ALLEN ENGINEERING
& ASSOCIATES, INC.

ENVIRONENTAL NOTIFICATION FORM

For

Gas Station Development

1603 &1605 Main Street (Route 9)
In
Leicester, Massachusetts

Submitted to:
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Prepared For:
Skaff Petroleum, Inc.
344 Grafton Street
Worcester, MA 01604

Prepared By:
Allen Engineering & Associates, Inc.
One Charlesview Road, Suite 2
Hopedale, MA 01747
and:
Ron Muller & Associates
56 Teresa Road
Hopkinton, MA 01748

June 1, 2021

ALLEN ENGINEERING
& ASSOCIATES, INC.

Civil Engineers, Surveyors &
Land Development Consultants

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June 1, 2021

Secretary Kathleen A. Theoharides
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: **Environmental Notification Form**
GAS STATION DEVELOPMENT
1603 & 1605 Main Street (Route 9)
Leicester, Massachusetts

Dear Secretary Theoharides:

On behalf of Skaff Petroleum, Inc. (the "Proponent"), Allen Engineering & Associates, Inc. is submitting the enclosed Environmental Notification Form for a commercial development consisting of a 10-vehicle position gas station with a 5,000 square foot convenience store/fast food restaurant with a drive-thru window (the "Project"). The ENF is required because the Project exceeds the ENF Transportation threshold of 2,000 or more average daily trips in conjunction with a Highway Access Permit from the Massachusetts Department of Transportation. No mandatory EIR thresholds apply to the Project.

Included in the ENF is a circulation list in accordance 301 CMR 11.16. Copies of the ENF have been distributed according and additional copies can be obtained by contacting Mark E. Allen by telephone at 508 381-3212 or by email at mark@allen-ea.com.

Kindly notice the ENF in the June 6, 2021 Environmental Monitor to initiate public review and comment. In accordance with the 2021 Publication Schedule, the Public comment period will be open until June 29, 2021 and an ENF decision anticipated on July 9, 2021.

Sincerely,

ALLEN ENGINEERING
& ASSOCIATES, INC.

Mark Allen, P.E.
President

Cc: Mr. Jean Skaff, Skaff Petroleum. Inc.
ENF Distribution List

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ENVIRONMENTAL NOTIFICATION FORM

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act (MEPA) Office

Environmental Notification Form

For Office Use Only

EEA#: _____

MEPA Analyst: _____

The information requested on this form must be completed in order to submit a document electronically for review under the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: **Gas Station Development**			
Street Address: **1603-1605 Main Street (Route 9)**			
Municipality: **Leicester**		Watershed: **Burncoat Pond/French**	
Universal Transverse Mercator Coordinates:		Latitude: **42.246945** Longitude: **-71.937713**	
Estimated commencement date: **Sept. 2021**		Estimated completion date: **June 2022**	
Project Type: **Commercial**		Status of project design: **75** %complete	
Proponent: **Skaff Petroleum, Inc.**			
Street Address: **344 Grafton Street**			
Municipality: **Worcester**		State: **MA**	Zip Code: **01604**
Name of Contact Person: **Mark E. Allen**			
Firm/Agency: **Allen Engineering & Assoc.**		Street Address: **One Charlesview Road**	
Municipality: **Hopedale**		State: **MA**	Zip Code: **01747**
Phone: **508 381-3212**	Fax:		E-mail:**mark@allen-ea.com**

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
☐Yes ☒No

If this is an Expanded Environmental Notification Form (ENF) (see 301 CMR 11.05(7)) or a Notice of Project Change (NPC), are you requesting: **N/A**

a Single EIR? (see 301 CMR 11.06(8))	☐Yes ☐No
a Special Review Procedure? (see 301CMR 11.09)	☐Yes ☐No
a Waiver of mandatory EIR? (see 301 CMR 11.11)	☐Yes ☐No
a Phase I Waiver? (see 301 CMR 11.11)	☐Yes ☐No

(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?
301 11.03(b)13. Generation of 2,000 or more new adt on roadways providing access to a single location.
Which State Agency Permits will the project require?
MassDOT Highway Access Permit
Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres: **N/A**

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total site acreage	**3.88**		
New acres of land altered		**3.58**	
Acres of impervious area	**0**	**2.16**	**2.16**
Square feet of new bordering vegetated wetlands alteration		**0**	
Square feet of new other wetland alteration		**0**	
Acres of new non-water dependent use of tidelands or waterways		0	
STRUCTURES			
Gross square footage	**0**	**35,000+/-**	**35,000+/-**
Number of housing units	**0**	**0**	**0**
Maximum height (feet)	**NA**	**36.2'+/-**	**36.2'+/-**
TRANSPORTATION			
Vehicle trips per day	**0**	**2,360**	**2,360**
Parking spaces	**0**	**70**	**70**
WASTEWATER			
Water Use (Gallons per day)	**0**	**2,500+/-**	**2,500+/-**
Water withdrawal (GPD)	**0**	**0**	**0**
Wastewater generation/treatment (GPD)	**0**	**2,500+/-**	**2,500+/-**
Length of water mains (miles)	**0**	**440**	**440**
Length of sewer mains (miles)	**0**	**400**	**400**

Has this project been filed with MEPA before?
☐ Yes (EEA #_____) ☒No

Has any project on this site been filed with MEPA before?
☐ Yes (EEA #_____) ☒No

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

Describe the existing conditions and land uses on the project site: **The project site contains Approximately 3.88 acres of land located in the Highway Business-industrial 1 zoning district. The site is currently vacant, but previously contained two single family residential dwellings, which were raised in the spring of 2016.**

Describe the proposed project and its programmatic and physical elements:
The Project entails construction of a 10-vehicle fueling position gas station with 5,000 square foot convenience store that will include a fast food restaurant with a drive-thru window, and a 3-story, 30,000 square foot self-storage facility. Access will be provided via a new driveway on Route 9 opposite the Walmart driveway to form the fourth leg of the existing signalized intersection. A separate right-out-only driveway will be located at the eastern property line.

The project will impact the existing 3-way, signalized intersection. To accommodate site access via the fourth leg of the signalized intersection, the project proponent will widen Route 9 to provide a westbound left-turn lane, one of the two existing Route 9 eastbound through lanes will be eliminated to improve safety, and buffered bike lanes will instead be provided through the intersection that will tie in with the existing Route 9 shoulder widths for safe bicycle travel through the intersection. The proponent will also grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage. The existing traffic signal will need to be modified to accommodate the fourth leg of the intersection and the addition of the westbound left-turn lane. The modifications include removal of existing signal equipment, installation of a new mast arm and signal heads, and adjustments to the signal phasing and timing consistent with current MassDOT standards.

On-Site stormwater impacts due to erosion and impervious surfaces and pollutants from paved areas will be mitigated by incorporating Stormwater Best Management Practices (BMPS). A closed drainage system consisting of deep sump/hooded catch basins and water quality structures will capture, convey and provide 44% pre-treatment which is required since the project is considered a Land Uses with Higher Potential Pollutant Loads (LUHPPL). Additional treatment will be provided via an infiltration basin with a sediment forebay. Peak flow mitigation will be achieved for the 2, 10, and 100 year storm events. Erosion control measures will be incorporated prior to construction and maintained until the site is fully stabilized.

The stormwater collection and treatment system will be designed to meet or exceed each of the ten (10) Standards of the MassDEP Stormwater Management Regulations as well as any local requirements pertaining to stormwater.

A bordering vegetated wetland (BVW) is located just off of the site at the southwest corner of the property. No impacts to the BVW or its 100-foot zone will occur. Erosion control measures will be installed prior to construction and will remain in place during construction and until the site is fully stabilized. Additional temporary construction controls will be implemented during construction including temporary diversion swales, check dams, rip-rap construction entrance, temporary sediment basins, water suppression, etc.

Based on discussions with Town Officials and research, there is adequate water and sewer infrastructure capacity to support the project.

NOTE: The project description should summarize both the project's direct and indirect impacts (including construction period impacts) in terms of their magnitude, geographic extent, duration and frequency, and reversibility, as applicable. It should also discuss the infrastructure requirements of the project and the capacity of the municipal and/or regional infrastructure to sustain these requirements into the future.

Describe the on-site project alternatives (and alternative off-site locations, if applicable), considered by the proponent, including at least one feasible alternative that is allowed under current zoning, and the reasons(s) that they were not selected as the preferred alternative:

The proponent has explored numerous development alternatives for the property dating back to 2013. Two (2) of the alternatives are outlined below (see Appendix C for plans). The proponent ultimately abandoned these alternative plans based on current market conditions and recommendations from area real estate brokers. The retail component was determined to be in low demand while the self-storage use proposed under the preferred development plan was identified as a use with high demand in the demographic study area.

<u>Alternative A</u> – This alternative includes a slightly smaller gas station, fast food and convenience store building with a drive-thru of approximately 4,000 sf; 7,500 square feet of retail space; a 2,500 square foot bank with drive-thru and a car wash. See exhibit titled "Development Alternative A".

<u>Alternative B</u> - This alternative contemplates a 20,000 +/- square foot retail building with a drive-thru and 100 parking spaces. See exhibit titled "Development Alternative B".

All of the alternatives explored represent similar impacts and mitigation in terms of land disturbance, impervious surface area and trip generation.

_____

NOTE*: The purpose of the alternatives analysis is to consider what effect changing the parameters and/or siting of a project, or components thereof, will have on the environment, keeping in mind that the objective of the MEPA review process is to avoid or minimize damage to the environment to the greatest extent feasible. Examples of alternative projects include alternative site locations, alternative site uses, and alternative site configurations.*

Summarize the mitigation measures proposed to offset the impacts of the preferred alternative:
To accommodate site access via the fourth leg of the signalized intersection, the project Proponent will widen Route 9 to provide a westbound left-turn lane, one of the two existing Route 9 eastbound through lanes will be eliminated to improve safety, and buffered bike lanes will instead be provided through the intersection that will tie in with the existing Route 9 shoulder widths for safe bicycle travel through the intersection. The proponent will also grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage.

See also stormwater mitigation and discussion below.

If the project is proposed to be constructed in phases, please describe each phase: **NA**

<u>AREAS OF CRITICAL ENVIRONMENTAL CONCERN:</u>
Is the project within or adjacent to an Area of Critical Environmental Concern?
☐Yes (Specify_____)
☒No
if yes, does the ACEC have an approved Resource Management Plan? ___ Yes ___ No;
If yes, describe how the project complies with this plan.
_____
Will there be stormwater runoff or discharge to the designated ACEC? ___ Yes ___ No;
If yes, describe and assess the potential impacts of such stormwater runoff/discharge to the designated ACEC.
_____

RARE SPECIES:
Does the project site include Estimated and/or Priority Habitat of State-Listed Rare Species? (see http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm)
☐Yes (Specify_____) ☒No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:
Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?
☐Yes (Specify_____) ☒No
If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? ☐Yes (Specify_____) ☒No

WATER RESOURCES:
Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site? ___Yes _X_No; if yes, identify the ORW and its location. _____

(NOTE: Outstanding Resource Waters include Class A public water supplies, their tributaries, and bordering wetlands; active and inactive reservoirs approved by MassDEP; certain waters within Areas of Critical Environmental Concern, and certified vernal pools. Outstanding resource waters are listed in the Surface Water Quality Standards, 314 CMR 4.00.)

Are there any impaired water bodies on or within a half-mile radius of the project site? ___Yes _X_No; if yes, identify the water body and pollutant(s) causing the impairment:_____.

Is the project within a medium or high stress basin, as established by the Massachusetts Water Resources Commission? ___Yes _X_No

STORMWATER MANAGEMENT:

Generally describe the project's stormwater impacts and measures that the project will take to comply with the standards found in MassDEP's Stormwater Management Regulations:

MASSACHUSETTS CONTINGENCY PLAN:
Has the project site been, or is it currently being, regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes ___ No _**X**_ ; if yes, please describe the current status of the site (including Release Tracking Number (RTN), cleanup phase, and Response Action Outcome classification):_____

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes ___ No _**X**_ ; if yes, describe which portion of the site and how the project will be consistent with the AUL: _____.

Are you aware of any Reportable Conditions at the property that have not yet been assigned an RTN? Yes ___ No _**X**_ ; if yes, please describe:_____

SOLID AND HAZARDOUS WASTE:

If the project will generate solid waste during demolition or construction, describe alternatives considered for re-use, recycling, and disposal of, e.g., asphalt, brick, concrete, gypsum, metal, wood: **The project does not involve demolition; however, a small amount of construction waste will be generated during construction. Where possible, materials will be recycled. When recycling is not possible, materials will be disposed of in accordance with all applicable laws. No waste will be buried or burned.**

(NOTE: Asphalt pavement, brick, concrete and metal are banned from disposal at Massachusetts landfills and waste combustion facilities and wood is banned from disposal at Massachusetts landfills. See 310 CMR 19.017 for the complete list of banned materials.)

Will your project disturb asbestos containing materials? Yes ___ No _**X**_ ;
if yes, please consult state asbestos requirements at http://mass.gov/MassDEP/air/asbhom01.htm

Describe anti-idling and other measures to limit emissions from construction equipment:
The Proponent will encourage contractors to comply with MassDEP' s "Diesel Engine Retrofits in the Construction Industry: A How to Guide" and the use of ultra-low sulfur diesel in off-rad engines. Construction vehicles will be required to comply with applicable laws and regulations regarding engine idling, and shall minimize any such idling. The construction contractor is encouraged to use equipment fitted with diesel oxidation catalysts (DOC) or diesel particulate filters (DPF) to reduce emissions.

DESIGNATED WILD AND SCENIC RIVER:

Is this project site located wholly or partially within a defined river corridor of a federally designated Wild and Scenic River or a state designated Scenic River? Yes ___ No _**X**_ ;
if yes, specify name of river and designation:

If yes, does the project have the potential to impact any of the "outstandingly remarkable" resources of a federally Wild and Scenic River or the stated purpose of a state designated Scenic River? Yes ___ No ___ ; if yes, specify name of river and designation: _____;
if yes, will the project will result in any impacts to any of the designated "outstandingly remarkable" resources of the Wild and Scenic River or the stated purposes of a Scenic River.
Yes ___ No ___ ;
if yes,describe the potential impacts to one or more of the "outstandingly remarkable" resources or stated purposes and mitigation measures proposed.

ATTACHMENTS:

1. List of all attachments to this document.
2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries.
3.. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.
4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources and/or districts.
5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).
6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).
7. List of municipal and federal permits and reviews required by the project, as applicable.

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to **land** (see 301 CMR 11.03(1)
___ Yes _**X**_ No; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	Existing	Change	Total
Footprint of buildings	**0**	**0.34**	**0.34**
Internal roadways	**0**	**0**	**0**
Parking and other paved areas	**0**	**1.82**	**1.82**
Other altered areas	**0**	**1.42**	**1.42**
Undeveloped areas	**3.88**	**-3.58**	**3.58**
Total: Project Site Acreage	**3.88**	**0**	**3.88**

B. Has any part of the project site been in active agricultural use in the last five years?
___ Yes _**X**_ No; if yes, how many acres of land in agricultural use (with prime state or locally important agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use?
___ Yes _**X**_ No; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a forest management plan approved by the Department of Conservation and Recreation:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes _**X**_ No; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? ___ Yes_**X**_ No; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes _**X**_ No; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ No _**X**_; if yes, describe:

III. Consistency

A. Identify the current municipal comprehensive land use plan
Title:__**Leicester Master Plan**_____ Date___**2009**_____

B. Describe the project's consistency with that plan with regard to:

1) economic development **provides commercial tax base and local jobs**

2) adequacy of infrastructure **the site is located in an area where adequate infrastructure exists**

3) open space impacts **The site is located along the Route 9 corridor in the Highway Business-Industrial Zoning District. It does not impact the Town's open space goals and objectives.**

4) compatibility with adjacent land uses **The project is compatible with other nearby uses in the Highway Business-Industrial District including the Walmart located Directly across Main Street. It is less compatible with adjacent residential dwellings which are pre-existing non-conforming uses in the district**

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)
RPA: **Central Massachusetts Regional Planning Commission**

Title: **Central Thirteen Prioritization Project** Date: **2012**

D. Describe the project's consistency with that plan with regard to:
1) economic development **The Site is located within a Locally-identified Priority Development Area.**
2) adequacy of infrastructure **Adequate water and sewer infrastructure is available at the Site frontage to support the proposed development.**
3) open space impacts **The project is a redevelopment located outside of Priority Preservation Areas.**

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

(NOTE: If you are uncertain, it is recommended that you consult with the Natural Heritage and Endangered Species Program (NHESP) prior to submitting the ENF.)

B. Does the project require any state permits related to **rare species or habitat**? ___ Yes **X** No

C. Does the project site fall within mapped rare species habitat (Priority or Estimated Habitat?) in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes _**X**_ No.

D. If you answered "No" to all questions A, B and C, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes ___ No. If yes,
1. Have you consulted with the Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)? ___Yes ___No; if yes, have you received a determination as to whether the project will result in the "take" of a rare species? ___ Yes ___ No; if yes, attach the letter of determination to this submission.

2. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, provide a summary of proposed measures to minimize and mitigate rare species impacts

3. Which rare species are known to occur within the Priority or Estimated Habitat?

4. Has the site been surveyed for rare species in accordance with the Massachusetts Endangered Species Act? ___ Yes ___ No

4. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes ___ No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, provide a summary of proposed measures to minimize and mitigate impacts to significant habitat:

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? ___ Yes ___ No; if yes, has a Notice of Intent been filed? ___ Yes ___ No; if yes, list the date and MassDEP file number: _____; if yes, has a local Order of Conditions been issued? ___ Yes ___ No; Was the Order of Conditions appealed? ___ Yes ___ No. Will the project require a Variance from the Wetlands regulations? ___ Yes ___ No.

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site:

C. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

Coastal Wetlands	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Land Under the Ocean	_____	_____
Designated Port Areas	_____	_____
Coastal Beaches	_____	_____
Coastal Dunes	_____	_____
Barrier Beaches	_____	_____
Coastal Banks	_____	_____
Rocky Intertidal Shores	_____	_____
Salt Marshes	_____	_____
Land Under Salt Ponds	_____	_____
Land Containing Shellfish	_____	_____
Fish Runs	_____	_____
Land Subject to Coastal Storm Flowage	_____	_____
Inland Wetlands		
Bank (lf)	_____	_____
Bordering Vegetated Wetlands	_____	_____
Isolated Vegetated Wetlands	_____	_____
Land under Water	_____	_____
Isolated Land Subject to Flooding	_____	_____
Borderi ng Land Subject to Flooding	_____	_____
Riverfront Area	_____	_____

D. Is any part of the project:

1. proposed as a **limited project**? ___ Yes ___ No; if yes, what is the area (in sf)?____
2. the construction or alteration of a **dam**? ___ Yes ___ No; if yes, describe:
3. fill or structure in a **velocity zone** or **regulatory floodway**? ___ Yes ___ No

4. dredging or disposal of dredged material? ___ Yes ___ No; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to an **Outstanding Resource Water (ORW)** or an **Area of Critical Environmental Concern (ACEC)**? ___ Yes ___ No
6. subject to a wetlands restriction order? ___ Yes ___ No; if yes, identify the area (in sf):
7. located in buffer zones? ___Yes ___No; if yes, how much (in sf) _____

E. Will the project:
1. be subject to a local wetlands ordinance or bylaw? ___ Yes ___ No
2. alter any federally-protected wetlands not regulated under state law? ___ Yes ___ No; if yes, what is the area (sf)?

III. Waterways and Tidelands Impacts and Permits

A. Does the project site contain waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? ___ Yes ___ No; if yes, is there a current Chapter 91 License or Permit affecting the project site? ___ Yes ___ No; if yes, list the date and license or permit number and provide a copy of the historic map used to determine extent of filled tidelands:

B. Does the project require a new or modified license or permit under M.G.L.c.91? ___ Yes ___ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent use? Current ___ Change ___ Total ___
If yes, how many square feet of solid fill or pile-supported structures (in sf)?

C. For non-water-dependent use projects, indicate the following:
Area of filled tidelands on the site:_____
Area of filled tidelands covered by buildings:_____
For portions of site on filled tidelands, list ground floor uses and area of each use:
_____
Does the project include new non-water-dependent uses located over flowed tidelands? Yes ___ No ___
Height of building on filled tidelands_____

Also show the following on a site plan: Mean High Water, Mean Low Water, Water-dependent Use Zone, location of uses within buildings on tidelands, and interior and exterior areas and facilities dedicated for public use, and historic high and historic low water marks.

D. Is the project located on landlocked tidelands? ___ Yes ___ No; if yes, describe the project's impact on the public's right to access, use and enjoy jurisdictional tidelands and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

E. Is the project located in an area where low groundwater levels have been identified by a municipality or by a state or federal agency as a threat to building foundations? ___Yes ___ No; if yes, describe the project's impact on groundwater levels and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

F. Is the project non-water-dependent **and** located on landlocked tidelands **or** waterways or tidelands subject to the Waterways Act **and** subject to a mandatory EIR? ___ Yes ___ No;
(NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.)

G. Does the project include dredging? ___ Yes ___ No; if yes, answer the following questions:
What type of dredging? Improvement ___ Maintenance ___ Both ____

What is the proposed dredge volume, in cubic yards (cys) _____
What is the proposed dredge footprint ____length (ft) ___width (ft)____depth (ft);
Will dredging impact the following resource areas?

Intertidal Yes__ No__; if yes, ___ sq ft
Outstanding Resource Waters Yes__ No__; if yes, ___ sq ft
Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No__; if yes __ sq ft
If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?
If no to any of the above, what information or documentation was used to support this determination?

Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.
Sediment Characterization

Existing gradation analysis results? __Yes ___No: if yes, provide results.
Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6? ___Yes ____No; if yes, provide results.

Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.

Beach Nourishment ___
Unconfined Ocean Disposal ___
Confined Disposal:
Confined Aquatic Disposal (CAD) ___
Confined Disposal Facility (CDF) ___
Landfill Reuse in accordance with COMM-97-001 ___
Shoreline Placement ___
Upland Material Reuse____
In-State landfill disposal____
Out-of-state landfill disposal ____
(NOTE: This information is required for a 401 Water Quality Certification.)

IV. Consistency:

A. Does the project have effects on the coastal resources or uses, and/or is the project located within the Coastal Zone? ___ Yes ___ No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

B. Is the project located within an area subject to a Municipal Harbor Plan? ___ Yes ___ No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **water supply**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons per day (gpd), the volume and source of water use for existing and proposed activities at the project site:

	Existing	Change	Total
Municipal or regional water supply	_____	_____	_____
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____

(NOTE: Interbasin Transfer approval will be required if the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.)

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source, has a pumping test been conducted? ___ Yes ___ No; if yes, attach a map of the drilling sites and a summary of the alternatives considered and the results. _____

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons per day)? _____Will the project require an increase in that withdrawal? ___Yes ___No; if yes, then how much of an increase (gpd)? _____

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___No. If yes, describe existing and proposed water supply facilities at the project site:

	Permitted Flow	Existing Avg Daily Flow	Project Flow	Total
Capacity of water supply well(s) (gpd)	_____	_____	_____	_____
Capacity of water treatment plant (gpd)	_____	_____	_____	_____

F. If the project involves a new interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

G. Does the project involve:

1. new water service by the Massachusetts Water Resources Authority or other agency of the Commonwealth to a municipality or water district? ___ Yes ___ No
2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking

water supply for purpose of forest harvesting activities? ___ Yes ___ No

III. Consistency

Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **wastewater**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. Impacts and Permits

A. Describe the volume (in gallons per day) and type of disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00 for septic systems or 314 CMR 7.00 for sewer systems):

	Existing	Change	Total
Discharge of sanitary wastewater	_____	_____	_____
Discharge of industrial wastewater	_____	_____	_____
TOTAL	_____	_____	_____

	Existing	Change	Total
Discharge to groundwater	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Discharge to municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. Is the existing collection system at or near its capacity? ___ Yes ___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

C. Is the existing wastewater disposal facility at or near its permitted capacity? ___ Yes___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___ No; if yes, describe as follows:

	Permitted	Existing Avg Daily Flow	Project Flow	Total
Wastewater treatment plant capacity (in gallons per day)	_____	_____	_____	_____

E. If the project requires an interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or new?

(NOTE: Interbasin Transfer approval may be needed if the basin and community where wastewater will be discharged is different from the basin and community where the source of water supply is located.)

F. Does the project involve new sewer service by the Massachusetts Water Resources Authority (MWRA) or other Agency of the Commonwealth to a municipality or sewer district? ___ Yes ___ No

G. Is there an existing facility, or is a new facility proposed at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, wastewater reuse (gray water) or other sewage residual materials? ___ Yes ___ No; if yes, what is the capacity (tons per day):

	Existing	Change	Total
Storage	_____	_____	_____
Treatment	_____	_____	_____
Processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the water conservation measures to be undertaken by the project, and other wastewater mitigation, such as infiltration and inflow removal.

III. Consistency

A. Describe measures that the proponent will take to comply with applicable state, regional, and local plans and policies related to wastewater management:

B. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EEA number for the plan and whether the project site is within a sewer service area recommended or approved in that plan:

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? _**X**_ Yes ___ No; if yes, specify, in quantitative terms:

The project will generate 2,360 daily vehicle trips

B. Does the project require any state permits related to **state-controlled roadways**? _**X**_ Yes __ No; if yes, specify which permit:

MassDOT Highway Access Permit

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	**0**	**70**	**70**
Number of vehicle trips per day	**0**	**2,360**	**2,360**
ITE Land Use Code(s):		**960/151**	

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change	Total
1. **Route 9**	**18,650**	**360**	**19,010**
2.			
3.			

C. If applicable, describe proposed mitigation measures on state-controlled roadways that the project proponent will implement:

To accommodate site access via the fourth leg of the signalized intersection, the project proponent will widen Route 9 to provide a westbound left-turn lane, one of the two existing Route 9 eastbound through lanes will be eliminated to improve safety, and buffered bike lanes will instead be provided through the intersection that will tie in with the existing Route 9 shoulder widths for safe bicycle travel through the intersection. The proponent will also grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage. The existing traffic signal will need to be modified to accommodate the fourth leg of the intersection and the addition of the westbound left-turn lane. The modifications include removal of existing signal equipment, installation of a new mast arm and signal heads, and adjustments to the signal phasing and timing consistent with current MassDOT standards.

D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?

Route 9 will be widened and restriped to eliminate one of the two existing Route 9 eastbound through lanes and buffered bike lanes will instead be provided through the intersection that will tie in with the existing Route 9 shoulder widths for safe bicycle travel through the intersection. The proponent will also grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage.

C. Is there a Transportation Management Association (TMA) that provides transportation demand management (TDM) services in the area of the project site? ____ Yes __**X**__ No; if yes,

describe if and how will the project will participate in the TMA:

D. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation facilities? ____ Yes _**X**_ No; if yes, generally describe:

E. If the project will penetrate approach airspace of a nearby airport, has the proponent filed a Massachusetts Aeronautics Commission Airspace Review Form (780 CMR 111.7) and a Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) (CFR Title 14 Part 77.13, forms 7460-1 and 7460-2)?

III. Consistency

Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

The proposed site driveways and all improvements at the Route 9 and Walmart driveway intersection including the installation of buffered bike lanes through the intersection will be constructed in accordance with current MassDOT standards. The proponent will grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage.

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **roadways or other transportation facilities**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities in the immediate vicinity of the project site:

B. Will the project involve any

1. Alteration of bank or terrain (in linear feet)? _____
2. Cutting of living public shade trees (number)? _____
3. Elimination of stone wall (in linear feet)? _____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	Existing	Change	Total
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are:

1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? ___Yes ___No; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency

Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? ___ Yes _**B**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? ___ Yes ___ No; if yes, describe existing and proposed emissions (in tons per day) of:

	Existing	Change	Total
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**? ___ Yes _**B**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos? ___ Yes ___ No

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency

Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? ___ Yes _**X**_ No; if yes, attach correspondence. For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? ____Yes ____ No; if yes, attach correspondence

B. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes _**X**_ No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? ___ Yes ___ No; if yes, please describe:

C. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes _**X**_ No; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes ___ No; if yes, please describe:

D. If you answered "No" to all parts of both questions A, B and C, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

II. Impacts

Describe and assess the project's impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

III. Consistency

Describe measures that the proponent will take to comply with federal, state, regional, and local

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

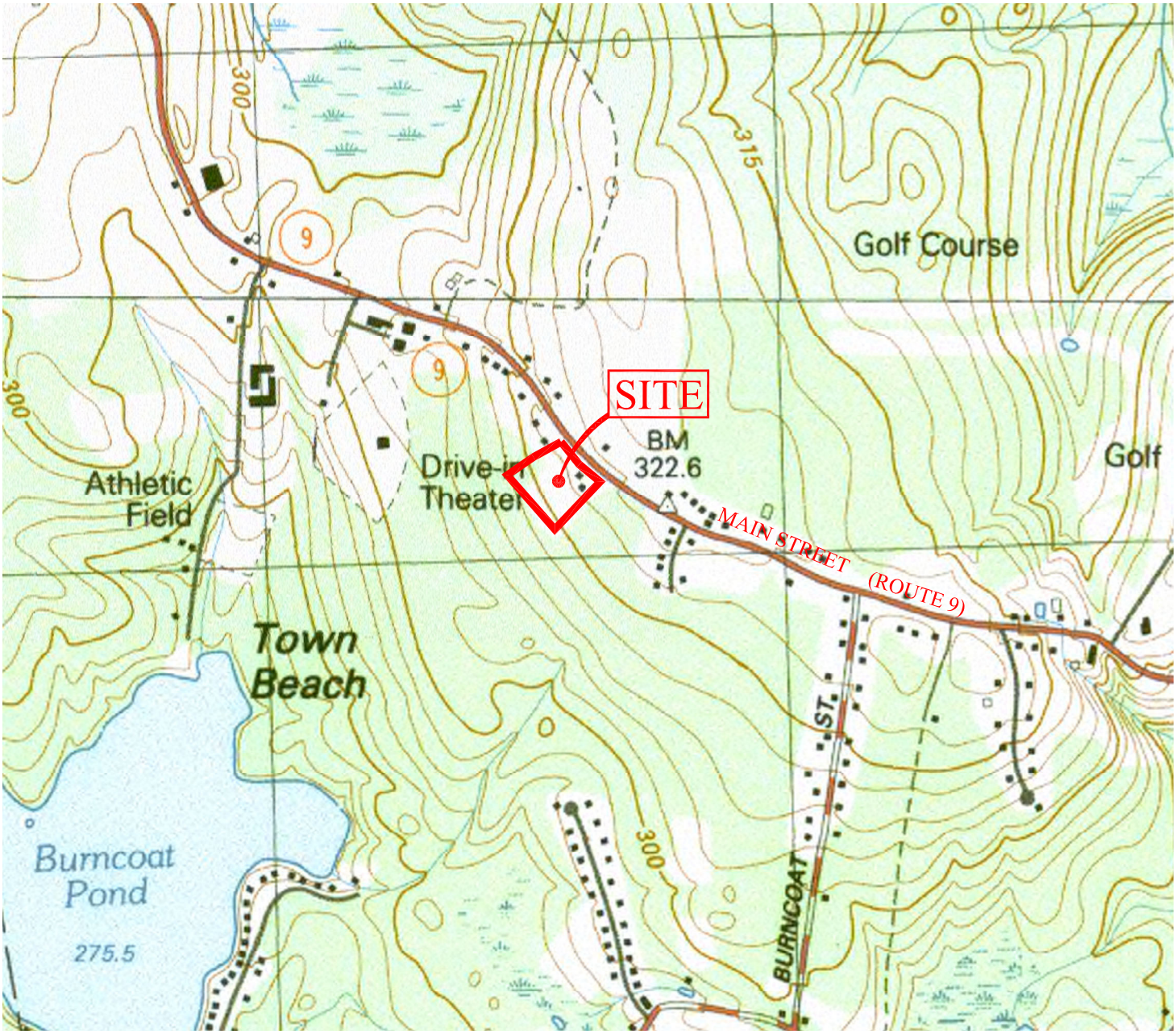
   (Name) **Worcester Telegram & Gazette** (Date) 6.9.21

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Signatures:

