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16. Abstract

The principal objectives of this study were to determine the following characteristics about special-use truck traffic: traffic patterns, vehicle axle distributions, axle load distributions, and radius of influence. The commodity movements which are considered in this study are: timber, produce, grain, beef cattle, limestone, and sand/gravel. Oil and gas exploration activities were the initial special-use concerns. Study 299 which addressed the effects of oilfield development on Texas roadways preceded the 420 study. Projects 299 and 420 identified the industries of timber, surface mining, agriculture, and oil and gas field exploration as those which contribute to pavement distress in a significant way. Also, these activities generate vehicles which are often dissimilar to truck traffic in general. This report includes the results of an intensive data gathering effort aimed at site-special trip generation characteristics and vehicular weight characteristics at special-use traffic generators.

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RESULTS OF SPECIAL-USE TRUCK DATA COLLECTION

by

Dan R. Middleton

Research Report 420-3F, Volume I
Research Study Number 2-18-85/8-420
Identification of Special-Use Truck Traffic

Sponsored by

Texas State Department of Highways and Public Transportation
in cooperation with
U.S. Department of Transportation, Federal Highway Administration

March 1989

TEXAS TRANSPORTATION INSTITUTE
The Texas A&M University System
College Station, Texas

METRIC (SI*) CONVERSION FACTORS

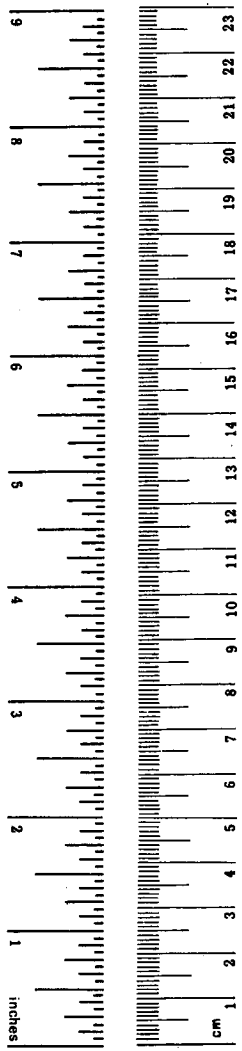
APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	millimetres	mm
ft	feet	0.3048	metres	m
yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km
AREA				
in²	square inches	645.2	millimetres squared	mm²
ft²	square feet	0.0929	metres squared	m²
yd²	square yards	0.836	metres squared	m²
mi²	square miles	2.59	kilometres squared	km²
ac	acres	0.395	hectares	ha
MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
VOLUME				
fl oz	fluid ounces	29.57	millilitres	mL
gal	gallons	3.785	litres	L
ft³	cubic feet	0.0328	metres cubed	m³
yd³	cubic yards	0.0765	metres cubed	m³

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi
AREA				
mm²	millimetres squared	0.0016	square inches	in²
m²	metres squared	10.764	square feet	ft²
km²	kilometres squared	0.39	square miles	mi²
ha	hectores (10 000 m²)	2.53	acres	ac
MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 kg)	1.103	short tons	T
VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
m³	metres cubed	35.315	cubic feet	ft³
m³	metres cubed	1.308	cubic yards	yd³

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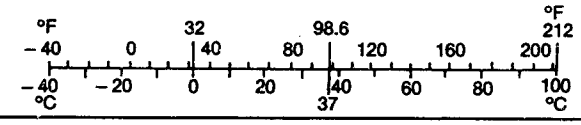

These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

ACKNOWLEDGEMENT

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ABSTRACT

The principal objectives of this study were to determine the following characteristics about special-use truck traffic: traffic patterns, vehicle axle distributions, axle load distributions, and radius of influence. The commodity movements which are considered in this study are: timber, produce, grain, beef cattle, limestone, and sand/gravel. Oil and gas exploration activities were the initial special-use concerns. Study 299 which addressed the effects of oilfield development on Texas roadways preceded the 420 study. Projects 299 and 420 identified the industries of timber, surface mining, agriculture, and oil and gas field exploration as those which contribute to pavement distress in a significant way. Also, these activities generate vehicles which are often dissimilar to truck traffic in general. This report includes the results of an intensive data gathering effort aimed at site-specific trip generation characteristics and vehicular weight characteristics at special-use traffic generators.

SUMMARY

This study was conducted in response to a need by highway engineers to identify special-use industries whose activity centers uniquely impact the highway system in Texas. The primary mode of transport for these facilities was the truck, characterized by unique travel patterns, trip lengths, and axle loads.

Three general areas previously identified in Phase I of this study were: timber, agriculture, and surface mining. The original list of 11 commodities was reduced to 6 which were considered most important. Commodities and activity centers selected were: timber mills, produce distributors, grain elevators, beef cattle feedlots, limestone quarries, and sand/gravel pits. A scientifically designed selection process identified sites which would be representative of typical activity center sizes and geographic locations throughout the state.

A case study was conducted to exhibit the use of special-use data and to determine the impact of this traffic on a U.S. highway near a pulpwood mill. Falling Weight Deflectometer readings were taken on the section of roadway. Weigh-in-motion (WIM) data provided axle load distributions of special-use vehicles and other vehicles. The AASHTO method was then used to determine the incremental reduction in pavement life due to timber trucks. Results indicated that serviceability reduction to 2.5 occurred 12 years sooner with special-use vehicles added to the traffic stream.

IMPLEMENTATION STATEMENT

Because information regarding special-use truck traffic has not been previously well documented, the findings of this study will undoubtedly assist SDHPT engineers in the areas of planning, research, geometric design, traffic operations, and pavement management.

The site-specific information gathered in this phase of Project 420 provides a useful description of activities which exist on a fairly widespread basis in Texas. The report also provides transitional information relating site-specific information to a statewide basis. Production quantities on a county-by-county basis provided in the report indicate relative production intensities. In cases where county information was not available, production quantities aggregated by SDHPT districts have been included.

DISCLAIMER

The views, interpretations, analysis, and conclusions expressed or implied in this report are those of the author. They are not necessarily those of the Texas State Department of Highways and Public Transportation or the Federal Highway Administration.

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1.0 INTRODUCTION

1.1 OBJECTIVE

The objective of this study was to collect site-specific information, specifically regarding traffic classification counts and vehicle weights, at or near special-use activity centers. This report contains the results of these field studies. Commodities examined in the traffic classification counts were: timber, produce, grain, beef cattle, limestone, and sand/gravel. Vehicle weight data were collected using portable weigh-in-motion (WIM) systems. In the weight studies, these same commodities were included with one addition -- oilfield activities. The results of these studies are reported herein along with information to relate site-specific information to total district activity and total statewide activity.

1.2 DEFINITION OF SPECIAL-USE TRAFFIC

The term "special-use" has been coined to give specific designation to truck traffic which is atypical in travel patterns, trip lengths, and axle loads. The travel patterns of these vehicles tend to be cyclical in nature, with the same trip being made in some cases several times in the same day. Trip lengths are relatively short, usually less than one hundred miles. The origin and destination may remain the same month after month, but usually either the origin or the destination will change after a period of time. Axle loads, although generally not well documented, are in many cases greater than normally expected.

The roads serving the special-use vehicles cover practically the entire spectrum. One particularly noteworthy roadway type which is common is the two-lane rural road. These roadways are usually paved, surface-treated roads intended for low traffic volumes with a small percentage of large trucks. Finally, special-use truck traffic in many cases experiences seasonal variations due to rainfall or the harvest season, as in the agricultural commodities.

1.3 PREVIOUS RESEARCH

The predecessor to this study was a comprehensive evaluation of the effects of oil field development on roadways in the state of Texas. Therefore, oilfield activity was actually the first special-use activity studied, followed by the activities included in the scope of Project 420. Research Reports 299-1 through 299-6 describe the methodology for assessing and predicting pavement damage to the surrounding road network caused by oilfield activity.

The objectives of Report 420-1 (1) were to identify specific special-use commodities, determine vehicular and industry characteristics in the movement of these commodities, determine the areas in the state impacted by this movement, and to develop a procedure for predicting the reduction in pavement life due to special-use truck traffic. Of the original commodities identified, the following were subsequently dropped from further investigation: poultry, uranium, cotton, iron ore, and lignite. Findings of this report

resulted from office and telephone interviews with industry, transportation, and enforcement officials who provided information on number of trips generated by activity centers, typical radius of influence of the center, periods of peak commodity movement, and general information on vehicle weights.

The objective of Report 420-2 was to study characteristics of truck traffic on various classes of highways and in various regions in Texas using the data available from the Texas Manual Count Annual Report between 1977 and 1983. The outcome of this analysis was proposed for use as the "datum" against which the distributions of truck traffic from "special-use" activity centers could be compared. In the analysis of truck traffic as a percentage of total traffic, the AASHTO 3-S2 (3-axle tractor with 2-axle semitrailer) vehicle was found to be the predominant cargo vehicle on the state's highway system. In the evaluation of truck traffic as a percentage of total traffic, large variations were observed in the proportion of 3-S2 and SU-1 (2-axle single unit truck) vehicles. These and other findings indicated that to predict the mix of trucks at a specific location and time, information would be needed concerning economic factors, surrounding industrial activities, and seasonal influence.

1.4 DESCRIPTION OF DATA COLLECTION PROCESS

The initial site selection process used total statewide site information. These sites were randomly selected through a statistically sound process such that results could be predictably accurate. For various reasons, some sites had to be changed during the course of the study. A few sites had closed due to economic conditions, some changed ownership with resulting change in character of the business, and others were in remote areas and were difficult to find using existing information. Alternate sites were selected near the original sites in almost all cases; these are identified herein by the use of the "A" following the number designation of the site.

Site-specific vehicle classification counts were conducted by manual methods, utilizing two persons at each site in most cases. Appendix A contains the count forms and interview forms used. Extremely busy sites required three persons. Data collected included a) the number of vehicle-trips entering and exiting the activity center by vehicle type tallied by 15 minute intervals and b) vehicle-trips passing the count location on the state or local jurisdiction roadway. Trucks counted in the second category were further broken down into special-use vehicles and other vehicles in order to assess the full impact of special-use activity centers. Spreadsheets for each site are included in Appendix B. The count period was typically daylight hours only for a time period of 8 to 12 hours each day. One-day counts were conducted on randomly selected dates. Study crews studied each activity center at least one full day, and usually two to four days. Office interviews supplemented field counts on the same day the count was conducted in order to compare the count information with interview questions which attempted to quantify average or typical conditions. The predominant direction of approach for loaded special-use trucks was recorded for many sites; however, for some locations this direction changed often due to changing trip origins.

Unsuccessful attempts were made to automate the vehicle classification counts. Systems which utilize loop detectors to classify vehicles by length were not consistent enough for this purpose. Problems centered around the unique vehicle types utilized by special-use activities, multiple directions of approach to the activity centers, unpaved surfaces, and traffic control for set-up in high speed and/or high traffic volume situations. No system was tested which was as feasible as the manual count method.

For vehicle weights, portable weigh-in-motion systems were used. The initial site-selection process used the following criteria: a) locations near activity centers previously identified for classification counts, b) locations with high truck volumes, c) locations with a smooth approach roadway profile, and d) locations with truck speeds over 40 miles per hour. Previous experience with the WIM systems dictated that a sample size of 50 to 100 trucks in a day's time was desirable in order to achieve a reasonably reliable sample. Speeds less than 40 mph yielded erroneous weights in most cases. Weight data gathering was usually continued for a time period of one work day, from about 8 a.m. to 4 p.m. For commodity movement which continued into the night (e.g. produce), data collection also continued. Results presented herein are a composite of day and night activities in those cases.

Just as the mechanical classification systems had their problems, the portable WIM system also had its shortcomings. Traffic control was a concern during setup and removal of the loops and mat in the traffic lane. Truckers often avoided the mat in low volume situations where there was little or no opposing traffic. The system was calibrated at a remote site and then used at several data collection sites before recalibration. In tests previously conducted where calibration was done on-site, accuracy of $\pm$10 percent for gross vehicle weights and $\pm$15 percent on axle groups with 95 percent confidence has been found. However, for this study where calibration was accomplished off-site, it was not possible to determine the accuracy of results. No attempt was made in the field to physically compare WIM results reported herein with statically determined weights. Therefore, none of the truck weight results reported herein have been adjusted, even if they appeared to be higher or lower than expected.

2.0 FIELD STUDY RESULTS

2.1 TIMBER

2.1.1 CLASSIFICATION COUNTS

2.1.1.1 Particle Board Mill, Site No. 110

Introduction. The site map shown in Figure 2.1.1.1-1 indicates that access is provided to this site by a U.S. Highway through the use of a local road. This site is located at the outskirts of a small community about 30 miles south of a medium-sized urban area in east Texas.

The random site selection process used to choose all sites for this study resulted in a few sites where evaluation of results was not as simple as it was elsewhere, and this was one of these sites. Two mills were located at the site -- a plywood mill and the selected particle board mill. Because both mills used the same entrance and a separation of traffic generated by the two was not possible, the field counts represent total trips generated by both mills. In order to estimate trips generated by each mill individually, interviews were conducted with mill officials. Because records were not kept on all vehicles, this information was not as comprehensive as desired but at least an estimate could be made. The total effect of both mills together may be useful, however, in that this same mill combination could occur elsewhere.

Information gathered on the plywood mill was more complete than that for the particle board mill. Therefore, to determine the trip-generating characteristics of the latter, the plywood mill trips were subtracted from the total.

Activity Center Trip-Generating Characteristics. The plywood mill received only 3-S2 log trucks (no single units) in the following numbers:

Year	No. of 3-S2 (Loads)
1985	16,332
1986	15,370

Also in terms of output for the years 1985 and 1986, the following number of truck loads and rail car loads was generated by the plywood mill:

Year	No. of Trucks	No. of Rail Cars
1985	3,708	373
1986	3,534	553

By dividing the number of annual loads by the number of days the mill operated in 1985 and 1986, the number of average daily, weekly, and monthly loads shipped out

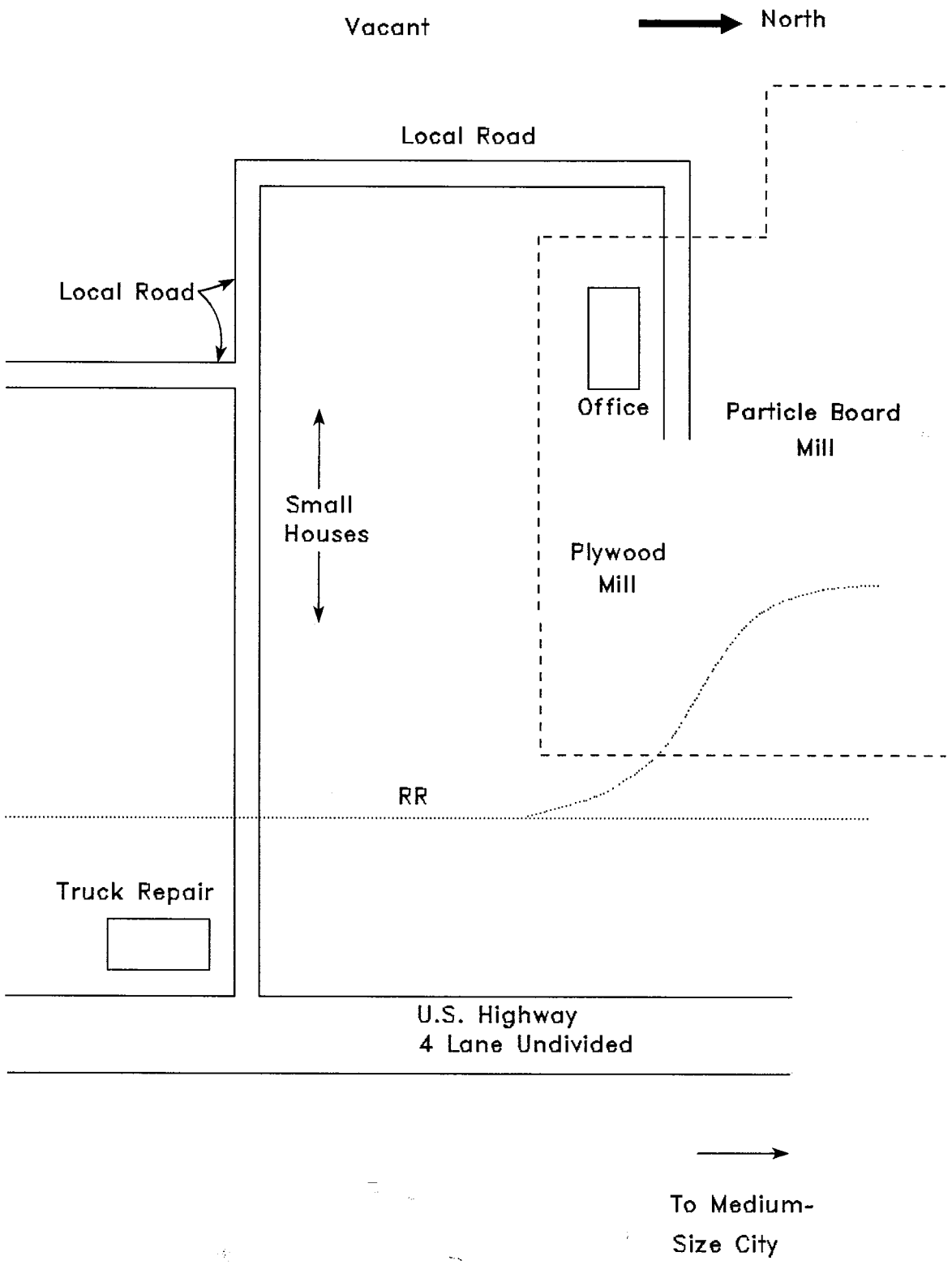


Figure 2.1.1.1-1. Site Map

by each mode, truck and rail, was computed. Assuming one week per year for plant closing, the average number of loads per month, week, and day are shown in Table 2.1.1.1-1. These are working days, not totals.

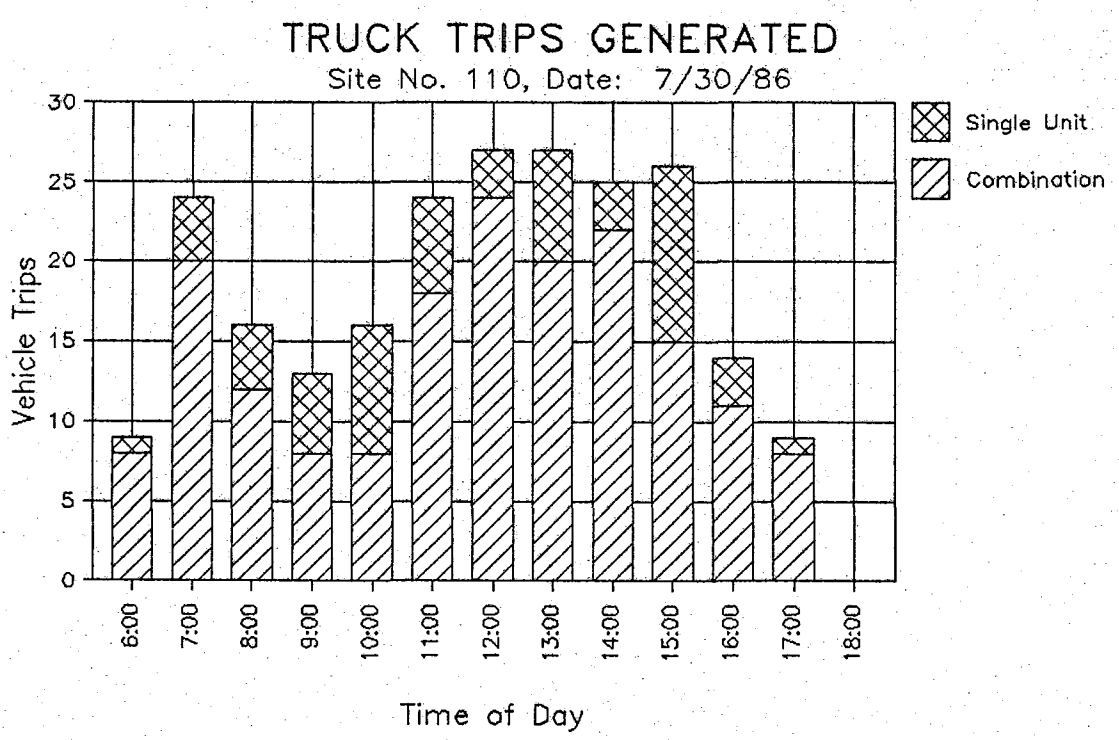
Table 2.1.1.1-1. Interview Information Summary

Year	Mode	Total	Month	Week	Daily
Outgoing Truck and Rail Car Loads					
1985	Truck	3,708	309	73	10.4
	Rail	373	31	7	1.04
1986	Truck	3,534	294	69	10
	Rail	553	46	11	1.5
Incoming Loaded Trucks					
1985	Truck	16,332	1,373	317	66
1986	Truck	15,370	1,290	298	62
Total Truck Loads					
1985	Truck	20,040	1,682	388	76
1986	Truck	18,904	1,584	366	72

For the plywood mill, the number of daily average 3-S2 combination truck trips for 1986 was 144. The total 3-S2 trips counted on July 30, 1986 was 261. Thus the 3-S2 trips generated by the particle board mill can be estimated as 117 trips (261 minus 144). The direction of approach for trucks hauling to both mills was from the south.

The remainder of this section will report on total trips generated by both mills located at this site. Figure 2.1.1.1-2 shows the truck traffic (in and out) generated by this site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by the site during the same 12-hour period on July 30, 1986.

Figure 2.1.1.1-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 (76%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto traffic represented 56 percent of this total.



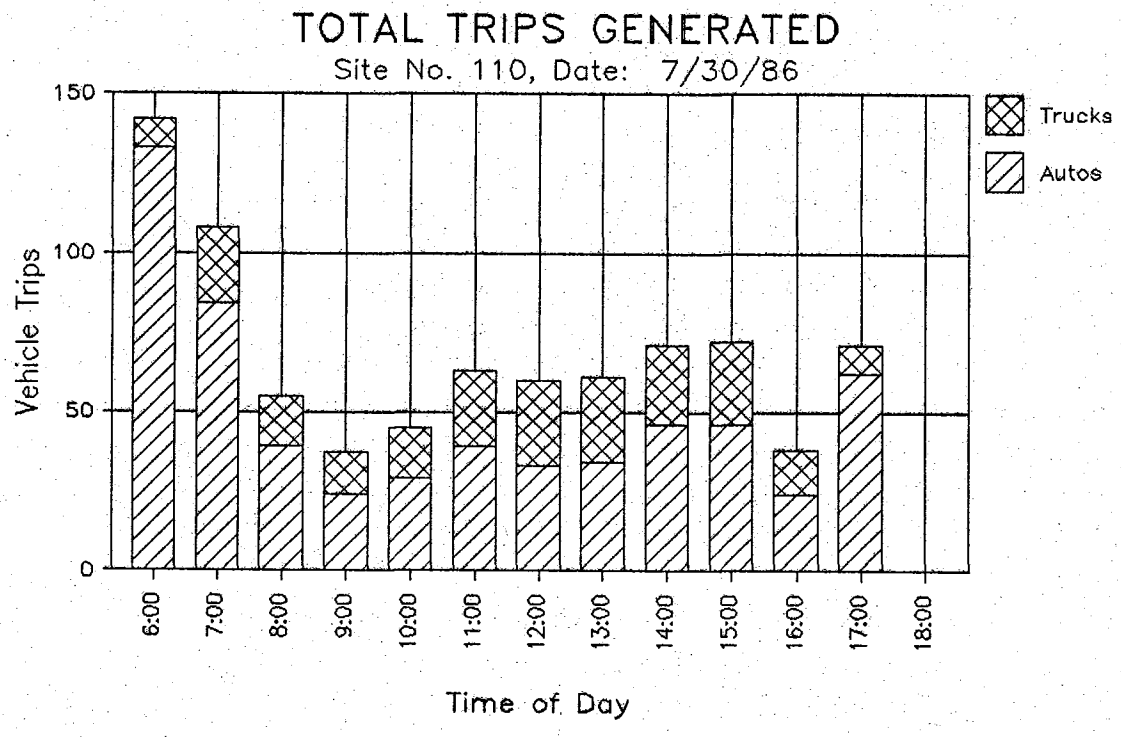
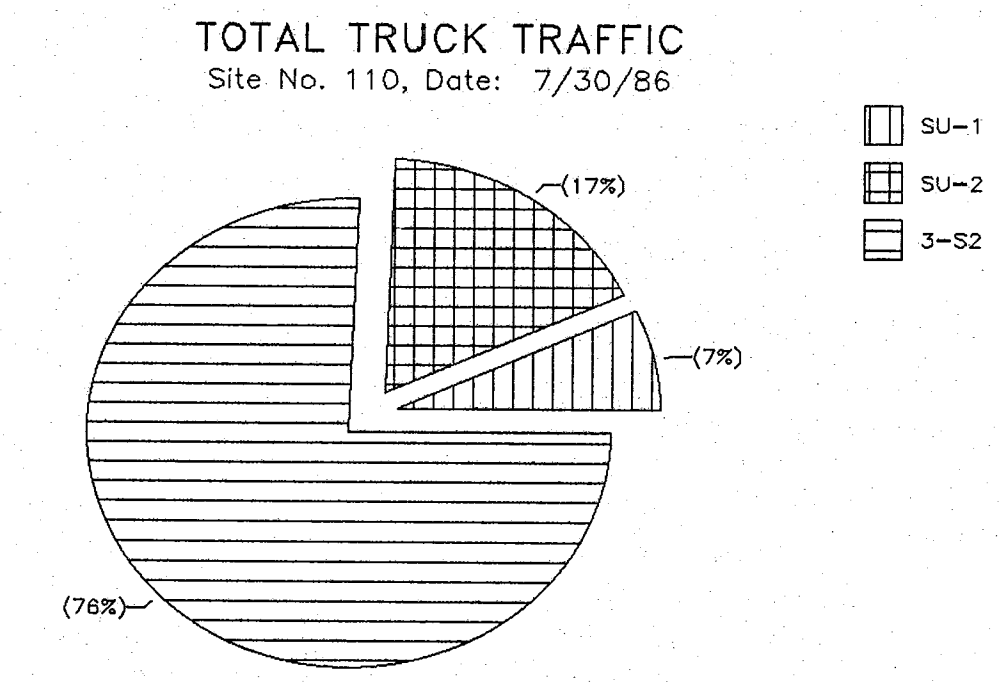


Figure 2.1.1.1-2. Hourly Trip Generation



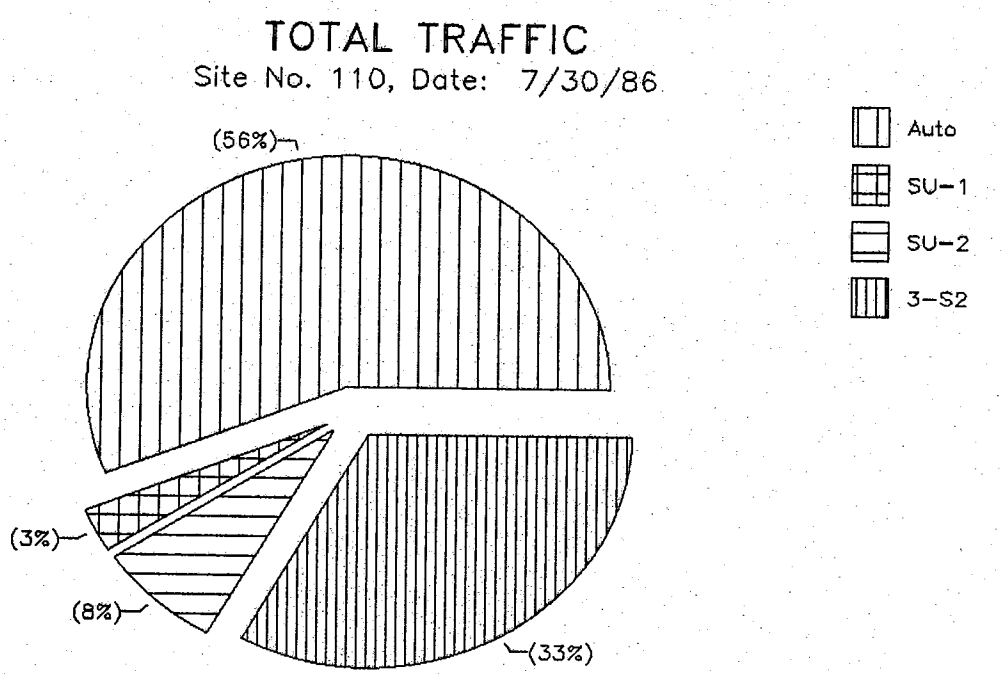


Figure 2.1.1.1-3. Activity Center Vehicle Percentages

Characteristics of Roadway Serving Activity Center. The major public roadway providing public access to this activity center was a U.S. Highway. According to SDHPT records, this U.S. Highway had an average daily traffic (ADT) of 12,500 vehicles per day in 1986. Manual classification counts were conducted in 1984, 1986, and 1988 primarily to determine the impact of special-use activities on this highway. Table 2.1.1.1-2 provides a summary of the counts taken. In Table 2.1.1.1-2A, vehicle classification counts for the activity center only (sum of both mills) are provided. In Table 2.1.1.1-2B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. In Table 2.1.1.1-2C, a total count of all vehicles on the highway is provided. This total is a sum of the activity center trips (Table 2.1.1.1-2A), traffic on the roadway without special-use vehicles (Table 2.1.1.1-2B), and special-use vehicles on the roadway. The user should note that the sum by vehicle class of Table 2.1.1.1-2A and 2.1.1.1-2B is not in every case equal the corresponding value in Table 2.1.1.1-2C. The difference is the number of special-use vehicles on the roadway not generated by this specific activity center.

Figure 2.1.1.1-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.1.1.1-2C values). The 3-S2 vehicle represents 75 percent of total trucks counted on this highway. Autos made up 75 percent of the total traffic on this day counted in 1986.

Table 2.1.1.1-2. Traffic Classification Count Summary

Table 2.1.1.1-2A. Activity Center Only

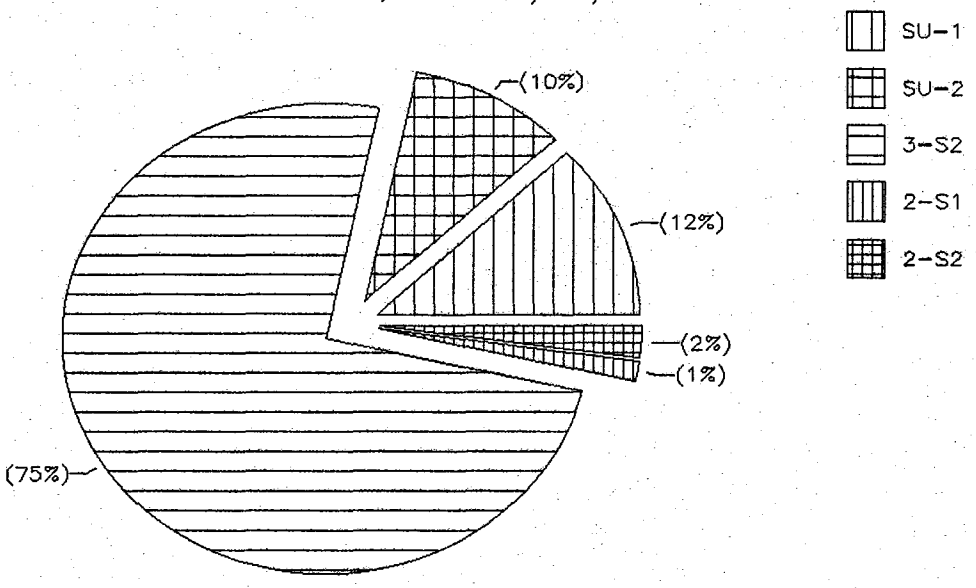
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
1/13/84	650	27	4	244	5	930	11%	89%	70%	30%
7/30/86	879	36	0	261	0	1176	12%	88%	75%	25%
4/28/88	437	74	8	353	0	872	19%	81%	50%	50%

Table 2.1.1.1-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
1/13/84	7950	218	90	47	104	966	10	9385	21%	79%	85%	15%
7/30/86	6773	252	149	35	54	1430	13	8706	21%	79%	78%	22%
4/28/88	6362	13	81	0	0	123	0	7686	7%	93%	83%	17%

Table 2.1.1.1-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
1/13/84	8580	245	94	47	104	1510	15	10595	17%	83%	81%	19%
7/30/86	7652	288	208	35	54	1874	13	10124	20%	80%	76%	24%
4/28/88	6799	87	89	0	0	1871	0	8846	9%	91%	77%	23%



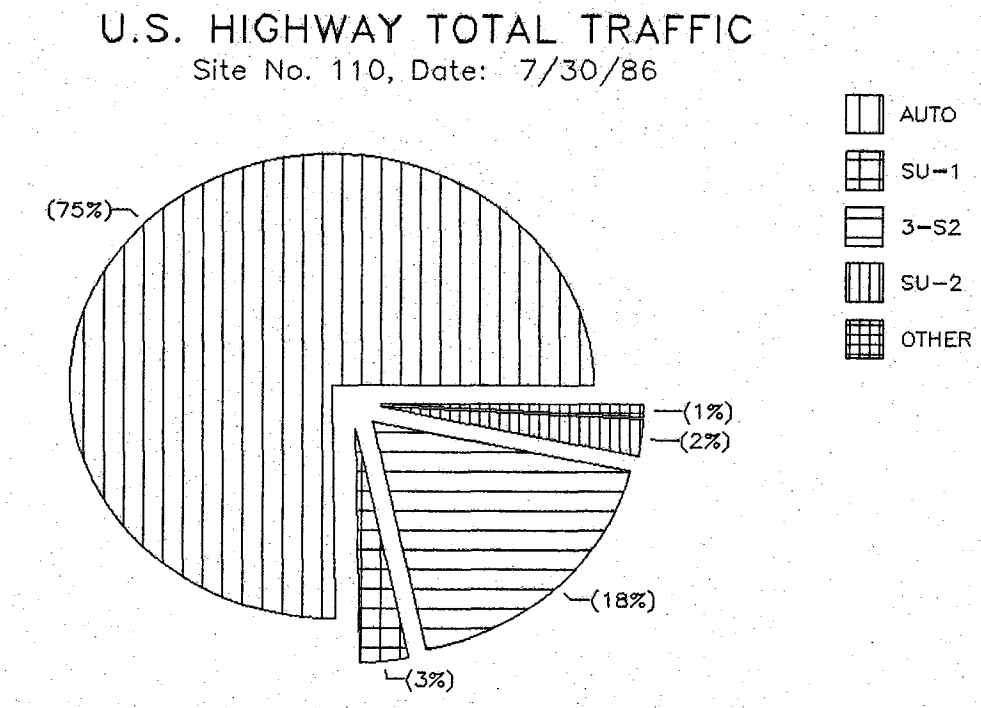


Figure 2.1.1.1-4. Highway Vehicle Percentages

2.1.1.2 Particle Board Mill, Site No. 111

Introduction. The site map shown in Figure 2.1.1.2-1 indicates that access is provided by two Farm-to-Market (FM) Highways. The activity center is located within a small urbanized area. Log trucks hauling raw timber to this mill come from both directions on the five-lane FM roadway, and proceed west on the other FM road to the back side of the mill. The site is served by a railroad which transports finished products from the mill but hauls no raw products into the mill. The entire mill site involved in this study included a plywood operation, a sawmill,and the desired particle board operation. Because there was no way to isolate traffic generated by any single part of the total site (the particle board mill alone, for example), an estimate must be made of the activities generated by the particle board mill by using interview information. Even though the results are estimates, they provide the best approximation possible of the impact of one particle board mill. The total site traffic is based on actual counts which are more accurate.

Activity Center Trip-Generating Characteristics. From interview information, it was estimated that the particle board mill generates an average of 122 truck trips per day. Total truck trips generated by the site recorded during the classification count on May 23, 1985 was 375. This percentage of particle board trucks to total trucks is 33 percent. It should be noted that the remainder of this section reports the impact of the total site, including the plywood mill, the sawmill, and the particle board mill.

Figure 2.1.1.2-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) on October 28, 1986. Auto traffic peaks occurred from 7 a.m. to 8 a.m. (shift change) and 12 noon to 1 p.m. (lunch traffic).

Figure 2.1.1.2-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (97%). Also illustrated is the breakdown of total traffic moving to and from the mill. The auto represented 78 percent of this total.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck during the 12-month calendar year. This information is provided in Table 2.1.1.2-1.

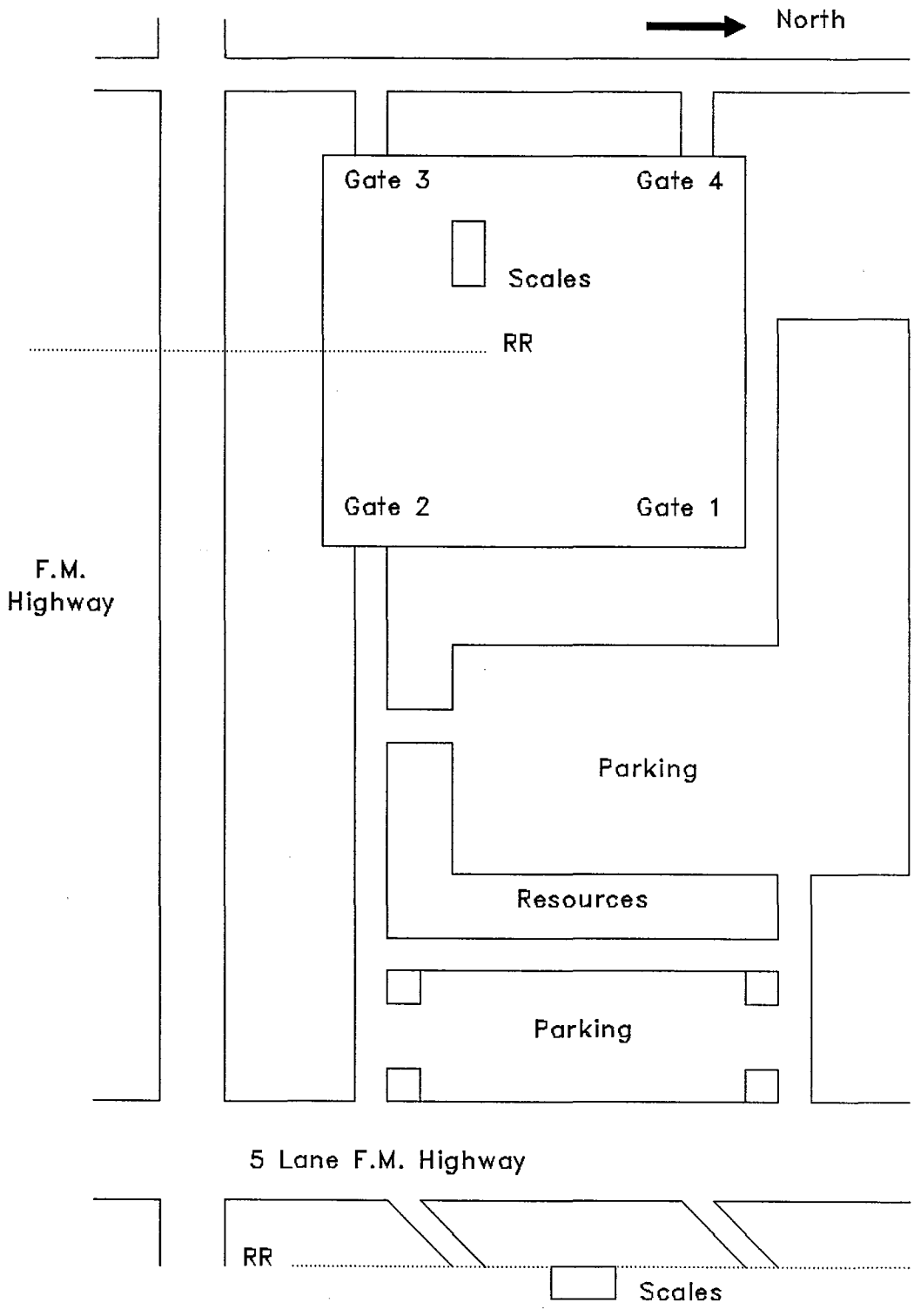
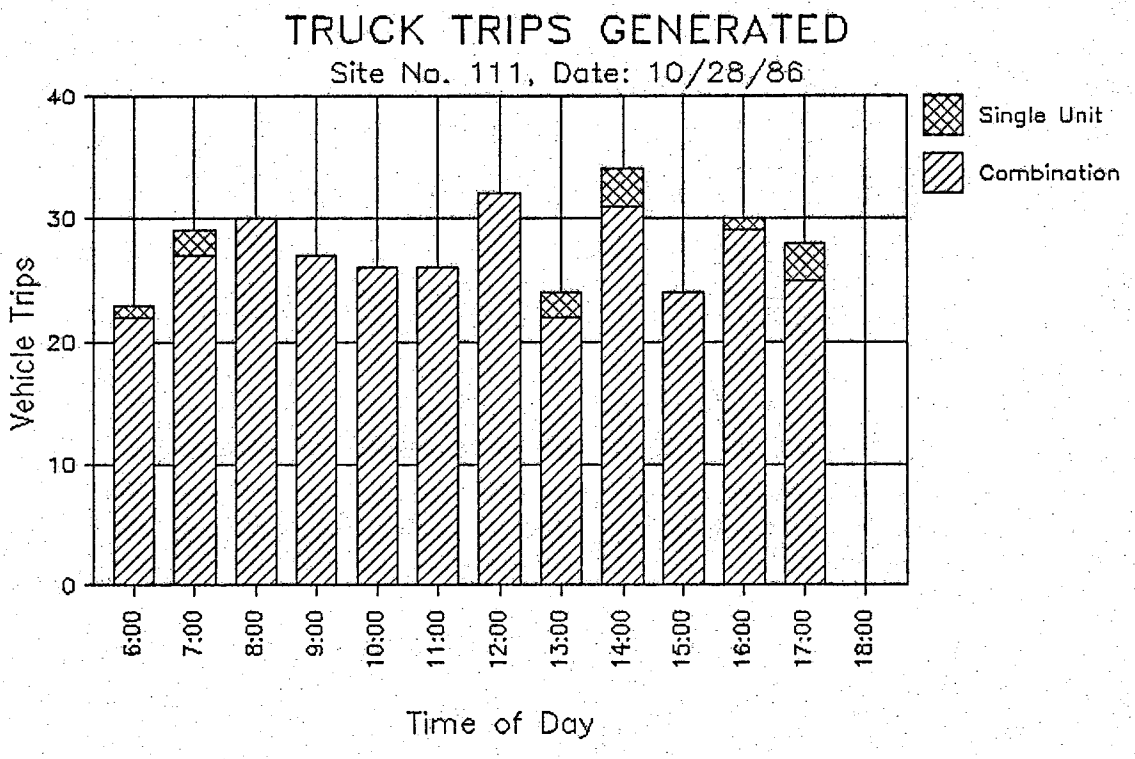


Figure 2.1.1.2-1. Site Map



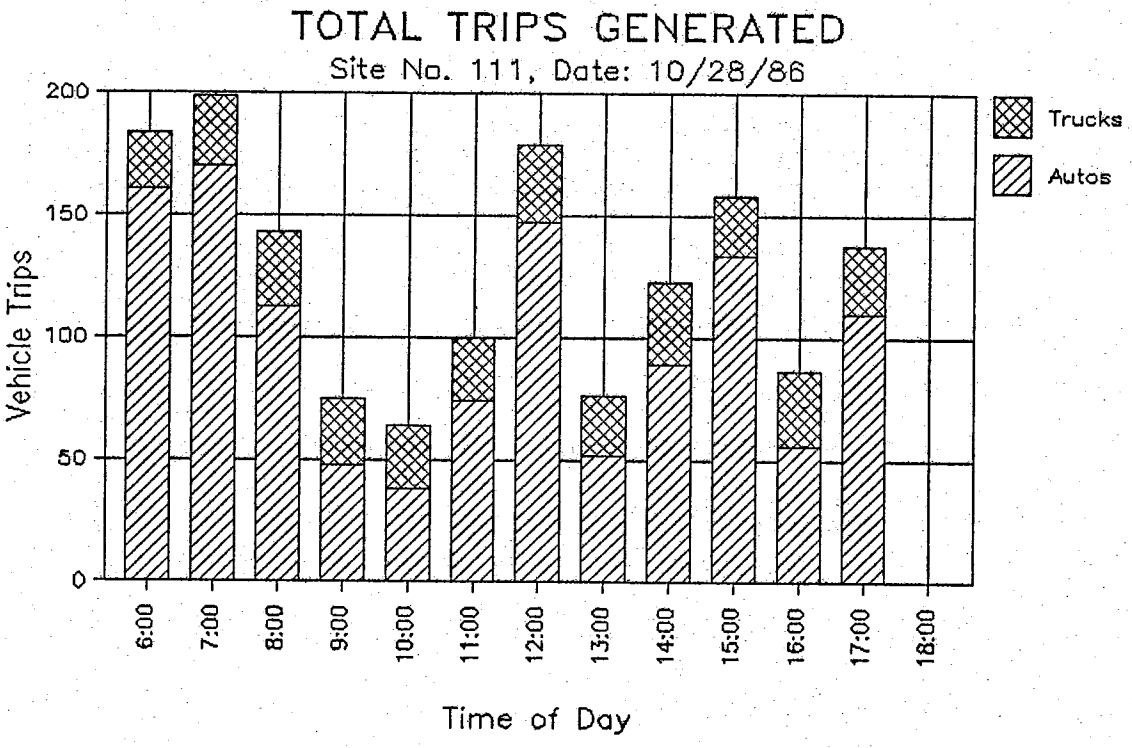
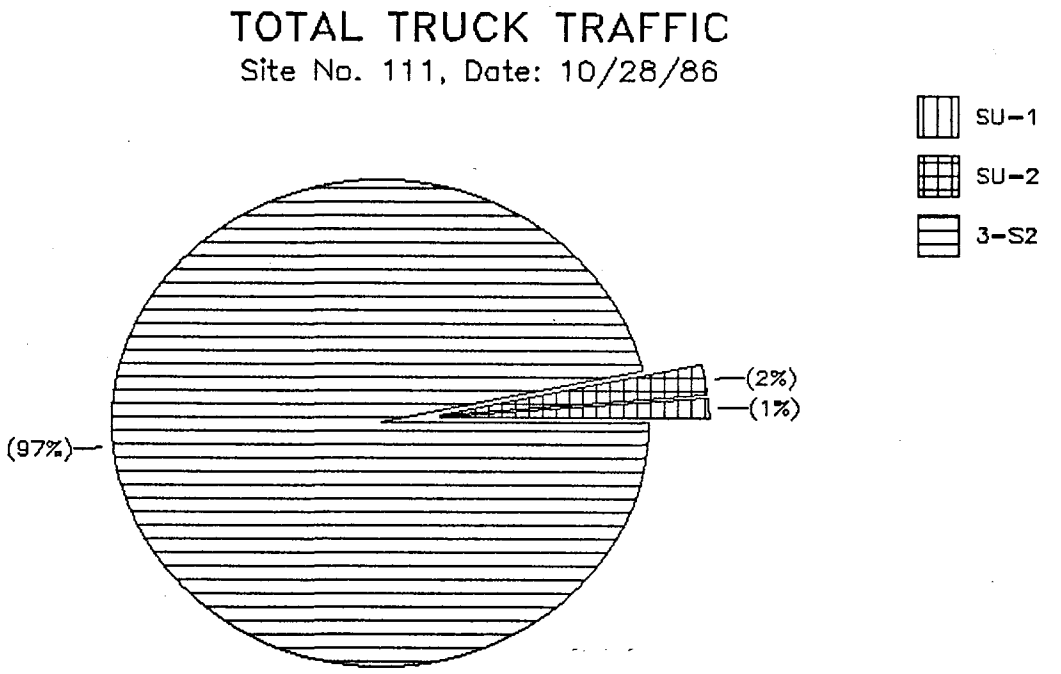


Figure 2.1.1.2-2. Hourly Trip Generation



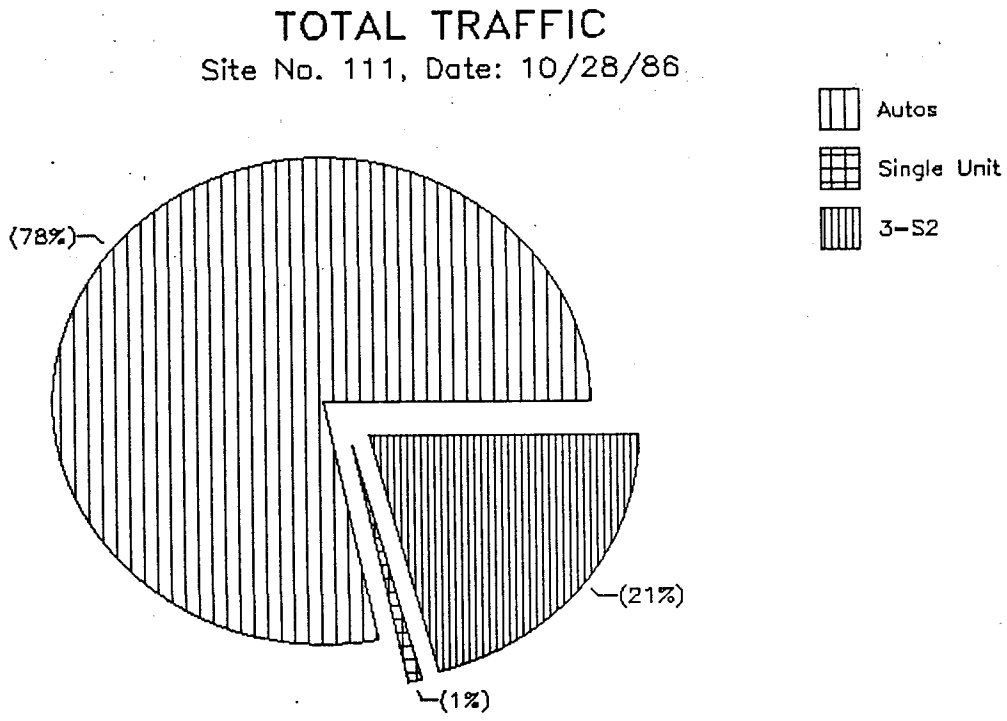


Figure 2.1.1.2-3. Activity Center Vehicle Percentages

Table 2.1.1.2-1. Industry Information On Raw Wood Input

Activity Center No. 111

Year	Raw Wood Type	No. of Cords	Pounds[1]
1985	Round Wood	138,081	7.25×10^8
1986	Round Wood	130,721	6.86×10^8

[1]Conversion for pine: 5,250 lb/cord, southern area.

Interviews with plant officials yielded information on truck loads (not trips) of incoming and outgoing products. Tables 2.1.1.2-2 and 2.1.1.2-3 present this information. The first reveals total site activity, while the second indicates truck loads for particle board only.

Table 2.1.1.2-2. Interview Information

Total Site Truck And Rail Loads (5/22/85)

Incoming (Loaded) Vehicles:

101 Log Trucks
53 Loads of sawdust (For power plant)
49 Loads of chips
30 Loads of particle board material

Outgoing (Loaded) Vehicles:

7 Loads of plywood
13 Loads of lumber
13 Loads of particle board
4 Rail cars of plywood
3 Rail cars of particle board

Table 2.1.1.2-3. Interview Information

Particle Board Mill Loads Only (5/22/85)

Incoming (Loaded) Vehicles
250 - 270 truck loads per week

Outgoing (Loaded) Vehicles:
40 - 50 truck loads per week
Rail is used for outgoing products, amount not specified

Characteristics of Roadway Serving Activity Center. Two Farm-to-Market roadways provided public access to this activity center. The higher volume north-south Farm-to-Market road carried an average daily traffic (ADT) of 13,800 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.2-4 provides a summary of the counts taken. First, in Table 2.1.1.2-4A, vehicle classification counts for the activity center only are provided. Second, in Table 2.1.1.2-4B, a count of all vehicles on the FM roadway except special-use vehicles is provided. Finally, in Table 2.1.1.2-4C, a total count of all vehicles on the main roadway (the north-south FM Road) is provided.

Table 2.1.1.2-4. Traffic Classification Count Summary

Table 2.1.1.2-4A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
5/23/85	1610	22	9	344	0	1985	8%	92%	81%	19%
10/28/86	1192	5	7	321	0	1525	4%	96%	78%	22%
10/29/86	1153	8	34	431	0	1626	9%	91%	71%	29%

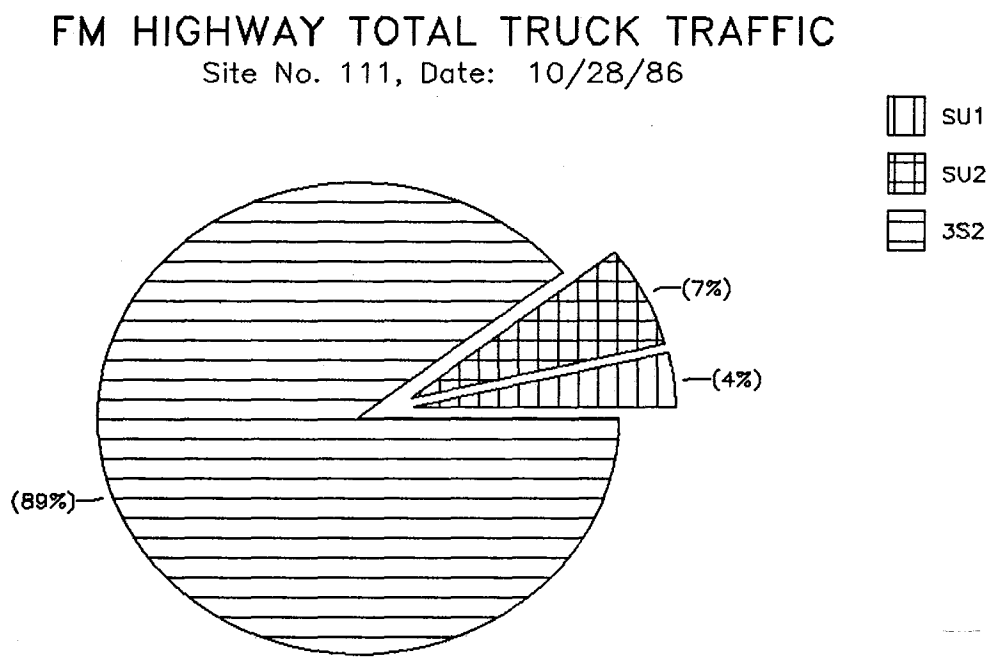
Table 2.1.1.2-4B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/28/86	9048	17	33	78	0	9176	39%	61%	99%	1%
10/29/86	9175	15	47	55	0	9292	53%	47%	99%	1%

Table 2.1.1.2-4C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/28/86	10240	22	40	519	0	10821	11%	89%	95%	5%
10/29/86	10328	23	81	573	0	11005	18%	82%	94%	6%

Figure 2.1.1.2-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.1.1.2-4C values). The 3-S2 vehicle represents 87 percent of total trucks counted on this roadway. Autos made up 94 percent of the total traffic stream.



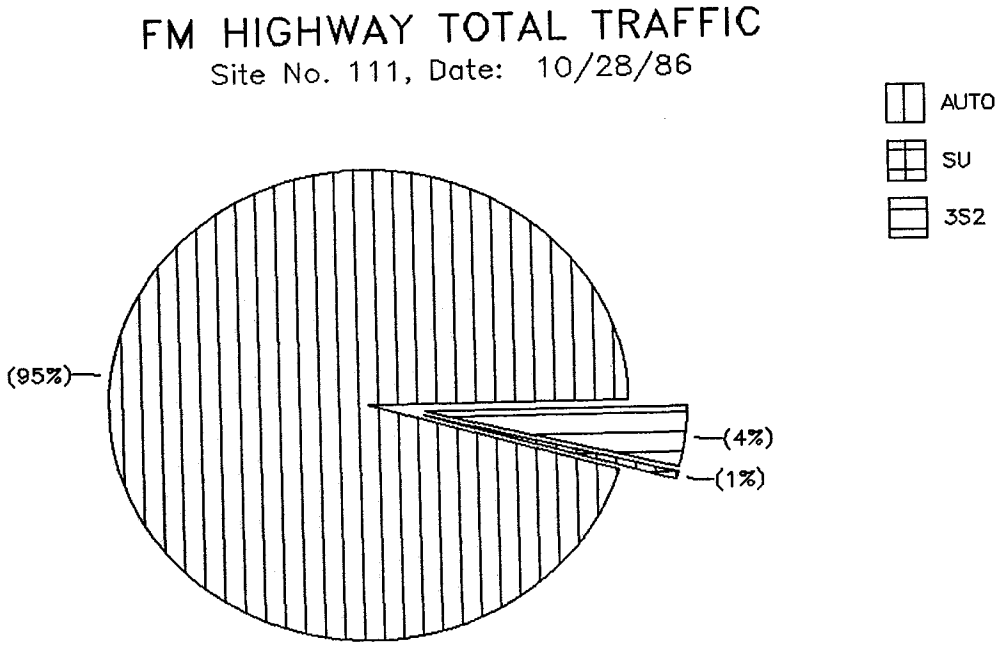


Figure 2.1.1.2-4. Highway Vehicle Percentages

2.1.1.3 Pulpwood Mill, Site No. 120

Introduction. The site map shown in Figure 2.1.1.3-1 indicates one access to a U.S. Highway. The activity center is located at the eastern outskirts of a very large urban area. Log trucks arriving at this mill approach exclusively from the east. The mill has only one access point for both cars and trucks. The site is also served by a railroad which carries no raw products to the mill but is used to haul finished products away from the mill.

Activity Center Trip Characteristics. Figure 2.1.1.3-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill received the major part of it's incoming log traffic during the 12-hour study period.

Figure 2.1.1.3-2 also shows the combination of trucks and autos that were generated by the mill during the 12-hour study period. The mill employs a total of 850 persons who work three shifts -- 8 a.m. to 4 p.m., 4 p.m. to 11 p.m., and 11 p.m. to 8 a.m. Other auto traffic including the 11 o'clock shift change was not captured by the studies made, but traffic generated at other periods is less critical. The average distance traveled by employees by auto was estimated at less than 20 miles.

Figure 2.1.1.3-3 illustrates the breakdown by AASHTO Classification of the total truck traffic generated by the mill. The predominant truck was the 3-S2 combination (86%). Also illustrated is the breakdown of total traffic moving to and from the mill. Trucks were 29 percent of total traffic.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.3-1.

Interviews with plant officials yielded information on trips generated and "radius of influence" of incoming and outgoing products. This radius of influence can be defined as the distance from activity centers to trip origins or destinations. Table 2.1.1.3-2 shows interview results. An average of 150 rail cars per month also shipped outgoing products.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway carrying an average daily traffic (ADT) of 15,000 per day in 1988. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.3-3 provides a summary of the counts that were taken. First, in Table 2.1.1.3-3A, vehicle classification counts are provided for the activity center. Second, in Table 2.1.1.3-3B, a count of all vehicles with the exception of special-use vehicles is provided. Table 2.1.1.3-3C shows a total count of all vehicles on the road.

Figure 2.1.1.3-4 shows the percentage of total traffic and total truck traffic on the highway when special-use vehicles are included (Table 2.1.1.3-3C values). The 3-S2 vehicle represents 63 percent of total trucks counted on this U.S. Highway.

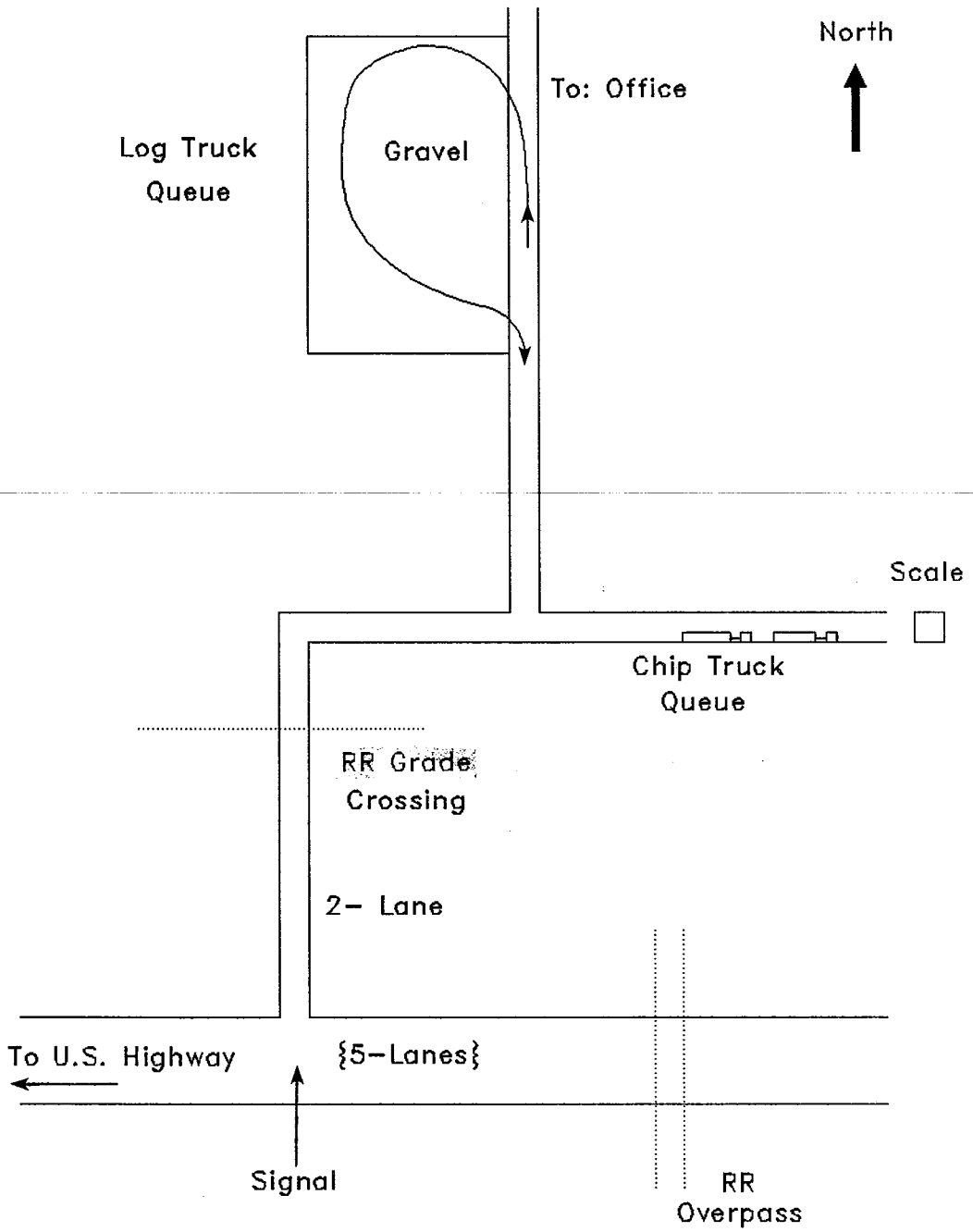
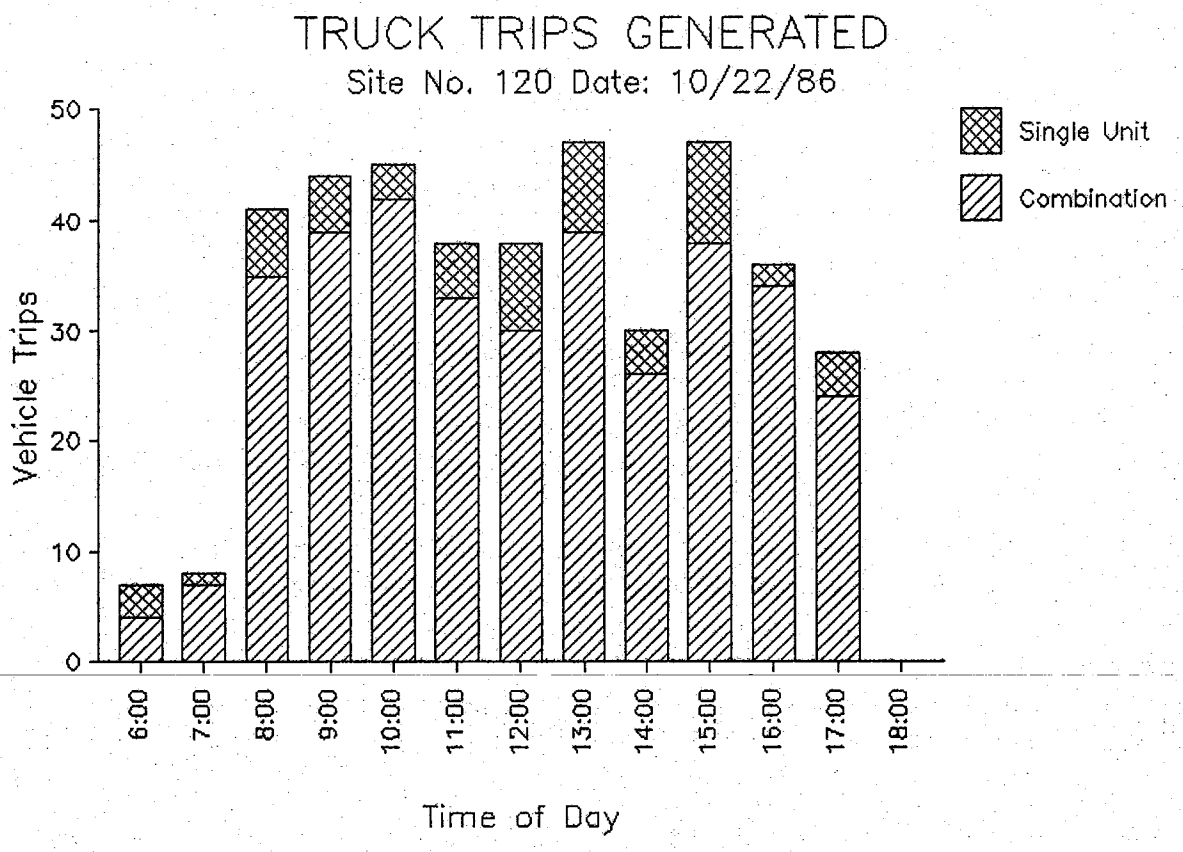


Figure 2.1.1.3-1. Site Map



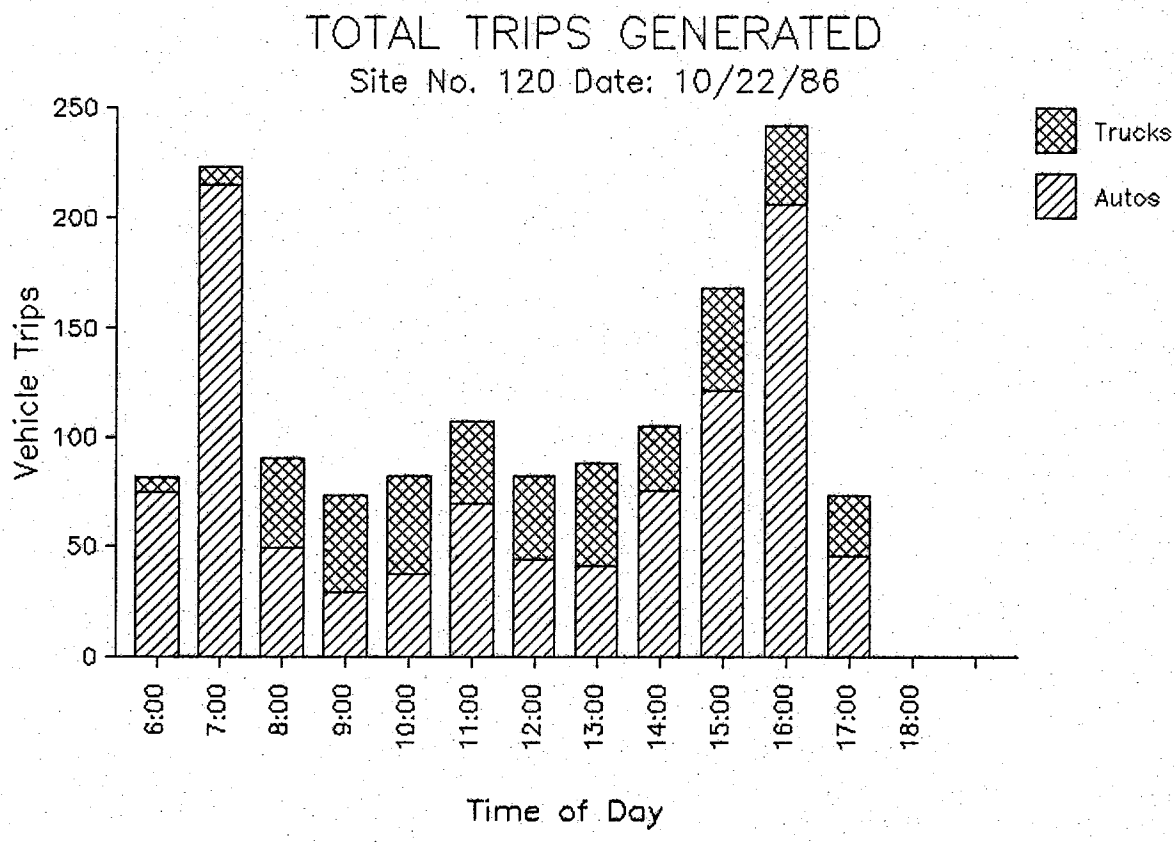
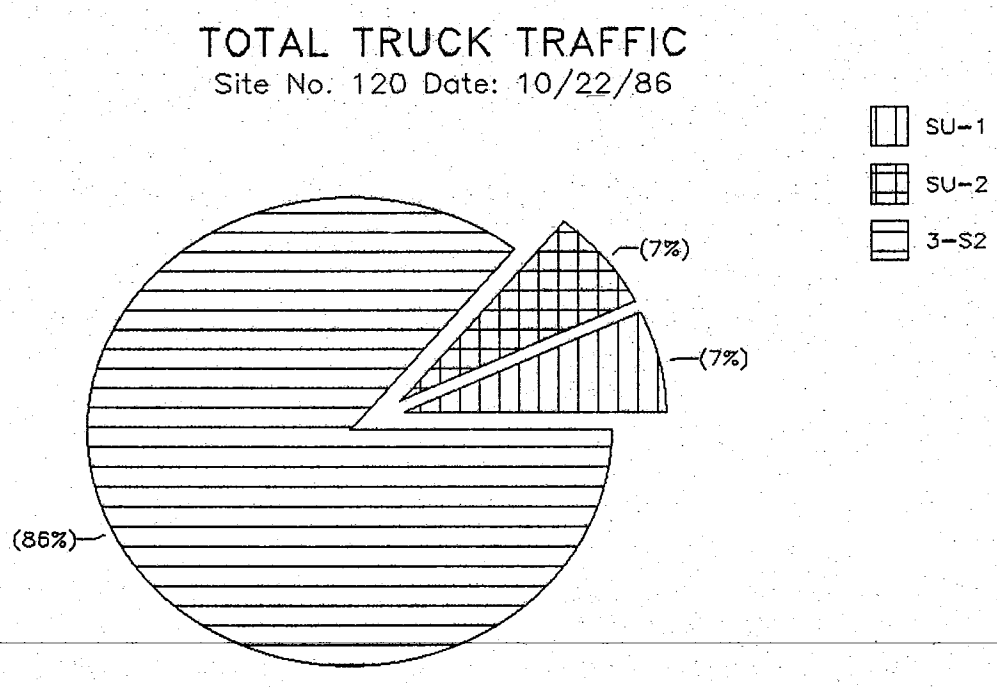


Figure 2.1.1.3-2. Hourly Trip Generation



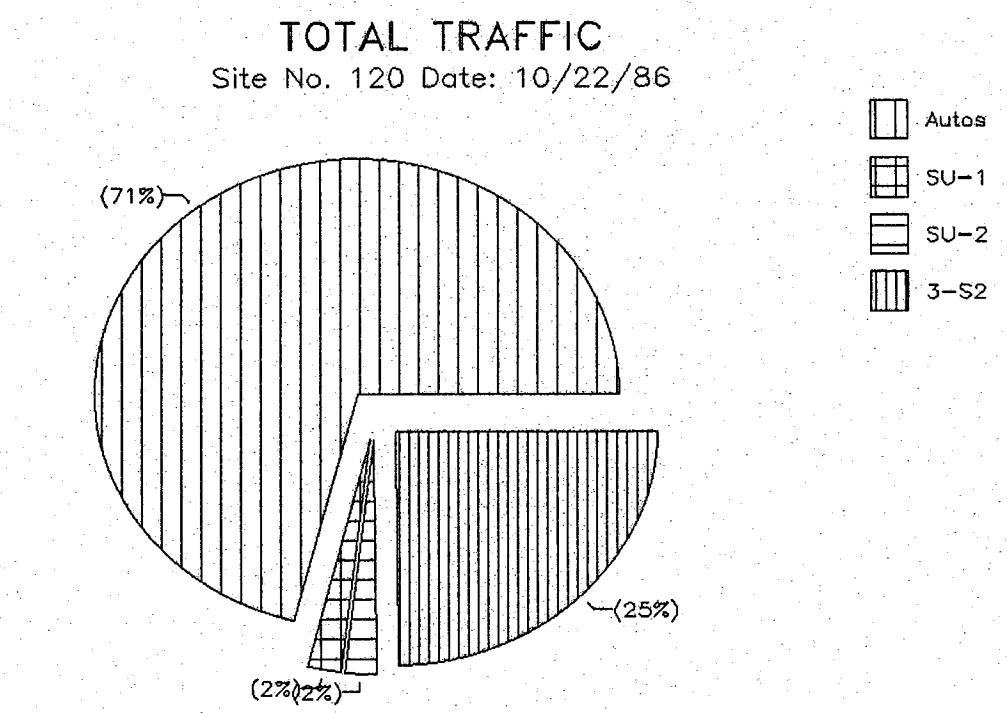


Figure 2.1.1.3-3. Activity Center Vehicle Percentages

Table 2.1.1.3-1. Industry Information On Raw Wood Input

Activity Center No. 120

Year	Raw Wood Type	No. of Cords	Pounds[1]
1985	Round Wood	356,915	1.87×10^9
	Wood Chips	113,328	0.52×10^9
	Annual Total		2.39×10^9
1986	Round Wood	394,417	2.07×10^9
	Wood Chips	107,327	0.49×10^9
	Annual Total		2.56×10^9

[1] Using conversion of 5,250 pounds per cord for round wood, 4,600 pounds per cord for wood chips.

Table 2.1.1.3-2. Interview Information

Daily Loads Hauled

Incoming (Loaded) Vehicles

Number of Loads

	Single Unit	3-S2	Reg. SU	Reg. 3-S2
Low		40		
Avg	15	63	3	7
High		77		

Radius of Influence[1]

Single Unit	3-S2
80% within 50 miles	80% within 50 miles

Outgoing (Loaded) Vehicles

Number of Loads

	Reg. 3-S2	Railcars
Low	35	120 per quarter
Avg	38	
High	41	

Radius of Influence[1]

3-S2
35% 50 miles
64% 400 miles

[1]Radius of influence can be defined as the distance from activity centers to trip origins or destinations.

Table 2.1.1.3-3. Traffic Classification Count Summary

Table 2.1.1.3-3A. Activity Center Only

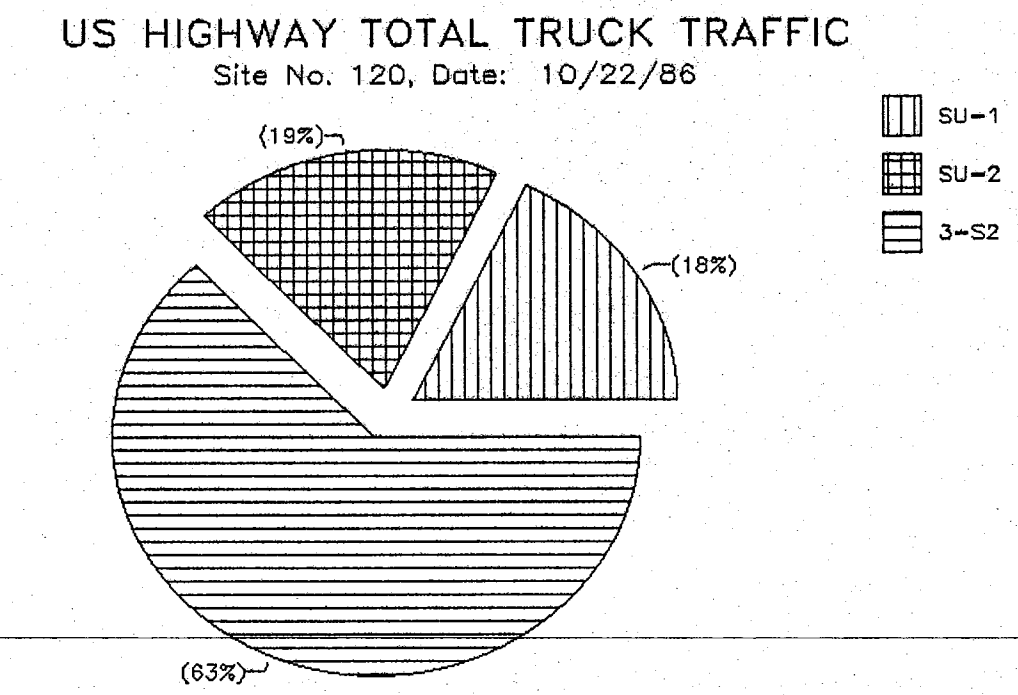
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
5/1/85	1012	37	27	235	1	1312	21%	79%	77%	23%
10/21/86	1093	38	30	332	0	1493	17%	83%	73%	27%
10/22/86	1005	29	29	351	0	1414	14%	86%	71%	29%

Table 2.1.1.3-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/21/86	8728	197	206	457	0	9588	47%	53%	91%	9%
10/22/86	8647	161	174	320	0	9302	51%	49%	93%	7%

Table 2.1.1.3-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/21/86	9821	234	233	692	0	10930	40%	60%	89%	11%
10/22/86	9652	190	203	671	0	10716	37%	63%	90%	10%



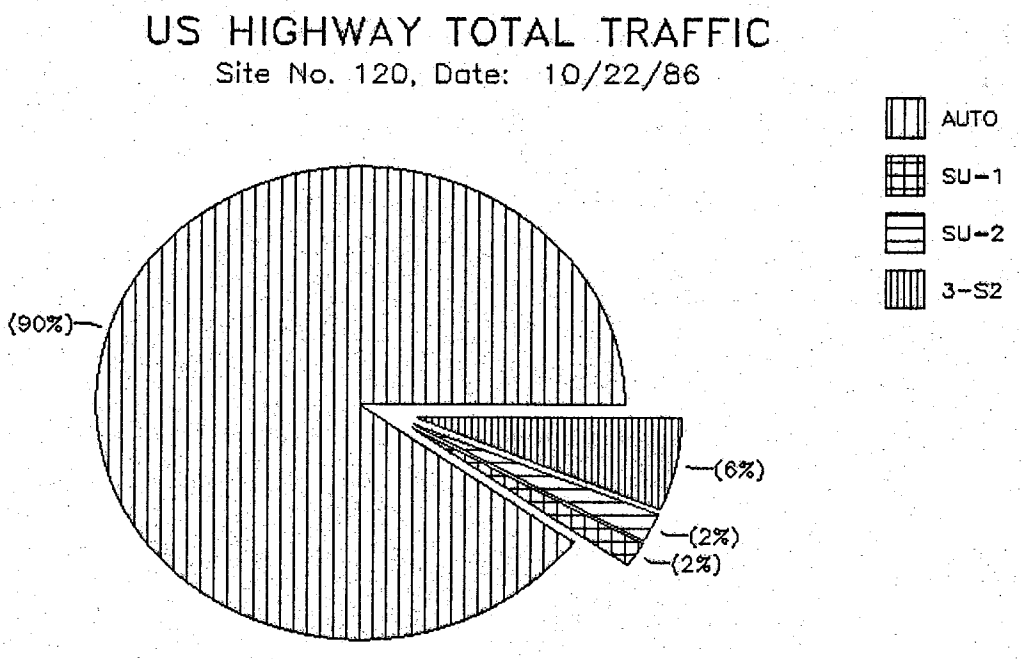


Figure 2.1.1.3-4. Highway Vehicle Percentages

2.1.1.4 Pulpwood Mill, Site No. 121

Introduction. The site map shown in Figure 2.1.1.4-1 indicates access directly to a State Highway by way of one access point for trucks and another for employees. The activity center is near the east skirts of a medium-sized city and log trucks hauling raw timber into this mill come almost exclusively from the west. The site is served by a railroad which carries no raw materials to the mill, but does haul finished products from the mill. Very little other special-use truck traffic was observed on the State Highway serving this mill.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.4-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill generally receives log and wood chip trucks from 6 a.m. to 6 p.m., although the mill sometimes receives incoming raw materials as late as 10 p.m.. The mill basically operates six days a week with Saturday being slower than Monday through Friday. In rare circumstances, wood is received on Sundays. Figure 2.1.1.4-2 also shows the number of trucks and autos that were generated by the mill during the same 12-hour period on September 29, 1986. The number of persons employed by the mill totaled 1,050. They were organized into three shifts -- 7 a.m. to 3 p.m., 3 p.m. to 11 p.m., and 11 p.m. to 7 a.m. Other auto traffic including the 11 o'clock shift change was not captured by the studies made, but other street traffic is less critical at this time. The distance traveled to work by employees was not available.

Figure 2.1.1.4-3 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the mill. The predominant truck was the 3S-2 combination (86%). Also illustrated is the breakdown of total traffic generated by the mill. Trucks represent 25% of total traffic.

Information requested from industry representatives for the years of 1985 to 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.4-1. Interviews with plant officials yielded information on truck loads (not trips) and radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.4-2. Outgoing products were also shipped by rail -- an average of six rail cars per day was estimated.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a state highway carrying an average daily traffic (ADT) of 10,900 vehicles per day in 1986. Manual classification counts were conducted in 1984 and 1986, primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.4-3 provides a summary of the counts that were taken. Table 2.1.1.4-3A is a vehicle classification count of the activity center, Tables 2.1.1.4-3B and 2.1.1.4-3C are roadway classification counts.

Figure 2.1.1.4-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.4-3C values). The 3-S2 vehicle represents 79% of total trucks. Trucks were 11% of total traffic.

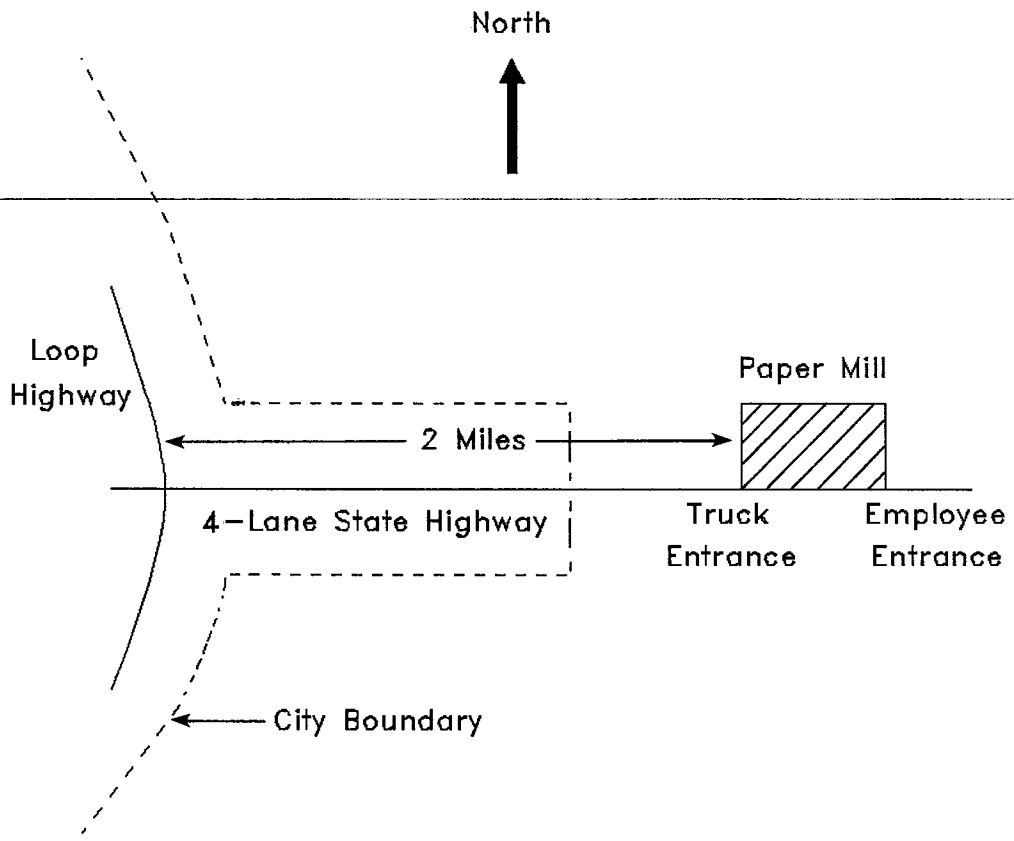
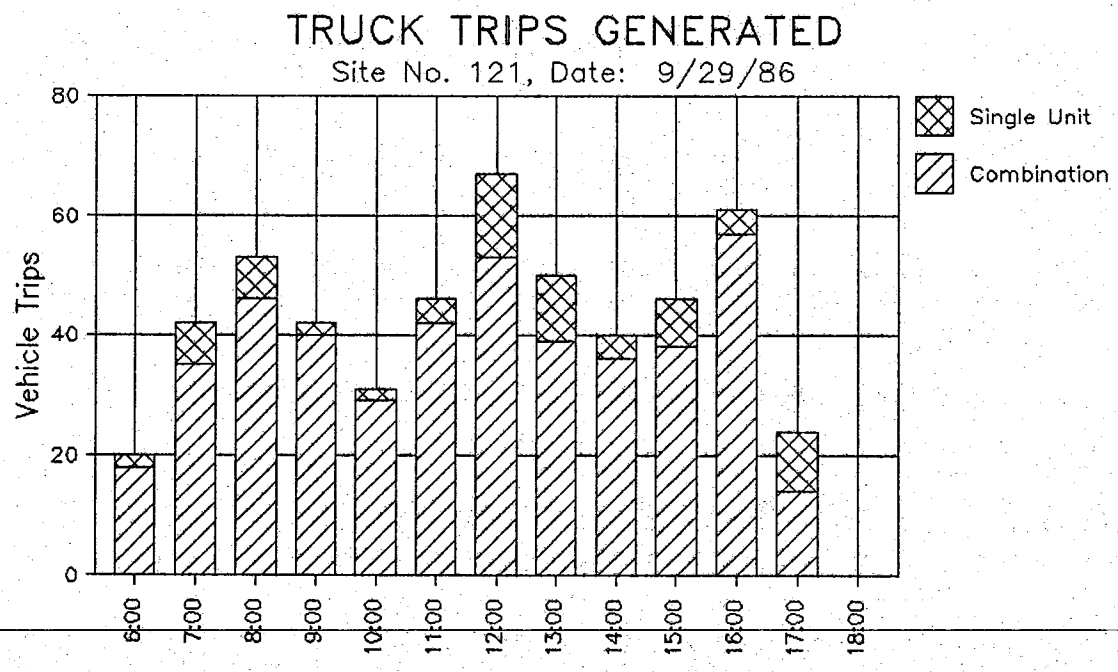


Figure 121-1. Site Map

Figure 2.1.1.4-1. Site Map



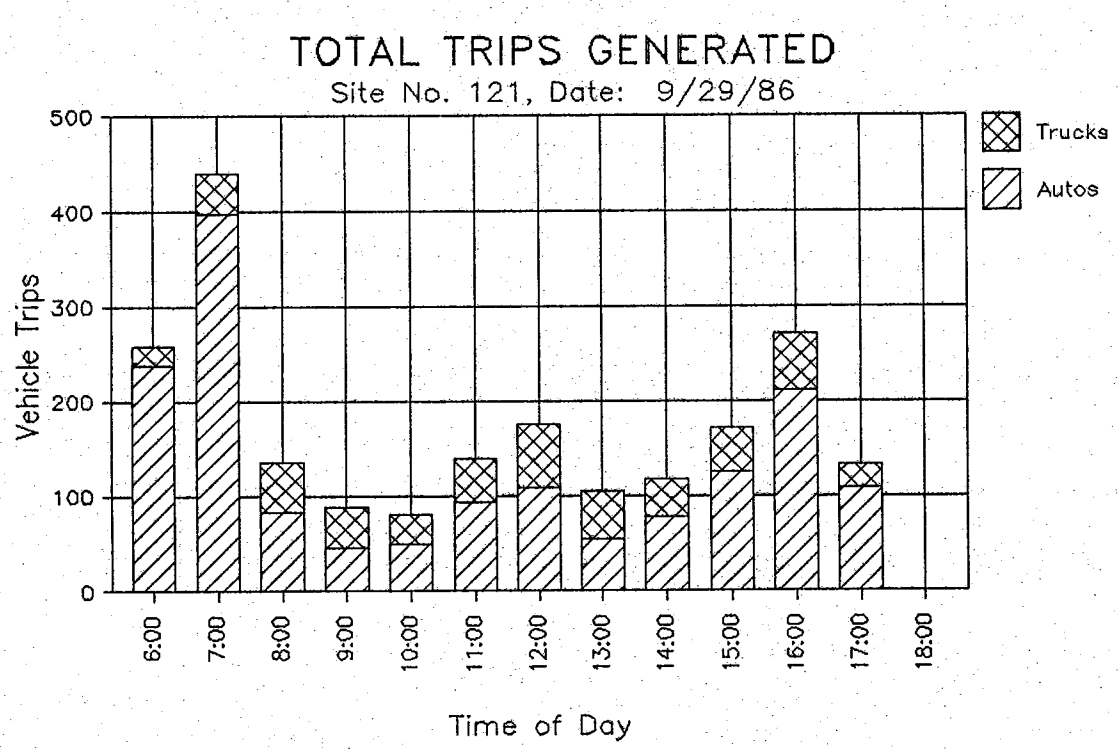
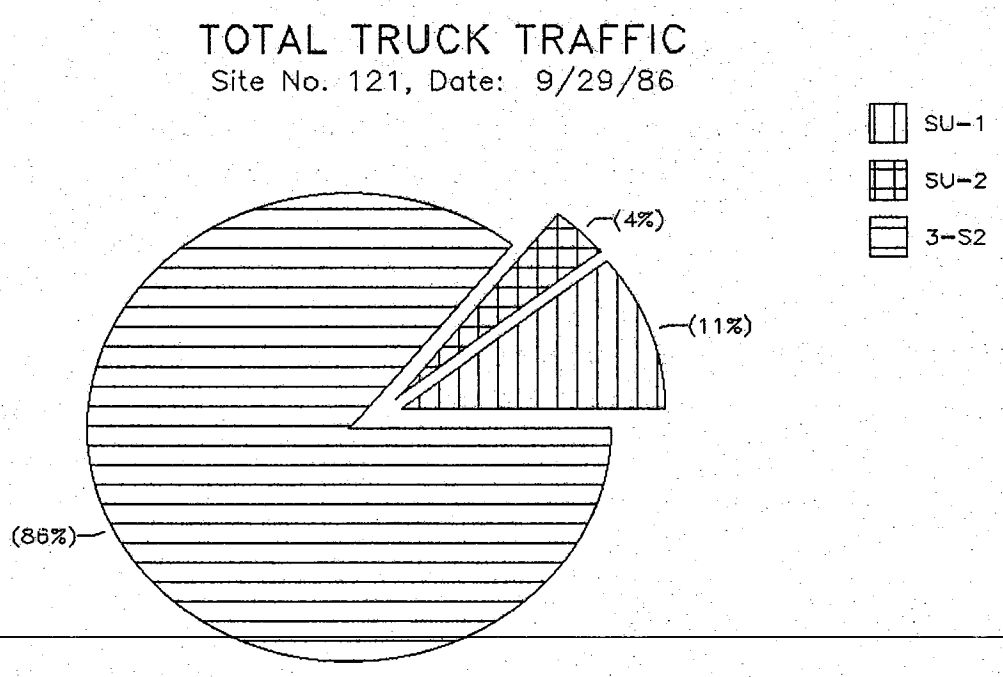


Figure 2.1.1.4-2. Hourly Trip Generation



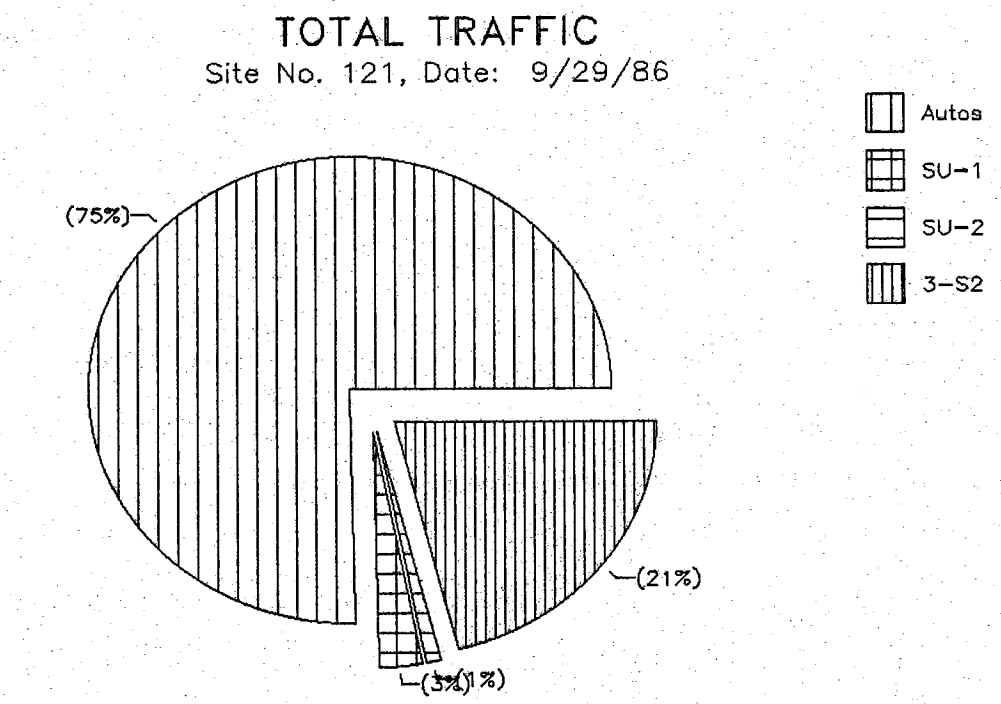


Figure 2.1.1.4-3. Activity Center Vehicle Percentages

Table 2.1.1.4-1. Industry Information On Raw Wood Input

Year	Wood Type	Cords	Pounds[1]
1985	Round Wood	344,679	1.81×10^9
	Wood Chips	104,681	0.48×10^9
	Annual Total		2.29×10^9
1986	Round Wood	346,112	1.82×10^9
	Wood Chips	119,767	0.55×10^9
	Annual Total		2.37×10^9

[1] Using conversion of 5,250 pounds per cord for round wood, 4,600 pounds per cord for wood chips.

