FINAL

Traffic Impact Study
for the
Clear River Energy Center

Wallum Lake Road (Route 100)
Burrillville, Rhode Island

Prepared by:

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Prepared for:

Invenergy Thermal Development, LLC

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

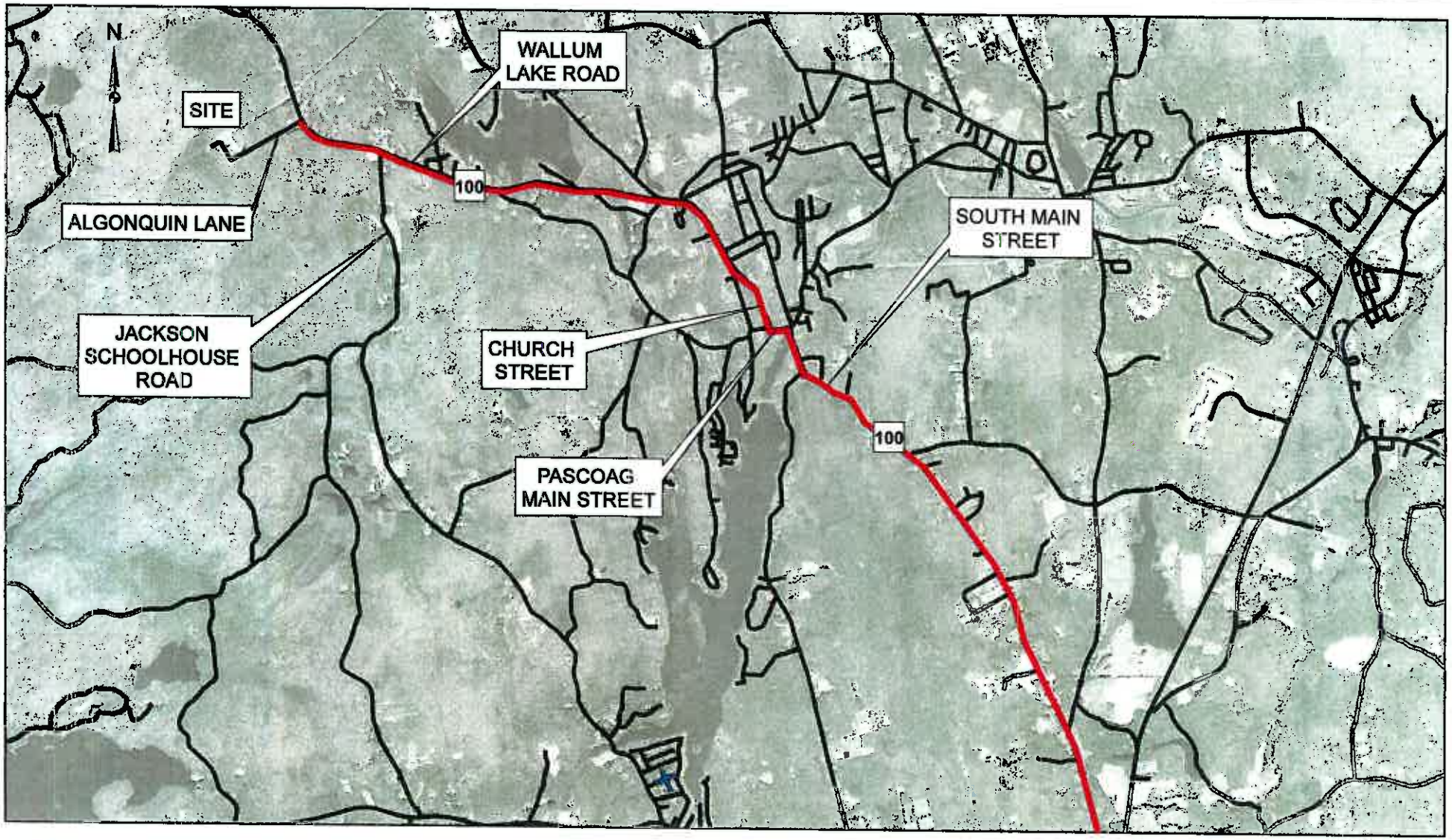
McMahon Associates has evaluated the existing traffic operations and potential traffic impacts associated with the proposed Clear River Energy Center (CREC) located on Wallum Lake Road (Route 100) in Burrillville, Rhode Island, as seen in Figure 1. The purpose of this study is to evaluate existing and projected traffic operational and safety conditions in the vicinity of the site and identify mitigating measures to offset potential project-related traffic impacts on the surrounding roadways, if necessary.

Our assessment is based on a review of current traffic volumes collected for this study and the anticipated traffic generating characteristics of the proposed development, both during the construction phases of the project and in its completed operational phase. This study examines existing and projected traffic operations (both with and without the proposed project) at key intersections in the vicinity of the project site. The study area was chosen based on a review of the proposed truck route that construction and delivery vehicles will use to access the site. This study provides a detailed analysis of traffic operations during the weekday morning and weekday afternoon peak hours, when the combination of adjacent roadway volumes and potential traffic increases associated with the project would be greatest. The study also includes an assessment of the pavement conditions on Route 100 in Burrillville and Glocester, along the designated truck route, intended to serve as a baseline for the potential evaluation of construction-related pavement deterioration.

Based on the analysis presented in this study, we conclude that the proposed truck routes are adequate and that the projected traffic increases associated with both the background traffic growth and the traffic generated by the project can be accommodated on the area roadways. This report documents our findings.

Project Description

The site presently consists of the Spectra Energy Algonquin Compressor Station and is located on the southern side of Wallum Lake Road (Route 100) approximately a half of a mile to the west of Jackson Schoolhouse Road. The site is connected to Wallum Lake Road by a site driveway and is bound on all sides by undeveloped, forested land. CREC is proposed to be accessed via a new site driveway connecting to Wallum Lake Road (Route 100).



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0 0.25 0.5 1 1.5 2 Miles

FIGURE 1
SITE LOCATION MAP
CLEAR RIVER ENERGY CENTER
BURRILLVILLE, RHODE ISLAND

Study Methodology

This study evaluates existing and projected traffic operations at study area intersections for the weekday morning and weekday afternoon peak hour traffic conditions when the combination of adjacent roadway volumes and potential traffic increases associated with the project would be greatest.

The study was conducted in three steps. The first step involved an inventory of existing traffic conditions in the vicinity of the site and along the truck route in Burrillville and Glocester, RI. As part of this inventory, traffic counts were collected at key intersections during the weekday morning and weekday afternoon peak periods.

The second step of the study builds upon data collected in the first step and establishes the basis for evaluating the transportation impacts associated with future conditions. In this step, Existing 2016 traffic volumes were projected to 2021 No Build (without project) conditions and 2021 Build (with project) conditions. In addition, 2021 Construction Build traffic volumes were estimated and are based upon the construction phase that generates the highest volume of traffic. The projected traffic demands of other future developments that could influence traffic volumes at the study area intersections were also assessed.

The final step looks to identify measures, if necessary, to improve existing and future traffic operations and safety, minimize potential traffic impacts and provide safe and efficient access to the project site.

Study Area Intersections

The area identified for detailed analysis in this study was determined based on a review of the anticipated traffic generating characteristics of the proposed project and a review of the surrounding roadway network serving the project site, as well as previous traffic studies. The study area intersections include:

- Pascoag Main Street at South Main Street
- Pascoag Main Street at Church Street
- Wallum Lake Road at proposed site driveway

EXISTING CONDITIONS

Effective evaluation of potential traffic impacts associated with the proposed development requires a thorough understanding of the existing traffic conditions on the roadways and intersections serving the project site. The assessment of existing conditions consists of an inventory of the roadway and intersection geometry, pavement conditions and traffic control devices; collection of peak-period traffic volumes and a review of recent accident history. A discussion of this information is presented below.

Roadway Network

The project site benefits from access via the local and regional roadway systems. A brief description of the principal roadways serving the project site is presented below. Additional information on the conditions of the roadways and suitability for heavy vehicle travel is documented in the Roadway Assessment report attached in Appendix A. Based on the findings of the report, the current truck route on Route 44/Route 100 is suitable for heavy vehicle travel, as all roadways are state-numbered routes with higher priorities for mobility.

Wallum Lake Road (Route 100)
Wallum Lake Road (Route 100) generally runs in a north-south direction in the town of Burrillville from its intersection with Church Street to the Massachusetts state line. Wallum Lake Road is classified as an urban minor arterial under Rhode Island Department of Transportation (RIDOT) jurisdiction and is primarily a two-lane, two-way roadway abutted by residential land uses. Wallum Lake Road provides a 12 foot-travel lane in both directions and three to six foot-wide shoulders in the vicinity of the project site. There are no sidewalks present on either side of the roadway and the posted speed limit is 40 miles per hour (mph).

Church Street (Route 100)
Church Street (Route 100) travels in the north-south direction beginning at the intersection with Wallum Lake Road to the north and continuing south towards Pascoag Main Street. Church Street is classified as an urban minor arterial under RIDOT jurisdiction and is primarily a two-lane, two-way roadway abutted by residential land uses. Church Street provides an 11 foot-travel lane in both directions with three-foot shoulders and a five-foot sidewalk along the eastern side of the road with a posted speed limit of 25 mph.

Pascoag Main Street (Route 100)
Pascoag Main Street (Route 100) runs in the east-west direction in downtown Burrillville and connects to Church Street to the west and continues to Route 107 to the east. Pascoag Main Street is classified as an urban minor arterial under RIDOT jurisdiction and is a two-lane, two-way roadway that typically provides 12 foot lanes in each direction, with the exception of the bridge over the Pascoag Reservoir, where

lanes are reduced to 10 feet in width. Shoulders measuring 1-2 feet and sidewalk measuring approximately five feet in width are present on both sides of the roadway.