Date Signature of Responsible Officer or Proponent	Date Signature of person preparing ENF (if different from above)
5/14/21	5/14/21
Jean Skaff	**Mark E. Allen**
Name (print or type)	Name (print or type)
Skaff Petroleum, Inc.	**Allen Engineering & Associates, Inc.**
Firm/Agency	Firm/Agency
344 Grafton Street	**One Charlesview Road, Suite 2**
Street	Street
Worcester, MA 01604	**Hopedale, MA 01747**
Municipality/State/Zip	Municipality/State/Zip
508 753-3752	**508 381-3212**
Phone	Phone

APPENDIX A – PROJECT MAPS



SCALE: 1" = 1000'

0 1000' 2000' 3000' 4000'

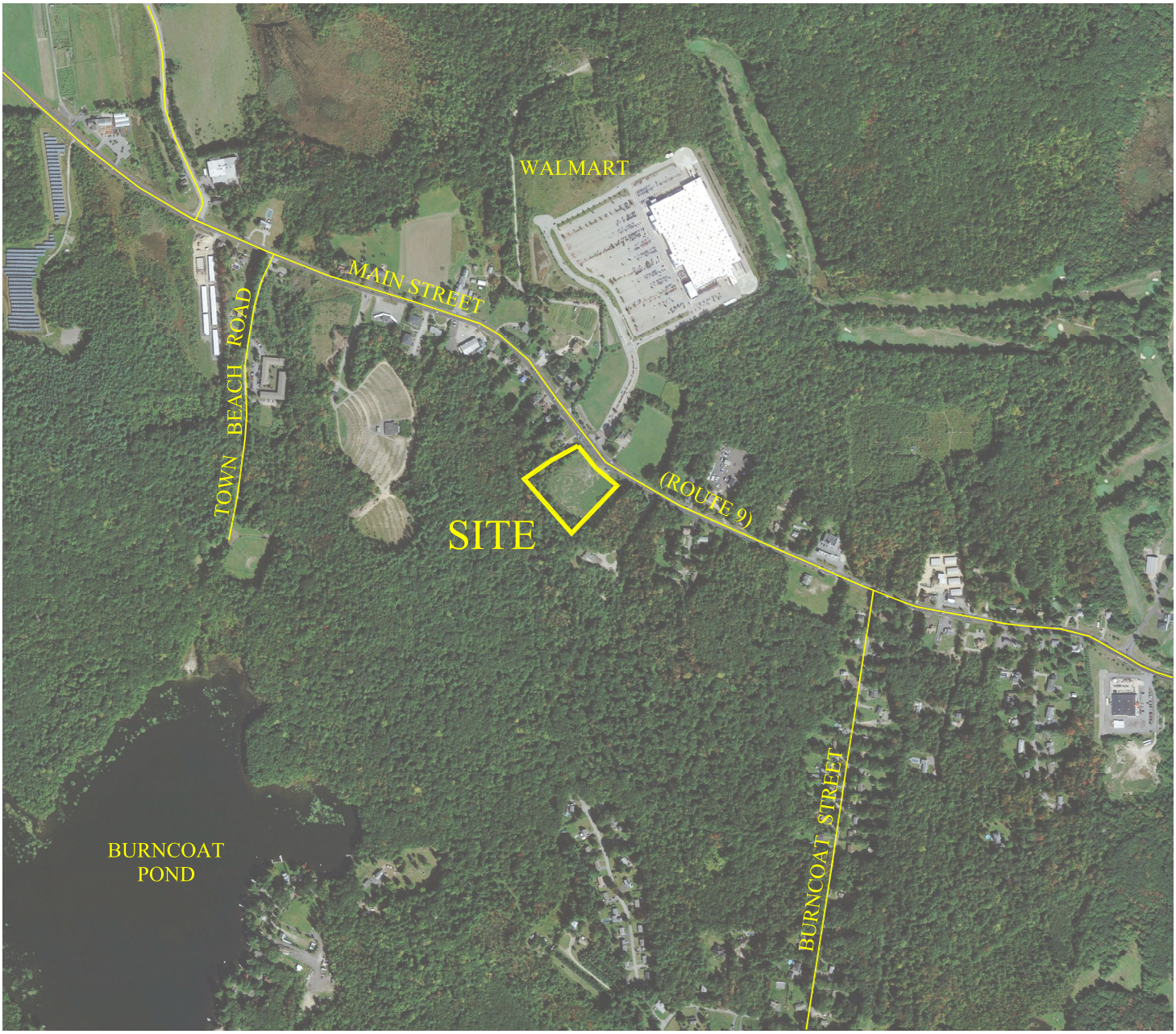
U.S.G.S. LOCUS MAP

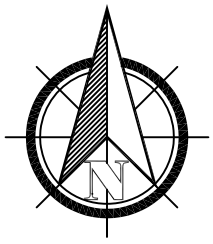
SITE:
Gas Station Development
1603 & 1605 Main Street (Route 9)
Leicester, Massachusetts

PREPARED BY: **ALLEN ENGINEERING & ASSOCIATES, INC.**
Civil Engineers • Surveyors
Land Development Consultants
One Charlesview Road - Suite 2
Hopedale, Ma 01747
(508) 381-3212 • Phone
www.allen-ea.com

DATE: 6/1/21

JOB NO: 00047





SCALE: 1" = 2000'

0 2000' 4000' 6000' 8000'

AERIAL MAP

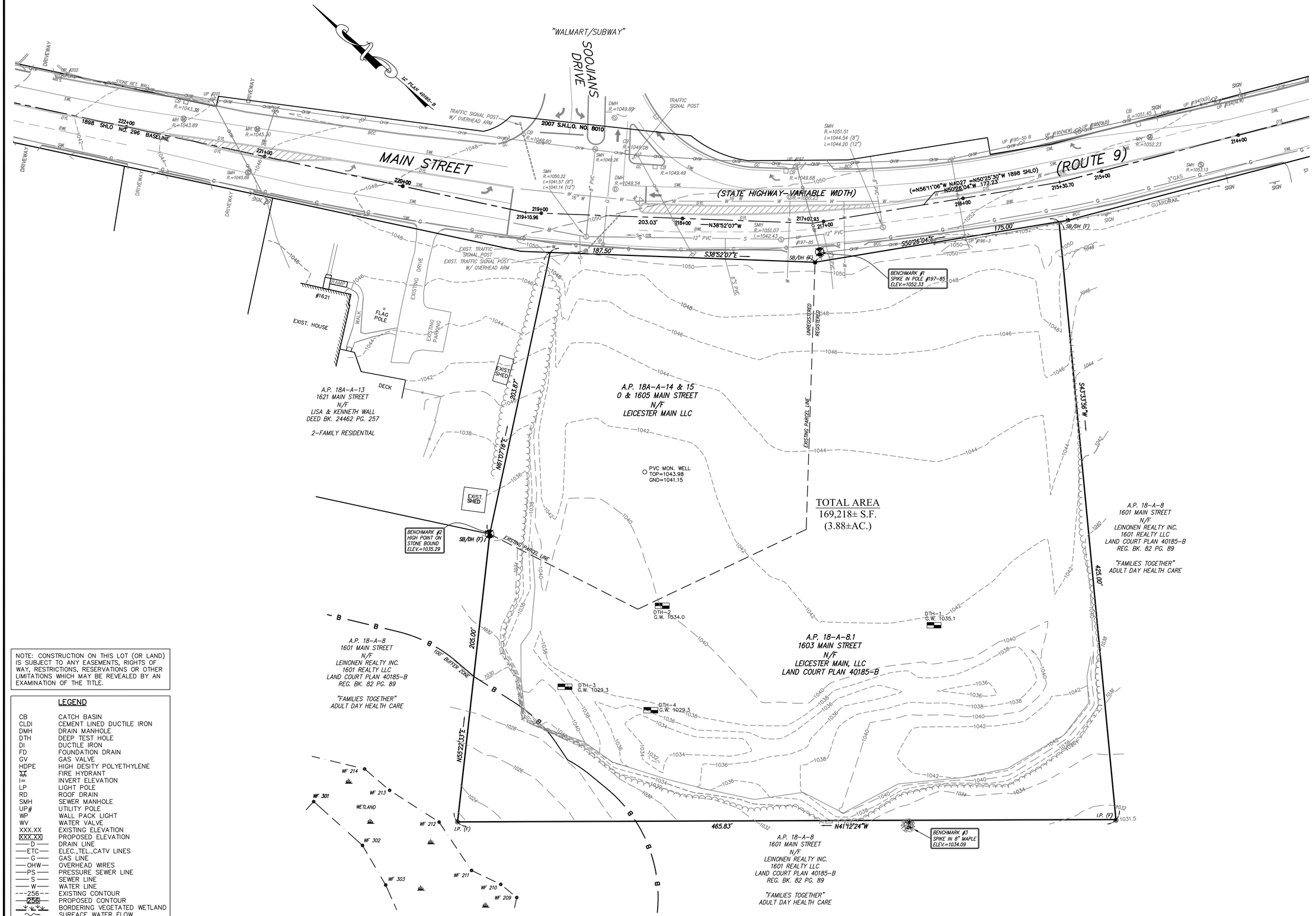
SITE:
Gas Station Development
1603 & 1605 Main Street (Route 9)
Leicester, Massachusetts

PREPARED BY: **ALLEN ENGINEERING & ASSOCIATES, INC.**
Civil Engineers • Surveyors
Land Development Consultants
One Charlesview Road - Suite 2
Hopedale, Ma 01747
(508) 381-3212 • Phone
www.allen-ea.com

DATE: 6/1/21

JOB NO: 00047

APPENDIX B – EXISTING AND PROPOSED CONDITIONS PLANS



NOTE: CONSTRUCTION ON THIS LOT (OR LAND) IS SUBJECT TO ANY EASEMENTS, RIGHTS OF WAY, RESTRICTIONS, RESERVATIONS OR OTHER LIMITATIONS WHICH MAY BE REVEALED BY AN EXAMINATION OF THE TITLE.

LEGEND

CB	CATCH BASIN
CLDI	CEMENT LINED DUCTILE IRON
DMH	DRAIN MANHOLE
DTH	DEEP TEST HOLE
DI	DUCTILE IRON
FD	FOUNDATION DRAIN
GV	GAS VALVE
HDPE	HIGH DESITY POLYETHYLENE
	FIRE HYDRANT
I=	INVERT ELEVATION
LP	LIGHT POLE
RD	ROOF DRAIN
SMH	SEWER MANHOLE
UP#	UTILITY POLE
WP	WALL PACK LIGHT
WV	WATER VALVE
XXX.XX	EXISTING ELEVATION
XXX.XX	PROPOSED ELEVATION
—— D ——	DRAIN LINE
——ETC——	ELEC.,TEL.,CATV LINES
—— G ——	GAS LINE
—— OHW ——	OVERHEAD WIRES
——PS——	PRESSURE SEWER LINE
—— S ——	SEWER LINE
—— W ——	WATER LINE
---256---	EXISTING CONTOUR
256	PROPOSED CONTOUR
	BORDERING VEGETATED WETLAND
	SURFACE WATER FLOW
	TRAFFIC FLOW

PREPARED FOR:

Skaff Petroleum, Inc.
334 Grafton Street,
Worcester, MA 01604

TITLE:

EXISTING CONDITIONS PLAN

For

#1603 - #1605 Main Street

In

Leicester, MA

PREPARED BY:

Allen Engineering & Associates, Inc.
Civil Engineers · Surveyors
Land Development Consultants
One Charlesview Road
Suite 2
Hopedale, Ma 01747
(508) 381-3212 · Phone
www.allen-ea.com

SCALE: 1"=30 FEET

0 30 60 90

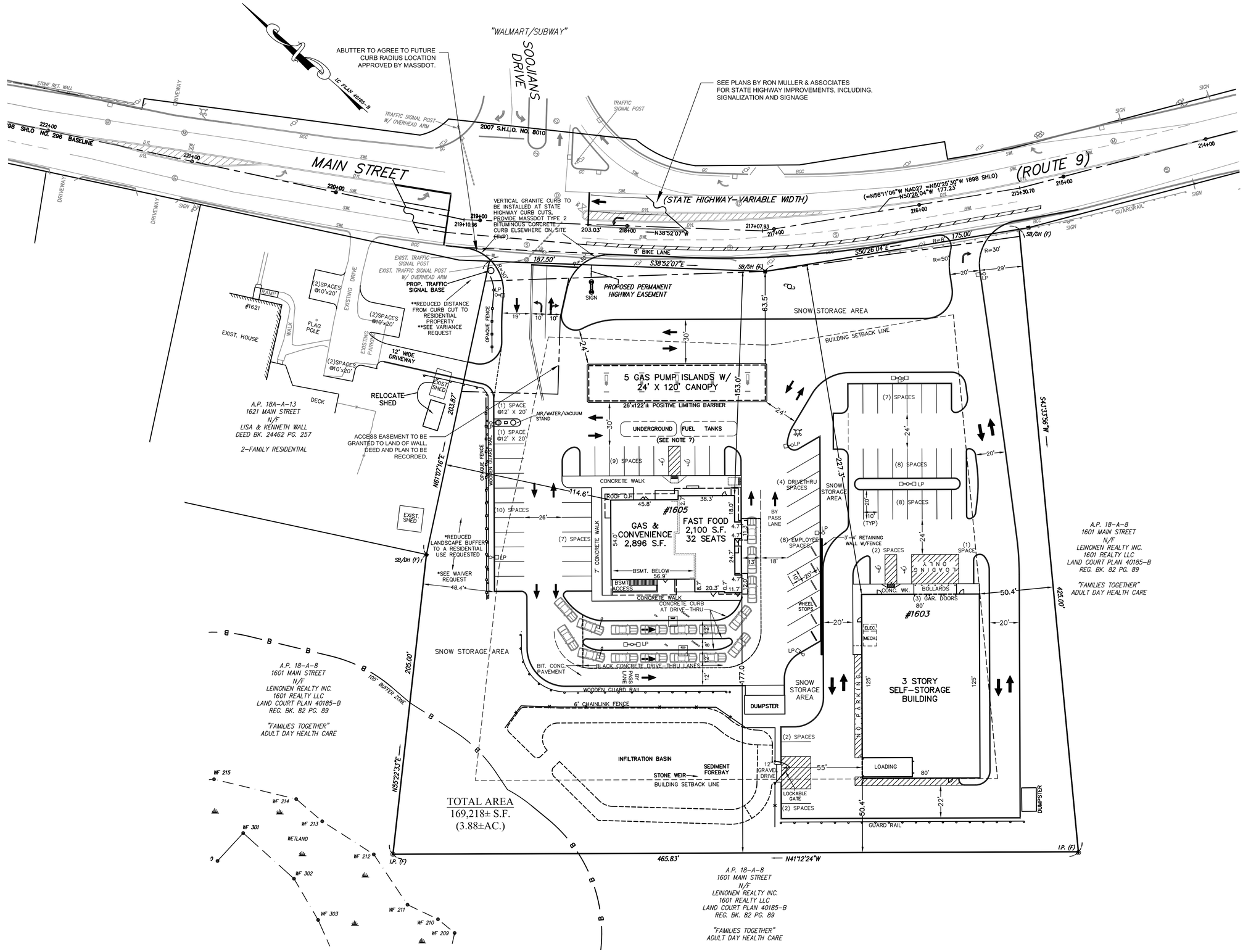
DATE: May 26, 2021

REVISIONS

#	DATE	DESCRIPTION	INIT

JOB NO: 00047

SHEET: 1 of 1



PREPARED FOR:

Skaff Petroleum, Inc.
334 Grafton Street,
Worcester, MA 01604

TITLE:

PROPOSED
DEVELOPMENT PLAN
For
#1603 - #1605 Main Street
In
Leicester, MA

PREPARED BY:

Allen Engineering
& Associates, Inc.
Civil Engineers · Surveyors
Land Development Consultants
One Charlesview Road
Suite 2
Hopedale, Ma 01747
(508) 381-3212 · Phone
www.allen-ea.com

SCALE: 1"=30 FEET

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DATE: May 26, 2021

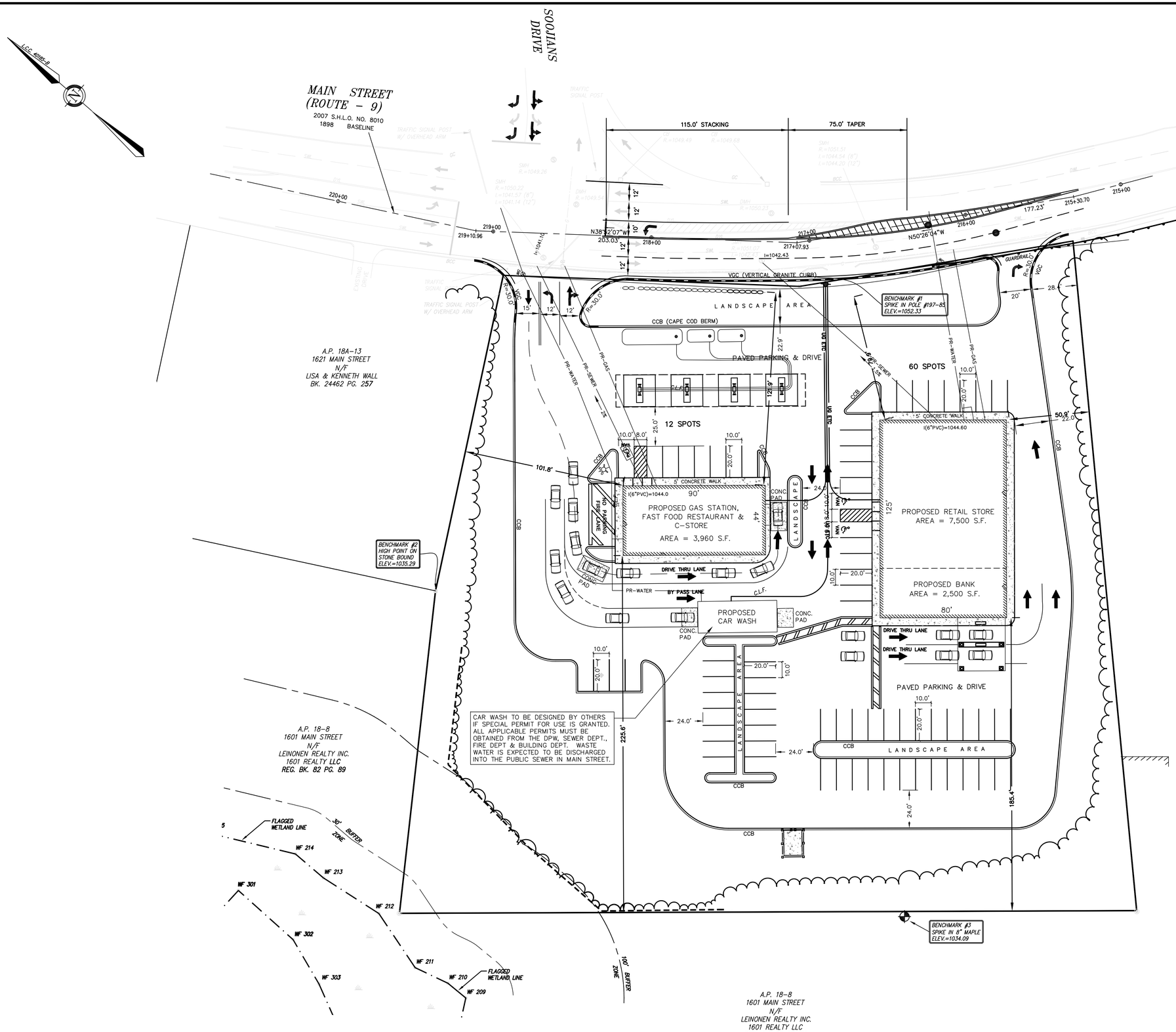
REVISIONS

#	DATE	DESCRIPTION	INIT

JOB NO: 00047

SHEET: 1 of 1

APPENDIX C – ALTERNATIVE PLANS



PREPARED FOR:

Skaff Petroleum, Inc.
334 Grafton Street,
Worcester, MA 01604

TITLE:

DEVELOPMENT
ALTERNATIVE A

For

#1603 - #1605 Main Street

In

Leicester, MA

PREPARED BY:

Allen Engineering
& Associates, Inc.
Civil Engineers · Surveyors
Land Development Consultants
One Charlesview Road
Suite 2
Hopedale, Ma 01747
(508) 381-3212 · Phone
www.allen-ea.com

SCALE: 1"=30 FEET

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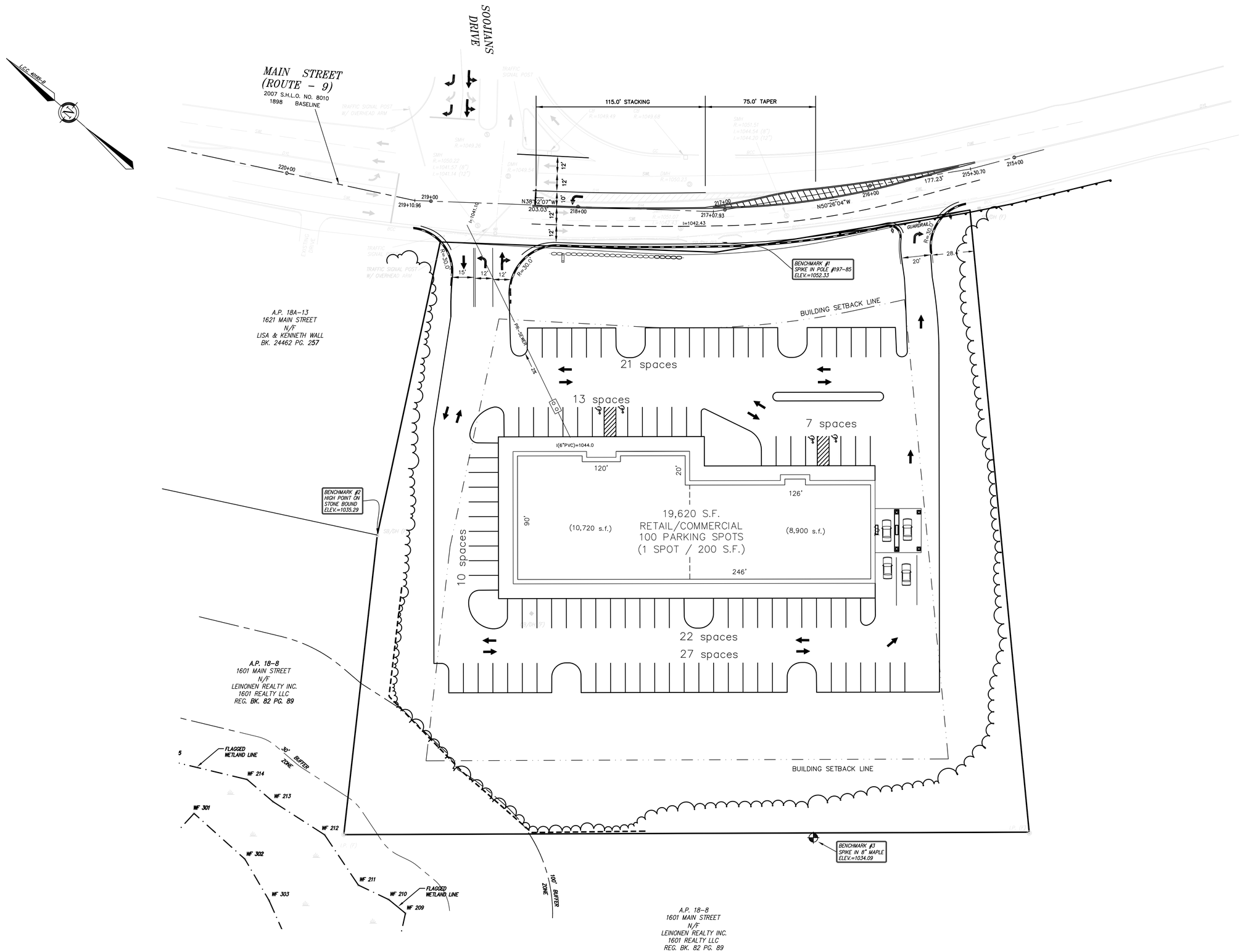
DATE: May 26, 2021

REVISIONS

#	DATE	DESCRIPTION	INIT

JOB NO: 00047

SHEET: 1 of 1



PREPARED FOR:

Skaff Petroleum, Inc.
334 Grafton Street,
Worcester, MA 01604

TITLE:

PROPOSED
ALTERNATIVE B
For
#1603 - #1605 Main Street
In
Leicester, MA

PREPARED BY:

Allen Engineering
& Associates, Inc.
Civil Engineers · Surveyors
Land Development Consultants
One Charlesview Road
Suite 2
Hopedale, Ma 01747
(508) 381-3212 · Phone
www.allen-ea.com

SCALE: 1"=30 FEET

0 30 60 90

DATE: May 26, 2021

REVISIONS

#	DATE	DESCRIPTION	INIT

JOB NO: 00047

SHEET: 1 of 1

APPENDIX D – LIST OF LOCAL, STATE AND FEDERAL PERMITS

LIST OF LOCAL, STATE AND FEDERAL PERMITS

Gas Station Development
Environmental Notification Form

LOCAL PERMITS:

- PERMIT: ORDER OF CONDITIONS
  ISSUING AUTHORITY: LEICESTER CONSERVATION COMMISSION

- SITE PLAN APPROVAL
  ISSUING AUTHORITY: LEICESTER PLANNING BOARD

- USE SPECIAL PERMITS (FOR GAS STATION, DRIVE-THRU AND SELF-STORAGE)
  ISSUING AUTHORITY: LEICESTER PLANNING BOARD

- VARIANCE PETITION
  ISSUING AUTHORITY: LEICESTER ZONING BOARD OF APPEALS

STATE PERMITS:

- PERMIT: HIGHWAY ACCESS PERMIT
  ISSUING AUTHORITY: MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (DISTRICT 3)

FEDERAL PERMITS:

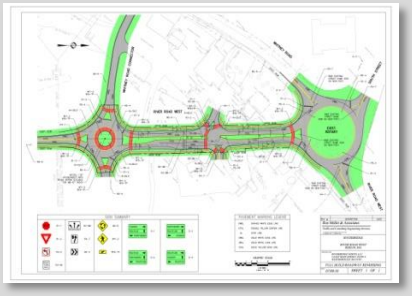
- PERMIT: CONSTRUCTION GENERAL PERMIT UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
  ISSUING AUTHORITY: U.S. ENVIRONMENTAL PROTECTION AGENCY

APPENDIX E – TRAFFIC IMPACT AND ACCESS STUDY

Ron Müller & Associates
Traffic Engineering and Consulting Services

56 Teresa Road
Hopkinton, MA 01748
Tel.: (508) 395-1576
Fax: (508) 435-2481
www.RonMullerAssociates.com

Quality



Traffic Impact and Access Study

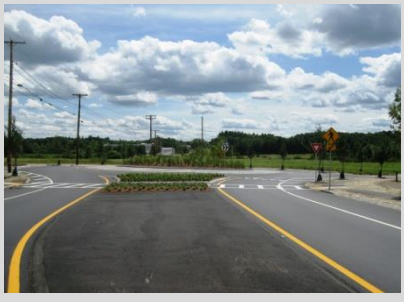
Gas Station Development
1603-1605 Main Street
Leicester, Massachusetts

Accuracy

Prepared for:

Skaff Petroleum, Inc.
344 Grafton Street
Worcester, MA 01604

Integrity



COMMONWEALTH OF MASSACHUSETTS
RONALD MÜLLER
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March 29, 2021

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Traffic Impact and Access Study

To:	Mr. Jean Skaff Skaff Petroleum, Inc. 334 Grafton Street Worcester, MA 01604	Reg:	Gas Station Development 1603-1605 Main Street Leicester, MA
		Date:	March 29, 2021
From:	Kirsten Braun, P.E., Associate Ron Müller, P.E., Principal	Project No.:	20009

INTRODUCTION

Ron Müller & Associates (RMA) has conducted this Traffic Impact and Access Study to evaluate the traffic impacts of a proposed gas station/convenience store and self-storage facility development project to be located at 1603-1605 Main Street (Route 9) opposite the Walmart driveway (Soojians Drive) in Leicester, Massachusetts. This study presents an update to a traffic study[1] conducted by RMA in 2013 for a similar development on the site. At that time, the Town of Leicester approved an 8 vehicle-fueling position gas station on the site with a 3,960 square foot convenience store/fast-food restaurant with drive-through window, a car wash, and a 10,000 square foot retail/bank building with drive-up teller lanes.

As currently proposed, the development includes the construction of a 10-vehicle fueling position gas station with an approximately 5,000 square foot convenience store that will include a fast-food restaurant with a drive-through window. The car wash is no longer proposed and the adjacent 10,000 square foot building is now proposed as three-story 30,000 square foot self-storage facility. Access to the development has not changed and will be provided via a new driveway to be constructed on Route 9 opposite the Walmart driveway to form the fourth leg of the existing signalized intersection, as well as a separate right-out-only driveway near the site's eastern property line. The site location in relation to the surrounding roadways is shown on Figure 1.

[1] *Traffic Impact and Access Study, Gas Station/Retail Development, Leicester, MA;* prepared for Snowflake, LLC; prepared by Ron Müller & Associates; March 14, 2013.

Figure 1
Site Location Map

This study provides an estimate of the expected traffic generation and distribution characteristics of the project, evaluates the impact of that traffic on Route 9 and its intersections with the Walmart driveway and the site driveways, and recommends improvements to assure safe and efficient access to/from the site. As documented in this report, most of the traffic generated by the proposed

uses comes from the traffic already on Route 9. In fact, the current development adds far fewer new trips to Route 9 than the prior approved development. Based on an analysis of project impacts, the development can be accommodated with minimal impact to the traffic on Route 9 and the intersection with the Walmart driveway. The proposed drive-through lane for the fast-food use can accommodate the anticipated queues. Several recommendations are made in this report including the design and location of the main driveway, construction of a westbound left-turn lane at the intersection, elimination of one of the two Route 9 eastbound through lanes, accommodations for bicycle traffic, and limiting landscaping and signs within the sight triangles so as not to impede sight distances for drivers exiting the site.

EXISTING CONDITIONS

Study Area

Evaluation of the traffic impacts associated with the proposed site development requires an evaluation of existing and projected traffic volumes, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets. In preparing this study for the site, the following intersections were analyzed and evaluated:

- Route 9 at Walmart Driveway and main site drive
- Route 9 at east site driveway

The proposed development is expected to have a minimal effect on traffic operations beyond this study area.

Traffic Volumes and Observations

Base traffic conditions within the study area were developed by conducting automatic traffic recorder (ATR) counts on Route 9 adjacent to the site as well as manual turning movement counts (TMC's) at the Route 9 and Walmart driveway intersection. The ATR counts were conducted in March 2013 and in December 2020 to collect both weekday and Saturday daily volume conditions and the TMC's were conducted during the weekday AM peak period (7:00 to 9:00 AM), the weekday PM peak period (4:00 to 6:00 PM), and the Saturday midday peak period (11:00 AM to 2:00 PM) in February and March 2013. Updated turning movement counts were not conducted for this study due to the effects of the current coronavirus pandemic, but the ATR counts were used to adjust the prior TMC's to reflect current volume conditions. All traffic count data are provided in the Appendix. The count data indicate that the weekday AM peak hour occurs from 7:15 to 8:15 AM, the weekday PM peak hour occurs from 4:45 to 5:45 PM, and the Saturday peak hour occurs from 12:00 to 1:00 PM.

To determine if the count data needed to be adjusted to represent annual average-month conditions consistent with state guidelines for traffic impact assessment, historical traffic volume data were obtained from the Massachusetts Department of Transportation (MassDOT). Based on the nearest MassDOT permanent count station reflective of the area and roadway facility (Station 3140 located on Route 122 in Paxton), traffic during the months of February and March are approximately 12 percent lower than average and December volumes are approximately 14 percent lower that annual average-month conditions. The counted volumes were accordingly upwardly adjusted by these factors.

In addition, to provide a meaningful comparison between the two count dates, a historical traffic growth rate was applied to the 2013 counts. Based on the same permanent count station data, traffic in the area has grown at an average rate of approximately 1 percent per year. Accordingly, the 2013 counts were further upwardly adjusted by a compounded rate of 7.2 percent to reflect current, pre-pandemic volume conditions. A comparison of the 2013 and 2020 traffic counts is provided in Table 1. All seasonal and historical adjustment data are provided in the Appendix.

