SECTION 6

TRAFFIC IMPACT ANALYSIS

6 TRAFFIC IMPACT ANALYSIS

Introduction

Criterion 6 of Section 39.2 of the Illinois Environmental Protection Act and of the City of Zion Pollution Control Facility Siting Ordinance requires that the traffic patterns to or from the facility are so designed as to minimize the impact on existing traffic flows. This section contains a Traffic Impact Analysis prepared by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA). This analysis demonstrates that the traffic patterns to or from the Facility are so designed as to minimize the impact on existing traffic flows.

Therefore, the proposed Facility satisfies Criterion 6.

Traffic Impact Analysis
Proposed Site 2 East Expansion of the Veolia ES Zion Landfill

Zion, Illinois

Prepared for
Veolia ES Zion Landfill, Inc.

By Kenig, Lindgren, O'Hara, Aboona, Inc.
Rosemont, Illinois
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1.
Introduction

This report summarizes the findings and recommendations of a traffic impact analysis conducted by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA, Inc.) for the proposed Site 2 East expansion of the Veolia ES Zion Landfill located in Zion, Illinois. The site of the existing Facility is generally located in the northeast quadrant of the intersection of Green Bay Road (IL 131) and Ninth Street. Currently, the existing landfill accepts an average of 3,100 tons of waste per day based on 5.5 days per week or 286 days per year. Access to the Facility is provided via a main access drive on Green Bay Road and an employee only access drive on Ninth Street. It should be noted that all truck traffic enters and exits the Facility via the main access drive on Green Bay Road.

Veolia ES Zion Landfill, Inc. (Veolia) proposes to expand the existing landfill vertically and laterally in order to continue operation of the landfill. The proposed expansion will continue to accept only municipal solid waste and nonhazardous special waste at daily volumes similar to that currently accepted.

KLOA, Inc. was asked to conduct this study to assess the impact of the proposed traffic patterns on the existing traffic flows in accordance with the sixth siting criterion provided in Section 39.2 of the Illinois Environmental Protection Act. That criterion reads as follows: "The traffic patterns to or from the facility are so designed as to minimize the impact on the existing traffic flows." Based on our review of the information described below, KLOA, Inc. has determined that the proposed Facility will comply with that siting criterion.

2.
Methodology

As part of the site planning process, KLOA, Inc. completed a detailed investigation and analysis of the traffic needs of the proposed Facility. In order to make a thorough evaluation of the traffic impact of the proposed Facility, KLOA, Inc. completed several types of studies.

Site Accessibility Investigation and Data Collection

KLOA, Inc. investigated existing traffic and roadway conditions that might affect access to the proposed Facility. This was accomplished by conducting several field surveys and in discussions with various representatives of the Illinois Department of Transportation (IDOT), the Lake County Division of Transportation (LCDOT), the City of Zion, and other public agencies. Data on existing traffic volumes, approved or proposed developments, planned or proposed roadway improvements, and accident data were obtained from the various public agencies. Peak period traffic counts were conducted at critical intersections and roadways in the area and included in the traffic analysis. Lastly, a gap study was conducted along Green Bay Road.

Traffic Characteristics of the Proposed Project

The directions by which traffic will approach and depart the proposed Facility were based on the design and operation of the roadway system, the projected service area provided by Veolia, and traffic counts conducted at the existing landfill. The volume of traffic that will be generated by the proposed Facility was estimated based on an analysis of the existing landfill and the projected daily operation of the proposed expansion as supplied by Veolia.

Traffic Assignment and Analysis

The proposed Facility-generated traffic volumes were combined with through (nonsite) traffic volumes and assigned to the adjacent roadway network according to the directional distribution analysis. Also included in these assignments were the traffic increases resulting from future development in the area and ambient traffic growth. These assignments were used to analyze the impact that the proposed Facility would have on traffic flows in the area.

Roadway and Site Access Requirements

Capacity analyses were conducted based on the assignment of existing traffic and estimated future traffic. Based on the results of the capacity analyses, the impact of the proposed Facility was determined. Lastly, a review was performed of the proposed Facility to ensure dirt, dust, and mud will be kept clear from the external roadways.

3.
Site Accessibility

Factors that affect access to any site include its location with respect to the area transportation system and the characteristics of the system. The accessibility of the expanded Facility will be governed by the following.

1. The site's location with respect to area roadways (that serve as routes to/from the Facility).

2. The existing conditions of those area roadways.

3. Planned or proposed area roadway improvements.

Site Location

The site of the existing and proposed Facility is generally located in the northeast quadrant of the intersection of Green Bay Road and Ninth Street. Land uses in the area consist mostly of vacant undeveloped land to the north of the site, residential homes to the east and the south of the site, and manufacturing/distribution developments to the west of the site. The Trumpet Business Park and the Cleveland Corporation are located west of the site on the west side of Green Bay Road. The Shepherd's Crook golf course is located directly north of the site.

Study Area

The Institute of Transportation Engineers (ITE) publication *Transportation Impact Analyses for Site Development* provides the following guidelines when determining the need for a traffic impact study.

Locally established guidelines based on trip generation, development size, other development or area characteristics, or localized conditions. In lieu of other locally preferred guidelines, development generation of 100 added vehicle trips during the adjacent roadway's peak traffic hour or the development's peak hour is suggested.

As will be discussed in the study, the additional traffic generated by the proposed Facility will be below the threshold of 100 peak hour trips. As such, the increase in traffic will have a limited impact on the roadways immediately adjacent to the Facility, but will have negligible impact on the roadways further from the Facility.

The study area for the traffic analysis was based on the criteria provided in the *Transportation Impact Analyses for Site Development* published by the ITE. ITE provides the following direction when determining the study area for a site traffic impact analysis.

Any site transportation study analyzing off-site access needs and impacts should include at least all site access points and major intersections (signalized and unsignalized) adjacent to the site. It is suggested that the first signalized intersection on each street serving the site also be analyzed, if it is within a specific locally determined distance of the site (for example, 0.25 mile or 0.5 mile). Beyond this area, the review agency (with input from the preparer) should determine any additional area to be included, based on local or site-specific issues, development size, or local policy.

Based on the ITE criteria, the following intersections were analyzed as part of the traffic study.

- Green Bay Road with the Facility's main access drive
- Ninth Street with the Facility's employee only access drive
- Green Bay Road with Ninth Street (major intersection adjacent to the Facility)
- Green Bay Road with Russell Road (first signalized intersection north of the Facility)
- Green Bay Road with IL 173 (first signalized intersection south of the Facility)

Further, the impact of the Facility-generated traffic on other intersections is judged insignificant as the Facility-generated traffic represents less than a one percent increase in traffic at other major intersections outside of the study area. This is demonstrated in **Table 1** which shows the existing daily traffic volumes and the average daily traffic generated by the Facility at several intersections adjacent to the study area.

Table 1
PERCENTAGE OF FACILITY-GENERATED TRAFFIC VOLUMES
AT VARIOUS INTERSECTIONS

Intersection	Daily Traffic Volumes		Percentage of Total Traffic
	Existing Traffic	Facility Traffic	
IL 173/Green Bay Road[1]	23,000	460	2.00%
IL 173/Kenosha Road	13,900	80	0.58%
IL 173/U.S. Route 41	37,150	240	0.65%
IL 173/I-94 Off-Ramp	17,000	160	0.94%
IL 173/I-94 On-Ramp	14,000	105	0.75%

1. This intersection is included in the study area.

Area Roadways

The major roadways that serve the area surrounding the Facility are illustrated in **Figure 1** and discussed below.