South Main Street (Route 100)
South Main Street (Route 100) runs in the north-south direction through Burrillville and Glocester, connecting to downtown Burrillville to the north and Route 44 to the south. South Main Street is classified as an urban minor arterial under RIDOT jurisdiction within the study area and is primarily a two-lane, two-way roadway abutted by residential land uses in the vicinity of the site. South Main Street generally has eleven foot-wide lanes in both directions, shoulders measuring 6-8 feet in width, and sidewalks measuring approximately five feet in width.

Main Street (Route 44)
Main Street (Route 44) runs in the north-south direction in downtown Chepachet, connecting to Money Hill Road (Route 100) and Putnam Pike (Route 44) to the north and south. This segment of roadway acts as a connector between the two segments of Putnam Pike (Route 44). Main Street is classified as a principal arterial under RDIOT jurisdiction and is primarily a two-lane, two-way roadway abutted by commercial land uses in the vicinity of the site. Through the downtown corridor, there is on-street parking and sidewalks on either side of the roadway. Main Street is typically 62 feet wide from curb to curb with a varying lane arrangement as it passes through multiple intersections.

Putnam Pike (Route 44)
Putnam Pike (Route 44) generally runs in the east-west direction through Glocester into Smithfield. Putnam Pike is classified as a rural minor arterial as it approaches Money Hill Road from the west and a rural principal arterial as it continues south from this intersection under RIDOT jurisdiction and is primarily a two-lane, two-way roadway abutted by residential and retail land uses in the vicinity of the site. Putnam Pike (Route 44) is 40 feet wide south of Money Hill Road, with the two travels lanes measuring 12 feet wide and eight foot-wide shoulders on either side of the roadway. West of Money Hill Road, Putnam Pike measures 39 feet in width with an exclusive westbound left turn lane, a shared through and right turn lane and eastbound receiving lane as well as one foot-wide shoulders and five foot wide sidewalks on either side of the roadway. There are inconsistent five foot-wide sidewalks along either side of Putnam Pike.

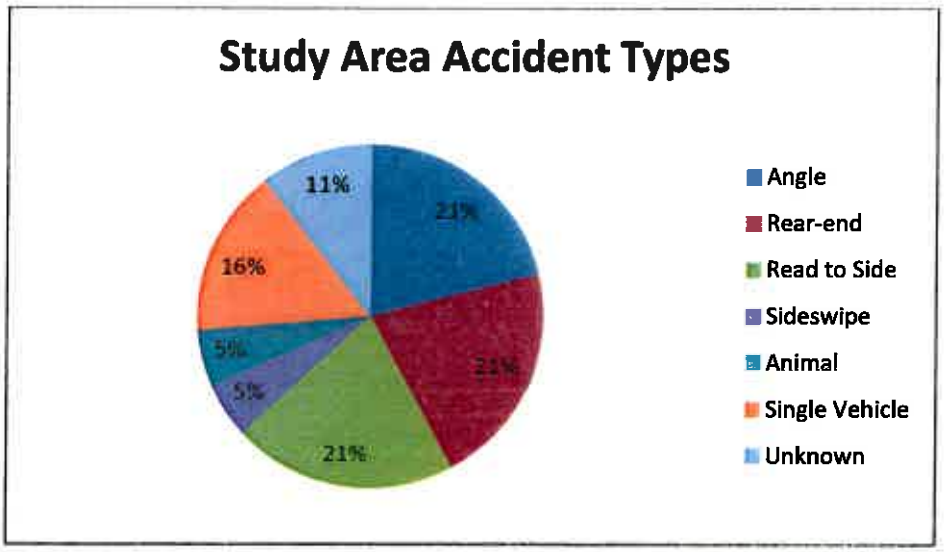
Accident Summary

Accident data for the study area intersections was obtained from Town of Burrillville Police Department for the most three year period from May 2013 to May 2016. A summary of the accident data is presented in Appendix B and shown graphically below.

The intersection of Pascoag Main Street at South Main Street/Sayles Avenue had a total of nine accidents over the three year period reviewed, resulting in an accident rate of 0.82 accidents per million entering vehicles. The majority of accidents were angle, rear-end, and rear-to-side accidents, and resulted in property damage only with no injuries.

The intersection of Pascoag Main Street at Church Street/High Street experienced a total of ten accidents over the three year period reviewed, resulting in an accident rate of 1.23 accidents per million entering vehicles. The accidents varied greatly in type, as shown graphically below, and the majority of accidents resulted in property damage only with no injuries.

The intersection of Wallum Lake Road at the CREC site driveway did not have any accidents over the three year period reviewed.



Existing Traffic Volumes

To assess peak hour traffic conditions, Manual turning movement (MTM) and vehicle classification counts were conducted at the study area intersections. Traffic counts were collected from 7:00 AM to 9:00 AM and 3:00 PM to 5:00 PM at the study area intersections on Tuesday, April 26, 2016.

Automatic Traffic Recorder (ATR) data was also collected for a 48-hour period from Tuesday, April 26, 2016 to Wednesday, April 27, 2016 to collect Average Daily Traffic (ADT) volumes, vehicle classification and speeds at the following locations on the Route 44/Route 100 truck route.

- Wallum Lake Road west of Jackson Schoolhouse Road
- Church Street (Route 100) north of Pine Street
- Pascoag Main Street east of Church Street
- South Main Street south of Masse Road
- Main Street (Route 44) north of Jack's Way
- Putnam Pike (Route 44) west of Highland Lake Shore Drive
- Putnam Pike (Route 44) west of Sawmill Road

The four highest consecutive 15-minute intervals during each of these count periods constitute the peak hours that are the basis of this traffic analysis. Based on a review of the traffic count data, the weekday morning peak hour of the adjacent street traffic occurs between 7:00 AM and 8:00 AM. The weekday afternoon peak hour of the adjacent street traffic is shown to occur between 5:00 PM and 6:00 PM. A summary of the ATR data is shown in Table 1. A complete set of MTM data and ATR data can be found in Appendix C and Appendix D of this report, respectively.

Seasonal Variation

According to RIDOT's 2013 Monthly Average Daily Traffic Factors, traffic volumes for a rural roadway collected during the month of April are shown to be higher than traffic volumes for the average month. Therefore, to provide a conservative analysis, the existing peak hour traffic volumes were not adjusted. The peak hourly traffic flows are depicted in Figures 2 and 3 for the weekday morning and weekday afternoon peak hours, respectively.

Table 1: ATR Summary

	D%[1]	ADT[2]	K[3]	85th % Speed[4]	%HV[5]	Morning Peak (7:00AM to 8:00AM)	Afternoon Peak (3:15PM to 4:15PM)
Wallum Lake Road west of Jackson Schoolhouse Road							
Eastbound	50%	1,261	10%	51	6.7%	109	151
Westbound		1,253		52	6.7%	77	90
TOTAL		2,514		52	6.7%	186	241
Church Street (RT 100) North of Pine Street							
Northbound	51%	1785	9%	38	8.7%	77	156
Southbound		1,870		39	8.8%	164	171
TOTAL		3,655		39	8.8%	241	327
Pascoag Main Street east of Church Street							
Eastbound	53%	3,029	9%	29	10.1%	321	237
Westbound		3,473		28	4.7%	141	317
TOTAL		6,502		29	7.4%	462	554
South Main Street south of Masse Road							
Northbound	51%	2,450	8%	49	5.9%	90	210
Southbound		2,504		48	6.6%	226	205
TOTAL		4,954		49	6.3%	316	415
Main Street (RT 44) north of Jack's Way							
Northbound	50%	7,861	8%	39	7.2%	450	648
Southbound		7,829		39	12.2%	685	598
TOTAL		15,690		39	9.7%	1,135	1,246
Putnam Pike (RT 44) west of Highland Lake Shore Drive							
Eastbound	50%	6,277	8%	41	6.8%	660	433
Westbound		6,197		40	6.5%	314	571
TOTAL		12,474		41	6.7%	974	1,004
Putnam Pike (RT 44) west of Sawmill Road							
Eastbound	50%	5,949	8%	50	14.5%	663	415
Westbound		5,834		48	9.4%	263	538
TOTAL		11,783		49	12%	926	953

1 - Directional Distribution

2 - Average Daily Traffic (ADT)

3 - K factor (percentage of ADT during the peak hour)