Table 1
Average-Month Traffic Volume Comparison [a]

Location/Time Period	2013 Counts	Adjusted to 2020 Volumes [b]	2020 Counts	Percent Change
Route 9 Adjacent to the Site:				
Weekday	18,650	20,000	19,380	-3.1%
Saturday Daily	17,840	19,130	17,190	-10.1%

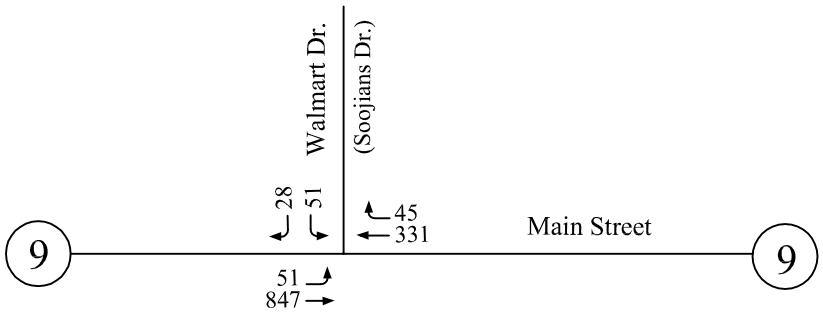
[a] All volumes seasonally adjusted to average-month conditions, in vehicles per day.
[b] Applying a 1% per year traffic growth rate compounded over 7 years (factor of 1.072).

As shown by this comparison, even after adjusting for seasonal variation and traffic growth, current volumes are lower than anticipated, which is to be expected given the current coronavirus pandemic and its effect on traffic. Accordingly, the turning movement counts collected in 2013 were used in this study, but adjusted to reflect 2021 annual average-month conditions using the factors described above. The 2021 Existing weekday AM, PM, and Saturday peak hour traffic flow networks are shown on Figure 2.

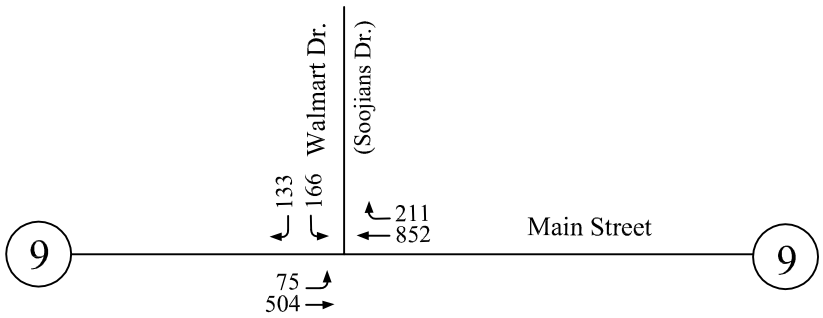
Accidents

Accident data for the study intersection were obtained from MassDOT for the period between 2016 and 2018, the most recent three-year period available for reporting purposes at the time this report was prepared. A summary of the MassDOT accident data is provided in Table 2. In addition to

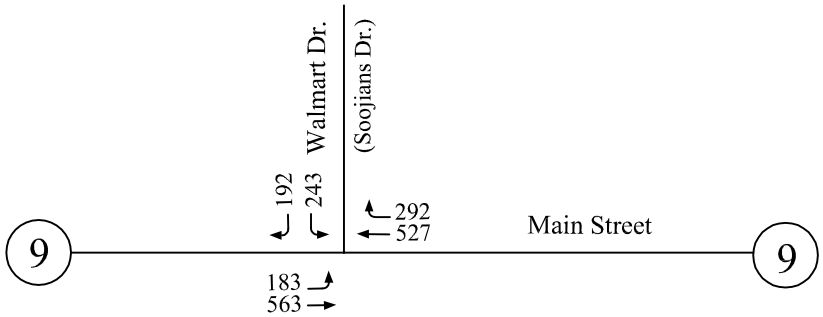
Figure 2
2021 Existing
Peak Hour Traffic Volumes



Weekday AM Peak Hour



Weekday PM Peak Hour



NOT TO SCALE

Saturday Peak Hour

the summary, accident occurrence should also be compared to the volume of traffic through a particular intersection to determine any significance. Accordingly, the accident rate was calculated for the intersection and compared with the statewide and district-wide averages. An intersection accident rate is a measure of the frequency of accidents compared to the volume of traffic through an intersection and is presented in accidents per million entering vehicles (acc/mev). For signalized intersections, the statewide average accident rate is 0.78 acc/mev and the district-wide (District 3) accident rate is 0.89 acc/mev. A comparison of the calculated accident rate to the statewide and district-wide averages can be used to establish the significance of accident occurrence and whether or not potential safety problems exist. The crash rate worksheet is provided in the Appendix.

Table 2
Accident Summary

Location	Number of Accidents			Severity [a]			Accident Type [b]						% During Wet/Icy Conditions
	Total	Avg./ Year	Accident Rate [c]	PD	PI	F	CM	RE	SV	SS	Ped	Other	
Route 9 at Walmart Drive	10	3.3	0.41	7	3	0	6	1	2	1	0	0	20%

Source: MassDOT Traffic Operations Safety Management System – 2016 through 2018 data.
[a] PD = property damage only; PI = personal injury; F = fatality.
[b] CM = cross movement/angle; RE = rear end; SV = single vehicle; SS = sideswipe; Ped = pedestrian.
[c] Measured in accidents per million entering vehicles.

As shown in Table 2, the intersection of Route 9 at the Walmart Driveway (Soojians Drive) experienced a total of 10 accidents over the three-year period, averaging just over three accidents per year. The calculated crash rate (0.41) is substantially lower than the statewide and district-wide averages, indicating that the number of crashes is not significant given the volume of traffic through the intersection. The intersection is accordingly not listed as a top crash location in the MassDOT database of Highway Safety Improvement Program (HSIP) eligible clusters. The majority of the accidents (70 percent) involved property damage only and most of the accidents (60 percent) were cross-movement, or angle-type collisions, which are typical at signalized intersections with permitted signal phasing on the approaches. No fatalities were reported at this intersection.

Vehicle Speeds

Speed measurements were conducted along Route 9 adjacent to the site by measuring the elapsed time for vehicles traveling a short, pre-measured distance between two checkpoints. The travel time was recorded using the automatic traffic recorder and the speed is derived by dividing the

elapsed time into the measured distance between checkpoints. The results of the speed measurements are summarized in Table 3.

Table 3
Observed Travel Speeds [a]

Location/Direction	Posted Speed Limit	Average Speed	85th Percentile Speed [b]
Route 9 Adjacent to Site:			
Eastbound	45	43	48
Westbound	45	40	45

[a] In miles per hour (mph).
[b] Speed at, or below which 85 percent of all observed vehicles travel.

As shown, the observed speeds on Route 9 were generally consistent with the posted speed limit, with 85th percentile speeds just slightly higher ranging between 45 and 48 mph. The highest observed 85th speeds were used to calculate the required sight distances for the proposed driveways.

Sight Distance

To identify potential safety concerns associated with site access and egress, sight distances have been evaluated at the existing and proposed site driveway locations to determine if the available sight distances for vehicles exiting the site meet or exceed the minimum distances required for approaching vehicles to safely stop. The available sight distances were compared with minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO)[2]. AASHTO is the national standard by which vehicle sight distance is calculated, measured, and reported. The MassDOT and the Executive Office of Energy and Environmental Affairs (EEA) require the use of AASHTO sight distance standards when preparing traffic impact assessments and studies, as stated in their guidelines for traffic impact assessment.

Sight distance is the length of roadway ahead that is visible to the driver. Stopping Sight Distance (SSD) is the minimum distance required for a vehicle traveling at a certain speed to safely stop before reaching a stationary object in its path. The values are based on a driver perception and reaction time of 2.5 seconds and a braking distance calculated for wet, level pavements. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. Stopping sight distance is measured from an eye height of 3.5 feet to an object height of 2 feet above street

[2] *A Policy on Geometric Design of Highways and Streets, 7th Edition*; American Association of State Highway and Transportation Officials (AASHTO); 2018.

level, equivalent to the taillight height of a passenger car. The SSD is measured along the centerline of the traveled way of the major road.

Intersection sight distance (ISD) is provided on minor street approaches to allow the drivers of stopped vehicles a sufficient view of the major roadway to decide when to enter the major roadway. By definition, ISD is the minimum distance required for a motorist exiting a minor street to turn onto the major street, without being overtaken by an approaching vehicle reducing its speed from the design speed to 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet above street level. The use of an object height equal to the driver eye height makes intersection sight distances reciprocal (i.e., if one driver can see another vehicle, then the driver of that vehicle can also see the first vehicle). When the minor street is on an upgrade that exceeds 3 percent, grade correction factors are applied.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersection. In accordance with the AASHTO manual, *"If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road."* Accordingly, ISD should be at least equal to the distance required to allow a driver approaching the minor road to safely stop.

The available SSD and ISD at the proposed site driveway locations were measured and compared to minimum requirements as established by AASHTO. Since the requirements are based on the speed of traffic on the adjacent streets, the results of the vehicle speed study on Route 9 were used for this purpose. The required minimum sight distances for these speeds are compared to the available distances, as shown in Table 4.

Table 4
Sight Distance Summary

Direction	Intersection Sight Distance (feet)		
	Measured	Minimum Required [a]	Desirable [b]
Route 9 at Main Site Drive:			
East of intersection	500+	400	500
West of Intersection	500+	400	500
Route 9 at East Site Drive:			
East of intersection	500+	400	500
West of Intersection	500+	400	500

[a] Values based on AASHTO SSD requirements for vehicles driving at the observed 85th percentile speeds of 48 mph on Route 9.
[b] Values based on AASHTO ISD requirements for posted speed limit of 45 mph on Route 9.

As shown in the table, ample sight distances exist at both proposed site driveway locations exceeding both minimum requirements and desirable distances. Safe operation can therefore be expected. Any proposed landscaping or signs in the vicinity of the driveways should be kept low to the ground (less than 2 feet above street level within the sight triangles) or set back sufficiently so as not to impede sight distances for drivers exiting the site.

FUTURE CONDITIONS

Traffic Growth

Future traffic conditions were projected to the year 2028, representing a 7-year design horizon consistent with state requirements for traffic impact analysis. To project traffic conditions within this design horizon, two components of traffic growth were included. First, an annual average traffic growth rate was determined to account for general population growth and smaller development projects that may impact traffic along Route 9 in the site vicinity. Based on the nearest MassDOT permanent count station reflective of the area and roadway facility (Station 3140 located on Route 122 in Paxton), traffic in the area has grown at an average rate of approximately 1.0 percent per year and this growth rate was accordingly applied to the existing volumes to represent future volume conditions.

Second, any planned or approved specific developments in the area that would generate a significant volume of traffic on study area roadways within the next five years were investigated.

Based on discussions with officials from the Town of Leicester, no other development projects were identified.

No-Build Conditions

The 2028 No-Build networks were accordingly developed by applying a compounded 1.0 percent annual growth rate (7.2 percent over seven years) to the existing adjacent street volumes. The 2028 No-Build peak-hour traffic-flow networks are shown on Figure 3.

Trip Generation

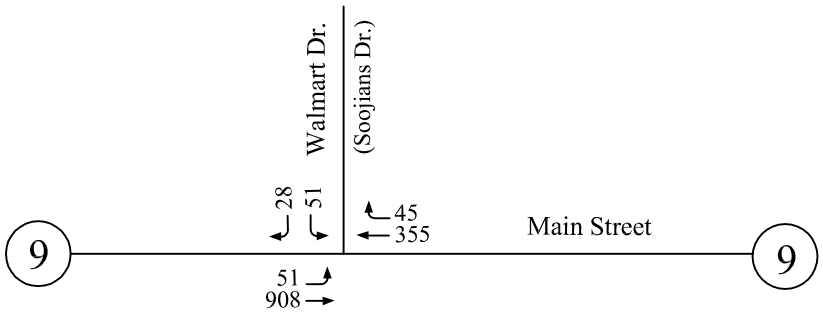
As proposed, the development will consist of a gas station with 10-vehicle fueling positions and an approximately 5,000 square foot convenience store that will include a fast-food restaurant with a drive-through window. In addition, a three story 30,000 square foot adjacent self-storage building is proposed on the site.

To estimate the volume of traffic to be generated by development of the site, trip-generation rates published in the ITE *Trip Generation Manual*[3] were researched. Land Use Code (LUC) 960 (Super Convenience Market/Gas Station) trip rates were accordingly applied to the proposed 10 vehicle fueling positions (vfp) and LUC 151 (Mini Warehouse) trip rates were applied to the proposed 30,000 square feet of gross floor area. The ITE manual defines LUC 960 as a gasoline station with convenience market where there is significant business related to the sale of convenience items (including freshly made coffee and sandwiches, bakery items, breakfast items, etc.) and the fueling of motor vehicles. This land use code is appropriate for sites where the convenience market is at least 3,000 gross square feet and the gas station provides at least 10 vehicle fueling positions.

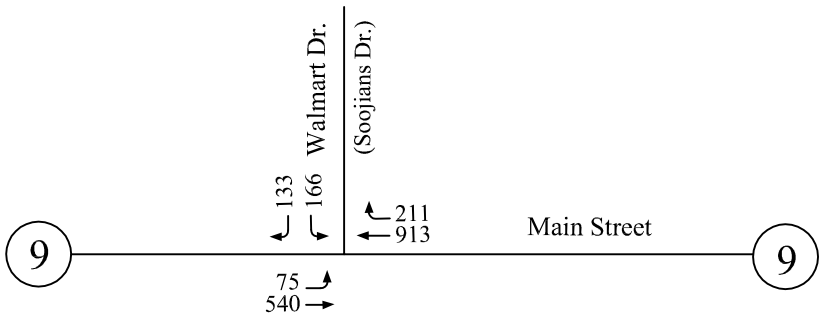
Since a portion of the convenience market will be occupied by a fast-food restaurant with drive-through window, a comparison was made between the trips generated using LUC 960 and those that would be generated using a combination of LUC 945 (Gasoline/Service Station with Convenience Market) based on 10 vfp plus LUC 934 (Fast Food Restaurant with Drive-Through Window) based on 2,000 square feet of space that the fast-food restaurant will occupy within the convenience store. The results of this comparison showed that using LUC 960 produces higher peak hour traffic generation and comparable daily traffic generation. Accordingly, the higher numbers were used in this report to present a conservative analytical scenario. A summary of the anticipated site traffic generation is provided in Table 5 and all trip-generation data are provided in the Appendix.

[3] *Trip Generation Manual, 10th Edition;* Institute of Transportation Engineers; Washington, DC; 2017.

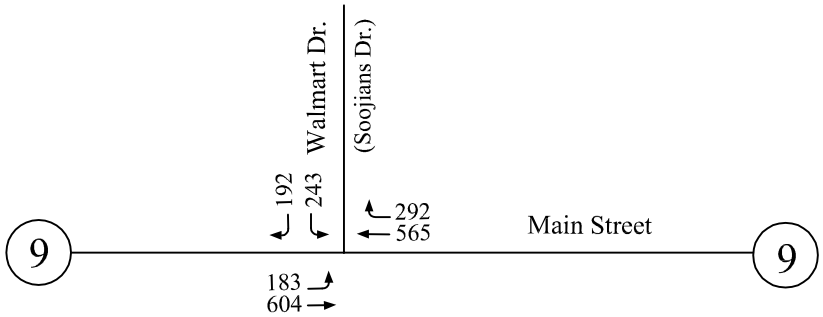
Figure 3
2028 No-Build
Peak Hour Traffic Volumes



Weekday AM Peak Hour



Weekday PM Peak Hour



NOT TO SCALE

Saturday Peak Hour

Table 5
Trip Generation Summary

Time Period	Gas Station/ Convenience Store [a]	Self-Storage Warehouse [b]	Total Trips	Pass-By Trips [c]	**New Trips**
Weekday Daily	2,310	50	2,360	1,760	**600**
Weekday AM Peak Hour					
Enter	141	2	143	107	**36**
Exit	140	1	141	106	**35**
Total	281	3	284	213	**71**
Weekday PM Peak Hour					
Enter	115	2	117	87	**30**
Exit	115	3	118	87	**31**
Total	230	5	235	174	**61**
Saturday Peak Hour					
Enter	117	5	122	89	**33**
Exit	116	4	120	88	**32**
Total	233	9	242	177	**65**

[a] ITE Land Use Code 960 (Super Convenience Market/Gasoline Station) trip rates applied to 10 vfp.
[b] ITE Land Use Code 151 (Mini Warehouse) trip rates applied to 30,000 sf.
[c] Pass-by rates from ITE Trip Generation Handbook, 3rd Edition, LUC 960 (Super Convenience Market/Gas Station); 76% applied to all gas station volumes.

Not all of the trips generated by the project represent new trips to the study area roadways. Studies have shown that for gas stations and convenience stores, a substantial portion of the site-generated trips are already present in the adjacent passing stream of traffic. This traffic is referred to as pass-by traffic. Based on information published in the ITE *Trip Generation Handbook,*[4] the average pass-by trip percentage for these types of uses (LUC 960) is 76 percent. Table 5 therefore also summarizes the expected volume of pass-by trips and the resulting new trips to be added to the surrounding roadways. It should be noted that the volume of pass-by traffic does not reduce the total volume of traffic generated by the development and the total trips generated will still be realized as turning movements at the site driveways.

As shown in Table 5, while the project is expected to generate a total of 2,360 weekday daily vehicle trips with 235 to 284 trips during the peak hours, the actual volume of *new* traffic to be added to Route 9 is significantly lower with 600 *new* weekday daily trips and 61 to 71 *new* trips during the peak hours.

[4] *Trip Generation Handbook, 3rd Edition;* Institute of Transportation Engineers; Washington, DC; September 2017.

It is important to note that in 2013, the site received approvals from the Town of Leicester to construct an 8 vehicle-fueling position gas station with a 3,960 square foot convenience store that also included a fast-food restaurant with a drive-through window. In addition, the project at that time included a separate building for a car wash and an adjacent 10,000 square foot building that was to contain a bank with drive-up teller lanes and several smaller retail stores. A comparison of the new trips to be added to the surrounding roadways between the current and prior development proposals for the site is shown in Table 6.

Table 6
Trip Generation Comparison – New Trips

Time Period	Current Project [a]	Prior Approved Project [b]	Difference
Weekday Daily	600	1,840	-1,240
Weekday AM Peak Hour			
Enter	36	75	-39
Exit	35	71	-36
Total	71	146	-75
Weekday PM Peak Hour			
Enter	30	82	-52
Exit	31	85	-54
Total	61	167	-106
Saturday Peak Hour			
Enter	33	122	-89
Exit	32	120	-88
Total	65	242	-177

[a] From Table 5.
[b] From *Traffic Impact and Access Study, Gas Station/Retail Development, Leicester, MA;* prepared for Snowflake LLC; prepared by Ron Müller & Associates; March 14, 2013 - Table 6, Page 10.

As shown by this comparison, the current development project is expected to add far fewer new trips to Route 9 than the prior approved project. On a weekday daily basis, 1,240 fewer weekday daily vehicle trips will be added to Route 9 while during the critical peak hours, between 75 and 177 fewer trips will be added over the approved project.

MEPA Thresholds

Route 9 adjacent to the site is under MassDOT jurisdiction and the project will therefore require a Highway Access Permit from MassDOT. Review and approval through the Massachusetts

Environmental Policy Act (MEPA) office will also be required if the project exceeds one or more of the following review thresholds:

- Generation of 2,000 or more daily vehicle trips
- Creation of 300 or more new parking spaces
- Generation of 1,000 or more daily vehicle trips plus 150 or more parking spaces
- Creation of 5 or more acres of additional impervious surface
- Alteration of 25 or more acres of additional land
- Site is located within an Area of Critical Environmental Concern (ACEC)

As shown in Table 5, the project will generate more than 2,360 daily vehicle trips, therefore exceeding the 2,000-trip threshold. Based on a review of the proposed site development plan, a total of approximately 75 parking spaces are proposed as part of the project. Therefore, the project exceeds one of the above thresholds and the submission of an Environmental Notification Form (ENF) to the MEPA office will be required.

Trip Distribution

The distribution of proposed new site traffic on the area roadways is based on the surrounding population densities, competing opportunities, existing travel patterns, and site access routes. Accordingly, approximately 60 percent of the new site traffic is expected on Route 9 to and from the east and 40 percent to and from the west. The distribution of pass-by traffic is expected to follow the directional distribution of adjacent street traffic. Since the site is located across from the Walmart supercenter and the site driveway will form the fourth leg of this intersection, 20 percent of the pass-by traffic is expected to and from Walmart and the remaining 80 percent to and from Route 9.

Build Conditions

Based on the traffic generation and distribution estimates for this project, the traffic volumes generated by the proposed project were assigned to the roadway network as shown on Figure 4 and were added to the 2028 No-Build traffic volumes to develop the 2028 Build traffic volumes. The 2028 Build peak hour traffic volumes are graphically depicted on Figure 5.

Traffic Increases

The proposed development project will result in increases in traffic on Route 9. Based on the above trip generation and distribution estimates, traffic-volume increases on Route 9 east of the site are expected in the range of 36 to 43 vehicles during the peak hours. West of the site, peak hour volume increases in the range of 25 to 28 vehicles are expected on Route 9. These increases represent on average about one additional vehicle every one to two minutes.

Figure 4
Site Generated
Peak Hour Traffic Volumes

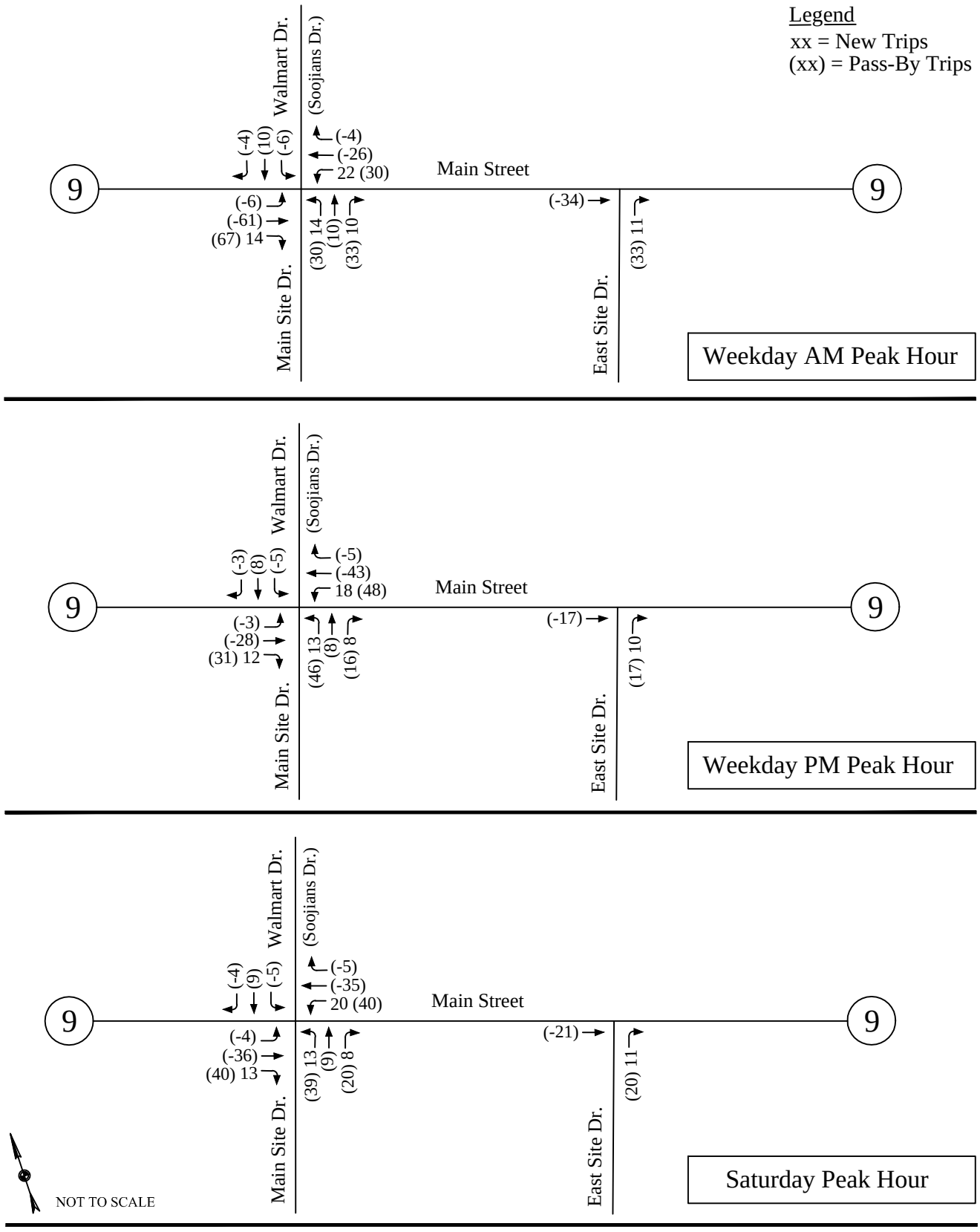
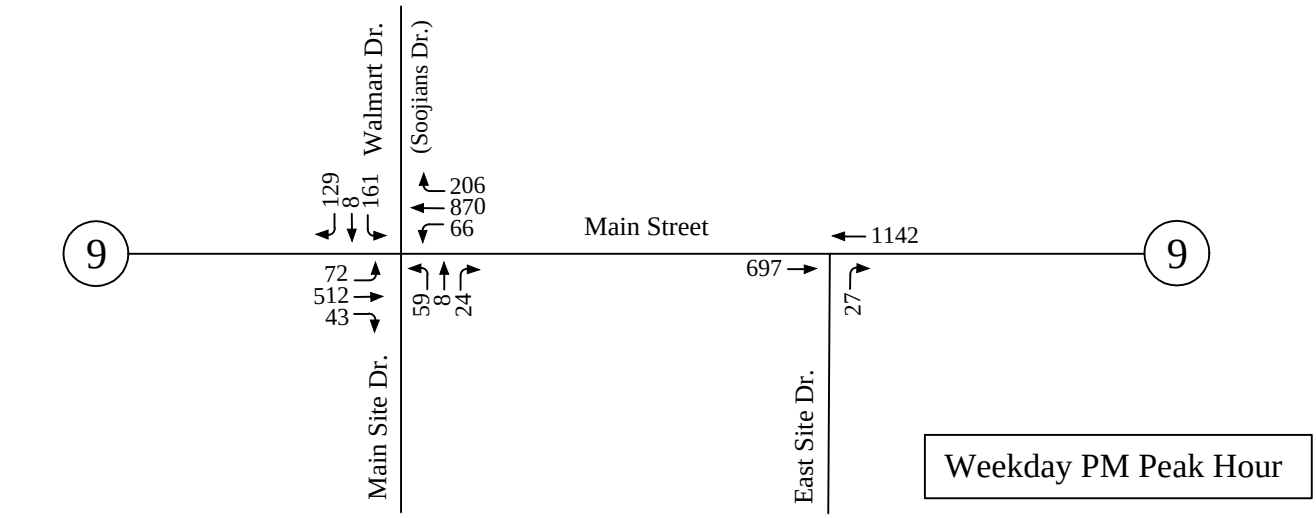
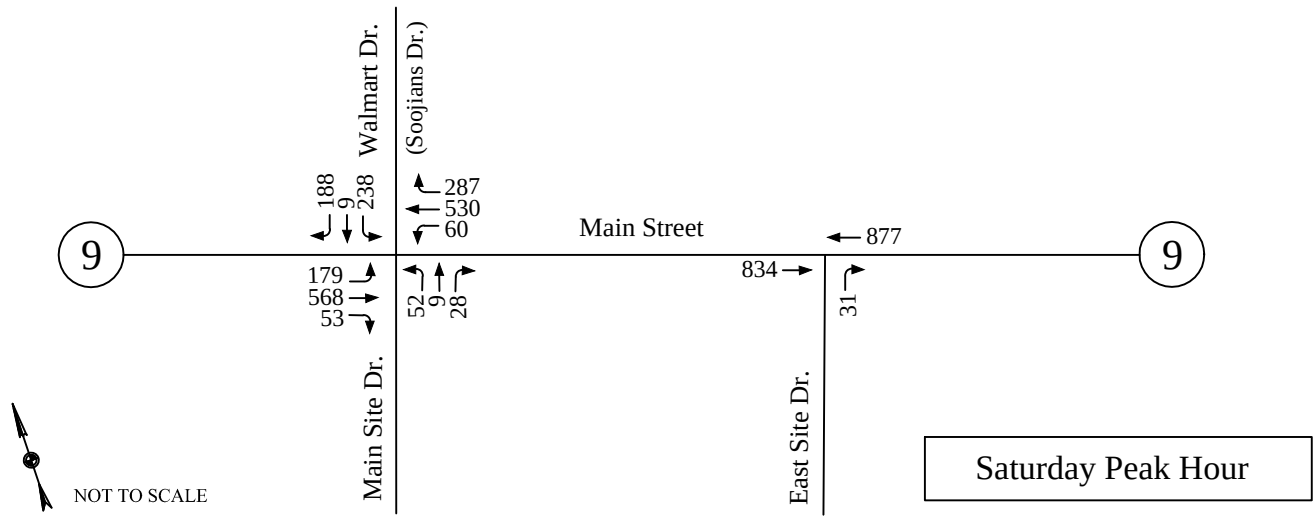


Figure 5
2028 Build
Peak Hour Traffic Volumes





Site Circulation and Queuing

Based on the site plan prepared by Allen Engineering & Associates, Inc., the fast-food drive through will provide a double drive through lane with two order boards for faster order processing and added queue storage. A by-pass lane is also proposed to allow motorists to leave the queue before the order board. In total, the double drive through can accommodate up to 17 vehicles in queue within the marked drive-through lanes. Based on a study[5] conducted at fast-food restaurants, the average of the maximum queues observed was 9 vehicles and the maximum queue observed at any one site was 13 vehicles. The study recommends that drive-through lanes at fast food restaurants provide stacking for 12 vehicles. These projected queues can easily be accommodated within he marked drive-through lanes without affecting on-site circulation or access.

As part of the development, an access easement with a driveway connection to the abutting residential home to the west of the site will be granted. The abutting property is zoned Highway Business-Industrial 1 (HB-1) and could be redeveloped into a commercial use in the future. The proposed access easement therefore allows the existing home and any future redevelopment of this property safe access to the traffic signal on Route 9. This easement was granted in return for allowing the proposed main driveway radius to extend beyond the property line and partially in front of the abutting parcel.

Site Access

As proposed, access to the site will be provided via a main driveway on Route 9 opposite the Walmart driveway, creating the fourth leg of this signalized intersection, and a right-out-only driveway at the site's eastern property line. To create the fourth leg at the intersection and provide safe and efficient access and egress to the site, it is recommended that the driveway be located directly opposite the Walmart driveway and provide one entering lane and two exiting lanes including a left-only lane and a shared through/right-turn lane. The corner radii at this new driveway should be 30 feet to accommodate larger delivery vehicles. The recommended driveway design and location requires that the western corner radius extend beyond the property line and in front of a portion of the abutter's property to the west. Written approval from this abutter has been obtained in exchange for the access easement described above.

To provide safe and efficient access to the site, it is recommended that Route 9 be widened to provide a westbound left-turn lane for safe storage of vehicles waiting to turn into the site. Route 9 should be widened on the south (site) side of the road to provide a 10-foot wide and 125-foot long left-turn lane to accommodate projected queues with a 75-foot taper. The length of this left-turn lane is limited due to the constraints of the existing Route 9 layout without acquiring land from the abutter to the east of the site. However, the design is very similar to the existing eastbound left-turn lane into the Walmart driveway where approximately 125 feet of storage are provided with a 40-foot taper.

