location of supporting information or comments:

   Not applicable
   section and/or page numbers

E. Protection of Open Space {6.40(4)(e)}

1. State Forests: Will the proposed solid waste management facility have an adverse impact on the physical environment of, or on the use and enjoyment of state forests?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 8.5.1
   section and/or page numbers

2. State or Municipal Lands: Will the proposed solid waste management facility have an adverse impact on the physical environment of, or on the use and enjoyment of state or municipal parklands or conservation land, or other open space held for natural resource purposes in accordance with Article 97 of the Massachusetts Constitution?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 8.5.2
   section and/or page numbers

E. Protection of Open Space {6.40(4)(e)} (cont.)

3. MDC Reservation: Will the proposed solid waste management facility have an adverse impact on the physical environment of, or on the use and enjoyment of MDC reservations?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 8.5.3
   section and/or page numbers

4. Lands Protected by EOEA Restrictions: Will the proposed solid waste management facility have an adverse impact on the physical environment of, or on the use and enjoyment of lands with conservation. preservation, agricultural, or watershed protection restrictions approved by the Secretary of the Executive Office of Environmental Affairs?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 8.5.4
   section and/or page numbers

5. Privately Owned Public Conservation Land: Will the proposed solid waste management facility have an adverse impact on the physical environment of, or on the use and enjoyment of conservation land owned by private non-profit land conservation organizations and open to the public?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:

   Report Section 8.5.5
   section and/or page numbers

F. Air Quality Impacts {16.40(4)(f)}

Instructions: If the proposed facility is a combustion facility, complete only section III.f.1. If the proposed facility is **not** a combustion facility, complete only section III.f.2.

1. Air Quality Impacts: Combustion Facilities

   The Applicant shall, pursuant to the Air Pollution Control regulations, 310 CMR 7.02, submit a complete application to the Department for its review. The application shall be submitted on forms furnished by the Bureau of Waste Prevention. A copy of the permit application shall be appended to this application.

   In addition to the Air Quality Control application, the Applicant shall provide information on any populations within the area impacted by emissions from the facility which might be sensitive to the projected emissions from the facility. Information should include relevant health statistics for the impacted population.

   Identify location of supporting information or comments:

   section and/or page numbers

2. Air Quality Impacts: Non-Combustion Facilities

   a) Characterize the possible airborne emissions from the proposed facility. Include the composition and quantity of possible emissions. Indicate how these emissions are expected to vary over the life of the facility. Also characterize any other air emissions associated with the proposed facility such as emissions from vehicles.

   b) Demonstrate that the anticipated emissions from the facility will meet required state and federal air quality standards and criteria and otherwise will not constitute a danger to the public health, safety or the environment. Take into account the concentration and dispersion of emissions, the number and proximity of sensitive receptors and the attainment status of the area.

   Identify location of supporting information or comments:

   Report Section 8.6 and Appendix H
   section and/or page numbers

G. Nuisance Conditions {16.40(4)(g)}

For each of the following nuisance conditions that could occur during the construction and/or operation of the proposed facility, indicate the extent of the possible nuisance conditions and the measures that will be taken to mitigate or prevent the occurrence of the nuisance condition:

- Noise,
- Dust,
- Litter;
- Vectors such as rodents and insects,
- Odors,
- Bird hazards to air traffic, and
- Other nuisance conditions (please specify).

Identify location of supporting information or comments:

Report Section 8.7 and Appendix I
section and/or page numbers

H. Size of Facility {16.40(4)(h)}

Explanation: The information requested in this section is needed to determine whether the size of the site, considering access roads, areas for vehicles to wait before unloading, unloading facilities, storage areas, waste processing areas and pollution control equipment, is adequate for a facility with the proposed daily capacity.

1. Discussion: Discuss the waste delivery, unloading, and handling (including processing and storage) activities and pollution control equipment to demonstrate whether the size of the site is adequate to properly manage the proposed facility. Be specific with respect to the proposed capacity of the facility.

   Identify the location of supporting information or comments:

   Report Section 8.8, Figures 7, 8A through 8C, 9A, 9B, and 10 through 13, and Appendix J
   section and/or page numbers

2. 100 Foot Set Back: Will the waste handling area or deposition area be less than 100 feet from any property boundary except where the property boundary borders a separate solid waste management facility?

   ☒ Yes ☐ No

H. Size of Facility {16.40(4)(h)} (cont.)

Identify location of supporting information or comments:

Report Section 8.8.8
section and/or page numbers

I. Areas Previously Used for Solid Waste Disposal {16.40(4)(i)}

1. Previous Solid Waste Activities: Have the proposed site or any of the abutting properties been previously used for the legal or illegal disposal of solid wastes?

☐ Yes ☒ No

Identify location of supporting information or comments:
Report Section 8.9
section and/or page numbers

If "yes," please supply the following information and append to this application:

a) Address: The address of the area previously used for the disposal of solid waste,

b) Owner: The owner and the address of the owner of the area previously used for the disposal of solid waste,

c) Dimensions: The dimensions of the area previously used for the disposal of solid waste,

d) Status: Current status of the area previously used for the disposal of solid waste (e.g., active, inactive),

e) Impacts on Site: The nature and extent to which the area previously used for the disposal of solid waste currently impacts or threatens to impact the proposed site,

f) Impacts of Site: The nature and extent to which the proposed site may impact the area previously used for the disposal of solid waste,

g) Combined Impacts: The nature and extent of any combined impacts from the area previously used for the disposal of solid waste and the proposed facility to public health, safety or the environment (Include factors such as ground water contamination and surface water runoff.),

h) Mitigation: The extent to which use of the proposed site would result in mitigation of existing or potential impacts from the previously used site through remediation, closure or other activities.

I. Areas Previously Used for Solid Waste Disposal {16.40(4)(i)} (cont.)

Identify location of supporting information or comments:

section and/or page numbers

J. Existing Disposal Facilities {16.40(4)(j)}

1. Existing Disposal Facilities in Municipality: Are there any existing (active or inactive) disposal facilities (solid waste landfills or combustion facilities) in the municipality in which the proposed site is located?

   ☒ Yes ☐ No

   Identify the location of supporting information or comments:

   Report Section 8.10
   section and/or page numbers

2. Exclusive Use of Facility: Will the proposed facility be limited to the exclusive use of the municipality in which the proposed facility is to be sited?

   ☐ Yes ☒ No

   Identify the location of supporting information or comments:
   Report Section 8.10
   section and/or page numbers

   Instructions: If the answer to III.J.1. is "yes" and the answer to III.J.2. is "no," please provide the information requested in III.J.3. Otherwise, go on to question III.K.

3. Existing Facility Identification: Provide the following information about the existing disposal facility or facilities in the municipality in which the proposed site is located:

   a) Existing facility identification (name, address, type of facility):

   b) How much of the waste (tons/day) accepted at the proposed facility will be generated in the municipality in which the facility is located?

   c) What percentage of the waste accepted at the proposed facility will come from the municipality in which the site is located?

J. Existing Disposal Facilities {16.40(4)(j)} (cont.)

d) Discuss to what extent the proposed facility meets the needs of the region in which the site is located.

e) Explain to what extent the proposed facility incorporates recycling, composting and waste diversion. (Refer to other responses, if appropriate.)

Identify the location where the information is attached:

Report Section 8.10
section and/or page numbers

K. Other Sources of Contamination or Pollution {16.40(4)(k)}

Attach an evaluation of whether the projected impacts of the proposed facility pose a threat to public health, safety or the environment, taking into consideration the impacts of existing sources of pollution or contamination as defined by the Department, and whether the proposed facility will mitigate or reduce those sources of pollution or contamination.

The Department has prepared a guidance document that describes how to make this evaluation. The document is titled, *Interim Risk-Evaluation Guidance Document for Solid Waste Site Assignment and Permitting in Support of 310 CMR 16.00 and 19.000* (initially published June 8, 2001, and most recently revised on March 22, 2006). This guidance document, including its title, will be revised from time to time. Please contact the Department or visit the Department's web site to obtain the most recent version of the guidance document.

The applicant should contact the Department to discuss the scope of work prior to undertaking the evaluation.

Identify the location of the attached evaluation:

Report Section 8.11
section and/or page numbers

L. Regional Participation

1. Municipal Participation in Regional Disposal: Does the municipality in which the proposed site is located now participate in a regional disposal facility?

   ☐ Yes ☒ No

   Identify location of supporting information or comments:
   Report Section 8.12
   section and/or page numbers

   Instructions: If the answer to question III.L.1. is "Yes," supply the information requested in question III.L.2. Otherwise, go on to part IV.

2. Proposed Facility: Provide the following information about the proposed facility:

   a) How much of the waste (tons/day) accepted at the proposed facility will be generated in the municipality in which the facility is located?

   b) What percentage of the waste accepted at the proposed facility will come from the municipality in which the site is located?

   c) Discuss to what extent the proposed facility meets the needs of the region in which the site is located.

   d) Explain to what extent the proposed facility incorporates recycling, composting and waste diversion. (Reference other responses, if appropriate.)

   Identify the location of the information or comments:

   section and/or page numbers

Section IV. Integrated Solid Waste Management {16.40(5)}

Instructions: Complete Part IV only if site assignment is sought for a **Landfill** or **Combustion** facility.

It is likely that the information requested in Part IV will have been included in the EIR submitted to complete the MEPA process. If this is the case, the applicant should attach the relevant sections from the EIR that was accepted by the Secretary of EOEA. If all the information requested below is not included in the EIR attach additional information.

In order to complete this section, the Applicant will need information on the Commonwealth's goals for recycling and composting and for establishing a statewide integrated solid waste management (ISWM) system. This information is contained in the Commonwealth's Solid Waste Master Plan which is available on the DEP's web site or by calling the DEP. The Master Plan is periodically revised and may be updated by issuing annual Status Reports, so it is important to make sure you have the current version before completing this application.

A. Capacity Need {16.40(5)(a)1.}

Demonstrate the need for the capacity that will be provided by the proposed facility. For each year of the expected life of the proposed facility identify the sources (residential, commercial, industrial) of the solid waste that will supply the amount of waste equal to the proposed capacity. Please be as specific as possible in identifying "sources." Include the municipalities in which the waste will be generated and the type of waste (demolition/construction, wood waste, sludge, ash, special wastes, commercial wastes, household wastes, etc.).

Show how the capacity that will be provided by the proposed facility will contribute to providing the capacity needed by the Commonwealth as identified in the most recent Solid Waste Master Plan and/or most recent annual Status Report.

B. Waste Diversion {16.40(5)(a)2.}

Explain how the proposed facility will maximize the diversion of recyclable and compostable materials from the waste prior to combustion or landfilling. Include a discussion of how the proposed facility will coordinate with other facilities or programs to maximize the diversion.

C. Contribution to ISWM {16.40(5)(a)3.}

How will the proposed facility contribute to the establishment and maintenance of a statewide system for integrated solid waste management? Include a discussion of how the proposed facility will complement the other facilities in the service area.

D. Recycling and Composting {16.40(5)(b)}

Explain to what extent the proposed facility itself incorporates recycling and composting and explain how the proposed facility will be integrated into the recycling and composting activities in the service area.

Identify the location of the information requested in Part IV:

Although this permit criterion is not applicable to a solid waste handling facility, information regarding capacity need is provided in the Site Suitability Report application for informational purposes. See Report Section 8.13.

section and/or page numbers

Section V. Waivers

A. Site Suitability Criteria Waiver {16.40(6)}

The Site Suitability Criteria Waiver Application should be completed only if the applicant is seeking a waiver from one or more of the Site Suitability Criteria set forth in the Site Assignment Regulations, 310 CMR 16.40(3) or the setback distance at 310 CMR 16.40(4)(h). (The intention to seek a waiver must be noted in Part I of the Site Assignment Application Form.)

Note: As required by 310 CMR 16.08(5)(c), an application for a waiver must be accompanied by all data and documentation necessary to support the waiver request.

☐ Check here if a waiver from the Site Suitability Criteria is requested.

Identify the location of the information requested in V.A.1 through V.A.9:

A limited waiver to the property line setback criterion (310 CMR 16.40(4)(h)) was granted when the facility was first seeking site assignment in 2003. No new waiver is sought in connection with the currently proposed capacity increase. See Report Sections 4.3 and 8.14.

section and/or page numbers

1. Criteria: Identify the Site Suitability Criteria in 310 CMR 16.40(3) or 310 CMR 16.40(4)(h) from which a waiver is sought and for each explain the nature of the waiver being requested.

2. Hardship: State the nature of the hardship which would result if a waiver were not granted.

3. Interest Served: State the community, regional or state public interest that would be served by granting the waiver.

4. Maintain Protection: Explain why granting the waiver will not result in less protection of the public health and safety and the environment than would exist in the absence of the waiver.

5. Alternative Site: Explain why the proposed facility cannot be located at another site in the affected municipality or region at which a waiver would not be needed.

6. Preferred Municipality: Is the proposed site located in a preferred municipality as defined in MGL c.111, s. 150A1/2? (A "preferred Municipality" is a municipality that does not have existing disposal facilities and is not part of a regional waste disposal district.)

7. Environmental Benefit: Will granting the waiver result in any environmental benefits in excess of those benefits achievable in the absence of a waiver? Explain.

8. Integrated Solid Waste Management: Explain how the proposed facility contributes to integrated solid waste management.

9. Waiver Needed for Project Goals: Explain why the solid waste management objectives of the proposed project could not be achieved in the absence of the waiver.

B. Waiver from Application Process {16.18}

This waiver application should be completed only if the applicant is seeking a waiver from one or more of the provisions of Part I (310 CMR 16.01-16.19) of the Site Assignment Regulations that deals with the application process. (The intention to seek a waiver must be noted in Part I of the application form .)

Note: As required by 310 CMR 16.08(5)(c), an application for a waiver must be accompanied by all data and documentation necessary to support the waiver request.

☐ Check here if a waiver from the Application Process is requested.

Identify the location of the information requested in V.B.1 through V.B.4.

1. Regulatory Provision: Identify the provision of the regulations from which a waiver is being requested and explain the specific nature of the request.
2. Interest Served: State the community, regional or state public interest that would be served by granting the waiver.
3. Interference with Suitability Evaluation: State why the granting of the waiver would not interfere with the ability of the Board of Health to evaluate the Suitability of the proposed site.
4. Public Review and Comment: State why granting the waiver would not diminish the ability of the general public to review and comment on the proposed project.

VI. Signatures and Certification {16.08(5)(e)}

A. Land Owner's Signature

Where the applicant is not the owner of the legal title to the land described as the "site" in this application, the owner or other person with control of the site pursuant to an order of a court of competent jurisdiction shall sign the application here:

Owner's Signature — Greg M. Leahey, President, COO

Date 4/25/23

B. Applicant's Signature and Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties both civil and criminal for submitting false information including possible fines and imprisonment.

Applicant's Signature — Greg M. Leahey, President, COO

Date 4/25/23

Agent's Signature

Date 04/28/2023

SANBORN HEAD

Building Trust. Engineering Success.

PERMIT APPLICATION
BWP SW 38
SITE SUITABILITY FOR A MAJOR MODIFICATION OF AN EXISTING SITE ASSIGNMENT

RESOURCE WARE C&D HANDLING FACILITY

Ware, Massachusetts

Prepared for ReSource Ware LLC
File No. 5094.10
April 2023

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APPENDICES

1.0 INTRODUCTION

This permit application narrative has been prepared by Sanborn, Head & Associates, Inc. (Sanborn Head) to accompany the permit application titled *BWP SW38 – Site Suitability for a Major Modification of an Existing Site Assignment, ReSource Ware C&D Handling Facility, Ware, Massachusetts*, dated April 2023. The permit application is being submitted to the Massachusetts Department of Environmental Protection (MassDEP) on behalf of ReSource Waste Services of Ware LLC (ReSource Ware).

The application has been prepared in support of ReSource Ware's proposed modification to the existing site assignment, where the modification seeks to increase the maximum capacity of the facility from 750 tons per day (TPD) of construction and demolition (C&D) material to a new maximum capacity of 1,400 TPD. As part of the proposed capacity increase, the site assignment modification proposes to allow for the acceptance of some street sweepings and catch basin cleanings within the building for off-site disposal by rail.

The Site Suitability application follows the format provided in MassDEP's BWP SW38 application form and contains the following information as required under 310 CMR 16.00 of the Site Assignment Regulations:

- Site Suitability application form (BWP SW38);
- Application narrative that provides information relative to each site suitability criterion;
- Attachments that supplement applicable sections of the application;
- Mapping that presents regional information on and near the site that is relevant to the siting criteria; and
- Site plans that provide additional detail regarding existing and proposed site conditions.

Table 1, provided on the following page, cross-references the sections included in the BWP SW38 permit application form with the corresponding response sections provided in the Site Suitability Report permit application.

Table 1
BWP SW38 Permit Application Form and Corresponding Site Suitability Report Response Sections

BWP SW38 Permit Application Form Sections	Site Suitability Report Response Sections
SECTION I – GENERAL INFORMATION	
A. Site Location and Project Description	Section 2
B. Applicant Identification	Section 3
C. Fees	Section 4
D. Collection Center for Household Hazardous Waste	
E. Declaration of Waiver Request	
F. Massachusetts Environmental Policy Act (MEPA)	Section 5
G. Wetlands Resources	Section 6
H. Maps	
SECTION II – FACILITY SPECIFIC CRITERIA	
A. Landfills (16.40(3)(a))	Not Applicable
B. Combustion Facilities (16.40(3)(c))	
C. Waste Handling and Processing Facilities (16.40(3)(d))	Section 7
SECTION III – GENERAL CRITERIA (16.40(4))	
A. through L.	Sections 8.1 through 8.12
SECTION IV – INTEGRATED SOLID WASTE MANAGEMENT (16.40(5))	Section 8.13
SECTION V – WAIVERS	Section 8.14

2.0 SITE LOCATION AND PROJECT DESCRIPTION

2.1 Site Location

The ReSource Ware C&D handling facility is located at 198 East Street, Ware, Massachusetts. The site property consists of approximately 25.1 acres and is zoned Highway Commercial. The property is bisected in a roughly north-south direction by rail line property owned by the Commonwealth of Massachusetts, which has contracted the rail line operations to the Massachusetts Central Railroad (MCER). The site is bordered by land owned by the Central Massachusetts Electric Company to the west, the Ware River to the northwest, residential property to the northeast, undeveloped forest to the southwest and East Street (Route 9) to the southeast with undeveloped forest beyond. The site location is shown on the Locus Plan,

provided as Figure 1, with site features and property boundaries shown on the Existing Conditions Site Plan, provided as Figure 7, and land use features within a half-mile of the site shown on the Land Use Plan, provided as Figure 6.

2.2 Type of Facility

The ReSource Ware facility was permitted and constructed as a Construction and Demolition Waste (C&D) Processing Facility, where demolition debris, consisting of materials such as masonry, plaster, gypsum wallboard, metal, and treated/engineered wood, are brought into the building for processing. To support the processing activities, the building was designed and constructed with stationary processing equipment (the "processing line") consisting of a preliminary feed shredder, C&D wood grinder, slot screener, elevated picking station for removal of recyclable materials, clean wood grinder, residuals grinder, magnets for metals removal, and conveyors to transport the C&D through the processing system. C&D materials remaining after processing (C&D residuals) are transported by rail for out-of-state disposal. Recovered recyclable material is removed from the site by truck.

The prior facility owner and operator, Tri-County Recycling, discontinued the use of the processing line several years ago due to the lower than planned C&D tonnage they received and, as a result, removed most of the processing equipment. ReSource Waste Services acquired the facility from Tri County Recycling in August of 2019. Since the acquisition, tonnage delivered to the facility has come predominantly from ReSource Waste's other C&D processing facilities (primarily from Roxbury, Massachusetts, Salem, New Hampshire, and Epping, New Hampshire), however, a small percentage of the incoming material consists of unprocessed C&D waste delivered to the facility by private haulers serving the area. Due to the small quantity of unprocessed C&D delivered to the facility, ReSource Ware has, like Tri County before it, found it uneconomical to operate the processing line and relied on kick-sorting to recover banned wastes from this small portion of its incoming C&D stream. "Kick-sorting" describes the process of removing recyclable materials from C&D material using the facility's construction operating equipment (excavator, skid steer loader), and by manual picking.

Because it was not economical for ReSource Ware to operate the processing line due to the small percentage of unprocessed C&D it receives, and because the facility had been operating principally as a large C&D transfer station due to the high percentage of processed C&D it receives, ReSource Ware submitted a permit application to MassDEP in March of 2022 to re-classify the facility's handling operations from a C&D Processing Facility to a C&D Transfer Station (see Section 2.6.2 for a summary of permit modification items included in the permit application). MassDEP issued its approval of the re-classification of the facility to a C&D Transfer Station in its permit modification approval letter dated May 6, 2022 (MassDEP File No. 22-309-004).

2.3 Total Site Area and Site Assignment Area

The total site area of ReSource Ware property is approximately 25.1 acres, of which approximately 8.9 acres is site-assigned by the Town of Ware Board of Health as a C&D Processing and Handling Facility. The site property boundary and site-assigned area are shown regionally on the Land Use Plan, provided as Figure 6, and on the Existing Conditions

Site Plan, provided as Figure 7. A copy of the existing site assignment, issued by the Board of Health on June 18, 2004, is provided in Appendix B.

The proposed site assignment modification to increase the maximum capacity of the facility to 1,400 TPD of C&D material, which would include acceptance of some street sweepings and catch basin cleanings within the building, does not require a modification to the existing site-assigned area.

2.4 Capacity

The existing site assignment allows the facility to accept a maximum 750 TPD of C&D material on weekdays and a maximum of 500 TPD on Saturdays. The Authorization to Operate (ATO) permit issued by MassDEP on February 13, 2006 and renewed on February 11, 2016, authorizes the facility to accept 750 TPD of C&D material including asphalt, brick, and concrete (ABC) and clean wood, where the facility is permitted to accept these materials up to a maximum of 214,500 tons of material in a calendar year.

The site assignment modification proposes to expand the permitted capacity of the facility in two stages:

> Stage 1 would increase the facility's permitted capacity from the existing 750 TPD to 1,125 TPD on weekdays (no tonnage change on Saturdays). The corresponding maximum permitted tonnage on an annual basis for Stage 1 operations would be 310,625 tons per year (TPY).
>
> Stage 2 would increase the permitted capacity to 1,400 tons per day on weekdays and 750 tons per day on Saturdays. The corresponding maximum permitted tonnage on an annual basis for Stage 2 operations would be 393,200 tons per year (TPY).

The proposed capacity increase is directed principally to accommodating the acceptance of the same materials (C&D waste, ABC, and clean wood) as are currently permitted, with the exception that a small amount of street sweepings and catch basin cleanings will also be accepted at the facility for rail transfer within the building. The quantity of street sweepings and catch basin cleanings accepted at the facility is not expected to exceed 5 percent of the total maximum annual permitted tonnage associated with the respective Stage 1 and Stage 2 capacity increases. Accordingly, the anticipated annual tonnage of street sweepings and catch basin cleanings should not exceed 15,500 TPY under Stage 1 conditions and should not exceed 19,600 TPY under Stage 2. However, in order to be able to adjust to market conditions and with limited options for disposal of street sweepings and catch basin materials, the facility is requesting that up to 10 percent of the annual tonnage be allowed for street sweepings and catch basin cleanings (31,000 TPY for Stage 1 and 39,000 TPY for Stage 2), noting that unless market conditions dramatically change, 5 percent is the anticipated tonnage.

The new maximum permitted capacity of 1,400 TPD associated with Stage 2 will result in a permitted capacity *increase* of 650 TPD with a corresponding annual tonnage *increase* of 178,700 TPY. Additional information regarding the proposed two-staged capacity increase is provided in Section 2.6.

2.5 Type of Waste

As described in Section 2.4, the facility is permitted to accept C&D material (C&D waste), including ABC and clean wood. Under the proposed site assignment modification, these materials will continue to be accepted at the facility, consistent with the existing site assignment. The proposed site assignment modification seeks the addition of street sweepings and catch basin cleanings to the type of waste permissible for acceptance at the facility.

Street sweepings represent material that is generated in the ordinary and customary cleaning of roadways and parking lots. Catch basin cleanings, consisting of materials such as leaves, sand, and twigs, is a material generated during the cleaning of storm water collection systems. These materials will be delivered to the tipping floor of the C&D handling facility where they will be transferred into the railcars for out-of-state disposal.

2.6 Project Description

2.6.1 Existing Operations

ReSource Ware operates six days a week, Monday through Saturday. The facility is permitted to accept a maximum of 750 TPD of C&D material on weekdays and a maximum of 500 TPD on Saturdays. The maximum annual permitted capacity of the facility is 214,500 TPY. The permitted hours of operation are Monday through Friday 7:00 am to 4:00 pm and Saturday 7:00 am to 1:00 pm.

The material drop-off (tipping floor) and transfer (rail pit) portion of the C&D building has dimensions of 120 feet by 180 feet and an adjoining office area with dimensions of 40 feet by 22 feet. The building includes three large overhead doors for vehicle access to the tipping floor and two overhead doors (either side of building) for railcar access to the rail pit portion of the building.

The building receives C&D material delivered by trucks of various sizes. The majority of C&D material delivered to the facility comes from ReSource Waste Services processing facilities in Roxbury, Massachusetts, Salem New Hampshire, and Epping New Hampshire. This material is delivered by semitrailer and consists of C&D residuals and fines resulting from the processing performed at these ReSource Waste facilities. Some unprocessed C&D is also delivered to the facility by ReSource Ware's private customers. In accordance with a recent MassDEP permit approval to complete specific minor physical and administrative changes to the facility (summarized in Section 2.6.2), the unprocessed C&D material delivered to the building is managed in accordance with MassDEP requirements applicable to a C&D transfer station. The processed C&D residuals and fines delivered to the facility are loaded into railcars and transported out-of-state for disposal.

The facility was originally constructed with stationary processing equipment and an elevated picking station to separate recoverable materials from unprocessed C&D material. Due to the low quantity of unprocessed C&D material delivered to the facility over the years (first experienced by the prior owner of the facility), much of the processing equipment has been removed, resulting in the processing line no longer functioning.

Asphalt, brick, and concrete (ABC) is tipped outside the building in a designated area west of the C&D building. The ABC is periodically processed in a grinder to produce road subbase material. Clean, sorted recyclable metal and gypsum is permitted to be stored in covered containers adjacent to the building. Clean wood, defined as trees, stumps, and brush, including but not limited to woodchips, and new or used lumber, may be tipped and stored outdoors. However, most of the wood delivered to the facility consists of treated and untreated lumber. This material is accepted and stored within the C&D building until a sufficient quantity has accumulated for off-site delivery to ReSource Waste's Epping, New Hampshire processing facility. At Epping the untreated wood is separated from the treated wood and is then ground for reuse as biomass fuel and for medium-density fiberboard manufacturing.

The C&D building and outdoor ABC material storage area are located on the site-assigned portion of the property, as shown on the Existing Conditions Site Plan (Figure 7).

2.6.2 Recent MassDEP Permit Approvals for Minor Facility Modifications

May 2022 Permit Approval

In March of 2022 ReSource Ware filed a permit application (MassDEP permit category: BWP SW45) to complete specific physical and administrative changes at the facility. These changes are summarized below:

- Record with MassDEP that the name of the facility was changed from ReEnergy Ware LLC to ReSource Waste Services of Ware LLC on November 9, 2020, thereby providing the Department with the mechanism by which to officially recognize the name change;
- Change the facility's current permitted handling operations classification from a "Construction and Demolition Waste Processing Facility" to a "Construction and Demolition Waste Transfer Station", where such terms are defined in the MassDEP Solid Waste Regulations (310 CMR 19.006);
- Install a new railcar tarping station outside of the C&D handling building that will replace the current method of tarping railcars within the building;
- Install a new large south-facing roll-up door to access the tipping floor, increasing the number of vehicle access doors on the building's southern façade from three to four;
- Install 12-foot-high steel plate cladding along a portion of the interior face of the building's west wall to provide added protection to the metal building wall panel; and
- Install a new Fire Rover fire suppression system to provide additional fire protection for the building.

MassDEP issued its approval of the above facility modifications in its permit modification approval letter dated May 6, 2022 (MassDEP File No. 22-309-004). A copy of the permit approval is provided in Appendix C-1.

January 2023 Permit Approval

In November of 2023 ReSource Ware filed a permit application (MassDEP permit category: BWP SW45) to obtain MassDEP approval to increase the size of the existing roll-up service door located on the western façade of the building. The existing roll-up door is 8' wide by 8' high. The permit application sought MassDEP approval to replace the existing door with an 18' wide by 28' high roll-up door to serve as an access location for ReSource Waste to dump its C&D fines loads in the transfer station.

The intent of the west door is to provide a dedicated entrance/exit for C&D fines loads, which will improve overall vehicle access to the tipping floor and minimize the angled backing in of semitrailers delivering C&D fines that often occurs with the current southern doorway access into the building. Under existing conditions, C&D fines loads typically account for approximately 5 visits per day at the facility. These visits and the associated use of the western door to accommodate them are projected to increase to 10 visits per day under the sought after Stage 2 capacity increase. This is considered light usage for access to the tipping floor, as such the west door would be closed except for when C&D fines loads are brought to this entrance.

MassDEP issued its approval of the west door facility modifications in its permit modification approval letter dated January 9, 2023 (MassDEP File No. 23-309-004). A copy of the permit approval is provided in Appendix C-2.

2.6.3 Proposed Facility Modifications

ReSource Ware proposes to increase the permitted capacity of the facility from its existing capacity of 750 TPD to a proposed capacity of 1,400 TPD. The capacity increase will apply to materials currently accepted at the facility (C&D waste, including ABC and clean wood), as well as allow for the addition of street sweepings and catch basin cleanings to the type of waste permissible for acceptance at the facility. C&D waste, ABC and clean wood will be handled in the same manner as they are under the current facility operations. The street sweepings and catch basin cleanings will be handled within the C&D building, where these materials will be delivered to the tipping floor and transferred into the railcars for out-of-state disposal.

The proposed capacity increase will be performed in two stages, as summarized below:

Stage 1 will increase the facility's permitted capacity to 1,125 tons per day on weekdays (no tonnage change on Saturdays). Under Stage 1, there will be no increase in building footprint or any required site alterations. Additionally, there will be no alterations required to the existing building space that have not already been approved by MassDEP (see Section 2.6.2). As part of the Stage 1 capacity increase, no rail line modifications will be required, however, the current rail service will increase from two visits per day (visit 1: empty railcar drop -off; visit 2: full railcar pick-up) to three (visit 1: empty railcar drop-off; visit 2: full railcar pick-up; visit 3: combination of both empty railcar drop-off and full railcar pickup) . It is anticipated that Stage 1 would go into effect in the summer of 2024, upon receipt of permit approvals.

Stage 2 will increase the permitted capacity to 1,400 tons per day on weekdays and 750 tons per day on Saturdays. As part of Stage 2, the C&D building will be expanded 50 feet extending from its existing southern façade along the full 180-foot width of the building (an expansion in the building footprint of approximately 9,000 square feet). Stage 2 will include improvements to the railroad tracks, where additional rail siding will be constructed to provide sufficient empty and full railcar storage that will allow rail service to drop to one visit per day (combination of both empty railcar drop-off and full railcar pick-up). It is anticipated that Stage 2 would go into effect in early 2026, upon receipt of permit approvals and completion of proposed building and rail alterations.

The new maximum permit capacity of 1,400 TPD associated with Stage 2 will result in a permitted capacity *increase* of 650 TPD. New operating hours are proposed from 7:00 am to 6:00 pm weekdays compared to current operations, which are performed from 7:00 am to 4:00 pm. No changes to Saturday operating hours (7:00 am to 1:00 pm) are proposed.

Based on the proposed Stage 1 and Stage 2 maximum daily tonnages of 1,125 TPD for Stage 1 and 1,400 TPD for Stage 2, the annual maximum tonnages received at the facility would be 310,625 TPY and 393,000 TPY for Stage 1 and Stage 2, respectively. The calculation for the maximum annual tonnage associated with each stage is summarized in Table 2.

Table 2
Calculation of Maximum Tons Per Year (TPY) Associated with Stage 1 and Stage 2 Capacity Increase

STAGE 1													
Operating Days of the Week	**Days/ Week**		**Weeks/ Year**		**Total Days/Year**		**Holidays/ Year**		**Operating Days/Year**		**Max TPD**		**Max TPY**
Monday to Friday	5	X	52	=	260	-	7	=	**253**	x	**1,125**	=	**284,625**
Saturday	1	X	52	=	52	-	0	=	**52**	x	**500**	=	**26,000**
											STAGE 1 Maximum Tons Per Year =		**310,625**
STAGE 2													
Operating Days of the Week	**Days/ Week**		**Weeks/ Year**		**Total Days/Year**		**Holidays/ Year**		**Operating Days/Year**		**Max TPD**		**Max TPY**
Monday to Friday	5	X	52	=	260	-	7	=	**253**	x	**1,400**	=	**354,200**
Saturday	1	X	52	=	52	-	0	=	**52**	x	**750**	=	**39,000**
											STAGE 2 Maximum Tons Per Year =		**393,200**

A summary of the proposed two-staged capacity increase in comparison to the facility's existing permitted capacity is presented in Table 3.

Table 3
Summary of Proposed Capacity Increase

Condition		Maximum Permitted Tons Per Day and Hours of Operation		Maximum Permitted Tons Per Year	Permitted Waste Type
		Mon – Fri	Sat		
Existing		750 (7 am to 4 pm)	500 (7 am to 1 pm)	214,500	C&D Only
Proposed	***Stage 1***	1,125 (7 am to 6 pm)	500 (No change to existing Saturday hours)	310,625	C&D and occasional street sweepings and catch basin cleanings
	Stage 2	1,400 (7 am to 6 pm)	750 (No change to existing Saturday hours)	393,200	
Total Tonnage Increase (Stage 2 compared to Existing)		*650*	*250*	*178,700*	*C&D and occasional street sweepings and catch basin cleanings*

2.6.4 State and Local Permitting for Proposed Capacity Increase

Upon receipt of the site assignment modification from the Ware Board of Health for the proposed capacity increase, the Project will transition to the permitting phase at the state and local levels. The two-staged capacity increase necessitates a two-staged permitting process to obtain approval for the initial capacity increase to 1,125 TPD, followed by the full capacity increase to 1,400 TPD. The permitting activities associated with each stage are summarized below.

Stage 1 Permitting

- Obtain Planning Board Special Permit Modification for Stage 1 increase; and
- Obtain MassDEP permit approval for Modification of a Large Handling Facility (BWP SW07) to operate at 1,125 TPD.

Stage 2 Permitting

- Obtain Planning Board Special Permit Modification for Stage 2 increase;
- Obtain Wetlands Order of Conditions from Ware Conservation Commission for work that may be performed within the buffer zone of a resource area (anticipated to be limited to rail improvement work); and
- Obtain MassDEP permit approval for Modification of a Large Handling Facility (BWP SW07) to operate at 1,400 TPD.

For planning purposes, it is anticipated that permits for the Stage 1 capacity increase will be in-hand by the summer of 2024, at which time Stage 1 operations would go into effect. Once Stage 1 operations are underway, permitting for the Stage 2 capacity increase would begin. Permits for Stage 2 are anticipated to be in-hand by the summer of 2025 followed by an estimated 6-month construction period, with Stage 2 operations beginning in early 2026. Therefore, for general planning purposes, Stage 2 operations are expected to begin within 18 months to two years following the start of Stage 1 operations.

3.0 APPLICANT IDENTIFICATION

The property and facilities located on the site are owned by ReSource Waste Services LLC, whose corporate headquarters are located at 159 Wolf Road, Suite 301, Albany, New York. The Applicant operates the ReSource Ware C&D handling facility, which has a total permitted capacity of 214,500 tons per year of C&D material.

4.0 FEES, HOUSEHOLD HAZARDOUS WASTE, WAIVERS

4.1 Fees

The maximum technical fee, calculated pursuant to the provisions of 310 CMR 16.99 of the Site Assignment Regulations, is $78,311. The fee was calculated based on the maximum tons per day of C&D material to be accepted at the facility under the proposed capacity increase (1,400 TPD). The Board of Health's confirmation of receipt of this payment is provided in Appendix A.

4.2 Household Hazardous Waste

ReSource Ware does not intend to apply for approval to operate a facility for the collection of household hazardous waste. Oil and hazardous waste storage on-site will consist of limited quantities of spent hydraulic oil, motor oil and antifreeze, generated from servicing on-site equipment. In the event household hazardous waste is found during ongoing waste stream observations, the oil and/or hazardous material will be placed in the on-site maintenance building for subsequent removal in accordance with applicable laws and regulations.

4.3 Declaration of Waiver Request

Section 4.3 summarizes the waiver provisions provided in the Site Assignment Regulations; describes the limited waiver that was obtained in 2003 as part of the original site assignment permitting process; and affirms that the currently proposed facility modifications do not affect the decision underlying the granting of the 2003 waiver or require a request for a waiver from any other provisions of 310 CMR 16.00.

4.3.1 Waiver Provisions Provided in the Site Assignment Regulations

The Site Assignment Regulations include provisions for requesting a waiver from the general provisions or site suitability criteria provided in 310 CMR 16.00. Waiver provisions are provided under two separate sections of the regulations, as summarized below:

- ***310 CMR 16.18: Waiver*** – This section of the regulations provides a mechanism for a project proponent to request from the Commissioner of MassDEP a waiver from any provision or requirement contained in Part 1 of 310 CMR 16.00, which addresses procedural matters for submission and review of site assignment applications, or at 310 CMR 16.21: *Alternative Use of Assigned Site*, not specifically required by law. Waivers granted under this section of the regulations must demonstrate to the Commissioner's satisfaction that:

  a) the waiver is necessary to accommodate an overriding community, regional or state public interest; and

  b) the granting of the waiver would not interfere with the ability of the board of health to fulfill its duties; and

  c) the granting of the waiver would not diminish the ability of the general public to review and comment on the proposed project.

- ***310 CMR 16.40(6) Waiver*** – This section of the regulations provides a mechanism for a project proponent to request from the Commissioner a waiver from any of the facility specific site suitability criteria contained in 310 CMR 16.40(3) not specifically required by law, or the setback distance at 310 CMR 16.40(4)(h), when the Commissioner finds that strict compliance with such criteria would result in undue hardship and would not serve to minimize or avoid adverse impact.

4.3.2 Existing Site Assignment Waiver (2003)

The O'Riley Family Trust (owner of the site at the time the original Site Suitability Report was filed in February of 2003) obtained a limited waiver from the property line setback criterion provided under 310 CMR 16.40(4)(h) of the Site Assignment Regulations. The waiver was granted in connection with the waiver request included in the original Site Suitability Report submitted to MassDEP in February 2003.

Section 310 CMR 16.40(4)(h) states that "No site shall be determined to be suitable or be assigned as a solid waste management facility if the size of the proposed site is insufficient to properly operate and maintain the proposed facility. The minimum distance between the waste handling area or deposition area and the property boundary shall be 100 feet, provided that a shorter distance may be suitable for that portion of the waste handling or deposition area which borders a separate solid waste management facility."

The O'Riley Family Trust requested a limited waiver with respect to the distance of the waste handling area to the property boundary of the rail line, known as the Ware River Secondary Track, owned by the Commonwealth of Massachusetts and licensed to MCER for the purposes of providing freight railroad service. On May 19, 2003 Ed Kunce, the then Acting Commissioner of MassDEP, issued the decision to grant the waiver. A copy of the Commissioner's decision is provided in Appendix D.

4.3.3 Proposed Site Assignment Modification Relative to Existing Waiver

In making the decision to grant the waiver, the MassDEP Commissioner found that strict compliance with the 100-foot waste handling area setback from the railroad property line

would result in undue hardship and would not serve to minimize or avoid adverse impact. The railroad property bisects the Applicant's property and the railroad property at issue is an integral part of the Applicant's operations. The Applicant proposes no further modifications to this setback as part of this Site Assignment Modification. The Commissioner's decision also states that granting the waiver is necessary to accommodate an overriding community, regional or state public interest and will not diminish the level of protection to public health, safety and the environment for the following reasons:

[Note: The text from the 2003 waiver decision is provided in bold text below. Sanborn Head's comment on each decision item relative to its consistency with the currently proposed site assignment modification is provided in italicized text.]

- **The type of facility proposed is in keeping with the goals of the Solid Waste Master Plan to increase the capacity in Massachusetts for processing C&D waste.**

  With respect to this item, it should be noted that the facility serves principally as a transfer location for C&D residuals generated at other processing facilities located within and outside of Massachusetts. In this capacity, the facility plays a key role in the Commonwealth's solid waste management infrastructure by providing a means to rail haul C&D residuals out-of-state for ultimate disposal, which is increasingly necessary due to diminished disposal capacity within Massachusetts for these materials. By supporting other C&D processing facilities, ReSource Ware continues to support the goals of the Solid Waste Master Plan, which will be further supported through the capacity increase sought under this site assignment modification. Therefore, the decision to grant the waiver as stipulated under this item remains valid as it is consistent with the objectives of the proposed facility modifications.

- **The location of the facility is in a preferred municipality for purposes of the Site Assignment Regulations and pursuant to Chapter 111, and section 150A½, paragraphs (15) and (16).**

  This waiver decision item remains valid for the proposed C&D waste capacity increase, inclusive of some street sweepings and catch basin cleanings proposed for acceptance within the limits of the proposed capacity increase.

- **The affected abutter, the Commonwealth of Massachusetts, has assented to the waiver of the 100-foot setback, provided that the applicant obtains all state and local permits required.**

  This waiver decision item remains valid and is not affected by the proposed facility modifications, which will require all applicable state and local permits be obtained prior to initiating the Stage 1 and Stage 2 capacity increases.

- **Compliance with the 100-foot setback would reduce the efficiency of the operation and increase capital and operating costs and would reduce the level of protection to other abutters by reducing the setback distance of the waste handling area when compared to the case where the waiver is granted.**

  This waiver decision item remains valid and is not affected by the proposed facility modifications.

- **By granting the waiver, the level of protection to public health and the environment will be increased because the waste management operation will be located further away from other abutters and the Ware River than would be the case in the absence of the waiver.**

  This waiver decision item remains valid and is not affected by the proposed facility modifications.

4.3.4 Waiver Conclusion

The ReSource Ware C&D handling facility was site assigned, constructed and operates in accordance with a limited waiver to the 100-foot waste handling area property line setback criterion with respect to the rail line that bisects the property and is critical to the facility's operation. As described in Section 4.3.3, the proposed facility modifications, consisting of a two-staged capacity increase of C&D material, inclusive of some street sweepings and catch basin cleanings, can be accommodated at the facility with no further modifications to the setback and thus no change is requested to the existing waiver.

5.0 MASSACHUSETTS ENVIRONMENTAL POLICY ACT, MEPA

Section 310 CMR 16.08(5)(d) of the Site Assignment Regulations requires that the applicant provide evidence that the proposed Project does or does not require review under the Massachusetts Environmental Policy Act (MEPA).

The permitting associated with the original development of the C&D facility necessitated that the MEPA process be initiated, which consisted of filing an Environmental Notification Form (ENF) and Final Environmental Impact Report (FEIR) in 2002. The Project was assigned Executive Office of Environmental Affairs (EOEA, now EEA), file #12699 and the Certificate from the Secretary of the EEA on the FEIR was issued for the Project on August 30, 2002. A copy of the EIR Certificate is provided in Appendix E-1.

In 2007, a prior owner of the facility, ABC&D Recycling, submitted a Notice of Project Change (NPC) requesting to include municipal solid waste (MSW) in the list of materials accepted at the facility within its permitted tonnage of 750 TPD. An NPC Certificate from the Secretary of the EEA was issued for the proposed Project change on September 21, 2007. A copy of the 2007 NPC Certificate is included in Appendix E-2. Although a certificate was issued, permitting was never completed for this proposed change.

In 2015, the prior owner of the facility, Tri County Recycling, submitted a Notice of Project Change to allow the facility to accept MSW and non-hazardous urban soils in the list of materials accepted at the facility within its permitted tonnage of 750 TPD. An NPC Certificate from the Secretary of the EEA was issued for the proposed Project change on July 10, 2015. A copy of the 2015 NPC Certificate is included in Appendix E-3. Although a certificate was issued, permitting was never completed for this proposed change.

A Notice of Project Change was filed for the currently proposed capacity increase modifications. The NPC, which includes an air quality study, noise study, and transportation impact analysis, was submitted to the MEPA office on April 29, 2022 and published in the May 11, 2022 edition of the Environmental Monitor. An NPC Certificate from the Secretary

of the EEA was issued for the proposed Project change on June 17, 2022 and determined that the Project does not require a Supplemental Environmental Impact Report and the Notice of Project Change had sufficiently described the nature and general elements of the Project for the purposes of MEPA review and identified measures to avoid, minimize, and mitigate the Project's environmental impacts. A copy of this Third NPC Certificate is included in Appendix E-4.

6.0 PRIORITY RESOURCES AND LAND USES

6.1 Wetland Resources

Table 4 presents a list of wetland resources areas on and near the ReSource Ware property and identifies their applicability relative to the proposed facility modifications.

Table 4
Wetland Resources on and Near the Project Site

Wetland Resource	Applicability
100-foot Buffer Zones from Wetland Areas	Wetland boundaries and 100-foot buffer zones to these boundaries are shown on Figures 4, 7, 9A, and 9B. The wetland areas consist of a narrow band of bank that runs along the Ware River east of the site and corresponding Riverfront Area (addressed below); a 3.5 acre pond, wetland bank adjacent to the pond, and Isolated Vegetated Wetlands near the pond, all of which are southwest of the C&D building; and bordering vegetated wetland and bank located along an intermittent stream that drains the southeast portion of the site between the railroad and East Street and discharges to the southeast corner of the pond. Previous project documentation notes that the pond was a cove of the Ware River that was cut off in the 19th century by the now-abandoned railroad embankment, and now functions as an independent pond that drains to the Ware River by a culvert through the embankment. All construction at the site was performed in accordance with an Order of Conditions issued by the Ware Conservation Commission on October 16, 2004. All operations and construction, except for a short section of the access driveway, were constructed outside of the100-foot buffer zone to the wetland resource areas described above. As described in Section 2.6.3, there will be no building or site alterations associated with the Stage 1 capacity increase, hence the Stage 1 increase will have no impact on wetland resource areas and does not require an Order of Conditions. The Stage 2 capacity increase will include an expansion to the C&D building as well as installation of additional railroad track siding. The rail line work will result in some construction activities occurring within the 100-foot buffer zone of the bank of the Ware River at the northernmost end of the proposed track construction work and within the 100-foot buffer zone of the wetland located near the southernmost end of the proposed track construction work. A Wetlands Notice of Intent (NOI) will be filed with the Ware Conservation Commission as part of the Stage 2 permitting to obtain an Order of Conditions for work performed in areas subject to protection under the Wetlands Protection Act.

Wetland Resource	Applicability
Riverfront Area	The 200-foot Riverfront Area (200-foot setback from the Ware River) is shown on Figures 4, 7, 9A and 9B. Except for the stormwater infiltration basin and outlet channel, the entire developed site is located outside of the Riverfront Area. As described above regarding wetland buffer zones, the Stage 1 capacity increase requires no work within and thus will have no impact on the Riverfront Area as there will be no building or site alterations associated with the Stage 1 increase. Also as described for the wetland buffer zones, the Stage 2 capacity increase will result in some construction activities occurring within the 200-foot Riverfront Area of the Ware River at the northernmost end of the proposed track construction work. As noted under the 100-foot buffer zone item above, a Wetlands Notice of Intent (NOI) will be filed with the Ware Conservation Commission as part of the Stage 2 permitting to obtain an Order of Conditions for work performed in areas subject to protection under the Wetlands Protection Act.
100-Year Floodplain	The 100-year floodplain on and near the Project site is shown Figures 4, 7, 9A and 9B. The floodplain represents the boundary determined by FEMA and shown on Flood Insurance Rate Map (FIRM) number 250172-0026-B, effective date, August 17, 1981. The developed portion of the site is above the 100-year flood elevation. Similarly, the proposed site and building modifications associated with the Stage 2 capacity increase will also be above the 100-year flood elevation.

6.2 Mapping

The following section addresses mapping requirements that are to be included in the Site Suitability Report permit application pursuant to the BWP SW38 application form. Section 6.2 provides mapping and supporting narrative addressing site locus plan requirements, groundwater contour mapping, water resources mapping, and land use mapping.

6.2.1 Locus Plan

A locus plan of the site, prepared from a US Geological Survey (USGS) topographic map of the Ware Quadrangle, is provided as Figure 1. Key locus plan source and datum attributes are summarized in Table 5.

Table 5
Locus Plan Attributes

Item	Description/Attribute
Quadrangle Name and Date	Ware (Massachusetts), 2021
Horizontal Datum	North American Datum of 1983 (NAD 83)
Vertical Datum	North American Vertical Datum of 1988 (NAVD 88)
Site Latitude & Longitude	Lat. 42° 16’ 03”; Long. 72° 13’ 17”
Site UTM Coordinates	729,200E; 4,683,100N (meters)
Approximate Elevation Range Across Site	From 465 feet to 530 feet, NAVD88

6.2.2 Groundwater Contour Map

Historic groundwater mapping, collected from the three on-site groundwater observation wells (MW-1, MW-2, and MW-3) demonstrates that groundwater flows across the site from east to west towards the Ware River. The groundwater contouring along the alignment of the three observations wells is shown on Figure 2.

6.2.3 Water Resources Plan

Table 6 provides a brief narrative regarding the presence or absence of water resources within a half-mile radius of the site property boundary. Water resources located within a half-mile radius of the site are shown on the Water Resources Plan, provided as Figure 3.

Table 6
Water Resources Located within a Half-Mile of the Project Site

Water Resource	Description
Wetlands	The Water Resources Plan and site plan figures (Figures 4, 7, 9A and 9B show the proximity of the facility to wetlands on and near the site and regionally in the site area. The wetlands shown on the site plan figures represent a wetland delineation performed in November of 2021 by Epsilon Associates of Maynard, Massachusetts. The wetland delineation was field surveyed in December of 2021 by WSP USA of Worcester, Massachusetts. It should be noted that the 2021 wetland delineation is largely the same as the original delineation performed when the facility was initially permitted in the early 2000s. The original delineation confirmed that some portions of the then-proposed facility construction would occur within discrete wetland buffer zone areas and Riverfront Area. The Conservation Commission issued an Order of Conditions for the construction of the facility on October 16, 2004. As noted in Table 4, the wetland areas on and near the site consist of a narrow band of bank that runs along the Ware River east of the site; a 3.5 acre pond, wetland bank adjacent to the pond, and Isolated Vegetated Wetlands near the pond, all of which are southwest of the C&D building; and bordering vegetated wetland and bank located along an intermittent stream that drains the southeast portion of the site between the railroad and East Street and discharges to the southeast corner of the pond. Previous project documentation notes that the pond was a cove of the Ware River that was cut off in the 19th century by the embankment of the now-abandoned railroad line, and now functions as an independent pond that drains to the Ware River by a culvert through the embankment. The facility layout was designed and constructed to minimize potential wetland impacts. This included locating all waste handling operations outside the 100-foot buffer zone of wetland resource areas and locating all facility operations - except for one infiltration basin - outside the 200-foot Riverfront Area of the Ware River. The design of all stormwater management systems was done in conformance with the MassDEP's Storm Water Management Policy. There will be no building or site alterations associated with the currently proposed Stage 1 capacity increase, hence the Stage 1 increase poses no impact to wetland resource areas and does not require an Order of Conditions. The Stage 2 capacity increase will include an expansion to the

Water Resource	Description
	C&D building as well as installation of additional railroad track siding. The only portion of the Stage 2 construction activities within resource areas are the proposed railroad track improvements that would be performed within a portion of the Riverfront Area at the northern end of the site (see discussion the Riverfront Areas discussion that follows). The Applicant will obtain an Order of Conditions for this work.
Wetland Buffer Zones	The 100-foot wetland buffer zones on and near the site are shown on Figures 4, 7, 9A, and 9B. As described above, there will be no building or site alterations associated with the proposed Stage 1 capacity increase and accordingly Stage 1 does not require an Order of Conditions. The Stage 2 capacity increase will include an expansion to the C&D building as well as installation of additional rail track siding. The rail line work will result in some construction activities occurring within the 100-foot buffer zone of the bank of the Ware River at the northernmost end of the proposed track construction work and within the 100-foot buffer zone of the wetland located near the southernmost end of the proposed track construction work. A Wetlands Notice of Intent will be filed with the Ware Conservation Commission as part of the Stage 2 permitting to obtain an Order of Conditions for work performed in areas subject to protection under the Wetlands Protection Act.
Riverfront Areas	The 200-foot Riverfront Area is shown on Figures 4, 7, 9A and 9B. The proposed Stage 1 capacity increase will have no impact on the Riverfront Area as there will be no building or site alterations associated with the Stage 1 increase. The proposed Stage 2 capacity increase will result in some construction activities occurring within the 200-foot Riverfront Area at the northernmost end of the proposed track construction work. A Wetlands Notice of Intent will be filed with the Ware Conservation Commission as part of the Stage 2 permitting to obtain an Order of Conditions for work performed in areas subject to protection under the Wetlands Protection Act.
100-Year Floodplains	The 100-year floodplain is shown regionally on the Water Resources Plan and on the existing and proposed conditions site plans (Figures 4, 7, 9A, and 9B). The developed portion of the site is above the 100-year flood elevation. The proposed site and building modifications associated with the Stage 2 capacity increase will also be above the 100-year flood elevation.
Surface Water Bodies	Surface water bodies located within a half-mile of the site are shown on the Water Resources Plan. The closest surface water bodies to the developed portion of the site are an intermittent stream draining the southeast portion of the site and an unnamed pond with a surface area of approximately 3.5 acres located at the southwest corner of the site. These surface water bodies are shown on Figures 4, 7 and 9A. The intermittent stream discharges to the pond and the pond discharges to the Ware River via a 36-inch diameter culvert located within the embankment of the abandoned rail line that separates the pond from the Ware River.
Streams and Surface Water Supplies	As noted on the Water Resources Plan, no public surface water supplies are located within the Town of Ware or within a half-mile of the site.
Private Water Supply Wells	Sanborn Head contacted the Ware Water Department and confirmed that - with the exception of residences located on Walter Drive - the developed properties located within a half-mile of the site all have access to the Town of Ware public water supply. Walter Drive is located northwest of the site, across the Ware River. At its closest point, Walter Drive is located approximately 880 feet from the western property line of the Project site. There are 10 developed properties on Walter Drive and each has a private well, as confirmed by the Ware Water Department. The southernmost

Water Resource	Description
	property (13 Walter Drive: Map 24, Lot 40) is closest to the Project site, where the closest distance between the two properties is approximately 925 feet. The location of the lots with private wells are shown on the Water Resources Plan.
Public Water Supply Wells	As noted on the Water Resources Plan, no public water supply wells are located within a half-mile of the site. According to MassGIS (MassMapper), the nearest Community Public Water Supply Groundwater Well is located approximately 3,800 feet north of the site, identified as the Dismal Swamp Well (1309000-03G) in the Town of Ware, just east of the Ware River. The well is located beyond the half-mile radius from the site property boundary and as such, is not shown on the Water Resources Plan.
IWPA and Zone II Areas	The site is not located within or adjacent to an Interim Wellhead Protection Area (IWPA) or Zone II area. The nearest Zone II is the zone of contribution associated with the Dismal Swamp Well. The closest the Zone II boundary comes to the site property boundary is approximately 3,300 feet. Note that the Dismal Swamp Well is located within a USGS-delineated Potentially Productive Aquifer (PPA). The southernmost limit of the PPA is shown on the Water Resources Plan.
Proposed Drinking Water Source Areas	The site is not located within or adjacent to a Proposed Drinking Water Source Area. Sanborn Head contacted the Ware Water Department and confirmed that the Town is not currently seeking a source approval for a new public water supply well, hence there are no Proposed Drinking Water Source Areas within the Town at the present time.
Zone A and B Areas to Surface Water Public Drinking Water Supply Areas	The site is not located within or adjacent to a Zone A (400 feet) or Zone B (half-mile) of a surface water public drinking water supply area. The nearest surface water source area is the Quabbin Reservoir, located approximately 4.2 miles northwest of the site.

6.2.4 Land Use Plan

Table 7 provides a brief narrative regarding land uses within a half-mile radius of the site property boundary. Land uses located within a half-mile radius of the site are shown on the Land Use Plan, provided as Figure 6.

Table 7
Land Uses Located within a Half-Mile of the Project Site

Land Use	Description
Natural Heritage Endangered Species Program	According to mapping available from MassGIS (MassMapper), a portion of the northern edge of the property abutting the Ware River is mapped within a Natural Heritage Endangered Species Program (NHESP) Priority Habitat for State Protected Rare Species. Within this same area of the site MassGIS also depicts Estimated Habitats for Rare Wildlife. The Priority Habitat is also mapped on the southern end of the property, confined to the limits of the pond in this area of the site. The Natural Heritage Plan, provided as Figure 5, shows the delineation of these NHESP habitat types located within a half-mile of the site. As shown on Figure 5, a small portion of the Priority and Estimated Habitats are also mapped on the abutting railroad property at the northern end of the site and beyond, with

Land Use	Description
	Priority Habitat mapped on the railroad property at the southern end of the site and continuing further to the south. Sanborn Head submitted a *Request for State-listed Species Information* to NHESP to confirm the species located within the mapped areas on and near the site. NHESP responded to the request in a letter dated March 11, 2023 (NHESP Tracking No. 23-41721). Per the NHESP letter, the species identified in the site area are "Creeper" of the mussel group and "Great Laurel", an evergreen shrub in the rhododendron family. The Creeper is listed by NHESP as a species of special concern and the Great Laurel is listed as threatened. A copy of the NHESP letter is provided in Appendix F. As noted previously, the Stage 2 capacity increase will include an expansion to the C&D building as well as installation of additional railroad track siding. The rail line work will result in some construction activities occurring within both the Priority Habitat for Rare Species and the Estimated Habitat for Rare Wildlife. Much of this work within the mapped habitat area will be performed in an area already disturbed by the existing rail line corridor. As required under the Wetlands Protection Act and the Massachusetts Endangered Species Act (MESA), a Wetlands Notice of Intent will be filed with the Ware Conservation Commission as part of the Stage 2 permitting and a copy of the NOI will be sent to NHESP. The Applicant will be prepared to file under MESA as appropriate for the proposed Stage 2 construction work that may fall within the mapped NHESP areas.
Wildlife Management Areas	The Coy Hill Wildlife Management Area (WMA) is located southeast of the site, located in the Towns of Ware and West Brookfield. The WMA is approximately 866 acres in size and is owned and managed by the Massachusetts Division of Fisheries and Wildlife. As shown on the Land Use Plan, the northernmost portion of the WMA is closest to the site property, where the WMA is located on the opposite side of East Street across from the site entrance.
ACECs	No Areas of Critical Environmental Concern (ACECs) are located within a half-mile of the site. The nearest ACEC is the Miscoe, Warren, and Whitehall Watersheds, located over 25 miles east of the site in the Grafton-Upton-Hopkinton area near Route 495.
Agricultural Lands	The site does not contain any land deemed Land Actively Devoted to Agricultural or Horticultural Uses nor are there any such lands within 100 feet of the site property boundary. Current mapping of the site, as obtained by Sanborn Head from the NRCS soil survey website, indicates that there is no Prime or Unique Farmland or Farmland of Local Importance mapped on the site. This same mapping shows that there is NRCS-classified Farmland of Statewide Importance located on the easterly portion of the property, where the boundary runs through the easternmost portion of the C&D facility, crosses the railroad property, and extends towards Route 9. The NRCS soil survey mapping is consistent with the mapping available from MassGIS (MassMapper). As shown on the Land Use Plan, the only NRCS-classified farmland within a half-mile of the site is Farmland of Statewide Importance. Additional information and interpretation regarding the NRCS mapping on and near the property is provided in Section 8.1.

Land Use	Description
State Forests	Sanborn Head reviewed the Department of Conservation and Recreation website for information regarding state forests and parklands. No state forests or parklands are located within a half-mile of the site property boundary.
Conservation and Parklands	There is one municipal park in the vicinity of the site, identified as Grenville Park, which is west of the facility across the Ware River. The park encompasses an area of approximately 75 acres and is owned by the Town of Ware. The closest distance from the site property line to the property line of the park is approximately 500 feet, where the park property line runs along the Ware River. There is also a 38.4-acre lot identified as Ware Assessors Map 24, Lot 34 owned by Joseph and Patricia Knapp, located approximately 900 feet south of the site and classified as Chapter 61B recreation land.
DCR Reservations	Sanborn Head reviewed the Department of Conservation and Recreation (DCR) website for information regarding reservations, including reservations formerly under the authority of the Metropolitan District Commission (MDC), a now-defunct state agency that in 2004 merged with the former Department of Environmental Management to form the DCR. The DCR is the successor agency responsible for state-owned urban parks and recreation areas ("MDC Reservations") in Boston and surrounding communities that had formerly been under the authority of the MDC. No information was found, therefore, there are no known DCR reservations in the Town of Ware. Note that land formerly designated as MDC reservation land would have been limited to areas in Boston and the Boston metropolitan area.
EOEA Restricted Lands	Sanborn Head did not identify any lands with conservation, preservation, agricultural, or watershed protection restrictions approved by the secretary of the EEA (formerly EOEA) within a half-mile of the site.
Privately Owned Public Access Conservation Land	The 38.4-acre lot identified as Ware Assessors Map 24, Lot 34 and owned by Joseph and Patricia Knapp, is classified as Chapter 61B recreation land, meaning it is accessible to the public for recreational purposes. The Knapp property is located south of the site and is approximately 900 feet from the closest southern property boundary of the Project site.
Residential Dwellings (500-foot radius)	No residential dwellings are located within 500 feet of the site assigned area. The nearest residential dwellings to the site are located at 155 East Street (Map 24, Lot 26) and 4 Gilbertville Road (Map 24, Lot 17). These two dwellings were used to establish part of the site assignment boundary during the original permitting for the Project. The two properties are shown on the Land Use Plan, each shown with a 500-foot setback to the site assignment area.
Commercial Buildings (500 foot-radius)	No commercial buildings are located within 500 feet of the site assigned area. Three commercial buildings are located within 500-feet of the site property boundary. These consist of a motel and food service establishment located at 149 East Street (Ware Assessors Map 24, Lot 27).
Health Care Facilities	Sanborn Head did not identify any health care facilities within a half-mile of the site.
Prisons	Using the MassGIS database, there are no prisons located within a half-mile of the site
Schools	Using the MassGIS database, there are no elementary schools, middle schools, or high schools located within a half-mile of the site
Daycare Facilities	Sanborn Head did not identify any daycare facilities within a half-mile of the site.
Senior and Youth Centers	Sanborn Head did not identify any senior centers or youth centers within a half-mile of the site.

Land Use	Description
Solid Waste Facilities	There are no other solid waste facilities within a half-mile of the site property boundary.
On-Site Waste Handling Areas	C&D waste, consisting of materials such as masonry, plaster, gypsum wallboard, metal, and treated/engineered wood, is brought to the C&D building for waste transfer into railcars. Asphalt, brick, and concrete (ABC) is tipped outside the building in a designated area west of the C&D building. The C&D building and the ABC area are shown on the Existing Conditions Site Plan (Figure 7). Under the proposed capacity increase the waste handling areas will remain the same, although the C&D building will also serve as the handling area for street sweepings and catch basin cleanings, as described in Section 2.4. Additionally, under Stage 2 of the capacity increase, the C&D building will be expanded by approximately 9,000 square feet as shown on Figures 9A and 9B. The building's square footage increase will result in an equivalent increase in the building's waste handling area.
Areas of Waste Deposition	The C&D facility is a handling facility that transfers C&D residuals off-site for ultimate disposal. There are no on-site waste deposition areas associated with the facility operations.
Existing and Proposed Buildings	There are four existing buildings located on the site, as shown on Figure 7. The main buildings are the 22,480 square foot C&D building and an 8,951 square foot maintenance building and scale house located near the site entrance. The other two buildings are garages. The Stage 2 capacity increase proposes a 9,000 square foot expansion of the waste handling area of the existing C&D building. The proposed building expansion is shown on Figures 9A, 9B, 10, 11, and 12.
Access Roads	There is one access road leading into and out of the site. The access road provides ample room for truck queuing and parking (see Section 8.8.4).
Traffic Flow	Existing traffic flow into and out of the site is shown on Figure 7. Traffic flow will remain the same under the proposed two-staged capacity increase. Traffic flow for the proposed Stage 2 capacity increase is shown on Figure 9A.
Zoning and Abutting Properties	The abutting properties along East Street and at the northernmost end of the site are zoned Highway-Commercial. The abutting properties to the west and northwest are zoned Rural Residential and abutting properties to the southwest, south and southeast are zoned Highway Commercial. Town of Ware Zoning districts are shown on the Land Use Plan.
Site Zoning	The zoning of the site is Highway-Commercial.

7.0 FACILITY SPECIFIC SITE SUITABILITY CRITERIA

7.1 Siting Criteria for Waste Handling and Processing Facilities

7.1.1 Zone I of a Public Water Supply

The waste handling area of the existing facility is not within a Zone I protective radius of a public water supply well or wellfield. The proposed capacity increase, specifically the C&D building expansion associated with the Stage 2 increase, will likewise not be located within a Zone I wellhead protection area (the site itself is not located within or near a Zone I wellhead protection area). The closest Zone I is the 400-foot wellhead protection radius associated with the Dismal Swamp Well. The closest the Zone I boundary comes to the site property boundary is approximately 3,400 feet.

7.1.2 Interim Wellhead Protection Area (IWPA) and Zone II Areas

As summarized in Section 6.2.3 (Table 6), the site is not located within or adjacent to an Interim Wellhead Protection Area (IWPA) or Zone II area. Accordingly, the waste handling area of the existing facility and that associated with the proposed capacity increase, would likewise not be located within an IWPA or Zone II wellhead protection area. The closest Zone II is that associated with the Dismal Swamp Well. The closest the Zone II boundary comes to the site property boundary is approximately 3,300 feet.

7.1.3 Zone A of a Surface Water Supply

As summarized in Section 6.2.3 (Table 6), the site is not located within or adjacent to a Zone A (400 feet) of a surface water public drinking water supply area. Accordingly, the waste handling area of the existing facility and that associated with the proposed capacity increase will likewise not be located within a Zone A of a surface water drinking supply. The closest Zone A, which is that associated with the Quabbin Reservoir, is over 4 miles away.

7.1.4 Proposed Drinking Water Source Area

As summarized in Section 6.2.3 (Table 6), the site is not located within or adjacent to a Proposed Drinking Water Source Area. Accordingly, the waste handling area of the existing facility and that associated with the proposed capacity increase will likewise not be located within a Proposed Drinking Water Source Area.

7.1.5 Private Water Supplies

Sanborn Head contacted the Ware Water Department and confirmed that - with the exception of residences located on Walter Drive - the developed properties located within a half-mile of the site all have access to the Town of Ware public water supply. Walter Drive is located northwest of the site, across the Ware River. At its closest point, Walter Drive is located approximately 880 feet from the western property line of the Project site. There are 10 developed properties on Walter Drive and each has a private well, as confirmed by the Ware Water Department. The southernmost property, 13 Walter Drive (Map 24, Lot 40), is closest to the Project site, where the closest distance between the two properties is approximately 925 feet. This distance increases to approximately 1,330 feet when measured from the closest distance of the building's waste handling area to the closest property line of 13 Walter Drive.

Based on the above, the waste handling area of the facility is currently well over 500 feet from the nearest private water supply well on Walter Drive. This is also the case for the proposed building expansion associated with the Stage 2 capacity increase, where the waste handling area would remain at approximately the same distance of 1,330 feet from the closest property line at 13 Walter Drive.

7.1.6 Occupied Dwellings and Other Facilities

Based on a review of Town of Ware and Town of West Brookfield Assessors records, the closest occupied residential dwellings exist along East Street and Gilbertville Road. None of the residences are within 500 feet of the facility's waste handling area and none will be

within 500 feet of the waste handling area associated with the C&D building expansion proposed as part of the Stage 2 capacity increase.

With respect to proximity to the site, the residence closest to the building's waste handling area is located at 155 East Street (Map 24, Lot 26), which is located south of the site. The distance from the residence to the waste handling area is approximately 760 feet.

The residence at 155 East Street is one of two dwellings that established part of the site assignment boundary for the facility when it was first site assigned in 2003. The other property is located at 4 Gilbertville Road (Map 24, Lot 17), which abuts a portion of the Project site's northern property line. The residence at 4 Gilbertville Road is approximately 800 feet from the building's waste handling area. When establishing the site assignment boundary for the facility, a 500-foot offset from the houses at 155 East Street and 4 Gilbertville Road were used to establish portions of the boundary nearest these two dwellings. The Land Use Plan (Figure 6) shows the site assignment boundary and the 500-foot offset distance from the nearest residences at 155 East Street and 4 Gilbertville Road.

The site assignment boundary assures that the waste handling area of the facility will not be any closer than the 500-foot minimum distance to an occupied residential dwelling, consistent with the requirements of the Site Assignment Regulations. Because the C&D building expansion proposed as part of the Stage 2 capacity increase will be located within the existing site-assigned area, the waste handling area of the expanded building will remain a minimum of 500 feet from the residences at 155 East Street and 4 Gilbertville Road. Specifically, the waste handling area of the expanded building will be approximately 735 feet from the residence at 155 East Street and will remain unchanged at approximately 800 feet from the residence at 4 Gilbertville Road.

No other excluded facilities (prison, health care facility, schools, etc.) as described in Section 6.2.4 (Table 7) are located within 500-feet of the site.

7.1.7 Riverfront Area

The waste handling area of the existing facility and that associated with the proposed capacity increase, will not be located within the Riverfront Area. As summarized in Section 6.2.3 (Table 6), the proposed Stage 2 capacity increase will result in some construction activities occurring within the 200-foot Riverfront Area at the northernmost end of the proposed track construction work, subject to the receipt of an Order of Conditions from the Ware Conservation Commission. However, none of this proposed work is related to the waste handling area of the facility and none of the proposed construction activities would expand the waste handling area into the Riverfront Area.

7.1.8 Depth to Groundwater

The facility currently maintains a minimum 2-foot separation between the seasonal high groundwater elevation and the ground/floor of the waste handling area. Based on groundwater elevations collected from the three on-site groundwater observation wells (MW-1, MW-2, and MW-3), the depth to groundwater is approximately 15 feet below the rail pit floor elevation of the C&D building (elevation = 490 feet NAVD88). The depth to

groundwater in the ABC storage area is approximately 6 feet below ground elevation. The groundwater contouring across the site, based on water level depths taken from the observation wells, is shown on Figure 2.

The proposed capacity increase, specifically the C&D building expansion associated with the Stage 2 increase, will tie the proposed floor expansion area into the existing floor elevations of the building. Therefore, the depth to groundwater from the floor of the C&D building under Stage 2 conditions will be similar to the current groundwater depth at the building and exceed the 2-foot minimum separation requirement specified in 310 CMR 16.40(3)(d)(7).

8.0 GENERAL SITE SUITABILITY CRITERIA

8.1 Agricultural Land

The site does not contain any land deemed Land Actively Devoted to Agricultural or Horticultural Uses nor are there any such lands within 100 feet of the site property boundary. This is the case now and was the case when the facility was first site-assigned in 2003, at which time the site had been used as an auto salvage business and auto salvage yard.

When first site assigned, the property was documented as not containing any farmland classified by the US Department of Agriculture, Natural Resources Conservation Service (NRCS) as Prime, Unique, or of State and Local Importance. Current mapping of the site, as obtained by Sanborn Head from the NRCS soil survey website, indicates that there is no Prime or Unique Farmland or Farmland of Local Importance mapped on the site. This same mapping shows that there is NRCS-classified Farmland of Statewide Importance located on the easterly portion of the property, where the boundary runs through the easternmost portion of the C&D facility, crosses the railroad property, and extends towards East Street (Route 9). The NRCS soil survey mapping is consistent with the mapping available from MassGIS (MassMapper). Although, as noted above, a portion of the site is mapped by NRCS, there is no known past agricultural use of the property or adjacent parcels and the existing site assignment and C&D transfer facility have been in active use for almost twenty years.

The Land Use Plan (Figure 6) depicts NRCS farmland classification boundaries within a half-mile of the site. As shown on the plan, the only NRCS-classified farmland within a half-mile of the site is Farmland of Statewide Importance. The mapping of this land in the site area extends northerly along the rail corridor and is roughly bounded by Gilbertville Road and the Ware River, where Town of Ware zoning of the land is Highway Commercial (HC) and Residential Business (RB) immediately north of the site. As shown on the Land Use Plan, the NRCS-mapped farmland south of the site is in areas zoned as Highway Commercial and Industrial (I), which includes land occupied by the MCER railyard and other industries in the East Street/Knox Avenue area of Ware. The current site uses and local zoning on and within a half-mile of the site, as well as the site's prior use as an auto salvage yard, supports the interpretation that NRCS-mapped Farmland of Statewide Importance on and near the site does not represent land that is suitable or valued for food crop production and would not be used for such purposes.

8.2 Traffic Impacts

ReSource Ware retained the services of Vanasse and Associates, Inc. (VAI) of Andover, Massachusetts to prepare a Transportation Impact Assessment (TIA) for the proposed Project. The TIA evaluates potential traffic impacts associated with the proposed waste handling capacity increase to 1,400 TPD. The study was conducted as part of the MEPA phase of the Project and was included in the April 2022 Notice of Project Change (NPC) MEPA filing. A copy of the TIA is provided in its entirety in Appendix G. A summary of the TIA scope, methodology, and findings is provided below.

The TIA was prepared in consultation with the Towns of Ware and West Brookfield and is consistent with standard methodology for TIAs in Massachusetts. A review of existing traffic and transportation conditions in the area expected to be impacted by the Project was conducted. Future conditions were developed to identify traffic operating parameters without the Project (i.e., the "No-Build" condition) and estimates of traffic generation associated with the Project were superimposed onto the future No-Build conditions in order to develop the future Build conditions with the Project and evaluate the Project impact on the study area locations.

ReSource Ware is seeking a permit modification to increase its weekday daily tonnage from 750 TPD to 1,400 TPD and increase its Saturday daily tonnage from 500 TPD to 750 TPD. On an annual basis, this equates to an increase in its permitted tonnage from 214,500 tons per year (TPY) to 393,200 TPY. Currently, material delivered to the facility by third-party customers originates from communities located largely within a 30-mile radius of the facility. As part of the proposed modifications, the facility will receive processed C&D material from ReSource Waste Services' other facilities, which are located east of the site, and will reduce the number of loads it accepts at the facility from its third-party customers.

Incoming material is currently brought to the facility via trucks and transferred into railcars to be transported off site. The facility currently operates Monday through Friday 7:00 am to 4:00 pm and Saturday 7:00 am to 1:00 pm. The Project proposes a change in the facility's weekday operating hours where the hours of operation would be from 7:00 am to 6:00 pm, with no changes to operating hours on Saturdays.

Access to the site is provided via one full-access driveway off East Street (Route 9) with no changes proposed to this driveway. At present, the Project site is bounded by open and wooded space. A comprehensive field inventory of traffic conditions on the study area roadways and intersections was conducted in December 2021, including sight distances at the site driveway, review of intersection geometry, and traffic counts during the weekday morning and weekday evening peak periods at locations expected to be impacted by the Project. The traffic volumes were increased by between 9 and 16 percent depending on time period to account for the effects of the COVID-19 pandemic and further increased by 8 percent to account for seasonal variation. The locations constituting the study area for the Project are listed below.

1. East Street (Route 9/32) at the site driveway
2. East Street (Route 9) at Gilbertville Road (Route 32)

3. East Street (Route 9/32) at Knox Avenue
4. East Main Street (Route 9/32) at Church Street and South Street
5. Main Street (Route 9/32) at North Street
6. Main Street (Route 9) at West Street (Route 32)

In order to assess the impact of the proposed Project on the roadway network, traffic operations analyses were performed at the study intersections under 2021 Existing, 2028 No-Build (750 TPD operations), and 2028 Build conditions (1,400 TPD operations).

Existing traffic data from the site was utilized to develop the new traffic generation associated with both the existing permitted capacity of 750 TPD and the proposed permitted capacity of 1,400 TPD. As it relates to the expected increase from 750 TPD to 1,400 TPD, the change to the proposed permitted capacity is expected to generate approximately 70 new vehicle trips on an average weekday (two-way, 24-hour volume), with 14 new truck trips (7 entering and 7 exiting) expected during the weekday morning and afternoon peak hours, respectively.

Due to the proposed change in operations with a projected increase in materials coming from ReSource Waste Services' other facilities that are located to the east via larger trucks, and corresponding decreases in locally originating trucks with smaller loads, truck traffic traveling to the site through the downtown area of Ware is expected to decrease. Accordingly, the traffic analysis indicated that the addition of site-related traffic at the proposed permitted capacity of 1,400 TPD will not result in a significant impact on overall operations at the study area intersections. Level-of-Service (LOS) at area intersections was shown to not be affected by the Project with minimal increases to vehicle delay and queues as a result of the Project volume increases.

With respect to the expected decrease in truck traffic travelling to the site through downtown Ware, it should be noted that ReSource Ware has a strict policy that the company enforces with their drivers that all semitrailers are to come from the east on Route 9 and they are to leave the site by the same route. If the drivers do not abide by the policy, disciplinary action is taken. Enforcement of this policy includes a requirement that all drivers employed by ReSource Waste Services are required to sign a document confirming that they understand the travel route and they must abide by it. If the drivers do not abide by the policy, they will not be allowed to return to the facility. These measures are working and Resource Ware will continue to diligently enforce these measures.

Projected peak-hour traffic volume increases are expected to range between –3 to 11 vehicles (-0.7 to 2.5 percent) on the study area roadways external to the study area. No apparent safety deficiencies were noted with respect to the motor vehicle crash history at the study area intersections. It is anticipated that safe and efficient access will be provided to the facility and the proposed capacity increase to 1,400 TPD can be accomplished with minimal impact to the area.

8.3 Wildlife and Wildlife Habitat

The following subsections address the Natural Heritage and Endangered Species Program administered by the Massachusetts Division of Fisheries and Wildlife.

8.3.1 Habitat of Endangered, Threatened or Special Concern Species

According to mapping available from MassGIS (MassMapper), a portion of the northern edge of the property abutting the Ware River is mapped within a Natural Heritage Endangered Species Program (NHESP) Priority Habitat for State Protected Rare Species. Within this same area of the site MassGIS also depicts Estimated Habitats for Rare Wildlife. The Priority Habitat is also mapped on the southern end of the property, confined to the limits of the pond in this area of the site.

The Natural Heritage Plan, provided as Figure 5, shows the delineation of these NHESP habitat types located within a half-mile of the site. As shown on the figure, a small portion of the Priority and Estimated Habitats are mapped on the abutting railroad property at the northern end of the site and beyond, with Priority Habitat also mapped on the railroad property at the southern end of the site and continuing further to the south.

Sanborn Head submitted a *Request for State-listed Species Information* to NHESP to confirm the species located within the mapped areas on and near the site. NHESP responded to the request in a letter dated March 11, 2023 (NHESP Tracking No. 23-41721). Per the NHESP letter, the species identified in the site area are "Creeper" of the mussel group and "Great Laurel", an evergreen shrub in the rhododendron family. The Creeper is listed by NHESP as a species of special concern and the Great Laurel is listed as threatened. A copy of the NHESP letter is provided in Appendix F.

The Creeper Mussel can be found in a variety of freshwater habitat types, including rivers, streams, ponds, and lakes, where it lives in the mud, sand, and gravel substrates of these waterbodies. The Great Laurel prefers areas of moderate moisture and is commonly located in riparian areas.

8.3.2 Ecologically Significant Communities

Based on MassGIS mapping in the site area, there are no Ecologically Significant Natural Communities located on or adjacent to the site.

8.3.3 Wildlife Management Area

The Coy Hill Wildlife Management Area (WMA) is southeast of the site, located in the Towns of Ware and West Brookfield. The WMA is approximately 866 acres in size and is owned and managed by the Massachusetts Division of Fisheries and Wildlife. As shown on the Land Use Plan, the northernmost portion of the WMA is closest to the site property, where the WMA is located on the opposite side of East Street across from the site entrance. The proposed capacity increase does not represent an adverse impact to the WMA, as demonstrated through the past operations of the facility.

8.3.4 Interpretation of Habitat Impact

As described in Section 2.6.3, there will be no building or site alterations associated with the Stage 1 capacity increase, hence the Stage 1 increase poses no impact to the habitat of the Creeper Mussel or Great Laurel Rhododendron.

The Stage 2 capacity increase will include an expansion to the C&D building, as well as installation of additional railroad track siding. The rail line work will result in some construction activities occurring within the Priority Habitat for Rare Species and the Estimated Habitat for Rare Wildlife. Much of this work within the mapped habitat area will be performed in an area already disturbed by the existing rail line corridor. Furthermore, with respect to the specific species in question, impact to the Creeper Mussel would not occur since the rail line work would not be performed in an area in which the mussel lives, namely the riverbed of the Ware River. With respect to the Great Laurel Rhododendron, the Stage 2 rail work would be performed within the open rail corridor and is not expected to disrupt this plant species.

Although Sanborn Head does not interpret the proposed Stage 2 construction activities as posing an adverse impact on the Creeper Mussel or Great Laurel Rhododendron, ReSource Ware will further coordinate the proposed work with NHESP early during the Stage 2 design phase to confirm this interpretation. Coordination with NHESP will be performed prior to filing a wetlands Notice of Intent (NOI) for the Stage 2 work. The filing of the NOI will be required due to the northernmost section of the proposed rail work occurring within the 100-foot buffer zone and 200-foot Riverfront Area of the Ware River. As required under the Wetlands Protection Act and the Massachusetts Endangered Species Act (MESA), the NOI will be filed with the Ware Conservation Commission and a copy will be sent to NHESP. In addition to submitting a copy of the NOI to NHESP, ReSource Ware will be prepared to file under MESA as well.

8.4 Areas of Critical Environmental Concern

The site is not within an Area of Critical Environmental Concern (ACEC), nor is it located adjacent to an ACEC. The nearest ACEC is the Miscoe, Warren, and Whitehall Watersheds, located over 25 miles east of the site in the Grafton-Upton-Hopkinton area near Route 495. Accordingly, the proposed Project does not present a potential adverse impact to this or other ACECs.

8.5 Protection of Open Space

The following subsections address land areas that are considered parks and recreation lands under local, regional, and state regulatory agency jurisdiction.

8.5.1 State Forests

Sanborn Head reviewed the Department of Conservation and Recreation website for information regarding state forests and parklands. No state forests or parklands are located within a half-mile of the site property boundary.

Due to the absence of state forests within a half-mile of the site, it is Sanborn Head's opinion that the proposed Project will not have an adverse impact on these lands.

8.5.2 State or Municipal Lands

There is one municipal park in the vicinity of the site, identified as Grenville Park. The park encompasses an area of approximately 75 acres owned by the Town of Ware, located approximately 500 feet (at its closest point) west of the westerly site property line of the C&D facility. The C&D building is approximately 970 feet east of the nearest park boundary under existing conditions. The proposed Stage 2 building expansion would reduce this distance to approximately 955 feet. Under existing conditions, the C&D building is approximately 1,925 feet from the baseball field outfield at the park. The proposed Stage 2 building expansion would reduce this distance to approximately 1,900 feet

It is Sanborn Head's opinion that due to the facility's distance from Grenville Park, the proposed Project will not have an adverse impact on the park's physical environment or on its use and enjoyment by park visitors. The existing facility's operations have not had an adverse impact on Grenville Park.

8.5.3 DCR Reservations

Sanborn Head reviewed the Department of Conservation and Recreation website for information regarding reservations, including reservations formerly under the authority of the Metropolitan District Commission (MDC), which merged in 2004 with the former Department of Environmental Management to form the DCR. The DCR is the successor agency responsible for state-owned urban parks and recreation areas ("MDC Reservations") in Boston and surrounding communities that had formerly been under the authority of the MDC.

Due to the absence of DCR land within a half-mile of the site, it is Sanborn Head's opinion that the proposed Project will not have an adverse impact on these lands.

8.5.4 EOEA Restricted Land

Sanborn Head did not identify any lands with conservation, preservation, agricultural, or watershed protection restrictions approved by the secretary of the EEA (formerly EOEA) within a half-mile of the site.

Due to the absence of EEA restricted land within a half-mile of the site, it is Sanborn Head's opinion that the proposed Project will not have an adverse impact on these lands.

8.5.5 Privately Owned Public Conservation Land

The 38.4-acre lot identified as Ware Assessors Map 24, Lot 34 and owned by Joseph and Patricia Knapp, is classified as Chapter 61B recreation land, which represents privately owned property that is accessible to the public for recreational purposes. The closest boundary to the Knapp property is approximately 1,590 feet from the C&D building under existing conditions and would be approximately 1,540 feet away under proposed Stage 2 building expansion conditions.

It is Sanborn Head's assertion that due to the distance and intervening forest land, the proposed Project will not have an adverse impact on this privately owned public conservation land.

8.6 Air Quality Impacts

ReSource Ware retained the services of Epsilon Associates, Inc. of Maynard, Massachusetts to conduct a study to assess potential air quality impacts related to the proposed waste handling capacity increase to 1,400 TPD. The original air quality study was completed in connection with the Project's 2022 MEPA phase and the results presented in the April 2022 Notice of Project Change (NPC) MEPA filing. A revised air quality study, prepared by Epsilon in support of this Site Suitability application, has since been conducted to further evaluate and refine the analysis to more precisely represent the Project details. The revised study is provided in its entirety in Appendix H.

In summary, the air quality study was performed to document that the modifications proposed at the facility use all feasible measures to avoid, minimize, and mitigate potential air-related impacts, and that the facility will not create conditions of unhealthy air.

Project changes relevant to the air quality study are:

- Increased facility operating hours;
- Increased utilization of onsite heavy equipment;
- Increased truck traffic onsite and offsite; and
- Increased rail operations.

Air quality impacts avoidance, minimization, and mitigation measures are:

- Routing of offsite trucks to minimize air quality impacts in the Ware EJ community;
- Installation of catalytic converters on four pieces of onsite heavy equipment used in the operation of the facility; and
- Use of a water misting system within the building and road watering/street sweeping onsite to control dust.

Stationary sources at the facility are subject to regulation by MassDEP. The air quality analysis reviews on-site fugitive dust, heavy-equipment, and locomotive sources and also includes mobile sources such as truck traffic both on-site and off-site. This more inclusive analysis allows the Project to be designed holistically to minimize environmental impacts and give a more complete picture of any Project related air impacts.

Broadly the emissions sources are in the following categories:

- Dust from material handling on-site. Emissions are estimated based on material transfer operations, and paved road dust;

- Diesel combustion exhaust from on-site heavy equipment operation, truck traffic both on-site and off-site, and on-site operation of the diesel locomotive.

ReSource Ware proposes a facility that avoids, minimizes, and mitigates potential air-related impacts as follows:

- Avoided impacts: ReSource Ware is using their existing location to avoid impacts to the public associated with a new facility. Material handling in enclosed areas and using best industry practices avoids off-site impacts of air emissions. Because the proposed capacity increase will serve existing needs for material handling with transportation by rail haul, the Project avoids transportation-related impacts currently associated with sending the materials farther by truck.

- Minimized impacts: The Project team evaluated the truck routing to identify the proposed transportation routing configuration (predominately eastern traffic) which minimizes off-site air concentrations in the Ware EJ community (westerly direction).

- Mitigated impacts: The use of the C&D building's water misting system during spring, summer, and fall; performing roadway sweeping and watering; and adding catalytic converters on the heavy equipment will mitigate project-related air impacts.

The study estimates the impacts of air pollutants on the nearby residential areas using the EPA's AERMOD model, which predicts air quality concentrations from sources related to the proposed Project. The results of the air quality modeling confirmed that the proposed Project satisfies criteria for air toxics, where all concentrations were below the EPA and MassDEP health-protective standards.

To further reduce emissions, ReSource Ware has committed to install diesel oxidation catalyst (DOC) devices (also known as catalytic converters) where feasible on existing onsite heavy equipment. A DOC will reduce emissions of carbon monoxide emissions by up to 90 percent and reduce emissions of VOCs by up to 50 percent. DOC devices will be installed to provide mitigation on a Caterpillar 330C excavator, a John Deere 744JX loader, a Caterpillar 312C excavator (backup unit), and a Caterpillar 325 excavator (backup unit). The Volvo L120C loader is already equipped with DOC. The existing equipment Caterpillar 966M front end loader and Caterpillar 236D skid steer are already certified Tier 4 and have the lowest emissions available in their class. The Caterpillar 345DL excavator is already fitted with a diesel particulate filter (DPF) and thus cannot feasibly be retrofitted with a DOC device.

The addition of aftermarket pollution control devices (catalytic converters) on some existing equipment will further reduce emissions that air modeling shows are already below health-protective standards. Therefore, it can be concluded that the proposed waste handling capacity increase to 1,400 TPD does not cause or contribute to a condition of air pollution in the area, and that impacts are minimized to the extent feasible.

Construction air quality impacts and mitigation measures are also evaluated in the air quality study. Project-related construction activities are related to the Stage 2 capacity increase, consisting of installation of additional rail siding and expansion of the building. As noted in

the air quality study, short-term impacts from fugitive dust may be expected during certain construction activities but are not expected to cause any significant impacts offsite based on the distance to the nearest offsite receptors and planned mitigation measures. Mitigation measures for controlling fugitive dust during demolition, excavation and construction include mechanical street sweeping, wetting portions of the work area during periods of high wind, and using covered trucks for material transport. Additional measures to minimize emissions from construction equipment are described in Section 3.6.3 of the air quality study.

8.7 Nuisance Conditions

8.7.1 Noise

ReSource Ware retained the services of Epsilon Associates to conduct a sound level analysis to assess potential noise impacts related to the proposed waste handling capacity increase to 1,400 TPD. The original sound analysis was completed in connection with the Project's 2022 MEPA phase and the results presented in the April 2022 Notice of Project Change (NPC) filing. A revised analysis, prepared by Epsilon in support of this Site Suitability application, has since been conducted to further evaluate and more precisely refine the original sound study. The revised study is provided in its entirety in Appendix I.

In summary, the sound analysis was conducted to study the noise impacts of the proposed operational changes, and to evaluate options to avoid, minimize, or mitigate potential damage caused by Project noise impacts.

As part of the revised analysis, several site visits were made by Epsilon to better define site operations and to make additional sound measurements. Also, a new and important source of sound was discovered: during the unloading of semitrailers that use a walking floor to discharge their loads (the majority of the trailers that visit the facility) the on-board hydraulic system that powers the walking floor is itself powered by revving the truck engine. This source was added to the analysis.

The primary noise sources are engine noise from the heavy construction equipment used in the C&D building to manipulate and load the C&D material; engine noise from trucks visiting the facility; noises generated from depositing and moving material on the tipping floor, including railcar loading operations; and backup alarms on the loading equipment. The majority of noise-producing activity takes place inside the building and at the open roll-up doors along the south side of the building. The proposed Project expands the capacity of the facility while largely maintaining the same operations as are currently conducted. As part of the Stage 2 capacity increase, the building footprint will increase by approximately 9,000 square feet and include four large roll-up doors to access the tipping floor and two roll-up doors located at either end of the rail pit. The proposed expansion will also increase the weekday operating hours from 7:00 am to 4:00 pm to 7:00 am to 6:00 pm on Monday through Friday. There are no proposed changes to the Saturday operating hours.

An existing sound level survey was conducted during the early morning, daytime, and evening hours to characterize the existing "baseline" acoustical environment near the site both during facility operating hours and during non-operating hours. Short-term sound level

measurements were performed at four potentially sensitive locations surrounding the site. These were supplemented with medium term measurements at two offsite locations during non-operating hours and one on-site and one off-site location during operations. These measurement locations are depicted on Figure 2-2 of the sound analysis.

Early morning measurements were conducted between 6:00 am and 7:00 am before the facility opens and evening measurements occurred between 4 pm and 6 pm after the facility closes to capture ambient levels before and after current operating hours. Additional measurements were taken during normal operating daytime hours on several weekdays and one Saturday to quantify sound levels when the facility is operating under typical conditions.

The noise impacts associated with the proposed Project were predicted using the CadnaA noise calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation). The benefits of this software are a refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The CadnaA software allows for frequency-based octave-band calculation of sound from multiple sources.

The modeled sources are broken into two types – continuous and intermittent. Continuous sources represent the primary sources of sound from dumping and moving of C&D material, railcar loading, loader and excavator operations, and truck engine noise, including unloading of semitrailers. Intermittent noise sources represent sounds from mobile sources that do not occur continuously when the facility is operating such as backup alarms, railcar coupling, and idling locomotives.

With respect to maximum practicable mitigation measures, ReSource Ware has committed to avoid, minimize, and mitigate noise impacts to the maximum extent practicable by taking the following measures:

- Conducting operations within the building.
- Use of a speed limit to minimize sound from trucking operations.
- Retrofit onsite equipment with white noise (broadband) backup alarms to replace beepers.

Factoring these mitigation measures into the sound assessment demonstrate that sound levels from the Project will meet the requirements set forth in the MassDEP Noise Policy at residential locations, and that the proposed capacity increase will not cause a condition of noise pollution.

Sound pressure levels due to the operation of all stationary equipment operating simultaneously were predicted at the four sound level modeling locations. All of the future predicted total sound levels show compliance with the MassDEP Noise Policy which restricts the increase over ambient sound levels to 10 dBA. In addition, operations from the Facility will not create any “pure tones”. Throughout the analysis, the facility has documented that

sound impacts will be avoided, minimized, and mitigated to the extent feasible. In addition, the Project will meet the daytime sound level limit of 70 dBA set forth in the Town of Ware Zoning Bylaw at the facility property line during operating hours.

8.7.2 Dust

The facility will continue to exercise dust control using the following measures:

- Maintaining paved vehicle traffic areas, including sweeping of these areas on a routine basis.
- Wetting paved surfaces as necessary.
- Posting signage regarding requirements for covering (tarping) of loads until inspection at the weigh station.
- Providing verbal commands at the weigh station.
- Handling the mixed C&D materials within the building only.
- Using the C&D building's water misting system within the building during spring, summer, and fall.

The above dust mitigation measures are applicable to existing operations as well as operations associated with the proposed capacity increase. These have proven to be effective control measures as the facility has received no dust complaints from the MassDEP, Town of Ware, or neighbors.

8.7.3 Litter

Litter control at the facility will continue to be exercised using procedures currently employed. Material delivered to the facility will be confined to the C&D building or areas of the site dedicated to sorted materials. All loads delivered to the site must be covered. Vehicles transporting from the site will be covered prior to leaving the facility. Laborers will be responsible for the maintenance of the site, including collection of any windblown litter.

Employees will inspect the facility daily for material which could be dispersed due to wind conditions. If materials are found, they will be picked up for disposal or reuse. To reduce the potential for windblown litter and material dispersion all containers subject to windy conditions will be properly covered, contained indoors and/or otherwise contained to the extent practicable.

All areas around the C&D building and along East Street will be inspected for litter and windblown material on a daily basis. Should litter and/or other windblown materials be encountered, they will be picked up during the daily cleanup activities.

8.7.4 Vectors

C&D and ABC (asphalt, brick and concrete), are non-putrescible materials and as such, are not a food source that attract vectors. This is also true of street sweepings and catch basin cleanings, which, in limited amounts, would be added to the list of accepted materials under

the proposed capacity increase (see Sections 2.4 and 2.5). Due to the absence of putrescible materials (i.e. food waste) in the facility's waste stream, the C&D and ABC do not attract vectors such as rodents, birds, and insects, as the materials do not provide a food source for these animals. Operating experience to date has demonstrated that vectors are not an issue at the site. In the event an issue with vectors were to arise, ReSource Ware would retain the services of a qualified and licensed local vector control service to provide consultation and site visits to address the issue.

8.7.5 Bird Hazards to Air Traffic

As noted above, C&D material does not provide a food source to attract birds and other vectors. Operating experience to date has confirmed that birds are not attracted to the facility. It is Sanborn Head's opinion that the proposed capacity increase, which will include the same material types as presently accepted, as well as the addition of street sweepings and catch basin cleanings in limited amounts, does not pose a hazard to air traffic.

8.7.6 Other Nuisance Conditions

It is Sanborn Head's opinion that other nuisance conditions are not likely to exist in connection with the proposed capacity increase, which includes the addition of some street sweepings and catch basin cleanings to the incoming material types. These materials consist predominantly of sand from the sweeping of roadways and parking lots, as well as sand generated from the cleaning of stormwater collection systems. These materials will be delivered to the tipping floor of the C&D building where they will be transferred into the railcars for out-of-state disposal.

8.8 Size of Facility

This section presents information confirming the size of the facility is sufficient to support the proposed capacity increase. A summary of the proposed increase is first presented, followed by a description of the facility layout, which provides the context for queuing and other considerations relative to the proposed capacity increase. These capacity-related considerations are presented following the description of the existing facility layout.

8.8.1 Summary of Proposed Capacity Increase

As described in Section 2.6.3, ReSource Ware proposes to increase the permitted capacity of the facility from 750 TPD to 1,400 TPD. The capacity increase will apply to materials currently accepted at the facility (C&D material, including ABC and clean wood), as well as allow for the addition of street sweepings and catch basin cleanings to the type of waste permissible for acceptance. C&D material, ABC and clean wood will be handled in the same manner as they are under the current facility operations. The street sweepings and catch basin cleanings will be handled within the C&D building, where these materials will be delivered to the tipping floor and transferred into the railcars for out-of-state disposal.

The proposed capacity increase will be performed in two stages:

Stage 1 will increase the facility's permitted capacity to 1,125 tons per day on weekdays (no tonnage change on Saturdays). Under Stage 1, there will be no increase in building

footprint or any required site alterations. Additionally, there will be no alterations required to the existing building space that have not already been approved by MassDEP (see Section 2.6.2). As part of the Stage 1 capacity increase, no rail line modifications will be required, however, rail service will increase from two visits per day (visit 1: empty railcar drop -off; visit 2: full railcar pick-up) to three (visit 1: empty railcar drop-off; visit 2: full railcar pick-up; visit 3: combination of both empty railcar drop-off and full railcar pickup). It is anticipated that Stage 1 would go into effect in the summer of 2024, upon receipt of permit approvals.

Stage 2 will increase the permitted capacity to 1,400 tons per day on weekdays and 750 tons per day on Saturdays. As part of Stage 2, the C&D building will be expanded 50 feet extending from its existing southern façade along the full 180-foot width of the building (an expansion in the building footprint of approximately 9,000 square feet). Stage 2 will include improvements to the railroad tracks, where additional rail siding will be constructed to provide sufficient empty and full railcar storage that will allow rail service to drop to one visit per day (combination of both empty railcar drop-off and full railcar pick-up). It is anticipated that Stage 2 would go into effect in early 2026, upon receipt of permit approvals and completion of proposed building and rail alterations.

New operating hours are proposed from 7:00 am to 6:00 pm weekdays compared to current operations, which are performed from 7:00 am to 4:00 pm. No changes to Saturday operating hours (7:00 am to 1:00 pm) are proposed.

8.8.2 Existing Site Layout

The layout of the existing facility consists of the following elements (for Items 1 through 4 below, refer to Figure 7):

1. Site Entrance Queuing Area: This paved area is located immediately inside of the site entrance gate off of Route 9. The area ranges from 60 to 90 feet in width and runs in a southwesterly direction roughly parallel to Route 9 for a distance of approximately 300 feet. The area was included in the original facility design to allow queuing of truck traffic on-site, if necessary, before crossing the scales, eliminating traffic back-up onto Route 9. This area provides a single file queuing line approximately 650 feet in length.

2. Vehicle Weigh Scales and Scale House Office: Two 70-foot-long truck scales are located adjacent to the existing office/maintenance building. The scale house is at the end of the building nearest the scales and the scale next to the building serves as the inbound truck scale. The second scale is used to weigh outbound loads. Both scales are parallel to one another and located approximately 80 feet into the site from the entrance gate.

3. Access Road to Railroad Crossing: The access road departs from the truck scales in a northwesterly direction for a distance of approximately 100-feet before making a left-hand turn to the southwest, where it descends for a straight distance of approximately 400 feet, levels off and extends an additional 100 feet to the railroad crossing. The full length of the access road from the departure end of the truck scales

to the rail crossing is approximately 600 feet. This will accommodate a queue of approximately eight semitrailers (eight inbound and eight outbound) between the end of the truck scales to the railroad crossing.

4. Access Road from Railroad Crossing to C&D Building: The access to the C&D building from the scale crossing represents the "approach path" to the building, where trucks (particularly semitrailers) approach the building by using the full paved apron area in the front of the building to take a U-turn path that brings the vehicle near the face of the building and roughly parallel to it, with the cab facing Route 9. This path is approximately 430 feet in length and provides queuing for approximately 6 semitrailers. At the end of the queue lane, trucks use the remainder of the paved apron (area in front of the roll-up doors) to make a final turn away from the building and back through the roll-up doors.

5. C&D Building: The material drop-off (tipping floor) and transfer (rail pit) portion of the C&D building has dimensions of 120 feet by 180 feet and an adjoining office area with dimensions of 40 feet by 22 feet. The building currently includes three large overhead doors for vehicle access to the tipping floor and two overhead doors (either side of building) for railcar access to the rail pit portion of the building. Of the three main overhead doors (see Figure 8A for door numbering), two doors, Door No. 2 (middle door) and Door No. 3 (western-most door), are the primary doors used by haulers to dump their loads onto the tipping floor. Door No. 1 is generally not used for incoming loads because the dumping corridor for this doorway is used instead as a railcar loading corridor in which the front-end-loader and excavator principally operate.

   Note: As summarized in Section 2.6.2, ReSource Ware has received MassDEP approval to install two new large roll-up doors to access the tipping floor:

   - One door will be located on the building's southern façade, increasing the number of doors on this side of the building from three to four (an increase from two to three doors for vehicles dumping on the tipping floor). The approval for the addition of this door was issued on May 6, 2022 in connection with a BWP SW45 permit application for this and other minor facility modifications.
   - One door will be located on the building's western façade and will serve as a dedicated access for ReSource Ware to dump its C&D fines loads in the building. Because of its dedicated use for C&D fines deliveries, this door will not be heavily used during the day. The approval for the addition of this door was issued on January 9, 2023 in connection with a BWP SW45 permit application.

   The railcar pit extends the full width of the building at 120 feet. A typical railcar is approximately 65 feet long, allowing a single railcar to be loaded within the building under current operations. Weighing of the cars is performed using a rail scale located at the north end of the rail pit near the overhead door. The rail scale weighs the railcar

truck assembly on one end of the car and then the other. The two weights when added together provide the total weight of the railcar.

6. Rail Siding: Four railroad track spurs service the C&D building. Track 1 ties to the main line north of the building and runs southerly through the building, terminating at a distance of approximately 200 feet south of the building. Track 2 spurs off of Track 1 north of the building and runs to the south passing close to the exterior of the building and terminating at a similar distance to the south as Track 1. Track 3 ties to the main line south of the building and ties to Track 2 just north of the building. Track 4 spurs from Track 3 in line with the northerly side of the building and runs north between the main line and Track 3 for a distance of approximately 300 feet where it terminates north of the building. The railroad track spurs are shown and labelled on the Existing Conditions Site Plan (Figure 7).

   A summary of track spur length and railcar storage capacity (on-site and on MassDOT property) is provided in Table 8. Tracks 1 and 2 are typically used for empty railcar storage and Tracks 3 and 4 for full railcar storage. The designation of half a railcar in Table 8 denotes that under maximum storage conditions, one half of a railcar may straddle both the site property and MassDOT property. This can be interpreted from Detail A of Figure 13, which shows the location of the maximum number of railcars that can be stored on each track, corresponding to the numbers shown in Table 8. The total number of railcars that can be stored on the four tracks (15) is dictated by the need to keep sections of each track open to allow the maneuvering of empty railcars from Track 2 to Track 1 and full rail cars from Track 1 to Tracks 3 and 4, until the full cars are ready for pick-up by Mass Central Railroad.

Table 8
Existing Conditions - Railroad Track Siding Length and Railcar Storage Summary

Siding Track No.	Approximate Track Length (ft)			Railcar Storage (# cars)		
	Site Property	MassDOT Property	Total	Site Property	MassDOT Property	Total
1	570	255	**825**	4	0	**4**
2	505	35	**540**	3.5	0.5	**4**
3	65	295	**360**	1.5	2.5	**4**
4	0	315	**315**	0	3	**3**
Totals	**1,140**	**900**	**2,040**	**9**	**6**	**15**

8.8.3 Existing Permit Requirements for On-Site C&D Storage

The Authorization to Operate (ATO) permit renewal issued by MassDEP on February 11, 2016 includes the following requirements for on-site storage of C&D materials handled within the building:

- Tipping Floor Storage: No more than a maximum of one day's permitted operation (750 tons) of C&D material (total of unprocessed and processed) may be kept on the tipping floor of the facility building at any time.
- On-Site Full Railcar Storage: A maximum of three (3) railcars containing processed C&D materials (no more than 200 tons total) may be stored outside the building at the site.

The above existing permit requirements are highlighted for the purpose of describing how they relate to facility size considerations in connection with the proposed capacity increase.

8.8.4 Existing and Proposed Truck Queuing Estimates

One of the items to be considered in evaluating the size of the facility relative to the proposed capacity increase is whether the site can adequately accommodate the projected increase in truck queuing that may result from the tonnage increase. Areas of the site that are appropriate to evaluate for truck queues are: 1) at the site entrance at the inbound scale; 2) at the C&D building; and 3) at the access road to the outbound scale. These areas are evaluated below using the projected truck traffic increase associated with the proposed 1,400 TPD operations, as identified in the Transportation Impact Assessment (Appendix G).

Truck Queuing at Inbound Scale

Tables 4 and 5 of the Transportation Impact Assessment predict the peak hourly number of trucks visiting the facility when operating under the current maximum daily tonnage of 750 TPD (Table 4 of the TIA) and the proposed maximum daily tonnage of 1,400 TPD (Table 5). For 750 TPD operations the peak morning hour is 15 trucks entering the site (same as the peak afternoon hour for trucks entering the site). For 1,400 TPD operations, the peak morning hour is 22 trucks entering the site (same as the afternoon peak hour).

For the purposes of the queuing analysis, Sanborn Head has adjusted the peak hourly numbers to a per-minute basis by dividing the hourly numbers by 60, which provides the average truck arrival rate in minutes during the peak hour. We can then compare the per-minute arrival rate to the typical time it takes for trucks to weigh-in on the inbound scale.

To quantify the typical vehicle weigh-in and weigh-out times at the truck scales, Sanborn Head recorded these times for all vehicles entering and exiting the site on March 9, 2023. The maximum weigh-in time was 1 minute and 18 seconds (1m:18s) and the minimum was 21 seconds (0m:21s) with an average for all vehicles of 39 seconds (0m:39s). For the purposes of evaluating potential queuing at the inbound scale, an average scale crossing weigh-in time was chosen as 1 minute (1m:0s).

It should be noted that the scale weigh-in times are quick in comparison to weigh-out times (see outbound scale queuing discussion later in this section) because at weigh-in the time on the scale is limited to the time needed to record the gross vehicle weight, at which point the vehicle can proceed to the C&D building. Unlike during weigh-out, the vehicle driver on weigh-in does not need to leave the vehicle to complete a transaction and obtain a weight slip, hence, the time on the inbound scale is shorter than that on the outbound scale.

As shown in Table 9, based upon the estimated arrival rate of one semitrailer every 2.7 minutes during the Stage 2 peak hour period, a one minute scale crossing weigh-in time will not create any vehicle queuing at the site entrance under the proposed 1,400 TPD operations.

Table 9
Site Entrance Truck Queuing Summary for
Existing and Proposed Full Capacity Operations

Item	Existing Conditions Full Capacity – 750 TPD	Proposed Conditions Full Capacity – 1,400 TPD
Peak Hour Entering Site	15 trucks[1]	22 trucks[1]
Peak Hour Arrival Rate Adjusted to Per Minute Basis	0.25 trucks/min (1 truck every 4 minutes)	0.37 trucks/min (3 trucks every 8 minutes)
Peak Arrival Rate in Minutes/Truck	4 minutes/truck	2.7 minutes/truck
Typical Inbound Truck Weigh-in Time[2]	1 minute/truck	1 minutes/truck
Maximum Predicted Queue	No Queue (weigh-in time does not exceed peak arrival rate)	No Queue (weigh-in time does not exceed peak arrival rate)

1. The number of peak hourly vehicles entering the site under current conditions at full capacity (750 TPD) was obtained from Table 4 of the April 2023 Transportation Impact Assessment (TIA) study prepared by Vanasse & Associates, Inc. The number of peak hourly vehicles entering the site under proposed conditions at full capacity (1,400 TPD) was obtained from Table 5 of the TIA. The TIA is provided in Appendix G.
2. Average inbound truck weigh-in time is based on scale crossing weigh-in times recorded by Sanborn Head for the full operating day on March 9, 2023. The average vehicle weigh-in time was 39 seconds. For the purposes of the queueing evaluation, the 39 second average was adjusted to one minute for added conservatism.

Under existing conditions with the facility operating at maximum capacity of 750 TPD, there is no queue predicted for vehicles weighing in at the truck scale. This is because, as shown in Table 9, during the peak-hour period, trucks are not arriving at a rate faster than the time required for trucks to weigh in at the scale. The no-queue prediction under current 750 TPD full capacity conditions is consistent with ReSource Ware's experience of not having queuing issues in the site entrance area under present operations.

As shown in Table 9, under the proposed maximum capacity of 1,400 TPD, an estimated arrival rate of 2.7 minutes per truck (3 trucks every 8 minutes) is estimated during a peak hour. Although the peak truck arrival rate increases to 2.7 minutes per truck under the proposed Stage 2 maximum capacity conditions, this increased rate remains greater than the time required for trucks to weigh in at the scale. Therefore, no queue is predicted at the inbound scale under the proposed maximum capacity of 1,400 TPD.

Truck Queuing at C&D Building

Sanborn Head's evaluation of truck queuing at the C&D building also relies on the trip generation estimates to the site provided in the Transportation Impact Assessment. In

addition to the TIA truck trip predictions, the queuing evaluation at the building incorporates Sanborn Head's full-day of operational observations performed on December 2, 2021. These observations were focused on the types of vehicles accessing the tipping floor, dumping activities and durations, heavy equipment operations related to C&D material moving and railcar loading, and railcar sequencing and storage activities in the rail siding area.

Sanborn Head's December 2, 2021 observations of typical times that trucks occupied the tipping floor are particularly relevant to the queuing evaluation at the building. These times varied depending on the type of truck visiting the facility. The majority of C&D residuals were delivered in walking floor trailers, whereas C&D fines were delivered in both semitrailer dump trailers and walking floor trailers. The remaining loads were smaller third party (non-ReSource) loads delivered in roll-off trucks and dump trucks. The semitrailer dump trailers could dump their loads and leave the building in less than 10 minutes, whereas the roll-offs and smaller vehicles were typically in the building for 5 minutes.

Based on Sanborn Head's observations, the walking floor trailers could dump their loads and leave the building in as little as 8 minutes, with the majority of the walking floors (nine out of the 15 semitrailers observed) occupying the tipping floor between 10 and 15 minutes. The average time a walking floor trailer was in the building was 14 minutes. Based on that average, which was the longest of any of the vehicle types using the facility, Sanborn Head's queuing evaluation for the building is based on a 15-minute interval for a semitrailer to enter the building, dump its load, and exit the building.

The December 2, 2021 observations were performed on a day when the total tonnage delivered to the building was approximately 710 tons, the total number of incoming truck loads was 52, and the peak number of vehicles recorded at the transfer station in a one-hour period was 13 in the morning and 10 in the afternoon. These numbers are in line with the TIA-predicted total number of trucks entering the facility on a weekday (60 trucks) and the predicted peak hourly trucks entering the facility (15 in the morning and 15 in the afternoon) when operating at the current maximum capacity of 750 TPD.

When evaluating queuing at the building, it is inappropriate to assume all vehicles visiting the facility are semitrailers, as this would place an unrealistic load demand on the facility. For example, during Sanborn Head's December 2,2021 observations, of the 52 incoming loads, 30 were small vehicles and 22 were semitrailers. This load distribution resulted in a total of 710 tons being brought to the facility that day. If all 52 vehicles were assumed to be semitrailers visiting the facility, it would result in a total tonnage for the day in the vicinity of more than 1,400 TPD (using typical load weights of 28 tons per trailer). This clearly would be an inaccurate assumption that would be equally inaccurate to apply to all vehicles visiting the facility during the peak one-hour period of operation. This is important to take into consideration when predicting queuing demands at the building.

While the TIA predicted peak hourly trucks entering the facility at 15 vehicles in the morning and 15 in the afternoon under current maximum capacity conditions of 750 TPD, these numbers are a blend of small vehicles and large semitrailers (a split of approximately 60% and 40%, respectively, based on observations from December 2, 2021). Semitrailers place the largest demands on the building because, unlike smaller trucks, they occupy a full bay

when unloading and their typical unloading time is the longest (15 minutes compared to an average of 5 minutes for smaller vehicles like roll-off trucks and smaller vehicles).

Under future conditions most of the vehicles visiting the transfer station will be semitrailers delivering C&D residuals from ReSource Waste's other processing facilities. Accordingly, for the purposes of estimating future queuing demands at the building, it is appropriate to base the queuing on semitrailers, which also conservatively represents the longest unloading times in the building. Additionally, the queuing estimates will be based on the estimated number of semitrailers visiting the facility during the day. Tables 10.1 and 10.2 summarize how the estimated number of semitrailers were calculated for existing (Table 10.1) and proposed Stage 2 (Table 10.2) conditions based on the total number of daily vehicle visits provided in the TIA.

Table 10.1
Estimated Number of Semitrailer vs. Smaller Vehicles
Visiting Facility Under Existing Conditions at Full Capacity (750 TPD)

Item	Daily Number of Vehicles Entering Site[1]	Percent Semitrailers[2]	Number of Semitrailers	Number of Small Trucks[3]
Peak Hour AM	15	40%	6	9
Peak Hour PM	15	40%	6	9
Off Peak (7 hours)	30	40%	12	18
Total	**60**		**24**	**36**
Average Tons/Load[4]			*28 ton/load*	*2 tons/load*
Daily Tonnage			*672 tons*	*72 tons*
Total Estimated Daily Tonnage			*744 TPD ≈750 TPD*	

1. Peak AM and PM vehicles and total vehicles entering site are from Table 4 of Vanasse & Associates April 2023 Transportation Impact Assessment.
2. Percentage of total daily vehicles entering the site that are semitrailers is based on Sanborn Head observations made on December 2, 2021.
3. Small trucks include roll-off trucks, dump trucks, box trucks, and pickup trucks.
4. Average tons per load based on ReSource Ware tonnage data for 2021 (January through September 2021).

Table 10.2
Estimated Number of Semitrailer vs. Smaller Vehicles
Visiting Facility Under Proposed Stage 2 Maximum Capacity (1,400 TPD)

Item	Daily Number of Vehicles Entering Site[1]	Percent Semitrailers[2]	Number of Semitrailers	Number of Small Trucks[3]
Peak Hour AM	22	55%	12	10
Peak Hour PM	22	55%	12	10
Off Peak (9 hours)	45	55%	25	20
Total	**89**		**49**	**40**
Average Tons/Load[4]			*28 ton/load*	*2 tons/load*
Daily Tonnage			*1,372 tons*	*80 tons*
Total Estimated Daily Tonnage			*1,452 TPD ≈1,400 TPD*	

1. Peak AM and PM vehicles and total vehicles entering site are from Table 5 of Vanasse & Associates April 2023 Transportation Impact Assessment.
2. Percentage of total daily vehicles entering the site that are semitrailers is derived from data used by Vanasse and Associates to estimate the 22 peak hourly vehicles entering the site.
3. Small trucks include roll-off trucks, dump trucks, box trucks, and pickup trucks.
4. Average tons per load based on ReSource Ware tonnage data for 2021 (January through September 2021).

As shown in Table 10.2, of the 22 vehicles predicted in the TIA entering the site during the peak morning and afternoon hours under future maximum operating capacity, 12 of these are estimated to be semitrailer visits. On a tonnage basis, this equates to approximately 670 tons delivered to the facility by semitrailer during the combined morning and afternoon peak hours ([12 loads peak AM +12 loads peak PM] x 28 tons/load = 672 TPD), or almost 50% of the total permitted capacity of the facility would be delivered during the two peak hours of the day.

Based on the information provided in Table 10.2, the estimated semitrailer queue at the C&D building under the proposed maximum operating capacity of 1,400 TPD would be based on a total of 49 semitrailers visiting the facility, of which 12 would visit in the peak morning hour and 12 would visit in the peak afternoon hour. In the interest of introducing additional conservatism in the queuing estimate, the number of semitrailers visiting the facility in the peak morning and afternoon hours for the 1,400 TPD future condition was increased from 12 to 16. Table 10.3 summarizes the estimated number of semitrailers visiting the facility under future conditions based on this increased level of conservatism for estimating queuing at the building.

Table 10.3
Adjusted Semitrailer Visits to C&D Building for Conservative Queue Estimating Under Proposed Stage 2 Maximum Capacity (1,400 TPD)

Item	Daily Number of Vehicles Entering Site[1]	Percent Semitrailers[2]	Number of Semitrailers	Number of Small Trucks[3]
Peak Hour AM	22	70%	16	6
Peak Hour PM	22	70%	16	6
Off Peak (9 hours)	45	33%	15	30
Total	**89**		**47**	**42**
Average Tons/Load[4]			*28 ton/load*	*2 tons/load*
Daily Tonnage			*1,316 tons*	*84 tons*
Total Estimated Daily Tonnage			*1,400 TPD*	

1. Peak AM and PM vehicles and total vehicles entering site are from Table 5 of Vanasse & Associates, Inc. April 2023 Transportation Impact Assessment.
2. Percentage of total daily vehicles entering the site that are semitrailers reflects a conservative estimate of 16 visiting during the peak morning and afternoon hour (70% of total vehicles visiting during these peak periods being semitrailers) and a reduction in the semitrailer visits during the off peak hours as required to operate within the 1,400 TPD capacity limit.
3. Small trucks include roll-off trucks, dump trucks, box trucks, and pickup trucks.
4. Average tons per load based on ReSource Ware tonnage data for 2021 (January through September 2021).

Using the existing and proposed semitrailer visits provided in Tables 10.1 and 10.3 and the assumption that these will be walking floor semitrailers with a typical building occupancy duration of 15 minutes, Sanborn Head prepared queuing estimates at the building for existing (750 TPD) and proposed Stage 1 (1,125 TPD) and Stage 2 (1,400 TPD) conditions. The queuing estimates were developed by predicting the frequency of semitrailer arrivals and departures in 15-minute intervals, the same time interval taken by each semitrailer to access the tipping floor, dump its load, and leave the building.

A full operating day was modelled for existing and proposed conditions, where the total number of semitrailers entering the site on a weekday and total number entering the site in a peak hour were taken from Tables 10.1 and 10.3 and subdivided into 15 minute intervals to model the variability of the queue that develops over the course of an operating day. For the 1,125 TPD Stage 1 proposed conditions, the queuing estimate is based on an adjustment of the total weekday number of semitrailers and peak hourly number of semitrailers provided in Table 10.3. This adjustment is made because the total number of vehicle visits (semitrailers and smaller vehicles) provided in Table 10.3 represents the number of visits associated with the full capacity increase to 1,400 TPD. To adjust the Table 10.3 projections to an 1,125 TPD basis, the Table 10.3 semitrailer visits were adjusted to 80 percent of the given values (1,125 TPD/1,400 TPD = 80 percent).

Table 10.4 summarizes how truck arrival rates at the C&D building were estimated per 15-minute interval of the operating day for existing and proposed conditions.

Table 10.4
Estimated Semitrailer Arrival Rates Per 15-Minute Interval at C&D Building for Existing and Proposed Full Capacity Operations

Item	Existing Conditions Full Capacity 750 TPD (2 Doors Available to Access Tipping Floor)[1]	Proposed Conditions	
		STAGE 1 Full Capacity 1,125 TPD (3 Doors Available to Access Tipping Floor)[1]	STAGE 2 Full Capacity 1,400 TPD (3 Doors Available to Access Tipping Floor)[1]
Operating Hours	9 hours 7 am to 4 pm	11 hours 7 am to 6 pm	11 hours 7 am to 6 pm
Weekday Total Daily Semitrailers Entering	24 semitrailers/day (Table 10.1)	38 semitrailers/day (80% of value provided in Table 10.3)[2]	47 semitrailers/day (Table 10.3)
Peak Hourly Semitrailers Entering	6 semitrailers/hr AM 6 semitrailers/hr PM (Table 10.1)	13 semitrailers/hr AM 13 semitrailers/hr PM (80% of semitrailer value provided in Table 10.3)[2]	16 semitrailers/hr AM 16 semitrailers/hr PM (Table 10.3)
Total Semitrailers Entering During Non-Peak Hours	12 semitrailers/7 hrs	12 semitrailers/9 hrs (80% of semitrailer value provided in Table 10.3)[2]	15 semitrailers/9 hrs
Peak Semitrailer Arrival Rate per 15 Minute Interval	1.5 semitrailers/15 min ≈ 1 to 2 semitrailer/15 min	3.25 semitrailers/15 min ≈ 3 to 4 semitrailer/15 min	4 semitrailers/15 min
Semitrailer Arrival Rate per 15 Minute Interval During Non-Peak Hours	1.7 semitrailers/hr ≈ 2 semitrailers/hr = 0 to 1 semitrailer/15 min	1.3 semitrailers/hr ≈ 2 semitrailers/hr = 0 to 1 semitrailer/15 min	1.7 semitrailers/hr ≈ 2 semitrailers/hr = 0 to 1 semitrailer/15 min

1. The number of doors available to access the tipping floor for material dumping is one less than the total number of doors that open to the tipping floor. This is because one of the doors, located next to the railcar pit, leads to a bay on the tipping floor used by the facility operators to load the railcars. Consequently, this roll-up door is generally not used for dumping loads in the building and is therefore not included in the queuing analysis.
2. The number of semitrailer visits provided in Table 10.3 represent projections associated with the full capacity increase to 1,400 TPD. The Table 10.3 projections were adjusted to 80 percent of their given value to estimate the weekday and peak hourly number of trucks entering the site for Stage 1 conditions (1,125/1,400 = 80 percent).

The semitrailer arrival rates per 15-minute interval were entered into a spreadsheet that tracks the accumulation of semitrailers in queue when more trailers arrive at the building per 15-minute interval than leave the tipping floor in that same period. The spreadsheet output showing the maximum queuing predicted at the C&D building under existing and proposed conditions is provided in Tables J-1, J-2, and J-3 of Appendix J. Table 11 summarizes the maximum queues predicted for each condition evaluated.

Table 11
Estimated Maximum Semitrailer Queues at C&D Building for Existing and Proposed Full Capacity Operations

Item	Existing Conditions Full Capacity 750 TPD (2 Doors Available to Access Tipping Floor)	Proposed Conditions	
		STAGE 1 Full Capacity 1,125 TPD (3 Doors Available to Access Tipping Floor)	STAGE 2 Full Capacity 1,400 TPD (3 Doors Available to Access Tipping Floor)
Maximum Estimated Queue	1 semitrailer	1 semitrailer	4 semitrailers

1. See Appendix J, Tables J-1, J-2, and J-3 for estimation of maximum semitrailer queuing at the C&D building for each of the above conditions.

As shown in Table 11, under existing conditions, with the facility operating at 750 TPD and having two doors available for truck access to the tipping floor, a maximum queue of one semitrailer is predicted at the building. The maximum predicted queuing at the building for the 1,125 TPD Stage 1 capacity increase is also one semitrailer. This is anticipated to occur during both the peak one-hour morning and afternoon traffic periods. Although the semitrailer arrival rate for the Stage 1 peak hour condition increases to 13 semitrailers (from 6 associated with existing conditions at maximum capacity of 750 TPD), the additional overhead door that will be added to the southern façade of the building provides increased access to the building that keeps the queue to one semitrailer under the Stage 1 condition. For the purposes of conservatively evaluating worst-case queuing space needs, represented by the 1,400 TPD Stage 2 full capacity increase, the estimated queue of 4 semitrailers will be used.

Although the estimated queue of 4 semitrailers is expected to represent a conservative (worst-case) condition, the facility layout provides sufficient capacity to accommodate this number of vehicles. Based on a queue of 4 semitrailers under proposed conditions, there is single lane queuing capacity for 5 trailers from the rail crossing to the expanded (Stage 2) building without interfering with vehicles departing the building. There is an additional queuing capacity for 8 semitrailers from the railroad tracks back to the truck scales. Therefore, the facility has a total single lane queuing capacity to the building of approximately 13 semitrailers, exceeding the conservative peak queuing estimate of 4 semitrailers for the proposed capacity increase to 1,400 TPD. With respect to vehicles in the queue to the building, there is signage posted at the building that limits truck idling time to 5 minutes, in accordance with the maximum amount of idle time allowed under Massachusetts regulations (MGL Ch. 90 §16A). ReSource Ware will post additional signage along the access road to the C&D building to further message to the truck drivers the maximum allowable idle time.

Truck Queuing at Outbound Scale

Queuing at the outbound scale is a function of the frequency at which vehicles leave the C&D building. Assuming the three main bays of the building are occupied by semitrailers and the three vehicles complete dumping and leave the building simultaneously, then three semitrailers would travel to the outbound scale for weighing, placing one semitrailer on the scale for weigh-out and two waiting in the queue. As noted earlier in this section, Sanborn Head recorded the typical vehicle weigh-in and weigh-out times at the truck scales for all vehicles entering and exiting the site on March 9, 2023. The maximum weigh-out time was 5 minutes and 41 seconds (5m:41s) and the minimum was 26 seconds (0m:26s) with an average for all vehicles of 2 minutes and 8 seconds (2m:8s). For the purposes of evaluating potential queuing at the outbound scale, an average scale crossing weigh-out time was chosen as 3 minutes (3m:0s).

Based on an outbound scale weigh-out time of 3 minutes, the three semitrailers at the outbound scale (one on the scale and two in queue) will have all weighed out in 9 minutes. If we further assume, conservatively, that there are three semitrailers unloading in the building during the same period as the three semitrailers are weighing out, then the three in the building, completing their unloading in a 15-minute period, will not depart the building until 6 minutes after the three semitrailers at the outbound scale have weighed-out and left the site. Therefore, the maximum queue at the outbound scale for semitrailers is two, with an additional semitrailer on the scale weighing out. This would be the case for both the proposed Stage 1 (1,125 TPD) and Stage 2 (1,400 TPD) conditions. This same queue is assumed for existing conditions (750 TPD) as well. This accounts for the possibility that, although currently there are two overhead doors that provide principal vehicle access to the tipping floor, the building has three dumping bays (two bays accessed via Door No. 3), therefore, three semitrailers could depart the building simultaneously under existing operations.

The summary of semitrailer queuing at the outbound scale is summarized in Table 12.

Table 12
Estimated Maximum Semitrailer Queues at Outbound Scale for Existing and Proposed Full Capacity Operations

Item	Existing Conditions Full Capacity 750 TPD	Proposed Conditions	
		STAGE 1 Full Capacity 1,125 TPD	STAGE 2 Full Capacity 1,400 TPD
Maximum Estimated Queue	2 semitrailers in queue and 1 semitrailer on scale	2 semitrailers in queue and 1 semitrailer on scale	2 semitrailers in queue and 1 semitrailer on scale

There is single lane queuing capacity for 8 semitrailers from the rail crossing to the approach pad of the outbound scale, exceeding the projected maximum queue of 2 semitrailers.

8.8.5 Railcar Loading, Storage, and Collection

As summarized in Section 8.8.1, under the proposed two-staged capacity increase, ReSource Ware proposes no building or site alterations for Stage 1, whereas Stage 2 will include a building expansion and construction of additional rail siding. This section describes how the existing size of the facility's rail infrastructure is sufficient to support the proposed "no-build" Stage 1 capacity increase to 1,125 TPD. This section also describes how the proposed Stage 2 building and site modifications will adequately support the rail-related facility operations associated with the subsequent increase from 1,125 TPD to the maximum permitted capacity of 1,400 TPD.

A common operational consideration for evaluating the size of a facility is understanding its throughput capacity, or the amount of time it takes to cycle material through the building. For the ReSource Ware facility, the throughput capacity is based on the time it takes to load an empty railcar and have the next car in-place and ready for loading. This empty-to-empty railcar cycle time will indicate the theoretical maximum daily throughput tonnage for the building under Stage 1 and Stage 2 conditions. The throughput capacity can then be compared to the sought-after tonnage increase for Stage 1 and Stage 2 and whether the railcar storage and collection frequency can support the proposed tonnage increase associated with each stage.

During Sanborn Head's full-day facility observations on December 2, 2021, the times required to cycle each railcar through the building, from entering empty, to loading, weighing and removing from the building, to having the next empty railcar in-place and ready for loading, was recorded. The typical time span for these activities is summarized in Table 13.

Table 13
Typical Railcar Cycle Time
(Time to Fill One Railcar and Ready the Next for Loading)

Activity	Time
Loading time	41 minutes
Time to top-dress railcars with C&D fines	4 minutes
Tarping time	2 minutes
Time to weigh-out full railcar and weigh-in next empty railcar	6 minutes
Total Cycle Time (empty-to-empty)	**53 minutes**

Using the above cycle time of 53 minutes for a railcar in the rail pit of the building, the hourly throughput tonnage associated with each railcar can be calculated and then applied to the theoretical throughput rate for the facility over a full operating day. To calculate the railcar tonnage throughput, the allowable tonnage per railcar is needed. ReSource Ware has a

mixed fleet of railcars, with some having a maximum load limit of 100 tons per car and others with a load limit of 106 tons per car. For the purposes of this evaluation, each railcar is assumed to have a cargo weight of 100 tons. Using the railcar cycle time of 53 minutes and a load weight of 100 tons, the hourly tonnage throughput rate for a railcar is approximately 114 tons per hour (TPH), as summarized in Table 14.

Table 14
Railcar Hourly Tonnage Throughput

Tons Per Railcar (load weight)	Railcar Cycle Time	Railcar Throughput Rate in minutes	Railcar Hourly Throughput Rate
100 tons	53 minutes	1.9 tons/minute	114 tons per hour (TPH)

Table 15 summarizes how the railcar hourly throughput rate of 114 TPH is used to calculate the theoretical throughput rate of the facility under existing, and proposed Stage 1 and Stage 2 conditions and compares these rates to the permit capacity associated with each.

Table 15
Theoretical Throughput Capacity of Facility – Existing and Proposed Conditions

Condition	Railcar Throughput Rate	Railcars that can be Loaded Simultaneously	Operating Hours/Day	Theoretical Facility Throughput Capacity (TPD)	***Permit Capacity***
Existing	114 TPH/railcar	1 railcar	9 hours/day	1,026 TPD	*750 TPD*
Proposed Stage 1	114 TPH/railcar	1 railcar	11 hours/day	1,254 TPD	*1,125 TPD*
Proposed Stage 2	114 TPH/railcar	2 railcars	11 hours/day	2,508 TPD	*1,400 TPD*

It is important to emphasize that the theoretical facility throughputs summarized in Table 15 reflect maximum theoretical operating conditions. To this end, it assumes the facility is operating at a steady railcar loading rate of one car every 53 minutes for every hour of the operating day. These are maximizing assumptions as there are typical down periods during an operating day when loading activities may not always be occurring continuously. Nevertheless, the theoretical maximum daily throughputs are provided for general comparison purposes to the permitted tonnages to show that the facility has the capacity to conduct railcar loading activities at a rate that exceeds the proposed Stage 1 and Stage 2 permitted daily tonnages.

With the theoretical facility throughput rates identified, the remainder of this section describes how the size of the facility (existing and proposed) meets the requirements for railcar storage under both Stage 1 and Stage 2 conditions.

Stage 1 Railcar Considerations

As noted above, the proposed Stage 1 capacity increase does not involve any building or site modifications and therefore relies on the facility's existing layout to support the proposed capacity increase to 1,125 TPD. With respect to vehicle queuing, the existing facility layout can accommodate the proposed Stage 2 capacity increase of 1,400 TPD (Section 8.8.4), therefore, the layout can accommodate the lesser queuing impacts that would be associated with 1,125 TPD operations. With respect to railcar storage, the evaluation of the size of the facility relative to the Stage 1 increase focuses on the ability of the existing railcar siding to provide sufficient storage capacity to support a peak operating capacity of 1,125 TPD.

Table 8 (Section 8.8.2) provides a summary of the total railcar storage provided by the four railroad tracks that comprise the existing rail siding for the facility. As noted in Table 8, the siding provides storage for up to 15 railcars. Under current permitted operations of 750 TPD and each full railcar having a load weight of 100 tons, approximately seven to eight railcars are needed to handle a day's worth of material throughput. Therefore, there needs to be storage capacity for approximately seven to eight empty railcars on the siding and swing space for seven to eight cars as they are filled during the day. The railcar storage need of 15 total railcar spaces is reflected in the storage space provided under existing conditions (see Detail A of Figure 13).

An important consideration when evaluating the adequacy of the facility's existing railcar storage capacity is the frequency that empty cars are delivered and full cars removed from the site by MCER. Under typical operations, MCER visits the site mid-morning, dropping off seven to eight empty railcars and returns in the early afternoon to collect seven to eight full railcars. In this way, a daily balance is maintained at the facility to store the required 15 railcars that support 750 TPD operations.

Under the proposed Stage 1 capacity increase, using the same ratios where empty railcar storage is based on one car per 100 tons of permitted capacity and full railcar storage is based on this same ratio, the facility would require storage capacity for up to 22 railcars; 11 full and 11 empty if, MCER were to perform one empty railcar delivery and one full railcar collection per day, similar to its current operations. However, instead of expanding the rail line to provide additional railcar storage in Stage 1, ReSource Ware will have MCER perform three visits per day. The first two visits will be similar to visits currently performed: empty railcar delivery in the morning and full railcar pickup in the early afternoon. The additional Stage 1 visit would occur later in the afternoon and consist of a combination of both empty railcar drop-off and full railcar pickup. With the three visits the same balance of cars will be retained on the site as experienced under current conditions. The expanded operating hours will facilitate the additional visit to the site by MCER each day during the Stage 1 period.

Table 16 provides a comparison between the proposed Stage 1 railcar collection and drop-off frequency and the existing conditions collection and drop-off frequency. The estimated collection and drop-off times shown for Stage 1 reflect Sanborn Head's evaluation of railcar

filling rates and sequencing, where the times shown represent reasonable periods for when full railcars would be ready for pick-up and empty cars can be dropped off at the site.

Table 16
Proposed Stage 1 Railcar Storage and Collection Compared to Existing Conditions

Condition	Permit Capacity	Operating Hours	Total Railcar Storage Provided	Approximate Railcar Collection/Drop Frequency
Existing	750 TPD	7:00 am to 4:00 pm	15	≈10:00 am drop-off of 7 to 8 empty cars ≈1:00 pm pickup of 7 to 8 full cars
Proposed Stage 1	1,125 TPD	7:00 am to 6:00 pm	15 (no change)	≈10:00 am drop-off of 7 empty railcars ≈2:00 pm pickup of 7 full cars ≈4:30 pm drop-off of 4 empty railcars and pickup 3 full railcars

As shown in Table 16, when the facility is operating at the Stage 1 permitted capacity of 1,125 TPD, MCER would collect approximately 10 full railcars at the site, equating to approximately 1,000 tons being rail-hauled from the facility. The remaining 125 tons of the day's permitted capacity would be placed in railcars as part of the facility's end of day operations and would be collected by MCER the following operating day.

Stage 2 Railcar Considerations

As summarized in Section 8.8.1, the C&D building will be expanded to accommodate the Stage 2 capacity increase to 1,400 TPD. Additional railroad track siding will also be constructed as part of the Stage 2 increase. The building expansion will consist of extending the tipping floor and rail pit an additional 50 feet from its existing southern façade along the full 180-foot width of the building. The 50-foot extension will increase the building's width from 120 feet to 170 feet and provide adequate length within the rail pit to simultaneously load two railcars (each car being approximately 65 feet in length). The current loading operations for a single railcar rely on an excavator and a front-end-loader to load the car. Under Stage 2 conditions, an additional excavator and front-end-loader will operate within the expanded building, dedicated to the loading required for the second railcar. The expansion of the rail pit and increase in railcar loading from one car to two will also include the installation of an additional rail scale in the pit for weighing of the second car.

Expanding the length of the railroad siding under Stage 2 will allow the drop-off and pickup of railcars by MCER to drop to one visit per day (combination of both empty railcar drop-off and full railcar pick-up). A 1,400 TPD operational throughput requires that railcar storage be provided for 14 empty cars and 14 full cars, or a total siding storage of 28 railcars (an increase of 13 cars from existing and proposed Stage 1 conditions). To provide the additional railcar storage requires that the main line track be shifted approximately 25 feet east of its current location in the site area, for a distance of approximately 1,500 feet. Shifting the main

rail line will provide space within the railroad property to construct additional track siding for the facility. Table 17 compares the estimated total length of siding associated with the proposed Stage 2 capacity increase with the length of siding currently provided at the facility.

Table 17
Comparison of Length of Existing Railroad Track Siding to Proposed Stage 2 Anticipated Siding Length

Siding Track No.	EXISTING CONDITIONS (SAME AS STAGE 1) Approximate Track Siding Length (ft)			PROPOSED STAGE 2 CONDITIONS Approximate Track Siding Length (ft)		
	Site Property	MassDOT Property	Total	Site Property	MassDOT Property	Total
1	570	255	**825**	625	390	**1,015**
2	505	35	**540**	560	95	**650**
3	65	295	**360**	0	885	**890**
4	0	315	**315**	0	485	**490**
Tail Track	NA	NA	**NA**	0	305	**305**
Totals	**1,140**	**900**	**2,040**	**1,185**	**2,160**	**3,345**

The proposed track layout for the Stage 2 capacity increase is shown on Detail B of Figure 13. As shown on the figure, the proposed layout provides storage capacity for a total of 28 railcars (14 empty, 14 full). Under Stage 2 conditions, it is anticipated the 14 empty railcars would be brought to the facility in the morning shortly after operations begin. MCER could then, as part of the same visit, remove 14 full railcars from the prior day's operations. Having capacity to store 14 full railcars corresponds to railcar storage capacity that meets the proposed Stage 2 operating capacity of 1,400 TPD.

It should be noted that the simultaneous loading of two railcars in the building under Stage 2 conditions will be double the railcar throughput rate compared to existing and Stage 1 conditions. As summarized in Table 14, the throughput tonnage provided by a single railcar in the rail pit is approximately 114 tons per hour of material transferred through the building. This throughput rate at the building increases to 228 tons per hour with dual railcar loading occurring under Stage 2 conditions. Therefore, if MCER were to return to the facility later in the day to complete a dedicated full railcar pick-up, the 14 cars could be ready by as early 6 to 7 hours from the start of operations (meaning on a high throughput day the 14 cars could be filled by 2:00 pm in the afternoon).

In summary, Sanborn Head's evaluation of the facility's throughput capacity and related railcar storage needs confirms that the existing facility can accommodate the proposed Stage 1 tonnage increase to 1,125 TPD. Similarly, with the expansion of the C&D building and the construction of additional rail siding proposed as part of the Stage 2 capacity increase, the expanded facility will be adequately sized to accommodate the increase to 1,400 TPD.

8.8.6 Tipping Floor Storage Capacity

As summarized in Section 8.8.3, the facility's February 2016 Authorization to Operate permit states that no more than a maximum of one day's permitted operation (750 tons) of C&D material may be kept on the tipping floor of the facility at any time. The existing facility, with the removal of the remaining components of the former C&D processing line, provides sufficient space on the tipping floor to store the equivalent of one day's permitted operation associated with the proposed Stage 1 increase (1,125 tons). Similarly, for Stage 2, the expanded tipping floor area provides sufficient space to store the equivalent of one day's permitted operation associated with the proposed Stage 2 increase (1,400 tons).

8.8.7 Facility Modifications

Stage 1

As described previously in this section, there are no site or building alterations required or proposed in connection with the Stage 1 capacity increase. However, when referring to "existing conditions" as they pertain to Stage 1, these conditions will result once ReSource Ware completes some minor facility modifications that were previously approved by MassDEP in May of 2022 and January of 2023. The MassDEP approvals for these minor modifications were issued in connection with two BWP SW45 permit applications that ReSource Ware filed with the Department in March of 2022 and November of 2022 (see Section 2.6.2).

One of these modifications, the installation of a new roll-up door on the building's southern façade to allow increased truck access to the tipping floor, is relevant to Stage 1. Because the door will be installed prior to when Stage 1 operations would begin, existing conditions for Stage 1, as presented herein, accounts for the additional roll-up door being in-place. Similarly, the elevated picking station and other remnants of the former processing line currently located in the C&D building will also be removed prior to when Stage 1 operations would begin. Lastly, installation of the large roll-up door on the western façade of the building (for ReSource Waste's C&D fines deliveries) will also be installed prior to the start of Stage 1 operations (note: this door will be lightly used and is not integral to accommodating the Stage 1 or Stage 2 capacity increase). Because these features have not yet been installed, they would not be shown on an existing conditions floor plan of the facility. However, they will be in place prior to the start of Stage 1 operations, and therefore would be appropriate to show on a Stage 1 existing conditions floor plan.

MassDEP's previously approved minor modifications to the C&D building (installation of the additional south-facing roll-up door, removal of the processing line, and installation of the west door) that have not yet been performed but will be completed before Stage 1 operations begin, are shown on Figures 8A, 8B, and 8C. These three figures depict the migration from existing conditions in the building as they presently exist, to existing conditions that will exist prior to Stage 1. A summary of the information shown on the three figures is provided below:

- *Figure 8A: Existing Conditions - C&D Building Floor Plan*

  Figure 8A depicts current conditions of the C&D building tipping floor and rail pit. The full extent of the original processing line is shown and the component equipment is itemized. The components of the processing that were previously removed are highlighted on the figure.

- *Figure 8B: Existing Conditions – MassDEP Approved Alterations Not Yet Performed*

  Figure 8B depicts the specific building elements that will be modified pursuant to prior approvals issued by MassDEP. As shown on the figure, these elements consist of: installing a new roll-up door for trucks to access the tipping floor (labelled as Door No. 4 on Figure 8B); placing additional steel cladding along a portion of the interior face of the west wall of the building to increase the push wall length in this area; removal of the elevated picking station and remaining processing equipment; removal of concrete pads and selected partition walls associated with the former processing line; and installation of the large roll-up door on the building's western façade (labelled as West Door on Figure 8B).

- *Figure 8C: Existing Conditions – Following Completion of Previously Approved Alterations*

  Figure 8C depicts conditions within the C&D building following the removal and installation of the items identified on Figure 8B. The floor conditions shown on Figure 8C represent existing conditions that will be in-place prior to the start of Stage 1 operations. Accordingly, Figure 8C represents the existing conditions floor plan for Stage 1 operations.

The Existing Conditions Site Plan, provided as Figure 7, represents site conditions that are also applicable to Stage 1, since there are no site alterations required or proposed in connection with the Stage 1 capacity increase. Figure 7 shows the existing traffic flow pattern at the site, which also represents the traffic flow associated with the Stage 1 capacity increase.

Stage 2

The building and site modifications associated with the proposed Stage 2 capacity increase are shown on Figures 9 (A and B) through 12. A summary of the information shown on these figures is provided below:

- *Figure 9A: Proposed Conditions Site Plan (Stage 2)*

  Figure 9A depicts the site alterations associated with the Stage 2 capacity increase. Alterations related to the building expansion shown on Figure 9A include: the footprint of the proposed 50-foot by 180-foot building expansion; regrading of the paved apron area in front of the building expansion to accommodate the extended floor elevation of the building; a new site retaining wall that ties to the building expansion at the rail pit entrance to the building; and relocation of storm drain utilities and a water line extension to a yard hydrant. The relocation of the storm drain utilities and hydrant reflect minor adjustments to their current locations, but

are necessitated by the 50-foot extension of the building's southern façade. As shown on Figure 9A, the building expansion and building-related site work is confined to the limits of the existing paved area south of the building.

The rail line modifications are also shown on Figure 9A and depict the main line and rail siding alterations summarized in Table 17. To accommodate the rail alterations, a proposed retaining wall is shown running along the eastern side of the railroad property for a distance of approximately 1,100 feet.

In addition to the site and building modifications, Figure 9A also shows the traffic flow pattern associated with the Stage 2 capacity increase.

- *Figure 9B: Proposed Conditions – Enlarged Site Plan (Stage 2)*

  Figure 9B is an enlarged site plan that focuses on only that portion of the site where building and site alterations are proposed. The plan depicts the same existing and proposed site features as shown on Figure 9A, but at a larger scale.

- *Figure 10: Proposed Conditions – C&D Building Floor Plan (Stage 2)*

  Figure 10 depicts the proposed floor plan of the C&D building, showing the proposed building alterations and site utility alterations in the immediate vicinity of the building. Figure 10 also shows the demolition of the existing site retaining wall that creates the grade separation between the tipping floor access and railcar pit access and shows the proposed retaining wall that will replace it.

- *Figure 11: Proposed Building Profile – West Elevation (Stage 2)*

  Figure 11 provides an elevation view of the western façade of the building, depicting the existing building's western elevation and the proposed elevation showing the building expansion.

- *Figure 12: Proposed Building Profile – South Elevation (Stage 2)*

  Figure 12 provides an elevation view of the southern façade of the building, depicting the existing building's southern elevation and wall elements that will be removed as part of the building expansion. Figure 12 also shows the final conditions view of the southern elevation of the building.

8.8.8 100-Foot Property Line Setback

When demonstrating the adequate sizing of a solid waste facility, as required under 310 CMR 16.40(4)(h) of the Site Assignment Regulations, the regulations specify a minimum 100-foot setback from the site property line to the waste handling area. As summarized in Section 4.3, the O'Riley Family Trust (owner of the site at the time the original Site Suitability Report was filed in February of 2003) received a limited waiver with respect to the distance of the waste handling area to the property boundary of the rail line owned by the Commonwealth of Massachusetts and licensed to MCER for the purposes of providing freight railroad service which bisects the property. On May 19, 2003 Ed Kunce, the then Acting Commissioner of MassDEP, issued the decision to grant the waiver. A copy of the Commissioner's decision is

provided in Appendix D. The waiver applies only to the Commonwealth of Massachusetts owned railroad corridor. The 100-foot property line setback requirement is achieved or exceeded for all other abutting properties.

As described in Section 4.3.3, the proposed two-staged capacity increase can be accommodated with no modification to the existing waiver. Furthermore, the proposed facility modifications do not require that an additional waiver be obtained as the waste handling area associated with the proposed capacity increase will be located within the existing site assignment limits.

8.9 Areas Previously Used for Solid Waste Disposal

Based on solid waste documents reviewed by Sanborn Head, including the original 2003 site assignment application, there were no former solid waste disposal activities performed on the site or on properties abutting the site. Accordingly, this siting criterion is not applicable.

8.10 Existing Disposal Facilities

There are no active solid waste landfills or combustion facilities in the Town of Ware. Per the MassDEP database of *Inactive & Closed Landfills and Dumping Grounds* (January 2020), there are two closed and capped landfills and one inactive landfill with closure status unknown in the Town of Ware. There are also two closed dumping grounds and two inactive dumping grounds with unknown closure status. A summary of these closed and inactive landfills and dumping grounds is provided in Table 18.

Table 18
Closed and Inactive Landfills and Dumping Grounds in the Town of Ware

Facility Name	Classification	Waste Type	Closure Status
Ware Landfill	Landfill	MSW	Closure Complete
200 West Street Site	Landfill	MSW	Closure Complete
Morin Farm Landfill	Landfill	MSW	Inactive; Closure Status Unknown
DeSantis Property	Dumping Ground	MSW	Closure Complete
Ware Freight Yard	Dumping Ground	MSW	Closure Complete
Real Estate Restoration Inc.	Dumping Ground	C&D Waste	Inactive; Closure Status Unknown
Ware-Enfield Rd Dump	Dumping Ground	Woodwaste	Inactive; Closure Status Unknown

Source: MassDEP list of Inactive & Closed Landfills and Dumping Grounds, January 2020.

The use of the facility is not for the exclusive use of the Town of Ware. Based on 2021 facility tonnage data, approximately 80 percent of the tonnage received at ReSource Ware was delivered as processed material coming from ReSource Waste's other processing facilities, with the remaining 20 percent coming from private haulers delivering unprocessed C&D. Of the 20 percent delivered by private haulers, ReSource Ware's 2021 data indicates that approximately 2 percent originated from within the Town of Ware. Using 2 percent as the representative percentage of C&D material that would be delivered to the facility from the Town of Ware under future conditions, approximately 23 TPD is estimated to originate from Ware under the Stage 1 capacity increase and approximately 28 TPD under the Stage 2 increase.

There are four other C&D handling facilities located within a 30-mile radius of ReSource Ware. Two of these are located at the outer edge of the 30-mile radius in Fitchburg, Massachusetts (AKS Recycling and Harvey Recycling). The other two are located to the southwest in Wilbraham (Waste Management Western Processing Facility) and West Springfield (K&W Materials and Recycling). The Wilbraham facility is closest to ReSource Ware, located approximately 15 miles away. Although the majority of ReSource Ware's capacity supports the receipt of processed C&D originating from ReSource Waste's other processing facilities, ReSource Ware provides an important outlet for the acceptance and handling of C&D generated in and near Ware.

ReSource Ware operates the facility pursuant to MassDEP waste ban requirements, as defined in 310 CMR 19.017 of the Solid Waste Regulations and provided in the facility's approved Waste Ban Compliance Plan. The facility also directly supports the recovery of recyclables from C&D material processed at ReSource Waste's other processing facilities by providing a means to rail haul the remaining C&D residuals out-of-state for ultimate disposal.

Unprocessed C&D material delivered to ReSource Ware by local haulers is handled in accordance with MassDEP's *Minimum Performance Standards for Construction and Demolition Handling Facilities* (MPS, October 2021). Pursuant to the MPS guidance, ReSource Ware separates clean gypsum wallboard and zero tolerance waste ban items from the incoming, unprocessed C&D loads. These recovered materials are stored in their current locations in roll-off containers immediately south of the building. The remaining C&D material from these incoming, unprocessed loads are stored in the southwestern corner of the tipping floor until a sufficient quantity has accumulated, at which time it will be loaded into a semitrailer for transport to an MPS-compliant facility. This is the process now employed by ReSource Ware with its recent reclassification as a C&D Transfer Station. As a transfer station, the facility has elected to transfer unprocessed C&D material to an MPS-compliant facility, where recyclable materials will be removed from the load.

8.11 Other Sources of Contamination or Pollution

The facility as designed and operated includes environmental controls for stormwater, dust, noise, and other nuisance conditions, as presented in Sections 8.6 and 8.7. These controls, and the supporting studies performed as part of the original permitting and design activities, confirm that the facility does not pose a threat to public health, safety or the environment. The studies conducted in connection with the currently proposed capacity increase also

confirm that the proposed Project does not pose a threat to public health, safety or the environment.

With respect to the proposed capacity increase, measures taken to avoid, minimize, and mitigate air quality impacts are summarized in Section 8.6 and consist of the following:

- Routing of offsite trucks to minimize air quality impacts in the Ware EJ community.
- Installation of catalytic converters on four pieces of onsite heavy equipment used in the operation of the facility.
- Use of a water misting system within the building and road watering/street sweeping onsite to control dust.

As summarized in Section 8.7.1, ReSource Ware has committed to avoid, minimize, and mitigate noise by taking the following measures:

- Conducting operations within the building.
- Use of a speed limit to minimize sound from trucking operations.
- Retrofit onsite equipment with white noise (broadband) backup alarms to replace beepers.

Sanborn Head conducted a search of MassDEP's online data portal for Waste Site & Reportable Releases to determine whether there were any reportable releases of oil and hazardous materials at the site. The data portal identified one release had occurred on the property (Release Tracking Number 1-0018752) in June of 2012, which was unrelated to the C&D facility operations. The release was subsequently closed with a Permanent Solution Without Conditions (PSNC) in August of 2014, pursuant to the provisions of the Massachusetts Contingency Plan.

Sanborn Head reviewed the PSNC, prepared by SAK Environmental, to identify the nature of the release and its location in the event the release occurred within an area where the site or building alterations for the Stage 2 capacity increase are proposed. The PSNC identified the release as a petroleum release occurring immediately behind the main office building at the site entrance. The evaluation area for the release encompassed a 50-foot by 40-foot area. The results of SAK's investigations led to the Licensed Site Professional's (LSP) filing of the PSNC, which closed-out the release requiring no further investigations. Because the former release is outside of the proposed limit of work for the Stage 2 site and building modifications, there are no special considerations necessary for the management of soils associated with Stage 2 earthwork insofar as the former petroleum release is concerned.

8.12 Regional Participation

The Town of Ware does not currently participate in any regional disposal facility. Municipal solid waste from the Town is primarily collected by private haulers who contract with area disposal facilities.

8.13 Integrated Solid Waste Management

The section of MassDEP's BWP SW38 permit application form that addresses Integrated Solid Waste Management (Section IV of the application form) requires a response only if the site assignment or site assignment modification pertains to a landfill or combustion facility, which is consistent with the requirements of 310 CMR 16.40(5) of the Site Assignment Regulations. Because ReSource Ware is a C&D handling facility, a response to this section of the permit application is not required.

Although a response to Integrated Solid Waste Management is not required pursuant to Section IV of the BWP SW38 permit application form or the Site Assignment Regulations, the application form includes a subsection related to "Capacity Need". In the interest of providing information related to the basis for the sought-after capacity increase, the following narrative has been prepared.

8.13.1 Capacity Need

ReSource Waste Services owns and operates four C&D processing facilities located in Roxbury, Massachusetts, Salem, New Hampshire, Epping, New Hampshire, and Lewiston, Maine. The facilities in Roxbury, Salem, and Epping deliver a portion of their C&D residuals to ReSource Ware where it is rail-hauled out of state for final disposal. The capacity increase sought in connection with this site assignment modification would allow ReSource Ware to accept a greater amount of C&D residuals from ReSource Waste's processing facilities, specifically the facilities in Roxbury, Salem, and Epping. The total tonnage of C&D residuals generated at Roxbury, Salem, and Epping in 2021 is summarized in Table 19.

Table 19
Tons of C&D Residuals Generated at ReSource Waste Services' Massachusetts and New Hampshire C&D Processing Facilities (2021)

Location	Residuals Generated for Disposal (2021)
Roxbury, Massachusetts	135,072
Salem, New Hampshire	156,479
Epping, New Hampshire	81,369
Totals	**373,190**

The total residuals generated at the above processing facilities provides an annual reference tonnage against which the sought-after two-staged capacity increase may be compared. This comparison is presented in Table 20 and is intended to provide a general concept of how the capacity increase would be distributed under the maximum annual permitted tonnages proposed for Stage 1 and Stage 2. The conceptual distribution is based on current (2021) annual C&D residuals generated at Roxbury, Salem, and Epping from Table 19 and rounding this value to 375,000 TPY. An annual set-aside for street sweepings and catch basin

cleanings (see Section 2.4) is factored into the distribution, and a net tonnage of between 10,000 and 20,000 TPY is reserved for C&D material delivered to the facility from third party sources. This third party tonnage range reflects a reduction in what the facility currently accepts (approximately 30,000 TPY in 2021) and represents ReSource Ware's planned reduction in accepting third party C&D loads.

Table 20
Conceptual Tonnage Distribution Associated with Proposed Stage 1 and Stage 2 Capacity Increases

Stage	Capacity Increase - Max Permitted TPY[2]	Residuals Generated at RWS[1] Processing Facilities, (TPY)	Planning-Level % of Total RWS Residuals to ReSource Ware	Estimated Residuals from RWS Processing Facilities to ReSource Ware (TPY)	Set-Aside for Street Sweepings & Catch Basin Cleanings (TPY)[3]	Net Third Party C&D Waste (TPY)	Planning Level % Max Permitted Capacity Dedicated to RWS Residuals
Stage 1	**310,625**	*375,000*	*70%*	**262,500**	**31,000**	**17,125**	85%
Stage 2	**393,200**	*375,000*	*90%*	**337,500**	**39,000**	**16,700**	85%

1. RWS = ReSource Waste Services.
2. See Table 2 for calculation of maximum permitted tons per year for Stage 1 and Stage 2.
3. Street sweepings and catch basin cleanings set-aside at 10% of maximum permitted tons per year for Stage 1 and Stage 2 (see Section 2.4).

As shown in Table 20, with the street sweepings and catch basin cleanings set-aside, in combination with a set-aside for third party C&D waste ranging between 10,000 and 20,000 TPY (per Table 20, approximately 17,000 TPY for both Stage 1 and Stage 2), the Stage 1 maximum annual permitted tonnage of 310,625 TPY would provide ReSource Waste Services with the ability to deliver approximately 70 percent of the total C&D residuals generated at their Roxbury, Salem, and Epping processing facilities to ReSource Ware for rail-haul disposal out of state. Under Stage 2 conditions, with the maximum annual permitted tonnage increasing to 393,200 TPY, ReSource Waste would have the ability to deliver approximately 90 percent of the total C&D residuals generated at Roxbury, Salem, and Epping to ReSource Ware.

From a planning perspective, as shown in Table 20, under both Stage 1 and Stage 2 conditions, approximately 85 percent of the total permitted capacity at ReSource Ware would be for the receipt of C&D materials emanating from ReSource Waste's other processing facilities. The remaining capacity would be available to third party sources or could be redirected to ReSource Waste sources, as appropriate.

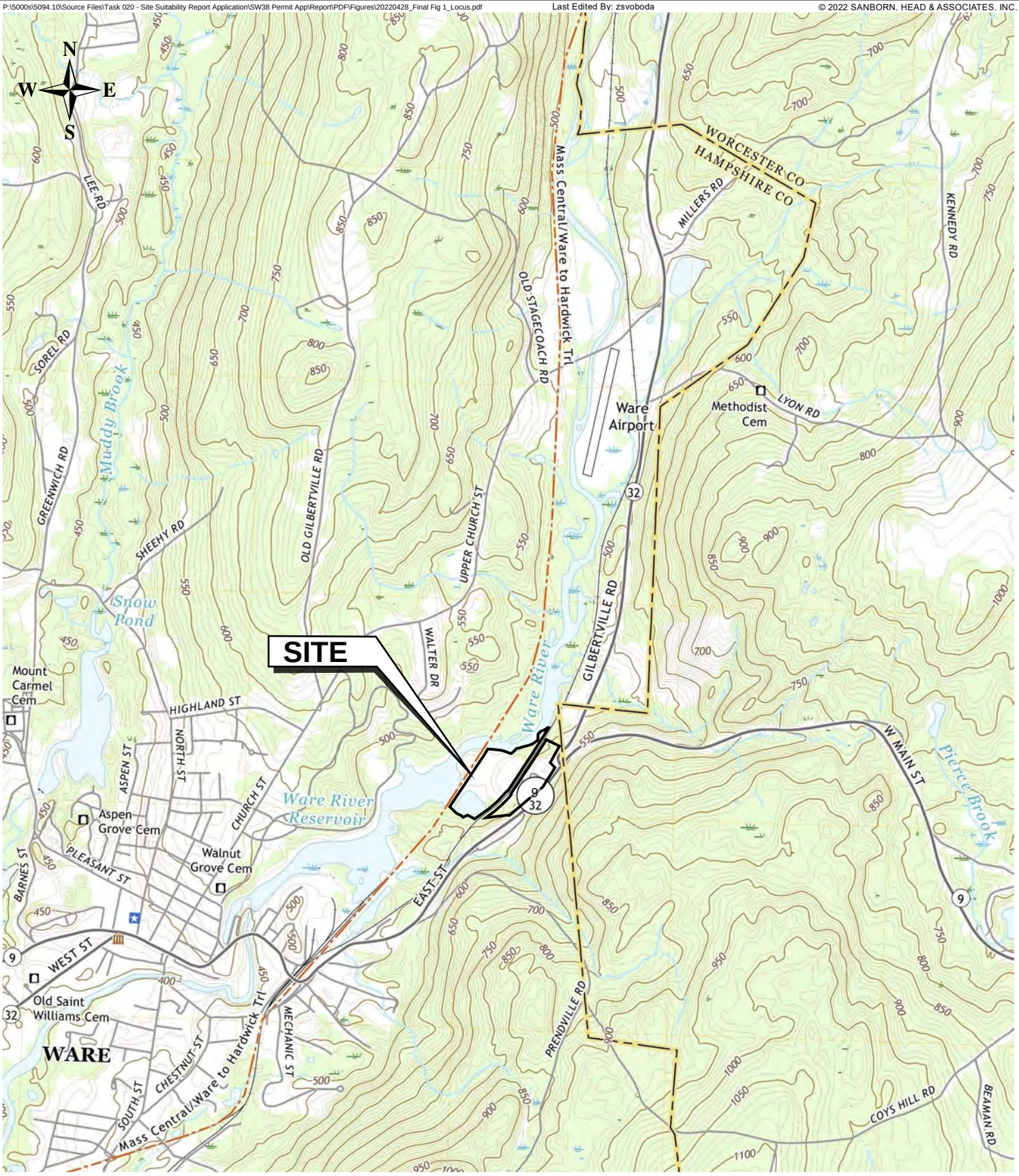
8.14 Waivers

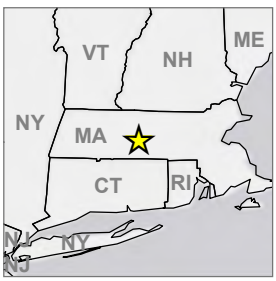
No new waivers or modifications to the existing waiver are requested in connection with this application. As summarized in Section 4.3, the O'Riley Family Trust (owner of the site at the time the original Site Suitability Report was filed in February of 2003) received a limited waiver with respect to the distance of the waste handling area to the property boundary of the rail line owned by the Commonwealth of Massachusetts and licensed to MCER which bisects the site. On May 19, 2003 Ed Kunce, the then Acting Commissioner of MassDEP,

issued the decision to grant the waiver. A copy of the Commissioner's decision is provided in Appendix D. The waiver applies only to the Commonwealth of Massachusetts owned railroad corridor. The 100-foot property line setback requirement is achieved or exceeded for all other abutting properties.

As described in Section 4.3.4, the proposed two-staged capacity increase can be accommodated with no modifications to the existing waiver. Furthermore, the proposed facility modifications do not require any additional waivers as the waste handling area associated with the proposed capacity increase will be located within the existing site assignment limits.

FIGURES





USGS Ware, MA Quadrangle, 2021

Horizontal Datum: NAD 83
Vertical Datum: NAVD 88
Topographic contouring shown is in feet

Drawn By:	Z. Svoboda
Designed By:	S. Wright
Reviewed By:	S. Wright
Project No:	5094.10
Date:	April 2023

1,000 500 0 1,000 2,000 Feet

SANBORN HEAD

Figure 1

Locus Plan

Site Suitability Report for Modification of Existing Site Assignment

ReSource Waste Services of Ware, LLC
Ware, Massachusetts

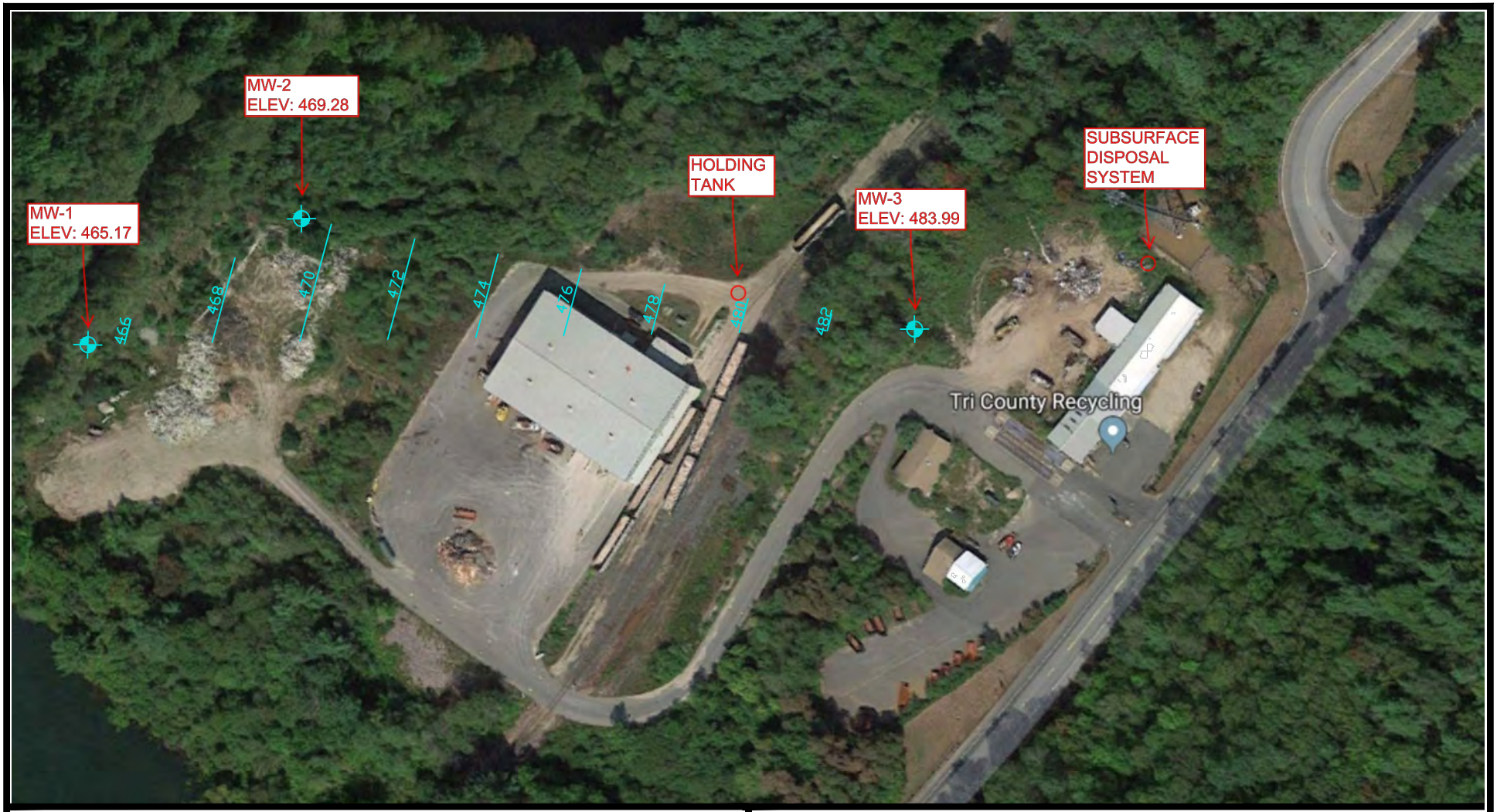


FIGURE NO. 2

GENERALIZED GROUNDWATER CONTOURS

SEPTEMBER 2018

CORNERSTONE
9F PRESIDENTIAL WAY
WOBURN, AMASSACHUSETTS 01801
(781) 937-3045

N

198 EAST STREET

WARE, MASSACHUSETTS 01082

Figure 3

Half-Mile Water Resources Plan

Site Suitability Report for Modification of Existing Site Assignment

ReSource Waste Services of Ware, LLC
Ware, Massachusetts

Drawn By: Z. Svoboda
Designed By: S. Wright
Reviewed By: S. Wright
Project No: 5094.10
Date: April 2023

Notes

1. Features and parcel ownership information downloaded from MassGIS and ESRI in February 2022.

2. 2021 Aerial Photo provided by MassGIS.

3. The following areas are not located within a half-mile of the site:
- Public Water Supply Wells;
- Interim Wellhead Protection Areas (IWPAs);
- Zone II Wellhead Protection Areas; and
- Zone A or Zone B of Surface Water Drinking Water Supplies.

Legend

- Site Property
- Town Line
- County Line
- Parcel Line
- Intermittent Stream
- Perennial Stream
- Water Bodies
- Potentially Productive Aquifer (Medium Yield in area shown)
- 100-Year Floodplain Boundary
- Properties with Private Water Supply Wells

MassDEP Wetlands

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

400 200 0 400 800 Feet

SANBORN HEAD

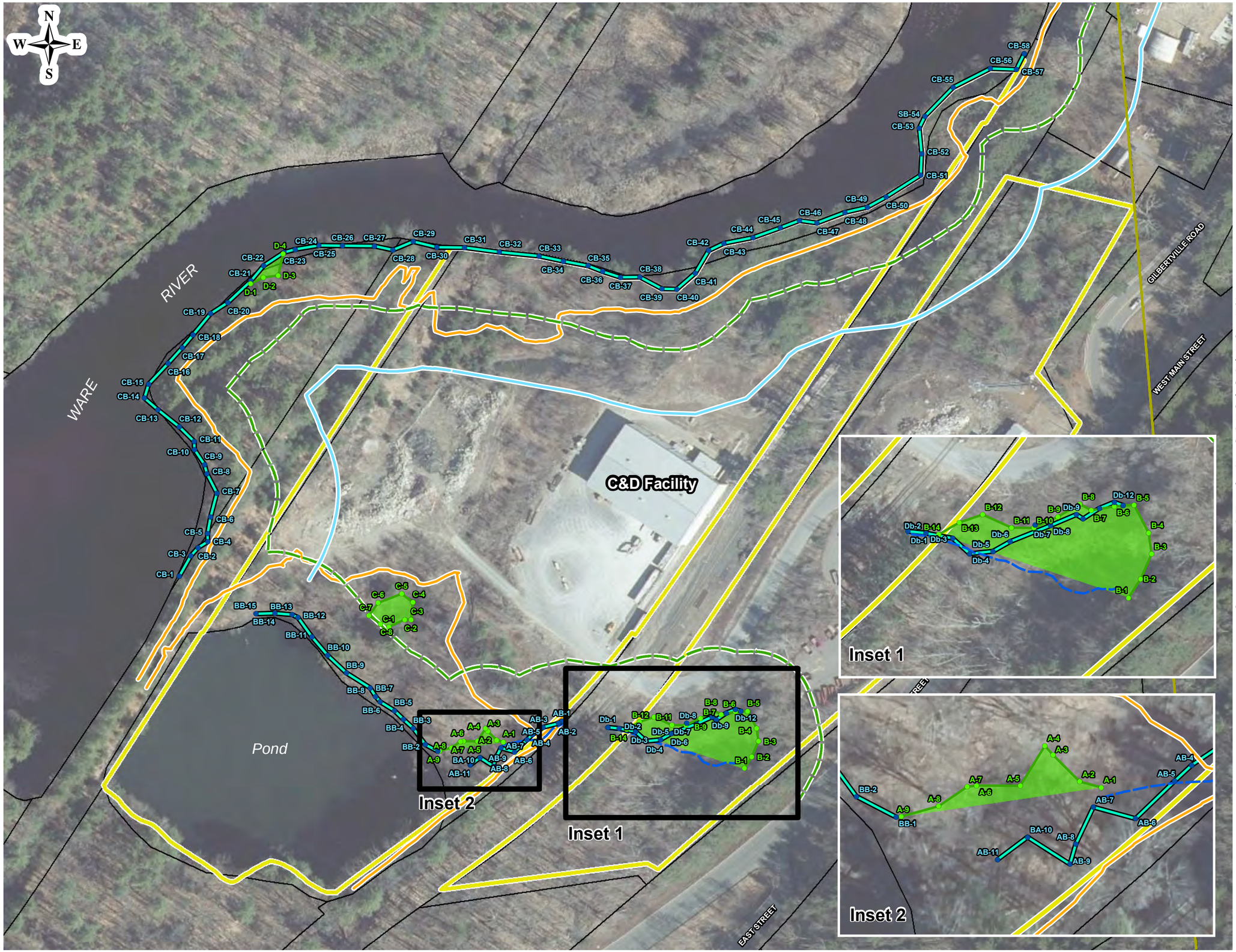


Figure 4

Wetland Resources Site Plan

Site Suitability Report for Modification of Existing Site Assignment

Ware, Massachusetts

Drawn By:	Z. Svoboda
Designed By:	S. Wright
Reviewed By:	S. Wright
Project No:	5094.10
Date:	April 2023

Notes

1. Aerials, roads and parcels downloaded from MassGIS and ESRI in February 2022.

2. The Flood Zone A7 (areas of 100 year flood; base flood elevation determined) is shown on the F.I.R.M. community panel number 250172-0026-B, effective date August 17, 1981, and is labeled as between 472 feet and 473 feet (average about 472.5 feet in the NGVD of 1929 datum). Converting from that datum to NAVD of 1988 datum results in an elevation of slightly less than 472 feet and zone A7 is shown as such using the elevation data collected for this plan. The line between Zone B (500 Year flood zone) and Zone C (area of minimal flooding) is not determined by elevation and is not shown hereon.

3. Wetland flags set by Epsilon Associates, Inc. of Maynard, MA on November 17 and 24, 2021. Wetland flags A-1 to A-9, AB-1 to AB-11, B-1 to B-14, BB-1 to BB-15, C-1 to C-8, and DB-1 to DB-13 located in field by WSP. Locations of flags CB-1 to CB-58 and D-1 to D-4 were provided by Epsilon.

Legend

- Wetland Flag
- Top of Bank Flag
- Delineated Top of Bank Line
- Delineated Wetland Line
- Delineated Wetland
- 200-Foot Riverfront Offset
- 100-Foot Wetland Offset (Buffer Zone)
- 100-Year Flood Boundary
- Intermittent Stream
- Site Boundary
- Parcel Line
- Town Line

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

75 37.5 0 75 150 Feet

SANBORN HEAD

Figure 5

Half-Mile Natural Heritage Plan

Site Suitability Report for Modification of Existing Site Assignment

ReSource Waste Services of Ware, LLC
Ware, Massachusetts

Drawn By: Z. Svoboda
Designed By: S. Wright
Reviewed By: S. Wright
Project No: 5094.10
Date: April 2023

Notes

1. Features and parcel ownership information downloaded from MassGIS and ESRI in February 2022.

2. 2021 Aerial Photo provided by MassGIS.

3. The following areas are not located within a half-mile of the site:
- Certified Vernal Pools

Legend

- Site Property
- Town Line
- County Line
- Parcel Line
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

STEPHEN E. WRIGHT CIVIL No. 39315 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

400 200 0 400 800 Feet

SANBORN HEAD

Figure 6

Half-Mile Land Use Plan

Site Suitability Report for Modification of Existing Site Assignment

ReSource Waste Services of Ware, LLC

Ware, Massachusetts

Drawn By: Z. Svoboda
Designed By: S. Wright
Reviewed By: S. Wright
Project No: 5094.10
Date: April 2023

Notes

1. Features and parcel ownership information downloaded from MassGIS and ESRI in February 2022.

2. 2021 Aerial Photo provided by MassGIS.

Legend

- Site Property Boundary
- Site Assignment Area
- 500-Foot Buffer to Residential Structures
- Town Line
- County Line
- Parcel Line

Open Space:

- Wildlife Management Area
- Municipal Park
- Land Trust
- Chapter 61B Land (Privately owned property accessible to the public for recreational purposes)
- Farmland of Statewide Importance

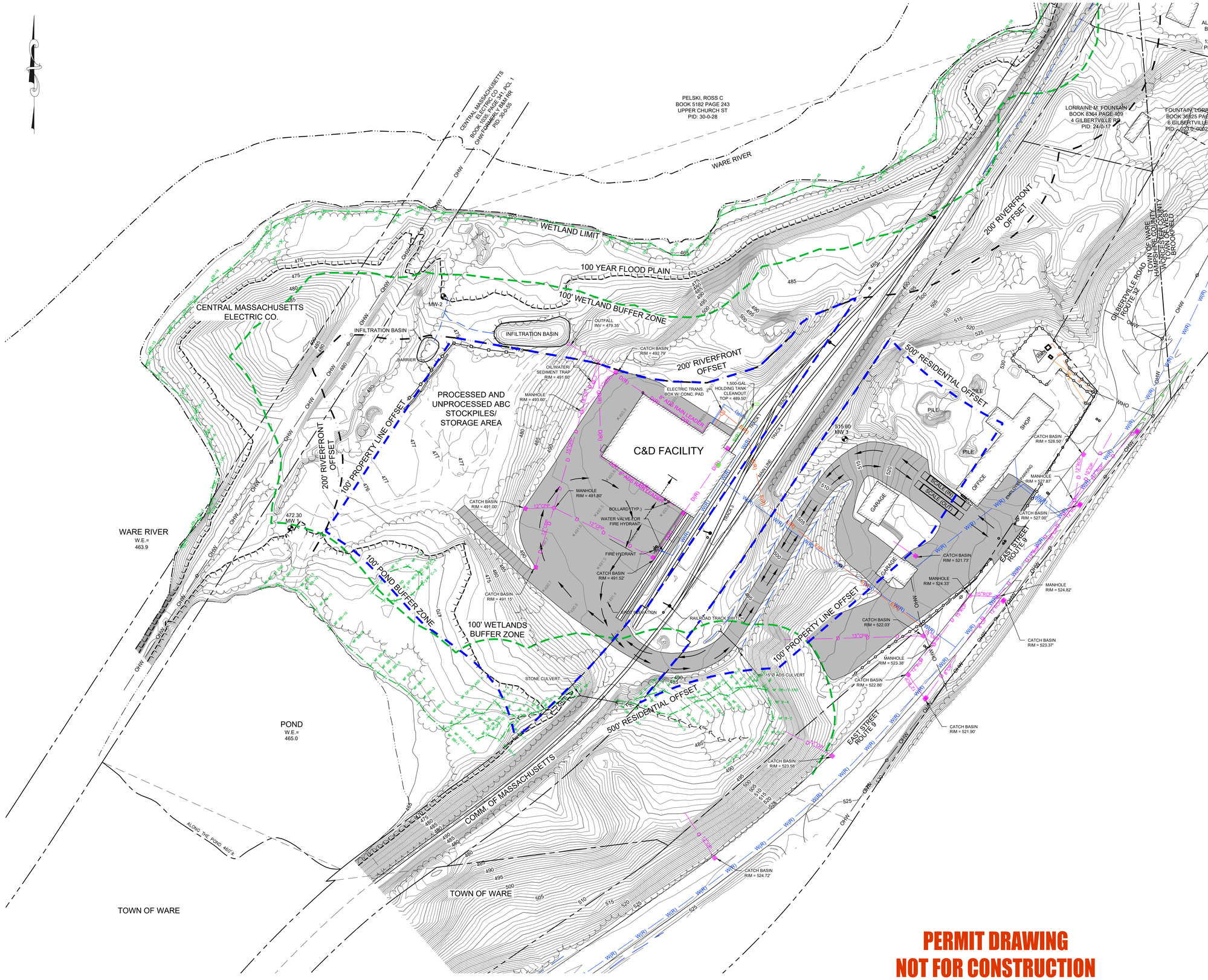
Zoning:

- Downtown Residential (DR)
- Highway Commercial (HC)
- Industrial (I)
- Residential Business (RB)
- Rural Residential (RR)
- Suburban Residential (SR)

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

400 200 0 400 800 Feet

SANBORN HEAD



NOTES:

1. EXISTING TOPOGRAPHY AND SITE FEATURES WERE PREPARED FROM AN AERIAL SURVEY CONDUCTED IN NOVEMBER 2021 AND GROUND SURVEY CONDUCTED IN DECEMBER 2021 BY WSP OF MERRIMACK, NEW HAMPSHIRE AND PROVIDED TO SANBORN HEAD & ASSOCIATES, INC. (SANBORN HEAD) IN DIGITAL FORMAT ON JANUARY 21, 2022.

   1.1. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983, MASSACHUSETTS STATE PLANE MAINLAND COORDINATE SYSTEM AND WAS ESTABLISHED UTILIZING RTK GPS TECHNIQUES.

   1.2. THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE VERTICAL DATUM NAVD88 AND WAS ESTABLISHED ON THE SITE UTILIZING RTK GPS SURVEY TECHNIQUES.

2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.

3. THE FLOOD ZONE A7 (AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATION DETERMINED) IS SHOWN ON THE F.I.R.M. COMMUNITY PANEL NUMBER 250172-0026-B, EFFECTIVE DATE AUGUST 17, 1981, AND IS LABELED AS BETWEEN 472 FEET AND 473 FEET (AVERAGE ABOUT 472.5 FEET IN THE NGVD OF 1929 DATUM). CONVERTING FROM THAT DATUM TO NAVD OF 1988 DATUM RESULTS IN AN ELEVATION OF SLIGHTLY LESS THAN 472 FEET AND ZONE A7 IS SHOWN AS SUCH USING THE ELEVATION DATA COLLECTED FOR THIS PLAN. THE LINE BETWEEN ZONE B (500 YEAR FLOOD ZONE) AND ZONE C (AREA OF MINIMAL FLOODING) IS NOT DETERMINED BY ELEVATION AND IS NOT SHOWN HEREON.

4. WETLAND FLAGS SET BY EPSILON ASSOCIATES, INC. OF MAYNARD, MA ON NOVEMBER 17 AND 24, 2021. WETLAND FLAGS A-1 TO A-9, AB-1 TO AB-11, B-1 TO B-14, BB-1 TO BB-15, C-1 TO C-8, AND DB-1 TO DB-13 LOCATED IN FIELD BY WSP. LOCATIONS OF FLAGS CB-1 TO CB-58 AND D-1 TO D-4 WERE PROVIDED BY EPSILON.

5. THE LOCATION OF UTILITIES SHOWN HEREON HAVE BEEN COMPILED BY WSP FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS PLAN SOURCES, INCLUDING MAPPING PREPARED BY GREEN SEAL ENVIRONMENTAL, INC. TITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015.

6. THE UNDERGROUND INFORMATION LABELED WITH AN (R) WAS OBTAINED FROM THE JANUARY 19, 2015 GREEN SEAL EXISTING CONDITIONS PLAN, FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES LABELED WITH AN (R) SHALL BE CONSIDERED APPROXIMATE.

LEGEND:

- 530 — EXISTING 5' CONTOURS
- EXISTING 1' CONTOURS
- PROPERTY LINE
- ZONE A7 FLOODPLAIN (WSP SURVEY)
- PAVED AREA
- GRAVEL
- RAILROAD TRACK
- WETLAND LIMIT
- 100-FOOT WETLAND BUFFER
- EDGE OF WATER
- 200-FOOT RIVERFRONT OFFSET
- INTERMITTENT STREAM
- DRAINAGE SWALE
- S — SANITARY SEWER
- D — STORM DRAIN
- E — UNDERGROUND ELECTRIC
- OHW — OVERHEAD WIRE
- W — WATER
- S(R) — RECORD SANITARY SEWER
- D(R) — RECORD STORM DRAIN
- E(R) — RECORD UNDERGROUND ELECTRIC
- W(R) — RECORD WATER
- CATCH BASIN
- MANHOLE
- FENCE
- UTILITY POLE
- MONITORING WELL
- TREE LINE
- BOARD OF HEALTH SITE-ASSIGNED AREA
- TRAFFIC FLOW ARROW (DASHED ARROW DENOTES BACKUP MOTION)

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
60' 30' 0 60' 120'

STEPHEN E WRIGHT CIVIL No. 39515 — COMMONWEALTH OF MASSACHUSETTS — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

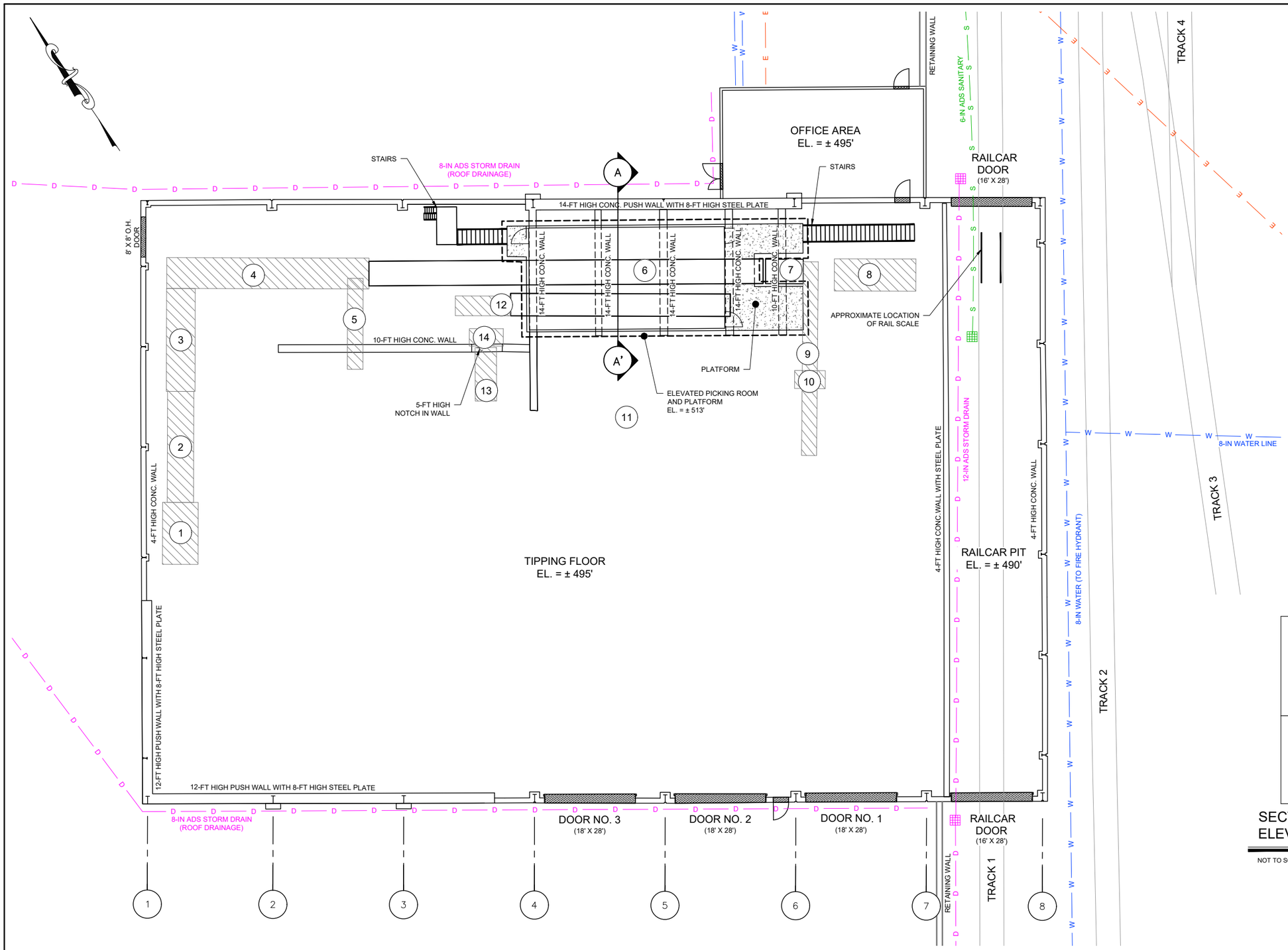
DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

EXISTING CONDITIONS SITE PLAN

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 7



NOTES:

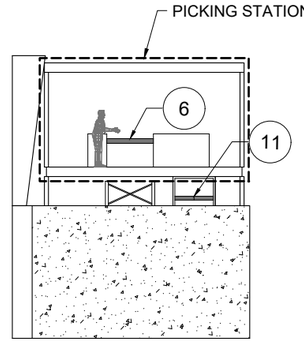
1. INTERIOR BUILDING FEATURES WERE PREPARED FROM THE DOCUMENT TITLED "NEW RECYCLING FACILITY" PREPARED BY ASSOCIATED BUILDERS, INC. ISSUED FOR CONSTRUCTION ON APRIL 27, 2005 AND PROVIDED TO SANBORN HEAD BY RESOURCE WASTE SERVICES.
2. THE UNDERGROUND UTILITY INFORMATION SHOWN HEREON IS FROM GREEN SEAL ENVIRONMENTAL, INC. "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015 FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHOWN SHOULD BE CONSIDERED APPROXIMATE.

LEGEND:

- PREVIOUSLY REMOVED PROCESSING EQUIPMENT
- E — EXISTING UNDERGROUND ELECTRIC
- W — EXISTING WATER
- S — EXISTING SANITARY SEWER
- D — EXISTING STORM DRAIN
- EXISTING CATCH BASIN

PROCESSING LINE EQUIPMENT

ID NUMBER	EQUIPMENT	STATUS
1	CBI ANNHILATOR (SHREDDER)	REMOVED
2	DISCHARGE CONVEYOR	REMOVED
3	INCLINE CONVEYOR	REMOVED
4	ACTION TAPER SLOT SCREENER	REMOVED
5	FINES CONVEYOR	REMOVED
6	PICKING CONVEYOR	TO BE REMOVED
7	48X60 FEED CONVEYOR	TO BE REMOVED
8	CBI GRIZZLY MILL	REMOVED
9	STACKING CONVEYOR	REMOVED
10	OVER BAND MAGNET	REMOVED
11	WOOD CONVEYOR	TO BE REMOVED
12	CBI GRIZZLY MILL	REMOVED
13	36X36 DISCHARGE CONVEYOR	REMOVED
14	OVER BAND MAGNET	REMOVED



SECTION A-A'
ELEVATED PICKING STATION

NOT TO SCALE

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
10' 5' 0' 10' 20'

STEPHEN E. WRIGHT CIVIL No. 39515 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

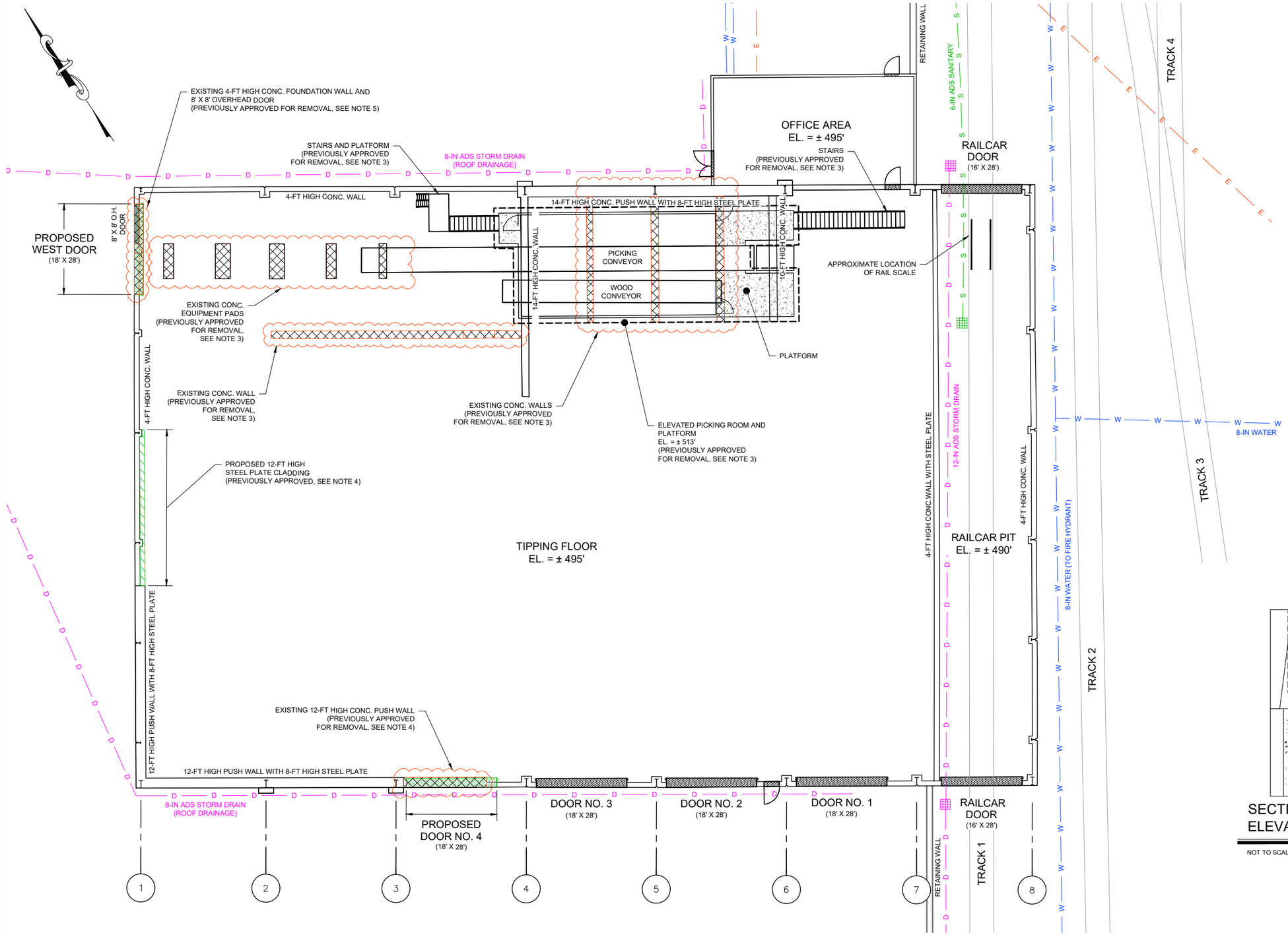
BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

EXISTING CONDITIONS
C&D BUILDING FLOOR PLAN

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 8A

IMAGES:
XREFS:
FILE: P:\5000s\5094.00\Graphics FiveCAD\Xrefs\8A\Figure8A Fig 8A - Existing Conditions Floor Plan.dwg
LAST SAVED: awilker
LAYOUT: ANSI C
PLOT DATE: 4-25-23 8:40 AM

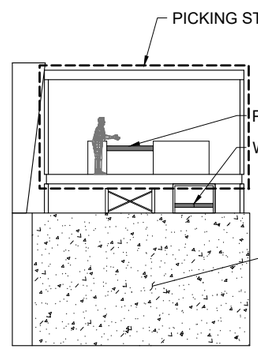


NOTES:

1. INTERIOR BUILDING FEATURES WERE PREPARED FROM THE DOCUMENT TITLED "NEW RECYCLING FACILITY" PREPARED BY ASSOCIATED BUILDERS, INC. ISSUED FOR CONSTRUCTION ON APRIL 27, 2005 AND PROVIDED TO SANBORN HEAD BY RESOURCE WASTE SERVICES.
2. THE UNDERGROUND UTILITY INFORMATION SHOWN HEREON IS FROM GREEN SEAL ENVIRONMENTAL, INC. "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015 FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHOWN SHOULD BE CONSIDERED APPROXIMATE.
3. THE EXISTING ELEVATED PICKING ROOM, PLATFORM, STAIRS, AND ASSOCIATED PROCESSING LINE COMPONENTS WERE PREVIOUSLY APPROVED FOR REMOVAL BY MASSDEP IN THE 2016 AUTHORIZATION TO OPERATE PERMIT RENEWAL. THE INTENT TO REMOVE THESE ITEMS WAS REITERATED IN SANBORN HEAD'S MARCH 2022 BWP SW 45 PERMIT APPLICATION, APPROVED BY MASSDEP ON MAY 6, 2022.
4. THE SELECTIVE WALL DEMOLITION REQUIRED FOR THE INSTALLATION OF OVERHEAD DOOR NO. 4 AND INSTALLATION OF THE DOOR WAS PRESENTED IN SANBORN HEAD'S MARCH 2022 BWP SW45 PERMIT APPLICATION, APPROVED BY MASSDEP ON MAY 6, 2022. THE INSTALLATION OF THE STEEL PLATE CLADDING WAS ALSO APPROVED BY MASSDEP AS PART OF THE MAY 6, 2022 BWP SW45 PERMIT APPROVAL.
5. THE SELECTIVE WALL AND 8'X8' OVERHEAD DOOR DEMOLITION REQUIRED FOR THE INSTALLATION OF THE WEST DOOR AND INSTALLATION OF THE DOOR WAS PRESENTED IN SANBORN HEAD'S NOVEMBER 2022 BWP SW45 PERMIT APPLICATION, APPROVED BY MASSDEP ON JANUARY 9, 2023.

LEGEND:

- PROPOSED SELECTIVE DEMOLITION (WALL REMOVAL)
- E — EXISTING UNDERGROUND ELECTRIC
- W — EXISTING WATER
- S — EXISTING SANITARY SEWER
- D — EXISTING STORM DRAIN
- EXISTING CATCH BASIN



SECTION A-A'
ELEVATED PICKING STATION

NOT TO SCALE

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
10' 5' 0' 10' 20'

COMMONWEALTH OF MASSACHUSETTS — STEPHEN F. WRIGHT — CIVIL — No. 39515 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

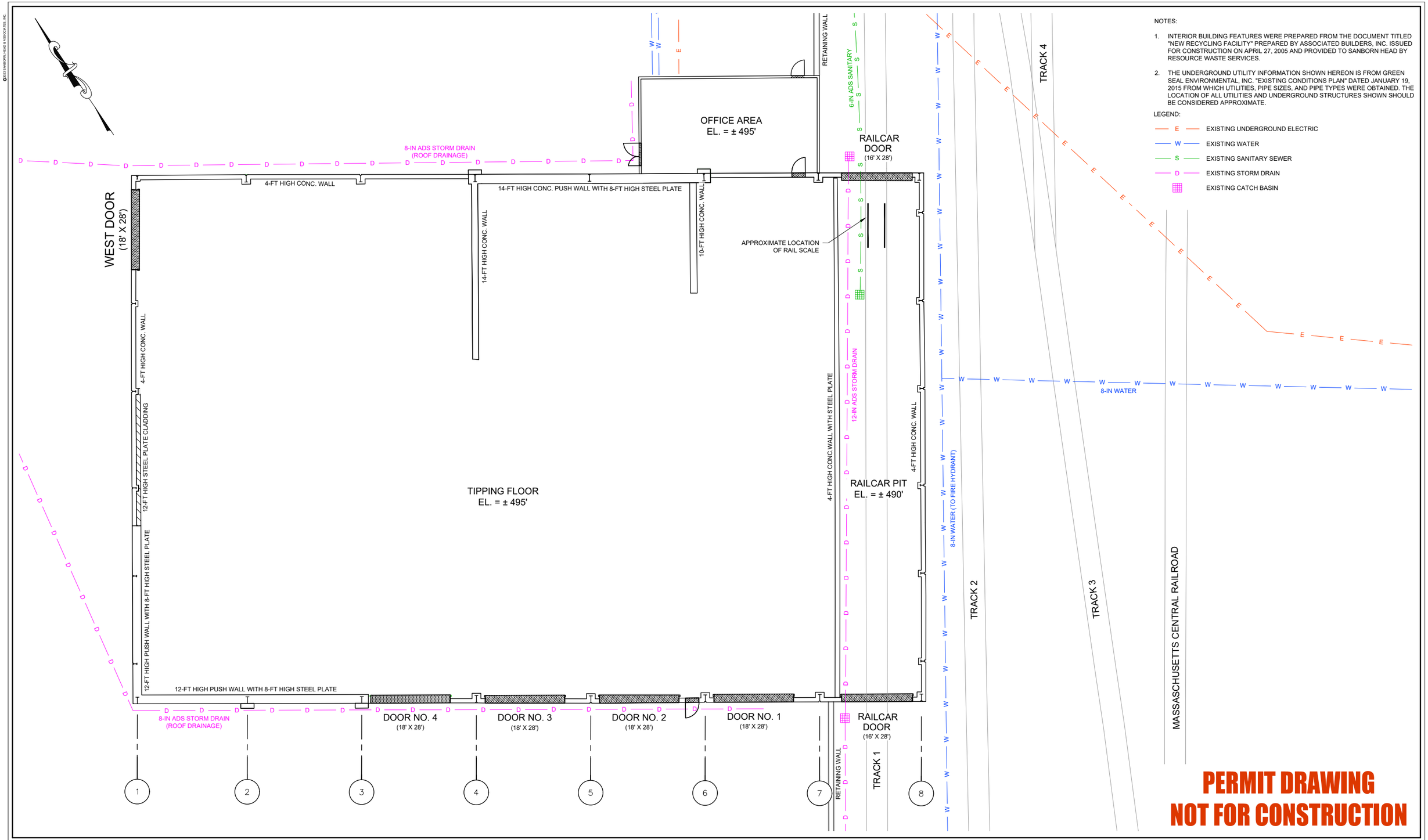
DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

EXISTING CONDITIONS FLOOR PLAN - MASSDEP APPROVED ALTERATIONS NOT YET PERFORMED

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 8B



NOTES:

1. INTERIOR BUILDING FEATURES WERE PREPARED FROM THE DOCUMENT TITLED "NEW RECYCLING FACILITY" PREPARED BY ASSOCIATED BUILDERS, INC. ISSUED FOR CONSTRUCTION ON APRIL 27, 2005 AND PROVIDED TO SANBORN HEAD BY RESOURCE WASTE SERVICES.
2. THE UNDERGROUND UTILITY INFORMATION SHOWN HEREON IS FROM GREEN SEAL ENVIRONMENTAL, INC. "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015 FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHOWN SHOULD BE CONSIDERED APPROXIMATE.

LEGEND:

- E — EXISTING UNDERGROUND ELECTRIC
- W — EXISTING WATER
- S — EXISTING SANITARY SEWER
- D — EXISTING STORM DRAIN
- EXISTING CATCH BASIN

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
10' 5' 0' 10' 20'

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROJECT NUMBER: 5094.10

EXISTING CONDITIONS FLOOR PLAN
FOLLOWING COMPLETION OF PREVIOUSLY
APPROVED ALTERATIONS

FIGURE NUMBER: 8C

NOTES:

1. EXISTING TOPOGRAPHY AND SITE FEATURES WERE PREPARED FROM AN AERIAL SURVEY CONDUCTED IN NOVEMBER 2021 AND GROUND SURVEY CONDUCTED IN DECEMBER 2021 BY WSP OF MERRIMACK, NEW HAMPSHIRE AND PROVIDED TO SANBORN HEAD & ASSOCIATES, INC. (SANBORN HEAD) IN DIGITAL FORMAT ON JANUARY 21, 2022.

1.1. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983, MASSACHUSETTS STATE PLANE MAINLAND COORDINATE SYSTEM AND WAS ESTABLISHED UTILIZING RTK GPS TECHNIQUES.

1.2. THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE VERTICAL DATUM NAVD88 AND WAS ESTABLISHED ON THE SITE UTILIZING RTK GPS SURVEY TECHNIQUES.

2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.

3. THE FLOOD ZONE A7 (AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATION DETERMINED) IS SHOWN ON THE F.I.R.M. COMMUNITY PANEL NUMBER 250172-0026-B, EFFECTIVE DATE AUGUST 17, 1981, AND IS LABELED AS BETWEEN 472 FEET AND 473 FEET (AVERAGE ABOUT 472.5 FEET IN THE NGVD OF 1929 DATUM). CONVERTING FROM THAT DATUM TO NAVD OF 1988 DATUM RESULTS IN AN ELEVATION OF SLIGHTLY LESS THAN 472 FEET AND ZONE A7 IS SHOWN AS SUCH USING THE ELEVATION DATA COLLECTED FOR THIS PLAN. THE LINE BETWEEN ZONE B (500 YEAR FLOOD ZONE) AND ZONE C (AREA OF MINIMAL FLOODING) IS NOT DETERMINED BY ELEVATION AND IS NOT SHOWN HEREON.

4. WETLAND FLAGS SET BY EPSILON ASSOCIATES, INC. OF MAYNARD, MA ON NOVEMBER 17 AND 24, 2021. WETLAND FLAGS A-1 TO A-9, AB-1 TO AB-11, B-1 TO B-14, BB-1 TO BB-15, C-1 TO C-8, AND DB-1 TO DB-13 LOCATED IN FIELD BY WSP. LOCATIONS OF FLAGS CB-1 TO CB-58 AND D-1 TO D-4 WERE PROVIDED BY EPSILON.

5. THE LOCATION OF UTILITIES SHOWN HEREON HAVE BEEN COMPILED BY WSP FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS PLAN SOURCES, INCLUDING MAPPING PREPARED BY GREEN SEAL ENVIRONMENTAL, INC. TITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015.

6. THE UNDERGROUND INFORMATION LABELED WITH AN (R) WAS OBTAINED FROM THE JANUARY 19, 2015 GREEN SEAL EXISTING CONDITIONS PLAN, FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES LABELED WITH AN (R) SHALL BE CONSIDERED APPROXIMATE.

LEGEND:

- EXISTING 5' CONTOURS
- EXISTING 1' CONTOURS
- PROPOSED 5' CONTOURS
- PROPOSED 1' CONTOURS
- PROPERTY LINE
- ZONE A7 FLOODPLAIN (WSP SURVEY)
- PAVED AREA
- GRAVEL
- EXISTING RAILROAD TRACK TO REMAIN
- EXISTING RAILROAD TRACK (CENTER LINE SHOWN) TO BE REMOVED
- PROPOSED RAILROAD TRACK
- PROPOSED RETAINING WALL
- WETLAND LIMIT
- WETLAND FLAG
- 100-FOOT WETLAND BUFFER
- EDGE OF WATER
- 200-FOOT RIVERFRONT OFFSET
- INTERMITTENT STREAM
- DRAINAGE SWALE
- SANITARY SEWER
- STORM DRAIN
- UNDERGROUND ELECTRIC
- OVERHEAD WIRE
- WATER
- RECORD SANITARY SEWER
- RECORD STORM DRAIN
- RECORD UNDERGROUND ELECTRIC
- RECORD WATER
- CATCH BASIN
- MANHOLE
- FENCE
- UTILITY POLE
- MONITORING WELL
- EXISTING TREE LINE
- PROPOSED TREE LINE
- BOARD OF HEALTH SITE-ASSIGNED AREA
- TRAFFIC FLOW ARROW (DASHED ARROW DENOTES BACKUP MOTION)

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
60' 30' 0 60' 120'

STEPHEN E. WRIGHT CIVIL No. 39515 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROPOSED CONDITIONS SITE PLAN
(STAGE 2)

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 9A

NOTES:

1. EXISTING TOPOGRAPHY AND SITE FEATURES WERE PREPARED FROM AN AERIAL SURVEY CONDUCTED IN NOVEMBER 2021 AND GROUND SURVEY CONDUCTED IN DECEMBER 2021 BY WSP OF MERRIMACK, NEW HAMPSHIRE AND PROVIDED TO SANBORN HEAD & ASSOCIATES, INC. (SANBORN HEAD) IN DIGITAL FORMAT ON JANUARY 21, 2022.
   - 1.1. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983, MASSACHUSETTS STATE PLANE MAINLAND COORDINATE SYSTEM AND WAS ESTABLISHED UTILIZING RTK GPS TECHNIQUES.
   - 1.2. THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE VERTICAL DATUM NAVD88 AND WAS ESTABLISHED ON THE SITE UTILIZING RTK GPS SURVEY TECHNIQUES.
2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.
3. THE FLOOD ZONE A7 (AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATION DETERMINED) IS SHOWN ON THE F.I.R.M. COMMUNITY PANEL NUMBER 250172-0026-B, EFFECTIVE DATE AUGUST 17, 1981, AND IS LABELED AS BETWEEN 472 FEET AND 473 FEET (AVERAGE ABOUT 472.5 FEET IN THE NGVD OF 1929 DATUM). CONVERTING FROM THAT DATUM TO NAVD OF 1988 DATUM RESULTS IN AN ELEVATION OF SLIGHTLY LESS THAN 472 FEET AND ZONE A7 IS SHOWN AS SUCH USING THE ELEVATION DATA COLLECTED FOR THIS PLAN. THE LINE BETWEEN ZONE B (500 YEAR FLOOD ZONE) AND ZONE C (AREA OF MINIMAL FLOODING) IS NOT DETERMINED BY ELEVATION AND IS NOT SHOWN HEREON.
4. WETLAND FLAGS SET BY EPSILON ASSOCIATES, INC. OF MAYNARD, MA ON NOVEMBER 17 AND 24, 2021. WETLAND FLAGS A-1 TO A-9, AB-1 TO AB-11, B-1 TO B-14, BB-1 TO BB-15, C-1 TO C-8, AND DB-1 TO DB-13 LOCATED IN FIELD BY WSP. LOCATIONS OF FLAGS CB-1 TO CB-58 AND D-1 TO D-4 WERE PROVIDED BY EPSILON.
5. THE LOCATION OF UTILITIES SHOWN HEREON HAVE BEEN COMPILED BY WSP FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS PLAN SOURCES, INCLUDING MAPPING PREPARED BY GREEN SEAL ENVIRONMENTAL, INC. TITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015.
6. THE UNDERGROUND INFORMATION LABELED WITH AN (R) WAS OBTAINED FROM THE JANUARY 19, 2015 GREEN SEAL EXISTING CONDITIONS PLAN, FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES LABELED WITH AN (R) SHALL BE CONSIDERED APPROXIMATE.

LEGEND:

- EXISTING 5' CONTOURS
- EXISTING 1' CONTOURS
- PROPOSED 5' CONTOURS
- PROPOSED 1' CONTOURS
- PROPERTY LINE
- ZONE A7 FLOODPLAIN (WSP SURVEY)
- PAVED AREA
- GRAVEL
- EXISTING RAILROAD TRACK TO REMAIN
- EXISTING RAILROAD TRACK (CENTER LINE SHOWN) TO BE REMOVED
- PROPOSED RAILROAD TRACK
- PROPOSED RETAINING WALL
- WETLAND LIMIT
- WETLAND FLAG
- 100-FOOT WETLAND BUFFER
- EDGE OF WATER
- 200-FOOT RIVERFRONT OFFSET
- INTERMITTENT STREAM
- DRAINAGE SWALE
- SANITARY SEWER
- STORM DRAIN
- UNDERGROUND ELECTRIC
- OVERHEAD WIRE
- WATER
- RECORD SANITARY SEWER
- RECORD STORM DRAIN
- RECORD UNDERGROUND ELECTRIC
- RECORD WATER
- CATCH BASIN
- MANHOLE
- FENCE
- UTILITY POLE
- MONITORING WELL
- EXISTING TREE LINE
- PROPOSED TREE LINE
- BOARD OF HEALTH SITE-ASSIGNED AREA

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
40' 20' 0 40' 80'

STEPHEN E. WRIGHT CIVIL No. 39515 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROPOSED CONDITIONS
ENLARGED SITE PLAN (STAGE 2)

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 9B

OUTFALL TO INFILTRATION BASIN
INV = 479.35'

CATCH BASIN
RIM = 492.79'

8-IN ADS STORM DRAIN
(ROOF DRAINAGE)

OFFICE AREA
EL. = ± 495'

RETAINING WALL

S 6-IN ADS SANITARY

RAILCAR DOOR
(16' X 28')

WEST DOOR
(18' X 28')

4-FT HIGH CONC. WALL

14-FT HIGH CONC. WALL

10-FT HIGH CONC. WALL

APPROXIMATE LOCATION OF RAIL SCALE

OIL/WATER/
SEDIMENT TRAP
RIM = 491.60'

RAILCAR PIT
EL. = ± 490'

4-FT HIGH CONC. WALL WITH STEEL PLATE

12-IN ADS STORM DRAIN

4-FT HIGH CONC. WALL

TIPPING FLOOR
EL. = ± 495'

MANHOLE
RIM = 493.60'

12-FT HIGH PUSH WALL WITH 8-FT HIGH STEEL PLATE

8-IN WATER (TO FIRE HYDRANT)

TRACK 3

TRACK 4

8-IN WATER

8-IN ADS STORM DRAIN
(ROOF DRAINAGE)

DOOR NO. 4
(18' X 28')

DOOR NO. 3
(18' X 28')

DOOR NO. 2
(18' X 28')

DOOR NO. 1
(18' X 28')

CAP EXISTING 8" STORM DRAIN AND ABANDON IN-PLACE

EXISTING WALL TO BE REMOVED

RAILCAR DOOR
(16' X 28')

RETAINING WALL

PROPOSED 8-FT HIGH CONC. WALL

TRACK 1

TRACK 2

MAIN LINE

PROPOSED 12-FT HIGH PUSH WALL WITH 8-FT HIGH STEEL PLATE

PROPOSED 8-IN ADS STORM DRAIN
(ROOF DRAINAGE)

DOOR NO. 4
(18' X 28')

DOOR NO. 3
(18' X 28')

DOOR NO. 2
(18' X 28')

DOOR NO. 1
(18' X 28')

RAILCAR DOOR
(16' X 28')

EDGE OF EXISTING PAVEMENT

RELOCATE EXISTING FIRE HYDRANT AND ASSOCIATED PIPING

EX. CATCH BASIN 1 (CB-1)
RIM = 491.52'
PROPOSED INV. OUT = 487.52'

CAP EXISTING 12" STORM DRAIN AND ABANDON IN-PLACE

EXISTING DRAINAGE MANHOLE (DMH)
RIM = 491.80'
PROPOSED INV. FROM CB-2 = 484.4'

12"CPP

PROPOSED RETAINING WALL

RELOCATED WATER VALVE FOR FIRE HYDRANT

RELOCATED WATER LINE AND FIRE HYDRANT

12"CPP

12"CPP

CATCH BASIN
RIM = 491.00'

PROPOSED 12-IN CPP STORM DRAIN

PROPOSED CB-2
INV. IN = 486.86'

12"CPP

CATCH BASIN
RIM = 491.15'

NOTES:

1. INTERIOR BUILDING FEATURES WERE PREPARED FROM THE DOCUMENT TITLED "NEW RECYCLING FACILITY" PREPARED BY ASSOCIATED BUILDERS, INC. ISSUED FOR CONSTRUCTION ON APRIL 27, 2005 AND PROVIDED TO SANBORN HEAD BY RESOURCE WASTE SERVICES.
2. THE UNDERGROUND UTILITY INFORMATION SHOWN HEREON IS FROM GREEN SEAL ENVIRONMENTAL, INC. "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015 FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHOWN SHOULD BE CONSIDERED APPROXIMATE.

LEGEND:

- PROPOSED SELECTIVE DEMOLITION (WALL REMOVAL)
- EDGE OF PAVED AREA
- EXISTING RAILROAD TRACK
- EXISTING RAILROAD TRACK (CENTER LINE SHOWN) TO BE REMOVED
- PROPOSED RAILROAD TRACK
- E — EXISTING UNDERGROUND ELECTRIC
- W — EXISTING WATER
- W — EXISTING WATER TO BE ABANDONED
- W — PROPOSED WATER
- S — EXISTING SANITARY SEWER
- D — EXISTING STORM DRAIN
- D — EXISTING STORM DRAIN TO BE ABANDONED
- D — PROPOSED STORM DRAIN
- Ⓓ EXISTING MANHOLE
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
20' 10' 0' 20' 40'

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

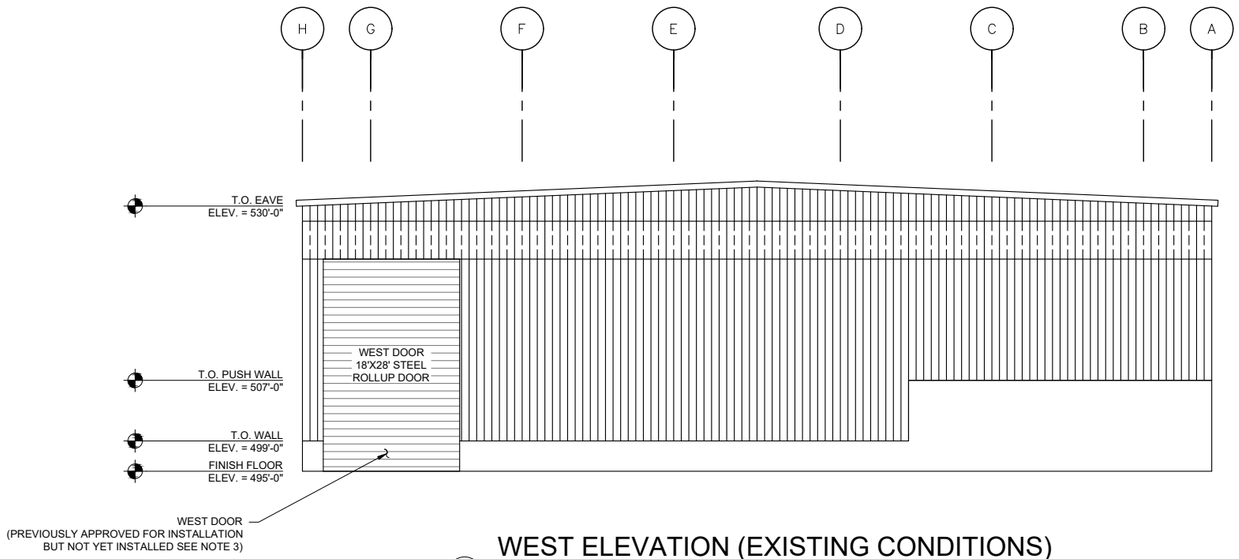
BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROPOSED CONDITIONS C&D
BUILDING FLOOR PLAN (STAGE 2)

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 10

IMAGES:
XREFS:
FILE P:\5000s\5094.10\Graphics Files\CAD\SW 38\Fig 10 - Stage 2 Building Expansion Floor Plan.dwg
LAYOUT: Layout1
USER: awilker
PLOT DATE: 4-18-23 4:47 PM

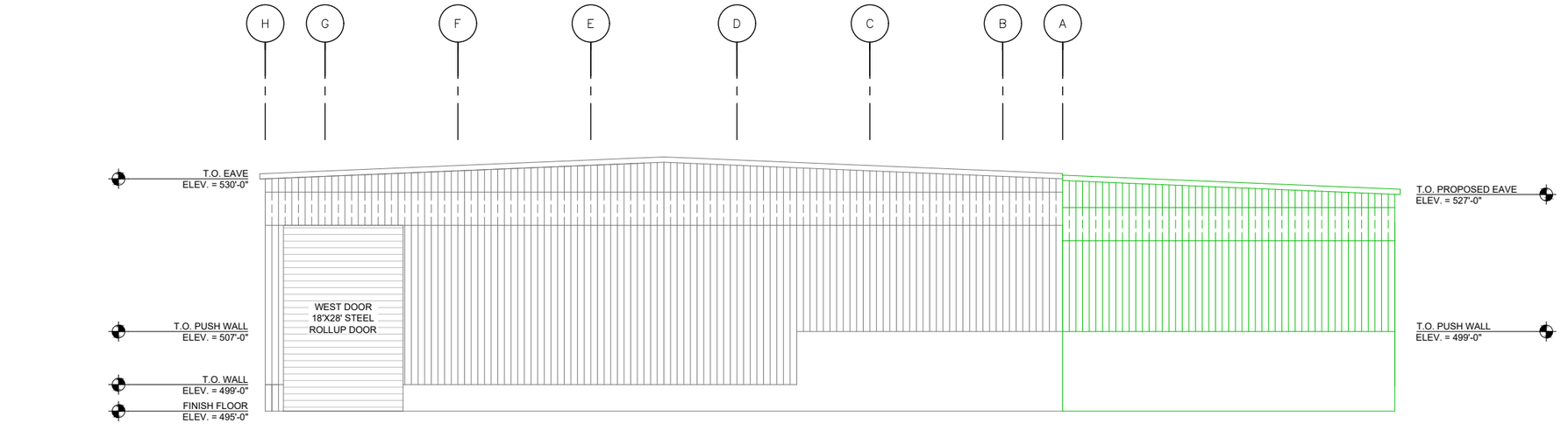


WEST ELEVATION (EXISTING CONDITIONS)

1

NOTES:

1. BUILDING ELEVATIONS AND FEATURES WERE PREPARED FROM A PLAN TITLED "ELEVATIONS" PROVIDED AS SHEET # 4896-A3.1 OF THE BUILDING DRAWING SET TITLED "PROPOSED BUILDING ABC&D RECYCLING LLD", PREPARED BY ASSOCIATED BUILDERS, INC., DATED APRIL 27, 2005.
2. ROOF LEADER LOCATIONS ARE BASED ON FIELD OBSERVATIONS AND SHOULD BE CONSIDERED APPROXIMATE.
3. THE SELECTIVE WALL AND 8'X8' OVERHEAD DOOR DEMOLITION REQUIRED FOR THE INSTALLATION OF THE WEST DOOR AND INSTALLATION OF THE DOOR WAS PRESENTED IN SANBORN HEAD'S NOVEMBER 2022 BWP SW45 PERMIT APPLICATION, APPROVED BY MASSDEP ON JANUARY 9, 2023.



WEST ELEVATION (PROPOSED CONDITIONS)

2

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
10' 5' 0' 10' 20'

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROJECT NUMBER: 5094.10

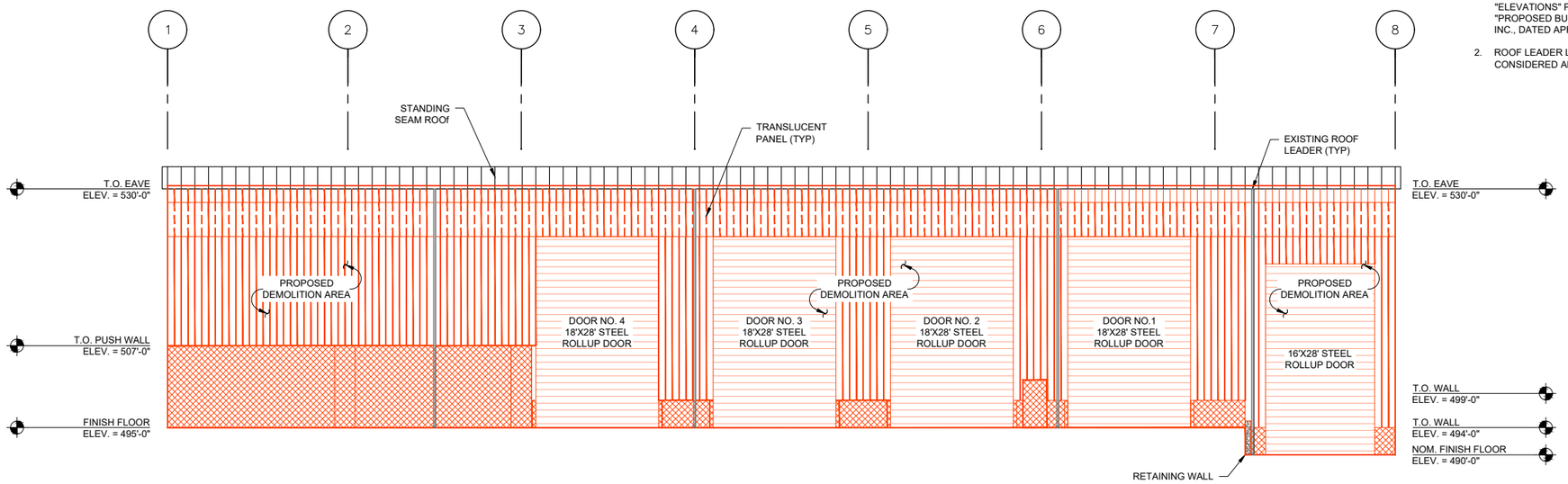
PROPOSED BUILDING PROFILE - WEST ELEVATION (STAGE 2)

FIGURE NUMBER: 11

IMAGES:
XREFS:
F:\E.P-3000s\5094.10\Graphics Files\CAD\SW-38\Fig 11-12 - Building Profile - West and South Elevations.dwg
LAYOUT: 11
USER: awilker
PLOT DATE: 4-18-23 4:48 PM

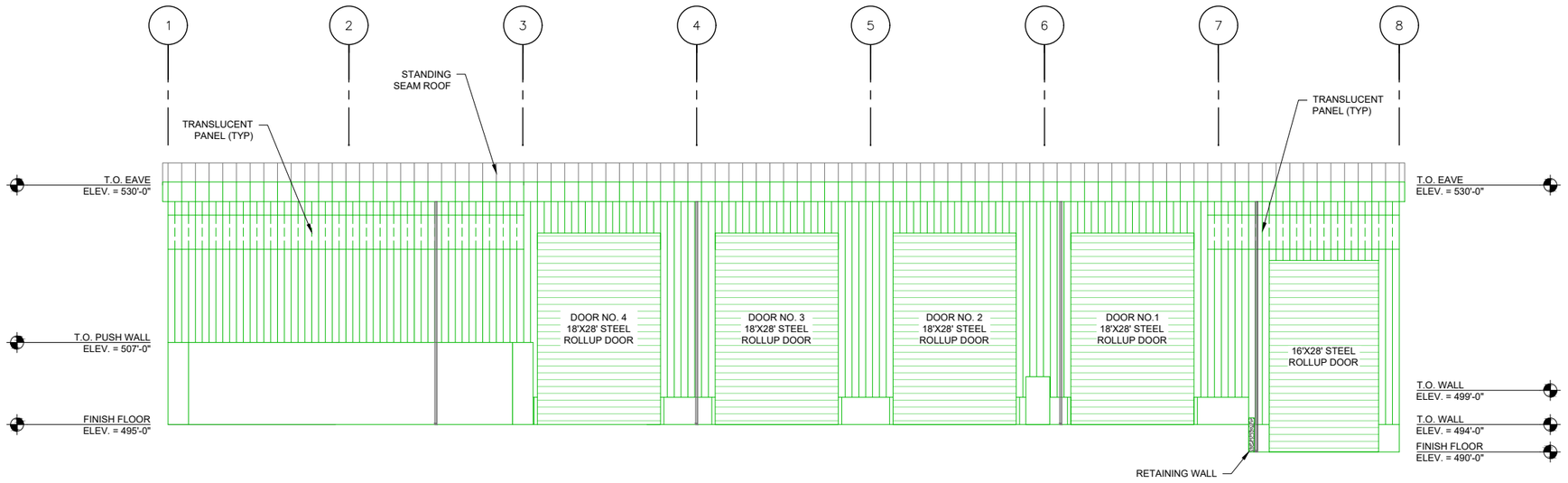
NOTES:

1. BUILDING ELEVATIONS AND FEATURES WERE PREPARED FROM A PLAN TITLED "ELEVATIONS" PROVIDED AS SHEET # 4896-A3.1 OF THE BUILDING DRAWING SET TITLED "PROPOSED BUILDING ABC&D RECYCLING LLD", PREPARED BY ASSOCIATED BUILDERS, INC., DATED APRIL 27, 2005.
2. ROOF LEADER LOCATIONS ARE BASED ON FIELD OBSERVATIONS AND SHOULD BE CONSIDERED APPROXIMATE.



SOUTH ELEVATION (EXISTING CONDITIONS)

1



SOUTH ELEVATION (PROPOSED CONDITIONS)

2

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
10' 5' 0' 10' 20'

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

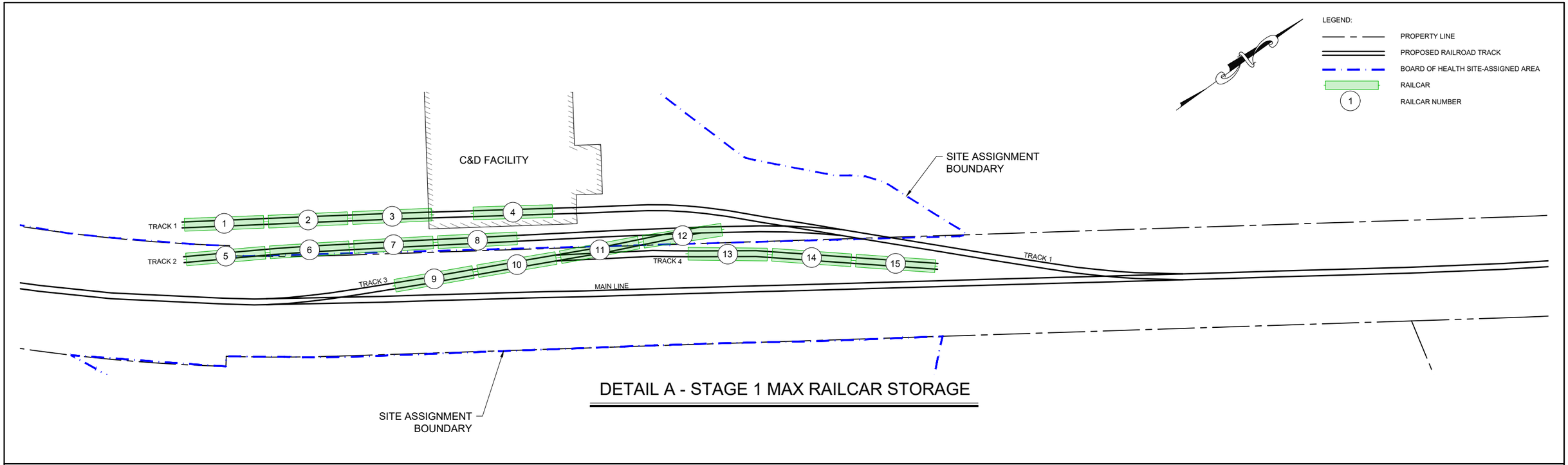
DRAWN BY: S. PERRY/ A.WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

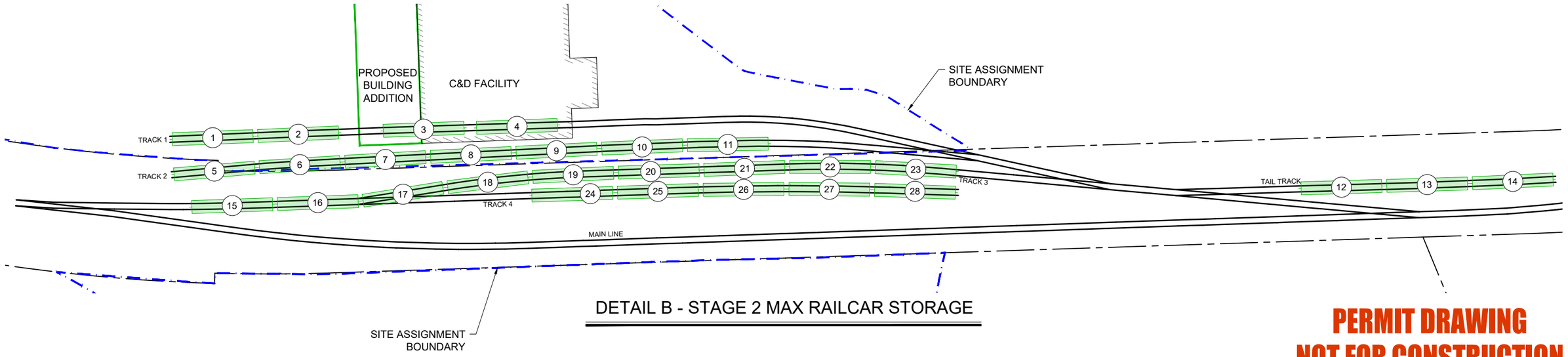
PROPOSED BUILDING PROFILE - SOUTH ELEVATION (STAGE 2)

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 12



DETAIL A - STAGE 1 MAX RAILCAR STORAGE



DETAIL B - STAGE 2 MAX RAILCAR STORAGE

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
40' 20' 0' 40' 80'

COMMONWEALTH OF MASSACHUSETTS
STEPHEN E. WRIGHT
CIVIL
No. 39515
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROJECT NUMBER: 5094.10

STAGE 1 AND STAGE 2 RAILCAR STORAGE

FIGURE NUMBER: 13

APPENDIX A

TECHNICAL FEE PAYMENT

Waste Services
ReSource
An Innovative Waste Management and Recycling Company

ReSource Waste Services of Ware LLC
198 East Street, Ware, MA 01082
(413) 967-7046
infoware@resource-waste.com

30 April 2023

Town of Ware
Board of Health
126 Main Street
Ware MA 01082

Enclosed is the payment from ReSource Waste Services to the Town of Ware Board of Health from ReSource Waste Services for the sum of $17,980.04 for Technical Review Fee. This payment, in addition to the remaining balance of $60,330.96 that the Board of Health has from our payment of the Technical Fee last year, resulting in total funds available to the Town of $78,311 for this year's review of the Site Suitability Report Application

Town of Ware: Betty Burke
Date: 4/27/2023

APPENDIX B

SITE ASSIGNMENT
(June 18, 2004)

2004 00024830
Bk: 7947Pg: 224 Page: 1 of 6
Recorded: 08/13/2004 03:03 PM

Application for Site Assignment
ABC&D Recycling
198 East Street
Ware MA
DEP DSWM File # 03-309-005

Town of Ware
Board of Health Decision

Upon reconsidering the decision of August 13, 2003, as remanded by the Superior Court of Hampshire County, The Ware Board of Health duly voted on June 9, 2004 after holding the requisite Public Hearing pursuant to 310 CMR 16.00 on July 1, 2003, to issue the following decision regarding the site assignment application, pursuant to MGL Ch. 111, sec. 150A and the subsequently promulgated regulation 310CMR 16.00, for ABC& D Recycling LLC at 198 East Street Ware, MA, 01082

Assignment is *approved with conditions* for the portions of the property located both east and west of the Massachusetts Central Railroad, also referred to as parcels "A" and " B" a portion of Book 1915, Page 199 in the Hampshire County Registry of Deeds, as delineated on the plan entitled "Plan of Land in Ware Survey for the O'Riley Family Trust" dated January 6, 2003, bearing the signature of Robert H. LeMaitre, Massachusetts- registered professional Land surveyor #30310 and the area shaded in gray on the plan entitled "Sheet 4 O'Riley Family Trust ABC&D Recycling Site Assignment Ware MA" dated April 2004 revised, bearing the signature of Doris S. Atkinson, Massachusetts -registered P.E. #39760.

This approval is contingent on the following conditions and limitations with respect to the extent, character, and nature of the facility as the Board of Health of the Town of Ware has deemed necessary to ensure the facility or its operations will not present a threat to public health, safety or the environment.

1. After 3 months in operation, complete and submit an Air Quality Study or report (using the services of an professional Industrial Hygienist) proving that Visible Emission Standards, National Ambient Air Quality Standards, and OSHA standards and regulations for interior air exchange and particulate exposure can all be met with the BMPs proposed. If standards can not be achieved with the BMPs currently proposed, submit to the Ware Board of Health Office the additional management practices and technology which will be utilized to achieve compliance with all applicable air quality standards, including those implemented to protect health and safety of employees.

2. The facility shall have adequate asbestos inspection personnel on site during all periods of operation. Personnel possessing asbestos inspection certification shall visually inspect all incoming loads for asbestos and asbestos-containing material. Classroom certification, on the job training, and sampling protocol and frequency

shall follow DEP requirements at all time all loads containing asbestos or asbestos containing waste shall o not be processed at the facility. Such loads shall be considered asbestos waste and handled according to all applicable local, state, and federal regulations.
Samples shall be analyzed utilizing Polarized Light Microscopy (PLM) testing methods. The facility shall be inspected as frequently as required by DEP by a qualified third-party asbestos inspector experienced in the management of C& D waste and retained by the owner/operator. During these third-party inspections the third-party inspector shall evaluate the sample monitoring program, including any approved modifications. Identify and record any deviations. And sample a random truckload for asbestos from materials that may potential contain asbestos. The owner/operator shall provide the Ware Board of Health will the following information, on the same frequency in which DEP receives information:

- The name of the employee on staff who is a certified asbestos inspector and a copy of his/her Division of Labor and Industry certification.
- The name and certification of the third-party asbestos inspector.
- A copy of the third-parties inspection and sampling results reports

3. Insist, by posting signage, issuing warnings from the weigh station, reporting violators, and turning away repeat offenders, that all transportation vehicles of any type entering the facility site do not idle in excess of the standards set forth in 310 CMR 7:11
" (1)(b) No person shall cause, suffer, allow, or permit the unnecessary operation of the engine of a motor vehicle while said vehicle is stopped for a foreseeable period of time in excess of 5 minutes...."
"(2)(b) No person shall cause, suffer, allow, or permit the oh unnecessary foreseeable idling of a diesel locomotive for a continuous period of time longer than 30 minutes...."