4 - 85th percentile speed

5 - Percentage of Heavy Vehicles

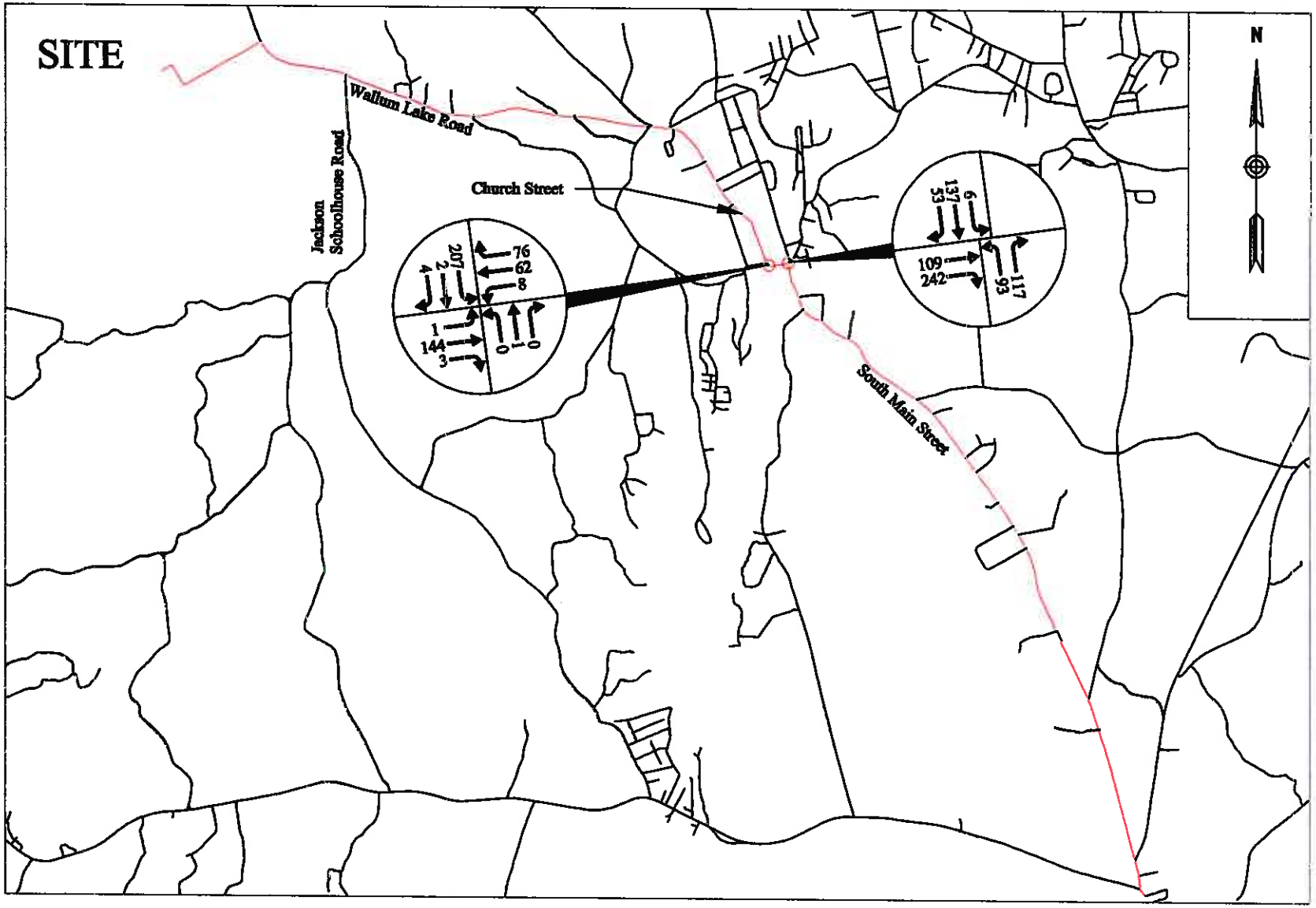


Figure 2
2016 Existing Weekday Morning Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

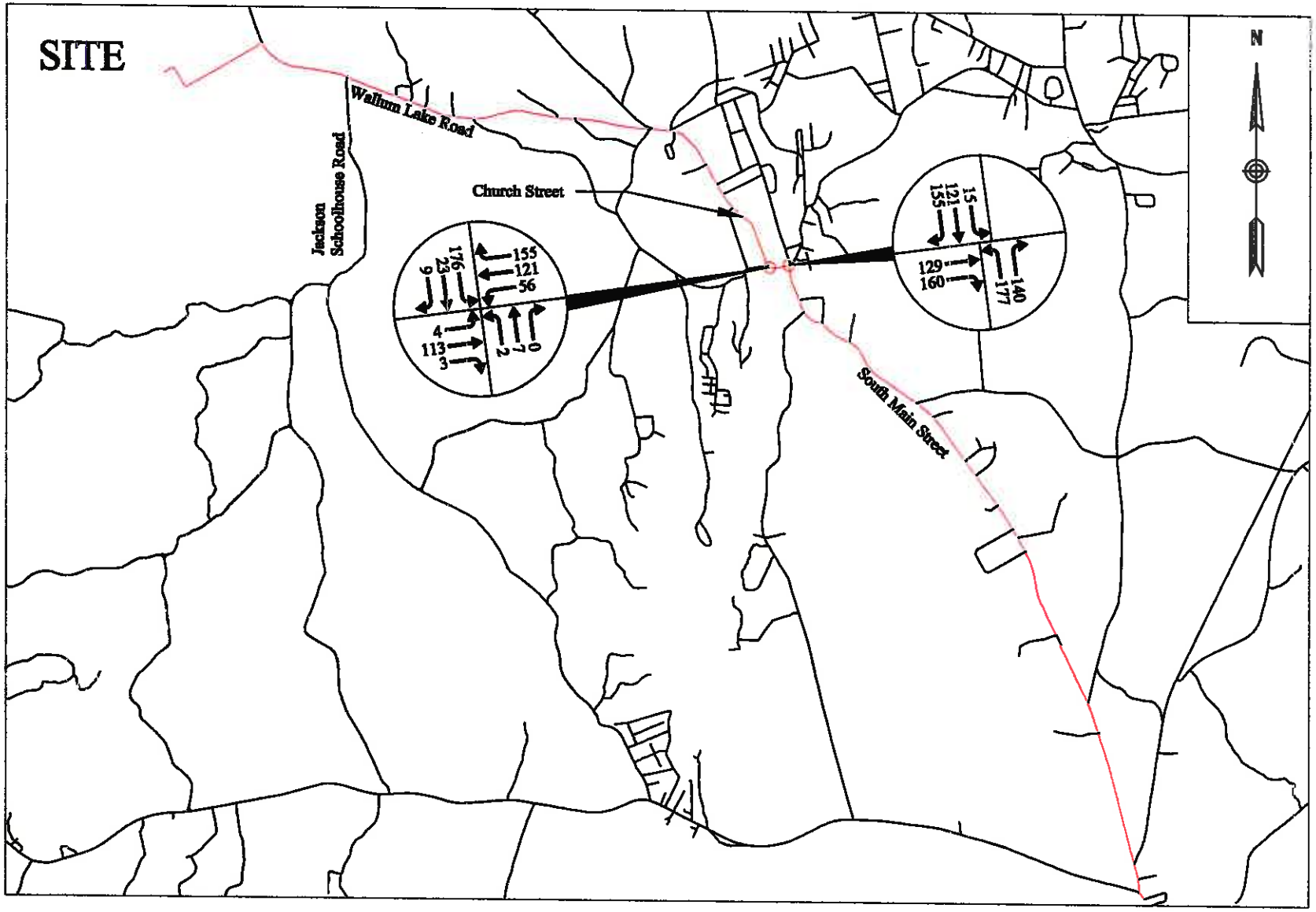


Figure 3
2016 Existing Weekday Afternoon Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

FUTURE CONDITIONS

The proposed project is scheduled to have a 30 month construction period beginning in the first quarter of 2017 with the proposed energy center planned to open in June of 2019. To present a conservative future condition and to be consistent with RIDOT guidelines, the 2016 Existing traffic volumes were projected to the future-year 2021 though the project is expected to be fully constructed and operating in 2019. Independent of the final proposed project and subsequent interim construction volumes, traffic volumes on the roadways in 2021 are assumed to include all existing traffic, as well as new traffic resulting from general growth in the study area and from other planned development projects. The potential background traffic growth unrelated to the proposed project was considered in the development of the 2021 No Build (without project) peak hour traffic volume networks.

The anticipated traffic increases associated with the completed CREC were then added to the 2021 No Build volumes to reflect the 2021 Final Operation (with project) traffic conditions. Additionally, traffic volumes associated with the construction period expected to generate the highest volume of traffic was added to the 2021 No Build volumes to reflect the 2021 Construction traffic condition. A more detailed description of the development of the 2021 No Build, 2021 Final Operation, and 2021 Construction traffic volumes follows.

Future Roadway Improvements

Planned roadway improvement projects can affect area travel patterns and future traffic operations. To develop a clearer understanding of future area roadway operations, we verified that there are two projects within the study area that may affect travel patterns on the existing truck route.

The first project is the Route 100/Route 44 intersection improvement project in Chepachet, which is an intersection on the truck route to the CREC site. The project proposes to redevelop the signalized intersection into a modern roundabout. Based on conversations with RIDOT, the project will be advertised in late 2016 and construction is expected to occur from 2018-2019, overlapping with the expected construction period of the CREC. In a review of the construction staging plans for the proposed Route 44/Route 100 roundabout project, there are no major detours during construction, and it is expected that there will be no major impacts to trucks traveling to the proposed energy center.

The second project is the resurfacing of Route 44 from West Greenville Road to the RIDOT Maintenance facility on Route 44. The project is proposed to occur from 2018-2019 and is not expected to have detours. The reconstruction work is expected to occur at night and is not expected to interfere with the construction operation for the CREC.

Background Traffic Growth

Traffic growth is primarily a function of changes in motor vehicle use and expected land development in the region. To predict a rate at which traffic on the roadways in the vicinity of the site can be expected to grow during the five-year forecast period (2016 to 2021), both historic traffic growth and planned area developments were examined.

Historic Traffic Growth

We have assumed a one percent per year background growth rate in order to forecast increases in traffic volumes on the study area roadways and intersections for our future analyses. This growth rate was confirmed by the Town of Burrillville Planning Department. This rate captures growth associated with general changes in population, accounts for other small developments in the vicinity of the study area and is consistent with similar traffic studies completed in this area in recent years.

Site-Specific Growth

Based on conversations with the Burrillville town planner regarding additional planned developments adjacent to the study area, there are no planned permitted developments that would add traffic to the study area roadways and intersections.

2021 No Build Traffic Volumes

The 2016 Existing peak hour traffic volumes were grown one percent per year over the five-year study horizon (2016 to 2021) to establish the 2021 base future traffic volumes. The 2021 No Build weekday morning and weekday afternoon peak hour traffic volume networks are illustrated in Figures 4 and 5, respectively and are documented in the traffic projection model presented in Appendix E of this report.