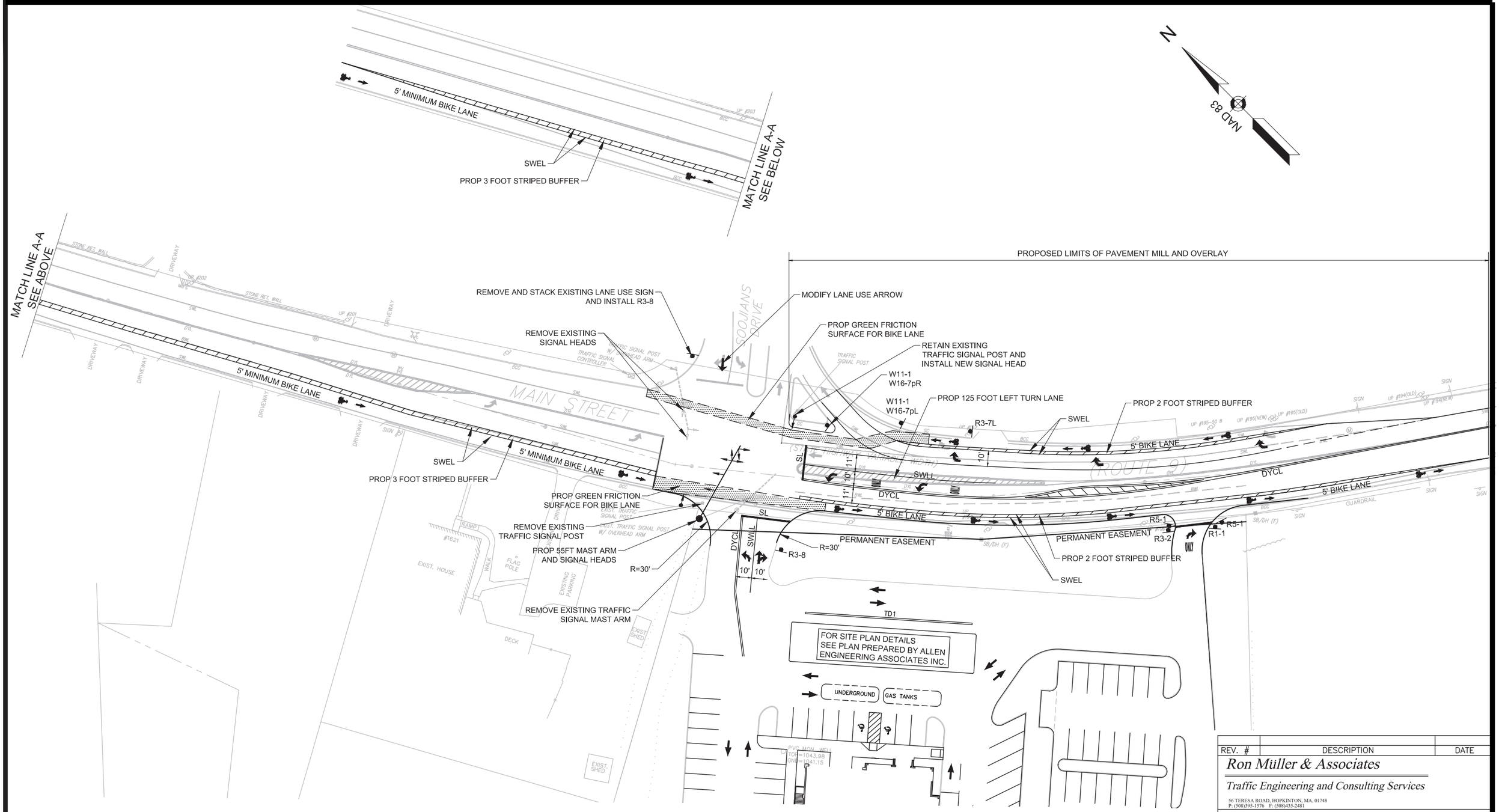
[5] *Drive-Through Queue Generation;* Mike Spack, PE, PTOE; CountingCars.com; February 2012.

The MassDOT Health Transportation Policy requires that all roadway improvement projects incorporate pedestrian and bicycle accommodation unless a design waiver is requested from these requirements. Based on discussions with MassDOT District 3, this section of Route 9 was found to have a very low potential for everyday walking, but a higher potential for everyday biking. The existing layout of Route 9 is very limited (even with a donation of land from the site) and cannot accommodate both pedestrian and bicycle facilities. It was accordingly decided to provide bicycle accommodations on both sides of the road and request a waiver from the requirement to construct sidewalks. However, the proponent will grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage.

Route 9 both east and west of the intersection provides one travel lane per direction with wide shoulders ranging in width from approximately 5 to 10 feet. These shoulder widths currently meet the requirements for safe bicycle travel. At the intersection, however, shoulder widths are reduced to 1 to 2 feet due to the additional travel and turn lanes provided and require bicyclists to travel in the through lanes to pass through the intersection. Based on discussions with MassDOT District 3, one of the two Route 9 eastbound through lanes through the intersection will be eliminated to instead provide buffered bike lanes and improve safety for bicyclists. An analysis of intersection operations with these modifications is presented in the next section. A conceptual plan showing the recommended improvements is provided on Figure 6.

The existing traffic signal be modified to accommodate these changes. The existing traffic signal mast arm and signal post on the south side of the road will be removed and a new mast arm will be installed to provide the appropriate signal heads for Route 9 eastbound, Walmart driveway, and site driveway traffic. An additional signal head for Route 9 westbound traffic will be installed on this mast arm to provide the requisite number of signal heads visible from 460 feet in advance of the intersection. There are currently existing signal heads for two driveways that used to exist on the south side of the road, one on the site and one on the abutter to the west. The existing signal head and post located on the channelizing island will be re-used to provide the requisite number of signal heads for the site driveway and the other signal head that formerly served a driveway on the abutting parcel will be removed.

The Walmart driveway approach will be modified to provide an exclusive left-turn lane and a shared through/right turn lane and the signal phasing will be modified to allow a lead phase for the Walmart driveway followed by a concurrent permitted phase between the Walmart and site driveway approaches. Both the eastbound and westbound left-turn movements will operate in a protected/permitted phase as they will then be opposed by only a single through lane. The yellow and all-red clearance intervals will be increased to be consistent with the current MassDOT clearance interval requirements.



PAVEMENT MARKING LEGEND	
DYCL	DOUBLE YELLOW CENTER LINE
SWEL	SOLID WHITE EDGE LINE
SWLL	SOLID WHITE LANE LINE
BWLL	BROKEN WHITE LANE LINE
SL	STOP LINE

SIGN SUMMARY

R1–1 R3–2 R3–7L R3–8 R5–1 W11–1 W16–7pL W16–7pR

REV. #	DESCRIPTION	DATE

Ron Müller & Associates

Traffic Engineering and Consulting Services

56 TERESA ROAD, HOPKINTON, MA, 01748
P: (508)395-1576 F: (508)435-2481

MAIN STREET (ROUTE 9)
AT SOOJIANS DRIVE
LEICESTER, MASSACHUSETTS

CONCEPTUAL IMPROVEMENT PLAN

DATE: *3/29/21*

FIGURE 6

CAPACITY ANALYSIS

Level-of-service (LOS) analyses were conducted at the Route 9 and Walmart driveway intersection and the project driveways under existing and projected volume conditions to determine the effect that the site generated traffic will have on traffic operations. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual*[6] (HCM) and is described in the Appendix. The maximum back of queue during an average signal cycle and a 95th percentile signal cycle was calculated for each lane group during the peak periods studied. The back of queue is the length of a backup of vehicles from the stop line of a signalized intersection to the last car in the queue that is required to stop, regardless of the signal indication. The length of this queue depends on a number of factors including signal timing, vehicle arrival patterns, and the saturation flow rate. For unsignalized intersections, the 95th percentile queue represents the length of queue of the critical minor-street movement that is not expected to be exceeded 95 percent of the time during the analysis period (typically one hour). In this case, the queue length is a function of the capacity of the movement and the movement's degree of saturation.

The level-of-service and queue results are presented in Table 7 and are discussed below. All analysis worksheets are provided in the Appendix. The site access and roadway improvements described in the previous section are assumed to be implemented under the Build-conditions analyses.

As shown in the table, the Route 9 and Walmart driveway intersection currently operates at desirable levels (LOS A to B) during all peak hours with individual movements through the intersection operating at LOS C or better. By 2028 with the anticipated growth in traffic, some increases in delay are expected, particularly on the Route 9 westbound through movement that drops to LOS D during the weekday PM peak hour, but overall operations remain at acceptable levels (LOS A to C).

The addition of the fourth leg to the intersection and associated improvements including the removal of one of the two Route 9 eastbound through lanes creates additional delay for all movements through the intersection, but individual movements remain at acceptable levels (LOS D or better) and overall intersection operations remain at LOS C or better. Maximum queues of 1 to 2 vehicles are expected in the proposed westbound left-turn lane. Queues for Route 9 eastbound through traffic will increase significantly due to the elimination of one of the lanes, particularly during the weekday PM peak hour when average queues of 437 feet are anticipated. The Walmart driveway will experience slightly smaller queues with these modifications and the site driveway approach will experience maximum queues of 2 to 3 vehicles. The proposed right-out-only driveway is expected to operate at a desirable level B during all peak hours with a maximum queue of one vehicle.

[6] *Highway Capacity Manual 2010;* Transportation Research Board; Washington, DC; 2010.

Table 7
Level-of-Service Analysis Summary

Location/Peak Hour/Movement	2021 Existing				2028 No-Build				2028 Build w/Improvements			
	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Route 9 at Walmart Drive/Site Drive												
Weekday AM Peak Hour												
EB Left	0.08	3.1	A	0/14	0.09	3.6	A	5/14	0.08	3.7	A	5/13
EB Thru	0.33	2.9	A	0/91	0.39	4.0	A	62/100	0.87	24.9	C	515/687
WB Left	---	---	---	---	---	---	---	---	0.32	8.8	A	6/15
WB Thru	0.33	9.2	A	37/142	0.36	10.6	B	86/154	0.32	8.1	A	83/130
NB Left	---	---	---	---	---	---	---	---	0.33	33.7	C	21/48
NB Thru/Right	---	---	---	---	---	---	---	---	0.26	14.6	B	5/33
SB Left	0.19	18.5	B	10/42	0.20	20.4	C	15/42	0.35	34.8	C	21/50
SB Thru/Right	0.07	4.8	A	0/12	0.07	5.0	A	0/12	0.19	16.9	B	5/28
Overall	---	**5.1**	**A**	---	---	**6.2**	**A**	---	---	**19.6**	**B**	---
Weekday PM Peak Hour												
EB Left	0.29	7.2	A	9/25	0.29	7.2	A	9/25	0.39	12.5	B	12/27
EB Thru	0.22	4.8	A	35/65	0.23	4.8	A	37/70	0.61	17.3	B	184/295
WB Left	---	---	---	---	---	---	---	---	0.19	7.5	A	11/25
WB Thru	0.89	30.6	C	322/629	0.95	39.5	D	420/692	0.94	39.9	D	437/647
NB Left	---	---	---	---	---	---	---	---	0.44	40.6	D	26/61
NB Thru/Right	---	---	---	---	---	---	---	---	0.20	18.7	B	3/28
SB Left	0.56	31.9	C	64/118	0.56	31.9	C	64/118	0.80	53.5	D	62/149
SB Thru/Right	0.23	7.7	A	15/47	0.23	8.9	A	19/51	0.33	7.7	A	3/44
Overall	---	**18.5**	**B**	---	---	**22.7**	**C**	---	---	**27.1**	**C**	---
Saturday Peak Hour												
EB Left	0.49	9.8	A	28/56	0.52	11.2	B	29/65	0.71	29.3	C	39/106
EB Thru	0.27	5.9	A	48/75	0.29	5.9	A	54/81	0.80	27.1	C	254/457
WB Left	---	---	---	---	---	---	---	---	0.28	11.3	B	12/28
WB Thru	0.77	24.8	C	181/301	0.80	26.5	C	203/334	0.82	29.6	C	202/332
NB Left	---	---	---	---	---	---	---	---	0.33	36.0	D	23/56
NB Thru/Right	---	---	---	---	---	---	---	---	0.21	18.1	B	4/31
SB Left	0.67	32.9	C	93/174	0.68	33.8	C	100/174	0.75	37.3	D	90/192
SB Thru/Right	0.25	3.4	A	2/36	0.26	4.3	A	397/43	0.36	5.9	A	3/48
Overall	---	**13.9**	**B**	---	---	**14.7**	**B**	---	---	**23.2**	**C**	---

[a] Volume-to-capacity ratio
[b] Average control delay in seconds per vehicle
[c] Level of service
[d] Average/95th percentile queue in feet, assuming 25 feet per vehicle

Table 7 (continued)
Level-of-Service Analysis Summary

Location/Peak Hour/Movement	2021 Existing				2028 No-Build				2028 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Route 9 at Right-Out Driveway												
Weekday AM Peak Hour												
NB Right	---	---	---	---	---	---	---	---	0.11	13.3	B	25
Weekday PM Peak Hour												
NB Right	---	---	---	---	---	---	---	---	0.04	10.9	B	25
Saturday Peak Hour												
NB Right	---	---	---	---	---	---	---	---	0.06	11.7	B	25

[a] Volume-to-capacity ratio
[b] Average control delay in seconds per vehicle
[c] Level of service
[d] 95th percentile queue in feet, assuming 25 feet per vehicle

CONCLUSIONS

Existing and future conditions at the study area intersections have been described and analyzed with respect to traffic operations and the impact of the proposed site development. Conclusions of this effort and recommendations are presented below.

- The proposed project consists of a gas station with 10 vehicle fueling positions, a 5,000 square foot convenience store containing a fast-food user with drive-through window, and a 30,000 square foot self storage building.

- Site access is proposed via a main driveway forming the fourth leg of the signalized intersection of Route 9 with the Walmart driveway and a right-out-only driveway on Route 9 at the site's eastern property line.

- The site was approved by the Town of Leicester in 2013 for a similar development that included an 8 vehicle-fueling position gas station with a 3,960 square foot convenience store/fast-food restaurant with drive-through window, a car wash, and a 10,000 square foot retail/bank building with drive-up teller lanes.

- The development is expected to generate between 235 and 284 peak hour vehicle trips (total of both entering and exiting traffic). However, since the development contains predominantly convenience-type uses, most of this traffic is expected to be drawn from the existing traffic already on Route 9. Accordingly, the actual volume of new traffic to be added to Route 9 ranges from 25 to 43 additional vehicles, representing on average about one additional vehicle every one to two minutes.

- When compared with the 2013-approved project, the current development project will generate between 75 and 177 fewer new trips to the surrounding streets. This is predominantly due to the elimination of the prior retail and bank uses.

- Vehicle queue studies at fast-food restaurants revealed a maximum queue of 13 vehicles in the drive-through lane. The proposed drive-through lane can accommodate up to 17 vehicles. Accordingly, ample queue storage is provided.

- Ample sight distances exist at the proposed driveways to allow safe operation. It is recommended that any landscaping or signs in the vicinity of the driveways be set back sufficiently so as not to impede sight distances for drivers exiting the site.

- It is recommended that the main driveway be located directly opposite the Walmart driveway and provide one entering lane and two exiting lanes. The recommended driveway design and location requires that the western corner radius extend beyond the property line and in front of a portion of the abutter's property to the west. Written approval from this abutter has been obtained in exchange for an access easement that allows this abutter access to the signal that will also benefit any future redevelopment of that parcel.

- Based on discussions with MassDOT, Route 9 will be widened to provide a westbound left-turn lane, one of the two existing Route 9 eastbound through lanes will be eliminated, and buffered bike lanes will instead be provided through the intersection that will tie in with the existing Route 9 shoulder widths for safe bicycle travel through the intersection. A conceptual plan showing the recommended improvements is provided on Figure 6 in this report.

- Due to the limited Route 9 right-of-way and the low potential for everyday walking along this section of Route 9, sidewalks are not proposed as part of the project. However, the proponent will grant a permanent highway easement from the site to accommodate the future construction of a sidewalk along the site frontage.

- The existing traffic signal will need to be modified to accommodate the fourth leg of the intersection and the addition of the westbound left-turn lane. The modifications include removal of existing signal equipment, installation of a new mast arm and signal heads, and adjustments to the signal phasing and timing consistent with current MassDOT standards.

- The creation of the fourth leg of the signalized intersection of Route 9 and the Walmart driveway will increase delays and queues for certain movements, but the intersection and all

lane groups will continue to operate at acceptable levels. Calculated queues in the proposed westbound left-turn lane and can easily be accommodated. The proposed right-out-only driveway is expected to operate at desirable levels.

- The project will require a Highway Access Permit from MassDOT for access to the site and the proposed roadway and signal improvements. In addition, the project will require an ENF submission to the MEPA office due the volume of daily traffic to be generated by the site.

APPENDIX

Traffic Count Data
Seasonal/Historical Adjustment Data and Crash Rate Worksheet
Trip Generation Worksheets and Drive-Through Queue Data
Capacity Analysis Methodology and Worksheets

Traffic Count Data

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-A

Count Date:
Thursday, December 3, 2020

Volume

EB						WB						Combined					
Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min
12:00 AM	11		12:00 PM	141		12:00 AM	10		12:00 PM	137		12:00 AM	21		12:00 PM	278	
12:15 AM	7		12:15 PM	142		12:15 AM	17		12:15 PM	158		12:15 AM	24		12:15 PM	300	
12:30 AM	6		12:30 PM	163		12:30 AM	7		12:30 PM	114		12:30 AM	13		12:30 PM	277	
12:45 AM	5	29	12:45 PM	132	578	12:45 AM	5	39	12:45 PM	171	580	12:45 AM	10	68	12:45 PM	303	1158
1:00 AM	5		1:00 PM	137		1:00 AM	5		1:00 PM	134		1:00 AM	10		1:00 PM	271	
1:15 AM	3		1:15 PM	128		1:15 AM	7		1:15 PM	137		1:15 AM	10		1:15 PM	265	
1:30 AM	4		1:30 PM	192		1:30 AM	3		1:30 PM	143		1:30 AM	7		1:30 PM	335	
1:45 AM	4	16	1:45 PM	150	607	1:45 AM	4	19	1:45 PM	157	571	1:45 AM	8	35	1:45 PM	307	1178
2:00 AM	13		2:00 PM	150		2:00 AM	6		2:00 PM	147		2:00 AM	19		2:00 PM	297	
2:15 AM	5		2:15 PM	165		2:15 AM	7		2:15 PM	150		2:15 AM	12		2:15 PM	315	
2:30 AM	4		2:30 PM	165		2:30 AM	3		2:30 PM	194		2:30 AM	7		2:30 PM	359	
2:45 AM	2	24	2:45 PM	143	623	2:45 AM	4	20	2:45 PM	176	667	2:45 AM	6	44	2:45 PM	319	1290
3:00 AM	8		3:00 PM	151		3:00 AM	8		3:00 PM	202		3:00 AM	16		3:00 PM	353	
3:15 AM	9		3:15 PM	169		3:15 AM	4		3:15 PM	190		3:15 AM	13		3:15 PM	359	
3:30 AM	6		3:30 PM	181		3:30 AM	4		3:30 PM	202		3:30 AM	10		3:30 PM	383	
3:45 AM	12	35	3:45 PM	174	675	3:45 AM	14	30	3:45 PM	199	793	3:45 AM	26	65	3:45 PM	373	1468
4:00 AM	22		4:00 PM	174		4:00 AM	2		4:00 PM	193		4:00 AM	24		4:00 PM	367	
4:15 AM	34		4:15 PM	156		4:15 AM	10		4:15 PM	206		4:15 AM	44		4:15 PM	362	
4:30 AM	45		4:30 PM	155		4:30 AM	6		4:30 PM	199		4:30 AM	51		4:30 PM	354	
4:45 AM	50	151	4:45 PM	143	628	4:45 AM	8	26	4:45 PM	164	762	4:45 AM	58	177	4:45 PM	307	1390
5:00 AM	48		5:00 PM	152		5:00 AM	12		5:00 PM	197		5:00 AM	60		5:00 PM	349	
5:15 AM	77		5:15 PM	137		5:15 AM	29		5:15 PM	193		5:15 AM	106		5:15 PM	330	
5:30 AM	109		5:30 PM	144		5:30 AM	26		5:30 PM	200		5:30 AM	135		5:30 PM	344	
5:45 AM	99	333	5:45 PM	125	558	5:45 AM	35	102	5:45 PM	166	756	5:45 AM	134	435	5:45 PM	291	1314
6:00 AM	118		6:00 PM	134		6:00 AM	33		6:00 PM	155		6:00 AM	151		6:00 PM	289	
6:15 AM	188		6:15 PM	94		6:15 AM	45		6:15 PM	135		6:15 AM	233		6:15 PM	229	
6:30 AM	189		6:30 PM	82		6:30 AM	59		6:30 PM	156		6:30 AM	248		6:30 PM	238	
6:45 AM	173	668	6:45 PM	92	402	6:45 AM	68	205	6:45 PM	104	550	6:45 AM	241	873	6:45 PM	196	952
7:00 AM	150		7:00 PM	76		7:00 AM	53		7:00 PM	107		7:00 AM	203		7:00 PM	183	
7:15 AM	191		7:15 PM	64		7:15 AM	82		7:15 PM	84		7:15 AM	273		7:15 PM	148	
7:30 AM	171		7:30 PM	62		7:30 AM	69		7:30 PM	122		7:30 AM	240		7:30 PM	184	
7:45 AM	158	670	7:45 PM	61	263	7:45 AM	104	308	7:45 PM	85	398	7:45 AM	262	978	7:45 PM	146	661
8:00 AM	134		8:00 PM	64		8:00 AM	92		8:00 PM	72		8:00 AM	226		8:00 PM	136	
8:15 AM	148		8:15 PM	54		8:15 AM	99		8:15 PM	53		8:15 AM	247		8:15 PM	107	
8:30 AM	145		8:30 PM	48		8:30 AM	88		8:30 PM	79		8:30 AM	233		8:30 PM	127	
8:45 AM	127	554	8:45 PM	51	217	8:45 AM	100	379	8:45 PM	43	247	8:45 AM	227	933	8:45 PM	94	464
9:00 AM	120		9:00 PM	40		9:00 AM	114		9:00 PM	47		9:00 AM	234		9:00 PM	87	
9:15 AM	128		9:15 PM	29		9:15 AM	101		9:15 PM	39		9:15 AM	229		9:15 PM	68	
9:30 AM	120		9:30 PM	34		9:30 AM	117		9:30 PM	38		9:30 AM	237		9:30 PM	72	
9:45 AM	118	486	9:45 PM	32	135	9:45 AM	124	456	9:45 PM	32	156	9:45 AM	242	942	9:45 PM	64	291
10:00 AM	109		10:00 PM	34		10:00 AM	117		10:00 PM	21		10:00 AM	226		10:00 PM	55	
10:15 AM	122		10:15 PM	26		10:15 AM	109		10:15 PM	31		10:15 AM	231		10:15 PM	57	
10:30 AM	144		10:30 PM	23		10:30 AM	105		10:30 PM	17		10:30 AM	249		10:30 PM	40	
10:45 AM	111	486	10:45 PM	20	103	10:45 AM	108	439	10:45 PM	25	94	10:45 AM	219	925	10:45 PM	45	197
11:00 AM	122		11:00 PM	23		11:00 AM	106		11:00 PM	26		11:00 AM	228		11:00 PM	49	
11:15 AM	145		11:15 PM	17		11:15 AM	137		11:15 PM	21		11:15 AM	282		11:15 PM	38	
11:30 AM	135		11:30 PM	13		11:30 AM	108		11:30 PM	16		11:30 AM	243		11:30 PM	29	
11:45 AM	133	535	11:45 PM	11	64	11:45 AM	131	482	11:45 PM	20	83	11:45 AM	264	1017	11:45 PM	31	147
Total	3987			4853		Total	2505			5657		Total	6492			10510	
Percent	45.10%			54.90%		Percent	30.69%			69.31%		Percent	38.18%			61.82%	
Day Total			8840			Day Total			8162			Day Total			17002		
Peak Hour	6:30 AM			3:15 PM		Peak Hour	11:45 AM			3:30 PM		Peak Hour	11:45 AM			3:30 PM	
Volume	703			698		Volume	540			800		Volume	1119			1485	
P.H.F.	0.920			0.964		P.H.F.	0.854			0.971		P.H.F.	0.933			0.969	

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-A

Count Date:
Friday, December 4, 2020

Volume

EB						WB						Combined					
Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min
12:00 AM	11		12:00 PM	138		12:00 AM	11		12:00 PM	173		12:00 AM	22		12:00 PM	311	
12:15 AM	2		12:15 PM	195		12:15 AM	6		12:15 PM	164		12:15 AM	8		12:15 PM	359	
12:30 AM	6		12:30 PM	213		12:30 AM	8		12:30 PM	144		12:30 AM	14		12:30 PM	357	
12:45 AM	4	23	12:45 PM	173	719	12:45 AM	8	33	12:45 PM	179	660	12:45 AM	12	56	12:45 PM	352	1379
1:00 AM	2		1:00 PM	162		1:00 AM	5		1:00 PM	134		1:00 AM	7		1:00 PM	296	
1:15 AM	4		1:15 PM	188		1:15 AM	3		1:15 PM	175		1:15 AM	7		1:15 PM	363	
1:30 AM	5		1:30 PM	174		1:30 AM	4		1:30 PM	174		1:30 AM	9		1:30 PM	348	
1:45 AM	4	15	1:45 PM	162	686	1:45 AM	4	16	1:45 PM	178	661	1:45 AM	8	31	1:45 PM	340	1347
2:00 AM	2		2:00 PM	172		2:00 AM	7		2:00 PM	150		2:00 AM	9		2:00 PM	322	
2:15 AM	4		2:15 PM	162		2:15 AM	3		2:15 PM	210		2:15 AM	7		2:15 PM	372	
2:30 AM	9		2:30 PM	185		2:30 AM	6		2:30 PM	191		2:30 AM	15		2:30 PM	376	
2:45 AM	5	20	2:45 PM	170	689	2:45 AM	3	19	2:45 PM	185	736	2:45 AM	8	39	2:45 PM	355	1425
3:00 AM	7		3:00 PM	185		3:00 AM	7		3:00 PM	181		3:00 AM	14		3:00 PM	366	
3:15 AM	8		3:15 PM	175		3:15 AM	6		3:15 PM	219		3:15 AM	14		3:15 PM	394	
3:30 AM	14		3:30 PM	166		3:30 AM	7		3:30 PM	218		3:30 AM	21		3:30 PM	384	
3:45 AM	7	36	3:45 PM	203	729	3:45 AM	9	29	3:45 PM	228	846	3:45 AM	16	65	3:45 PM	431	1575
4:00 AM	24		4:00 PM	182		4:00 AM	10		4:00 PM	189		4:00 AM	34		4:00 PM	371	
4:15 AM	30		4:15 PM	170		4:15 AM	7		4:15 PM	210		4:15 AM	37		4:15 PM	380	
4:30 AM	37		4:30 PM	164		4:30 AM	10		4:30 PM	202		4:30 AM	47		4:30 PM	366	
4:45 AM	48	139	4:45 PM	160	676	4:45 AM	16	43	4:45 PM	195	796	4:45 AM	64	182	4:45 PM	355	1472
5:00 AM	59		5:00 PM	162		5:00 AM	17		5:00 PM	210		5:00 AM	76		5:00 PM	372	
5:15 AM	89		5:15 PM	171		5:15 AM	24		5:15 PM	219		5:15 AM	113		5:15 PM	390	
5:30 AM	79		5:30 PM	198		5:30 AM	25		5:30 PM	181		5:30 AM	104		5:30 PM	379	
5:45 AM	92	319	5:45 PM	139	670	5:45 AM	31	97	5:45 PM	179	789	5:45 AM	123	416	5:45 PM	318	1459
6:00 AM	108		6:00 PM	134		6:00 AM	34		6:00 PM	166		6:00 AM	142		6:00 PM	300	
6:15 AM	161		6:15 PM	153		6:15 AM	52		6:15 PM	190		6:15 AM	213		6:15 PM	343	
6:30 AM	168		6:30 PM	112		6:30 AM	58		6:30 PM	157		6:30 AM	226		6:30 PM	269	
6:45 AM	164	601	6:45 PM	144	543	6:45 AM	66	210	6:45 PM	131	644	6:45 AM	230	811	6:45 PM	275	1187
7:00 AM	166		7:00 PM	103		7:00 AM	62		7:00 PM	108		7:00 AM	228		7:00 PM	211	
7:15 AM	172		7:15 PM	102		7:15 AM	85		7:15 PM	112		7:15 AM	257		7:15 PM	214	
7:30 AM	169		7:30 PM	88		7:30 AM	78		7:30 PM	105		7:30 AM	247		7:30 PM	193	
7:45 AM	154	661	7:45 PM	85	378	7:45 AM	85	310	7:45 PM	108	433	7:45 AM	239	971	7:45 PM	193	811
8:00 AM	161		8:00 PM	93		8:00 AM	87		8:00 PM	75		8:00 AM	248		8:00 PM	168	
8:15 AM	146		8:15 PM	82		8:15 AM	111		8:15 PM	101		8:15 AM	257		8:15 PM	183	
8:30 AM	139		8:30 PM	67		8:30 AM	98		8:30 PM	69		8:30 AM	237		8:30 PM	136	
8:45 AM	135	581	8:45 PM	62	304	8:45 AM	116	412	8:45 PM	69	314	8:45 AM	251	993	8:45 PM	131	618
9:00 AM	128		9:00 PM	58		9:00 AM	131		9:00 PM	84		9:00 AM	259		9:00 PM	142	
9:15 AM	129		9:15 PM	53		9:15 AM	99		9:15 PM	56		9:15 AM	228		9:15 PM	109	
9:30 AM	168		9:30 PM	43		9:30 AM	111		9:30 PM	51		9:30 AM	279		9:30 PM	94	
9:45 AM	134	559	9:45 PM	48	202	9:45 AM	132	473	9:45 PM	58	249	9:45 AM	266	1032	9:45 PM	106	451
10:00 AM	154		10:00 PM	51		10:00 AM	107		10:00 PM	47		10:00 AM	261		10:00 PM	98	
10:15 AM	141		10:15 PM	40		10:15 AM	118		10:15 PM	48		10:15 AM	259		10:15 PM	88	
10:30 AM	131		10:30 PM	37		10:30 AM	149		10:30 PM	31		10:30 AM	280		10:30 PM	68	
10:45 AM	147	573	10:45 PM	31	159	10:45 AM	123	497	10:45 PM	30	156	10:45 AM	270	1070	10:45 PM	61	315
11:00 AM	137		11:00 PM	22		11:00 AM	137		11:00 PM	38		11:00 AM	274		11:00 PM	60	
11:15 AM	161		11:15 PM	21		11:15 AM	147		11:15 PM	34		11:15 AM	308		11:15 PM	55	
11:30 AM	149		11:30 PM	18		11:30 AM	169		11:30 PM	25		11:30 AM	318		11:30 PM	43	
11:45 AM	154	601	11:45 PM	11	72	11:45 AM	137	590	11:45 PM	24	121	11:45 AM	291	1191	11:45 PM	35	193
Total	4128			5827		Total	2729			6405		Total	6857			12232	
Percent	41.47%			58.53%		Percent	29.88%			70.12%		Percent	35.92%			64.08%	
Day Total			9955			Day Total			9134			Day Total			19089		
Peak Hour	11:45 AM			12:15 PM		Peak Hour	11:30 AM			3:15 PM		Peak Hour	11:45 AM			3:15 PM	
Volume	700			743		Volume	643			854		Volume	1318			1580	
P.H.F.	0.822			0.872		P.H.F.	0.929			0.936		P.H.F.	0.918			0.916	