Green Bay Road (IL 131) is a north-south arterial roadway that becomes Wisconsin State Trunk Highway (STH) 31 north of the Wisconsin border. In the vicinity of the site, Green Bay Road generally has a two-lane cross section that is widened to a four-lane cross section just south of Russell Road. A second northbound through lane is provided on Green Bay Road for several hundred feet south and north of the existing Facility access drive. Green Bay Road has a posted speed limit that ranges between 45 and 55 mph. Separate left-turn lanes are provided on Green Bay Road at its signalized intersections with Russell Road and IL173 and its unsignalized intersection with the existing Facility access drive. A separate right-turn lane is provided on the southbound approach of Green Bay Road at its intersections with IL 173. Green Bay Road is under the jurisdiction of IDOT and is classified as a Class II Truck Route (weight limit of 80,000 pounds) between Russell Road and IL 173.

IL 173 (Rosecrans Road) is an east-west arterial roadway that has a partial access (to and from the south) interchange with I-94. In the vicinity of the site, IL 173 has a two-lane cross section and a posted speed limit that ranges between 45 and 55 mph. Separate left-turn lanes are provided on IL 173 at most major cross roads, including its signalized intersection with Green Bay Road. A separate right-turn lane is provided on both approaches of IL 173 at its intersection with Green Bay Road. IL 173 is under the jurisdiction of IDOT and is classified as a Class II Truck Route (weight limit of 80,000 pounds).

Site Location **Figure 1**

Russell Road is an east-west arterial roadway that has a full-access interchange with I-94. In the vicinity of the site, Russell Road has a two-lane cross section and a posted speed limit of 55 mph. At is signalized intersection with Green Bay Road, Russell Road provides a separate left-turn lane and a separate right-turn lane on both approaches. Russell Road is under the jurisdiction of LCDOT and has a weight limit of 73,280 pounds.

Ninth Street (Winthrop Harbor Road) is an east-west collector roadway. In the vicinity of the site, Ninth Street has a two-lane cross section and is under stop sign control at its intersection with Green Bay Road. East of Green Bay Road, Ninth Street is under the jurisdiction of LCDOT and has a posted speed limit of 55 mph. West of Green Bay Road, Ninth Street has a posted speed limit of 30 mph. Ninth Street has a weight limit of 73,280 pounds.

Proposed Roadway Improvements

IDOT has initiated a Phase I preliminary engineering study for Green Bay Road. The study limits for the project extend approximately 7.5 miles from Russell Road to Sunset Avenue. According to IDOT, the study process is expected to take three to four years

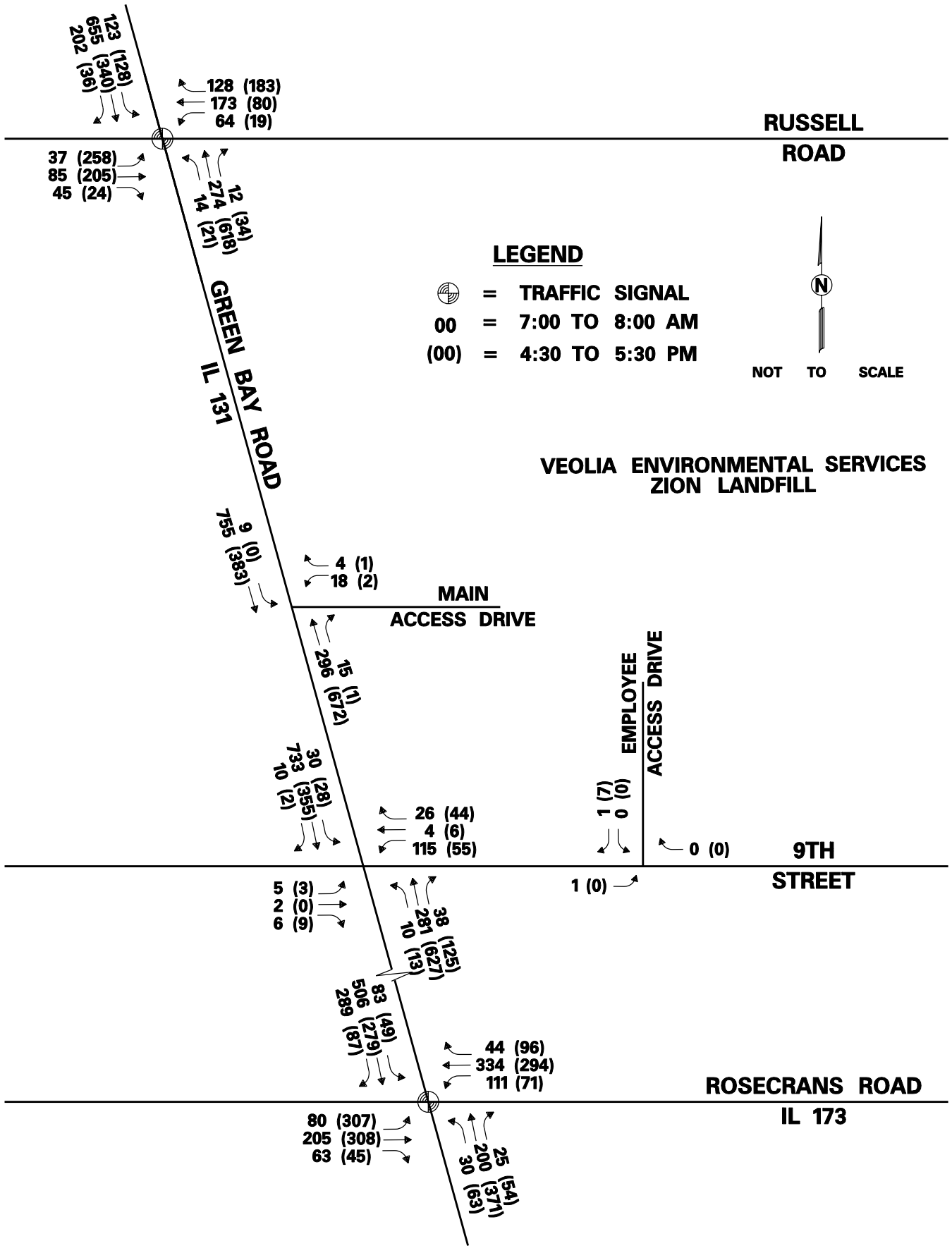
Based on discussions with officials from IDOT, LCDOT, and the City of Zion, other than the aforementioned item and resurfacing projects, no roadway improvements are programmed and/or proposed within the study area.

March 2008 Existing Traffic Volumes

In order to determine the existing traffic volumes on the area roadways, KLOA, Inc. conducted manual traffic counts at the following intersections.

- Green Bay Road with IL 173
- Green Bay Road with Ninth Street
- Green Bay Road with Russell Road
- Green Bay Road with the Facility's main access drive
- Ninth Street with the Facility's employee only access drive

The traffic counts were conducted in March 2008 during the morning (6:00 to 9:00 A.M.) and evening (3:00 to 6:00 P.M.) peak periods. The results of the traffic counts indicated that the peak hours of traffic occur between 7:00 and 8:00 A.M. and 4:30 and 5:30 P.M. It should be noted that the traffic counts were also broken down by vehicle type (passenger vehicles, single unit trucks, and semi-trailers). **Figure 2** illustrates the existing peak hour traffic volumes. Copies of the traffic counts are provided in Appendix U.



PROJECT:	TITLE:	PROJECT NO: 06–277
VEOLIA ENVIRONMENTAL SERVICES ZION LANDFILL SITE 2 EAST EXPANSION ZION, ILLINOIS	MARCH 2008 EXISTING PEAK HOUR VOLUMES	KLOA FIGURE NO: 2

In addition to the manual traffic counts, 24-hour machine counts were obtained from IDOT. The IDOT traffic counts were conducted in 2007. **Table 2** provides the results of the 24-hour traffic counts which show the magnitude of total traffic and percentage of truck traffic on the area roadways.