Table 2.1.1.4-2. Interview Information On Daily Loads

Incoming (Loaded) Vehicles

Number of Loads

	Single Unit	3-S2	Railcars
Low	6	80	
Avg	28	150	7
High	40	178	

Radius of Influence

Single Unit	3-S2
100% 100 miles	100% 100 miles

Outgoing (Loaded) Vehicles

Number of Loads

	Reg. 3-S2	Railcars
Low	6	
Avg	30	6
High	40	

Radius of Influence

3-S2
20% 200 miles
50% 500 miles

Table 2.1.1.4-3A. Activity Center Only

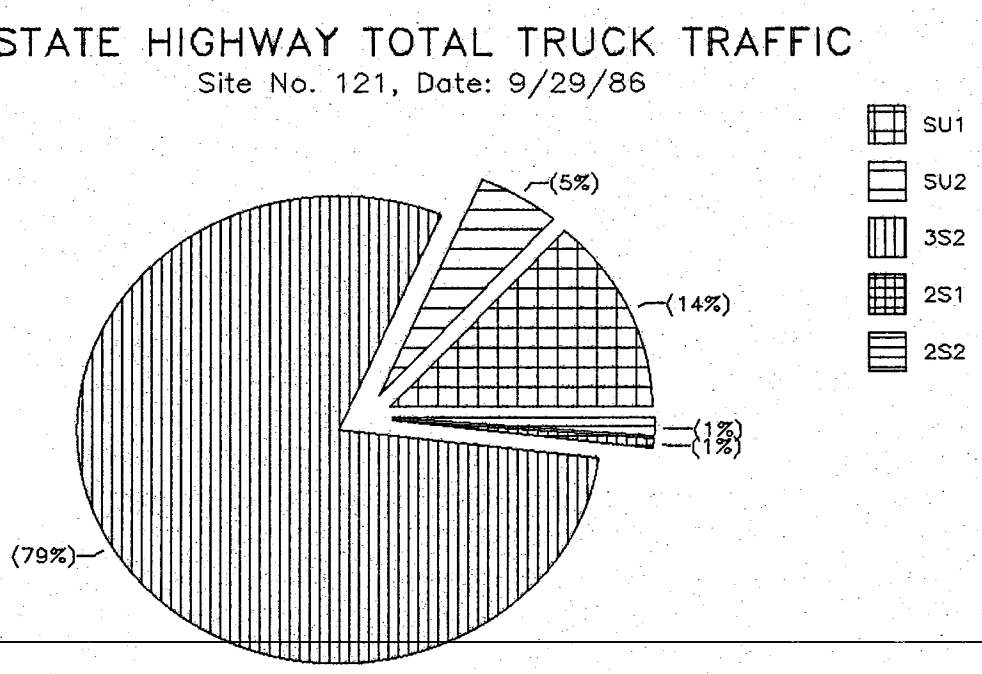
Date	Vehicle Classification						% of Trucks		% of Total	
	Auto	SU-1	SU-2	3-S2	Other 2-S2	Total	SU	Comb.	Cars	Trucks
1/13/84	1796	53	52	360	15	2276	22%	78%	79%	21%
9/29/86	1592	56	19	447	0	2114	14%	86%	75%	25%
9/30/86	1511	63	27	463	0	2064	16%	84%	73%	27%

Table 2.1.1.4-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Auto	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/29/86	5219	60	25	207	17	5528	28%	72%	94%	6%
9/30/86	5011	77	34	199	17	5338	34%	66%	94%	6%

Table 2.1.1.4-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Auto	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/29/86	6811	116	44	654	17	7642	20%	80%	89%	11%
9/30/86	6522	140	61	662	17	7402	23%	77%	88%	12%



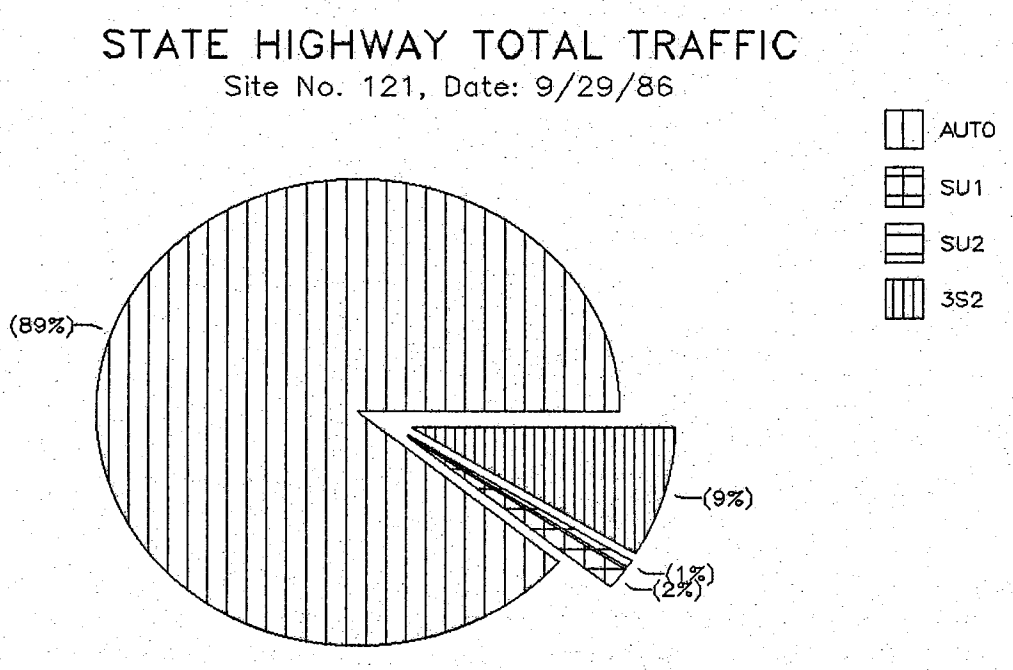


Figure 2.1.1.4-4. Highway Vehicle Percentages

2.1.1.5 Plywood Mill, Site No. 130

Introduction. The site map shown in Figure 2.1.1.5-1 indicates access directly to a Farm-to-Market (FM) Highway. The activity center is approximately one-half mile north of a small Texas city; most log trucks approach this mill from the south. The site is served by a railroad which carries no raw materials to the plant but does haul some finished products from the mill.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.5-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrated the fluctuations in this traffic on an hourly basis. This mill generally receives log trucks from 6 a.m. to 6 p.m.

Figure 2.1.1.5-2 also shows the number of trucks and autos generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) on October 16, 1986. The number of persons employed by the mill totaled 310. They were organized into three shifts -- 7 a.m. to 3 p.m., 3 p.m. to 11 p.m. and 11 p.m. to 7 a.m. Office hours were 7 a.m. to 6 p.m. Other auto traffic including the 11 p.m. shift change was not captured by the studies made, but traffic generated at other periods is less critical. It was estimated that 80% of the employees live within 25 miles of the plant.

Figure 2.1.1.5-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3S-2 combination (58%). Also illustrated is the breakdown of total traffic moving to and from the mill. The auto was the major user (87%).

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.5-1. Interviews with plant officials yielded information on truck loads generated by radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.5-2. Outgoing products were also shipped by rail -- an average of 20 railcars per year was estimated.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 1,900 in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.5-3 provides a summary of the counts that were taken. In Table 2.1.1.5-3A, vehicle classification counts are provided for the traffic moving to and from the activity center. In Tables 2.1.1.5-3B and 3C, roadway counts with and without special-use vehicles are provided.

Figure 2.1.1.5-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.5-3C values). The 3-S2 vehicles represent 55% of total trucks counted on this state highway. Trucks were 8 percent of total roadway traffic on the day evaluated.

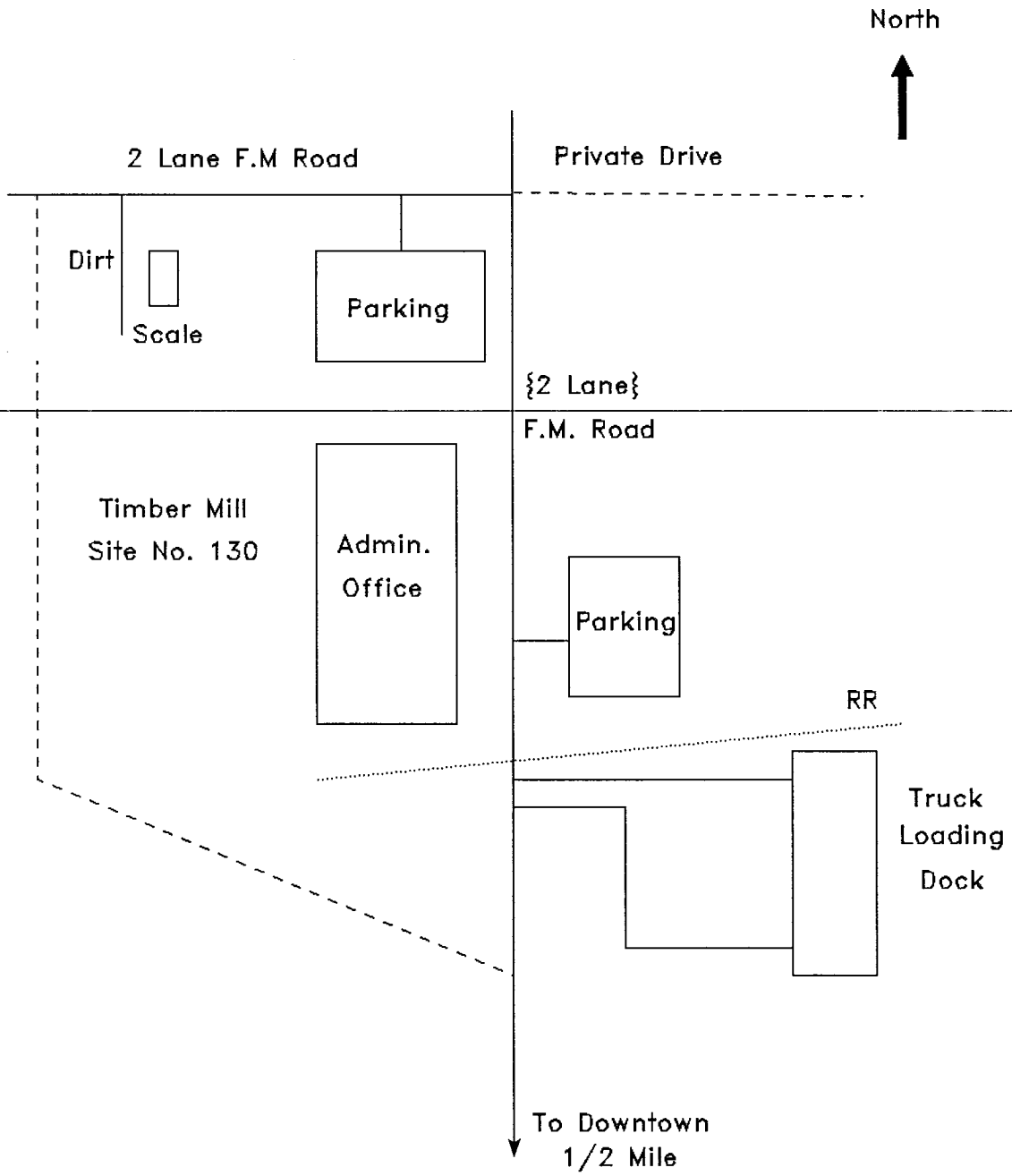
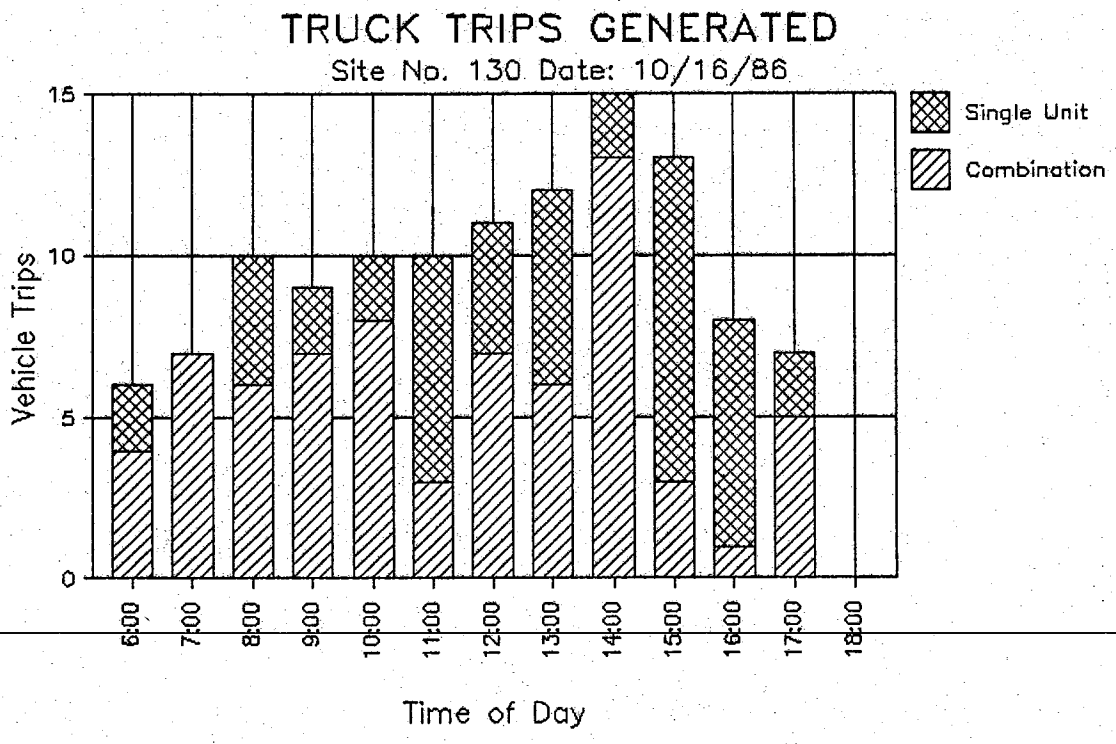


Figure 2.1.1.5-1. Site Map



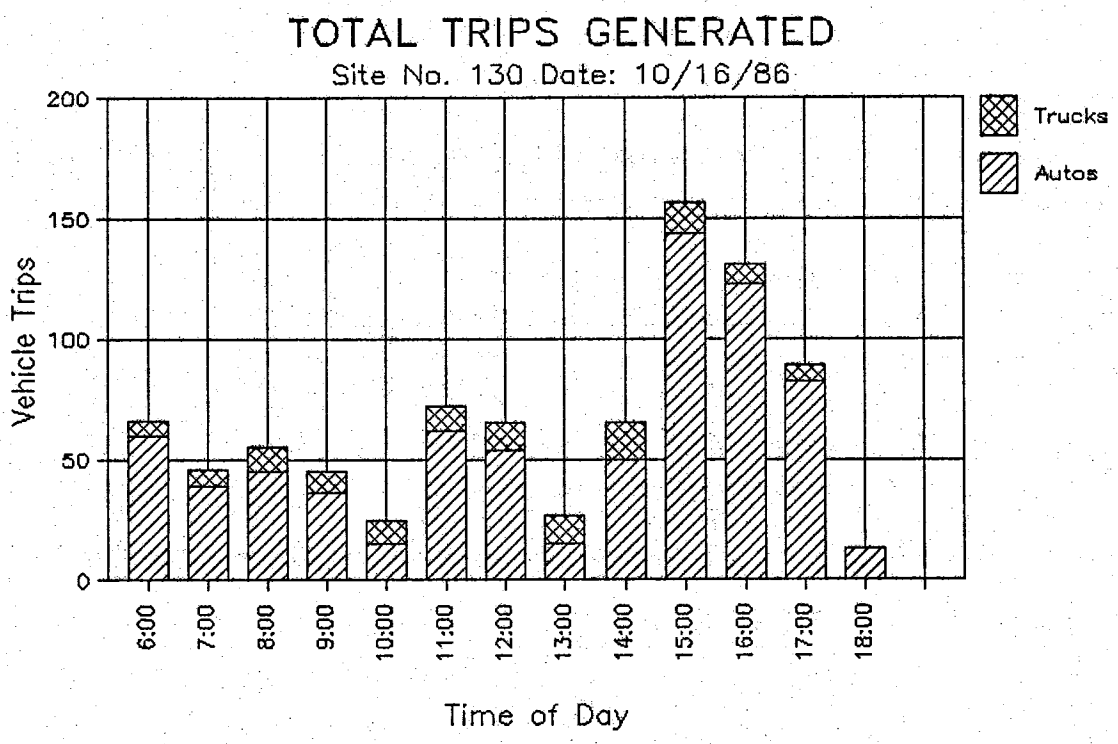
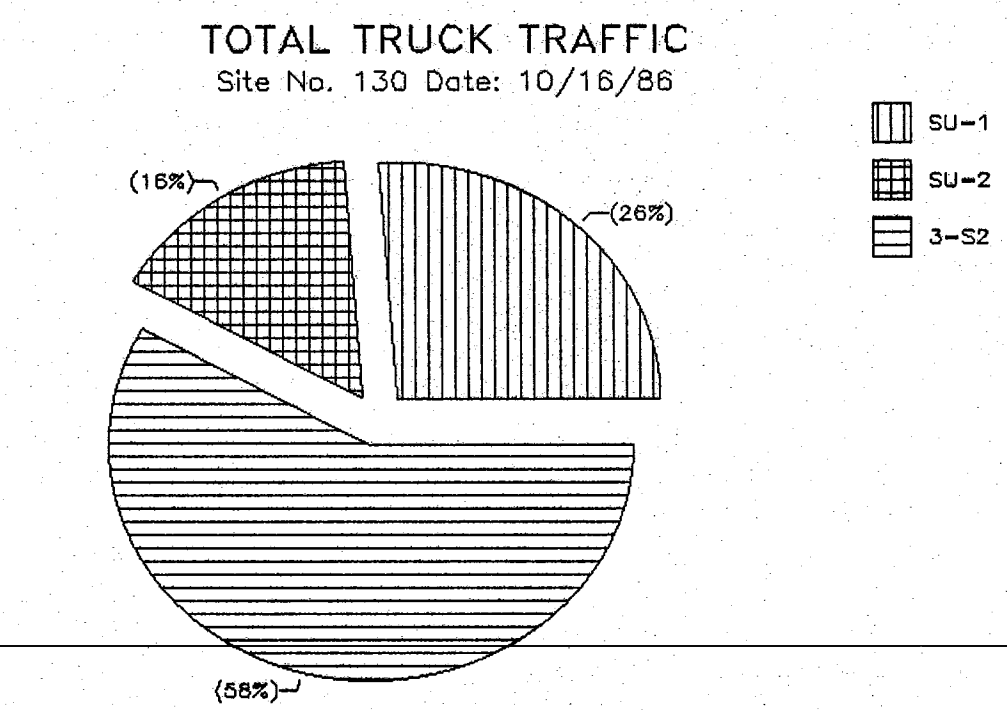


Figure 2.1.1.5-2. Hourly Trip Generation



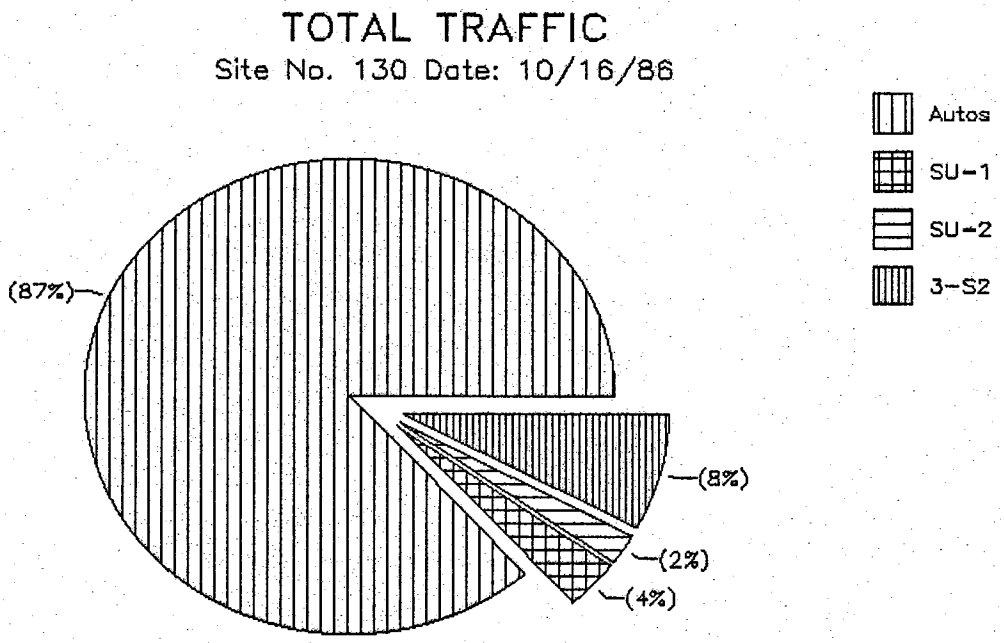


Figure 2.1.1.5-2. Activity Center Vehicle Percentages

Table 2.1.1.5-1. Industry Information On Raw Wood Input

Activity Center No. 130

Year	Raw Wood Type	No. of Board-Feet	Pounds[1]
1985	Round Wood	8,000,000	1.44×10^8
1986	Round Wood	11,000,000	1.98×10^8

[1]Hardwood: 9 Tons/1000 Board-Feet.

Table 2.1.1.5-2. Interview Information

Daily Loads Hauled

Incoming (Loaded) Vehicles

Number of Loads

	3S-2
Low	10
Avg	25
High	50

Radius of Influence

3S-2

40% 100 Miles
100% 200 Miles

Outgoing (Loaded) Vehicles

Number of Loads

	Reg. 3-S2	Railcars
Low	5	
Avg	8	20/yr.
High	10	

Radius of Influence

3-S2

50% 50 miles
100% 600 miles

Table 2.1.1.5-3. Traffic Classification Count Summary

Site No. 130

Table 2.1.1.5-3A. Activity Center Only

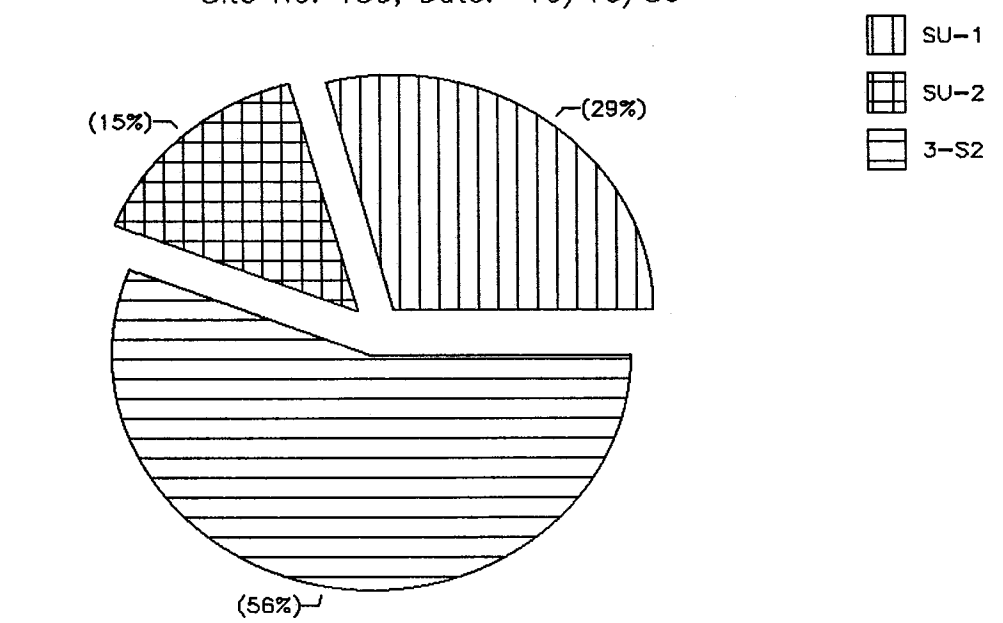
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other 2-S2	Total	SU	Comb.	Cars	Trucks
6/5/85	299	13	0	41	0	353	24%	76%	85%	15%
10/15/86	626	11	8	38	3	686	32%	68%	91%	9%
10/16/86	738	30	18	67	3	856	41%	59%	86%	14%

Table 2.1.1.5-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/15/86	813	16	1	13	0	843	57%	43%	96%	4%
10/16/86	896	9	2	8	0	915	58%	42%	98%	2%

Table 2.1.1.5-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/15/86	1439	27	9	51	3	1529	40%	60%	94%	6%
10/16/86	1634	39	20	75	3	1771	44%	56%	92%	8%



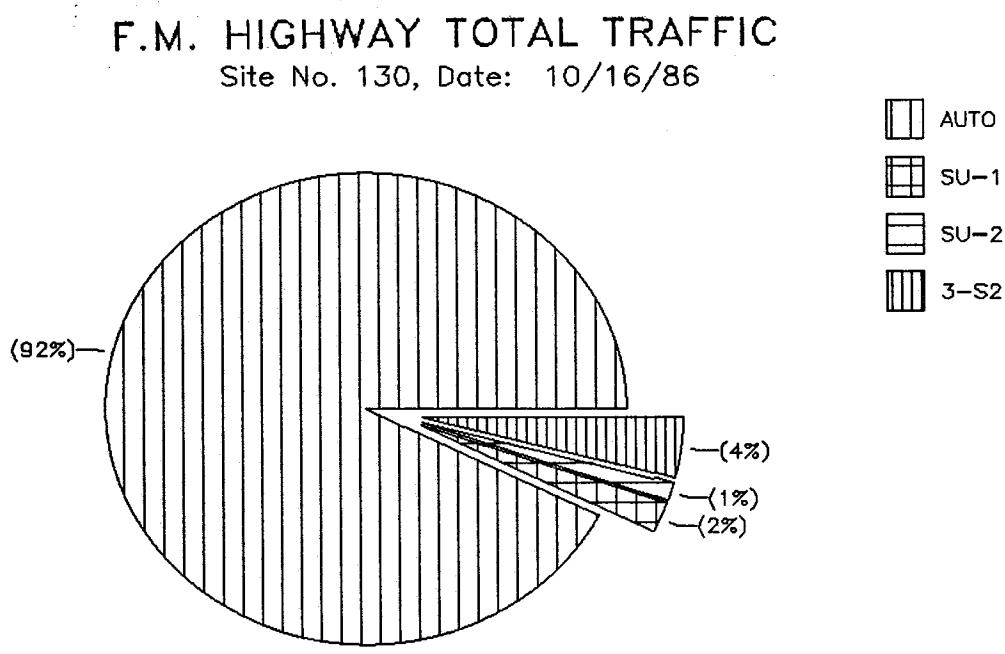


Figure 2.1.1.5-4. Highway Vehicle Percentages

2.1.1.6 Plywood Mill, Site No. 131

Introduction. The site map shown in Figure 2.1.1.6-1 indicates access directly to a Farm-to-Market (FM) Highway. The activity center is approximately one-half mile south of a small city with log trucks hauling raw timber into this mill, approaching from the west (from the US highway). The site is served by a railroad which carries no raw materials to the mill, but does haul finished products from the mill.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.6-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill generally receives log trucks and ships finished products from 6 a.m. to 6 p.m. The site includes a plywood mill, a study mill and a chip mill. Estimates by mill shipment officials indicate that 45% of the total log trucks entering the plant are for plywood. The total site impact is evaluated in this section simply because these mill combinations are fairly typical and there is no reasonably accurate way to isolate plywood total traffic (cars and trucks) from total site traffic. Interview information provided later in this section could be used if estimates are needed.

Figure 2.1.1.6-2 also shows the number of trucks and autos that were generated by the site during a 12-hour period (6 a.m. to 6 p.m.) on October 8, 1986. The number of persons employed for the entire operation totaled 395. They were organized into three shifts -- 7 a.m. to 3 p.m. to 11 p.m. and 11 p.m. to 7 a.m. Other auto traffic including the 11 p.m. shift change was not captured by the studies made, but traffic generated at other periods (before or after the 6 a.m. to 6 p.m. period) is less critical. The employees were located within a 50-mile radius of the mill.

Figure 2.1.1.6-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (97%). Also illustrated is the breakdown of the total traffic moving to and from the mill. The 3-S2 was the major vehicle type at 53%, with autos at 45%.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.6-1.

Interviews with plant officials yielded information on trips generated and radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.6-2. Outgoing products were also shipped by rail. Estimates indicated that 1% of the studs, 5% of the plywood, and 90% of the chips were moved by railcars.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market highway carrying an average daily traffic (ADT) of 2,000 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 186 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.6-3 provides a summary of the counts that were taken. In Table 2.1.1.6-3A, vehicle classification counts are provided for traffic generated by the activity

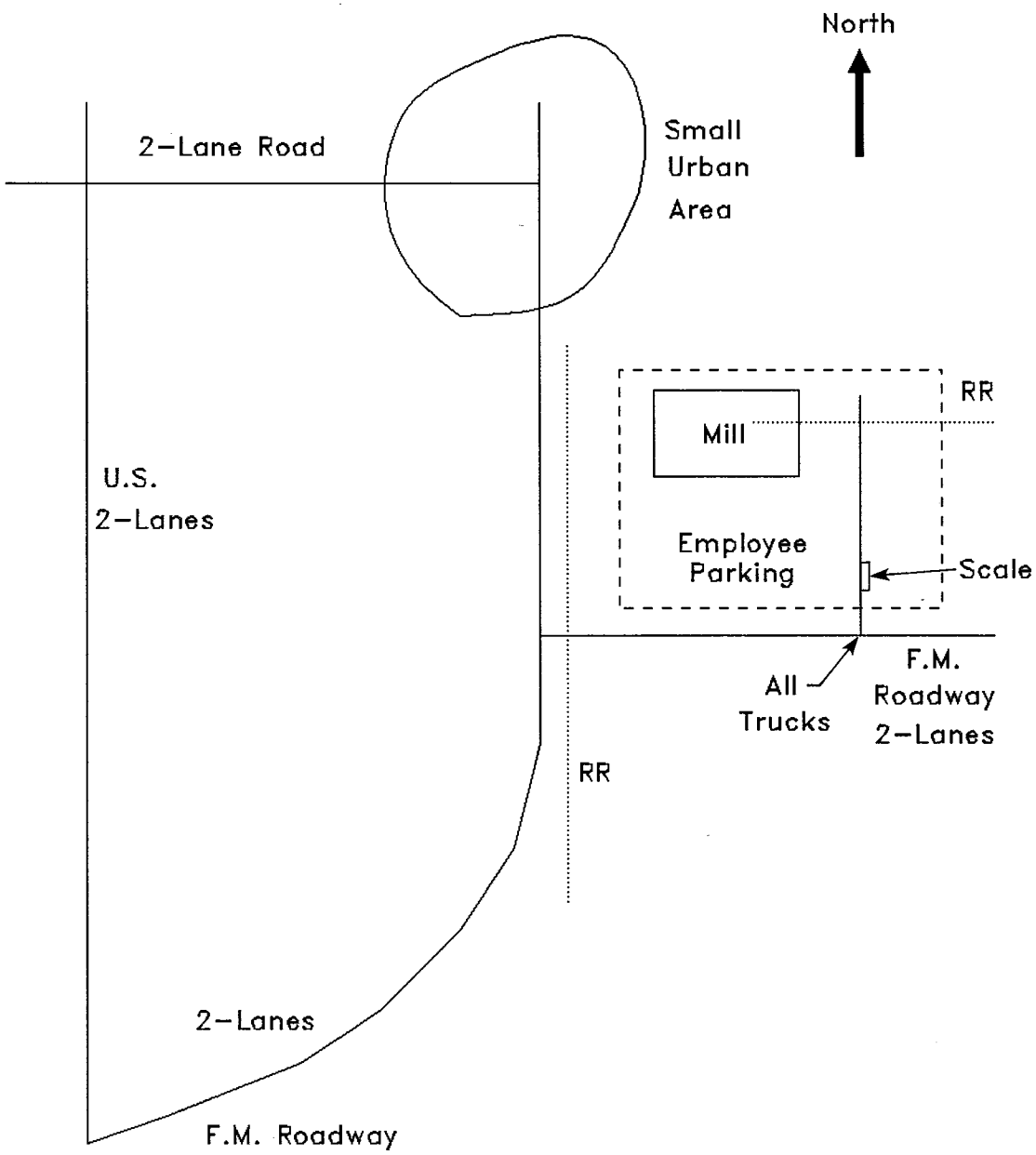
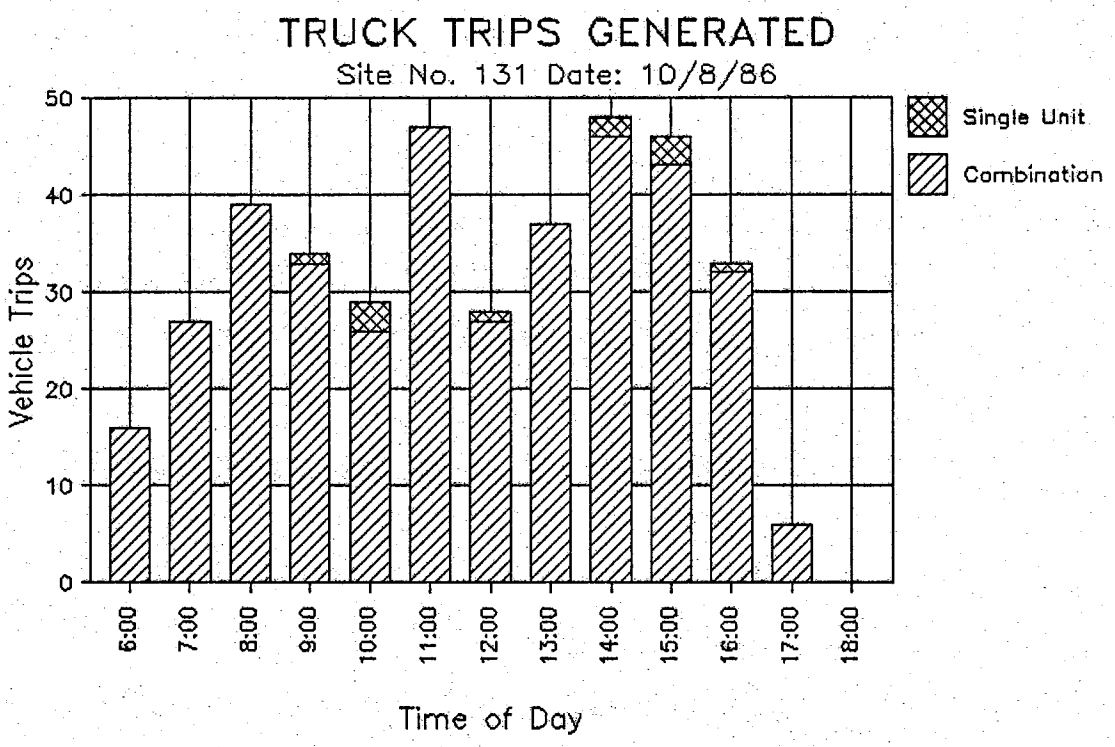


Figure 2.1.1.6-1. Site Map



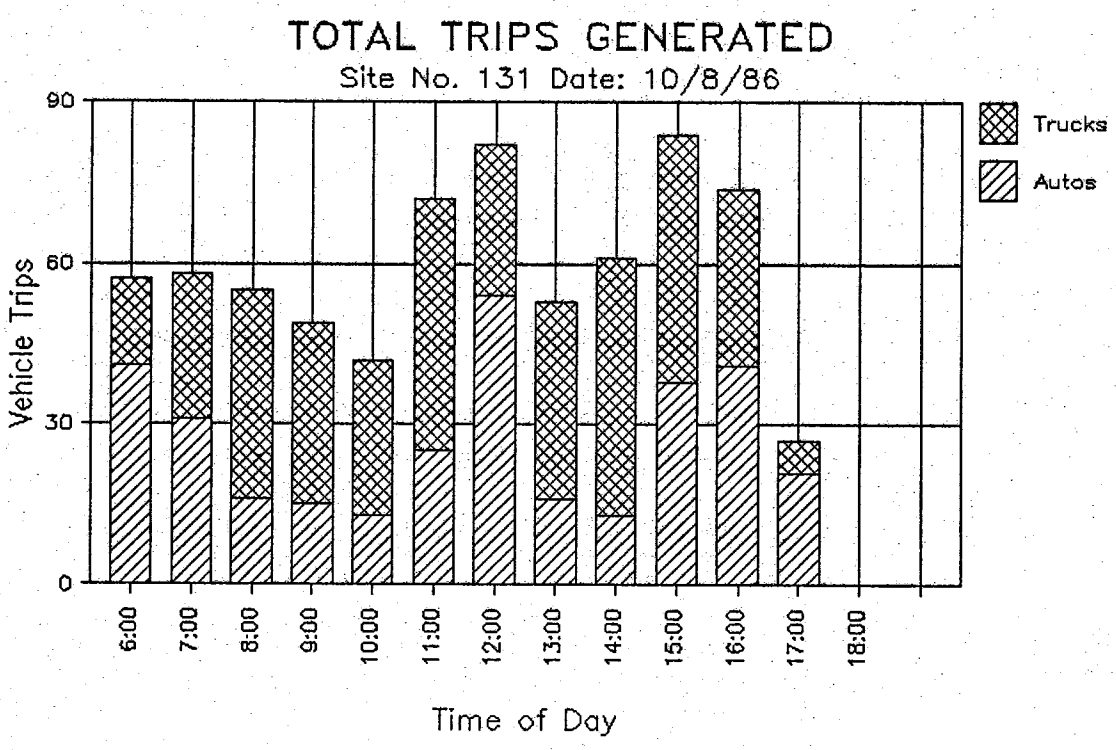


Figure 2.1.1.6-2. Hourly Trip Generation

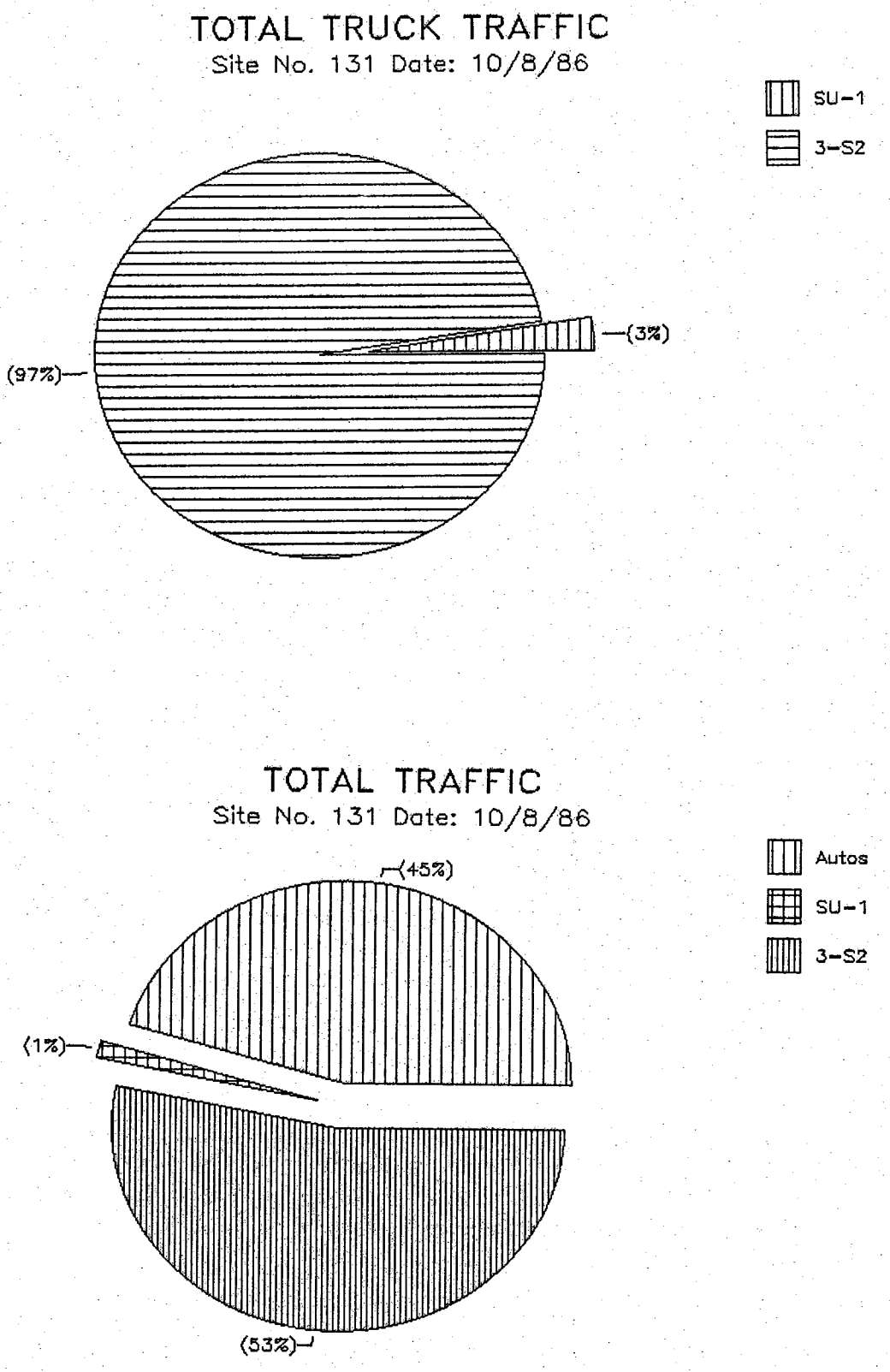


Figure 2.1.1.6-3. Activity Center Vehicle Percentages

center. In Table 2.1.1.6-1B a count of all non-special-use vehicles on the main roadway is provided, and in Table 2.1.1.6-3C, a total count of all vehicles on the main roadway is provided.

Figure 2.1.1.6-4 shows the percentages of total truck and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.6-3C values). The 3-S2 vehicle represents 93% of total trucks counted on this FM highway. The passenger car makes up 71% of the total traffic stream (cars plus trucks).

Table 2.1.1.6-1. Industry Information On Raw Wood Input

Activity Center No. 131

Year	Raw Wood Type	No. of Board-Feet	Pounds[1]
1985	Round Wood	72,651,000	1.16×10^9
1986	Round Wood	91,443,000	1.46×10^9

[1]Pine: 8 Tons/1000 Board-Feet

Table 2.1.1.6-2. Interview Information

Daily Loads Hauled

Incoming (Loaded) Vehicles[1]

Number of Loads

	Single Unit	3-S2
Low	0	70
Avg	3	140
High	7	200

Radius of Influence

Single Unit	3-S2
100% 100 miles	60% 50 miles 90% 100 miles 100% 150 miles

Outgoing (Loaded) Vehicles[1]

Number of Loads

	Reg. SU	Reg. 3-S2	Railcars
Low	0	25	1% of Studs
Avg	3	35	5% of Plywood
High	6	42	40% of Chips

Radius of Influence

Single Unit	3-S2
95% 100 Miles	75% 200 Miles

[1]The number of trips is double the number of loads.

Table 2.1.1.6-3. Traffic Classification Count Summary

Table 2.1.1.6-3A. Activity Center Only

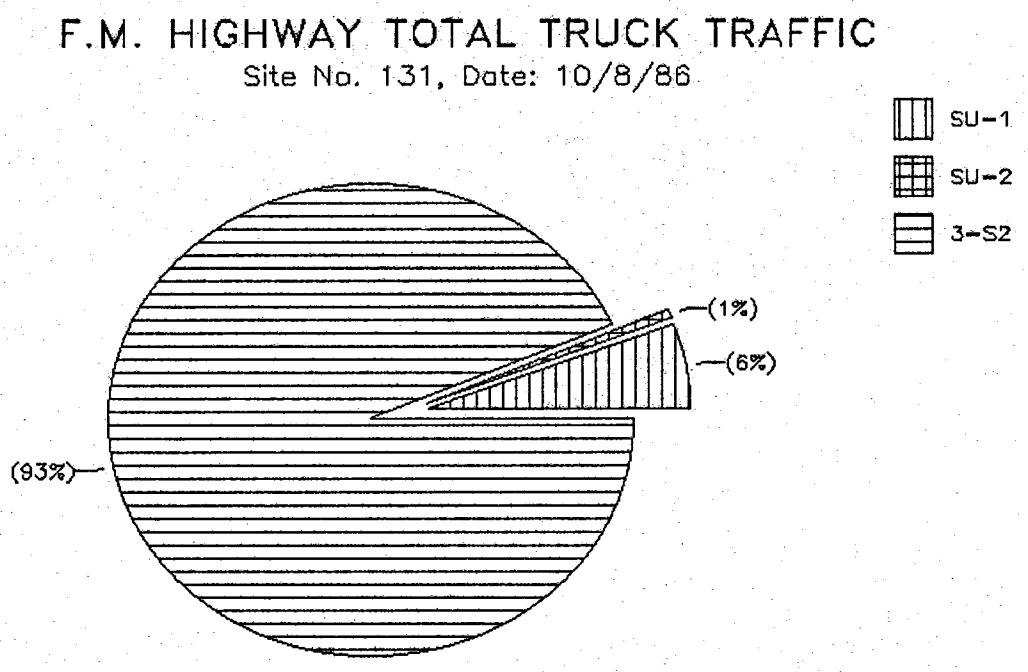
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
5/13/85	402	3	2	384	0	791	1%	99%	51%	49%
10/8/86	324	10	1	379	0	714	3%	97%	45%	55%
10/7/86	327	8	1	420	0	756	2%	98%	43%	57%

Table 2.1.1.6-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/8/86	780	16	2	11	0	809	62%	38%	96%	4%
10/7/86	702	11	7	14	8	742	45%	55%	95%	5%

Table 2.1.1.6-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/8/86	1104	26	3	415	0	1548	7%	93%	71%	29%
10/7/86	1029	19	8	446	8	1510	6%	94%	68%	32%



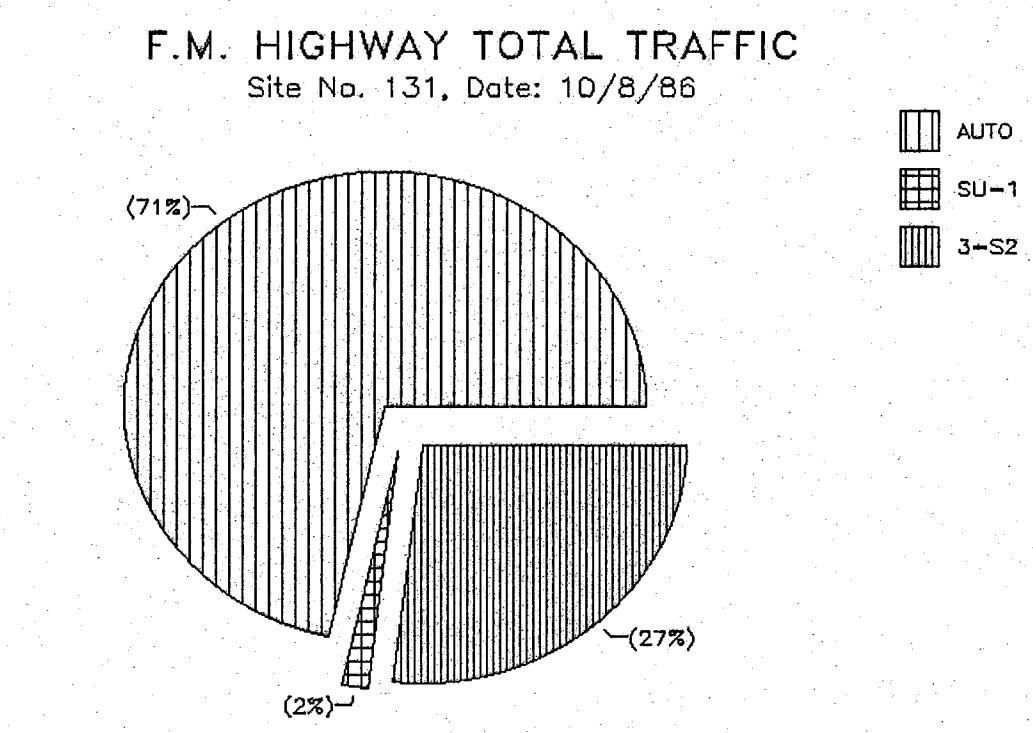


Figure 2.1.1.6-4. Highway Vehicle Percentages

2.1.1.7 Plywood Mill, Site No. 132

Introduction. The site map shown in Figure 2.1.1.7-1 indicates access directly to a Farm-to-Market Highway. The activity center is approximately three miles southwest of a small city. Log trucks approach from each direction on the FM highway. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.7-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill generally receives incoming raw materials during this 12-hour period.

Figure 2.1.1.7-2 also shows the number of trucks and autos that were generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) on April 28, 1988. The number of persons employed at this mill was not available.

Figure 2.1.1.7-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (91%). Also illustrated is the breakdown of total traffic moving to and from the mill. The auto was the major user (71%).

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.7-1.

It was not possible to obtain information on trips generated and radius of influence of incoming and outgoing products.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a FM Highway carrying ana average daily traffic (ADT) of 1,300 vehicles per day in 1986. Manual classification counts were conducted in 1985, 1986, and 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.7-2 provides a summary of the counts that were taken. In Table 2.1.1.7-2A vehicle classification counts are provided for the traffic generated by the activity center. In Table 2.1.1.7-2B, a count of all vehicles with the exception of special-use vehicles is provided for the main roadway. Finally, in Table 2.1.1.7-2C, a total count of all vehicles on the main roadway is provided.

Figure 2.1.1.7-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.7-2C values). The 3-S2 vehicles represent 88% of total trucks counted on this highway. The passenger car makes up 71% of the total traffic stream (cars plus trucks).

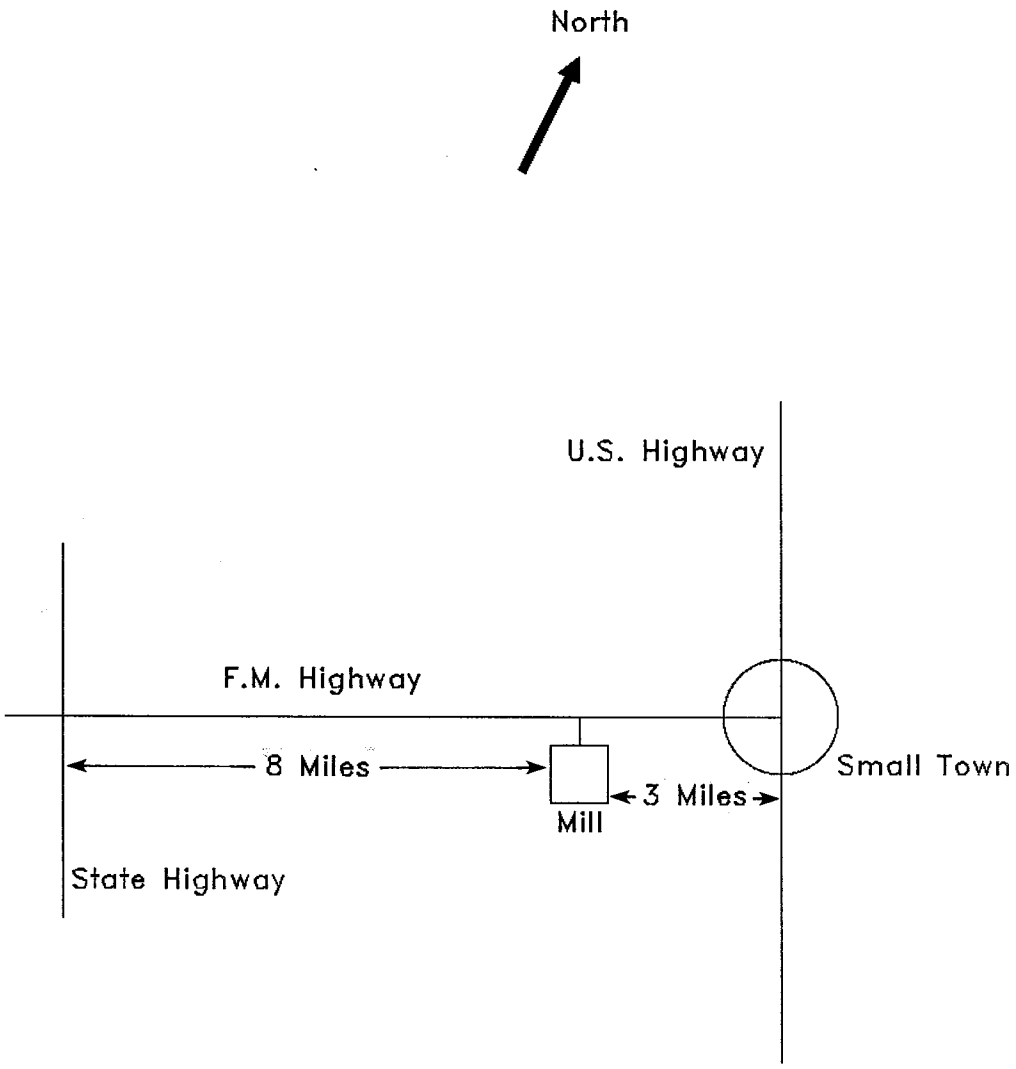


Figure 2.1.1.7-1. Site Map

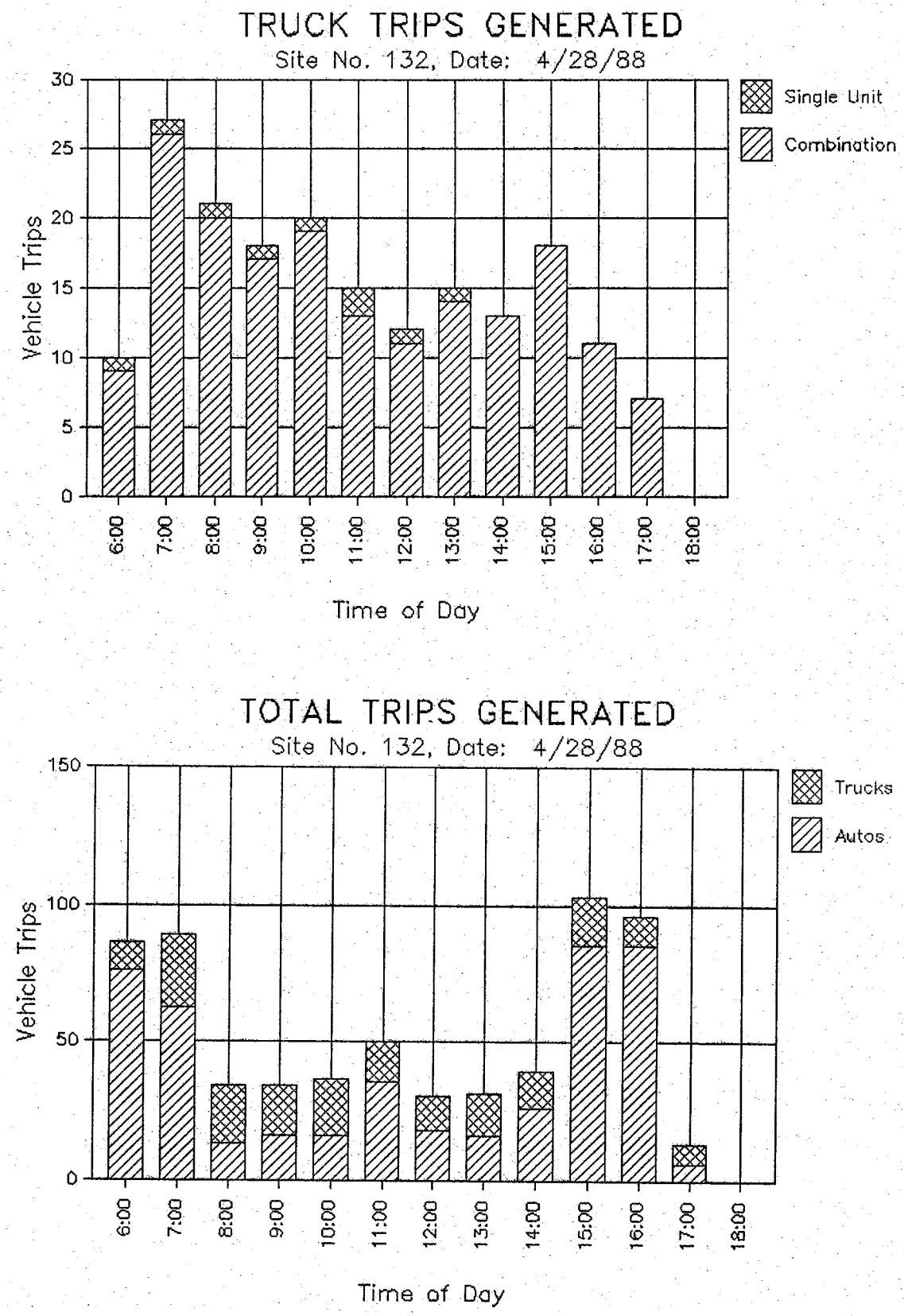
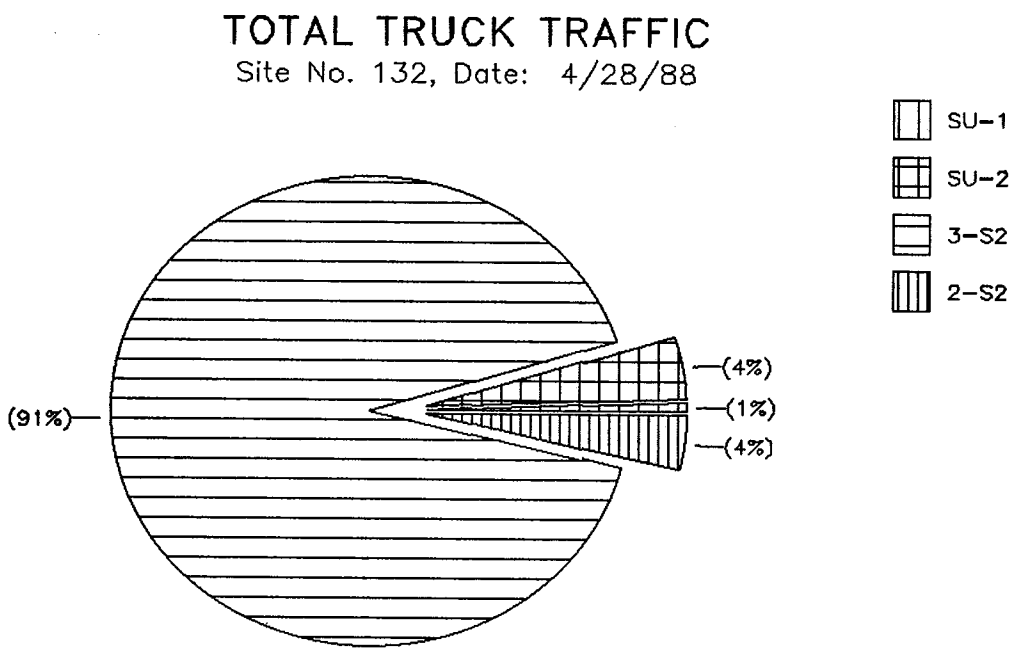


Figure 2.1.1.7-2. Hourly Trip Generation



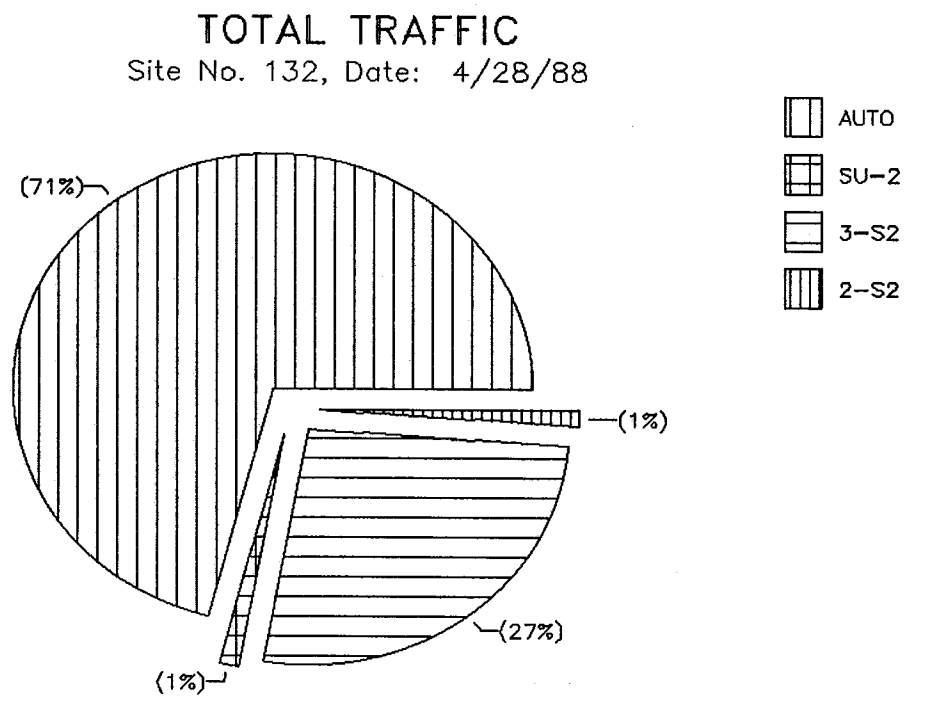


Figure 2.1.1.7-3. Activity Center Vehicle Percentages

Table 2.1.1.7-1. Industry Information On Raw Wood Input

Year	Raw Wood Type	No. of Cords	Pounds[1]
1985	Round Wood	187,357	0.98×10^9
1986	Round Wood	198,277	1.04×10^9

[1]Conversion of pine: 5,250 lb/ Cord, Southern area.

Table 2.1.1.7-2. Traffic Classification Count Summary

Table 2.1.1.7-2A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/4/85	1010	6	0	280	88	1384	2%	98%	73%	27%
9/24/86	579	4	0	236	5	824	2%	98%	70%	30%
9/25/86	601	2	0	245	8	856	1%	99%	70%	30%
4/28/88	454	1	8	171	7	641	5%	95%	71%	29%

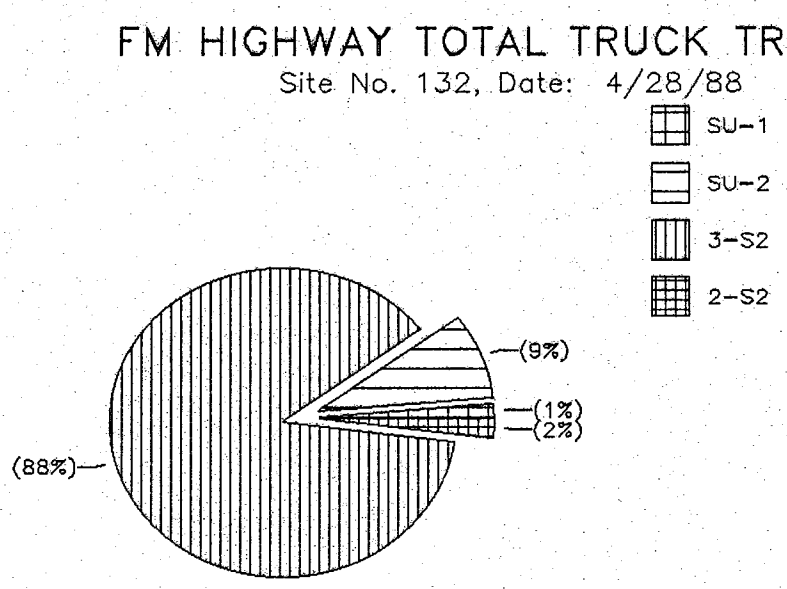
Table 2.1.1.7-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/24/86[1]	424	35	3	88	1	551	30%	70%	77%	23%
9/25/86[1]	421	34	12	87	11	566	32%	68%	74%	26%
4/28/88	425	4	10	19	0	458	42%	58%	93%	7%

[1]Counts for this data did not identify special-use vehicles on the roadway.

Table 2.1.1.7-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/28/88	879	5	31	309	7	1231	10%	90%	71%	29%



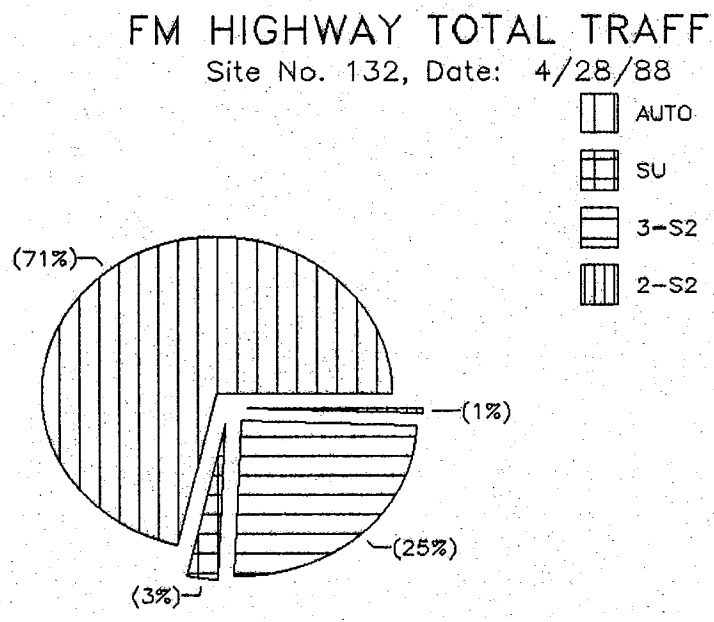


Figure 2.1.1.7-4. Highway Vehicle Percentages

2.1.1.8 Plywood Mill, Site No. 133

Introduction. The site map shown in Figure 2.1.1.8-1 indicates access directly to a Farm-to-Market (FM) Highway. The activity center is near the outskirts of a small city and log trucks hauling raw timber into this mill come almost exclusively from the U.S. Highway to the west. The site, which includes a plywood mill and a lumber mill, is served by a railroad which carries no raw materials to the mill, but does haul finished products from the mill.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.8-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill basically operates six days a week. The figure also shows the number of trucks and autos that were generated by the mill during the same 12-hour period on July 29, 1986. The number of persons employed by the mill totaled 352. They were organized into three shifts -- 7 a.m. to 3 p.m., 3 p.m. to 11 p.m., and 11 p.m. to 7 a.m. Other auto traffic including the 11 p.m. shift change was not captured by the studies made, but traffic generated at other periods (before or after the 6 a.m. to 6 p.m. period) is less critical. The distance traveled by employees from home to work was not available.

Figure 2.1.1.8-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (92%). Also illustrated is the breakdown of total traffic moving to and from the mill. Trucks were 33% of the total.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.8-1. Interviews with plant officials yielded information on loads (not trips) of raw materials by-products and finished products generated and radius of influence of these vehicles. This information is shown in Table 2.1.1.8-2. An estimated 10% of outgoing products are shipped by rail.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 1,600 in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway Table 2.1.1.8-3 provides a summary of the counts that were taken. Table 2.1.1.8-3A, provides vehicle classification counts for the activity center, Table 2.1.1.8-3B summarizes counts taken on the roadway excluding special-use vehicles, and Table 2.1.1.8-3C is a total of all roadway vehicles.

Figure 2.1.1.8-4 shows the percentage of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.8-3C values). The 3-S2 vehicle represents 88% of total trucks counted on this FM highway. Trucks were 29% of total traffic on this date.

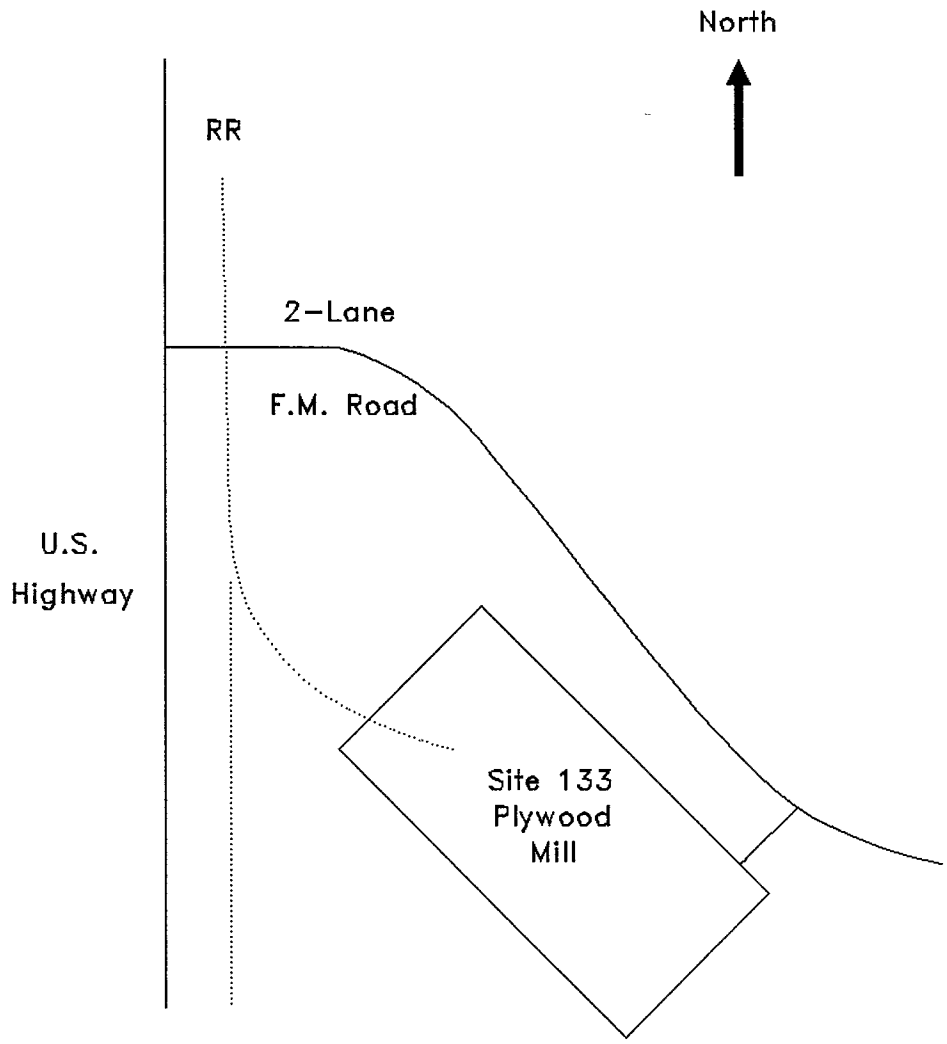
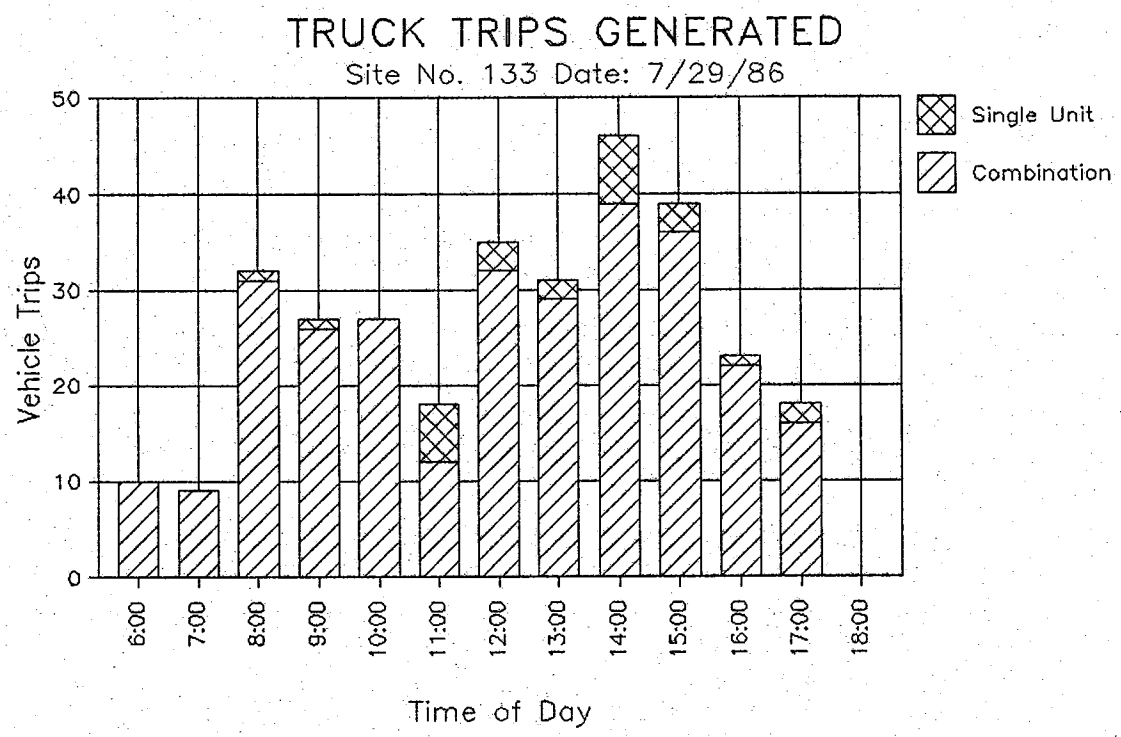


Figure 2.1.1.8-1. Site Map



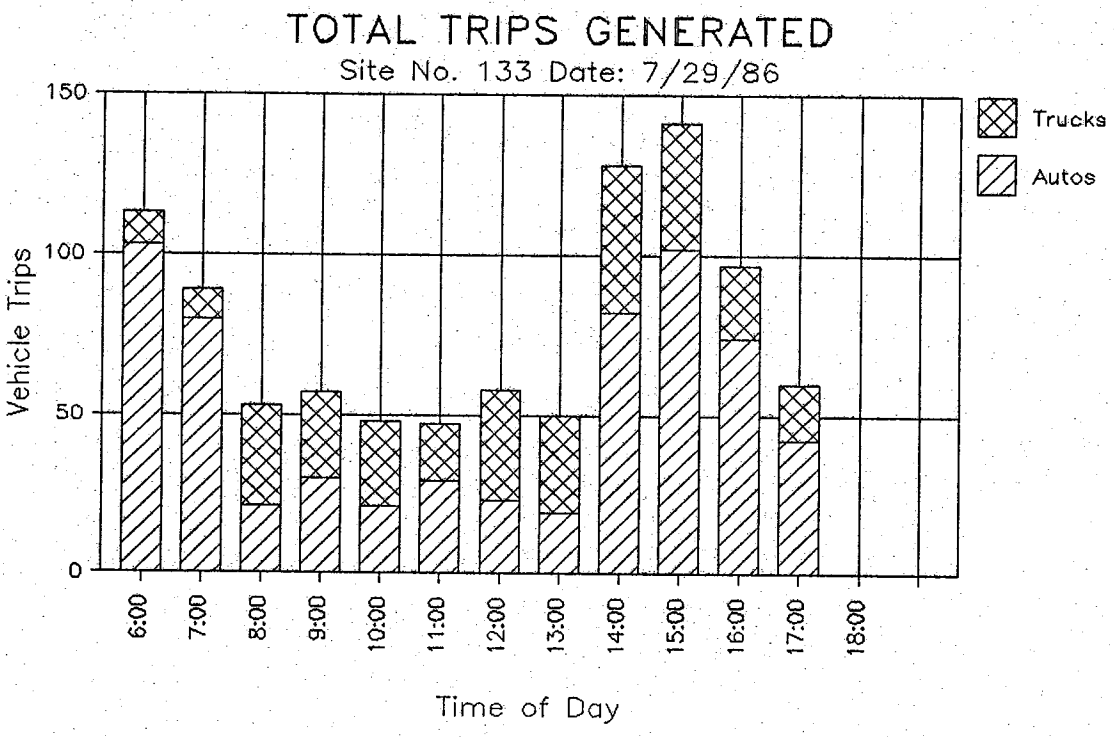
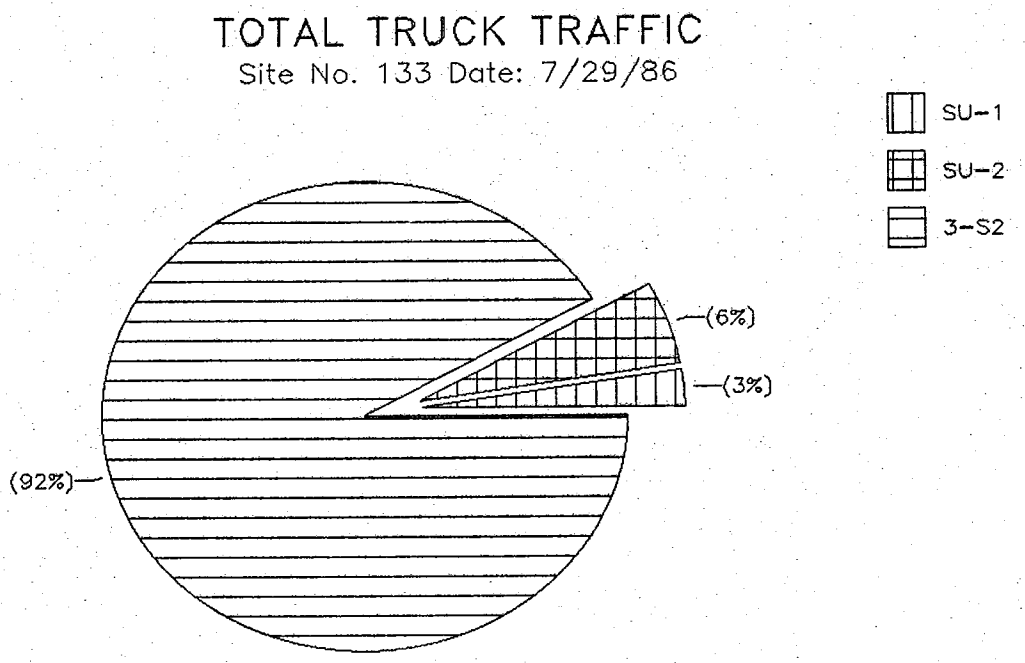


Figure 2.1.1.8-2. Hourly Trip Generation



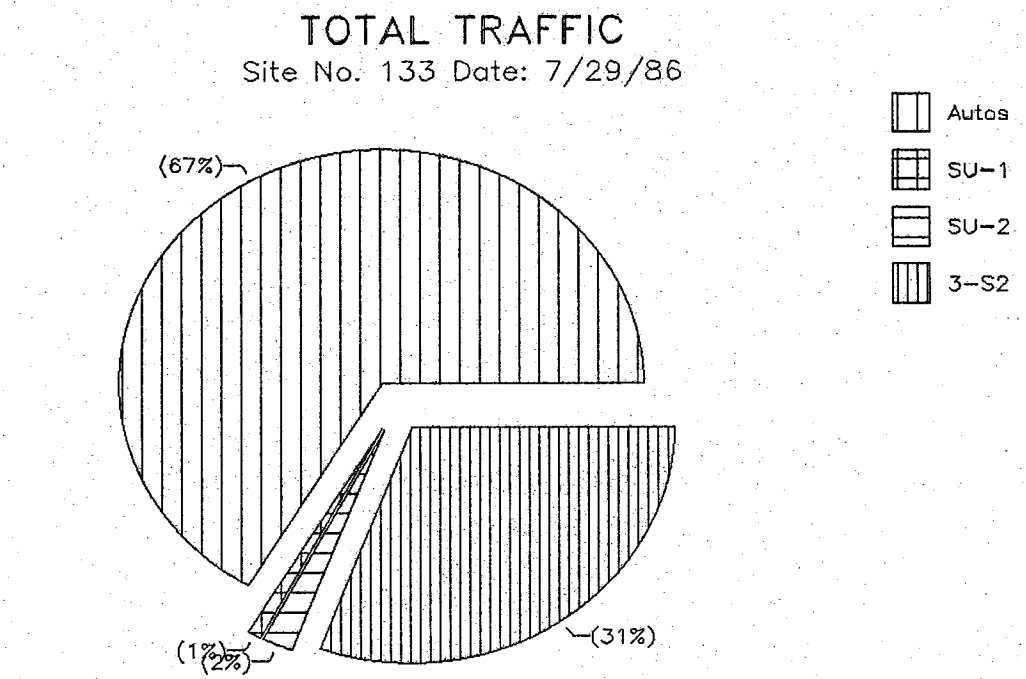


Figure 2.1.1.8-3. Activity Center Vehicle Percentages

Table 2.1.1.8-1. Industry Information On Raw Wood Input

Activity Center No. 133

Year	Raw Wood Type	No. of Board-Feet	Pounds[1]
1985	Round Wood	75,000,000	1.20×10^9
1986	Round Wood	75,000,000	1.20×10^9

[1]Pine: 8 Tons/1,000 Board-Feet

Table 2.1.1.8-2. Interview Information

Daily Loads Hauled

Incoming (Loaded) Vehicles

Loads Per Day:

	3S-2
Low	60
Avg	100
High	120

Radius of Influence

3-S2
100% 50 Miles

Outgoing (Loaded) Vehicles

Loads Per Day:

	Reg. Single Unit	Reg. 3-S2	Railcars
Low	4	50	10% of Total
Avg	6	70	
High	10	90	

Radius Of Influence

SU	3-S2
100 % 200 miles	100% 200 miles

Table 2.1.1.8-3. Traffic Classification Count Summary

Table 2.1.1.8-3A. Activity Center Only

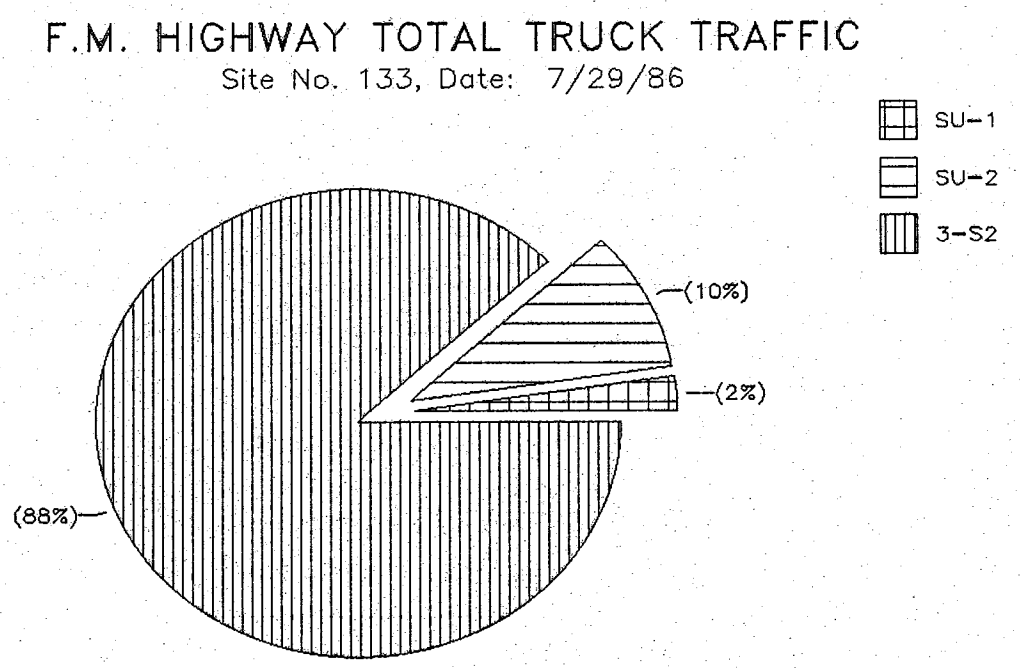
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
5/22/85	598	10	46	210	0	864	21%	79%	69%	31%
7/29/86	626	8	18	289	0	941	8%	92%	66%	34%
7/30/86	615	4	26	237	0	972	8%	92%	63%	37%

Table 2.1.1.8-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/29/86	207	0	15	8	0	230	65%	35%	90%	10%

Table 2.1.1.8-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/29/86	833	8	33	297	0	1171	12%	88%	71%	29%



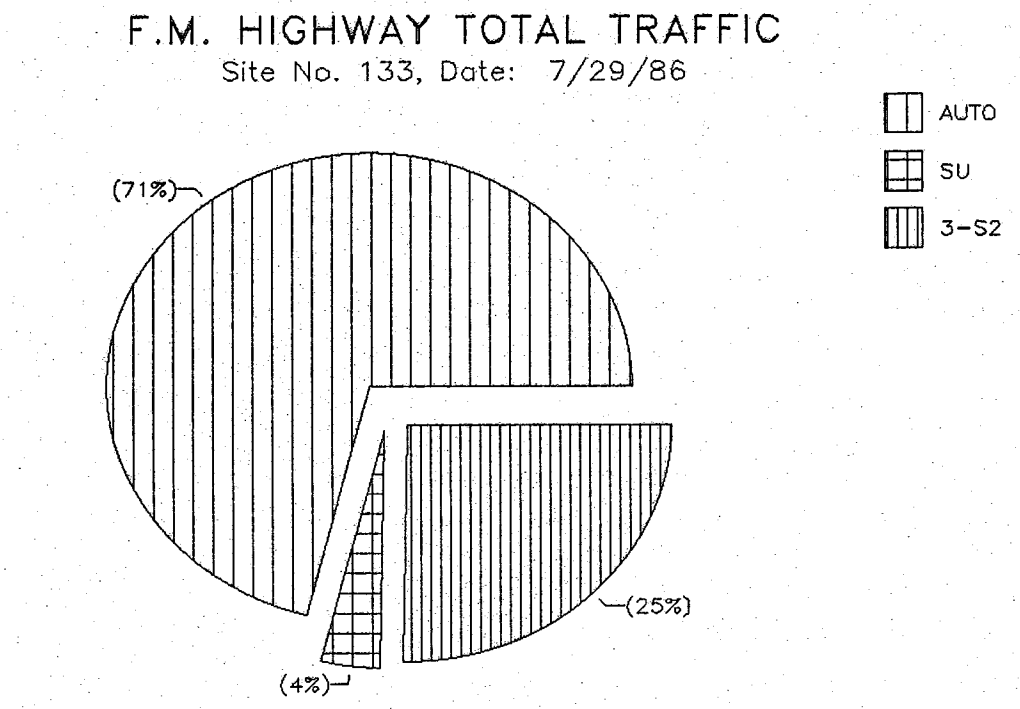


Figure 2.1.1.8-4. Highway Vehicle Percentages

2.1.1.9 Sawmill, Site No. 140

Introduction. The site map shown in Figure 2.1.1.9-1 indicates access directly to a U.S. Highway. The activity center is near the north outskirts of a medium-sized city. The site is not served by a railroad. The majority of trucks approach the mill from the south.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.9-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill generally receives log trucks from 6 a.m. to 6 p.m. This figure also shows the number of trucks and autos that were generated by the mill during the same 12-hour period on July 31, 1986. The number of persons employed by the mill totaled 352; 90 of these were hourly personnel. They work one shift from 7 a.m. to 6 p.m. The distance traveled to work by employees was not disclosed.

Figure 2.1.1.9-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3S-2 combination (69%). Also illustrated is the breakdown of total traffic moving to and from the mill. Total traffic was comprised of 35 percent trucks and 65 percent automobiles.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.9-1.

Table 2.1.1.9-1. Industry Information On Raw Wood Input

Year	Raw Wood Type	No of Board-Feet	Pounds[1]
1985	Round Wood	17,500,000	2.8×10^8
1986	Round Wood	22,000,000	3.52×10^8

[1]Pine: 8 Tons/1,000 Board-Feet

Interviews with plant officials yielded information on loaded vehicles entering and leaving the sawmill and their radius of influence. This information is shown in Table 2.1.1.9-2. This was the largest independent sawmill in East Texas with daily average input of 150,000 board feet per day. Finished products sent by truck are typically sent to Austin, Corpus Christi, Houston, and Dallas. Some goes to other states in the north and west.

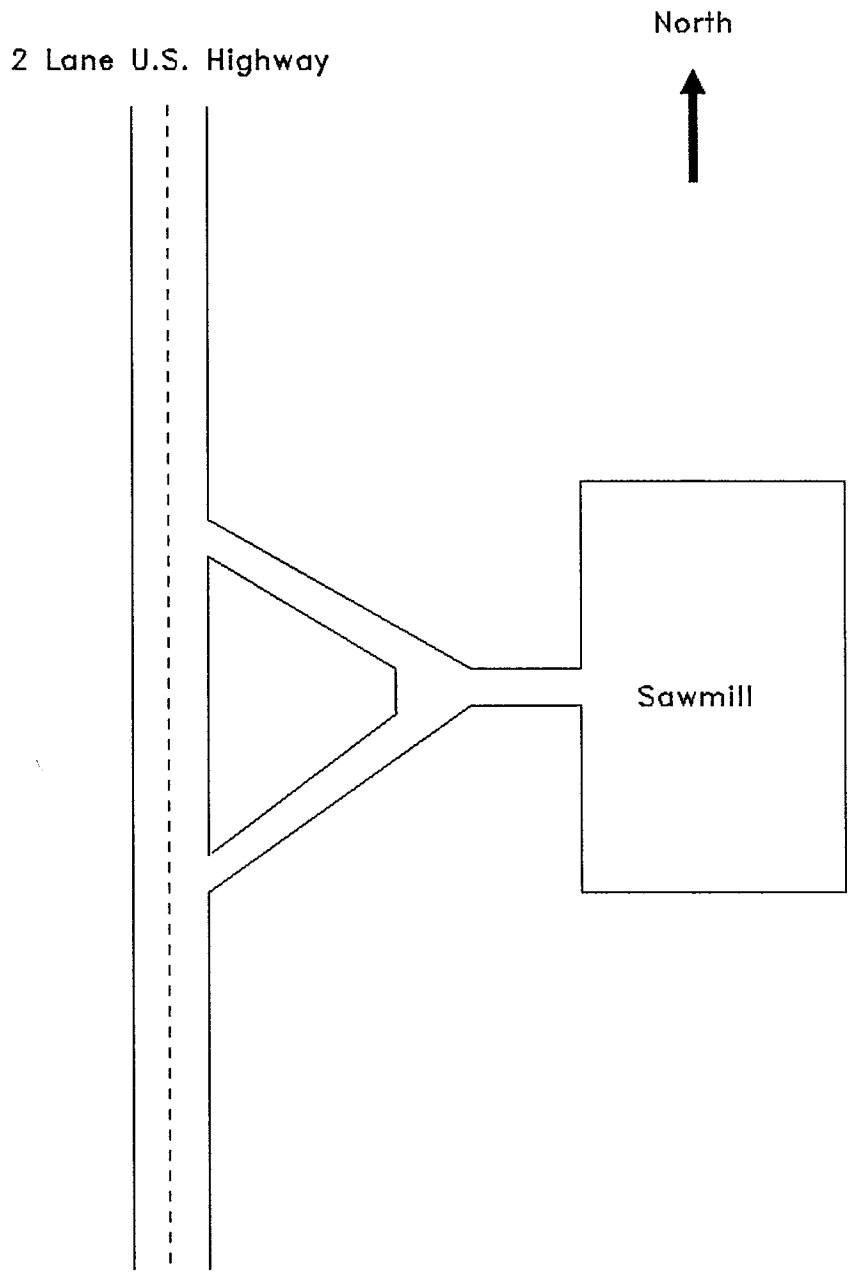
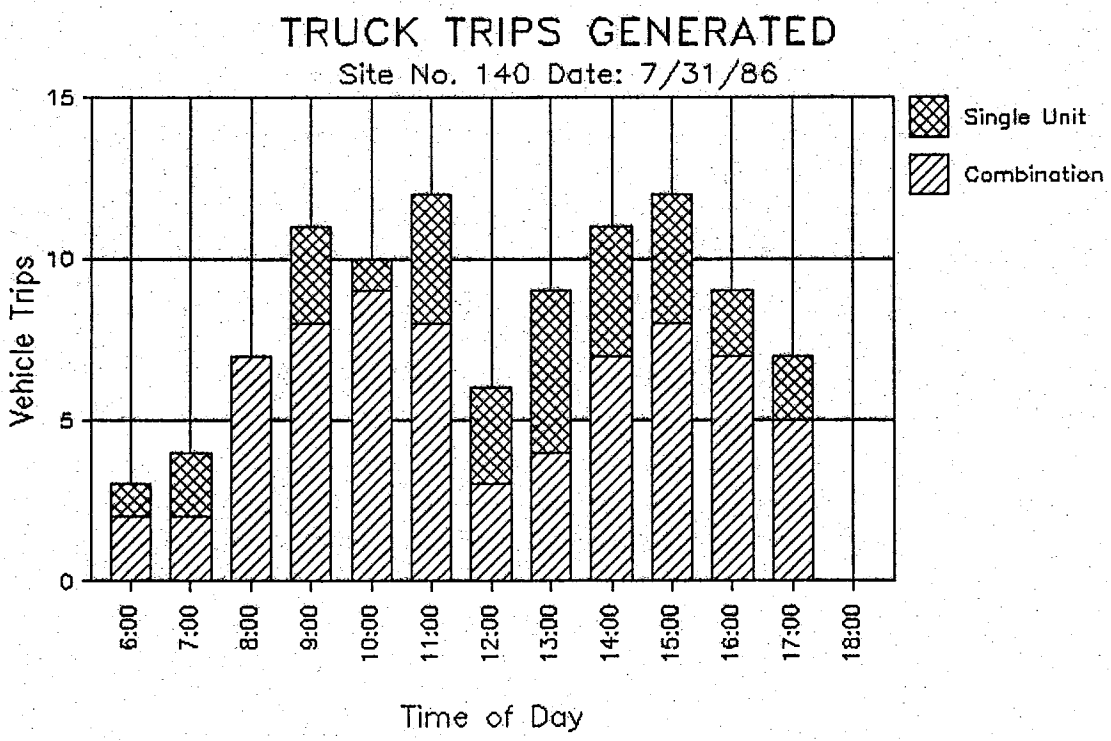


Figure 2.1.1.9-1. Site Map



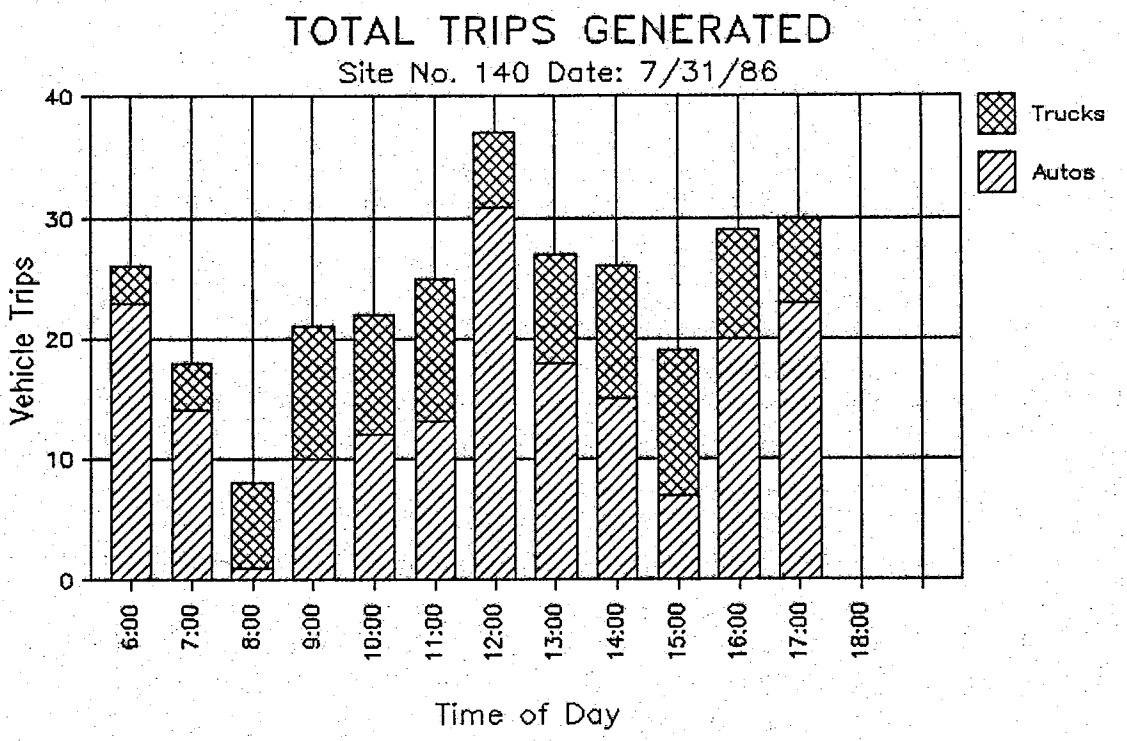


Figure 2.1.1.9-2. Hourly Trip Generation

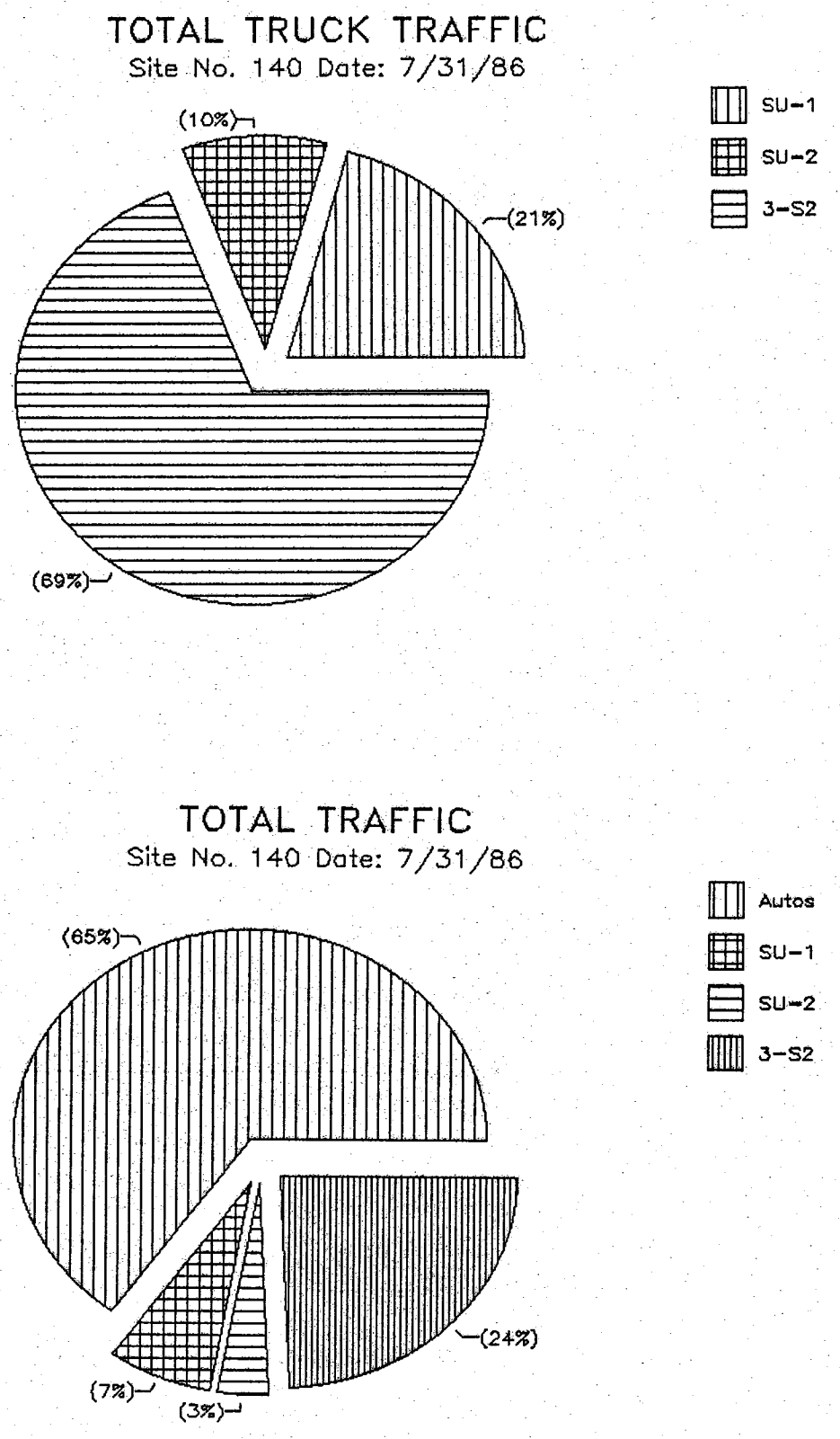


Figure 2.1.1.9-3. Activity Center Vehicle Percentages

Table 2.1.1.9-2. Interview Information on Daily Loads

Incoming (Loaded) Vehicles		Outgoing (Loaded) Vehicles		
Number of Loads		Number of Loads		
	3-S2		Reg Single Unit	Reg 3-S2
Low	0	Low		14
Avg	22	Avg	6	16
High	40	High		18
Radius of Influence		Radius of Influence		
3S-2		3-S2		
100% 120 Miles		80% 300 Miles 100% 600 Miles		

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway carrying an average daily traffic (ADT) of 3,100 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activity on the roadway. Table 2.1.1.9-3 provides a summary of the counts that were taken. Table 2.1.1.9-3A, represents vehicle classification counts for the activity center. Table 2.1.1.9-3B is a count of all vehicles on the roadway with the exception of special-use vehicles, while Table 2.1.1.9-3C, is a total count of all vehicles (sum of 3A and 3B plus special-use vehicles on the roadway).