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-AA

Count Date:
Saturday, December 12, 2020

Volume

EB						WB						Combined					
Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min
12:00 AM	14		12:00 PM	145		12:00 AM	12		12:00 PM	178		12:00 AM	26		12:00 PM	323	
12:15 AM	2		12:15 PM	178		12:15 AM	17		12:15 PM	169		12:15 AM	19		12:15 PM	347	
12:30 AM	7		12:30 PM	160		12:30 AM	14		12:30 PM	178		12:30 AM	21		12:30 PM	338	
12:45 AM	9	32	12:45 PM	164	647	12:45 AM	7	50	12:45 PM	184	709	12:45 AM	16	82	12:45 PM	348	1356
1:00 AM	8		1:00 PM	165		1:00 AM	8		1:00 PM	193		1:00 AM	16		1:00 PM	358	
1:15 AM	3		1:15 PM	173		1:15 AM	8		1:15 PM	179		1:15 AM	11		1:15 PM	352	
1:30 AM	4		1:30 PM	159		1:30 AM	4		1:30 PM	182		1:30 AM	8		1:30 PM	341	
1:45 AM	5	20	1:45 PM	166	663	1:45 AM	4	24	1:45 PM	174	728	1:45 AM	9	44	1:45 PM	340	1391
2:00 AM	9		2:00 PM	144		2:00 AM	7		2:00 PM	157		2:00 AM	16		2:00 PM	301	
2:15 AM	4		2:15 PM	188		2:15 AM	3		2:15 PM	166		2:15 AM	7		2:15 PM	354	
2:30 AM	4		2:30 PM	150		2:30 AM	4		2:30 PM	180		2:30 AM	8		2:30 PM	330	
2:45 AM	3	20	2:45 PM	154	636	2:45 AM	4	18	2:45 PM	176	679	2:45 AM	7	38	2:45 PM	330	1315
3:00 AM	5		3:00 PM	137		3:00 AM	3		3:00 PM	167		3:00 AM	8		3:00 PM	304	
3:15 AM	5		3:15 PM	126		3:15 AM	10		3:15 PM	157		3:15 AM	15		3:15 PM	283	
3:30 AM	3		3:30 PM	129		3:30 AM	4		3:30 PM	167		3:30 AM	7		3:30 PM	296	
3:45 AM	5	18	3:45 PM	126	518	3:45 AM	9	26	3:45 PM	163	654	3:45 AM	14	44	3:45 PM	289	1172
4:00 AM	16		4:00 PM	150		4:00 AM	13		4:00 PM	142		4:00 AM	29		4:00 PM	292	
4:15 AM	16		4:15 PM	124		4:15 AM	3		4:15 PM	122		4:15 AM	19		4:15 PM	246	
4:30 AM	16		4:30 PM	135		4:30 AM	4		4:30 PM	118		4:30 AM	20		4:30 PM	253	
4:45 AM	17	65	4:45 PM	121	530	4:45 AM	16	36	4:45 PM	120	502	4:45 AM	33	101	4:45 PM	241	1032
5:00 AM	15		5:00 PM	110		5:00 AM	12		5:00 PM	127		5:00 AM	27		5:00 PM	237	
5:15 AM	28		5:15 PM	116		5:15 AM	16		5:15 PM	106		5:15 AM	44		5:15 PM	222	
5:30 AM	36		5:30 PM	101		5:30 AM	19		5:30 PM	122		5:30 AM	55		5:30 PM	223	
5:45 AM	40	119	5:45 PM	95	422	5:45 AM	28	75	5:45 PM	109	464	5:45 AM	68	194	5:45 PM	204	886
6:00 AM	26		6:00 PM	106		6:00 AM	29		6:00 PM	85		6:00 AM	55		6:00 PM	191	
6:15 AM	49		6:15 PM	87		6:15 AM	23		6:15 PM	95		6:15 AM	72		6:15 PM	182	
6:30 AM	38		6:30 PM	63		6:30 AM	28		6:30 PM	83		6:30 AM	66		6:30 PM	146	
6:45 AM	61	174	6:45 PM	80	336	6:45 AM	35	115	6:45 PM	83	346	6:45 AM	96	289	6:45 PM	163	682
7:00 AM	58		7:00 PM	68		7:00 AM	51		7:00 PM	70		7:00 AM	109		7:00 PM	138	
7:15 AM	75		7:15 PM	71		7:15 AM	41		7:15 PM	87		7:15 AM	116		7:15 PM	158	
7:30 AM	76		7:30 PM	54		7:30 AM	44		7:30 PM	82		7:30 AM	120		7:30 PM	136	
7:45 AM	78	287	7:45 PM	65	258	7:45 AM	65	201	7:45 PM	67	306	7:45 AM	143	488	7:45 PM	132	564
8:00 AM	87		8:00 PM	43		8:00 AM	70		8:00 PM	57		8:00 AM	157		8:00 PM	100	
8:15 AM	84		8:15 PM	53		8:15 AM	80		8:15 PM	62		8:15 AM	164		8:15 PM	115	
8:30 AM	100		8:30 PM	38		8:30 AM	95		8:30 PM	48		8:30 AM	195		8:30 PM	86	
8:45 AM	111	382	8:45 PM	33	167	8:45 AM	92	337	8:45 PM	63	230	8:45 AM	203	719	8:45 PM	96	397
9:00 AM	117		9:00 PM	35		9:00 AM	103		9:00 PM	41		9:00 AM	220		9:00 PM	76	
9:15 AM	129		9:15 PM	45		9:15 AM	121		9:15 PM	57		9:15 AM	250		9:15 PM	102	
9:30 AM	137		9:30 PM	49		9:30 AM	105		9:30 PM	44		9:30 AM	242		9:30 PM	93	
9:45 AM	145	528	9:45 PM	34	163	9:45 AM	112	441	9:45 PM	45	187	9:45 AM	257	969	9:45 PM	79	350
10:00 AM	146		10:00 PM	33		10:00 AM	137		10:00 PM	34		10:00 AM	283		10:00 PM	67	
10:15 AM	152		10:15 PM	31		10:15 AM	164		10:15 PM	41		10:15 AM	316		10:15 PM	72	
10:30 AM	187		10:30 PM	26		10:30 AM	140		10:30 PM	22		10:30 AM	327		10:30 PM	48	
10:45 AM	159	644	10:45 PM	22	112	10:45 AM	168	609	10:45 PM	22	119	10:45 AM	327	1253	10:45 PM	44	231
11:00 AM	175		11:00 PM	25		11:00 AM	182		11:00 PM	18		11:00 AM	357		11:00 PM	43	
11:15 AM	160		11:15 PM	7		11:15 AM	160		11:15 PM	27		11:15 AM	320		11:15 PM	34	
11:30 AM	201		11:30 PM	8		11:30 AM	143		11:30 PM	17		11:30 AM	344		11:30 PM	25	
11:45 AM	163	699	11:45 PM	10	50	11:45 AM	176	661	11:45 PM	13	75	11:45 AM	339	1360	11:45 PM	23	125
Total	2988			4502		Total	2593			4999		Total	5581			9501	
Percent	39.89%			60.11%		Percent	34.15%			65.85%		Percent	37.00%			63.00%	
Day Total			7490			Day Total			7592			Day Total			15082		
Peak Hour	11:00 AM			12:15 PM		Peak Hour	11:45 AM			12:45 PM		Peak Hour	11:00 AM			12:45 PM	
Volume	699			667		Volume	701			738		Volume	1360			1399	
P.H.F.	0.869			0.937		P.H.F.	0.985			0.956		P.H.F.	0.952			0.977	

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-A

Count Date
Thursday, December 3, 2020

Speed (60-minute)

EB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	2	8	13	4	2	0	0	0	29	50.0	46.5
1:00 AM	0	0	0	0	0	2	5	6	3	0	0	0	0	16	49.8	45.1
2:00 AM	0	0	0	0	1	9	7	3	1	2	0	1	0	24	50.3	43.4
3:00 AM	0	0	0	0	0	2	14	9	8	1	0	1	0	35	51.0	46.3
4:00 AM	0	0	0	1	0	3	27	72	40	7	1	0	0	151	51.0	47.6
5:00 AM	0	1	0	2	5	6	68	163	73	10	5	0	0	333	51.0	46.9
6:00 AM	0	0	0	12	15	28	186	344	74	8	0	0	1	668	49.0	45.2
7:00 AM	0	0	0	1	11	63	271	257	59	6	0	1	1	670	49.0	44.4
8:00 AM	0	0	1	2	9	66	253	179	39	5	0	0	0	554	48.0	43.6
9:00 AM	0	0	2	2	16	65	235	135	24	5	1	0	1	486	47.0	43.1
10:00 AM	0	0	0	1	16	87	207	142	27	5	0	1	0	486	47.0	43.0
11:00 AM	0	0	1	0	20	113	196	166	36	2	1	0	0	535	47.0	42.8
12:00 PM	0	0	0	0	14	133	241	152	32	4	2	0	0	578	47.0	42.6
1:00 PM	0	0	0	6	23	132	270	150	23	3	0	0	0	607	46.0	42.1
2:00 PM	0	1	3	5	25	176	286	108	17	2	0	0	0	623	45.0	41.1
3:00 PM	0	2	0	7	31	192	277	145	17	2	2	0	0	675	46.0	41.3
4:00 PM	0	0	0	4	49	180	256	103	28	6	2	0	0	628	46.0	41.2
5:00 PM	0	0	0	0	29	175	259	77	16	2	0	0	0	558	45.0	41.0
6:00 PM	0	0	0	3	27	100	174	79	15	4	0	0	0	402	46.0	41.4
7:00 PM	0	0	0	1	6	55	106	79	13	3	0	0	0	263	48.0	42.9
8:00 PM	0	0	0	1	14	53	87	54	7	1	0	0	0	217	47.0	41.6
9:00 PM	0	0	0	1	3	26	63	32	8	2	0	0	0	135	48.0	42.7
10:00 PM	1	0	0	0	4	11	35	40	8	1	2	0	1	103	49.0	44.3
11:00 PM	0	0	0	0	1	9	24	27	2	1	0	0	0	64	49.0	44.3
Total	1	4	7	49	319	1688	3555	2535	574	84	16	4	4	8840	48.0	42.9
Percent	0.01%	0.05%	0.08%	0.55%	3.61%	19.10%	40.21%	28.68%	6.49%	0.95%	0.18%	0.05%	0.05%			
AM Peak		5:00 AM	9:00 AM	6:00 AM	11:00 AM	11:00 AM	7:00 AM	6:00 AM	6:00 AM	5:00 AM	5:00 AM	2:00 AM	6:00 AM	7:00 AM		
Volume	0	1	2	12	20	113	271	344	74	10	5	1	1	670		
PM Peak	10:00 PM	3:00 PM	2:00 PM	3:00 PM	4:00 PM	3:00 PM	2:00 PM	12:00 PM	12:00 PM	4:00 PM	12:00 PM		10:00 PM	3:00 PM		
Volume	1	2	3	7	49	192	286	152	32	6	2	0	1	675		

15th Percentile:	38.0 MPH	Average Speed:	42.9 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	43.0 MPH	10 MPH Pace:	39 to 48 MPH	Number of Vehicles > 40 MPH:	6096
85th Percentile:	48.0 MPH	Number in Pace:	6341	Percent of Vehicles > 40 MPH:	69.0%
95th Percentile:	51.0 MPH	Percent in Pace:	71.7%		

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
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Office: 508-875-0100 Fax: 508-875-0118
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PDI File #: 207730 ATR-A

Count Date
Thursday, December 3, 2020

Speed (60-minute)

WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	8	18	11	1	0	0	0	0	39	46.0	42.4
1:00 AM	0	0	0	0	1	2	5	7	3	1	0	0	0	19	50.3	44.9
2:00 AM	0	0	0	0	1	7	8	3	1	0	0	0	0	20	46.3	41.6
3:00 AM	0	0	1	2	2	7	11	3	2	2	0	0	0	30	47.3	41.0
4:00 AM	0	0	0	0	1	5	7	8	4	1	0	0	0	26	50.0	43.8
5:00 AM	0	0	0	2	11	20	38	25	6	0	0	0	0	102	46.0	41.3
6:00 AM	0	0	0	3	10	47	89	45	10	1	0	0	0	205	46.0	41.7
7:00 AM	0	0	1	5	29	78	124	59	11	1	0	0	0	308	46.0	40.8
8:00 AM	0	1	2	14	15	96	180	60	9	1	0	0	1	379	45.0	40.7
9:00 AM	0	0	1	3	16	164	212	55	5	0	0	0	0	456	44.0	40.4
10:00 AM	0	0	1	3	33	153	191	54	3	0	0	0	1	439	44.0	40.2
11:00 AM	0	0	1	2	23	154	233	67	2	0	0	0	0	482	44.0	40.7
12:00 PM	0	1	3	12	47	203	244	62	7	0	0	0	1	580	44.0	39.7
1:00 PM	0	0	1	4	34	163	269	87	13	0	0	0	0	571	45.0	40.8
2:00 PM	0	0	7	19	46	195	293	101	6	0	0	0	0	667	45.0	40.0
3:00 PM	1	4	14	36	117	302	261	54	4	0	0	0	0	793	43.0	37.8
4:00 PM	2	3	9	22	137	351	200	35	3	0	0	0	0	762	42.0	37.3
5:00 PM	1	1	12	35	167	336	177	26	1	0	0	0	0	756	41.0	36.6
6:00 PM	0	0	4	8	65	247	185	36	4	1	0	0	0	550	42.0	38.6
7:00 PM	0	0	0	2	17	182	150	43	3	0	1	0	0	398	44.0	40.0
8:00 PM	0	0	0	3	15	88	104	37	0	0	0	0	0	247	44.1	40.2
9:00 PM	0	0	0	0	2	53	64	33	4	0	0	0	0	156	46.0	41.4
10:00 PM	0	0	0	0	1	14	48	25	4	0	1	1	0	94	48.0	43.6
11:00 PM	0	0	0	0	2	10	37	27	4	3	0	0	0	83	47.0	43.6
Total	4	10	57	175	793	2885	3148	963	110	11	2	1	3	8162	44.0	39.5
Percent	0.05%	0.12%	0.70%	2.14%	9.72%	35.35%	38.57%	11.80%	1.35%	0.13%	0.02%	0.01%	0.04%			
AM Peak		8:00 AM	8:00 AM	8:00 AM	10:00 AM	9:00 AM	11:00 AM	11:00 AM	7:00 AM	3:00 AM			8:00 AM	11:00 AM		
Volume	0	1	2	14	33	164	233	67	11	2	0	0	1	482		
PM Peak	4:00 PM	3:00 PM	3:00 PM	3:00 PM	5:00 PM	4:00 PM	2:00 PM	2:00 PM	1:00 PM	11:00 PM	7:00 PM	10:00 PM	12:00 PM	3:00 PM		
Volume	2	4	14	36	167	351	293	101	13	3	1	1	1	793		

15th Percentile:	35.0 MPH	Average Speed:	39.5 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	40.0 MPH	10 MPH Pace:	36 to 45 MPH	Number of Vehicles > 40 MPH:	3519
85th Percentile:	44.0 MPH	Number in Pace:	6068	Percent of Vehicles > 40 MPH:	43.1%
95th Percentile:	47.0 MPH	Percent in Pace:	74.3%		

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PDI File #: 207730 ATR-A

Count Date
Thursday, December 3, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	10	26	24	5	2	0	0	0	68	48.0	44.1
1:00 AM	0	0	0	0	1	4	10	13	6	1	0	0	0	35	50.0	45.0
2:00 AM	0	0	0	0	2	16	15	6	2	2	0	1	0	44	47.6	42.6
3:00 AM	0	0	1	2	2	9	25	12	10	3	0	1	0	65	50.4	43.9
4:00 AM	0	0	0	1	1	8	34	80	44	8	1	0	0	177	51.0	47.1
5:00 AM	0	1	0	4	16	26	106	188	79	10	5	0	0	435	50.0	45.6
6:00 AM	0	0	0	15	25	75	275	389	84	9	0	0	1	873	48.0	44.4
7:00 AM	0	0	1	6	40	141	395	316	70	7	0	1	1	978	48.0	43.3
8:00 AM	0	1	3	16	24	162	433	239	48	6	0	0	1	933	47.0	42.4
9:00 AM	0	0	3	5	32	229	447	190	29	5	1	0	1	942	46.0	41.8
10:00 AM	0	0	1	4	49	240	398	196	30	5	0	1	1	925	46.0	41.6
11:00 AM	0	0	2	2	43	267	429	233	38	2	1	0	0	1017	47.0	41.8
12:00 PM	0	1	3	12	61	336	485	214	39	4	2	0	1	1158	46.0	41.1
1:00 PM	0	0	1	10	57	295	539	237	36	3	0	0	0	1178	46.0	41.5
2:00 PM	0	1	10	24	71	371	579	209	23	2	0	0	0	1290	45.0	40.5
3:00 PM	1	6	14	43	148	494	538	199	21	2	2	0	0	1468	45.0	39.4
4:00 PM	2	3	9	26	186	531	456	138	31	6	2	0	0	1390	44.0	39.0
5:00 PM	1	1	12	35	196	511	436	103	17	2	0	0	0	1314	43.0	38.5
6:00 PM	0	0	4	11	92	347	359	115	19	5	0	0	0	952	44.0	39.7
7:00 PM	0	0	0	3	23	237	256	122	16	3	1	0	0	661	46.0	41.1
8:00 PM	0	0	0	4	29	141	191	91	7	1	0	0	0	464	46.0	40.9
9:00 PM	0	0	0	1	5	79	127	65	12	2	0	0	0	291	47.0	42.0
10:00 PM	1	0	0	0	5	25	83	65	12	1	3	1	1	197	48.0	43.9
11:00 PM	0	0	0	0	3	19	61	54	6	4	0	0	0	147	48.0	43.9
Total	5	14	64	224	1112	4573	6703	3498	684	95	18	5	7	17002	46.0	41.2
Percent	0.03%	0.08%	0.38%	1.32%	6.54%	26.90%	39.42%	20.57%	4.02%	0.56%	0.11%	0.03%	0.04%			
AM Peak		5:00 AM	8:00 AM	8:00 AM	10:00 AM	11:00 AM	9:00 AM	6:00 AM	6:00 AM	5:00 AM	5:00 AM	2:00 AM	6:00 AM	11:00 AM		
Volume	0	1	3	16	49	267	447	389	84	10	5	1	1	1017		
PM Peak	4:00 PM	3:00 PM	3:00 PM	3:00 PM	5:00 PM	4:00 PM	2:00 PM	1:00 PM	12:00 PM	4:00 PM	10:00 PM	10:00 PM	12:00 PM	3:00 PM		
Volume	2	6	14	43	196	531	579	237	39	6	3	1	1	1468		

15th Percentile:	36.0 MPH	Average Speed:	41.2 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	41.0 MPH	10 MPH Pace:	37 to 46 MPH	Number of Vehicles > 40 MPH:	9615
85th Percentile:	46.0 MPH	Number in Pace:	11836	Percent of Vehicles > 40 MPH:	56.6%
95th Percentile:	49.0 MPH	Percent in Pace:	69.6%		

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-A

Count Date
Friday, December 4, 2020

Speed (60-minute)

EB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	0	2	10	10	1	0	0	0	0	23	47.0	44.3
1:00 AM	0	0	0	0	0	0	4	7	3	1	0	0	0	15	50.9	47.0
2:00 AM	0	0	0	0	0	1	11	4	4	0	0	0	0	20	50.0	45.1
3:00 AM	0	0	0	0	0	4	15	14	2	1	0	0	0	36	47.8	44.5
4:00 AM	0	0	0	0	1	3	23	65	37	7	3	0	0	139	52.0	48.0
5:00 AM	0	0	1	2	1	7	66	172	53	14	1	0	2	319	51.0	47.0
6:00 AM	0	0	0	3	17	54	236	239	43	8	1	0	0	601	48.0	44.1
7:00 AM	0	0	0	2	17	84	219	284	49	6	0	0	0	661	48.0	44.1
8:00 AM	0	0	0	6	15	110	232	175	35	7	1	0	0	581	47.0	42.9
9:00 AM	0	0	1	4	17	95	248	161	29	4	0	0	0	559	47.0	42.8
10:00 AM	0	0	0	4	19	133	249	137	26	5	0	0	0	573	47.0	42.2
11:00 AM	0	0	2	2	25	165	250	130	22	4	1	0	0	601	46.0	41.7
12:00 PM	0	0	0	5	45	214	281	157	14	3	0	0	0	719	46.0	41.1
1:00 PM	0	0	0	2	25	167	318	148	21	3	0	2	0	686	46.0	41.8
2:00 PM	0	2	7	15	41	184	277	139	22	1	1	0	0	689	46.0	40.8
3:00 PM	0	0	1	3	54	179	315	147	27	3	0	0	0	729	46.0	41.4
4:00 PM	0	2	3	16	77	237	222	97	17	4	1	0	0	676	45.0	39.7
5:00 PM	0	0	0	6	56	191	276	116	18	6	1	0	0	670	45.0	40.8
6:00 PM	1	0	0	0	32	179	220	95	12	2	2	0	0	543	46.0	40.9
7:00 PM	0	0	0	0	17	118	170	62	8	3	0	0	0	378	45.0	41.0
8:00 PM	0	0	0	2	17	81	118	72	10	4	0	0	0	304	46.0	41.7
9:00 PM	0	0	0	3	13	45	86	44	9	2	0	0	0	202	47.0	41.7
10:00 PM	0	0	0	0	6	27	65	40	16	5	0	0	0	159	48.3	43.5
11:00 PM	0	0	0	0	4	6	34	21	6	1	0	0	0	72	47.4	43.4
Total	1	4	15	75	499	2286	3945	2536	484	94	12	2	2	9955	47.0	42.1
Percent	0.01%	0.04%	0.15%	0.75%	5.01%	22.96%	39.63%	25.47%	4.86%	0.94%	0.12%	0.02%	0.02%			
AM Peak			11:00 AM	8:00 AM	11:00 AM	11:00 AM	11:00 AM	7:00 AM	5:00 AM	5:00 AM	4:00 AM		5:00 AM	7:00 AM		
Volume	0	0	2	6	25	165	250	284	53	14	3	0	2	661		
PM Peak	6:00 PM	2:00 PM	2:00 PM	4:00 PM	4:00 PM	4:00 PM	1:00 PM	12:00 PM	3:00 PM	5:00 PM	6:00 PM	1:00 PM		3:00 PM		
Volume	1	2	7	16	77	237	318	157	27	6	2	2	0	729		

15th Percentile:	37.0 MPH	Average Speed:	42.1 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	42.0 MPH	10 MPH Pace:	38 to 47 MPH	Number of Vehicles > 40 MPH:	6294
85th Percentile:	47.0 MPH	Number in Pace:	7052	Percent of Vehicles > 40 MPH:	63.2%
95th Percentile:	50.0 MPH	Percent in Pace:	70.8%		

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-A

Count Date
Friday, December 4, 2020

Speed (60-minute)

WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	9	14	6	3	0	0	0	0	33	46.0	41.7
1:00 AM	0	0	0	0	1	2	7	5	1	0	0	0	0	16	48.5	43.3
2:00 AM	0	0	0	0	3	1	9	5	1	0	0	0	0	19	46.3	42.0
3:00 AM	0	0	0	0	0	5	16	6	2	0	0	0	0	29	45.8	42.9
4:00 AM	0	0	0	0	1	10	17	10	3	1	1	0	0	43	48.0	43.3
5:00 AM	0	0	0	0	4	15	44	29	4	0	0	0	1	97	46.0	42.9
6:00 AM	0	0	0	2	21	54	81	43	8	1	0	0	0	210	46.0	40.9
7:00 AM	0	0	1	4	22	82	140	49	11	1	0	0	0	310	45.0	40.8
8:00 AM	0	1	4	10	25	137	169	61	5	0	0	0	0	412	45.0	39.9
9:00 AM	0	1	0	4	38	159	229	37	5	0	0	0	0	473	43.0	39.8
10:00 AM	0	0	3	4	45	184	206	53	1	0	0	0	1	497	44.0	39.6
11:00 AM	0	0	1	4	33	224	267	56	5	0	0	0	0	590	43.7	39.8
12:00 PM	0	1	3	11	52	237	285	63	8	0	0	0	0	660	44.0	39.6
1:00 PM	0	0	0	10	59	272	256	58	3	1	1	1	0	661	43.0	39.3
2:00 PM	2	6	39	61	91	257	224	55	1	0	0	0	0	736	43.0	36.8
3:00 PM	0	1	6	36	122	373	269	38	1	0	0	0	0	846	42.0	37.8
4:00 PM	0	5	12	38	172	335	208	23	3	0	0	0	0	796	42.0	36.7
5:00 PM	0	0	4	34	204	332	183	30	2	0	0	0	0	789	41.0	36.8
6:00 PM	0	0	3	33	130	283	166	29	0	0	0	0	0	644	41.0	37.2
7:00 PM	0	0	1	6	54	185	148	39	0	0	0	0	0	433	43.0	38.8
8:00 PM	0	0	0	2	38	104	134	32	4	0	0	0	0	314	44.0	39.7
9:00 PM	0	0	0	3	20	109	92	19	4	2	0	0	0	249	44.0	39.6
10:00 PM	1	0	0	0	9	47	67	29	3	0	0	0	0	156	45.0	40.6
11:00 PM	0	0	0	0	6	33	47	26	5	2	0	0	2	121	47.0	42.4
Total	3	15	77	262	1151	3449	3278	801	83	8	2	1	4	9134	43.0	38.7
Percent	0.03%	0.16%	0.84%	2.87%	12.60%	37.76%	35.89%	8.77%	0.91%	0.09%	0.02%	0.01%	0.04%			
AM Peak		8:00 AM	8:00 AM	8:00 AM	10:00 AM	11:00 AM	11:00 AM	8:00 AM	7:00 AM	4:00 AM	4:00 AM		5:00 AM	11:00 AM		
Volume	0	1	4	10	45	224	267	61	11	1	1	0	1	590		
PM Peak	2:00 PM	2:00 PM	2:00 PM	2:00 PM	5:00 PM	3:00 PM	12:00 PM	12:00 PM	12:00 PM	9:00 PM	1:00 PM	1:00 PM	11:00 PM	3:00 PM		
Volume	2	6	39	61	204	373	285	63	8	2	1	1	2	846		

15th Percentile:	34.0 MPH	Average Speed:	38.7 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	39.0 MPH	10 MPH Pace:	35 to 44 MPH	Number of Vehicles > 40 MPH:	3293
85th Percentile:	43.0 MPH	Number in Pace:	6727	Percent of Vehicles > 40 MPH:	36.1%
95th Percentile:	46.0 MPH	Percent in Pace:	73.6%		

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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-A

Count Date
Friday, December 4, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	11	24	16	4	0	0	0	0	56	47.0	42.8
1:00 AM	0	0	0	0	1	2	11	12	4	1	0	0	0	31	49.5	45.1
2:00 AM	0	0	0	0	3	2	20	9	5	0	0	0	0	39	48.3	43.6
3:00 AM	0	0	0	0	0	9	31	20	4	1	0	0	0	65	47.4	43.8
4:00 AM	0	0	0	0	2	13	40	75	40	8	4	0	0	182	52.0	46.9
5:00 AM	0	0	1	2	5	22	110	201	57	14	1	0	3	416	50.0	46.0
6:00 AM	0	0	0	5	38	108	317	282	51	9	1	0	0	811	48.0	43.3
7:00 AM	0	0	1	6	39	166	359	333	60	7	0	0	0	971	48.0	43.1
8:00 AM	0	1	4	16	40	247	401	236	40	7	1	0	0	993	46.0	41.7
9:00 AM	0	1	1	8	55	254	477	198	34	4	0	0	0	1032	46.0	41.4
10:00 AM	0	0	3	8	64	317	455	190	27	5	0	0	1	1070	45.0	41.0
11:00 AM	0	0	3	6	58	389	517	186	27	4	1	0	0	1191	45.0	40.8
12:00 PM	0	1	3	16	97	451	566	220	22	3	0	0	0	1379	45.0	40.4
1:00 PM	0	0	0	12	84	439	574	206	24	4	1	3	0	1347	45.0	40.6
2:00 PM	2	8	46	76	132	441	501	194	23	1	1	0	0	1425	45.0	38.7
3:00 PM	0	1	7	39	176	552	584	185	28	3	0	0	0	1575	44.0	39.4
4:00 PM	0	7	15	54	249	572	430	120	20	4	1	0	0	1472	43.0	38.1
5:00 PM	0	0	4	40	260	523	459	146	20	6	1	0	0	1459	44.0	38.6
6:00 PM	1	0	3	33	162	462	386	124	12	2	2	0	0	1187	44.0	38.9
7:00 PM	0	0	1	6	71	303	318	101	8	3	0	0	0	811	44.0	39.9
8:00 PM	0	0	0	4	55	185	252	104	14	4	0	0	0	618	45.0	40.7
9:00 PM	0	0	0	6	33	154	178	63	13	4	0	0	0	451	46.0	40.5
10:00 PM	1	0	0	0	15	74	132	69	19	5	0	0	0	315	47.0	42.1
11:00 PM	0	0	0	0	10	39	81	47	11	3	0	0	2	193	47.0	42.8
Total	4	19	92	337	1650	5735	7223	3337	567	102	14	3	6	19089	46.0	40.5
Percent	0.02%	0.10%	0.48%	1.77%	8.64%	30.04%	37.84%	17.48%	2.97%	0.53%	0.07%	0.02%	0.03%			
AM Peak		8:00 AM	8:00 AM	8:00 AM	10:00 AM	11:00 AM	11:00 AM	7:00 AM	7:00 AM	5:00 AM	4:00 AM		5:00 AM	11:00 AM		
Volume	0	1	4	16	64	389	517	333	60	14	4	0	3	1191		
PM Peak	2:00 PM	2:00 PM	2:00 PM	2:00 PM	5:00 PM	4:00 PM	3:00 PM	12:00 PM	3:00 PM	5:00 PM	6:00 PM	1:00 PM	11:00 PM	3:00 PM		
Volume	2	8	46	76	260	572	584	220	28	6	2	3	2	1575		

15th Percentile:	36.0 MPH	Average Speed:	40.5 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	41.0 MPH	10 MPH Pace:	36 to 45 MPH	Number of Vehicles > 40 MPH:	9587
85th Percentile:	46.0 MPH	Number in Pace:	13279	Percent of Vehicles > 40 MPH:	50.2%
95th Percentile:	49.0 MPH	Percent in Pace:	69.6%		

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PDI File #: 207730 ATR-AA

Count Date
Saturday, December 12, 2020

Speed (60-minute)

EB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	6	13	9	3	0	0	0	0	32	48.0	43.1
1:00 AM	0	0	0	2	0	3	6	9	0	0	0	0	0	20	48.2	42.1
2:00 AM	0	0	0	0	0	1	6	9	3	1	0	0	0	20	51.0	45.8
3:00 AM	0	0	0	0	2	2	5	7	2	0	0	0	0	18	46.9	42.8
4:00 AM	0	0	0	0	1	3	18	33	7	3	0	0	0	65	49.4	45.8
5:00 AM	0	0	1	1	2	4	43	51	12	5	0	0	0	119	49.0	45.3
6:00 AM	0	0	0	0	2	16	67	68	20	0	1	0	0	174	49.0	44.5
7:00 AM	0	0	0	1	8	56	117	84	19	2	0	0	0	287	47.0	42.8
8:00 AM	0	0	0	0	8	90	155	105	20	2	2	0	0	382	47.0	42.6
9:00 AM	0	0	0	0	26	122	254	111	14	1	0	0	0	528	46.0	41.6
10:00 AM	1	2	1	2	34	194	270	126	12	0	2	0	0	644	45.0	41.0
11:00 AM	0	2	5	9	70	285	223	87	18	0	0	0	0	699	44.3	39.3
12:00 PM	1	0	3	15	87	233	227	71	7	3	0	0	0	647	44.0	39.1
1:00 PM	0	1	5	13	67	274	218	79	6	0	0	0	0	663	44.0	39.1
2:00 PM	0	2	4	17	96	256	192	59	6	3	0	0	1	636	43.0	38.5
3:00 PM	0	0	1	8	64	182	183	70	10	0	0	0	0	518	45.0	39.4
4:00 PM	0	0	1	15	92	206	168	43	5	0	0	0	0	530	43.0	38.3
5:00 PM	0	0	1	7	75	155	146	35	1	2	0	0	0	422	43.0	38.5
6:00 PM	0	0	2	5	45	149	108	23	3	1	0	0	0	336	42.0	38.4
7:00 PM	0	0	2	9	16	83	111	32	4	1	0	0	0	258	44.0	39.9
8:00 PM	0	0	0	3	22	42	65	31	3	1	0	0	0	167	46.0	40.4
9:00 PM	0	0	0	0	21	46	58	29	8	0	1	0	0	163	46.0	40.7
10:00 PM	0	0	0	8	8	24	34	28	10	0	0	0	0	112	48.0	41.3
11:00 PM	0	0	1	0	6	17	11	11	2	1	1	0	0	50	46.0	41.3
Total	2	7	27	115	753	2449	2698	1210	195	26	7	0	1	7490	45.0	40.1
Percent	0.03%	0.09%	0.36%	1.54%	10.05%	32.70%	36.02%	16.15%	2.60%	0.35%	0.09%	0.00%	0.01%			
AM Peak	10:00 AM	10:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	10:00 AM	10:00 AM	6:00 AM	5:00 AM	8:00 AM			11:00 AM		
Volume	1	2	5	9	70	285	270	126	20	5	2	0	0	699		
PM Peak	12:00 PM	2:00 PM	1:00 PM	2:00 PM	2:00 PM	1:00 PM	12:00 PM	1:00 PM	3:00 PM	12:00 PM	9:00 PM		2:00 PM	1:00 PM		
Volume	1	2	5	17	96	274	227	79	10	3	1	0	1	663		