4. Cumulative noise impact at the property line shall not exceed Town of Ware standards as detailed in the Town of Ware Zoning By-Law Article 5.630(b):

Noise--Maximum permissible sound-pressure levels at the lot line for noise radiated continuously from a facility between the hours of 9:00 P.M. and 7:00 A.M.

Table A

Frequency Band Cycles per Sound	Sound Pressure Level Decibels re 0.002 dyne/cm²
20-75	69
75-150	60
150-300	56
300-600	51

600-1,200	42
1,200-2,400	40
2,400-4,800	38
4,800-10,000	35

If the noise is not smooth and continuous and is not radiated between the hours of 9:00 P.M. and 7:00 A.M., one or more of the corrections in Table B below shall be added or subtracted from each of the decibel levels above.

Table B

Type of Operation in Character of Noise	Correction in Decibels
Daytime operation only	plus 5
Noise source operates less than 20% of any one-hour period	plus 5*
Noise source operates less than 5% of any one-hour period	plus 10*
Noise source operates less than 1% of any one-hour period	plus 15*
Noise of impulsive character (hammering, etc.)	minus 5
Noise of period character (hum, speech, et–.)	minus 5

*Apply one of these corrections only.

A noise study, utilizing current, acceptable methodology, equipment and knowledgeable professionals shall be performed prior to operations, start-up operations, and at full capacity. The results of the study shall conclude that DEP Noise Policy and Regulation 310 CMR 7.10 are being complied with at all times, as well as the more stringent standard required by the Town of Ware Zoning By-law. If the study concludes that noise standards are not being achieved during operations, then additional BMPs and technology must be proposed and implemented.

5. Develop and implement a materials haulers education plan to include haul route restrictions, haul route road signage, hauler truck speed and weight restrictions, and truck and diesel train engine queuing and idling

6. Transport as much out bound material as possible by rail.

7. The amount of processed and unprocessed material stored on site, outdoors, shall not exceed 35, 000 cubic yards.

8. Reduce Saturday tonnage from 750 TPD to 500 TPD.

9. The owner/operator must comply with all terms and conditions incorporated in the Order of Conditions to be issued by the Ware Conservation Commission.

10. Operations must be conducted in full compliance with the terms and conditions as will be listed in the Department of Environmental "Authorization to Construct" and "Authorization to Operate" permits

11. Compliance with all applicable federal, state, and local environmental and public health regulations, including but not limited to the following:
310 CMR 7.00- Air Pollution
310 CMR 6.00 Ambient Air Standards
310 CMR 19.00- Waste Facilities
310 CMR 30.00- Hazardous Waste
310 CMR15.00- Title V
310 CMR 10.00- Wetlands Protection Act
Clean Water Act
Clean Air Act
MGL C. 111, sec 122
Division of Labor Regulations for Asbestos and Lead
Occupational Health and Safety Regulations
Massachusetts State Building, Plumbing, Electrical and Fire Codes

12. Commit to monitoring the entire operation by submitting reports to the Ware Board of Health of all truck and train trips to and from the site, including time of day, origin/destination where known, and weight and nature of the materials processed. These reports shall be submitted with the same frequency as information is submitted to DEP.

13. Owner/operator must develop a Fire Contingency plan fully compliant with standards set forth by state and local regulations said contingency plan shall be approved by the Ware Fire Chief and submitted to the Board of Health. The owner/operator shall provide liability and fire protection insurance. The owner/operator shall provide copies of the policies to the Board of Health.

14. For the purposes of dust and noise control, maintain and replace vegetative buffer along East Street and the Ware River (as detailed in the Planning Board Special Permit)

15. For the purposes of dust control, blacktop the access road for the entire length of the way until after the final turn into the active processing and stockpiling area.

16. For the purpose of dust control, post signage, give verbal commands at the weigh station, report violators, turn away repeat offenders, require all trucks entering the facility to have their truck beds/ dump bodies and/or trailers covered until inspection at the weight station.

17. Provide for-hazardous waste handling and removal companies to remove any hazardous material inadvertently dumped on the tipping floor. Prepare an in-house plan with company contact information, complete construction details, on-site traffic circulation details, a detailed facility operation and maintenance plan, contingency plans, and a spill prevention and control plan. Provide a copy of the in-house plan to the Board of Health

Signed this day, June 18, 2004

Joseph J Ciejka

Joseph J. Ciejka

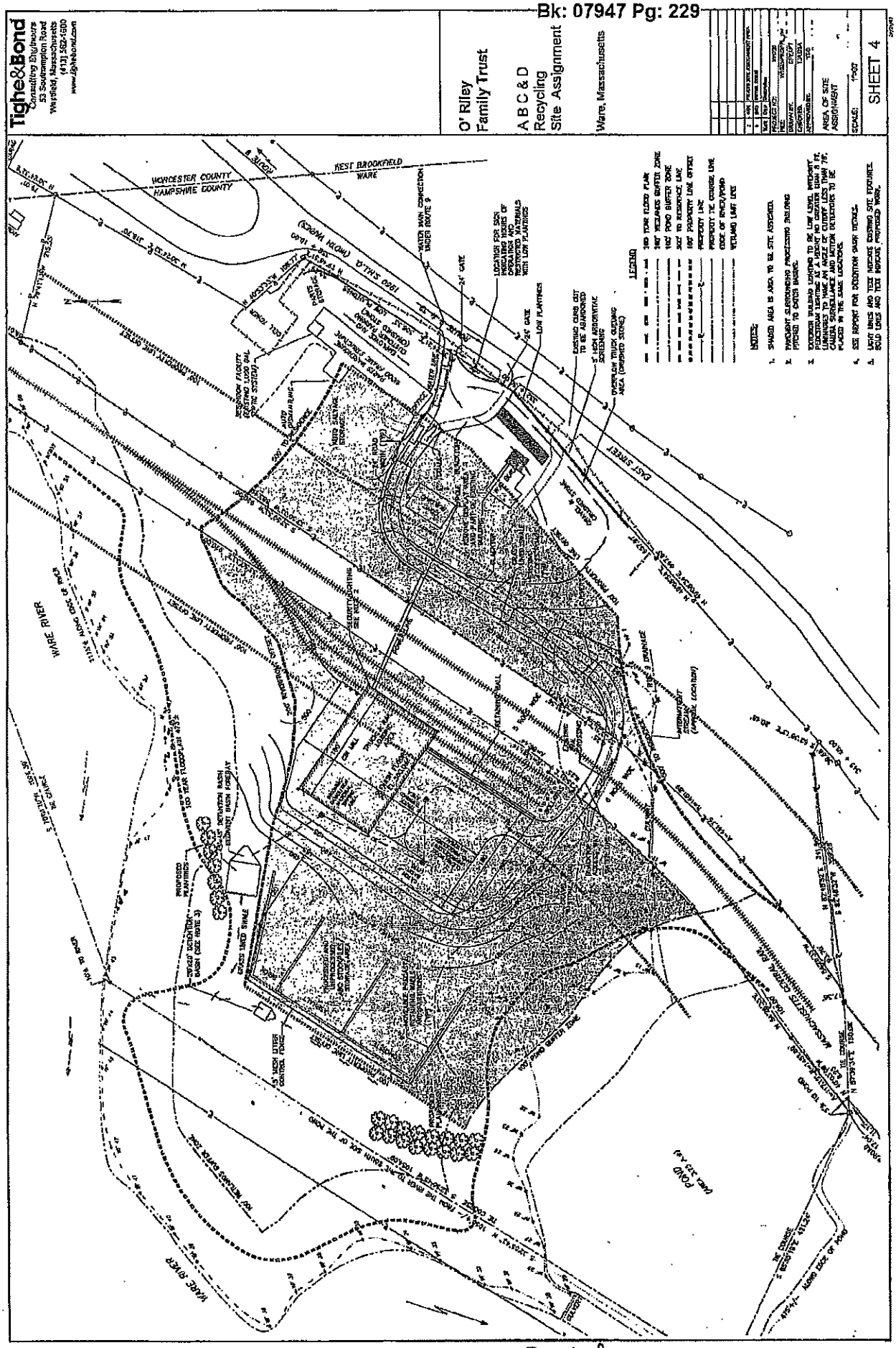
Michael Juda

Michael Juda

Hampshire, SS Commonwealth of Massachusetts June 18, 2004 Then personally appeared the above named Michael Juda, known personally to me, and acknowledged the foregoing instrument to be his free act + deed.

Margaret Sorel
Notary Public
Commission Expires 09-12-2008

Hampshire, SS Commonwealth of Massachusetts June 18, 2004 Then personally appeared the above named Joseph J. Ciejka, known personally to me, and acknowledged the foregoing instrument to be his free act and deed. Margaret D. Sorel, Notary Public Commission Expires 09-12-2008



ATTEST: HAMPSHIRE, Marianne L. Donohue, REGISTER

MARIANNE L. DONOHUE

APPENDIX C

MASSDEP BWP SW45 PERMIT APPROVALS (2022 and 2023)

C-1

BWP SW45 PERMIT APPROVAL
May 6, 2022

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Western Regional Office • 436 Dwight Street, Springfield MA 01103 • 413-784-1100

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

May 6, 2022

Mr. John Farese, Vice President
Director of Operations
ReSource Waste Services of Ware, LLC
198 East Street
Ware, MA 01082

Re: Ware - SWM - Handling Facility
ReSource Waste Services of Ware, LLC
BWP SW 45: Alternative Modification to Any SW Management Facility
ePlace Application No. 22-SW45-0009-APP
File No. 22-309-004, FMF#377539

Dear Mr. Farese:

On March 24, 2022 the Department of Environmental Protection, Bureau of Waste Prevention, Western Regional Office ("MassDEP" or "Department") received a BWP-SW-45 permit application to modify the ReSource Waste Services of Ware, LLC solid waste facility in Ware, Massachusetts, (the "Facility) which is owned and operated by ReSource Waste Services of Ware, LLC (ReSource). The Facility is located at 198 East Street in Ware.

The purpose of this Application was to permit certain technical improvements to the facility buildings, and to make two administrative changes to the Facility's ownership and classification in MassDEP files, as described below. The Application does not propose changing the type (construction and demolition waste) or quantities of waste material which the facility may accept, which are specified in the February 2016 Authorization to Operate renewal and the Site Assignment issued by the Ware Board of Health in 2004.

Sanborn, Head & Associates prepared the application on behalf of ReSource. The application and enclosed engineering plans bear the stamp and signature of Stephen E. Wright Commonwealth of Massachusetts Registered Professional Engineer (Civil) No. 39515. The application includes a project narrative, plan drawings for the Facility, specifications for a Fire Rover fire suppression system, and documentation of the facility's current ownership.

Facility Description

The Facility is an operational solid waste handling facility currently permitted to accept construction and demolition (C&D) waste, with a maximum daily limit per the ATO and Site Assignment of 750 tons per day Monday through Friday, and 500 tons per day on Saturdays. The Facility's maximum annual permitted capacity is 214,500 tons per year. The Facility operating hours are 7:00 AM to 4:00 PM, Monday through Friday, and 7:00 AM to 1:00 PM on Saturday.

The Facility is located on a 23.99-acre parcel of land, approximately 10 acres of which is site-assigned. The Facility's handling building is an approximately 21,600 foot structure, used for receiving and rail-loading of C&D waste materials. A yard area southwest of the building is used for stockpiling of asphalt, brick and concrete rubble. The handling building includes a rail loading bay and is located adjacent to a Massachusetts Central Railroad line and siding.

Proposed Changes

The Application proposes the following material changes to the Facility:

- ReSource proposes to install a new railcar tarping station outside of the C&D handling building that will replace the current method of tarping railcars within the building. This system will be located outside the northern access door for the railcar loading bay, and will include two railing-equipped work platforms located on opposite sides of the gondola car, and a roll of polypropylene netting mounted over the loading bay door. Facility staff will pull netting off the roll and secure it to each gondola car as it is prepared for rail transport. The Application indicates the proposed arrangement will eliminate the need for Facility staff to access the top of the loaded gondola cars.

- ReSource proposes to install a fourth large (18'W x 28'H) roll-up truck door to access the handling building's tipping floor. The Application indicates that the intent is to ease the flow of deliveries to and across the tipping floor.

- ReSource proposes to install 12-foot-high steel plate cladding along a 30-foot long portion of the interior face of the handling building's western wall, to extend an existing push wall and provide added protection to the metal building wall paneling. The building's western wall has been repeatedly damaged by equipment collisions in this area.

- ReSource proposes to install a new Fire Rover fire suppression system to provide additional fire protection for the building, in addition to the existing sprinkler system. The system consists of a self-contained apparatus including computer control system, pump, and tanks of suppressant foam, installed in a CONEX shipping container which will be located on a concrete pad outside the handling building's southern or western wall. This will be connected to a turret centrally located within the building, equipped with a foam gun and high-definition and thermographic cameras. If the system detects indicators of a fire, the system triggers a remote alarm to the Fire Rover command center and remote operators activate the foam gun. The Application anticipates that the entire tipping floor is within the foam gun's effective range, which the manufacturer's documentation indicates is 140 feet.

- ReSource proposes to remove the remaining components of the disused C&D material processing line equipment, including the mezzanine picking station, together with the associated concrete walls and equipment pads.

The Application also proposes the following administrative changes to the Facility:

- The Application indicates that the name of the facility was changed from ReEnergy Ware LLC to ReSource Waste Services of Ware LLC on November 9, 2020. This Application thereby provides the Department with the mechanism by which to officially recognize the name change.

- ReSource proposes to change the facility's current permitted handling operations classification from a "Construction and Demolition Waste Processing Facility" to a "Construction and Demolition Waste Transfer Station."

II. DEPARTMENT DETERMINATIONS

This application was reviewed in accordance with Massachusetts General Laws Chapter 111, Section 150A, and the Massachusetts Solid Waste Regulations at 310 CMR 16.00 and 19.000, including 310 CMR 19.033, *Permit Procedure for an Application for a Permit Modification or Other Approval*. The plans and reports described above establish that the facility complies with the criteria at 310 CMR 19.038(2)(a) and (b), except where variances have been approved by MassDEP.

MassDEP, as a result of its review of the Application, has determined that the permit application substantially complies with the requirements of 310 CMR 19.042 *Authorization to Operate*. Accordingly, MassDEP, with the authority granted pursuant to 310 CMR 19.042, hereby approves the Alternative Modification subject to the conditions listed in Section III of this Permit.

This document is a permit issued pursuant to M.G.L. c. 111, s. 150A and 310 CMR 19.000, subject to the conditions set forth below and the standard conditions at 310 CMR 19.043(5) and any amendments thereto. In the event this Permit conflicts with all or parts of prior plan approvals or permits issued pursuant to c. 111, s. 150A or solid waste regulations in effect prior to July 1, 1990 the terms and conditions of this Permit shall supersede the conflicting provisions of such prior permits or approvals. This Permit does not convey property rights of any sort or any exclusive privilege.

III. PERMIT CONDITIONS

This Permit is issued subject to the following conditions:

GENERAL PERMIT CONDITIONS

1. **Compliance with Plans** – ReSource Waste Services of Ware, LLC ("ReSource") shall operate the Facility in accordance with approved plans, reports, and other submissions described in this Permit except as may be modified by the conditions set forth herein. No material changes in the design or activities set forth in the approved documents shall be performed without prior written MassDEP approval. ReSource shall submit an appropriate permit application and receive MassDEP approval before making any such change, or shall seek guidance as to the applicability of permitting requirements if applicability is unclear.

2. **Standard Conditions** - ReSource shall operate the Facility in accordance with the conditions stated in 310 CMR 19.007-19.011 and 19.043(5) as currently written or as may be modified at a future date.

3. **Joint Liability** - This Permit is issued subject to the conditions of joint liability of the owner and operator in accordance with 310 CMR 19.043(3).

4. **Transfer** - No transfer of this Permit shall be permitted except in accordance with 310 CMR 19.044.

5. **Permit Modification** - MassDEP reserves the right to require design and/or operational modifications to the approved plans, and to rescind, suspend, or modify this Permit by the imposition of additional conditions based upon evaluation of the Facility's performance.

6. **Demonstration Projects** - This permit application does not include any provisions for demonstration projects. All demonstration projects proposed for the facility will require separate MassDEP approvals.

7. **Variances** - This permit application does not seek approval for any variances from applicable requirements.

8. **Right of Entry** - MassDEP and its agents and employees shall have the right to enter upon the site at all reasonable times and without notice, to inspect the transfer station and any equipment, structure or land located thereon, take samples, recover materials or discharges, have access to and photocopy records, to perform tests and to otherwise monitor compliance with this Permit and all environmental laws and regulations. This right of entry and inspection shall be in addition to MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and MassDEP.

9. **Waste Ban** - The Operator shall comply with all applicable waste ban restrictions set forth at 310 CMR 19.017.

10. **Other Laws and Regulations** - The operation, maintenance, and closure shall be performed in compliance with other applicable state and federal laws and regulations.

11. **Submissions** - Compliance with submission deadlines pursuant to this approval shall be determined by the date of receipt by MassDEP or by the postmarked date, whichever is earlier. Unless otherwise directed herein, all submissions required pursuant to this Permit shall be sent to:

    Section Chief, Solid Waste Management
    Massachusetts Department of Environmental Protection
    436 Dwight Street
    Springfield, MA 01103

12. **Authorization to Construct** - Before commencing any construction not specifically approved herein and that would result in a modification of waste handling processes and/or increase the processing or handling capacity of the Facility beyond the capacity approved in this Permit, the Owner and/or Operator shall obtain an Authorization to

Construct in accordance with 310 CMR 19.041 or a modification of this Permit, as determined by MassDEP.

SPECIFIC PERMIT CONDITIONS

1. Except where addressed by specific conditions enumerated below, this Permit shall not supersede the 2016 Authorization to Operate for this Facility.

2. This Permit shall not be construed as overriding any condition of any local permit (e.g. Special Permit issued by the Ware Zoning Board of Appeals), ordinance, or other requirement.

3. ReSource shall complete the installation of Door 4, installation of the push plates, removal of the remaining C&D processing equipment, and installation of the tarping system, within one year of the effective date of this permit.

4. ReSource shall complete installation of the Fire Rover system within 180 days of the effective date of this permit.

5. ReSource shall repair the damaged exterior metal paneling of the building's western wall as part of the installation of the push plates.

6. A complete set of construction plans for the improvements proposed in the Application shall be filed electronically and as hard copy with MassDEP prior to commencing work.

7. An additional misting system similar to those installed at Doors 1, 2 and 3 shall be installed to provide dust-control coverage for the new Door 4.

8. The stockpiling of material within the building not previously used for stockpiling shall not obstruct exit doors.

9. The structure of the tarping station along the handling building's northern face shall not interfere with the safety of, or access to, the 1,500 gallon underground industrial wastewater holding tank also located in this area.

10. MassDEP approves the reclassification of the Facility from a C&D Processing Facility to a C&D Transfer Station. Subject to this reclassification, the Facility shall not process raw C&D loads other than for removal of zero-tolerance waste ban items, but shall store and transfer materials from one vehicle or container to another vehicle or container for transport off-site to a construction and demolition waste processing facility.

11. The Facility shall comply with the Construction and Demolition Waste Minimum Performance Standard by transporting all raw C&D materials received by the Facility to an MPS-compliant facility.

12. ReSource shall ensure that within 30 days of the effective date of this permit, the information on file for the Facility's Financial Assurance Mechanism is updated to reflect any changes in name or ownership.

IV. RIGHT OF APPEAL

Right to Appeal- Pursuant to 310 CMR 19.033(5), except as provided for under 310 CMR 19.033(4)(b), any person aggrieved by the issuance of this Permit may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L., c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision.

Notice of Appeal- Any aggrieved person intending to appeal the decision to the superior court shall provide notice to MassDEP of intention to commence such action. Said notice of intention shall include MassDEP File Number **(22-309-004)** and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of MassDEP and the Regional Director for the regional office which made the decision. The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street -Third floor
Boston, Massachusetts 02108

Regional Director
Department of Environmental Protection
Western Regional Office
436 Dwight Street
Springfield, Massachusetts 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

If you have any questions, please call the Technical Reviewer assigned to your facility, Thomas Speight, at 755-2120.

Sincerely,

Daniel Hall
Solid Waste Chief
Bureau of Waste Prevention
Western Region

TBS/tbs

cc: Ware Board of Health
Mary LaPlante, DEP WERO (electronic)

C-2

BWP SW45 PERMIT APPROVAL
JANUARY 9, 2023

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Western Regional Office • 436 Dwight Street, Springfield MA 01103 • 413-784-1100

Maura T. Healey
Governor

Kimberly Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Gary Moran
Acting Commissioner

January 9, 2023

Mr. John Farese, Vice President
Director of Operations
ReSource Waste Services of Ware, LLC
198 East Street
Ware, MA 01082

Re: Ware - SWM - Handling Facility
ReSource Waste Services of Ware, LLC
BWP SW 45: Alternative Modification to Any SW Management Facility
ePlace Application 22-SW45-0076-APP
File No. 23-309-004, FMF#377539

Dear Mr. Farese:

On December 9, 2022 the Department of Environmental Protection, Bureau of Waste Prevention, Western Regional Office ("MassDEP" or "Department") received a BWP-SW-45 permit application to modify the ReSource Waste Services of Ware, LLC solid waste Facility in Ware, Massachusetts, (the "Facility) which is owned and operated by ReSource Waste Services of Ware, LLC (ReSource). The Facility is located at 198 East Street in Ware.

The purpose of this Application was to permit certain technical improvements to the Facility buildings, as described below. The Application does not propose changing the type (construction and demolition waste) or quantities of waste material which the Facility may accept, which are specified in the February 2016 Authorization to Operate renewal and the Site Assignment issued by the Ware Board of Health in 2004.

Sanborn, Head & Associates prepared the application on behalf of ReSource. The application and enclosed engineering plans bear the stamp and signature of Stephen E. Wright Commonwealth of Massachusetts Registered Professional Engineer (Civil) No. 39515. The application includes a project narrative, plan drawings for the Facility, and Massachusetts Natural Heritage and Endangered Species Program (MNHESP) filing information. Mr. Wright subsequently provided additional information via electronic mail in response to MassDEP comments.

Facility Description

The Facility is an operational solid waste transfer Facility currently permitted to accept construction and demolition (C&D) waste, with a maximum daily limit per the ATO and Site Assignment of 750 tons per day Monday through Friday, and 500 tons per day on Saturdays. The Facility's maximum annual permitted capacity is 214,500 tons per year. The Facility operating hours are 7:00 AM to 4:00 PM, Monday through Friday, and 7:00 AM to 1:00 PM on Saturday.

The Facility is located on a 23.99-acre parcel of land, approximately 10 acres of which is site-assigned. The Facility building is an approximately 21,600 foot structure, used for receiving and rail-loading of C&D waste materials. A yard area southwest of the building is used for stockpiling of asphalt, brick and concrete rubble. The handling building includes a rail loading bay and is located adjacent to a Massachusetts Central Railroad line and siding.

Proposed Changes

The Application proposes the following material changes to the Facility:

- ReSource proposes to replace an existing 8-foot high by 8-foot wide roll-up door in the western face of the Facility building with a new 18-foot wide by 28-foot high roll-up door. The purpose of this door will be to allow offloading of incoming C&D fines into an underutilized portion of the Facility building, which will help improve tipping floor efficiency and material handling.

- This door will be installed in lieu of a door which was proposed to be added to the southern face of the Facility building, for which MassDEP issued a SW-45 minor modification approval on May 6, 2022. The southern-facing door may be installed as part of future permitting and modification work.

- The proposed work will include removal of the existing door, removal of existing metal exterior wall paneling, and demolition of ten linear feet of the four-foot high concrete wall, prior to installation of the new door system. The Application does not anticipate major structural changes to the Facility building.

- The Application assumes that the C&D fines will be delivered by tractor-trailer trucks which reverse down the access road west of the Facility building to access the proposed door. The turning radius of these trucks requires that an area of fill be placed on the slope which bounds the access road to the west, to create an apron capable of supporting truck traffic that widens a portion of the access road by approximately 35 feet. The Application assumes placement of 400 cubic yards of crushed asphalt, brick and concrete (ABC) fill over an approximately 3,500 square foot area of slope, with a minimum fill depth in the apron area of one foot and a maximum of four feet, and a 3:1 slope along the western (downhill) face of the filled area. The wearing surface will consist of exposed ABC material and the slope face with be top-dressed with four inches of loam. Jersey barriers will be placed along the edge of the apron.

- A portion of the fill area will be located above an existing oil/water/sediment trap. The trap's risers will be extended as necessary to maintain grade access.

- The Application asserts that none of the proposed work is located with wetlands resource areas or their buffer zones.

II. DEPARTMENT DETERMINATIONS

This application was reviewed in accordance with Massachusetts General Laws Chapter 111, Section 150A, and the Massachusetts Solid Waste Regulations at 310 CMR 16.00 and 19.000, including 310 CMR 19.033, *Permit Procedure for an Application for a Permit Modification or Other Approval.* The plans and reports described above establish that the Facility complies with the criteria at 310 CMR 19.038(2)(a) and (b), except where variances have been approved by MassDEP.

MassDEP, as a result of its review of the Application, has determined that the permit application substantially complies with the requirements of 310 CMR 19.042 *Authorization to Operate.* Accordingly, MassDEP, with the authority granted pursuant to 310 CMR 19.042, hereby approves the Alternative Modification subject to the conditions listed in Section III of this Permit.

This document is a permit issued pursuant to M.G.L. c. 111, s. 150A and 310 CMR 19.000, subject to the conditions set forth below and the standard conditions at 310 CMR 19.043(5) and any amendments thereto. In the event this Permit conflicts with all or parts of prior plan approvals or permits issued pursuant to c. 111, s. 150A or solid waste regulations in effect prior to July 1, 1990 the terms and conditions of this Permit shall supersede the conflicting provisions of such prior permits or approvals. This Permit does not convey property rights of any sort or any exclusive privilege.

III. PERMIT CONDITIONS

This Permit is issued subject to the following conditions:

GENERAL PERMIT CONDITIONS

1. **Compliance with Plans** – ReSource Waste Services of Ware, LLC ("ReSource") shall operate the Facility in accordance with approved plans, reports, and other submissions described in this Permit except as may be modified by the conditions set forth herein. No material changes in the design or activities set forth in the approved documents shall be performed without prior written MassDEP approval. ReSource shall submit an appropriate permit application and receive MassDEP approval before making any such change; or shall seek guidance as to the applicability of permitting requirements if applicability is unclear.

2. **Standard Conditions** - ReSource shall operate the Facility in accordance with the conditions stated in 310 CMR 19.007-19.011 and 19.043(5) as currently written or as may be modified at a future date.

3. **Joint Liability** - This Permit is issued subject to the conditions of joint liability of the owner and operator in accordance with 310 CMR 19.043(3).

4. **Transfer** - No transfer of this Permit shall be permitted except in accordance with 310 CMR 19.044.

5. **Permit Modification** - MassDEP reserves the right to require design and/or operational modifications to the approved plans, and to rescind, suspend, or modify this Permit by the imposition of additional conditions based upon evaluation of the Facility's performance.

6. **Demonstration Projects** - This permit application does not include any provisions for demonstration projects. All demonstration projects proposed for the Facility will require separate MassDEP approvals.

7. **Variances** - This permit application does not seek approval for any variances from applicable requirements.

8. **Right of Entry** - MassDEP and its agents and employees shall have the right to enter upon the site at all reasonable times and without notice, to inspect the transfer station and any equipment, structure or land located thereon, take samples, recover materials or discharges, have access to and photocopy records, to perform tests and to otherwise monitor compliance with this Permit and all environmental laws and regulations. This right of entry and inspection shall be in addition to MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and MassDEP.

9. **Waste Ban** - The Operator shall comply with all applicable waste ban restrictions set forth at 310 CMR 19.017.

10. **Other Laws and Regulations** - The operation, maintenance, and closure shall be performed in compliance with other applicable state and federal laws and regulations.

11. **Submissions** - Compliance with submission deadlines pursuant to this approval shall be determined by the date of receipt by MassDEP or by the postmarked date, whichever is earlier. Unless otherwise directed herein, all submissions required pursuant to this Permit shall be sent to:

    Section Chief, Solid Waste Management
    Massachusetts Department of Environmental Protection
    436 Dwight Street
    Springfield, MA 01103

12. **Authorization to Construct** - Before commencing any construction not specifically approved herein and that would result in a modification of waste handling processes and/or increase the processing or handling capacity of the Facility beyond the capacity approved in this Permit, the Owner and/or Operator shall obtain an Authorization to Construct in accordance with 310 CMR 19.041 or a modification of this Permit, as determined by MassDEP.

SPECIFIC PERMIT CONDITIONS

1. Except where addressed by specific conditions enumerated below, this Permit shall not supersede the 2016 Authorization to Operate for this Facility or any other approval for the Facility, including the May 6, 2022 SW-45 approval and the conditions in that approval for repair to the Facility building's damaged western exterior metal wall, removal of the internal mezzanine, and the installation of push plates on portions of the interior walls.

2. This Permit shall not be construed as overriding any condition of any local permit (e.g. Special Permit issued by the Ware Zoning Board of Appeals), ordinance, or other requirement.

3. A complete set of final construction plans for the improvements proposed in the Application shall be filed electronically and as hard copy with MassDEP prior to commencing work.

4. The fill material shall be placed on the slope in accordance with good engineering and construction practice. Geogrid or other reinforcing material shall be installed as necessary in order to ensure stability of the fill material. The ABC material shall be crushed to a size appropriate for the purpose before being placed.

5. The truck traffic to the new Door 4 shall not interfere with the safety of, or access to, the aboveground diesel fuel storage tank located along the western face of the building, which is currently protected only by several large concrete blocks. The tank shall be provided with all additional protection against vehicle collision that is consistent with the size of trucks delivery wastes and sound engineering practice.

6. ReSource shall submit to MassDEP an engineer's letter certifying that the work has been completed in accordance with the permit conditions, regulations and other requirements cited above within 30 days of the completion of work.

7. The fourth southerly-facing roll-up door may still be installed as provided for in the May 6, 2022 SW-45 approval. ReSource shall notify MassDEP 30 days before undertaking this work and shall submit a complete set of final construction plans, engineering reports and any other associated documentation reflecting changes to plans made since the May 6, 2022 approval was issued.

IV. RIGHT OF APPEAL

Right to Appeal- Pursuant to 310 CMR 19.033(5), except as provided for under 310 CMR 19.033(4)(b), any person aggrieved by the issuance of this Permit may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L., c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision.

Notice of Appeal- Any aggrieved person intending to appeal the decision to the superior court shall provide notice to MassDEP of intention to commence such action. Said notice of intention shall include MassDEP File Number **(23-309-004)** and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of MassDEP and the Regional Director for the regional office which made the decision. The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street -Third floor
Boston, Massachusetts 02108

Regional Director
Department of Environmental Protection
Western Regional Office
436 Dwight Street
Springfield, Massachusetts 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

If you have any questions, please call the Technical Reviewer assigned to your Facility, Thomas Speight, at 755-2120 or Thomas.Speight@mass.gov.

Sincerely,

Daniel Hall
Solid Waste Chief
Bureau of Waste Prevention
Western Region

TBS/tbs

cc: Ware Board of Health
Stephen Wright, PE, Sanborn Head & Associates, Inc.
Audrey Piubeni, DEP WERO (electronic)

APPENDIX D

EXISTING WAIVER FOR PROPERTY LINE SETBACK (May 19, 2003)

File

309-005

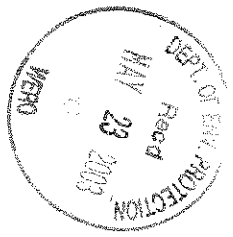
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

EDWARD P. KUNCE
Acting Commissioner



MEMORANDUM

To: Mike Gorski, Regional Director, WRO
From: Ed Kunce, Acting Commissioner
Date: May 19, 2003

RE: Approval of Waiver Request, O'Riley Family Trust Site Assignment Application for C&D Waste processing facility, Ware, Massachusetts (Transmittal # W034477)

The O'Riley Family Trust has submitted a site assignment application to the Department for a Construction and Demolition (C&D) recycling facility to be located in Ware, Massachusetts. As part of the site assignment application, the proponent is asking for a waiver from the 100 foot setback criterion at 310 CMR 16.40(4)(h), Size of Facility. This criterion states:

> The minimum distance between the waste handling area or deposition area and the property boundary shall be 100 feet, provided that a shorter distance may be suitable for that portion of the waste handling or deposition area which borders a separate solid waste management facility.

The Site Assignment Regulations at 310 CMR 16.40(6) govern the waiver process.

Proposal

The O'Riley Family Trust is proposing to construct a 750 ton per day C&D waste processing facility on a parcel of land currently used as an auto salvage yard that is bisected by a railroad track owned by the Commonwealth of Massachusetts. The applicant is requesting a limited waiver of the requirements of 310 CMR 16.40(4)(h), only with respect to the distance to the property boundary of the railroad track, known as the Ware River Secondary Track. This request does not apply to the required 100 foot distance to any other abutting property. The O'Riley Family Trust owns the parcel on the opposite side of the railroad track from the proposed waste handing facility.

The Ware River Secondary Track is owned by the Commonwealth of Massachusetts and is currently licensed to the Massachusetts Central Railroad for the purpose of providing freight railroad service. The Department has received a form entitled "Assent of Abutter" from the Secretary of the Executive Office of Transportation and Construction, dated April 18, 2003, whereby the abutter assents to the allowance of the requested waiver of the 100 foot setback,

provided that the applicant obtains all state and local permits required for the property. The proposal to site the facility less than 100 feet from this railroad track property will increase the setback from sensitive receptors, including residences, the Ware River and Grenville Park located across the river.

Criteria

The Department has reviewed the waiver request submitted with the Site Assignment Application based upon the criteria established in the Site Assignment Regulations at 310 CMR 16.40(6). Those regulations indicate that the Commissioner may waive the setback distance at 16.40(4)(h) (100 foot setback to the property line) when the Commissioner finds that strict compliance with the criterion "would result in undue hardship and would not serve to minimize or avoid adverse impact."

The regulations indicate that a waiver shall not be granted unless "the Commissioner determines that the granting of a waiver is necessary to accommodate an overriding community, regional, or state public interest and the granting of the waiver would not diminish the level of protection to public health and safety and the environment." In reviewing a waiver request the regulations include a number of factors for consideration. These are presented below.

Considerations

Availability of other suitable sites – The applicant states that because of the nature of the proposed facility and the desire to ship materials by rail, location near a railroad is an integral component of the operation. Other sites that are not located near a railroad would therefore be unacceptable given the method of operation proposed. Furthermore, the closer the facility is located to the railroad the more efficient the operation will be. Alternative sites that have access to a railroad will therefore have the same issue associated with them and therefore would not eliminate the need to request a waiver.

Whether the site is in a preferred municipality – Because the Town of Ware does not have an existing active disposal facility, nor is it part of a regional solid waste management district, it is considered to be a preferred municipality for purposes of the Site Assignment Regulations. Site assignments for new solid waste facilities are preferred in municipalities without existing facilities and in municipalities not participating in a regional refuse disposal district.[1]

The minimum facility size required to reasonably meet essential waste handling activities - The size of the proposed facility will be sufficient to properly operate. Reducing the 100 foot setback to the property line will not reduce the overall size of the facility, but rather will allow the facility building, rail spurs and operations to be moved closer to the railroad and further from other abutting properties.

Whether the waiver will result in environmental benefits in excess of those that could be achieved in the absence of the waiver – The applicant states that the waiver will result in environmental benefits in excess of those that could be achieved in the absence of the waiver.

[1] See Chapter 111, section 150A1/2, paragraphs (15) and (16).

Moving the operation closer to the railroad will benefit other abutters to the facility because the setback distances to those abutters will be greater than would otherwise be the case. By moving the waste management area closer to the railroad it will be located further from the Ware River, residential areas and the park across the river.

The extent to which the proposed facility is part of an integrated solid waste management activity – The proposed facility will operate as an integrated solid waste management facility. An integrated solid waste management facility is one where materials are processed to remove recyclable materials before the residual materials that are generated are disposed of. Furthermore, some C&D residual and fine materials may be suitable for use as daily cover material or grading and shaping material in the closure of landfills, further reducing the amount of material that must be disposed.

Whether the solid waste management objectives of the proposed project could be achieved in the absence of the waiver – The solid waste objectives of the proposed project could likely be achieved in the absence of the waiver, but at greater cost and reduced operational efficiency. Furthermore, absence of the waiver would require the facility buildings and operations to be located closer to other abutters and sensitive resources such as the Ware River.

Decision

The Commissioner has reviewed the waiver request submitted by the O'Riley Family Trust and hereby grants a waiver from the 100 foot setback to the abutting Ware River Secondary Track property owned by the Commonwealth of Massachusetts. The Commissioner finds that strict compliance with the criterion would result in undue hardship and would not serve to minimize or avoid adverse impact. Moreover, the granting of the waiver is necessary to accommodate an overriding community, regional or state public interest and will not diminish the level of protection to public health, safety and the environment for the following reasons:

- The type of facility proposed is in keeping with the goals of the Beyond 2000 Solid Waste Master Plan to increase the capacity in Massachusetts for processing construction and demolition (C&D) waste to separate out recyclable and reusable materials and minimize the need to dispose of C&D waste.
- The location of the facility is in a preferred municipality for purposes of the Site Assignment Regulations and pursuant to Chapter 111, section 150A1/2, paragraphs (15) and (16).
- The affected abutter, the Commonwealth of Massachusetts, through its Secretary of the Executive Office of Transportation and Construction, has assented to the waiver of the 100 foot setback, provided that the applicant obtains all state and local permits required for the property.
- Compliance with the 100 foot setback would reduce the efficiency of the operation and increase capital and operating costs for the applicant and would reduce the level of protection to other abutters by reducing the setback distance of the waste handling area when compared to the case where the waiver is granted.
- By granting the waiver, the level of protection to public health and the environment will be increased because the waste management operation will be located further away from other abutters and the Ware River than would be the case in the absence of the waiver.

APPENDIX E

MEPA CERTIFICATES

E-1

ENVIRONMENTAL IMPACT REPORT CERTIFICATE
AUGUST 30, 2002

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston, MA 02114-2119

JANE SWIFT
GOVERNOR

BOB DURAND
SECRETARY

Tel. (617) 626-1000
Fax (617) 626-1181
http://www.magnet.state.ma.us/envir

FILE COPY

August 30, 2002

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
DRAFT ~~FINAL~~ ENVIRONMENTAL IMPACT REPOIRT

PROJECT NAME	**:C & D Material Processing Facility**
PROJECT MUNICIPALITY	**:Ware**
PROJECT WATERSHED	**:Chicopee**
EOEA NUMBER	**:12699**
PROJECT PROPONENT	**:O'Riley Family Trust**
DATE NOTICED IN MONITOR	**:July 24, 2002**

As Secretary of Environmental Affairs, I determine that the Final Environmental Impact Report (FEIR) submitted on the above project **adequately and properly complies** with the Massachusetts Environmental Policy Act (MEPA, M.G. L., c. 30, ss. 61-62H) and Section 11.06 of the MEPA regulations (301 CMR 11.00).

As described in the Environmental Notification Form (ENF), the proposed project involves the redevelopment of an existing auto salvage yard into a construction and demolition (C&D) material processing facility on approximately 21 acres of land located in Ware adjacent to the Ware River. The proposed facility has a designed capacity of 750 tons per day. The site is currently operated as an auto salvage yard. The existing buildings will be reused, with portions of one of the buildings to be demolished.

A new 21,600 sf building will be constructed to provide cover for tipping, processing, and loading activities. Clean materials, including asphalt, brick, concrete and wood, will also be sorted and processed in designated outdoor areas. The proposed project will be serviced by both rail and truck. The proposed facility's processing will include rough screening, picking and sorting of recyclable materials. Unwanted materials removed in the initial screening process, together with other un-recyclable fed through the facility's grinder process, will be transported by rail and truck for landfill disposal. Reclaimed materials and processed residuals will also be transported from the proposed project site by rail and trucks. Although not mentioned in the ENF, the proponent indicated during the MEPA site visit that the existing on-site auto salvage business will continue to operate on-site as part of the proposed project.

The project is subject to review and mandatory preparation of an EIR pursuant to section 11.03 (9)(a) of the MEPA regulations because the project involves the construction of a new solid waste transfer facility with a capacity of 150 or more tons per day for storage, treatment, processing, combustion or disposal of solid waste. This project will require an Order of Conditions from the Ware Conservation Commission, and hence a Superseding Order from the Department of Environmental Protection (DEP) if the local Order were appealed. The proposed project represents a change in use involving a change in the type and pattern of traffic using an existing curb cut that may result in a substantial increase or impact on traffic. As a result, the proposed project will require a new curb cut permit from the Massachusetts Highway Department (MHD). The use of rail and trucks to transport both raw construction/demolition debris and recycled and processed residual materials will have potential impacts on local traffic patterns.

The project will be subject to a three-tiered review process including: 1) MEPA review; 2) the site assignment process administered jointly by the Ware Board of Health, the Department of Environmental Protection (DEP) and the Department of Public Health (DPH); and 3) the solid waste management facility permit review process administered by DEP.

The FEIR has generally responded adequately and resolved many of the remaining issues outlined in the Certificate in the DEIR. Several modifications to the proposed project have been made by the proponent in response to comments received on the Draft Environmental Impact Report (DEIR) to reduce impacts to wetlands, traffic, and air quality.

According to DEP's comment letter, the proposed project will need to meet the requirements for Standard #5 of DEP's Stormwater Management Standards pertaining to higher potential pollutant loads. The proponent will also be required to provide additional information on the proposed project's materials handling and processing activities, waste reduction methodologies, mitigation of noise, dust and odor, and proposed environmental monitoring systems during the permitting process. The proponent must address these issues to DEP's satisfaction.

The proponent should consult with DEP, Ware officials, and local residents located within the project area, to develop a materials hauler education/notification plan to include: haul route restrictions, haul route road signage, hauler truck speed and weight restrictions, and truck queuing and idling.

I ask DEP to consult with the Town of Ware officials to establish specific truck haul routes on state-numbered highways (i.e. Route 9/Route 32), and give serious consideration to restricting trucks from operating on local roadways servicing primarily residential developments, schools and public open spaces in the Town of Ware. DEP should also specify the facility's operating hours in its permit to minimize, to the maximum extent possible, disturbances from the facility to the surrounding neighborhoods.

I am satisfied that the project has avoided and mitigated environmental impacts to the greatest feasible extent, and that the state permitting agencies have adequate information to base their permit decisions, and sufficient permitting authority to ensure that any remaining issues are adequately addressed.

Mitigation

The proponent and state agencies should forward copies of the final Section 61 Findings to the MEPA Office for completion of the file.

August 30, 2002
DATE

Bob Durand

Comments received:

7/29/02 Massachusetts Department of Environmental Protection – CERO
8/22/02 Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement - Riverways Program

FEIR #12699

BAD/NCZ/ncz

N2

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100

JANE SWIFT
Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

RECEIVED
AUG 22 2002
MEPA

Date: August 23, 2002

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attention: MEPA Office
Nicholas Zavolas, EOEA No. 12699R
251 Causeway Street, Suite 900
Boston, MA 02114

Re: C & D Material Processing Facility
Ware, MA

Dear Secretary Durand,

The Department of Environmental Protection, Western Regional Office appreciates the opportunity to comment on the Draft Environmental Impact Report (DEIR) submitted for the proposed C & D Material Processing Facility (EOEA #12699R) in Ware. Department staff members from the Bureau of Waste Prevention's Solid Waste Program and the Bureau of Resource Protection's Wetlands and Waterways Program have participated in this review and comment letter.

I. Project Description

The Project Site is located in the east-central area of Ware. The site is zoned Highway Commercial and is currently developed and actively used as Rocoso Used Auto Parts, an auto salvage yard. The site is bounded to the east by Route 9, to the south by abutting undeveloped property, to the west by the Ware River and an abandoned rail right-of-way, and to the north by a trailer home. The New York Central Railroad bisects the site. Three buildings and a cell tower are located on the southeastern portion of the property. The remainder of the property is used primarily for the storage of car shells. The borders of the property are wooded.

The proposed project will alter the use of the site to a recycling and processing facility for construction and demolition material. The existing buildings will remain, although portions of one building will be demolished. A new 21,600 sf building will be constructed to provide cover for tipping, processing and truck and rail loading activities. The Proposed Project will be serviced by rail and truck for transport of reclaimed materials and process residuals. Additionally, clean sorted materials such as asphalt, brick and concrete (ABC), as well as clean wood, will be stored and processed in designated outdoor areas. The outside ABC holding areas will be walled with moveable pre-cast

retaining walls and partitions and 15-foot mesh litter control fencing. The maximum capacity at the facility will be 750 tons per day.

The processes within the processing building include rough screening to remove "fines" from recyclable materials. The fines will be moved by conveyor to a bunker within the building and then loaded to rail or truck for disposal. Screened material will be conveyed to several raised picking stations. Recyclable materials will be removed and deposited into bins below the picking stations. Bins can be accessed either from doors to the outside of the building or to the interior of the building for further processing. Reject material that is not removed during the picking process is conveyed to the feed hopper of the Grindall and is mechanically ground to reduce size. Conveyors are provided to discharge processed residuals either onto the rail loading area or directly into trucks. Provisions are made for two trucks to be positions to allow continuous operation. Outdoor processing will include periodic crushing and screening of ABC material.

Much of the materials to be transported from the site will be via rail. To facilitate rail transportation, three rail spurs will be constructed off of the existing New York Central Railroad line. Vehicular traffic will utilize the existing curb cuts. Traffic is projected to increase by approximately 100 vehicle trips per day.

The existing buildings will remain, and one new building will be constructed. The proposed facility has been designed to be setback a minimum of 500 feet from any residential building. All new buildings, roadways and storage areas will be located outside of the 200-foot Riverfront Area to the Ware River. The only work proposed within the Riverfront Area is plantings for screening purposes and the installation of storm water management systems. The storm water management system will incorporate catch basins, grassed swales, and detention basins.

Noise impacts are anticipated from trucks, wheel loader, bulldozer, asphalt grinding machinery and a wood shredder. The main part of the facility will be located at a minimum of 500 feet from the property line. Noise levels at the property line have been conservatively estimated at 45 decibels on average days and 51 decibels under worst-case conditions when the wood shredder is operating. Operation of the wood shredder will be occasional. Noise levels will be consistent with DEP standards and the standards of the Ware Zoning Bylaw. Air quality impacts have been kept to a minimum by the use of electric powered equipment for primary processing equipment. Potential air quality impacts will be from diesel trucks entering and exiting the Project Site.

The Proposed Project includes the installation of an on-site well for non-potable water for use in dust control. The water would be used for dust suppression inside the building above the screening unit, Grindall, and on tipping and loading areas. Additional dust suppression will occur on a periodic basis outside the buildings on roadways and on concrete prior to its crushing. The amount of water to be used will be limited to the amount required to adequately wet the target areas.

The new facility will be screened from view from the Ware River and from residences in the vicinity by elevation and vegetation. The facility will be located a minimum of 500 feet from existing and proposed residences. Existing vegetation along the north, west, and southwestern property boundaries will be maintained to the extent possible. Plantings of white pine are proposed in less vegetated areas. Additionally, aesthetic plantings are proposed along the property boundary with Route 9 to enhance the roadside appearance of the facility.

II. Required DEP Permits and/or Applicable Regulations

Program Resource Protection

Wetland Regulations (310 CMR 10.00 - Order of Conditions)

Bureau of Waste Prevention

Air Pollution Control Regulations (310 CMR 7.00, et seq.)

Site Assignment Regulations (310 CMR 16.00, et seq.)

Solid Waste Regulations (M.G.L. Chapter 40, Section 54; 310 CMR 16.00 et seq. & 310 CMR 19.000, et seq.)

Water Pollution Control Regulations (314 CMR 1.00-7.00, et seq.)

III. Permit Discussion

Bureau of Resource Protection

Wetlands Program

As described in the ENF, under the Wetlands Protection Act, MGL ch 131, §40, and the Regulations 310 CMR 10.00, this office understands that work is proposed within the Riverfront Area and the 100-foot Buffer Zone. Based on information submitted in the ENF, the Wetlands Program is of the opinion that in order for the project to meet the Department's Stormwater Management Policy, it should be proposed to meet the requirements of Standard #5 for higher potential pollutant loads. This project can progress through the local permitting process if the proponent incorporates best management practices and mitigation for all jurisdictional area impacts, thereby protecting the "interests" of the Wetlands Protection Act.

Bureau of Waste Prevention

Solid Waste Management and Air Quality Programs

The proposed Construction and Demolition (C&D) processing facility will need to comply with the Site Assignment regulations (310 CMR 16.00) and the solid waste management regulations (310 CMR 19.000) as a solid waste handling facility, including all applicable setback requirements. The DEIR states that the project as proposed meets all applicable setback requirements. The re-use of any processed C&D materials within Massachusetts would require issuance of a Beneficial Use Determination (BUD) permit. Other processed materials (i.e. clean wood chips or clean, processed asphalt, brick and concrete (ABC) material) would need to comply with the Solid Waste Management (SWM) regulations for exempt materials and the Department's "Guide to Regulations for Using or Processing Asphalt, Brick and Concrete Rubble", revised February 1, 1995.

The DEIR states that all tipping, processing, and loading of C&D material will be conducted in a totally enclosed building, as is required by the Department for the siting and permitting of a C&D processing facility. Only clean wood (i.e. not painted, stained or

treated) and clean ABC rubble will be allowed to be tipped, stored and processed outside the building, in accordance with the SWM regulations and Department policies. The proponent should implement measures to mitigate dust, noise, and odor nuisance conditions, which may occur during normal operation of the facility including activities conducted outdoors. Such operations, including the operation of the ABC crusher and clean wood waste grinder, must comply with the applicable air quality regulations at 310 CMR 7.01, 7.09, 7.10 and 7.11, and the Department's Division of Air Quality Noise Policy DAQC 90-001.

The project proponent is advised that asbestos and asbestos-containing material (ACM) is a special waste as defined in the *"Solid Waste Management Regulations"*. These wastes must be managed in accordance with 310 CMR 19.061 as well as with 310 CMR 7.15. Asbestos wastes and ACM will not be accepted, handled, or processed at the facility. As part of the permitting process, the Department will outline and specify the requirements for inspection of and sampling of incoming C&D loads, as well as any outgoing BUD materials. Inspection and sampling will be required to be performed by personnel with appropriate training and certification, as well as by independent, third party consultants, and the results of inspection and sampling will be required to be submitted to the Department on a regular basis. No hazardous wastes will be accepted at the facility. The SWM permit will specify the permitted hours of operation for the facility; the proposed hours are Monday through Friday, 7:00 AM to 4:00 PM, and Saturday 7:00 AM to 1:00 PM. The Department will determine, as part of the SWM permitting process, whether a bathroom is required to be installed within the proposed new building.

All materials entering the site must, after handling and/or processing, be disposed of properly off-site at a permitted facility, recycled, or beneficially re-used in accordance with a valid BUD permit. No disposal of any solid wastes will be allowed on-site, and the SWM permits will establish limits for the volumes of materials that may be stored on-site. As outlined above, only clean wood waste and clean ABC material (unprocessed and processed) will be allowed to be stored outside the building. The project proposal is to accept a maximum of a total of 750 tons per day of solid wastes, clean wood and ABC rubble. Solid wastes, BUD materials, and processed clean wood/ABC material will be transported from the site via a combination of rail and trucks. The loading area for both railcars and trucks must be inside the enclosed building; the building must have doors that close when trucks or railcars are not passing in or out. As part of the SWM permitting process, the Department will require that the facility has a fire prevention and contingency plan in place and approved by the Ware Fire Department prior to the beginning of operation.

IV. Other Comments/Guidance

Bureau of Waste Site Cleanup

Project #12699 does not indicate any provisions for dealing with soil contamination generated from historical practices at an auto reclamation yard.

The Massachusetts Contingency Plan (MCP) - regulation 310 CMR 40.0000, governs the cleanup of oil and hazardous material releases in Massachusetts. The regulations have made provisions for excavating and disposing of limited surficial soil contamination. Excavation would be performed as a "Limited Removal Action" (LRA), as specified in 40.0318. All excavation activities conducted, as a LRA must have occurred within 120 days

of obtaining knowledge of soil concentrations greater than the Reportable Concentrations listed in the MCP.

However, during this 120 day time period, the regulations allow for the removal of up to 100 cubic yards of petroleum-contaminated soil or 20 cubic yards of hazardous material contaminated soil as a LRA. A specialized contractor is not required to perform the LRA, but must be supervised by someone knowledgeable with spill cleanups, such as a Licensed Site Professional (LSP). The contaminated soil must be managed and disposed of in accordance with 310 CMR 40.0030.

The party performing the LRA must notify the Department, if the volume of soil exceeds 100 cubic yards for oil or 20 cubic yards for a hazardous material, in order to obtain approval for the removal of additional soil. If all the soil contamination has been removed (as determined by a knowledgeable party such as the an environmental specialist, hazardous waste coordinator, or Licensed Site Professional), confirmatory soil samples must be collected to confirm that the concentrations are below the Reportable Concentrations. If the LRA activities fail to reduce soil concentrations to below the Reportable Concentrations within the 120 days, then formal notification must be provided to the Department. If the LRA exceeds the limits of 100 cubic yards for oil or 20 cubic yards for hazardous materials, then approval must be granted from the Department to continue removal actions as a Release Abatement Measure, as specified in 310 CMR 40.0443.

Soil must be disposed of under a "Bill of Lading" which requires that a Massachusetts LSP sample the excavated soil and verify that the soil meets the permit requirements of the receiving disposal facility. Soil disposal must be completed within 120 days from the date it is excavated. Records of the LRA and soil disposal must be retained for a period of 5 years.

Finally, a LRA only applies to soil that exceeds the Reportable Concentrations listed in the MCP. Therefore, more than 100 cubic yards may be excavated without notifying the Department if the initial soil concentrations were below the Reportable Concentrations. All contaminated soil must still be managed in accordance with 310 CMR 40.0030.

If you have any questions regarding this comment letter please do not hesitate to call Craig Givens at (413)-755-2217.

Sincerely,

Michael J. Gorski
Regional Director

cc: DEP/Boston/David Murphy
MEPA File
DEP/WERO/Larry Hanson

Commonwealth of Massachusetts

Riverways Programs

IV 2

July 29, 2002

RECEIVED
JUL 29 2002
MEPA

Robert Durand, Secretary
Executive Office of Environmental Affairs
251 Causeway St., Suite 900
Boston, MA 02114
ATTN: MEPA UNIT

Re: Comments on Draft Environmental Impact Report, C&D material processing facility, Ware, MEPA # 12699R

It is my understanding that other portions of the "old railroad grade" mentioned on the Environmental Notification Form (ENF) located outside of the project site are being considered for or actively being converted to recreational (i.e. rail trail) use. Either Danny O'Brien, Jennifer Howard or Pete Brandenburg of DEM are likely to know more specifics about that, as may Paul Hills of the Ware Office of Community Development (who stated in June of 2001 that the so-called "25 percent design" of three miles of the proposed Ware River Rail Trail in Ware, from Grenville Park to the Hardwick line, is awaiting state review). Also see info posted on-line at <http://members.fortunecity.com/railtrails/MA/BW/>. Anyway, it would be nice for this proposed development not to do anything that would preclude the possibility of reactivating the old RR grade through the parcel for rail trail use.

I notice from the USGS topo map that there is a park (labelled "Grenville Park") that is located across the Ware River from the project site. I am wondering about the potential adverse visual and/or noise impact this project might have on the park. Of course the site's current use (as an auto junkyard) is not visually appealing either, and there is the potential that the redevelopment of the site for the proposed use could make it considerably more visually appealing than its current use.

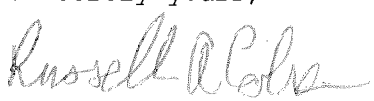
I note from the ENF the statement that "All new buildings, roadways and storage areas will be located outside of the 200-foot Riverfront Area to the Ware River. The only work proposed within the Riverfront Area are plantings for screening purposes and the installation of stormwater management systems." I was glad to read this, especially if this means that any junk cars that may currently be located within the Riverfront Area will be removed. I applaud the applicant for revegetating the Riverfront Area, and I hope the applicant will look for opportunities to reestablish a 100-foot+ wide corridor of undisturbed vegetation along the river and locate the stormwater BMPs outside of the 200-foot Riverfront Area as much as possible in order to maximize the natural functions and values of the riparian area. Here is some language from a presentation I made on this subject at the MACC conference earlier this year:

310 CMR 10.58 (4)(d)1.a of the Wetlands Protection Act regulations state that "structural stormwater management measures may be allowed [within the minimum 100-foot-wide area of natural vegetation required by the performance standards, usually the 100 feet closest to the river] only when there is no practicable alternative". Structural stormwater BMPs are permitted elsewhere within the Riverfront Area (i.e., beyond the minimum 100-foot-wide area of natural vegetation). The second paragraph of 310 CMR 10.58 (4)(d)1. states that "the calculation of square footage of alteration [subject to the 5,000 sq. ft. or 10% maximum alteration performance standard] .shall exclude areas used for structural stormwater management measures, provided there is no practicable alternative to siting these structures within the riverfront area and provided a wildlife corridor is maintained (e.g., detention basins shall not be fenced)." In other words, the square footage of any stormwater BMP located anywhere within the Riverfront Area is considered an "alteration" and must be lumped in with all other proposed alteration subject to the 5000 sq. ft. or 10% maximum performance standard, unless: (1) there is no practicable alternative to siting these structures within the riverfront area; and (2) a wildlife corridor is maintained.

Notwithstanding the above, the proposed project is likely to quality for treatment under the "redevelopment" provision of the Rivers/Wetlands regulations (310 CMR 10.58 (5)), where the above performance standards are more flexible.

Thanks for the opportunity to comment on this project. I look forward to reading the proponent's responses to these comments in the final EIR for this project.

Sincerely yours,



Russell A. Cohen
Rivers Advocate

E-2

NOTICE OF PROJECT CHANGE CERTIFICATE
SEPTEMBER 21, 2007
(Project not Implemented)

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

DEVAL L. PATRICK
GOVERNOR
TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR
IAN A. BOWLES
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

B

9/25/07

Note: The proposed project change associated with this Certificate was not implemented

September 21, 2007

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
NOTICE OF PROJECT CHANGE

PROJECT NAME	:ABC&D Material Processing Facility (formerly C&D Material Processing Facility)
PROJECT MUNICIPALITY	:Ware
PROJECT WATERSHED	:Chicopee
EOEA NUMBER	:12699
PROJECT PROPONENT	:ABC&D Recycling Inc.
DATE NOTICED IN MONITOR	:August 22, 2007

Pursuant to the Massachusetts Environmental Policy Act (M.G.L. c.30, ss.61-62H) and Section 11.17 of the MEPA regulations (301 CMR 11.00), I have reviewed the Notice of Project Change (NPC) submitted for this project and hereby determine that it **does not require** the preparation of an Environmental Impact Report (EIR).

Project History

As described in the original Environmental Notification Form (ENF) filed with the MEPA Office in January 2002, the project involved the redevelopment of an existing auto salvage yard into a 750 tons per day (tpd) construction and demolition (C&D) material processing facility located on a 21-acre site on East Street in Ware adjacent to the Ware River. The facility has a designed capacity of 750 tons per day. Most of the existing buildings were reused by the C&D processing facility. A new 21,600 square foot (sf) building was constructed to provide cover for tipping, processing, and loading activities. Clean materials, including asphalt, brick, concrete and wood, will also be sorted and processed in designated outdoor areas. The facility is served by both rail and truck. The facility's processing includes rough screening, picking and sorting of recyclable materials.

Note: The proposed project change associated with this Certificate was not implemented

Unwanted materials removed in the initial screening process, together with other un-recyclable fed through the facility's grinder process, are transported by rail and truck for landfill disposal. Reclaimed materials and processed residuals are also transported from the proposed project site by rail and trucks.

The project as originally proposed required the mandatory preparation of an EIR pursuant to section 11.03 (9)(a) of the MEPA regulations because it involved the construction of a new solid waste transfer facility with a capacity of 150 or more tpd (750 tpd total) for the storage and processing of solid waste. The project received an Order of Conditions from the Ware Conservation Commission. The project required a new curb cut permit from the Massachusetts Highway Department (MHD). The use of rail and trucks to transport both raw construction & demolition debris and recycled and processed residual materials will have potential impacts on local traffic patterns. The project was subject to a three-tiered review process including: 1) MEPA review; 2) the site assignment process administered jointly by the Ware Board of Health, the Department of Environmental Protection (MassDEP) and the Department of Public Health (DPH); and 3) the solid waste management facility permit review process administered by MassDEP. A Secretary's Certificate on the FEIR was issued on August 30, 2002 and determined that the FEIR responded adequately and resolved many of the remaining issues outlined in the Certificate in the DEIR.

Notice of Project Change

As described in this NPC, the proponent is proposing to expand the list of acceptable materials that may be processed within the proponent's facility to include the processing of 50 tpd or more of municipal solid waste (MSW) within the facility's permitted tonnage of 750 tpd. According to the comments received from MassDEP, the proposed addition of MSW processing will require modifications to the existing facility's Site Assignment Permit, Authorization to Construct Permit and Authorization to Operate (ATO) permit previously issued to the proponent for the acceptance and processing of C&D material. The proponent should consult with the Town of Ware officials, and local residents located within the project area, to develop a MSW materials hauler education/notification plan to include: haul route restrictions, haul route road signage, hauler truck speed and weight restrictions, and truck queuing and idling.

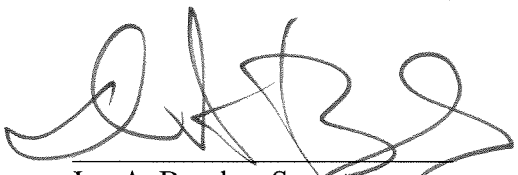
Note: The proposed project change associated with this Certificate was not implemented

Odor/Vectors/Litter

The proposed MSW processing activities will be conducted within the existing enclosed processing building. According to the proponent, C&D and MSW waste materials will be stored on the project site. The processing building is equipped with a spray-mist dust prevention system and two exhaust fans designed to minimize impacts to air quality. I continue to encourage the proponent to consider the use of additional available technologies, including but not limited to the installation of a negative air pressure system with appropriate air pollution controls, to control dust and odor emissions from the proposed facility.

According to MassDEP, the acceptance and processing MSW at the facility will also require the proponent to modify the facility's existing maintenance and operation plan to address the Solid Waste Management requirements specified for Cover Material, Vector, Dust and Odor Control, and Litter Control pursuant to 310 CMR 19.130, 15-17. MassDEP may require the proponent to install and operate additional odor control equipment within the processing building. The proponent has proposed to temporarily store MSW in railcars to be located outside the process building within the project site. I anticipate that MassDEP's Site Suitability permit modification review process will include a review of the proponent's waste storage plan, and the potential benefits of limiting the amount of rail cars used for on-site MSW storage and/or limiting the amount of time MSW-filled rail cars may remain on site to further control odor emissions from the facility. MassDEP has indicated that the proponent will be required to design and implement a bird-control plan for the facility.

I am satisfied that the project has avoided and mitigated environmental impacts to the greatest feasible extent, and that the state permitting agencies have adequate information to base their permit decisions, and sufficient permitting authority to ensure that any remaining issues are adequately addressed.



September 21, 2007
DATE

Ian A. Bowles, Secretary

Note: The proposed project change associated with this Certificate was not implemented

Comments received:

09/13/07	Massachusetts Department of Environmental Protection – WERO
09/10/07	Natural Heritage and Endangered Species Program (NHESP)
09/06/07	Department of Conservation and Recreation (DCR)

NPC #12699
IAB/NCZ/ncz

E-3

SECOND NOTICE OF PROJECT CHANGE CERTIFICATE
JULY 10, 2015
(Project not Implemented)

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Note: The proposed project change associated with this Certificate was not implemented

FILE COPY

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Matthew A. Beaton
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

July 10, 2015

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
SECOND NOTICE OF PROJECT CHANGE

PROJECT NAME	: Tri County Recycling
PROJECT MUNICIPALITY	: Ware
PROJECT WATERSHED	: Ware River
EEA NUMBER	: 12699
PROJECT PROPONENT	: Tri County Recycling, Inc.
DATE NOTICED IN MONITOR	: June 10, 2015

Pursuant to the Massachusetts Environmental Policy Act (MEPA, M.G.L. c. 30, ss. 61-62I) and Section 11.10 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project change does not require the submission of a supplemental Environmental Impact Report (EIR). The issues associated with this project change can be addressed during state and local permitting.

Project History

As described in the Environmental Notification Form (ENF) reviewed under MEPA in 2002, the original project involved the redevelopment of an existing auto salvage yard into a construction and demolition (C&D) material processing facility located on a 21-acre site on East Street in Ware adjacent to the Ware River. The facility has a design capacity of 750 tons per day (tpd). Most of the existing buildings on-site were reused by the C&D processing facility. A new 21,600-square foot (sf) building was constructed to provide cover for tipping, processing, and loading activities. Clean materials, including asphalt, brick, concrete (ABC), and wood will also be sorted and processed in designated outdoor areas. The facility is served by both rail and truck.

Note: The proposed project change associated with this Certificate was not implemented

The facility's processing includes rough screening, picking and sorting of recyclable materials. Unwanted materials removed in the initial screening process, together with other non-recyclable material are fed through the facility's grinder process, and transported by rail and truck for landfill disposal. Reclaimed materials and processed residuals are also transported from the site by rail and trucks.

The Certificate on the ENF, issued on April 1, 2002, indicated that an EIR was required. A Certificate on the Final EIR (FEIR) was issued on August 30, 2002 that determined that it adequately and properly complied with MEPA. The facility has been in operation since 2006. It currently accepts C&D, ABC, and ferrous and non-ferrous scrap metal debris.

A Notice of Project Change (NPC) was filed in 2007 (the 2007 NPC) by ABC&D Recycling, Inc. (ABC&D) to propose a change in the type of material to be accepted at the facility. The 2007 NPC proposed that the facility accept municipal solid waste (MSW) in addition to the C&D and recyclable material that the facility is currently permitted to accept. The NPC did not request an increase in the allowed tonnage at the facility; the capacity would remain at 750 tpd. A Certificate on the NPC, issued on September 21, 2007, determined that the project change did not require a supplemental EIR. Permitting required for this project change was never completed and, consequently, no changes were made and the facility has not accepted MSW. The facility was purchased from ABC&D by 198 East Street, LLC in May 2014. The Proponent currently operates the facility.

Jurisdiction and Permitting

The original project underwent MEPA review and required a mandatory EIR pursuant to 301 CMR 11.03(9)(a) of the MEPA regulations because it required State Agency Actions and involved the construction of a new solid waste transfer facility with a capacity of 150 or more tpd (750 tpd total) for the storage and processing of solid waste. The project required a Site Suitability Report including an Authorization to Construct and Authorization to Operate from the Massachusetts Department of Environmental Protection (MassDEP) and a new curb cut permit from the Massachusetts Department of Transportation (MassDOT) (formerly the Massachusetts Highway Department). The project also required Site Assignment Approval from the Ware Board of Health, a Special Permit and a Site Plan Approval from the Ware Planning Board, and an Order of Conditions from the Ware Conservation Commission.

The project change will require modifications to the existing Site Assignment, Authorization to Construct, and Authorization to Operate permits from MassDEP and/or the Ware Board of Health. It may also require a revised Access Permit from MassDOT.

Because the Proponent is not seeking Financial Assistance from the Commonwealth for the project change, MEPA jurisdiction extends to those aspects of the project that may have significant environmental impacts and that are within the subject matter of required or potentially required state permits. In this case, MEPA jurisdiction exists over solid waste and transportation.

Note: The proposed project change associated with this Certificate was not implemented

Project Change

The Second NPC includes a description of the proposed changes, a comparison of these changes to the project as previously reviewed in the 2007 NPC and 2002 FEIR, existing and proposed conditions plans, and a traffic impact study. It also provides a discussion of how the project will avoid, minimize, and mitigate project-related impacts.

Solid Waste

The 2015 NPC proposes a change to the existing facility to allow the transfer station to accept MSW and non-hazardous soil (urban fill) within the current 750 tpd capacity of the facility. Following processing at the facility, MSW and urban soils will be loaded into rail cars for disposal at appropriately permitted landfills. In addition, the Proponent proposes a "Pay as you throw" (PAYT) and recycling program for residents of the Town of Ware. 198 East Street, LLC submitted an application for the Modification of the Site Assignment to MassDEP and the Ware Board of Health.

The proposed MSW and urban soils processing activities will be conducted within the existing enclosed processing building. No additional structures or infrastructure is proposed on the site in association with the change. According to the Proponent, C&D and MSW waste materials will be stored on the project site. The Proponent proposes to temporarily store MSW in railcars which will be located outside the processing building but within the project site. The processing building is equipped with a spray-mist dust prevention system and two exhaust fans designed to minimize impacts to air quality. The Proponent will make the following facility and operational modifications to support acceptance of MSW and urban soils:

- Installation of quick closing doors to control dust and odors;
- Addition of odor neutralizing agents to the misting equipment to suppress odors;
- Use of measures to control potential rodents and other vermin (such as hiring a pest-control company);
- MSW will be tipped within the confines of the facility building and loaded in bulk into rail cars or containers that will be airtight and leak-proof and include steel covers to control odors;
- MSW will be removed from the tipping floor at the end of each operational day; and
- Installation of a negative air pressure system (carbon filtration ventilation units) to capture dust and odor prior to discharging building air to the atmosphere.

The Proponent should ensure that the facility will appropriately manage dust and odor emissions. I note that the comments from MassDEP which indicate that many of the existing permitting requirements and design/operation components of the facility would not require modification. MassDEP identifies the following facility permitting requirements, design features, and operational issues which may be impacted by the acceptance of MSW and urban soils:

- Upgrades to the existing building dust suppression (misting) system;
- Modification of the proposed odor control system;

Note: The proposed project change associated with this Certificate was not implemented

- Demonstration of the facility's compliance with applicable regulations to ensure that the facility does not pose a threat to public health and safety;
- Requirement of additional measures to control vectors such as rodents and birds;
- Requirement to design and implement a bird-control plan for the facility;
- Evaluation of the outside storage of MSW in an unspecified number of railcars;
- Documentation of generation and analysis of soils proposed to be delivered to the facility to ensure hazardous wastes are not accepted;
- Implementation of protocols to mitigate tracking of contaminated soils outside the building;
- Requirement that industrial wastewater holding tank will comply with regulations at 314 CMR 18.00;
- Modification of the facility's existing operations and maintenance (O&M) plan and waste ban plan to address the Solid Waste Management requirements for C&D, MSW, and urban soils loads; and
- Evaluation of the adequacy of the existing wastewater holding tank's capacity, alarm system, and pumping schedule.

I anticipate that MassDEP's Site Suitability permit modification review process will include a comprehensive review of the facility and operations to address potential impacts and identify additional mitigation measures as warranted. I acknowledge the comments from the Ware Board of Selectmen and Planning Board that outline concerns regarding the permitted uses associated with the Special Permit and Site Assignment issued by the Ware Board of Health. Specifically, these comments raise concerns that the Special Permit did not allow solid waste disposal, instead it permitted light industrial use of processing of ABC, and demolition debris into useable materials. The Town asserts that the project change is not an allowable use under the current zoning regulations. These issues can be resolved during the state and local permitting processes.

Transportation

The ENF includes a Traffic Impact Study that evaluates existing and projected traffic operational and safety conditions at key intersections in the vicinity of the site. Study area intersections include:

- East Street (Route 9)/Site Driveway;
- East Street (Route 9)/Gilbertville Road (Route 32);
- East Street (Routes 9/32)/Knox Avenue;
- East Main Street (Routes 9/32)/Church Street/South Street;
- East Main Street (Routes 9/32)/North Street; and
- Main Street (Route 9)/West Street (Route 32).

The project will generate an additional 132 vehicle trips from the PAYT and recycling programs, and 22 truck trips in the morning and afternoon peak hours. Truck trips will be distributed evenly between the weekday morning and afternoon peak hours; approximately 25 percent will travel through downtown Ware (approximately six trucks). The capacity analysis indicates that the project change will not have a significant impact on traffic operations at study

Note: The proposed project change associated with this Certificate was not implemented

area intersections or roadways. However, there may be minor increases in delay through the downtown area of Ware as a result of the increase in truck traffic. The traffic impact study indicates that area roadways can accommodate projected increases in traffic volumes from both anticipated background development and the project change. The Proponent does not propose to implement any mitigation measures for project-related traffic in the NPC.

Comments from MassDOT indicate that the project may require a revised Access Permit from MassDOT. The Proponent should consult with the MassDOT District 2 Office to determine if an Access Permit is required and if so, identify appropriate mitigation to address project-related traffic increases, including the addition of a left-turn lane on East Street to enter the site.

Construction

The project must comply with MassDEP Solid Waste and Air Pollution Control regulations, pursuant to M.G.L. c.40, s.54 during construction and operation. All construction and operation activities should be undertaken in compliance with the conditions of all State and local permits. The Proponent must implement measures to control dust, noise and odor nuisance conditions in compliance with 310 CMR 7.01, 7.09, and 7.10.

All on-site equipment currently meets or exceeds the EPA federal Tier 2 emission standards for diesel-powered equipment. I encourage the Proponent to consider retrofitting the equipment to meet federal Tier 3 or 4 emission standards.

Conclusion

Based on a review of the 2015 NPC and consultation with State Agencies, I find that additional MEPA review in the form of a supplemental EIR is not warranted. Outstanding issues can be addressed during State and local permitting and review. The Proponent and State Agencies should forward copies of any changes to the final Section 61 Findings to the MEPA Office for publication in accordance with 301 CMR 11.12.

July 10, 2015
Date

Matthew A. Beaton

Comments received:

06/18/2015 Ware Planning Board
06/30/2015 Ware Board of Selectmen
07/02/2015 Massachusetts Department of Environmental Protection (MassDEP)/ Western Regional Office (WERO)
07/07/2015 Massachusetts Department of Transportation (MassDOT)

MAB/PPP/ppp

E-4

THIRD NOTICE OF PROJECT CHANGE CERTIFICATE
JUNE 17, 2022
(Current Project)

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Bethany A. Card
SECRETARY

Tel: (617) 626-1000
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http://www.mass.gov/eea

June 17, 2022

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
THIRD NOTICE OF PROJECT CHANGE

PROJECT NAME	: ReSource Ware Construction and Demolition Facility Capacity Expansion[1]
PROJECT MUNICIPALITY	: Ware
PROJECT WATERSHED	: Chicopee River
EEA NUMBER	: 12699
PROJECT PROPONENT	: ReSource Waste Services of Ware (ReSource Ware)
DATE NOTICED IN MONITOR	: May 11, 2022

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G. L. c. 30, ss. 61-62L) and Section 11.10 of the MEPA regulations (301 CMR 11.00), I have reviewed the Third Notice of Project Change (3rd NPC) submitted for this project and hereby determine that it **does not require** a Supplemental Environmental Impact Report (EIR).

Project History and Description

The project has a lengthy MEPA review history. As described in the Environmental Notification Form (ENF) submitted in 2002, the original project involved redevelopment of an existing auto salvage yard into a construction and demolition (C&D) material processing facility located on a 21-acre site[2] on East Street in Ware adjacent to the Ware River. The facility has a design capacity of 750 tons per day (tpd). Most of the existing buildings on-site were reused by the C&D processing facility. A new 21,600-square foot (sf) building[3] was constructed to provide cover for tipping, processing, and loading activities. Clean materials, including asphalt, brick, concrete (ABC), and wood are sorted and processed

[1] Formerly known as "C&D Material Processing Facility" in 2002; "ABC&D Material Processing Facility" in 2007; and "Tri County Recycling" in 2015.
[2] According to the 3rd NPC, the site area has not changed and is estimated to be ±25 acres.
[3] According to the 3rd NPC, the building footprint has not changed and encompasses an area of 22,480 sf, which includes 880 sf of office space.

in designated outdoor areas. The facility is served by both rail and trucks.[4] According to the 3rd NPC, the facility was permitted and constructed as a C&D processing facility where demolition debris (e.g., masonry, plaster, gypsum wallboard, metal, and treated/engineered wood) would be brought into the building for processing. To support processing activities, the building included stationary processing equipment consisting of a preliminary feed shredder, wood grinder, slot screener, elevated picking station for removal of recyclable materials, clean wood grinder, residuals grinder, magnets for metals removal, and conveyors to transport the C&D through the processing system. C&D materials remaining after processing (C&D residuals) are transported by rail for out-of-state disposal. Recovered recyclable material is removed from the site by truck.

The Certificate on the ENF, issued on April 1, 2002, indicated that an EIR was required. A Certificate on the Final EIR (FEIR) was issued on August 30, 2002 that determined that it adequately and properly complied with MEPA. According to the Certificate on the FEIR, the facility has been in operation since 2006 and is allowed to accept C&D, ABC, and ferrous and non-ferrous scrap metal debris.

ABC&D Recycling, Inc. (ABC&D) filed an NPC in 2007 (1st NPC) to propose an expansion in the type of material accepted at the facility to include processing of 50 tpd or more of municipal solid waste (MSW) in addition to the C&D and recyclable material that the facility is currently permitted to accept (capacity would remain at 750 tpd). A Certificate on the 1st NPC, issued on September 21, 2007, determined that the project change did not require a supplemental EIR. Subsequent permitting required for this project change was never completed and, consequently, no changes were implemented, and the facility has not accepted MSW. The facility was purchased by 198 East Street, LLC in May 2014, and was operated by Tri County Recycling, Inc.

The second NPC (2nd NPC), submitted in 2015, proposed a change to the existing facility to allow it to accept MSW and non-hazardous soil (urban fill) within its permitted tonnage of 750 tpd. Following processing at the facility, MSW and urban soils would be loaded into rail cars for disposal at landfills. In addition, a MSW collection ("pay as you throw") and recycling program for residents of the Town of Ware, as well as temporary storage of MSW in railcars within the project site, was proposed. On July 10, 2015, a Certificate on the 2nd NPC was issued, which determined that the project change did not require a Supplemental EIR. While permitting was initiated, this project change was never implemented.

Project Change Description

As described in the 3rd NPC, the Proponent acquired the C&D facility from Tri County Recycling in October 2018. Since the acquisition, tonnage delivered to the facility has come predominantly from the Proponent's other C&D processing facilities (primarily from Roxbury, Massachusetts and Salem and Epping, New Hampshire); however, a small percentage of incoming material consists of unprocessed C&D waste delivered to the facility by private haulers serving the area. Due to the small quantity of unprocessed C&D delivered to the facility, the Proponent has found it

[4] The ENF indicated that the facility's processing would include rough screening, picking and sorting of recyclable materials. Unwanted materials removed in the initial screening process and other non-recyclable material would be fed through the grinder process, and transported by rail/truck for landfill disposal (in addition to reclaimed materials and processed residuals).

uneconomical to operate the processing line and has relied on kicksorting[5] to recover banned wastes from this small portion of its incoming C&D stream. Comments from the Massachusetts Department of Environmental Protection (MassDEP) confirm that the facility was reclassified from a C&D Processing Facility to a C&D Transfer Station effective May 6, 2022.

According to the 3rd NPC, the project change proposes to increase the permitted capacity at the facility while maintaining existing operations, except that a small amount of unprocessed C&D material may be transported from the facility by semitrailer (four to six trailers per week) for off-site processing and a small amount of municipal street sweepings and catch basin cleanings may be accepted at the facility for rail transfer within the building. The current permit capacity of the facility is 750 tpd. The capacity increase is proposed to occur in the following two stages:

- Stage 1
  - increase the permitted capacity to 1,125 tpd on weekdays (increase of 375 tpd on weekdays (50%) with no tonnage change on Saturdays)
  - no increase in building footprint
  - rail service will increase from one round trip per day to two
  - commence in the summer of 2023
- Stage 2
  - increase the permitted capacity to 1,400 tpd on weekdays and 750 tpd on Saturdays
  - expand the 22,480-sf transfer station building by ±45% (adding 10,000 sf) on the currently paved area
  - improve rail tracks to allow rail service to return to one round trip per day from two
  - commence in the fall of 2024 or early 2025

The new maximum permit capacity of 1,400 tpd associated with Stage 2 will result in a total permitted capacity increase of 650 tpd (from existing 750 tpd). New operating hours are proposed from 6 AM to 6 PM on weekdays compared to current operations from 7 AM to 4 PM. No changes to Saturday operating hours (7 AM to 1 PM) are proposed.

Project Site

The ±26.78-acre project site is located at 198 East Street in Ware and is bounded by open and wooded space. It is bordered by the Ware River to the north and west and Route 9 to the southeast. Residential areas are located along Gilbertville Road northeast of the site, on Route 9 south of the site, and across the Ware River northwest of the site. Grenville Park is located across the Ware River west of the site. The site currently consists of an office building, a C&D handling building, and a C&D handling yard. The project site is zoned highway commercial. Access is via East Street (Route 9/Route 32) which is under the jurisdiction of the Massachusetts Department of Transportation (MassDOT).

Portions of the project site are mapped as Priority Habitat for a state-listed species. The project site includes wetland resource areas including Bordering Vegetated Wetlands (BVW), Bordering Land Subject to Flooding (BLSF), Riverfront Area (RFA) and Buffer Zone to BVW. The site is located within one mile of three block groups that meet the criteria as Environmental Justice (EJ) populations

[5] "Kicksorting" describes the process of removing recyclable materials from C&D material using the facility's construction operating equipment (excavator, skid steer loader), and by manual picking.

characterized by Income and Income and Minority. It is located directly across East Street from one EJ population (Block Group 1, Census Tract 8201.02). As described below, the 3rd NPC identifies the "Designated Geographic Area" (DGA) for the project as 1 mile, includes a review of potential impacts and benefits to EJ populations within this DGA, and describes public outreach efforts undertaken to date.

Environmental Impacts and Mitigation

The 3rd NPC indicates that impacts associated with the project change include an increase in the following: land alteration of 1.6 acres (from 6.56 acres to 8.16 acres); impacts to RFA and 100-foot buffer zone; vehicle trips by 100 average daily trips (adt) from 100 adt to 200 adt; water use by 400 gallons per day (gpd) from 700 gpd to 1,100 gpd; and wastewater generation by 200 gpd from 200 gpd to 400 gpd. Measures proposed to avoid, minimize, and mitigate impacts associated with the project change include designation of specific truck routes, use of white noise backup alarms instead of backup beepers, retrofit of heavy equipment with catalytic converters, and implementation of construction period best management practices (BMPs).[6]

Jurisdiction and Permitting

The original project underwent MEPA review including submission of a mandatory EIR pursuant to 301 CMR 11.03(9)(a) because it required Agency Action and involved construction of a new solid waste transfer facility with a capacity of 150 or more tpd (750 tpd total) for the storage and processing of solid waste. The project required a Site Suitability Report including an Authorization to Construct (ATC) and Authorization to Operate (ATO) from MassDEP and a Highway Access Permit from MassDOT.[7]

The project also required Site Assignment Approval from the Ware Board of Health (BOH), a Special Permit and a Site Plan Approval from the Ware Planning Board, and an Order of Conditions from the Ware Conservation Commission (WCC).

The project change described in the 3rd NPC exceeds the ENF threshold pursuant to 301 CMR 11.03(9)(b)(i) for New Capacity or Expansion in Capacity for combustion or disposal of any quantity of solid waste, or storage, treatment or processing of 50 or more tpd of solid waste. It will require a Site Suitability Report for a Major Modification of an Existing Site Assignment and a Modification of a Large Handling Facility (to be issued separately for both Stage 1 and Stage 2 operations) from MassDEP and may require a revised Access Permit from MassDOT. The Proponent is also seeking grant funding from MassDOT to implement rail siding improvements.

It will also require Site Assignment Modification from the Ware BOH, a Special Permit Modification for both Stage 1 and 2 operations from the Ware Planning Board, an Order of Conditions from the WCC (or in the case of an appeal, a Superseding Order of Conditions from MassDEP) for work proposed in Stage 2, and a National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) from the U.S. Environmental Protection Agency (EPA).

[6] Because the project originally underwent review prior to issuance of the 2010 MEPA Greenhouse Gas Emissions (GHG) Policy and Protocol, the project did not undertake an analysis of GHG emissions or other climate change impacts.
[7] Formerly the Massachusetts Highway Department

Because the Proponent is seeking financial Assistance, MEPA jurisdiction is broad and extends to all aspects of the project that are likely, directly or indirectly, to cause Damage to the Environment as defined in the MEPA regulations.

Review of the 3rd NPC

The 3rd NPC describes the project change and identifies measures to mitigate project-related impacts. It provides detailed analyses regarding impacts associated with noise, air quality, traffic, and EJ populations. The ENF contains an output report from the MA Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (RMAT) (the "MA Resilience Design Tool"),[8] together with information on climate resilience strategies to be undertaken by the project. During MEPA review, the Proponent provided supplemental information on May 26, 2022 to provide additional project-related information and June 13, 2022 to provide a response to comments on the 3rd NPC. For purposes of clarity, all supplemental materials are referred to herein as the "3rd NPC" unless otherwise referenced.

I have received comments from a resident of Ware near the project site which identify strong opposition to the scope of the proposed project change and increased operating hours. While I acknowledge these concerns, the project does not exceed mandatory thresholds for preparation of an EIR. The mandatory EIR review thresholds are intended to identify projects or aspects thereof that are presumed to have particularly significant environmental impacts, and for which an EIR is presumed to benefit the project and the environment. A determination that an EIR is not required does not signify the conclusion of environmental review. The information and analysis provided in the 3rd NPC and review of it by Agencies will inform the MassDEP permitting process. The project also requires review by multiple local boards including the BOH, WCC, and Planning Board. These processes will provide additional opportunity for public review and comment. Solid waste facilities are regulated by the MassDEP pursuant to a number of Massachusetts laws and regulations, including, M.G.L. c.111, §§ 150A and 150A½, and the MassDEP regulations at 310 CMR 16.00 (Site Assignment Regulations for Solid Waste Facilities), and 310 CMR 19.00 (Solid Waste Regulations). The MassDEP permitting process required for this project is thorough and comprehensive. In addition, the project will require review by the Ware BOH. The comprehensive scope of the Site Assignment modification process and the solid waste management facility permitting process will provide additional transparency and public participation opportunities.

Environmental Justice

As noted above, the project site is within 1-mile and 5-miles of EJ populations characterized by Income and Income and Minority. Within the census tracts containing the above EJ populations within 1- and 5-miles of the project site, no languages were identified as those spoken by 5% of more of residents who also identify as not speaking English very well.

I note that under Section 58 of St. 2021, c. 8, *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*, and amendments to MEPA regulations effective December 24, 2021, all projects filed on or after January 1, 2022 and located within at least 1 mile of an EJ population will be

[8] https://resilientma.org/rmat_home/designstandards/

required to provide additional analyses of environmental and public health impacts to identified EJ populations in the form of an EIR. Two related MEPA protocols – the MEPA Public Involvement Protocol for Environmental Justice Populations ("MEPA EJ Public Involvement Protocol") and MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations ("MEPA Interim Protocol for Analysis of EJ Impacts") – are also in effect for new projects filed on or after January 1, 2022.[9] While the original project commenced review prior to January 1, 2022 and the filing currently under MEPA review is an NPC which is not subject to these requirements, the 3rd NPC addresses the new protocols, describes the project's past and planned efforts to reach out to EJ communities, provides an enhanced analysis of potential impacts, and describes measures to reduce these impacts.

Separate pre-filing meetings with MassDEP and the MEPA Office to discuss the project change and proposed outreach methods resulted in preparation of a Public Involvement Plan (PIP) in connection with MassDEP's EJ Enhanced Outreach requirements (associated with the solid waste permitting process) and provision of a list of community-based organizations (CBOs) and tribes/indigenous organizations (the "EJ Reference List") by the MEPA Office in consultation with the EEA EJ Director (supplemented with input from MassDEP). Advance notification of the project change to the CBOs on the EJ Reference List was provided on March 11, 2022. Fact Sheets in English and Spanish are posted on the Proponent's website[10] and at locations in Ware. A public information session was held in Ware on the evening of April 14th, 2022, which was advertised via email to all known interested parties (including the EJ Reference List) in The Ware River News, and by fliers posted in the public library and town hall to solicit input on the project change. To enhance the public involvement of EJ populations, the 3rd NPC was distributed to the EJ Reference List concurrently when it was filed with MEPA. The 3rd NPC summarizes questions and comments received at the information session which included concerns regarding noise during extended operating hours, increased traffic impacts, truck routes, notification to the Town of West Brookfield, and public community benefits. The 3rd NPC includes correspondence, EJ Reference List contacts, fact sheets, public presentation materials, and outreach summaries. Notice of the MEPA remote consultation session (held the evening of May 26, 2022) was distributed to the EJ Reference List. The 3rd NPC states the Proponent is committed to continuing outreach and engagement efforts with the local community to gather public input on the project change, and notes that future outreach will be implemented as part of the MassDEP PIP and local approval processes.

The 3rd NPC contains a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations. The DPH EJ Tool identifies Ware as a municipality in which the EJ populations are located as exhibiting "vulnerable health EJ criteria" for blood lead level, low birth weight and childhood asthma; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.[11] In addition, the 3rd NPC indicates that the following sources of potential pollution exist within the identified EJ populations, based on the mapping layers available in the DPH EJ Tool:

- Small Quantity Hazardous Waste Generators: 1 (CVS Pharmacy #1111)
- Large Quantity Toxic Waste Users and EPA Toxic Release Inventory (TRI) Facilities: 2 (Quabbin Wire and Cable Co., Kanzaki Specialty Papers)

[9] Available at https://www.mass.gov/service-details/eea-policies-and-guidance.
[10] https://resourcewasteservices.com/our-facilities/resource-ware/
[11] See https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer.

- M.G.L. c. 21E sites: 3
- Tier II Toxics Use Reporting Facilities: 5 (Quabbin Wire Co., Kanzaki Specialty Papers, First Student, Inc., Baystate Mary Lane Outpatient Center, and Verizon Ware Co.)
- MassDEP Sites with Activity Use Limitations (AULs): 1 (commercial development at the intersection of Vernon and West Street)
- Wastewater Treatment Plants (WWTP): 2 (Ware WWTP and Quabbin Wire & Cable Co.)
- Underground Storage Tanks (USTs): 3 (Highland Exxon, Speedway Gas Station, Kanzaki Specialty Papers)
- Road Infrastructure: Routes 9 and 32
- Other Transportation Infrastructure: 1 (freight rail line owned by MassDOT and used by the Proponent)
- Regional Transit Agency: 2 (Pioneer Valley Transit Authority and Worcester Regional Transit Authority)
- Energy Generation and Supply: 1 (Pioneer Hydropower power plant)

In summary, there are three MassDEP major air & waste facilities, three M.G.L c. 21E sites, five Tier II reporting facilities, one MassDEP site with an AUL, two WWTP (facilities with a NPDES permit), three sites with USTs, three EPA TRI reporting facilities, and one hydro powerplant within the EJ populations that intersect the DGA. There is also a public bus route, one MassDOT rail freight line, and two state routes (9 and 32) that pass through the EJ block groups. The 3rd NPC also identifies notices of noncompliance (NONs) associated with potential pollutions sources referenced above. Facilities with recent NONs are relevant potential sources of pollution that may add to the environmental burden for the community. The 3rd NPC identifies several facilities within the DGA including Kanzaki Specialty Papers, Highland Exxon gas station, and Speedway that received NONs.

The 3rd NPC includes a screening of climate risk for the project site using the MA Resilience Design Tool. Based on the output of this Tool provided in the ENF,[12] the project has a high exposure rating and high risk rating for extreme precipitation (urban and riverine flooding) and extreme heat. Based on the minimum 20-year useful life identified for the project and the self-assessed criticality of project assets, the Tool recommends a planning horizon of 2050 and a return period associated with a 10-year (10% chance) storm event when designing the proposed expansion for the extreme precipitation parameter. These design recommendations appear to be based on a "Low" criticality rating (assigned based on the Proponent's inputs) for project assets. For "Moderate" or "High" rated buildings and infrastructure, the MA Climate Resilience Design Standards Tool recommends a return period associated with a 25-year to 50-year storm event for extreme precipitation.[13]

Finally, the 3rd NPC includes an analysis using the EPA EJ Screening Tool (EJ Screen) to review 11 environmental indicators. Based on the results of the EJ Screen for the EJ block groups within the DGA, exposure to lead paint is the one environmental indicator of concern where block group(s) rank in the 80th percentile or above. The lead paint indicator values for all EJ block groups was elevated compared to the statewide average, with block group 1021 ranked in the 89th percentile statewide. According to the 3rd NPC, there is no pathway for the project to impact childhood blood lead levels

[12] The output report from the MA Climate Resilience Design Standards Tool was created on September 8, 2021, prior to revisions of the Tool in 2021 and 2022.
[13] See https://eea-nescaum-dataservices-assets-prd.s3.amazonaws.com/cms/GUIDELINES/20210401Section3ClimateResilienceDesignStandardsOverview.pdf, at p. 19.

because project operations will not affect the presence or absence of lead pipes or lead paint in the community. The facility does not handle categorical lead-containing materials and any such materials delivered to the Proponent's other facilities are removed at those facilities and are not a component of the C&D that is delivered to the Ware facility. The facility also does not accept lead-containing materials in the incidental C&D materials accepted from its third-party customers. The 3rd NPC maintains that project activities are unlikely to release lead from trace amounts present in C&D materials.

The 3rd NPC asserts that the increase in facility capacity will not disproportionately affect EJ populations. According to the 3rd NPC, air quality impacts will be minimized to the extent feasible using air pollution controls. Results from air dispersion modeling predicted air quality impacts below relevant health-based standards at all locations at all times. As indicated above, an EJ population is located directly across East Street from the project site. The 3rd NPC indicates that maximum predicted air quality impacts are generally located at or close to the site boundary and are generally similar for EJ and non-EJ populations. The 3rd NPC further asserts that increased air pollutant concentrations in EJ areas resulting from the project change will likely be indistinguishable from background levels of air pollution (due to existing traffic, industrial activity, natural sources, and other emitters). According to the 3rd NPC, the relative air pollution burden added from the small increase in traffic, rail, and construction activities and the added volume of the facility is likely to be minimal. Most truck traffic arrives via Route 9 outside of the EJ block groups within the DGA. During Stage 1, there will be one additional rail trip per day, which will return to one trip per day in Stage 2. All EJ Screen environmental indicators related to air pollution and respiratory health (particulate matter, diesel PM, air toxics cancer risk, respiratory hazard index) are below the 50th percentile of statewide average.

The project change is expected to generate a total of 14 truck trips during weekday peak hours and 70 new adt on an average weekday. The traffic analysis concludes that the project will not create any significant traffic impacts, as described further below. The majority of trips travel away from the EJ populations. C&D is transported by trucks in enclosed trailers to reduce the potential for materials to escape during transport. Railcar C&D loads are covered with mesh and zip tied. Truck trips and rail travel are not expected to create disproportionate traffic impacts to EJ populations.

The noise analysis in the 3rd NPC indicates that the project change will mitigate noise impacts to the extent feasible and will not cause a noise nuisance condition. Noise impacts are proximity-based, and the project is outside EJ populations. As the maximum predicted impacts are generally at or close to the site boundary, the 3rd NPC concludes that impacts are generally similar for EJ and non-EJ populations.

The 3rd NPC describes impacts associated with the construction period. Air quality impacts during construction include creation of fugitive dust and emission of diesel exhaust. As the EJ block groups are not burdened with high levels of existing diesel particulate matter (EJ Screen), the short-term diesel emissions from project construction are unlikely to create a health burden. The Proponent is committed to mitigating noise impacts from construction of the project to avoid creating a nuisance condition including using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers; muffling enclosures on continuously running equipment; scheduling equipment operations to keep average noise levels low; and turning off idling equipment. The project will minimize traffic-related construction impacts to the extent possible; no offsite staging or parking will be needed during construction and material delivery and worker commute routes will generally follow the

preferred truck route outside EJ communities. The Proponent will apply for coverage under a NPDES CGP for stormwater discharges and impacts will be minimized through erosion BMPs.

Solid Waste

The facility is subject to the Solid Waste facility regulations at 310 CMR 19.000 and the Site Assignment regulations at 310 CMR 16.00. The facility currently maintains a solid waste site assignment from the Ware BOH and an ATO from MassDEP. The facility originally was permitted as a C&D Processing Facility and was reclassified by MassDEP from a C&D Processing Facility to a Permitted C&D Transfer Station (effective May 6, 2022). Currently, the facility only receives C&D residuals from other waste processors and small amounts of raw C&D; that material must be transferred to other processors to meet recycling standards.

The project change requires a Site Suitability for a Major Modification to an Existing Site Assignment (BAW SW 38) from MassDEP. The project also requires approval of proposed changes to the Facility's existing Site Assignment from the Ware BOH. The 3rd NPC does not propose expansion of the Site Assigned area. The proposed 10,000-sf expansion of the existing building will occur within the existing Site Assigned area and will replace a portion of the existing paved yard area. Portions of the railroad spur line serving the facility will also be upgraded within the existing railroad right-of-way (ROW). In addition to the Site Assignment permits, each of the proposed two stages of the project will require a Modification of a Large Handling Facility (BAW SW 07) Permit from MassDEP.

The 3rd NPC provides the original Draft Section 61 Findings as proposed in the FEIR and includes updates to reflect mitigation associated with the proposed project change. MassDEP comments indicate that it has reviewed the Draft Section 61 Findings and finds them to be acceptable. Once permit applications are submitted, the Section 61 Findings will be reviewed in context of the application and any proposed modifications will be included as part of permitting. I anticipate that the Proponent will work closely with MassDEP throughout the permitting process to revise Draft Section 61 Findings as needed to ensure the mitigation commitments accurately reflect commitments to environmental mitigation identified during the MEPA process and subsequent permitting process.

Transportation

The project change may require a revised Vehicular Access Permit from MassDOT because the site abuts Route 9/Route 32, a state-controlled roadway. Additionally, the Proponent is seeking Financial Assistance from MassDOT to implement rail siding improvements. The 3rd NPC includes a Transportation Impact Assessment (TIA) prepared in consultation Towns of Ware, West Brookfield, and Brookfield. MassDOT comments do not recommend additional review based on transportation issues. The Proponent should continue consultation with MassDOT and the District 2 office regarding site access during the permitting process.

According to the TIA, material is currently delivered to the facility by third-party customers via trucks from communities located largely within a 30-mile radius of the facility and transferred into railcars to be transported off site. As part of the project change, the facility will receive C&D debris from the Proponent's other facilities, which are located east of the site, and will reduce the number of loads it accepts at the facility from third-party customers.

Access to the site is provided via one full-access driveway off Route 9 with no changes proposed to this driveway. A field inventory of traffic conditions on study area roadways and intersections was conducted in December 2021, including sight distances at the site driveway, review of intersection geometry, and traffic counts during the weekday morning and evening peak periods at locations expected to be impacted by the project. Traffic volumes were increased by between 9 and 16% to account for the effects of the COVID-19 pandemic and further increased by 8% to account for seasonal variation. No apparent safety deficiencies were noted with respect to the motor vehicle crash history at the study area intersections.

Traffic operations analyses were performed at the six study intersections under 2021 Existing, 2028 No-Build (750 tpd operations), and 2028 Build conditions (1,400 tpd operations) to assess the impact of the project on the roadway network. Existing traffic data from the site was used to develop the new traffic generation associated with both the existing permitted capacity of 750 tpd and the proposed permitted capacity of 1,400 tpd. The project change is expected to generate ±70 new adt on an average weekday (two-way, 24-hour volume), with 14 new truck trips (7 entering and 7 exiting) expected during the weekday morning and afternoon peak hours, respectively. According to the TIA, due to the proposed change in operations with a projected increase in materials coming from the Proponent's other facilities that are located to the east via larger trucks, and corresponding decreases in locally originating trucks with smaller loads, truck traffic traveling to the site through the downtown area of Ware is expected to decrease. Consequently, the TIA concluded that the addition of site-related traffic at the proposed permitted capacity of 1,400 tpd will not result in a significant impact on overall operations at the study area intersections. Level-of-Service (LOS) at area intersections was shown to not be affected by the project with minimal increases to vehicle delay and queues as a result of the project volume increases. Projected peak-hour traffic volume increases are expected to range between – 3 to 11 vehicles (-0.7 to 2.5 percent) on the study area roadways external to the study area.

Comments from the Ware BOH and a resident of Ware identify a concern regarding a lack of enforcement for the preferred truck route established by the Proponent which will minimize traffic-related impacts in Ware, including but not limited to, avoiding downtown traffic/on-street parking and EJ areas. The Proponent proposes to instruct truck drivers to access the project site using Exit 78 in Sturbridge off the Massachusetts Turnpike to Routes 20, 49, and 9 to enter Ware from the east. The traffic study is based on the vast majority of trucks using this exit; however, BOH comments note that GPS guidance and Turnpike signage normally directs drivers to Turnpike Exit 63 in Palmer to Route 32N to reach Ware from the east instead. The Proponent maintains that it has a strict policy that it enforces with its drivers that all semitrailers must arrive from the east on Route 9 and exit via the same route and drivers that do not abide by the policy receive disciplinary action or are no longer allowed to return to the facility. Enforcement of this policy includes a requirement that all drivers employed by the Proponent are required to sign a document agreeing to the sole use of the preferred travel route. The Proponent claims that these measures are working and it will continue to enforce this policy. I note that the proposed change requires both MassDEP and municipal review and approval, including a Site Assignment Modification from the BOH and Special Permit from the Planning Board and expect that this issue will be resolved during the subsequent permitting processes.

Rare Species

Portions of the project site are mapped as Priority Habitat for state-listed species. These species and its habitats are protected pursuant to the Massachusetts Endangered Species Act (MESA; MGL

c.131A) and its implementing regulations (321 CMR 10.00). According to comments from Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP), the project change (physical alterations to the facility) remains exempt from MESA review pursuant to 321 CMR 10.14(2). Comments from NHESP strongly recommend that the Proponent conduct annual evaluations of the proposed O&M Plan and make adaptive changes, leverage new technology, correct insufficiencies, and adapt monitoring to protect water quality (as needed). I refer the Proponent to comments from NHESP for additional guidance on this issue.

Additionally, railroad track improvements will also occur within ±0.45 acres of mapped Priority and Estimated Habitat, which will require review by NHESP as described below. Based on information provided by NHESP, the species identified on-site area include "Creeper" of the mussel group (species of Special Concern) and "Great Laurel", an evergreen shrub in the rhododendron family (Threatened species). The Proponent will continue to coordinate with NHESP during the planning and permit review process to ensure that the project does not result in a "take" and appropriate BMPs are implemented during and post construction.

Wetlands and Stormwater

An Order of Conditions was issued on October 15, 2004 for the original project (construction of the C&D facility). The Proponent will work with the WCC to determine the status of the Certificate of Compliance (COC), and if it was not issued, it will file a request for a COC.

The 3rd NPC maintains the proposed design will avoid disturbance of wetlands and generation of additional stormwater flows and will minimize construction impacts. Stage 2 proposes alteration of rail tracks within RFA and the 100-foot buffer zone in late 2023/early 2024. The WCC will review Stage 2 for its consistency with the Wetlands Protection Act (WPA), Wetlands Regulations (310 CMR 10.00) and associated performance standards including stormwater management standards (SMS). MassDEP comments note that although the site plan in the 3rd NPC depicts where this track improvement will occur, it does not delineate RFA. Supplemental information (May 26, 2022) estimates ±1 acre of work will occur in RFA and within the existing railroad ROW associated with Stage 2 railroad track improvements. Concurrent MESA review by NHESP via the Notice of Intent (NOI) review process will also occur. The 3rd NPC indicates that the project will be designed to comply with the RFA performance standards at 310 CMR 10.58 and work in Estimated Habitat at 310 CMR 10.59.

MassDEP comments continue to emphasize compliance with the SMS, in particular Standard 5 which addresses land uses with higher potential pollutant loads (LUHPPL). Comments from MassDEP also recommend additional stormwater analysis to further substantiate that there are no increased impacts. In response to these comments, the Proponent performed a preliminary stormwater evaluation for Stage 2, which proposes to expand the building and construct additional railroad track siding. While Stage 2 will not increase impervious area, changes to grading near a portion of the proposed building expansion will result in a slight increase in stormwater flow (less than 4% compared to existing conditions) to the existing stormwater infrastructure that serves the building catchment area. As part of the permitting associated with the NOI for Stage 2, the Proponent will provide final grading and design plans to the WCC and MassDEP, which will include a detailed stormwater design. If current plans are modified during the permitting and design phase, the stormwater analysis included in the NOI will address any changes in stormwater flow and the associated stormwater design will meet all applicable performance standards and be conducted in accordance with the SMS.

Construction

All construction and demolition (C&D) activities should be managed in accordance with applicable MassDEP's regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). The Proponent will install erosion controls. The project should include measures to reduce construction period impacts (e.g., noise, dust, odor, solid waste management) and emissions of air pollutants from equipment, including anti-idling measures in accordance with the Air Quality regulations (310 CMR 7.11) such as driver training, inspections by site supervisors, and posting temporary/permanent signage. The facility has committed to install diesel oxidation catalyst (DOC) devices (also known as catalytic converters) on four pieces of heavy equipment to reduce emissions. Some equipment are already equipped with DOC devices or certified Tier 4. Off-road vehicles are required to use ultra-low sulfur diesel fuel (ULSD). If oil and/or hazardous materials are found during construction, the Proponent should notify MassDEP in accordance with the Massachusetts Contingency Plan (310 CMR 40.00) and retain a Licensed Site Professional (LSP). The Proponent should prepare a spills contingency plan as outlined in MassDEP comments. All construction activities should be undertaken in compliance with the conditions of all State and local permits.

Conclusion

The 3rd NPC has sufficiently described the nature and general elements of the project for the purposes of MEPA review and identified measures to avoid, minimize, and mitigate the project's environmental impacts. Comments from Agencies do not request additional MEPA review and I am satisfied that any outstanding issues can be addressed during subsequent permitting. Accordingly, I find that a Supplemental EIR is not required for this project change.

June 17, 2022
Date

Bethany A. Card

Comments received:

05/25/2022	Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)
06/07/2022	Massachusetts Department of Environmental Protection (MassDEP) – Western Regional Office (WERO)
06/07/2022	Ware Board of Health
06/07/2022	Kevin O'Regan
06/08/2022	Massachusetts Department of Transportation (MassDOT)

BAC/PPP/ppp

From:	Marold, Misty-Anne (FWE)
To:	Patel, Purvi (EEA)
Cc:	Cheeseman, Melany (FWE)
Subject:	NPC for Resource Ware Construction, EEA 12699
Date:	Wednesday, May 25, 2022 4:36:23 PM

RE: NPC for Resource Ware Construction, NHESP 07-2250

Hi Purvi,

The MA Division of Fisheries and Wildlife reviewed the Notice of Project Change (NPC) for the Resource Ware Construction. The changes proposed remain exempt from MESA review pursuant to 321 CMR 10.14(2) based on the included plans. No new comments will be issued on this project, but I've copied below a paragraph from our 5 September 2007 letter on a prior NPC which remain relevant to this project and its design and development.

"*As proposed, the [2007] NPC includes physical alterations to the facility that is exempt from MESA review pursuant to 321 CMR 10.14(2). We strongly recommend that the proponent conduct annual evaluations of the proposed Operation & Maintenance Plan and make adaptive changes, leverage new technology, correct insufficiencies, and adapt monitoring to protect water quality (as needed). Care should be taken to include increased oversight and monitoring in the first few years if the proposed change is approved to ensure that the proposed Operation & Maintenance Plan adequately address water quality concerns relative to the Ware River once the facility is actually processing new materials*."

Thank your for this opportunity to comment on this project. Best, Misty-Anne

Misty-Anne R. Marold (*she/her/hers*)
Senior Endangered Species Review Biologist
Massachusetts Division of Fisheries & Wildlife
Natural Heritage Endangered Species Program
1 North Drive, Rabbit Hill Road
Westborough, MA 01581
misty-anne.marold@mass.gov

View Comment

Comment Details

EEA #/MEPA ID	First Name	Address Line 1	Organization
12699	Kevin	133 Church Street	Ware Resident
Comments Submit Date	**Last Name**	**Address Line 2**	**Affiliation Description**
6-7-2022	O'Regan	--	Individual
Certificate Action Date	**Phone**	**State**	**Status**
6-7-2022	--	MASSACHUSETTS	Opened
Reviewer	**Email**	**Zip Code**	
Purvi Patel, (617)874-0668, purvi.patel@mass.gov	oregan6@gmail.com	01082	

Comment Title or Subject

Topic: Ware Resident Concerns about Project 12699 - Expansion of C&D Material Handling and Processing Facility

Comments

Resource Waste Services operates on the banks of the Ware River across from Grenville Park, Ware's largest public park. My residence at 133 Church Street abuts Grenville Park directly across from the facility as the crow flies. At times I can hear the banging of the industrial trucks that deliver C&D to the facility.

This proposal is not modest and seeks a huge expansion of Resource Wastes' industrial business, which currently processes for transfer approximately 500 tons of C&D material, only 66% of its current licensed capacity of 650 tons per day. Nonetheless, the proposal is to increase Monday to Friday C&D tonnage capacity by over 85%, increase the building footprint by 44% and increase operating time by 33% Monday through Friday, particularly between 6-7am when the operator has said most of the increased truck traffic will occur. Based on the numbers provided by Resource Waste, the number of daily truckloads of C&D to the facility eventually will double. This will require constructing a major addition to the existing building and significant expansion of the rail access to the facility, all next to the Ware River and Grenville Park. The requested increases are too great because they will add more noise and truck and rail traffic than is reasonable for Ware residents to endure, particularly very early in the morning.

This proposal consolidates Resource Waste's C&D transfer activities from other areas of New England to Ware and will require greatly increased industrial truck and rail traffic into and out of the facility. The truck traffic will be focused on the early morning hours. Although Resource Waste says that the trucks will not travel through Ware's downtown area, there is no regulation or binding agreement to enforce this. Nor is there any provision to limit the truck noise at the facility, particularly the banging of large trucks which each haul 26-28 tons of C&D material.

I do not oppose the basic concept of the proposal and a modest increase in capacity, but I strongly oppose the scope of the proposal and increased operating hours.

Kevin O'Regan

133 Church Street

Ware, MA 01082

413-658-4350

Attachments

Update Status

Status

Accepted

SUBMIT

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Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
Western Regional Office • 436 Dwight Street, Springfield MA 01103 • 413-784-1100

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Bethany A Card
Secretary

Martin Suuberg
Commissioner

June 7, 2022

Bethany A. Card, Secretary
Executive Office of Energy & Environmental Affairs
Massachusetts Environmental Policy Act Office
Purvi Patel, EEA No. 12699
100 Cambridge Street, 9th Floor
Boston, MA 02114-2524

Re: ReSource Waste Services of Ware
Notice of Project Change

Dear Secretary Card,

The Massachusetts Department of Environmental Protection (MassDEP), Western Regional Office (WERO) appreciates the opportunity to comment on the Massachusetts Environmental Policy Act (MEPA) Notice of Project Change (NPC) submitted for the ReSource Ware Construction & Demolition Facility Capacity Expansion at 198 East Street, Ware, MA.

The applicable MassDEP regulatory and permitting considerations regarding wetlands, solid waste, and waste site cleanup are discussed. MassDEP attended a virtual site visit on May 26, 2022.

I. Project Description

Resource Waste Services of Ware (the Proponent) is proposing to increase the permitted capacity and operating hours of the facility in two stages. The first stage proposal increases the permitted capacity to 1,125 tons per day (tpd) on weekdays; no tonnage increase on Saturdays. Rail service is proposed to increase from one round trip per day to two per day. The second stage proposal increases capacity to 1,400 tpd on weekdays and 750 tpd on Saturdays (an increase of 250 tpd on Saturday). Annual permitted tonnage is proposed to increase from 214,500 tons per year (tpy) to 393,200 tpy.

In addition, during the second stage, the facility building is proposed to expand by 10,000 square feet and improvements to the rail track are proposed allowing rail service to return to one round trip per day. Hours of operation on weekdays is proposed to change from 6

AM – 6 PM to 7 AM – 4 PM. Weekend hours of operation will remain unchanged (7 AM – 1 PM). The facility proposes to accept street sweepings and catch basin cleanings in addition to C & D materials.

There are two Environmental Justice populations within a one-mile radius of the site. the Proponent posits that the increase in facility capacity will not disproportionately affect Environmental Justice populations.

Environmental Impacts associated with this project include:

- Total site acreage –26.78 acres
- Acres of land altered –proposed change increase 1.6 acres, Total 8.16 acres
- Acres of impervious area – no change
- Bordering Vegetated Wetlands alteration – no change
- Structures - proposed increase- 10,000 sf, Total 32,480 sf
- Vehicle trips per day (vtpd)- proposed increase- 100 vtpd, Total 200
- Parking spaces –no change
- Water Use, Gallons per day (gpd)- proposed increase 400 gpd, Total 1,100 gpd
- Wastewater generation gpd proposed increase- 200 gpd, Total 400 gpd

II. Required Mass DEP Permits and/or Applicable Regulations

Wetlands
310 CMR 10.00
Solid Waste Facilities
310 CMR 16.00
310 CMR 19.00
Bureau of Waste Site Cleanup
310 CMR 40.000

III. Permit Discussion

Bureau of Water Resources

Wetlands
The original Notice of Intent was filed for the project on August 13, 2004 (DEP file Number 317-0310) and an Order of Conditions was issued on October 15, 2004. The Proponent should clarify the status of any Wetlands Protection Act (WPA) filing relative to the project site and the activities discussed in the original EIR. The Proponent should ensure that they have applied for and/or received a Certificate of Compliance relative to any outstanding WPA Order of Conditions.

MassDEP's comments on the original MEPA filing emphasized compliance with the Massachusetts Stormwater Standards, in particular Stormwater Standard Number 5 which

addresses land uses with higher potential pollutant loads. While the Proponent anticipates the proposed design will "*…avoid disturbance of wetlands, generation of additional stormwater flows, and minimize construction impacts…",* MassDEP recommends a detailed analysis to ensure there are no increased impacts. In the event the current project plans are modified and changes result to the stormwater flows, the Proponent may be required to seek appropriate permits under the Massachusetts WPA.

The Project Change Description states that the rail tracks will be improved. Although the site plan (Figure 1-4, Proposed Conditions Site Plan) depicts where this track improvement will be occurring, the site plan does not depict the Riverfront Area, as defined in 310 CMR 10.58(2). It appears that some work is likely to occur within the Riverfront Area. The Proponent should clarify whether work is occurring within the Riverfront Area and if so, clarify how the work will comply with the performance standards at 310 CMR 10.58(4) or is otherwise exempt. Additional permitting may be required. MassDEP staff are available for consultation.

Bureau of Air and Waste

The facility is subject to the Solid Waste facility regulations at 310 CMR 19.000 and the Site Assignment regulations at 310 CMR 16.00. The facility currently maintains a solid waste site assignment from the Town of Ware Board of Health and an Authorization to Operate from MassDEP. The facility originally was permitted as a Construction & Demolition (C&D) Processing Facility and was reclassified from a C&D Processing Facility to a Permitted C&D Transfer Station effective May 6, 2022. Currently, the facility only receives C&D residuals from other waste processors and small amounts of raw C&D; that material must be transferred to other processors to meet recycling standards.

The proposed project change requires a MassDEP permit *BAW SW 38 - Site Suitability for a Major Modification to an Existing Site Assignment.* The project also requires approval of the proposed changes to the Facility's existing *Site Assignment* from the Ware Board of Health. The NPC does not propose expansion of the Site Assigned area. The proposed 10,000-sf expansion of the existing building will occur within the existing Site Assigned area and will replace a portion of the existing paved yard area. Portions of the railroad spur line serving the facility will also be upgraded within the existing railroad way. In addition to the Site Assignment permits, each of the proposed two stages of the project will require a *BAW SW 07 - Modification of a Large Handling Facility* permit from MassDEP.

Bureau of Waste Site Cleanup

The project site has a release tracking number, (RTN) 1-0018752, with a Permanent Solution without conditions (PSNC). If soil and/or groundwater contamination is encountered during reconstruction activities, the proponent should retain a Licensed Site Professional (LSP); the MCP details procedures to follow for the parties conducting work. MassDEP staff are available for guidance.

In addition, a spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction and agricultural activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential releases.

IV. Section 61 Findings

The NPC provided the original Draft Section 61 Findings as proposed in the Draft EIR and included updates. MassDEP has reviewed the Draft Section 61 Findings and find them to be acceptable. Once the permit applications are submitted, the Section 61 Findings will be reviewed in context of the application and any proposed modifications will be included as part of permitting. MassDEP has the authority during permitting to ensure that environmental impacts are avoided, minimized and mitigated, as appropriate.

V. Other Comments/Guidance

MassDEP staff are available for discussions as the project progresses. If you have any questions regarding this comment letter, please do not hesitate to contact Kathleen Fournier at (413) 755-2267.

Sincerely,

Catherine V. Skiba, P.G. for
Michael J. Gorski
Regional Director

cc: MEPA File

From: Metcalf, Judy
To: Patel, Purvi (EEA); Dorothy Buckoski
Subject: ReSource Waste Services of Ware
Date: Tuesday, June 7, 2022 12:22:26 PM

Dear Ms. Patel,

On behalf of the Ware Board of Health, I am submitting the following comments regarding the truck route for this project expansion:

ReSource Ware proposes to instruct truck drivers to take Exit 78 formerly Exit 9 (Sturbridge) off MA turnpike to Route 20 to Route 49 to Route 9 to enter into Ware from the East. The traffic study attached based the vast majority of trucks using Exit 78(Sturbridge).

This proposal is not the normal route into Ware from points east in Massachusetts. Maps, GPS, even Turnpike signage direct drivers to MA Turnpike Exit 63 formerly Exit 8 (Palmer) to Route 32N to reach Ware. The same follows for the locations in Salem and especially Epping, New Hampshire assuming they would even use I495 to the MA turnpike as opposed to using MA Route 2 and ultimately RT 32S into Ware from the North.

While the proposed route is preferable for Ware, including but not limited to, avoiding downtown traffic / on-street parking and Town of Ware Environmental Justice areas, it is not enforceable. The proposed route is akin to a promise.

Thank you for your consideration of this concern.

Sincerely,

Judy Metcalf, RS.CHO

From:	Wiemann, Curtis B. (DOT)
To:	Patel, Purvi (EEA); Lucien, Lionel (DOT)
Subject:	RE: comments for 12699 ReSource Ware
Date:	Wednesday, June 8, 2022 12:52:56 PM

Good afternoon:

I apologize for the late reply – we looked at this project quickly and did not see any items of concern. I'd encourage the Proponent to coordinate with MassDOT District 2 to limit Project impacts on MassDOT Project 606517 on Route 9 just over the West Brookfield border and Project 610271 resurfacing Route 32 just east of the Project. There are no substantial traffic impacts associated with the project, and the project already possesses an access permit for the curb cut on East Street.

Thank you for inquiring and if you have any questions feel free to let me know.

Sincerely,
Curtis Wiemann

From: Patel, Purvi (EEA) <purvi.patel@mass.gov>
Sent: Tuesday, June 7, 2022 5:10 PM
To: Lucien, Lionel (DOT) <Lionel.Lucien@dot.state.ma.us>; Wiemann, Curtis B. (DOT) <Curtis.B.Wiemann@dot.state.ma.us>
Subject: comments for 12699 ReSource Ware

Good afternoon – please let me know if I should be expecting comments from MassDOT for the NPC for this project. Comments are due today. Thank you

Ms. Purvi P. Patel, EIT
Massachusetts Environmental Policy Act (MEPA) Office
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
617.874.0668
Please be informed that the MEPA Office has finalized amendments to 301 CMR 11.00 for promulgation on December 24, 2021. Two protocols relative to environmental justice have been issued with effective dates of January 1, 2022. An amended Environmental Notification Form (ENF) is in effect as of January 1, 2022.
Please consult the MEPA website for more details.

APPENDIX F

NHESP RARE SPECIES LETTER
(March 11, 2023)

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

March 11, 2023

Stephen Wright
Sanborn, Head & Associates, Inc.
48 Wave Avenue
Wakefield MA 01880

RE: Project Location: 198 East Street
Town: WARE
NHESP Tracking No.: 23-41721

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located **within** *Priority Habitat 1356* (PH 1356) and *Estimated Habitat 968* (EH 968) as indicated in the *Massachusetts Natural Heritage Atlas* (15th Edition) for the following state-listed rare species:

Scientific name	Common Name	Taxonomic Group	State Status
Rhododendron maximum	Great Laurel	Plant	Threatened
Strophitus undulatus	Creeper	Mussel	Special Concern

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)
If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the Division so that it is received at the same time as the local conservation commission. If the Division determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the Division to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: https://www.mass.gov/how-to/wpa-form-3-wetlands-notice-of-intent.

MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to Natural Heritage Regulatory Review to determine whether a probable Take under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: https://www.mass.gov/regulatory-review.

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If the purpose of your inquiry is to generate a species list to fulfill the federal Endangered Species Act (16 U.S.C. 1531 et seq.) information requirements for a permit, proposal, or authorization of any kind from a federal agency, we recommend that you contact the National Marine Fisheries Service at (978)281-9328 and use the U.S. Fish and Wildlife Service's Information for Planning and Conservation website (https://ecos.fws.gov/ipac). If you have any questions regarding this letter please contact Melany Cheeseman, Endangered Species Review Assistant, at (508) 389-6357.

Sincerely,

Everose Schlüter

Everose Schlüter, Ph.D.
Assistant Director

APPENDIX G

TRANSPORTATION IMPACT ASSESSMENT

Transportation Impact Assessment

ReSource Ware Construction & Demolition Debris Handling Facility
Proposed Capacity Increase
198 East Street (Route 9/32)
Ware, Massachusetts

Prepared for:

Sanborn Head & Associates, Inc.
Westford, Massachusetts

April 2022
Updated April 2023

Prepared by:

Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
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Andover, MA 01810

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EXECUTIVE SUMMARY

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to evaluate potential traffic impacts associated with Permit Modifications proposed for the ReSource Ware facility located at 198 East Street (Route 9/32) in Ware, Massachusetts (the "Project"). This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing and future traffic conditions, both with and without the Project.

PROJECT DESCRIPTION

The ReSource Ware construction and demolition debris (C&D) handling facility is owned and operated by ReSource Waste Services of Ware LLC. ReSource Ware is seeking a permit modification to increase its weekday daily tonnage (TPD) from 750 TPD to 1,400 TPD and increase its Saturday daily tonnage from 500 TPD to 750 TPD.[1] On an annual basis, this equates to an increase in its permitted tonnage from 214,500 tons per year (TPY) to 393,200 TPY.

As part of the proposed modifications, the facility will receive C&D from ReSource Waste's other facilities, which are located east of the site, and will reduce the number of loads it accepts at the facility from its third-party customers. For the purposes of this study, under future conditions, the number of third-party loads are based on the number of loads originating from within the Town of Ware. The proposed modifications mark a change in source material from the existing operation that accepts material from third-party customers located largely within an approximately 30-mile radius from the facility.

Incoming material is brought to the facility via trucks and transferred into railcars to be transported off site. The facility currently operates Monday through Friday 7:00 AM to 4:00 PM and Saturday 7:00 AM to 1:00 PM. This Project proposes a change in the facility's weekday operating hours where the hours of operations would be from 7:00 AM to 6:00 PM, with no changes to operating hours on Saturdays. Access to the site is provided via one full-access driveway off East Street (Route 9/32) with no changes proposed to this driveway. At present, the Project site is bounded by

[1]The capacity increase will be performed in two stages. Stage 1 proposes to increase the weekday daily tonnage to 1,125 TPD with no change in the Saturday daily tonnage. Stage 2 would increase the weekday tonnage to 1,400 TPD and increase the Saturday tonnage to 750 TPD. This Traffic Impact Analysis evaluates the full capacity increase from existing permitted conditions to the sought-after maximum capacity increase associated with Stage 2. It is anticipated that the Stage 2 operations would begin within one to two years following the start of Stage 1 operations.

open and wooded space.

EXISTING CONDITIONS

A comprehensive field inventory of traffic conditions on the study area roadways was conducted in December 2021.

Existing Traffic Volumes

In order to establish base traffic-volume conditions within the study area, manual turning movement counts (TMCs), and an automatic traffic recorder (ATR) count were completed in December 2021. The TMCs were conducted during the weekday morning and weekday afternoon peak periods, which represent the peak periods for the Project traffic. Due to lingering effects of the COVID-19 pandemic, traffic adjustments were considered. A review of historic traffic data resulted in COVID-specific adjustments to the count data. The observed traffic-volume data was increased by 16 percent during the weekday morning peak hour, 9 percent during the weekday afternoon peak hour, and 11 percent during a daily basis. Although traffic levels have been steadily increasing over the last several months, available traffic data suggests that traffic conditions have not yet returned to pre-pandemic levels.

Safety Analysis

The study intersections along the downtown corridor were shown to have the highest accident ratio of any of the study locations during the period analyzed (2015 through 2019). These intersections were found to have a motor vehicle crash rate above both statewide and the Massachusetts Department of Transportation (MassDOT) average for the District in which the Project is located (District 2). However, improvements proposed as part of the Ware Main Street improvement plan, which was completed in 2022, may decrease the crash rate at these locations in the future. No fatalities were reported at any of the study area intersections over the five-year period reviewed. In addition, crash data for the period 2015-2019 along Route 9 in West Brookfield was also reviewed and the crash rate for the corridor was determined to be below the MassDOT average crash rate for both urban and rural principal arterials that are not freeways or expressways.

FUTURE CONDITIONS

Traffic volumes within the study area were projected to 2028, which reflects a seven-year planning horizon consistent with State traffic study guidelines.

Background Traffic Growth

A 1 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and any presently unforeseen development within the study area.

Specific Development by Others

The Towns of Ware and West Brookfield were contacted in order to determine if there are any planned or approved specific development projects within the area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, a recreational cannabis retail shop at 24 West Main Street and The Ware Marijuana Mill Yard are the only future projects

that were identified by the Towns that are in the immediate area of the Project site. Traffic from these site-specific projects was incorporated into the study.

Planned Roadway Improvements

The Towns of Ware and West Brookfield were also contacted to determine if there are any planned roadway improvements in the area that would have an impact on future traffic operations. Based on these discussions, the following planned roadway improvement projects that would affect the study area were identified: i) East Main Street Canal Bridge structural repair; and ii) Resurfacing and related work along East Street (Route 9), 1.1 miles east of the Ware town line. Projects were incorporated into future conditions as appropriate. In addition, the Main Street Improvement project was under construction at the time of data collection and the pre-construction traffic conditions were used in the analysis of existing conditions. The improvements were incorporated into future conditions analysis and the Improvement project is now complete.

No-Build Traffic Volumes (Projected 2028 Conditions with Facility Operating at 750 TPD)

The 2028 No-Build weekday morning and afternoon peak-hour traffic-volume networks were developed by applying the 1 percent per year compounded annual background traffic growth rate to the 2021 Existing condition peak-hour traffic volumes, plus the identified background developments and trips expected from the facility when it is operating at full 750 TPD capacity.

Project-Generated Traffic Volumes

ReSource Ware is seeking a permit modification to increase its weekday daily tonnage from 750 TPD to 1,400 TPD and increase its Saturday daily tonnage from 500 TPD to 750 TPD. This equates to an increase in its annual permitted tonnage from 214,500 TPY to 393,200 TPY. As part of the proposed modifications, the facility will receive C&D from ReSource Waste's other facilities, which are located east of the site, and will reduce the number of loads it accepts at the facility from its third-party customers. Under future conditions, the number of third-party loads are based on the number of loads originating from within the Town of Ware. Currently, material delivered to the facility by third-party customers originates from communities located largely within a 30-mile radius from the facility. The proposed changes in the operation (proposed permitted capacity of 1,400 TPD) is expected to generate approximately 70 new vehicle trips on an average weekday (two-way, 24-hour volume), with 14 new truck trips (7 entering and 7 exiting) expected during the weekday morning and afternoon peak hours, respectively.

Trip Distribution and Assignment

The directional distribution of generated trips to and from the Project site was determined based on a review of existing facility tonnage data and the existing route defined by ReSouce for their drivers traveling to the site from the intercompany sources. This data indicated the origins from all trucks arriving at the site. Consistent with the proposed change in operations, 75 percent of the trips are expected to arrive and depart the site to/from the east and 25 percent of the trips are expected to arrive and depart the site to/from the west.

TRAFFIC OPERATIONS ANALYSIS

In order to assess the impact of the proposed Project on the roadway network, traffic operations analyses were performed at the study intersections under 2021 Existing, 2028 No-Build (750 TPD

operations), and 2028 Build conditions (1,400 TPD operations). The addition of site-related traffic will not result in a significant impact on overall operations at the study area intersections.

RECOMMENDATIONS

The following recommendations have been developed as a part of this evaluation and, where applicable, will be implemented before facility operations are performed above the current 750 TPD permitted capacity, subject to receipt of all necessary rights, permits, and approvals.

Project Access

Access to the site is provided via one full-access driveway off East Street (Route 9/32). The following recommendation is offered with respect to Project access for the Project:

- In order to encourage safe and efficient flow of traffic to and from the site, should any landscaping or signage along the site frontage or the site driveway be proposed or requested by others, these features are recommended to be no higher than 24 inches or be set back sufficiently from the edge of the roadways so as not to inhibit the available sightlines. It is our recommendation that the existing "Janine's Frosty" sign be relocated to provide an unobstructed sightline for vehicles exiting the Project driveway.

CONCLUSIONS

The proposed Project, which contemplates a capacity increase to 1,400 TPD of C&D accepted at the facility, will not result in a significant impact on traffic operations at the intersections reviewed for this analysis. Due to the proposed change in operations, a slight decrease in truck traffic traveling to the site through the downtown area of Ware is expected. With the implementation of the above recommendations, safe and efficient access will be provided to the facility and the proposed capacity increase to 1,400 TPD can be accomplished with minimal impact to the area.

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to evaluate potential traffic impacts associated with Permit Modifications proposed for the ReSource Ware facility located at 198 East Street (Route 9/32) in Ware, Massachusetts (the "Project"). This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing and future traffic conditions, both with and without the Project.

PROJECT DESCRIPTION

The ReSource Ware construction and demolition debris (C&D) handling facility is owned and operated by ReSource Waste Services of Ware LLC. ReSource Ware is seeking a permit modification to increase its weekday daily tonnage (TPD) from 750 TPD to 1,400 TPD and increase its Saturday daily tonnage from 500 TPD to 750 TPD.[2] On an annual basis, this equates to an increase in its permitted tonnage from 214,500 tons per year (TPY) to 393,200 TPY.

As part of the proposed modifications, the facility will receive C&D from ReSource Waste's other facilities, which are located east of the site, and will reduce the number of loads it accepts at the facility from its third-party customers. For the purposes of this study, under future conditions the number of third-party loads are based on the number of loads originating from within the Town of Ware. The proposed modifications mark a change in source material from the existing operation that accepts material from third-party customers located largely within an approximately 30-mile radius from the facility.

Incoming material is brought to the facility via trucks and transferred into railcars to be transported off-site. The facility currently operates Monday through Friday 7:00 AM to 4:00 PM and Saturday 7:00 AM to 1:00 PM. This Project proposes a change in the facility's weekday operating hours where the hours of operation would be from 7:00 AM to 6:00 PM, with no changes to operating hours on Saturdays. Access to the site is provided via one full-access driveway off East Street (Route 9/32) with no changes proposed to this driveway. At present, the Project site is bounded by open and wooded space.

[2]Ibid 1.

STUDY METHODOLOGY

This study was prepared in consultation with the Town of Ware and in accordance with the Massachusetts Department of Transportation (MassDOT) *Transportation Impact Assessment (TIA) Guidelines;* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian facilities; observations of traffic flow; review of safety characteristics along area roadways; and collection of daily and peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for analyses consistent with State guidelines for the preparation of TIAs. The traffic analysis conducted in stage two identifies existing or projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any, identified in stage two of the study.

EXISTING CONDITIONS

A comprehensive field inventory of traffic conditions on the study area roadways was conducted in December 2021. The field investigation consisted of an inventory of existing roadway geometrics, pedestrian facilities, traffic volumes, and operating characteristics, as well as posted speed limits and land use information for the roadways that provide access to the Project including East Street and Main Street as well as the intersections which are expected to accommodate the majority of Project-related traffic. The study area for the Project is listed below and is graphically depicted in Figure 1.

1. East Street (Route 9/32) at the site driveway
2. East Street (Route 9) at Gilbertville Road (Route 32)
3. East Street (Route 9/32) at Knox Avenue
4. East Main Street (Route 9/32) at Church Street and South Street
5. Main Street (Route 9/32) at North Street
6. Main Street (Route 9) at West Street (Route 32)

The following describes the study area roadway and intersections:

GEOMETRY

Roadway

East Street (Route 9/32)

East Street (Route 9/32) runs in a northeast-southwest direction in the Town of Ware and extends from the West Brookfield town line to Grove Street and East Main Street. East Street is classified as a principal arterial and is under Town of Ware jurisdiction to the south of Prendiville Road and is under MassDOT jurisdiction to the north. To the north of Gilbertville Road, East Street continues into the Town of West Brookfield to the east as Route 9 while Route 32 follows Gilbertville Road to the north. East Street is primarily a two-lane, two-way roadway abutted by retail and residential land uses. Travel lane and shoulder widths vary along East Street; however, in the immediate vicinity of the Project site East Street provides a 12- to 13-foot wide travel lane width in the eastbound direction and 13- to 16-foot wide travel lane in the westbound direction. There are no sidewalks present on either side of the roadway in the immediate vicinity of the Project site.

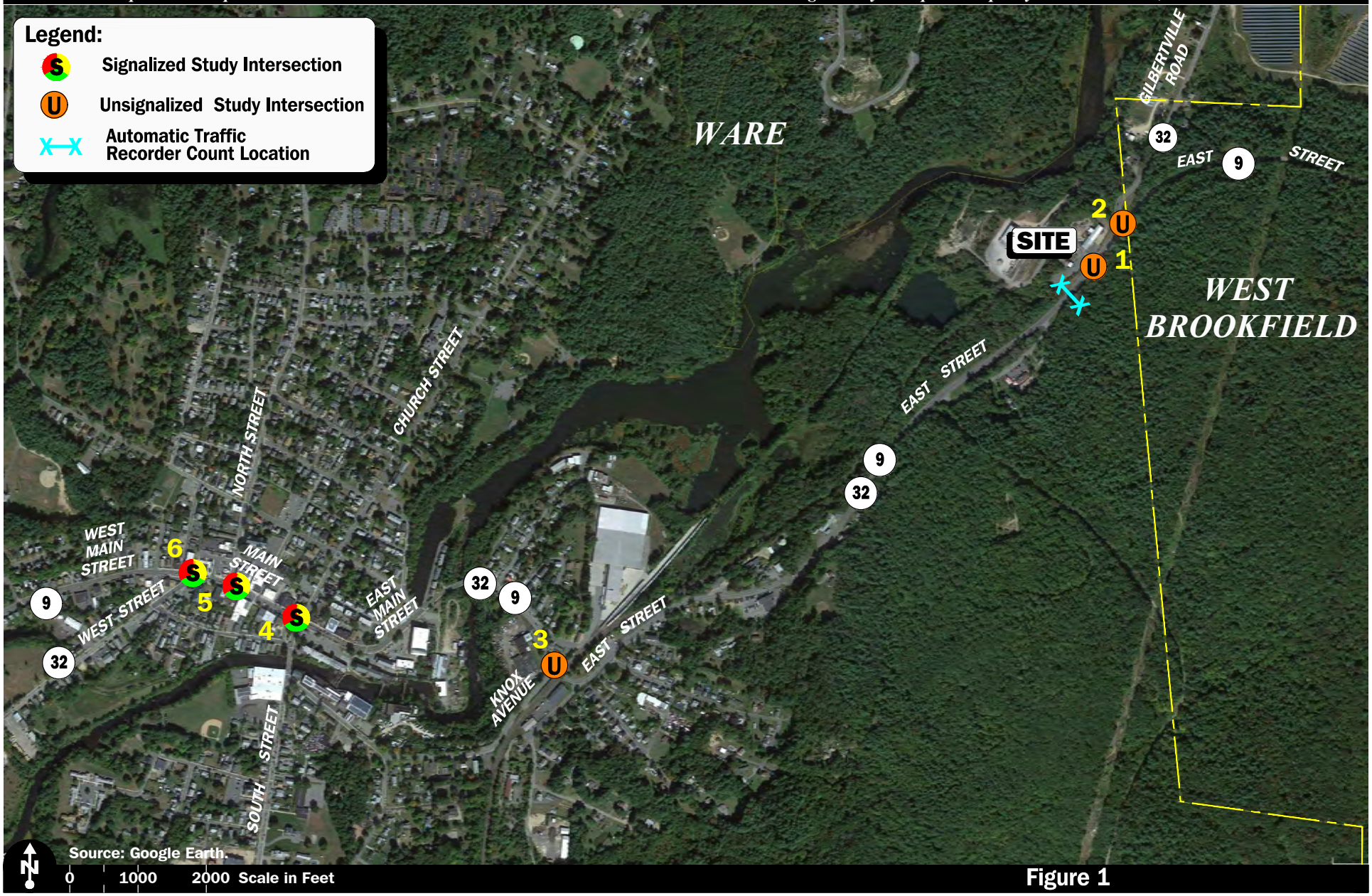


Figure 1

Site Location and Study Map

Vanasse & Associates inc

Gilbertville Road (Route 32)

Gilbertville Road (Route 32) travels in a north-south direction beginning at the intersection with East Street (Route 9) to the south and continuing north towards Hardwick. Gilbertville Road (Route 32) is classified as an urban principal arterial under MassDOT jurisdiction within the study area and is primarily a two-lane, two-way roadway abutted by residential uses. Gilbertville Road provides a 13-foot wide travel lane in both directions with no shoulders. In the immediate vicinity of the site sidewalks are not provided.

West Main Street (Route 9)

West Main Street (Route 9) runs in an east-west direction in the Town of Ware and connects to the downtown area from the west. West Main Street ends at its intersection with West Street (Route 32) and Route 9 continues as Main Street then East Main Street to the east. West Main Street (Route 9) is classified as a principal arterial under Town of Ware jurisdiction within the study area and is primarily a two-lane, two-way roadway abutted by retail and residential land uses in the vicinity of the site. West Main Street generally provides a 12-foot wide travel lane in both directions, with 8-foot wide shoulders. In addition, an auxiliary 10-foot wide bypass lane for slower traffic is provided in some sections of West Main Street in the westbound direction. At the intersection with West Street and Main Street, West Main Street is approximately 40 feet wide including one 12-foot wide travel lane with a 6-foot wide bike lane in the eastbound direction and one 14-foot wide westbound receiving lane with an 8-foot wide on-street parking space to the north. At present, a 6-foot wide sidewalk is provided on either side of the roadway.

West Street (Route 32)

West Street (Route 32) runs in a northeast-southwest direction in the Town of Ware and connects to the downtown area to the north. West Street ends at its intersection with West Main Street (Route 9) and Main Street. West Street (Route 32) is classified as a principal arterial under Town of Ware jurisdiction within the study area and is primarily a two-lane, two-way roadway abutted by retail and residential land uses in the vicinity of the site. At the intersection with Main Street, West Street is approximately 37 feet wide with a 15-foot wide receiving travel lane traveling in the southbound direction and a 23-foot wide northbound lane including a 14-foot wide travel lane and an 8-foot wide on-street parking space which ends and become a 5-foot wide bike lane. There are 6-foot wide sidewalks on either side of the road.

Main Street (Route 9/32)

Main Street (Route 9/32) runs in an east-west direction in the Town of Ware through the downtown area. Main Street begins at the intersection with West Street and West Main Street to the west and ends at the intersection with Church Street/South Street to the east. Main Street (Route 9/32) is classified as a principal arterial under Town of Ware jurisdiction within the study area and is primarily a two-lane roadway with additional auxiliary lanes in either direction at various intersections along Main Street abutted by retail land uses in the vicinity of the site. Through the downtown corridor, there is on-street parking and sidewalks on either side of the roadway. Main Street (Route 9/32) is typically 50 to 56 feet wide from curb to curb with a varying lane arrangement as it passes through multiple intersections.

East Main Street (Route 9/32)

East Main Street (Route 9/32) winds in an east-west direction just east of the downtown area in the Town of Ware and connects with Main Street to the west at the intersection of Main Street with Church Street/South Street and to East Street to the east at the intersection with East Street with Grove Street. East Main Street (Route 9/32) is classified as a principal arterial under Town of Ware jurisdiction within the study area and is primarily a two-lane, two-way roadway abutted by retail and residential land uses in the vicinity of the site. East Main Street generally provides a 12-footwide travel lane in both directions and varying shoulder widths as it travels around several horizontal curves. There is sidewalk present on the southern side of the road for the length of East Main Street and on the northern portion of East Main Street for approximately 500 feet east of Church Street.

Intersections

Figure 2 summarizes existing lane use and travel lane widths at the study area intersections as observed in December 2021.

EXISTING TRAFFIC VOLUMES

In order to establish base traffic-volume conditions within the study area, manual turning movement counts (TMCs) and an automatic traffic recorder (ATR) count were conducted in December 2021. The TMCs were conducted on Tuesday, December 7, 2021 during the weekday morning (7:00 to 9:00 AM) and weekday afternoon (3:00 to 5:00 PM) peak periods, which represent the roadway's peak. The ATR count was conducted on December 7 and 8, 2021 at East Street (Route 9/32) just south of the site driveway for 48 hours (Tuesday through Wednesday).

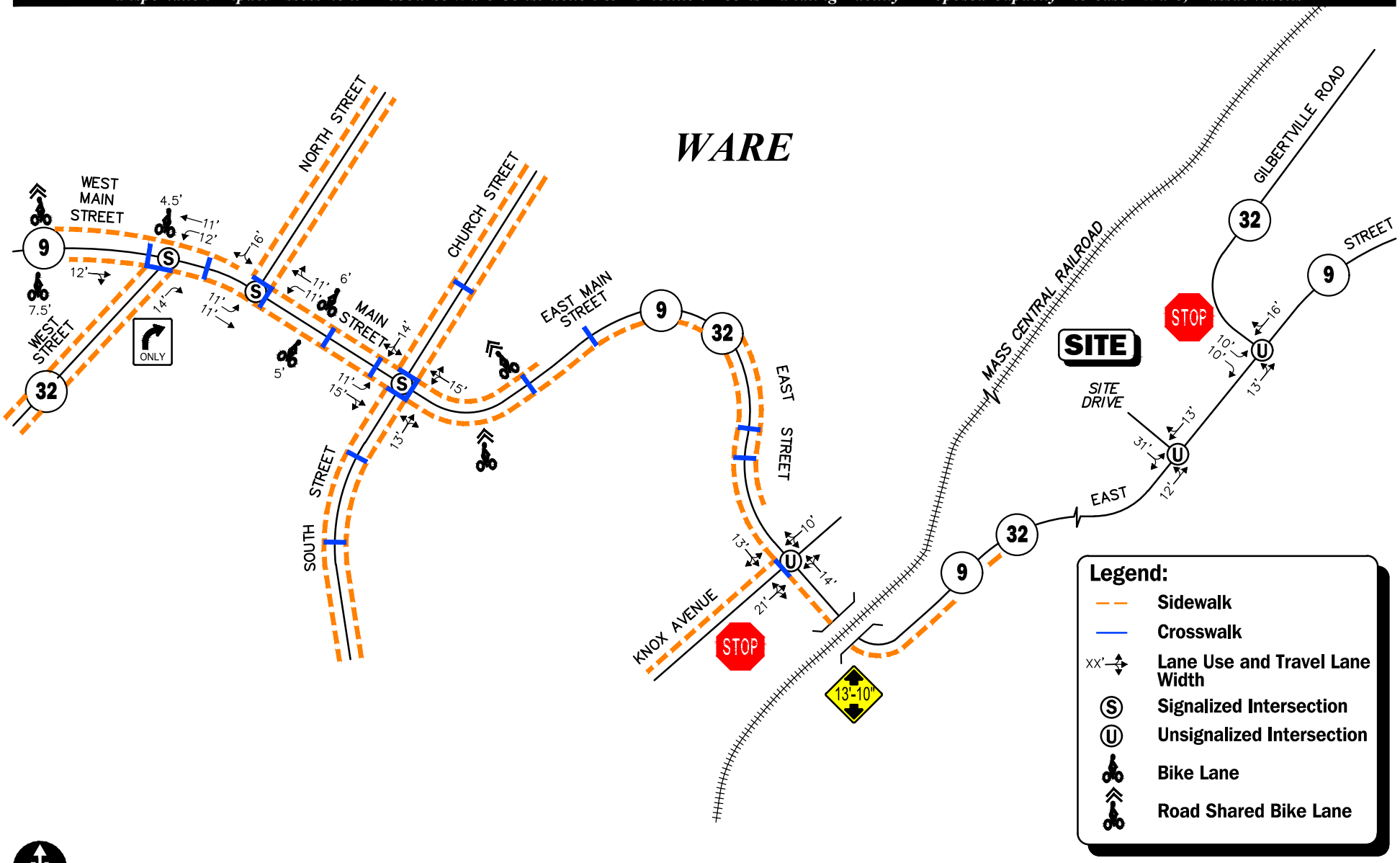
Traffic Adjustment

In accordance with MassDOT guidelines, traffic counts collected in 2021 may not be representative of typical traffic volumes due to the COVID-19 pandemic.[3],[4] To determine whether a pandemic adjustment should be made to the December 2021 traffic counts, count data from the MassDOT permanent count station ID AET05, 3140, and 3331 located close by the site were reviewed.[5] Traffic-volume data collected at this continuous count station in December 2021 was compared to December 2019 traffic volumes that were collected at the same location. The 2019 traffic volumes were expanded to 2021 (same-year condition) by applying a background traffic growth rate of 1 percent per year (discussion follows) in order to allow for a comparison of the data. Based on this pre- and post-COVID-19 traffic data comparison, the 2021 traffic-volume data that was collected as a part of this assessment was adjusted upward by an additional 16 percent during the weekday morning peak hour, 9 percent during the weekday afternoon peak hour, and 11 percent during a daily basis, in order to account for the reduced traffic volumes, an approach consistent with the phased "Reopening Massachusetts" plan provided by MassDOT. Although traffic levels have been steadily increasing over the last several months, available traffic data suggests that traffic conditions have not yet returned to pre-pandemic levels.

[3]Chief Engineer Patricia Leavenworth. MassDOT Engineering Directive E-20-005 – Guidance on Traffic Count Data. May 11, 2020.

[4]Massachusetts Department of Transportation, Highway Division. Guidance on Traffic Count Data; April 2020.

[5]MassDOT traffic volumes for the Commonwealth of Massachusetts; 2020.



Not to Scale

Figure 2

Existing Intersection Lane Use, Travel Lane Width and Pedestrian Facilities

Vanasse & Associates inc

Seasonal Adjustment

In addition to developing correction factors for COVID-19, adjustments were made to account for seasonal fluctuations in traffic. The MassDOT permanent count station ID 3140 was used to evaluate the traffic volumes for seasonal fluctuations. Based on this data, it was determined that December traffic volumes are approximately 8 percent below average-month conditions for this station. Therefore, the December traffic volumes were increased by an additional 8 percent in order to provide a conservative analysis condition.

Existing Facility Trip Adjustment

ReSource Ware daily tonnage data collected on December 2, 7, and 8, 2021 (Thursday, Tuesday, and Wednesday), was obtained and analyzed. The tonnage data shows the number of loads occurring throughout the day. For analysis purposes, the truck load data was separated by the number of loads occurring every 15 minutes. It was assumed that each load in the data represented a truck entering the facility and exiting within 15 minutes. The data shows that within the three days, the facility's peak load/trips may occur during different hours of the day. Therefore, an average of the three-day highest morning and afternoon peak hours were obtained and added to the 2021 existing baseline condition (discussion follows). This provides a conservative existing condition analysis and assumes worst-case scenario analyses of the facility peaking at the same time as the roadway morning and afternoon peak hours. The existing facility daily data is provided in the Appendix.

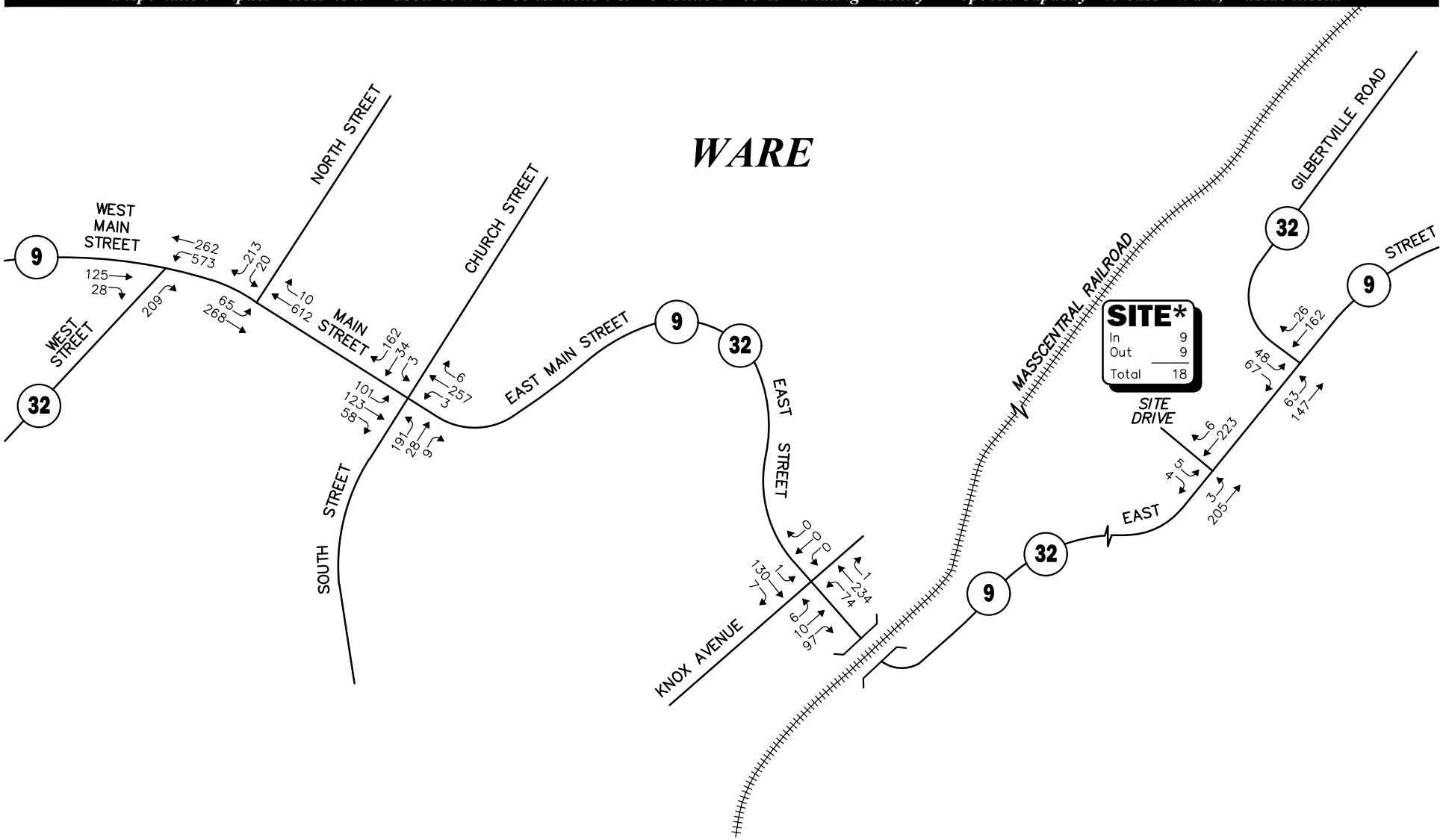
The 2021 Existing traffic volumes are summarized in Table 1, with the weekday morning and afternoon peak-hour traffic volumes graphically depicted on Figures 3 and 4. It is important to note that the peak-hour traffic volumes presented in Table 1 were obtained from the TMCs and are reflected on the aforementioned figures.

Table 1
EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY

Location	Daily Volume (vpd)[a]	Weekday Morning Peak Hour (7:30 – 8:30 AM)			Weekday Afternoon Peak Hour (3:45 – 4:45 PM)		
		Volume (vph)[b]	Percent of Daily Traffic	Predominant Flow	Volume (vph)	Percent of Daily Traffic	Predominant Flow
East Street (Route 9/32), south of the Site Driveway	6,415	435	6.8	52% SB	623	9.7	52% NB

[a]Two-way daily traffic expressed in vehicles per day; from ATR counts, December 2021 (adjusted).
[b]Manual turning movement counts conducted in December 2021 (adjusted).
[c]The percent of daily traffic that occurs during the peak hour.
NB= northbound; SB= southbound.

As can be seen in Table 1, East Street (Route 9/32), south of the site driveway was found to accommodate approximately 6,415 vehicles on an average weekday (24-hour, two-way volume), with approximately 435 vehicles per hour (vph) during the weekday morning peak hour and 623 vph during the weekday afternoon peak hour. The predominant flow on East Street (Route 9/32)



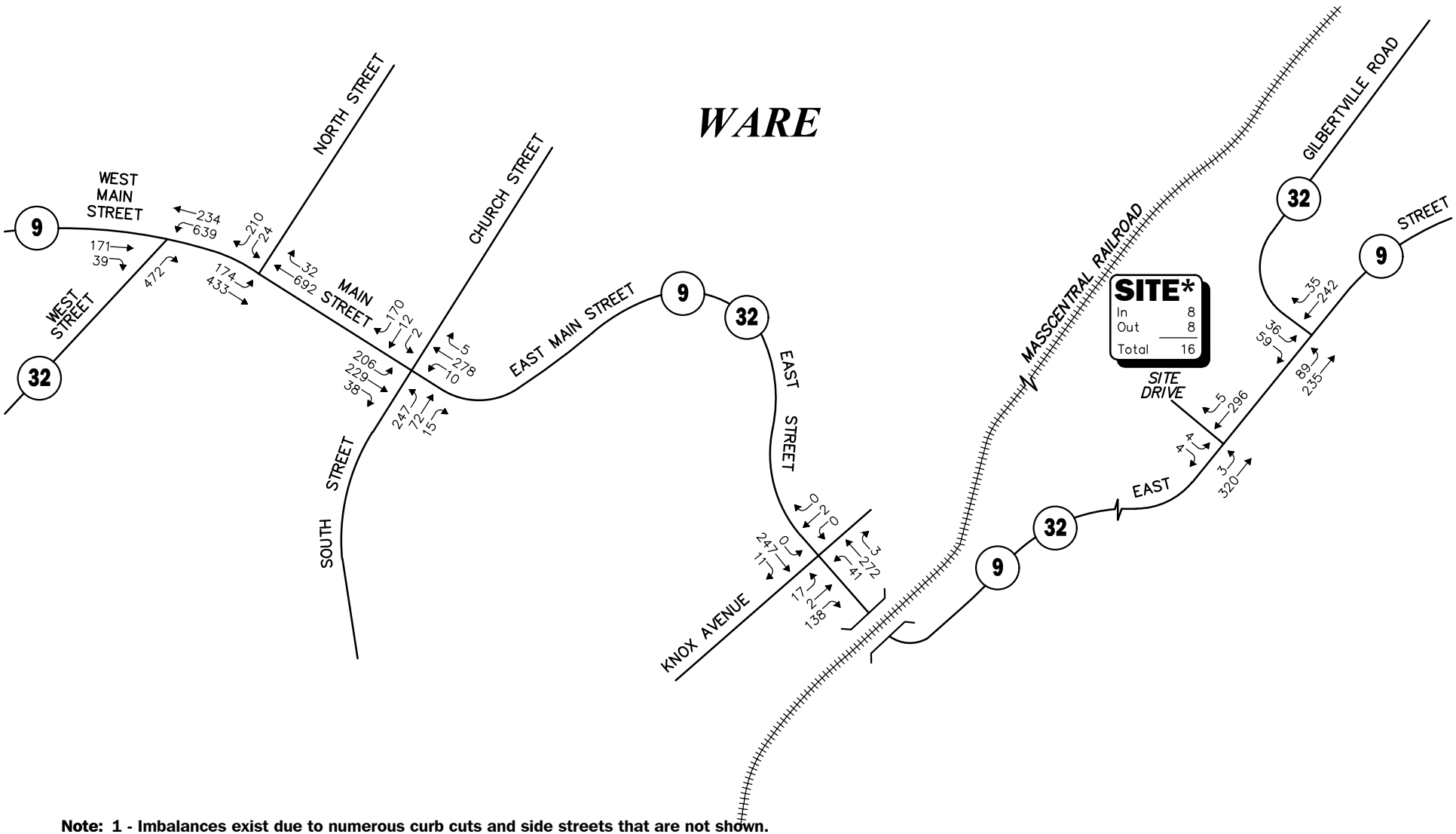
Note: **1 - Imbalances exist due to numerous curb cuts and side streets that are not shown.**
2 - Traffic counted December 7, 2021.
***Site volume adjusted to reflect site peak hour volumes.**

Not to Scale

Figure 3

Vanasse & Associates inc

2021 Existing Condition
Weekday Morning
Peak Hour Traffic Volume
(7:30 - 8:30 AM)



Note: **1 - Imbalances exist due to numerous curb cuts and side streets that are not shown.**
2 - Traffic counted December 7, 2021.
***Site volume adjusted to reflect site peak hour volumes.**

Not to Scale

Figure 4

Vanasse & Associates inc

2021 Existing Condition
Weekday Afternoon
Peak Hour Traffic Volume
(3:45 - 4:45 PM)

during the weekday morning peak hour is in the southbound direction and during the weekday afternoon peak hour is in the northbound direction.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 7:30 and 8:30 AM with the weekday afternoon peak hour generally occurring between 3:45 and 4:45 PM.

PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in December 2021. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing facilities along the study roadways and at the study intersections, as well as the location of existing and planned future bicycle facilities. As detailed on Figure 2, sidewalks are provided along both sides of the Main Street corridor, with painted crosswalks provided at most intersections. As part of the Ware Main Street Improvement project, exclusive bicycle travel lanes were provided along both sides of the Main Street corridor. Sidewalks are also provided along the south side of East Main Street (Route 9/32). Shared traveled way signage was also identified along East Main Street (Route 9/32), West Street (Route 32), and West Main Street (Route 9).

SAFETY ANALYSIS

In order to evaluate whether there are any notable trends that would indicate potential safety deficiencies within the study area, a motor vehicle accident analysis was conducted in accordance with State guidelines as described below.

Vehicle Accident Data

Motor vehicle accident data was acquired from the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2015 through 2019) in order to examine motor vehicle accident trends occurring within the study area. The data is summarized by intersection, type, and severity, and is presented in Table 2.

As summarized in Table 2, the intersections of Main Street (Route 9/32) at North Street experienced the highest frequency of accidents in the study area with a total of 31 accidents over the five-year review period, averaging 6.2 accidents per year. The majority of the accidents at Main Street (Route 9/32) at North Street were rear-end collisions (13 out of 31), during the daylight (25 out of 31), caused property damage only (27 out of 31), and involved passenger cars (28 out of 31). The majority of the crashes at this location were rear-end collisions, which is a typical crash type for signalized intersections. No crashes were recorded at the site driveway intersection with East Street. The most recent crash data available only goes through 2019, and therefore any effects due to the Ware Main Street Improvement project, construction of which began in the summer of 2020, would not be reflected in this data.

The study intersections along the downtown corridor were noted to have higher accident ratios than the other study locations during the period analyzed. These three study intersections were found to have a motor vehicle crash rate above both statewide and the MassDOT average for the District in which the Project is located (District 2). It is important to note that the Ware Main Street Improvement plan was recently completed and is likely to improve safety within the limits of the

project. The Main Street Improvement plan included roadway and sidewalk reconstruction, corridor travel lane reconfiguration, bicycle lanes, traffic signal optimization, and a new traffic signal installation at the intersection of Main Street (Route 9) at West Street (Route 32). The construction began in the summer of 2020 and was completed in 2022. Improvements proposed along this corridor may decrease the crash rate at these locations in the future. No fatalities were reported at any of the study area intersections over the five-year period reviewed. In addition, the Highway Safety Improvement Program (HSIP) database was reviewed and none of the study area intersections are listed as HSIP-eligible clusters in the most recent (2015 through 2017) HSIP cluster listing. The detailed MassDOT Crash Rate Worksheets are provided in the Appendix.

Table 2
MOTOR VEHICLE ACCIDENT DATA SUMMARY[a]

	East St (Rte 9) at Gilbertville Rd (Rte 32) (Unsignalized)	East St at Knox Ave (Unsignalized)	East St at Railroad Bridge (Roadway)	East Main St/ Main St at Church St and South St (Signalized)	Main St at North St (Signalized)	West Main St (Rte 9)/ Main Street at West St (Rte 32) (Signalized)
Year:						
2015	0	0	0	5	4	3
2016	0	0	1	6	4	8
2017	2	1	0	9	5	4
2018	0	0	0	3	8	7
2019	2	1	0	5	10	7
Total	4	2	1	28	31	29
Average[b]	0.80	0.40	0.20	5.6	6.20	5.80
Crash Rate[c]	0.28	0.14	--	1.08	0.98	0.92
Significant	No	No	--	Yes	Yes	Yes
Type:						
Angle	0	0	0	5	8	8
Rear-End	2	1	0	12	13	7
Head-On	0	0	0	1	2	1
Sideswipe	0	1	0	5	5	7
Fixed Object	2	0	1	4	3	5
Pedestrian	0	0	0	0	0	0
Bicyclist	0	0	0	0	0	0
Unknown/Other	0	0	0	1	0	1
Total	4	2	1	28	31	29
Weather Conditions:						
Clear	4	0	0	23	22	23
Cloudy/Rain	0	2	1	4	7	6
Snow/Ice	0	0	0	1	2	0
Fog	0	0	0	0	0	0
Unknown/Other	0	0	0	0	0	0
Total	4	2	1	28	31	29
Lighting Conditions:						
Daylight	3	2	1	22	25	25
Dawn/Dusk	0	0	0	2	2	0
Dark (lit)	1	0	0	4	4	4
Dark (unlit)	0	0	0	0	0	0
Unknown/Other	0	0	0	0	0	0
Total	4	2	1	28	31	29
Pavement Conditions :						
Dry	3	0	0	25	25	24
Wet	0	2	1	1	1	4
Snow/Ice	0	0	0	1	5	1
Unknown/Other	1	0	0	1	0	0
Total	4	2	1	28	31	29
Vehicle Configuration:						
Passenger Car	4	2	1	21	28	25
Light Truck	0	0	0	5	1	1
Motorcycle	0	0	0	1	2	1
Truck/trailer	0	0	0	1	0	1
Tractor/semi-trailer	0	0	0	0	0	2
Total	4	2	1	28	31	29
Severity:						
Property Damage Only	1	2	1	21	27	24
Personal Injury	3	0	0	6	4	5
Fatality	0	0	0	0	0	0
Unknown/Other	0	0	0	1	0	0
Total	4	2	1	28	31	29

[a]Source: MassDOT, 2015 through 2019.
[b]Average crashes over five-year period.
[c]Crash rate per million entering vehicles.
Unsignalized intersections are significant if rate >0.62 crashes per million vehicles (District 2) or if rate >0.57 crashes per million vehicles (Statewide).
Signalized intersections are significant if rate >0.89 crashes per million vehicles (District 2) or if rate >0.78 crashes per million vehicles (Statewide).

Route 9 Brookfield Corridor

In addition, motor vehicle crash data along Route 9 in West Brookfield was also included, as it is the primary truck route to the site. MassDOT count location RPA05-323-3154 on West Main Street (Route 9), west of Route 19/67, was used to run the safety analysis along this segment. Accordingly, crash data from 2015-2019 along Route 9 in West Brookfield were queried from the MassDOT IMPACT crash portal. Route 9 is a principal arterial roadway that travels 7.04 miles through West Brookfield from the Ware town line to the Brookfield town line. Based on the query, 44 crashes were identified to have occurred along Route 9 in West Brookfield from 2015-2019. A crash rate for the roadway segment was determined using the MassDOT crash rate worksheet for roadway segments. The average daily traffic (ADT) volume on Route 9 was obtained from MassDOT count station RPA05-323-3154 for the year 2019. Station RPA05-323-3154 is located on Route 9 west of Route 19-67. The ADT was found to be 6,430 vehicles per day. Based on this information, the MassDOT crash rate worksheet indicates that this segment of Route 9 has a crash rate of 0.53, which is below the MassDOT average crash rate for both rural and urban principal arterial roadways that are not freeways or expressways.

SPOT SPEED MEASUREMENTS

Vehicle travel speed measurements were performed along East Street (Route 9/32) just south of the Project driveway. Table 3 summarizes the vehicle travel speed measurements.

Table 3
VEHICLE TRAVEL SPEED MEASUREMENTS

	East Street Northbound	East Street Southbound
Mean Travel Speed (mph)	39	44
85th Percentile Speed (mph)[6]	50	48
Posted Speed Limit (mph)	45	45

mph = miles per hour.

As can be seen in Table 3, the mean (average) vehicle travel speed along East Street in the vicinity of the Project site was found to be approximately 39 miles per hour (mph) in the northbound direction and 44 mph in the southbound direction. The measured 85th percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be approximately 50 mph in the northbound and approximately 48 mph in the southbound direction. The 85th percentile speed is used as the basis of engineering design and in the evaluation of sight distances and is often used in establishing posted speed limits.

[6]The 85th percentile speed is defined as a speed that 85 percent of all vehicles are observed to travel at or below under free-flowing conditions past a monitored point.

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2028, which reflects a seven-year planning horizon consistent with State Traffic Study Guidelines. Independent of the Project, traffic volumes on the roadway network in the year 2028 under No-Build conditions (750 TPD operations) include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon this 2028 No-Build traffic network reflect the 2028 Build conditions (1,400 TPD operations) associated with the Project.

FUTURE TRAFFIC GROWTH

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

GENERAL BACKGROUND TRAFFIC GROWTH

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on this data, it was determined that traffic volumes within the study area have been increasing at a rate of approximately 0.8± percent per year. Therefore, to provide a conservative (higher than expected) analysis scenario, a 1 percent compounded annual growth was used to account for general background traffic growth for the weekday morning and afternoon peak hours. The MassDOT adjustment data are provided in the Appendix.

SPECIFIC DEVELOPMENT BY OTHERS

The Towns of Ware and West Brookfield were contacted in order to determine if there are any planned or approved development projects that are expected to influence future traffic volumes within the study area. Based on these discussions, the following projects were identified for inclusion in this assessment:

- ***Marijuana Dispensary – 50 East Main Street – Ware, Massachusetts.*** This project will entail development of a 1,600 square foot (sf) recreational marijuana space. This project is currently in the permitting stage. Traffic volumes associated with this project were obtained using trip-generation information available from the Institute of Transportation Engineers (ITE)[7] for the appropriate land use and assigned onto the study area roadway network based on existing traffic patterns where no other information was available.

- ***Cannabis Growing Facility Mill Yard – 0 East Main Street – Ware, Massachusetts.*** This project entails construction of a 7,700 sf warehouse-style steel structure to accommodate a cannabis growing facility. This project was approved by the Ware Planning Board. Traffic volumes associated with this project were obtained using trip-generation information available from the ITE for the appropriate land use and assigned onto the study area roadway network based on existing traffic patterns where no other information was available.

No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

ROADWAY IMPROVEMENT PROJECTS

The Towns of Ware and West Brookfield were contacted to determine if there are any planned roadway improvements in the area that would have an impact on future traffic operations. Based on these discussions, the following projects were identified for inclusion in this assessment:

- ***East Main Street Canal Bridge – Ware, Massachusetts.*** MassDOT conducted a structural analysis along the East Main Street Canal Bridge, which is located approximately halfway between South Street and Knox Avenue. This bridge is currently operating as a one-way street with a light system allowing one lane of traffic at a time. MassDOT has also placed barriers on the bridge over the canal and a temporary pathway for pedestrians is provided. There is no timetable for design and repair/replacement of the bridge.

- ***East Street (Route 9) Resurfacing and Related Work – West Brookfield, Massachusetts.*** This project will be conducted by MassDOT and is at the 75 percent design phase. The project is scheduled to start construction in 2024 and will include road drainage improvements and a travel lane reconfiguration (12 feet each direction) to include 5-foot breakdown lanes.

- ***Bridge Replacement on Route 32 (Palmer Road) over the Ware River.*** This project was given a Notice to Proceed at the end of 2022. The funding for this project is through the 2022 Transportation Improvement Program for the Pioneer Valley Metropolitan

[7]Trip Generation, 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.

Planning Organization. Under the current truck route for the Project, the majority of the Project traffic arrives and departs the facility via Route 9 to the east, while the bridge replacement is west of the Project site. The smaller component of Project traffic expected to come from the west will consist of smaller trucks and if any detour is required for this project, truck traveling to the site should not require a specialized route.

- ***Resurfacing of Route 32.*** This project is expected to begin construction in winter 2024/2025. The project manager was contacted to receive plans for this project, but as of this writing, no response has been received. However, this project spans four towns: Hardwick, New Braintree, Ware, and West Brookfield. The majority of this project will not overlap with the proposed truck route for the Project which utilizes Route 9 from the east. Route 32 splits with Route 9 at Gilbertville Road and the Project driveway access onto Route 9/32 is approximately 350 feet west of Gilbertville Road. There is no feasible way to avoid traveling the 350 feet on Route 32 to access the Project site which would be the only overlapping section of the proposed truck route with the resurfacing project on Route 32.

  For reference, the proposed truck route for the Project is provided in the appendix of this report.

In addition, the following project was underway at the time of study preparation but has since been completed:

- ***Main Street Improvement Project – Ware, Massachusetts.*** Construction on this project began in the summer of 2020 and has been completed. The Main Street improvements include a new traffic signal at the intersection of Main Street with West Street, traffic signal optimization along the corridor, reconstruction of sidewalks, and travel lane reconfiguration to accommodate bicycle lanes and additional on-street parking spaces. The pre-construction traffic conditions were used in the analysis of Existing conditions; the improvements were incorporated into future No-Build and Build analysis.

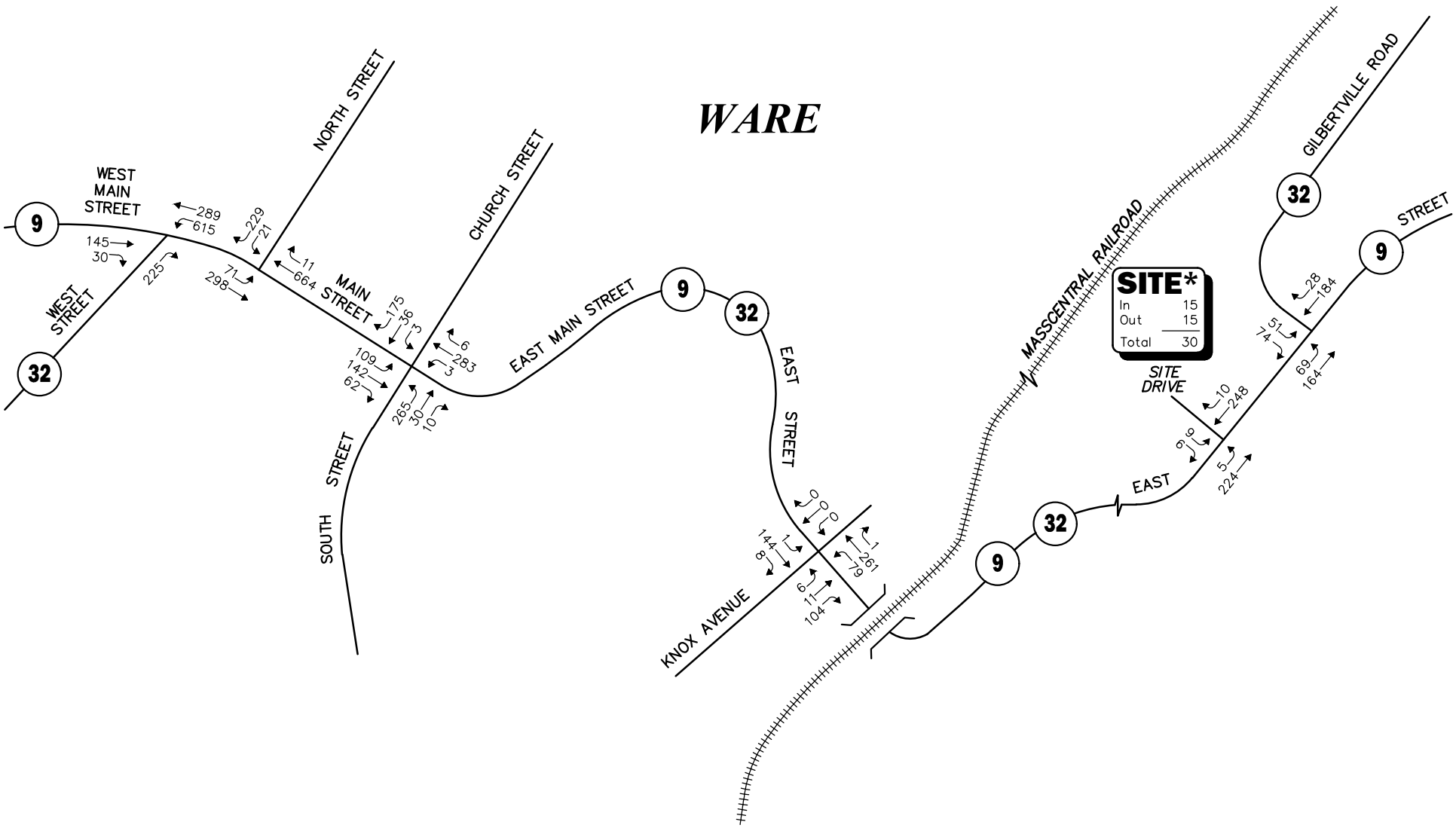
NO-BUILD TRAFFIC VOLUMES

The 2028 No-Build peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2021 Existing peak-hour traffic volumes plus the identified background developments and facility trip generation adjusted to a 100 percent full capacity condition (750 TPD, representing the maximum daily tonnage allowed under the existing permit). The resulting 2028 No-Build weekday morning and weekday afternoon peak-hour traffic-volume networks are shown on Figures 5 and 6.

PROJECT-GENERATED TRAFFIC

Existing Site Trip Generation

The ReSource Ware C&D daily tonnage data collected on December 2, 7, and 8, 2021 (Thursday, Tuesday, and Wednesday), was obtained and analyzed. The tonnage data shows the number of loads occurring throughout the day. For analysis purposes, the truck/load data was separated by the



*Site volume adjusted to reflect site peak hour volumes under Site Full Tonnage Capacity per day.

Not to Scale

Figure 5

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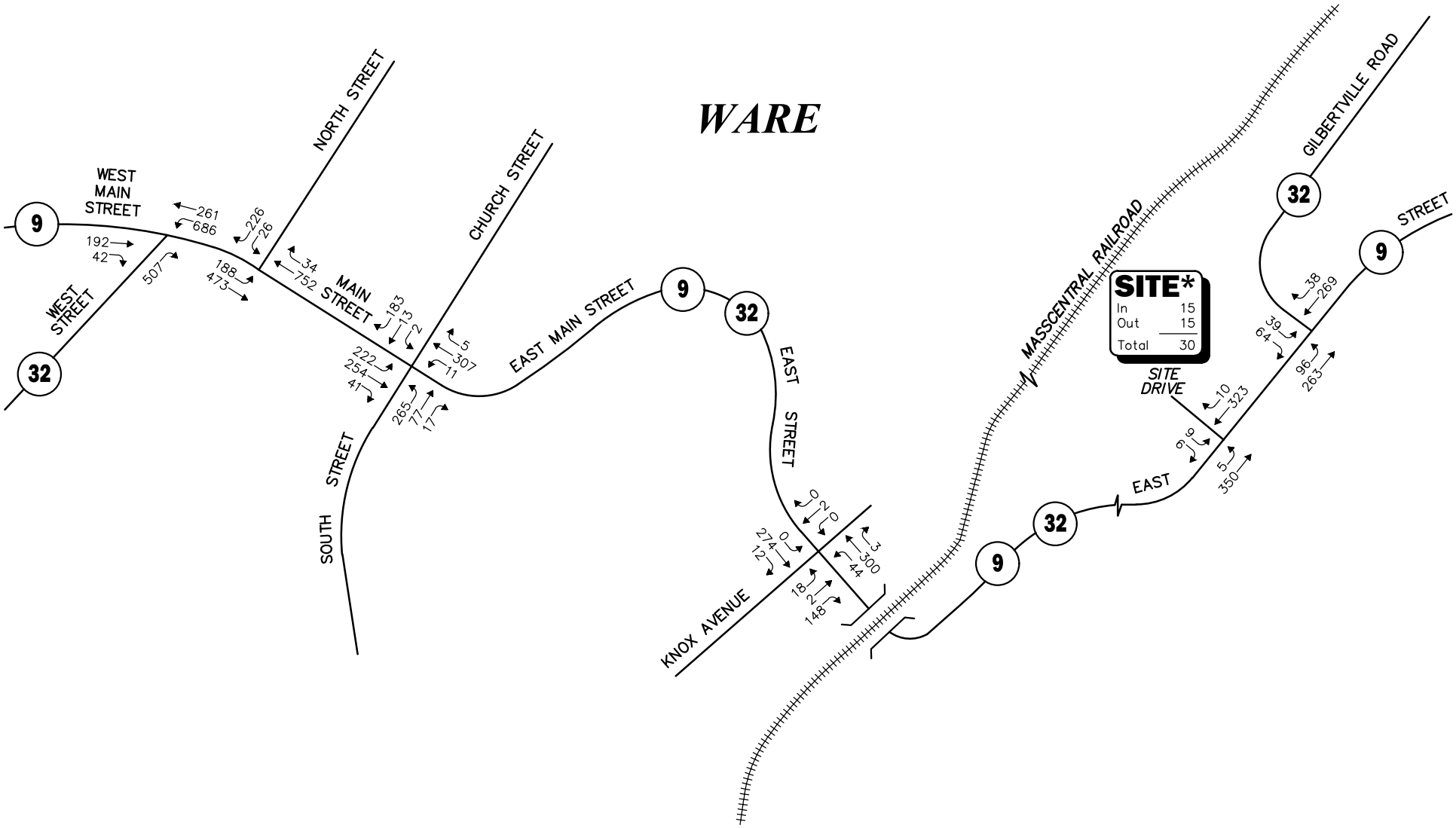
2028 No-Build Condition (750 TPD) Weekday Morning Peak Hour Traffic Volume



*Site volume adjusted to reflect site peak hour volumes under Site Full Tonnage Capacity per day.

Not to Scale

Figure 6

Vanasse & Associates inc

2028 No-Build Condition (750 TPD) Weekday Afternoon Peak Hour Traffic Volume

number of loads occurring every 15 minutes. It was assumed that each load in the data represents trucks entering the facility and exiting within 15 minutes.

The data shows that within the three days, the facility's peak load/trips may occur during different hours of the day. Therefore, an average of the three days' highest morning and afternoon peak hours were obtained and added to the 2021 existing baseline condition. This will provide a conservative (highest volume) existing condition analysis and assumes the worst-case scenario analyses of the facility peaking at the same time as the roadway peak hours.

Employee trips were incorporated into the daily trips. A total of 5 employees were on the site during December counts. At present, all employees are on one shift and all employee trips occur outside of the facility's operating hours.

The types of trucks that use the facility include walking floor trailers (100 cubic yards (cy) and above), dump trailers (60-80 cy), and roll-offs and truck bodies (40 cy or less)

Based on the existing tonnage data by hour, the existing facility will generate approximately 98 vehicle trips on an average weekday, which includes 10 employees vehicle trips (two-way, 24-hour volume), with 18 truck trips (9 entering and 9 exiting) expected during the weekday morning peak hour and 16 truck trips (8 entering and 8 exiting) expected during the weekday afternoon peak hour.

ReSource Ware's existing daily tonnage data from January through September 2021 was also obtained and analyzed. The data shows the daily number of loads, tonnage for each day, and truck origin. The data indicated that on average, the facility operates at approximately 70 percent of its full capacity (750 TPD) on an average day. Therefore, for analysis purposes, an estimation of trips generated by the facility operating at full capacity was conducted.

In order to assume the trips generated by the facility at full capacity, the highest load rate (most conservative) was used. The existing tonnage data showed that the highest load and tonnage that the facility received occurred on May 7, 2021, where a total of 59 loads (trucks) entered the facility. On that day, the facility processed a total of 747 tons of C&D material resulting in a ratio of 12.66 tons/truck entering the facility. This ratio was then applied to the full capacity of 750 TPD. In order to determine the future morning and evening peak hour percentage, the facility daily data from the December tonnage data was evaluated. Based on December data the peak percentage varied between 18 and 25 percent. In order to provide a conservative analysis under future conditions, it was assumed that approximately 25 percent of the daily trips will occur during the morning and afternoon peak hours.

The existing trips generated by the facility are summarized in Table 4.

Table 4
EXISTING SITE TRIP-GENERATION SUMMARY

Time Period/Direction	Observed Vehicle Trips[a]	Employee Trips	Average December Trips (572.43)[b]	Facility Full Capacity (750.00)[c]
Weekday Daily:				
Entering	--	5	44	65
Exiting		5	44	65
Total		10	88	130[d]
Weekday Morning Peak Hour:				
Entering	3	0	9	15
Exiting	5	0	9	15
Total	8	0	18	30[e]
Weekday Afternoon Peak Hour:				
Entering	1	0	8	15
Exiting	3	0	8	15
Total	4	0	16	30[e]

[a]Based on driveway counts conducted on December 7th, 2021.
[b]Based on an average of existing facility data from December 2nd, 7th, and 8th, 2021. Average TPD received at the facility during these three days was 572.43 TPD.
[c]Based on existing facility highest daily load rate of 12.66 tons/truck entering the facility and a total of 750 tons received for the day (load rate of 12.66 tons/truck based on data from January through September 2021).
[d]Assumes five employees entering and exiting over a daily basis that occurs outside of the peak hours indicated.
[e]Assumes that 25 percent of daily trips occur during the morning and afternoon peak hours.

As shown in Table 4, under full capacity (750 TPD) the facility would generate approximately 130 vehicle trips on an average weekday, which includes 10 employee vehicle trips (two-way, 24-hour volume). During peak hours, 30 truck trips (15 entering and 15 exiting) are expected during the weekday morning peak hour and 30 new truck trips (15 entering and 15 exiting) are expected during the weekday afternoon peak hour.

Proposed Site Trip Generation

ReSource Ware is seeking a permit modification to increase its weekday daily tonnage from 750 TPD to 1,400 TPD and increase its Saturday daily tonnage from 500 TPD to 750 TPD. Under the proposed permit modification, the facility will receive C&D from ReSource Waste's other facilities, which are located east of the site, and will reduce the number of loads it accepts at the facility from its third-party customers. Under future conditions the number of third-party loads are based on the number of loads originating from within the Town of Ware. The proposed modifications mark a change in source material from the existing operation that accepts material from third-party customers located largely within an approximately 30-mile radius from the facility.

In order to develop the traffic characteristics for the Build condition (1,400 TPD operation), the existing highest ton/truck ratio was estimated using third-party loads originating from the Town of only and loads from ReSource Waste's other facilities. Based on these criteria, the highest number of loads and tonnage per day (originating from the Town of Ware and from ReSource's own facilities) that the facility received occurred on May 7, 2021, where a total of 41 loads (trucks) entered the facility. On that day, the facility accepted a total of 644 tons of C&D from these two sources, resulting in a ratio of 15.70 tons/truck. This ratio was then applied to the proposed full

capacity of 1,400 TPD. Trip-generation calculations were performed for a typical weekday, as well as the weekday morning and weekday afternoon peak hours.

As part of the proposed capacity increase to 1,400 TPD, the number of employees at the facility is expected to increase to 11. Similar to existing conditions, employee trips are expected to occur outside of the facility's operating hours. The expected trips generated by the facility are summarized in Table 5.

Table 5
PROPOSED SITE TRIP-GENERATION SUMMARY

Time Period/Direction	Future Capacity of 1,400 Tons/Day[a]	Future Employee Trips[b]	Total Future Trips	*Net Increase from Existing Facility at Full Capacity (750 TPD) to Proposed Max Capacity Increase (1,400 TPD)*
Weekday Daily:				
Entering	89	11	100	*35*
Exiting	89	11	100	*35*
Total	178	22	200	*70*
Weekday Morning Peak Hour:				
Entering	22	0	22	*7*
Exiting	22	0	22	*7*
Total	44	0	44	*14*
Weekday Afternoon Peak Hour:				
Entering	22	0	22	*7*
Exiting	22	0	22	*7*
Total	44	0	44	*14*

[a]Based on existing facility, the highest load rate of 15.70 tons/truck and a total of 1,400 tons received for the day (load rate of 15.70 tons/truck based on data from January through September 2021. This rate accounts for loads from ReSource Waste facilities and third-party loads originating from the Town of Ware).
[b]Number of employees obtained from client.
Assumed that 25 percent of daily trips occur during the morning and afternoon peak hours.

As shown in Table 5, with the proposed changes, the facility is expected to generate approximately 70 new vehicle trips on an average weekday (two-way, 24-hour volume), with 14 new trucks trips (7 entering and 7 exiting) expected during the weekday morning and afternoon peak hours, respectively.

With regard to site improvements, on-site parking for employees and visitors, construction period issues, and details of on-site transportation-related improvements, no on-site transportation-related improvements are proposed. Parking for employees is located in the parking area in front of the office which is to the northeast of the site access. All construction on-site is expected to be contained within the limits of the site property. No changes to the existing internal roads or driveways are expected. When trucks enter the site, they weigh-in at the inbound scale located next to the office. The circulation of the trucks through the site beyond the scale area is shown on the site plan.

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated trips to and from the facility was determined based on a review of existing C&D tonnage data. This data showed that 70 percent of the trips under Build (1,400 TPD) conditions will originate from the other ReSource Waste facilities and the remaining 30 percent of the trips will originate from third-party customers from Ware.

A mandatory haul route is and will continue to be utilized under future conditions for all tractor-trailer trucks originating from the other ReSource facilities. The mandatory haul route indicates that trucks will access the site through the Massachusetts Turnpike (Mass Pike) Exit 78 (Sturbridge) to Route 20 east, to Route 49 north, to Route 9 west to the facility.

The general truck trip distribution for the Build (1,400 TPD) condition is summarized in Table 6 and graphically depicted on Figure 7. The weekday morning and weekday afternoon peak-hour traffic volumes expected to be generated by the proposed site redevelopment were assigned on the study area roadway network as shown on Figures 8 and 9.

Table 6
TRIP-DISTRIBUTION SUMMARY

Roadway	Direction (To/From)	Truck Trip Percentage (To/From)
East Street (Route 9)	East	70
Gilbertville Road (Route 32)	North	5
Knox Avenue	West	5
West Main Street (Route 9)	West	10
West Street (Route 32)	South	10
TOTAL		**100**

FUTURE TRAFFIC VOLUMES - BUILD CONDITION (1,400 TPD OPERATIONS)

The 2028 Build condition networks consist of the 2028 No-Build traffic volumes (without existing projected site trips) with the proposed new site-generated traffic added to them. The 2028 Build weekday morning and weekday afternoon peak-hour traffic-volume networks are graphically depicted on Figures 10 and 11. A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 7. These volumes are based on the expected increases from the Project.

It is important to note that with the reduction in third-party customers, the directional distribution of the site will slightly change. The analysis showed that although there is an increase in trucks at the site driveway, with the proposed permit modification it can be expected that there will be a slight reduction of trucks driving along the Main Street corridor.

As shown in Table 7, in comparison to future No-Build conditions, Project-related traffic increases are projected to range between -3 to 11 vehicles during peak hours, with traffic percent increases ranging from -0.7 to 2.5 percent.

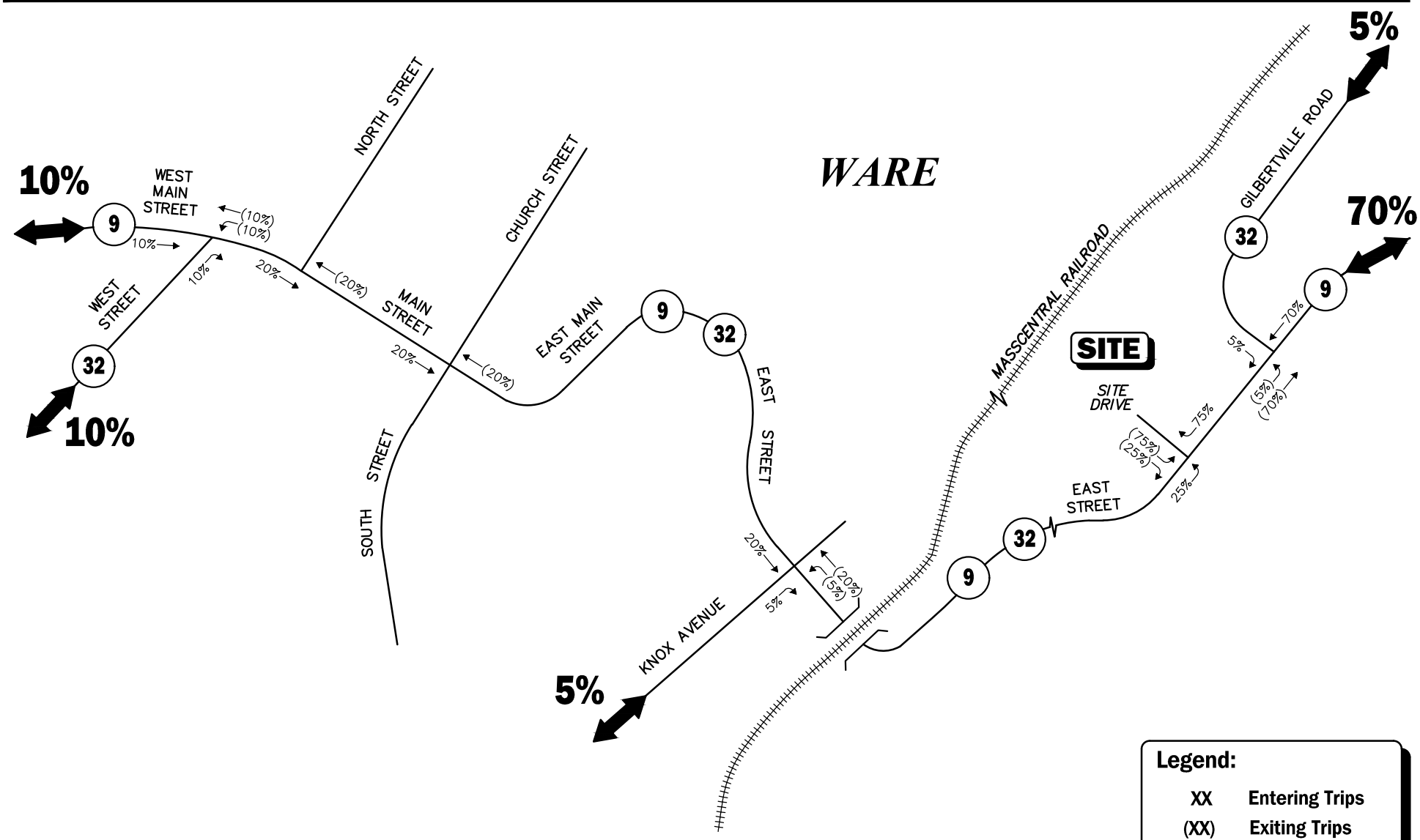


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Figure 7

Trip Distribution Map
Third Party Trucks and
ReSource's other facilities

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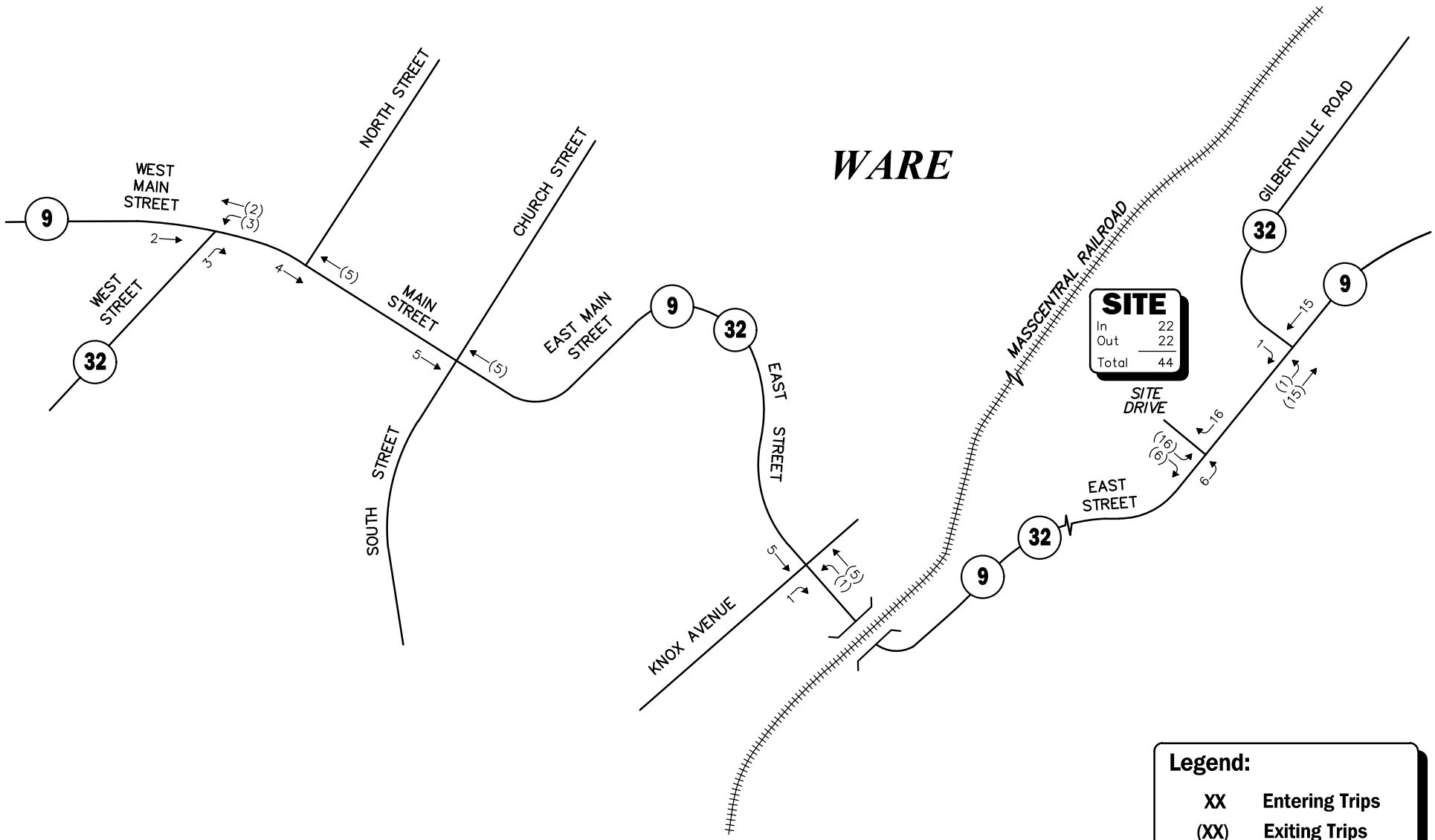

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Figure 8

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Project-Generated (1,400 TPD)
Weekday Morning
Peak Hour Traffic Volume

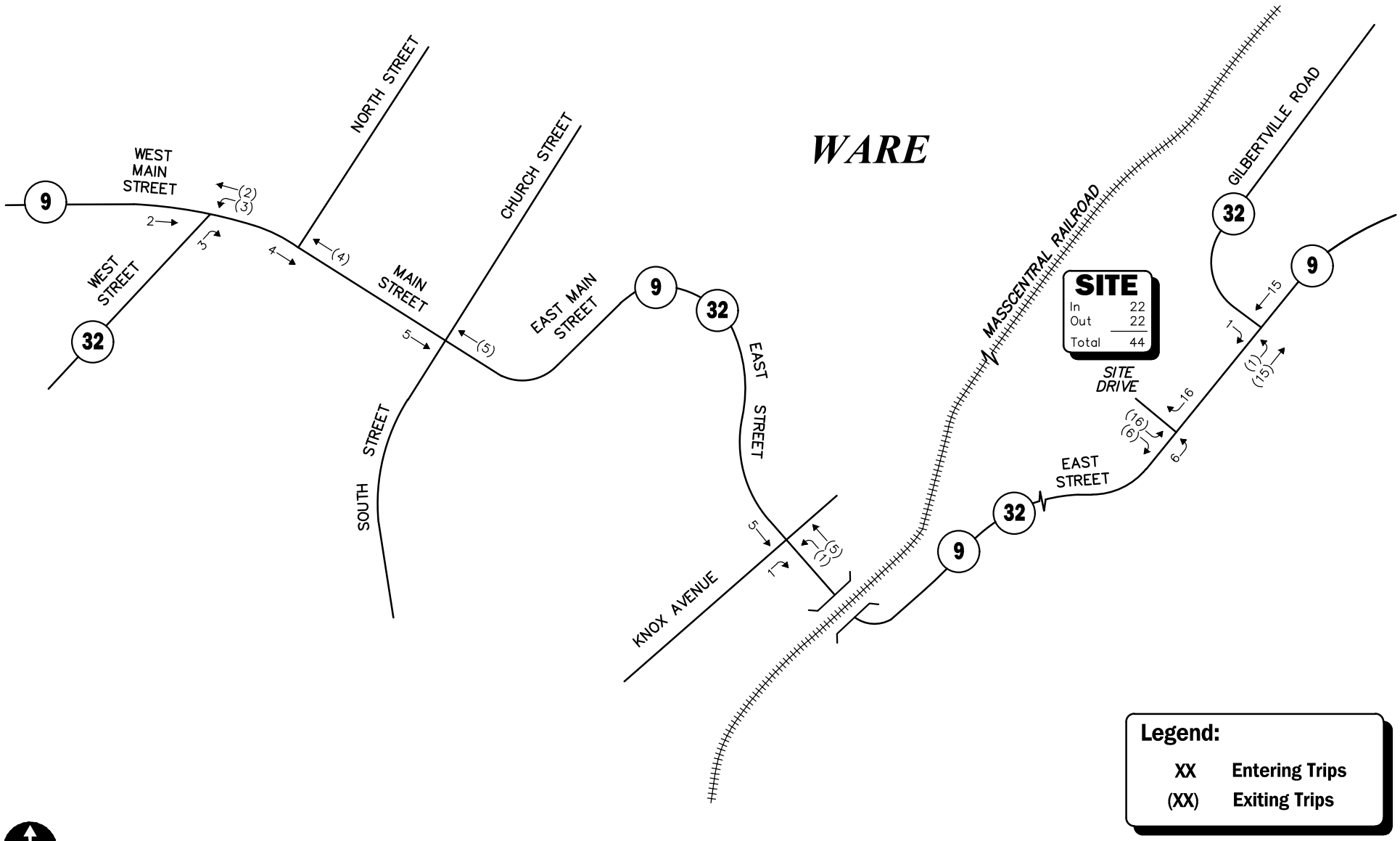

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Figure 9

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Project-Generated (1,400 TPD)
Weekday Afternoon
Peak Hour Traffic Volume

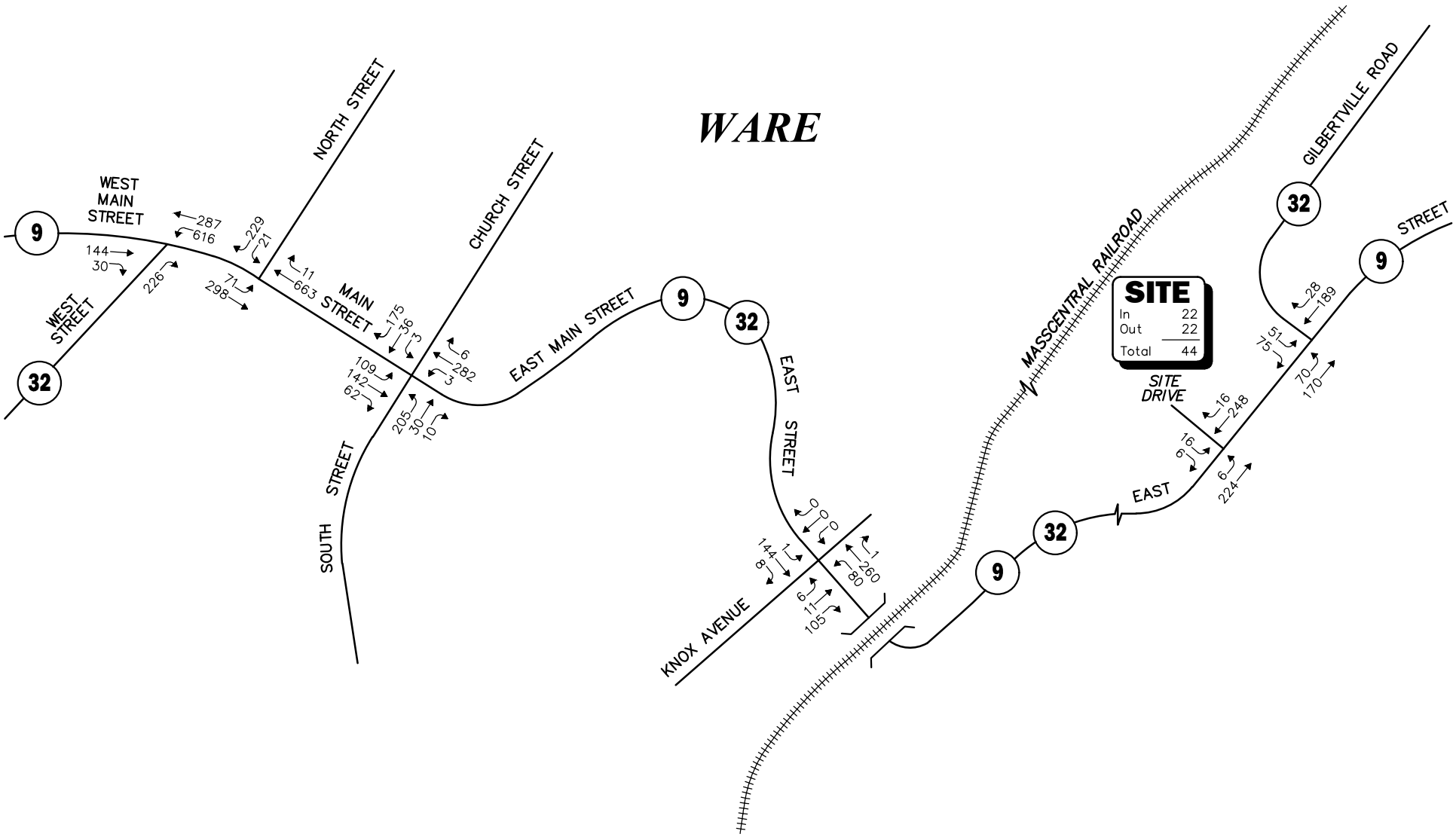

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Figure 10

2028 Build Condition
(1,400 TPD)
Weekday Morning
Peak Hour Traffic Volume

Vanasse & Associates inc

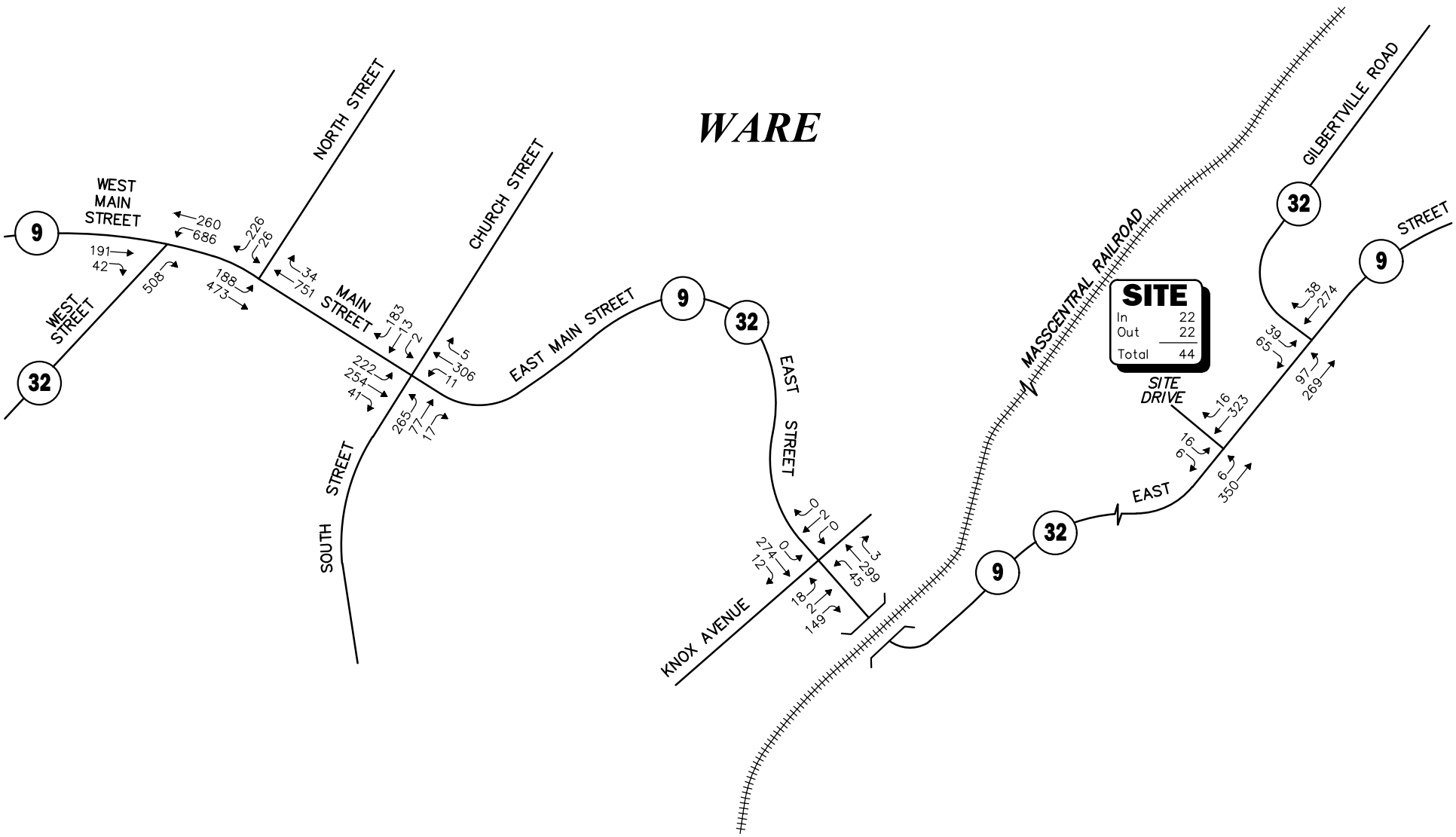

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Figure 11

2028 Build Condition
(1,400 TPD)
Weekday Afternoon
Peak Hour Traffic Volume

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Table 7
PEAK-HOUR TRAFFIC-VOLUME INCREASES[a]

Location/Peak Hour	2028 No-Build	2028 Build	Traffic-Volume Increase Over No-Build	Percent Increase Over No-Build
East Street (Route 9), east of Gilbertville Road (Route 32):				
Weekday Morning	427	438	11	2.5
Weekday Afternoon	609	620	11	1.8
Gilbertville Road (Route 32), north of East Street (Route 9):				
Weekday Morning	222	224	2	0.9
Weekday Afternoon	237	239	2	0.8
Knox Avenue, west of East Street (Route 9/32):				
Weekday Morning	208	210	2	1.0
Weekday Afternoon	226	228	2	0.9
West Main Street (Route 9), west of West Street (Route 32):				
Weekday Morning	464	461	-3	-0.7
Weekday Afternoon	495	493	-2	-0.4
West Street (Route 32/Main Street, south of West Main Street (Route 9):				
Weekday Morning	870	872	2	0.2
Weekday Afternoon	1235	1236	1	0.1

[a]Vehicles per hour, total of both directions.

SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the site driveway intersection with East Street (Route 9/32) in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)[8] guidelines. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. ***In accordance with AASHTO standards, if the measured ISD is at least equal to the recommended SSD value for the appropriate design speed, the intersection can operate in a safe manner.*** Table 8 presents the measured SSD and ISD at the subject intersection.

[8] *A Policy on Geometric Design of Highway and Streets,* 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.

Table 8
SIGHT DISTANCE MEASUREMENTS[a]

Intersection/Sight Distance Measurement	Recommended Distances (Feet) (40 mph)	(45 mph)	(50 mph)	Field Measured Distances (Feet)
East Street (Route 9/32) at Site Driveway				
Stopping Sight Distance:				
East Street approaching from the north	305	360	425	650+
East Street approaching from the south	305	360	425	583
Intersection Sight Distance[b]:				
Left turn from Project Site (looking north)	445	500	555	650+
Left turn from Project Site (looking south)	445	500	555	523(620)[c]

[a]Recommended values obtained from *A Policy on Geometric Design of Highways and Streets,* 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018.
[b]Values shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.
[c]A maximum sight vision of 620 feet can be obtained if existing signage can be relocated.

As can be seen in Table 8, the sight distance at the site driveway intersection with East Street (Route 9/32) was found to exceed the recommended values for SSDs in both directions, based on the posted speed limit of 45 mph and 85th percentile vehicle travel speed of 50 mph. Due to an existing sign, the site driveway did not meet the recommended value for ISD (looking south) for the 85th percentile vehicle travel speed of 50 mph. However, this existing sign is an advance notice sign for "Janine's Frosty" which can likely be relocated out of the sight triangle. In addition, based on AASHTO standards, if the measured ISD is greater than the recommended SSD value the intersection can operate in a safe manner, which is the case with this driveway. Sight distance pictures from the site driveway are provided in the Appendix.

In order to encourage safe and efficient flow of traffic to and from the site, should any landscaping or signage along the site frontage or the site driveway be proposed or requested by others, these features are recommended to be no higher than 24 inches or be set back sufficiently from the edge of the roadways so as not to inhibit the available sightlines.

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity, and vehicle queue analyses were conducted under Existing, 2028 No-Build (750 TPD), and 2028 Build (1,400 TPD) traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analyses is the assignment of level-of-service to traffic facilities under various traffic-flow conditions.[9] The concept of level-of-service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level-of-service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

[9]The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual;* Transportation Research Board; Washington, DC; 2010.

Signalized Intersections

The six levels of service for signalized intersections may be described as follows:

- *LOS A* describes operations with very low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop, and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections were calculated using the Percentile Delay Method implemented as a part of the Synchro™ 11 software as required by MassDOT. The Percentile Delay Method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on "percentile" delay. Level-of-service designations are based on the criterion of percentile delay per vehicle and is a measure of: i) driver discomfort; ii) motorist frustration; and iii) fuel consumption; and includes a uniform delay based on percentile volumes using a Poisson arrival pattern, an initial queue move-up time, and a queue interaction delay that accounts for delays resulting from queues extending from adjacent intersections. Table 9 summarizes the relationship between level-of-service and percentile delay and uses the same numerical delay thresholds as the 2000 *Highway Capacity Manual*[10] method. The tabulated percentile delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 9
LEVEL-OF-SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS

Level of Service	Percentile Delay Per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

[10]*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the 2010 *Highway Capacity Manual.*[11] Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the 2010 *Highway Capacity Manual*. Table 10 summarizes the relationship between level of service and average control delay for two-way STOP-controlled and all-way STOP-controlled intersections.

Table 10
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[a]

Level-of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
v/c ≤ 1.0	v/c > 1.0	
A	F	≤10.0
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	>50.0

[a]Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010; page 19-2.

ANALYSIS RESULTS

Level-of-service and vehicle queue analyses were conducted for 2021 Existing, 2028 No-Build

[11]*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

(750 TPD), and 2028 Build (1,400 TPD) conditions for the intersections within the study area. The results of the intersection capacity and vehicle queue analyses are summarized for signalized intersections in Table 11 and for unsignalized intersections in Table 12 with the detailed analysis results presented in the Appendix. The following is a summary of the level-of-service and delay analyses for the intersections within the study area:

Table 11
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/Peak Hour/Movement	2021 Existing				2028 No-Build				2028 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th
East Main Street/Main Street at South Street/Church Street												
Weekday Morning:												
Main Street (Route 9/32) EB LT	0.55	39.3	D	41/118	0.32	10.8	B	50/30	0.32	10.5	B	50/32
Main Street (Route 9/32) EB TH/RT	0.32	25.2	C	63/168	0.27	8.6	A	87/32	0.27	8.2	A	87/34
East Main Street (Route 9/32) WB LT/TH/RT	0.73	46.4	D	190/260	0.50	27.3	C	171/230	0.50	27.1	C	171/230
South Street NB LT/TH/RT	0.40	22.2	C	81/255	0.71	34.8	C	117/213	0.14	34.8	C	117/213
Church Street SB LT/TH/RT	0.81	36.2	D	66/89	0.69	23.3	C	64/83	0.69	23.3	C	64/83
Overall	--	**34.3**	**C**	--	--	**22.6**	**C**	--	--	**22.4**	**C**	--
Weekday Afternoon:												
Main Street (Route 9/32) EB LT	1.03	>80.0	F	134/226	0.77	38.2	D	123/168	0.77	38.0	D	124/167
Main Street (Route 9/32) EB TH/RT	0.45	33.6	C	160/260	0.41	21.4	C	172/178	0.41	21.4	C	173/177
East Main Street (Route 9/32) WB LT/TH/RT	0.74	47.7	D	189/305	0.59	34.6	C	189/283	0.59	34.6	C	189/283
South Street NB LT/TH/RT	0.68	28.3	C	162/381	0.89	42.8	D	212/244	0.89	42.8	D	212/244
Church Street SB LT/TH/RT	0.50	12.2	B	8/72	0.36	7.3	A	8/63	0.36	7.3	A	8/63
Overall	--	**43.3**	**D**	--	--	**31.2**	**C**	--	--	**31.2**	**C**	--
Main Street at North Street												
Weekday Morning:												
Main Street (Route 9/32) EB LT	0.19	5.1	A	5/28	0.77	8.4	A	15/51	0.21	10.0	B	17/55
Main Street (Route 9/32) EB TH/RT	0.27	5.7	A	22/117	0.77	9.4	A	78/199	0.30	11.0	B	87/216
Main Street (Route 9/32) WB LT/TH/RT	0.42	14.5	B	80/300	0.65	10.3	B	118/185	0.46	12.8	B	115/222
North Street SB LT/TH/RT	0.80	24.2	C	18/25	0.13	25.0	C	44/133	0.83	26.6	C	52/142
Overall	--	**14.4**	**B**	--	--	**13.3**	**B**	--	--	**15.4**	**B**	--
Weekday Afternoon:												
Main Street (Route 9/32) EB LT	0.46	7.9	A	15/61	0.48	7.2	A	20/49	0.48	7.2	A	19/49
Main Street (Route 9/32) EB TH/RT	0.39	7	A	44/323	0.42	4.8	A	51/111	0.42	4.8	A	50/112
Main Street (Route 9/32) WB LT/TH/RT	0.45	18.3	B	102/351	0.47	13.7	B	148/273	0.47	13.7	B	148/271
North Street SB LT/TH/RT	0.78	27.3	C	19/59	0.79	21.1	C	21/102	0.79	21.1	C	21/102
Overall	--	**15.7**	**B**	--	--	**11.9**	**B**	--	--	**11.9**	**B**	--

See notes at end of table.

Table 11
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/Peak Hour/Movement	2021 Existing				2028 No-Build				2028 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th
West Main Street/Main Street at West Street												
Weekday Morning:												
Main Street (Route 9) EB TH/RT	0.35	34.7	C	80/184	0.16	7.5	A	33/92	0.16	7.4	A	32/92
Main Street (Route 9/32) WB LT	0.81	72.5	E	266/453	0.69	7.7	A	130/1	0.69	8.1	A	122/12
Main Street (Route 9/32) WB TH	0.28	11.9	B	98/190	0.20	0.2	A	0/0	0.20	0.2	A	0/0
West Street (Route 32) NEB RT	0.23	0.5	A	0/0	0.37	1.5	A	0/0	0.37	1.5	A	0/0
Overall	--	**42.6**	**D**	--	--	**5.0**	**A**	--	--	**5.1**	**A**	--
Weekday Afternoon:												
Main Street (Route 9) EB TH/RT	0.71	55.4	E	160/277	0.33	21.0	C	105/210	0.33	20.9	C	104/209
Main Street (Route 9/32) WB LT	0.87	>80.0	F	394/532	0.68	10.4	B	256/405	0.68	10.4	B	256/405
Main Street (Route 9/32) WB TH	0.23	10.1	B	76/118	0.17	0.2	A	0/0	0.17	0.2	A	0/0
West Street (Route 32) NEB RT	0.48	1.8	A	0/3	0.69	16.7	B	168/170	0.70	16.7	B	168/170
Overall	--	**46.1**	**D**	--	--	**12.2**	**B**	--	--	**12.2**	**B**	--

[a]Volume-to-capacity ratio.
[b]Control (signal) delay per vehicle in seconds.
[c]Level of service.
[d]Queue length in feet.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; NEB = northeastbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

Table 12
UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

	2021 Existing				2028 No-Build				2028 Build			
Unsignalized Intersection/Peak Hour/Movement	Demand[a]	Delay[b]	LOS[c]	Queue 95th Percentile	Demand	Delay	LOS	Queue 95th Percentile	Demand	Delay	LOS	Queue 95th Percentile
East Street (Route 9/32) at Site Driveway												
Weekday Morning:												
Site Driveway WB LT/RT	9	13.1	B	0.1	15	14.2	B	0.2	22	15.2	C	0.3
East Street NB LT	3	9.1	A	0.0	5	9.2	A	0.0	6	9.3	A	0.0
Weekday Afternoon:												
Site Driveway WB LT/RT	8	14.7	B	0.2	15	17.1	C	0.0	22	19.3	C	0.7
East Street NB LT	3	9.3	A	0.0	5	9.4	A	0.4	6	9.4	A	0.0
Overall? – Text refers to conditions overall and Table 11 has an "Overall" for each intersection too. Are we missing an Overall for these unsignalized intersections?												
East Street (Route 9) at Gilbertville Road (Route 32)												
Weekday Morning:												
Gilbertville Road WB LT	48	13.5	B	0.4	51	14.4	B	0.5	51	14.7	B	0.5
Gilbertville Road WB RT	67	9.8	A	0.3	74	10.0	B	0.4	75	10.1	B	0.4
East Street NB LT	63	7.9	A	0.2	69	8.0	A	0.2	70	8.0	A	0.2
Weekday Afternoon:												
Gilbertville Road WB LT	36	17.0	C	0.5	39	18.9	C	0.6	39	19.3	C	0.6
Gilbertville Road WB RT	59	10.5	B	0.3	64	10.8	B	0.4	65	10.9	B	0.4
East Street NB LT	89	8.2	A	0.3	96	8.3	A	0.3	97	8.3	A	0.3
East Street (Route 9/32) at Knox Avenue												
Weekday Morning:												
Knox Avenue WB LT/TH/RT	113	10.8	B	0.7	121	11.2	B	0.8	122	11.3	B	0.8
East Street NB LT	74	7.7	A	0.2	79	7.7	A	0.2	80	7.7	A	0.2
East Street SB LT	1	9.0	A	0.0	1	9.1	A	0.0	1	9.1	A	0.0
Weekday Afternoon:												
Knox Avenue WB LT/TH/RT	157	13.2	B	1.3	168	14.3	B	1.6	169	14.3	B	1.6
Knox Avenue EB LT/TH/RT	2	18.1	C	0.0	2	19.7	C	0.0	2	19.8	C	0.0
East Street NB LT	41	8.0	A	0.1	44	8.1	A	0.1	45	8.2	A	0.1

[a]Demand in vehicles per hour.
[b]Control (signal) delay per vehicle in seconds.
[c]Level of service.
[d]Queue length in vehicle.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

Signalized Intersections

East Main Street (Routes 9/32)/Main Street at Church Street and South Street

Under 2021 Existing conditions, this signalized intersection operates at an overall LOS C during the weekday morning peak hour and at an overall LOS D during the weekday afternoon peak hour. Under 2028 No-Build conditions, the upgrades from the Main Street Improvement Project were incorporated into the analysis. With these improvements, this signalized intersection will operate at an overall LOS C during both the weekday morning and weekday afternoon peak hours. No changes to level of service occur as a result of the addition of Project volumes under 2028 Build conditions. It is noteworthy that the level of service remains the same under future No-Build (750 TPD) and Build (1,400 TPD) conditions without any increase in delay. It is also important to note that under future conditions the facility will continue to receive C&D from ReSource Waste's other facilities and will reduce the number of loads it accepts at the facility from its third-party customers, such that the loads delivered to the facility are expected to travel in different patterns when compared to existing conditions. Therefore, it is expected that there will be a reduction of truck trips during weekday morning and afternoon peak hours at this intersection under Build conditions which will result in a slight decrease in delays for some movements under future conditions.

Main Street (Routes 9/32) at North Street

Under all conditions, this signalized intersection will operate at an overall LOS B during both weekday morning and weekday afternoon peak hours. Under 2028 No-Build conditions, the upgrades from the Main Street Improvement Project were incorporated into the analysis. No changes to overall level of service occur as a result of the addition of Project volumes under 2028 Build conditions.

West Main Street (Route 9) at West Street (Route 32)

Under existing conditions, this signalized intersection will operate at an overall LOS D during both weekday morning and weekday afternoon peak hours. Under 2028 No-Build conditions, the upgrades from the Main Street Improvement Project were incorporated into the analysis. Under 2028 No-Build conditions, this signalized intersection will operate at an overall LOS A during the weekday morning peak hour and at an overall LOS B during the weekday afternoon peak hour. No changes to level of service occur as a result of the addition of Project volumes under 2028 Build conditions. It is noteworthy that the level of service remains the same under future No-Build (750 TPD) and Build (1,400 TPD) conditions. It is also important to note that under future conditions the facility will continue to receive C&D from ReSource Waste's other facilities and will reduce the number of loads it accepts at the facility from its third-party customers, such that the loads delivered to the facility are expected to travel in different patterns when compared to existing conditions. Therefore, it is expected that there will be a reduction of one truck trip during weekday morning and weekday afternoon peak hours which will result in a slight decrease in delays for some movements under future conditions.

Unsignalized Intersections

East Street (Route 9/32) at Site Driveway

Under existing conditions, the movements at this unsignalized intersection will operate at LOS B or better during the weekday morning and afternoon peak hours. Under future No-Build (750 TPD) conditions, the movements at this unsignalized intersection will operate at LOS B or better during

the weekday morning peak hour and at an overall LOS C or better during the weekday afternoon peak hour. Under future Build (1,400 TPD) conditions, the movements at this unsignalized intersection will operate at LOS C or better during the weekday morning and afternoon peak hours. Impacts from the proposed capacity increase to 1,400 TPD are anticipated to be minimal with an increase in delays by less than 3 seconds on average.

East Street (Route 9) at Gilbertville Road (Route 32)

Under all conditions, the movements (left turns from Gilbertville Road) at this unsignalized intersection will operate at LOS B or better during the weekday morning peak hour and at LOS C or better during the weekday afternoon peak hour.

East Street (Route 9/32) at Knox Avenue

Under all conditions, the movements (turns from Knox Avenue) at this unsignalized intersection will operate at LOS B or better during the weekday morning peak hour and at LOS C or better during the weekday afternoon peak hour.

Interaction with School Bus Routes

A review of school bus routes and bus stops was conducted to determine how the truck routes to the site could potentially coincide with school bus-related activity.

The administrative assistant to the Superintendent for Ware Public Schools was contacted in order to determine if the proposed truck route for the Project overlaps with any school bus route/stop. We were directed to the First Student Bus Company as they handle the bus routing for Ware Public Schools. The representative of the First Student Bus Company indicated that the proposed truck route does not overlap with any of the school bus routes/stops. In addition, the Quaboag Regional School District, which includes West Brookfield, was contacted. They indicated that their bus routes are posted on their website. This data was used to develop Figure 12 which depicts the truck route and the overlap with school bus routes. As shown in Figure 12, the truck route overlaps with several bus routes in various sections of Route 9 from three different schools in the Quaboag Regional School District.

Construction Management

Impacts on traffic as a result of the Project construction are expected to be minimal, with the impact on traffic occurring as a result of the expansion and additional material being brought to the site. There is no material change to the site boundaries and only slight building modifications in order to accommodate a larger C&D processing area. However, prior to commencing construction activities, a Construction Management Plan will be developed that adheres to all Federal, State, and local guidelines and requirements. This will be developed in consultation with all applicable departments including but not limited to the building department, Department of Public Works, police department, and fire department.

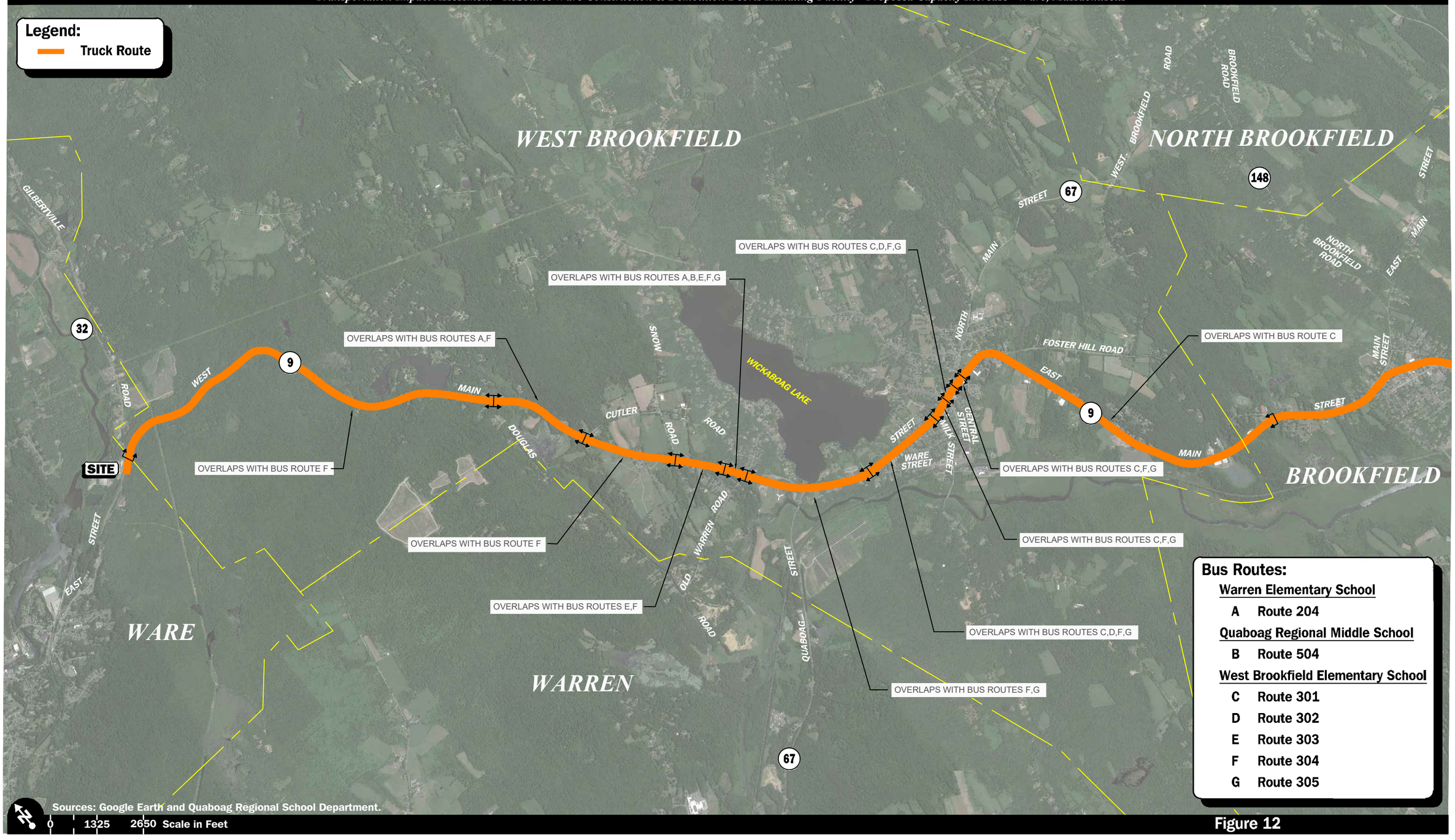

Figure 12

Truck Route/
School Bus Route Overlap

Vanasse & Associates inc

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CONCLUSIONS AND RECOMMENDATIONS

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to evaluate potential traffic impacts associated with the ReSource Ware C&D handling facility located at 198 East Street (Route 9/32) in Ware, Massachusetts. This study was prepared in accordance with the MassDOT *Transportation Impact Assessment (TIA) Guidelines;* and was conducted pursuant to the standards of the Traffic Engineering and Transportation Planning Professions for the preparation of such reports. Based on the results of this study, the following can be concluded:

- The facility proposed increase in capacity is expected to generate approximately 70 new truck trips on an average weekday (two-way, 24-hour volume), with 14 new truck trips (7 entering and 7 exiting) expected during the weekday morning and afternoon peak hours, respectively.

- Project-related traffic increases are projected to range between -3 to 11 vehicles during peak hours, with traffic percent increases ranging from -0.7 to 2.5 percent.

- The analysis has indicated that the Project will result in minimal impact on motorist delays at the study intersections, as compared to future No-Build (750 TPD) conditions.

- No apparent safety deficiencies were noted with respect to the motor vehicle crash history at the study area intersections in the immediate area of the Project.

- Lines of sight at the Project site roadway where it intersects with East Street (Route 9/32) were found to exceed or could be made to meet or exceed the recommended minimum distance for safe operation based on the appropriate approach speed.

In consideration of the above, we have concluded that the proposed capacity increase to 1,400 TPD can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the following recommendations.

RECOMMENDATIONS

The following recommendations have been developed as a part of this evaluation and, where applicable, will be implemented before facility operations are performed above the current 750 TPD permitted capacity, subject to receipt of all necessary rights, permits, and approvals.

Project Access

Access to the site is provided via one full-access driveway off East Street (Route 9/32). The following recommendation is offered with respect to Project access for the Project:

- In order to encourage safe and efficient flow of traffic to and from the site, should any landscaping or signage along the site frontage or the site driveway be proposed or requested by others, these features are recommended to be no higher than 24 inches or be set back sufficiently from the edge of the roadways so as not to inhibit the available sightlines. It is our recommendation that the existing "Janine's Frosty" sign be relocated to provide an unobstructed sight line for vehicles exiting the Project driveway.

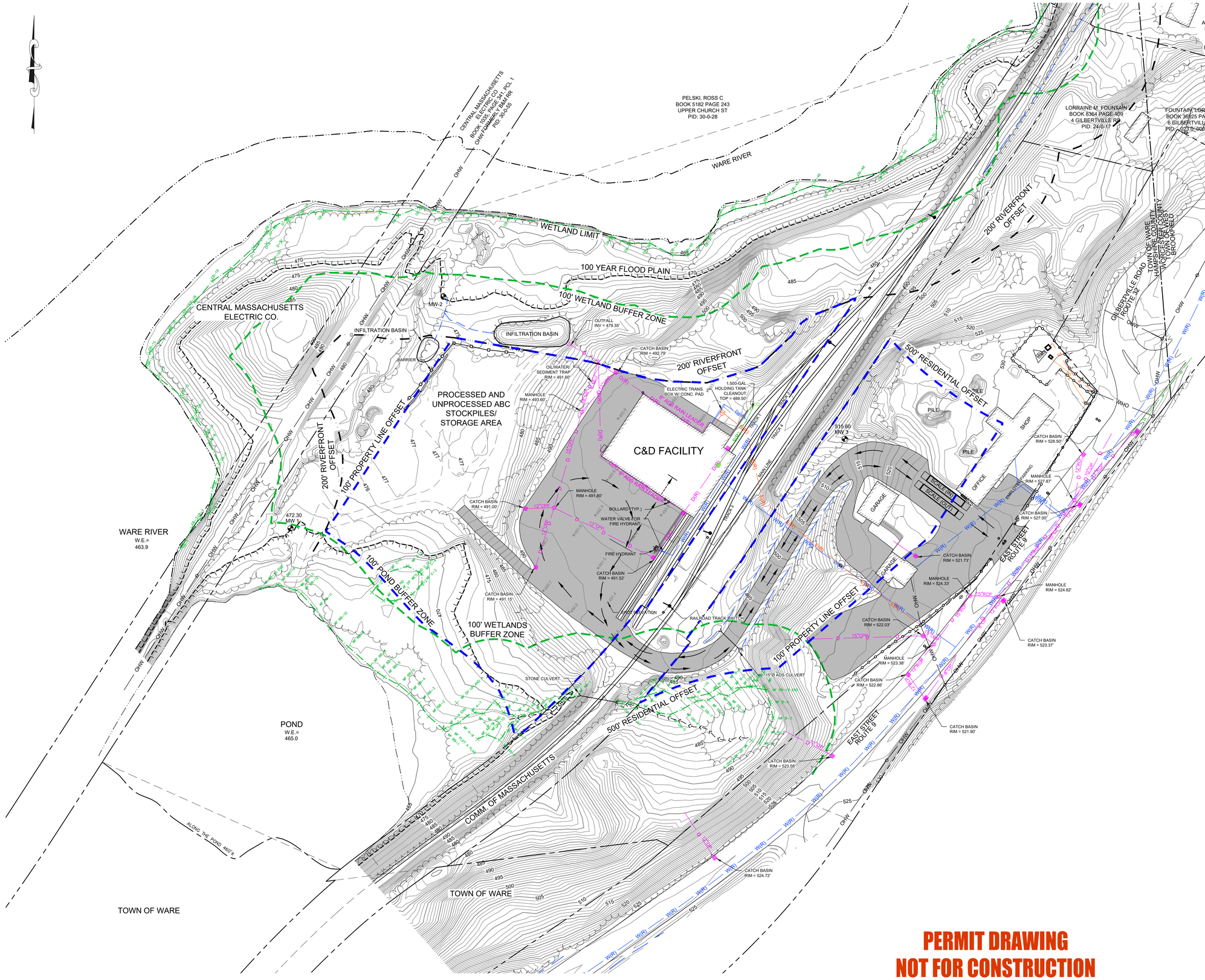
CONCLUSIONS

The proposed Project, which contemplates a capacity increase to 1,400 TPD of C&D accepted at the facility, will not result in a significant impact on traffic operations at the intersections reviewed for this analysis. Due to the proposed change in operations, a slight decrease in truck traffic traveling to the site through the downtown area of Ware is expected. With the implementation of the above recommendations, safe and efficient access will be provided to the facility and the proposed capacity increase to 1,400 TPD can be accomplished with minimal impact to the area.