Figure 2.1.1.9-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.9-3C values). The 3-S2 vehicle represents 60% of total truck counted on this U.S. Highway. Trucks are 10% of total traffic.

Table 2.1.1.9-3. Traffic Classification Count Summary

Table 2.1.1.9-3A. Activity Center Only

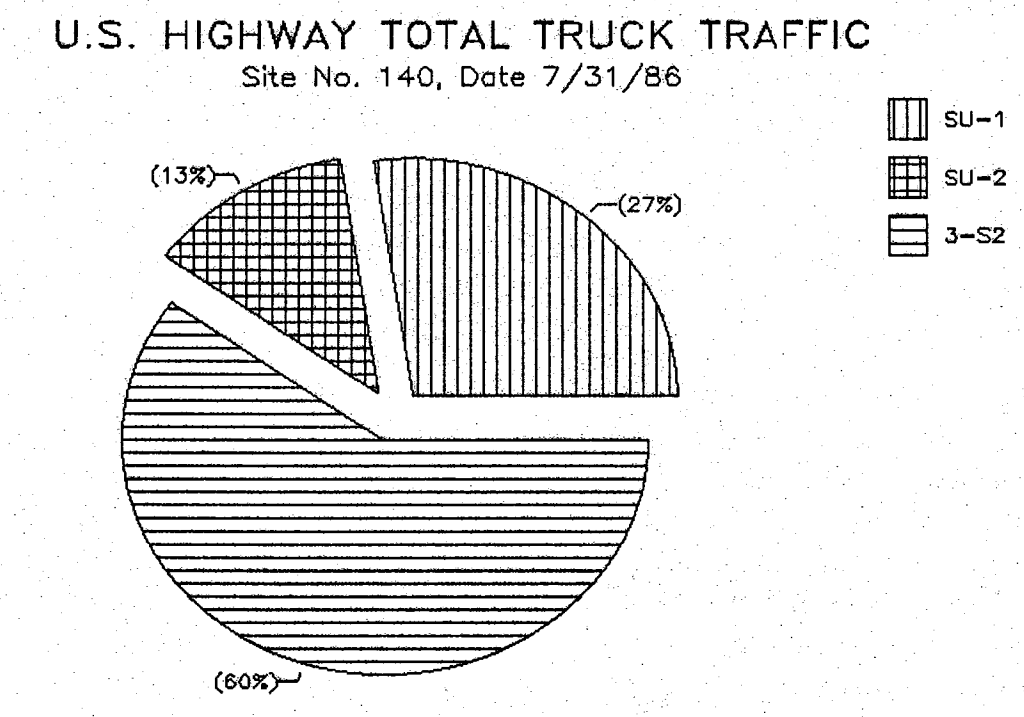
Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
5/21/85	123	3	15	54	195	25%	75%	63%	37%
7/31/86	187	21	10	70	288	31%	69%	65%	35%
8/01/86	153	4	6	28	191	26%	74%	80%	20%

Table 2.1.1.9-3B. Roadway Without Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	2-S1	2-S2	3-S2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
5/21/85	2507	100	26	6	6	87	2732	56%	44%	92%	8%
7/31/86	2349	55	25	0	0	76	2505	51%	49%	94%	6%
8/01/86	2308	56	15	2	0	48	2429	59%	41%	95%	5%

Table 2.1.1.9-3C. Roadway With Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	2-S1	2-S2	3-S2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
5/21/85	2630	103	41	6	6	141	2927	48%	52%	90%	10%
7/31/86	2536	76	35	0	0	167	2814	40%	60%	90%	10%
8/01/86	2562	62	22	2	0	89	2737	49%	51%	94%	6%



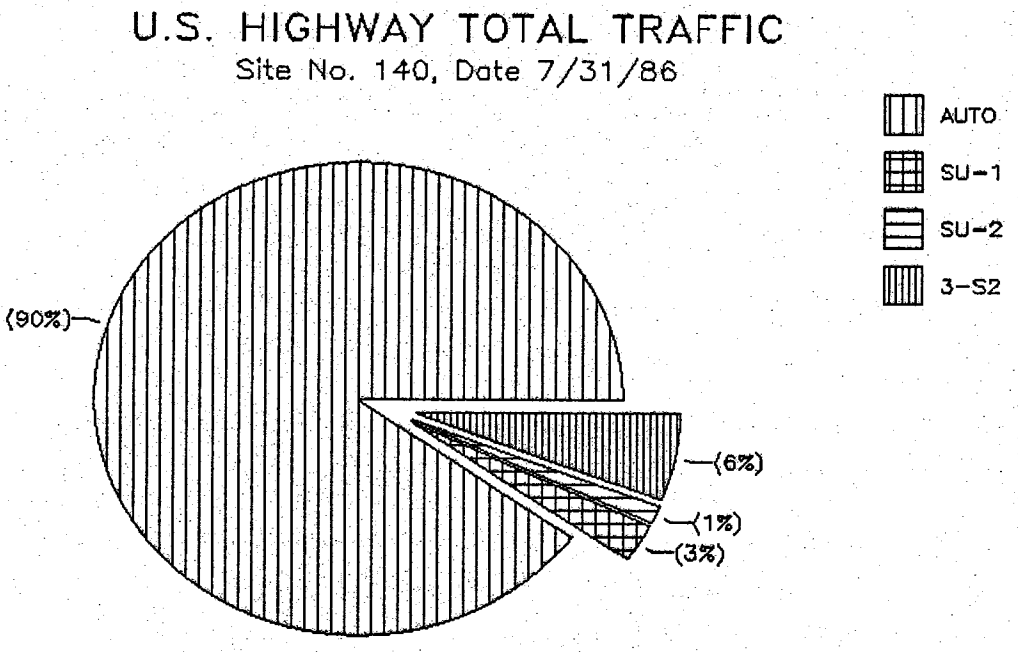


Figure 2.1.1.9-4. Highway Vehicle Percentages

2.1.1.10 Sawmill, Site No. 141

Introduction. The site map shown in Figure 2.1.1.10-1 indicates access to a State Highway which is designated a loop for a medium-sized city. The site is served by a railroad which carries no raw materials to the mill, but does haul finished products and by-products from the sawmill.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.10-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill generally receives log trucks from 6 a.m. to 6 p.m. The figure also shows the combination of trucks and autos that were generated by the mill during the same 12-hour period on August 12, 1986. The number of persons employed by the mill totaled 215 in 1985 and 125 in 1986. They were employed in two 8-hour shifts in 1985 and one shift from 7 a.m. to 5 p.m. in 1986. The distance traveled by the employees in arriving at work was not available.

Figure 2.1.1.10-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (93%). Also illustrated is the breakdown of total traffic moving to and from the mill. Trucks made up 20% of total traffic.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.10-1.

Interviews with plant officials yielded information on loads (not trips) generated and radius of influence of incoming and outgoing products. This information is shown in Tables 2.1.1.10-2 and 2.1.1.10-3. Outgoing products were also shipped by rail. It was estimated that approximately 65% of the finished products went out by rail.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a State Highway (Loop) carrying an average daily traffic (ADT) of 1,500 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.10-4 provides a summary of the counts that were taken. In Table 2.1.1.10-4A, vehicle classification counts are provided for the traffic moving to and from the activity center. In Table 2.1.1.10-4B, a count of all vehicles, with the exception of special-use vehicles, is provided for the main roadway. In Table 2.1.1.10-4C, a total count of all vehicles (sum of 4A, 4B, and special-use on the roadway is provided.)

Figure 2.1.1.10-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.10-4C values). The 3-S2 vehicle represents 79% of total trucks counted on this State Highway. Trucks are 11% of total traffic.

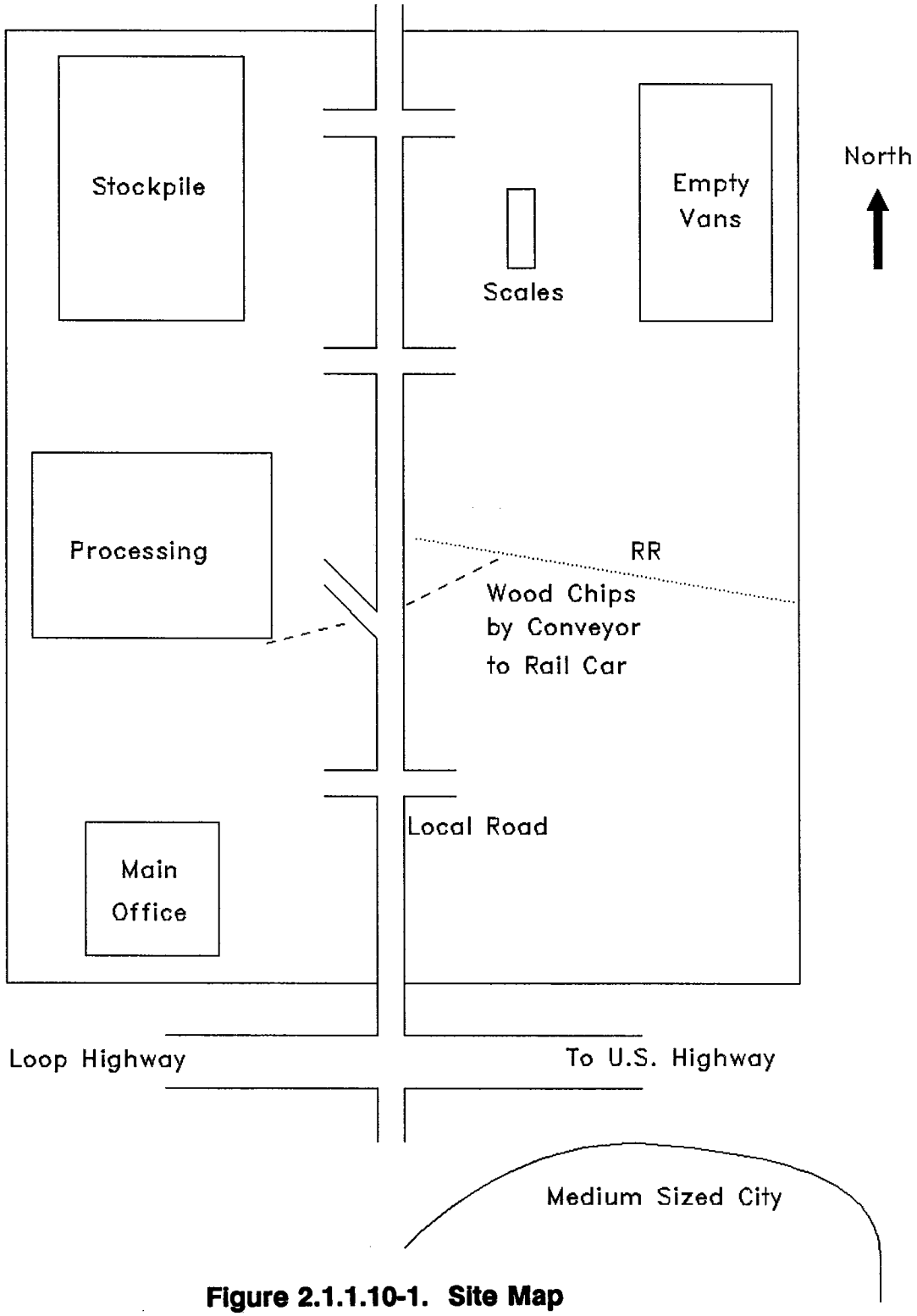
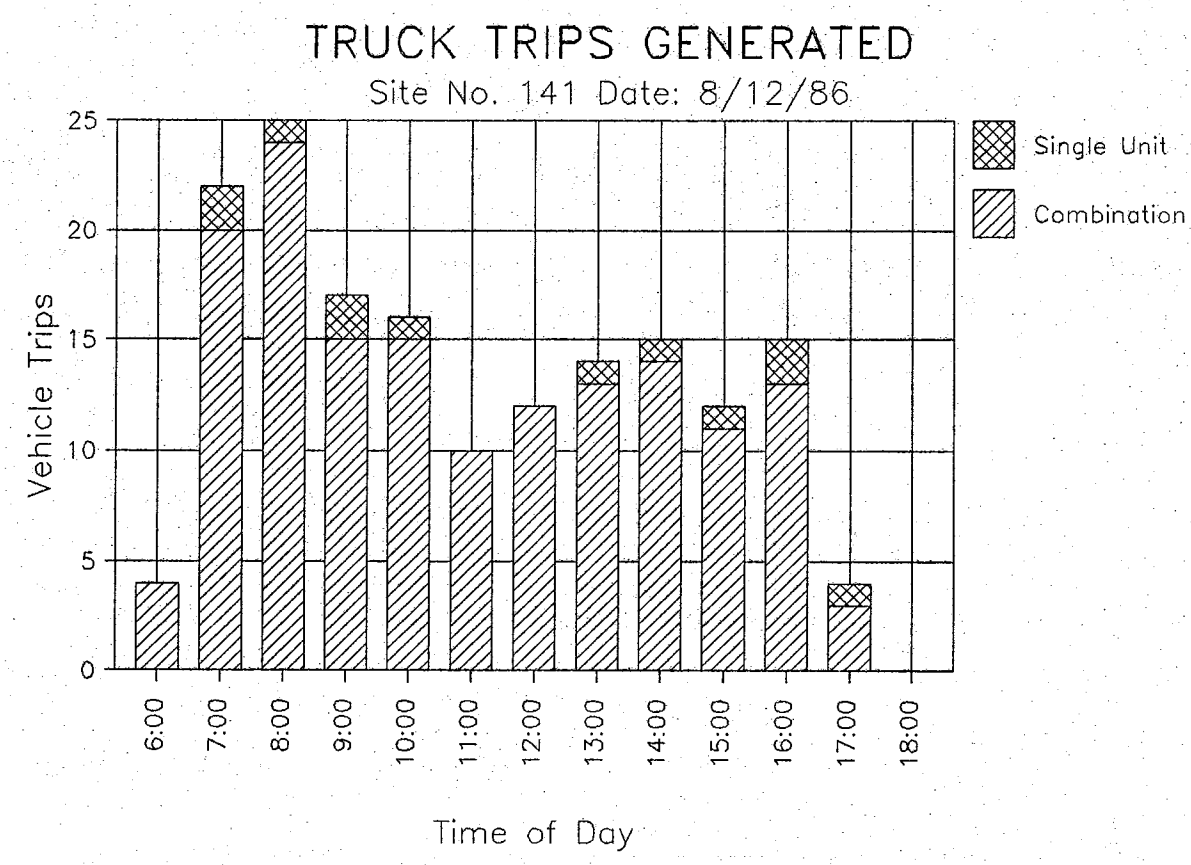


Figure 2.1.1.10-1. Site Map



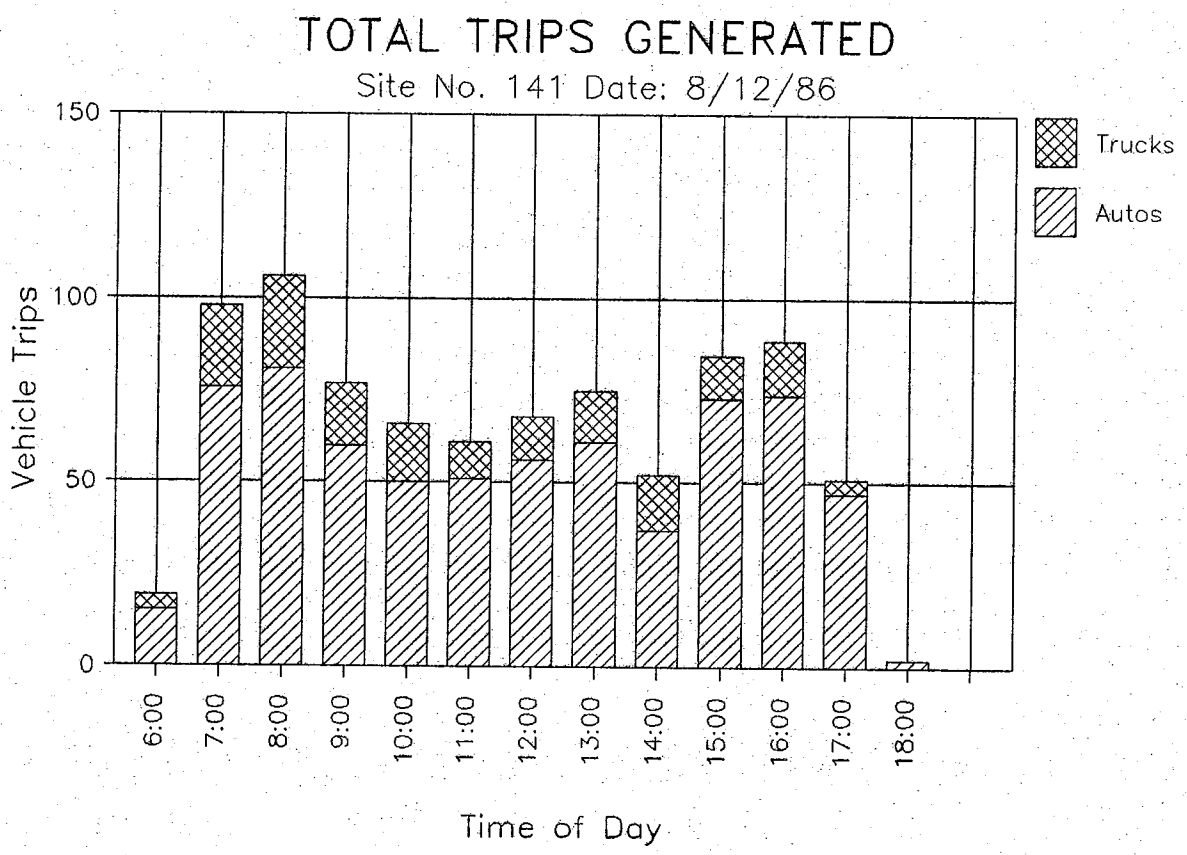
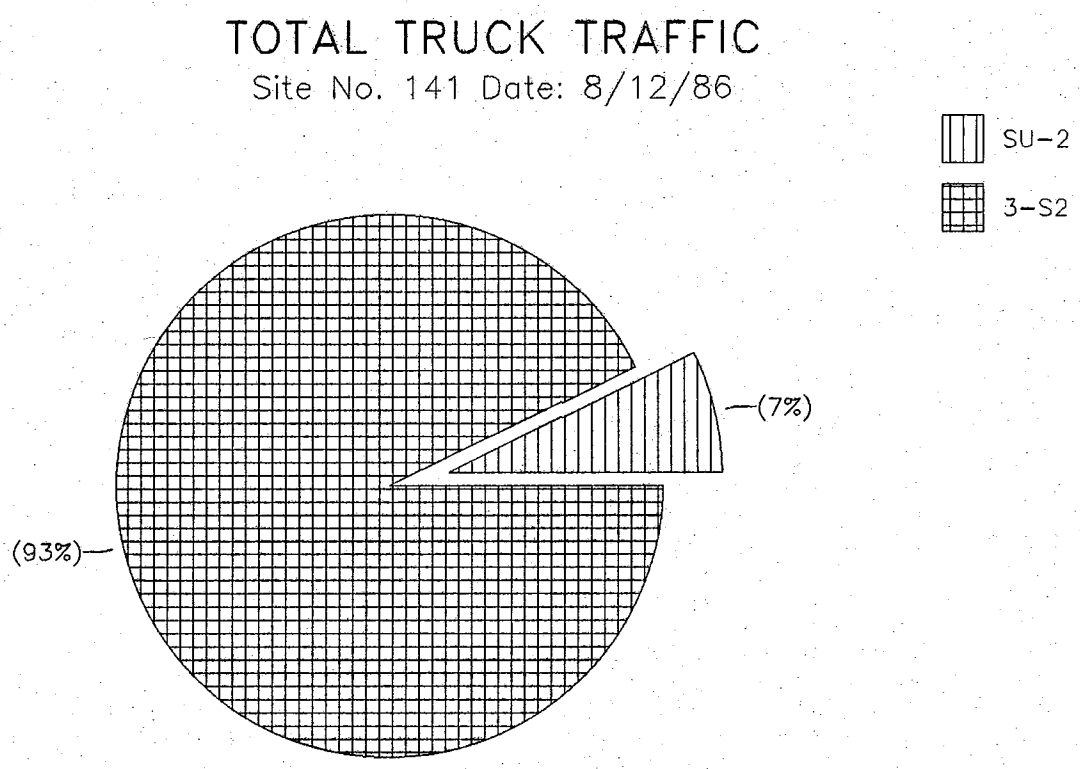


Figure 2.1.1.10-2. Hourly Trip Generation



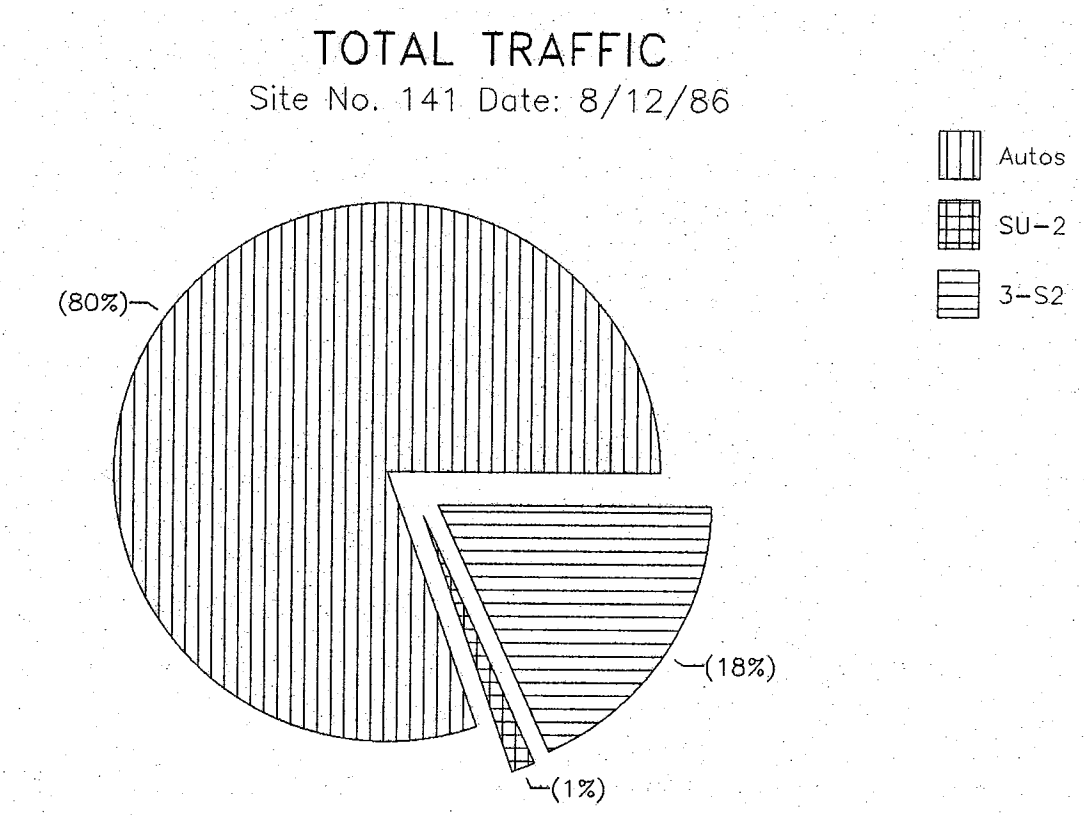


Figure 2.1.1.10-3. Activity Center Vehicle Percentages

Table 2.1.1.10-1 Industry Information on Raw Wood Input

Year	Wood Type	Board-Feet	Pounds[1]
1985	Round Wood	31,800,000	5.09×10^8
1986	Round Wood	37,004,000	5.92×10^8

[1]Pine: 8 Tons/1,000 Board-Feet

Table 2.1.1.10-2. Interview Information on Daily Loads, 1985

Incoming (Loaded) Vehicles

Number of Loads (60,000 lb each)

	3-S2
Low	---
Avg	50
High	80
Maximum	113

Radius of Influence

3-S2
75 mi

Outgoing (Loaded) Vehicles

Number of Loads

Reg.3-S2

Avg: 7-8 (3-S2 fin. lumber) 46,500 lb each. 3 (shavings from kiln dryer) 60,000 lb each. No sawdust or bark -- used as fuel.

Rail

7-8 per 16 hr shift (170,000 lb per car)

Rule of Thumb: 10 loads of Logs for 1 load dressed 1" lumber

Table 2.1.1.10-3 Interview Information on Daily Loads, 1986

Incoming (Loaded) Vehicles			Outgoing (Loaded) Vehicles		
Number of Loads			Number of Loads		
	3-S2	Auto		Reg 3-S2	Railcars: 65%
Low	10		Low	10	
Avg	40	120	Avg	18	
High	80		High	25	
Radius of Influence			Radius of Influence		
	3-S2		No data obtained		
	75% 50 Miles				
	100% 100 Miles				

Table 2.1.1.10-4. Traffic Classification Count Summary

Table 2.1.1.10-4A. Activity Center Only

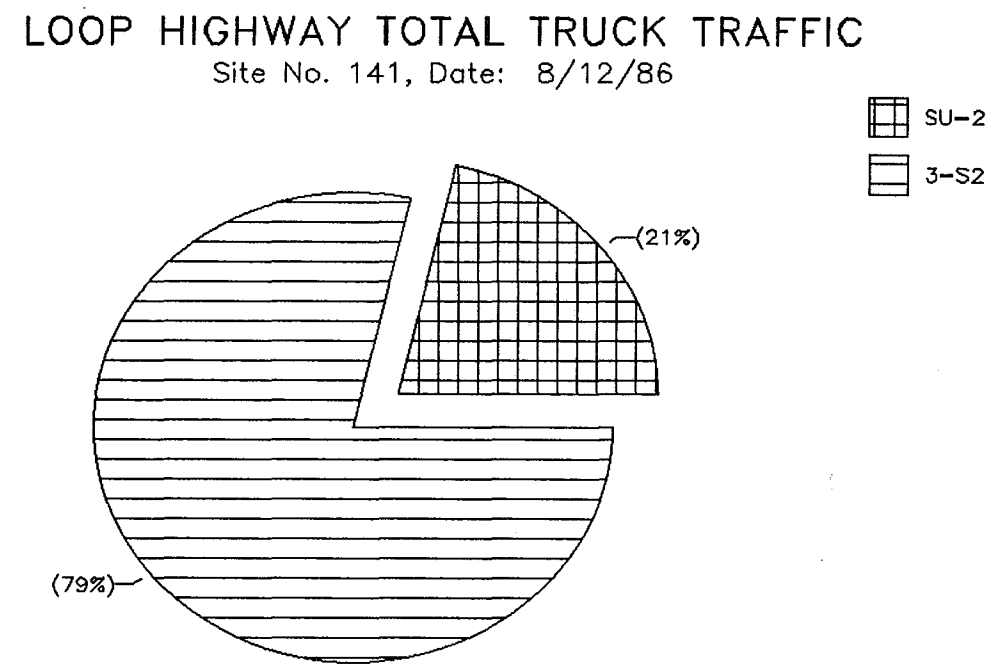
Date	Vehicle Classification						% of Trucks		% of Trucks	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/04/85	650	7	7	250	0	914	5%	95%	71%	29%
8/07/86	733	0	7	093	1	834	7%	93%	88%	12%
8/12/86	683	0	7	135	0	825	5%	95%	83%	17%

Table 2.1.1.10-4B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Trucks	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/07/86	1241	0	64	49	2	1356	56%	44%	91%	9%
8/12/86	1303	0	47	63	0	1413	43%	57%	92%	8%

Table 2.1.1.10-4C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Trucks	
	Autos	SU-1	SU-2	2-S1	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/07/86	1974	0	85	1	142	2	1613	37%	63%	86%	14%
8/12/86	1986	0	54	0	198	0	2238	21%	79%	89%	11%



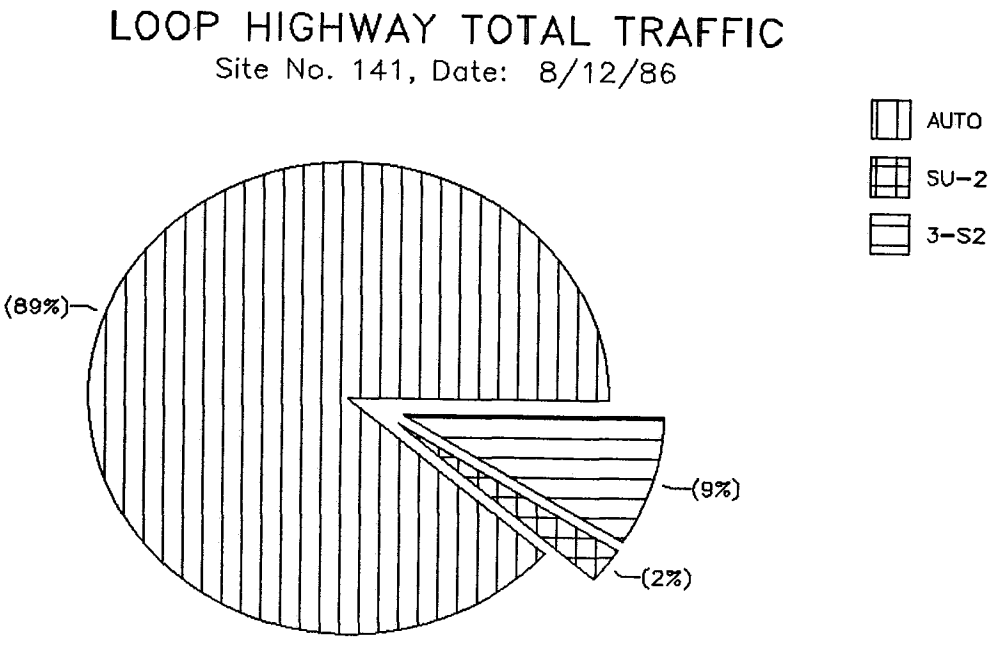


Figure 2.1.1.10-4. Highway Vehicle Percentages

2.1.1.11 Sawmill, Site No. 142

Introduction. The site map shown in Figure 2.1.1.11-1 indicates indirect access to a State Highway. The activity center is located approximately five miles northwest of a medium-sized city. The site had rail service available but the track had not been used in some time.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.11-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The mill generally receives log trucks from 6 a.m. to 5 p.m. The figure also shows the combination of trucks and autos that were generated by the mill during the same 12-hour period on August 14, 1986. The number of persons employed by the mill totaled 100. They worked one shift from 6 a.m. to 5 p.m. Because many employees arrived before 6 a.m. their auto trips are not refleced in Figure 2.1.1.11-2.

Figure 2.1.1.11-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (90%). Also illustrated is the breakdown of total traffic moving to and from the mill. Trucks were 42% of total generated by this sawmill.

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.11-1. Interviews with plant officials yielded information on trips generated and radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.11-2.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a State Highway carrying an average daily traffic (ADT) of 4,000 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.11-3 provides a summary of the counts that were taken. Table 2.1.1.11-3A represents only the activity center. Table 2.1.1.11-3B includes roadway traffic without special-use vehicles, and Table 2.1.1.11-3C is total traffic on the roadway (3A and 3B plus special-use traffic on the roadway).

Figure 2.1.1.11-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.11-3C values). The 3-S2 vehicle represent 76% of total trucks counted on the State Highway. Total traffic was made up of 12% trucks and 88% passenger cars.

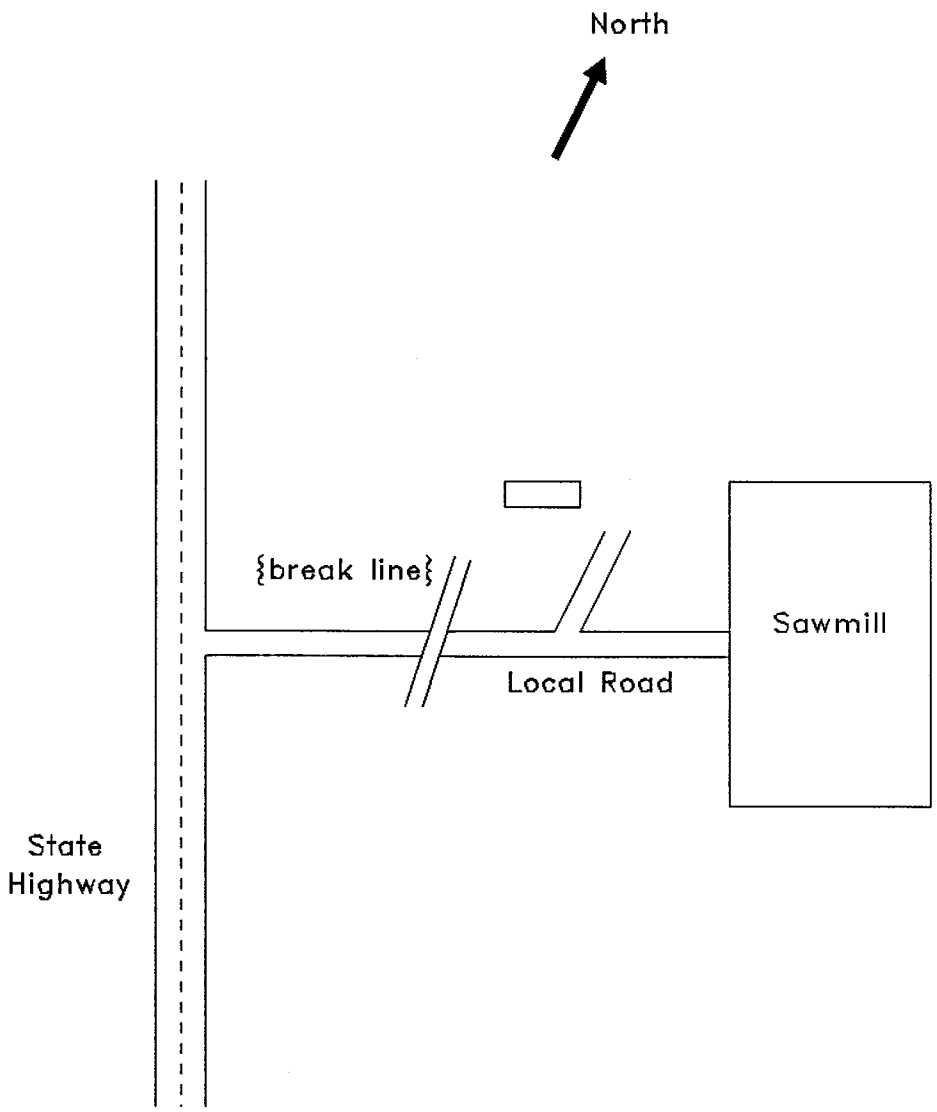
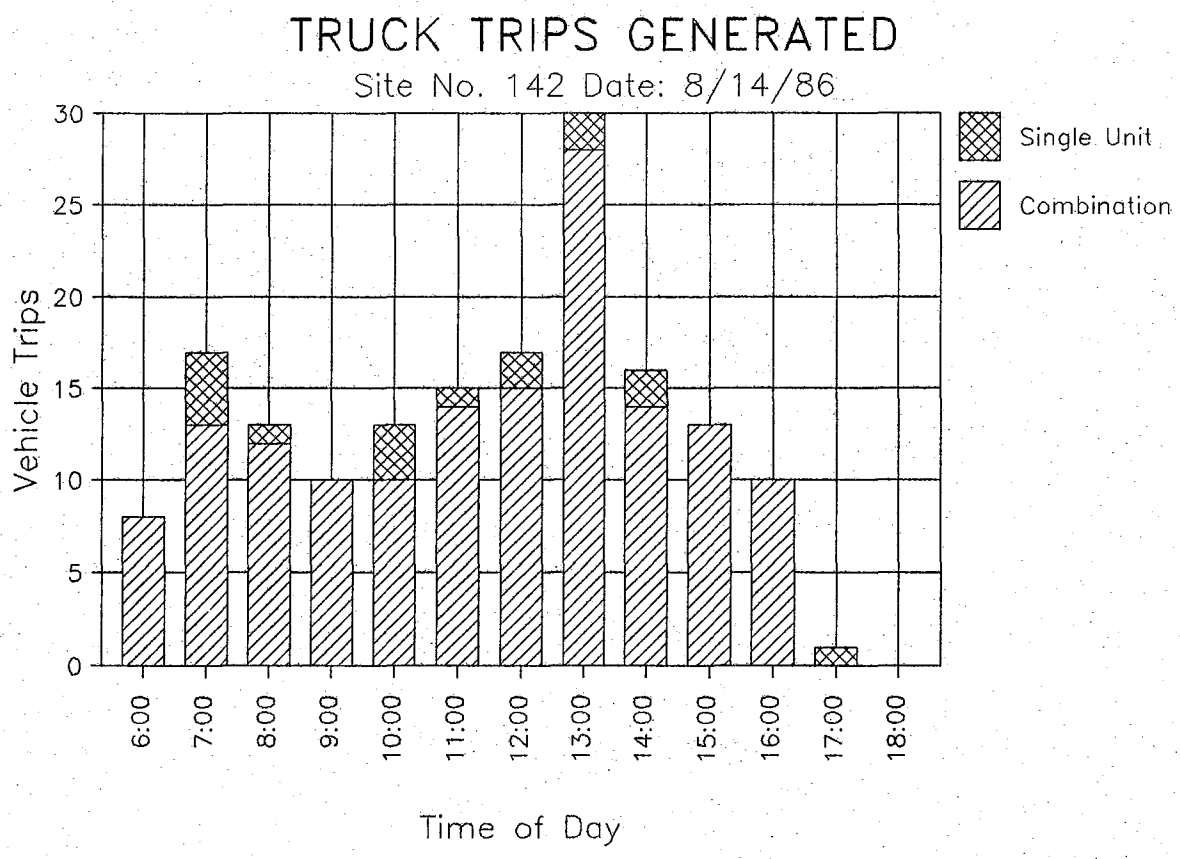


Figure 2.1.1.11-1. Site Map



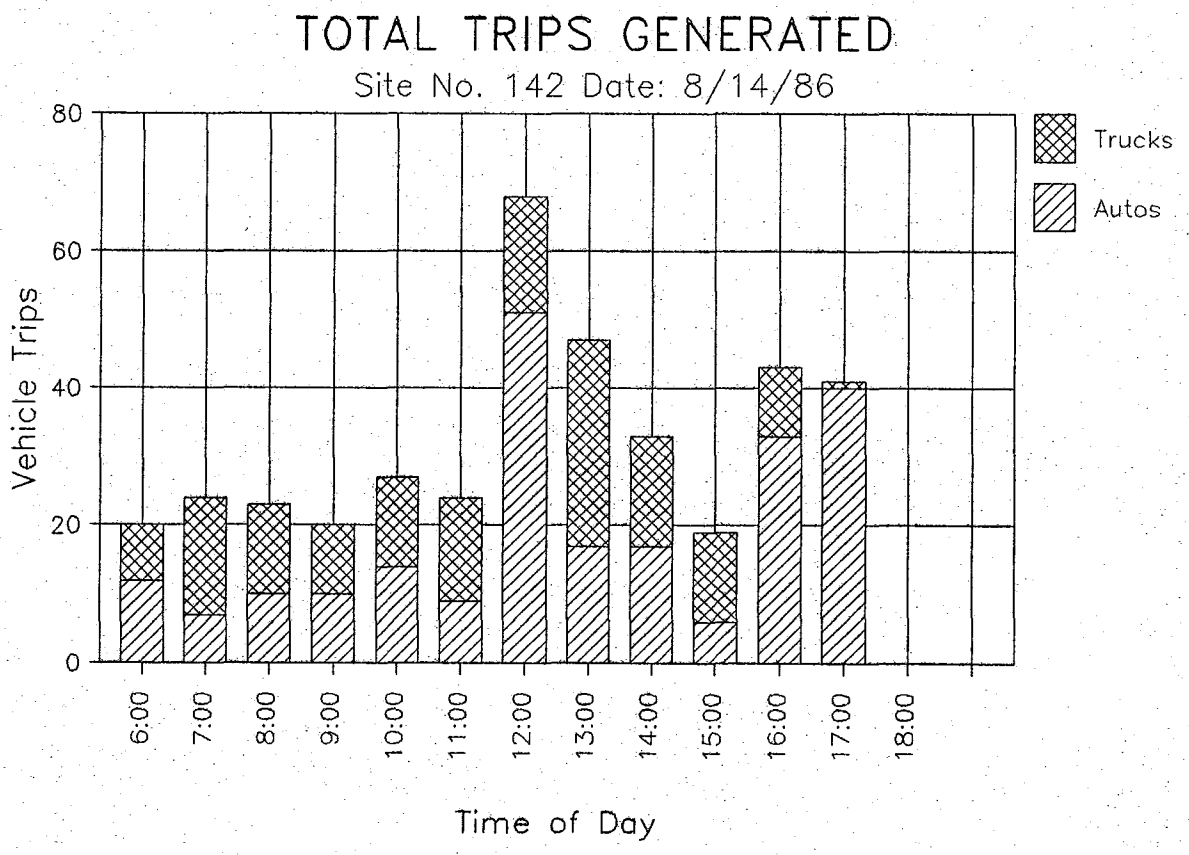


Figure 2.1.1.11-2. Hourly Trip Generation

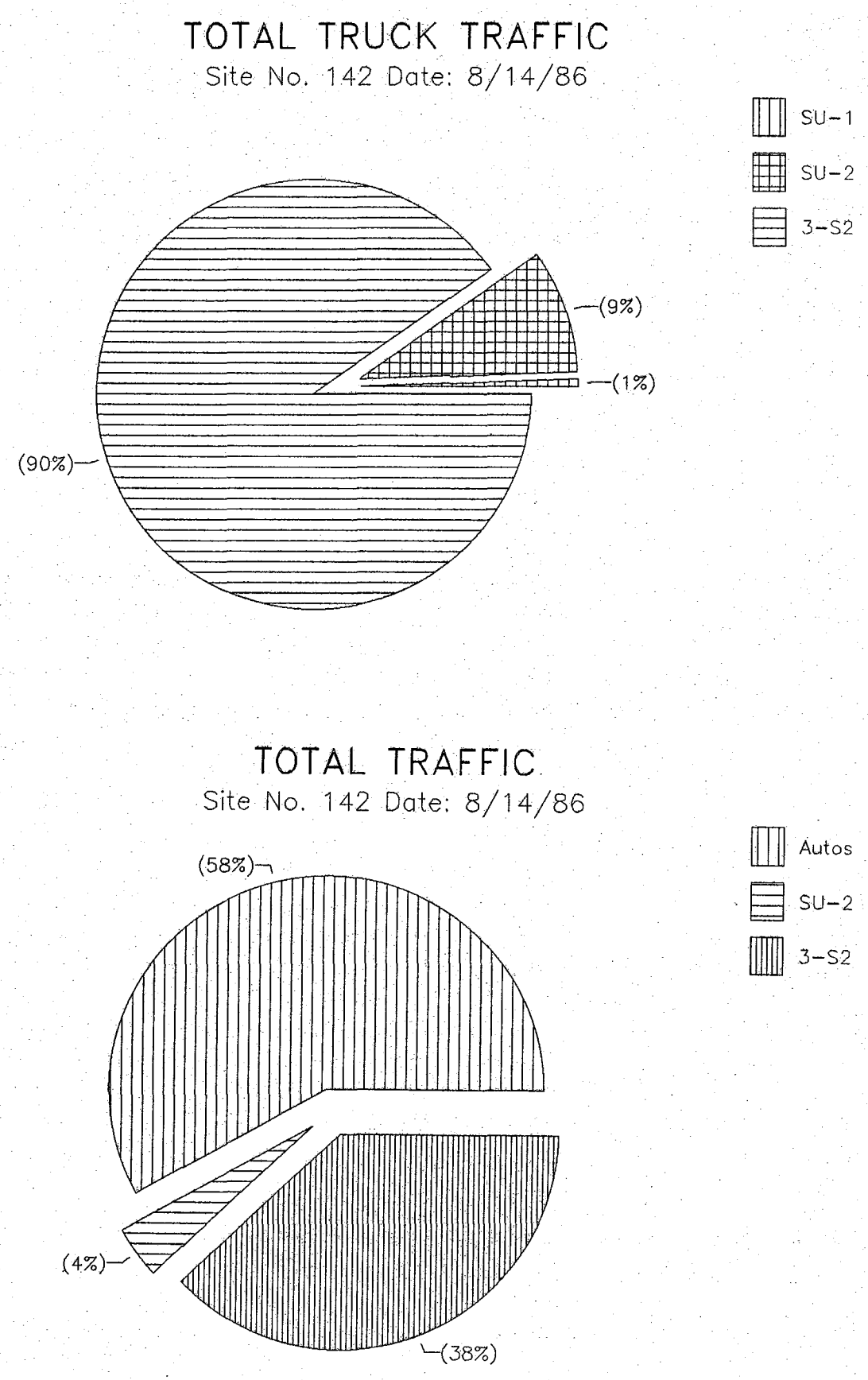


Figure 2.1.1.11-3. Activity Center Vehicle Percentages

Table 2.1.1.11-1. Industry Information on Raw Wood Input

Year	Wood Type	Board-Feet	Pounds[1]
1985	Round Wood	25,000,000	4.00×10^8
1986	Round Wood	25,000,000	4.00×10^8

[1]Pine: 8 Tons/1000 Board-Feet

Table 2.1.1.11-2. Interview Information on Daily Loads

Incoming Vehicles		Outgoing (Loaded) Vehicles	
Number of Loads		Number of Loads	
	3-S2		3-S2
Low	20	Low	30
Avg	40	Avg	36
High	60	High	45
Radius of Influence		Radius of Influence	
No information available			3-S2
			95% 300 miles

Table 2.1.1.11-3. Traffic Classification Count Summary

Table 2.1.1.11-3A. Activity Center Only

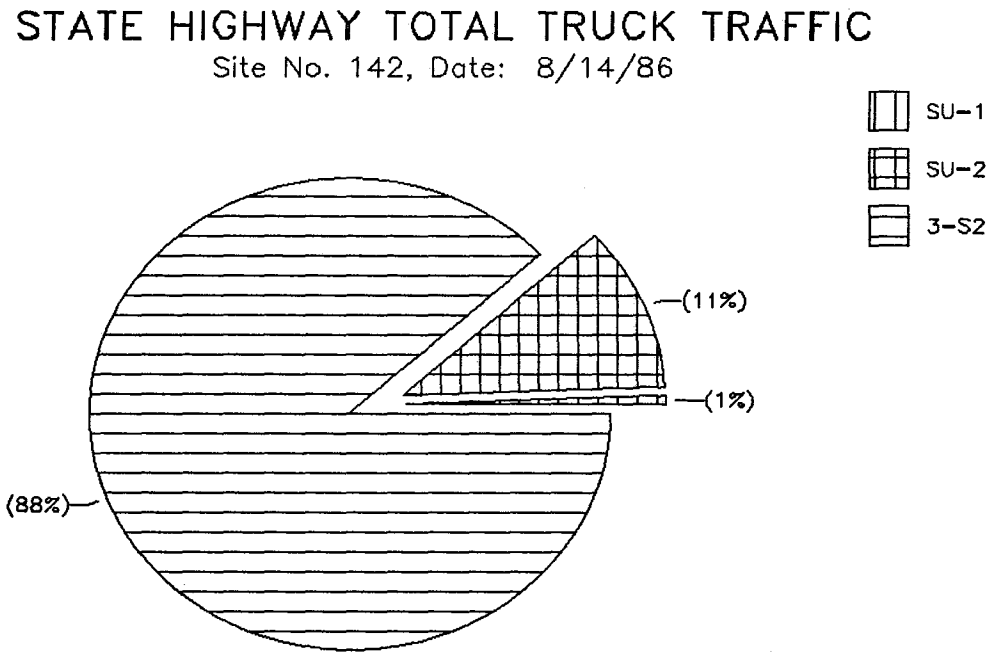
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/05/85	232	4	15	114	0	365	14%	86%	64%	36%
8/13/86	221	1	7	56	0	285	12%	88%	78%	22%
8/14/86	226	1	15	147	0	389	10%	90%	58%	42%

Table 2.1.1.11-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/13/86	205	0	5	2	0	212	71%	29%	97%	3%
8/14/86	300	0	4	2	0	306	67%	33%	98%	2%

Table 2.1.1.11-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/13/86	426	1	12	58	0	497	18%	82%	86%	14%
8/14/86	526	1	19	149	0	695	12%	88%	76%	24%



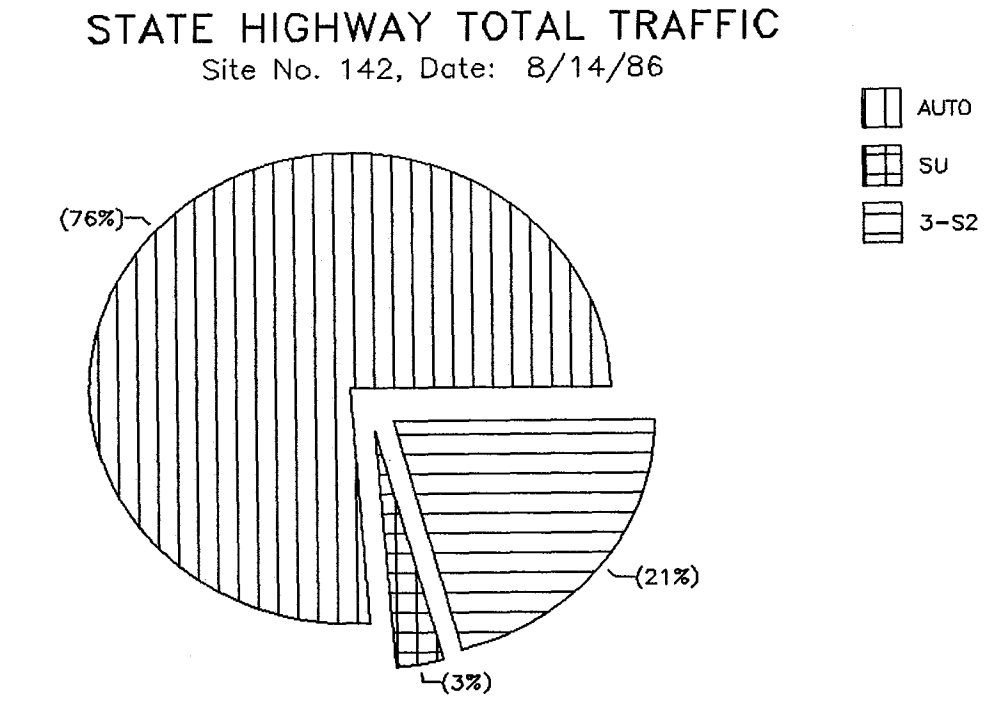


Figure 2.1.1.11-4. Highway Vehicle Percentages

2.1.1.12 Sawmill, Site No. 143

Introduction. The site map shown in Figure 2.1.1.12-1 indicates access directly to a U.S. Highway. The activity center is near the south edge of a small urbanized area. Log trucks hauling raw timber into this mill come predominantly from the south. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.12-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill receives log trucks from 6 a.m. to 5 p.m. The figure also shows the combination of trucks and autos that were generated by the mill during the same 12-hour period on October 3, 1986. The number of persons employed by the mill totaled 24. They worked one shift from 7 a.m. to 5 p.m. The distance traveled by the employees to work was not available.

Figure 2.1.1.12-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (69%). Also illustrated is the breakdown of total traffic moving to and from the mill. The auto was the major user (78%).

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.12-1.

Interviews with plant officials yielded information on loads (not trips) generated and radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.12-2. There was no railroad serving the activity center.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway carrying an average daily traffic (ADT) of 4,100 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.12-3 provides a summary of the counts that were taken. In Table 2.1.1.12-3A, vehicle classification counts are provided for the traffic moving to and from the activity center. In Table 2.1.1.12-3B, a count of all vehicles with the exception of special-use vehicles is provided for the main roadway. Finally, in Table 2.1.1.12-3C, a total count of all vehicles (sum of 3A, 3B, and special-use traffic on the roadway) is provided.

Figure 2.1.1.12-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.12-3C values). The 3-S2 vehicles represent 83% of total trucks counted on this U.S. Highway. Of the total traffic stream, trucks are 15% and cars are 85%.

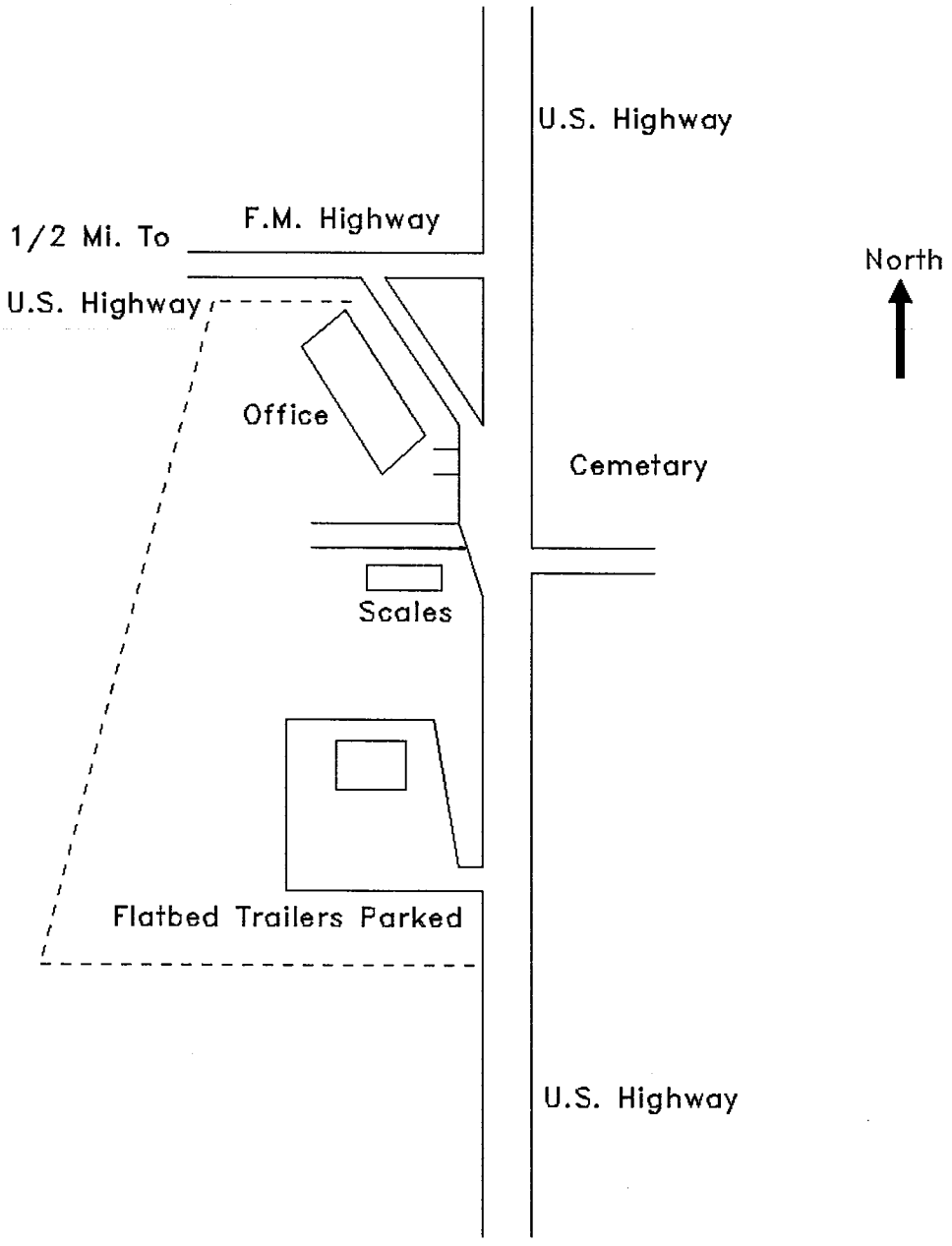
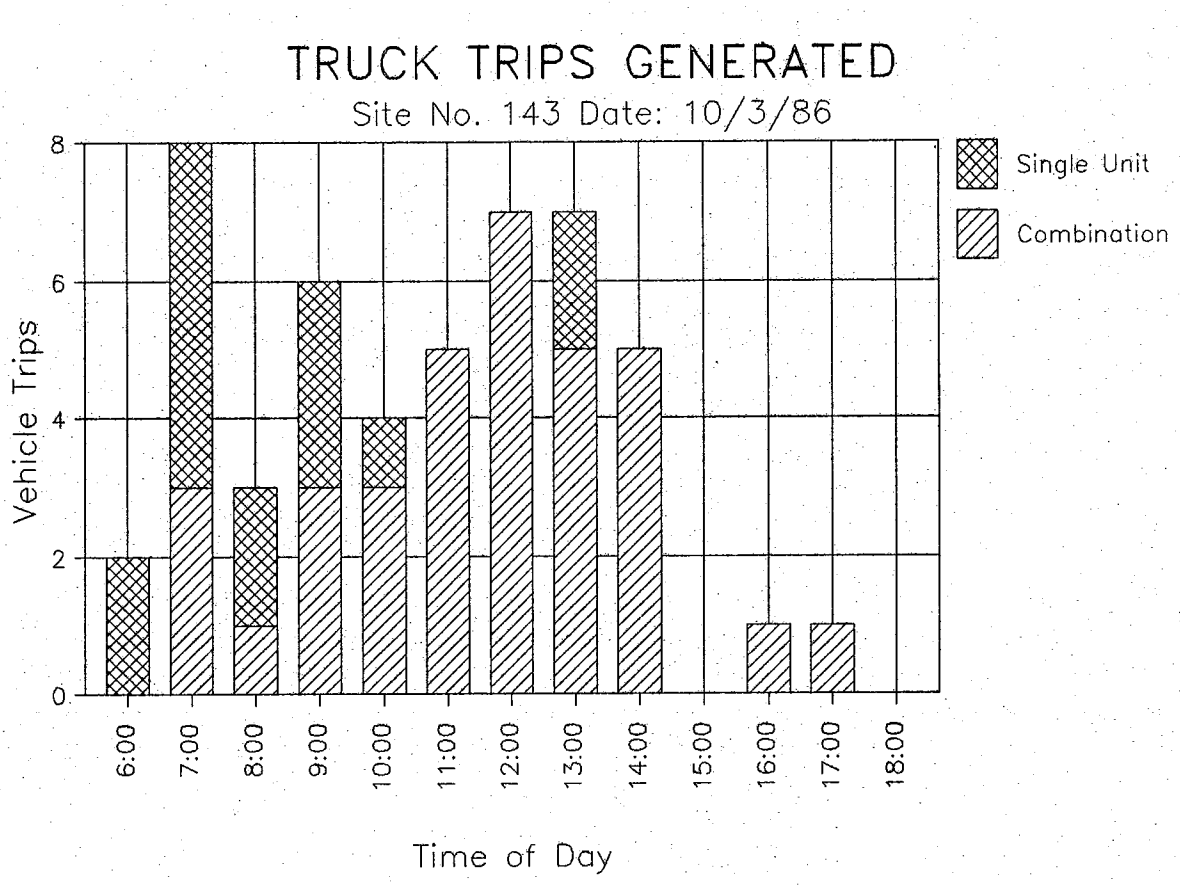


Figure 2.1.1.12-1. Site Map



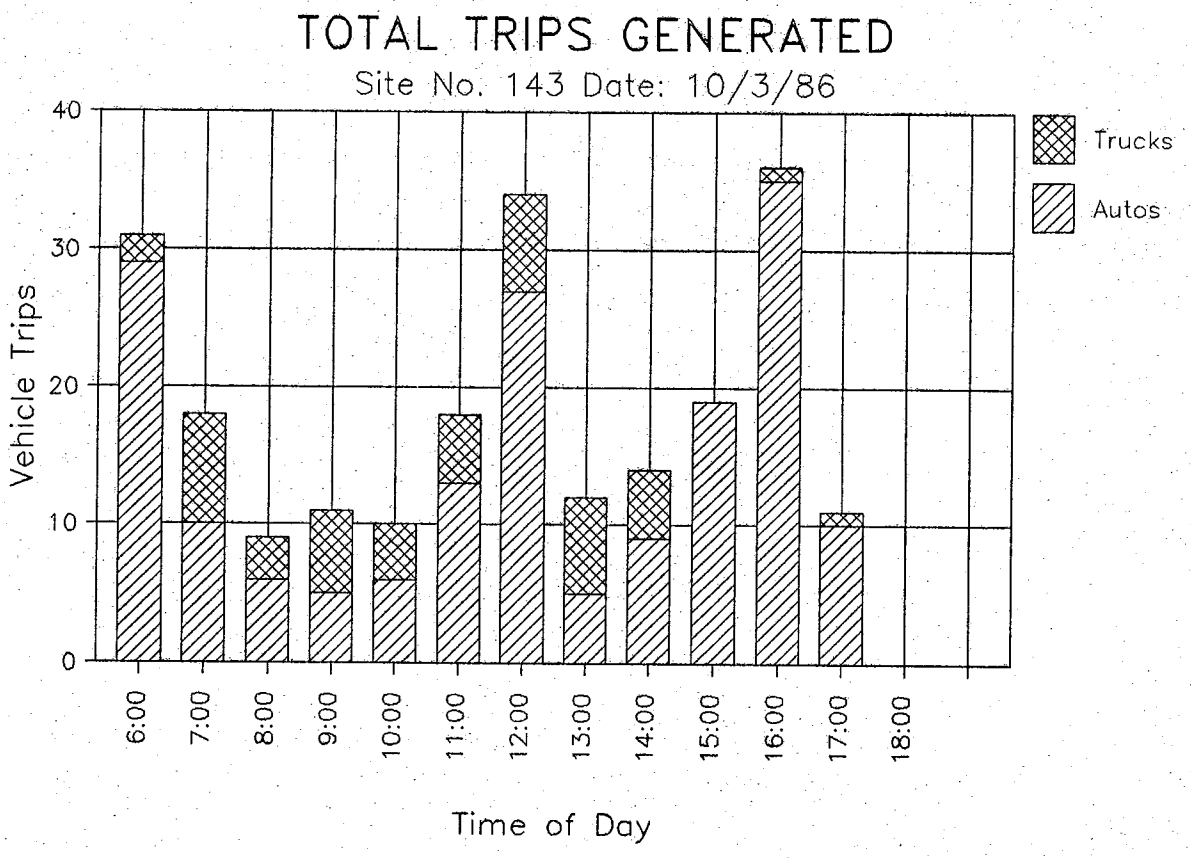
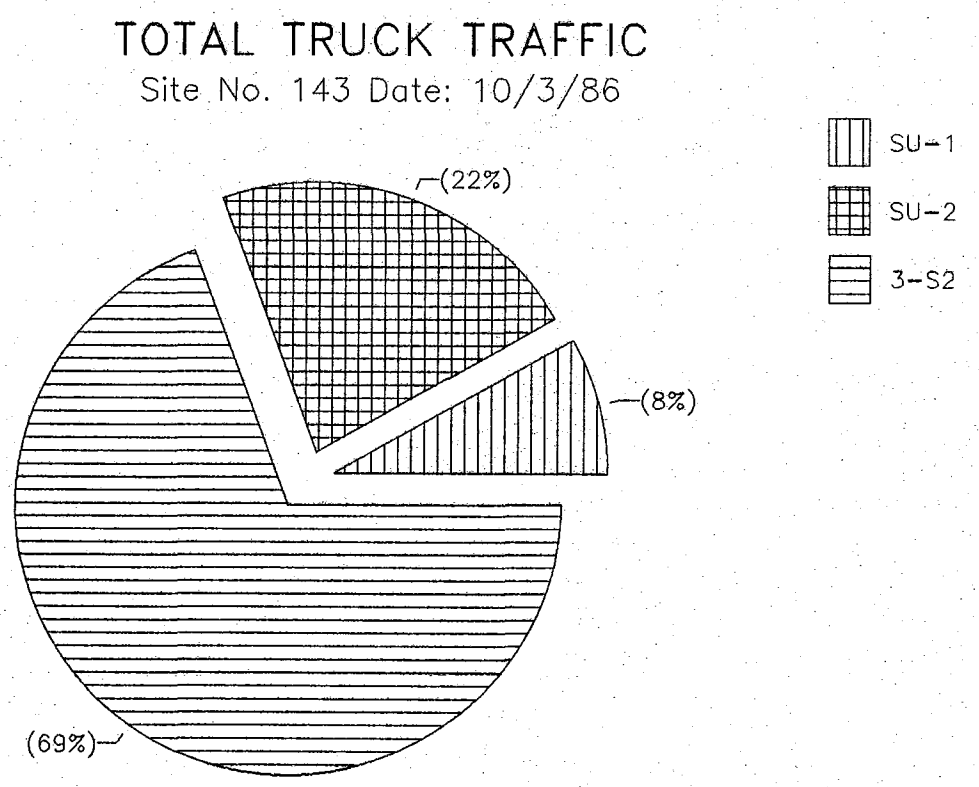


Figure 2.1.1.12-2. Hourly Trip Generation



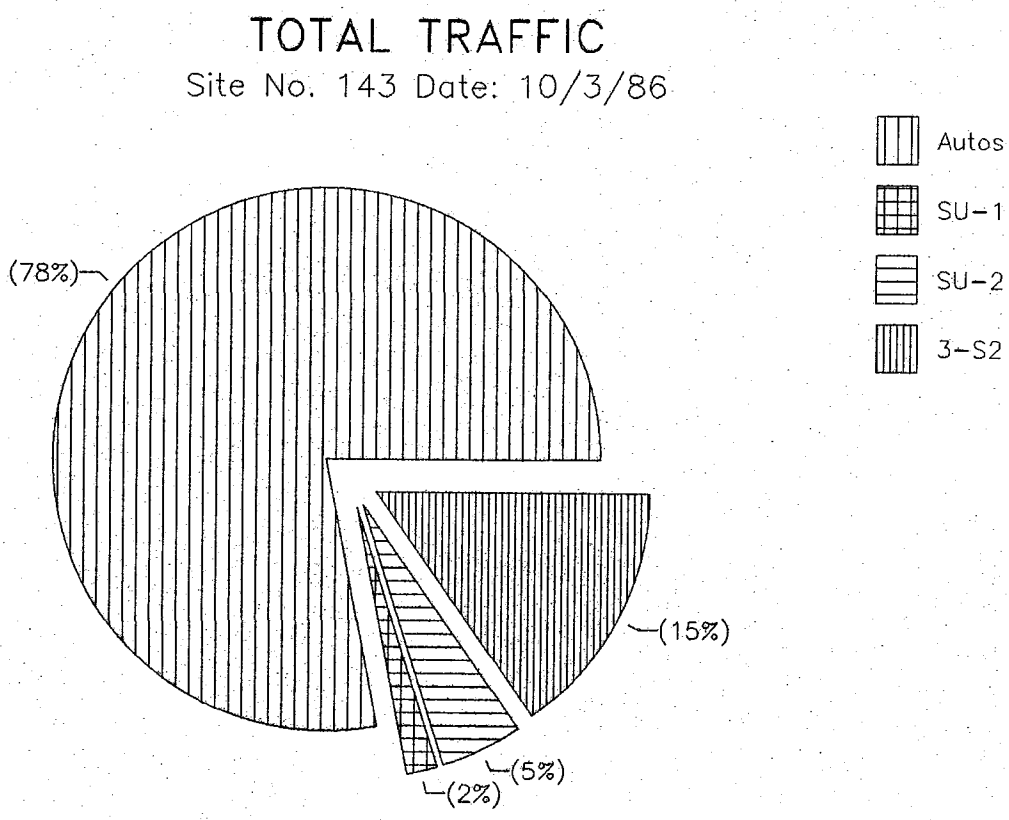


Figure 2.1.1.12-3. Activity Center Vehicle Percentages

Table 2.1.1.12-1. Industry Information on Raw Wood Input

Year	Wood Type	Board-Feet	Pounds[1]
1985	Round Wood	6,700,000	1.07×10^8
1986	Round Wood	6,200,000	0.99×10^8

[1]Pine: 8 Tons/1000 Board-Feet

Table 2.1.1.12-2. Interview Information on Daily Loads

Incoming (Loaded) Vehicles		Outgoing (Loaded) Vehicles	
Number of Loads		Number of Loads	
3-S2		Reg 3-S2	
Low	4	Low	4
Avg	9	Avg	7
High	20	High	15
Radius of Influence		Radius of Influence	
3-S2		3-S2	
50%	50 miles	60%	200 miles
100%	100 miles	100%	300 miles

Table 2.1.1.12-3. Traffic Classification Count Summary

Table 2.1.1.12-3A. Activity Center Only

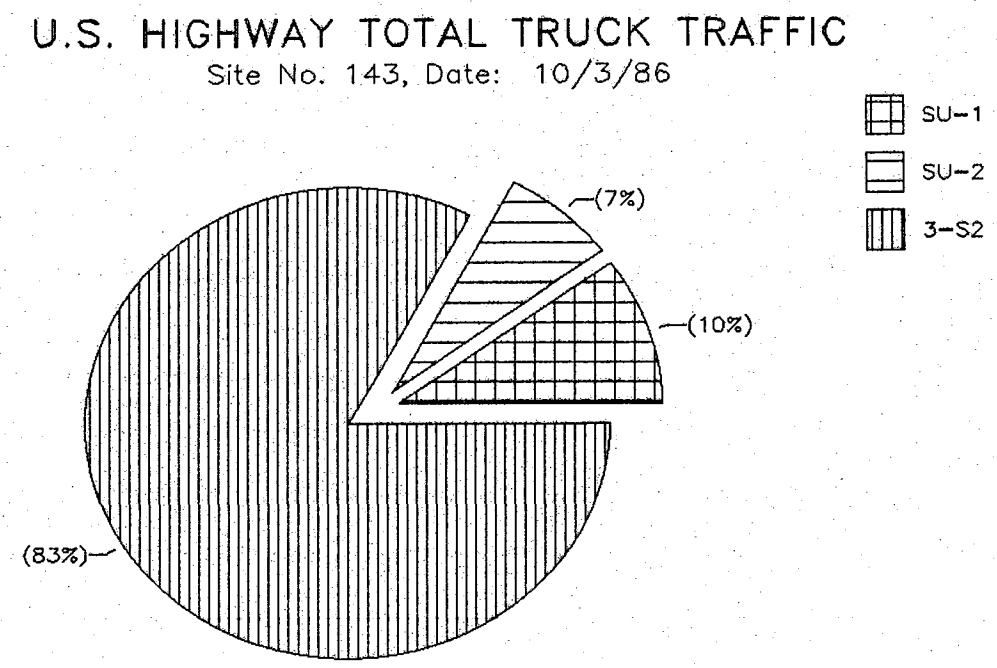
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/6/85	204	9	18	16	0	247	63%	37%	83%	17%
10/2/86	176	1	10	33	0	220	25%	75%	80%	20%
10/3/86	174	4	11	34	0	223	31%	69%	78%	22%

Table 2.1.1.12-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
6/6/85	2228	111	48	8	7	271	2673	36%	64%	83%	17%
10/3/86	2012	36	17	0	0	293	2358	15%	85%	85%	15%

Table 2.1.1.12-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
10/3/86	2186	40	28	0	0	327	2581	17%	83%	85%	15%



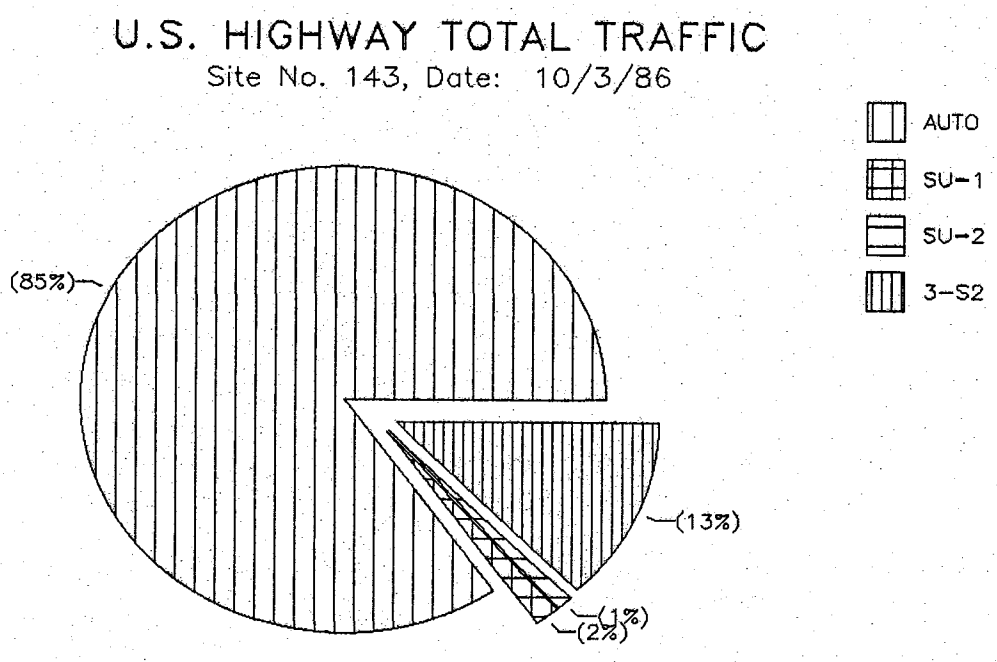


Figure 2.1.1.12-4. Highway Vehicle Percentages

2.1.1.13 Sawmill, Site No. 144

Introduction. The site map shown in Figure 2.1.1.13-1 indicates indirect access to a U.S. Highway. The activity center is near the southern outskirts of a small city.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.13-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill receives log trucks during the period from 6 a.m. to 6 p.m. The figure also shows the combination of trucks and autos that were generated by the mill during the same 12-hour period on April 27, 1988. The number of persons employed by the mill was not available. The work is accomplished in one 8 a.m. to 5 p.m. shift, five days per week.

Figure 2.1.1.13-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3-S2 combination (82%). Also illustrated is the breakdown of total traffic moving to and from the mill. The auto was the major user (72%).

Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.13-1.

Interviews with plant officials yielded information on truck loads (not trips) generated and radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.13-2. No products were shipped by rail.

The sawmill had added a sawdust oven prior to 1985 which reduced the number of truck trips because of the more efficient use of by-products. Sawdust which was hauled away before could now be utilized in kiln drying the wood. It was estimated that 2 to 3 vans of sawdust were burned per week in the process with 3 to 4 vans per week remaining to be hauled away.

Incoming logs were in 16'-6" lengths. The general rule of thumb used to convert weight of raw timber to quantity of finished products is 1,400 pounds of logs to 1,000 board feet of lumber.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway carrying an average daily traffic (ADT) of 13,600 vehicles per day in 1986. Manual classification counts were conducted in 1985, 1986, and 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.13-3 provides a summary of the counts that were taken. In Table 2.1.1.13-3A, vehicle classification counts are shown for the traffic moving to and from the activity center. In Table 2.1.1.13-3B, a count of all vehicles with the exception of special-use vehicles is shown for the main roadway. Finally, in Table 2.1.1.13-3C, a total count of all vehicles on the main roadway is shown.

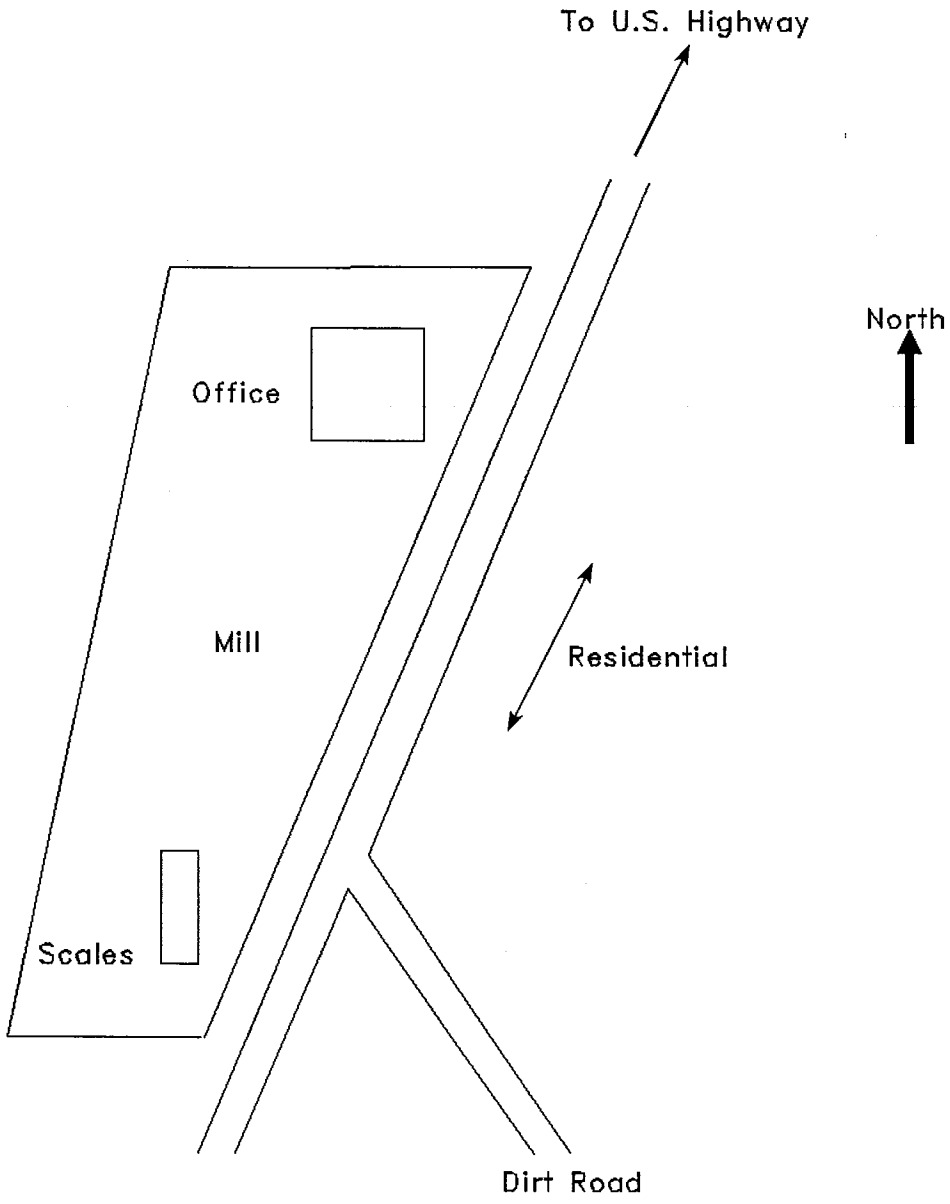
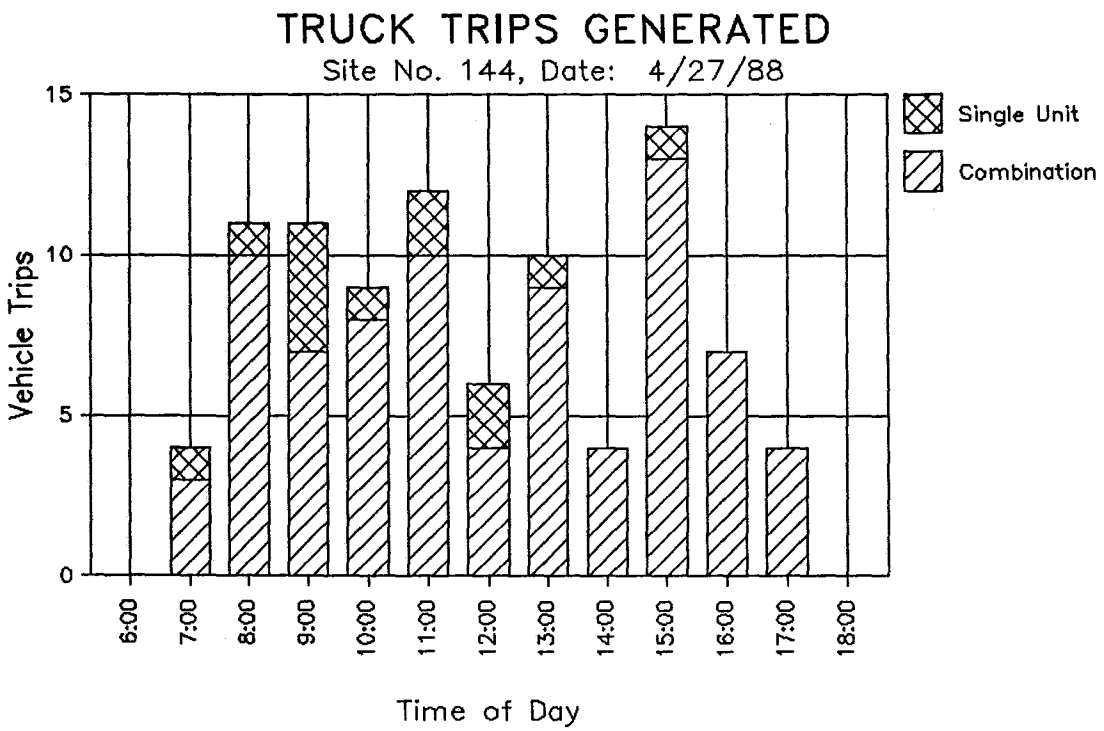


Figure 2.1.1.13-1. Site Map



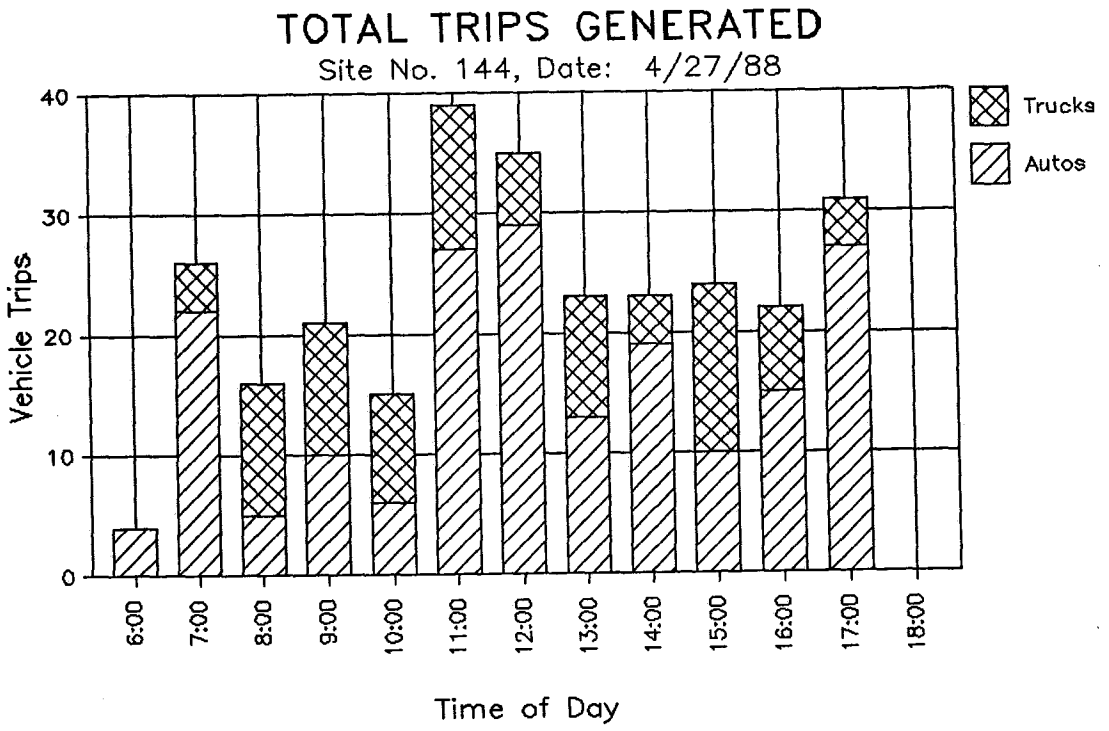
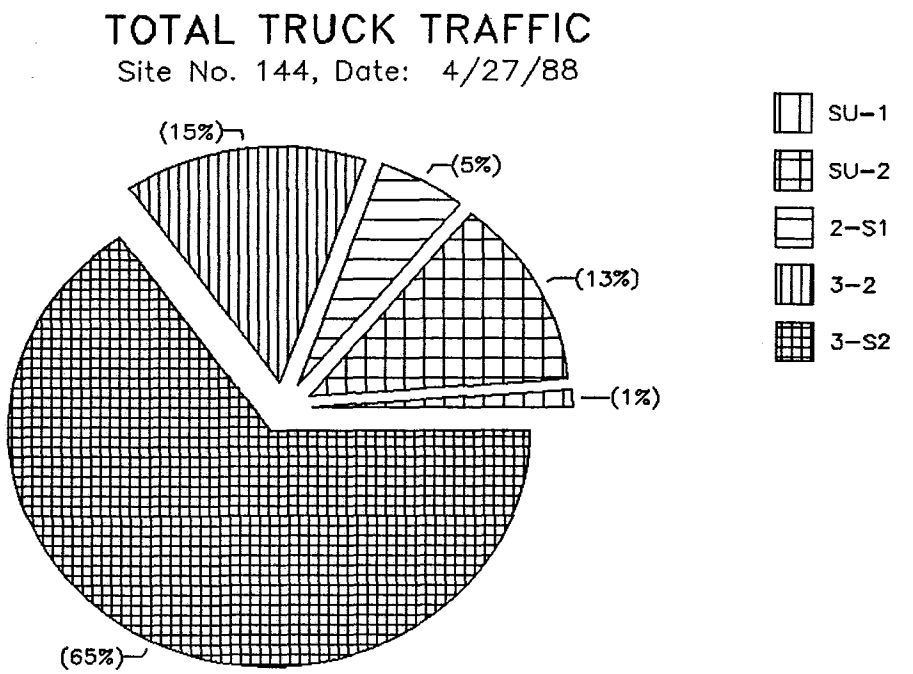


Figure 2.1.1.13-2. Hourly Trip Generation



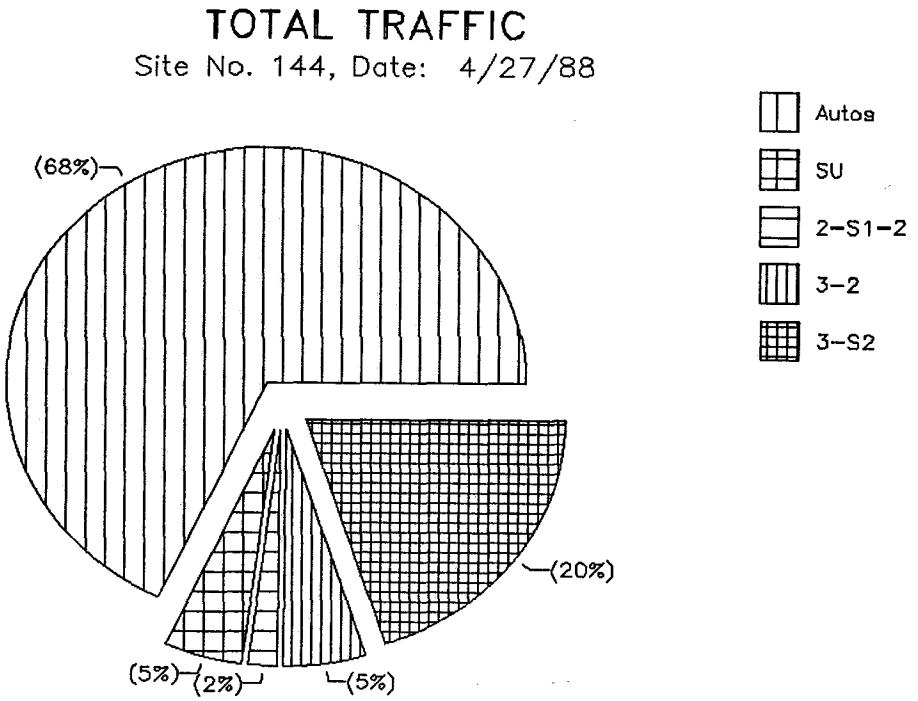


Figure 2.1.1.13-3. Activity Center Vehicle Percentages

Table 2.1.1.13-1. Industry Information on Raw Wood Input

Year	Wood Type	Board-Feet	Pounds[1]
1985	Round Wood	6,628,000	1.06×10^8
1986	Round Wood	7,470,000	1.20×10^8

[1]Pine: 8 Tons/1000 Board-Feet

Table 2.1.1.13-2. Interview Information on Daily Loads

Incoming (Loaded) Vehicles		Outgoing (Loaded) Vehicles	
Number of Loads		Number of Loads	
3-S2		Single Unit	3-S2
Low	6	Low 2	1
Avg	8	Avg 2	2
High	10	High 3	2
Radius of Influence		Radius of Influence	
3-S2		Single Unit	3-S2
80% 20 miles		100% 250 miles	80% 250 miles

Table 2.1.1.13-3. Traffic Classification Count Summary

Table 2.1.1.13-3A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
5/17/85	192	0	4	20	0	216	17%	83%	89%	11%
7/29/86	131	1	4	17	0	153	23%	77%	86%	14%
4/27/88	187	1	12	60	19[1]	279	14%	86%	67%	33%

[1]Other vehicles are 5 2-S2 and 14 3-2.

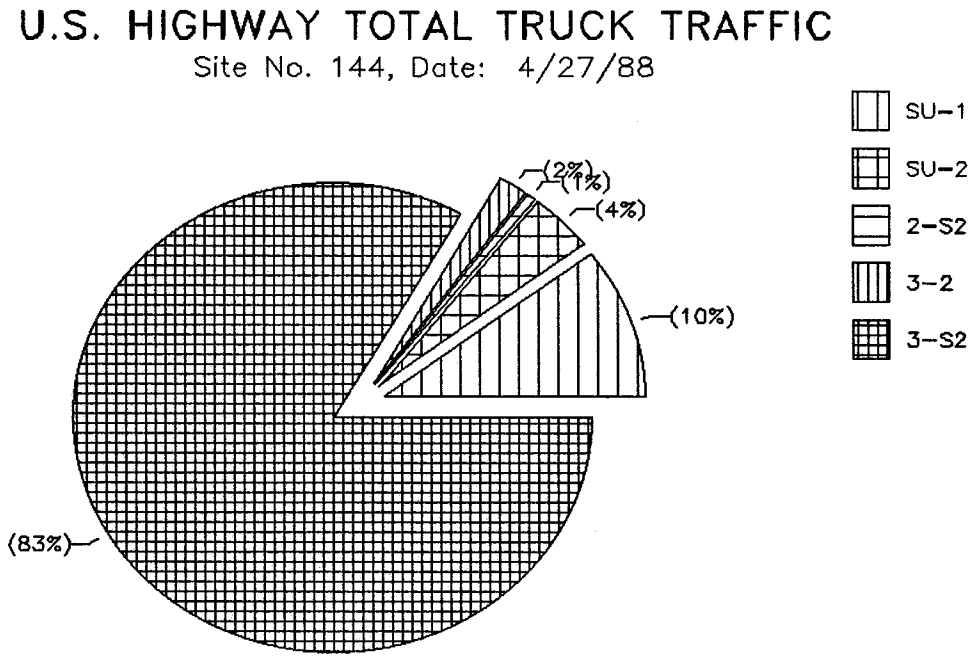
Table 2.1.1.13-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/27/88	6316	80	20	594	0	7010	14%	86%	90%	10%

Table 2.1.1.13-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S2	3-2	3-S2	Total	SU	Comb.	Cars	Trucks
4/27/88	6503	87	43	5	14	752	7404	14%	86%	88%	12%

Figure 2.1.1.13-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.13-3C values). The 3-S2 vehicle represent 83% of the total trucks counted on this U.S. Highway. Trucks were 12% of total traffic on this particular day.



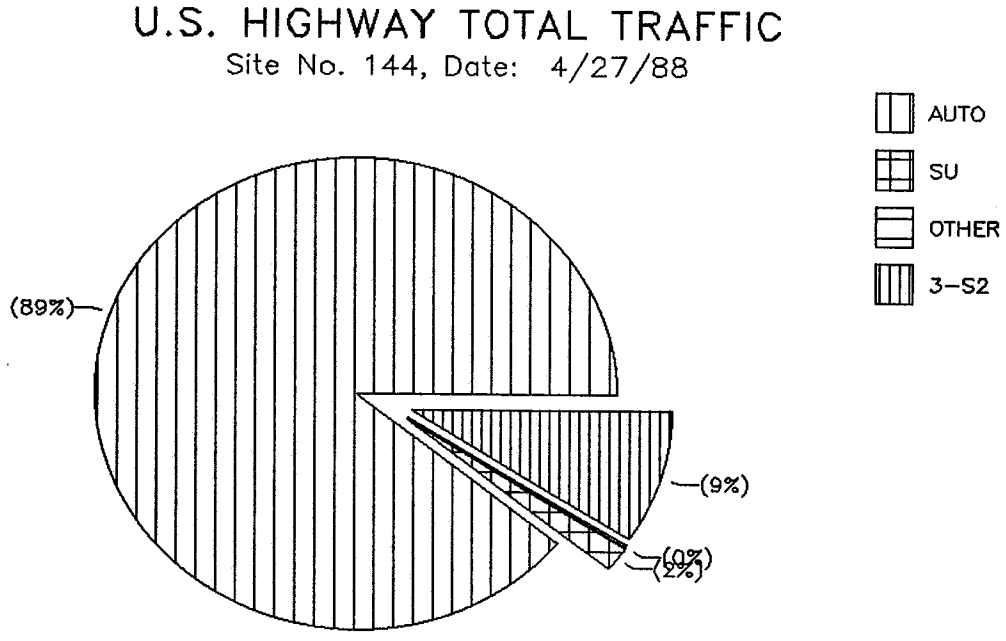


Figure 2.1.1.13-4. Highway Vehicle Percentages

2.1.1.14 Sawmill, Site No. 145A

Introduction. The site map shown in Figure 2.1.1.14-1 indicates that access is provided directly to a U.S. Highway. The activity center is near the western outskirts of a medium-sized city. The site is served by a railroad which carries no raw materials to the mill but does haul some finished products from the mill.