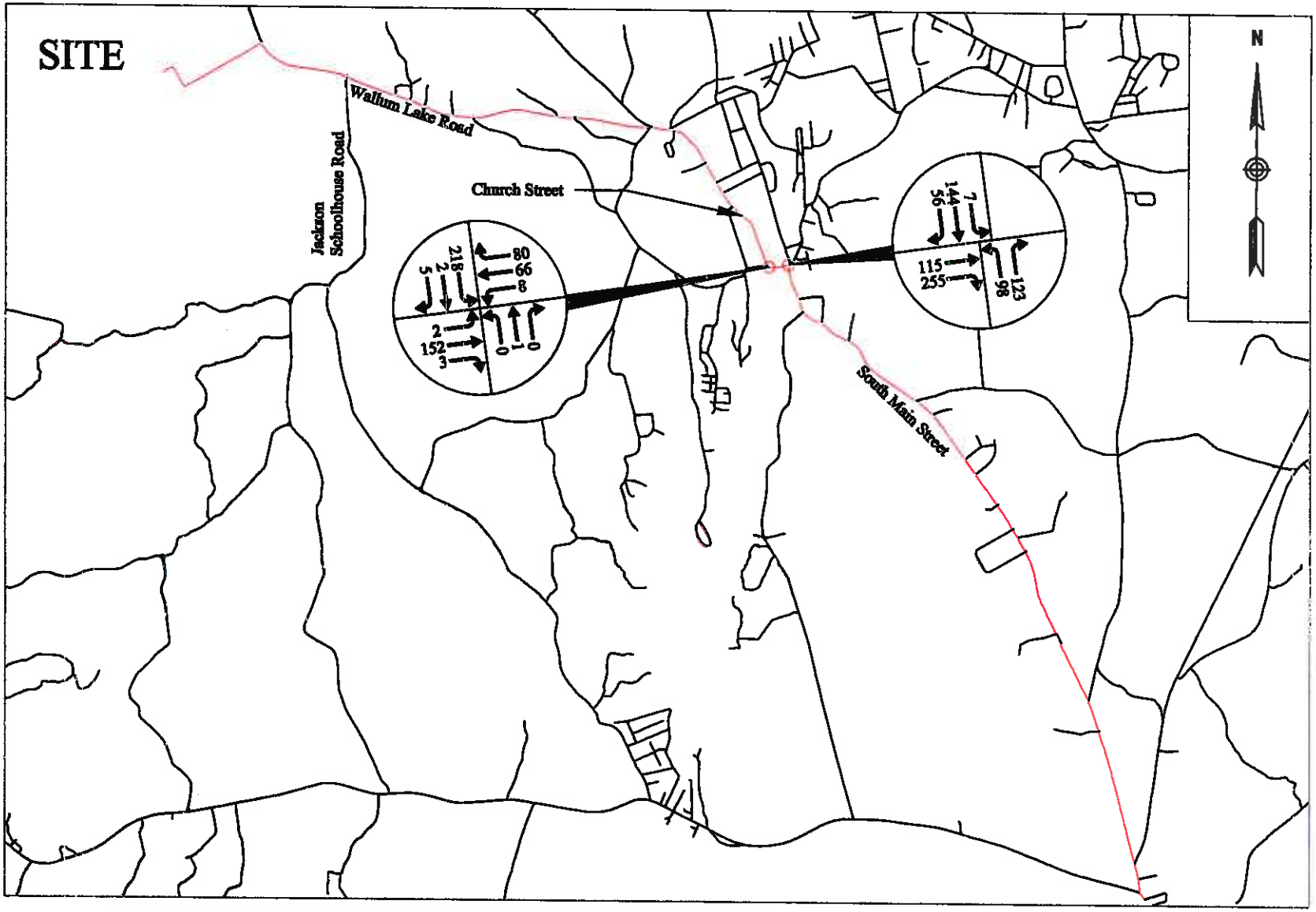


Figure 4
2021 No Build Weekday Morning Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

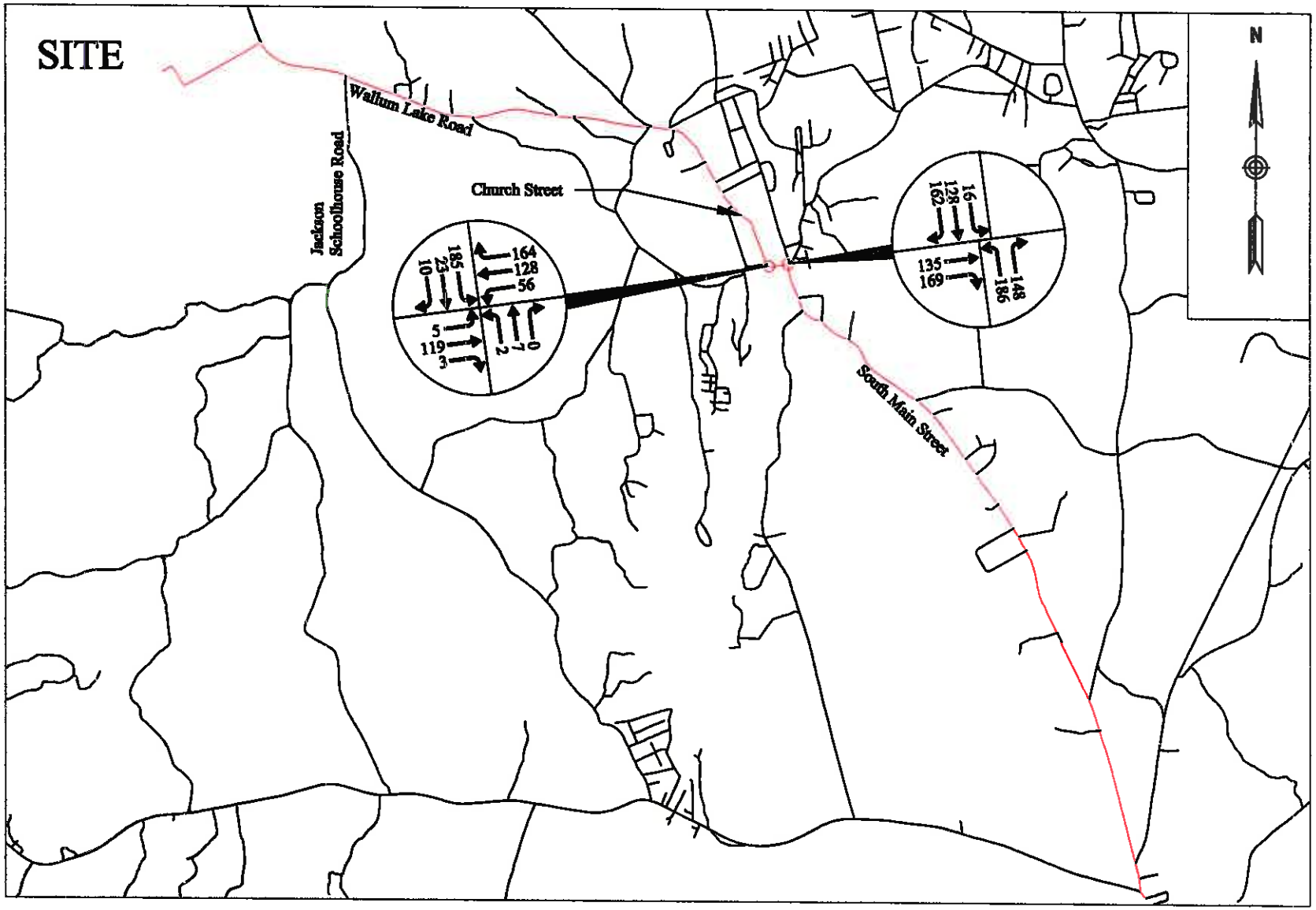


Figure 5
2021 No Build Weekday Afternoon Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

Site-Generated Traffic

Two considerations were given for site generated traffic: The site generated traffic for the Final Operation condition when the CREC is fully built and occupied, and the expected site generation for the construction stage generating the highest volume of traffic. Trip generation estimates were based on information supplied by the CREC as no relevant information was available in the Institute of Transportation Engineers (ITE) publication, *Trip Generation Manual, 9th Edition.*

Final Operation

The Final Operation trip generation was determined using employment information from the applicant to determine the expected peak hour traffic during the weekday morning and weekday afternoon peak hour. Based on the information provided, the proposed site is expected to have a total of 25 employees when it is fully built and occupied. The distribution of employees entering and exiting the site during both the weekday morning and weekday afternoon peak period was determined using information in the ITE publication, *Trip Generation Manual, 9th edition,* for Land Use Code 170 (Utilities). To provide a conservative analysis, it was assumed that all 25 employees will travel to the site as a single occupancy vehicle.

The expected trip generation for the Final Operation condition of the CREC is presented in Table 2 below.

Table 2: Final Operation Trip Generation Summary

	Weekday AM Peak Hour			Weekday PM Peak Hour		
Description	In	Out	Total	In	Out	Total
Proposed CREC Staff [1]	22	3	25	3	22	25
Proposed Oil Delivery Trucks [2]	4	4	8	4	4	8
Total Final Build Trips	26	7	33	7	26	33

(1) Expected employement of facility based on information from the CREC

(2) Expected number of Oil Delivery Trucks based on client information

As shown in Table 2, the peak hour trip generation for the proposed CREC is approximately 33 new trips (26 vehicles entering, seven vehicles exiting) during the weekday morning peak hour, and approximately 33 trips (seven trips entering, 26 trips exiting) during the weekday afternoon peak hour.

In addition to the daily employee trips expected to be generated by the proposed site, ammonia deliveries are expected by truck approximately twice per month (every 15 days) and are expected to occur outside of the weekday morning and weekday afternoon peak hours. Since these trips do not occur daily and are not expected to occur during the weekday morning or weekday afternoon peak hour, they were not included in the peak hour trip generation summary for the final operations of the site.

There are also conditions where oil deliveries may be necessary to the proposed CREC. In this condition, oil would be delivered by truck 3-4 times per hour over the course of several days, totaling approximately 360 trucks per year. This occurrence is rare and would be needed only if extreme temperatures are reached and the CREC needs to run on oil. Although these deliveries are on an as needed basis in rare, extreme weather conditions when the background traffic volumes are typically lower, the additional four oil truck trips were included in the peak hourly trip generation estimates shown in Table 2 for the final operation of the proposed site.