APPENDIX

- SITE PLAN
- AUTOMATIC TRAFFIC RECORDER
- TURNING MOVEMENT COUNTS
- SPOT SPEED MEASUREMENTS
- EXISTING WASTE FACILITY DATA
- TRAFFIC ADJUSTMENTS
- MOTOR VEHICLE CRASH DATA
- GROWTH RATE CALCULATIONS
- EXISTING SITE TRIPS AT FULL CAPACITY - 750 TON/DAY
- BACKGROUND DEVELOPMENT
- TRUCK ROUTE
- TRIP DISTRIBUTION
- FUTURE FACILITY DATA WITHOUT THIRD PARTY EXCEPT
- FOR LOADS ORIGINATING FROM TOWN OF WARE
- TRIP GENERATION
- TRUCK TRIPS PERCENTAGE ADJUSTMENT
- SIGHT DISTANCE MEASUREMENTS
- NO-BUILD TO BUILD SITE TRAFFIC INCREASE
- CAPACITY ANALYSIS

SITE PLAN



PERMIT DRAWING
NOT FOR CONSTRUCTION

NOTES:

1. EXISTING TOPOGRAPHY AND SITE FEATURES WERE PREPARED FROM AN AERIAL SURVEY CONDUCTED IN NOVEMBER 2021 AND GROUND SURVEY CONDUCTED IN DECEMBER 2021 BY WSP OF MERRIMACK, NEW HAMPSHIRE AND PROVIDED TO SANBORN HEAD & ASSOCIATES, INC. (SANBORN HEAD) IN DIGITAL FORMAT ON JANUARY 21, 2022.

   1.1. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983, MASSACHUSETTS STATE PLANE MAINLAND COORDINATE SYSTEM AND WAS ESTABLISHED UTILIZING RTK GPS TECHNIQUES.

   1.2. THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE VERTICAL DATUM NAVD88 AND WAS ESTABLISHED ON THE SITE UTILIZING RTK GPS SURVEY TECHNIQUES.

2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.

3. THE FLOOD ZONE A7 (AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATION DETERMINED) IS SHOWN ON THE F.I.R.M. COMMUNITY PANEL NUMBER 250172-0026-B, EFFECTIVE DATE AUGUST 17, 1981, AND IS LABELED AS BETWEEN 472 FEET AND 473 FEET (AVERAGE ABOUT 472.5 FEET IN THE NGVD OF 1929 DATUM). CONVERTING FROM THAT DATUM TO NAVD OF 1988 DATUM RESULTS IN AN ELEVATION OF SLIGHTLY LESS THAN 472 FEET AND ZONE A7 IS SHOWN AS SUCH USING THE ELEVATION DATA COLLECTED FOR THIS PLAN. THE LINE BETWEEN ZONE B (500 YEAR FLOOD ZONE) AND ZONE C (AREA OF MINIMAL FLOODING) IS NOT DETERMINED BY ELEVATION AND IS NOT SHOWN HEREON.

4. WETLAND FLAGS SET BY EPSILON ASSOCIATES, INC. OF MAYNARD, MA ON NOVEMBER 17 AND 24, 2021. WETLAND FLAGS A-1 TO A-9, AB-1 TO AB-11, B-1 TO B-14, BB-1 TO BB-15, C-1 TO C-8, AND DB-1 TO DB-13 LOCATED IN FIELD BY WSP. LOCATIONS OF FLAGS CB-1 TO CB-58 AND D-1 TO D-4 WERE PROVIDED BY EPSILON.

5. THE LOCATION OF UTILITIES SHOWN HEREON HAVE BEEN COMPILED BY WSP FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS PLAN SOURCES, INCLUDING MAPPING PREPARED BY GREEN SEAL ENVIRONMENTAL, INC. TITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015.

6. THE UNDERGROUND INFORMATION LABELED WITH AN (R) WAS OBTAINED FROM THE JANUARY 19, 2015 GREEN SEAL EXISTING CONDITIONS PLAN, FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES LABELED WITH AN (R) SHALL BE CONSIDERED APPROXIMATE.

LEGEND:

- 530 — EXISTING 5' CONTOURS
- EXISTING 1' CONTOURS
- PROPERTY LINE
- ZONE A7 FLOODPLAIN (WSP SURVEY)
- PAVED AREA
- GRAVEL
- RAILROAD TRACK
- WETLAND LIMIT
- 100-FOOT WETLAND BUFFER
- EDGE OF WATER
- 200-FOOT RIVERFRONT OFFSET
- INTERMITTENT STREAM
- DRAINAGE SWALE
- S — SANITARY SEWER
- D — STORM DRAIN
- E — UNDERGROUND ELECTRIC
- OHW — OVERHEAD WIRE
- W — WATER
- S(R) — RECORD SANITARY SEWER
- D(R) — RECORD STORM DRAIN
- E(R) — RECORD UNDERGROUND ELECTRIC
- W(R) — RECORD WATER
- CATCH BASIN
- MANHOLE
- FENCE
- UTILITY POLE
- MONITORING WELL
- TREE LINE
- BOARD OF HEALTH SITE-ASSIGNED AREA
- TRAFFIC FLOW ARROW (DASHED ARROW DENOTES BACKUP MOTION)

SANBORN HEAD

GRAPHICAL SCALE
60' 30' 0 60' 120'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

EXISTING CONDITIONS SITE PLAN

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 7

NOTES:

1. EXISTING TOPOGRAPHY AND SITE FEATURES WERE PREPARED FROM AN AERIAL SURVEY CONDUCTED IN NOVEMBER 2021 AND GROUND SURVEY CONDUCTED IN DECEMBER 2021 BY WSP OF MERRIMACK, NEW HAMPSHIRE AND PROVIDED TO SANBORN HEAD & ASSOCIATES, INC. (SANBORN HEAD) IN DIGITAL FORMAT ON JANUARY 21, 2022.

1.1. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983, MASSACHUSETTS STATE PLANE MAINLAND COORDINATE SYSTEM AND WAS ESTABLISHED UTILIZING RTK GPS TECHNIQUES.

1.2. THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE VERTICAL DATUM NAVD88 AND WAS ESTABLISHED ON THE SITE UTILIZING RTK GPS SURVEY TECHNIQUES.

2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.

3. THE FLOOD ZONE A7 (AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATION DETERMINED) IS SHOWN ON THE F.I.R.M. COMMUNITY PANEL NUMBER 250172-0026-B, EFFECTIVE DATE AUGUST 17, 1981, AND IS LABELED AS BETWEEN 472 FEET AND 473 FEET (AVERAGE ABOUT 472.5 FEET IN THE NGVD OF 1929 DATUM). CONVERTING FROM THAT DATUM TO NAVD OF 1988 DATUM RESULTS IN AN ELEVATION OF SLIGHTLY LESS THAN 472 FEET AND ZONE A7 IS SHOWN AS SUCH USING THE ELEVATION DATA COLLECTED FOR THIS PLAN. THE LINE BETWEEN ZONE B (500 YEAR FLOOD ZONE) AND ZONE C (AREA OF MINIMAL FLOODING) IS NOT DETERMINED BY ELEVATION AND IS NOT SHOWN HEREON.

4. WETLAND FLAGS SET BY EPSILON ASSOCIATES, INC. OF MAYNARD, MA ON NOVEMBER 17 AND 24, 2021. WETLAND FLAGS A-1 TO A-9, AB-1 TO AB-11, B-1 TO B-14, BB-1 TO BB-15, C-1 TO C-8, AND DB-1 TO DB-13 LOCATED IN FIELD BY WSP. LOCATIONS OF FLAGS CB-1 TO CB-58 AND D-1 TO D-4 WERE PROVIDED BY EPSILON.

5. THE LOCATION OF UTILITIES SHOWN HEREON HAVE BEEN COMPILED BY WSP FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS PLAN SOURCES, INCLUDING MAPPING PREPARED BY GREEN SEAL ENVIRONMENTAL, INC. TITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 19, 2015.

6. THE UNDERGROUND INFORMATION LABELED WITH AN (R) WAS OBTAINED FROM THE JANUARY 19, 2015 GREEN SEAL EXISTING CONDITIONS PLAN, FROM WHICH UTILITIES, PIPE SIZES, AND PIPE TYPES WERE OBTAINED. THE LOCATION OF ALL UTILITIES LABELED WITH AN (R) SHALL BE CONSIDERED APPROXIMATE.

LEGEND:

- EXISTING 5' CONTOURS
- EXISTING 1' CONTOURS
- PROPOSED 5' CONTOURS
- PROPOSED 1' CONTOURS
- PROPERTY LINE
- ZONE A7 FLOODPLAIN (WSP SURVEY)
- PAVED AREA
- GRAVEL
- EXISTING RAILROAD TRACK TO REMAIN
- EXISTING RAILROAD TRACK (CENTER LINE SHOWN) TO BE REMOVED
- PROPOSED RAILROAD TRACK
- PROPOSED RETAINING WALL
- WETLAND LIMIT
- WETLAND FLAG
- 100-FOOT WETLAND BUFFER
- EDGE OF WATER
- 200-FOOT RIVERFRONT OFFSET
- INTERMITTENT STREAM
- DRAINAGE SWALE
- SANITARY SEWER
- STORM DRAIN
- UNDERGROUND ELECTRIC
- OVERHEAD WIRE
- WATER
- RECORD SANITARY SEWER
- RECORD STORM DRAIN
- RECORD UNDERGROUND ELECTRIC
- RECORD WATER
- CATCH BASIN
- MANHOLE
- FENCE
- UTILITY POLE
- MONITORING WELL
- EXISTING TREE LINE
- PROPOSED TREE LINE
- BOARD OF HEALTH SITE-ASSIGNED AREA
- TRAFFIC FLOW ARROW (DASHED ARROW DENOTES BACKUP MOTION)

PERMIT DRAWING
NOT FOR CONSTRUCTION

SANBORN HEAD

GRAPHICAL SCALE
60' 30' 0 60' 120'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: A. WILKER
DESIGNED BY: A. WILKER
REVIEWED BY: S. WRIGHT
PROJECT MGR: S. WRIGHT
PIC: S. WRIGHT
DATE: APRIL 2023

BWP SW38 SITE SUITABILITY REPORT
RESOURCE WARE C&D FACILITY
WARE, MASSACHUSETTS

PROPOSED CONDITIONS SITE PLAN (STAGE 2)

PROJECT NUMBER: 5094.10

FIGURE NUMBER: 9A

IMAGES:

XREFS: P:\5094\09\04\GIS\plans\Year2\Submits\SW38 Figures\Fig 9A - Stage 2 Building Expansion Site Plan.dwg
P:\5094\09\04\GIS\plans\Year2\Submits\SW38 Figures\Fig 9A - Stage 2 Building Expansion Site Plan.dwg

FILE: P:\5094\09\04\GIS\plans\Year2\Submits\SW38 Figures\Fig 9A - Stage 2 Building Expansion Site Plan.dwg
USER: awilker
PLOTTED: 4/28/2023 8:31 AM

AUTOMATIC TRAFFIC RECORDER

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA

12/6/2021	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Week Average	
Time	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,
12:00 AM	*	*	5	8	12	7	*	*	*	*	*	*	*	*	8	8
1:00	*	*	6	4	6	4	*	*	*	*	*	*	*	*	6	4
2:00	*	*	2	4	2	4	*	*	*	*	*	*	*	*	2	4
3:00	*	*	14	6	12	14	*	*	*	*	*	*	*	*	13	10
4:00	*	*	21	23	20	20	*	*	*	*	*	*	*	*	20	22
5:00	*	*	83	43	84	48	*	*	*	*	*	*	*	*	84	46
6:00	*	*	128	104	124	104	*	*	*	*	*	*	*	*	126	104
7:00	*	*	172	165	168	166	*	*	*	*	*	*	*	*	170	166
8:00	*	*	145	178	138	168	*	*	*	*	*	*	*	*	142	173
9:00	*	*	152	158	130	146	*	*	*	*	*	*	*	*	141	152
10:00	*	*	179	171	151	192	*	*	*	*	*	*	*	*	165	182
11:00	*	*	177	199	188	182	*	*	*	*	*	*	*	*	182	190
12:00 PM	*	*	188	195	236	157	*	*	*	*	*	*	*	*	212	176
1:00	*	*	179	171	177	149	*	*	*	*	*	*	*	*	178	160
2:00	*	*	235	199	193	165	*	*	*	*	*	*	*	*	214	182
3:00	*	*	242	246	221	219	*	*	*	*	*	*	*	*	232	232
4:00	*	*	272	244	228	242	*	*	*	*	*	*	*	*	250	243
5:00	*	*	219	220	192	201	*	*	*	*	*	*	*	*	206	210
6:00	*	*	127	141	133	131	*	*	*	*	*	*	*	*	130	136
7:00	*	*	103	82	104	79	*	*	*	*	*	*	*	*	104	80
8:00	*	*	68	58	53	59	*	*	*	*	*	*	*	*	60	58
9:00	*	*	43	34	52	32	*	*	*	*	*	*	*	*	48	33
10:00	*	*	25	24	32	24	*	*	*	*	*	*	*	*	28	24
11:00	*	*	6	16	22	21	*	*	*	*	*	*	*	*	14	18
Total	0	0	2791	2693	2678	2534	0	0	0	0	0	0	0	0	2735	2613
Day	0		5484		5212		0		0		0		0		5348	
AM Peak			10:00	11:00	11:00	10:00									11:00	11:00
Volume			179	199	188	192									182	190
PM Peak			4:00	3:00	12:00 PM	4:00									4:00	4:00
Volume			272	246	236	242									250	243
Comb Total	0		5484		5212		0		0		0		0		5348	
ADT	ADT: 5,348		AADT: 5,348													

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA

12/7/2021	NB,		Hour Totals		SB,		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	2	53			4	38				
12:15	2	49			3	46				
12:30	1	43			0	53				
12:45	0	43	5	188	1	58	8	195	13	383
1:00	2	40			1	39				
1:15	3	49			3	51				
1:30	1	43			0	47				
1:45	0	47	6	179	0	34	4	171	10	350
2:00	1	54			1	46				
2:15	0	57			0	48				
2:30	1	51			2	55				
2:45	0	73	2	235	1	50	4	199	6	434
3:00	0	61			3	56				
3:15	2	49			2	59				
3:30	4	64			1	58				
3:45	8	68	14	242	0	73	6	246	20	488
4:00	3	56			7	63				
4:15	6	76			7	61				
4:30	5	72			3	59				
4:45	7	68	21	272	6	61	23	244	44	516
5:00	16	68			9	55				
5:15	24	52			9	71				
5:30	16	46			5	50				
5:45	27	53	83	219	20	44	43	220	126	439
6:00	24	50			12	39				
6:15	29	30			27	34				
6:30	37	19			26	34				
6:45	38	28	128	127	39	34	104	141	232	268
7:00	43	39			29	21				
7:15	47	27			33	19				
7:30	43	19			49	23				
7:45	39	18	172	103	54	19	165	82	337	185
8:00	37	24			45	19				
8:15	23	15			43	16				
8:30	47	15			54	14				
8:45	38	14	145	68	36	9	178	58	323	126
9:00	47	8			37	12				
9:15	23	15			37	8				
9:30	51	10			41	7				
9:45	31	10	152	43	43	7	158	34	310	77
10:00	45	10			33	3				
10:15	40	4			45	12				
10:30	39	6			51	6				
10:45	55	5	179	25	42	3	171	24	350	49
11:00	44	3			48	4				
11:15	50	1			42	6				
11:30	36	1			56	1				
11:45	47	1	177	6	53	5	199	16	376	22
Total	1084	1707			1063	1630			2147	3337
Percent	38.8%	61.2%			39.5%	60.5%			39.2%	60.8%

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA

12/8/2021	NB,		Hour Totals		SB,		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	3	53			1	47				
12:15	5	68			2	35				
12:30	2	57			3	41				
12:45	2	58	12	236	1	34	7	157	19	393
1:00	2	49			1	33				
1:15	2	57			3	36				
1:30	1	33			0	37				
1:45	1	38	6	177	0	43	4	149	10	326
2:00	0	45			1	41				
2:15	1	53			1	35				
2:30	0	48			1	46				
2:45	1	47	2	193	1	43	4	165	6	358
3:00	1	43			3	34				
3:15	1	64			3	55				
3:30	6	54			3	76				
3:45	4	60	12	221	5	54	14	219	26	440
4:00	4	47			3	61				
4:15	4	59			7	69				
4:30	4	61			4	53				
4:45	8	61	20	228	6	59	20	242	40	470
5:00	17	61			4	49				
5:15	23	45			14	61				
5:30	24	43			10	58				
5:45	20	43	84	192	20	33	48	201	132	393
6:00	28	41			15	34				
6:15	22	33			19	32				
6:30	37	29			34	38				
6:45	37	30	124	133	36	27	104	131	228	264
7:00	36	36			37	19				
7:15	48	15			26	24				
7:30	37	23			53	18				
7:45	47	30	168	104	50	18	166	79	334	183
8:00	44	15			54	18				
8:15	37	17			35	17				
8:30	31	12			45	11				
8:45	26	9	138	53	34	13	168	59	306	112
9:00	30	13			36	10				
9:15	40	15			32	8				
9:30	33	11			34	7				
9:45	27	13	130	52	44	7	146	32	276	84
10:00	24	11			45	8				
10:15	40	9			47	7				
10:30	49	6			44	3				
10:45	38	6	151	32	56	6	192	24	343	56
11:00	56	5			39	4				
11:15	49	8			43	7				
11:30	39	6			38	6				
11:45	44	3	188	22	62	4	182	21	370	43
Total	1035	1643			1055	1479			2090	3122
Percent	38.6%	61.4%			41.6%	58.4%			40.1%	59.9%
Grand Total	2119	3350			2118	3109			4237	6459
Percent	38.7%	61.3%			40.5%	59.5%			39.6%	60.4%
ADT		ADT: 5,348		AADT: 5,348						

TURNING MOVEMENT COUNTS

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	East St From North		East St From South		Site Driveway From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	28	1	0	42	1	0	72
07:15 AM	35	1	0	46	1	0	83
07:30 AM	48	0	1	40	1	1	91
07:45 AM	52	1	0	40	0	1	94
Total	163	3	1	168	3	2	340
08:00 AM	43	0	0	36	0	1	80
08:15 AM	45	2	1	28	1	0	77
08:30 AM	53	1	1	38	0	0	93
08:45 AM	38	0	1	38	1	1	79
Total	179	3	3	140	2	2	329
Grand Total	342	6	4	308	5	4	669
Apprch %	98.3	1.7	1.3	98.7	55.6	44.4	
Total %	51.1	0.9	0.6	46	0.7	0.6	
Cars	326	3	3	294	0	3	629
% Cars	95.3	50	75	95.5	0	75	94
Trucks	16	3	1	14	5	1	40
% Trucks	4.7	50	25	4.5	100	25	6

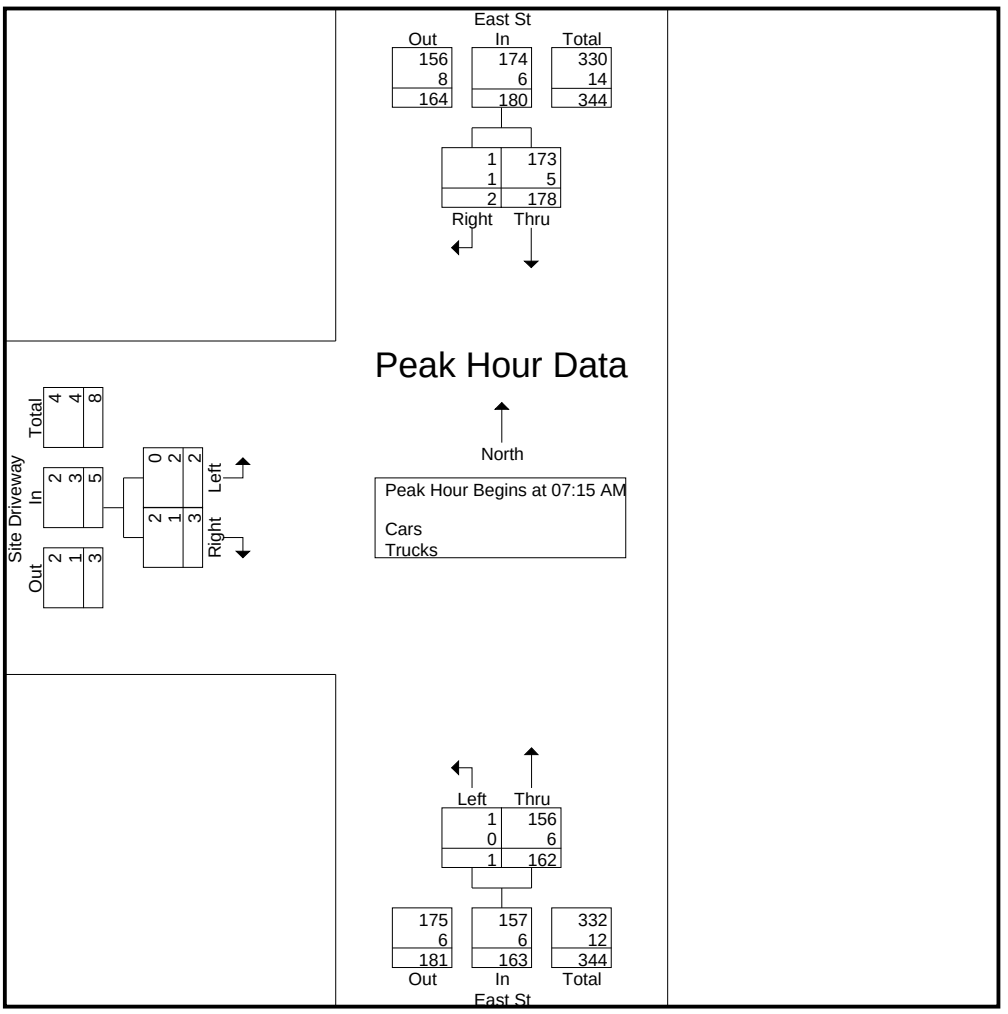
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	35	**1**	36	0	**46**	**46**	**1**	0	1	83
07:30 AM	48	0	48	**1**	40	41	1	**1**	**2**	91
07:45 AM	**52**	1	**53**	0	40	40	0	1	1	**94**
08:00 AM	43	0	43	0	36	36	0	1	1	80
Total Volume	178	2	180	1	162	163	2	3	5	348
% App. Total	98.9	1.1		0.6	99.4		40	60		
PHF	.856	.500	.849	.250	.880	.886	.500	.750	.625	.926
Cars	173	1	174	1	156	157	0	2	2	333
% Cars	97.2	50.0	96.7	100	96.3	96.3	0	66.7	40.0	95.7
Trucks	5	1	6	0	6	6	2	1	3	15
% Trucks	2.8	50.0	3.3	0	3.7	3.7	100	33.3	60.0	4.3

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

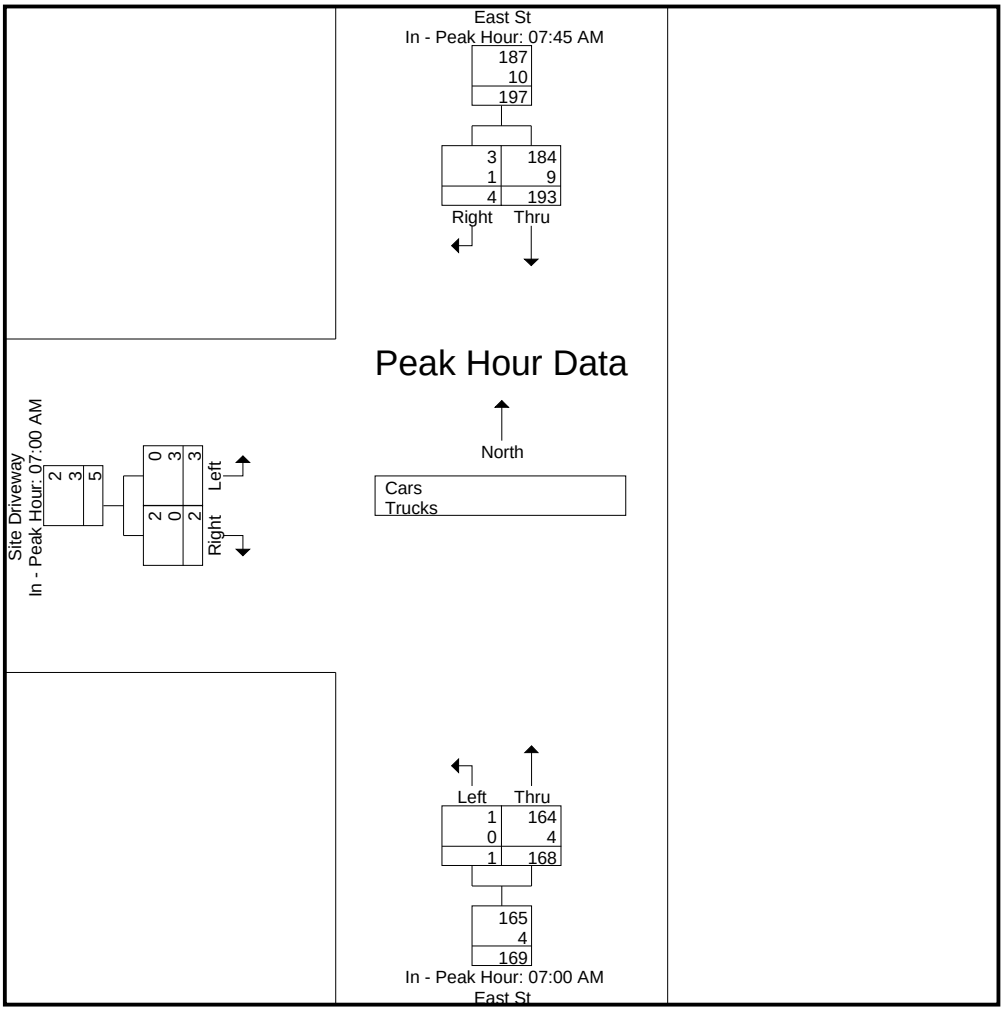
	07:45 AM			07:00 AM			07:00 AM		
+0 mins.	52	1	53	0	42	42	**1**	0	1
+15 mins.	43	0	43	0	**46**	**46**	1	0	1
+30 mins.	45	**2**	47	**1**	40	41	1	**1**	**2**
+45 mins.	**53**	1	**54**	0	40	40	0	1	1
Total Volume	193	4	197	1	168	169	3	2	5
% App. Total	98	2		0.6	99.4		60	40	
PHF	.910	.500	.912	.250	.913	.918	.750	.500	.625
Cars	184	3	187	1	164	165	0	2	2
% Cars	95.3	75	94.9	100	97.6	97.6	0	100	40
Trucks	9	1	10	0	4	4	3	0	3
% Trucks	4.7	25	5.1	0	2.4	2.4	100	0	60

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	East St From North		East St From South		Site Driveway From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	24	0	0	42	0	0	66
07:15 AM	35	0	0	43	0	0	78
07:30 AM	46	0	1	40	0	1	88
07:45 AM	52	1	0	39	0	1	93
Total	157	1	1	164	0	2	325
08:00 AM	40	0	0	34	0	0	74
08:15 AM	42	2	1	27	0	0	72
08:30 AM	50	0	0	36	0	0	86
08:45 AM	37	0	1	33	0	1	72
Total	169	2	2	130	0	1	304
Grand Total	326	3	3	294	0	3	629
Apprch %	99.1	0.9	1	99	0	100	
Total %	51.8	0.5	0.5	46.7	0	0.5	

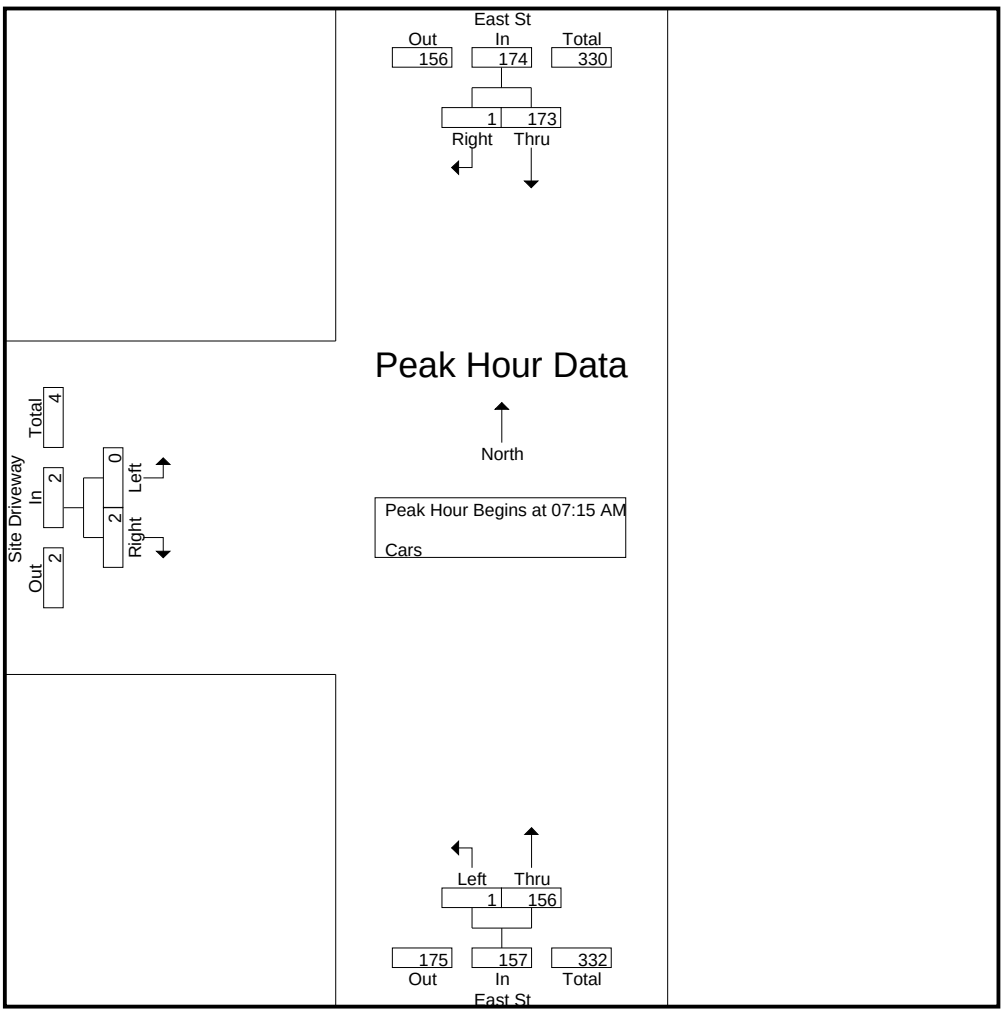
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	35	0	35	0	**43**	**43**	0	0	0	78
07:30 AM	46	0	46	**1**	40	41	0	**1**	**1**	88
07:45 AM	**52**	**1**	**53**	0	39	39	0	1	1	**93**
08:00 AM	40	0	40	0	34	34	0	0	0	74
Total Volume	173	1	174	1	156	157	0	2	2	333
% App. Total	99.4	0.6		0.6	99.4		0	100		
PHF	.832	.250	.821	.250	.907	.913	.000	.500	.500	.895

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

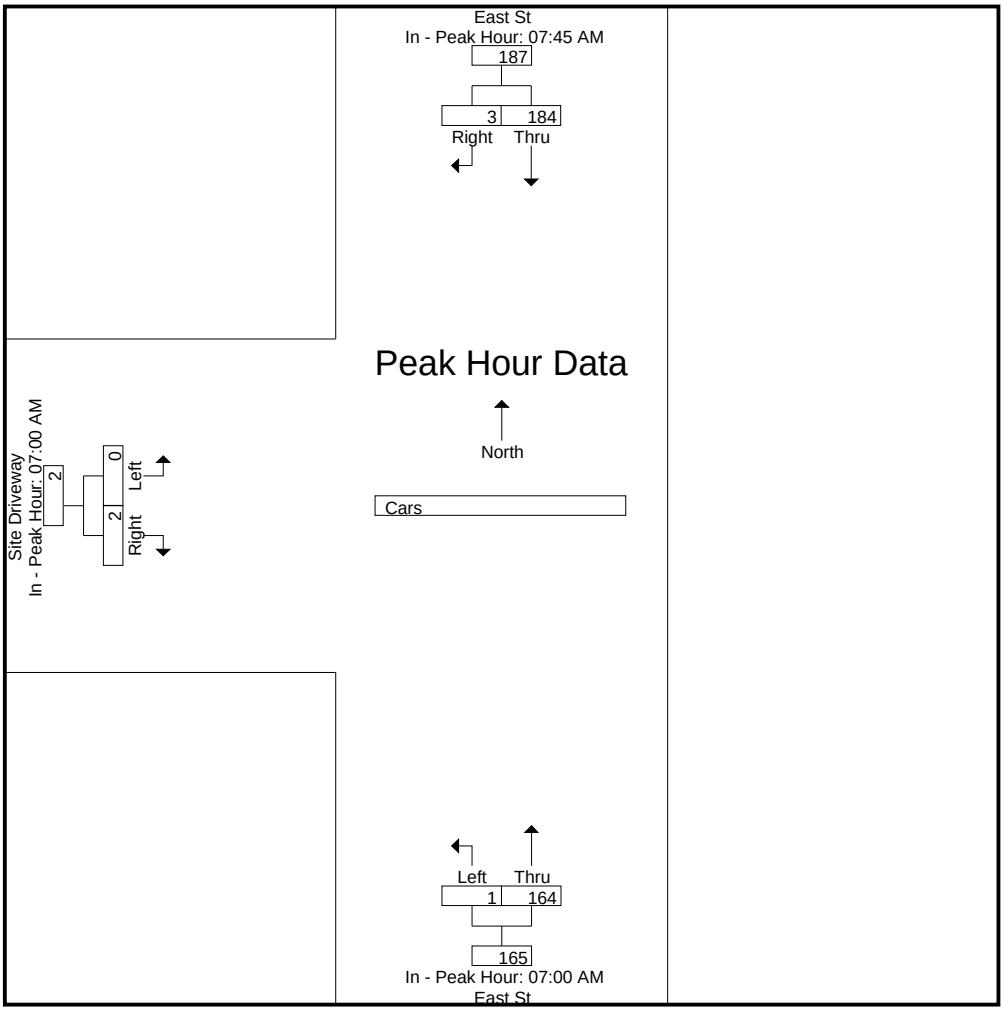
	07:45 AM			07:00 AM			07:00 AM		
+0 mins.	**52**	1	**53**	0	42	42	0	0	0
+15 mins.	40	0	40	0	**43**	**43**	0	0	0
+30 mins.	42	**2**	44	**1**	40	41	0	**1**	**1**
+45 mins.	50	0	50	0	39	39	0	1	1
Total Volume	184	3	187	1	164	165	0	2	2
% App. Total	98.4	1.6		0.6	99.4		0	100	
PHF	.885	.375	.882	.250	.953	.959	.000	.500	.500

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 7

Groups Printed- Trucks

	East St From North		East St From South		Site Driveway From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	4	1	0	0	1	0	6
07:15 AM	0	1	0	3	1	0	5
07:30 AM	2	0	0	0	1	0	3
07:45 AM	0	0	0	1	0	0	1
Total	6	2	0	4	3	0	15
08:00 AM	3	0	0	2	0	1	6
08:15 AM	3	0	0	1	1	0	5
08:30 AM	3	1	1	2	0	0	7
08:45 AM	1	0	0	5	1	0	7
Total	10	1	1	10	2	1	25
Grand Total	16	3	1	14	5	1	40
Apprch %	84.2	15.8	6.7	93.3	83.3	16.7	
Total %	40	7.5	2.5	35	12.5	2.5	

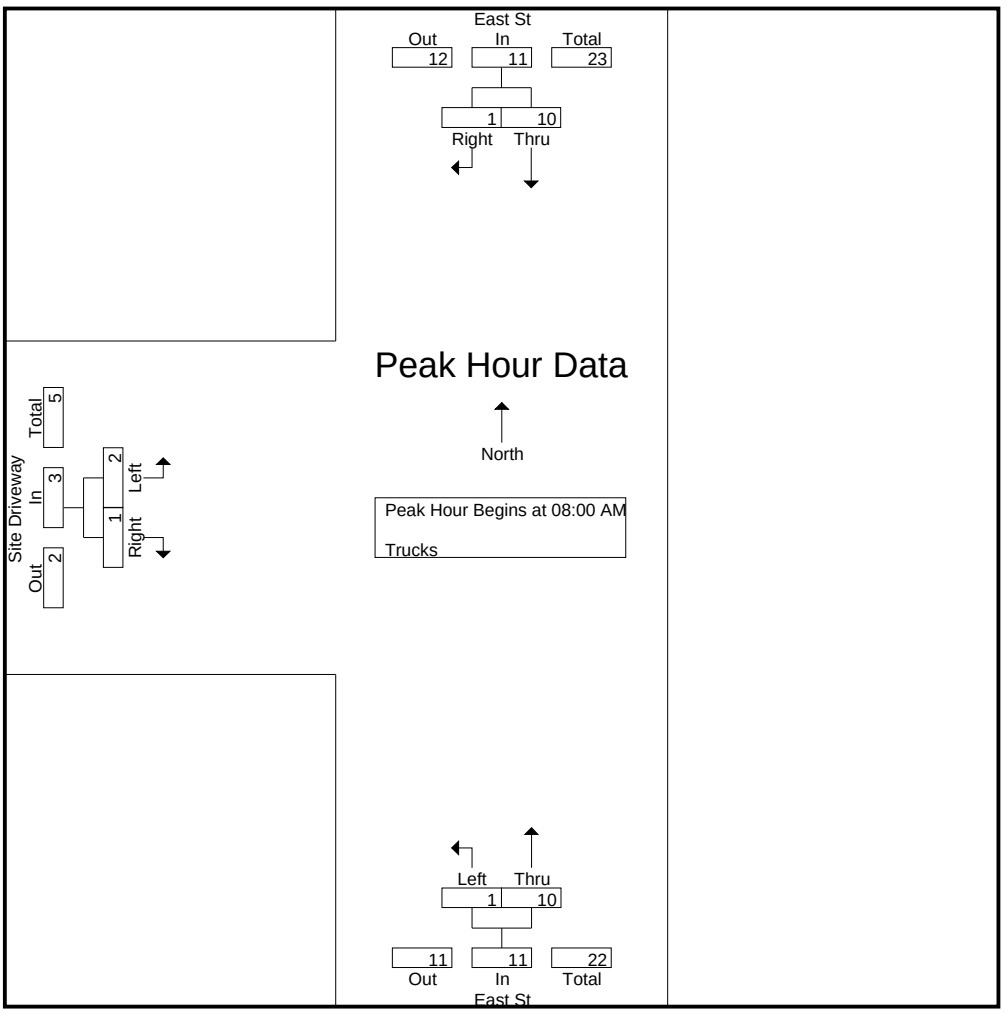
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	**3**	0	3	0	2	2	0	**1**	**1**	6
08:15 AM	3	0	3	0	1	1	**1**	0	1	5
08:30 AM	3	**1**	**4**	**1**	2	3	0	0	0	**7**
08:45 AM	1	0	1	0	**5**	**5**	1	0	1	7
Total Volume	10	1	11	1	10	11	2	1	3	25
% App. Total	90.9	9.1		9.1	90.9		66.7	33.3		
PHF	.833	.250	.688	.250	.500	.550	.500	.250	.750	.893

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 8



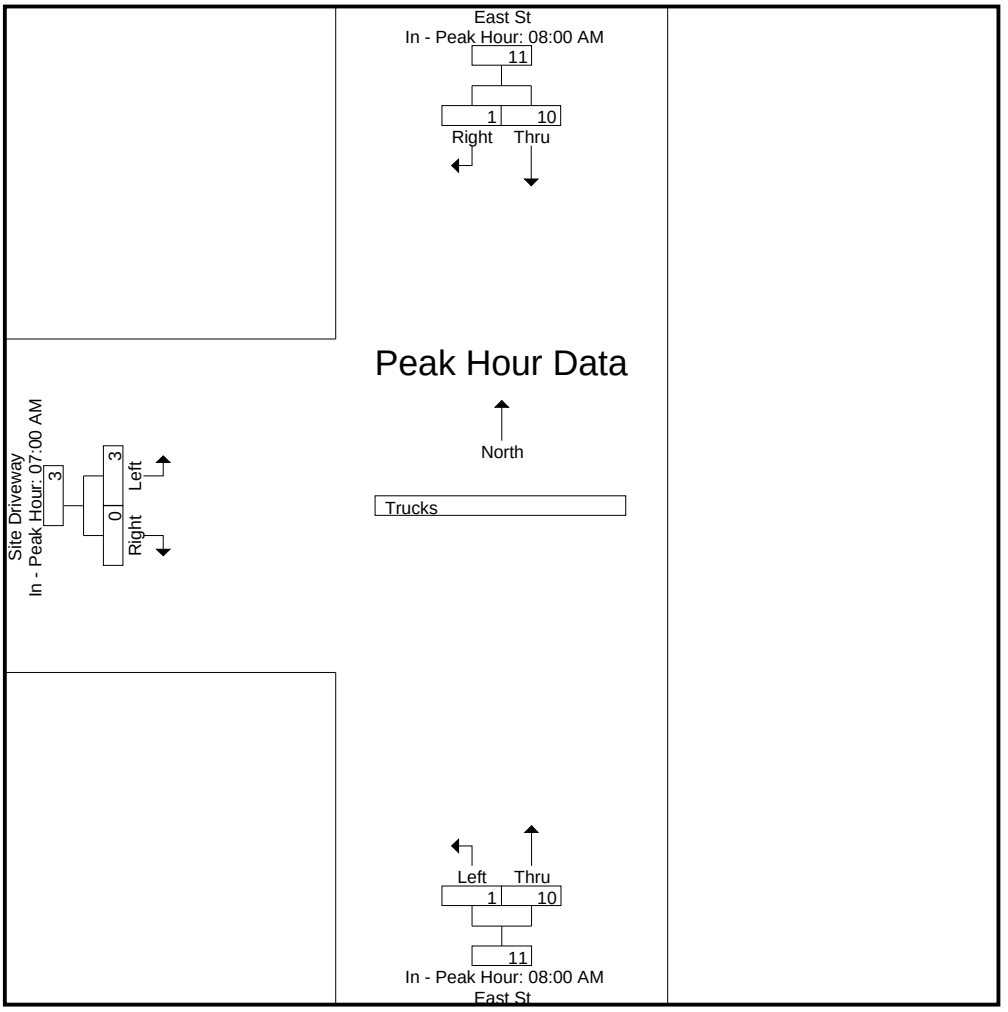
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			08:00 AM			07:00 AM		
+0 mins.	**3**	0	3	0	2	2	**1**	0	**1**
+15 mins.	3	0	3	0	1	1	1	0	1
+30 mins.	3	**1**	**4**	**1**	2	3	1	0	1
+45 mins.	1	0	1	0	**5**	**5**	0	0	0
Total Volume	10	1	11	1	10	11	3	0	3
% App. Total	90.9	9.1		9.1	90.9		100	0	
PHF	.833	.250	.688	.250	.500	.550	.750	.000	.750

Accurate Counts
978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021

Groups Printed- Bikes Peds

	East St From North			East St From South			Site Driveway From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0		0	0		0	0				
Total %										0	0	

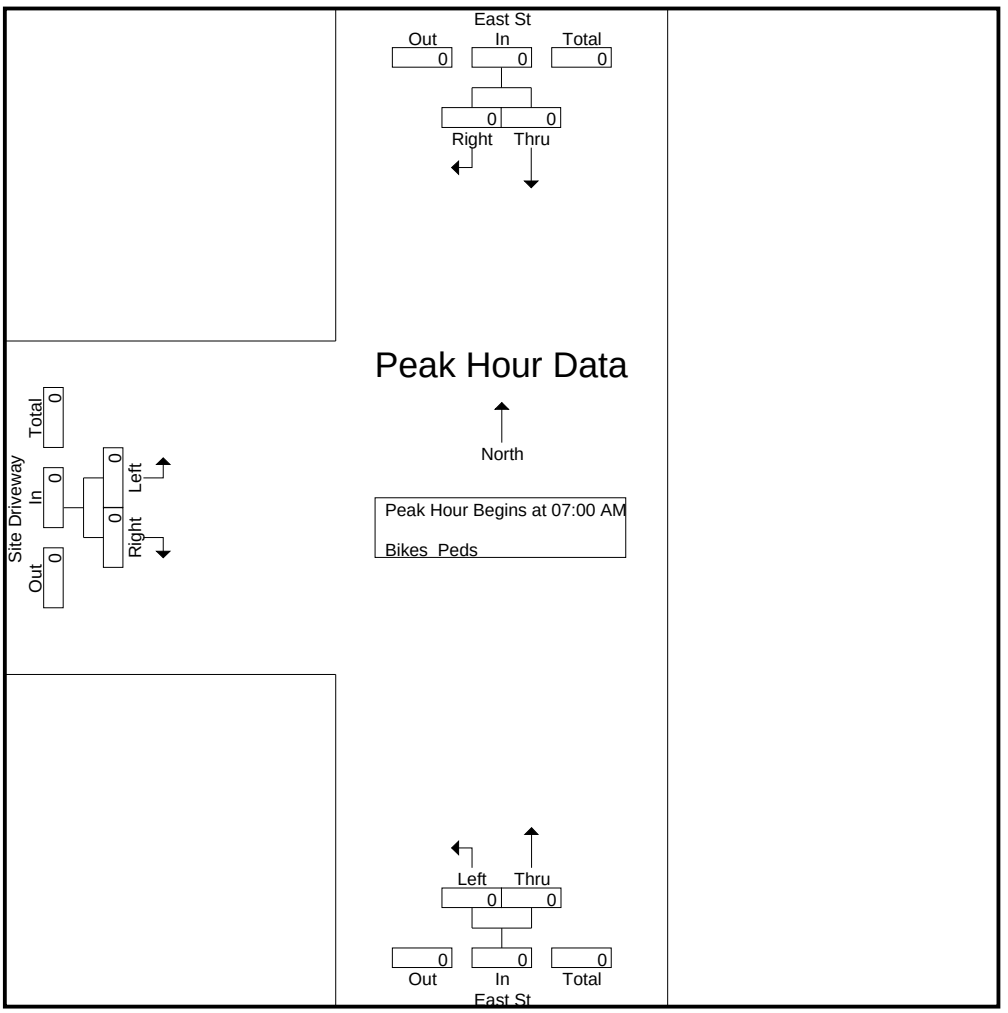
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 11



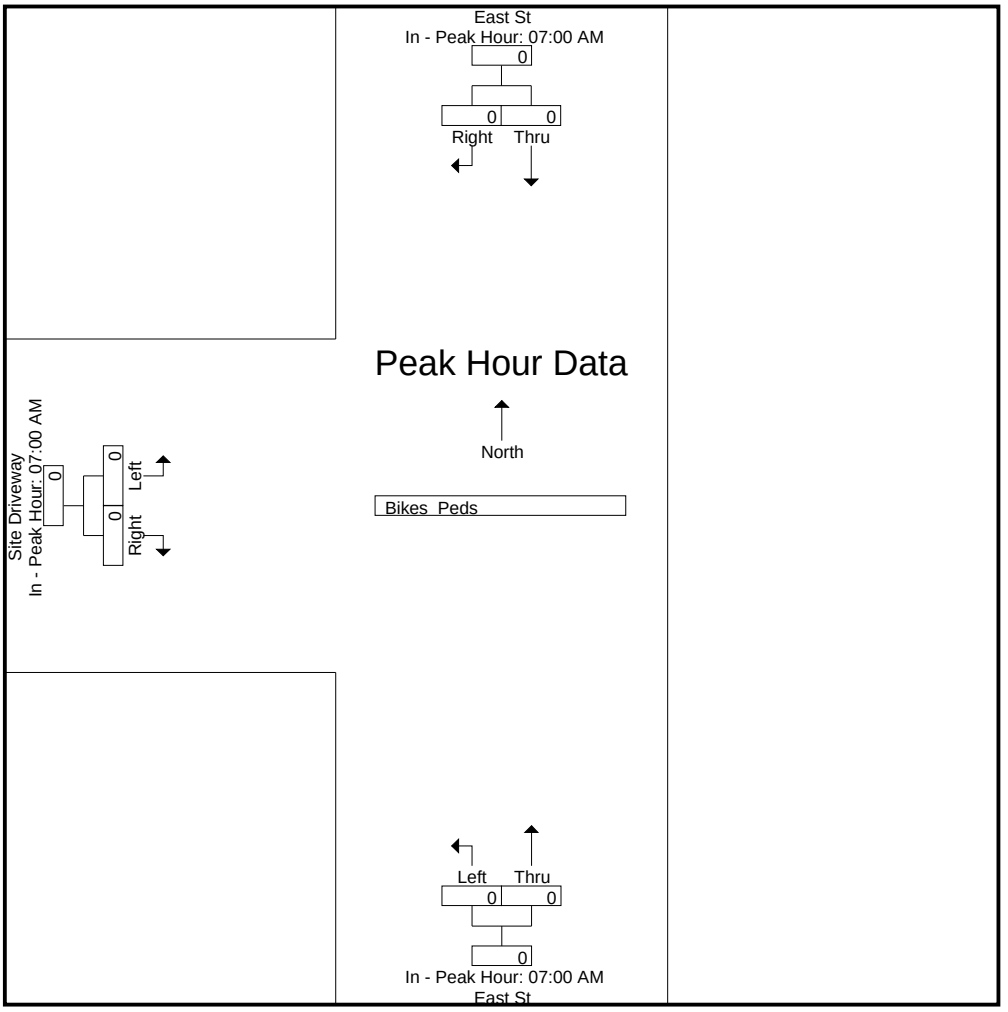
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	East St From North		East St From South		Site Driveway From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
03:00 PM	56	1	1	57	1	0	116
03:15 PM	55	1	1	51	1	1	110
03:30 PM	63	1	0	62	2	1	129
03:45 PM	62	0	0	67	0	1	130
Total	236	3	2	237	4	3	485
04:00 PM	64	0	0	59	1	1	125
04:15 PM	61	0	1	72	0	0	134
04:30 PM	60	0	0	74	0	0	134
04:45 PM	55	0	0	67	0	1	123
Total	240	0	1	272	1	2	516
Grand Total	476	3	3	509	5	5	1001
Apprch %	99.4	0.6	0.6	99.4	50	50	
Total %	47.6	0.3	0.3	50.8	0.5	0.5	
Cars	462	2	3	504	5	4	980
% Cars	97.1	66.7	100	99	100	80	97.9
Trucks	14	1	0	5	0	1	21
% Trucks	2.9	33.3	0	1	0	20	2.1

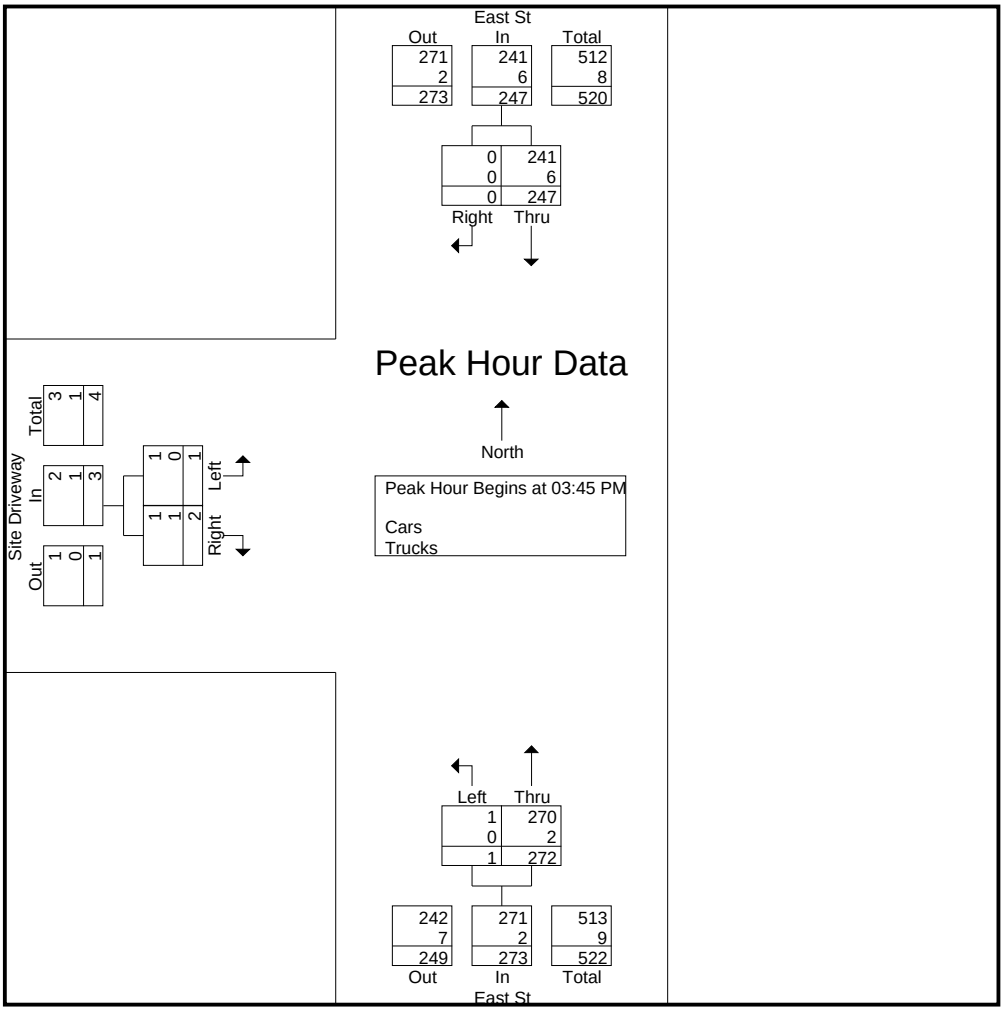
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:45 PM										
03:45 PM	62	0	62	0	67	67	0	**1**	1	130
04:00 PM	**64**	0	**64**	0	59	59	**1**	1	**2**	125
04:15 PM	61	0	61	**1**	72	73	0	0	0	**134**
04:30 PM	60	0	60	0	**74**	**74**	0	0	0	134
Total Volume	247	0	247	1	272	273	1	2	3	523
% App. Total	100	0		0.4	99.6		33.3	66.7		
PHF	.965	.000	.965	.250	.919	.922	.250	.500	.375	.976
Cars	241	0	241	1	270	271	1	1	2	514
% Cars	97.6	0	97.6	100	99.3	99.3	100	50.0	66.7	98.3
Trucks	6	0	6	0	2	2	0	1	1	9
% Trucks	2.4	0	2.4	0	0.7	0.7	0	50.0	33.3	1.7

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

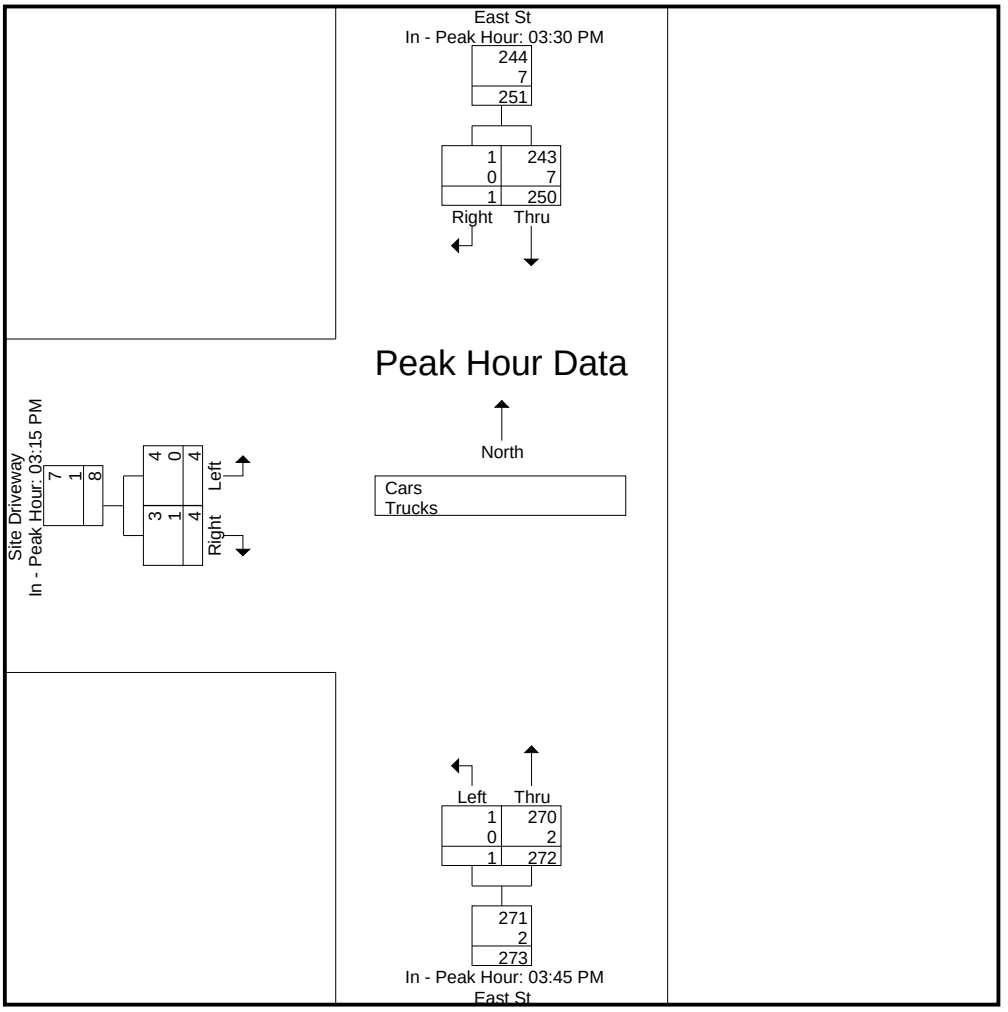
	03:30 PM			03:45 PM			03:15 PM		
+0 mins.	63	**1**	**64**	0	67	67	1	**1**	2
+15 mins.	62	0	62	0	59	59	**2**	1	**3**
+30 mins.	**64**	0	64	**1**	72	73	0	1	1
+45 mins.	61	0	61	0	**74**	**74**	1	1	2
Total Volume	250	1	251	1	272	273	4	4	8
% App. Total	99.6	0.4		0.4	99.6		50	50	
PHF	.977	.250	.980	.250	.919	.922	.500	1.000	.667
Cars	243	1	244	1	270	271	4	3	7
% Cars	97.2	100	97.2	100	99.3	99.3	100	75	87.5
Trucks	7	0	7	0	2	2	0	1	1
% Trucks	2.8	0	2.8	0	0.7	0.7	0	25	12.5

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	East St From North		East St From South		Site Driveway From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
03:00 PM	54	1	1	56	1	0	113
03:15 PM	52	0	1	51	1	1	106
03:30 PM	61	1	0	60	2	1	125
03:45 PM	59	0	0	66	0	0	125
Total	226	2	2	233	4	2	469
04:00 PM	64	0	0	58	1	1	124
04:15 PM	59	0	1	72	0	0	132
04:30 PM	59	0	0	74	0	0	133
04:45 PM	54	0	0	67	0	1	122
Total	236	0	1	271	1	2	511
Grand Total	462	2	3	504	5	4	980
Apprch %	99.6	0.4	0.6	99.4	55.6	44.4	
Total %	47.1	0.2	0.3	51.4	0.5	0.4	

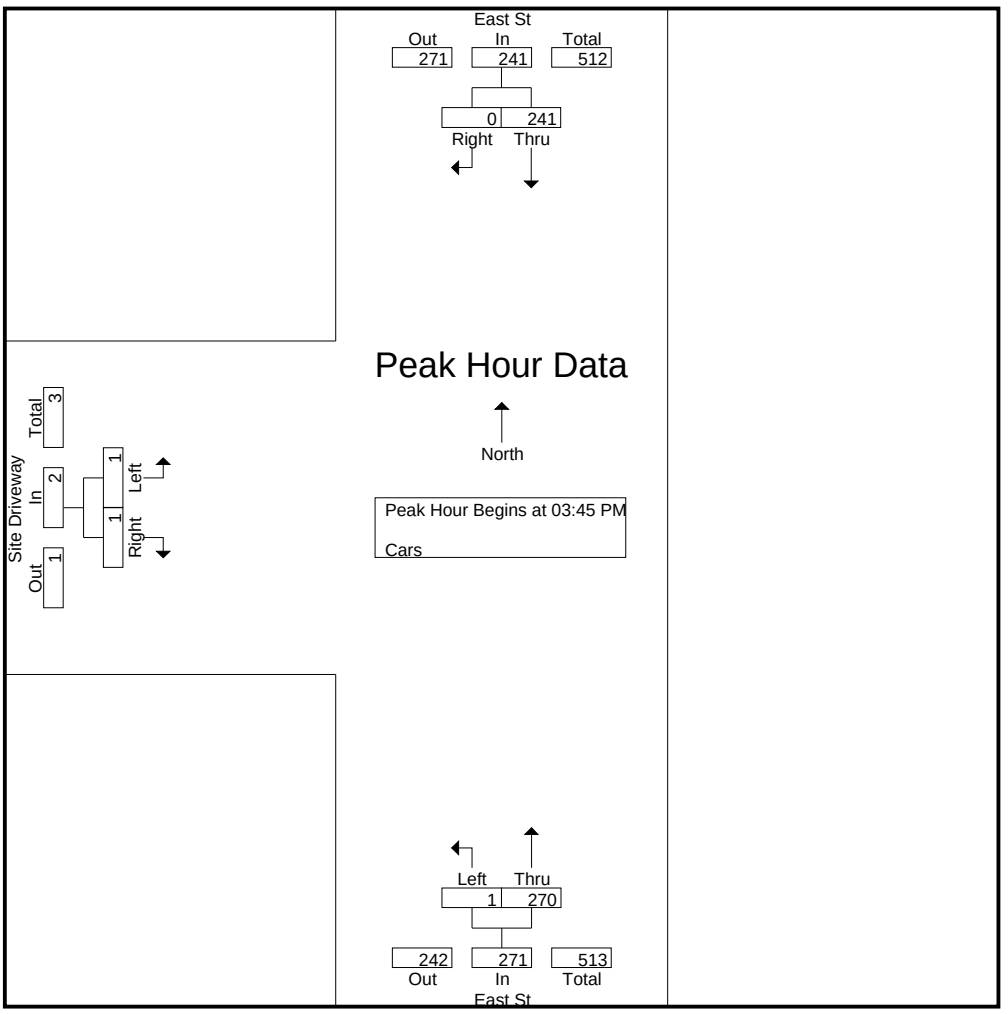
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:45 PM										
03:45 PM	59	0	59	0	66	66	0	0	0	125
04:00 PM	**64**	0	**64**	0	58	58	**1**	**1**	**2**	124
04:15 PM	59	0	59	**1**	72	73	0	0	0	132
04:30 PM	59	0	59	0	**74**	**74**	0	0	0	**133**
Total Volume	241	0	241	1	270	271	1	1	2	514
% App. Total	100	0		0.4	99.6		50	50		
PHF	.941	.000	.941	.250	.912	.916	.250	.250	.250	.966

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

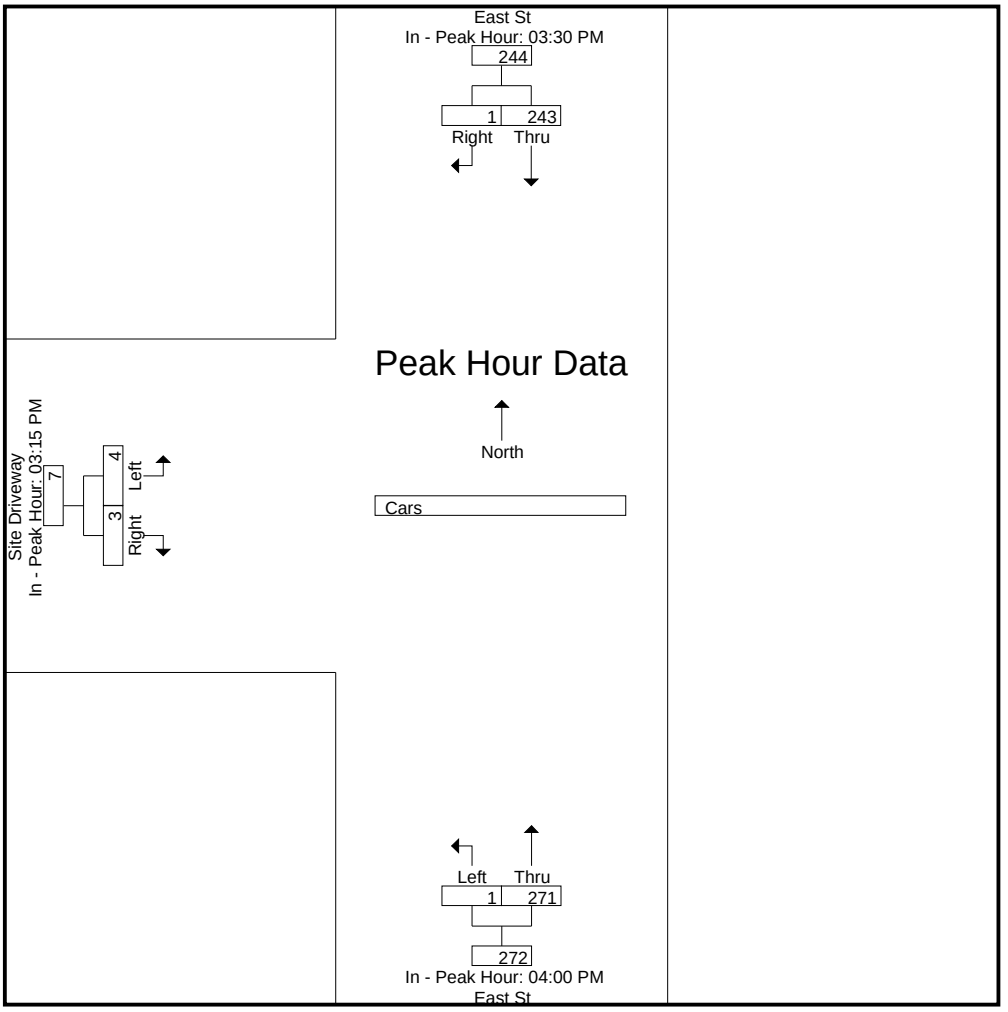
	03:30 PM			04:00 PM			03:15 PM		
+0 mins.	61	**1**	62	0	58	58	1	**1**	2
+15 mins.	59	0	59	**1**	72	73	**2**	1	**3**
+30 mins.	**64**	0	**64**	0	**74**	**74**	0	0	0
+45 mins.	59	0	59	0	67	67	1	1	2
Total Volume	243	1	244	1	271	272	4	3	7
% App. Total	99.6	0.4		0.4	99.6		57.1	42.9	
PHF	.949	.250	.953	.250	.916	.919	.500	.750	.583

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 7

Groups Printed- Trucks

	East St From North		East St From South		Site Driveway From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
03:00 PM	2	0	0	1	0	0	3
03:15 PM	3	1	0	0	0	0	4
03:30 PM	2	0	0	2	0	0	4
03:45 PM	3	0	0	1	0	1	5
Total	10	1	0	4	0	1	16
04:00 PM	0	0	0	1	0	0	1
04:15 PM	2	0	0	0	0	0	2
04:30 PM	1	0	0	0	0	0	1
04:45 PM	1	0	0	0	0	0	1
Total	4	0	0	1	0	0	5
Grand Total	14	1	0	5	0	1	21
Apprch %	93.3	6.7	0	100	0	100	
Total %	66.7	4.8	0	23.8	0	4.8	

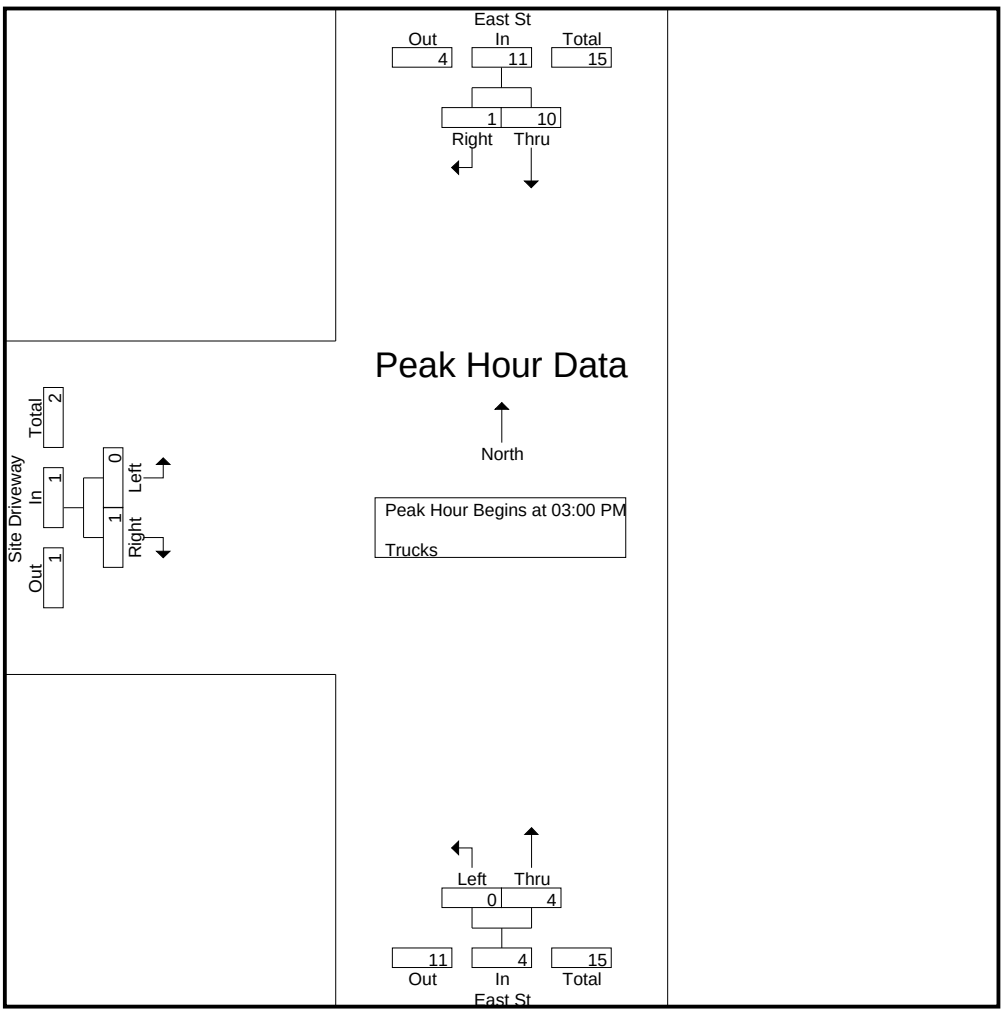
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	2	0	2	0	1	1	0	0	0	3
03:15 PM	**3**	**1**	**4**	0	0	0	0	0	0	4
03:30 PM	2	0	2	0	**2**	**2**	0	0	0	4
03:45 PM	3	0	3	0	1	1	0	**1**	**1**	**5**
Total Volume	10	1	11	0	4	4	0	1	1	16
% App. Total	90.9	9.1		0	100		0	100		
PHF	.833	.250	.688	.000	.500	.500	.000	.250	.250	.800

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 8



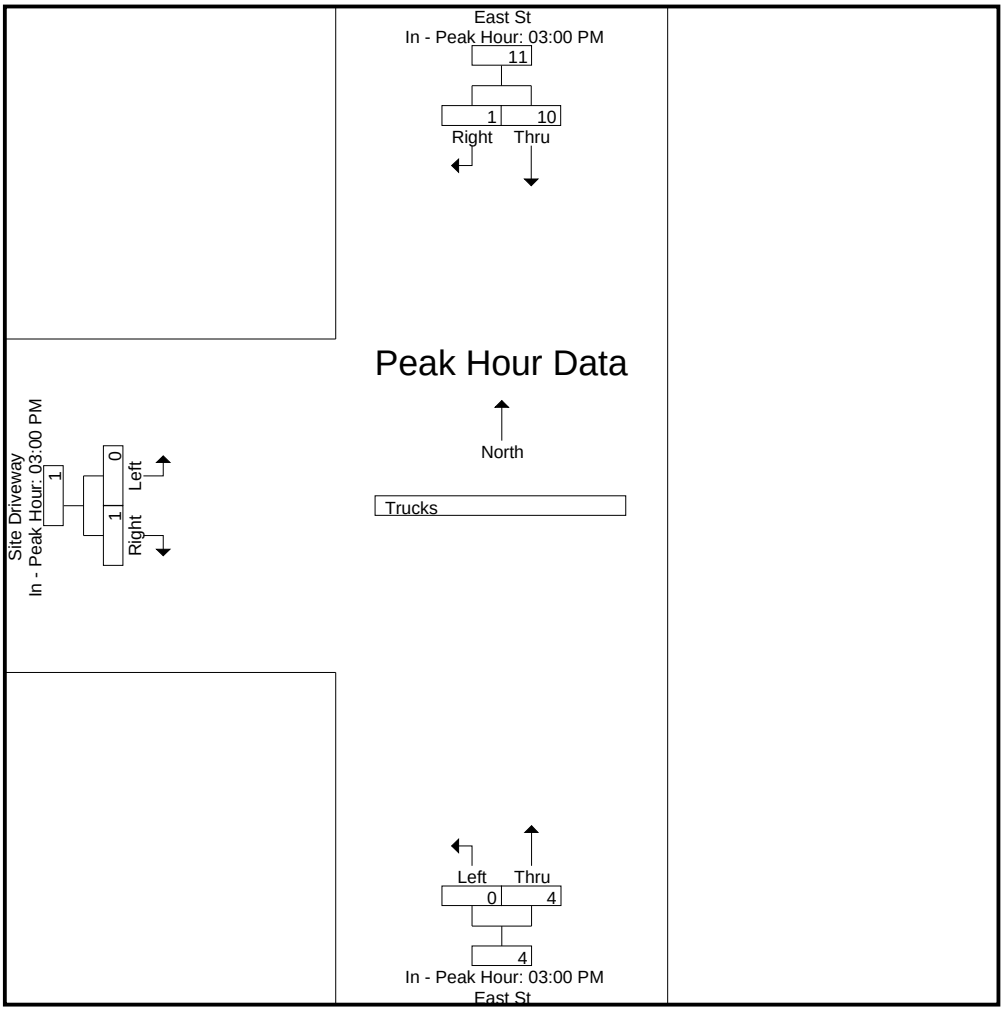
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	03:00 PM			03:00 PM			03:00 PM		
+0 mins.	2	0	2	0	1	1	0	0	0
+15 mins.	**3**	**1**	**4**	0	0	0	0	0	0
+30 mins.	2	0	2	0	**2**	**2**	0	0	0
+45 mins.	3	0	3	0	1	1	0	**1**	**1**
Total Volume	10	1	11	0	4	4	0	1	1
% App. Total	90.9	9.1		0	100		0	100	
PHF	.833	.250	.688	.000	.500	.500	.000	.250	.250

Accurate Counts
978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 10

Groups Printed- Bikes Peds

	East St From North			East St From South			Site Driveway From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0		0	0		0	0				
Total %										0	0	

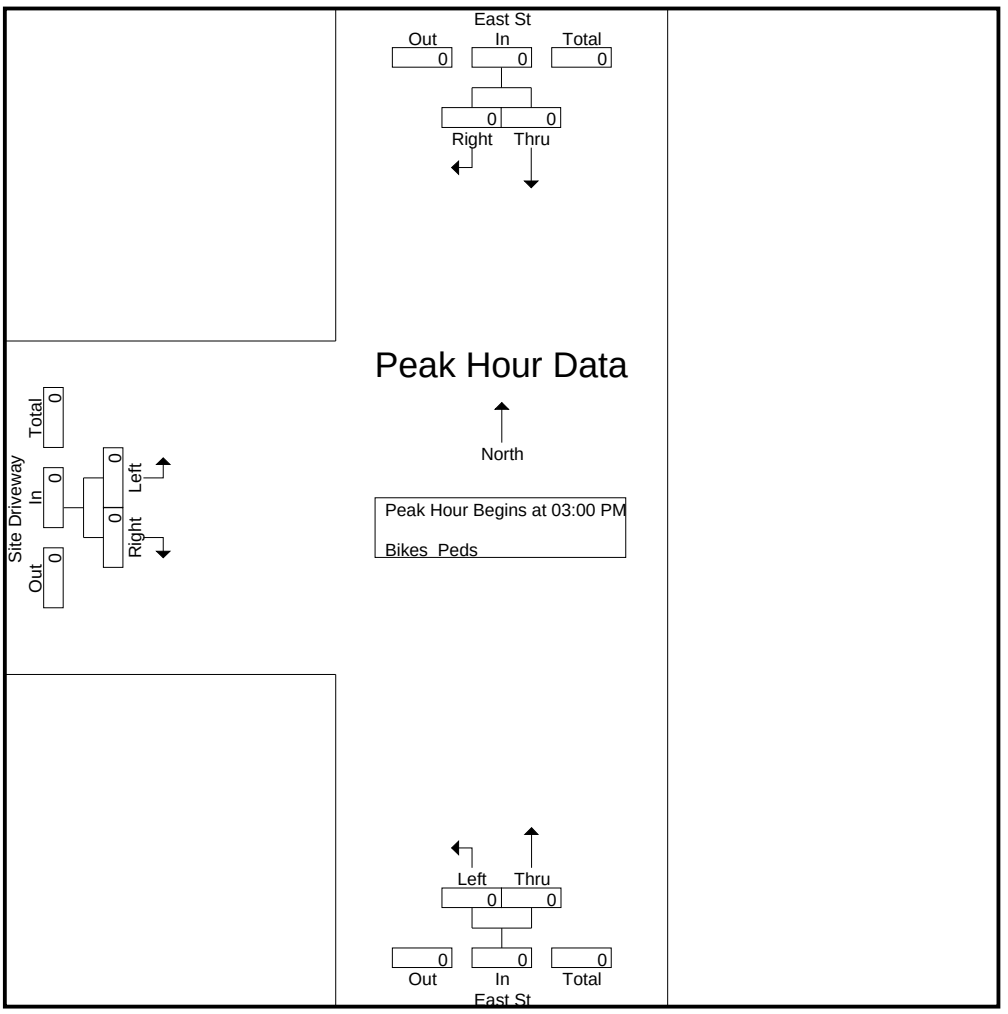
	East St From North			East St From South			Site Driveway From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

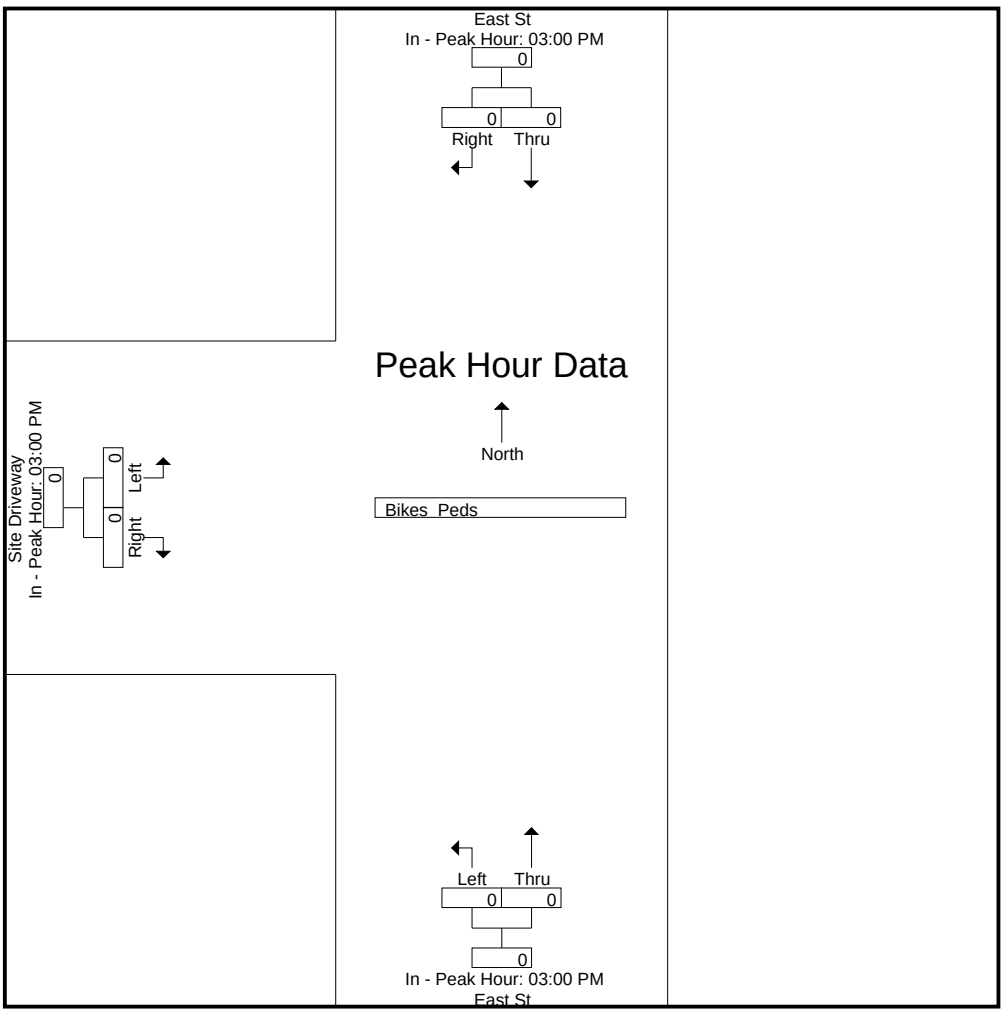
	03:00 PM			03:00 PM			03:00 PM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Site Driveway
City/State : Ware, MA
Weather : Clear

File Name : 91300001
Site Code : 91300001
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	East St From North		East St From South		Gilbertville Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	18	3	8	35	3	11	78
07:15 AM	25	6	11	36	10	11	99
07:30 AM	36	4	15	27	8	12	102
07:45 AM	37	5	12	27	8	16	105
Total	116	18	46	125	29	50	384
08:00 AM	28	5	12	25	12	15	97
08:15 AM	33	7	6	18	6	13	83
08:30 AM	37	1	10	32	4	18	102
08:45 AM	31	2	14	26	5	6	84
Total	129	15	42	101	27	52	366
Grand Total	245	33	88	226	56	102	750
Apprch %	88.1	11.9	28	72	35.4	64.6	
Total %	32.7	4.4	11.7	30.1	7.5	13.6	
Cars	234	33	79	216	51	94	707
% Cars	95.5	100	89.8	95.6	91.1	92.2	94.3
Trucks	11	0	9	10	5	8	43
% Trucks	4.5	0	10.2	4.4	8.9	7.8	5.7

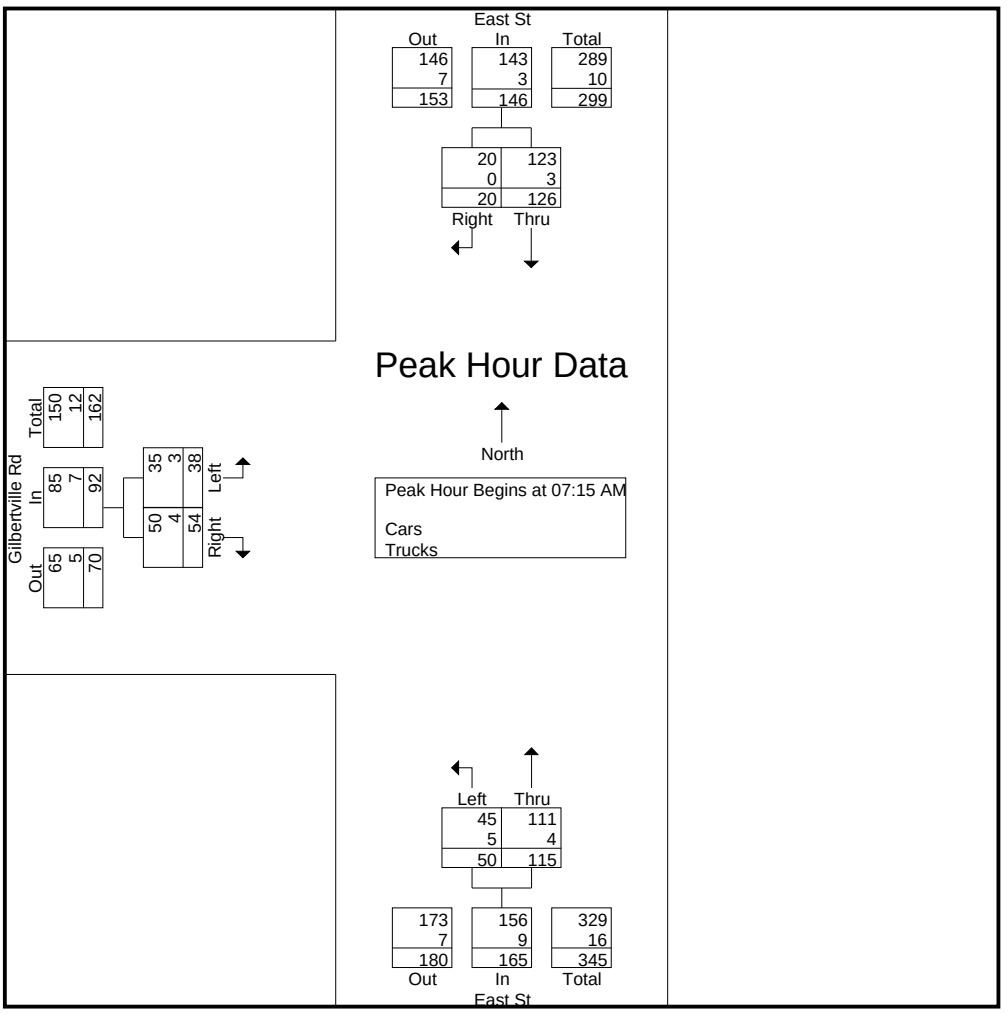
	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	25	**6**	31	11	**36**	**47**	10	11	21	99
07:30 AM	36	4	40	**15**	27	42	8	12	20	102
07:45 AM	**37**	5	**42**	12	27	39	8	**16**	24	**105**
08:00 AM	28	5	33	12	25	37	**12**	15	**27**	97
Total Volume	126	20	146	50	115	165	38	54	92	403
% App. Total	86.3	13.7		30.3	69.7		41.3	58.7		
PHF	.851	.833	.869	.833	.799	.878	.792	.844	.852	.960
Cars	123	20	143	45	111	156	35	50	85	384
% Cars	97.6	100	97.9	90.0	96.5	94.5	92.1	92.6	92.4	95.3
Trucks	3	0	3	5	4	9	3	4	7	19
% Trucks	2.4	0	2.1	10.0	3.5	5.5	7.9	7.4	7.6	4.7

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

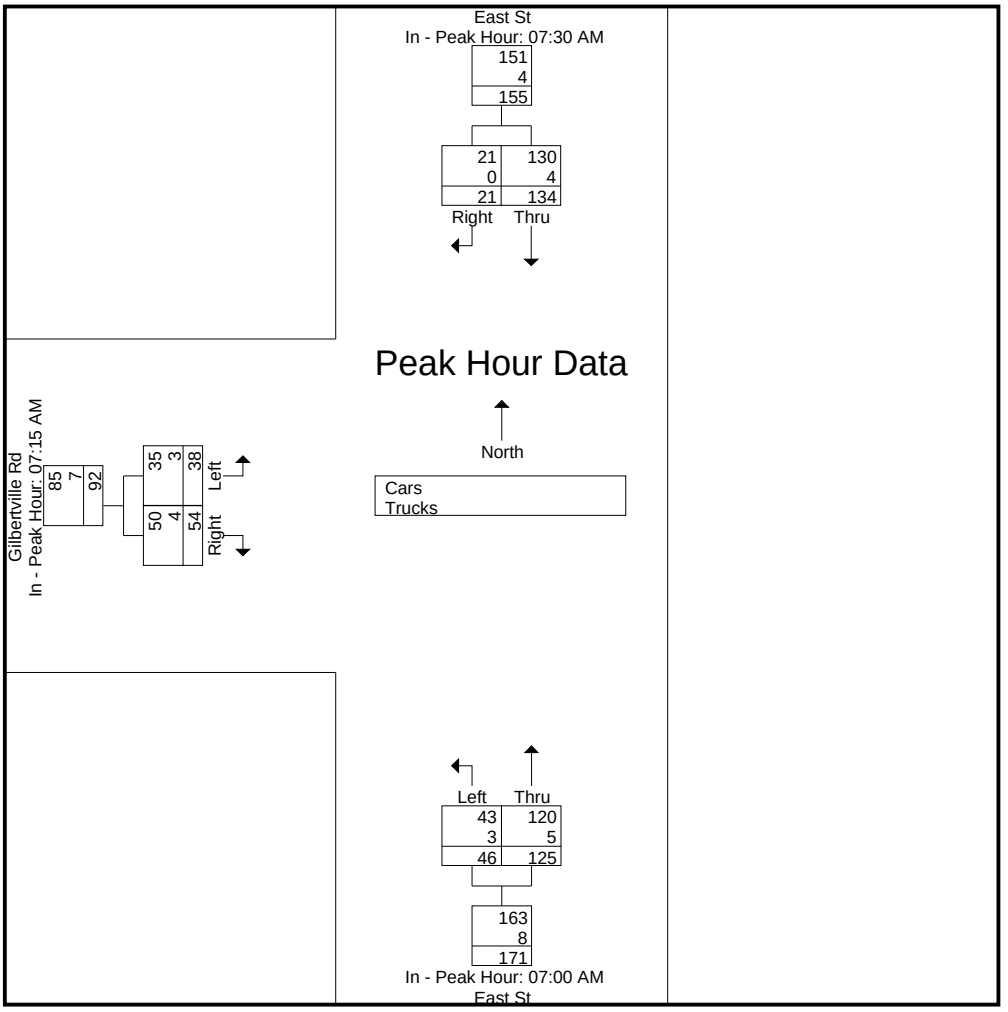
	07:30 AM			07:00 AM			07:15 AM		
+0 mins.	36	4	40	8	35	43	10	11	21
+15 mins.	**37**	5	**42**	11	**36**	**47**	8	12	20
+30 mins.	28	5	33	**15**	27	42	8	**16**	24
+45 mins.	33	**7**	40	12	27	39	**12**	15	**27**
Total Volume	134	21	155	46	125	171	38	54	92
% App. Total	86.5	13.5		26.9	73.1		41.3	58.7	
PHF	.905	.750	.923	.767	.868	.910	.792	.844	.852
Cars	130	21	151	43	120	163	35	50	85
% Cars	97	100	97.4	93.5	96	95.3	92.1	92.6	92.4
Trucks	4	0	4	3	5	8	3	4	7
% Trucks	3	0	2.6	6.5	4	4.7	7.9	7.4	7.6

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021

Groups Printed- Cars

	East St From North		East St From South		Gilbertville Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	14	3	8	34	2	10	71
07:15 AM	24	6	8	34	10	11	93
07:30 AM	35	4	15	26	6	10	96
07:45 AM	37	5	12	26	8	16	104
Total	110	18	43	120	26	47	364
08:00 AM	27	5	10	25	11	13	91
08:15 AM	31	7	6	17	6	13	80
08:30 AM	35	1	9	30	3	16	94
08:45 AM	31	2	11	24	5	5	78
Total	124	15	36	96	25	47	343
Grand Total	234	33	79	216	51	94	707
Apprch %	87.6	12.4	26.8	73.2	35.2	64.8	
Total %	33.1	4.7	11.2	30.6	7.2	13.3	

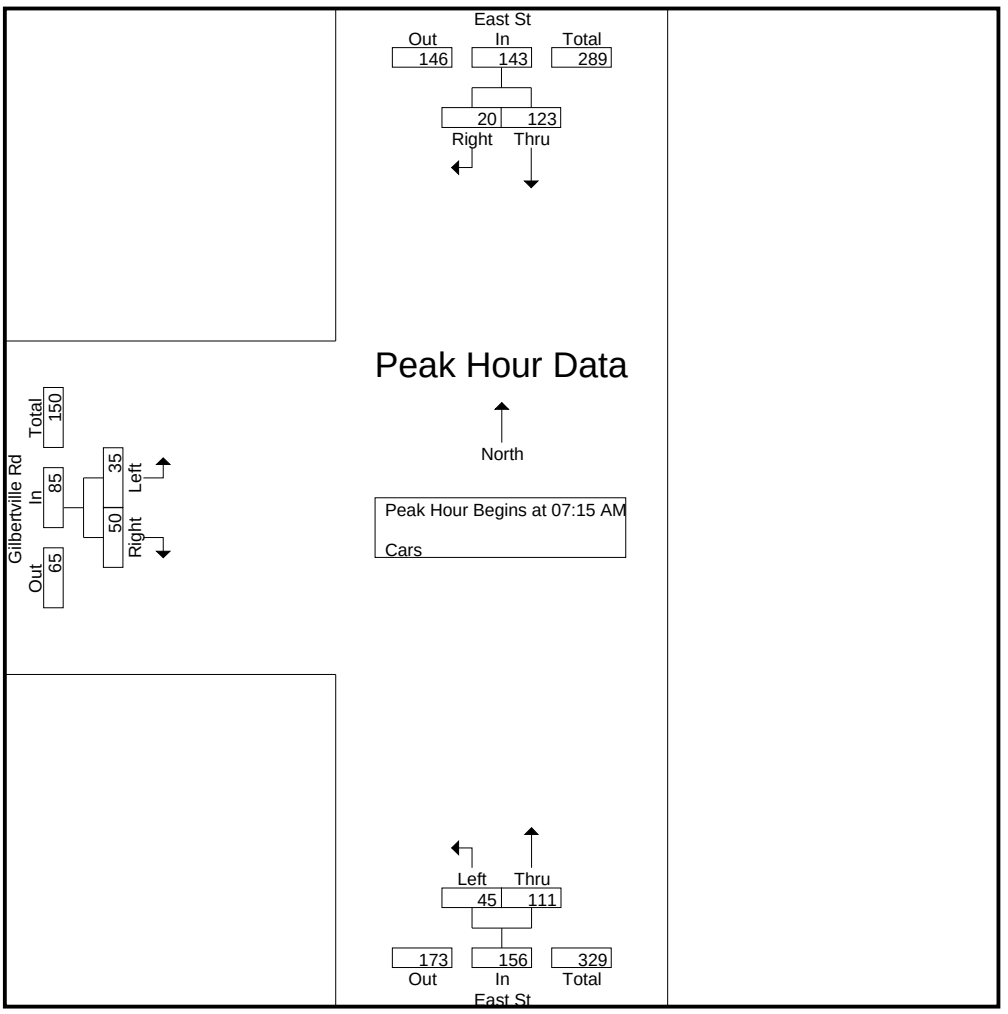
	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	24	**6**	30	8	**34**	**42**	10	11	21	93
07:30 AM	35	4	39	**15**	26	41	6	10	16	96
07:45 AM	**37**	5	**42**	12	26	38	8	**16**	**24**	**104**
08:00 AM	27	5	32	10	25	35	**11**	13	24	91
Total Volume	123	20	143	45	111	156	35	50	85	384
% App. Total	86	14		28.8	71.2		41.2	58.8		
PHF	.831	.833	.851	.750	.816	.929	.795	.781	.885	.923

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

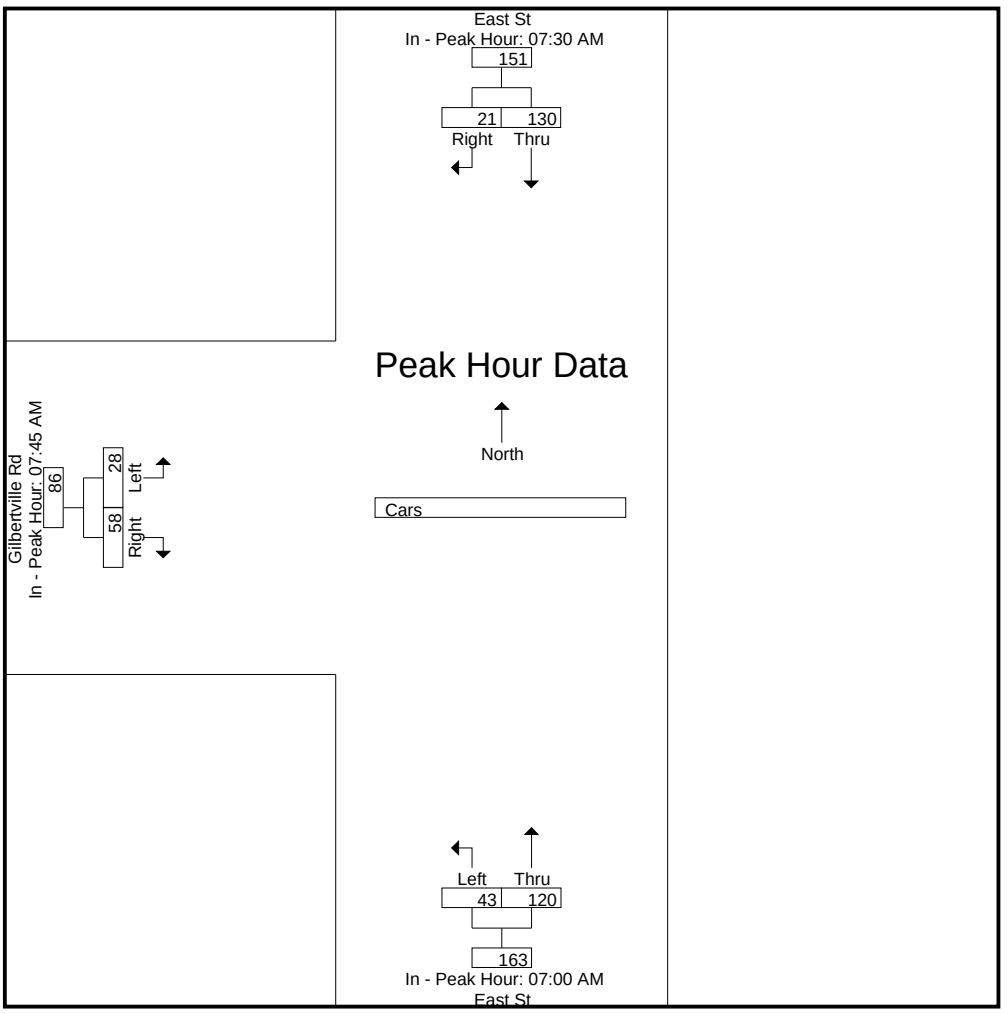
	07:30 AM			07:00 AM			07:45 AM		
+0 mins.	35	4	39	8	**34**	**42**	8	**16**	**24**
+15 mins.	**37**	5	**42**	8	34	42	**11**	13	24
+30 mins.	27	5	32	**15**	26	41	6	13	19
+45 mins.	31	**7**	38	12	26	38	3	16	19
Total Volume	130	21	151	43	120	163	28	58	86
% App. Total	86.1	13.9		26.4	73.6		32.6	67.4	
PHF	.878	.750	.899	.717	.882	.970	.636	.906	.896

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021

Groups Printed- Trucks

	East St From North		East St From South		Gilbertville Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	4	0	0	1	1	1	7
07:15 AM	1	0	3	2	0	0	6
07:30 AM	1	0	0	1	2	2	6
07:45 AM	0	0	0	1	0	0	1
Total	6	0	3	5	3	3	20
08:00 AM	1	0	2	0	1	2	6
08:15 AM	2	0	0	1	0	0	3
08:30 AM	2	0	1	2	1	2	8
08:45 AM	0	0	3	2	0	1	6
Total	5	0	6	5	2	5	23
Grand Total	11	0	9	10	5	8	43
Apprch %	100	0	47.4	52.6	38.5	61.5	
Total %	25.6	0	20.9	23.3	11.6	18.6	

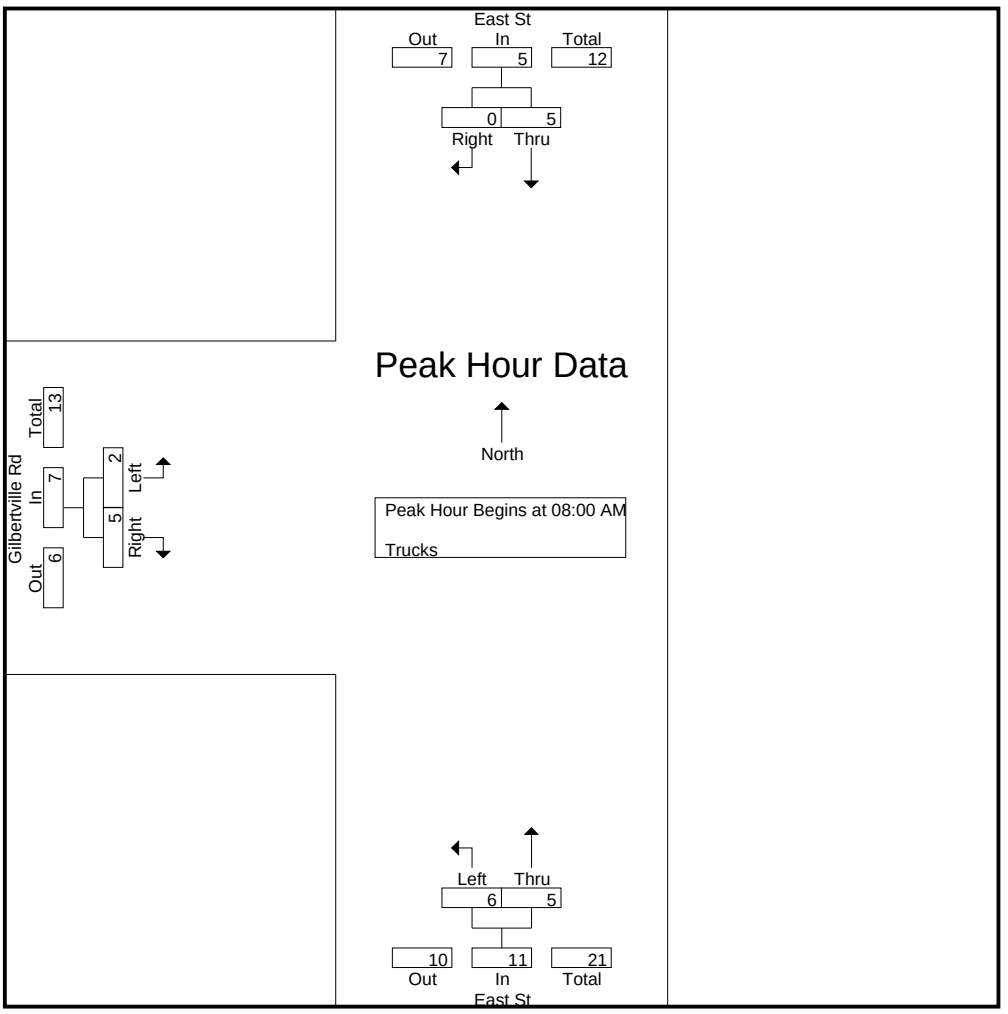
	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	1	0	1	2	0	2	**1**	**2**	**3**	6
08:15 AM	**2**	0	**2**	0	1	1	0	0	0	3
08:30 AM	2	0	2	1	**2**	3	1	2	3	**8**
08:45 AM	0	0	0	**3**	2	**5**	0	1	1	6
Total Volume	5	0	5	6	5	11	2	5	7	23
% App. Total	100	0		54.5	45.5		28.6	71.4		
PHF	.625	.000	.625	.500	.625	.550	.500	.625	.583	.719

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

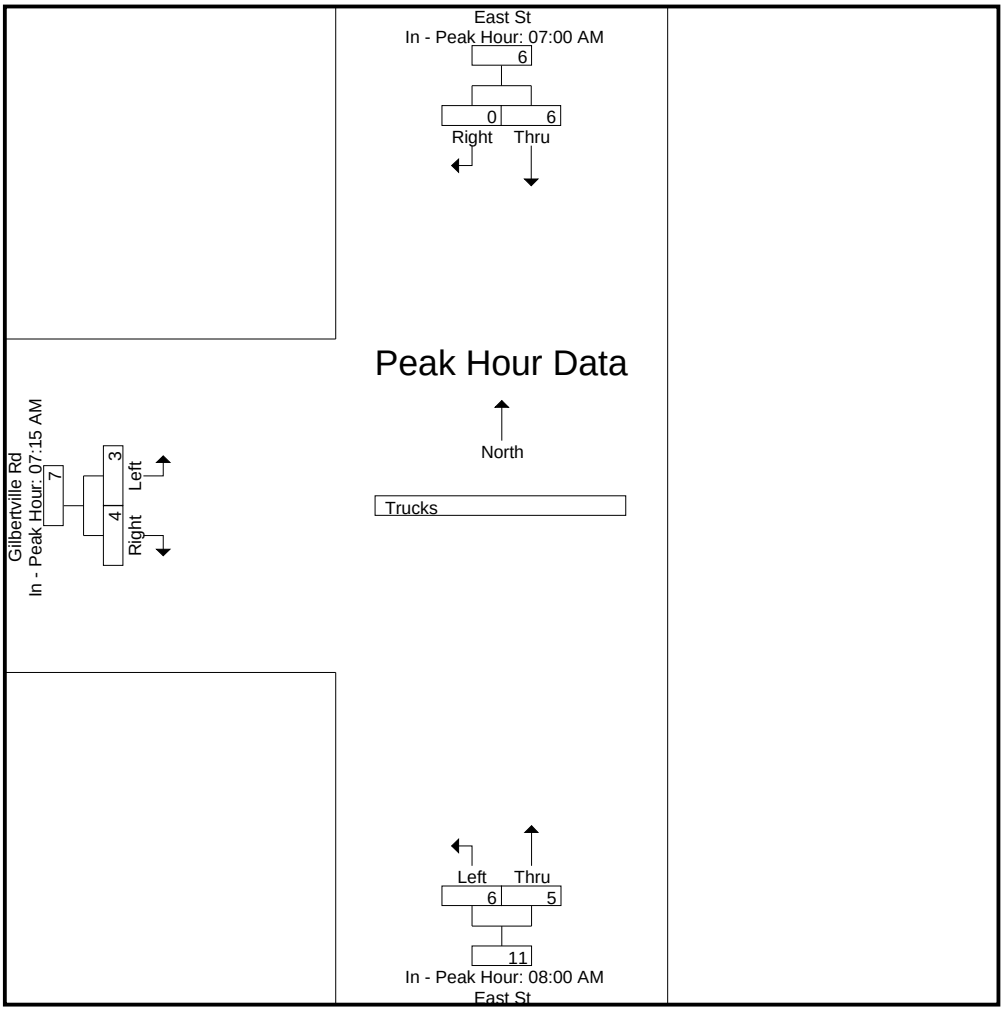
	07:00 AM			08:00 AM			07:15 AM		
+0 mins.	**4**	0	**4**	2	0	2	0	0	0
+15 mins.	1	0	1	0	1	1	**2**	**2**	**4**
+30 mins.	1	0	1	1	**2**	3	0	0	0
+45 mins.	0	0	0	**3**	2	**5**	1	2	3
Total Volume	6	0	6	6	5	11	3	4	7
% App. Total	100	0		54.5	45.5		42.9	57.1	
PHF	.375	.000	.375	.500	.625	.550	.375	.500	.438

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021

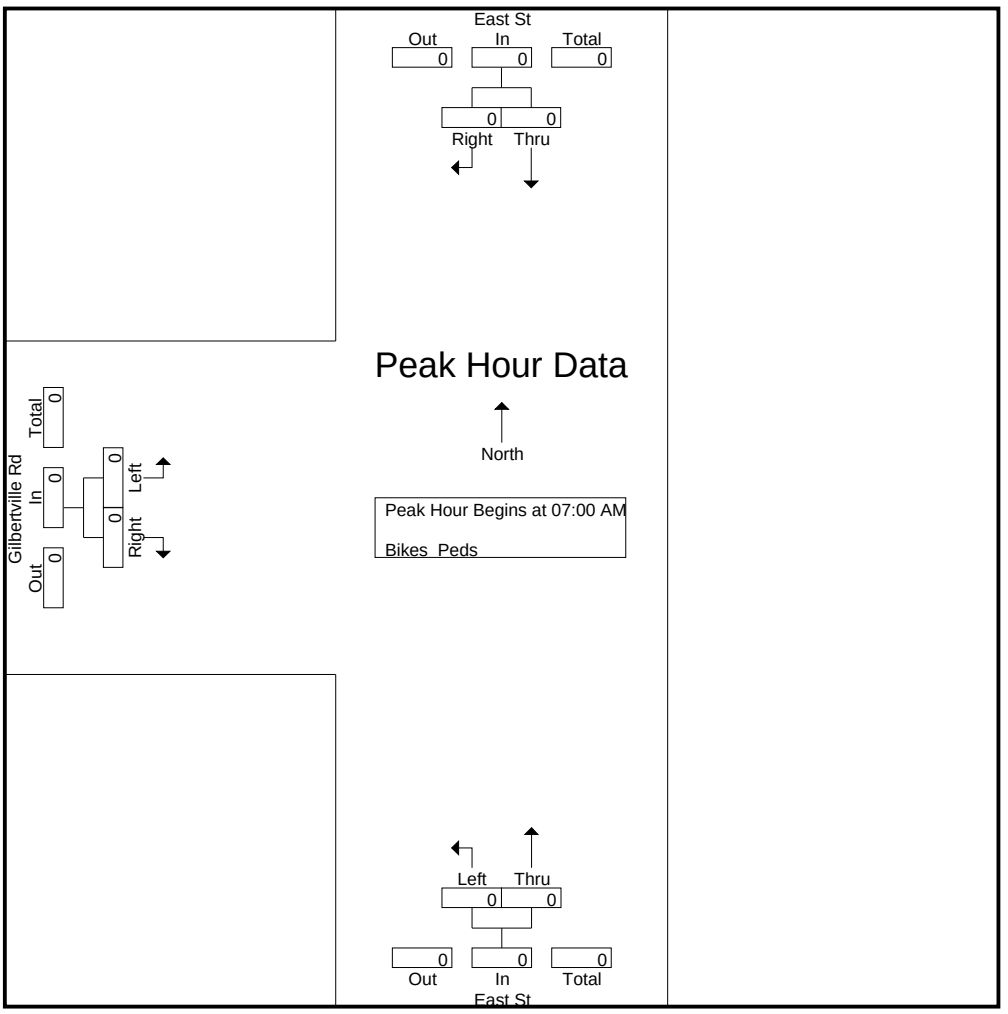
Groups Printed- Bikes Peds

	East St From North			East St From South			Gilbertville Rd From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0		0	0		0	0				
Total %										0	0	

	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 11



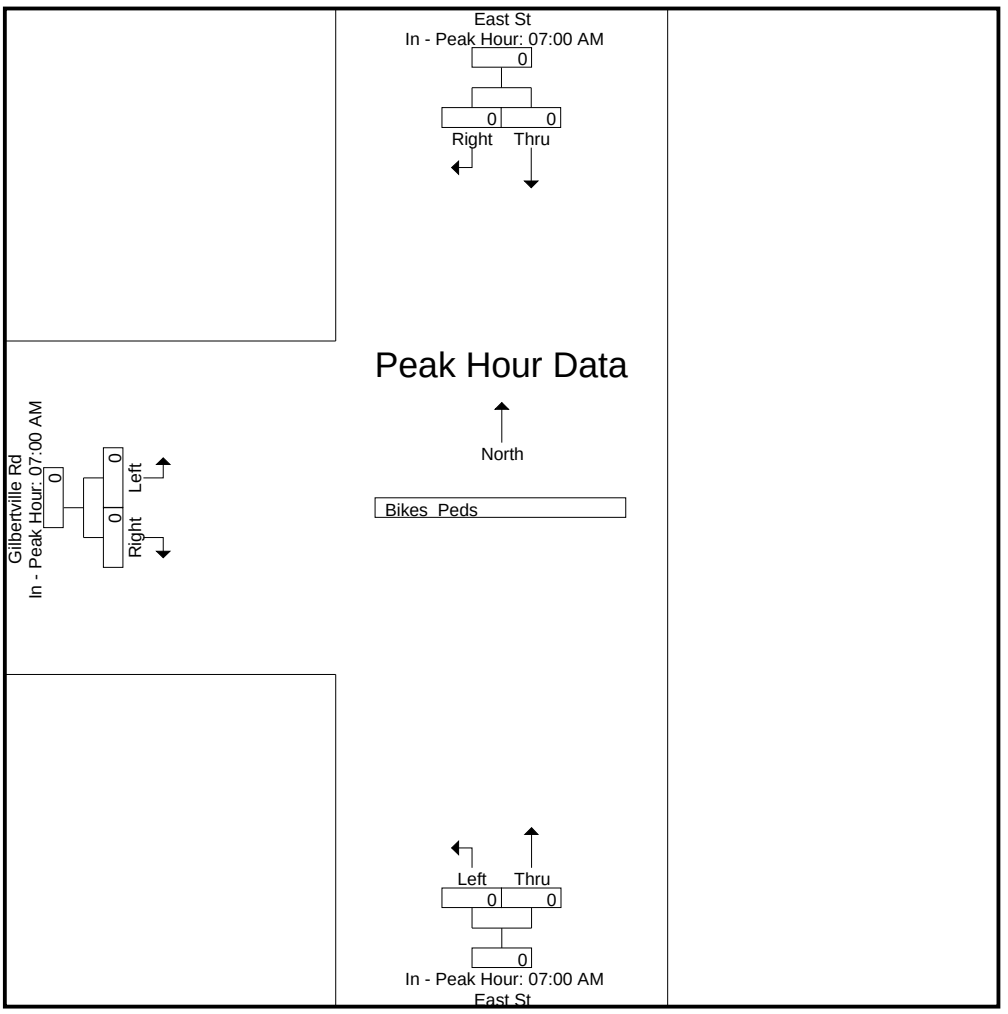
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 1

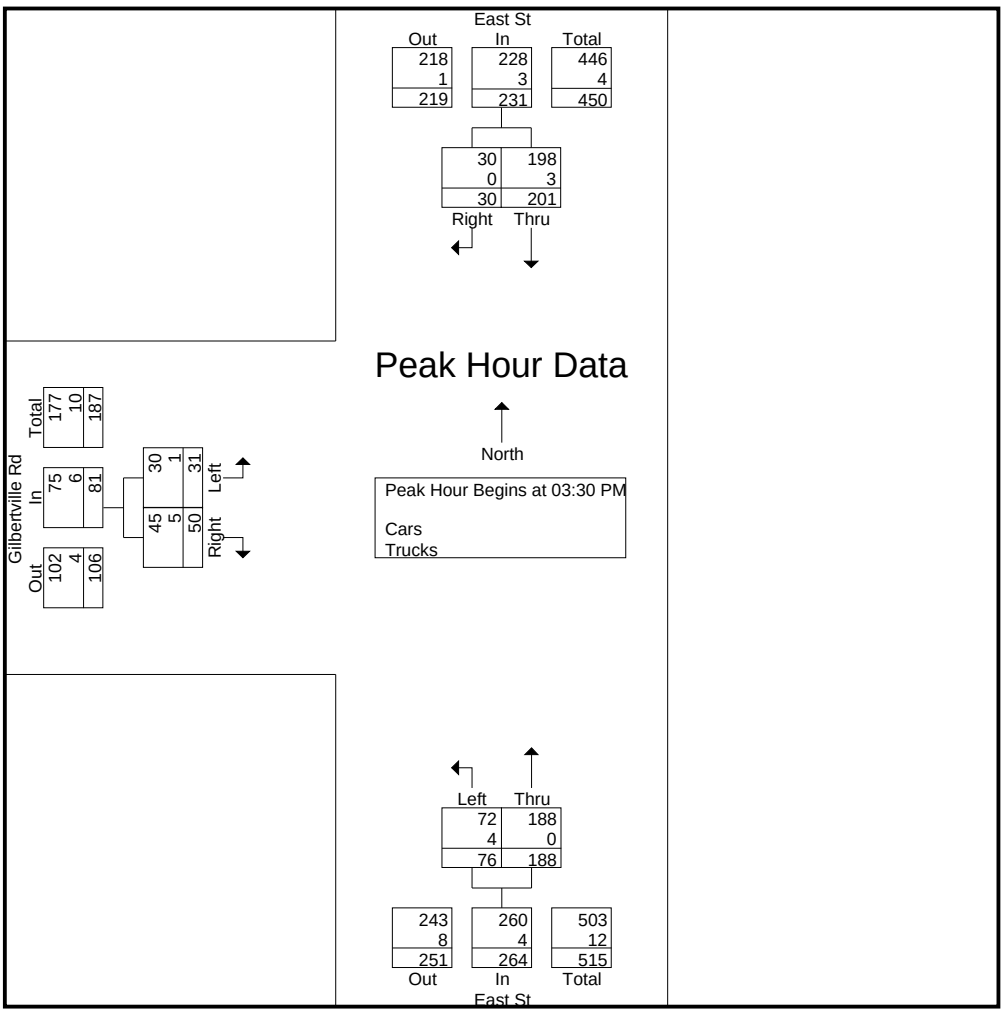
Groups Printed- Cars - Trucks

	East St From North		East St From South		Gilbertville Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
03:00 PM	44	5	16	43	6	11	125
03:15 PM	42	11	20	32	5	15	125
03:30 PM	50	5	17	47	12	14	145
03:45 PM	48	6	22	45	2	15	138
Total	184	27	75	167	25	55	533
04:00 PM	55	10	17	44	8	9	143
04:15 PM	48	9	20	52	9	12	150
04:30 PM	53	6	19	55	2	7	142
04:45 PM	48	7	11	55	1	7	129
Total	204	32	67	206	20	35	564
Grand Total	388	59	142	373	45	90	1097
Apprch %	86.8	13.2	27.6	72.4	33.3	66.7	
Total %	35.4	5.4	12.9	34	4.1	8.2	
Cars	382	57	138	372	44	80	1073
% Cars	98.5	96.6	97.2	99.7	97.8	88.9	97.8
Trucks	6	2	4	1	1	10	24
% Trucks	1.5	3.4	2.8	0.3	2.2	11.1	2.2

	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	50	5	55	17	47	64	**12**	14	**26**	145
03:45 PM	48	6	54	**22**	45	67	2	**15**	17	138
04:00 PM	**55**	**10**	**65**	17	44	61	8	9	17	143
04:15 PM	48	9	57	20	**52**	**72**	9	12	21	**150**
Total Volume	201	30	231	76	188	264	31	50	81	576
% App. Total	87	13		28.8	71.2		38.3	61.7		
PHF	.914	.750	.888	.864	.904	.917	.646	.833	.779	.960
Cars	198	30	228	72	188	260	30	45	75	563
% Cars	98.5	100	98.7	94.7	100	98.5	96.8	90.0	92.6	97.7
Trucks	3	0	3	4	0	4	1	5	6	13
% Trucks	1.5	0	1.3	5.3	0	1.5	3.2	10.0	7.4	2.3

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

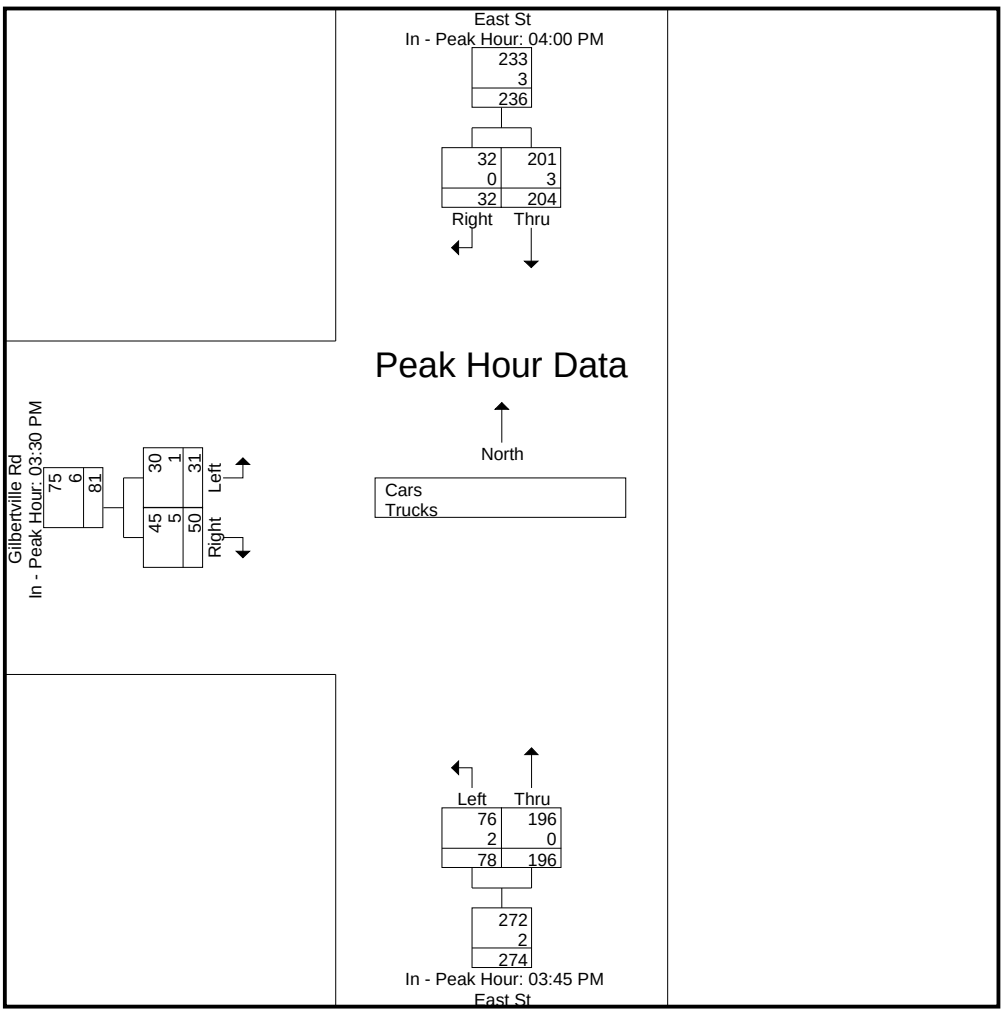
	04:00 PM			03:45 PM			03:30 PM		
+0 mins.	**55**	**10**	**65**	**22**	45	67	**12**	14	**26**
+15 mins.	48	9	57	17	44	61	2	**15**	17
+30 mins.	53	6	59	20	52	72	8	9	17
+45 mins.	48	7	55	19	**55**	**74**	9	12	21
Total Volume	204	32	236	78	196	274	31	50	81
% App. Total	86.4	13.6		28.5	71.5		38.3	61.7	
PHF	.927	.800	.908	.886	.891	.926	.646	.833	.779
Cars	201	32	233	76	196	272	30	45	75
% Cars	98.5	100	98.7	97.4	100	99.3	96.8	90	92.6
Trucks	3	0	3	2	0	2	1	5	6
% Trucks	1.5	0	1.3	2.6	0	0.7	3.2	10	7.4

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021

Groups Printed- Cars

	East St From North		East St From South		Gilbertville Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
03:00 PM	43	3	16	42	6	10	120
03:15 PM	41	11	20	32	5	12	121
03:30 PM	50	5	15	47	11	12	140
03:45 PM	47	6	21	45	2	13	134
Total	181	25	72	166	24	47	515
04:00 PM	54	10	16	44	8	9	141
04:15 PM	47	9	20	52	9	11	148
04:30 PM	52	6	19	55	2	7	141
04:45 PM	48	7	11	55	1	6	128
Total	201	32	66	206	20	33	558
Grand Total	382	57	138	372	44	80	1073
Apprch %	87	13	27.1	72.9	35.5	64.5	
Total %	35.6	5.3	12.9	34.7	4.1	7.5	

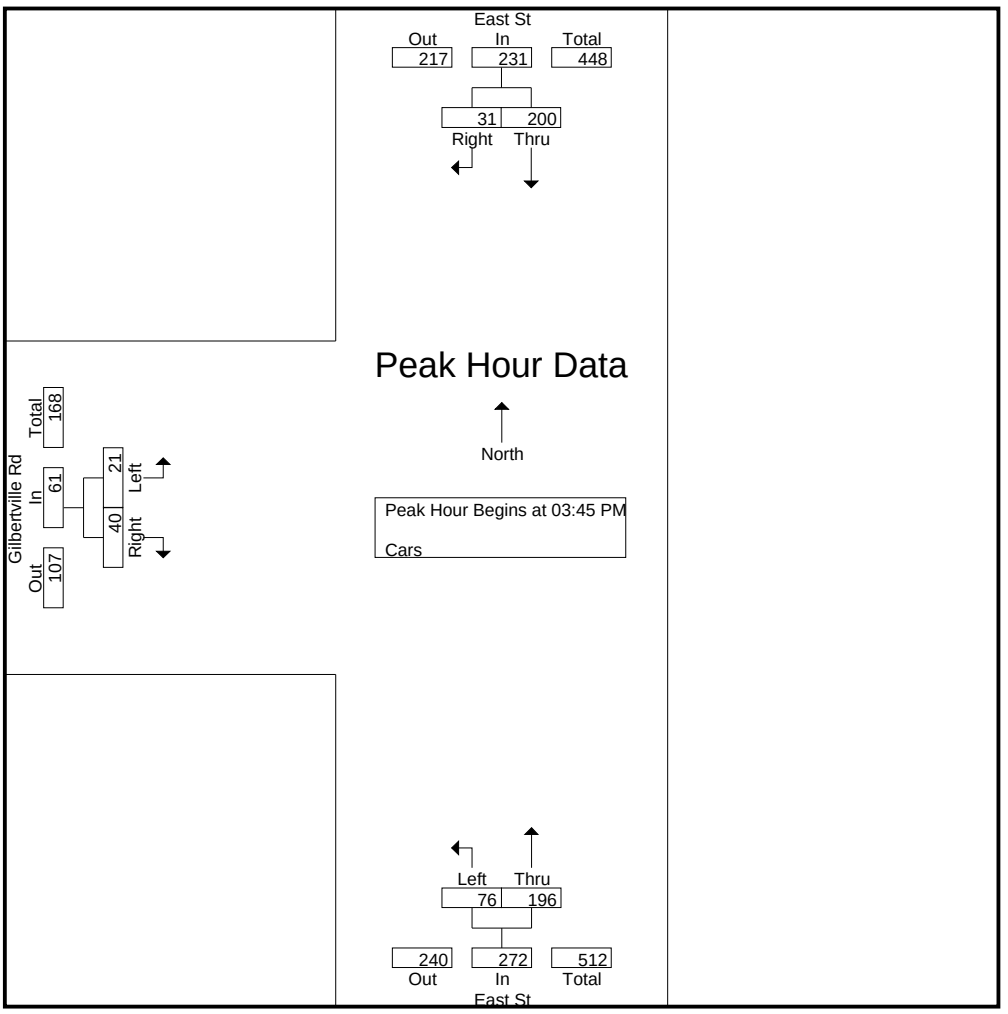
	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:45 PM										
03:45 PM	47	6	53	**21**	45	66	2	**13**	15	134
04:00 PM	**54**	**10**	**64**	16	44	60	8	9	17	141
04:15 PM	47	9	56	20	52	72	**9**	11	**20**	**148**
04:30 PM	52	6	58	19	**55**	**74**	2	7	9	141
Total Volume	200	31	231	76	196	272	21	40	61	564
% App. Total	86.6	13.4		27.9	72.1		34.4	65.6		
PHF	.926	.775	.902	.905	.891	.919	.583	.769	.763	.953

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

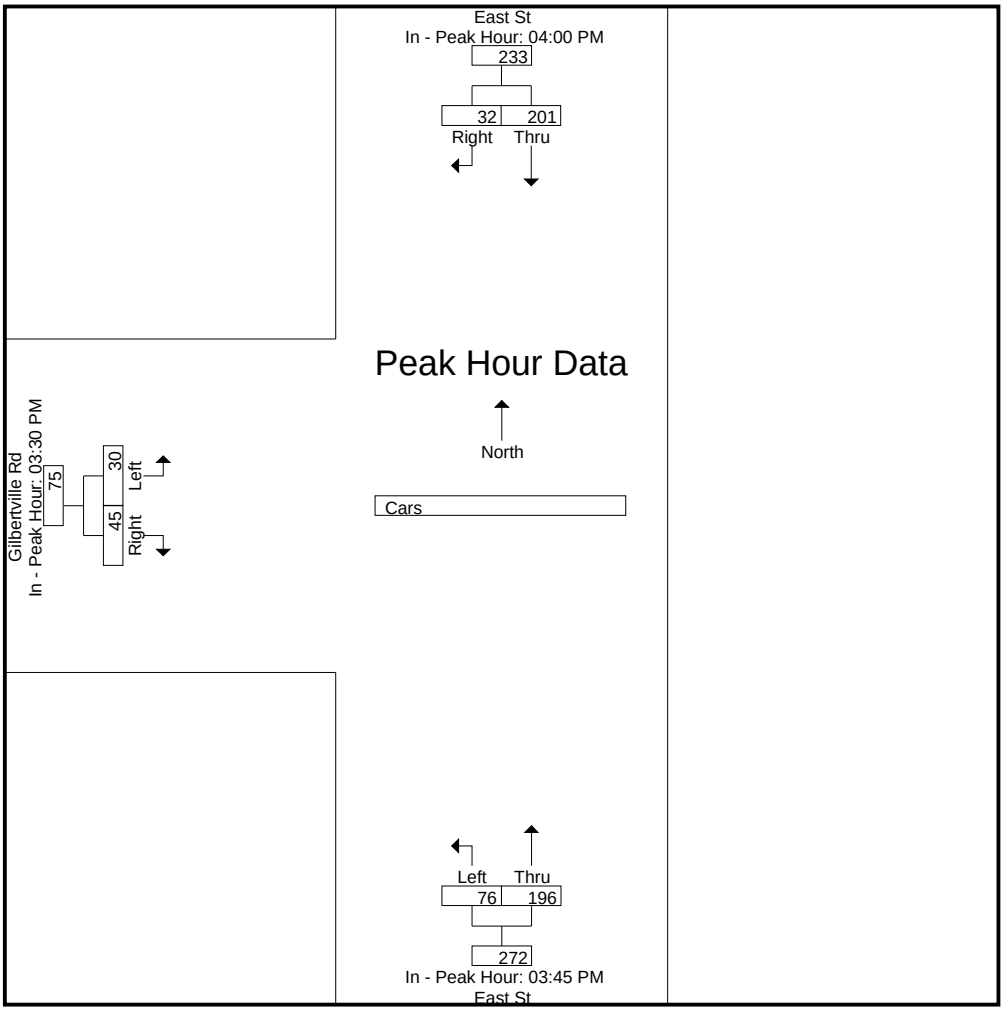
	04:00 PM			03:45 PM			03:30 PM		
+0 mins.	**54**	**10**	**64**	**21**	45	66	**11**	12	**23**
+15 mins.	47	9	56	16	44	60	2	**13**	15
+30 mins.	52	6	58	20	52	72	8	9	17
+45 mins.	48	7	55	19	**55**	**74**	9	11	20
Total Volume	201	32	233	76	196	272	30	45	75
% App. Total	86.3	13.7		27.9	72.1		40	60	
PHF	.931	.800	.910	.905	.891	.919	.682	.865	.815

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021

Groups Printed- Trucks

	East St From North		East St From South		Gilbertville Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
03:00 PM	1	2	0	1	0	1	5
03:15 PM	1	0	0	0	0	3	4
03:30 PM	0	0	2	0	1	2	5
03:45 PM	1	0	1	0	0	2	4
Total	3	2	3	1	1	8	18
04:00 PM	1	0	1	0	0	0	2
04:15 PM	1	0	0	0	0	1	2
04:30 PM	1	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	1	1
Total	3	0	1	0	0	2	6
Grand Total	6	2	4	1	1	10	24
Apprch %	75	25	80	20	9.1	90.9	
Total %	25	8.3	16.7	4.2	4.2	41.7	

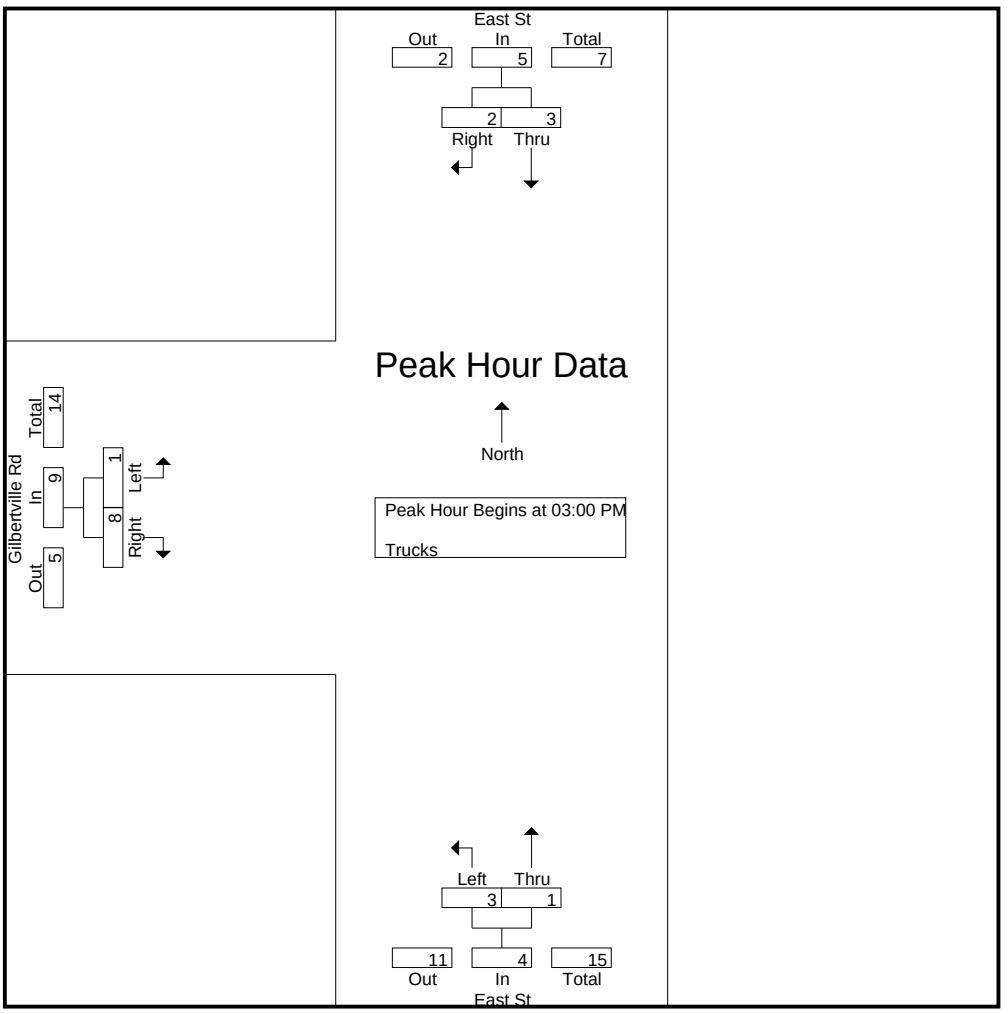
	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	**1**	**2**	**3**	0	**1**	1	0	1	1	**5**
03:15 PM	1	0	1	0	0	0	0	**3**	**3**	4
03:30 PM	0	0	0	**2**	0	**2**	**1**	2	3	5
03:45 PM	1	0	1	1	0	1	0	2	2	4
Total Volume	3	2	5	3	1	4	1	8	9	18
% App. Total	60	40		75	25		11.1	88.9		
PHF	.750	.250	.417	.375	.250	.500	.250	.667	.750	.900

Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 8



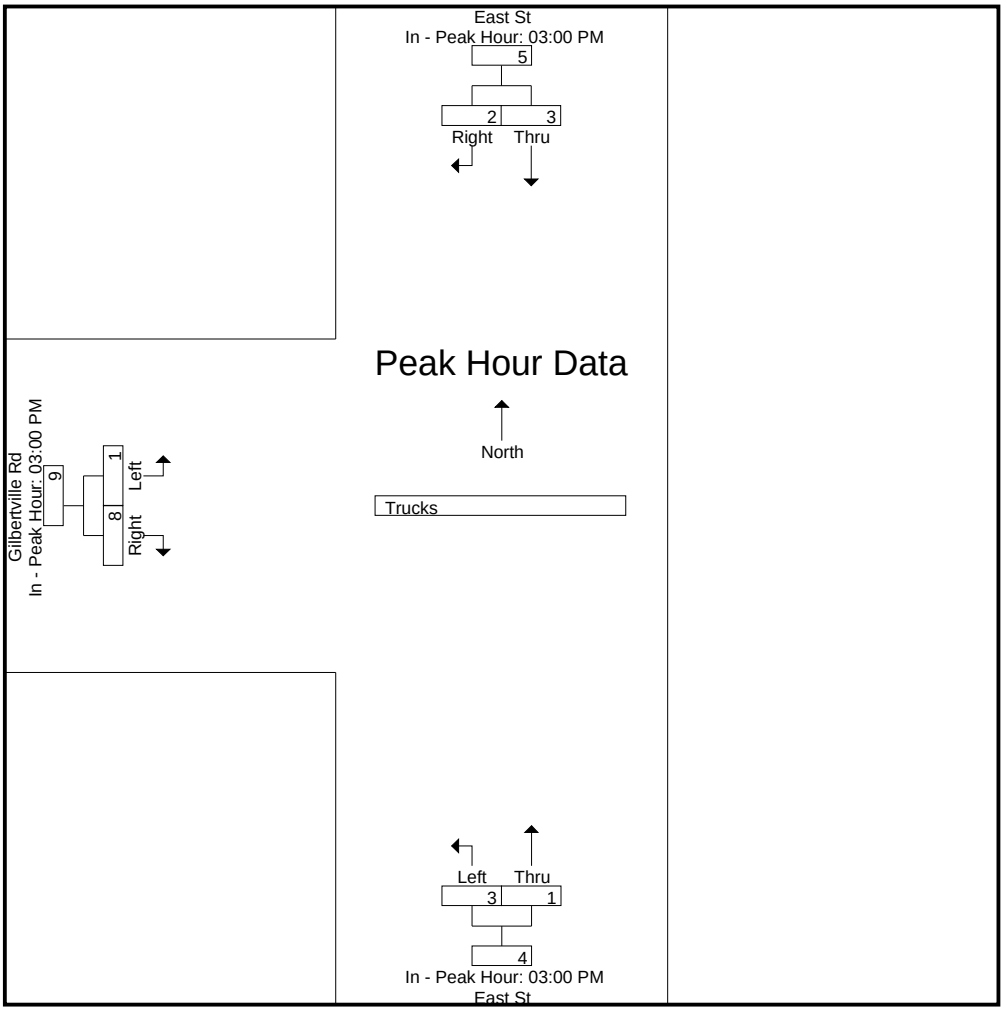
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	03:00 PM			03:00 PM			03:00 PM		
+0 mins.	**1**	**2**	**3**	0	**1**	1	0	1	1
+15 mins.	1	0	1	0	0	0	0	**3**	**3**
+30 mins.	0	0	0	**2**	0	**2**	**1**	2	3
+45 mins.	1	0	1	1	0	1	0	2	2
Total Volume	3	2	5	3	1	4	1	8	9
% App. Total	60	40		75	25		11.1	88.9	
PHF	.750	.250	.417	.375	.250	.500	.250	.667	.750

Accurate Counts
978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021

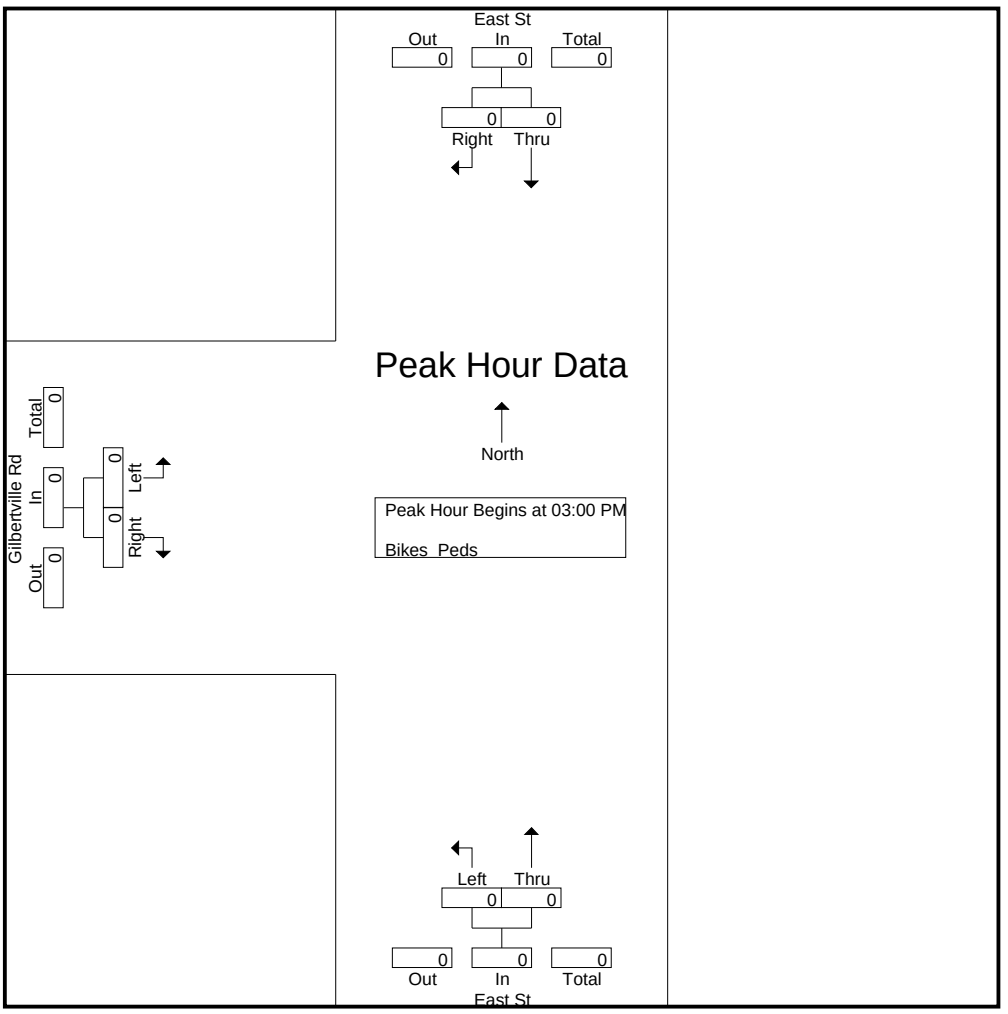
Groups Printed- Bikes Peds

	East St From North			East St From South			Gilbertville Rd From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0		0	0		0	0				
Total %										0	0	

	East St From North			East St From South			Gilbertville Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 11



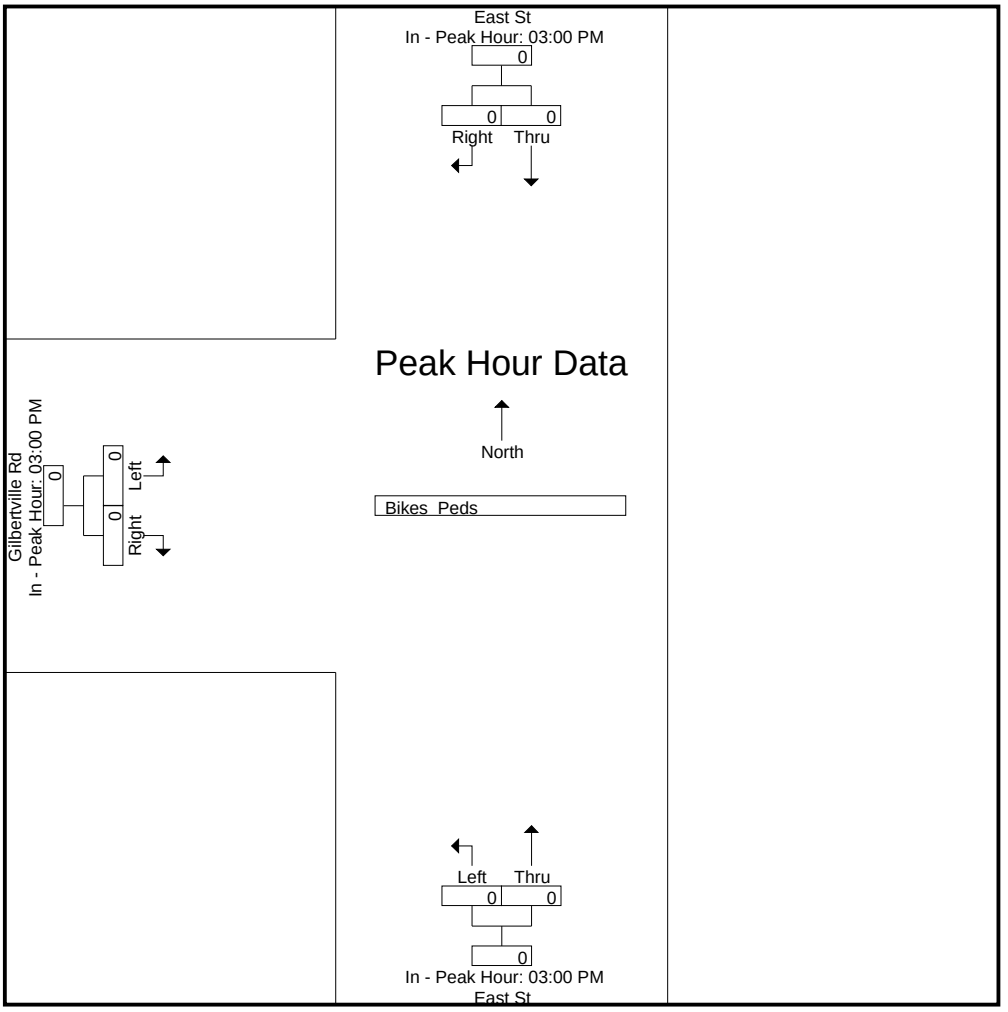
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	03:00 PM			03:00 PM			03:00 PM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : East Street
E/W Street : Gilbertville Road
City/State : Ware, MA
Weather : Clear

File Name : 91300002
Site Code : 91300002
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	Knox Ave From North			East St From East			Knox Ave From South			East St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	4	37	0	2	1	22	0	22	0	88
07:15 AM	0	0	0	1	35	0	0	1	14	0	30	0	81
07:30 AM	0	0	0	12	55	1	0	1	22	0	23	0	114
07:45 AM	0	0	0	12	50	0	1	4	18	0	25	0	110
Total	0	0	0	29	177	1	3	7	76	0	100	0	393
08:00 AM	0	0	0	13	38	0	2	3	25	0	26	4	111
08:15 AM	0	0	0	22	43	0	2	0	13	1	28	2	111
08:30 AM	0	0	0	12	47	0	3	2	21	0	29	0	114
08:45 AM	1	0	0	8	37	0	3	0	18	0	34	1	102
Total	1	0	0	55	165	0	10	5	77	1	117	7	438
Grand Total	1	0	0	84	342	1	13	12	153	1	217	7	831
Apprch %	100	0	0	19.7	80.1	0.2	7.3	6.7	86	0.4	96.4	3.1	
Total %	0.1	0	0	10.1	41.2	0.1	1.6	1.4	18.4	0.1	26.1	0.8	
Cars	0	0	0	84	325	0	13	12	149	0	199	7	789
% Cars	0	0	0	100	95	0	100	100	97.4	0	91.7	100	94.9
Trucks	1	0	0	0	17	1	0	0	4	1	18	0	42
% Trucks	100	0	0	0	5	100	0	0	2.6	100	8.3	0	5.1

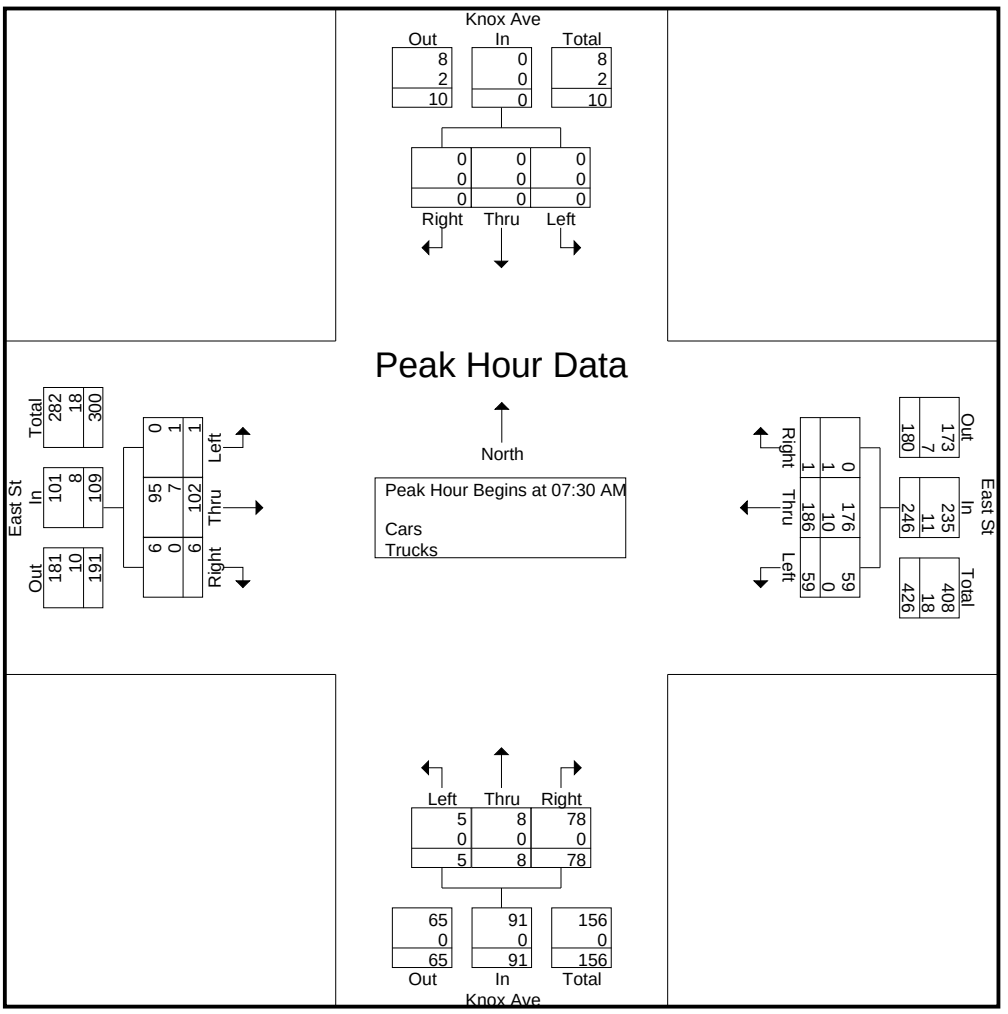
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	12	**55**	**1**	**68**	0	1	22	23	0	23	0	23	**114**
07:45 AM	0	0	0	0	12	50	0	62	1	**4**	18	23	0	25	0	25	110
08:00 AM	0	0	0	0	13	38	0	51	**2**	3	**25**	**30**	0	26	**4**	30	111
08:15 AM	0	0	0	0	**22**	43	0	65	2	0	13	15	**1**	**28**	2	**31**	111
Total Volume	0	0	0	0	59	186	1	246	5	8	78	91	1	102	6	109	446
% App. Total	0	0	0		24	75.6	0.4		5.5	8.8	85.7		0.9	93.6	5.5		
PHF	.000	.000	.000	.000	.670	.845	.250	.904	.625	.500	.780	.758	.250	.911	.375	.879	.978
Cars	0	0	0	0	59	176	0	235	5	8	78	91	0	95	6	101	427
% Cars	0	0	0	0	100	94.6	0	95.5	100	100	100	100	0	93.1	100	92.7	95.7
Trucks	0	0	0	0	0	10	1	11	0	0	0	0	1	7	0	8	19
% Trucks	0	0	0	0	0	5.4	100	4.5	0	0	0	0	100	6.9	0	7.3	4.3

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

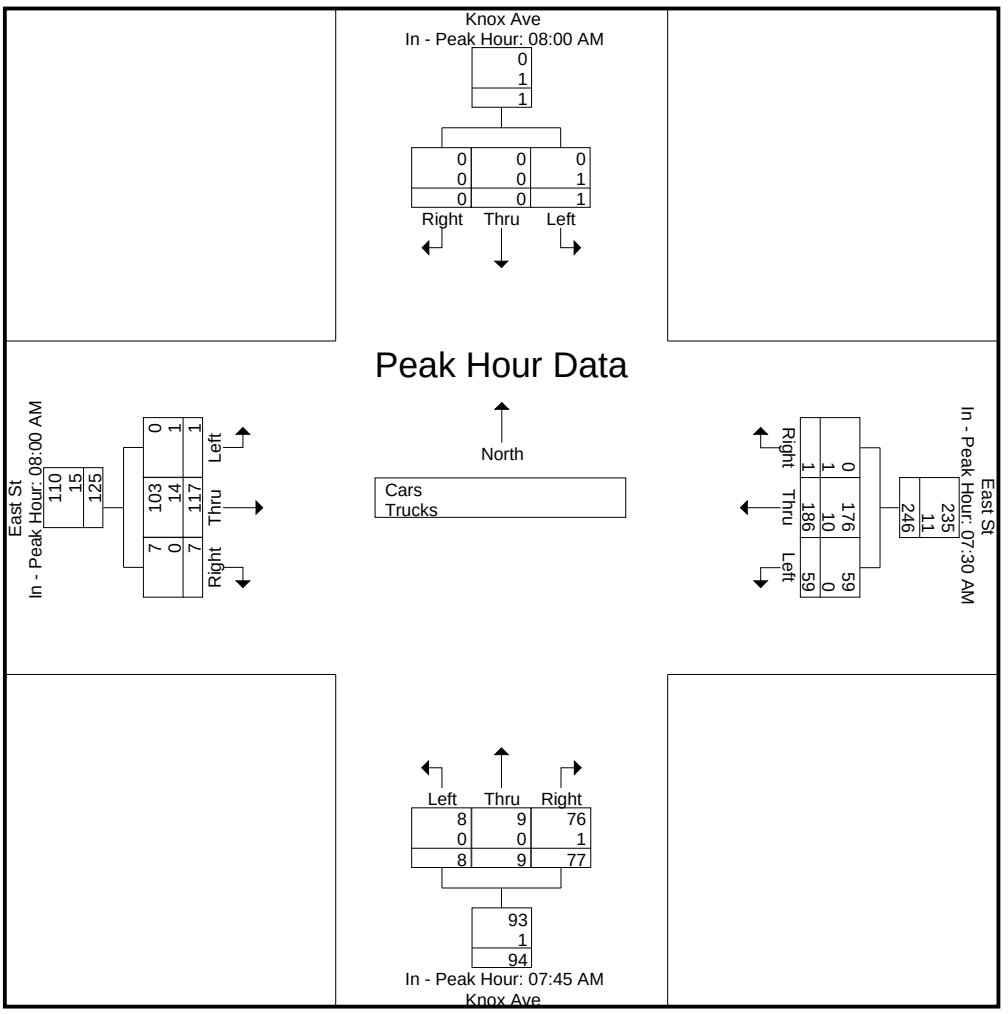
	08:00 AM				07:30 AM				07:45 AM				08:00 AM			
+0 mins.	0	0	0	0	12	**55**	**1**	**68**	1	**4**	18	23	0	26	**4**	30
+15 mins.	0	0	0	0	12	50	0	62	2	3	**25**	**30**	**1**	28	2	31
+30 mins.	0	0	0	0	13	38	0	51	2	0	13	15	0	29	0	29
+45 mins.	**1**	0	0	**1**	**22**	43	0	65	**3**	2	21	26	0	**34**	1	**35**
Total Volume	1	0	0	1	59	186	1	246	8	9	77	94	1	117	7	125
% App. Total	100	0	0		24	75.6	0.4		8.5	9.6	81.9		0.8	93.6	5.6	
PHF	.250	.000	.000	.250	.670	.845	.250	.904	.667	.563	.770	.783	.250	.860	.438	.893
Cars	0	0	0	0	59	176	0	235	8	9	76	93	0	103	7	110
% Cars	0	0	0	0	100	94.6	0	95.5	100	100	98.7	98.9	0	88	100	88
Trucks	1	0	0	1	0	10	1	11	0	0	1	1	1	14	0	15
% Trucks	100	0	0	100	0	5.4	100	4.5	0	0	1.3	1.1	100	12	0	12

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021

Groups Printed- Cars

	Knox Ave From North			East St From East			Knox Ave From South			East St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	4	33	0	2	1	22	0	21	0	83
07:15 AM	0	0	0	1	35	0	0	1	12	0	28	0	77
07:30 AM	0	0	0	12	53	0	0	1	22	0	23	0	111
07:45 AM	0	0	0	12	48	0	1	4	18	0	24	0	107
Total	0	0	0	29	169	0	3	7	74	0	96	0	378
08:00 AM	0	0	0	13	34	0	2	3	25	0	24	4	105
08:15 AM	0	0	0	22	41	0	2	0	13	0	24	2	104
08:30 AM	0	0	0	12	44	0	3	2	20	0	26	0	107
08:45 AM	0	0	0	8	37	0	3	0	17	0	29	1	95
Total	0	0	0	55	156	0	10	5	75	0	103	7	411
Grand Total	0	0	0	84	325	0	13	12	149	0	199	7	789
Apprch %	0	0	0	20.5	79.5	0	7.5	6.9	85.6	0	96.6	3.4	
Total %	0	0	0	10.6	41.2	0	1.6	1.5	18.9	0	25.2	0.9	

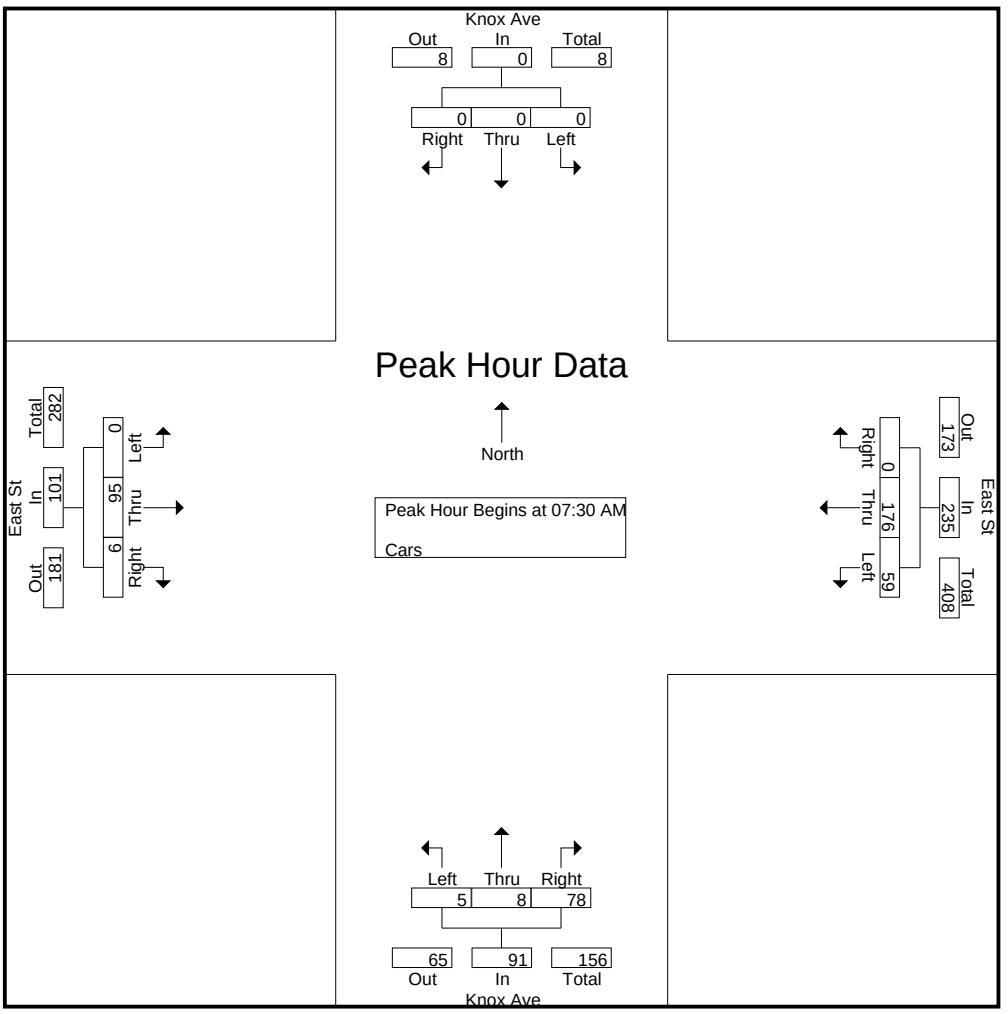
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	12	**53**	0	**65**	0	1	22	23	0	23	0	23	**111**
07:45 AM	0	0	0	0	12	48	0	60	1	**4**	18	23	0	**24**	0	24	107
08:00 AM	0	0	0	0	13	34	0	47	**2**	3	**25**	**30**	0	24	**4**	**28**	105
08:15 AM	0	0	0	0	**22**	41	0	63	2	0	13	15	0	24	2	26	104
Total Volume	0	0	0	0	59	176	0	235	5	8	78	91	0	95	6	101	427
% App. Total	0	0	0		25.1	74.9	0		5.5	8.8	85.7		0	94.1	5.9		
PHF	.000	.000	.000	.000	.670	.830	.000	.904	.625	.500	.780	.758	.000	.990	.375	.902	.962

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

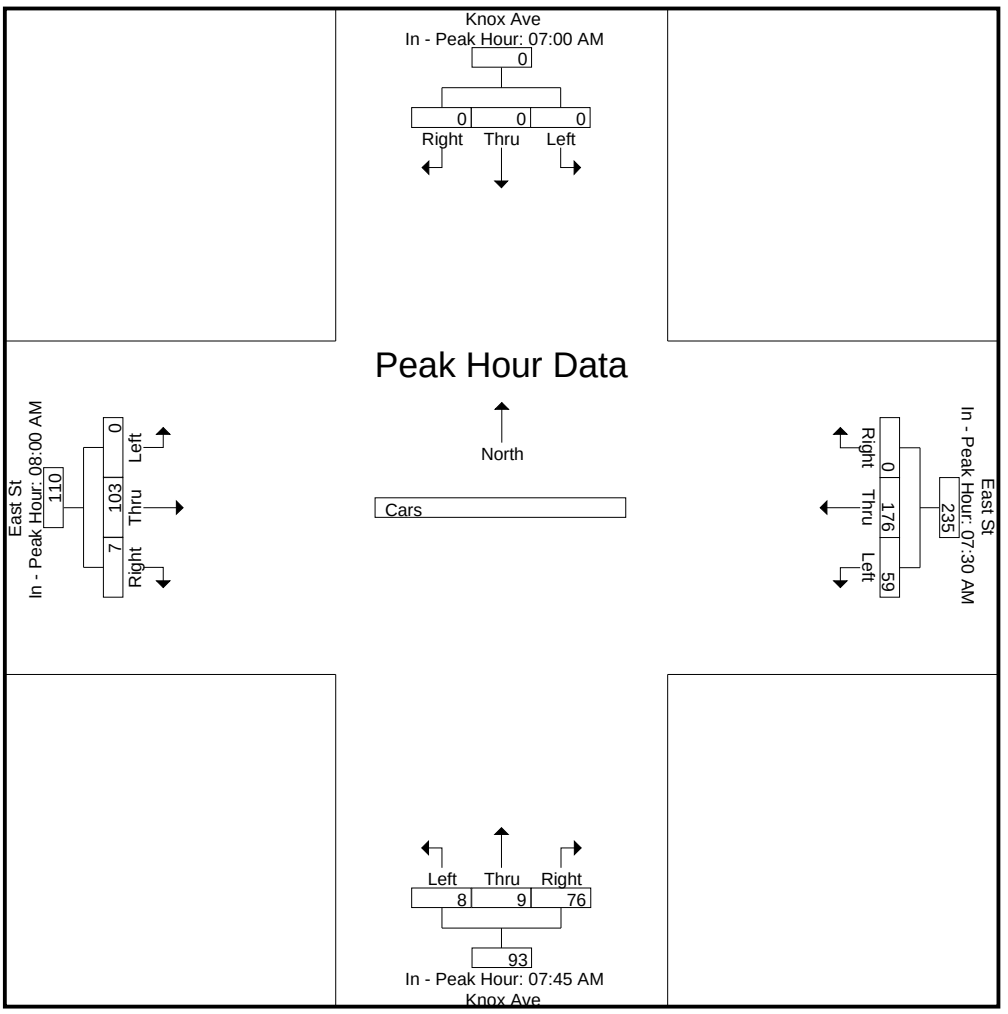
	07:00 AM				07:30 AM				07:45 AM				08:00 AM			
+0 mins.	0	0	0	0	12	**53**	0	**65**	1	**4**	18	23	0	24	**4**	28
+15 mins.	0	0	0	0	12	48	0	60	2	3	**25**	**30**	0	24	2	26
+30 mins.	0	0	0	0	13	34	0	47	2	0	13	15	0	26	0	26
+45 mins.	0	0	0	0	**22**	41	0	63	**3**	2	20	25	0	**29**	1	**30**
Total Volume	0	0	0	0	59	176	0	235	8	9	76	93	0	103	7	110
% App. Total	0	0	0		25.1	74.9	0		8.6	9.7	81.7		0	93.6	6.4	
PHF	.000	.000	.000	.000	.670	.830	.000	.904	.667	.563	.760	.775	.000	.888	.438	.917

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021

Groups Printed- Trucks

	Knox Ave From North			East St From East			Knox Ave From South			East St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	0	4	0	0	0	0	0	1	0	5
07:15 AM	0	0	0	0	0	0	0	0	2	0	2	0	4
07:30 AM	0	0	0	0	2	1	0	0	0	0	0	0	3
07:45 AM	0	0	0	0	2	0	0	0	0	0	1	0	3
Total	0	0	0	0	8	1	0	0	2	0	4	0	15
08:00 AM	0	0	0	0	4	0	0	0	0	0	2	0	6
08:15 AM	0	0	0	0	2	0	0	0	0	1	4	0	7
08:30 AM	0	0	0	0	3	0	0	0	1	0	3	0	7
08:45 AM	1	0	0	0	0	0	0	0	1	0	5	0	7
Total	1	0	0	0	9	0	0	0	2	1	14	0	27
Grand Total	1	0	0	0	17	1	0	0	4	1	18	0	42
Apprch %	100	0	0	0	94.4	5.6	0	0	100	5.3	94.7	0	
Total %	2.4	0	0	0	40.5	2.4	0	0	9.5	2.4	42.9	0	

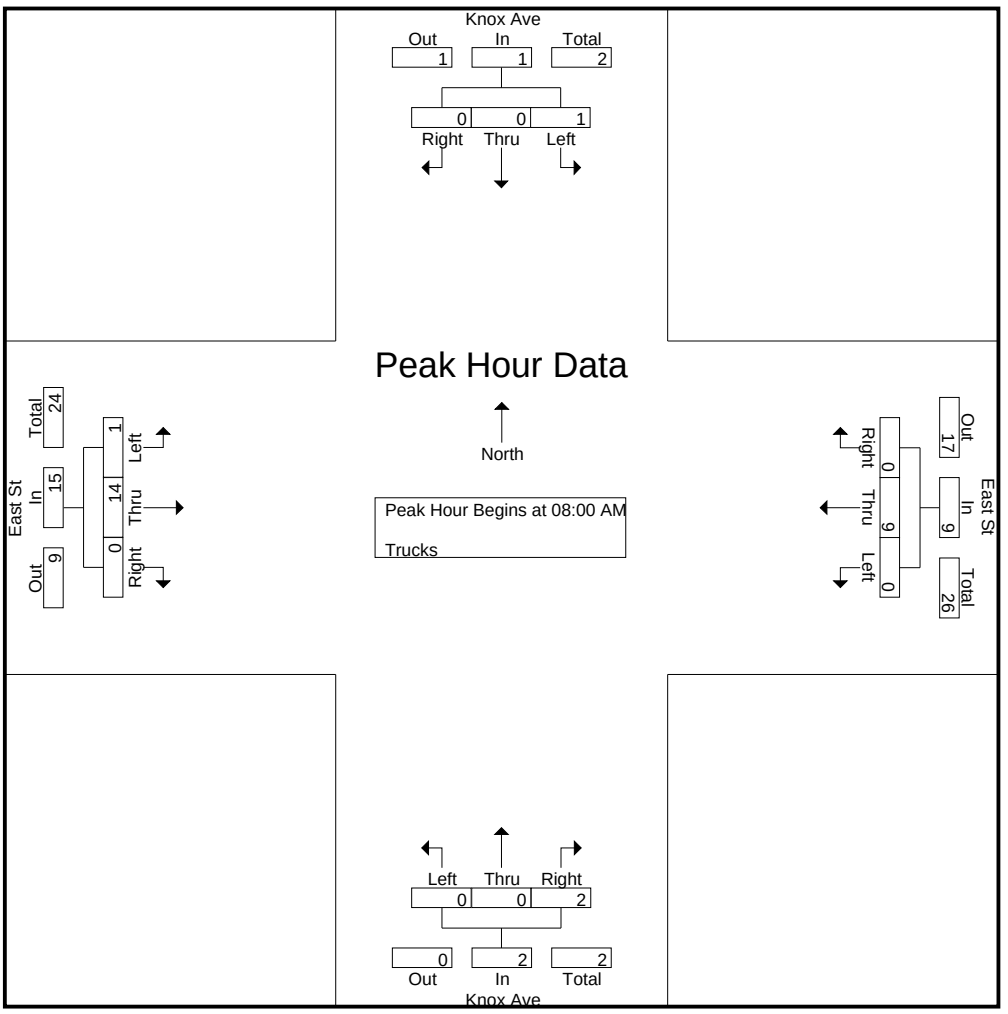
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	0	**4**	0	**4**	0	0	0	0	0	2	0	2	6
08:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	**1**	4	0	**5**	**7**
08:30 AM	0	0	0	0	0	3	0	3	0	0	**1**	**1**	0	3	0	3	7
08:45 AM	**1**	0	0	**1**	0	0	0	0	0	0	1	1	0	**5**	0	5	7
Total Volume	1	0	0	1	0	9	0	9	0	0	2	2	1	14	0	15	27
% App. Total	100	0	0		0	100	0		0	0	100		6.7	93.3	0		
PHF	.250	.000	.000	.250	.000	.563	.000	.563	.000	.000	.500	.500	.250	.700	.000	.750	.964

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

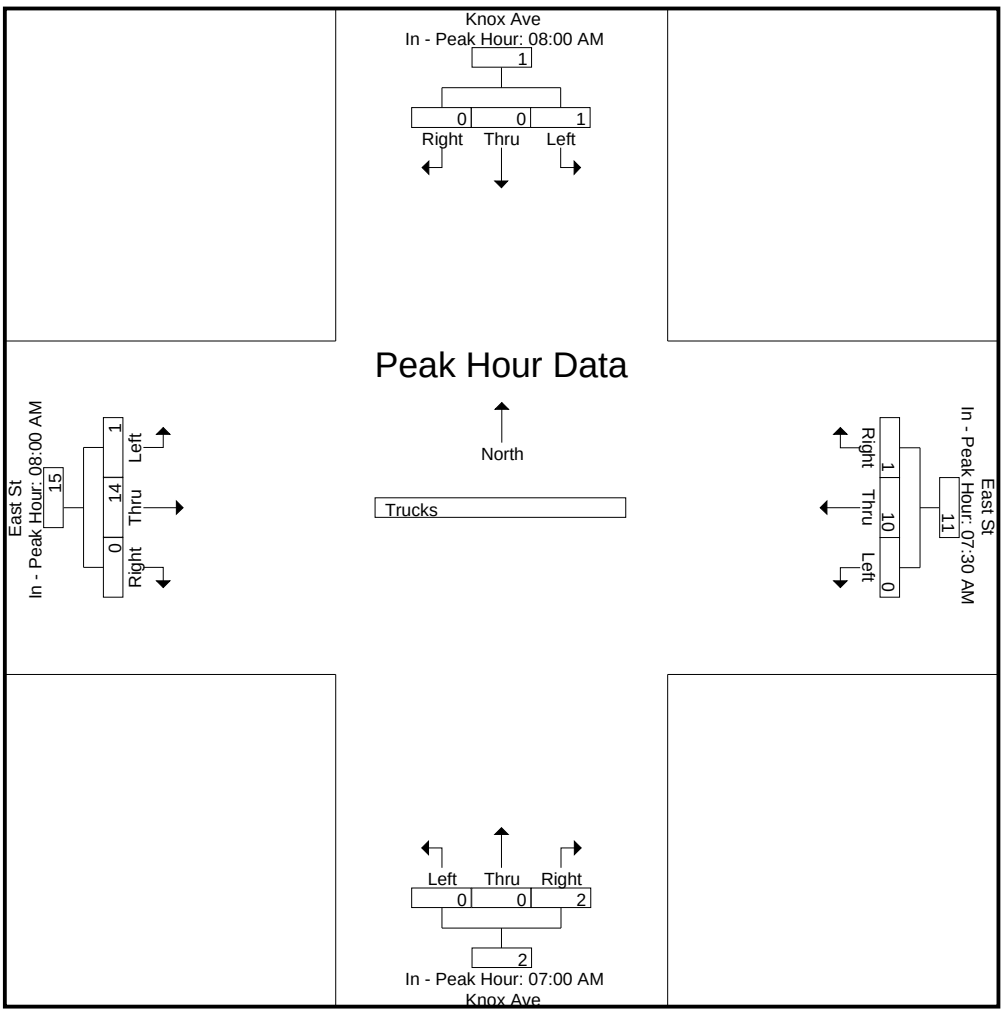
	08:00 AM				07:30 AM				07:00 AM				08:00 AM			
+0 mins.	0	0	0	0	0	2	**1**	3	0	0	0	0	0	2	0	2
+15 mins.	0	0	0	0	0	2	0	2	0	0	**2**	**2**	**1**	4	0	**5**
+30 mins.	0	0	0	0	0	**4**	0	**4**	0	0	0	0	0	3	0	3
+45 mins.	**1**	0	0	**1**	0	2	0	2	0	0	0	0	0	**5**	0	5
Total Volume	1	0	0	1	0	10	1	11	0	0	2	2	1	14	0	15
% App. Total	100	0	0		0	90.9	9.1		0	0	100		6.7	93.3	0	
PHF	.250	.000	.000	.250	.000	.625	.250	.688	.000	.000	.250	.250	.250	.700	.000	.750

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021

Groups Printed- Bikes Peds

	Knox Ave From North				East St From East				Knox Ave From South				East St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	

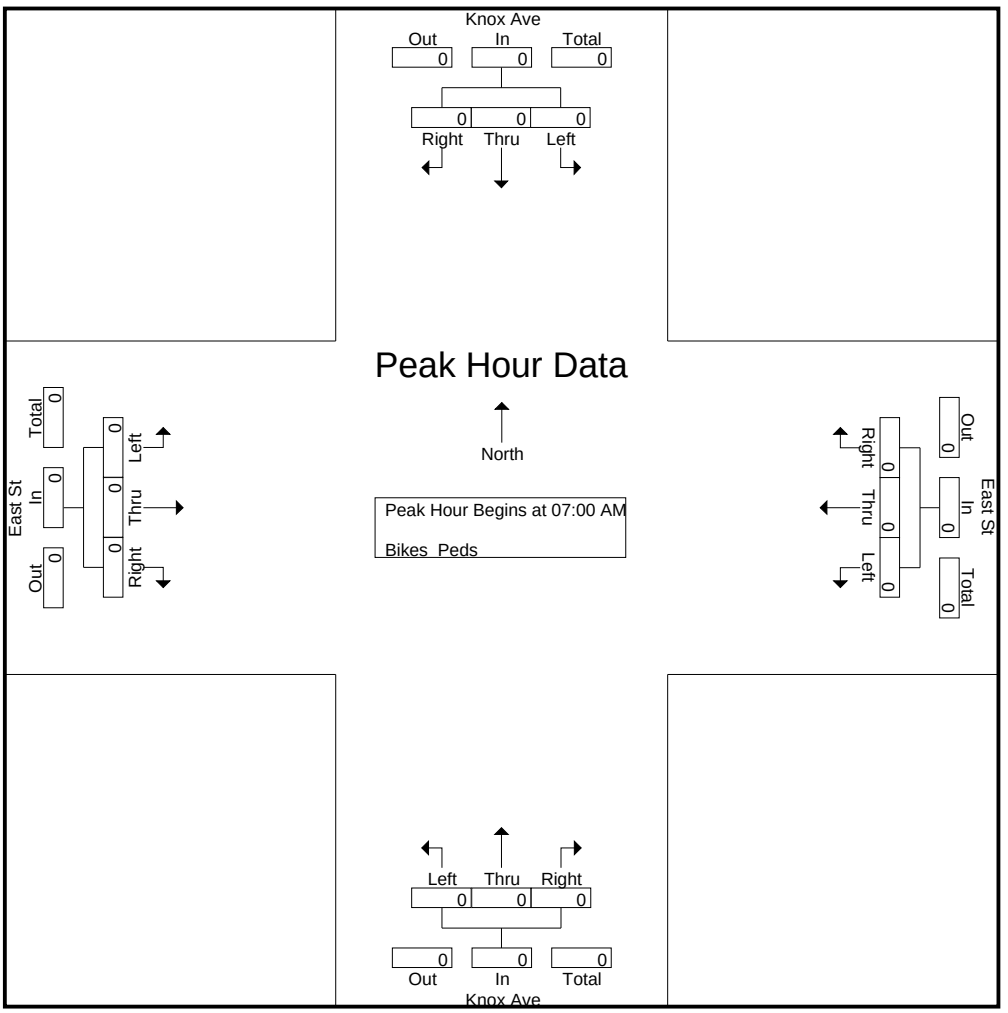
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

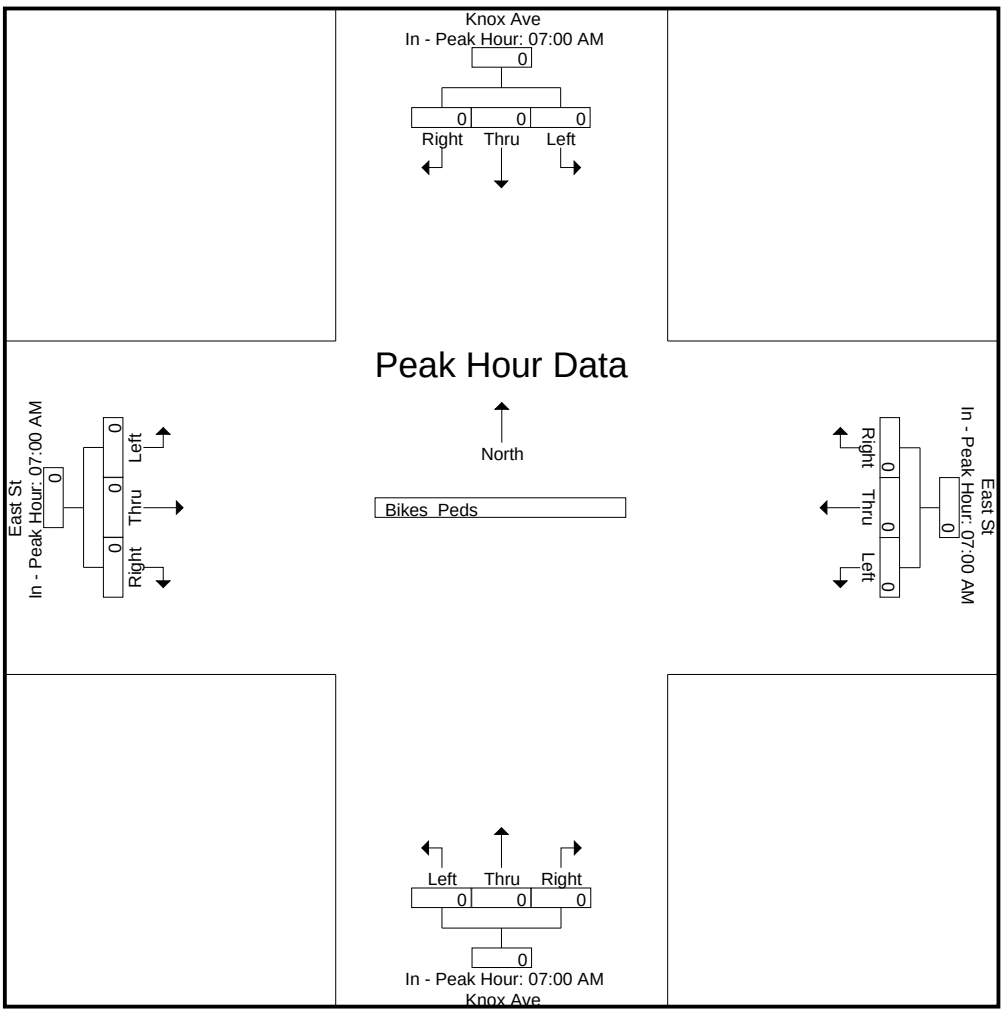
	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	Knox Ave From North			East St From East			Knox Ave From South			East St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
03:00 PM	0	0	0	7	58	0	1	0	18	0	48	2	134
03:15 PM	0	0	0	5	52	2	2	0	24	0	51	3	139
03:30 PM	0	0	0	6	55	0	2	1	24	0	52	1	141
03:45 PM	0	1	0	12	66	2	3	1	27	0	55	3	170
Total	0	1	0	30	231	4	8	2	93	0	206	9	584
04:00 PM	0	1	0	6	60	0	3	0	29	0	39	3	141
04:15 PM	0	0	0	9	58	1	2	1	26	0	65	2	164
04:30 PM	0	0	0	8	46	0	7	0	36	0	49	1	147
04:45 PM	1	0	0	11	71	0	3	0	25	0	51	1	163
Total	1	1	0	34	235	1	15	1	116	0	204	7	615
Grand Total	1	2	0	64	466	5	23	3	209	0	410	16	1199
Apprch %	33.3	66.7	0	12	87.1	0.9	9.8	1.3	88.9	0	96.2	3.8	
Total %	0.1	0.2	0	5.3	38.9	0.4	1.9	0.3	17.4	0	34.2	1.3	
Cars	1	1	0	63	454	5	23	2	209	0	404	16	1178
% Cars	100	50	0	98.4	97.4	100	100	66.7	100	0	98.5	100	98.2
Trucks	0	1	0	1	12	0	0	1	0	0	6	0	21
% Trucks	0	50	0	1.6	2.6	0	0	33.3	0	0	1.5	0	1.8

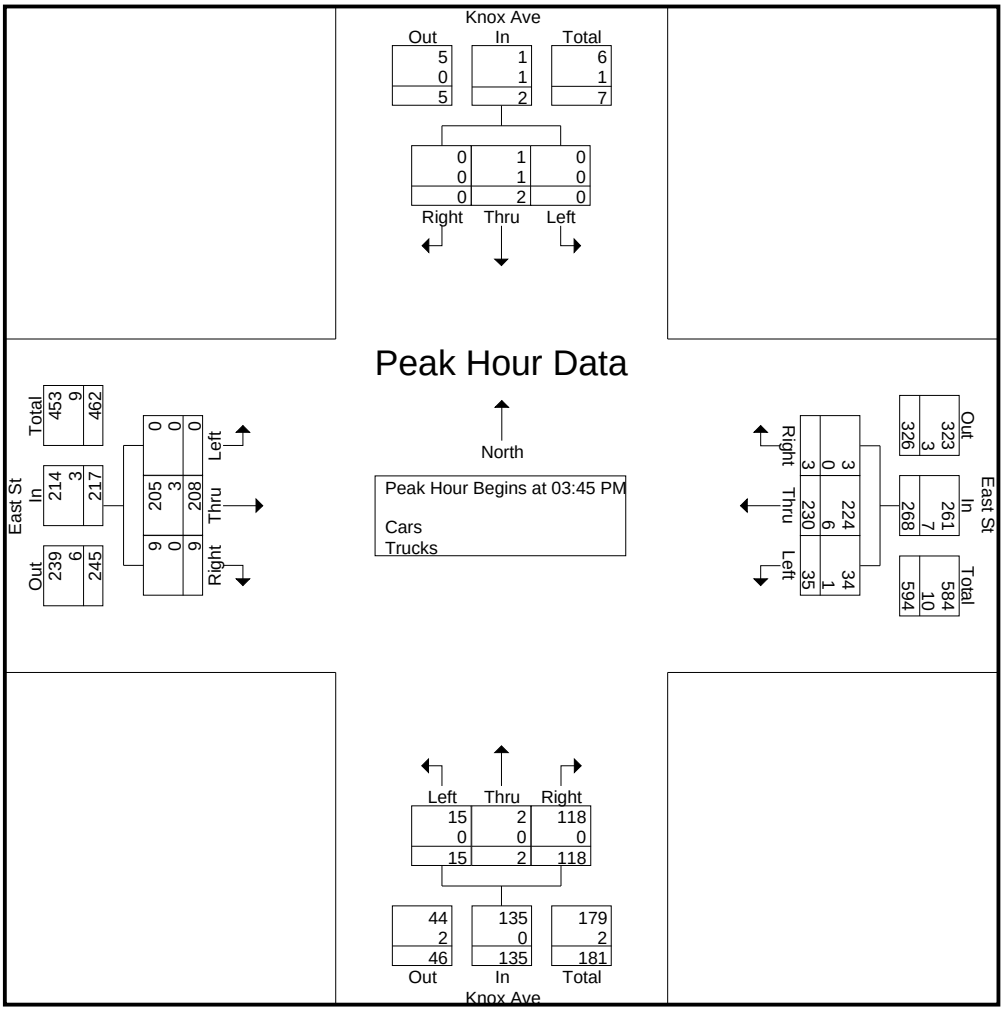
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	0	**1**	0	**1**	**12**	**66**	**2**	**80**	3	**1**	27	31	0	55	**3**	58	**170**
04:00 PM	0	1	0	1	6	60	0	66	3	0	29	32	0	39	3	42	141
04:15 PM	0	0	0	0	9	58	1	68	2	1	26	29	0	**65**	2	**67**	164
04:30 PM	0	0	0	0	8	46	0	54	**7**	0	**36**	**43**	0	49	1	50	147
Total Volume	0	2	0	2	35	230	3	268	15	2	118	135	0	208	9	217	622
% App. Total	0	100	0		13.1	85.8	1.1		11.1	1.5	87.4		0	95.9	4.1		
PHF	.000	.500	.000	.500	.729	.871	.375	.838	.536	.500	.819	.785	.000	.800	.750	.810	.915
Cars	0	1	0	1	34	224	3	261	15	2	118	135	0	205	9	214	611
% Cars	0	50.0	0	50.0	97.1	97.4	100	97.4	100	100	100	100	0	98.6	100	98.6	98.2
Trucks	0	1	0	1	1	6	0	7	0	0	0	0	0	3	0	3	11
% Trucks	0	50.0	0	50.0	2.9	2.6	0	2.6	0	0	0	0	0	1.4	0	1.4	1.8

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

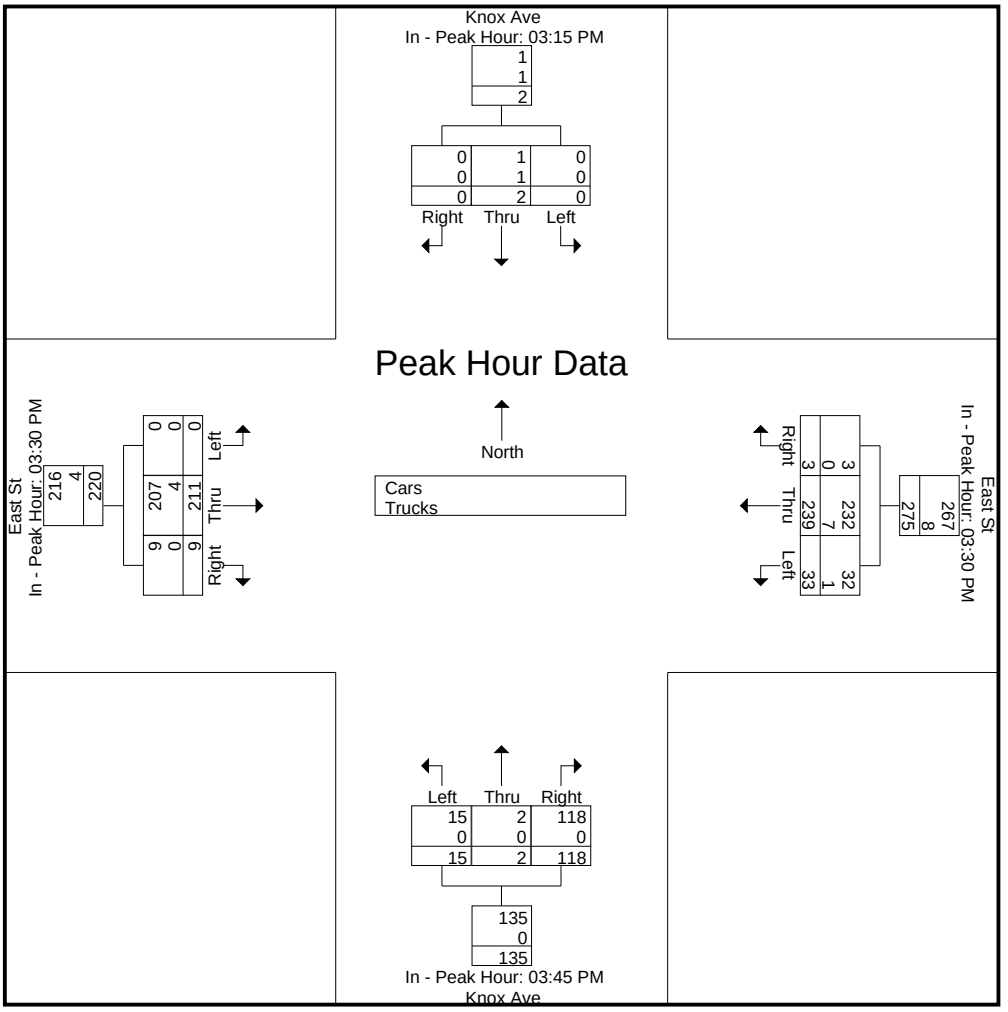
	03:15 PM				03:30 PM				03:45 PM				03:30 PM			
+0 mins.	0	0	0	0	6	55	0	61	3	**1**	27	31	0	52	1	53
+15 mins.	0	0	0	0	**12**	**66**	**2**	**80**	3	0	29	32	0	55	**3**	58
+30 mins.	0	**1**	0	**1**	6	60	0	66	2	1	26	29	0	39	3	42
+45 mins.	0	1	0	1	9	58	1	68	**7**	0	**36**	**43**	0	**65**	2	**67**
Total Volume	0	2	0	2	33	239	3	275	15	2	118	135	0	211	9	220
% App. Total	0	100	0		12	86.9	1.1		11.1	1.5	87.4		0	95.9	4.1	
PHF	.000	.500	.000	.500	.688	.905	.375	.859	.536	.500	.819	.785	.000	.812	.750	.821
Cars	0	1	0	1	32	232	3	267	15	2	118	135	0	207	9	216
% Cars	0	50	0	50	97	97.1	100	97.1	100	100	100	100	0	98.1	100	98.2
Trucks	0	1	0	1	1	7	0	8	0	0	0	0	0	4	0	4
% Trucks	0	50	0	50	3	2.9	0	2.9	0	0	0	0	0	1.9	0	1.8

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021

Groups Printed- Cars

	Knox Ave From North			East St From East			Knox Ave From South			East St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
03:00 PM	0	0	0	7	56	0	1	0	18	0	47	2	131
03:15 PM	0	0	0	5	51	2	2	0	24	0	51	3	138
03:30 PM	0	0	0	6	53	0	2	0	24	0	50	1	136
03:45 PM	0	0	0	12	62	2	3	1	27	0	53	3	163
Total	0	0	0	30	222	4	8	1	93	0	201	9	568
04:00 PM	0	1	0	6	60	0	3	0	29	0	39	3	141
04:15 PM	0	0	0	8	57	1	2	1	26	0	65	2	162
04:30 PM	0	0	0	8	45	0	7	0	36	0	48	1	145
04:45 PM	1	0	0	11	70	0	3	0	25	0	51	1	162
Total	1	1	0	33	232	1	15	1	116	0	203	7	610
Grand Total	1	1	0	63	454	5	23	2	209	0	404	16	1178
Apprch %	50	50	0	12.1	87	1	9.8	0.9	89.3	0	96.2	3.8	
Total %	0.1	0.1	0	5.3	38.5	0.4	2	0.2	17.7	0	34.3	1.4	

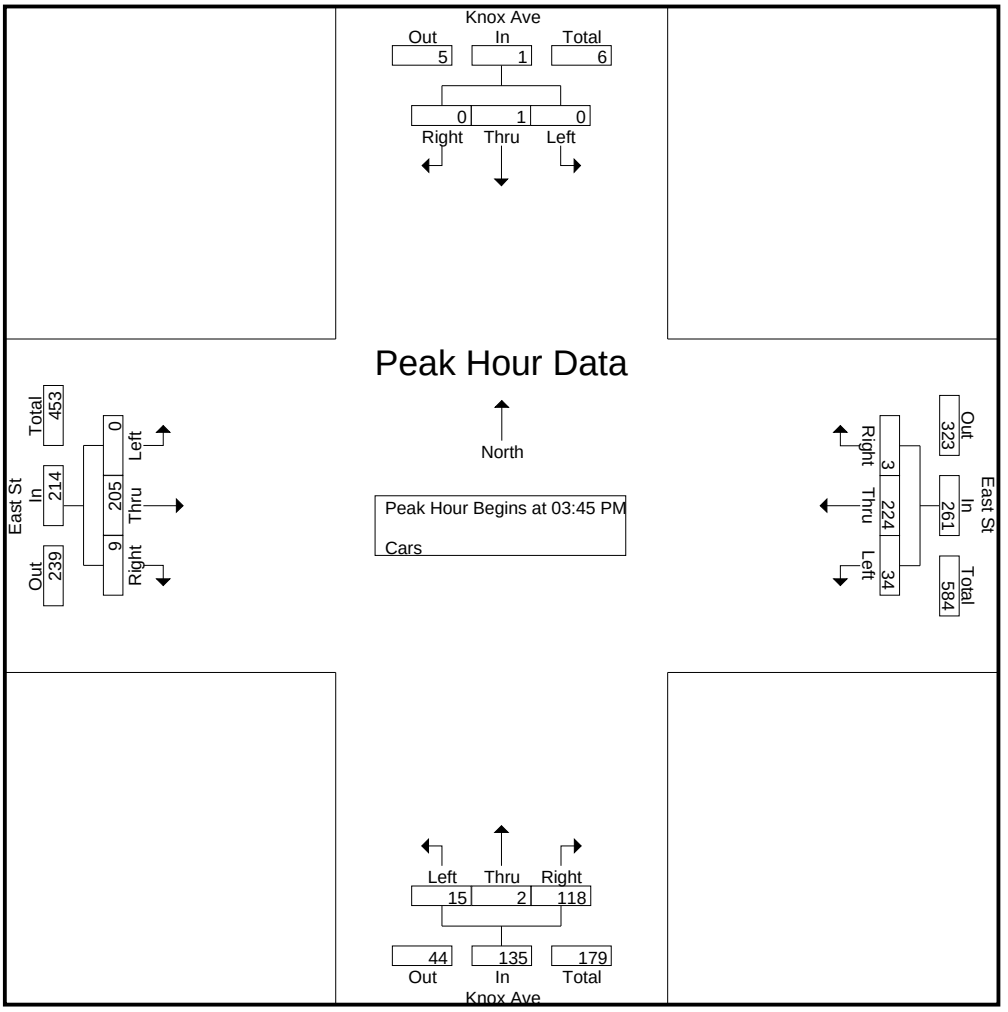
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	0	0	0	0	**12**	**62**	**2**	**76**	3	**1**	27	31	0	53	**3**	56	**163**
04:00 PM	0	**1**	0	**1**	6	60	0	66	3	0	29	32	0	39	3	42	141
04:15 PM	0	0	0	0	8	57	1	66	2	1	26	29	0	**65**	2	**67**	162
04:30 PM	0	0	0	0	8	45	0	53	**7**	0	**36**	**43**	0	48	1	49	145
Total Volume	0	1	0	1	34	224	3	261	15	2	118	135	0	205	9	214	611
% App. Total	0	100	0		13	85.8	1.1		11.1	1.5	87.4		0	95.8	4.2		
PHF	.000	.250	.000	.250	.708	.903	.375	.859	.536	.500	.819	.785	.000	.788	.750	.799	.937

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

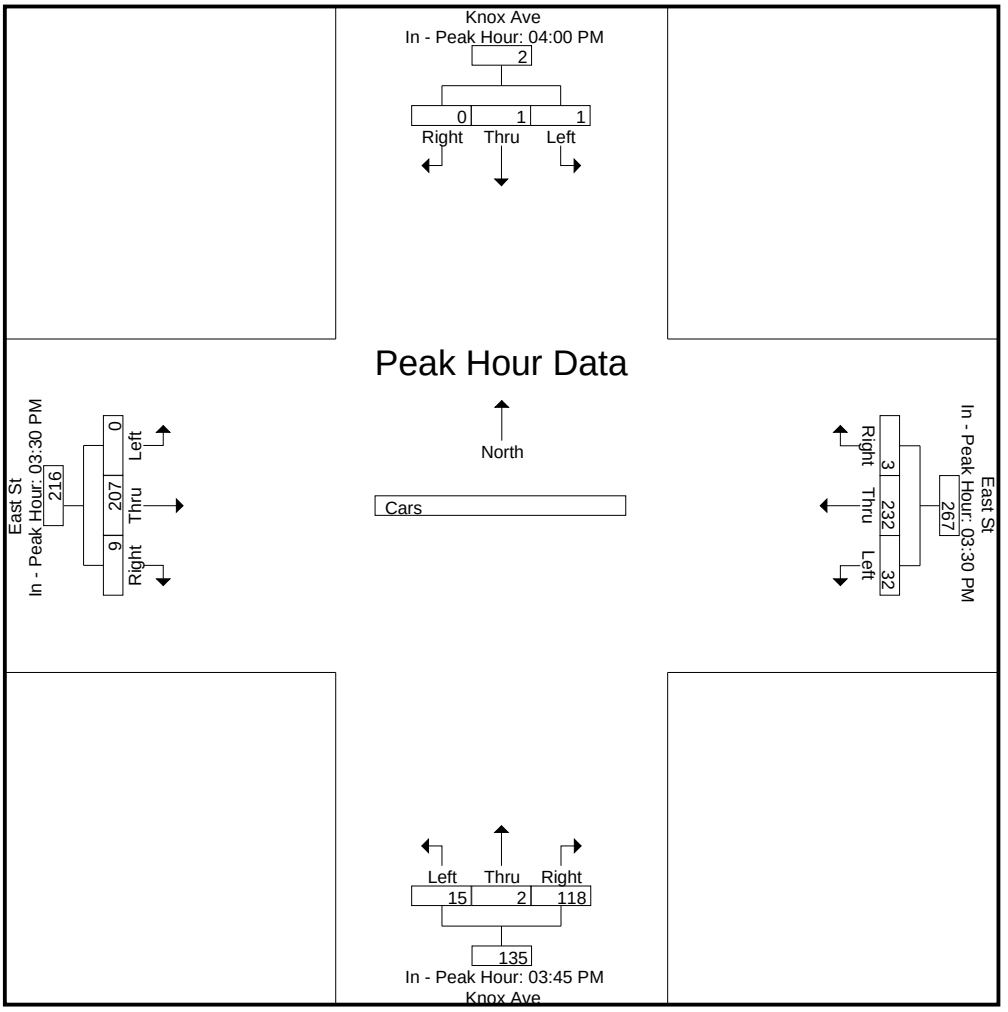
	04:00 PM				03:30 PM				03:45 PM				03:30 PM			
+0 mins.	0	**1**	0	**1**	6	53	0	59	3	**1**	27	31	0	50	1	51
+15 mins.	0	0	0	0	**12**	**62**	**2**	**76**	3	0	29	32	0	53	**3**	56
+30 mins.	0	0	0	0	6	60	0	66	2	1	26	29	0	39	3	42
+45 mins.	**1**	0	0	1	8	57	1	66	**7**	0	**36**	**43**	0	**65**	2	**67**
Total Volume	1	1	0	2	32	232	3	267	15	2	118	135	0	207	9	216
% App. Total	50	50	0		12	86.9	1.1		11.1	1.5	87.4		0	95.8	4.2	
PHF	.250	.250	.000	.500	.667	.935	.375	.878	.536	.500	.819	.785	.000	.796	.750	.806

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021

Groups Printed- Trucks

	Knox Ave From North			East St From East			Knox Ave From South			East St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
03:00 PM	0	0	0	0	2	0	0	0	0	0	1	0	3
03:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	2	0	0	1	0	0	2	0	5
03:45 PM	0	1	0	0	4	0	0	0	0	0	2	0	7
Total	0	1	0	0	9	0	0	1	0	0	5	0	16
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	2
04:30 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
04:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
Total	0	0	0	1	3	0	0	0	0	0	1	0	5
Grand Total	0	1	0	1	12	0	0	1	0	0	6	0	21
Apprch %	0	100	0	7.7	92.3	0	0	100	0	0	100	0	
Total %	0	4.8	0	4.8	57.1	0	0	4.8	0	0	28.6	0	

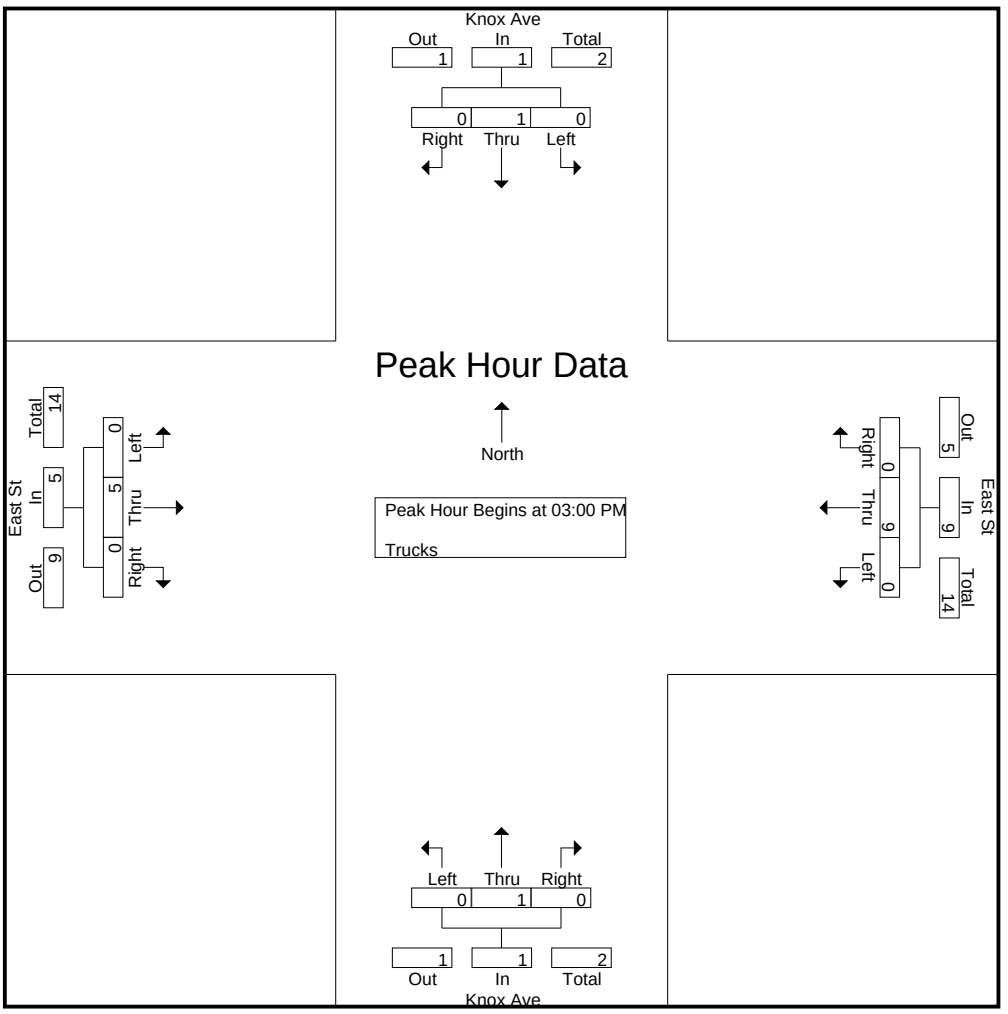
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	1	3
03:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	0	2	0	2	0	**1**	0	**1**	0	**2**	0	**2**	5
03:45 PM	0	**1**	0	**1**	0	**4**	0	**4**	0	0	0	0	0	2	0	2	**7**
Total Volume	0	1	0	1	0	9	0	9	0	1	0	1	0	5	0	5	16
% App. Total	0	100	0		0	100	0		0	100	0		0	100	0		
PHF	.000	.250	.000	.250	.000	.563	.000	.563	.000	.250	.000	.250	.000	.625	.000	.625	.571

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

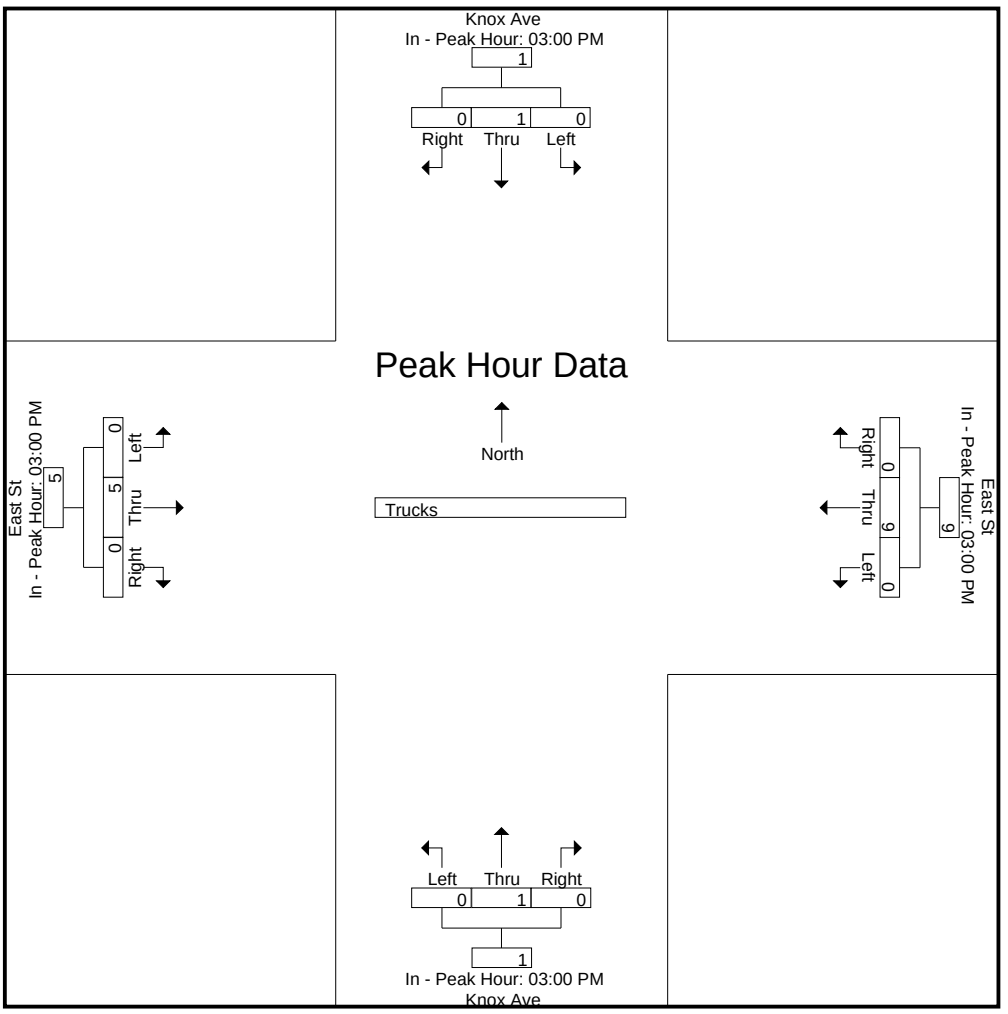
	03:00 PM				03:00 PM				03:00 PM				03:00 PM			
+0 mins.	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	1
+15 mins.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	2	0	2	0	**1**	0	**1**	0	**2**	0	**2**
+45 mins.	0	**1**	0	**1**	0	**4**	0	**4**	0	0	0	0	0	2	0	2
Total Volume	0	1	0	1	0	9	0	9	0	1	0	1	0	5	0	5
% App. Total	0	100	0		0	100	0		0	100	0		0	100	0	
PHF	.000	.250	.000	.250	.000	.563	.000	.563	.000	.250	.000	.250	.000	.625	.000	.625

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021

Groups Printed- Bikes Peds

	Knox Ave From North				East St From East				Knox Ave From South				East St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	

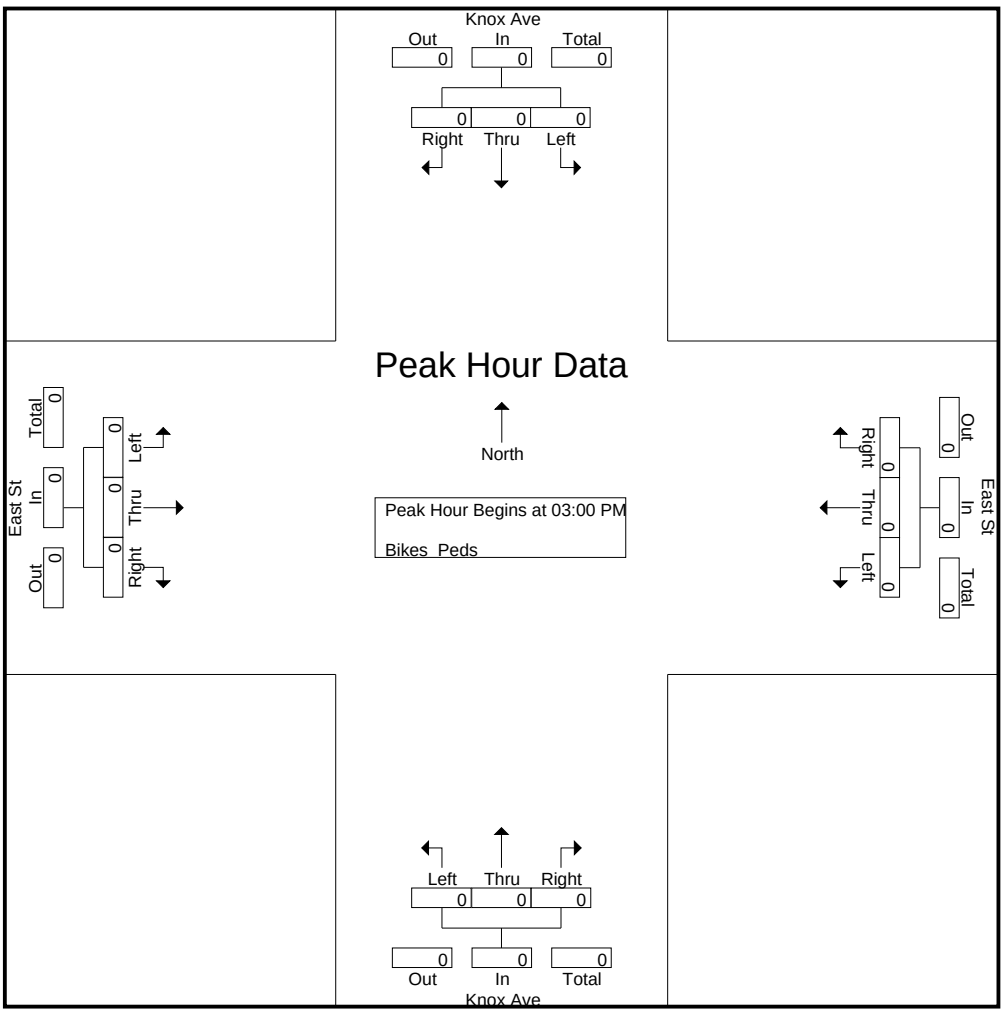
	Knox Ave From North				East St From East				Knox Ave From South				East St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1

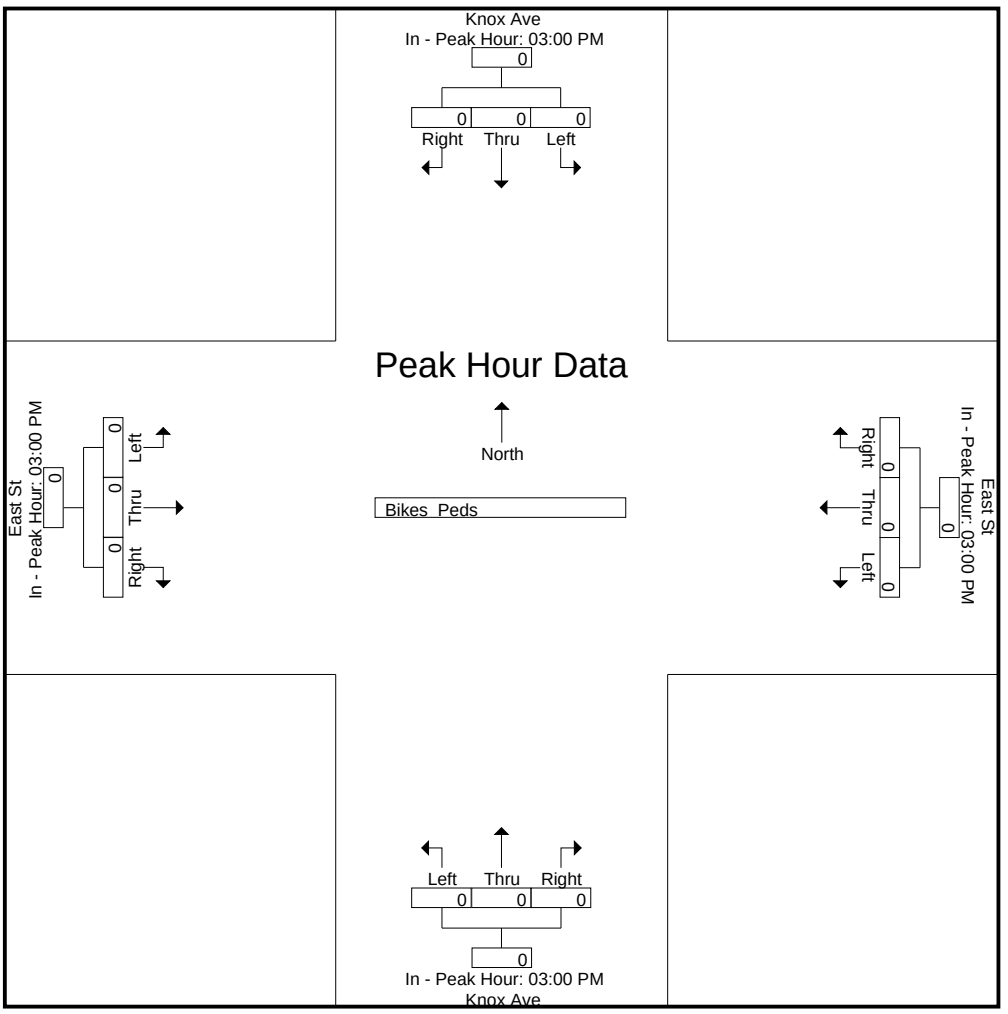
Peak Hour for Each Approach Begins at:

	03:00 PM				03:00 PM				03:00 PM				03:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : Knox Avenue
E/W Street : East Street
City/State : Ware, MA
Weather : Clear

File Name : 91300003
Site Code : 91300003
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	Church St From North			East Main St From East			South St From South			East Main St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	1	2	25	0	37	0	24	8	0	16	24	5	142
07:15 AM	0	5	30	2	25	1	33	10	3	21	25	7	162
07:30 AM	2	9	32	2	49	0	33	2	4	17	22	7	179
07:45 AM	2	12	43	0	59	0	42	4	2	20	29	20	233
Total	5	28	130	4	170	1	132	24	9	74	100	39	716
08:00 AM	0	6	32	1	48	3	29	6	3	20	21	7	176
08:15 AM	0	3	26	1	35	2	37	8	2	15	23	11	163
08:30 AM	1	6	29	1	63	0	45	4	0	26	23	8	206
08:45 AM	1	7	18	1	42	1	33	4	5	20	40	14	186
Total	2	22	105	4	188	6	144	22	10	81	107	40	731
Grand Total	7	50	235	8	358	7	276	46	19	155	207	79	1447
Apprch %	2.4	17.1	80.5	2.1	96	1.9	80.9	13.5	5.6	35.1	46.9	17.9	
Total %	0.5	3.5	16.2	0.6	24.7	0.5	19.1	3.2	1.3	10.7	14.3	5.5	
Cars	7	48	232	7	336	7	272	44	17	149	189	75	1383
% Cars	100	96	98.7	87.5	93.9	100	98.6	95.7	89.5	96.1	91.3	94.9	95.6
Trucks	0	2	3	1	22	0	4	2	2	6	18	4	64
% Trucks	0	4	1.3	12.5	6.1	0	1.4	4.3	10.5	3.9	8.7	5.1	4.4

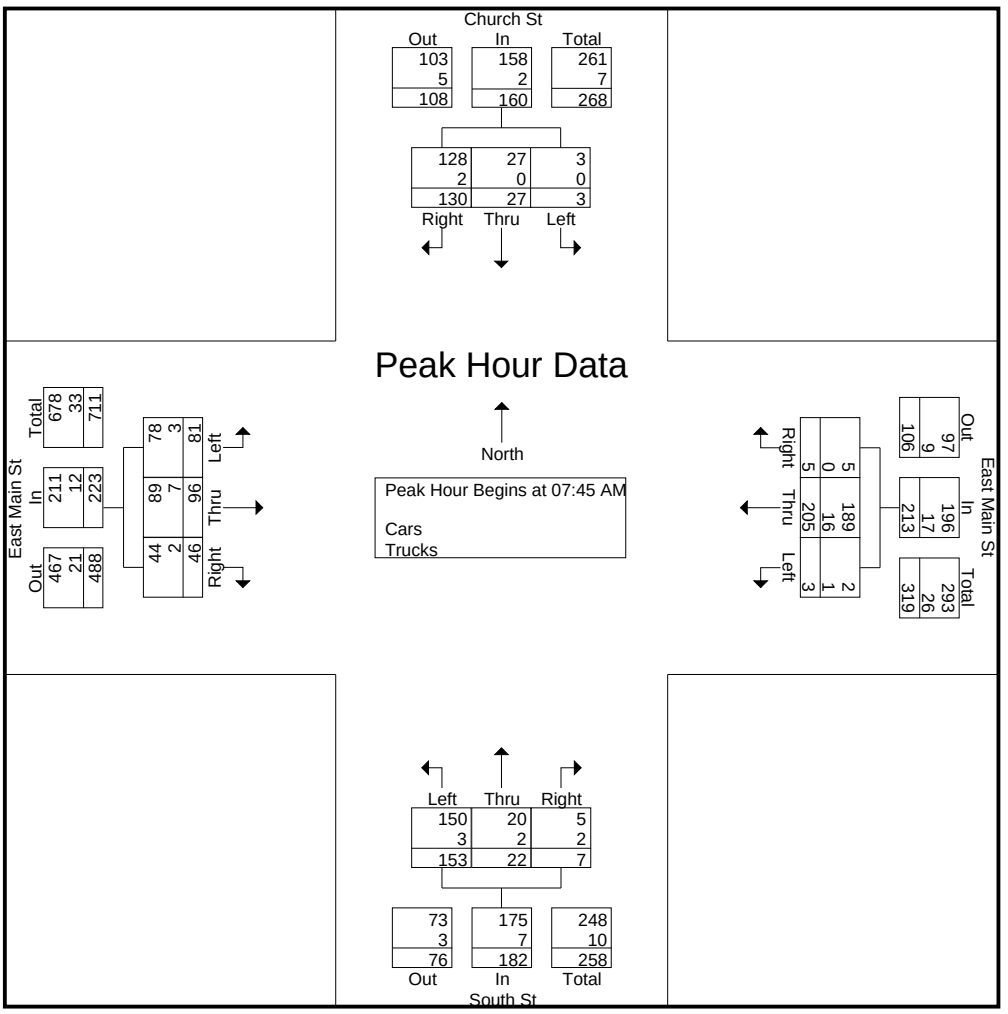
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**2**	**12**	**43**	**57**	0	59	0	59	42	4	2	48	20	**29**	**20**	**69**	**233**
08:00 AM	0	6	32	38	**1**	48	**3**	52	29	6	**3**	38	20	21	7	48	176
08:15 AM	0	3	26	29	1	35	2	38	37	**8**	2	47	15	23	11	49	163
08:30 AM	1	6	29	36	1	**63**	0	**64**	**45**	4	0	**49**	**26**	23	8	57	206
Total Volume	3	27	130	160	3	205	5	213	153	22	7	182	81	96	46	223	778
% App. Total	1.9	16.9	81.2		1.4	96.2	2.3		84.1	12.1	3.8		36.3	43	20.6		
PHF	.375	.563	.756	.702	.750	.813	.417	.832	.850	.688	.583	.929	.779	.828	.575	.808	.835
Cars	3	27	128	158	2	189	5	196	150	20	5	175	78	89	44	211	740
% Cars	100	100	98.5	98.8	66.7	92.2	100	92.0	98.0	90.9	71.4	96.2	96.3	92.7	95.7	94.6	95.1
Trucks	0	0	2	2	1	16	0	17	3	2	2	7	3	7	2	12	38
% Trucks	0	0	1.5	1.3	33.3	7.8	0	8.0	2.0	9.1	28.6	3.8	3.7	7.3	4.3	5.4	4.9

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

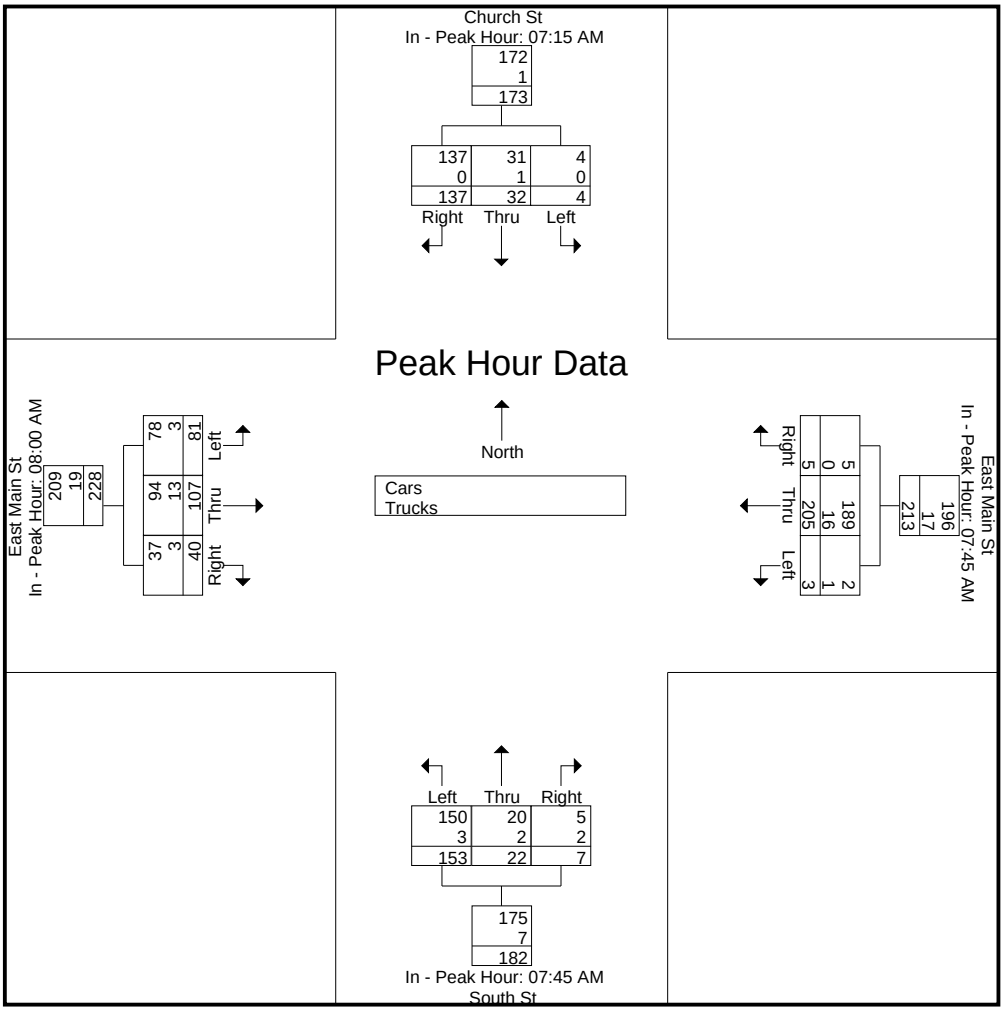
	07:15 AM				07:45 AM				07:45 AM				08:00 AM			
+0 mins.	0	5	30	35	0	59	0	59	42	4	2	48	20	21	7	48
+15 mins.	**2**	9	32	43	**1**	48	**3**	52	29	6	**3**	38	15	23	11	49
+30 mins.	2	**12**	**43**	**57**	1	35	2	38	37	**8**	2	47	**26**	23	8	57
+45 mins.	0	6	32	38	1	**63**	0	**64**	**45**	4	0	**49**	20	**40**	**14**	**74**
Total Volume	4	32	137	173	3	205	5	213	153	22	7	182	81	107	40	228
% App. Total	2.3	18.5	79.2		1.4	96.2	2.3		84.1	12.1	3.8		35.5	46.9	17.5	
PHF	.500	.667	.797	.759	.750	.813	.417	.832	.850	.688	.583	.929	.779	.669	.714	.770
Cars	4	31	137	172	2	189	5	196	150	20	5	175	78	94	37	209
% Cars	100	96.9	100	99.4	66.7	92.2	100	92	98	90.9	71.4	96.2	96.3	87.9	92.5	91.7
Trucks	0	1	0	1	1	16	0	17	3	2	2	7	3	13	3	19
% Trucks	0	3.1	0	0.6	33.3	7.8	0	8	2	9.1	28.6	3.8	3.7	12.1	7.5	8.3

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	Church St From North			East Main St From East			South St From South			East Main St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	1	2	24	0	33	0	24	8	0	16	22	5	135
07:15 AM	0	5	30	2	24	1	33	10	3	19	25	6	158
07:30 AM	2	8	32	2	48	0	33	2	4	16	20	7	174
07:45 AM	2	12	43	0	57	0	42	4	2	20	28	20	230
Total	5	27	129	4	162	1	132	24	9	71	95	38	697
08:00 AM	0	6	32	1	42	3	29	6	3	19	20	7	168
08:15 AM	0	3	25	0	32	2	36	6	0	13	20	10	147
08:30 AM	1	6	28	1	58	0	43	4	0	26	21	7	195
08:45 AM	1	6	18	1	42	1	32	4	5	20	33	13	176
Total	2	21	103	3	174	6	140	20	8	78	94	37	686
Grand Total	7	48	232	7	336	7	272	44	17	149	189	75	1383
Apprch %	2.4	16.7	80.8	2	96	2	81.7	13.2	5.1	36.1	45.8	18.2	
Total %	0.5	3.5	16.8	0.5	24.3	0.5	19.7	3.2	1.2	10.8	13.7	5.4	

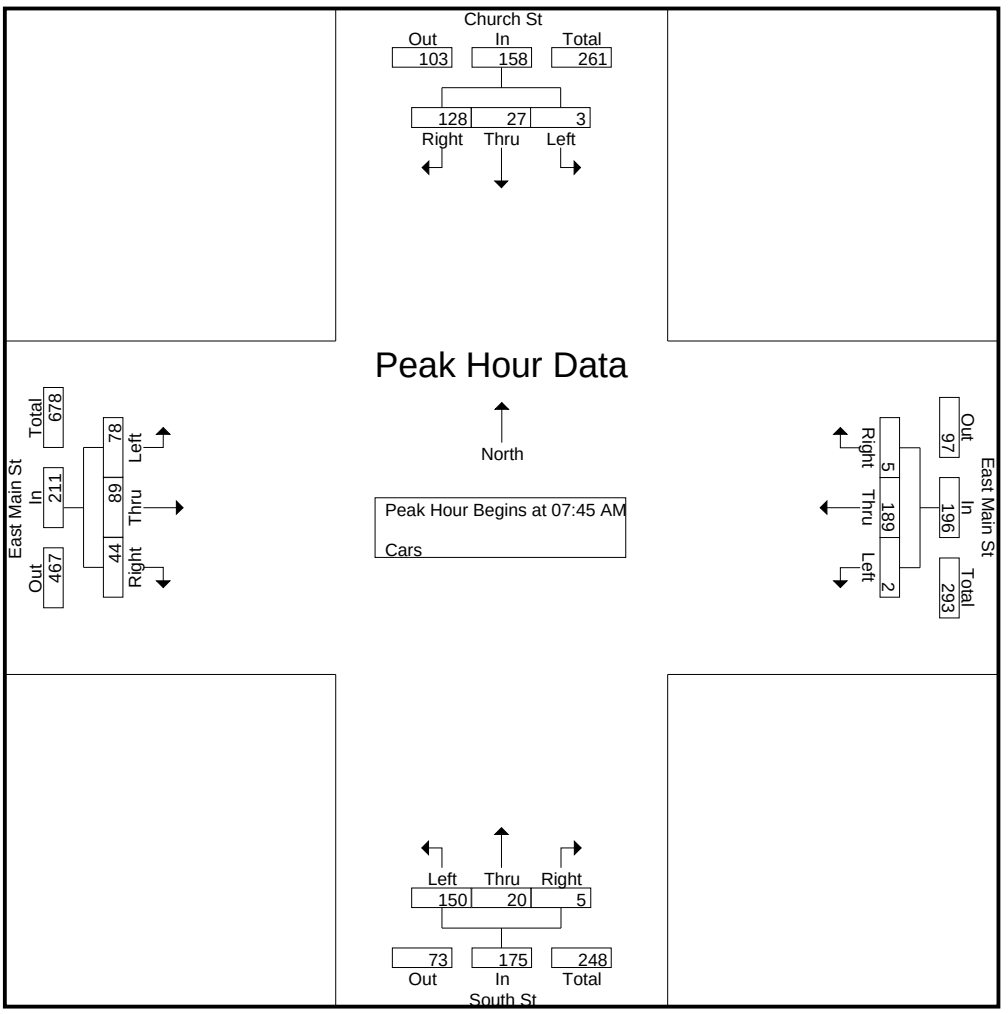
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**2**	**12**	**43**	**57**	0	57	0	57	42	4	2	**48**	20	**28**	**20**	**68**	**230**
08:00 AM	0	6	32	38	**1**	42	**3**	46	29	**6**	**3**	38	19	20	7	46	168
08:15 AM	0	3	25	28	0	32	2	34	36	6	0	42	13	20	10	43	147
08:30 AM	1	6	28	35	1	**58**	0	**59**	**43**	4	0	47	**26**	21	7	54	195
Total Volume	3	27	128	158	2	189	5	196	150	20	5	175	78	89	44	211	740
% App. Total	1.9	17.1	81		1	96.4	2.6		85.7	11.4	2.9		37	42.2	20.9		
PHF	.375	.563	.744	.693	.500	.815	.417	.831	.872	.833	.417	.911	.750	.795	.550	.776	.804

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

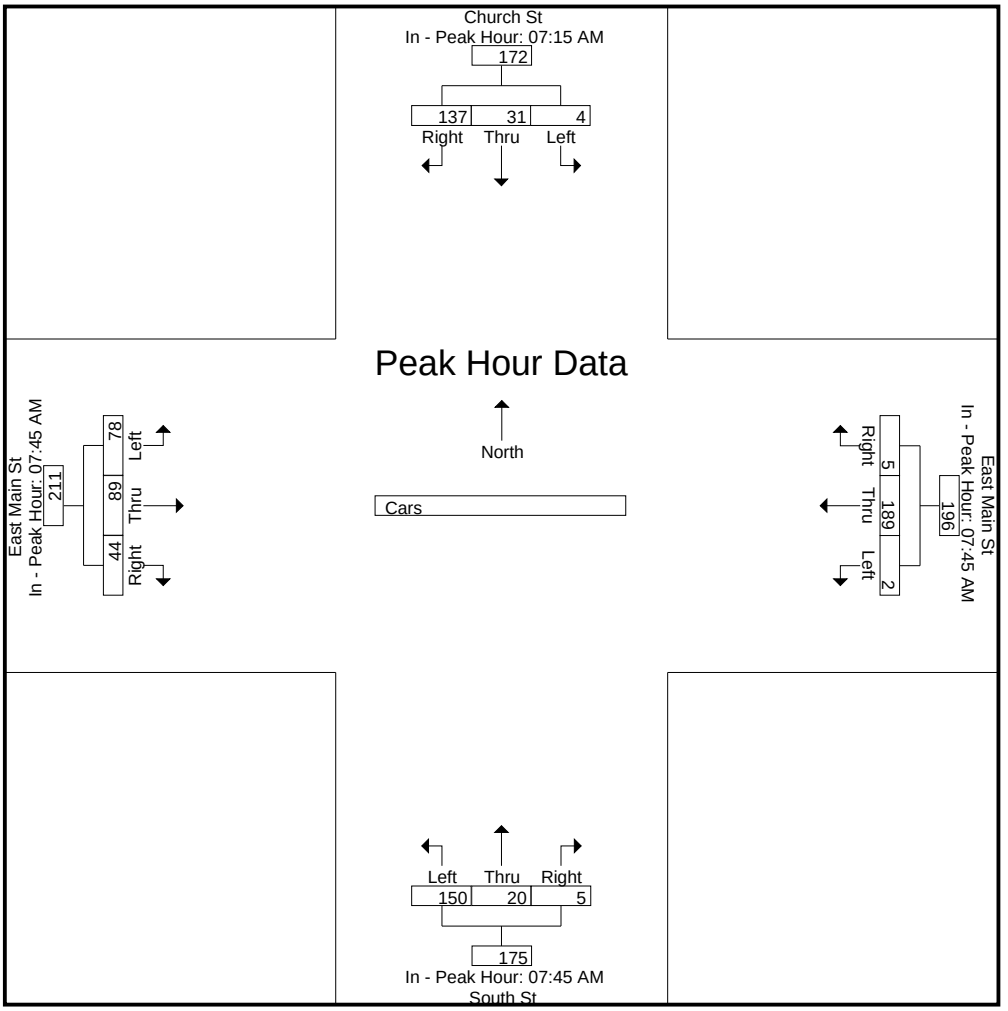
	07:15 AM				07:45 AM				07:45 AM				07:45 AM			
+0 mins.	0	5	30	35	0	57	0	57	42	4	2	**48**	20	**28**	**20**	**68**
+15 mins.	**2**	8	32	42	**1**	42	**3**	46	29	**6**	**3**	38	19	20	7	46
+30 mins.	2	**12**	**43**	**57**	0	32	2	34	36	6	0	42	13	20	10	43
+45 mins.	0	6	32	38	1	**58**	0	**59**	**43**	4	0	47	**26**	21	7	54
Total Volume	4	31	137	172	2	189	5	196	150	20	5	175	78	89	44	211
% App. Total	2.3	18	79.7		1	96.4	2.6		85.7	11.4	2.9		37	42.2	20.9	
PHF	.500	.646	.797	.754	.500	.815	.417	.831	.872	.833	.417	.911	.750	.795	.550	.776

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 7

Groups Printed- Trucks

	Church St From North			East Main St From East			South St From South			East Main St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	1	0	4	0	0	0	0	0	2	0	7
07:15 AM	0	0	0	0	1	0	0	0	0	2	0	1	4
07:30 AM	0	1	0	0	1	0	0	0	0	1	2	0	5
07:45 AM	0	0	0	0	2	0	0	0	0	0	1	0	3
Total	0	1	1	0	8	0	0	0	0	3	5	1	19
08:00 AM	0	0	0	0	6	0	0	0	0	1	1	0	8
08:15 AM	0	0	1	1	3	0	1	2	2	2	3	1	16
08:30 AM	0	0	1	0	5	0	2	0	0	0	2	1	11
08:45 AM	0	1	0	0	0	0	1	0	0	0	7	1	10
Total	0	1	2	1	14	0	4	2	2	3	13	3	45
Grand Total	0	2	3	1	22	0	4	2	2	6	18	4	64
Apprch %	0	40	60	4.3	95.7	0	50	25	25	21.4	64.3	14.3	
Total %	0	3.1	4.7	1.6	34.4	0	6.2	3.1	3.1	9.4	28.1	6.2	

