

2.0 EXISTING INVENTORY & DATA COLLECTION

In preparation for the customized study and evaluation of proposed Fermi 3 expansion conditions, it is important to establish a clear inventory and understanding of the existing study area conditions. An array of fundamental study area characteristics were inventoried by MSG in addition to significant traffic volume data collection. The following elements presented further in this section:

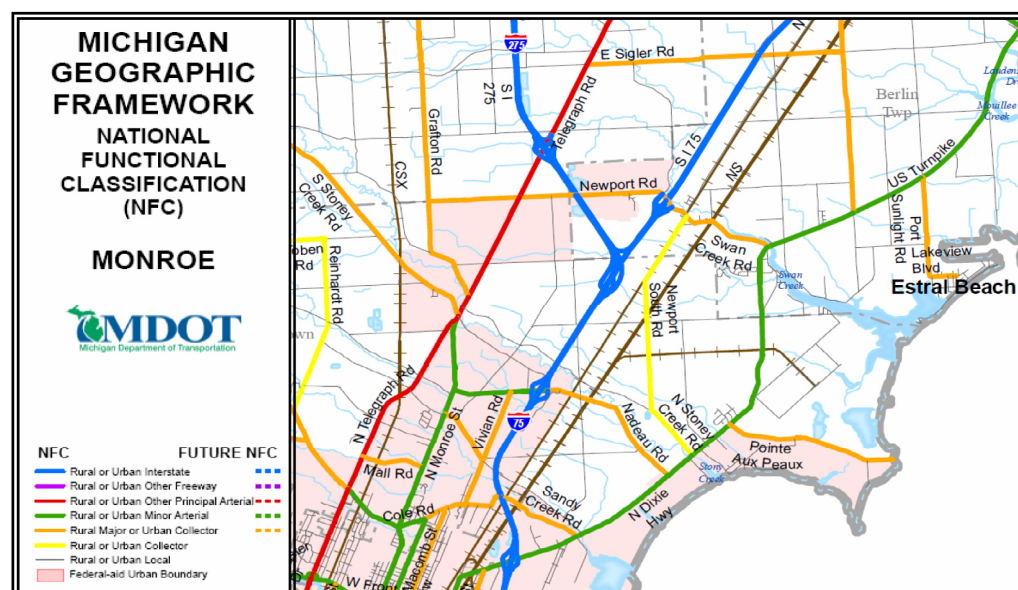
- Roadway Functional Classification
- Posted Speed Limits
- Roadway Characteristics
- Pavement Type and Condition Rating
- Interstate Access/ Interchanges
- Existing Traffic Conditions
- Heavy Vehicles & Load Limits
- Seasonal Traffic Variation
- Peak Hour Factor
- Existing Traffic Volumes, Lane Use and Traffic Control

Roadway features (including lanes, posted speed limits, pavement conditions and intersection traffic control) are provided on **Figure 5 – Existing Roadway Inventory**.

2.1 Roadway Functional Classifications

As roadways are evaluated and any deficiencies or improvement needs are considered, the National Functional Classification (NFC) is an important reference for perspective. This classifies the roadway or intersection facility relative to its intended purpose. In addition, the functional class and the defined federal-aid urban boundary will influence any available funding sources and strategies associated with project improvements. The figure below, as published by MDOT, summarizes the study area functional classes and delineates the federal-aid urban boundary to facilitate these considerations.

FIGURE 4 Roadway Functional Class Map



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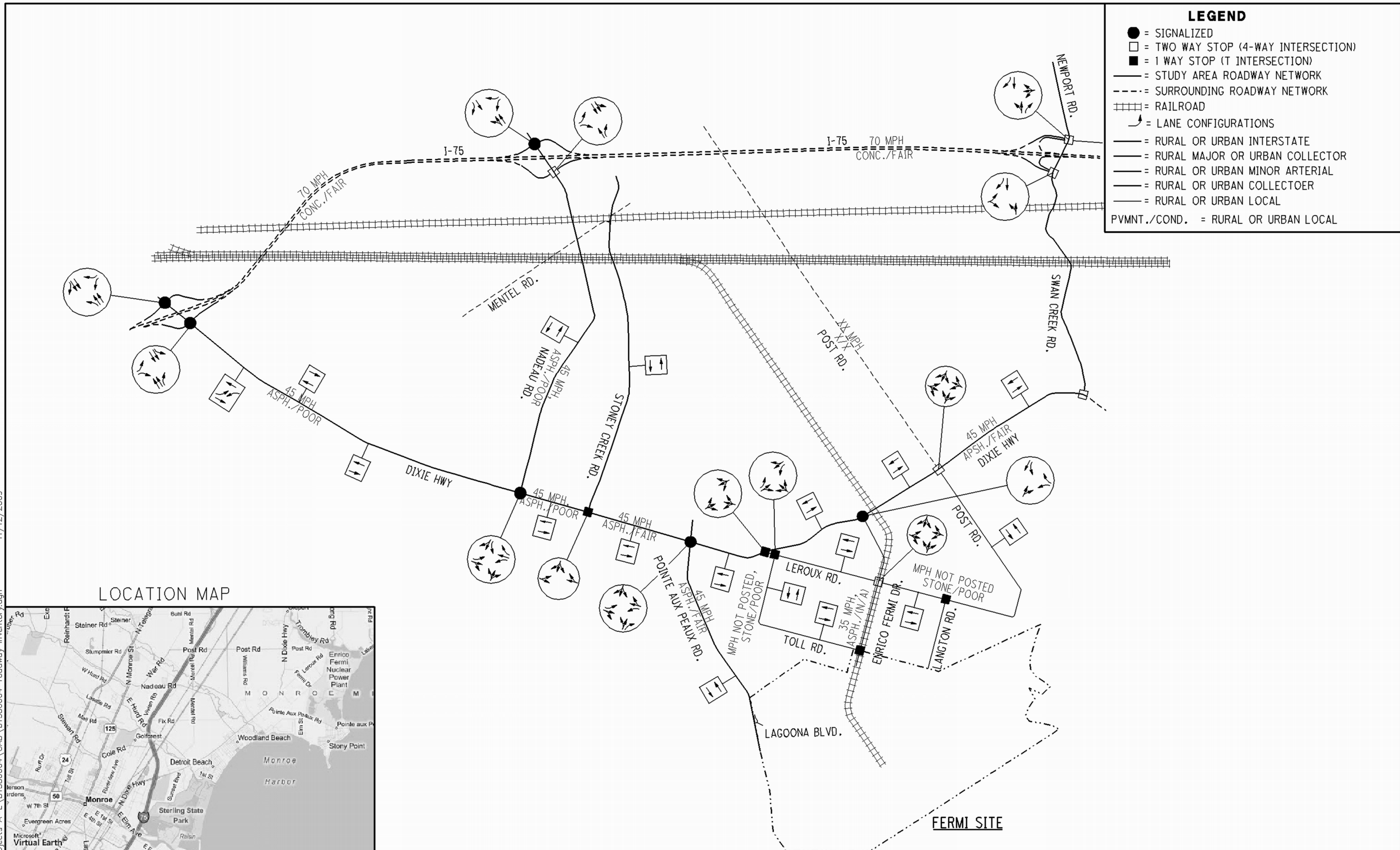