Table 2
24-HOUR CLASSIFICATION TRAFFIC COUNTS

	Daily Traffic Volume	Percent of Cars and Light Trucks	Percent of Single-Unit and Semi-Trailers
Green Bay Road north of Ninth Street	13,200	86%	14%
Green Bay Road south of Ninth Street	13,300	84%	16%
IL 173 east of Green Bay Road	10,900	96%	4%
IL 173 west of Green Bay Road	11,300	92%	8%

Note: The daily traffic volumes include the traffic generated by the existing Facility.

4.
Development Traffic Characteristics

The following traffic characteristics of the proposed Facility were analyzed to evaluate its potential impact on area roadways and traffic conditions.

1. The type and size of truck traffic that will be delivering waste to the expanded Facility.

2. The directional distribution of projected Facility-generated traffic on the area roadway system.

3. The traffic volumes that will be generated by the expanded Facility.

4. The travel patterns of traffic generated by other existing, planned, or anticipated developments in the vicinity of the site.

Truck Traffic Dimensions

As indicated previously, the existing landfill and proposed expansion will only accept solid waste and nonhazardous special waste. The majority of the solid waste will be delivered to the Facility via collection trucks (roll-off and packer trucks) and transfer trailers. Dump trucks will deliver the majority of the nonhazardous special waste as it typically consists of various types of soils that are disposed within the landfill. **Table 3** provides the approximate dimensions of the trucks that will typically be delivering waste to the expanded landfill.

Table 3
APPROXIMATE TRUCK DIMENSIONS

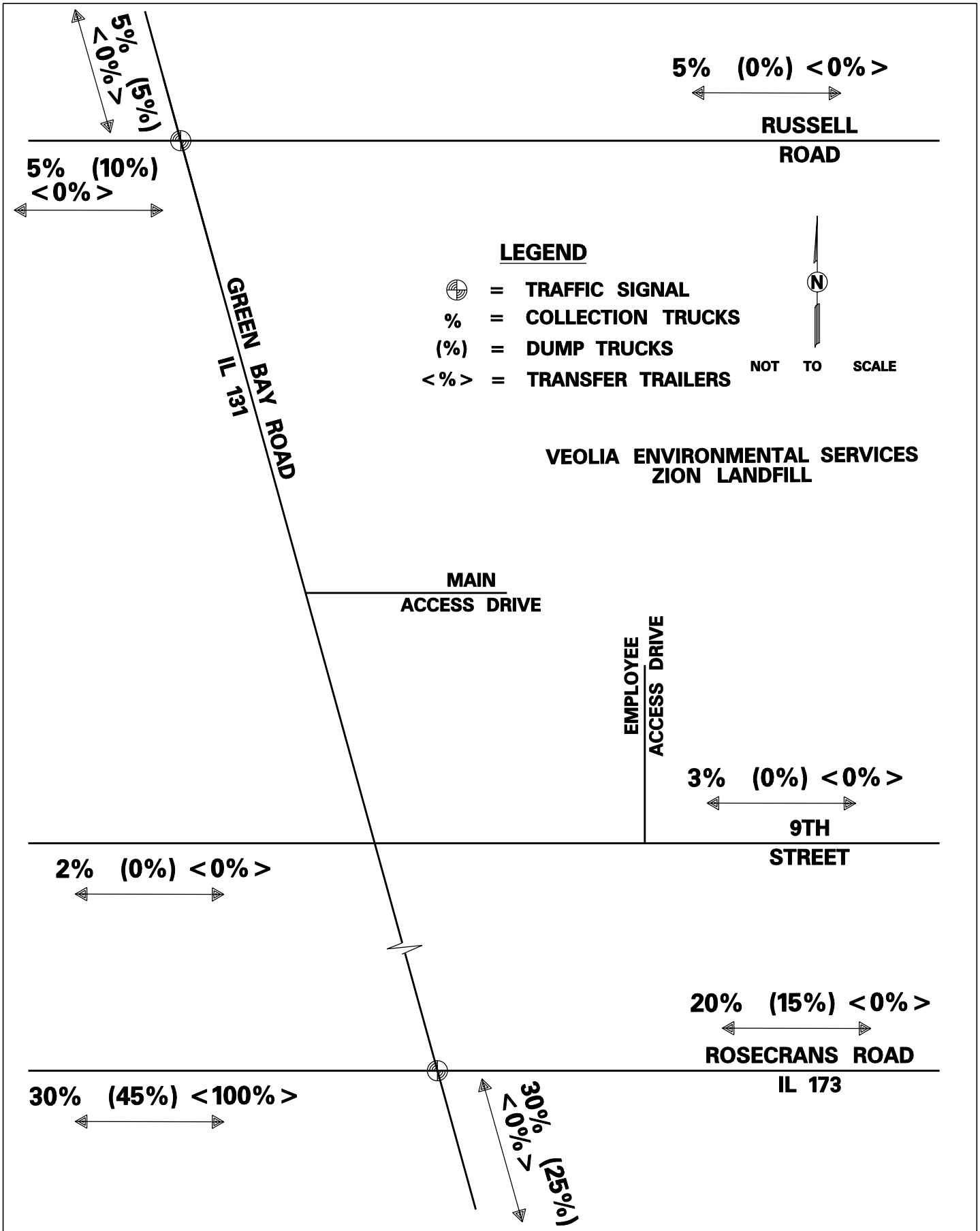
	Wheel Base Length (feet)	Maximum Height (feet)	Expected Weight (pounds)
Packer Trucks	23 - 24	13.5	35,000 - 55,000
Roll-Off Trucks	14 - 22	13.5	20,000 - 55,000
Transfer Trailers	40 - 62	13.5	70,000 - 80,000
Dump Truck	40 - 50	13.5	60,000 - 70,000

Note: All dimensions are approximate given the various truck designs within each truck class.

Directional Distribution

The directional distribution of existing and proposed Facility-generated trips on the external roadways depends on several variables, including the operational characteristics (weight limits) of the roadway system, and the accessibility of the major roadways serving the Facility. The collection truck traffic generally traverses the most direct route to/from the Facility along the arterial (major) roadway system. As a result, the impact of the Facility is minimized as it (1) reduces the truck miles traveled on the roadway system and (2) helps to distribute the traffic over the roadway system. The alternative routes for the fully loaded transfer trailers are restricted as they are only permitted to traverse those roadways with a weight limit of 80,000 pounds (Class I and II truck routes). Therefore, the current routes (same as the proposed routes) were determined to be the most viable to serve the proposed Facility.

The directional distribution for the proposed Facility was estimated based on the intended service area of the landfill which was provided by Veolia and the existing travel patterns as determined from the existing traffic counts. It is expected that the directional distribution of the direct (local) haul waste (collection trucks) and the nonhazardous special waste (dump trucks) will be similar to the directional distribution for the existing Facility. The majority of the waste arriving from transfer sources (via transfer trailers) is expected to continue to reach the Facility via the regional roadway system. As such, the transfer trailers will continue to access the expanded Facility via I-94 to IL 173 to Green Bay Road to the main access drive. **Table 4** and **Figure 3** show the estimated directional distribution for the expanded Facility.