Activity Center Trip-Generating Characteristics. Figure 2.1.1.14-2 shows the truck traffic (in and out) generated by the mill during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This mill operates on a five day a week basis with working hours from 7:30 a.m. to 4 p.m. The figure also shows the combination of trucks and autos that were generated by the mill during the same 12-hour period on April 6, 1988. The number of persons employed by the mill was not obtained.

Figure 2.1.1.14-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the mill. The predominant truck was the 3S-2 combination (90%). Also illustrated is the breakdown of total traffic moving to and from the mill. The percentages of cars and trucks generated by the sawmill was 56 percent and 44 percent, respectively. Information requested from industry representatives for the years of 1985 and 1986 included an estimate of the total raw wood hauled into the mill by truck. This information is shown in Table 2.1.1.14-1.

Interviews with plant officials yielded information on truck loads (not trips) generated and radius of influence of incoming and outgoing products. This information is shown in Table 2.1.1.14-2. Some outgoing products were also shipped by rail but this was estimated at only 1% of the total output.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway carrying an average daily traffic (ADT) of 3,400 vehicles per day in 1986. Manual classification counts were conducted in 1986 and 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.1.1.14-3 provides a summary of the counts that were taken. Table 2.1.1.14-3A provides vehicle classification counts for the activity center. Table 2.1.1.14-3B provides a count of all vehicles on the roadway with the exception of special-use vehicles. Table 2.1.1.14-3C provides a total count of all vehicles on the main roadway.

Figure 2.1.1.14-4 shows the percentages of total trucks and total vehicles on the highway when special-use vehicles are included (Table 2.1.1.14-3C values). The 3-S2 vehicle represents 71% of total trucks counted on this U.S. Highway. Trucks were six percent of the total traffic stream on this date.

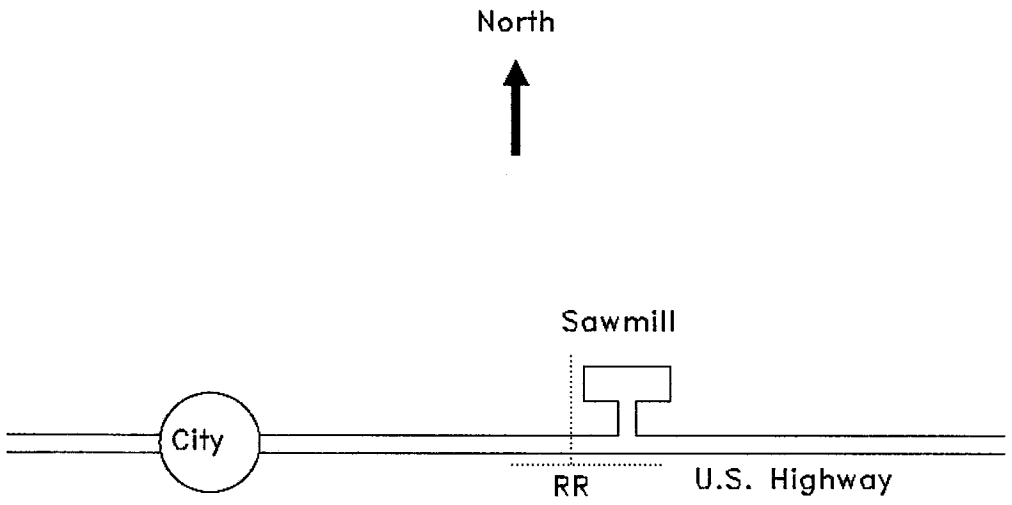
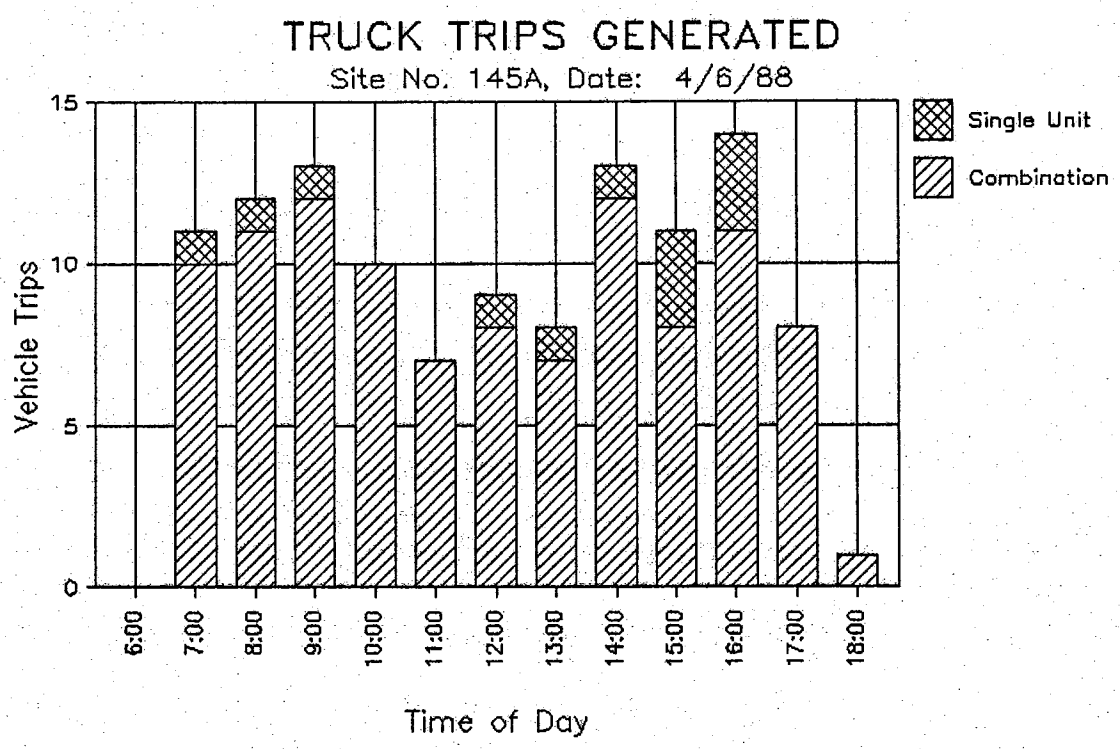


Figure 2.1.1.14-1. Site Map



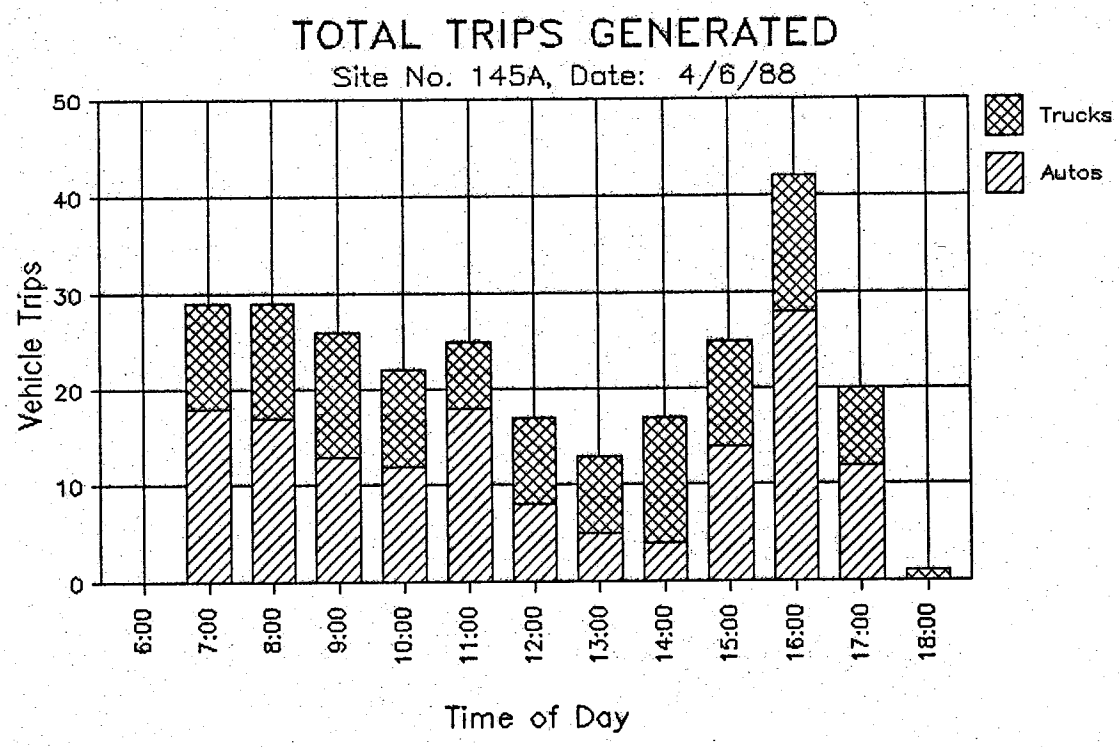
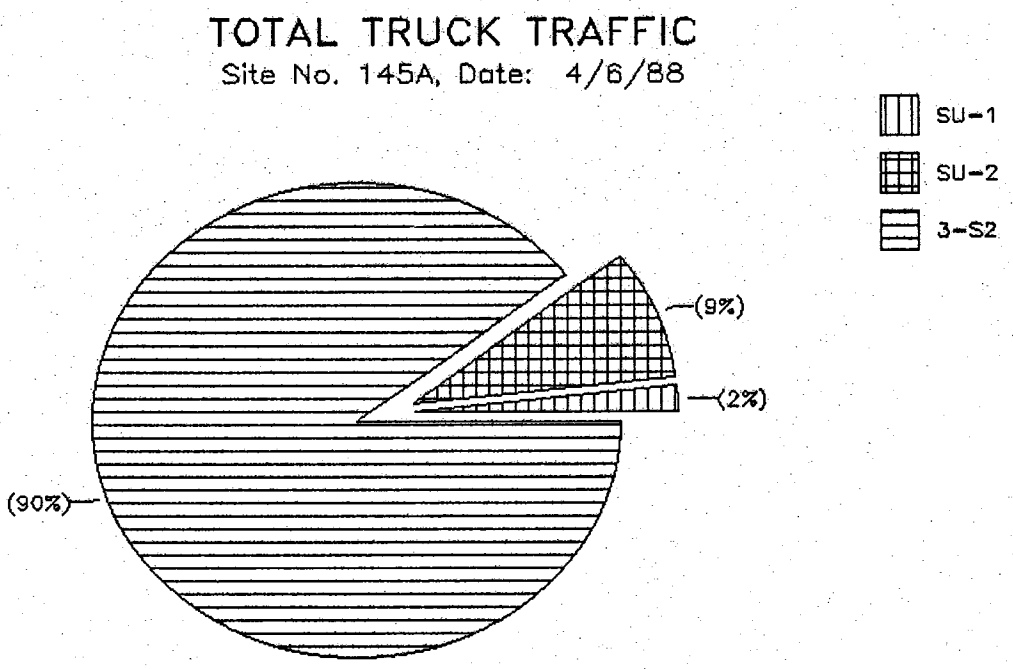


Figure 2.1.1.14-2. Hourly Trip Generation



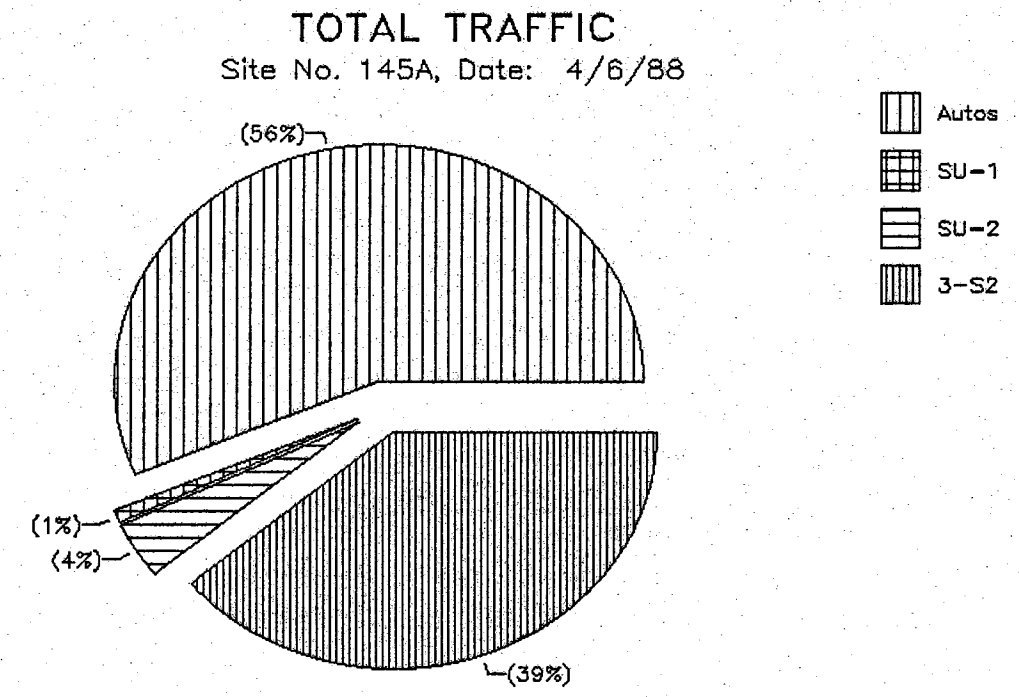


Figure 2.1.1.14-3. Activity Center Vehicle Percentages

Table 2.1.1.14-1. Industry Information on Raw Wood Input

Year	Wood Type	No. of Cords	Pounds[1]
1985	Round Wood	99,682	4.98×10^8
1986	Round Wood	97,370	4.87×10^8

[1]Conversion 5000 lbs/Cord, northern area.

Table 2.1.1.14-2. Interview Information on Daily Loads

Incoming (Loaded) Vehicles

Number of Truck Loads

	Single Unit	3-S2
Low	-	--
Avg	-	50
High	-	80

Radius of Influence

Not Available

Outgoing (Loaded) Vehicles

Number of Truck Loads

	Reg 3-S2	Railers - 1%
Low	15	
Avg	30	
High	40	

Radius of Influence

3-S2

80% 200 miles
100% 300 miles

Table 2.1.1.14-3. Traffic Classification Count Summary

Table 2.1.1.14-3A. Activity Center Only

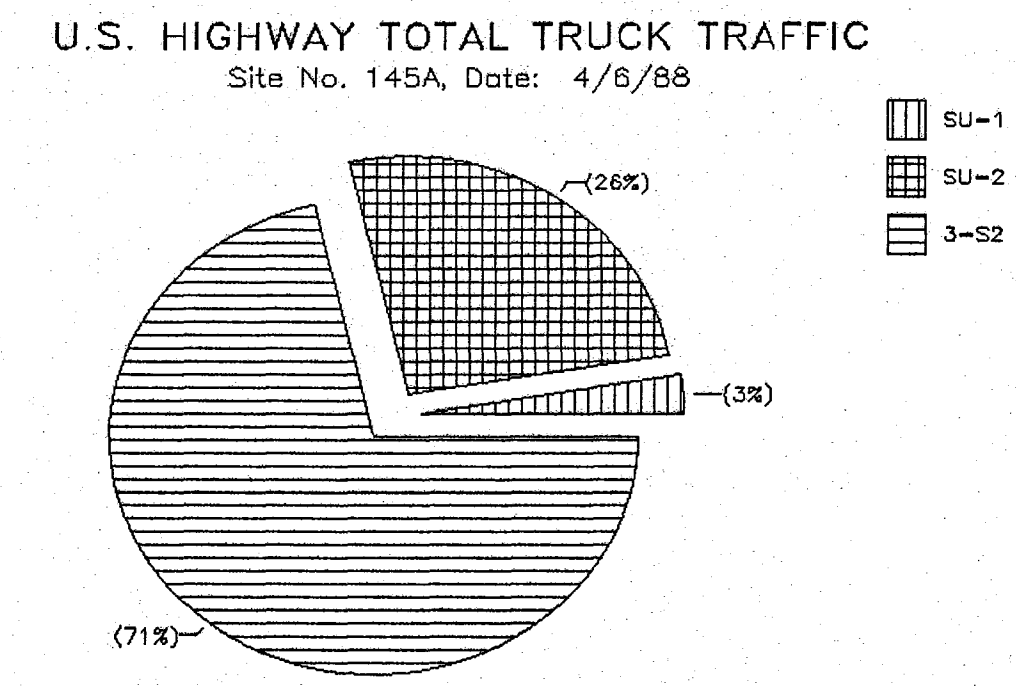
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/5/86	193	0	5	141	2	341	3%	97%	57%	43%
8/6/86	180	0	9	105	2	296	8%	92%	61%	39%
4/6/88	149	2	10	103	1	265	10%	90%	56%	44%

Table 2.1.1.14-3B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/6/86	2492	0	0	45	0	2537	0%	100%	98%	2%
4/6/88	2589	1	19	17	0	2626	54%	46%	99%	1%

Table 2.1.1.14-3C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/6/86	2672	0	41	150	0	2863	21%	79%	93%	7%
4/6/88	2738	5	49	135	0	2927	29%	71%	93%	7%



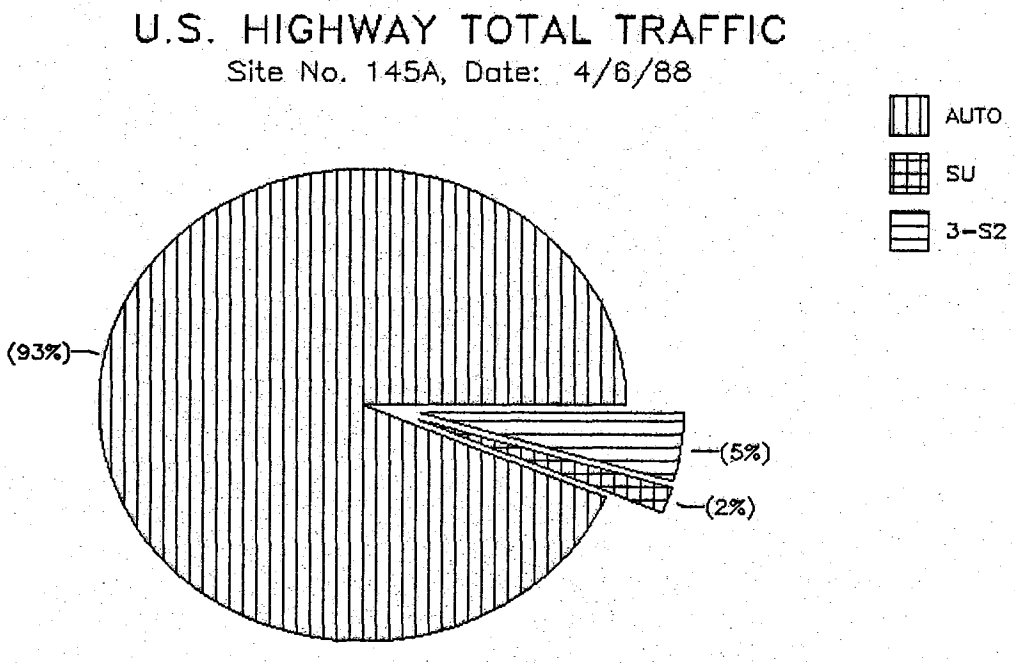


Figure 2.1.1.14-4. Highway Vehicle Percentages

2.1.2 WEIGH-IN-MOTION RESULTS FOR TIMBER

Figures 2.1.2-1 through 2.1.2-20 are cumulative distribution plots of axle weights and gross vehicle weights of timber trucks. The site numbers identified on the plots are the same as those used elsewhere for vehicle classification counts. The weigh-in-motion (WIM) crew identified special-use vehicles associated with each site and coded the vehicle for subsequent evaluation. The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weight. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was typically deployed at timber mills from about 8 a.m. to about 4 p.m. In other words, the system was not used to monitor night activity. Most of the trucks hauling raw timber traveled during the daytime, so the need to monitor night movement was not apparent.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near special-use traffic generators, lanes used for raw product movement, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked. All of the sites selected met these criteria fairly well, although the perfect location was difficult to find.

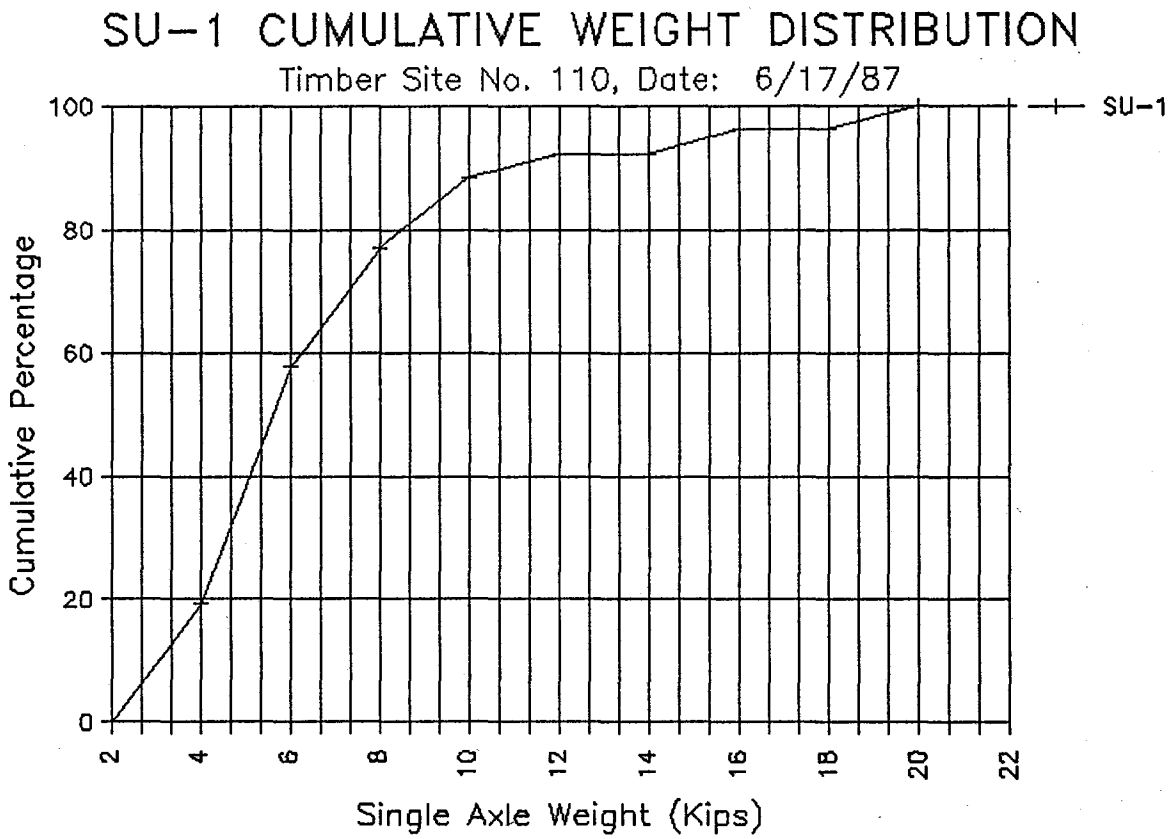


Figure 2.1.2-1 Timber Truck Weights: SU-1, Single Axle, 6/17/87

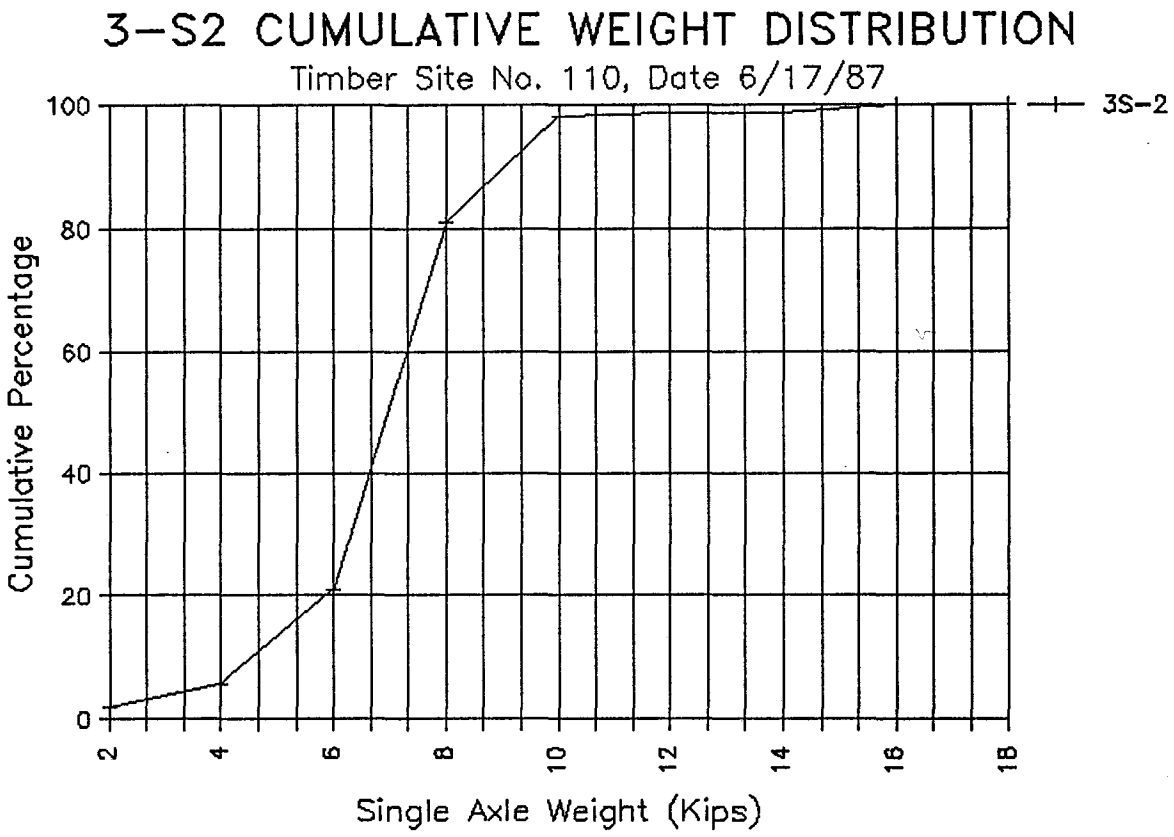


Figure 2.1.2-2 Timber Truck Weights: 3-S2, Single Axle, 6/17/87

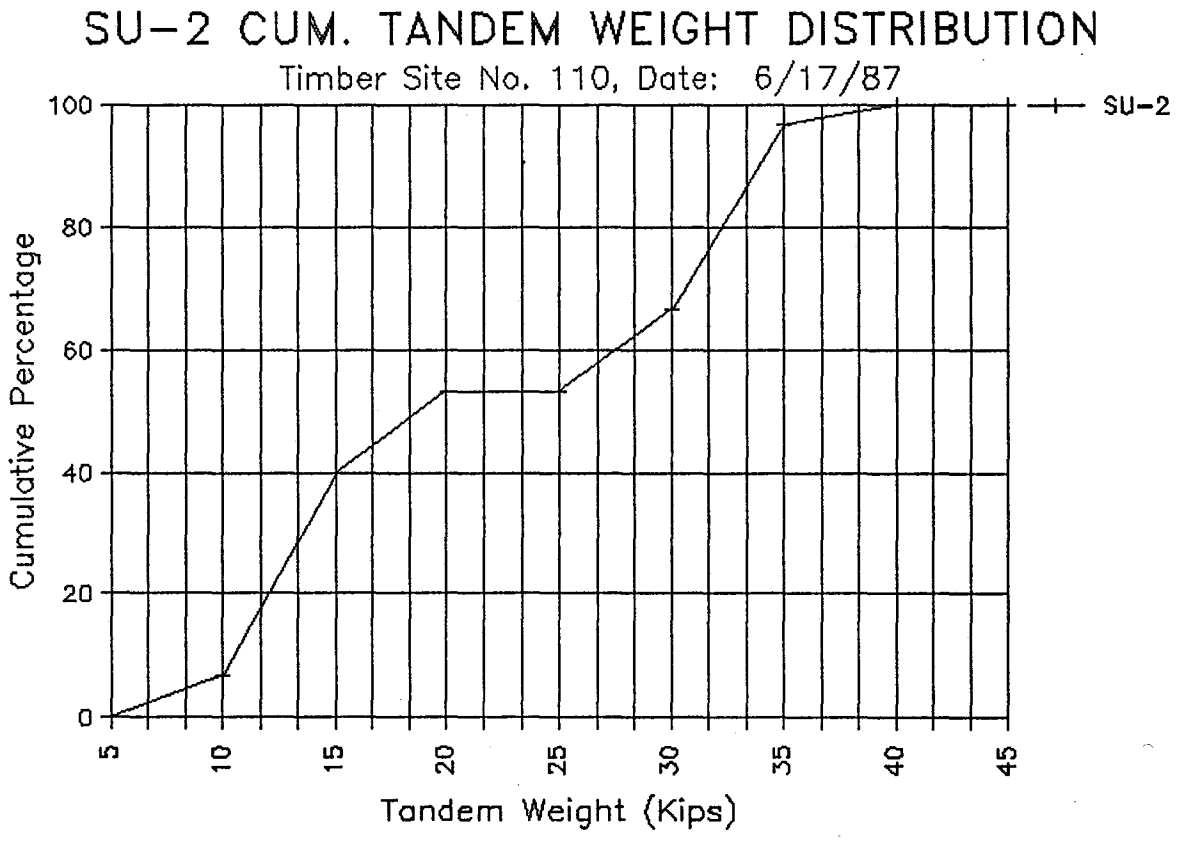


Figure 2.1.2-3 Timber Truck Weights: SU-2, Tandem, 6/17/87

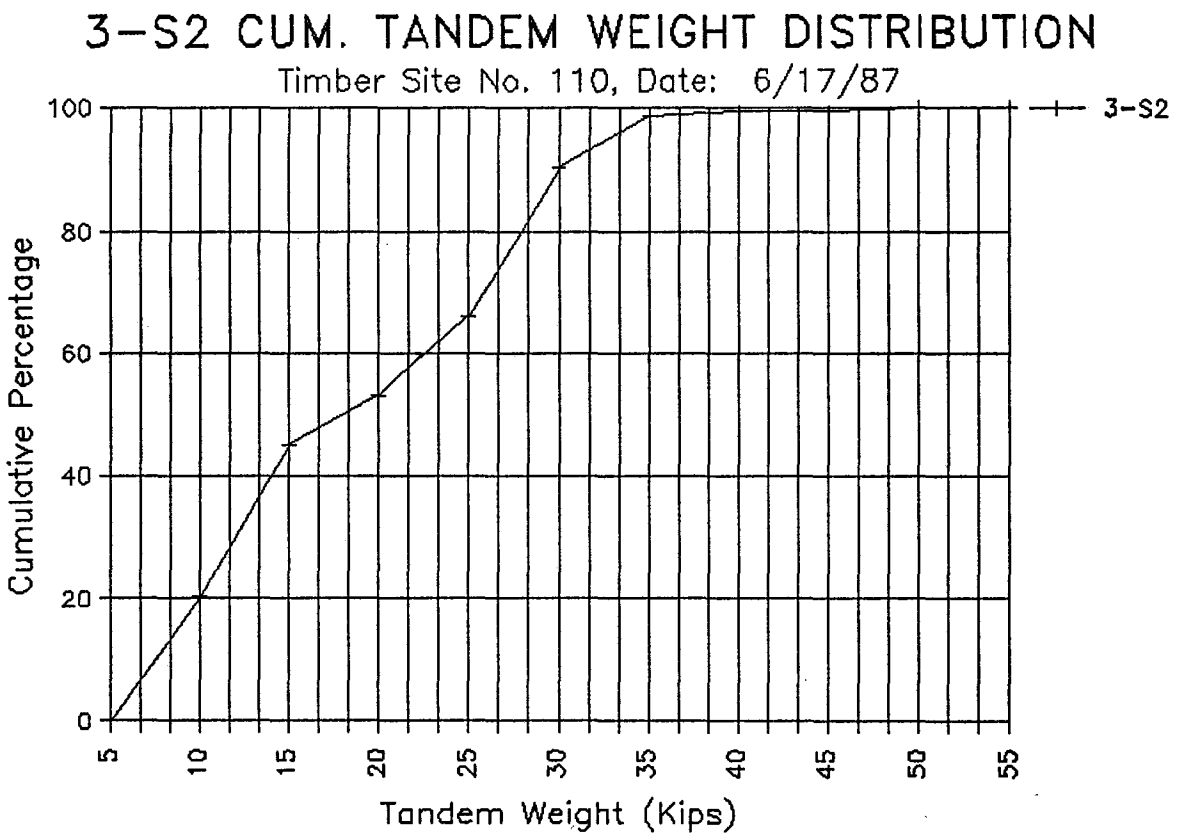


Figure 2.1.2-4 Timber Truck Weights: 3-S2, Tandem, 6/17/87

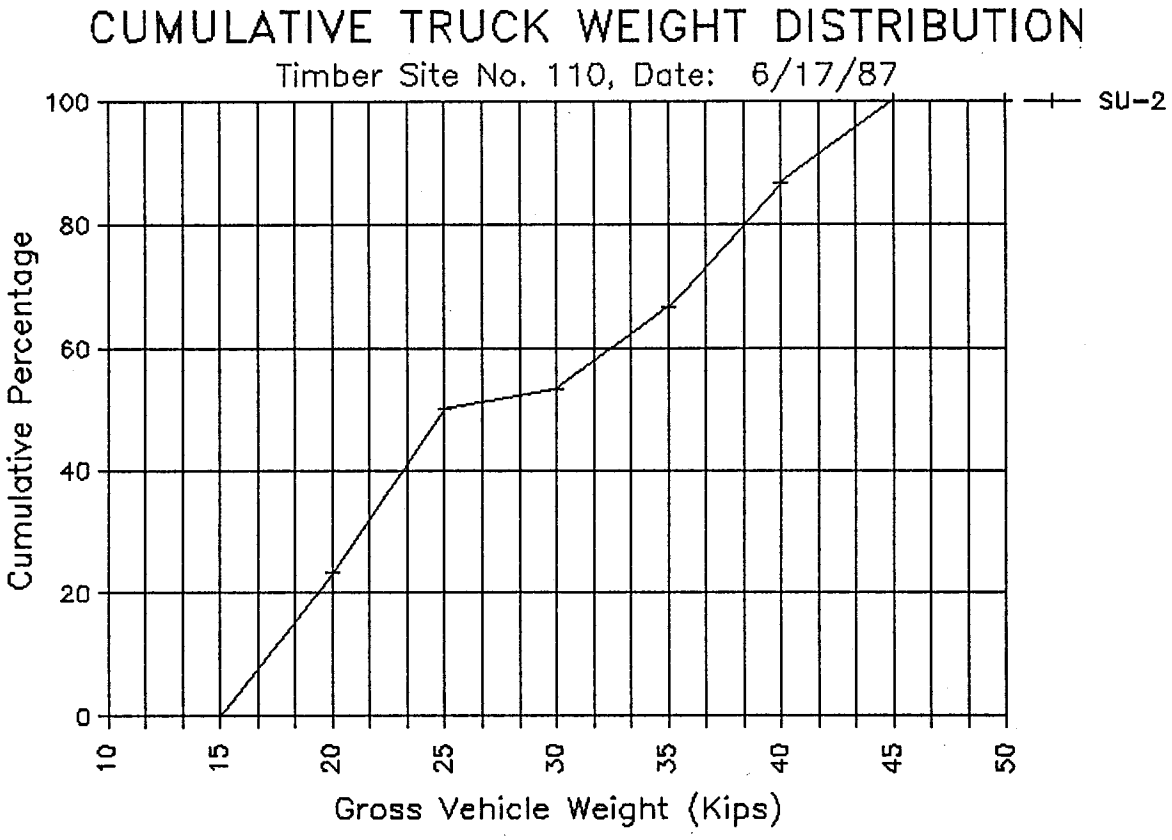


Figure 2.1.2-5 Timber Truck Weights: SU-2, Gross Vehicle, 6/17/87

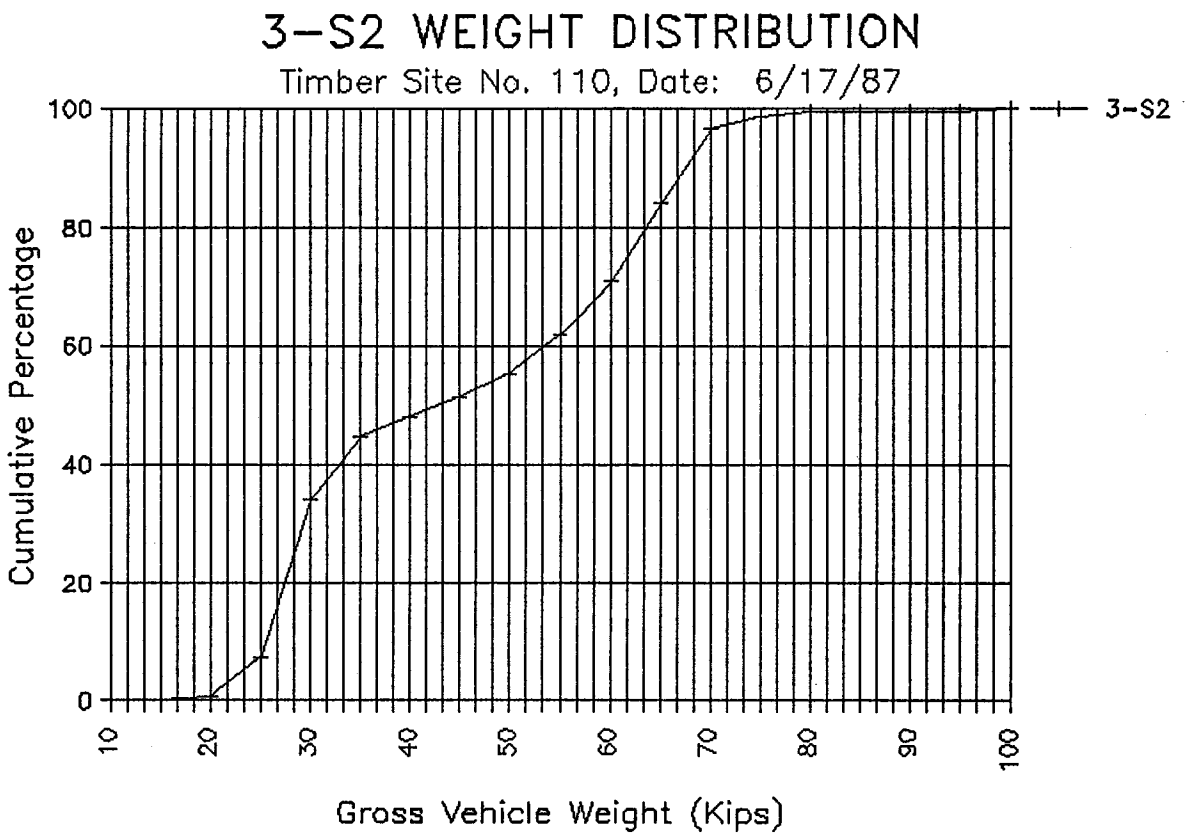


Figure 2.1.2-6 Timber Truck Weights: 3-S2, Gross Vehicle, 6/17/87

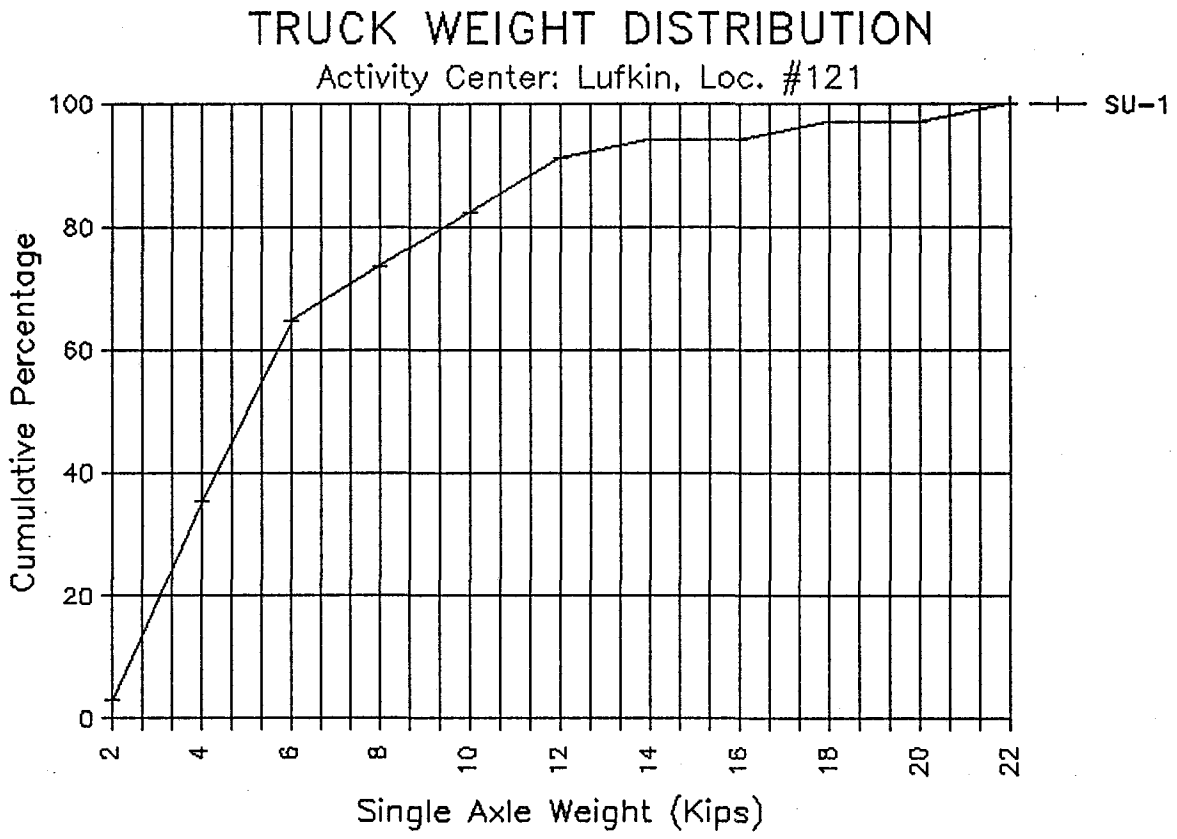


Figure 2.1.2-7 Timber Truck Weights: SU-1, Single Axle, 6/16/87

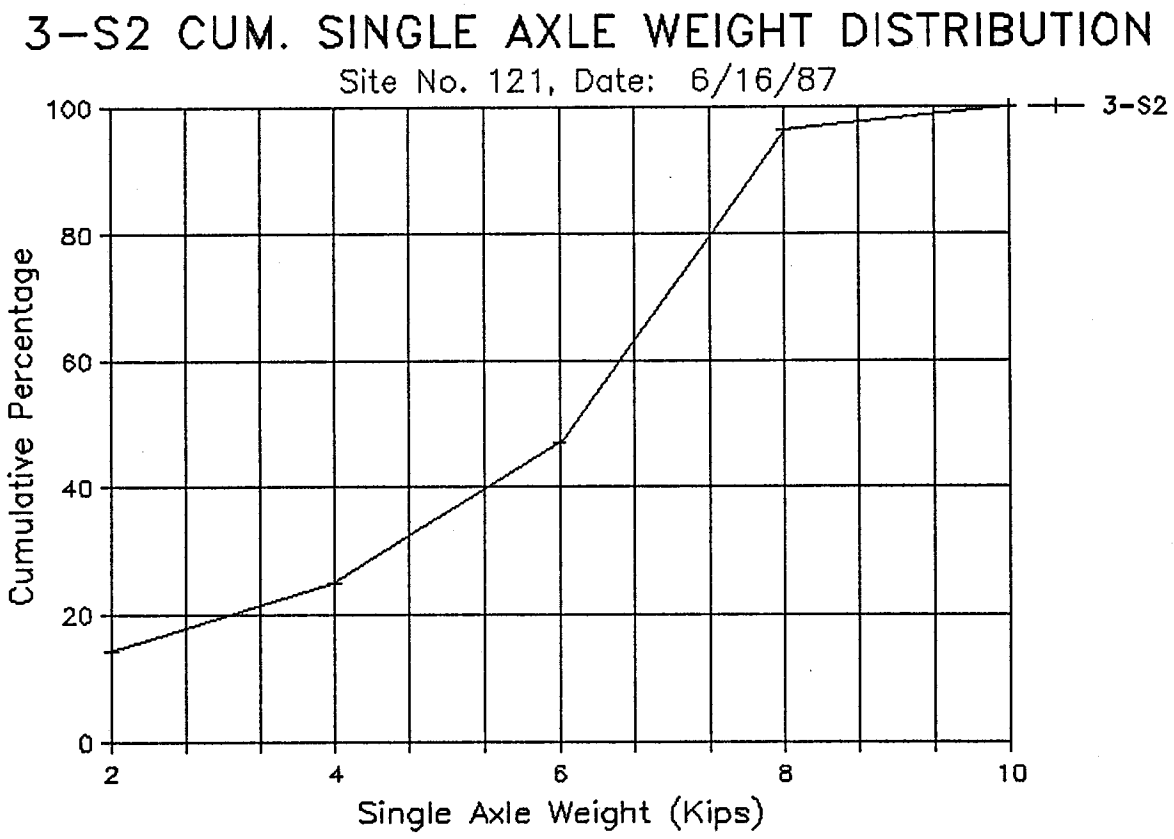


Figure 2.1.2-8 Timber Truck Weights: 3-S2, Single Axle, 6/16/87

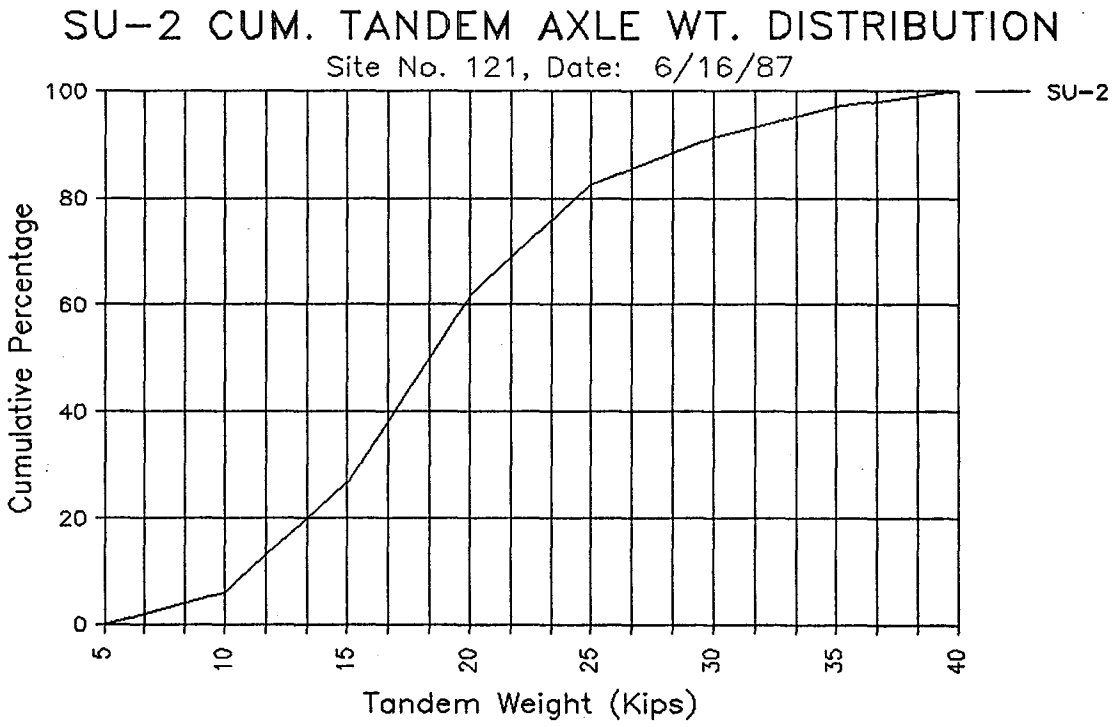


Figure 2.1.2-9 Timber Truck Weights: SU-2, Tandem, 6/16/87

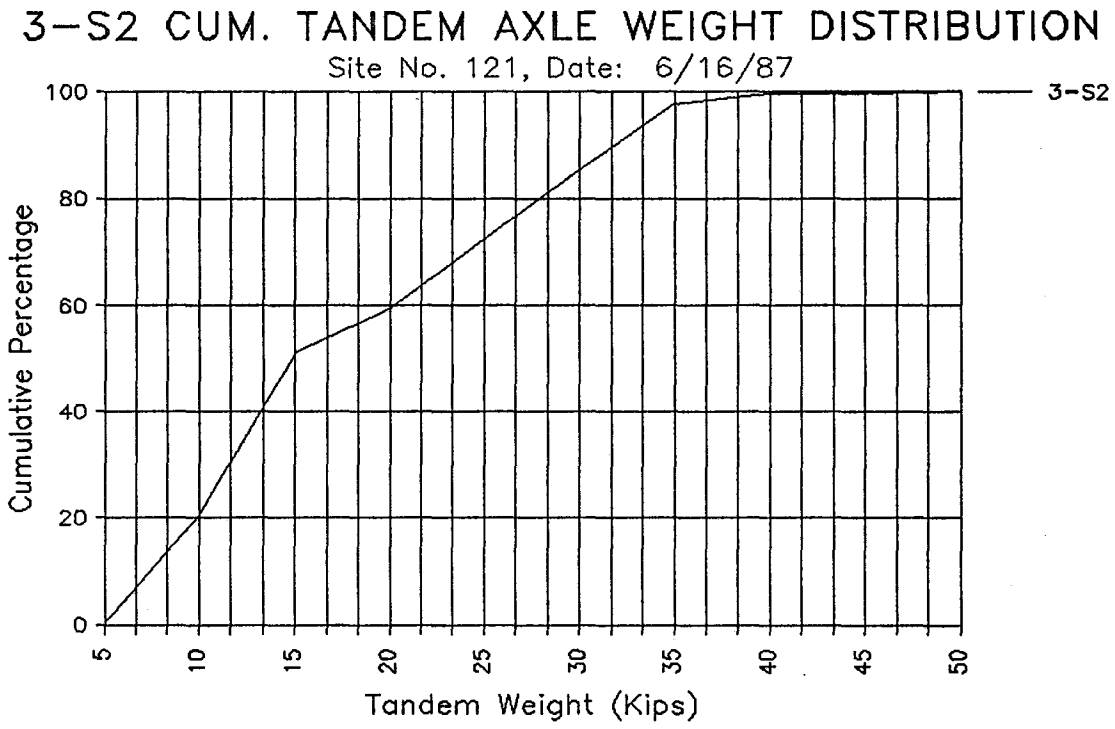


Figure 2.1.2-10 Timber Truck Weights: 3-S2, Tandem, 6/16/87

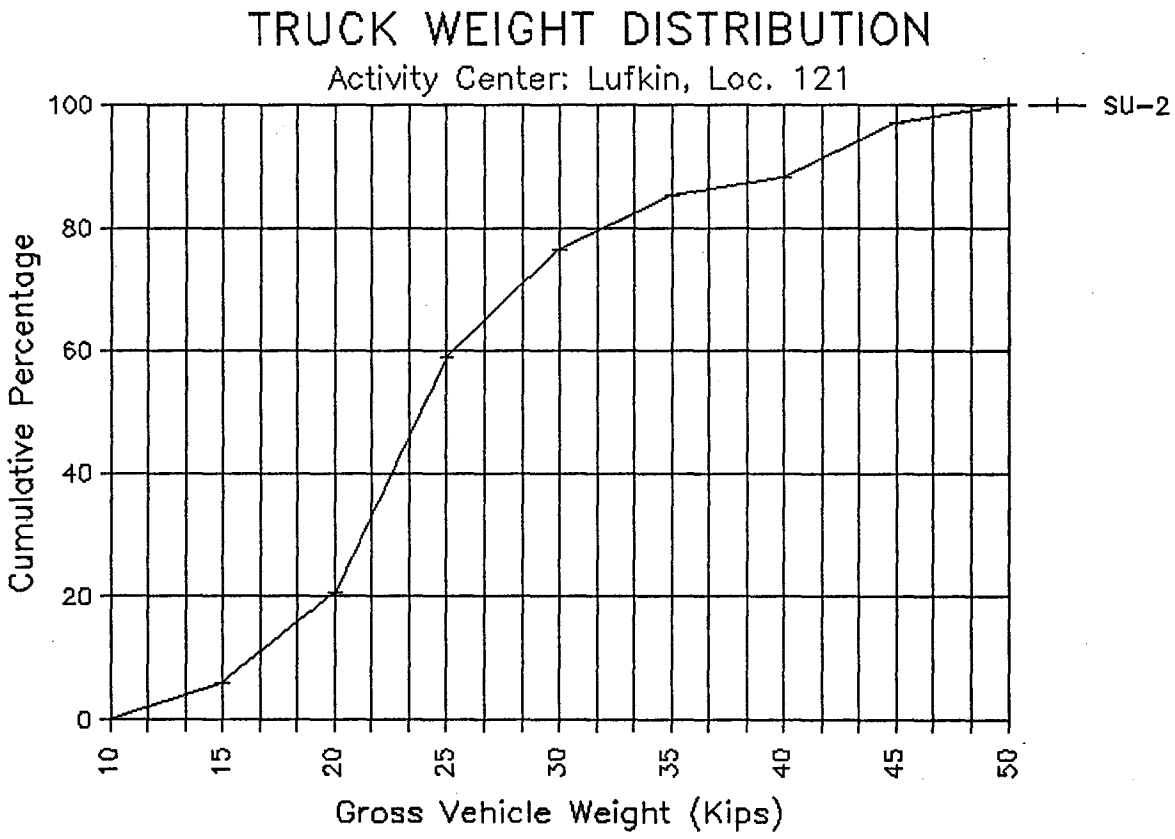


Figure 2.1.2-11 Timber Truck Weights: SU-2, Gross Vehicle, 6/16/87

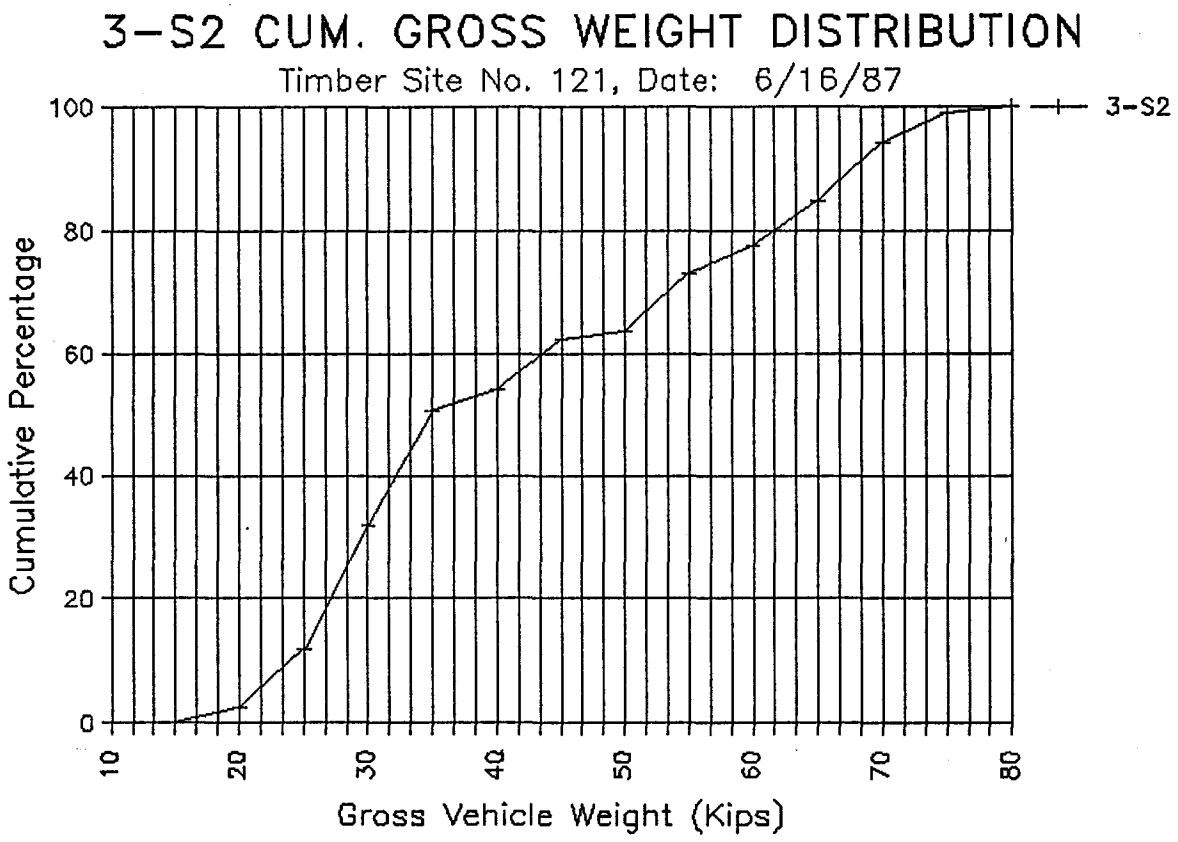


Figure 2.1.2-12 Timber Truck Weights: 3-S2, Gross Vehicle, 6/16/87

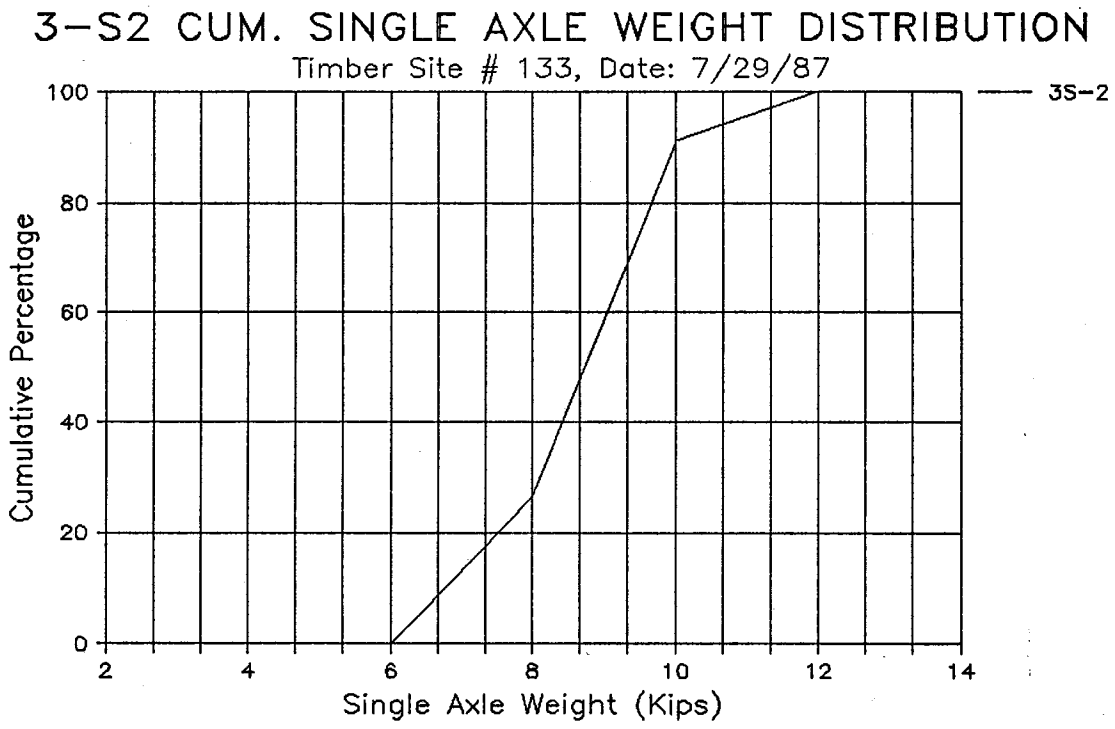


Figure 2.1.2-19 Timber Truck Weights: 3-S2, Single Axle, 7/29/87

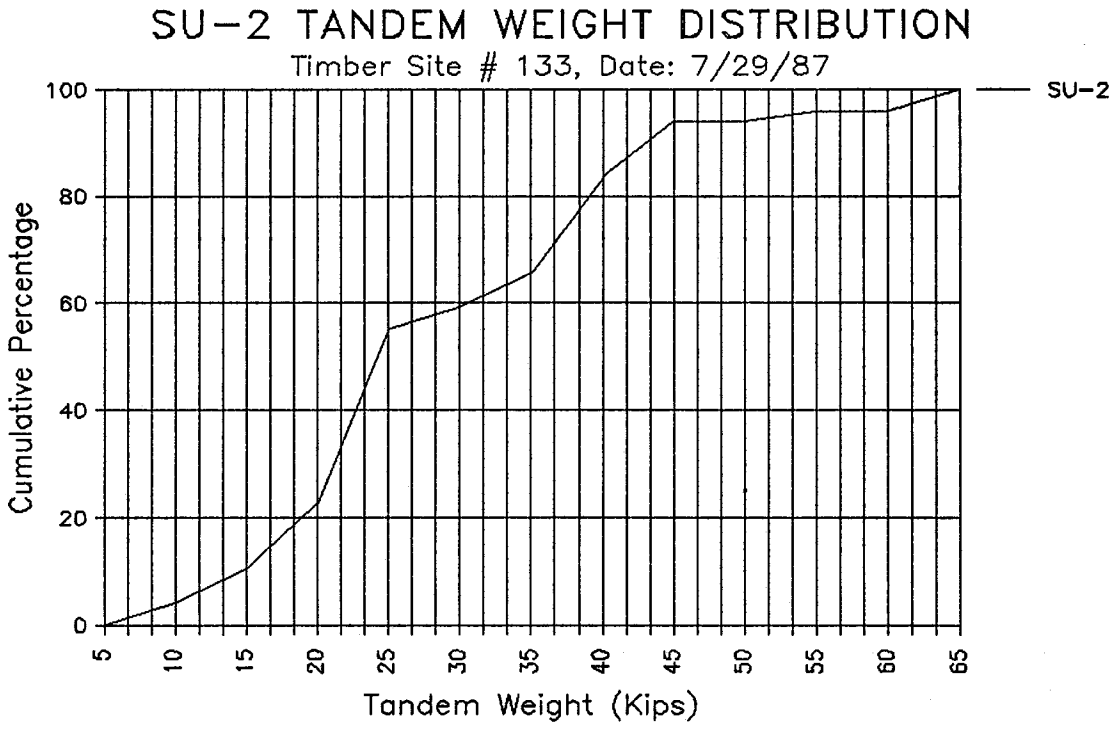


Figure 2.1.2-13 Timber Truck Weights: SU-2, Tandem, 7/29/87

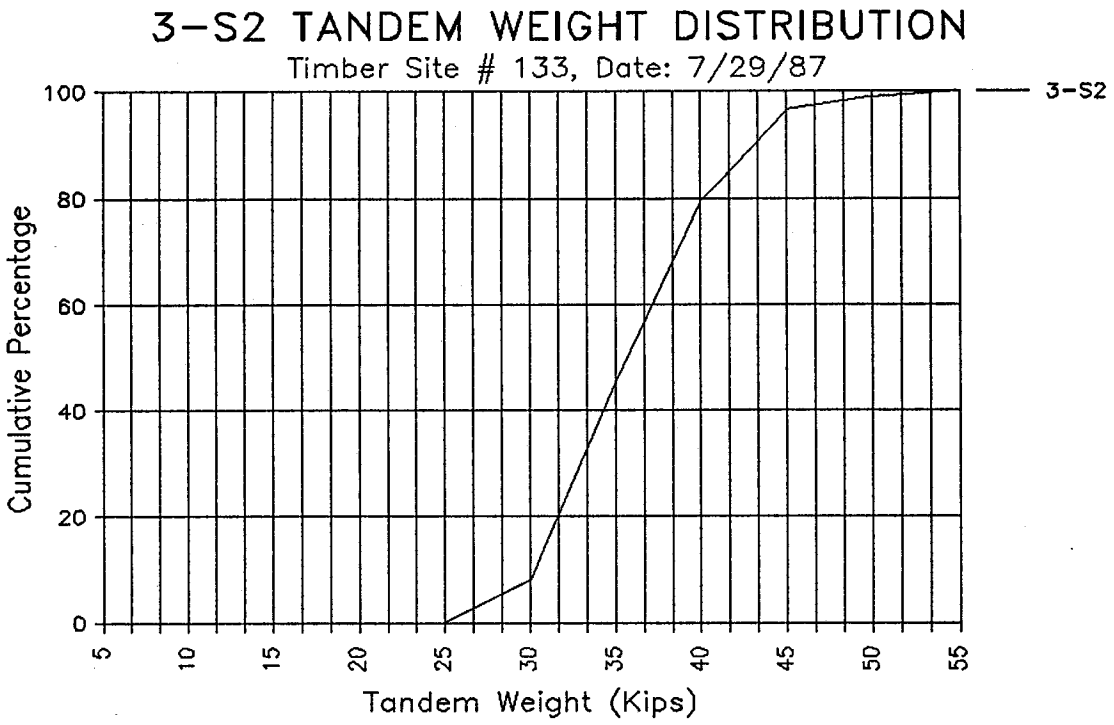


Figure 2.1.2-14 Timber Truck Weights: 3-S2, Tandem, 7/29/87

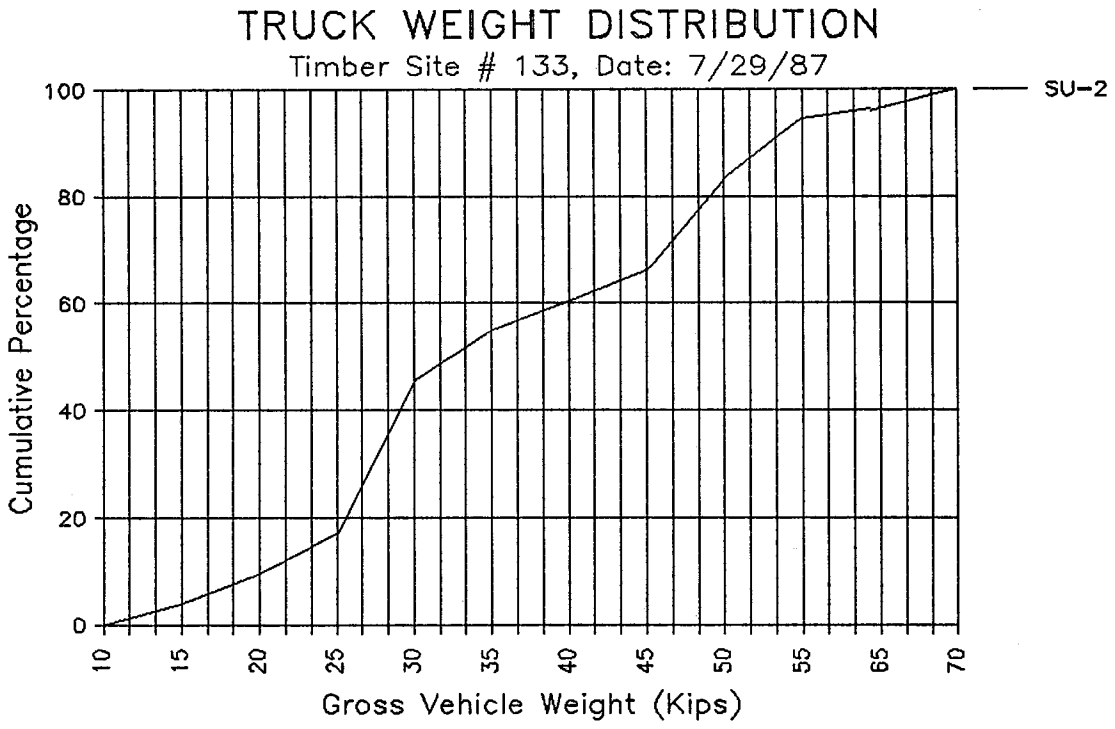


Figure 2.1.2-15 Timber Truck Weights: SU-2, Gross Vehicle, 7/29/87

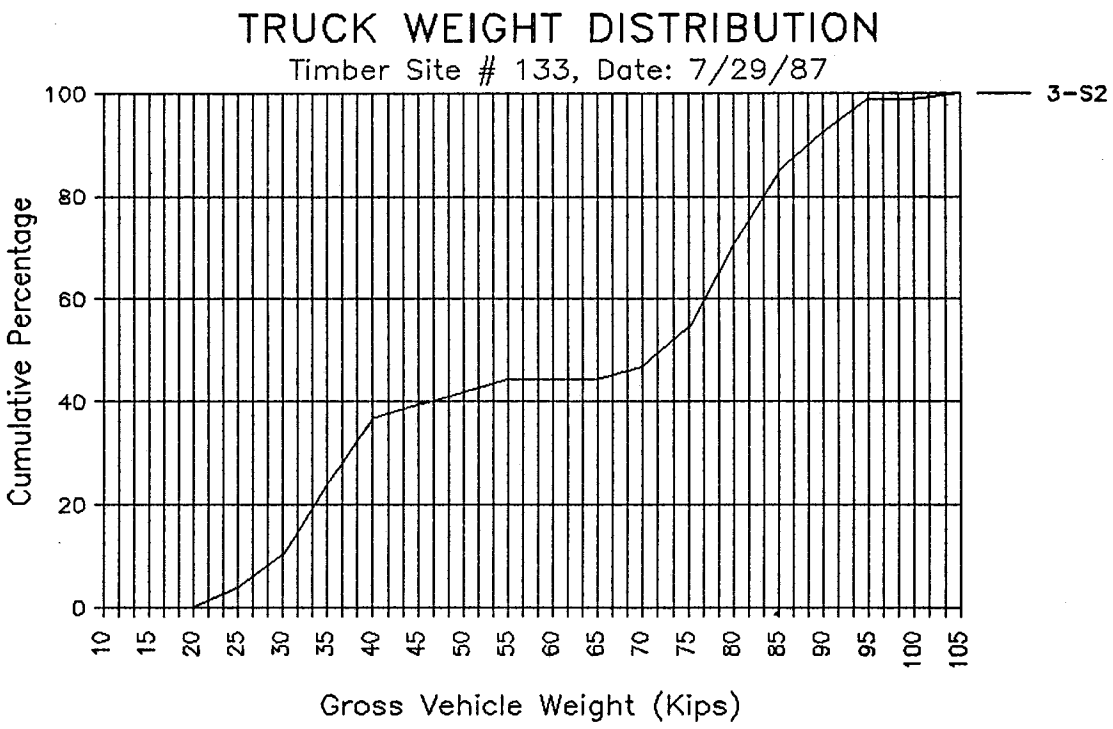


Figure 2.1.2-16 Timber Truck Weights: 3-S2, Gross Vehicle, 7/29/87

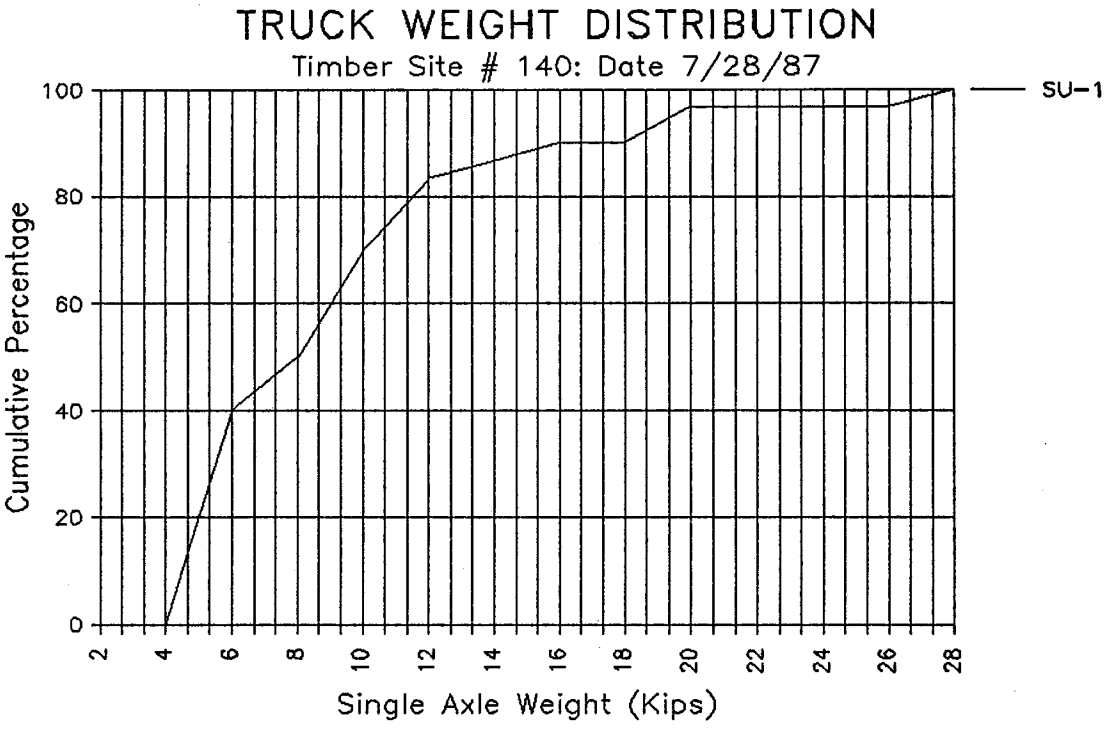


Figure 2.1.2-20 Timber Truck Weights: SU-1, Single Axle, 7/28/87

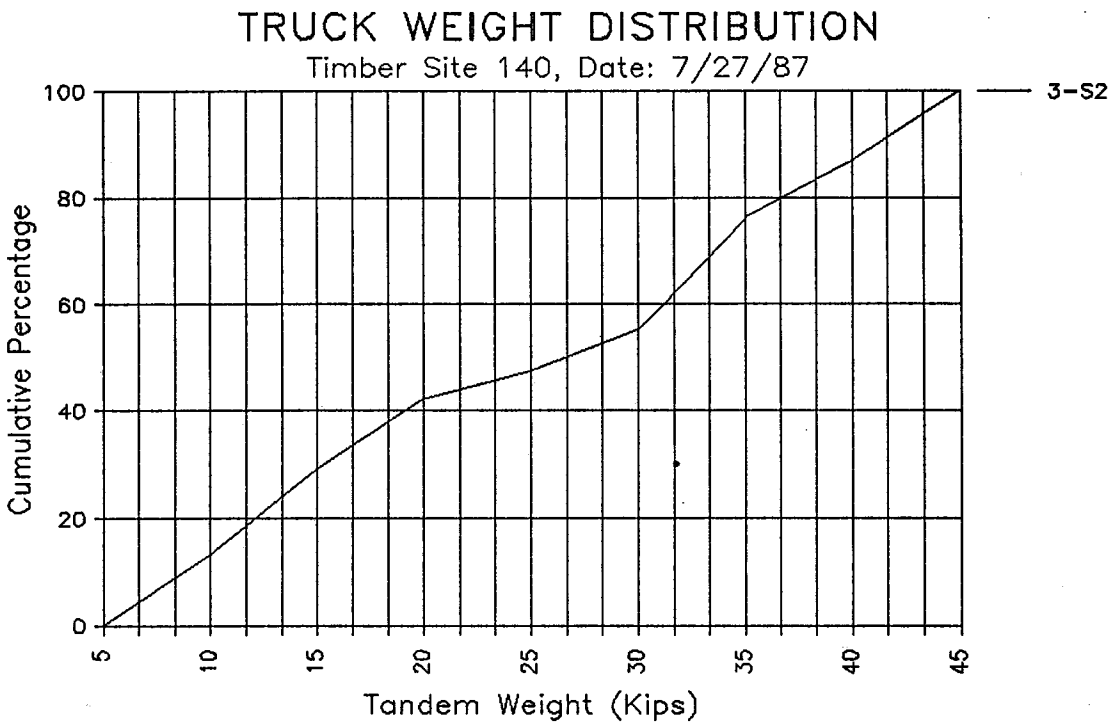


Figure 2.1.2-17 Timber Truck Weights: 3-S2, Tandem, 7/27/87

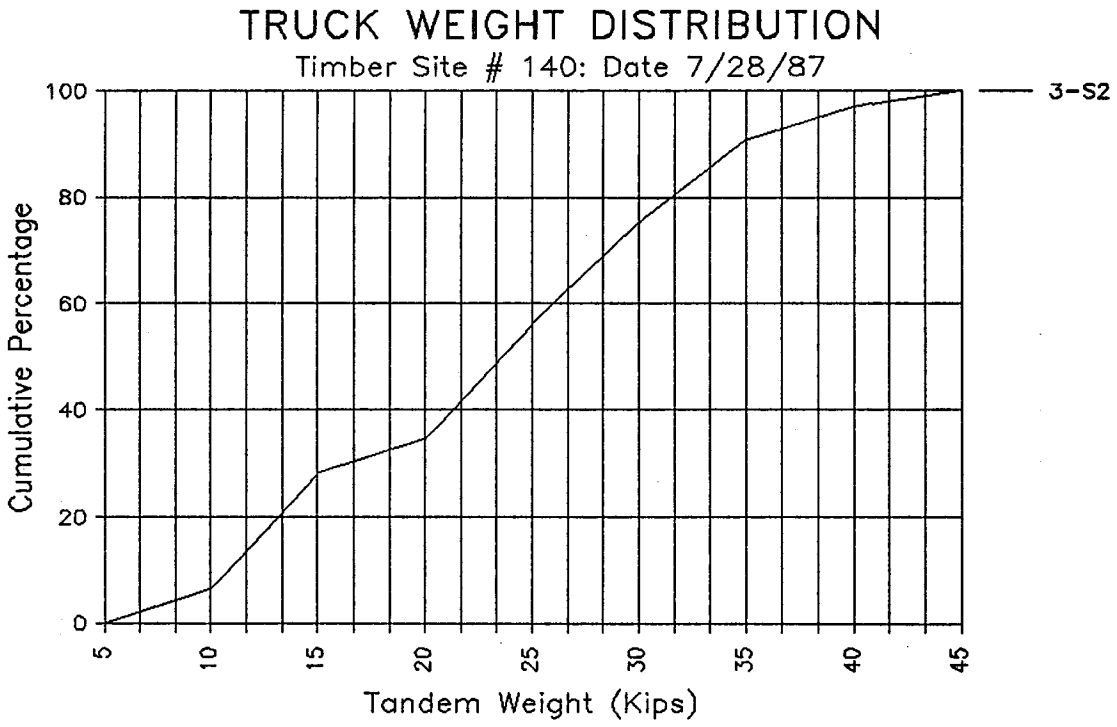


Figure 2.1.2-18 Timber Truck Weights: 3-S2, Tandem, 7/28/87

2.1.3 CASE STUDY

A case study was conducted on the U.S. Highway providing access to Activity Center number 120, a pulpwood mill, in order to illustrate the reduction in pavement life due to a special-use activity and to illustrate the use of the AASHTO method. This pavement was initially selected because all incoming loaded log trucks came from only one direction, and the total effect of these vehicles could be readily evaluated. Also, when the site selection process was underway, Falling Weight Deflectometer (FWD) tests were scheduled, and were subsequently completed for this roadway. However, weigh-in-motion (WIM) studies for the site were not done due initially to mechanical problems with the system. Therefore, WIM results from another timber mill, site number 133, were used to conduct this case study.

The pavement analysis was carried out according to the AASHTO Guide for Design of Pavement Structures, 1986 (3). The serviceability loss (Delta PSI) at the study site with time was calculated for normal traffic only and for normal traffic plus special-use vehicles. The following relationship was used for these computations.

$$\log_{10}W_{18} = Z_R S_o + 9.36 \log_{10}(SN+1) - 0.2 + \frac{\log_{10}\{\Delta PSI/2.7\}}{0.4 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \log_{10}M_R - 8.07$$

Where:

W_{18} = Number of 18 kip equivalent single axle load (ESAL) applications during the specified period.

R = Reliability level of the road.

Z_R = Standard normal deviate corresponding to level of reliability.

S_o = Overall standard deviation

SN = Structural Number

ΔPSI = Serviceability loss at the end of the specified period.

M_R = The effective resilient modulus of roadbed material.

For the calculation of W_{18} values, a traffic growth factor of three percent per year was assumed. The daily traffic volume used was that counted by project personnel during a two-day time period from 6 a.m. to 6 p.m. each day. Obviously, other (non-special-use) traffic during the time period not counted will also contribute toward pavement deterioration. The incremental reduction in pavement life due to special-use vehicles would be the same, however. The daily 18 kip equivalent single axle loads (ESAL) for normal traffic and for special-use traffic were computed using vehicle type, axle type, and axle load. Weigh-in-motion (WIM) data for special-use vehicles and other vehicles were used to plot the cumulative frequency distribution for each vehicle type. Single and tandem axle weights of special-use and normal vehicles were used to compute damage over time due to each vehicle class. The calculated daily ESAL values for special-use and other vehicles, along with growth factors, were used to compute the corresponding W_{18} values for selected number of years from 0 to 30. These are shown in Tables 2.1.3-1 and 2.3.1-2.

Reliability (R) of 90 percent and overall standard deviation (S_o) of 0.44 were selected according to the AASHTO Guide to suit the site conditions. The 90 percent reliability gave a Z_R value of -1.282. According to information provided by SDHPT, this pavement had the following layer composition: 1-inch asphalt surface layer and 14-inch cement treated base layer. The AASHTO Guide provides layer coefficients of 0.4 and 0.23 for these surface and base conditions, resulting in a structural number (SN) of 3.62.

Falling Weight Deflectometer (FWD) data obtained at the site were used to back calculate the modulus value of subgrade. The average modulus value obtained was 21036 pounds per square inch. The computer program "Modulus" was used to back calculate the modulus values. This modulus value was taken as the yearly average Resilient Modulus (M_R) value of subgrade. In this case study, it was not possible to count the seasonal effects accurately because there was only one FWD data set available. These FWD results were taken during the summer when the M_R value was close to the annual average M_R value, thus providing reasonably accurate results.

The Terminal Serviceability Index (P_t) selected for this U.S. Highway was 2.5. The Initial Serviceability Index was assumed to be 4.2, which is the standard for flexible pavements.

RESULTS:

The daily 18 kip equivalent single wheel load for normal traffic was:

$W_N = 883$

The daily 18 kip equivalent single wheel load for special-use vehicles was:

$W_S = 1002$

Table 2.1.3-1 PSI Values for Normal Traffic Only

Years	Growth factor F = 3%	$W_{18} = W_N x F x 365$ (for normal vehicles)	ΔPSI	PSI (4.2-ΔPSI)
0	--	0	0	4.2
2	2.03	654258	0.148	4.05
4	4.185	1348804	0.261	3.94
6	6.47	2085248	0.368	3.83
8	8.90	2866814	0.473	3.73
10	11.48	3699946	0.579	3.62
12	14.22	4583035	0.685	3.52
14	17.13	5520913	0.794	3.41
16	20.23	6520027	0.905	3.30
18	23.53	7583601	1.020	3.18
20	27.04	8714857	1.138	3.06
25	36.84	11873348	1.452	2.75
30	48.32	15573294	1.798	2.40

Table 2.1.3-2 PSI Values for Normal Traffic Plus Special-Use Traffic

Years	Growth factor F = 3%	$W_{18}=W_s xFx365$ (for total vehicles)	ΔPSI	PSI (4.2- △PSI)
0	--	0	0	4.2
2	2.03	1396690	0.269	3.93
4	4.185	2879384	0.475	3.72
6	6.47	4451522	0.670	3.53
8	8.90	6119982	0.861	3.34
10	11.48	7898527	1.053	3.15
12	14.22	9783715	1.246	2.95
14	17.13	11785868	1.444	2.76
16	20.23	13918745	1.646	2.55
18	23.53	16189228	1.854	2.35
20	27.04	18604196	2.069	2.13
25	36.84	25346841	2.641	1.56
30	48.32	33245368	3.270	0.93

The two curves in Figure 2.1.3-1 represent the serviceability variation with time at the study site for the two cases considered. The lower curve, which includes log trucks traveling to the timber mill indicates a significant reduction in pavement life compared to normal traffic only (the higher curve). The difference between these two curves after serviceability is reduced to 2.5 is 12 years. This means the additional traffic due to the timber mill is anticipated to reduce the life of this pavement by 12 years, or that major rehabilitation will be required 12 years earlier than similar pavement with no special-use traffic.

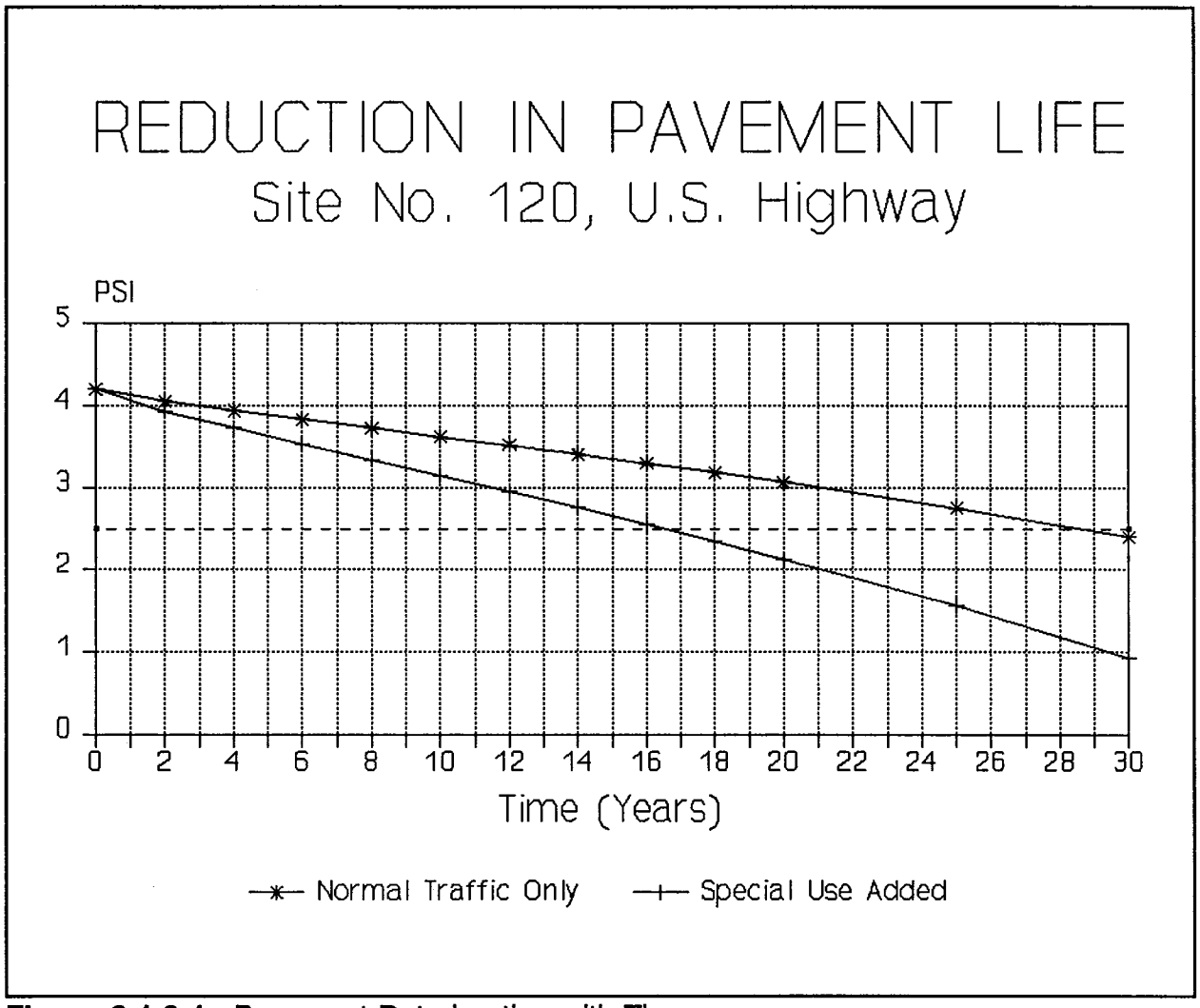


Figure 2.1.3-1. Pavement Deterioration with Time

2.1.4 STATEWIDE APPLICATION OF SITE-SPECIFIC TIMBER INFORMATION

Figure 2.1.4-1 illustrates the trend in pine and hardwood harvesting over the past decade in Texas as published by the Texas Forest Service (4). The total timber production by county and SDHPT district for 1986 is shown in Table 2.1.4-1. Note that the "total" shown in Figure 2.1.4-1 includes three categories not particularly important to this study in that little or no transporting by trucks on highways is involved. These categories, which make up about eight percent of the 1986 harvest, are: fuel wood, logging residue, and other removals. These three categories are excluded from Table 2.1.4-1.

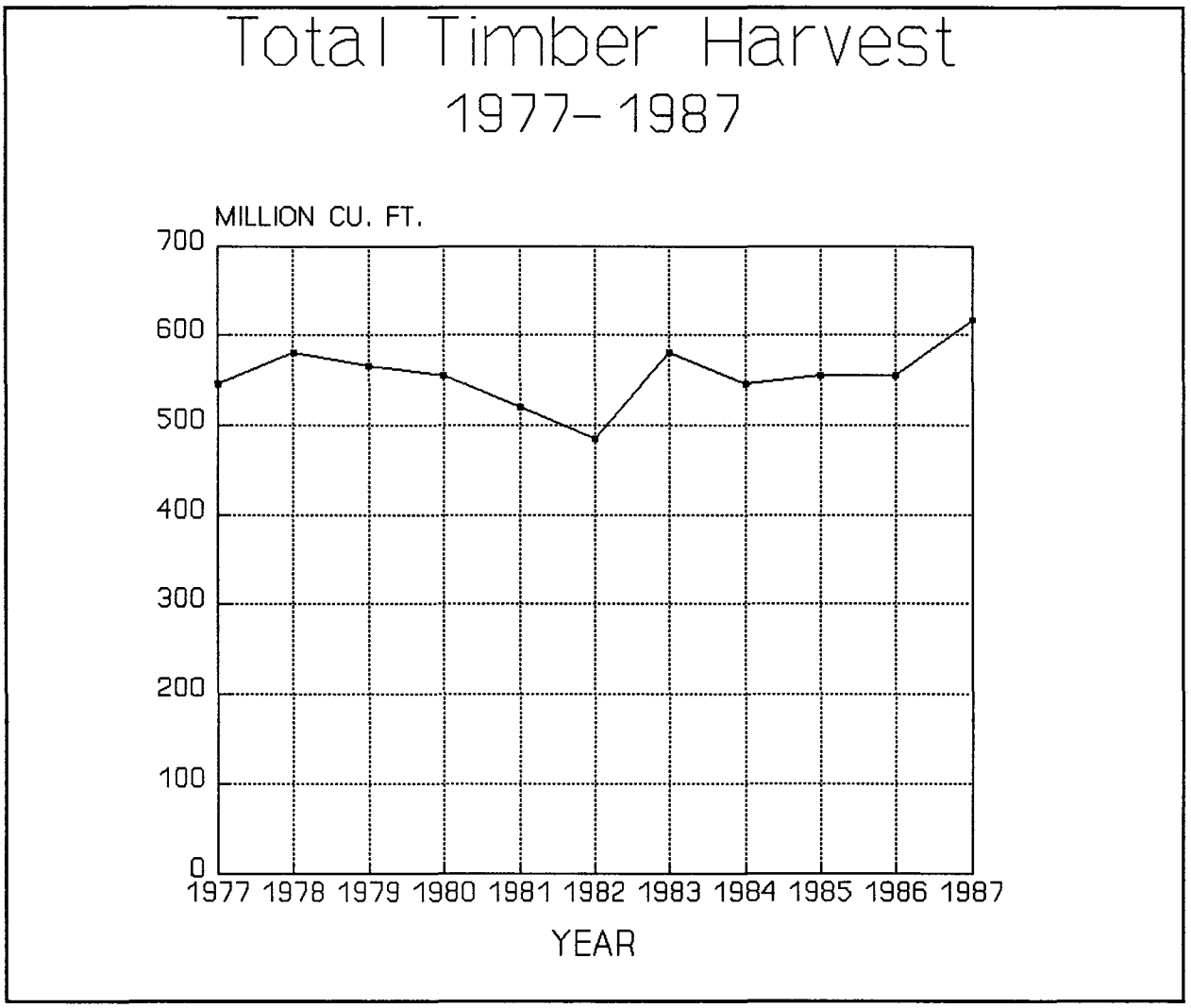


Figure 2.1.4-1. Total Timber Harvest

Table 2.1.4-1 Timber Production by SDHPT District
(Units: Cubic Feet)

District 1

County	Pine	Hardwood	Total
Franklin	299885	217842	517727
Red River	6222083	466982	6689065
TOTALS	6521968	684824	7206792

District 10

County	Pine	Hardwood	Total
Anderson	4068996	894879	4963875
Cherokee	12373420	4901740	17275160
Gregg	924054	934670	1858724
Rusk	10544159	3058596	13602755
Smith	2507329	1669676	4177005
Wood	2247812	1281898	3529710
TOTALS	32665770	12741459	45407229

District 11

County	Pine	Hardwood	Total
Angelina	23867015	3463972	27330987
Houston	11508973	1101812	12610785
Nacogdoches	17060592	4229141	21289733
Polk	33467333	4600571	38067904
Sabine	12560556	2605889	15166445
San Augustine	11576665	6091220	17667885
San Jacinto	17943084	60371	18003455
Shelby	10729238	3683172	14412410
Trinity	17778819	299286	18078105
TOTALS	156492275	26135434	182627709

Table 2.1.4-1 (Continued) Timber Production by SDHPT District
(Units: Cubic Feet)

District 12

County	Pine	Hardwood	Total
Harris	3863821	0	3863821
Montgomery	23370784	1955360	25326144
Waller	2362048	79657	2441705
TOTALS	29596653	2035017	31631670

District 17

County	Pine	Hardwood	Total
Grimes	5027401	15260	5042661
Leon	0	0	0
Walker	18017501	33900	18051401
TOTALS	23044902	49160	23094062

District 19

County	Pine	Hardwood	Total
Bowie	3788454	1551175	5339629
Camp	868789	652187	1520976
Cass	15940639	8378666	24319305
Harrison	7503547	5283944	12787491
Marion	9381763	3407136	12788899
Morris	2701637	1621515	4323152
Panola	8977773	2427999	11405772
Titus	2995086	552859	3547945
Upshur	4583334	1243283	5826617
TOTALS	56741022	25118764	81859786

Table 2.1.4-1 (Continued) Timber Production by SDHPT District
(Units: Cubic Feet)

District 20			
County	Pine	Hardwood	Total
Chambers	768876	0	768876
Hardin	19626428	3487525	23113953
Jasper	28984941	7291390	36276331
Jefferson	6668998	455286	7124284
Liberty	16114131	5066240	21180371
Newton	27636903	3952730	31589633
Orange	7164989	1219460	8384449
Tyler	21503831	2467182	23971013
TOTALS	128469097	23939813	152408910
Other Counties	3870557	758083	4628640
GRAND TOTAL	437402244	91462554	528864798

2.2 PRODUCE

2.2.1 CLASSIFICATION COUNTS

2.2.1.1 Produce Distributor, Site No. 200

Introduction. The site map shown in Figure 2.2.1.1-1 indicates that this activity center is located within a medium-sized urban area. An arterial street intersects with a Farm-to-Market Highway adjacent to the site.

Activity Center Trip-Generating Characteristics. Figure 2.2.1.1-2 shows the truck traffic (in and out) generated by the activity center during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by the activity center during a 12-hour period (6 a.m. to 6 p.m.) on March 29, 1988. The number of employees working at this activity center was not disclosed.

Figure 2.2.1.1-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The largest number of trucks was the 3S-2 combination (40%). Also illustrated is the breakdown of total traffic moving to and from the activity center. The auto represented 54 percent of this total. There was no interview information from the officials of the activity center.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a city street carrying an average daily traffic (ADT) of 19,000 in 1986. Manual classification counts were conducted in 1985 and 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.2.1.1-1 provides a summary of the counts that were taken. In Table 2.2.1.1-1A, vehicle classification counts for the activity center only are provided; in Table 2.2.1.1-1B, a count of all vehicles on the city street except special-use vehicles is provided; and in Table 2.2.1.1-1C, a total count of all vehicles on the main roadway (sum of 1A and 1B plus special-use vehicles on the roadway) is provided.

Figure 2.2.1.1-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.2.1.1-1C values). The SU-1 vehicle represents 28 percent of total trucks counted on this roadway. Autos make up 95 percent of the total traffic stream. The "other" category (37 percent) consists of mostly field trailers, along with a few 2-S1, 2-S2 and 3-2.