FIGURE 5
EXISTING ROADWAY INVENTORY

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UNIT 3 EXPANSION TRAFFIC STUDY
FRENCH TOWNSHIP,
MONROE COUNTY, MI



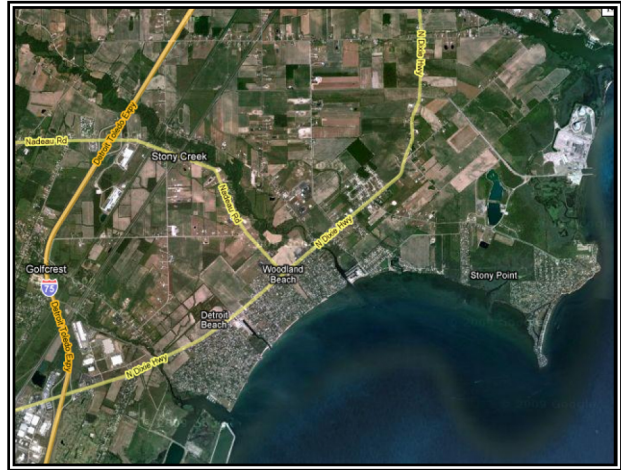
2.2 Posted Speed Limits

Study Area Posted Speed Limits	
Roadway	Posted Speed (mph)
I-75	70
N. Dixie Highway	45
Nadeau Road	45
Stoney Creek Road	45
Pointe Aux Peaux Road	45
Swan Creek Road	Varies 25-45
Enrico Fermi Drive	35
Post Road	Not Posted
Leroux Road	Not Posted
Toll Road	Not Posted
Langton Road	Not Posted

2.3 Roadway Characteristics

2.3.1 N. Dixie Highway

As a minor arterial N. Dixie Highway is a key connecting roadway between the Fermi site and region. It serves as a key north-south roadway link to surrounding communities and intersects many other key local and regional roadways. Through the study area, N. Dixie Hwy, is an asphalt pavement section and varies from 5 and 6 lanes at I-75, to 3 lanes between northeast of I-75 and Stoney Creek Road, to 2 lanes from Stoney Creek Road to Swan Creek Road with periodic turn lanes.



- To the south study limit, it crosses I-75 with a full diamond interchange in Frenchtown Township. Southwest of I-75 beyond the study limits it enters the northeast limits of the City of Monroe where it becomes M-50 through the city and extends westward through the Village of Dundee to intersect US-23 where it extends further west reaching communities such as Britton and Tecumseh.
- To the north study limit, it intersects Swan Creek Road (un-signalized T-intersection) which extends northwestward into Newport and connects with I-75 via a partial cloverleaf interchange.
- In the south central portion of the study area, it intersects Nadeau Road (signalized T-intersection) which extends northwestward to a full diamond interchange with I-75.

2.3.2 Nadeau Road

Nadeau Road is a rural major collector within the study area. Nadeau Road serves as a project connection with I-75 and the northern limits of the City of Monroe. From N. Dixie Highway to I-75 Nadeau Road exists as a primarily 2-lane asphalt pavement section, except for lane widening at I-75 and N. Dixie Highway. Nadeau Road services mostly residential and some minor commercial access points. Three (3) railroad crossings on Nadeau Road exist east of I-75 near Mentel Road.

Just west of I-75, Nadeau Road enters the City of Monroe and changes classification to a minor arterial. Nadeau Road extends westward to terminate into a signalized T-intersection with N. Monroe St. (M-125) which is a north/south minor arterial through central Monroe.



2.3.3 Swan Creek Road

Swan Creek Road is a rural major collector. As was noted, it is a key link between N. Dixie Highway, the Fermi site, and I-75. The corridor is a 2-lane asphalt pavement section with varying speed zones in Oldport (near the Swan Creek Road & N. Dixie Highway intersection) and Newport just east of I-75. Mostly residential with some minor commercial access points. There is a major industrial warehouse access point immediately east of I-75 on Swan Creek Road.



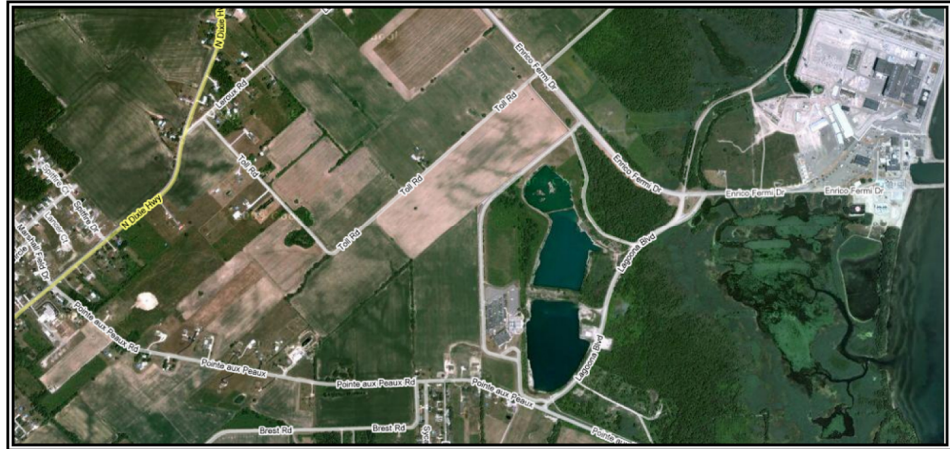
2.3.4 Stoney Creek Road

Stoney Creek Road is a rural collector. Stoney Creek Road has mostly localized roadway connections. Stoney Creek Road is a 2-lane asphalt pavement section that parallels Nadeau Road and extends westward to dead-end east of I-75 (no overpass). Traffic served by Stoney Creek Road is mostly residential with some minor commercial. Additionally, the Jefferson Middle and High School Complex located between paralleled Stoney Creek Road and Williams Road.