15th Percentile:	35.0 MPH	Average Speed:	40.1 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	40.0 MPH	10 MPH Pace:	36 to 45 MPH	Number of Vehicles > 40 MPH:	3485
85th Percentile:	45.0 MPH	Number in Pace:	5202	Percent of Vehicles > 40 MPH:	46.5%
95th Percentile:	48.0 MPH	Percent in Pace:	69.5%		

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-AA

Count Date
Saturday, December 12, 2020

Speed (60-minute)

WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	11	17	17	3	0	0	1	0	50	48.0	43.8
1:00 AM	0	0	0	0	0	9	10	3	2	0	0	0	0	24	46.6	41.7
2:00 AM	0	0	0	0	1	5	10	2	0	0	0	0	0	18	43.0	40.9
3:00 AM	0	0	0	0	3	2	9	10	1	1	0	0	0	26	47.3	43.4
4:00 AM	0	0	0	0	0	10	17	9	0	0	0	0	0	36	45.8	42.1
5:00 AM	0	0	0	1	7	15	34	12	4	2	0	0	0	75	46.0	41.6
6:00 AM	0	0	0	1	7	29	57	17	2	1	0	1	0	115	45.0	41.3
7:00 AM	0	0	0	0	2	29	100	57	12	1	0	0	0	201	47.0	43.2
8:00 AM	0	1	0	0	5	48	177	88	17	1	0	0	0	337	47.0	43.1
9:00 AM	1	0	0	0	5	111	213	96	14	1	0	0	0	441	46.0	42.0
10:00 AM	0	0	0	1	15	164	287	127	15	0	0	0	0	609	46.0	41.7
11:00 AM	0	0	0	1	21	230	318	86	4	1	0	0	0	661	44.0	40.7
12:00 PM	0	0	0	3	43	238	329	81	14	1	0	0	0	709	44.0	40.3
1:00 PM	0	0	0	1	61	314	291	59	2	0	0	0	0	728	43.0	39.5
2:00 PM	1	0	1	3	56	244	291	75	8	0	0	0	0	679	44.0	39.8
3:00 PM	0	0	0	2	35	211	305	88	12	1	0	0	0	654	45.0	40.7
4:00 PM	0	0	0	1	29	180	248	39	5	0	0	0	0	502	44.0	40.0
5:00 PM	0	0	0	7	82	195	156	22	2	0	0	0	0	464	42.0	38.1
6:00 PM	0	0	0	0	45	139	140	20	2	0	0	0	0	346	43.0	39.1
7:00 PM	0	0	0	3	17	103	147	31	3	1	1	0	0	306	44.0	40.2
8:00 PM	1	0	0	0	11	96	82	38	2	0	0	0	0	230	45.0	40.3
9:00 PM	0	0	0	0	9	54	98	25	1	0	0	0	0	187	44.0	40.7
10:00 PM	0	0	0	0	2	29	60	20	8	0	0	0	0	119	46.0	42.1
11:00 PM	0	0	0	1	3	10	39	19	3	0	0	0	0	75	46.0	42.2
Total	3	1	1	25	460	2476	3435	1041	136	11	1	2	0	7592	45.0	40.6
Percent	0.04%	0.01%	0.01%	0.33%	6.06%	32.61%	45.24%	13.71%	1.79%	0.14%	0.01%	0.03%	0.00%			
AM Peak	9:00 AM	8:00 AM		5:00 AM	11:00 AM	11:00 AM	11:00 AM	10:00 AM	8:00 AM	5:00 AM		12:00 AM		11:00 AM		
Volume	1	1	0	1	21	230	318	127	17	2	0	1	0	661		
PM Peak	2:00 PM		2:00 PM	5:00 PM	5:00 PM	1:00 PM	12:00 PM	3:00 PM	12:00 PM	12:00 PM	7:00 PM			1:00 PM		
Volume	1	0	1	7	82	314	329	88	14	1	1	0	0	728		

15th Percentile:	36.0 MPH	Average Speed:	40.6 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	40.0 MPH	10 MPH Pace:	36 to 45 MPH	Number of Vehicles > 40 MPH:	3795
85th Percentile:	45.0 MPH	Number in Pace:	6001	Percent of Vehicles > 40 MPH:	50.0%
95th Percentile:	48.0 MPH	Percent in Pace:	79.0%		

Main Street (Route 9)
west of Woodland Drive
City, State: Leicester, MA
Client: RMA/ R. Muller
Site Code: 20009

PRECISION D A T A INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207730 ATR-AA

Count Date
Saturday, December 12, 2020

Speed (60-minute)

Combined EB and WB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	2	17	30	26	6	0	0	1	0	82	48.0	43.5
1:00 AM	0	0	0	2	0	12	16	12	2	0	0	0	0	44	47.6	41.9
2:00 AM	0	0	0	0	1	6	16	11	3	1	0	0	0	38	48.5	43.5
3:00 AM	0	0	0	0	5	4	14	17	3	1	0	0	0	44	47.6	43.2
4:00 AM	0	0	0	0	1	13	35	42	7	3	0	0	0	101	49.0	44.5
5:00 AM	0	0	1	2	9	19	77	63	16	7	0	0	0	194	49.0	43.9
6:00 AM	0	0	0	1	9	45	124	85	22	1	1	1	0	289	48.0	43.2
7:00 AM	0	0	0	1	10	85	217	141	31	3	0	0	0	488	47.0	42.9
8:00 AM	0	1	0	0	13	138	332	193	37	3	2	0	0	719	47.0	42.8
9:00 AM	1	0	0	0	31	233	467	207	28	2	0	0	0	969	46.0	41.8
10:00 AM	1	2	1	3	49	358	557	253	27	0	2	0	0	1253	46.0	41.3
11:00 AM	0	2	5	10	91	515	541	173	22	1	0	0	0	1360	44.0	40.0
12:00 PM	1	0	3	18	130	471	556	152	21	4	0	0	0	1356	44.0	39.7
1:00 PM	0	1	5	14	128	588	509	138	8	0	0	0	0	1391	44.0	39.3
2:00 PM	1	2	5	20	152	500	483	134	14	3	0	0	1	1315	44.0	39.2
3:00 PM	0	0	1	10	99	393	488	158	22	1	0	0	0	1172	45.0	40.1
4:00 PM	0	0	1	16	121	386	416	82	10	0	0	0	0	1032	43.0	39.1
5:00 PM	0	0	1	14	157	350	302	57	3	2	0	0	0	886	42.3	38.3
6:00 PM	0	0	2	5	90	288	248	43	5	1	0	0	0	682	43.0	38.8
7:00 PM	0	0	2	12	33	186	258	63	7	2	1	0	0	564	44.0	40.1
8:00 PM	1	0	0	3	33	138	147	69	5	1	0	0	0	397	45.0	40.3
9:00 PM	0	0	0	0	30	100	156	54	9	0	1	0	0	350	45.0	40.7
10:00 PM	0	0	0	8	10	53	94	48	18	0	0	0	0	231	47.0	41.7
11:00 PM	0	0	1	1	9	27	50	30	5	1	1	0	0	125	46.0	41.8
Total	5	8	28	140	1213	4925	6133	2251	331	37	8	2	1	15082	45.0	40.4
Percent	0.03%	0.05%	0.19%	0.93%	8.04%	32.65%	40.66%	14.93%	2.19%	0.25%	0.05%	0.01%	0.01%			
AM Peak	9:00 AM	10:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	10:00 AM	10:00 AM	8:00 AM	5:00 AM	8:00 AM	12:00 AM		11:00 AM		
Volume	1	2	5	10	91	515	557	253	37	7	2	1	0	1360		
PM Peak	12:00 PM	2:00 PM	1:00 PM	2:00 PM	5:00 PM	1:00 PM	12:00 PM	3:00 PM	3:00 PM	12:00 PM	7:00 PM		2:00 PM	1:00 PM		
Volume	1	2	5	20	157	588	556	158	22	4	1	0	1	1391		

15th Percentile:	36.0 MPH	Average Speed:	40.4 MPH	Posted Speed Limit:	40 MPH
50th Percentile:	40.0 MPH	10 MPH Pace:	36 to 45 MPH	Number of Vehicles > 40 MPH:	7280
85th Percentile:	45.0 MPH	Number in Pace:	11203	Percent of Vehicles > 40 MPH:	48.3%
95th Percentile:	48.0 MPH	Percent in Pace:	74.3%		

Main Street (Route 9)
east of Wal-Mart Drive
City, State: Leicester, MA
Client: Ron Muller and Assoc./ R. Muller

133225 A Volume
Site Code: TBA

	Thu 28-Feb-13		Fri 01-Mar-13		Sat 02-Mar-13		Sun 03-Mar-13		Mon 04-Mar-13		Tue 05-Mar-13		Wed 06-Mar-13		Weekday Average	
	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
12:00 AM			52	33	97	45	94	45	36	18					44	26
01:00			41	25	65	41	53	30	18	15					30	20
02:00			37	23	45	26	50	21	20	28					29	26
03:00			22	41	35	24	27	18	21	37					22	39
04:00			38	92	28	23	19	20	22	87					30	90
05:00			65	257	44	100	45	60	75	290					70	274
06:00			173	622	100	209	62	129	186	642					180	632
07:00			354	770	189	335	123	149	329	824					342	797
08:00	321	631	338	594	304	411	183	207	323	576					327	600
09:00	386	452	379	478	407	511	275	355	320	440					362	457
10:00	390	418	414	440	596	609	408	435	384	446					396	435
11:00	421	467	480	510	591	662	458	502	392	427					431	468
12:00 PM	471	467	497	478	714	696	568	609	450	484					473	476
01:00	442	496	516	476	649	644	607	612	499	427					486	466
02:00	611	491	650	536	655	569	561	580	575	468					612	498
03:00	689	501	745	543	644	561	608	592	687	545					707	530
04:00	793	468	831	552	596	549	507	515							812	510
05:00	854	530	892	540	555	510	448	424							873	535
06:00	617	452	705	472	422	449	361	344							661	462
07:00	453	309	415	368	348	356	312	245							434	339
08:00	347	230	327	279	251	258	208	178							337	255
09:00	310	196	264	211	238	183	189	135							287	204
10:00	185	114	244	168	237	120	112	98							215	141
11:00	97	70	167	95	152	79	78	48							132	83
Total	7387	6292	8646	8603	7962	7970	6356	6351	4337	5754	0	0	0	0	8288	8359
Day	13679		17249		15932		12707		10091		0		0		16648	

Ron Müller & Associates
Traffic Engineering and Consulting Services
56 Teresa Road, Hopkinton, MA 01748

File Name : 13007 Rte 9-Walmart Dvwy Am
Site Code : 13007
Start Date : 2/14/2013
Page No : 1

E-W Street: Rte 9/ Main St.
N-S Street: Walmart Dvwy

Groups Printed- Cars - Trucks

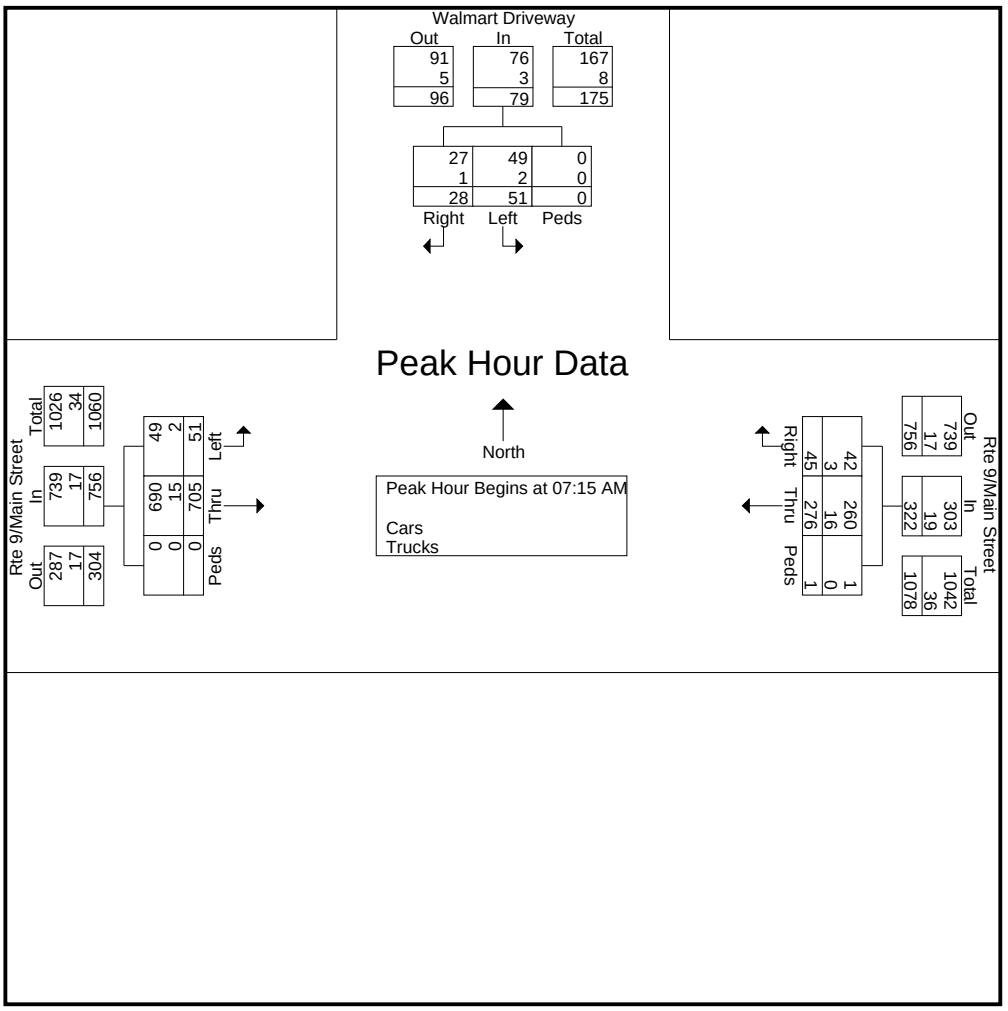
	Walmart Driveway From North				Rte 9/Main Street From East				Rte 9/Main Street From West				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	6	2	0	8	24	6	0	30	5	77	1	83	121
07:15 AM	15	11	0	26	78	13	0	91	7	217	0	224	341
07:30 AM	9	9	0	18	57	15	0	72	13	171	0	184	274
07:45 AM	14	5	0	19	83	9	0	92	17	189	0	206	317
Total	44	27	0	71	242	43	0	285	42	654	1	697	1053
08:00 AM	13	3	0	16	58	8	1	67	14	128	0	142	225
08:15 AM	12	10	0	22	54	22	0	76	10	156	0	166	264
08:30 AM	17	11	0	28	46	22	0	68	19	129	0	148	244
08:45 AM	18	11	0	29	81	20	0	101	18	90	0	108	238
Total	60	35	0	95	239	72	1	312	61	503	0	564	971
Grand Total	104	62	0	166	481	115	1	597	103	1157	1	1261	2024
Apprch %	62.7	37.3	0		80.6	19.3	0.2		8.2	91.8	0.1		
Total %	5.1	3.1	0	8.2	23.8	5.7	0	29.5	5.1	57.2	0	62.3	
Cars	99	59	0	158	456	109	1	566	99	1130	1	1230	1954
% Cars	95.2	95.2	0	95.2	94.8	94.8	100	94.8	96.1	97.7	100	97.5	96.5
Trucks	5	3	0	8	25	6	0	31	4	27	0	31	70
% Trucks	4.8	4.8	0	4.8	5.2	5.2	0	5.2	3.9	2.3	0	2.5	3.5

Ron Müller & Associates
Traffic Engineering and Consulting Services
56 Teresa Road, Hopkinton, MA 01748

File Name : 13007 Rte 9-Walmart Dvwy Am
Site Code : 13007
Start Date : 2/14/2013
Page No : 2

E-W Street: Rte 9/ Main St.
N-S Street: Walmart Dvwy

	Walmart Driveway From North				Rte 9/Main Street From East				Rte 9/Main Street From West				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	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	**15**	**11**	0	**26**	78	13	0	91	7	**217**	0	**224**	**341**
07:30 AM	9	9	0	18	57	**15**	0	72	13	171	0	184	274
07:45 AM	14	5	0	19	**83**	9	0	**92**	**17**	189	0	206	317
08:00 AM	13	3	0	16	58	8	**1**	67	14	128	0	142	225
Total Volume	51	28	0	79	276	45	1	322	51	705	0	756	1157
% App. Total	64.6	35.4	0		85.7	14	0.3		6.7	93.3	0		
PHF	.850	.636	.000	.760	.831	.750	.250	.875	.750	.812	.000	.844	.848
Cars	49	27	0	76	260	42	1	303	49	690	0	739	1118
% Cars	96.1	96.4	0	96.2	94.2	93.3	100	94.1	96.1	97.9	0	97.8	96.6
Trucks	2	1	0	3	16	3	0	19	2	15	0	17	39
% Trucks	3.9	3.6	0	3.8	5.8	6.7	0	5.9	3.9	2.1	0	2.2	3.4



Ron Müller & Associates
Traffic Engineering and Consulting Services
56 Teresa Road, Hopkinton, MA 01748

File Name : 13007 Rte 9-Walmart Dvwy pm
Site Code : 13007
Start Date : 2/14/2013
Page No : 1

E-W Street: Rte 9/ Main St.
N-S Street: Walmart Dvwy

Groups Printed- Cars - Trucks

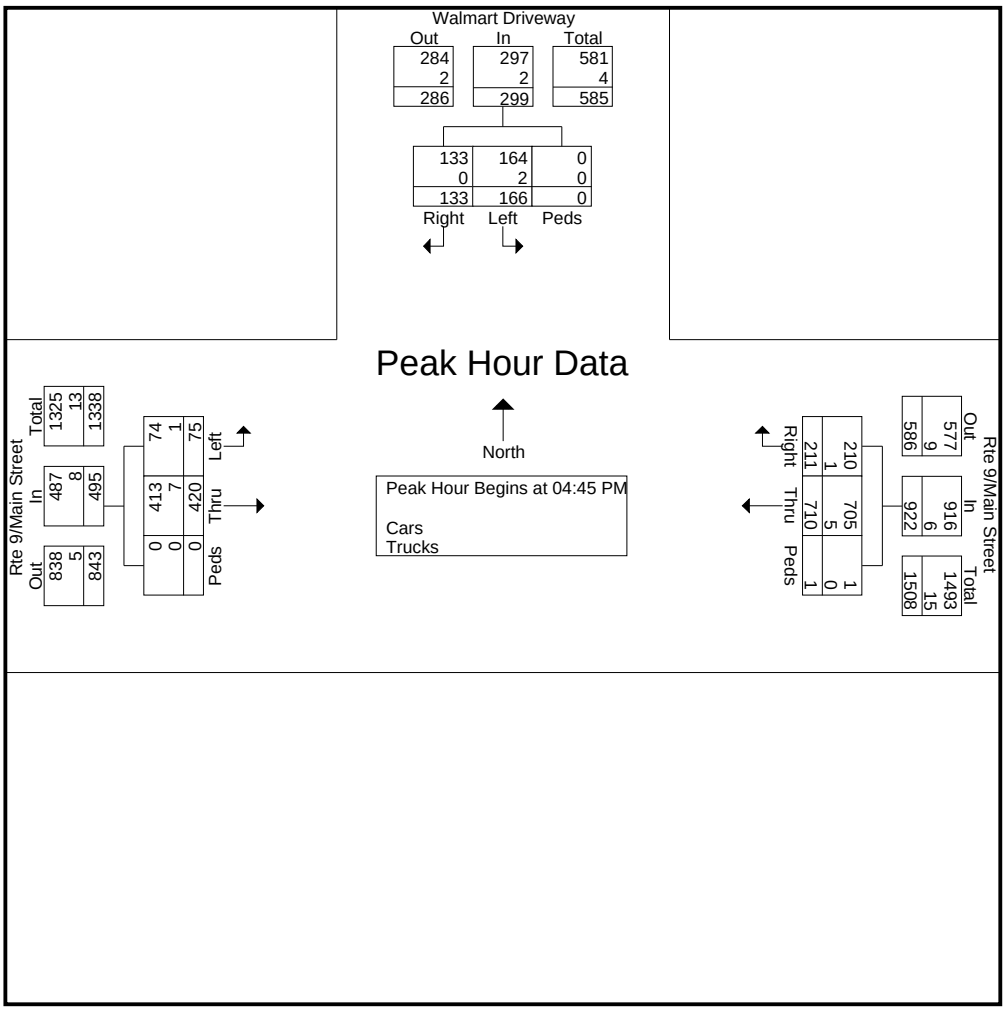
	Walmart Driveway From North				Rte 9/Main Street From East				Rte 9/Main Street From West				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	45	43	0	88	162	68	0	230	21	88	0	109	427
04:15 PM	47	36	0	83	158	61	0	219	22	106	0	128	430
04:30 PM	47	35	0	82	154	45	0	199	30	85	0	115	396
04:45 PM	37	33	0	70	166	48	1	215	17	105	0	122	407
Total	176	147	0	323	640	222	1	863	90	384	0	474	1660
05:00 PM	47	38	0	85	177	55	0	232	20	109	0	129	446
05:15 PM	41	27	0	68	192	57	0	249	17	109	0	126	443
05:30 PM	41	35	0	76	175	51	0	226	21	97	0	118	420
05:45 PM	42	37	0	79	161	43	0	204	21	73	0	94	377
Total	171	137	0	308	705	206	0	911	79	388	0	467	1686
Grand Total	347	284	0	631	1345	428	1	1774	169	772	0	941	3346
Apprch %	55	45	0		75.8	24.1	0.1		18	82	0		
Total %	10.4	8.5	0	18.9	40.2	12.8	0	53	5.1	23.1	0	28.1	
Cars	341	281	0	622	1335	422	1	1758	167	760	0	927	3307
% Cars	98.3	98.9	0	98.6	99.3	98.6	100	99.1	98.8	98.4	0	98.5	98.8
Trucks	6	3	0	9	10	6	0	16	2	12	0	14	39
% Trucks	1.7	1.1	0	1.4	0.7	1.4	0	0.9	1.2	1.6	0	1.5	1.2

Ron Müller & Associates
Traffic Engineering and Consulting Services
56 Teresa Road, Hopkinton, MA 01748

File Name : 13007 Rte 9-Walmart Dvwy pm
Site Code : 13007
Start Date : 2/14/2013
Page No : 2

E-W Street: Rte 9/ Main St.
N-S Street: Walmart Dvwy

	Walmart Driveway From North				Rte 9/Main Street From East				Rte 9/Main Street From West				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	37	33	0	70	166	48	**1**	215	17	105	0	122	407
05:00 PM	**47**	**38**	0	**85**	177	55	0	232	20	**109**	0	**129**	**446**
05:15 PM	41	27	0	68	**192**	**57**	0	**249**	17	109	0	126	443
05:30 PM	41	35	0	76	175	51	0	226	**21**	97	0	118	420
Total Volume	166	133	0	299	710	211	1	922	75	420	0	495	1716
% App. Total	55.5	44.5	0		77	22.9	0.1		15.2	84.8	0		
PHF	.883	.875	.000	.879	.924	.925	.250	.926	.893	.963	.000	.959	.962
Cars	164	133	0	297	705	210	1	916	74	413	0	487	1700
% Cars	98.8	100	0	99.3	99.3	99.5	100	99.3	98.7	98.3	0	98.4	99.1
Trucks	2	0	0	2	5	1	0	6	1	7	0	8	16
% Trucks	1.2	0	0	0.7	0.7	0.5	0	0.7	1.3	1.7	0	1.6	0.9



Ron Müller & Associates
Traffic Engineering and Consulting Services
56 Teresa Road, Hopkinton, MA 01748

File Name : 13007 Rte 9-Walmart Dvwy Sat
Site Code : 13007
Start Date : 3/2/2013
Page No : 1

E-W Street: Rte 9/Main Street
N-S Street: Walmart Driveway

Groups Printed- Cars - Trucks

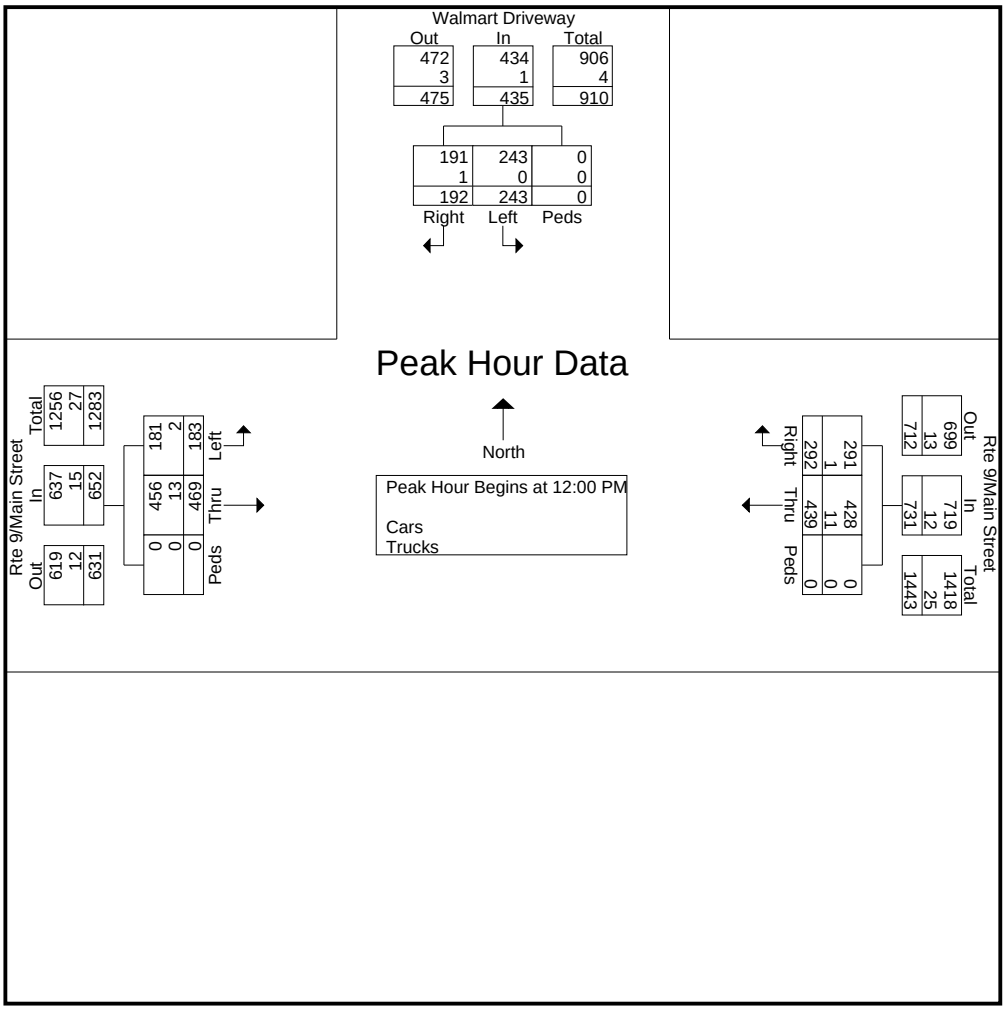
	Walmart Driveway From North				Rte 9/Main Street From East				Rte 9/Main Street From West				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	40	48	0	88	53	85	0	138	109	42	0	151	377
11:15 AM	43	45	0	88	67	93	0	160	116	28	0	144	392
11:30 AM	43	52	0	95	52	98	0	150	130	41	0	171	416
11:45 AM	44	59	0	103	58	103	0	161	109	51	0	160	424
Total	170	204	0	374	230	379	0	609	464	162	0	626	1609
12:00 PM	41	55	0	96	75	111	0	186	94	57	0	151	433
12:15 PM	53	63	0	116	70	115	0	185	130	51	0	181	482
12:30 PM	44	69	0	113	79	107	0	186	130	35	0	165	464
12:45 PM	54	56	0	110	68	106	0	174	115	40	0	155	439
Total	192	243	0	435	292	439	0	731	469	183	0	652	1818
01:00 PM	37	52	0	89	66	113	0	179	112	28	0	140	408
01:15 PM	47	56	0	103	65	116	0	181	113	49	0	162	446
01:30 PM	42	54	0	96	57	98	0	155	104	39	0	143	394
01:45 PM	46	59	0	105	61	93	0	154	115	40	0	155	414
Total	172	221	0	393	249	420	0	669	444	156	0	600	1662
Grand Total	534	668	0	1202	771	1238	0	2009	1377	501	0	1878	5089
Apprch %	44.4	55.6	0		38.4	61.6	0		73.3	26.7	0		
Total %	10.5	13.1	0	23.6	15.2	24.3	0	39.5	27.1	9.8	0	36.9	
Cars	529	662	0	1191	766	1208	0	1974	1350	495	0	1845	5010
% Cars	99.1	99.1	0	99.1	99.4	97.6	0	98.3	98	98.8	0	98.2	98.4
Trucks	5	6	0	11	5	30	0	35	27	6	0	33	79
% Trucks	0.9	0.9	0	0.9	0.6	2.4	0	1.7	2	1.2	0	1.8	1.6

Ron Müller & Associates
Traffic Engineering and Consulting Services
56 Teresa Road, Hopkinton, MA 01748

File Name : 13007 Rte 9-Walmart Dvwy Sat
Site Code : 13007
Start Date : 3/2/2013
Page No : 2

E-W Street: Rte 9/Main Street
N-S Street: Walmart Driveway

	Walmart Driveway From North				Rte 9/Main Street From East				Rte 9/Main Street From West				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 12:00 PM													
12:00 PM	41	55	0	96	75	111	0	**186**	94	**57**	0	151	433
12:15 PM	53	63	0	**116**	70	**115**	0	185	**130**	51	0	**181**	**482**
12:30 PM	44	**69**	0	113	**79**	107	0	186	130	35	0	165	464
12:45 PM	**54**	56	0	110	68	106	0	174	115	40	0	155	439
Total Volume	192	243	0	435	292	439	0	731	469	183	0	652	1818
% App. Total	44.1	55.9	0		39.9	60.1	0		71.9	28.1	0		
PHF	.889	.880	.000	.938	.924	.954	.000	.983	.902	.803	.000	.901	.943
Cars	191	243	0	434	291	428	0	719	456	181	0	637	1790
% Cars	99.5	100	0	99.8	99.7	97.5	0	98.4	97.2	98.9	0	97.7	98.5
Trucks	1	0	0	1	1	11	0	12	13	2	0	15	28
% Trucks	0.5	0	0	0.2	0.3	2.5	0	1.6	2.8	1.1	0	2.3	1.5