Construction Build Scenario

The Construction Build generated traffic was determined using information of expected truck deliveries detailed in the Rhode Island Energy Facility Siting Board Application for the CREC dated October 28, 2015 and prepared by ESS Group, Inc. The study details that there are four construction phases for the CREC. The first is the Limited Notice to Proceed (LNTP) phase (site mobilization), which will take place in the first three months of construction. This phase will consist of the construction site set-up including deliveries of office trailers, construction equipment, and warehousing deliveries. Over the three month period, a total of 420 trucks are expected to access the site, for an average of seven trucks per day delivering materials. There are no daily expected deliveries during this construction phase nor are staff and craft workers expected to be working on site.

The next phase is the Full Notice to Proceed (FNTP) phase, which is divided into two major phases: the underground work phase and the above ground work phase. The FNTP phase will span from the third quarter of 2017 through the 1st quarter of 2018. The underground work phase is expected to be the busiest phase for truck deliveries since there will be deliveries for the above ground site mobilization as well as deliveries for daily work on the underground phase. Based on the information provided in the ESS Group, Inc. report, the following truck deliveries are expected:

- 30-50 trucks per day for earthwork deliveries
- 10-15 trucks per day for aggregates, concrete, rebar, pipe, electrical conduit and small tools and supplies
- 146 additional mobilization deliveries during the nine month period, totaling to approximately five additional trips per week.
- Total truck traffic (underground): 70 trucks daily (maximum of 18 trucks during peak hours)

The truck trips (excluding concrete deliveries) are expected to occur between 8:00 AM and 3:00 PM, Monday through Friday. Concrete deliveries are expected to occur between 7:30 AM and 4:00 PM, Monday through Friday. There will be rare circumstances when a large volume of concrete is being poured, during which concrete trucks will be arriving at the site throughout the night. The underground work phase is expected to have approximately 270 craft employees and 150 staff employees working daily. The first shift is expected to draw the majority of

employees with employees expected to arrive between 6:00 AM and 7:00 AM and depart between 5:00 PM and 6:00 PM.

The second part of the FNTP phase is the above ground work phase. This phase is expected to have less truck trips than the previous underground work phase, but is the peak number of employees working on site during construction. Based on the information provided in the ESS Group, Inc. report, the following truck deliveries are expected:

- 10 trucks per day delivering air-cooled condenser (ACC) equipment
- 10-15 trucks per day of additional equipment deliveries
- Total truck traffic (above ground): 25 trucks daily (maximum of six trucks during peak hours)

Similar to the underground work phase, the truck trips are expected to occur between 8:00 AM and 3:00 PM, Monday through Friday. The above ground work phase is expected to have the highest volume of staff and craft employees, approximately 350 craft employees and 150 staff employees working daily. The first shift is expected to draw the majority of employees, while the swing shift (2nd shift) is expected to have approximately 25 staff employees. Employees are expected to arrive for 1st shift between 6:00 AM and 7:00 AM with an expected shift change between 5:00 PM and 6:00 PM.

The final phase of construction is the demobilization phase. Similar to the mobilization phase, there is expected truck travel to and from the site, but only workers to facilitate the loading of vehicles will be present. Therefore it is not considered as a major construction phase.

Construction Trip Generation Assumptions

As previously noted, the additional traffic accessing the site has been scheduled to arrive and depart at staggered times, so the event of all of the additional daily traffic accessing the site within the same hours or within the weekday morning or weekday afternoon peak hours is unlikely. However, to present a conservative analysis, the following assumptions have been made to develop trip generation estimates that reflect both the peaks of the staff trip generation and the truck traffic during construction:

- The expected truck traffic accessing the site during the underground work phase and the employee trips accessing the site during the above ground work phase are the highest. To provide a conservative analysis for purposes of this report, the highest truck trip generation and highest employee trip generation will be combined for the construction trip generation analysis.
- The 146 mobilization deliveries during the underground work phase would equate to an average of five truck deliveries per week. To present a conservative analysis, it is assumed that all of these trips would occur on a single day.
- The truck trips are expected to access the site between 8:00 AM and 3:00 PM. Employee trips are expected to access the site between 6:00 AM and 7:00 AM and

depart the site between 5:00 PM and 6:00 PM. None of these trips are expected to occur during the weekday morning peak hour of 7:00 AM to 8:00 AM or the afternoon peak hour of 3:15 PM to 4:15 PM. However, to provide a conservative analysis, 50% of the daily truck trips are assumed to access the site during the weekday morning and weekday afternoon peak hours, and all employee trips are assumed to access the site during peak hours.

- Based on information provided in the Federal Highway Administration (FHWA) publication, *Summary of Travel Trends, 2009*, it is assumed that the occupancy rate of a vehicle accessing the proposed site during construction is approximately 1.18 persons per vehicle.

Based on the information provided and assumptions listed, the expected trip generation for the construction build condition of the proposed site is shown in Table 3 below.

Table 3: Construction Build Trip Generation Summary

	Weekday AM Peak Hour			Weekday PM Peak Hour		
Description	In	Out	Total	In	Out	Total
FNTP Construction Vehicles [1]	18	18	36	18	18	36
FNTP Staff and Craft Employees [1]	401	0	401	21	401	422
Total Trips FNTP Construction Phase	419	18	437	39	419	458

(1) Data collected from CREC RI Energy Facility Siting Board Application

As shown in Table 3, the peak hour trip generation during the peak of construction for the proposed Clear River Energy Center is approximately 437 new trips (419 vehicles entering, 18 vehicles exiting) during the weekday morning peak hour, and approximately 458 trips (39 trips entering, 419 trips exiting) during the weekday afternoon peak hour.

Project Trip Distribution and Assignment

Trip distribution for the employee trips accessing the proposed site was determined using the 2010 U.S. Census Journey to Work data. The data provides information from the 2010 census of where people work and live. Since the proposed site will draw new employees during both the construction build phase and the final operation, the data was used to determine where workers in the town of Burrillville originate from. Detailed information regarding the proposed distribution is shown in Appendix F. The resulting arrival and departure patterns are shown graphically in Figure 6. The truck traffic is expected to access the proposed site via the designated truck route on Route 100 and Route 44 from I-295, as described in the Roadway Assessment report and the ESS Group, Inc. report.

2021 Final Operation and Construction Build Peak Hour Traffic Volumes

To establish the 2021 Final Operation peak hour traffic volumes, the project-related traffic shown in Table 2 was assigned to the surrounding roadway network based on the project distribution patterns determined from the Journey to Work data, shown in Figure 6. These project trips were then added to the 2021 No Build peak hour traffic volumes to reflect the 2021 Final Operation peak hour traffic volumes. The resulting 2021 Final Operation weekday morning and weekday afternoon peak hour traffic volumes are presented in Figures 7 and 8, respectively.

Similarly, to establish the 2021 Construction Build peak hour traffic volumes, the employee traffic shown in Table 3 was assigned to the surrounding roadway network based on the project distribution patterns determined from the Journey to Work data, shown in Figure 6. The expected truck trips were assigned to the roadway network utilizing the Route 100/Route 44 truck route. These project trips were then added to the 2021 No Build peak hour traffic volumes to reflect the 2021 Construction Build peak hour traffic volumes. The resulting 2021 construction Build weekday morning and weekday afternoon peak hour traffic volumes are presented in Figures 9 and 10, respectively.

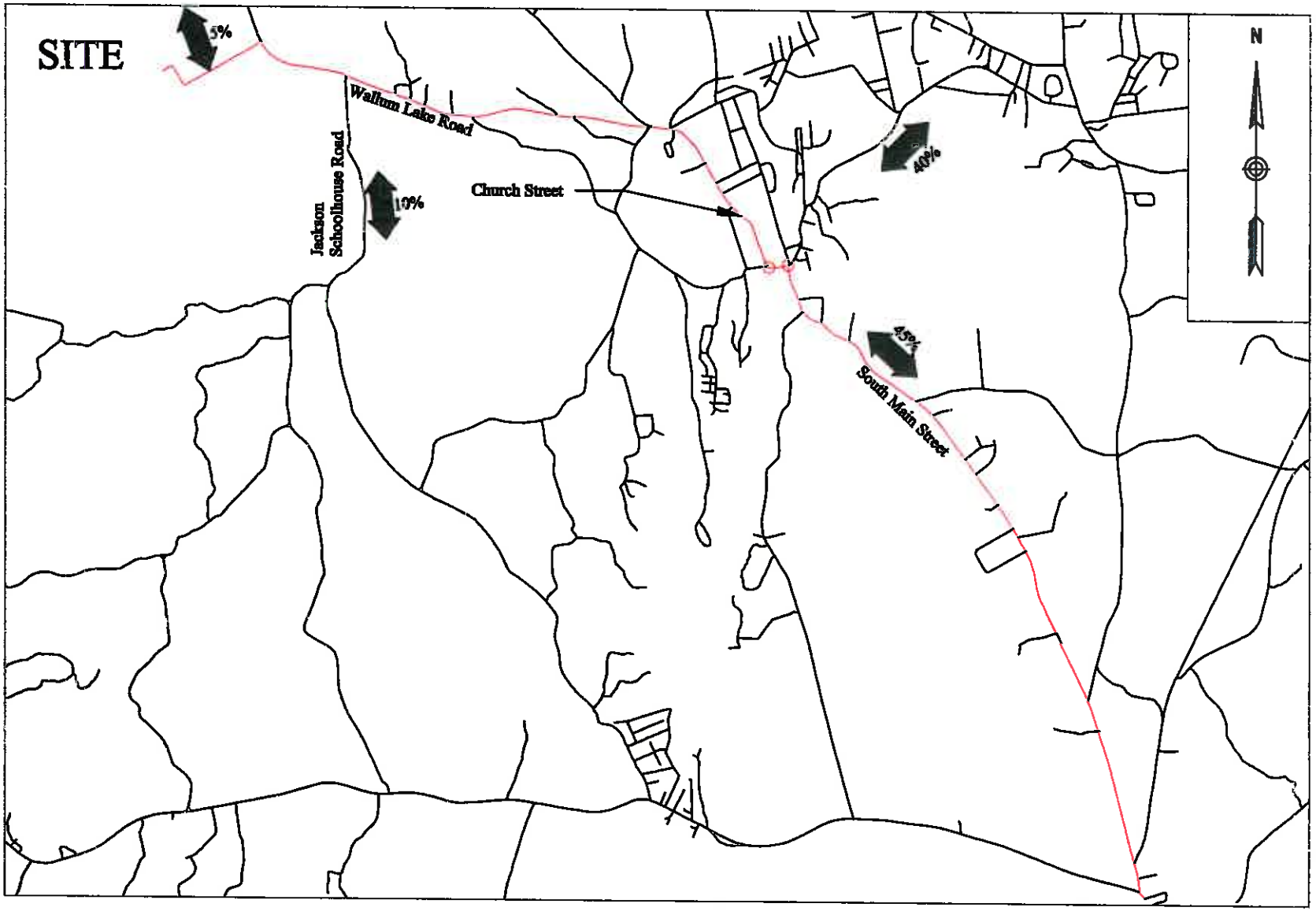


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Figure 6
Directions of Arrival and Departure
Clear River Energy Center
Burrillville, Rhode Island