2.3.5 Pointe Aux Peaux Road

Pointe Aux Peaux Road is a rural major collector extending from N. Dixie Highway to Stony Point Road at the Lake Erie coastline. It is 2-lane asphalt pavement section services primarily residential traffic to Stony Point Road and other direct access residences along the corridor. Additionally, Pointe Aux Peaux Road borders the south side of the Fermi site. There is an unused and gated Fermi access known as Lagoon Boulevard off of Pointe Aux Peaux Road.



2.3.6 Enrico Fermi Drive

Enrico Fermi Drive is a mostly private drive for exclusive service into the Fermi plant. A portion of the intersecting access at N. Dixie Highway is dedicated public road according to the Monroe County Road Commission (MCRC). The intersection is signalized under jurisdiction of the MCRC. Enrico Fermi Drive operates with a 2-lane approach to N. Dixie Hwy., but otherwise functions as an un-curbed 2-lane asphalt pavement section all the way into the plant gate. It directly parallels a railroad spur serving the plant and a line of major high voltage electrical transmission lines.


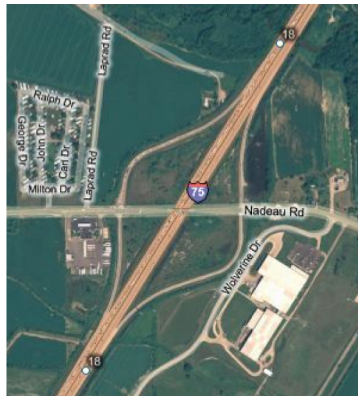

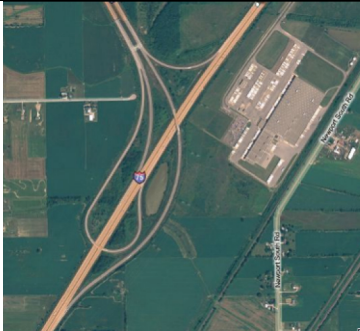


2.3.7 Post, Leroux, Toll, and Langton Roads

Post, Leroux, Toll, and Langton are each rural locals serving almost exclusively local residential traffic only. Each connect to N. Dixie Hwy. Pointe Aux Peaux Road and Enrico Fermi Drive, but traffic counts indicate minimal Fermi traffic utilizes these roads. The roads vary in character slightly from posted speeds and paved surfaces to un-posted speeds and un-paved surfaces.

Roadway Character Summary				
Roadway Segment	Pavement Type	Condition	Load Limit	Pavement Section
I-75 from N. Dixie Highway to Swan Creek/ Newport Road	Concrete	Fair	All-Season	3-lanes NB & SB I-75
N. Dixie Highway @ I-75 Interchange	Asphalt	Good	Special	5-Lanes w/ center left-turn lanes
N. Dixie Highway from east of I-75 to east of Grand Blvd.			15 Ton	3-Lanes w/ center left-turn lanes
N. Dixie Highway from east of Grand Blvd. to west of Nadeau Road				2-lanes
N. Dixie Highway @ Nadeau Road				3-Lanes w/ center left-turn lane
N. Dixie Highway from east of Nadeau Road to Stoney Creek Road				Varies 3-Lanes w/ center left-turn lane and 2-lane
N. Dixie Highway from Stoney Creek Road to west of Pointe Aux Peaux Road		2-lanes		
N. Dixie Highway @ Pointe Aux Peaux Road		Fair		3-lanes w/ center left-turn lanes
N. Dixie Highway from east of Pointe Aux Peaux Road to Swan Creek Road				2-lanes
N. Dixie Highway @ Swan Creek Road				3-lanes w/ center left-turn lane
Nadeau Road @ I-75 Interchange				Poor
Nadeau Road from east of I-75 to N. Dixie Highway		2-lanes (3-lane approach to N. Dixie Hwy.)		
Stoney Creek Road		Fair		2-lanes
Pointe Aux Peaux Road		Fair		2-lanes; 3-lanes w/ left-turn lane N. Dixie Hwy. approach
Swan Creek Road/Newport Road @ I-75		Good	Special	Varies: 2-lane overpass bridge
Swan Creek Road from I-75 to N. Dixie Highway		Fair/ Poor		2-lanes; 3-lane N. Dixie Hwy approach
Enrico Fermi Drive		Un-paved (Stone)	N/A	15 Ton
Post Road	Poor		-	2-lane
Toll Road				
Leroux Road				
Langton Road				

2.4 Interstate Access/ Interchanges

INTERSTATE ACCESS & INTERCHANGE SUMMARY			
Location	Interchange/ Type	Considerations	Aerial
I-75 & M-50/ N. Dixie Hwy.	Rural Diamond	<ul style="list-style-type: none"> • Signalized ramp intersections • Approximately 6.2 miles (11 minutes) SE of Fermi 2 Site • Connects M-50 SW into the City of Monroe • Commercialized interchange with multiple hotel restaurant, and other land uses. • Services commercial travel center for trucks (NW quadrant) 	
I-75 & Nadeau Road	Rural Diamond	<ul style="list-style-type: none"> • Un-signalized NB ramp intersections • Signalized SB ramp intersections • Approximately 6 miles (10 minutes) E of Fermi 2 Site • Provides key Nadeau Road east/west connection to M-125 and N. Dixie Hwy. • Serves large industrial manufacturing facility (SE quadrant) • Serves commercial truck travel center (SW quadrant) 	
I-75 & Newport Road/ Swan Creek Road	Partial Cloverleaf	<ul style="list-style-type: none"> • Un-signalized ramp intersections • Approximately 6 miles (15 minutes) NW of Fermi • Newport, MI access • Serves large distribution/ warehouse center (SE quadrant) • Serves gas station and convenience mart (SW quadrant) 	
I-75 & I-275	Directional-T	<ul style="list-style-type: none"> • Interchange offers connection to Detroit Metro Airport approximately 26 miles (30 minutes) NW of Fermi • I-275 provides key connection to I-94 and I-96 as the primary Michigan east/ west interstate corridors. 	