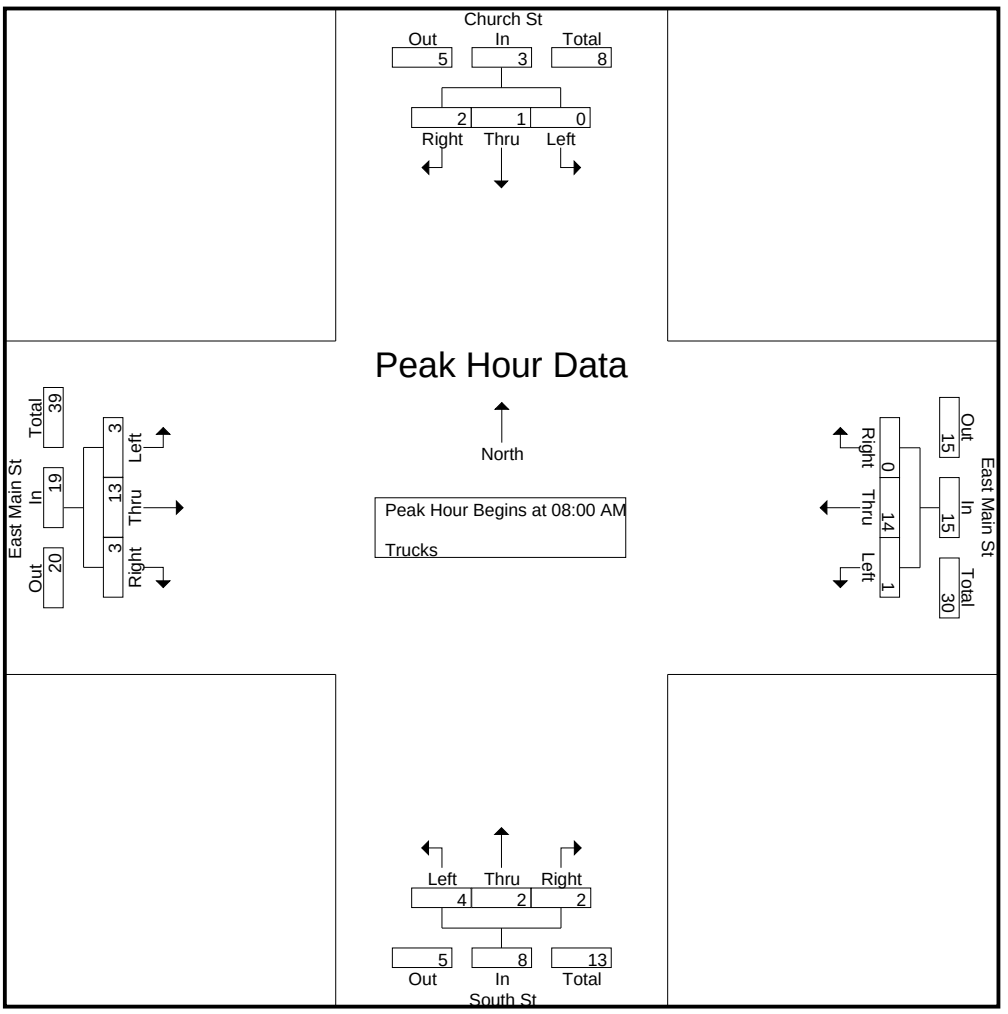
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	0	**6**	0	**6**	0	0	0	0	1	1	0	2	8
08:15 AM	0	0	**1**	**1**	**1**	3	0	4	1	**2**	**2**	**5**	**2**	3	**1**	6	**16**
08:30 AM	0	0	1	1	0	5	0	5	**2**	0	0	2	0	2	1	3	11
08:45 AM	0	**1**	0	1	0	0	0	0	1	0	0	1	0	**7**	1	**8**	10
Total Volume	0	1	2	3	1	14	0	15	4	2	2	8	3	13	3	19	45
% App. Total	0	33.3	66.7		6.7	93.3	0		50	25	25		15.8	68.4	15.8		
PHF	.000	.250	.500	.750	.250	.583	.000	.625	.500	.250	.250	.400	.375	.464	.750	.594	.703

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

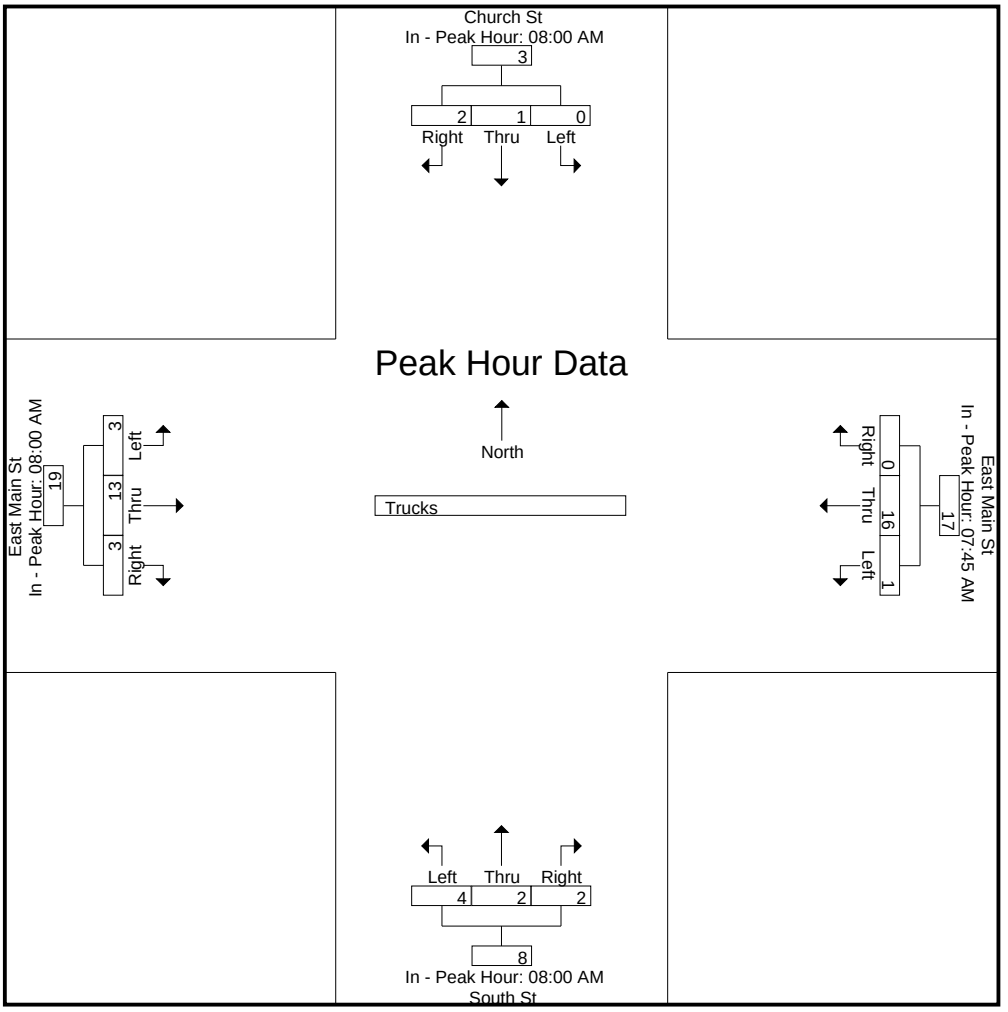
	08:00 AM				07:45 AM				08:00 AM				08:00 AM			
+0 mins.	0	0	0	0	0	2	0	2	0	0	0	0	1	1	0	2
+15 mins.	0	0	**1**	**1**	0	**6**	0	**6**	1	**2**	**2**	**5**	**2**	3	**1**	6
+30 mins.	0	0	1	1	**1**	3	0	4	**2**	0	0	2	0	2	1	3
+45 mins.	0	**1**	0	1	0	5	0	5	1	0	0	1	0	**7**	1	**8**
Total Volume	0	1	2	3	1	16	0	17	4	2	2	8	3	13	3	19
% App. Total	0	33.3	66.7		5.9	94.1	0		50	25	25		15.8	68.4	15.8	
PHF	.000	.250	.500	.750	.250	.667	.000	.708	.500	.250	.250	.400	.375	.464	.750	.594

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021

Groups Printed- Bikes Peds

	Church St From North				East Main St From East				South St From South				East Main St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
07:15 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	3	0	3
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	2
Total	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	1	7	0	7
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	1	7	0	7
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	

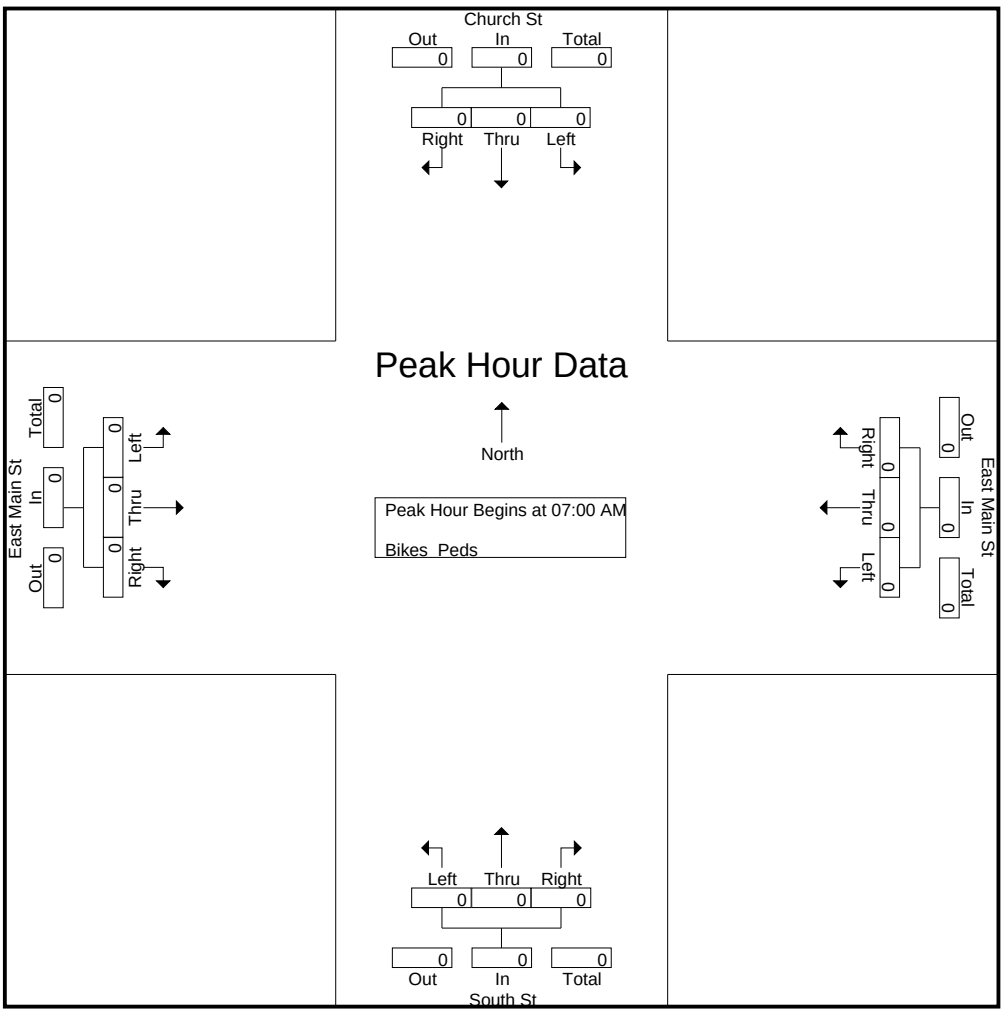
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 11



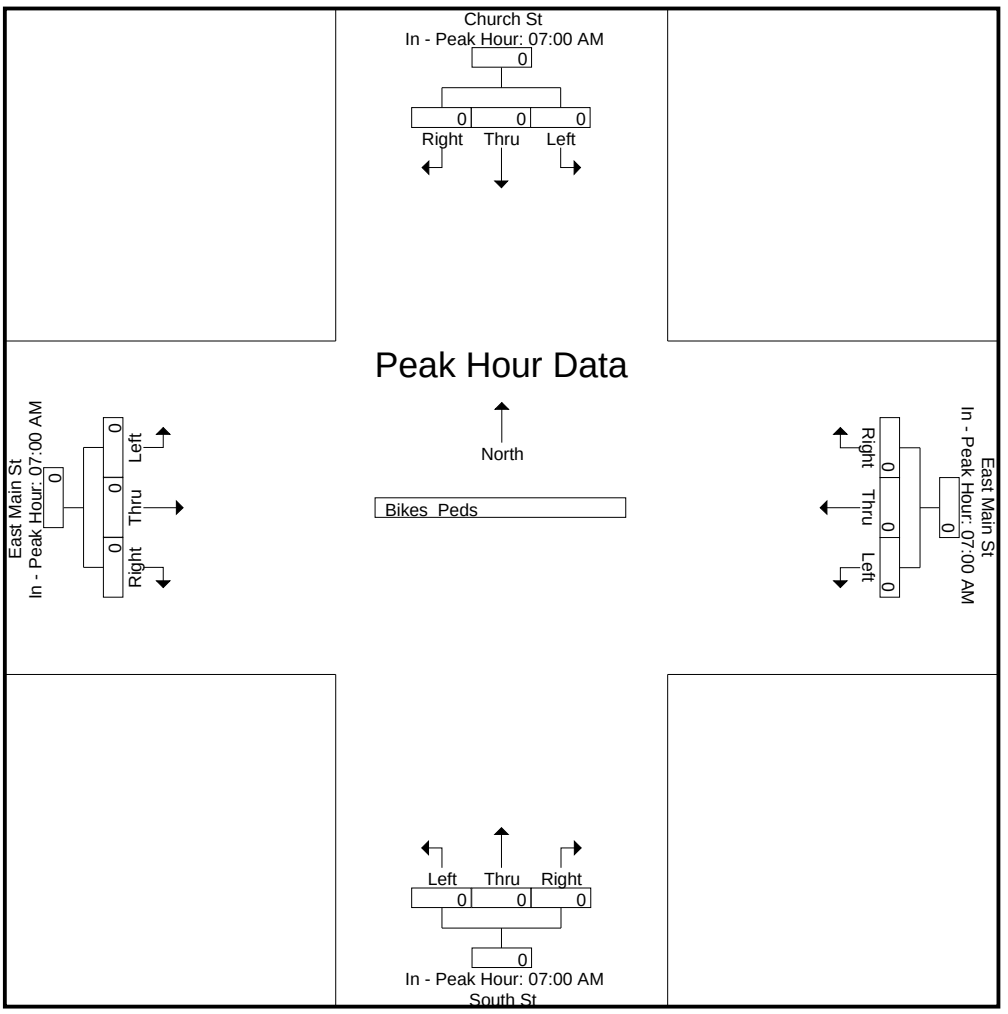
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	Church St From North			East Main St From East			South St From South			East Main St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
03:00 PM	1	5	23	1	56	2	60	6	2	36	44	4	240
03:15 PM	0	4	25	2	54	1	50	12	4	30	47	12	241
03:30 PM	0	6	42	0	64	1	47	8	2	25	51	16	262
03:45 PM	0	5	35	4	62	1	51	15	1	43	49	8	274
Total	1	20	125	7	236	5	208	41	9	134	191	40	1017
04:00 PM	0	2	37	0	61	2	72	18	3	30	34	7	266
04:15 PM	2	1	32	3	62	2	41	13	5	50	62	9	282
04:30 PM	0	2	40	1	49	0	46	15	4	52	48	8	265
04:45 PM	1	2	27	2	60	3	61	14	3	39	38	6	256
Total	3	7	136	6	232	7	220	60	15	171	182	30	1069
Grand Total	4	27	261	13	468	12	428	101	24	305	373	70	2086
Apprch %	1.4	9.2	89.4	2.6	94.9	2.4	77.4	18.3	4.3	40.8	49.9	9.4	
Total %	0.2	1.3	12.5	0.6	22.4	0.6	20.5	4.8	1.2	14.6	17.9	3.4	
Cars	4	25	258	13	453	12	415	101	24	302	367	65	2039
% Cars	100	92.6	98.9	100	96.8	100	97	100	100	99	98.4	92.9	97.7
Trucks	0	2	3	0	15	0	13	0	0	3	6	5	47
% Trucks	0	7.4	1.1	0	3.2	0	3	0	0	1	1.6	7.1	2.3

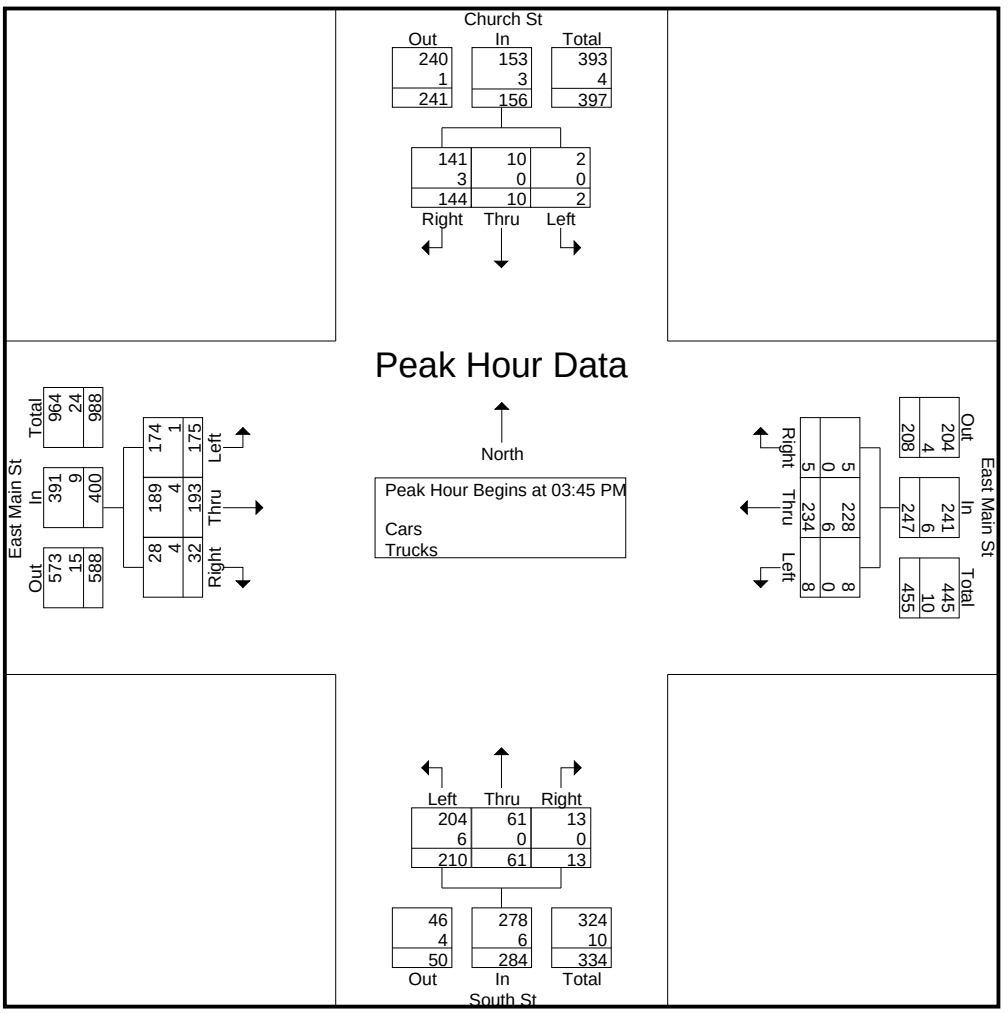
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	0	**5**	35	40	**4**	**62**	1	**67**	51	15	1	67	43	49	8	100	274
04:00 PM	0	2	37	39	0	61	**2**	63	**72**	**18**	3	**93**	30	34	7	71	266
04:15 PM	**2**	1	32	35	3	62	2	67	41	13	**5**	59	50	**62**	**9**	**121**	**282**
04:30 PM	0	2	**40**	**42**	1	49	0	50	46	15	4	65	**52**	48	8	108	265
Total Volume	2	10	144	156	8	234	5	247	210	61	13	284	175	193	32	400	1087
% App. Total	1.3	6.4	92.3		3.2	94.7	2		73.9	21.5	4.6		43.8	48.2	8		
PHF	.250	.500	.900	.929	.500	.944	.625	.922	.729	.847	.650	.763	.841	.778	.889	.826	.964
Cars	2	10	141	153	8	228	5	241	204	61	13	278	174	189	28	391	1063
% Cars	100	100	97.9	98.1	100	97.4	100	97.6	97.1	100	100	97.9	99.4	97.9	87.5	97.8	97.8
Trucks	0	0	3	3	0	6	0	6	6	0	0	6	1	4	4	9	24
% Trucks	0	0	2.1	1.9	0	2.6	0	2.4	2.9	0	0	2.1	0.6	2.1	12.5	2.3	2.2

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

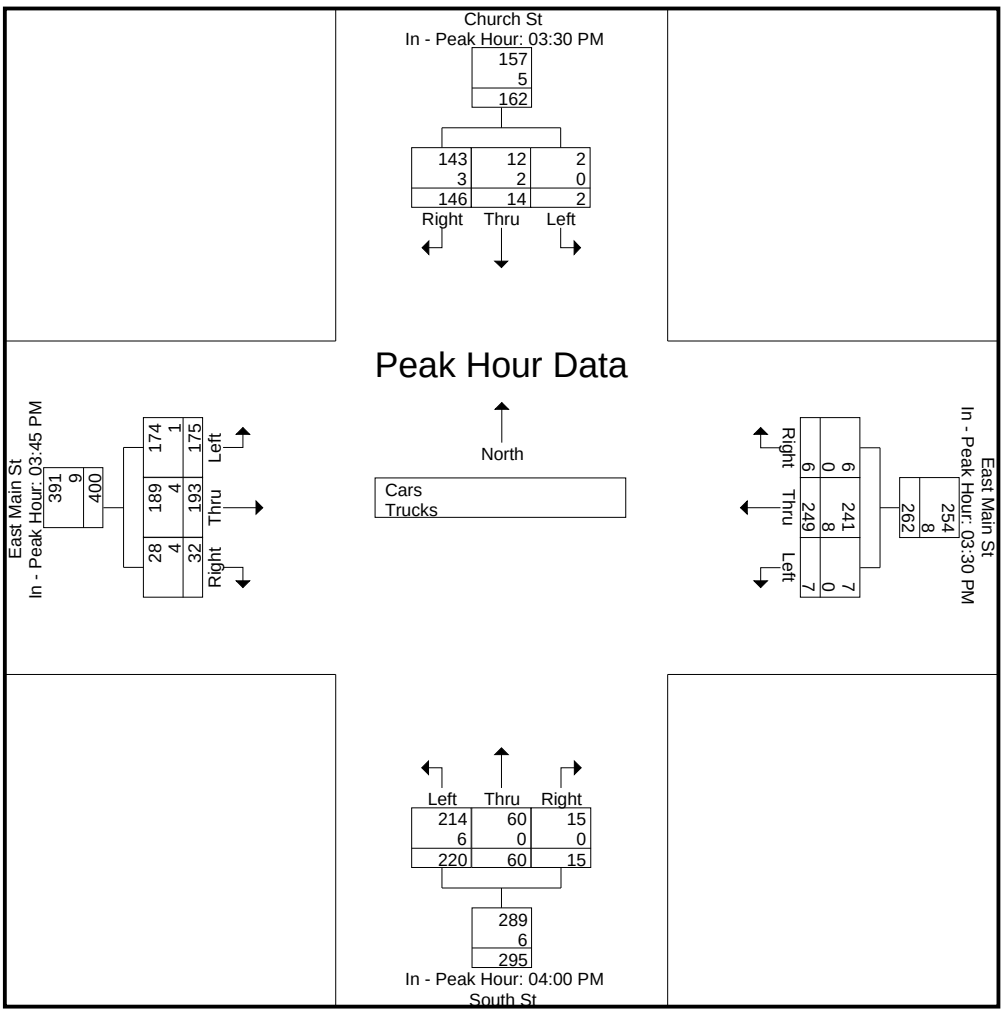
	03:30 PM				03:30 PM				04:00 PM				03:45 PM			
+0 mins.	0	**6**	**42**	**48**	0	**64**	1	65	**72**	**18**	3	**93**	43	49	8	100
+15 mins.	0	5	35	40	**4**	62	1	**67**	41	13	**5**	59	30	34	7	71
+30 mins.	0	2	37	39	0	61	**2**	63	46	15	4	65	50	**62**	**9**	**121**
+45 mins.	**2**	1	32	35	3	62	2	67	61	14	3	78	**52**	48	8	108
Total Volume	2	14	146	162	7	249	6	262	220	60	15	295	175	193	32	400
% App. Total	1.2	8.6	90.1		2.7	95	2.3		74.6	20.3	5.1		43.8	48.2	8	
PHF	.250	.583	.869	.844	.438	.973	.750	.978	.764	.833	.750	.793	.841	.778	.889	.826
Cars	2	12	143	157	7	241	6	254	214	60	15	289	174	189	28	391
% Cars	100	85.7	97.9	96.9	100	96.8	100	96.9	97.3	100	100	98	99.4	97.9	87.5	97.8
Trucks	0	2	3	5	0	8	0	8	6	0	0	6	1	4	4	9
% Trucks	0	14.3	2.1	3.1	0	3.2	0	3.1	2.7	0	0	2	0.6	2.1	12.5	2.2

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	Church St From North			East Main St From East			South St From South			East Main St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
03:00 PM	1	5	23	1	55	2	58	6	2	36	43	4	236
03:15 PM	0	4	25	2	51	1	49	12	4	28	46	12	234
03:30 PM	0	4	42	0	62	1	47	8	2	25	51	16	258
03:45 PM	0	5	33	4	59	1	47	15	1	43	47	8	263
Total	1	18	123	7	227	5	201	41	9	132	187	40	991
04:00 PM	0	2	36	0	60	2	71	18	3	30	34	5	261
04:15 PM	2	1	32	3	60	2	40	13	5	49	61	8	276
04:30 PM	0	2	40	1	49	0	46	15	4	52	47	7	263
04:45 PM	1	2	27	2	57	3	57	14	3	39	38	5	248
Total	3	7	135	6	226	7	214	60	15	170	180	25	1048
Grand Total	4	25	258	13	453	12	415	101	24	302	367	65	2039
Apprch %	1.4	8.7	89.9	2.7	94.8	2.5	76.9	18.7	4.4	41.1	50	8.9	
Total %	0.2	1.2	12.7	0.6	22.2	0.6	20.4	5	1.2	14.8	18	3.2	

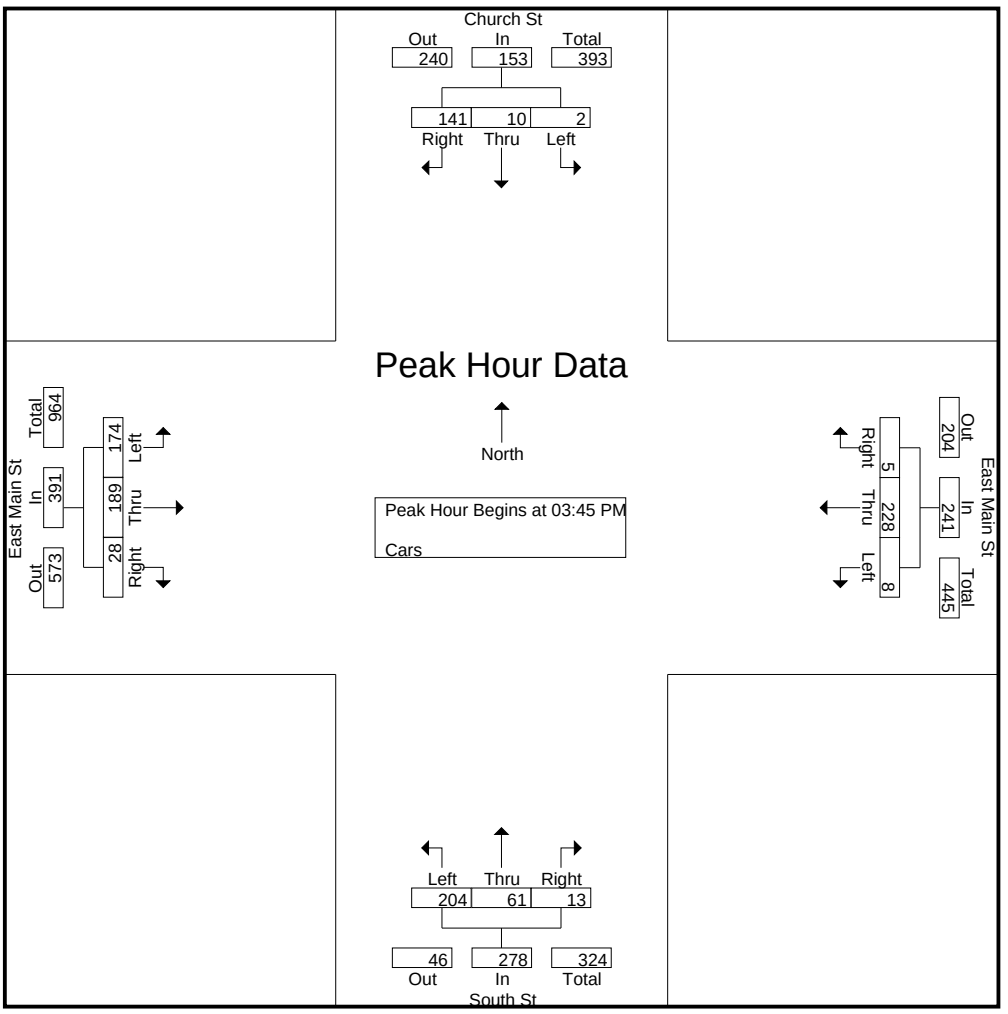
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	0	**5**	33	38	**4**	59	1	64	47	15	1	63	43	47	**8**	98	263
04:00 PM	0	2	36	38	0	**60**	**2**	62	**71**	**18**	3	**92**	30	34	5	69	261
04:15 PM	**2**	1	32	35	3	60	2	**65**	40	13	**5**	58	49	**61**	8	**118**	**276**
04:30 PM	0	2	**40**	**42**	1	49	0	50	46	15	4	65	**52**	47	7	106	263
Total Volume	2	10	141	153	8	228	5	241	204	61	13	278	174	189	28	391	1063
% App. Total	1.3	6.5	92.2		3.3	94.6	2.1		73.4	21.9	4.7		44.5	48.3	7.2		
PHF	.250	.500	.881	.911	.500	.950	.625	.927	.718	.847	.650	.755	.837	.775	.875	.828	.963

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

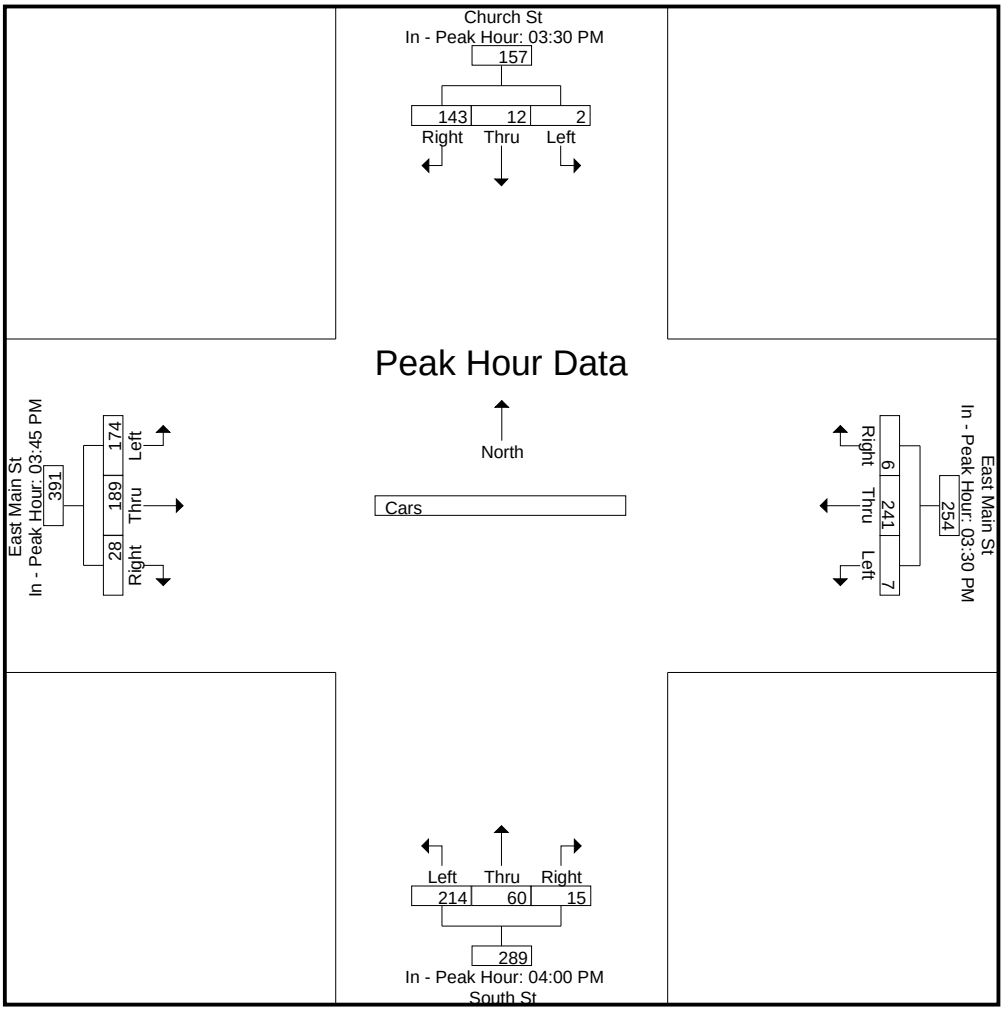
	03:30 PM				03:30 PM				04:00 PM				03:45 PM			
+0 mins.	0	4	**42**	**46**	0	**62**	1	63	**71**	**18**	3	**92**	43	47	**8**	98
+15 mins.	0	**5**	33	38	**4**	59	1	64	40	13	**5**	58	30	34	5	69
+30 mins.	0	2	36	38	0	60	**2**	62	46	15	4	65	49	**61**	8	**118**
+45 mins.	**2**	1	32	35	3	60	2	**65**	57	14	3	74	**52**	47	7	106
Total Volume	2	12	143	157	7	241	6	254	214	60	15	289	174	189	28	391
% App. Total	1.3	7.6	91.1		2.8	94.9	2.4		74	20.8	5.2		44.5	48.3	7.2	
PHF	.250	.600	.851	.853	.438	.972	.750	.977	.754	.833	.750	.785	.837	.775	.875	.828

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 7

Groups Printed- Trucks

	Church St From North			East Main St From East			South St From South			East Main St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
03:00 PM	0	0	0	0	1	0	2	0	0	0	1	0	4
03:15 PM	0	0	0	0	3	0	1	0	0	2	1	0	7
03:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	4
03:45 PM	0	0	2	0	3	0	4	0	0	0	2	0	11
Total	0	2	2	0	9	0	7	0	0	2	4	0	26
04:00 PM	0	0	1	0	1	0	1	0	0	0	0	2	5
04:15 PM	0	0	0	0	2	0	1	0	0	1	1	1	6
04:30 PM	0	0	0	0	0	0	0	0	0	0	1	1	2
04:45 PM	0	0	0	0	3	0	4	0	0	0	0	1	8
Total	0	0	1	0	6	0	6	0	0	1	2	5	21
Grand Total	0	2	3	0	15	0	13	0	0	3	6	5	47
Apprch %	0	40	60	0	100	0	100	0	0	21.4	42.9	35.7	
Total %	0	4.3	6.4	0	31.9	0	27.7	0	0	6.4	12.8	10.6	

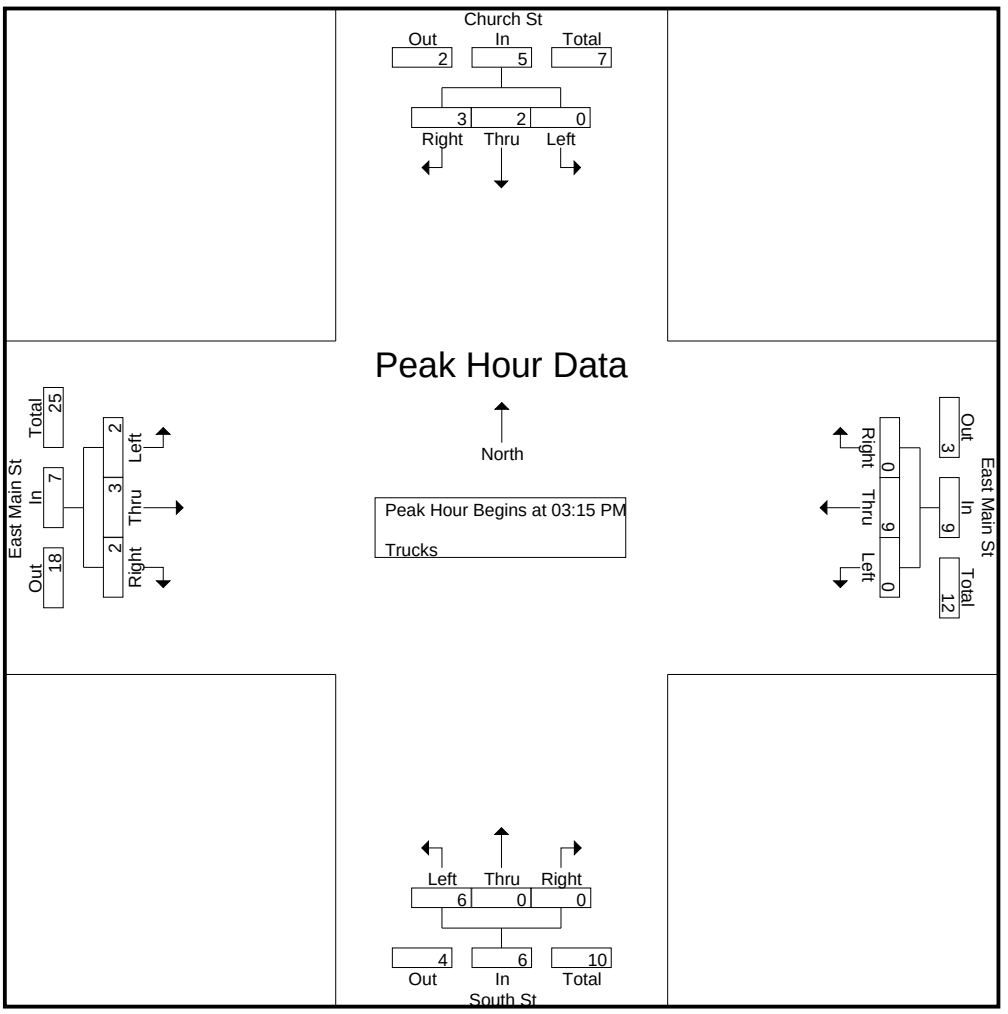
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	0	0	0	0	0	**3**	0	**3**	1	0	0	1	**2**	1	0	**3**	7
03:30 PM	0	**2**	0	**2**	0	2	0	2	0	0	0	0	0	0	0	0	4
03:45 PM	0	0	**2**	2	0	3	0	3	**4**	0	0	**4**	0	**2**	0	2	**11**
04:00 PM	0	0	1	1	0	1	0	1	1	0	0	1	0	0	**2**	2	5
Total Volume	0	2	3	5	0	9	0	9	6	0	0	6	2	3	2	7	27
% App. Total	0	40	60		0	100	0		100	0	0		28.6	42.9	28.6		
PHF	.000	.250	.375	.625	.000	.750	.000	.750	.375	.000	.000	.375	.250	.375	.250	.583	.614

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

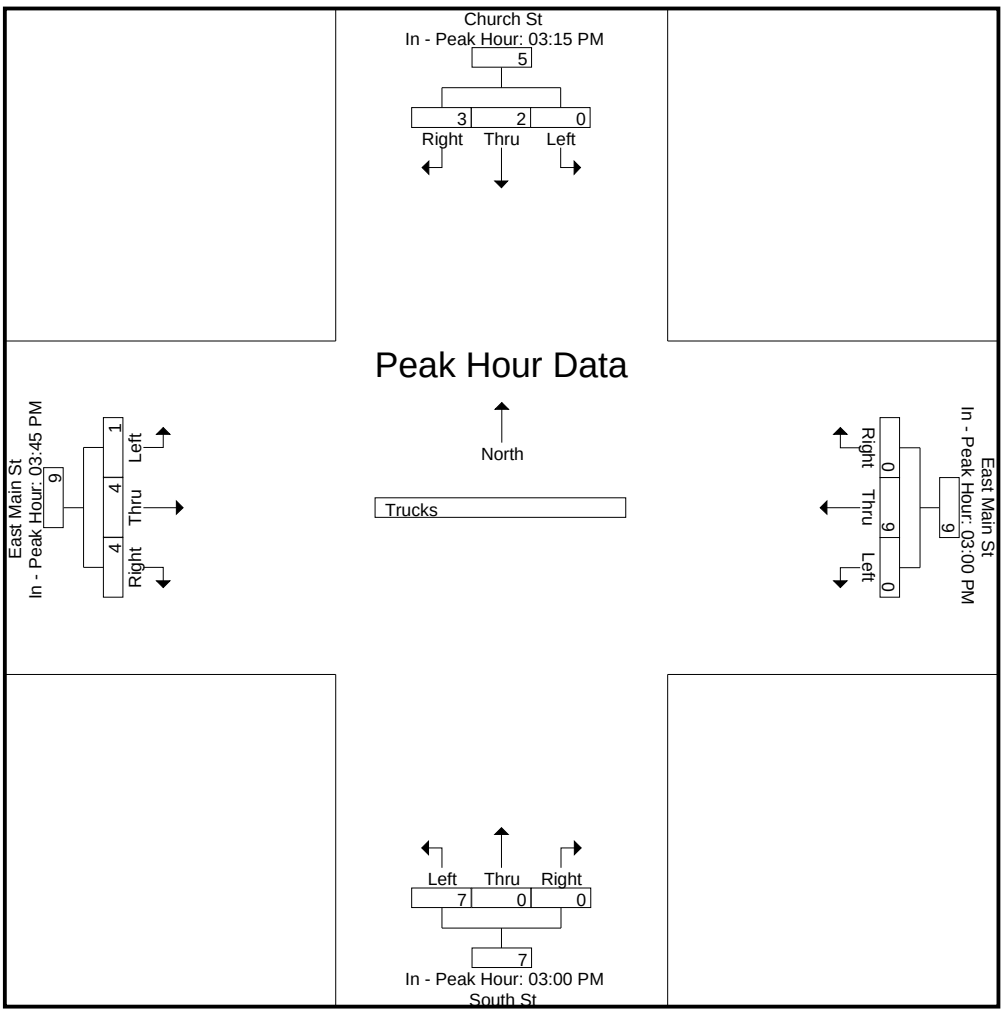
	03:15 PM				03:00 PM				03:00 PM				03:45 PM			
+0 mins.	0	0	0	0	0	1	0	1	2	0	0	2	0	**2**	0	2
+15 mins.	0	**2**	0	**2**	0	**3**	0	**3**	1	0	0	1	0	0	**2**	2
+30 mins.	0	0	**2**	2	0	2	0	2	0	0	0	0	**1**	1	1	**3**
+45 mins.	0	0	1	1	0	3	0	3	**4**	0	0	**4**	0	1	1	2
Total Volume	0	2	3	5	0	9	0	9	7	0	0	7	1	4	4	9
% App. Total	0	40	60		0	100	0		100	0	0		11.1	44.4	44.4	
PHF	.000	.250	.375	.625	.000	.750	.000	.750	.438	.000	.000	.438	.250	.500	.500	.750

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021

Groups Printed- Bikes Peds

	Church St From North				East Main St From East				South St From South				East Main St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
03:30 PM	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	5	0	5
03:45 PM	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	5	8	0	8
Total	0	0	0	9	0	0	0	3	0	0	0	0	0	0	0	5	17	0	17
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
04:15 PM	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	4	0	4
04:30 PM	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
04:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	0	2
Total	0	0	0	7	0	0	0	1	0	0	0	2	0	0	0	1	11	0	11
Grand Total	0	0	0	16	0	0	0	4	0	0	0	2	0	0	0	6	28	0	28
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	

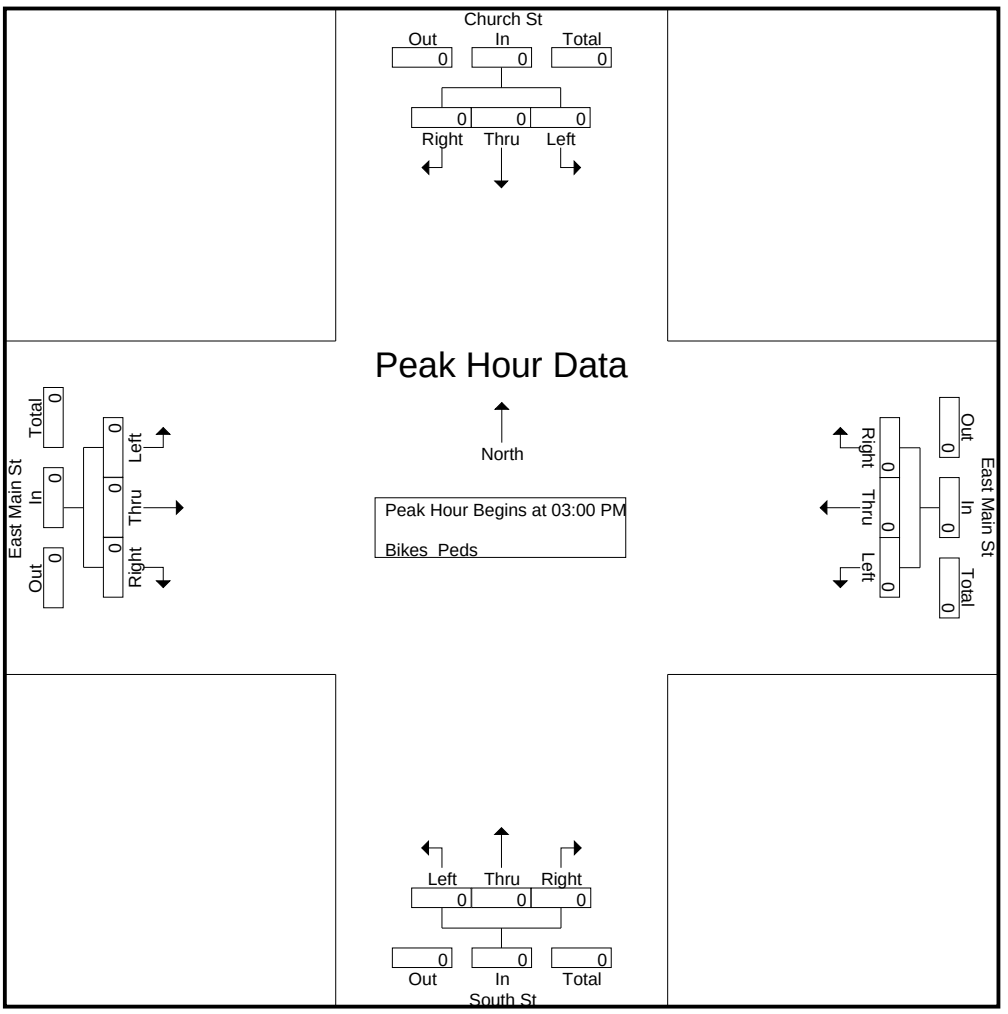
	Church St From North				East Main St From East				South St From South				East Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1

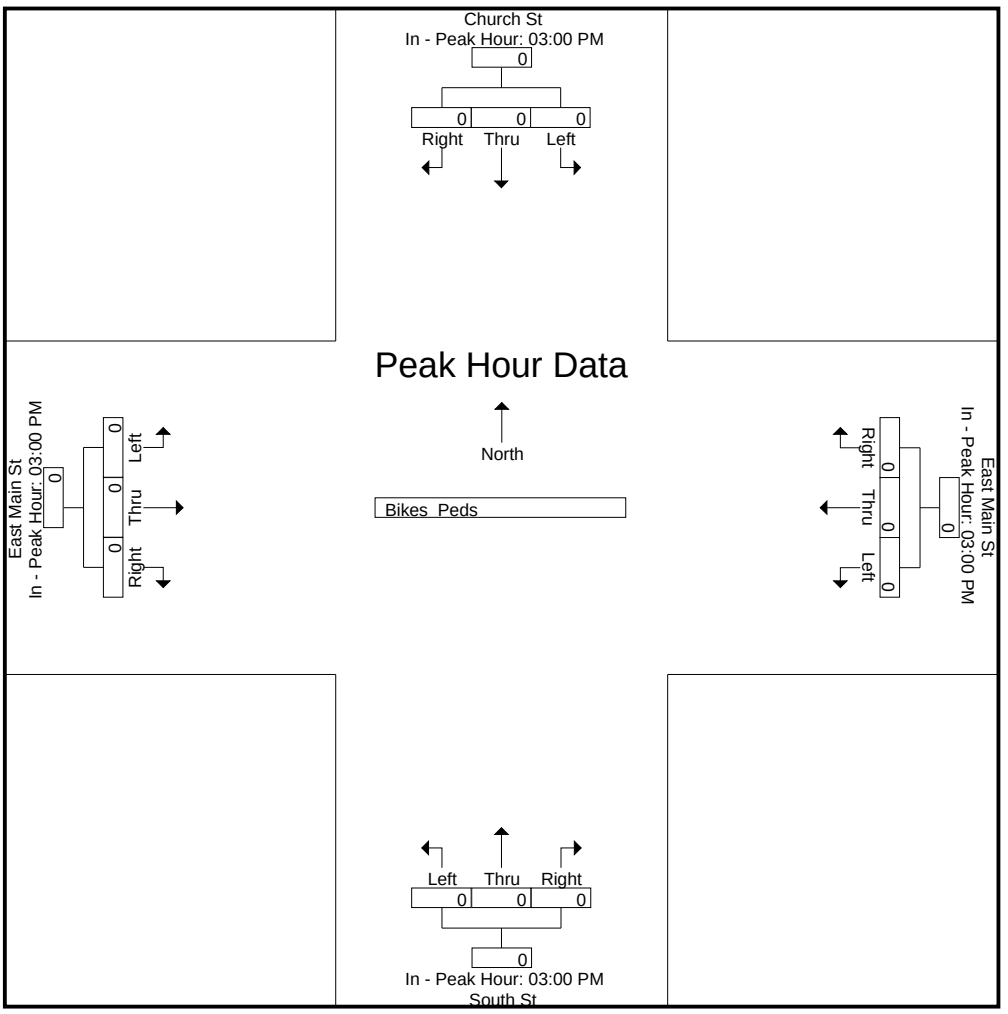
Peak Hour for Each Approach Begins at:

	03:00 PM				03:00 PM				03:00 PM				03:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : Church St / South St
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300004
Site Code : 91300004
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 1

Groups Printed- Cars - Trucks

	North St From North		East Main St From East		East Main St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	3	31	86	0	16	42	178
07:15 AM	5	39	94	4	16	49	207
07:30 AM	6	47	97	7	11	46	214
07:45 AM	7	33	149	4	7	61	261
Total	21	150	426	15	50	198	860
08:00 AM	3	34	103	1	11	46	198
08:15 AM	2	39	100	2	17	59	219
08:30 AM	4	64	136	1	17	46	268
08:45 AM	5	45	93	1	19	72	235
Total	14	182	432	5	64	223	920
Grand Total	35	332	858	20	114	421	1780
Apprch %	9.5	90.5	97.7	2.3	21.3	78.7	
Total %	2	18.7	48.2	1.1	6.4	23.7	
Cars	35	320	829	18	107	393	1702
% Cars	100	96.4	96.6	90	93.9	93.3	95.6
Trucks	0	12	29	2	7	28	78
% Trucks	0	3.6	3.4	10	6.1	6.7	4.4

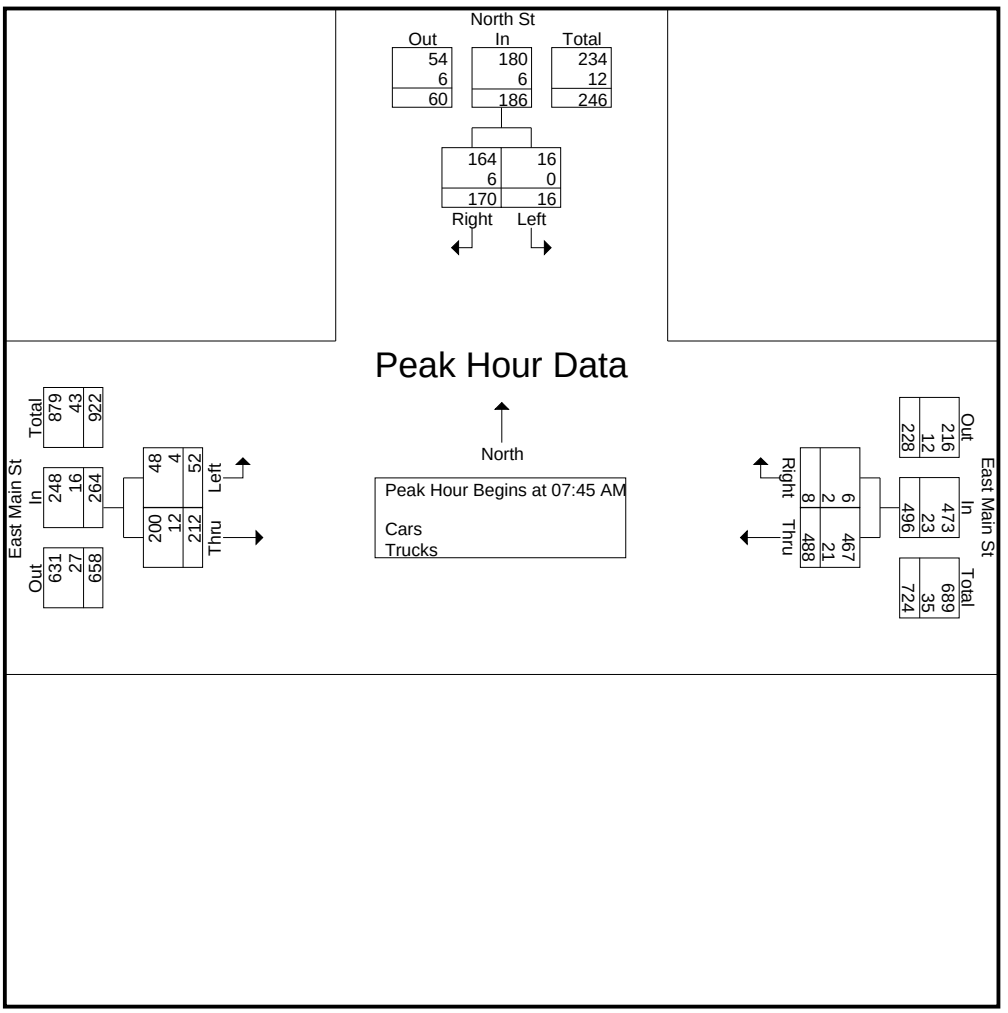
	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	**7**	33	40	**149**	**4**	**153**	7	**61**	68	261
08:00 AM	3	34	37	103	1	104	11	46	57	198
08:15 AM	2	39	41	100	2	102	**17**	59	**76**	219
08:30 AM	4	**64**	**68**	136	1	137	17	46	63	**268**
Total Volume	16	170	186	488	8	496	52	212	264	946
% App. Total	8.6	91.4		98.4	1.6		19.7	80.3		
PHF	.571	.664	.684	.819	.500	.810	.765	.869	.868	.882
Cars	16	164	180	467	6	473	48	200	248	901
% Cars	100	96.5	96.8	95.7	75.0	95.4	92.3	94.3	93.9	95.2
Trucks	0	6	6	21	2	23	4	12	16	45
% Trucks	0	3.5	3.2	4.3	25.0	4.6	7.7	5.7	6.1	4.8

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

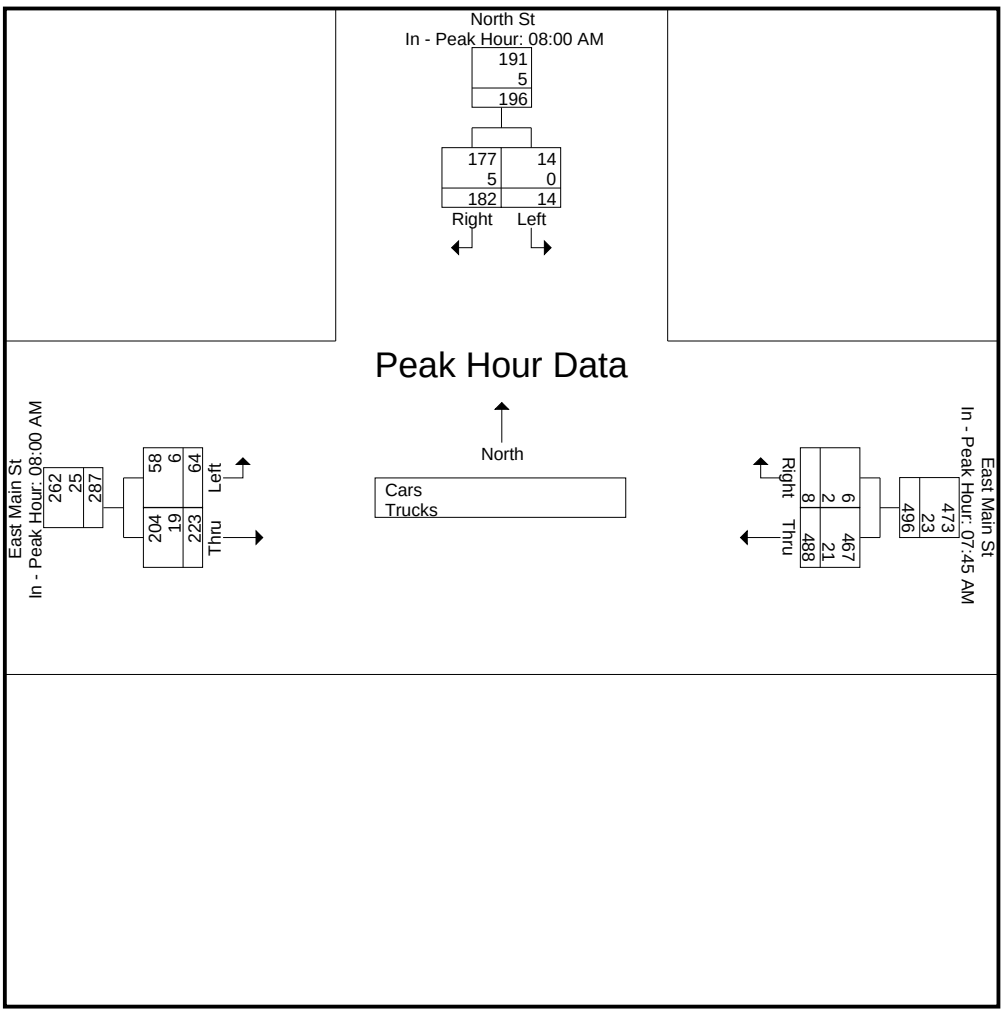
	08:00 AM			07:45 AM			08:00 AM		
+0 mins.	3	34	37	**149**	**4**	**153**	11	46	57
+15 mins.	2	39	41	103	1	104	17	59	76
+30 mins.	4	**64**	**68**	100	2	102	17	46	63
+45 mins.	**5**	45	50	136	1	137	**19**	**72**	**91**
Total Volume	14	182	196	488	8	496	64	223	287
% App. Total	7.1	92.9		98.4	1.6		22.3	77.7	
PHF	.700	.711	.721	.819	.500	.810	.842	.774	.788
Cars	14	177	191	467	6	473	58	204	262
% Cars	100	97.3	97.4	95.7	75	95.4	90.6	91.5	91.3
Trucks	0	5	5	21	2	23	6	19	25
% Trucks	0	2.7	2.6	4.3	25	4.6	9.4	8.5	8.7

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	North St From North		East Main St From East		East Main St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	3	30	82	0	16	40	171
07:15 AM	5	38	92	4	15	46	200
07:30 AM	6	44	96	7	11	43	207
07:45 AM	7	31	146	4	7	60	255
Total	21	143	416	15	49	189	833
08:00 AM	3	34	97	1	10	43	188
08:15 AM	2	38	95	1	14	52	202
08:30 AM	4	61	129	0	17	45	256
08:45 AM	5	44	92	1	17	64	223
Total	14	177	413	3	58	204	869
Grand Total	35	320	829	18	107	393	1702
Apprch %	9.9	90.1	97.9	2.1	21.4	78.6	
Total %	2.1	18.8	48.7	1.1	6.3	23.1	

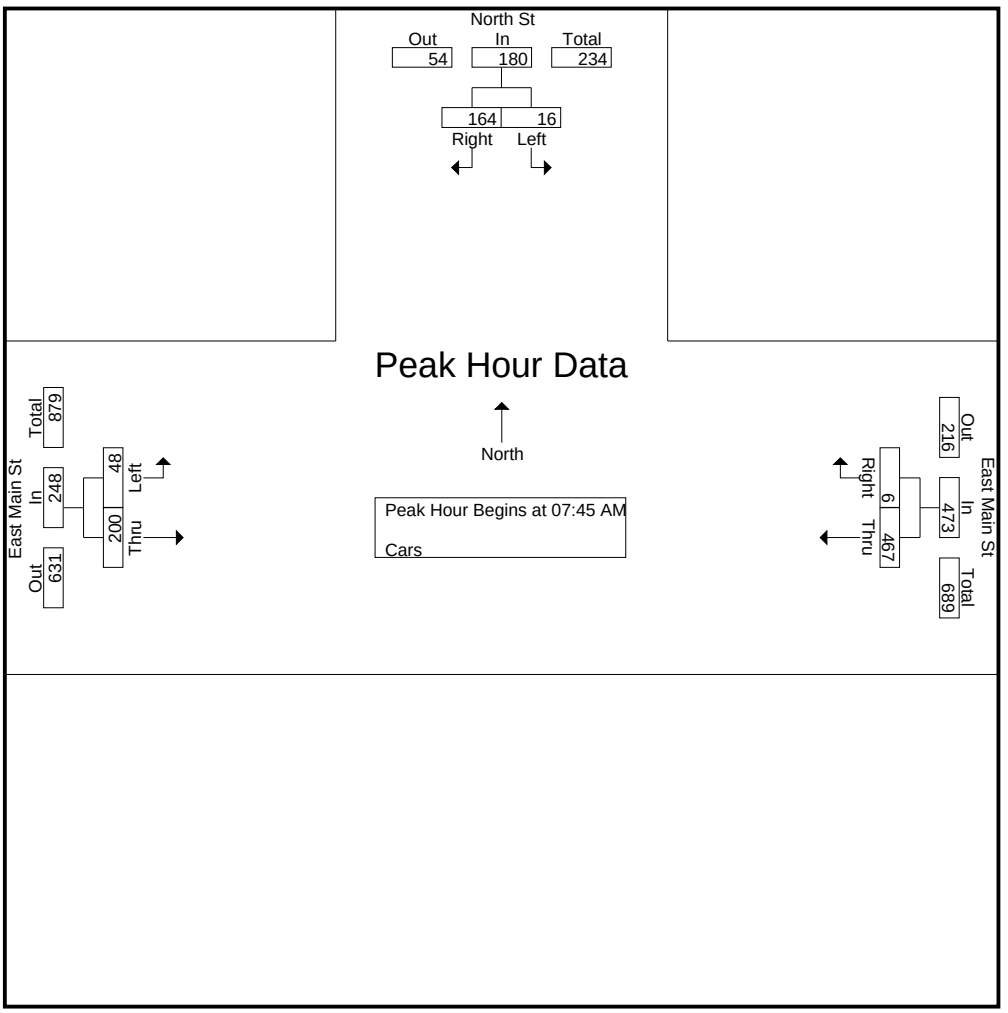
	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	**7**	31	38	**146**	**4**	**150**	7	**60**	**67**	255
08:00 AM	3	34	37	97	1	98	10	43	53	188
08:15 AM	2	38	40	95	1	96	14	52	66	202
08:30 AM	4	**61**	**65**	129	0	129	**17**	45	62	**256**
Total Volume	16	164	180	467	6	473	48	200	248	901
% App. Total	8.9	91.1		98.7	1.3		19.4	80.6		
PHF	.571	.672	.692	.800	.375	.788	.706	.833	.925	.880

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

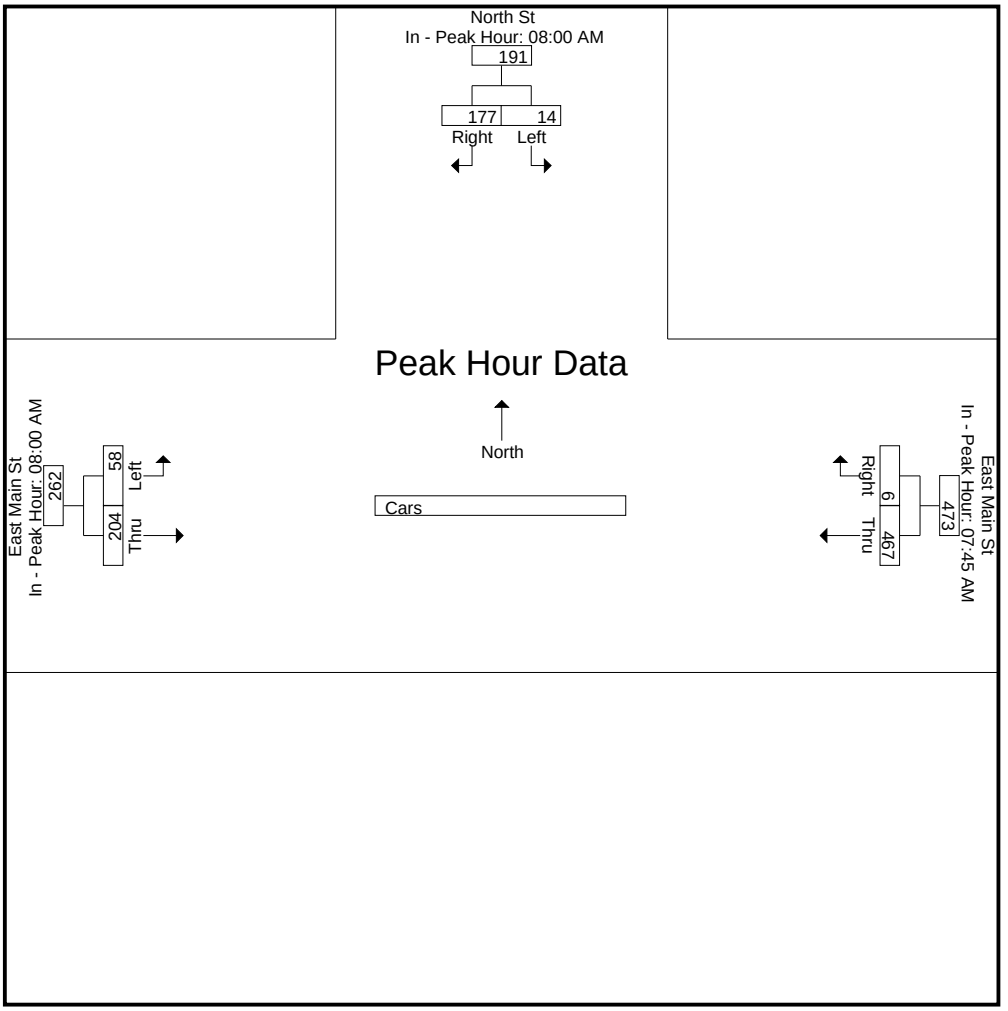
	08:00 AM			07:45 AM			08:00 AM		
+0 mins.	3	34	37	**146**	**4**	**150**	10	43	53
+15 mins.	2	38	40	97	1	98	14	52	66
+30 mins.	4	**61**	**65**	95	1	96	**17**	45	62
+45 mins.	**5**	44	49	129	0	129	17	**64**	**81**
Total Volume	14	177	191	467	6	473	58	204	262
% App. Total	7.3	92.7		98.7	1.3		22.1	77.9	
PHF	.700	.725	.735	.800	.375	.788	.853	.797	.809

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 7

Groups Printed- Trucks

	North St From North		East Main St From East		East Main St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	0	1	4	0	0	2	7
07:15 AM	0	1	2	0	1	3	7
07:30 AM	0	3	1	0	0	3	7
07:45 AM	0	2	3	0	0	1	6
Total	0	7	10	0	1	9	27
08:00 AM	0	0	6	0	1	3	10
08:15 AM	0	1	5	1	3	7	17
08:30 AM	0	3	7	1	0	1	12
08:45 AM	0	1	1	0	2	8	12
Total	0	5	19	2	6	19	51
Grand Total	0	12	29	2	7	28	78
Apprch %	0	100	93.5	6.5	20	80	
Total %	0	15.4	37.2	2.6	9	35.9	

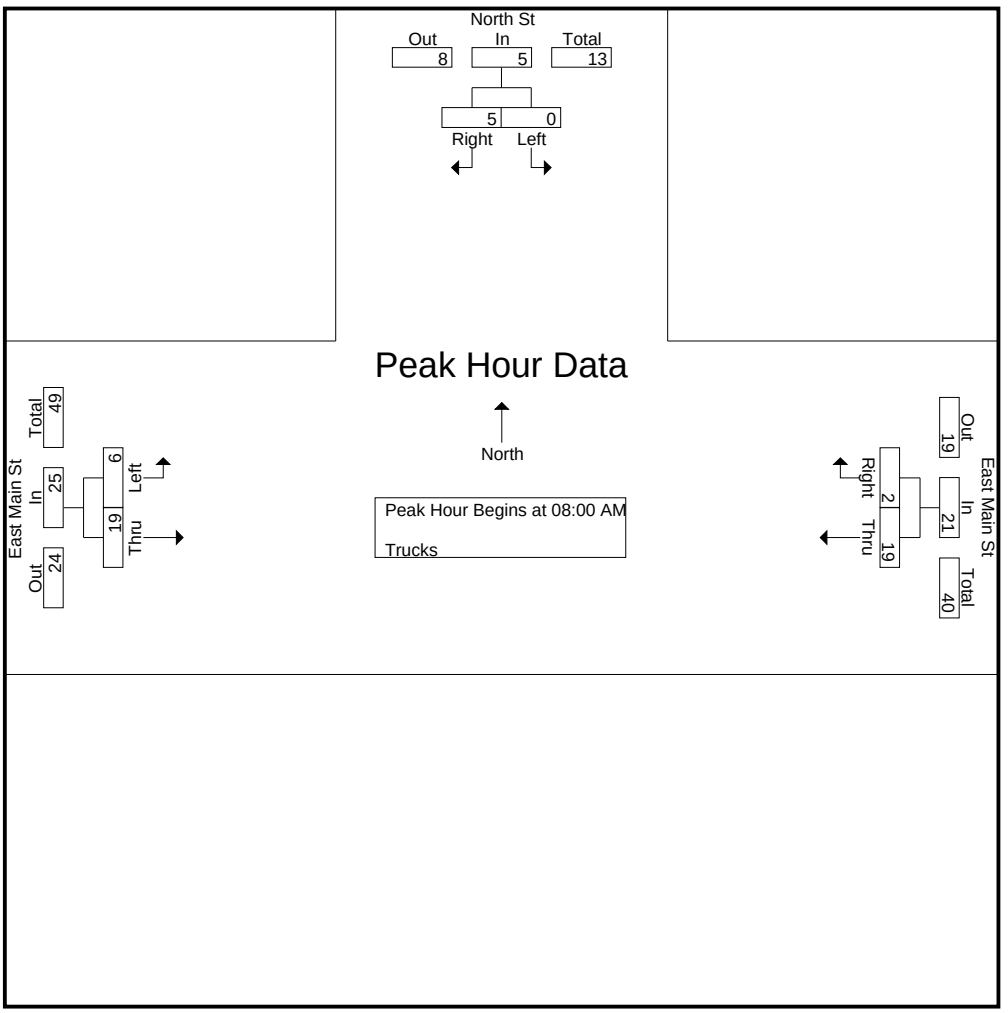
	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	0	0	0	6	0	6	1	3	4	10
08:15 AM	0	1	1	5	**1**	6	**3**	7	**10**	**17**
08:30 AM	0	**3**	**3**	**7**	1	**8**	0	1	1	12
08:45 AM	0	1	1	1	0	1	2	**8**	10	12
Total Volume	0	5	5	19	2	21	6	19	25	51
% App. Total	0	100		90.5	9.5		24	76		
PHF	.000	.417	.417	.679	.500	.656	.500	.594	.625	.750

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 8



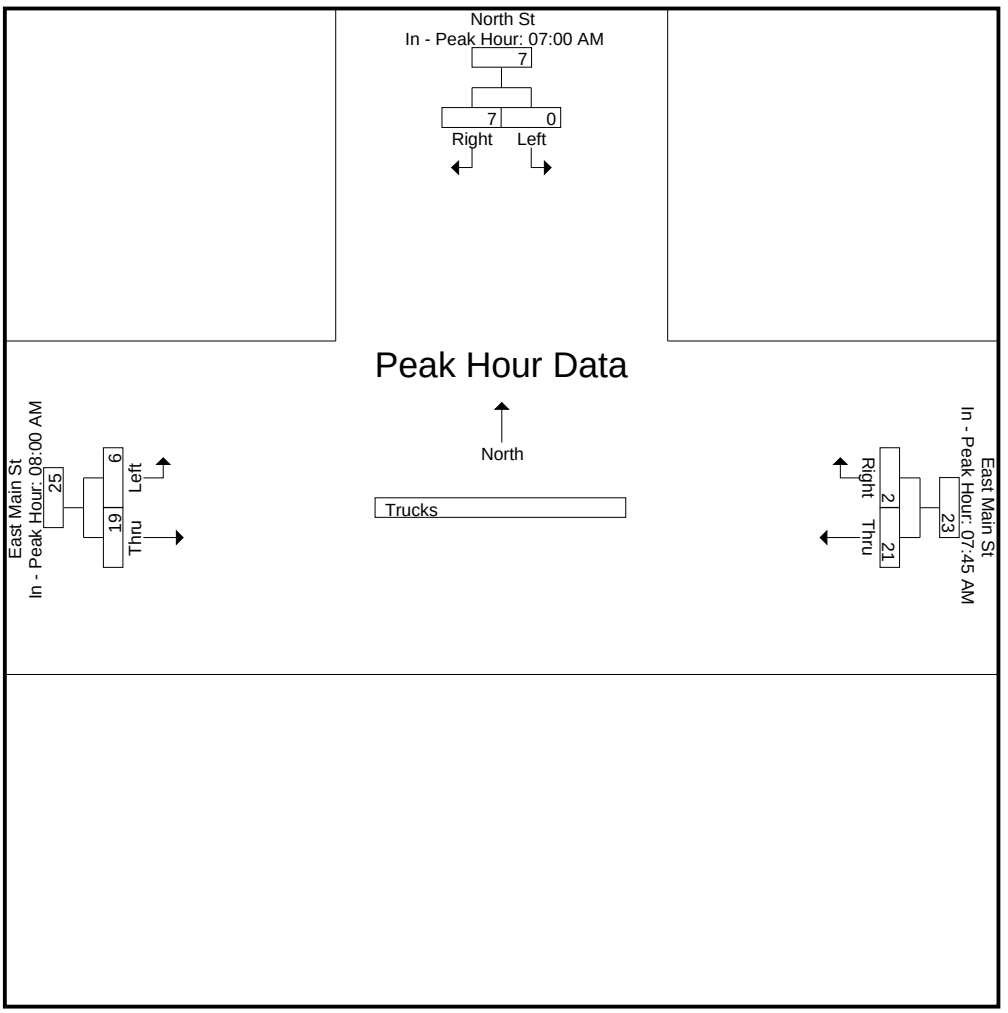
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			07:45 AM			08:00 AM		
+0 mins.	0	1	1	3	0	3	1	3	4
+15 mins.	0	1	1	6	0	6	**3**	7	**10**
+30 mins.	0	**3**	**3**	5	**1**	6	0	1	1
+45 mins.	0	2	2	**7**	1	**8**	2	**8**	10
Total Volume	0	7	7	21	2	23	6	19	25
% App. Total	0	100		91.3	8.7		24	76	
PHF	.000	.583	.583	.750	.500	.719	.500	.594	.625

Accurate Counts
978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021

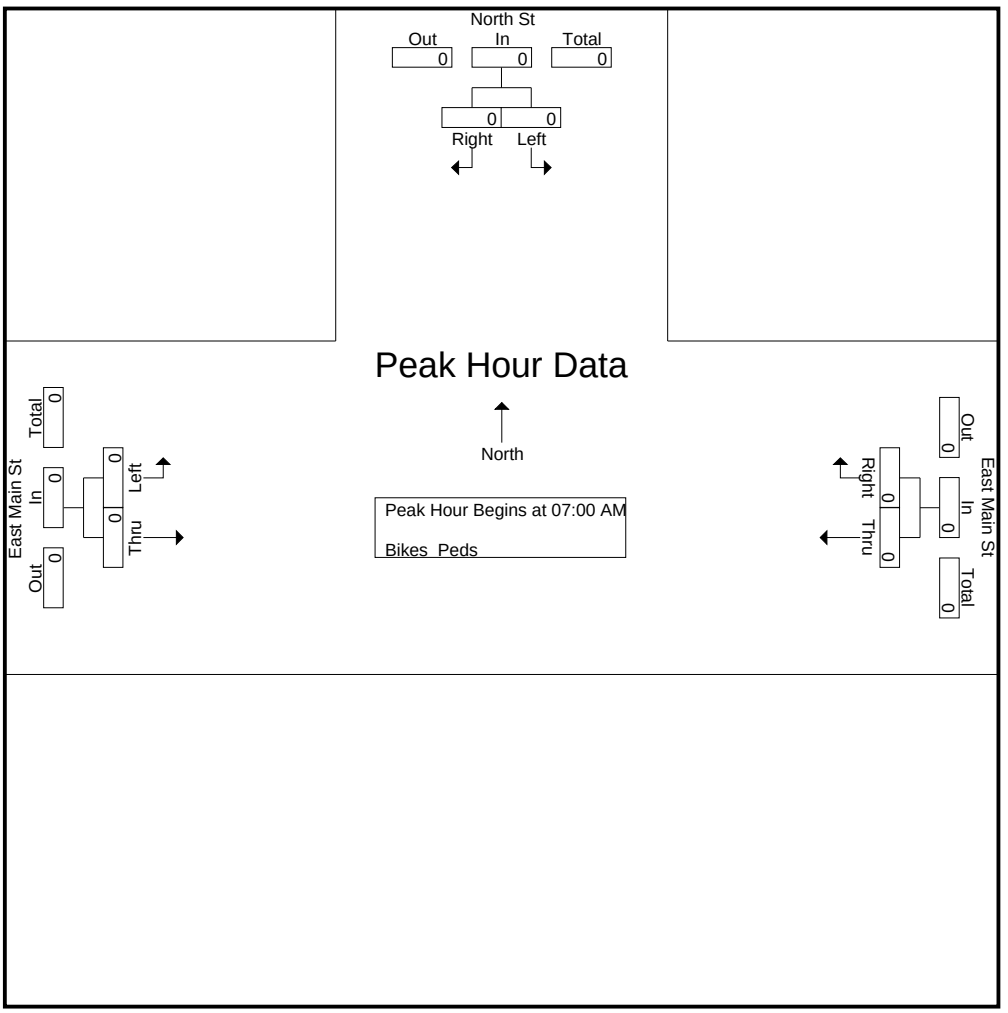
Groups Printed- Bikes Peds

	North St From North			East Main St From East			East Main St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	1	0	0	1	0	0	0	2	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	1	0	0	0	2	0	2
08:00 AM	0	0	1	0	0	0	0	0	0	1	0	1
08:15 AM	0	0	1	0	0	0	0	0	1	2	0	2
08:30 AM	0	0	2	0	0	2	0	0	0	4	0	4
08:45 AM	0	0	5	0	0	0	0	0	0	5	0	5
Total	0	0	9	0	0	2	0	0	1	12	0	12
Grand Total	0	0	10	0	0	3	0	0	1	14	0	14
Apprch %	0	0		0	0		0	0				
Total %										100	0	

	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

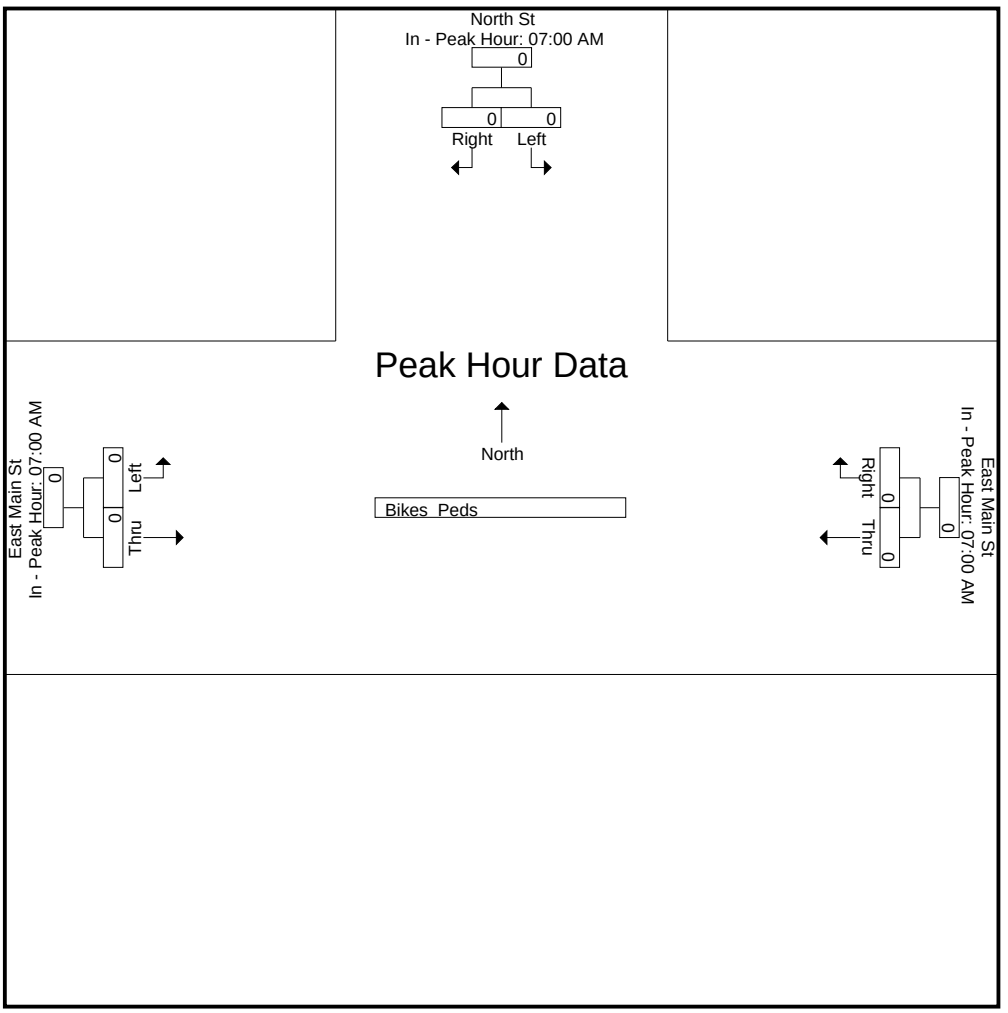
	07:00 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 1

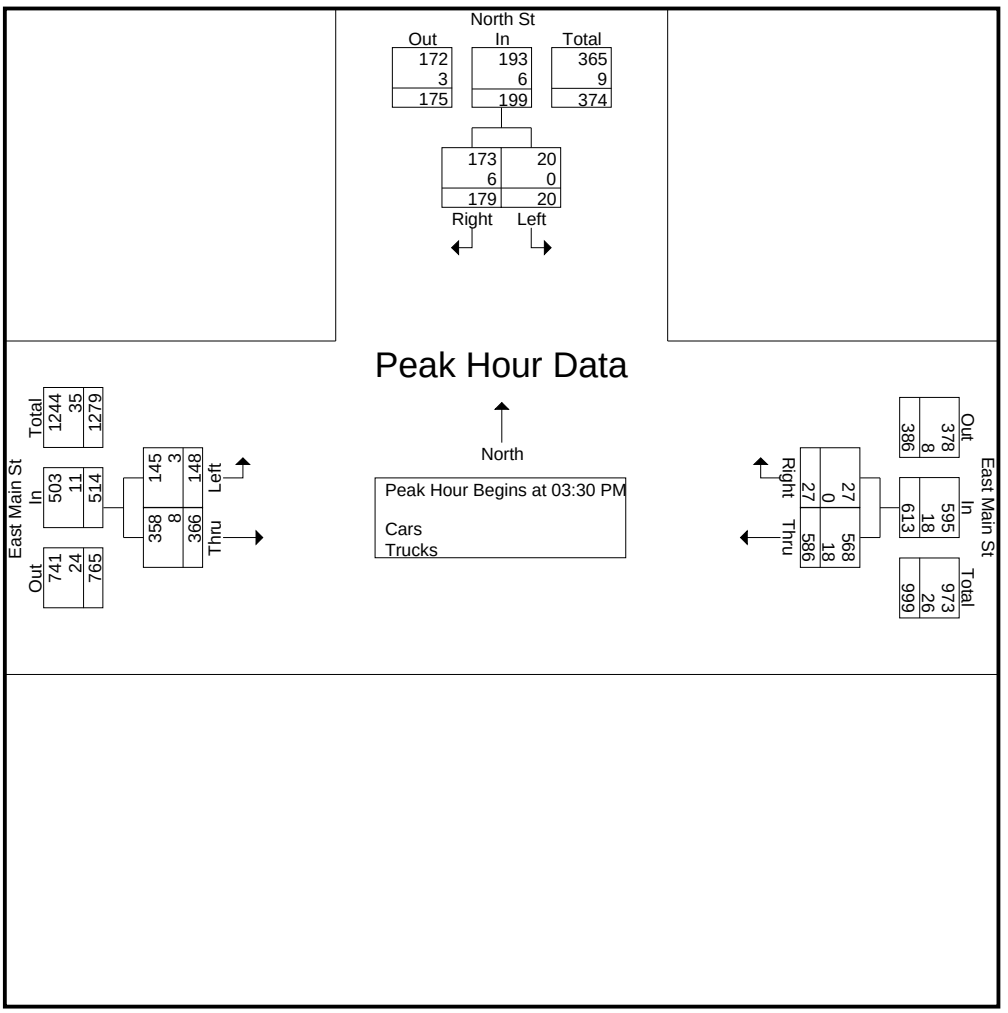
Groups Printed- Cars - Trucks

	North St From North		East Main St From East		East Main St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
03:00 PM	2	32	133	5	25	88	285
03:15 PM	9	31	139	8	32	80	299
03:30 PM	8	57	143	6	32	86	332
03:45 PM	4	44	152	4	44	94	342
Total	23	164	567	23	133	348	1258
04:00 PM	3	39	165	6	34	83	330
04:15 PM	5	39	126	11	38	103	322
04:30 PM	5	38	139	7	31	103	323
04:45 PM	5	27	138	9	39	78	296
Total	18	143	568	33	142	367	1271
Grand Total	41	307	1135	56	275	715	2529
Apprch %	11.8	88.2	95.3	4.7	27.8	72.2	
Total %	1.6	12.1	44.9	2.2	10.9	28.3	
Cars	41	299	1104	56	268	700	2468
% Cars	100	97.4	97.3	100	97.5	97.9	97.6
Trucks	0	8	31	0	7	15	61
% Trucks	0	2.6	2.7	0	2.5	2.1	2.4

	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	**8**	**57**	**65**	143	6	149	32	86	118	332
03:45 PM	4	44	48	152	4	156	**44**	94	138	**342**
04:00 PM	3	39	42	**165**	6	**171**	34	83	117	330
04:15 PM	5	39	44	126	**11**	137	38	**103**	**141**	322
Total Volume	20	179	199	586	27	613	148	366	514	1326
% App. Total	10.1	89.9		95.6	4.4		28.8	71.2		
PHF	.625	.785	.765	.888	.614	.896	.841	.888	.911	.969
Cars	20	173	193	568	27	595	145	358	503	1291
% Cars	100	96.6	97.0	96.9	100	97.1	98.0	97.8	97.9	97.4
Trucks	0	6	6	18	0	18	3	8	11	35
% Trucks	0	3.4	3.0	3.1	0	2.9	2.0	2.2	2.1	2.6

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

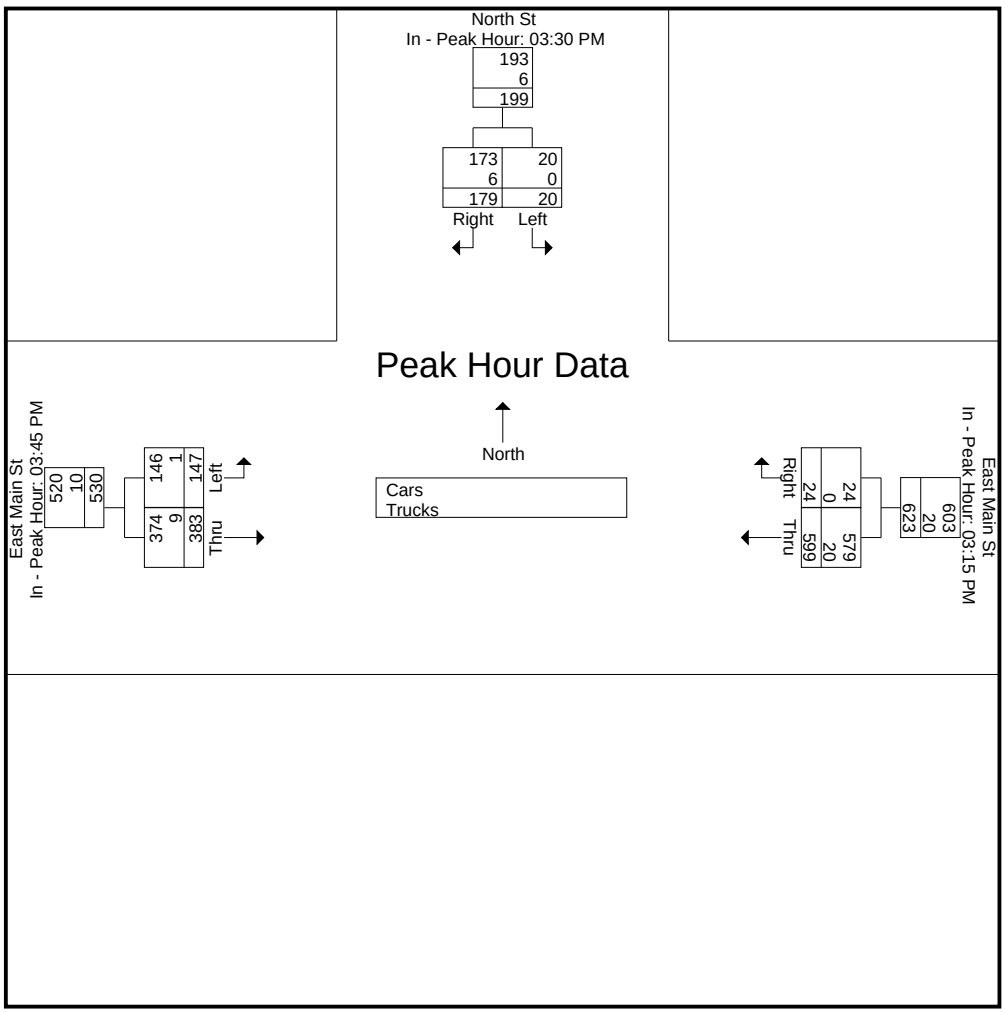
	03:30 PM			03:15 PM			03:45 PM		
+0 mins.	**8**	**57**	**65**	139	**8**	147	**44**	94	138
+15 mins.	4	44	48	143	6	149	34	83	117
+30 mins.	3	39	42	152	4	156	38	**103**	**141**
+45 mins.	5	39	44	**165**	6	**171**	31	103	134
Total Volume	20	179	199	599	24	623	147	383	530
% App. Total	10.1	89.9		96.1	3.9		27.7	72.3	
PHF	.625	.785	.765	.908	.750	.911	.835	.930	.940
Cars	20	173	193	579	24	603	146	374	520
% Cars	100	96.6	97	96.7	100	96.8	99.3	97.7	98.1
Trucks	0	6	6	20	0	20	1	9	10
% Trucks	0	3.4	3	3.3	0	3.2	0.7	2.3	1.9

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	North St From North		East Main St From East		East Main St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
03:00 PM	2	31	131	5	23	87	279
03:15 PM	9	30	134	8	31	77	289
03:30 PM	8	56	141	6	30	85	326
03:45 PM	4	40	143	4	43	92	326
Total	23	157	549	23	127	341	1220
04:00 PM	3	38	161	6	34	80	322
04:15 PM	5	39	123	11	38	101	317
04:30 PM	5	38	139	7	31	101	321
04:45 PM	5	27	132	9	38	77	288
Total	18	142	555	33	141	359	1248
Grand Total	41	299	1104	56	268	700	2468
Apprch %	12.1	87.9	95.2	4.8	27.7	72.3	
Total %	1.7	12.1	44.7	2.3	10.9	28.4	

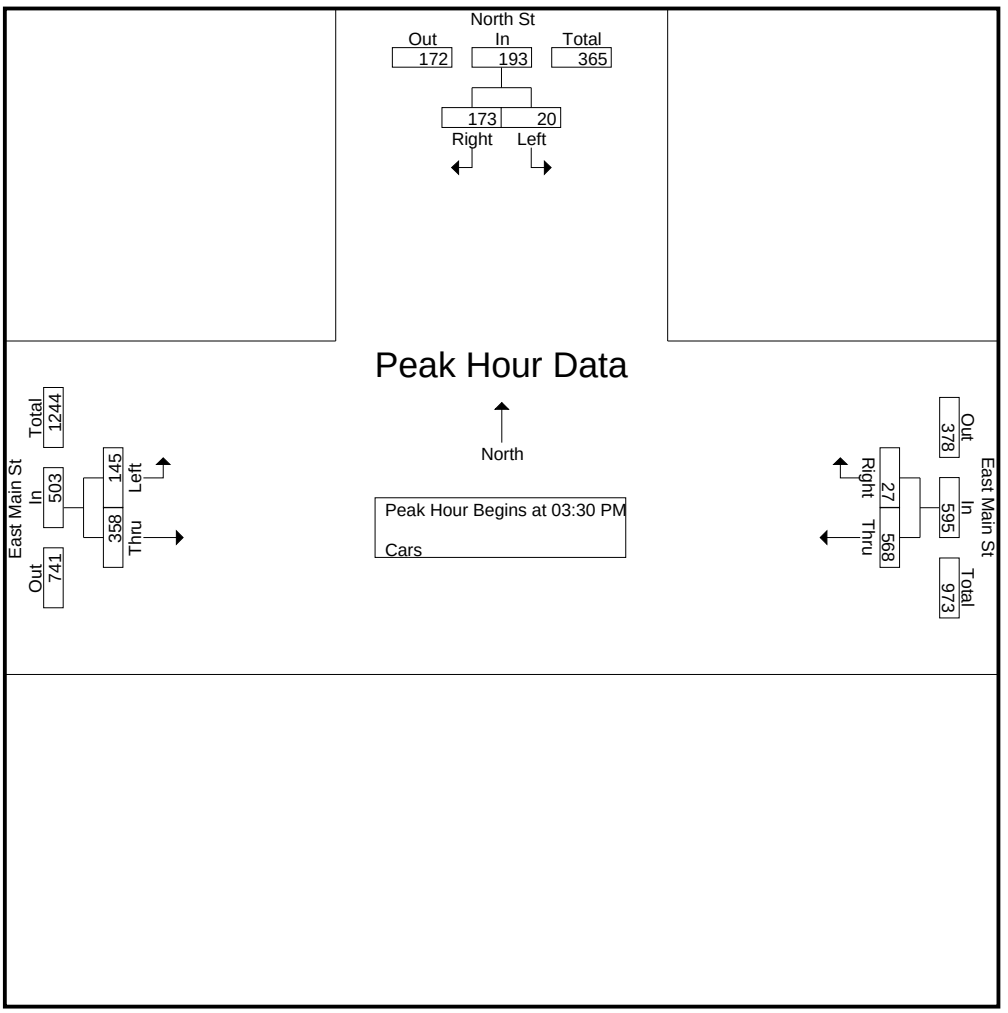
	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	**8**	**56**	**64**	141	6	147	30	85	115	**326**
03:45 PM	4	40	44	143	4	147	**43**	92	135	326
04:00 PM	3	38	41	**161**	6	**167**	34	80	114	322
04:15 PM	5	39	44	123	**11**	134	38	**101**	**139**	317
Total Volume	20	173	193	568	27	595	145	358	503	1291
% App. Total	10.4	89.6		95.5	4.5		28.8	71.2		
PHF	.625	.772	.754	.882	.614	.891	.843	.886	.905	.990

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

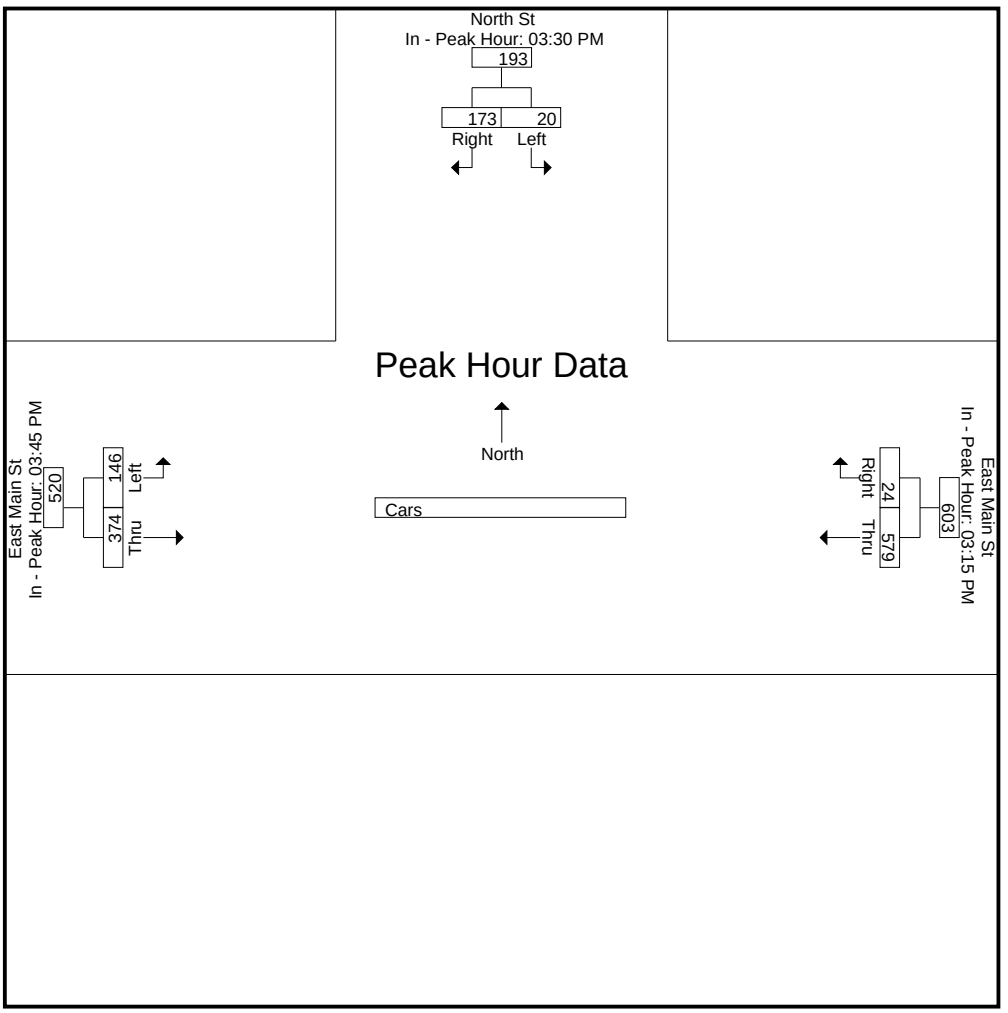
	03:30 PM			03:15 PM			03:45 PM		
+0 mins.	**8**	**56**	**64**	134	**8**	142	**43**	92	135
+15 mins.	4	40	44	141	6	147	34	80	114
+30 mins.	3	38	41	143	4	147	38	**101**	**139**
+45 mins.	5	39	44	**161**	6	**167**	31	101	132
Total Volume	20	173	193	579	24	603	146	374	520
% App. Total	10.4	89.6		96	4		28.1	71.9	
PHF	.625	.772	.754	.899	.750	.903	.849	.926	.935

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 7

Groups Printed- Trucks

	North St From North		East Main St From East		East Main St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
03:00 PM	0	1	2	0	2	1	6
03:15 PM	0	1	5	0	1	3	10
03:30 PM	0	1	2	0	2	1	6
03:45 PM	0	4	9	0	1	2	16
Total	0	7	18	0	6	7	38
04:00 PM	0	1	4	0	0	3	8
04:15 PM	0	0	3	0	0	2	5
04:30 PM	0	0	0	0	0	2	2
04:45 PM	0	0	6	0	1	1	8
Total	0	1	13	0	1	8	23
Grand Total	0	8	31	0	7	15	61
Apprch %	0	100	100	0	31.8	68.2	
Total %	0	13.1	50.8	0	11.5	24.6	

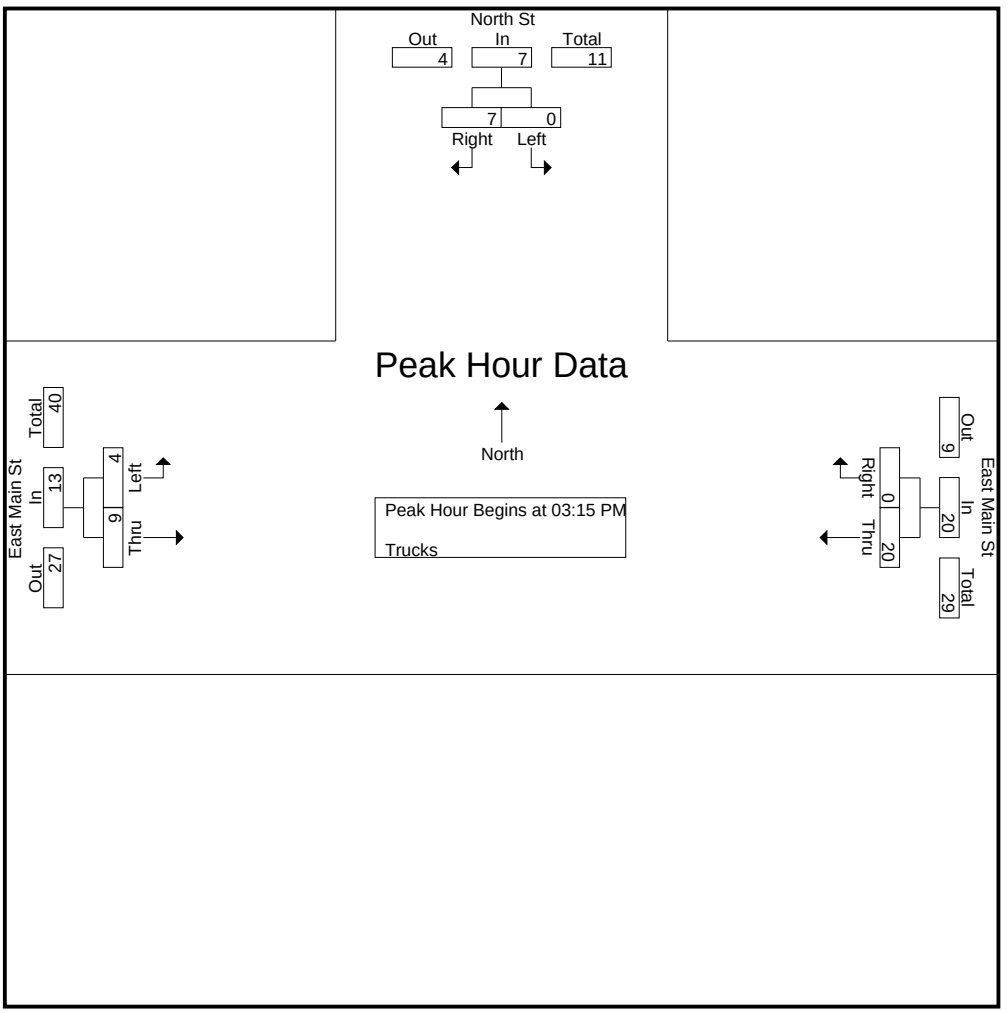
	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:15 PM										
03:15 PM	0	1	1	5	0	5	1	**3**	**4**	10
03:30 PM	0	1	1	2	0	2	**2**	1	3	6
03:45 PM	0	**4**	**4**	**9**	0	**9**	1	2	3	**16**
04:00 PM	0	1	1	4	0	4	0	3	3	8
Total Volume	0	7	7	20	0	20	4	9	13	40
% App. Total	0	100		100	0		30.8	69.2		
PHF	.000	.438	.438	.556	.000	.556	.500	.750	.813	.625

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

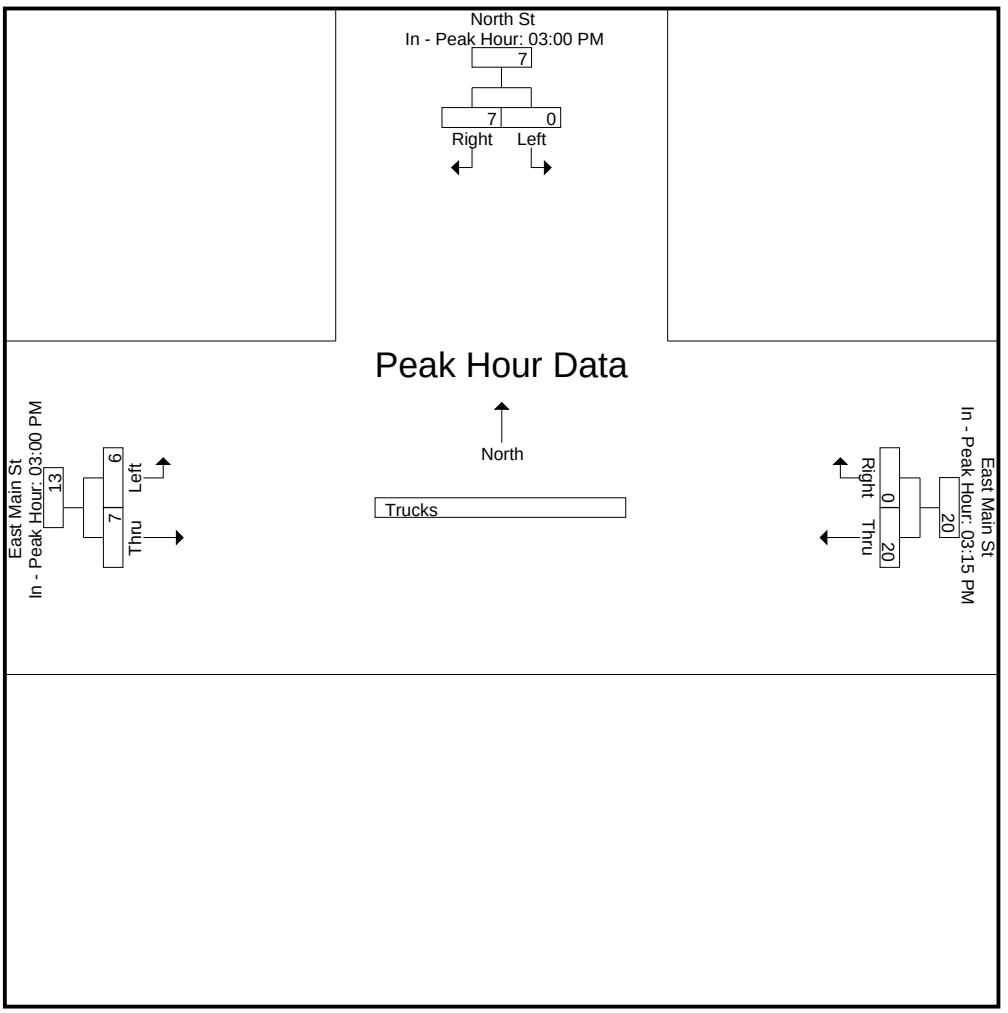
	03:00 PM			03:15 PM			03:00 PM		
+0 mins.	0	1	1	5	0	5	**2**	1	3
+15 mins.	0	1	1	2	0	2	1	**3**	**4**
+30 mins.	0	1	1	**9**	0	**9**	2	1	3
+45 mins.	0	**4**	**4**	4	0	4	1	2	3
Total Volume	0	7	7	20	0	20	6	7	13
% App. Total	0	100		100	0		46.2	53.8	
PHF	.000	.438	.438	.556	.000	.556	.750	.583	.813

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021

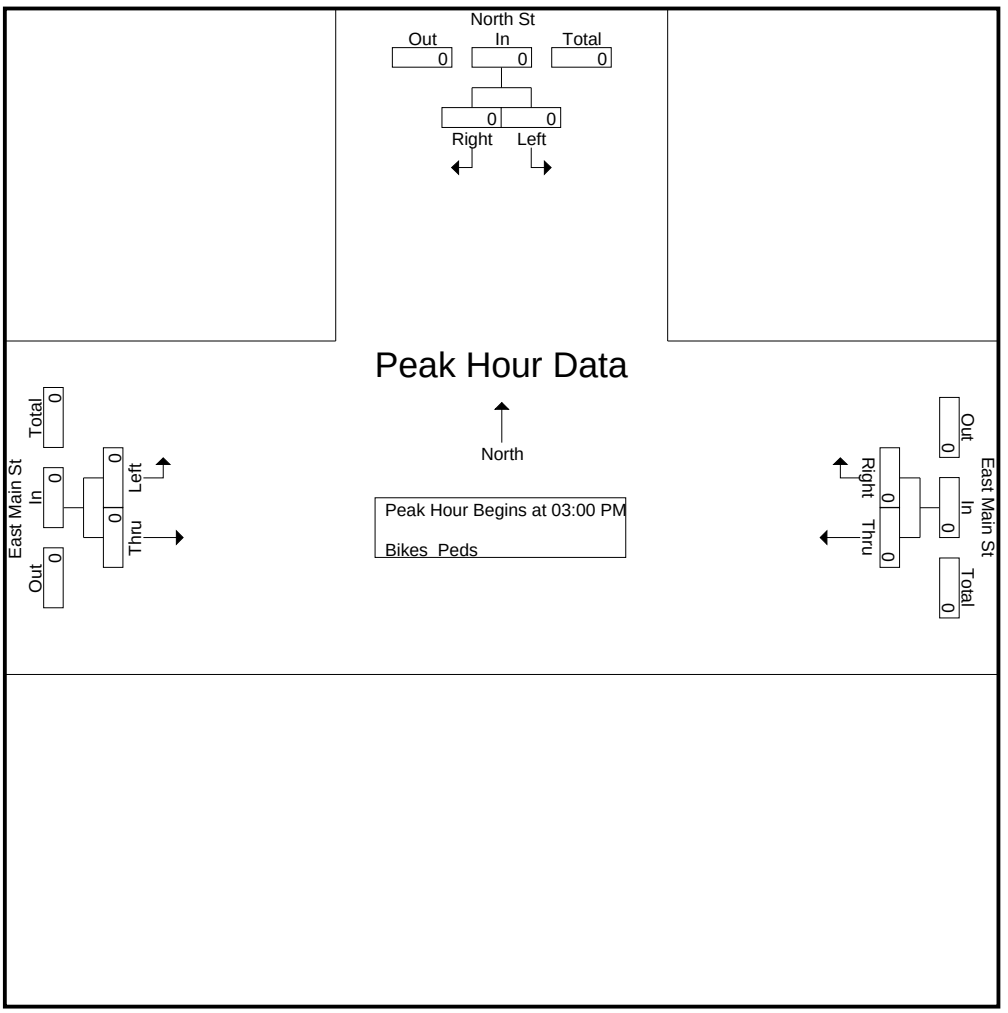
Groups Printed- Bikes Peds

	North St From North			East Main St From East			East Main St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	1	0	0	0	0	0	0	1	0	1
03:15 PM	0	0	1	0	0	0	0	0	0	1	0	1
03:30 PM	0	0	2	0	0	0	0	0	0	2	0	2
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	4	0	0	0	0	0	0	4	0	4
04:00 PM	0	0	2	0	0	1	0	0	0	3	0	3
04:15 PM	0	0	1	0	0	0	0	0	0	1	0	1
04:30 PM	0	0	2	0	0	0	0	0	0	2	0	2
04:45 PM	0	0	1	0	0	0	0	0	0	1	0	1
Total	0	0	6	0	0	1	0	0	0	7	0	7
Grand Total	0	0	10	0	0	1	0	0	0	11	0	11
Apprch %	0	0		0	0		0	0				
Total %										100	0	

	North St From North			East Main St From East			East Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

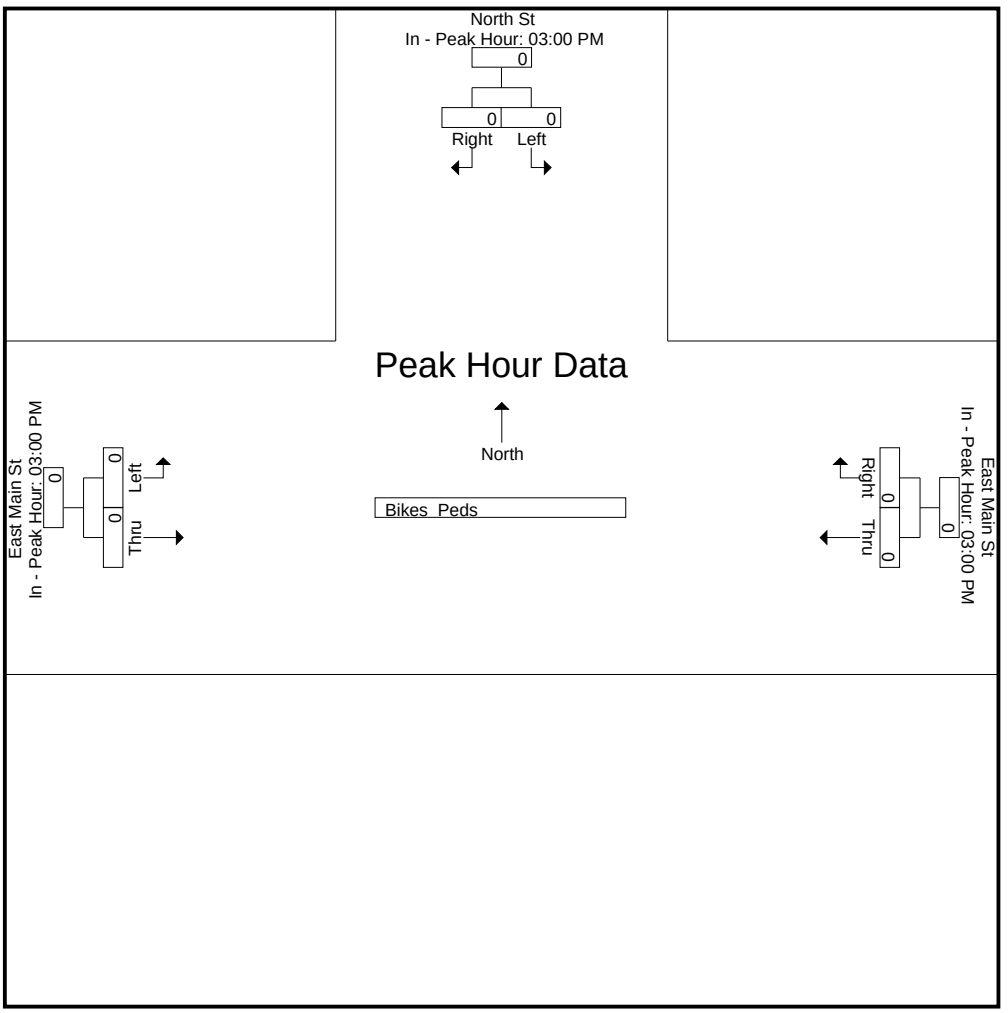
	03:00 PM			03:00 PM			03:00 PM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : North Street
E/W Street : East Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300005
Site Code : 91300005
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021

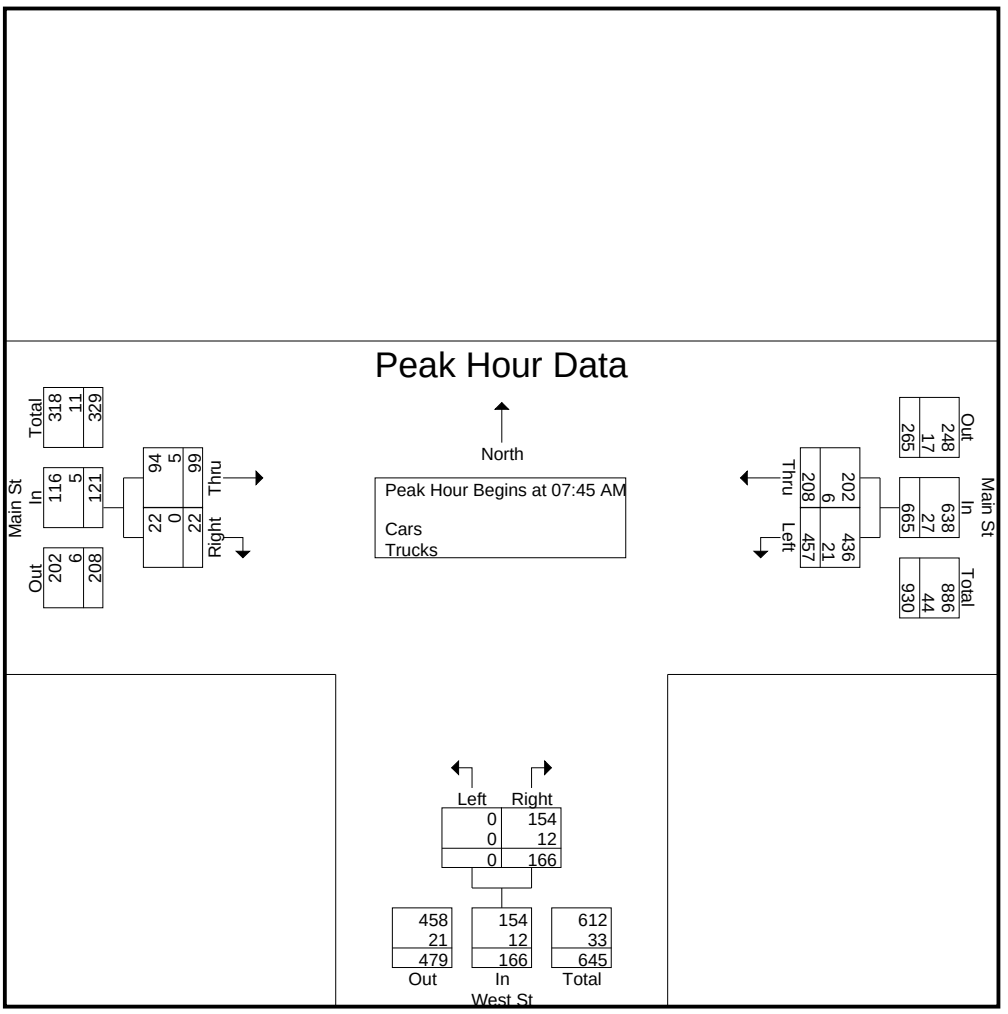
Groups Printed- Cars - Trucks

	Main St From East		West St From South		Main St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	75	42	0	38	19	2	176
07:15 AM	79	53	0	36	29	5	202
07:30 AM	98	51	0	32	29	6	216
07:45 AM	114	70	0	41	27	5	257
Total	366	216	0	147	104	18	851
08:00 AM	96	42	0	35	24	9	206
08:15 AM	101	38	0	47	28	4	218
08:30 AM	146	58	0	43	20	4	271
08:45 AM	96	43	0	61	34	8	242
Total	439	181	0	186	106	25	937
Grand Total	805	397	0	333	210	43	1788
Apprch %	67	33	0	100	83	17	
Total %	45	22.2	0	18.6	11.7	2.4	
Cars	777	383	0	303	201	43	1707
% Cars	96.5	96.5	0	91	95.7	100	95.5
Trucks	28	14	0	30	9	0	81
% Trucks	3.5	3.5	0	9	4.3	0	4.5

	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	114	**70**	184	0	41	41	27	5	32	257
08:00 AM	96	42	138	0	35	35	24	**9**	**33**	206
08:15 AM	101	38	139	0	**47**	**47**	**28**	4	32	218
08:30 AM	**146**	58	**204**	0	43	43	20	4	24	**271**
Total Volume	457	208	665	0	166	166	99	22	121	952
% App. Total	68.7	31.3		0	100		81.8	18.2		
PHF	.783	.743	.815	.000	.883	.883	.884	.611	.917	.878
Cars	436	202	638	0	154	154	94	22	116	908
% Cars	95.4	97.1	95.9	0	92.8	92.8	94.9	100	95.9	95.4
Trucks	21	6	27	0	12	12	5	0	5	44
% Trucks	4.6	2.9	4.1	0	7.2	7.2	5.1	0	4.1	4.6

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

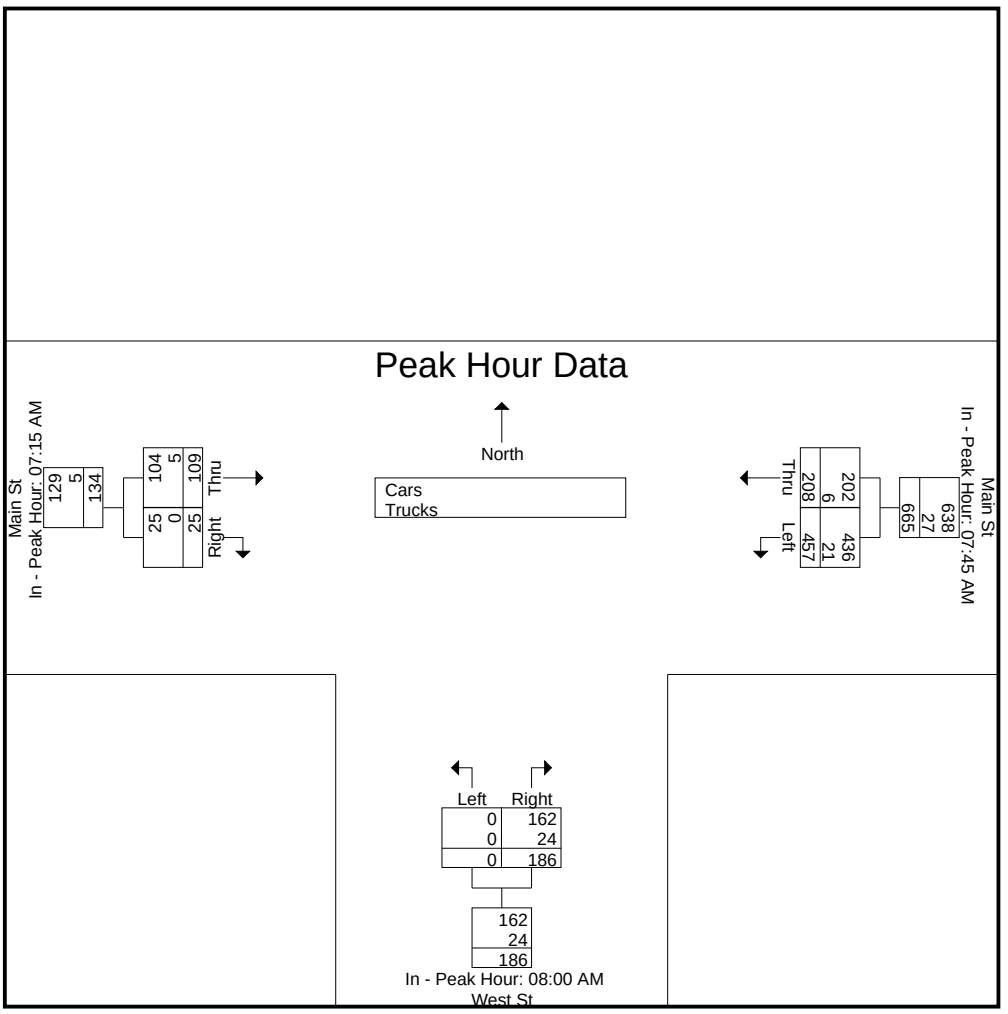
	07:45 AM			08:00 AM			07:15 AM		
+0 mins.	114	**70**	184	0	35	35	**29**	5	34
+15 mins.	96	42	138	0	47	47	29	6	**35**
+30 mins.	101	38	139	0	43	43	27	5	32
+45 mins.	**146**	58	**204**	0	**61**	**61**	24	**9**	33
Total Volume	457	208	665	0	186	186	109	25	134
% App. Total	68.7	31.3		0	100		81.3	18.7	
PHF	.783	.743	.815	.000	.762	.762	.940	.694	.957
Cars	436	202	638	0	162	162	104	25	129
% Cars	95.4	97.1	95.9	0	87.1	87.1	95.4	100	96.3
Trucks	21	6	27	0	24	24	5	0	5
% Trucks	4.6	2.9	4.1	0	12.9	12.9	4.6	0	3.7

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	Main St From East		West St From South		Main St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	72	40	0	37	18	2	169
07:15 AM	77	51	0	34	27	5	194
07:30 AM	97	48	0	29	29	6	209
07:45 AM	109	70	0	41	26	5	251
Total	355	209	0	141	100	18	823
08:00 AM	90	42	0	33	22	9	196
08:15 AM	98	35	0	39	26	4	202
08:30 AM	139	55	0	41	20	4	259
08:45 AM	95	42	0	49	33	8	227
Total	422	174	0	162	101	25	884
Grand Total	777	383	0	303	201	43	1707
Apprch %	67	33	0	100	82.4	17.6	
Total %	45.5	22.4	0	17.8	11.8	2.5	

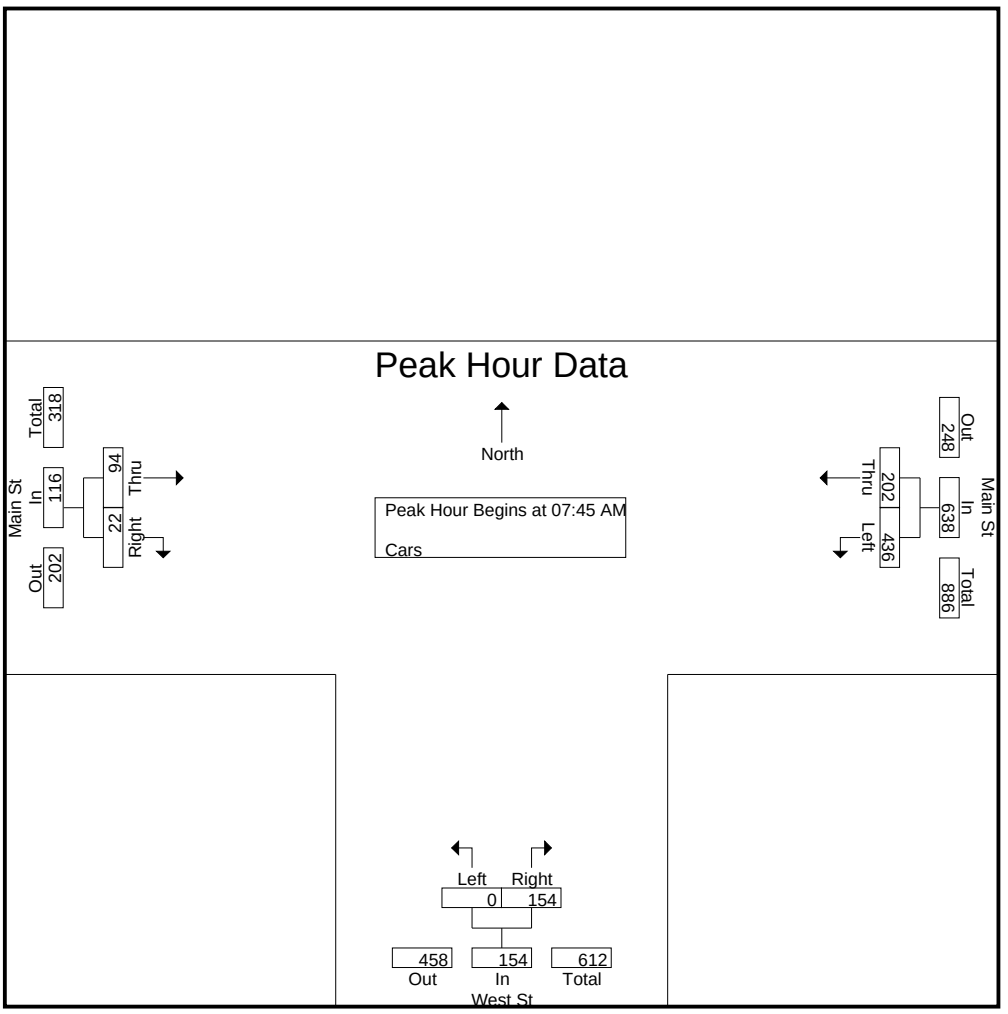
	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	109	**70**	179	0	**41**	**41**	**26**	5	**31**	251
08:00 AM	90	42	132	0	33	33	22	**9**	31	196
08:15 AM	98	35	133	0	39	39	26	4	30	202
08:30 AM	**139**	55	**194**	0	41	41	20	4	24	**259**
Total Volume	436	202	638	0	154	154	94	22	116	908
% App. Total	68.3	31.7		0	100		81	19		
PHF	.784	.721	.822	.000	.939	.939	.904	.611	.935	.876

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

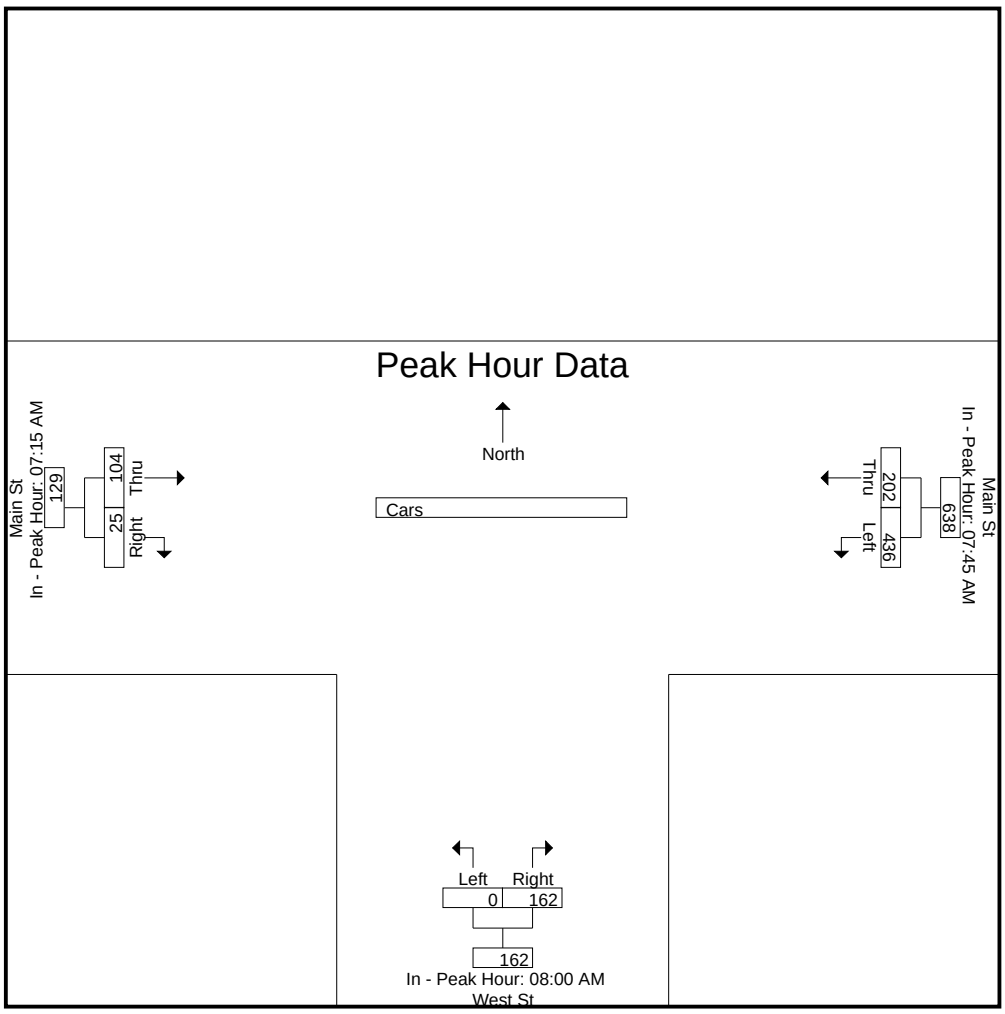
	07:45 AM			08:00 AM			07:15 AM		
+0 mins.	109	**70**	179	0	33	33	27	5	32
+15 mins.	90	42	132	0	39	39	**29**	6	**35**
+30 mins.	98	35	133	0	41	41	26	5	31
+45 mins.	**139**	55	**194**	0	**49**	**49**	22	**9**	31
Total Volume	436	202	638	0	162	162	104	25	129
% App. Total	68.3	31.7		0	100		80.6	19.4	
PHF	.784	.721	.822	.000	.827	.827	.897	.694	.921

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021

Groups Printed- Trucks

	Main St From East		West St From South		Main St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	3	2	0	1	1	0	7
07:15 AM	2	2	0	2	2	0	8
07:30 AM	1	3	0	3	0	0	7
07:45 AM	5	0	0	0	1	0	6
Total	11	7	0	6	4	0	28
08:00 AM	6	0	0	2	2	0	10
08:15 AM	3	3	0	8	2	0	16
08:30 AM	7	3	0	2	0	0	12
08:45 AM	1	1	0	12	1	0	15
Total	17	7	0	24	5	0	53
Grand Total	28	14	0	30	9	0	81
Apprch %	66.7	33.3	0	100	100	0	
Total %	34.6	17.3	0	37	11.1	0	

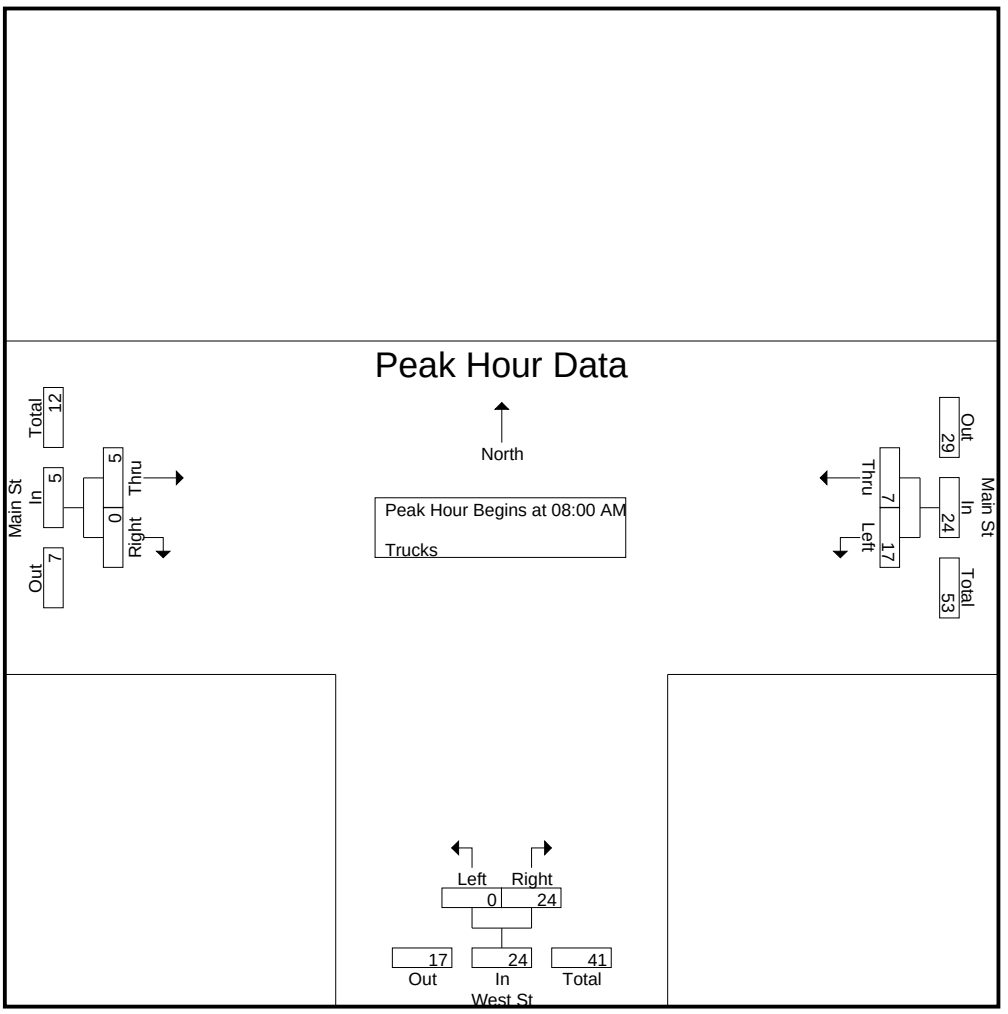
	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	6	0	6	0	2	2	**2**	0	**2**	10
08:15 AM	3	**3**	6	0	8	8	2	0	2	**16**
08:30 AM	**7**	3	**10**	0	2	2	0	0	0	12
08:45 AM	1	1	2	0	**12**	**12**	1	0	1	15
Total Volume	17	7	24	0	24	24	5	0	5	53
% App. Total	70.8	29.2		0	100		100	0		
PHF	.607	.583	.600	.000	.500	.500	.625	.000	.625	.828

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

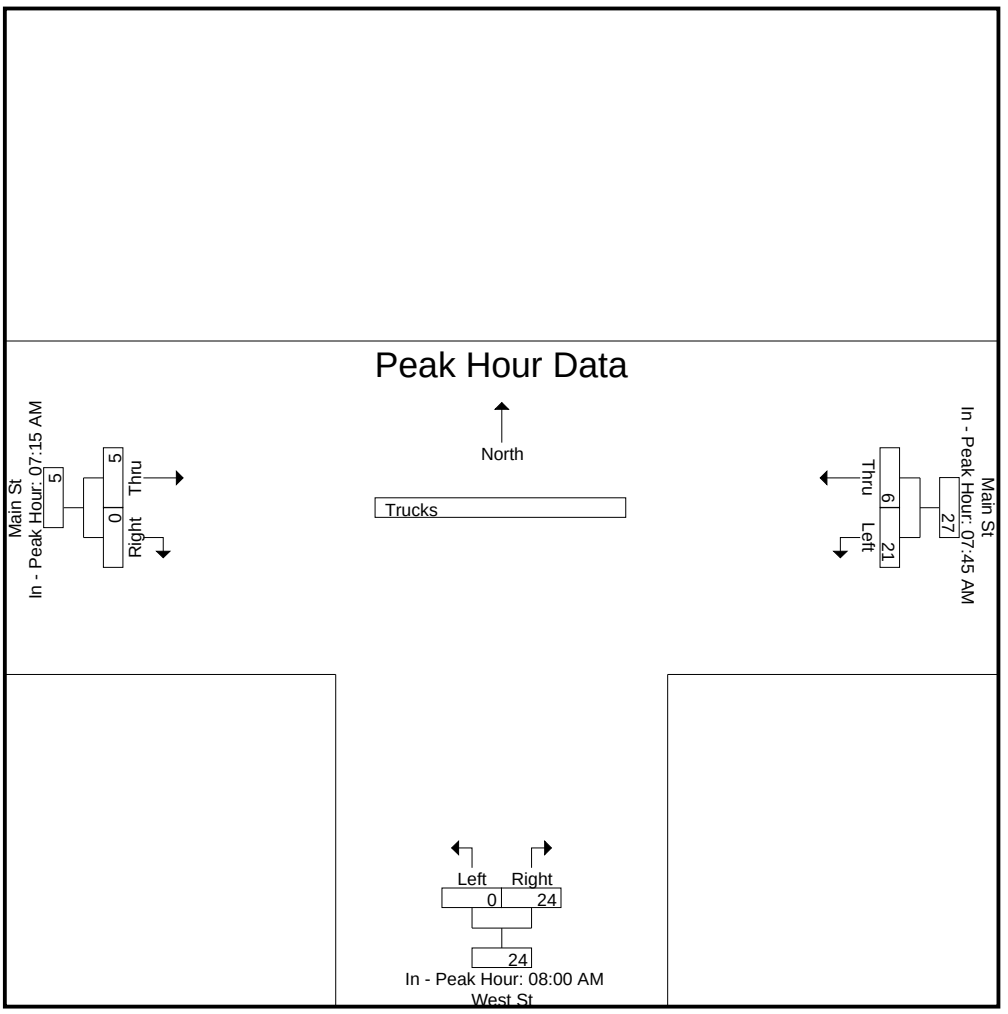
	07:45 AM			08:00 AM			07:15 AM		
+0 mins.	5	0	5	0	2	2	**2**	0	**2**
+15 mins.	6	0	6	0	8	8	0	0	0
+30 mins.	3	**3**	6	0	2	2	1	0	1
+45 mins.	**7**	3	**10**	0	**12**	**12**	2	0	2
Total Volume	21	6	27	0	24	24	5	0	5
% App. Total	77.8	22.2		0	100		100	0	
PHF	.750	.500	.675	.000	.500	.500	.625	.000	.625

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021

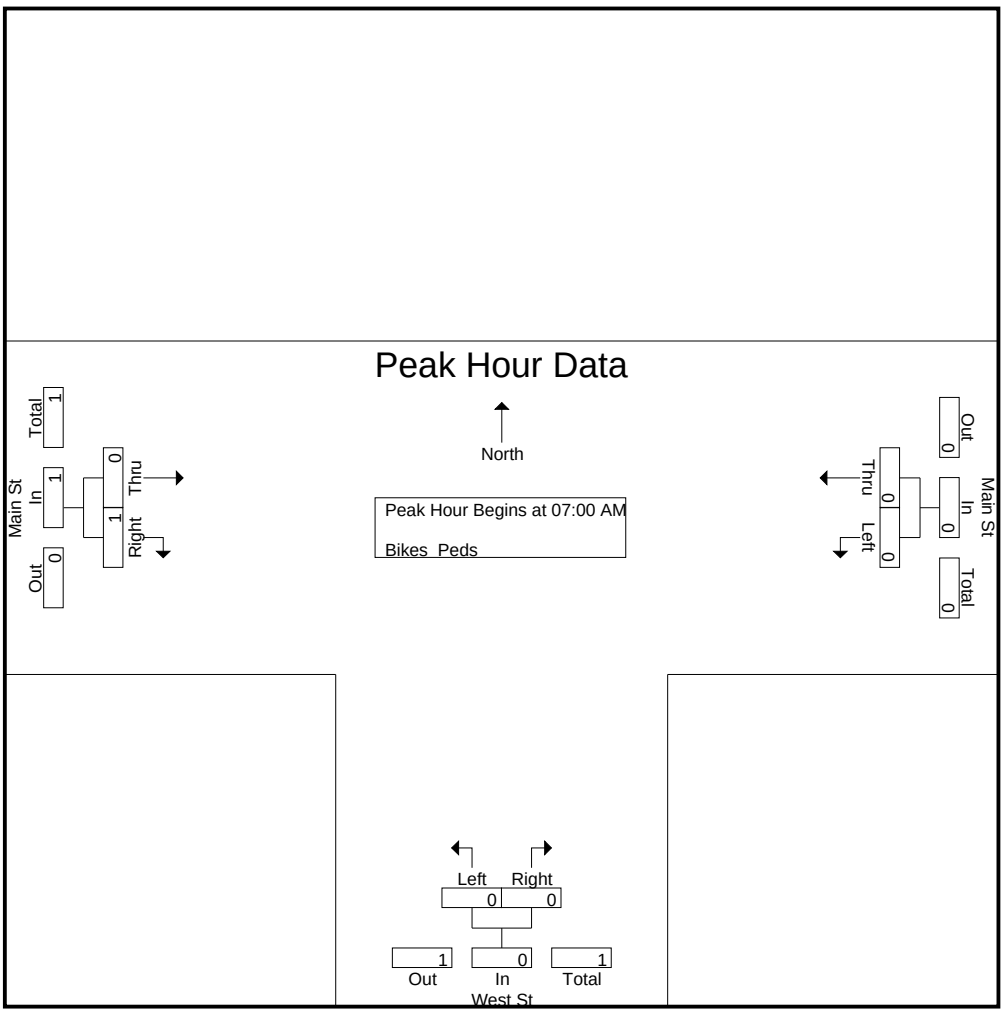
Groups Printed- Bikes Peds

	Main St From East			West St From South			Main St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	2	2	0	2
07:15 AM	0	0	5	0	0	0	0	0	0	5	0	5
07:30 AM	0	0	2	0	0	0	0	1	0	2	1	3
07:45 AM	0	0	4	0	0	0	0	0	3	7	0	7
Total	0	0	11	0	0	0	0	1	5	16	1	17
08:00 AM	0	0	4	0	0	0	0	0	1	5	0	5
08:15 AM	0	0	3	0	0	0	0	0	1	4	0	4
08:30 AM	0	0	0	0	0	0	0	0	1	1	0	1
08:45 AM	0	0	2	0	0	0	0	0	1	3	0	3
Total	0	0	9	0	0	0	0	0	4	13	0	13
Grand Total	0	0	20	0	0	0	0	1	9	29	1	30
Apprch %	0	0		0	0		0	100				
Total %	0	0		0	0		0	100		96.7	3.3	

	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	**1**	**1**	**1**
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	1	1	1
% App. Total	0	0		0	0		0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.250	.250

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

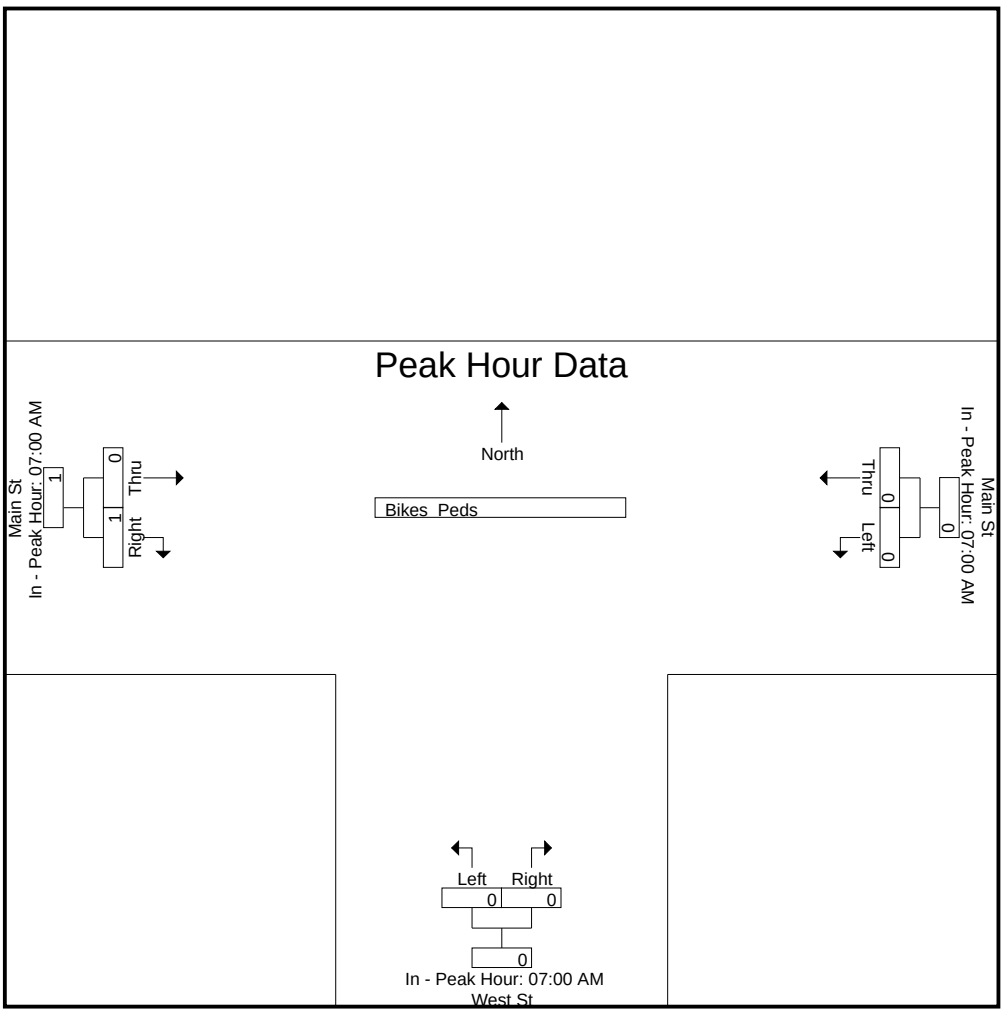
	07:00 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	**1**	**1**
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	1	1
% App. Total	0	0		0	0		0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.250

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 12



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 1

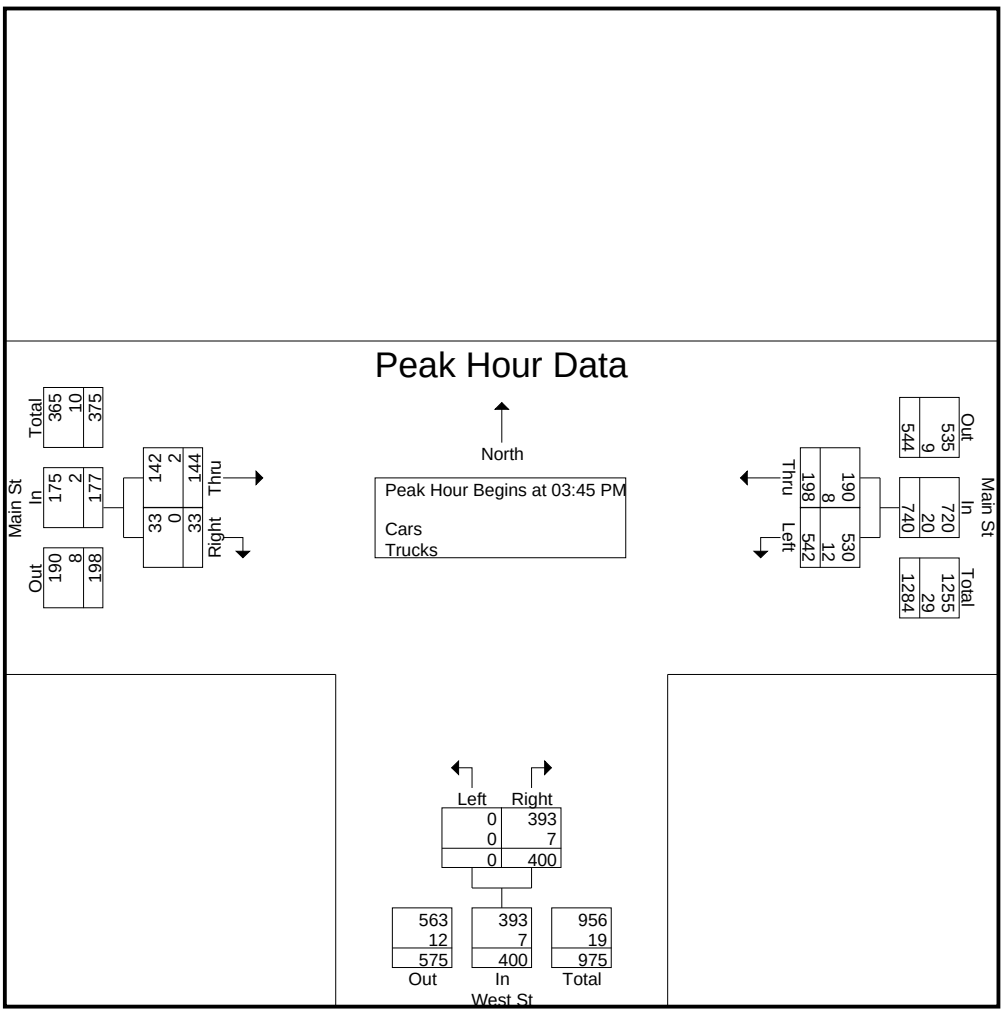
Groups Printed- Cars - Trucks

	Main St From East		West St From South		Main St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
03:00 PM	126	40	0	87	27	8	288
03:15 PM	130	49	0	83	33	10	305
03:30 PM	151	52	0	88	26	6	323
03:45 PM	135	49	0	103	35	9	331
Total	542	190	0	361	121	33	1247
04:00 PM	157	56	0	90	32	7	342
04:15 PM	121	48	0	111	32	6	318
04:30 PM	129	45	0	96	45	11	326
04:45 PM	123	50	0	88	25	3	289
Total	530	199	0	385	134	27	1275
Grand Total	1072	389	0	746	255	60	2522
Apprch %	73.4	26.6	0	100	81	19	
Total %	42.5	15.4	0	29.6	10.1	2.4	
Cars	1048	375	0	730	251	60	2464
% Cars	97.8	96.4	0	97.9	98.4	100	97.7
Trucks	24	14	0	16	4	0	58
% Trucks	2.2	3.6	0	2.1	1.6	0	2.3

	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:45 PM										
03:45 PM	135	49	184	0	103	103	35	9	44	331
04:00 PM	**157**	**56**	**213**	0	90	90	32	7	39	**342**
04:15 PM	121	48	169	0	**111**	**111**	32	6	38	318
04:30 PM	129	45	174	0	96	96	**45**	**11**	**56**	326
Total Volume	542	198	740	0	400	400	144	33	177	1317
% App. Total	73.2	26.8		0	100		81.4	18.6		
PHF	.863	.884	.869	.000	.901	.901	.800	.750	.790	.963
Cars	530	190	720	0	393	393	142	33	175	1288
% Cars	97.8	96.0	97.3	0	98.3	98.3	98.6	100	98.9	97.8
Trucks	12	8	20	0	7	7	2	0	2	29
% Trucks	2.2	4.0	2.7	0	1.8	1.8	1.4	0	1.1	2.2

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 2



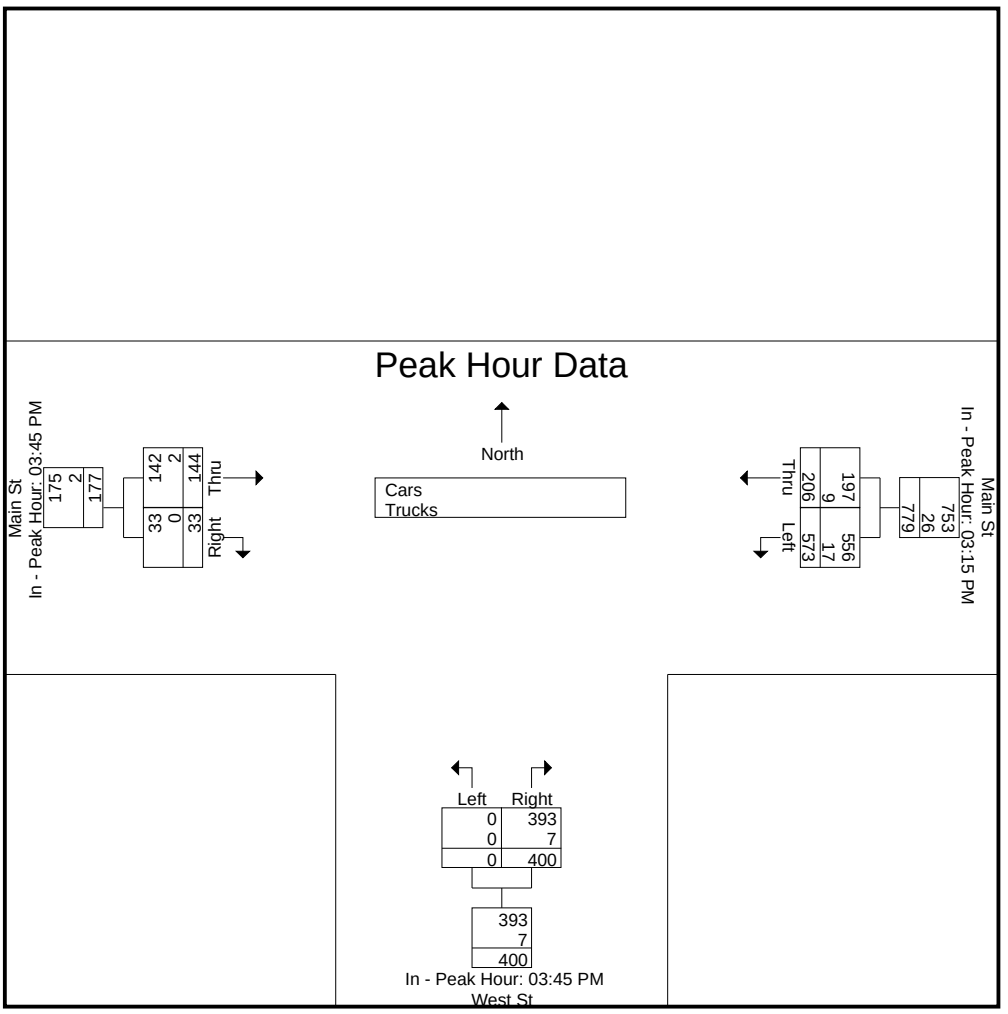
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	03:15 PM			03:45 PM			03:45 PM		
+0 mins.	130	49	179	0	103	103	35	9	44
+15 mins.	151	52	203	0	90	90	32	7	39
+30 mins.	135	49	184	0	**111**	**111**	32	6	38
+45 mins.	**157**	**56**	**213**	0	96	96	**45**	**11**	**56**
Total Volume	573	206	779	0	400	400	144	33	177
% App. Total	73.6	26.4		0	100		81.4	18.6	
PHF	.912	.920	.914	.000	.901	.901	.800	.750	.790
Cars	556	197	753	0	393	393	142	33	175
% Cars	97	95.6	96.7	0	98.2	98.2	98.6	100	98.9
Trucks	17	9	26	0	7	7	2	0	2
% Trucks	3	4.4	3.3	0	1.8	1.8	1.4	0	1.1

Accurate Counts
978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 3



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 4

Groups Printed- Cars

	Main St From East		West St From South		Main St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
03:00 PM	124	39	0	84	27	8	282
03:15 PM	127	47	0	81	31	10	296
03:30 PM	148	51	0	85	26	6	316
03:45 PM	127	45	0	102	34	9	317
Total	526	182	0	352	118	33	1211
04:00 PM	154	54	0	87	32	7	334
04:15 PM	120	47	0	109	32	6	314
04:30 PM	129	44	0	95	44	11	323
04:45 PM	119	48	0	87	25	3	282
Total	522	193	0	378	133	27	1253
Grand Total	1048	375	0	730	251	60	2464
Apprch %	73.6	26.4	0	100	80.7	19.3	
Total %	42.5	15.2	0	29.6	10.2	2.4	

	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:45 PM										
03:45 PM	127	45	172	0	102	102	34	9	43	317
04:00 PM	**154**	**54**	**208**	0	87	87	32	7	39	**334**
04:15 PM	120	47	167	0	**109**	**109**	32	6	38	314
04:30 PM	129	44	173	0	95	95	**44**	**11**	**55**	323
Total Volume	530	190	720	0	393	393	142	33	175	1288
% App. Total	73.6	26.4		0	100		81.1	18.9		
PHF	.860	.880	.865	.000	.901	.901	.807	.750	.795	.964

N/S Street : West Street
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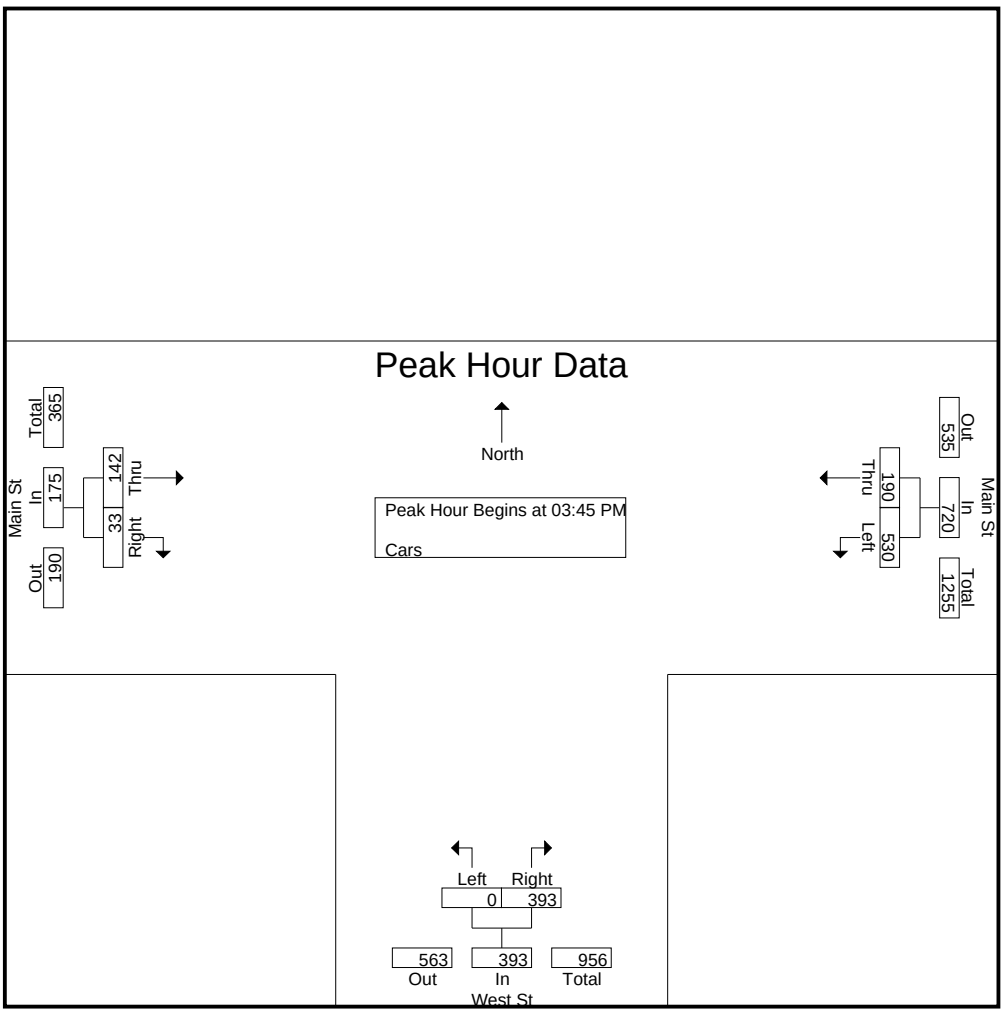
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 5



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

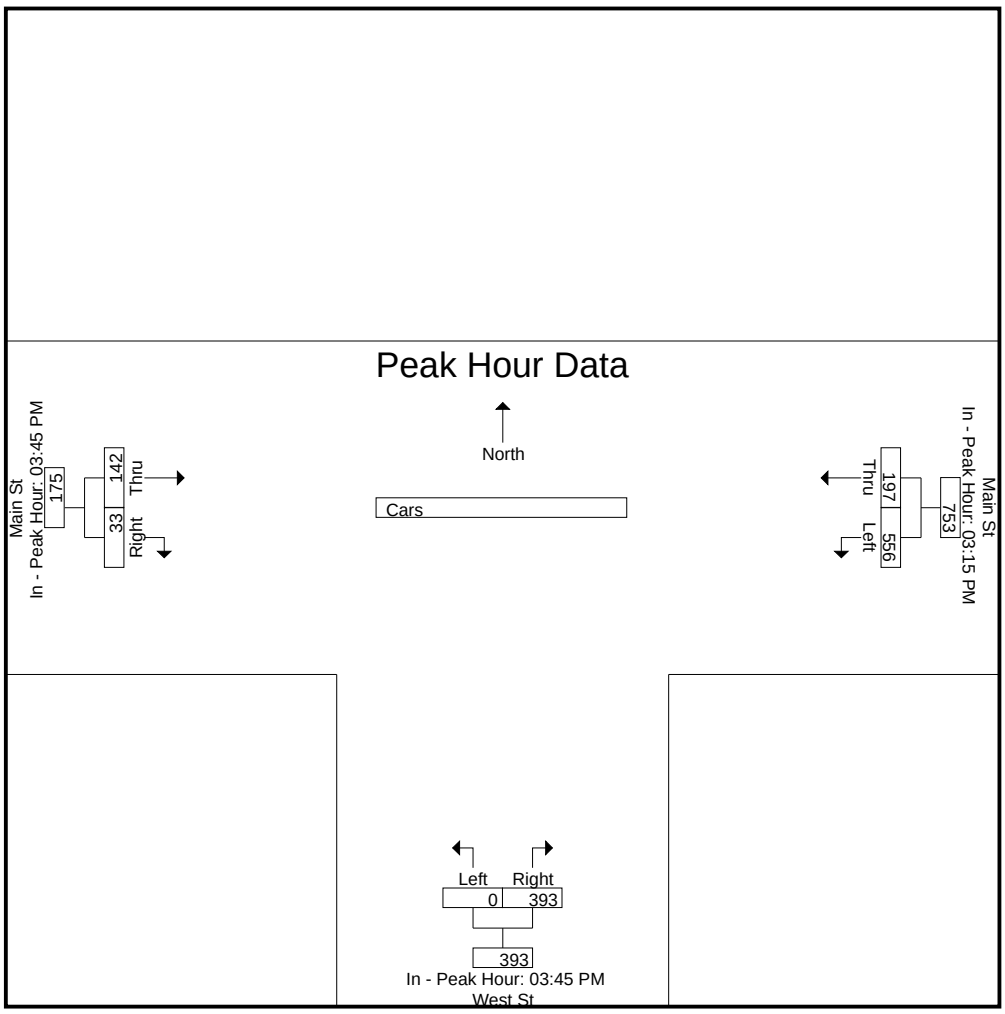
	03:15 PM			03:45 PM			03:45 PM		
+0 mins.	127	47	174	0	102	102	34	9	43
+15 mins.	148	51	199	0	87	87	32	7	39
+30 mins.	127	45	172	0	**109**	**109**	32	6	38
+45 mins.	**154**	**54**	**208**	0	95	95	**44**	**11**	**55**
Total Volume	556	197	753	0	393	393	142	33	175
% App. Total	73.8	26.2		0	100		81.1	18.9	
PHF	.903	.912	.905	.000	.901	.901	.807	.750	.795

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 6



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 7

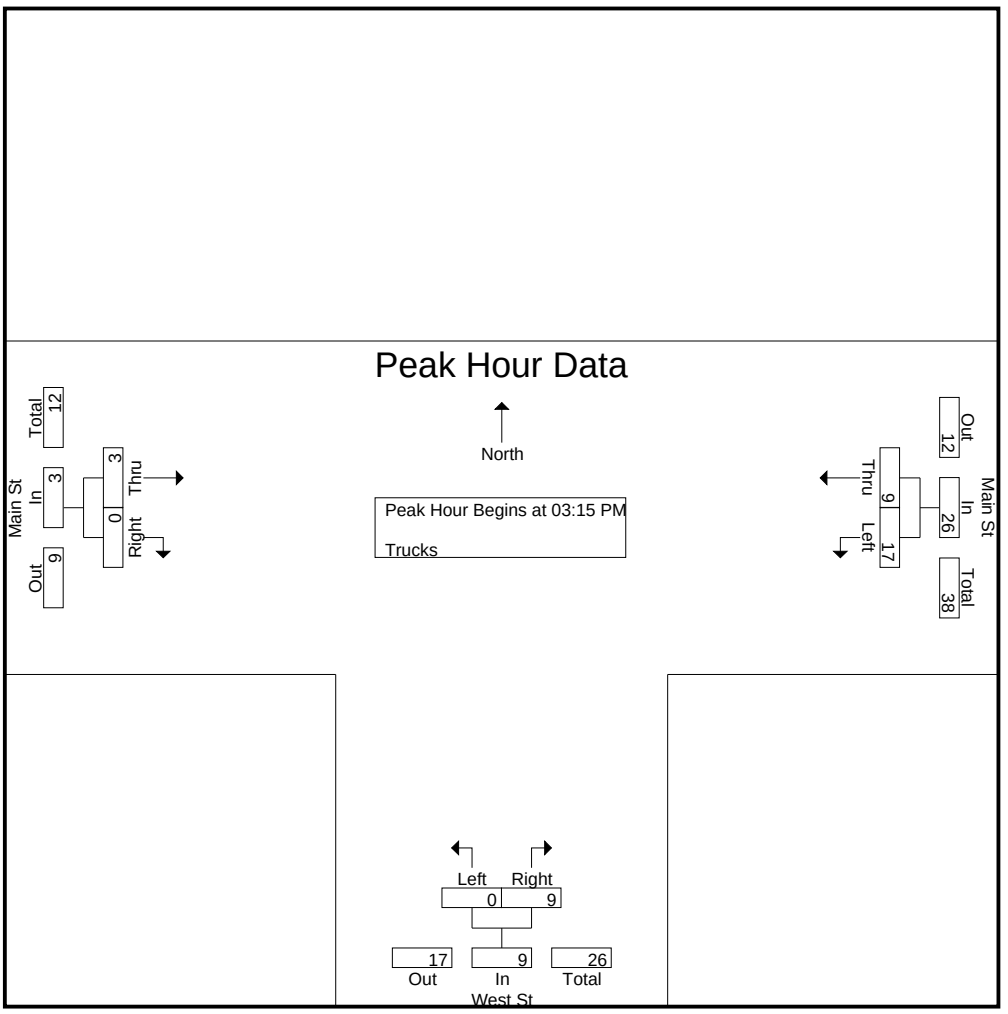
Groups Printed- Trucks

	Main St From East		West St From South		Main St From West		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
03:00 PM	2	1	0	3	0	0	6
03:15 PM	3	2	0	2	2	0	9
03:30 PM	3	1	0	3	0	0	7
03:45 PM	8	4	0	1	1	0	14
Total	16	8	0	9	3	0	36
04:00 PM	3	2	0	3	0	0	8
04:15 PM	1	1	0	2	0	0	4
04:30 PM	0	1	0	1	1	0	3
04:45 PM	4	2	0	1	0	0	7
Total	8	6	0	7	1	0	22
Grand Total	24	14	0	16	4	0	58
Apprch %	63.2	36.8	0	100	100	0	
Total %	41.4	24.1	0	27.6	6.9	0	

	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:15 PM										
03:15 PM	3	2	5	0	2	2	**2**	0	**2**	9
03:30 PM	3	1	4	0	**3**	**3**	0	0	0	7
03:45 PM	**8**	**4**	**12**	0	1	1	1	0	1	**14**
04:00 PM	3	2	5	0	3	3	0	0	0	8
Total Volume	17	9	26	0	9	9	3	0	3	38
% App. Total	65.4	34.6		0	100		100	0		
PHF	.531	.563	.542	.000	.750	.750	.375	.000	.375	.679

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 8



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

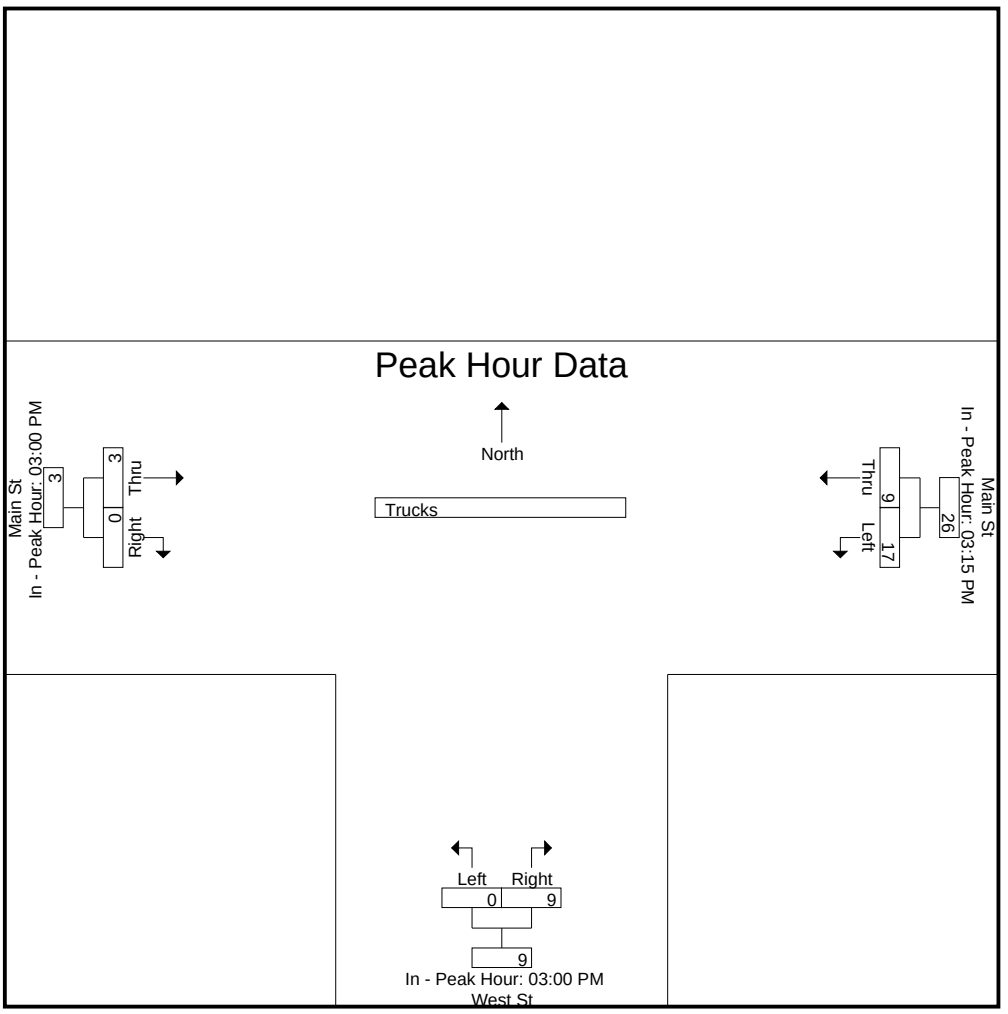
	03:15 PM			03:00 PM			03:00 PM		
+0 mins.	3	2	5	0	**3**	**3**	0	0	0
+15 mins.	3	1	4	0	2	2	**2**	0	**2**
+30 mins.	**8**	**4**	**12**	0	3	3	0	0	0
+45 mins.	3	2	5	0	1	1	1	0	1
Total Volume	17	9	26	0	9	9	3	0	3
% App. Total	65.4	34.6		0	100		100	0	
PHF	.531	.563	.542	.000	.750	.750	.375	.000	.375

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 9



Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021

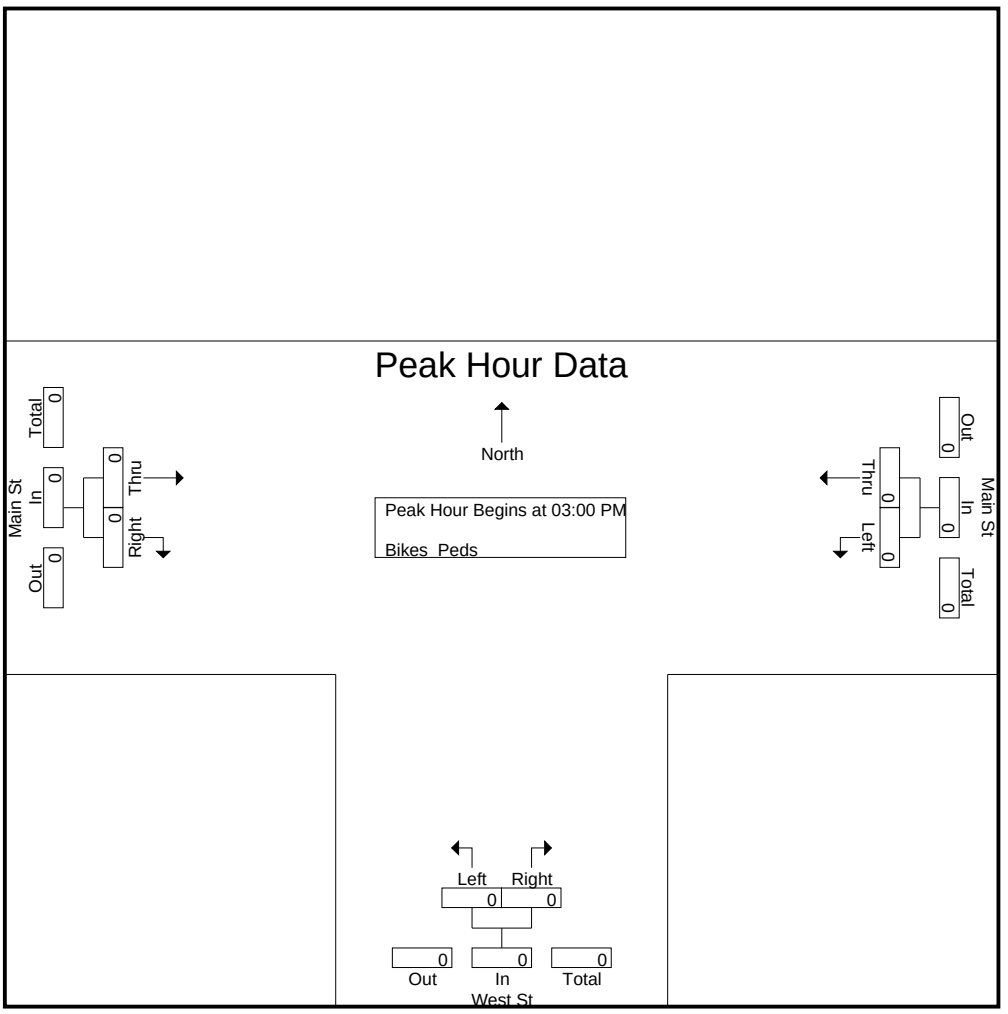
Groups Printed- Bikes Peds

	Main St From East			West St From South			Main St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	1	0	0	0	0	0	2	3	0	3
04:15 PM	0	0	1	0	0	1	0	0	3	5	0	5
04:30 PM	0	0	0	0	0	0	0	0	1	1	0	1
04:45 PM	0	0	0	0	0	0	0	0	1	1	0	1
Total	0	0	2	0	0	1	0	0	7	10	0	10
Grand Total	0	0	2	0	0	1	0	0	7	10	0	10
Apprch %	0	0		0	0		0	0				
Total %										100	0	

	Main St From East			West St From South			Main St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 11



Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

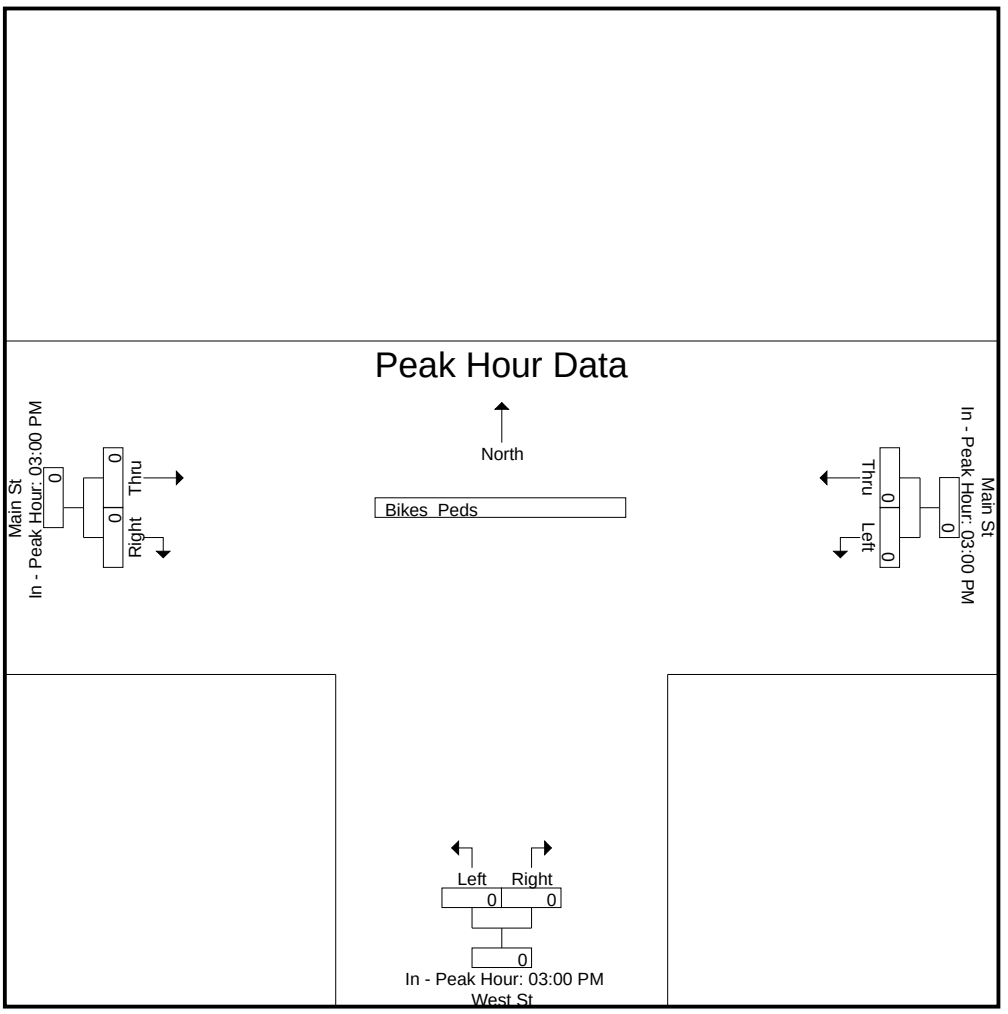
	03:00 PM			03:00 PM			03:00 PM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : West Street
E/W Street : Main Street
City/State : Ware, MA
Weather : Clear

File Name : 91300006
Site Code : 91300006
Start Date : 12/7/2021
Page No : 12



SPOT SPEED MEASUREMENTS

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA
Direction: NB,

12/7/2021 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	1	0	0	1	0	0	1	1	0	1	0	0	5
1:00	0	0	0	0	0	3	1	1	0	1	0	0	0	6
2:00	0	0	0	0	0	0	1	1	0	0	0	0	0	2
3:00	0	0	0	0	0	2	4	5	1	2	0	0	0	14
4:00	1	0	0	0	1	5	3	6	4	0	1	0	0	21
5:00	0	0	0	0	1	18	29	27	7	1	0	0	0	83
6:00	1	1	1	2	3	18	57	31	9	5	0	0	0	128
7:00	0	0	0	0	12	19	45	71	22	3	0	0	0	172
8:00	0	0	3	2	11	14	43	49	19	4	0	0	0	145
9:00	0	0	0	0	1	26	69	33	16	6	1	0	0	152
10:00	0	1	2	14	0	22	45	68	22	4	1	0	0	179
11:00	0	0	1	4	7	29	60	57	17	2	0	0	0	177
12:00 PM	0	1	1	3	8	16	55	69	31	3	1	0	0	188
1:00	0	0	0	0	0	29	54	66	25	4	1	0	0	179
2:00	0	0	0	6	3	46	85	77	16	0	2	0	0	235
3:00	0	0	1	1	2	31	94	83	24	6	0	0	0	242
4:00	0	0	0	0	11	39	93	103	19	6	1	0	0	272
5:00	0	0	0	0	16	43	93	52	14	1	0	0	0	219
6:00	0	0	0	8	4	20	65	29	1	0	0	0	0	127
7:00	0	0	0	0	4	4	51	33	10	1	0	0	0	103
8:00	0	0	0	0	1	14	22	21	9	1	0	0	0	68
9:00	0	0	0	0	0	4	18	14	5	1	0	1	0	43
10:00	0	0	0	1	0	4	7	5	3	4	1	0	0	25
11:00	0	0	0	0	1	1	3	1	0	0	0	0	0	6
Total	2	4	9	41	87	407	997	903	275	55	10	1	0	2791

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA
Direction: NB,

12/8/2021 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	0	5	2	1	3	0	1	0	0	0	12
1:00	0	0	0	0	1	1	2	2	0	0	0	0	0	6
2:00	0	0	0	0	0	0	2	0	0	0	0	0	0	2
3:00	0	0	0	0	0	3	3	5	1	0	0	0	0	12
4:00	1	0	0	0	0	3	10	3	3	0	0	0	0	20
5:00	0	0	0	1	3	11	36	25	4	3	1	0	0	84
6:00	4	0	8	2	1	17	39	37	15	1	0	0	0	124
7:00	0	0	0	2	7	11	57	69	17	5	0	0	0	168
8:00	0	0	0	2	2	16	44	45	23	6	0	0	0	138
9:00	0	0	4	1	2	8	47	35	28	5	0	0	0	130
10:00	0	0	2	3	3	20	44	64	14	1	0	0	0	151
11:00	0	1	1	2	4	27	66	60	20	7	0	0	0	188
12:00 PM	1	0	3	5	5	21	68	86	40	7	0	0	0	236
1:00	0	0	0	4	8	17	65	62	16	3	2	0	0	177
2:00	0	0	0	0	9	18	58	72	26	9	1	0	0	193
3:00	0	0	0	0	4	15	79	83	31	6	3	0	0	221
4:00	0	0	0	0	4	34	99	63	23	4	1	0	0	228
5:00	0	0	0	0	4	54	83	37	13	0	0	0	1	192
6:00	0	0	2	6	14	36	62	10	3	0	0	0	0	133
7:00	0	0	1	3	8	16	36	33	6	1	0	0	0	104
8:00	0	0	0	1	1	11	27	10	3	0	0	0	0	53
9:00	0	0	2	1	5	19	13	9	2	1	0	0	0	52
10:00	0	0	3	0	4	11	9	4	0	1	0	0	0	32
11:00	0	0	1	0	1	4	12	2	1	0	0	1	0	22
Total	6	1	27	33	95	375	962	819	289	61	8	1	1	2678
Grand Total	8	5	36	74	182	782	1959	1722	564	116	18	2	1	5469

Stats					
	Percentile	15th	50th	85th	95th
	Speed	39	44	49.6	52.7

Mean Speed (Average)	44.1
10 MPH Pace Speed	40-49
Number in Pace	3662
Percent in Pace	67.0%
Number > 45 MPH	2423
Percent > 45 MPH	44.3%

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA
Direction: SB,

12/7/2021 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	0	2	3	3	0	0	0	0	0	0	8
1:00	0	0	0	0	1	0	2	0	0	1	0	0	0	4
2:00	0	0	0	0	2	1	0	1	0	0	0	0	0	4
3:00	0	0	0	0	1	2	1	2	0	0	0	0	0	6
4:00	0	0	1	0	2	7	5	6	1	1	0	0	0	23
5:00	0	0	0	0	1	2	22	16	2	0	0	0	0	43
6:00	0	0	0	1	6	24	36	33	3	1	0	0	0	104
7:00	0	0	2	0	5	12	53	74	17	2	0	0	0	165
8:00	0	1	0	2	5	20	66	61	21	2	0	0	0	178
9:00	0	1	0	0	2	20	56	63	14	2	0	0	0	158
10:00	0	0	1	1	5	20	67	55	19	1	2	0	0	171
11:00	0	0	0	3	5	25	64	84	14	4	0	0	0	199
12:00 PM	1	1	1	0	5	19	70	75	21	1	0	1	0	195
1:00	0	0	1	0	4	20	56	73	14	2	1	0	0	171
2:00	0	1	0	2	13	36	79	44	20	4	0	0	0	199
3:00	0	0	2	7	6	25	87	98	18	3	0	0	0	246
4:00	0	0	1	1	4	27	94	107	6	4	0	0	0	244
5:00	0	0	0	1	8	39	118	48	6	0	0	0	0	220
6:00	0	0	1	0	3	18	73	38	8	0	0	0	0	141
7:00	0	0	0	0	2	10	40	28	2	0	0	0	0	82
8:00	0	0	0	0	0	3	28	20	7	0	0	0	0	58
9:00	0	0	0	1	0	5	17	10	0	1	0	0	0	34
10:00	0	0	0	0	0	6	8	9	1	0	0	0	0	24
11:00	0	0	0	0	0	1	6	7	2	0	0	0	0	16
Total	1	4	10	19	82	345	1051	952	196	29	3	1	0	2693

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA
Direction: SB,

12/8/2021 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	0	0	2	1	3	0	1	0	0	0	7
1:00	0	0	0	0	1	0	2	1	0	0	0	0	0	4
2:00	0	0	0	0	0	2	1	0	0	0	1	0	0	4
3:00	0	0	0	0	2	2	5	2	3	0	0	0	0	14
4:00	0	0	0	1	0	4	8	7	0	0	0	0	0	20
5:00	0	0	0	0	4	9	15	17	3	0	0	0	0	48
6:00	0	1	0	1	7	23	37	29	5	1	0	0	0	104
7:00	0	0	0	3	4	18	69	57	14	1	0	0	0	166
8:00	0	0	1	3	9	23	45	60	24	3	0	0	0	168
9:00	0	0	2	1	10	22	49	42	18	1	1	0	0	146
10:00	0	0	0	6	6	26	53	81	18	2	0	0	0	192
11:00	0	0	0	2	9	30	62	60	18	1	0	0	0	182
12:00 PM	0	1	1	1	6	17	44	60	26	1	0	0	0	157
1:00	0	1	0	2	5	18	45	53	21	4	0	0	0	149
2:00	0	1	2	0	3	18	39	70	30	1	0	1	0	165
3:00	0	0	0	1	8	20	90	80	18	2	0	0	0	219
4:00	0	0	0	0	3	42	109	73	15	0	0	0	0	242
5:00	0	0	0	1	9	47	109	35	0	0	0	0	0	201
6:00	0	1	0	7	6	34	62	17	3	1	0	0	0	131
7:00	0	0	0	1	1	23	41	11	2	0	0	0	0	79
8:00	0	1	0	0	2	16	26	14	0	0	0	0	0	59
9:00	0	0	1	3	6	11	7	2	2	0	0	0	0	32
10:00	0	1	0	2	4	9	4	2	2	0	0	0	0	24
11:00	0	0	2	0	7	4	7	1	0	0	0	0	0	21
Total	0	7	9	35	112	420	930	777	222	19	2	1	0	2534
Grand Total	1	11	19	54	194	765	1981	1729	418	48	5	2	0	5227

Stats				
Percentile	15th	50th	85th	95th
Speed	39	44	48.4	51.5

Mean Speed (Average)	43.8
10 MPH Pace Speed	40-49
Number in Pace	3691
Percent in Pace	70.6%
Number > 45 MPH	2202
Percent > 45 MPH	42.1%

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA
Direction: Combined

12/7/2021 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	1	0	0	3	3	3	1	1	0	1	0	0	13
1:00	0	0	0	0	1	3	3	1	0	2	0	0	0	10
2:00	0	0	0	0	2	1	1	2	0	0	0	0	0	6
3:00	0	0	0	0	1	4	5	7	1	2	0	0	0	20
4:00	1	0	1	0	3	12	8	12	5	1	1	0	0	44
5:00	0	0	0	0	2	20	51	43	9	1	0	0	0	126
6:00	1	1	1	3	9	42	93	64	12	6	0	0	0	232
7:00	0	0	2	0	17	31	98	145	39	5	0	0	0	337
8:00	0	1	3	4	16	34	109	110	40	6	0	0	0	323
9:00	0	1	0	0	3	46	125	96	30	8	1	0	0	310
10:00	0	1	3	15	5	42	112	123	41	5	3	0	0	350
11:00	0	0	1	7	12	54	124	141	31	6	0	0	0	376
12:00 PM	1	2	2	3	13	35	125	144	52	4	1	1	0	383
1:00	0	0	1	0	4	49	110	139	39	6	2	0	0	350
2:00	0	1	0	8	16	82	164	121	36	4	2	0	0	434
3:00	0	0	3	8	8	56	181	181	42	9	0	0	0	488
4:00	0	0	1	1	15	66	187	210	25	10	1	0	0	516
5:00	0	0	0	1	24	82	211	100	20	1	0	0	0	439
6:00	0	0	1	8	7	38	138	67	9	0	0	0	0	268
7:00	0	0	0	0	6	14	91	61	12	1	0	0	0	185
8:00	0	0	0	0	1	17	50	41	16	1	0	0	0	126
9:00	0	0	0	1	0	9	35	24	5	2	0	1	0	77
10:00	0	0	0	1	0	10	15	14	4	4	1	0	0	49
11:00	0	0	0	0	1	2	9	8	2	0	0	0	0	22
Total	3	8	19	60	169	752	2048	1855	471	84	13	2	0	5484

Location : East Street 91300001
Location : Just South of Site Driveway
City/State: Ware, MA
Direction: Combined

12/8/2021 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	0	5	4	2	6	0	2	0	0	0	19
1:00	0	0	0	0	2	1	4	3	0	0	0	0	0	10
2:00	0	0	0	0	0	2	3	0	0	0	1	0	0	6
3:00	0	0	0	0	2	5	8	7	4	0	0	0	0	26
4:00	1	0	0	1	0	7	18	10	3	0	0	0	0	40
5:00	0	0	0	1	7	20	51	42	7	3	1	0	0	132
6:00	4	1	8	3	8	40	76	66	20	2	0	0	0	228
7:00	0	0	0	5	11	29	126	126	31	6	0	0	0	334
8:00	0	0	1	5	11	39	89	105	47	9	0	0	0	306
9:00	0	0	6	2	12	30	96	77	46	6	1	0	0	276
10:00	0	0	2	9	9	46	97	145	32	3	0	0	0	343
11:00	0	1	1	4	13	57	128	120	38	8	0	0	0	370
12:00 PM	1	1	4	6	11	38	112	146	66	8	0	0	0	393
1:00	0	1	0	6	13	35	110	115	37	7	2	0	0	326
2:00	0	1	2	0	12	36	97	142	56	10	1	1	0	358
3:00	0	0	0	1	12	35	169	163	49	8	3	0	0	440
4:00	0	0	0	0	7	76	208	136	38	4	1	0	0	470
5:00	0	0	0	1	13	101	192	72	13	0	0	0	1	393
6:00	0	1	2	13	20	70	124	27	6	1	0	0	0	264
7:00	0	0	1	4	9	39	77	44	8	1	0	0	0	183
8:00	0	1	0	1	3	27	53	24	3	0	0	0	0	112
9:00	0	0	3	4	11	30	20	11	4	1	0	0	0	84
10:00	0	1	3	2	8	20	13	6	2	1	0	0	0	56
11:00	0	0	3	0	8	8	19	3	1	0	0	1	0	43
Total	6	8	36	68	207	795	1892	1596	511	80	10	2	1	5212
Grand Total	9	16	55	128	376	1547	3940	3451	982	164	23	4	1	10696

Stats				
	Percentile	15th	50th	85th	95th
	Speed	39	44	49	52.1
Mean Speed (Average)	43.9				
10 MPH Pace Speed	40-49				
Number in Pace	7353				
Percent in Pace	68.7%				
Number > 45 MPH	4625				
Percent > 45 MPH	43.2%				

EXISTING WASTE FACILITY DATA

Existing facility Daily Data January - September 2021 + 2nd, 7th and 8th days of Decembe

		Sum of LOADS				Sum of TONS						
Day	Month	3rd Large	3rd Small	3rd Small - Ware	IC	3rd Large	3rd Small	3rd Small - Ware	IC	Total Sum of LOADS	Total Sum of TONS	Rate
07	May	4	14	21	20	75.09	28.11	55.14	588.38	59	746.72	12.656 tons/truck
27	April	4	20	16	19	90.69	44.37	30.64	570.5	59	736.20	12.478 tons/truck
10	September	4	23	12	18	73	56.61	27.88	525.6	57	683.09	11.984 tons/truck
09	September	8	22	11	15	233.11	58.34	14.66	443.8	56	749.91	13.391 tons/truck
03	June	4	17	15	20	99.82	34.93	19.07	584.44	56	738.26	13.183 tons/truck
26	April	4	20	16	16	124.8	36.95	25.99	477.28	56	665.02	11.875 tons/truck
04	June	4	20	8	22	93.63	26.88	6.28	622.91	54	749.70	13.883 tons/truck
02	June	1	19	11	23	20.58	28.49	13.58	653.52	54	716.17	13.262 tons/truck
20	April	6	16	12	19	148.58	33.84	12.56	551.88	53	746.86	14.092 tons/truck
06	May	5	11	18	19	113.03	25.6	38.68	564.19	53	741.50	13.991 tons/truck
13	September	4	24	11	14	95.56	58.89	15.77	411.75	53	581.97	10.981 tons/truck
17	May	3	13	15	21	79.72	32.86	20	598.22	52	730.80	14.054 tons/truck
30	April	5	15	12	20	126.32	28.23	14.64	551.03	52	720.22	13.850 tons/truck
01	June	2	20	9	21	45.45	43.51	7.83	615.23	52	712.02	13.693 tons/truck
02	December	1	12	18	21	38.77	29	19.37	623.23	52	710.37	13.661 tons/truck
29	March	10	16	10	15	263.87	32.34	17.85	400.78	51	714.84	14.016 tons/truck
21	April	11	17	10	13	266.19	35	11.06	376.85	51	689.10	13.512 tons/truck
03	May	9	21	4	16	244.28	36.69	6.89	461.93	50	749.79	14.996 tons/truck
11	May	1	21	6	22	20.06	41.65	9.09	648.98	50	719.78	14.396 tons/truck
27	September		14	15	21		18.72	12.38	639.41	50	670.51	13.410 tons/truck
15	April	6	15	8	20	155.53	30.4	10.46	546.32	49	742.71	15.157 tons/truck
24	May	1	20	10	18	20.53	36.99	21.81	517.08	49	596.41	12.172 tons/truck
28	April	6	15	9	18	150.63	32.14	18.47	541.75	48	742.99	15.479 tons/truck
17	September	7	15	10	16	183.3	41.24	19.03	464.83	48	708.40	14.758 tons/truck
16	September	7	16	10	15	187.13	40.77	10.32	432.31	48	670.53	13.969 tons/truck
19	April	4	14	13	17	99.5	28.42	25.58	491.9	48	645.40	13.446 tons/truck
14	April	8	13	8	18	181.19	44.07	8.99	508.85	47	743.10	15.811 tons/truck
30	August	3	10	16	18	54.22	16.93	25.04	528.56	47	624.75	13.293 tons/truck
09	April	5	14	11	17	140.4	24.62	12.74	445.28	47	623.04	13.256 tons/truck
24	June	1	18	9	19	27.73	32.73	10.22	548.45	47	619.13	13.173 tons/truck
13	April	9	10	10	17	231.26	20.61	8.4	472.41	46	732.68	15.928 tons/truck
04	May	8	15	9	14	205.3	31.74	19.81	420.47	46	677.32	14.724 tons/truck
21	September	8	18	6	14	207.83	38.06	12.39	416.12	46	674.40	14.661 tons/truck
28	September	5	18	7	16	113.18	46.22	6.55	481.55	46	647.50	14.076 tons/truck
19	May	4	15	12	15	109.24	36.31	10.31	434.58	46	590.44	12.836 tons/truck
07	June	2	17	4	22	51.08	39.57	10.65	645.86	45	747.16	16.604 tons/truck
18	May	6	13	7	19	164.44	33.15	4.83	533.91	45	736.33	16.363 tons/truck
26	March	8	14	7	16	218.1	46.37	11.96	440.25	45	716.68	15.926 tons/truck
23	March	10	12	9	14	218.22	41.56	13.16	384.73	45	657.67	14.615 tons/truck
08	December		19	9	17		57.27	4.84	485.21	45	547.32	12.163 tons/truck
05	May	3	10	12	19	78.84	17.89	42.71	569.46	44	708.90	16.111 tons/truck
03	August	2	18	7	17	63	48.57	24.3	516.83	44	652.70	14.834 tons/truck
14	May	5	14	9	16	125.7	34.7	13.22	462.79	44	636.41	14.464 tons/truck
28	May	2	17	7	18	49.27	31.46	6.47	534.3	44	621.50	14.125 tons/truck
26	July		12	13	19		31.18	18.72	538.5	44	588.40	13.373 tons/truck
23	September	3	17	9	15	72.43	50.97	12.08	450.08	44	585.56	13.308 tons/truck
25	June		13	13	18		24.74	19.97	528.21	44	572.92	13.021 tons/truck
22	April	10	9	7	17	213.26	19.23	10.49	499.75	43	742.73	17.273 tons/truck
23	August		12	9	22		37.94	15.38	665.81	43	719.13	16.724 tons/truck
10	May	3	13	8	19	71.92	24.73	22.02	582.52	43	701.19	16.307 tons/truck
22	March	3	10	12	18	73	17.07	22.07	515.84	43	627.98	14.604 tons/truck
15	September	8	16	7	12	225.51	32.44	7	357.56	43	622.51	14.477 tons/truck
29	July	2	13	10	18	61.13	27.57	11.26	512.67	43	612.63	14.247 tons/truck
17	March	3	18	5	17	63.29	53.31	13.77	456.52	43	586.89	13.649 tons/truck
16	July	3	8	15	17	72.71	14.17	16.3	481.01	43	584.19	13.586 tons/truck
10	August	1	14	13	15	23.01	25.8	26.77	430.87	43	506.45	11.778 tons/truck
29	April	2	9	10	21	35.14	15.65	16.48	581.12	42	648.39	15.438 tons/truck
12	April	8	12	8	14	212.94	26.99	21.59	386.42	42	647.94	15.427 tons/truck
15	July	2	14	7	19	60.18	28.75	7.08	507.98	42	603.99	14.381 tons/truck
08	April	5	14	6	17	103.52	26.56	3.8	458.52	42	592.40	14.105 tons/truck
28	June	1	13	10	18	13.25	27.97	11.45	539.33	42	592.00	14.095 tons/truck
27	July		16	7	19		30.52	16.98	490.04	42	537.54	12.799 tons/truck
26	May	1	16	9	16	20.59	27.52	18.74	465.8	42	532.65	12.682 tons/truck
11	January	1	20	6	15	19.03	53.35	7.59	420.67	42	500.64	11.920 tons/truck
23	April	9	7	7	18	180.87	15.64	9.66	518.28	41	724.45	17.670 tons/truck
30	September	5	16	3	17	114.32	33.85	5.45	521.11	41	674.73	16.457 tons/truck
25	May	2	15	4	20	48.94	27.88	5.96	590.17	41	672.95	16.413 tons/truck
18	January	1	9	11	20	19.65	21.38	16.28	569.44	41	626.75	15.287 tons/truck
13	July	1	12	10	18	21.16	30.21	13.84	523.91	41	589.12	14.369 tons/truck
25	March	8	8	8	16	215.47	30.32	16.18	461.23	40	723.20	18.080 tons/truck
14	September	7	14	4	15	169.02	37.98	5.45	425.21	40	637.66	15.942 tons/truck
23	June	1	12	10	17	28.43	24.79	10.41	517.23	40	580.86	14.522 tons/truck
16	August		14	10	16		32.66	14.35	489.59	40	536.60	13.415 tons/truck
06	August	2	12	11	15	57.03	27.67	15.08	434.07	40	533.85	13.346 tons/truck
20	July		11	12	17		25.71	24.15	453.26	40	503.12	12.578 tons/truck
30	July	1	13	11	15	25.51	33.93	12.21	415.47	40	487.12	12.178 tons/truck
16	June		12	13	15		31.67	14.76	430.78	40	477.21	11.930 tons/truck
07	September	5	9	8	17	137.45	23.31	12.46	497.54	39	670.76	17.199 tons/truck
03	September	3	9	11	16	87.04	17.75	19.65	524.13	39	648.57	16.630 tons/truck

Existing facility Daily Data January - September 2021 + 2nd, 7th and 8th days of Decembe

		Sum of LOADS				Sum of TONS						
Day	Month	3rd Large	3rd Small	3rd Small - Ware	IC	3rd Large	3rd Small	3rd Small - Ware	IC	Total Sum of LOADS	Total Sum of TONS	Rate
09	March	5	12	7	15	123.18	23.57	5.35	422.93	39	575.03	14.744 tons/truck
05	August	1	17	4	17	24.09	39.99	3.83	495.68	39	563.59	14.451 tons/truck
09	August		14	8	17		18.82	15.28	512.18	39	546.28	14.007 tons/truck
11	March	6	12	8	13	160.75	39.33	8.97	327.82	39	536.87	13.766 tons/truck
20	May	8	14	2	14	219.83	27.01	2.59	406.45	38	655.88	17.260 tons/truck
29	September	4	7	11	16	121.95	23.72	23.32	486.55	38	655.54	17.251 tons/truck
14	July	2	14	3	19	62.29	29.01	2.41	503.34	38	597.05	15.712 tons/truck
09	July	2	12	8	16	49.57	31.9	11.92	476.83	38	570.22	15.006 tons/truck
18	March	4	15	3	16	92.48	32.39	2.95	434.26	38	562.08	14.792 tons/truck
10	March	3	11	10	14	73.88	25.18	12.72	403.55	38	515.33	13.561 tons/truck
01	September	2	16	7	13	52.16	38.05	7.58	400.85	38	498.64	13.122 tons/truck
29	June	1	12	10	15	30.3	18.82	14.36	434.51	38	497.99	13.105 tons/truck
09	June	1	15	8	14	20.39	34.22	16.86	403.1	38	474.57	12.489 tons/truck
26	January	5	6	6	20	113.98	11.17	9.29	554.12	37	688.56	18.610 tons/truck
08	September	5	11	4	17	147.36	19.46	11.15	496.19	37	674.16	18.221 tons/truck
01	March	3	9	7	18	67.07	26.33	7.34	506.18	37	606.92	16.403 tons/truck
02	March	3	11	4	19	74.98	18.93	4.58	500.74	37	599.23	16.195 tons/truck
22	September	8	10	7	12	188.06	31.7	8	356.34	37	584.10	15.786 tons/truck
30	March	2	13	5	17	50.88	34.32	5.82	478.34	37	569.36	15.388 tons/truck
22	February	4	9	3	20	117.11	14.21	5.26	591.97	36	728.55	20.238 tons/truck
27	May	5	9	3	19	138.13	15.62	1.48	567.79	36	723.02	20.084 tons/truck
12	July		10	5	21		19.31	12.94	609.05	36	641.30	17.814 tons/truck
01	April	4	9	5	18	93.59	15.97	14.01	515.62	36	639.19	17.755 tons/truck
12	May	3	8	7	18	68.14	15.64	9.95	541.47	36	635.20	17.644 tons/truck
06	April	8	12	3	13	215.07	26.77	3.35	371.66	36	616.85	17.135 tons/truck
31	August	4	9	9	14	89.39	13.98	14.3	426.07	36	543.74	15.104 tons/truck
21	May	5	7	10	14	127.45	16.12	11.65	381.24	36	536.46	14.902 tons/truck
24	August	1	14	6	15	19.39	22.09	10.17	458.21	36	509.86	14.163 tons/truck
04	August	1	17	4	14	21.64	47.29	4.2	401.33	36	474.46	13.179 tons/truck
17	June	2	12	8	14	52.41	30.26	10.13	380.23	36	473.03	13.140 tons/truck
07	April	3	14	7	12	68.7	30.4	7.54	329.57	36	436.21	12.117 tons/truck
05	April	3	12	8	13	40.63	22.17	12.8	354.8	36	430.40	11.956 tons/truck
07	July	3	10	4	18	87.91	19.98	2.63	556.64	35	667.16	19.062 tons/truck
31	March	4	13	3	15	88.24	34.81	7.11	430.67	35	560.83	16.024 tons/truck
24	September	2	8	10	15	51.36	15.1	20.83	458.91	35	546.20	15.606 tons/truck
27	August	2	10	6	17	57.99	22.3	10.02	447.18	35	537.49	15.357 tons/truck
20	August	1	14	7	13	27.8	27.99	7.54	388.48	35	451.81	12.909 tons/truck
18	August	1	13	9	12	24.6	43.92	18.81	363.39	35	450.72	12.878 tons/truck
22	June		16	15	4		33.52	27.01	119.3	35	179.83	5.138 tons/truck
03	February	2	11	3	18	64.2	19.6	7.08	534.53	34	625.41	18.394 tons/truck
25	August	2	9	7	16	47.35	15.71	9.2	472.81	34	545.07	16.031 tons/truck
08	March	2	5	12	15	43.74	15.79	12.26	411.36	34	483.15	14.210 tons/truck
10	June	2	13	6	13	50.55	29.71	5.34	367.66	34	453.26	13.331 tons/truck
15	June	1	15	5	13	30.16	27.13	4.41	375.39	34	437.09	12.856 tons/truck
14	June	3	16	5	10	70.58	41.69	10.31	310.4	34	432.98	12.735 tons/truck
07	December		9	11	14		18.2	7.75	433.64	34	459.59	13.517 tons/truck
13	May	4	5	3	21	108.21	11.74	1.92	621.34	33	743.21	22.522 tons/truck
25	January	2	9	3	19	39.97	15.93	4.32	544.63	33	604.85	18.329 tons/truck
05	February	2	11	3	17	50.98	24.46	6.14	513.35	33	594.93	18.028 tons/truck
26	August	1	10	6	16	36.38	26.1	7.82	457.76	33	528.06	16.002 tons/truck
02	August		9	7	17		31.24	6.08	489.31	33	526.63	15.958 tons/truck
19	July	1	11	4	17	11.84	19.37	8.04	482.2	33	521.45	15.802 tons/truck
15	January	2	5	10	16	44.88	11.2	18.71	427.14	33	501.93	15.210 tons/truck
02	April	4	10	6	13	99.63	20.62	7.46	367.35	33	495.06	15.002 tons/truck
15	March	3	4	3	22	73.36	7.82	3.05	562.73	32	646.96	20.218 tons/truck
08	July	2	8	4	18	50.56	26.97	5.45	506.19	32	589.17	18.412 tons/truck
24	February	1	10	3	18	23.57	18.3	4.12	500.17	32	546.16	17.068 tons/truck
26	February	2	7	6	17	51.88	11.86	8.58	463.15	32	535.47	16.733 tons/truck
11	August	2	9	8	13	61.77	28.33	16.75	374.46	32	481.31	15.041 tons/truck
11	June	1	14	6	11	17.61	21.68	4.83	306.07	32	350.19	10.943 tons/truck
16	March	5	4	4	18	128.32	6.43	5.84	485.08	31	625.67	20.183 tons/truck
28	January	3	5	4	19	81.48	8.52	3.7	530.49	31	624.19	20.135 tons/truck
05	March	2	6	4	19	49.21	11.57	5.37	541.73	31	607.88	19.609 tons/truck
24	March	5	4	7	15	129.07	9.36	11.2	413.66	31	563.29	18.171 tons/truck
22	January	4	10	3	14	118.93	23.08	2.5	401.38	31	545.89	17.609 tons/truck
12	March	4	6	7	14	92.79	8.82	8.85	400.06	31	510.52	16.468 tons/truck
02	July	1	10	7	13	25.25	24.19	10.25	387.32	31	447.01	14.420 tons/truck
30	June	1	10	7	13	26.83	27.66	8.49	381.27	31	444.25	14.331 tons/truck
20	September	2	16	3	10	83.84	30.19	5.75	314.48	31	434.26	14.008 tons/truck
23	July		10	9	12		24.97	10.33	344.45	31	379.75	12.250 tons/truck
18	June	1	10	9	11	31.93	25.28	7.34	281.53	31	346.08	11.164 tons/truck
14	January	4	6	3	17	90.7	10.89	2.94	461.3	30	565.83	18.861 tons/truck
04	March	2	5	7	16	59.35	17.91	13.48	461.83	30	552.57	18.419 tons/truck
28	July	1	9	4	16	33.58	26.35	6.22	479.02	30	545.17	18.172 tons/truck
04	February	1	10	3	16	26.32	17.55	3.46	471.1	30	518.43	17.281 tons/truck
04	January	1	2	11	16	23.91	1.78	10.93	429.56	30	466.18	15.539 tons/truck
12	January	2	8	6	14	52.66	14.7	5.81	381.26	30	454.43	15.148 tons/truck
16	April	7	3		19	189.22	6.26		537.91	29	733.39	25.289 tons/truck
11	February	2	3	5	19	60.5	2.99	3.61	546.83	29	613.93	21.170 tons/truck

Existing facility Daily Data January - September 2021 + 2nd, 7th and 8th days of Decembe

		Sum of LOADS				Sum of TONS						
Day	Month	3rd Large	3rd Small	3rd Small - Ware	IC	3rd Large	3rd Small	3rd Small - Ware	IC	Total Sum of LOADS	Total Sum of TONS	Rate
20	January	2	7	2	18	55.4	12.96	5.32	501.37	29	575.05	19.829 tons/truck
05	January	3	5	4	17	86.48	10.26	4.78	453.49	29	555.01	19.138 tons/truck
15	February	1	5	5	18	22.77	7.07	8.83	485.65	29	524.32	18.080 tons/truck
19	January	2	10	3	14	55.5	20.5	2.84	403.74	29	482.58	16.641 tons/truck
06	January	2	6	7	14	56.34	23.78	12.85	382.65	29	475.62	16.401 tons/truck
03	March	3	7		18	65.19	17.8		492.85	28	575.84	20.566 tons/truck
13	January	2	4	4	18	54.56	10.6	5.34	459.87	28	530.37	18.942 tons/truck
22	July		7	7	14		9.77	9.25	376.19	28	395.21	14.115 tons/truck
21	July		10	6	12		20	4.93	328.18	28	353.11	12.611 tons/truck
10	February	1	5	1	20	19.52	18.68	0.36	572.82	27	611.38	22.644 tons/truck
02	September	3	8	4	12	91.63	22.54	3.92	376.3	27	494.39	18.311 tons/truck
17	August	1	8	4	14	28.14	16.04	5.66	410.76	27	460.60	17.059 tons/truck
01	July	2	9	3	13	55.38	18.62	3.28	374.76	27	452.04	16.742 tons/truck
19	March	4	7	4	12	97.04	14.12	5.42	317.45	27	434.03	16.075 tons/truck
08	January	1	10	2	14	23.51	23.25	3.84	366.21	27	416.81	15.437 tons/truck
08	February	1	2	3	20	21.7	7.2	2.25	557.42	26	588.57	22.637 tons/truck
25	February	2	6	2	16	53.11	12.26	2.41	441.86	26	509.64	19.602 tons/truck
06	July		13	6	7		31.5	7.37	194.86	26	233.73	8.990 tons/truck
23	February	4	2	1	18	107.39	2.4	2.02	493.12	25	604.93	24.197 tons/truck
19	August	2	7	5	11	66.28	10.3	3.88	344.97	25	425.43	17.017 tons/truck
13	August	1	8	9	7	34.17	18.08	12.97	204.6	25	269.82	10.793 tons/truck
12	February		6	1	17		17.63	0.55	476.67	24	494.85	20.619 tons/truck
29	January		8	1	15		22.63	8.76	414.22	24	445.61	18.567 tons/truck
16	February	10	3	3	8	211.93	11.73	2.87	218.99	24	445.52	18.563 tons/truck
17	February	6	3	2	12	154.36	5.11	1.28	336.55	23	497.30	21.622 tons/truck
12	August	1	7	5	10	34.11	20.19	15.31	284.46	23	354.07	15.394 tons/truck
07	January	2	10	1	10	47.37	23.06	1.1	254.98	23	326.51	14.196 tons/truck
09	February	3	3	2	12	78.55	9.78	0.98	323.04	20	412.35	20.618 tons/truck
21	January	2	2	5	10	38.73	2.62	4.75	264.61	19	310.71	16.353 tons/truck
27	January		2	2	14		2.31	2.52	396.53	18	401.36	22.298 tons/truck
18	February	2	4	1	10	55.3	12.77	0.59	282.65	17	351.31	20.665 tons/truck
01	February	1	1	4	11	19.71	1.28	5.91	276.85	17	303.75	17.868 tons/truck
17	April	3			13	74.24			373.64	16	447.88	27.993 tons/truck
19	February	1	1	2	12	20.74	0.89		351.58	16	379.26	23.704 tons/truck
08	June	1	2		9	19.05	8.8		262.11	12	289.96	24.163 tons/truck
03	April				10				277.97	10	277.97	27.797 tons/truck
08	May				10				272.34	10	272.34	27.234 tons/truck
10	April	1			8	32.66			206.06	9	238.72	26.524 tons/truck
24	July		2		6		9.71		187.33	8	197.04	24.630 tons/truck
24	April		3		5		2.93		147.97	8	150.90	18.863 tons/truck
25	September				7				212.53	7	212.53	30.361 tons/truck
31	July				7				211.96	7	211.96	30.280 tons/truck
05	June	1			6	16.65			171.38	7	188.03	26.861 tons/truck
01	May		1		6		1.49		177.69	7	179.18	25.597 tons/truck
07	August				6				187.68	6	187.68	31.280 tons/truck
21	August				6				183.87	6	183.87	30.645 tons/truck
28	August				6				171.67	6	171.67	28.612 tons/truck
22	May				6				167.58	6	167.58	27.930 tons/truck
15	May				6				154.67	6	154.67	25.778 tons/truck
11	September				5				156.85	5	156.85	31.370 tons/truck
17	July				5				145.35	5	145.35	29.070 tons/truck
14	August				3				103.05	3	103.05	34.350 tons/truck
20	March				3				79.55	3	79.55	26.517 tons/truck
26	June				3				77.68	3	77.68	25.893 tons/truck
18	September				2				74.3	2	74.30	37.150 tons/truck
10	July				2				61.91	2	61.91	30.955 tons/truck
27	March				2				53.74	2	53.74	26.870 tons/truck
13	March				2				51.04	2	51.04	25.520 tons/truck
02	February		1		1		1.04		33.54	2	34.58	17.290 tons/truck
									Total	**7323**	**113425**	tons/truck
									Average	**34**	**522.70**	**17.04** tons/truck
									Max	**59**	**749.91**	**37.150** tons/truck

Existing Ware Transfer Station Data - January - September 2021

				Matrix %												Trips											
				Exit						Enter						Exit						Enter					
	Row Labels	Count of IC/Large/Small - revised	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	total	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	total
IC	ROXBURYMA	2294	31.9%	100%					1.0	100%					1.0	2294	0	0	0	0	2294	2294	0	0	0	0	2294
IC	SALEMNH	622	8.6%	100%					1.0	100%					1.0	622	0	0	0	0	622	622	0	0	0	0	622
IC	EPPINGNH	231	3.2%	100%					1.0	100%					1.0	231	0	0	0	0	231	231	0	0	0	0	231
IC	LEWISTONME	3	0.0%	100%					1.0	100%					1.0	3	0	0	0	0	3	3	0	0	0	0	3
3rd Large	NEWINGTONNH	157	2.2%	100%					1.0	100%					1.0	157	0	0	0	0	157	157	0	0	0	0	157
3rd Large	NANDOVER	111	1.5%	100%					1.0	100%					1.0	111	0	0	0	0	111	111	0	0	0	0	111
3rd Large	GEORGETOWNMA	107	1.5%	100%					1.0	100%					1.0	107	0	0	0	0	107	107	0	0	0	0	107
3rd Large	NEWBEDFORDMA	66	0.9%	100%					1.0	100%					1.0	66	0	0	0	0	66	66	0	0	0	0	66
3rd Large	EVERETTEMA	29	0.4%	100%					1.0	100%					1.0	29	0	0	0	0	29	29	0	0	0	0	29
3rd Large	BOSTONMA	16	0.2%	100%					1.0	100%					1.0	16	0	0	0	0	16	16	0	0	0	0	16
3rd Large	FRAMINGHAM-MA	13	0.2%	100%					1.0	100%					1.0	13	0	0	0	0	13	13	0	0	0	0	13
3rd Large	WATERTOWN	13	0.2%	100%					1.0	100%					1.0	13	0	0	0	0	13	13	0	0	0	0	13
3rd Large	ROXBURYMA	12	0.2%	100%					1.0	100%					1.0	12	0	0	0	0	12	12	0	0	0	0	12
3rd Large	LYNNMA	11	0.2%	100%					1.0	100%					1.0	11	0	0	0	0	11	11	0	0	0	0	11
3rd Large	BRAINTREEMA	10	0.1%	100%					1.0	100%					1.0	10	0	0	0	0	10	10	0	0	0	0	10
3rd Large	WARRENMA	6	0.1%	100%					1.0	100%					1.0	6	0	0	0	0	6	6	0	0	0	0	6
3rd Large	HANOVERMA	5	0.1%	100%					1.0	100%					1.0	5	0	0	0	0	5	5	0	0	0	0	5
3rd Large	FAIRHAVEN	4	0.1%	100%					1.0	100%					1.0	4	0	0	0	0	4	4	0	0	0	0	4
3rd Large	LAWARENCE	3	0.0%	100%					1.0	100%					1.0	3	0	0	0	0	3	3	0	0	0	0	3
3rd Large	SDENNIS	3	0.0%	100%					1.0	100%					1.0	3	0	0	0	0	3	3	0	0	0	0	3
3rd Large	WINCHESTER	3	0.0%	100%					1.0	100%					1.0	3	0	0	0	0	3	3	0	0	0	0	3
3rd Large	BELMONT	2	0.0%	100%					1.0	100%					1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Large	DENNIS-MA	2	0.0%	100%					1.0	100%					1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Large	MEDFORD	2	0.0%	100%					1.0	100%					1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Large	WESTON	2	0.0%	100%					1.0	100%					1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Large	WOBURN	2	0.0%	100%					1.0	100%					1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Large	HUBBARDSTONMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Large	MONSONMA	1	0.0%			30%	40%	30%	1.0			30%	40%	30%	1.0	0	0	0	0	0	1	0	0	0	0	0	1
3rd Large	NBROOKFIELDMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Large	PALMERMA	1	0.0%			30%	40%	30%	1.0			30%	40%	30%	1.0	0	0	0	0	0	1	0	0	0	0	0	1
3rd Large	PEABODY-MA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Large	SBARREMA	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Large	SLAWARENCE	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Large	SPENCERMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Large	WAREMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Large	WORCEMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
Ware	WAREMA	1337	18.6%		10%	20%	30%	40%	1.0		10%	20%	30%	40%	1.0	0	134	267	401	535	1337	0	134	267	401	535	1337
3rd Small	PALMER MA	264	3.7%			30%	40%	30%	1.0			30%	40%	30%	1.0	0	0	79	106	79	264	0	0	79	106	79	264
3rd Small	WBROOKFIELD	202	2.8%	80%	20%				1.0	100%					1.0	162	40	0	0	0	202	202	0	0	0	0	202
3rd Small	WARREN MA	192	2.7%	50%		50%			1.0	50%		50%			1.0	96	0	96	0	0	192	96	0	96	0	0	192
3rd Small	BELCHERTOWN MA	138	1.9%				10%	90%	1.0					100%	1.0	0	0	0	14	124	138	0	0	0	0	138	138
3rd Small	BROOKFIELDMA	118	1.6%	100%					1.0	100%					1.0	118	0	0	0	0	118	118	0	0	0	0	118
3rd Small	STURBRIDGEMA	107	1.5%	100%					1.0	100%					1.0	107	0	0	0	0	107	107	0	0	0	0	107
3rd Small	NBROOKFIELD MA	105	1.5%	60%	40%				1.0	60%	40%				1.0	63	42	0	0	0	105	63	42	0	0	0	105
3rd Small	SPENCER MA	99	1.4%	80%	20%				1.0	80%	20%				1.0	79	20	0	0	0	99	79	20	0	0	0	99
3rd Small	BRIMFIELDMA	81	1.1%	70%		30%			1.0	70%		30%			1.0	57	0	24	0	0	81	57	0	24	0	0	81
3rd Small	BARREMA	76	1.1%		100%				1.0		100%				1.0	0	76	0	0	0	76	0	76	0	0	0	76
3rd Small	EBROOKFIELDMA	68	0.9%	100%					1.0	100%					1.0	68	0	0	0	0	68	68	0	0	0	0	68
3rd Small	MONSONMA	63	0.9%			30%	40%	30%	1.0			30%	40%	30%	1.0	0	0	19	25	19	63	0	0	19	25	19	63
3rd Small	HOLLANDMA	58	0.8%	70%		30%			1.0	100%					1.0	41	0	17	0	0	58	58	0	0	0	0	58
3rd Small	HARDWICKMA	50	0.7%		100%				1.0		100%				1.0	0	50	0	0	0	50	0	50	0	0	0	50
3rd Small	NBRAINTREEMA	41	0.6%	90%	10%				1.0	100%					1.0	37	4	0	0	0	41	41	0	0	0	0	41
3rd Small	OAKHAMMA	41	0.6%		100%				1.0		100%				1.0	0	41	0	0	0	41	0	41	0	0	0	41
3rd Small	CHARLTONMA	35	0.5%	100%					1.0	100%					1.0	35	0	0	0	0	35	35	0	0	0	0	35
3rd Small	SOUTHBRIDGEMA	32	0.4%	70%		30%			1.0	100%					1.0	22	0	10	0	0	32	32	0	0	0	0	32
3rd Small	GILBERTVILLEMA	31	0.4%		100%				1.0		100%				1.0	0	31	0	0	0	31	0	31	0	0	0	31

Existing Ware Transfer Station Data - January - September 2021

				Matrix %												Trips											
				Exit						Enter						Exit						Enter					
	Row Labels	Count of IC/Large/Small - revised	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	total	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	total
3rd Small	RUTLANDMA	27	0.4%		100%				1.0	10%	90%				1.0	0	27	0	0	0	27	3	24	0	0	0	27
3rd Small	SPRINGFIELDMA	21	0.3%				100%		1.0			10%	90%		1.0	0	0	0	21	0	21	0	0	2	19	0	21
3rd Small	AMHERSTMA	20	0.3%					100%	1.0					100%	1.0	0	0	0	0	20	20	0	0	0	0	20	20
3rd Small	FISKDALEMA	20	0.3%	80%		20%			1.0	80%		20%			1.0	16	0	4	0	0	20	16	0	4	0	0	20
3rd Small	WILBRAMA	19	0.3%			20%	80%		1.0			20%	80%		1.0	0	0	4	15	0	19	0	0	4	15	0	19
3rd Small	LUDLOWMA	17	0.2%				100%		1.0			10%	90%		1.0	0	0	0	17	0	17	0	0	2	15	0	17
3rd Small	WALESMA	15	0.2%	80%		20%			1.0	80%		20%			1.0	12	0	3	0	0	15	12	0	3	0	0	15
3rd Small	LIECESTERMA	14	0.2%	90%	10%				1.0	90%	10%				1.0	13	1	0	0	0	14	13	1	0	0	0	14
3rd Small	WHEELWRIGHTMA	14	0.2%		100%				1.0		100%				1.0	0	14	0	0	0	14	0	14	0	0	0	14
3rd Small	WORCEMA	14	0.2%	70%	30%				1.0	70%	30%				1.0	10	4	0	0	0	14	10	4	0	0	0	14
3rd Small	ORANGEMA	11	0.2%		100%				1.0		100%				1.0	0	11	0	0	0	11	0	11	0	0	0	11
3rd Small	THREERIVERSMA	10	0.1%			20%	80%		1.0			20%	80%		1.0	0	0	2	8	0	10	0	0	2	8	0	10
3rd Small	WESTWARREN	10	0.1%	50%		50%			1	50%		50%			1.0	5	0	5	0	0	10	5	0	5	0	0	10
3rd Small	CHICOPEEMA	9	0.1%				80%	20%	1.0				80%	20%	1.0	0	0	0	7	2	9	0	0	0	7	2	9
3rd Small	LYNNMA	9	0.1%	100%					1.0	100%					1.0	9	0	0	0	0	9	9	0	0	0	0	9
3rd Small	AUBURNMA	8	0.1%	100%					1.0	90%	10%				1.0	8	0	0	0	0	8	7	1	0	0	0	8
3rd Small	HUBBARDSTONMA	7	0.1%		100%				1.0		100%				1.0	0	7	0	0	0	7	0	7	0	0	0	7
3rd Small	BONDSVILLEMA	6	0.1%				90%	10%	1.0			10%	90%		1.0	0	0	0	5	1	6	0	0	1	5	0	6
3rd Small	EASTLONGMEADOW	5	0.1%				100%		1.0			10%	90%		1.0	0	0	0	5	0	5	0	0	1	5	0	5
3rd Small	DUDLYMA	4	0.1%	100%					1.0	100%					1.0	4	0	0	0	0	4	4	0	0	0	0	4
3rd Small	NANDOVER	4	0.1%		100%				1.0	10%	90%				1.0	0	4	0	0	0	4	0	4	0	0	0	4
3rd Small	PEABODY-MA	4	0.1%	90%	10%				1.0	90%	10%				1.0	4	0	0	0	0	4	4	0	0	0	0	4
3rd Small	PAXTONMA	3	0.0%	10%	90%				1.0	10%	90%				1.0	0	3	0	0	0	3	0	3	0	0	0	3
3rd Small	SLAWARENCE	3	0.0%		100%				1.0	10%	90%				1.0	0	3	0	0	0	3	0	3	0	0	0	3
3rd Small	EHAMPTON	2	0.0%				80%	20%	1.0				80%	20%	1.0	0	0	0	2	0	2	0	0	0	2	0	2
3rd Small	FITCHBURGMA	2	0.0%		100%				1.0		100%				1.0	0	2	0	0	0	2	0	2	0	0	0	2
3rd Small	GARDNERMA	2	0.0%		100%				1.0		100%				1.0	0	2	0	0	0	2	0	2	0	0	0	2
3rd Small	LONGMEADOWMA	2	0.0%			20%	80%		1.0			20%	80%		1.0	0	0	0	2	0	2	0	0	0	2	0	2
3rd Small	MILLBURYMA	2	0.0%	100%					1.0	100%					1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Small	NEWSALEMMA	2	0.0%		90%			10%	1.0		90%			10%	1.0	0	2	0	0	0	2	0	2	0	0	0	2
3rd Small	PELHAMMA	2	0.0%					100%	1.0					100%	1.0	0	0	0	0	2	2	0	0	0	0	2	2
3rd Small	PETERSHAMMA	2	0.0%		100%				1.0		100%				1.0	0	2	0	0	0	2	0	2	0	0	0	2
3rd Small	SHREWSBURYMA	2	0.0%	80%	20%				1.0	80%	20%				1.0	2	0	0	0	0	2	2	0	0	0	0	2
3rd Small	SUNDERLAND-MA	2	0.0%					100%	1.0					100%	1.0	0	0	0	0	2	2	0	0	0	0	2	2
3rd Small	AGAWAMMA	1	0.0%				100%		1.0			10%	90%		1.0	0	0	0	1	0	1	0	0	0	1	0	1
3rd Small	BOSTONMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Small	DEERFIELD-MA	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	FLORENCE	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	GREENFIELDMA	1	0.0%					100%	1.0		100%				1.0	0	0	0	0	1	1	0	1	0	0	0	1
3rd Small	HADLEYMA	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	HOLDENMA	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Small	HOLYOKEMA	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	NORTHAMPTON	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	PRINCETONMA	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Small	ROXBURYMA	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Small	SDEERFIELD	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	SHADLEYMA	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	TEMPLETONMA	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Small	THORNDIKEMA	1	0.0%				100%		1.0				100%		1.0	0	0	0	1	0	1	0	0	0	1	0	1
3rd Small	WARWICK	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Small	WELLESLY	1	0.0%	100%					1.0	100%					1.0	1	0	0	0	0	1	1	0	0	0	0	1
3rd Small	WENDELL-MA	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Small	WILLIAMSBURG	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
3rd Small	WINCHENDON-MA	1	0.0%		100%				1.0		100%				1.0	0	1	0	0	0	1	0	1	0	0	0	1
3rd Small	WSPRINGFIELD	1	0.0%					100%	1.0					100%	1.0	0	0	0	0	1	1	0	0	0	0	1	1
	Total	**7192**													**Total**	4707	528	532	631	795	7192	4781	482	510	612	807	7192
															%	65%	7%	7%	9%	11%		66%	7%	7%	9%	11%	
															Say	**65**	**5**	**5**	**10**	**15**	**100**	**65**	**5**	**5**	**10**	**15**	**100**

Existing Tonnage Data - Existing every 15 minutes

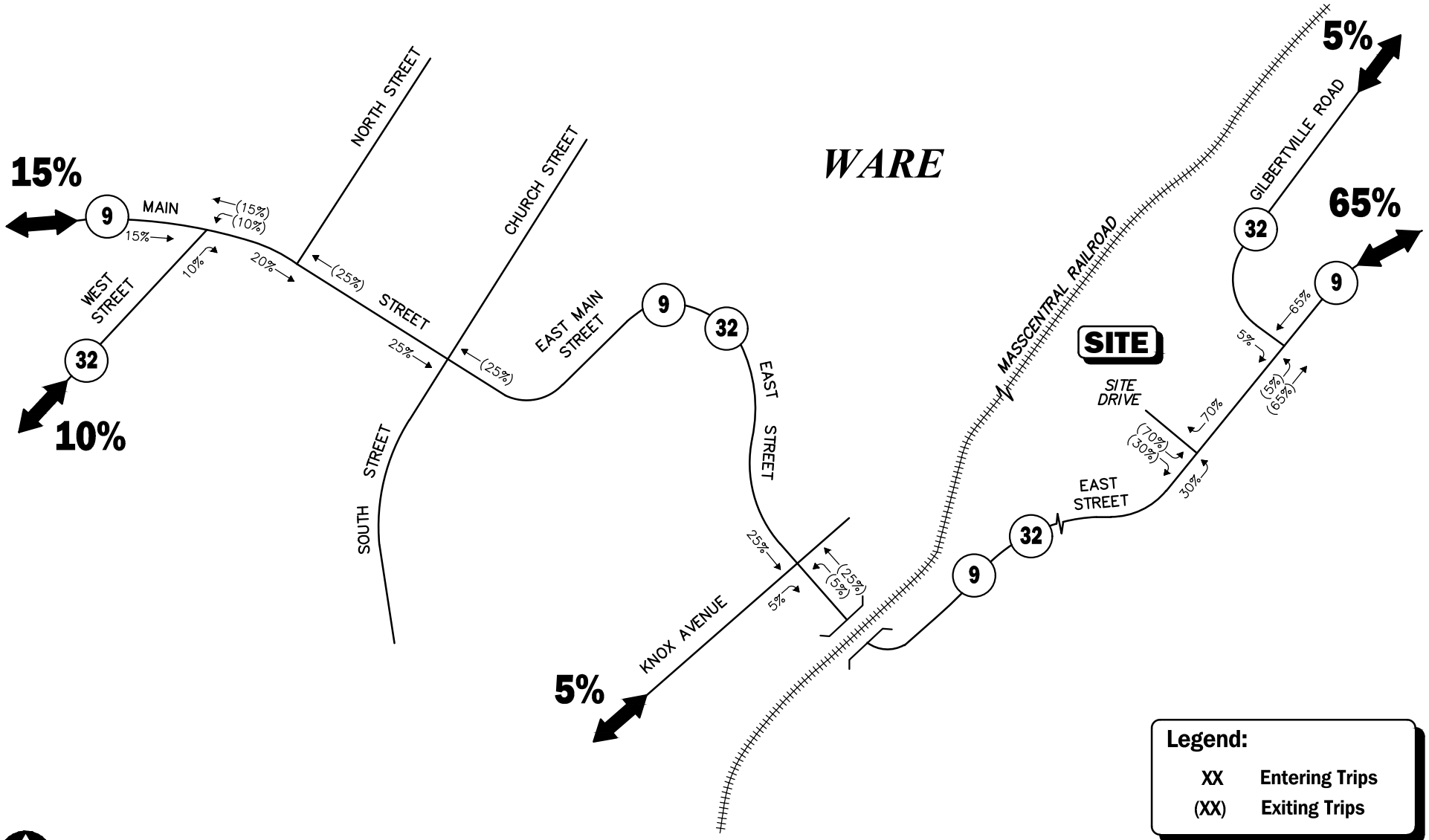
	Thursday, December 2, 2021						Tuesday, December 7, 2021					Wednesday, December 8, 2021				
Row Labels	3rd Large	3rd Small	Ware	IC	TOTAL	Peak Hour	3rd Small	Ware	IC	TOTAL	Peak Hour	3rd Small	Ware	IC	TOTAL	Peak Hour
6:00					0					0					0	
6:15					0					0					0	
6:30				3	3				1	1		1		1	2	
6:45	1			1	2	5			2	2	3			1	1	3
7:00		1			1	6			1	1	4			1	1	4
7:15				2	2	8			2	2	6		1	3	4	8
7:30				2	2	7	1			1	6			1	1	7
7:45					0	5				0	4	2		1	3	9
8:00					0	4				0	3				0	8
8:15					0	2		1		1	2	1			1	5
8:30			2	1	3	3	2			2	3	1			1	5
8:45			2		2	5	1			1	4	1	1		2	4
9:00		1	3		4	9				0	4	1	1		2	6
9:15		3	1		4	13				0	3	1			1	6
9:30		2			2	12				0	1		1		1	6
9:45				1	1	11	1			1	1				0	4
10:00					0	7				0	1				0	2
10:15					0	3				0	1		1		1	2
10:30		1		1	2	3			1	1	2			2	2	3
10:45		1	1	1	3	5			1	1	2	1	2	1	4	7
11:00					0	5	1	1		2	4	1		1	2	9
11:15					0	5			1	1	5				0	8
11:30				1	1	4				0	4	2		1	3	9
11:45		1	2		3	4			1	1	4				0	5
12:00				1	1	5	1			1	3	1			1	4
12:15					0	5	1		1	2	4	1	1		2	6
12:30			1	1	2	6				0	4				0	3
12:45				1	1	4		2	1	3	6		1		1	4
13:00			3		3	6				0	5	1		2	3	6
13:15			1	1	2	8	1			1	4				0	4
13:30		1	2	1	4	10		1		1	5				0	4
13:45					0	9				0	2	1		2	3	6
14:00				1	1	7		1		1	3				0	3
14:15				1	1	6			1	1	3	1			1	4
14:30					0	2		2		2	4				0	4
14:45				1	1	3		2		2	6	1			1	2
15:00					0	2		1		1	6	1			1	3
15:15		1			1	2			1	1	6				0	2
15:30					0	2				0	4				0	2
15:45					0	1				0	2				0	1
					52					34					45	