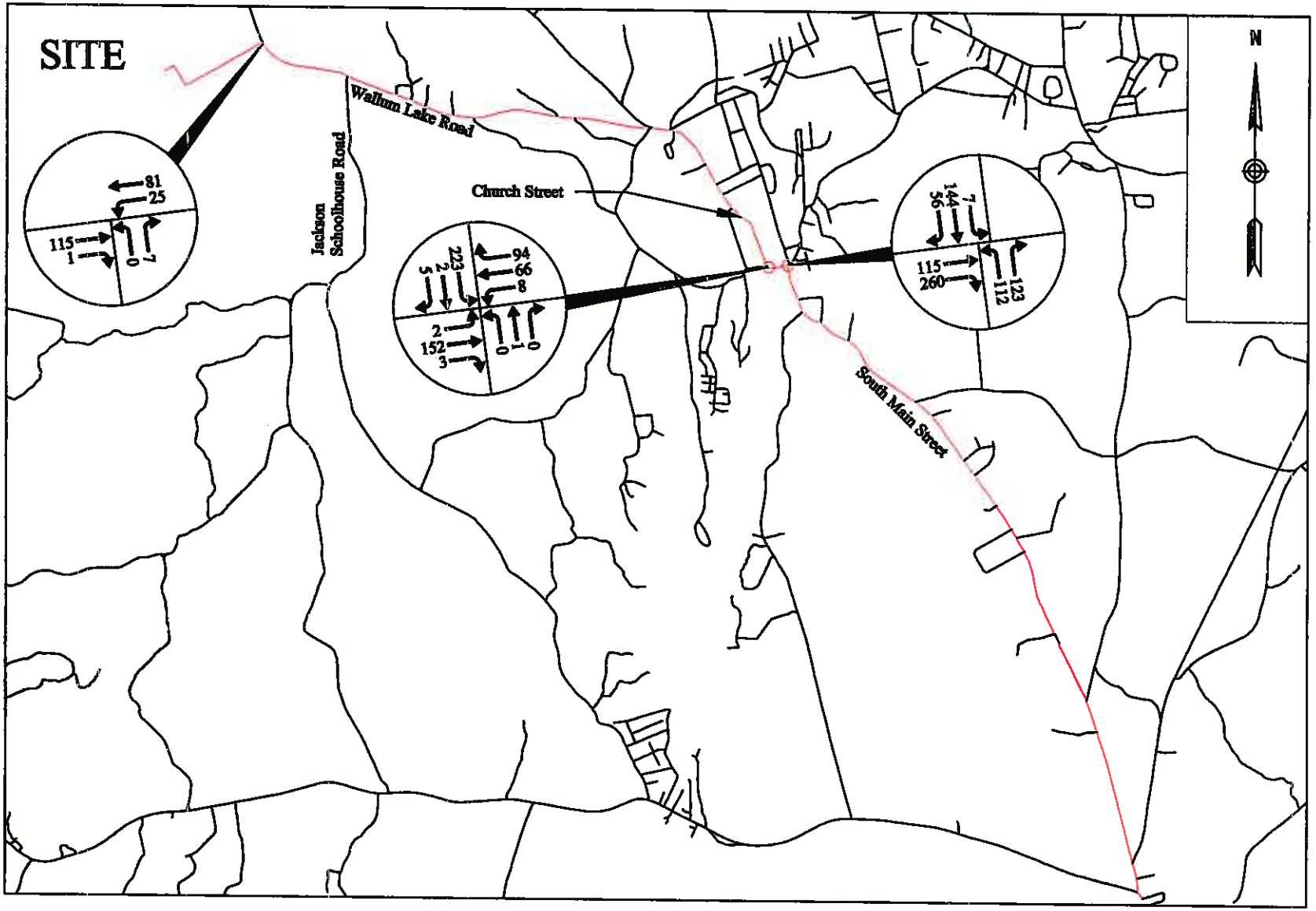

Figure 7
2021 Final Operation Weekday Morning Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

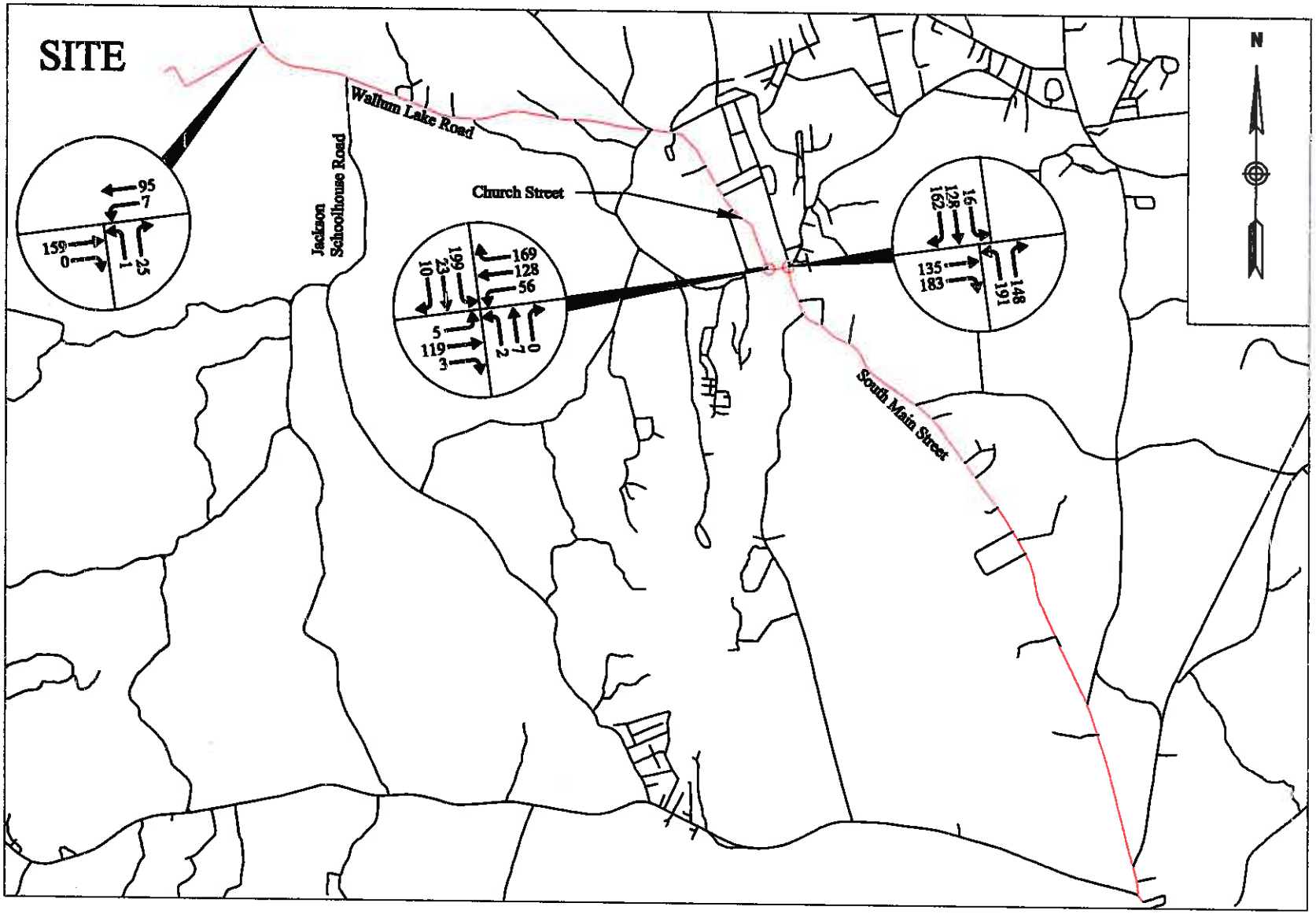

Figure 8
2021 Final Operation Weekday Afternoon Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