2.5 Existing Traffic Conditions

MSG conducted an extensive traffic volume data inventory to facilitate this study. The inventory included both a review of any readily available record traffic volume data (i.e. records maintained by public agencies) and a traffic count collection program throughout the study area. Elements of the inventoried traffic data include:

- 24-Hour Bi-directional Pneumatic Hose Machine Counts
- Manual Peak Hour Intersection Turning Movement Counts
- Annual/ Seasonal Fermi Traffic Fluctuation
- Heavy Vehicle Classifications
- Peak Hour Factors

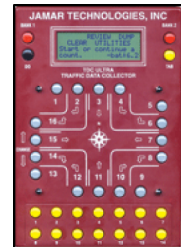
24-Hour Bi-directional Machine Counts

Automated pneumatic hose traffic data recorders were deployed at locations throughout the study area to collect continuous **count, speed, and vehicle classification data**. The continuous collection of this data and processing tools allow detailed reporting for the variation of traffic volume over the day and week, distribution of vehicle speeds, and the proportion of truck traffic using the roadway. The count locations included in this study involve eleven (11) locations in the study area as delineated on **Figure 6 - Traffic Data Collection Program**.



Manual Peak Hour Intersection Turning Movement Counts

MSG performed a manual collection of intersection turning movements during the identified AM and PM peak hours associated with plant traffic activity. This provides the data necessary to fully evaluate intersection safety and operational efficiency conditions and develop traffic analysis models for operational analyses. Intersections in which MSG collected manual turn counts are summarized on **Figure 6 - Traffic Data Collection Program**.



Additionally, MSG's traffic count program included two phases to account for annual traffic fluctuations associated with normal and outage operations at Fermi. The operations of the plant include an outage period when scheduled operational maintenance, repairs, and upgrades occur. As a result, outage operations add considerable contractor population and increased operational staff to Fermi, and a spike in traffic conditions is known to occur on the surrounding roadway network.

Normal & Outage Plant Operation Traffic Data Collection	
Plant Operational Phase	MSG 24-Hr Automated Data Collection
Fermi Plant Outage Operations	April 2009
Normal Fermi Plant Operations	May 2009

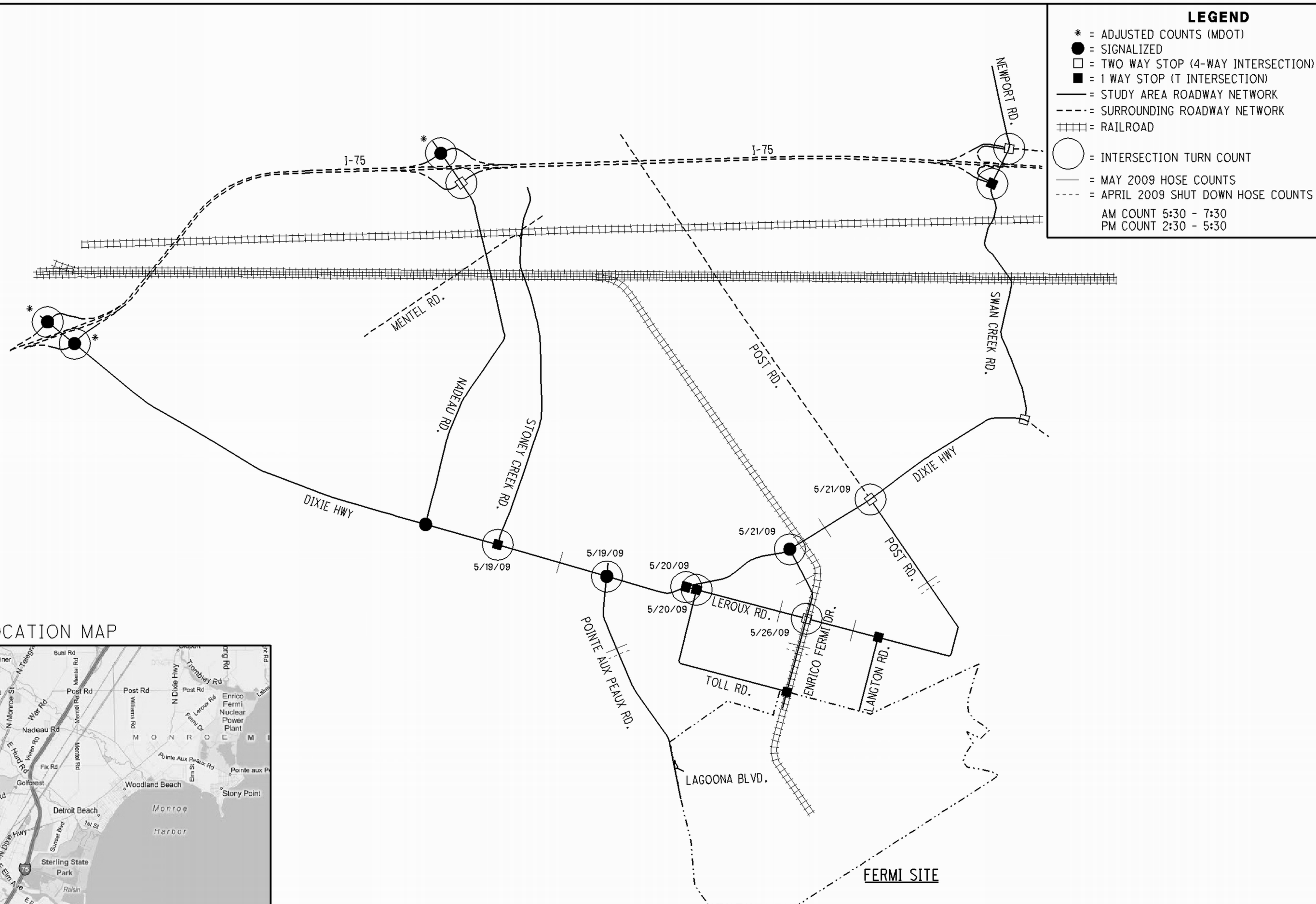


FIGURE 6
TRAFFIC DATA COLLECTION PROGRAM

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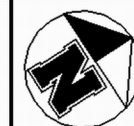