	AM	PM
in	13	10
out	13	10
total	26	20

	AM	PM
in	6	6
out	6	6
total	12	12

	AM	PM
in	9	9
out	9	9
total	18	18

average	AM	PM
in	9	8
out	9	8
total	18	16

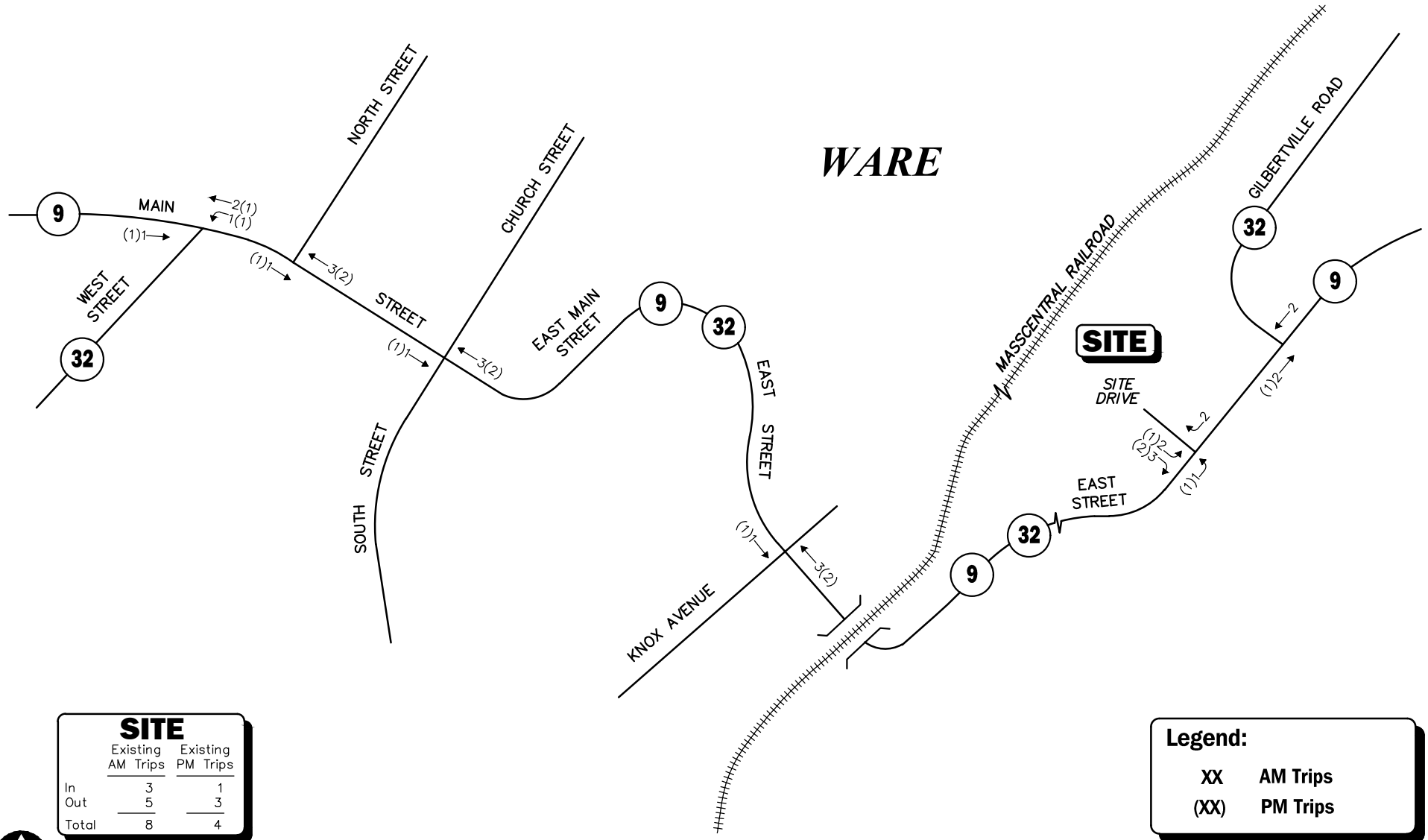


Not to Scale

Figure A1

Waste Handling Facility
Existing Trips Distribution Map
Weekday
Peak Hour Traffic Volume

Vanasse & Associates inc



SITE	Existing AM Trips	Existing PM Trips
In	3	1
Out	5	3
Total	8	4

Legend:

XX AM Trips

(XX) PM Trips

Not to Scale

Figure A2

Waste Handling Facility
Observed Peak Hour Trips
Peak Hour Traffic Volume

Vanasse & Associates inc

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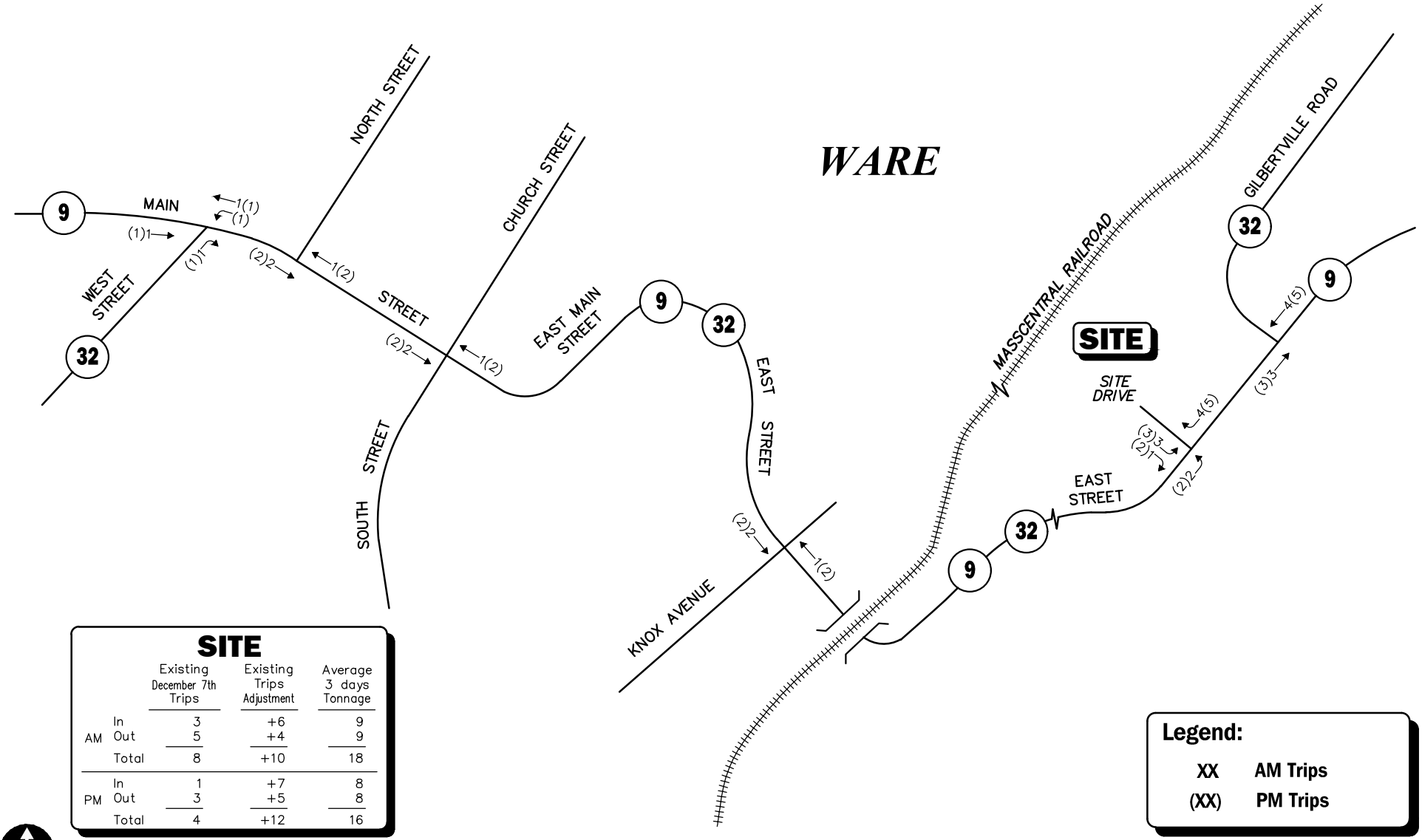


SITE

		Existing December 7th Trips	Existing Trips Adjustment	Average 3 days Tonnage
AM	In	3	+6	9
	Out	5	+4	9
	Total	8	+10	18
PM	In	1	+7	8
	Out	3	+5	8
	Total	4	+12	16

Legend:

XX AM Trips

(XX) PM Trips

Not to Scale

Figure A3

Waste Handling Facility
Existing Trips Adjustment
Weekday
Peak Hour Traffic Volume

Vanasse & Associates inc

R:\9130\3 - 9130nt2.dwg, 1/18/2022 10:42:18 AM

TRAFFIC ADJUSTMENTS

Traffic Study Stations

Sta. AET05 2019 -2021

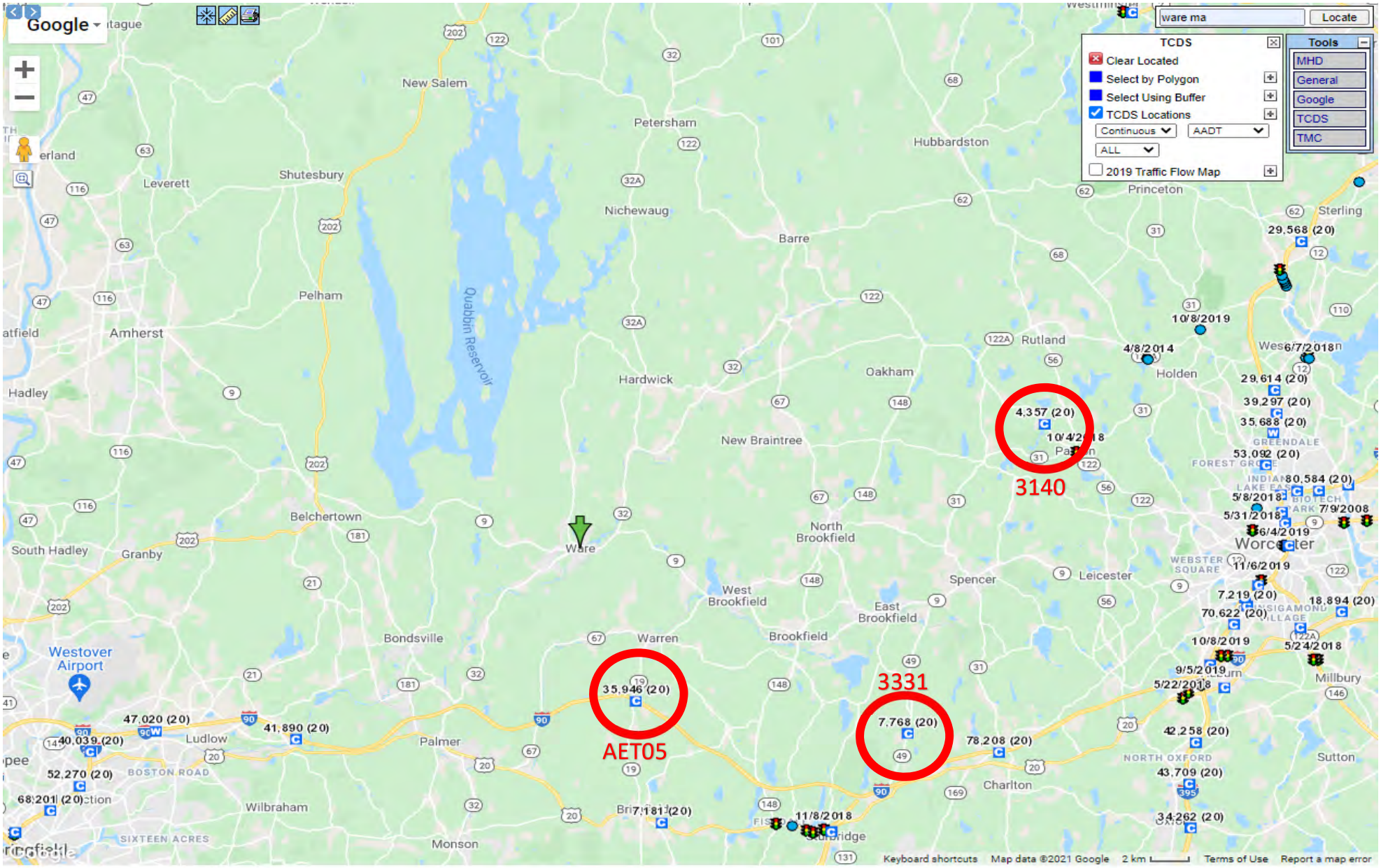
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	Average AM Peak Hour 7-9	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	Average PM Peak Hour 3-5	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily	
2019 December ADT	312	290	269	355	700	1435	2171	2778	2799	2789	2540	2392	2378	2401	2546	2713	3103	3176	3140	2572	2022	1515	1079	901	685	490	41622	one day comparisson **Tuesday, December 10, 2019**
Growth Rate: 1%/Year																												
2019 December ADT Adj	318	296	274	362	714	1464	2215	2834	2855	2845	2591	2440	2426	2449	2597	2768	3165	3240	3203	2624	2063	1545	1101	919	699	500	42459	
2021 December ADT	372	232	269	364	590	1295	2134	2494	2556	2525	2353	2299	2339	2277	2406	2614	2994	2885	2940	2606	1831	1276	964	866	636	482	39134	**Tuesday, December 7, 2021**
COVID Adjustment	0.85	1.28	1.02	0.99	1.21	1.13	1.04	1.14	1.12	1.13	1.10	1.06	1.04	1.08	1.08	1.06	1.06	1.12	1.09	1.01	1.13	1.21	1.14	1.06	1.10	1.04	1.08	

Sta. 3140 2019-2021

	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	Average AM Peak Hour 7-9	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	Average PM Peak Hour 3-5	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily	
2019 December ADT	23	14	14	16	42	162	361	463	390	427	254	232	227	243	251	281	385	441	413	402	281	188	135	110	61	56	5032	one day comparisson **Tuesday, December 10, 2019**
Growth Rate: 1%/Year																												
2019 December ADT Adj	23	14	14	16	43	165	368	472	398	435	259	237	232	248	256	287	393	450	421	410	287	192	138	112	62	57	5133	
2021 December ADT	14	5	15	15	51	159	292	374	332	353	233	222	235	248	249	328	385	412	399	347	217	153	93	70	40	34	4523	**Tuesday, December 7, 2021**
COVID Adjustment	2.64	2.80	0.93	1.07	0.84	1.04	1.26	1.26	1.20	1.23	1.11	1.07	0.99	1.00	1.03	0.88	1.02	1.09	1.06	1.18	1.32	1.25	1.48	1.60	1.55	1.68	1.13	

Sta. 3331- 2019-2021

	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	Average AM Peak Hour 7-9	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	Average PM Peak Hour 3-5	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily	
2019 December ADT	33	20	20	32	74	216	434	650	588	619	483	509	551	557	592	633	763	821	792	636	476	328	247	146	101	53	8963	one day comparisson **Tuesday, December 10, 2019**
Growth Rate: 1%/Year																												
2019 December ADT Adj	34	20	20	33	75	220	443	663	600	631	493	519	562	568	604	646	778	838	808	649	486	335	252	149	103	54	9143	
2021 December ADT	26	26	17	33	79	195	415	560	574	567	511	471	502	567	495	608	689	734	712	623	399	610	199	136	97	56	8314	**Tuesday, December 7, 2021**
COVID Adjustment	0.00	0.77	1.18	1.00	0.95	1.13	1.07	1.18	1.05	1.11	0.96	1.10	1.12	1.00	1.22	1.06	1.13	1.14	1.14	1.04	1.22	0.55	1.27	1.10	1.06	0.96	1.10	
Average	1.17	1.62	1.04	1.02	1.00	1.10	1.12	1.19	1.12	**1.16**	1.06	1.08	1.05	1.03	1.11	1.00	1.07	1.12	**1.09**	1.08	1.22	1.00	1.30	1.25	1.24	1.23	**1.11**	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AADT
ALL
2019 Traffic Flow Map
Tools
MHD
General
Google
TCDS
TMC
3140
AET05
3331
4,357 (20)
35,946 (20)
7,768 (20)
Ware
Hardwick
Oakham
New Braintree
Rutland
Holden
Princeton
Sterling
Barre
Nichewaug
Petersham
New Salem
Hubbardston
Shutesbury
Leverett
Pelham
Amherst
Hadley
Belchertown
South Hadley
Granby
Quabbin Reservoir
North Brookfield
West Brookfield
East Brookfield
Brookfield
Warren
Bondsville
Palmer
Ludlow
Wilbraham
Monson
Spencer
Leicester
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Massachusetts Highway Department

AET05: Monthly Hourly Volume for December 2019

Location ID:	**AET05**	**Seasonal Factor Group:**	**R1**
County:	**Worcester**	**Daily Factor Group:**	
Functional Class	**1**	**Axle Factor Group:**	**R1**
Location:	**MASSACHUSETTS TURNPIKE**	**Growth Factor Group:**	

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	Average PH	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	Average PH	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	688	440	271	291	303	463	889	1730	2960	2345	4313	5238	4985	4685	5042	3605	2140	1327	1733.5	1162	911	712	498	347	396	565	43961	Accepted
2	310	216	175	210	341	564	720	1006	980	993	1172	1343	1403	1510	1521	1590	1546	1468	1507	1183	829	541	636	415	340	366	20385	Accepted
3	256	180	124	153	265	644	892	1484	1431	1457.5	1537	1674	1865	1935	1954	2206	2307	2274	2290.5	2087	1416	1063	925	785	667	527	28651	Accepted
4	337	296	268	363	670	1494	2226	2899	2814	2856.5	2636	2556	2524	2524	2757	2837	3248	3272	3260	2753	2214	1584	1165	883	816	546	43682	Accepted
5	379	283	265	380	709	1460	2197	2786	2814	2800	2511	2589	2524	2429	2813	3078	3299	3217	3258	3032	2271	1575	1364	1030	771	594	44370	Accepted
6	391	274	274	395	664	1340	2060	2681	2609	2645	2644	2532	2767	3016	2975	3199	3606	3523	3564.5	3208	2435	2309	1431	1137	996	728	47194	Accepted
7	536	368	290	277	356	689	1089	1428	1875	1651.5	2542	2904	3213	3203	3085	3062	3322	3245	3283.5	2997	2245	1703	1671	1462	1228	827	43617	Accepted
8	455	266	203	165	156	333	556	810	1190	1000	1860	2709	3214	3313	3227	3431	3486	3336	3411	2717	2287	1859	1761	1438	1067	607	40446	Accepted
9	367	259	211	310	690	1496	2188	2685	2688	2686.5	2546	2555	2384	2452	2552	2632	2887	2763	2825	2416	1855	1359	1050	834	646	542	40367	Accepted
10	312	290	269	355	700	1435	2171	2778	2799	2788.5	2540	2392	2378	2401	2546	2713	3103	3176	3139.5	2572	2022	1515	1079	901	685	490	41622	Accepted
11	371	267	270	312	578	1153	1795	2247	2393	2320	2198	2232	2283	2282	2488	2702	3067	2984	3025.5	2581	2120	1510	1081	882	713	533	39042	Accepted
12	331	284	274	396	731	1417	2190	2817	2696	2756.5	2676	2579	2674	2670	2966	3172	3552	3432	3492	3199	2398	1853	1373	1191	881	617	46369	Accepted
13	451	336	332	373	679	1320	1934	2541	2575	2558	2595	2693	2910	3125	3511	3802	4018	3721	3869.5	3385	2825	2285	1602	1259	1009	687	49968	Accepted
14	512	323	286	229	298	421	759	1137	1746	1441.5	2221	2880	3132	3196	3100	3167	2970	2855	2912.5	2666	2116	1628	1322	1194	962	662	39782	Accepted
15	478	261	227	168	168	259	462	682	1227	954.5	1824	2615	3196	3292	3343	3162	3158	3104	3131	2912	2527	1768	1911	1209	727	443	39123	Accepted
16	302	231	222	318	747	1511	2310	2799	2776	2787.5	2678	2780	2712	2642	2789	3090	3260	3329	3294.5	2859	2221	1744	1400	1053	859	552	45184	Accepted
17	366	310	303	344	574	1026	1277	1466	1439	1452.5	1309	1416	1220	1673	1583	1653	1918	2134	2026	1836	1202	914	832	647	543	461	26446	Accepted
18	357	266	254	331	652	1335	2005	2704	2830	2767	2768	2837	3035	3114	3349	2764	4360	3491	3925.5	3253	2522	1988	1478	1141	817	520	48171	Accepted
19	417	310	286	377	674	1405	2153	2746	2898	2822	2728	3080	2966	3282	3583	3307	2517	3813	3165	3734	2902	2112	1628	1384	795	643	49740	Accepted
20	474	328	357	358	657	1348	1870	2509	2688	2598.5	2752	3026	3166	3430	3638	3877	4076	3712	3894	3764	3232	2607	1953	1346	1071	758	52997	Accepted
21	583	368	333	274	343	579	820	1337	1946	1641.5	2745	3665	3965	4014	3787	3802	3422	3007	3214.5	2639	2137	1733	1692	1481	1318	904	46894	Accepted
22	452	279	209	177	170	326	482	742	1338	1040	2121	3015	3692	3594	3615	3611	3368	2983	3175.5	2798	2483	2147	1674	1289	844	517	41926	Accepted
23	358	260	250	320	629	1312	1860	2339	2361	2350	2619	3020	3255	3648	3910	3813	3655	3383	3519	3113	2519	2137	1538	1267	817	628	49011	Accepted
24	440	315	272	296	533	837	1200	1412	1666	1539	2119	2915	3339	3484	3741	3764	3426	2728	3077	2869	1723	1402	1512	1561	1307	798	43659	Accepted
25	425	216	167	112	112	140	285	507	896	701.5	1557	2427	3344	3705	3242	2673	2240	2346	2293	2519	2644	2554	2159	1625	884	503	37282	Accepted
26	295	165	174	248	501	1033	1515	1840	2161	2000.5	2700	3674	4162	4079	4332	3995	3921	3743	3832	2832	2263	1788	1497	1084	842	571	49415	Accepted
27	396	291	287	340	609	1051	1516	1868	2200	2034	2719	3344	3781	4053	4252	4442	4262	3688	3975	3139	2617	1954	1622	1176	922	629	51158	Accepted
28	379	283	243	275	264	450	693	984	1550	1267	2451	3461	3976	3993	4319	3976	3740	3473	3606.5	3082	2583	2131	1852	1372	1064	687	47281	Accepted
29	381	255	203	173	190	295	430	798	1348	1073	2294	3182	3849	4023	4070	3867	4055	3588	3821.5	2741	3209	2318	1575	1044	669	594	45151	Accepted
30	296	216	201	266	502	913	1312	1655	1629	1642	1726	1863	1861	1983	2888	2620	2561	2082	2321.5	1726	1347	1013	839	669	493	261	30922	Accepted
31	427	241	216	293	484	877	1237	1567	1695	1631	1873	2147	2508	2879	3165	3283	3170	2810	2990	2321	1704	1186	821	601	515	322	36342	Accepted
	404	**280**	**249**	**286**	**482**	**933**	**1390**	**1838**	**2072**		**2354**	**2753**	**2977**	**3085**	**3230**	**3190**	**3215**	**3032**		**2713**	**2186**	**1709**	**1385**	**1087**	**828**	**583**	**42263**	

Massachusetts Highway Department

AET05: Monthly Hourly Volume for December 2021

Location ID:	**AET05**	**Seasonal Factor Group:**	**R1**
County:	**Worcester**	**Daily Factor Group:**	
Functional Class	**1**	**Axle Factor Group:**	**R1**
Location:	**MASSACHUSETTS TURNPIKE**	**Growth Factor Group:**	

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	Average PH	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	Average PH	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	429	281	262	364	610	1357	2099	2455	2404	2429.5	2366	2317	2351	2429	2537	2777	2924	2941	2932.5	2496	1811	1264	1021	955	711	532	39693	Accepted
2	362	256	275	385	634	1297	1958	2458	2455	2456.5	2327	2367	2419	2415	2624	2849	3225	3024	3124.5	2471	2003	1395	1078	967	750	553	40547	Accepted
3	452	362	303	373	632	1251	1934	2289	2310	2299.5	2502	2680	2844	3082	3261	3685	3521	3495	3508	3221	2624	1879	1348	1097	890	640	46675	Accepted
4	445	320	286	249	304	591	989	1354	1825	1589.5	2517	3050	3185	3017	3002	3160	3181	2957	3069	2690	2004	1627	1464	1186	858	699	40960	Accepted
5	383	262	183	163	172	271	487	715	1127	921	1832	2401	2991	3139	3158	3207	3263	3316	3289.5	2748	2155	1846	1356	1061	701	417	37354	Accepted
6	342	248	239	334	563	1342	2055	2322	2398	2360	2258	2290	2341	2386	2386	2540	2553	2607	2580	2242	1523	1182	850	745	541	485	36772	Accepted
7	372	232	269	364	590	1295	2134	2494	2556	2525	2353	2299	2339	2277	2406	2614	2994	2885	2939.5	2606	1831	1276	964	866	636	482	39134	Accepted
8	415	264	315	358	589	1317	1996	2392	2418	2405	2191	2265	2310	2289	2524	2688	2801	2700	2750.5	2370	1617	1157	915	725	552	453	37621	Accepted
9	350	263	292	356	569	1267	1999	2352	2441	2396.5	2406	2393	2508	2503	2654	2970	3064	3010	3037	2707	1943	1513	1083	917	704	496	40760	Accepted
10	357	270	277	345	594	1231	1855	2232	2290	2261	2520	2604	2684	3125	3348	3609	3685	3651	3668	3462	2625	1981	1440	1100	850	691	46826	Accepted
11	457	317	285	247	304	427	846	1133	1670	1401.5	2232	2810	3028	3089	2975	3030	2901	2595	2748	2299	1981	1494	1273	1090	855	572	37910	Accepted
12	415	271	210	160	179	214	480	803	1273	1038	1950	2606	3145	3415	3347	3379	3323	3217	3270	2789	2417	1906	1498	1135	679	436	39247	Accepted
13	272	210	231	326	624	1356	2083	2470	2381	2425.5	2452	2413	2523	2375	2397	2430	3306	2874	3090	2447	1903	1333	917	786	628	534	39271	Accepted
14	375	278	298	366	627	1386	2104	2386	2581	2483.5	2389	2369	2470	2474	2613	2952	3132	3031	3081.5	2605	1965	1480	1062	863	784	542	41132	Accepted
15	380	284	285	364	649	1370	2030	2418	2561	2489.5	2493	2499	2714	2812	2977	3373	3513	3418	3465.5	2853	2089	1576	1231	929	710	528	44056	Accepted
16	377	329	304	358	630	1347	2074	2467	2611	2539	2761	2817	3043	3011	3260	3609	3328	3828	3578	3305	2469	1928	1521	1129	805	572	47883	Accepted
17	421	316	305	380	610	1273	1981	2317	2543	2430	2790	3137	3399	3567	3689	3883	4167	3775	3971	4003	3207	2449	1783	1242	1065	727	53029	Accepted
18	565	326	293	268	308	464	771	1177	1755	1466	2315	2786	3025	2887	2749	2380	2417	2180	2298.5	1815	1555	1235	1020	838	719	551	34399	Accepted
19	411	221	176	150	168	245	413	694	1110	902	1857	2771	3233	3390	2986	3628	3284	3027	3155.5	2748	2311	1954	1480	1036	663	445	38401	Accepted
20	293	250	248	338	611	1349	2012	2295	2352	2323.5	2407	2462	2566	2759	2716	2930	2907	2930	2918.5	2599	1852	1376	1027	844	624	514	40261	Accepted
21	342	254	275	354	596	1298	1944	2298	2447	2372.5	2424	2433	2591	2735	2714	2998	3193	2925	3059	2469	1964	1552	1132	882	651	501	40972	Accepted
22	364	282	305	410	577	1151	1654	2101	2157	2129	2361	2572	2877	2952	3159	3160	3241	3014	3127.5	2735	2237	1640	1200	960	698	549	42356	Accepted
23	379	319	288	386	579	1104	1681	1944	2153	2048.5	2463	2867	3122	3372	3856	3915	3601	3393	3497	3291	2525	2106	1459	1108	841	538	47290	Accepted
24	377	245	246	251	301	446	605	834	1208	1021	1853	2541	3248	3513	3822	3292	2972	2455	2713.5	2019	1529	1340	1346	1230	969	566	37208	Accepted
25	319	162	114	80	91	124	195	297	587	442	969	1691	2233	3034	2990	2455	1877	1774	1825.5	1701	1685	1615	1401	949	617	306	27266	Accepted
26	203	138	92	91	114	207	368	826	1466	1146	2532	3543	4094	4036	3935	3839	3383	3110	3246.5	3205	2768	2234	1556	1086	701	389	43916	Accepted
27																												
28																												
29																												
30																												
31																												
	379	**268**	**256**	**301**	**470**	**961**	**1490**	**1828**	**2042**		**2289**	**2576**	**2819**	**2926**	**3003**	**3129**	**3144**	**3005**		**2688**	**2100**	**1628**	**1247**	**989**	**739**	**528**	**40805**	

Massachusetts Highway Department

3140: Monthly Hourly Volume for December 2019

Location ID:	**3140**	**Seasonal Factor Group:**	**U3**
County:	**Worcester**	**Daily Factor Group:**	
Functional Class	**3**	**Axle Factor Group:**	**U3**
Location:	**PLEASANT STREET**	**Growth Factor Group:**	

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	Average PH	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	Average PH	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	42	19	12	18	9	34	61	96	154	125	248	312	329	360	337	310	279	168	223.5	123	108	71	57	36	30	28	3241	Accepted
2	23	11	19	32	41	103	162	178	166	172	129	130	146	135	159	187	223	202	212.5	221	125	80	58	52	43	41	2666	Accepted
3	30	9	15	29	42	75	159	216	205	210.5	188	159	146	191	214	273	284	317	300.5	292	212	138	104	91	58	55	3502	Accepted
4	22	11	10	20	58	164	333	497	380	438.5	279	215	233	250	257	308	383	423	403	412	316	181	141	106	95	59	5153	Accepted
5	27	22	7	21	45	152	360	496	404	450	277	228	213	213	254	304	431	483	457	435	331	209	148	117	83	56	5316	Accepted
6	29	18	10	17	65	164	322	478	343	410.5	237	249	226	241	260	314	414	474	444	452	316	208	138	129	134	74	5312	Accepted
7	59	31	20	22	29	60	106	170	243	206.5	238	264	276	338	331	297	314	349	331.5	334	278	148	132	134	109	74	4356	Accepted
8	49	30	16	9	14	20	56	96	163	129.5	200	218	314	325	292	277	301	290	295.5	238	177	128	117	78	62	45	3515	Accepted
9	22	2	12	20	45	153	325	458	362	410	279	186	246	215	243	299	367	380	373.5	371	266	158	146	77	68	52	4752	Accepted
10	23	14	14	16	42	162	361	463	390	426.5	254	232	227	243	251	281	385	441	413	402	281	188	135	110	61	56	5032	Accepted
11	28	18	11	34	78	145	249	309	386	347.5	275	234	245	224	227	260	394	402	398	409	284	206	139	111	77	61	4806	Accepted
12	27	20	9	20	59	173	368	468	373	420.5	293	236	238	243	264	308	435	482	458.5	481	348	210	179	142	96	69	5541	Accepted
13	30	25	13	19	55	159	345	472	349	410.5	268	259	233	259	278	325	379	537	458	472	340	233	152	145	104	85	5536	Accepted
14	45	18	16	22	18	43	94	147	205	176	233	269	287	304	318	270	265	316	290.5	308	261	135	124	139	116	85	4038	Accepted
15	56	19	21	10	11	15	65	94	146	120	215	254	279	348	281	278	225	274	249.5	266	182	120	102	80	58	49	3448	Accepted
16	21	9	8	10	54	156	345	508	389	448.5	279	223	242	254	255	327	405	457	431	406	275	189	153	87	68	51	5171	Accepted
17	31	19	16	22	39	139	225	258	224	241	152	149	143	167	172	227	241	266	253.5	240	195	103	74	62	54	57	3275	Accepted
18	19	9	18	21	67	166	267	414	371	392.5	299	249	264	238	267	327	409	478	443.5	400	324	209	139	141	79	63	5238	Accepted
19										#DIV/0!									#DIV/0!									
20	39	29	14	18	53	162	317	462	356	409	276	253	248	295	329	360	419	487	453	459	333	221	179	134	103	105	5651	Accepted
21	47	25	18	9	15	45	106	157	243	200	266	297	322	336	333	293	330	311	320.5	252	210	161	162	131	121	77	4267	Accepted
22	53	29	19	18	11	21	73	89	148	118.5	202	237	268	316	289	298	284	283	283.5	240	199	140	127	95	71	47	3557	Accepted
23	29	15	13	14	46	136	259	365	339	352	327	280	262	315	361	330	376	380	378	405	279	174	128	106	75	66	5080	Accepted
24	39	17	16	14	40	107	205	261	241	251	244	260	268	379	360	344	378	324	351	308	223	157	217	230	200	105	4937	Accepted
25	24	18	7	3	8	15	43	59	92	75.5	129	203	279	340	335	255	218	277	247.5	265	251	215	173	106	59	47	3421	Accepted
26	29	12	7	11	33	113	211	239	232	235.5	187	270	259	306	249	297	367	354	360.5	313	202	154	131	79	93	57	4205	Accepted
27	31	18	18	15	45	122	211	281	272	276.5	278	254	248	280	295	311	347	411	379	376	265	195	150	132	91	64	4710	Accepted
28	27	12	17	19	23	34	101	112	155	133.5	237	270	311	345	315	328	338	320	329	266	209	164	120	134	140	79	4076	Accepted
29	41	20	16	16	9	22	53	80	124	102	228	237	314	315	261	238	253	307	280	249	178	129	103	83	47	29	3352	Accepted
30	20	6	8	17	33	102	198	238	178	208	148	146	133	155	213	184	252	212	232	198	120	88	54	57	44	38	2842	Accepted
31	27	14	31	22	39	101	192	257	256	256.5	232	241	231	264	294	327	355	343	349	301	217	147	123	85	75	63	4237	Accepted
	33	**17**	**14**	**18**	**38**	**102**	**206**	**281**	**263**		**237**	**234**	**248**	**273**	**276**	**291**	**335**	**358**		**330**	**244**	**162**	**130**	**107**	**84**	**61**	**4341**	

Massachusetts Highway Department

3140: Monthly Hourly Volume for December 2021

Location ID:	**3140**	**Seasonal Factor Group:**	**U3**
County:	**Worcester**	**Daily Factor Group:**	
Functional Class	**3**	**Axle Factor Group:**	**U3**
Location:	**PLEASANT STREET**	**Growth Factor Group:**	

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	Average PH	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	Average PH	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	16	16	13	15	43	178	322	418	331	374.5	277	208	226	234	263	320	406	449	427.5	361	222	150	123	78	62	55	4786	Accepted
2	18	14	11	16	40	159	311	398	341	369.5	240	231	213	264	247	321	421	434	427.5	363	221	163	108	76	54	46	4710	Accepted
3	23	15	11	15	41	158	315	363	285	324	237	225	262	251	296	333	452	436	444	410	299	170	150	99	95	52	4993	Accepted
4	33	14	11	15	19	51	82	158	222	190	239	338	367	366	335	347	334	316	325	256	205	183	124	98	83	74	4270	Accepted
5	29	16	8	11	7	15	61	109	167	138	230	260	302	295	294	285	277	288	282.5	235	177	141	85	62	45	31	3430	Accepted
6	15	10	10	13	57	154	300	362	296	329	233	254	207	233	269	308	380	381	380.5	331	201	143	82	58	48	36	4381	Accepted
7	14	5	15	15	51	159	292	374	332	353	233	222	235	248	249	328	385	412	398.5	347	217	153	93	70	40	34	4523	Accepted
8	16	7	15	17	47	174	323	400	323	361.5	230	211	253	249	209	298	389	434	411.5	345	211	128	97	79	53	44	4552	Accepted
9	17	13	17	23	42	174	333	379	299	339	245	185	195	222	244	328	405	403	404	346	226	147	108	82	62	49	4544	Accepted
10	17	14	13	16	55	137	299	365	306	335.5	244	209	230	237	257	303	482	418	450	392	236	167	134	123	92	75	4821	Accepted
11	29	22	10	17	24	37	73	135	175	155	243	307	330	299	298	299	276	284	280	232	201	169	131	98	106	79	3874	Accepted
12	40	27	10	11	14	27	45	108	173	140.5	217	270	270	355	318	353	301	252	276.5	246	183	122	84	59	46	25	3556	Accepted
13	16	7	10	18	55	157	311	398	293	345.5	219	207	242	249	263	315	396	401	398.5	374	219	149	91	58	53	37	4538	Accepted
14	14	7	10	15	59	167	310	426	343	384.5	265	216	211	245	255	318	380	405	392.5	363	240	165	90	68	40	47	4659	Accepted
15	12	10	9	18	54	168	326	407	289	348	234	207	262	249	290	337	406	458	432	391	240	153	134	83	60	45	4842	Accepted
16	15	10	10	20	54	152	338	400	286	343	260	242	260	261	252	334	385	427	406	388	257	204	130	91	70	59	4905	Accepted
17	22	12	17	17	52	149	327	380	302	341	280	262	301	288	292	388	449	430	439.5	383	301	201	144	123	98	101	5319	Accepted
18	39	10	17	14	14	42	88	155	197	176	244	293	305	294	238	244	214	223	218.5	199	160	117	98	87	54	62	3408	Accepted
19	25	12	13	11	7	28	50	78	133	105.5	190	250	250	310	331	258	291	237	264	222	182	146	91	71	45	36	3267	Accepted
20	14	10	9	12	51	148	291	372	288	330	235	202	216	254	257	336	399	388	393.5	329	208	142	111	67	60	43	4442	Accepted
21	12	4	13	15	46	144	311	364	287	325.5	297	269	233	271	292	366	383	403	393	349	235	155	136	77	57	49	4768	Accepted
22	14	10	13	17	45	152	260	304	254	279	221	231	235	258	246	356	369	398	383.5	312	240	145	134	80	56	53	4403	Accepted
23	24	15	11	12	44	130	235	306	287	296.5	277	252	320	306	341	394	431	364	397.5	295	270	182	121	98	76	69	4860	Accepted
24	28	16	18	15	21	50	86	158	157	157.5	212	248	316	300	309	305	342	291	316.5	230	152	146	162	135	104	75	3876	Accepted
25	25	11	9	2	8	8	31	50	67	58.5	105	135	209	239	202	182	195	196	195.5	170	179	144	111	77	47	47	2449	Accepted
26	15	19	7	8	5	17	45	75	95	85	168	212	268	275	235	197	226	225	225.5	183	138	98	71	69	41	32	2724	Accepted
27	10	11	9	17	37	124	174	252	210	231	249	198	251	288	268	321	330	340	335	289	201	99	81	60	53	51	3923	Accepted
28																												
29																												
30																												
31																												
	20	**12**	**12**	**15**	**37**	**113**	**220**	**285**	**250**		**234**	**235**	**258**	**272**	**272**	**314**	**359**	**359**		**309**	**216**	**151**	**112**	**82**	**63**	**52**	**4253**	

Massachusetts Highway Department

3331: Monthly Hourly Volume for December 2019

Location ID:	**3331**	**Seasonal Factor Group:**	**R4-7**
County:	**Worcester**	**Daily Factor Group:**	
Functional Class	**4**	**Axle Factor Group:**	**R4-7**
Location:	**ROUTE 49**	**Growth Factor Group:**	

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	Average PH	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	Average PH	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1																												
2																												
3																												
4																												
5																												
6																												
7	40	26	14	21	34	68	156	244	360	302	479	631	760	763	799	724	710	641	675.5	641	465	361	272	240	196	118	8763	Accepted
8	43	27	16	18	14	47	68	135	214	174.5	377	479	646	623	690	644	609	538	573.5	413	317	244	263	129	73	50	6677	Accepted
9	22	13	13	37	60	234	458	651	567	609	504	472	516	481	498	586	648	704	676	666	407	233	187	142	96	32	8227	Accepted
10	33	20	20	32	74	216	434	650	588	619	483	509	551	557	592	633	763	821	792	636	476	328	247	146	101	53	8963	Accepted
11	29	16	13	40	75	174	383	477	509	493	464	464	497	519	506	587	715	760	737.5	693	482	350	249	163	100	51	8316	Accepted
12	29	16	20	35	74	198	459	649	613	631	506	560	568	571	626	655	789	824	806.5	802	516	390	301	224	124	65	9614	Accepted
13	41	23	23	32	69	212	408	589	616	602.5	496	650	607	618	636	735	874	866	870	711	566	376	280	232	184	99	9943	Accepted
14	50	18	16	21	29	64	123	231	330	280.5	473	656	694	784	779	711	687	688	687.5	610	477	370	324	234	198	95	8662	Accepted
15	64	22	25	11	20	45	83	156	220	188	383	506	681	761	637	591	565	595	580	521	361	265	228	138	88	50	7016	Accepted
16	20	24	7	35	62	214	481	675	577	626	524	536	639	640	597	680	789	846	817.5	765	453	327	250	180	103	52	9476	Accepted
17	37	14	16	31	60	166	285	333	363	348	281	265	324	306	352	366	444	486	465	404	252	160	120	99	80	53	5297	Accepted
18	25	21	16	46	81	188	425	557	599	578	511	551	604	610	633	672	769	836	802.5	740	488	360	249	211	108	69	9369	Accepted
19	21	15	18	36	68	183	438	612	577	594.5	502	475	568	612	594	690	808	858	833	793	580	431	344	227	147	87	9684	Accepted
20	43	23	22	24	54	197	404	556	624	590	507	618	692	682	675	786	931	928	929.5	836	623	468	354	297	211	134	10689	Accepted
21	41	32	27	29	25	71	144	212	389	300.5	562	728	820	847	762	744	756	672	714	556	401	306	376	264	188	110	9062	Accepted
22	64	22	11	14	12	47	84	142	238	190	419	570	730	818	761	718	770	653	711.5	558	445	332	293	208	123	90	8122	Accepted
23	30	25	16	29	57	186	355	478	525	501.5	615	730	816	843	828	858	864	872	868	776	616	430	371	191	152	96	10759	Accepted
24	38	17	19	23	47	126	290	331	455	393	543	660	724	874	777	747	715	563	639	545	374	295	284	296	254	137	9134	Accepted
25	42	33	11	7	10	24	41	73	120	96.5	222	323	410	525	426	364	370	352	361	396	345	311	276	230	98	58	5067	Accepted
26	23	16	13	24	47	122	263	341	424	382.5	450	563	614	659	698	851	890	773	831.5	597	436	337	225	212	132	71	8781	Accepted
27	31	12	24	30	53	134	287	434	449	441.5	475	618	707	712	688	783	912	861	886.5	693	467	355	289	243	151	88	9496	Accepted
28	44	40	17	22	25	56	118	200	292	246	433	615	809	763	745	765	769	674	721.5	575	432	310	283	227	155	89	8458	Accepted
29	45	23	10	10	14	35	92	133	225	179	344	506	687	687	629	558	613	985	799	971	603	262	220	140	78	60	7930	Accepted
30	28	14	26	29	48	141	262	337	387	362	321	388	376	346	325	427	472	433	452.5	400	247	187	116	112	70	57	5549	Accepted
31	33	26	17	23	58	131	293	400	419	409.5	468	493	625	621	683	754	726	674	700	559	438	311	237	162	99	75	8325	Accepted
	37	**22**	**17**	**26**	**47**	**131**	**273**	**384**	**427**		**454**	**543**	**627**	**649**	**637**	**665**	**718**	**716**		**634**	**451**	**324**	**266**	**198**	**132**	**78**	**8455**	

Massachusetts Highway Department

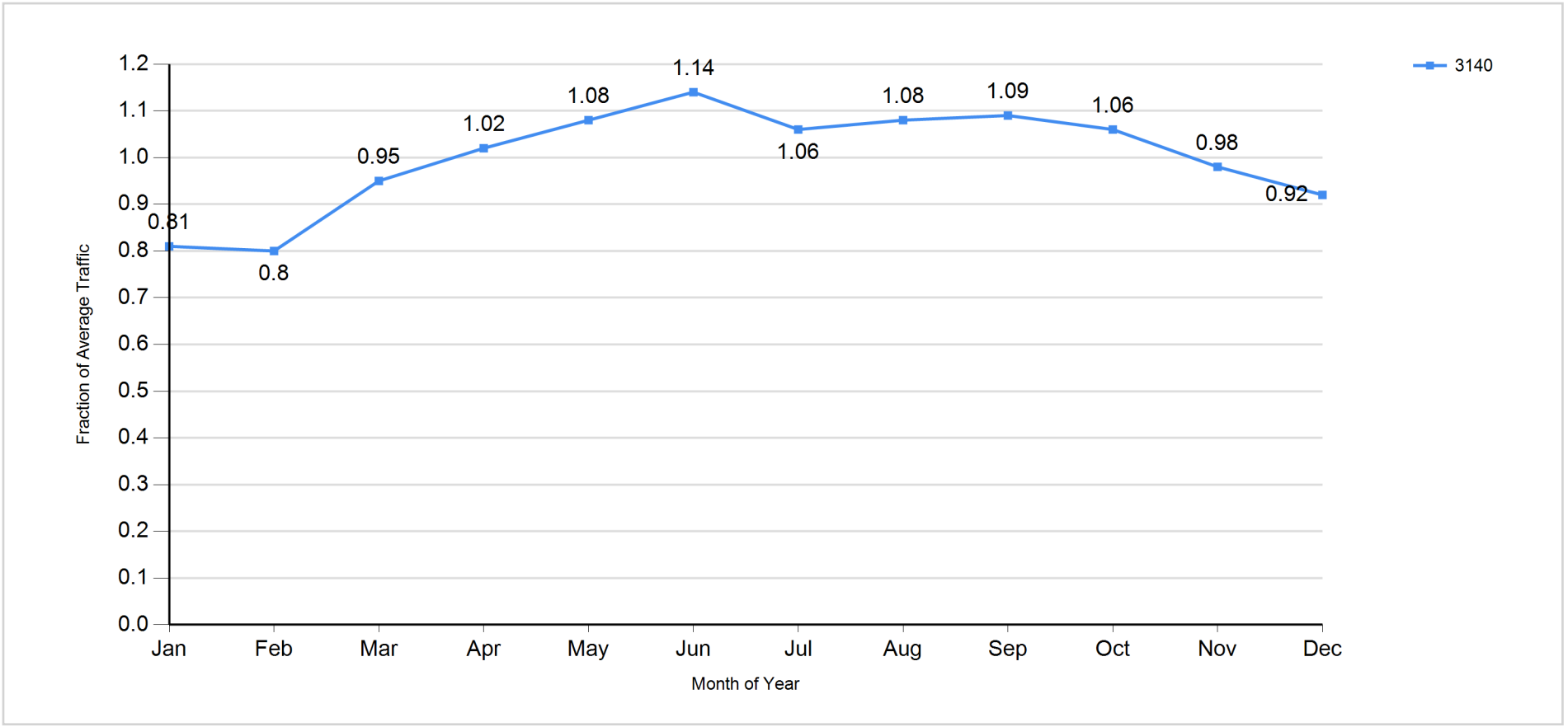
3331: Monthly Hourly Volume for December 2021

Location ID:	**3331**	**Seasonal Factor Group:**	**R4-7**
County:	**Worcester**	**Daily Factor Group:**	
Functional Class	**4**	**Axle Factor Group:**	**R4-7**
Location:	**ROUTE 49**	**Growth Factor Group:**	

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	Average PH	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	Average PH	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	27	32	19	39	77	227	457	632	623	627.5	515	447	493	540	524	617	757	717	737	647	406	269	219	135	105	70	8594	Accepted
2	29	25	21	30	74	175	442	588	518	553	506	497	538	581	570	602	798	710	754	646	423	287	199	165	98	62	8584	Accepted
3	49	23	17	30	81	188	432	550	531	540.5	475	552	541	600	588	693	757	809	783	710	563	395	265	236	189	100	9374	Accepted
4	64	37	22	30	34	77	172	235	351	293	514	599	714	796	714	717	648	647	647.5	509	438	284	318	220	158	81	8379	Accepted
5	43	49	18	14	37	45	72	126	238	182	379	492	652	634	638	566	612	543	577.5	435	323	249	199	143	54	30	6591	Accepted
6	32	27	11	37	78	200	450	572	526	549	472	478	523	515	571	642	707	680	693.5	609	382	232	166	109	82	33	8134	Accepted
7	26	26	17	33	79	195	415	560	574	567	511	471	502	567	495	608	689	734	711.5	623	399	609.89	199	136	97	56	8314	Accepted
8	32	29	16	33	68	196	410	607	575	591	477	504	543	548	547	668	781	720	750.5	562	366	623.19	188	137	98	69	8405	Accepted
9	29	28	31	45	80	190	417	600	559	579.5	461	493	549	565	529	642	721	686	703.5	691	423	615.97	216	168	98	45	8540	Accepted
10	33	28	21	26	72	191	407	551	534	542.5	520	567	570	611	638	731	819	838	828.5	750	546	361	277	225	172	119	9607	Accepted
11	60	37	16	25	26	78	142	201	314	257.5	466	580	664	653	656	671	653	621	637	545	385	326	260	196	148	110	7833	Accepted
12	37	30	18	16	24	49	81	144	209	176.5	375	489	639	698	654	643	627	568	597.5	444	364	249	216	136	81	43	6834	Accepted
13	28	17	24	34	76	190	429	557	545	551	493	482	569	548	564	621	745	669	707	612	419	274	208	171	83	49	8407	Accepted
14	17	26	24	31	75	199	457	583	559	571	531	487	561	624	547	633	787	814	800.5	684	475	311	216	161	90	45	8937	Accepted
15	30	24	23	38	58	208	417	572	601	586.5	501	524	572	640	632	654	763	779	771	669	487	284	247	144	76	45	8988	Accepted
16	24	24	17	36	70	178	437	644	583	613.5	527	516	588	584	602	606	839	779	809	682	452	333	248	158	116	71	9114	Accepted
17	39	23	12	33	62	197	413	548	545	546.5	544	601	703	671	691	739	887	872	879.5	751	557	404	320	250	158	107	10127	Accepted
18	53	41	32	25	29	72	149	210	359	284.5	495	602	700	704	624	583	512	514	513	433	319	248	220	183	117	101	7325	Accepted
19	61	37	21	20	22	53	77	132	212	172	363	517	654	730	695	647	655	575	615	485	398	305	216	121	89	56	7141	Accepted
20	22	19	9	50	62	202	414	600	559	579.5	473	616	698	643	599	706	780	792	786	651	451	296	210	124	89	46	9111	Accepted
21	24	26	8	49	64	188	405	607	601	604	524	569	628	650	657	731	798	811	804.5	724	464	313	236	190	92	51	9410	Accepted
22	28	41	10	44	63	187	354	514	488	501	484	502	626	648	707	717	830	816	823	677	468	338	240	176	101	58	9117	Accepted
23	30	40	14	41	84	176	361	479	536	507.5	559	645	742	731	819	805	855	773	814	685	530	421	293	243	134	85	10081	Accepted
24	25	29	37	40	62	69	127	212	284	248	434	583	658	683	600	639	562	528	545	416	299	247	253	220	199	84	7290	Accepted
25	40	19	14	5	13	19	40	58	66	62	188	252	333	412	388	298	276	298	287	317	277	271	236	133	89	47	4089	Accepted
26	30	14	11	20	24	44	88	111	195	153	340	491	651	866	797	576	479	477	478	386	293	274	223	111	85	50	6636	Accepted
27	27	22	6	50	66	141	273	378	410	394	444	526	568	597	600	614	738	626	682	531	326	232	205	124	85	47	7636	Accepted
28																												
29																												
30																												
31																												
	35	**29**	**18**	**32**	**58**	**146**	**309**	**429**	**448**		**466**	**522**	**599**	**631**	**617**	**643**	**706**	**681**		**588**	**416**	**335**	**233**	**167**	**110**	**65**	**8244**	

Massachusetts Highway Department

Traffic Pattern by Month for 1/1/2021 - 12/31/2021
Criteria: Location ID = 3140, From 1/1/1900 To 12/31/2049 12:00:00 AM



MOTOR VEHICLE CRASH DATA

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : West Brookfield COUNT DATE 2019

DISTRICT : 5

~ SEGMENT DATA ~

ROADWAY NAME: Route 9

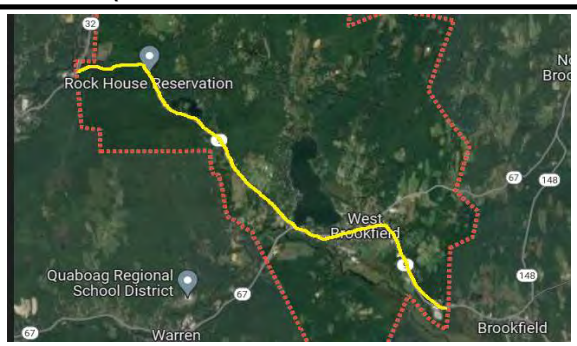
START POINT: Town Line between Ware/West Brookfield

END POINT: Town Line between West Brookfiled/Brookfiled

FUNCTIONAL CLASSIFICATION OF ROADWAY: Rural/Urban Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)

North



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**7.04**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	6,430

TOTAL # OF CRASHES:	44	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**8.80**

CRASH RATE CALCULATION : **0.53**

$$RATE = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : Accident Rate for Principal Areial - Rural - 0.57

Accident Rate for Principal Areial - Urban - 3.58

MassDOT Crash Report for Route 9 thorugh West Brookfield MA 2015-2019

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway	Near Intersection Roadway	Distance and Direction From Intersection
02/20/2015	Property damage only (none injured)	2:00 AM	1	D1: (No improper driving)	Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: Not Reported	Clear	V1:(Collision with other movable object),(Collision with motor vehicle in traffic)		WEST BROOKFIELD ROAD Rte 67	ALLEN STREET	500 feet E of
08/10/2015	Non-fatal injury	3:46 AM	1	D1: (Inattention),(Disregarded traffic signs, signals, road markings)	Dark - lighted roadway	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: N	Clear	V1:(Collision with guardrail)		WEST MAIN STREET Rte 9 W / BOSTON POST ROAD Rte 19 N		
09/07/2015	Property damage only (none injured)	3:54 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N /V2: E	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		WEST MAIN STREET Rte 9 / WARE STREET		
10/02/2016	Non-fatal injury	1:08 PM	3	D1: (No improper driving) / D2: (Failed to yield right of way) / D3: (No improper driving)	Daylight	Sideswipe, opposite direction	Dry	V1: Overtaking/passing / V2: Travelling straight ahead / V3: Travelling straight ahead	V1: E / V2: W /V3: E	Not Reported	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic),(Collision with embankment)		WEST MAIN STREET Rte 9 W	SHORELINE DRIVE	200 feet E of
12/17/2016	Property damage only (none injured)	2:01 PM	2	D2: (Inattention)	Daylight	Angle	Snow	V1: Parked / V2: Backing	V1: E / V2: W	Cloudy	V2:(Collision with parked motor vehicle)		EAST MAIN STREET Rte SR9 E / PLEASANT STREET		
02/18/2017	Property damage only (none injured)	4:40 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: W /V2: W	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		WEST MAIN STREET Rte 9 W	OLD WARREN ROAD	100 feet N of
08/12/2017	Property damage only (none injured)	3:43 AM	1	D1: (No improper driving)	Dark - lighted roadway	Single vehicle crash	Wet	V1: Travelling straight ahead	V1: E	Rain	V1:(Collision with animal - other)	175	E MAIN ST	RIDGE RD	500 feet W of
07/21/2017	Non-fatal injury	4:41 PM	2	D1: (Made an improper turn) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: N /V2: W	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL STREET Rte SR9 W / COTTAGE STREET		
09/15/2017	Property damage only (none injured)	2:52 PM	2	D1: (Failed to yield right of way),(Inattention) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N /V2: E	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		BOSTON POST ROAD / WEST MAIN STREET		
09/17/2017	Non-fatal injury	7:46 PM	1	D1: (No improper driving)	Dark - roadway not lighted	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: E	Clear	V1:(Collision with animal - other)	118	W MAIN ST		
07/20/2017	Property damage only (none injured)	9:05 AM	1	D1: (Inattention),(Fatigued/asleep)	Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Clear/Cloudy	V1:(Collision with utility pole)		W MAIN ST Rte 9 / COTTAGE ST		
11/28/2017	Property damage only (none injured)	12:18 PM	2	D1: (Inattention) / D2: (Inattention)	Daylight	Angle	Dry	V1: Backing / V2: Travelling straight ahead	V1: N /V2: S	Clear/Cloudy	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	1	E MAIN ST		
12/17/2017	Property damage only (none injured)	11:01 PM	1	D1: (Other improper action)	Dark - lighted roadway	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Not Reported	V1:(Collision with motor vehicle in traffic),(Collision with light pole or other post/support)	16	EAST MAIN STREET Rte 9 E		
11/29/2017	Property damage only (none injured)	5:45 AM	2	D1: (Distracted) / D2: (No improper driving)	Dark - lighted roadway	Rear-end	Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Cloudy/Fog, smog, smoke	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		BOSTON POST RD Rte 19 N / W MAIN ST Rte 9 E		
07/29/2017	Property damage only (none injured)	12:05 PM	1	D1: (Inattention)	Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: N	Clear/Cloudy	V1:(Other)	143	W MAIN ST		
10/11/2017	Property damage only (none injured)	2:43 PM	1	D1: (No improper driving)	Daylight	Sideswipe, opposite direction	Dry	V1: Travelling straight ahead	V1: W	Clear	V1:(Collision with motor vehicle in traffic)		WEST MAIN STREET / ALLEN STREET		
10/31/2017	Property damage only (none injured)	3:37 PM	2	D1: (No improper driving) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CONNECTOR-RT 67 TO RT 9	WEST MAIN STREET	
05/13/2016	Non-fatal injury	12:22 PM	1		Daylight	Single vehicle crash	Dry	V1: Entering traffic lane	V1: E	Cloudy	V1:(Equipment failure)		SCHOOL STREET	EAST MAIN STREET Rte 9 E	
09/04/2016	Non-fatal injury	5:44 PM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Turning right	V1: E / V2: E	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	118	WEST MAIN STREET Rte 9 E	WARE STREET	20 feet E of
12/04/2016	Non-fatal injury	3:43 PM	2	D1: (Unknown) / D2: (No improper driving)	Daylight	Head-on	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: W	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		WEST MAIN STREET Rte 9 W	CUTLER ROAD	2000 feet W of
12/17/2016	Property damage only (none injured)	11:44 AM	1	D1: (No improper driving)	Daylight	Single vehicle crash	Slush	V1: Travelling straight ahead	V1: E	Snow	V1:(Collision with utility pole)		EAST MAIN STREET Rte 9	FOSTER HILL ROAD	30 feet E of
11/16/2016	Property damage only (none injured)	6:23 PM	1	D1: (No improper driving)	Dark - roadway not lighted	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: E	Clear	V1:(Collision with animal - other)		WEST MAIN STREET Rte 9 E	OLD WARE ROAD	20 feet E of
01/16/2018	Non-fatal injury	6:49 PM	1	D1: (Driving too fast for conditions)	Dark - roadway not lighted	Single vehicle crash	Ice	V1: Travelling straight ahead	V1: E	Sleet, hail (freezing rain or drizzle)/Snow	V1:(Collision with embankment),(Collision with tree),(Collision with other fixed object(wall, building, tunnel, etc.)),(Overturn/rollover)		EAST MAIN STREET Rte SR9 W / NORTH MAIN STREET Rte SR67 S		
01/19/2018	Property damage only (none injured)	1:04 AM	1	D1: (Visibility obstructed)	Dark - roadway not lighted	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Clear	V1:(Ran off road left)		WEST MAIN STREET Rte SR9 W	GILBERTVILLE ROAD Rte 32	
01/01/2018	Non-fatal injury	10:03 PM	1	D1: (Exceeded authorized speed limit)	Dark - lighted roadway	Single vehicle crash	Ice	V1: Travelling straight ahead	V1: W	Clear	V1:(Collision with utility pole)		Rte 9	SCHOOL STREET	
01/05/2018	Property damage only (none injured)	8:09 PM	2	D1: (Visibility obstructed) / D2: (No improper driving)	Dawn	Rear-end	Wet	V1: Backing / V2: Parked	V1: E / V2: E	Clear/Blowing sand, snow	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	118	W MAIN ST		
01/07/2018	Property damage only (none injured)	7:15 PM	2	D1: (Inattention) / D2: (Unknown)	Dark - lighted roadway	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear/Cloudy	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	8	E MAIN ST		
01/14/2018	Property damage only (none injured)	6:01 PM	2	D1: (Inattention) / D2: (No improper driving)	Dark - lighted roadway	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W /V2: W	Clear/Cloudy	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		EAST MAIN STREET Rte SR9 W / NORTH MAIN STREET Rte SR67 S		
12/01/2017	Property damage only (none injured)	6:40 PM	2	D1: (Inattention),(Visibility obstructed) / D2: (Visibility obstructed)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear/Cloudy	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		EAST MAIN STREET Rte 9	COTTAGE STREET	
12/28/2017	Property damage only (none injured)	4:08 PM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear/Cloudy	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	118	WEST MAIN STREET		
02/06/2018	Property damage only (none injured)	11:32 AM	2	D1: (No improper driving) / D2: (No improper driving)	Daylight	Sideswipe, same direction	Snow	V2: Travelling straight ahead / V1: Turning right	V2: W /V1: W	Snow	V2:(Collision with motor vehicle in traffic) V1:(Collision with motor vehicle in traffic)		WEST MAIN STREET	MOORINGS WAY	
02/10/2018	Property damage only (none injured)	6:41 PM	1	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Exceeded authorized speed limit)	Dark - lighted roadway	Single vehicle crash	Wet	V1: Travelling straight ahead	V1: E	Rain	V1:(Collision with utility pole)		ROUTE 9 HWY	RIDGE RD	
02/24/2018	Property damage only (none injured)	8:07 PM	1	D1: (No improper driving)	Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Clear/Cloudy	V1:(Collision with animal - deer)	260	W MAIN ST		
03/08/2018	Non-fatal injury	4:46 PM	1	D1: (No improper driving)	Daylight	Single vehicle crash	Wet	V1: Travelling straight ahead	V1: W	Cloudy/Snow	V1:(Collision with ditch)		EAST MAIN STREET Rte 9	WEST MAIN STREET	
03/09/2018	Property damage only (none injured)	7:29 AM	2	D1: (Followed too closely) / D2: (No improper driving)	Daylight	Rear-end	Snow	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W /V2: W	Snow	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	138	W MAIN ST	WARE ST	

MassDOT Crash Report for Route 9 thorugh West Brookfield MA 2015-2019

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway	Near Intersection Roadway	Distance and Direction From Intersection
04/02/2018	Fatal injury	11:49 AM	3	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner) / D2: (No improper driving) / D3: (No improper driving)	Daylight	Unknown	Dry	V1: Travelling straight ahead / V2: Parked / V3: Slowing or stopped in traffic	V1: W / V2: E / V3: N	Clear	V1: (Collision with motor vehicle in traffic) V2: (Collision with motor vehicle in traffic) V3: (Collision with motor vehicle in traffic)	30	WEST MAIN STREET Rte SR67 N	MILK STREET	
04/24/2018	Property damage only (none injured)	7:06 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Dawn	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Entering traffic lane	V1: E / V2: E	Clear	V1: (Collision with motor vehicle in traffic) V2: (Collision with motor vehicle in traffic)		EAST MAIN STREET / CENTRAL STREET		
05/18/2018	Non-fatal injury	8:05 AM	2	D1: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Not reported	V1: E / V2: Not Reported	Clear	V1: (Collision with motor vehicle in traffic)		BOSTON POST ROAD	WEST MAIN STREET Rte SR9 E	
03/24/2018	Non-fatal injury	3:41 PM	1	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Exceeded authorized speed limit)	Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: N	Clear/Unknown	V1: (Overturn/rollover),(Collision with guardrail),(Ran off road right),(Collision with motor vehicle in traffic)		WEST MAIN STREET Rte SR9 W / BOSTON POST ROAD Rte SR19 N		
04/26/2018	Property damage only (none injured)	5:11 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Daylight	Sideswipe, same direction	Dry	V1: Parked / V2: Slowing or stopped in traffic	V1: E / V2: E	Clear	V1: (Collision with motor vehicle in traffic) V2: (Collision with motor vehicle in traffic)		EAST MAIN STREET / CENTRAL STREET		
10/03/2018	Non-fatal injury	8:59 AM	2	D1: (Other improper action) / D2: (No improper driving)	Daylight	Rear-end	Wet	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Cloudy	V1: (Collision with motor vehicle in traffic) V2: (Collision with motor vehicle in traffic)		Rte SR9 W		
12/08/2018	Property damage only (none injured)	8:57 AM	1	D1: (Made an improper turn)	Daylight	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: S	Clear/Cloudy	V1: (Collision with utility pole)		CROSS STREET / Rte 9 / Rte 9 S		
09/23/2019	Property damage only (none injured)	8:26 AM	2	D1: (Inattention) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	Clear	V1: (Collision with motor vehicle in traffic) V2: (Collision with motor vehicle in traffic)		WEST MAIN STREET	CENTRAL STREET	
10/04/2019	Non-fatal injury	4:27 PM	2	D1: (Other improper action) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	Clear	V1: (Collision with motor vehicle in traffic) V2: (Collision with motor vehicle in traffic)	169	WEST MAIN STREET		

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Ware MA COUNT DATE : 2021

DISTRICT : 2 UNSIGNALIZED : x SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : East Street (Route 9) ST #

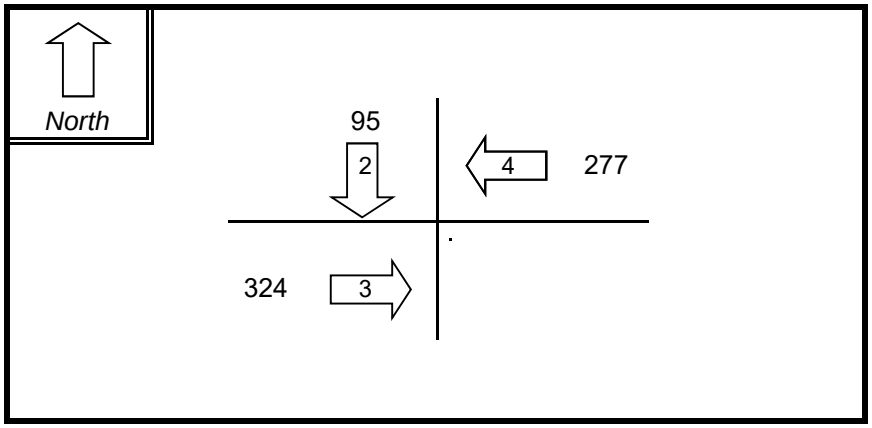
MINOR STREET(S) : Gilbertville Road (Route 32) ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4		Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :		95	324	277		696

" K " FACTOR : 0.090 APPROACH ADT : 7,733 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 4 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : 0.80

CRASH RATE CALCULATION : 0.28 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 2 unsignalized intersections = 0.62

Accident Rate for District 2 signalized intersections = 0.89

Statewide = Unsignalized Intersection - 0.78 Unsignalized - 0.57

S:\Jobs\9130\8 - Crash Data\Crash Rates Worksheet

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Ware MA COUNT DATE : 2021

DISTRICT : 2 UNSIGNALIZED : x SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : East Street (Route 9/32) ST #

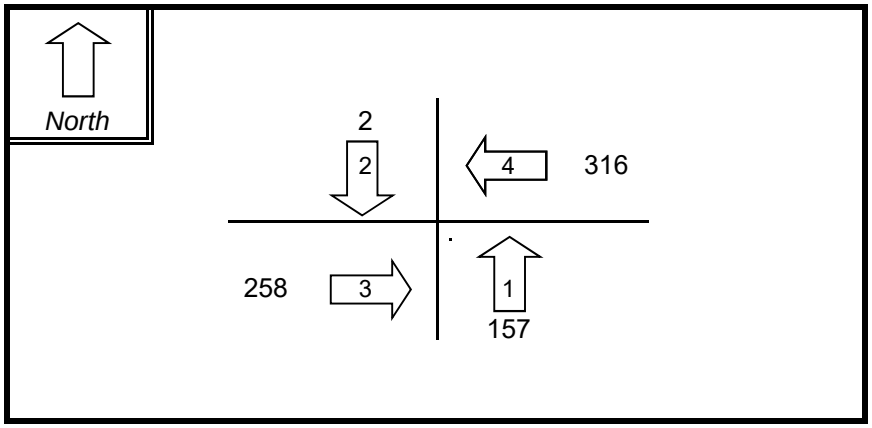
MINOR STREET(S) : Knox Avenue ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4		Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	157	2	258	316		733

" K " FACTOR : 0.090 APPROACH ADT : 8,144 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 2 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : 0.40

CRASH RATE CALCULATION : 0.13 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 2 unsignalized intersections = 0.62

Accident Rate for District 2 signalized intersections = 0.89

Statewide = Unsignalized Intersection - 0.78 Unsignalized - 0.57

S:\Jobs\9130\8 - Crash Data\Crash Rates Worksheet

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Ware MA COUNT DATE : 2021

DISTRICT : 2 UNSIGNALIZED : SIGNALIZED : x

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : East Main Street (Route 9/32)/ Main Street(Route 9/32) ST #

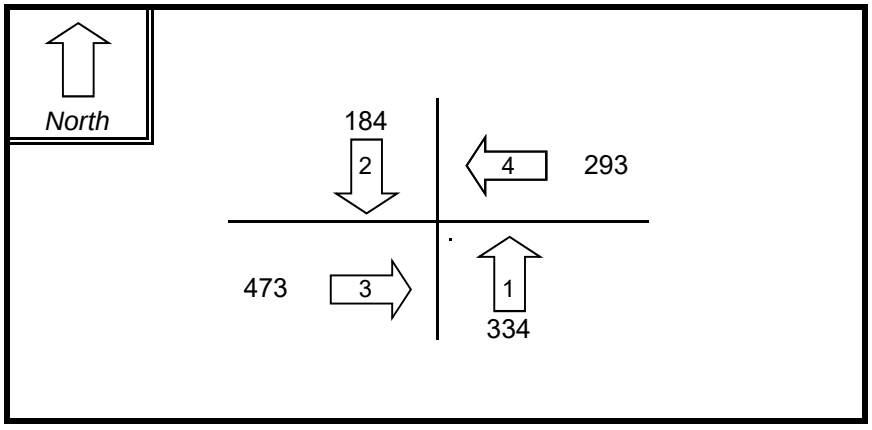
MINOR STREET(S) : Church Street ST #

South Street ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4		Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	334	184	473	293		1,284

" K " FACTOR : 0.090 APPROACH ADT : 14,267 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 28 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : 5.60

CRASH RATE CALCULATION : 1.08 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 2 unsignalized intersections = 0.62

Accident Rate for District 2 signalized intersections = 0.89

Statewide = Unsignalized Intersection - 0.78 Unsignalized - 0.57

S:\Jobs\9130\8 - Crash Data\Crash Rates Worksheet

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Ware MA COUNT DATE : 2021

DISTRICT : 2 UNSIGNALIZED : SIGNALIZED : x

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Main Street(Route 9/32) ST #

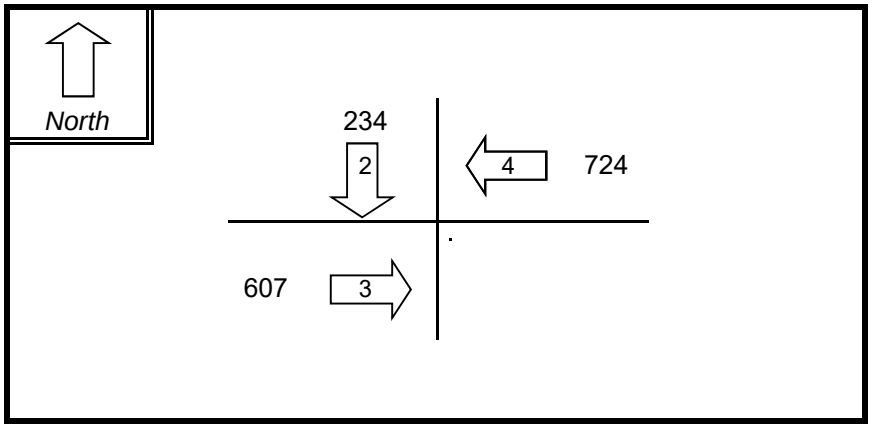
MINOR STREET(S) : North Street ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4		Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :		234	607	724		1,565

" K " FACTOR : 0.090 APPROACH ADT : 17,389 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 31 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : 6.20

CRASH RATE CALCULATION : 0.98 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 2 unsignalized intersections = 0.62

Accident Rate for District 2 signalized intersections = 0.89

Statewide = Unsignalized Intersection - 0.78 Unsignalized - 0.57

S:\Jobs\9130\8 - Crash Data\Crash Rates Worksheet

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Ware MA COUNT DATE : 2021

DISTRICT : 2 UNSIGNALIZED : SIGNALIZED : x

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Main Street (Route 9) ST #

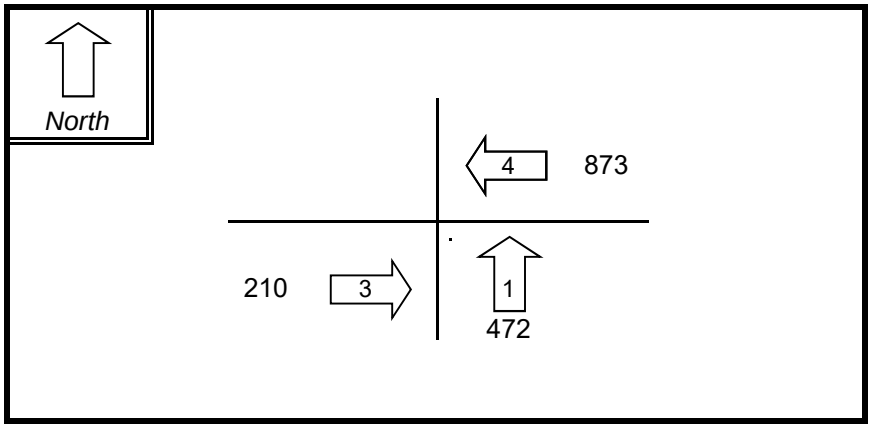
MINOR STREET(S) : West Street (Route 32) ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4		Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	472		210	873		1,555

" K " FACTOR : 0.090 APPROACH ADT : 17,278 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 29 # OF YEARS : 5 AVERAGE # OF ACCIDENTS (**A**) : 5.80

CRASH RATE CALCULATION : 0.92 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : Accident Rate for District 2 unsignalized intersections = 0.62

Accident Rate for District 2 signalized intersections = 0.89

Statewide = Unsignalized Intersection - 0.78 Unsignalized - 0.57

S:\Jobs\9130\8 - Crash Data\Crash Rates Worksheet

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
EAST STREET Rte SR9 W / GILBERTVILLE ROAD Rte 32																														
4733019	WARE	08/01/2019	Property damage only (none injured)	3:38 PM	No Apparent Injury (O)	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	unknow	Not at junction	0	0	No controls	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	35	42.26759	-72.21763		EAST STREET Rte SR9 W / GILBERTVILLE ROAD Rte 32		
4693819	WARE	04/11/2019	Non-fatal injury	4:39 PM	Possible Injury (C)	2	D1: (Unknown) / D2: (Distracted)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	T-intersection	0	0	No controls	Two-way, divided, unprotected median	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26759	-72.21763		GILBERTVILLE RD / EAST ST		
4459038	WARE	11/23/2017	Non-fatal injury	3:24 AM	Non-fatal injury - Non-incapacitating	1	D1: (Physical impairment),(Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)	Collision with guardrail	Dark - lighted roadway	Single vehicle crash	2	Dry	Not at junction	0	2	No controls	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: S	Clear	Outside roadway	V1:(Collision with guardrail)	30	42.26783	-72.21781		GILBERTVILLE RD Rte 32	EAST ST Rte 9	100 feet N of
4354296	WARE	04/20/2017	Non-fatal injury	6:30 PM	Non-fatal injury - Non-incapacitating	1	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)	Collision with guardrail	Daylight	Single vehicle crash	2	Dry	T-intersection	0	1	Stop signs	Two-way, divided, unprotected median	V1: Travelling straight ahead	V1:(Passenger car)	V1: S	Clear	Roadway	V1:(Collision with embankment)		42.26759	-72.21763		EAST ST	GILBERTVILLE RD	
EAST STREET Rte 9 W / KNOX AVENUE																														
4443590	WARE	10/09/2017	Property damage only (none injured)	12:06 PM	No injury	2	D1: (Unknown) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	2	Wet	Four-way intersection	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: E	Rain/Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25878	-72.23291		EAST STREET Rte 9 W / KNOX AVENUE		
4759140	WARE	09/24/2019	Property damage only (none injured)	5:40 PM	No Apparent Injury (O)	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Wet	T-intersection	0	0	No controls	Two-way, divided, unprotected median	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Rain	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25877	-72.23291		EAST STREET Rte SR9 W / KNOX AVENUE		
RAILROAD BRIDGE																														
4248696	WARE	09/10/2016	Property damage only (none injured)	11:49 AM	No injury	1	D1: (No improper driving)	Collision with bridge overhead structure	Daylight	Single vehicle crash	2	Wet	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: W	Rain/Cloudy	Outside roadw	V1:(Collision with bridge overhead structure)		42.25865	-72.23273		EAST STREET Rte 9 W		RAILROAD BRIDGE
MAIN STREET Rte 9 W / SOUTH STREET / CHURCH STREET																														
4443588	WARE	10/07/2017	Property damage only (none injured)	1:20 PM	No injury	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)	V1: E / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		MAIN STREET Rte 9 / CHURCH STREET / SOUTH STREET		
4443592	WARE	10/18/2017	Property damage only (none injured)	12:06 PM	No injury	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		MAIN STREET Rte 9 W / SOUTH STREET / CHURCH STREET		
4443595	WARE	10/23/2017	Property damage only (none injured)	6:59 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, divided, unprotected median	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		SOUTH ST	MAIN ST	

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4443638	WARE	10/07/2017	Property damage only (none injured)	4:43 PM	No injury	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.25971	-72.23975		EAST MAIN STREET Rte 9 W / CHURCH STREET		
4346207	WARE	04/01/2017	Property damage only (none injured)	7:39 AM	No injury	2	D1: (No improper driving) / D2: (Visibility obstructed)	Collision with parked motor vehicle	Dawn	Rear-end	2	Snow	Four-way intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)	V1: S / V2: S	Rain/Snow	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with parked motor vehicle)	30	42.25971	-72.23975		CHURCH ST / MAIN ST		
4338027	WARE	03/13/2017	Property damage only (none injured)	10:21 AM	No injury	2	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		MAIN STREET Rte 9 W / SOUTH STREET		
4234763	WARE	08/10/2016	Property damage only (none injured)	5:47 PM	No injury	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Wet	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning right / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		MAIN ST / CHURCH ST		
4228597	WARE	07/26/2016	Not Reported	9:53 AM	Not Applicable	1		Collision with unknown fixed object	Daylight	Single vehicle crash	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning left	V1:(Passenger car)	V1: S	Clear	ıtside roadw	V1:(Collision with fence)		42.25971	-72.23975		MAIN ST / SOUTH ST		
4211412	WARE	06/14/2016	Property damage only (none injured)	1:29 PM	No injury	1	D1: (No improper driving)	Collision with pedestrian	Daylight	Single vehicle crash	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: E	Clear	Roadway	V1:(Collision with pedestrian)		42.25971	-72.23975		MAIN STREET Rte 9 E	SOUTH STREET	
4181458	WARE	04/24/2016	Non-fatal injury	3:29 PM	Non-fatal injury - Non-incapacitating	1	D1: (No improper driving),(Unknown)	Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Daylight	Angle	2	Dry	Four-way intersection	0	1	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: W	Clear	Roadway	V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))		42.25971	-72.23975		MAIN ST / CHURCH ST		
4174445	WARE	03/31/2016	Property damage only (none injured)	2:12 PM	No injury	2	D1: (No improper driving) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Backing	V1:(Passenger car) / V2:(Truck/trailer)	V1: N / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.25971	-72.23975		CHURCH STREET / MAIN STREET		
4150316	WARE	01/30/2016	Property damage only (none injured)	5:38 PM	No injury	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Collision with motor vehicle in traffic	Daylight	Head-on	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25984	-72.24008		MAIN ST	SOUTH STREET	100 feet W of
4123996	WARE	12/15/2015	Property damage only (none injured)	4:45 PM	No injury	2	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, divided, unprotected median	V1: Travelling straight ahead / V2: Turning right	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		SOUTH STREET / MAIN STREET Rte SR9 E / EAST MAIN STREET Rte SR32 E		

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4117835	WARE	11/27/2015	Property damage only (none injured)	7:41 AM	No injury	2	D1: (No improper driving) / D2: (Followed too closely)	Collision with other movable object	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with parked motor vehicle)		42.25971	-72.23975		SOUTH STREET / MAIN STREET Rte SR9 E / EAST MAIN STREET Rte SR32 E		
4100259	WARE	10/20/2015	Non-fatal injury	4:58 PM	Non-fatal injury - Possible	1	D1: (No improper driving)	Collision with pedestrian	Daylight	Single vehicle crash	2	Dry	Four-way intersection	0	1	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: N	Clear	Roadway	V1:(Collision with pedestrian)		42.25971	-72.23975		CHURCH ST / MAIN ST		
4063975	WARE	07/17/2015	Property damage only (none injured)	4:44 PM	No injury	2	D1: (Inattention),(Other improper action) / D2: (No improper driving)	Collision with parked motor vehicle	Daylight	Unknown	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Backing / V2: Parked	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Clear	Roadway	V1:(Collision with parked motor vehicle) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		SOUTH ST / MAIN ST		
4031325	WARE	04/03/2015	Property damage only (none injured)	4:00 PM	No injury	2	D1: (No improper driving) / D2: (Distracted)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, divided, unprotected median	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		MAIN ST / CHURCH ST / SOUTH ST		
4771841	WARE	10/29/2019	Property damage only (none injured)	5:02 PM	No Apparent Injury (O)	2	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead / V2: Changing lanes	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: E / V2: E	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.25979	-72.23991		MAIN STREET Rte SR9 E	SOUTH STREET	
4746632	WARE	08/31/2019	Non-fatal injury	12:15 PM	Possible Injury (C)	2	D1: (Visibility obstructed) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Motorcycle)	V1: S / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	20	42.25983	-72.24004	40	MAIN STREET Rte 9		NORTH BROOKFIELD SAVINGS BANK
4733015	WARE	07/22/2019	Property damage only (none injured)	3:23 PM	No Apparent Injury (O)	2	D1: (Over-correcting/over-steering) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	2	unknow	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning left / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: N	Cloudy/Rain	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25972	-72.23975		EAST MAIN STREET Rte SR9 W / SOUTH STREET / CHURCH STREET		
4671901	WARE	02/28/2019	Property damage only (none injured)	10:08 AM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25972	-72.23975		MAIN ST / SOUTH ST		
4664970	WARE	01/31/2019	Property damage only (none injured)	4:40 PM	No injury	1	D1: (Inattention)	Collision with other light pole or other post/support	Daylight	Single vehicle crash	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, divided, unprotected median	V1: Turning left	V1:(Passenger car)	V1: N	Clear	Roadside	V1:(Collision with light pole or other post/support)		42.25972	-72.23975		CHURCH STREET	MAIN STREET	

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4525395	WARE	03/01/2018	Property damage only (none injured)	9:04 PM	No injury	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	2	Dry	Four-way intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25972	-72.23975		CHURCH ST / MAIN ST		
4497937	WARE	02/01/2018	Property damage only (none injured)	4:03 PM	No injury	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25972	-72.23975		MAIN ST / CHURCH ST		
4480827	WARE	01/05/2018	Non-fatal injury	5:08 PM	Non-fatal injury - Non-incapacitating	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	2	Dry	Not at junction	0	1	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25972	-72.23975		MAIN STREET / SOUTH STREET / CHURCH STREET		
4478650	WARE	12/27/2017	Property damage only (none injured)	6:03 AM	No injury	2	D1: (Unknown) / D2: (Followed too closely)	Collision with motor vehicle in traffic	Dawn	Rear-end	2	Dry	Four-way intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.25971	-72.23975		MAIN STREET Rte 9 E / CHURCH STREET / SOUTH STREET		
4383034	WARE	06/24/2017	Non-fatal injury	6:47 PM	Non-fatal injury - Non-incapacitating	2	D1: (Physical impairment) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	Four-way intersection	0	3	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.25971	-72.23975		SOUTH STREET / MAIN STREET Rte 9 / CHURCH STREET		
4365882	WARE	05/18/2017	Non-fatal injury	2:00 PM	Non-fatal injury - Non-incapacitating	2	D1: (No improper driving) / D2: (Inattention),(Disregarded traffic signs, signals, road markings)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Four-way intersection	0	1	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.25971	-72.23975		EAST MAIN STREET Rte 9 W / CHURCH STREET / SOUTH STREET		
MAIN STREET Rte 32 E / NORTH STREET																														
4406961	WARE	07/20/2017	Property damage only (none injured)	7:47 AM	No injury	2	D1: (No improper driving) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26041	-72.2416		MAIN STREET Rte 32 E / NORTH STREET		
4278792	WARE	11/05/2016	Non-fatal injury	4:57 PM	Non-fatal injury - Possible	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Not at junction	0	1	No controls	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26021	-72.2411		MAIN STREET Rte 9 W	NORTH STREET	150 feet E of
4224330	WARE	07/08/2016	Property damage only (none injured)	3:17 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Entering traffic lane / V2: Changing lanes	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26041	-72.2416		MAIN STREET Rte SR9 E / NORTH STREET		
4211416	WARE	06/08/2016	Property damage only (none injured)	7:28 PM	No injury	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		MAIN ST / NORTH ST		

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4165682	WARE	03/19/2016	Property damage only (none injured)	12:37 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with parked motor vehicle	Daylight	Rear-end	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with parked motor vehicle)	25	42.26041	-72.2416		MAIN ST	NORTH STREET	
4122234	WARE	12/14/2015	Property damage only (none injured)	4:05 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead / V2: Entering traffic lane	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: N	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		MAIN STREET Rte SR9 E / NORTH STREET		
4045906	WARE	05/23/2015	Non-fatal injury	9:31 AM	Non-fatal injury - Non-incapacitating	2	D1: (No improper driving) / D2: (Failed to yield right of way),(Inattention)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	T-intersection	0	1	Traffic control signal	Two-way, not divided	V1: Turning right / V2: Travelling straight ahead	V1:(Passenger car) / V2:(MOPED)	V1: N / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	20	42.26041	-72.2416		MAIN ST / NORTH ST		
4011874	WARE	02/21/2015	Property damage only (none injured)	9:58 AM	No injury	2	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		NORTH ST / MAIN ST		
4007764	WARE	02/12/2015	Property damage only (none injured)	2:07 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Snow	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: S	Cloudy/Snow	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		NORTH ST / MAIN ST		
4794811	WARE	11/27/2019	Property damage only (none injured)	9:56 AM	No Apparent Injury (O)	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning right	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26041	-72.2416		MAIN STREET Rte SR9 W / NORTH STREET		
4777378	WARE	10/15/2019	Property damage only (none injured)	12:08 PM	No Apparent Injury (O)	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning right	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26041	-72.2416		MAIN STREET Rte SR9 W / NORTH STREET		
4759137	WARE	09/21/2019	Property damage only (none injured)	1:25 PM	No Apparent Injury (O)	1	D1: (No improper driving)	Other non-collision	Daylight	Single vehicle crash	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning left	V1:(Motorcycle)	V1: N	Clear	Roadway	V1:(Other non-collision)	20	42.26041	-72.2416		MAIN STREET Rte SR9 E / NORTH STREET		
4759128	WARE	09/17/2019	Property damage only (none injured)	3:12 PM	No Apparent Injury (O)	1	D1: (Unknown)	Collision with pedestrian	Daylight	Single vehicle crash	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic	V1:(Passenger car)	V1: E	Clear	Roadway	V1:(Collision with pedestrian)		42.26047	-72.24186	112	MAIN ST		
4746636	WARE	09/07/2019	Property damage only (none injured)	4:22 PM	No Apparent Injury (O)	2	D1: (No improper driving) / D2: (Other improper action)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Y-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		MAIN STREET Rte 9 W / NORTH STREET		

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4737947	WARE	08/11/2019	Property damage only (none injured)	12:03 PM	No Apparent Injury (O)	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	20	42.26041	-72.2416		MAIN STREET Rte SR9 E / NORTH STREET		
4699856	WARE	05/04/2019	Property damage only (none injured)	5:39 PM	No Apparent Injury (O)	2	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, divided, unprotected median	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		MAIN STREET Rte SR9 W / NORTH STREET		
4683156	WARE	03/23/2019	Property damage only (none injured)	5:57 AM	No injury	1	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Inattention)	Collision with curb	Dawn	Single vehicle crash	2	Snow	Y-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: N	Snow/Blowing sand, snow	Roadside	V1:(Collision with curb)		42.26061	-72.24258		MAIN ST	WEST ST	
4664971	WARE	02/12/2019	Property damage only (none injured)	9:38 AM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.2604	-72.24159		MAIN ST	NORTH ST	
4656766	WARE	01/06/2019	Property damage only (none injured)	5:04 PM	No injury	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	lighted roa	Head-on	2	Dry	Y-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	20	42.2604	-72.24159		NORTH STREET / MAIN STREET		
4643059	WARE	12/25/2018	Property damage only (none injured)	1:15 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.2604	-72.24159		MAIN ST / NORTH ST		
4594697	WARE	08/25/2018	Property damage only (none injured)	9:28 PM	No injury	2	D1: (No improper driving) / D2: (Unknown)	Collision with motor vehicle in traffic	lighted roa	Angle	2	Dry	T-intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: W / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.2604	-72.24159		NORTH ST / MAIN ST		
4573421	WARE	04/21/2018	Property damage only (none injured)	5:15 PM	No injury	3	D1: (Inattention)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Parked / V3: Parked	V1:(Passenger car) / V2:(Passenger car) / V3:(Passenger car)	V1: W / V2: Not Reported / V3: Not Reported	Clear	Roadway	V1:(Collision with parked motor vehicle) / V2:(Collision with motor vehicle in traffic) / V3:(Collision with motor vehicle in traffic)	25	42.2604	-72.2416		MAIN STREET Rte 9 W	NORTH STREET	
4525402	WARE	03/17/2018	Property damage only (none injured)	2:07 PM	No injury	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Not at junction	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.2604	-72.2416		MAIN STREET Rte 9	NORTH STREET	

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4488127	WARE	01/08/2018	Property damage only (none injured)	5:36 PM	No injury	2	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	lighted roa	Sideswipe, same direction	2	Snow	T-intersection	0	0	No controls	Two-way, not divided	V1: Turning right / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Snow	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.2604	-72.24159		MAIN ST / NORTH ST		
4488086	WARE	01/18/2018	Property damage only (none injured)	6:05 AM	No injury	2	D1: (No improper driving) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Ice	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: S	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	30	42.2604	-72.24159		NORTH ST / MAIN ST		
4480831	WARE	01/03/2018	Non-fatal injury	7:11 PM	Non-fatal injury - Possible	2	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	lighted roa	Rear-end	2	Dry	T-intersection	0	1	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.2604	-72.24159		MAIN ST / NORTH ST		
4480714	WARE	01/05/2018	Property damage only (none injured)	12:34 PM	No injury	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Collision with motor vehicle in traffic	Daylight	Head-on	2	Snow	Four-way intersection	0	0	Stop signs	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.2604	-72.24159		NORTH ST / MAIN ST		
4470803	WARE	12/17/2017	Property damage only (none injured)	8:25 AM	No injury	2	D1: (Glare) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning right	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.24162	95	MAIN ST		
4459034	WARE	11/15/2017	Property damage only (none injured)	8:31 AM	No injury	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Collision with motor vehicle in traffic	Dawn	Angle	2	Wet	T-intersection	0	0	Traffic control signal	Two-way, divided, unprotected median	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: E	Rain/Sleet, hail (freezing rain or drizzle)	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26041	-72.2416		MAIN STREET Rte 32 W / NORTH STREET		
4428964	WARE	09/17/2017	Property damage only (none injured)	12:02 PM	No injury	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26041	-72.2416		MAIN ST / NORTH ST		
4419189	WARE	08/11/2017	Non-fatal injury	10:02 AM	Non-fatal injury - Possible	2	D1: (Unknown) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Not at junction	0	2	No controls	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24155	7	NORTH STREET		OTTO FLORIST
WEST STREET Rte SR32 S / WEST MAIN STREET Rte SR9 E / MAIN STREET Rte SR9 W																														
4165808	WARE	03/17/2016	Property damage only (none injured)	4:30 PM	No injury	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	T-intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Turning left / V2: Turning right	V1:(Passenger car) / V2:(Truck/trailer)	V1: S / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		WEST STREET Rte SR32 S / WEST MAIN STREET Rte SR9 E / MAIN STREET Rte SR9 W		

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4385260	WARE	06/25/2017	Property damage only (none injured)	5:42 PM	No injury	2	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26043	-72.24168	99	MAIN ST		
4789381	WARE	11/20/2019	Property damage only (none injured)	3:41 PM	No Apparent Injury (O)	2	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Y-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24259		MAIN STREET Rte SR9 E / WEST STREET		
4263282	WARE	10/03/2016	Property damage only (none injured)	5:30 PM	No injury	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	Y-intersection	0	0	Stop signs	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: W	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		MAIN ST Rte 9 / WEST ST Rte 32		
4224328	WARE	06/26/2016	Property damage only (none injured)	8:02 PM	No injury	2	D1: (No improper driving) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Stop signs	Two-way, not divided	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		MAIN ST / WEST ST		
4224264	WARE	07/23/2016	Property damage only (none injured)	4:19 PM	No injury	1	D1: (No improper driving)	Collision with parked motor vehicle	Daylight	Unknown	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Parked	V1:(Passenger car)	V1: E	Clear	Roadside	V1:(Collision with parked motor vehicle)		42.26061	-72.24258		WEST STREET Rte SR32 N / MAIN STREET Rte SR9 E		
4224261	WARE	07/15/2016	Property damage only (none injured)	4:18 PM	No injury	1	D1: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic)		42.26063	-72.24277		WEST MAIN ST	WEST STREET	50 feet W of
4224258	WARE	07/08/2016	Property damage only (none injured)	4:00 PM	No injury	1	D1: (Over-correcting/over-steering)	Collision with curb	Daylight	Single vehicle crash	2	Dry	T-intersection	0	0	No controls	Two-way, divided, unprotected median	V1: Travelling straight ahead	V1:(Passenger car)	V1: S	Clear	Roadside	V1:(Collision with curb)		42.26061	-72.24258		MAIN ST / WEST ST		
4181459	WARE	04/26/2016	Property damage only (none injured)	12:59 PM	No injury	2	D1: (Followed too closely) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Wet	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Cloudy/Rain	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26053	-72.24215		MAIN STREET Rte 9 W		VETERANS PARK DRIVEWAY
4178844	WARE	04/09/2016	Non-fatal injury	9:00 PM	Non-fatal injury - Possible	1	D1: (No improper driving)	Collision with pedestrian	lighted roa	Single vehicle crash	2	Dry	Y-intersection	0	1	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: W	Clear	Roadway	V1:(Collision with pedestrian)		42.26061	-72.24258		WEST STREET Rte SR32 N / WEST MAIN STREET Rte SR9 W / MAIN STREET Rte SR9 W		
4065499	WARE	07/18/2015	Property damage only (none injured)	5:34 PM	No injury	2	D1: (Followed too closely),(Other improper action) / D2: (No improper driving)	Collision with parked motor vehicle	Daylight	Rear-end	2	Dry	Not at junction	0	0	Yield signs	Two-way, not divided	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with parked motor vehicle) / V2:(Collision with motor vehicle in traffic)		42.26055	-72.24224		MAIN STREET Rte 9 E		VETERANS PARK

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4040162	WARE	05/08/2015	Property damage only (none injured)	12:39 PM	No injury	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		WEST STREET Rte SR32 N / WEST MAIN STREET Rte SR9 W / MAIN STREET Rte SR9 W		
4033763	WARE	04/05/2015	Property damage only (none injured)	11:42 AM	No injury	1	D1: (Physical impairment)	Collision with unknown fixed object	Daylight	Single vehicle crash	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: N	Clear	utside roadw	V1:(Collision with other fixed object (wall, building, tunnel, etc.))		42.26061	-72.24258		WEST ST	MAIN STREET	
4794812	WARE	12/01/2019	Property damage only (none injured)	3:03 PM	No Apparent Injury (O)	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Snow	Y-intersection	0	0	Traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Cloudy/Snow	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	20	42.26061	-72.24259		WEST STREET Rte SR32 N / MAIN STREET Rte SR9 E		
4746633	WARE	09/06/2019	Property damage only (none injured)	9:36 PM	No Apparent Injury (O)	2	D1: (Unknown) / D2: (Inattention)	Collision with motor vehicle in traffic	lighted roa	Rear-end	2	Wet	T-intersection	0	0	Stop signs	Two-way, divided, unprotected median	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Rain	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24259		MAIN STREET Rte SR9 E / WEST STREET Rte 32		
4743338	WARE	08/16/2019	Property damage only (none injured)	10:53 AM	No Apparent Injury (O)	1	D1: (Over-correcting/over-steering)	Collision with other light pole or other post/support	Daylight	Single vehicle crash	2	Dry	Y-intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Turning right	V1:(Tractor/semi-trailer)	V1: E	Clear	Roadside	V1:(Collision with light pole or other post/support)		42.26061	-72.24259		MAIN STREET Rte SR9 E / WEST STREET Rte 32		
4722789	WARE	06/21/2019	Property damage only (none injured)	12:40 PM	No Apparent Injury (O)	2	D1: (No improper driving) / D2: (Unknown)	Collision with parked motor vehicle	Daylight	Angle	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Parked / V2: Backing	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with parked motor vehicle)	20	42.26066	-72.24313	133	MAIN ST		
4699852	WARE	04/25/2019	Property damage only (none injured)	12:49 PM	No Apparent Injury (O)	1	D1: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Travelling straight ahead	V1:(Passenger car)	V1: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic)		42.2606	-72.24246	126	MAIN ST		
4693868	WARE	04/13/2019	Non-fatal injury	3:30 PM	Suspected Minor Injury (B)	2	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Motorcycle) / V2:(Passenger car)	V1: E / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		MAIN ST / WEST MAIN ST		
4620435	WARE	10/30/2018	Property damage only (none injured)	3:15 PM	No injury	2	D1: (Glare) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	2	Dry	Not at junction	0	0	No controls	Two-way, not divided	V1: Entering traffic lane / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: N	Clear/Other	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24258		WEST ST Rte 32 / MAIN ST Rte 9		
4611639	WARE	10/14/2018	Property damage only (none injured)	2:58 PM	No injury	2	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	2	Dry	T-intersection	0	0	Stop signs	Two-way, not divided	V1: Travelling straight ahead / V2: Turning right	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: E / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24259		MAIN STREET Rte 9 E / WEST STREET Rte 32 N		

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	MassDOT District	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Traffic Control Device Type	Trafficway Description	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	First Harmful Event Location	Most Harmful Event (All Vehicles)	Speed Limit	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway	Landmark
4594728	WARE	09/06/2018	Property damage only (none injured)	6:00 PM	No injury	2	D1: (No improper driving) / D2: (Distracted)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	2	Dry	Y-intersection	0	0	Flashing traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24258		MAIN ST / WEST ST		
4594698	WARE	08/26/2018	Property damage only (none injured)	5:09 PM	No injury	2	D1: (Failed to yield right of way) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	2	Dry	T-intersection	0	0	Stop signs	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: S	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24258		MAIN ST / WEST ST		
4533678	WARE	04/27/2018	Property damage only (none injured)	9:19 PM	No injury	1	D1: (Unknown)	Collision with pedestrian	lighted roa	Single vehicle crash	2	Wet	T-intersection	0	0	Flashing traffic control signal	Two-way, divided, unprotected median	V1: Travelling straight ahead	V1:(Passenger car)	V1: E	Cloudy	Roadway	V1:(Collision with pedestrian)	25	42.26061	-72.24258		WEST ST	MAIN ST	
4525459	WARE	03/09/2018	Property damage only (none injured)	6:45 PM	No injury	2	D1: (Failed to yield right of way) / D2: (Unknown)	Collision with motor vehicle in traffic	lighted roa	Angle	2	Dry	T-intersection	0	0	Stop signs	Two-way, not divided	V1: Travelling straight ahead / V2: Turning right	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24258		MAIN ST Rte 9 E / WEST ST Rte 32 N		
4480715	WARE	01/02/2018	Non-fatal injury	11:21 AM	Non-fatal injury - Possible	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Head-on	2	Wet	T-intersection	0	1	Stop signs	Two-way, not divided	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: W	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		MAIN ST / WEST ST		
4432340	WARE	09/29/2017	Property damage only (none injured)	9:03 AM	No injury	2	D1: (No improper driving) / D2: (Followed too closely)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Y-intersection	0	0	Stop signs	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	20	42.26061	-72.24258		WEST ST / MAIN ST		
4387532	WARE	07/03/2017	Non-fatal injury	9:22 PM	Non-fatal injury - Possible	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	2	Dry	Y-intersection	0	1	Flashing traffic control signal	Two-way, not divided	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Clear	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)		42.26061	-72.24258		WEST ST / MAIN ST		
4373472	WARE	06/05/2017	Non-fatal injury	7:22 AM	Non-fatal injury - Possible	2	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	2	Dry	T-intersection	0	1	Flashing traffic control signal	Two-way, not divided	V1: Travelling straight ahead / V2: Turning left	V1:(Unknown heavy truck, cannot classify) / V2:(Passenger car)	V1: E / V2: W	Cloudy	Roadway	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	25	42.26061	-72.24258		MAIN STREET / WEST STREET / WEST MAIN STREET		

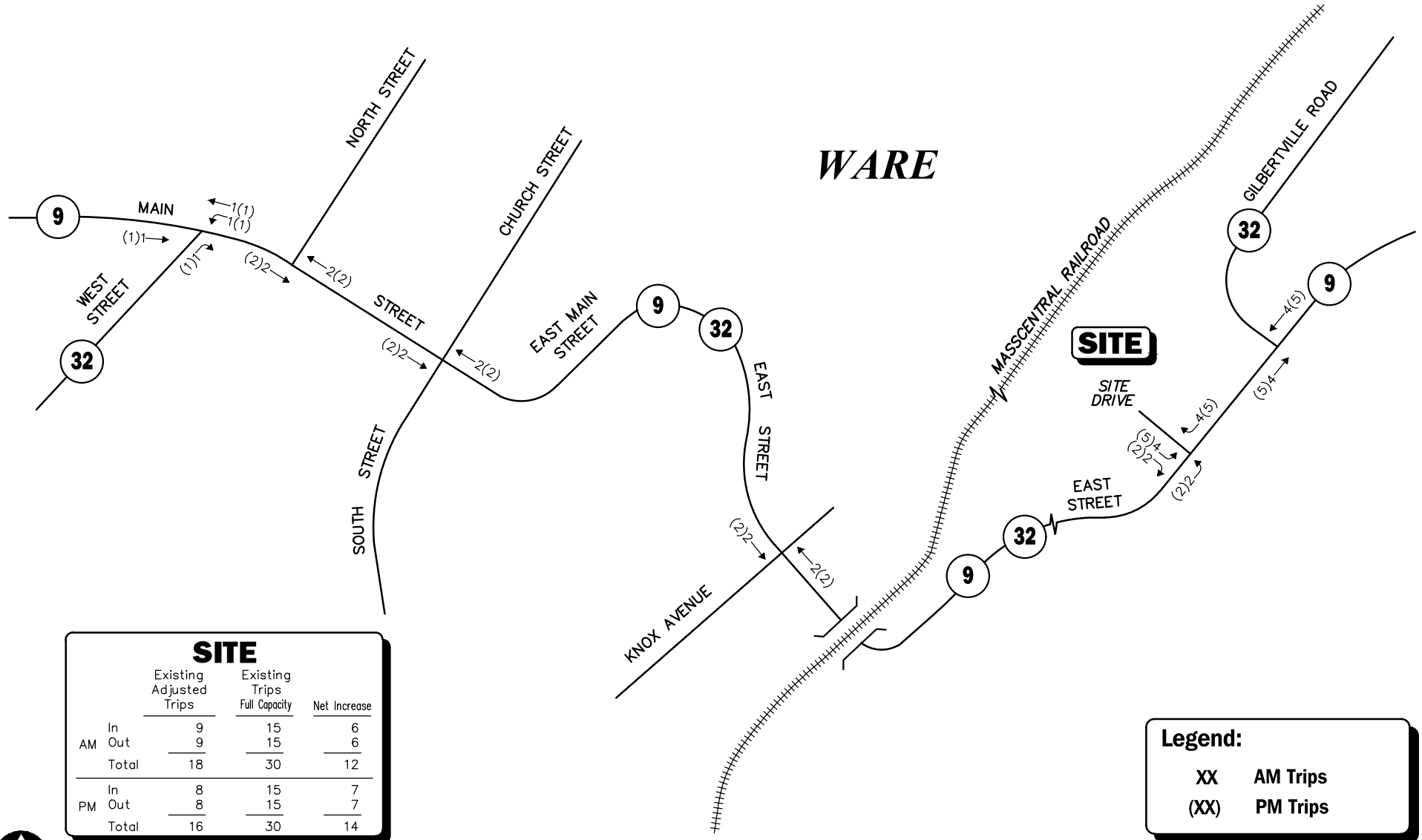
GROWTH RATE CALCULATIONS

General Background Traffic Growth - Daily Traffic Volumes

Station	Community	Station	Station Information	2015	2016	2017	2018	2019	Annual Growth
Day Count	Hardwick	251180	MAIN STREET		3,929	3,996	4,008	4,198	**2.08%**
Day Count	Ware	2153	PALMER ROAD	11,861			12,584	12,634	**1.33%**
Day Count	Ware	2154	WEST MAIN STREET	6,898	6,611	6,684	6,361	6,588	**-1.24%**
Day Count	Ware	2811	EAST STREET	6,572	6,757	6,831	6,927	6,405	**-0.28%**
Day Count	Ware	2812	GILBERTVILLE ROAD	4,576			4,877	4,704	**-0.24%**
Day Count	Ware	RPA03-309-9067	WEST STREET			2,737	2,745	2,756	**0.35%**
Day Count	Ware	RPA03-309-9548	BUCKLEY COURT	2,682	2,848	2,896	2,905	2,893	**1.78%**
Day Count	Ware	RPA03-309-9819	WEST STREET	12,447			13,267	13,320	**1.42%**
Day Count	Ware	RPA03-309-9820	WEST STREET	10,851		11,410	11,444	11,490	**1.14%**
Day Count	Ware	RPA03-309-9821	Main St.	13,291	13,464	13,612	13,803	13,858	**1.08%**
Day Count	Ware	RPA03-309-9822	WEST MAIN STREET	4,983	5,048	5,104	5,175	5,196	**1.09%**
Day Count	Ware	RPA05-323-3152	GILBERTVILLE ROAD	2,843	2,349	2,389	2,396	2,406	**-3.08%**
Day Count	West Brookfield	251362	WARE ROAD			4,961	5,016	5,317	**3.55%**
Continue Station	Charlton	AET06	MASSACHUSETTS TURNPIKE			103,449	104,684	106,021	**1.24%**
Continue Station	Ludlow	9007	MASSACHUSETTS TURNPIKE	59,999	56,401	57,529	57,721	62,578	**1.14%**
Continue Station	Ludlow	AET04	MASSACHUSETTS TURNPIKE			54,864	55,437	55,977	**1.01%**
Continue Station	Sturbridge	3331	ROUTE 49	8,343	8,468	8,538	8,512	8,647	**0.79%**
Continue Station	Warren	AET05	MASSACHUSETTS TURNPIKE			47,799	48,477	49,182	**1.44%**
									0.81%
								SAY	1.0%

S:\Jobs\9130\5 - Traffic Adjustment\Growth Rate\9130 - Growth Rate.

EXISTING SITE TRIPS AT FULL CAPACITY - 750 TON/DAY



SITE

		Existing Adjusted Trips	Existing Trips Full Capacity	Net Increase
AM	In	9	15	6
	Out	9	15	6
	Total	18	30	12
PM	In	8	15	7
	Out	8	15	7
	Total	16	30	14

Legend:

XX AM Trips

(XX) PM Trips

Not to Scale

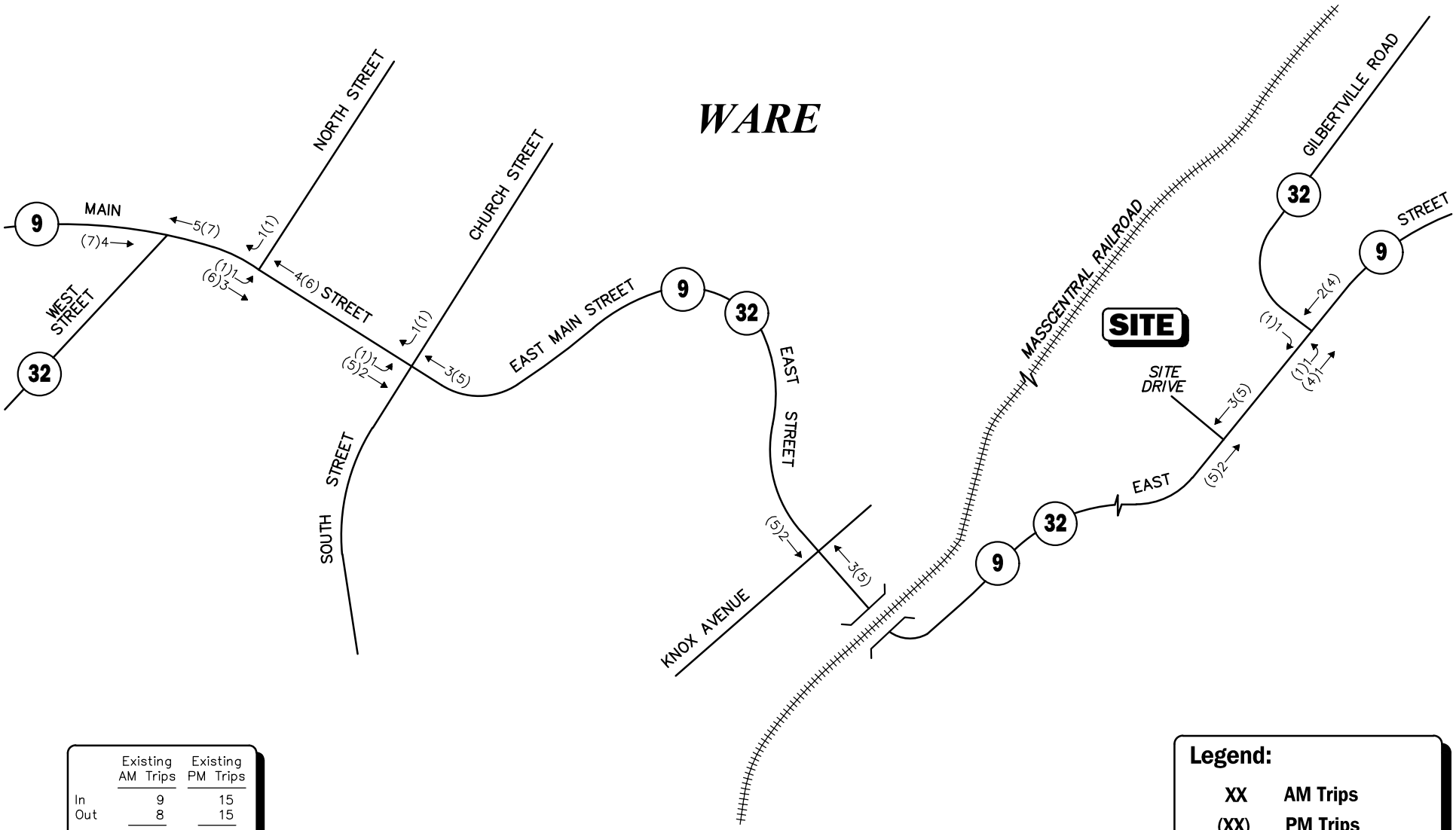
Figure A4

Waste Handling Facility
Existing Site at Full Capacity
750 Tons/day
Weekday
Peak Hour Traffic Volume

Vanasse & Associates inc

R:\9130\3 - 9130nt2.dwg, 1/18/2022 10:42:29 AM

BACKGROUND DEVELOPMENT



	Existing AM Trips	Existing PM Trips
In	9	15
Out	8	15
Total	17	30

Legend:

XX	AM Trips
(XX)	PM Trips

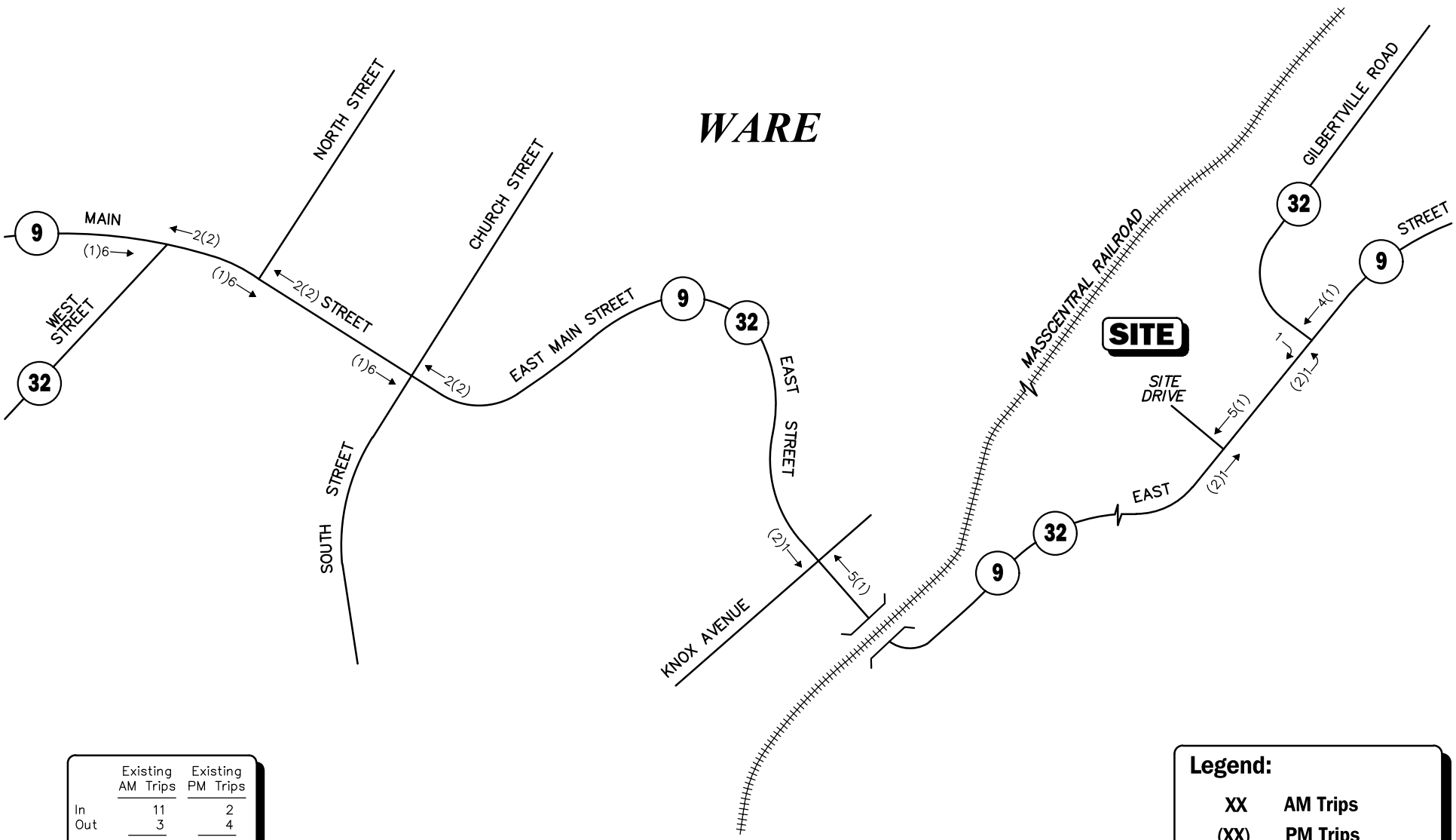
Not to Scale

Figure A5

Vanasse & Associates inc

Recreational Cannabis Retail
24 West Main Street
Weekday
Peak Hour Traffic Volume

R:\9130\3 - 9130nt2.dwg, 1/18/2022 10:42:42 AM



	Existing AM Trips	Existing PM Trips
In	11	2
Out	3	4
Total	14	6

Legend:

XX AM Trips

(XX) PM Trips

Not to Scale

Figure A6

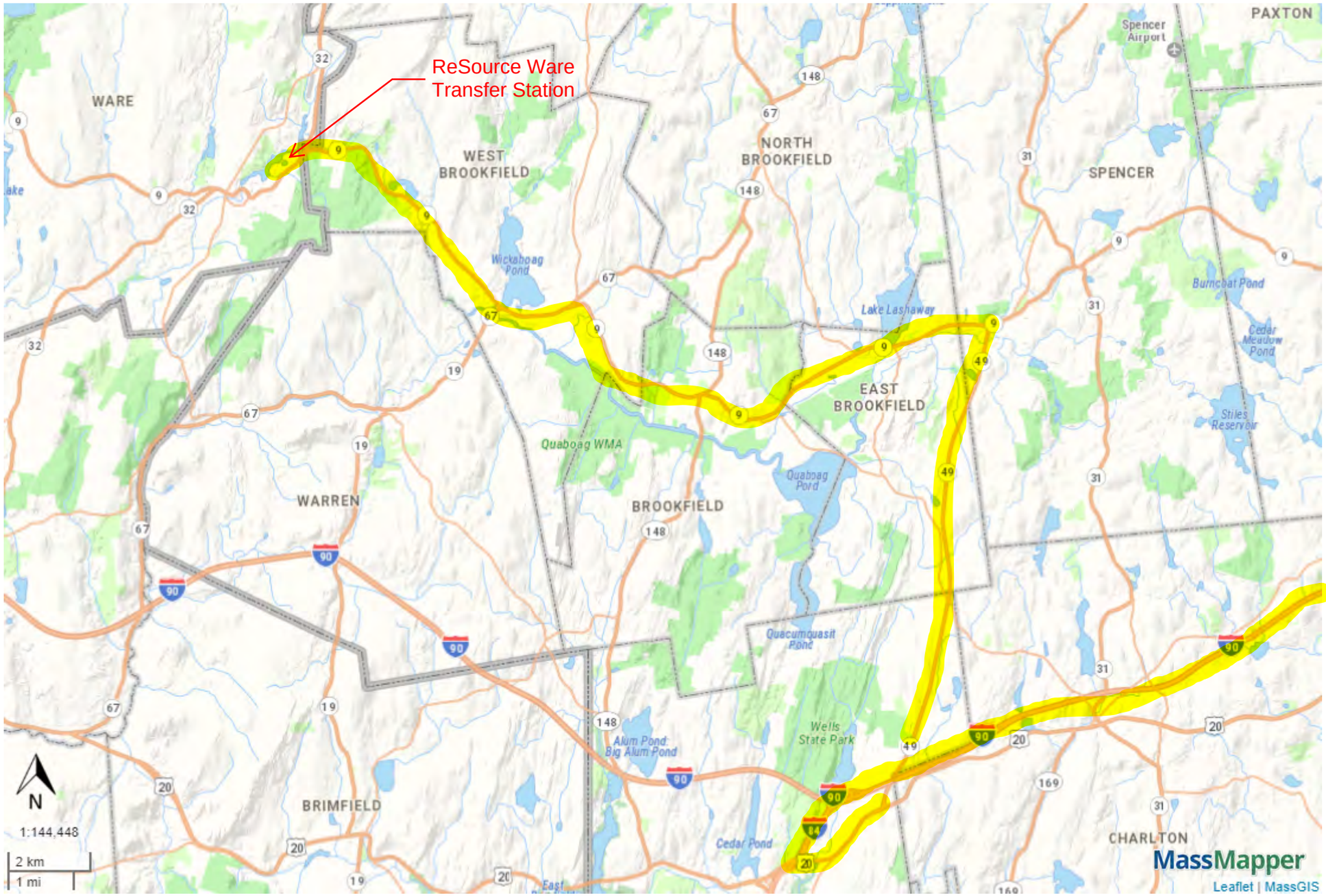
Vanasse & Associates inc

The Ware Marijuana Mill Yard
Weekday
Peak Hour Traffic Volume

R:\9130\3 - 9130nt2.dwg, 1/18/2022 10:42:54 AM

TRUCK ROUTE

Haul Route to ReSource Ware



Property Tax Parcels

P:\Opportunities\ReSource Waste Services, Transfer Station Expansion Planning, Ware, MA\Correspondence\Information\RWS Coord\RWS Haul Route to Ware.pdf

TRIP DISTRIBUTION

Waste Services
ReSource
An Innovative Waste Management and Recycling Company

ReSource Waste Services of Ware LLC
198 East Street, Ware, MA 01082
(413) 967-7046
infoware@resource-waste.com

04 OCT 2021

To All Drivers !

We continue to get numerous complaints regarding Trucks in route to ReSource Waste Services Ware from residents residing on Route 148 & Route 9 in Brookfield. Exceeding the SPEED LIMIT and excessive use of JAKE BRAKE is the major complaint.

ReSource Waste Services Ware has addressed this with all Company Drivers, Subcontractors and Owner Operators on numerous occasions.

ReSource Waste Services Ware needs to be a good community member, therefore we are implementing a mandatory Haul Route into the facility for all Tractor Trailer Trucks hauling into ReSource Waste Services Ware accessing the facility off the Mass Pike, Exit 78 Sturbridge.

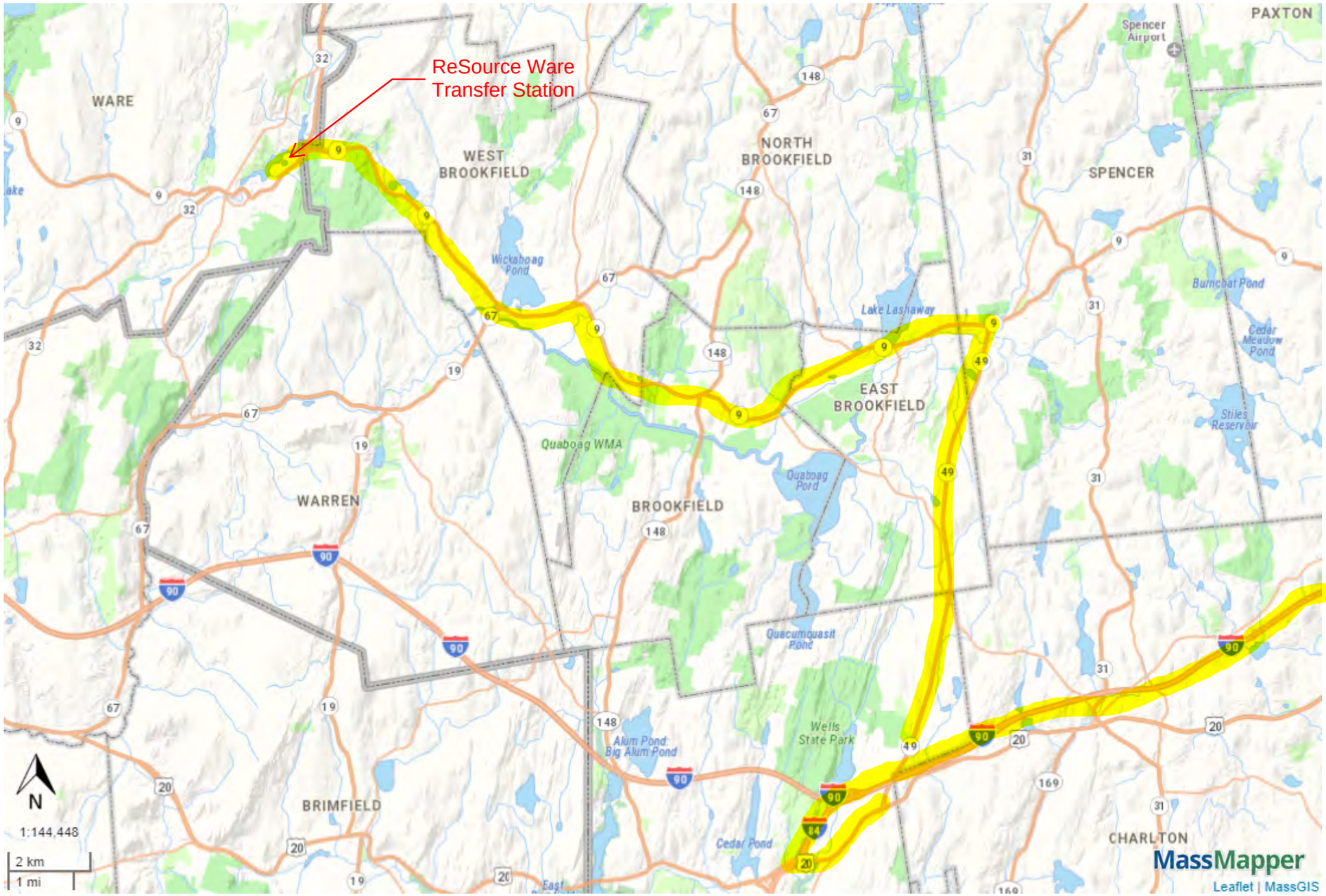
Haul Route: **Mass Pike, Exit 78 to Route 20 east to Route 49 north to Route 9 West follow to facility (see map)**

Please be mindful of speed and use of jake brake at all times. There are family homes along the whole route.

Thank you.

Christopher Lowe **David DeVito** **Dave Guilherme**

Haul Route to ReSource Ware



Property Tax Parcels

P:\Opportunities\ReSource Waste Services, Transfer Station Expansion Planning, Ware, MA\Correspondence\Information\RWS Coord\RWS Haul Route to Ware.pdf

Existing Ware Transfer Station Data - January - September 2021 - without 3rd Party trucks

Future Trip Distribution

	Row Labels	3rd Small - Ware	IC	Grand Total
Ware	WAREMA	1337		1337
IC	ROXBURYMA		2294	2294
IC	SALEMNH		622	622
IC	EPPINGNH		231	231
IC	LEWISTONME		3	3
	Grand Total	**0**	**3150**	**4487**

Matrix %

	Exit						Enter					
%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	%
30%		10%	25%	30%	35%	1		10%	25%	30%	35%	1
51%	100%					1	100%					1
14%	100%					1	100%					1
5%	100%					1	100%					1
0%	100%					1	100%					1

Trips

	Exit						Enter					
%	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	total	Route 9 (East)	Route 32 (North)	knox Av (West)	West Street (South)	W Main Street (West)	total
1	0	134	334	401	468	1337	0	134	334	401	468	1337
1	2294	0	0	0	0	2294	2294	0	0	0	0	2294
1	622	0	0	0	0	622	622	0	0	0	0	622
1	231	0	0	0	0	231	231	0	0	0	0	231
1	3	0	0	0	0	3	3	0	0	0	0	3
Total	3150	134	334	401	468	4487	3150	134	334	401	468	4487
%	70%	3%	7%	9%	10%		70%	3%	7%	9%	10%	
Say	**70**	**5**	**5**	**10**	**10**	**100**	**70**	**5**	**5**	**10**	**10**	**100**

FUTURE FACILITY DATA WITHOUT THIRD PARTY
EXCEPT FOR LOADS ORIGINATING FROM TOWN OF WARE

Future Daily Data - January - September 2021 + 2nd, 7th and 8th days of December

		Sum of LOADS		Sum of TONS				
Day	Month	3rd Small - Ware	IC	3rd Small - Ware	IC	Total Sum of LOADS	Total Sum of TONS	Rate
07	May	21	20	55.14	588.38	41	643.52	15.696 tons/truck
02	December	18	21	19.37	623.23	39	642.6	16.477 tons/truck
06	May	18	19	38.68	564.19	37	602.87	16.294 tons/truck
27	September	15	21	12.38	639.41	36	651.79	18.105 tons/truck
17	May	15	21	20	598.22	36	618.22	17.173 tons/truck
03	June	15	20	19.07	584.44	35	603.51	17.243 tons/truck
27	April	16	19	30.64	570.5	35	601.14	17.175 tons/truck
02	June	11	23	13.58	653.52	34	667.1	19.621 tons/truck
30	August	16	18	25.04	528.56	34	553.6	16.282 tons/truck
30	April	12	20	14.64	551.03	32	565.67	17.677 tons/truck
26	July	13	19	18.72	538.5	32	557.22	17.413 tons/truck
26	April	16	16	25.99	477.28	32	503.27	15.727 tons/truck
16	July	15	17	16.3	481.01	32	497.31	15.541 tons/truck
23	August	9	22	15.38	665.81	31	681.19	21.974 tons/truck
05	May	12	19	42.71	569.46	31	612.17	19.747 tons/truck
29	April	10	21	16.48	581.12	31	597.6	19.277 tons/truck
18	January	11	20	16.28	569.44	31	585.72	18.894 tons/truck
20	April	12	19	12.56	551.88	31	564.44	18.208 tons/truck
25	June	13	18	19.97	528.21	31	548.18	17.683 tons/truck
04	June	8	22	6.28	622.91	30	629.19	20.973 tons/truck
01	June	9	21	7.83	615.23	30	623.06	20.769 tons/truck
10	September	12	18	27.88	525.6	30	553.48	18.449 tons/truck
22	March	12	18	22.07	515.84	30	537.91	17.930 tons/truck
19	April	13	17	25.58	491.9	30	517.48	17.249 tons/truck
20	July	12	17	24.15	453.26	29	477.41	16.462 tons/truck
11	May	6	22	9.09	648.98	28	658.07	23.503 tons/truck
24	June	9	19	10.22	548.45	28	558.67	19.953 tons/truck
15	April	8	20	10.46	546.32	28	556.78	19.885 tons/truck
28	June	10	18	11.45	539.33	28	550.78	19.671 tons/truck
24	May	10	18	21.81	517.08	28	538.89	19.246 tons/truck
13	July	10	18	13.84	523.91	28	537.75	19.205 tons/truck
29	July	10	18	11.26	512.67	28	523.93	18.712 tons/truck
09	April	11	17	12.74	445.28	28	458.02	16.358 tons/truck
10	August	13	15	26.77	430.87	28	457.64	16.344 tons/truck
16	June	13	15	14.76	430.78	28	445.54	15.912 tons/truck
10	May	8	19	22.02	582.52	27	604.54	22.390 tons/truck
28	April	9	18	18.47	541.75	27	560.22	20.749 tons/truck
03	September	11	16	19.65	524.13	27	543.78	20.140 tons/truck
23	June	10	17	10.41	517.23	27	527.64	19.542 tons/truck
29	September	11	16	23.32	486.55	27	509.87	18.884 tons/truck
13	April	10	17	8.4	472.41	27	480.81	17.808 tons/truck
19	May	12	15	10.31	434.58	27	444.89	16.477 tons/truck
04	January	11	16	10.93	429.56	27	440.49	16.314 tons/truck
08	March	12	15	12.26	411.36	27	423.62	15.690 tons/truck
07	June	4	22	10.65	645.86	26	656.51	25.250 tons/truck
12	July	5	21	12.94	609.05	26	621.99	23.923 tons/truck
26	January	6	20	9.29	554.12	26	563.41	21.670 tons/truck
18	May	7	19	4.83	533.91	26	538.74	20.721 tons/truck
14	April	8	18	8.99	508.85	26	517.84	19.917 tons/truck
15	July	7	19	7.08	507.98	26	515.06	19.810 tons/truck
27	July	7	19	16.98	490.04	26	507.02	19.501 tons/truck
16	August	10	16	14.35	489.59	26	503.94	19.382 tons/truck
17	September	10	16	19.03	464.83	26	483.86	18.610 tons/truck
09	September	11	15	14.66	443.8	26	458.46	17.633 tons/truck
06	August	11	15	15.08	434.07	26	449.15	17.275 tons/truck
15	January	10	16	18.71	427.14	26	445.85	17.148 tons/truck
30	July	11	15	12.21	415.47	26	427.68	16.449 tons/truck
08	December	9	17	4.84	485.21	26	490.05	18.848 tons/truck
15	March	3	22	3.05	562.73	25	565.78	22.631 tons/truck
12	May	7	18	9.95	541.47	25	551.42	22.057 tons/truck
28	May	7	18	6.47	534.3	25	540.77	21.631 tons/truck
23	April	7	18	9.66	518.28	25	527.94	21.118 tons/truck
09	August	8	17	15.28	512.18	25	527.46	21.098 tons/truck
01	March	7	18	7.34	506.18	25	513.52	20.541 tons/truck
07	September	8	17	12.46	497.54	25	510	20.400 tons/truck
26	May	9	16	18.74	465.8	25	484.54	19.382 tons/truck
24	September	10	15	20.83	458.91	25	479.74	19.190 tons/truck
14	May	9	16	13.22	462.79	25	476.01	19.040 tons/truck
29	June	10	15	14.36	434.51	25	448.87	17.955 tons/truck
16	September	10	15	10.32	432.31	25	442.63	17.705 tons/truck
13	September	11	14	15.77	411.75	25	427.52	17.101 tons/truck
29	March	10	15	17.85	400.78	25	418.63	16.745 tons/truck
07	December	11	14	7.75	433.64	25	441.39	17.656 tons/truck
13	May	3	21	1.92	621.34	24	623.26	25.969 tons/truck
25	May	4	20	5.96	590.17	24	596.13	24.839 tons/truck
11	February	5	19	3.61	546.83	24	550.44	22.935 tons/truck
03	August	7	17	24.3	516.83	24	541.13	22.547 tons/truck
22	April	7	17	10.49	499.75	24	510.24	21.260 tons/truck
02	August	7	17	6.08	489.31	24	495.39	20.641 tons/truck

Future Daily Data - January - September 2021 + 2nd, 7th and 8th days of December

		Sum of LOADS		Sum of TONS					
Day	Month	3rd Small - Ware	IC	3rd Small - Ware	IC	Total Sum of LOADS	Total Sum of TONS	Rate	
09	July	8	16	11.92	476.83	24	488.75	20.365	tons/truck
25	March	8	16	16.18	461.23	24	477.41	19.892	tons/truck
23	September	9	15	12.08	450.08	24	462.16	19.257	tons/truck
10	March	10	14	12.72	403.55	24	416.27	17.345	tons/truck
21	May	10	14	11.65	381.24	24	392.89	16.370	tons/truck
22	February	3	20	5.26	591.97	23	597.23	25.967	tons/truck
08	February	3	20	2.25	557.42	23	559.67	24.333	tons/truck
05	March	4	19	5.37	541.73	23	547.1	23.787	tons/truck
28	January	4	19	3.7	530.49	23	534.19	23.226	tons/truck
01	April	5	18	14.01	515.62	23	529.63	23.027	tons/truck
02	March	4	19	4.58	500.74	23	505.32	21.970	tons/truck
15	February	5	18	8.83	485.65	23	494.48	21.499	tons/truck
28	September	7	16	6.55	481.55	23	488.1	21.222	tons/truck
25	August	7	16	9.2	472.81	23	482.01	20.957	tons/truck
04	March	7	16	13.48	461.83	23	475.31	20.666	tons/truck
26	February	6	17	8.58	463.15	23	471.73	20.510	tons/truck
08	April	6	17	3.8	458.52	23	462.32	20.101	tons/truck
27	August	6	17	10.02	447.18	23	457.2	19.878	tons/truck
26	March	7	16	11.96	440.25	23	452.21	19.661	tons/truck
31	August	9	14	14.3	426.07	23	440.37	19.147	tons/truck
04	May	9	14	19.81	420.47	23	440.28	19.143	tons/truck
23	March	9	14	13.16	384.73	23	397.89	17.300	tons/truck
21	April	10	13	11.06	376.85	23	387.91	16.866	tons/truck
27	May	3	19	1.48	567.79	22	569.27	25.876	tons/truck
07	July	4	18	2.63	556.64	22	559.27	25.421	tons/truck
25	January	3	19	4.32	544.63	22	548.95	24.952	tons/truck
08	July	4	18	5.45	506.19	22	511.64	23.256	tons/truck
14	July	3	19	2.41	503.34	22	505.75	22.989	tons/truck
16	March	4	18	5.84	485.08	22	490.92	22.315	tons/truck
30	March	5	17	5.82	478.34	22	484.16	22.007	tons/truck
17	March	5	17	13.77	456.52	22	470.29	21.377	tons/truck
26	August	6	16	7.82	457.76	22	465.58	21.163	tons/truck
13	January	4	18	5.34	459.87	22	465.21	21.146	tons/truck
09	March	7	15	5.35	422.93	22	428.28	19.467	tons/truck
24	March	7	15	11.2	413.66	22	424.86	19.312	tons/truck
09	June	8	14	16.86	403.1	22	419.96	19.089	tons/truck
12	April	8	14	21.59	386.42	22	408.01	18.546	tons/truck
17	June	8	14	10.13	380.23	22	390.36	17.744	tons/truck
10	February	1	20	0.36	572.82	21	573.18	27.294	tons/truck
03	February	3	18	7.08	534.53	21	541.61	25.791	tons/truck
08	September	4	17	11.15	496.19	21	507.34	24.159	tons/truck
24	February	3	18	4.12	500.17	21	504.29	24.014	tons/truck
05	August	4	17	3.83	495.68	21	499.51	23.786	tons/truck
19	July	4	17	8.04	482.2	21	490.24	23.345	tons/truck
24	August	6	15	10.17	458.21	21	468.38	22.304	tons/truck
05	January	4	17	4.78	453.49	21	458.27	21.822	tons/truck
11	January	6	15	7.59	420.67	21	428.26	20.393	tons/truck
12	March	7	14	8.85	400.06	21	408.91	19.472	tons/truck
06	January	7	14	12.85	382.65	21	395.5	18.833	tons/truck
11	August	8	13	16.75	374.46	21	391.21	18.629	tons/truck
22	July	7	14	9.25	376.19	21	385.44	18.354	tons/truck
18	August	9	12	18.81	363.39	21	382.2	18.200	tons/truck
05	April	8	13	12.8	354.8	21	367.6	17.505	tons/truck
23	July	9	12	10.33	344.45	21	354.78	16.894	tons/truck
11	March	8	13	8.97	327.82	21	336.79	16.038	tons/truck
30	September	3	17	5.45	521.11	20	526.56	26.328	tons/truck
05	February	3	17	6.14	513.35	20	519.49	25.975	tons/truck
20	January	2	18	5.32	501.37	20	506.69	25.335	tons/truck
28	July	4	16	6.22	479.02	20	485.24	24.262	tons/truck
03	May	4	16	6.89	461.93	20	468.82	23.441	tons/truck
14	January	3	17	2.94	461.3	20	464.24	23.212	tons/truck
21	September	6	14	12.39	416.12	20	428.51	21.426	tons/truck
01	September	7	13	7.58	400.85	20	408.43	20.422	tons/truck
02	July	7	13	10.25	387.32	20	397.57	19.879	tons/truck
20	August	7	13	7.54	388.48	20	396.02	19.801	tons/truck
30	June	7	13	8.49	381.27	20	389.76	19.488	tons/truck
12	January	6	14	5.81	381.26	20	387.07	19.354	tons/truck
18	June	9	11	7.34	281.53	20	288.87	14.444	tons/truck
16	April		19		537.91	19	537.91	28.311	tons/truck
23	February	1	18	2.02	493.12	19	495.14	26.060	tons/truck
04	February	3	16	3.46	471.1	19	474.56	24.977	tons/truck
18	March	3	16	2.95	434.26	19	437.21	23.011	tons/truck
14	September	4	15	5.45	425.21	19	430.66	22.666	tons/truck
02	April	6	13	7.46	367.35	19	374.81	19.727	tons/truck
10	June	6	13	5.34	367.66	19	373	19.632	tons/truck
15	September	7	12	7	357.56	19	364.56	19.187	tons/truck
22	September	7	12	8	356.34	19	364.34	19.176	tons/truck
07	April	7	12	7.54	329.57	19	337.11	17.743	tons/truck
22	June	15	4	27.01	119.3	19	146.31	7.701	tons/truck

Future Daily Data - January - September 2021 + 2nd, 7th and 8th days of December

		Sum of LOADS		Sum of TONS					
Day	Month	3rd Small - Ware	IC	3rd Small - Ware	IC	Total Sum of LOADS	Total Sum of TONS	Rate	
03	March		18		492.85	18	492.85	27.381	tons/truck
12	February	1	17	0.55	476.67	18	477.22	26.512	tons/truck
25	February	2	16	2.41	441.86	18	444.27	24.682	tons/truck
31	March	3	15	7.11	430.67	18	437.78	24.321	tons/truck
17	August	4	14	5.66	410.76	18	416.42	23.134	tons/truck
04	August	4	14	4.2	401.33	18	405.53	22.529	tons/truck
15	June	5	13	4.41	375.39	18	379.8	21.100	tons/truck
21	July	6	12	4.93	328.18	18	333.11	18.506	tons/truck
19	January	3	14	2.84	403.74	17	406.58	23.916	tons/truck
22	January	3	14	2.5	401.38	17	403.88	23.758	tons/truck
11	June	6	11	4.83	306.07	17	310.9	18.288	tons/truck
29	January	1	15	8.76	414.22	16	422.98	26.436	tons/truck
20	May	2	14	2.59	406.45	16	409.04	25.565	tons/truck
27	January	2	14	2.52	396.53	16	399.05	24.941	tons/truck
02	September	4	12	3.92	376.3	16	380.22	23.764	tons/truck
01	July	3	13	3.28	374.76	16	378.04	23.628	tons/truck
06	April	3	13	3.35	371.66	16	375.01	23.438	tons/truck
08	January	2	14	3.84	366.21	16	370.05	23.128	tons/truck
19	August	5	11	3.88	344.97	16	348.85	21.803	tons/truck
19	March	4	12	5.42	317.45	16	322.87	20.179	tons/truck
13	August	9	7	12.97	204.6	16	217.57	13.598	tons/truck
14	June	5	10	10.31	310.4	15	320.71	21.381	tons/truck
12	August	5	10	15.31	284.46	15	299.77	19.985	tons/truck
01	February	4	11	5.91	276.85	15	282.76	18.851	tons/truck
21	January	5	10	4.75	264.61	15	269.36	17.957	tons/truck
19	February	2	12	6.05	351.58	14	357.63	25.545	tons/truck
17	February	2	12	1.28	336.55	14	337.83	24.131	tons/truck
09	February	2	12	0.98	323.04	14	324.02	23.144	tons/truck
17	April		13		373.64	13	373.64	28.742	tons/truck
20	September	3	10	5.75	314.48	13	320.23	24.633	tons/truck
06	July	6	7	7.37	194.86	13	202.23	15.556	tons/truck
18	February	1	10	0.59	282.65	11	283.24	25.749	tons/truck
07	January	1	10	1.1	254.98	11	256.08	23.280	tons/truck
16	February	3	8	2.87	218.99	11	221.86	20.169	tons/truck
03	April		10		277.97	10	277.97	27.797	tons/truck
08	May		10		272.34	10	272.34	27.234	tons/truck
08	June		9		262.11	9	262.11	29.123	tons/truck
10	April		8		206.06	8	206.06	25.758	tons/truck
25	September		7		212.53	7	212.53	30.361	tons/truck
31	July		7		211.96	7	211.96	30.280	tons/truck
07	August		6		187.68	6	187.68	31.280	tons/truck
24	July		6		187.33	6	187.33	31.222	tons/truck
21	August		6		183.87	6	183.87	30.645	tons/truck
01	May		6		177.69	6	177.69	29.615	tons/truck
28	August		6		171.67	6	171.67	28.612	tons/truck
05	June		6		171.38	6	171.38	28.563	tons/truck
22	May		6		167.58	6	167.58	27.930	tons/truck
15	May		6		154.67	6	154.67	25.778	tons/truck
11	September		5		156.85	5	156.85	31.370	tons/truck
24	April		5		147.97	5	147.97	29.594	tons/truck
17	July		5		145.35	5	145.35	29.070	tons/truck
14	August		3		103.05	3	103.05	34.350	tons/truck
20	March		3		79.55	3	79.55	26.517	tons/truck
26	June		3		77.68	3	77.68	25.893	tons/truck
18	September		2		74.3	2	74.3	37.150	tons/truck
10	July		2		61.91	2	61.91	30.955	tons/truck
27	March		2		53.74	2	53.74	26.870	tons/truck
13	March		2		51.04	2	51.04	25.520	tons/truck
02	February		1		33.54	1	33.54	33.540	tons/truck
					Total	**4577**	**93720**		tons/truck
					Average	**21**	**431.89**	**21.58**	tons/truck
					Max	**41**	**681.19**	**37.150**	tons/truck

TRIP GENERATION

TRIP-GENERATION SUMMARY EXISTING

	Existing									
		Existing Facility Dec counts [b]				Existing Facility Data Jan through Sep - Dec[c]				
Time Period/Direction	Existing Facility Traffic Count[a]	Dec 2nd (710.37)	Dec 7th (459.59)	Dec 8th (547.32)	Average (572.43)	Highest Loads (746.72)	Average Tons/ Load (522.70)	Highest Ton (749.91)	Average rate full capacity (750)[d]	Highest Rate full capacity (750)[e]
Weekday Daily	--	52	34	45	44	59	34	56	44	20
Entering		52	34	45	44	59	34	56	44	20
Exiting		104	68	90	88	118	68	112	88	40
Total										
Weekday Morning Peak Hour:										
Entering	3	13	6	9	9	15				
Exiting	5	13	6	9	9	15				
Total	8	26	12	18	18	30				
Weekday Evening Peak Hour:										
Entering	1	10	6	9	8	15				
Exiting	3	10	6	9	8	15				
Total	4	20	12	18	16	30				

[a]Based on Average of Traffic Count December 7th and 8th 2021
[b]Based existing facility data December 2nd, 7th and 8th 2021
[c] Based existing facility data January through September – Dec 2021
[d]Based existing facility Average Rate for 17.04 tons/truck (in trips only)
[e]Based existing facility Highest Rate for 37.15 tons/truck (in trips only)

TRIP-GENERATION SUMMARY EXISTING W/OUT 3rd small/large

	Existing W/out 3rd small/large								
	Existing Facility Dec counts [a]				Existing Facility Data Jan through Sep - Dec[b]				
Time Period/Direction	Dec 2nd (642.6)	Dec 7th (441.39)	Dec 8th (490.05)	Average (524.68)	Highest Loads (643.52)	Average Tons/ Load (431.89)	Highest Ton (681.19)	Average rate full capacity (750)[c]	Highest Rate full capacity (750)[d]
Weekday Daily	39	25	26	30	41	21	31	35	20
Entering	39	25	26	30	41	21	31	35	20
Exiting	78	50	52	60	82	42	62	70	40
Total									
Weekday Morning Peak Hour:									
Entering	9	6	7	7	10				
Exiting	9	6	7	7	10				
Total	18	12	14	14	20				
	(24%)	(24%)	(27%)						
Weekday Evening Peak Hour:									
Entering	9	6	7	6	10				
Exiting	9	6	7	6	10				
Total	18	12	14	12	20				
	(24%)	(24%)	(27%)						

[a]Based existing facility data December 7th and 8th 2021
[b]Based existing facility data January through September – Dec 2021
[c]Based existing facility Average Rate for 21.58 tons/truck (Rate per tons/truck trips entering the facility)
[d]Based existing facility Highest Rate for 37.15 tons/truck (Rate per tons/truck trips entering the facility)

TRIP-GENERATION SUMMARY FUTURE

	Future Stage 1 – Capacity of 1400 Ton Day								
	Existing Facility Dec counts [b]				Existing Facility Data Jan through Sep - Dec[b]				
Time Period/Direction	Dec 2nd (16.48)	Dec 7th (17.66)	Dec 8th (18.85)	Average (17.49)	Highest Loads (15.70)	Average Tons/ Load (20.57)	Highest Ton (21.97)	Average rate (21.58)	Highest Rate (37.15)
Weekday Daily									
Entering	85	79	74	80	89	68	64	65	38
Exiting	85	79	74	80	89	68	64	65	38
Total	170	158	148	160	178	136	128	130	76
Weekday Morning Peak Hour:									
Entering	20	19	20	19	22				
Exiting	20	19	20	19	22				
Total	40	38	40	38	44				
Weekday Evening Peak Hour:									
Entering	20	19	20	16	22				
Exiting	20	19	20	16	22				
Total	40	38	40	32	44				

[a]Based on existing facility data December 2nd, 7th and 8th 2021
[b]Based existing facility data January through September – Dec 2021
Note: Rates per tons/truck trips entering the facility

TRIP-GENERATION SUMMARY BY HIGHEST LOAD

	Existing				Future No-Build			Future Build Condition			
Time Period/Direction	Existing Facility Traffic Count[a]	Existing Average December trips (572.43) [b]	Existing Employee Trips	Existing Total Trips	Existing Facility Full Capacity (750.00) [c]	Existing Employee Trip	Total Full Capacity	Future Capacity of 1400 Tons a Day [d]	Future Employee Trip	Total Future Trips	Net Increase from No-Build to Build
Weekday Daily	--	44	5	49	60	5	65	89	11	100	35
Entering		44	5	49	60	5	65	89	11	100	35
Exiting		88	10	98	120	10	130	178	22	200	70
Total											
Weekday Morning Peak Hour:											
Entering	3	9	0	9	15	0	15	22	0	22	7
Exiting	5	9	0	9	15	0	15	22	0	22	7
Total	8	18	0	18	30	0	30	44	0	44	14
Weekday Afternoon Peak Hour:											
Entering	1	8	0	8	15	0	15	22	0	22	7
Exiting	3	8	0	8	15	0	15	22	0	22	7
Total	4	16	0	16	30	0	30	44	0	44	14

[a]Based on Average of Traffic Count December 7th
[b]Based existing facility data December 2nd, 7th and 8th 2021. (Average)
[c]Based on existing facility Highest load rate of 12.66 tons/truck
[d]Based on existing facility Highest load rate of 15.70 tons/truck (January through September and December 2021) – This Rate only accounts for Intercompany and 3rd small party from Ware
[e]Number of employees obtained from client
Assumed that 25% of daily trips occur during the morning and evening peak hours

TRUCK TRIPS PERCENTAGE ADJUSTMENT

		(A)		(B)		(C= 2021 Baseline Volumes * Truck Percentage)		(D)		(E= Fig A2)		(F= Fig A3)		(G= C-D+E+F)		(H= G / Fig 3 and 4)		(I= H* 2028 Future volume)		(J=Fig A4)		(K= I+J)		(L= K/ Fig 5 and 6)		(M= Fig 8 and 9)		(N=(I-E-F)+M)		(O=N/Fig 10 and 11	
Intersection	MVMT	RAW TRUCK PERCENTAGE		2021 Raw traffic Count		2021 Baseline Balanced		Existing site Truck trips (to be eliminted)		Existing site trips (car and truck) assumed to be truck from site		Site Existing Adjusted		Adjusted 2021 Baseline Condition		TRUCK %		2028 Future		Site full capacity no build		2028 No-Build		TRUCK %		Project Generated Trips		2028 Build		TRUCK %	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
East St at Site Drive																															
	WB LT	100%	0.0%	2	0	2	0	2		2	1	3	3	5	4	100%	100%	5	4	4	5	9	9	100%	100%	16	16	16	16	100%	100%
	WB RT	33.3%	50.0%	1	1	1	1	1	1	3	2	1	2	4	4	100%	100%	4	4	2	2	6	6	100%	100%	6	6	6	6	100%	100%
	NB LT	0.0%	0.0%	0	0	0	0			1	1	2	2	3	3	100%	100%	3	3	2	2	5	5	100%	100%	6	6	6	6	100%	100%
	NB TH	3.7%	0.7%	6	2	8	2							8	2	4%	1%	8	2			8	2	3.7%	0.7%			8	2	3.7%	0.7%
	SB TH	2.8%	2.4%	5	6	6	7							6	7	3%	2%	7	8			7	8	2.8%	2.4%			7	8	2.8%	2.4%
	SB RT	100%	0%	1	0	1	0	1		2		4	5	6	5	100%	100%	6	5	4	5	10	10	100%	100%	16	16	16	16	100%	100%
	TOTAL			15	9													33	26			45	40					59	54		
East St at Gilbertville Road																															
	WB LT	7.9%	3.2%	3	1	4	1							4	1	7.9%	3.2%	4	1			4	1	7.9%	3.2%			4	1	7.9%	3.2%
	WB RT	7.4%	10.0%	4	5	5	6							5	6	7.4%	10.0%	5	6			5	6	7.4%	10.0%	1	1	6	7	8.0%	10.8%
	NB LT	10.0%	5.3%	5	4	6	5							6	5	10.0%	5.3%	7	5			7	5	10.0%	5.3%	1	1	8	6	11.4%	6.2%
	NB TH	3.5%	0.0%	4	0	5	0	2		2	1	3	3	8	4	5.5%	1.7%	9	4	4	5	13	9	7.9%	3.4%	15	15	19	15	11.2%	5.6%
	SB TH	2.4%	1.5%	3	3	4	4	1		2		4	5	9	9	5.4%	3.5%	10	9	4	5	14	14	7.6%	5.2%	15	15	19	19	10.1%	6.9%
	SB RT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	TOTAL			19	13													35	25			43	35					56	48		
East St at Knox Avenue																															
	EB LT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	EB TH	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	EB RT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%	1	1	1	1	1.0%	0.7%
	WB LT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	WB TH	0.0%	50.0%	0	1	0	1							0	1	0.0%	50.0%	0	1			0	1	0.0%	50.0%			0	1	0.0%	50.0%
	WB RT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	SB LT	100%	0.0%	1	0	1	0							1	0	100%	0.0%	1	0			1	0	100%	0.0%			1	0	100%	0.0%
	SB TH	6.9%	1.4%	7	3	9	3			1	1	2	2	12	6	9.1%	2.6%	13	7	2	2	15	9	10.4%	3.3%	5	5	15	9	10.4%	3.3%
	SB RT	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%	0.0%
	NB LT	0.0%	2.9%	0	1	0	1							0	1	0.0%	2.9%	0	1			0	1	0.0%	2.9%	1	1	1	2	1.3%	4.4%
	NB TH	5.4%	2.6%	10	6	13	7	1	1	3	2	1	2	16	10	6.7%	3.7%	17	11	2	2	19	13	7.3%	4.3%	5	5	18	12	6.9%	4.0%
	NB RT	100%	0.0%	1	0	1	0							1	0	100%	0.0%	1	0			1	0	100%	0.0%			1	0	100%	0.0%
	TOTAL			19	11													32	20			36	24					37	25		
East Main Street at Church St / South St																															
	EB LT	3.7%	0.6%	3	1	4	1							4	1	3.7%	0.6%	4	1			4	1	3.7%	0.6%			4	1	3.7%	0.6%
	EB TH	7.3%	2.1%	7	4	9	5			1	1	2	2	12	8	9.6%	3.4%	13	9	2	2	15	11	10.6%	4.3%	5	5	15	11	10.6%	4.3%
	EB RT	4.3%	12.5%	2	4	2	5							2	5	4.3%	12.5%	3	5			3	5	4.3%	12.5%			3	5	4.3%	12.5%
	WB LT	33.3%	0.0%	1	0	1	0							1	0	33.3%	0.0%	1	0			1	0	33.3%	0.0%			1	0	33.3%	0.0%
	WB TH	7.8%	2.6%	16	6	20	7	1	1	3	2	1	2	23	10	8.9%	3.7%	25	11	2	2	27	13	9.5%	4.2%	5	5	26	12	9.2%	3.9%
	WB RT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	SB LT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	SB TH	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	SB RT	1.5%	2.1%	2	3	2	4							2	4	1.5%	2.1%	3	4			3	4	1.5%	2.1%			3	4	1.5%	2.1%
	NB LT	2.0%	2.9%	3	6	4	7							4	7	2.0%	2.9%	4	8			4	8	2.0%	2.9%			4	8	2.0%	2.9%
	NB TH	9.1%	0.0%	2	0	3	0							3	0	9.1%	0.0%	3	0			3	0	9.1%	0.0%			3	0	9.1%	0.0%
	NB RT	28.6%	0.0%	2	0	3	0							3	0	28.6%	0.0%	3	0			3	0	28.6%	0.0%			3	0	28.6%	0.0%
	TOTAL			38	24													59	38			63	42					62	41		
East Main Street at North Street																															
	EB LT	7.7%	2.0%	4	3	5	3							5	3	7.7%	2.0%	5	4			5	4	7.7%	2.0%			5	4	7.7%	2.0%
	EB TH	5.7%	2.2%	12	8	15	9			1	1	2	2	18	12	6.8%	2.9%	20	14	2	2	22	16	7.4%	3.4%	5	5	22	16	7.4%	3.4%
	WB TH	4.3%	3.1%	21	18	26	21	1	1	3	2	1	2	29	24	4.8%	3.5%	32	26	2	2	34	28	5.1%	3.7%	5	5	33	27	5.0%	3.6%
	WB RT	25.0%	0.0%	2	0	3	0							3	0	25.0%	0.0%	3	0			3	0	25.0%	0.0%			3	0	27.3%	0.0%
	SB LT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	SB RT	3.5%	3.4%	6	6	7	7							7	7	3.5%	3.4%	8	8			8	8	3.5%	3.4%			8	8	3.5%	3.4%
	TOTAL			45	35													68	52			72	56					71	55		
Main Street at West Street																															
	EB TH	5.1%	1.4%	5	2	6	2			1	1	1	1	8	4	6.7%	2.6%	10	5	1	1	11	6	7.6%	3.1%	2	2	10	5	6.9%	2.6%
	EB RT	0.0%	0.0%	0	0	0	0							0	0	0.0%	0.0%	0	0			0	0	0.0%	0.0%			0	0	0.0%	0.0%
	WB LT	4.6%	2.2%	21	12	26	14	1	1	1	1		1	26	15	4.6%	2.4%	28	16	1	1	29	17	4.7%	2.5%	3	3	30	17	4.9%	2.5%
	WB TH	2.9%	4.0%	6	8	8	9			2	1	1	1	11	11	4.0%	4.8%	12	13	1	1	13	14	4.5%	5.4%	2	2	11	13	3.8%	5.0%
	NB RT	7.2%	1.8%	12	7	15	8					1	1	16	9	7.6%	2.0%	17	10	1	1	18	11	8.0%	2.2%	3	3	19	12	8.4%	2.4%
	TOTAL			44	29													67	44			71	48					70	47		

SIGHT DISTANCE MEASUREMENTS

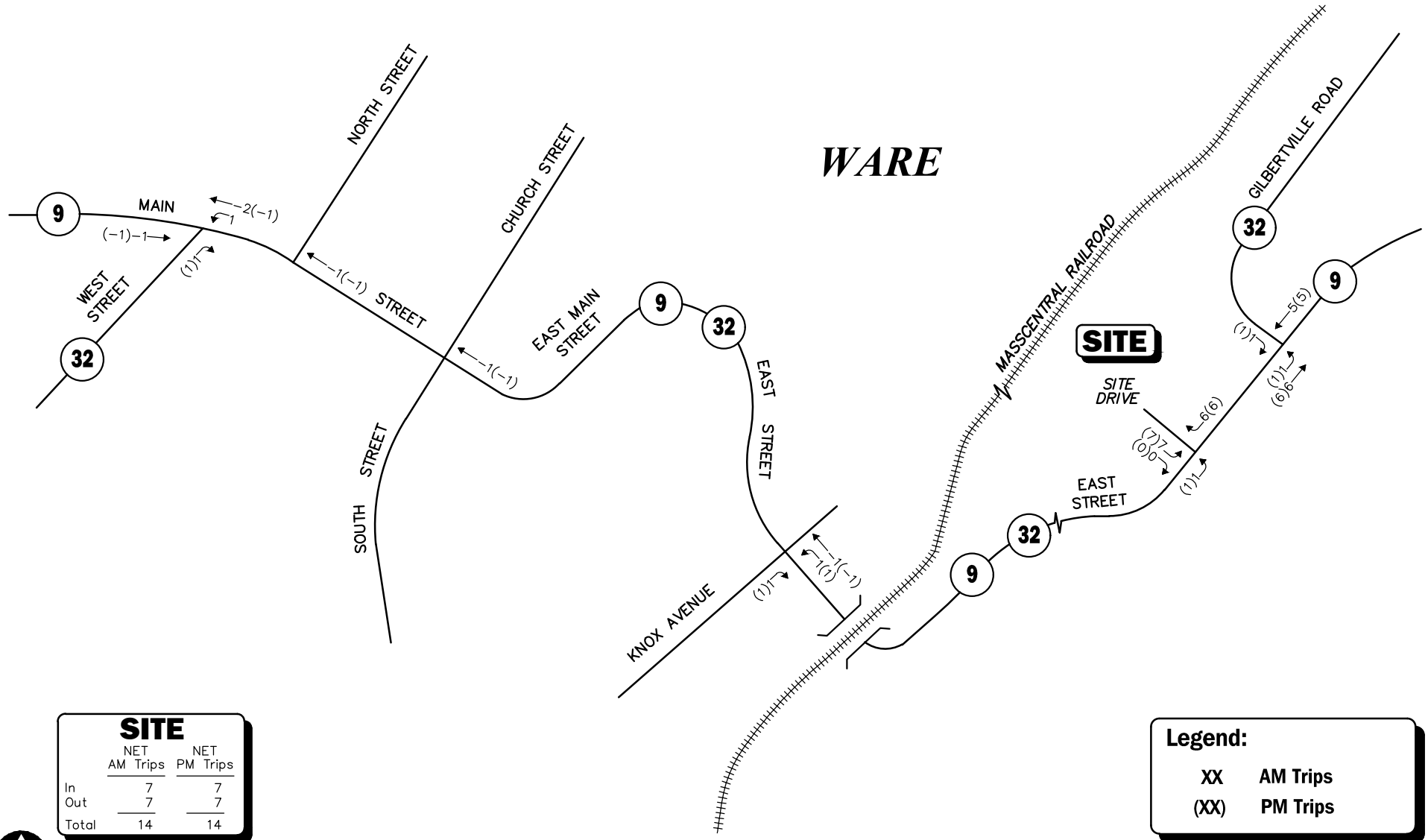
EAST STREET APPROACHING FROM THE NORTH

EAST STREET APPROACHING FROM THE SOUTH

LEFT TURN FROM PROJECT SITE (LOOKING NORTH)

LEFT TURN FROM PROJECT SITE (LOOKING SOUTH)

NO BUILD TO BUILD SITE TRAFFIC INCREASE



SITE	NET AM Trips	NET PM Trips
In	7	7
Out	7	7
Total	14	14

Legend:

XX AM Trips

(XX) PM Trips

Not to Scale

Figure A7

Waste Handling Facility
Net Increase/Decrease
(No-Build to Build)
Peak Hour Traffic Volume

Vanasse & Associates inc

R:\9130\3 - 9130nt2.dwg, 1/18/2022 10:43:07 AM

CAPACITY ANALYSIS

East Street (Routes 9/32) at Site Driveway
East Street (Route 9) at Gilbertville Road (Route 32)
East Street (Routes 9/32) at Knox Avenue
East Main Street (Routes 9/32) at Church Street and South Street
East Main Street (Routes 9/32) at North Street
Main Street (Route 9) at West Street (Route 32)

East Street (Routes 9/32) at Site Driveway

Intersection	
Int Delay, s/veh	0.4

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	5	4	3	205	223	6
Future Vol, veh/h	5	4	3	205	223	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	62	89	89	85	85
Heavy Vehicles, %	100	100	100	4	3	100
Mvmt Flow	8	6	3	230	262	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	502	266	269	0	-	0
Stage 1	266	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	390	586	889	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	619	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	388	586	889	-	-	-
Mov Cap-2 Maneuver	388	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	619	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	13.1	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	889	-	457	-	-
HCM Lane V/C Ratio	0.004	-	0.032	-	-
HCM Control Delay (s)	9.1	0	13.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	4	4	3	320	296	5
Future Vol, veh/h	4	4	3	320	296	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	92	92	96	96
Heavy Vehicles, %	100	100	100	1	2	100
Mvmt Flow	11	11	3	348	308	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	665	311	313	0	-	0
Stage 1	311	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	305	549	850	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	537	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	304	549	850	-	-	-
Mov Cap-2 Maneuver	304	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	537	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	14.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	850	-	391	-	-
HCM Lane V/C Ratio	0.004	-	0.054	-	-
HCM Control Delay (s)	9.3	0	14.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	9	6	5	224	248	10
Future Vol, veh/h	9	6	5	224	248	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	62	89	89	85	85
Heavy Vehicles, %	100	100	100	4	3	100
Mvmt Flow	15	10	6	252	292	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	562	298	304	0	-	0
Stage 1	298	-	-	-	-	-
Stage 2	264	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	356	559	858	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	353	559	858	-	-	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	570	-	-	-	-	-
Stage 2	599	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	14.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	858	-	414	-	-
HCM Lane V/C Ratio	0.007	-	0.058	-	-
HCM Control Delay (s)	9.2	0	14.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	9	6	5	350	323	10
Future Vol, veh/h	9	6	5	350	323	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	92	92	96	96
Heavy Vehicles, %	100	100	100	1	2	100
Mvmt Flow	24	16	5	380	336	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	731	341	346	0	-	0
Stage 1	341	-	-	-	-	-
Stage 2	390	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	275	525	823	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	273	525	823	-	-	-
Mov Cap-2 Maneuver	273	-	-	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	17.1	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	823	-	338	-	-
HCM Lane V/C Ratio	0.007	-	0.117	-	-
HCM Control Delay (s)	9.4	0	17.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	1

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	16	6	6	224	248	16
Future Vol, veh/h	16	6	6	224	248	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	62	89	89	85	85
Heavy Vehicles, %	100	100	100	4	3	100
Mvmt Flow	26	10	7	252	292	19

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	568	302	311	0	-	0
Stage 1	302	-	-	-	-	-
Stage 2	266	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	353	556	852	-	-	-
Stage 1	572	-	-	-	-	-
Stage 2	597	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	349	556	852	-	-	-
Mov Cap-2 Maneuver	349	-	-	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	597	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	15.2	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	852	-	388	-	-
HCM Lane V/C Ratio	0.008	-	0.091	-	-
HCM Control Delay (s)	9.3	0	15.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	16	6	6	350	323	16
Future Vol, veh/h	16	6	6	350	323	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	92	92	96	96
Heavy Vehicles, %	100	100	100	1	2	100
Mvmt Flow	42	16	7	380	336	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	739	345	353	0	-	0
Stage 1	345	-	-	-	-	-
Stage 2	394	-	-	-	-	-
Critical Hdwy	7.4	7.2	5.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	3.1	-	-	-
Pot Cap-1 Maneuver	272	522	817	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	269	522	817	-	-	-
Mov Cap-2 Maneuver	269	-	-	-	-	-
Stage 1	537	-	-	-	-	-
Stage 2	512	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	19.3	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	817	-	310	-	-
HCM Lane V/C Ratio	0.008	-	0.187	-	-
HCM Control Delay (s)	9.4	0	19.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

East Street (Route 9) at Gilbertville Road (Route 32)

Intersection	
Int Delay, s/veh	3.6

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	48	67	63	147	162	26
Future Vol, veh/h	48	67	63	147	162	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	88	88	87	87
Heavy Vehicles, %	8	7	10	6	5	0
Mvmt Flow	56	79	72	167	186	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	512	201	216	0	-	0
Stage 1	201	-	-	-	-	-
Stage 2	311	-	-	-	-	-
Critical Hdwy	6.48	6.27	4.2	-	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.363	2.29	-	-	-
Pot Cap-1 Maneuver	511	827	1308	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	480	827	1308	-	-	-
Mov Cap-2 Maneuver	480	-	-	-	-	-
Stage 1	769	-	-	-	-	-
Stage 2	730	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	11.3	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SELn2	SWT	SWR
Capacity (veh/h)	1308	-	480	827	-	-
HCM Lane V/C Ratio	0.055	-	0.118	0.095	-	-
HCM Control Delay (s)	7.9	0	13.5	9.8	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	0.3	-	-

Intersection	
Int Delay, s/veh	3

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	36	59	89	235	242	35
Future Vol, veh/h	36	59	89	235	242	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	92	92	89	89
Heavy Vehicles, %	3	10	5	2	4	0
Mvmt Flow	46	76	97	255	272	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	741	292	311	0	-	0
Stage 1	292	-	-	-	-	-
Stage 2	449	-	-	-	-	-
Critical Hdwy	6.43	6.3	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.39	2.245	-	-	-
Pot Cap-1 Maneuver	382	729	1233	-	-	-
Stage 1	756	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	347	729	1233	-	-	-
Mov Cap-2 Maneuver	347	-	-	-	-	-
Stage 1	686	-	-	-	-	-
Stage 2	641	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	13	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SELn2	SWT	SWR
Capacity (veh/h)	1233	-	347	729	-	-
HCM Lane V/C Ratio	0.078	-	0.133	0.104	-	-
HCM Control Delay (s)	8.2	0	17	10.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.5	0.3	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	51	74	69	164	184	28
Future Vol, veh/h	51	74	69	164	184	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	88	88	87	87
Heavy Vehicles, %	8	7	10	8	7	0
Mvmt Flow	60	87	78	186	211	32

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	569	227	243	0	-	0
Stage 1	227	-	-	-	-	-
Stage 2	342	-	-	-	-	-
Critical Hdwy	6.48	6.27	4.2	-	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.363	2.29	-	-	-
Pot Cap-1 Maneuver	474	800	1278	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	706	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	442	800	1278	-	-	-
Mov Cap-2 Maneuver	442	-	-	-	-	-
Stage 1	743	-	-	-	-	-
Stage 2	706	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	11.8	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SELn2	SWT	SWR
Capacity (veh/h)	1278	-	442	800	-	-
HCM Lane V/C Ratio	0.061	-	0.136	0.109	-	-
HCM Control Delay (s)	8	0	14.4	10	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	0.4	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	39	64	96	263	269	38
Future Vol, veh/h	39	64	96	263	269	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	92	92	89	89
Heavy Vehicles, %	3	10	5	3	5	0
Mvmt Flow	50	82	104	286	302	43

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	818	324	345	0	-	0
Stage 1	324	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Critical Hdwy	6.43	6.3	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.39	2.245	-	-	-
Pot Cap-1 Maneuver	344	699	1197	-	-	-
Stage 1	731	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	309	699	1197	-	-	-
Mov Cap-2 Maneuver	309	-	-	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	611	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	13.9	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SELn2	SWT	SWR
Capacity (veh/h)	1197	-	309	699	-	-
HCM Lane V/C Ratio	0.087	-	0.162	0.117	-	-
HCM Control Delay (s)	8.3	0	18.9	10.8	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	0.4	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	51	75	70	170	189	28
Future Vol, veh/h	51	75	70	170	189	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	88	88	87	87
Heavy Vehicles, %	8	8	11	11	10	0
Mvmt Flow	60	88	80	193	217	32

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	586	233	249	0	-	0
Stage 1	233	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.48	6.28	4.21	-	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.299	-	-	-
Pot Cap-1 Maneuver	463	791	1266	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	698	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	430	791	1266	-	-	-
Mov Cap-2 Maneuver	430	-	-	-	-	-
Stage 1	736	-	-	-	-	-
Stage 2	698	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	12	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SELn2	SWT	SWR
Capacity (veh/h)	1266	-	430	791	-	-
HCM Lane V/C Ratio	0.063	-	0.14	0.112	-	-
HCM Control Delay (s)	8	0	14.7	10.1	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	0.4	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	39	65	97	269	274	38
Future Vol, veh/h	39	65	97	269	274	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	92	92	89	89
Heavy Vehicles, %	3	11	6	6	7	0
Mvmt Flow	50	83	105	292	308	43

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	832	330	351	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Critical Hdwy	6.43	6.31	4.16	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.399	2.254	-	-	-
Pot Cap-1 Maneuver	338	691	1186	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	302	691	1186	-	-	-
Mov Cap-2 Maneuver	302	-	-	-	-	-
Stage 1	649	-	-	-	-	-
Stage 2	606	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	14.1	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SELn2	SWT	SWR
Capacity (veh/h)	1186	-	302	691	-	-
HCM Lane V/C Ratio	0.089	-	0.166	0.121	-	-
HCM Control Delay (s)	8.3	0	19.3	10.9	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	0.4	-	-

East Street (Routes 9/32) at Knox Avenue

Intersection	
Int Delay, s/veh	3.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	130	7	74	234	1	6	10	97	0	0	0
Future Vol, veh/h	1	130	7	74	234	1	6	10	97	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	90	90	90	76	76	76	92	92	92
Heavy Vehicles, %	100	9	0	0	7	100	0	0	0	0	0	0
Mvmt Flow	1	148	8	82	260	1	8	13	128	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	261	0	0	156	0	0	579	579	152	650	583	261
Stage 1	-	-	-	-	-	-	154	154	-	425	425	-
Stage 2	-	-	-	-	-	-	425	425	-	225	158	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	896	-	-	1436	-	-	429	429	900	385	427	783
Stage 1	-	-	-	-	-	-	853	774	-	611	590	-
Stage 2	-	-	-	-	-	-	611	590	-	782	771	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	896	-	-	1436	-	-	407	400	900	305	398	783
Mov Cap-2 Maneuver	-	-	-	-	-	-	407	400	-	305	398	-
Stage 1	-	-	-	-	-	-	852	773	-	610	550	-
Stage 2	-	-	-	-	-	-	570	550	-	659	770	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.1	1.8	10.8	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	766	1436	-	-	896	-	-	-
HCM Lane V/C Ratio	0.194	0.057	-	-	0.001	-	-	-
HCM Control Delay (s)	10.8	7.7	0	-	9	0	-	0
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.7	0.2	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	247	11	41	272	3	17	2	138	0	2	0
Future Vol, veh/h	0	247	11	41	272	3	17	2	138	0	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	84	84	84	79	79	79	50	50	50
Heavy Vehicles, %	0	3	0	3	4	0	0	0	0	0	50	0
Mvmt Flow	0	305	14	49	324	4	22	3	175	0	4	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	328	0	0	319	0	0	738	738	312	825	743	326
Stage 1	-	-	-	-	-	-	312	312	-	424	424	-
Stage 2	-	-	-	-	-	-	426	426	-	401	319	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.2	7.1	7	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	6	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4	3.3	3.5	4.45	3.3
Pot Cap-1 Maneuver	1243	-	-	1235	-	-	336	348	733	294	292	720
Stage 1	-	-	-	-	-	-	703	661	-	612	513	-
Stage 2	-	-	-	-	-	-	610	589	-	630	575	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1243	-	-	1235	-	-	320	331	733	214	278	720
Mov Cap-2 Maneuver	-	-	-	-	-	-	320	331	-	214	278	-
Stage 1	-	-	-	-	-	-	703	661	-	612	488	-
Stage 2	-	-	-	-	-	-	575	560	-	478	575	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1	13.2	18.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	635	1235	-	-	1243	-	-	278
HCM Lane V/C Ratio	0.313	0.04	-	-	-	-	-	0.014
HCM Control Delay (s)	13.2	8	0	-	0	-	-	18.1
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	3.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	144	8	79	261	1	6	11	104	0	0	0
Future Vol, veh/h	1	144	8	79	261	1	6	11	104	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	90	90	90	76	76	76	92	92	92
Heavy Vehicles, %	100	10	0	0	7	100	0	0	0	0	0	0
Mvmt Flow	1	164	9	88	290	1	8	14	137	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	291	0	0	173	0	0	638	638	169	713	642	291
Stage 1	-	-	-	-	-	-	171	171	-	467	467	-
Stage 2	-	-	-	-	-	-	467	467	-	246	175	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	869	-	-	1416	-	-	392	397	880	349	395	753
Stage 1	-	-	-	-	-	-	836	761	-	580	565	-
Stage 2	-	-	-	-	-	-	580	565	-	762	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	869	-	-	1416	-	-	370	367	880	269	365	753
Mov Cap-2 Maneuver	-	-	-	-	-	-	370	367	-	269	365	-
Stage 1	-	-	-	-	-	-	835	760	-	579	523	-
Stage 2	-	-	-	-	-	-	537	523	-	631	757	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.1	1.8	11.2	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	736	1416	-	-	869	-	- -
HCM Lane V/C Ratio	0.216	0.062	-	-	0.001	-	- -
HCM Control Delay (s)	11.2	7.7	0	-	9.1	0	- 0
HCM Lane LOS	B	A	A	-	A	A	- A
HCM 95th %tile Q(veh)	0.8	0.2	-	-	0	-	- -

Intersection	
Int Delay, s/veh	3.6

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	274	12	44	300	3	18	2	148	0	2	0
Future Vol, veh/h	0	274	12	44	300	3	18	2	148	0	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	84	84	84	79	79	79	50	50	50
Heavy Vehicles, %	0	3	0	3	4	0	0	0	0	0	50	0
Mvmt Flow	0	338	15	52	357	4	23	3	187	0	4	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	361	0	0	353	0	0	811	811	346	904	816	359
Stage 1	-	-	-	-	-	-	346	346	-	463	463	-
Stage 2	-	-	-	-	-	-	465	465	-	441	353	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.2	7.1	7	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	6	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4	3.3	3.5	4.45	3.3
Pot Cap-1 Maneuver	1209	-	-	1200	-	-	300	316	702	260	263	690
Stage 1	-	-	-	-	-	-	674	639	-	583	491	-
Stage 2	-	-	-	-	-	-	581	566	-	599	554	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1209	-	-	1200	-	-	284	299	702	181	249	690
Mov Cap-2 Maneuver	-	-	-	-	-	-	284	299	-	181	249	-
Stage 1	-	-	-	-	-	-	674	639	-	583	464	-
Stage 2	-	-	-	-	-	-	545	535	-	437	554	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1	14.3	19.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	598	1200	-	-	1209	-	-	249
HCM Lane V/C Ratio	0.356	0.044	-	-	-	-	-	0.016
HCM Control Delay (s)	14.3	8.1	0	-	0	-	-	19.7
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	1.6	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	3.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	144	8	80	260	1	6	11	105	0	0	0
Future Vol, veh/h	1	144	8	80	260	1	6	11	105	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	90	90	90	76	76	76	92	92	92
Heavy Vehicles, %	100	10	0	1	7	100	0	0	1	0	0	0
Mvmt Flow	1	164	9	89	289	1	8	14	138	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	290	0	0	173	0	0	639	639	169	715	643	290
Stage 1	-	-	-	-	-	-	171	171	-	468	468	-
Stage 2	-	-	-	-	-	-	468	468	-	247	175	-
Critical Hdwy	5.1	-	-	4.11	-	-	7.1	6.5	6.21	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.209	-	-	3.5	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	870	-	-	1410	-	-	392	397	878	348	394	754
Stage 1	-	-	-	-	-	-	836	761	-	579	565	-
Stage 2	-	-	-	-	-	-	579	565	-	761	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	870	-	-	1410	-	-	369	367	878	268	364	754
Mov Cap-2 Maneuver	-	-	-	-	-	-	369	367	-	268	364	-
Stage 1	-	-	-	-	-	-	835	760	-	578	523	-
Stage 2	-	-	-	-	-	-	536	523	-	628	757	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.1	1.8	11.3	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	736	1410	-	-	870	-	- -
HCM Lane V/C Ratio	0.218	0.063	-	-	0.001	-	- -
HCM Control Delay (s)	11.3	7.7	0	-	9.1	0	- 0
HCM Lane LOS	B	A	A	-	A	A	- A
HCM 95th %tile Q(veh)	0.8	0.2	-	-	0	-	- -

Intersection	
Int Delay, s/veh	3.7

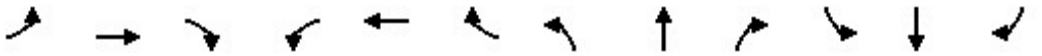
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	274	12	45	299	3	18	2	149	0	2	0
Future Vol, veh/h	0	274	12	45	299	3	18	2	149	0	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	84	84	84	79	79	79	50	50	50
Heavy Vehicles, %	0	3	0	4	4	0	1	0	0	0	50	0
Mvmt Flow	0	338	15	54	356	4	23	3	189	0	4	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	360	0	0	353	0	0	814	814	346	908	819	358
Stage 1	-	-	-	-	-	-	346	346	-	466	466	-
Stage 2	-	-	-	-	-	-	468	468	-	442	353	-
Critical Hdwy	4.1	-	-	4.14	-	-	7.11	6.5	6.2	7.1	7	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.5	-	6.1	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.5	-	6.1	6	-
Follow-up Hdwy	2.2	-	-	2.236	-	-	3.509	4	3.3	3.5	4.45	3.3
Pot Cap-1 Maneuver	1210	-	-	1195	-	-	298	315	702	258	262	691
Stage 1	-	-	-	-	-	-	672	639	-	581	489	-
Stage 2	-	-	-	-	-	-	577	565	-	598	554	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1210	-	-	1195	-	-	282	297	702	180	247	691
Mov Cap-2 Maneuver	-	-	-	-	-	-	282	297	-	180	247	-
Stage 1	-	-	-	-	-	-	672	639	-	581	462	-
Stage 2	-	-	-	-	-	-	540	533	-	436	554	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.1	14.3	19.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	598	1195	-	-	1210	-	-	247
HCM Lane V/C Ratio	0.358	0.045	-	-	-	-	-	0.016
HCM Control Delay (s)	14.3	8.2	0	-	0	-	-	19.8
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	1.6	0.1	-	-	0	-	-	0

East Main Street (Routes 9/32) at Church Street and South Street



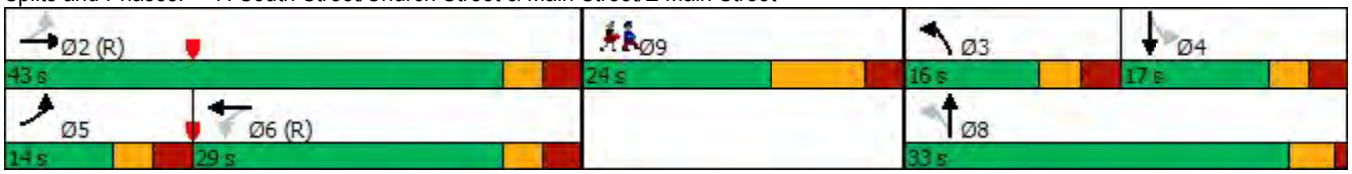
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	123	58	3	257	6	191	28	9	3	34	162
Future Volume (vph)	101	123	58	3	257	6	191	28	9	3	34	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	15	15	15	15	15	13	13	13	14	14	14
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952			0.997			0.994			0.890	
Flt Protected	0.950				0.999			0.960			0.999	
Satd. Flow (prot)	1678	1841	0	0	1908	0	0	1802	0	0	1773	0
Flt Permitted	0.189				0.995			0.199			0.992	
Satd. Flow (perm)	334	1841	0	0	1900	0	0	374	0	0	1761	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			1			2			176	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		177			476			696			1124	
Travel Time (s)		4.8			13.0			19.0			30.7	
Peak Hour Factor	0.81	0.81	0.81	0.83	0.83	0.83	0.93	0.93	0.93	0.70	0.70	0.70
Heavy Vehicles (%)	4%	10%	4%	33%	9%	0%	2%	9%	29%	0%	0%	2%
Adj. Flow (vph)	125	152	72	4	310	7	205	30	10	4	49	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	125	224	0	0	321	0	0	245	0	0	284	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	0.88	0.88	0.88	0.88	0.88	0.96	0.96	0.96	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.5	24.0		24.0	24.0		24.0	22.5		24.0	24.0	
Total Split (s)	14.0	43.0		29.0	29.0		16.0	33.0		17.0	17.0	
Total Split (%)	14.0%	43.0%		29.0%	29.0%		16.0%	33.0%		17.0%	17.0%	
Maximum Green (s)	8.0	37.0		23.0	23.0		10.0	28.5		11.0	11.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.5		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	1.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0			4.5			6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Max	None		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	37.0	37.0			23.2			47.7			11.0	
Actuated g/C Ratio	0.37	0.37			0.23			0.48			0.11	
v/c Ratio	0.55	0.32			0.73			0.40			0.81	
Control Delay	39.3	25.2			46.4			22.2			36.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	39.3	25.2			46.4			22.2			36.2	
LOS	D	C			D			C			D	
Approach Delay		30.3			46.4			22.2			36.2	
Approach LOS		C			D			C			D	

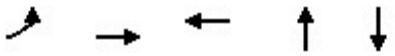
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 98 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 34.3		Intersection LOS: C	
Intersection Capacity Utilization 67.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: South Street/Church Street & Main Street/E Main Street



Lane Group	Ø9
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	28.0
Total Split (s)	24.0
Total Split (%)	24%
Maximum Green (s)	14.0
Yellow Time (s)	7.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

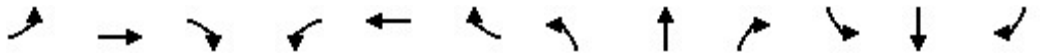
Intersection Summary



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	125	224	321	245	284
v/c Ratio	0.55	0.32	0.73	0.40	0.81
Control Delay	39.3	25.2	46.4	22.2	36.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.3	25.2	46.4	22.2	36.2
Queue Length 50th (ft)	41	63	190	81	66
Queue Length 95th (ft)	m118	168	260	#255	89
Internal Link Dist (ft)		97	396	616	1044
Turn Bay Length (ft)	100				
Base Capacity (vph)	231	698	441	618	350
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.32	0.73	0.40	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



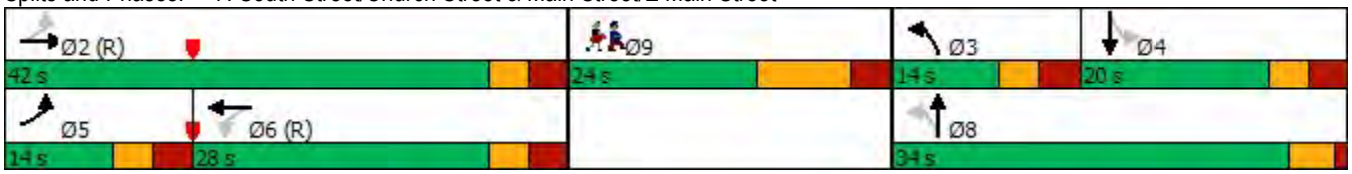
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	206	229	38	10	278	5	247	72	15	2	12	170
Future Volume (vph)	206	229	38	10	278	5	247	72	15	2	12	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	15	15	15	15	15	13	13	13	14	14	14
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.998			0.994			0.875	
Flt Protected	0.950				0.998			0.964			0.999	
Satd. Flow (prot)	1728	1962	0	0	2005	0	0	1841	0	0	1739	0
Flt Permitted	0.200				0.976			0.311			0.993	
Satd. Flow (perm)	364	1962	0	0	1961	0	0	594	0	0	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			1			2			183	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		177			476			696			1124	
Travel Time (s)		4.8			13.0			19.0			30.7	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.76	0.76	0.76	0.93	0.93	0.93
Heavy Vehicles (%)	1%	3%	12%	0%	4%	0%	3%	0%	0%	0%	0%	2%
Adj. Flow (vph)	248	276	46	11	302	5	325	95	20	2	13	183
Shared Lane Traffic (%)												
Lane Group Flow (vph)	248	322	0	0	318	0	0	440	0	0	198	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	0.88	0.88	0.88	0.88	0.88	0.96	0.96	0.96	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.5	24.0		24.0	24.0		24.0	22.5		24.0	24.0	
Total Split (s)	14.0	42.0		28.0	28.0		14.0	34.0		20.0	20.0	
Total Split (%)	14.0%	42.0%		28.0%	28.0%		14.0%	34.0%		20.0%	20.0%	
Maximum Green (s)	8.0	36.0		22.0	22.0		8.0	29.5		14.0	14.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.5		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	1.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0			4.5			6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Max	None		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	36.0	36.0			22.0			48.7			14.0	
Actuated g/C Ratio	0.36	0.36			0.22			0.49			0.14	
v/c Ratio	1.03	0.45			0.74			0.68			0.50	
Control Delay	101.8	33.6			47.7			28.3			12.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	101.8	33.6			47.7			28.3			12.2	
LOS	F	C			D			C			B	
Approach Delay		63.2			47.7			28.3			12.2	
Approach LOS		E			D			C			B	

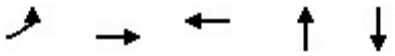
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 98 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 135			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.03			
Intersection Signal Delay: 43.3		Intersection LOS: D	
Intersection Capacity Utilization 78.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 7: South Street/Church Street & Main Street/E Main Street



Lane Group	Ø9
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	28.0
Total Split (s)	24.0
Total Split (%)	24%
Maximum Green (s)	14.0
Yellow Time (s)	7.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	10
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	248	322	318	440	198
v/c Ratio	1.03	0.45	0.74	0.68	0.50
Control Delay	101.8	33.6	47.7	28.3	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	101.8	33.6	47.7	28.3	12.2
Queue Length 50th (ft)	~134	160	189	162	8
Queue Length 95th (ft)	m#226	260	#305	#381	72
Internal Link Dist (ft)		97	396	616	1044
Turn Bay Length (ft)	100				
Base Capacity (vph)	240	712	432	648	399
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.03	0.45	0.74	0.68	0.50

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

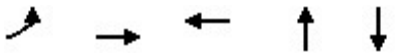
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	142	62	3	283	6	205	30	10	3	36	175
Future Volume (vph)	109	142	62	3	283	6	205	30	10	3	36	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	15	15	15	15	15	13	13	13	14	14	14
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954			0.997			0.994			0.889	
Flt Protected	0.950				0.999			0.960			0.999	
Satd. Flow (prot)	1678	1832	0	0	1891	0	0	1802	0	0	1771	0
Flt Permitted	0.380				0.997			0.169			0.994	
Satd. Flow (perm)	671	1832	0	0	1888	0	0	317	0	0	1762	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			1			3			195	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		177			476			696			1124	
Travel Time (s)		4.8			13.0			19.0			30.7	
Peak Hour Factor	0.81	0.81	0.81	0.83	0.83	0.83	0.93	0.93	0.93	0.70	0.70	0.70
Heavy Vehicles (%)	4%	11%	4%	33%	10%	0%	2%	9%	29%	0%	0%	2%
Adj. Flow (vph)	135	175	77	4	341	7	220	32	11	4	51	250
Shared Lane Traffic (%)												
Lane Group Flow (vph)	135	252	0	0	352	0	0	263	0	0	305	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	0.88	0.88	0.88	0.88	0.88	0.96	0.96	0.96	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.5	24.0		24.0	24.0		24.0	22.5		24.0	24.0	
Total Split (s)	14.0	57.0		43.0	43.0		21.0	43.0		22.0	22.0	
Total Split (%)	14.0%	57.0%		43.0%	43.0%		21.0%	43.0%		22.0%	22.0%	
Maximum Green (s)	8.0	51.0		37.0	37.0		15.0	38.5		16.0	16.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.5		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	1.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0			4.5			6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Max	None		Max	Max	
Act Effct Green (s)	51.0	51.0			37.2			38.5			16.0	
Actuated g/C Ratio	0.51	0.51			0.37			0.38			0.16	
v/c Ratio	0.32	0.27			0.50			0.71			0.69	
Control Delay	10.8	8.6			27.3			34.8			23.3	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	10.8	8.6			27.3			34.8			23.3	
LOS	B	A			C			C			C	
Approach Delay		9.4			27.3			34.8			23.3	
Approach LOS		A			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 9 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 22.6		Intersection LOS: C	
Intersection Capacity Utilization 71.8%		ICU Level of Service C	
Analysis Period (min) 15			

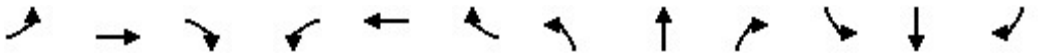
Splits and Phases: 7: South Street/Church Street & Main Street/E Main Street



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	135	252	352	263	305
v/c Ratio	0.32	0.27	0.50	0.71	0.69
Control Delay	10.8	8.6	27.3	34.8	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	8.6	27.3	34.8	23.3
Queue Length 50th (ft)	50	87	171	117	64
Queue Length 95th (ft)	30	32	230	#213	83
Internal Link Dist (ft)		97	396	616	1044
Turn Bay Length (ft)	100				
Base Capacity (vph)	422	950	703	368	445
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.27	0.50	0.71	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

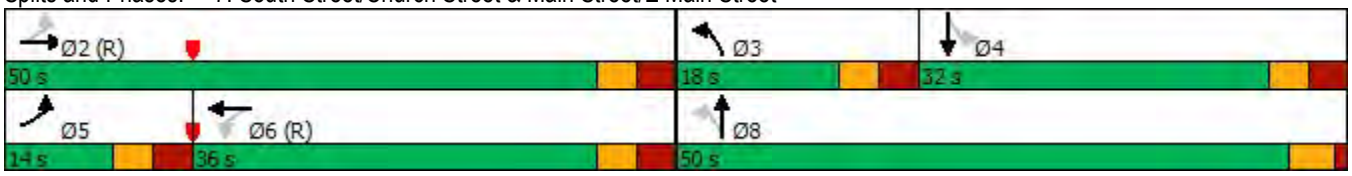


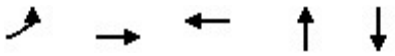
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	254	41	11	307	5	265	77	17	2	13	183
Future Volume (vph)	222	254	41	11	307	5	265	77	17	2	13	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	15	15	15	15	15	13	13	13	14	14	14
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.998			0.994			0.875	
Flt Protected	0.950				0.998			0.964				
Satd. Flow (prot)	1728	1947	0	0	2005	0	0	1840	0	0	1741	0
Flt Permitted	0.321				0.982			0.460			0.996	
Satd. Flow (perm)	584	1947	0	0	1973	0	0	878	0	0	1734	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			1			3			197	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		177			476			696			1124	
Travel Time (s)		4.8			13.0			19.0			30.7	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.76	0.76	0.76	0.93	0.93	0.93
Heavy Vehicles (%)	1%	4%	12%	0%	4%	0%	3%	0%	0%	0%	0%	2%
Adj. Flow (vph)	267	306	49	12	334	5	349	101	22	2	14	197
Shared Lane Traffic (%)												
Lane Group Flow (vph)	267	355	0	0	351	0	0	472	0	0	213	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	0.88	0.88	0.88	0.88	0.88	0.96	0.96	0.96	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.5	24.0		24.0	24.0		24.0	22.5		24.0	24.0	
Total Split (s)	14.0	50.0		36.0	36.0		18.0	50.0		32.0	32.0	
Total Split (%)	14.0%	50.0%		36.0%	36.0%		18.0%	50.0%		32.0%	32.0%	
Maximum Green (s)	8.0	44.0		30.0	30.0		12.0	45.5		26.0	26.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.5		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	1.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0			4.5			6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Max	None		Max	Max	
Act Effct Green (s)	44.0	44.0			30.0			45.5			26.0	
Actuated g/C Ratio	0.44	0.44			0.30			0.46			0.26	
v/c Ratio	0.77	0.41			0.59			0.89			0.36	
Control Delay	38.2	21.4			34.6			42.8			7.3	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	38.2	21.4			34.6			42.8			7.3	
LOS	D	C			C			D			A	
Approach Delay		28.6			34.6			42.8			7.3	
Approach LOS		C			C			D			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 98 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 31.2		Intersection LOS: C	
Intersection Capacity Utilization 83.5%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 7: South Street/Church Street & Main Street/E Main Street

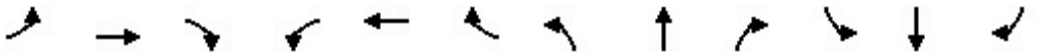




Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	267	355	351	472	213
v/c Ratio	0.77	0.41	0.59	0.89	0.36
Control Delay	38.2	21.4	34.6	42.8	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	21.4	34.6	42.8	7.3
Queue Length 50th (ft)	123	172	189	212	8
Queue Length 95th (ft)	#168	178	283	244	63
Internal Link Dist (ft)		97	396	616	1044
Turn Bay Length (ft)	100				
Base Capacity (vph)	348	862	592	530	596
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.77	0.41	0.59	0.89	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

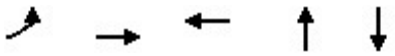


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	142	62	3	283	6	205	30	10	3	36	175
Future Volume (vph)	109	142	62	3	283	6	205	30	10	3	36	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	15	15	15	15	15	13	13	13	14	14	14
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954			0.997			0.994			0.889	
Flt Protected	0.950				0.999			0.960			0.999	
Satd. Flow (prot)	1678	1832	0	0	1908	0	0	1802	0	0	1771	0
Flt Permitted	0.380				0.997			0.169			0.994	
Satd. Flow (perm)	671	1832	0	0	1904	0	0	317	0	0	1762	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			1			3			195	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		177			476			696			1124	
Travel Time (s)		4.8			13.0			19.0			30.7	
Peak Hour Factor	0.81	0.81	0.81	0.83	0.83	0.83	0.93	0.93	0.93	0.70	0.70	0.70
Heavy Vehicles (%)	4%	11%	4%	33%	9%	0%	2%	9%	29%	0%	0%	2%
Adj. Flow (vph)	135	175	77	4	341	7	220	32	11	4	51	250
Shared Lane Traffic (%)												
Lane Group Flow (vph)	135	252	0	0	352	0	0	263	0	0	305	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	0.88	0.88	0.88	0.88	0.88	0.96	0.96	0.96	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.5	24.0		24.0	24.0		24.0	22.5		24.0	24.0	
Total Split (s)	14.0	57.0		43.0	43.0		21.0	43.0		22.0	22.0	
Total Split (%)	14.0%	57.0%		43.0%	43.0%		21.0%	43.0%		22.0%	22.0%	
Maximum Green (s)	8.0	51.0		37.0	37.0		15.0	38.5		16.0	16.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.5		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	1.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0			4.5			6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Max	None		Max	Max	
Act Effct Green (s)	51.0	51.0			37.2			38.5			16.0	
Actuated g/C Ratio	0.51	0.51			0.37			0.38			0.16	
v/c Ratio	0.32	0.27			0.50			0.71			0.69	
Control Delay	10.5	8.2			27.2			34.8			23.3	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	10.5	8.2			27.2			34.8			23.3	
LOS	B	A			C			C			C	
Approach Delay		9.0			27.2			34.8			23.3	
Approach LOS		A			C			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 9 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 22.4	Intersection LOS: C
Intersection Capacity Utilization 71.8%	ICU Level of Service C
Analysis Period (min) 15	

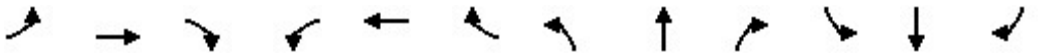
Splits and Phases: 7: South Street/Church Street & Main Street/E Main Street



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	135	252	352	263	305
v/c Ratio	0.32	0.27	0.50	0.71	0.69
Control Delay	10.5	8.2	27.2	34.8	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	8.2	27.2	34.8	23.3
Queue Length 50th (ft)	50	87	171	117	64
Queue Length 95th (ft)	32	34	230	#213	83
Internal Link Dist (ft)		97	396	616	1044
Turn Bay Length (ft)	100				
Base Capacity (vph)	422	950	709	368	445
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.27	0.50	0.71	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

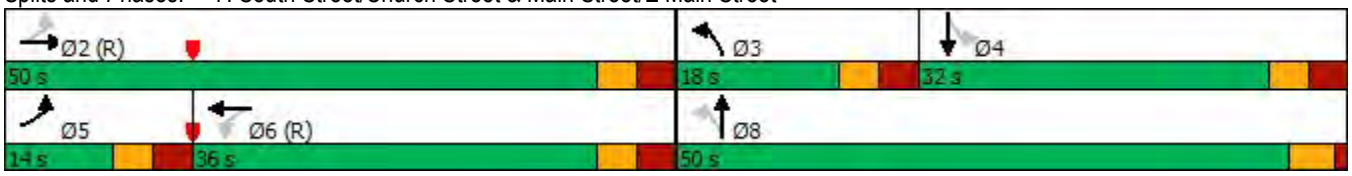


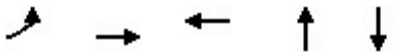
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	254	41	11	306	5	265	77	17	2	13	183
Future Volume (vph)	222	254	41	11	306	5	265	77	17	2	13	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	15	15	15	15	15	13	13	13	14	14	14
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.998			0.994			0.875	
Flt Protected	0.950				0.998			0.964				
Satd. Flow (prot)	1728	1947	0	0	2005	0	0	1840	0	0	1741	0
Flt Permitted	0.322				0.982			0.460			0.996	
Satd. Flow (perm)	586	1947	0	0	1973	0	0	878	0	0	1734	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			1			3			197	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		177			476			696			1124	
Travel Time (s)		4.8			13.0			19.0			30.7	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.76	0.76	0.76	0.93	0.93	0.93
Heavy Vehicles (%)	1%	4%	12%	0%	4%	0%	3%	0%	0%	0%	0%	2%
Adj. Flow (vph)	267	306	49	12	333	5	349	101	22	2	14	197
Shared Lane Traffic (%)												
Lane Group Flow (vph)	267	355	0	0	350	0	0	472	0	0	213	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	0.88	0.88	0.88	0.88	0.88	0.96	0.96	0.96	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.5	24.0		24.0	24.0		24.0	22.5		24.0	24.0	
Total Split (s)	14.0	50.0		36.0	36.0		18.0	50.0		32.0	32.0	
Total Split (%)	14.0%	50.0%		36.0%	36.0%		18.0%	50.0%		32.0%	32.0%	
Maximum Green (s)	8.0	44.0		30.0	30.0		12.0	45.5		26.0	26.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.5		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	1.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0			4.5			6.0	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Max	None		Max	Max	
Act Effct Green (s)	44.0	44.0			30.0			45.5			26.0	
Actuated g/C Ratio	0.44	0.44			0.30			0.46			0.26	
v/c Ratio	0.77	0.41			0.59			0.89			0.36	
Control Delay	38.0	21.4			34.6			42.8			7.3	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	38.0	21.4			34.6			42.8			7.3	
LOS	D	C			C			D			A	
Approach Delay		28.5			34.6			42.8			7.3	
Approach LOS		C			C			D			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 98 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 31.2		Intersection LOS: C	
Intersection Capacity Utilization 83.5%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 7: South Street/Church Street & Main Street/E Main Street



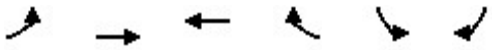


Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	267	355	350	472	213
v/c Ratio	0.77	0.41	0.59	0.89	0.36
Control Delay	38.0	21.4	34.6	42.8	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	21.4	34.6	42.8	7.3
Queue Length 50th (ft)	124	173	189	212	8
Queue Length 95th (ft)	#167	177	283	244	63
Internal Link Dist (ft)		97	396	616	1044
Turn Bay Length (ft)	100				
Base Capacity (vph)	349	862	592	530	596
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.77	0.41	0.59	0.89	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

East Main Street (Routes 9/32) at North Street

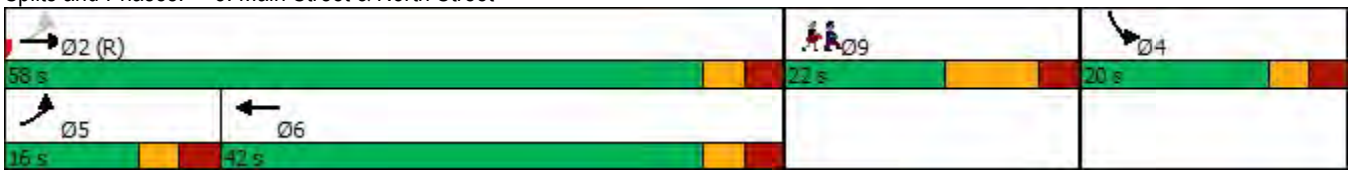


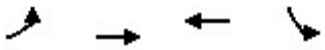
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	65	268	612	10	20	213	
Future Volume (vph)	65	268	612	10	20	213	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	11	11	11	11	16	16	
Storage Length (ft)	100			0	0	0	
Storage Lanes	1			0	1	0	
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00	
Frt			0.998		0.876		
Flt Protected	0.950				0.996		
Satd. Flow (prot)	1454	1545	2976	0	1631	0	
Flt Permitted	0.279				0.996		
Satd. Flow (perm)	427	1545	2976	0	1631	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			2		313		
Link Speed (mph)		25	25		25		
Link Distance (ft)		287	373		938		
Travel Time (s)		7.8	10.2		25.6		
Peak Hour Factor	0.87	0.87	0.81	0.81	0.68	0.68	
Heavy Vehicles (%)	8%	7%	5%	25%	0%	4%	
Adj. Flow (vph)	75	308	756	12	29	313	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	75	308	768	0	342	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		11	11		16		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.19	1.19	1.19	1.19	0.97	0.97	
Turning Speed (mph)	15			9	15	9	
Number of Detectors	1	2	2		1		
Detector Template	Left	Thru	Thru		Left		
Leading Detector (ft)	20	100	100		20		
Trailing Detector (ft)	0	0	0		0		
Detector 1 Position(ft)	0	0	0		0		
Detector 1 Size(ft)	20	6	6		20		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		0.0		
Detector 2 Position(ft)		94	94				
Detector 2 Size(ft)		6	6				
Detector 2 Type		Cl+Ex	Cl+Ex				
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0				
Turn Type	pm+pt	NA	NA		Prot		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Protected Phases	5	2	6		4		9
Permitted Phases	2						
Detector Phase	5	2	6		4		
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0		5.0		5.0
Minimum Split (s)	11.0	24.0	24.0		20.0		28.0
Total Split (s)	16.0	58.0	42.0		20.0		22.0
Total Split (%)	16.0%	58.0%	42.0%		20.0%		22%
Maximum Green (s)	10.0	52.0	36.0		14.0		12.0
Yellow Time (s)	3.0	3.0	3.0		3.0		7.0
All-Red Time (s)	3.0	3.0	3.0		3.0		3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		
Total Lost Time (s)	6.0	6.0	6.0		6.0		
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min	Min		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							7
Act Effct Green (s)	74.7	74.7	61.6		8.9		
Actuated g/C Ratio	0.75	0.75	0.62		0.09		
v/c Ratio	0.19	0.27	0.42		0.80		
Control Delay	5.1	5.1	14.4		21.2		
Queue Delay	0.0	0.6	0.1		2.9		
Total Delay	5.1	5.7	14.5		24.2		
LOS	A	A	B		C		
Approach Delay		5.6	14.5		24.2		
Approach LOS		A	B		C		

Intersection Summary			
Area Type:	CBD		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 5 (5%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 14.4		Intersection LOS: B	
Intersection Capacity Utilization 54.2%		ICU Level of Service A	
Analysis Period (min) 15			

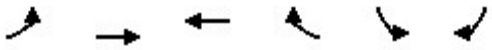
Splits and Phases: 5: Main Street & North Street





Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	75	308	768	342
v/c Ratio	0.19	0.27	0.42	0.80
Control Delay	5.1	5.1	14.4	21.2
Queue Delay	0.0	0.6	0.1	2.9
Total Delay	5.1	5.7	14.5	24.2
Queue Length 50th (ft)	5	22	80	18
Queue Length 95th (ft)	28	117	300	25
Internal Link Dist (ft)		207	293	858
Turn Bay Length (ft)	100			
Base Capacity (vph)	421	1154	1835	497
Starvation Cap Reductn	0	500	0	0
Spillback Cap Reductn	0	0	234	77
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.47	0.48	0.81

Intersection Summary

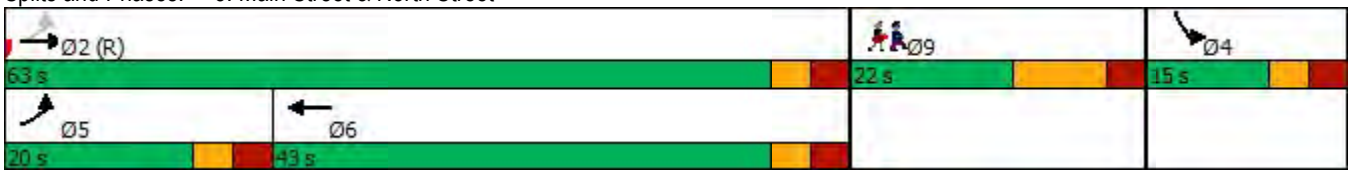


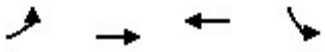
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	174	433	692	32	24	210	
Future Volume (vph)	174	433	692	32	24	210	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	11	11	11	11	16	16	
Storage Length (ft)	100			0	0	0	
Storage Lanes	1			0	1	0	
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00	
Frt			0.993		0.879		
Flt Protected	0.950				0.995		
Satd. Flow (prot)	1540	1605	3004	0	1651	0	
Flt Permitted	0.259				0.995		
Satd. Flow (perm)	420	1605	3004	0	1651	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			5		273		
Link Speed (mph)		25	25		25		
Link Distance (ft)		287	373		938		
Travel Time (s)		7.8	10.2		25.6		
Peak Hour Factor	0.91	0.91	0.90	0.90	0.77	0.77	
Heavy Vehicles (%)	2%	3%	4%	0%	0%	3%	
Adj. Flow (vph)	191	476	769	36	31	273	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	191	476	805	0	304	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		11	11		16		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.19	1.19	1.19	1.19	0.97	0.97	
Turning Speed (mph)	15			9	15	9	
Number of Detectors	1	2	2		1		
Detector Template	Left	Thru	Thru		Left		
Leading Detector (ft)	20	100	100		20		
Trailing Detector (ft)	0	0	0		0		
Detector 1 Position(ft)	0	0	0		0		
Detector 1 Size(ft)	20	6	6		20		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		0.0		
Detector 2 Position(ft)		94	94				
Detector 2 Size(ft)		6	6				
Detector 2 Type		Cl+Ex	Cl+Ex				
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0				
Turn Type	pm+pt	NA	NA		Prot		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Protected Phases	5	2	6		4		9
Permitted Phases	2						
Detector Phase	5	2	6		4		
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0		5.0		5.0
Minimum Split (s)	11.0	24.0	24.0		20.0		28.0
Total Split (s)	20.0	63.0	43.0		15.0		22.0
Total Split (%)	20.0%	63.0%	43.0%		15.0%		22%
Maximum Green (s)	14.0	57.0	37.0		9.0		12.0
Yellow Time (s)	3.0	3.0	3.0		3.0		7.0
All-Red Time (s)	3.0	3.0	3.0		3.0		3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		
Total Lost Time (s)	6.0	6.0	6.0		6.0		
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min	Min		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	75.2	75.2	60.0		8.4		
Actuated g/C Ratio	0.75	0.75	0.60		0.08		
v/c Ratio	0.46	0.39	0.45		0.78		
Control Delay	7.4	6.0	18.1		23.1		
Queue Delay	0.5	1.1	0.2		4.2		
Total Delay	7.9	7.0	18.3		27.3		
LOS	A	A	B		C		
Approach Delay		7.3	18.3		27.3		
Approach LOS		A	B		C		

Intersection Summary			
Area Type:	CBD		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 5 (5%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 64.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: Main Street & North Street

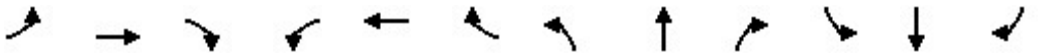




Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	191	476	805	304
v/c Ratio	0.46	0.39	0.45	0.78
Control Delay	7.4	6.0	18.1	23.1
Queue Delay	0.5	1.1	0.2	4.2
Total Delay	7.9	7.0	18.3	27.3
Queue Length 50th (ft)	15	44	102	19
Queue Length 95th (ft)	m61	323	351	59
Internal Link Dist (ft)		207	293	858
Turn Bay Length (ft)	100			
Base Capacity (vph)	472	1207	1805	406
Starvation Cap Reductn	79	474	0	0
Spillback Cap Reductn	0	0	358	51
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.65	0.56	0.86

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

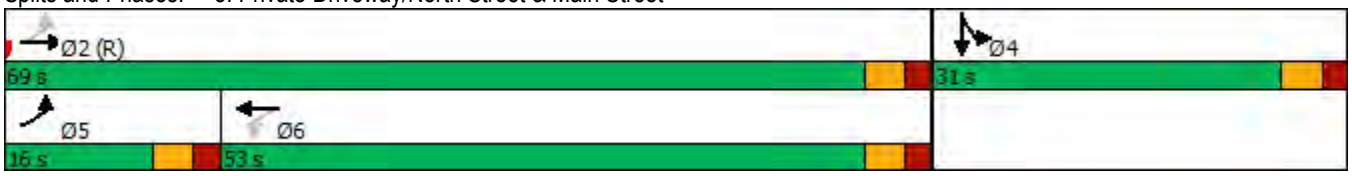


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	298	0	0	664	11	0	0	0	21	1	229
Future Volume (vph)	71	298	0	0	664	11	0	0	0	21	1	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	11	12	12	12	16	12	16
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997						0.877	
Flt Protected	0.950										0.996	
Satd. Flow (prot)	1454	1545	0	0	2973	0	0	0	0	0	1441	0
Flt Permitted	0.283										0.996	
Satd. Flow (perm)	433	1545	0	0	2973	0	0	0	0	0	1441	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					2						296	
Link Speed (mph)		25			25			30			25	
Link Distance (ft)		287			373			153			938	
Travel Time (s)		7.8			10.2			3.5			25.6	
Peak Hour Factor	0.87	0.87	0.92	0.92	0.81	0.81	0.92	0.92	0.92	0.68	0.92	0.68
Heavy Vehicles (%)	8%	7%	2%	2%	5%	25%	2%	2%	2%	0%	2%	4%
Adj. Flow (vph)	82	343	0	0	820	14	0	0	0	31	1	337
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	343	0	0	834	0	0	0	0	0	369	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.19	1.19	1.14	1.14	1.14	0.97	1.14	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2					1	2	
Detector Template	Left	Thru		Left	Thru					Left	Thru	
Leading Detector (ft)	20	100		20	100					20	100	
Trailing Detector (ft)	0	0		0	0					0	0	
Detector 1 Position(ft)	0	0		0	0					0	0	
Detector 1 Size(ft)	20	6		20	6					20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	pm+pt	NA			NA					Split	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6					4	4	
Permitted Phases	2			6								
Detector Phase	5	2		6	6					4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0					5.0	5.0	
Minimum Split (s)	11.0	24.0		24.0	24.0					20.0	20.0	
Total Split (s)	16.0	69.0		53.0	53.0					31.0	31.0	
Total Split (%)	16.0%	69.0%		53.0%	53.0%					31.0%	31.0%	
Maximum Green (s)	11.0	64.0		48.0	48.0					26.0	26.0	
Yellow Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0					2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0						0.0	
Total Lost Time (s)	5.0	5.0			5.0						5.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Recall Mode	Min	C-Min		Min	Min					None	None	
Act Effct Green (s)	76.8	76.8			64.7						13.2	
Actuated g/C Ratio	0.77	0.77			0.65						0.13	
v/c Ratio	0.20	0.29			0.43						0.83	
Control Delay	8.4	8.8			9.6						25.0	
Queue Delay	0.0	0.5			0.0						0.0	
Total Delay	8.4	9.4			9.7						25.0	
LOS	A	A			A						C	
Approach Delay		9.2			9.7						25.0	
Approach LOS		A			A						C	

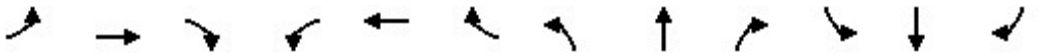
Intersection Summary			
Area Type:	CBD		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 5 (5%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Private Driveway/North Street & Main Street



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	82	343	834	369
v/c Ratio	0.20	0.29	0.43	0.83
Control Delay	8.4	8.8	9.6	25.0
Queue Delay	0.0	0.5	0.0	0.0
Total Delay	8.4	9.4	9.7	25.0
Queue Length 50th (ft)	15	78	106	44
Queue Length 95th (ft)	51	199	174	133
Internal Link Dist (ft)		207	293	858
Turn Bay Length (ft)	100			
Base Capacity (vph)	445	1187	1924	593
Starvation Cap Reductn	0	476	0	0
Spillback Cap Reductn	0	0	19	1
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.48	0.44	0.62

Intersection Summary

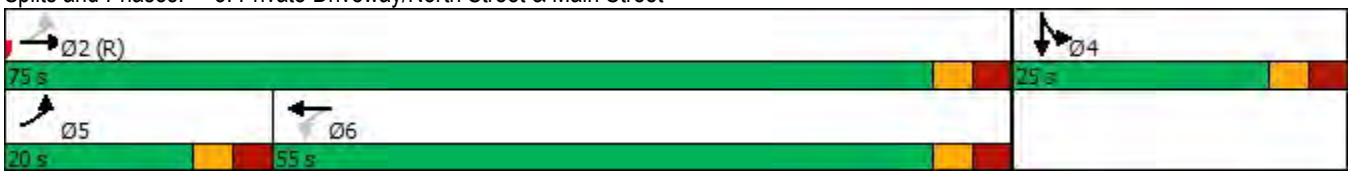


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	473	0	0	752	34	0	0	0	26	0	226
Future Volume (vph)	188	473	0	0	752	34	0	0	0	26	0	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	11	12	12	12	16	12	16
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.993						0.879	
Flt Protected	0.950										0.995	
Satd. Flow (prot)	1540	1605	0	0	3004	0	0	0	0	0	1456	0
Flt Permitted	0.262										0.995	
Satd. Flow (perm)	425	1605	0	0	3004	0	0	0	0	0	1456	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					6						294	
Link Speed (mph)		25			25			30			25	
Link Distance (ft)		287			373			153			938	
Travel Time (s)		7.8			10.2			3.5			25.6	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.90	0.90	0.92	0.92	0.92	0.77	0.92	0.77
Heavy Vehicles (%)	2%	3%	2%	2%	4%	0%	2%	2%	2%	0%	2%	3%
Adj. Flow (vph)	207	520	0	0	836	38	0	0	0	34	0	294
Shared Lane Traffic (%)												
Lane Group Flow (vph)	207	520	0	0	874	0	0	0	0	0	328	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.19	1.19	1.14	1.14	1.14	0.97	1.14	0.97
Turning Speed (mph)	15		60	60		9	60		60	15		9
Number of Detectors	1	2		1	2					1	2	
Detector Template	Left	Thru		Left	Thru					Left	Thru	
Leading Detector (ft)	20	100		20	100					20	100	
Trailing Detector (ft)	0	0		0	0					0	0	
Detector 1 Position(ft)	0	0		0	0					0	0	
Detector 1 Size(ft)	20	6		20	6					20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	pm+pt	NA			NA					Split	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6					4	4	
Permitted Phases	2			6								
Detector Phase	5	2		6	6					4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0					5.0	5.0	
Minimum Split (s)	11.0	24.0		24.0	24.0					20.0	20.0	
Total Split (s)	20.0	75.0		55.0	55.0					25.0	25.0	
Total Split (%)	20.0%	75.0%		55.0%	55.0%					25.0%	25.0%	
Maximum Green (s)	14.0	69.0		49.0	49.0					19.0	19.0	
Yellow Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0						0.0	
Total Lost Time (s)	6.0	6.0			6.0						6.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Recall Mode	Min	C-Min		Min	Min					None	None	
Act Effct Green (s)	77.4	77.4			62.0						10.6	
Actuated g/C Ratio	0.77	0.77			0.62						0.11	
v/c Ratio	0.48	0.42			0.47						0.79	
Control Delay	6.9	4.0			13.6						21.0	
Queue Delay	0.3	0.8			0.0						0.1	
Total Delay	7.2	4.8			13.7						21.1	
LOS	A	A			B						C	
Approach Delay		5.5			13.7						21.1	
Approach LOS		A			B						C	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 84.1%		ICU Level of Service E	
Analysis Period (min) 15			

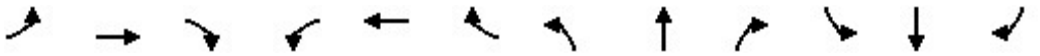
Splits and Phases: 5: Private Driveway/North Street & Main Street



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	207	520	874	328
v/c Ratio	0.48	0.42	0.47	0.79
Control Delay	6.9	4.0	13.6	21.0
Queue Delay	0.3	0.8	0.0	0.1
Total Delay	7.2	4.8	13.7	21.1
Queue Length 50th (ft)	20	51	148	21
Queue Length 95th (ft)	49	111	m273	102
Internal Link Dist (ft)		207	293	858
Turn Bay Length (ft)	100			
Base Capacity (vph)	484	1247	1873	518
Starvation Cap Reductn	51	432	0	0
Spillback Cap Reductn	0	0	99	9
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.64	0.49	0.64

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

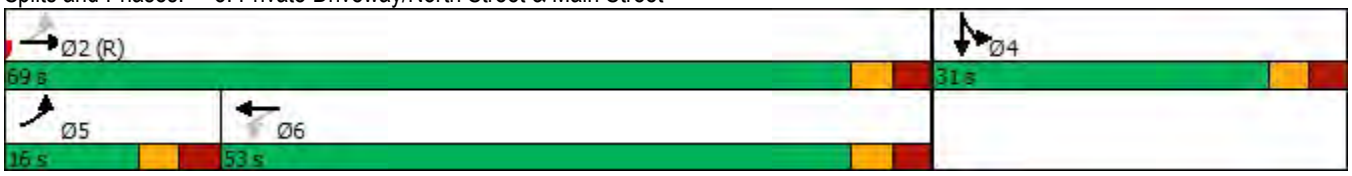


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	298	0	0	663	11	0	0	0	21	0	229
Future Volume (vph)	71	298	0	0	663	11	0	0	0	21	0	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	11	12	12	12	16	12	16
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997						0.876	
Flt Protected	0.950										0.996	
Satd. Flow (prot)	1454	1545	0	0	2972	0	0	0	0	0	1439	0
Flt Permitted	0.274										0.996	
Satd. Flow (perm)	419	1545	0	0	2972	0	0	0	0	0	1439	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					2						281	
Link Speed (mph)		25			25			30			25	
Link Distance (ft)		287			373			153			938	
Travel Time (s)		7.8			10.2			3.5			25.6	
Peak Hour Factor	0.87	0.87	0.92	0.92	0.81	0.81	0.92	0.92	0.92	0.68	0.92	0.68
Heavy Vehicles (%)	8%	7%	2%	2%	5%	27%	2%	2%	2%	0%	2%	4%
Adj. Flow (vph)	82	343	0	0	819	14	0	0	0	31	0	337
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	343	0	0	833	0	0	0	0	0	368	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.19	1.19	1.14	1.14	1.14	0.97	1.14	0.97
Turning Speed (mph)	15		60	60		9	60		60	15		9
Number of Detectors	1	2		1	2					1	2	
Detector Template	Left	Thru		Left	Thru					Left	Thru	
Leading Detector (ft)	20	100		20	100					20	100	
Trailing Detector (ft)	0	0		0	0					0	0	
Detector 1 Position(ft)	0	0		0	0					0	0	
Detector 1 Size(ft)	20	6		20	6					20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	pm+pt	NA			NA					Split	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6					4	4	
Permitted Phases	2			6								
Detector Phase	5	2		6	6					4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0					5.0	5.0	
Minimum Split (s)	11.0	24.0		24.0	24.0					20.0	20.0	
Total Split (s)	16.0	69.0		53.0	53.0					31.0	31.0	
Total Split (%)	16.0%	69.0%		53.0%	53.0%					31.0%	31.0%	
Maximum Green (s)	10.0	63.0		47.0	47.0					25.0	25.0	
Yellow Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0						0.0	
Total Lost Time (s)	6.0	6.0			6.0						6.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Recall Mode	Min	C-Min		Min	Min					None	None	
Act Effct Green (s)	74.0	74.0			60.7						14.0	
Actuated g/C Ratio	0.74	0.74			0.61						0.14	
v/c Ratio	0.21	0.30			0.46						0.83	
Control Delay	10.0	10.4			12.8						26.6	
Queue Delay	0.0	0.6			0.0						0.0	
Total Delay	10.0	11.0			12.8						26.6	
LOS	B	B			B						C	
Approach Delay		10.8			12.8						26.6	
Approach LOS		B			B						C	

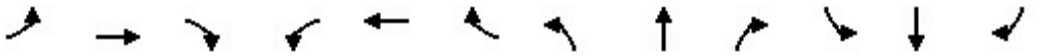
Intersection Summary			
Area Type:	CBD		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 5 (5%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 15.4		Intersection LOS: B	
Intersection Capacity Utilization 70.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Private Driveway/North Street & Main Street



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	82	343	833	368
v/c Ratio	0.21	0.30	0.46	0.83
Control Delay	10.0	10.4	12.8	26.6
Queue Delay	0.0	0.6	0.0	0.0
Total Delay	10.0	11.0	12.8	26.6
Queue Length 50th (ft)	17	87	115	52
Queue Length 95th (ft)	55	216	221	142
Internal Link Dist (ft)		207	293	858
Turn Bay Length (ft)	100			
Base Capacity (vph)	413	1146	1810	572
Starvation Cap Reductn	0	457	0	0
Spillback Cap Reductn	0	0	20	1
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.20	0.50	0.47	0.64

Intersection Summary

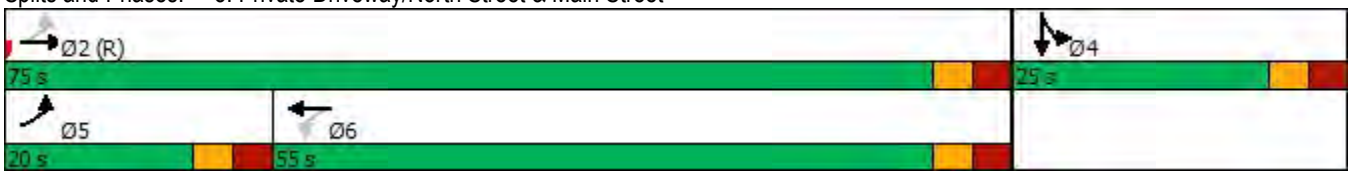


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	473	0	0	751	34	0	0	0	26	0	226
Future Volume (vph)	188	473	0	0	751	34	0	0	0	26	0	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	11	12	12	12	16	12	16
Storage Length (ft)	100		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.993						0.879	
Flt Protected	0.950										0.995	
Satd. Flow (prot)	1540	1605	0	0	3004	0	0	0	0	0	1456	0
Flt Permitted	0.263										0.995	
Satd. Flow (perm)	426	1605	0	0	3004	0	0	0	0	0	1456	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					6						294	
Link Speed (mph)		25			25			30			25	
Link Distance (ft)		287			373			153			938	
Travel Time (s)		7.8			10.2			3.5			25.6	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.90	0.90	0.92	0.92	0.92	0.77	0.92	0.77
Heavy Vehicles (%)	2%	3%	2%	2%	4%	0%	2%	2%	2%	0%	2%	3%
Adj. Flow (vph)	207	520	0	0	834	38	0	0	0	34	0	294
Shared Lane Traffic (%)												
Lane Group Flow (vph)	207	520	0	0	872	0	0	0	0	0	328	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.19	1.19	1.14	1.14	1.14	0.97	1.14	0.97
Turning Speed (mph)	15		60	60		9	60		60	15		9
Number of Detectors	1	2		1	2					1	2	
Detector Template	Left	Thru		Left	Thru					Left	Thru	
Leading Detector (ft)	20	100		20	100					20	100	
Trailing Detector (ft)	0	0		0	0					0	0	
Detector 1 Position(ft)	0	0		0	0					0	0	
Detector 1 Size(ft)	20	6		20	6					20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	pm+pt	NA			NA					Split	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			6					4	4	
Permitted Phases	2			6								
Detector Phase	5	2		6	6					4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0					5.0	5.0	
Minimum Split (s)	11.0	24.0		24.0	24.0					20.0	20.0	
Total Split (s)	20.0	75.0		55.0	55.0					25.0	25.0	
Total Split (%)	20.0%	75.0%		55.0%	55.0%					25.0%	25.0%	
Maximum Green (s)	14.0	69.0		49.0	49.0					19.0	19.0	
Yellow Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Lost Time Adjust (s)	0.0	0.0			0.0						0.0	
Total Lost Time (s)	6.0	6.0			6.0						6.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Recall Mode	Min	C-Min		Min	Min					None	None	
Act Effct Green (s)	77.4	77.4			62.0						10.6	
Actuated g/C Ratio	0.77	0.77			0.62						0.11	
v/c Ratio	0.48	0.42			0.47						0.79	
Control Delay	6.9	4.0			13.6						21.0	
Queue Delay	0.3	0.8			0.0						0.1	
Total Delay	7.2	4.8			13.7						21.1	
LOS	A	A			B						C	
Approach Delay		5.5			13.7						21.1	
Approach LOS		A			B						C	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 84.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 5: Private Driveway/North Street & Main Street



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	207	520	872	328
v/c Ratio	0.48	0.42	0.47	0.79
Control Delay	6.9	4.0	13.6	21.0
Queue Delay	0.3	0.8	0.0	0.1
Total Delay	7.2	4.8	13.7	21.1
Queue Length 50th (ft)	19	50	148	21
Queue Length 95th (ft)	49	112	m271	102
Internal Link Dist (ft)		207	293	858
Turn Bay Length (ft)	100			
Base Capacity (vph)	485	1247	1873	518
Starvation Cap Reductn	51	432	0	0
Spillback Cap Reductn	0	0	101	9
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.64	0.49	0.64

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

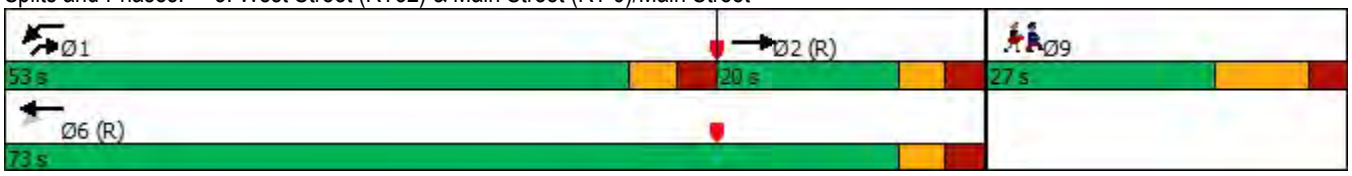
Main Street (Route 9) at West Street (Route 32)

Lane Group	EBT	EBR	WBL	WBT	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	125	28	573	262	0	209	
Future Volume (vph)	125	28	573	262	0	209	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	14	14	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	0.976					0.865	
Flt Protected			0.950				
Satd. Flow (prot)	1754	0	1719	1766	0	1623	
Flt Permitted			0.505				
Satd. Flow (perm)	1754	0	914	1766	0	1623	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	9					738	
Link Speed (mph)	25			25	25		
Link Distance (ft)	456			287	474		
Travel Time (s)	12.4			7.8	12.9		
Peak Hour Factor	0.92	0.92	0.81	0.81	0.88	0.88	
Heavy Vehicles (%)	7%	0%	5%	4%	0%	8%	
Adj. Flow (vph)	136	30	707	323	0	238	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	166	0	707	323	0	238	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(ft)	23			23	0		
Link Offset(ft)	0			0	0		
Crosswalk Width(ft)	16			16	16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.04	0.92	0.92	
Turning Speed (mph)		9	15		15	9	
Number of Detectors	2		1	2		1	
Detector Template	Thru		Left	Thru		Right	
Leading Detector (ft)	100		20	100		20	
Trailing Detector (ft)	0		0	0		0	
Detector 1 Position(ft)	0		0	0		0	
Detector 1 Size(ft)	6		20	6		20	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0		0.0	
Detector 1 Queue (s)	0.0		0.0	0.0		0.0	
Detector 1 Delay (s)	0.0		0.0	0.0		0.0	
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA		pm+pt	NA		Over	
Protected Phases	2		1	6		1	9
Permitted Phases			6				
Detector Phase	2		1	6		1	

Lane Group	EBT	EBR	WBL	WBT	NEL	NER	Ø9
Switch Phase							
Minimum Initial (s)	5.0		5.0	5.0		5.0	5.0
Minimum Split (s)	20.0		53.0	68.0		53.0	28.0
Total Split (s)	20.0		53.0	73.0		53.0	27.0
Total Split (%)	20.0%		53.0%	73.0%		53.0%	27%
Maximum Green (s)	13.5		46.5	66.5		46.5	17.0
Yellow Time (s)	3.5		3.5	3.5		3.5	7.0
All-Red Time (s)	3.0		3.0	3.0		3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	
Lead/Lag	Lag		Lead			Lead	
Lead-Lag Optimize?	Yes		Yes			Yes	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0
Recall Mode	C-Min		Min	C-Min		Min	Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							10
Act Effct Green (s)	26.6		66.0	66.0		32.9	
Actuated g/C Ratio	0.27		0.66	0.66		0.33	
v/c Ratio	0.35		0.81	0.28		0.23	
Control Delay	34.6		25.4	10.2		0.5	
Queue Delay	0.1		47.2	1.7		0.0	
Total Delay	34.7		72.5	11.9		0.5	
LOS	C		E	B		A	
Approach Delay	34.7			53.5	0.5		
Approach LOS	C			D	A		

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 42.6		Intersection LOS: D	
Intersection Capacity Utilization 50.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: West Street (RT32) & Main Street (RT 9)/Main Street



Lane Group	EBT	WBL	WBT	NER
Lane Group Flow (vph)	166	707	323	238
v/c Ratio	0.35	0.81	0.28	0.23
Control Delay	34.6	25.4	10.2	0.5
Queue Delay	0.1	47.2	1.7	0.0
Total Delay	34.7	72.5	11.9	0.5
Queue Length 50th (ft)	80	266	98	0
Queue Length 95th (ft)	#184	453	190	0
Internal Link Dist (ft)	376		207	
Turn Bay Length (ft)				
Base Capacity (vph)	473	977	1174	1149
Starvation Cap Reductn	0	328	672	0
Spillback Cap Reductn	21	0	0	14
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.37	1.09	0.64	0.21

Intersection Summary

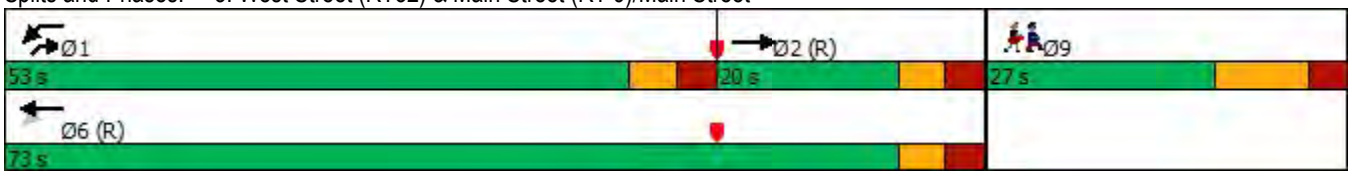
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	171	39	639	234	0	472	
Future Volume (vph)	171	39	639	234	0	472	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	14	14	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	0.975					0.865	
Flt Protected			0.950				
Satd. Flow (prot)	1823	0	1770	1749	0	1719	
Flt Permitted			0.287				
Satd. Flow (perm)	1823	0	535	1749	0	1719	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	9					666	
Link Speed (mph)	25			25	25		
Link Distance (ft)	456			287	474		
Travel Time (s)	12.4			7.8	12.9		
Peak Hour Factor	0.79	0.79	0.87	0.87	0.90	0.90	
Heavy Vehicles (%)	2%	0%	2%	5%	0%	2%	
Adj. Flow (vph)	216	49	734	269	0	524	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	265	0	734	269	0	524	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(ft)	23			23	0		
Link Offset(ft)	0			0	0		
Crosswalk Width(ft)	16			16	16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.04	0.92	0.92	
Turning Speed (mph)		9	15		15	9	
Number of Detectors	2		1	2		1	
Detector Template	Thru		Left	Thru		Right	
Leading Detector (ft)	100		20	100		20	
Trailing Detector (ft)	0		0	0		0	
Detector 1 Position(ft)	0		0	0		0	
Detector 1 Size(ft)	6		20	6		20	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0		0.0	
Detector 1 Queue (s)	0.0		0.0	0.0		0.0	
Detector 1 Delay (s)	0.0		0.0	0.0		0.0	
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA		pm+pt	NA		Over	
Protected Phases	2		1	6		1	9
Permitted Phases			6				
Detector Phase	2		1	6		1	

Lane Group	EBT	EBR	WBL	WBT	NEL	NER	Ø9
Switch Phase							
Minimum Initial (s)	5.0		5.0	5.0		5.0	5.0
Minimum Split (s)	20.0		53.0	68.0		53.0	28.0
Total Split (s)	20.0		53.0	73.0		53.0	27.0
Total Split (%)	20.0%		53.0%	73.0%		53.0%	27%
Maximum Green (s)	13.5		46.5	66.5		46.5	17.0
Yellow Time (s)	3.5		3.5	3.5		3.5	7.0
All-Red Time (s)	3.0		3.0	3.0		3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	
Lead/Lag	Lag		Lead			Lead	
Lead-Lag Optimize?	Yes		Yes			Yes	
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0
Recall Mode	C-Min		Min	C-Min		Min	Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							11.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	20.1		66.5	66.5		39.9	
Actuated g/C Ratio	0.20		0.66	0.66		0.40	
v/c Ratio	0.71		0.87	0.23		0.48	
Control Delay	51.2		35.8	8.6		1.7	
Queue Delay	4.2		51.9	1.5		0.0	
Total Delay	55.4		87.7	10.1		1.8	
LOS	E		F	B		A	
Approach Delay	55.4			66.9	1.8		
Approach LOS	E			E	A		

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green, Master Intersection	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 46.1	Intersection LOS: D
Intersection Capacity Utilization 57.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: West Street (RT32) & Main Street (RT 9)/Main Street



Lane Group	EBT	WBL	WBT	NER
Lane Group Flow (vph)	265	734	269	524
v/c Ratio	0.71	0.87	0.23	0.48
Control Delay	51.2	35.8	8.6	1.7
Queue Delay	4.2	51.9	1.5	0.0
Total Delay	55.4	87.7	10.1	1.8
Queue Length 50th (ft)	160	394	76	0
Queue Length 95th (ft)	#277	532	m118	3
Internal Link Dist (ft)	376		207	
Turn Bay Length (ft)				
Base Capacity (vph)	373	930	1163	1155
Starvation Cap Reductn	0	384	704	0
Spillback Cap Reductn	55	0	0	23
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.83	1.34	0.59	0.46

Intersection Summary

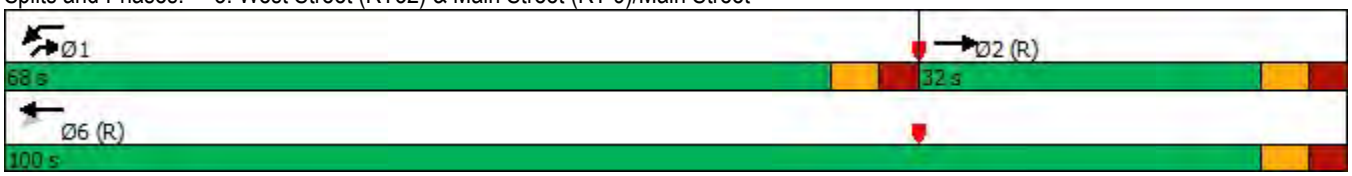
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	145	30	615	289	0	225
Future Volume (vph)	145	30	615	289	0	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.977					0.865
Flt Protected			0.950			
Satd. Flow (prot)	1741	0	1719	1766	0	1623
Flt Permitted			0.582			
Satd. Flow (perm)	1741	0	1053	1766	0	1623
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10					491
Link Speed (mph)	25			25	25	
Link Distance (ft)	456			287	474	
Travel Time (s)	12.4			7.8	12.9	
Peak Hour Factor	0.92	0.92	0.81	0.81	0.88	0.88
Heavy Vehicles (%)	8%	0%	5%	4%	0%	8%
Adj. Flow (vph)	158	33	759	357	0	256
Shared Lane Traffic (%)						
Lane Group Flow (vph)	191	0	759	357	0	256
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	23			23	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.04	0.92	0.92
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2		1
Detector Template	Thru		Left	Thru		Right
Leading Detector (ft)	100		20	100		20
Trailing Detector (ft)	0		0	0		0
Detector 1 Position(ft)	0		0	0		0
Detector 1 Size(ft)	6		20	6		20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0		0.0
Detector 1 Queue (s)	0.0		0.0	0.0		0.0
Detector 1 Delay (s)	0.0		0.0	0.0		0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA		Over
Protected Phases	2		1	6		1
Permitted Phases			6			
Detector Phase	2		1	6		1

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0		5.0
Minimum Split (s)	20.0		53.0	68.0		53.0
Total Split (s)	32.0		68.0	100.0		68.0
Total Split (%)	32.0%		68.0%	100.0%		68.0%
Maximum Green (s)	25.5		61.5	93.5		61.5
Yellow Time (s)	3.5		3.5	3.5		3.5
All-Red Time (s)	3.0		3.0	3.0		3.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.5		6.5	6.5		6.5
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Recall Mode	C-Min		Min	C-Min		Min
Act Effct Green (s)	68.4		93.5	100.0		18.6
Actuated g/C Ratio	0.68		0.94	1.00		0.19
v/c Ratio	0.16		0.69	0.20		0.37
Control Delay	7.5		7.2	0.2		1.5
Queue Delay	0.0		0.4	0.0		0.0
Total Delay	7.5		7.5	0.2		1.5
LOS	A		A	A		A
Approach Delay	7.5			5.2	1.5	
Approach LOS	A			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 4.9		Intersection LOS: A	
Intersection Capacity Utilization 54.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: West Street (RT32) & Main Street (RT 9)/Main Street



Lane Group	EBT	WBL	WBT	NER
Lane Group Flow (vph)	191	759	357	256
v/c Ratio	0.16	0.69	0.20	0.37
Control Delay	7.5	7.2	0.2	1.5
Queue Delay	0.0	0.4	0.0	0.0
Total Delay	7.5	7.5	0.2	1.5
Queue Length 50th (ft)	33	110	0	0
Queue Length 95th (ft)	92	1	0	0
Internal Link Dist (ft)	376		207	
Turn Bay Length (ft)				
Base Capacity (vph)	1194	1394	1766	1187
Starvation Cap Reductn	0	218	0	0
Spillback Cap Reductn	52	0	0	14
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.65	0.20	0.22

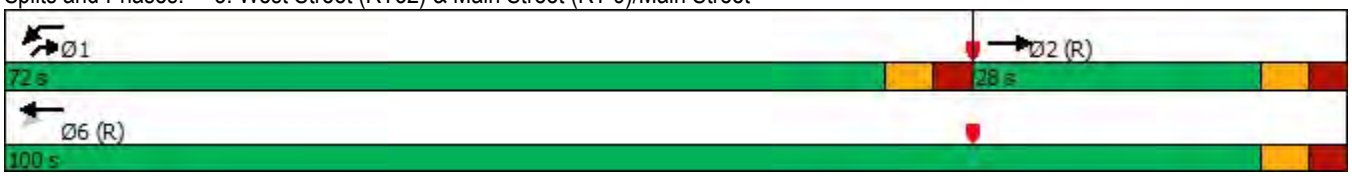
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	192	42	686	261	0	507
Future Volume (vph)	192	42	686	261	0	507
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.976					0.865
Flt Protected			0.950			
Satd. Flow (prot)	1810	0	1770	1749	0	1719
Flt Permitted			0.474			
Satd. Flow (perm)	1810	0	883	1749	0	1719
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10					250
Link Speed (mph)	25			25	25	
Link Distance (ft)	456			287	474	
Travel Time (s)	12.4			7.8	12.9	
Peak Hour Factor	0.79	0.79	0.87	0.87	0.90	0.90
Heavy Vehicles (%)	3%	0%	2%	5%	0%	2%
Adj. Flow (vph)	243	53	789	300	0	563
Shared Lane Traffic (%)						
Lane Group Flow (vph)	296	0	789	300	0	563
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	23			23	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.04	0.92	0.92
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2		1
Detector Template	Thru		Left	Thru		Right
Leading Detector (ft)	100		20	100		20
Trailing Detector (ft)	0		0	0		0
Detector 1 Position(ft)	0		0	0		0
Detector 1 Size(ft)	6		20	6		20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0		0.0
Detector 1 Queue (s)	0.0		0.0	0.0		0.0
Detector 1 Delay (s)	0.0		0.0	0.0		0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA		Over
Protected Phases	2		1	6		1
Permitted Phases			6			
Detector Phase	2		1	6		1

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0		5.0
Minimum Split (s)	20.0		53.0	68.0		53.0
Total Split (s)	28.0		72.0	100.0		72.0
Total Split (%)	28.0%		72.0%	100.0%		72.0%
Maximum Green (s)	21.5		65.5	93.5		65.5
Yellow Time (s)	3.5		3.5	3.5		3.5
All-Red Time (s)	3.0		3.0	3.0		3.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.5		6.5	6.5		6.5
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Recall Mode	C-Min		Min	C-Min		Min
Act Effct Green (s)	48.8		93.5	100.0		38.2
Actuated g/C Ratio	0.49		0.94	1.00		0.38
v/c Ratio	0.33		0.68	0.17		0.69
Control Delay	21.0		9.8	0.2		16.7
Queue Delay	0.0		0.6	0.0		0.0
Total Delay	21.0		10.4	0.2		16.7
LOS	C		B	A		B
Approach Delay	21.0			7.6	16.7	
Approach LOS	C			A	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 61.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: West Street (RT32) & Main Street (RT 9)/Main Street



Lane Group	EBT	WBL	WBT	NER
Lane Group Flow (vph)	296	789	300	563
v/c Ratio	0.33	0.68	0.17	0.69
Control Delay	21.0	9.8	0.2	16.7
Queue Delay	0.0	0.6	0.0	0.0
Total Delay	21.0	10.4	0.2	16.7
Queue Length 50th (ft)	105	256	0	168
Queue Length 95th (ft)	210	405	0	170
Internal Link Dist (ft)	376		207	
Turn Bay Length (ft)				
Base Capacity (vph)	888	1406	1749	1212
Starvation Cap Reductn	0	277	0	0
Spillback Cap Reductn	3	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.33	0.70	0.17	0.46

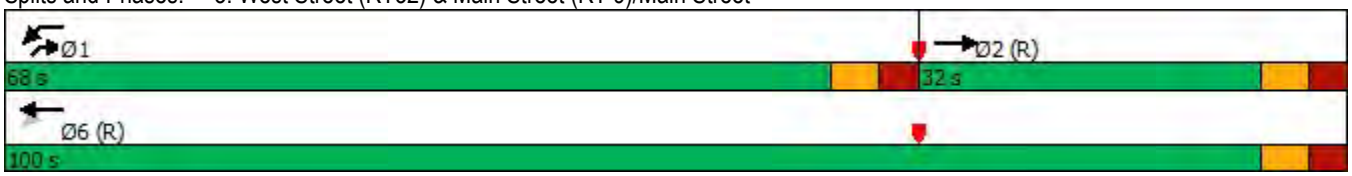
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	144	30	616	287	0	226
Future Volume (vph)	144	30	616	287	0	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.977					0.865
Flt Protected			0.950			
Satd. Flow (prot)	1755	0	1719	1783	0	1623
Flt Permitted			0.583			
Satd. Flow (perm)	1755	0	1055	1783	0	1623
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10					494
Link Speed (mph)	25			25	25	
Link Distance (ft)	456			287	474	
Travel Time (s)	12.4			7.8	12.9	
Peak Hour Factor	0.92	0.92	0.81	0.81	0.88	0.88
Heavy Vehicles (%)	7%	0%	5%	3%	0%	8%
Adj. Flow (vph)	157	33	760	354	0	257
Shared Lane Traffic (%)						
Lane Group Flow (vph)	190	0	760	354	0	257
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	23			23	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.04	0.92	0.92
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2		1
Detector Template	Thru		Left	Thru		Right
Leading Detector (ft)	100		20	100		20
Trailing Detector (ft)	0		0	0		0
Detector 1 Position(ft)	0		0	0		0
Detector 1 Size(ft)	6		20	6		20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0		0.0
Detector 1 Queue (s)	0.0		0.0	0.0		0.0
Detector 1 Delay (s)	0.0		0.0	0.0		0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA		Over
Protected Phases	2		1	6		1
Permitted Phases			6			
Detector Phase	2		1	6		1

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0		5.0
Minimum Split (s)	20.0		53.0	68.0		53.0
Total Split (s)	32.0		68.0	100.0		68.0
Total Split (%)	32.0%		68.0%	100.0%		68.0%
Maximum Green (s)	25.5		61.5	93.5		61.5
Yellow Time (s)	3.5		3.5	3.5		3.5
All-Red Time (s)	3.0		3.0	3.0		3.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.5		6.5	6.5		6.5
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Recall Mode	C-Min		Min	C-Min		Min
Act Effct Green (s)	68.5		93.5	100.0		18.5
Actuated g/C Ratio	0.68		0.94	1.00		0.18
v/c Ratio	0.16		0.69	0.20		0.37
Control Delay	7.4		7.7	0.2		1.5
Queue Delay	0.0		0.4	0.0		0.0
Total Delay	7.4		8.1	0.2		1.5
LOS	A		A	A		A
Approach Delay	7.4			5.6	1.5	
Approach LOS	A			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 5.1		Intersection LOS: A	
Intersection Capacity Utilization 54.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: West Street (RT32) & Main Street (RT 9)/Main Street



Lane Group	EBT	WBL	WBT	NER
Lane Group Flow (vph)	190	760	354	257
v/c Ratio	0.16	0.69	0.20	0.37
Control Delay	7.4	7.7	0.2	1.5
Queue Delay	0.0	0.4	0.0	0.0
Total Delay	7.4	8.1	0.2	1.5
Queue Length 50th (ft)	32	121	0	0
Queue Length 95th (ft)	92	12	0	0
Internal Link Dist (ft)	376		207	
Turn Bay Length (ft)				
Base Capacity (vph)	1204	1394	1783	1188
Starvation Cap Reductn	0	230	0	0
Spillback Cap Reductn	73	0	0	21
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.65	0.20	0.22

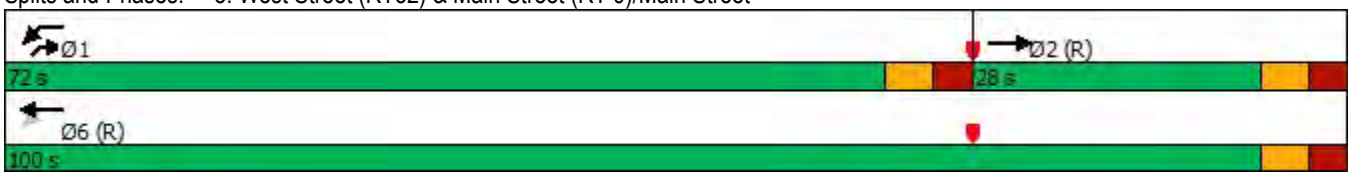
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	191	42	686	260	0	508
Future Volume (vph)	191	42	686	260	0	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.976					0.865
Flt Protected			0.950			
Satd. Flow (prot)	1810	0	1770	1749	0	1719
Flt Permitted			0.475			
Satd. Flow (perm)	1810	0	885	1749	0	1719
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10					252
Link Speed (mph)	25			25	25	
Link Distance (ft)	456			287	474	
Travel Time (s)	12.4			7.8	12.9	
Peak Hour Factor	0.79	0.79	0.87	0.87	0.90	0.90
Heavy Vehicles (%)	3%	0%	2%	5%	0%	2%
Adj. Flow (vph)	242	53	789	299	0	564
Shared Lane Traffic (%)						
Lane Group Flow (vph)	295	0	789	299	0	564
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	23			23	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.04	0.92	0.92
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2		1
Detector Template	Thru		Left	Thru		Right
Leading Detector (ft)	100		20	100		20
Trailing Detector (ft)	0		0	0		0
Detector 1 Position(ft)	0		0	0		0
Detector 1 Size(ft)	6		20	6		20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0		0.0
Detector 1 Queue (s)	0.0		0.0	0.0		0.0
Detector 1 Delay (s)	0.0		0.0	0.0		0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA		Over
Protected Phases	2		1	6		1
Permitted Phases			6			
Detector Phase	2		1	6		1

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0		5.0
Minimum Split (s)	20.0		53.0	68.0		53.0
Total Split (s)	28.0		72.0	100.0		72.0
Total Split (%)	28.0%		72.0%	100.0%		72.0%
Maximum Green (s)	21.5		65.5	93.5		65.5
Yellow Time (s)	3.5		3.5	3.5		3.5
All-Red Time (s)	3.0		3.0	3.0		3.0
Lost Time Adjust (s)	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.5		6.5	6.5		6.5
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Recall Mode	C-Min		Min	C-Min		Min
Act Effct Green (s)	49.0		93.5	100.0		38.0
Actuated g/C Ratio	0.49		0.94	1.00		0.38
v/c Ratio	0.33		0.68	0.17		0.70
Control Delay	20.9		9.8	0.2		16.7
Queue Delay	0.0		0.6	0.0		0.0
Total Delay	20.9		10.4	0.2		16.7
LOS	C		B	A		B
Approach Delay	20.9			7.6	16.7	
Approach LOS	C			A	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: West Street (RT32) & Main Street (RT 9)/Main Street



Lane Group	EBT	WBL	WBT	NER
Lane Group Flow (vph)	295	789	299	564
v/c Ratio	0.33	0.68	0.17	0.70
Control Delay	20.9	9.8	0.2	16.7
Queue Delay	0.0	0.6	0.0	0.0
Total Delay	20.9	10.4	0.2	16.7
Queue Length 50th (ft)	104	256	0	168
Queue Length 95th (ft)	209	405	0	170
Internal Link Dist (ft)	376		207	
Turn Bay Length (ft)				
Base Capacity (vph)	891	1407	1749	1212
Starvation Cap Reductn	0	277	0	0
Spillback Cap Reductn	3	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.33	0.70	0.17	0.47

Intersection Summary

APPENDIX H

AIR QUALITY ANALYSIS

3.0 AIR QUALITY, REVISED APRIL, 2023

3.1 Project Description

An air quality analysis has been prepared to document that the modifications proposed at the ReSource Ware C&D Handling Facility use all feasible measures to avoid, minimize, and mitigate potential air-related impacts, and that the facility will not create conditions of unhealthy air. A revised analysis has been conducted for further evaluation and refinement to more precisely represent the project details. The revised analysis focuses only on the future cases (Stage 1 and Stage 2). The future cases include worst case Stage 2 operations including trucking combined with a worst case Stage 1 rail scenario (i.e. no siding expansion) that results in three train visits per day. In the Stage 2 rail scenario with new sidings, only 1 visit per day would be needed. Thus, the Stage 2 rail scenario is only modeled for 1 hour average NO2 as a worst case.