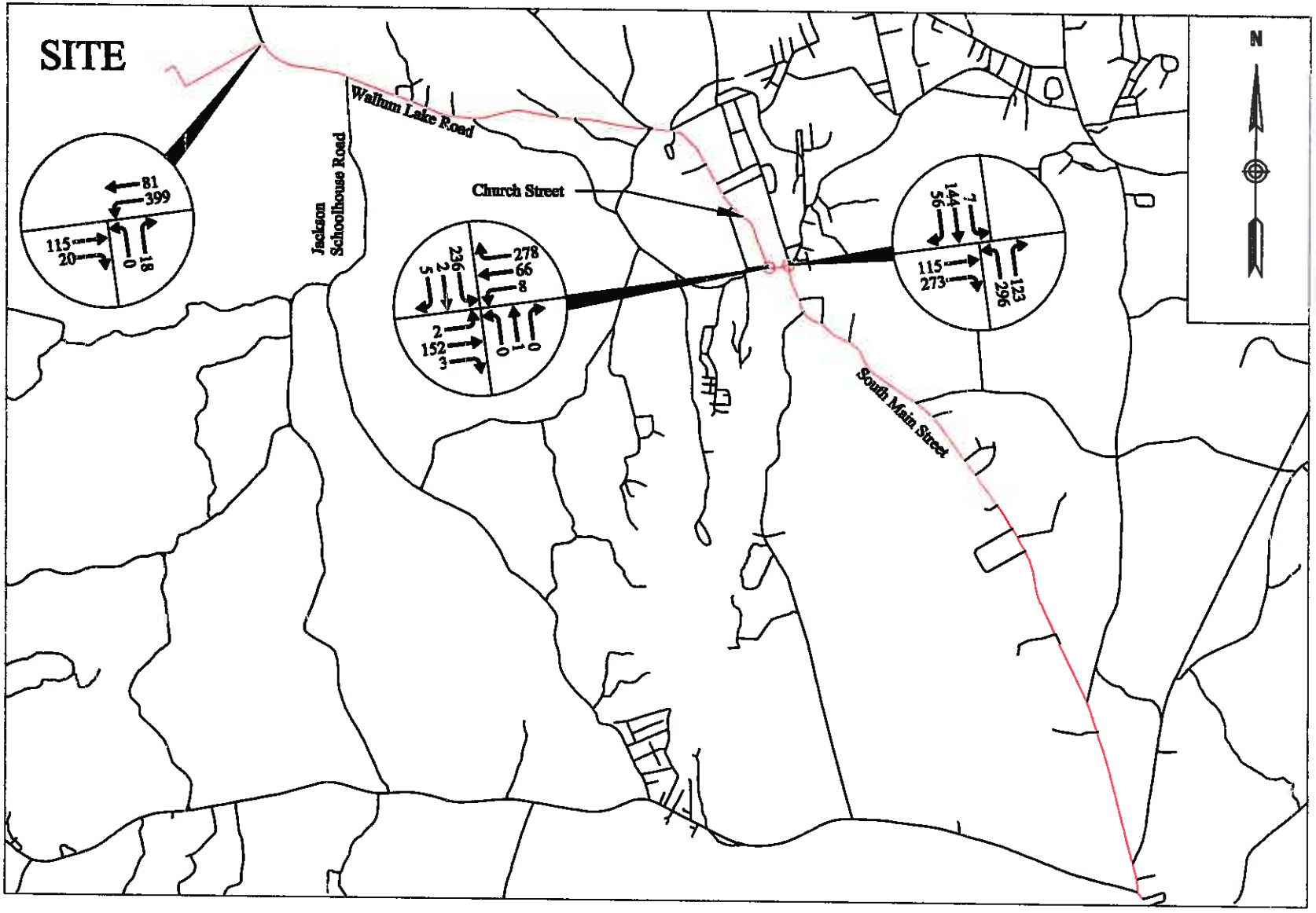

Figure 9
2021 Construction Build Weekday Morning Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

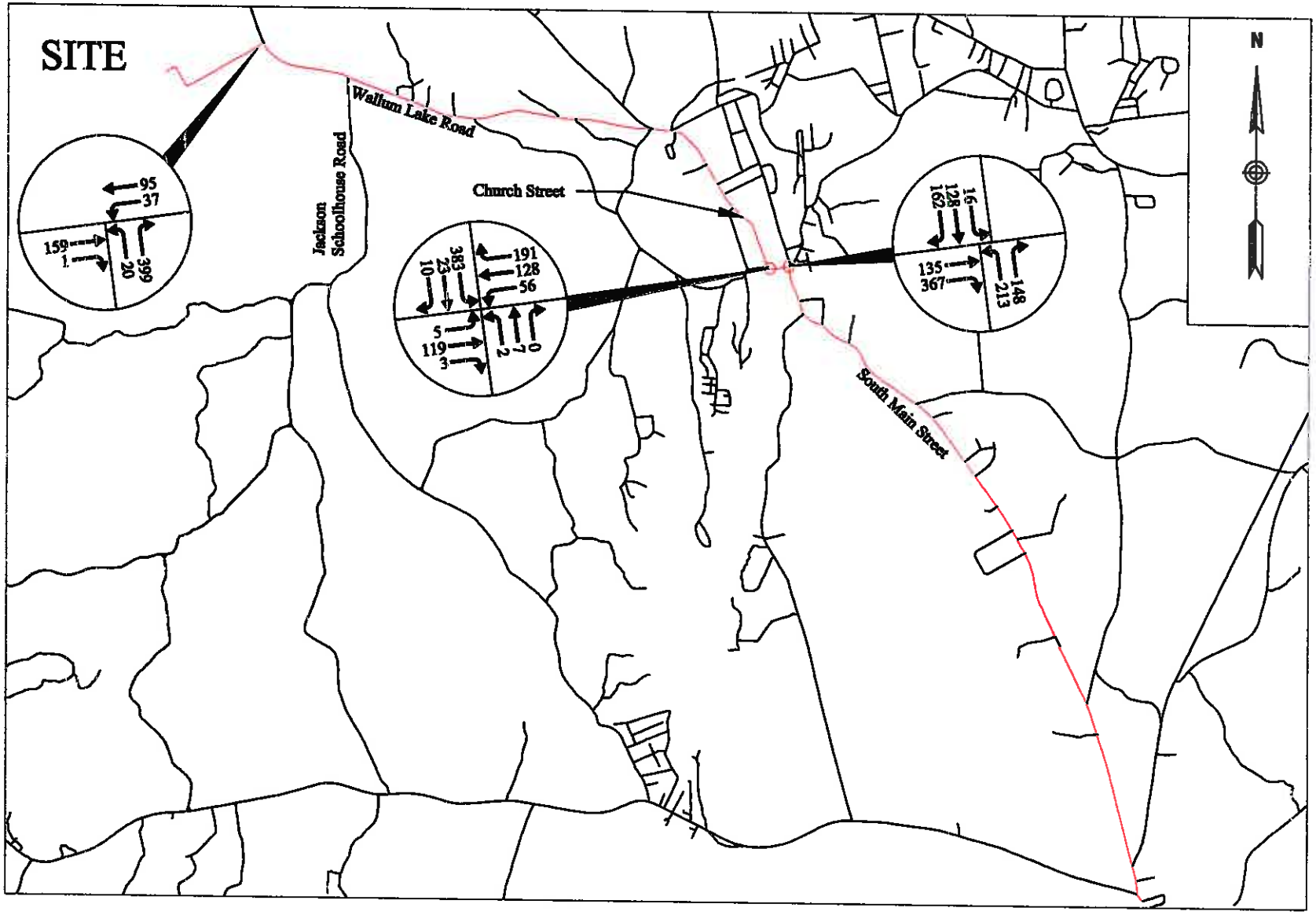

Figure 10
2021 Construction Build Weekday Afternoon Peak Hour Traffic Volumes
Clear River Energy Center
Burrillville, Rhode Island

TRAFFIC OPERATIONS ANALYSIS

In previous sections of this report, the quantity of traffic on the study area roadways was described. The following section describes the quality of traffic flow at the study area intersections for the given travel demands. As a basis for this assessment, intersection capacity analyses were conducted using Synchro capacity analysis software for the study area intersections under the 2016 Existing, 2021 No Build, 2021 Final Operation and 2021 Construction Build peak hour traffic conditions. This analysis is based on procedures contained in the 2000 Highway Capacity Manual (HCM) which are summarized in Appendix G. A discussion of the evaluation criteria and a summary of the results of the capacity analyses are presented below.

Level-of-Service Criteria

Operating levels of service (LOS) are reported on a scale of A to F with A representing the best conditions (with little or no delay) and F representing the worst operating conditions (longer delays).

Capacity Analysis Results

Intersection capacity analyses were conducted for the study area intersections to evaluate the 2016 Existing, 2021 No Build, 2021 Final Operation and 2021 Construction Build peak hour traffic conditions. Based on our analysis, the peak hour of the adjacent street traffic occurs between 7:00 AM and 8:00 AM for the weekday morning and 3:15 PM and 4:15 PM for the weekday afternoon peak periods.

The capacity analysis results for the 2016 Existing, 2021 No Build, 2021 Final Operation and 2021 Construction Build conditions are presented in Appendix H, Appendix I, Appendix J, and Appendix K respectively. The results of the signalized and unsignalized intersection capacity analyses are presented in Table 4 and Table 5 for the weekday morning and weekday afternoon peak hours, respectively.