Figure 7- Existing Traffic Volumes (2009 Normal Operations), provides an overall summary of AM and PM Peak intersection turning movement volumes and average daily traffic throughout the study area. The following data represents conditions during normal Fermi plant operations as collected by MSG or supplemented by readily available public records. A full presentation of traffic data collected for this study, including both normal and outage conditions at Fermi, is provided in the appendix as follows:

- **Appendix A – Fermi Nuclear Power Plant – Outage and Regular Traffic Profiles**
- **Appendix B – Outage Traffic Data Summary Report**
- **Appendix C – 24-Hour Automated Traffic Recorder Reports**
- **Appendix D – Peak Hour Intersection Turning Movement Counts**

2.5.1 Average Daily Traffic

The average Daily Traffic (ADT) typically represents the traffic that would be expected to be traveling a roadway on any average weekday. Seasonal and daily variations would be averaged into the ADT. The table below provides the ADT for roadway segments in the study area. Weekend average traffic is also provided for locations where Saturday and Sunday traffic counts were conducted by MSG.

A graphical presentation of the ADT in **Figure 8 – Existing 2009 ADT** by Roadway Segment notes that other than I-75 and N. Dixie Highway, the remaining roads (Nadeau Road, Stoney Creek Road, Pointe Aux Peaux Road, Swan Creek Road, Post Road and Leroux Road) are very low volume roads with an ADT of less than 5,000 vehicles per day. Typically, a two lane rural roadway can accommodate 10,000 to 15,000 vehicles per day.

Existing ADT		
Roadway	Weekday ADT	Weekend
I-75, N. Dixie Hwy. to Nadeau Road	16,800*	*
I-75, I-275 to Newport/ Swan Creek Road	31,200*	*
N. Dixie Hwy., I-75 to Nadeau	12,700*	*
N. Dixie Hwy., Stoney Creek to Pointe Aux Peaux Road	8,494	7,219
N. Dixie Hwy., south of Enrico Fermi Drive	4,307	*
Nadeau Road	5,300*	*
Pointe Aux Peaux Road	4,110	3,766
Swan Creek Road	4,300*	*
Enrico Fermi Drive	2,378	611
Post Road, east of N. Dixie Hwy.	275	260
Leroux Road	124	125

* Weekend Data not available

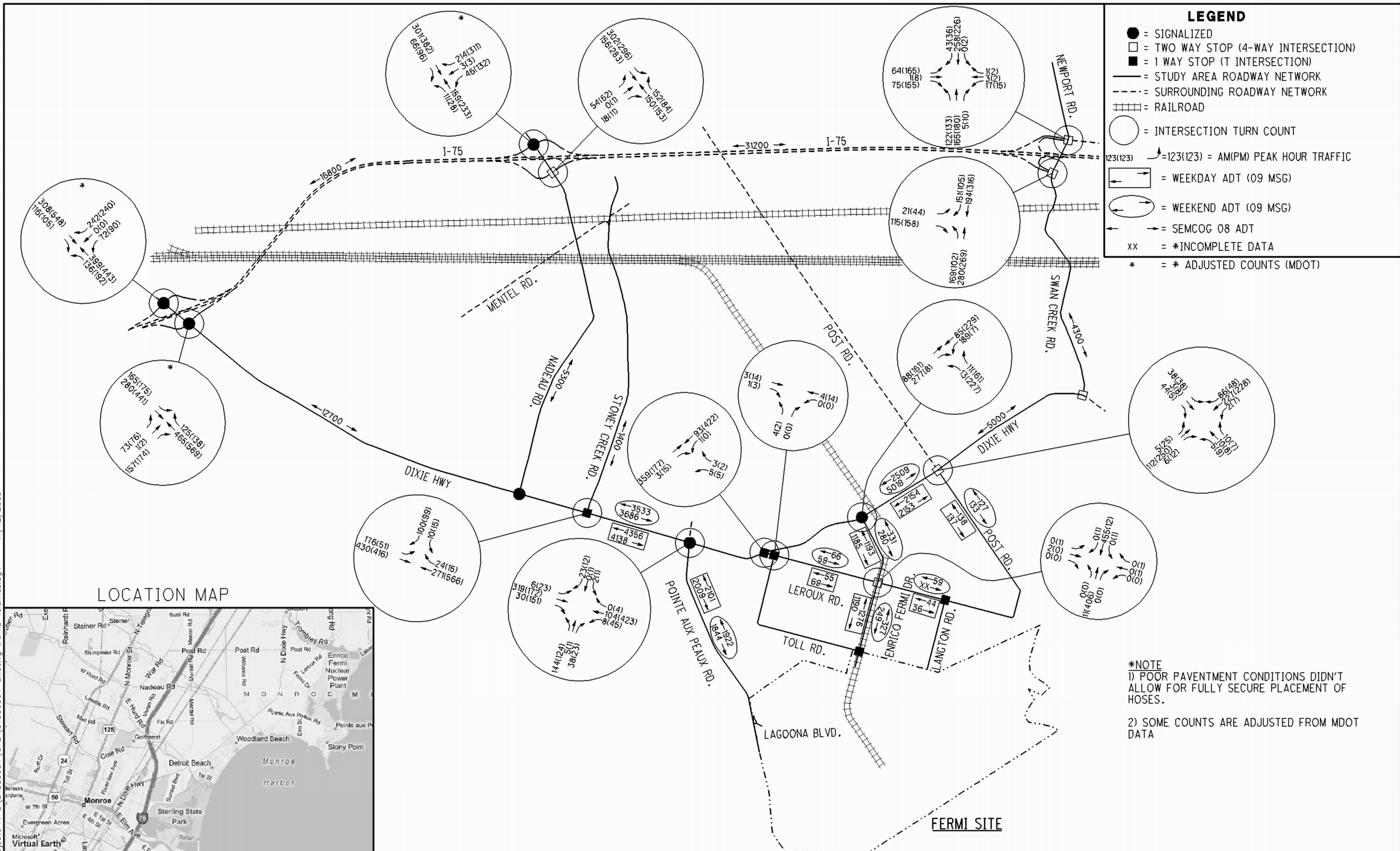
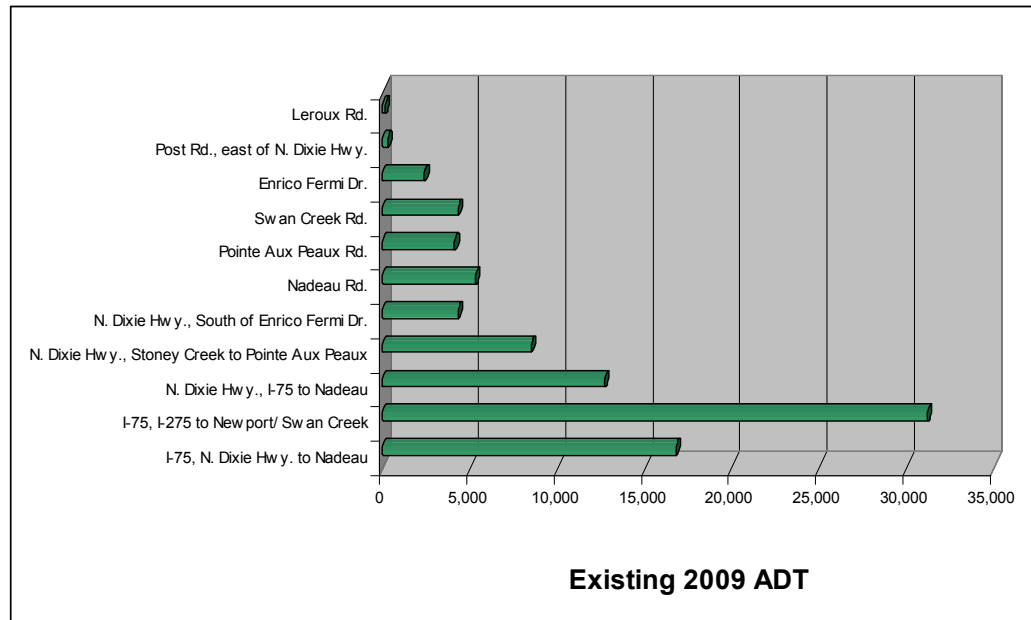