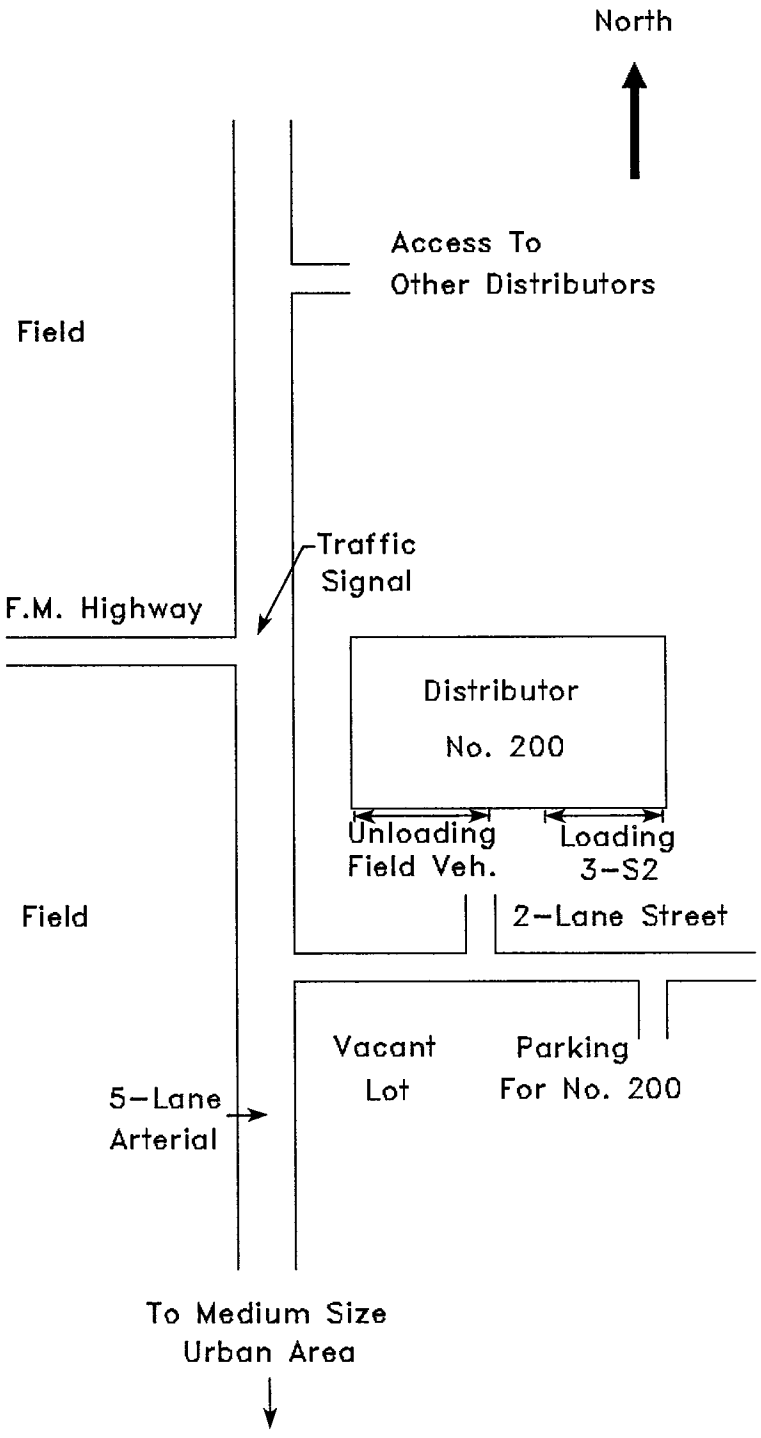
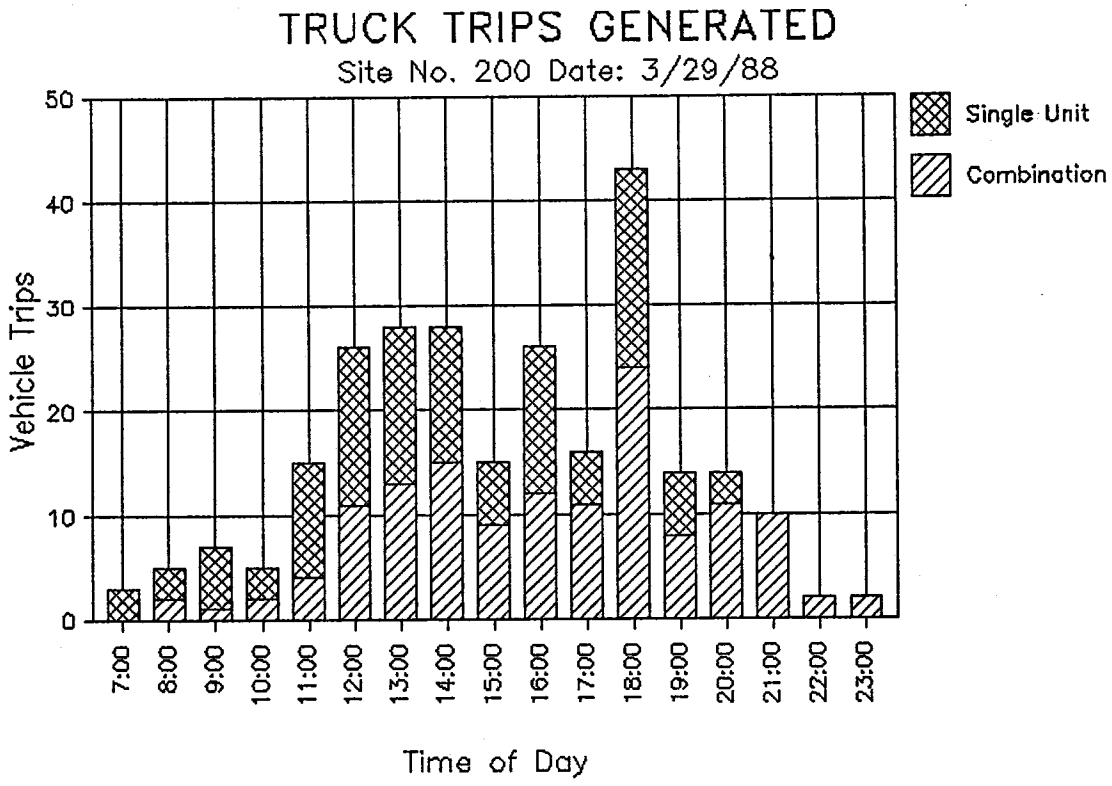


Figure 2.2.1.1-1. Site Map



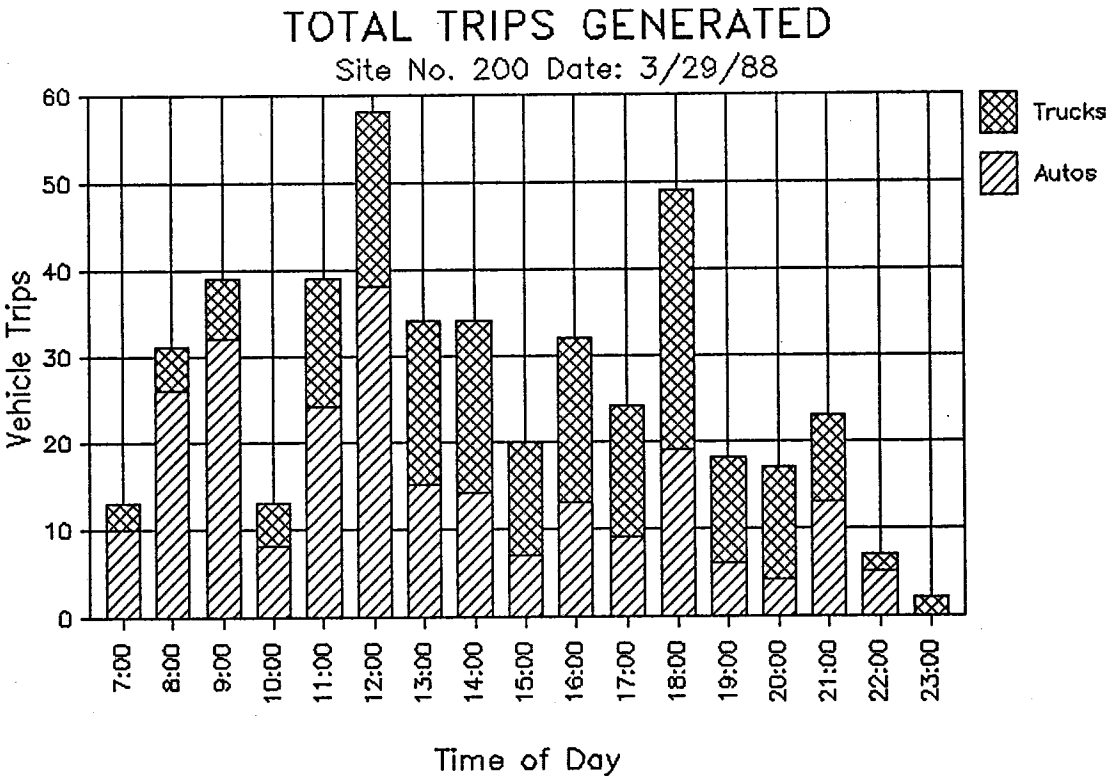
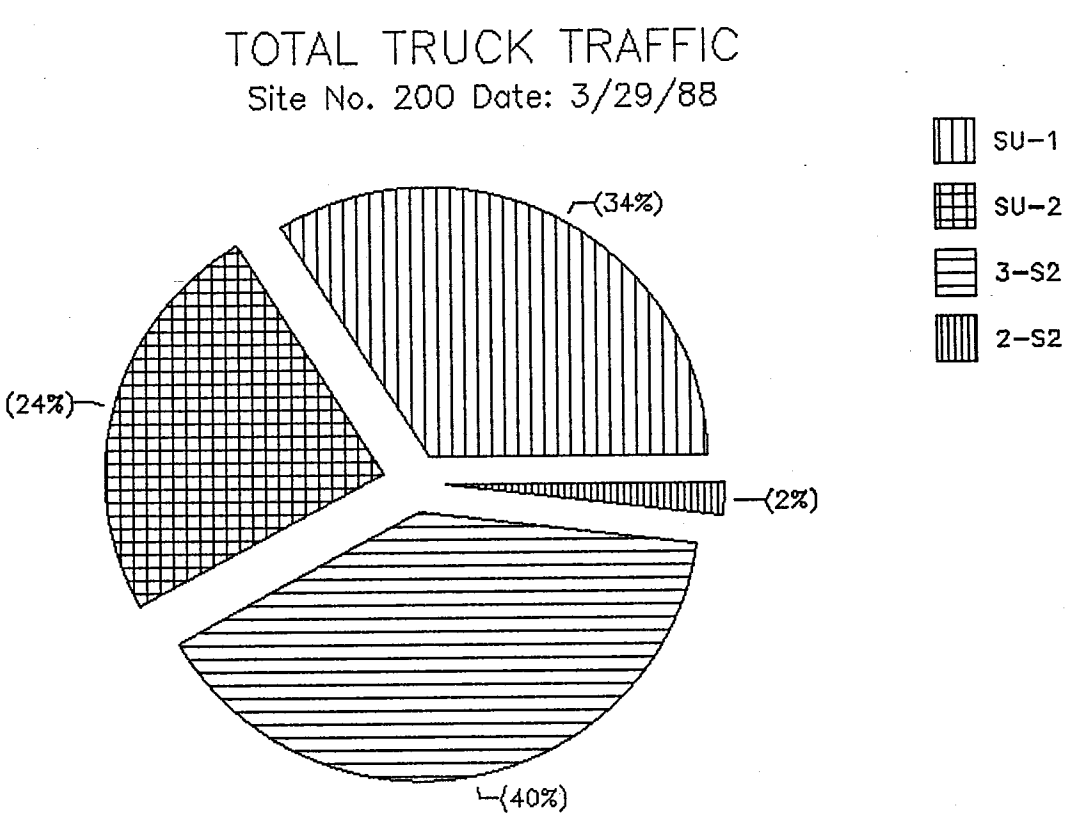


Figure 2.2.1.1-2. Hourly Trip Generation



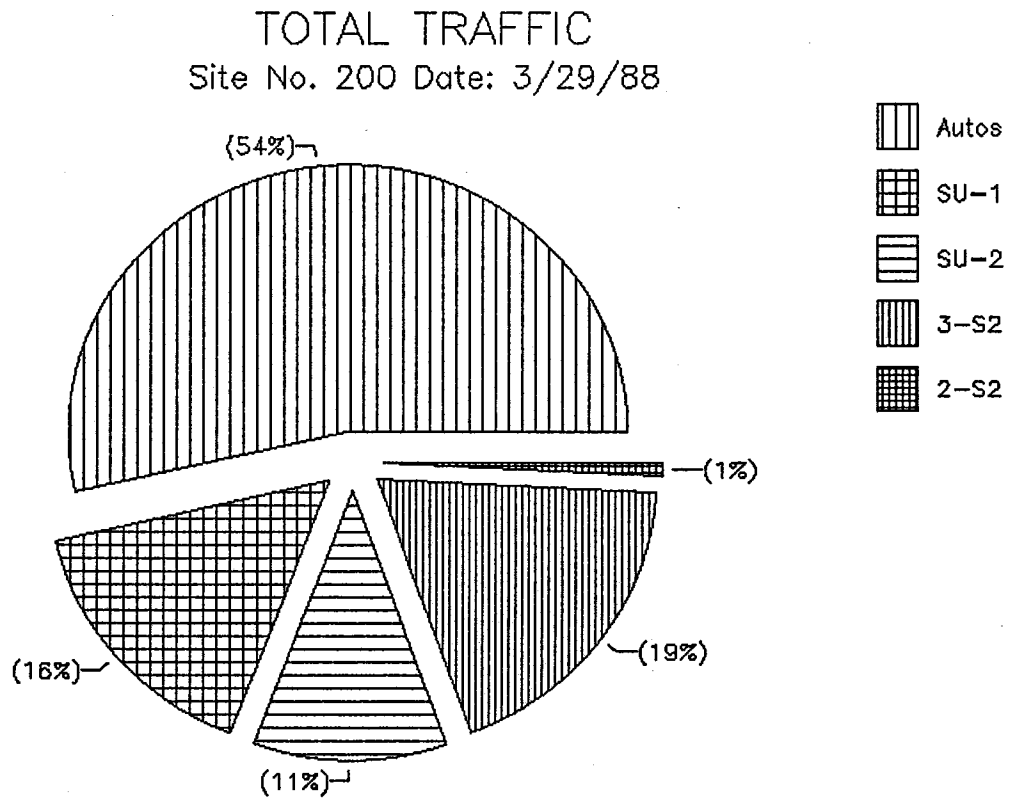


Figure 2.2.1.1-3. Activity Center Vehicle Percentages

Table 2.2.1.1-1. Traffic Classification Count Summary

Table 2.2.1.1-1A. Activity Center Only

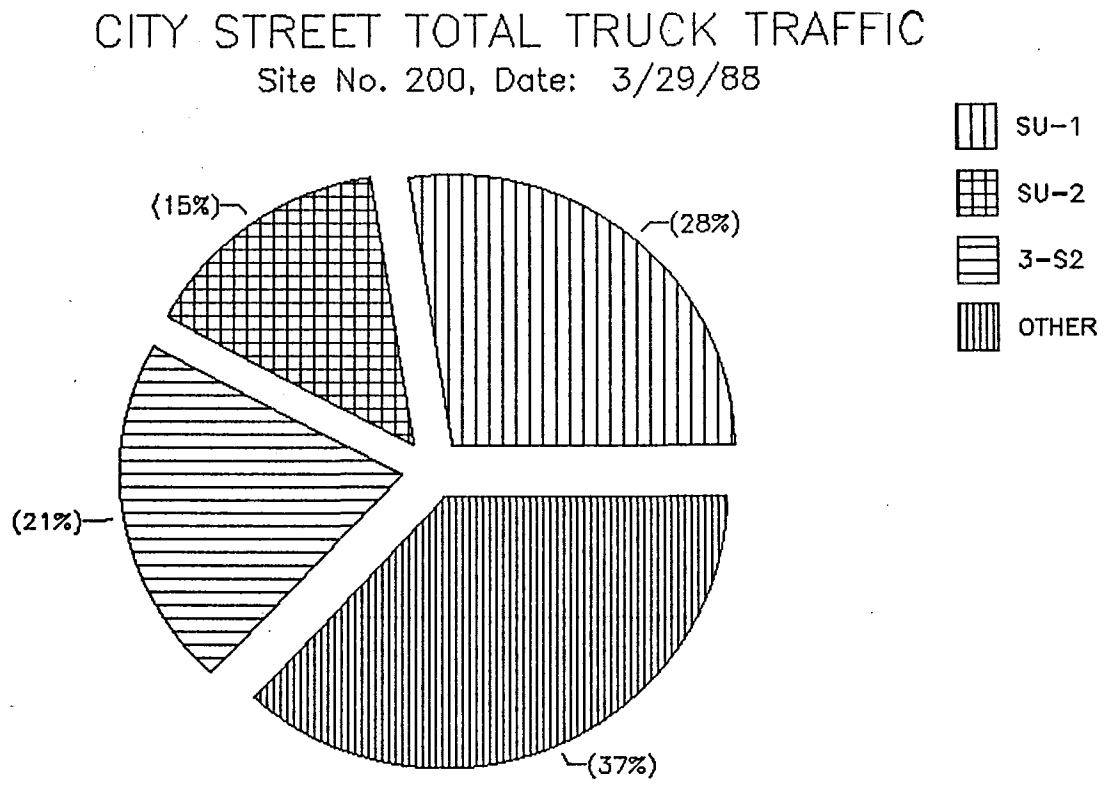
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
5/28/85	315	257	84	0	21	677	94%	6%	46%	54%
3/29/88	243	71	2	84	4	404	45%	55%	60%	40%

Table 2.2.1.1-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
3/29/88	18869	118	118	115	22	19312	69%	31%	98%	2%

Table 2.2.1.1-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
3/29/88	19112	259	137	199	26	19733	64%	36%	97%	3%



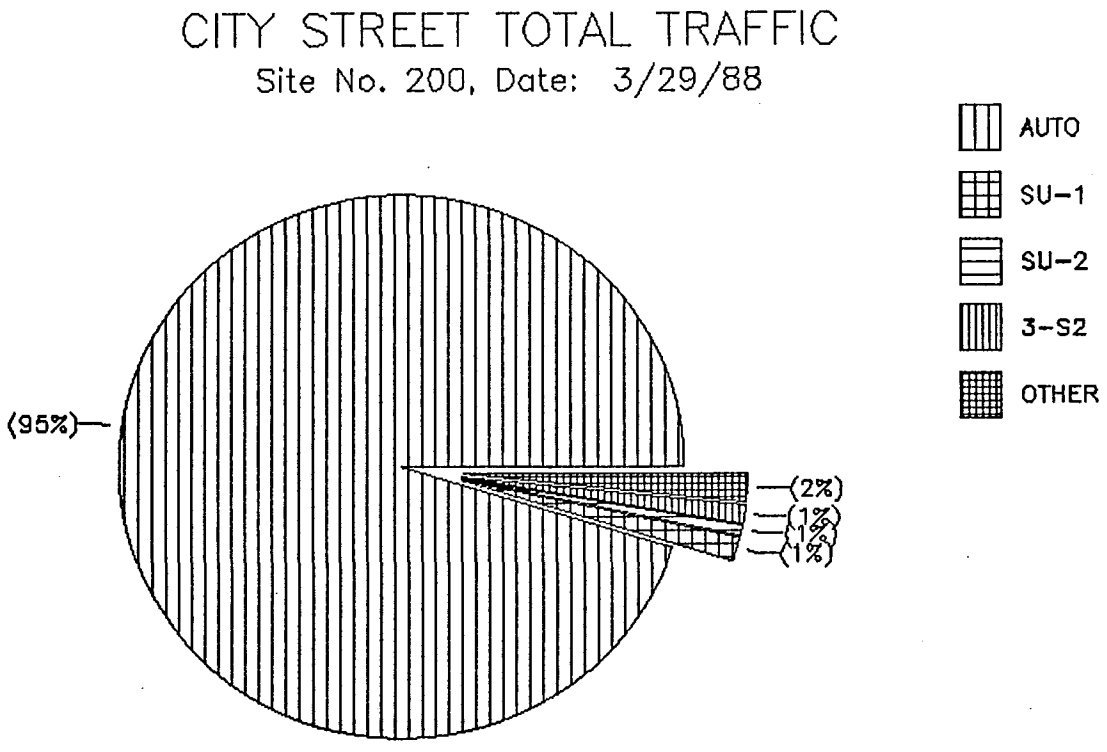


Figure 2.2.1.1-4. Highway Vehicle Percentages

2.2.1.2 Produce Distributor, Site No. 201

Introduction. The site map shown in Figure 2.2.1.2-1 indicates that this activity center is located within a small urban area. Access to the activity center is provided by a US Business route. Traffic to and from the produce distributor moves from the south and east to this site.

Activity Center Trip-Generating Characteristics. Figure 2.2.1.2-2 shows the truck traffic (in and out) generated by the activity center during a 17-hour period (7 a.m. to 12 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by the activity center during this same 17-hour period on March 31, 1988. The number of employees working at this activity center was not disclosed.

Figure 2.2.1.2-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The largest number of trucks were 3-S2 combinations (43%). Also illustrated is the breakdown of total traffic moving to and from the activity center. The auto represents 61 percent of this total. There was no interview information from the officials of the activity center.

Characteristics of Roadway Serving Activity Center. The roadway providing access to this activity center was a Business US Highway carrying an average daily traffic (ADT) of 12,000 in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.2.1.2-1 provides a summary of the counts taken. First, in Table 2.2.1.2-1A, vehicle classification counts for the activity center only were provided. Second, in Table 2.2.1.2-1B, a count of all vehicles on the US Highway except special-use vehicles is provided. Finally, in Table 2.2.1.2-1C, a total count of all vehicles on the main roadway including those generated by this site is provided.

Figure 2.2.1.2-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.2.1.2-1C values). The 3-S2 vehicle represents 31 percent of total trucks counted on the roadway. Autos make up 94 percent of the total traffic stream.

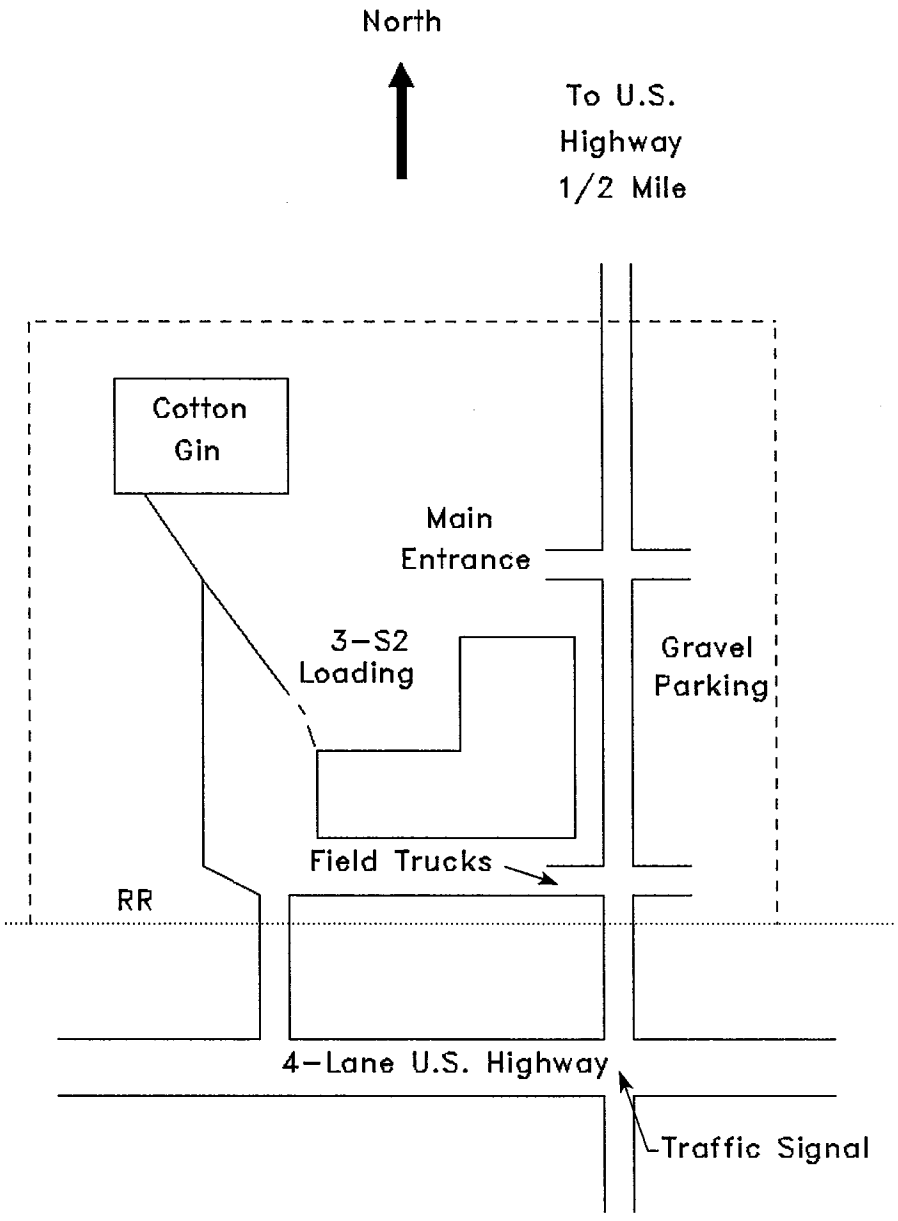
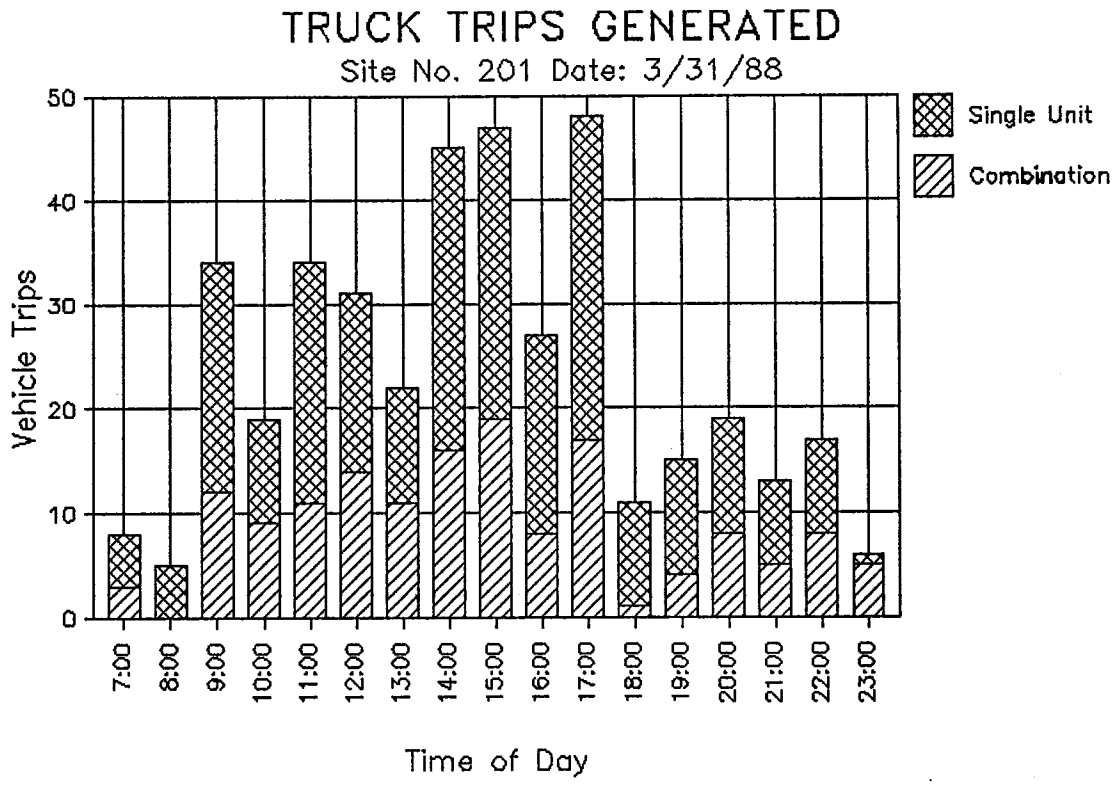


Figure 201-1. Site Map

Figure 2.2.1.2-1. Site Map



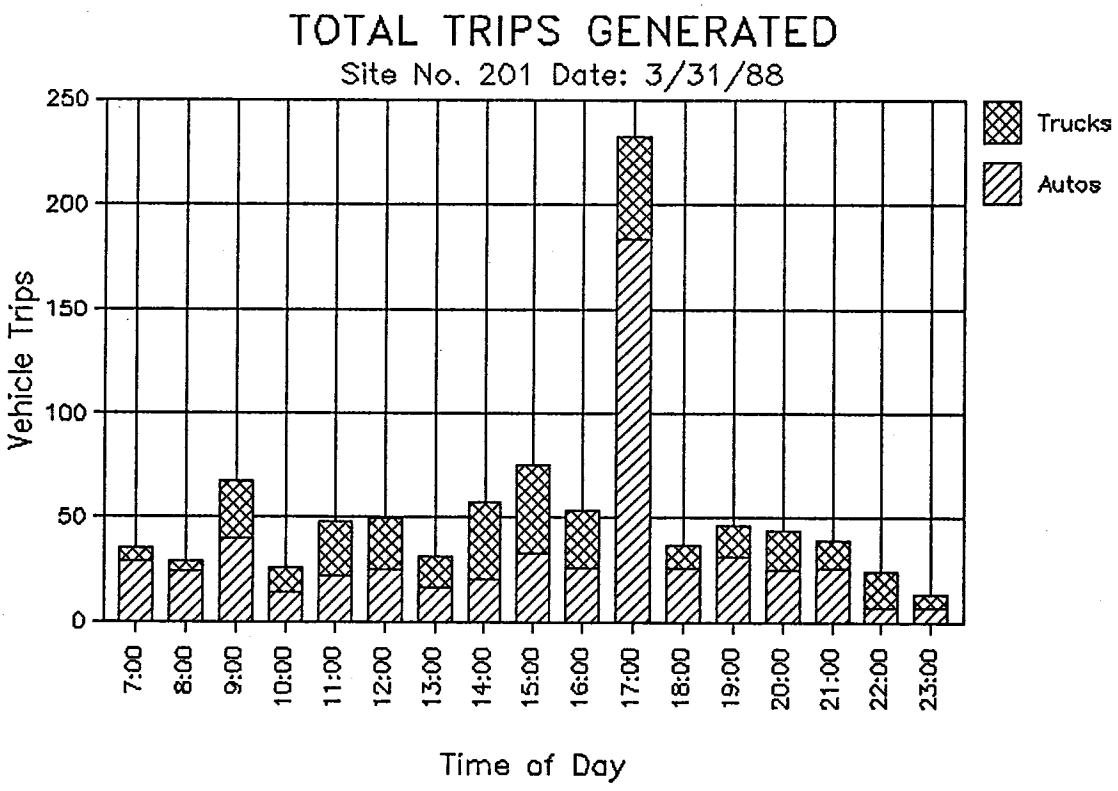
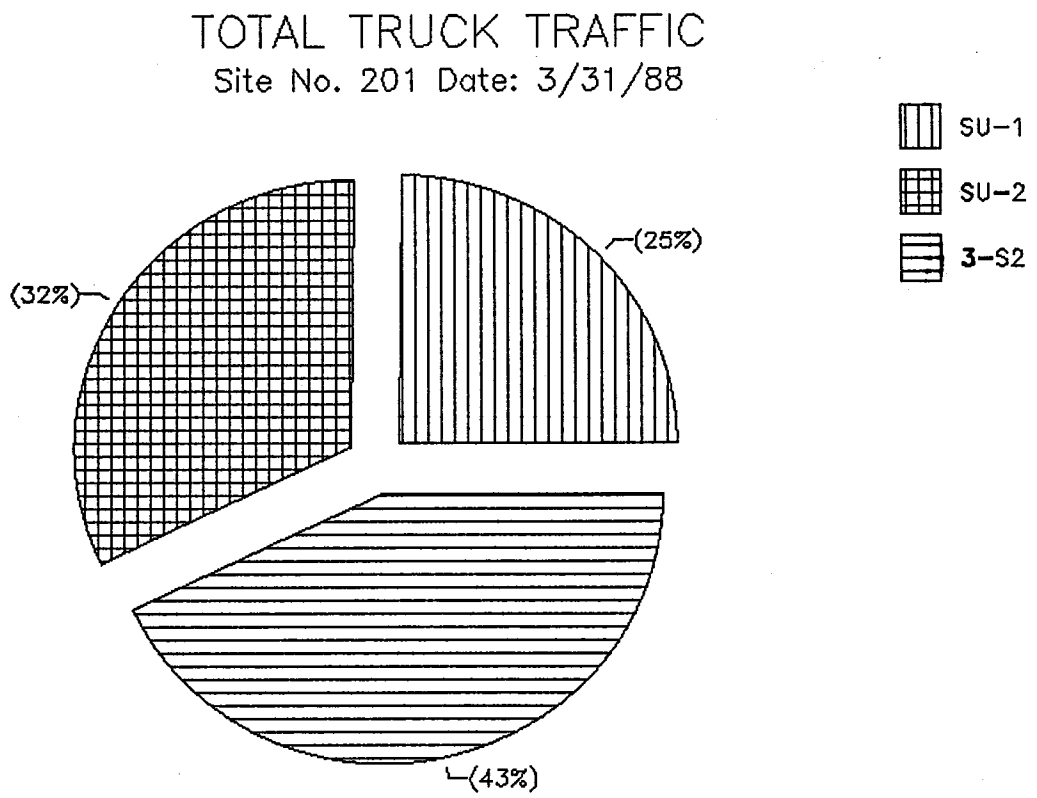


Figure 2.2.1.2-2. Hourly Trip Generation



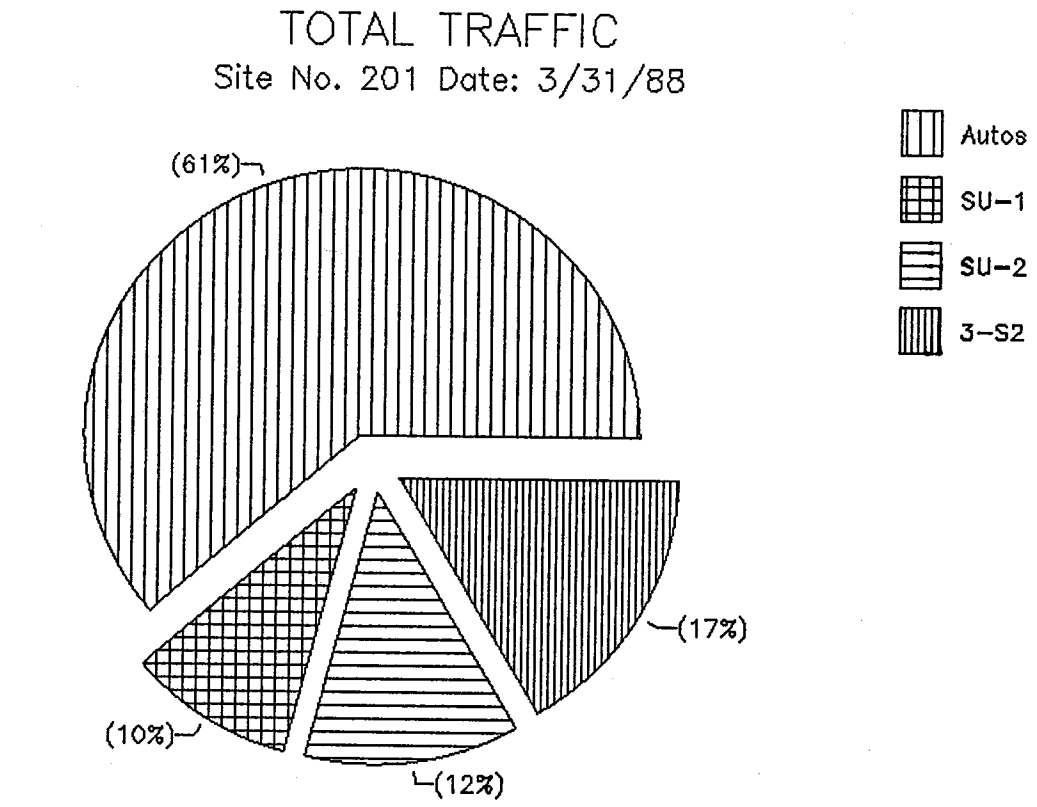


Figure 2.2.1.2-3. Activity Center Vehicle Percentages

Table 2.2.1.2-1. Traffic Classification Count Summary

Table 2.2.1.2-1A. Activity Center Only

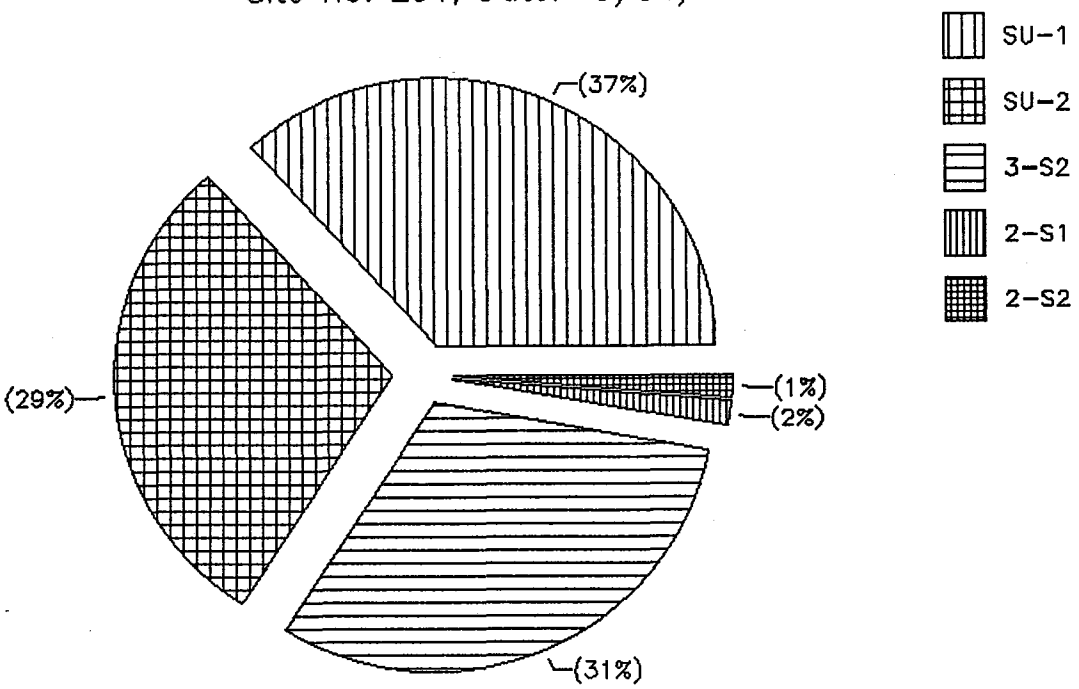
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other 2-S2	Total	SU	Com.	Cars	Trucks
3/31/88	555	83	59	99	51	847	49%	51%	66%	34%

Table 2.2.1.2-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
3/31/88	8422	71	51	66	24	8634	58%	42%	98%	2%

Table 2.2.1.2-1C. Roadway With Special-Use

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
3/31/88	8977	154	114	165	76	9486	53%	47%	95%	5%



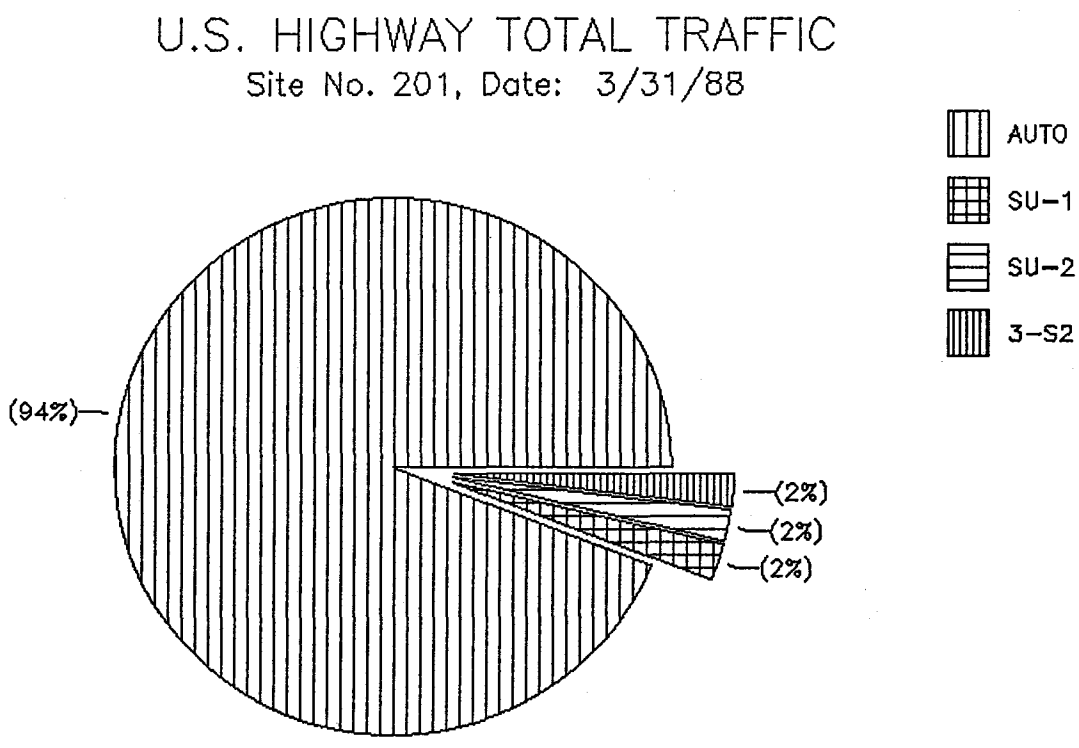


Figure 2.2.1.2-4. Highway Vehicle Percentages

2.2.1.3 Produce Distributor, Site No. 202

Introduction. The site map shown in Figure 2.2.1.3-1 indicates that this activity center is located at the city limits of a small urban area. The roadway giving access to the activity center is a two-lane Farm-to-Market Highway. This distributor had changed ownership within the previous two years, resulting in a tremendous increase in traffic generation, even though the building size had not changed.

Activity Center Trip-Generating Characteristics. Figure 2.2.1.3-2 shows the truck traffic (in and out) generated by the activity center during a 13-hour period (10 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by the activity center during the same 13-hour period on April 1, 1988. The total number of employees averaged 25 to 30 when the study was taken.

Figure 2.2.1.3-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The largest number of trucks was the 3-S2 combination (50%). Also illustrated is the breakdown of total traffic moving to and from the activity center. The auto represented 69 percent of this total.

Interview information from a person at the activity center indicated that the peak period was from December to June. The origin of the produce was indicated as 50% from the valley area of Texas and 50% from Mexico. The destination of produce leaving the center was 15% to the valley area, 35% to other areas of Texas, and 50% to other parts of the United States. The hours of operation were from 8:30 a.m. to 11 p.m.

Characteristics of Roadway Serving Activity Center. The roadway providing access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 5,400 in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.2.1.3-1 provides a summary of the counts taken. In Table 2.2.1.3-1A, vehicle classification counts for the activity center only were provided. In Table 2.2.1.3-1B, a count of all vehicles on the Farm-to-Market Highway except special-use vehicles is provided. In Table 2.2.1.3-1C, a total of all vehicles on the main roadway (including this activity center) is provided. The "other" category includes primarily field trailer combinations along with a few 2-S1 and 2-S2 combinations.

Figure 2.2.1.3-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.2.1.3-2C values). The 3-S2 vehicle represents 41% of total trucks on the roadway. Autos were 95 percent of total traffic on the roadway.

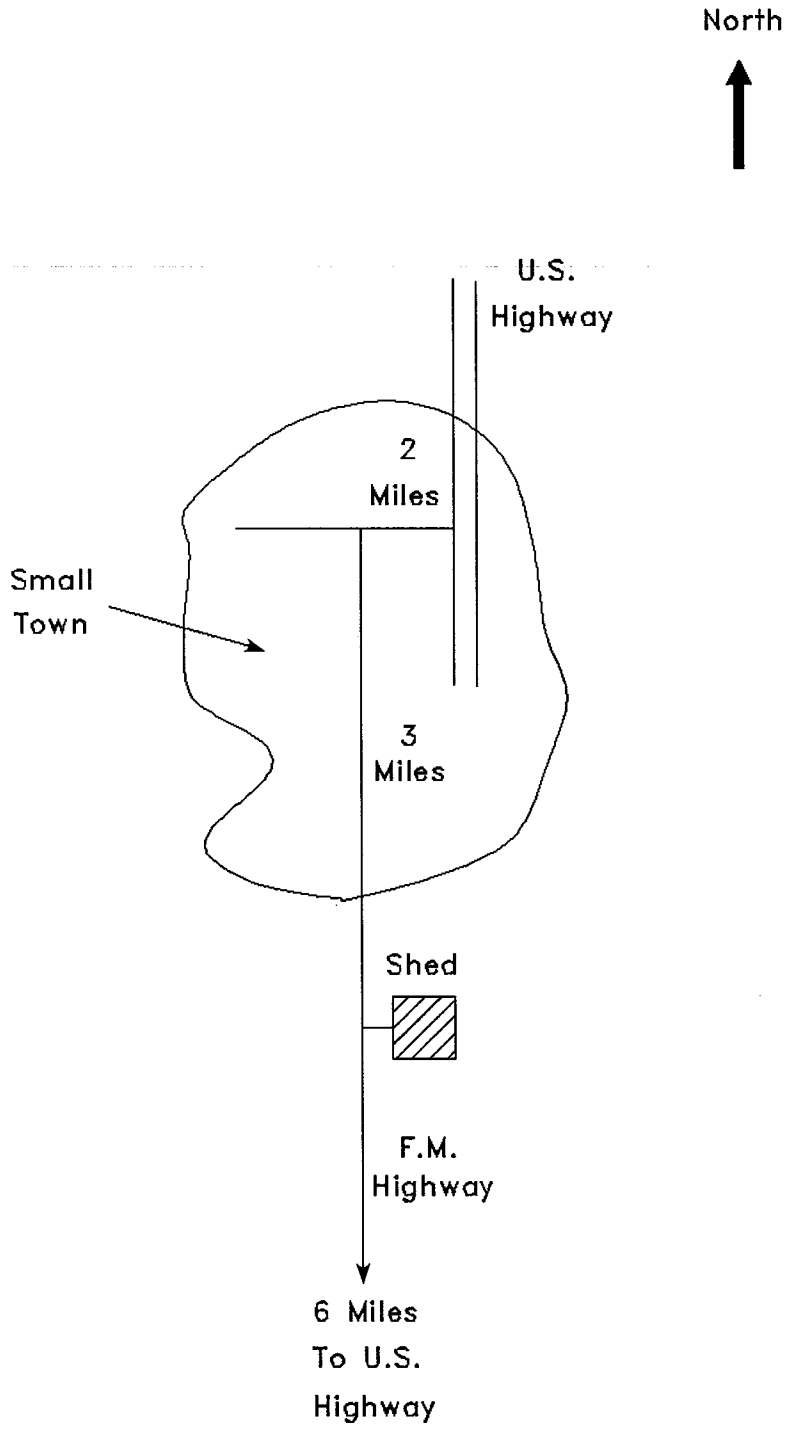


Figure 2.2.1.3-1. Site Map

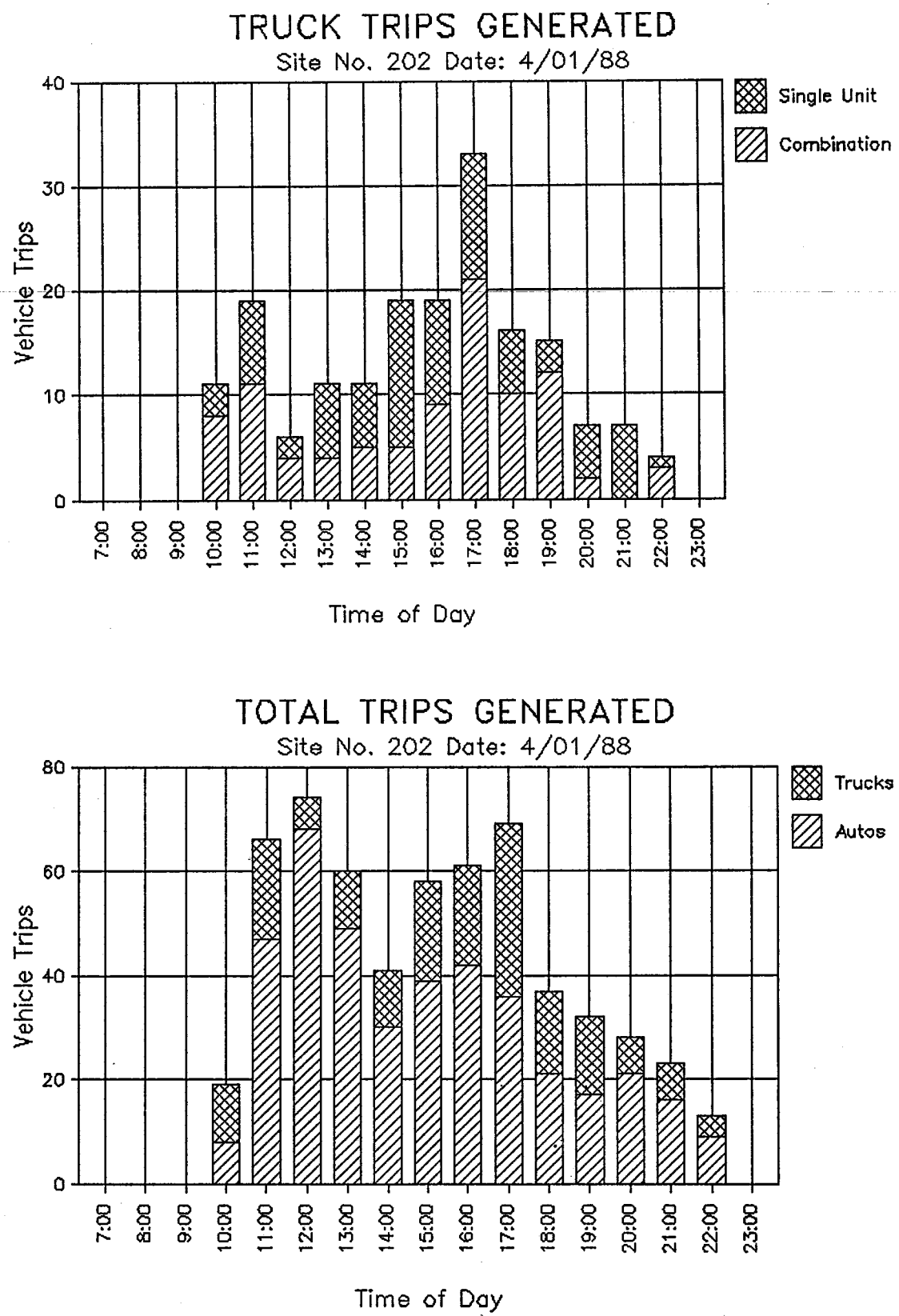
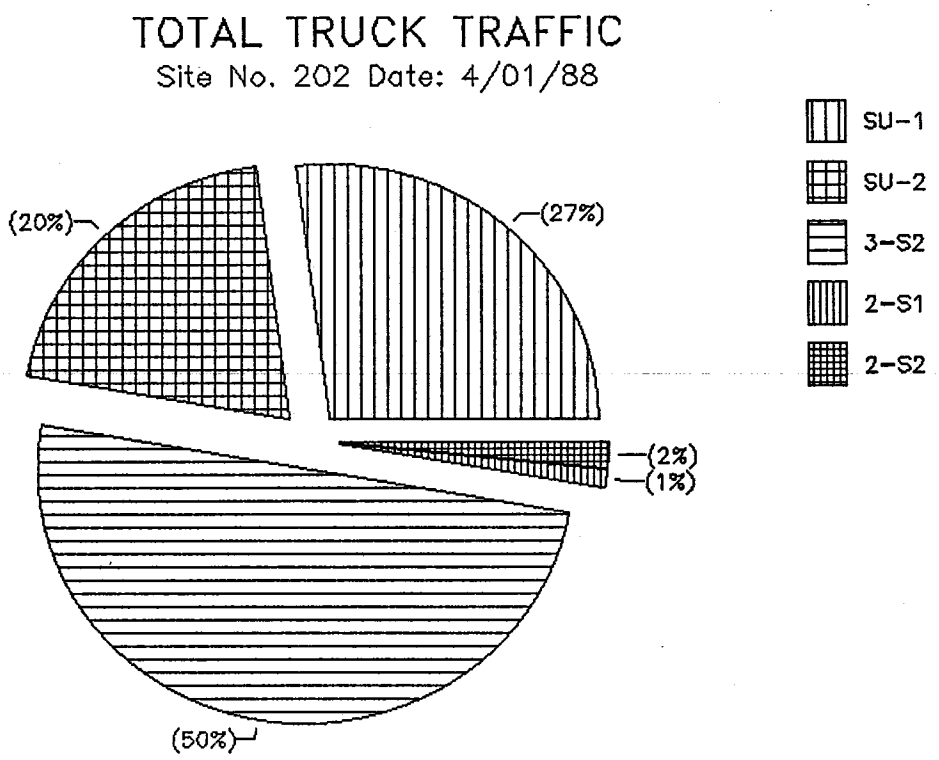


Figure 2.2.1.3-2. Hourly Trip Generation



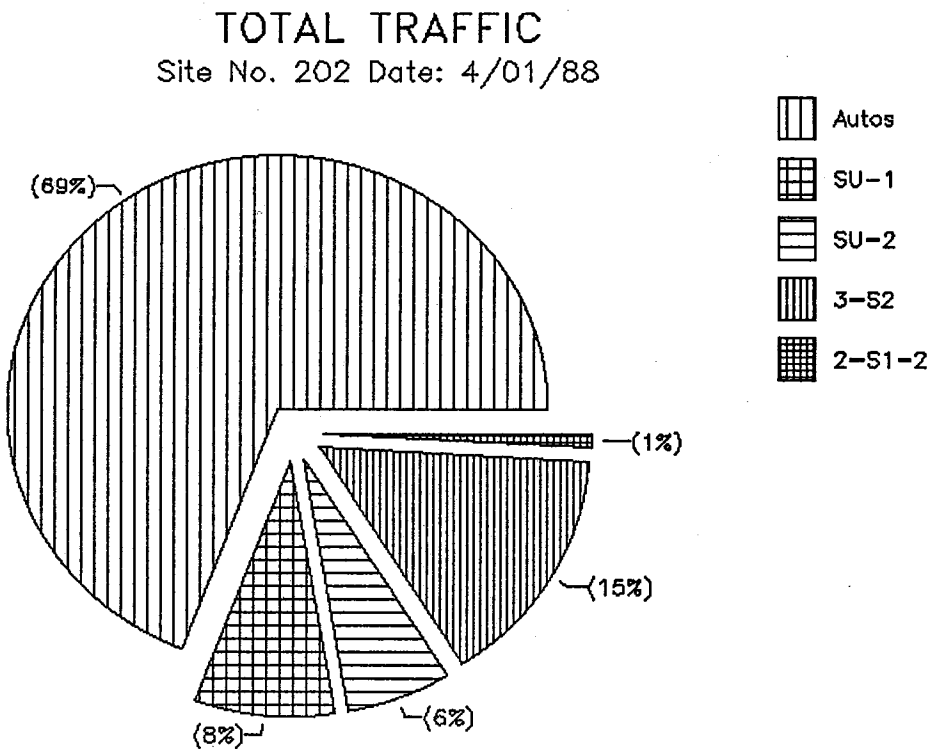


Figure 2.2.1.3-3. Activity Center Vehicle Percentages

Table 2.2.1.3-1. Traffic Classification Count Summary

Table 2.2.1.3-1A. Activity Center Only

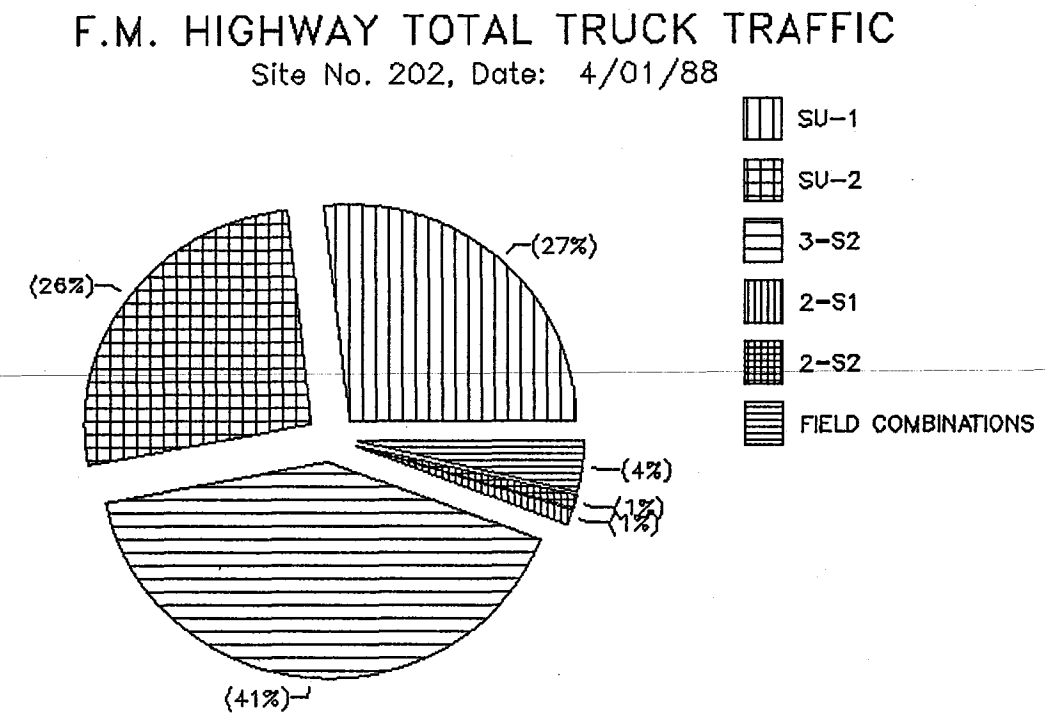
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
4/1/88	403	48	36	89	2	578	48%	52%	70%	30%

Table 2.2.1.3-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
4/1/88	7484	30	41	31	12	7598	62%	38%	98%	2%

Table 2.2.1.3-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
4/1/88	7887	78	77	120	17	8179	53%	47%	96%	4%



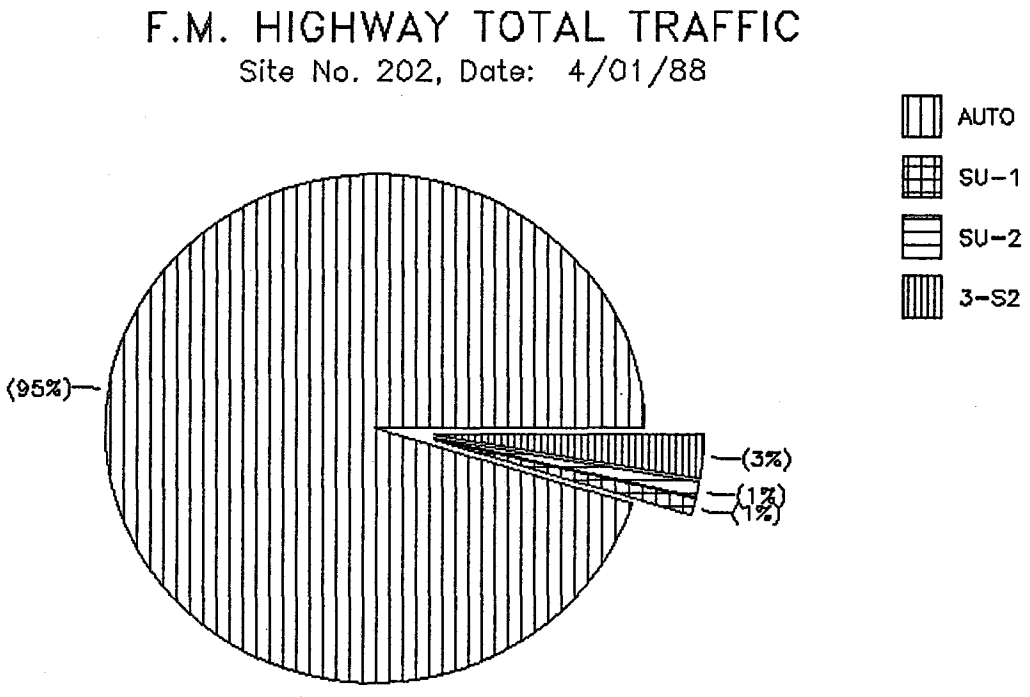


Figure 2.2.1.3-4. Highway Vehicle Percentages

2.2.1.4 Produce Distributor, Site No. 203

Introduction. The site map shown in Figure 2.2.1.4-1 indicates that access is provided by a Farm-to-Market Highway. This produce distributor or "shed" is near a small urbanized area in the Rio Grande Valley area. Even though this company is located near a railroad, nothing is shipped by rail from this activity center. This company is involved in growing, packing, and shipping onions, cantaloupes, cabbage, cucumbers, and bell peppers.

Activity Center Trip-Generating Characteristics. Figure 2.2.1.4-2 shows the truck traffic (in and out) generated by this produce distributor during a 16-hour period from 7 a.m. to 11 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the shed during the same 16-hour period on April 1, 1988. According to interview information, the plant employs 40 people in the shed and office, and from 100 to 200 in the fields. The 1985 season was an average season for cantaloupe, again according to interview information.

Figure 2.2.1.4-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. The predominant truck was the SU-2 (59 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Trucks represented 36 percent of all traffic.

Interviews with plant officials indicated that the average number of truck loads shipped out in a day's time was between 12 and 20 during the harvest season for each commodity. This shed closes from July to October. The total number of trucks during the harvest season is provided in Table 2.2.1.4-1 below.

Table 2.2.1.4-1. Interview Information

Commodity	Number of Loads
Onions	100 (1,000 sacks per truck, 100,000 sacks harvested)
Cantaloupe	80 truck loads
Cabbage & Cucumber	170 to 175 truck loads

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 2,400 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.2.1.4-2 provides a summary of the counts taken. In Table 2.2.1.4-2A, vehicle classification counts for the activity center only are provided. In Table 2.2.1.4-2B, a count of all vehicles on the U.S. Highway except special-use vehicles is provided. Finally, in Table 2.2.1.4-2C, a total count of all vehicles on the roadway is provided.

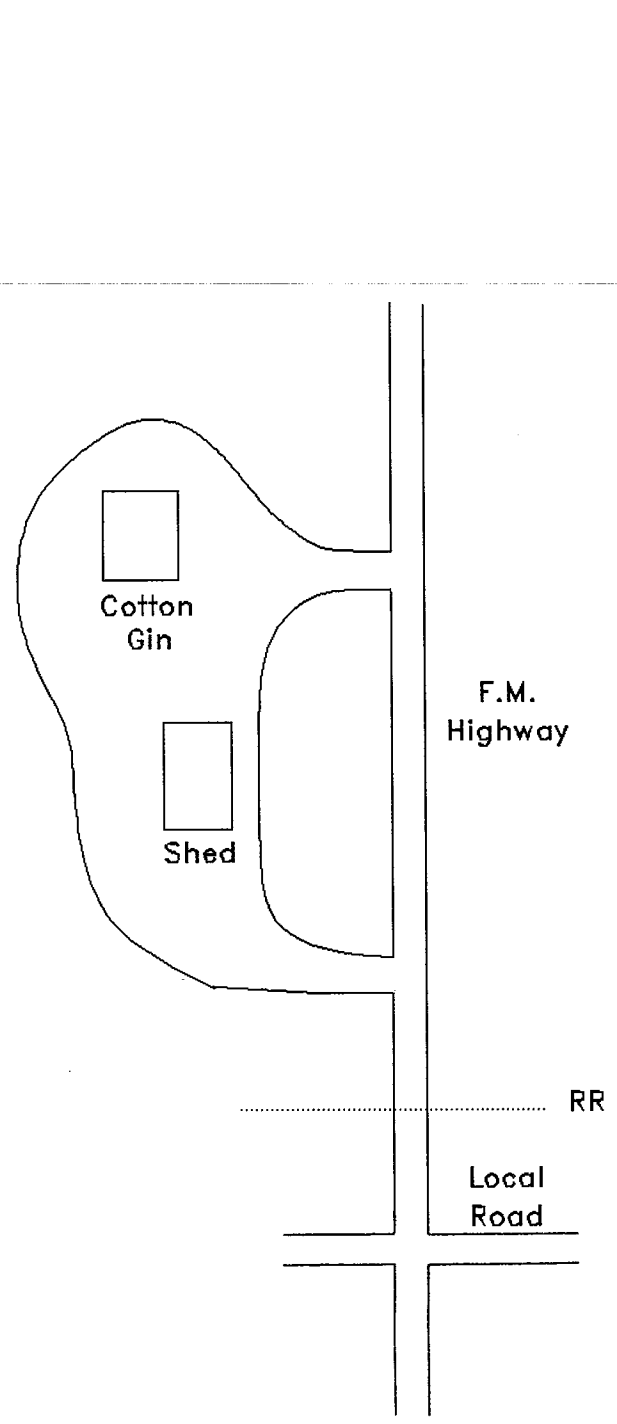
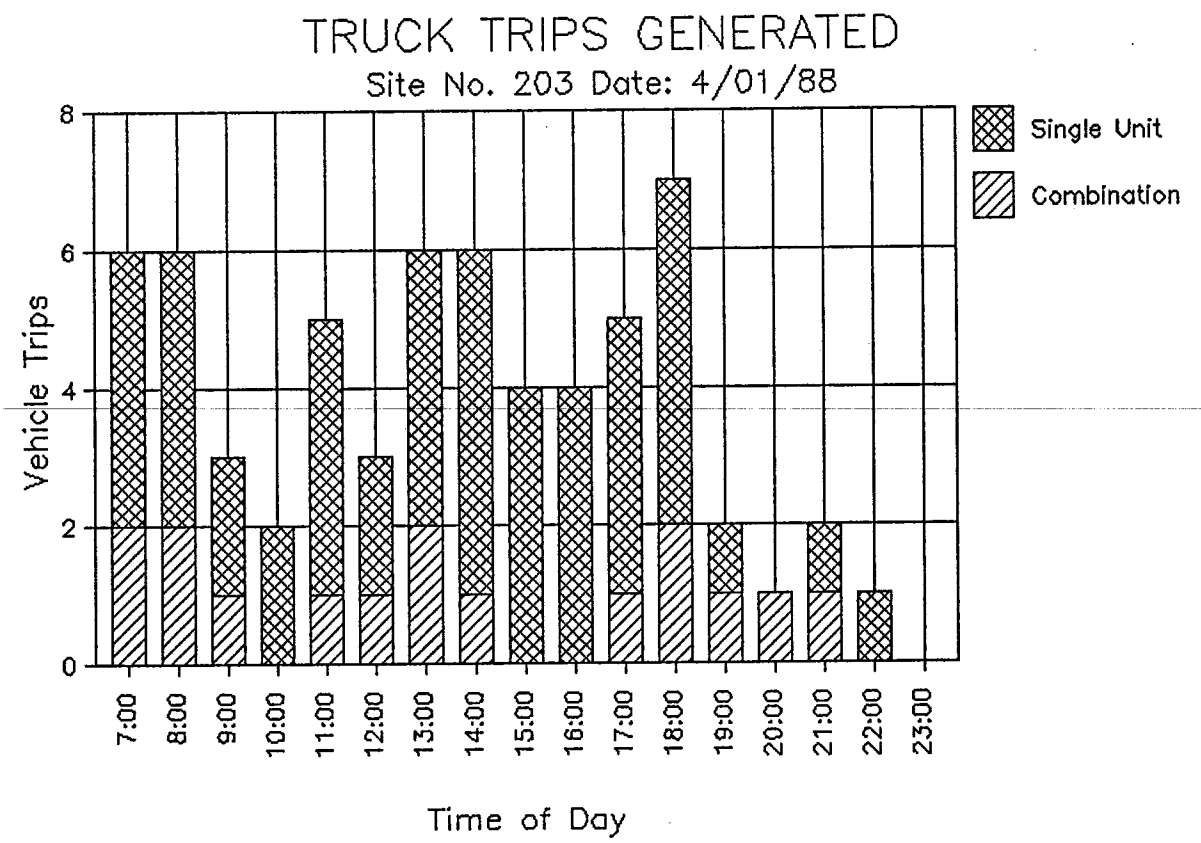


Figure 2.2.1.4-1. Site Map



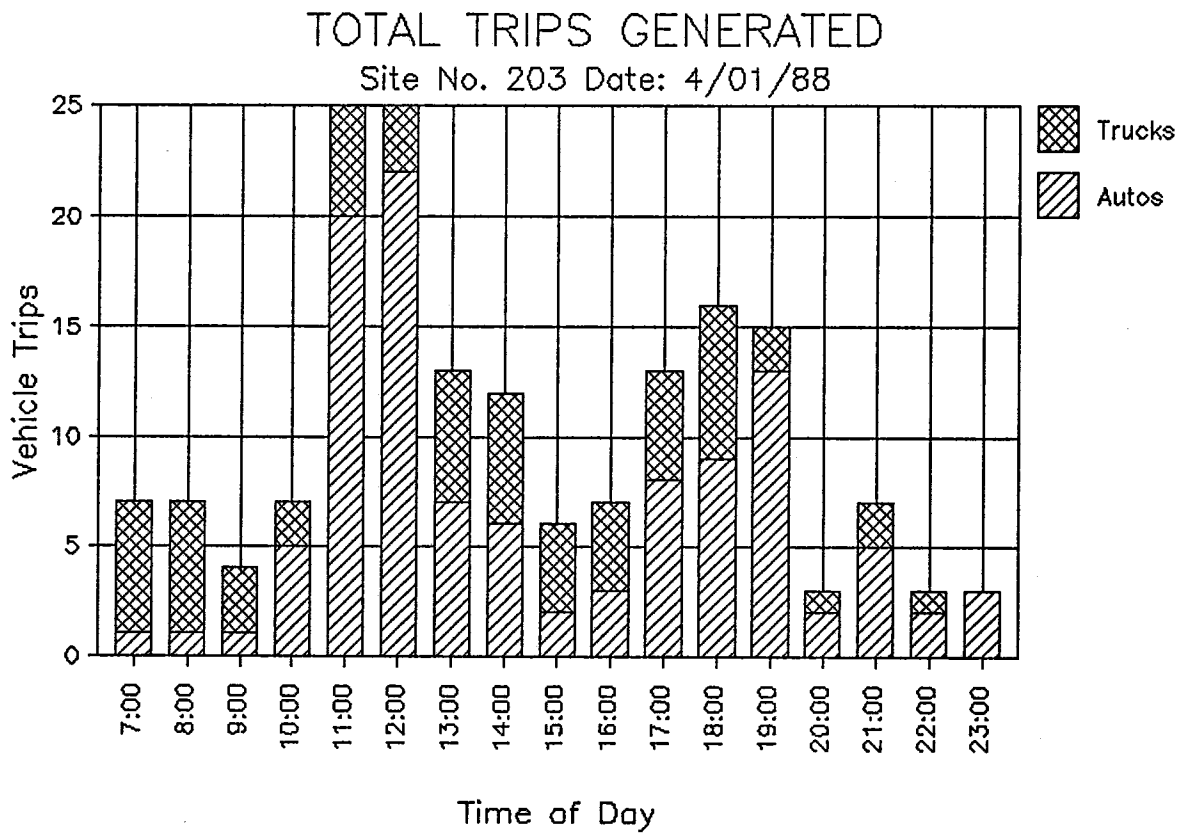
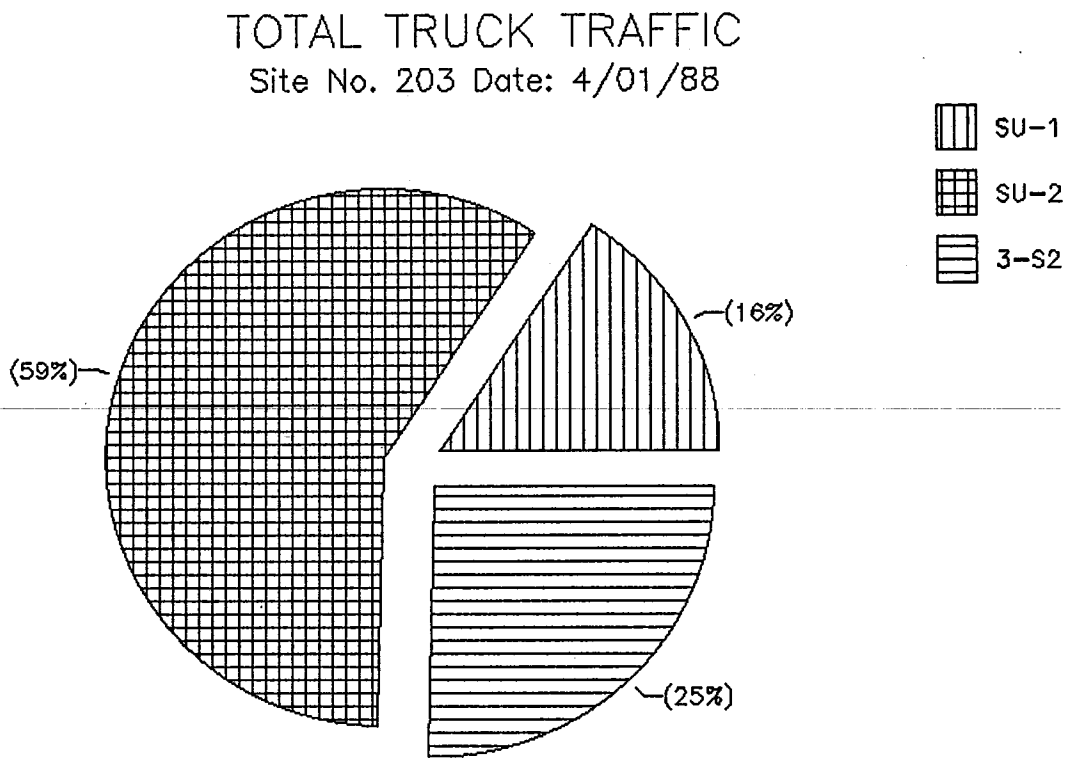


Figure 2.2.1.4-2. Hourly Trip Generation



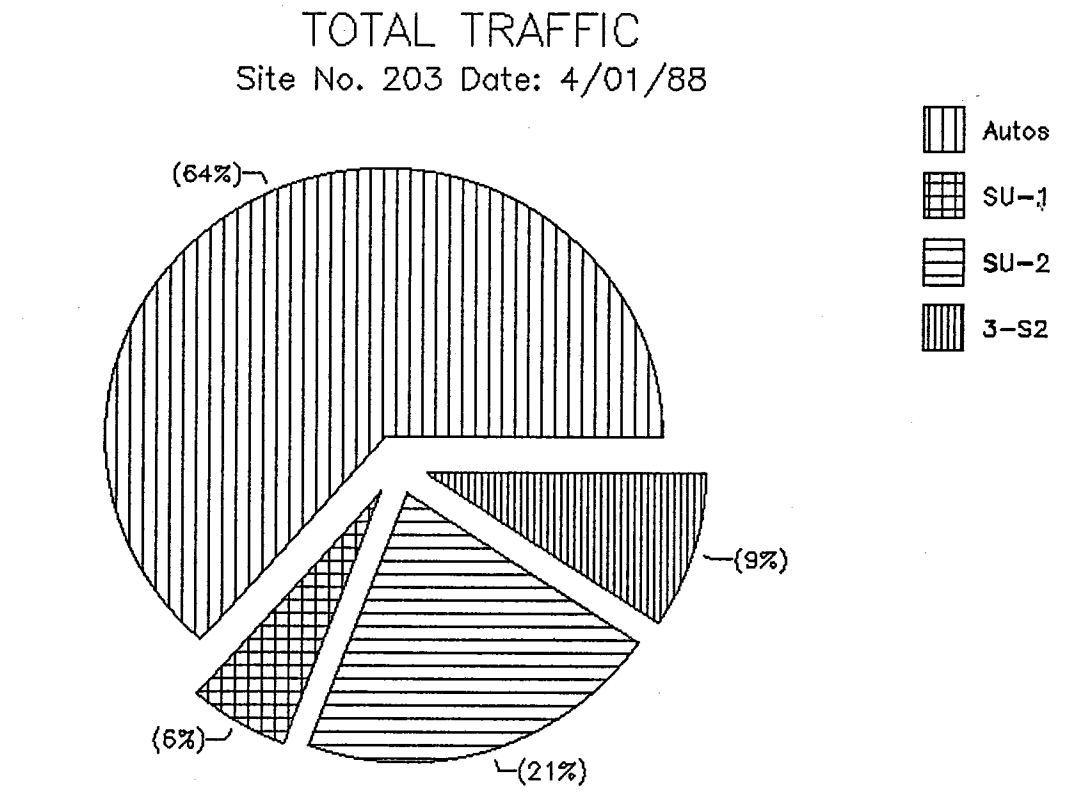


Figure 2.2.1.4-3. Activity Center Vehicle Percentages

Table 2.2.1.4-2. Traffic Classification Count Summary

Table 2.2.1.4-2A. Activity Center Only

Date	Vehicle Classification Autos	SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
4/01/88	110	10	37	16	0	173	75%	25%	64%	36%
5/30/85	17	18		11	0	46	62%	38%	37%	63%

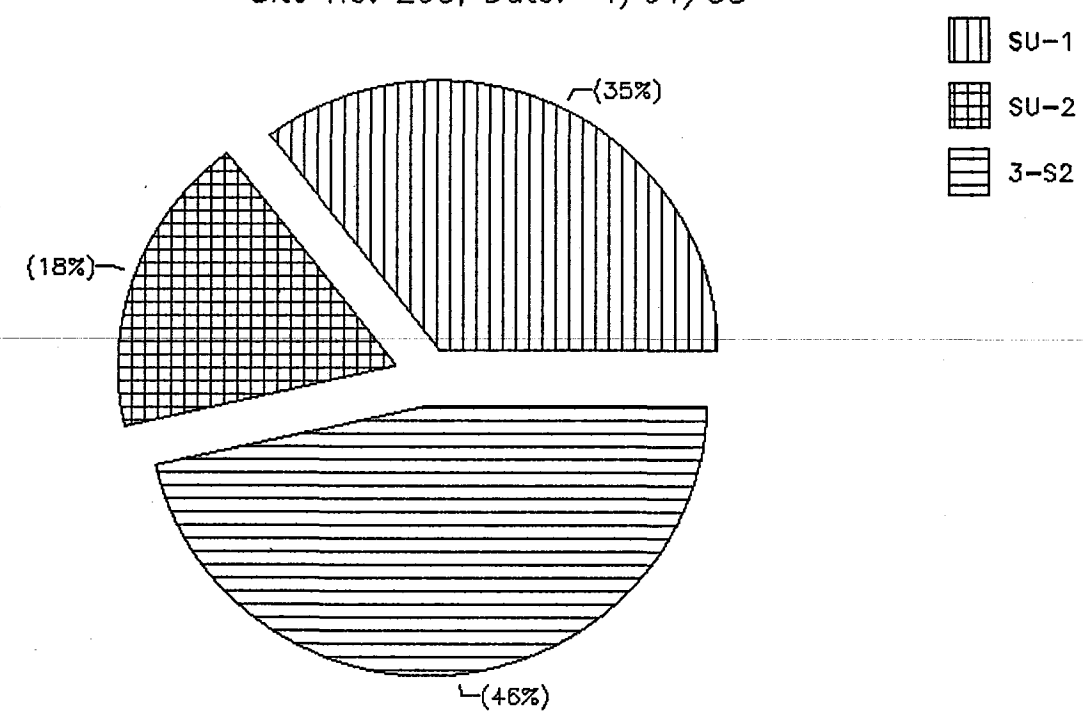
Table 2.2.1.4-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
4/1/88	2038	25	25	1	1	22	2113	67%	33%	96%	4%

Table 2.2.1.4-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
4/1/88	2148	35	62	1	1	38	1	2286	70%	30%	94%	6%

Figure 2.2.1.4-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.2.1.4-2C values). The 3-S2 vehicle is the dominant vehicle at 46 percent of total truck traffic. When all vehicles on the roadway are considered together, trucks represent 5 percent of the total traffic stream.



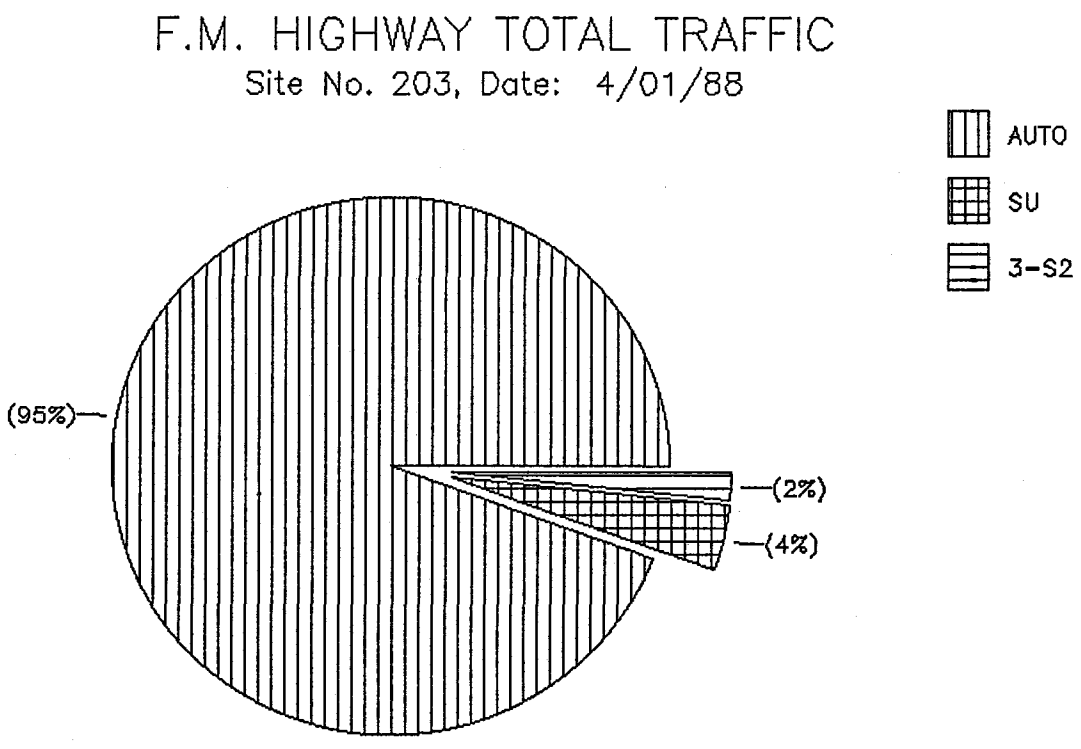


Figure 2.2.1.4-4. Highway Vehicle Percentages

2.2.1.5 Produce Distributor, Site No. 204

Introduction. The site map shown in Figure 2.2.1.5-1 indicates that access is provided by a Farm-to-Market Highway. This produce distributor or "shed" is south of a small urbanized area in the Rio Grande Valley area. No rail service is provided. This company is based on a partnership of four to six principals, each contributing the yield from their privately owned land.

Activity Center Trip-Generating Characteristics. Figure 2.2.1.5-2 shows the truck traffic (in and out) generated by this produce distributor during an 18-hour period from 7 a.m. to 11 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the shed during the same 11-hour period on March 30, 1988. A traffic peak occurred at 3 p.m. to 4 p.m. for trucks, whereas for autos the number began high at 7 a.m. and steadily decreased throughout the day.

The plant employs 50 to 200 people in the packing shed and 50 to 200 in the fields. At the end of the cantaloupe season (May), this shed closes to do accounting, maintenance, and planting. The 1988 season was an average season for cantaloupe, again, according to interview information.

Figure 2.2.1.5-3 illustrates the breakdown by AASHTO classification of the total traffic going into and out of the site. Even though field trailers are typically pulled behind single unit trucks to the send, they are shown as a separate category in the graphs for purposes of evaluation. The predominant truck was the two axle single unit (38 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Autos represented 77 percent of all traffic. During the day counted in 1988, this distributor added 20 3-S2 vehicle trips and 55 single unit truck trips to the traffic stream. Some of these single unit trucks were pulling field trailers.

Interviews with plant officials indicated that the average number of truck loads shipped out in a days time was between 7 and 22 during the harvest season for cantaloupes. The average daily number of truck loads shipped during the harvest season for each commodity is provided in Table 2.2.1.5-1.

Table 2.2.1.5-1. Interview Information

Commodity	Number of Loads
Onions	8 to 10 -- Average day 20 to 30 -- High day
Cantaloupe	7 to 22 truck loads

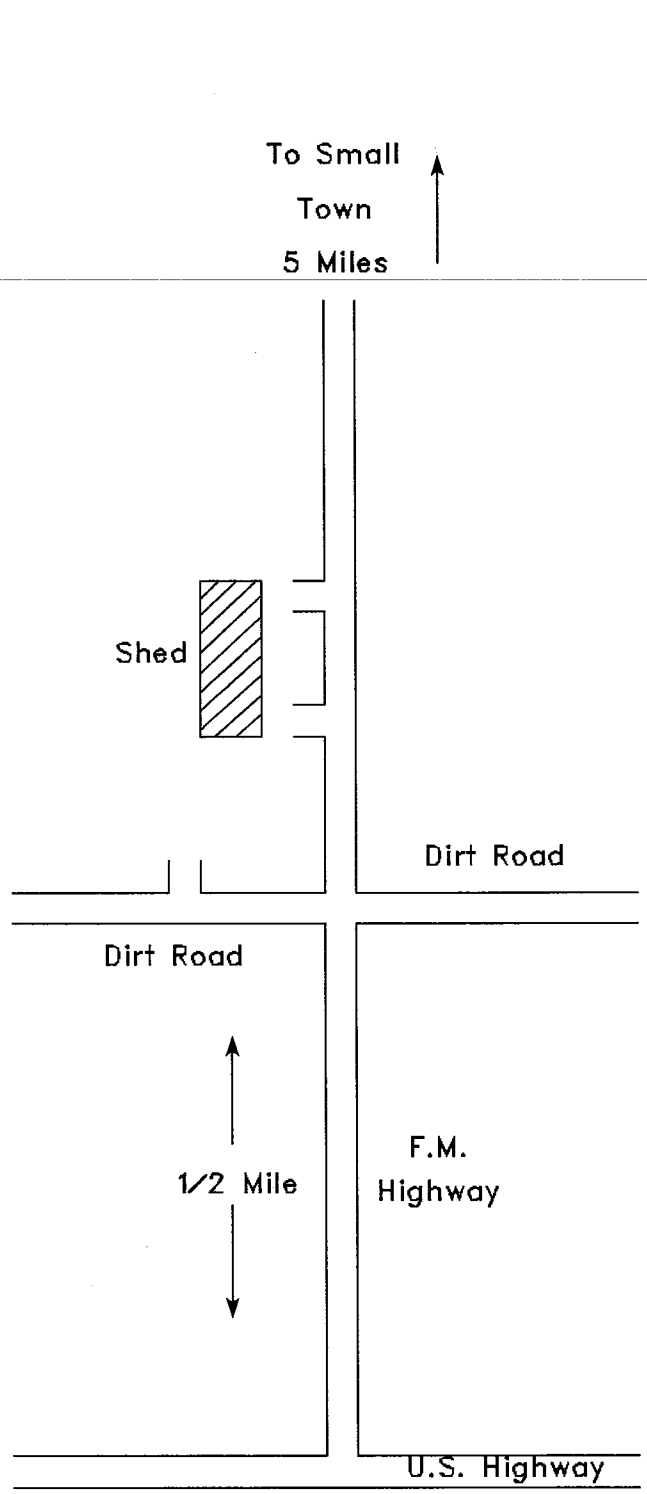
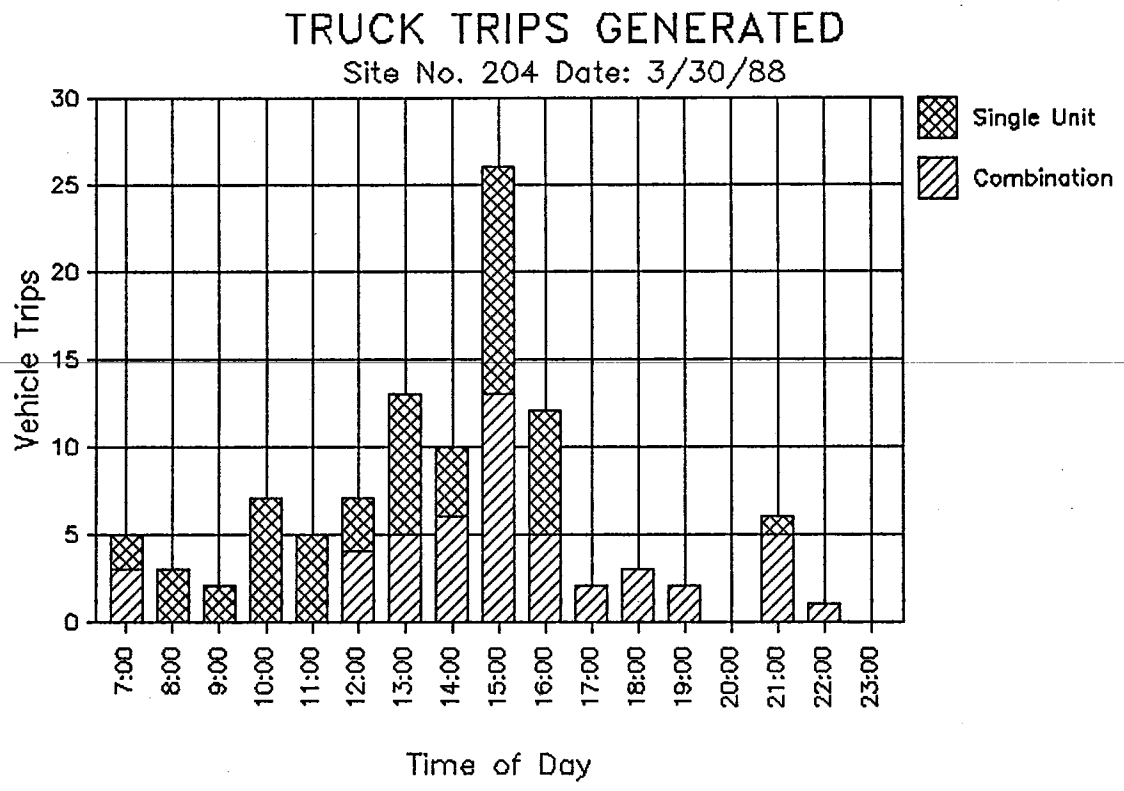


Figure 2.2.1.5-1. Site Map



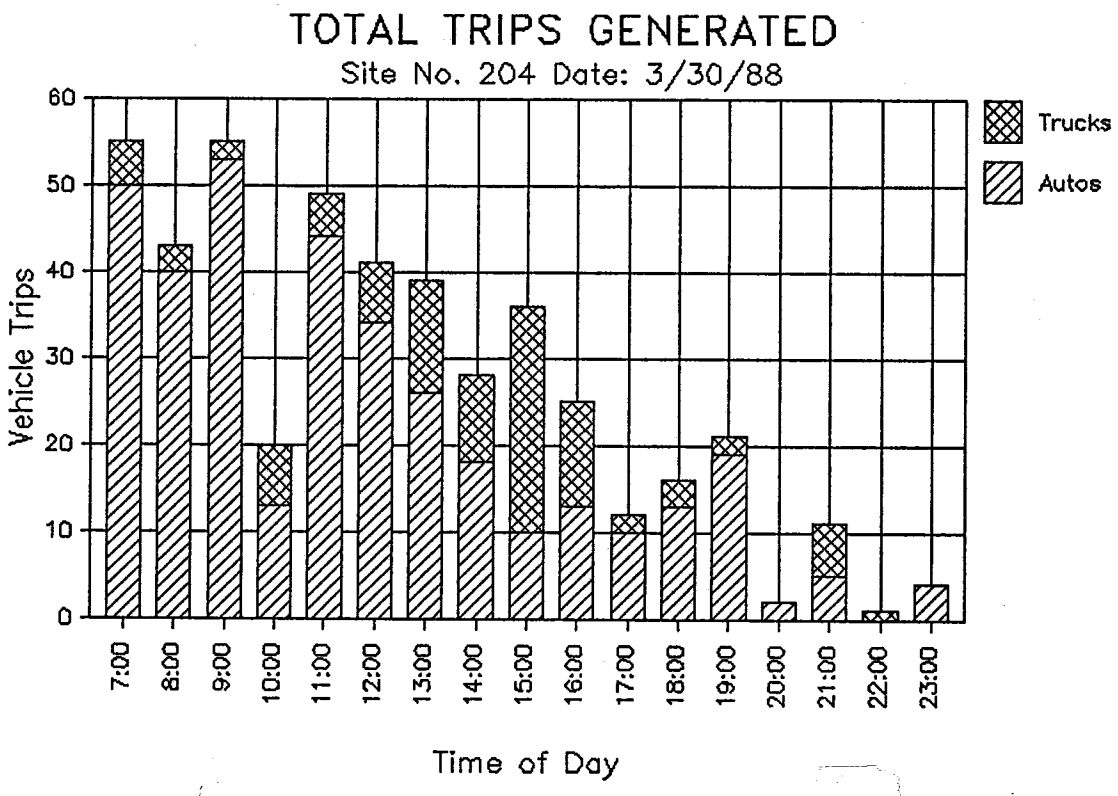
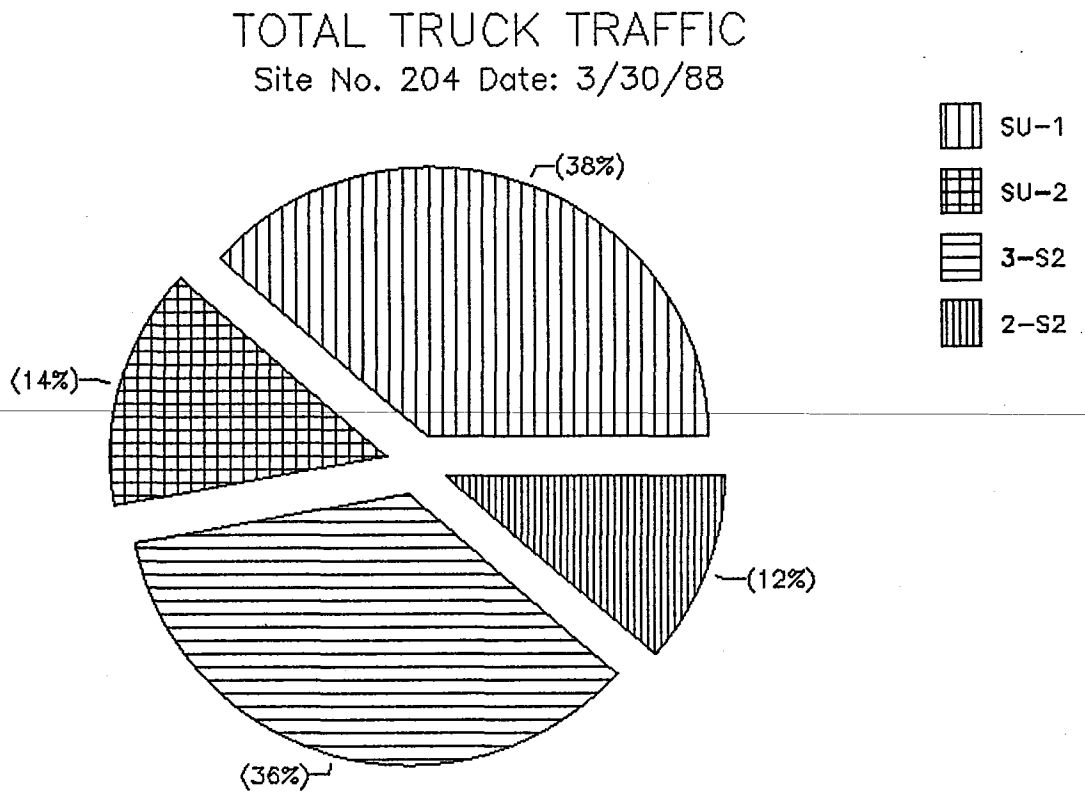


Figure 2.2.1.5-2. Hourly Trip Generation



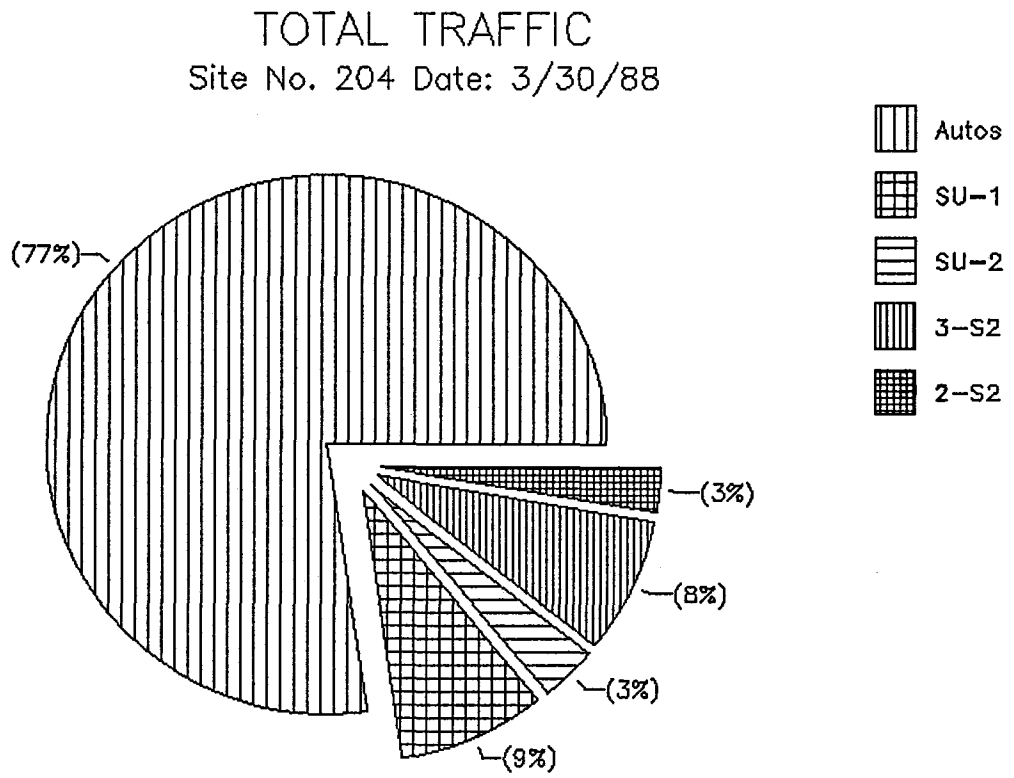


Figure 2.2.1.5-3. Activity Center Vehicle Percentages

The radius on influence for this site differs greatly between incoming and outgoing vehicles. Tractor trailers (3-S2) loaded at this site travel mostly to the east coast. For field trucks and trailers, the maximum distance traveled is about seven miles.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 740 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.2.1.5-2 provides a summary of the counts taken. In Table 2.2.1.5-2A, vehicle classification counts for the activity center only are provided. In Table 2.2.1.5-2B, a count of all vehicles on the U.S. Highway except special-use vehicles is provided. Finally, in Table 2.2.1.5-2C, a total count of all vehicles on the roadway (sum of 2A and 2B plus special-use vehicles on the roadway) is provided.