Table 4: Weekday Morning Peak Hour Intersection Capacity Analysis Results

Intersection	Movement		Weekday Morning Peak Hour											
			2016 Existing			2021 No Build			2021 Final Operation			2021 Construction Build		
			LOS[1]	Delay[2]	V/C[3]	LOS[1]	Delay[2]	V/C[3]	LOS[1]	Delay[2]	V/C[3]	LOS[1]	Delay[2]	V/C[3]
Sayles Avenue at	EB	TR	A	0.0	0.25	A	0.0	0.27	A	0.0	0.27	A	0.0	0.28
Pascoag Main Street (Route 100)	NB	L	C	17.9	0.26	C	19.4	0.30	C	20.8	0.35	F	69.1	0.93
and South Main Street		R	B	10.7	0.17	B	10.9	0.18	B	11.0	0.18	B	11.0	0.18
	SB	L	B	13.3	0.02	B	13.8	0.02	B	13.8	0.02	B	14.0	0.02
		TR	B	14.5	0.37	C	15.2	0.40	C	15.4	0.41	C	15.7	0.41
Church Street at	EB	LTR	A	0.1	0.00	A	0.1	0.00	A	0.1	0.00	A	0.1	0.00
Pascoag Main Street (Route 100)	WB	LTR	A	0.5	0.01	A	0.5	0.01	A	0.4	0.01	A	0.2	0.01
and High Street	NB	LTR	B	11.5	0.00	B	11.7	0.00	B	11.9	0.00	B	14.3	0.00
	SB	LTR	C	15.0	0.43	C	15.9	0.46	C	16.4	0.47	C	23.6	0.62
Wallum Lake Road at	EB	TR	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.09	A	0.0	0.10
Site Driveway	WB	LT	n/a	n/a	n/a	n/a	n/a	n/a	A	2.0	0.02	A	8.0	0.34
	NB	LR	n/a	n/a	n/a	n/a	n/a	n/a	A	9.7	0.01	A	9.6	0.02

1 Level-of-Service
2 Average vehicle delay in seconds
3 Volume to capacity ratio
n/a Not Applicable

Table 5: Weekday Afternoon Peak Hour Intersection Capacity Analysis Results

Intersection	Movement		Weekday Afternoon Peak Hour											
			2016 Existing			2021 No Build			2021 Final Operation			2021 Construction Build		
			LOS[1]	Delay[2]	V/C[3]	LOS[1]	Delay[2]	V/C[3]	LOS[1]	Delay[2]	V/C[3]	LOS[1]	Delay[2]	V/C[3]
Sayles Avenue at	EB	TR	A	0.0	0.19	A	0.0	0.00	A	0.0	0.21	A	0.0	0.34
Pascoag Main Street (Route 100)	NB	L	D	31.1	0.59	E	37.7	0.67	E	40.1	0.69	F	112.7	1.03
and South Main Street		R	B	10.5	0.19	B	10.7	0.20	B	10.8	0.21	B	11.9	0.23
	SB	L	B	13.3	0.04	B	13.7	0.04	B	13.8	0.05	C	15.9	0.06
		TR	B	12.7	0.42	B	13.2	0.45	B	13.4	0.45	C	16.7	0.54
Church Street at	EB	LTR	A	0.3	0.00	A	0.4	0.00	A	0.4	0.00	A	0.4	0.01
Pascoag Main Street (Route 100)	WB	LTR	A	1.6	0.04	A	1.6	0.04	A	1.6	0.04	A	1.5	0.04
and High Street	NB	LTR	B	14.0	0.03	B	14.3	0.03	B	14.3	0.03	B	14.7	0.03
	SB	LTR	C	21.0	0.53	C	23.1	0.57	C	24.5	0.60	F	118.0	1.14
Wallum Lake Road at	EB	TR	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.12	A	0.0	0.12
Site Driveway	WB	LT	n/a	n/a	n/a	n/a	n/a	n/a	A	0.6	0.01	A	2.6	0.04
	NB	LR	n/a	n/a	n/a	n/a	n/a	n/a	A	9.7	0.04	B	14.8	0.56

1 Level-of-Service
2 Average vehicle delay in seconds
3 Volume to capacity ratio
n/a Not Applicable

Table 4 and Table 5 report the level-of-service results for the unsignalized study area intersections during the weekday morning and weekday afternoon peak hours, which can also be found in Appendix L. The specific capacity analysis results of the study area intersections are discussed below.

Sayles Avenue at Pascoag Main Street/South Main Street

The capacity analysis indicates that the critical northbound left turn movement on South Main Street currently operates at LOS C during the weekday morning peak hour and LOS D during the weekday afternoon peak hour. All other movements are shown to currently operate at LOS B or better during both peak hours.

During 2021 No Build conditions, the northbound left turn movement on South Main Street is expected to continue to operate at LOS C during the weekday morning peak hour, but decrease to from LOS D to LOS E during the weekday afternoon peak hour. The southbound shared through and right turn movement on Sayles Avenue is expected to decrease from LOS B to LOS C during the weekday morning peak hour and remain at LOS B during the weekday afternoon peak hour. All other critical stop controlled movements are not expected to decrease in levels-of-service during 2021 No Build conditions.

During the 2021 Final Operation conditions, there are no additional expected changes in levels-of-service for any of the critical stop controlled movements during the weekday morning or weekday afternoon peak hours.

During the 2021 Construction Build condition, the northbound left turn movement from South Main Street is expected to decrease from LOS C to LOS F during the weekday morning peak hour and decrease from LOS E to LOS F during the weekday afternoon peak hour. Additionally, both the southbound left turn movement and the shared through and right turn movement on Sayles Avenue are expected to decrease to LOS C during the weekday afternoon peak hour. No other changes in individual level-of-service are expected. While the northbound left turn is expected to decrease to LOS F during the weekday afternoon peak hour, the movement is expected to operate under capacity and will be of short duration during the worst peak hour. As previously noted, our capacity analysis presents a worst case scenario and is based on conservative trip generation estimates.

Church Street at Pascoag Main Street and High Street

The capacity analysis indicates that the critical stop controlled southbound approach from Church Street currently operates at LOS C during the weekday morning and weekday afternoon peak hours. During 2021 No Build conditions and 2021 Final Operation conditions, the Church Street southbound approach is expected to continue to operate a LOS C.

During the 2021 Construction Build conditions, the southbound Church Street approach is expected to continue to operate at LOS C during the weekday morning peak hour, but decrease from LOS C to LOS F during the weekday afternoon peak hour. It should be noted that this

condition would only be for a short duration during the weekday afternoon peak hour, and only will occur if all traffic assumptions for a conservative "worst case" scenario were to coincide.

Wallum Lake Road at CREC Site Driveway

Under 2021 Final Build conditions, the proposed critical stop-controlled CREC site driveway along Wallum Lake Road is expected to operate at LOS A during both the weekday morning and weekday afternoon peak hours. During 2021 Construction Build conditions, the site driveway is expected to operate at LOS A during the weekday morning peak hour and LOS B during weekday afternoon peak hour. Though there is a high volume of traffic exiting the site during the weekday afternoon peak hour, the majority of traffic will be making a right turn onto Wallum Lake Road, and therefore, delays exiting the site are minimal.

Sight Distance

A field review of the available sight distances was conducted for the site driveway. The 85th percentile speeds were collected as part of the ATR data and show that the 85th percentile speed in the eastbound direction of Wallum Lake Road is 51 mph, and the 85th percentile speed in the westbound direction is 52 mph. It should be noted that the site driveway will require a Physical Alteration Permit from the RIDOT and coordination with RIDOT is already underway.

The American Association of State Highway and Transportation Officials' (AASHTO) publication, *A Policy on Geometric Design, 2011 Edition,* defines minimum and desirable sight distances at intersections. The minimum sight distance is based on the required stopping sight distance (SSD) for vehicles traveling along the main road and the desirable sight distance allows vehicles to enter the main street traffic flow without requiring the mainline traffic to slow to less than 70% of their speed and is referred to as intersection sight distance (ISD). According to AASHTO, "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 time to anticipate and avoid collisions." The following table summarizes the sight distance standards for the various speeds. Since there is added truck traffic accessing the site during the construction build condition, the required sight distance is adjusted to use a single unit truck as a design vehicle.

Table 6: Sight Distance Requirements

Driveway	Direction	85th Percentile Speed (MPH)	SSD Required[1] (ft)	ISD Required[2] (ft)	SSD Measured (ft)	Meets SSD Requirements
Wallum Lake Road at Proposed Site Driveway	Left (West)	52	450	640	580	Yes
	Right (East)	51	450	725	1,000+	Yes

1 - AASHTO Stopping sight distance (see AASHTO Exhibit 3-1).
2 - AASHTO Intersection sight distance based on Case B1, left turn from stop crossing a single lane or B2, right turn from stop.

The CREC site driveway on Wallum Lake Road has approximately 1,000 feet of available sight distance to the east, which remains generally unobstructed and approximately 580 feet of sight distance to the west, which is obstructed by a horizontal curve. Both directions exceed the minimum stopping sight distance requirements for the 85th percentile vehicle speeds.

The majority of proposed laydown areas for the site during the construction phase will be on site. Additional laydown areas under consideration include the Port of Providence in Providence and Quonset Point in North Kingstown, RI. No other laydown areas have been identified offsite within the Town of Burrillville. As previously mentioned, the site driveway has adequate sight distance for heavy vehicle access and egress to the proposed laydown areas.

CONCLUSION

The CREC is proposed for project on Wallum Lake Road and will operate as an electric generating facility. The site will be accessed via a new site driveway connecting to Wallum Lake Road (Route 100).

Two traffic scenarios were considered for the proposed development: the Final Operation of the proposed CREC, and the construction phase that will add the highest volume of traffic to the study area intersections and roadways. It should be noted that a worst case scenario was analyzed for the construction build phase, and based on the employee shift times and truck time restrictions, this condition should not typically occur.

The Final Operation condition is expected to add approximately 33 vehicle trips (26 vehicles entering, seven vehicles exiting) during the weekday morning peak hour, and 33 vehicles trips (seven vehicles entering, 26 vehicles exiting) during the weekday afternoon peak hour. Based on the assumptions for the Construction Build conditions, the peak of construction is expected to generate approximately 437 new vehicle trips (419 vehicles entering, 18 vehicles exiting) during the weekday morning peak hour, and approximately 458 vehicle trips (39 vehicles entering, 419 vehicles exiting) during the weekday afternoon peak hour.

The capacity analysis indicates that the Final Operation of the proposed CREC will not have an appreciable impact on the study area roadways and intersection. There are no expected decreases in levels-of-service between the 2021 No Build and 2021 Final Operation conditions.

During the Construction Build condition, there are critical movements at study area intersections that will experience a decrease in level-of-service, some of which will be reduced to LOS F, though they will typically remain under capacity. It should also be noted that this condition is a worst case scenario during the weekday afternoon peak hour over a short duration within the highest construction period. This analysis depicts that at the highest volume conditions during construction, there are decreases in levels-of-service, however, the overall operations at the study area intersection are still generally operating under capacity.

Based on the information provided, it is expected that overall, the proposed CREC will have an minimal impact on the overall operations on the study area roadways and intersections.