FIGURE 7
EXISTING TRAFFIC VOLUMES
(2009 NORMAL OPERATION)

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MONROE COUNTY, MI



FIGURE 8 Existing ADT by Roadway Segment

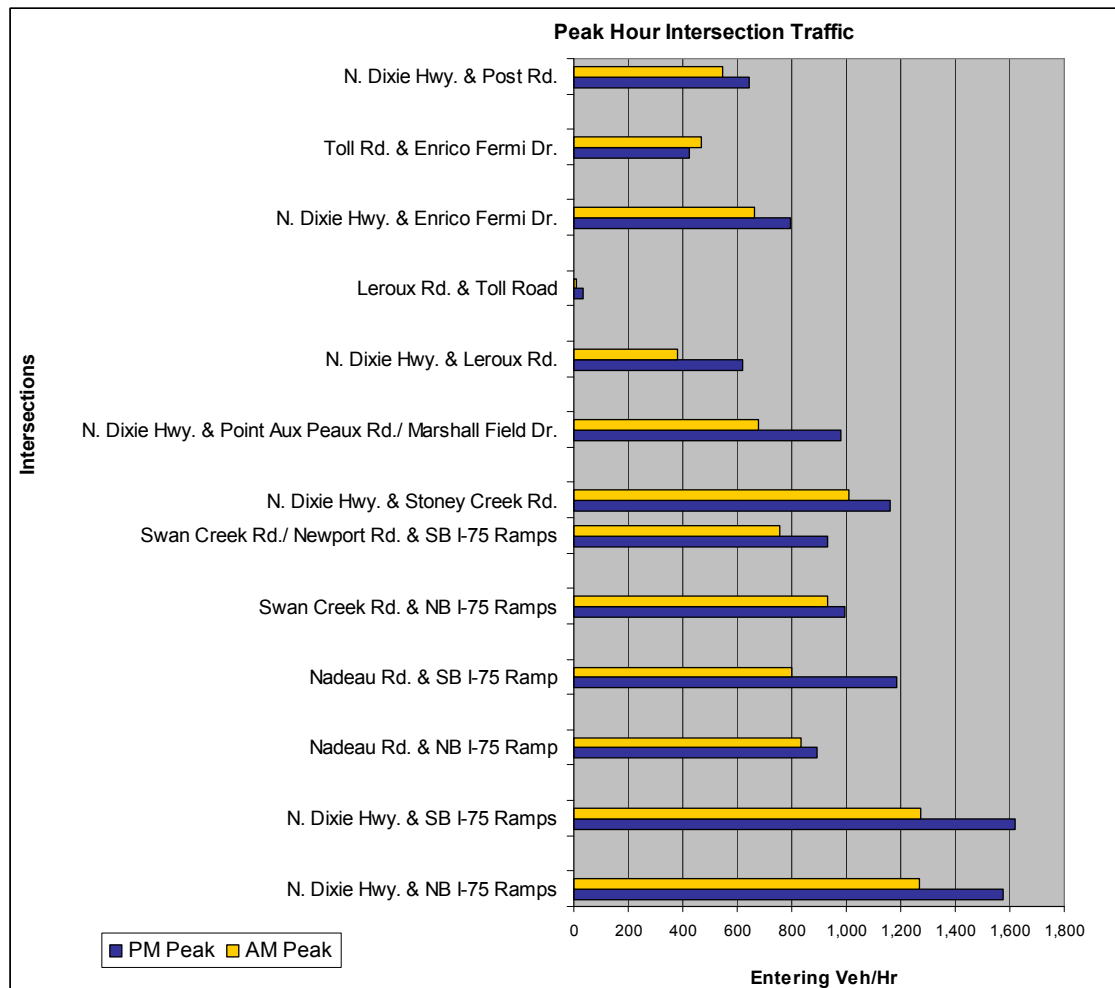


2.5.2 Peak Hour Traffic

The AM and PM peak hour traffic conditions will be the focus of the operational analyses. Peak traffic hours (AM and PM) are typically the times of day that represent the highest probability of congestions due to the highest traffic volumes. The table below presents the AM and PM peak hour traffic volumes for the study area intersections. The PM peak hour's traffic noted higher traffic than the AM with the exception of Toll Road & Enrico Fermi Drive. The highest volume intersections primarily involved the I-75 interchanges. A graphical presentation of intersection AM and PM peak hour traffic is provided on *Figure 9 – Existing 2009 Peak Hour Intersection Traffic*.

Existing 2009 Peak Hour Intersection Traffic Summary			
Intersection		AM Peak	PM Peak
Interchanges	N. Dixie Hwy. & NB I-75 Ramps	1,266	1,575
	N. Dixie Hwy. & SB I-75 Ramps	1,273	1,618
	Nadeau Road & NB I-75 Ramp	832	891
	Nadeau Road & SB I-75 Ramp	800	1,185
	Swan Creek Road & NB I-75 Ramps	930	994
	Swan Creek Road/ Newport Road & SB I-75 Ramps	754	934
Surface Intersections	N. Dixie Hwy. & Pointe Aux Peaux Road/ Marshall	679	980
	N. Dixie Hwy. & Leroux Road	380	621
	Leroux Road & Toll Road	12	33
	N. Dixie Hwy. & Enrico Fermi Drive	663	793
	Toll Road & Enrico Fermi Drive	468	423
	N. Dixie Hwy. & Post Road	548	645

FIGURE 9 Existing 2009 Peak Hour Intersection



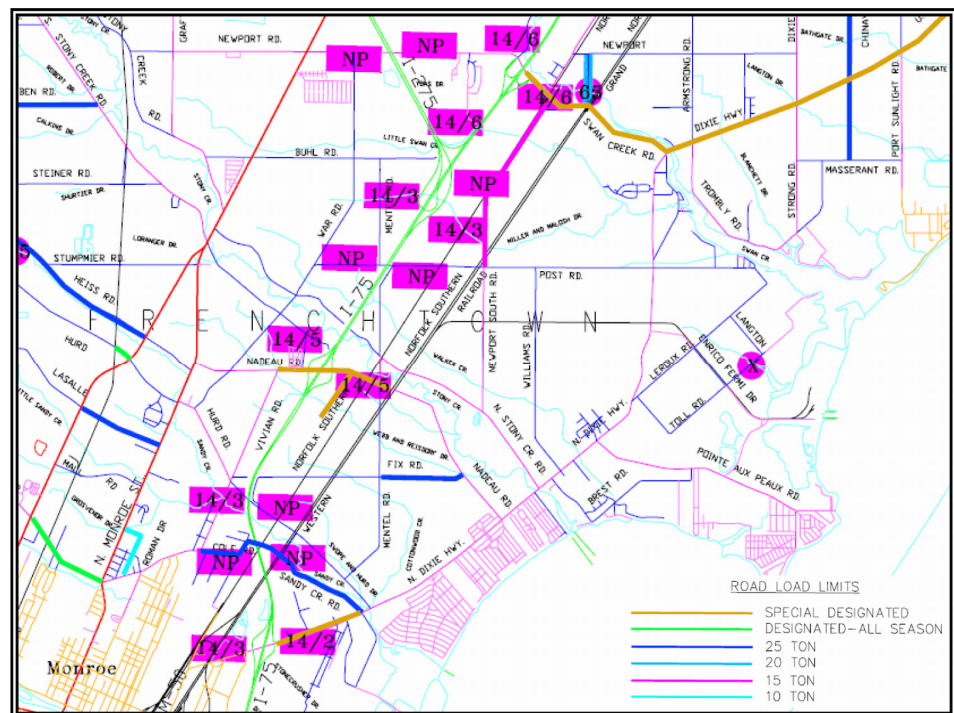
2.5.3 Heavy Vehicles