PROJECT: VEOLIA ENVIRONMENTAL SERVICES ZION LANDFILL SITE 2 EAST EXPANSION ZION, ILLINOIS	TITLE: DIRECTIONAL DISTRIBUTION	PROJECT NO: 06-277 KLOA FIGURE NO: 3

Table 4
SITE TRAFFIC DIRECTIONAL DISTRIBUTION

Direction	Roll-Off and Packer Collection Trucks	Dump Trucks	Transfer Trailers
To and from the north on STH 131	5%	5%	0%
To and from the south on Green Bay Road	30%	25%	0%
To and from the east on Russell Road	5%	0%	0%
To and from the west on Russell Road	5%	10%	0%
To and from the east on Ninth Street	3%	0%	0%
To and from the west on Ninth Street	2%	0%	0%
To and from the east on IL 173	20%	15%	0%
To and from the west on IL 173	30%	45%	100%
Total	100%	100%	100%

Estimated Site Traffic Generation

The estimated volumes of traffic that will be generated by the proposed Facility were based on the magnitude and character of the proposed expansion and its intended service area. The expansion is proposed to extend the life of the existing landfill. Once the expanded landfill is completed and in operation, it is projected that it will continue to accept an average of 3,100 tons of waste per day. However, to be conservative and ensure that the analysis was conducted based on projections that exceed the anticipated traffic volumes, all of the analyses and evaluations in this study are based on the expanded landfill accepting 4,300 tons of waste per day which represents the average peak volume historically accepted at the existing landfill.

The majority of the direct haul waste will be transported to the site via six ton (average payload) collection trucks (packer and roll off trucks). All of the waste from transfer sources will be transported to the site via 24 ton (average payload) transfer trailers. Lastly, the majority of the nonhazardous special waste will be transported to the site via 18 ton (average payload) dump trucks. The hourly distribution of the truck traffic was determined based on the expected arrival schedules of the various customers and patrons that will use the expanded landfill, the existing traffic counts conducted at the Facility access drives, and the daily activity reports as provided by the applicant.

In addition to the truck traffic, the expanded Facility is expected to generate the following additional traffic.

- The expanded facility will have a total of approximately thirteen employees that work various shifts between 5:45 A.M. and 7:00 P.M.

- The Facility typically generates five to six daily trips due to maintenance and service of the landfill.

- Currently fifteen transfer trailers are parked overnight at the Facility. Veolia does not expect any significant changes in the number of transfer trailers parked at the Facility.

Table 5 shows the estimate of the traffic that will be generated by the expanded Facility based on the landfill accepting 3,100 and 4,300 tons of waste per day. It should be noted that the proposed expansion is just extending the life of the existing landfill and will continue to accept an average of 3,100 tons of waste per day. As such, the traffic estimated to be generated by the proposed Facility at 3,100 tons per day is currently generated by the existing Facility and is therefore already on the existing roadway system.

Future Growth

To evaluate the impact that proposed Facility-generated traffic will have on area roadways, the total peak period traffic volumes at the proposed Facility access drives and area intersections had to be estimated for the year the expansion is expected to start receiving waste, which is projected to be 2012. Given the current disposal rates and the remaining capacity of the existing landfill, Veolia has indicated that the existing landfill will reach its capacity by 2012. As such, the expanded landfill is projected to start receiving waste by 2012. For the purpose of this analysis the following two future traffic assignments were evaluated.

Year 2012 traffic volumes without the expansion-generated traffic which includes existing traffic plus four years of ambient growth plus the traffic generated by other specific developments proposed in the area.

Year 2012 traffic volumes with the expansion-generated traffic which includes existing traffic plus the expansion-generated traffic plus four years of ambient growth plus traffic generated by the other specific developments proposed in the area.

Both ambient background growth and specific developments proposed within the area were included in the future traffic assignments. Estimating the projected growth in the area, and based on previous traffic studies conducted in the area, an ambient growth factor of 3.0 percent per year was considered appropriate for this traffic analysis. Therefore, to obtain the projected nonsite traffic volumes, the 3.0 percent ambient growth factor was applied to the existing nonsite traffic volumes for each year between 2008 and 2012.

Table 5
ESTIMATED SITE-GENERATED TRAFFIC VOLUMES

	Morning Peak Hour (7:00 to 8:00 A.M.)		Evening Peak Hour (4:30 to 5:30 P.M.)		Daily Volumes	
	In	Out	In	Out	In	Out
3,100 Tons of Waste Per Day						
Collection Trucks	14	14	0	0	156	156
Transfer Trailers	3	3	3	1	46	46
Dump Trucks	4	4	0	0	60	60
Miscellaneous Traffic[1]	3	1	0	11	20	20
Total Traffic	24	22	3	12	282	282
Green Bay Road Drive	23	21	3	5	267	267
Ninth Street Drive	1	1	0	7	15	15
4,300 Tons of Waste Per Day						
Collection Trucks	20	20	0	0	216	216
Transfer Trailers	4	4	5	1	64	64
Dump Trucks	6	6	0	0	83	83
Miscellaneous Traffic[1]	3	1	0	11	20	20
Total Traffic	33	31	5	12	383	383
Green Bay Road Drive	32	30	5	5	368	368
Ninth Street Drive	1	1	0	7	15	15

1. Includes employee traffic, service and maintenance traffic, and citizen (local) waste drop-off traffic.

Besides the increase in traffic due to ambient growth, this study also considered the increase in traffic due to the following developments that were under construction and/or proposed when the traffic counts were conducted.

- The Great Lakes Crossing development that is under construction in the northeast quadrant of the intersection of IL 173 with Green Bay Road. Only the CVS/pharmacy had been completed and open within this development when the March 2008 traffic counts were performed. In addition to the CVS/pharmacy, the development is to contain approximately 120,000 square feet of commercial space and 10,000 square feet of medical office space.

- The Zion Crossing development that is under construction in the southeast quadrant of the intersection of IL 173 with Green Bay Road. This development is to contain approximately 31,000 square feet of commercial space, 7,600 square feet of restaurants, and a gas station/convenience store.

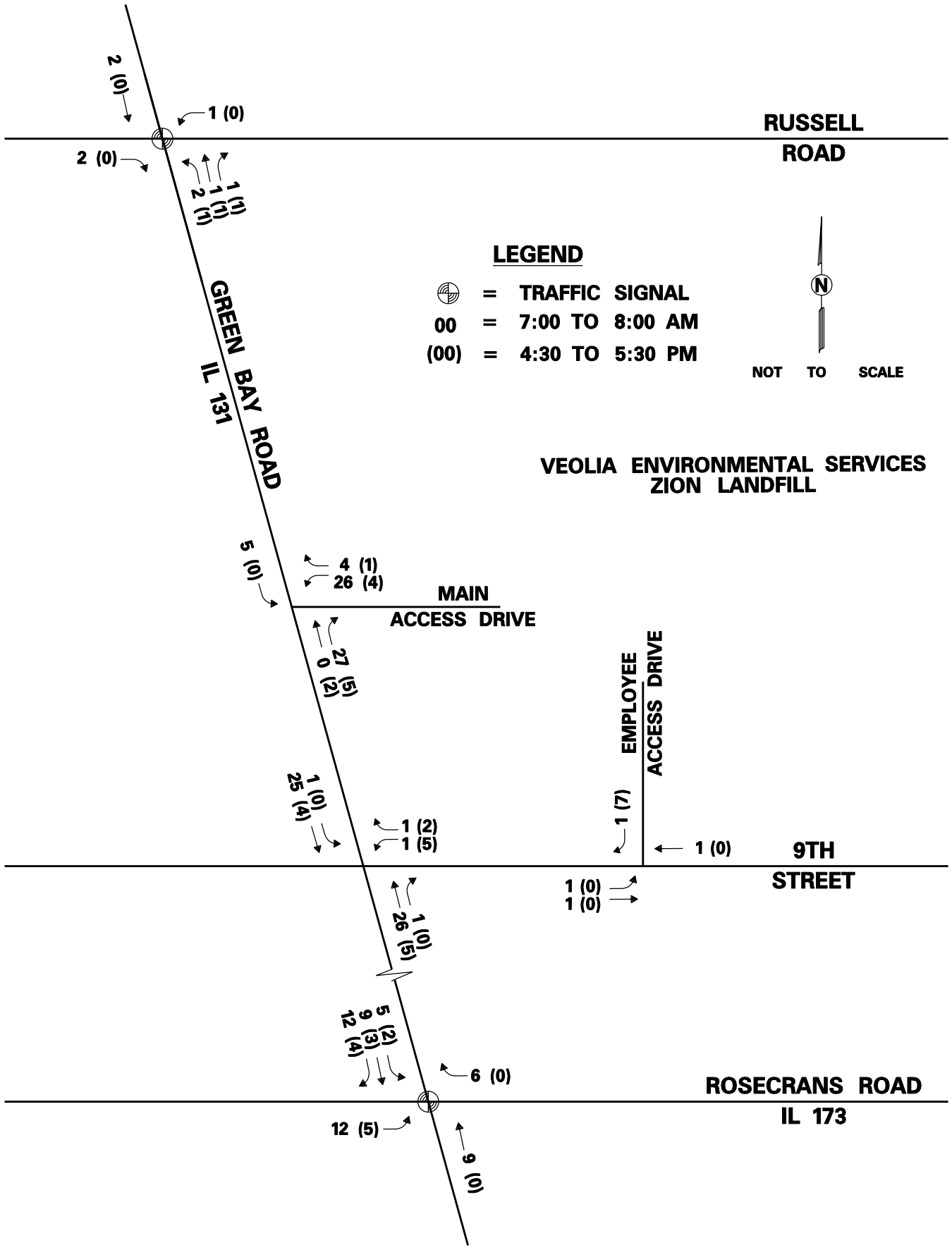
- The Wal-Mart store that is located in the northwest quadrant of the intersection of IL 173 with Kenosha Road. It should be noted that the store was not open when the March 2008 traffic counts were performed.