Several site visits have been made to better define site operations, especially with respect to rail operations, and the rail operations have been more finely delineated by Sanborn Head to support more detailed analysis of rail movements and the amount of time the locomotives are in motion or in idle during on-site rail activities. A new source of emissions was also discovered, during the unloading of transfer trailers, the walking floors are moved with onboard hydraulic equipment which are powered by revving the truck engine. This source was added to the analysis.

Project changes relevant to the air quality analysis are:

- Increased facility operating hours
- Increased utilization of onsite heavy equipment
- Increased truck traffic onsite and offsite
- Increased rail operations.

Air quality impacts avoidance, minimization, and mitigation measures are:

- Routing of offsite trucks to minimize air quality impacts in the Ware EJ community
- Installation of catalytic converters on four pieces of onsite heavy equipment
- Use of a water misting system within the building and road watering/street sweeping onsite to control dust

The remainder of this section documents the potential air emissions, regulatory applicability of air related permitting and regulations, and an analysis of air quality impacts related to the proposed project. This analysis is intended to document that there are no disproportionate or adverse impacts on any EJ populations related to air quality from the project and discuss how the

project will avoid, minimize, and mitigate the potential air quality related environmental and public health impacts.

Sources of Air Emissions

Stationary sources at the facility are subject to regulation by MassDEP. This study reviews on-site fugitive dust, heavy-equipment, and locomotive sources and also includes mobile sources such as truck traffic both on-site and off-site. This more inclusive analysis allows the project to be designed holistically to minimize environmental impacts and give a more complete picture of any project related air impacts.

Broadly the emissions sources are in the following categories:

- Dust from material handling on-site. Emissions are estimated based on material transfer operations, and paved road dust.

- Diesel combustion exhaust from on-site heavy equipment operation, truck traffic both on-site and off-site, and on-site operation of the diesel locomotive for moving rail cars onto and off of sidings.

Impacts

ReSource Ware proposes a facility that avoids, minimizes, and mitigates potential air-related impacts as follows:

- Avoided impacts: ReSource Ware is using their existing location to avoid impacts to the public associated with a new facility. Material handling in enclosed areas, using best industry practices, avoids off-site impacts of air emissions. Because the proposed facility will serve existing needs for material handling with transportation by rail haul, the project avoids transportation-related impacts currently associated with sending the materials farther by truck.

- Minimized impacts: The project team evaluated the truck routing to identify the proposed transportation routing configuration (predominately eastern traffic) which minimizes off-site air concentrations in the Ware EJ community (westerly direction).

- Mitigated impacts: The use of water misting during spring, summer, and fall, of on-site paved roadway sweeping and watering, and of additional catalytic converters on the heavy equipment will mitigate Project air impacts.

3.2 Comparison to Standards

The analysis shows that, under maximum expected operating conditions and using conservative assumptions, the project's impacts will comply with all applicable standards. Specifically:

- The National Ambient Air Quality Standards (NAAQS) will not be exceeded. Per USEPA, these standards "provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly.[1]"

- MassDEP has developed "health- and science-based air guidelines - known as Ambient Air Limits (AALs) and Threshold Effect Exposure Limits (TELs) - to evaluate potential human health risks from exposures to chemicals in air.[2]" The Massachusetts AALs and TELs will not be exceeded in residential areas.

This report describes the sources of air emissions included in the ambient air impacts analysis (Section 3. 3), the methodologies and bases for derivation of air emission estimates (Section 3. 4), and the air regulatory applicability framework for the project (Section 3. 5). Section 3. 6 contains a description of the methodologies and bases for preparation of the ambient air impacts analyses. The criteria used in analyses and results of the analyses are presented in Section 3. 6.2 for criteria pollutants and air toxics.

3.3 Source Descriptions

This section describes the types of air pollutant emitting sources included in the ambient air impacts analysis. The analysis presented in this report encompasses a broader range of air emission sources than would be regulated by MassDEP in that certain mobile combustion sources are included. There are no significant stationary combustion sources located at the site.

Sources of air pollution are typically units that combust fuel. In this case, these sources consist mainly of mobile sources, including trucks, heavy equipment, and locomotives. Dust is also generated by activities at the facility.

Existing operations occur for 9 hours on weekdays and 6 hours on Saturdays. Future operations were originally expected to be expanded to 12 hours on weekdays and remain 6 hours on Saturdays. For the revised analysis, due to modification of the project parameters after the NPC filing, the hours will be expanded to 11 hours on weekdays and remain 6 hours on Saturdays. This means the weekday operating hours for Stage 1 and Stage 2 conditions will be 7 am to 6 pm (not 6 am to 6 pm as previously proposed).

3.3.1 Trucks

Trucks deliver waste to and depart unloaded from the facility. Based on transportation analyses and forecast growth, the existing operations consist of 59 trucks daily while the expansion is expected to produce 89 trucks daily. Transportation analyses focus on peak hour volumes, to

[1] https://www.epa.gov/criteria-air-pollutants/naaqs-table

[2] https://www.mass.gov/service-details/massdep-ambient-air-toxics-guidelines

address traffic flow and safety considerations. Existing peak hour operations were 30 trips (15 trucks) while 44 trips (22 trucks) would be expected in the expansion. One "trip" is either entering or exiting the facility, so one truck's arrival and departure equals two trips.

Roadway movements were provided in the transportation analysis. Generally, 75% of all truck traffic arrives from and departs to the east on Route 9. The remaining 25% is to the west on Route 9. The transportation analysis provides the number of trucks expected at each intersection for the am and pm peak hours. Allocation of truck emissions to the other operating hours of the day was made using hourly observational data from December 2021.

Idling of trucks at the incoming and outgoing scales, and near the building where trucks wait to unload as well as any queues at these locations were included in the revised analysis. Also, it was determined that it takes about 15 minutes to unload a transfer trailer and for 10 minutes of this time, the truck engine is revved to drive the hydraulic pump for the walking floor and these emissions were estimated and included in the revised analysis. The other 5 minutes is the backing in, closing door, pulling out and the driver time to move about to conduct the full unloading sequence. It was determined that the maximum number of transfer trailers that can be unloaded is 12 per hour, since there will be three doors used for unloading, and it takes 15 minutes to unload one trailer.

3.3.2 Heavy Equipment

Heavy equipment is used in the handling of waste inside the building and to move railcars around the property. Again, existing operations occur for 9 hours on weekdays and 6 hours on Saturdays. The facility currently uses two (2) excavators, one (1) front-end loader for materials handling, one (1) front-end loader for moving railcars, one (1) skid-steer, and one (1) tow-behind air compressor. All equipment is diesel-fueled.

Future operations were originally proposed to be expanded to 12 hours on weekdays and remain 6 hours on Saturdays. For the revised analysis 12 hours has been reduced to 11 hours. The expansion will require the use of one (1) additional front-end loader for materials handling.

Emissions from the heavy equipment originate from two basic locations: within the handling building, and outside where one loader moves railcars. The building currently has five (5) large bay doors, and an additional approximately south facing door will be added with the expansion (totaling 6 doors). An approximately west facing door will be added prior to the expansion, but it will have limited use just by fines tractor trailer and will employ a door that will be closed the majority of the time.

The equipment used within the building is shown in Table 3-1. For the revised analysis, it was determined that two (2) CAT 966M Loaders, and the two excavators would be representative of equipment in use. The CAT-236D SkidSteer and the JD 744JX Loader would be redundant in reserve equipment and the compressor would only be used for maintenance during downtime. Thus these equipment were not included in the revised air modeling.

Table 3-1 C&D Handling Building Heavy Equipment Summary

Existing	Expansion	Expansion (Mitigated)
CAT 236D SkidSteer	CAT 236D SkidSteer	CAT 236D SkidSteer
Sullair 185 Compressor	Sullair 185 Compressor	Sullair 185 Compressor
CAT 966M Loader	CAT 966M Loader	CAT 966M Loader
CAT 345DL Excavator	John Deere 744JX Loader	John Deere 744JX Loader[1]
CAT 330C Excavator	CAT 345DL Excavator	CAT 345DL Excavator
	CAT 330C Excavator	CAT 330C Excavator[1]

[1] To be retrofitted with a diesel oxidation catalyst (catalytic converters) to control CO and VOC. The CAT 236D SkidSteer, CAT 345DL Excavator, and CAT 966M Loader cannot be retrofitted with catalytic converters since they already have other forms of air pollution control devices.
There are 2 additional excavators that are used as backup, a CAT 312C and a CAT 325, which are not included in general operations, and will also be retrofit with catalytic converters.

A Volvo L120C wheeled loader with a railcar hookup, which is already equipped with a diesel oxidation catalyst to control carbon monoxide (CO) and volatile organic compounds (VOC), is primarily used outside to move loaded and unloaded railcars to a position to be linked to the locomotives.

3.3.3 Locomotives

Locomotives remove loaded railcars and return empty railcars. In the original analysis, both existing and Stage 2 expanded operations, locomotives were expected to make two daily visits to the facility in the Stage 2 expanded operations, roughly at 10am and 1pm (similar to the two locomotive visits performed under current conditions). Idling was assumed to persist for an entire hour. Based on more recent work by Sanborn Head, for Stage 1 operations, there will be up to three visits per day at roughly 10 am , 2 pm and 4:30 pm. For Stage 2 operations, after the addition of new sidings, there would be one visit per day at roughly 7 am, shortly after the facility opens. Idling time is based on the length of the visit, whenever the trains are not moving.

Locomotives were found to generally be General Electric EMD GP38-2 engines rated at 2000 horsepower. During site visits in 2023, it was discovered that generally the railroad has two engines in service when visiting the facility, both of which are operating so the revised modeling includes both.

The locomotive is modeled as a line volume source, denoted as LOCOMOTIVE in the air quality analysis. The line extends the length of the railway on the property, as it is uncertain where on the line the locomotive may sit while coupling and uncoupling railcars. Sanborn Head's observations of railcar movements and understanding of how the cars are sequenced during daily operations, in combination with Epsilon's own observations, has allowed us to generate more refined air modeling of the switching and idling operations based on the amount of time the rail cars are being moved, and the balance of the time on-site assuming the locomotives are idling in

a nominal centroid location of activity for that visit. For example, for the first visit of the day, most of the rail car movements are near the northern switch from the main line onto the sidings, while the afternoon visits are split evenly between activities near the northern and the southern switch. The idling emissions are modeled as point sources from two vertical vents on top of each locomotive, and the switching emissions are modeled as line volume sources along a route associated with the extent of movements for each visit.

3.3.4 Other Sources

Operations within the facility are expected to be a source of dust/particulate matter. The process of sorting and loading the C&D material generates airborne dust which then exits through the open doors. Estimates of this are made using USEPA methodology and operational data provided by the facility.

Any traditional stationary sources such as small heaters and/or boilers are negligible for this facility. The C&D handling operations are performed in an unconditioned space which is not served by any heating source.

Figure 3-1 shows the location of all modeled sources. Revised sources and locations are presented in Figure 3-1 Revised. Detailed air emission calculations and assumptions, and exhaust parameters for all sources are presented in Attachments 3-1a, 3-1b, and 3-1c and Attachments 3-1d and 3-1e which contain revised information.

3.4 Emissions Estimates

Emission sources at the facility are primarily mobile sources. The onroad (trucks) source air emission estimates relied upon the USEPA Motor Vehicle Emissions Simulator (MOVES) software/database for mobile source emission factors. The heavy equipment emissions were calculated using the USEPA NONROAD model within MOVES, USEPA Tier certification emission limits, and in some cases on the USEPA "SPECIATE" database. Emissions for the locomotives were based on USEPA literature. Emissions are estimated for criteria pollutants, as well as air toxics.

The six criteria pollutants are sulfur dioxide (SO_2); particulate matter (which is broken up into two categories: PM_{10} which is particulate having an aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ which is particulate matter having an aerodynamic diameter of 2.5 micrometers or less); nitrogen dioxide (NO_2); carbon monoxide (CO); ozone (O_3); and lead (Pb). Lead has generally been phased out in mobile source fuels (it is still used in aviation gasoline). Additionally, MassDEP no longer samples for lead in its Ambient Air Monitoring program. Thus, emissions of lead are expected to be insignificant and not included in the analysis.

ReSource – Ware, MA

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Figure 3-1
Source Locations

ReSource – Ware, MA

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Figure 3-1 Revised
Source Locations

Air toxic compounds were selected for emissions estimation based on the MassDEP Ambient Air Toxics Guidelines. In general, chemicals for which MassDEP has published allowable ambient limits (AALs) and threshold effect exposure limits (TELs), and for which specific emission factors were available, are included in the analysis.

Emissions are estimated for the peak hour. Adjustments to off-peak hours are made through the use of options in the dispersion model.

Detailed methods used for the air emission estimation are discussed below and supporting calculations can be found in Attachments 3-1a, 3-1b, and 3-1c to this report. The revised air emission estimates are included in additional Attachments 3-1e and 3-1d.

3.4.1 Onroad Sources

Mobile sources of emissions include on-road truck traffic to and from the site as well as onsite heavy equipment and locomotive engines.

Truck emissions are modeled in AERMOD in three ways. Trucks idling at local intersections are modeled as volume sources. Trucks idling onsite while tipping or waiting are modeled as an area source. For the revised modeling, they are modeled as volume sources. Trucks moving on local roads are modeled as line volume sources.

Mobile Source Emissions and Source Parameters

The USEPA MOVES3 computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES3 model are based on motor vehicle operations typical of daily periods. Massachusetts' statewide annual Inspection and Maintenance (I&M) program were included, as well as the county-specific vehicle age registration distribution, meteorology, and other inputs.

MOVES produces emission rates of many pollutants including both criteria and hazardous air pollutants. For particulates, MOVES calculates emission rates of exhaust, tire wear, and brake wear separately. In this analysis, diesel exhaust particulate (as exhaust $PM_{2.5}$) is also analyzed as the particulate attributable to exhaust is of more health concern than that of tire and brake wear. Exhaust particulate is often comprised of other chemical compounds, in addition to the actual soot particles, to which these compounds adhere. These compounds are analyzed separately as well and compared to their applicable toxics AALs and TELs.

It is estimated that the number of truck trips would increase from an existing 30 to a future 44 trips in the peak hour. Since a single trip is either an entrance or an exit, two trips equals one truck on site. Distribution of truck trips is based on trucks observed to be entering and exiting the existing facility continuously from 7am to 4pm on a Tuesday, Wednesday, and Thursday in December 2021. The hourly variability is reflected in the modeling using hourly and day-of-week variable emission factors (EMISFACT keyword). Peak hourly trucks occur between 7 am and 11 am

(revised to 1 pm for the revised analysis based on a more detailed analysis of operating data) on weekdays and 9 am on Saturdays (revised to 7 am for the revised analysis), denoted by a factor of 1.0 or 100% in AERMOD EMISFACT keyword. Non-peak hours are factored as a fraction of the peak based on the observed data.

Individual roadway link and intersection emissions are presented as Attachment 3-1a, 3-1b, and 3-1c, and revised link and intersection emissions are presented in Attachment 3-1d and 3-1e.

Roadways

Roadway emissions are broken down by link. The modeled network includes the onsite road, roadway network on which trucks are expected to use based on the traffic analysis extends on Route 9 from Gilbertville Road to West Street in Ware. For the revised analysis, links include the paved area in front of the building doors where trucks arrive, wait and turn to back up to the door ways, and the roads adjacent to the project site where trucks are expected to travel. The roadway network was truncated in the revised analysis to only include roadways directly adjacent to the project including the on-site roadways, Route 9 East of Gilbertville Road, Route 9/32 between the site drive and Gilbertville Road, and Route 9/32 between the site drive and Knox Avenue.

For each link, the link length, peak hour vehicles, and vehicle speed are input in MOVES to estimate total vehicle emissions for various pollutants along the roadway.

Road Dust

PM_{10} and $PM_{2.5}$ emission rates from paved roads for the study area were estimated using USEPA AP-42, Section 13.2.1. Road dust emissions apply to moving vehicles only. The trucks were assumed to have a weighted average weight of 28 tons. This weight was input into Equation 1 of the AP-42 Section 13.2. The silt loading was taken as the ubiquitous baseline values in Table 13.2.1-2 of AP-42 times 4 to account for trackout of dust from truck and heavy equipment tires for the appropriate average daily traffic (ADT) category, considering all traffic on each roadway segment. Precipitation and antiskid application were ignored as simplifying assumptions. Particle size multipliers were applied using Table 13.2.2-1 of AP-42. The resulting emission factors in g/vehicle mile travelled were applied to the trucks and cars for each segment and added to the MOVES3 tailpipe, brake, and tire wear emissions as inputs to the air dispersion model. Section J.3 of Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas – Appendices discusses how to characterize mobile emission sources in AERMOD, and that guidance was used.[3]

Roadway emissions are broken down by link. The modeled network includes the onsite road and for the revised analysis the pathway for C&D fines trucks (to the approximately west facing door), and the trucks arriving on the apron (where they idle waiting to back up to the doors), and the

[3] USEPA, Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas., EPA-420-B-15-084, November 2015

path backing up to doors, and leaving after unloading,, and the roadway network on which trucks are expected to use based on the traffic analysis. The network extends on Route 9 from Gilbertville Road to West Street in Ware but is truncated for the revised analysis since further roadways will have no impact on the worst case impacts at the facility fenceline which are dominated by onsite rail operations and operations in and near the transfer station building which are away from the further offsite roadways. Table 3.2 presents the roadway links included in the traffic analysis including the revised analysis..

Table 3-2 Truck Movement Sources

Description	AERMOD Source Type	AERMOD Source Name
Onsite Roadway	Line Volume	ONSITERD
Gilbertville Road /Route 32	Line Volume	SLINE1
Route 9 East of Gilbertville Road	Line Volume	SLINE2
Route 9/32 Site Drive to Gilbertville Road	Line Volume	SLINE3
Route 9/32, Site Drive to Knox Avenue	Line Volume	SLINE4
Knox Ave, S of Route 9/32	Line Volume	SLINE5
Route 9/32, Knox to South/Church Streets	Line Volume	SLINE6
Route 9/32, South/Church to North Street	Line Volume	SLINE7
Route 9/32, North to West Street	Line Volume	SLINE9
West Street /Route 32	Line Volume	SLINE10
Route 9, West of West Street	Line Volume	SLINE11
Revised Truck Movement Sources		
Onsite Roadway	Line Volume	ONSITERD
Fines Trucks	Line Volume	FINESTRUCKS
Empty Trucks return path	Line Volume	TRUCKS_RTRN
Trucks U-Turn Path and backup to Door 3	Line Volume	UTURN_PATH
Trucks forward/backup to Door2	Line Volume	DOOR2_TIP
Trucks forward/backup to Door4	Line Volume	DOOR4_TIP
Fines Trucks	Line Volume	FINESTRUCKS
Empty Trucks return path	Line Volume	TRUCK_RTRN
Trucks U-Turn Path and backup to Door 3	Line Volume	UTURN_PATH
Trucks forward/backup to Door2	Line Volume	DOOR2_TIP
Route 9 East of Gilbertville Road	Line Volume	SLINE2
Route 9/32 Site Drive to Gilbertville Road	Line Volume	SLINE3
Route 9/32, Site Drive to Knox Avenue	Line Volume	SLINE4
Onsite Roadway	Line Volume	ONSITERD

Intersections

The traffic analysis included analysis of 6 local intersections. For the revised analysis, this was truncated to the two local intersections near the project site. Emissions from vehicles idling at intersections are calculated using 0 mph and rural unrestricted roadway emission factors obtained from MOVES3. The factors, along with the vehicle volumes and average delay times provide the basis of the emissions calculation at each intersection. An existing peak hourly volume of 30 truck trips at the site entrance was used. Delay times at each intersection were taken from the transportation analysis and used to calculate truck emissions at the intersections.

Property Idling Areas

Onsite truck loading/unloading areas were included in the analysis to account for exhaust from idling trucks. For the revised analysis, this includes the scales (incoming and outgoing), and the arrival of trucks onto the apron waiting to backup to doors.

The maximum amount of idle time that Massachusetts Regulations MGL Ch. 90 §16A allows is 5 minutes. The analysis includes 5 minutes of idle time emissions per vehicle in the air modeling at the truck unloading area.

The facility will post any required signage to minimize idle time in accordance with regulations, and has adequate roadway, parking areas and loading bays to avoid excessive queuing onsite.

MOVES3 was run with allocated source types to represent the areas. Emissions were calculated based on projected hourly vehicle movements in each area. Massachusetts has regulations limiting vehicle idling time. It is assumed that each vehicle idles for approximate 5 minutes (300 seconds), regardless of ambient temperature.

Sources of idling emissions are presented in Table 3-3, including for the revised analysis.

Table 3-3 Existing Condition Modeled Idling Areas (Intersections and Onsite Unloading)

Source ID	Description	Average Peak Delay time (s/veh)	Peak Volume (vph)
TRUCKIDLE1	Truck Exhaust Tipping Area	300	15
TRUCKIDLE2	Site Drive @Rte 9	0.5	30
TRUCKIDLE3	Gilbertville Rd & Rte 9	3.3	19
TRUCKIDLE4	Knox Ave @ Rte 9	3.5	11
TRUCKIDLE5	South/Church St @Rte 9	38.8	11
TRUCKIDLE6	North St @ Rte 9	15.1	11
TRUCKIDLE7	West St @ Rte 9	44.4	11

Table 3-4 Existing Condition Modeled Idling Areas (Intersections and Onsite Unloading) (Continued)

Source ID	Description	Average Peak Delay time (s/veh)	Peak Volume (vph)
Revised Modeled Idling Areas			
IDLE_APRON	Truck Exhaust Tipping Area [(1)]	300	16
TRUCKIDLE2	Site Drive @Rte 9	1.25	40
TRUCKIDLE3	Gilbertville Rd & Rte 9	3.3	30
OBTRUCKIDLE	Outbound idling trucks queue	180	2
IB_SCALE_IDL	Inb Trucks on Scale idling	60	22
OB_SCALE_TRK	Ob Trucks on Scale idling	180	18

USEPA has provided guidance on using AERMOD when modeling roadway sources.[4] The methods shown in this guidance were used in the calculation of initial plume heights, initial plume widths, and release heights. For the intersection and loading areas, the initial widths were estimated based on the size of the area.

On-site sources as represented in the model are shown in Figure 3-2. The revised on-site sources are shown in Figure 3-2 Revised. Specific model inputs for mobile sources can be found in Attachment 3-1a, 3-1b, and 3-1c and revised model inputs for mobile sources can be found in Attachment 3-1e and 3-1d.

3.4.2 Offroad Sources

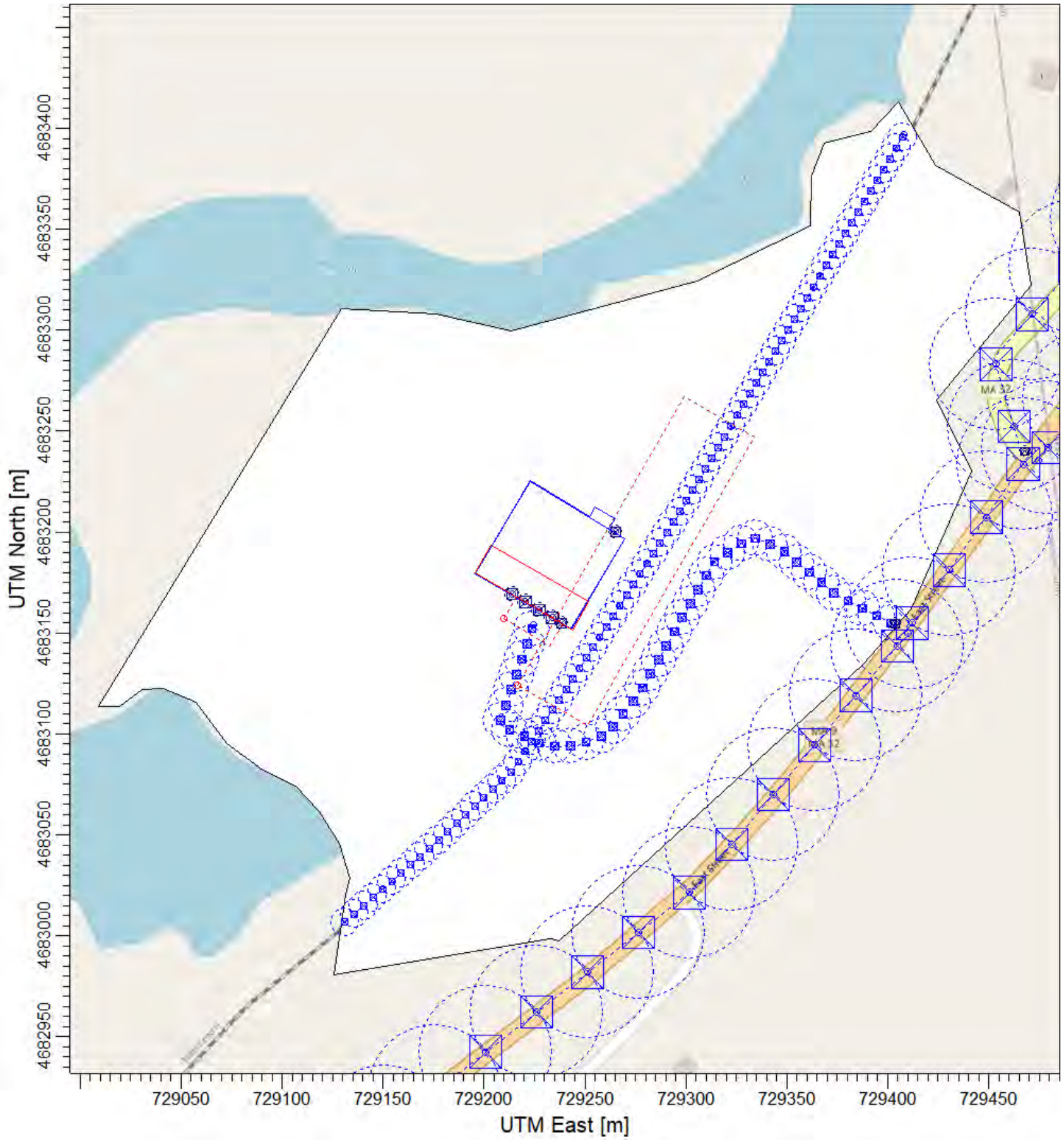
Heavy Equipment

Exhaust emission rates for heavy equipment is obtained from the MOVES3 model. The model contains the NONROAD emissions model predecessor and provides emission factors for various equipment in grams per brake-horsepower hour. Using these factors, the specific equipment type, its horsepower, and a load factor, hourly estimates of pollutant emissions can be made.

Fugitive Dust

Additionally, estimates of fugitive dust generated from materials handling were made and included with the equipment's exhaust particulate emissions. PM10 and PM2.5 emissions generated by dumping, moving, and loading the C&D material the facility handles are included in

[4] USEPA, Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas., EPA-420-B-15-084, November 2015



ReSource – Ware, MA

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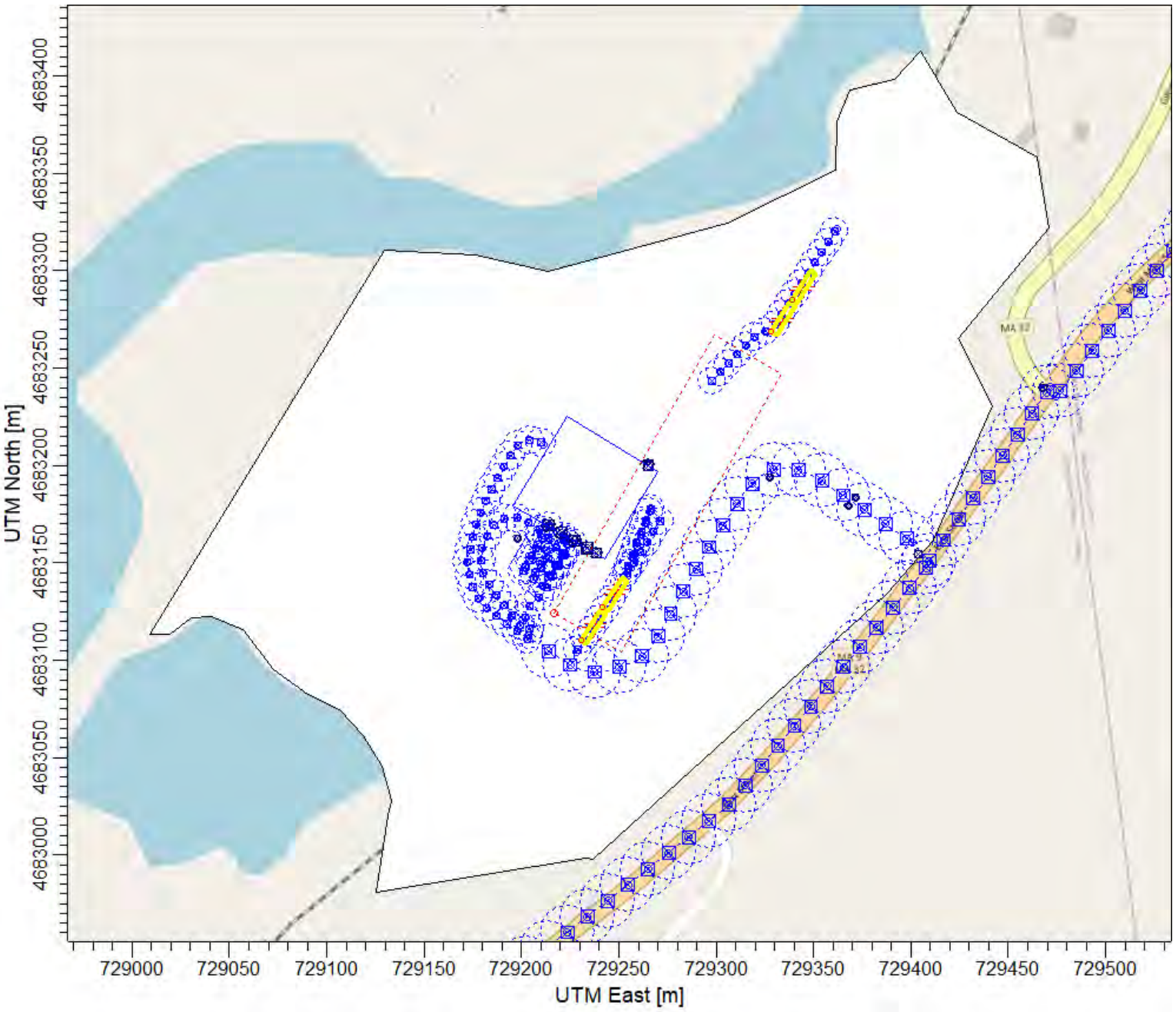
Figure 3-2
On-site Sources



ReSource – Ware, MA

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Figure 3-2 Revised

On-site Sources

the analysis. Emissions were calculated based on methodology outlined in AP-42 Section 13 which details emissions from heavy duty construction operations. More details on the calculation methods for fugitive dust from material handling are presented in Attachment 3-1a, 3-1b, and 3-1c and revised dust calculations are presented in Attachment 3-1d and 3-1e.

Locomotives

Emissions factors for locomotive operations were obtained from USEPA.[5] Emissions are generally described as "line haul" and "switching". "Line haul" is described as "The movement of freight by a carrier over its line or part of its line, excluding switching, pick-up or delivery".[6] While "switching" is described as "moving cars within a yard". Most of the locomotive operations onsite can be described as "switching" or locomotives sitting idling and waiting. Thus emissions were based on an "idle" throttle setting assumed to be at 10% of full load. Details on the locomotive emissions calculations are presented in Attachment 3-1a, 3-1b, and 3-1c and revised locomotive emissions calculations are included in Attachment 3-1d and 3-1e.

For the revised analysis, with the more detailed descriptions and locations of movements from Sanborn Head, it was possible to refine the rail emissions. A Locomotive Attributes tab has been added to the emissions spreadsheet, where detailed rail data from a CARB Rail Study conducted at a large rail yard in California[7] were used to better characterize emissions during switching and idling for each visit during Stage 1 and Stage 2, including individual average load for each set of switching operations and idling time. In addition, the idle emissions were modeled as stationary sources from the two stacks on each of two locomotives. Revised calculations are presented in Attachments 3-1d and 3-1e.

3.5 Regulatory Applicability

This section describes the regulatory standards and their applicability to the proposed project. For each air regulatory program listed in Table 3-4 below, there is a section briefly explaining why the standard does or does not apply.

5 USEPA, Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

6 CSX Railroad Dictionary, https://www.csx.com/index.cfm/about-us/company-overview/railroad-dictionary/

7 Roseville Rail Yard Study, CARB. https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/rrstudy/rrstudy101404.pdf , October 14, 2004.

Table 3-5 Summary of Applicable Requirements

Regulatory Program	Applicability
Ambient Air Quality Standards and Policies	Apply and are satisfied as described in Section 3. 5.1 and Section 3.6
Prevention of Significant Deterioration (PSD) Review	Not Applicable, See Section 3.5.2
Non-Attainment New Source Review (NSR)	Not Applicable, See Section 3.5.3
New Source Performance Standards (NSPS)	Not Applicable, See Section 3.5.4
National Emission Standards for Hazardous Air Pollutants (NESHAPs)	Not Applicable, See Section 3.5.5
Emissions Trading Programs	Not Applicable, See Section 3.5.6
Visible Emissions	Applies and is satisfied as described in Section 3.5.7
Noise Control Regulation and Policy	Applies and is satisfied as described in Section 3.5.8
Industry Performance Standards	Not Applicable, See Section 3.5.9
Air Plan Approval	Not Applicable, See Section 3.5.10
Best Available Control Technology (BACT)	Not Applicable, See Section 3.5.11
Operating Permit and Compliance Assurance Monitoring (CAM)	Not Applicable, See Section 3.5.12
Massachusetts Environmental Policy Act (MEPA)	Applies and is satisfied as described in Section 3.5.13
Massachusetts Air Toxics Guidelines	Apply and are satisfied as described in Section 3.5.14

3.5.1 *Ambient Air Quality Standards and Policies*

One of the most basic goals set forth in the federal and state air regulations is to ensure that ambient air quality, including the impact of background, existing sources, and new sources, complies with ambient air quality standards. As such, all areas of the country are labeled with one of three classifications for each contaminant. These three classifications are "attainment," "nonattainment," and "unclassified."

In areas designated as attainment, the air quality with respect to the pollutant is equal to or better than the NAAQS. These areas are under a mandate to maintain, i.e., prevent significant deterioration of such air quality. In areas designated as unclassifiable, there is limited air quality data, and those areas are treated as attainment areas for regulatory purposes. In areas designated as nonattainment, the air quality with respect to the pollutant is worse than the NAAQS. These areas must take actions to improve air quality and attain the NAAQS within a certain period.

Part of documenting compliance with Massachusetts air regulations is to document that new emission sources associated with the project do not cause or contribute to an exceedance of the air quality standards set forth by the State and Federal regulations. The USEPA has developed a set of NAAQS for six air contaminants that are collectively known as criteria pollutants. These NAAQS are intended to protect public health and welfare. The six criteria pollutants are sulfur dioxide (SO_2); particulate matter (which is broken up into two categories: PM_{10} which is particulate

having an aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ which is particulate matter having an aerodynamic diameter of 2.5 micrometers or less); nitrogen dioxide (NO_2); carbon monoxide (CO); ozone (O_3); and lead (Pb). Coinciding with the NAAQS, the Commonwealth of Massachusetts has set forth its own state air quality standards called the Massachusetts Ambient Air Quality Standards (MAAQS) which are codified in 310 CMR 6. These MAAQS generally follow the USEPA NAAQS, though the MAAQS have not been updated to reflect some of the more recent USEPA updates to the NAAQS. Recently, a proposal for conformance of the MAAQS with the NAAQS has been issued for public comment by MassDEP.

The NAAQS and MAAQS have been developed for various durations of exposure. The short-term standards typically refer to pollutant levels that are not to be exceeded except for a limited number of times per year. The long-term standards typically refer to pollutant levels that are not to be exceeded on an annual average basis. These standards can be further broken down into primary and secondary standards. Primary standards are intended to protect human health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. The secondary standards are intended to provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The significant impact levels (SILs) are numerical values that represent thresholds of insignificant, i.e., de minimis, modeled source impacts. The SILs are small fractions of the health protective NAAQS. For new sources that exceed these levels, the air quality impact analysis is required to include the new source, existing interactive sources, and measured background levels. If the maximum predicted impacts of a pollutant due to a proposed emission increase are below the applicable SILs, the predicted emissions from the proposed project are in compliance with the NAAQS for that pollutant. The NAAQS and MAAQS and SILs for criteria pollutants are shown in **Table 3-5** below.

Table 3-6 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards and Significant Impact Levels (SILs)

Pollutant	Averaging Period	NAAQS/MAAQS (µg/m³)		SILs (µg/m³)
		Primary	Secondary	
CO	1-Hour	40,000[1]	Same	2,000
	8-Hour	10,000[1]	Same	500
Pb	Rolling 3-month avg.	0.15[2]	Same	N/A
NO_2	1-Hour	188[3]	None	7.5
	Annual	100[4]	Same	1
O_3	8-Hour	137.4[5]	Same	N/A
$PM_{2.5}$	24-Hour	35[6]	Same	1.2
	Annual	12[7]	15[7]	0.2

Table 3-7 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards and Significant Impact Levels (SILs) (Continued)

Pollutant	Averaging Period	NAAQS/MAAQS (µg/m³)		SILs (µg/m³)
		Primary	Secondary	
PM_{10}	24-Hour	150[1]	Same	5
SO_2	1-Hour	196.0[8]	None	7.8
	3-Hour	None	1,310[1]	25

[1] Not to be exceeded more than once per year
[2] Not to be exceeded
[3] 98th percentile of 1-hour daily maximum concentrations averaged over 3 years
[4] Annual mean
[5] Annual fourth-highest daily maximum ozone concentration, averaged over 3 years
[6] 98th percentile, averaged over 3 years
[7] Annual mean, averaged over 3 years
[8] 99th percentile of 1-hour daily maximum concentrations averaged over 3 years

An air quality impact analysis was performed for the new sources associated with this project to document compliance with the ambient air quality standards as well as the air toxics guidance (discussed in detail in Section 3.5.13). This air quality impact analysis is further discussed in Section 3.6 of this document.

3.5.2 *Prevention of Significant Deterioration (PSD) Review*

The PSD new source review program is a federally-mandated program review of new major stationary sources of criteria pollutants designed to maintain the NAAQS and prevent degradation of air quality in attainment/unclassifiable areas. The PSD program, which is implemented by the Massachusetts Department of Environmental Protection (MassDEP) in Massachusetts[8], applies to new major stationary sources and major modifications of existing major sources of air pollution in attainment/unclassifiable areas. The facility is not an existing major source under PSD regulations and the new potential emissions from the fugitive dust sources at the project do not exceed the relevant PSD major source emissions threshold of 250 tpy.

3.5.3 Non-Attainment New Source Review

If a major source of pollution is proposed in an area designated as nonattainment for a particular pollutant, the source is subject to Nonattainment New Source Review (NSR) for that pollutant. The federal Clean Air Act defines levels of nonattainment classifications for ozone ("O_3"). The entire Commonwealth of Massachusetts was previously classified as moderate nonattainment for 8-hour ozone. MassDEP has not taken any action to revise its Nonattainment NSR provisions

[8] MassDEP administers the federal PSD program in accordance with the provisions of the April 11, 2011 PSD Delegation Agreement between MassDEP and USEPA which states that MassDEP agrees to implement and enforce the federal PSD regulations as found in 40 CFR 52.21.

because of the recent reclassification of most of the state to "unclassifiable/attainment" for 8-hr ozone. Therefore, the Nonattainment NSR provisions of MassDEP regulations at 310 CMR 7.00 Appendix A ("Appendix A") are still currently applicable state-wide to major sources of NO_x and VOC, as precursors to ozone.

The major source threshold for NO_x and VOC is currently 50 tpy in Massachusetts. The Non-Attainment NSR regulations do not apply to this project because the aggregate potential emissions from the existing and proposed fugitive dust sources at the facility are not sources of NO_x and VOC and thus are below the 50 tpy threshold for NO_x and the 50 tpy threshold for VOC.

3.5.4 New Source Performance Standards

The USEPA has implemented New Source Performance Standards (NSPS) at 40 CFR 60. These NSPS are intended to regulate air contaminants that may be emitted by various categories of newly constructed industrial or commercial equipment. None of the fugitive dust emission sources at the proposed facility fall into the categories and definitions of applicability in any of the established NSPS requirements. As such, the facility is not subject to the requirements of any NSPS.

3.5.5 National Emission Standards for Hazardous Air Pollutants

Realizing that there were many pollutants that did not meet the specific requirements for developing a NAAQS, Congress included a section (Section 112) in the 1990 Amendments to the Clean Air Act that established a vehicle for the USEPA to develop air quality standards for potentially hazardous pollutants. Updates to regulations set forth in 40 CFR 61 and new regulations published in 40 CFR 63 were developed to implement Section 112 of the 1990 Amendments to the Clean Air Act. The regulations at 40 CFR 61 apply to specific pollutants and source categories that do not include the proposed facility. 40 CFR 63 established numerous National Emission Standards for Hazardous Air Pollutants (NESHAPs) to regulate Hazardous Air Pollutants (HAPs). HAPs refers to specified pollutants regulated under the Clean Air Act, including organic compounds and trace metals for which the USEPA has not established ambient air quality standards. HAPs are defined in detail within 42 U.S.C. 7412, and accompanying regulations in 40 CFR Part 63, Subpart C. There are no NESHAP requirements that are applicable to the facility as existing or proposed.

3.5.6 Emissions Trading Programs

The Acid Rain Program (40 CFR 72), the Regional Greenhouse Gas Initiative (RGGI), and the Massachusetts NO_x Budget program apply to fossil fuel-fired combustion devices serving a generator with a nameplate capacity of greater than 25 MWe. The proposed facility modifications do not include any fossil fuel-fired combustion devices serving a generator larger than 25 MWe, thus these three programs do not apply.

3.5.7 Visible Emissions

Massachusetts regulation (310 CMR 7.06) limits smoke to No. 1 on the Ringlemann Chart (except for six minutes in an hour up to No. 2 on the Chart) and limits opacity to 20% (except for two minutes in an hour up to 40%). These limits apply only to stationary sources. The proposed facility is not expected to have any visible emissions impact from stationary sources and is expected to operate below the visible emissions limits set forth in 310 CMR 7.06.

3.5.8 Noise Control Regulation and Policy

MassDEP regulations, set forth in 310 CMR 7.10 and as interpreted in the MassDEP Noise Policy 90-001, limit noise increases to 10 dBA over the existing L90 ambient level at the closest residence and at property lines. The proposed project conforms to the Noise Control Regulations and Policy as discussed in Section 2.0 of the NPC.

3.5.9 Industry Performance Standards

MassDEP has set forth industry performance standards in 310 CMR 7.26 which relate to the Massachusetts Environmental Results Program (ERP). The ERP regulations apply to a variety of stationary sources, including engines, turbines, and boilers that fall within a certain size range and/or use category. There are no stationary sources located at ReSource Ware that are subject to these industry performance standards.

3.5.10 Air Plan Approval

The proposed facility will not be subject to MassDEP air plan approval (air permitting) requirements under 310 CMR 7.02. Key standards for approval are listed in 310 CMR 7.02 (4) for Limited Plan Approvals and 310 CMR 7.02 (5) for Comprehensive Plan Approvals. These standards typically include ensuring that these new stationary sources will follow all applicable federal and MassDEP air regulatory requirements, ensuring that the new sources will meet ambient air quality criteria, and requiring a certification that any facilities in Massachusetts owned or operated by the applicant are in compliance with MassDEP air requirements (or are on an approved schedule to come into compliance). The proposed facility is not subject to the MassDEP air plan approval requirements for a Limited Plan Application (LPA) because the estimated emissions from fugitive dust sources are below the one ton per year threshold of any regulated pollutant.

3.5.11 Best Available Control Technology

Massachusetts BACT is based on the maximum degree of reduction of any regulated air contaminant that the MassDEP determines, on a case-by-case basis, is achievable considering energy, environmental, and economic impacts. A BACT determination can never result in a less stringent emission limitation than an applicable emission standard. Depending on the circumstances, BACT may parallel with the emission standard or may be more stringent than the emission standard. BACT itself is a standard that balances emission control benefits with technical feasibility, other environmental impacts, and costs. The facility has no sources that are subject to

the MassDEP Plan Approval process. The non-mobile activities at the facility only result in the emissions of fugitive dust (particulate matter) in small quantities from the process that are below applicability thresholds for a plan approval or BACT analysis.

3.5.12 Operating Permit and Compliance Assurance Monitoring

The proposed facility will not be subject to the requirements to obtain an operating permit as it is not a major source of emissions and no Federal regulations apply that require obtaining an operating permit (i.e., certain NSPS and NESHAP).

The Compliance Assurance Monitoring (CAM) requirements at 40 CFR 64 apply when an emission unit uses a control device to comply with certain emission limits, the potential emissions before control are above major source thresholds, and an operating permit does not specify a continuous compliance determination method, such as continuous emissions monitoring systems (CEMS). No such sources exist at this facility and the proposed facility will not be required to obtain an operating permit; therefore, CAM does not apply.

3.5.13 Massachusetts Environmental Policy Act

Per the MEPA Office website, MEPA requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. It also requires them to take all feasible measures to avoid, minimize, and mitigate damage to the environment.

MEPA further requires that state agencies "use all practicable means and measures to minimize damage to the environment," by studying alternatives to the proposed facility, and developing enforceable mitigation commitments, which will become conditions for the project when they are permitted. A Notice of Project Change, filed and certificate issued in 2022, serves as the MEPA compliance filing for the proposed facility.

3.5.14 Massachusetts Air Toxics Guidelines

Similar to the NAAQS and MAAQS discussed in Section 3.5.1, there are concentration thresholds for air toxics that are in place to protect air quality and human health. MassDEP has set forth guideline values known as the Ambient Air Limits (AALs) and Threshold Effect Exposure Limits (TELs) to allow evaluation of the potential for human health risks associated with exposure from certain chemicals in the air.

MassDEP determines the AALs and TELS through an analysis of health effects. The first step in developing an AAL and TEL is to look at the carcinogenic and non-carcinogenic health effects of the chemicals.

Known or suspected carcinogenic health effects make up the basis of the Non-Threshold Effects Exposure Limits (NTELs) which are associated with a one in a million excess cancer risk over a lifetime of continuous exposure to the chemical.

The TEL addresses the non-cancer health effects and is intended to protect the general population from adverse health effects over a lifetime of exposure to the chemical. The TEL includes impacts on sensitive populations such as children and considers other pathways for exposure to the chemical than just ambient air. These other pathways that are evaluated in the TEL determination include indoor air, food, soil, and water.

MassDEP then compares the NTEL and TEL and assigns whichever concentration is lower as the AAL to make sure both cancer and non-cancer health impacts are mitigated to the fullest extent possible. Most AALs are based on the NTELs since the NTEL tends to be lower than the TEL for most compounds. For non-carcinogenic compounds, the AAL will be based on the TEL which results in the published AAL and TEL values being the same. It is important to note that exposure above an AAL or TEL does not necessarily mean there will be adverse health impacts, but rather that the risk of these adverse effects increases with the frequency of exposure above these levels.

To address the air toxics guidelines, air toxic mass emission rates were estimated for both stationary and mobile sources at the proposed facility, ambient concentrations from all sources were modeled, and the maximum modeled concentrations were compared to the AAL (on an annual average basis) and TEL (on a short-term basis) to ensure there are no exceedances in the residential neighborhoods. In some cases, AALs and TELs were not available for pollutants of concern, and in those cases other equivalent criteria were used for comparison. The results of the air toxics analysis that contains the comparison to these AALs and TELs (and other equivalent criteria as appropriate) is found in Section 3.6.2 of this report.

Hazardous Air Pollutants (HAPs, or toxic air pollutants) are regulated through Section 112 of the Federal Clean Air Act. These are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. These chemicals enter the body through inhalation, ingestion, or contact exposure. There are currently 187 Federally listed HAPS.[9]

Massachusetts has 24-hour Threshold Exposure Limits (TELs) and annual Allowable Ambient Limits (AALs) to regulate emissions of HAPs. Since combustion of diesel fuel produces emissions of a select number of HAPs, only those with quantifiable diesel emissions are shown, rather than the entire set of 187 pollutants. The TELs and AALs used are presented in Table 3-6.

[9] 42 U.S.C. §7401 et seq. (1990)

Table 3-8 Massachusetts Hazardous Air Pollutant Standards

Pollutant	24-hr Threshold Exposure Limits (TEL) (µg/m³)	Annual Allowable Ambient Limit (AAL) (µg/m3)
1,3-BUTADIENE	1.2	0.003
2-METHYLNAPHTHALENE	14.25	14.25
ACETALDEHYDE	30	0.4
ACETONE	160.54	160.54
ACROLEIN	0.07	0.07
AMMONIA (NH3)	100	100
ARSENIC	0.003	0.0003
BENZENE	0.6	0.1
BERYLLIUM	0.001	0.0004
CADMIUM	0.002	0.0002
CHROMIUM	0.003	0.0001
COPPER	0.54	0.54
DICHLOROBENZENE	81.74	0.18
ETHANOL	51.24	51.24
ETHYL BENZENE	300	300
FORMALDEHYDE	2	0.08
FURANS	0.4	0.02
LEAD	0.14	0.07
MERCURY	0.003	0.0014
METHYL ETHYL KETONE	200	10
NAPHTHALENE	14.25	14.25
NICKEL	0.27	0.18
SELENIUM	0.54	0.54
STYRENE	200	2
TOLUENE	80	20
VANADIUM	0.27	0.27
XYLENE	11.8	11.8

The inhalation Reference Concentration (RfC) is based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis. The inhalation RfC considers toxic effects for both the respiratory system (portal-of-entry) and systems peripheral to the respiratory system. It is generally expressed in units of mg/m³. In general, the RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Diesel engine exhaust (DE) is a complex mixture of airborne particles and gases. Diesel particulate matter (DPM), composed of elemental carbon particles and adsorbed organic compounds, is the most frequently determined measure of DE and the measure reported in toxicological studies of diesel engine exhaust. The RfC 0f $5x10^{-3}$ mg/m³ is used in the USEPA's Integrated Risk Information System (IRIS) as an appropriate threshold.[10]

3.6 Air Quality Impacts Analysis & Results

3.6.1 General Approach

As part of the environmental impact analysis for the proposed project, an air quality analysis has been completed to estimate the impacts of air pollutants on the nearby residential areas.

Modeling Methodology

To predict potential project-generated air quality impacts at nearby locations, USEPA has developed computer software to emulate dispersion of chemicals in the atmosphere. These "models" incorporate pollutant source characteristics, local meteorological data, digital location and terrain data, and a variety of control options to estimate pollutant concentrations at a given location. This technique is often required for sources of air pollution and the acceptable and appropriate methods are specified in detail in both USEPA regulations[11] and state modeling guidelines.[12]

The models and air quality modeling techniques are developed with a relatively highly conservative margin of error, such that results are generally shown to be higher or worse than actual atmospheric dispersion. This provides reasonable confidence that by showing compliance with applicable standards, that protection of public health and welfare is assured.

Air Quality Model Selection and Options

The USEPA's AERMOD model (Version 21112) was selected to predict concentrations from the stationary source related to the proposed project. AERMOD is the USEPA's preferred model for regulatory applications. The use of AERMOD provides the benefits of using the most current algorithms available for steady state dispersion modeling. The revised modeling used the latest AERMOD version 22112.

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[10] USEPA, Integrated Risk Information System (IRIS), Diesel engine exhaust; Chemical Assessment Summary, CASRN N.A., February 28, 2003.

[11] 40 CFR Part 51, Appendix W. Guideline on Air Quality Models

[12] MassDEP, 2011: Modeling Guidance For Significant Stationary Sources Of Air Pollution, Massachusetts Department of Environmental Protection, Boston, MA 02108

The AERMOD View graphical user interface (GUI) Version 10.2.1, created by Lakes Environmental, was used to facilitate model setup and post-processing of data. Revised modeling used the most recent GUI Version 11.2.0. The AERMOD model was selected for this analysis because it:

- is the required USEPA model for all refined regulatory analyses for receptors within 50 km of a source;
- is a refined model for facilities with multiple sources, source types, and building-induced downwash;
- uses actual representative hourly meteorological data;
- incorporates direction-specific building parameters which can be used to predict impacts within the wake region of nearby structures;
- allows the modeling of multiple sources together to predict cumulative downwind impacts,
- provides for variable emission rates;
- provides options to select multiple averaging periods between one-hour and one year (scaling factors can be applied to adjust the one-hour impact to a peak impact less than one-hour); and,
- allows the use of large Cartesian and polar receptor grids, as well as discrete receptor locations.

Modeling was performed with regulatory options. Regulatory default options adopted for the model include:

- Use stack-tip downwash (except for building downwash). Stack-tip downwash is an adjustment of the actual stack release height for conditions when the gas exit velocity is less than 1.5 times the wind speed. For these conditions, the effective release height is reduced a bit, based on the diameter of the stack and the wind and gas exit velocity. This option applies to point sources only, such as stacks and vents.
- Use the missing data and calms processing routines. The model treats missing meteorological data in the same way as the calms processing routine, i.e., it sets the concentration values to zero for that hour and calculates the short-term averages according to USEPA's calms policy, as set forth in the Guideline on Air Quality Models (Appendix W to 40 CFR 51).

Non-regulatory options used in the revised modeling include:

- Non-default in-stack ratio of 0.1 for the ratio of NO2 to NOx, which has been approved by MassDEP for other projects and was approved by MassDEP for this project.[13]

- The use of the NO2/NOx conversion Tier 3 Ozone Limiting Method (OLM). While non-regulatory, this method is routinely used and was approved by MassDEP.[14] The OLM method takes into account the varying amount of ozone in the atmosphere available to interact with NO to form NO2. A background air quality station located in Ware near the Quabbin Reservoir and close to the project site was chosen as an appropriate station to provide background hourly ozone concentrations. Additional details about OLM are provided in section 3.6.1 – Background Air Quality.

A complete description of the AERMOD dispersion model may be found in the AERMOD User's guide[15] and the AERMOD model implementation guide.[16]

Source Representations

In AERMOD, roadway sources are modeled as a series of volume sources. The use of volume sources allows the characterization of vehicular emissions to account for the initial turbulence created by moving vehicles. This initial plume spread is directly input into the AERMOD model.

For the roadway links, initial lateral plume spread is determined by the roadway width and varies by roadway. Road widths were measured in Google Earth and initial lateral spread values were calculated using width / 2.15 as described in the guidance referenced above. Estimating an average truck exhaust pipe height of about 4 m produces an initial vertical spread of about 1.86 m. The release height was set to an assumed truck height of 4 m.

In the revised modeling, roadway widths were revised to match updated 2021 PM2.5 Hot-spot Guidance ("the Guidance"). Widths were calculated by counting the number of travel lanes and applying a 3.3 m/lane conversion factor as recommended in the Guidance, p. J-2. [17] One-lane roadways (on-site roads) were 3.3 m wide and two-lane roadways (on-site driveway and off-site roads) were 6.6 m. The heavy-duty truck dimensions were obtained via the Mass.gov maximum

[13] Email concurrence from Glenn Pacheco of MassDEP March 14th, 2023 1:19 PM in response to DKB meeting minutes emailed on March 14th, 10:45 AM.

[14] Email concurrence from Glenn Pacheco of MassDEP March 14th, 2023 1:19 PM in response to DKB meeting minutes emailed on March 14th, 10:45 AM.

[15] USEPA, 2021: User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-21-001. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

[16] USEPA, 2021: AERMOD Implementation Guide. EPA-454/B-21-006. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

[17] PM2.5 Hot-Spot Guidance, EPA. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013C6A.pdf, EPA-420-B-21-037. October, 2021. Pg J-2.

commercial truck height limits, which specifies a maximum allowable truck height of 4.1 m and width of 2.6 m.[18] An average truck exhaust pipe height of about 4.1 m produces a vertical plume height of vehicle height*the 1.7 turbulence multiplier, or 7 m, and initial vertical spread of 7 m/2.15 or 3.25 m. The release height was set to one half the plume height or 3.5 m, as specified in the Guidance p. J-2.

The intersection sources were modeled as volume sources, given their general shape and orientation. The loading area was modeled as an area source. All trucks are assumed to be heavy-duty trucks. The conformity guidance states to assume a 4-meter release height and to assume 1.86 meters for the initial vertical spread.

For the intersection sources, vehicles are not moving, so a limited vertical mixing of 1.86 meters was assumed for trucks. The release height was set to 4 m for trucks. Intersection initial lateral spreads were based on visual inspection of the intersection's size. At a 10 m side, the initial lateral spread was set to 2.33 m.

In the revised modeling, a limited vertical mixing of 1.91 meters was assumed for trucks. The release height was set to 2.1 m for trucks, or one half the plume height without the 1.7 turbulence multiplier. Off-site intersection lengths of sides were based on the 3.3 m/lane for non-highway roads described in the Guidance. On-site idling vehicles used the maximum truck width of 2.6 m as the volume source length of side, since in many cases on-site there are no defined road lanes at truck idling locations.

The heavy equipment primarily operates within the building. Emissions are assumed to be released through the large open doors used to allow trucks to enter and unload within the building. Each door is modeled as a volume source. The door sources are denoted as RDOOR1-2 and TDOOR1-4 in the air quality analysis.

The railcar moving loader is modeled as an area source, given its mobility in the vicinity of the railroad tracks. The emissions from this operation are denoted as source RAILCAR in the air quality analysis and as "RAIL_LDR" in the revised analysis. For the revised modeling, the door sources were denoted as TDOOR1 through TDOO4 for the doors that the trucks enter and RDOOR1 and RDOOR2 for the two rail doors. The truck engines revving to drive the hydraulic pump on the walking floor are modeled as six volume sources overlapping the existing "TDOOR" and "RDOOR" volume sources. The truck engine sources are denoted with a "W_" prefix. The locomotive is modeled as a line volume source, denoted as LOCOMOTIVE in the air quality analysis. The line extends the length of the railway on the property, as it's uncertain where on the line the locomotive may sit while coupling and uncoupling railcars.

[18] https://www.mass.gov/info-details/commercial-truck-permits-height-and-weight-limitations

For the revised analysis, the locations of the locomotives were observed on-site during two site visits and modeled as a line volume source when moving for switching. For the time the rail cars are being moved they are modeled in a limited travel area depending on the time of day of the visit, and the balance of the time on-site assuming the locomotives are idling in a nominal centroid location of activity for that visit. For example, for the first visit of the day in Stage 1, most of the rail car movements are near the northern switch from the main line onto the sidings, while the two afternoon visit movements and idling time are evenly split between the northern and southern switches. The first visit of the day occurs at the north location, denoted as source group TRIP1SWC in the air quality analysis. The second and third visits of the day are denoted as source groups TRIP2SWC and TRIP3SWC, respectively. While the locomotives are idling, they are modeled as stationary point sources. Their denoted source group is TRIP(X)IDL, with "(X)" as visit 1, 2, or 3.

The idling emissions are modeled as point sources from two vertical stacks on top of each locomotive, and the switching emissions are modeled as line volume sources along a route associated with the extent of movements for each visit. For the future case for all pollutants, Stage 1 was modeled on since it needs three visits per day, while Stage 2 would result in only one visit per day. Thus Stage 1 is worst case for most pollutants and averaging times based on total emissions per 24-hour period or annually. The only exception to this is for 1 hr NO2, where the one visit per day could result in higher impacts than Stage 1 since there would be more switching time than any of the individual three visits in Stage 1, while there would be less idle time during that same hour than the sum of the three visits for Stage 1. Just as with the afternoon visits in Stage 1, the movements and idling locations are evenly split between the northern and southern mainline switch for the single daily visit in Stage 2. More detailed descriptions of these are provided in the calculations in Attachment 3-1d and 3-1e.

Urban / Rural Analysis

The AERMOD model can assign sources to a rural or urban category to allow specified urban sources to use the effects of increased surface heating under stable atmospheric conditions. The USEPA recommended procedure in *The Guideline on Air Quality Models* was followed to determine urban/rural classification using the Auer land use technique. The land use within the total area within 3 km of the site is classified using the meteorological land use typing scheme shown in **Table 3-7**. Based on a visual inspection, the rural dispersion classification was selected. The area within 3 km of the site and the land-use are shown in Figure 3-3.

Table 3-9 Identification and Classification of Land Use

Type	Use and Structures	Vegetation
I1	Heavy Industrial Major chemical, steel and fabrication industries; generally, 3-5 story buildings, flat roofs	Grass and tree growth extremely rare; <5% vegetation
I2	Light-Moderate Industrial Rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally, 1-3 story buildings, flat roofs	Very limited grass, trees almost absent; <5% vegetation
C1	Commercial Office and apartment buildings, hotels; >10 story heights, flat roofs	Limited grass and trees; < 15% vegetation
R1	Common Residential Single family dwellings with normal easements; generally, one story, pitched roof structures; frequent driveways	Abundant grass lawns and light-moderately wooded; >70% vegetation
R2	Compact Residential Single, some multiple, family dwellings with close spacing; generally, <2 story, pitched roof structures; garages (via alley), no driveways	Limited lawn sizes and shade trees; < 30% vegetation
R3	Compact Residential Old multi-family dwellings with close (<2m) lateral separation; generally, 2 story, flat roof structures; garages (via alley) and ashpits, no driveways	Limited lawn sizes, old established shade trees; < 35% vegetation
R4	Estate Residential Expansive family dwellings on multi-acre tracts	Abundant grass lawns and lightly wooded; > 95% vegetation
A1	Metropolitan Natural Major municipal, state or federal parks, golf courses, cemeteries, campuses, occasional single-story structures	Nearly total grass and lightly wooded; > 95% vegetation
A2	Agricultural; Rural	Local crops (e.g., corn, soybean); > 95% vegetation
A3	Undeveloped; Uncultivated; wasteland	Mostly wild grasses and weeds, lightly wooded; > 90% vegetation
A4	Undeveloped Rural	Heavily wooded; > 95% vegetation
A5	Water Surfaces: Rivers, lakes	

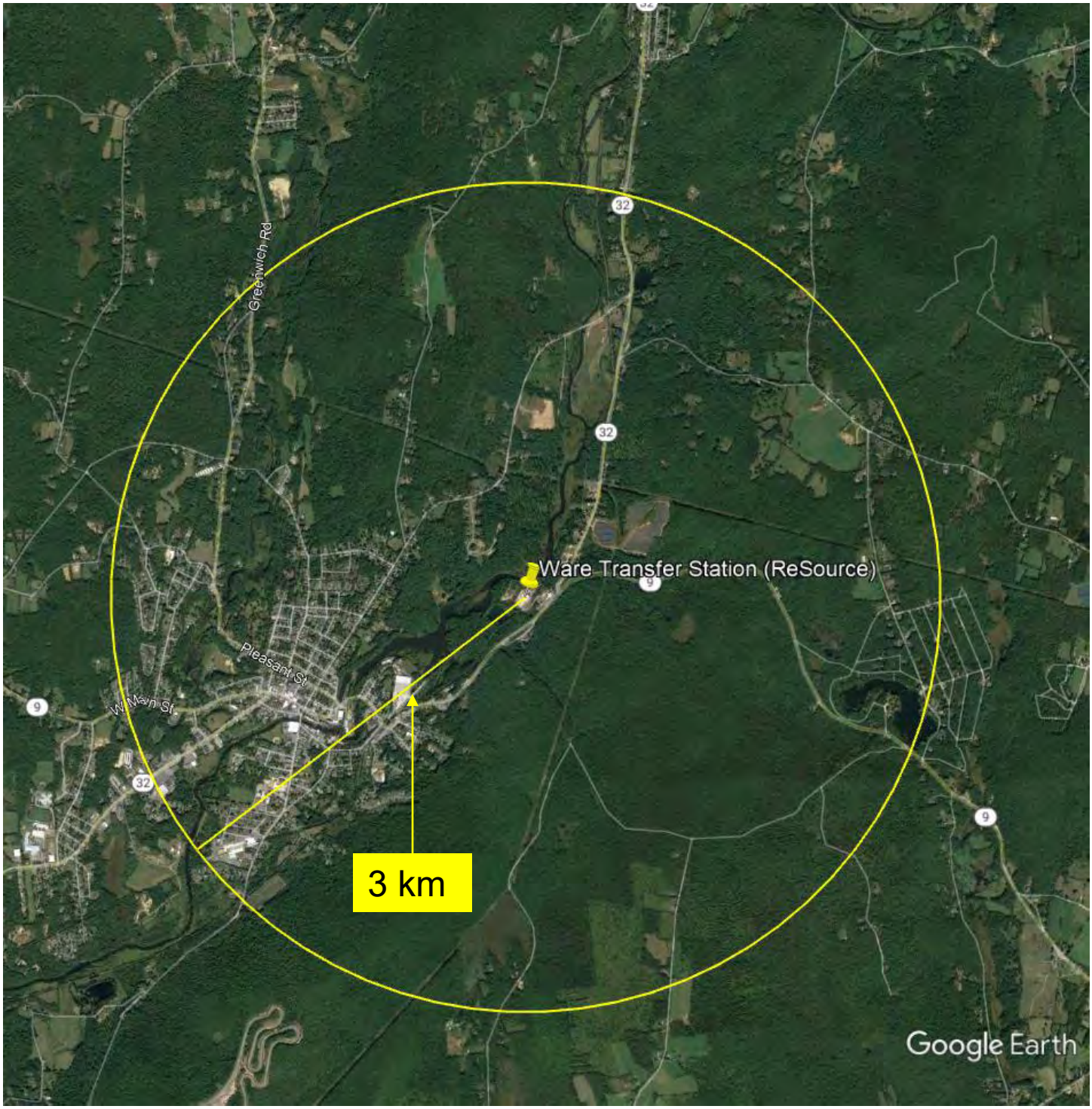

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Figure 3-3
Urban/Rural Determination

Background Air Quality Data

To estimate background pollutant levels representative of the area, the most recent air quality monitor data reported by the MassDEP in their Annual Air Quality Reports was obtained for 2018 to 2020. The three-hour SO_2 values are no longer published in the annual reports. Data for this pollutant and averaging time combination were obtained from the USEPA's AirData website. Background concentrations were determined from the closest available monitoring stations to the project site. All pollutants are not monitored at every station, so data from multiple locations are necessary. The closest monitor is at the Quabbin Reservoir in Ware (roughly 6.2 miles west-northwest, 10 kilometers) of the facility. However due to the land use around the monitor, this site can be considered less representative of the air quality on Route 9 near the facility. Therefore, the next closest appropriate monitor at Anderson Road in Chicopee (17.8 miles west-southwest, 28.6 kilometers) was chosen. Data for pollutants not sampled in Chicopee were obtained from the monitor at 600 Liberty Street in Springfield as a first, more conservative, choice and from the Ware monitor as a second choice when both Chicopee and Springfield data were unavailable. A summary of the background criteria pollutant concentrations is presented in Table 3-8. The yearly values as recorded in MassDEP's annual Air Quality Reports and USEPA's AirData website are presented in Attachment 3-2.

Table 3-10 Observed Ambient Air Quality Concentrations and Selected Background Levels

Pollutant	Averaging Period	Form	Background Concentration (µg/m³)	NAAQS	Percent of NAAQS
SO_2 [1][5]	1-Hr [4]	99th %	11.4	196.0	6%
	3-Hr	H2H	13.1	1300.0	1%
PM10	24-Hr	H2H	16	150.0	11%
PM2.5	24-Hr [4]	98th %	14.3	35.0	41%
	Annual [4]	H	5.7	12.0	47%
NO_2 [3]	1-Hr [4]	98th %	63.9	188.0	34%
	Annual	H	9.9	100.0	10%
CO [2]	1-Hr	H2H	2428.4	40000.0	6%
	8-Hr	H2H	1375.2	10000.0	14%
Revised Background Concentrations (PM2.5 Only)					
PM2.5	24-Hr [4]	98th %	14.5	35.0	41%
	Annual [4]	H	5.7	12.0	47%

Notes:
From MassDEP Air Quality Reports and USEPA's Airdata Website
[1] SO_2 reported ppb. Converted to µg/m³ using factor of 1 ppb = 2.62 µg/m³.
[2] CO reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1146 µg/m³.
[3] NO_2 reported in ppb. Converted to µg/m³ using factor of 1 ppb = 1.88 µg/m³.
[4] Background level is the average concentration of the three years.
[5] The 24-hour and Annual standards were revoked by USEPA on June 22, 2010, Federal Register 75-119, p. 35520.

Air quality in the vicinity of the project site is generally good, with all local background concentrations found to be well below the NAAQS. Note that only PM2.5 was revised to include recent data measured between 2019-2021.

For modeling NO2, MassDEP and USEPA allow the use of seasonal hourly background data. Seasonal diurnal variations in background data are accounted for by using the three-year (2019-2021) average of the 98th percentile background concentration by season and hour of day per the USEPA.[19] The selection of background data was revised for the 2023 modeling effort after input from MassDEP. Ware was used as the primary site for both NO2 and ozone data.[20] For the background seasonal NO2, the secondary monitor site of Anderson Road in Chicopee (17.8 miles west-southwest, 28.6 kilometers) was used to fill in missing Ware data. Gaps of one to two hours were filled using linear interpolation, and gaps larger than two hours were filled using the 3-year seasonal hourly average. Three years of NO2 data (between 2018-2021) were processed. The final dataset was sorted into meteorological seasons (Fall as Sept, Oct, Nov; Winter as Dec, Jan, Feb; Spring as Mar, Apr, May; and Summer as Jun, July, Aug) and hours. Lastly, the 3rd highest seasonal hourly NO2 concentration was selected for each hour of each season, and this set of values entered in AERMOD as the background NO2. The table containing the background values for the seasonal hourly 98th percentile is included in Attachment 3-2 Rev.

OLM requires the use of background hourly ozone data. Ozone data was gathered for the 5-year period between 2017-2021 using Ware as the primary monitor, Uxbridge as the secondary monitor, and Chicopee as the tertiary monitor.[21] Small gaps of one to two hours were filled using linear interpolation. Larger gaps were filled using linear interpolation or seasonal hourly averages, whichever was more appropriate given the stability levels over the 3-day period during which the gap occurred.[22] Since the ozone is processed on an hourly basis, there are 5 yrs * 8,760 hours or 43,800 data entries, and is too long to include in this report.

Meteorological Data for Modeling

The regional meteorology in Ware is best approximated with meteorological data collected by the nearby Westfield Barnes Airport in Westfield. The station is located approximately 26.5 miles (43 kilometers) to the west southwest of the project Site at an elevation of 272 feet (83 m) above mean sea level. This station is the closest site for which extensive meteorological data are available which are representative of similar topographic influences that affect the project Site. Five years (2016-2020) of hourly surface data collected at the station include wind speed and direction, temperature, cloud cover and ceiling height. Upper air data from Albany, New York was processed along with the surface data using version 21112 of the AERMET meteorological

[19] USEPA, Memorandum "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1 hour NO2 National Ambient Air Quality Standard", March 1, 2011

[20] E-mail communication from Glenn Pacheco of MassDEP 3/15/2022

[21] Email concurrence from Glenn Pacheco of MassDEP March 14th, 2023 1:19 PM in response to DKB meeting minutes emailed on March 14th, 10:45 am.

[22] Ozone data was missing from all three monitors 12/28/18 11:00 – 12/31/18 23:00 and the full day on 10/31/19.

data preprocessor. These files have been used on other AERMOD applications in the area for review by MassDEP and have previously been considered to be of sufficient quality for regulatory applications. The revised modeling used the 5-year period of 2017-2021 and the updated AERMET processor, version 22112.

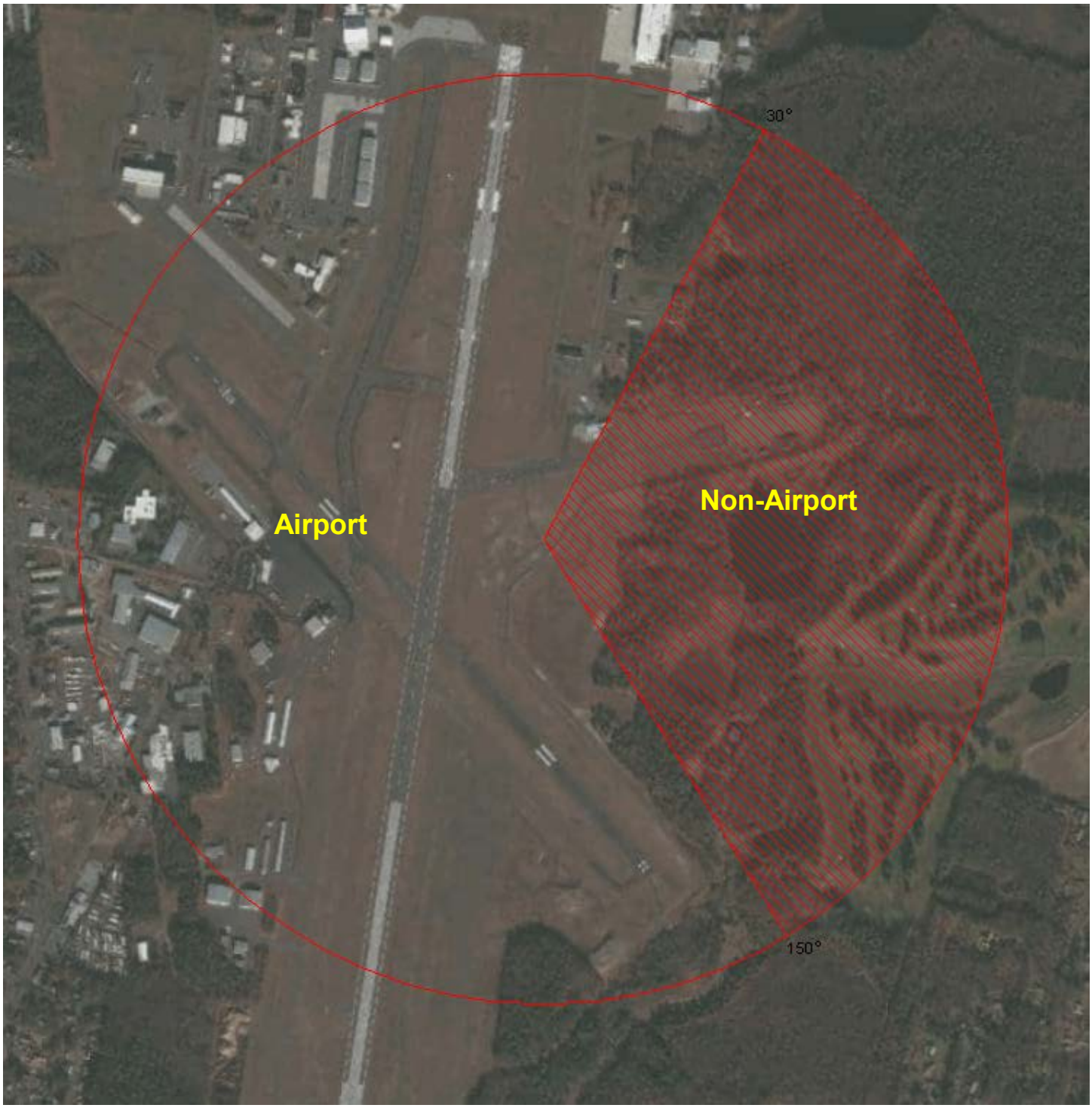
AERSURFACE (version 20060) processes digital land cover data to determine the surface characteristics for use in AERMET. These parameters include surface roughness, albedo, and Bowen ratio. Surface roughness was included using the AERSURFACE (version 20060). If the total precipitation was between the 30th and 70th percentile it was considered average, if it was less than 30th percentile it was considered "dry", and if it was greater than 70th percentile, wet. Based on the 30-year climatological record from Westfield, MA Barnes Municipal Airport, and Westfield and Holyoke monitoring locations from 1981 to 2020; 2016, 2017, and 2020 were considered dry, 2018 was considered wet, and 2019 was considered average. Other options include the use the Modify Option for the Upper Air Soundings, and inputs of a base elevation of 272 feet (83 meters) and an anemometer height of 33 feet (10 meters). In the revised modeling, the 30th and 70th percentiles of the 30-year precipitation data between 1992-2021 were calculated. Years 2017 and 2020 were classified as Dry, years 2019 and 2022 were classified as Average, and years 2018 and 2021 were classified as wet.

AERSURFACE now allows for the identification of airport and non-airport land-uses by each sector around the meteorological site based on a visual inspection of the sectors. Based on the guidance contained in the AERSURFACE user's guide: "A sector can be identified as airport or non-airport independently of whether the meteorological tower is physically located at an airport and should be judged by the predominant land use within a kilometer radius of the meteorological tower, giving more weight to land use nearest the tower."[23] Based on this visual inspection, the sectors between 30 and 150° were defined as 'non-airport' with all remaining sectors determined to be 'airport'. Figure 3-4 shows the sectors surrounding the meteorological site in relation to airport classifications.

Continuous snow cover was determined from data downloaded from the National Operational Hydrologic Remote Sensing Center Interactive Snow Information Website (http://www.nohrsc.noaa.gov/interactive/html/graph.html). These annual datasets contain both observed and modeled snow depths for every hour of a year at a prescribed location. The number of hours of modeled snow depth greater than zero was calculated for each month. The following rules were applied:

- If December, January, or February had greater than 1 inch of snow cover for greater than 50% of the hours was considered having "Continuous Snow Cover"
- April and May are always considered "Transitional Spring"
- June/July/August are always considered "Midsummer"

[23] User's Guide for AERSURFACE Tool, EPA-454/B-20-008, February 2020.



Sector	Airport/Non-Airport
150°-30°	Airport
30°-150°	Non-Airport

Figure 3-4
Barnes Westfied (MA) Airport Sectors

- September and October are always considered "Autumn"
- November through March without snow cover is considered "Late Autumn/Winter Without Snow"

The results of the revised precipitation analysis and snow cover analysis are presented in Attachment 3-3 Rev.

Testing of the 2016-2020 data found that the five-year period of 43,848 total hours, 465 calm hours (1.06%) were identified, and 439 (1.00%) missing hours were identified. Thus, these data should be deemed complete and representative for air quality modeling of the project site. The revised 2017-2021 dataset contains 1.50% calms and 0.71% missing hours and can also be considered complete and representative. The change in calms and missing hours is due to the exclusion of data from 2016 and addition of data from 2021, resulting in a new set of meteorological data.

A wind rose showing the 2016-2020 distribution of wind speed and direction is presented in Figure 3-5, and the revised wind rose with 2017-2021 data is presented in Figure 3-5 Revised

Receptor Grid

A network of 5,237 receptors with increasing spacing was used for the original and revised AERMOD modeling analyses. A nested grid of Cartesian receptors extending 11 kilometers in both the North-South and East-West directions and centered on the project site was used. The entire modeling domain encompassed 121 square kilometers.

Receptors were also placed around the property boundary. A total of 158 receptors spaced at 10-meter intervals would be sufficient to assess any impacts at the property boundary.

Terrain data were obtained from the U.S.G.S National Map Seamless Server (www.seamless.usgs.gov) according to guidance set forth by USEPA.[24] Source, building, and receptor elevations were processed using the AERMAP processor by way of the Lakes AERMOD View interface. Figure 3-6 presents the receptor locations, and Figure 3-6 Revised shows the receptor locations for the updated modeling runs.

[24] USEPA, AERMOD Implementation Guide, 454-B-21-002, April 22, 2021

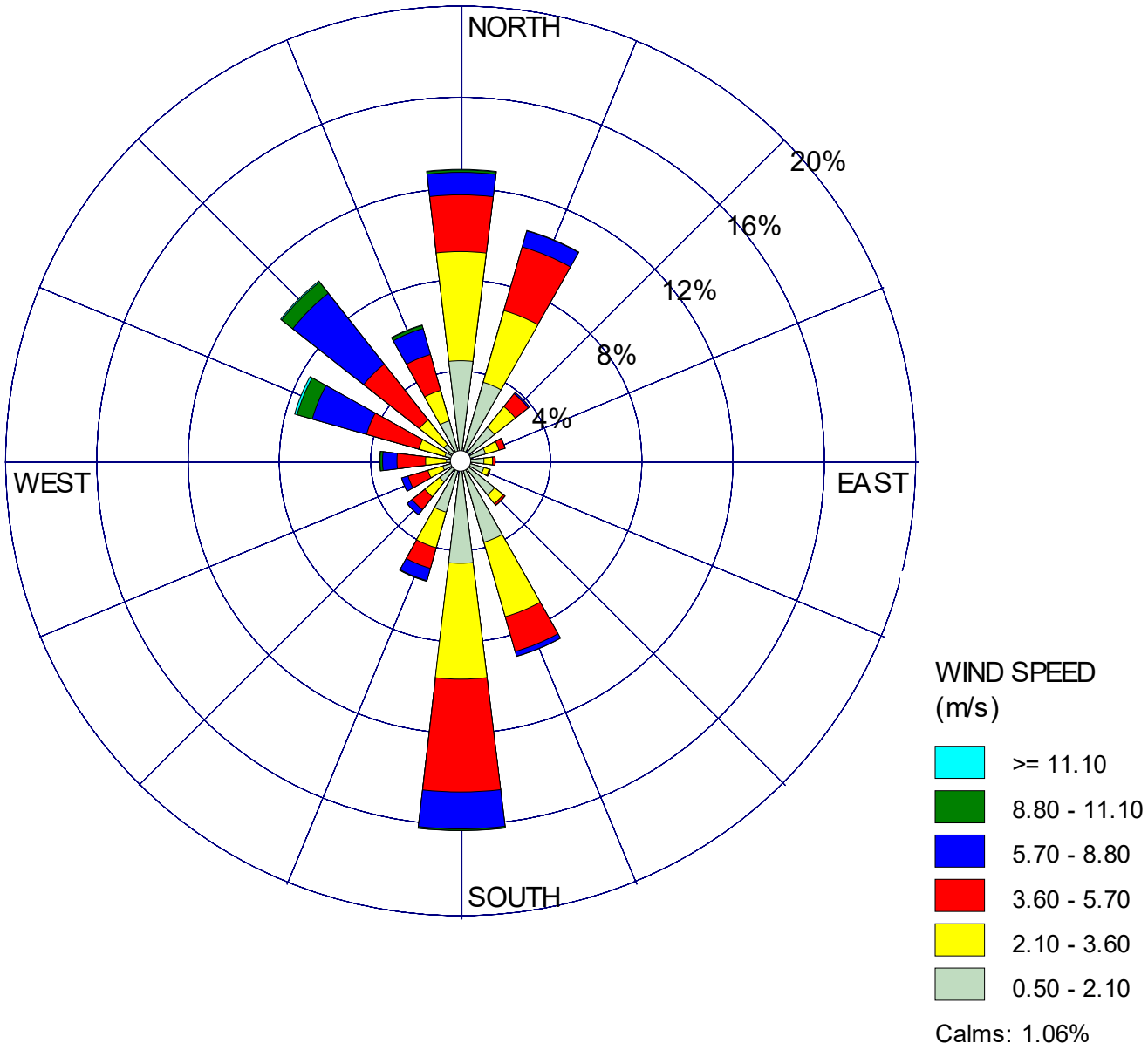


Figure 3-5

2016-2020 Westfield Barnes Airport Wind Rose

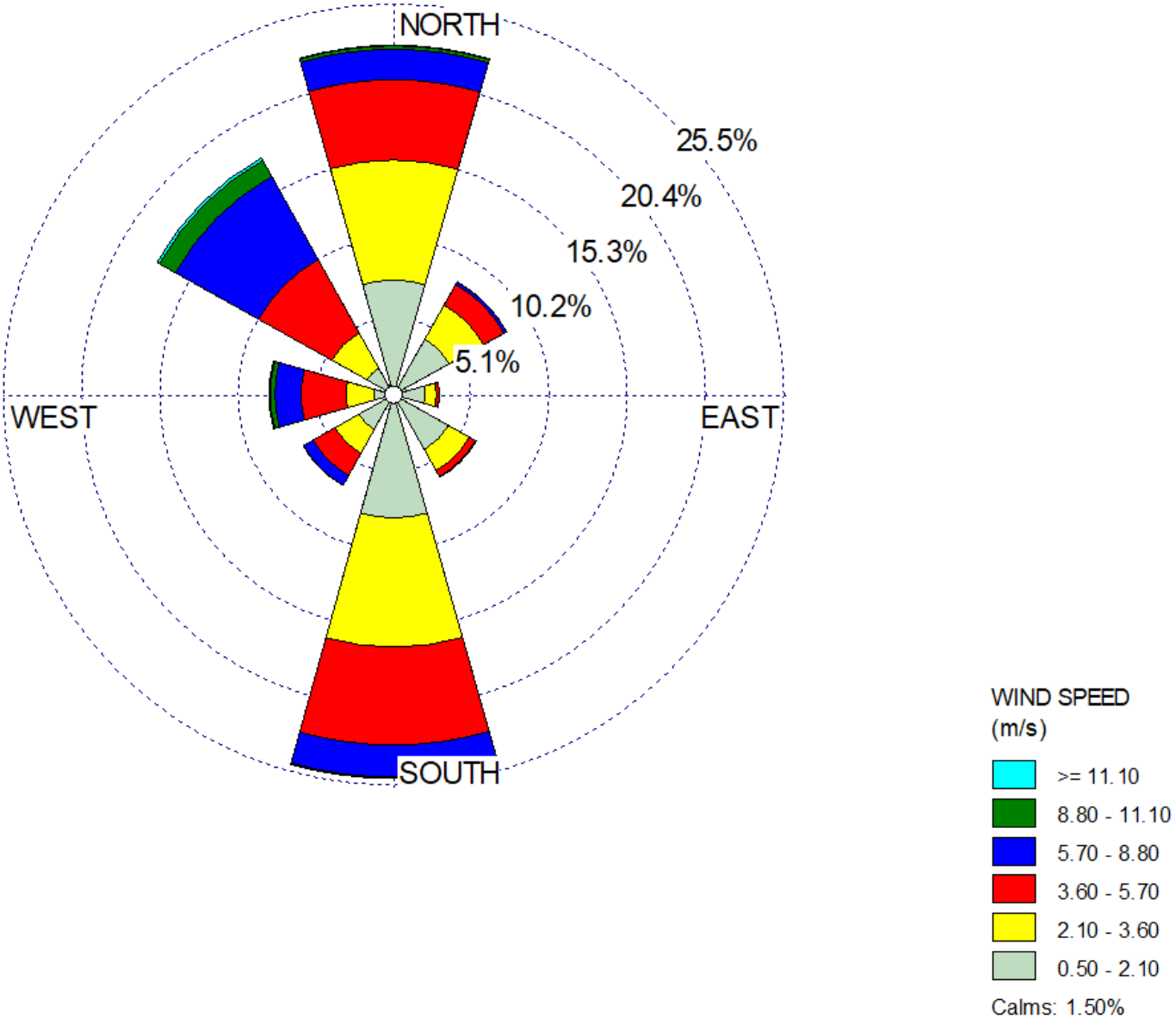


Figure 3-5 Revised

2017-2021 Westfield Barnes Airport Wind Rose

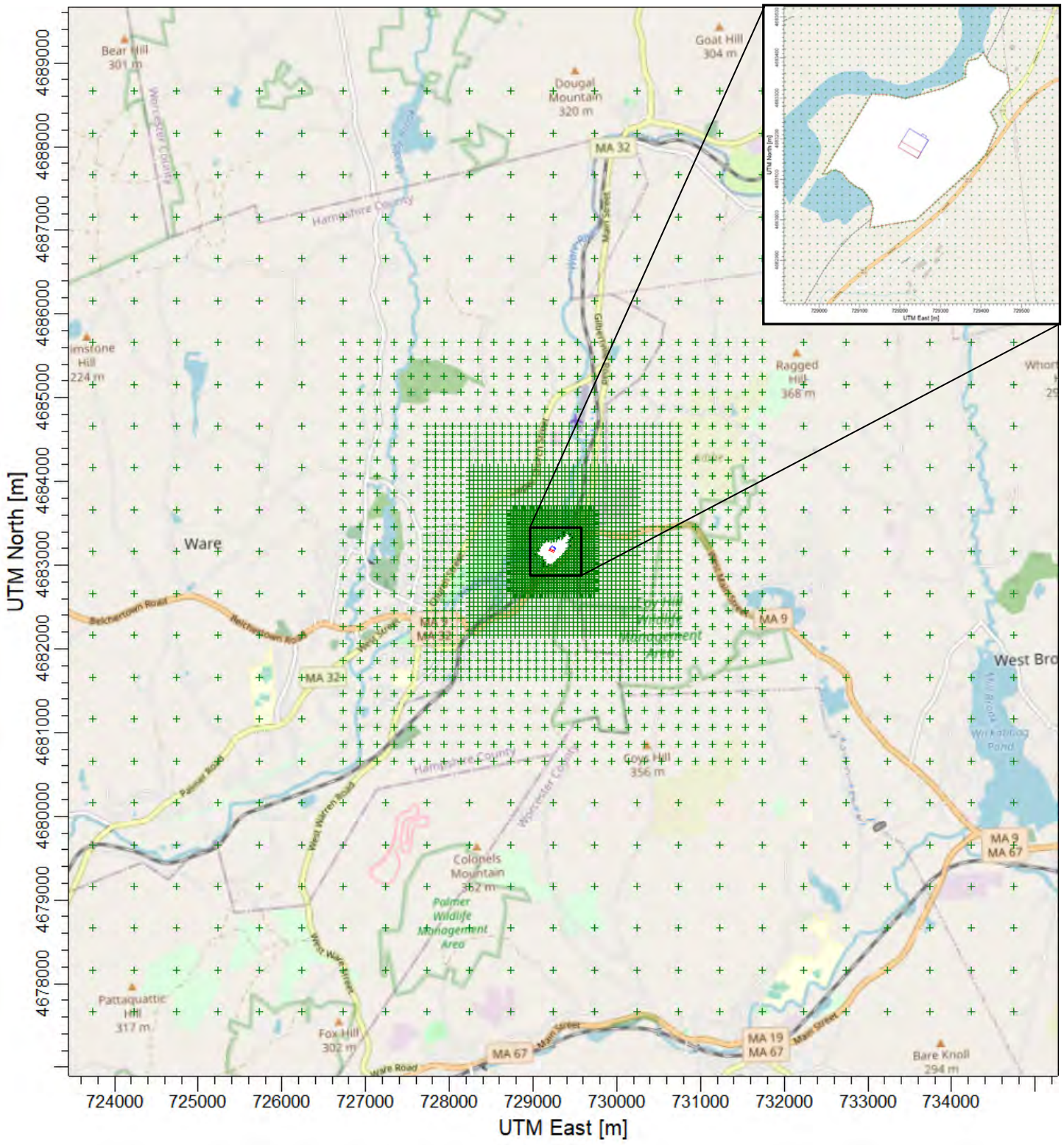


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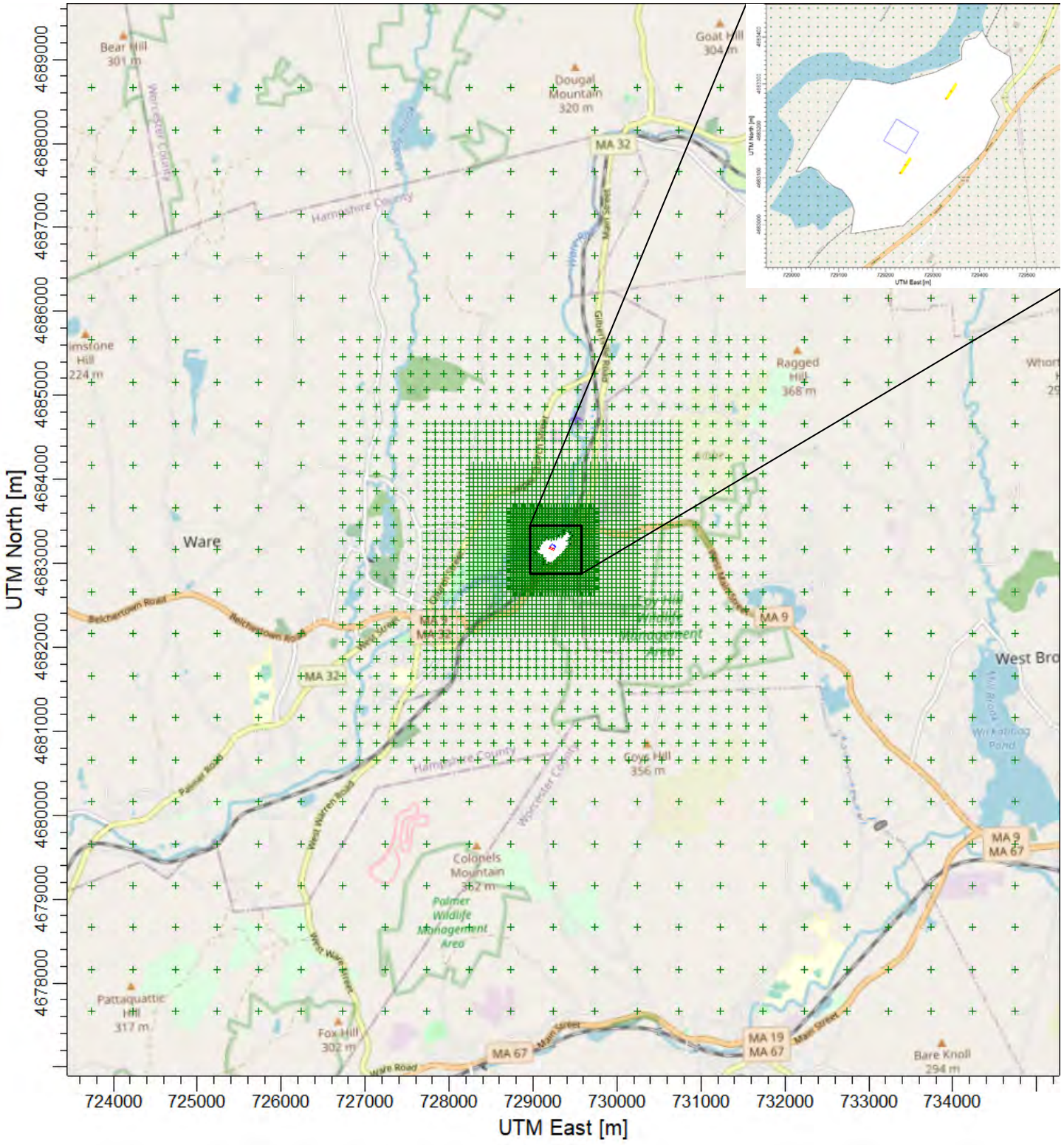
Figure 3-6
Receptor Locations



ReSource – Ware, MA

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Figure 3-6 Revised
Receptor Locations

Good Engineering Practice Stack Height Determination

AERMOD requires direction specific building parameters to adequately incorporate the aerodynamic effects of buildings on plume dispersion on stack exhaust. The most recent version (04274) of the Building Profile Input Program with the Prime downwash algorithms (BPIP-Prime) is used to calculate these parameters. BPIP-Prime uses the stack information, as well as the height information of nearby buildings to calculate the required heights, widths, and setbacks required to account for building downwash. Since there are no regulated stationary sources, this option is not required in the modeling.

For the revised analysis, the transfer building with proposed expansion was entered into the model. Since the locomotive engine bodies are essentially small buildings (length of 59.2 ft, width of 10.3 ft, and height of 15.8 ft), they were also entered into the model at the locations of the idling locomotives. BPIP-Prime was run for these buildings.

Selection of Sources to Include in Analyses

On-site equipment and truck traffic both on-site and off-site were included in the analysis. This represents a broader inclusion of sources than is typically considered in a MassDEP air plan application air dispersion modeling analysis. This more inclusive analysis allows the project to be designed holistically to minimize environmental impacts and give a more complete picture of all significant project related air impacts.

Air Toxics Methodology

The air toxics modeling was conducted using the Lakes AERMOD View multi-pollutant processing routines. The software automatically creates the unit emission AERMOD inputs for each source, and postprocesses the results at the completion of the AERMOD runs to calculate pollutant-specific concentrations. The post-processing consists of multiplying the normalized concentrations produced with a unit emission rate by pollutant specific emission rates for each source, then summing the concentrations at each receptor for each modeled hour. Lastly, concentrations on an annual basis are compared to the AALs while 24-hour concentrations are compared to the TELs. For the revised modeling for the two air toxics acrolein and formaldehyde, no multipollutant processing was needed.

Temporal Adjustments

Existing operations occur for 9 hours on weekdays and 6 hours on Saturdays. Future operations are expected to be expanded to 12 hours on weekdays and remain 6 hours on Saturdays. For the revised modeling, the 12 hours was reduced to 11 hours for the weekdays and 6 hours on Saturdays was retained

In order to account for this schedule, AERMOD modeling included the use of the EMISFACT keyword and inputs to adjust hours from the peak hourly emission rate. Thus, hours where the facility is in operation are given a factor of 1.0, directing the model to use the full peak hourly emission rate. For hours where the facility is not operating, a factor of 0.0 is used, effectively shutting down emissions during those hours.

Selection of Pollutants to Include in Analyses and Criteria

Air pollutants included in this analysis include the criteria air pollutants CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2 and MassDEP air toxics.

The NAAQS for criteria pollutants are the health protective criteria for those pollutants. The NAAQS for these pollutants are enumerated in Section 3.6.1 above. The MassDEP AALs and TELs are the health protective criteria for air toxics. The AALs and TELs are listed with the air toxics analysis results in Section 3.6.2.

NO_x to NO_2 Conversion

Though the NAAQS are based on NO_2 concentrations, most nitrogen oxides (NO_x) emissions are in the form of nitric oxide (NO) rather than NO_2. Oxides of nitrogen undergo chemical conversion with atmospheric ozone to form NO_2. USEPA allows the use of the Ambient Ratio Method (ARM2) without prior approval from the regulatory agency. For this analysis, ARM2 with the default minimum and maximum NO_2/NO_x values of 0.5 and 0.9, respectively, was used for the existing sources. USEPA also allows the use of the Ozone Limiting Method (OLM)with prior approval from the regulatory agency. For analysis of future conditions, OLM and in-stack ratio NO_2/NO_x value of 0.1, were used [25].

3.6.2 Results

NAAQS Analysis

The project was modeled and then background concentrations were added to peak impacts to compare to the NAAQS for CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2. To attain the one-hour CO concentration must not exceed 40,000 µg/m^3 more than once per year. This metric is represented in the modeling analysis as the maximum of the 2nd highest (H2H) one-hour concentration over five years. For the eight-hour CO NAAQS of 10,000 µg/m^3 is only to be exceeded once be year and is confirmed by showing that the maximum of the 2nd highest (H2H) eight-hour concentration over five years is less than the 10,000 µg/m^3 value.

[22] Conference call discussion and follow-up e-mails with Glenn Pacheco (dated March 10 and March 14, 2023 respectively, MassDEP confirmed the selection of the OLM model and in-stack ratio for NO2 modeling.

Table 3-9 presents the cumulative modeling results for the current operating layout at full capacity sources plus monitored background values. All total impacts, when combined with background, are below the NAAQS for all pollutants and averaging periods. The concentration closest to its applicable standard is one-hour NO_2 (146.5 µg/m³ and 78 percent of NAAQS). This was done with the default, less refined ARM technique.

Table 3-10 presents the cumulative modeling results for the future Stage 2 operating layout at full capacity sources plus monitored background values. All total impacts, when combined with background, are below the NAAQS for all pollutants and averaging periods. Note, only 1-hr NO2 and PM 2.5 (24 hr and annual averages) were modeled in the revised analysis as they are the only pollutants and averaging times that were more than 50% of the NAAQS. Diesel oxidation (DOC) catalysts will be used to mitigate both CO and air toxics emissions, as discussed in the "Mitigation" section below. Credit for CO mitigation was not taken in the Stage 2 operating layout case presented immediately below, because the reductions will be small and did not warrant a separate analysis.

Table 3-11 Summary of NAAQS Source Modeling Analysis Results (Existing Full Capacity)

Pollutant	Averaging Time	Maximum Modeled Conc. (µg/m³)	Background Concentration (µg/m³)	Total Conc. (µg/m³)	Standard (µg/m³)	% Of Standard
SO_2	1-HR (1)	1.59	11.4	13.0	196	7%
	3-HR (2)	1.52	13.1	14.6	1300	1%
PM10	24-HR (4)	15.28	16.0	31.3	150	21%
PM2.5	24-HR (5)	2.76	14.3	17.1	35	49%
	ANN (6)	0.55	5.7	6.2	12	52%
NO_2	1-HR (7)	146.48	***Included***	146.5	188	78%
	ANN (3)	28.21	***Included***	28.2	100	28%
CO	1-HR (2)	127.26	2428.4	2555.6	40000	6%
	8-HR (2)	23.08	1375.2	1398.3	10000	14%

Notes:
(1) Maximum 4th-Highest Maximum Daily 1-Hr Concentration Averaged Over 5 Years
(2) Highest 2nd-High Concentration Over 5 Years
(3) Highest Annual Concentration Over 5 Years
(4) Highest 6th-High Concentration Over 5 Years
(5) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(6) Maximum Annual Concentration Averaged Over 5 Years
(7) Maximum 8th Highest Maximum Daily 1-hour Concentrations Averaged Over 5 Years.

PM2.5 and 1-hr avg NO2 were revised based on the refined operational conditions discussed above. The 1-hr avg NO2 results are based on Stage 2 operations. Stage 1 rail operations with Stage 2 all other operations was also modeled and found to have lower 1-hr NO2 results. The 24-hr average and annual PM-2.5 were based on Stage 1 rail operations with Stage 2 all other operations as a worst case. This is worst case as the daily and annual emissions will be higher for

Stage 1 due to 3 rail visits per day rather than 1 during Stage 2. No other pollutants or averaging times were analyzed since the variations are expected to be small based on the modeling of these two key pollutants. While the maximum 1-hr average NO2 emissions increase in the revised analysis of Stage 2, the impacts decrease using the more refined (and accurate) OLM method.

Table 3-12 Summary of NAAQS Source Modeling Analysis Results (Future Stage 2 with Stage 1 Rail Full Capacity)

Pollutant	Averaging Time	Maximum Modeled Conc. (µg/m³)	Background Concentration (µg/m³)	Total Conc. (µg/m³)	Standard (µg/m³)	% Of Standard
SO_2	1-HR (1)	1.59	11.4	13.0	196	7%
	3-HR (2)	1.53	13.1	14.6	1300	1%
PM10	24-HR (4)	22.70	16.0	38.7	150	26%
PM2.5	24-HR (5)	3.79	14.3	18.1	35	52%
	ANN (6)	0.74	5.7	6.4	12	53%
NO_2	1-HR (7)	166.17	***Included***	166.2	188	88%
	ANN (3)	29.03	***Included***	29.0	100	29%
CO	1-HR (2)	176.29	2428.4	2604.7	40000	7%
	8-HR (2)	35.11	1375.2	1410.3	10000	14%
Revised Analysis Results						
PM2.5	24-HR (5)	3.66	14.5	18.16	35	52%
	ANN (6)	0.71	6.0	6.71	12	56%
NO_2	1-HR (7)	133.28	***Included***	133.28	188	71%
	ANN (3)	26.03	***Included***	26.03	100	26%

Notes:
(1) Maximum 4th-Highest Maximum Daily 1-Hr Concentration Averaged Over 5 Years
(2) Highest 2nd-High Concentration Over 5 Years
(3) Highest Annual Concentration Over 5 Years
(4) Highest 6th-High Concentration Over 5 Years
(5) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(6) Maximum Annual Concentration Averaged Over 5 Years
(7) Maximum 8th Highest Maximum Daily 1-hour Concentrations Averaged Over 5 Years.

The air quality analysis shows the 1-hour H2H CO impact of 2604.7 µg/m³, which includes background. This value is less than the applicable 1-hour CO NAAQS of 40,000 µg/m³. An 8-hour H2H maximum predicted concentration of 1410.3 µg/m³, also which includes background. This value is far less than the applicable 8-hour CO NAAQS of 10,000 µg/m³. Based on these results, it can be concluded that the project meets the applicable standards for CO.

To attain the one-hour NO_2 standard, the three-year average of the 98th percentile of the maximum daily one-hour concentrations must not exceed 188 µg/m³. This metric is represented in the modeling analysis as the maximum of the eighth-highest (H8H) 1-hour concentrations

averaged over five years (as recommended by USEPA).[26] The annual NO_2 NAAQS of 100 µg/m^3 is never to be exceeded and is confirmed by showing that the annual average for any individual year is below the 100 µg/m^3 value.

For Stage 2 modeling in combination with Stage 1 rail modeling, the air quality analysis shows a five-year average of the 1-hour H8H NO_2 impact of 133.28 µg/m^3, which includes background. This value is less than the applicable 1-hour NO_2 NAAQS of 188 µg/m^3. A maximum predicted annual concentration of 26.03 µg/m^3, also which includes background. This value is far less than the applicable annual average NO_2 NAAQS of 100 µg/m^3. Based on these results, it can be concluded that the project meets the applicable standards for NO_2.

Stage 2 with Stage 2 rail was also modeled as it was anticipated that NO2 concentrations would be worst-case. In this scenario, only one locomotive trip per day is made and coincides with the morning peak truck hour. Results are presented in Table 3-11. Only NO2 was run.

Table 3-11 NO_2 Source Modeling Analysis Results (Future Stage 2 with Stage 2 Rail Full Capacity) Revised Analysis

Pollutant	Averaging Time	Maximum Modeled Conc. (µg/m^3)	Background Concentration (µg/m^3)	Total Conc. (µg/m^3)	Standard (µg/m^3)	% Of Standard
NO_2	1-HR (7)	143.53	***Included***	143.53	188	76%
	ANN (3)	25.58	***Included***	25.58	100	26%

Notes:
(3) Highest Annual Concentration Over 5 Years
(7) Maximum 8th Highest Maximum Daily 1-hour Concentrations Averaged Over 5 Years.

For Stage 2 with Stage 2 rail modeling, the air quality analysis shows a five-year average of the 1-hour H8H NO_2 impact of 143.53 µg/m^3, which includes background. A maximum predicted annual concentration of 25.58 µg/m^3, also which includes background. Thus, the worst-case five-year average of the 1-hour H8H NO_2 concentration occurs in Stage 2 with Stage 2 rail while the maximum annual concentration occurs in the Stage 2 with Stage 1 rail modeling. Based on these results, it can be concluded that the project meets the applicable standards for NO_2. Both maximum concentrations are less than their NAAQS standards of 188 µg/m^3 for one-hour NO_2 and 100 µg/m^3 for annual NO_2 and meet the applicable NO_2 standards. For $PM_{2.5}$, to attain the 24-hour $PM_{2.5}$ standard, the three-year average of the 98th percentile of the maximum daily concentrations must not exceed 35 µg/m^3. This metric is represented in the modeling analysis as the maximum of the eighth-highest (H8H) 24-hour concentrations averaged over five years. The Annual $PM_{2.5}$ NAAQS of 12 µg/m^3 is never to be exceeded and is confirmed by showing that the annual average over five years is below the 12 µg/m^3 value.

[26] USEPA, 2010: Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. June 28, 2010.

The air quality analysis shows a five-year average of the 24-hour H8H $PM_{2.5}$ impact of 18.2 µg/m^3, which includes background. This value is less than the applicable 24-hour $PM_{2.5}$ NAAQS of 35 µg/m^3. A maximum predicted annual concentration of 6.4 µg/m^3, also which includes background. This value is far less than the applicable annual average $PM_{2.5}$ NAAQS of 12 µg/m^3. Based on these results, it can be concluded that the project meets the applicable standards for $PM_{2.5}$.

For PM_{10}, to attain the 24-hour PM_{10} standard must not exceed 150 µg/m^3 more than once per year. This metric is represented in the modeling analysis as the maximum of the 6th-highest (H6H) 24-hour concentration over five years.

The air quality analysis shows a maximum of the 24-hour H6H PM_{10} impact of 38.7 µg/m^3 over five years, which includes background. This value is less than the applicable 24-hour PM_{10} NAAQS of 150 µg/m^3. Based on this result, it can be concluded that the project meets the applicable standard for PM_{10}.

For SO_2, the three-year average of the 98th percentile of the maximum daily concentrations must not exceed 196 µg/m^3. This metric is represented in the modeling analysis as the maximum of the fourth highest (H4H) 1-hour concentrations averaged over five years. The three-hour SO_2 NAAQS of 1,300 µg/m^3 is only to be exceeded once be year and is confirmed by showing that the maximum of the 2nd highest (H2H) three-hour concentration over five years is less than the 1,300 µg/m^3 value.

The air quality analysis shows a five-year average of the 1-hour H4H SO_2 impact of 13.0 µg/m^3, which includes background. This value is less than the applicable 1-hour SO_2 NAAQS of 196 µg/m^3. The air quality analysis shows a maximum of the 3-hour H2H SO_2 impact of 14.6 µg/m^3 over five years, which includes background. This value is less than the applicable 3-hour SO_2 NAAQS of 1,300 µg/m^3. Based on these results, it can be concluded that the project meets the applicable standards for SO_2.

Air Toxics

Air toxics are emitted from mobile source combustion exhaust. MassDEP has published AALs and TELs to protect public health. The results of the air toxics analysis, including maximum concentration impacts predicted using AERMOD and comparison of the maximum concentration impacts to the AALs and TELs (or other equivalent criteria as appropriate), are included in Table 3-12 and Table 3-13 below. No air toxic exceeds the AALs or TELs (or other equivalent criteria) off-site.

Table 3-13 Summary of Air Toxics (HAPs) Source Modeling Analysis Annual Results (Future Stage 2 Full Capacity with Stage 1 Rail – UNMITIGATED)

Pollutant	Maximum Modeled Concentration (µG/M^3)	Allowable Ambient Limit (AAL) (µG/M^3)	% of Standard
1,3-BUTADIENE	6.084E-04	0.003	20%
ACETALDEHYDE	2.807E-02	0.4	7%
ACETONE	2.738E-03	160.54	0%
ACROLEIN	5.309E-03	0.07	8%
AMMONIA (NH3)	5.490E-03	100	0%
ARSENIC	8.971E-06	0.0003	3%
BENZENE	1.069E-02	0.1	11%
CHROMIUM	4.414E-08	0.0001	0%
DICHLOROBENZENE	0.000E+00	0.18	0%
DIESEL PM	2.419E-01	***5***	5%
ETHYL BENZENE	1.804E-03	300	0%
FORMALDEHYDE	7.924E-02	0.08	99%
FURANS	4.687E-04	0.02	2%
MERCURY	4.908E-08	0.0014	0%
METHYL ETHYL KETONE	2.463E-03	10	0%
NAPHTHALENE	1.945E-03	14.25	0%
NICKEL	2.141E-05	0.18	0%
STYRENE	1.388E-04	2	0%
TOLUENE	9.467E-03	20	0%
XYLENE	4.656E-02	11.8	0%

Diesel PM threshold is USEPA reference concentration (RfC) of 5 ug/m^3 for annual averaging times.

Table 3-14 Summary of Air Toxics (HAPs) Source Modeling Analysis 24-Hour Average Results (Future Full Stage 2 Capacity with Stage 1 Rail - UNMITIGATED

Pollutant	Maximum Modeled Concentration (µg/m^3)	Threshold Exposure Limits (TEL) (µg/m^3)	% of Standard
1,3-BUTADIENE	7.786E-03	1.2	1%
ACETALDEHYDE	3.585E-01	30	1%
ACETONE	3.667E-02	160.54	0%
ACROLEIN	6.786E-02	0.07	97%
AMMONIA (NH3)	9.008E-02	100	0%
ARSENIC	2.051E-04	0.003	7%

Table 3-15 Summary of Air Toxics (HAPs) Source Modeling Analysis 24-Hour Average Results (Future Full Stage 2 Capacity with Stage 1 Rail – UNMITIGATED (Continued)

Pollutant	Maximum Modeled Concentration ($\mu g/m^3$)	Threshold Exposure Limits (TEL) ($\mu g/m^3$)	% of Standard
BENZENE	1.248E-01	0.6	21%
CHROMIUM	9.176E-07	0.003	0%
ETHYL BENZENE	2.560E-02	300	0%
FORMALDEHYDE	1.018E+00	2	51%
FURANS	6.916E-03	0.4	2%
MERCURY	1.021E-06	0.003	0%
METHYL ETHYL KETONE	3.067E-02	200	0%
NAPHTHALENE	3.010E-02	14.25	0%
NICKEL	5.126E-04	0.27	0%
STYRENE	1.842E-03	200	0%
TOLUENE	1.181E-01	80	0%
XYLENE	3.412E-01	11.8	3%

Based on these results, it can be concluded that the project satisfies criteria for air toxics.

Operations Mitigation

To further reduce emissions, the facility has committed to install diesel oxidation catalyst (DOC) devices (also known as catalytic converters) where feasible on existing onsite heavy equipment. A DOC will reduce emissions of CO by up to 90% and reduce emissions of VOC by up to 50%.

DOC devices will be installed to provide mitigation on a Caterpillar 330C excavator, a John Deere 744JX loader, a Caterpillar 312C excavator (backup unit), and a Caterpillar 325 excavator (backup unit). The Volvo L120C loader is already equipped with DOC. The existing equipment Caterpillar 966M front end loader and Caterpillar 236D skid steer are already certified Tier 4 and have the lowest emissions available in their class. The Caterpillar 345DL excavator is already fitted with a diesel particulate filter (DPF) and thus cannot feasibly be retrofitted with a DOC device.

Analysis of air toxics impacts with the installation of the DOC devices was performed. Results are shown in Table 3-14 and Table 3-15 for the Annual and 24-hour averaging times, respectively. Acrolein and Formaldehyde were revised based on the refined analysis of operations discussed above as they were the closest air toxics to either an AAL or TEL. As the results are very close to the original modeling, there was no need to revise any other of the air toxics.

Table 3-16 Summary of Air Toxics (HAPs) Source Modeling Analysis Annual Results (Future Full Stage 2 Capacity – MITIGATED)

Pollutant	Maximum Modeled Concentration (µg/m³)	Allowable Ambient Limit (AAL) (µg/m³)	% of Standard
1,3-BUTADIENE	4.973E-04	0.003	17%
ACETALDEHYDE	2.215E-02	0.4	6%
ACETONE	2.738E-03	160.54	0%
ACROLEIN	4.503E-03	0.07	6%
AMMONIA (NH3)	4.679E-03	100	0%
ARSENIC	8.818E-06	0.0003	3%
BENZENE	8.721E-03	0.1	9%
CHROMIUM	4.197E-08	0.0001	0%
DICHLOROBENZENE	0.000E+00	0.18	0%
DIESEL PM	1.914E-01	***5***	4%
ETHYL BENZENE	1.395E-03	300	0%
FORMALDEHYDE	6.214E-02	0.08	78%
FURANS	4.687E-04	0.02	2%
MERCURY	4.843E-08	0.0014	0%
METHYL ETHYL KETONE	1.766E-03	10	0%
NAPHTHALENE	1.426E-03	14.25	0%
NICKEL	2.141E-05	0.18	0%
STYRENE	1.388E-04	2	0%
TOLUENE	7.593E-03	20	0%
XYLENE	4.582E-02	11.8	0%
Revised Analysis Results			
ACROLEIN	3.85E-03	0.07	6%
FORMALDEHYDE	6.11E-02	0.08	76%

Diesel PM threshold is USEPA reference concentration (RfC) of 5 ug/m³ for annual averaging times.

Table 3-17 Summary of Air Toxics (HAPs) Source Modeling Analysis 24-Hour Average Results (Future Full Stage 2 Capacity - MITIGATED)

Pollutant	Maximum Modeled Concentration ($\mu g/m^3$)	Threshold Exposure Limits (TEL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	5.764E-03	1.2	0%
ACETALDEHYDE	2.604E-01	30	1%
ACETONE	3.667E-02	160.54	0%
ACROLEIN	5.545E-02	0.07	79%
AMMONIA (NH3)	7.534E-02	100	0%
ARSENIC	2.041E-04	0.003	7%
BENZENE	1.144E-01	0.6	19%
CHROMIUM	9.024E-07	0.003	0%
ETHYL BENZENE	1.871E-02	300	0%
FORMALDEHYDE	7.379E-01	2	37%
FURANS	6.916E-03	0.4	2%
MERCURY	1.017E-06	0.003	0%
METHYL ETHYL KETONE	2.057E-02	200	0%
NAPHTHALENE	2.239E-02	14.25	0%
NICKEL	5.126E-04	0.27	0%
STYRENE	1.842E-03	200	0%
TOLUENE	8.793E-02	80	0%
XYLENE	3.328E-01	11.8	3%
Revised Analysis Results			
ACROLEIN	5.61E-02	0.07	80%
FORMALDEHYDE	9.27E-01	2	46%

3.6.3 Construction Air Quality Impacts and Mitigation

Short-term air quality impacts from fugitive dust may be expected during certain construction activities but are not expected to cause any significant impacts offsite based on the distance to the nearest offsite receptors and planned mitigation measures. Plans for controlling fugitive dust during demolition, excavation and construction include mechanical street sweeping, wetting portions of the Project Site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for a number of measures to be used by contractors to reduce potential emissions and minimize impacts. These measures are expected to include:

- Using wetting agents on areas of exposed soil on a scheduled basis;
- Using covered trucks;
- Minimizing spills on the construction site;

- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the construction site; and
- Periodic street cleaning with water to minimize dust accumulations.

To minimize air emissions from construction equipment, the Contractor will comply with state law (G.L. c. 90, § l6A) and MassDEP regulations (310 CMR 7. 11 (1)(b)), which limit vehicle idling to no more than five minutes except for vehicles being serviced, vehicles making deliveries that need to keep their engines running, and vehicles that need to run their engines to operate accessories.

MassDEP requires contractors working on projects financed by the State Revolving Fund (SRF) to install retrofit pollution controls in their construction equipment engines. Due to this requirement, many large construction firms in Massachusetts have already installed pollution controls on their fleet of heavy construction equipment.

It is likely that the Proponent will use a contractor that uses these pollution controls on their fleet of heavy construction equipment, and the Proponent will strongly encourage the contractor to utilize heavy equipment with pollution controls on the Project.

3.6.4 Conclusions

The predicted air pollutant concentrations are shown to be below the applicable NAAQS/MAAQS, MassDEP AALs and TELs using the USEPA AERMOD model. The addition of aftermarket pollution control devices (catalytic converters) on some existing equipment will further reduce emissions. Therefore, it can be concluded that the proposed project as designed does not cause or contribute to a condition of air pollution in the area, and that impacts are minimized to the extent feasible.

Attachment 3-1a

EXISTING Air Source Parameters & Calculations

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
NAAQS Results - All Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
SO_2	1 HOUR (1)	1.58910	2016-2020	729416.26, 4683401.03, 147.88, 315.21, 0.00	11.4	13.0	196	7%
	3 HOUR (2)	1.52319	17121812	729136.26, 4682941.03, 155.61, 324.78, 0.00	13.1	14.6	1300	1%
PM_{10}	24 HOUR (3)	15.27718	16120724	729203.71, 4682993.45, 150.87, 324.78, 0.00	16.0	31.3	150	21%
$PM_{2.5}$	24 HOUR (4)	2.75403	2016-2020	729258.51, 4683017.18, 152.08, 317.66, 0.00	14.3	17.1	35	49%
	ANNUAL (5)	0.55238	2016-2020	729380.82, 4683128.16, 159.84, 315.21, 0.00	5.7	6.2	12	52%
NO_2	1 HOUR (6)	146.48386	2016-2020	729213.48, 4682995.05, 151.42, 324.78, 0.00	*Included*	146.5	188	78%
	ANNUAL (7)	28.21317	2018	729213.48, 4682995.05, 151.42, 324.78, 0.00	*Included*	28.2	100	28%
CO	1 HOUR (2)	127.26436	17123010	729164.63, 4682987.06, 150.30, 324.78, 0.00	2428.4	2555.6	40000	6%
	8 HOUR (2)	23.07723	19121316	729203.71, 4682993.45, 150.87, 324.78, 0.00	1375.2	1398.3	10000	14%

Notes:

(1) Maximum 4th-Highest Maximum Daily 1-Hr Concentration Averaged Over 5 Years
(2) Highest 2nd-High Concentration Over 5 Years
(3) Highest 6th-High Concentration Over 5 Years
(4) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(5) Maximum Annual Concentration Averaged Over 5 Years
(6) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years
(7) Highest Annual Concentration Over 5 Years
Seasonal-hourly background data included in NO2 AERMOD runs.

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Annual Allowable Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Allowable Ambient Limit (AAL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	ANNUAL	4.373E-04	2018	729213.5, 4682995, 151.42, 324.78, 0	0.003	15%
ACETALDEHYDE	ANNUAL	1.688E-02	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.4	4%
ACETONE	ANNUAL	1.501E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	160.54	0%
ACROLEIN	ANNUAL	3.044E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.07	4%
AMMONIA (NH3)	ANNUAL	3.949E-03	2018	729258.5, 4683017, 152.08, 317.66, 0	100	0%
ARSENIC	ANNUAL	8.884E-06	2018	729258.5, 4683017, 152.08, 317.66, 0	0.0003	3%
BENZENE	ANNUAL	6.988E-03	2018	729193.938, 4682992, 150.54, 324.78, 0	0.1	7%
CHROMIUM	ANNUAL	4.640E-08	2018	729258.5, 4683017, 152.08, 317.66, 0	0.0001	0%
DIESEL PM	ANNUAL	1.450E-01	2018	729258.5, 4683017, 152.08, 317.66, 0	***5***	3%
ETHYL BENZENE	ANNUAL	1.012E-03	2018	729213.5, 4682995, 151.42, 324.78, 0	300	0%
FORMALDEHYDE	ANNUAL	4.638E-02	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.08	58%
FURANS	ANNUAL	1.962E-04	2018	729268.75, 4683314.5, 145.18, 315.21, 0	0.02	1%
MERCURY	ANNUAL	4.515E-08	2018	729258.5, 4683017, 152.08, 317.66, 0	0.0014	0%
METHYL ETHYL KETONE	ANNUAL	1.332E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	10	0%
NAPHTHALENE	ANNUAL	1.194E-03	2018	729258.5, 4683017, 152.08, 317.66, 0	14.25	0%
NICKEL	ANNUAL	2.648E-05	2018	729258.5, 4683017, 152.08, 317.66, 0	0.18	0%
STYRENE	ANNUAL	1.621E-04	2018	729380.812, 4683128, 159.84, 315.21, 0	2	0%
TOLUENE	ANNUAL	5.666E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	20	0%
XYLENE	ANNUAL	5.224E-02	2018	729380.812, 4683128, 159.84, 315.21, 0	11.8	0%

Diesel PM threshold is EPA reference concentration (RfC) of 5 ug/m3 for annual averaging times.

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Threshold Exposure Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Threshold Exposure Limits (TEL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	24-Hr	4.815E-03	17123024	729176.25, 4682961, 156.38, 324.78, 0	1.2	0%
ACETALDEHYDE	24-Hr	2.338E-01	17123024	729176.25, 4682961, 156.38, 324.78, 0	30	1%
ACETONE	24-Hr	2.008E-02	17123024	729176.25, 4682961, 156.38, 324.78, 0	160.54	0%
ACROLEIN	24-Hr	4.237E-02	17123024	729176.25, 4682961, 156.38, 324.78, 0	0.07	61%
AMMONIA (NH3)	24-Hr	5.577E-02	19122524	729280.125, 4683037, 151.8, 317.66, 0	100	0%
ARSENIC	24-Hr	1.501E-04	19122524	729272.875, 4683030, 151.46, 323.7, 0	0.003	5%
BENZENE	24-Hr	1.124E-01	17123024	729176.25, 4682961, 156.38, 324.78, 0	0.6	19%
CHROMIUM	24-Hr	7.687E-07	19122524	729280.125, 4683037, 151.8, 317.66, 0	0.003	0%
ETHYL BENZENE	24-Hr	1.170E-02	19121324	729213.5, 4682995, 151.42, 324.78, 0	300	0%
FORMALDEHYDE	24-Hr	6.546E-01	17123024	729176.25, 4682961, 156.38, 324.78, 0	2	33%
FURANS	24-Hr	2.819E-03	18111924	729272.875, 4683030, 151.46, 323.7, 0	0.4	1%
MERCURY	24-Hr	7.453E-07	19122524	729280.125, 4683037, 151.8, 317.66, 0	0.003	0%
METHYL ETHYL KETONE	24-Hr	2.048E-02	17123024	729176.25, 4682961, 156.38, 324.78, 0	200	0%
NAPHTHALENE	24-Hr	1.487E-02	19122524	729280.125, 4683037, 151.8, 317.66, 0	14.25	0%
NICKEL	24-Hr	4.517E-04	19122524	729272.875, 4683030, 151.46, 323.7, 0	0.27	0%
STYRENE	24-Hr	1.549E-03	19122524	729272.875, 4683030, 151.46, 323.7, 0	200	0%
TOLUENE	24-Hr	8.238E-02	17123024	729176.25, 4682961, 156.38, 324.78, 0	80	0%
XYLENE	24-Hr	2.855E-01	20121924	729265.688, 4683023.5, 151.85, 317.66, 0	11.8	2%

ReSource - Ware, MA

Mobile Source Emissions Analysis - EXISTING CONDITIONS - AERMOD Input Emissions

Inside Building

	Source Type		AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
Fugitive Dust (LT)						4.26E-02	6.00E-03																				
Fugitive Dust (ST - 6hr)						8.27E-02	1.16E-02																				
Fugitive Dust (ST - 9hr)						5.52E-02	7.76E-03																				
CAT 236D SkidSteer				4.33E-03	4.58E-03	2.72E-05	2.72E-05	5.34E-06	6.46E-01	8.00E-06	1.32E-04	9.18E-07	1.62E-05	1.35E-09	2.85E-11	1.79E-11	5.75E-07	4.39E-05	6.57E-06	6.98E-06	4.12E-06	3.10E-06	8.55E-06	8.93E-04	5.66E-15	2.34E-06	9.90E-06	2.08E-06
Sullair 185 Compressor				5.79E-03	2.59E-03	3.78E-04	3.66E-04	6.83E-06	1.06E+00	1.96E-05	1.36E-04	3.40E-06	1.64E-05	1.83E-09	3.21E-11	2.43E-11	8.76E-07	4.76E-05	9.16E-06	9.47E-06	2.66E-06	9.53E-07	9.83E-06	3.66E-04	5.50E-15	8.76E-07	4.31E-06	4.80E-06
CAT 966M Loader				1.38E-03	1.66E-02	6.90E-05	6.90E-05	1.86E-05	2.40E+00	2.17E-05	3.58E-04	2.50E-06	4.41E-05	4.80E-09	8.60E-11	6.38E-11	1.56E-06	1.19E-04	1.79E-05	2.48E-05	1.12E-05	8.43E-06	2.32E-05	2.53E-03	1.47E-14	6.10E-06	2.69E-05	5.66E-06
CAT 345DL Excavator				2.30E-02	9.17E-04	2.33E-04	2.26E-04	4.86E-05	8.81E+00	4.01E-05	3.62E-04	1.80E-05	4.83E-05	7.17E-09	7.83E-11	1.76E-10	1.76E-06	1.21E-04	1.95E-05	3.71E-05	8.35E-06	5.30E-06	4.28E-05	2.26E-04	2.11E-14	3.17E-14	1.25E-05	1.39E-05
CAT 330C Excavator				1.50E-02	5.96E-03	1.01E-03	9.81E-04	3.16E-05	5.73E+00	5.21E-05	4.71E-04	2.34E-05	6.28E-05	9.32E-09	1.02E-10	1.24E-10	2.29E-06	1.58E-04	2.54E-05	4.82E-05	1.08E-05	6.89E-06	5.57E-05	9.81E-04	1.37E-14	2.29E-06	1.62E-05	1.80E-05
TOTAL				4.95E-02	3.07E-02	5.69E-02	9.43E-03	1.11E-04	1.86E+01	1.42E-04	1.46E-03	4.83E-05	1.88E-04	2.45E-08	3.27E-10	4.06E-10	7.07E-06	4.90E-04	7.85E-05	1.27E-04	3.72E-05	2.47E-05	1.40E-04	5.00E-03	6.06E-14	1.16E-05	6.98E-05	4.45E-05
Div/5 Doors	**Volume**	**9hr**	**RDOOR1**	**9.90E-03**	**6.13E-03**	**1.14E-02**	**1.89E-03**	**2.22E-05**	**3.73E+00**	**2.83E-05**	**2.92E-04**	**9.66E-06**	**3.76E-05**	**4.90E-09**	**6.54E-11**	**8.13E-11**	**1.41E-06**	**9.79E-05**	**1.57E-05**	**2.53E-05**	**7.43E-06**	**4.93E-06**	**2.80E-05**	**1.00E-03**	**1.21E-14**	**2.32E-06**	**1.40E-05**	**8.89E-06**
		6hr				**1.69E-02**	**2.66E-03**																					
		Saturday/Weekday Ratio for EMISFACT				**1.48**	**1.41**																					
		Ann					**1.53E-03**																					

Railcar Moving

6600 m2 area source		area (m2)	AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
L120C Loader	**Area**	**6600**	**RAILCAR**	**2.04E-06**	**1.90E-06**	**2.98E-07**	**2.89E-07**	**2.13E-09**	**2.74E-04**	**1.21E-08**	**9.34E-08**	**1.68E-09**	**9.63E-09**	**5.48E-13**	**9.82E-15**	**7.29E-15**	**6.96E-10**	**3.30E-08**	**7.84E-09**	**2.84E-09**	**2.18E-09**	**7.52E-10**	**6.93E-09**	**2.89E-07**	**1.67E-18**	**6.96E-10**	**3.07E-09**	**3.43E-09**

Locomotive Idling

		AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	**Line Volume**	**LOCOMOTIVE**	**7.11E-01**	**1.22E-01**	**2.11E-02**	**2.05E-02**	**6.87E-03**	**3.73E+01**	**2.31E-03**	**1.21E-02**	**3.20E-05**	**1.56E-03**	**8.48E-05**	**4.33E-03**	**7.73E-04**	**1.76E-04**	**1.08E-04**	**4.86E-04**	**2.05E-02**	**3.45E-04**	**3.84E-04**

Roadway

		AERMOD Source Name	CO2e	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	VOC	Benzene	Naphthalene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury	Arsenic	Chromium	Nickel	Diesel PM	Dioxins	Furans
Onsite Roadway	**Line Volume**	**ONSITERD**	**4.25E+00**	**3.28E-02**	**1.11E-02**	**1.07E-01**	**2.77E-02**	**1.98E-06**	**1.66E-03**	**1.28E-05**	**1.50E-05**	**4.47E-06**	**1.38E-04**	**6.44E-05**	**1.12E-05**	**5.43E-05**	**5.98E-06**	**3.51E-06**	**5.13E-06**	**1.47E-05**	**1.88E-03**	**2.99E-06**	**7.44E-10**	**1.56E-07**	**7.75E-10**	**4.78E-07**	**1.42E-03**	**1.94E-13**	**2.06E-13**
Gilbertville Rd/Rte 32	**Line Volume**	**SLINE1**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9 East of Gilbertville	**Line Volume**	**SLINE2**	**2.10E+00**	**1.52E-02**	**4.37E-03**	**7.72E-04**	**7.10E-04**	**6.86E-07**	**5.89E-04**	**4.42E-06**	**5.18E-06**	**1.55E-06**	**4.76E-05**	**2.24E-05**	**3.89E-06**	**2.38E-05**	**2.13E-06**	**1.21E-06**	**2.48E-06**	**7.25E-06**	**6.66E-04**	**1.45E-06**	**2.24E-10**	**4.69E-08**	**2.34E-10**	**1.44E-07**	**7.10E-04**	**5.84E-14**	**6.20E-14**
Rte 9/32 Site Drive to Gilbertville	**Line Volume**	**SLINE3**	**7.53E-01**	**5.44E-03**	**1.57E-03**	**2.77E-04**	**2.55E-04**	**2.47E-07**	**2.11E-04**	**1.59E-06**	**1.86E-06**	**5.56E-07**	**1.71E-05**	**8.04E-06**	**1.40E-06**	**8.57E-06**	**7.65E-07**	**4.35E-07**	**8.92E-07**	**2.61E-06**	**2.39E-04**	**5.21E-07**	**8.06E-11**	**1.69E-08**	**8.40E-11**	**5.18E-08**	**2.55E-04**	**2.10E-14**	**2.23E-14**
Rte 9/32, Site Drive to Knox	**Line Volume**	**SLINE4**	**6.17E+00**	**4.46E-02**	**1.29E-02**	**2.27E-03**	**2.09E-03**	**2.02E-06**	**1.73E-03**	**1.30E-05**	**1.53E-05**	**4.55E-06**	**1.40E-04**	**6.59E-05**	**1.15E-05**	**7.02E-05**	**6.27E-06**	**3.56E-06**	**7.31E-06**	**2.14E-05**	**1.96E-03**	**4.27E-06**	**6.61E-10**	**1.38E-07**	**6.88E-10**	**4.24E-07**	**2.09E-03**	**1.72E-13**	**1.83E-13**
Knox Ave, S of Rte 9/32	**Line Volume**	**SLINE5**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9/32, Knox to South/Church	**Line Volume**	**SLINE6**	**2.84E+00**	**2.05E-02**	**5.92E-03**	**1.05E-03**	**9.63E-04**	**9.31E-07**	**7.98E-04**	**6.00E-06**	**7.03E-06**	**2.10E-06**	**6.46E-05**	**3.04E-05**	**5.28E-06**	**3.23E-05**	**2.89E-06**	**1.64E-06**	**3.36E-06**	**9.83E-06**	**9.03E-04**	**1.97E-06**	**3.04E-10**	**6.36E-08**	**3.17E-10**	**1.95E-07**	**9.63E-04**	**7.93E-14**	**8.41E-14**
Rte 9/32, South/Church to North	**Line Volume**	**SLINE7**	**6.54E-01**	**4.73E-03**	**1.36E-03**	**2.41E-04**	**2.22E-04**	**2.14E-07**	**1.84E-04**	**1.38E-06**	**1.62E-06**	**4.83E-07**	**1.49E-05**	**6.99E-06**	**1.22E-06**	**7.45E-06**	**6.65E-07**	**3.78E-07**	**7.75E-07**	**2.27E-06**	**2.08E-04**	**4.53E-07**	**7.01E-11**	**1.47E-08**	**7.30E-11**	**4.50E-08**	**2.22E-04**	**1.83E-14**	**1.94E-14**
North St	**Line Volume**	**SLINE8**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9/32, North to West	**Line Volume**	**SLINE9**	**3.16E-01**	**2.29E-03**	**6.59E-04**	**1.17E-04**	**1.07E-04**	**1.04E-07**	**8.89E-05**	**6.68E-07**	**7.83E-07**	**2.34E-07**	**7.20E-06**	**3.38E-06**	**5.88E-07**	**3.60E-06**	**3.22E-07**	**1.83E-07**	**3.75E-07**	**1.10E-06**	**1.01E-04**	**2.19E-07**	**3.39E-11**	**7.09E-09**	**3.53E-11**	**2.18E-08**	**1.07E-04**	**8.83E-15**	**9.37E-15**
West St/Rte 32	**Line Volume**	**SLINE10**	**3.30E-01**	**2.38E-03**	**6.87E-04**	**1.21E-04**	**1.12E-04**	**1.08E-07**	**9.26E-05**	**6.96E-07**	**8.16E-07**	**2.43E-07**	**7.50E-06**	**3.52E-06**	**6.12E-07**	**3.75E-06**	**3.35E-07**	**1.90E-07**	**3.90E-07**	**1.14E-06**	**1.05E-04**	**2.28E-07**	**3.53E-11**	**7.38E-09**	**3.68E-11**	**2.27E-08**	**1.12E-04**	**9.20E-15**	**9.76E-15**
Rte 9, West of West	**Line Volume**	**SLINE11**	**9.04E-01**	**6.53E-03**	**1.88E-03**	**3.33E-04**	**3.06E-04**	**2.96E-07**	**2.54E-04**	**1.91E-06**	**2.24E-06**	**6.67E-07**	**2.06E-05**	**9.65E-06**	**1.68E-06**	**1.03E-05**	**9.19E-07**	**5.22E-07**	**1.07E-06**	**3.13E-06**	**2.87E-04**	**6.25E-07**	**9.68E-11**	**2.02E-08**	**1.01E-10**	**6.21E-08**	**3.06E-04**	**2.52E-14**	**2.68E-14**

Truck Idling

		area (m2)	AERMOD Source Name	CO2e	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	VOC	Benzene	Naphthalene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury	Arsenic	Chromium	Nickel	Diesel PM	Dioxins	Furans
Truck Exhaust Tipping Area	**Area**	**357.3**	**TRUCKIDLE1**	**7.62E-03**	**8.47E-05**	**2.45E-05**	**4.11E-06**	**3.78E-06**	**2.62E-08**	**8.48E-06**	**6.28E-08**	**7.33E-08**	**2.22E-08**	**6.67E-07**	**3.11E-07**	**5.48E-08**	**3.66E-07**	**2.80E-08**	**1.69E-08**	**9.90E-09**	**5.14E-08**	**8.57E-08**	**1.57E-08**	**6.44E-12**	**1.35E-09**	**6.71E-12**	**4.13E-09**	**3.78E-06**	**1.68E-15**	**1.78E-15**
Site Drive @Rte 9	**Volume**		**TRUCKIDLE2**	**8.16E-03**	**9.08E-05**	**2.63E-05**	**4.40E-06**	**4.05E-06**	**2.81E-08**	**9.09E-06**	**6.74E-08**	**7.86E-08**	**2.38E-08**	**7.15E-07**	**3.33E-07**	**5.87E-08**	**3.92E-07**	**3.00E-08**	**1.81E-08**	**1.06E-08**	**5.51E-08**	**9.18E-08**	**1.69E-08**	**6.90E-12**	**1.44E-09**	**7.19E-12**	**4.43E-09**	**4.05E-06**	**1.80E-15**	**1.91E-15**
Gilbertville Rd & Rte 9	**Volume**		**TRUCKIDLE3**	**3.79E-02**	**4.22E-04**	**1.22E-04**	**2.05E-05**	**1.88E-05**	**1.31E-07**	**4.22E-05**	**3.13E-07**	**3.65E-07**	**1.11E-07**	**3.32E-06**	**1.55E-06**	**2.73E-07**	**1.82E-06**	**1.39E-07**	**8.42E-08**	**4.93E-08**	**2.56E-07**	**4.27E-07**	**7.84E-08**	**3.21E-11**	**6.70E-09**	**3.34E-11**	**2.06E-08**	**1.88E-05**	**8.35E-15**	**8.86E-15**
Knox Ave @ Rte 9	**Volume**		**TRUCKIDLE4**	**2.30E-02**	**2.55E-04**	**7.39E-05**	**1.24E-05**	**1.14E-05**	**7.91E-08**	**2.56E-05**	**1.89E-07**	**2.21E-07**	**6.70E-08**	**2.01E-06**	**9.36E-07**	**1.65E-07**	**1.10E-06**	**8.42E-08**	**5.09E-08**	**2.98E-08**	**1.55E-07**	**2.58E-07**	**4.75E-08**	**1.94E-11**	**4.06E-09**	**2.02E-11**	**1.25E-08**	**1.14E-05**	**5.06E-15**	**5.36E-15**
South/Church @Rte 9	**Volume**		**TRUCKIDLE5**	**2.58E-01**	**2.87E-03**	**8.31E-04**	**1.39E-04**	**1.28E-04**	**8.89E-07**	**2.88E-04**	**2.13E-06**	**2.49E-06**	**7.54E-07**	**2.26E-05**	**1.05E-05**	**1.86E-06**	**1.24E-05**	**9.47E-07**	**5.73E-07**	**3.35E-07**	**1.74E-06**	**2.90E-06**	**5.34E-07**	**2.18E-10**	**4.56E-08**	**2.27E-10**	**1.40E-07**	**1.28E-04**	**5.69E-14**	**6.03E-14**
North St @ Rte 9	**Volume**		**TRUCKIDLE6**	**1.00E-01**	**1.11E-03**	**3.22E-04**	**5.40E-05**	**4.97E-05**	**3.45E-07**	**1.12E-04**	**8.26E-07**	**9.64E-07**	**2.92E-07**	**8.77E-06**	**4.08E-06**	**7.20E-07**	**4.81E-06**	**3.67E-07**	**2.22E-07**	**1.30E-07**	**6.76E-07**	**1.13E-06**	**2.07E-07**	**8.47E-11**	**1.77E-08**	**8.82E-11**	**5.43E-08**	**4.97E-05**	**2.21E-14**	**2.34E-14**
West St @ Rte 9	**Volume**		**TRUCKIDLE7**	**2.95E-01**	**3.28E-03**	**9.50E-04**	**1.59E-04**	**1.46E-04**	**1.02E-06**	**3.29E-04**	**2.43E-06**	**2.84E-06**	**8.62E-07**	**2.58E-05**	**1.20E-05**	**2.12E-06**	**1.42E-05**	**1.08E-06**	**6.55E-07**	**3.83E-07**	**1.99E-06**	**3.32E-06**	**6.10E-07**	**2.49E-10**	**5.22E-08**	**2.60E-10**	**1.60E-07**	**1.46E-04**	**6.50E-14**	**6.90E-14**

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Idling

Temporal Data

312.0 days/yr

GE EMD-38-2 Locomotive provided by client

2000 Max hp 10% switch load factor

Operating Schedule

1 number of equipment
2 hours each per day
2 hr/day 10am & 1pm per email 12/11/21

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Acetone	Methyl Ethyl Ketone
Emission Factor (g/gal)																			
Line Haul Duty Cycle	225.68	98.28	8.37	8.12	1.88	10217													
Switch Duty Cycle	194.56	33.44	5.78	5.60	1.88	10217													
Emission Factor (g/bhp-hr)																			
Line Haul Duty Cycle (SPECIATE 2)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4)							3.91E-03	6.43E-02	4.49E-04	7.94E-03	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2)	12.80	2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4)							5.01E-03	8.24E-02	5.75E-04	1.02E-02	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03

Emissions		Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Acetone	Methyl Ethyl Ketone
	g/day	5120.00	880.00	152.00	147.44	49.47	268868.42	1.66E+01	8.73E+01	2.30E-01	1.12E+01	6.11E-01	3.12E+01	5.56E+00	1.27E+00	7.77E-01	3.50E+00	1.47E+02	2.48E+00	2.77E+00
	lb/day	11.29	1.94	0.34	0.33	0.11	592.76	3.67E-02	1.92E-01	5.07E-04	2.48E-02	1.35E-03	6.88E-02	1.23E-02	2.80E-03	1.71E-03	7.72E-03	3.25E-01	5.47E-03	6.10E-03
	TPY	1.76	0.30	0.05	0.05	0.02	92.47	5.72E-03	3.00E-02	7.92E-05	3.86E-03	2.10E-04	1.07E-02	1.91E-03	4.37E-04	2.67E-04	1.20E-03	5.07E-02	8.54E-04	9.51E-04
Peak hour (g/s)		7.11E-01	0.1222	0.0211	0.0205	0.0069	37.3428	2.31E-03	1.21E-02	3.20E-05	1.56E-03	8.48E-05	4.33E-03	7.73E-04	1.76E-04	1.08E-04	4.86E-04	2.05E-02	3.45E-04	3.84E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

236D Skidsteer Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 236D Skidsteer Tier 4F from MiltonCat

74.3 hp 6% Load Factor (from DB Email 1/26/22)

Operating Schedule

1 number of equipment
9 hours each per day
9 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Skid Steers	4.80716	4.94339	0.74313	0.72084	0.00431		2.85E-02	2.35E-01	3.70E-03	2.09E-02	1.09E-06	2.30E-08	1.45E-08	1.89E-03	8.39E-02	2.44E-02	5.64E-03	7.05E-03	2.01E-03	1.93E-02	7.21E-01	4.57E-12	1.89E-03		
Skid Steers TOG X SPECIATE Tier 2							5.36E-02	2.81E-01		3.62E-02				1.97E-03	1.01E-01	1.79E-02		4.09E-03		1.13E-02					8.91E-03
Skid Steers TOG X SPECIATE Tier 4							6.46E-03	1.06E-01	7.42E-04	1.31E-02				4.64E-04	3.55E-02	5.30E-03		3.33E-03	2.50E-03	6.90E-03				8.00E-03	1.68E-03
Tier Standards																									
Tier 3 Standards (50-100 hp	3.5	3.7	0.3	0.3																	0.3				
Tier 4 Standards (50-75 hp)	3.5	3.7	0.022	0.022				2.48E-03													0.022				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	140.43	148.45	0.88	0.88	0.17	20928.8	2.59E-01	4.26E+00	2.98E-02	5.26E-01	4.37E-05	9.23E-07	5.81E-07	1.86E-02	1.42E+00	2.13E-01	2.26E-01	1.33E-01	1.00E-01	2.77E-01	2.89E+01	1.83E-10	7.57E-02	3.21E-01	6.74E-02
lb/day	0.31	0.33	0.00	0.00	0.00	46.14	5.71E-04	9.40E-03	6.56E-05	1.16E-03	9.64E-08	2.04E-09	1.28E-09	4.11E-05	3.14E-03	4.69E-04	4.99E-04	2.94E-04	2.21E-04	6.11E-04	6.38E-02	4.04E-13	1.67E-04	7.07E-04	1.49E-04
TPY	0.05	0.05	0.00	0.00	0.00	7.20	8.91E-05	1.47E-03	1.02E-05	1.81E-04	1.50E-08	3.18E-10	2.00E-10	6.41E-06	4.90E-04	7.32E-05	7.78E-05	4.59E-05	3.45E-05	9.53E-05	9.95E-03	6.31E-14	2.60E-05	1.10E-04	2.32E-05
Annual	1.39E-03	1.47E-03	8.73E-06	8.73E-06	1.71E-06	0.2071	2.56E-06	4.22E-05	2.94E-07	5.20E-06	4.32E-10	9.13E-12	5.75E-12	1.84E-07	1.41E-05	2.10E-06	2.24E-06	1.32E-06	9.94E-07	2.74E-06	2.86E-04	1.81E-15	7.49E-07	3.17E-06	6.67E-07
100% to open doors	1.39E-03	1.47E-03	8.73E-06	8.73E-06	1.71E-06	0.2071	2.56E-06	4.22E-05	2.94E-07	5.20E-06	4.32E-10	9.13E-12	5.75E-12	1.84E-07	1.41E-05	2.10E-06	2.24E-06	1.32E-06	9.94E-07	2.74E-06	2.86E-04	1.81E-15	7.49E-07	3.17E-06	6.67E-07
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.63E-03	1.72E-03	1.02E-05	1.02E-05	2.00E-06	0.2422	3.00E-06	4.93E-05	3.44E-07	6.09E-06	5.06E-10	1.07E-11	6.72E-12	2.16E-07	1.65E-05	2.46E-06	2.62E-06	1.54E-06	1.16E-06	3.21E-06	3.35E-04	2.12E-15	8.76E-07	3.71E-06	7.80E-07
100% to open doors	1.63E-03	1.72E-03	1.02E-05	1.02E-05	2.00E-06	0.2422	3.00E-06	4.93E-05	3.44E-07	6.09E-06	5.06E-10	1.07E-11	6.72E-12	2.16E-07	1.65E-05	2.46E-06	2.62E-06	1.54E-06	1.16E-06	3.21E-06	3.35E-04	2.12E-15	8.76E-07	3.71E-06	7.80E-07
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	4.33E-03	4.58E-03	2.72E-05	2.72E-05	5.34E-06	0.6459	8.00E-06	1.32E-04	9.18E-07	1.62E-05	1.35E-09	2.85E-11	1.79E-11	5.75E-07	4.39E-05	6.57E-06	6.98E-06	4.12E-06	3.10E-06	8.55E-06	8.93E-04	5.66E-15	2.34E-06	9.90E-06	2.08E-06
100% to open doors	4.33E-03	4.58E-03	2.72E-05	2.72E-05	5.34E-06	0.6459	8.00E-06	1.32E-04	9.18E-07	1.62E-05	1.35E-09	2.85E-11	1.79E-11	5.75E-07	4.39E-05	6.57E-06	6.98E-06	4.12E-06	3.10E-06	8.55E-06	8.93E-04	5.66E-15	2.34E-06	9.90E-06	2.08E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Sullair 185 Compressor Exhaust

Temporal Data

312.0 days/yr

Assumed Sullair 185 Compressor

61 hp 12% Load Factor (from DB Email 1/26/22)

Operating Schedule

1 number of equipment
9 hours each per day
9 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Air Compressors	2.84920	1.27262	0.18573	0.18016	0.00336		9.65E-03	6.70E-02	1.67E-03	8.09E-03	9.00E-07	1.58E-08	1.20E-08	4.31E-04	2.34E-02	4.51E-03	4.66E-03	1.31E-03	4.69E-04	4.84E-03	1.80E-01	2.71E-12	4.31E-04		
Air Compressors TOG X SPECIATE Tier 2							1.42E-02	7.45E-02		9.59E-03				5.21E-04	2.66E-02	4.75E-03		1.08E-03		2.99E-03					2.36E-03
Air Compressors TOG X SPECIATE Tier 4							1.71E-03	2.81E-02	1.96E-04	3.47E-03				1.23E-04	9.40E-03	1.40E-03		8.81E-04	6.63E-04	1.83E-03				2.12E-03	4.45E-04
Tier Standards																									
Tier 3 Standards (50-100 hp)	3.5	3.7	0.3	0.3																	0.3				
Tier 4 Standards (50-75 hp)	3.5	3.7	0.022	0.022																	0.022				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	187.71	83.84	12.24	11.87	0.22	34364.9	6.36E-01	4.41E+00	1.10E-01	5.33E-01	5.93E-05	1.04E-06	7.88E-07	2.84E-02	1.54E+00	2.97E-01	3.07E-01	8.60E-02	3.09E-02	3.19E-01	1.19E+01	1.78E-10	2.84E-02	1.40E-01	1.55E-01
lb/day	0.41	0.18	0.03	0.03	0.00	75.76	1.40E-03	9.73E-03	2.43E-04	1.18E-03	1.31E-07	2.29E-09	1.74E-09	6.25E-05	3.40E-03	6.54E-04	6.76E-04	1.90E-04	6.81E-05	7.02E-04	2.62E-02	3.93E-13	6.25E-05	3.08E-04	3.43E-04
TPY	0.06	0.03	0.00	0.00	0.00	11.82	2.19E-04	1.52E-03	3.79E-05	1.83E-04	2.04E-08	3.57E-10	2.71E-10	9.76E-06	5.30E-04	1.02E-04	1.06E-04	2.96E-05	1.06E-05	1.10E-04	4.08E-03	6.13E-14	9.76E-06	4.80E-05	5.35E-05
Annual	1.86E-03	8.29E-04	1.21E-04	1.17E-04	2.19E-06	0.3400	6.29E-06	4.37E-05	1.09E-06	5.27E-06	5.87E-10	1.03E-11	7.80E-12	2.81E-07	1.52E-05	2.94E-06	3.04E-06	8.51E-07	3.05E-07	3.15E-06	1.17E-04	1.76E-15	2.81E-07	1.38E-06	1.54E-06
100% to open doors	1.86E-03	8.29E-04	1.21E-04	1.17E-04	2.19E-06	0.3400	6.29E-06	4.37E-05	1.09E-06	5.27E-06	5.87E-10	1.03E-11	7.80E-12	2.81E-07	1.52E-05	2.94E-06	3.04E-06	8.51E-07	3.05E-07	3.15E-06	1.17E-04	1.76E-15	2.81E-07	1.38E-06	1.54E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	2.17E-03	9.70E-04	1.42E-04	1.37E-04	2.56E-06	0.3977	7.36E-06	5.11E-05	1.28E-06	6.17E-06	6.86E-10	1.20E-11	9.12E-12	3.28E-07	1.78E-05	3.44E-06	3.55E-06	9.96E-07	3.57E-07	3.69E-06	1.37E-04	2.06E-15	3.28E-07	1.61E-06	1.80E-06
100% to open doors	2.17E-03	9.70E-04	1.42E-04	1.37E-04	2.56E-06	0.3977	7.36E-06	5.11E-05	1.28E-06	6.17E-06	6.86E-10	1.20E-11	9.12E-12	3.28E-07	1.78E-05	3.44E-06	3.55E-06	9.96E-07	3.57E-07	3.69E-06	1.37E-04	2.06E-15	3.28E-07	1.61E-06	1.80E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	5.79E-03	2.59E-03	3.78E-04	3.66E-04	6.83E-06	1.0606	1.96E-05	1.36E-04	3.40E-06	1.64E-05	1.83E-09	3.21E-11	2.43E-11	8.76E-07	4.76E-05	9.16E-06	9.47E-06	2.66E-06	9.53E-07	9.83E-06	3.66E-04	5.50E-15	8.76E-07	4.31E-06	4.80E-06
100% to open doors	5.79E-03	2.59E-03	3.78E-04	3.66E-04	6.83E-06	1.0606	1.96E-05	1.36E-04	3.40E-06	1.64E-05	1.83E-09	3.21E-11	2.43E-11	8.76E-07	4.76E-05	9.16E-06	9.47E-06	2.66E-06	9.53E-07	9.83E-06	3.66E-04	5.50E-15	8.76E-07	4.31E-06	4.80E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Railcar Mover Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Volvo L120C Loader

208 hp 6% Load Factor (from DB Email 1/26/22)

Operating Schedule

1 number of equipment
9 hours each per day
9 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3	2.6	0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	436.01	405.54	63.73	61.82	0.45	58589.3	2.59E+00	2.00E+01	3.58E-01	2.06E+00	1.17E-04	2.10E-06	1.56E-06	1.49E-01	7.05E+00	1.68E+00	6.07E-01	4.67E-01	1.61E-01	1.48E+00	6.18E+01	3.58E-10	1.49E-01	6.58E-01	7.33E-01
lb/day	0.96	0.89	0.14	0.14	0.00	129.17	5.72E-03	4.40E-02	7.90E-04	4.54E-03	2.58E-07	4.63E-09	3.44E-09	3.28E-04	1.56E-02	3.70E-03	1.34E-03	1.03E-03	3.54E-04	3.27E-03	1.36E-01	7.89E-13	3.28E-04	1.45E-03	1.62E-03
TPY	0.15	0.14	0.02	0.02	0.00	20.15	8.92E-04	6.87E-03	1.23E-04	7.08E-04	4.03E-08	7.22E-10	5.36E-10	5.12E-05	2.43E-03	5.76E-04	2.09E-04	1.61E-04	5.53E-05	5.10E-04	2.13E-02	1.23E-13	5.12E-05	2.26E-04	2.52E-04
Annual	4.31E-03	4.01E-03	6.31E-04	6.12E-04	4.50E-06	0.5797	2.57E-05	1.98E-04	3.54E-06	2.04E-05	1.16E-09	2.08E-11	1.54E-11	1.47E-06	6.98E-05	1.66E-05	6.00E-06	4.62E-06	1.59E-06	1.47E-05	6.12E-04	3.54E-15	1.47E-06	6.51E-06	7.25E-06
100% to open doors	4.31E-03	4.01E-03	6.31E-04	6.12E-04	4.50E-06	0.5797	2.57E-05	1.98E-04	3.54E-06	2.04E-05	1.16E-09	2.08E-11	1.54E-11	1.47E-06	6.98E-05	1.66E-05	6.00E-06	4.62E-06	1.59E-06	1.47E-05	6.12E-04	3.54E-15	1.47E-06	6.51E-06	7.25E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	5.05E-03	4.69E-03	7.38E-04	7.16E-04	5.26E-06	0.6781	3.00E-05	2.31E-04	4.15E-06	2.38E-05	1.36E-09	2.43E-11	1.80E-11	1.72E-06	8.16E-05	1.94E-05	7.02E-06	5.41E-06	1.86E-06	1.72E-05	7.16E-04	4.14E-15	1.72E-06	7.61E-06	8.48E-06
100% to open doors	5.05E-03	4.69E-03	7.38E-04	7.16E-04	5.26E-06	0.6781	3.00E-05	2.31E-04	4.15E-06	2.38E-05	1.36E-09	2.43E-11	1.80E-11	1.72E-06	8.16E-05	1.94E-05	7.02E-06	5.41E-06	1.86E-06	1.72E-05	7.16E-04	4.14E-15	1.72E-06	7.61E-06	8.48E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.35E-02	1.25E-02	1.97E-03	1.91E-03	1.40E-05	1.8083	8.00E-05	6.16E-04	1.11E-05	6.36E-05	3.62E-09	6.48E-11	4.81E-11	4.59E-06	2.18E-04	5.17E-05	1.87E-05	1.44E-05	4.96E-06	4.57E-05	1.91E-03	1.10E-14	4.59E-06	2.03E-05	2.26E-05
100% to open doors	1.35E-02	1.25E-02	1.97E-03	1.91E-03	1.40E-05	1.8083	8.00E-05	6.16E-04	1.11E-05	6.36E-05	3.62E-09	6.48E-11	4.81E-11	4.59E-06	2.18E-04	5.17E-05	1.87E-05	1.44E-05	4.96E-06	4.57E-05	1.91E-03	1.10E-14	4.59E-06	2.03E-05	2.26E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

966M Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 966M Loader Tier 4F from MiltonCat

276 hp 6% Load Factor (from DB Email 1/26/22)

Operating Schedule

1 number of equipment
9 hours each per day
9 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0		0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	44.71	538.12	2.24	2.24	0.60	77743.5	7.04E-01	1.16E+01	8.09E-02	1.43E+00	1.56E-04	2.79E-06	2.07E-06	5.06E-02	3.87E+00	5.78E-01	8.05E-01	3.63E-01	2.73E-01	7.53E-01	8.20E+01	4.75E-10	1.98E-01	8.72E-01	1.83E-01
lb/day	0.10	1.19	0.00	0.00	0.00	171.40	1.55E-03	2.56E-02	1.78E-04	3.15E-03	3.43E-07	6.14E-09	4.56E-09	1.12E-04	8.54E-03	1.28E-03	1.77E-03	8.00E-04	6.02E-04	1.66E-03	1.81E-01	1.05E-12	4.35E-04	1.92E-03	4.04E-04
TPY	0.02	0.19	0.00	0.00	0.00	26.74	2.42E-04	3.99E-03	2.78E-05	4.92E-04	5.35E-08	9.59E-10	7.11E-10	1.74E-05	1.33E-03	1.99E-04	2.77E-04	1.25E-04	9.39E-05	2.59E-04	2.82E-02	1.63E-13	6.79E-05	3.00E-04	6.30E-05
Annual	4.42E-04	5.32E-03	2.21E-05	2.21E-05	5.97E-06	0.7692	6.97E-06	1.15E-04	8.01E-07	1.42E-05	1.54E-09	2.76E-11	2.05E-11	5.01E-07	3.83E-05	5.72E-06	7.96E-06	3.59E-06	2.70E-06	7.45E-06	8.12E-04	4.70E-15	1.95E-06	8.63E-06	1.81E-06
100% to open doors	4.42E-04	5.32E-03	2.21E-05	2.21E-05	5.97E-06	0.7692	6.97E-06	1.15E-04	8.01E-07	1.42E-05	1.54E-09	2.76E-11	2.05E-11	5.01E-07	3.83E-05	5.72E-06	7.96E-06	3.59E-06	2.70E-06	7.45E-06	8.12E-04	4.70E-15	1.95E-06	8.63E-06	1.81E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	5.18E-04	6.23E-03	2.59E-05	2.59E-05	6.98E-06	0.8998	8.15E-06	1.34E-04	9.37E-07	1.66E-05	1.80E-09	3.23E-11	2.39E-11	5.86E-07	4.48E-05	6.70E-06	9.32E-06	4.20E-06	3.16E-06	8.72E-06	9.49E-04	5.50E-15	2.29E-06	1.01E-05	2.12E-06
100% to open doors	5.18E-04	6.23E-03	2.59E-05	2.59E-05	6.98E-06	0.8998	8.15E-06	1.34E-04	9.37E-07	1.66E-05	1.80E-09	3.23E-11	2.39E-11	5.86E-07	4.48E-05	6.70E-06	9.32E-06	4.20E-06	3.16E-06	8.72E-06	9.49E-04	5.50E-15	2.29E-06	1.01E-05	2.12E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.38E-03	1.66E-02	6.90E-05	6.90E-05	1.86E-05	2.3995	2.17E-05	3.58E-04	2.50E-06	4.41E-05	4.80E-09	8.60E-11	6.38E-11	1.56E-06	1.19E-04	1.79E-05	2.48E-05	1.12E-05	8.43E-06	2.32E-05	2.53E-03	1.47E-14	6.10E-06	2.69E-05	5.66E-06
100% to open doors	1.38E-03	1.66E-02	6.90E-05	6.90E-05	1.86E-05	2.3995	2.17E-05	3.58E-04	2.50E-06	4.41E-05	4.80E-09	8.60E-11	6.38E-11	1.56E-06	1.19E-04	1.79E-05	2.48E-05	1.12E-05	8.43E-06	2.32E-05	2.53E-03	1.47E-14	6.10E-06	2.69E-05	5.66E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Caterpillar 345DL Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 345DL Excavator — DPF per MiltonCat controls 90% of CO, 85% of PM, and 50% of VOC.

380 hp 16% Load Factor (from DB Email 1/26/22)

Operating Schedule

1 number of equipment
9 hours each per day
9 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Excavators	1.36389	0.05431	0.01382	0.01340	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	4.25E-07	4.64E-09	1.04E-08	1.04E-04	7.17E-03	1.16E-03	2.20E-03	4.94E-04	3.14E-04	2.54E-03	1.34E-02	1.25E-12	1.88E-12		
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03				3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03					8.22E-04
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03				8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03				7.38E-04	3.10E-04
Tier Standards																									
Tier 3 Standards (300-600 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	746.32	29.72	7.56	7.33	1.58	285435.1	1.30E+00	1.17E+01	5.84E-01	1.57E+00	2.32E-04	2.54E-06	5.72E-06	5.72E-02	3.93E+00	6.32E-01	1.20E+00	2.70E-01	1.72E-01	1.39E+00	7.33E+00	6.83E-10	1.03E-09	4.04E-01	4.50E-01
lb/day	1.65	0.07	0.02	0.02	0.00	629.28	2.86E-03	2.59E-02	1.29E-03	3.45E-03	5.12E-07	5.60E-09	1.26E-08	1.26E-04	8.65E-03	1.39E-03	2.65E-03	5.96E-04	3.78E-04	3.06E-03	1.62E-02	1.51E-12	2.26E-12	8.90E-04	9.92E-04
TPY	0.26	0.01	0.00	0.00	0.00	98.17	4.47E-04	4.04E-03	2.01E-04	5.38E-04	7.99E-08	8.73E-10	1.97E-09	1.97E-05	1.35E-03	2.18E-04	4.13E-04	9.30E-05	5.90E-05	4.77E-04	2.52E-03	2.35E-13	3.53E-13	1.39E-04	1.55E-04
Annual	7.38E-03	2.94E-04	7.48E-05	7.26E-05	1.56E-05	2.8239	1.29E-05	1.16E-04	5.78E-06	1.55E-05	2.30E-09	2.51E-11	5.65E-11	5.66E-07	3.88E-05	6.26E-06	1.19E-05	2.68E-06	1.70E-06	1.37E-05	7.26E-05	6.75E-15	1.02E-14	3.99E-06	4.45E-06
100% to open doors	7.38E-03	2.94E-04	7.48E-05	7.26E-05	1.56E-05	2.8239	1.29E-05	1.16E-04	5.78E-06	1.55E-05	2.30E-09	2.51E-11	5.65E-11	5.66E-07	3.88E-05	6.26E-06	1.19E-05	2.68E-06	1.70E-06	1.37E-05	7.26E-05	6.75E-15	1.02E-14	3.99E-06	4.45E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	8.64E-03	3.44E-04	8.75E-05	8.49E-05	1.82E-05	3.3036	1.50E-05	1.36E-04	6.76E-06	1.81E-05	2.69E-09	2.94E-11	6.62E-11	6.62E-07	4.54E-05	7.32E-06	1.39E-05	3.13E-06	1.99E-06	1.61E-05	8.49E-05	7.90E-15	1.19E-14	4.67E-06	5.21E-06
100% to open doors	8.64E-03	3.44E-04	8.75E-05	8.49E-05	1.82E-05	3.3036	1.50E-05	1.36E-04	6.76E-06	1.81E-05	2.69E-09	2.94E-11	6.62E-11	6.62E-07	4.54E-05	7.32E-06	1.39E-05	3.13E-06	1.99E-06	1.61E-05	8.49E-05	7.90E-15	1.19E-14	4.67E-06	5.21E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.30E-02	9.17E-04	2.33E-04	2.26E-04	4.86E-05	8.8097	4.01E-05	3.62E-04	1.80E-05	4.83E-05	7.17E-09	7.83E-11	1.76E-10	1.76E-06	1.21E-04	1.95E-05	3.71E-05	8.35E-06	5.30E-06	4.28E-05	2.26E-04	2.11E-14	3.17E-14	1.25E-05	1.39E-05
100% to open doors	2.30E-02	9.17E-04	2.33E-04	2.26E-04	4.86E-05	8.8097	4.01E-05	3.62E-04	1.80E-05	4.83E-05	7.17E-09	7.83E-11	1.76E-10	1.76E-06	1.21E-04	1.95E-05	3.71E-05	8.35E-06	5.30E-06	4.28E-05	2.26E-04	2.11E-14	3.17E-14	1.25E-05	1.39E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Caterpillar 330C Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 330C Excavator Tier 4F from MiltonCat

247 hp 16% Load Factor (from DB Email 1/26/22)

Operating Schedule

1 number of equipment
9 hours each per day
9 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Excavators	1.36389	0.54310	0.09212	0.08936	0.00288		4.75E-03	4.29E-02	2.13E-03	5.72E-03	8.49E-07	9.28E-09	1.13E-08	2.09E-04	1.43E-02	2.31E-03	4.39E-03	9.88E-04	6.27E-04	5.07E-03	8.94E-02	1.25E-12	2.09E-04		
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03				3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03					1.64E-03
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03				8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03				1.48E-03	3.10E-04
Tier Standards																									
Tier 3 Standards (300-600 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	485.11	193.17	32.77	31.78	1.02	185532.8	1.69E+00	1.53E+01	7.59E-01	2.04E+00	3.02E-04	3.30E-06	4.02E-06	7.43E-02	5.10E+00	8.22E-01	1.56E+00	3.52E-01	2.23E-01	1.80E+00	3.18E+01	4.44E-10	7.43E-02	5.25E-01	5.85E-01
lb/day	1.07	0.43	0.07	0.07	0.00	409.03	3.72E-03	3.36E-02	1.67E-03	4.49E-03	6.66E-07	7.27E-09	8.85E-09	1.64E-04	1.13E-02	1.81E-03	3.45E-03	7.75E-04	4.92E-04	3.98E-03	7.01E-02	9.78E-13	1.64E-04	1.16E-03	1.29E-03
TPY	0.17	0.07	0.01	0.01	0.00	63.81	5.81E-04	5.25E-03	2.61E-04	7.00E-04	1.04E-07	1.13E-09	1.38E-09	2.56E-05	1.76E-03	2.83E-04	5.38E-04	1.21E-04	7.67E-05	6.21E-04	1.09E-02	1.53E-13	2.56E-05	1.80E-04	2.01E-04
Annual	4.80E-03	1.91E-03	3.24E-04	3.14E-04	1.01E-05	1.8356	1.67E-05	1.51E-04	7.51E-06	2.01E-05	2.99E-09	3.26E-11	3.97E-11	7.35E-07	5.05E-05	8.13E-06	1.55E-05	3.48E-06	2.21E-06	1.79E-05	3.14E-04	4.39E-15	7.35E-07	5.19E-06	5.79E-06
100% to open doors	4.80E-03	1.91E-03	3.24E-04	3.14E-04	1.01E-05	1.8356	1.67E-05	1.51E-04	7.51E-06	2.01E-05	2.99E-09	3.26E-11	3.97E-11	7.35E-07	5.05E-05	8.13E-06	1.55E-05	3.48E-06	2.21E-06	1.79E-05	3.14E-04	4.39E-15	7.35E-07	5.19E-06	5.79E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	5.61E-03	2.24E-03	3.79E-04	3.68E-04	1.19E-05	2.1474	1.95E-05	1.77E-04	8.79E-06	2.36E-05	3.50E-09	3.82E-11	4.65E-11	8.60E-07	5.91E-05	9.52E-06	1.81E-05	4.07E-06	2.58E-06	2.09E-05	3.68E-04	5.14E-15	8.60E-07	6.07E-06	6.77E-06
100% to open doors	5.61E-03	2.24E-03	3.79E-04	3.68E-04	1.19E-05	2.1474	1.95E-05	1.77E-04	8.79E-06	2.36E-05	3.50E-09	3.82E-11	4.65E-11	8.60E-07	5.91E-05	9.52E-06	1.81E-05	4.07E-06	2.58E-06	2.09E-05	3.68E-04	5.14E-15	8.60E-07	6.07E-06	6.77E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.50E-02	5.96E-03	1.01E-03	9.81E-04	3.16E-05	5.7263	5.21E-05	4.71E-04	2.34E-05	6.28E-05	9.32E-09	1.02E-10	1.24E-10	2.29E-06	1.58E-04	2.54E-05	4.82E-05	1.08E-05	6.89E-06	5.57E-05	9.81E-04	1.37E-14	2.29E-06	1.62E-05	1.80E-05
100% to open doors	1.50E-02	5.96E-03	1.01E-03	9.81E-04	3.16E-05	5.7263	5.21E-05	4.71E-04	2.34E-05	6.28E-05	9.32E-09	1.02E-10	1.24E-10	2.29E-06	1.58E-04	2.54E-05	4.82E-05	1.08E-05	6.89E-06	5.57E-05	9.81E-04	1.37E-14	2.29E-06	1.62E-05	1.80E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 -	Dioxins	Furans
0 mph	7838.07	87.183	25.2333	4.22838	3.8901	0.027005	8.73061	6.47E-02	0.00E+00	7.55E-02	2.29E-02	6.87E-01	3.20E-01	5.64E-02	3.77E-01	2.88E-02	1.74E-02	1.02E-02	5.29E-02	8.82E-02	1.62E-02	6.63E-06	1.39E-03	6.90E-06	4.25E-03	3.89E+00	1.73E-09	1.83E-09

Idling Times	Idle Minutes Per Truck	Idle Hours per Truck	Peak Hour Trucks	All Truck Idling time ((veh-hr)/hr) [1]	
Truck Exhaust Tipping Area	5	0.0833	15	1.250	if 30 trips peak hour, 1 truck comes in, dumps, then leaves = 2 trips but 1 truck idling.
Site Drive @Rte 9	0.0075	0.0001	30	0.004	
Gilbertville Rd & Rte 9	0.055	0.0009	19	0.017	
Knox Ave @ Rte 9	0.0575	0.0010	11	0.011	
South/Church @Rte 9	0.646667	0.0108	11	0.119	
North St @ Rte 9	0.250833	0.0042	11	0.046	
West St @ Rte 9	0.739167	0.0123	11	0.136	

[1] vehicle hours of delay (idle) per hour of actual time

Emissions (g/hr)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Truck Exhaust Tipping Area	9797.6	109.0	31.5	5.3	4.9	0.0	10.9	8.08E-02	0.00E+00	9.43E-02	2.86E-02	8.58E-01	3.99E-01	7.04E-02	4.71E-01	3.60E-02	2.17E-02	1.27E-02	6.61E-02	1.10E-01	2.03E-02	8.28E-06	1.73E-03	8.63E-06	5.32E-03	4.86E+00	2.16E-09	2.29E-09
Site Drive @Rte 9	29.4	0.3	0.1	0.0	0.0	0.0	0.0	2.42E-04	0.00E+00	2.83E-04	8.58E-05	2.57E-03	1.20E-03	2.11E-04	1.41E-03	1.08E-04	6.52E-05	3.82E-05	1.98E-04	3.31E-04	6.08E-05	2.49E-08	5.20E-06	2.59E-08	1.60E-05	1.46E-02	6.47E-12	6.87E-12
Gilbertville Rd & Rte 9	136.5	1.5	0.4	0.1	0.1	0.0	0.2	1.13E-03	0.00E+00	1.31E-03	3.99E-04	1.20E-02	5.57E-03	9.82E-04	6.56E-03	5.01E-04	3.03E-04	1.77E-04	9.21E-04	1.54E-03	2.82E-04	1.15E-07	2.41E-05	1.20E-07	7.41E-05	6.78E-02	3.01E-11	3.19E-11
Knox Ave @ Rte 9	82.6	0.9	0.3	0.0	0.0	0.0	0.1	6.82E-04	0.00E+00	7.95E-04	2.41E-04	7.24E-03	3.37E-03	5.94E-04	3.97E-03	3.03E-04	1.83E-04	1.07E-04	5.58E-04	9.29E-04	1.71E-04	6.99E-08	1.46E-05	7.28E-08	4.48E-05	4.10E-02	1.82E-11	1.93E-11
South/Church @Rte 9	929.2	10.3	3.0	0.5	0.5	0.0	1.0	7.67E-03	0.00E+00	8.95E-03	2.71E-03	8.14E-02	3.79E-02	6.68E-03	4.46E-02	3.41E-03	2.06E-03	1.21E-03	6.27E-03	1.05E-02	1.92E-03	7.86E-07	1.64E-04	8.18E-07	5.04E-04	4.61E-01	2.05E-10	2.17E-10
North St @ Rte 9	360.4	4.0	1.2	0.2	0.2	0.0	0.4	2.97E-03	0.00E+00	3.47E-03	1.05E-03	3.16E-02	1.47E-02	2.59E-03	1.73E-02	1.32E-03	8.00E-04	4.68E-04	2.43E-03	4.05E-03	7.45E-04	3.05E-07	6.37E-05	3.17E-07	1.96E-04	1.79E-01	7.94E-11	8.42E-11
West St @ Rte 9	1062.2	11.8	3.4	0.6	0.5	0.0	1.2	8.76E-03	0.00E+00	1.02E-02	3.10E-03	9.30E-02	4.33E-02	7.64E-03	5.10E-02	3.90E-03	2.36E-03	1.38E-03	7.17E-03	1.19E-02	2.20E-03	8.98E-07	1.88E-04	9.36E-07	5.76E-04	5.27E-01	2.34E-10	2.48E-10

AERMOD Emissions (g/s)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Truck Exhaust Tipping Area	2.72E+00	3.03E-02	8.76E-03	1.47E-03	1.35E-03	9.38E-06	3.03E-03	2.25E-05	0.00E+00	2.62E-05	7.95E-06	2.38E-04	1.11E-04	1.96E-05	1.31E-04	9.99E-06	6.04E-06	3.54E-06	1.84E-05	3.06E-05	5.63E-06	2.30E-09	4.81E-07	2.40E-09	1.48E-06	1.35E-03	5.99E-13	6.36E-13
Site Drive @Rte 9	8.16E-03	9.08E-05	2.63E-05	4.40E-06	4.05E-06	2.81E-08	9.09E-06	6.74E-08	0.00E+00	7.86E-08	2.38E-08	7.15E-07	3.33E-07	5.87E-08	3.92E-07	3.00E-08	1.81E-08	1.06E-08	5.51E-08	9.18E-08	1.69E-08	6.90E-12	1.44E-09	7.19E-12	4.43E-09	4.05E-06	1.80E-15	1.91E-15
Gilbertville Rd & Rte 9	3.79E-02	4.22E-04	1.22E-04	2.05E-05	1.88E-05	1.31E-07	4.22E-05	3.13E-07	0.00E+00	3.65E-07	1.11E-07	3.32E-06	1.55E-06	2.73E-07	1.82E-06	1.39E-07	8.42E-08	4.93E-08	2.56E-07	4.27E-07	7.84E-08	3.21E-11	6.70E-09	3.34E-11	2.06E-08	1.88E-05	8.35E-15	8.86E-15
Knox Ave @ Rte 9	2.30E-02	2.55E-04	7.39E-05	1.24E-05	1.14E-05	7.91E-08	2.56E-05	1.89E-07	0.00E+00	2.21E-07	6.70E-08	2.01E-06	9.36E-07	1.65E-07	1.10E-06	8.42E-08	5.09E-08	2.98E-08	1.55E-07	2.58E-07	4.75E-08	1.94E-11	4.06E-09	2.02E-11	1.25E-08	1.14E-05	5.06E-15	5.36E-15
South/Church @Rte 9	2.58E-01	2.87E-03	8.31E-04	1.39E-04	1.28E-04	8.89E-07	2.88E-04	2.13E-06	0.00E+00	2.49E-06	7.54E-07	2.26E-05	1.05E-05	1.86E-06	1.24E-05	9.47E-07	5.73E-07	3.35E-07	1.74E-06	2.90E-06	5.34E-07	2.18E-10	4.56E-08	2.27E-10	1.40E-07	1.28E-04	5.69E-14	6.03E-14
North St @ Rte 9	1.00E-01	1.11E-03	3.22E-04	5.40E-05	4.97E-05	3.45E-07	1.12E-04	8.26E-07	0.00E+00	9.64E-07	2.92E-07	8.77E-06	4.08E-06	7.20E-07	4.81E-06	3.67E-07	2.22E-07	1.30E-07	6.76E-07	1.13E-06	2.07E-07	8.47E-11	1.77E-08	8.82E-11	5.43E-08	4.97E-05	2.21E-14	2.34E-14
West St @ Rte 9	2.95E-01	3.28E-03	9.50E-04	1.59E-04	1.46E-04	1.02E-06	3.29E-04	2.43E-06	0.00E+00	2.84E-06	8.62E-07	2.58E-05	1.20E-05	2.12E-06	1.42E-05	1.08E-06	6.55E-07	3.83E-07	1.99E-06	3.32E-06	6.10E-07	2.49E-10	5.22E-08	2.60E-10	1.60E-07	1.46E-04	6.50E-14	6.90E-14

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 -	Dioxins	Furans
15 mph	2525.98	19.47	6.59	0.92	0.84	1.18E-03	0.98	7.62E-03	0.00E+00	8.93E-03	2.66E-03	8.22E-02	3.82E-02	6.67E-03	3.22E-02	3.55E-03	2.08E-03	3.04E-03	8.74E-03	1.12E+00	1.78E-03	4.42E-07	9.24E-05	4.60E-07	2.84E-04	8.43E-01	1.15E-10	1.22E-10
30 mph	2062.96	14.92	4.30	0.76	0.70	6.76E-04	0.58	4.35E-03	0.00E+00	5.10E-03	1.52E-03	4.69E-02	2.20E-02	3.83E-03	2.35E-02	2.10E-03	1.19E-03	2.44E-03	7.14E-03	6.56E-01	1.43E-03	2.21E-07	4.62E-05	2.30E-07	1.42E-04	6.99E-01	5.75E-11	6.11E-11
Fugitive PM				62.35	15.59																							

ONSITE

Idling Times

	link Avg Speed	Peak Hourly Veh. #	Link Length meters	Link Length miles	Link Vehicle Miles Traveled VMT/hr (peak hr)
Onsite Roadway	15	30	325.30	0.20	6.06
Gilbertville Rd/Rte 32	30	0	465.80	0.29	0.00
Rte 9 East of Gilbertville	30	19	309.70	0.19	3.66
Rte 9/32 Site Drive to Gilbertville	30	19	111.30	0.07	1.31
Rte 9/32, Site Drive to Knox	30	11	1575.40	0.98	10.77
Knox Ave, S of Rte 9/32	30	0	206.60	0.13	0.00
Rte 9/32, Knox to South/Church	30	11	725.50	0.45	4.96
Rte 9/32, South/Church to North	30	11	167.10	0.10	1.14
North St	30	0	170.60	0.11	0.00
Rte 9/32, North to West	30	11	80.80	0.05	0.55
West St/Rte 32	30	5	185.20	0.12	0.58
Rte 9, West of West	30	7	362.60	0.23	1.58

Emissions (g/hr)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Onsite Roadway	15317.4	118.1	40.0	383.7	99.6	7.14E-03	6.0	4.62E-02	0.00E+00	5.41E-02	1.61E-02	4.98E-01	2.32E-01	4.05E-02	1.95E-01	2.15E-02	1.26E-02	1.85E-02	5.30E-02	6.78E+00	1.08E-02	2.68E-06	5.60E-04	2.79E-06	1.72E-03	5.11E+00	6.98E-10	7.41E-10
Gilbertville Rd/Rte 32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9 East of Gilbertville	7542.9	54.5	15.7	2.8	2.6	0.0	2.1	1.59E-02	0.00E+00	1.87E-02	5.57E-03	1.72E-01	8.06E-02	1.40E-02	8.58E-02	7.67E-03	4.35E-03	8.93E-03	2.61E-02	2.40E+00	5.22E-03	8.08E-07	1.69E-04	8.41E-07	5.18E-04	2.56E+00	2.10E-10	2.23E-10
Rte 9/32 Site Drive to Gilbertville	2710.8	19.6	5.6	1.0	0.9	0.0	0.8	5.72E-03	0.00E+00	6.71E-03	2.00E-03	6.16E-02	2.90E-02	5.03E-03	3.08E-02	2.76E-03	1.56E-03	3.21E-03	9.38E-03	8.62E-01	1.87E-03	2.90E-07	6.07E-05	3.02E-07	1.86E-04	9.18E-01	7.56E-11	8.02E-11
Rte 9/32, Site Drive to Knox	22213.9	160.6	46.3	8.2	7.5	0.0	6.2	4.69E-02	0.00E+00	5.50E-02	1.64E-02	5.05E-01	2.37E-01	4.12E-02	2.53E-01	2.26E-02	1.28E-02	2.63E-02	7.69E-02	7.06E+00	1.54E-02	2.38E-06	4.97E-04	2.48E-06	1.53E-03	7.53E+00	6.20E-10	6.58E-10
Knox Ave, S of Rte 9/32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, Knox to South/Church	10229.9	74.0	21.3	3.8	3.5	0.0	2.9	2.16E-02	0.00E+00	2.53E-02	7.55E-03	2.33E-01	1.09E-01	1.90E-02	1.16E-01	1.04E-02	5.90E-03	1.21E-02	3.54E-02	3.25E+00	7.08E-03	1.10E-06	2.29E-04	1.14E-06	7.03E-04	3.47E+00	2.85E-10	3.03E-10
Rte 9/32, South/Church to North	2356.2	17.0	4.9	0.9	0.8	0.0	0.7	4.97E-03	0.00E+00	5.83E-03	1.74E-03	5.36E-02	2.52E-02	4.37E-03	2.68E-02	2.39E-03	1.36E-03	2.79E-03	8.15E-03	7.49E-01	1.63E-03	2.52E-07	5.28E-05	2.63E-07	1.62E-04	7.98E-01	6.57E-11	6.97E-11
North St	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, North to West	1139.3	8.2	2.4	0.4	0.4	0.0	0.3	2.40E-03	0.00E+00	2.82E-03	8.41E-04	2.59E-02	1.22E-02	2.12E-03	1.30E-02	1.16E-03	6.58E-04	1.35E-03	3.94E-03	3.62E-01	7.88E-04	1.22E-07	2.55E-05	1.27E-07	7.83E-05	3.86E-01	3.18E-11	3.37E-11
West St/Rte 32	1187.0	8.6	2.5	0.4	0.4	0.0	0.3	2.50E-03	0.00E+00	2.94E-03	8.76E-04	2.70E-02	1.27E-02	2.20E-03	1.35E-02	1.21E-03	6.85E-04	1.41E-03	4.11E-03	3.77E-01	8.21E-04	1.27E-07	2.66E-05	1.32E-07	8.16E-05	4.02E-01	3.31E-11	3.51E-11
Rte 9, West of West	3253.6	23.5	6.8	1.2	1.1	0.0	0.9	6.86E-03	0.00E+00	8.05E-03	2.40E-03	7.40E-02	3.48E-02	6.04E-03	3.70E-02	3.31E-03	1.88E-03	3.85E-03	1.13E-02	1.03E+00	2.25E-03	3.48E-07	7.29E-05	3.63E-07	2.24E-04	1.10E+00	9.08E-11	9.63E-11

AERMOD Emissions (g/s)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Onsite Roadway	4.25E+00	3.28E-02	1.11E-02	1.07E-01	2.77E-02	1.98E-06	1.66E-03	1.28E-05	0.00E+00	1.50E-05	4.47E-06	1.38E-04	6.44E-05	1.12E-05	5.43E-05	5.98E-06	3.51E-06	5.13E-06	1.47E-05	1.88E-03	2.99E-06	7.44E-10	1.56E-07	7.75E-10	4.78E-07	1.42E-03	1.94E-13	2.06E-13
Gilbertville Rd/Rte 32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9 East of Gilbertville	2.10E+00	1.52E-02	4.37E-03	7.72E-04	7.10E-04	6.86E-07	5.89E-04	4.42E-06	0.00E+00	5.18E-06	1.55E-06	4.76E-05	2.24E-05	3.89E-06	2.38E-05	2.13E-06	1.21E-06	2.48E-06	7.25E-06	6.66E-04	1.45E-06	2.24E-10	4.69E-08	2.34E-10	1.44E-07	7.10E-04	5.84E-14	6.20E-14
Rte 9/32 Site Drive to Gilbertville	7.53E-01	5.44E-03	1.57E-03	2.77E-04	2.55E-04	2.47E-07	2.11E-04	1.59E-06	0.00E+00	1.86E-06	5.56E-07	1.71E-05	8.04E-06	1.40E-06	8.57E-06	7.65E-07	4.35E-07	8.92E-07	2.61E-06	2.39E-04	5.21E-07	8.06E-11	1.69E-08	8.40E-11	5.18E-08	2.55E-04	2.10E-14	2.23E-14
Rte 9/32, Site Drive to Knox	6.17E+00	4.46E-02	1.29E-02	2.27E-03	2.09E-03	2.02E-06	1.73E-03	1.30E-05	0.00E+00	1.53E-05	4.55E-06	1.40E-04	6.59E-05	1.15E-05	7.02E-05	6.27E-06	3.56E-06	7.31E-06	2.14E-05	1.96E-03	4.27E-06	6.61E-10	1.38E-07	6.88E-10	4.24E-07	2.09E-03	1.72E-13	1.83E-13
Knox Ave, S of Rte 9/32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, Knox to South/Church	2.84E+00	2.05E-02	5.92E-03	1.05E-03	9.63E-04	9.31E-07	7.98E-04	6.00E-06	0.00E+00	7.03E-06	2.10E-06	6.46E-05	3.04E-05	5.28E-06	3.23E-05	2.89E-06	1.64E-06	3.36E-06	9.83E-06	9.03E-04	1.97E-06	3.04E-10	6.36E-08	3.17E-10	1.95E-07	9.63E-04	7.93E-14	8.41E-14
Rte 9/32, South/Church to North	6.54E-01	4.73E-03	1.36E-03	2.41E-04	2.22E-04	2.14E-07	1.84E-04	1.38E-06	0.00E+00	1.62E-06	4.83E-07	1.49E-05	6.99E-06	1.22E-06	7.45E-06	6.65E-07	3.78E-07	7.75E-07	2.27E-06	2.08E-04	4.53E-07	7.01E-11	1.47E-08	7.30E-11	4.50E-08	2.22E-04	1.83E-14	1.94E-14
North St	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, North to West	3.16E-01	2.29E-03	6.59E-04	1.17E-04	1.07E-04	1.04E-07	8.89E-05	6.68E-07	0.00E+00	7.83E-07	2.34E-07	7.20E-06	3.38E-06	5.88E-07	3.60E-06	3.22E-07	1.83E-07	3.75E-07	1.10E-06	1.01E-04	2.19E-07	3.39E-11	7.09E-09	3.53E-11	2.18E-08	1.07E-04	8.83E-15	9.37E-15
West St/Rte 32	3.30E-01	2.38E-03	6.87E-04	1.21E-04	1.12E-04	1.08E-07	9.26E-05	6.96E-07	0.00E+00	8.16E-07	2.43E-07	7.50E-06	3.52E-06	6.12E-07	3.75E-06	3.35E-07	1.90E-07	3.90E-07	1.14E-06	1.05E-04	2.28E-07	3.53E-11	7.38E-09	3.68E-11	2.27E-08	1.12E-04	9.20E-15	9.76E-15
Rte 9, West of West	9.04E-01	6.53E-03	1.88E-03	3.33E-04	3.06E-04	2.96E-07	2.54E-04	1.91E-06	0.00E+00	2.24E-06	6.67E-07	2.06E-05	9.65E-06	1.68E-06	1.03E-05	9.19E-07	5.22E-07	1.07E-06	3.13E-06	2.87E-04	6.25E-07	9.68E-11	2.02E-08	1.01E-10	6.21E-08	3.06E-04	2.52E-14	2.68E-14

PM-10, PM-2.5, Emission Calculations and Stack Parameters for C&D Transfer Station in Ware, MA - Existing Case
Date 1/18/2022
Engineer DTR/DKB
Checked DKB/NRD

C&D Tipping - Particulate Matter
Existing capacity 750 tons per day of C&D (mix of bulky and residuals)
Most deliveries are by 25 ton trailers, or about 30 ADT (30 full arrivals and 30 empty departures per day). Load out into 100 ton rail cars.

Facility accepts waste 6 days per week, 8 hours per day on weekdays, 5 hours on Sat, existing is limited to 214,500 tpy.
= 214,500 / 750 = 286 days per year of operation
286 days per year operation on average to accept 214,500 tpy
Loads are dumped on tipping floor from trucks (including 5.5 ton roll-off trucks, 4 ton roll-off containers,but primarily self dumping live floor 100 CY, 25 ton trailers)

The MSW load is dumped and transferred via front end loader or grapple picker into a pile (wood, residuals, etc). Most is loaded into 100 ton rail cars.

So, each ton of material is dumped (or loaded) twice and may othewise be handled (using front end loader or grapple W) in the tipping floor area.

Transfer building is currently 180' x 120' x 40' H for a total volume of 864,000 CF
Assume nominal two air changes per hour (864,000 CF x 2)/60 min/hr= 28,800 acfm
The transfer building has 6 roof vents and 4 side vents - conservatively assume fans are not operating (and four doors are open during use)

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors for Construction Operations, under Construction Phase - Demolition and Debris Removal, Loading of Debris On-site or Unloading of Debris Offsite, this Table recommends the use of emission factor from Section 13.2.4)

Section 13.2.4 is called Aggregate Handling and Storage Piles, which includes material unloading from trucks onto piles and loading of trucks for shipment or transfer to process

E = k (0.0032) (U/5)^1.3 / (M/2)^1.4 - Equation (1) 13.2.4

where:

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless); 0.35 for PM-10 (particles less than 10 microns in diameter), and 0.053 for PM-2.5
U = mean wind speed (mile/hr)
M = material moisture content (%)

E = 0.35 (0.0032) (U/5)^1.3 / (M/2)^1.4 (for PM10)

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 0.44-19%, and a moisture content range of 0.25 -4.8%.

This equation will produce higher emissions with lower moisture content. Use 2.2% consistent with pushing below.

While the unloading and loading occurs indoors, there is air movement caused by the ventilation system. This can be translated into a "wind speed" equivalent by dividing the volume of air flow, by the face area of the room normal to the exhaust pickups and door openings.

Assume all of this volume is drawn across 100' wide area at tipping floor where doors are, and over an avg height of 20'

(28,800 ft^3/min) x (1/(100x20)) SF = 14 ft/min
14 ft/min x 60 min/hr x 1 mile/5280 ft = 0.16 mph

The low end of the range of wind speed for emission factor equation above is 1.3 mph - use this as a default value to account for any stray currents caused by localized air movement

E = 0.35 x 0.0032 x (1.3/5)^1.3 / ((2.2/2)^1.4) = 0.00017 lb/ton

0.00017 lb/ton x 750 ton/day x 1/24 hr/day x 2 drops = 0.011 lb/hr (24 hr avg) uncontrolled PM-10
(add controls further below)

For PM-2.5, the k multiplier is 0.053 instead of 0.35, apply to emission rate: 0.053/0.35 x 0.011 = 0.0016 lb/hr uncontrolled

Next, consider pushing of material to piles or to hopper (double counts with a drop)- use bulldozing pushing

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors for Construction Operations, under Construction Phase - Site Preparation - Bulldozing
this Table recommends the use of emission factor from Section 11.9)

Section 11.9 is called Western Surface Coal Mining, and includes bulldozing overburden (dirt)

E = 1.0 x s^1.5/ M^1.4 - Table 11.9-1 PM-15

where:

E = emission factor (lb/hr)
s = material silt content (%)
M = material moisture content (%)

multiplier for PM-10 is 0.75 according to Table 11.9-1

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 3.8-15.1%, and a moisture content range of 2.2-16.8%.

This equation will produce higher emissions with lower moisture content and higher silt content
Use a conservative moisture content of 2.2% 2.2 % moisture
Use a conservative silt content of 3.8% (higher than the low end of 0.44% low for drop equation) 3.8 % silt

E = 1.0 x (3.8)^1.5 / ((2.2)^1.4) = 2.456 lb/hr PM-15
2.456 lb/hr x 0.75 = 1.842 lb/hr PM-10

Assume pushing occurs for total of 2 hours per shift.

1.842 lb/hr x 2 hr/day x 1/24 hr/day = 0.154 lb/hr 24-hr avg PM-10 uncontrolled

For PM-2.5, the multiplier is 0.105 instead of 0.75, apply to emission rate: 0.154/0.75 x 0.105 = 0.021 lb/hr uncontrolled

Total uncontrolled PM-10 emissions from dumping, loading, pushing (handling) of waste

	PM-10	PM-2.5	
2 dumping actions	0.011	0.0016	lb/hr
2 hours pushing	0.154	0.021	lb/hr
Total	0.164	0.023	lb/hr

Sanity Check, stack test at UMW Holyoke in 2014 handling 750 tpd C&D including processing found 0.17 lb/hr of PM-10 while operating

Apply 50% reduction from water sprays in ceiling. These are turned off for the cold weather months (Nov-Mar), 5 months out of 12, only apply to tons per year, not for short term air modeling
50% is an assumption based on published factors from EPA-AP-42 of 78% to 96% for close in water sprays on crushing, screening and transfer points for aggregate processing, less control at greater distance from spray
0.5 x 7/12 = 0.27 (27% control), mutiply uncontrolled emissions x 0.73

Calculate Controlled annual emissions
0.164 lb/hr x 0.73 x24 hr/day x 312 day/yr/2000 lb/ton = **0.45 ton/yr** PM-10
0.023 lb/hr x 0.73 x 24 hr/day x 312 day/yr/2000 lb/ton = **0.06 ton/yr** PM-2.5
Operations:6 days/week x 52 weeks/year = 312 days/yr

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2,
a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2 (X4 as for winter baseline with anti skid abrasives)

	No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 12.66 ton per Truck full	59	12.66	20	33	16.33
C&D 0 ton per Truck empty	59	0	20	20	10.00
Total Truck Trips	118	trips/day			26.33
Total Trucks	59	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (26.33) ^1.02 = 62.4 g/VMT
0.137 lb/VMT

Estimate each truck travels approximately 1100 ft from Route 9 to come in and back up and 900 ft to leave, avg 1000 ft 1000
Total daily PM-10 fugitive emissions: 59 x 1000/5280 x 0.137 lb/VMT 1.5 lb/day
1.5 lb/day x 312 day/yr x 1 ton/2000 lb = **0.24 tons/yr** **PM-10**

For PM-2.5, the value of k is reduced to 0.25 X g/VMT, 15.6 g/VMT
0.03 lb/VMT

Factor down to PM-2.5: 0.25/1.0 x 0.24 ton/yr = **0.06 tons/yr** **PM-2.5**

SUMMARY: Total of C&D Tipping, Handling (including Rail Car Loading) and Paved Roads

0.69 tons/yr **PM-10**
0.12 tons/yr **PM-2.5**

Doors are open so worst case is all PM emissions coming out doors, conduct air modeling of this condition

PM-10 emission rate total from all doors **0.0207 g/s from all doors**
PM-2.5 emission rate total from all doors **0.00291 g/s from all doors**

Attachment 3-1b

Stage 2 Air Source Parameters & Calculations

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
NAAQS Results - All Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
SO_2	1 HOUR (1)	1.59189	2016-2020	729416.26, 4683401.03, 147.88, 315.21, 0.00	11.4	13.0	196	7%
	3 HOUR (2)	1.53381	17121812	729136.26, 4682941.03, 155.61, 324.78, 0.00	13.1	14.6	1300	1%
PM_{10}	24 HOUR (3)	22.70495	18012224	729203.71, 4682993.45, 150.87, 324.78, 0.00	16.0	38.7	150	26%
$PM_{2.5}$	24 HOUR (4)	3.76235	2016-2020	729244.12, 4683004.13, 153.84, 317.32, 0.00	14.3	18.1	35	52%
	ANNUAL (5)	0.72886	2016-2020	729301.68, 4683056.35, 153.20, 317.66, 0.00	5.7	6.4	12	53%
NO_2	1 HOUR (6)	166.16539	2016-2020	729258.51, 4683017.18, 152.08, 317.66, 0.00	*Included*	166.2	188	88%
	ANNUAL (7)	29.02984	2016	729203.71, 4682993.45, 150.87, 324.78, 0.00	*Included*	29.0	100	29%
CO	1 HOUR (2)	176.28932	17111508	729272.90, 4683030.24, 151.46, 323.70, 0.00	2428.4	2604.7	40000	7%
	8 HOUR (2)	35.10864	17123016	729193.94, 4682991.85, 150.54, 324.78, 0.00	1375.2	1410.3	10000	14%

Notes:

(1) Maximum 4th-Highest Maximum Daily 1-Hr Concentration Averaged Over 5 Years
(2) Highest 2nd-High Concentration Over 5 Years
(3) Highest 6th-High Concentration Over 5 Years
(4) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(5) Maximum Annual Concentration Averaged Over 5 Years
(6) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years
(7) Highest Annual Concentration Over 5 Years

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Annual Allowable Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Allowable Ambient Limit (AAL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	ANNUAL	6.084E-04	2018	729213.5, 4682995, 151.42, 324.78, 0	0.003	20%
ACETALDEHYDE	ANNUAL	2.807E-02	2016	729203.688, 4682993.5, 150.87, 324.78, 0	0.4	7%
ACETONE	ANNUAL	2.738E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	160.54	0%
ACROLEIN	ANNUAL	5.309E-03	2018	729213.5, 4682995, 151.42, 324.78, 0	0.07	8%
AMMONIA (NH3)	ANNUAL	5.490E-03	2018	729213.5, 4682995, 151.42, 324.78, 0	100	0%
ARSENIC	ANNUAL	8.971E-06	2018	729213.5, 4682995, 151.42, 324.78, 0	0.0003	3%
BENZENE	ANNUAL	1.069E-02	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.1	11%
CHROMIUM	ANNUAL	4.414E-08	2018	729213.5, 4682995, 151.42, 324.78, 0	0.0001	0%
DIESEL PM	ANNUAL	2.419E-01	2016	729213.5, 4682995, 151.42, 324.78, 0	***5***	5%
ETHYL BENZENE	ANNUAL	1.804E-03	2016	729213.5, 4682995, 151.42, 324.78, 0	300	0%
FORMALDEHYDE	ANNUAL	7.924E-02	2016	729203.688, 4682993.5, 150.87, 324.78, 0	0.08	99%
FURANS	ANNUAL	4.687E-04	2018	729213.5, 4682995, 151.42, 324.78, 0	0.02	2%
MERCURY	ANNUAL	4.908E-08	2018	729213.5, 4682995, 151.42, 324.78, 0	0.0014	0%
METHYL ETHYL KETONE	ANNUAL	2.463E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	10	0%
NAPHTHALENE	ANNUAL	1.945E-03	2018	729213.5, 4682995, 151.42, 324.78, 0	14.25	0%
NICKEL	ANNUAL	2.141E-05	2018	729213.5, 4682995, 151.42, 324.78, 0	0.18	0%
STYRENE	ANNUAL	1.388E-04	2018	729380.812, 4683128, 159.84, 315.21, 0	2	0%
TOLUENE	ANNUAL	9.467E-03	2016	729203.688, 4682993.5, 150.87, 324.78, 0	20	0%
XYLENE	ANNUAL	4.656E-02	2018	729380.812, 4683128, 159.84, 315.21, 0	11.8	0%

Diesel PM threshold is EPA reference concentration (RfC) of 5 ug/m3 for annual averaging times.