The proportion of heavy vehicles within any traffic stream or roadway network can play a significant role in the character and operations experienced. Heavy vehicles can impede traffic streams due to their less agile operations or impact the pavement conditions of roadways due to their weight. Typical heavy vehicle percentages can range from 2-20% on most roadways and generally are found to have direct proportionality with the roadway classification and proximity to interstate facilities. Near the interchange locations higher heavy vehicle percentages were identified. Dixie Highway serves as a primary corridor in the study area and was identified with heavy vehicle percentages on the order of 4-6%.

Truck percentages calculated from actual traffic counts will be utilized in the traffic analyses.

Study Area Heavy Vehicle Summary by Intersection		
Intersection	AM Peak	PM Peak
Nadeau Road & NB I-75 Ramp	2-20%	2-15%
Swan Creek Road & NB I-75 Ramps	2-7%	2-7%
Swan Creek Road/ Newport Road & SB I-75 Ramps	2-15%	2-5%
N. Dixie Hwy. & Stoney Creek Road	2-10%	2-6%
N. Dixie Hwy. & Pointe Aux Peaux Road/ Marshall Field	2%	2-4%
N. Dixie Hwy. & Leroux Road	2-3%	2-3%
Leroux Road & Toll Road	2%	2-7%
N. Dixie Hwy. & Enrico Fermi Drive	2-8%	2%
Toll Road & Enrico Fermi Drive	2%	2%
N. Dixie Hwy. & Post Road	2-16%	2-12%

FIGURE 10 MCRC Load Limits Map



2.5.4 Seasonal Traffic Variations

In this region, daily traffic volumes trend at slightly above annual averages during the warmer months of mid/late spring to mid-fall. This can be attributed to a wide array of factors among which include more tourism and vacation travel. During the remaining cold-weather months daily traffic volumes trend at slightly below the annual averages. Seasonal adjustment factors (SAF) can be used to calibrate traffic collected during a short timeframe within any given month back to something representative of average annual conditions. The table below shows representative SAFs published by the Michigan Department of Transportation relative to the April and May 2009 data collected for this study.