- A 150,000 square foot industrial/warehouse building to be located in the Trumpet Business Park which is generally located west of Green Bay Road between Russell Road and Ninth Street.

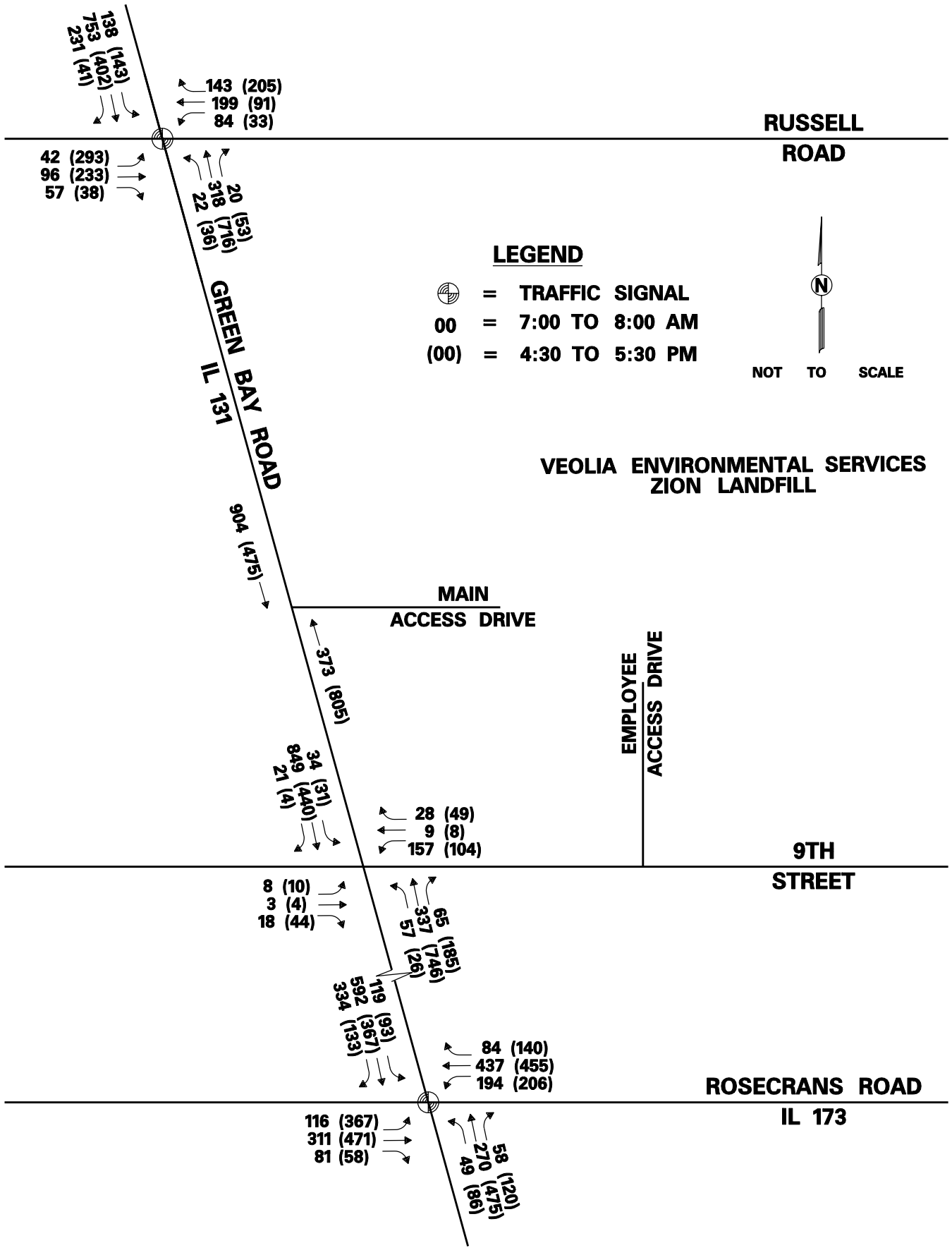
The traffic to be generated by these developments was estimated based on rates published by the (ITE).