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Threshold Exposure Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Threshold Exposure Limits (TEL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	24-Hr	7.786E-03	18111924	729258.5, 4683017, 152.08, 317.66, 0	1.2	1%
ACETALDEHYDE	24-Hr	3.585E-01	18111924	729258.5, 4683017, 152.08, 317.66, 0	30	1%
ACETONE	24-Hr	3.667E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	160.54	0%
ACROLEIN	24-Hr	6.786E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	0.07	97%
AMMONIA (NH3)	24-Hr	9.008E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	100	0%
ARSENIC	24-Hr	2.051E-04	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.003	7%
BENZENE	24-Hr	1.248E-01	17123024	729176.25, 4682961, 156.38, 324.78, 0	0.6	21%
CHROMIUM	24-Hr	9.176E-07	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.003	0%
ETHYL BENZENE	24-Hr	2.560E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	300	0%
FORMALDEHYDE	24-Hr	1.018E+00	18111924	729258.5, 4683017, 152.08, 317.66, 0	2	51%
FURANS	24-Hr	6.916E-03	18111924	729258.5, 4683017, 152.08, 317.66, 0	0.4	2%
MERCURY	24-Hr	1.021E-06	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.003	0%
METHYL ETHYL KETONE	24-Hr	3.067E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	200	0%
NAPHTHALENE	24-Hr	3.010E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	14.25	0%
NICKEL	24-Hr	5.126E-04	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.27	0%
STYRENE	24-Hr	1.842E-03	20121924	729272.875, 4683030, 151.46, 323.7, 0	200	0%
TOLUENE	24-Hr	1.181E-01	19121324	729203.688, 4682993.5, 150.87, 324.78, 0	80	0%
XYLENE	24-Hr	3.412E-01	20121924	729265.688, 4683023.5, 151.85, 317.66, 0	11.8	3%

ReSource - Ware, MA

Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD Input Emissions

Inside Building

	Source Type		AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
Fugitive Dust (LT)						6.56E-02	9.23E-03																				
Fugitive Dust (ST - 6hr)						1.65E-01	2.32E-02																				
Fugitive Dust (ST - 12hr)						8.24E-02	1.16E-02																				
CAT 236D SkidSteer				5.78E-03	6.11E-03	3.63E-05	3.63E-05	7.12E-06	8.61E-01	1.07E-05	1.75E-04	1.22E-06	2.16E-05	1.80E-09	3.80E-11	2.39E-11	7.67E-07	5.86E-05	8.76E-06	9.31E-06	5.49E-06	4.13E-06	1.14E-05	1.19E-03	7.55E-15	3.11E-06	1.32E-05	2.77E-06
Sullair 185 Compressor				8.21E-03	3.67E-03	5.35E-04	5.19E-04	9.68E-06	1.50E+00	2.78E-05	1.93E-04	4.82E-06	2.33E-05	2.59E-09	4.54E-11	3.45E-11	1.24E-06	6.74E-05	1.30E-05	1.34E-05	3.76E-06	1.35E-06	1.39E-05	5.19E-04	7.79E-15	1.24E-06	0.00E+00	0.00E+00
CAT 966M Loader				1.84E-03	2.21E-02	9.20E-05	9.20E-05	2.48E-05	3.20E+00	2.90E-05	4.77E-04	3.33E-06	5.89E-05	6.40E-09	1.15E-10	8.51E-11	2.08E-06	1.59E-04	2.38E-05	3.31E-05	1.49E-05	1.12E-05	3.10E-05	3.38E-03	1.95E-14	8.13E-06	3.59E-05	7.54E-06
Deere 944JX Loader				2.29E-02	2.13E-02	3.35E-03	3.25E-03	2.39E-05	3.08E+00	1.36E-04	1.05E-03	1.89E-05	1.08E-04	6.17E-09	1.11E-10	8.20E-11	7.83E-06	3.71E-04	7.76E-05	3.19E-05	2.46E-05	8.46E-06	7.80E-05	3.25E-03	1.88E-14	7.83E-06	3.46E-05	3.86E-05
CAT 345DL Excavator				3.31E-02	1.32E-03	3.35E-04	3.25E-04	6.99E-05	1.27E+01	5.76E-05	5.21E-04	2.59E-05	6.95E-05	1.03E-08	1.13E-10	2.54E-10	2.54E-06	1.74E-04	2.81E-05	5.33E-05	1.20E-05	7.61E-06	6.16E-05	3.25E-04	3.03E-14	4.55E-14	1.79E-05	2.00E-05
CAT 330C Excavator				2.15E-02	8.57E-03	1.45E-03	1.41E-03	4.54E-05	8.23E+00	7.49E-05	6.77E-04	3.37E-05	9.03E-05	1.34E-08	1.46E-10	1.78E-10	3.30E-06	2.26E-04	3.65E-05	6.93E-05	1.56E-05	9.90E-06	8.01E-05	1.41E-03	1.97E-14	3.30E-06	2.33E-05	2.59E-05
TOTAL				9.34E-02	6.32E-02	8.82E-02	1.72E-02	1.81E-04	2.95E+01	3.36E-04	3.09E-03	8.78E-05	3.72E-04	4.07E-08	5.68E-10	6.57E-10	1.78E-05	1.06E-03	1.88E-04	2.10E-04	7.64E-05	4.27E-05	2.76E-04	1.01E-02	1.04E-13	2.36E-05	1.25E-04	9.48E-05
Div/6 Doors	**Volume**	**12hr**	**RDOOR1**	**1.56E-02**	**1.05E-02**	**1.47E-02**	**2.87E-03**	**3.01E-05**	**4.92E+00**	**5.61E-05**	**5.16E-04**	**1.46E-05**	**6.20E-05**	**6.78E-09**	**9.46E-11**	**1.10E-10**	**2.96E-06**	**1.76E-04**	**3.13E-05**	**3.51E-05**	**1.27E-05**	**7.12E-06**	**4.60E-05**	**1.68E-03**	**1.73E-14**	**3.94E-06**	**2.08E-05**	**1.58E-05**
		6hr				**2.84E-02**	**4.80E-03**																					
		Saturday/Weekday Ratio for EMISFACT				**1.93**	**1.67**																					
		Ann					**2.48E-03**																					

Railcar Moving

		area	AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
6600 m2 area source		(m2)																									
L120C Loader	**Area**	**6600**	**RAILCAR**	**2.72E-06**	**2.53E-06**	**3.97E-07**	**3.85E-07**	**2.84E-09**	**3.65E-04**	**1.62E-08**	**1.24E-07**	**2.23E-09**	**1.28E-08**	**7.31E-13**	**1.31E-14**	**9.72E-15**	**9.28E-10**	**4.40E-08**	**1.05E-08**	**3.78E-09**	**2.91E-09**	**1.00E-09**	**9.24E-09**	**3.85E-07**	**2.23E-18**	**9.28E-10**	**4.10E-09**	**4.57E-09**

Locomotive Idling

		AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	**Line Volume**	**LOCOMOTIVE**	**7.11E-01**	**1.22E-01**	**2.11E-02**	**2.05E-02**	**6.87E-03**	**3.73E+01**	**2.31E-03**	**1.21E-02**	**3.20E-05**	**1.56E-03**	**8.48E-05**	**4.33E-03**	**7.73E-04**	**1.76E-04**	**1.08E-04**	**4.86E-04**	**2.05E-02**	**3.45E-04**	**3.84E-04**

Roadway

		AERMOD Source Name	CO2e	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	VOC	Benzene	Ethanol	Naphthalene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury	Arsenic	Chromium	Nickel	Diesel PM	Dioxins	Furans
Onsite Roadway	**Line Volume**	**ONSITERD**	**6.00E+00**	**4.30E-02**	**1.52E-02**	**1.60E-01**	**4.14E-02**	**2.33E-06**	**2.09E-03**	**1.52E-05**	**0.00E+00**	**1.79E-05**	**5.27E-06**	**1.67E-04**	**8.01E-05**	**1.36E-05**	**7.78E-05**	**8.10E-06**	**4.26E-06**	**6.42E-06**	**2.06E-05**	**2.37E-03**	**3.75E-06**	**1.06E-09**	**2.22E-07**	**9.51E-10**	**5.66E-07**	**1.79E-03**	**2.44E-13**	**2.70E-13**
Gilbertville Rd/Rte 32	**Line Volume**	**SLINE1**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9 East of Gilbertville	**Line Volume**	**SLINE2**	**3.60E+00**	**2.37E-02**	**7.19E-03**	**1.21E-03**	**1.11E-03**	**9.83E-07**	**9.12E-04**	**6.38E-06**	**0.00E+00**	**7.52E-06**	**2.22E-06**	**7.02E-05**	**3.41E-05**	**5.76E-06**	**4.17E-05**	**3.55E-06**	**1.79E-06**	**3.84E-06**	**1.24E-05**	**1.03E-03**	**2.24E-06**	**3.90E-10**	**8.15E-08**	**3.50E-10**	**2.08E-07**	**1.11E-03**	**8.99E-14**	**9.93E-14**
Rte 9/32 Site Drive to Gilbertville	**Line Volume**	**SLINE3**	**1.29E+00**	**8.53E-03**	**2.58E-03**	**4.33E-04**	**3.99E-04**	**3.53E-07**	**3.28E-04**	**2.29E-06**	**0.00E+00**	**2.70E-06**	**7.97E-07**	**2.52E-05**	**1.22E-05**	**2.07E-06**	**1.50E-05**	**1.28E-06**	**6.44E-07**	**1.38E-06**	**4.45E-06**	**3.69E-04**	**8.07E-07**	**1.40E-10**	**2.93E-08**	**1.26E-10**	**7.48E-08**	**3.99E-04**	**3.23E-14**	**3.57E-14**
Rte 9/32, Site Drive to Knox	**Line Volume**	**SLINE4**	**6.11E+00**	**4.02E-02**	**1.22E-02**	**2.04E-03**	**1.88E-03**	**1.67E-06**	**1.55E-03**	**1.08E-05**	**0.00E+00**	**1.27E-05**	**3.76E-06**	**1.19E-04**	**5.78E-05**	**9.77E-06**	**7.06E-05**	**6.02E-06**	**3.04E-06**	**6.52E-06**	**2.10E-05**	**1.74E-03**	**3.81E-06**	**6.61E-10**	**1.38E-07**	**5.93E-10**	**3.53E-07**	**1.88E-03**	**1.52E-13**	**1.68E-13**
Knox Ave, S of Rte 9/32	**Line Volume**	**SLINE5**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9/32, Knox to South/Church	**Line Volume**	**SLINE6**	**2.81E+00**	**1.85E-02**	**5.61E-03**	**9.41E-04**	**8.66E-04**	**7.67E-07**	**7.12E-04**	**4.98E-06**	**0.00E+00**	**5.87E-06**	**1.73E-06**	**5.48E-05**	**2.66E-05**	**4.50E-06**	**3.25E-05**	**2.77E-06**	**1.40E-06**	**3.00E-06**	**9.68E-06**	**8.02E-04**	**1.75E-06**	**3.04E-10**	**6.36E-08**	**2.73E-10**	**1.62E-07**	**8.66E-04**	**7.02E-14**	**7.76E-14**
Rte 9/32, South/Church to North	**Line Volume**	**SLINE7**	**6.48E-01**	**4.27E-03**	**1.29E-03**	**2.17E-04**	**1.99E-04**	**1.77E-07**	**1.64E-04**	**1.15E-06**	**0.00E+00**	**1.35E-06**	**3.99E-07**	**1.26E-05**	**6.13E-06**	**1.04E-06**	**7.49E-06**	**6.39E-07**	**3.22E-07**	**6.91E-07**	**2.23E-06**	**1.85E-04**	**4.04E-07**	**7.01E-11**	**1.47E-08**	**6.29E-11**	**3.74E-08**	**1.99E-04**	**1.62E-14**	**1.79E-14**
North St	**Line Volume**	**SLINE8**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9/32, North to West	**Line Volume**	**SLINE9**	**3.13E-01**	**2.06E-03**	**6.25E-04**	**1.05E-04**	**9.65E-05**	**8.55E-08**	**7.93E-05**	**5.55E-07**	**0.00E+00**	**6.54E-07**	**1.93E-07**	**6.10E-06**	**2.96E-06**	**5.01E-07**	**3.62E-06**	**3.09E-07**	**1.56E-07**	**3.34E-07**	**1.08E-06**	**8.94E-05**	**1.95E-07**	**3.39E-11**	**7.09E-09**	**3.04E-11**	**1.81E-08**	**9.65E-05**	**7.81E-15**	**8.64E-15**
West St/Rte 32	**Line Volume**	**SLINE10**	**3.26E-01**	**2.15E-03**	**6.51E-04**	**1.09E-04**	**1.00E-04**	**8.90E-08**	**8.26E-05**	**5.78E-07**	**0.00E+00**	**6.81E-07**	**2.01E-07**	**6.36E-06**	**3.09E-06**	**5.22E-07**	**3.77E-06**	**3.22E-07**	**1.62E-07**	**3.48E-07**	**1.12E-06**	**9.31E-05**	**2.03E-07**	**3.53E-11**	**7.38E-09**	**3.17E-11**	**1.89E-08**	**1.00E-04**	**8.14E-15**	**9.00E-15**
Rte 9, West of West	**Line Volume**	**SLINE11**	**8.95E-01**	**5.89E-03**	**1.78E-03**	**2.99E-04**	**2.75E-04**	**2.44E-07**	**2.26E-04**	**1.58E-06**	**0.00E+00**	**1.87E-06**	**5.51E-07**	**1.74E-05**	**8.46E-06**	**1.43E-06**	**1.03E-05**	**8.82E-07**	**4.45E-07**	**9.54E-07**	**3.08E-06**	**2.55E-04**	**5.57E-07**	**9.68E-11**	**2.02E-08**	**8.69E-11**	**5.17E-08**	**2.75E-04**	**2.23E-14**	**2.47E-14**

Truck Idling

		area	AERMOD Source Name	CO2e	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	VOC	Benzene	Ethanol	Naphthalene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury	Arsenic	Chromium	Nickel	Diesel PM	Dioxins	Furans
		(m2)																												
Truck Exhaust Tipping Area	**Area**	**357.3**	**TRUCKIDLE1**	**1.12E-02**	**1.14E-04**	**3.45E-05**	**5.64E-06**	**5.19E-06**	**3.82E-08**	**1.06E-05**	**7.59E-08**	**0.00E+00**	**8.89E-08**	**2.67E-08**	**8.19E-07**	**3.91E-07**	**6.74E-08**	**5.37E-07**	**3.80E-08**	**2.08E-08**	**1.19E-08**	**6.99E-08**	**1.37E-07**	**2.15E-08**	**9.45E-12**	**1.98E-09**	**8.48E-12**	**5.04E-09**	**5.19E-06**	**2.18E-15**	**2.41E-15**
Site Drive @Rte 9	**Volume**		**TRUCKIDLE2**	**3.33E-02**	**3.41E-04**	**1.03E-04**	**1.68E-05**	**1.55E-05**	**1.14E-07**	**3.16E-05**	**2.26E-07**	**0.00E+00**	**2.65E-07**	**7.95E-08**	**2.44E-06**	**1.16E-06**	**2.01E-07**	**1.60E-06**	**1.13E-07**	**6.20E-08**	**3.53E-08**	**2.08E-07**	**4.06E-07**	**6.39E-08**	**2.81E-11**	**5.88E-09**	**2.52E-11**	**1.50E-08**	**1.55E-05**	**6.49E-15**	**7.17E-15**
Gilbertville Rd & Rte 9	**Volume**		**TRUCKIDLE3**	**6.68E-02**	**6.85E-04**	**2.06E-04**	**3.38E-05**	**3.11E-05**	**2.29E-07**	**6.36E-05**	**4.54E-07**	**0.00E+00**	**5.32E-07**	**1.60E-07**	**4.90E-06**	**2.34E-06**	**4.04E-07**	**3.21E-06**	**2.28E-07**	**1.25E-07**	**7.10E-08**	**4.18E-07**	**8.17E-07**	**1.29E-07**	**5.65E-11**	**1.18E-08**	**5.08E-11**	**3.02E-08**	**3.11E-05**	**1.30E-14**	**1.44E-14**
Knox Ave @ Rte 9	**Volume**		**TRUCKIDLE4**	**2.39E-02**	**2.45E-04**	**7.39E-05**	**1.21E-05**	**1.11E-05**	**8.20E-08**	**2.28E-05**	**1.63E-07**	**0.00E+00**	**1.90E-07**	**5.72E-08**	**1.76E-06**	**8.38E-07**	**1.45E-07**	**1.15E-06**	**8.15E-08**	**4.47E-08**	**2.54E-08**	**1.50E-07**	**2.93E-07**	**4.60E-08**	**2.03E-11**	**4.23E-09**	**1.82E-11**	**1.08E-08**	**1.11E-05**	**4.67E-15**	**5.16E-15**
South/Church @Rte 9	**Volume**		**TRUCKIDLE5**	**2.92E-01**	**2.99E-03**	**9.00E-04**	**1.47E-04**	**1.36E-04**	**9.98E-07**	**2.77E-04**	**1.98E-06**	**0.00E+00**	**2.32E-06**	**6.97E-07**	**2.14E-05**	**1.02E-05**	**1.76E-06**	**1.40E-05**	**9.93E-07**	**5.44E-07**	**3.10E-07**	**1.82E-06**	**3.56E-06**	**5.61E-07**	**2.47E-10**	**5.16E-08**	**2.21E-10**	**1.32E-07**	**1.36E-04**	**5.69E-14**	**6.29E-14**
North St @ Rte 9	**Volume**		**TRUCKIDLE6**	**1.02E-01**	**1.05E-03**	**3.16E-04**	**5.17E-05**	**4.76E-05**	**3.51E-07**	**9.74E-05**	**6.96E-07**	**0.00E+00**	**8.15E-07**	**2.45E-07**	**7.51E-06**	**3.59E-06**	**6.19E-07**	**4.92E-06**	**3.49E-07**	**1.91E-07**	**1.09E-07**	**6.41E-07**	**1.25E-06**	**1.97E-07**	**8.66E-11**	**1.81E-08**	**7.78E-11**	**4.62E-08**	**4.76E-05**	**2.00E-14**	**2.21E-14**
West St @ Rte 9	**Volume**		**TRUCKIDLE7**	**3.60E-01**	**3.69E-03**	**1.11E-03**	**1.82E-04**	**1.67E-04**	**1.23E-06**	**3.42E-04**	**2.45E-06**	**0.00E+00**	**2.86E-06**	**8.60E-07**	**2.64E-05**	**1.26E-05**	**2.17E-06**	**1.73E-05**	**1.23E-06**	**6.71E-07**	**3.82E-07**	**2.25E-06**	**4.40E-06**	**6.92E-07**	**3.04E-10**	**6.36E-08**	**2.73E-10**	**1.62E-07**	**1.67E-04**	**7.02E-14**	**7.76E-14**

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Idling

Temporal Data

312.0 days/yr

GE EMD-38-2 Locomotive provided by client

2000 Max hp 10% switch load factor

Operating Schedule

1 number of equipment
2 hours each per day
2 hr/day 10am & 1pm per email 12/11/21

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Acetone	Methyl Ethyl Ketone
Emission Factor (g/gal)																			
Line Haul Duty Cycle	225.68	98.28	8.37	8.12	1.88	10217													
Switch Duty Cycle	194.56	33.44	5.78	5.60	1.88	10217													
Emission Factor (g/bhp-hr)																			
Line Haul Duty Cycle (SPECIATE 2)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4)							3.91E-03	6.43E-02	4.49E-04	7.94E-03	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2)	12.80	2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4)							5.01E-03	8.24E-02	5.75E-04	1.02E-02	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03

Emissions		Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Acetone	Methyl Ethyl Ketone
	g/day	5120.00	880.00	152.00	147.44	49.47	268868.42	1.66E+01	8.73E+01	2.30E-01	1.12E+01	6.11E-01	3.12E+01	5.56E+00	1.27E+00	7.77E-01	3.50E+00	1.47E+02	2.48E+00	2.77E+00
	lb/day	11.29	1.94	0.34	0.33	0.11	592.76	3.67E-02	1.92E-01	5.07E-04	2.48E-02	1.35E-03	6.88E-02	1.23E-02	2.80E-03	1.71E-03	7.72E-03	3.25E-01	5.47E-03	6.10E-03
	TPY	1.76	0.30	0.05	0.05	0.02	92.47	5.72E-03	3.00E-02	7.92E-05	3.86E-03	2.10E-04	1.07E-02	1.91E-03	4.37E-04	2.67E-04	1.20E-03	5.07E-02	8.54E-04	9.51E-04
Peak hour (g/s)		7.11E-01	0.1222	0.0211	0.0205	0.0069	37.3428	2.31E-03	1.21E-02	3.20E-05	1.56E-03	8.48E-05	4.33E-03	7.73E-04	1.76E-04	1.08E-04	4.86E-04	2.05E-02	3.45E-04	3.84E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

236D Skidsteer Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 236D Skidsteer Tier 4F from MiltonCat

74.3 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Skid Steers	4.80716	4.94339	0.74313	0.72084	0.00431		2.85E-02	2.35E-01	3.70E-03	2.09E-02	1.09E-06	2.30E-08	1.45E-08	1.89E-03	8.39E-02	2.44E-02	5.64E-03	7.05E-03	2.01E-03	1.93E-02	7.21E-01	4.57E-12	1.89E-03		
Skid Steers TOG X SPECIATE Tier 2							5.36E-02	2.81E-01		3.62E-02				1.97E-03	1.01E-01	1.79E-02		4.09E-03		1.13E-02					8.91E-03
Skid Steers TOG X SPECIATE Tier 4							6.46E-03	1.06E-01	7.42E-04	1.31E-02				4.64E-04	3.55E-02	5.30E-03		3.33E-03	2.50E-03	6.90E-03				8.00E-03	1.68E-03
Tier Standards																									
Tier 3 Standards (50-100 hp	3.5	3.7	0.3	0.3																	0.3				
Tier 4 Standards (50-75 hp)	3.5	3.7	0.022	0.022				2.48E-03													0.022				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	249.65	263.91	1.57	1.57	0.31	37206.7	4.61E-01	7.58E+00	5.29E-02	9.35E-01	7.77E-05	1.64E-06	1.03E-06	3.31E-02	2.53E+00	3.78E-01	4.02E-01	2.37E-01	1.79E-01	4.93E-01	5.14E+01	3.26E-10	1.35E-01	5.70E-01	1.20E-01
lb/day	0.55	0.58	0.00	0.00	0.00	82.03	1.02E-03	1.67E-02	1.17E-04	2.06E-03	1.71E-07	3.62E-09	2.28E-09	7.30E-05	5.58E-03	8.34E-04	8.86E-04	5.23E-04	3.94E-04	1.09E-03	1.13E-01	7.19E-13	2.97E-04	1.26E-03	2.64E-04
TPY	0.09	0.09	0.00	0.00	0.00	12.80	1.58E-04	2.61E-03	1.82E-05	3.22E-04	2.67E-08	5.65E-10	3.55E-10	1.14E-05	8.71E-04	1.30E-04	1.38E-04	8.16E-05	6.14E-05	1.69E-04	1.77E-02	1.12E-13	4.63E-05	1.96E-04	4.12E-05
Annual	2.47E-03	2.61E-03	1.55E-05	1.55E-05	3.04E-06	0.3681	4.56E-06	7.50E-05	5.23E-07	9.25E-06	7.69E-10	1.62E-11	1.02E-11	3.28E-07	2.50E-05	3.74E-06	3.98E-06	2.35E-06	1.77E-06	4.87E-06	5.09E-04	3.23E-15	1.33E-06	5.64E-06	1.19E-06
100% to open doors	2.47E-03	2.61E-03	1.55E-05	1.55E-05	3.04E-06	0.3681	4.56E-06	7.50E-05	5.23E-07	9.25E-06	7.69E-10	1.62E-11	1.02E-11	3.28E-07	2.50E-05	3.74E-06	3.98E-06	2.35E-06	1.77E-06	4.87E-06	5.09E-04	3.23E-15	1.33E-06	5.64E-06	1.19E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	2.89E-03	3.05E-03	1.82E-05	1.82E-05	3.56E-06	0.4306	5.33E-06	8.77E-05	6.12E-07	1.08E-05	8.99E-10	1.90E-11	1.20E-11	3.83E-07	2.93E-05	4.38E-06	4.65E-06	2.75E-06	2.07E-06	5.70E-06	5.95E-04	3.77E-15	1.56E-06	6.60E-06	1.39E-06
100% to open doors	2.89E-03	3.05E-03	1.82E-05	1.82E-05	3.56E-06	0.4306	5.33E-06	8.77E-05	6.12E-07	1.08E-05	8.99E-10	1.90E-11	1.20E-11	3.83E-07	2.93E-05	4.38E-06	4.65E-06	2.75E-06	2.07E-06	5.70E-06	5.95E-04	3.77E-15	1.56E-06	6.60E-06	1.39E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	5.78E-03	6.11E-03	3.63E-05	3.63E-05	7.12E-06	0.8613	1.07E-05	1.75E-04	1.22E-06	2.16E-05	1.80E-09	3.80E-11	2.39E-11	7.67E-07	5.86E-05	8.76E-06	9.31E-06	5.49E-06	4.13E-06	1.14E-05	1.19E-03	7.55E-15	3.11E-06	1.32E-05	2.77E-06
100% to open doors	5.78E-03	6.11E-03	3.63E-05	3.63E-05	7.12E-06	0.8613	1.07E-05	1.75E-04	1.22E-06	2.16E-05	1.80E-09	3.80E-11	2.39E-11	7.67E-07	5.86E-05	8.76E-06	9.31E-06	5.49E-06	4.13E-06	1.14E-05	1.19E-03	7.55E-15	3.11E-06	1.32E-05	2.77E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Sullair 185 Compressor Exhaust

Temporal Data

312.0 days/yr

Assumed Sullair 185 Compressor

61 hp 17% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Air Compressors	2.84920	1.27262	0.18573	0.18016	0.00336		9.65E-03	6.70E-02	1.67E-03	8.09E-03	9.00E-07	1.58E-08	1.20E-08	4.31E-04	2.34E-02	4.51E-03	4.66E-03	1.31E-03	4.69E-04	4.84E-03	1.80E-01	2.71E-12	4.31E-04		
Air Compressors TOG X SPECIATE Tier 2							0.00E+00	0.00E+00		0.00E+00				0.00E+00	0.00E+00	0.00E+00		0.00E+00		0.00E+00					0.00E+00
Air Compressors TOG X SPECIATE Tier 4							0.00E+00	0.00E+00	0.00E+00	0.00E+00				0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00				0.00E+00	0.00E+00
Tier Standards																									
Tier 3 Standards (50-100 hp	3.5	3.7	0.3	0.3																	0.3				
Tier 4 Standards (50-75 hp)	3.5	3.7	0.022	0.022																	0.022				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	354.55	158.37	23.11	22.42	0.42	64911.5	1.20E+00	8.33E+00	2.08E-01	1.01E+00	1.12E-04	1.96E-06	1.49E-06	5.36E-02	2.91E+00	5.61E-01	5.80E-01	1.62E-01	5.83E-02	6.02E-01	2.24E+01	3.37E-10	5.36E-02	0.00E+00	0.00E+00
lb/day	0.78	0.35	0.05	0.05	0.00	143.11	2.65E-03	1.84E-02	4.59E-04	2.22E-03	2.47E-07	4.32E-09	3.28E-09	1.18E-04	6.42E-03	1.24E-03	1.28E-03	3.58E-04	1.29E-04	1.33E-03	4.94E-02	7.42E-13	1.18E-04	0.00E+00	0.00E+00
TPY	0.12	0.05	0.01	0.01	0.00	22.32	4.13E-04	2.87E-03	7.16E-05	3.46E-04	3.85E-08	6.75E-10	5.12E-10	1.84E-05	1.00E-03	1.93E-04	1.99E-04	5.59E-05	2.01E-05	2.07E-04	7.71E-03	1.16E-13	1.84E-05	0.00E+00	0.00E+00
Annual	3.51E-03	1.57E-03	2.29E-04	2.22E-04	4.14E-06	0.6422	1.19E-05	8.25E-05	2.06E-06	9.96E-06	1.11E-09	1.94E-11	1.47E-11	5.30E-07	2.88E-05	5.55E-06	5.73E-06	1.61E-06	5.77E-07	5.95E-06	2.22E-04	3.33E-15	5.30E-07	0.00E+00	0.00E+00
100% to open doors	3.51E-03	1.57E-03	2.29E-04	2.22E-04	4.14E-06	0.6422	1.19E-05	8.25E-05	2.06E-06	9.96E-06	1.11E-09	1.94E-11	1.47E-11	5.30E-07	2.88E-05	5.55E-06	5.73E-06	1.61E-06	5.77E-07	5.95E-06	2.22E-04	3.33E-15	5.30E-07	0.00E+00	0.00E+00
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	4.10E-03	1.83E-03	2.67E-04	2.59E-04	4.84E-06	0.7513	1.39E-05	9.65E-05	2.41E-06	1.17E-05	1.30E-09	2.27E-11	1.72E-11	6.20E-07	3.37E-05	6.49E-06	6.71E-06	1.88E-06	6.75E-07	6.96E-06	2.59E-04	3.90E-15	6.20E-07	0.00E+00	0.00E+00
100% to open doors	4.10E-03	1.83E-03	2.67E-04	2.59E-04	4.84E-06	0.7513	1.39E-05	9.65E-05	2.41E-06	1.17E-05	1.30E-09	2.27E-11	1.72E-11	6.20E-07	3.37E-05	6.49E-06	6.71E-06	1.88E-06	6.75E-07	6.96E-06	2.59E-04	3.90E-15	6.20E-07	0.00E+00	0.00E+00
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	8.21E-03	3.67E-03	5.35E-04	5.19E-04	9.68E-06	1.5026	2.78E-05	1.93E-04	4.82E-06	2.33E-05	2.59E-09	4.54E-11	3.45E-11	1.24E-06	6.74E-05	1.30E-05	1.34E-05	3.76E-06	1.35E-06	1.39E-05	5.19E-04	7.79E-15	1.24E-06	0.00E+00	0.00E+00
100% to open doors	8.21E-03	3.67E-03	5.35E-04	5.19E-04	9.68E-06	1.5026	2.78E-05	1.93E-04	4.82E-06	2.33E-05	2.59E-09	4.54E-11	3.45E-11	1.24E-06	6.74E-05	1.30E-05	1.34E-05	3.76E-06	1.35E-06	1.39E-05	5.19E-04	7.79E-15	1.24E-06	0.00E+00	0.00E+00
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Railcar Mover Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Volvo L120C Loader

208 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3	2.6	0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	775.12	720.96	113.31	109.91	0.81	104158.8	4.61E+00	3.55E+01	6.37E-01	3.66E+00	2.08E-04	3.73E-06	2.77E-06	2.65E-01	1.25E+01	2.98E+00	1.08E+00	8.31E-01	2.86E-01	2.63E+00	1.10E+02	6.36E-10	2.65E-01	1.17E+00	1.30E+00
lb/day	1.71	1.59	0.25	0.24	0.00	229.63	1.02E-02	7.83E-02	1.40E-03	8.07E-03	4.59E-07	8.23E-09	6.11E-09	5.83E-04	2.76E-02	6.57E-03	2.38E-03	1.83E-03	6.30E-04	5.81E-03	2.42E-01	1.40E-12	5.83E-04	2.58E-03	2.87E-03
TPY	0.27	0.25	0.04	0.04	0.00	35.82	1.59E-03	1.22E-02	2.19E-04	1.26E-03	7.17E-08	1.28E-09	9.53E-10	9.10E-05	4.31E-03	1.02E-03	3.71E-04	2.86E-04	9.83E-05	9.06E-04	3.78E-02	2.19E-13	9.10E-05	4.02E-04	4.48E-04
Annual	7.67E-03	7.13E-03	1.12E-03	1.09E-03	8.00E-06	1.0305	4.56E-05	3.51E-04	6.30E-06	3.62E-05	2.06E-09	3.69E-11	2.74E-11	2.62E-06	1.24E-04	2.95E-05	1.07E-05	8.22E-06	2.83E-06	2.61E-05	1.09E-03	6.29E-15	2.62E-06	1.16E-05	1.29E-05
100% to open doors	7.67E-03	7.13E-03	1.12E-03	1.09E-03	8.00E-06	1.0305	4.56E-05	3.51E-04	6.30E-06	3.62E-05	2.06E-09	3.69E-11	2.74E-11	2.62E-06	1.24E-04	2.95E-05	1.07E-05	8.22E-06	2.83E-06	2.61E-05	1.09E-03	6.29E-15	2.62E-06	1.16E-05	1.29E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	8.97E-03	8.34E-03	1.31E-03	1.27E-03	9.36E-06	1.2055	5.33E-05	4.11E-04	7.37E-06	4.24E-05	2.41E-09	4.32E-11	3.21E-11	3.06E-06	1.45E-04	3.45E-05	1.25E-05	9.61E-06	3.31E-06	3.05E-05	1.27E-03	7.36E-15	3.06E-06	1.35E-05	1.51E-05
100% to open doors	8.97E-03	8.34E-03	1.31E-03	1.27E-03	9.36E-06	1.2055	5.33E-05	4.11E-04	7.37E-06	4.24E-05	2.41E-09	4.32E-11	3.21E-11	3.06E-06	1.45E-04	3.45E-05	1.25E-05	9.61E-06	3.31E-06	3.05E-05	1.27E-03	7.36E-15	3.06E-06	1.35E-05	1.51E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.79E-02	1.67E-02	2.62E-03	2.54E-03	1.87E-05	2.4111	1.07E-04	8.22E-04	1.47E-05	8.48E-05	4.82E-09	8.64E-11	6.41E-11	6.13E-06	2.90E-04	6.90E-05	2.50E-05	1.92E-05	6.61E-06	6.10E-05	2.54E-03	1.47E-14	6.13E-06	2.71E-05	3.02E-05
100% to open doors	1.79E-02	1.67E-02	2.62E-03	2.54E-03	1.87E-05	2.4111	1.07E-04	8.22E-04	1.47E-05	8.48E-05	4.82E-09	8.64E-11	6.41E-11	6.13E-06	2.90E-04	6.90E-05	2.50E-05	1.92E-05	6.61E-06	6.10E-05	2.54E-03	1.47E-14	6.13E-06	2.71E-05	3.02E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

966M Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 966M Loader Tier 4F from MiltonCat

276 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0		0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	79.49	956.65	3.97	3.97	1.07	138210.7	1.25E+00	2.06E+01	1.44E-01	2.54E+00	2.77E-04	4.95E-06	3.68E-06	9.00E-02	6.88E+00	1.03E+00	1.43E+00	6.45E-01	4.85E-01	1.34E+00	1.46E+02	8.44E-10	3.51E-01	1.55E+00	3.26E-01
lb/day	0.18	2.11	0.01	0.01	0.00	304.70	2.76E-03	4.54E-02	3.17E-04	5.61E-03	6.10E-07	1.09E-08	8.10E-09	1.99E-04	1.52E-02	2.27E-03	3.15E-03	1.42E-03	1.07E-03	2.95E-03	3.22E-01	1.86E-12	7.74E-04	3.42E-03	7.18E-04
TPY	0.03	0.33	0.00	0.00	0.00	47.53	4.31E-04	7.09E-03	4.95E-05	8.74E-04	9.51E-08	1.70E-09	1.26E-09	3.10E-05	2.37E-03	3.54E-04	4.92E-04	2.22E-04	1.67E-04	4.61E-04	5.02E-02	2.90E-13	1.21E-04	5.33E-04	1.12E-04
Annual	7.86E-04	9.46E-03	3.93E-05	3.93E-05	1.06E-05	1.3674	1.24E-05	2.04E-04	1.42E-06	2.52E-05	2.74E-09	4.90E-11	3.64E-11	8.91E-07	6.81E-05	1.02E-05	1.42E-05	6.38E-06	4.80E-06	1.32E-05	1.44E-03	8.35E-15	3.47E-06	1.53E-05	3.22E-06
100% to open doors	7.86E-04	9.46E-03	3.93E-05	3.93E-05	1.06E-05	1.3674	1.24E-05	2.04E-04	1.42E-06	2.52E-05	2.74E-09	4.90E-11	3.64E-11	8.91E-07	6.81E-05	1.02E-05	1.42E-05	6.38E-06	4.80E-06	1.32E-05	1.44E-03	8.35E-15	3.47E-06	1.53E-05	3.22E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	9.20E-04	1.11E-02	4.60E-05	4.60E-05	1.24E-05	1.5997	1.45E-05	2.39E-04	1.66E-06	2.94E-05	3.20E-09	5.73E-11	4.25E-11	1.04E-06	7.97E-05	1.19E-05	1.66E-05	7.47E-06	5.62E-06	1.55E-05	1.69E-03	9.77E-15	4.06E-06	1.80E-05	3.77E-06
100% to open doors	9.20E-04	1.11E-02	4.60E-05	4.60E-05	1.24E-05	1.5997	1.45E-05	2.39E-04	1.66E-06	2.94E-05	3.20E-09	5.73E-11	4.25E-11	1.04E-06	7.97E-05	1.19E-05	1.66E-05	7.47E-06	5.62E-06	1.55E-05	1.69E-03	9.77E-15	4.06E-06	1.80E-05	3.77E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.84E-03	2.21E-02	9.20E-05	9.20E-05	2.48E-05	3.1993	2.90E-05	4.77E-04	3.33E-06	5.89E-05	6.40E-09	1.15E-10	8.51E-11	2.08E-06	1.59E-04	2.38E-05	3.31E-05	1.49E-05	1.12E-05	3.10E-05	3.38E-03	1.95E-14	8.13E-06	3.59E-05	7.54E-06
100% to open doors	1.84E-03	2.21E-02	9.20E-05	9.20E-05	2.48E-05	3.1993	2.90E-05	4.77E-04	3.33E-06	5.89E-05	6.40E-09	1.15E-10	8.51E-11	2.08E-06	1.59E-04	2.38E-05	3.31E-05	1.49E-05	1.12E-05	3.10E-05	3.38E-03	1.95E-14	8.13E-06	3.59E-05	7.54E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

John Deere Loader

Temporal Data

312.0 days/yr

Assumed John Deere 944JX Loader

266 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0		0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	991.26	921.99	144.90	140.55	1.03	133203.1	5.89E+00	4.54E+01	8.14E-01	4.68E+00	2.67E-04	4.78E-06	3.54E-06	3.38E-01	1.60E+01	3.35E+00	1.38E+00	1.06E+00	3.65E-01	3.37E+00	1.41E+02	8.14E-10	3.38E-01	1.49E+00	1.67E+00
lb/day	2.19	2.03	0.32	0.31	0.00	293.66	1.30E-02	1.00E-01	1.80E-03	1.03E-02	5.88E-07	1.05E-08	7.81E-09	7.46E-04	3.54E-02	7.39E-03	3.04E-03	2.34E-03	8.06E-04	7.43E-03	3.10E-01	1.79E-12	7.46E-04	3.30E-03	3.67E-03
TPY	0.34	0.32	0.05	0.05	0.00	45.81	2.03E-03	1.56E-02	2.80E-04	1.61E-03	9.17E-08	1.64E-09	1.22E-09	1.16E-04	5.52E-03	1.15E-03	4.74E-04	3.65E-04	1.26E-04	1.16E-03	4.83E-02	2.80E-13	1.16E-04	5.14E-04	5.73E-04
Annual	9.81E-03	9.12E-03	1.43E-03	1.39E-03	1.02E-05	1.3178	5.83E-05	4.49E-04	8.06E-06	4.63E-05	2.64E-09	4.72E-11	3.51E-11	3.35E-06	1.59E-04	3.32E-05	1.36E-05	1.05E-05	3.62E-06	3.33E-05	1.39E-03	8.05E-15	3.35E-06	1.48E-05	1.65E-05
100% to open doors	9.81E-03	9.12E-03	1.43E-03	1.39E-03	1.02E-05	1.3178	5.83E-05	4.49E-04	8.06E-06	4.63E-05	2.64E-09	4.72E-11	3.51E-11	3.35E-06	1.59E-04	3.32E-05	1.36E-05	1.05E-05	3.62E-06	3.33E-05	1.39E-03	8.05E-15	3.35E-06	1.48E-05	1.65E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.15E-02	1.07E-02	1.68E-03	1.63E-03	1.20E-05	1.5417	6.82E-05	5.25E-04	9.43E-06	5.42E-05	3.08E-09	5.53E-11	4.10E-11	3.92E-06	1.86E-04	3.88E-05	1.60E-05	1.23E-05	4.23E-06	3.90E-05	1.63E-03	9.42E-15	3.92E-06	1.73E-05	1.93E-05
100% to open doors	1.15E-02	1.07E-02	1.68E-03	1.63E-03	1.20E-05	1.5417	6.82E-05	5.25E-04	9.43E-06	5.42E-05	3.08E-09	5.53E-11	4.10E-11	3.92E-06	1.86E-04	3.88E-05	1.60E-05	1.23E-05	4.23E-06	3.90E-05	1.63E-03	9.42E-15	3.92E-06	1.73E-05	1.93E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.29E-02	2.13E-02	3.35E-03	3.25E-03	2.39E-05	3.0834	1.36E-04	1.05E-03	1.89E-05	1.08E-04	6.17E-09	1.11E-10	8.20E-11	7.83E-06	3.71E-04	7.76E-05	3.19E-05	2.46E-05	8.46E-06	7.80E-05	3.25E-03	1.88E-14	7.83E-06	3.46E-05	3.86E-05
100% to open doors	2.29E-02	2.13E-02	3.35E-03	3.25E-03	2.39E-05	3.0834	1.36E-04	1.05E-03	1.89E-05	1.08E-04	6.17E-09	1.11E-10	8.20E-11	7.83E-06	3.71E-04	7.76E-05	3.19E-05	2.46E-05	8.46E-06	7.80E-05	3.25E-03	1.88E-14	7.83E-06	3.46E-05	3.86E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Caterpillar 345DL Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 345DL Excavator — DPF per MiltonCat controls 90% of CO, 85% of PM, and 50% of VOC.

380 hp 23% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Excavators	1.36389	0.05431	0.01382	0.01340	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	4.25E-07	4.64E-09	1.04E-08	1.04E-04	7.17E-03	1.16E-03	2.20E-03	4.94E-04	3.14E-04	2.54E-03	1.34E-02	1.25E-12	1.88E-12		
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03				3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03					8.22E-04
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03				8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03				7.38E-04	3.10E-04
Tier Standards																									
Tier 3 Standards (300-600 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	1430.45	56.96	14.49	14.06	3.02	547084.0	2.49E+00	2.25E+01	1.12E+00	3.00E+00	4.45E-04	4.86E-06	1.10E-05	1.10E-01	7.52E+00	1.21E+00	2.30E+00	5.18E-01	3.29E-01	2.66E+00	1.41E+01	1.31E-09	1.97E-09	7.74E-01	8.62E-01
lb/day	3.15	0.13	0.03	0.03	0.01	1206.12	5.49E-03	4.96E-02	2.47E-03	6.62E-03	9.82E-07	1.07E-08	2.42E-08	2.42E-04	1.66E-02	2.67E-03	5.08E-03	1.14E-03	7.25E-04	5.87E-03	3.10E-02	2.88E-12	4.34E-12	1.71E-03	1.90E-03
TPY	0.49	0.02	0.00	0.00	0.00	188.15	8.56E-04	7.73E-03	3.85E-04	1.03E-03	1.53E-07	1.67E-09	3.77E-09	3.77E-05	2.59E-03	4.17E-04	7.93E-04	1.78E-04	1.13E-04	9.15E-04	4.83E-03	4.50E-13	6.76E-13	2.66E-04	2.96E-04
Annual	1.42E-02	5.64E-04	1.43E-04	1.39E-04	2.99E-05	5.4126	2.46E-05	2.22E-04	1.11E-05	2.97E-05	4.41E-09	4.81E-11	1.08E-10	1.08E-06	7.44E-05	1.20E-05	2.28E-05	5.13E-06	3.25E-06	2.63E-05	1.39E-04	1.29E-14	1.95E-14	7.65E-06	8.53E-06
100% to open doors	1.42E-02	5.64E-04	1.43E-04	1.39E-04	2.99E-05	5.4126	2.46E-05	2.22E-04	1.11E-05	2.97E-05	4.41E-09	4.81E-11	1.08E-10	1.08E-06	7.44E-05	1.20E-05	2.28E-05	5.13E-06	3.25E-06	2.63E-05	1.39E-04	1.29E-14	1.95E-14	7.65E-06	8.53E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.66E-02	6.59E-04	1.68E-04	1.63E-04	3.49E-05	6.3320	2.88E-05	2.60E-04	1.30E-05	3.47E-05	5.15E-09	5.63E-11	1.27E-10	1.27E-06	8.71E-05	1.40E-05	2.67E-05	6.00E-06	3.81E-06	3.08E-05	1.63E-04	1.51E-14	2.28E-14	8.95E-06	9.98E-06
100% to open doors	1.66E-02	6.59E-04	1.68E-04	1.63E-04	3.49E-05	6.3320	2.88E-05	2.60E-04	1.30E-05	3.47E-05	5.15E-09	5.63E-11	1.27E-10	1.27E-06	8.71E-05	1.40E-05	2.67E-05	6.00E-06	3.81E-06	3.08E-05	1.63E-04	1.51E-14	2.28E-14	8.95E-06	9.98E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	3.31E-02	1.32E-03	3.35E-04	3.25E-04	6.99E-05	12.6640	5.76E-05	5.21E-04	2.59E-05	6.95E-05	1.03E-08	1.13E-10	2.54E-10	2.54E-06	1.74E-04	2.81E-05	5.33E-05	1.20E-05	7.61E-06	6.16E-05	3.25E-04	3.03E-14	4.55E-14	1.79E-05	2.00E-05
100% to open doors	3.31E-02	1.32E-03	3.35E-04	3.25E-04	6.99E-05	12.6640	5.76E-05	5.21E-04	2.59E-05	6.95E-05	1.03E-08	1.13E-10	2.54E-10	2.54E-06	1.74E-04	2.81E-05	5.33E-05	1.20E-05	7.61E-06	6.16E-05	3.25E-04	3.03E-14	4.55E-14	1.79E-05	2.00E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Caterpillar 330C Excavator

Temporal Data
312.0 days/yr
Assumed Caterpillar 330C Excavator
247 hp 23% Load Factor (from DB Email 1/28/22)
Operating Schedule
1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Excavators	1.36389	0.54310	0.09212	0.08936	0.00288		4.75E-03	4.29E-02	2.13E-03	5.72E-03	8.49E-07	9.28E-09	1.13E-08	2.09E-04	1.43E-02	2.31E-03	4.39E-03	9.88E-04	6.27E-04	5.07E-03	8.94E-02	1.25E-12	2.09E-04		
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03				3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03					1.64E-03
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03				8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03				1.48E-03	3.10E-04
Tier Standards																									
Tier 3 Standards (300-600 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	929.79	370.24	62.80	60.92	1.96	355604.6	3.24E+00	2.92E+01	1.46E+00	3.90E+00	5.79E-04	6.32E-06	7.70E-06	1.42E-01	9.78E+00	1.58E+00	3.00E+00	6.74E-01	4.28E-01	3.46E+00	6.09E+01	8.51E-10	1.42E-01	1.01E+00	1.12E+00
lb/day	2.05	0.82	0.14	0.13	0.00	783.98	7.14E-03	6.44E-02	3.21E-03	8.60E-03	1.28E-06	1.39E-08	1.70E-08	3.14E-04	2.16E-02	3.47E-03	6.60E-03	1.49E-03	9.43E-04	7.62E-03	1.34E-01	1.88E-12	3.14E-04	2.22E-03	2.47E-03
TPY	0.32	0.13	0.02	0.02	0.00	122.30	1.11E-03	1.01E-02	5.01E-04	1.34E-03	1.99E-07	2.18E-09	2.65E-09	4.90E-05	3.36E-03	5.42E-04	1.03E-03	2.32E-04	1.47E-04	1.19E-03	2.10E-02	2.93E-13	4.90E-05	3.46E-04	3.85E-04
Annual	9.20E-03	3.66E-03	6.21E-04	6.03E-04	1.94E-05	3.5182	3.20E-05	2.89E-04	1.44E-05	3.86E-05	5.73E-09	6.26E-11	7.61E-11	1.41E-06	9.68E-05	1.56E-05	2.96E-05	6.67E-06	4.23E-06	3.42E-05	6.03E-04	8.42E-15	1.41E-06	9.95E-06	1.11E-05
100% to open doors	9.20E-03	3.66E-03	6.21E-04	6.03E-04	1.94E-05	3.5182	3.20E-05	2.89E-04	1.44E-05	3.86E-05	5.73E-09	6.26E-11	7.61E-11	1.41E-06	9.68E-05	1.56E-05	2.96E-05	6.67E-06	4.23E-06	3.42E-05	6.03E-04	8.42E-15	1.41E-06	9.95E-06	1.11E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.08E-02	4.29E-03	7.27E-04	7.05E-04	2.27E-05	4.1158	3.75E-05	3.38E-04	1.68E-05	4.52E-05	6.70E-09	7.32E-11	8.91E-11	1.65E-06	1.13E-04	1.82E-05	3.47E-05	7.80E-06	4.95E-06	4.00E-05	7.05E-04	9.84E-15	1.65E-06	1.16E-05	1.30E-05
100% to open doors	1.08E-02	4.29E-03	7.27E-04	7.05E-04	2.27E-05	4.1158	3.75E-05	3.38E-04	1.68E-05	4.52E-05	6.70E-09	7.32E-11	8.91E-11	1.65E-06	1.13E-04	1.82E-05	3.47E-05	7.80E-06	4.95E-06	4.00E-05	7.05E-04	9.84E-15	1.65E-06	1.16E-05	1.30E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.15E-02	8.57E-03	1.45E-03	1.41E-03	4.54E-05	8.2316	7.49E-05	6.77E-04	3.37E-05	9.03E-05	1.34E-08	1.46E-10	1.78E-10	3.30E-06	2.26E-04	3.65E-05	6.93E-05	1.56E-05	9.90E-06	8.01E-05	1.41E-03	1.97E-14	3.30E-06	2.33E-05	2.59E-05
100% to open doors	2.15E-02	8.57E-03	1.45E-03	1.41E-03	4.54E-05	8.2316	7.49E-05	6.77E-04	3.37E-05	9.03E-05	1.34E-08	1.46E-10	1.78E-10	3.30E-06	2.26E-04	3.65E-05	6.93E-05	1.56E-05	9.90E-06	8.01E-05	1.41E-03	1.97E-14	3.30E-06	2.33E-05	2.59E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
0 mph	7836.78	80.259	24.1896	3.95912	3.64238	0.026827	7.45356	5.32E-02	0.00E+00	6.23E-02	1.87E-02	5.75E-01	2.74E-01	4.73E-02	3.77E-01	2.67E-02	1.46E-02	8.33E-03	4.90E-02	9.58E-02	1.51E-02	6.63E-06	1.39E-03	5.95E-06	3.54E-03	3.64E+00	1.53E-09	1.69E-09

Idling Times	Idle Minutes Per Truck	Idle Hours per Truck	Peak Hour Trucks	Idling time ((veh-hr)/hr) [1]	
Truck Exhaust Tipping Area	5	0.0833	22	1.833	if 44 trips peak hour, 1 truck comes in, dumps, then leaves = 2 trips but 1 truck idling.
Site Drive @Rte 9	0.020833	0.0003	44	0.015	
Gilbertville Rd & Rte 9	0.055833	0.0009	33	0.031	
Knox Ave @ Rte 9	0.06	0.0010	11	0.011	
South/Church @Rte 9	0.730833	0.0122	11	0.134	
North St @ Rte 9	0.256667	0.0043	11	0.047	
West St @ Rte 9	0.901667	0.0150	11	0.165	

[1] vehicle hours of delay (idle) per hour of actual time

Emissions (g/hr)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Truck Exhaust Tipping Area	14367.4	147.1	44.3	7.3	6.7	0.0	13.7	9.76E-02	0.00E+00	1.14E-01	3.43E-02	1.05E+00	5.03E-01	8.68E-02	6.90E-01	4.89E-02	2.68E-02	1.53E-02	8.99E-02	1.76E-01	2.76E-02	1.22E-05	2.54E-03	1.09E-05	6.49E-03	6.68E+00	2.80E-09	3.10E-09
Site Drive @Rte 9	119.7	1.2	0.4	0.1	0.1	0.0	0.1	8.14E-04	0.00E+00	9.52E-04	2.86E-04	8.78E-03	4.19E-03	7.23E-04	5.75E-03	4.08E-04	2.23E-04	1.27E-04	7.49E-04	1.46E-03	2.30E-04	1.01E-07	2.12E-05	9.09E-08	5.41E-05	5.56E-02	2.33E-11	2.58E-11
Gilbertville Rd & Rte 9	240.7	2.5	0.7	0.1	0.1	0.0	0.2	1.64E-03	0.00E+00	1.91E-03	5.75E-04	1.77E-02	8.42E-03	1.45E-03	1.16E-02	8.20E-04	4.49E-04	2.56E-04	1.51E-03	2.94E-03	4.63E-04	2.04E-07	4.26E-05	1.83E-07	1.09E-04	1.12E-01	4.69E-11	5.19E-11
Knox Ave @ Rte 9	86.2	0.9	0.3	0.0	0.0	0.0	0.1	5.86E-04	0.00E+00	6.86E-04	2.06E-04	6.32E-03	3.02E-03	5.21E-04	4.14E-03	2.94E-04	1.61E-04	9.16E-05	5.39E-04	1.05E-03	1.66E-04	7.29E-08	1.52E-05	6.54E-08	3.89E-05	4.01E-02	1.68E-11	1.86E-11
South/Church @Rte 9	1050.0	10.8	3.2	0.5	0.5	0.0	1.0	7.13E-03	0.00E+00	8.35E-03	2.51E-03	7.70E-02	3.68E-02	6.34E-03	5.05E-02	3.58E-03	1.96E-03	1.12E-03	6.57E-03	1.28E-02	2.02E-03	8.88E-07	1.86E-04	7.97E-07	4.74E-04	4.88E-01	2.05E-10	2.26E-10
North St @ Rte 9	368.8	3.8	1.1	0.2	0.2	0.0	0.4	2.51E-03	0.00E+00	2.93E-03	8.82E-04	2.70E-02	1.29E-02	2.23E-03	1.77E-02	1.26E-03	6.88E-04	3.92E-04	2.31E-03	4.51E-03	7.09E-04	3.12E-07	6.52E-05	2.80E-07	1.66E-04	1.71E-01	7.19E-11	7.95E-11
West St @ Rte 9	1295.5	13.3	4.0	0.7	0.6	0.0	1.2	8.80E-03	0.00E+00	1.03E-02	3.10E-03	9.50E-02	4.54E-02	7.82E-03	6.23E-02	4.41E-03	2.42E-03	1.38E-03	8.10E-03	1.58E-02	2.49E-03	1.10E-06	2.29E-04	9.84E-07	5.85E-04	6.02E-01	2.53E-10	2.79E-10

AERMOD Emissions (g/s)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Truck Exhaust Tipping Area	3.99E+00	4.09E-02	1.23E-02	2.02E-03	1.85E-03	1.37E-05	3.80E-03	2.71E-05	0.00E+00	3.17E-05	9.54E-06	2.93E-04	1.40E-04	2.41E-05	1.92E-04	1.36E-05	7.44E-06	4.24E-06	2.50E-05	4.88E-05	7.67E-06	3.38E-09	7.06E-07	3.03E-09	1.80E-06	1.85E-03	7.78E-13	8.60E-13
Site Drive @Rte 9	3.33E-02	3.41E-04	1.03E-04	1.68E-05	1.55E-05	1.14E-07	3.16E-05	2.26E-07	0.00E+00	2.65E-07	7.95E-08	2.44E-06	1.16E-06	2.01E-07	1.60E-06	1.13E-07	6.20E-08	3.53E-08	2.08E-07	4.06E-07	6.39E-08	2.81E-11	5.88E-09	2.52E-11	1.50E-08	1.55E-05	6.49E-15	7.17E-15
Gilbertville Rd & Rte 9	6.68E-02	6.85E-04	2.06E-04	3.38E-05	3.11E-05	2.29E-07	6.36E-05	4.54E-07	0.00E+00	5.32E-07	1.60E-07	4.90E-06	2.34E-06	4.04E-07	3.21E-06	2.28E-07	1.25E-07	7.10E-08	4.18E-07	8.17E-07	1.29E-07	5.65E-11	1.18E-08	5.08E-11	3.02E-08	3.11E-05	1.30E-14	1.44E-14
Knox Ave @ Rte 9	2.39E-02	2.45E-04	7.39E-05	1.21E-05	1.11E-05	8.20E-08	2.28E-05	1.63E-07	0.00E+00	1.90E-07	5.72E-08	1.76E-06	8.38E-07	1.45E-07	1.15E-06	8.15E-08	4.47E-08	2.54E-08	1.50E-07	2.93E-07	4.60E-08	2.03E-11	4.23E-09	1.82E-11	1.08E-08	1.11E-05	4.67E-15	5.16E-15
South/Church @Rte 9	2.92E-01	2.99E-03	9.00E-04	1.47E-04	1.36E-04	9.98E-07	2.77E-04	1.98E-06	0.00E+00	2.32E-06	6.97E-07	2.14E-05	1.02E-05	1.76E-06	1.40E-05	9.93E-07	5.44E-07	3.10E-07	1.82E-06	3.56E-06	5.61E-07	2.47E-10	5.16E-08	2.21E-10	1.32E-07	1.36E-04	5.69E-14	6.29E-14
North St @ Rte 9	1.02E-01	1.05E-03	3.16E-04	5.17E-05	4.76E-05	3.51E-07	9.74E-05	6.96E-07	0.00E+00	8.15E-07	2.45E-07	7.51E-06	3.59E-06	6.19E-07	4.92E-06	3.49E-07	1.91E-07	1.09E-07	6.41E-07	1.25E-06	1.97E-07	8.66E-11	1.81E-08	7.78E-11	4.62E-08	4.76E-05	2.00E-14	2.21E-14
West St @ Rte 9	3.60E-01	3.69E-03	1.11E-03	1.82E-04	1.67E-04	1.23E-06	3.42E-04	2.45E-06	0.00E+00	2.86E-06	8.60E-07	2.64E-05	1.26E-05	2.17E-06	1.73E-05	1.23E-06	6.71E-07	3.82E-07	2.25E-06	4.40E-06	6.92E-07	3.04E-10	6.36E-08	2.73E-10	1.62E-07	1.67E-04	7.02E-14	7.76E-14

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
15 mph	2499.95	17.92	6.33	0.81	0.75	9.73E-04	0.87	6.35E-03	0.00E+00	7.47E-03	2.20E-03	6.97E-02	3.34E-02	5.69E-03	3.24E-02	3.38E-03	1.78E-03	2.68E-03	8.59E-03	9.87E-01	1.56E-03	4.42E-07	9.24E-05	3.97E-07	2.36E-04	7.48E-01	1.02E-10	1.13E-10
30 mph	2042.57	13.45	4.07	0.68	0.63	5.57E-04	0.52	3.62E-03	0.00E+00	4.26E-03	1.26E-03	3.98E-02	1.93E-02	3.27E-03	2.36E-02	2.01E-03	1.02E-03	2.18E-03	7.02E-03	5.83E-01	1.27E-03	2.21E-07	4.62E-05	1.98E-07	1.18E-04	6.29E-01	5.09E-11	5.63E-11
Fugitive PM				66.03	16.51																							

ONSITE

Idling Times

	link Avg Speed	Peak Hourly Veh. #	Link Length meters	Link Length miles	Link Vehicle Miles Traveled VMT/hr (peak hr)
Onsite Roadway	15	44	315.80	0.20	8.63
Gilbertville Rd/Rte 32	30	0	465.80	0.29	0.00
Rte 9 East of Gilbertville	30	33	309.70	0.19	6.35
Rte 9/32 Site Drive to Gilbertville	30	33	111.30	0.07	2.28
Rte 9/32, Site Drive to Knox	30	11	1575.40	0.98	10.77
Knox Ave, S of Rte 9/32	30	0	206.60	0.13	0.00
Rte 9/32, Knox to South/Church	30	11	725.50	0.45	4.96
Rte 9/32, South/Church to North	30	11	167.10	0.10	1.14
North St	30	0	170.60	0.11	0.00
Rte 9/32, North to West	30	11	80.80	0.05	0.55
West St/Rte 32	30	5	185.20	0.12	0.58
Rte 9, West of West	30	7	362.60	0.23	1.58

Emissions (g/hr)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Onsite Roadway	21584.8	154.8	54.6	577.1	149.0	8.40E-03	7.5	5.48E-02	0.00E+00	6.45E-02	1.90E-02	6.02E-01	2.88E-01	4.91E-02	2.80E-01	2.92E-02	1.53E-02	2.31E-02	7.42E-02	8.52E+00	1.35E-02	3.81E-06	7.98E-04	3.42E-06	2.04E-03	6.46E+00	8.80E-10	9.72E-10
Gilbertville Rd/Rte 32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9 East of Gilbertville	12971.3	85.4	25.9	4.3	4.0	0.0	3.3	2.30E-02	0.00E+00	2.71E-02	7.98E-03	2.53E-01	1.23E-01	2.07E-02	1.50E-01	1.28E-02	6.45E-03	1.38E-02	4.46E-02	3.70E+00	8.08E-03	1.40E-06	2.93E-04	1.26E-06	7.49E-04	3.99E+00	3.23E-10	3.58E-10
Rte 9/32 Site Drive to Gilbertville	4661.6	30.7	9.3	1.6	1.4	0.0	1.2	8.26E-03	0.00E+00	9.72E-03	2.87E-03	9.08E-02	4.41E-02	7.45E-03	5.39E-02	4.60E-03	2.32E-03	4.97E-03	1.60E-02	1.33E+00	2.90E-03	5.04E-07	1.05E-04	4.53E-07	2.69E-04	1.44E+00	1.16E-10	1.29E-10
Rte 9/32, Site Drive to Knox	21994.4	144.8	43.9	7.4	6.8	0.0	5.6	3.89E-02	0.00E+00	4.59E-02	1.35E-02	4.28E-01	2.08E-01	3.52E-02	2.54E-01	2.17E-02	1.09E-02	2.35E-02	7.56E-02	6.27E+00	1.37E-02	2.38E-06	4.97E-04	2.14E-06	1.27E-03	6.77E+00	5.49E-10	6.06E-10
Knox Ave, S of Rte 9/32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, Knox to South/Church	10128.8	66.7	20.2	3.4	3.1	0.0	2.6	1.79E-02	0.00E+00	2.11E-02	6.23E-03	1.97E-01	9.57E-02	1.62E-02	1.17E-01	9.99E-03	5.03E-03	1.08E-02	3.48E-02	2.89E+00	6.31E-03	1.10E-06	2.29E-04	9.83E-07	5.85E-04	3.12E+00	2.53E-10	2.79E-10
Rte 9/32, South/Church to North	2332.9	15.4	4.7	0.8	0.7	0.0	0.6	4.13E-03	0.00E+00	4.87E-03	1.44E-03	4.54E-02	2.21E-02	3.73E-03	2.70E-02	2.30E-03	1.16E-03	2.49E-03	8.02E-03	6.65E-01	1.45E-03	2.52E-07	5.28E-05	2.27E-07	1.35E-04	7.18E-01	5.82E-11	6.43E-11
North St	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, North to West	1128.1	7.4	2.2	0.4	0.3	0.0	0.3	2.00E-03	0.00E+00	2.35E-03	6.94E-04	2.20E-02	1.07E-02	1.80E-03	1.30E-02	1.11E-03	5.61E-04	1.20E-03	3.88E-03	3.22E-01	7.03E-04	1.22E-07	2.55E-05	1.10E-07	6.51E-05	3.47E-01	2.81E-11	3.11E-11
West St/Rte 32	1175.3	7.7	2.3	0.4	0.4	0.0	0.3	2.08E-03	0.00E+00	2.45E-03	7.23E-04	2.29E-02	1.11E-02	1.88E-03	1.36E-02	1.16E-03	5.84E-04	1.25E-03	4.04E-03	3.35E-01	7.32E-04	1.27E-07	2.66E-05	1.14E-07	6.79E-05	3.62E-01	2.93E-11	3.24E-11
Rte 9, West of West	3221.5	21.2	6.4	1.1	1.0	0.0	0.8	5.70E-03	0.00E+00	6.72E-03	1.98E-03	6.28E-02	3.05E-02	5.15E-03	3.72E-02	3.18E-03	1.60E-03	3.44E-03	1.11E-02	9.19E-01	2.01E-03	3.48E-07	7.29E-05	3.13E-07	1.86E-04	9.92E-01	8.03E-11	8.88E-11

AERMOD Emissions (g/s)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Onsite Roadway	6.00E+00	4.30E-02	1.52E-02	1.60E-01	4.14E-02	2.33E-06	2.09E-03	1.52E-05	0.00E+00	1.79E-05	5.27E-06	1.67E-04	8.01E-05	1.36E-05	7.78E-05	8.10E-06	4.26E-06	6.42E-06	2.06E-05	2.37E-03	3.75E-06	1.06E-09	2.22E-07	9.51E-10	5.66E-07	1.79E-03	2.44E-13	2.70E-13
Gilbertville Rd/Rte 32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9 East of Gilbertville	3.60E+00	2.37E-02	7.19E-03	1.21E-03	1.11E-03	9.83E-07	9.12E-04	6.38E-06	0.00E+00	7.52E-06	2.22E-06	7.02E-05	3.41E-05	5.76E-06	4.17E-05	3.55E-06	1.79E-06	3.84E-06	1.24E-05	1.03E-03	2.24E-06	3.90E-10	8.15E-08	3.50E-10	2.08E-07	1.11E-03	8.99E-14	9.93E-14
Rte 9/32 Site Drive to Gilbertville	1.29E+00	8.53E-03	2.58E-03	4.33E-04	3.99E-04	3.53E-07	3.28E-04	2.29E-06	0.00E+00	2.70E-06	7.97E-07	2.52E-05	1.22E-05	2.07E-06	1.50E-05	1.28E-06	6.44E-07	1.38E-06	4.45E-06	3.69E-04	8.07E-07	1.40E-10	2.93E-08	1.26E-10	7.48E-08	3.99E-04	3.23E-14	3.57E-14
Rte 9/32, Site Drive to Knox	6.11E+00	4.02E-02	1.22E-02	2.04E-03	1.88E-03	1.67E-06	1.55E-03	1.08E-05	0.00E+00	1.27E-05	3.76E-06	1.19E-04	5.78E-05	9.77E-06	7.06E-05	6.02E-06	3.04E-06	6.52E-06	2.10E-05	1.74E-03	3.81E-06	6.61E-10	1.38E-07	5.93E-10	3.53E-07	1.88E-03	1.52E-13	1.68E-13
Knox Ave, S of Rte 9/32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, Knox to South/Church	2.81E+00	1.85E-02	5.61E-03	9.41E-04	8.66E-04	7.67E-07	7.12E-04	4.98E-06	0.00E+00	5.87E-06	1.73E-06	5.48E-05	2.66E-05	4.50E-06	3.25E-05	2.77E-06	1.40E-06	3.00E-06	9.68E-06	8.02E-04	1.75E-06	3.04E-10	6.36E-08	2.73E-10	1.62E-07	8.66E-04	7.02E-14	7.76E-14
Rte 9/32, South/Church to North	6.48E-01	4.27E-03	1.29E-03	2.17E-04	1.99E-04	1.77E-07	1.64E-04	1.15E-06	0.00E+00	1.35E-06	3.99E-07	1.26E-05	6.13E-06	1.04E-06	7.49E-06	6.39E-07	3.22E-07	6.91E-07	2.23E-06	1.85E-04	4.04E-07	7.01E-11	1.47E-08	6.29E-11	3.74E-08	1.99E-04	1.62E-14	1.79E-14
North St	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, North to West	3.13E-01	2.06E-03	6.25E-04	1.05E-04	9.65E-05	8.55E-08	7.93E-05	5.55E-07	0.00E+00	6.54E-07	1.93E-07	6.10E-06	2.96E-06	5.01E-07	3.62E-06	3.09E-07	1.56E-07	3.34E-07	1.08E-06	8.94E-05	1.95E-07	3.39E-11	7.09E-09	3.04E-11	1.81E-08	9.65E-05	7.81E-15	8.64E-15
West St/Rte 32	3.26E-01	2.15E-03	6.51E-04	1.09E-04	1.00E-04	8.90E-08	8.26E-05	5.78E-07	0.00E+00	6.81E-07	2.01E-07	6.36E-06	3.09E-06	5.22E-07	3.77E-06	3.22E-07	1.62E-07	3.48E-07	1.12E-06	9.31E-05	2.03E-07	3.53E-11	7.38E-09	3.17E-11	1.89E-08	1.00E-04	8.14E-15	9.00E-15
Rte 9, West of West	8.95E-01	5.89E-03	1.78E-03	2.99E-04	2.75E-04	2.44E-07	2.26E-04	1.58E-06	0.00E+00	1.87E-06	5.51E-07	1.74E-05	8.46E-06	1.43E-06	1.03E-05	8.82E-07	4.45E-07	9.54E-07	3.08E-06	2.55E-04	5.57E-07	9.68E-11	2.02E-08	8.69E-11	5.17E-08	2.75E-04	2.23E-14	2.47E-14

PM-10, PM-2.5, Emission Calculations and Stack Parameters for C&D Transfer Station in Ware, MA - Incremental Case
Date 1/18/2022
Engineer DTR/DKB
Checked DKB/NRD

C&D Tipping - Particulate Matter
Adding 650 tons per day of C&D (mix of bulky and residuals)
Most deliveries are by 25 ton trailers, or about 26 ADT (26 full arrivals and 26 empty departures per day). Load out into 100 ton rail cars.

Facility accepts waste 6 days per week, 8 hours per day on weekdays, 5 hours on Sat, but proposes to increase hours to 11 hours per day on weekdays, increase limited to 178,700 tpy. 275 days per year operation on average
= 178,700 / 650 = 275 days per year of operation to accept 178,700 tpy
Loads are dumped on tipping floor from trucks (including 5.5 ton roll-off trucks, 4 ton roll-off containers,but primarily self dumping live floor 100 CY, 25 ton trailers)

The MSW load is dumped and transferred via front end loader or grapple picker into a pile (wood, residuals, etc). Most is loaded into 100 ton rail cars.

So, each ton of material is dumped (or loaded) twice and may othewise be handled (using front end loader or grapple W) in the tipping floor area.

Transfer building is currently 180' x 120' x 40' H (bump out front by 50') for a total volume of 1,224,000 CF
Assume nominal two air changes per hour (1,224,000 CF x 2)/60 min/hr= 40,800 acfm
The transfer building has 6 roof vents and 4 side vents - conservatively assume fans are not operating (and four doors are open during use)

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors
for Construction Operations, under Construction Phase - Demolition and Debris Removal, Loading of Debris On-site or
Unloading of Debris Offsite, this Table recommends the use of emission factor from Section 13.2.4)

Section 13.2.4 is called Aggregate Handling and Storage Piles, which includes material unloading from trucks onto
piles and loading of trucks for shipment or transfer to process

E = k (0.0032) (U/5)^1.3 / (M/2)^1.4 - Equation (1) 13.2.4

where:

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless); 0.35 for PM-10 (particles less than 10 microns in diameter), and 0.053 for PM-2.5
U = mean wind speed (mile/hr)
M = material moisture content (%)

E = 0.35 (0.0032) (U/5)^1.3 / (M/2)^1.4 (for PM10)

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 0.44-19%, and
a moisture content range of 0.25 -4.8%.

This equation will produce higher emissions with lower moisture content. Use 2.2% consistent with pushing below.

While the unloading and loading occurs indoors, there is air movement caused by the ventilation system. This can be translated
into a "wind speed" equivalent by dividing the volume of air flow, by the face area of the room normal to the exhaust pickups and door openings.

Assume all of this volume is drawn across 100' wide area at tipping floor where doors are, and over an avg height of 20'

(40,800 ft^3/min) x (1/(100x20)) SF = 20 ft/min
20 ft/min x 60 min/hr x 1 mile/5280 ft = 0.23 mph

The low end of the range of wind speed for emission factor equation above is 1.3 mph - use this as a default value to account
for any stray currents caused by localized air movement

E = 0.35 x 0.0032 x (1.3/5)^1.3 / ((2.2/2)^1.4) = 0.00017 lb/ton

0.00017 lb/ton x 650 ton/day x 1/24 hr/day x 2 drops = 0.009 lb/hr (24 hr avg) uncontrolled PM-10
(add controls further below)

For PM-2.5, the k multiplier is 0.053 instead of 0.35, apply to emission rate: 0.053/0.35 x 0.009 = 0.0014 lb/hr uncontrolled

Next, consider pushing of material to piles or to hopper (double counts with a drop)- use bulldozing pushing

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors
for Construction Operations, under Construction Phase - Site Preparation - Bulldozing
this Table recommends the use of emission factor from Section 11.9)

Section 11.9 is called Western Surface Coal Mining, and includes bulldozing overburden (dirt)

E = 1.0 x s^1.5/ M^1.4 - Table 11.9-1 PM-15

where:

E = emission factor (lb/hr)
s = material silt content (%)
M = material moisture content (%)

multiplier for PM-10 is 0.75 according to Table 11.9-1

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 3.8-15.1%, and
a moisture content range of 2.2-16.8%.

This equation will produce higher emissions with lower moisture content and higher silt content
Use a conservative moisture content of 2.2% 2.2 % moisture
Use a conservative silt content of 3.8% (higher than the low end of 0.44% low for drop equation) 3.8 % silt

E = 1.0 x (3.8)^1.5 / ((2.2)^1.4) = 2.456 lb/hr PM-15
2.456 lb/hr x 0.75 = 1.842 lb/hr PM-10

Assume pushing occurs for total of 2 hours per shift.

1.842 lb/hr x 2 hr/day x 1/24 hr/day = 0.154 lb/hr 24-hr avg PM-10 uncontrolled

For PM-2.5, the multiplier is 0.105 instead of 0.75, apply to emission rate: 0.154/0.75 x 0.105 = 0.021 lb/hr uncontrolled

Total uncontrolled PM-10 emissions from dumping, loading, pushing (handling) of waste

	PM-10	PM-2.5	
2 dumping actions	0.009	0.0014	lb/hr
2 hours pushing	0.154	0.021	lb/hr
Total	0.163	0.023	lb/hr

Sanity Check, stack test at UMW Holyoke in 2014 handling 750 tpd C&D including processing found 0.17 lb/hr of PM-10 while operating

Apply 50% reduction from water sprays in ceiling. These are turned off for the cold weather months (Nov-Mar), 5 months out of 12, only apply to tons per year, not for short term air modeling
50% is an assumption based on published factors from EPA-AP-42 of 78% to 96% for close in water sprays on crushing, screening and transfer points for aggregate processing, less control at greater distance from spray
0.5 x 7/12 = 0.27 (27% control), mutiply uncontrolled emissions x 0.73

Calculate Controlled annual emissions

0.163 lb/hr x 0.73 x24 hr/day x 312 day/yr/2000 lb/ton = **0.44 ton/yr** PM-10
0.023 lb/hr x 0.73 x 24 hr/day x 312 day/yr/2000 lb/ton = **0.06 ton/yr** PM-2.5
Operations:6 days/week x 52 weeks/year = 312 days/yr

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2,
a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2 (X4 as for winter baseline with anti skid abrasives)

		No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 15.7 tons per Truck full	overestimate the incremental number of trucks (actual = 1400 TPD / 15.7 ton/truck - 59 existing = 30)	41	15.7	20	36	17.85
C&D 0 tons per Truck empty		41	0	20	20	10.00
Total Truck Trips		82	trips/day			27.85
Total Trucks		41	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (27.85) ^1.02 = 66.0 g/VMT
0.145 lb/VMT

Estimate each truck travels approximately 1100 ft from Route 9 to come in and back up and 900 ft to leave, avg 1000 ft 1000
Total daily PM-10 fugitive emissions: 41 x 1000/5280 x 0.145 lb/VMT 1.1 lb/day
1.1 lb/day x 312 day/yr x 1 ton/2000 lb = **0.18 tons/yr** **PM-10**

For PM-2.5, the value of k is reduced to 0.25 X g/VMT, 16.5 g/VMT
0.04 lb/VMT

Factor down to PM-2.5: 0.25/1.0 x 0.18 ton/yr = **0.04 tons/yr** **PM-2.5**

SUMMARY: Total of C&D Tipping, Handling (including Rail Car Loading) and Paved Roads

0.62 tons/yr **PM-10**
0.11 tons/yr **PM-2.5**

Doors are open so worst case is all PM emissions coming out doors, conduct air modeling of this condition

PM-10 emission rate total from all doors **0.0205 g/s from all doors**
PM-2.5 emission rate total from all doors **0.00288 g/s from all doors**

Existing

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0207	0.0029	24-hour
	0.0414	0.0058	12-hour (for addition to incremental future)
	0.0552	0.0078	9-hour
	0.0827	0.0116	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0129	0.0018	8,760 hr/yr
	0.0329	0.0046	260-day/yr & 12 hr/day + 52-day/yr & 6 hr/day = 3,432 hr/yr (for addition to incremental future)
	0.0426	0.0060	260-day/yr & 9 hr/day + 52-day/yr & 6 hr/day = 2,652 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 62.4 g PM10/VMT on-site paved roads

15.6 g PM2.5/VMT

Incremental

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0205	0.0029	24-hour
	0.0410	0.0058	12-hour
	0.0820	0.0115	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0128	0.0018	8,760 hr/yr
	0.0327	0.0046	260 days/yr & 12 hr/day + 52 days/yr & 6 hr/day = 3,432 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 66.0 g PM10/VMT on-site paved roads

16.5 g PM2.5/VMT

Future = Existing + Incremental

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0412	0.0058	24-hour
	0.0824	0.0116	12-hour
	0.1647	0.0232	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0257	0.0036	8,760 hr/yr
	0.0656	0.0092	260 days/yr & 12 hr/day + 52 days/yr & 6 hr/day = 3,432 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 66.0 g PM10/VMT on-site paved roads

16.5 g/VMT

Attachment 3-1c

Stage 2 Mitigated Air Source Parameters & Calculations

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
NAAQS Results - All Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
SO_2	1 HOUR (1)	1.59189	2016-2020	729416.26, 4683401.03, 147.88, 315.21, 0.00	11.4	13.0	196	7%
	3 HOUR (2)	1.53381	17121812	729136.26, 4682941.03, 155.61, 324.78, 0.00	13.1	14.6	1300	1%
PM_{10}	24 HOUR (3)	22.70495	18012224	729203.71, 4682993.45, 150.87, 324.78, 0.00	16.0	38.7	150	26%
$PM_{2.5}$	24 HOUR (4)	3.76235	2016-2020	729244.12, 4683004.13, 153.84, 317.32, 0.00	14.3	18.1	35	52%
	ANNUAL (5)	0.72886	2016-2020	729301.68, 4683056.35, 153.20, 317.66, 0.00	5.7	6.4	12	53%
NO_2	1 HOUR (6)	166.16539	2016-2020	729258.51, 4683017.18, 152.08, 317.66, 0.00	*Included*	166.2	188	88%
	ANNUAL (7)	29.02984	2016	729203.71, 4682993.45, 150.87, 324.78, 0.00	*Included*	29.0	100	29%
CO	1 HOUR (2)	176.28932	17111508	729272.90, 4683030.24, 151.46, 323.70, 0.00	2428.4	2604.7	40000	7%
	8 HOUR (2)	35.10864	17123016	729193.94, 4682991.85, 150.54, 324.78, 0.00	1375.2	1410.3	10000	14%

Notes:

(1) Maximum 4th-Highest Maximum Daily 1-Hr Concentration Averaged Over 5 Years
(2) Highest 2nd-High Concentration Over 5 Years
(3) Highest 6th-High Concentration Over 5 Years
(4) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(5) Maximum Annual Concentration Averaged Over 5 Years
(6) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years
(7) Highest Annual Concentration Over 5 Years

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Annual Allowable Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Allowable Ambient Limit (AAL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	ANNUAL	4.973E-04	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.003	17%
ACETALDEHYDE	ANNUAL	2.215E-02	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.4	6%
ACETONE	ANNUAL	2.738E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	160.54	0%
ACROLEIN	ANNUAL	4.503E-03	2016	729203.688, 4682993.5, 150.87, 324.78, 0	0.07	6%
AMMONIA (NH3)	ANNUAL	4.679E-03	2018	729213.5, 4682995, 151.42, 324.78, 0	100	0%
ARSENIC	ANNUAL	8.818E-06	2018	729213.5, 4682995, 151.42, 324.78, 0	0.0003	3%
BENZENE	ANNUAL	8.721E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.1	9%
CHROMIUM	ANNUAL	4.197E-08	2018	729213.5, 4682995, 151.42, 324.78, 0	0.0001	0%
DIESEL PM	ANNUAL	1.914E-01	2016	729213.5, 4682995, 151.42, 324.78, 0	***5***	4%
ETHYL BENZENE	ANNUAL	1.395E-03	2016	729203.688, 4682993.5, 150.87, 324.78, 0	300	0%
FORMALDEHYDE	ANNUAL	6.214E-02	2018	729203.688, 4682993.5, 150.87, 324.78, 0	0.08	78%
FURANS	ANNUAL	4.687E-04	2018	729213.5, 4682995, 151.42, 324.78, 0	0.02	2%
MERCURY	ANNUAL	4.843E-08	2018	729213.5, 4682995, 151.42, 324.78, 0	0.0014	0%
METHYL ETHYL KETONE	ANNUAL	1.766E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	10	0%
NAPHTHALENE	ANNUAL	1.426E-03	2018	729213.5, 4682995, 151.42, 324.78, 0	14.25	0%
NICKEL	ANNUAL	2.141E-05	2018	729213.5, 4682995, 151.42, 324.78, 0	0.18	0%
STYRENE	ANNUAL	1.388E-04	2018	729380.812, 4683128, 159.84, 315.21, 0	2	0%
TOLUENE	ANNUAL	7.593E-03	2018	729203.688, 4682993.5, 150.87, 324.78, 0	20	0%
XYLENE	ANNUAL	4.582E-02	2018	729380.812, 4683128, 159.84, 315.21, 0	11.8	0%

Diesel PM threshold is EPA reference concentration (RfC) of 5 ug/m3 for annual averaging times.

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Threshold Exposure Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Threshold Exposure Limits (TEL) ($\mu g/m^3$)	% of Standard
1,3-BUTADIENE	24-Hr	5.764E-03	18111924	729258.5, 4683017, 152.08, 317.66, 0	1.2	0%
ACETALDEHYDE	24-Hr	2.604E-01	19121324	729203.688, 4682993.5, 150.87, 324.78, 0	30	1%
ACETONE	24-Hr	3.667E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	160.54	0%
ACROLEIN	24-Hr	5.545E-02	19121324	729203.688, 4682993.5, 150.87, 324.78, 0	0.07	79%
AMMONIA (NH3)	24-Hr	7.534E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	100	0%
ARSENIC	24-Hr	2.041E-04	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.003	7%
BENZENE	24-Hr	1.144E-01	17123024	729176.25, 4682961, 156.38, 324.78, 0	0.6	19%
CHROMIUM	24-Hr	9.024E-07	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.003	0%
ETHYL BENZENE	24-Hr	1.871E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	300	0%
FORMALDEHYDE	24-Hr	7.379E-01	19121324	729203.688, 4682993.5, 150.87, 324.78, 0	2	37%
FURANS	24-Hr	6.916E-03	18111924	729258.5, 4683017, 152.08, 317.66, 0	0.4	2%
MERCURY	24-Hr	1.017E-06	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.003	0%
METHYL ETHYL KETONE	24-Hr	2.057E-02	17123024	729176.25, 4682961, 156.38, 324.78, 0	200	0%
NAPHTHALENE	24-Hr	2.239E-02	18111924	729258.5, 4683017, 152.08, 317.66, 0	14.25	0%
NICKEL	24-Hr	5.126E-04	20121924	729272.875, 4683030, 151.46, 323.7, 0	0.27	0%
STYRENE	24-Hr	1.842E-03	20121924	729272.875, 4683030, 151.46, 323.7, 0	200	0%
TOLUENE	24-Hr	8.793E-02	19121324	729203.688, 4682993.5, 150.87, 324.78, 0	80	0%
XYLENE	24-Hr	3.328E-01	20121924	729265.688, 4683023.5, 151.85, 317.66, 0	11.8	3%

ReSource - Ware, MA

Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD Input Emissions

Inside Building

Source Type		AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
Fugitive Dust (LT)					6.56E-02	9.23E-03																				
Fugitive Dust (ST - 6hr)					1.65E-01	2.32E-02																				
Fugitive Dust (ST - 12hr)					8.24E-02	1.16E-02																				
CAT 236D SkidSteer			5.78E-03	6.11E-03	3.63E-05	3.63E-05	7.12E-06	8.61E-01	1.07E-05	1.75E-04	1.22E-06	2.16E-05	1.80E-09	3.80E-11	2.39E-11	7.67E-07	5.86E-05	8.76E-06	9.31E-06	5.49E-06	4.13E-06	1.14E-05	1.19E-03	7.55E-15	3.11E-06	1.32E-05	2.77E-06
Sullair 185 Compressor			8.21E-03	3.67E-03	5.35E-04	5.19E-04	9.68E-06	1.50E+00	2.78E-05	1.93E-04	4.82E-06	2.33E-05	2.59E-09	4.54E-11	3.45E-11	1.24E-06	6.74E-05	1.30E-05	1.34E-05	3.76E-06	1.35E-06	1.39E-05	5.19E-04	7.79E-15	1.24E-06	0.00E+00	0.00E+00
CAT 966M Loader			1.84E-03	2.21E-02	9.20E-05	9.20E-05	2.48E-05	3.20E+00	2.90E-05	4.77E-04	3.33E-06	5.89E-05	6.40E-09	1.15E-10	8.51E-11	2.08E-06	1.59E-04	2.38E-05	3.31E-05	1.49E-05	1.12E-05	3.10E-05	3.38E-03	1.95E-14	8.13E-06	3.59E-05	7.54E-06
Deere 944JX Loader			2.29E-02	2.13E-02	3.35E-03	3.25E-03	2.39E-05	3.08E+00	6.82E-05	5.25E-04	9.43E-06	5.42E-05	3.08E-09	5.53E-11	7.01E-11	3.92E-06	1.86E-04	7.76E-05	1.60E-05	1.23E-05	4.23E-06	3.90E-05	1.63E-03	9.60E-15	7.83E-06	3.46E-05	1.93E-05
CAT 345DL Excavator			3.31E-02	1.32E-03	3.35E-04	3.25E-04	6.99E-05	1.27E+01	5.76E-05	5.21E-04	2.59E-05	6.95E-05	1.03E-08	1.13E-10	2.54E-10	2.54E-06	1.74E-04	2.81E-05	5.33E-05	1.20E-05	7.61E-06	6.16E-05	3.25E-04	3.03E-14	4.55E-14	1.79E-05	2.00E-05
CAT 330C Excavator			2.15E-02	8.57E-03	1.45E-03	1.41E-03	4.54E-05	8.23E+00	3.75E-05	3.38E-04	1.68E-05	4.52E-05	6.70E-09	7.32E-11	1.52E-10	1.65E-06	1.13E-04	1.82E-05	3.47E-05	7.80E-06	4.95E-06	4.00E-05	7.05E-04	9.91E-15	3.30E-06	2.33E-05	1.30E-05
TOTAL			9.34E-02	6.32E-02	8.82E-02	1.72E-02	1.81E-04	2.95E+01	2.31E-04	2.23E-03	6.16E-05	2.73E-04	3.09E-08	4.39E-10	6.20E-10	1.22E-05	7.58E-04	1.69E-04	1.60E-04	5.63E-05	3.35E-05	1.97E-04	7.74E-03	8.47E-14	2.36E-05	1.25E-04	6.25E-05
Div/6 Doors	**Volume**	**12hr**	**RDOOR1**	**1.56E-02**	**1.05E-02**	**1.47E-02**	**2.87E-03**	**3.01E-05**	**4.92E+00**	**3.85E-05**	**3.72E-04**	**1.03E-05**	**4.54E-05**	**5.15E-09**	**7.32E-11**	**1.03E-10**	**2.03E-06**	**1.26E-04**	**2.82E-05**	**2.66E-05**	**9.38E-06**	**5.59E-06**	**3.28E-05**	**1.29E-03**	**1.41E-14**	**3.94E-06**	**2.08E-05**	**1.04E-05**
		6hr			**2.84E-02**	**4.80E-03**																						
		Saturday/Weekday Ratio for EMISFACT			**1.93**	**1.67**																						
		Ann				**2.48E-03**																						

Railcar Moving

6600 m2 area source		area (m2)	AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
L120C Loader	**Area**	**6600**	**RAILCAR**	**2.72E-06**	**2.53E-06**	**3.97E-07**	**3.85E-07**	**2.84E-09**	**3.65E-04**	**8.08E-09**	**6.22E-08**	**1.12E-09**	**6.42E-09**	**3.65E-13**	**6.55E-15**	**8.31E-15**	**4.64E-10**	**2.20E-08**	**5.23E-09**	**1.89E-09**	**1.46E-09**	**5.01E-10**	**4.62E-09**	**1.93E-07**	**1.14E-18**	**9.28E-10**	**4.10E-09**	**2.28E-09**

Locomotive Idling

		AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	**Line Volume**	**LOCOMOTIVE**	**7.11E-01**	**1.22E-01**	**2.11E-02**	**2.05E-02**	**6.87E-03**	**3.73E+01**	**2.31E-03**	**1.21E-02**	**3.20E-05**	**1.56E-03**	**8.48E-05**	**4.33E-03**	**7.73E-04**	**1.76E-04**	**1.08E-04**	**4.86E-04**	**2.05E-02**	**3.45E-04**	**3.84E-04**

Roadway

		AERMOD Source Name	CO2e	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	VOC	Benzene	Ethanol	Naphthalene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury	Arsenic	Chromium	Nickel	Diesel PM	Dioxins	Furans
Onsite Roadway	**Line Volume**	**ONSITERD**	**6.00E+00**	**4.30E-02**	**1.52E-02**	**#REF!**	**#REF!**	**2.33E-06**	**2.09E-03**	**1.52E-05**	**0.00E+00**	**1.79E-05**	**5.27E-06**	**1.67E-04**	**8.01E-05**	**1.36E-05**	**7.78E-05**	**8.10E-06**	**4.26E-06**	**6.42E-06**	**2.06E-05**	**2.37E-03**	**3.75E-06**	**1.06E-09**	**2.22E-07**	**9.51E-10**	**5.66E-07**	**1.79E-03**	**2.44E-13**	**2.70E-13**
Gilbertville Rd/Rte 32	**Line Volume**	**SLINE1**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9 East of Gilbertville	**Line Volume**	**SLINE2**	**3.60E+00**	**2.37E-02**	**7.19E-03**	**1.21E-03**	**1.11E-03**	**9.83E-07**	**9.12E-04**	**6.38E-06**	**0.00E+00**	**7.52E-06**	**2.22E-06**	**7.02E-05**	**3.41E-05**	**5.76E-06**	**4.17E-05**	**3.55E-06**	**1.79E-06**	**3.84E-06**	**1.24E-05**	**1.03E-03**	**2.24E-06**	**3.90E-10**	**8.15E-08**	**3.50E-10**	**2.08E-07**	**1.11E-03**	**8.99E-14**	**9.93E-14**
Rte 9/32 Site Drive to Gilbertville	**Line Volume**	**SLINE3**	**1.29E+00**	**8.53E-03**	**2.58E-03**	**4.33E-04**	**3.99E-04**	**3.53E-07**	**3.28E-04**	**2.29E-06**	**0.00E+00**	**2.70E-06**	**7.97E-07**	**2.52E-05**	**1.22E-05**	**2.07E-06**	**1.50E-05**	**1.28E-06**	**6.44E-07**	**1.38E-06**	**4.45E-06**	**3.69E-04**	**8.07E-07**	**1.40E-10**	**2.93E-08**	**1.26E-10**	**7.48E-08**	**3.99E-04**	**3.23E-14**	**3.57E-14**
Rte 9/32, Site Drive to Knox	**Line Volume**	**SLINE4**	**6.11E+00**	**4.02E-02**	**1.22E-02**	**2.04E-03**	**1.88E-03**	**1.67E-06**	**1.55E-03**	**1.08E-05**	**0.00E+00**	**1.27E-05**	**3.76E-06**	**1.19E-04**	**5.78E-05**	**9.77E-06**	**7.06E-05**	**6.02E-06**	**3.04E-06**	**6.52E-06**	**2.10E-05**	**1.74E-03**	**3.81E-06**	**6.61E-10**	**1.38E-07**	**5.93E-10**	**3.53E-07**	**1.88E-03**	**1.52E-13**	**1.68E-13**
Knox Ave, S of Rte 9/32	**Line Volume**	**SLINE5**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9/32, Knox to South/Church	**Line Volume**	**SLINE6**	**2.81E+00**	**1.85E-02**	**5.61E-03**	**9.41E-04**	**8.66E-04**	**7.67E-07**	**7.12E-04**	**4.98E-06**	**0.00E+00**	**5.87E-06**	**1.73E-06**	**5.48E-05**	**2.66E-05**	**4.50E-06**	**3.25E-05**	**2.77E-06**	**1.40E-06**	**3.00E-06**	**9.68E-06**	**8.02E-04**	**1.75E-06**	**3.04E-10**	**6.36E-08**	**2.73E-10**	**1.62E-07**	**8.66E-04**	**7.02E-14**	**7.76E-14**
Rte 9/32, South/Church to North	**Line Volume**	**SLINE7**	**6.48E-01**	**4.27E-03**	**1.29E-03**	**2.17E-04**	**1.99E-04**	**1.77E-07**	**1.64E-04**	**1.15E-06**	**0.00E+00**	**1.35E-06**	**3.99E-07**	**1.26E-05**	**6.13E-06**	**1.04E-06**	**7.49E-06**	**6.39E-07**	**3.22E-07**	**6.91E-07**	**2.23E-06**	**1.85E-04**	**4.04E-07**	**7.01E-11**	**1.47E-08**	**6.29E-11**	**3.74E-08**	**1.99E-04**	**1.62E-14**	**1.79E-14**
North St	**Line Volume**	**SLINE8**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Rte 9/32, North to West	**Line Volume**	**SLINE9**	**3.13E-01**	**2.06E-03**	**6.25E-04**	**1.05E-04**	**9.65E-05**	**8.55E-08**	**7.93E-05**	**5.55E-07**	**0.00E+00**	**6.54E-07**	**1.93E-07**	**6.10E-06**	**2.96E-06**	**5.01E-07**	**3.62E-06**	**3.09E-07**	**1.56E-07**	**3.34E-07**	**1.08E-06**	**8.94E-05**	**1.95E-07**	**3.39E-11**	**7.09E-09**	**3.04E-11**	**1.81E-08**	**9.65E-05**	**7.81E-15**	**8.64E-15**
West St/Rte 32	**Line Volume**	**SLINE10**	**3.26E-01**	**2.15E-03**	**6.51E-04**	**1.09E-04**	**1.00E-04**	**8.90E-08**	**8.26E-05**	**5.78E-07**	**0.00E+00**	**6.81E-07**	**2.01E-07**	**6.36E-06**	**3.09E-06**	**5.22E-07**	**3.77E-06**	**3.22E-07**	**1.62E-07**	**3.48E-07**	**1.12E-06**	**9.31E-05**	**2.03E-07**	**3.53E-11**	**7.38E-09**	**3.17E-11**	**1.89E-08**	**1.00E-04**	**8.14E-15**	**9.00E-15**
Rte 9, West of West	**Line Volume**	**SLINE11**	**8.95E-01**	**5.89E-03**	**1.78E-03**	**2.99E-04**	**2.75E-04**	**2.44E-07**	**2.26E-04**	**1.58E-06**	**0.00E+00**	**1.87E-06**	**5.51E-07**	**1.74E-05**	**8.46E-06**	**1.43E-06**	**1.03E-05**	**8.82E-07**	**4.45E-07**	**9.54E-07**	**3.08E-06**	**2.55E-04**	**5.57E-07**	**9.68E-11**	**2.02E-08**	**8.69E-11**	**5.17E-08**	**2.75E-04**	**2.23E-14**	**2.47E-14**

Truck Idling

		area (m2)	AERMOD Source Name	CO2e	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	VOC	Benzene	Ethanol	Naphthalene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury	Arsenic	Chromium	Nickel	Diesel PM	Dioxins	Furans
Truck Exhaust Tipping Area	**Area**	**357.3**	**TRUCKIDLE1**	**1.12E-02**	**1.14E-04**	**3.45E-05**	**5.64E-06**	**5.19E-06**	**3.82E-08**	**1.06E-05**	**7.59E-08**	**0.00E+00**	**8.89E-08**	**2.67E-08**	**8.19E-07**	**3.91E-07**	**6.74E-08**	**5.37E-07**	**3.80E-08**	**2.08E-08**	**1.19E-08**	**6.99E-08**	**1.37E-07**	**2.15E-08**	**9.45E-12**	**1.98E-09**	**8.48E-12**	**5.04E-09**	**5.19E-06**	**2.18E-15**	**2.41E-15**
Site Drive @Rte 9	**Volume**		**TRUCKIDLE2**	**3.33E-02**	**3.41E-04**	**1.03E-04**	**1.68E-05**	**1.55E-05**	**1.14E-07**	**3.16E-05**	**2.26E-07**	**0.00E+00**	**2.65E-07**	**7.95E-08**	**2.44E-06**	**1.16E-06**	**2.01E-07**	**1.60E-06**	**1.13E-07**	**6.20E-08**	**3.53E-08**	**2.08E-07**	**4.06E-07**	**6.39E-08**	**2.81E-11**	**5.88E-09**	**2.52E-11**	**1.50E-08**	**1.55E-05**	**6.49E-15**	**7.17E-15**
Gilbertville Rd & Rte 9	**Volume**		**TRUCKIDLE3**	**6.68E-02**	**6.85E-04**	**2.06E-04**	**3.38E-05**	**3.11E-05**	**2.29E-07**	**6.36E-05**	**4.54E-07**	**0.00E+00**	**5.32E-07**	**1.60E-07**	**4.90E-06**	**2.34E-06**	**4.04E-07**	**3.21E-06**	**2.28E-07**	**1.25E-07**	**7.10E-08**	**4.18E-07**	**8.17E-07**	**1.29E-07**	**5.65E-11**	**1.18E-08**	**5.08E-11**	**3.02E-08**	**3.11E-05**	**1.30E-14**	**1.44E-14**
Knox Ave @ Rte 9	**Volume**		**TRUCKIDLE4**	**2.39E-02**	**2.45E-04**	**7.39E-05**	**1.21E-05**	**1.11E-05**	**8.20E-08**	**2.28E-05**	**1.63E-07**	**0.00E+00**	**1.90E-07**	**5.72E-08**	**1.76E-06**	**8.38E-07**	**1.45E-07**	**1.15E-06**	**8.15E-08**	**4.47E-08**	**2.54E-08**	**1.50E-07**	**2.93E-07**	**4.60E-08**	**2.03E-11**	**4.23E-09**	**1.82E-11**	**1.08E-08**	**1.11E-05**	**4.67E-15**	**5.16E-15**
South/Church @Rte 9	**Volume**		**TRUCKIDLE5**	**2.92E-01**	**2.99E-03**	**9.00E-04**	**1.47E-04**	**1.36E-04**	**9.98E-07**	**2.77E-04**	**1.98E-06**	**0.00E+00**	**2.32E-06**	**6.97E-07**	**2.14E-05**	**1.02E-05**	**1.76E-06**	**1.40E-05**	**9.93E-07**	**5.44E-07**	**3.10E-07**	**1.82E-06**	**3.56E-06**	**5.61E-07**	**2.47E-10**	**5.16E-08**	**2.21E-10**	**1.32E-07**	**1.36E-04**	**5.69E-14**	**6.29E-14**
North St @ Rte 9	**Volume**		**TRUCKIDLE6**	**1.02E-01**	**1.05E-03**	**3.16E-04**	**5.17E-05**	**4.76E-05**	**3.51E-07**	**9.74E-05**	**6.96E-07**	**0.00E+00**	**8.15E-07**	**2.45E-07**	**7.51E-06**	**3.59E-06**	**6.19E-07**	**4.92E-06**	**3.49E-07**	**1.91E-07**	**1.09E-07**	**6.41E-07**	**1.25E-06**	**1.97E-07**	**8.66E-11**	**1.81E-08**	**7.78E-11**	**4.62E-08**	**4.76E-05**	**2.00E-14**	**2.21E-14**
West St @ Rte 9	**Volume**		**TRUCKIDLE7**	**3.60E-01**	**3.69E-03**	**1.11E-03**	**1.82E-04**	**1.67E-04**	**1.23E-06**	**3.42E-04**	**2.45E-06**	**0.00E+00**	**2.86E-06**	**8.60E-07**	**2.64E-05**	**1.26E-05**	**2.17E-06**	**1.73E-05**	**1.23E-06**	**6.71E-07**	**3.82E-07**	**2.25E-06**	**4.40E-06**	**6.92E-07**	**3.04E-10**	**6.36E-08**	**2.73E-10**	**1.62E-07**	**1.67E-04**	**7.02E-14**	**7.76E-14**

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Idling

Temporal Data

312.0 days/yr

GE EMD-38-2 Locomotive provided by client

2000 Max hp 10% switch load factor

Operating Schedule

1 number of equipment
2 hours each per day
2 hr/day 10am & 1pm per email 12/11/21

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Acetone	Methyl Ethyl Ketone
Emission Factor (g/gal)																			
Line Haul Duty Cycle	225.68	98.28	8.37	8.12	1.88	10217													
Switch Duty Cycle	194.56	33.44	5.78	5.60	1.88	10217													
Emission Factor (g/bhp-hr)																			
Line Haul Duty Cycle (SPECIATE 2)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4)							3.91E-03	6.43E-02	4.49E-04	7.94E-03	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2)	12.80	2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4)							5.01E-03	8.24E-02	5.75E-04	1.02E-02	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03

Emissions		Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Acetone	Methyl Ethyl Ketone
	g/day	5120.00	880.00	152.00	147.44	49.47	268868.42	1.66E+01	8.73E+01	2.30E-01	1.12E+01	6.11E-01	3.12E+01	5.56E+00	1.27E+00	7.77E-01	3.50E+00	1.47E+02	2.48E+00	2.77E+00
	lb/day	11.29	1.94	0.34	0.33	0.11	592.76	3.67E-02	1.92E-01	5.07E-04	2.48E-02	1.35E-03	6.88E-02	1.23E-02	2.80E-03	1.71E-03	7.72E-03	3.25E-01	5.47E-03	6.10E-03
	TPY	1.76	0.30	0.05	0.05	0.02	92.47	5.72E-03	3.00E-02	7.92E-05	3.86E-03	2.10E-04	1.07E-02	1.91E-03	4.37E-04	2.67E-04	1.20E-03	5.07E-02	8.54E-04	9.51E-04
Peak hour (g/s)		7.11E-01	0.1222	0.0211	0.0205	0.0069	37.3428	2.31E-03	1.21E-02	3.20E-05	1.56E-03	8.48E-05	4.33E-03	7.73E-04	1.76E-04	1.08E-04	4.86E-04	2.05E-02	3.45E-04	3.84E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

236D Skidsteer Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 236D Skidsteer Tier 4F from MiltonCat

74.3 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Skid Steers	4.80716	4.94339	0.74313	0.72084	0.00431		2.85E-02	2.35E-01	3.70E-03	2.09E-02	1.09E-06	2.30E-08	1.45E-08	1.89E-03	8.39E-02	2.44E-02	5.64E-03	7.05E-03	2.01E-03	1.93E-02	7.21E-01	4.57E-12	1.89E-03		
Skid Steers TOG X SPECIATE Tier 2							5.36E-02	2.81E-01		3.62E-02				1.97E-03	1.01E-01	1.79E-02		4.09E-03		1.13E-02					8.91E-03
Skid Steers TOG X SPECIATE Tier 4							6.46E-03	1.06E-01	7.42E-04	1.31E-02				4.64E-04	3.55E-02	5.30E-03		3.33E-03	2.50E-03	6.90E-03				8.00E-03	1.68E-03
Tier Standards																									
Tier 3 Standards (50-100 hp	3.5	3.7	0.3	0.3																	0.3				
Tier 4 Standards (50-75 hp)	3.5	3.7	0.022	0.022				2.48E-03													0.022				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	249.65	263.91	1.57	1.57	0.31	37206.7	4.61E-01	7.58E+00	5.29E-02	9.35E-01	7.77E-05	1.64E-06	1.03E-06	3.31E-02	2.53E+00	3.78E-01	4.02E-01	2.37E-01	1.79E-01	4.93E-01	5.14E+01	3.26E-10	1.35E-01	5.70E-01	1.20E-01
lb/day	0.55	0.58	0.00	0.00	0.00	82.03	1.02E-03	1.67E-02	1.17E-04	2.06E-03	1.71E-07	3.62E-09	2.28E-09	7.30E-05	5.58E-03	8.34E-04	8.86E-04	5.23E-04	3.94E-04	1.09E-03	1.13E-01	7.19E-13	2.97E-04	1.26E-03	2.64E-04
TPY	0.09	0.09	0.00	0.00	0.00	12.80	1.58E-04	2.61E-03	1.82E-05	3.22E-04	2.67E-08	5.65E-10	3.55E-10	1.14E-05	8.71E-04	1.30E-04	1.38E-04	8.16E-05	6.14E-05	1.69E-04	1.77E-02	1.12E-13	4.63E-05	1.96E-04	4.12E-05
Annual	2.47E-03	2.61E-03	1.55E-05	1.55E-05	3.04E-06	0.3681	4.56E-06	7.50E-05	5.23E-07	9.25E-06	7.69E-10	1.62E-11	1.02E-11	3.28E-07	2.50E-05	3.74E-06	3.98E-06	2.35E-06	1.77E-06	4.87E-06	5.09E-04	3.23E-15	1.33E-06	5.64E-06	1.19E-06
100% to open doors	2.47E-03	2.61E-03	1.55E-05	1.55E-05	3.04E-06	0.3681	4.56E-06	7.50E-05	5.23E-07	9.25E-06	7.69E-10	1.62E-11	1.02E-11	3.28E-07	2.50E-05	3.74E-06	3.98E-06	2.35E-06	1.77E-06	4.87E-06	5.09E-04	3.23E-15	1.33E-06	5.64E-06	1.19E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	2.89E-03	3.05E-03	1.82E-05	1.82E-05	3.56E-06	0.4306	5.33E-06	8.77E-05	6.12E-07	1.08E-05	8.99E-10	1.90E-11	1.20E-11	3.83E-07	2.93E-05	4.38E-06	4.65E-06	2.75E-06	2.07E-06	5.70E-06	5.95E-04	3.77E-15	1.56E-06	6.60E-06	1.39E-06
100% to open doors	2.89E-03	3.05E-03	1.82E-05	1.82E-05	3.56E-06	0.4306	5.33E-06	8.77E-05	6.12E-07	1.08E-05	8.99E-10	1.90E-11	1.20E-11	3.83E-07	2.93E-05	4.38E-06	4.65E-06	2.75E-06	2.07E-06	5.70E-06	5.95E-04	3.77E-15	1.56E-06	6.60E-06	1.39E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	5.78E-03	6.11E-03	3.63E-05	3.63E-05	7.12E-06	0.8613	1.07E-05	1.75E-04	1.22E-06	2.16E-05	1.80E-09	3.80E-11	2.39E-11	7.67E-07	5.86E-05	8.76E-06	9.31E-06	5.49E-06	4.13E-06	1.14E-05	1.19E-03	7.55E-15	3.11E-06	1.32E-05	2.77E-06
100% to open doors	5.78E-03	6.11E-03	3.63E-05	3.63E-05	7.12E-06	0.8613	1.07E-05	1.75E-04	1.22E-06	2.16E-05	1.80E-09	3.80E-11	2.39E-11	7.67E-07	5.86E-05	8.76E-06	9.31E-06	5.49E-06	4.13E-06	1.14E-05	1.19E-03	7.55E-15	3.11E-06	1.32E-05	2.77E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Sullair 185 Compressor Exhaust

Temporal Data

312.0 days/yr

Assumed Sullair 185 Compressor

61 hp 17% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Air Compressors	2.84920	1.27262	0.18573	0.18016	0.00336		9.65E-03	6.70E-02	1.67E-03	8.09E-03	9.00E-07	1.58E-08	1.20E-08	4.31E-04	2.34E-02	4.51E-03	4.66E-03	1.31E-03	4.69E-04	4.84E-03	1.80E-01	2.71E-12	4.31E-04		
Air Compressors TOG X SPECIATE Tier 2							0.00E+00	0.00E+00		0.00E+00				0.00E+00	0.00E+00	0.00E+00		0.00E+00		0.00E+00					0.00E+00
Air Compressors TOG X SPECIATE Tier 4							0.00E+00	0.00E+00	0.00E+00	0.00E+00				0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00				0.00E+00	0.00E+00
Tier Standards																									
Tier 3 Standards (50-100 hp	3.5	3.7	0.3	0.3																	0.3				
Tier 4 Standards (50-75 hp)	3.5	3.7	0.022	0.022																	0.022				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	354.55	158.37	23.11	22.42	0.42	64911.5	1.20E+00	8.33E+00	2.08E-01	1.01E+00	1.12E-04	1.96E-06	1.49E-06	5.36E-02	2.91E+00	5.61E-01	5.80E-01	1.62E-01	5.83E-02	6.02E-01	2.24E+01	3.37E-10	5.36E-02	0.00E+00	0.00E+00
lb/day	0.78	0.35	0.05	0.05	0.00	143.11	2.65E-03	1.84E-02	4.59E-04	2.22E-03	2.47E-07	4.32E-09	3.28E-09	1.18E-04	6.42E-03	1.24E-03	1.28E-03	3.58E-04	1.29E-04	1.33E-03	4.94E-02	7.42E-13	1.18E-04	0.00E+00	0.00E+00
TPY	0.12	0.05	0.01	0.01	0.00	22.32	4.13E-04	2.87E-03	7.16E-05	3.46E-04	3.85E-08	6.75E-10	5.12E-10	1.84E-05	1.00E-03	1.93E-04	1.99E-04	5.59E-05	2.01E-05	2.07E-04	7.71E-03	1.16E-13	1.84E-05	0.00E+00	0.00E+00
Annual	3.51E-03	1.57E-03	2.29E-04	2.22E-04	4.14E-06	0.6422	1.19E-05	8.25E-05	2.06E-06	9.96E-06	1.11E-09	1.94E-11	1.47E-11	5.30E-07	2.88E-05	5.55E-06	5.73E-06	1.61E-06	5.77E-07	5.95E-06	2.22E-04	3.33E-15	5.30E-07	0.00E+00	0.00E+00
100% to open doors	3.51E-03	1.57E-03	2.29E-04	2.22E-04	4.14E-06	0.6422	1.19E-05	8.25E-05	2.06E-06	9.96E-06	1.11E-09	1.94E-11	1.47E-11	5.30E-07	2.88E-05	5.55E-06	5.73E-06	1.61E-06	5.77E-07	5.95E-06	2.22E-04	3.33E-15	5.30E-07	0.00E+00	0.00E+00
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	4.10E-03	1.83E-03	2.67E-04	2.59E-04	4.84E-06	0.7513	1.39E-05	9.65E-05	2.41E-06	1.17E-05	1.30E-09	2.27E-11	1.72E-11	6.20E-07	3.37E-05	6.49E-06	6.71E-06	1.88E-06	6.75E-07	6.96E-06	2.59E-04	3.90E-15	6.20E-07	0.00E+00	0.00E+00
100% to open doors	4.10E-03	1.83E-03	2.67E-04	2.59E-04	4.84E-06	0.7513	1.39E-05	9.65E-05	2.41E-06	1.17E-05	1.30E-09	2.27E-11	1.72E-11	6.20E-07	3.37E-05	6.49E-06	6.71E-06	1.88E-06	6.75E-07	6.96E-06	2.59E-04	3.90E-15	6.20E-07	0.00E+00	0.00E+00
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	8.21E-03	3.67E-03	5.35E-04	5.19E-04	9.68E-06	1.5026	2.78E-05	1.93E-04	4.82E-06	2.33E-05	2.59E-09	4.54E-11	3.45E-11	1.24E-06	6.74E-05	1.30E-05	1.34E-05	3.76E-06	1.35E-06	1.39E-05	5.19E-04	7.79E-15	1.24E-06	0.00E+00	0.00E+00
100% to open doors	8.21E-03	3.67E-03	5.35E-04	5.19E-04	9.68E-06	1.5026	2.78E-05	1.93E-04	4.82E-06	2.33E-05	2.59E-09	4.54E-11	3.45E-11	1.24E-06	6.74E-05	1.30E-05	1.34E-05	3.76E-06	1.35E-06	1.39E-05	5.19E-04	7.79E-15	1.24E-06	0.00E+00	0.00E+00
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Railcar Mover Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Volvo L120C Loader

208 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		1.15E-02	8.89E-02	1.59E-03	9.17E-03	5.22E-07	9.35E-09	1.19E-08	6.63E-04	3.14E-02	7.46E-03	2.70E-03	2.08E-03	7.16E-04	6.60E-03	2.75E-01	1.62E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					3.26E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3	2.6	0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	775.12	720.96	113.31	109.91	0.81	104158.8	2.30E+00	1.77E+01	3.18E-01	1.83E+00	1.04E-04	1.87E-06	2.37E-06	1.32E-01	6.27E+00	1.49E+00	5.39E-01	4.15E-01	1.43E-01	1.32E+00	5.50E+01	3.24E-10	2.65E-01	1.17E+00	6.51E-01
lb/day	1.71	1.59	0.25	0.24	0.00	229.63	5.08E-03	3.91E-02	7.02E-04	4.04E-03	2.30E-07	4.12E-09	5.22E-09	2.92E-04	1.38E-02	3.28E-03	1.19E-03	9.16E-04	3.15E-04	2.90E-03	1.21E-01	7.15E-13	5.83E-04	2.58E-03	1.44E-03
TPY	0.27	0.25	0.04	0.04	0.00	35.82	7.93E-04	6.10E-03	1.10E-04	6.30E-04	3.58E-08	6.42E-10	8.15E-10	4.55E-05	2.16E-03	5.12E-04	1.85E-04	1.43E-04	4.91E-05	4.53E-04	1.89E-02	1.12E-13	9.10E-05	4.02E-04	2.24E-04
Annual	7.67E-03	7.13E-03	1.12E-03	1.09E-03	8.00E-06	1.0305	2.28E-05	1.76E-04	3.15E-06	1.81E-05	1.03E-09	1.85E-11	2.34E-11	1.31E-06	6.20E-05	1.47E-05	5.33E-06	4.11E-06	1.41E-06	1.30E-05	5.44E-04	3.21E-15	2.62E-06	1.16E-05	6.44E-06
100% to open doors	7.67E-03	7.13E-03	1.12E-03	1.09E-03	8.00E-06	1.0305	2.28E-05	1.76E-04	3.15E-06	1.81E-05	1.03E-09	1.85E-11	2.34E-11	1.31E-06	6.20E-05	1.47E-05	5.33E-06	4.11E-06	1.41E-06	1.30E-05	5.44E-04	3.21E-15	2.62E-06	1.16E-05	6.44E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	8.97E-03	8.34E-03	1.31E-03	1.27E-03	9.36E-06	1.2055	2.67E-05	2.05E-04	3.69E-06	2.12E-05	1.21E-09	2.16E-11	2.74E-11	1.53E-06	7.26E-05	1.72E-05	6.24E-06	4.81E-06	1.65E-06	1.52E-05	6.36E-04	3.75E-15	3.06E-06	1.35E-05	7.54E-06
100% to open doors	8.97E-03	8.34E-03	1.31E-03	1.27E-03	9.36E-06	1.2055	2.67E-05	2.05E-04	3.69E-06	2.12E-05	1.21E-09	2.16E-11	2.74E-11	1.53E-06	7.26E-05	1.72E-05	6.24E-06	4.81E-06	1.65E-06	1.52E-05	6.36E-04	3.75E-15	3.06E-06	1.35E-05	7.54E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.79E-02	1.67E-02	2.62E-03	2.54E-03	1.87E-05	2.4111	5.33E-05	4.11E-04	7.37E-06	4.24E-05	2.41E-09	4.32E-11	5.48E-11	3.06E-06	1.45E-04	3.45E-05	1.25E-05	9.61E-06	3.31E-06	3.05E-05	1.27E-03	7.51E-15	6.13E-06	2.71E-05	1.51E-05
100% to open doors	1.79E-02	1.67E-02	2.62E-03	2.54E-03	1.87E-05	2.4111	5.33E-05	4.11E-04	7.37E-06	4.24E-05	2.41E-09	4.32E-11	5.48E-11	3.06E-06	1.45E-04	3.45E-05	1.25E-05	9.61E-06	3.31E-06	3.05E-05	1.27E-03	7.51E-15	6.13E-06	2.71E-05	1.51E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

966M Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 966M Loader Tier 4F from MiltonCat

276 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0		0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	79.49	956.65	3.97	3.97	1.07	138210.7	1.25E+00	2.06E+01	1.44E-01	2.54E+00	2.77E-04	4.95E-06	3.68E-06	9.00E-02	6.88E+00	1.03E+00	1.43E+00	6.45E-01	4.85E-01	1.34E+00	1.46E+02	8.44E-10	3.51E-01	1.55E+00	3.26E-01
lb/day	0.18	2.11	0.01	0.01	0.00	304.70	2.76E-03	4.54E-02	3.17E-04	5.61E-03	6.10E-07	1.09E-08	8.10E-09	1.99E-04	1.52E-02	2.27E-03	3.15E-03	1.42E-03	1.07E-03	2.95E-03	3.22E-01	1.86E-12	7.74E-04	3.42E-03	7.18E-04
TPY	0.03	0.33	0.00	0.00	0.00	47.53	4.31E-04	7.09E-03	4.95E-05	8.74E-04	9.51E-08	1.70E-09	1.26E-09	3.10E-05	2.37E-03	3.54E-04	4.92E-04	2.22E-04	1.67E-04	4.61E-04	5.02E-02	2.90E-13	1.21E-04	5.33E-04	1.12E-04
Annual	7.86E-04	9.46E-03	3.93E-05	3.93E-05	1.06E-05	1.3674	1.24E-05	2.04E-04	1.42E-06	2.52E-05	2.74E-09	4.90E-11	3.64E-11	8.91E-07	6.81E-05	1.02E-05	1.42E-05	6.38E-06	4.80E-06	1.32E-05	1.44E-03	8.35E-15	3.47E-06	1.53E-05	3.22E-06
100% to open doors	7.86E-04	9.46E-03	3.93E-05	3.93E-05	1.06E-05	1.3674	1.24E-05	2.04E-04	1.42E-06	2.52E-05	2.74E-09	4.90E-11	3.64E-11	8.91E-07	6.81E-05	1.02E-05	1.42E-05	6.38E-06	4.80E-06	1.32E-05	1.44E-03	8.35E-15	3.47E-06	1.53E-05	3.22E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	9.20E-04	1.11E-02	4.60E-05	4.60E-05	1.24E-05	1.5997	1.45E-05	2.39E-04	1.66E-06	2.94E-05	3.20E-09	5.73E-11	4.25E-11	1.04E-06	7.97E-05	1.19E-05	1.66E-05	7.47E-06	5.62E-06	1.55E-05	1.69E-03	9.77E-15	4.06E-06	1.80E-05	3.77E-06
100% to open doors	9.20E-04	1.11E-02	4.60E-05	4.60E-05	1.24E-05	1.5997	1.45E-05	2.39E-04	1.66E-06	2.94E-05	3.20E-09	5.73E-11	4.25E-11	1.04E-06	7.97E-05	1.19E-05	1.66E-05	7.47E-06	5.62E-06	1.55E-05	1.69E-03	9.77E-15	4.06E-06	1.80E-05	3.77E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.84E-03	2.21E-02	9.20E-05	9.20E-05	2.48E-05	3.1993	2.90E-05	4.77E-04	3.33E-06	5.89E-05	6.40E-09	1.15E-10	8.51E-11	2.08E-06	1.59E-04	2.38E-05	3.31E-05	1.49E-05	1.12E-05	3.10E-05	3.38E-03	1.95E-14	8.13E-06	3.59E-05	7.54E-06
100% to open doors	1.84E-03	2.21E-02	9.20E-05	9.20E-05	2.48E-05	3.1993	2.90E-05	4.77E-04	3.33E-06	5.89E-05	6.40E-09	1.15E-10	8.51E-11	2.08E-06	1.59E-04	2.38E-05	3.31E-05	1.49E-05	1.12E-05	3.10E-05	3.38E-03	1.95E-14	8.13E-06	3.59E-05	7.54E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

John Deere Loader

Temporal Data

312.0 days/yr

Assumed John Deere 944JX Loader

266 hp 8% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Tractors/Loaders/Backhoes	3.88183	3.61055	0.56744	0.55042	0.00405		1.15E-02	8.89E-02	1.59E-03	9.17E-03	5.22E-07	9.35E-09	1.19E-08	6.63E-04	3.14E-02	7.46E-03	2.70E-03	2.08E-03	7.16E-04	6.60E-03	2.75E-01	1.62E-12	1.33E-03		
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02				1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					3.26E-03
Tractors/Loaders/Backhoes TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03				3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards																									
Tier 3 Standards (175-300 h	3.0		0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	991.26	921.99	144.90	140.55	1.03	133203.1	2.95E+00	2.27E+01	4.07E-01	2.34E+00	1.33E-04	2.39E-06	3.03E-06	1.69E-01	8.02E+00	3.35E+00	6.90E-01	5.31E-01	1.83E-01	1.68E+00	7.03E+01	4.15E-10	3.38E-01	1.49E+00	8.33E-01
lb/day	2.19	2.03	0.32	0.31	0.00	293.66	6.50E-03	5.00E-02	8.98E-04	5.16E-03	2.94E-07	5.26E-09	6.68E-09	3.73E-04	1.77E-02	7.39E-03	1.52E-03	1.17E-03	4.03E-04	3.71E-03	1.55E-01	9.15E-13	7.46E-04	3.30E-03	1.84E-03
TPY	0.34	0.32	0.05	0.05	0.00	45.81	1.01E-03	7.81E-03	1.40E-04	8.05E-04	4.58E-08	8.21E-10	1.04E-09	5.82E-05	2.76E-03	1.15E-03	2.37E-04	1.83E-04	6.28E-05	5.79E-04	2.42E-02	1.43E-13	1.16E-04	5.14E-04	2.86E-04
Annual	9.81E-03	9.12E-03	1.43E-03	1.39E-03	1.02E-05	1.3178	2.92E-05	2.25E-04	4.03E-06	2.32E-05	1.32E-09	2.36E-11	3.00E-11	1.67E-06	7.93E-05	3.32E-05	6.82E-06	5.25E-06	1.81E-06	1.67E-05	6.95E-04	4.10E-15	3.35E-06	1.48E-05	8.24E-06
100% to open doors	9.81E-03	9.12E-03	1.43E-03	1.39E-03	1.02E-05	1.3178	2.92E-05	2.25E-04	4.03E-06	2.32E-05	1.32E-09	2.36E-11	3.00E-11	1.67E-06	7.93E-05	3.32E-05	6.82E-06	5.25E-06	1.81E-06	1.67E-05	6.95E-04	4.10E-15	3.35E-06	1.48E-05	8.24E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.15E-02	1.07E-02	1.68E-03	1.63E-03	1.20E-05	1.5417	3.41E-05	2.63E-04	4.71E-06	2.71E-05	1.54E-09	2.76E-11	3.51E-11	1.96E-06	9.28E-05	3.88E-05	7.98E-06	6.15E-06	2.11E-06	1.95E-05	8.13E-04	4.80E-15	3.92E-06	1.73E-05	9.64E-06
100% to open doors	1.15E-02	1.07E-02	1.68E-03	1.63E-03	1.20E-05	1.5417	3.41E-05	2.63E-04	4.71E-06	2.71E-05	1.54E-09	2.76E-11	3.51E-11	1.96E-06	9.28E-05	3.88E-05	7.98E-06	6.15E-06	2.11E-06	1.95E-05	8.13E-04	4.80E-15	3.92E-06	1.73E-05	9.64E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.29E-02	2.13E-02	3.35E-03	3.25E-03	2.39E-05	3.0834	6.82E-05	5.25E-04	9.43E-06	5.42E-05	3.08E-09	5.53E-11	7.01E-11	3.92E-06	1.86E-04	7.76E-05	1.60E-05	1.23E-05	4.23E-06	3.90E-05	1.63E-03	9.60E-15	7.83E-06	3.46E-05	1.93E-05
100% to open doors	2.29E-02	2.13E-02	3.35E-03	3.25E-03	2.39E-05	3.0834	6.82E-05	5.25E-04	9.43E-06	5.42E-05	3.08E-09	5.53E-11	7.01E-11	3.92E-06	1.86E-04	7.76E-05	1.60E-05	1.23E-05	4.23E-06	3.90E-05	1.63E-03	9.60E-15	7.83E-06	3.46E-05	1.93E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Caterpillar 345DL Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 345DL Excavator — DPF per MiltonCat controls 90% of CO, 85% of PM, and 50% of VOC.

380 hp 23% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Excavators	1.36389	0.05431	0.01382	0.01340	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	4.25E-07	4.64E-09	1.04E-08	1.04E-04	7.17E-03	1.16E-03	2.20E-03	4.94E-04	3.14E-04	2.54E-03	1.34E-02	1.25E-12	1.88E-12		
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03				3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03					8.22E-04
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03				8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03				7.38E-04	3.10E-04
Tier Standards																									
Tier 3 Standards (300-600 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	1430.45	56.96	14.49	14.06	3.02	547084.0	2.49E+00	2.25E+01	1.12E+00	3.00E+00	4.45E-04	4.86E-06	1.10E-05	1.10E-01	7.52E+00	1.21E+00	2.30E+00	5.18E-01	3.29E-01	2.66E+00	1.41E+01	1.31E-09	1.97E-09	7.74E-01	8.62E-01
lb/day	3.15	0.13	0.03	0.03	0.01	1206.12	5.49E-03	4.96E-02	2.47E-03	6.62E-03	9.82E-07	1.07E-08	2.42E-08	2.42E-04	1.66E-02	2.67E-03	5.08E-03	1.14E-03	7.25E-04	5.87E-03	3.10E-02	2.88E-12	4.34E-12	1.71E-03	1.90E-03
TPY	0.49	0.02	0.00	0.00	0.00	188.15	8.56E-04	7.73E-03	3.85E-04	1.03E-03	1.53E-07	1.67E-09	3.77E-09	3.77E-05	2.59E-03	4.17E-04	7.93E-04	1.78E-04	1.13E-04	9.15E-04	4.83E-03	4.50E-13	6.76E-13	2.66E-04	2.96E-04
Annual	1.42E-02	5.64E-04	1.43E-04	1.39E-04	2.99E-05	5.4126	2.46E-05	2.22E-04	1.11E-05	2.97E-05	4.41E-09	4.81E-11	1.08E-10	1.08E-06	7.44E-05	1.20E-05	2.28E-05	5.13E-06	3.25E-06	2.63E-05	1.39E-04	1.29E-14	1.95E-14	7.65E-06	8.53E-06
100% to open doors	1.42E-02	5.64E-04	1.43E-04	1.39E-04	2.99E-05	5.4126	2.46E-05	2.22E-04	1.11E-05	2.97E-05	4.41E-09	4.81E-11	1.08E-10	1.08E-06	7.44E-05	1.20E-05	2.28E-05	5.13E-06	3.25E-06	2.63E-05	1.39E-04	1.29E-14	1.95E-14	7.65E-06	8.53E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.66E-02	6.59E-04	1.68E-04	1.63E-04	3.49E-05	6.3320	2.88E-05	2.60E-04	1.30E-05	3.47E-05	5.15E-09	5.63E-11	1.27E-10	1.27E-06	8.71E-05	1.40E-05	2.67E-05	6.00E-06	3.81E-06	3.08E-05	1.63E-04	1.51E-14	2.28E-14	8.95E-06	9.98E-06
100% to open doors	1.66E-02	6.59E-04	1.68E-04	1.63E-04	3.49E-05	6.3320	2.88E-05	2.60E-04	1.30E-05	3.47E-05	5.15E-09	5.63E-11	1.27E-10	1.27E-06	8.71E-05	1.40E-05	2.67E-05	6.00E-06	3.81E-06	3.08E-05	1.63E-04	1.51E-14	2.28E-14	8.95E-06	9.98E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	3.31E-02	1.32E-03	3.35E-04	3.25E-04	6.99E-05	12.6640	5.76E-05	5.21E-04	2.59E-05	6.95E-05	1.03E-08	1.13E-10	2.54E-10	2.54E-06	1.74E-04	2.81E-05	5.33E-05	1.20E-05	7.61E-06	6.16E-05	3.25E-04	3.03E-14	4.55E-14	1.79E-05	2.00E-05
100% to open doors	3.31E-02	1.32E-03	3.35E-04	3.25E-04	6.99E-05	12.6640	5.76E-05	5.21E-04	2.59E-05	6.95E-05	1.03E-08	1.13E-10	2.54E-10	2.54E-06	1.74E-04	2.81E-05	5.33E-05	1.20E-05	7.61E-06	6.16E-05	3.25E-04	3.03E-14	4.55E-14	1.79E-05	2.00E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Caterpillar 330C Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 330C Excavator

247 hp 23% Load Factor (from DB Email 1/28/22)

Operating Schedule

1 number of equipment
12 hours each per day
12 hr/day

g/hp-hr

	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor																									
Excavators	1.36389	0.54310	0.09212	0.08936	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	4.25E-07	4.64E-09	9.65E-09	1.04E-04	7.17E-03	1.16E-03	2.20E-03	4.94E-04	3.14E-04	2.54E-03	4.47E-02	6.28E-13	2.09E-04		
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03				3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03					8.22E-04
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03				8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03				1.48E-03	3.10E-04
Tier Standards																									
Tier 3 Standards (300-600 h	3.0	2.6	0.15	0.15																	0.15				
Tier 4 Standards (175-750 h	0.3		0.015	0.015				2.48E-03													0.015				
AP-42 Table 3.3-1																									
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63																			

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	929.79	370.24	62.80	60.92	1.96	355604.6	1.62E+00	1.46E+01	7.28E-01	1.95E+00	2.89E-04	3.16E-06	6.58E-06	7.12E-02	4.89E+00	7.88E-01	1.50E+00	3.37E-01	2.14E-01	1.73E+00	3.05E+01	4.28E-10	1.42E-01	1.01E+00	5.60E-01
lb/day	2.05	0.82	0.14	0.13	0.00	783.98	3.57E-03	3.22E-02	1.60E-03	4.30E-03	6.38E-07	6.97E-09	1.45E-08	1.57E-04	1.08E-02	1.74E-03	3.30E-03	7.43E-04	4.71E-04	3.81E-03	6.72E-02	9.43E-13	3.14E-04	2.22E-03	1.24E-03
TPY	0.32	0.13	0.02	0.02	0.00	122.30	5.57E-04	5.03E-03	2.50E-04	6.71E-04	9.96E-08	1.09E-09	2.26E-09	2.45E-05	1.68E-03	2.71E-04	5.15E-04	1.16E-04	7.35E-05	5.95E-04	1.05E-02	1.47E-13	4.90E-05	3.46E-04	1.93E-04
Annual	9.20E-03	3.66E-03	6.21E-04	6.03E-04	1.94E-05	3.5182	1.60E-05	1.45E-04	7.20E-06	1.93E-05	2.86E-09	3.13E-11	6.51E-11	7.05E-07	4.84E-05	7.80E-06	1.48E-05	3.33E-06	2.12E-06	1.71E-05	3.01E-04	4.23E-15	1.41E-06	9.95E-06	5.54E-06
100% to open doors	9.20E-03	3.66E-03	6.21E-04	6.03E-04	1.94E-05	3.5182	1.60E-05	1.45E-04	7.20E-06	1.93E-05	2.86E-09	3.13E-11	6.51E-11	7.05E-07	4.84E-05	7.80E-06	1.48E-05	3.33E-06	2.12E-06	1.71E-05	3.01E-04	4.23E-15	1.41E-06	9.95E-06	5.54E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.08E-02	4.29E-03	7.27E-04	7.05E-04	2.27E-05	4.1158	1.87E-05	1.69E-04	8.42E-06	2.26E-05	3.35E-09	3.66E-11	7.62E-11	8.24E-07	5.66E-05	9.12E-06	1.73E-05	3.90E-06	2.47E-06	2.00E-05	3.53E-04	4.95E-15	1.65E-06	1.16E-05	6.49E-06
100% to open doors	1.08E-02	4.29E-03	7.27E-04	7.05E-04	2.27E-05	4.1158	1.87E-05	1.69E-04	8.42E-06	2.26E-05	3.35E-09	3.66E-11	7.62E-11	8.24E-07	5.66E-05	9.12E-06	1.73E-05	3.90E-06	2.47E-06	2.00E-05	3.53E-04	4.95E-15	1.65E-06	1.16E-05	6.49E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.15E-02	8.57E-03	1.45E-03	1.41E-03	4.54E-05	8.2316	3.75E-05	3.38E-04	1.68E-05	4.52E-05	6.70E-09	7.32E-11	1.52E-10	1.65E-06	1.13E-04	1.82E-05	3.47E-05	7.80E-06	4.95E-06	4.00E-05	7.05E-04	9.91E-15	3.30E-06	2.33E-05	1.30E-05
100% to open doors	2.15E-02	8.57E-03	1.45E-03	1.41E-03	4.54E-05	8.2316	3.75E-05	3.38E-04	1.68E-05	4.52E-05	6.70E-09	7.32E-11	1.52E-10	1.65E-06	1.13E-04	1.82E-05	3.47E-05	7.80E-06	4.95E-06	4.00E-05	7.05E-04	9.91E-15	3.30E-06	2.33E-05	1.30E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
0 mph	7836.78	80.259	24.1896	3.95912	3.64238	0.026827	7.45356	5.32E-02	0.00E+00	6.23E-02	1.87E-02	5.75E-01	2.74E-01	4.73E-02	3.77E-01	2.67E-02	1.46E-02	8.33E-03	4.90E-02	9.58E-02	1.51E-02	6.63E-06	1.39E-03	5.95E-06	3.54E-03	3.64E+00	1.53E-09	1.69E-09

Idling Times	Idle Minutes Per Truck	Idle Hours per Truck	Peak Hour Trucks	Idling time ((veh-hr)/hr) [1]	
Truck Exhaust Tipping Area	5	0.0833	22	1.833	if 44 trips peak hour, 1 truck comes in, dumps, then leaves = 2 trips but 1 truck idling.
Site Drive @Rte 9	0.020833	0.0003	44	0.015	
Gilbertville Rd & Rte 9	0.055833	0.0009	33	0.031	
Knox Ave @ Rte 9	0.06	0.0010	11	0.011	
South/Church @Rte 9	0.730833	0.0122	11	0.134	
North St @ Rte 9	0.256667	0.0043	11	0.047	
West St @ Rte 9	0.901667	0.0150	11	0.165	

[1] vehicle hours of delay (idle) per hour of actual time

Emissions (g/hr)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Truck Exhaust Tipping Area	14367.4	147.1	44.3	7.3	6.7	0.0	13.7	9.76E-02	0.00E+00	1.14E-01	3.43E-02	1.05E+00	5.03E-01	8.68E-02	6.90E-01	4.89E-02	2.68E-02	1.53E-02	8.99E-02	1.76E-01	2.76E-02	1.22E-05	2.54E-03	1.09E-05	6.49E-03	6.68E+00	2.80E-09	3.10E-09
Site Drive @Rte 9	119.7	1.2	0.4	0.1	0.1	0.0	0.1	8.14E-04	0.00E+00	9.52E-04	2.86E-04	8.78E-03	4.19E-03	7.23E-04	5.75E-03	4.08E-04	2.23E-04	1.27E-04	7.49E-04	1.46E-03	2.30E-04	1.01E-07	2.12E-05	9.09E-08	5.41E-05	5.56E-02	2.33E-11	2.58E-11
Gilbertville Rd & Rte 9	240.7	2.5	0.7	0.1	0.1	0.0	0.2	1.64E-03	0.00E+00	1.91E-03	5.75E-04	1.77E-02	8.42E-03	1.45E-03	1.16E-02	8.20E-04	4.49E-04	2.56E-04	1.51E-03	2.94E-03	4.63E-04	2.04E-07	4.26E-05	1.83E-07	1.09E-04	1.12E-01	4.69E-11	5.19E-11
Knox Ave @ Rte 9	86.2	0.9	0.3	0.0	0.0	0.0	0.1	5.86E-04	0.00E+00	6.86E-04	2.06E-04	6.32E-03	3.02E-03	5.21E-04	4.14E-03	2.94E-04	1.61E-04	9.16E-05	5.39E-04	1.05E-03	1.66E-04	7.29E-08	1.52E-05	6.54E-08	3.89E-05	4.01E-02	1.68E-11	1.86E-11
South/Church @Rte 9	1050.0	10.8	3.2	0.5	0.5	0.0	1.0	7.13E-03	0.00E+00	8.35E-03	2.51E-03	7.70E-02	3.68E-02	6.34E-03	5.05E-02	3.58E-03	1.96E-03	1.12E-03	6.57E-03	1.28E-02	2.02E-03	8.88E-07	1.86E-04	7.97E-07	4.74E-04	4.88E-01	2.05E-10	2.26E-10
North St @ Rte 9	368.8	3.8	1.1	0.2	0.2	0.0	0.4	2.51E-03	0.00E+00	2.93E-03	8.82E-04	2.70E-02	1.29E-02	2.23E-03	1.77E-02	1.26E-03	6.88E-04	3.92E-04	2.31E-03	4.51E-03	7.09E-04	3.12E-07	6.52E-05	2.80E-07	1.66E-04	1.71E-01	7.19E-11	7.95E-11
West St @ Rte 9	1295.5	13.3	4.0	0.7	0.6	0.0	1.2	8.80E-03	0.00E+00	1.03E-02	3.10E-03	9.50E-02	4.54E-02	7.82E-03	6.23E-02	4.41E-03	2.42E-03	1.38E-03	8.10E-03	1.58E-02	2.49E-03	1.10E-06	2.29E-04	9.84E-07	5.85E-04	6.02E-01	2.53E-10	2.79E-10

AERMOD Emissions (g/s)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Truck Exhaust Tipping Area	3.99E+00	4.09E-02	1.23E-02	2.02E-03	1.85E-03	1.37E-05	3.80E-03	2.71E-05	0.00E+00	3.17E-05	9.54E-06	2.93E-04	1.40E-04	2.41E-05	1.92E-04	1.36E-05	7.44E-06	4.24E-06	2.50E-05	4.88E-05	7.67E-06	3.38E-09	7.06E-07	3.03E-09	1.80E-06	1.85E-03	7.78E-13	8.60E-13
Site Drive @Rte 9	3.33E-02	3.41E-04	1.03E-04	1.68E-05	1.55E-05	1.14E-07	3.16E-05	2.26E-07	0.00E+00	2.65E-07	7.95E-08	2.44E-06	1.16E-06	2.01E-07	1.60E-06	1.13E-07	6.20E-08	3.53E-08	2.08E-07	4.06E-07	6.39E-08	2.81E-11	5.88E-09	2.52E-11	1.50E-08	1.55E-05	6.49E-15	7.17E-15
Gilbertville Rd & Rte 9	6.68E-02	6.85E-04	2.06E-04	3.38E-05	3.11E-05	2.29E-07	6.36E-05	4.54E-07	0.00E+00	5.32E-07	1.60E-07	4.90E-06	2.34E-06	4.04E-07	3.21E-06	2.28E-07	1.25E-07	7.10E-08	4.18E-07	8.17E-07	1.29E-07	5.65E-11	1.18E-08	5.08E-11	3.02E-08	3.11E-05	1.30E-14	1.44E-14
Knox Ave @ Rte 9	2.39E-02	2.45E-04	7.39E-05	1.21E-05	1.11E-05	8.20E-08	2.28E-05	1.63E-07	0.00E+00	1.90E-07	5.72E-08	1.76E-06	8.38E-07	1.45E-07	1.15E-06	8.15E-08	4.47E-08	2.54E-08	1.50E-07	2.93E-07	4.60E-08	2.03E-11	4.23E-09	1.82E-11	1.08E-08	1.11E-05	4.67E-15	5.16E-15
South/Church @Rte 9	2.92E-01	2.99E-03	9.00E-04	1.47E-04	1.36E-04	9.98E-07	2.77E-04	1.98E-06	0.00E+00	2.32E-06	6.97E-07	2.14E-05	1.02E-05	1.76E-06	1.40E-05	9.93E-07	5.44E-07	3.10E-07	1.82E-06	3.56E-06	5.61E-07	2.47E-10	5.16E-08	2.21E-10	1.32E-07	1.36E-04	5.69E-14	6.29E-14
North St @ Rte 9	1.02E-01	1.05E-03	3.16E-04	5.17E-05	4.76E-05	3.51E-07	9.74E-05	6.96E-07	0.00E+00	8.15E-07	2.45E-07	7.51E-06	3.59E-06	6.19E-07	4.92E-06	3.49E-07	1.91E-07	1.09E-07	6.41E-07	1.25E-06	1.97E-07	8.66E-11	1.81E-08	7.78E-11	4.62E-08	4.76E-05	2.00E-14	2.21E-14
West St @ Rte 9	3.60E-01	3.69E-03	1.11E-03	1.82E-04	1.67E-04	1.23E-06	3.42E-04	2.45E-06	0.00E+00	2.86E-06	8.60E-07	2.64E-05	1.26E-05	2.17E-06	1.73E-05	1.23E-06	6.71E-07	3.82E-07	2.25E-06	4.40E-06	6.92E-07	3.04E-10	6.36E-08	2.73E-10	1.62E-07	1.67E-04	7.02E-14	7.76E-14

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
15 mph	2499.95	17.92	6.33	0.81	0.75	9.73E-04	0.87	6.35E-03	0.00E+00	7.47E-03	2.20E-03	6.97E-02	3.34E-02	5.69E-03	3.24E-02	3.38E-03	1.78E-03	2.68E-03	8.59E-03	9.87E-01	1.56E-03	4.42E-07	9.24E-05	3.97E-07	2.36E-04	7.48E-01	1.02E-10	1.13E-10
30 mph	2042.57	13.45	4.07	0.68	0.63	5.57E-04	0.52	3.62E-03	0.00E+00	4.26E-03	1.26E-03	3.98E-02	1.93E-02	3.27E-03	2.36E-02	2.01E-03	1.02E-03	2.18E-03	7.02E-03	5.83E-01	1.27E-03	2.21E-07	4.62E-05	1.98E-07	1.18E-04	6.29E-01	5.09E-11	5.63E-11
Fugitive PM				#REF!	#REF!																							

ONSITE

Idling Times

	link Avg Speed	Peak Hourly Veh. #	Link Length meters	Link Length miles	Link Vehicle Miles Traveled VMT/hr (peak hr)
Onsite Roadway	15	44	315.80	0.20	8.63
Gilbertville Rd/Rte 32	30	0	465.80	0.29	0.00
Rte 9 East of Gilbertville	30	33	309.70	0.19	6.35
Rte 9/32 Site Drive to Gilbertville	30	33	111.30	0.07	2.28
Rte 9/32, Site Drive to Knox	30	11	1575.40	0.98	10.77
Knox Ave, S of Rte 9/32	30	0	206.60	0.13	0.00
Rte 9/32, Knox to South/Church	30	11	725.50	0.45	4.96
Rte 9/32, South/Church to North	30	11	167.10	0.10	1.14
North St	30	0	170.60	0.11	0.00
Rte 9/32, North to West	30	11	80.80	0.05	0.55
West St/Rte 32	30	5	185.20	0.12	0.58
Rte 9, West of West	30	7	362.60	0.23	1.58

Emissions (g/hr)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Onsite Roadway	21584.8	154.8	54.6	#REF!	#REF!	8.40E-03	7.5	5.48E-02	0.00E+00	6.45E-02	1.90E-02	6.02E-01	2.88E-01	4.91E-02	2.80E-01	2.92E-02	1.53E-02	2.31E-02	7.42E-02	8.52E+00	1.35E-02	3.81E-06	7.98E-04	3.42E-06	2.04E-03	6.46E+00	8.80E-10	9.72E-10
Gilbertville Rd/Rte 32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9 East of Gilbertville	12971.3	85.4	25.9	4.3	4.0	0.0	3.3	2.30E-02	0.00E+00	2.71E-02	7.98E-03	2.53E-01	1.23E-01	2.07E-02	1.50E-01	1.28E-02	6.45E-03	1.38E-02	4.46E-02	3.70E+00	8.08E-03	1.40E-06	2.93E-04	1.26E-06	7.49E-04	3.99E+00	3.23E-10	3.58E-10
Rte 9/32 Site Drive to Gilbertville	4661.6	30.7	9.3	1.6	1.4	0.0	1.2	8.26E-03	0.00E+00	9.72E-03	2.87E-03	9.08E-02	4.41E-02	7.45E-03	5.39E-02	4.60E-03	2.32E-03	4.97E-03	1.60E-02	1.33E+00	2.90E-03	5.04E-07	1.05E-04	4.53E-07	2.69E-04	1.44E+00	1.16E-10	1.29E-10
Rte 9/32, Site Drive to Knox	21994.4	144.8	43.9	7.4	6.8	0.0	5.6	3.89E-02	0.00E+00	4.59E-02	1.35E-02	4.28E-01	2.08E-01	3.52E-02	2.54E-01	2.17E-02	1.09E-02	2.35E-02	7.56E-02	6.27E+00	1.37E-02	2.38E-06	4.97E-04	2.14E-06	1.27E-03	6.77E+00	5.49E-10	6.06E-10
Knox Ave, S of Rte 9/32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, Knox to South/Church	10128.8	66.7	20.2	3.4	3.1	0.0	2.6	1.79E-02	0.00E+00	2.11E-02	6.23E-03	1.97E-01	9.57E-02	1.62E-02	1.17E-01	9.99E-03	5.03E-03	1.08E-02	3.48E-02	2.89E+00	6.31E-03	1.10E-06	2.29E-04	9.83E-07	5.85E-04	3.12E+00	2.53E-10	2.79E-10
Rte 9/32, South/Church to North	2332.9	15.4	4.7	0.8	0.7	0.0	0.6	4.13E-03	0.00E+00	4.87E-03	1.44E-03	4.54E-02	2.21E-02	3.73E-03	2.70E-02	2.30E-03	1.16E-03	2.49E-03	8.02E-03	6.65E-01	1.45E-03	2.52E-07	5.28E-05	2.27E-07	1.35E-04	7.18E-01	5.82E-11	6.43E-11
North St	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, North to West	1128.1	7.4	2.2	0.4	0.3	0.0	0.3	2.00E-03	0.00E+00	2.35E-03	6.94E-04	2.20E-02	1.07E-02	1.80E-03	1.30E-02	1.11E-03	5.61E-04	1.20E-03	3.88E-03	3.22E-01	7.03E-04	1.22E-07	2.55E-05	1.10E-07	6.51E-05	3.47E-01	2.81E-11	3.11E-11
West St/Rte 32	1175.3	7.7	2.3	0.4	0.4	0.0	0.3	2.08E-03	0.00E+00	2.45E-03	7.23E-04	2.29E-02	1.11E-02	1.88E-03	1.36E-02	1.16E-03	5.84E-04	1.25E-03	4.04E-03	3.35E-01	7.32E-04	1.27E-07	2.66E-05	1.14E-07	6.79E-05	3.62E-01	2.93E-11	3.24E-11
Rte 9, West of West	3221.5	21.2	6.4	1.1	1.0	0.0	0.8	5.70E-03	0.00E+00	6.72E-03	1.98E-03	6.28E-02	3.05E-02	5.15E-03	3.72E-02	3.18E-03	1.60E-03	3.44E-03	1.11E-02	9.19E-01	2.01E-03	3.48E-07	7.29E-05	3.13E-07	1.86E-04	9.92E-01	8.03E-11	8.88E-11

AERMOD Emissions (g/s)

	CO2E	NOX	CO	PM10	PM2.5	SO2	VOC	Benzene	Ethanol	Naphthalene (total)	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Toluene	Xylene	Chloride	Mercury (total)	Arsenic Compounds	Chromium 6+	Nickel Compounds	Primary Exhaust PM2.5 - Total	Dioxins	Furans
Onsite Roadway	6.00E+00	4.30E-02	1.52E-02	#REF!	#REF!	2.33E-06	2.09E-03	1.52E-05	0.00E+00	1.79E-05	5.27E-06	1.67E-04	8.01E-05	1.36E-05	7.78E-05	8.10E-06	4.26E-06	6.42E-06	2.06E-05	2.37E-03	3.75E-06	1.06E-09	2.22E-07	9.51E-10	5.66E-07	1.79E-03	2.44E-13	2.70E-13
Gilbertville Rd/Rte 32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9 East of Gilbertville	3.60E+00	2.37E-02	7.19E-03	1.21E-03	1.11E-03	9.83E-07	9.12E-04	6.38E-06	0.00E+00	7.52E-06	2.22E-06	7.02E-05	3.41E-05	5.76E-06	4.17E-05	3.55E-06	1.79E-06	3.84E-06	1.24E-05	1.03E-03	2.24E-06	3.90E-10	8.15E-08	3.50E-10	2.08E-07	1.11E-03	8.99E-14	9.93E-14
Rte 9/32 Site Drive to Gilbertville	1.29E+00	8.53E-03	2.58E-03	4.33E-04	3.99E-04	3.53E-07	3.28E-04	2.29E-06	0.00E+00	2.70E-06	7.97E-07	2.52E-05	1.22E-05	2.07E-06	1.50E-05	1.28E-06	6.44E-07	1.38E-06	4.45E-06	3.69E-04	8.07E-07	1.40E-10	2.93E-08	1.26E-10	7.48E-08	3.99E-04	3.23E-14	3.57E-14
Rte 9/32, Site Drive to Knox	6.11E+00	4.02E-02	1.22E-02	2.04E-03	1.88E-03	1.67E-06	1.55E-03	1.08E-05	0.00E+00	1.27E-05	3.76E-06	1.19E-04	5.78E-05	9.77E-06	7.06E-05	6.02E-06	3.04E-06	6.52E-06	2.10E-05	1.74E-03	3.81E-06	6.61E-10	1.38E-07	5.93E-10	3.53E-07	1.88E-03	1.52E-13	1.68E-13
Knox Ave, S of Rte 9/32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, Knox to South/Church	2.81E+00	1.85E-02	5.61E-03	9.41E-04	8.66E-04	7.67E-07	7.12E-04	4.98E-06	0.00E+00	5.87E-06	1.73E-06	5.48E-05	2.66E-05	4.50E-06	3.25E-05	2.77E-06	1.40E-06	3.00E-06	9.68E-06	8.02E-04	1.75E-06	3.04E-10	6.36E-08	2.73E-10	1.62E-07	8.66E-04	7.02E-14	7.76E-14
Rte 9/32, South/Church to North	6.48E-01	4.27E-03	1.29E-03	2.17E-04	1.99E-04	1.77E-07	1.64E-04	1.15E-06	0.00E+00	1.35E-06	3.99E-07	1.26E-05	6.13E-06	1.04E-06	7.49E-06	6.39E-07	3.22E-07	6.91E-07	2.23E-06	1.85E-04	4.04E-07	7.01E-11	1.47E-08	6.29E-11	3.74E-08	1.99E-04	1.62E-14	1.79E-14
North St	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rte 9/32, North to West	3.13E-01	2.06E-03	6.25E-04	1.05E-04	9.65E-05	8.55E-08	7.93E-05	5.55E-07	0.00E+00	6.54E-07	1.93E-07	6.10E-06	2.96E-06	5.01E-07	3.62E-06	3.09E-07	1.56E-07	3.34E-07	1.08E-06	8.94E-05	1.95E-07	3.39E-11	7.09E-09	3.04E-11	1.81E-08	9.65E-05	7.81E-15	8.64E-15
West St/Rte 32	3.26E-01	2.15E-03	6.51E-04	1.09E-04	1.00E-04	8.90E-08	8.26E-05	5.78E-07	0.00E+00	6.81E-07	2.01E-07	6.36E-06	3.09E-06	5.22E-07	3.77E-06	3.22E-07	1.62E-07	3.48E-07	1.12E-06	9.31E-05	2.03E-07	3.53E-11	7.38E-09	3.17E-11	1.89E-08	1.00E-04	8.14E-15	9.00E-15
Rte 9, West of West	8.95E-01	5.89E-03	1.78E-03	2.99E-04	2.75E-04	2.44E-07	2.26E-04	1.58E-06	0.00E+00	1.87E-06	5.51E-07	1.74E-05	8.46E-06	1.43E-06	1.03E-05	8.82E-07	4.45E-07	9.54E-07	3.08E-06	2.55E-04	5.57E-07	9.68E-11	2.02E-08	8.69E-11	5.17E-08	2.75E-04	2.23E-14	2.47E-14

PM-10, PM-2.5, Emission Calculations and Stack Parameters for C&D Transfer Station in Ware, MA - Incremental Case
Date 1/18/2022
Engineer DTR/DKB
Checked DKB/NRD

C&D Tipping - Particulate Matter
Adding 650 tons per day of C&D (mix of bulky and residuals)
Most deliveries are by 25 ton trailers, or about 26 ADT (26 full arrivals and 26 empty departures per day). Load out into 100 ton rail cars.

Facility accepts waste 6 days per week, 8 hours per day on weekdays, 5 hours on Sat, but proposes to increase hours to 11 hours per day on weekdays, increase limited to 178,700 tpy. 275 days per year operation on average
= 178,700 / 650 = 275 days per year of operation to accept 178,700 tpy
Loads are dumped on tipping floor from trucks (including 5.5 ton roll-off trucks, 4 ton roll-off containers,but primarily self dumping live floor 100 CY, 25 ton trailers)

The MSW load is dumped and transferred via front end loader or grapple picker into a pile (wood, residuals, etc). Most is loaded into 100 ton rail cars.

So, each ton of material is dumped (or loaded) twice and may othewise be handled (using front end loader or grapple W) in the tipping floor area.

Transfer building is currently 180' x 120' x 40' H (bump out front by 50') for a total volume of 1,224,000 CF
Assume nominal two air changes per hour (1,224,000 CF x 2)/60 min/hr= 40,800 acfm
The transfer building has 6 roof vents and 4 side vents - conservatively assume fans are not operating (and four doors are open during use)

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors
for Construction Operations, under Construction Phase - Demolition and Debris Removal, Loading of Debris On-site or
Unloading of Debris Offsite, this Table recommends the use of emission factor from Section 13.2.4)

Section 13.2.4 is called Aggregate Handling and Storage Piles, which includes material unloading from trucks onto
piles and loading of trucks for shipment or transfer to process

E = k (0.0032) (U/5)^1.3 / (M/2)^1.4 - Equation (1) 13.2.4

where:

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless); 0.35 for PM-10 (particles less than 10 microns in diameter), and 0.053 for PM-2.5
U = mean wind speed (mile/hr)
M = material moisture content (%)

E = 0.35 (0.0032) (U/5)^1.3 / (M/2)^1.4 (for PM10)

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 0.44-19%, and
a moisture content range of 0.25 -4.8%.

This equation will produce higher emissions with lower moisture content. Use 2.2% consistent with pushing below.

While the unloading and loading occurs indoors, there is air movement caused by the ventilation system. This can be translated
into a "wind speed" equivalent by dividing the volume of air flow, by the face area of the room normal to the exhaust pickups and door openings.

Assume all of this volume is drawn across 100' wide area at tipping floor where doors are, and over an avg height of 20'

(40,800 ft^3/min) x (1/(100x20)) SF = 20 ft/min
20 ft/min x 60 min/hr x 1 mile/5280 ft = 0.23 mph

The low end of the range of wind speed for emission factor equation above is 1.3 mph - use this as a default value to account
for any stray currents caused by localized air movement

E = 0.35 x 0.0032 x (1.3/5)^1.3 / ((2.2/2)^1.4) = 0.00017 lb/ton

0.00017 lb/ton x 650 ton/day x 1/24 hr/day x 2 drops = 0.009 lb/hr (24 hr avg) uncontrolled PM-10
(add controls further below)

For PM-2.5, the k multiplier is 0.053 instead of 0.35, apply to emission rate: 0.053/0.35 x 0.009 = 0.0014 lb/hr uncontrolled

Next, consider pushing of material to piles or to hopper (double counts with a drop)- use bulldozing pushing

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors
for Construction Operations, under Construction Phase - Site Preparation - Bulldozing
this Table recommends the use of emission factor from Section 11.9)

Section 11.9 is called Western Surface Coal Mining, and includes bulldozing overburden (dirt)

E = 1.0 x s^1.5/ M^1.4 - Table 11.9-1 PM-15

where:

E = emission factor (lb/hr)
s = material silt content (%)
M = material moisture content (%)

multiplier for PM-10 is 0.75 according to Table 11.9-1

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 3.8-15.1%, and
a moisture content range of 2.2-16.8%.

This equation will produce higher emissions with lower moisture content and higher silt content
Use a conservative moisture content of 2.2% 2.2 % moisture
Use a conservative silt content of 3.8% (higher than the low end of 0.44% low for drop equation) 3.8 % silt

E = 1.0 x (3.8)^1.5 / ((2.2)^1.4) = 2.456 lb/hr PM-15
2.456 lb/hr x 0.75 = 1.842 lb/hr PM-10

Assume pushing occurs for total of 2 hours per shift.

1.842 lb/hr x 2 hr/day x 1/24 hr/day = 0.154 lb/hr 24-hr avg PM-10 uncontrolled

For PM-2.5, the multiplier is 0.105 instead of 0.75, apply to emission rate: 0.154/0.75 x 0.105 = 0.021 lb/hr uncontrolled

Total uncontrolled PM-10 emissions from dumping, loading, pushing (handling) of waste

	PM-10	PM-2.5	
2 dumping actions	0.009	0.0014	lb/hr
2 hours pushing	0.154	0.021	lb/hr
Total	0.163	0.023	lb/hr

Sanity Check, stack test at UMW Holyoke in 2014 handling 750 tpd C&D including processing found 0.17 lb/hr of PM-10 while operating

Apply 50% reduction from water sprays in ceiling. These are turned off for the cold weather months (Nov-Mar), 5 months out of 12, only apply to tons per year, not for short term air modeling
50% is an assumption based on published factors from EPA-AP-42 of 78% to 96% for close in water sprays on crushing, screening and transfer points for aggregate processing, less control at greater distance from spray
0.5 x 7/12 = 0.27 (27% control), mutiply uncontrolled emissions x 0.73

Calculate Controlled annual emissions

0.163 lb/hr x 0.73 x24 hr/day x 312 day/yr/2000 lb/ton = **0.44 ton/yr** PM-10
0.023 lb/hr x 0.73 x 24 hr/day x 312 day/yr/2000 lb/ton = **0.06 ton/yr** PM-2.5
Operations:6 days/week x 52 weeks/year = 312 days/yr

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2,
a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2 (X4 as for winter baseline with anti skid abrasives)

		No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 15.7 tons per Truck full	overestimate the incremental number of trucks (actual = 1400 TPD / 15.7 ton/truck - 59 existing = 30)	41	15.7	20	36	17.85
C&D 0 tons per Truck empty		41	0	20	20	10.00
Total Truck Trips		82	trips/day			27.85
Total Trucks		41	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (27.85) ^1.02 = 66.0 g/VMT
0.145 lb/VMT

Estimate each truck travels approximately 1100 ft from Route 9 to come in and back up and 900 ft to leave, avg 1000 ft 1000
Total daily PM-10 fugitive emissions: 41 x 1000/5280 x 0.145 lb/VMT 1.1 lb/day
1.1 lb/day x 312 day/yr x 1 ton/2000 lb = **0.18 tons/yr** **PM-10**

For PM-2.5, the value of k is reduced to 0.25 X g/VMT, 16.5 g/VMT
0.04 lb/VMT

Factor down to PM-2.5: 0.25/1.0 x 0.18 ton/yr = **0.04 tons/yr** **PM-2.5**

SUMMARY: Total of C&D Tipping, Handling (including Rail Car Loading) and Paved Roads

0.62 tons/yr **PM-10**
0.11 tons/yr **PM-2.5**

Doors are open so worst case is all PM emissions coming out doors, conduct air modeling of this condition

PM-10 emission rate total from all doors **0.0205 g/s from all doors**
PM-2.5 emission rate total from all doors **0.00288 g/s from all doors**

Existing

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0207	0.0029	24-hour
	0.0414	0.0058	12-hour (for addition to incremental future)
	0.0552	0.0078	9-hour
	0.0827	0.0116	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0129	0.0018	8,760 hr/yr
	0.0329	0.0046	260-day/yr & 12 hr/day + 52-day/yr & 6 hr/day = 3,432 hr/yr (for addition to incremental future)
	0.0426	0.0060	260-day/yr & 9 hr/day + 52-day/yr & 6 hr/day = 2,652 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 62.4 g PM10/VMT on-site paved roads

15.6 g PM2.5/VMT

Incremental

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0205	0.0029	24-hour
	0.0410	0.0058	12-hour
	0.0820	0.0115	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0128	0.0018	8,760 hr/yr
	0.0327	0.0046	260 days/yr & 12 hr/day + 52 days/yr & 6 hr/day = 3,432 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 66.0 g PM10/VMT on-site paved roads

16.5 g PM2.5/VMT

Future = Existing + Incremental

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0412	0.0058	24-hour
	0.0824	0.0116	12-hour
	0.1647	0.0232	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0257	0.0036	8,760 hr/yr
	0.0656	0.0092	260 days/yr & 12 hr/day + 52 days/yr & 6 hr/day = 3,432 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 66.0 g PM10/VMT on-site paved roads

16.5 g/VMT

Attachment 3-1d

Stage 2 with Stage 1 Rail Air Source Parameters & Calculations

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
NAAQS Results - All Sources - Stage 1 with Stage 2 Rail

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
PM2.5	24 HOUR (4)	3.66	2017-2021	729213.48, 4682995.05, 151.42, 324.78, 0	14.5	18.16	35	52%
	ANNUAL (5)	0.71	2017-2021	729399.92, 4683148.26, 160.30, 315.21, 0	6.0	6.71	12	56%
NO_2	1 HOUR (6)	133.28	2017-2021	729218.36, 4682995.85, 152.04, 324.78, 0	***Included***	133.28	188	71%
	ANNUAL (7)	26.03	2021	729306.94, 4683061.13, 154.06, 317.66, 0	***Included***	26.03	100	26%

Notes:

(4) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years

(5) Maximum Annual Concentration Averaged Over 5 Years

(6) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

(7) Highest Annual Concentration Over 5 Years

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Annual Allowable Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Allowable Ambient Limit (AAL) ($\mu g/m^3$)	% of Standard
ACROLEIN	ANNUAL	3.85E-03	2021	729306.94, 4683061.13, 154.06, 317.66, 0	0.07	6%
FORMALDEHYDE	ANNUAL	6.11E-02	2021	729306.94, 4683061.13, 154.06, 317.66, 0	0.08	76%

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
HAPs Results - All Sources - Threshold Exposure Limits

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	Threshold Exposure Limits (TEL) ($\mu g/m^3$)	% of Standard
ACROLEIN	24-Hr	5.61E-02	21122924	729213.48, 4682995.05, 151.42, 324.78, 0	0.07	80%
FORMALDEHYDE	24-Hr	9.27E-01	18111924	729259.04, 4683017.66, 152.01, 317.66, 0	2	46%

ReSource - Ware, MA

Stage 1 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD Input Emissions

Inside Building (g/s)

Description		Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene
Fugitive Dust (LT)						7.10E-02	9.99E-03			
Fugitive Dust (ST - 6hr)						1.65E-01	2.32E-02			
Fugitive Dust (ST - 11hr)						8.99E-02	1.26E-02			
CAT 966M Loader (2)				4.60E-03	5.54E-02	2.30E-04	2.30E-04	6.21E-05	8.00E+00	7.25E-05
CAT 345DL Excavator				4.03E-02	1.61E-03	4.08E-04	3.96E-04	8.51E-05	1.54E+01	7.02E-05
CAT 330C Excavator				2.62E-02	9.39E-03	1.77E-03	1.72E-03	5.53E-05	1.00E+01	4.56E-05
TOTAL				7.11E-02	6.64E-02	9.23E-02	1.50E-02	2.02E-04	3.34E+01	1.88E-04
Div/6 Doors	11hr	Volume	(R/T)DOOR1-6	0.0119	1.11E-02	1.54E-02	2.50E-03	3.37E-05	5.57E+00	3.14E-05
	6hr		Saturday			2.79E-02	4.25E-03			
			Saturday/Weekday Ratio for EMISFACT (Particulates only)			1.81	1.70			

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

Description	Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene
TOTAL			1.19E-01	2.26E-02	3.80E-03	3.71E-03	3.10E-06	1.13E+01	2.01E-05
Truck Engine doing work (Hydraulic Rev/Unload)	Volume	W_(R)DOOR1-6	1.99E-02	3.77E-03	6.33E-04	6.18E-04	5.16E-07	1.89E+00	3.35E-06

Railcar Moving (g/s-m2)

Description		Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene
L120C Loader	6600 area (m2)	Area	RAIL_LOADER	3.40E-06	3.16E-06	4.97E-07	4.82E-07	3.54E-09	4.57E-04	1.01E-08

STAGE 1 - Locomotive Idling

Description		Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #1	Point Source	T1LC11	6.38E-02	1.70E-02	1.33E-03	1.33E-03	1.21E-04	6.57E-01	4.07E-05
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #2	Point Source	T1LC12	6.38E-02	1.70E-02	1.33E-03	1.33E-03	1.21E-04	6.57E-01	4.07E-05
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #1	Point Source	T1LC21	6.38E-02	1.70E-02	1.33E-03	1.33E-03	1.21E-04	6.57E-01	4.07E-05
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #2	Point Source	T1LC22	6.38E-02	1.70E-02	1.33E-03	1.33E-03	1.21E-04	6.57E-01	4.07E-05
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 North	Point Source	T2LC11_N	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 North	Point Source	T2LC12_N	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 North	Point Source	T2LC21_N	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 North	Point Source	T2LC22_N	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 South	Point Source	T2LC11_S	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 South	Point Source	T2LC12_S	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 South	Point Source	T2LC21_S	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 South	Point Source	T2LC22_S	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 North	Point Source	T3LC11_N	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 North	Point Source	T3LC12_N	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 North	Point Source	T3LC21_N	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05

	Description	Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 North	Point Source	T3LC22_N	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 South	Point Source	T3LC11_S	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 South	Point Source	T3LC12_S	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 South	Point Source	T3LC21_S	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 South	Point Source	T3LC22_S	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05

Locomotive Switching/Pushing

	Description	Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene
GE EMD-38-2 Locomotive	Am Trip (#1) Switching	Line Volume	T1_SWC	1.946E-01	3.264E-02	4.983E-03	4.983E-03	1.900E-03	1.032E+01	6.389E-04
GE EMD-38-2 Locomotive	PM Trip (#2) Switching North	Line Volume	T2_SWC_N	1.076E-01	1.723E-02	3.172E-03	3.172E-03	1.193E-03	6.485E+00	4.013E-04
GE EMD-38-2 Locomotive	PM Trip (#2) Switching South	Line Volume	T2_SWC_S	1.076E-01	1.723E-02	3.172E-03	3.172E-03	1.193E-03	6.485E+00	4.013E-04
GE EMD-38-2 Locomotive	PM Trip (#3) Switching North	Line Volume	T3_SWC_N	7.666E-02	1.262E-02	2.082E-03	2.082E-03	7.901E-04	4.294E+00	2.657E-04
GE EMD-38-2 Locomotive	PM Trip (#3) Switching South	Line Volume	T3_SWC_S	7.666E-02	1.262E-02	2.082E-03	2.082E-03	7.901E-04	4.294E+00	2.657E-04

Roadway (g/s)

Description	Source Type	AERMOD Source Name	NOx	CO	PM10	PM2.5	SO2	CO2E	Benzene
Two Lane Onsite Roadway	Line Volume	ONSITEDRIVE	3.208E-02	1.133E-02	1.196E-01	3.104E-02	1.742E-06	4.474E+00	1.137E-05
Fines Trucks	Line Volume	FINESTRUCKS	8.514E-04	3.006E-04	2.276E-03	5.991E-04	4.623E-08	1.187E-01	3.017E-07
Empty Trucks return path	Line Volume	TRUCKS_RTRN	3.369E-03	1.190E-03	9.006E-03	2.371E-03	1.830E-07	4.699E-01	1.194E-06
Trucks U-Turn and backup to Door 3	Line Volume	UTURN_PATH	8.799E-03	3.107E-03	4.215E-02	1.085E-02	4.778E-07	1.227E+00	3.118E-06
Trucks forward/backup to Door2	Line Volume	DOOR2_TIP	7.004E-04	2.473E-04	3.356E-03	8.637E-04	3.803E-08	9.769E-02	2.482E-07
Trucks forward/backup to Door4	Line Volume	DOOR4_TIP	6.794E-04	2.399E-04	3.255E-03	8.377E-04	3.689E-08	9.476E-02	2.408E-07
Rte 9 East of Gilbertville	Line Volume	SLINE2	2.157E-02	6.533E-03	1.096E-03	1.070E-03	8.935E-07	3.276E+00	5.801E-06
Rte 9/32 Site Drive to Gilbertville	Line Volume	SLINE3	7.753E-03	2.348E-03	3.939E-04	3.844E-04	3.211E-07	1.177E+00	2.085E-06
Rte 9/32, Site Drive to Knox	Line Volume	SLINE4	3.658E-02	1.108E-02	1.858E-03	1.814E-03	1.515E-06	5.554E+00	9.836E-06

Truck Idling - Volume Sources (g/s)

Description	Source Type	AERMOD Source Name	NOx	CO	PM10	PM2.5	SO2	CO2E	Benzene
Truck Exhaust Tipping Area	Volume	IDLE_APRON	2.97E-02	8.96E-03	1.47E-03	1.35E-03	9.94E-06	2.90E+00	1.97E-05
Outbound idling trucks queue	Volume	OBTRUCKIDLE	2.23E-03	6.72E-04	1.10E-04	1.01E-04	7.45E-07	2.18E-01	1.48E-06
Inb Trucks on Scale idling	Volume	IB_SCALE_IDL	8.17E-03	2.46E-03	4.03E-04	3.71E-04	2.73E-06	7.98E-01	5.42E-06
Ob Trucks on Scale idling	Volume	OB_SCALE_TRK	2.01E-02	6.05E-03	9.90E-04	9.11E-04	6.71E-06	1.96E+00	1.33E-05
Site Drive @Rte 9	Volume	TRUCKIDLE2	0.000310	9.33E-05	1.53E-05	0.0000141	1.04E-07	3.02E-02	2.05E-07
Gilbertville Rd & Rte 9	Volume	TRUCKIDLE3	0.000622	1.88E-04	3.07E-05	0.0000282	2.08E-07	6.08E-02	4.13E-07

ReSource - Ware, MA

Stage 1 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD

Inside Building (g/s)

Description		Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
Fugitive Dust (LT)												
Fugitive Dust (ST - 6hr)												
Fugitive Dust (ST - 11hr)												
CAT 966M Loader (2)				1.19E-03	8.32E-06	1.47E-04	1.60E-08	2.87E-10	2.13E-10	0.00E+00	5.21E-06	3.98E-04
CAT 345DL Excavator				6.34E-04	3.15E-05	8.46E-05	2.51E-08	2.74E-10	3.34E-10	0.00E+00	3.09E-06	2.12E-04
CAT 330C Excavator				4.12E-04	2.05E-05	5.50E-05	1.63E-08	1.78E-10	2.17E-10	0.00E+00	2.01E-06	1.38E-04
TOTAL				2.24E-03	6.04E-05	2.87E-04	5.74E-08	7.39E-10	7.63E-10	0.00E+00	1.03E-05	7.48E-04
Div/6 Doors	11hr	Volume	(R/T)DOOR1-6	3.73E-04	1.01E-05	4.78E-05	9.57E-09	1.23E-10	1.27E-10	0.00E+00	1.72E-06	1.25E-04
	6hr		Saturday									
			Saturday/Weekday Ratio for									

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

Description	Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
TOTAL			2.21E-04	2.37E-05	3.90E-05	2.57E-07	1.10E-09	1.23E-09	6.55E-07	6.98E-06	1.07E-04
Truck Engine doing work (Hydraulic Rev/Unload)	Volume	W_(R)DOOR1-6	3.68E-05	3.94E-06	6.50E-06	4.28E-08	1.84E-10	2.05E-10	1.09E-07	1.16E-06	1.79E-05

Railcar Moving (g/s-m2)

Description		Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
L120C Loader	6600 area (m2)	Area	RAIL_LOADER	7.78E-08	1.40E-09	8.03E-09	9.14E-13	1.64E-14	1.21E-14	0.00E+00	5.80E-10	2.75E-08

STAGE 1 - Locomotive Idling

Description		Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #1	Point Source	T1LC11	2.13E-04	5.63E-07	2.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-06	7.63E-05
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #2	Point Source	T1LC12	2.13E-04	5.63E-07	2.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-06	7.63E-05
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #1	Point Source	T1LC21	2.13E-04	5.63E-07	2.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-06	7.63E-05
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #2	Point Source	T1LC22	2.13E-04	5.63E-07	2.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-06	7.63E-05
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 North	Point Source	T2LC11_N	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 North	Point Source	T2LC12_N	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 North	Point Source	T2LC21_N	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 North	Point Source	T2LC22_N	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 South	Point Source	T2LC11_S	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 South	Point Source	T2LC12_S	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 South	Point Source	T2LC21_S	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 South	Point Source	T2LC22_S	1.28E-05	3.37E-08	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-08	4.57E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 North	Point Source	T3LC11_N	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 North	Point Source	T3LC12_N	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 North	Point Source	T3LC21_N	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05

	Description	Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 North	Point Source	T3LC22_N	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 South	Point Source	T3LC11_S	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 South	Point Source	T3LC12_S	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 South	Point Source	T3LC21_S	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 South	Point Source	T3LC22_S	9.39E-05	2.48E-07	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-07	3.36E-05

Locomotive Switching/Pushing

	Description	Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
GE EMD-38-2 Locomotive	Am Trip (#1) Switching	Line Volume	T1_SWC	3.350E-03	8.837E-06	4.313E-04	########	########	########	########	2.344E-05	1.198E-03
GE EMD-38-2 Locomotive	PM Trip (#2) Switching North	Line Volume	T2_SWC_N	2.105E-03	5.551E-06	2.709E-04	########	########	########	########	1.473E-05	7.525E-04
GE EMD-38-2 Locomotive	PM Trip (#2) Switching South	Line Volume	T2_SWC_S	2.105E-03	5.551E-06	2.709E-04	########	########	########	########	1.473E-05	7.525E-04
GE EMD-38-2 Locomotive	PM Trip (#3) Switching North	Line Volume	T3_SWC_N	1.394E-03	3.676E-06	1.794E-04	########	########	########	########	9.751E-06	4.983E-04
GE EMD-38-2 Locomotive	PM Trip (#3) Switching South	Line Volume	T3_SWC_S	1.394E-03	3.676E-06	1.794E-04	########	########	########	########	9.751E-06	4.983E-04

Roadway (g/s)

Description	Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
Two Lane Onsite Roadway	Line Volume	ONSITEDRIVE	1.248E-04	1.337E-05	1.538E-05	1.653E-07	7.098E-10	7.907E-10	4.221E-07	3.934E-06	5.975E-05
Fines Trucks	Line Volume	FINESTRUCKS	3.313E-06	3.548E-07	4.083E-07	4.388E-09	1.884E-11	2.099E-11	1.120E-08	1.044E-07	1.586E-06
Empty Trucks return path	Line Volume	TRUCKS_RTRN	1.311E-05	1.404E-06	1.616E-06	1.736E-08	7.455E-11	8.305E-11	4.434E-08	4.132E-07	6.276E-06
Trucks U-Turn and backup to Door 3	Line Volume	UTURN_PATH	3.424E-05	3.667E-06	4.219E-06	4.535E-08	1.947E-10	2.169E-10	1.158E-07	1.079E-06	1.639E-05
Trucks forward/backup to Door2	Line Volume	DOOR2_TIP	2.725E-06	2.919E-07	3.359E-07	3.610E-09	1.550E-11	1.727E-11	9.217E-09	8.590E-08	1.305E-06
Trucks forward/backup to Door4	Line Volume	DOOR4_TIP	2.644E-06	2.831E-07	3.258E-07	3.502E-09	1.503E-11	1.675E-11	8.941E-09	8.332E-08	1.266E-06
Rte 9 East of Gilbertville	Line Volume	SLINE2	6.381E-05	6.832E-06	1.127E-05	7.408E-08	3.180E-10	3.543E-10	1.891E-07	2.016E-06	3.096E-05
Rte 9/32 Site Drive to Gilbertville	Line Volume	SLINE3	2.293E-05	2.455E-06	4.049E-06	2.662E-08	1.143E-10	1.273E-10	6.797E-08	7.245E-07	1.113E-05
Rte 9/32, Site Drive to Knox	Line Volume	SLINE4	1.082E-04	1.159E-05	1.910E-05	1.256E-07	5.393E-10	6.007E-10	3.207E-07	3.418E-06	5.250E-05

Truck Idling - Volume Sources (g/s)

Description	Source Type	AERMOD Source Name	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury	Nickel	1,3-Butadiene	Acetaldehyde
Truck Exhaust Tipping Area	Volume	IDLE_APRON	2.13E-04	2.31E-05	1.82E-05	5.13E-07	2.20E-09	2.45E-09	1.31E-06	6.94E-06	1.02E-04
Outbound idling trucks queue	Volume	OBTRUCKIDLE	1.60E-05	1.73E-06	1.36E-06	3.85E-08	1.65E-10	1.84E-10	9.83E-08	5.20E-07	7.62E-06
Inb Trucks on Scale idling	Volume	IB_SCALE_IDL	5.85E-05	6.35E-06	4.99E-06	1.41E-07	6.06E-10	6.75E-10	3.60E-07	1.91E-06	2.79E-05
Ob Trucks on Scale idling	Volume	OB_SCALE_TRK	1.44E-04	1.56E-05	1.23E-05	3.46E-07	1.49E-09	1.66E-09	8.85E-07	4.68E-06	6.86E-05
Site Drive @Rte 9	Volume	TRUCKIDLE2	2.22E-06	2.41E-07	1.89E-07	5.35E-09	2.30E-11	2.56E-11	1.37E-08	7.23E-08	1.06E-06
Gilbertville Rd & Rte 9	Volume	TRUCKIDLE3	4.46E-06	4.83E-07	3.80E-07	1.07E-08	4.61E-11	5.14E-11	2.74E-08	1.45E-07	2.13E-06

ReSource - Ware, MA

Stage 1 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD

Inside Building (g/s)

Description		Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
Fugitive Dust (LT)												
Fugitive Dust (ST - 6hr)												
Fugitive Dust (ST - 11hr)												
CAT 966M Loader (2)				5.95E-05	4.14E-05	1.87E-05	1.40E-05	0.00E+00	3.87E-05	0.00E+00	2.44E-14	1.02E-05
CAT 345DL Excavator				3.42E-05	1.30E-04	1.46E-05	9.27E-06	0.00E+00	7.50E-05	0.00E+00	3.69E-14	5.84E-14
CAT 330C Excavator				2.22E-05	8.44E-05	9.49E-06	6.02E-06	0.00E+00	4.87E-05	0.00E+00	2.40E-14	4.01E-06
TOTAL				1.16E-04	2.56E-04	4.28E-05	2.93E-05	0.00E+00	1.62E-04	0.00E+00	8.53E-14	1.42E-05
Div/6 Doors	11hr	Volume	(R/T)DOOR1-6	1.93E-05	4.26E-05	7.13E-06	4.89E-06	0.00E+00	2.71E-05	0.00E+00	1.42E-14	2.36E-06
	6hr		Saturday									
			Saturday/Weekday Ratio for									

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

Description	Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
TOTAL			1.81E-05	1.31E-04	1.12E-05	5.64E-06	1.21E-05	3.24E-03	7.07E-06	2.83E-13	3.13E-13
Truck Engine doing work (Hydraulic Rev/Unload)	Volume	W_(R)DOOR1-6	3.02E-06	1.31E-04	1.12E-05	5.64E-06	1.21E-05	3.24E-03	7.07E-06	2.83E-13	3.13E-13

Railcar Moving (g/s-m2)

Description		Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
L120C Loader	6600 area (m2)	Area	RAIL_LOADER	6.53E-09	4.73E-09	1.82E-09	6.26E-10	0.00E+00	5.78E-09	0.00E+00	2.79E-18	1.16E-09

STAGE 1 - Locomotive Idling

Description		Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #1	Point Source	T1LC11	1.36E-05	0.00E+00	3.10E-06	1.90E-06	0.00E+00	8.56E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #2	Point Source	T1LC12	1.36E-05	0.00E+00	3.10E-06	1.90E-06	0.00E+00	8.56E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #1	Point Source	T1LC21	1.36E-05	0.00E+00	3.10E-06	1.90E-06	0.00E+00	8.56E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #2	Point Source	T1LC22	1.36E-05	0.00E+00	3.10E-06	1.90E-06	0.00E+00	8.56E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 North	Point Source	T2LC11_N	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 North	Point Source	T2LC12_N	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 North	Point Source	T2LC21_N	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 North	Point Source	T2LC22_N	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 South	Point Source	T2LC11_S	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 South	Point Source	T2LC12_S	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 South	Point Source	T2LC21_S	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 South	Point Source	T2LC22_S	8.15E-07	0.00E+00	1.86E-07	1.14E-07	0.00E+00	5.13E-07	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 North	Point Source	T3LC11_N	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 North	Point Source	T3LC12_N	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 North	Point Source	T3LC21_N	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00

	Description	Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 North	Point Source	T3LC22_N	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 South	Point Source	T3LC11_S	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 South	Point Source	T3LC12_S	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 South	Point Source	T3LC21_S	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 South	Point Source	T3LC22_S	5.99E-06	0.00E+00	1.37E-06	8.36E-07	0.00E+00	3.77E-06	0.00E+00	0.00E+00	0.00E+00

Locomotive Switching/Pushing

	Description	Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
GE EMD-38-2 Locomotive	Am Trip (#1) Switching	Line Volume	T1_SWC	2.136E-04	########	4.876E-05	2.982E-05	########	1.344E-04	########	########	########
GE EMD-38-2 Locomotive	PM Trip (#2) Switching North	Line Volume	T2_SWC_N	1.342E-04	########	3.063E-05	1.873E-05	########	8.445E-05	########	########	########
GE EMD-38-2 Locomotive	PM Trip (#2) Switching South	Line Volume	T2_SWC_S	1.342E-04	########	3.063E-05	1.873E-05	########	8.445E-05	########	########	########
GE EMD-38-2 Locomotive	PM Trip (#3) Switching North	Line Volume	T3_SWC_N	8.885E-05	########	2.028E-05	1.240E-05	########	5.592E-05	########	########	########
GE EMD-38-2 Locomotive	PM Trip (#3) Switching South	Line Volume	T3_SWC_S	8.885E-05	########	2.028E-05	1.240E-05	########	5.592E-05	########	########	########

Roadway (g/s)

Description	Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
Two Lane Onsite Roadway	Line Volume	ONSITEDRIVE	1.017E-05	5.803E-05	6.042E-06	3.178E-06	4.794E-06	1.766E-03	2.800E-06	1.823E-13	2.015E-13
Fines Trucks	Line Volume	FINESTRUCKS	2.701E-07	1.540E-06	1.604E-07	8.436E-08	1.272E-07	4.688E-05	7.431E-08	4.839E-15	5.349E-15
Empty Trucks return path	Line Volume	TRUCKS_RTRN	1.069E-06	6.095E-06	6.347E-07	3.338E-07	5.035E-07	1.855E-04	2.941E-07	1.915E-14	2.117E-14
Trucks U-Turn and backup to Door 3	Line Volume	UTURN_PATH	2.791E-06	1.592E-05	1.657E-06	8.718E-07	1.315E-06	4.844E-04	7.680E-07	5.001E-14	5.528E-14
Trucks forward/backup to Door2	Line Volume	DOOR2_TIP	2.222E-07	1.267E-06	1.319E-07	6.940E-08	1.047E-07	3.856E-05	6.114E-08	3.981E-15	4.401E-15
Trucks forward/backup to Door4	Line Volume	DOOR4_TIP	2.155E-07	1.229E-06	1.280E-07	6.731E-08	1.015E-07	3.740E-05	5.930E-08	3.862E-15	4.268E-15
Rte 9 East of Gilbertville	Line Volume	SLINE2	5.237E-06	3.787E-05	3.229E-06	1.628E-06	3.494E-06	9.343E-04	2.040E-06	8.169E-14	9.029E-14
Rte 9/32 Site Drive to Gilbertville	Line Volume	SLINE3	1.882E-06	1.361E-05	1.160E-06	5.850E-07	1.255E-06	3.358E-04	7.333E-07	2.936E-14	3.245E-14
Rte 9/32, Site Drive to Knox	Line Volume	SLINE4	8.880E-06	6.421E-05	5.475E-06	2.760E-06	5.924E-06	1.584E-03	3.460E-06	1.385E-13	1.531E-13

Truck Idling - Volume Sources (g/s)

Description	Source Type	AERMOD Source Name	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans
Truck Exhaust Tipping Area	Volume	IDLE_APRON	1.75E-05	1.39E-04	9.88E-06	5.41E-06	3.08E-06	3.55E-05	5.58E-06	5.66E-13	6.26E-13
Outbound idling trucks queue	Volume	OBTRUCKIDLE	1.31E-06	1.05E-05	7.41E-07	4.06E-07	2.31E-07	2.66E-06	4.19E-07	4.25E-14	4.69E-14
Inb Trucks on Scale idling	Volume	IB_SCALE_IDL	4.82E-06	3.84E-05	2.72E-06	1.49E-06	8.48E-07	9.75E-06	1.53E-06	1.56E-13	1.72E-13
Ob Trucks on Scale idling	Volume	OB_SCALE_TRK	1.18E-05	9.42E-05	6.67E-06	3.65E-06	2.08E-06	2.39E-05	3.77E-06	3.82E-13	4.22E-13
Site Drive @Rte 9	Volume	TRUCKIDLE2	1.83E-07	1.45E-06	1.03E-07	5.64E-08	3.21E-08	3.70E-07	5.81E-08	5.90E-15	6.52E-15
Gilbertville Rd & Rte 9	Volume	TRUCKIDLE3	3.67E-07	2.92E-06	2.07E-07	1.13E-07	6.46E-08	7.43E-07	1.17E-07	1.19E-14	1.31E-14

ReSource - Ware, MA

Stage 1 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD

Inside Building (g/s)

Description		Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
Fugitive Dust (LT)					
Fugitive Dust (ST - 6hr)					
Fugitive Dust (ST - 11hr)					
CAT 966M Loader (2)				4.49E-05	9.43E-06
CAT 345DL Excavator				4.36E-05	2.43E-05
CAT 330C Excavator				2.83E-05	1.58E-05
TOTAL				1.17E-04	4.95E-05
Div/6 Doors	11hr	Volume	(R/T)DOOR1-6	1.95E-05	8.25E-06
	6hr		Saturday		
			Saturday/Weekday Ratio for		

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

Description	Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
TOTAL			0.00E+00	0.00E+00
Truck Engine doing work (Hydraulic Rev/Unload)	Volume	W_(R)DOOR1-6	0.00E+00	0.00E+00

Railcar Moving (g/s-m2)

Description		Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
L120C Loader	6600 area (m2)	Area	RAIL_LOADER	5.12E-09	2.86E-09

STAGE 1 - Locomotive Idling

Description		Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #1	Point Source	T1LC11	6.07E-06	6.76E-06
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #1, Stack #2	Point Source	T1LC12	6.07E-06	6.76E-06
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #1	Point Source	T1LC21	6.07E-06	6.76E-06
GE EMD-38-2 Locomotive	Am Trip (#1), Locomotive #2, Stack #2	Point Source	T1LC22	6.07E-06	6.76E-06
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 North	Point Source	T2LC11_N	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 North	Point Source	T2LC12_N	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 North	Point Source	T2LC21_N	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 North	Point Source	T2LC22_N	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1 South	Point Source	T2LC11_S	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2 South	Point Source	T2LC12_S	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1 South	Point Source	T2LC21_S	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2 South	Point Source	T2LC22_S	3.63E-07	4.05E-07
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 North	Point Source	T3LC11_N	2.67E-06	2.98E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 North	Point Source	T3LC12_N	2.67E-06	2.98E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 North	Point Source	T3LC21_N	2.67E-06	2.98E-06

	Description	Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 North	Point Source	T3LC22_N	2.67E-06	2.98E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #1 South	Point Source	T3LC11_S	2.67E-06	2.98E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #1, Stack #2 South	Point Source	T3LC12_S	2.67E-06	2.98E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #1 South	Point Source	T3LC21_S	2.67E-06	2.98E-06
GE EMD-38-2 Locomotive	PM Trip (#3), Locomotive #2, Stack #2 South	Point Source	T3LC22_S	2.67E-06	2.98E-06

Locomotive Switching/Pushing

	Description	Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	Am Trip (#1) Switching	Line Volume	T1_SWC	9.529E-05	1.062E-04
GE EMD-38-2 Locomotive	PM Trip (#2) Switching North	Line Volume	T2_SWC_N	5.986E-05	6.671E-05
GE EMD-38-2 Locomotive	PM Trip (#2) Switching South	Line Volume	T2_SWC_S	5.986E-05	6.671E-05
GE EMD-38-2 Locomotive	PM Trip (#3) Switching North	Line Volume	T3_SWC_N	3.963E-05	4.417E-05
GE EMD-38-2 Locomotive	PM Trip (#3) Switching South	Line Volume	T3_SWC_S	3.963E-05	4.417E-05

Roadway (g/s)

	Description	Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
Two Lane Onsite Roadway		Line Volume	ONSITEDRIVE	########	0.000E+00
Fines Trucks		Line Volume	FINESTRUCKS	########	0.000E+00
Empty Trucks return path		Line Volume	TRUCKS_RTRN	########	0.000E+00
Trucks U-Turn and backup to Door 3		Line Volume	UTURN_PATH	########	0.000E+00
Trucks forward/backup to Door2		Line Volume	DOOR2_TIP	########	0.000E+00
Trucks forward/backup to Door4		Line Volume	DOOR4_TIP	########	0.000E+00
Rte 9 East of Gilbertville		Line Volume	SLINE2	########	0.000E+00
Rte 9/32 Site Drive to Gilbertville		Line Volume	SLINE3	########	0.000E+00
Rte 9/32, Site Drive to Knox		Line Volume	SLINE4	########	0.000E+00

Truck Idling - Volume Sources (g/s)

	Description	Source Type	AERMOD Source Name	Acetone	Methyl Ethyl Ketone
Truck Exhaust Tipping Area		Volume	IDLE_APRON	0.00E+00	0.00E+00
Outbound idling trucks queue		Volume	OBTRUCKIDLE	0.00E+00	0.00E+00
Inb Trucks on Scale idling		Volume	IB_SCALE_IDL	0.00E+00	0.00E+00
Ob Trucks on Scale idling		Volume	OB_SCALE_TRK	0.00E+00	0.00E+00
Site Drive @Rte 9		Volume	TRUCKIDLE2	0.00E+00	0.00E+00
Gilbertville Rd & Rte 9		Volume	TRUCKIDLE3	0.00E+00	0.00E+00

AERMOD Input - Plume Attributes

Area source, line volume source, volume sources

Line Volume Sources	Vertical dimension (m)	Release Height (m)	Plume Width (m)	SYINIT (m)	SZINIT (m)
Locomotives switching					
T1_SWC	8.72	5.13	3.15	2.93	4.06
T2_SWC_N	8.72	5.13	3.15	2.93	4.06
T2_SWC_S	8.72	5.13	3.15	2.93	4.06
T3_SWC_N	8.72	5.13	3.15	2.93	4.06
T3_SWC_S	8.72	5.13	3.15	2.93	4.06
Moving Trucks					
ONSITEDRIVE	7.00	3.50	6.60	6.14	3.26
FINESTRUCKS	7.00	3.50	3.30	3.07	3.26
TRUCKS_RTRN	7.00	3.50	3.30	3.07	3.26
UTURN_PATH	7.00	3.50	3.30	3.07	3.26
DOOR2_TIP	7.00	3.50	3.30	3.07	3.26
DOOR4_TIP	7.00	3.50	3.30	3.07	3.26
SLINE2	7.00	3.50	6.60	6.14	3.26
SLINE3	7.00	3.50	6.60	6.14	3.26
SLINE4	7.00	3.50	6.6	6.14	3.26

Volume Sources	Length of Side (m)	Release Height (m)	Initial Vertical dim (m)
Building Truck Bay Doors			
TDOOR1	5.49	4.27	3.97
TDOOR2	5.49	4.27	3.97
TDOOR3	5.49	4.27	3.97
TDOOR4	5.49	4.27	3.97
Building Truck Bay Doors - Truck Revving Emissions			
W_DOOR1	5.49	4.27	3.97
W_DOOR2	5.49	4.27	3.97
W_DOOR3	5.49	4.27	3.97
W_DOOR4	5.49	4.27	3.97
Building Rail Doors			
RDOOR1	4.88	4.27	3.97
RDOOR2	4.88	4.27	3.97
Building Rail Doors - Truck Revving Emissions			
W_RDOOR1	4.88	4.27	3.97
W_RDOOR2	4.88	4.27	3.97
On-site Idling Trucks			
IDLE_APRON	2.60	2.06	1.91
OBTRUCKIDLE	2.60	2.06	1.91
IB_SCALE_IDL	2.60	2.06	1.914
OB_SCALE_TRK	2.60	2.06	1.914

Off-site Idling Trucks @ intersections			
TRUCKIDLE2	3.3	2.1	1.914
TRUCKIDLE3	3.3	2.1	1.914

Point Sources	Stack Height (m)	Exit temp (F)	Inside Diamter (m)	Exit Velocity (m/s)	Flow Rate (m^3/s)
Idling locomotive stack					
T1LC11	5.131	156	0.3048	7.5	0.55
T1LC12	5.131	156	0.3048	7.5	0.55
T1LC21	5.131	156	0.3048	7.5	0.55
T1LC22	5.131	156	0.3048	7.5	0.55
T2LC11_N	5.131	156	0.3048	7.5	0.55
T2LC12_N	5.131	156	0.3048	7.5	0.55
T2LC21_N	5.131	156	0.3048	7.5	0.55
T2LC22_N	5.131	156	0.3048	7.5	0.55
T2LC11_S	5.131	156	0.3048	7.5	0.55
T2LC12_S	5.131	156	0.3048	7.5	0.55
T2LC21_S	5.131	156	0.3048	7.5	0.55
T2LC22_S	5.131	156	0.3048	7.5	0.55
T3LC11_N	5.131	156	0.3048	7.5	0.55
T3LC12_N	5.131	156	0.3048	7.5	0.55
T3LC21_N	5.131	156	0.3048	7.5	0.55
T3LC22_N	5.131	156	0.3048	7.5	0.55
T3LC11_S	5.131	156	0.3048	7.5	0.55
T3LC12_S	5.131	156	0.3048	7.5	0.55
T3LC21_S	5.131	156	0.3048	7.5	0.55
T3LC22_S	5.131	156	0.3048	7.5	0.55

Area Sources	Initial Vertical Dim. (m)	Release Height (m)
RAIL_LOADER	3	3.048

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

source added or modified from original 1/23/2023, IHW
text Added source, text, or calculation, Jan 2023 IHW

MOVES Emission Factors (g/vmt)

	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
15 mph	17.92	6.33	0.81	0.84	9.73E-04	2499.95		6.35E-03		6.97E-02
30 mph	13.45	4.07	0.68	0.67	5.57E-04	2042.57		3.62E-03		3.98E-02
Fugitive PM - Emtpy & Full Truck Avg Emissions			66.03	16.51						
Fugitive PM - Emtpy Truck, 0 tons C&D			47.10	11.78						
Fugitive PM - Full Truck, 15.7 tons C&D			85.06	21.26						

VMT	link Avg Speed mph	Peak Hourly Veh. #	Link Length meters	Link Length miles	Link Vehicle Miles Traveled VMT/hr (peak hr)	Notes
Two Lane Onsite Roadway	15	40	259.20	0.16	6.44	40 trips during peak hour, 20 trucks total - 50% Full, 50% empty
Fines Trucks	15	2	137.60	0.09	0.17	2 Fines Trucks
Empty Trucks return path	15	18	60.50	0.04	0.68	18 trips TOTAL - this ONE WAY path for EMPTY trucks exiting the building & returning to the main site drive
Trucks U-Turn and backup to Door 3	15	18	158.00	0.10	1.77	18 trips, FULL Trucks (since the trucks make a loop and do not return on the same pathway)
Trucks forward/backup to Door2	15	4	56.60	0.04	0.14	3 doors for tipping; 20 trucks during peak hour, each tip for 15 minutes = each door has capacity for 4 trucks per hour = 12 trucks tip per hour
Trucks forward/backup to Door4	15	4	54.90	0.03	0.14	
Rte 9 East of Gilbertville	30	30	309.70	0.19	5.77	
Rte 9/32 Site Drive to Gilbertville	30	30	111.30	0.07	2.07	
Rte 9/32, Site Drive to Knox	30	10	1575.40	0.98	9.79	

Emissions (g/hr)	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
Two Lane Onsite Roadway	1.15E+02	4.08E+01	430.60	111.73	6.27E-03	1.61E+04	0	4.09E-02	0	4.49E-01
Fines Trucks	3.07E+00	1.08E+00	8.19	2.16	1.66E-04	4.27E+02	0	1.09E-03	0	1.19E-02
Empty Trucks return path	1.21E+01	4.28E+00	32.42	8.53	6.59E-04	1.69E+03	0	4.30E-03	0	4.72E-02
Trucks U-Turn and backup to Door 3	3.17E+01	1.12E+01	151.75	39.06	1.72E-03	4.42E+03	0	1.12E-02	0	1.23E-01
Trucks forward/backup to Door2	2.52E+00	8.90E-01	12.08	3.11	1.37E-04	3.52E+02	0	8.94E-04	0	9.81E-03
Trucks forward/backup to Door4	2.45E+00	8.64E-01	11.72	3.02	1.33E-04	3.41E+02	0	8.67E-04	0	9.52E-03
Rte 9 East of Gilbertville	7.77E+01	2.35E+01	3.95E+00	3.85E+00	3.22E-03	1.18E+04	0	2.09E-02	0	2.30E-01
Rte 9/32 Site Drive to Gilbertville	2.79E+01	8.45E+00	1.42E+00	1.38E+00	1.16E-03	4.24E+03	0	7.50E-03	0	8.26E-02
Rte 9/32, Site Drive to Knox	1.32E+02	3.99E+01	6.69E+00	6.53E+00	5.45E-03	2.00E+04	0	3.54E-02	0	3.90E-01

AERMOD Emissions (g/s)	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
Two Lane Onsite Roadway	3.21E-02	1.13E-02	1.20E-01	3.10E-02	1.74E-06	4.47E+00	0	1.14E-05	0	1.25E-04

AERMOD Emissions (g/s)	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
Fines Trucks	8.51E-04	3.01E-04	2.28E-03	5.99E-04	4.62E-08	1.19E-01	0	3.02E-07	0	3.31E-06
Empty Trucks return path	3.37E-03	1.19E-03	9.01E-03	2.37E-03	1.83E-07	4.70E-01	0	1.19E-06	0	1.31E-05
Trucks U-Turn and backup to Door 3	8.80E-03	3.11E-03	4.22E-02	1.08E-02	4.78E-07	1.23E+00	0	3.12E-06	0	3.42E-05
Trucks forward/backup to Door2	7.00E-04	2.47E-04	3.36E-03	8.64E-04	3.80E-08	9.77E-02	0	2.48E-07	0	2.73E-06
Trucks forward/backup to Door4	6.79E-04	2.40E-04	3.25E-03	8.38E-04	3.69E-08	9.48E-02	0	2.41E-07	0	2.64E-06
Rte 9 East of Gilbertville	2.16E-02	6.53E-03	1.10E-03	1.07E-03	8.93E-07	3.28E+00	0	5.80E-06	0	6.38E-05
Rte 9/32 Site Drive to Gilbertville	7.75E-03	2.35E-03	3.94E-04	3.84E-04	3.21E-07	1.18E+00	0	2.08E-06	0	2.29E-05
Rte 9/32, Site Drive to Knox	3.66E-02	1.11E-02	1.86E-03	1.81E-03	1.51E-06	5.55E+00	0	9.84E-06	0	1.08E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
15 mph	7.47E-03	8.59E-03	9.24E-05			3.97E-07			4.42E-07	2.36E-04				2.20E-03	3.34E-02
30 mph	4.26E-03	7.02E-03	4.62E-05			1.98E-07			2.21E-07	1.18E-04				1.26E-03	1.93E-02
Fugitive PM - Emtpy & Full Truck Avg Emissions															
Fugitive PM - Emtpy Truck, 0 tons C&D															
Fugitive PM - Full Truck, 15.7 tons C&D															

Emissions (g/hr)	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
Two Lane Onsite Roadway	4.81E-02	5.54E-02	5.95E-04	0	0	2.56E-06	0	0	2.85E-06	1.52E-03	0	0	0	1.42E-02	2.15E-01
Fines Trucks	1.28E-03	1.47E-03	1.58E-05	0	0	6.78E-08	0	0	7.56E-08	4.03E-05	0	0	0	3.76E-04	5.71E-03
Empty Trucks return path	5.05E-03	5.82E-03	6.25E-05	0	0	2.68E-07	0	0	2.99E-07	1.60E-04	0	0	0	1.49E-03	2.26E-02
Trucks U-Turn and backup to Door 3	1.32E-02	1.52E-02	1.63E-04	0	0	7.01E-07	0	0	7.81E-07	4.17E-04	0	0	0	3.88E-03	5.90E-02
Trucks forward/backup to Door2	1.05E-03	1.21E-03	1.30E-05	0	0	5.58E-08	0	0	6.22E-08	3.32E-05	0	0	0	3.09E-04	4.70E-03
Trucks forward/backup to Door4	1.02E-03	1.17E-03	1.26E-05	0	0	5.41E-08	0	0	6.03E-08	3.22E-05	0	0	0	3.00E-04	4.56E-03
Rte 9 East of Gilbertville	2.46E-02	4.06E-02	2.67E-04	0	0	1.14E-06	0	0	1.28E-06	6.81E-04	0	0	0	7.26E-03	1.11E-01
Rte 9/32 Site Drive to Gilbertville	8.84E-03	1.46E-02	9.58E-05	0	0	4.11E-07	0	0	4.58E-07	2.45E-04	0	0	0	2.61E-03	4.01E-02
Rte 9/32, Site Drive to Knox	4.17E-02	6.88E-02	4.52E-04	0	0	1.94E-06	0	0	2.16E-06	1.15E-03	0	0	0	1.23E-02	1.89E-01

AERMOD Emissions (g/s)	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
Two Lane Onsite Roadway	1.34E-05	1.54E-05	1.65E-07	0	0	7.10E-10	0	0	7.91E-10	4.22E-07	0	0	0	3.93E-06	5.97E-05

AERMOD Emissions (g/s)	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
Fines Trucks	3.55E-07	4.08E-07	4.39E-09	0	0	1.88E-11	0	0	2.10E-11	1.12E-08	0	0	0	1.04E-07	1.59E-06
Empty Trucks return path	1.40E-06	1.62E-06	1.74E-08	0	0	7.46E-11	0	0	8.30E-11	4.43E-08	0	0	0	4.13E-07	6.28E-06
Trucks U-Turn and backup to Door 3	3.67E-06	4.22E-06	4.53E-08	0	0	1.95E-10	0	0	2.17E-10	1.16E-07	0	0	0	1.08E-06	1.64E-05
Trucks forward/backup to Door2	2.92E-07	3.36E-07	3.61E-09	0	0	1.55E-11	0	0	1.73E-11	9.22E-09	0	0	0	8.59E-08	1.30E-06
Trucks forward/backup to Door4	2.83E-07	3.26E-07	3.50E-09	0	0	1.50E-11	0	0	1.67E-11	8.94E-09	0	0	0	8.33E-08	1.27E-06
Rte 9 East of Gilbertville	6.83E-06	1.13E-05	7.41E-08	0	0	3.18E-10	0	0	3.54E-10	1.89E-07	0	0	0	2.02E-06	3.10E-05
Rte 9/32 Site Drive to Gilbertville	2.46E-06	4.05E-06	2.66E-08	0	0	1.14E-10	0	0	1.27E-10	6.80E-08	0	0	0	7.24E-07	1.11E-05
Rte 9/32, Site Drive to Knox	1.16E-05	1.91E-05	1.26E-07	0	0	5.39E-10	0	0	6.01E-10	3.21E-07	0	0	0	3.42E-06	5.25E-05

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
15 mph	5.69E-03	3.24E-02	3.38E-03	1.78E-03	2.68E-03	9.87E-01	1.56E-03		1.02E-10	1.13E-10			0.87	0.00E+00
30 mph	3.27E-03	2.36E-02	2.01E-03	1.02E-03	2.18E-03	5.83E-01	1.27E-03		5.09E-11	5.63E-11			0.52	0.00E+00
Fugitive PM - Emtpy & Full Truck Avg Emissions														
Fugitive PM - Emtpy Truck, 0 tons C&D														
Fugitive PM - Full Truck, 15.7 tons C&D														

Emissions (g/hr)	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
Two Lane Onsite Roadway	3.66E-02	2.09E-01	2.18E-02	1.14E-02	1.73E-02	6.36E+00	1.01E-02	0.00E+00	6.56E-10	7.25E-10	0.00E+00	0.00E+00	5.62E+00	0.00E+00
Fines Trucks	9.72E-04	5.54E-03	5.77E-04	3.04E-04	4.58E-04	1.69E-01	2.68E-04	0.00E+00	1.74E-11	1.93E-11	0.00E+00	0.00E+00	1.49E-01	0.00E+00
Empty Trucks return path	3.85E-03	2.19E-02	2.28E-03	1.20E-03	1.81E-03	6.68E-01	1.06E-03	0.00E+00	6.89E-11	7.62E-11	0.00E+00	0.00E+00	5.90E-01	0.00E+00
Trucks U-Turn and backup to Door 3	1.00E-02	5.73E-02	5.97E-03	3.14E-03	4.73E-03	1.74E+00	2.76E-03	0.00E+00	1.80E-10	1.99E-10	0.00E+00	0.00E+00	1.54E+00	0.00E+00
Trucks forward/backup to Door2	8.00E-04	4.56E-03	4.75E-04	2.50E-04	3.77E-04	1.39E-01	2.20E-04	0.00E+00	1.43E-11	1.58E-11	0.00E+00	0.00E+00	1.23E-01	0.00E+00
Trucks forward/backup to Door4	7.76E-04	4.42E-03	4.61E-04	2.42E-04	3.66E-04	1.35E-01	2.13E-04	0.00E+00	1.39E-11	1.54E-11	0.00E+00	0.00E+00	1.19E-01	0.00E+00
Rte 9 East of Gilbertville	1.89E-02	1.36E-01	1.16E-02	5.86E-03	1.26E-02	3.36E+00	7.35E-03	0.00E+00	2.94E-10	3.25E-10	0.00E+00	0.00E+00	2.98E+00	0.00E+00
Rte 9/32 Site Drive to Gilbertville	6.78E-03	4.90E-02	4.18E-03	2.11E-03	4.52E-03	1.21E+00	2.64E-03	0.00E+00	1.06E-10	1.17E-10	0.00E+00	0.00E+00	1.07E+00	0.00E+00
Rte 9/32, Site Drive to Knox	3.20E-02	2.31E-01	1.97E-02	9.94E-03	2.13E-02	5.70E+00	1.25E-02	0.00E+00	4.99E-10	5.51E-10	0.00E+00	0.00E+00	5.06E+00	0.00E+00

AERMOD Emissions (g/s)	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
Two Lane Onsite Roadway	1.02E-05	5.80E-05	6.04E-06	3.18E-06	4.79E-06	1.77E-03	2.80E-06	0.00E+00	1.82E-13	2.02E-13	0.00E+00	0.00E+00	1.56E-03	0.00E+00

AERMOD Emissions (g/s)	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
Fines Trucks	2.70E-07	1.54E-06	1.60E-07	8.44E-08	1.27E-07	4.69E-05	7.43E-08	0.00E+00	4.84E-15	5.35E-15	0.00E+00	0.00E+00	4.14E-05	0.00E+00
Empty Trucks return path	1.07E-06	6.09E-06	6.35E-07	3.34E-07	5.04E-07	1.85E-04	2.94E-07	0.00E+00	1.92E-14	2.12E-14	0.00E+00	0.00E+00	1.64E-04	0.00E+00
Trucks U-Turn and backup to Door 3	2.79E-06	1.59E-05	1.66E-06	8.72E-07	1.32E-06	4.84E-04	7.68E-07	0.00E+00	5.00E-14	5.53E-14	0.00E+00	0.00E+00	4.28E-04	0.00E+00
Trucks forward/backup to Door2	2.22E-07	1.27E-06	1.32E-07	6.94E-08	1.05E-07	3.86E-05	6.11E-08	0.00E+00	3.98E-15	4.40E-15	0.00E+00	0.00E+00	3.41E-05	0.00E+00
Trucks forward/backup to Door4	2.15E-07	1.23E-06	1.28E-07	6.73E-08	1.02E-07	3.74E-05	5.93E-08	0.00E+00	3.86E-15	4.27E-15	0.00E+00	0.00E+00	3.31E-05	0.00E+00
Rte 9 East of Gilbertville	5.24E-06	3.79E-05	3.23E-06	1.63E-06	3.49E-06	9.34E-04	2.04E-06	0.00E+00	8.17E-14	9.03E-14	0.00E+00	0.00E+00	8.29E-04	0.00E+00
Rte 9/32 Site Drive to Gilbertville	1.88E-06	1.36E-05	1.16E-06	5.85E-07	1.26E-06	3.36E-04	7.33E-07	0.00E+00	2.94E-14	3.25E-14	0.00E+00	0.00E+00	2.98E-04	0.00E+00
Rte 9/32, Site Drive to Knox	8.88E-06	6.42E-05	5.48E-06	2.76E-06	5.92E-06	1.58E-03	3.46E-06	0.00E+00	1.39E-13	1.53E-13	0.00E+00	0.00E+00	1.41E-03	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022 (g/hr)	NOx	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Naphthalene
0 mph	80.259	24.1896	3.95912	3.64238	0.0268274	7836.78		5.32E-02		5.75E-01	6.23E-02

Idling Times	Idle Minutes Per Truck	Idle seconds Per Truck	Idle Hours per Truck	Peak Hour Trucks	All Truck Idling time ((veh-hr)/hr) [1]	Notes
Truck Exhaust Tipping Area	5	300	0.0833	16	1.333	16 large trucks per hour at peak, all need to stop and remove tarp so assumed to idle 5 min before pulling into door, 6 smaller trucks will not need to idle
Outbound idling trucks queue	3	180	0.0500	2	0.100	3 mins max idling during peak hour, 1 on scale and 2 waiting
Inb Trucks on Scale idling	1	60	0.0167	22	0.367	1 min idling, from recent video
Ob Trucks on Scale idling	3	180	0.0500	18	0.900	3 doors, 15 mins for each large truck to unload, so each door can do 4 large trucks per hour, or 3 doors * 4 large trucks = 12 large trucks per hour + 6 other small trucks = 18.
Site Drive @Rte 9	0.021	1.25	0.0003	40	0.014	4 outgoing trips occur in the next hour, so 18 + 22 = 40
Gilbertville Rd & Rte 9	0.056	3.35	0.0009	30	0.028	

[1] vehicle hours of delay (idle) per hour of actual time

Emissions (g/hr)	NOx	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Naphthalene
Truck Exhaust Tipping Area	1.07E+02	3.23E+01	5.28E+00	4.86E+00	3.58E-02	1.04E+04	0.00	7.10E-02	0.00E+00	7.66E-01	8.31E-02
Outbound idling trucks queue	8.03E+00	2.42E+00	3.96E-01	3.64E-01	2.68E-03	7.84E+02	0.00	5.32E-03	0.00E+00	5.75E-02	6.23E-03
Inb Trucks on Scale idling	2.94E+01	8.87E+00	1.45E+00	1.34E+00	9.84E-03	2.87E+03	0.00	1.95E-02	0.00E+00	2.11E-01	2.29E-02
Ob Trucks on Scale idling	7.22E+01	2.18E+01	3.56E+00	3.28E+00	2.41E-02	7.05E+03	0.00	4.79E-02	0.00E+00	5.17E-01	5.61E-02
Site Drive @Rte 9	1.11E+00	3.36E-01	5.50E-02	5.06E-02	3.73E-04	1.09E+02	0.00	7.40E-04	0.00E+00	7.98E-03	8.66E-04
Gilbertville Rd & Rte 9	2.24E+00	6.75E-01	1.11E-01	1.02E-01	7.49E-04	2.19E+02	0.00	1.49E-03	0.00E+00	1.60E-02	1.74E-03

Emissions (g/s) - Volume Sources	NOx	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Naphthalene
Truck Exhaust Tipping Area	2.97E-02	8.96E-03	1.47E-03	1.35E-03	9.94E-06	2.90E+00	0.00	1.97E-05	0.00E+00	2.13E-04	2.31E-05
Outbound idling trucks queue	2.23E-03	6.72E-04	1.10E-04	1.01E-04	7.45E-07	2.18E-01	0.00	1.48E-06	0.00E+00	1.60E-05	1.73E-06
Inb Trucks on Scale idling	8.17E-03	2.46E-03	4.03E-04	3.71E-04	2.73E-06	7.98E-01	0.00	5.42E-06	0.00E+00	5.85E-05	6.35E-06
Ob Trucks on Scale idling	2.01E-02	6.05E-03	9.90E-04	9.11E-04	6.71E-06	1.96E+00	0.00	1.33E-05	0.00E+00	1.44E-04	1.56E-05
Site Drive @Rte 9	3.10E-04	9.33E-05	1.53E-05	1.41E-05	1.04E-07	3.02E-02	0.00	2.05E-07	0.00E+00	2.22E-06	2.41E-07
Gilbertville Rd & Rte 9	6.22E-04	1.88E-04	3.07E-05	2.82E-05	2.08E-07	6.08E-02	0.00E+00	4.13E-07	0.00E+00	4.46E-06	4.83E-07

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022 (g/hr)	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde	Acrolein
0 mph	4.90E-02	1.39E-03			5.95E-06			6.63E-06	3.54E-03				1.87E-02	2.74E-01	4.73E-02

Emissions (g/hr)	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde	Acrolein
Truck Exhaust Tipping Area	6.54E-02	1.85E-03	0	0	7.93E-06	0	0	8.84E-06	4.72E-03	0	0	0	2.50E-02	3.66E-01	6.31E-02
Outbound idling trucks queue	4.90E-03	1.39E-04	0	0	5.95E-07	0	0	6.63E-07	3.54E-04	0	0	0	1.87E-03	2.74E-02	4.73E-03
Inb Trucks on Scale idling	1.80E-02	5.08E-04	0	0	2.18E-06	0	0	2.43E-06	1.30E-03	0	0	0	6.87E-03	1.01E-01	1.74E-02
Ob Trucks on Scale idling	4.41E-02	1.25E-03	0	0	5.35E-06	0	0	5.96E-06	3.18E-03	0	0	0	1.69E-02	2.47E-01	4.26E-02
Site Drive @Rte 9	6.81E-04	1.92E-05	0	0	8.26E-08	0	0	9.20E-08	4.91E-05	0	0	0	2.60E-04	3.81E-03	6.57E-04
Gilbertville Rd & Rte 9	1.37E-03	3.87E-05	0	0	1.66E-07	0	0	1.85E-07	9.88E-05	0	0	0	5.23E-04	7.66E-03	1.32E-03

Emissions (g/s) - Volume Sources	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde	Acrolein
Truck Exhaust Tipping Area	1.82E-05	5.13E-07	0	0	2.20E-09	0	0	2.45E-09	1.31E-06	0	0	0	6.94E-06	1.02E-04	1.75E-05
Outbound idling trucks queue	1.36E-06	3.85E-08	0	0	1.65E-10	0	0	1.84E-10	9.83E-08	0	0	0	5.20E-07	7.62E-06	1.31E-06
Inb Trucks on Scale idling	4.99E-06	1.41E-07	0	0	6.06E-10	0	0	6.75E-10	3.60E-07	0	0	0	1.91E-06	2.79E-05	4.82E-06
Ob Trucks on Scale idling	1.23E-05	3.46E-07	0	0	1.49E-09	0	0	1.66E-09	8.85E-07	0	0	0	4.68E-06	6.86E-05	1.18E-05
Site Drive @Rte 9	1.89E-07	5.35E-09	0	0	2.30E-11	0	0	2.56E-11	1.37E-08	0	0	0	7.23E-08	1.06E-06	1.83E-07
Gilbertville Rd & Rte 9	3.80E-07	1.07E-08	0	0	4.61E-11	0	0	5.14E-11	2.74E-08	0	0	0	1.45E-07	2.13E-06	3.67E-07

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022 (g/hr)	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Ethyl Ketone	VOC	Ethanol
0 mph	3.77E-01	2.67E-02	1.46E-02	8.33E-03	9.58E-02	1.51E-02		1.53E-09	1.69E-09			7.45356	0.00E+00

Emissions (g/hr)	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Ethyl Ketone	VOC	Ethanol
Truck Exhaust Tipping Area	5.02E-01	3.56E-02	1.95E-02	1.11E-02	1.28E-01	2.01E-02	0	2.04E-09	2.25E-09	0.00E+00	0.00E+00	9.94E+00	0.00E+00
Outbound idling trucks queue	3.77E-02	2.67E-03	1.46E-03	8.33E-04	9.58E-03	1.51E-03	0	1.53E-10	1.69E-10	0.00E+00	0.00E+00	7.45E-01	0.00E+00
Inb Trucks on Scale idling	1.38E-01	9.79E-03	5.36E-03	3.05E-03	3.51E-02	5.53E-03	0	5.60E-10	6.19E-10	0.00E+00	0.00E+00	2.73E+00	0.00E+00
Ob Trucks on Scale idling	3.39E-01	2.40E-02	1.32E-02	7.49E-03	8.62E-02	1.36E-02	0	1.38E-09	1.52E-09	0.00E+00	0.00E+00	6.71E+00	0.00E+00
Site Drive @Rte 9	5.23E-03	3.71E-04	2.03E-04	1.16E-04	1.33E-03	2.09E-04	0	2.12E-11	2.35E-11	0.00E+00	0.00E+00	1.04E-01	0.00E+00
Gilbertville Rd & Rte 9	1.05E-02	7.45E-04	4.08E-04	2.32E-04	2.67E-03	4.21E-04	0	4.27E-11	4.72E-11	0.00E+00	0.00E+00	2.08E-01	0.00E+00

Emissions (g/s) - Volume Sources	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl	VOC	Ethanol
Truck Exhaust Tipping Area	1.39E-04	9.88E-06	5.41E-06	3.08E-06	3.55E-05	5.58E-06	0	5.66E-13	6.26E-13	0.00E+00	0.00E+00	2.76E-03	0.00E+00
Outbound idling trucks queue	1.05E-05	7.41E-07	4.06E-07	2.31E-07	2.66E-06	4.19E-07	0	4.25E-14	4.69E-14	0.00E+00	0.00E+00	2.07E-04	0.00E+00
Inb Trucks on Scale idling	3.84E-05	2.72E-06	1.49E-06	8.48E-07	9.75E-06	1.53E-06	0	1.56E-13	1.72E-13	0.00E+00	0.00E+00	7.59E-04	0.00E+00
Ob Trucks on Scale idling	9.42E-05	6.67E-06	3.65E-06	2.08E-06	2.39E-05	3.77E-06	0	3.82E-13	4.22E-13	0.00E+00	0.00E+00	1.86E-03	0.00E+00
Site Drive @Rte 9	1.45E-06	1.03E-07	5.64E-08	3.21E-08	3.70E-07	5.81E-08	0	5.90E-15	6.52E-15	0.00E+00	0.00E+00	2.88E-05	0.00E+00
Gilbertville Rd & Rte 9	2.92E-06	2.07E-07	1.13E-07	6.46E-08	7.43E-07	1.17E-07	0	1.19E-14	1.31E-14	0.00E+00	0.00E+00	5.78E-05	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Idling

Temporal Data						
312.0	days/yr					
GE EMD-38-2 Locomotive provided by client						
2000	Max hp	0.6%	idle load factor		11	source: CA Doc - "Locomotive-Attributes"
Operating Schedule						table in row 152
	Trip #1 - AM	**Trip #2 - PM**	**Trip #3 - PM**	Stage 2	**Notes**	
Number of locomotives working	2	2	2	2	Site visit DTR 1/16/2023 observed 2 locomotives working	
Total time idling/pushing per trip, mins	51	16	43	32.8		
Minutes Idling	38.4	4.6	33.8	11		
Hours Idling (per locomotive)	0.64	0.08	0.56	0.18		
Hours Idling total (locomotive-hrs/hr)	1.28	0.15	1.13	0.37		
Times of Day (start hour)	10:00 AM	2:00 PM	5:00 PM	7:00 AM		
Times of Day (end Hour)	11:00 AM	3:00 PM	6:00 PM	8:00 AM	EF in AERMOD will be entered on this hour.	
Stacks per Locomotive	2	2	2	2		
Total Stacks	4	4	4	4		

Emission Factors	**Oxides of Nitrogen (NOx)**	**Carbon Monoxide (CO)**	**Primary Exhaust PM10 - Total**	**Primary Exhaust PM2.5 - Total**	**Sulfur Dioxide (SO2)**	**CO2e**	**Benzene**	**Formaldehyde**	**Naphthalene**	**Toluene**
Emission Factor (g/gal)										
Line Haul Duty Cycle	225.68	98.28	8.37	8.12	1.88	10217				
Switch Duty Cycle	194.56	33.44	5.78	5.60	1.88	10217				
Emission Factor (g/bhp-hr)										
Line Haul Duty Cycle (SPECIATE 2)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02
Line Haul Duty Cycle (SPECIATE 4)							3.91E-03	6.43E-02	4.49E-04	7.94E-03
Switch Duty Cycle (SPECIATE 2)	12.80	2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02
Switch Duty Cycle (SPECIATE 4)							5.01E-03	8.24E-02	5.75E-04	1.02E-02
Idling g/hr (from Loc Attributes)	718	191	15	15						

Emissions	**Oxides of Nitrogen (NOx)**	**Carbon Monoxide (CO)**	**Primary Exhaust PM10 - Total**	**Primary Exhaust PM2.5 - Total**	**Sulfur Dioxide (SO2)**	**CO2e**	**Benzene**	**Formaldehyde**	**Naphthalene**	**Toluene**
g/day	58.67	10.08	1.74	1.69	0.57	3080.78	1.91E-01	1.00E+00	2.64E-03	1.29E-01
lb/day	1.29E-01	2.22E-02	3.84E-03	3.72E-03	1.25E-03	6.79	4.20E-04	2.20E-03	5.81E-06	2.84E-04
TPY	2.02E-02	3.47E-03	5.99E-04	5.81E-04	1.95E-04	1.06	6.56E-05	3.44E-04	9.07E-07	4.43E-05
2 Locomotives, 1 hour (g/s)	3.99E-01	1.06E-01	8.33E-03	8.33E-03	0.0008	4.1077	2.54E-04	1.33E-03	3.52E-06	1.72E-04
Trip #1 (2 Locomotives) g/s	2.55E-01	6.79E-02	5.33E-03	5.33E-03	4.84E-04	2.63E+00	1.63E-04	8.53E-04	2.25E-06	1.10E-04
Trip #2 (2 Locomotives) g/s	3.06E-02	8.14E-03	6.39E-04	6.39E-04	5.79E-05	3.15E-01	1.95E-05	1.02E-04	2.70E-07	1.32E-05
Trip #3 (2 Locomotives) g/s	2.25E-01	5.98E-02	4.69E-03	4.69E-03	4.26E-04	2.31E+00	1.43E-04	7.51E-04	1.98E-06	9.67E-05
Stage 2 g/s	7.31E-02	1.95E-02	1.53E-03	1.53E-03	1.39E-04	7.53E-01	4.66E-05	2.44E-04	6.45E-07	3.15E-05

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Trip #1 - Emission Rate Per Stack g/s	6.38E-02	1.70E-02	1.33E-03	1.33E-03	1.21E-04	6.57E-01	4.07E-05	2.13E-04	5.63E-07	2.75E-05
Trip #2 - Emission Rate Per Stack g/s	7.65E-03	2.03E-03	1.60E-04	1.60E-04	1.45E-05	7.87E-02	4.87E-06	2.56E-05	6.74E-08	3.29E-06
Trip #3 - Emission Rate Per Stack g/s	5.62E-02	1.49E-02	1.17E-03	1.17E-03	1.06E-04	5.79E-01	3.58E-05	1.88E-04	4.95E-07	2.42E-05
Stage 2 g/s	1.83E-02	4.86E-03	3.82E-04	3.82E-04	3.46E-05	1.88E-01	1.17E-05	6.11E-05	1.61E-07	7.87E-06
Split emissions between 2 locations for Trips 2 and 3										
Trip 2 - Location 1 - North	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06	1.28E-05	3.37E-08	1.64E-06
Trip 2 - Location 2 - South	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06	1.28E-05	3.37E-08	1.64E-06
Trip 3 - Location 1 - north	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05	9.39E-05	2.48E-07	1.21E-05
Trip 3 - Location 2 - South	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05	9.39E-05	2.48E-07	1.21E-05
Stage 2 - Location 1 - North	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02	5.83E-06	3.06E-05	8.06E-08	3.93E-06
Stage 2 - Location 2 - South	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02	5.83E-06	3.06E-05	8.06E-08	3.93E-06

source: https://nepis.epa.gov/Exe/tiff2png.cgi/P100500D.PNG?-r+85+-g+15+D%3A%5CZYFILES%5CINDEX%20DATA%5C06THRU10%5CTIFF%5C00000524%5CP100500D.TIF
R:\6336 Sanborn Head Ware Transfer Station\Air\References\EPA-420-F-09-025 Emission Factors for Locomotive...

ReSource - Ware, MA
Mobile Source Emissions

Locomotive Idling

Emission Factors	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Emission Factor (g/gal)									
Line Haul Duty Cycle									
Switch Duty Cycle									
Emission Factor (g/bhp-hr)									
Line Haul Duty Cycle (SPECIATE 2)	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4)	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2)	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4)	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03
Idling g/hr (from Loc Attributes)									

Emissions	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
g/day	7.00E-03	3.58E-01	6.38E-02	1.46E-02	8.90E-03	4.01E-02	1.69E+00	2.84E-02	3.17E-02
lb/day	1.54E-05	7.88E-04	1.41E-04	3.21E-05	1.96E-05	8.85E-05	3.72E-03	6.27E-05	6.99E-05
TPY	2.41E-06	1.23E-04	2.19E-05	5.00E-06	3.06E-06	1.38E-05	5.81E-04	9.78E-06	1.09E-05
2 Locomotives, 1 hour (g/s)	9.33E-06	4.77E-04	8.50E-05	1.94E-05	1.19E-05	5.35E-05	2.25E-03	3.79E-05	4.23E-05
Trip #1 (2 Locomotives) g/s	5.97E-06	3.05E-04	5.44E-05	1.24E-05	7.59E-06	3.42E-05	1.44E-03	2.43E-05	2.70E-05
Trip #2 (2 Locomotives) g/s	7.15E-07	3.65E-05	6.52E-06	1.49E-06	9.10E-07	4.10E-06	1.73E-04	2.91E-06	3.24E-06
Trip #3 (2 Locomotives) g/s	5.26E-06	2.69E-04	4.79E-05	1.09E-05	6.68E-06	3.01E-05	1.27E-03	2.14E-05	2.38E-05
Stage 2 g/s	1.71E-06	8.74E-05	1.56E-05	3.56E-06	2.18E-06	9.81E-06	4.13E-04	6.95E-06	7.75E-06

Emissions	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Trip #1 - Emission Rate Per Stack g/s	1.49E-06	7.63E-05	1.36E-05	3.10E-06	1.90E-06	8.56E-06	3.60E-04	6.07E-06	6.76E-06
Trip #2 - Emission Rate Per Stack g/s	1.79E-07	9.14E-06	1.63E-06	3.72E-07	2.27E-07	1.03E-06	4.32E-05	7.27E-07	8.10E-07
Trip #3 - Emission Rate Per Stack g/s	1.31E-06	6.71E-05	1.20E-05	2.73E-06	1.67E-06	7.53E-06	3.17E-04	5.34E-06	5.95E-06
Stage 2 g/s	4.28E-07	2.18E-05	3.90E-06	8.89E-07	5.44E-07	2.45E-06	1.03E-04	1.74E-06	1.94E-06
Split emissions between 2 locations for T									
Trip 2 - Location 1 - North	8.94E-08	4.57E-06	8.15E-07	1.86E-07	1.14E-07	5.13E-07	2.16E-05	3.63E-07	4.05E-07
Trip 2 - Location 2 - South	8.94E-08	4.57E-06	8.15E-07	1.86E-07	1.14E-07	5.13E-07	2.16E-05	3.63E-07	4.05E-07
Trip 3 - Location 1 - north	6.57E-07	3.36E-05	5.99E-06	1.37E-06	8.36E-07	3.77E-06	1.59E-04	2.67E-06	2.98E-06
Trip 3 - Location 2 - South	6.57E-07	3.36E-05	5.99E-06	1.37E-06	8.36E-07	3.77E-06	1.59E-04	2.67E-06	2.98E-06
Stage 2 - Location 1 - North	2.14E-07	1.09E-05	1.95E-06	4.45E-07	2.72E-07	1.23E-06	5.16E-05	8.69E-07	9.68E-07
Stage 2 - Location 2 - South	2.14E-07	1.09E-05	1.95E-06	4.45E-07	2.72E-07	1.23E-06	5.16E-05	8.69E-07	9.68E-07

source: https://nepis.epa.gov/Exe/tiff2pn

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ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching

Temporal Data	312.0	days/yr			
GE EMD-38-2 Locomotive provided by client		2000	Max hp	switch load factor based on time in each notch	
				(sample in movements descr. for Trip 1)	
Operating Schedule/load Factor:	6.6%	9.1%	7.5%	6.8%	
	Trip #1 - AM	**Trip #2 - PM**	**Trip #3 - PM**	**Stage 2**	**Notes**
Number of locomotives working	2	2	2	2	- Site visit DTR 1/16/2023 observed 2 locomotives working.
Minutes shuttling	12.6	11.4	9.2	21.8	- Calculations in movement desc., likely conservative
Hours shuttling (per locomotive)	0.210	0.190	0.153	0.363	assumptions
(Locomotive-hrs)/hr	0.42	0.38	0.31	0.73	2 locomotives for a relatively small
Approximate avg speed (mph)	2.41	2.84	2.57	2.44	
Distance traveled while switching (mi)	1.01	1.08	0.79	1.77	
1 locomotive travel dist (m)	814.49	868.40	634.19	1426.74	
Times of Day	10:00 AM	2:00 PM	5:00 PM	7:00 AM	
Times of Day (end Hour)	11:00 AM	3:00 PM	6:00 PM	8:00 AM	EF in AERMOD will be entered on this hour.

Emission Factors	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Line Haul Duty Cycle (SPECIATE 2) (g/bhp-hr)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02
Line Haul Duty Cycle (SPECIATE 4) (g/bhp-hr)							3.91E-03	6.43E-02	4.49E-04	7.94E-03
Switch Duty Cycle (SPECIATE 2) (g/bhp-hr)		2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02
Switch Duty Cycle (SPECIATE 4) (g/bhp-hr)	above not used as Attributes has g/hr data						5.01E-03	8.24E-02	5.75E-04	1.02E-02
Trip 1 - g/hr	1668	280	43	43						
Trip 2 - g/hr	2039	326	60	60						
Trip 3 - g/hr	1800	296	49	49						
Stage 2 - g/hr	1692	283	44	44						

See notes for time in Notch 1 and 2; g/hr from Attributes Tab - Row 151

Emissions (g/hr or g/s)	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Trip #1 (2 Locomotives) g/hr	700.55	117.51	17.94	17.94	6.84E+00	3.72E+04	2.30E+00	1.21E+01	3.18E-02	1.55E+00
Trip #2 (2 Locomotives) g/hr	774.98	124.02	22.84	22.84	8.59E+00	4.67E+04	2.89E+00	1.52E+01	4.00E-02	1.95E+00
Trip #3 (2 Locomotives) g/hr	551.97	90.87	14.99	14.99	5.69E+00	3.09E+04	1.91E+00	1.00E+01	2.65E-02	1.29E+00
Stage 2 g/hr	1229.46	205.49	31.84	31.84	1.21E+01	6.60E+04	4.09E+00	2.14E+01	5.65E-02	2.76E+00
Trip #1 (2 Locomotives) g/s	0.195	3.26E-02	4.98E-03	4.98E-03	1.90E-03	1.03E+01	6.39E-04	3.35E-03	8.84E-06	4.31E-04
Trip #2 (2 Locomotives) g/s	0.215	3.45E-02	6.34E-03	6.34E-03	2.39E-03	1.30E+01	8.03E-04	4.21E-03	1.11E-05	5.42E-04
Trip #3 (2 Locomotives) g/s	0.153	2.52E-02	4.16E-03	4.16E-03	1.58E-03	8.59E+00	5.31E-04	2.79E-03	7.35E-06	3.59E-04
Stage 2 g/s	0.342	0.057	0.009	0.009	0.003	18.342	1.14E-03	5.95E-03	1.57E-05	7.66E-04
Split emission btw 2 locations for Trips 2, 3 and Stage 2										
Trip 2 - Location 1 (North)	0.108	1.72E-02	3.17E-03	3.17E-03	1.19E-03	6.48E+00	4.01E-04	2.10E-03	5.55E-06	2.71E-04
Trip 2 - Location 2 (South)	0.108	1.72E-02	3.17E-03	3.17E-03	1.19E-03	6.48E+00	4.01E-04	2.10E-03	5.55E-06	2.71E-04
Trip 3 - Location 1 (North)	0.077	1.26E-02	2.08E-03	2.08E-03	7.90E-04	4.29E+00	2.66E-04	1.39E-03	3.68E-06	1.79E-04
Trip 3 - Location 2 (South)	0.077	1.26E-02	2.08E-03	2.08E-03	7.90E-04	4.29E+00	2.66E-04	1.39E-03	3.68E-06	1.79E-04

Emissions (g/hr or g/s)	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Stage 2 - Location 1 (North)	0.171	2.85E-02	4.42E-03	4.42E-03	1.69E-03	9.17E+00	5.68E-04	2.98E-03	7.85E-06	3.83E-04
Stage 2 - Location 2 (South)	0.171	2.85E-02	4.42E-03	4.42E-03	1.69E-03	9.17E+00	5.68E-04	2.98E-03	7.85E-06	3.83E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching

Emission Factors	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Line Haul Duty Cycle (SPECIATE 2) (g/bhp-hr)	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4) (g/bhp-hr)	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2) (g/bhp-hr)	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4) (g/bhp-hr)	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03
Trip 1 - g/hr									
Trip 2 - g/hr									
Trip 3 - g/hr									
Stage 2 - g/hr									

Emissions (g/hr or g/s)	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Trip #1 (2 Locomotives) g/hr	8.44E-02	4.31E+00	7.69E-01	1.76E-01	1.07E-01	4.84E-01	2.04E+01	3.43E-01	3.82E-01
Trip #2 (2 Locomotives) g/hr	1.06E-01	5.42E+00	9.66E-01	2.21E-01	1.35E-01	6.08E-01	2.56E+01	4.31E-01	4.80E-01
Trip #3 (2 Locomotives) g/hr	7.02E-02	3.59E+00	6.40E-01	1.46E-01	8.93E-02	4.03E-01	1.70E+01	2.85E-01	3.18E-01
Stage 2 g/hr	1.50E-01	7.66E+00	1.37E+00	3.12E-01	1.91E-01	8.60E-01	3.62E+01	6.09E-01	6.79E-01
Trip #1 (2 Locomotives) g/s	2.34E-05	1.20E-03	2.14E-04	4.88E-05	2.98E-05	1.34E-04	5.66E-03	9.53E-05	1.06E-04
Trip #2 (2 Locomotives) g/s	2.95E-05	1.51E-03	2.68E-04	6.13E-05	3.75E-05	1.69E-04	7.11E-03	1.20E-04	1.33E-04
Trip #3 (2 Locomotives) g/s	1.95E-05	9.97E-04	1.78E-04	4.06E-05	2.48E-05	1.12E-04	4.71E-03	7.93E-05	8.83E-05
Stage 2 g/s	4.17E-05	2.13E-03	3.80E-04	8.66E-05	5.30E-05	2.39E-04	1.01E-02	1.69E-04	1.89E-04
Split emission btw 2 locations for Trips 2, 3 and Stage 2									
Trip 2 - Location 1 (North)	1.47E-05	7.53E-04	1.34E-04	3.06E-05	1.87E-05	8.45E-05	3.56E-03	5.99E-05	6.67E-05
Trip 2 - Location 2 (South)	1.47E-05	7.53E-04	1.34E-04	3.06E-05	1.87E-05	8.45E-05	3.56E-03	5.99E-05	6.67E-05
Trip 3 - Location 1 (North)	9.75E-06	4.98E-04	8.89E-05	2.03E-05	1.24E-05	5.59E-05	2.35E-03	3.96E-05	4.42E-05
Trip 3 - Location 2 (South)	9.75E-06	4.98E-04	8.89E-05	2.03E-05	1.24E-05	5.59E-05	2.35E-03	3.96E-05	4.42E-05

Emissions (g/hr or g/s)	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Stage 2 - Location 1 (North)	2.08E-05	1.06E-03	1.90E-04	4.33E-05	2.65E-05	1.19E-04	5.03E-03	8.47E-05	9.43E-05
Stage 2 - Location 2 (South)	2.08E-05	1.06E-03	1.90E-04	4.33E-05	2.65E-05	1.19E-04	5.03E-03	8.47E-05	9.43E-05

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching
Movement Descriptions

Trip #1 - AM From March 2023 Sandborn Head Stage 1 Rail Sequencing Document
Rail Car Movement - Engine arrives at site at 10:07 am
10:07 to 10:15 AM Engine moves 7 empty rail cars back on Track 1 and connects to 4 full cars
It moves 5 cars back from switch Each car takes up 65' so this is 5 x 65 = 325' of movement
10:15 to 10:23 AM Engine pulls the cars forward onto mainline and then pushes 6 car lengths back on mainline.
Moves 5 car lengths forward plus 6 back or 11 x 65 = 715'
10:23 AM - 10:28 AM Disconnect 4 full rail cars and index forward 2 car lengths.
10:28 AM -10:36 MA Engine pushes 12 rail cars 12 lengths back onto Track 1 and 2 and detaches 3 empty rail cars
14 car lengths of movement: 14 x 65 = 910'
10:36 AM- 10:43 engine pulls forward 7 car lengths
10:43 to 10:58 AM engine pushes back 4 car lengths and leaves site at 10:58
11 x 65= 715'
Total movement for Trip #1; 325+715'+910'+715' = 2665 or 0.505 miles
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
One 910' movement, assume avg of 4 mph: (0.173 mi/4 mph)*60 = 2.6 min.
for remaining 1,755', assume avg of 2 mph: (0.332 mi/2)*60 = 9.96 min, Total time moving: 12.6 min

Trip #2 - Engine arrives at 14:03 from the North
14:03 to 14:07 PM Engine pulls 5 cars off of mainline and pushes onto track 1, for a total movement of 13 lengths, 13x65= 845'
14:07 to 14:12 PM Engine goes back to mainline, moving 1 car length, then moves south 12 car lengths to switch at track 3
13 x 65=845'
14:12 to 14:16 PM Engine reverses onto Track 3, 2 car lengths to couple with full cars and then pulls them 6 car lengths to meet Track 4
8 x 65 = 520'
14:16 to 14:19PM Engine reverses 2 car lengths, then pulls back 8 car lengths to get all cars back to mainline and leaves site
10 x 65 = 650'
Total movement for Trip #2: 845'+845'+520+650'= 2860 or 0.54 mi 2860 0.541667
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
Two 845' movements, assume avg of 4 mph: (0.32mi/4 mph)*60 = 4.8 min.
for remaining 1,170', assume avg of 2 mph: (0.22 mi/2)*60 =6.6 min, Total time moving: 11.4 min
Total elapsed time is 16 minutes, at 2.8 mph, takes 11.4 minutes of movement. Rest of time is coupling, swiching, idling
Average speed: (4*4.8/11.4)+(2*6.6/11.4)= 2.84 mph

Split emissons in half between Locations 1 and 2 (north and south switch) based on time near each

Trip #3 - Engine arrives from South at 16:37 and pulls 7 empty cars past Track 1.
16:37 to 16:45 PM Engine pushes 7 cars off of mainline and onto track 2, distance of 3 length, decouples 4 of the cars
16:45 to 16:55 PM, Engine pulls 3 cars back to switch on Track 1 (5 lengths), and then reverses onto Track 1 (2 lengths)
10 x 65=650'
16:55 to 17:02 PM, Engine pulls 2 lengths back onto to mainline and travels 12 car lengths to switch at track 3
14 x 65 = 910'
17:02 to 17:20 PM, Engine reverses onto Track 3, then 4 (4 lengths) to connect with 3 full rail cars,
then departs the site taking 4 lengths to get to mainline.
8 x 65 = 520'
Total movement for Trip #3: 650'+910'+520'= 2080' or 0.394 mi
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
One 910' movement, assume avg of 4 mph: (0.173 mi/4 mph)*60 = 2.6 min.
for remaining 1,170', assume avg of 2 mph: (0.22 mi/2)*60 =6.6 min, Total time moving: 9.2 min
Total elapsed time is 43 minutes, at 2.6 mph, takes 9.2 minutes of movement. Rest of time is coupling, swiching, idling
Average speed: (4*2.6/9.2)+(2*6.6/9.2)= 2.57 mph

Split emissons in half between Locations 1 and 2 (north and south switch) based on time near each

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching
Movement Descriptions

Stage 2 - VHB Movements

Engine arrives from South at 7 AM with 14 empty railcars, moves past switch for Track 1
and then reverses 7 cars onto Track 2 and 4 onto Track 1
11 car lengths to move 7 to Track 2, then pull forward 10 lengths to clear switch to Track 1, then reverse 10 lengths onto Track 2
Move locomotive back to main line, 8 lengths, then move south to track 3, 12 lengths
Reverse 1 length onto Track 3 to couple with 13 full rail cars. Pull forward to main track, 14 lenghts and leave.
Total "shorter" lengths: 7+11+10+10+8=46 x 65=2,990 Total longer lengths: 12+14=26 *65= 1,690'
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
Long movements, assume avg of 4 mph: (0.32 mi/4 mph)*60 = 4.8 min.
for remaining 2,990', assume avg of 2 mph: (0.566 mi/2)*60 =17 min, Total time moving: 21.8 min
Total movement: 2,990+1,690 =4,680/5280=0.89 mi.
total couplings or uncouplings: 4, assume 1 min each, total switches: 7, 1 min each, Total 11 min.
Total elapse time 32.8 min.

Average speed: (4*4.8/21.8)+(2*17/21.8)= 2.44 mph

Locomotive Attributes - Summary

Point Source characteristics		**Units**	**Notes**	
Emission Rate		g/s	will vary	
Release Height	16.8	ft	From, EIF_MCER001750_2019.pdf, plus 12 inch stub stack	
	5.13	m		
Gas Exit Temperature	156.0	Degrees F	Table B-3, "Idle", for engine type GP 38-2: pg 81	
			https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/rrstudy/rrstudy101404.pdf	
Stack Inside Diameter	1.0	ft	" " same as above	
Gas Exit Velocity	7.5	m/s	" " same as above	
Gas Exit Flow Rate	0.55	m^3/s	" " same as above	Note that the flow rate in Table B-3 is for the two
Locomotive Body width	10.3	ft	*EIF_MCER001750_2019.pdf*	stacks combined
Locomotive Body Length	59.2	ft	*EIF_MCER001750_2019.pdf*	

Line volume characteristics		**Units**	**Notes**
Plume Height	28.6	ft	Release Height * 1.7 turbulence factor (Pg J-2, PM2.5 Hotspot Guidance:)
Plume Width	10.3	ft	*EIF_MCER001750_2019.pdf*
Release Height	16.8	ft	From, EIF_MCER001750_2019.pdf, plus 12 inch stub stack
Plume Height	8.72	m	Release Height * 1.7 turbulence factor (Pg J-2, PM2.5 Hotspot Guidance)
Plume Width	3.15	m	*EIF_MCER001750_2019.pdf*
Release Height	5.13	m	From, EIF_MCER001750_2019.pdf, plus 12 inch stub stack
SZINIT	4.06	m	vertical dimension divided by 2.15
SYINIT	2.93	m	Plume width * 2 (center to center distance) /2.15
Emission Rate	varies	g/s	

Locomotive Body Characteristics		**Units**	**Notes**
Length	59.2	ft	These are inputted as two rectangular structures with the dimensions as written
Width	10.3	ft	
Height	15.8	ft	

Notes on PDFs:

MCER MCER0000001750			**metric conversion**	**Notes/Source**
Weight on Drivers	264000	ft		264000 lbs *EIF_MCER001750_2019.pdf*

Outside Length	59.16667	ft	18.034	m	59 ft 2 in	*EIF_MCER001750_2019.pdf*
Outside Extreme Width	10.33333	ft	3.1496	m	10 ft 4 in	*EIF_MCER001750_2019.pdf*
Outside Extreme Height	15.83333	ft	4.826	m	15 ft 10 in	*EIF_MCER001750_2019.pdf*
		ft				
Stub stack height	1	ft			IW assumption from diagram	

Diesel Engine EMD 16V-645E, GP 38-2
According to previous modeling above, it operates at Switch Duty

source: Evaluation of Biodiesel Fuel in an EMD GP38, pg 26

CSX #2629 EMD GP38 EMD 16-645-E3
Tested 10/26/00 @ SwRI. Baseline (EM-2834-F)

Notch	Gross HP	obs Fuel Rate (lb/hr)	HC (g/hr)	CO (g/hr)	Corr. NOx (g/hr)	PM (g/hr)	AAR Corr bsfc	Corr. Fuel Rate (lb/hr)	WF	w-BHP	obs w-Fuel w-(lb/hr)	corr w-Fuel w-(lb/hr)	w-HC w-(g/hr)	w-CO w-(g/hr)	w-NOx w-(g/hr)	w-PM w-(g/hr)
8	2,140	912	1,451	18,180	24,443	1,139	0.426	912	25.0%	535.1	228.0	227.9	362.8	4545.0	6110.8	284.8
7	1,694	768	1,128	9,730	22,583	867	0.406	768	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1,575	620	697	4,245	18,723	552	0.394	620	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1,283	498	497	1,337	15,065	405	0.388	498	25.0%	320.8	124.5	124.5	124.3	334.3	3766.3	101.3
4	1,032	394	365	658	11,455	356	0.382	394	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	586	228	285	430	5,659	154	0.389	226	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	320	134	173	452	3,041	107	0.419	134	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	83	51	143	235	1,311	26	0.615	51	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Idle	11	25	131	191	718	15	2.349	25	50.0%	5.3	12.4	12.3	65.5	95.5	359.0	7.5
DB-2	18	40	162	343	990	28	2.216	40	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						sum =			100.0%	861.1	364.9	364.7	552.5	4974.8	10236.0	393.5

AAR 3x3 Weighted Results

AAR 3x3 duty cycle weighted brake-specific emissions =

0.424 bsfc	0.424 corr bsfc	0.64	5.78	11.89	0.457

EPA Switcher Duty Cycle Weighted Results

Notch	WF	w-BHP	obs w-Fuel w-(lb/hr)	corr w-Fuel w-(lb/hr)	w-HC w-(g/hr)	w-CO w-(g/hr)	w-NOx w-(g/hr)	w-PM w-(g/hr)
8	0.8%	17.1	7.3	7.3	11.6	145.4	195.5	9.1
7	0.2%	3.8	1.5	1.5	2.3	19.5	45.4	1.7
6	1.5%	23.6	9.3	9.3	10.5	63.7	280.8	8.3
5	3.6%	46.2	17.9	17.9	17.9	48.1	542.3	14.5
4	3.6%	37.1	14.2	14.2	13.1	23.7	412.4	12.8
3	5.8%	34.0	13.2	13.2	16.5	24.9	326.2	8.9
2	12.3%	39.3	16.5	16.5	21.3	55.6	374.0	13.2
1	12.4%	10.3	6.3	6.3	17.7	29.1	162.6	3.2
Idle	59.8%	5.3	14.8	14.7	78.3	114.2	429.4	9.0
DB	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
sum =	100.0%	217.7	101.1	101.0	189.2	524.3	2770.7	80.8

V-1

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck using engine to unload w/ hydraulics

1/23/2023, IHW
Epsilon

Calculation/Constant	Units	Value	Notes
Equivalent speed	mph	10	From DTR observation on-site 1/16/23 and 28 gpm at 1000 rpm hydraulic pump for walking floor, 20 HP needed from truck engine
Unit emission rate, time travel	minutes	60	Calculate the unit emission rate
Equivalent distance traveled	miles	10	
Truck revving time while tipping	minute/truck	10	From DTR observation on-site 1/16/23
Total truck revving time per hour	(veh-hr)/hr	2.0	Total truck idling hours per hour
Peak trucks in one hour	VPH	12	Trucks being unloaded in 1 hr. (15 mins/truck = 4 trucks/door * 3 doors = 12 trucks)
Number of active doors	doors	3	

Pollutant	EF [(1)] units	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium
Emission Factor @ 10 mph	g/vmt	21.49	4.07	0.68	0.67	5.57E-04	2042.57	3.62E-03	3.98E-02	4.26E-03	7.02E-03	4.62E-05	1.98E-07
Emission rate @ 10 mph	g/veh-hr	214.93	40.74	6.83	6.67	5.57E-03	20425.70	3.62E-02	3.98E-01	4.26E-02	7.02E-02	4.62E-04	1.98E-06
Emission rate, all doors	g/hr	429.86	81.47	13.67	13.34	1.11E-02	40851.40	7.23E-02	7.96E-01	8.52E-02	1.40E-01	9.24E-04	3.97E-06
Emission rate, all doors	g/s	1.19E-01	2.26E-02	3.80E-03	3.71E-03	3.10E-06	1.13E+01	2.01E-05	2.21E-04	2.37E-05	3.90E-05	2.57E-07	1.10E-09

[(1)] Efs rom Truck Link Emis tab (MOVES output, truck type 62, @30 mph)

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck using engine to unload w/ hydraulics

1/23/2023, IHW
Epsilon

Pollutant	Mercury	Nickel	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans	VOC
Emission Factor @ 10 mph	2.21E-07	1.18E-04	1.26E-03	1.93E-02	3.27E-03	2.36E-02	2.01E-03	1.02E-03	2.18E-03	5.83E-01	1.27E-03	5.09E-11	5.63E-11	5.17E-01
Emission rate @ 10 mph	2.21E-06	1.18E-03	1.26E-02	1.93E-01	3.27E-02	2.36E-01	2.01E-02	1.02E-02	2.18E-02	5.83E+00	1.27E-02	5.09E-10	5.63E-10	5.17E+00
Emission rate, all doors	4.42E-06	2.36E-03	2.51E-02	3.86E-01	6.53E-02	4.72E-01	4.03E-02	2.03E-02	4.36E-02	1.17E+01	2.54E-02	1.02E-09	1.13E-09	1.03E+01
Emission rate, all doors	1.23E-09	6.55E-07	6.98E-06	1.07E-04	1.81E-05	1.31E-04	1.12E-05	5.64E-06	1.21E-05	3.24E-03	7.07E-06	2.83E-13	3.13E-13	2.87E-03

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Railcar Mover Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Volvo L120C Loader

208 hp 10% Load Factor (from DKB updated emissions 2/28/2023)

Operating Schedule

1 number of equipment

11 hours each per day

11 hr/day

3/29/2023: Added 50% control to organic HAPS except if using a Tier 4 factor, and excluding metals, NH3, dioxins, furans.