Figure 2.2.1.5-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.2.1.5-2C values). The two axle single unit vehicle is the dominant vehicle at 42 percent of total truck traffic. When all vehicles on the roadway are considered together, trucks represent 16 percent of the total traffic stream.

Table 2.2.1.5-2. Traffic Classification Count Summary

Table 2.2.1.5-2A. Activity Center Only

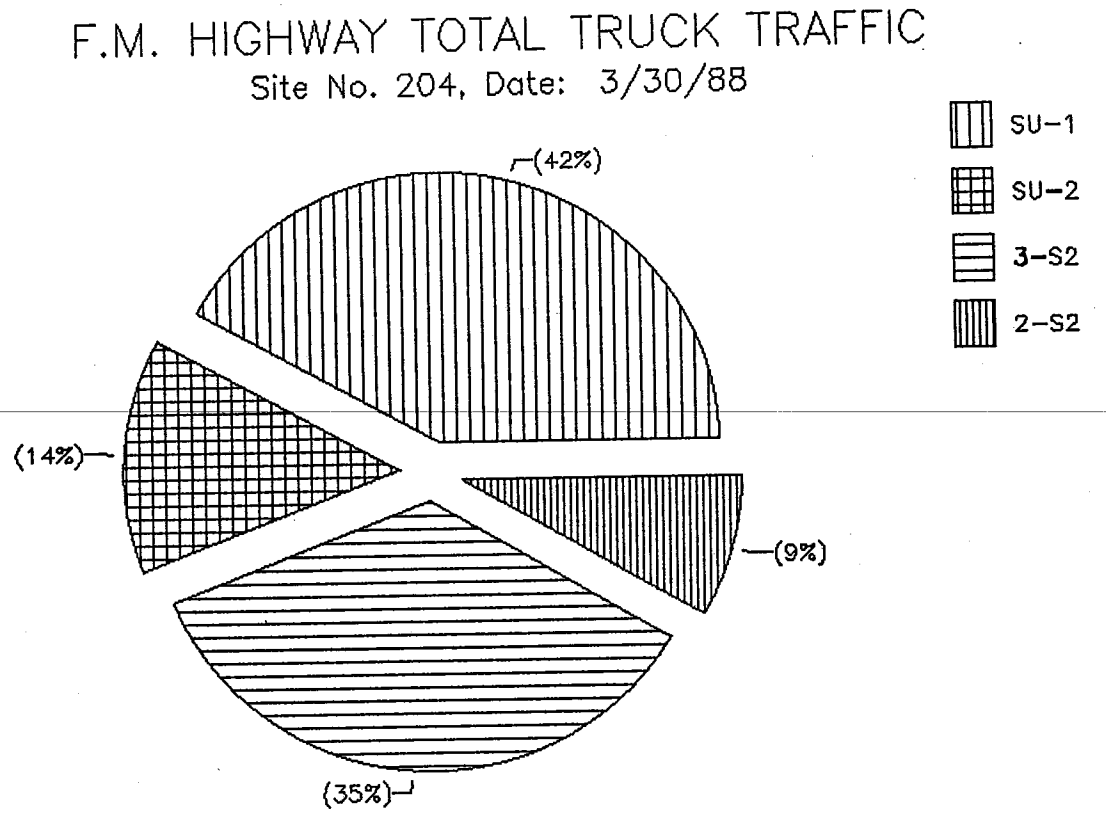
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
5/28/85	155	33	2	35	8	233	45%	55%	66%	34%
3/30/88	354	40	15	20	17	446	60%	40%	79%	21%

Table 2.2.1.5-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
3/30/88	403	19	5	1	12	428	97%	3%	94%	6%

Table 2.2.1.5-2C. Roadway With Special-Use

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
3/30/88	757	59	20	21	41	898	77%	23%	84%	16%



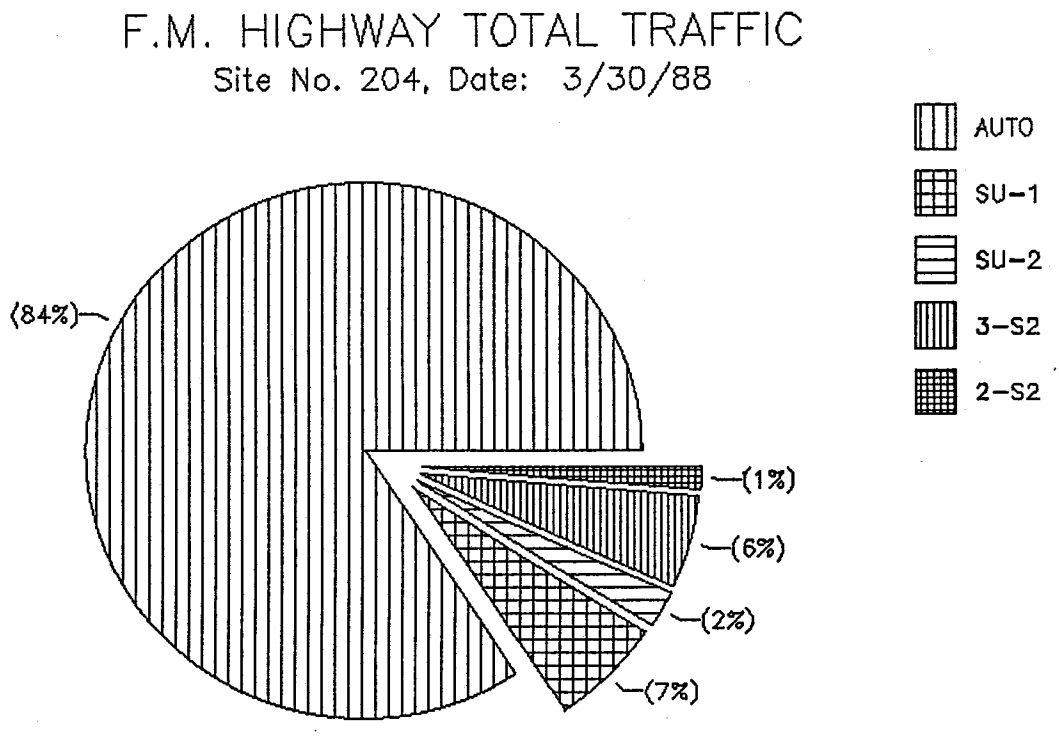


Figure 2.2.1.5-4. Highway Vehicle Percentages

2.2.1.6 Produce Distributor, Site No. 205

Introduction. The site map shown in Figure 2.2.1.6-1 indicates that access is provided by a Farm-to-Market Highway. This produce activity center is a "freezer" operation, and is therefore somewhat different from the other produce centers evaluated herein. This site is within a few miles of a small urban area, located within the "Winter Garden" area of the state. Rail service is provided for shipping frozen produce, but the quantity shipped by this mode was not revealed during interviews.

Activity Center Trip-Generating Characteristics. This company is involved in processing, packaging, and freezing the following vegetables: spinach (December to March), broccoli (October to May), southern greens (October to December), carrots (December to April), okra (June to August), yellow squash (April and May), and zucchini (April and May). The processing plant is 55,000 square feet in size, located on a 15-acre tract. Their projected output is 30 million pounds per year.

Figure 2.2.1.6-2 shows the truck traffic (in and out) generated by this produce distributor during a 12-hour period from 7 a.m. to 7 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the shed during the same 12-hour period on April 6, 1988. A truck traffic peak occurred at 3 p.m. to 4 p.m., consisting primarily of single unit trucks. Auto peaks occurred at 8 a.m. to 9 p.m. and 5 p.m. to 6 p.m.

The plant employed 100 people in 1985, who worked two shifts. This center works as many as 300 employees (3 shifts) depending on the demand. The heaviest shipping season is September 25 to May 1, when they are shipping southern greens and spinach. Over a six-day period in June of 1985, they expected to load 14 3-S2 trucks with 750,000 pounds of frozen produce. The summer months of June, July, and August are slow.

Figure 2.2.1.6-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. Even though field trailers are typically pulled behind single unit trucks to the processing plant, they are shown as a separate category in the graphs for purposes of evaluation. The predominant truck was the 3-S2 (39 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Autos represented 83 percent of all traffic. During the day counted in 1988, this distributor added 18 3-S2 vehicle trips and 35 single unit truck trips to the traffic stream. Some of these single unit trucks were pulling field trailers. Interviews with plant officials indicated that the average number of truck loads (all 3-S2) shipped out in a days time was between 1 and 6. No information was provided on radius of influence.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 960 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.2.1.6-1 provides a summary of the counts taken. In Table 2.2.1.6-1A, vehicle classification counts for the activity center only are provided. In Table 2.2.1.6-1B, a count of all vehicles on the F.M. Highway except special-use vehicles is provided.

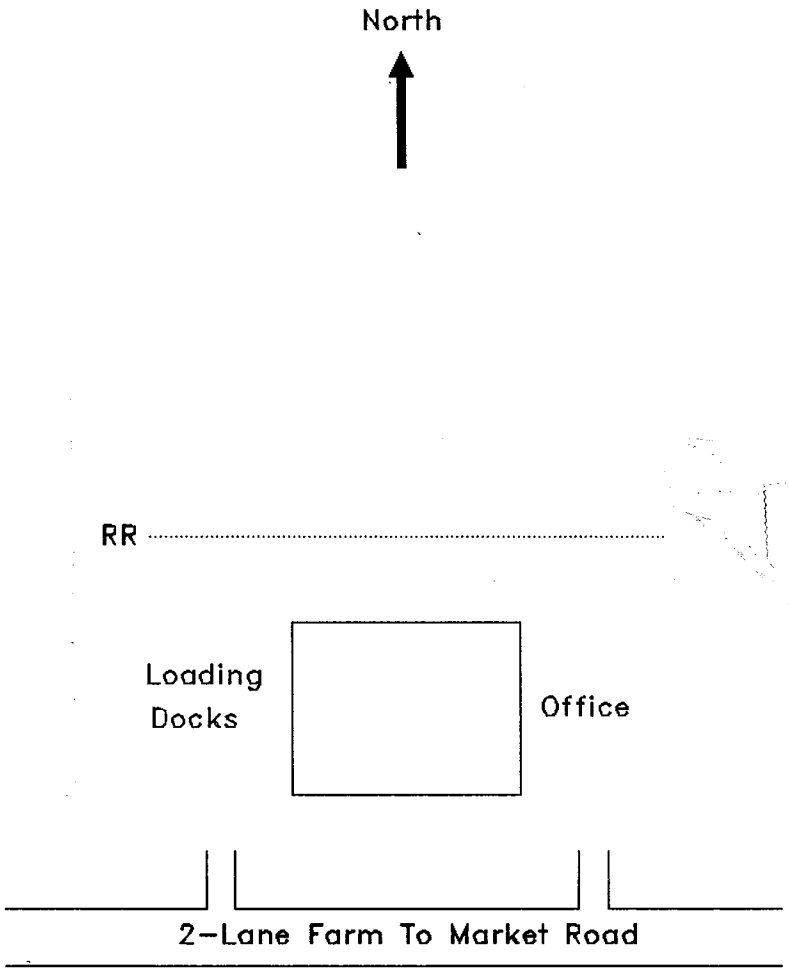
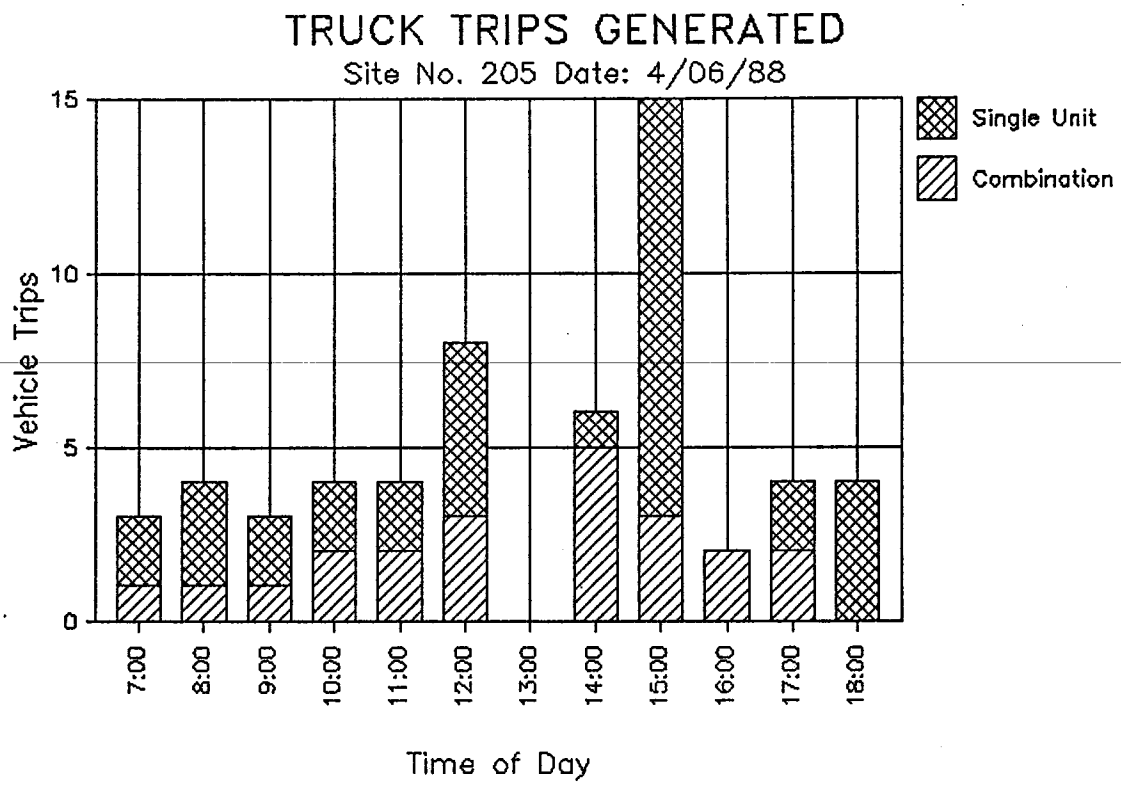


Figure 2.2.1.6-1. Site Map



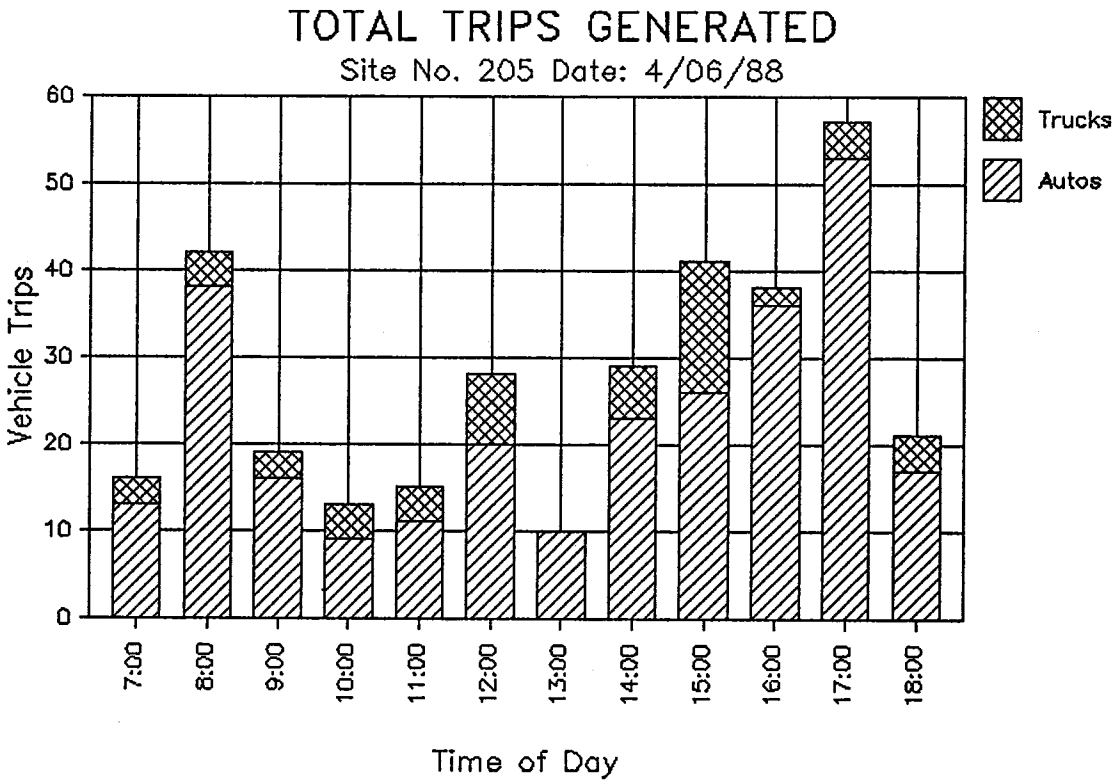
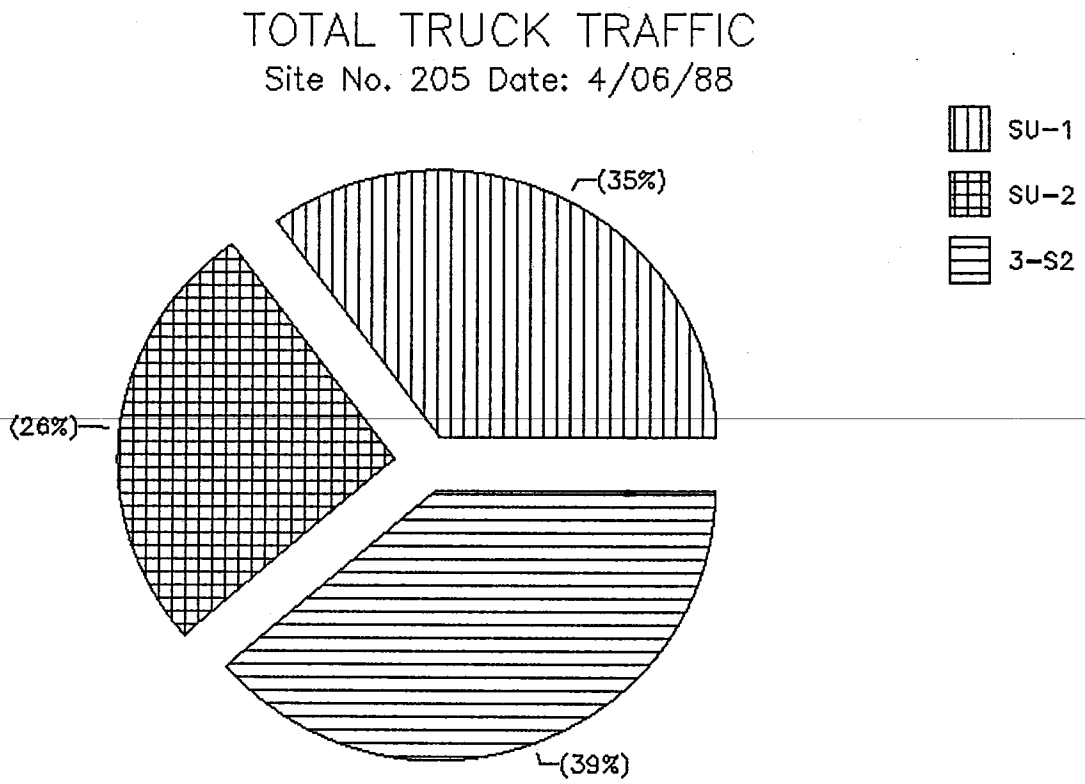


Figure 2.2.1.6-2. Hourly Trip Generation



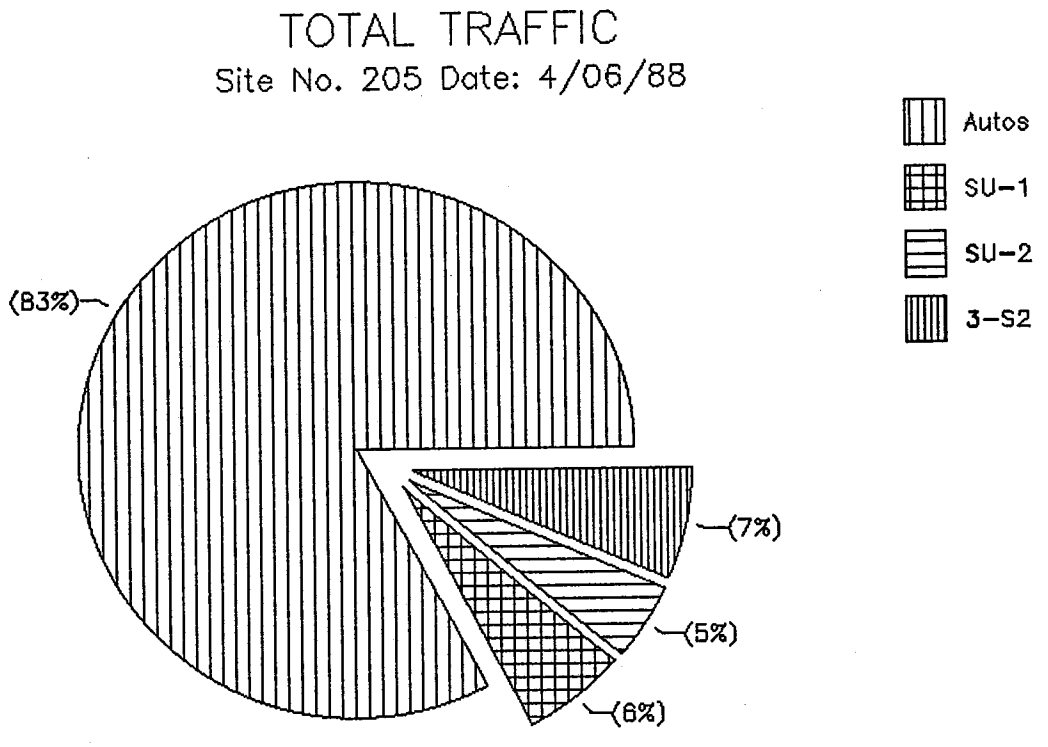


Figure 2.2.1.6-3. Activity Center Vehicle Percentages

Finally, in Table 2.2.1.6-1C, a total count of all vehicles on the roadway (sum of 1A and 1B plus special-use vehicles on the roadway) is provided.

Figure 2.2.1.6-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.2.1.6-1C values). The 3-S2 combination is the dominant vehicle at 48 percent of total truck traffic. When all vehicles on the roadway are considered together, trucks represent 12% of the total traffic stream.

Table 2.2.1.6-1. Traffic Classification Count Summary

Table 2.2.1.6-1A. Activity Center Only

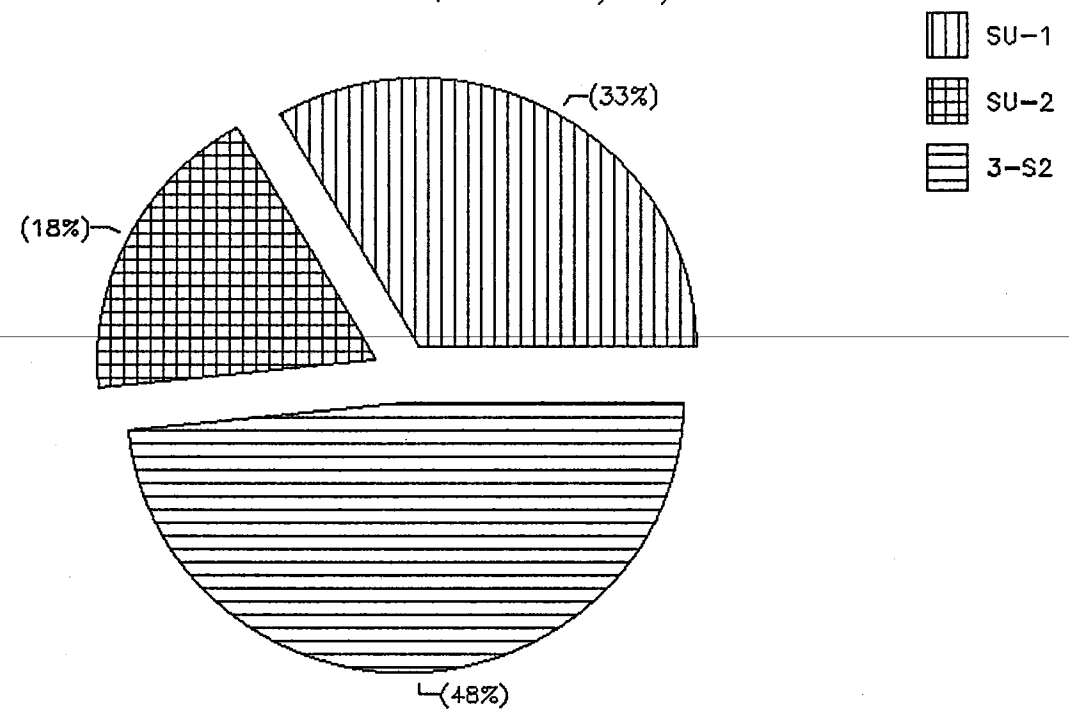
	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/6/88	272	20	15	18	4	329	68%	32%	83%	17%
6/13/85	164	12	0	2	0	178	93%	7%	92%	8%

Table 2.2.1.6-1B. Roadway Without Special-Use Traffic

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/6/88	348	7	0	13	0	368	35%	65%	95%	5%

Table 2.2.1.6-1C. Roadway With Special-Use

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/6/88	620	29	16	38	4	707	56%	44%	88%	12%



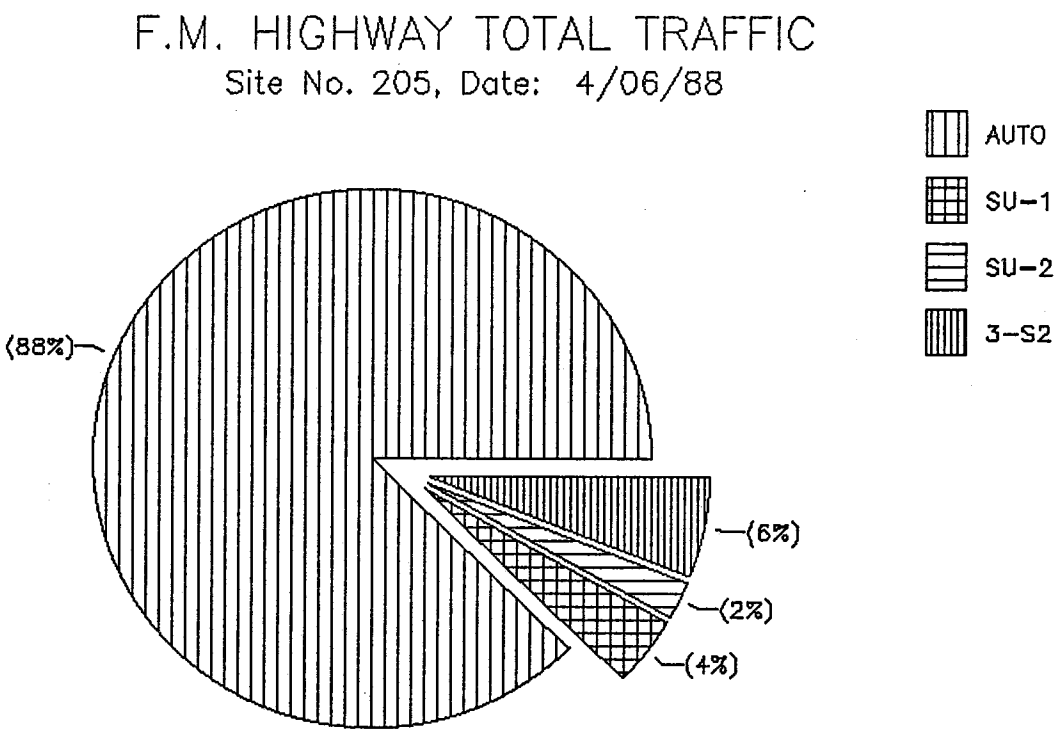


Figure 2.2.1.6-4. Highway Vehicle Percentages

2.2.2 WEIGH-IN-MOTION RESULTS FOR PRODUCE

Figures 2.2.2-1 through 2.2.2-16 are cumulative distribution plots of axle weights and gross vehicle weights of produce trucks. Highway route numbers and dates when the studies were conducted are included on the graphs. Site numbers are not provided because the weighing sites were not adjacent to classification count activity centers. The weigh-in-motion (WIM) crew identified special-use vehicles associated with each site and coded the weighed vehicle for subsequent evaluation.

The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weight. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last. Single unit trucks were usually field trucks, while 3-S2 vehicles were usually refrigerated vans hauling produce from the Rio Grande Valley for a considerable distance.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was deployed at locations in the Rio Grande Valley area 8 a.m. to about midnight on the dates shown on graphs. Day and night weight data have been combined in these results.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near special-use traffic generators, lanes used for raw product movement, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked beside the roadway. No sites adjacent to classification count sites were suitable, so other roadways were sought which had a large number of produce vehicles as well as other desirable characteristics.

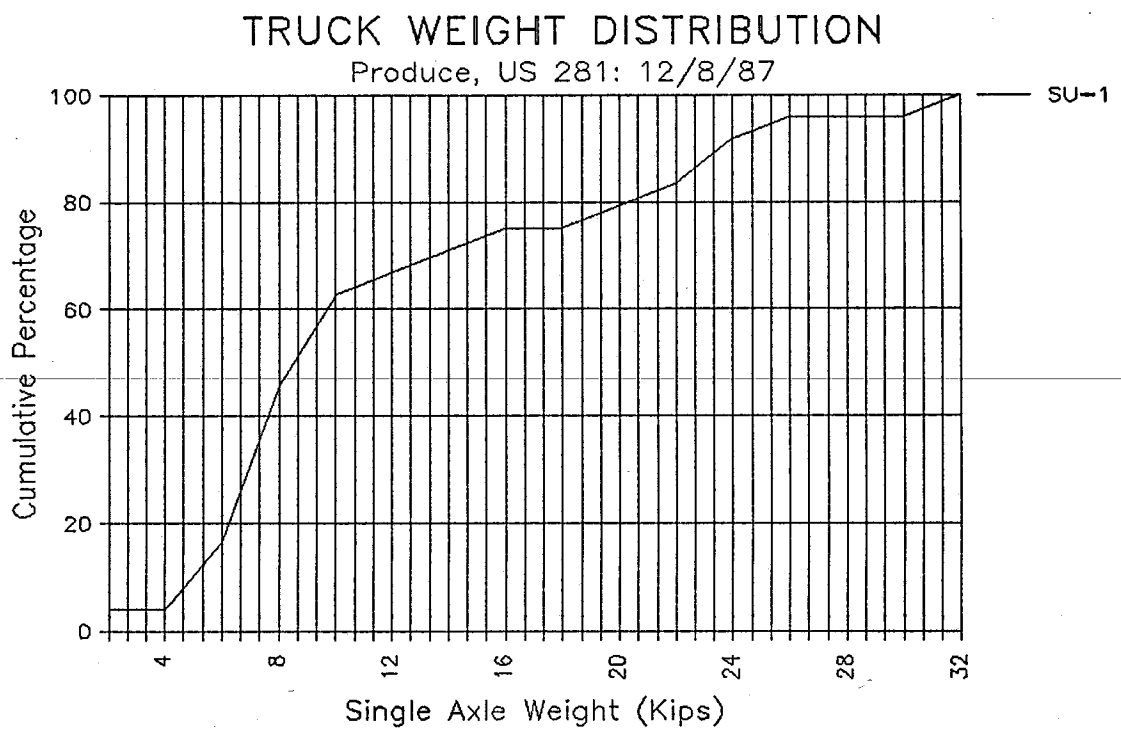


Figure 2.2.2-1 Produce Truck Weights: SU-1, Single Axle, 12/8/87

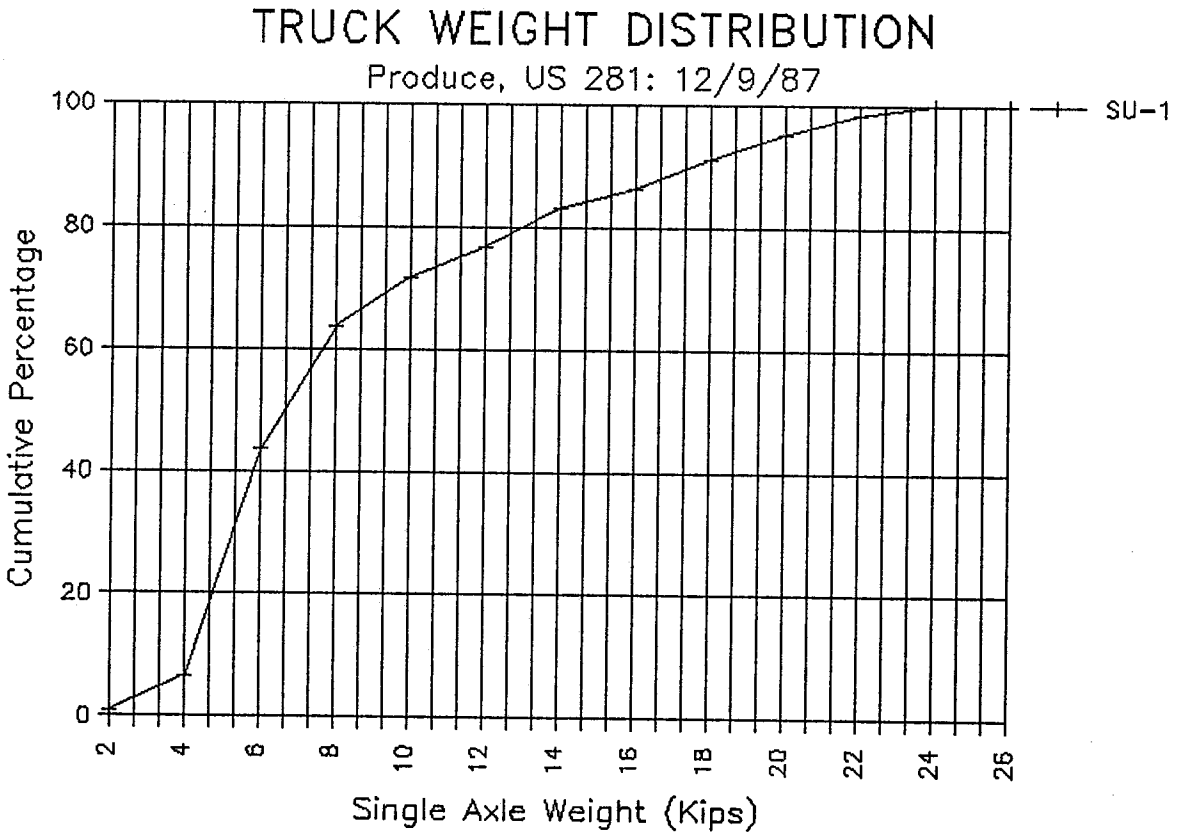


Figure 2.2.2-2 Produce Truck Weights: SU-1, Single Axle, 12/9/87

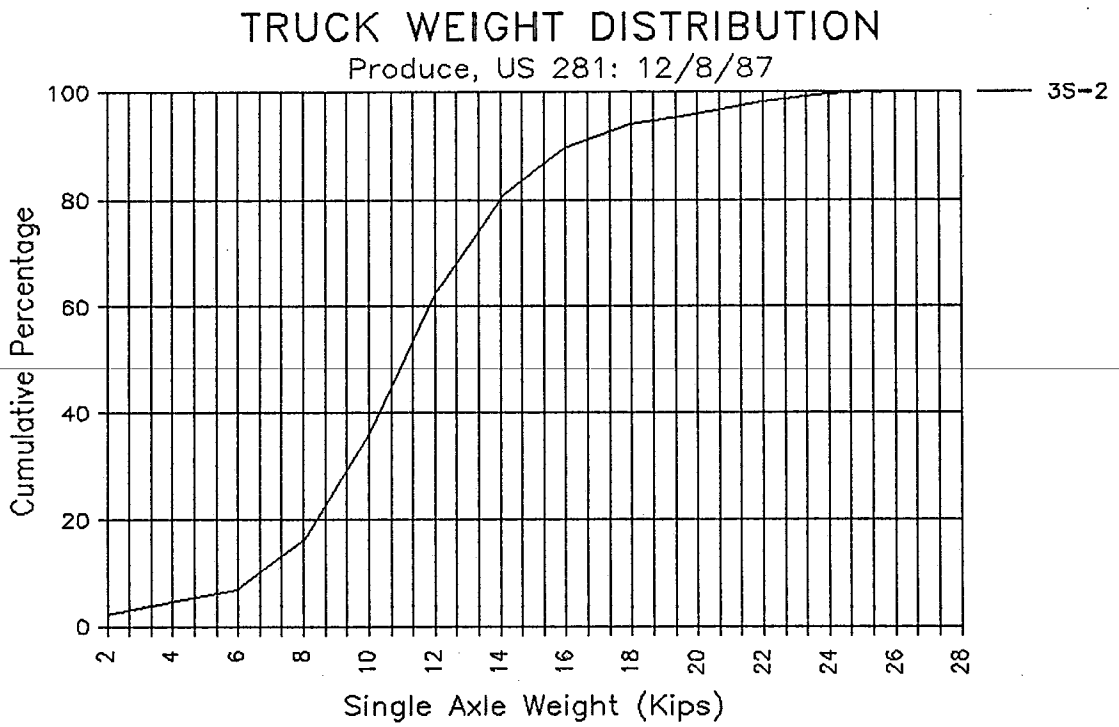


Figure 2.2.2-3 Produce Truck Weights: 3-S2, Single Axle, 12/9/87

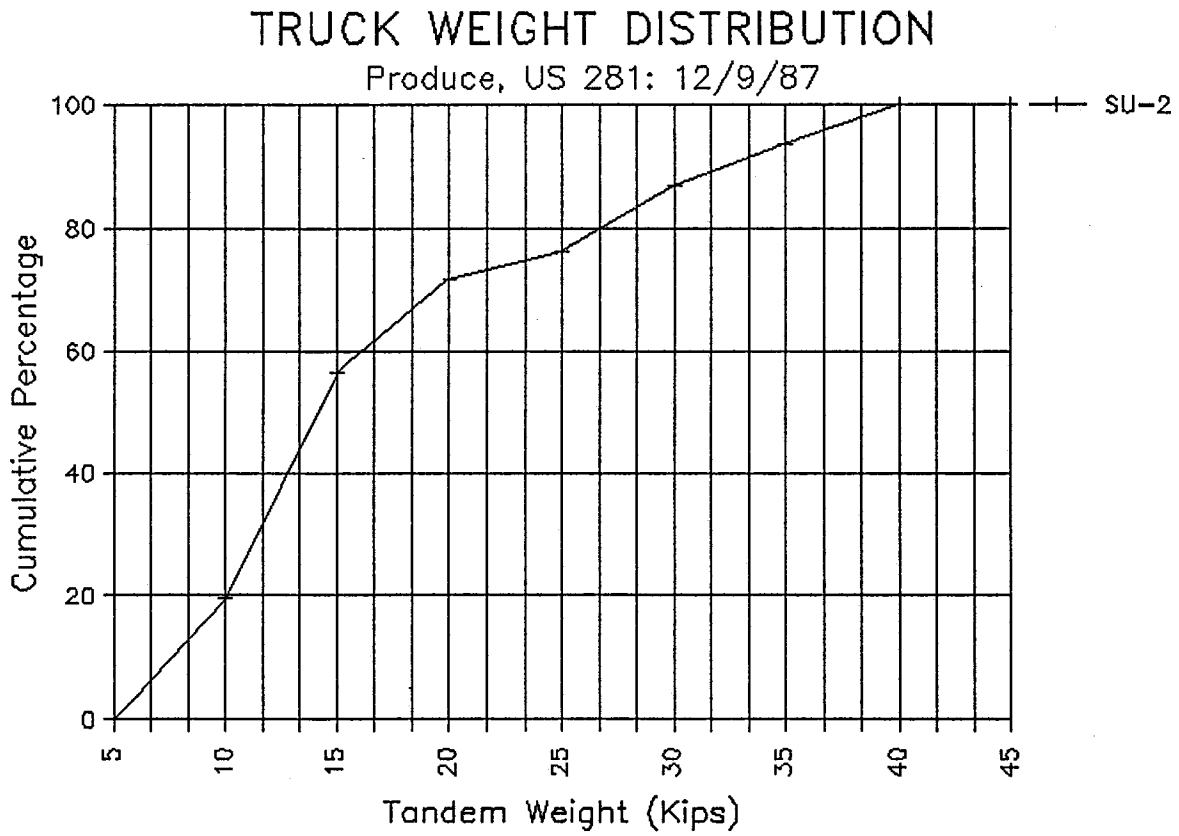


Figure 2.2.2-4 Produce Truck Weights: SU-2, Tandem, 12/9/87

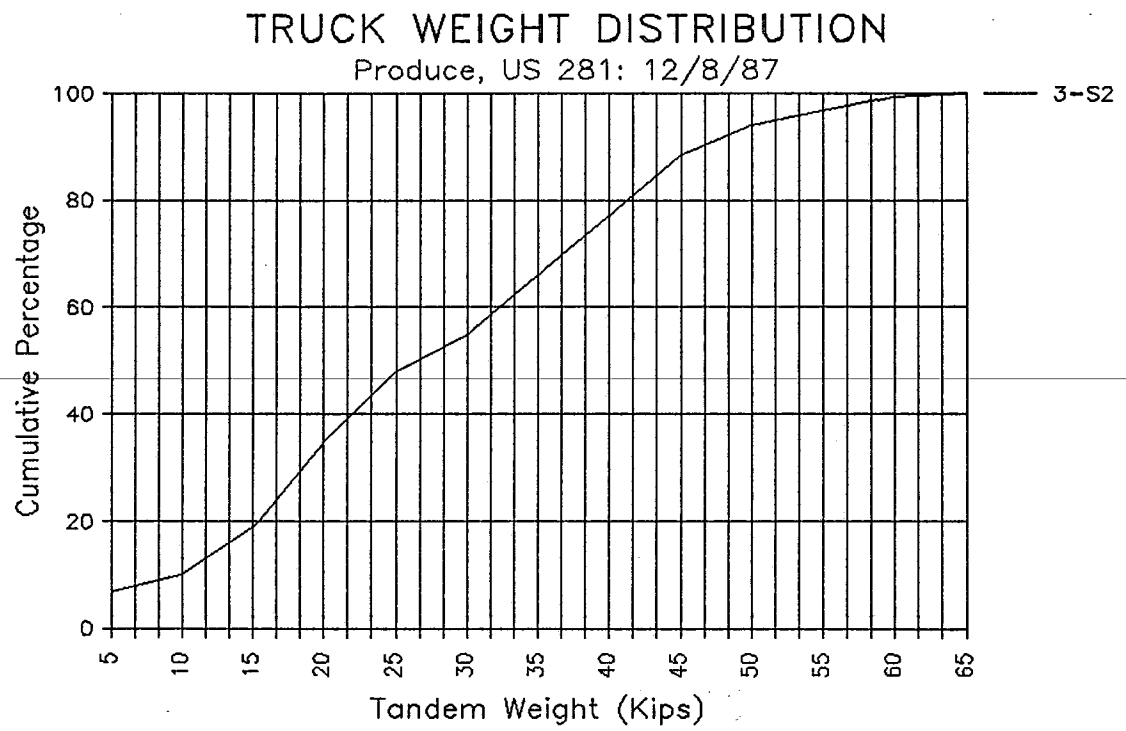


Figure 2.2.2-5 Produce Truck Weights: 3-S2, Tandem, 12/8/87

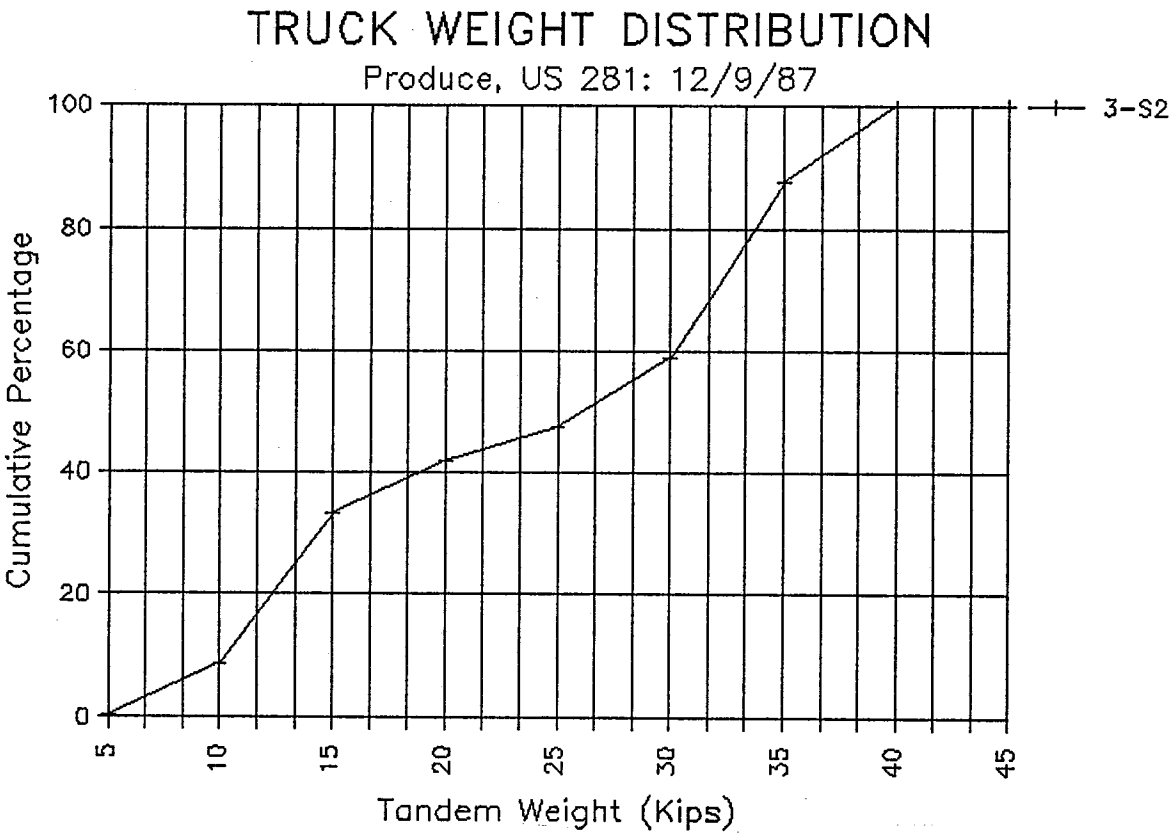


Figure 2.2.2-6 Produce Truck Weights: 3-S2, Tandem, 12/9/87

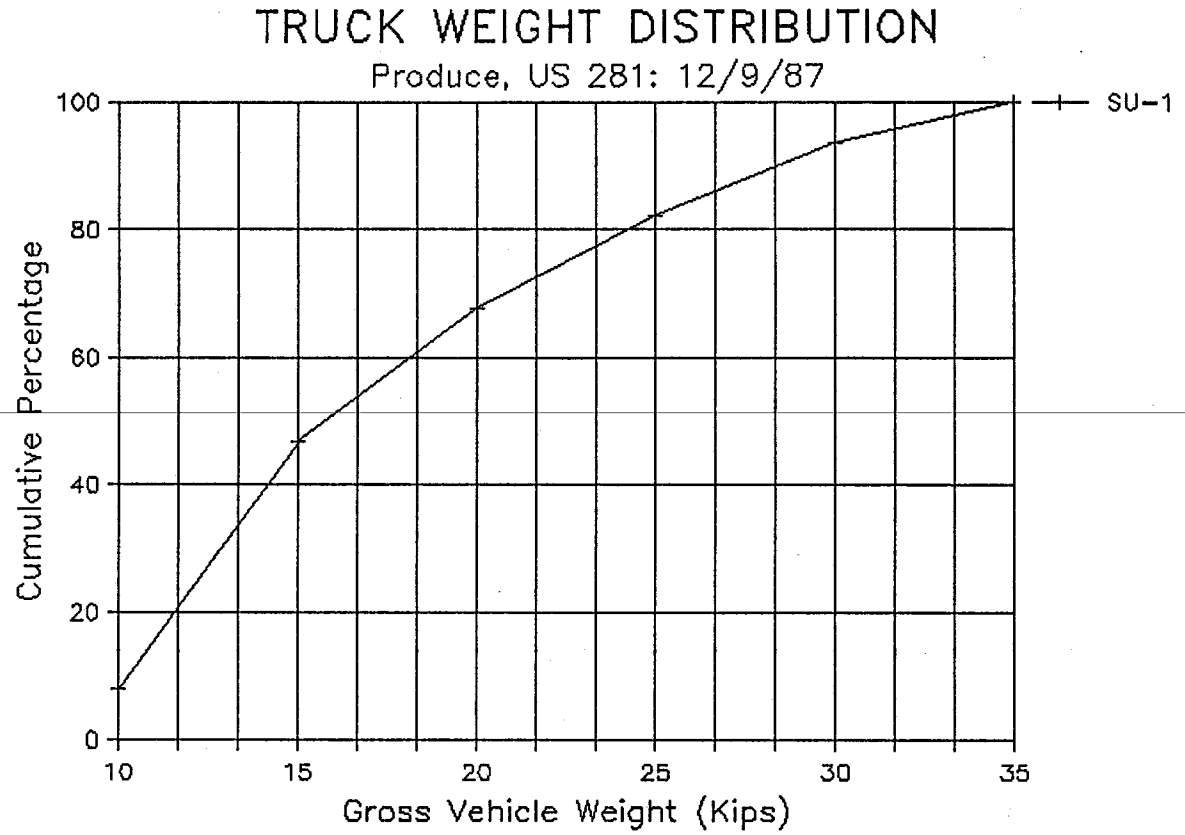


Figure 2.2.2-7 Produce Truck Weights: SU-1, Gross Vehicle, 12/9/87

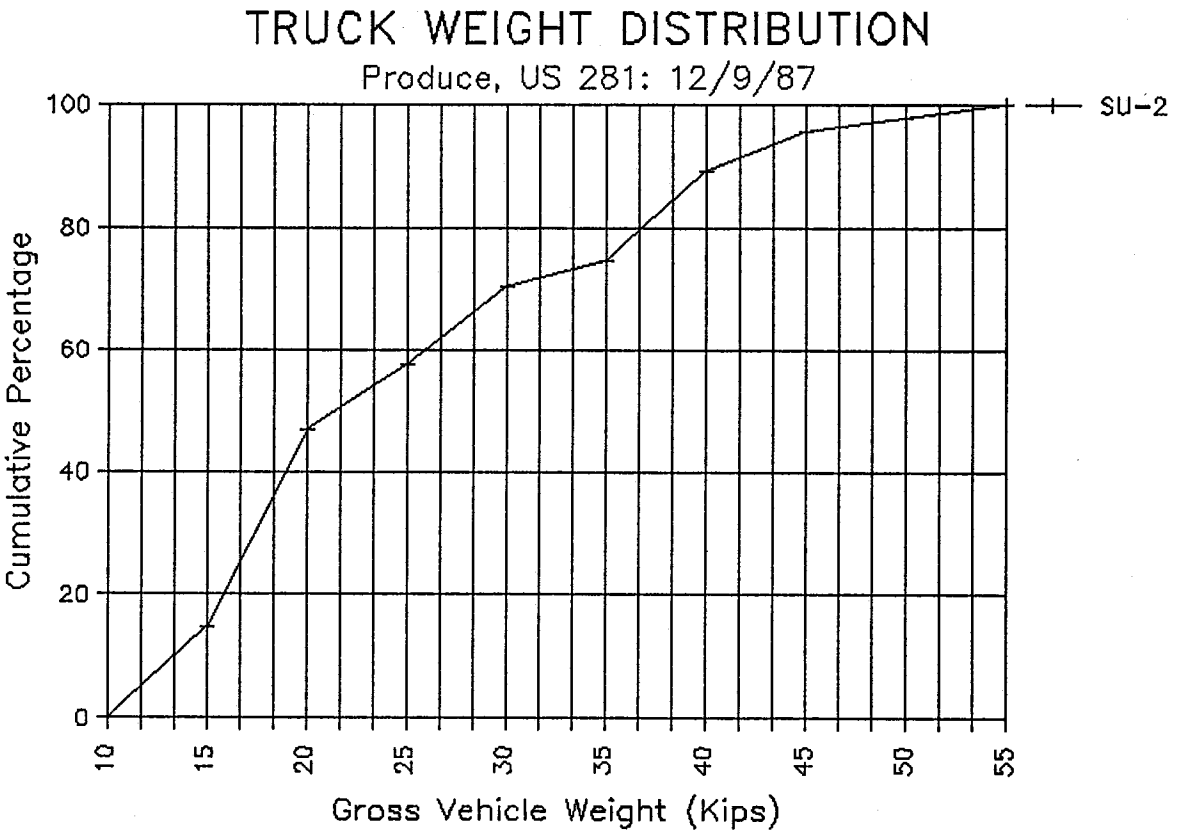


Figure 2.2.2-8 Produce Truck Weights: SU-2, Gross Vehicle, 12/9/87

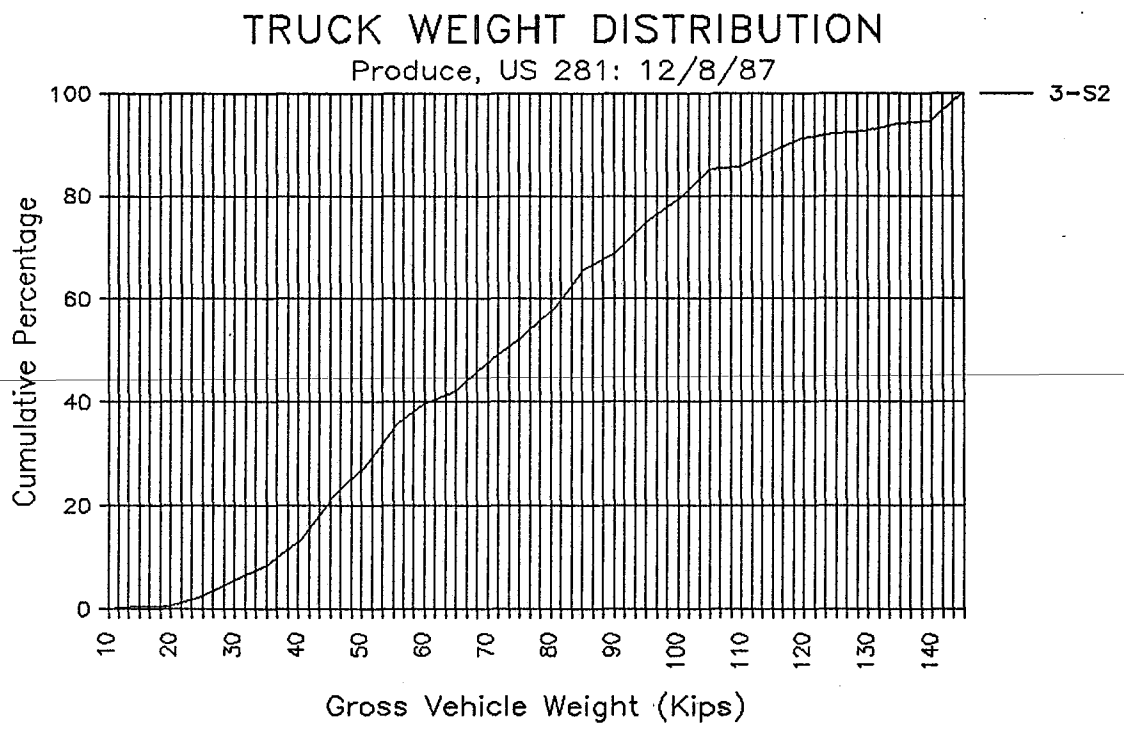


Figure 2.2.2-9 Produce Truck Weights: 3-S2, Gross Vehicle, 12/8/87

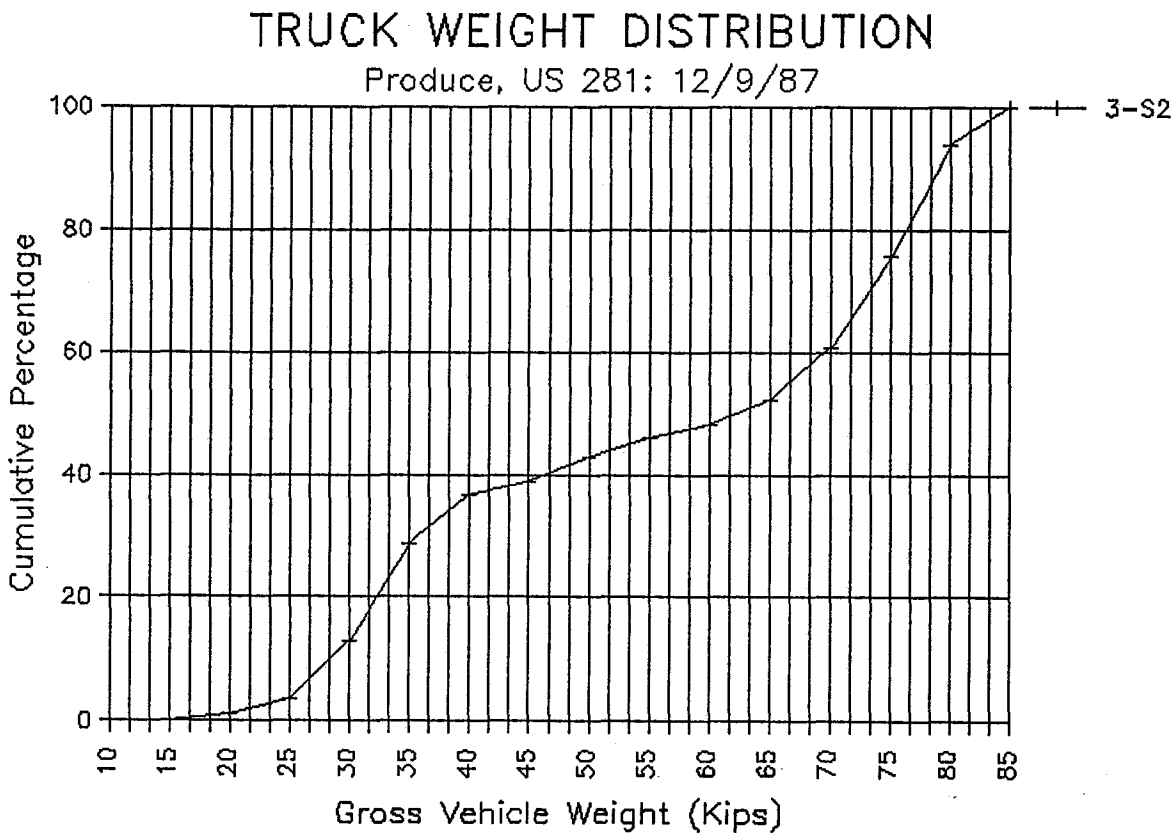


Figure 2.2.2-10 Produce Truck Weights: 3-S2, Gross Vehicle, 12/9/87

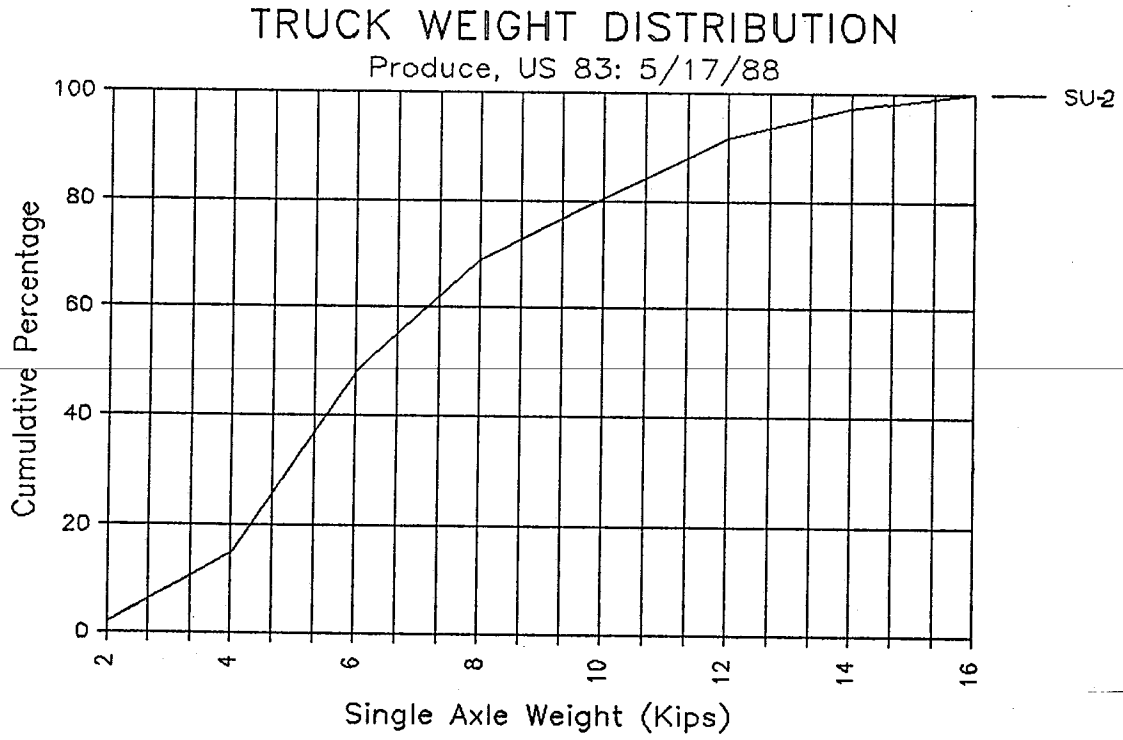


Figure 2.2.2-11 Produce Truck Weights: SU-2, Single Axle, 5/17/88

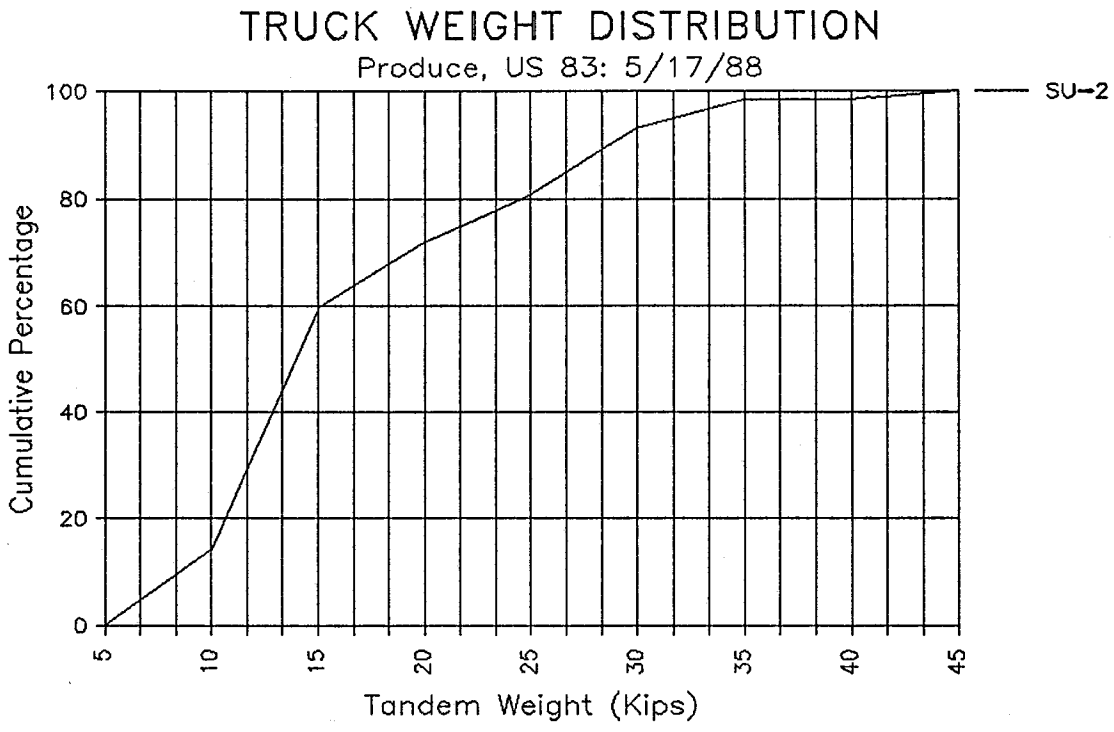


Figure 2.2.2-12 Produce Truck Weights: SU-2, Tandem, 5/17/88

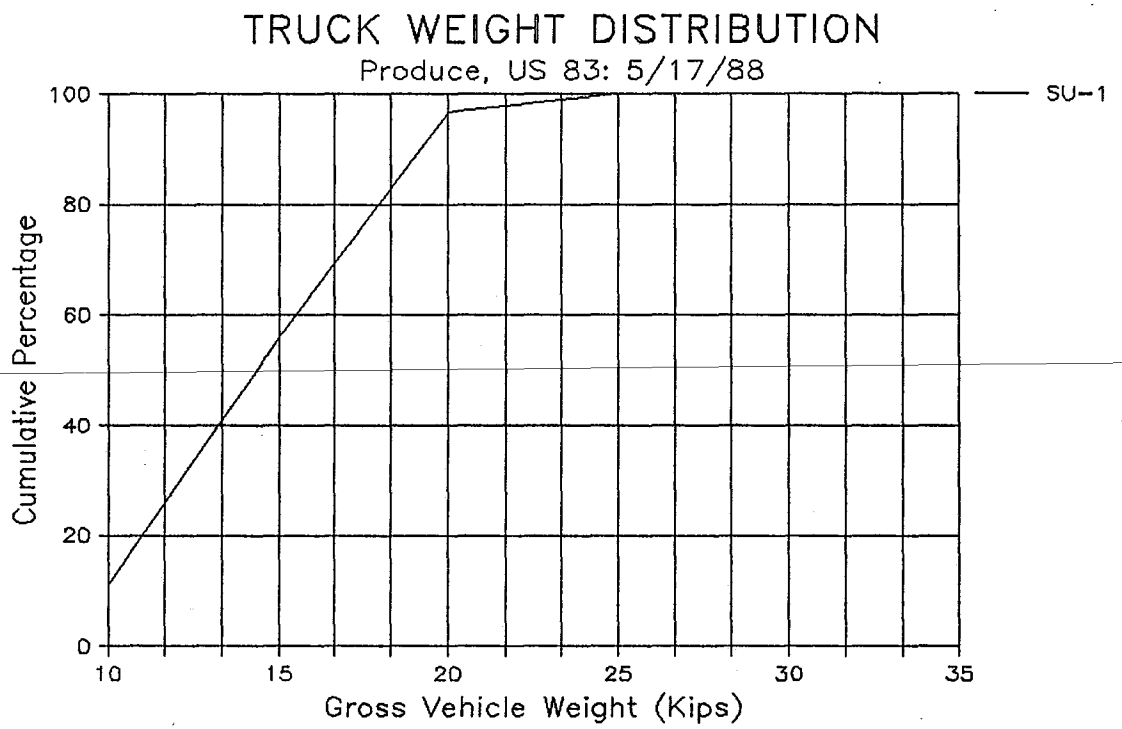


Figure 2.2.2-13 Produce Truck Weights: SU-1, Gross Vehicle, 5/17/88

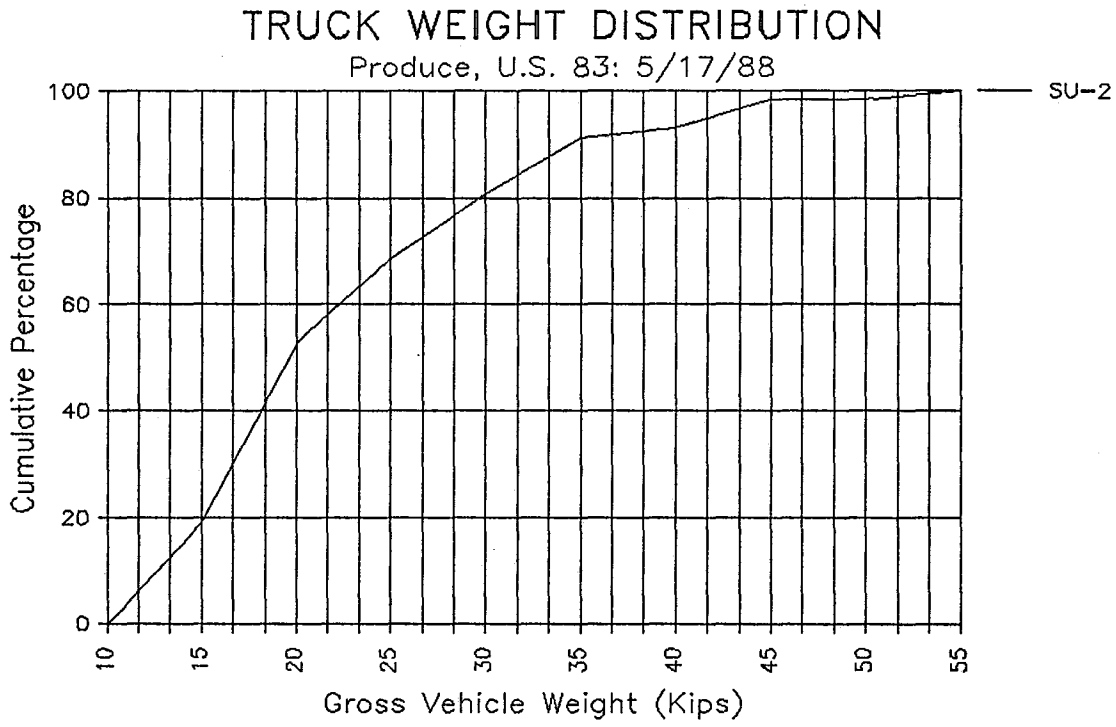


Figure 2.2.2-14 Produce Truck Weights: SU-2, Gross Vehicle, 5/17/88

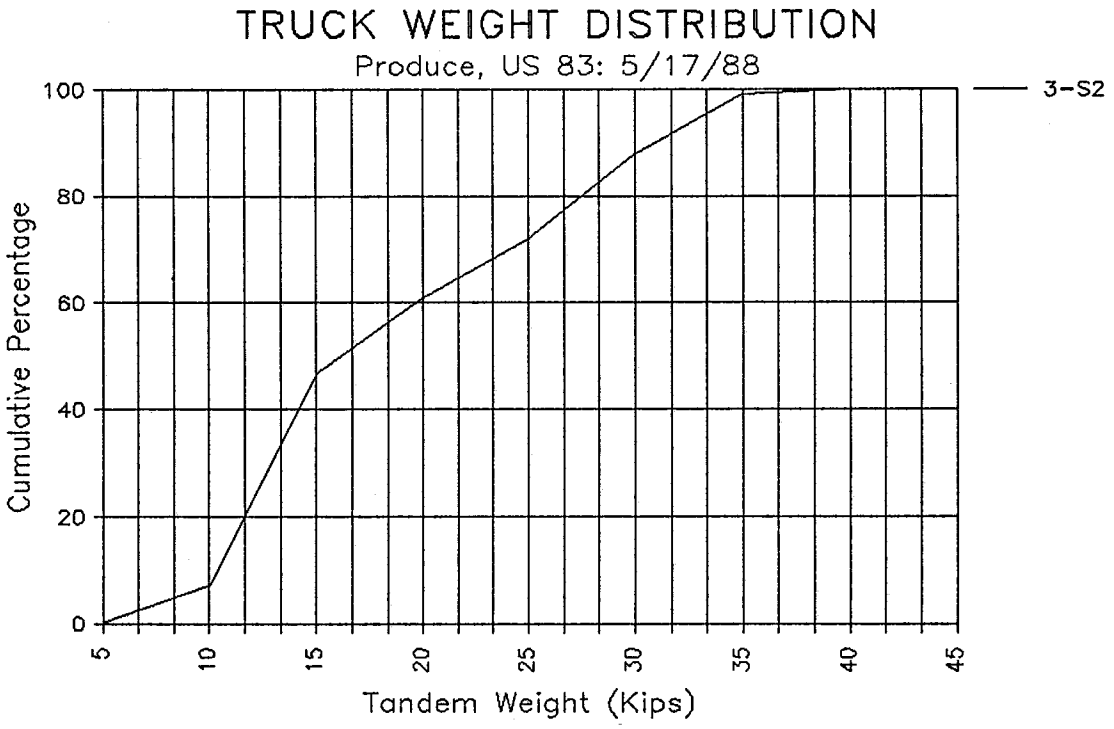


Figure 2.2.2-15 Produce Truck Weights: 3-S2, Tandem, 5/17/88

2.2.3 STATEWIDE APPLICATION OF SITE-SPECIFIC PRODUCE INFORMATION

The state of Texas is widely recognized as one of the leading producers of agricultural products in the nation. Vegetable production is a primary contributor to the total revenue generated by agriculture in the state. Texas ranks third in the nation in total acreage of vegetables planted and harvested and second in the case of some specific vegetables.

The Texas Agricultural Statistics Service makes estimates of acreage, production, and value for 14 commercial vegetables, potatoes, and sweetpotatoes grown in Texas for fresh market and processing. Data for the year 1985 (5) published by the Texas Department of Agriculture in cooperation with the U.S. Department of Agriculture provide the basis for this evaluation.

Commercial vegetables are grown in about 200 counties in Texas. Data for the counties are grouped into 13 principal areas named according to geographical location within the state. In some cases, an area is named for the most active shipping point, such as San Antonio, Laredo, and Eagle Pass. The geographical areas are depicted in Figure 2.2.3-1 (5). Recognizing that these areas are, in some cases, covered by two or more SDHPT districts, these data have been separated into county statistics in order to report vegetable production by highway districts.

Figure 2.2.3-2 (5) depicts the most intensive areas of vegetable production in Texas. This map indicates that the Lower Rio Grande Valley, Winter Garden, and the High Plains are the primary contributors to vegetable production in the state.

Figure 2.2.3-3 (5) shows the typical planting and harvesting dates for the 14 vegetables, potatoes, and sweetpotatoes which comprise this survey. Because truck trip generation is the primary concern of this study, the harvesting periods are of particular interest. During this time, the most heavily loaded trucks and the highest numbers of truck trips will be generated.

Table 2.2.3-1 (5) is a presentation of vegetable production by SDHPT district. Using this data and the data from Figure 2.2.3-3, one can make an accurate prediction as to when an increase in truck activity due to vegetable production will occur. Only those counties where commercial production exceeds 100 acres are included in this study. Lower production levels are difficult to account for and are not expected to generate significant heavy truck traffic.

Texas Vegetables

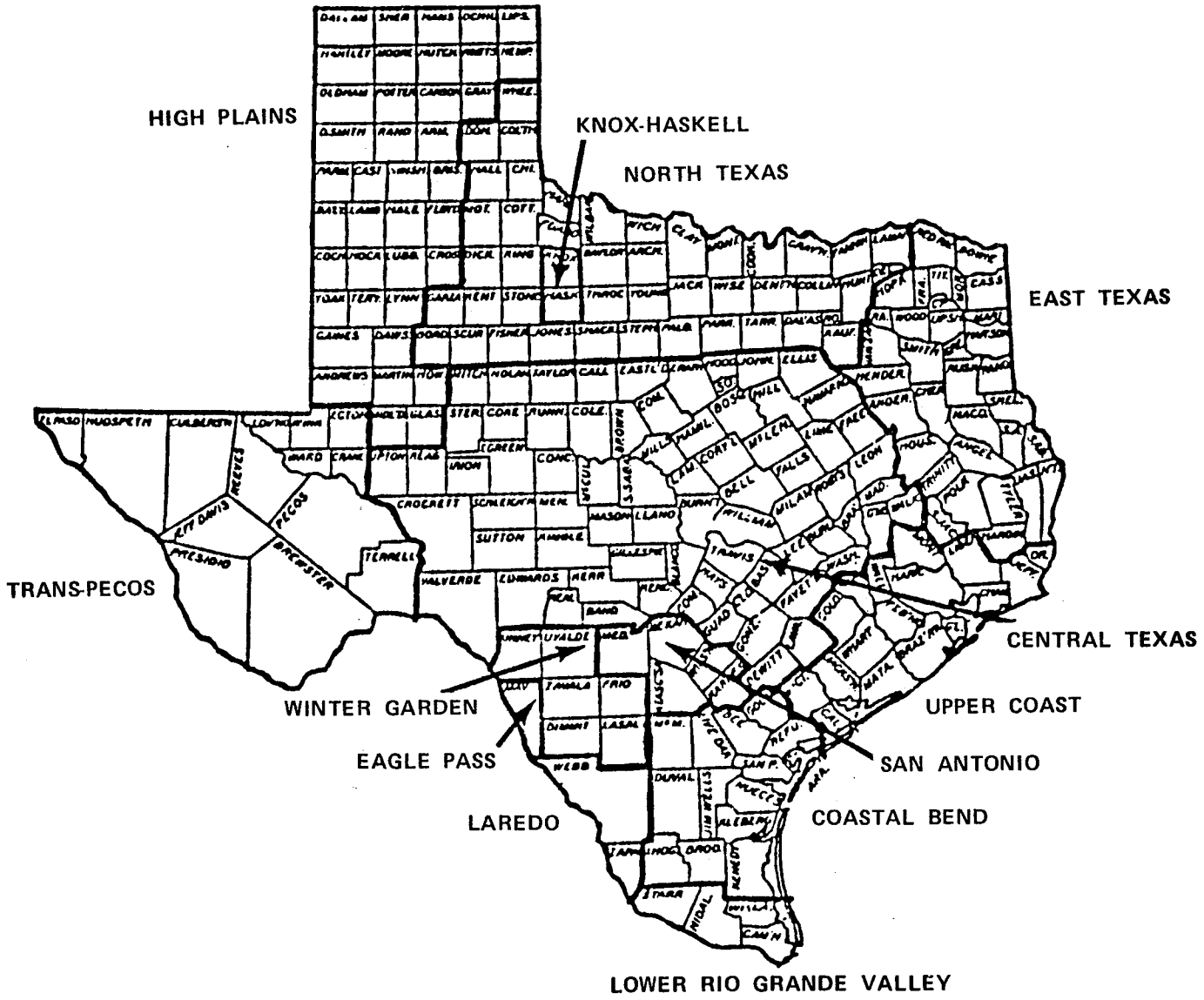
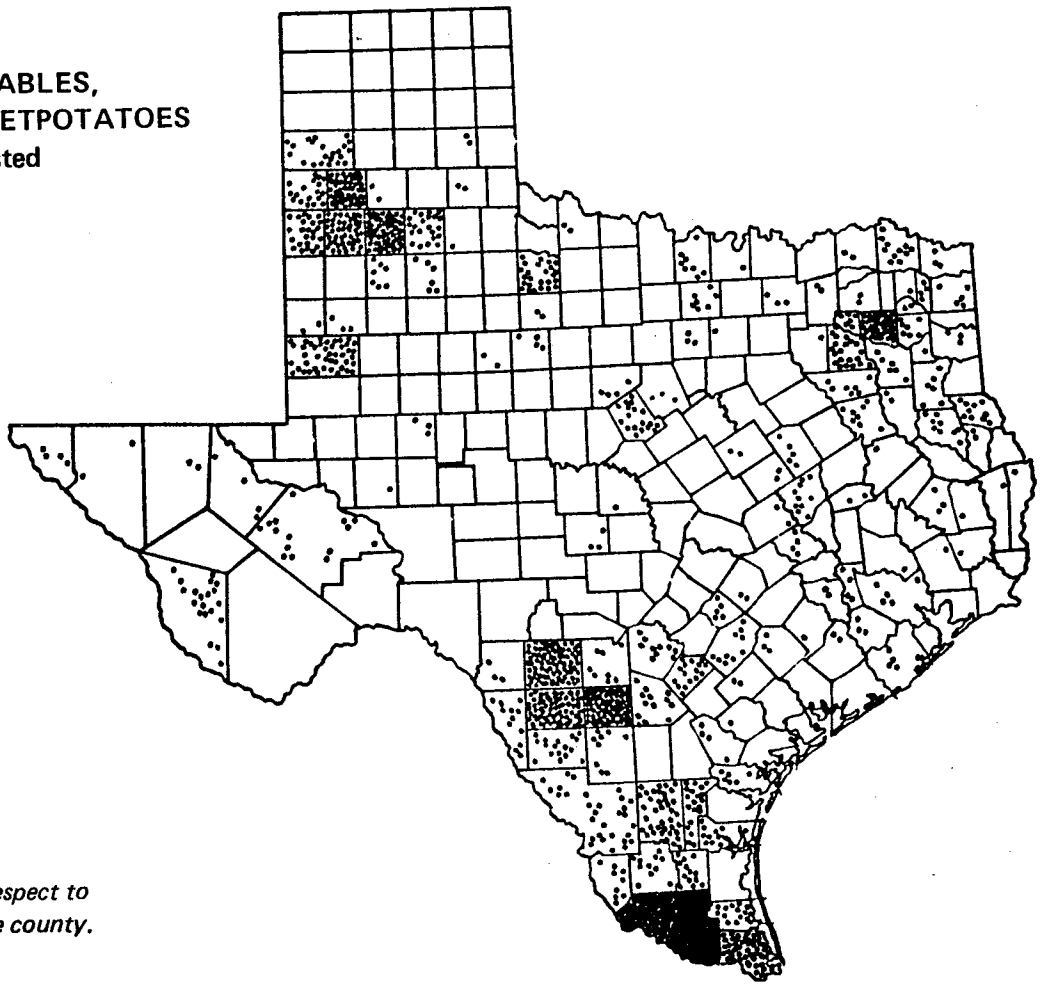


Figure 2.2.3-1 Texas Vegetable Reporting Districts

TOTAL VEGETABLES,
POTATOES AND SWEETPOTATOES
Acres Harvested
1985



1 dot = 100 acres
Dots indicate acres without respect to geographic location within the county.

Figure 2.2.3-2 Location of Texas Produce

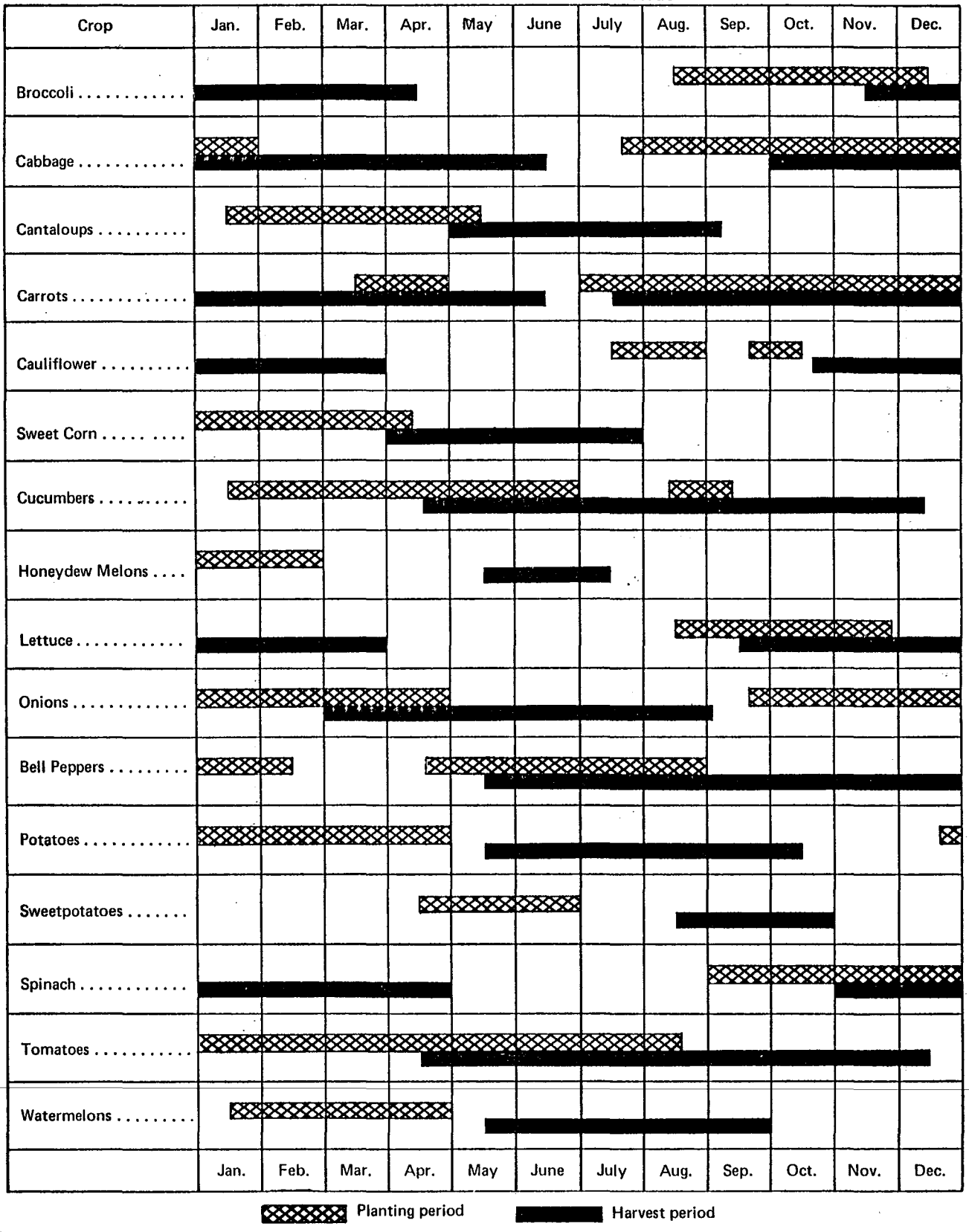


Figure 2.2.3-3 Texas Planting and Harvesting Dates

Table 2.2.3-1 Vegetable Production by SDHPT District

District 1

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	140	22.4	Hunt
Sweet potatoes	150	19.5	Hopkins
Watermelons	340	44.2	Raines, Red River

District 2

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	190	30.4	Wise
Sweet corn	100	6	Tarrent
Watermelons	540	70.2	Wise, Parker

District 3

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Watermelons	160	20.8	Wilbarger

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 4

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	270	43.2	Deaf Smith
Carrots	430	62.4	Deaf Smith
Lettuce	200	32.0	Deaf Smith
Onions	150	34.5	Deaf Smith
Potatoes	1020	224.4	Deaf Smith

District 5

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cabbage	200	54	Bailey, Hale
Cantaloupes	740	118.4	Castro, Lubbock, Parmer
Carrots	1040	150.8	Bailey, Castro, Floyd, Hale, Parmer
Cucumbers	480	57.6	Bailey, Floyd, Hale
Onions	2310	531.3	Bailey, Castro, Crosby, Floyd, Hale, Lamb, Lubbock, Parmer
Bell Peppers	2010	241.3	Bailey, Floyd, Hale
Potatoes	10930	2404.6	Bailey, Castro, Floyd, Gaines, Hale, Lamb, Parmer
Watermelons	2200	286	Bailey, Gaines, Hale, Lamb, Lubbock, Parmer, Swisher, Terry, Yoakum

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 6

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cabbage	100	27	Pecos
Cantaloupes	720	115.2	Pecos, Reeves
Onions	470	108.1	Pecos, Reeves
Bell Peppers	480	57.6	Pecos
Watermelons	100	13	Upton

District 7

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	100	16	Kinney
Onions	130	29.9	Kinney

District 8

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Potatoes	100	22	Haskell
Watermelons	650	84.5	Fisher, Jones

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 9

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Watermelons	540	70.2	Limestone, McClennan

District 10

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	170	27.2	Anderson
Sweet Potatoes	3710	482.3	Henderson, Smith, Van Zandt, Wood
Tomatoes	170	10.2	Van Zandt
Watermelons	3690	479.7	Anderson, Henderson, Rusk, Van Zandt, Wood

District 11

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	220	35.2	Polk
Watermelons	1810	235.3	Henderson, Nacogdoches, San Augustine, Shelby

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 12

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Sweet Corn	210	12.6	Harris
Potatoes	230	50.6	Brazoria
Watermelons	740	96.2	Austin, Fort Bend, Harris, Waller

District 13

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Watermelons	1410	183.3	DeWitt, Gonzales, Lavaca, Wharton

District 14

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Watermelons	900	117	Bastrop, Caldwell, Mason

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 15

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Broccoli	200	17.2	Uvalde
Cabbage	1510	407.7	Bexar, Dimmit, Frio, Medina, Uvalde, Zavala
Cantaloupes	1650	264	Atascosa, Dimmit, Frio, Maverick, Uvalde, Zavala
Carrots	2200	319	Bexar, Dimmit, Medina, Uvalde, Zavala
Sweet Corn	100	6	Bexar
Cucumbers	670	80.4	Frio, Uvalde
Honey dew Melons	110	20.9	Frio
Lettuce	280	44.8	Frio, Uvalde
Onions	2170	499.1	Dimmit, Maverick, Uvalde, Zavala
Potatoes	1200	264	Bexar, Frio, Medina
Spinach	4420	397.8	Dimmit, Frio, Maverick, Uvalde, Zavala
Watermelons	9200	1196	Atascosa, Bexar, Frio, La Salle, Wilson, Zavala

District 16

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Watermelons	2700	351	Bee, Goliad, Jim Wells, Kleberg

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 17

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Potatoes	140	30.8	Robertson
Watermelons	1310	170.3	Burleson, Madison, Milam, Robertson

District 18

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	240	38.4	Collin

District 19

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Sweet Potatoes	1250	162.5	Camp, Cass, Morris, Upshur

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 20

No significant commercial vegetable production.

District 21

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Broccoli	6820	586.5	Cameron, Hidalgo, Starr
Cabbage	11530	3113.1	Cameron, Hidalgo, Starr, Webb
Cantaloupes	13860	2217.6	Cameron, Hidalgo, Starr, Webb
Carrots	9920	1438.4	Cameron, Hidalgo, Webb, Zapata, Hidalgo
Cauliflower	1210	96.8	Hidalgo
Sweet Corn	1010	60.6	Cameron, Hidalgo, Willacy
Cucumbers	4100	492	Cameron, Hidalgo, Starr
Honeydew Melons	4230	803.7	Hidalgo, Starr, Webb
Lettuce	2500	400	Cameron, Hidalgo, Starr
Onions	14700	3381	Cameron, Hidalgo, Starr, Webb, Willacy, Zapata
Bell Peppers	4930	591.6	Cameron, Hidalgo, Starr
Potatoes	2300	506	Hidalgo, Willacy
Spinach	800	72	Hidalgo
Tomatoes	1670	100.2	Cameron, Hidalgo, Starr
Watermelons	11530	1498.9	Brooks, Duval, Cameron, Hidalgo, Jim Hagg, Starr, Webb, Willacy, Zapata

Table 2.2.3-1 (Continued) Vegetable Production by SDHPT District

District 23

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Watermelons	1920	249.6	Comanche, Eastland

District 24

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cantaloupes	520	83.2	Presidio
Honeydew Melons	470	89.3	Presidio
Lettuce	460	73.6	El Paso, Presidio
Onions	600	138	Presidio
Tomatoes	250	15	Culberson, Hudspeth

District 25

Commodity	Acres Harvested	Production (1000 cwt.)	Leading Counties
Cabbage	210	56.7	Knox
Cantaloups	360	57.6	Knox
Onions	300	69	Knox
Potatoes	1350	297	Knox
Watermelons	770	100.1	Donley, Hall, Knox, Motley

2.3 GRAIN

2.3.1 CLASSIFICATION COUNTS

2.3.1.1 Grain Elevator, Site No. 300

Introduction. The activity center is located in a rural area of the coastal plains. The site map shown in Figure 2.3.1.1-1 indicates two access points for trucks, one directly from the State Highway and one via service road. Autos gain access directly from the State Highway.

Activity Center Trip Generation Characteristics. Figure 2.3.1.1-2 shows the truck traffic (in and out) generated by the elevator during an 8-hour period (10 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis on July 27, 1988. Unfortunately, the entire day of operation was not captured, but interview information provided below gives additional insight into daily average loads. Also depicted in Figure 2.3.1.1-2 is the combination of trucks and autos that were generated by the activity center from 10 a.m. to 6 p.m. The relatively large number of autos at the site can be explained by the presence of a retail facility located next to the elevator.

Figure 2.3.1.1-3 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the elevator. The predominant truck was the 3-S2 combination, 63% of total trucks. Also illustrated is the breakdown of total traffic generated by the site. Trucks were 30% of this total.

Site representatives provided the following daily grain processing data for the 1988 harvest. The peak tonnage of incoming and outgoing grain is shown in Table 2.3.1.1-1. The number of trucks loaded or unloaded averages 80 per day. During peak periods, the number of truck loads is in excess of 100 per day. The site has a radius of influence of 30 miles for inbound loads and as much as 100 miles for outbound loads. The breakdown of outbound loads is 40% to local feedlots and 60% to the Port of Houston for export.

Characteristics of Roadway Serving Activity Center. The roadway providing access to this site was a State Highway. Manual classification counts were conducted in 1988 to determine the impact of special-use activities on the roadway. Table 2.3.1.1-2 provides a summary of the counts that were taken. In Table 2.3.1.1-2A vehicle classification counts are provided for the activity center. Table 2.3.1.1-2B shows a count of all vehicles with the exception of special-use vehicles on the roadway. Table 2.3.1.1-2C is a total count of all vehicles on the roadway, including those generated by this elevator.

Figure 2.3.1.1-4 illustrates the percentages of total truck traffic and total traffic on the State Highway (Table 2.3.1.1-2C values). The 3-S2 combination is the predominant truck type on the main roadway (67%). All trucks made up 24% of the total traffic stream on the date of this count.