Traffic Assignments

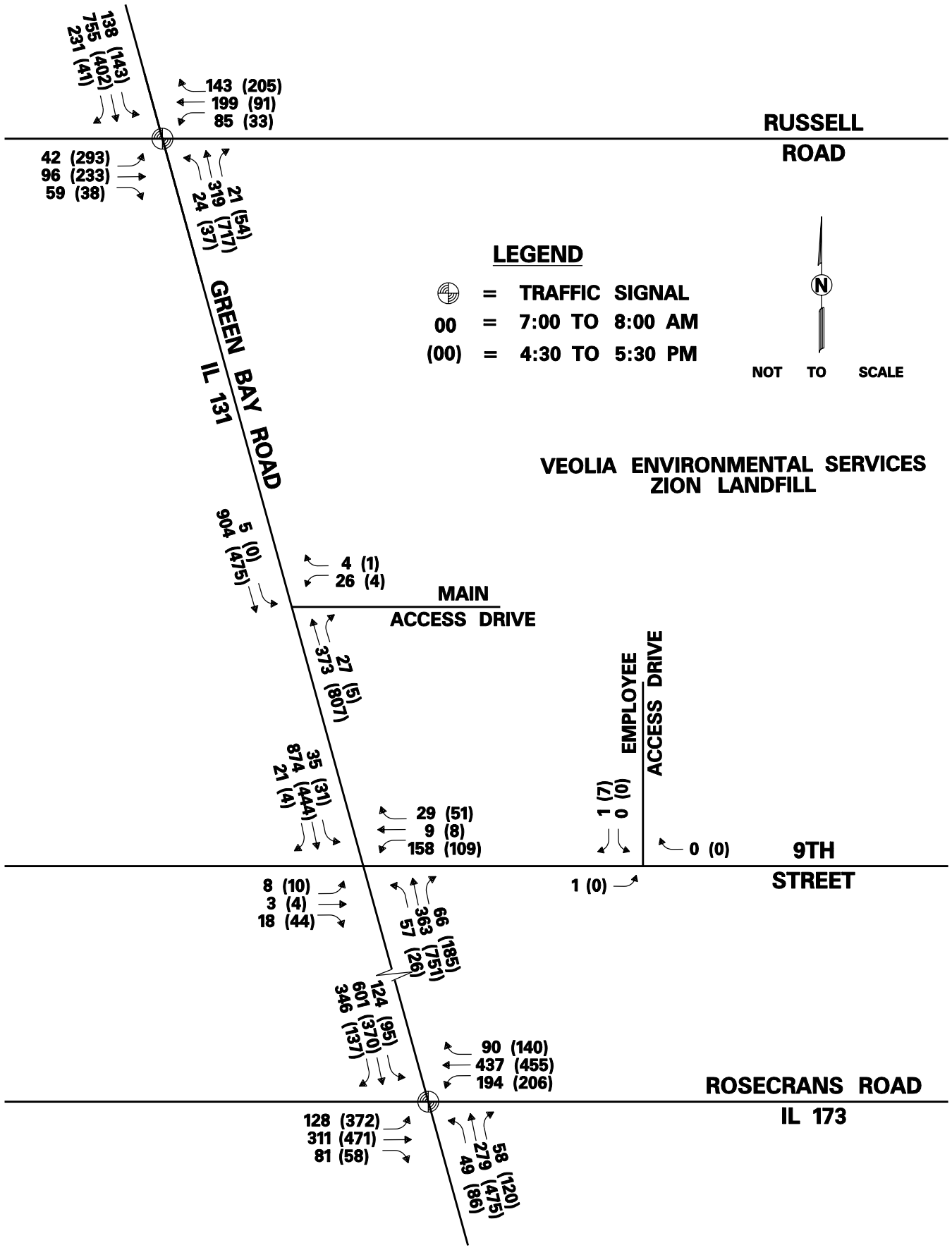
Traffic that will be generated by the proposed Facility and through or non-site traffic volumes were combined and assigned to the major roadways in the area. This provided the basis for capacity analyses and roadway improvement recommendations. The estimated peak hour traffic volumes that will be generated by the proposed Facility accepting 4,300 tons of waste per day were assigned to the various roadways serving the Facility access drives in accordance with the previously described directional distribution. **Figure 4** illustrates the expansion-generated peak hour volumes. **Figure 5** illustrates the year 2012 peak hour volumes without the expansion-generated traffic and **Figure 6** illustrates the year 2012 peak hour volumes with the expansion-generated traffic.



PROJECT:	TITLE:	PROJECT NO: 06–277
VEOLIA ENVIRONMENTAL SERVICES ZION LANDFILL SITE 2 EAST EXPANSION ZION, ILLINOIS	EXPANSION-GENERATED PEAK HOUR VOLUMES (4,300 TONS PER DAY)	KLOA FIGURE NO: 4



PROJECT: VEOLIA ENVIRONMENTAL SERVICES ZION LANDFILL SITE 2 EAST EXPANSION ZION, ILLINOIS	TITLE: YEAR 2012 PEAK HOUR VOLUMES WITHOUT EXPANSION-GENERATED TRAFFIC	PROJECT NO: 06–277 KLOA FIGURE NO: 5



PROJECT:	TITLE:	PROJECT NO: 06–277
VEOLIA ENVIRONMENTAL SERVICES ZION LANDFILL SITE 2 EAST EXPANSION ZION, ILLINOIS	YEAR 2012 PEAK HOUR VOLUMES WITH EXPANSION-GENERATED TRAFFIC (4,300 TONS PER DAY)	KLOA FIGURE NO: 6

In order to provide a worst case analysis, the traffic generated by the existing Facility, which was included in the existing traffic counts, was only removed (subtracted) from the Facility's existing access drives (Figures 5). The year 2012 total peak hour volumes at the other study intersections as shown in Figure 6 include both the current traffic generated by the Facility and the traffic to be generated by the proposed Facility. Therefore, the year 2012 total peak hour volumes (Figure 6) are conservatively high as they are based on the proposed Facility accepting approximately two times the projected average daily waste.

5.
Traffic Impact Analysis

The traffic impacts that will result from a proposed development are typically assessed in terms of the ability of the area roadway system to accommodate site-generated traffic, particularly at the site access drives and adjacent critical intersections. The ability of the intersections to accommodate the new traffic is expressed in terms of Level of Service (LOS).

There are six levels of service, ranging from A through F, which relate to driving conditions from best to worst, respectively. Levels of service for unsignalized intersections are defined in terms of delay, which is a measure of driver discomfort and lost travel time. For design purposes, an intersection with a Level of Service D or better is generally considered acceptable within the industry. **Tables 6** and **7** indicate the levels of service and the corresponding vehicular delay range for each level of service for both unsignalized (stop sign control) and signalized intersections.

Intersection Capacity Analyses

Capacity analyses were conducted at critical intersections in the vicinity of the site. Based on the traffic assignment data cited previously, the following traffic assignments were tested.

- Existing March 2008 Traffic Volumes
- Year 2012 Projected Traffic Volumes without the Expansion-Generated Traffic
- Year 2012 Projected Traffic Volumes with the Expansion-Generated Traffic

Table 8 summarizes the levels of service and the delays for the critical intersections analyzed under the above-mentioned scenarios. Copies of the capacity analyses are enclosed in Appendix U. The following summarizes how each of the intersections are projected to operate.

Table 6
LEVEL OF SERVICE CRITERIA: UNSIGNALIZED INTERSECTIONS

Level of Service	Average Total Delay (SEC/VEH)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Source: *Highway Capacity Manual*, 2000.

Table 7
LEVEL OF SERVICE CRITERIA: SIGNALIZED INTERSECTIONS

Level of Service	Interpretation	Delay per Vehicle (seconds)
A	Very short delay, with extremely favorable progression. Most vehicles arrive during the green phase and do not stop at all.	≤10.0
B	Good progression, with more vehicles stopping than for Level of Service A, causing higher levels of average delay.	>10 and ≤20.0
C	Light congestion, with individual cycle failures beginning to appear. Number of vehicles stopping is significant at this level though many still pass through the intersection without stopping.	>20 and ≤35
D	Congestion is more noticeable, with longer delays resulting from combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and the proportion of vehicles not stopping declines.	>35 and ≤55
E	High delays result from poor progression, high cycle lengths and high V/C ratios.	>55 and ≤80
F	Unacceptable delay occurring, with oversaturation.	>80.0

Source: *Highway Capacity Manual*, 2000.