Seasonal/Historical Adjustment Data and Crash Rate Worksheet

Massachusetts Highway Department

3140: Monthly Hourly Volume for February 2019

Location ID:	**3140**	**Seasonal Factor Group:**	**U3**
County:	**Worcester**	**Daily Factor Group:**	
Funcationl 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	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL
1	25	16	6	15	56	155	353	484	328	238	240	211	199	245	300	404	445	428	317	229	171	103	100	78	5146
2	34	38	20	28	46	138	230	332	317	248	261	239	285	282	312	321	276	312	216	201	135	94	92	70	4527
3	41	15	19	17	38	122	270	371	279	235	250	249	233	255	272	276	267	280	152	64	84	57	158	103	4107
4	13	9	8	24	46	126	289	431	371	280	219	218	250	233	260	422	401	442	262	184	131	88	55	33	4795
5	20	10	11	8	19	49	151	194	217	256	251	259	263	293	289	398	419	409	296	212	155	82	57	35	4353
6	31	7	9	6	14	41	117	148	170	186	230	244	245	220	282	360	453	408	256	166	129	88	51	46	3907
7	33	13	9	25	45	126	335	463	358	249	214	203	219	217	276	389	440	400	302	168	124	104	79	41	4832
12	12	8	7	6	23	46	161	450	365	298	208	241	289	357	320	254	181	134	72	53	41	31	31	38	3626
13	22	12	8	12	8	44	117	318	283	240	199	224	215	207	240	352	423	373	268	168	128	105	80	63	4109
14	26	14	16	37	53	166	334	470	366	270	232	213	208	234	295	370	467	428	329	194	158	102	74	51	5107
15	20	15	11	18	49	140	329	475	356	271	206	230	253	273	302	406	488	440	327	194	142	145	88	72	5250
16	20	10	16	20	40	114	253	162	206	245	273	330	343	291	310	287	331	328	211	161	134	113	107	57	4362
17	32	25	21	22	47	160	302	82	140	198	223	254	306	300	250	242	280	270	196	145	119	75	71	32	3792
18	29	16	23	18	46	149	294	218	183	178	161	185	195	212	220	288	255	279	176	146	91	82	53	33	3530
19	25	15	11	14	18	63	105	426	317	252	264	270	302	250	308	357	402	409	293	194	144	97	62	41	4639
20	23	12	8	9	14	35	98	404	355	253	261	228	284	270	324	384	381	410	279	177	87	91	54	48	4489
21	19	25	20	20	35	85	178	341	309	238	210	212	254	249	282	334	402	367	290	196	125	139	81	51	4462
22	24	15	13	20	52	157	300	384	309	262	247	270	277	283	333	391	452	430	303	215	163	113	103	53	5169
23	18	7	9	28	50	147	290	126	185	242	227	297	275	289	304	330	297	277	224	185	137	128	130	86	4288
24	20	24	19	28	52	121	235	67	98	146	176	213	235	264	241	238	241	207	184	122	109	57	40	40	3177
25	36	20	16	16	50	131	232	477	349	237	200	212	208	253	286	354	355	370	216	141	116	78	47	29	4429
26	20	12	9	15	21	43	144	476	357	250	232	198	213	252	285	412	435	396	304	186	138	87	58	40	4583
27	21	14	5	12	10	34	108	472	359	248	218	219	235	228	283	393	475	403	263	180	139	76	63	65	4523
28	23	12	14	21	54	158	342	393	325	310	260	223	228	244	285	400	401	391	280	177	162	87	86	63	4939

December ADT:	**4423**
AADT:	**4935**
Factor to Average:	**1.12**

Massachusetts Highway Department

3140: Monthly Hourly Volume for March 2019

Location ID:	**3140**	**Seasonal Factor Group:**	**U3**
County:	**Worcester**	**Daily Factor Group:**	
Funcationl 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	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL
4	19	16	12	18	23	44	112	114	145	180	171	202	202	219	257	261	280	305	209	142	98	87	51	36	3203
5	20	13	9	13	13	41	117	145	177	215	217	243	275	229	267	386	418	405	285	193	143	88	60	39	4011
6	43	19	24	16	30	97	199	237	235	206	184	211	217	242	325	388	474	402	268	187	141	87	61	49	4342
7	20	15	8	20	46	165	349	473	366	252	200	247	256	239	290	464	445	432	310	202	144	122	89	55	5209
8	18	10	11	24	44	167	341	472	392	239	181	207	257	272	339	412	476	407	329	201	147	128	118	85	5277
9	33	13	16	19	55	148	300	445	329	272	278	251	259	348	316	364	353	298	274	213	144	127	120	71	5046
10	32	28	15	19	52	144	302	399	275	219	204	210	212	170	191	198	219	182	118	110	54	39	35	22	3449

March ADT:	**4362**
AADT:	**4935**
Factor to Average:	**1.13**

Massachusetts Highway Department

3140: Monthly Hourly Volume for December 2019

Location ID:	**3140**	**Seasonal Factor Group:**	**U3**
County:	**Worcester**	**Daily Factor Group:**	
Funcationl 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	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL
1	42	19	12	18	9	34	61	96	154	248	312	329	360	337	310	279	168	123	108	71	57	36	30	28	3241
2	23	11	19	32	41	103	162	178	166	129	130	146	135	159	187	223	202	221	125	80	58	52	43	41	2666
3	30	9	15	29	42	75	159	216	205	188	159	146	191	214	273	284	317	292	212	138	104	91	58	55	3502
4	22	11	10	20	58	164	333	497	380	279	215	233	250	257	308	383	423	412	316	181	141	106	95	59	5153
5	27	22	7	21	45	152	360	496	404	277	228	213	213	254	304	431	483	435	331	209	148	117	83	56	5316
6	29	18	10	17	65	164	322	478	343	237	249	226	241	260	314	414	474	452	316	208	138	129	134	74	5312
7	59	31	20	22	29	60	106	170	243	238	264	276	338	331	297	314	349	334	278	148	132	134	109	74	4356
8	49	30	16	9	14	20	56	96	163	200	218	314	325	292	277	301	290	238	177	128	117	78	62	45	3515
9	22	2	12	20	45	153	325	458	362	279	186	246	215	243	299	367	380	371	266	158	146	77	68	52	4752
10	23	14	14	16	42	162	361	463	390	254	232	227	243	251	281	385	441	402	281	188	135	110	61	56	5032
11	28	18	11	34	78	145	249	309	386	275	234	245	224	227	260	394	402	409	284	206	139	111	77	61	4806
12	27	20	9	20	59	173	368	468	373	293	236	238	243	264	308	435	482	481	348	210	179	142	96	69	5541
13	30	25	13	19	55	159	345	472	349	268	259	233	259	278	325	379	537	472	340	233	152	145	104	85	5536
14	45	18	16	22	18	43	94	147	205	233	269	287	304	318	270	265	316	308	261	135	124	139	116	85	4038
15	56	19	21	10	11	15	65	94	146	215	254	279	348	281	278	225	274	266	182	120	102	80	58	49	3448
16	21	9	8	10	54	156	345	508	389	279	223	242	254	255	327	405	457	406	275	189	153	87	68	51	5171
17	31	19	16	22	39	139	225	258	224	152	149	143	167	172	227	241	266	240	195	103	74	62	54	57	3275
18	19	9	18	21	67	166	267	414	371	299	249	264	238	267	327	409	478	400	324	209	139	141	79	63	5238
20	39	29	14	18	53	162	317	462	356	276	253	248	295	329	360	419	487	459	333	221	179	134	103	105	5651
21	47	25	18	9	15	45	106	157	243	266	297	322	336	333	293	330	311	252	210	161	162	131	121	77	4267
22	53	29	19	18	11	21	73	89	148	202	237	268	316	289	298	284	283	240	199	140	127	95	71	47	3557
23	29	15	13	14	46	136	259	365	339	327	280	262	315	361	330	376	380	405	279	174	128	106	75	66	5080
24	39	17	16	14	40	107	205	261	241	244	260	268	379	360	344	378	324	308	223	157	217	230	200	105	4937
25	24	18	7	3	8	15	43	59	92	129	203	279	340	335	255	218	277	265	251	215	173	106	59	47	3421
26	29	12	7	11	33	113	211	239	232	187	270	259	306	249	297	367	354	313	202	154	131	79	93	57	4205
27	31	18	18	15	45	122	211	281	272	278	254	248	280	295	311	347	411	376	265	195	150	132	91	64	4710
28	27	12	17	19	23	34	101	112	155	237	270	311	345	315	328	338	320	266	209	164	120	134	140	79	4076
29	41	20	16	16	9	22	53	80	124	228	237	314	315	261	238	253	307	249	178	129	103	83	47	29	3352
30	20	6	8	17	33	102	198	238	178	148	146	133	155	213	184	252	212	198	120	88	54	57	44	38	2842
31	27	14	31	22	39	101	192	257	256	232	241	231	264	294	327	355	343	301	217	147	123	85	75	63	4237

December ADT:	**4341**
AADT:	**4935**
Factor to Average:	**1.14**

MassDOT Transportation Data Management System

STATION 3140 - PAXTON - RTE 122 - SOUTH OF BROOKS ROAD

YEAR #	YEAR	AADT
1	2010	4,500
2	2011	
3	2012	
4	2013	
5	2014	
6	2015	
7	2016	
8	2017	4,841
9	2018	4,979
10	2019	4,935

5-Year Annual Growth:

Year 6-7	
Year 6-8	
Year 6-9	
Year 6-10	
Year 7-8	
Year 7-9	
Year 7-10	
Year 8-9	2.85%
Year 8-10	0.97%
Year 9-10	-0.88%
Avg. Growth:	**0.98%**

Traffic Growth Calculations

Year 1-2		Year 2-3		Year 3-4		Year 4-5		Year 5-6
Year 1-3		Year 2-4		Year 3-5		Year 4-6		Year 5-7
Year 1-4		Year 2-5		Year 3-6		Year 4-7		Year 5-8
Year 1-5		Year 2-6		Year 3-7		Year 4-8		Year 5-9
Year 1-6		Year 2-7		Year 3-8		Year 4-9		Year 5-10
Year 1-7		Year 2-8		Year 3-9		Year 4-10		
Year 1-8	1.08%	Year 2-9		Year 3-10				
Year 1-9	1.33%	Year 2-10						
Year 1-10	1.07%							
Year 6-7		Year 7-8		Year 8-9	2.85%	Year 9-10	-0.88%	
Year 6-8		Year 7-9		Year 8-10	0.97%			
Year 6-9		Year 7-10						
Year 6-10								

10 Year Annual Average Traffic Growth Rate: 1.07%

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Leicester COUNT DATE : Dec-20

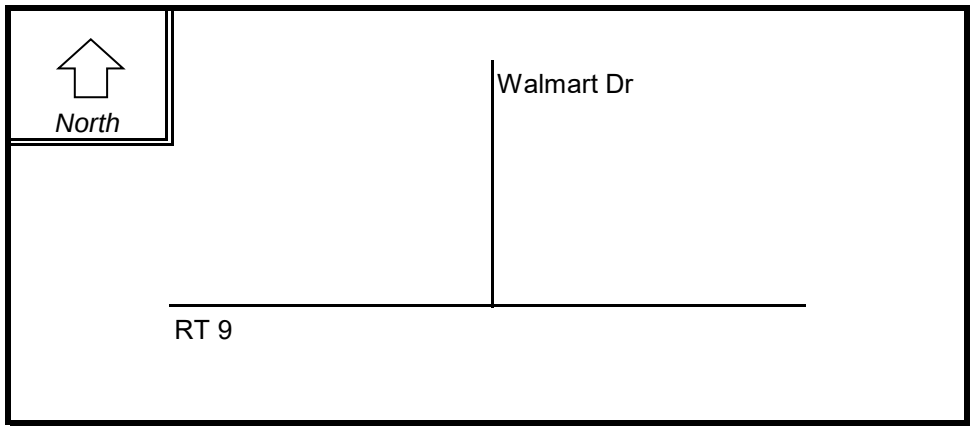
DISTRICT : 3 UNSIGNALIZED : SIGNALIZED : x

~ INTERSECTION DATA ~

MAJOR STREET : Route 9

MINOR STREET(S) : Walmart Drive

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	WB	NB	EB		
PEAK HOURLY VOLUMES (PM) :	435	819		746		**2,000**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **22,222**

TOTAL # OF CRASHES : 10

OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR (**A**) : **3.33**

CRASH RATE CALCULATION : **0.41**

RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : MassDOT Crash Portal 2016-2018

Project Title & Date:

Trip Generation Worksheets and Drive-Through Queue Data

Institute of Transportation Engineers (ITE); 10th Edition
Land Use Code (LUC) 960 - Super Convenience Market/Gas Sation

Average Vehicle Trips Ends vs: Vehicle Fueling Positions
Independent Variable (X): 10

AVERAGE WEEKDAY DAILY

T = 230.52 * (X)
T = 2,305.20
T = 2,310 vehicle trips
with 50% (1,155 vpd) entering and 50% (1,155 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 28.08 * (X)
T = 280.80
T = 281 vehicle trips
with 50% (141 vph) entering and 50% (140 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 22.96 * (X)
T = 229.60
T = 230 vehicle trips
with 50% (115 vph) entering and 50% (115 vph) exiting.

SATURDAY DAILY

T = 291.67 * (X)
T = 2,916.70
T = 2,920 vehicle trips
with 50% (1,460 vpd) entering and 50% (1,460 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 23.26 * (X)
T = 232.60
T = 233 vehicle trips
with 50% (117 vph) entering and 50% (116 vph) exiting.

Institute of Transportation Engineers (ITE); 10th Edition
Land Use Code (LUC) 151 - Mini-Warehouse

Average Vehicle Trips Ends vs: 1000 Square Feet Gross Floor Area
Independent Variable (X): 30.000 ksf

AVERAGE WEEKDAY DAILY

T = 1.51 * (X)
T = 45.30
T = 50 vehicle trips
with 50% (25 vpd) entering and 50% (25 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.10 * (X)
T = 3.00
T = 3 vehicle trips
with 60% (2 vph) entering and 40% (1 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.17 * (X)
T = 5.10
T = 5 vehicle trips
with 47% (2 vph) entering and 53% (3 vph) exiting.

SATURDAY DAILY

T = 1.95 * (X)
T = 58.50
T = 60 vehicle trips
with 50% (30 vpd) entering and 50% (30 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.31 * (X)
T = 9.30
T = 9 vehicle trips
with 59% (5 vph) entering and 41% (4 vph) exiting.

Institute of Transportation Engineers (ITE); 10th Edition

Land Use Code (LUC) 945 - Gasoline/Service Station with Convenience Market

Average Vehicle Trips Ends vs: Vehicle Fueling Positions
Independent Variable (X): 10

AVERAGE WEEKDAY DAILY

T = 268.46 * (X) - 1161.00
T = 1523.60
T = 1,520 vehicle trips
with 50% (760 vpd) entering and 50% (760 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 19.00 * (X) - 96.53
T = 93.47
T = 93 vehicle trips
with 51% (47 vph) entering and 49% (46 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 13.99 * (X)
T = 139.90
T = 140 vehicle trips
with 51% (71 vph) entering and 49% (69 vph) exiting.

SATURDAY MIDDAY PEAK HOUR

Institute of Transportation Engineers (ITE); 10th Edition

Land Use Code (LUC) 934 - Fast-Food Restaurant with Drive-Through Window

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Floor Area
Independent Variable (X): 2.100

AVERAGE WEEKDAY DAILY

T = 470.95 * (X)
T = 989.00
T = 990 vehicle trips
with 50% (495 vpd) entering and 50% (495 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 40.19 * (X)
T = 84.40
T = 84 vehicle trips
with 51% (43 vph) entering and 49% (41 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 32.67 * (X)
T = 68.61
T = 69 vehicle trips
with 52% (36 vph) entering and 48% (33 vph) exiting.

SATURDAY DAILY

T = 616.12 * (X)
T = 1,293.85
T = 1,290 vehicle trips
with 50% (645 vpd) entering and 50% (645 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 54.86 * (X)
T = 115.21
T = 115 vehicle trips
with 51% (59 vph) entering and 49% (56 vph) exiting.

Drive-Through Queue Generation

Mike Spack, PE, PTOE, Max Moreland, EIT, Lindsay de Leeuw, Nate Hood

1.0 Introduction

This report provides queuing data for businesses with drive-through services. It is intended to be an aid for site designers and reviewers, similar to the Institute of Transportation Engineers' *Trip Generation* and *Parking Generation* reports. The data presentation is modeled on the *Parking Generation* report and data is provided based on at least six sites, similar to data sets marked as statistically significant in *Trip Generation*.

Businesses with drive-through lanes are very common in the United States and having data that gives usage information for drive-through lanes will assist designers as well as cities in determining the appropriate amount of storage needed for proposed drive-through businesses. Data for drive-through queues was published by the ITE Technical Council Committee 5D-10 in 1995 based on information collected between the late 1960's and the 1990's. A paper was also published in 2009 by Mark Stuecheli, PTP giving updated information for bank and coffee shop drive-through lanes. The results from the 2009 study are incorporated into this paper (thank you Mark for your assistance).

2.0 Data Collection

Data was collected using COUNTcam video recording systems at a total of 30 drive-through locations in Minneapolis, MN and several surrounding suburbs between 2010 and 2012 (26 of the 30 videos were recorded in February of 2012, which should represent peak usage in the cold Minnesota winter). Videos of drive-through lanes were collected at banks, car washes, coffee shops, fast food restaurants and pharmacies. A total of six locations were selected for each of the five different land uses. Each location was recorded for between one and five days where the majority of locations were recorded for two consecutive days. The days of the week that each video was recorded on varies.

The 24-hour videos were watched at high speeds with the PC-TAS counting software and maximum queues throughout the day were noted. Most of the COUNTcams were set up such that the entire queue lane could be seen, but at a few locations the drive-through lanes wrapped around the building in a way that the entire queue length would not be able to be seen. For these situations, the COUNTcams were set up so that the ordering window and back of the queue could be seen and it was noted how many vehicles could fit between the ordering window and the front of the queue. For drive-through locations with multiple lanes, the number of lanes was noted but the maximum queue is defined as the sum of the queues at each lane for any given point in time, not the queue per lane. This approach provides overall demand, which may assist designers in determining how many drive through lanes are appropriate in addition to determining how long they should be.

Once the maximum queue for each day at each location was determined, the data was compiled and statistics for each land use were calculated. The average maximum queue, standard deviation, coefficient of variation, range, 85th percentile and 33rd percentile were calculated for each land use.

Data for drive-through coffee shops and banks from the Kansas City, Kansas metropolitan area was published in the 2009 paper New Drive-Through Stacking Information for Banks and Coffee Shops by Mark Stuecheli. This data is included in the analysis.

3.0 Data Analysis

Based on the peak queue lengths, it is apparent that each land use will require a different minimum drive through stacking distance. The results for each land use can be found below. The peak queue lengths for each location, broken down by land use and day of the week, can be found in the Appendix.

3.1 Banks

Data collection was done at six banks with drive-through services (including one credit union) in August 2011 and February 2012. Twelve days of data were collected. The banks were located in the cities of Minneapolis, Robbinsdale and St. Louis Park, MN.

All of the locations had a lane with a drive-through ATM and at least two other lanes. Though service times may differ for ATM lanes compared to the regular lanes, the maximum queues were counted together. This is because based upon what was observed, vehicles would occasionally switch the lane they were in. For example, a vehicle waiting in the ATM line with a queue of three vehicles may move over to a regular line with a queue of only one vehicle. Much of what can be done at the bank's drive-through lane can also be accomplished at that bank's ATM and vice versa. Vehicles being served were counted as being in the queue.

Nine days of data from the Kansas City, Kansas area is also included. This data does not factor in vehicles in ATM lanes.

Table 3.1 – Drive-Through Bank Maximum Queue Statistics

	Minnesota Data	Minnesota + Kansas Data
Number of Data Points	12	21
Average Maximum Queue (Vehicles)	5.83	5.76
Standard Deviation (Vehicles)	1.85	2.21
Coefficient of Variation	32%	38%
Range (Vehicles)	3 to 8	1 to 10
85th Percentile (Vehicles)	8.00	8.00
33rd Percentile (Vehicles)	5.00	5.00

Figure 3.1.1 – Drive-Through Bank Maximum Queue Frequency – Minnesota Data

Figure 3.1.2 – Drive-Through Bank Maximum Queue Frequency – Minnesota + Kansas Data

The data for Kansas banks was collected between 4:30pm and 6:00pm. While many of the maximum queues for the data collected in Minnesota were between these times, maximum queues occurred between 8:30am and 5:30pm so it is possible that some of the Kansas data does not capture the actual maximum queues for the day.

The number of available lanes at banks, not including the ATM lane, ranged from two to seven lanes (though the most open at one time was five lanes). Even though plenty of lanes were available, cars often stacked at the lane closest to the building, thus additional lanes may not result in shorter queues. With an 85th percentile maximum queue of eight vehicles, the data suggests that banks with drive-through lanes should be able to accommodate 160 feet of vehicle stacking.

3.2 Car Washes

Data collection was done at six car washes with drive-through services (including one full-service car wash) in February 2012. Twelve days of data were collected. The car washes were located in the cities of Falcon Heights, Hopkins, Minneapolis, Roseville and St. Louis Park, MN. Five of the six car washes (excluding the full-service car wash) were located at gas stations. Only the vehicles waiting in line were counted; vehicles being washed were not added to the queue.

Table 3.2 – Drive-Through Car Wash Maximum Queue Statistics

Number of Data Points	**12**
Average Maximum Queue (Vehicles)	**4.42**
Standard Deviation (Vehicles)	**2.31**
Coefficient of Variation	**52%**
Range (Vehicles)	**1 to 10**
85th Percentile (Vehicles)	**6.20**
33rd Percentile (Vehicles)	**3.00**

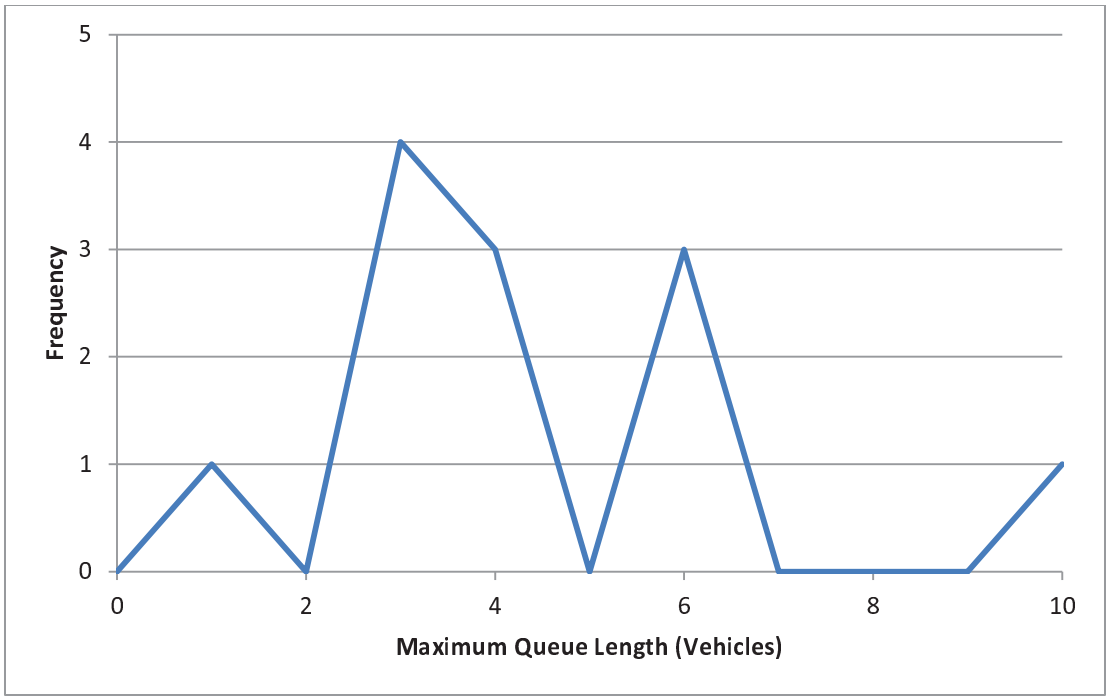


Figure 3.2 – Drive-Through Car Wash Maximum Queue Frequency

Two of the car washes had two lanes while the other four were one lane car washes. The full-service car wash had two lanes and also produced the highest maximum queue of 10 vehicles. The maximum queues for car washes were spread throughout the afternoon from 12:30pm to 8:30pm. With an 85th percentile maximum queue of more than six vehicles, the data suggests that car washes with drive-through lanes should be able to accommodate 140 feet of vehicle stacking throughout the day.

3.3 Coffee Shops

Data collection was done at six coffee shops with drive-through services in November 2010, August 2011 and February 2012. Fourteen days of data were collected. The coffee shops were located in the cities of Edina, Hopkins, Minneapolis, Roseville and St. Louis Park, MN. Vehicles being served were counted as being in the queue. Twelve days of data from the Kansas City, Kansas area is also included.

Table 3.3 – Drive-Through Coffee Shop Maximum Queue Statistics

	Minnesota Data	Minnesota + Kansas Data
Number of Data Points	14	26
Average Maximum Queue (Vehicles)	11.00	10.23
Standard Deviation (Vehicles)	2.25	2.76
Coefficient of Variation	20%	27%
Range (Vehicles)	7 to 16	3 to 16
85th Percentile (Vehicles)	13.50	13.00
33rd Percentile (Vehicles)	10.00	9.91

Figure 3.3.1 – Drive-Through Coffee Shop Maximum Queue Frequency – Minnesota Data

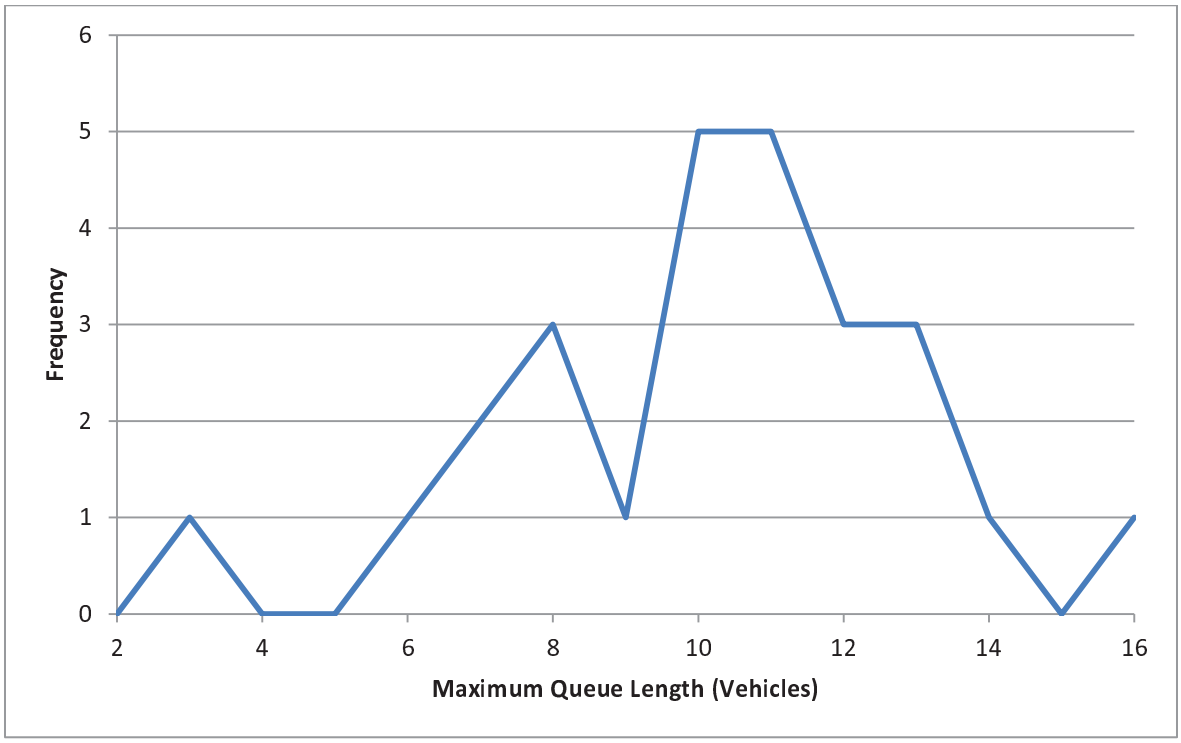


Figure 3.3.2 – Drive-Through Coffee Shop Maximum Queue Frequency – MN + KS Data

Coffee shops produced the longest maximum queues of any of the land uses in this study with all of the maximum queues occurring in the morning. In four of the six cases, the queues spilled out of the parking lot and into the street. These spillovers would typically only happen once or twice a day and last only a few minutes, however, one location had stacking into the street for about 15 minutes in addition to multiple periods of several minutes where cars would queue in the street.

With an 85th percentile maximum queue of 13 vehicles, the data suggests that coffee shops with drive-through lanes should be able to accommodate at least 260 feet of vehicle stacking during morning hours.

3.4 Fast Food Restaurants

Data collection was done at six fast food restaurants with drive-through services in August 2011 and February 2012. Fourteen days of data were collected. The restaurants were located in the cities of Golden Valley, Hopkins, Minneapolis and St. Louis Park, MN. Vehicles being served were counted as being in the queue.

Table 3.4 – Drive-Through Fast Food Restaurant Maximum Queue Statistics

Number of Data Points	14
Average Maximum Queue (Vehicles)	8.50
Standard Deviation (Vehicles)	2.68
Coefficient of Variation	32%
Range (Vehicles)	5-13
85th Percentile (Vehicles)	12.00
33rd Percentile (Vehicles)	7.90

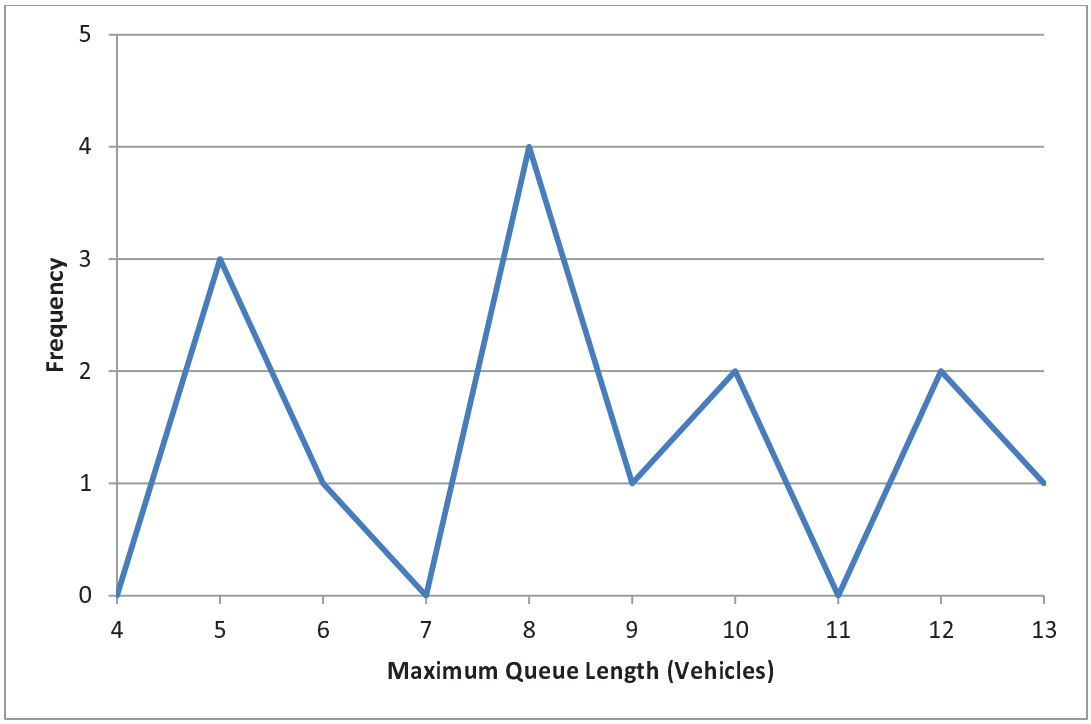


Figure 3.4 – Drive-Through Fast Food Restaurant Maximum Queue Frequency

The maximum queues for fast food restaurants were spread throughout the day from 8:00am to 10:00pm. With an 85th percentile maximum queue of 12 vehicles, the data suggests that fast food restaurants with drive-through lanes should be able to accommodate 240 feet of vehicle stacking throughout the day.

3.5 Pharmacies

Data collection was done at six pharmacies with drive-through services in February 2012. Twelve days of data were collected. The pharmacies were located in the cities of Hopkins, Minneapolis, New Hope and Robbinsdale, MN. Vehicles being served were counted as being in the queue.