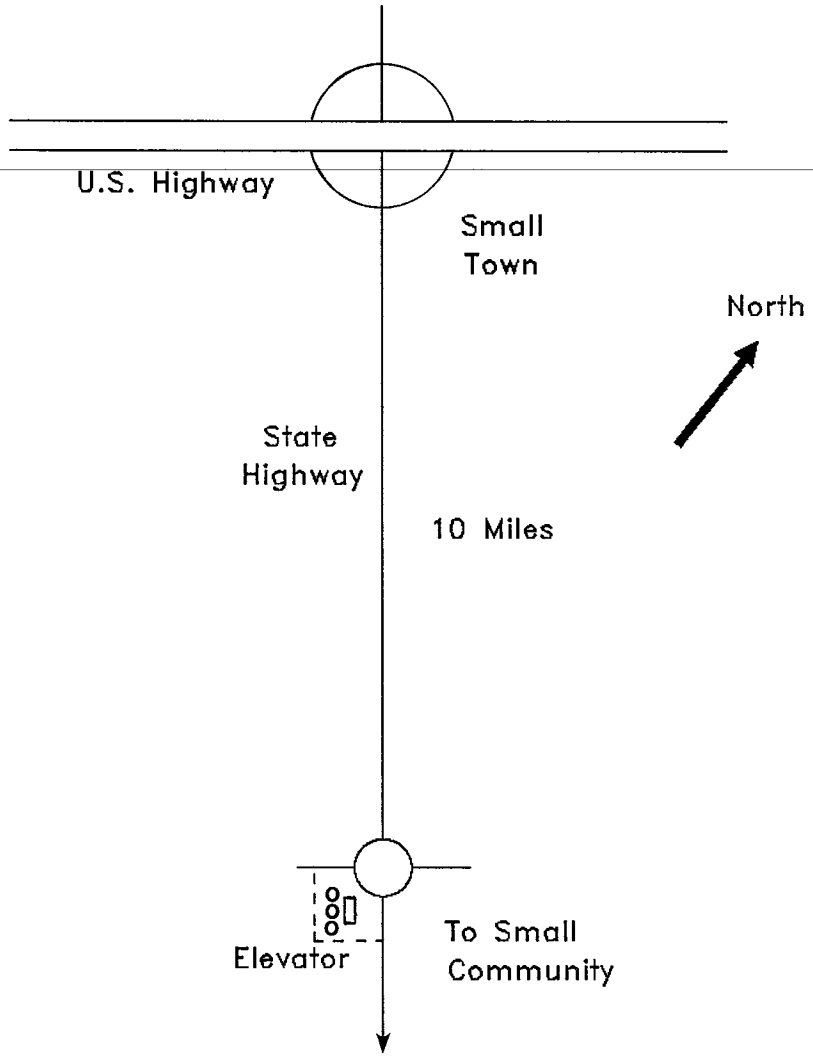
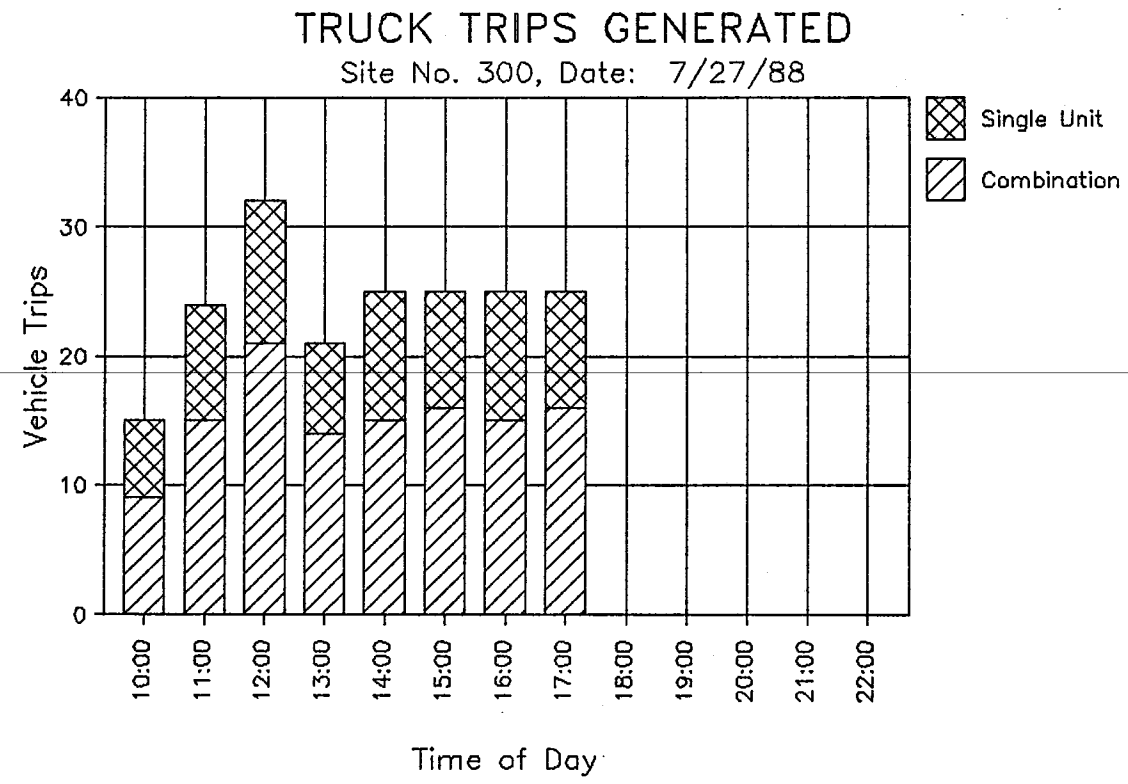


Figure 2.3.1.1-1. Site Map



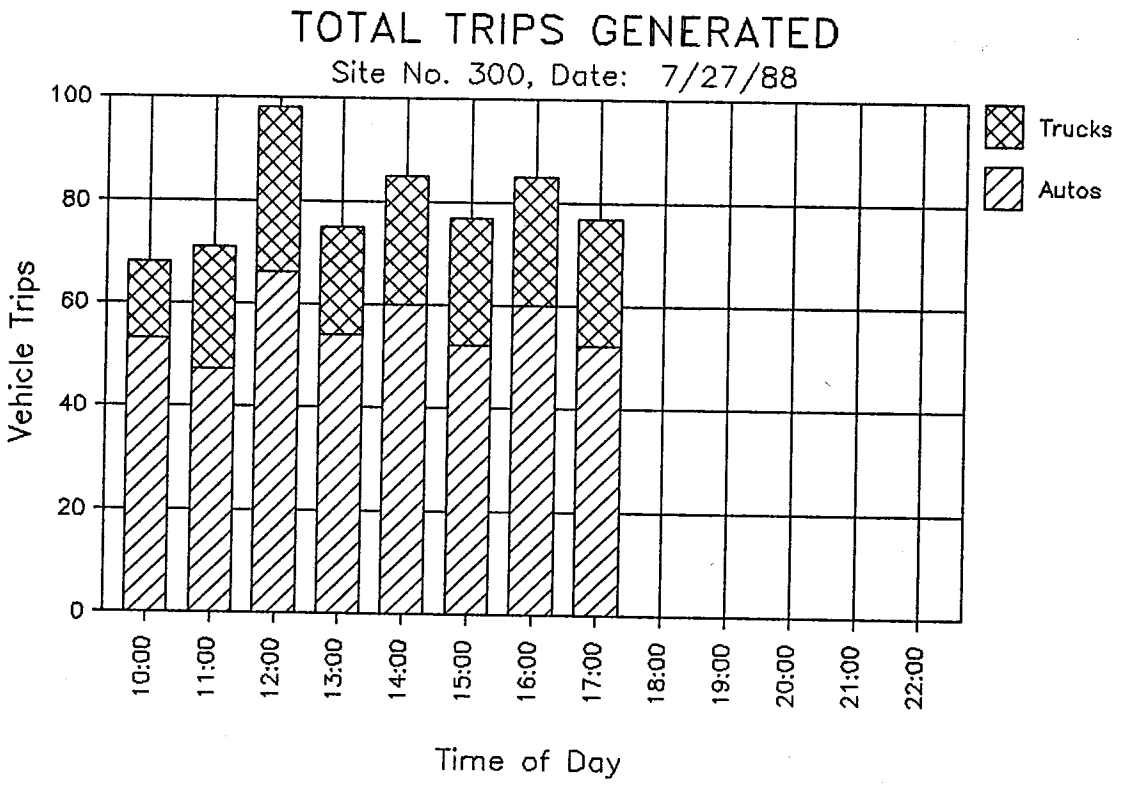
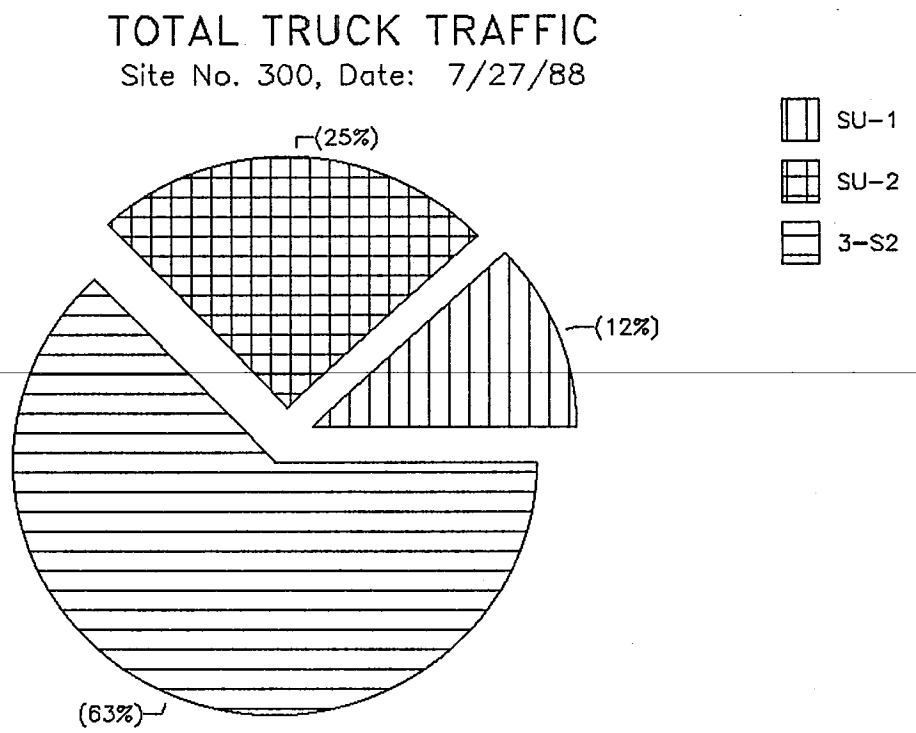


Figure 2.3.1.1-2. Hourly Trip Generation



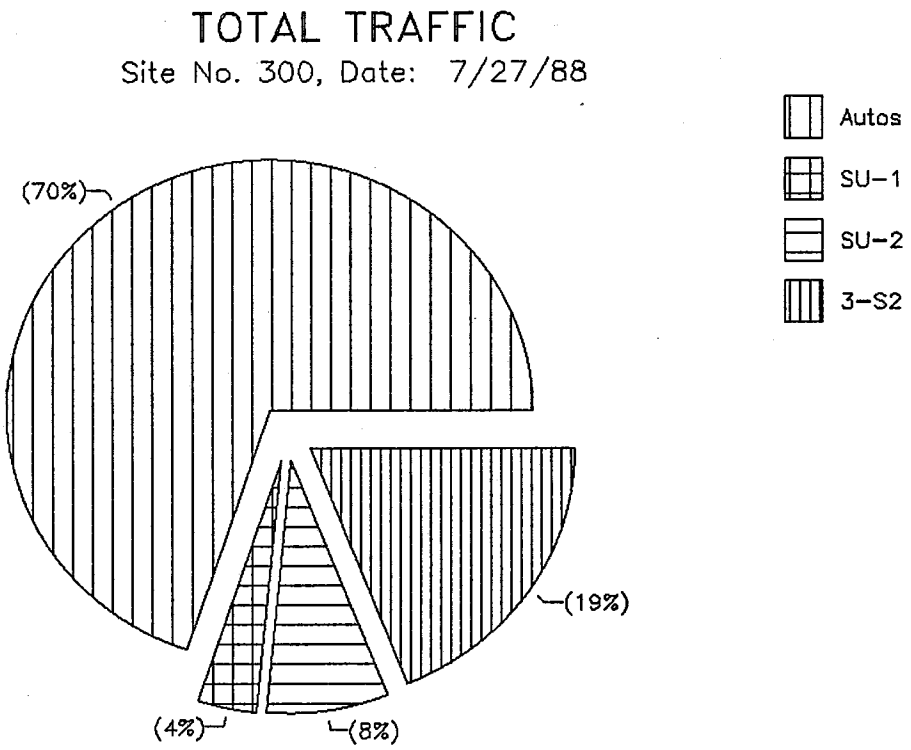


Figure 2.3.1.1-3. Activity Center Vehicle Percentages

Table 2.3.1.1-1. Interview Information

Year	Commodity	Tons Incoming[1]	Tons Outgoing[1]
1988	Milo	2500	2000
	Corn	500	250

[1] Daily averages expected during the peak season.

Table 2.3.1.1-2. Traffic Classification Count Summary

Table 2.3.1.1-2A. Activity Center Only

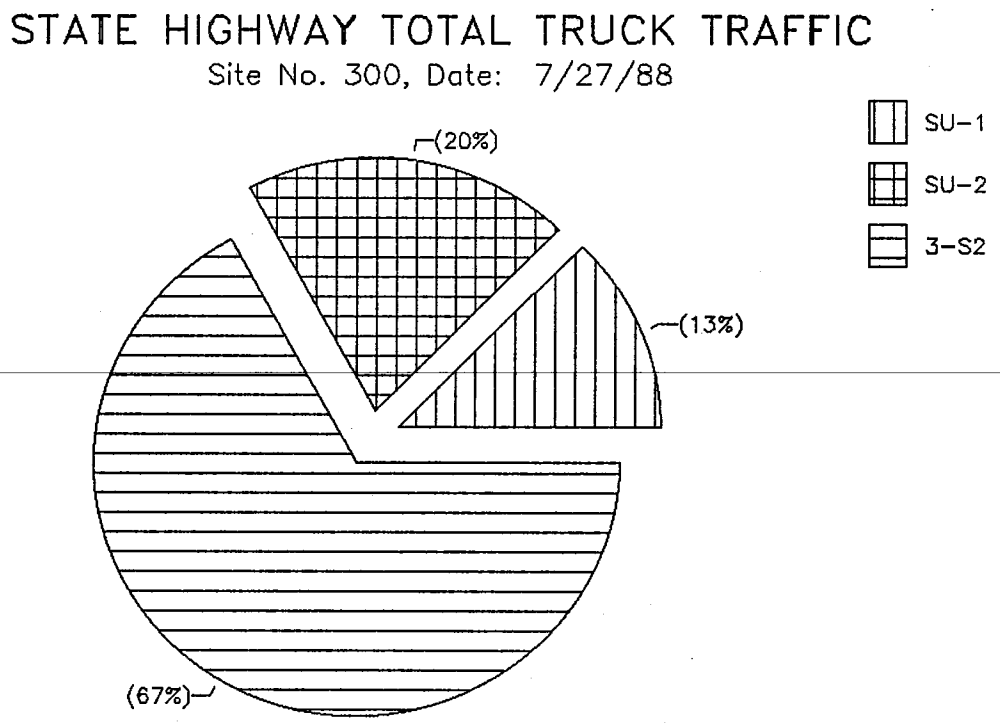
Date	Autos	SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	% of Trucks Comb	% of Total Cars	% of Total Trucks
7/27/88	444	23	48	121	0	636	37%	63%	70%	30%

Table 2.3.1.1-2B. Roadway Without Special-Use Traffic

Date	Autos	SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	% of Trucks Comb	% of Total Cars	% of Total Trucks
7/27/88	890	29	35	154	0	1108	29%	71%	80%	20%

Table 2.3.1.1-2C. Roadway With Special-Use Traffic

Date	Autos	SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	% of Trucks Comb	% of Total Cars	% of Total Trucks
7/27/88	1334	52	83	275	0	1744	33%	67%	76%	24%



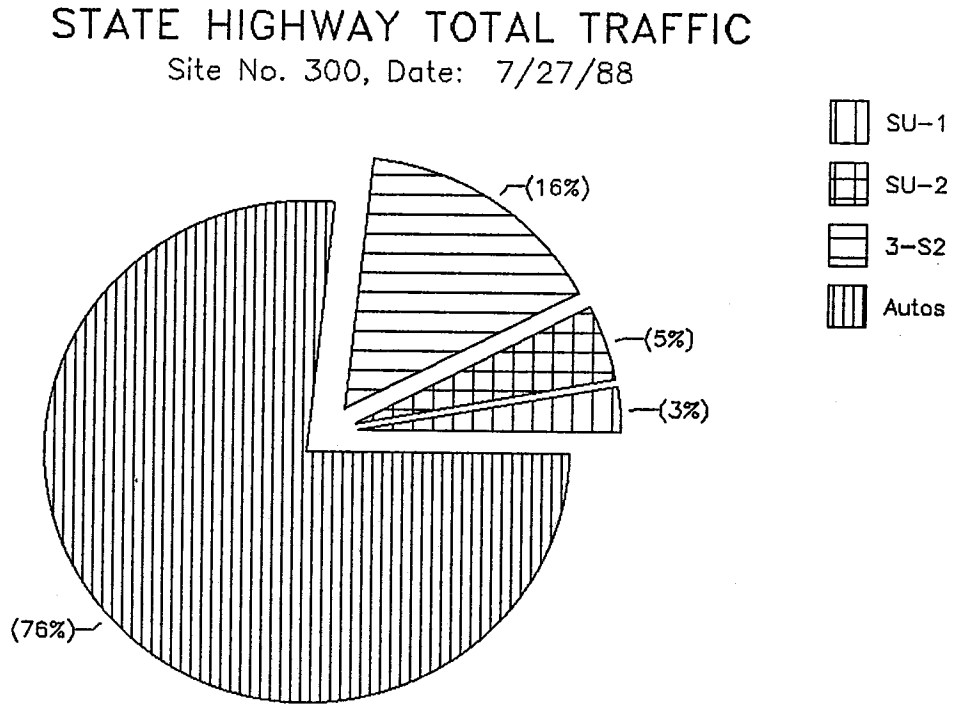


Figure 2.3.1.1-4. Highway Vehicle Percentages

2.3.1.2 Grain Elevator Site No. 301

Introduction. The site map shown in Figure 2.3.1.2-1 indicates that access is provided by a U.S. Highway. The activity center is located 1/2 mile west of a small community. Trucks hauling to and from this site serve an area of approximately 50 miles. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.2-2 shows the truck traffic (in and out) generated by the site during a 13-hour period (10 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 13-hour period on July 14, 1988.

Figure 2.3.1.2-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (51%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 48 percent of this total.

An interview was conducted with an official at the facility. It was estimated that approximately 20 trucks came in on an average day and a million pounds went out. They had 4 office workers and 5 field workers and worked a long day (8 a.m. to 10 p.m.). Approximately 20 percent of the grain went to feedlots and the other 80 percent was hauled to ports for export. A printout of daily loads entering and exiting this elevator from July 18 to July 21, 1988 is summarized in Table 2.3.1.2-1.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a U.S. Highway. It is estimated that this highway had an average daily traffic (ADT) of 4,800 vehicles per day in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.2-2 provides a summary of the counts taken. First, in Table 2.3.1.2-2A, vehicle classification counts for the activity center only are provided. Second, in Table 2.3.1.2-2B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.3.1.2-2C, a total count of all vehicles on the highway is provided.

Figure 2.3.1.2-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.3.1.2-2C values). The 3-S2 vehicle represents 60 percent of total trucks counted on this highway. Autos make up 85 percent of the total traffic shown.

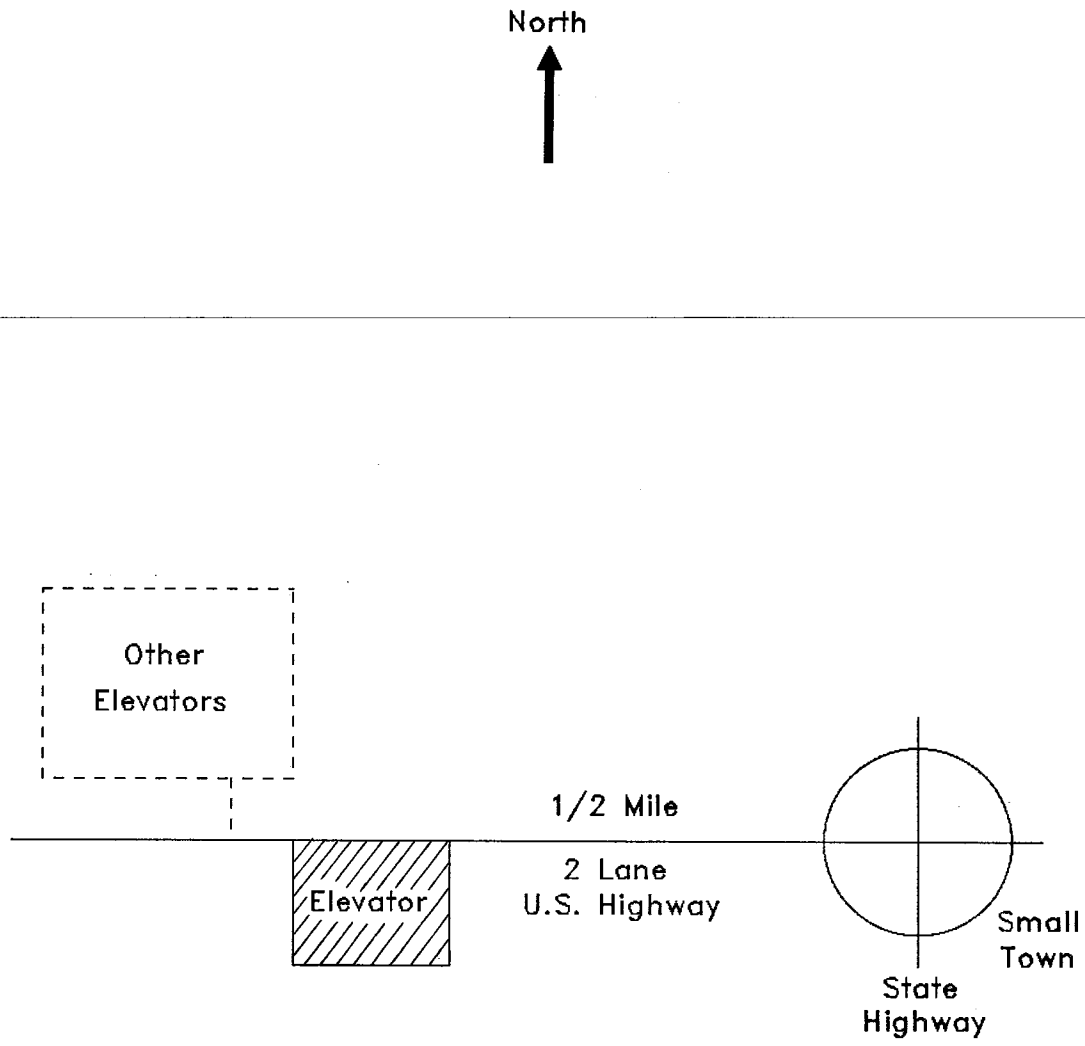
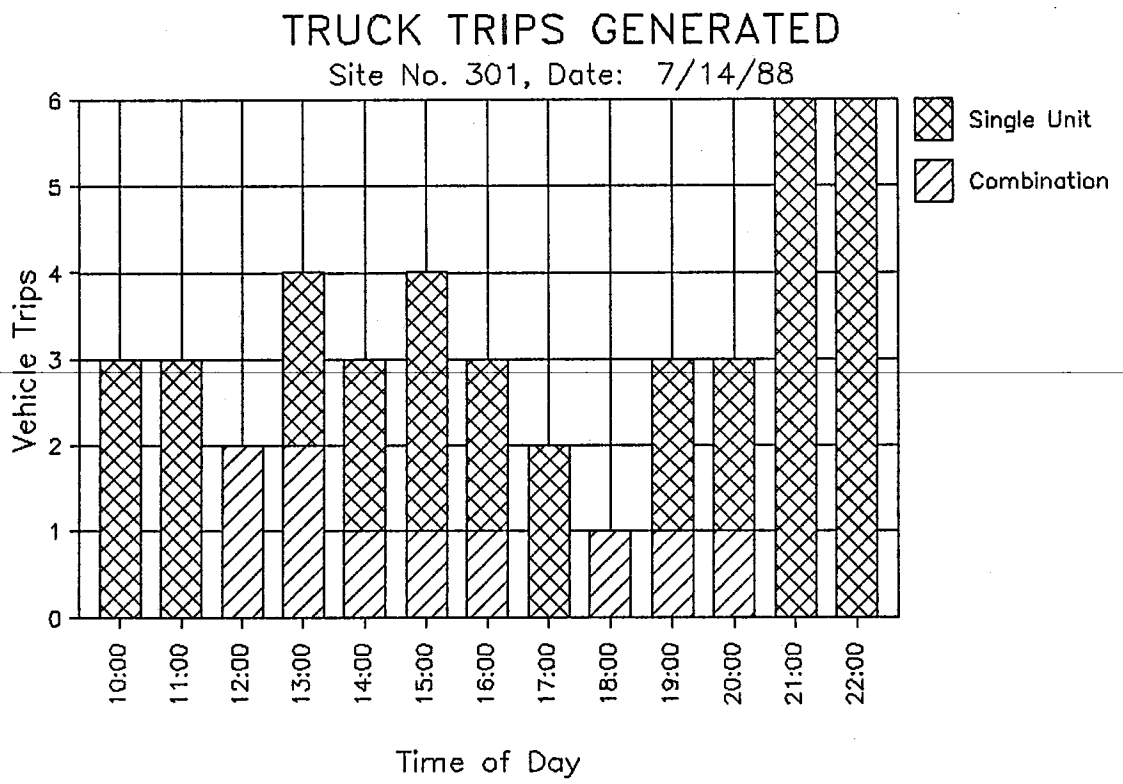


Figure 2.3.1.2-1. Site Map



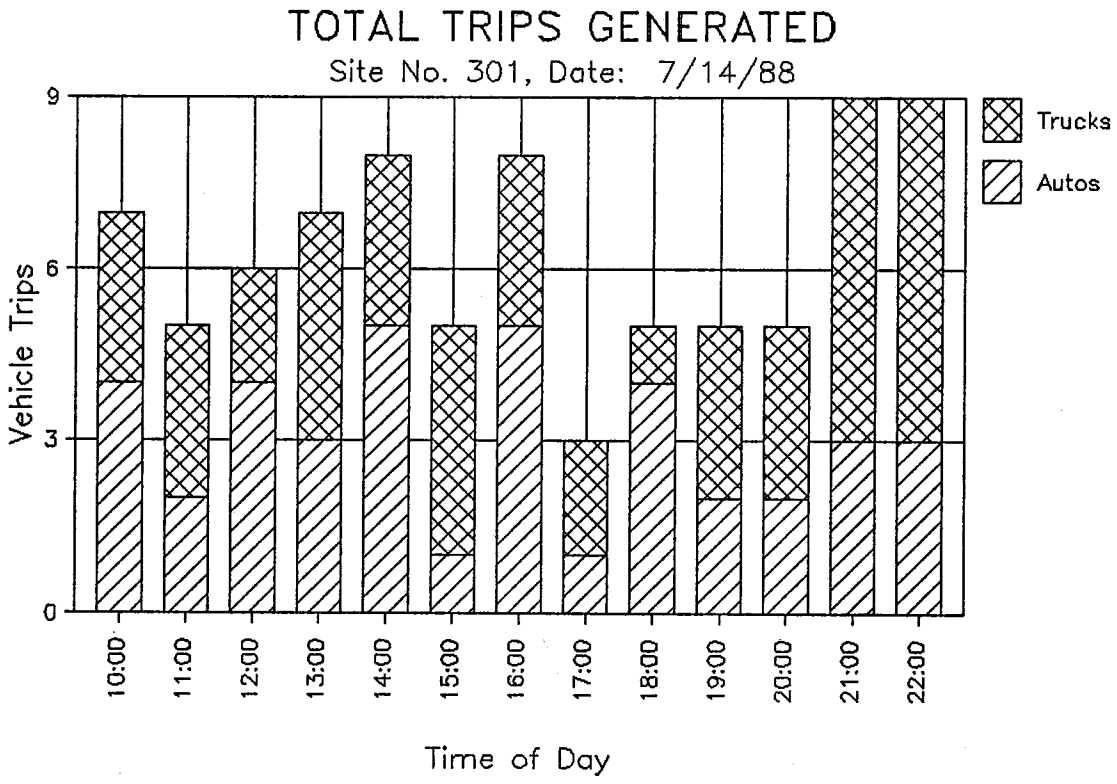
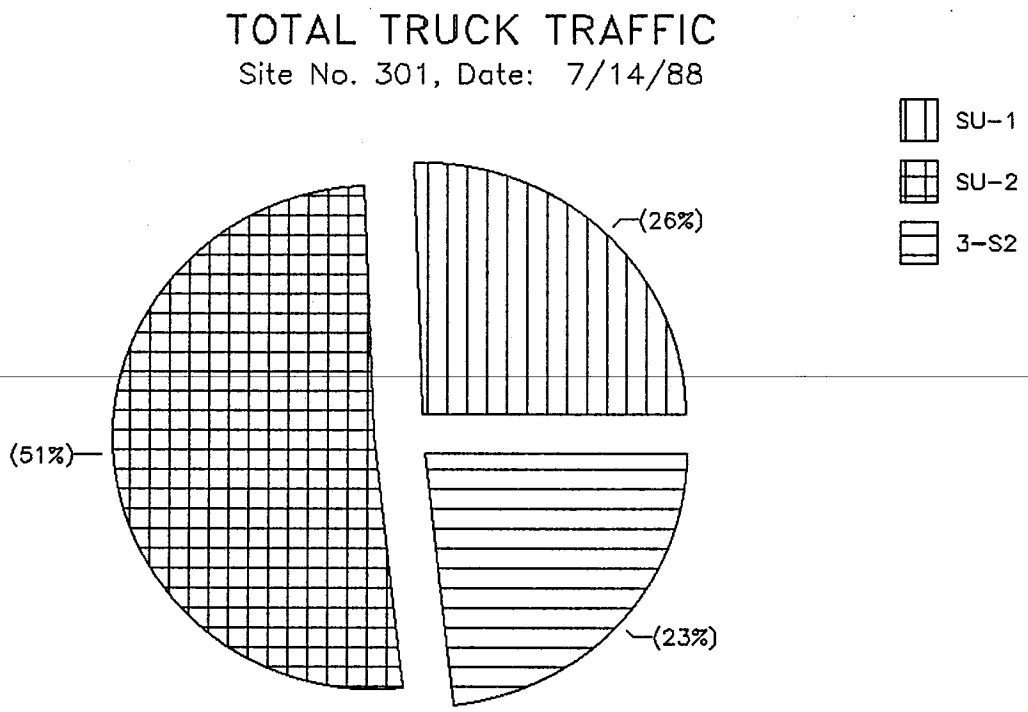


Figure 2.3.1.2-2. Hourly Trip Generation



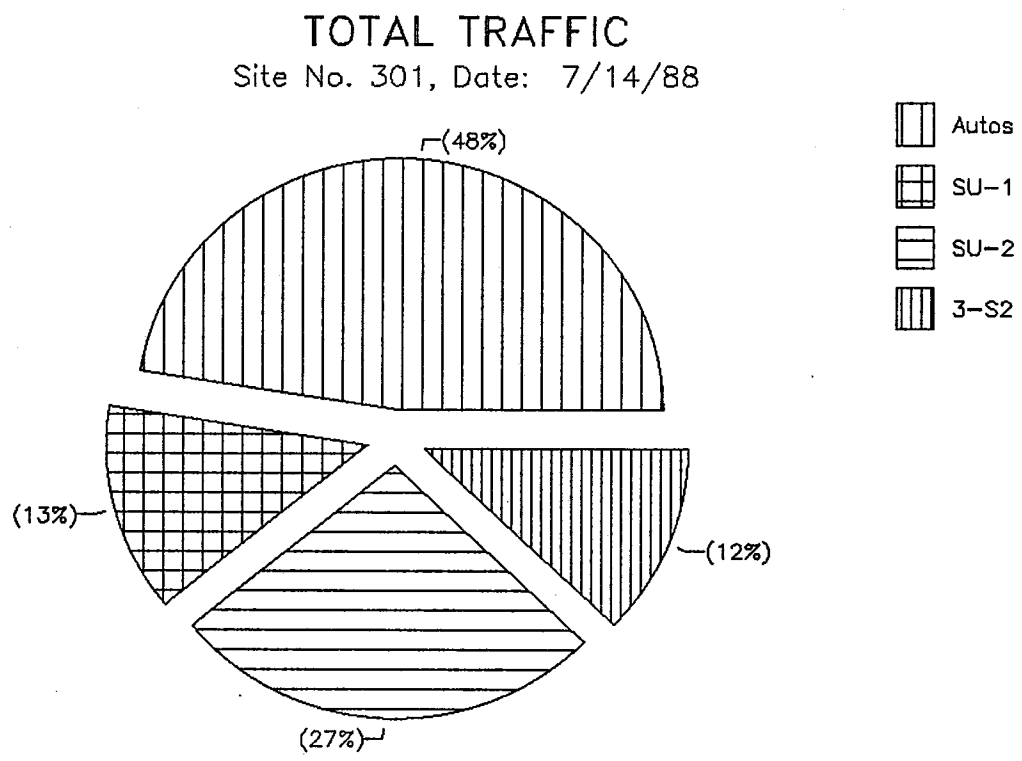


Figure 2.3.1.2-3. Activity Center Vehicle Percentages

Table 2.3.1.2-1. Interview Information

Date	Loads	SU	Combination
7/18	70	60	10
7/19	55	33	22
7/20	33	12	21
7/21	15	9	6

Table 2.3.1.2-2. Traffic Classification Count Summary

Table 2.3.1.2-2A. Activity Center Only

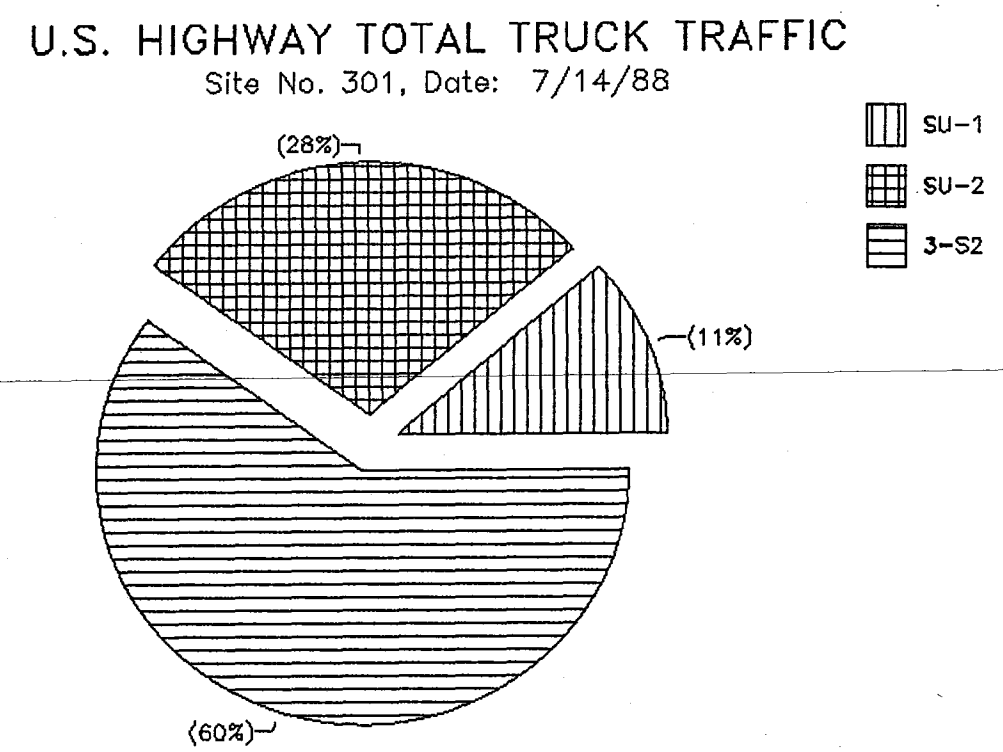
		Vehicle Classification				% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/14/88	39	11	22	10	82	77%	23%	48%	52%

Table 2.3.1.2-2B. Roadway Without Special-Use Traffic

		Vehicle Classification				% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/14/88	4034	69	177	413	4693	37%	63%	86%	14%

Table 2.3.1.2-2C. Roadway With Special-Use Traffic

		Vehicle Classification				% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/14/88	4073	80	199	423	4775	40%	60%	85%	15%



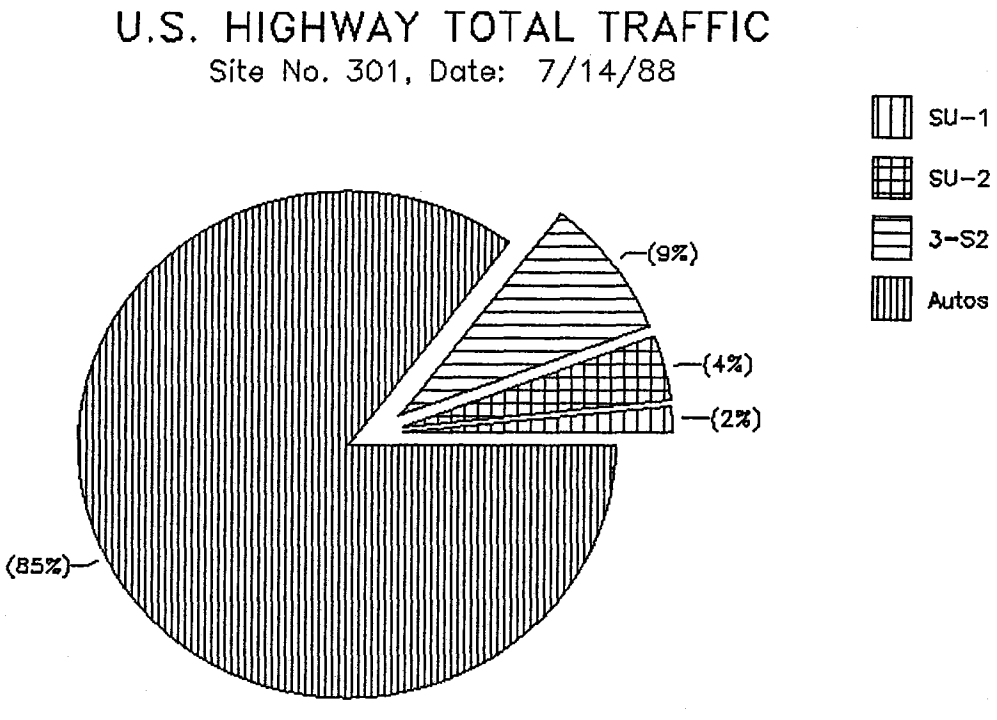


Figure 2.3.1.2-4. Highway Vehicle Percentages

2.3.1.3 Grain Elevator, Site No. 302

Introduction. The site map shown in Figure 2.3.1.3-1 indicates that access is provided by a city street. The Public Elevator is located in the north edge of a relatively large urban area. The site is not served by railroad, but has access to a port facility.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.3-2 shows the truck traffic (in and out) generated by the site during a 10-hour period (8 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 10-hour period on July 13, 1988.

Figure 2.3.1.3-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (97%). Also illustrated is the breakdown of total moving to and from the site. The auto represented 23 percent of this total. No interview with an official from the Public Elevator was obtained.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a two-lane city street which functions as a major collector. It is estimated that this city street had an average daily traffic (ADT) of 2,000 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1988 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.3-1 provides a summary of the counts taken. Only vehicle classification counts for the activity center were obtained. For classification counts on the roadway see Site Number 303, Section 2.3.4.

Table 2.3.1.3-1. Traffic Classification Count Summary

Activity Center Only

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/18/85	53	0	20	613	686	3%	97%	8%	92%
7/13/88	174	2	14	580	770	3%	97%	23%	77%

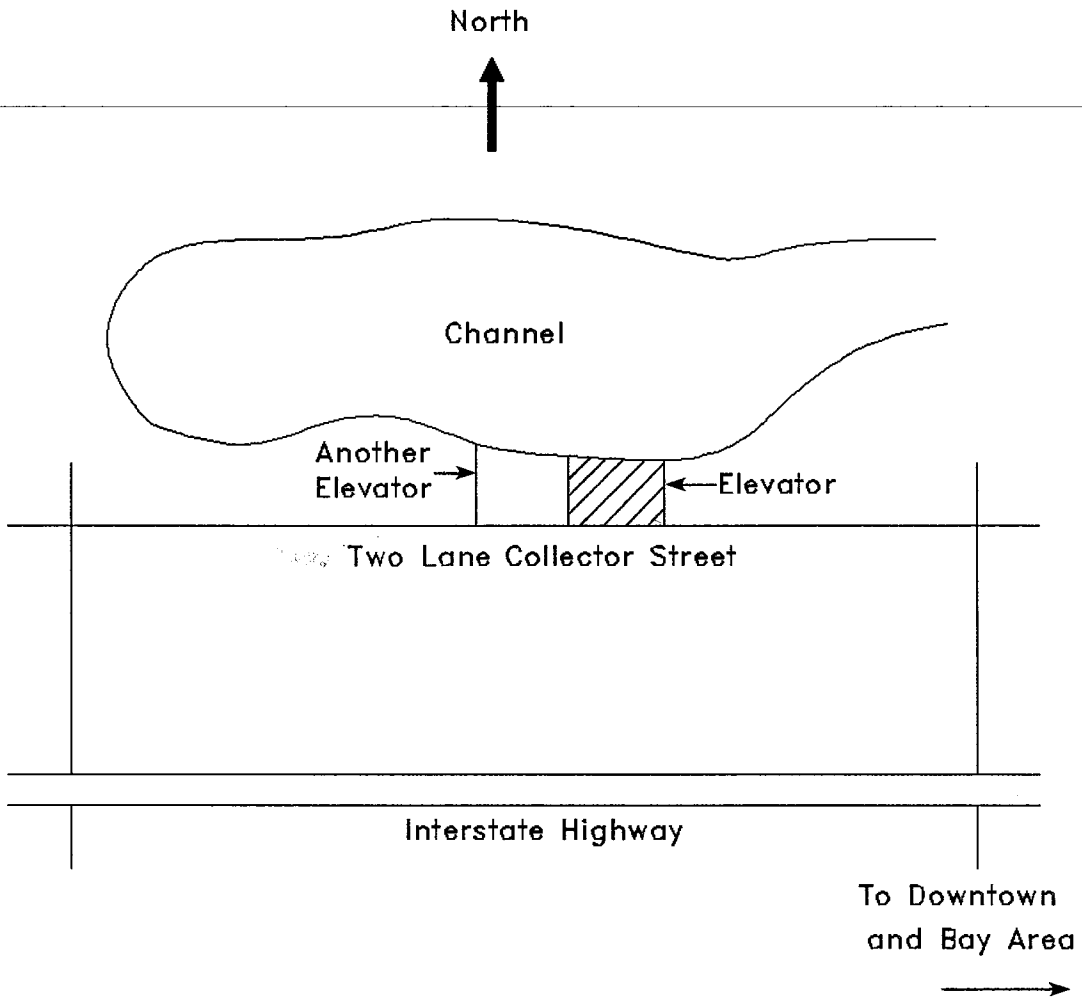
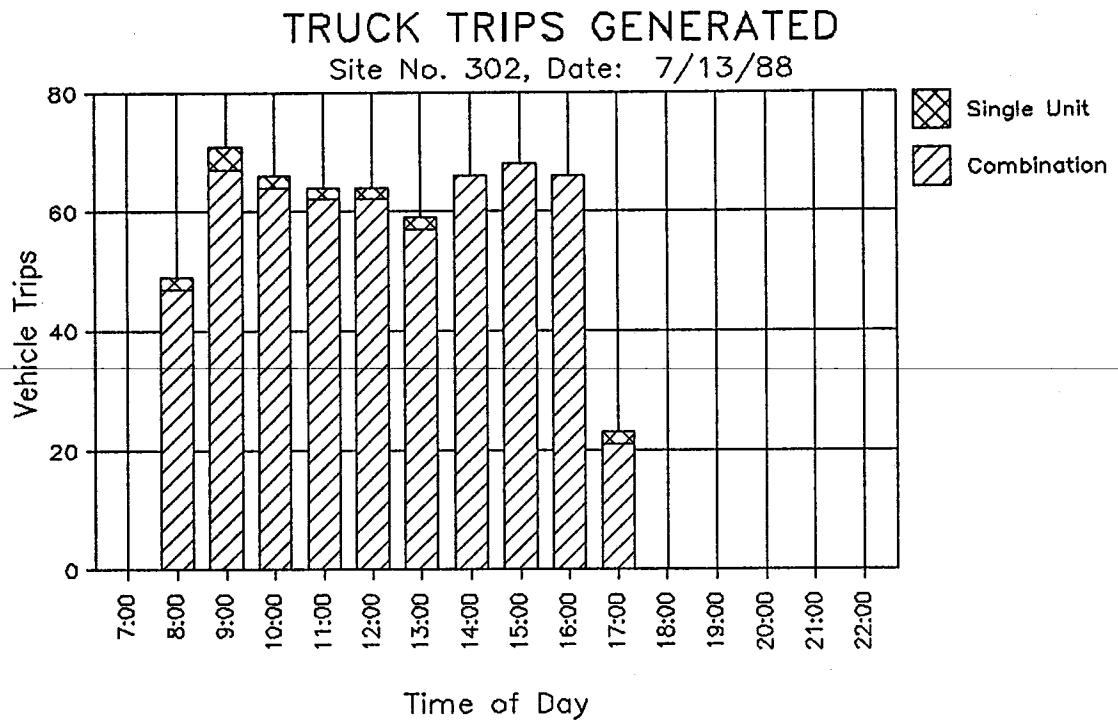


Figure 2.3.1.3-1. Site Map



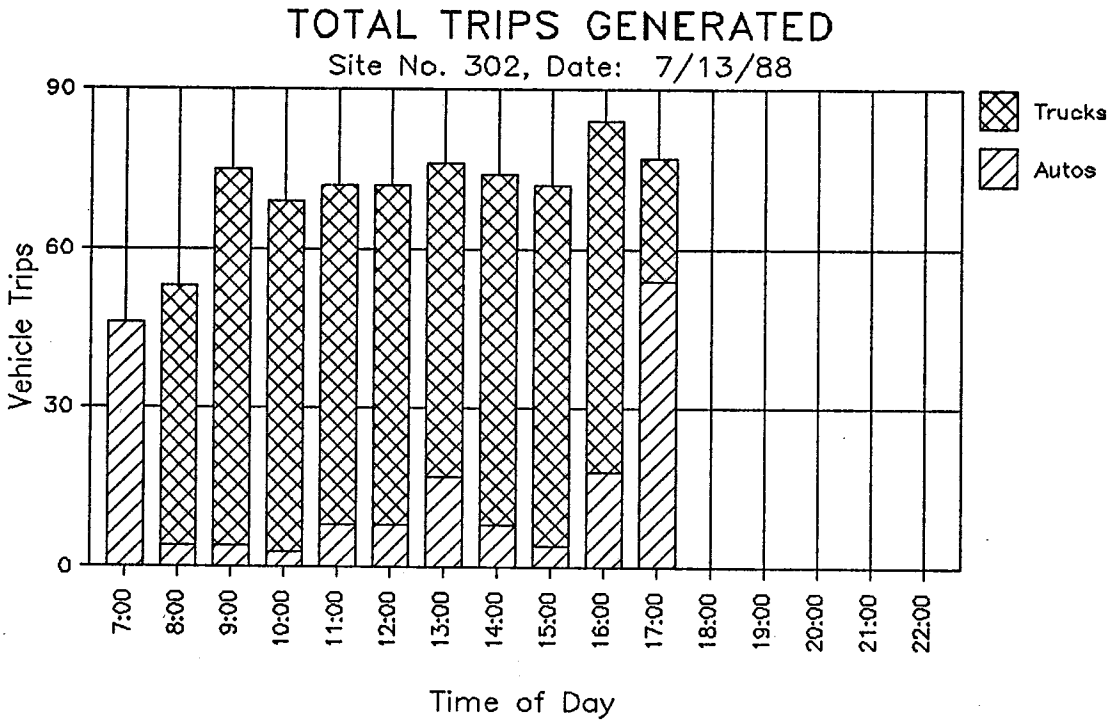
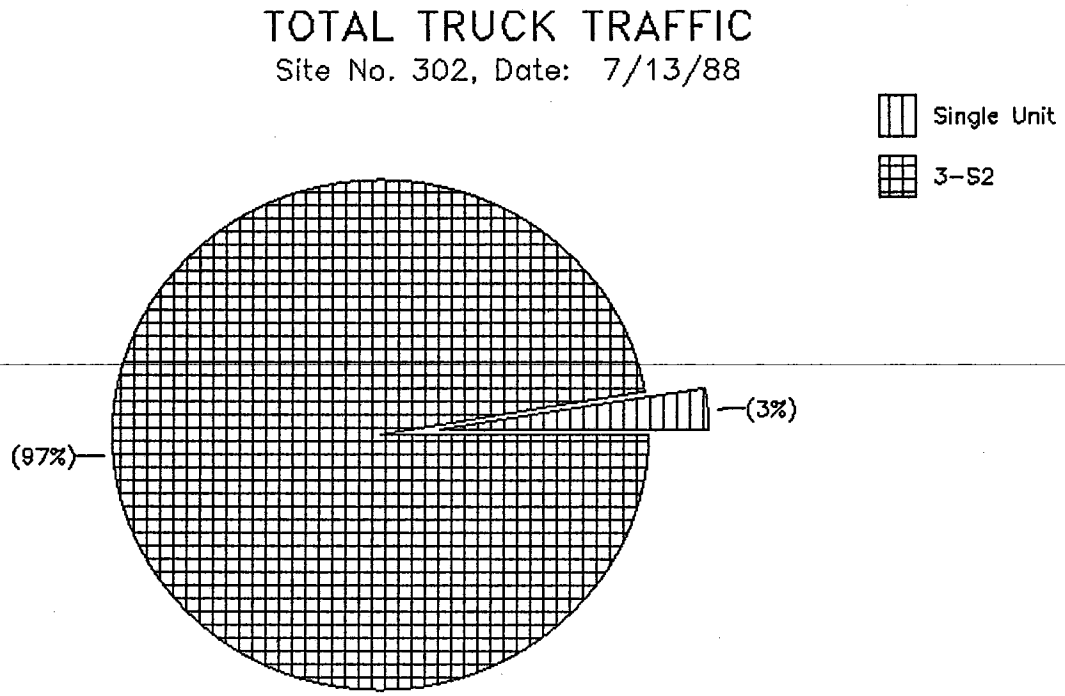


Figure 2.3.1.3-2. Hourly Trip Generation



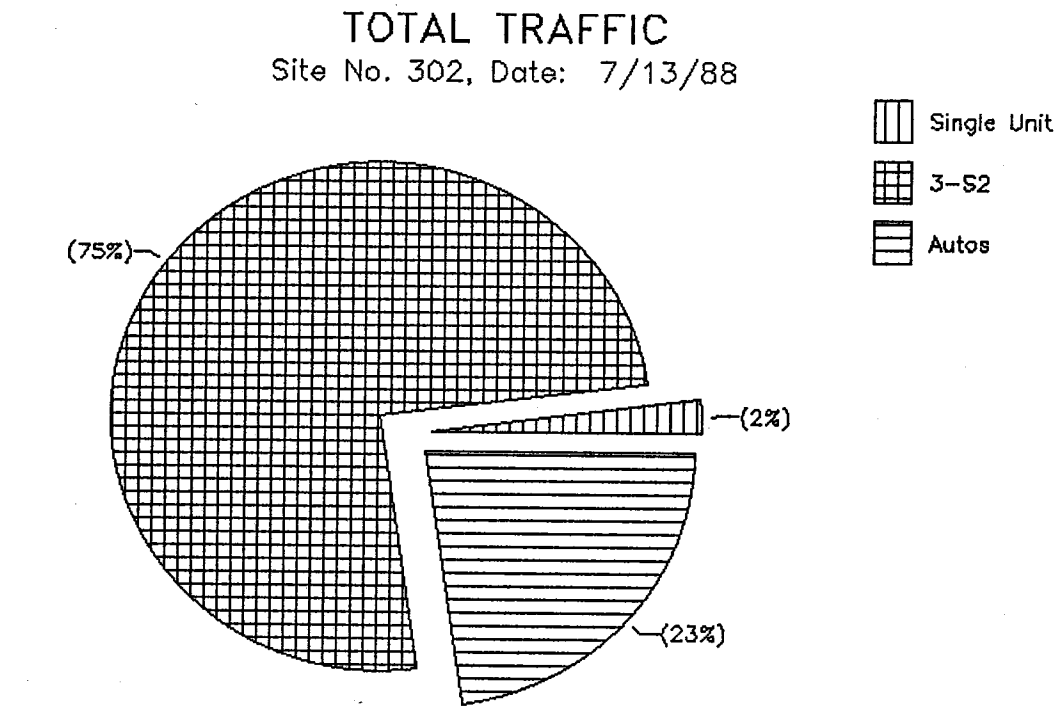


Figure 2.3.1.3-3. Activity Center Vehicle Percentages

2.3.1.4 Grain Elevator, Site No. 303

Introduction. The site map shown in Figure 2.3.1.4-1 indicates that access is provided by a local road. The activity center is located within a relatively large urban area. Products entering this activity center come from an area within approximately 90 miles and products leaving this activity center move 10 miles or less. The site is not served by a railroad, but has access to a port facility.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.4-2 shows the truck traffic (in and out) generated by the site during a 16-hour period (7 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 16-hour period on July 17, 1985.

Figure 2.3.1.4-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (55%). Also illustrated is the breakdown of total traffic moving to and from the site. Autos represented 10 percent of this total.

An interview with officials from the site indicated that approximately six (6) autos and ten (10) single unit trucks entered and exited the site during an average day. The work shift was from 8 a.m. to 6 p.m.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a two-lane city street which functions as a major collector. It is estimated that this local road had an average daily traffic (ADT) of 2,000 in 1986. Manual classification counts were conducted in 1985 and 1988 primarily to determine the impact of special-use activities on the local road. Table 2.3.1.4-1 provides a summary of the counts taken. In Table 2.3.1.4-1A, vehicle classification counts for the activity center only are provided. In Table 2.3.1.4-1B, a count of all vehicles on the local road serving the activity center except special-use vehicles is provided. In Table 2.3.1.4-1C, a total count of all vehicles on the local road is provided.

Figure 2.3.1.4-4 shows the percentages of total truck traffic and total traffic on the local road when special-use vehicles are included (Table 2.3.1.4-10 values). The 3-S2 vehicle represents 37 percent of total trucks counted on this local road. Autos made up 58 percent of the total traffic counted.

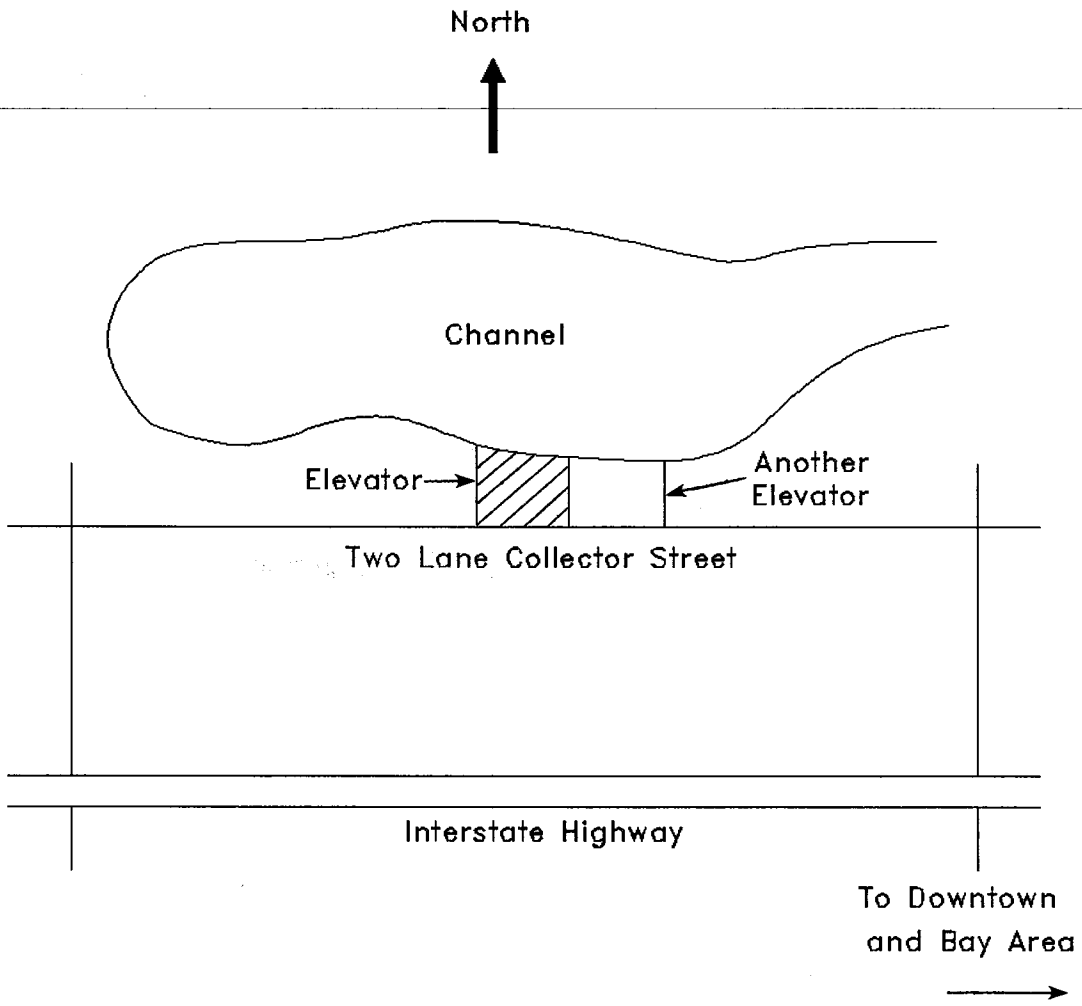
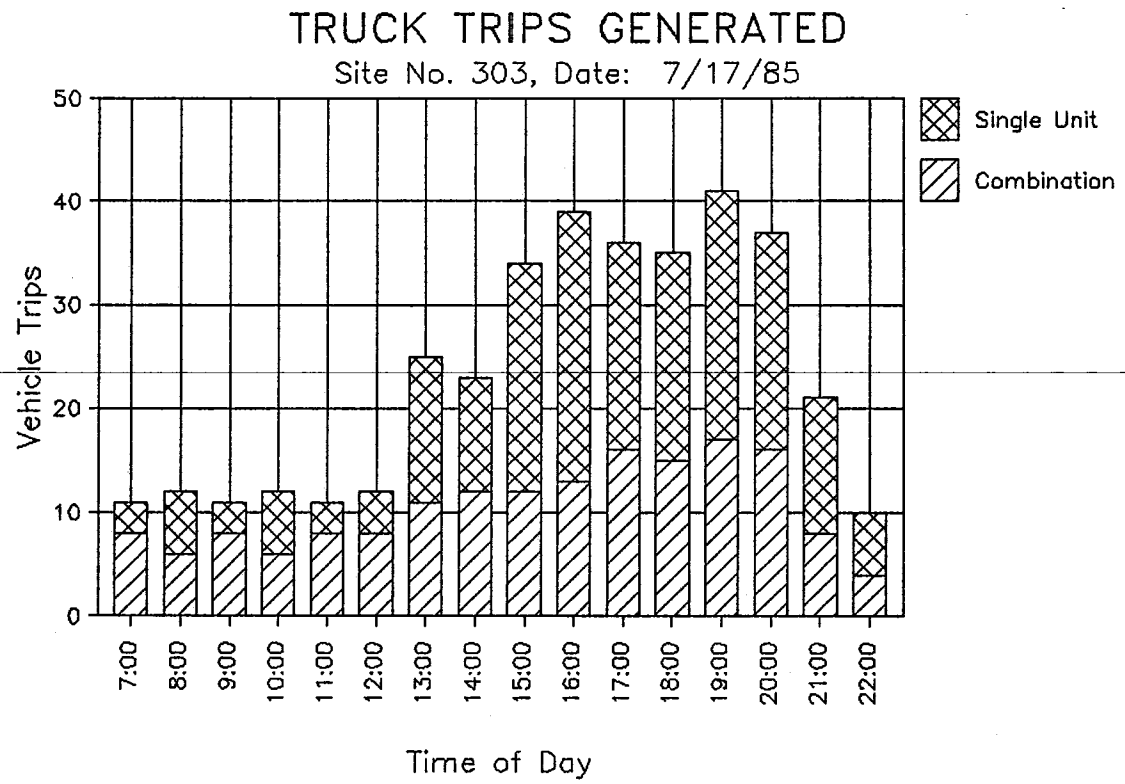


Figure 2.3.1.4-1. Site Map



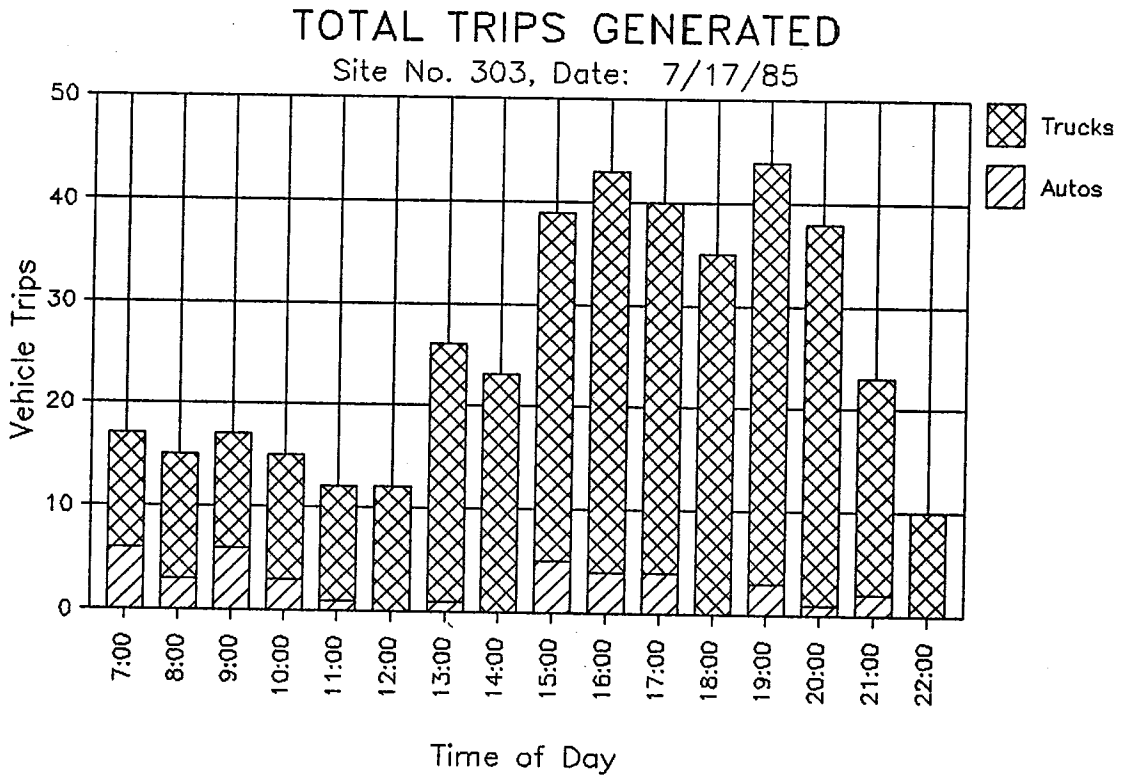
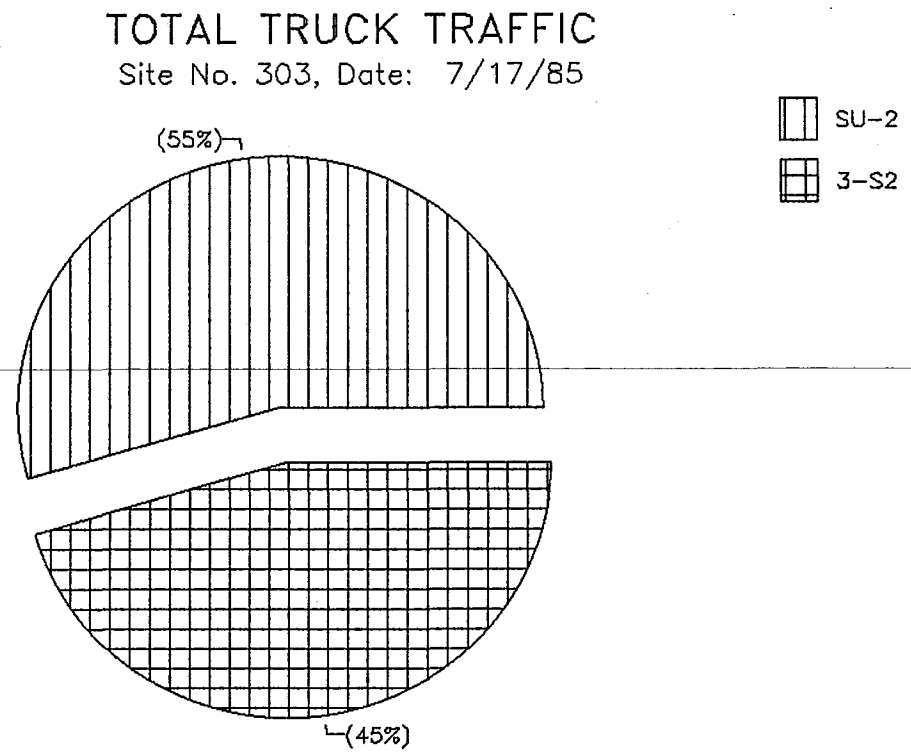


Figure 2.3.1.4-2. Hourly Trip Generation



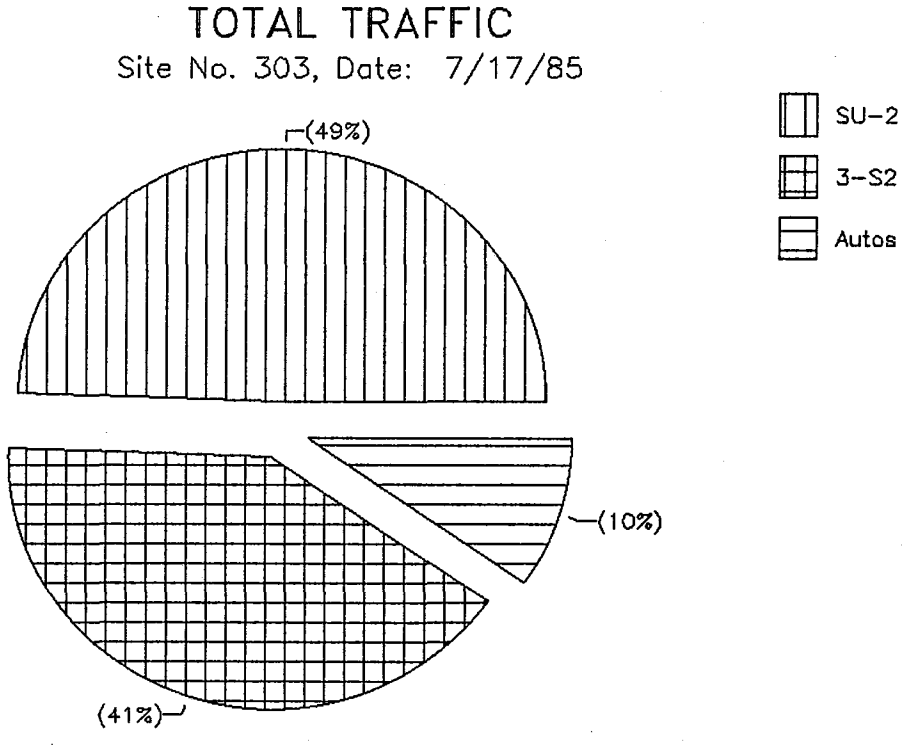


Figure 2.3.1.4-3. Activity Center Vehicle Percentages

Table 2.3.1.4-1. Traffic Classification Count Summary

Table 2.3.1.4-1A. Activity Center Only

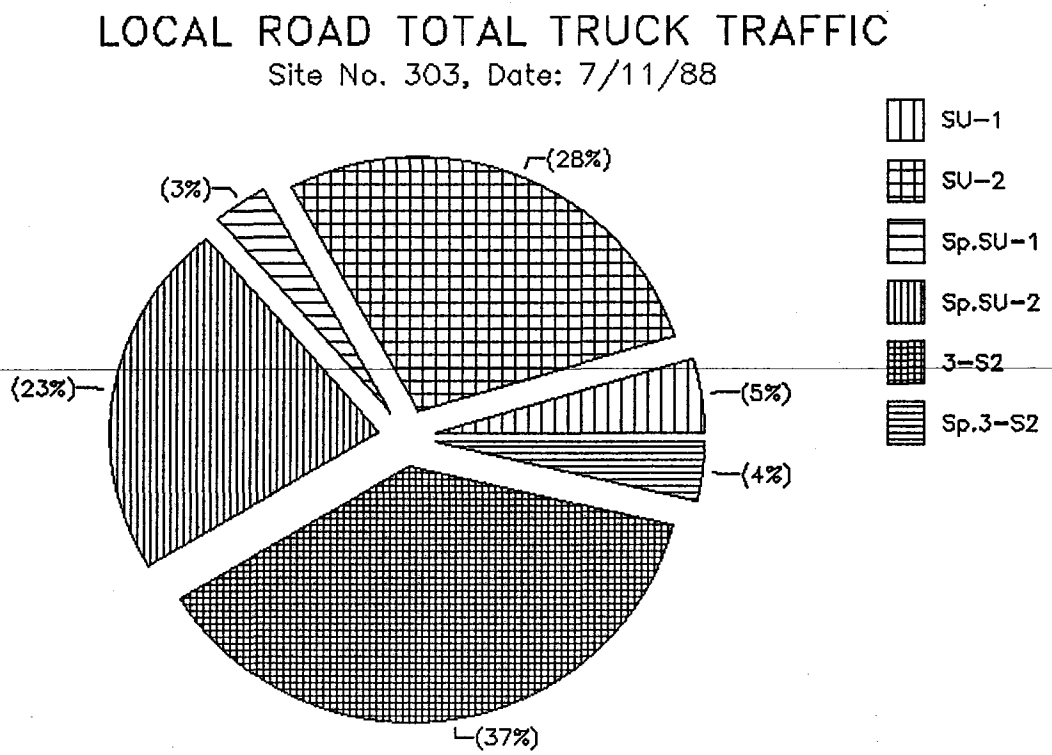
Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/11/88	76	7	69	30	182	72%	28%	42%	58%
7/17/85	39	0	202	168	409	55%	45%	10%	90%

Table 2.3.1.4-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/11/88	1176	24	142	189	1531	47%	53%	77%	23%

Table 2.3.1.4-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/11/88	1215	40	459	376	2090	57%	43%	58%	42%



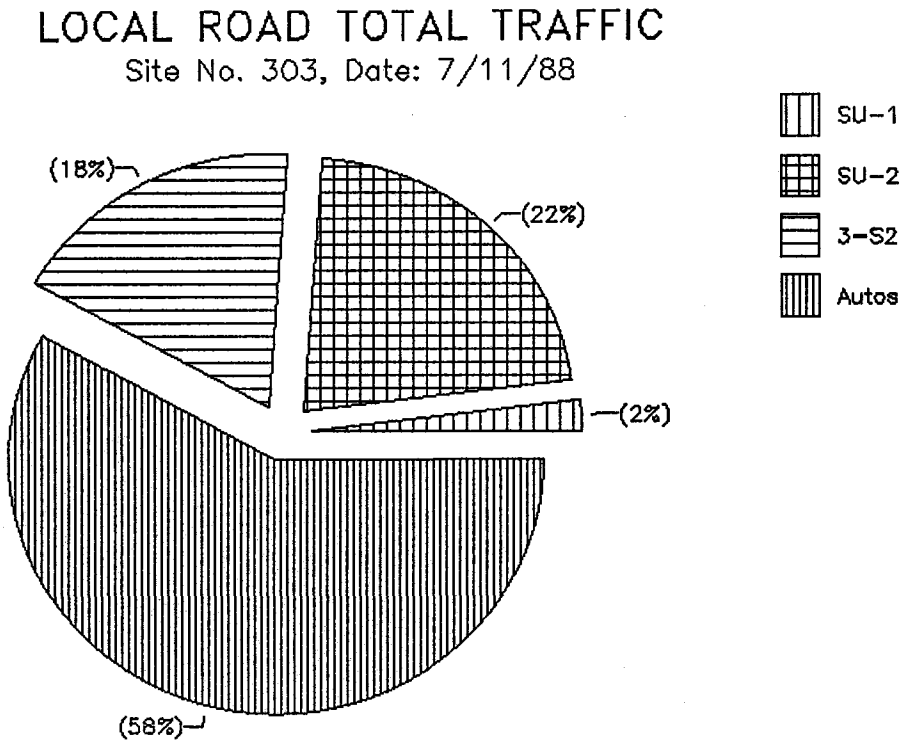


Figure 2.3.1.4-4. Highway Vehicle Percentages

2.3.1.5 Grain Elevator, Site No. 304

Introduction. The site map shown in Figure 2.3.1.5-1 indicates that access is provided by a two-lane local road. The site is near other elevators and is near a small urban area. A fairly large city is located about 30 miles east of this site.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.5-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (11 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 12-hour period on July 18, 1985.

Figure 2.3.1.5-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of this site. The predominant truck was the SU-1 (82%). Also illustrated is the breakdown of total traffic moving to and from the site. Autos represented 19 percent of this total.

An interview was conducted with an official of the elevator. The facility handled about 170,000 tons per day as an average. The facility had 10 employees. All products received came from a 30-mile radius; 70 percent of this grain was sent to elevators within a 70-mile radius. The facility usually loads or unloads approximately 16 SU-2's daily beginning at 8 a.m. and continuing to 9:30 p.m.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a State Highway. It is estimated that this state highway had an average daily traffic (ADT) of 1,200 in 1986. Manual classification counts were conducted in 1985 and 1988 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.5-1 provides a summary of the counts taken. In Table 2.3.1.5-1A, vehicle classification counts for the activity center only are provided. In Table 2.3.1.5-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. In Table 2.3.1.5-1C, a total count of all vehicles on the highway is provided.

Figure 2.3.1.5-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.3.1.5-1C values). The SU-1 vehicle represents 63 percent of total trucks counted on this highway. Autos make up 75 percent of the total traffic shown.

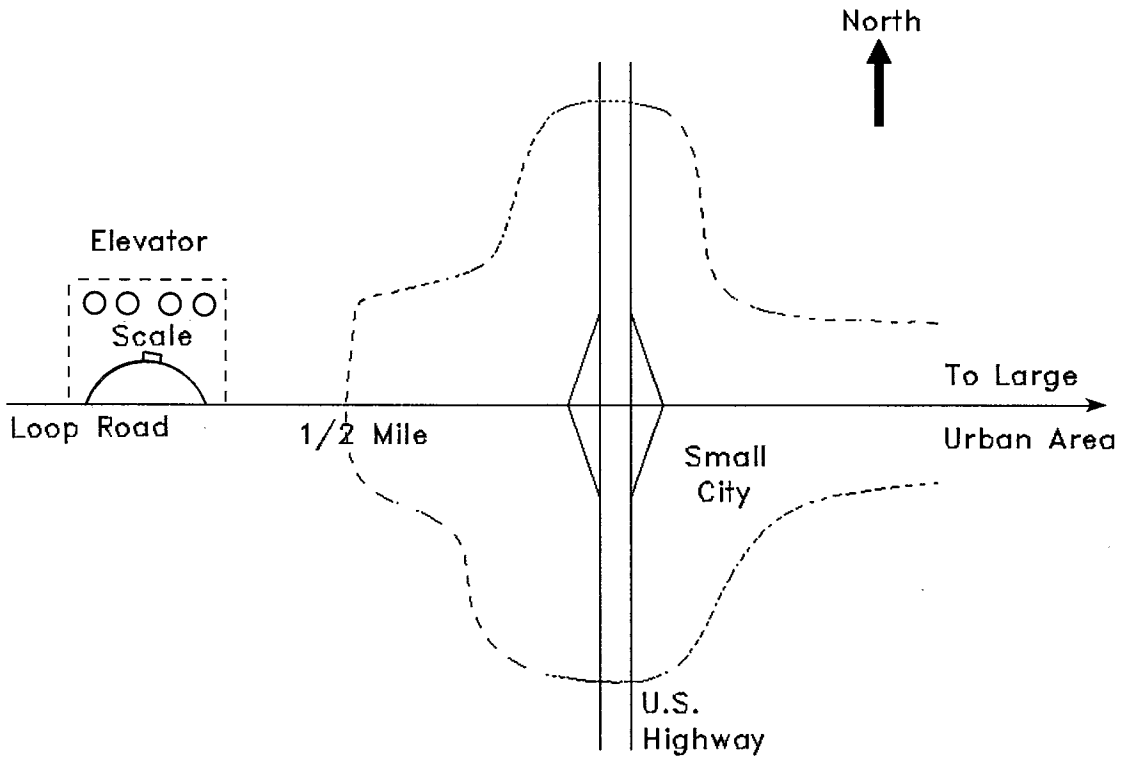
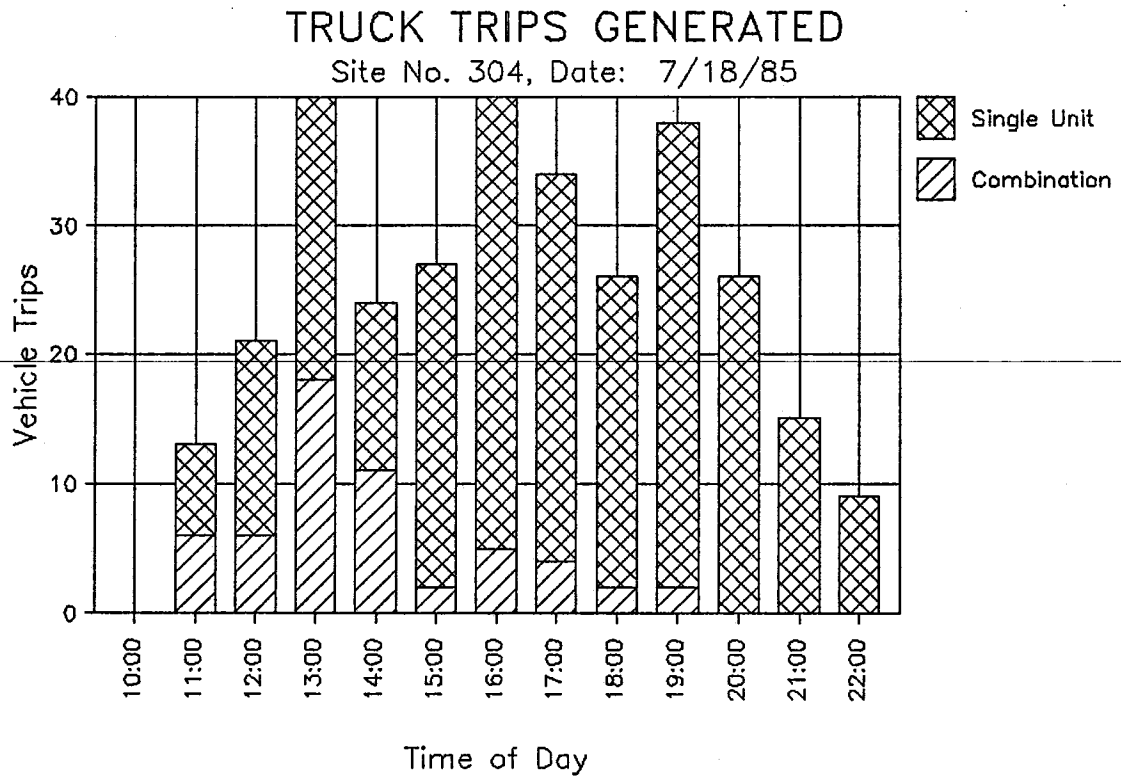


Figure 2.3.1.5-1. Site Map



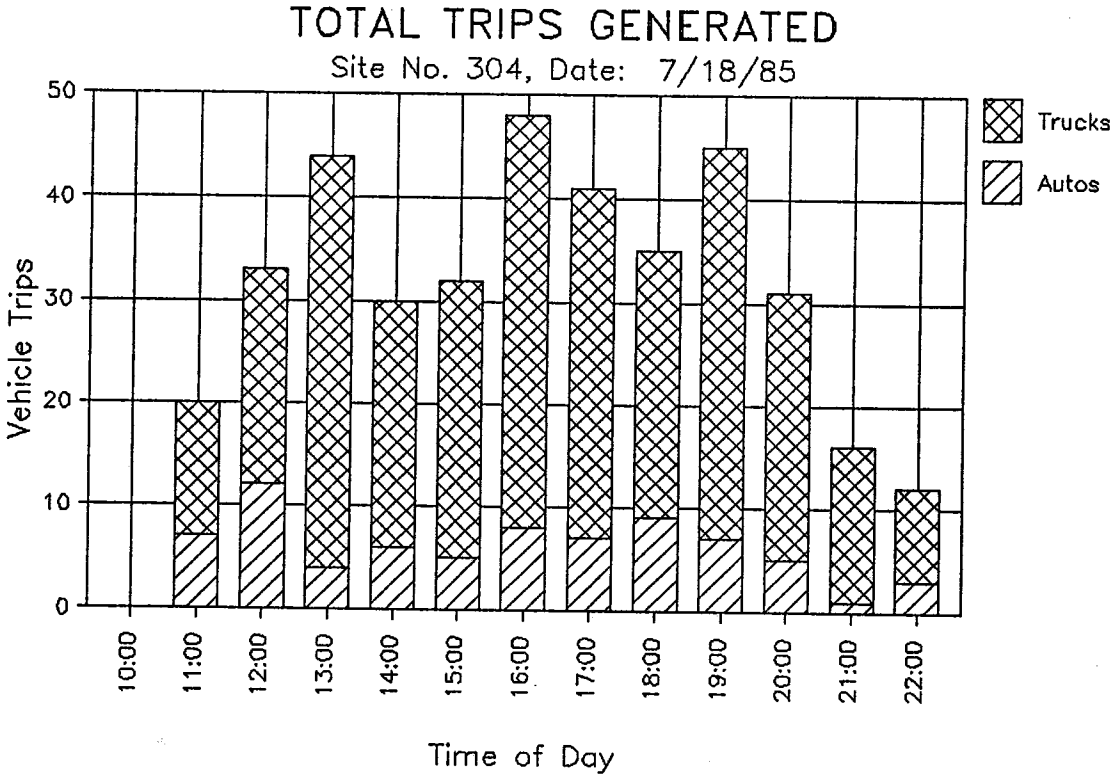
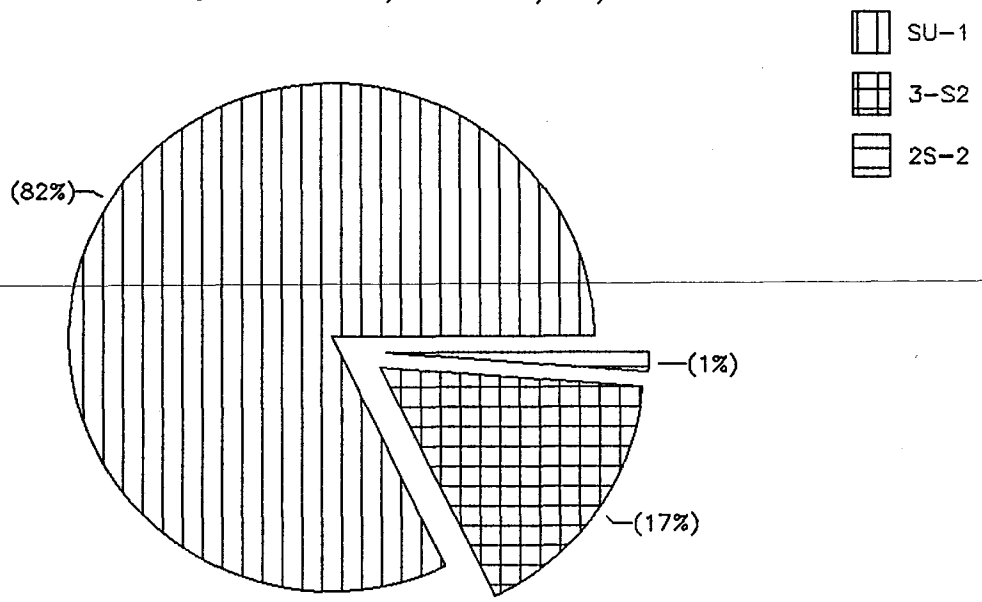


Figure 2.3.1.5-2. Hourly Trip Generation



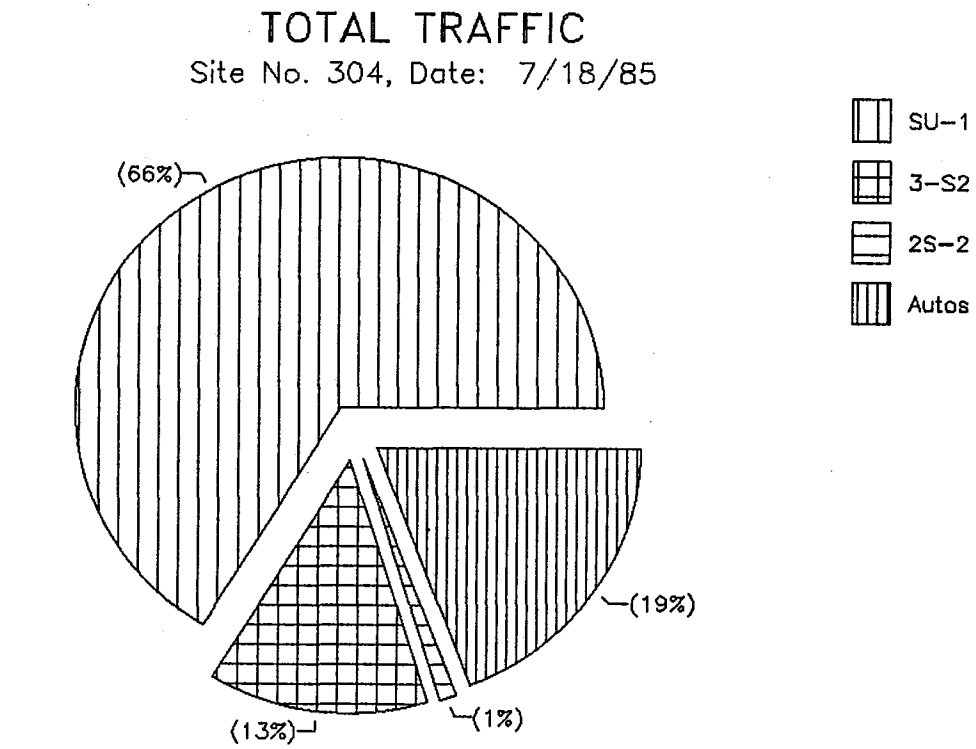


Figure 2.3.1.5-3. Activity Center Vehicle Percentages

Table 2.3.1.5-1. Traffic Classification Count Summary

Table 2.3.1.5-1A. Activity Center Only

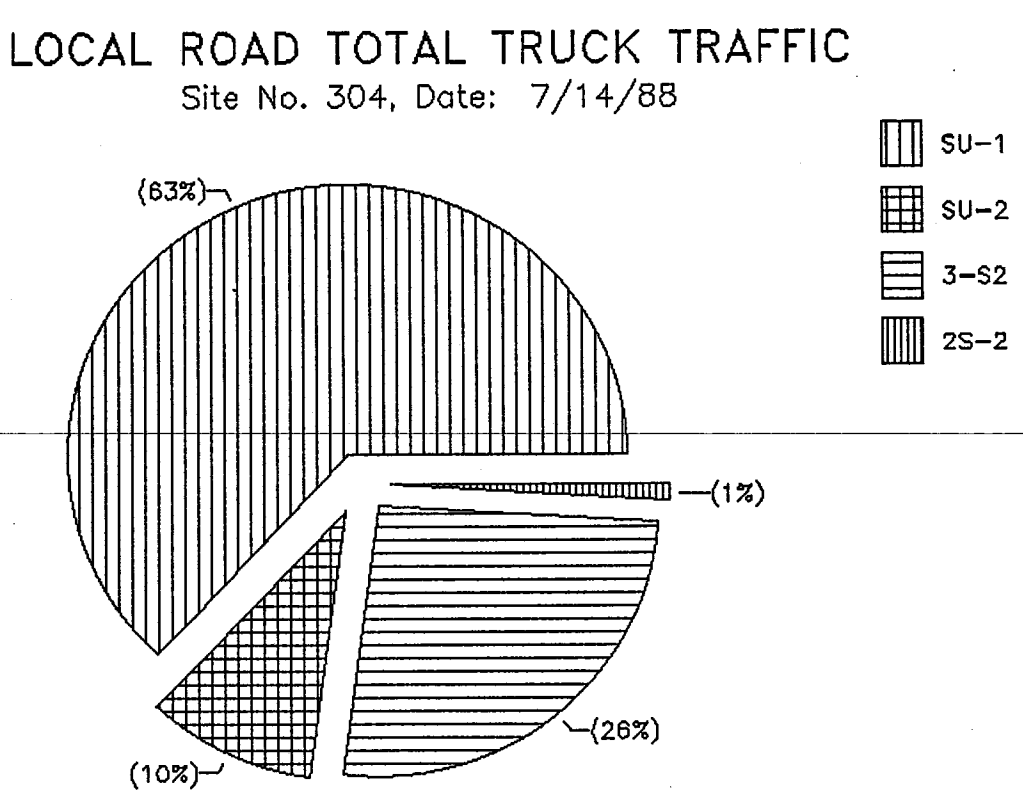
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/14/88	20	0	17	0	0	37	100%	0%	54%	46%
7/18/85	74	257	0	52	4	287	82%	18%	19%	81%

Table 2.3.1.5-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/14/88	1159	1	40	55	0	1255	43%	57%	92%	8%

Table 2.3.1.5-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/14/88	1233	258	40	107	4	1642	73%	27%	75%	25%



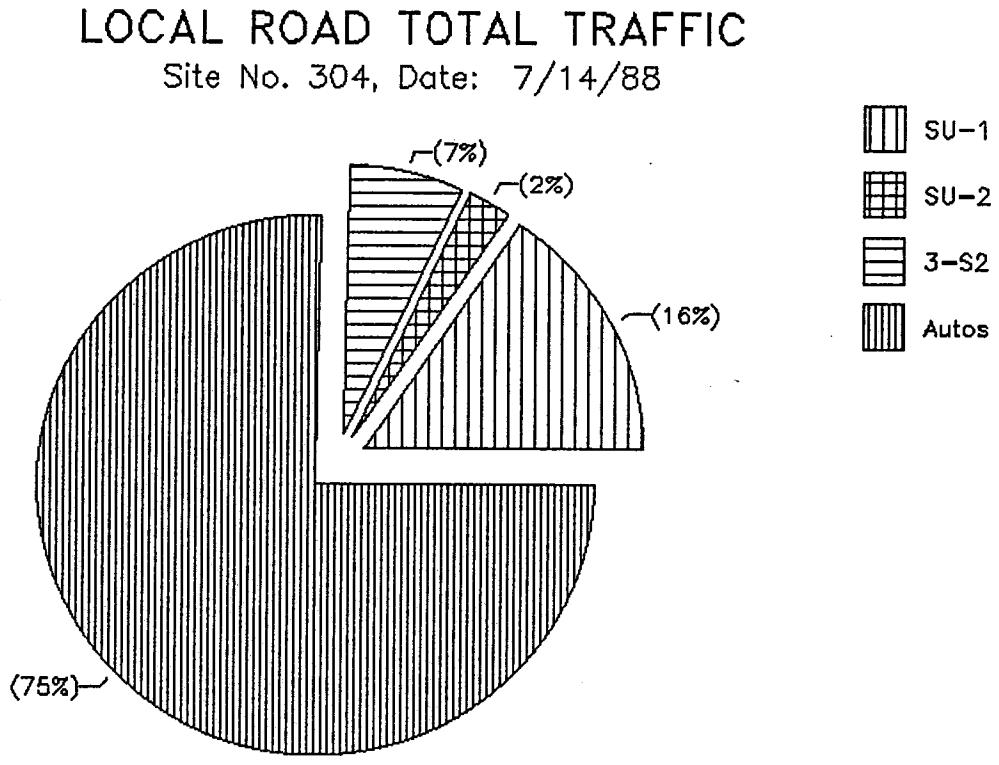


Figure 2.3.1.5-4. Highway Vehicle Percentages

2.3.1.6 Grain Elevator, Site No. 305

Introduction. The site map shown in Figure 2.3.1.6-1 indicates that access is provided by a State Highway. The activity center is located in a small community about 30 miles west of a relatively large urban area.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.6-2 shows the truck traffic (in and out) generated by the site during a 10-hour period (12 noon to 10 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 10-hour period on July 19, 1985.

Figure 2.3.1.6-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (63%). Also illustrated is the breakdown of total traffic moving to and from the site. Autos represented 10 percent of this total. No interview was conducted at this elevator.

Characteristics of Roadway Serving Activity Center. Counts of the highway serving this activity center were not conducted. Therefore, it was not possible to evaluate vehicle percentages on this roadway. It should be noted that site number 312 is located near this site and contains an evaluation of the same state highway. Table 2.3.1.6-1 is a summary of trips generated at the activity center.