Table 8
INTERSECTION LEVEL OF SERVICE AND VEHICULAR DELAY

Intersection	Morning Peak Hour (7:00 to 8:00 A.M.) Level of Service	Morning Peak Hour (7:00 to 8:00 A.M.) Delay (seconds)	Evening Peak Hour (4:30 to 5:30 P.M.) Level of Service	Evening Peak Hour (4:30 to 5:30 P.M.) Delay (seconds)
Year 2008 Existing Volumes				
Green Bay Road with IL 173[1]	C	28.6	C	30.3
Green Bay Road with Ninth Street[2]	F	80.4	E	38.4
Green Bay Road with Facility Drive[2]	D	29.1	C	24.9
Green Bay Road with Russell Road[1]	C	22.3	C	22.9
Ninth Street with Facility Drive[2]	A	9.0	A	8.8
Year 2012 Projected Volumes without the Expansion-Generated Traffic				
Green Bay Road with IL 173[1]	C	32.2	D	53.6
Green Bay Road with Ninth Street[2, 3]	F	99.0+	F	99.0+
Green Bay Road with Russell Road[1]	C	23.7	C	24.0
Year 2012 Projected Volumes with the Expansion-Generated Traffic				
Green Bay Road with IL 173[1]	C	32.6	D	54.3
Green Bay Road with Ninth Street[2]	F	99.0+	F	99.0+
Green Bay Road with Facility Drive[2]	E	47.5	D	29.9
Green Bay Road with Russell Road[1]	C	23.8	C	24.1
Ninth Street with Facility Drive[2]	A	9.3	A	9.1

1. Signalized Intersection. The level of service and average delay represents the operation of the overall intersection.
2. Unsignalized Intersection. The level of service and average delay represents the operation of the worst movement or approach at the intersection.
3. Even without the traffic generated by the Facility, this intersection is projected to operate at a Level of Service F assuming the year 2012 projected traffic volumes.

Green Bay Road with IL 173

Under existing traffic conditions, this signalized intersection is operating at a good level of service. This intersection is projected to continue to operate at a good level of service assuming the year 2012 projected traffic volumes with and without the expansion-generated traffic. As such, this intersection has sufficient reserve capacity to accommodate both the expansion-generated traffic and the future growth assumed in the area. Consequently, no improvements are required at this intersection. It should be noted that the impact of the Facility on this intersection is limited as the expansion-generated traffic represents less than two percent of the year 2012 projected morning peak hour volumes and less than one percent of the year 2012 projected evening peak hour volumes.

Green Bay Road with Russell Road

Under existing traffic conditions, this signalized intersection is operating at a good level of service. This intersection is projected to continue to operate at a good level of service assuming the year 2012 projected traffic volumes with and without the expansion-generated traffic. As such, this intersection has sufficient reserve capacity to accommodate both the expansion-generated traffic and the future growth assumed in the area. Consequently, no improvements are required at this intersection. It should be noted that the impact of the Facility on this intersection is limited as the expansion-generated traffic represents less than one percent of the year 2012 projected morning and evening peak hour volumes.

Green Bay Road with Ninth Street

The Ninth Street approaches of this intersection are currently and projected to continue to operate at a poor level of service during the peak hours. The poor level of service along the Ninth Street approaches is due to the existing volume of traffic on Ninth Street and the through traffic on Green Bay Road. The Ninth Street traffic will be able to exit onto Green Bay Road. However, during the peak hours, this traffic may experience delays longer than what is considered acceptable. It should be noted that the traffic generated by the proposed Facility will have a limited impact on the operation of this intersection due to the following.

- No waste truck traffic will enter or exit the Facility from Ninth Street.
- Only a limited volume of expansion-generated traffic is projected to traverse Ninth Street and will consist of employee traffic and/or single unit trucks.
- The expansion-generated traffic represents approximately three percent of the year 2012 projected morning peak hour volumes and approximately one percent of the year 2012 projected evening peak hour volumes.

As such, the poor level of service along the Ninth Street approaches are a result of the existing traffic levels and the projected growth in the area, not the Facility-generated traffic. This is evident in the fact that the Ninth Street approaches are currently operating at a poor level of service and are projected to continue to operate at a poor level of service without the Facility. Even without the traffic generated by the existing Facility, this intersection is projected to operate at a Level of Service F assuming the year 2012 projected traffic volumes.

Green Bay Road with Facility Access Drive

Under existing traffic conditions, this unsignalized intersection is operating at a good level of service. The outbound movements from this access drive are projected to operate at a Level of Service E during the morning peak hour assuming the year 2012 projected traffic volumes and the expansion-generated traffic volumes. The expansion-generated traffic will be able to exit onto Green Bay Road. However, during the morning peak hour, this traffic may experience some limited additional delay. As the gap study shows, which is presented in the next section, sufficient gaps are available in the Green Bay Road traffic stream to accommodate the expansion-generated traffic. Furthermore, only the Facility traffic will experience any delay at this intersection and more than sufficient internal stacking has been provided along the access drive to accommodate the traffic exiting the access drive. The through traffic on Green Bay Road has the right-of-way and, as such, will not experience any delay at this intersection. Lastly, the peak outbound movement from the Facility occurs outside of the morning and evening peak hours on the existing roadway system when more gaps are available in the Green Bay Road traffic stream.

Ninth Street with Facility Access Drive

Under existing traffic conditions, this unsignalized intersection is operating at a good level of service. This intersection is projected to continue to operate at a good level of service assuming the year 2012 projected traffic volumes. As such, this intersection has sufficient reserve capacity to accommodate both the expansion-generated traffic and the future growth assumed in the area. Consequently, no improvements are required at this intersection.

Accident Data

KLOA, Inc. obtained accident data from both IDOT and LCDOT for the following roadway sections for the period from January 2002 through October 2008.

- Green Bay Road from Russell Road to Kenosha Road
- IL 173 from Hunt Club Road to Lewis Avenue
- Russell Road from Old U.S. Route 41 to Kenosha Road
- Ninth Street from Green Bay Road to Kenosha Road

Based on the review of this data, the traffic characteristics of the Facility, and the existing design of the access drive, we have concluded that the additional traffic generated by the expanded Facility will ***not*** measurably contribute to conditions resulting in accidents on any of the area roadways. The IDOT and LCDOT accident data is enclosed in Appendix U.

Site Access

Access to the Facility will be provided via the existing main access drive located on Green Bay Road and the employee only access drive located on Ninth Street. The following describes the design and location of the two existing access drives.

The *Green Bay Road access drive* is located on the east side of the road approximately 1,660 feet north of Ninth Street and is the primary access drive to the Facility. All truck traffic is required to enter and exit the Facility from this access drive. This drive is currently designed with a 36-foot cross section, with one inbound lane and one outbound lane. To facilitate the access of truck traffic, the access drive has been designed with larger radiuses along both the north side and south side of the access drive. The outbound lane at the access drive is under stop sign control. In addition, the following external roadway improvements are provided on Green Bay Road serving this access drive.

- A southbound-to-eastbound separate left-turn lane is provided on Green Bay Road serving the access drive.

- A second northbound through lane is provided on Green Bay Road for several hundred feet south and north of the Facility access drive. This second lane serves as (1) a deceleration lane for the traffic traveling to the Facility from the south on Green Bay Road and (2) an acceleration lane for the traffic exiting the Facility to the north on Green Bay Road.

The existing access drive has been designed to provide approximately 1,000 lineal feet of paved storage for trucks waiting to access the inbound scale. Based on the operation of the existing Facility, it is our opinion that the stacking is sufficient to accommodate the projected peak demand of inbound collection trucks for the expanded Facility. In addition, the 1,000 lineal feet of paved surface together with the sweeper the existing Facility currently uses, will ensure that dirt, mud, dust, and debris from the site will be kept clear of Green Bay Road and the other roadways in the area.

The *Ninth Street access drive* is located on the north side of the road approximately 3,200 feet east of Green Bay Road and is a secondary access drive serving only employees. This drive is currently designed with one inbound lane and one outbound lane. The outbound lane is under stop sign control.

Gap Study

Gap studies are conducted to determine whether a roadway traffic stream has sufficient available gaps to accommodate traffic entering or exiting a particular side street or access drive. This is accomplished by surveying the number and lengths of available gaps in the traffic stream of a particular roadway. Gaps are defined as the headways (spacing) of the traffic flow (vehicles) on the roadway with the right-of-way at unsignalized intersections. The distribution of available gaps in a traffic stream is dependent on the total traffic volume, the directional distribution of the traffic, the number of lanes on the roadway, and the degree and type of platooning in the traffic flow. (It should be noted that vehicles typically do not travel at constant (equal) headways. Vehicles tend to travel in platoons, with varying headways (gaps) between successive vehicles). The demand for gaps in the traffic flow is a function of the number of vehicles entering and exiting a side street or access drive and the directional distribution of those vehicles.