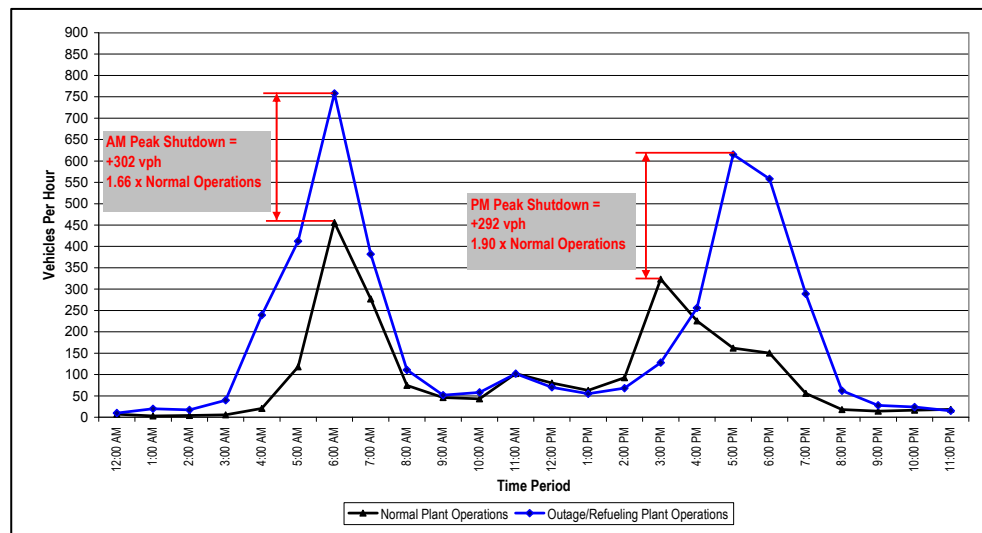
It can be seen that the months of April and May actually hover quite close to the average (represented by a factor of 1.0) annual conditions as these are transitional months between the cold weather period and warm weather travel season. Thus, it should be noted that the months of traffic data collection provide a fair representation of “normal” or average annual traffic conditions.

Representative Seasonal Adjustment Factors		
Functional Class	April	May
Principal Arterial	1.0005	0.973
Minor Arterial	1.000	0.956
Collector & Local	0.983	0.951

As the table above shows, traffic data collected during April and May of 2009 generally fell during and represented a normative period of the year. This supports a goal of this study to conduct analysis of conditions typically experienced on a normal day.

The primary traffic fluctuation which occurs within the study area was accounted for in the collection of both “outage” and “normal” plant operations during April and May respectively. **Figure 11- Normal vs. Outage Fermi Plant Operations Traffic** shows an hourly traffic profile for both conditions at Enrico Fermi Drive.

FIGURE 11 Normal vs. Outage Fermi Plant Operations Traffic



Two important observations are noted from **Figure 11** regarding the ratio of outage to normal traffic:

- **AM Peak Outage Traffic = 1.66 x Normal**
- **PM Peak Outage Traffic = 1.90 x Normal**

Peak hour traffic conditions during a Fermi outage are confirmed to create significant upward fluctuation for site traffic. Traffic increases by nearly a factor of two (2) during the PM Peak outage condition. While the objective of this study is to evaluate regularly occurring daily conditions of existing Fermi 2 and projected Fermi 3, the fluctuation of plant outage traffic is an important general consideration given its substantial nature and regular annual recurrence. The outage periods, however, are not part of what would be considered average conditions over the course of the year. It is, however, prudent to be aware of these outage traffic increases so that the added traffic can be managed through on-site shift staggering.

2.5.5 Peak Hour Factors

Because traffic does not flow evenly across an hour period, hourly peaking is accounted for in any peak hour analyses. A Peak Hour Factor (PHF) is calculated from the four 15 minute traffic count intervals by dividing the peak hour total by four times the highest 15 minute interval. This value is then applied the peak hour traffic to account for the highest 15 minute traffic interval. The *Highway Capacity Manual* identifies PHF of 0.92 and 0.88 to be typical default values for urban and rural conditions, respectively. A PHF close to 1.0 is indicative of traffic that is spread nearly evenly over the hour. A lower PHF is indicative of heavy surges of traffic over the course of an hour. The PHF for each intersection in the study area and each traffic movement was calculated based on the aforementioned formula with ranges for AM and PM peak hours as presented in the table below.

Study Area Peak Hour Factor Summary by Intersection		
Intersection	AM Peak	PM Peak
N. Dixie Hwy. & NB I-75 Ramps	0.62 – 0.88	0.71 – 0.93
N. Dixie Hwy. & SB I-75 Ramps	0.71 - 0.98	0.78 – 0.89
Nadeau Road & NB I-75 Ramp	0.50 – 0.81	0.71 – 0.91
Nadeau Road & SB I-75 Ramp	0.50 – 0.94	0.71 – 0.90
Swan Creek Road & NB I-75 Ramps	0.70 – 0.88	0.50 – 0.95
Swan Creek Road/ Newport Road & SB I-75 Ramps	0.63 – 0.94	0.50 – 0.88
N. Dixie Hwy. & Stoney Creek Road	0.42 – 0.77	0.75 – 0.89
N. Dixie Hwy. & Pointe Aux Peaux Road/ Marshall Field Drive	0.67 – 0.92	0.64 – 0.92
N. Dixie Hwy. & Leroux Road	0.31 – 0.85	0.42 – 0.82
Leroux Road & Toll Road	0.33 – 0.75	0.50 – 0.70
N. Dixie Hwy. & Enrico Fermi Drive	0.65 – 0.81	0.58 – 0.87
Leroux Road & Enrico Fermi Drive	0.50 – 0.90	0.60 – 0.79
N. Dixie Hwy. & Post Road	0.50 – 0.85	0.44 – 0.98