Table 3.5 – Drive-Through Pharmacy Maximum Queue Statistics

Number of Data Points	12
Average Maximum Queue (Vehicles)	2.92
Standard Deviation (Vehicles)	1.16
Coefficient of Variation	40%
Range (Vehicles)	1-5
85th Percentile (Vehicles)	4.05
33rd Percentile (Vehicles)	2.00

Figure 3.5 – Drive-Through Pharmacy Maximum Queue Frequency

The maximum queues for pharmacies were spread throughout the day from 8:00am to 10:00pm. With an 85th percentile maximum queue of more than 4 vehicles, the data suggests that pharmacies with drive-through lanes should be able to accommodate 100 feet of vehicle stacking throughout the day.

4.0 Conclusions

The 85th percentile maximum queue lengths for each land use are: 160 feet for banks (eight vehicles), 140 feet for car washes (seven vehicles), 260 feet for coffee shops (13 vehicles), 240 feet for fast food restaurants (12 vehicles) and 100 feet for pharmacies (five vehicles).

While some of the locations observed have an excess of space dedicated to drive-through lanes (i.e. some banks and pharmacies), others could occasionally use additional space for drive-through lanes (i.e. coffee shops in the morning).

Fast food restaurants and coffee shops have the longest maximum queues of the five land uses observed. Coffee shops have a tendency for the morning queues to build so long that they spill out onto the street, though, as is expected, their afternoon and evening queues are minimal. Fast food restaurants also have large queues, but they tended to have enough dedicated space that stacking did not go beyond the designated queuing area.

The data collected for this paper along with the data from the papers by Mark Stuecheli and the ITE Technical Committee 5D-10 (see Appendix for both of these) will hopefully provide useful data for traffic engineers and others trying to analyze drive-through queuing storage areas.

5.0 Labor Savings of the COUNTkit

Deploying people in the field to perform this data collection would not have been feasible. Using the COUNTcam video system made it possible to observe the drive through lanes 24 hours a day and the PC-TAS software made the data reduction practical. One location was recorded in November 2010 for 6 hours, three locations were recorded in August 2011 for a total of 202 hours and 26 locations were recorded in February 2012 for a total of 1012 hours. These 1220 hours of video were counted with a total of 120 hours of labor, meaning the videos were watched at approximately 10x speed. Installation of a COUNTcam takes approximately 10 minutes and retrieval takes approximately 5 minutes. This whole project was completed in approximately 3 weeks.

6.0 References

1. Stuecheli, M. (2009). New Drive-Through Stacking Information for Banks and Coffee Shops. *ITE 2009 Annual Meeting and Exhibit.* Print.
2. ITE Technical Committee 5D-10. "Queuing Areas for Drive-Thru Facilities." *ITE Journal* (May 1995): 38-42. Print.
3. Institute of Transportation Engineers. *Parking Generation.* 4th ed. Washington, DC: Institute of Transportation Engineers, 2010. Print.
4. Institute of Transportation Engineers. *Trip Generation.* 8th ed. Washington, DC: Institute of Transportation Engineers, 2008. Print.

7.0 Appendix

A – Day of Week Maximum Queues
B – New Drive-Through Stacking Information for Banks and Coffee Shops
C – ITE Technical Committee 5D-10: Queuing Areas for Drive-Thru Facilities
D – Drive-Through Data Forms

Capacity Analysis Methodology and Worksheets

General

A primary result of capacity analysis is the assignment of levels of service to traffic facilities under various traffic flow conditions. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM); Transportation Research Board; Washington, D.C.; 2010. The concept of level of service (LOS) 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 LOS A representing the best operating conditions and LOS F the worst. 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. A description of the operating condition under each level of service is provided below:

- LOS A describes conditions with little to no delay to motorists.
- LOS B represents a desirable level with relatively low delay to motorists.
- LOS C describes conditions with average delays to motorists.
- LOS D describes operations where the influence of congestion becomes more noticeable. Delays are still within an acceptable range.
- LOS E represents operating conditions with high delay values. This level is considered by many agencies to be the limit of acceptable delay.
- LOS F is considered to be unacceptable to most drivers with high delay values that often occur, when arrival flow rates exceed the capacity of the intersection.

Unsignalized Intersections

Levels of service for unsignalized intersections are calculated using the operational analysis methodology of the HCM. The procedure accounts for lane configuration on both the minor and major street approaches, conflicting traffic stream volumes, and the type of intersection control (STOP, YIELD, or all-way STOP control). The definition of level of service for unsignalized intersections is a function of average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The level-of-service criteria for unsignalized intersections are shown in Table A-1.

Signalized Intersections

Levels of service for signalized intersections are also calculated using the operational analysis methodology of the HCM. The methodology for signalized intersections assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometries on average *control* delay. Control delay includes queue move-up time and stopped delay. Table A-l summarizes the relationship between level of service and average control delay.

Table A-1
Level-of-Service Criteria for Intersections

Level of Service	Unsignalized Criteria Average Control Delay In Seconds Per Vehicle	Signalized Criteria Average Control Delay In Seconds Per Vehicle
A	≤ 10	≤ 10
B	10.1 to 15.0	10.1 to 20.0
C	15.1 to 25.0	20.1 to 35.0
D	25.1 to 35.0	35.1 to 55.0
E	35.1 to 50.0	55.1 to 80.0
F	>50	>80

For signalized intersections, this delay criterion may be applied in assigning level of service designations to individual lane groups, to individual intersection approaches, or to the entire intersection. For unsignalized intersections, this delay criterion may be applied in assigning level of service designations to individual lane groups or to individual intersection approaches.

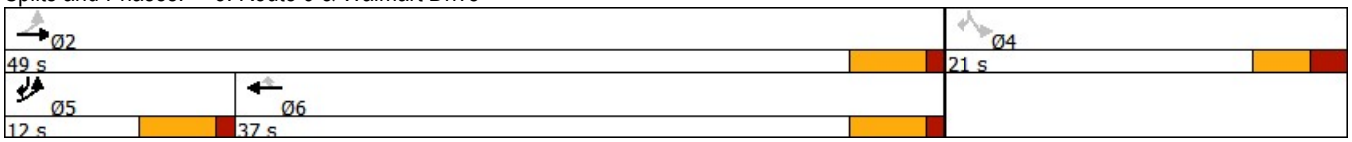
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	51	847	331	45	51	28
Future Volume (vph)	51	847	331	45	51	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	12	12	12
Storage Length (ft)	125			300	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	40				25	
Satd. Flow (prot)	1652	3539	1792	1524	1736	1553
Flt Permitted	0.423				0.950	
Satd. Flow (perm)	735	3539	1792	1524	1736	1553
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				53		33
Link Speed (mph)		30	30		30	
Link Distance (ft)		568	696		380	
Travel Time (s)		12.9	15.8		8.6	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	6%	6%	4%	4%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	996	389	53	60	33
Turn Type	pm+pt	NA	NA	Perm	Perm	pm+ov
Protected Phases	5	2	6			5
Permitted Phases	2			6	4	4
Total Split (s)	12.0	49.0	37.0	37.0	21.0	12.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	30.2	34.0	26.5	26.5	7.4	11.0
Actuated g/C Ratio	0.76	0.85	0.67	0.67	0.19	0.28
v/c Ratio	0.08	0.33	0.33	0.05	0.19	0.07
Control Delay	3.1	2.9	9.2	3.7	18.5	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	2.9	9.2	3.7	18.5	4.8
LOS	A	A	A	A	B	A
Approach Delay		2.9	8.5		13.7	
Approach LOS		A	A		B	
Queue Length 50th (ft)	0	0	37	0	10	0
Queue Length 95th (ft)	14	91	142	14	42	12
Internal Link Dist (ft)		488	616		300	
Turn Bay Length (ft)	125			300		
Base Capacity (vph)	729	3339	1493	1278	741	479
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.30	0.26	0.04	0.08	0.07

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 39.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.33

Intersection Signal Delay: 5.1	Intersection LOS: A
Intersection Capacity Utilization 36.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Route 9 & Walmart Drive



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	504	852	211	166	133
Future Volume (vph)	75	504	852	211	166	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	12	12	12
Storage Length (ft)	125			300	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	40				25	
Satd. Flow (prot)	1668	3574	1881	1599	1787	1599
Flt Permitted	0.100				0.950	
Satd. Flow (perm)	176	3574	1881	1599	1787	1599
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				220		82
Link Speed (mph)		30	30		30	
Link Distance (ft)		568	696		380	
Travel Time (s)		12.9	15.8		8.6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	525	888	220	173	139
Turn Type	pm+pt	NA	NA	Perm	Perm	pm+ov
Protected Phases	5	2	6			5
Permitted Phases	2			6	4	4
Total Split (s)	12.0	49.0	37.0	37.0	21.0	12.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	44.7	44.7	35.2	35.2	11.5	23.2
Actuated g/C Ratio	0.68	0.68	0.53	0.53	0.17	0.35
v/c Ratio	0.29	0.22	0.89	0.23	0.56	0.23
Control Delay	7.2	4.8	30.6	2.5	31.9	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	4.8	30.6	2.5	31.9	7.7
LOS	A	A	C	A	C	A
Approach Delay		5.1	25.1		21.1	
Approach LOS		A	C		C	
Queue Length 50th (ft)	9	35	322	0	64	15
Queue Length 95th (ft)	25	65	#629	33	118	47
Internal Link Dist (ft)		488	616		300	
Turn Bay Length (ft)	125			300		
Base Capacity (vph)	276	2413	998	952	432	620
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.22	0.89	0.23	0.40	0.22

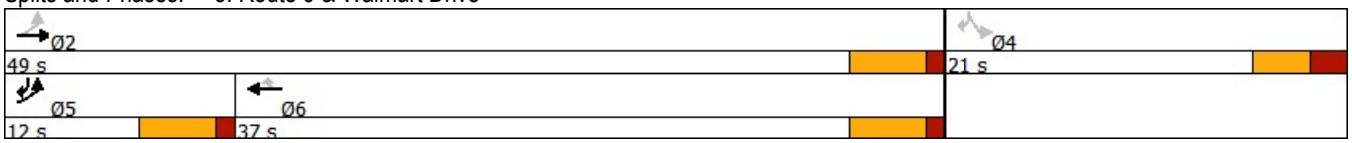
Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 66.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89

Intersection Signal Delay: 18.5	Intersection LOS: B
Intersection Capacity Utilization 70.7%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Route 9 & Walmart Drive



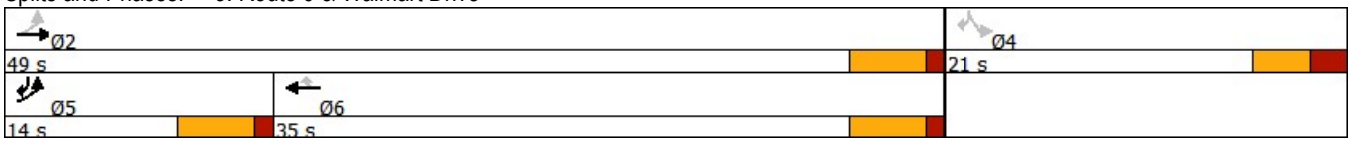
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	183	563	527	292	243	192
Future Volume (vph)	183	563	527	292	243	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	12	12	12
Storage Length (ft)	125			300	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	40				25	
Satd. Flow (prot)	1652	3539	1863	1583	1805	1615
Flt Permitted	0.191				0.950	
Satd. Flow (perm)	332	3539	1863	1583	1805	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				311		196
Link Speed (mph)		30	30		30	
Link Distance (ft)		568	696		380	
Travel Time (s)		12.9	15.8		8.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	599	561	311	259	204
Turn Type	pm+pt	NA	NA	Perm	Perm	pm+ov
Protected Phases	5	2	6			5
Permitted Phases	2			6	4	4
Total Split (s)	14.0	49.0	35.0	35.0	21.0	14.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	37.6	37.6	23.7	23.7	13.0	26.9
Actuated g/C Ratio	0.62	0.62	0.39	0.39	0.21	0.44
v/c Ratio	0.49	0.27	0.77	0.39	0.67	0.25
Control Delay	9.8	5.9	24.8	3.3	32.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.8	5.9	24.8	3.3	32.9	3.4
LOS	A	A	C	A	C	A
Approach Delay		6.8	17.2		19.9	
Approach LOS		A	B		B	
Queue Length 50th (ft)	28	48	181	0	93	2
Queue Length 95th (ft)	56	75	301	41	174	36
Internal Link Dist (ft)		488	616		300	
Turn Bay Length (ft)	125			300		
Base Capacity (vph)	406	2638	947	957	489	835
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.23	0.59	0.32	0.53	0.24

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 60.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77

Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 63.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Route 9 & Walmart Drive



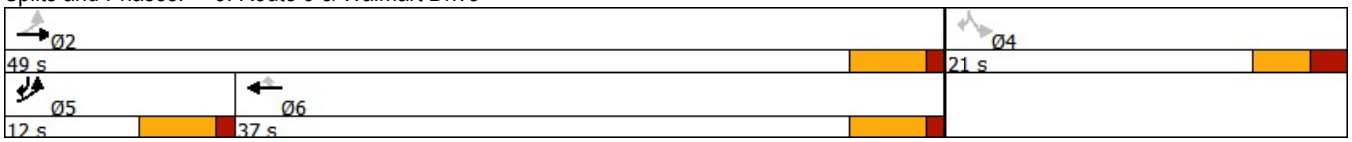
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	51	908	355	45	51	28
Future Volume (vph)	51	908	355	45	51	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	12	12	12
Storage Length (ft)	125			300	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	40				25	
Satd. Flow (prot)	1652	3539	1792	1524	1736	1553
Flt Permitted	0.399				0.950	
Satd. Flow (perm)	694	3539	1792	1524	1736	1553
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				53		33
Link Speed (mph)		30	30		30	
Link Distance (ft)		568	696		380	
Travel Time (s)		12.9	15.8		8.6	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	6%	6%	4%	4%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	1068	418	53	60	33
Turn Type	pm+pt	NA	NA	Perm	Perm	pm+ov
Protected Phases	5	2	6			5
Permitted Phases	2			6	4	4
Total Split (s)	12.0	49.0	37.0	37.0	21.0	12.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	30.9	33.7	27.7	27.7	7.4	13.4
Actuated g/C Ratio	0.72	0.78	0.64	0.64	0.17	0.31
v/c Ratio	0.09	0.39	0.36	0.05	0.20	0.07
Control Delay	3.6	4.0	10.6	3.6	20.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	4.0	10.6	3.6	20.4	5.0
LOS	A	A	B	A	C	A
Approach Delay		4.0	9.8		14.9	
Approach LOS		A	A		B	
Queue Length 50th (ft)	5	62	86	0	15	0
Queue Length 95th (ft)	14	100	154	14	42	12
Internal Link Dist (ft)		488	616		300	
Turn Bay Length (ft)	125			300		
Base Capacity (vph)	665	3337	1392	1195	687	534
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.32	0.30	0.04	0.09	0.06

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 43
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.39

Intersection Signal Delay: 6.2	Intersection LOS: A
Intersection Capacity Utilization 37.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Route 9 & Walmart Drive



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	540	913	211	166	133
Future Volume (vph)	75	540	913	211	166	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	12	12	12
Storage Length (ft)	125			300	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	40				25	
Satd. Flow (prot)	1668	3574	1881	1599	1787	1599
Flt Permitted	0.100				0.950	
Satd. Flow (perm)	176	3574	1881	1599	1787	1599
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				220		68
Link Speed (mph)		30	30		30	
Link Distance (ft)		568	696		380	
Travel Time (s)		12.9	15.8		8.6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	563	951	220	173	139
Turn Type	pm+pt	NA	NA	Perm	Perm	pm+ov
Protected Phases	5	2	6			5
Permitted Phases	2			6	4	4
Total Split (s)	12.0	49.0	37.0	37.0	21.0	12.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	44.6	44.6	35.1	35.1	11.5	23.1
Actuated g/C Ratio	0.67	0.67	0.53	0.53	0.17	0.35
v/c Ratio	0.29	0.23	0.95	0.23	0.56	0.23
Control Delay	7.2	4.8	39.5	2.5	31.9	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	4.8	39.5	2.5	31.9	8.9
LOS	A	A	D	A	C	A
Approach Delay		5.1	32.5		21.7	
Approach LOS		A	C		C	
Queue Length 50th (ft)	9	37	~420	0	64	19
Queue Length 95th (ft)	25	70	#692	33	118	51
Internal Link Dist (ft)		488	616		300	
Turn Bay Length (ft)	125			300		
Base Capacity (vph)	276	2413	998	952	432	611
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.23	0.95	0.23	0.40	0.23

Intersection Summary

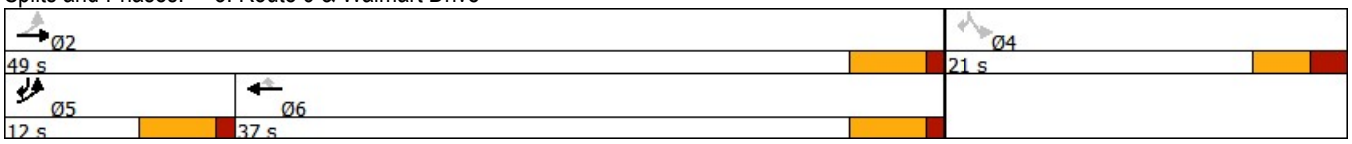
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 66.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95

Intersection Signal Delay: 22.7	Intersection LOS: C
Intersection Capacity Utilization 73.9%	ICU Level of Service D
Analysis Period (min) 15	

~ 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.

Splits and Phases: 3: Route 9 & Walmart Drive



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	183	604	565	292	243	192
Future Volume (vph)	183	604	565	292	243	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	12	12	12
Storage Length (ft)	125			300	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	40				25	
Satd. Flow (prot)	1652	3539	1863	1583	1805	1615
Flt Permitted	0.170				0.950	
Satd. Flow (perm)	296	3539	1863	1583	1805	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				311		173
Link Speed (mph)		30	30		30	
Link Distance (ft)		568	696		380	
Travel Time (s)		12.9	15.8		8.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	643	601	311	259	204
Turn Type	pm+pt	NA	NA	Perm	Perm	pm+ov
Protected Phases	5	2	6			5
Permitted Phases	2			6	4	4
Total Split (s)	14.0	49.0	35.0	35.0	21.0	14.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	38.9	38.9	25.0	25.0	13.1	27.0
Actuated g/C Ratio	0.62	0.62	0.40	0.40	0.21	0.43
v/c Ratio	0.52	0.29	0.80	0.38	0.68	0.26
Control Delay	11.2	5.9	26.5	3.3	33.8	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	5.9	26.5	3.3	33.8	4.3
LOS	B	A	C	A	C	A
Approach Delay		7.2	18.6		20.8	
Approach LOS		A	B		C	
Queue Length 50th (ft)	29	54	203	0	100	7
Queue Length 95th (ft)	65	81	#334	41	174	43
Internal Link Dist (ft)		488	616		300	
Turn Bay Length (ft)	125			300		
Base Capacity (vph)	386	2571	923	941	476	810
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.25	0.65	0.33	0.54	0.25

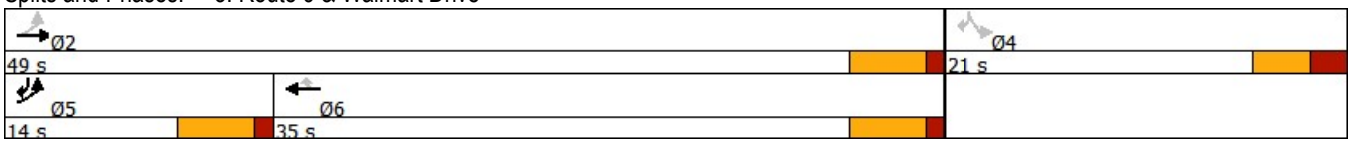
Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 62.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80

Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 65.8%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Route 9 & Walmart Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	847	81	52	329	41	44	10	43	45	10	24
Future Volume (vph)	45	847	81	52	329	41	44	10	43	45	10	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	10	12	12	12	12	12	12	12	12
Storage Length (ft)	125		0	115		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	40			75			25			25		
Satd. Flow (prot)	1652	1839	0	1589	1792	1524	1805	1670	0	1736	1635	0
Flt Permitted	0.517			0.091			0.731			0.716		
Satd. Flow (perm)	899	1839	0	152	1792	1524	1389	1670	0	1308	1635	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				234		51			28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		568			514			465			380	
Travel Time (s)		12.9			11.7			10.6			8.6	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	1091	0	61	387	48	52	63	0	53	40	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6		Free	8			4		
Total Split (s)	10.0	45.0		10.0	45.0		15.0	15.0		15.0	15.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	46.2	45.2		46.2	45.2	66.7	7.7	7.7		7.7	7.7	
Actuated g/C Ratio	0.69	0.68		0.69	0.68	1.00	0.12	0.12		0.12	0.12	
v/c Ratio	0.08	0.87		0.32	0.32	0.03	0.33	0.26		0.35	0.19	
Control Delay	3.7	24.9		8.8	8.1	0.0	33.7	14.6		34.8	16.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	3.7	24.9		8.8	8.1	0.0	33.7	14.6		34.8	16.9	
LOS	A	C		A	A	A	C	B		C	B	
Approach Delay		23.9			7.4			23.2			27.1	
Approach LOS		C			A			C			C	
Queue Length 50th (ft)	5	~515		6	83	0	21	5		21	5	
Queue Length 95th (ft)	13	#687		15	130	0	48	33		50	28	
Internal Link Dist (ft)		488			434			385			300	
Turn Bay Length (ft)	125			115		300						
Base Capacity (vph)	667	1250		191	1214	1524	187	270		177	245	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.08	0.87		0.32	0.32	0.03	0.28	0.23		0.30	0.16	

Intersection Summary

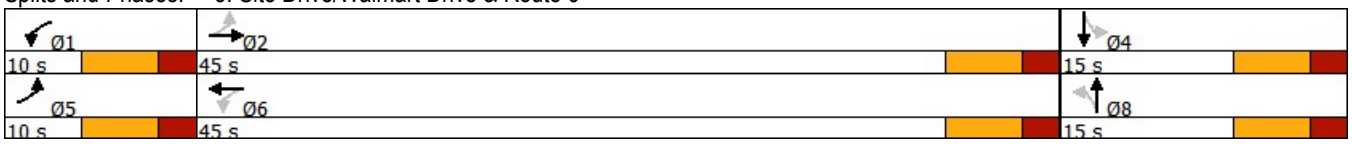
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 66.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87

Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 68.6%	ICU Level of Service C
Analysis Period (min) 15	

~ 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.

Splits and Phases: 3: Site Drive/Walmart Drive & Route 9



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	512	43	66	870	206	59	8	24	161	8	129
Future Volume (vph)	72	512	43	66	870	206	59	8	24	161	8	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	10	12	12	12	12	12	12	12	12
Storage Length (ft)	125		0	115		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	40			75			25			25		
Satd. Flow (prot)	1652	1840	0	1668	1881	1599	1805	1683	0	1787	1614	0
Flt Permitted	0.114			0.305			0.851			0.374		
Satd. Flow (perm)	198	1840	0	536	1881	1599	1617	1683	0	704	1614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				327		25			134	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		568			514			465			380	
Travel Time (s)		12.9			11.7			10.6			8.6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	578	0	69	906	215	61	33	0	168	142	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Perm	NA		pm+pt	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2			6		Free	8			4		
Total Split (s)	10.0	38.0		10.0	38.0		12.0	12.0		10.0	22.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	38.4	35.2		38.4	35.2	69.0	6.0	6.0		13.9	13.9	
Actuated g/C Ratio	0.56	0.51		0.56	0.51	1.00	0.09	0.09		0.20	0.20	
v/c Ratio	0.39	0.61		0.19	0.94	0.13	0.44	0.20		0.80	0.33	
Control Delay	12.5	17.3		7.5	39.9	0.2	40.6	18.7		53.5	7.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	12.5	17.3		7.5	39.9	0.2	40.6	18.7		53.5	7.7	
LOS	B	B		A	D	A	D	B		D	A	
Approach Delay		16.7			30.8			32.9			32.5	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)	12	184		11	~437	0	26	3		62	3	
Queue Length 95th (ft)	27	295		25	#647	0	61	28		#149	44	
Internal Link Dist (ft)		488			434			385			300	
Turn Bay Length (ft)	125			115		300						
Base Capacity (vph)	194	942		363	959	1599	140	169		210	477	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.39	0.61		0.19	0.94	0.13	0.44	0.20		0.80	0.30	

Intersection Summary

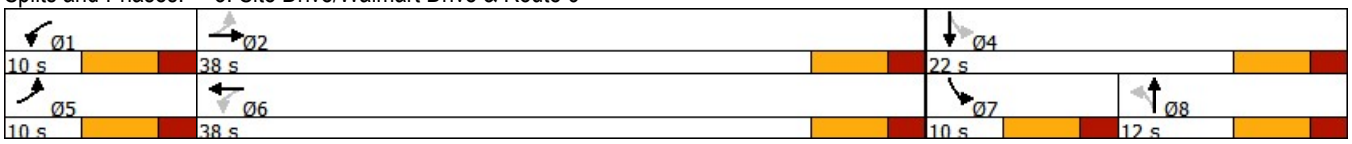
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 69
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94

Intersection Signal Delay: 27.1	Intersection LOS: C
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	

~ 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.

Splits and Phases: 3: Site Drive/Walmart Drive & Route 9



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	568	53	60	530	287	52	9	28	238	9	188
Future Volume (vph)	179	568	53	60	530	287	52	9	28	238	9	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	12	12	10	12	12	12	12	12	12	12	12
Storage Length (ft)	125		0	115		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	40			75			25			25		
Satd. Flow (prot)	1652	1839	0	1652	1863	1583	1805	1685	0	1805	1628	0
Flt Permitted	0.221			0.185			0.889			0.381		
Satd. Flow (perm)	384	1839	0	322	1863	1583	1689	1685	0	724	1628	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				327		30			200	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		568			514			465			380	
Travel Time (s)		12.9			11.7			10.6			8.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	190	660	0	64	564	305	55	40	0	253	210	0
Turn Type	pm+pt	NA		pm+pt	NA	Free	Perm	NA		pm+pt	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2			6		Free	8			4		
Total Split (s)	10.0	34.0		10.0	34.0		12.0	12.0		14.0	26.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	30.6	28.4		27.7	23.5	63.5	6.2	6.2		17.2	17.2	
Actuated g/C Ratio	0.48	0.45		0.44	0.37	1.00	0.10	0.10		0.27	0.27	
v/c Ratio	0.71	0.80		0.28	0.82	0.19	0.33	0.21		0.75	0.36	
Control Delay	29.3	27.1		11.3	29.6	0.3	36.0	18.1		37.3	5.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	29.3	27.1		11.3	29.6	0.3	36.0	18.1		37.3	5.9	
LOS	C	C		B	C	A	D	B		D	A	
Approach Delay		27.6			18.7			28.4			23.0	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	39	254		12	202	0	23	4		90	3	
Queue Length 95th (ft)	#106	#457		28	#332	0	56	31		#192	48	
Internal Link Dist (ft)		488			434			385			300	
Turn Bay Length (ft)	125			115		300						
Base Capacity (vph)	268	867		227	850	1583	165	191		337	666	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.71	0.76		0.28	0.66	0.19	0.33	0.21		0.75	0.32	

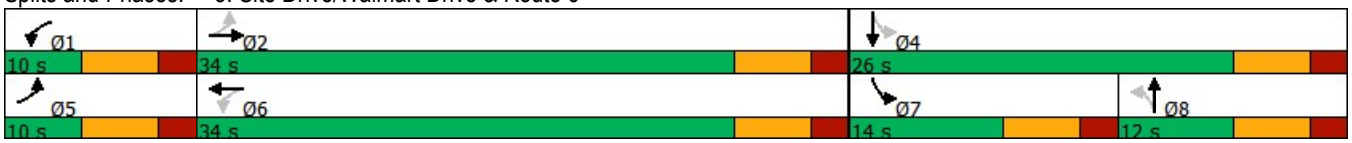
Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 63.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 76.0%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Site Drive/Walmart Drive & Route 9



Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		↱
Traffic Vol, veh/h	935	0	0	422	0	44
Future Vol, veh/h	935	0	0	422	0	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	0	0	6	0	0
Mvmt Flow	1100	0	0	496	0	52

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	550
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	0	0	-	0	484
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	484
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	484	-	-
HCM Lane V/C Ratio	0.107	-	-
HCM Control Delay (s)	13.3	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		↱
Traffic Vol, veh/h	697	0	0	1142	0	27
Future Vol, veh/h	697	0	0	1142	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	726	0	0	1190	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	363
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	0	0	-	0	640
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	640
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	640	-	-
HCM Lane V/C Ratio	0.044	-	-
HCM Control Delay (s)	10.9	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		↱
Traffic Vol, veh/h	834	0	0	877	0	31
Future Vol, veh/h	834	0	0	877	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	887	0	0	933	0	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	444
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	0	0	-	0	567
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	567
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	567	-	-
HCM Lane V/C Ratio	0.058	-	-
HCM Control Delay (s)	11.7	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

APPENDIX F – CIRCULATION LIST

CIRCULATION LIST

Gas Station Development
Environmental Notification Form

Secretary Kathleen A. Theoharides
Executive Office of Energy and Environmental Affairs
ATTN: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114
(Two copies)

Massachusetts Department of Environmental Protection
ATTN: MEPA Coordinator
One Winter Street
Boston, MA 02108

Massachusetts Department of Environmental Protection
Central Regional Office
ATTN: MEPA Coordinator
8 New Bond Street
Worcester, MA 01606

Massachusetts Department of Environmental Protection
Central Regional Office
ATTN: Bureau of Water Resources
8 New Bond Street
Worcester, MA 01606

Massachusetts Department of Transportation
Public/Private Development Unit
10 Park Plaza, Suite 4160
Boston, MA 02116

Massachusetts Department of Transportation
District 3
403 Belmont Street
Worcester, MA 01604

Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

Central Massachusetts Regional Planning Commission
1 Mercantile Street, Suite 520
Worcester, MA 01608

Town of Leicester on Board of Selectmen
3 Washburn Square
Leicester, MA 01524

Town of Leicester Planning Board
3 Washburn Square
Leicester, MA 01524

Town of Leicester Conservation Commission
3 Washburn Square
Leicester, MA 01524

Town of Leicester Board of Health
3 Washburn Square
Leicester, MA 01524

Town of Leicester Public Library
1136 Main Street,
Leicester, MA 01524

Department of Conservation and Recreation
251 Causeway Street, 9th floor
Boston, MA 02114

Department of Public Health
250 Washington Street
Boston MA 02108

APPENDIX G – PUBLIC NOTICE

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs

MEPA Office

100 Cambridge St., Suite 900
Boston, MA 02114
Telephone 617-626-1020

The following should be completed and submitted to a local newspaper:

PUBLIC NOTICE OF ENVIRONMENTAL REVIEW

PROJECT: **GAS STATION DEVELOPMENT**

LOCATION: **1603 & 1605 Main Street, Leicester, MA**

PROPONENT: **Skaff Petroleum, Inc.**

The undersigned is submitting an Environmental Notification Form ("ENF") to the Secretary of Energy & Environmental Affairs on or before
June 1, 2021 *(date)*

This will initiate review of the above project pursuant to the Massachusetts Environmental Policy Act ("MEPA", M.G.L. c. 30, s.s. 61-62I). Copies of the ENF may be obtained from:
Allen Engineering & Associates, Inc. (Proponent's Agent)
One Charlesview Road, Suite 2, Hopedale, MA 01747
508 381-3212
(Name, email address, phone number of proponent or proponent's agent)

During the interim Covid-19 response period, electronic copies of the ENF are also being sent to the Conservation Commission and Planning Board of
Leicester *(Municipality)***.**

The Secretary of Energy & Environmental Affairs will publish notice of the ENF in the Environmental Monitor, will receive public comments on the project for 20 days, and will then decide, within ten days, if an Environmental Impact Report is needed. A site visit and consultation session on the project may also be scheduled. All persons wishing to comment on the project, or to be notified of a site visit or consultation session, should email MEPA@mass.gov. Mail correspondence will continue to be accepted, though responses may be delayed. Mail correspondence should be direct to the Secretary of Energy & Environmental Affairs, 100 Cambridge St., Suite 900, Boston, Massachusetts 02114, Attention: MEPA Office, referencing the above project.

By **Jean Skaff, Skaff Petroleum, Inc.** *(Proponent)*