A gap study was conducted along Green Bay Road approximately halfway between the main access drive and Ninth Street in May 2008. Counts of available gaps were conducted during the morning and evening peak hours. The following types of gaps were measured.

1. The *Green Bay Road northbound gap* which represents a break in the northbound traffic stream. This gap is required to make (1) a right turn from a side street/access drive on the east side of Green Bay Road to northbound Green Bay Road and (2) a left turn from southbound Green Bay Road to a side street/access drive on the east side of the road.

2. The *Green Bay Road southbound gap* which represents a break in the southbound traffic stream. This gap is required to make (1) a right turn from a side street/access drive on the west side of Green Bay Road to southbound Green Bay Road and (2) a left turn from northbound Green Bay Road to a side street/access drive on the west side of the road.

3. The *Green Bay Road combined gap* which represents a simultaneous break in both the northbound and southbound traffic stream. This gap is required to make (1) a left turn from the side street/access drive to Green Bay Road or (2) to cross Green Bay Road.

The right-turn movement from the major roadway (Green Bay Road) to the minor road does not require a gap as it is not crossing or entering a traffic stream along the major road. As such, the right-turn movement from the major road to the minor road is not considered in a gap study.

The number of gaps, their duration, and their type are summarized in **Tables 9** and **10** and are based on the following.

- The gap sizes used for the Green Bay Road/Ninth Street intersection (Table 9) were determined based on the recommended gap sizes and factors as outlined in the ITE *Traffic Engineering Handbook* , 4th Edition. ITE indicates that "typically, gaps of six to nine seconds are needed to allow the critical entry into the traffic stream of a major street." These gaps sizes are consistent with those outlined in the Transportation Research Board (TRB) *Highway Capacity Manual*, Special Report 209.

- The gap sizes used for the Green Bay Road/Facility access drive intersection (Table 10) were determined based on the time it takes transfer trailers, not automobile traffic, to complete the turning movements. These gap periods were based on the gap acceptance times provided in the IDOT *Bureau of Design and Environmental Manual*. It should be noted that single unit trucks and passenger cars will also be exiting the site which require shorter gaps than transfer trailers. As such, the gap study is very conservative as it assumes gap periods required for only transfer trailers are required for all site traffic.

Table 9
GAP DISTRIBUTION BY SIZE AND TYPE: GREEN BAY ROAD AND NINTH STREET

Gap Period (seconds)	Number of Vehicles Served Per Gap	Northbound Gap	Southbound Gap	Combined Gap
Morning Peak Hour				
6.0 to 9.9	1	53	58	71
10.0 to 13.9	2	25	36	29
14.0 to 16.9	3	20	28	17
17.0 to 19.9	4	9	9	2
20.0 to 22.9	5	12	5	4
23.0+	6	29	11	2
Evening Peak Hour				
6.0 to 9.9	1	36	24	34
10.0 to 13.9	2	27	15	25
14.0 to 16.9	3	15	11	21
17.0 to 19.9	4	13	6	6
20.0 to 22.9	5	8	10	11
23.0+	6	31	37	21

Table 10
GAP DISTRIBUTION BY SIZE AND TYPE:
GREEN BAY ROAD AND THE FACILITY ACCESS DRIVE

Gap Period (seconds)	Number of Vehicles Served Per Gap	Northbound Gap	Combined Gap
Morning Peak Hour			
11.0 to 21.9	1	52	41
22.0+	2	36	4
Evening Peak Hour			
11.0 to 21.9	1	52	50
22.0+	2	33	24

The supply of gaps along Green Bay Road and the vehicular demand of traffic entering and exiting Ninth Street and the expanded Facility access drive are shown in **Tables 11** and **12**. It should be noted that Tables 11 and 12 show the total projected vehicles requiring a gap at both Ninth Street and the Facility access drive. However, the majority of the projected traffic is existing traffic that is already using an available gap within the Green Bay Road traffic stream that were not considered as an available gap in Tables 11 and 12. Therefore, Tables 11 and 12 provide a very conservative (worst case) analyses as they do not take into consideration the gaps used by the existing Ninth Street and the Facility access drive traffic. Even based on the very conservative analyses, adequate gaps occur in the Green Bay Road traffic stream to accommodate the traffic turning to and from Ninth Street and the Facility access drive during both of the peak hours. From the results of the gap study, it has been demonstrated that there are sufficient gaps in the Green Bay Road traffic stream to accommodate the projected traffic volumes using Ninth Street and the Facility access drive.

Table 11
GREEN BAY ROAD AT NINTH STREET: GAP SUPPLY AND DEMAND

Time Period	Northbound Gap	Southbound Gap	Combined Gap
Morning Peak Hour			
Number of Vehicles Requiring Gap	64	75	178
Supply of Gaps Available	433	341	220
Evening Peak Hour			
Number of Vehicles Requiring Gap	82	70	131
Supply of Gaps Available	413	383	352

Table 12
GREEN BAY ROAD AT THE FACILITY ACCESS DRIVE
GAP SUPPLY AND DEMAND

Time Period	Northbound Gap	Combined Gap
Morning Peak Hour		
Number of Vehicles Requiring Gap	9	26
Supply of Gaps Available	124	49
Evening Peak Hour		
Number of Vehicles Requiring Gap	1	4
Supply of Gaps Available	118	98

6.
Conclusion

Veolia proposes to expand the existing landfill vertically and laterally to allow continued operation of the landfill. As proposed, the expanded Facility is expected to continue to accept an average of 3,100 tons of waste per day. As such, the proposed expansion is expected to generate a very limited amount of additional traffic than what is currently generated by the Facility.

As is the case today, the traffic generated by the proposed expansion of the Facility will not have a significant impact on the existing roadway network. The design of the existing Green Bay Road access drive is more than sufficient to serve the proposed Facility and ensure the traffic demands will be accommodated. Therefore, the proposed demands of the expanded Facility can be accommodated efficiently on the existing roadway system.

Based on the findings of the traffic study, it is KLOA, Inc's conclusion that the proposed Facility has been designed to meet the sixth siting criterion provided in Section 39.2 of the Illinois Environmental Protection Act. This is based on the following.

- The proposed traffic routes to/from the Facility are consistent with the current routes and given the operational characteristics and accessibility of the roadway system are the most viable for the Facility.

- The traffic generated by the proposed Facility will have a limited impact on the operation of the roadway system as it will account for less than three percent of the peak hour traffic at any of the intersections within the study area.

- The existing roadway system and Facility access drives are sufficient to accommodate the proposed Facility and, as such, no roadway improvements are required.

- Except for the intersections of Green Bay Road/Ninth Street and Green Bay Road/access drive, the intersections in the study area operate at an acceptable Level of Service assuming the proposed Facility and other area growth. The intersection of Green Bay Road/Ninth Street is currently operating at a poor Level of Service and, as the study has shown, the Facility-generated traffic will have a limited impact on the operation of this intersection. Lastly, only the Facility traffic will experience any delay at the Green Bay Road/access drive intersection and the operation of this intersection will not impact the non-Facility (through) traffic.

- The study has demonstrated that there are sufficient gaps in the Green Bay Road traffic stream to accommodate the projected traffic volumes using Ninth Street and the Facility access drive.

Therefore, it is our professional opinion that the "traffic patterns to and from the facility are so designed as to minimize the impact on the existing traffic flows."

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