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
NONROAD (via MOVES) Emission Factor											
Tractors/Loaders/Backhoes (T/L/B)	3.88183	3.61055	0.56744	0.55042	0.00405		1.15E-02	8.89E-02	1.59E-03	9.17E-03	1.04E-06
T/L/B TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02	
T/L/Bs TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03	
Tier Standards											
Tier 3 Standards (175-300 hp)	3.0	2.6	0.15	0.15							
Tier 4 Standards (175-750 hp)	0.3	2.6	0.015	0.015				2.48E-03			
AP-42 Table 3.3-1											
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63					

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
g/day	888.16	826.09	129.83	125.94	0.93	119348.6	2.64E+00	2.03E+01	3.65E-01	2.10E+00	2.39E-04
lb/day	1.96	1.82	0.29	0.28	0.00	263.12	5.82E-03	4.48E-02	8.04E-04	4.63E-03	5.26E-07
TPY	0.31	0.28	0.04	0.04	0.00	41.05	9.08E-04	6.99E-03	1.25E-04	7.22E-04	8.21E-08
Annual	8.79E-03	8.17E-03	1.28E-03	1.25E-03	9.17E-06	1.1808	2.61E-05	2.01E-04	3.61E-06	2.08E-05	2.36E-09
100% to open doors	8.79E-03	8.17E-03	1.28E-03	1.25E-03	9.17E-06	1.1808	2.61E-05	2.01E-04	3.61E-06	2.08E-05	2.36E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.03E-02	9.56E-03	1.50E-03	1.46E-03	1.07E-05	1.3813	3.06E-05	2.35E-04	4.22E-06	2.43E-05	2.76E-09
100% to open doors	1.03E-02	9.56E-03	1.50E-03	1.46E-03	1.07E-05	1.3813	3.06E-05	2.35E-04	4.22E-06	2.43E-05	2.76E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.24E-02	2.09E-02	3.28E-03	3.18E-03	2.34E-05	3.0139	6.67E-05	5.14E-04	9.21E-06	5.30E-05	6.03E-09
100% to open doors	2.24E-02	2.09E-02	3.28E-03	3.18E-03	2.34E-05	3.0139	6.67E-05	5.14E-04	9.21E-06	5.30E-05	6.03E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Railcar Mover Loader Exhaust

g/hp-hr	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
NONROAD (via MOVES) Emission Factor												
Tractors/Loaders/Backhoes (T/L/B)	1.87E-08	1.39E-08	6.63E-04	3.14E-02	7.46E-03	5.40E-03	2.08E-03	7.16E-04	6.60E-03	5.50E-01	3.19E-12	1.33E-03
T/L/B TOG X SPECIATE Tier 2			1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03			
T/L/Bs TOG X SPECIATE Tier 4			3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03			
Tier Standards												
Tier 3 Standards (175-300 hp)										0.15		
Tier 4 Standards (175-750 hp)										0.015		
AP-42 Table 3.3-1												
Diesel Fuel												

Emissions	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
g/day	4.28E-06	3.17E-06	1.52E-01	7.18E+00	1.71E+00	1.24E+00	4.76E-01	1.64E-01	1.51E+00	1.26E+02	7.29E-10	3.03E-01
lb/day	9.43E-09	7.00E-09	3.34E-04	1.58E-02	3.76E-03	2.72E-03	1.05E-03	3.61E-04	3.33E-03	2.78E-01	1.61E-12	6.68E-04
TPY	1.47E-09	1.09E-09	5.21E-05	2.47E-03	5.87E-04	4.25E-04	1.64E-04	5.63E-05	5.19E-04	4.33E-02	2.51E-13	1.04E-04
Annual	4.23E-11	3.14E-11	1.50E-06	7.11E-05	1.69E-05	1.22E-05	4.71E-06	1.62E-06	1.49E-05	1.25E-03	7.21E-15	3.00E-06
100% to open doors	4.23E-11	3.14E-11	1.50E-06	7.11E-05	1.69E-05	1.22E-05	4.71E-06	1.62E-06	1.49E-05	1.25E-03	7.21E-15	3.00E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	4.95E-11	3.67E-11	1.75E-06	8.32E-05	1.98E-05	1.43E-05	5.51E-06	1.89E-06	1.75E-05	1.46E-03	8.44E-15	3.51E-06
100% to open doors	4.95E-11	3.67E-11	1.75E-06	8.32E-05	1.98E-05	1.43E-05	5.51E-06	1.89E-06	1.75E-05	1.46E-03	8.44E-15	3.51E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.08E-10	8.02E-11	3.83E-06	1.81E-04	4.31E-05	3.12E-05	1.20E-05	4.13E-06	3.81E-05	3.18E-03	1.84E-14	7.66E-06
100% to open doors	1.08E-10	8.02E-11	3.83E-06	1.81E-04	4.31E-05	3.12E-05	1.20E-05	4.13E-06	3.81E-05	3.18E-03	1.84E-14	7.66E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Railcar Mover Loader Exhaust

g/hp-hr	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor		
Tractors/Loaders/Backhoes (T/L/B)		
T/L/B TOG X SPECIATE Tier 2		3.26E-03
T/L/Bs TOG X SPECIATE Tier 4	5.85E-03	1.23E-03
Tier Standards		
Tier 3 Standards (175-300 hp)		
Tier 4 Standards (175-750 hp)		
AP-42 Table 3.3-1		
Diesel Fuel		

Emissions		Acetone	Methyl Ethyl Ketone
	g/day	1.34E+00	7.46E-01
	lb/day	2.95E-03	1.65E-03
	TPY	4.61E-04	2.57E-04
	Annual	1.33E-05	7.38E-06
100% to open doors		1.33E-05	7.38E-06
0% to exhaust vents		0.00E+00	0.00E+00
	over 24 hr work day (g/s)	1.55E-05	8.64E-06
100% to open doors		1.55E-05	8.64E-06
0% to exhaust vents		0.00E+00	0.00E+00
	Peak hour (g/s)	3.38E-05	1.88E-05
100% to open doors		3.38E-05	1.88E-05
0% to exhaust vents		0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

966M Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 966M Loader Tier 4F from MiltonCat

276 hp 10% Load Factor (from DKB updated emissions 2/28/2023)

Operating Schedule

1 number of equipment

11 hours each per day Updated 1/27/2023

11 hr/day

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium
NONROAD (via MOVES) Emission Factor												
Tractors/Loaders/Backhoes (T/L/B)	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08
T/L/B TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02		
T/L/Bs TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03		
Tier Standards												
Tier 3 Standards (175-300 hp)	3.0		0.15	0.15								
Tier 4 Standards (175-750 hp)	0.3		0.015	0.015				2.48E-03				
AP-42 Table 3.3-1												
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63						

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium
g/day	91.08	1096.16	4.55	4.55	1.23	158366.4	1.44E+00	2.36E+01	1.65E-01	2.91E+00	3.17E-04	5.68E-06
lb/day	0.20	2.42	0.01	0.01	0.00	349.14	3.16E-03	5.21E-02	3.63E-04	6.42E-03	6.99E-07	1.25E-08
TPY	0.03	0.38	0.00	0.00	0.00	54.47	4.94E-04	8.12E-03	5.67E-05	1.00E-03	1.09E-07	1.95E-09
Annual	9.01E-04	1.08E-02	4.51E-05	4.51E-05	1.22E-05	1.5668	1.42E-05	2.34E-04	1.63E-06	2.88E-05	3.14E-09	5.62E-11
100% to open doors	9.01E-04	1.08E-02	4.51E-05	4.51E-05	1.22E-05	1.5668	1.42E-05	2.34E-04	1.63E-06	2.88E-05	3.14E-09	5.62E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.05E-03	1.27E-02	5.27E-05	5.27E-05	1.42E-05	1.8329	1.66E-05	2.73E-04	1.91E-06	3.37E-05	3.67E-09	6.57E-11
100% to open doors	1.05E-03	1.27E-02	5.27E-05	5.27E-05	1.42E-05	1.8329	1.66E-05	2.73E-04	1.91E-06	3.37E-05	3.67E-09	6.57E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.30E-03	2.77E-02	1.15E-04	1.15E-04	3.10E-05	3.9992	3.62E-05	5.96E-04	4.16E-06	7.36E-05	8.00E-09	1.43E-10
100% to open doors	2.30E-03	2.77E-02	1.15E-04	1.15E-04	3.10E-05	3.9992	3.62E-05	5.96E-04	4.16E-06	7.36E-05	8.00E-09	1.43E-10
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

966M Loader Exhaust

g/hp-hr	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factc													
Tractors/Loaders/Backhoes (T/L/B)	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
T/L/B TOG X SPECIATE Tier 2		1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
T/L/Bs TOG X SPECIATE Tier 4		3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards													
Tier 3 Standards (175-300 hp)									0.15				
Tier 4 Standards (175-750 hp)									0.015				
AP-42 Table 3.3-1													
Diesel Fuel													

Emissions	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	4.21E-06	1.03E-01	7.89E+00	1.18E+00	1.64E+00	7.39E-01	5.56E-01	1.53E+00	1.67E+02	9.67E-10	4.02E-01	1.78E+00	3.73E-01
lb/day	9.29E-09	2.27E-04	1.74E-02	2.60E-03	3.61E-03	1.63E-03	1.23E-03	3.38E-03	3.68E-01	2.13E-12	8.87E-04	3.92E-03	8.23E-04
TPY	1.45E-09	3.55E-05	2.71E-03	4.05E-04	5.64E-04	2.54E-04	1.91E-04	5.28E-04	5.75E-02	3.33E-13	1.38E-04	6.11E-04	1.28E-04
Annual	4.17E-11	1.02E-06	7.80E-05	1.17E-05	1.62E-05	7.31E-06	5.50E-06	1.52E-05	1.65E-03	9.57E-15	3.98E-06	1.76E-05	3.69E-06
100% to open doors	4.17E-11	1.02E-06	7.80E-05	1.17E-05	1.62E-05	7.31E-06	5.50E-06	1.52E-05	1.65E-03	9.57E-15	3.98E-06	1.76E-05	3.69E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	4.88E-11	1.19E-06	9.13E-05	1.36E-05	1.90E-05	8.56E-06	6.44E-06	1.78E-05	1.93E-03	1.12E-14	4.66E-06	2.06E-05	4.32E-06
100% to open doors	4.88E-11	1.19E-06	9.13E-05	1.36E-05	1.90E-05	8.56E-06	6.44E-06	1.78E-05	1.93E-03	1.12E-14	4.66E-06	2.06E-05	4.32E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.06E-10	2.61E-06	1.99E-04	2.98E-05	4.14E-05	1.87E-05	1.40E-05	3.87E-05	4.22E-03	2.44E-14	1.02E-05	4.49E-05	9.43E-06
100% to open doors	1.06E-10	2.61E-06	1.99E-04	2.98E-05	4.14E-05	1.87E-05	1.40E-05	3.87E-05	4.22E-03	2.44E-14	1.02E-05	4.49E-05	9.43E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 345DL Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 345DL Excavator

380 hp 28%

Operating Schedule

1 number of equipment

11 hours each per day

11 hr/day

3/29/2023: Catalyzed DPF per MiltonCat controls 85% of PM, 90% of CO and 50% of organic toxics except if using a Tier 4 factor. And excluding dioxins and furans.

Load Factor (from DKB updated emissions 2/28/2023)

Updated 1/27/2023

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
NONROAD (via MOVES) Emission Factor											
Excavators	1.36389	0.05431	0.01382	0.01340	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	8.49E-07
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03	
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03	
Tier Standards											
Tier 3 Standards (300-600 hp)	3.0	2.6	0.15	0.15							
Tier 4 Standards (175-750 hp)	0.3		0.015	0.015				2.48E-03			
AP-42 Table 3.3-1											
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63					

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
g/day	1596.30	63.56	16.17	15.69	3.37	610514.0	2.78E+00	2.51E+01	1.25E+00	3.35E+00	9.94E-04
lb/day	3.52	0.14	0.04	0.03	0.01	1345.96	6.12E-03	5.53E-02	2.75E-03	7.38E-03	2.19E-06
TPY	0.55	0.02	0.01	0.01	0.00	209.97	9.55E-04	8.63E-03	4.30E-04	1.15E-03	3.42E-07
Annual	1.58E-02	6.29E-04	1.60E-04	1.55E-04	3.33E-05	6.0401	2.75E-05	2.48E-04	1.24E-05	3.31E-05	9.83E-09
100% to open doors	1.58E-02	6.29E-04	1.60E-04	1.55E-04	3.33E-05	6.0401	2.75E-05	2.48E-04	1.24E-05	3.31E-05	9.83E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.85E-02	7.36E-04	1.87E-04	1.82E-04	3.90E-05	7.0661	3.22E-05	2.90E-04	1.45E-05	3.88E-05	1.15E-08
100% to open doors	1.85E-02	7.36E-04	1.87E-04	1.82E-04	3.90E-05	7.0661	3.22E-05	2.90E-04	1.45E-05	3.88E-05	1.15E-08
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	4.03E-02	1.61E-03	4.08E-04	3.96E-04	8.51E-05	15.4170	7.02E-05	6.34E-04	3.15E-05	8.46E-05	2.51E-08
100% to open doors	4.03E-02	1.61E-03	4.08E-04	3.96E-04	8.51E-05	15.4170	7.02E-05	6.34E-04	3.15E-05	8.46E-05	2.51E-08
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 345DL Excavator

g/hp-hr	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
NONROAD (via MOVES) Emission Factor												
Excavators	9.28E-09	1.13E-08	1.04E-04	7.17E-03	1.16E-03	4.39E-03	4.94E-04	3.14E-04	2.54E-03	8.94E-02	1.25E-12	1.97E-12
Excavators TOG X SPECIATE Tier 2			3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03			
Excavators TOG X SPECIATE Tier 4			8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03			
Tier Standards												
Tier 3 Standards (300-600 hp)										0.15		
Tier 4 Standards (175-750 hp)										0.015		
AP-42 Table 3.3-1												
Diesel Fuel												

Emissions	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
g/day	1.09E-05	1.32E-05	1.22E-01	8.40E+00	1.35E+00	5.14E+00	5.78E-01	3.67E-01	2.97E+00	1.05E+02	1.46E-09	2.31E-09
lb/day	2.39E-08	2.91E-08	2.70E-04	1.85E-02	2.98E-03	1.13E-02	1.28E-03	8.09E-04	6.55E-03	2.31E-01	3.22E-12	5.10E-12
TPY	3.73E-09	4.54E-09	4.21E-05	2.89E-03	4.65E-04	1.77E-03	1.99E-04	1.26E-04	1.02E-03	3.60E-02	5.02E-13	7.95E-13
Annual	1.07E-10	1.31E-10	1.21E-06	8.31E-05	1.34E-05	5.09E-05	5.72E-06	3.63E-06	2.94E-05	1.03E-03	1.44E-14	2.29E-14
100% to open doors	1.07E-10	1.31E-10	1.21E-06	8.31E-05	1.34E-05	5.09E-05	5.72E-06	3.63E-06	2.94E-05	1.03E-03	1.44E-14	2.29E-14
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.26E-10	1.53E-10	1.42E-06	9.72E-05	1.57E-05	5.95E-05	6.69E-06	4.25E-06	3.44E-05	1.21E-03	1.69E-14	2.68E-14
100% to open doors	1.26E-10	1.53E-10	1.42E-06	9.72E-05	1.57E-05	5.95E-05	6.69E-06	4.25E-06	3.44E-05	1.21E-03	1.69E-14	2.68E-14
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.74E-10	3.34E-10	3.09E-06	2.12E-04	3.42E-05	1.30E-04	1.46E-05	9.27E-06	7.50E-05	2.64E-03	3.69E-14	5.84E-14
100% to open doors	2.74E-10	3.34E-10	3.09E-06	2.12E-04	3.42E-05	1.30E-04	1.46E-05	9.27E-06	7.50E-05	2.64E-03	3.69E-14	5.84E-14
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 345DL Excavator

g/hp-hr	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor		
Excavators		
Excavators TOG X SPECIATE Tier 2		8.22E-04
Excavators TOG X SPECIATE Tier 4	1.48E-03	3.10E-04
Tier Standards		
Tier 3 Standards (300-600 hp)		
Tier 4 Standards (175-750 hp)		
AP-42 Table 3.3-1		
Diesel Fuel		

Emissions		Acetone	Methyl Ethyl Ketone
	g/day	1.73E+00	9.62E-01
	lb/day	3.81E-03	2.12E-03
	TPY	5.94E-04	3.31E-04
	Annual	1.71E-05	9.52E-06
	100% to open doors	1.71E-05	9.52E-06
	0% to exhaust vents	0.00E+00	0.00E+00
	over 24 hr work day (g/s)	2.00E-05	1.11E-05
	100% to open doors	2.00E-05	1.11E-05
	0% to exhaust vents	0.00E+00	0.00E+00
	Peak hour (g/s)	4.36E-05	2.43E-05
	100% to open doors	4.36E-05	2.43E-05
	0% to exhaust vents	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 330C Excavator

Temporal Data
312.0 days/yr
Assumed Caterpillar 330C Excavator
247 hp 28%
Operating Schedule
1 number of equipment
11 hours each per day
11 hr/day

3/29/2023: Includes a DOC which will remove 90% CO, 50% organic toxics unless already using a Tier 4 factor, and excluding dioxins and furans
Load Factor (from DKB updated emissions 2/28/2023)

Updated 1/27/2023

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury
NONROAD (via MOVES) Emission Factor													
Excavators	1.36389	0.48879	0.09212	0.08936	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	8.49E-07	9.28E-09	1.13E-08
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03			
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03			
Tier Standards													
Tier 3 Standards (300-600 hp)	3.0	2.6	0.15	0.15									
Tier 4 Standards (175-750 hp)	0.3		0.015	0.015				2.48E-03					
AP-42 Table 3.3-1													
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63							

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury
g/day	1037.60	371.85	70.08	67.98	2.19	396834.1	1.81E+00	1.63E+01	8.12E-01	2.18E+00	6.46E-04	7.06E-06	8.59E-06
lb/day	2.29	0.82	0.15	0.15	0.00	874.87	3.98E-03	3.60E-02	1.79E-03	4.80E-03	1.42E-06	1.56E-08	1.89E-08
TPY	0.36	0.13	0.02	0.02	0.00	136.48	6.21E-04	5.61E-03	2.79E-04	7.49E-04	2.22E-07	2.43E-09	2.95E-09
Annual	1.03E-02	3.68E-03	6.93E-04	6.73E-04	2.17E-05	3.9261	1.79E-05	1.61E-04	8.03E-06	2.15E-05	6.39E-09	6.98E-11	8.50E-11
100% to open doors	1.03E-02	0.00E+00	6.93E-04	6.73E-04	2.17E-05	3.9261	1.79E-05	1.61E-04	8.03E-06	2.15E-05	6.39E-09	6.98E-11	8.50E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.20E-02	4.30E-03	8.11E-04	7.87E-04	2.53E-05	4.5930	2.09E-05	1.89E-04	9.40E-06	2.52E-05	7.48E-09	8.17E-11	9.94E-11
100% to open doors	1.20E-02	4.30E-03	8.11E-04	7.87E-04	2.53E-05	4.5930	2.09E-05	1.89E-04	9.40E-06	2.52E-05	7.48E-09	8.17E-11	9.94E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.62E-02	9.39E-03	1.77E-03	1.72E-03	5.53E-05	10.0211	4.56E-05	4.12E-04	2.05E-05	5.50E-05	1.63E-08	1.78E-10	2.17E-10
100% to open doors	2.62E-02	9.39E-03	1.77E-03	1.72E-03	5.53E-05	10.0211	4.56E-05	4.12E-04	2.05E-05	5.50E-05	1.63E-08	1.78E-10	2.17E-10
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 330C Excavator

g/hp-hr	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor											
Excavators	1.04E-04	7.17E-03	1.16E-03	4.39E-03	4.94E-04	3.14E-04	2.54E-03	1.25E-12	2.09E-04		
Excavators TOG X SPECIATE Tier 2	3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03				8.22E-04
Excavators TOG X SPECIATE Tier 4	8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03			1.48E-03	3.10E-04
Tier Standards											
Tier 3 Standards (300-600 hp)											
Tier 4 Standards (175-750 hp)											
AP-42 Table 3.3-1											
Diesel Fuel											

Emissions	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	7.95E-02	5.46E+00	8.79E-01	3.34E+00	3.76E-01	2.39E-01	1.93E+00	9.49E-10	1.59E-01	1.12E+00	6.25E-01
lb/day	1.75E-04	1.20E-02	1.94E-03	7.37E-03	8.29E-04	5.26E-04	4.25E-03	2.09E-12	3.50E-04	2.47E-03	1.38E-03
TPY	2.73E-05	1.88E-03	3.02E-04	1.15E-03	1.29E-04	8.21E-05	6.64E-04	3.26E-13	5.47E-05	3.86E-04	2.15E-04
Annual	7.86E-07	5.40E-05	8.70E-06	3.31E-05	3.72E-06	2.36E-06	1.91E-05	9.39E-15	1.57E-06	1.11E-05	6.19E-06
100% to open doors	7.86E-07	5.40E-05	8.70E-06	3.31E-05	3.72E-06	2.36E-06	1.91E-05	9.39E-15	1.57E-06	1.11E-05	6.19E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	9.20E-07	6.32E-05	1.02E-05	3.87E-05	4.35E-06	2.76E-06	2.23E-05	1.10E-14	1.84E-06	1.30E-05	7.24E-06
100% to open doors	9.20E-07	6.32E-05	1.02E-05	3.87E-05	4.35E-06	2.76E-06	2.23E-05	1.10E-14	1.84E-06	1.30E-05	7.24E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.01E-06	1.38E-04	2.22E-05	8.44E-05	9.49E-06	6.02E-06	4.87E-05	2.40E-14	4.01E-06	2.83E-05	1.58E-05
100% to open doors	2.01E-06	1.38E-04	2.22E-05	8.44E-05	9.49E-06	6.02E-06	4.87E-05	2.40E-14	4.01E-06	2.83E-05	1.58E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

PM-10, PM-2.5, Emission Calculations and Stack Parameters for C&D Transfer Station in Ware, MA - Existing Case
Date 1/18/2022
Engineer DTR/DKB
Checked DKB/NRD

C&D Tipping - Particulate Matter
Existing capacity 750 tons per day of C&D (mix of bulky and residuals)
Most deliveries are by 25 ton trailers, or about 30 ADT (30 full arrivals and 30 empty departures per day). Load out into 100 ton rail cars.

Facility accepts waste 6 days per week, 8 hours per day on weekdays, 5 hours on Sat, existing is limited to 214,500 tpy.
= 214,500 / 750 = 286 days per year of operation
286 days per year operation on average to accept 214,500 tpy
Loads are dumped on tipping floor from trucks (including 5.5 ton roll-off trucks, 4 ton roll-off containers,but primarily self dumping live floor 100 CY, 25 ton trailers)

The MSW load is dumped and transferred via front end loader or grapple picker into a pile (wood, residuals, etc). Most is loaded into 100 ton rail cars.

So, each ton of material is dumped (or loaded) twice and may othewise be handled (using front end loader or grapple W) in the tipping floor area.

Transfer building is currently 180' x 120' x 40' H for a total volume of 864,000 CF
Assume nominal two air changes per hour (864,000 CF x 2)/60 min/hr= 28,800 acfm
The transfer building has 6 roof vents and 4 side vents - conservatively assume fans are not operating (and four doors are open during use)

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors for Construction Operations, under Construction Phase - Demolition and Debris Removal, Loading of Debris On-site or Unloading of Debris Offsite, this Table recommends the use of emission factor from Section 13.2.4)

Section 13.2.4 is called Aggregate Handling and Storage Piles, which includes material unloading from trucks onto piles and loading of trucks for shipment or transfer to process

E = k (0.0032) (U/5)^1.3 / (M/2)^1.4 - Equation (1) 13.2.4

where:

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless); 0.35 for PM-10 (particles less than 10 microns in diameter), and 0.053 for PM-2.5
U = mean wind speed (mile/hr)
M = material moisture content (%)

E = 0.35 (0.0032) (U/5)^1.3 / (M/2)^1.4 (for PM10)

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 0.44-19%, and a moisture content range of 0.25 -4.8%.

This equation will produce higher emissions with lower moisture content. Use 2.2% consistent with pushing below.

While the unloading and loading occurs indoors, there is air movement caused by the ventilation system. This can be translated into a "wind speed" equivalent by dividing the volume of air flow, by the face area of the room normal to the exhaust pickups and door openings.

Assume all of this volume is drawn across 100' wide area at tipping floor where doors are, and over an avg height of 20'

(28,800 ft^3/min) x (1/(100x20)) SF = 14 ft/min
14 ft/min x 60 min/hr x 1 mile/5280 ft = 0.16 mph

The low end of the range of wind speed for emission factor equation above is 1.3 mph - use this as a default value to account for any stray currents caused by localized air movement

E = 0.35 x 0.0032 x (1.3/5)^1.3 / ((2.2/2)^1.4) = 0.00017 lb/ton

0.00017 lb/ton x 750 ton/day x 1/24 hr/day x 2 drops = 0.011 lb/hr (24 hr avg) uncontrolled PM-10
(add controls further below)

For PM-2.5, the k multiplier is 0.053 instead of 0.35, apply to emission rate: 0.053/0.35 x 0.011 = 0.0016 lb/hr uncontrolled

Next, consider pushing of material to piles or to hopper (double counts with a drop)- use bulldozing pushing

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors for Construction Operations, under Construction Phase - Site Preparation - Bulldozing
this Table recommends the use of emission factor from Section 11.9)

Section 11.9 is called Western Surface Coal Mining, and includes bulldozing overburden (dirt)

E = 1.0 x s^1.5/ M^1.4 - Table 11.9-1 PM-15

where:

E = emission factor (lb/hr)
s = material silt content (%)
M = material moisture content (%)

multiplier for PM-10 is 0.75 according to Table 11.9-1

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 3.8-15.1%, and a moisture content range of 2.2-16.8%.

This equation will produce higher emissions with lower moisture content and higher silt content
Use a conservative moisture content of 2.2% 2.2 % moisture
Use a conservative silt content of 3.8% (higher than the low end of 0.44% low for drop equation) 3.8 % silt

E = 1.0 x (3.8)^1.5 / ((2.2)^1.4) = 2.456 lb/hr PM-15
2.456 lb/hr x 0.75 = 1.842 lb/hr PM-10

Assume pushing occurs for total of 2 hours per shift.

1.842 lb/hr x 2 hr/day x 1/24 hr/day = 0.154 lb/hr 24-hr avg PM-10 uncontrolled

For PM-2.5, the multiplier is 0.105 instead of 0.75, apply to emission rate: 0.154/0.75 x 0.105 = 0.021 lb/hr uncontrolled

Total uncontrolled PM-10 emissions from dumping, loading, pushing (handling) of waste

	PM-10	PM-2.5	
2 dumping actions	0.011	0.0016	lb/hr
2 hours pushing	0.154	0.021	lb/hr
Total	0.164	0.023	lb/hr

Sanity Check, stack test at UMW Holyoke in 2014 handling 750 tpd C&D including processing found 0.17 lb/hr of PM-10 while operating

Apply 50% reduction from water sprays in ceiling. These are turned off for the cold weather months (Nov-Mar), 5 months out of 12, only apply to tons per year, not for short term air modeling
50% is an assumption based on published factors from EPA-AP-42 of 78% to 96% for close in water sprays on crushing, screening and transfer points for aggregate processing, less control at greater distance from spray
0.5 x 7/12 = 0.27 (27% control), mutiply uncontrolled emissions x 0.73

Calculate Controlled annual emissions
0.164 lb/hr x 0.73 x24 hr/day x 312 day/yr/2000 lb/ton = **0.45 ton/yr** PM-10
0.023 lb/hr x 0.73 x 24 hr/day x 312 day/yr/2000 lb/ton = **0.06 ton/yr** PM-2.5
Operations:6 days/week x 52 weeks/year = 312 days/yr

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2,
a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2 (X4 as for winter baseline with anti skid abrasives)

	No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 12.66 ton per Truck full	59	12.66	20	33	16.33
C&D 0 ton per Truck empty	59	0	20	20	10.00
Total Truck Trips	118	trips/day			26.33
Total Trucks	59	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (26.33) ^1.02 = 62.4 g/VMT
0.137 lb/VMT

Estimate each truck travels approximately 1100 ft from Route 9 to come in and back up and 900 ft to leave, avg 1000 ft 1000
Total daily PM-10 fugitive emissions: 59 x 1000/5280 x 0.137 lb/VMT 1.5 lb/day
1.5 lb/day x 312 day/yr x 1 ton/2000 lb = **0.24 tons/yr** **PM-10**

For PM-2.5, the value of k is reduced to 0.25 X g/VMT, 15.6 g/VMT
0.03 lb/VMT

Factor down to PM-2.5: 0.25/1.0 x 0.24 ton/yr = **0.06 tons/yr** **PM-2.5**

SUMMARY: Total of C&D Tipping, Handling (including Rail Car Loading) and Paved Roads

0.69 tons/yr **PM-10**
0.12 tons/yr **PM-2.5**

Doors are open so worst case is all PM emissions coming out doors, conduct air modeling of this condition

PM-10 emission rate total from all doors **0.0207 g/s from all doors**
PM-2.5 emission rate total from all doors **0.00291 g/s from all doors**

PM-10, PM-2.5, Emission Calculations and Stack Parameters for C&D Transfer Station in Ware, MA - Incremental Case
Date 1/18/2022
Engineer DTR/DKB
Checked DKB/NRD

C&D Tipping - Particulate Matter
Adding 650 tons per day of C&D (mix of bulky and residuals)
Most deliveries are by 25 ton trailers, or about 26 ADT (26 full arrivals and 26 empty departures per day). Load out into 100 ton rail cars.

Facility accepts waste 6 days per week, 8 hours per day on weekdays, 5 hours on Sat, but proposes to increase hours to 11 hours per day on weekdays, increase limited to 178,700 tpy. 275 days per year operation on average to accept 178,700 tpy
= 178,700 / 650 = 275 days per year of operation
Loads are dumped on tipping floor from trucks (including 5.5 ton roll-off trucks, 4 ton roll-off containers,but primarily self dumping live floor 100 CY, 25 ton trailers)

The MSW load is dumped and transferred via front end loader or grapple picker into a pile (wood, residuals, etc). Most is loaded into 100 ton rail cars.

So, each ton of material is dumped (or loaded) twice and may othewise be handled (using front end loader or grapple W) in the tipping floor area.

Transfer building is currently 180' x 120' x 40' H (bump out front by 50') for a total volume of 1,224,000 CF
Assume nominal two air changes per hour (1,224,000 CF x 2)/60 min/hr= 40,800 acfm
The transfer building has 6 roof vents and 4 side vents - conservatively assume fans are not operating (and four doors are open during use)

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors for Construction Operations, under Construction Phase - Demolition and Debris Removal, Loading of Debris On-site or Unloading of Debris Offsite, this Table recommends the use of emission factor from Section 13.2.4)

Section 13.2.4 is called Aggregate Handling and Storage Piles, which includes material unloading from trucks onto piles and loading of trucks for shipment or transfer to process

E = k (0.0032) (U/5)^1.3 / (M/2)^1.4 - Equation (1) 13.2.4

where:

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless); 0.35 for PM-10 (particles less than 10 microns in diameter), and 0.053 for PM-2.5
U = mean wind speed (mile/hr)
M = material moisture content (%)

E = 0.35 (0.0032) (U/5)^1.3 / (M/2)^1.4 (for PM10)

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 0.44-19%, and a moisture content range of 0.25 -4.8%.

This equation will produce higher emissions with lower moisture content. Use 2.2% consistent with pushing below.

While the unloading and loading occurs indoors, there is air movement caused by the ventilation system. This can be translated into a "wind speed" equivalent by dividing the volume of air flow, by the face area of the room normal to the exhaust pickups and door openings.

Assume all of this volume is drawn across 100' wide area at tipping floor where doors are, and over an avg height of 20'

(40,800 ft^3/min) x (1/(100x20)) SF = 20 ft/min
20 ft/min x 60 min/hr x 1 mile/5280 ft = 0.23 mph

The low end of the range of wind speed for emission factor equation above is 1.3 mph - use this as a default value to account for any stray currents caused by localized air movement

E = 0.35 x 0.0032 x (1.3/5)^1.3 / ((2.2/2)^1.4) = 0.00017 lb/ton

0.00017 lb/ton x 650 ton/day x 1/24 hr/day x 2 drops = 0.009 lb/hr (24 hr avg) uncontrolled PM-10
(add controls further below)

For PM-2.5, the k multiplier is 0.053 instead of 0.35, apply to emission rate: 0.053/0.35 x 0.009 = 0.0014 lb/hr uncontrolled

Next, consider pushing of material to piles or to hopper (double counts with a drop)- use bulldozing pushing

According to EPA AP-42, Section 13.2.3, Heavy Construction Operations (Table 13.2.3-1, Recommended Emission Factors for Construction Operations, under Construction Phase - Site Preparation - Bulldozing
this Table recommends the use of emission factor from Section 11.9)

Section 11.9 is called Western Surface Coal Mining, and includes bulldozing overburden (dirt)

E = 1.0 x s^1.5/ M^1.4 - Table 11.9-1 PM-15

where:

E = emission factor (lb/hr)
s = material silt content (%)
M = material moisture content (%)

multiplier for PM-10 is 0.75 according to Table 11.9-1

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) content range of 3.8-15.1%, and a moisture content range of 2.2-16.8%.

This equation will produce higher emissions with lower moisture content and higher silt content
Use a conservative moisture content of 2.2% 2.2 % moisture
Use a conservative silt content of 3.8% (higher than the low end of 0.44% low for drop equation) 3.8 % silt

E = 1.0 x (3.8)^1.5 / ((2.2)^1.4) = 2.456 lb/hr PM-15
2.456 lb/hr x 0.75 = 1.842 lb/hr PM-10

Assume pushing occurs for total of 2 hours per shift.

1.842 lb/hr x 2 hr/day x 1/24 hr/day = 0.154 lb/hr 24-hr avg PM-10 uncontrolled

For PM-2.5, the multiplier is 0.105 instead of 0.75, apply to emission rate: 0.154/0.75 x 0.105 = 0.021 lb/hr uncontrolled

Total uncontrolled PM-10 emissions from dumping, loading, pushing (handling) of waste

	PM-10	PM-2.5	
2 dumping actions	0.009	0.0014	lb/hr
2 hours pushing	0.154	0.021	lb/hr
Total	0.163	0.023	lb/hr

Sanity Check, stack test at UMW Holyoke in 2014 handling 750 tpd C&D including processing found 0.17 lb/hr of PM-10 while operating

Apply 50% reduction from water sprays in ceiling. These are turned off for the cold weather months (Nov-Mar), 5 months out of 12, only apply to tons per year, not for short term air modeling
50% is an assumption based on published factors from EPA-AP-42 of 78% to 96% for close in water sprays on crushing, screening and transfer points for aggregate processing, less control at greater distance from spray
0.5 x 7/12 = 0.27 (27% control), mutiply uncontrolled emissions x 0.73

Calculate Controlled annual emissions
0.163 lb/hr x 0.73 x24 hr/day x 312 day/yr/2000 lb/ton = **0.44 ton/yr** PM-10
0.023 lb/hr x 0.73 x 24 hr/day x 312 day/yr/2000 lb/ton = **0.06 ton/yr** PM-2.5
Operations:6 days/week x 52 weeks/year = 312 days/yr

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2,
a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2 (X4 as for winter baseline with anti skid abrasives)

		No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 15.7 tons per Truck full	overestimate the incremental number of trucks (actual = 1400 TPD / 15.7 ton/truck - 59 existing = 30)	41	15.7	20	36	17.85
C&D 0 tons per Truck empty		41	0	20	20	10.00
Total Truck Trips		82	trips/day			27.85
Total Trucks		41	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (27.85) ^1.02 = 66.0 g/VMT
0.145 lb/VMT

Estimate each truck travels approximately 1100 ft from Route 9 to come in and back up and 900 ft to leave, avg 1000 ft 1000
Total daily PM-10 fugitive emissions: 41 x 1000/5280 x 0.145 lb/VMT 1.1 lb/day
1.1 lb/day x 312 day/yr x 1 ton/2000 lb = **0.18 tons/yr** **PM-10**

For PM-2.5, the value of k is reduced to 0.25 X g/VMT, 16.5 g/VMT
0.04 lb/VMT

Factor down to PM-2.5: 0.25/1.0 x 0.18 ton/yr = **0.04 tons/yr** **PM-2.5**

SUMMARY: Total of C&D Tipping, Handling (including Rail Car Loading) and Paved Roads

0.62 tons/yr **PM-10**
0.11 tons/yr **PM-2.5**

Doors are open so worst case is all PM emissions coming out doors, conduct air modeling of this condition

PM-10 emission rate total from all doors **0.0205 g/s from all doors**
PM-2.5 emission rate total from all doors **0.00288 g/s from all doors**

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2,
a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2 (X4 as for winter baseline with anti skid abrasives)

	No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 15.7 tons load per Truck full	89	15.7	20	36	17.85
C&D 0 tons load per Truck empty	89	0	20	20	10.00
Total Truck Trips	178	trips/day			27.85
Total Trucks	89	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (27.85) ^1.02 = 66.0 g/VMT
0.145 lb/VMT

Estimate each truck travels approximately 1100 ft from Route 9 to come in and back up and 900 ft to leave, avg 1000 ft 1000
Total daily PM-10 fugitive emissions: 89 x 1000/5280 x 0.145 lb/VMT 2.5 lb/day
1.1 lb/day x 312 day/yr x 1 ton/2000 lb = **0.38 tons/yr** **PM-10**

For PM-2.5, the value of k is reduced to 0.25 X g/VMT, 16.5 g/VMT
0.04 lb/VMT
Factor down to PM-2.5: 0.25/1.0 x 0.38 ton/yr = **0.10 tons/yr** **PM-2.5**

Calculate PM-10 and PM-2.5 Emissions from Fugitive Dust generated by Trucks on Paved Roads (on-site)

From EPA AP-42, Section 13.2.1 - Paved Roads

E = k (sL)^0.91 * (W)^1.02; Equation (1) - 13.2.1

where:

E = particulate emission factor (grams/vehicle mile traveled (g/VMT))
k = particle size multiplier; 1.0 g/VMT for PM-10 (particles less than 10 microns in diameter)
sL = road surface silt loading (grams per square meter)
W = average weight (tons) of vehicles traveling the road

According to EPA, this emission factor is valid over a silt (% of particles less than 75 microns dia) loading range of 0.03 - 400 g/m^2, a mean vehicle weight of 2 - 42 tons, and a mean vehicle speed of 1 - 55 mph.

sL is from Table 13.2.1-2, for low volume roads (ADT < 500), use ubiquitous baseline value of 0.6 g/m^2
Even though the area is swept daily, to account for trackout waste floor, increase this to 2.4 g/M^2
(X4 as for winter baseline with anti skid abrasives)

	No of Truck trips	Material Weight (tons)	Truck Weight (tons)	Total Weight (tons/truck)	Weighted average
C&D 15.7 tons load per Truck full	89	15.7	20	36	17.85
C&D 0 tons load per Truck empty	89	0	20	20	10.00
Total Truck Trips	178	trips/day			27.85
Total Trucks	89	trucks/day			(tons/truck)

E =1.0 x (2.4)^0.91 x (27.85) ^1.02 = PM10 66.0 g/VMT per Truck - Avg Weight of 50% Full, 50% Empty Tru
0.145 lb/VMT

47.1 g/VMT per Truck - Empty, 0 tons C&D

85.1 g/VMT per Truck - Full 15.7 Tons C&D

Revised Dust Calculations

Estimate each truck travels approximately 2,417 ft TOTAL -	1209			
Total daily PM-10 fugitive emissions: 89 x 1209 x 0.145 lb/VMT	3.0	lb/day		
1.1 lb/day x 312 day/yr x 1 ton/2000 lb =	**0.46**	**tons/yr**	**PM-10**	(To determine if PTE is over 1 TPY, not used in official calcs)
For PM-2.5, the value of k is reduced to 0.25 X g/VMT, PM2.5	16.5	g/VMT	per Truck - Avg Weight of 50% Full, 50% Empty Tru	
	0.04	lb/VMT		
Factor down to PM-2.5: 0.25/1.0 x 0.46 ton/yr =	**0.12**	**tons/yr**	**PM-2.5**	
	11.8	g/VMT	per Truck - Empty, 0 tons C&D	
	21.3	g/VMT	per Truck - Full 15.7 Tons C&D	

Existing

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0207	0.0029	24-hour
	0.0451	0.0064	11-hour (for addition to incremental future)
	0.0552	0.0078	9-hour
	0.0827	0.0116	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0129	0.0018	8,760 hr/yr
	0.0356	0.0050	260-day/yr & 11 hr/day + 52-day/yr & 6 hr/day = 3,172 hr/yr (for addition to incremental future)
	0.0426	0.0060	260-day/yr & 9 hr/day + 52-day/yr & 6 hr/day = 2,652 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 62.4 g PM10/VMT on-site paved roads
15.6 g PM2.5/VMT

Incremental

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0205	0.0029	24-hour
	0.0447	0.0063	11-hour
	0.0820	0.0115	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0128	0.0018	8,760 hr/yr
	0.0353	0.0050	260 days/yr & 11 hr/day + 52 days/yr & 6 hr/day = 3,172 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 66.0 g PM10/VMT on-site paved roads
16.5 g PM2.5/VMT

Future = Existing + Incremental

SOURCES	PM10 (g/s)	PM2.5 (g/s)	Averaging Period Bases
Transfer Building short term	0.0412	0.0058	24-hour
	0.0899	0.0126	11-hour
	0.1647	0.0232	6-hour (overestimates lesser Saturday activity)
Transfer Building annual	0.0257	0.0036	8,760 hr/yr
	0.0710	0.0100	260 days/yr & 11 hr/day + 52 days/yr & 6 hr/day = 3,172 hr/yr

*Transfer Building short-term g/s are based on lb/hr times 453.6 g/lb and divided by 3600 s/hr

*Annual g/s are the TPY values multiplied by 2000 lb/ton and 453.6 g/lb and divided by 8760 hr/yr and 3600 s/hr

Truck travel emission factor 66.0 g PM10/VMT on-site paved roads
16.5 g/VMT

Attachment 3-1e

Stage 2 with Stage 2 Rail Air Source Parameters & Calculations

ReSource Transfer Station - Ware, MA
AERMOD Dispersion Modeling Analysis
NAAQS Results - All Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
NO_2	1 HOUR (6)	143.53	2017-2021	729255.35, 4683014.32, 152.36, 317.66, 0	***Included***	143.53	188	76%
	ANNUAL (7)	25.58	2021	729306.94, 4683061.13, 154.06, 317.66, 0	***Included***	25.58	100	26%

Notes:

(6) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

(7) Highest Annual Concentration Over 5 Years

ReSource - Ware, MA

Stage 2 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMOD Input Emissions

Inside Building (g/s)

	Description	Source Type	AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e
Fugitive Dust (LT)						7.10E-02	9.99E-03		
Fugitive Dust (ST - 6hr)						1.65E-01	2.32E-02		
Fugitive Dust (ST - 11hr)						8.99E-02	1.26E-02		
CAT 236D SkidSteer									
Sullair 185 Compressor									
CAT 966M Loader (2)				4.60E-03	5.54E-02	2.30E-04	2.30E-04	6.21E-05	8.00E+00
Deere 944JX Loader									
CAT 345DL Excavator				4.03E-02	1.61E-03	4.08E-04	3.96E-04	8.51E-05	1.54E+01
CAT 330C Excavator				2.62E-02	9.39E-03	1.77E-03	1.72E-03	5.53E-05	1.00E+01
TOTAL				7.11E-02	6.64E-02	9.23E-02	1.50E-02	2.02E-04	3.34E+01
Div/6 Doors	11hr	Volume	(R/T)DOOR1-6	1.19E-02	1.11E-02	1.54E-02	2.50E-03	3.37E-05	5.57E+00
	6hr		Saturday			2.79E-02	4.25E-03		
	Saturday/Weekday Ratio for EMISFACT			EMISFACT for AERMOD (Particulates only)		1.81	1.70		

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

	Description	Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e
TOTAL				1.19E-01	2.26E-02	3.80E-03	3.71E-03	3.10E-06	1.13E+01
Truck Engine doing work (Hydraulic Rev/Unload)		Volume	W_(R)DOOR1-6	1.99E-02	3.77E-03	6.33E-04	6.18E-04	5.16E-07	1.89E+00

Railcar Moving (g/s-m2)

6600 m2 area source	area (m2)			AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e
L120C Loader		6600	Area	RAIL_LOADER	3.40E-06	3.16E-06	4.97E-07	4.82E-07	3.54E-09	4.57E-04

STAGE 2 RAIL - Locomotive IDLING (Single Trip in the AM)

	Description	Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1	Point Source	T1LC11_N	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2	Point Source	T1LC12_N	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1	Point Source	T1LC21_N	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2	Point Source	T1LC22_N	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1	Point Source	T1LC11_S	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2	Point Source	T1LC12_S	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1	Point Source	T1LC21_S	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2	Point Source	T1LC22_S	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02

	Description	Source Type	AERMOD Source Name	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e

STAGE 2 RAIL - Locomotive Switching/Pushing (Single Trip in the AM)

	Description	Source Type	AERMOD Source Name	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e
GE EMD-38-2 Locomotive	AM Trip Locomotive Push North	Line Volume	T1_SWC_N	1.71E-01	2.85E-02	4.42E-03	4.42E-03	1.69E-03	9.17E+00
GE EMD-38-2 Locomotive	AM Trip Locomotive Push South	Line Volume	T1_SWC_S	1.71E-01	2.85E-02	4.42E-03	4.42E-03	1.69E-03	9.17E+00

Roadway (g/s)

	Description	Source Type	AERMOD Source Name	NOx	CO	PM10	PM2.5	SO2	CO2E
Two Lane Onsite Roadway		Line Volume	ONSITEDRIVE	3.21E-02	1.13E-02	1.20E-01	3.10E-02	1.74E-06	4.47E+00
Fines Trucks		Line Volume	FINESTRUCKS	8.51E-04	3.01E-04	2.28E-03	5.99E-04	4.62E-08	1.19E-01
Empty Trucks return path		Line Volume	TRUCKS_RTRN	3.37E-03	1.19E-03	9.01E-03	2.37E-03	1.83E-07	4.70E-01
Trucks U-Turn and backup to Door 3		Line Volume	UTURN_PATH	8.80E-03	3.11E-03	4.22E-02	1.08E-02	4.78E-07	1.23E+00
Trucks forward/backup to Door2		Line Volume	DOOR2_TIP	7.00E-04	2.47E-04	3.36E-03	8.64E-04	3.80E-08	9.77E-02
Trucks forward/backup to Door4		Line Volume	DOOR4_TIP	6.79E-04	2.40E-04	3.25E-03	8.38E-04	3.69E-08	9.48E-02
Rte 9 East of Gilbertville		Line Volume	SLINE2	2.16E-02	6.53E-03	1.10E-03	1.07E-03	8.93E-07	3.28E+00
Rte 9/32 Site Drive to Gilbertville		Line Volume	SLINE3	7.75E-03	2.35E-03	3.94E-04	3.84E-04	3.21E-07	1.18E+00
Rte 9/32, Site Drive to Knox		Line Volume	SLINE4	3.66E-02	1.11E-02	1.86E-03	1.81E-03	1.51E-06	5.55E+00

Truck Idling - Volume Sources (g/s)

	Description	Source Type	AERMOD Source Name	NOx	CO	PM10	PM2.5	SO2	CO2E
Truck Exhaust Tipping Area		Volume	IDLE_APRON	2.97E-02	8.96E-03	1.47E-03	1.35E-03	9.94E-06	2.90E+00
Outbound idling trucks queue		Volume	OBTRUCKIDLE	2.23E-03	6.72E-04	1.10E-04	1.01E-04	7.45E-07	2.18E-01
Inb Trucks on Scale idling		Volume	IB_SCALE_IDL	8.17E-03	2.46E-03	4.03E-04	3.71E-04	2.73E-06	7.98E-01
Ob Trucks on Scale idling		Volume	OB_SCALE_TRK	2.01E-02	6.05E-03	9.90E-04	9.11E-04	6.71E-06	1.96E+00
Site Drive @Rte 9		Volume	TRUCKIDLE2	3.10E-04	9.33E-05	1.53E-05	1.41E-05	1.04E-07	3.02E-02
Gilbertville Rd & Rte 9		Volume	TRUCKIDLE3	6.22E-04	1.88E-04	3.07E-05	2.82E-05	2.08E-07	6.08E-02

ReSource - Ware, MA
Stage 2 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMO

Inside Building (g/s)

	Description		Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
Fugitive Dust (LT)											
Fugitive Dust (ST - 6hr)											
Fugitive Dust (ST - 11hr)											
CAT 236D SkidSteer											
Sullair 185 Compressor											
CAT 966M Loader (2)					0.00E+00	7.25E-05	0.00E+00	1.19E-03	5.95E-05	4.14E-05	1.87E-05
Deere 944JX Loader											
CAT 345DL Excavator					0.00E+00	7.02E-05	0.00E+00	6.34E-04	3.42E-05	1.30E-04	1.46E-05
CAT 330C Excavator					0.00E+00	4.56E-05	0.00E+00	4.12E-04	2.22E-05	8.44E-05	9.49E-06
TOTAL					0.00E+00	1.88E-04	0.00E+00	2.24E-03	1.16E-04	2.56E-04	4.28E-05
Div/6 Doors	11hr		Volume	(R/T)DOOR1-6	0.00E+00	3.14E-05	0.00E+00	3.73E-04	1.93E-05	4.26E-05	7.13E-06
	6hr			Saturday							
	Saturday/Weekday Ratio for EMISFACT										

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

	Description		Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
TOTAL					0.00E+00	2.01E-05	0.00E+00	2.21E-04	1.81E-05	1.31E-04	1.12E-05
Truck Engine doing work (Hydraulic Rev/Unload)			Volume	W_(R)DOOR1-6	0.00E+00	3.35E-06	0.00E+00	3.68E-05	3.02E-06	1.31E-04	1.12E-05

Railcar Moving (g/s-m2)

6600 m2 area source	area (m2)			AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
L120C Loader		6600	Area	RAIL_LOADER	0.00E+00	1.01E-08	0.00E+00	7.78E-08	6.53E-09	4.73E-09	1.82E-09

STAGE 2 RAIL - Locomotive IDLING (Single Trip in the AM)

	Description	Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1	Point Source	T1LC11_N	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2	Point Source	T1LC12_N	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1	Point Source	T1LC21_N	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2	Point Source	T1LC22_N	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1	Point Source	T1LC11_S	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2	Point Source	T1LC12_S	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1	Point Source	T1LC21_S	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2	Point Source	T1LC22_S	0.00E+00	5.83E-06	0.00E+00	3.06E-05	1.95E-06	0.00E+00	4.45E-07

	Description	Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene

STAGE 2 RAIL - Locomotive Switching/Pushing (Single Trip in the AM)

	Description	Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
GE EMD-38-2 Locomotive	AM Trip Locomotive Push North	Line Volume	T1_SWC_N	0.00E+00	5.68E-04	0.00E+00	2.98E-03	1.90E-04	0.00E+00	4.33E-05
GE EMD-38-2 Locomotive	AM Trip Locomotive Push South	Line Volume	T1_SWC_S	0.00E+00	5.68E-04	0.00E+00	2.98E-03	1.90E-04	0.00E+00	4.33E-05

Roadway (g/s)

	Description	Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
Two Lane Onsite Roadway		Line Volume	ONSITEDRIVE	0.00E+00	1.14E-05	0.00E+00	1.25E-04	1.02E-05	5.80E-05	6.04E-06
Fines Trucks		Line Volume	FINESTRUCKS	0.00E+00	3.02E-07	0.00E+00	3.31E-06	2.70E-07	1.54E-06	1.60E-07
Empty Trucks return path		Line Volume	TRUCKS_RTRN	0.00E+00	1.19E-06	0.00E+00	1.31E-05	1.07E-06	6.09E-06	6.35E-07
Trucks U-Turn and backup to Door 3		Line Volume	UTURN_PATH	0.00E+00	3.12E-06	0.00E+00	3.42E-05	2.79E-06	1.59E-05	1.66E-06
Trucks forward/backup to Door2		Line Volume	DOOR2_TIP	0.00E+00	2.48E-07	0.00E+00	2.73E-06	2.22E-07	1.27E-06	1.32E-07
Trucks forward/backup to Door4		Line Volume	DOOR4_TIP	0.00E+00	2.41E-07	0.00E+00	2.64E-06	2.15E-07	1.23E-06	1.28E-07
Rte 9 East of Gilbertville		Line Volume	SLINE2	0.00E+00	5.80E-06	0.00E+00	6.38E-05	5.24E-06	3.79E-05	3.23E-06
Rte 9/32 Site Drive to Gilbertville		Line Volume	SLINE3	0.00E+00	2.08E-06	0.00E+00	2.29E-05	1.88E-06	1.36E-05	1.16E-06
Rte 9/32, Site Drive to Knox		Line Volume	SLINE4	0.00E+00	9.84E-06	0.00E+00	1.08E-04	8.88E-06	6.42E-05	5.48E-06

Truck Idling - Volume Sources (g/s)

	Description	Source Type	AERMOD Source Name	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene
Truck Exhaust Tipping Area		Volume	IDLE_APRON	0.00E+00	1.97E-05	0.00E+00	2.13E-04	1.75E-05	1.39E-04	9.88E-06
Outbound idling trucks queue		Volume	OBTRUCKIDLE	0.00E+00	1.48E-06	0.00E+00	1.60E-05	1.31E-06	1.05E-05	7.41E-07
Inb Trucks on Scale idling		Volume	IB_SCALE_IDL	0.00E+00	5.42E-06	0.00E+00	5.85E-05	4.82E-06	3.84E-05	2.72E-06
Ob Trucks on Scale idling		Volume	OB_SCALE_TRK	0.00E+00	1.33E-05	0.00E+00	1.44E-04	1.18E-05	9.42E-05	6.67E-06
Site Drive @Rte 9		Volume	TRUCKIDLE2	0.00E+00	2.05E-07	0.00E+00	2.22E-06	1.83E-07	1.45E-06	1.03E-07
Gilbertville Rd & Rte 9		Volume	TRUCKIDLE3	0.00E+00	4.13E-07	0.00E+00	4.46E-06	3.67E-07	2.92E-06	2.07E-07

ReSource - Ware, MA
Stage 2 Mobile Source Emissions Analysis - FUTURE CONDITIONS - AERMO

Inside Building (g/s)

	Description		Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
Fugitive Dust (LT)													
Fugitive Dust (ST - 6hr)													
Fugitive Dust (ST - 11hr)													
CAT 236D SkidSteer													
Sullair 185 Compressor													
CAT 966M Loader (2)					1.40E-05	0.00E+00	3.87E-05	0.00E+00	4.22E-03	2.44E-14	1.02E-05	4.49E-05	9.43E-06
Deere 944JX Loader													
CAT 345DL Excavator					9.27E-06	0.00E+00	7.50E-05	0.00E+00	2.64E-03	3.69E-14	5.84E-14	4.36E-05	2.43E-05
CAT 330C Excavator					6.02E-06	0.00E+00	4.87E-05	0.00E+00	1.72E-03	2.40E-14	4.01E-06	2.83E-05	1.58E-05
TOTAL					2.93E-05	0.00E+00	1.62E-04	0.00E+00	8.58E-03	8.53E-14	1.42E-05	1.17E-04	4.95E-05
Div/6 Doors	11hr		Volume	(R/T)DOOR1-6	4.89E-06	0.00E+00	2.71E-05	0.00E+00	1.43E-03	1.42E-14	2.36E-06	1.95E-05	8.25E-06
	6hr			Saturday									
	Saturday/Weekday Ratio for EMISFACT												

Hydraulics/Truck Engine Revving while unloading (inside building) (g/s)

	Description	Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
TOTAL				5.64E-06	1.21E-05	3.24E-03	7.07E-06	#REF!	2.83E-13	3.13E-13	0.00E+00	0.00E+00
Truck Engine doing work (Hydraulic Rev/Unload)		Volume	W_(R)DOOR1-6	5.64E-06	1.21E-05	3.24E-03	7.07E-06	#REF!	2.83E-13	3.13E-13	0.00E+00	0.00E+00

Railcar Moving (g/s-m2)

6600 m2 area source	area (m2)			AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
L120C Loader		6600	Area	RAIL_LOADER	6.26E-10	0.00E+00	5.78E-09	0.00E+00	4.82E-07	2.79E-18	1.16E-09	5.12E-09	2.86E-09

STAGE 2 RAIL - Locomotive IDLING (Single Trip in the AM)

	Description	Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1	Point Source	T1LC11_N	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2	Point Source	T1LC12_N	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1	Point Source	T1LC21_N	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2	Point Source	T1LC22_N	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	PM Trip (#2), Locomotive #1, Stack #1	Point Source	T1LC11_S	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #1, Stack #2	Point Source	T1LC12_S	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #1	Point Source	T1LC21_S	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07
GE EMD-38-2 Locomotive	Pm Trip (#2), Locomotive #2, Stack #2	Point Source	T1LC22_S	2.72E-07	0.00E+00	1.23E-06	0.00E+00	5.16E-05	0.00E+00	0.00E+00	8.69E-07	9.68E-07

	Description	Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone

STAGE 2 RAIL - Locomotive Switching/Pushing (Single Trip in the AM)

	Description	Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
GE EMD-38-2 Locomotive	AM Trip Locomotive Push North	Line Volume	T1_SWC_N	2.65E-05	0.00E+00	1.19E-04	0.00E+00	5.03E-03	0.00E+00	0.00E+00	8.47E-05	9.43E-05
GE EMD-38-2 Locomotive	AM Trip Locomotive Push South	Line Volume	T1_SWC_S	2.65E-05	0.00E+00	1.19E-04	0.00E+00	5.03E-03	0.00E+00	0.00E+00	8.47E-05	9.43E-05

Roadway (g/s)

	Description	Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
Two Lane Onsite Roadway		Line Volume	ONSITEDRIVE	3.18E-06	4.79E-06	1.77E-03	2.80E-06	0.00E+00	1.82E-13	2.02E-13	0.00E+00	0.00E+00
Fines Trucks		Line Volume	FINESTRUCKS	8.44E-08	1.27E-07	4.69E-05	7.43E-08	0.00E+00	4.84E-15	5.35E-15	0.00E+00	0.00E+00
Empty Trucks return path		Line Volume	TRUCKS_RTRN	3.34E-07	5.04E-07	1.85E-04	2.94E-07	0.00E+00	1.92E-14	2.12E-14	0.00E+00	0.00E+00
Trucks U-Turn and backup to Door 3		Line Volume	UTURN_PATH	8.72E-07	1.32E-06	4.84E-04	7.68E-07	0.00E+00	5.00E-14	5.53E-14	0.00E+00	0.00E+00
Trucks forward/backup to Door2		Line Volume	DOOR2_TIP	6.94E-08	1.05E-07	3.86E-05	6.11E-08	0.00E+00	3.98E-15	4.40E-15	0.00E+00	0.00E+00
Trucks forward/backup to Door4		Line Volume	DOOR4_TIP	6.73E-08	1.02E-07	3.74E-05	5.93E-08	0.00E+00	3.86E-15	4.27E-15	0.00E+00	0.00E+00
Rte 9 East of Gilbertville		Line Volume	SLINE2	1.63E-06	3.49E-06	9.34E-04	2.04E-06	0.00E+00	8.17E-14	9.03E-14	0.00E+00	0.00E+00
Rte 9/32 Site Drive to Gilbertville		Line Volume	SLINE3	5.85E-07	1.26E-06	3.36E-04	7.33E-07	0.00E+00	2.94E-14	3.25E-14	0.00E+00	0.00E+00
Rte 9/32, Site Drive to Knox		Line Volume	SLINE4	2.76E-06	5.92E-06	1.58E-03	3.46E-06	0.00E+00	1.39E-13	1.53E-13	0.00E+00	0.00E+00

Truck Idling - Volume Sources (g/s)

	Description	Source Type	AERMOD Source Name	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
Truck Exhaust Tipping Area		Volume	IDLE_APRON	5.41E-06	3.08E-06	3.55E-05	5.58E-06	0.00E+00	5.66E-13	6.26E-13	0.00E+00	0.00E+00
Outbound idling trucks queue		Volume	OBTRUCKIDLE	4.06E-07	2.31E-07	2.66E-06	4.19E-07	0.00E+00	4.25E-14	4.69E-14	0.00E+00	0.00E+00
Inb Trucks on Scale idling		Volume	IB_SCALE_IDL	1.49E-06	8.48E-07	9.75E-06	1.53E-06	0.00E+00	1.56E-13	1.72E-13	0.00E+00	0.00E+00
Ob Trucks on Scale idling		Volume	OB_SCALE_TRK	3.65E-06	2.08E-06	2.39E-05	3.77E-06	0.00E+00	3.82E-13	4.22E-13	0.00E+00	0.00E+00
Site Drive @Rte 9		Volume	TRUCKIDLE2	5.64E-08	3.21E-08	3.70E-07	5.81E-08	0.00E+00	5.90E-15	6.52E-15	0.00E+00	0.00E+00
Gilbertville Rd & Rte 9		Volume	TRUCKIDLE3	1.13E-07	6.46E-08	7.43E-07	1.17E-07	0.00E+00	1.19E-14	1.31E-14	0.00E+00	0.00E+00

AERMOD Input - Plume Attributes

Area source, line volume source, volume sources

Line Volume Sources	Vertical dimension (m)	Release Height (m)	Plume Width (m)	SYINIT (m)	SZINIT (m)
Locomotives switching					
T1_SWC	8.72	5.13	3.15	2.93	4.06
T2_SWC_N	8.72	5.13	3.15	2.93	4.06
T2_SWC_S	8.72	5.13	3.15	2.93	4.06
T3_SWC_N	8.72	5.13	3.15	2.93	4.06
T3_SWC_S	8.72	5.13	3.15	2.93	4.06
Moving Trucks					
ONSITEDRIVE	7.00	3.50	6.60	6.14	3.26
FINESTRUCKS	7.00	3.50	3.30	3.07	3.26
TRUCKS_RTRN	7.00	3.50	3.30	3.07	3.26
UTURN_PATH	7.00	3.50	3.30	3.07	3.26
DOOR2_TIP	7.00	3.50	3.30	3.07	3.26
DOOR4_TIP	7.00	3.50	3.30	3.07	3.26
SLINE2	7.00	3.50	6.60	6.14	3.26
SLINE3	7.00	3.50	6.60	6.14	3.26
SLINE4	7.00	3.50	6.6	6.14	3.26

Volume Sources	Length of Side (m)	Release Height (m)	Initial Vertical dim (m)
Building Truck Bay Doors			
TDOOR1	5.49	4.27	3.97
TDOOR2	5.49	4.27	3.97
TDOOR3	5.49	4.27	3.97
TDOOR4	5.49	4.27	3.97
Building Truck Bay Doors - Truck Revving Emissions			
W_DOOR1	5.49	4.27	3.97
W_DOOR2	5.49	4.27	3.97
W_DOOR3	5.49	4.27	3.97
W_DOOR4	5.49	4.27	3.97
Building Rail Doors			
RDOOR1	4.88	4.27	3.97
RDOOR2	4.88	4.27	3.97
Building Rail Doors - Truck Revving Emissions			
W_RDOOR1	4.88	4.27	3.97
W_RDOOR2	4.88	4.27	3.97
On-site Idling Trucks			
IDLE_APRON	2.60	2.06	1.91
OBTRUCKIDLE	2.60	2.06	1.91
IB_SCALE_IDL	2.60	2.06	1.914
OB_SCALE_TRK	2.60	2.06	1.914

Off-site Idling Trucks @ intersections			
TRUCKIDLE2	3.3	2.1	1.914
TRUCKIDLE3	3.3	2.1	1.914

Point Sources	Stack Height (m)	Exit temp (F)	Inside Diamter (m)	Exit Velocity (m/s)	Flow Rate (m^3/s)
Idling locomotive stack					
T1LC11	5.131	156	0.3048	7.5	0.55
T1LC12	5.131	156	0.3048	7.5	0.55
T1LC21	5.131	156	0.3048	7.5	0.55
T1LC22	5.131	156	0.3048	7.5	0.55
T2LC11_N	5.131	156	0.3048	7.5	0.55
T2LC12_N	5.131	156	0.3048	7.5	0.55
T2LC21_N	5.131	156	0.3048	7.5	0.55
T2LC22_N	5.131	156	0.3048	7.5	0.55
T2LC11_S	5.131	156	0.3048	7.5	0.55
T2LC12_S	5.131	156	0.3048	7.5	0.55
T2LC21_S	5.131	156	0.3048	7.5	0.55
T2LC22_S	5.131	156	0.3048	7.5	0.55
T3LC11_N	5.131	156	0.3048	7.5	0.55
T3LC12_N	5.131	156	0.3048	7.5	0.55
T3LC21_N	5.131	156	0.3048	7.5	0.55
T3LC22_N	5.131	156	0.3048	7.5	0.55
T3LC11_S	5.131	156	0.3048	7.5	0.55
T3LC12_S	5.131	156	0.3048	7.5	0.55
T3LC21_S	5.131	156	0.3048	7.5	0.55
T3LC22_S	5.131	156	0.3048	7.5	0.55

Area Sources	Initial Vertical Dim. (m)	Release Height (m)
RAIL_LOADER	3	3.048

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

source added or modified from original 1/23/2023, IHW
text Added source, text, or calculation, Jan 2023 IHW

MOVES Emission Factors (g/vmt)

	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
15 mph	17.92	6.33	0.81	0.84	9.73E-04	2499.95		6.35E-03		6.97E-02
30 mph	13.45	4.07	0.68	0.67	5.57E-04	2042.57		3.62E-03		3.98E-02
Fugitive PM - Emtpy & Full Truck Avg Emissions			66.03	16.51						
Fugitive PM - Emtpy Truck, 0 tons C&D			47.10	11.78						
Fugitive PM - Full Truck, 15.7 tons C&D			85.06	21.26						

VMT	link Avg Speed mph	Peak Hourly Veh. #	Link Length meters	Link Length miles	Link Vehicle Miles Traveled VMT/hr (peak hr)	Notes
Two Lane Onsite Roadway	15	40	259.20	0.16	6.44	40 trips during peak hour, 20 trucks total - 50% Full, 50% empty
Fines Trucks	15	2	137.60	0.09	0.17	2 Fines Trucks
Empty Trucks return path	15	18	60.50	0.04	0.68	18 trips TOTAL - this ONE WAY path for EMPTY trucks exiting the building & returning to the main site drive
Trucks U-Turn and backup to Door 3	15	18	158.00	0.10	1.77	18 trips, FULL Trucks (since the trucks make a loop and do not return on the same pathway)
Trucks forward/backup to Door2	15	4	56.60	0.04	0.14	3 doors for tipping; 20 trucks during peak hour, each tip for 15 minutes = each door has capacity for 4 trucks per hour = 12 trucks tip per hour
Trucks forward/backup to Door4	15	4	54.90	0.03	0.14	
Rte 9 East of Gilbertville	30	30	309.70	0.19	5.77	
Rte 9/32 Site Drive to Gilbertville	30	30	111.30	0.07	2.07	
Rte 9/32, Site Drive to Knox	30	10	1575.40	0.98	9.79	

Emissions (g/hr)	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
Two Lane Onsite Roadway	1.15E+02	4.08E+01	430.60	111.73	6.27E-03	1.61E+04	0	4.09E-02	0	4.49E-01
Fines Trucks	3.07E+00	1.08E+00	8.19	2.16	1.66E-04	4.27E+02	0	1.09E-03	0	1.19E-02
Empty Trucks return path	1.21E+01	4.28E+00	32.42	8.53	6.59E-04	1.69E+03	0	4.30E-03	0	4.72E-02
Trucks U-Turn and backup to Door 3	3.17E+01	1.12E+01	151.75	39.06	1.72E-03	4.42E+03	0	1.12E-02	0	1.23E-01
Trucks forward/backup to Door2	2.52E+00	8.90E-01	12.08	3.11	1.37E-04	3.52E+02	0	8.94E-04	0	9.81E-03
Trucks forward/backup to Door4	2.45E+00	8.64E-01	11.72	3.02	1.33E-04	3.41E+02	0	8.67E-04	0	9.52E-03
Rte 9 East of Gilbertville	7.77E+01	2.35E+01	3.95E+00	3.85E+00	3.22E-03	1.18E+04	0	2.09E-02	0	2.30E-01
Rte 9/32 Site Drive to Gilbertville	2.79E+01	8.45E+00	1.42E+00	1.38E+00	1.16E-03	4.24E+03	0	7.50E-03	0	8.26E-02
Rte 9/32, Site Drive to Knox	1.32E+02	3.99E+01	6.69E+00	6.53E+00	5.45E-03	2.00E+04	0	3.54E-02	0	3.90E-01

AERMOD Emissions (g/s)	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
Two Lane Onsite Roadway	3.21E-02	1.13E-02	1.20E-01	3.10E-02	1.74E-06	4.47E+00	0	1.14E-05	0	1.25E-04

AERMOD Emissions (g/s)	NOX	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde
Fines Trucks	8.51E-04	3.01E-04	2.28E-03	5.99E-04	4.62E-08	1.19E-01	0	3.02E-07	0	3.31E-06
Empty Trucks return path	3.37E-03	1.19E-03	9.01E-03	2.37E-03	1.83E-07	4.70E-01	0	1.19E-06	0	1.31E-05
Trucks U-Turn and backup to Door 3	8.80E-03	3.11E-03	4.22E-02	1.08E-02	4.78E-07	1.23E+00	0	3.12E-06	0	3.42E-05
Trucks forward/backup to Door2	7.00E-04	2.47E-04	3.36E-03	8.64E-04	3.80E-08	9.77E-02	0	2.48E-07	0	2.73E-06
Trucks forward/backup to Door4	6.79E-04	2.40E-04	3.25E-03	8.38E-04	3.69E-08	9.48E-02	0	2.41E-07	0	2.64E-06
Rte 9 East of Gilbertville	2.16E-02	6.53E-03	1.10E-03	1.07E-03	8.93E-07	3.28E+00	0	5.80E-06	0	6.38E-05
Rte 9/32 Site Drive to Gilbertville	7.75E-03	2.35E-03	3.94E-04	3.84E-04	3.21E-07	1.18E+00	0	2.08E-06	0	2.29E-05
Rte 9/32, Site Drive to Knox	3.66E-02	1.11E-02	1.86E-03	1.81E-03	1.51E-06	5.55E+00	0	9.84E-06	0	1.08E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
15 mph	7.47E-03	8.59E-03	9.24E-05			3.97E-07			4.42E-07	2.36E-04				2.20E-03	3.34E-02
30 mph	4.26E-03	7.02E-03	4.62E-05			1.98E-07			2.21E-07	1.18E-04				1.26E-03	1.93E-02
Fugitive PM - Emtpy & Full Truck Avg Emissions															
Fugitive PM - Emtpy Truck, 0 tons C&D															
Fugitive PM - Full Truck, 15.7 tons C&D															

Emissions (g/hr)	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
Two Lane Onsite Roadway	4.81E-02	5.54E-02	5.95E-04	0	0	2.56E-06	0	0	2.85E-06	1.52E-03	0	0	0	1.42E-02	2.15E-01
Fines Trucks	1.28E-03	1.47E-03	1.58E-05	0	0	6.78E-08	0	0	7.56E-08	4.03E-05	0	0	0	3.76E-04	5.71E-03
Empty Trucks return path	5.05E-03	5.82E-03	6.25E-05	0	0	2.68E-07	0	0	2.99E-07	1.60E-04	0	0	0	1.49E-03	2.26E-02
Trucks U-Turn and backup to Door 3	1.32E-02	1.52E-02	1.63E-04	0	0	7.01E-07	0	0	7.81E-07	4.17E-04	0	0	0	3.88E-03	5.90E-02
Trucks forward/backup to Door2	1.05E-03	1.21E-03	1.30E-05	0	0	5.58E-08	0	0	6.22E-08	3.32E-05	0	0	0	3.09E-04	4.70E-03
Trucks forward/backup to Door4	1.02E-03	1.17E-03	1.26E-05	0	0	5.41E-08	0	0	6.03E-08	3.22E-05	0	0	0	3.00E-04	4.56E-03
Rte 9 East of Gilbertville	2.46E-02	4.06E-02	2.67E-04	0	0	1.14E-06	0	0	1.28E-06	6.81E-04	0	0	0	7.26E-03	1.11E-01
Rte 9/32 Site Drive to Gilbertville	8.84E-03	1.46E-02	9.58E-05	0	0	4.11E-07	0	0	4.58E-07	2.45E-04	0	0	0	2.61E-03	4.01E-02
Rte 9/32, Site Drive to Knox	4.17E-02	6.88E-02	4.52E-04	0	0	1.94E-06	0	0	2.16E-06	1.15E-03	0	0	0	1.23E-02	1.89E-01

AERMOD Emissions (g/s)	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
Two Lane Onsite Roadway	1.34E-05	1.54E-05	1.65E-07	0	0	7.10E-10	0	0	7.91E-10	4.22E-07	0	0	0	3.93E-06	5.97E-05

AERMOD Emissions (g/s)	Naphthalene	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde
Fines Trucks	3.55E-07	4.08E-07	4.39E-09	0	0	1.88E-11	0	0	2.10E-11	1.12E-08	0	0	0	1.04E-07	1.59E-06
Empty Trucks return path	1.40E-06	1.62E-06	1.74E-08	0	0	7.46E-11	0	0	8.30E-11	4.43E-08	0	0	0	4.13E-07	6.28E-06
Trucks U-Turn and backup to Door 3	3.67E-06	4.22E-06	4.53E-08	0	0	1.95E-10	0	0	2.17E-10	1.16E-07	0	0	0	1.08E-06	1.64E-05
Trucks forward/backup to Door2	2.92E-07	3.36E-07	3.61E-09	0	0	1.55E-11	0	0	1.73E-11	9.22E-09	0	0	0	8.59E-08	1.30E-06
Trucks forward/backup to Door4	2.83E-07	3.26E-07	3.50E-09	0	0	1.50E-11	0	0	1.67E-11	8.94E-09	0	0	0	8.33E-08	1.27E-06
Rte 9 East of Gilbertville	6.83E-06	1.13E-05	7.41E-08	0	0	3.18E-10	0	0	3.54E-10	1.89E-07	0	0	0	2.02E-06	3.10E-05
Rte 9/32 Site Drive to Gilbertville	2.46E-06	4.05E-06	2.66E-08	0	0	1.14E-10	0	0	1.27E-10	6.80E-08	0	0	0	7.24E-07	1.11E-05
Rte 9/32, Site Drive to Knox	1.16E-05	1.91E-05	1.26E-07	0	0	5.39E-10	0	0	6.01E-10	3.21E-07	0	0	0	3.42E-06	5.25E-05

ReSource - Ware, MA
Mobile Source Emissions Analysis

Truck Emissions on Roads at Facility

MOVES Emission Factors (g/vmt)

	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
15 mph	5.69E-03	3.24E-02	3.38E-03	1.78E-03	2.68E-03	9.87E-01	1.56E-03		1.02E-10	1.13E-10			0.87	0.00E+00
30 mph	3.27E-03	2.36E-02	2.01E-03	1.02E-03	2.18E-03	5.83E-01	1.27E-03		5.09E-11	5.63E-11			0.52	0.00E+00
Fugitive PM - Emtpy & Full Truck Avg Emissions														
Fugitive PM - Emtpy Truck, 0 tons C&D														
Fugitive PM - Full Truck, 15.7 tons C&D														

Emissions (g/hr)	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
Two Lane Onsite Roadway	3.66E-02	2.09E-01	2.18E-02	1.14E-02	1.73E-02	6.36E+00	1.01E-02	0.00E+00	6.56E-10	7.25E-10	0.00E+00	0.00E+00	5.62E+00	0.00E+00
Fines Trucks	9.72E-04	5.54E-03	5.77E-04	3.04E-04	4.58E-04	1.69E-01	2.68E-04	0.00E+00	1.74E-11	1.93E-11	0.00E+00	0.00E+00	1.49E-01	0.00E+00
Empty Trucks return path	3.85E-03	2.19E-02	2.28E-03	1.20E-03	1.81E-03	6.68E-01	1.06E-03	0.00E+00	6.89E-11	7.62E-11	0.00E+00	0.00E+00	5.90E-01	0.00E+00
Trucks U-Turn and backup to Door 3	1.00E-02	5.73E-02	5.97E-03	3.14E-03	4.73E-03	1.74E+00	2.76E-03	0.00E+00	1.80E-10	1.99E-10	0.00E+00	0.00E+00	1.54E+00	0.00E+00
Trucks forward/backup to Door2	8.00E-04	4.56E-03	4.75E-04	2.50E-04	3.77E-04	1.39E-01	2.20E-04	0.00E+00	1.43E-11	1.58E-11	0.00E+00	0.00E+00	1.23E-01	0.00E+00
Trucks forward/backup to Door4	7.76E-04	4.42E-03	4.61E-04	2.42E-04	3.66E-04	1.35E-01	2.13E-04	0.00E+00	1.39E-11	1.54E-11	0.00E+00	0.00E+00	1.19E-01	0.00E+00
Rte 9 East of Gilbertville	1.89E-02	1.36E-01	1.16E-02	5.86E-03	1.26E-02	3.36E+00	7.35E-03	0.00E+00	2.94E-10	3.25E-10	0.00E+00	0.00E+00	2.98E+00	0.00E+00
Rte 9/32 Site Drive to Gilbertville	6.78E-03	4.90E-02	4.18E-03	2.11E-03	4.52E-03	1.21E+00	2.64E-03	0.00E+00	1.06E-10	1.17E-10	0.00E+00	0.00E+00	1.07E+00	0.00E+00
Rte 9/32, Site Drive to Knox	3.20E-02	2.31E-01	1.97E-02	9.94E-03	2.13E-02	5.70E+00	1.25E-02	0.00E+00	4.99E-10	5.51E-10	0.00E+00	0.00E+00	5.06E+00	0.00E+00

AERMOD Emissions (g/s)	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
Two Lane Onsite Roadway	1.02E-05	5.80E-05	6.04E-06	3.18E-06	4.79E-06	1.77E-03	2.80E-06	0.00E+00	1.82E-13	2.02E-13	0.00E+00	0.00E+00	1.56E-03	0.00E+00

AERMOD Emissions (g/s)	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone	VOC	Ethanol
Fines Trucks	2.70E-07	1.54E-06	1.60E-07	8.44E-08	1.27E-07	4.69E-05	7.43E-08	0.00E+00	4.84E-15	5.35E-15	0.00E+00	0.00E+00	4.14E-05	0.00E+00
Empty Trucks return path	1.07E-06	6.09E-06	6.35E-07	3.34E-07	5.04E-07	1.85E-04	2.94E-07	0.00E+00	1.92E-14	2.12E-14	0.00E+00	0.00E+00	1.64E-04	0.00E+00
Trucks U-Turn and backup to Door 3	2.79E-06	1.59E-05	1.66E-06	8.72E-07	1.32E-06	4.84E-04	7.68E-07	0.00E+00	5.00E-14	5.53E-14	0.00E+00	0.00E+00	4.28E-04	0.00E+00
Trucks forward/backup to Door2	2.22E-07	1.27E-06	1.32E-07	6.94E-08	1.05E-07	3.86E-05	6.11E-08	0.00E+00	3.98E-15	4.40E-15	0.00E+00	0.00E+00	3.41E-05	0.00E+00
Trucks forward/backup to Door4	2.15E-07	1.23E-06	1.28E-07	6.73E-08	1.02E-07	3.74E-05	5.93E-08	0.00E+00	3.86E-15	4.27E-15	0.00E+00	0.00E+00	3.31E-05	0.00E+00
Rte 9 East of Gilbertville	5.24E-06	3.79E-05	3.23E-06	1.63E-06	3.49E-06	9.34E-04	2.04E-06	0.00E+00	8.17E-14	9.03E-14	0.00E+00	0.00E+00	8.29E-04	0.00E+00
Rte 9/32 Site Drive to Gilbertville	1.88E-06	1.36E-05	1.16E-06	5.85E-07	1.26E-06	3.36E-04	7.33E-07	0.00E+00	2.94E-14	3.25E-14	0.00E+00	0.00E+00	2.98E-04	0.00E+00
Rte 9/32, Site Drive to Knox	8.88E-06	6.42E-05	5.48E-06	2.76E-06	5.92E-06	1.58E-03	3.46E-06	0.00E+00	1.39E-13	1.53E-13	0.00E+00	0.00E+00	1.41E-03	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022 (g/hr)	NOx	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Naphthalene
0 mph	80.259	24.1896	3.95912	3.64238	0.0268274	7836.78		5.32E-02		5.75E-01	6.23E-02

Idling Times	Idle Minutes Per Truck	Idle seconds Per Truck	Idle Hours per Truck	Peak Hour Trucks	All Truck Idling time ((veh-hr)/hr) [1]	Notes
Truck Exhaust Tipping Area	5	300	0.0833	16	1.333	16 large trucks per hour at peak, all need to stop and remove tarp so assumed to idle 5 min before pulling into door, 6 smaller trucks will not need to idle
Outbound idling trucks queue	3	180	0.0500	2	0.100	3 mins max idling during peak hour, 1 on scale and 2 waiting
Inb Trucks on Scale idling	1	60	0.0167	22	0.367	1 min idling, from recent video
Ob Trucks on Scale idling	3	180	0.0500	18	0.900	3 doors, 15 mins for each large truck to unload, so each door can do 4 large trucks per hour, or 3 doors * 4 large trucks = 12 large trucks per hour + 6 other small trucks = 18.
Site Drive @Rte 9	0.021	1.25	0.0003	40	0.014	4 outgoing trips occur in the next hour, so 18 + 22 = 40
Gilbertville Rd & Rte 9	0.056	3.35	0.0009	30	0.028	

[1] vehicle hours of delay (idle) per hour of actual time

Emissions (g/hr)	NOx	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Naphthalene
Truck Exhaust Tipping Area	1.07E+02	3.23E+01	5.28E+00	4.86E+00	3.58E-02	1.04E+04	0.00	7.10E-02	0.00E+00	7.66E-01	8.31E-02
Outbound idling trucks queue	8.03E+00	2.42E+00	3.96E-01	3.64E-01	2.68E-03	7.84E+02	0.00	5.32E-03	0.00E+00	5.75E-02	6.23E-03
Inb Trucks on Scale idling	2.94E+01	8.87E+00	1.45E+00	1.34E+00	9.84E-03	2.87E+03	0.00	1.95E-02	0.00E+00	2.11E-01	2.29E-02
Ob Trucks on Scale idling	7.22E+01	2.18E+01	3.56E+00	3.28E+00	2.41E-02	7.05E+03	0.00	4.79E-02	0.00E+00	5.17E-01	5.61E-02
Site Drive @Rte 9	1.11E+00	3.36E-01	5.50E-02	5.06E-02	3.73E-04	1.09E+02	0.00	7.40E-04	0.00E+00	7.98E-03	8.66E-04
Gilbertville Rd & Rte 9	2.24E+00	6.75E-01	1.11E-01	1.02E-01	7.49E-04	2.19E+02	0.00	1.49E-03	0.00E+00	1.60E-02	1.74E-03

Emissions (g/s) - Volume Sources	NOx	CO	PM10	PM2.5	SO2	CO2E	2-Methylnaphthalene	Benzene	Dichlorobenzene	Formaldehyde	Naphthalene
Truck Exhaust Tipping Area	2.97E-02	8.96E-03	1.47E-03	1.35E-03	9.94E-06	2.90E+00	0.00	1.97E-05	0.00E+00	2.13E-04	2.31E-05
Outbound idling trucks queue	2.23E-03	6.72E-04	1.10E-04	1.01E-04	7.45E-07	2.18E-01	0.00	1.48E-06	0.00E+00	1.60E-05	1.73E-06
Inb Trucks on Scale idling	8.17E-03	2.46E-03	4.03E-04	3.71E-04	2.73E-06	7.98E-01	0.00	5.42E-06	0.00E+00	5.85E-05	6.35E-06
Ob Trucks on Scale idling	2.01E-02	6.05E-03	9.90E-04	9.11E-04	6.71E-06	1.96E+00	0.00	1.33E-05	0.00E+00	1.44E-04	1.56E-05
Site Drive @Rte 9	3.10E-04	9.33E-05	1.53E-05	1.41E-05	1.04E-07	3.02E-02	0.00	2.05E-07	0.00E+00	2.22E-06	2.41E-07
Gilbertville Rd & Rte 9	6.22E-04	1.88E-04	3.07E-05	2.82E-05	2.08E-07	6.08E-02	0.00E+00	4.13E-07	0.00E+00	4.46E-06	4.83E-07

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022 (g/hr)	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde	Acrolein
0 mph	4.90E-02	1.39E-03			5.95E-06			6.63E-06	3.54E-03				1.87E-02	2.74E-01	4.73E-02

Emissions (g/hr)	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde	Acrolein
Truck Exhaust Tipping Area	6.54E-02	1.85E-03	0	0	7.93E-06	0	0	8.84E-06	4.72E-03	0	0	0	2.50E-02	3.66E-01	6.31E-02
Outbound idling trucks queue	4.90E-03	1.39E-04	0	0	5.95E-07	0	0	6.63E-07	3.54E-04	0	0	0	1.87E-03	2.74E-02	4.73E-03
Inb Trucks on Scale idling	1.80E-02	5.08E-04	0	0	2.18E-06	0	0	2.43E-06	1.30E-03	0	0	0	6.87E-03	1.01E-01	1.74E-02
Ob Trucks on Scale idling	4.41E-02	1.25E-03	0	0	5.35E-06	0	0	5.96E-06	3.18E-03	0	0	0	1.69E-02	2.47E-01	4.26E-02
Site Drive @Rte 9	6.81E-04	1.92E-05	0	0	8.26E-08	0	0	9.20E-08	4.91E-05	0	0	0	2.60E-04	3.81E-03	6.57E-04
Gilbertville Rd & Rte 9	1.37E-03	3.87E-05	0	0	1.66E-07	0	0	1.85E-07	9.88E-05	0	0	0	5.23E-04	7.66E-03	1.32E-03

Emissions (g/s) - Volume Sources	Toluene	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Vanadium	Ethanol	1,3-Butadiene	Acetaldehyde	Acrolein
Truck Exhaust Tipping Area	1.82E-05	5.13E-07	0	0	2.20E-09	0	0	2.45E-09	1.31E-06	0	0	0	6.94E-06	1.02E-04	1.75E-05
Outbound idling trucks queue	1.36E-06	3.85E-08	0	0	1.65E-10	0	0	1.84E-10	9.83E-08	0	0	0	5.20E-07	7.62E-06	1.31E-06
Inb Trucks on Scale idling	4.99E-06	1.41E-07	0	0	6.06E-10	0	0	6.75E-10	3.60E-07	0	0	0	1.91E-06	2.79E-05	4.82E-06
Ob Trucks on Scale idling	1.23E-05	3.46E-07	0	0	1.49E-09	0	0	1.66E-09	8.85E-07	0	0	0	4.68E-06	6.86E-05	1.18E-05
Site Drive @Rte 9	1.89E-07	5.35E-09	0	0	2.30E-11	0	0	2.56E-11	1.37E-08	0	0	0	7.23E-08	1.06E-06	1.83E-07
Gilbertville Rd & Rte 9	3.80E-07	1.07E-08	0	0	4.61E-11	0	0	5.14E-11	2.74E-08	0	0	0	1.45E-07	2.13E-06	3.67E-07

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck Emissions At Idling Points

MOVES Emission Factors 2022 (g/hr)	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Ethyl Ketone	VOC	Ethanol
0 mph	3.77E-01	2.67E-02	1.46E-02	8.33E-03	9.58E-02	1.51E-02		1.53E-09	1.69E-09			7.45356	0.00E+00

Emissions (g/hr)	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Ethyl Ketone	VOC	Ethanol
Truck Exhaust Tipping Area	5.02E-01	3.56E-02	1.95E-02	1.11E-02	1.28E-01	2.01E-02	0	2.04E-09	2.25E-09	0.00E+00	0.00E+00	9.94E+00	0.00E+00
Outbound idling trucks queue	3.77E-02	2.67E-03	1.46E-03	8.33E-04	9.58E-03	1.51E-03	0	1.53E-10	1.69E-10	0.00E+00	0.00E+00	7.45E-01	0.00E+00
Inb Trucks on Scale idling	1.38E-01	9.79E-03	5.36E-03	3.05E-03	3.51E-02	5.53E-03	0	5.60E-10	6.19E-10	0.00E+00	0.00E+00	2.73E+00	0.00E+00
Ob Trucks on Scale idling	3.39E-01	2.40E-02	1.32E-02	7.49E-03	8.62E-02	1.36E-02	0	1.38E-09	1.52E-09	0.00E+00	0.00E+00	6.71E+00	0.00E+00
Site Drive @Rte 9	5.23E-03	3.71E-04	2.03E-04	1.16E-04	1.33E-03	2.09E-04	0	2.12E-11	2.35E-11	0.00E+00	0.00E+00	1.04E-01	0.00E+00
Gilbertville Rd & Rte 9	1.05E-02	7.45E-04	4.08E-04	2.32E-04	2.67E-03	4.21E-04	0	4.27E-11	4.72E-11	0.00E+00	0.00E+00	2.08E-01	0.00E+00

Emissions (g/s) - Volume Sources	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl	VOC	Ethanol
Truck Exhaust Tipping Area	1.39E-04	9.88E-06	5.41E-06	3.08E-06	3.55E-05	5.58E-06	0	5.66E-13	6.26E-13	0.00E+00	0.00E+00	2.76E-03	0.00E+00
Outbound idling trucks queue	1.05E-05	7.41E-07	4.06E-07	2.31E-07	2.66E-06	4.19E-07	0	4.25E-14	4.69E-14	0.00E+00	0.00E+00	2.07E-04	0.00E+00
Inb Trucks on Scale idling	3.84E-05	2.72E-06	1.49E-06	8.48E-07	9.75E-06	1.53E-06	0	1.56E-13	1.72E-13	0.00E+00	0.00E+00	7.59E-04	0.00E+00
Ob Trucks on Scale idling	9.42E-05	6.67E-06	3.65E-06	2.08E-06	2.39E-05	3.77E-06	0	3.82E-13	4.22E-13	0.00E+00	0.00E+00	1.86E-03	0.00E+00
Site Drive @Rte 9	1.45E-06	1.03E-07	5.64E-08	3.21E-08	3.70E-07	5.81E-08	0	5.90E-15	6.52E-15	0.00E+00	0.00E+00	2.88E-05	0.00E+00
Gilbertville Rd & Rte 9	2.92E-06	2.07E-07	1.13E-07	6.46E-08	7.43E-07	1.17E-07	0	1.19E-14	1.31E-14	0.00E+00	0.00E+00	5.78E-05	0.00E+00

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Idling

Temporal Data						
312.0	days/yr					
GE EMD-38-2 Locomotive provided by client						
2000	Max hp	0.6%	idle load factor		11	source: CA Doc - "Locomotive-Attributes"
Operating Schedule						table in row 152
	Trip #1 - AM	**Trip #2 - PM**	**Trip #3 - PM**	Stage 2	**Notes**	
Number of locomotives working	2	2	2	2	Site visit DTR 1/16/2023 observed 2 locomotives working	
Total time idling/pushing per trip, mins	51	16	43	32.8		
Minutes Idling	38.4	4.6	33.8	11		
Hours Idling (per locomotive)	0.64	0.08	0.56	0.18		
Hours Idling total (locomotive-hrs/hr)	1.28	0.15	1.13	0.37		
Times of Day (start hour)	10:00 AM	2:00 PM	5:00 PM	7:00 AM		
Times of Day (end Hour)	11:00 AM	3:00 PM	6:00 PM	8:00 AM	EF in AERMOD will be entered on this hour.	
Stacks per Locomotive	2	2	2	2		
Total Stacks	4	4	4	4		

Emission Factors	**Oxides of Nitrogen (NOx)**	**Carbon Monoxide (CO)**	**Primary Exhaust PM10 - Total**	**Primary Exhaust PM2.5 - Total**	**Sulfur Dioxide (SO2)**	**CO2e**	**Benzene**	**Formaldehyde**	**Naphthalene**	**Toluene**
Emission Factor (g/gal)										
Line Haul Duty Cycle	225.68	98.28	8.37	8.12	1.88	10217				
Switch Duty Cycle	194.56	33.44	5.78	5.60	1.88	10217				
Emission Factor (g/bhp-hr)										
Line Haul Duty Cycle (SPECIATE 2)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02
Line Haul Duty Cycle (SPECIATE 4)							3.91E-03	6.43E-02	4.49E-04	7.94E-03
Switch Duty Cycle (SPECIATE 2)	12.80	2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02
Switch Duty Cycle (SPECIATE 4)							5.01E-03	8.24E-02	5.75E-04	1.02E-02
Idling g/hr (from Loc Attributes)	718	191	15	15						

Emissions	**Oxides of Nitrogen (NOx)**	**Carbon Monoxide (CO)**	**Primary Exhaust PM10 - Total**	**Primary Exhaust PM2.5 - Total**	**Sulfur Dioxide (SO2)**	**CO2e**	**Benzene**	**Formaldehyde**	**Naphthalene**	**Toluene**
g/day	58.67	10.08	1.74	1.69	0.57	3080.78	1.91E-01	1.00E+00	2.64E-03	1.29E-01
lb/day	1.29E-01	2.22E-02	3.84E-03	3.72E-03	1.25E-03	6.79	4.20E-04	2.20E-03	5.81E-06	2.84E-04
TPY	2.02E-02	3.47E-03	5.99E-04	5.81E-04	1.95E-04	1.06	6.56E-05	3.44E-04	9.07E-07	4.43E-05
2 Locomotives, 1 hour (g/s)	3.99E-01	1.06E-01	8.33E-03	8.33E-03	0.0008	4.1077	2.54E-04	1.33E-03	3.52E-06	1.72E-04
Trip #1 (2 Locomotives) g/s	2.55E-01	6.79E-02	5.33E-03	5.33E-03	4.84E-04	2.63E+00	1.63E-04	8.53E-04	2.25E-06	1.10E-04
Trip #2 (2 Locomotives) g/s	3.06E-02	8.14E-03	6.39E-04	6.39E-04	5.79E-05	3.15E-01	1.95E-05	1.02E-04	2.70E-07	1.32E-05
Trip #3 (2 Locomotives) g/s	2.25E-01	5.98E-02	4.69E-03	4.69E-03	4.26E-04	2.31E+00	1.43E-04	7.51E-04	1.98E-06	9.67E-05
Stage 2 g/s	7.31E-02	1.95E-02	1.53E-03	1.53E-03	1.39E-04	7.53E-01	4.66E-05	2.44E-04	6.45E-07	3.15E-05

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Trip #1 - Emission Rate Per Stack g/s	6.38E-02	1.70E-02	1.33E-03	1.33E-03	1.21E-04	6.57E-01	4.07E-05	2.13E-04	5.63E-07	2.75E-05
Trip #2 - Emission Rate Per Stack g/s	7.65E-03	2.03E-03	1.60E-04	1.60E-04	1.45E-05	7.87E-02	4.87E-06	2.56E-05	6.74E-08	3.29E-06
Trip #3 - Emission Rate Per Stack g/s	5.62E-02	1.49E-02	1.17E-03	1.17E-03	1.06E-04	5.79E-01	3.58E-05	1.88E-04	4.95E-07	2.42E-05
Stage 2 g/s	1.83E-02	4.86E-03	3.82E-04	3.82E-04	3.46E-05	1.88E-01	1.17E-05	6.11E-05	1.61E-07	7.87E-06
Split emissions between 2 locations for Trips 2 and 3										
Trip 2 - Location 1 - North	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06	1.28E-05	3.37E-08	1.64E-06
Trip 2 - Location 2 - South	3.82E-03	1.02E-03	7.99E-05	7.99E-05	7.24E-06	3.94E-02	2.44E-06	1.28E-05	3.37E-08	1.64E-06
Trip 3 - Location 1 - north	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05	9.39E-05	2.48E-07	1.21E-05
Trip 3 - Location 2 - South	2.81E-02	7.47E-03	5.87E-04	5.87E-04	5.32E-05	2.89E-01	1.79E-05	9.39E-05	2.48E-07	1.21E-05
Stage 2 - Location 1 - North	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02	5.83E-06	3.06E-05	8.06E-08	3.93E-06
Stage 2 - Location 2 - South	9.14E-03	2.43E-03	1.91E-04	1.91E-04	1.73E-05	9.41E-02	5.83E-06	3.06E-05	8.06E-08	3.93E-06

source: https://nepis.epa.gov/Exe/tiff2png.cgi/P100500D.PNG?-r+85+-g+15+D%3A%5CZYFILES%5CINDEX%20DATA%5C06THRU10%5CTIFF%5C00000524%5CP100500D.TIF
R:\6336 Sanborn Head Ware Transfer Station\Air\References\EPA-420-F-09-025 Emission Factors for Locomotive...

ReSource - Ware, MA
Mobile Source Emissions

Locomotive Idling

Emission Factors	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Emission Factor (g/gal)									
Line Haul Duty Cycle									
Switch Duty Cycle									
Emission Factor (g/bhp-hr)									
Line Haul Duty Cycle (SPECIATE 2)	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4)	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2)	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4)	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03
Idling g/hr (from Loc Attributes)									

Emissions	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
g/day	7.00E-03	3.58E-01	6.38E-02	1.46E-02	8.90E-03	4.01E-02	1.69E+00	2.84E-02	3.17E-02
lb/day	1.54E-05	7.88E-04	1.41E-04	3.21E-05	1.96E-05	8.85E-05	3.72E-03	6.27E-05	6.99E-05
TPY	2.41E-06	1.23E-04	2.19E-05	5.00E-06	3.06E-06	1.38E-05	5.81E-04	9.78E-06	1.09E-05
2 Locomotives, 1 hour (g/s)	9.33E-06	4.77E-04	8.50E-05	1.94E-05	1.19E-05	5.35E-05	2.25E-03	3.79E-05	4.23E-05
Trip #1 (2 Locomotives) g/s	5.97E-06	3.05E-04	5.44E-05	1.24E-05	7.59E-06	3.42E-05	1.44E-03	2.43E-05	2.70E-05
Trip #2 (2 Locomotives) g/s	7.15E-07	3.65E-05	6.52E-06	1.49E-06	9.10E-07	4.10E-06	1.73E-04	2.91E-06	3.24E-06
Trip #3 (2 Locomotives) g/s	5.26E-06	2.69E-04	4.79E-05	1.09E-05	6.68E-06	3.01E-05	1.27E-03	2.14E-05	2.38E-05
Stage 2 g/s	1.71E-06	8.74E-05	1.56E-05	3.56E-06	2.18E-06	9.81E-06	4.13E-04	6.95E-06	7.75E-06

Emissions	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Trip #1 - Emission Rate Per Stack g/s	1.49E-06	7.63E-05	1.36E-05	3.10E-06	1.90E-06	8.56E-06	3.60E-04	6.07E-06	6.76E-06
Trip #2 - Emission Rate Per Stack g/s	1.79E-07	9.14E-06	1.63E-06	3.72E-07	2.27E-07	1.03E-06	4.32E-05	7.27E-07	8.10E-07
Trip #3 - Emission Rate Per Stack g/s	1.31E-06	6.71E-05	1.20E-05	2.73E-06	1.67E-06	7.53E-06	3.17E-04	5.34E-06	5.95E-06
Stage 2 g/s	4.28E-07	2.18E-05	3.90E-06	8.89E-07	5.44E-07	2.45E-06	1.03E-04	1.74E-06	1.94E-06
Split emissions between 2 locations for T									
Trip 2 - Location 1 - North	8.94E-08	4.57E-06	8.15E-07	1.86E-07	1.14E-07	5.13E-07	2.16E-05	3.63E-07	4.05E-07
Trip 2 - Location 2 - South	8.94E-08	4.57E-06	8.15E-07	1.86E-07	1.14E-07	5.13E-07	2.16E-05	3.63E-07	4.05E-07
Trip 3 - Location 1 - north	6.57E-07	3.36E-05	5.99E-06	1.37E-06	8.36E-07	3.77E-06	1.59E-04	2.67E-06	2.98E-06
Trip 3 - Location 2 - South	6.57E-07	3.36E-05	5.99E-06	1.37E-06	8.36E-07	3.77E-06	1.59E-04	2.67E-06	2.98E-06
Stage 2 - Location 1 - North	2.14E-07	1.09E-05	1.95E-06	4.45E-07	2.72E-07	1.23E-06	5.16E-05	8.69E-07	9.68E-07
Stage 2 - Location 2 - South	2.14E-07	1.09E-05	1.95E-06	4.45E-07	2.72E-07	1.23E-06	5.16E-05	8.69E-07	9.68E-07

source: https://nepis.epa.gov/Exe/tiff2pn

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ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching

Temporal Data	312.0	days/yr			
GE EMD-38-2 Locomotive provided by client		2000	Max hp	switch load factor based on time in each notch	
				(sample in movements descr. for Trip 1)	
Operating Schedule/load Factor:	6.6%	9.1%	7.5%	6.8%	
	Trip #1 - AM	**Trip #2 - PM**	**Trip #3 - PM**	**Stage 2**	**Notes**
Number of locomotives working	2	2	2	2	- Site visit DTR 1/16/2023 observed 2 locomotives working.
Minutes shuttling	12.6	11.4	9.2	21.8	- Calculations in movement desc., likely conservative
Hours shuttling (per locomotive)	0.210	0.190	0.153	0.363	assumptions
(Locomotive-hrs)/hr	0.42	0.38	0.31	0.73	2 locomotives for a relatively small
Approximate avg speed (mph)	2.41	2.84	2.57	2.44	
Distance traveled while switching (mi)	1.01	1.08	0.79	1.77	
1 locomotive travel dist (m)	814.49	868.40	634.19	1426.74	
Times of Day	10:00 AM	2:00 PM	5:00 PM	7:00 AM	
Times of Day (end Hour)	11:00 AM	3:00 PM	6:00 PM	8:00 AM	EF in AERMOD will be entered on this hour.

Emission Factors	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Line Haul Duty Cycle (SPECIATE 2) (g/bhp-hr)	12.40	5.40	0.46	0.4462	0.10	561.37	3.25E-02	1.70E-01		2.19E-02
Line Haul Duty Cycle (SPECIATE 4) (g/bhp-hr)							3.91E-03	6.43E-02	4.49E-04	7.94E-03
Switch Duty Cycle (SPECIATE 2) (g/bhp-hr)		2.20	0.38	0.3686	0.12	672.17	4.16E-02	2.18E-01		2.81E-02
Switch Duty Cycle (SPECIATE 4) (g/bhp-hr)	above not used as Attributes has g/hr data						5.01E-03	8.24E-02	5.75E-04	1.02E-02
Trip 1 - g/hr	1668	280	43	43						
Trip 2 - g/hr	2039	326	60	60						
Trip 3 - g/hr	1800	296	49	49						
Stage 2 - g/hr	1692	283	44	44						

See notes for time in Notch 1 and 2; g/hr from Attributes Tab - Row 151

Emissions (g/hr or g/s)	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Trip #1 (2 Locomotives) g/hr	700.55	117.51	17.94	17.94	6.84E+00	3.72E+04	2.30E+00	1.21E+01	3.18E-02	1.55E+00
Trip #2 (2 Locomotives) g/hr	774.98	124.02	22.84	22.84	8.59E+00	4.67E+04	2.89E+00	1.52E+01	4.00E-02	1.95E+00
Trip #3 (2 Locomotives) g/hr	551.97	90.87	14.99	14.99	5.69E+00	3.09E+04	1.91E+00	1.00E+01	2.65E-02	1.29E+00
Stage 2 g/hr	1229.46	205.49	31.84	31.84	1.21E+01	6.60E+04	4.09E+00	2.14E+01	5.65E-02	2.76E+00
Trip #1 (2 Locomotives) g/s	0.195	3.26E-02	4.98E-03	4.98E-03	1.90E-03	1.03E+01	6.39E-04	3.35E-03	8.84E-06	4.31E-04
Trip #2 (2 Locomotives) g/s	0.215	3.45E-02	6.34E-03	6.34E-03	2.39E-03	1.30E+01	8.03E-04	4.21E-03	1.11E-05	5.42E-04
Trip #3 (2 Locomotives) g/s	0.153	2.52E-02	4.16E-03	4.16E-03	1.58E-03	8.59E+00	5.31E-04	2.79E-03	7.35E-06	3.59E-04
Stage 2 g/s	0.342	0.057	0.009	0.009	0.003	18.342	1.14E-03	5.95E-03	1.57E-05	7.66E-04
Split emission btw 2 locations for Trips 2, 3 and Stage 2										
Trip 2 - Location 1 (North)	0.108	1.72E-02	3.17E-03	3.17E-03	1.19E-03	6.48E+00	4.01E-04	2.10E-03	5.55E-06	2.71E-04
Trip 2 - Location 2 (South)	0.108	1.72E-02	3.17E-03	3.17E-03	1.19E-03	6.48E+00	4.01E-04	2.10E-03	5.55E-06	2.71E-04
Trip 3 - Location 1 (North)	0.077	1.26E-02	2.08E-03	2.08E-03	7.90E-04	4.29E+00	2.66E-04	1.39E-03	3.68E-06	1.79E-04
Trip 3 - Location 2 (South)	0.077	1.26E-02	2.08E-03	2.08E-03	7.90E-04	4.29E+00	2.66E-04	1.39E-03	3.68E-06	1.79E-04

Emissions (g/hr or g/s)	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene
Stage 2 - Location 1 (North)	0.171	2.85E-02	4.42E-03	4.42E-03	1.69E-03	9.17E+00	5.68E-04	2.98E-03	7.85E-06	3.83E-04
Stage 2 - Location 2 (South)	0.171	2.85E-02	4.42E-03	4.42E-03	1.69E-03	9.17E+00	5.68E-04	2.98E-03	7.85E-06	3.83E-04

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching

Emission Factors	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Line Haul Duty Cycle (SPECIATE 2) (g/bhp-hr)	1.19E-03	6.09E-02	1.09E-02	2.48E-03		6.83E-03	4.46E-01		5.40E-03
Line Haul Duty Cycle (SPECIATE 4) (g/bhp-hr)	2.81E-04	2.15E-02	3.21E-03	2.01E-03	1.52E-03	4.18E-03		4.84E-03	1.02E-03
Switch Duty Cycle (SPECIATE 2) (g/bhp-hr)	1.53E-03	7.80E-02	1.39E-02	3.17E-03		8.75E-03	3.69E-01		6.91E-03
Switch Duty Cycle (SPECIATE 4) (g/bhp-hr)	3.60E-04	2.75E-02	4.11E-03	2.58E-03	1.94E-03	5.36E-03		6.20E-03	1.30E-03
Trip 1 - g/hr									
Trip 2 - g/hr									
Trip 3 - g/hr									
Stage 2 - g/hr									

Emissions (g/hr or g/s)	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Trip #1 (2 Locomotives) g/hr	8.44E-02	4.31E+00	7.69E-01	1.76E-01	1.07E-01	4.84E-01	2.04E+01	3.43E-01	3.82E-01
Trip #2 (2 Locomotives) g/hr	1.06E-01	5.42E+00	9.66E-01	2.21E-01	1.35E-01	6.08E-01	2.56E+01	4.31E-01	4.80E-01
Trip #3 (2 Locomotives) g/hr	7.02E-02	3.59E+00	6.40E-01	1.46E-01	8.93E-02	4.03E-01	1.70E+01	2.85E-01	3.18E-01
Stage 2 g/hr	1.50E-01	7.66E+00	1.37E+00	3.12E-01	1.91E-01	8.60E-01	3.62E+01	6.09E-01	6.79E-01
Trip #1 (2 Locomotives) g/s	2.34E-05	1.20E-03	2.14E-04	4.88E-05	2.98E-05	1.34E-04	5.66E-03	9.53E-05	1.06E-04
Trip #2 (2 Locomotives) g/s	2.95E-05	1.51E-03	2.68E-04	6.13E-05	3.75E-05	1.69E-04	7.11E-03	1.20E-04	1.33E-04
Trip #3 (2 Locomotives) g/s	1.95E-05	9.97E-04	1.78E-04	4.06E-05	2.48E-05	1.12E-04	4.71E-03	7.93E-05	8.83E-05
Stage 2 g/s	4.17E-05	2.13E-03	3.80E-04	8.66E-05	5.30E-05	2.39E-04	1.01E-02	1.69E-04	1.89E-04
Split emission btw 2 locations for Trips 2, 3 and Stage 2									
Trip 2 - Location 1 (North)	1.47E-05	7.53E-04	1.34E-04	3.06E-05	1.87E-05	8.45E-05	3.56E-03	5.99E-05	6.67E-05
Trip 2 - Location 2 (South)	1.47E-05	7.53E-04	1.34E-04	3.06E-05	1.87E-05	8.45E-05	3.56E-03	5.99E-05	6.67E-05
Trip 3 - Location 1 (North)	9.75E-06	4.98E-04	8.89E-05	2.03E-05	1.24E-05	5.59E-05	2.35E-03	3.96E-05	4.42E-05
Trip 3 - Location 2 (South)	9.75E-06	4.98E-04	8.89E-05	2.03E-05	1.24E-05	5.59E-05	2.35E-03	3.96E-05	4.42E-05

Emissions (g/hr or g/s)	1,3-Butadiene	Acetaldehyde	Acrolein	Ethyl Benzene	Hexane	Xylene	Diesel PM	Acetone	Methyl Ethyl Ketone
Stage 2 - Location 1 (North)	2.08E-05	1.06E-03	1.90E-04	4.33E-05	2.65E-05	1.19E-04	5.03E-03	8.47E-05	9.43E-05
Stage 2 - Location 2 (South)	2.08E-05	1.06E-03	1.90E-04	4.33E-05	2.65E-05	1.19E-04	5.03E-03	8.47E-05	9.43E-05

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching
Movement Descriptions

Trip #1 - AM From March 2023 Sandborn Head Stage 1 Rail Sequencing Document
Rail Car Movement - Engine arrives at site at 10:07 am
10:07 to 10:15 AM Engine moves 7 empty rail cars back on Track 1 and connects to 4 full cars
It moves 5 cars back from switch Each car takes up 65' so this is 5 x 65 = 325' of movement
10:15 to 10:23 AM Engine pulls the cars forward onto mainline and then pushes 6 car lengths back on mainline.
Moves 5 car lengths forward plus 6 back or 11 x 65 = 715'
10:23 AM - 10:28 AM Disconnect 4 full rail cars and index forward 2 car lengths.
10:28 AM -10:36 MA Engine pushes 12 rail cars 12 lengths back onto Track 1 and 2 and detaches 3 empty rail cars
14 car lengths of movement: 14 x 65 = 910'
10:36 AM- 10:43 engine pulls forward 7 car lengths
10:43 to 10:58 AM engine pushes back 4 car lengths and leaves site at 10:58
11 x 65= 715'
Total movement for Trip #1; 325+715'+910'+715' = 2665 or 0.505 miles
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
One 910' movement, assume avg of 4 mph: (0.173 mi/4 mph)*60 = 2.6 min.
for remaining 1,755', assume avg of 2 mph: (0.332 mi/2)*60 = 9.96 min, Total time moving: 12.6 min

Trip #2 - Engine arrives at 14:03 from the North
14:03 to 14:07 PM Engine pulls 5 cars off of mainline and pushes onto track 1, for a total movement of 13 lengths, 13x65= 845'
14:07 to 14:12 PM Engine goes back to mainline, moving 1 car length, then moves south 12 car lengths to switch at track 3
13 x 65=845'
14:12 to 14:16 PM Engine reverses onto Track 3, 2 car lengths to couple with full cars and then pulls them 6 car lengths to meet Track 4
8 x 65 = 520'
14:16 to 14:19PM Engine reverses 2 car lengths, then pulls back 8 car lengths to get all cars back to mainline and leaves site
10 x 65 = 650'
Total movement for Trip #2: 845'+845'+520+650'= 2860 or 0.54 mi 2860 0.541667
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
Two 845' movements, assume avg of 4 mph: (0.32mi/4 mph)*60 = 4.8 min.
for remaining 1,170', assume avg of 2 mph: (0.22 mi/2)*60 =6.6 min, Total time moving: 11.4 min
Total elapsed time is 16 minutes, at 2.8 mph, takes 11.4 minutes of movement. Rest of time is coupling, swiching, idling
Average speed: (4*4.8/11.4)+(2*6.6/11.4)= 2.84 mph

Split emissons in half between Locations 1 and 2 (north and south switch) based on time near each

Trip #3 - Engine arrives from South at 16:37 and pulls 7 empty cars past Track 1.
16:37 to 16:45 PM Engine pushes 7 cars off of mainline and onto track 2, distance of 3 length, decouples 4 of the cars
16:45 to 16:55 PM, Engine pulls 3 cars back to switch on Track 1 (5 lengths), and then reverses onto Track 1 (2 lengths)
10 x 65=650'
16:55 to 17:02 PM, Engine pulls 2 lengths back onto to mainline and travels 12 car lengths to switch at track 3
14 x 65 = 910'
17:02 to 17:20 PM, Engine reverses onto Track 3, then 4 (4 lengths) to connect with 3 full rail cars,
then departs the site taking 4 lengths to get to mainline.
8 x 65 = 520'
Total movement for Trip #3: 650'+910'+520'= 2080' or 0.394 mi
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
One 910' movement, assume avg of 4 mph: (0.173 mi/4 mph)*60 = 2.6 min.
for remaining 1,170', assume avg of 2 mph: (0.22 mi/2)*60 =6.6 min, Total time moving: 9.2 min
Total elapsed time is 43 minutes, at 2.6 mph, takes 9.2 minutes of movement. Rest of time is coupling, swiching, idling
Average speed: (4*2.6/9.2)+(2*6.6/9.2)= 2.57 mph

Split emissons in half between Locations 1 and 2 (north and south switch) based on time near each

ReSource - Ware, MA
Mobile Source Emissions Analysis

Locomotive Shuttling/Switching
Movement Descriptions

Stage 2 - VHB Movements

Engine arrives from South at 7 AM with 14 empty railcars, moves past switch for Track 1
and then reverses 7 cars onto Track 2 and 4 onto Track 1
11 car lengths to move 7 to Track 2, then pull forward 10 lengths to clear switch to Track 1, then reverse 10 lengths onto Track 2
Move locomotive back to main line, 8 lengths, then move south to track 3, 12 lengths
Reverse 1 length onto Track 3 to couple with 13 full rail cars. Pull forward to main track, 14 lenghts and leave.
Total "shorter" lengths: 7+11+10+10+8=46 x 65=2,990 Total longer lengths: 12+14=26 *65= 1,690'
Assume movements are all in notch 1 for short movements and notch 2 for longer movements.
Long movements, assume avg of 4 mph: (0.32 mi/4 mph)*60 = 4.8 min.
for remaining 2,990', assume avg of 2 mph: (0.566 mi/2)*60 =17 min, Total time moving: 21.8 min
Total movement: 2,990+1,690 =4,680/5280=0.89 mi.
total couplings or uncouplings: 4, assume 1 min each, total switches: 7, 1 min each, Total 11 min.
Total elapse time 32.8 min.

Average speed: (4*4.8/21.8)+(2*17/21.8)= 2.44 mph

Locomotive Attributes - Summary

Point Source characteristics		**Units**	**Notes**	
Emission Rate		g/s	will vary	
Release Height	16.8	ft	From, EIF_MCER001750_2019.pdf, plus 12 inch stub stack	
	5.13	m		
Gas Exit Temperature	156.0	Degrees F	Table B-3, "Idle", for engine type GP 38-2: pg 81	
			https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/rrstudy/rrstudy101404.pdf	
Stack Inside Diameter	1.0	ft	" " same as above	
Gas Exit Velocity	7.5	m/s	" " same as above	
Gas Exit Flow Rate	0.55	m^3/s	" " same as above	Note that the flow rate in Table B-3 is for the two
Locomotive Body width	10.3	ft	*EIF_MCER001750_2019.pdf*	stacks combined
Locomotive Body Length	59.2	ft	*EIF_MCER001750_2019.pdf*	

Line volume characteristics		**Units**	**Notes**
Plume Height	28.6	ft	Release Height * 1.7 turbulence factor (Pg J-2, PM2.5 Hotspot Guidance:)
Plume Width	10.3	ft	*EIF_MCER001750_2019.pdf*
Release Height	16.8	ft	From, EIF_MCER001750_2019.pdf, plus 12 inch stub stack
Plume Height	8.72	m	Release Height * 1.7 turbulence factor (Pg J-2, PM2.5 Hotspot Guidance)
Plume Width	3.15	m	*EIF_MCER001750_2019.pdf*
Release Height	5.13	m	From, EIF_MCER001750_2019.pdf, plus 12 inch stub stack
SZINIT	4.06	m	vertical dimension divided by 2.15
SYINIT	2.93	m	Plume width * 2 (center to center distance) /2.15
Emission Rate	varies	g/s	

Locomotive Body Characteristics		**Units**	**Notes**
Length	59.2	ft	These are inputted as two rectangular structures with the dimensions as written
Width	10.3	ft	
Height	15.8	ft	

Notes on PDFs:

MCER MCER0000001750			**metric conversion**	**Notes/Source**
Weight on Drivers	264000	ft		264000 lbs *EIF_MCER001750_2019.pdf*

Outside Length	59.16667	ft	18.034	m	59 ft 2 in	*EIF_MCER001750_2019.pdf*
Outside Extreme Width	10.33333	ft	3.1496	m	10 ft 4 in	*EIF_MCER001750_2019.pdf*
Outside Extreme Height	15.83333	ft	4.826	m	15 ft 10 in	*EIF_MCER001750_2019.pdf*
		ft				
Stub stack height	1	ft			IW assumption from diagram	

Diesel Engine EMD 16V-645E, GP 38-2
According to previous modeling above, it operates at Switch Duty

source: Evaluation of Biodiesel Fuel in an EMD GP38, pg 26

CSX #2629 EMD GP38 EMD 16-645-E3
Tested 10/26/00 @ SwRI. Baseline (EM-2834-F)

Notch	Gross HP	obs Fuel Rate (lb/hr)	HC (g/hr)	CO (g/hr)	Corr. NOx (g/hr)	PM (g/hr)	AAR Corr bsfc	Corr. Fuel Rate (lb/hr)	WF	w-BHP	obs w-Fuel w-(lb/hr)	corr w-Fuel w-(lb/hr)	w-HC w-(g/hr)	w-CO w-(g/hr)	w-NOx w-(g/hr)	w-PM w-(g/hr)
8	2,140	912	1,451	18,180	24,443	1,139	0.426	912	25.0%	535.1	228.0	227.9	362.8	4545.0	6110.8	284.8
7	1,694	768	1,128	9,730	22,583	867	0.406	768	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1,575	620	697	4,245	18,723	552	0.394	620	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1,283	498	497	1,337	15,065	405	0.388	498	25.0%	320.8	124.5	124.5	124.3	334.3	3766.3	101.3
4	1,032	394	365	658	11,455	356	0.382	394	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	586	228	285	430	5,659	154	0.389	226	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	320	134	173	452	3,041	107	0.419	134	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	83	51	143	235	1,311	26	0.615	51	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Idle	11	25	131	191	718	15	2.349	25	50.0%	5.3	12.4	12.3	65.5	95.5	359.0	7.5
DB-2	18	40	162	343	990	28	2.216	40	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						sum =			100.0%	861.1	364.9	364.7	552.5	4974.8	10236.0	393.5

AAR 3x3 Weighted Results

AAR 3x3 duty cycle weighted brake-specific emissions =

0.424 bsfc	0.424 corr bsfc	0.64	5.78	11.89	0.457

EPA Switcher Duty Cycle Weighted Results

Notch	WF	w-BHP	obs w-Fuel w-(lb/hr)	corr w-Fuel w-(lb/hr)	w-HC w-(g/hr)	w-CO w-(g/hr)	w-NOx w-(g/hr)	w-PM w-(g/hr)
8	0.8%	17.1	7.3	7.3	11.6	145.4	195.5	9.1
7	0.2%	3.8	1.5	1.5	2.3	19.5	45.4	1.7
6	1.5%	23.6	9.3	9.3	10.5	63.7	280.8	8.3
5	3.6%	46.2	17.9	17.9	17.9	48.1	542.3	14.5
4	3.6%	37.1	14.2	14.2	13.1	23.7	412.4	12.8
3	5.8%	34.0	13.2	13.2	16.5	24.9	326.2	8.9
2	12.3%	39.3	16.5	16.5	21.3	55.6	374.0	13.2
1	12.4%	10.3	6.3	6.3	17.7	29.1	162.6	3.2
Idle	59.8%	5.3	14.8	14.7	78.3	114.2	429.4	9.0
DB	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
sum =	100.0%	217.7	101.1	101.0	189.2	524.3	2770.7	80.8

V-1

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck using engine to unload w/ hydraulics

1/23/2023, IHW
Epsilon

Calculation/Constant	Units	Value	Notes
Equivalent speed	mph	10	From DTR observation on-site 1/16/23 and 28 gpm at 1000 rpm hydraulic pump for walking floor, 20 HP needed from truck engine
Unit emission rate, time travel	minutes	60	Calculate the unit emission rate
Equivalent distance traveled	miles	10	
Truck revving time while tipping	minute/truck	10	From DTR observation on-site 1/16/23
Total truck revving time per hour	(veh-hr)/hr	2.0	Total truck idling hours per hour
Peak trucks in one hour	VPH	12	Trucks being unloaded in 1 hr. (15 mins/truck = 4 trucks/door * 3 doors = 12 trucks)
Number of active doors	doors	3	

Pollutant	EF [(1)] units	NOx	Carbon Monoxide (CO)	PM10 Total	PM2.5 Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium
Emission Factor @ 10 mph	g/vmt	21.49	4.07	0.68	0.67	5.57E-04	2042.57	3.62E-03	3.98E-02	4.26E-03	7.02E-03	4.62E-05	1.98E-07
Emission rate @ 10 mph	g/veh-hr	214.93	40.74	6.83	6.67	5.57E-03	20425.70	3.62E-02	3.98E-01	4.26E-02	7.02E-02	4.62E-04	1.98E-06
Emission rate, all doors	g/hr	429.86	81.47	13.67	13.34	1.11E-02	40851.40	7.23E-02	7.96E-01	8.52E-02	1.40E-01	9.24E-04	3.97E-06
Emission rate, all doors	g/s	1.19E-01	2.26E-02	3.80E-03	3.71E-03	3.10E-06	1.13E+01	2.01E-05	2.21E-04	2.37E-05	3.90E-05	2.57E-07	1.10E-09

[(1)] Efs rom Truck Link Emis tab (MOVES output, truck type 62, @30 mph)

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Truck using engine to unload w/ hydraulics

1/23/2023, IHW
Epsilon

Pollutant	Mercury	Nickel	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Styrene	Xylene	Chloride	Dioxins	Furans	VOC
Emission Factor @ 10 mph	2.21E-07	1.18E-04	1.26E-03	1.93E-02	3.27E-03	2.36E-02	2.01E-03	1.02E-03	2.18E-03	5.83E-01	1.27E-03	5.09E-11	5.63E-11	5.17E-01
Emission rate @ 10 mph	2.21E-06	1.18E-03	1.26E-02	1.93E-01	3.27E-02	2.36E-01	2.01E-02	1.02E-02	2.18E-02	5.83E+00	1.27E-02	5.09E-10	5.63E-10	5.17E+00
Emission rate, all doors	4.42E-06	2.36E-03	2.51E-02	3.86E-01	6.53E-02	4.72E-01	4.03E-02	2.03E-02	4.36E-02	1.17E+01	2.54E-02	1.02E-09	1.13E-09	1.03E+01
Emission rate, all doors	1.23E-09	6.55E-07	6.98E-06	1.07E-04	1.81E-05	1.31E-04	1.12E-05	5.64E-06	1.21E-05	3.24E-03	7.07E-06	2.83E-13	3.13E-13	2.87E-03

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Railcar Mover Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Volvo L120C Loader

208 hp 10% Load Factor (from DKB updated emissions 2/28/2023)

Operating Schedule

1 number of equipment

11 hours each per day

11 hr/day

3/29/2023: Added 50% control to organic HAPS except if using a Tier 4 factor, and excluding metals, NH3, dioxins, furans.

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
NONROAD (via MOVES) Emission Factor											
Tractors/Loaders/Backhoes (T/L/B)	3.88183	3.61055	0.56744	0.55042	0.00405		1.15E-02	8.89E-02	1.59E-03	9.17E-03	1.04E-06
T/L/B TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02	
T/L/Bs TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03	
Tier Standards											
Tier 3 Standards (175-300 hp)	3.0	2.6	0.15	0.15							
Tier 4 Standards (175-750 hp)	0.3	2.6	0.015	0.015				2.48E-03			
AP-42 Table 3.3-1											
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63					

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
g/day	888.16	826.09	129.83	125.94	0.93	119348.6	2.64E+00	2.03E+01	3.65E-01	2.10E+00	2.39E-04
lb/day	1.96	1.82	0.29	0.28	0.00	263.12	5.82E-03	4.48E-02	8.04E-04	4.63E-03	5.26E-07
TPY	0.31	0.28	0.04	0.04	0.00	41.05	9.08E-04	6.99E-03	1.25E-04	7.22E-04	8.21E-08
Annual	8.79E-03	8.17E-03	1.28E-03	1.25E-03	9.17E-06	1.1808	2.61E-05	2.01E-04	3.61E-06	2.08E-05	2.36E-09
100% to open doors	8.79E-03	8.17E-03	1.28E-03	1.25E-03	9.17E-06	1.1808	2.61E-05	2.01E-04	3.61E-06	2.08E-05	2.36E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.03E-02	9.56E-03	1.50E-03	1.46E-03	1.07E-05	1.3813	3.06E-05	2.35E-04	4.22E-06	2.43E-05	2.76E-09
100% to open doors	1.03E-02	9.56E-03	1.50E-03	1.46E-03	1.07E-05	1.3813	3.06E-05	2.35E-04	4.22E-06	2.43E-05	2.76E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.24E-02	2.09E-02	3.28E-03	3.18E-03	2.34E-05	3.0139	6.67E-05	5.14E-04	9.21E-06	5.30E-05	6.03E-09
100% to open doors	2.24E-02	2.09E-02	3.28E-03	3.18E-03	2.34E-05	3.0139	6.67E-05	5.14E-04	9.21E-06	5.30E-05	6.03E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Railcar Mover Loader Exhaust

g/hp-hr	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
NONROAD (via MOVES) Emission Factor												
Tractors/Loaders/Backhoes (T/L/B)	1.87E-08	1.39E-08	6.63E-04	3.14E-02	7.46E-03	5.40E-03	2.08E-03	7.16E-04	6.60E-03	5.50E-01	3.19E-12	1.33E-03
T/L/B TOG X SPECIATE Tier 2			1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03			
T/L/Bs TOG X SPECIATE Tier 4			3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03			
Tier Standards												
Tier 3 Standards (175-300 hp)										0.15		
Tier 4 Standards (175-750 hp)										0.015		
AP-42 Table 3.3-1												
Diesel Fuel												

Emissions	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
g/day	4.28E-06	3.17E-06	1.52E-01	7.18E+00	1.71E+00	1.24E+00	4.76E-01	1.64E-01	1.51E+00	1.26E+02	7.29E-10	3.03E-01
lb/day	9.43E-09	7.00E-09	3.34E-04	1.58E-02	3.76E-03	2.72E-03	1.05E-03	3.61E-04	3.33E-03	2.78E-01	1.61E-12	6.68E-04
TPY	1.47E-09	1.09E-09	5.21E-05	2.47E-03	5.87E-04	4.25E-04	1.64E-04	5.63E-05	5.19E-04	4.33E-02	2.51E-13	1.04E-04
Annual	4.23E-11	3.14E-11	1.50E-06	7.11E-05	1.69E-05	1.22E-05	4.71E-06	1.62E-06	1.49E-05	1.25E-03	7.21E-15	3.00E-06
100% to open doors	4.23E-11	3.14E-11	1.50E-06	7.11E-05	1.69E-05	1.22E-05	4.71E-06	1.62E-06	1.49E-05	1.25E-03	7.21E-15	3.00E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	4.95E-11	3.67E-11	1.75E-06	8.32E-05	1.98E-05	1.43E-05	5.51E-06	1.89E-06	1.75E-05	1.46E-03	8.44E-15	3.51E-06
100% to open doors	4.95E-11	3.67E-11	1.75E-06	8.32E-05	1.98E-05	1.43E-05	5.51E-06	1.89E-06	1.75E-05	1.46E-03	8.44E-15	3.51E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.08E-10	8.02E-11	3.83E-06	1.81E-04	4.31E-05	3.12E-05	1.20E-05	4.13E-06	3.81E-05	3.18E-03	1.84E-14	7.66E-06
100% to open doors	1.08E-10	8.02E-11	3.83E-06	1.81E-04	4.31E-05	3.12E-05	1.20E-05	4.13E-06	3.81E-05	3.18E-03	1.84E-14	7.66E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Railcar Mover Loader Exhaust

g/hp-hr	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor		
Tractors/Loaders/Backhoes (T/L/B)		
T/L/B TOG X SPECIATE Tier 2		3.26E-03
T/L/Bs TOG X SPECIATE Tier 4	5.85E-03	1.23E-03
Tier Standards		
Tier 3 Standards (175-300 hp)		
Tier 4 Standards (175-750 hp)		
AP-42 Table 3.3-1		
Diesel Fuel		

Emissions		Acetone	Methyl Ethyl Ketone
	g/day	1.34E+00	7.46E-01
	lb/day	2.95E-03	1.65E-03
	TPY	4.61E-04	2.57E-04
	Annual	1.33E-05	7.38E-06
100% to open doors		1.33E-05	7.38E-06
0% to exhaust vents		0.00E+00	0.00E+00
	over 24 hr work day (g/s)	1.55E-05	8.64E-06
100% to open doors		1.55E-05	8.64E-06
0% to exhaust vents		0.00E+00	0.00E+00
	Peak hour (g/s)	3.38E-05	1.88E-05
100% to open doors		3.38E-05	1.88E-05
0% to exhaust vents		0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

966M Loader Exhaust

Temporal Data

312.0 days/yr

Assumed Caterpillar 966M Loader Tier 4F from MiltonCat

276 hp 10% Load Factor (from DKB updated emissions 2/28/2023)

Operating Schedule

1 number of equipment

11 hours each per day Updated 1/27/2023

11 hr/day

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium
NONROAD (via MOVES) Emission Factor												
Tractors/Loaders/Backhoes (T/L/B)	3.88183	3.61055	0.56744	0.55042	0.00405		2.31E-02	1.78E-01	3.19E-03	1.83E-02	1.04E-06	1.87E-08
T/L/B TOG X SPECIATE Tier 2							3.92E-02	2.06E-01		2.65E-02		
T/L/Bs TOG X SPECIATE Tier 4							4.73E-03	7.78E-02	5.43E-04	9.60E-03		
Tier Standards												
Tier 3 Standards (175-300 hp)	3.0		0.15	0.15								
Tier 4 Standards (175-750 hp)	0.3		0.015	0.015				2.48E-03				
AP-42 Table 3.3-1												
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63						

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium
g/day	91.08	1096.16	4.55	4.55	1.23	158366.4	1.44E+00	2.36E+01	1.65E-01	2.91E+00	3.17E-04	5.68E-06
lb/day	0.20	2.42	0.01	0.01	0.00	349.14	3.16E-03	5.21E-02	3.63E-04	6.42E-03	6.99E-07	1.25E-08
TPY	0.03	0.38	0.00	0.00	0.00	54.47	4.94E-04	8.12E-03	5.67E-05	1.00E-03	1.09E-07	1.95E-09
Annual	9.01E-04	1.08E-02	4.51E-05	4.51E-05	1.22E-05	1.5668	1.42E-05	2.34E-04	1.63E-06	2.88E-05	3.14E-09	5.62E-11
100% to open doors	9.01E-04	1.08E-02	4.51E-05	4.51E-05	1.22E-05	1.5668	1.42E-05	2.34E-04	1.63E-06	2.88E-05	3.14E-09	5.62E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.05E-03	1.27E-02	5.27E-05	5.27E-05	1.42E-05	1.8329	1.66E-05	2.73E-04	1.91E-06	3.37E-05	3.67E-09	6.57E-11
100% to open doors	1.05E-03	1.27E-02	5.27E-05	5.27E-05	1.42E-05	1.8329	1.66E-05	2.73E-04	1.91E-06	3.37E-05	3.67E-09	6.57E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.30E-03	2.77E-02	1.15E-04	1.15E-04	3.10E-05	3.9992	3.62E-05	5.96E-04	4.16E-06	7.36E-05	8.00E-09	1.43E-10
100% to open doors	2.30E-03	2.77E-02	1.15E-04	1.15E-04	3.10E-05	3.9992	3.62E-05	5.96E-04	4.16E-06	7.36E-05	8.00E-09	1.43E-10
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

966M Loader Exhaust

g/hp-hr	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factc													
Tractors/Loaders/Backhoes (T/L/B)	1.39E-08	1.33E-03	6.28E-02	1.49E-02	5.40E-03	4.16E-03	1.43E-03	1.32E-02	5.50E-01	3.19E-12	1.33E-03		
T/L/B TOG X SPECIATE Tier 2		1.44E-03	7.36E-02	1.31E-02		3.00E-03		8.26E-03					6.52E-03
T/L/Bs TOG X SPECIATE Tier 4		3.40E-04	2.60E-02	3.88E-03		2.43E-03	1.83E-03	5.05E-03				5.85E-03	1.23E-03
Tier Standards													
Tier 3 Standards (175-300 hp)									0.15				
Tier 4 Standards (175-750 hp)									0.015				
AP-42 Table 3.3-1													
Diesel Fuel													

Emissions	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Diesel PM	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	4.21E-06	1.03E-01	7.89E+00	1.18E+00	1.64E+00	7.39E-01	5.56E-01	1.53E+00	1.67E+02	9.67E-10	4.02E-01	1.78E+00	3.73E-01
lb/day	9.29E-09	2.27E-04	1.74E-02	2.60E-03	3.61E-03	1.63E-03	1.23E-03	3.38E-03	3.68E-01	2.13E-12	8.87E-04	3.92E-03	8.23E-04
TPY	1.45E-09	3.55E-05	2.71E-03	4.05E-04	5.64E-04	2.54E-04	1.91E-04	5.28E-04	5.75E-02	3.33E-13	1.38E-04	6.11E-04	1.28E-04
Annual	4.17E-11	1.02E-06	7.80E-05	1.17E-05	1.62E-05	7.31E-06	5.50E-06	1.52E-05	1.65E-03	9.57E-15	3.98E-06	1.76E-05	3.69E-06
100% to open doors	4.17E-11	1.02E-06	7.80E-05	1.17E-05	1.62E-05	7.31E-06	5.50E-06	1.52E-05	1.65E-03	9.57E-15	3.98E-06	1.76E-05	3.69E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	4.88E-11	1.19E-06	9.13E-05	1.36E-05	1.90E-05	8.56E-06	6.44E-06	1.78E-05	1.93E-03	1.12E-14	4.66E-06	2.06E-05	4.32E-06
100% to open doors	4.88E-11	1.19E-06	9.13E-05	1.36E-05	1.90E-05	8.56E-06	6.44E-06	1.78E-05	1.93E-03	1.12E-14	4.66E-06	2.06E-05	4.32E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	1.06E-10	2.61E-06	1.99E-04	2.98E-05	4.14E-05	1.87E-05	1.40E-05	3.87E-05	4.22E-03	2.44E-14	1.02E-05	4.49E-05	9.43E-06
100% to open doors	1.06E-10	2.61E-06	1.99E-04	2.98E-05	4.14E-05	1.87E-05	1.40E-05	3.87E-05	4.22E-03	2.44E-14	1.02E-05	4.49E-05	9.43E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 345DL Excavator

Temporal Data

312.0 days/yr

Assumed Caterpillar 345DL Excavator

380 hp 28%

Operating Schedule

1 number of equipment

11 hours each per day

11 hr/day

3/29/2023: Catalyzed DPF per MiltonCat controls 85% of PM, 90% of CO and 50% of organic toxics except if using a Tier 4 factor. And excluding dioxins and furans.

Load Factor (from DKB updated emissions 2/28/2023)

Updated 1/27/2023

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
NONROAD (via MOVES) Emission Factor											
Excavators	1.36389	0.05431	0.01382	0.01340	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	8.49E-07
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03	
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03	
Tier Standards											
Tier 3 Standards (300-600 hp)	3.0	2.6	0.15	0.15							
Tier 4 Standards (175-750 hp)	0.3		0.015	0.015				2.48E-03			
AP-42 Table 3.3-1											
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63					

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic
g/day	1596.30	63.56	16.17	15.69	3.37	610514.0	2.78E+00	2.51E+01	1.25E+00	3.35E+00	9.94E-04
lb/day	3.52	0.14	0.04	0.03	0.01	1345.96	6.12E-03	5.53E-02	2.75E-03	7.38E-03	2.19E-06
TPY	0.55	0.02	0.01	0.01	0.00	209.97	9.55E-04	8.63E-03	4.30E-04	1.15E-03	3.42E-07
Annual	1.58E-02	6.29E-04	1.60E-04	1.55E-04	3.33E-05	6.0401	2.75E-05	2.48E-04	1.24E-05	3.31E-05	9.83E-09
100% to open doors	1.58E-02	6.29E-04	1.60E-04	1.55E-04	3.33E-05	6.0401	2.75E-05	2.48E-04	1.24E-05	3.31E-05	9.83E-09
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.85E-02	7.36E-04	1.87E-04	1.82E-04	3.90E-05	7.0661	3.22E-05	2.90E-04	1.45E-05	3.88E-05	1.15E-08
100% to open doors	1.85E-02	7.36E-04	1.87E-04	1.82E-04	3.90E-05	7.0661	3.22E-05	2.90E-04	1.45E-05	3.88E-05	1.15E-08
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	4.03E-02	1.61E-03	4.08E-04	3.96E-04	8.51E-05	15.4170	7.02E-05	6.34E-04	3.15E-05	8.46E-05	2.51E-08
100% to open doors	4.03E-02	1.61E-03	4.08E-04	3.96E-04	8.51E-05	15.4170	7.02E-05	6.34E-04	3.15E-05	8.46E-05	2.51E-08
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 345DL Excavator

g/hp-hr	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
NONROAD (via MOVES) Emission Factor												
Excavators	9.28E-09	1.13E-08	1.04E-04	7.17E-03	1.16E-03	4.39E-03	4.94E-04	3.14E-04	2.54E-03	8.94E-02	1.25E-12	1.97E-12
Excavators TOG X SPECIATE Tier 2			3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03			
Excavators TOG X SPECIATE Tier 4			8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03			
Tier Standards												
Tier 3 Standards (300-600 hp)										0.15		
Tier 4 Standards (175-750 hp)										0.015		
AP-42 Table 3.3-1												
Diesel Fuel												

Emissions	Chromium	Mercury	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Primary Exhaust PM2.5 - Total	Dioxins	Furans
g/day	1.09E-05	1.32E-05	1.22E-01	8.40E+00	1.35E+00	5.14E+00	5.78E-01	3.67E-01	2.97E+00	1.05E+02	1.46E-09	2.31E-09
lb/day	2.39E-08	2.91E-08	2.70E-04	1.85E-02	2.98E-03	1.13E-02	1.28E-03	8.09E-04	6.55E-03	2.31E-01	3.22E-12	5.10E-12
TPY	3.73E-09	4.54E-09	4.21E-05	2.89E-03	4.65E-04	1.77E-03	1.99E-04	1.26E-04	1.02E-03	3.60E-02	5.02E-13	7.95E-13
Annual	1.07E-10	1.31E-10	1.21E-06	8.31E-05	1.34E-05	5.09E-05	5.72E-06	3.63E-06	2.94E-05	1.03E-03	1.44E-14	2.29E-14
100% to open doors	1.07E-10	1.31E-10	1.21E-06	8.31E-05	1.34E-05	5.09E-05	5.72E-06	3.63E-06	2.94E-05	1.03E-03	1.44E-14	2.29E-14
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.26E-10	1.53E-10	1.42E-06	9.72E-05	1.57E-05	5.95E-05	6.69E-06	4.25E-06	3.44E-05	1.21E-03	1.69E-14	2.68E-14
100% to open doors	1.26E-10	1.53E-10	1.42E-06	9.72E-05	1.57E-05	5.95E-05	6.69E-06	4.25E-06	3.44E-05	1.21E-03	1.69E-14	2.68E-14
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.74E-10	3.34E-10	3.09E-06	2.12E-04	3.42E-05	1.30E-04	1.46E-05	9.27E-06	7.50E-05	2.64E-03	3.69E-14	5.84E-14
100% to open doors	2.74E-10	3.34E-10	3.09E-06	2.12E-04	3.42E-05	1.30E-04	1.46E-05	9.27E-06	7.50E-05	2.64E-03	3.69E-14	5.84E-14
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 345DL Excavator

g/hp-hr	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor		
Excavators		
Excavators TOG X SPECIATE Tier 2		8.22E-04
Excavators TOG X SPECIATE Tier 4	1.48E-03	3.10E-04
Tier Standards		
Tier 3 Standards (300-600 hp)		
Tier 4 Standards (175-750 hp)		
AP-42 Table 3.3-1		
Diesel Fuel		

Emissions		Acetone	Methyl Ethyl Ketone
	g/day	1.73E+00	9.62E-01
	lb/day	3.81E-03	2.12E-03
	TPY	5.94E-04	3.31E-04
	Annual	1.71E-05	9.52E-06
	100% to open doors	1.71E-05	9.52E-06
	0% to exhaust vents	0.00E+00	0.00E+00
	over 24 hr work day (g/s)	2.00E-05	1.11E-05
	100% to open doors	2.00E-05	1.11E-05
	0% to exhaust vents	0.00E+00	0.00E+00
	Peak hour (g/s)	4.36E-05	2.43E-05
	100% to open doors	4.36E-05	2.43E-05
	0% to exhaust vents	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 330C Excavator

Temporal Data
312.0 days/yr
Assumed Caterpillar 330C Excavator
247 hp 28%
Operating Schedule
1 number of equipment
11 hours each per day
11 hr/day

3/29/2023: Includes a DOC which will remove 90% CO, 50% organic toxics unless already using a Tier 4 factor, and excluding dioxins and furans
Load Factor (from DKB updated emissions 2/28/2023)

Updated 1/27/2023

g/hp-hr	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury
NONROAD (via MOVES) Emission Factor													
Excavators	1.36389	0.48879	0.09212	0.08936	0.00288		2.37E-03	2.14E-02	1.07E-03	2.86E-03	8.49E-07	9.28E-09	1.13E-08
Excavators TOG X SPECIATE Tier 2							9.89E-03	5.19E-02		6.68E-03			
Excavators TOG X SPECIATE Tier 4							1.19E-03	1.96E-02	1.37E-04	2.42E-03			
Tier Standards													
Tier 3 Standards (300-600 hp)	3.0	2.6	0.15	0.15									
Tier 4 Standards (175-750 hp)	0.3		0.015	0.015				2.48E-03					
AP-42 Table 3.3-1													
Diesel Fuel	14.06	3.03	1.00	1.00	0.93	521.63							

Emissions	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Primary Exhaust PM10 - Total	Primary Exhaust PM2.5 - Total	Sulfur Dioxide (SO2)	CO2e	Benzene	Formaldehyde	Naphthalene	Toluene	Arsenic	Chromium	Mercury
g/day	1037.60	371.85	70.08	67.98	2.19	396834.1	1.81E+00	1.63E+01	8.12E-01	2.18E+00	6.46E-04	7.06E-06	8.59E-06
lb/day	2.29	0.82	0.15	0.15	0.00	874.87	3.98E-03	3.60E-02	1.79E-03	4.80E-03	1.42E-06	1.56E-08	1.89E-08
TPY	0.36	0.13	0.02	0.02	0.00	136.48	6.21E-04	5.61E-03	2.79E-04	7.49E-04	2.22E-07	2.43E-09	2.95E-09
Annual	1.03E-02	3.68E-03	6.93E-04	6.73E-04	2.17E-05	3.9261	1.79E-05	1.61E-04	8.03E-06	2.15E-05	6.39E-09	6.98E-11	8.50E-11
100% to open doors	1.03E-02	0.00E+00	6.93E-04	6.73E-04	2.17E-05	3.9261	1.79E-05	1.61E-04	8.03E-06	2.15E-05	6.39E-09	6.98E-11	8.50E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	1.20E-02	4.30E-03	8.11E-04	7.87E-04	2.53E-05	4.5930	2.09E-05	1.89E-04	9.40E-06	2.52E-05	7.48E-09	8.17E-11	9.94E-11
100% to open doors	1.20E-02	4.30E-03	8.11E-04	7.87E-04	2.53E-05	4.5930	2.09E-05	1.89E-04	9.40E-06	2.52E-05	7.48E-09	8.17E-11	9.94E-11
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.62E-02	9.39E-03	1.77E-03	1.72E-03	5.53E-05	10.0211	4.56E-05	4.12E-04	2.05E-05	5.50E-05	1.63E-08	1.78E-10	2.17E-10
100% to open doors	2.62E-02	9.39E-03	1.77E-03	1.72E-03	5.53E-05	10.0211	4.56E-05	4.12E-04	2.05E-05	5.50E-05	1.63E-08	1.78E-10	2.17E-10
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ReSource - Ware, MA
Mobile Source
Emissions Analysis

Caterpillar 330C Excavator

g/hp-hr	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
NONROAD (via MOVES) Emission Factor											
Excavators	1.04E-04	7.17E-03	1.16E-03	4.39E-03	4.94E-04	3.14E-04	2.54E-03	1.25E-12	2.09E-04		
Excavators TOG X SPECIATE Tier 2	3.63E-04	1.85E-02	3.31E-03		7.55E-04		2.08E-03				8.22E-04
Excavators TOG X SPECIATE Tier 4	8.56E-05	6.55E-03	9.78E-04		6.14E-04	4.62E-04	1.27E-03			1.48E-03	3.10E-04
Tier Standards											
Tier 3 Standards (300-600 hp)											
Tier 4 Standards (175-750 hp)											
AP-42 Table 3.3-1											
Diesel Fuel											

Emissions	1,3-Butadiene	Acetaldehyde	Acrolein	Ammonia (NH3)	Ethyl Benzene	Hexane	Xylene	Dioxins	Furans	Acetone	Methyl Ethyl Ketone
g/day	7.95E-02	5.46E+00	8.79E-01	3.34E+00	3.76E-01	2.39E-01	1.93E+00	9.49E-10	1.59E-01	1.12E+00	6.25E-01
lb/day	1.75E-04	1.20E-02	1.94E-03	7.37E-03	8.29E-04	5.26E-04	4.25E-03	2.09E-12	3.50E-04	2.47E-03	1.38E-03
TPY	2.73E-05	1.88E-03	3.02E-04	1.15E-03	1.29E-04	8.21E-05	6.64E-04	3.26E-13	5.47E-05	3.86E-04	2.15E-04
Annual	7.86E-07	5.40E-05	8.70E-06	3.31E-05	3.72E-06	2.36E-06	1.91E-05	9.39E-15	1.57E-06	1.11E-05	6.19E-06
100% to open doors	7.86E-07	5.40E-05	8.70E-06	3.31E-05	3.72E-06	2.36E-06	1.91E-05	9.39E-15	1.57E-06	1.11E-05	6.19E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
over 24 hr work day (g/s)	9.20E-07	6.32E-05	1.02E-05	3.87E-05	4.35E-06	2.76E-06	2.23E-05	1.10E-14	1.84E-06	1.30E-05	7.24E-06
100% to open doors	9.20E-07	6.32E-05	1.02E-05	3.87E-05	4.35E-06	2.76E-06	2.23E-05	1.10E-14	1.84E-06	1.30E-05	7.24E-06
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Peak hour (g/s)	2.01E-06	1.38E-04	2.22E-05	8.44E-05	9.49E-06	6.02E-06	4.87E-05	2.40E-14	4.01E-06	2.83E-05	1.58E-05
100% to open doors	2.01E-06	1.38E-04	2.22E-05	8.44E-05	9.49E-06	6.02E-06	4.87E-05	2.40E-14	4.01E-06	2.83E-05	1.58E-05
0% to exhaust vents	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment 3-2

Raw Air Background Data

ReSource Transfer Station - Ware, MA

Ambient Monitored Concentrations

POLLUTANT	AVERAGING TIME	Form	2018	2019	2020	Units	ppm/ppb to µg/m³ Conversion Factor	2017-2019 Background Concentration (µg/m³)	Location
SO_2 [1][6]	1-Hour [5]	99th %	7.8	2.5	2.8	ppb	2.62	11.4	600 Liberty St., Springfield
	3-Hour	H2H	5.0	2.7	3.8	ppb	2.62	13.1	600 Liberty St., Springfield
PM-10 [7]	24-Hour	H2H	16	15	16	µg/m³	1	16	Skyline Drive, Ware
PM-2.5	24-Hour [5]	98th %	14.4	12.7	15.9	µg/m³	1	14.3	Anderson Rd, Chicopee (FRM)
	Annual [5]	H	5.2	5.0	6.9	µg/m³	1	5.7	Anderson Rd, Chicopee (FRM)
NO_2 [3]	1-Hour [5]	98th %	37	32	33	ppb	1.88	63.9	Anderson Rd, Chicopee
	Annual	H	5.24	4.45	4.30	ppb	1.88	9.9	Anderson Rd, Chicopee
CO [2]	1-Hour	H2H	1.4	1.6	***2.1***	ppm	1146	2428.4	600 Liberty St., Springfield/***Summer St, Worcester***
	8-Hour	H2H	0.9	1.2	***1.1***	ppm	1146	1375.2	600 Liberty St., Springfield/***Summer St, Worcester***
Ozone [4]	8-Hour	H4H	0.070	0.066	0.061	ppm	1963	137.4	Anderson Rd, Chicopee

Notes:

From 2018-2020 MassDEP annual reports and EPA's AirData Website

[1] SO_2 reported ppb. Converted to µg/m^3 using factor of 1 ppb = 2.62 µg/m^3.

[2] CO reported in ppm. Converted to µg/m^3 using factor of 1 ppm = 1146 µg/m^3.

[3] NO_2 reported in ppb. Converted to µg/m^3 using factor of 1 ppb = 1.88 µg/m^3.

[4] O_3 reported in ppm. Converted to µg/m^3 using factor of 1 ppm = 1963 µg/m^3.

[5] Background level is the average concentration of the three years.

[6] The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

[7] The Annual PM10 standard was revoked by EPA on October 17, 2006, Federal Register 71-200, p. 61144.

[8] The monitor at 165 Liberty St was replaced with one at 600 Liberty St

Attachment 3-2 Rev

REVISED Raw Air Background Data

ReSource Transfer Station - Ware, MA

Revised Ambient Monitored Concentrations

POLLUTANT	AVERAGING TIME	Form	2019	2020	2021	Units	ppm/ppb to µg/m³ Conversion Factor	2019-2021 Background Concentration (µg/m³)	Location
PM-2.5	24-Hour [1]	98th %	15.5	14.2	13.8	µg/m³	1	14.5	Ware, Skyline Drive (FEM)
	Annual [1]	H	5.61	6.8	5.71	µg/m³	1	6.0	Ware, Skyline Drive (FEM)
NO_2 [2, 3]	1-Hour [1]	98th %	20	23	17	ppb	1.88	37.6	Ware, Skyline Drive (FEM)
	Annual	H	1.83	2.2	1.71	ppb	1.88	4.1	Ware, Skyline Drive (FEM)

Notes:

From 2019-2021 MassDEP annual reports and EPA's AirData Website

[1] Background level is the average concentration of the three years.

[2] Note that NO2 is presented here for completeness but the AERMOD modeling relies on background seasonal NO2 values, presented on the next page.

[3] NO_2 reported in ppb. Converted to µg/m^3 using factor of 1 ppb = 1.88 µg/m^3.

ReSource Transfer Station - Ware, MA

Background Seasonal Hourly NO2 Concentrations

End of Hour	Concentration (ppb) (1)			
	WINTER	SPRING	SUMMER	FALL
1	27	8	6	10
2	32	8	6	10
3	26	8	5	11
4	20	11	6	15
5	23	10	6	15
6	22	11	8	14
7	22	14	6	14
8	19	13	5	14
9	18	12	5	15
10	17	9	5	14
11	14	8	3	15
12	13	8	3	13
13	15	8	3	12
14	14	8	4	10
15	15	7	3	13
16	17	6	2	14
17	20	8	2	15
18	22	9	3	16
19	26	10	4	13
20	25	13	6	13
21	26	11	5	13
22	25	9	5	13
23	29	10	6	13
24	28	9	6	13

Notes:

(1) Background seasonal hourly NO2 are used in revised modeling

Air monitor locations: Primary: Ware, Skyline Drive, MA

Secondary: Uxbridge, MA

Tertiary: Chicopee, Anderson Rd., MA

source: https://aqs.epa.gov/aqsweb/airdata/download_files.html

Attachment 3-3

Precipitation and Snow Cover

Summary of Precipitation Analysis Results
Westfield Barnes Municipal Airport - KBAF

Year	Annual Inches of Rain	Notes	Location
1981	44.97		Westfield
1982	50.37		Westfield
1983	70.73		Westfield
1984	50.31		Westfield
1985	43.12		Westfield
1986	50.08		Westfield
1987	47.17		Westfield
1988		Missing more than half the year	Westfield
1989	49.68	Missing July	Westfield
1990	54.73		Westfield
1991	55.1	Missing Feb.	Westfield
1992	45.57		Westfield
1993	45.52		Westfield
1994			Holyoke
1995	35.81		Holyoke
1996	51.84		Holyoke
1997		Missing portions of Jan, Feb, March	Holyoke
1998	36.15		Holyoke
1999	51.23		Barnes Municipal
2000	44.04		Barnes Municipal
2001	35.95		Barnes Municipal
2002	43.1		Barnes Municipal
2003	56.65		Barnes Municipal
2004	39.61		Barnes Municipal
2005	57.63		Barnes Municipal
2006	47.18		Barnes Municipal
2007	43.22		Barnes Municipal
2008	59.67		Barnes Municipal
2009	45.05		Barnes Municipal
2010	42.07		Barnes Municipal
2011	59.56		Barnes Municipal
2012	40.25		Barnes Municipal
2013	43.85		Barnes Municipal
2014	45.99		Barnes Municipal
2015	36.17		Barnes Municipal
2016	29.84		Barnes Municipal
2017	38.48		Barnes Municipal
2018	61.82		Barnes Municipal
2019	44.59		Barnes Municipal
2020	39.76		Barnes Municipal

30th Percentile	70th Percentile
43.12	50.322

Year	Inches	Moisture Profile
2010	42.07	Dry
2011	59.56	Wet
2012	40.25	Dry
2013	43.85	Average
2014	45.99	Average
2015	36.17	Dry
2016	29.84	Dry
2017	38.48	Dry
2018	61.82	Wet
2019	44.59	Average
2020	39.76	Dry

* Total precipitation is missing one or more days

** Missing the Month of December, that being said the month of December would not have been enough to make this an average year.

Summary of Snow Cover Analysis Results
Westfield, MA - Barnes Municipal Airfield - KBAF

Summary					
	2016	**2017**	**2018**	**2019**	**2020**
January	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow
February	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow
March	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow
April	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring
May	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring
June	Midsummer	Midsummer	Midsummer	Midsummer	Midsummer
July	Midsummer	Midsummer	Midsummer	Midsummer	Midsummer
August	Midsummer	Midsummer	Midsummer	Midsummer	Midsummer
September	Autumn	Autumn	Autumn	Autumn	Autumn
October	Autumn	Autumn	Autumn	Autumn	Autumn
November	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow
December	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow

Data from National Operational Hydrologic Remote Sensing Center Interactive Snow Information Website
http://www.nohrsc.noaa.gov/interactive/html/graph.html?station=KBAF&w=600&h=400&o=a&uc=0&by=2014&bm=1&bd=1&bh=0&ey=2014&em=12&ed=31&eh=23&data=1&units=0&region=us

Station: KBAF - WESTFIELD BARNES MUNICIPAL
Latitude: 42.166667 N
Longitude: 72.716667 W
Elevation: 262 Feet
Start Date: 2014-01-01 00 UTC
Stop Date: 2014-12-31 23 UTC
Forest Density: 11%
Land Use: Cool Broadleaf Forest

Any month having >1" snow cover for greater than 60% of the hours was considered having “Continuous Snow Cover”.
April and May are always considered “Transitional Spring”
June/July/August are always "Midsummer"
September and October are always "Autumn"
November through March without snow cover is considered “Late Autumn/Winter Without Continuous Snow Cover”

Attachment 3-3 Rev

REVISED Precipitation and Snow Cover

Summary of Precipitation Analysis Results
Westfield Barnes Municipal Airport - KBAF

Year	Annual Inches of Rain	Notes	Location
1981	44.97		Westfield
1982	50.37		Westfield
1983	70.73		Westfield
1984	50.31		Westfield
1985	43.12		Westfield
1986	50.08		Westfield
1987	47.17		Westfield
1988		Missing more than half the year	Westfield
1989	49.68	Missing July	Westfield
1990	54.73		Westfield
1991	55.1	Missing Feb.	Westfield
1992	45.57		Westfield
1993	45.52		Westfield
1994			Holyoke
1995	35.81		Holyoke
1996	51.84		Holyoke
1997		Missing portions of Jan, Feb, March	Holyoke
1998	36.15		Holyoke
1999	51.23		Barnes Municipal
2000	44.04		Barnes Municipal
2001	35.95		Barnes Municipal
2002	43.1		Barnes Municipal
2003	56.65		Barnes Municipal
2004	39.61		Barnes Municipal
2005	57.63		Barnes Municipal
2006	47.18		Barnes Municipal
2007	43.22		Barnes Municipal
2008	59.67		Barnes Municipal
2009	45.05		Barnes Municipal
2010	42.07		Barnes Municipal
2011	59.56		Barnes Municipal
2012	40.25		Barnes Municipal
2013	43.85		Barnes Municipal
2014	45.99		Barnes Municipal
2015	36.17		Barnes Municipal
2016	29.84		Barnes Municipal
2017	38.48		Barnes Municipal
2018	61.82		Barnes Municipal
2019	44.59		Barnes Municipal
2020	39.76		Barnes Municipal
2021	55.43		Barnes Municipal
2022	41.63		Barnes Municipal
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			

30th Percentile	70th Percentile
40.43	47.061

Year	Inches	Moisture Profile
[redacted]		
2017	38.48	Dry
2018	61.82	Wet
2019	44.59	Average
2020	39.76	Dry
2021	55.43	Wet

Summary of Snow Cover Analysis Results
Westfield, MA - Barnes Municipal Airfield - KBAF

Summary					
	2017	**2018**	**2019**	**2020**	**2021**
January	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow
February	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Continuous Snow Cover
March	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow
April	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring
May	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring	Transitional Spring
June	Midsummer	Midsummer	Midsummer	Midsummer	Midsummer
July	Midsummer	Midsummer	Midsummer	Midsummer	Midsummer
August	Midsummer	Midsummer	Midsummer	Midsummer	Midsummer
September	Autumn	Autumn	Autumn	Autumn	Autumn
October	Autumn	Autumn	Autumn	Autumn	Autumn
November	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow
December	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Continuous Snow Cover	Late Autumn/Winter w/o Snow	Late Autumn/Winter w/o Snow

Data from National Operational Hydrologic Remote Sensing Center Interactive Snow Information Website
http://www.nohrsc.noaa.gov/interactive/html/graph.html?station=KBAF&w=600&h=400&o=a&uc=0&by=2014&bm=1&bd=1&bh=0&ey=2014&em=12&ed=31&eh=23&data=1&units=0&region=us

Station: KBAF - WESTFIELD BARNES MUNICIPAL
Latitude: 42.166667 N
Longitude: 72.716667 W
Elevation: 262 Feet
Start Date: 2014-01-01 00 UTC
Stop Date: 2014-12-31 23 UTC
Forest Density: 11%
Land Use: Cool Broadleaf Forest

Any month having >1" snow cover for greater than 50% of the hours was considered having “Continuous Snow Cover”.
April and May are always considered “Transitional Spring”
June/July/August are always "Midsummer"
September and October are always "Autumn"
November through March without snow cover is considered “Late Autumn/Winter Without Continuous Snow Cover”

Attachment 3-4

Additional Figures

ReSource - Ware Transfer Station Ware, MA

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Figure 3-4a

Buildings, Locomotive Engine Bodies, Railcar Loader

ReSource - Ware Transfer Station Ware, MA

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Figure 3-4b

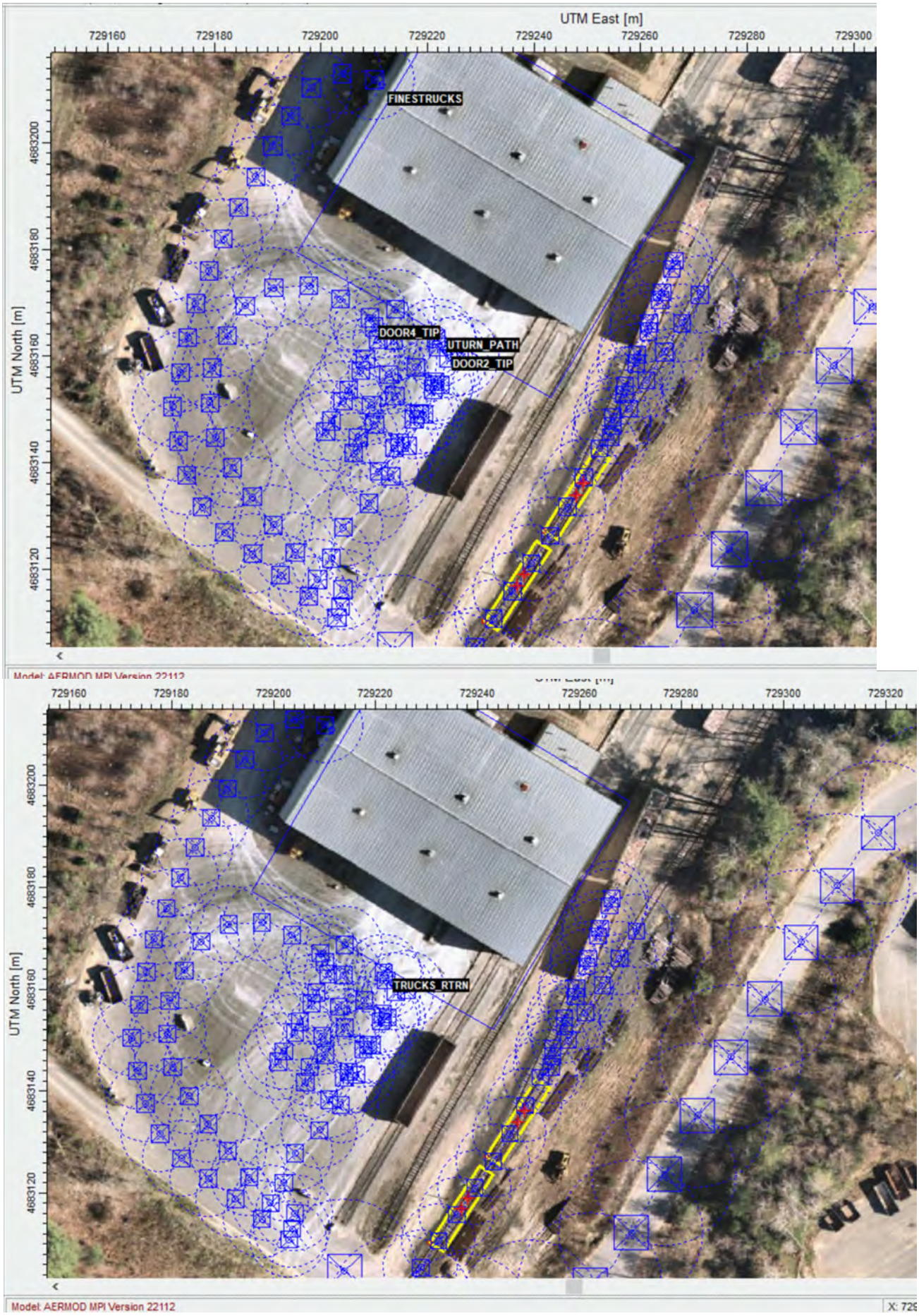
Railcar Loader and Locomotive Idling and Switching North Location

ReSource - Ware Transfer Station Ware, MA

Epsilon ASSOCIATES INC.

Figure 3-4c

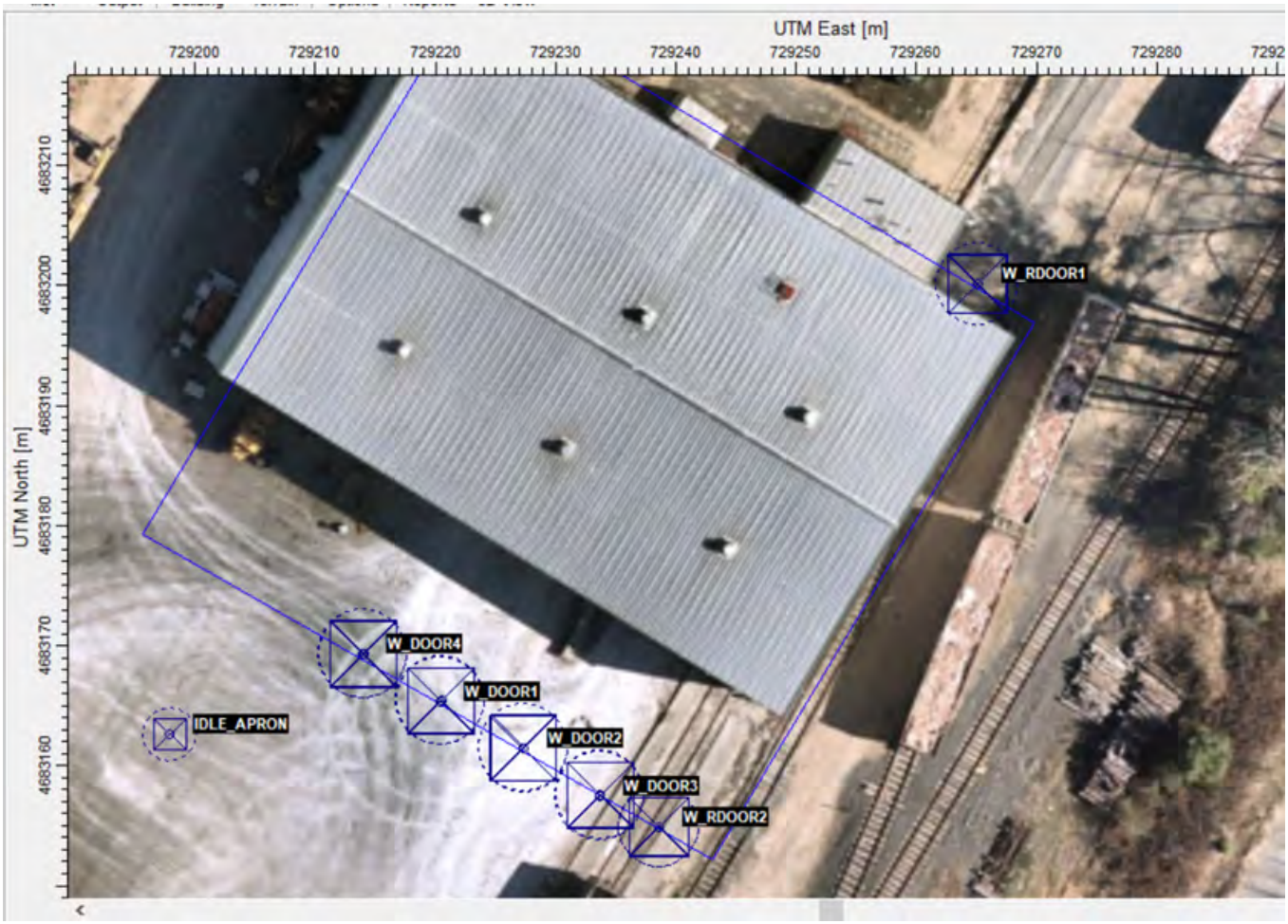
Locomotive Idling and Switching South Location

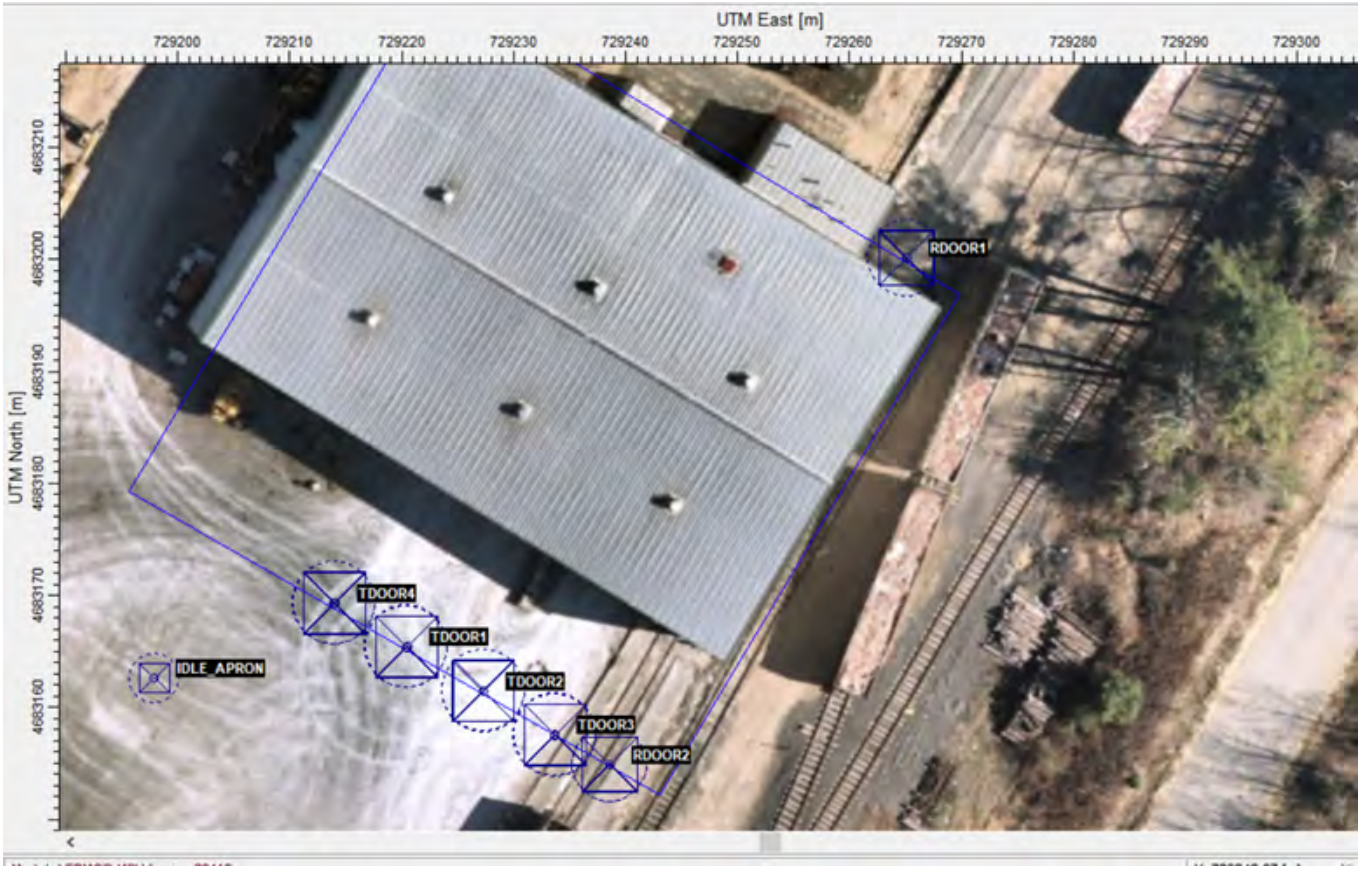


ReSource - Ware Transfer Station Ware, MA

Figure 3-4d

Truck Roadway Sources at Building





ReSource - Ware Transfer Station Ware, MA

Epsilon Associates Inc.

Figure 3-4e

Building Door Volume Sources (from indoor equipment operating)

ReSource - Ware Transfer Station Ware, MA

Epsilon Associates Inc.

Figure 3-4f

Truck Idling Locations and On-site Driveway

APPENDIX I

SOUND ANALYSIS

2.0 NOISE

A sound level assessment has been completed to evaluate noise due to operation of the ReSource Ware facility. The analysis was conducted to study the noise impacts of the proposed operational changes, and to evaluate options to avoid, minimize, or mitigate any damage caused by project noise impacts. The results of this assessment are described in this Section as follows:

- Section 2.1 describes the noise generated by existing and proposed ReSource Ware activities;
- Section 2.2 explains how sound levels are measured and described;
- Section 2.3 summarizes the applicable noise-related regulations, guidance, and policy;
- Section 2.4 describes existing sound levels at the facility and its environs;
- Section 2.5 summarizes the sound associated with the proposed changes;
- Section 2.6 describes how computer modeling predicts future sound levels with the proposed changes;
- Section 2.7 presents the results of the modeling;
- Section 2.8 evaluates the predicted future sound levels against the measured ambient sound levels per MassDEP's noise policy;
- Section 2.9 shows results with both continuous and intermittent sound sources; and
- Section 2.10 evaluates additional mitigation measures.

The Project is an expansion of existing facility operations, and generally the character and intensity of generated sounds are not predicted to change. Because the facility will operate for longer hours on weekdays, there will be new weekday morning and evening hours with facility-generated sound. This analysis documents that the sound levels during the increased operating hours will not cause a nuisance condition, and that the impacts have been mitigated to the extent feasible. A revised analysis has been conducted for further evaluation and refinement to more precisely represent the project details. Several site visits have been made to better define site operations and to make additional sound measurements. Also, a new and important source of sound was discovered; during the unloading of transfer trailers, the walking floors are moved with onboard hydraulic equipment which are powered by revving the truck engine. This source was added to the analysis.

2.1 Existing and Proposed Operations

Currently the facility accepts truck-transported construction and demolition debris (C&D) and transfers it to railcars for disposal out of state. The trucks pull up to one of three open roll-up doors on the C&D handling building and deposit C&D materials on the tipping floor, which are then loaded into open railcars using a front-end loader and excavator. The loading takes place inside the C&D processing building. The primary noise sources are engine noise from the loading equipment and trucks (including truck engine noise driving the hydraulics for walking floor unloading on transfer trailers), noise from depositing and moving the C&D material, and backup alarms on the loading equipment. The majority of noise producing activity takes place inside the building and at the open roll-up doors along the south side of the building. The proposed Project expands the capacity of the facility while largely maintaining the same operations as are currently conducted. The building footprint will increase from 22,480 square feet to approximately 32,480 square feet, and the expansion to the facility will include an additional (fourth) roll-up door to access the tipping floor.

The proposed expansion will also increase the weekday operating hours from 7 am to 4 pm to 7 am to 6 pm on Monday through Friday. There are no proposed changes to the weekend operating hours.

2.2 Sound Metrics

There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not arithmetically additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-decibel increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. A 3-dB increase or decrease corresponds to the threshold of perceptibility of change. In practice, a 3 dBA change in environmental sound is at the margin of perceptibility to the average person.1

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

1 2009 ASHRAE Handbook – Fundamentals, American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc., Atlanta, GA.

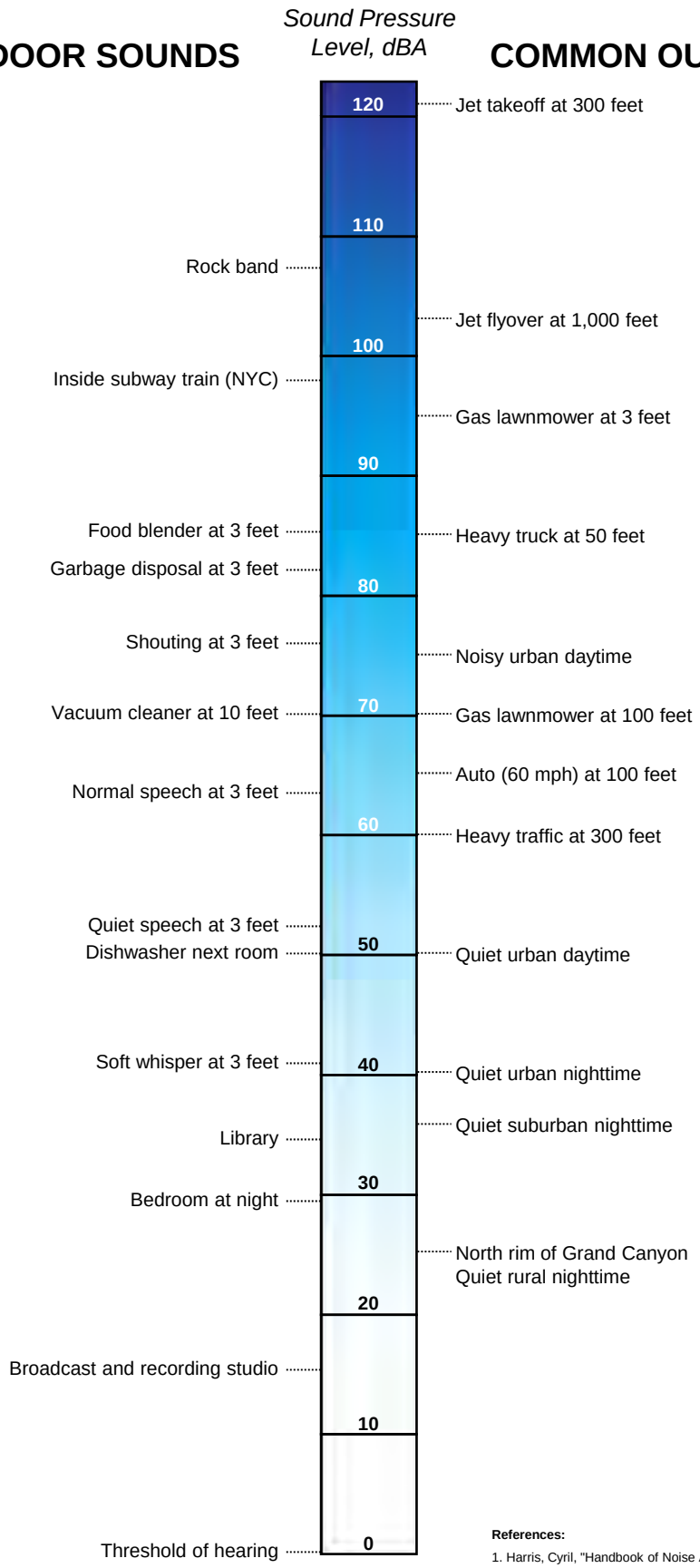
A sound level meter (SLM) that is used to measure sound is a standardized instrument.2 It contains "weighting networks" (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as "pitch" or "tone". The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as "dBA". Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred to as "unweighted". Sound pressure levels for some common indoor and outdoor environments are shown in Figure 2-1.

Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from a large number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated Ln, where n can have a value between 0 and 100 in terms of percentage. Three sound level metrics that are utilized in this report are described below.

- L_{eq}, the equivalent level, is the level of a hypothetical steady sound that would have the same energy (i.e., the same time-averaged mean square sound pressure) as the actual fluctuating sound detected. The equivalent level is designated L_{eq} and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by loud sounds if there are fluctuating sound levels.

- L_{90} is the sound level exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level detected. It is essentially the same as the residual sound level, which is the sound level detected when there are no obvious nearby intermittent sound sources. The L_{90} level is used to establish the "ambient" or "background" sound level as part of the MassDEP Noise Policy.

2 American National Standard Specification for Sound Level Meters, ANSI S1.4-1983 (R2006), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.



References:

1. Harris, Cyril, "Handbook of Noise Acoustical Measurements and Noise Control", p 1-10., 1998
2. "Controlling Noise", USAF, AFMC, AFDTC, Elgin AFB, Fact Sheet, August 1996
3. California Dept. of Trans., "Technical Noise Supplement", Oct, 1998

Epsilon ASSOCIATES INC.

Figure 2-1

Common Indoor and Outdoor Sound Levels

2.3 Noise Regulation

2.3.1 Federal Regulations

There are no federal community noise regulations applicable to this Project.

2.3.2 Massachusetts State Regulations

The MassDEP has the authority to regulate noise under 310 CMR 7.10, which is part of the Commonwealth's air pollution control regulations. Those regulations apply to "suppressible and preventable industrial and commercial sources of sound" and include the following:

No person owning, leasing, or controlling a source of sound shall willfully, negligently, or through failure to provide necessary equipment, service, or maintenance or to take necessary precautions cause, suffer, allow, or permit unnecessary emissions from said source of sound that may cause noise.

where noise is defined as causing a nuisance, being injurious, or unreasonably interfering with the comfortable enjoyment of life and property or the conduct of business. The MassDEP administers this regulation through its Noise Policy DAQC 90-001, dated February 1, 1990. The Noise Policy limits a source to a 10-dBA increase above the ambient sound measured (the L_{90} sound level) at the property line for the site and at the nearest residences. According to the MassDEP, "Noise levels that exceed the criteria at the source's property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10). The agency also considers the effect of noise on the nearest occupied residence and/or building housing sensitive receptors."[3] In addition, "…[a] new noise source that would be located in an area in which housing or buildings containing other sensitive receptors could be developed in the future may be required to mitigate its noise impact in these areas."

MassDEP's Noise Policy further prohibits "pure tone" conditions where the sound pressure level in one octave band is 3 dB or more than the sound levels in each of the two adjacent octave bands. A qualitative example of a source emitting a "pure tone" is a fan with a bad bearing that is producing an objectionable squealing sound.

2.3.3 Local Regulations

The Town of Ware Zoning Bylaw includes quantitative noise limits that are applicable to industrial classified facilities. Sound pressure levels due to facility activities are limited to no more than 70 dBA between 7:00 am and 9:00 pm and no more than 60 dBA between 9:00 pm and 7:00 am.

3 Energy and Environmental Affairs. Noise Pollution Policy Interpretation | MassDEP. https://www.mass.gov/files/documents/2018/01/31/noise-interpretation.pdf. Accessed April 2022.

Although the Project site is zoned highway commercial (which has no noise limit), not industrial, the Project will meet the noise limit for industrial facilities.

2.4 Existing Sound Levels

The Project site is located at 198 East Street Ware, Massachusetts. The property is bordered by the Ware River to the north and west and Route 9 to the southeast. There are residential areas along Gilbertville Road northeast of the site, on Route 9 south of the site, and across the Ware River northwest of the site. Grenville Park, a daytime recreational area, is located across the Ware River west of the site. The site currently consists of an office building, a C&D handling building, and a C&D handling yard.

2.4.1 Baseline Sound Environment

An existing sound level survey was conducted during the daytime and evening hours to characterize the existing baseline acoustical environment near the site both during facility operating hours and during non-operating hours. Short-term and medium-term (for the revised analysis) sound level measurements were performed at four potentially sensitive locations surrounding the site. These measurement locations are depicted in Figure 2-2.

Evening measurements occurred between 4 PM and 6 PM after the facility closes to capture ambient levels after current operating hours. Additional measurements were taken during normal operating daytime hours on four weekdays (additional measurements for revised analysis) and one Saturday to quantify sound levels when the facility is operating under typical conditions. The short-term monitoring intervals were 20 minutes in duration. Medium-term measurements lasted several hours (for the revised analysis). The purpose of the measurements was to:

1. Establish representative A-weighted broadband ambient sound pressure levels,

2. Establish representative octave-band ambient sound pressure levels to identify any existing “pure tones,” as defined by MassDEP, and evaluate whether the addition of modeled sound levels from the proposed Project to these background sound levels may introduce or exacerbate existing “pure tones” in the community, and

3. Quantify the facility’s contribution to the ambient sound level at offsite locations during operating hours.

In addition, multiple up-close reference measurements were taken of specific onsite noise events for modeling purposes.

G:\Projects2\MA\Ware\6336\MXD\Noise_Monitoring_Locations_20211110.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- Noise Monitoring Locations
- Project Site
- Town/City Boundary

Scale 1:7,200
1 inch = 600 feet

0 300 600 Feet

Basemap: 2019 Orthophotography, MassGIS

R1
R2
R3
R4

WARE
WEST BROOKFIELD

Old Gilbertville Road
Upper Church Street
Walter Drive
Gilbertville Road
Highland Street
Highland Village
Church Street
Smith Avenue
Walnut Street
Castle Street
Cottage Street
Grenville Park Road
East Street
Prendville Road
Pine Street
Grove Street
Park Street
Canal Street
Pleasant Street
East Main Street
Cherry Street
West Main Street

32
9

ReSource Ware Transfer Station Town of Ware, Massachusetts

Epsilon Associates Inc.

Figure 2-2
Sound Level Measurement Locations

2.4.1.1 Measurement Locations

The selection of the sound level measurement locations was based upon a review of zoning and land use in the surrounding area. Four measurement locations were selected to sample the baseline noise environment with and without the facility operating. These measurement locations are depicted in Figure 2-2 and described below.

- Location R1 is northeast of the Project near the closest residence on Gilbertville Road. This location is representative of residential receptors northeast of the Project.

- Location R2 is located in the parking lot of Janine's Frostee at 149 East Street (Route 9). This location is south of the Project and is representative of residential receptors south of the Project.

- Location R3 is located near the boat ramp in Grenville Park. This location is west of the Project, across the Ware River. This location is representative of recreational receptors in the park west of the Project.

- Location R4 is located at the edge of a vacant lot on Walter Drive across the Ware River from the Project. This location is representative of residential receptors northwest of the Project.

2.4.2 Measurement Methodology

A comprehensive sound level measurement program was developed to quantify the ambient and operational sound levels at the four measurement locations around the Project. Non-operational sound levels were measured during the week between 4 pm and 6 pm to quantify the current ambient sound levels during the hours that will be impacted by the proposed expansion. Operational levels were also measured both during a typical weekday and a typical Saturday.

Non-operational ambient level measurements were made at the four offsite measurement locations on Thursday, January 27, 2022 4:02 pm to 5:55 pm) while there was no noise producing activity taking place at the facility and on Monday January 30, 2023 (5:00 pm to 6:00 pm) . Operational sound level measurements were made on Tuesday, November 30, 2021 (10:57 a.m. to 11:16 a.m.) and on Saturday, December 4, 2021 (9:10 a.m. to 10:56 a.m.), Monday, January 30, 2023 (11:03 am to 3:40 pm) and on February 14, 2023 (3:02 pm to 3:47 pm

Sound levels were measured at publicly accessible locations at a height of five feet (1.5 meters) above ground level, under low wind conditions, and with dry roadway surfaces. Wind speed, temperature, and humidity measurements were made with Kestrel 3000 Pocket Weather Meters, which are equipped with a wind speed impeller, temperature thermistor, and humidity sensor. Unofficial observations about meteorology or land use in the community were made solely to characterize the existing sound levels in the area and to estimate the noise sensitivity at properties near the Project.

2.4.3 Measurement Equipment

2.4.3.1 Sound Level Equipment

Larson Davis Model 831 sound level meters equipped with a PCB PRM831 preamplifiers, PCB 377C20 half-inch microphones, and manufacturer-provided windscreens were used to collect sound pressure level data. Measurement equipment was calibrated in the field before and after the surveys with Larson Davis CAL200 acoustical calibrators which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984.

Statistical descriptors (e.g., L_{eq}, L_{90}, etc.) were measured for each 20-minute sampling period, with octave-band sound levels corresponding to the same data set processed for the broadband levels.

All sound monitoring instrumentation met the "Type 1 - Precision" requirements set forth in ANSI S1.4-1983 as specified in the ANSI S12.18-1994 methodology as well as those in ANSI S1.11-2004 (octave filter standard) for acoustical measuring devices.

2.4.3.2 Meteorological Equipment

Wind speed can have a strong influence on ambient sound levels. To understand how the existing sound levels are influenced by wind speed, continuous wind speed data were recorded near the onsite sound level monitor. An ATMOS 41 (manufactured by The Meter Group) was used to continuously measure the wind speed, wind direction, and any local precipitation. The wind sensor was mounted at a height of approximately six feet above ground level and data was logged every 10-minutes to be synced with the sound level measurements. The ATMOS 41 sensor has a measurement range of 0 to 30 m/s (67 mph) and an accuracy of ±0.3 m/s (0.7 mph).

2.4.4 Baseline Ambient Sound Levels

The ambient sound level environment consists primarily of vehicle traffic from traffic on Route 9 and other roadways, pedestrians at the park, rustling vegetation, occasional aircraft, and birds. Some facility noise was audible at all measurement locations during operating hours.

2.4.5 Establishment of Existing Sound Levels

To support an evaluation of the change in sound levels associated with increased weekday operating hours, the measured short-duration sound levels taken at the four measurement locations were used to establish the existing sound levels both with and without the facility operating. Existing sound levels with no current facility operations are shown in Table 2-1. Measurements were taken on a weekday between 4 pm and 6 pm. New 1 hour long evening measurements were made at Receptors 1 and 2 for the revised analysis as it was found that the previous short-term measurements did not accurately reflect traffic sounds during the worst case 1 hour evening period, especially at Receptor 2 where the last 20 minutes of the hour were during waning traffic conditions. Operational levels are shown during operating hours for both a typical weekday and a typical Saturday.

Table 2-1 Summary of Measured Non-Operational Ambient Sound Levels – January 30, 2023 and January 27, 2022

Loc.	Period	Date	Start Time	L_{eq} (dBA)	L_{90} (dBA)	L_{90} Sound Pressure Level (dB) by Octave-Band Center Frequency (Hz)									
						31.5	63	125	250	500	1000	2000	4000	8000	16000
R1	Evening	01/30/2023	5:00 PM	64	45	47	47	40	38	39	43	36	19	11	12
R2	Evening	01/30/2023	5:00 PM	57	44	48	48	44	38	36	41	35	23	17	15
R3	Evening	01/27/2022	4:02 PM	43	33	47	42	36	31	31	29	17	13	12	14
R4	Evening	01/27/2022	4:39 PM	40	34	46	41	34	32	33	30	18	14	13	14

Note: Sound pressure levels are rounded to the nearest whole decibel.

Weather Conditions:

Date	Temp	RH	Sky	Wind
Monday, January 30, 2023	45°F	72%	Clear	0 – 3 mph
Thursday, January 27, 2022	28°F	33%	Clear	0 – 1 mph

Monitoring Equipment Used:

Equipment	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	4373, 4374, 3752
Microphone	Larson Davis	377B20	165061, 319397, 165015
Preamp	Larson Davis	PRM831	046514, 046515, 029564
Calibrator	Larson Davis	Cal200	7146

Table 2-2 Summary of Measured Operational Ambient Sound Levels – November 30, 2021 (Weekday), December 4, 2021 (Saturday) , January 30, 2023 (Weekday)

Loc.	Period	Date	Start Time	L_{eq} (dBA)	L_{90} (dBA)	L_{90} Sound Pressure Level (dB) by Octave-Band Center Frequency (Hz)									
						31.5	63	125	250	500	1000	2000	4000	8000	16000
R1	Weekday	11/30/2021	8:57 AM	61	44	48	47	44	39	38	41	34	21	15	13
R2	Weekday	11/30/2021	9:28 AM	53	43	49	48	47	41	37	39	33	20	13	13
R3	Weekday	11/30/2021	10:18 AM	39	36	49	47	38	32	31	31	22	19	16	14
R4	Weekday	11/30/2021	10:56 AM	46	39	52	47	41	37	35	34	25	17	13	13
R1	Saturday	12/04/2021	10:11 AM	63	48	52	55	46	41	41	45	40	27	19	14
R2	Saturday	12/04/2021	10:36 AM	55	46	51	51	47	42	39	43	35	22	14	13
R3	Saturday	12/04/2021	9:10 AM	40	36	49	46	41	35	33	32	21	14	13	13
R4	Saturday	12/04/2021	9:42 AM	45	36	48	45	40	35	33	31	20	14	12	13
Loc.	**Period**	**Date**	**Start Time**	**L_{eq} (dBA)**	**L_{90} (dBA)**	**L_{eq} Sound Pressure Level (dB) by Octave-Band Center Frequency (Hz)**									
						31.5	63	125	250	500	1000	2000	4000	8000	16000
Apron Edge	Weekday	01/30/2023	2:00 PM	64	49	66	72	66	65	61	60	56	51	44	41

Note: Sound pressure levels are rounded to the nearest whole decibel.

Weather Conditions:

Date	Temp	RH	Sky	Wind
Tuesday, November 30, 2021	33°F	47%	Clear	0 mph
Saturday, December 4, 2021	41°F	48%	Partly Cloudy	0 – 1 mph
Monday, January 30, 2023	45°F	72%	Clear	0 – 3 mph

Monitoring Equipment Used:

	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	4373, 4375
Microphone	Larson Davis	377C20	165061, 165757
Preamp	Larson Davis	PRM831	046514, 046516
Calibrator	Larson Davis	Cal200	13675, 7146

Measurements taken onsite during operating hours on January 30, 2023 and February 14, 2023 were used to calibrate the sound model to the current conditions. The model includes sound originating at the façades of the C&D handling building at the locations of the open roll-up doors and over the area of the apron in which trucks, loaders, and other mobile sources operate outside the building. The sound power level used to model the existing conditions are shown in Table 2-3. This sound power level includes multiple sources that were operating during the measurement period used to calibrate the sound model including trucks, loading equipment, and backup alarms. The model was calibrated using the hourly average sound pressure level measured at the edge of the apron between 2:00 pm and 3:00 pm on January 30, 2023, which is shown in Table 2-2. The facility sound power level was adjusted such that a calibration receptor included in the model at the measurement location at the apron edge shows a sound pressure level of 64 dBA, equivalent to the measured sound pressure level during operations. The model calibration resulted in the sound power levels shown in Table 2-3.

Table 2-3 Model Input Sound Power Levels per Noise Source – Existing Condition

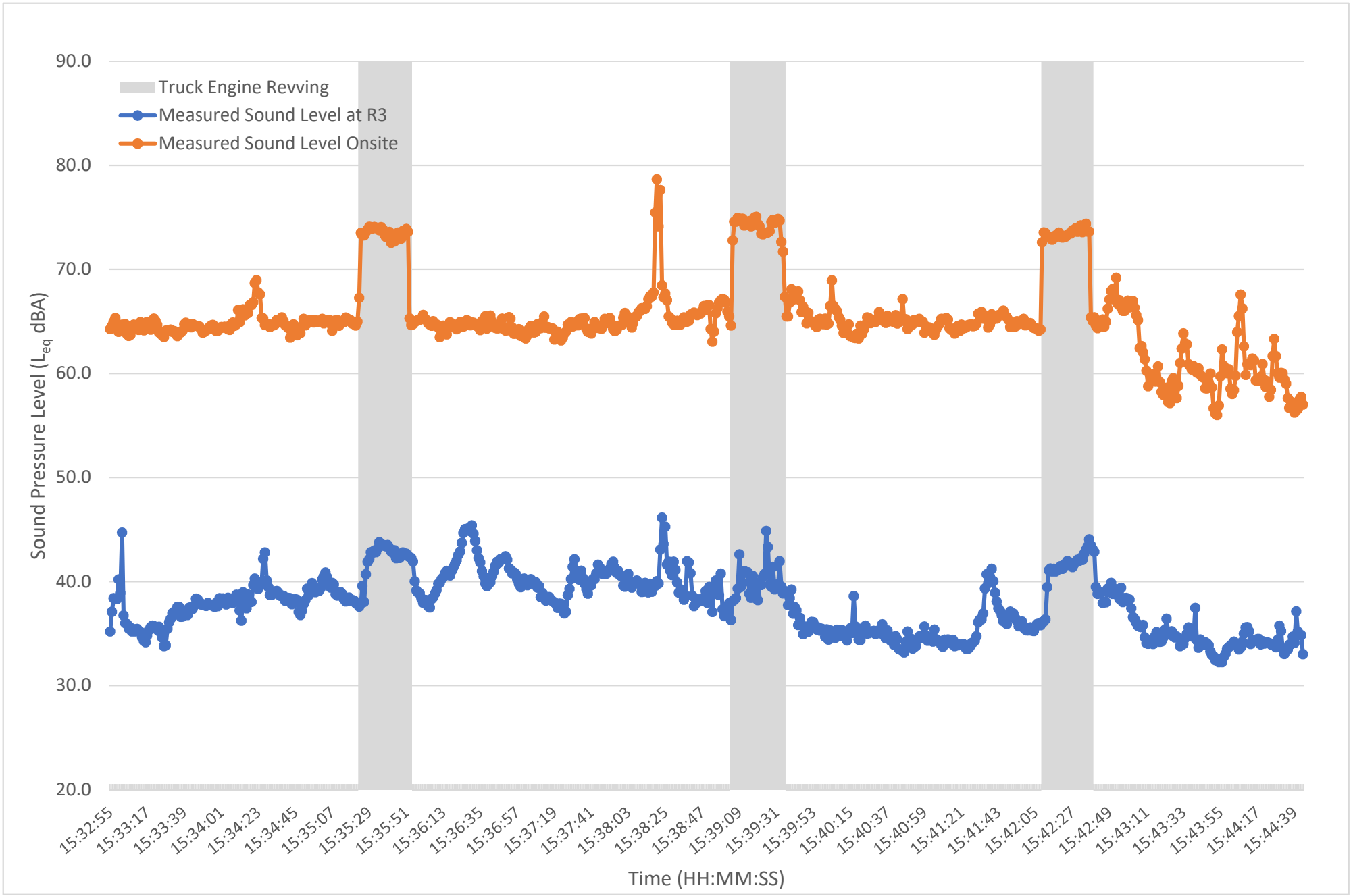
Noise Source	Quantity	Sound Power Level (L_w) at Octave-Band Center Frequency (Hz)									Broad band (dBA)
		31.5	63	125	250	500	1k	2k	4k	8k	
Open Loading Bays	5[1]	100	101	97	97	95	93	88	85	76	98
Apron Mobile Sources	1[2]	107	108	104	104	102	100	95	92	83	105
Total Facility Sound Power		110	111	107	107	105	103	98	95	86	108

[1] The model includes 3 open roll-up doors for truck access on the south side of the C&D handling building and 2 rail access roll-up doors, 1 on the north side and 1 on the south side.

[2] No more than 1 truck was actively unloading during the model calibration measurements. A grapple and loader were also in operation during the majority of the measurement period.

Sound pressure level measurements made at the apron edge near the railroad crossing are graphed in Figure 2-3. These show the predominance of the transfer trailer truck revving and the corresponding levels measured at Receptor 3, offsite.

Figure 2-3: Sound Pressure Level Correlation Between Onsite and R3 During Truck Unloading, February 14, 2023



2.5 Modeled Future Sound Source Levels

The proposed changes to the facility include increasing the footprint of the C&D handling building to the south. The southern façade of the building addition will include four roll-up doors to allow trucks to access the tipping floor (an addition of one door compared to current conditions).

Modeled sources are broken into two types – continuous and intermittent. Continuous sources represent the primary sources of sound from tipping and moving of C&D material, railcar loading, loader and excavator operations, and truck engine noise (including truck engine noise driving the hydraulics for walking floor unloading on transfer trailers which was found to be the predominate source of noise from the building, and simultaneous unloading operation of 3 trailers was modeled as the worst case). Intermittent noise sources represent sounds from mobile sources that do not occur continuously when the facility is operating such as backup alarms, railcar coupling, idling locomotives, and any sound emanating from the roll-up door on the west side of the building during the brief periods when it is open.

Reference sound level data used in the noise model consists of sound level measurements taken at the site and measurements of similar facilities or equipment.

2.5.1 Continuous Noise Sources

Continuous sources represent stationary sources that are functioning the majority of the time that the facility is operational. The continuous sources that were input into the noise model are described individually below. Since most of the noise generating activity takes place inside the C&D handling building or directly in front of the roll-up doors, continuous source sound levels were modeled at the roll-up door openings. The sound coming from the open bay doors was based on measurements taken of site activity during operations. For the future case, the backup alarm noise was removed by excluding any sound energy in the 1250 Hz third octave band. The model inputs associated with these sources are shown in Table 2-4 below. The locations of the continuous noise sources are shown in Figure 2-4.

1. Building Bay Doors – The model includes four open 18 by 28 foot roll-up doors on the south side of the C&D handling building. These roll-up doors are input into the model as vertical area sources to represent sound being emitted through the openings. These doorways represent the source of the sounds from a front-end loader and excavator (C&D tipping/pushing/moving) that is occurring inside the building on the tipping floor. The sound levels associated with this source are based on actual measurements performed by Epsilon staff at the facility.

2. Railcar Loading Bay Doors– The model includes two open 16 by 28 foot railcar loading bays on the southeast and northeast sides of the C&D handling building. This source is modeled as a vertical area source to represent sound being emitted through the opening. The same sound level source data for the Building Roll-Up Doors based on actual measurements was used to represent the sound of railcar loading.

G:\Projects2\MA\Ware\6336\MXD\Fig_2-3_Source_and_Receptor_Locations_8x11_20230322.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

ReSource Ware C&D Handling Facility Town of Ware, Massachusetts

Epsilon Associates Inc.

Figure 2-4

Sound Modeling - Sound Source Locations

3. Apron Mobile Sources – The model includes sound from three transfer trailers unloading including the predominant sound of the engines revving to operate the walking floor hydraulics.

Table 2-4 Model Input Sound Power Levels per Noise Source – Future Condition (Stage 2)

Noise Source	Quantity	Octave-Band Center Frequency (Hz)									Broadband (dBA)
		31.5	63	125	250	500	1k	2k	4k	8k	
Open Loading Bays	6	104	105	101	101	99	97	92	89	80	102
Apron Mobile Sources	3	112	113	109	108	107	105	100	97	88	109
Total Facility Sound Power		115	116	112	112	110	108	103	100	91	112[2]

[1] The model includes 4 open roll-up doors for truck access on the south side of the C&D handling building and 2 rail access roll-up doors, 1 on the north side and 1 on the south side as shown in Figure 2-4.
[2] The total facility sound power level was increased by 4.8 dB which is equivalent to tripling the number of sources present.

2.5.2 Intermittent Noise Sources

Intermittent noise sources represent sounds from mobile sources that do not occur continuously when the facility is operating such as backup alarms, railcar coupling, and idling locomotives. These noise sources are federally regulated by the Occupational Safety and Health Administration (OSHA) (backup beepers) and the U.S. Environmental Protection Agency (USEPA) (railcar coupling and idling locomotives). Federal laws and regulations4 preempt state and local government regulation of these sources, however, these sources were modeled to fully describe the existing and proposed operations.

Continuous sources are steady or relatively steady sources of sound, and the public will experience those sounds in toto, that is, as a combined total effect. Cadna/A modeling reflects the combined impact of the continuous sources. For completeness, and to provide through MEPA review meaningful opportunities for public review of the potential environmental impacts of the Project, this assessment evaluates the impacts of intermittent sound. Intermittent sources will have a different character than the continuous sound, and the potential for nuisance is separate.

The intermittent sources that were input into the noise model are described individually below. The model inputs associated with these sources are presented in Table 2-5 below. The location of each intermittent noise source is shown in Figure 2-4.

1. Backup Alarm – Truck backup alarm operating in the center of the C&D handling yard.

4 Federal law preempts state and local governments from regulating the sound of trucks making deliveries to a commercial site under the Noise Control Act of 1972 and the Surface Transportation Assistance Act of 1982. USEPA regulates railroad emissions in standards published at 40 CFR 201: Noise Emission Standards for Transportation Equipment: Interstate Rail Carriers.

2. Idling Locomotive – Idling locomotive located along the railroad tracks southwest of the C&D handling building. There are many locations along the tracks where the locomotive may sit while coupling and uncoupling railcars. Of all the potential locations for the locomotive, the location shown in Figure 2-4 resulted in the highest impacts at Receptor 2. Although moving the source farther north on the tracks would result in a higher sound level at Receptor 1, the higher ambient sound level at Receptor 1 reduces the overall sound impacts. Therefore, the selected locomotive modeling location represents the worst-case condition for locomotive noise.

3. Railcar Coupling – This source represents railcar coupling, assumed to be occurring at the eastern-most rail spur. The sound level of railcar coupling was based upon the day/night (DNL) sound level of railcar coupling at 200 ft.

4. West Roll-Up Door – A new 18' x 28' roll-up door is planned for the west side of the C&D building for delivery of C&D fines. The door will be opened only for brief periods to accommodate deliveries and will otherwise be closed.

Table 2-5 Model Input Sound Power Levels per Noise Source

Noise Source	Frequency (Hz)	Broadband (dBA)
Backup Alarm[1]	1,000	109
Idling Locomotive[2]	125	107
Railcar Coupling[2]	2,500	95
West Roll-Up Door[3]	Broadband[4]	102

[1] From field measurements collected by Epsilon.
[2] Based on the day/night (DNL) sound level at 200 ft derived from *Surface Transportation Board, Norfolk Southern Railway Company, Pan Am Railways, Inc., et al.—Joint Control and Operating/Pooling Agreements—Pan Am Southern, LLC In NY, NH, VT, MA and CT, Appendix D, November 2008.*
[3] Based on field measurements collected by Epsilon, see Section 2.5.1
[4] The open roll-up door frequency spectrum is shown in Table 2-4.

2.6 Modeling Methodology

The noise impacts associated with the proposed Project were predicted using the Cadna/A noise calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation). The benefits of this software are a refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The Cadna/A software allows for frequency-based octave-band calculation of sound from multiple sources.

Inputs and significant parameters employed in the model are described below:

- Site Plan: The Project Site Plan provided the locations and dimensions of key inputs into the model such as site building, and rail spur locations.

- Modeling Locations: Sound level modeling was conducted at four sensitive receptors, R1 through R4. These are the same four locations where measurements were taken to establish existing sound levels. The locations are shown in Figure 2-2. All receptors were modeled with a height of 5 feet above ground level (AGL) to mimic the ears of a typical standing observer.

- Terrain Elevation: Elevation contours for the modeling domain were directly imported into Cadna/A which allowed for consideration of terrain shielding where appropriate. The terrain height contours for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.

- Source Sound Levels: Broadband and octave-band sound power levels (when available) for the potential noise sources for the Project presented in Table 2-4 and Table 2-5 were input in the model.

- Ground Attenuation: Spectral ground absorption was calculated using a G-factor of 0 for bodies of water, which corresponds to acoustically reflective surfaces, and a G-factor of 0.5 for the facility apron for the revised analysis. For all other areas of the revised analysis, a G-factor of 0.8 was used which corresponds to soft ground.

- Foliage: Foliage was included northwest of the facility apron and ABC area up to the Ware River. This was done to calibrate the model to sound levels measured in Grenville Park at Receptor 3.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by the user, were implemented in the Cadna/A model to ensure conservative results (i.e., higher sound levels), and are described below:

- As per ISO 9613-2, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night, or equivalently downwind propagation.

- Meteorological conditions assumed in the model (T=10°C and RH=70%) were selected to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave-bands where the human ear is most sensitive.

- No additional attenuation due to tree shielding, air turbulence, or wind shadow effects was considered in the model. For the revised analysis, tree shielding was added in one area as described above.

Figure 2-4 shows the modeled location of the equipment for both the continuous and the intermittent noise model runs.

2.7 Sound Level Modeling Results

The resulting sound levels from the Project's sources were exported from the Cadna/A model. The results are split up into two segments. The first segment is the continuous sources which were all modeled cumulatively. The resulting project only sound levels are documented in Table 2-6 below. The second segment of the modeling results are the modeled sound levels at each receptor for the intermittent noise sources. These model outputs are documented in Table 2-7 below. The results from the model are evaluated against ambient sound levels and the MassDEP Noise Policy in Section 2.8 below.

Table 2-6 Cadna/A Model Output Sound Levels for Continuous Sources

Receptor	Project Only Continuous Source Sound Pressure Level (dBA L_{eq})
R1	37
R2	49
R3	42
R4	42

Table 2-7 Cadna/A Model Output Sound Levels for Intermittent Sources

Receptor	Project Only Intermittent Source Sound Pressure Levels (dBA L_{eq})			
	Idling Locomotive	Equipment Backup Alarms	Railcar Coupling	West Roll-Up Door
R1	41	26	33	25
R2	45	46	39	22
R3	35	40	33	33
R4	39	43	20	34

2.8 Evaluation of Sound Levels

According to the MassDEP Noise Policy, a source of sound will be considered to be violating the noise regulation at 310 CMR 7.10 if the source increases the broadband sound level by more than 10 dBA above ambient. In addition to limiting the increase in the ambient sound level, the Noise Policy prohibits "pure tone" conditions where the sound pressure level in one octave band frequency is at least 3 dB greater than the sound levels in each of two adjacent frequency bands. The compliance analysis for the noise sources is presented for Continuous Sources and Intermittent Sources.

2.8.1 Broadband Analysis – Continuous Sources

For the continuous sources, the modeled Project Only sound levels provided in Table 2-6 above are added to the measured non-operational ambient sound levels to calculate the total future sound levels. The future sound levels are compared to the non-operational ambient sound level to document that the increase is at or below 10 dB. It is important to note that the sound levels are expressed in decibels which must be added logarithmically. For the purposes of this analysis, the arithmetic average ambient L_{90} sound level measured when the facility was not operating are conservatively used to represent the ambient sound level. Table 2-8 below provides the comparison of the modeled results to the lowest existing ambient sound level.

Table 2-8 Modeled Continuous Sound Pressure Levels Compared to Non-Operational Ambient

Receptor	Project Only Sound Level (dBA)	Ambient L_{90} Sound Level (dBA)	Total Ambient Plus Project (dBA)	Increase over Ambient (dBA)
R1	37	45	46	1
R2	49	44	50	6
R3	42	33	42	9
R4	42	34	43	9

Notes:

1. Only whole numbers are shown; calculations were performed using values with additional precision.
2. The increase over ambient shown represents a conservative estimate of worst-case operations occurring in the new, proposed two hour period between 4 and 6 pm. The increase in existing operations during all other periods will likely be no more than 3 dBA (consistent with a doubling of operations).

2.8.2 Pure Tone Analysis

MassDEP's Noise Policy prohibits "pure tone" conditions where the sound pressure level in one octave band is 3 dB or more than the sound levels in each of the two adjacent octave bands. The logarithmic sum of the non-operational ambient levels and the predicted future levels are shown in Table 2-9.

Table 2-9 Pure Tone Octave Band Analysis

Loc.	Sound Pressure Level (dB) by Octave-Band Center Frequency (Hz)								
	31	63	125	250	500	1000	2000	4000	8000
R1	51	51	44	41	40	43[1]	36	20	11
R2	55	56	50	46	47	47	41	31	17
R3	53	53	43	39	39	39	31	17	12
R4	54	54	44	38	39	40	33	20	13

Notes:

1. There is an apparent pure tone at 1000 Hz at location R1. However, this is due to a tone in the ambient measurement at this location, as shown in Table 2-1, and is not due to facility operations.

2.8.3 Construction Noise

Project construction will primarily consist of concrete work and steel work, with no pile driving. In general, the sound levels from construction activity will be dominated by the loudest piece of equipment operating at the time. Truck traffic activity sound levels will be transitory and limited in nature when equipment is moved throughout the Project Area. Therefore, at any given point within the Project Area, the loudest operating piece of equipment will be the most representative of the expected sound levels in the area. Table 2-10 shows the equipment sound levels for the louder pieces of construction equipment expected to be used at this site. Reference sound source information was obtained from the FHWA's Roadway Construction Noise Model (RCNM). Maximum sound levels from typical equipment that will be used during construction are listed in Table 2-10 at a reference distance of 50 feet. Construction noise is expected to be very similar to operational noise based on the equipment sound levels.

Table 2-10 Reference Sound Levels of Construction Equipment at 50 feet

Equipment	Sound Level at 50 feet [dBA]
Grader (174 hp)	85
Excavator (168 hp)	85
Dump Truck	84
Crane (399 hp)	83
Flatbed Truck	84

2.9 Cumulative Results

The predicted impacts due to intermittent noise sources alone are shown in Table 2-7. Table 2-11 below shows cumulative impacts with both continuous and intermittent sound levels combined.

Table 2-11 Modeled Cumulative Continuous and Intermittent Sound Levels

Receptor	Project Only Cumulative Intermittent and Continuous Source Sound Pressure Levels (dBA L_{eq})			
	Continuous with Idling Locomotive	Continuous with Equipment Backup Alarms	Continuous with Railcar Coupling	Continuous with West Roll-Up Door
R1	42	38	42	37
R2	51	51	51	49
R3	43	44	43	42
R4	44	46	44	43

2.10 Maximum Practicable Mitigation

The proposed Project is designed to avoid noise impacts to noise sensitive areas, and ReSource Ware has evaluated mitigation measures to minimize sound levels to the extent practicable.

In addition to compliance with MassDEP policy, evaluation of all practicable avoidance, minimization, and mitigation is required by MEPA as part of this process/assessment. The project has evaluated such measures. Further controls were considered but not deemed either available or practicable. The current sound impacts are from a cumulative contribution of many sources. Because sound source contributions are added logarithmically and not arithmetically, reducing total sound impacts any further to achieve an overall net reduction would require a significant reduction in the sound impacts of each and every continuous contributing source. Each intermittent sound source has been analyzed individually and the Project has mitigated impacts to the extent practicable.

ReSource Ware provided initial conceptual design elements during the sound assessment process. Initial noise impacts, based on the original project design, were modeled and opportunities were identified to implement a variety of avoidance, minimization, and mitigation measures. ReSource Ware has committed to avoid, minimize and mitigate noise impacts to the maximum extent practicable by taking the following measures:

- Enclosure of operations within a building
- Use of a speed limit to minimize sound from trucking operations
- Retrofit onsite equipment with white noise (broadband) backup alarms

2.10.1 Feasibility of Mitigation Beyond what was Proposed

Options that were determined to be infeasible for additional noise control include the following:

- Changes to the facility orientation or layout could direct sound away from some receptors but would then direct the sound towards other receptors. Other design constraints (including traffic flow and existing structures) prevent any effective noise reductions through layout changes.
- Operating the facility with the roll-up doors closed is infeasible due to the frequency of vehicles visiting the facility.
- Add-on noise control is not generally available for the material handling equipment (front-end loaders and excavators). Add-on control can also create engine performance and air emissions problems (due to back-pressure and overheating). Because overall project sound comes from several different sources (including trucks outside of ReSource Ware's control), retrofits to the material handling equipment would not significantly reduce overall sound levels.
- Sound barriers were evaluated and determined to be infeasible as described below.

Sound barriers are most effective when placed very close to either the noise source or the receiver. Two different hypothetical systems were evaluated by placing 25-foot-tall sound barriers at the facility along the south corner of the yard (facility barrier south) and along the west corner of the yard (facility barrier west) as shown in Figure 2-5. The results of the barrier analysis are shown in Table 2-12.

The facility is at a lower elevation than the residences on East Ware Street, so the south facility barrier will have a very minor impact on the sound levels at the East Ware Street residences. The west facility barrier will have a slightly greater impact on the receptors west of the facility.

Table 2-12 Modeled Sound Reduction from Hypothetical Barriers

Receptor	Project Only Sound Level with No Barriers (dBA)	Facility Barrier South		Facility Barrier West	
		Sound Level (dBA)	Reduction (dBA)	Sound Level (dBA)	Reduction (dBA)
R1	37	33	0	37	0
R2	49	44	0	49	0
R3	42	38	0	38	4
R4	42	31	0	37	5

As shown in Table 2-12, onsite barriers provide essentially no benefit. ReSource Ware is not able to install a barrier at location R2 as that is on property outside ReSource Ware's control. The barrier would also only provide benefit for a limited number of receptors, and would create its own impacts (visibility, site access, and possibly installation issues including zoning issues).

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

ReSource Ware C&D Handling Facility Town of Ware, Massachusetts

Epsilon Associates Inc.

Figure 2-5

Hypothetical Facility Barrier Location

2.11 Conclusions

A comprehensive sound level modeling assessment was conducted for the ReSource Ware Project. In addition, operational and non-operational ambient sound levels were measured to characterize the existing background sound levels within the area. Results of the comprehensive sound level assessment demonstrate that sound levels from the Project with the sound mitigation measures described in this report will meet the requirements set forth in the MassDEP Noise Policy at residential locations, and that the Project will not cause a condition of noise pollution. In addition, the Project will meet the daytime sound level limit of 70 dBA set forth in the Town of Ware Zoning Bylaw at the facility property line during operating hours.

Sound pressure levels due to the operation of all stationary equipment operating simultaneously were predicted at the four sound level modeling locations. All of the future predicted total sound levels documented in Table 2-8 above show compliance with the MassDEP Noise Policy which restricts the increase over ambient sound levels to 10 dBA. In addition, operations from the Facility will not create any "pure tones". Throughout the analysis, the facility has documented that sound impacts will be avoided, minimized, and mitigated to the extent feasible.

APPENDIX J

SEMITRAILER QUEUING TABLES

APPENDIX J
TABLE J-1

ESTIMATED SEMITRAILER QUEUING AT C&D BUILDING FOR 750 TPD CAPACITY
TWO ROLL-UP DOORS AVAILABLE TO ACCESS TIPPING FLOOR
HOURS OF OPERATION: 7:00 AM to 4:00 PM

Total Semitrailers Per Hour	Time Interval	Semitrailers Arriving in Time Interval	Semitrailers in Queue from Prior Interval	Number of Semitrailers in Tip Floor Bay #2 (DOOR #2 - See Figure 8A)	Number of Semitrailers in Tip Floor Bay #3 (DOOR #3 - See Figure 8A)	PEAK SEMITRAILERS IN QUEUE (Trucks in Queue Outside of Building by End of Time Interval)	Semitrailers Departing Tipping Floor at End of Time Interval
2	0:00:00 0:15:00	1	0	1	0	**0**	1
	0:15:00 0:30:00	0	0	0	0	**0**	0
	0:30:00 0:45:00	1	0	1	0	**0**	1
	0:45:00 1:00:00	0	0	0	0	**0**	0
2	1:00:00 1:15:00	0	0	0	0	**0**	0
	1:15:00 1:30:00	1	0	1	0	**0**	1
	1:30:00 1:45:00	0	0	0	0	**0**	0
	1:45:00 2:00:00	1	0	1	0	**0**	1
6	2:00:00 2:15:00	2	0	1	1	**0**	2
	2:15:00 2:30:00	0	0	0	0	**0**	0
	2:30:00 2:45:00	3	0	1	1	**1**	2
	2:45:00 3:00:00	1	1	1	1	**0**	2
2	3:00:00 3:15:00	1	0	1	0	**0**	1
	3:15:00 3:30:00	0	0	0	0	**0**	0
	3:30:00 3:45:00	0	0	0	0	**0**	0
	3:45:00 4:00:00	1	0	1	0	**0**	1
1	4:00:00 4:15:00	0	0	0	0	**0**	0
	4:15:00 4:30:00	0	0	0	0	**0**	0
	4:30:00 4:45:00	0	0	0	0	**0**	0
	4:45:00 5:00:00	1	0	1	0	**0**	1
6	5:00:00 5:15:00	2	0	1	1	**0**	2
	5:15:00 5:30:00	1	0	1	0	**0**	1
	5:30:00 5:45:00	2	0	1	1	**0**	2
	5:45:00 6:00:00	1	0	1	0	**0**	1
1	6:00:00 6:15:00	1	0	1	0	**0**	1
	6:15:00 6:30:00	0	0	0	0	**0**	0
	6:30:00 6:45:00	0	0	0	0	**0**	0
	6:45:00 7:00:00	0	0	0	0	**0**	0
1	7:00:00 7:15:00	0	0	0	0	**0**	0
	7:15:00 7:30:00	0	0	0	0	**0**	0
	7:30:00 7:45:00	0	0	0	0	**0**	0
	7:45:00 8:00:00	1	0	1	0	**0**	1
2	8:00:00 8:15:00	1	0	1	0	**0**	1
	8:15:00 8:30:00	0	0	0	0	**0**	0
	8:30:00 8:45:00	0	0	0	0	**0**	0
	8:45:00 9:00:00	1	0	1	0	**0**	1
					Maximum Estimated Semitrailer Queue:	**1**	

Hours of Operation	9	hrs (7 AM to 4 PM)
Maximum Operating Capacity	750	TPD
From VAI April 2023 Transportation Impact Assessment (Table 4):		
VAI estimated Weekday Daily Trucks Entering	60	trucks entering/day
VAI Peak Hourly Entering AM	15	trucks entering/hr
VAI Peak Hourly Entering PM	15	trucks entering/hr
Remaining Daily Trucks Entering, Off-Peak Hours	30	trucks entering over remaining 7 hrs of day

Distribution of Semitrailers vs Smaller Trucks:

	Semitrailers	Small Trucks	Total Vehicles
Peak Hourly Entering AM	6	9	15
Peak Hourly Entering PM	6	9	15
Remaining Daily Trucks Entering, Off-Peak Hours	12	18	30
Total Semitrailers at Building, for Queuing Estimate	**24**	36	60

Semitrailer Arrival Rate Per Hour:

Peak	6	Semitrailers/hour
	1.5	Semitrailers/15 minute interval
Off-Peak	1.7	Semitrailers/hour (12 semitrailers over 7 hr off-peak period)
	0.4	Semitrailers/15 minute interval

Semitrailer Unload Time - Conservative Estimate for Walking Floor Unload and Depart Building (Based on SHA Observations): 15 Minutes

APPENDIX J
TABLE J-2

ESTIMATED SEMITRAILER QUEUING AT C&D BUILDING FOR 1,125 TPD CAPACITY
THREE ROLL-UP DOORS AVAILABLE TO ACCESS TIPPING FLOOR
HOURS OF OPERATION: 7:00 AM to 6:00 PM

Total Semitrailers Per Hour	Time Interval	Semitrailers Arriving in Time Interval	Semitrailers in Queue from Prior Interval	Number of Semitrailers in Tip Floor Bay #2 (DOOR #2 - See Figure 8C)	Number of Semitrailers in Tip Floor Bay #3 (DOOR #3 - See Figure 8C)	Number of Semitrailers in Tip Floor Bay #4 (DOOR #4 - See Figure 8C)	PEAK SEMITRAILERS IN QUEUE (Trucks in Queue Outside of Building by End of Time Interval)	Semitrailers Departing Tipping Floor at End of Time Interval
1	0:00:00 0:15:00	0	0	0	0	0	**0**	0
	0:15:00 0:30:00	0	0	0	0	0	**0**	0
	0:30:00 0:45:00	1	0	1	0	0	**0**	1
	0:45:00 1:00:00	0	0	0	0	0	**0**	0
1	1:00:00 1:15:00	0	0	0	0	0	**0**	0
	1:15:00 1:30:00	1	0	1	0	0	**0**	1
	1:30:00 1:45:00	0	0	0	0	0	**0**	0
	1:45:00 2:00:00	0	0	0	0	0	**0**	0
13	2:00:00 2:15:00	4	0	1	1	1	**1**	3
	2:15:00 2:30:00	3	1	1	1	1	**1**	3
	2:30:00 2:45:00	3	1	1	1	1	**1**	3
	2:45:00 3:00:00	3	1	1	1	1	**1**	3
2	3:00:00 3:15:00	2	1	1	1	1	**0**	3
	3:15:00 3:30:00	0	0	0	0	0	**0**	0
	3:30:00 3:45:00	0	0	0	0	0	**0**	0
	3:45:00 4:00:00	0	0	0	0	0	**0**	0
2	4:00:00 4:15:00	1	0	1	0	0	**0**	1
	4:15:00 4:30:00	0	0	0	0	0	**0**	0
	4:30:00 4:45:00	0	0	0	0	0	**0**	0
	4:45:00 5:00:00	1	0	1	0	0	**0**	1
2	5:00:00 5:15:00	2	0	1	1	0	**0**	2
	5:15:00 5:30:00	0	0	0	0	0	**0**	0
	5:30:00 5:45:00	0	0	0	0	0	**0**	0
	5:45:00 6:00:00	0	0	0	0	0	**0**	0
2	6:00:00 6:15:00	1	0	1	0	0	**0**	1
	6:15:00 6:30:00	0	0	0	0	0	**0**	0
	6:30:00 6:45:00	1	0	1	0	0	**0**	1
	6:45:00 7:00:00	0	0	0	0	0	**0**	0
13	7:00:00 7:15:00	3	0	1	1	1	**0**	3
	7:15:00 7:30:00	3	0	1	1	1	**0**	3
	7:30:00 7:45:00	3	0	1	1	1	**0**	3
	7:45:00 8:00:00	4	0	1	1	1	**1**	3
2	8:00:00 8:15:00	1	1	1	1	0	**0**	2
	8:15:00 8:30:00	1	0	1	0	0	**0**	1
	8:30:00 8:45:00	0	0	0	0	0	**0**	0
	8:45:00 9:00:00	0	0	0	0	0	**0**	0
1	9:00:00 9:15:00	0	0	0	0	0	**0**	0
	9:15:00 9:30:00	0	0	0	0	0	**0**	0
	9:30:00 9:45:00	1	0	1	0	0	**0**	1
	9:45:00 10:00:00	0	0	0	0	0	**0**	0
2	10:00:00 10:15:00	1	0	1	0	0	**0**	1
	10:15:00 10:30:00	0	0	0	0	0	**0**	0
	10:30:00 10:45:00	0	0	0	0	0	**0**	0
	10:45:00 11:00:00	1	0	1	0	0	**0**	1
						Maximum Estimated Semitrailer Queue:	**1**	

Hours of Operation	11	hrs (7 AM to 6 PM)
Maximum Operating Capacity	1125	TPD; 80% of 1,400 TPD Max
From VAI April 2023 Transportation Impact Assessment (Table 5, 1,400 TPD) ADJUSTED TO 80% for 1,125 TPD:		
VAI estimated Weekday Daily Trucks Entering	72	trucks entering/day
VAI Peak Hourly Entering AM	18	trucks entering/hr
VAI Peak Hourly Entering PM	18	trucks entering/hr
Remaining Daily Trucks Entering, Off-Peak Hours	36	trucks entering over remaining 9 hrs of day

Distribution of Semitrailers vs Smaller Trucks:

	Semitrailers	Small Trucks	Total Vehicles
Peak Hourly Entering AM	13	5	18
Peak Hourly Entering PM	13	5	18
Remaining Daily Trucks Entering, Off-Peak Hours	12	24	36
Total Semitrailers at Building, for Queuing Estimate	**38**	34	72

Semitrailer Arrival Rate Per Hour:

Peak	13	Semitrailers/hour
	3.25	Semitrailers/15 minute interval
Off-Peak	1.3	Semitrailers/hour (12 semi's over 9 hr off-peak period)
	0.3	Semitrailers/15 minute interval

Semitrailer Unload Time - Conservative Estimate for Walking Floor Unload and Depart Building (Based on SHA Observations): 15 Minutes

APPENDIX J
TABLE J-3

ESTIMATED SEMITRAILER QUEUING AT C&D BUILDING FOR 1,400 TPD CAPACITY
THREE ROLL-UP DOORS AVAILABLE TO ACCESS TIPPING FLOOR
HOURS OF OPERATION: 7:00 AM to 6:00 PM

Total Semitrailers Per Hour	Time Interval	Semitrailers Arriving in Time Interval	Semitrailers in Queue from Prior Interval	Number of Semitrailers in Tip Floor Bay #2 (DOOR #2 - See Figure 8C)	Number of Semitrailers in Tip Floor Bay #3 (DOOR #3 - See Figure 8C)	Number of Semitrailers in Tip Floor Bay #4 (DOOR #4 - See Figure 8C)	PEAK SEMITRAILERS IN QUEUE (Trucks in Queue Outside of Building by End of Time Interval)	Semitrailers Departing Tipping Floor at End of Time Interval
2	0:00:00 0:15:00	0	0	0	0	0	**0**	0
	0:15:00 0:30:00	0	0	0	0	0	**0**	0
	0:30:00 0:45:00	1	0	1	0	0	**0**	1
	0:45:00 1:00:00	1	0	1	0	0	**0**	1
2	1:00:00 1:15:00	0	0	0	0	0	**0**	0
	1:15:00 1:30:00	1	0	1	0	0	**0**	1
	1:30:00 1:45:00	0	0	0	0	0	**0**	0
	1:45:00 2:00:00	1	0	1	0	0	**0**	1
16	2:00:00 2:15:00	4	0	1	1	1	**1**	3
	2:15:00 2:30:00	4	1	1	1	1	**2**	3
	2:30:00 2:45:00	4	2	1	1	1	**3**	3
	2:45:00 3:00:00	4	3	1	1	1	**4**	3
2	3:00:00 3:15:00	2	4	1	1	1	**3**	3
	3:15:00 3:30:00	0	3	1	1	1	**0**	3
	3:30:00 3:45:00	0	0	0	0	0	**0**	0
	3:45:00 4:00:00	0	0	0	0	0	**0**	0
2	4:00:00 4:15:00	1	0	1	0	0	**0**	1
	4:15:00 4:30:00	0	0	0	0	0	**0**	0
	4:30:00 4:45:00	0	0	0	0	0	**0**	0
	4:45:00 5:00:00	1	0	1	0	0	**0**	1
2	5:00:00 5:15:00	2	0	1	1	0	**0**	2
	5:15:00 5:30:00	0	0	0	0	0	**0**	0
	5:30:00 5:45:00	0	0	0	0	0	**0**	0
	5:45:00 6:00:00	0	0	0	0	0	**0**	0
1	6:00:00 6:15:00	0	0	0	0	0	**0**	0
	6:15:00 6:30:00	0	0	0	0	0	**0**	0
	6:30:00 6:45:00	1	0	1	0	0	**0**	1
	6:45:00 7:00:00	0	0	0	0	0	**0**	0
16	7:00:00 7:15:00	4	0	1	1	1	**1**	3
	7:15:00 7:30:00	4	1	1	1	1	**2**	3
	7:30:00 7:45:00	4	2	1	1	1	**3**	3
	7:45:00 8:00:00	4	3	1	1	1	**4**	3
1	8:00:00 8:15:00	0	4	1	1	1	**1**	3
	8:15:00 8:30:00	1	1	1	1	0	**0**	2
	8:30:00 8:45:00	0	0	0	0	0	**0**	0
	8:45:00 9:00:00	0	0	0	0	0	**0**	0
1	9:00:00 9:15:00	0	0	0	0	0	**0**	0
	9:15:00 9:30:00	0	0	0	0	0	**0**	0
	9:30:00 9:45:00	1	0	1	0	0	**0**	1
	9:45:00 10:00:00	0	0	0	0	0	**0**	0
2	10:00:00 10:15:00	0	0	0	0	0	**0**	0
	10:15:00 10:30:00	1	0	1	0	0	**0**	1
	10:30:00 10:45:00	0	0	0	0	0	**0**	0
	10:45:00 11:00:00	1	0	1	0	0	**0**	1
						Maximum Estimated Semitrailer Queue:	**4**	

Hours of Operation	11	hrs (7 AM to 6 PM)
Maximum Operating Capacity	1400	TPD
From VAI April 2023 Transportation Impact Assessment (Table 5):		
VAI estimated Weekday Daily Trucks Entering	89	trucks entering/day
VAI Peak Hourly Entering AM	22	trucks entering/hr
VAI Peak Hourly Entering PM	22	trucks entering/hr
Remaining Daily Trucks Entering, Off-Peak Hours	45	trucks entering over remaining 9 hrs of day

Distribution of Semitrailers vs Smaller Trucks:

	Semitrailers	Small Trucks	Total Vehicles
Peak Hourly Entering AM	16	6	22
Peak Hourly Entering PM	16	6	22
Remaining Daily Trucks Entering, Off-Peak Hours	15	30	45
Total Semitrailers at Building, for Queuing Estimate	**47**	42	89

Semitrailer Arrival Rate Per Hour:

Peak	16	Semitrailers/hour
	4	Semitrailers/15 minute interval
Off-Peak	1.7	Semitrailers/hour (15 semitrailers over 9 hr off-peak period)
	0.4	Semitrailers/15 minute interval

Semitrailer Unload Time - Conservative Estimate for Walking Floor Unload and Depart Building (Based on SHA Observations): 15 Minutes