Table 2.3.1.6-1. Traffic Classification Count Summary

Activity Center Only

Date	Autos	SU-1	SU-2	3-S2	Total	% of Trucks SU	% of Trucks Comb.	% of Total Cars	% of Total Trucks
7/19/85	22	6	123	67	218	66%	34%	10%	90%

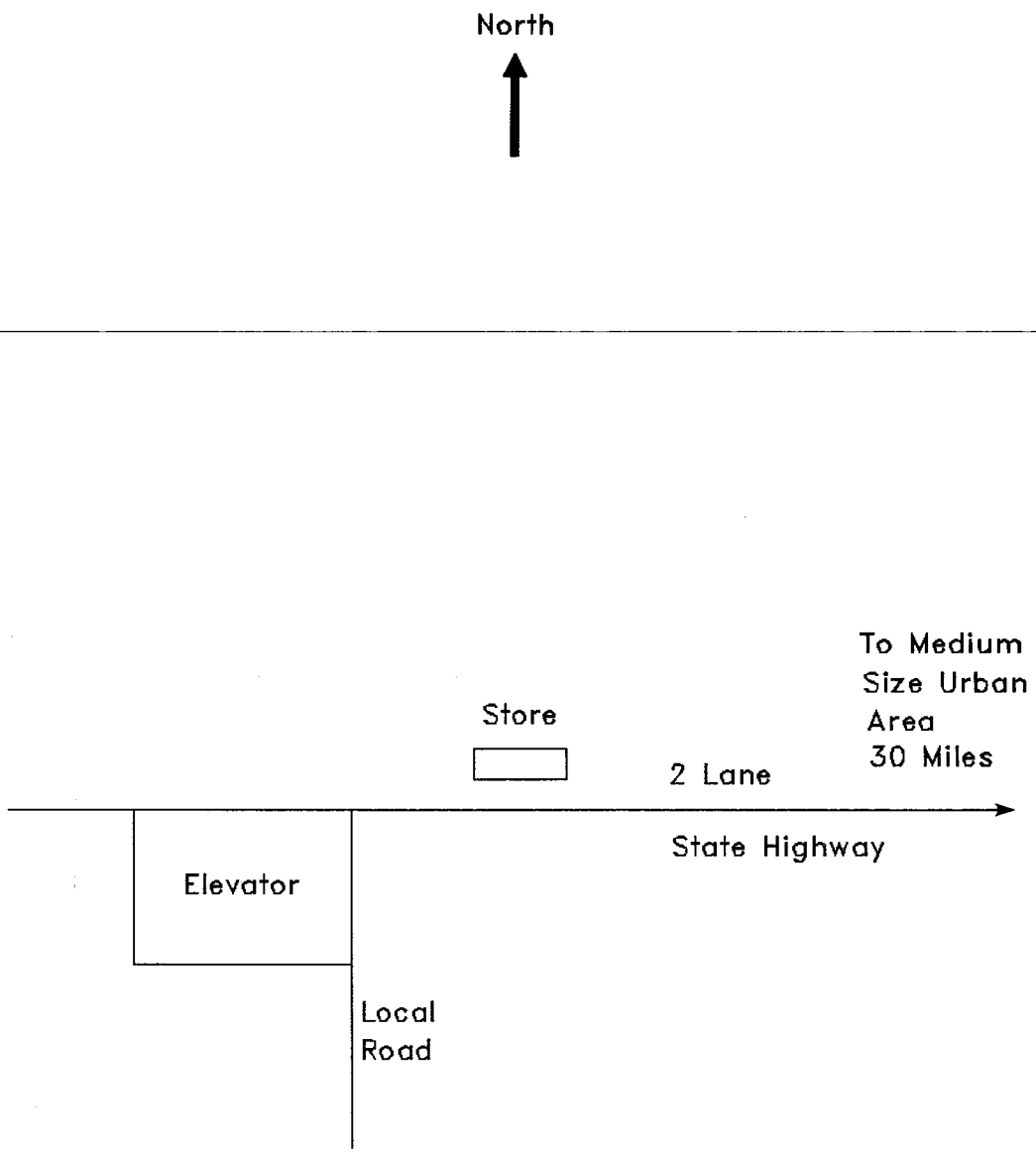
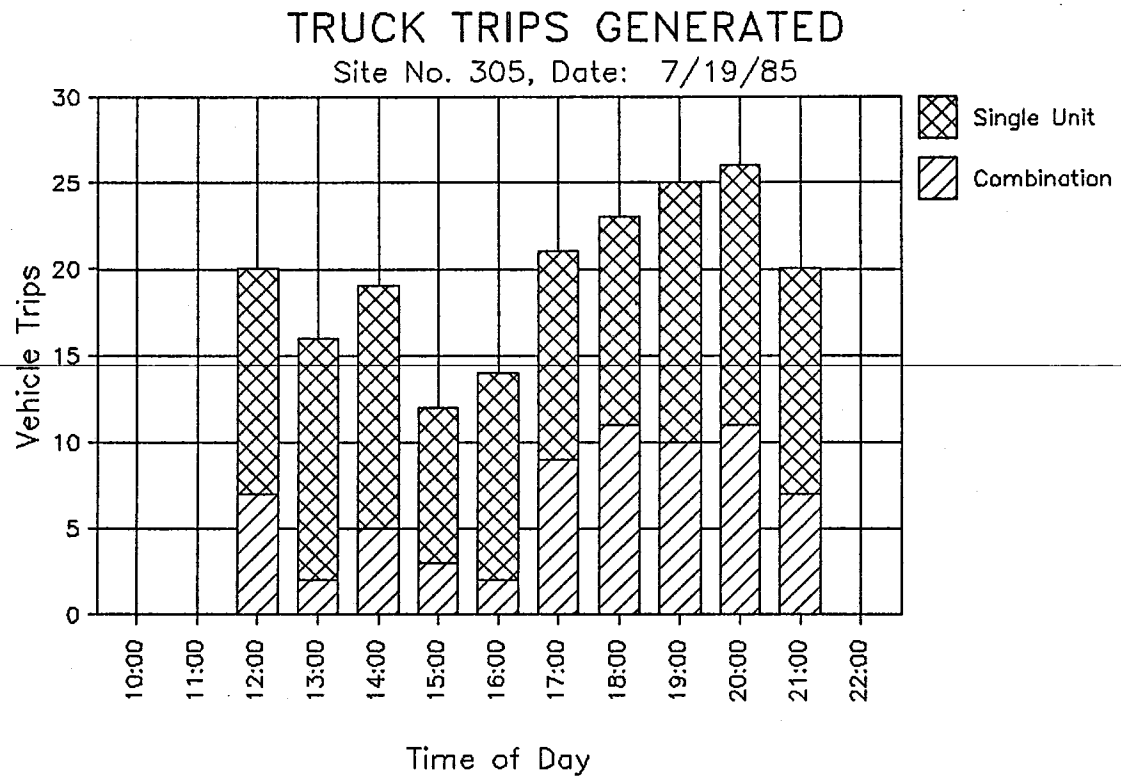


Figure 2.3.1.6-1. Site Map



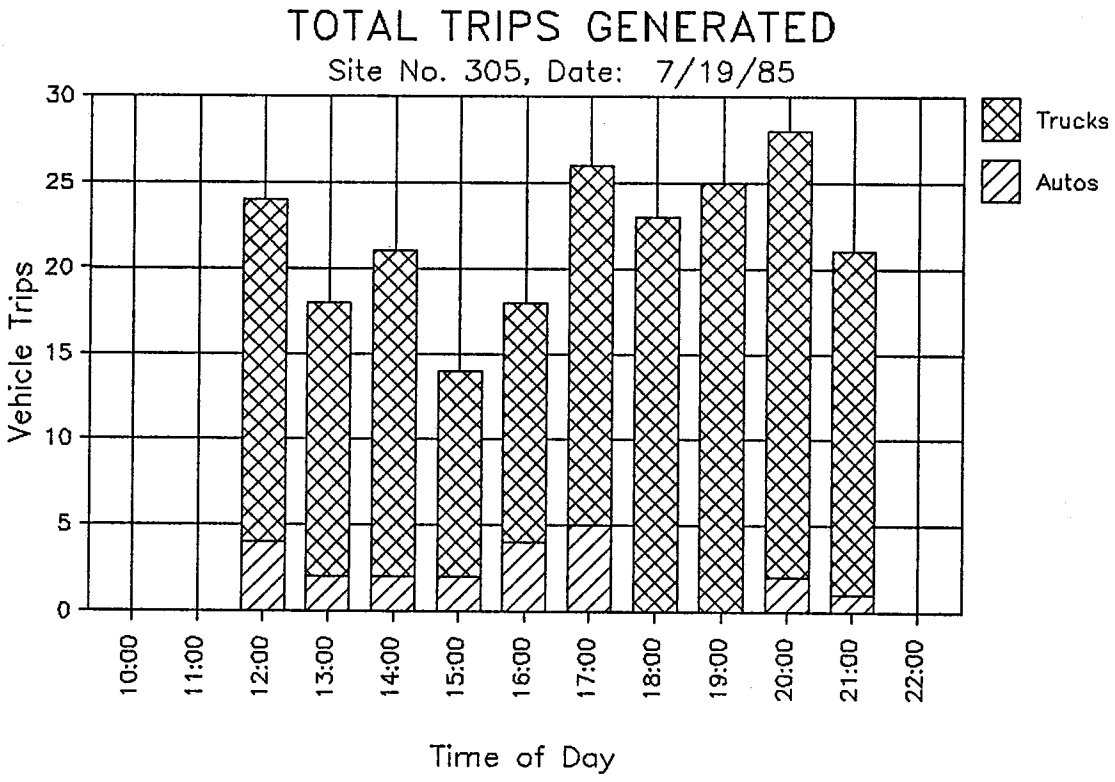
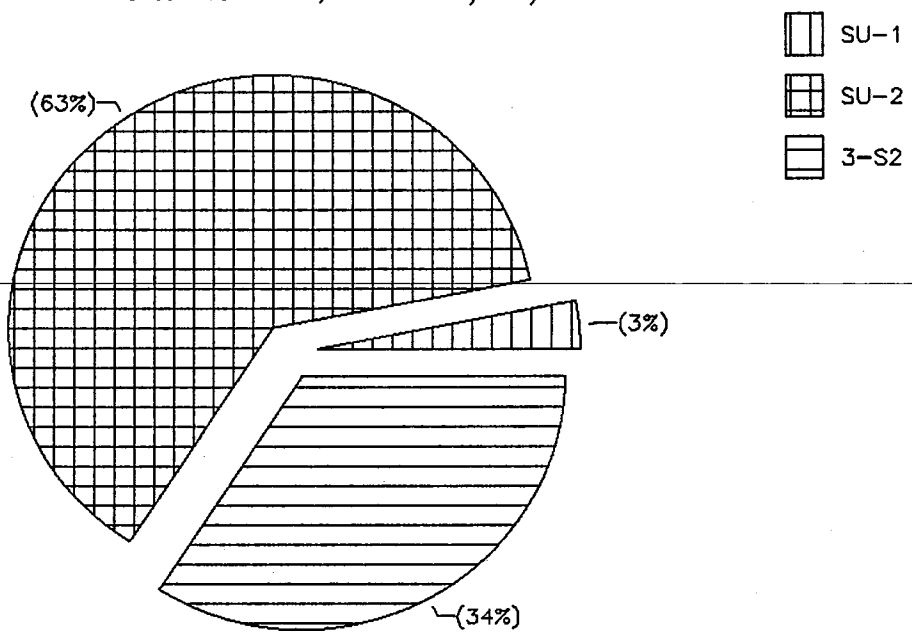


Figure 2.3.1.6-2. Hourly Trip Generation



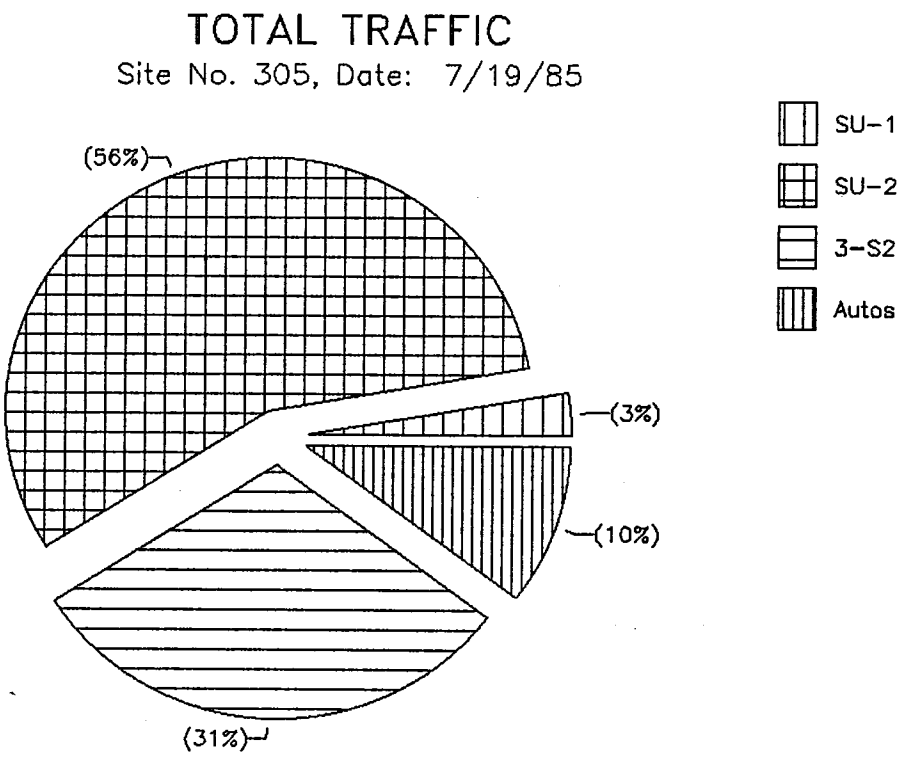


Figure 2.3.1.6-3. Activity Center Vehicle Percentages

2.3.1.7 Grain Elevator, Site No. 306

Introduction. This site, surveyed only once in 1985, was located in a small town in the Panhandle area of Texas.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.7-1 shows the truck traffic (in and out) generated by the site during an 11-hour period (10 a.m. to 9 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 11-hour period on September 24, 1985.

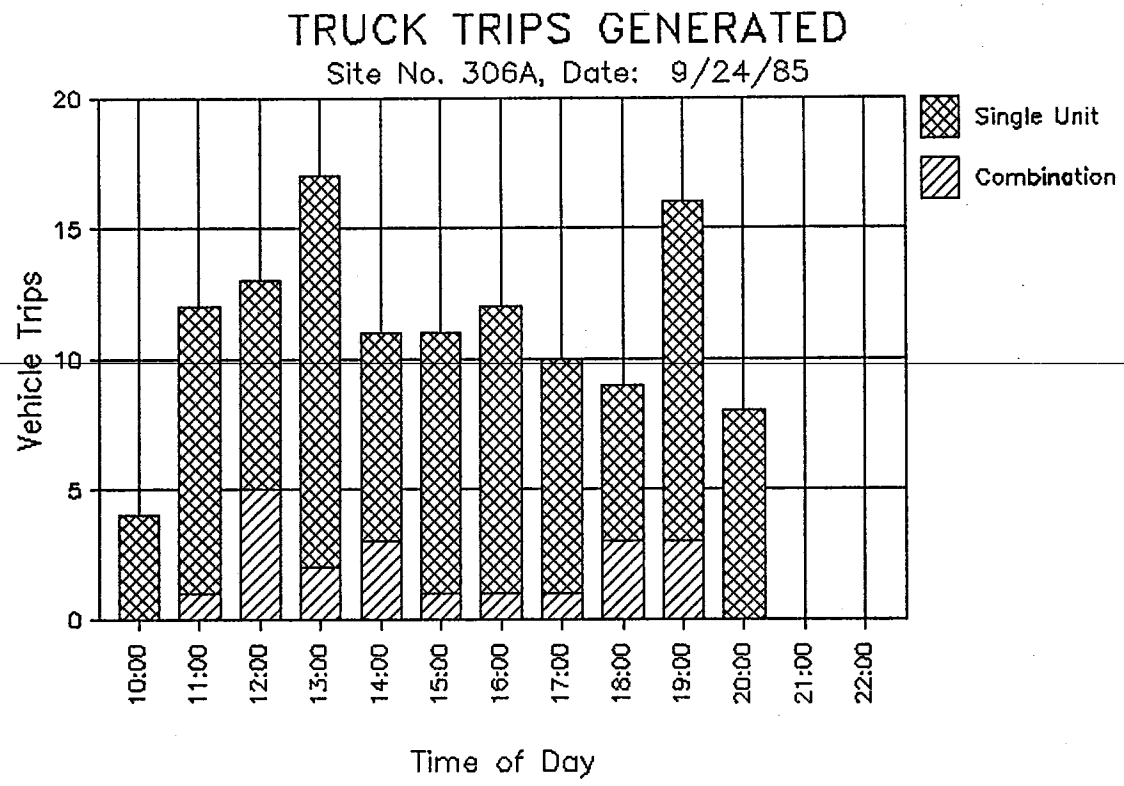
Figure 2.3.1.7-2 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (41%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represents 29 percent of this total. Table 2.3.1.7-1 is a summary of trips generated at the activity center. No interview was gathered at this site.

Characteristics of Roadway Serving Activity Center. The classification count conducted at this site in 1985 included only the activity center. Evaluation of vehicle percentages on the roadway was therefore not possible.

Table 2.3.1.7-1. Traffic Classification Count Summary

Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/24/85	50	41	50	20	12	173	74%	26%	29%	71%



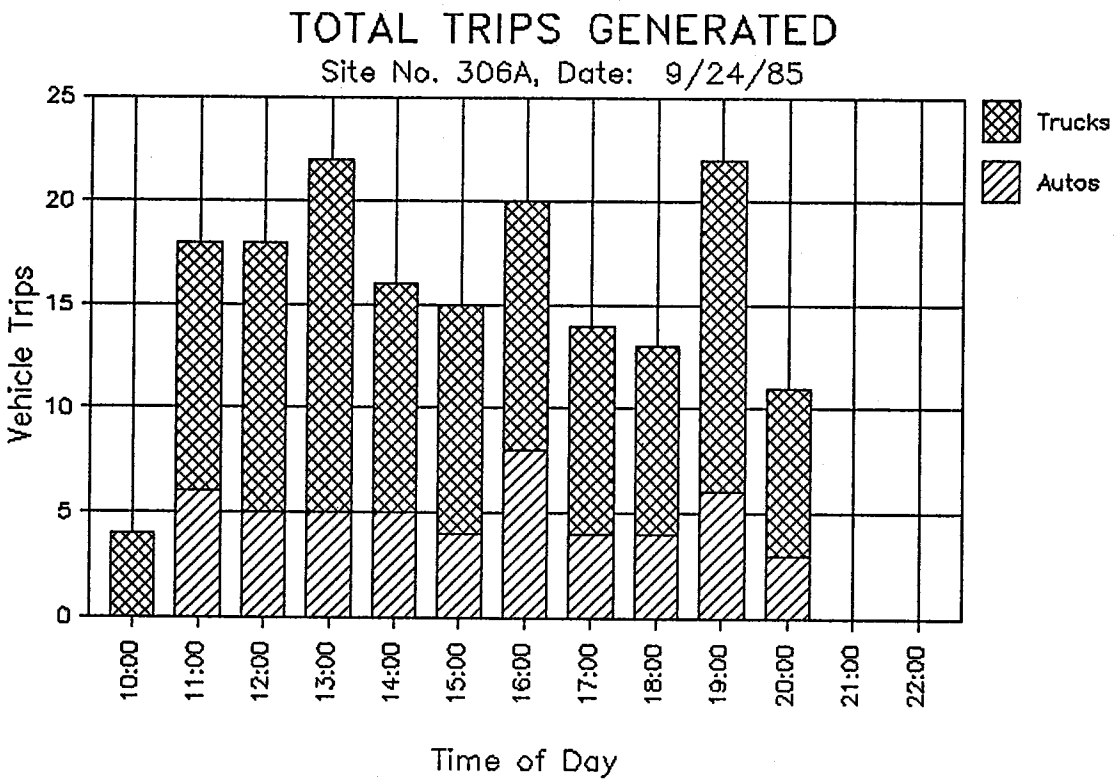
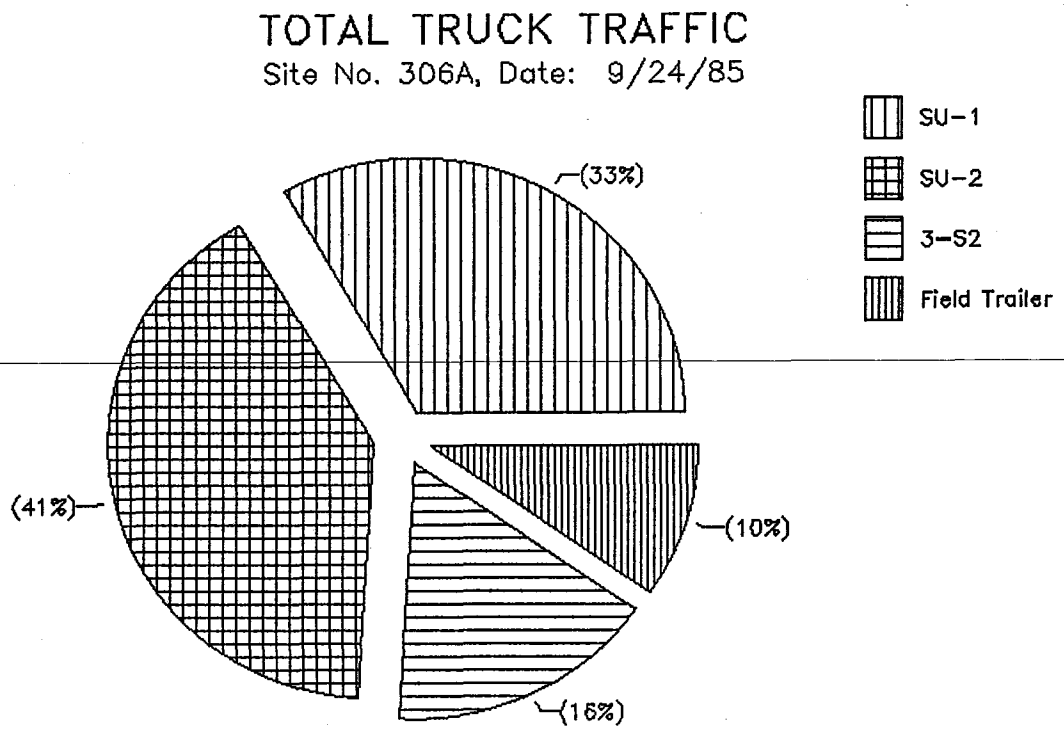


Figure 2.3.1.7-1. Hourly Trip Generation



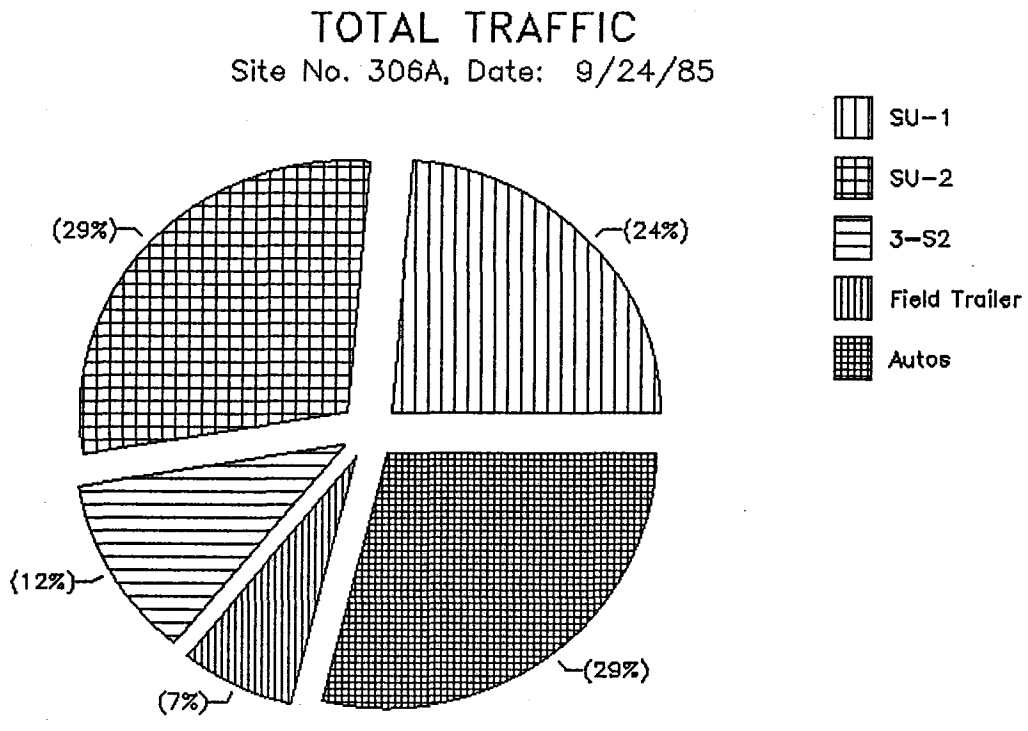


Figure 2.3.1.7-2. Activity Center Vehicle Percentages

2.3.1.8 Grain Elevator, Site No. 307

Introduction. The site map shown in Figure 2.3.1.8-1 indicates that access is provided by a State Highway. The activity center is located in a small town in the Panhandle area of the state. Trucks hauling grain into this site are serving an area approximately 20 miles in radius. The site is served by a railroad as shown by the site map.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.8-2 shows the truck traffic (in and out) generated by the site during a 10-hour period (8 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 10-hour period on September 26, 1985.

Figure 2.3.1.8-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (41%). Also illustrated is the breakdown of total traffic moving to and from the site. Autos represented 34 percent of this total.

An interview was conducted with an official at the site. The grain elevator had a capacity of 1,112,000 bushels and the grain came from area farms. The peak season is typically from September 15 to October 10. The scales were open from 8 a.m. to 9 p.m.

Characteristics of Roadway Serving Activity Center. The classification count conducted at this site in 1985 only included the activity center. Therefore the evaluation of roadway traffic could not be performed. Table 2.3.1.8-1 is a summary of trips generated at the activity center.

Table 2.3.1.8-1. Traffic Classification Count Summary

Activity Center Only

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/26/85	57	28	46	22	15	168	67%	33%	34%	66%

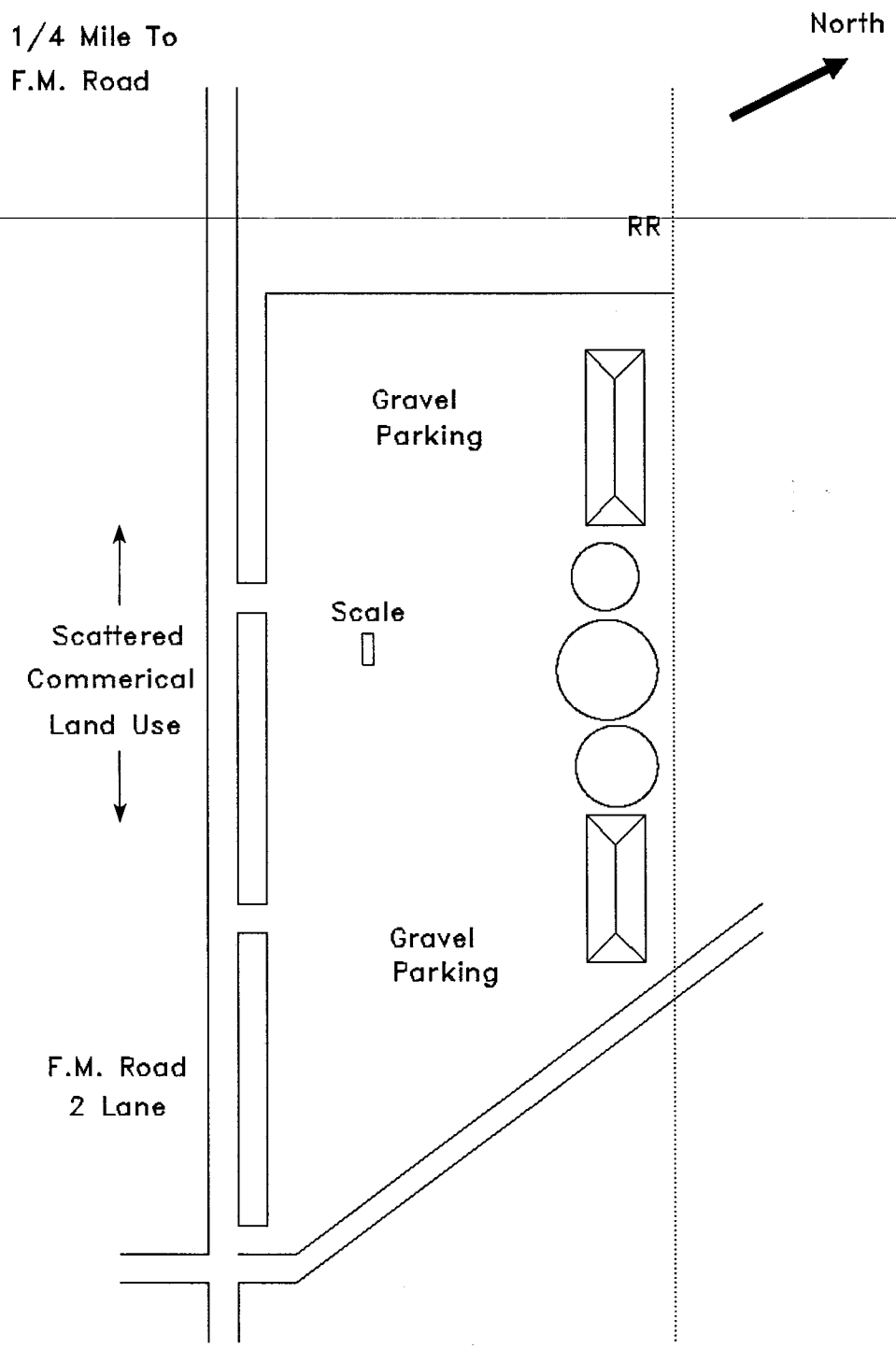
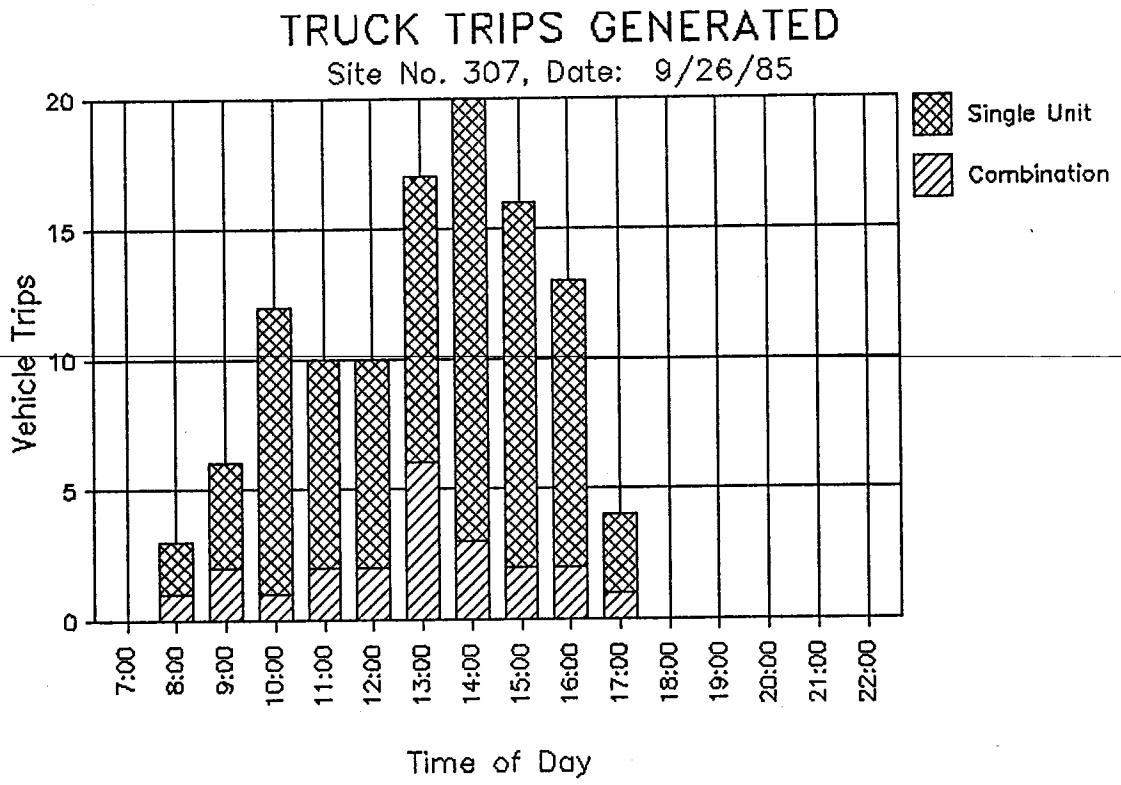


Figure 2.3.1.8-1. Site Map



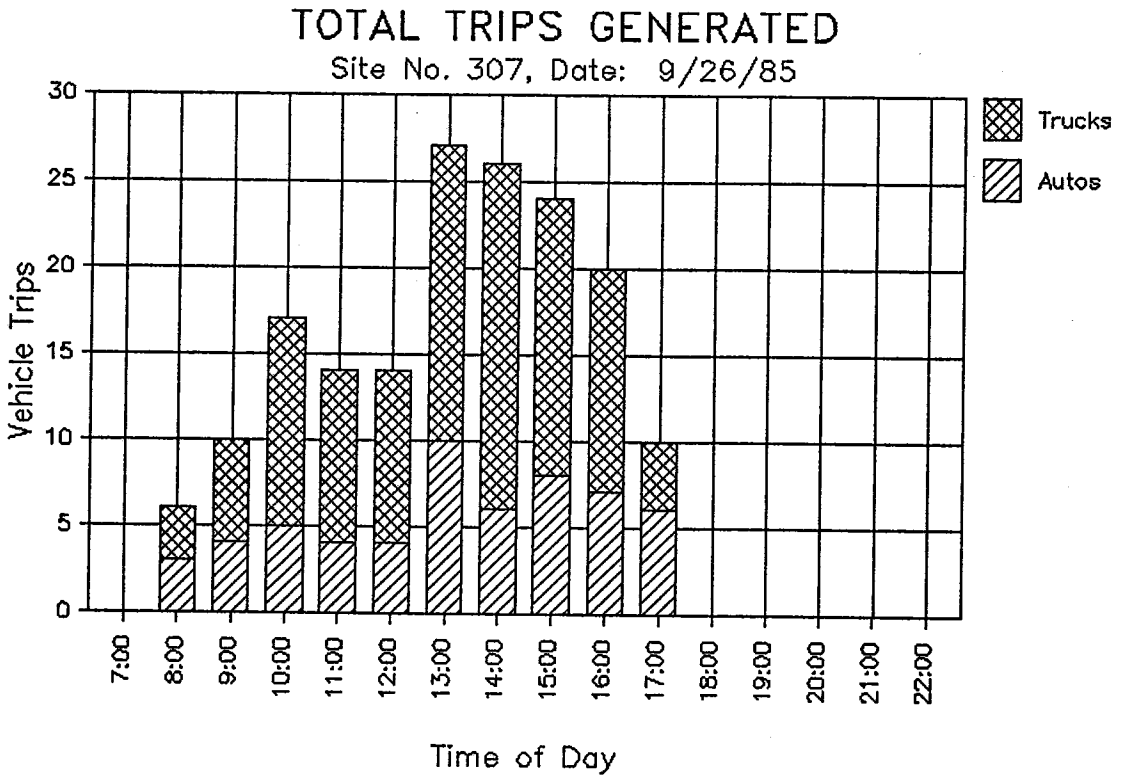
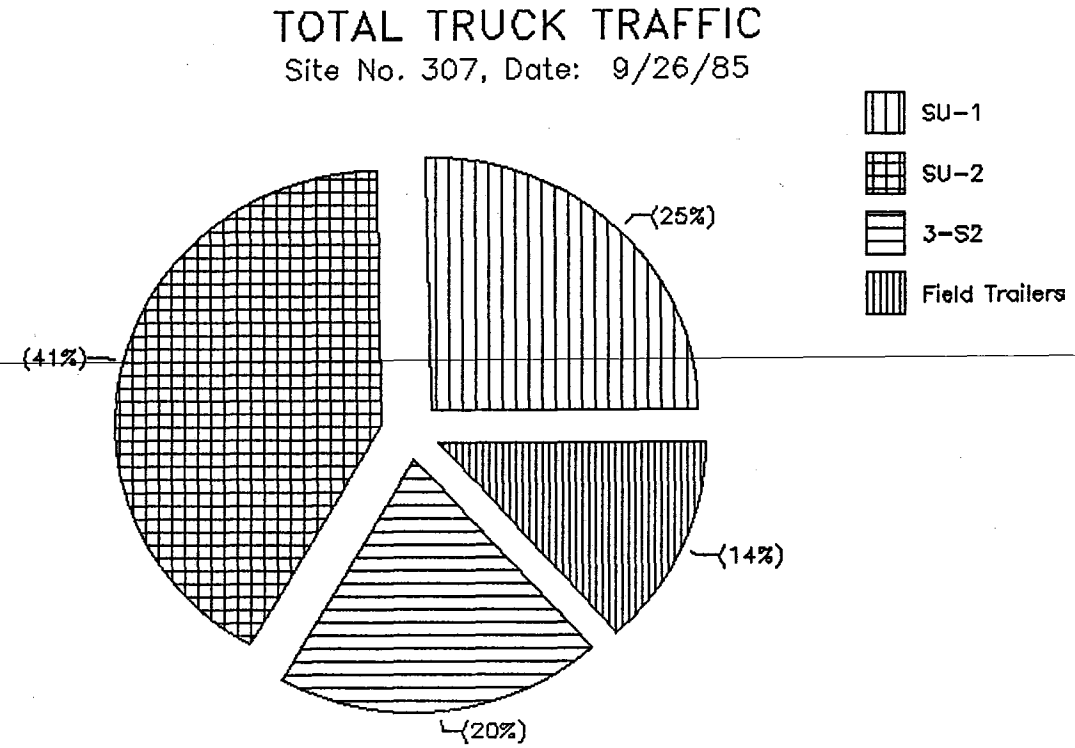


Figure 2.3.1.8-2. Hourly Trip Generation



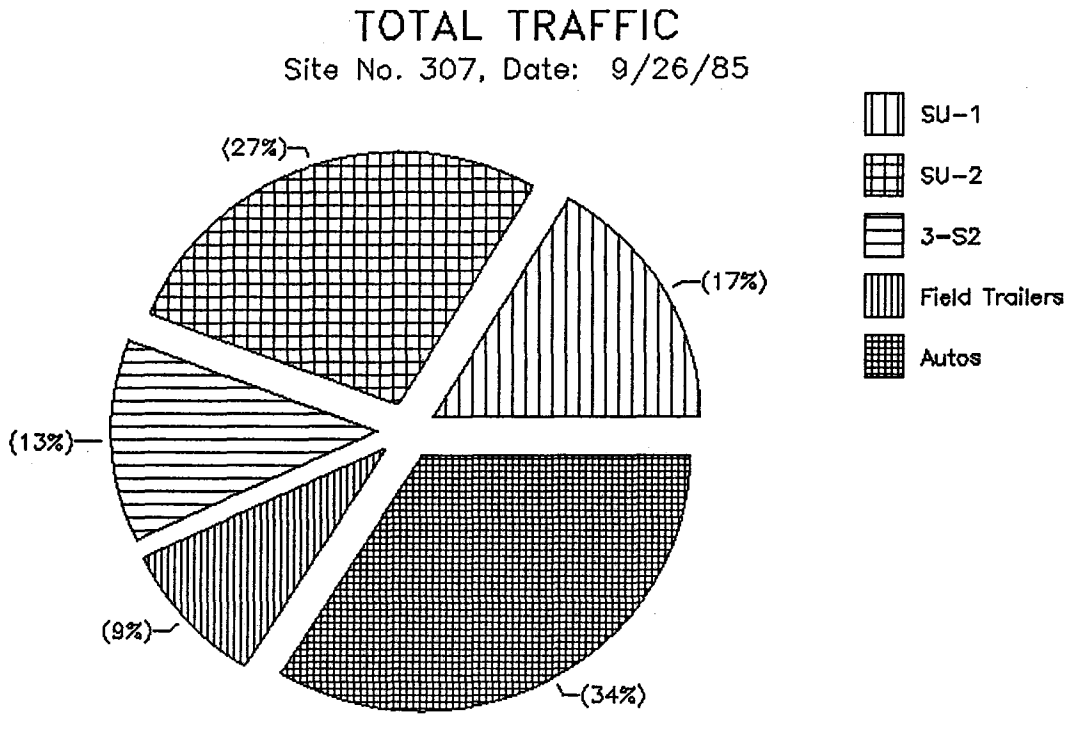


Figure 2.3.1.8-3. Activity Center Vehicle Percentages

2.3.1.9 Grain Elevator, Site No. 308A

Introduction. The site map shown in Figure 2.3.1.9-1 indicates access provided by a U.S. Highway within a small town. This town is located in the Panhandle area of the state, about 50 miles from any medium-sized urban area.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.9-2 shows the truck traffic (in and out) generated by the site during an 11-hour period (8 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 11-hour period on October 15, 1987.

Figure 2.3.1.9-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 (100%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 46 percent of this total.

An interview was conducted with an official at the grain site. The grain elevator had a capacity of 3 million bushels, with 90 percent of the grain coming from area farms within 30 miles. Approximately 10 percent of the grain was shipped by rail. Of the 90 percent shipped by truck, approximately 5 percent went to ports and 85 percent went to feedlots within a 50-mile radius. The peak season for wheat is typically from June 10 to July 15 and the peak season for corn is from September 10 to November 24.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a U.S. Highway. It is estimated that this highway had an average daily traffic (ADT) of 3,700 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.9-1 provides a summary of the counts taken. First, in Table 2.3.1.9-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.3.1.9-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.3.1.9-1C, a total count of all vehicles on the highway is provided.

Figure 2.3.1.9-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.3.1.9-1C values). The 3-S2 vehicle represents 61 percent of total trucks counted on this highway. Autos make up 55 percent of the total traffic shown.

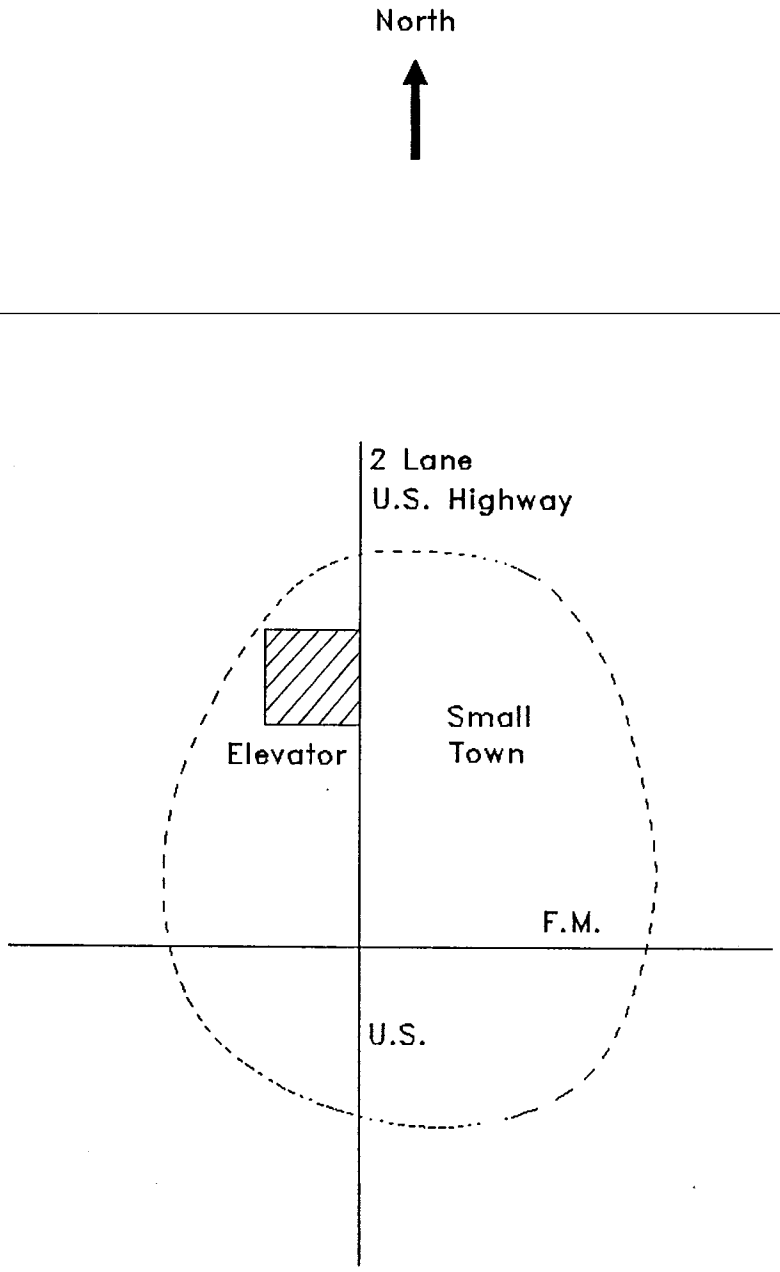
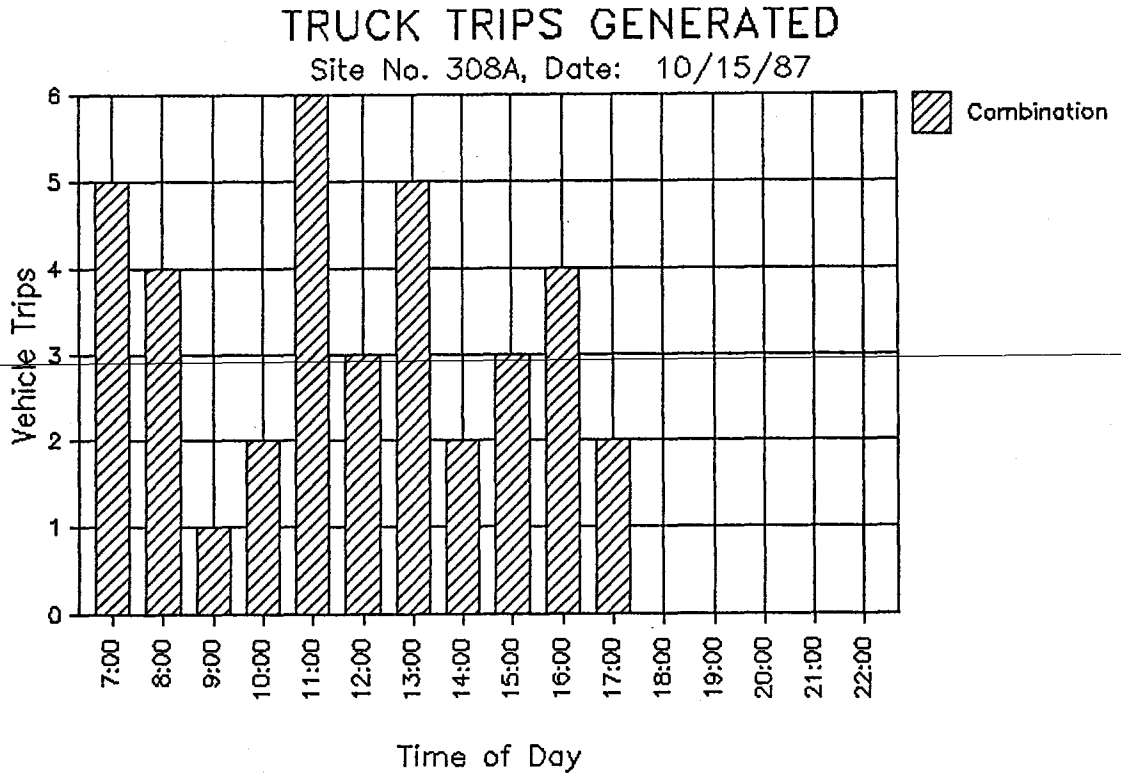


Figure 2.3.1.9-1. Site Map



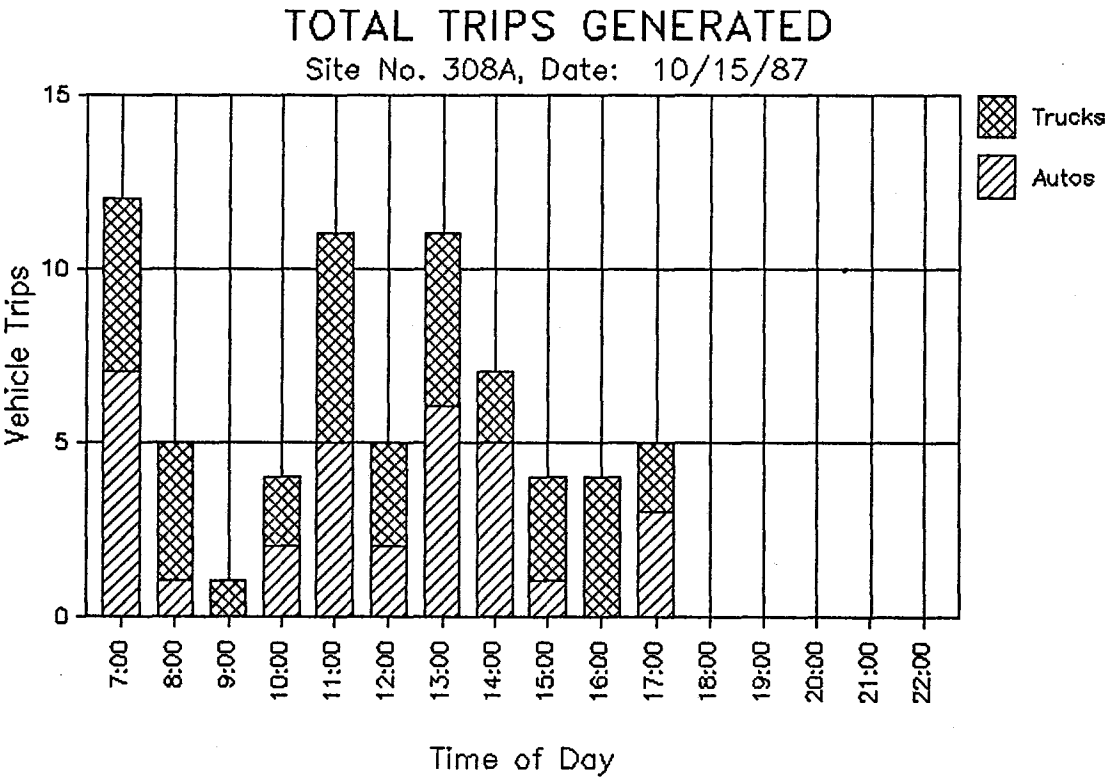


Figure 2.3.1.9-2. Hourly Trip Generation

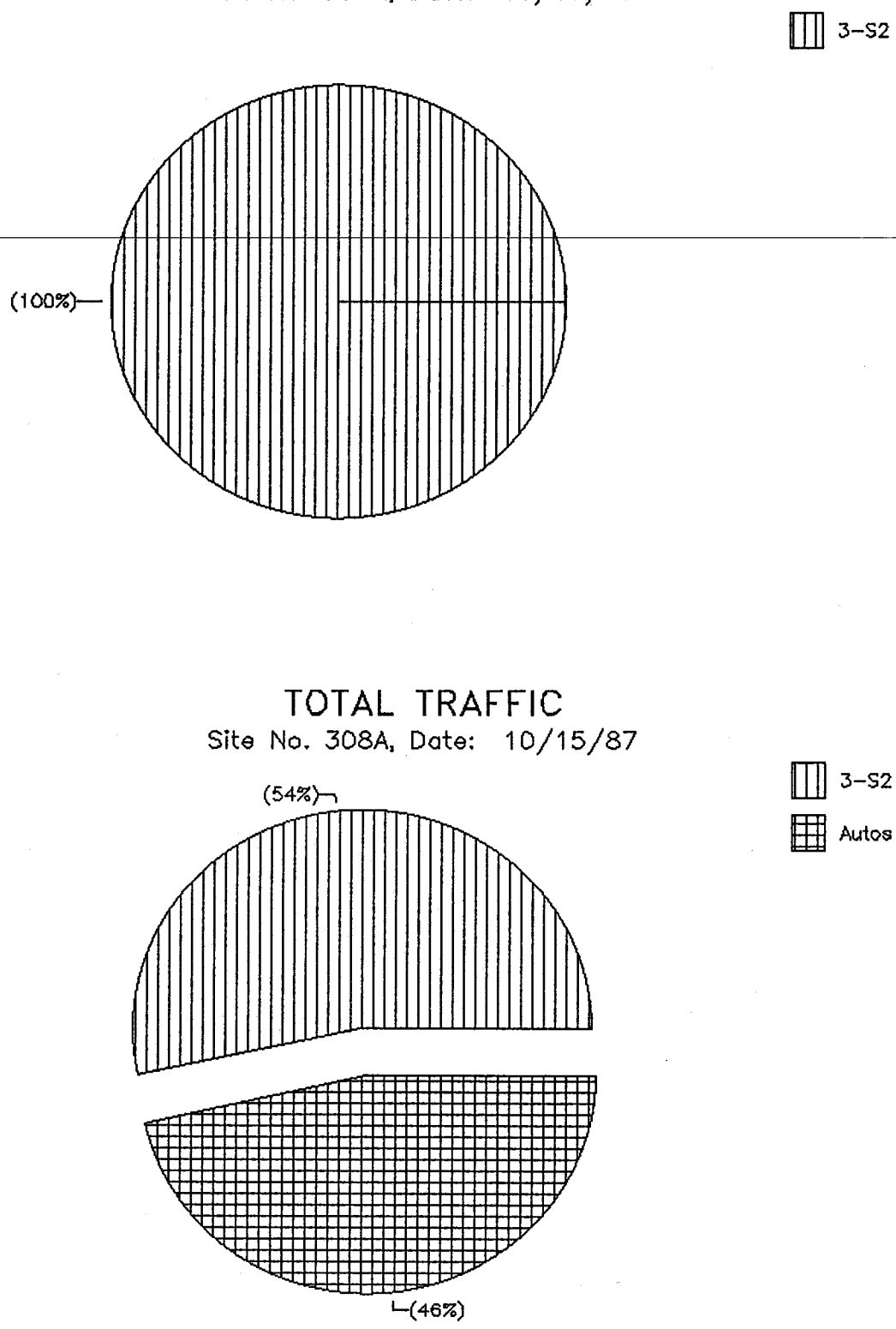


Figure 2.3.1.9-3. Activity Center Vehicle Percentages

Table 2.3.1.9-1. Traffic Classification Count Summary

Table 2.3.1.9-1A. Activity Center Only

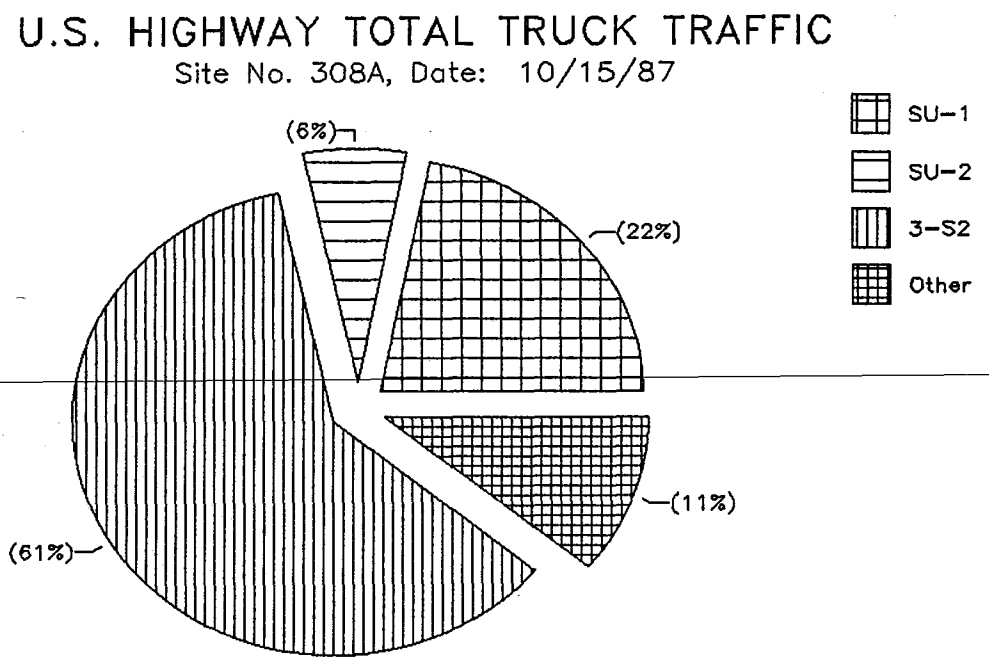
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
09/25/85	56	18	45	24	16	159	61%	39%	35%	65%
10/15/87	32	0	0	37	0	69	0%	100%	46%	54%

Table 2.3.1.9-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/15/87	243	44	13	122	2	424	32%	68%	57%	43%

Table 2.3.1.9-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/15/87	275	44	13	159	2	493	26%	74%	56%	44%



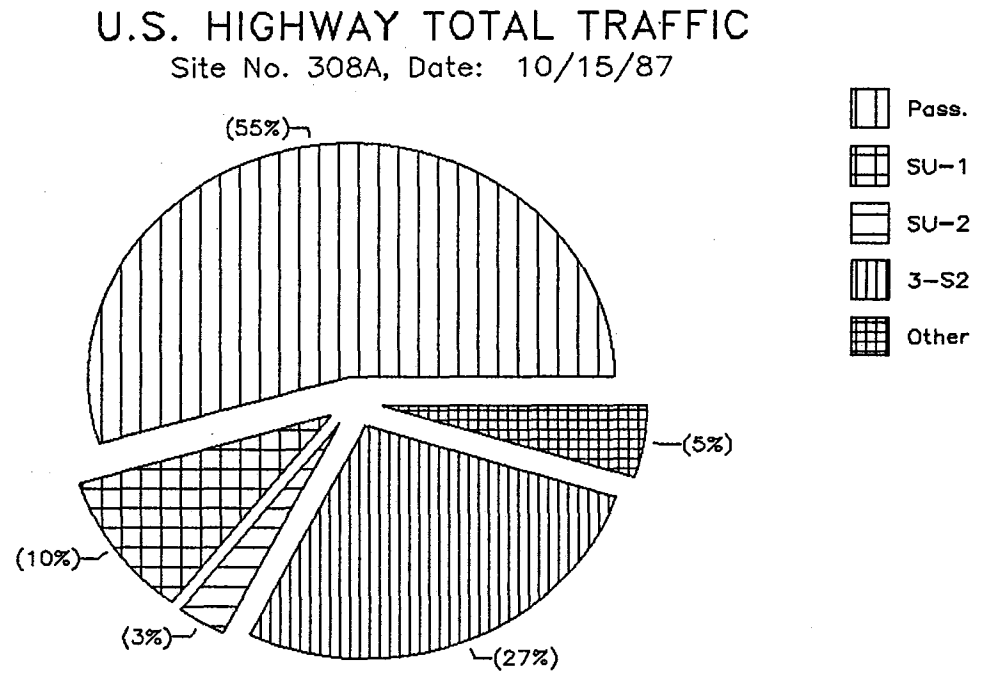


Figure 2.3.1.9-4. Highway Vehicle Percentages

2.3.1.10 Grain Elevator, Site No. 309A

Introduction. The site map shown in Figure 2.3.1.10-1 indicates that access is provided by a two-lane loop roadway. The elevator is located within a small urban area 2 miles west of a major U.S. highway and 30 miles west of a fairly large city. Most of the field (single unit) grain tracks approached the site from the north.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.10-2 shows the truck traffic (in and out) generated by the site during a 13-hour period (10 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 13-hour period on July 14, 1988.

Figure 2.3.1.10-3 illustrates the breakdown by AASHTO classification of the total traffic going in and out of the site. The predominant truck was the SU-2 (72)%. Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 38 percent of this total. No interview was granted at this activity center.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Loop Highway. It is estimated that this state highway had an average daily traffic (ADT) of 2,000 in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.10-1 provides a summary of the counts taken. In Table 2.3.1.10-1A, vehicle classification counts for the activity center only are provided. In Table 2.3.1.10-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. In Table 2.3.1.10-1C, a total count of all vehicles on the highway is provided.

Figure 2.3.1.10-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.3.1.10-1C values). The SU-2 vehicle represents 64 percent of total trucks counted on this highway. Autos make up 80 percent of the total traffic counted.

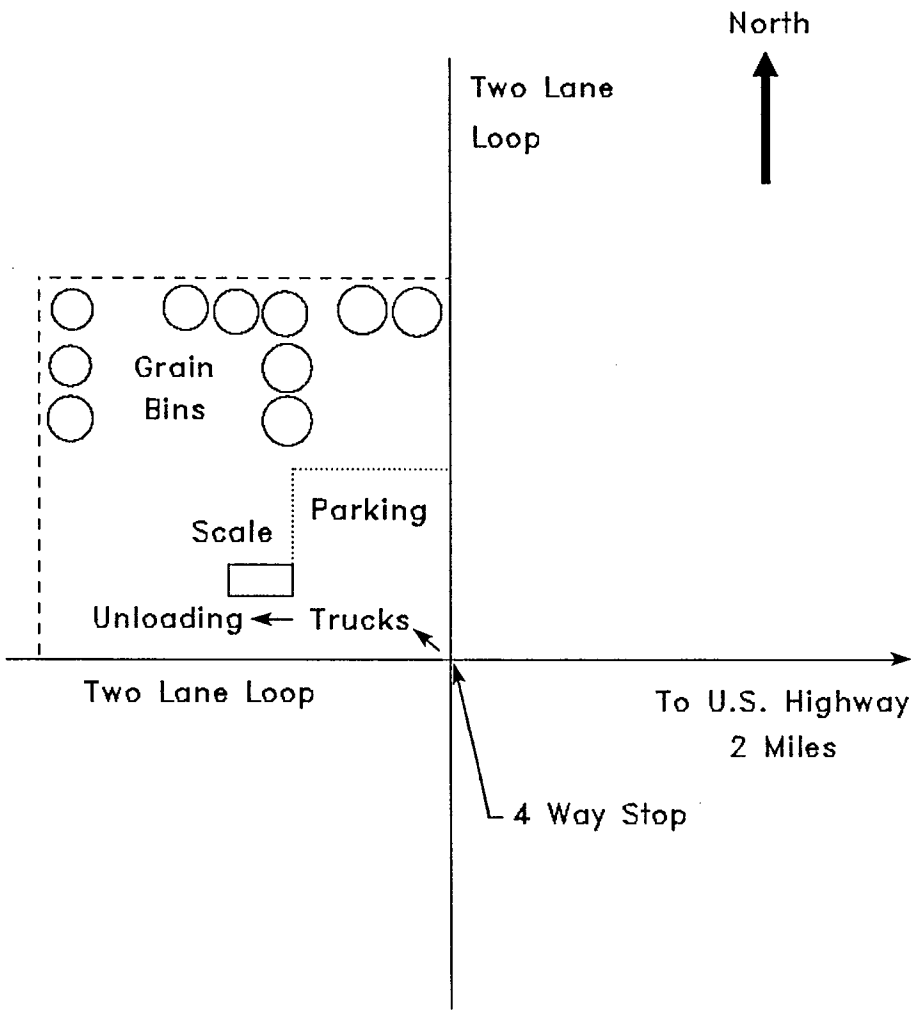


Figure 2.3.1.10-1. Site Map

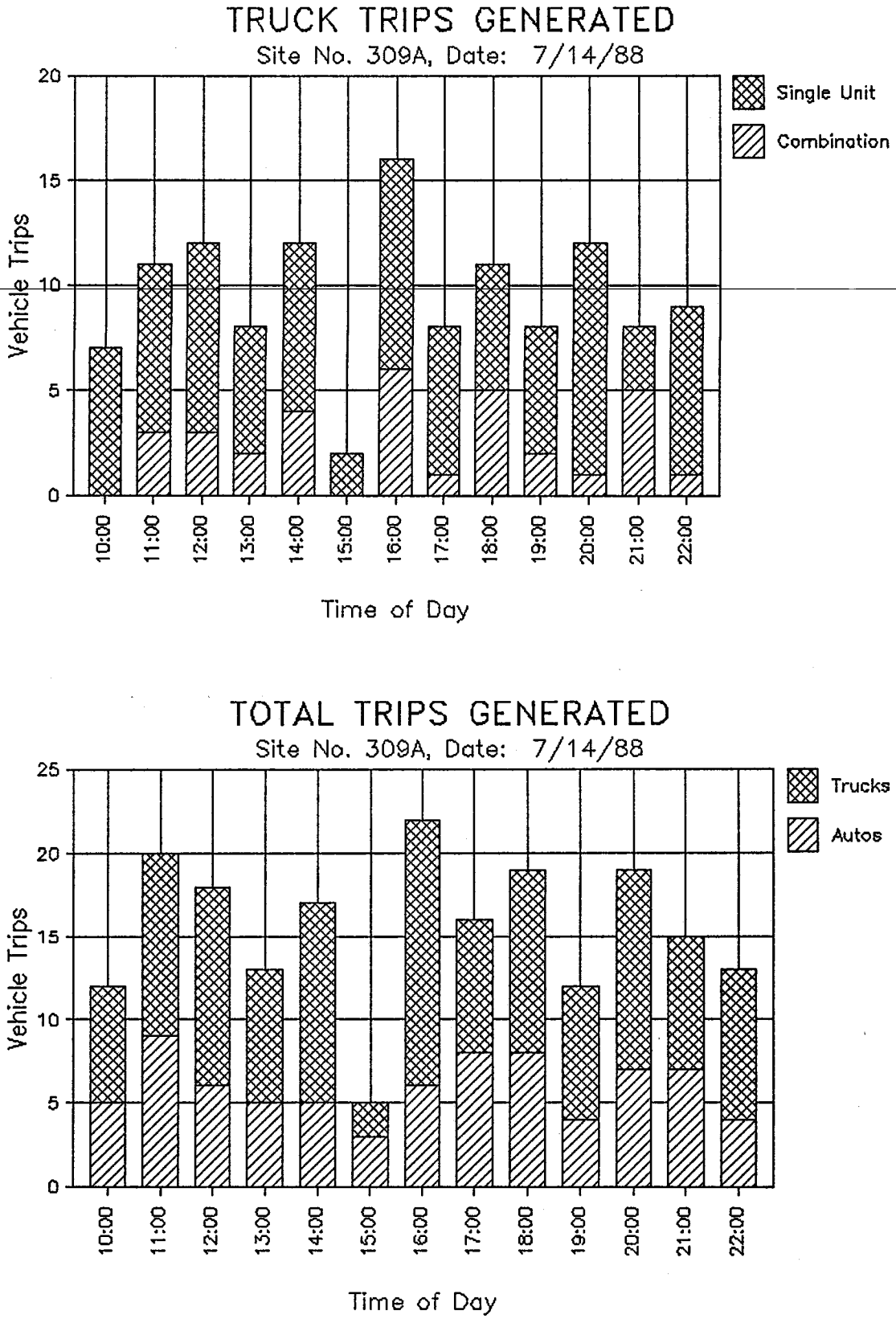
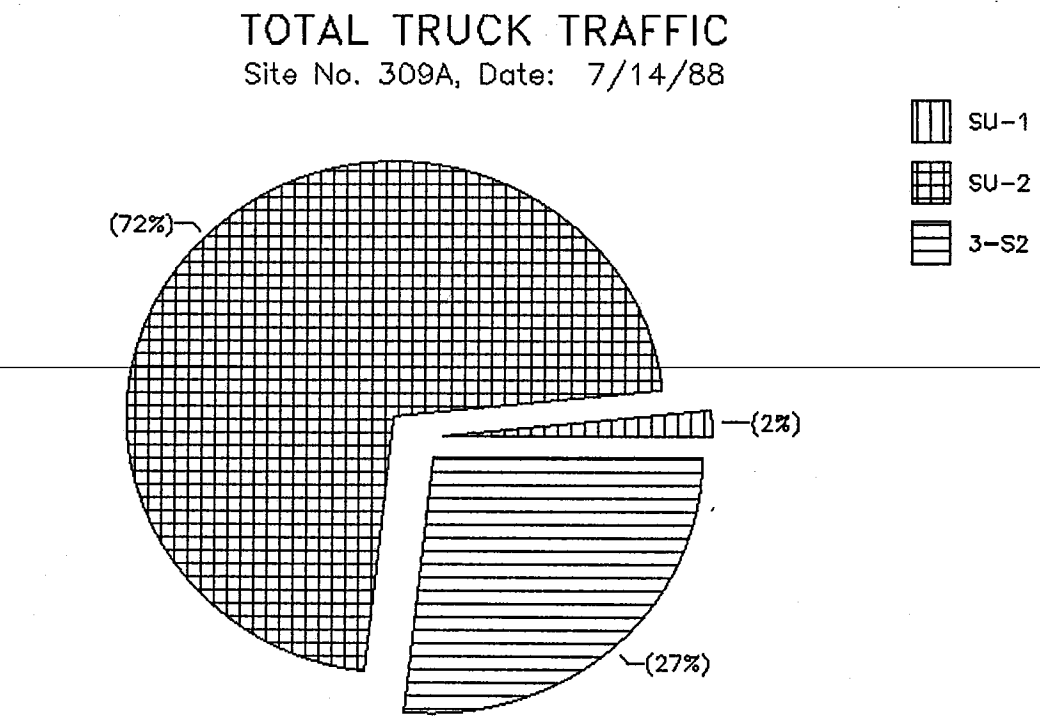


Figure 2.3.1.10-2. Hourly Trip Generation



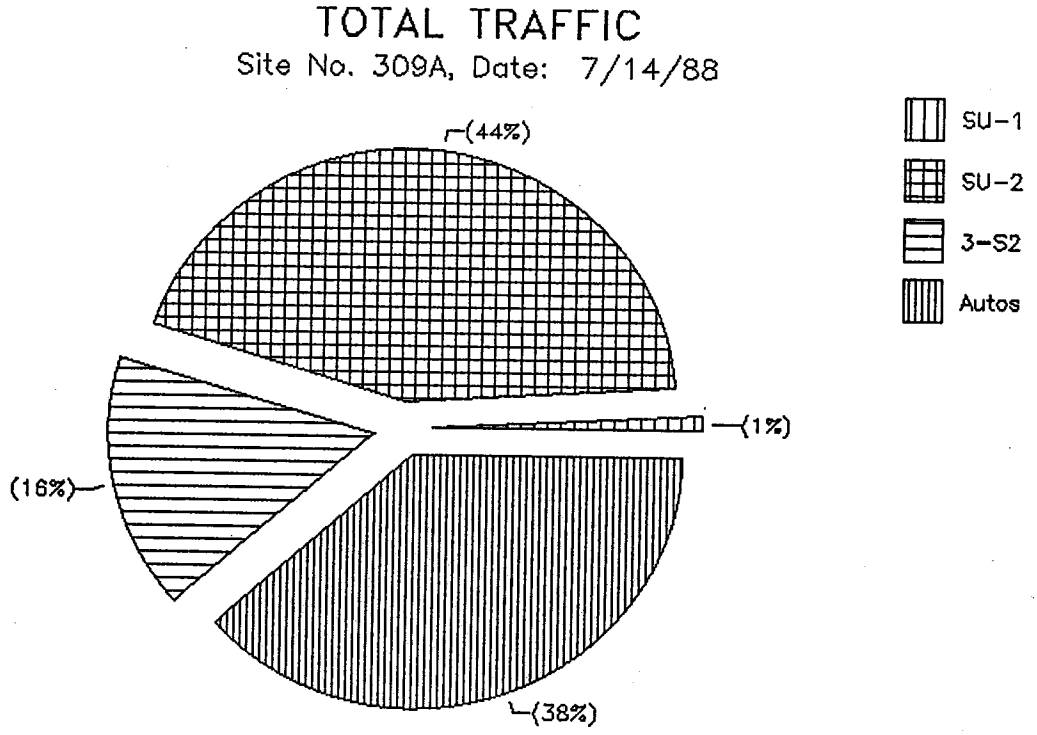


Figure 2.3.1.10-3. Activity Center Vehicle Percentages

Table 2.3.1.10-1. Traffic Classification Count Summary

Table 2.3.1.10-1A. Activity Center Only

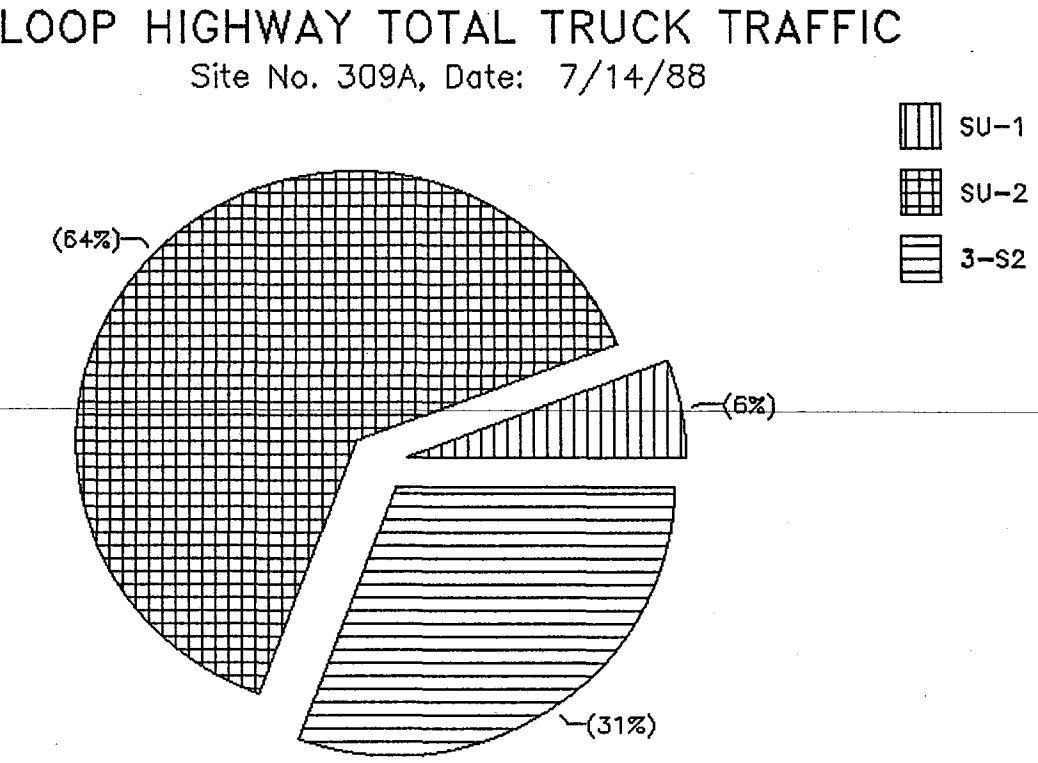
Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/14/88	77	2	89	33	201	73%	27%	38%	62%

Table 2.3.1.10-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/14/88	615	8	19	19	661	59%	41%	93%	7%

Table 2.3.1.10-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/14/88	692	10	108	52	862	69%	31%	80%	20%



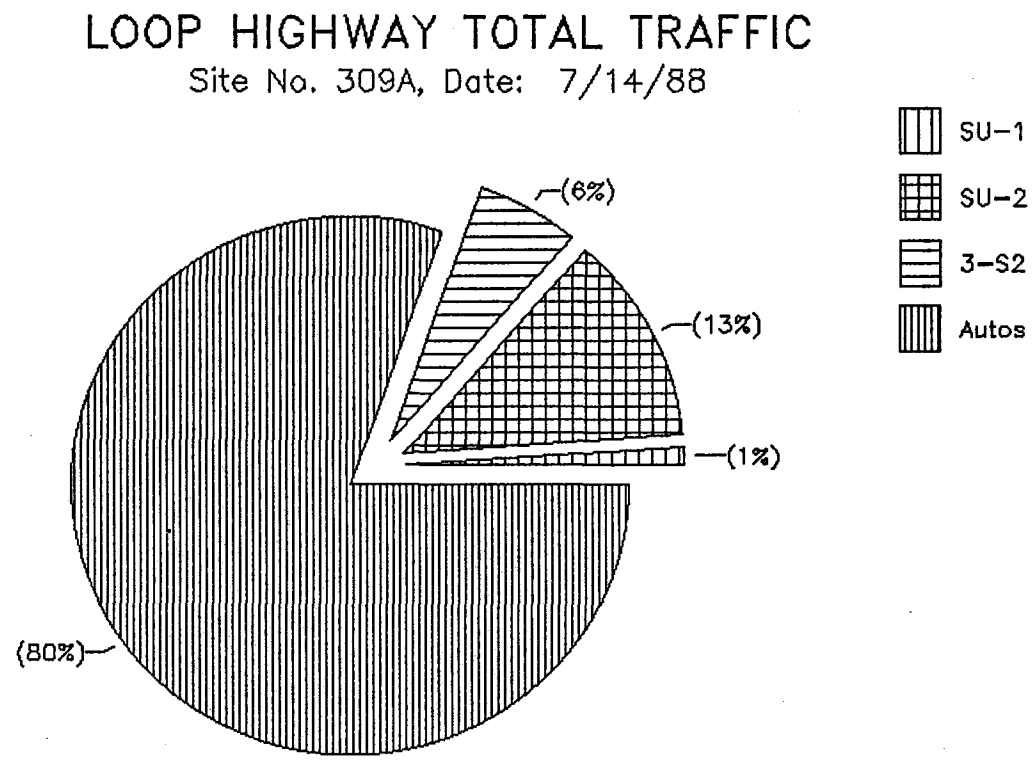


Figure 2.3.1.10-4. Highway Vehicle Percentages

2.3.1.11 Grain Elevator, Site No. 310

Introduction. The site map shown in Figure 2.3.1.11-1 indicates that this site is located adjacent to a railroad and at the intersection of an F.M. Road and a U.S. Highway. Another elevator is located adjacent to it. The elevators are located in a relatively small town and have access only to the F.M. Road.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.11-2 shows the truck traffic (in and out) generated by the site during a 13-hour period (10 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 13-hour period on July 16, 1985.

Figure 2.3.1.11-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (44%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 16 percent of this total. No interview information was available.

Characteristics of Roadway Serving Activity Center. Roadway classification counts were not included in the field study conducted in 1985. Therefore, no analysis can be made of vehicle percentages. Table 2.3.1.11-1 is a summary of trips generated at the activity center.

Table 2.3.1.11-1. Traffic Classification Count Summary

Activity Center Only

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/16/85	103	175	245	132	4	659	75%	25%	16%	84%

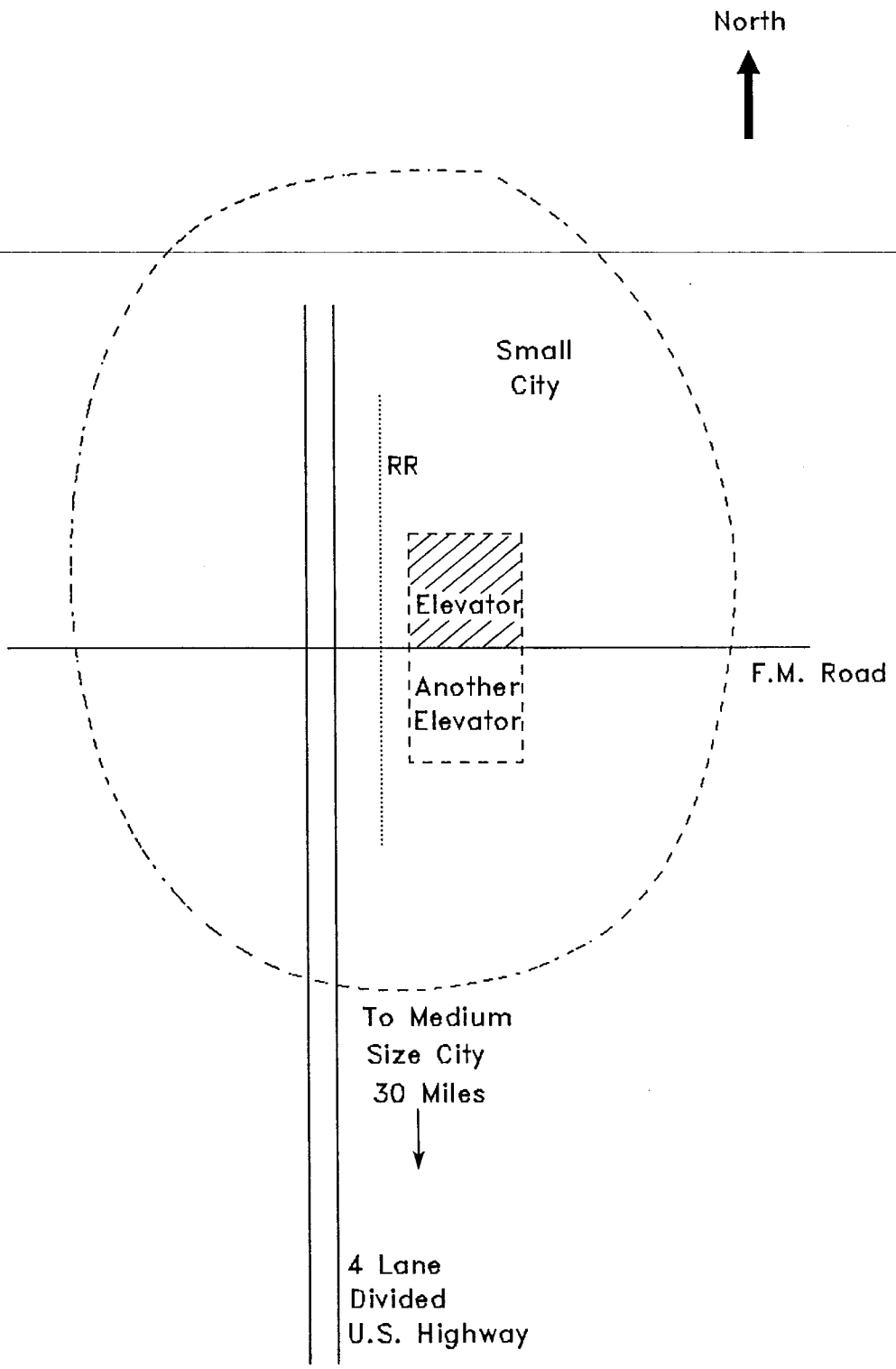
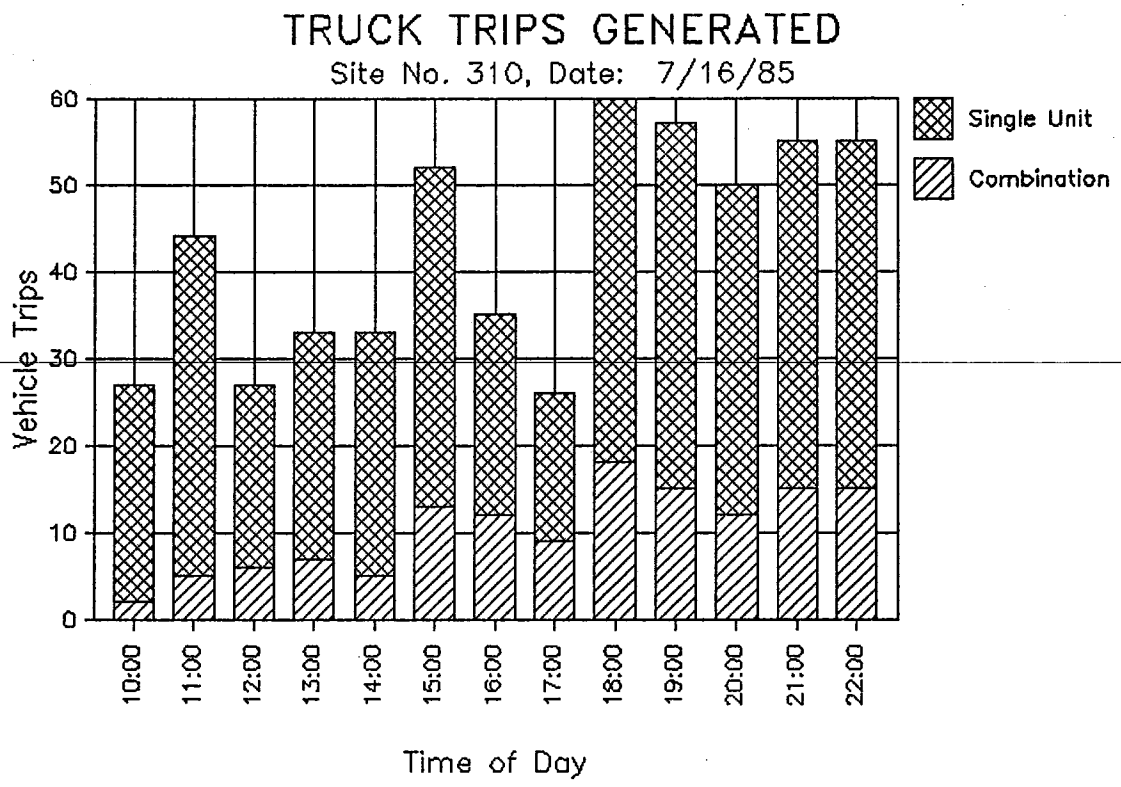


Figure 2.3.11-1. Site Map



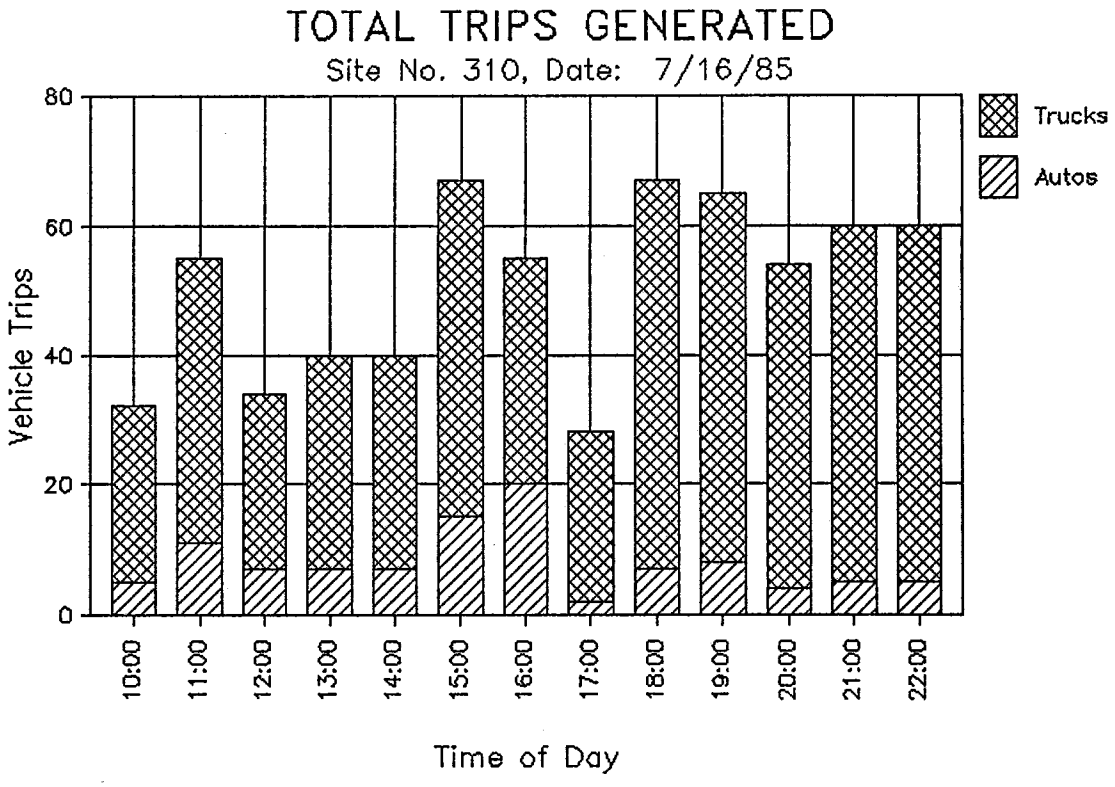
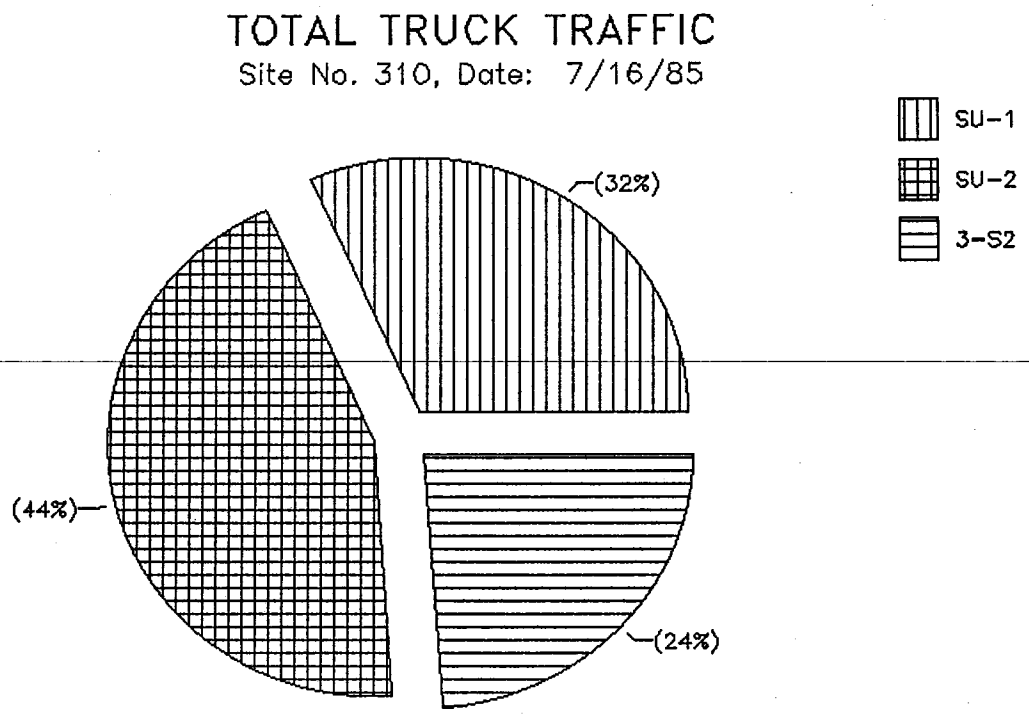


Figure 2.3.11-2. Hourly Trip Generation



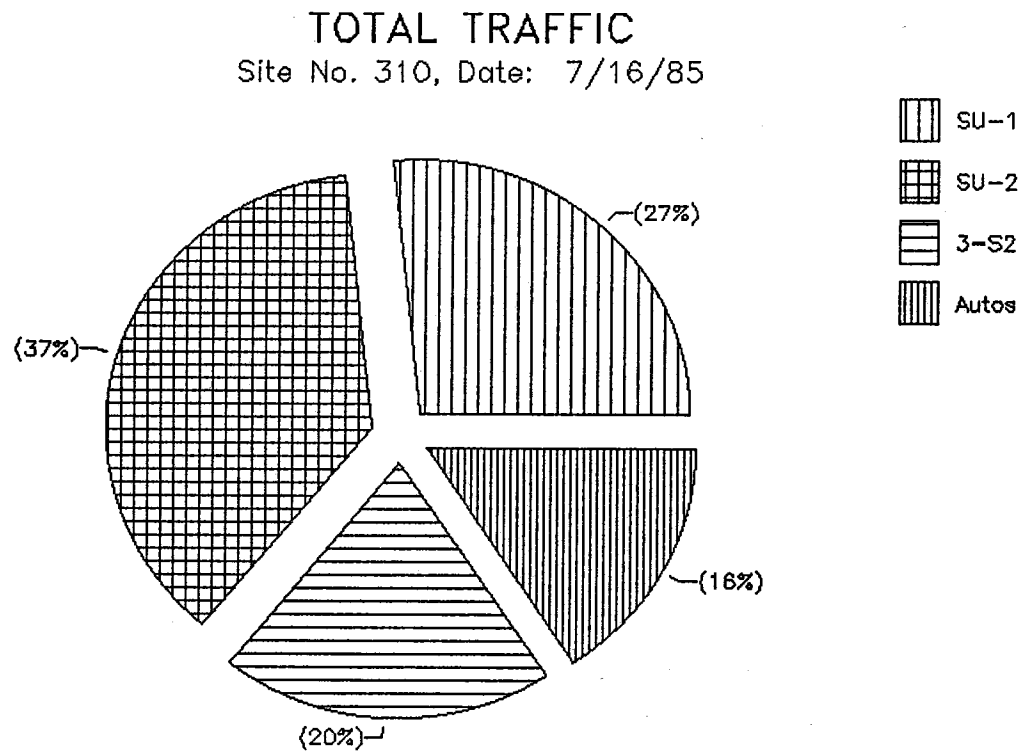


Figure 2.3.11-3. Activity Center Vehicle Percentages

2.3.1.12 Grain Elevator, Site No. 311

Introduction. This site is located on a major U.S. Highway as shown by Figure 2.3.1.12-1. The activity center is located north of a small urban area. A railroad spur was available but it had not been used in 8 years. This elevator had been in business for 16 years.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.12-2 shows the truck traffic (in and out) generated by the site during a 13-hour period (10 a.m. - 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 13-hour period on July 15, 1985.

Figure 2.3.1.12-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-1 (74%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 18 percent of this total.

Interview information on the number of truck loads of grain hauled from the fields to this elevator during the 1987 harvest is summarized in Table 2.3.1.12-1. According to the elevator owner, about 25 percent of these trucks were 3-S2 combinations with most of the remainder being three axle single unit trucks. Only a few were two axle trucks. Practically all trucks hauling grain away from this elevator are 3-S2 combinations.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway. According to SDHPT records, this highway had an average daily traffic (ADT) of 8,800 vehicles per day in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.12-2 provides a summary of the counts taken. In Table 2.3.1.12-2A, vehicle classification counts for the activity center only are provided. In Table 2.3.1.12-2B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.3.1.12-2C, a total count of all vehicles on the highway is provided.

Figure 2.3.1.12-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.3.1.12-2C values). The 3-S2 vehicle represents 82 percent of total trucks counted on this highway. Autos made up 84 percent of the total traffic on the day counted.

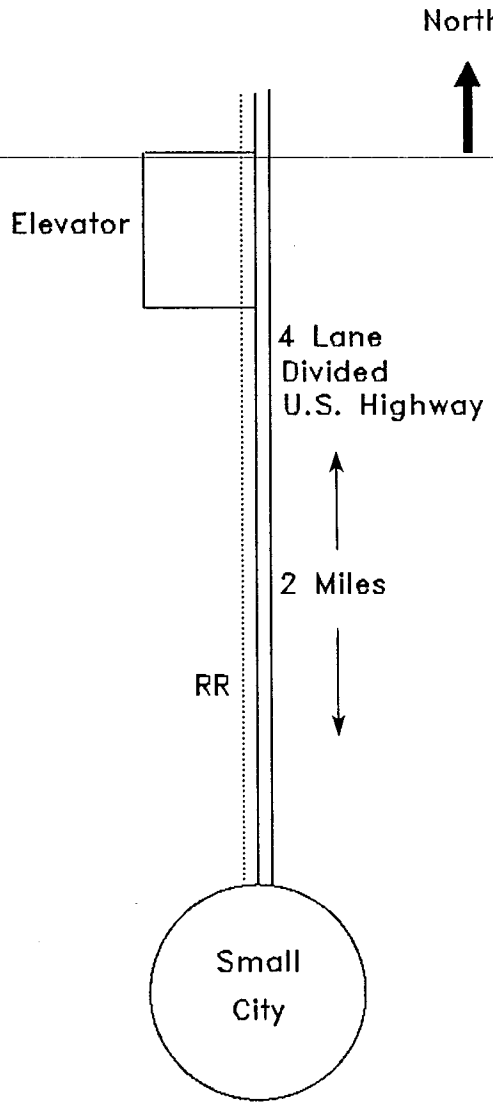
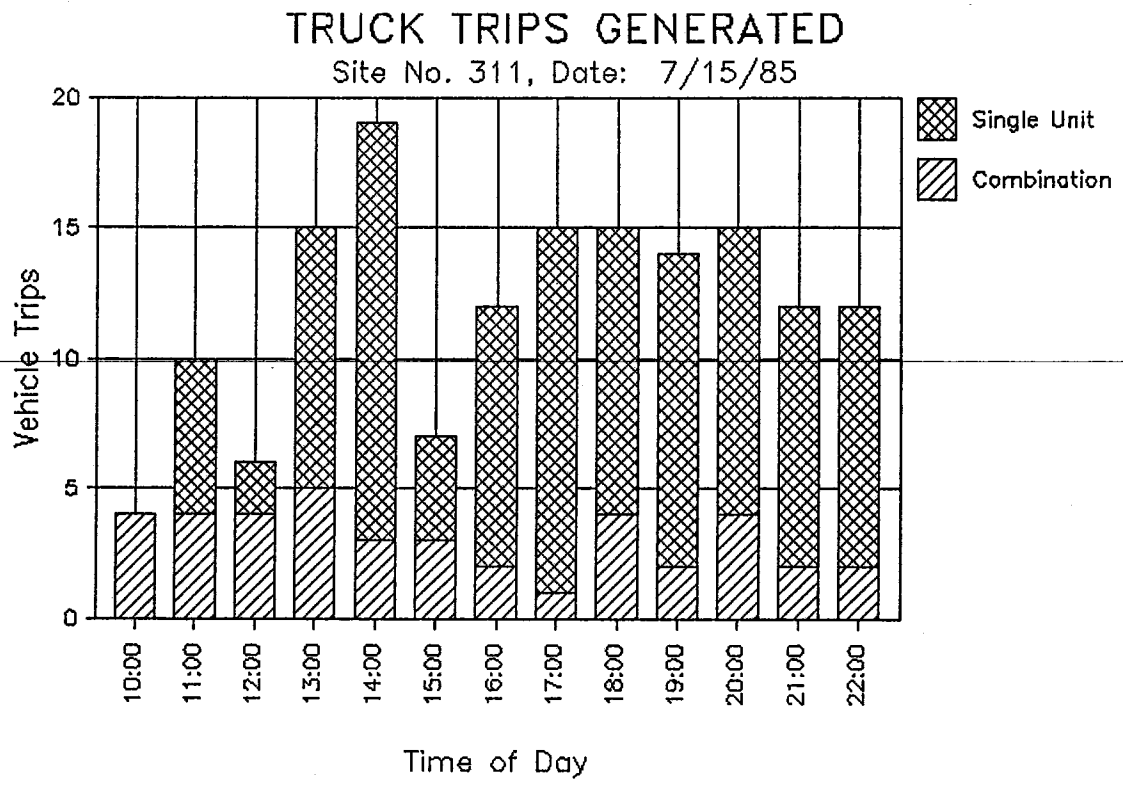


Figure 311-1. Site Map

Figure 2.3.1.12-1. Site Map



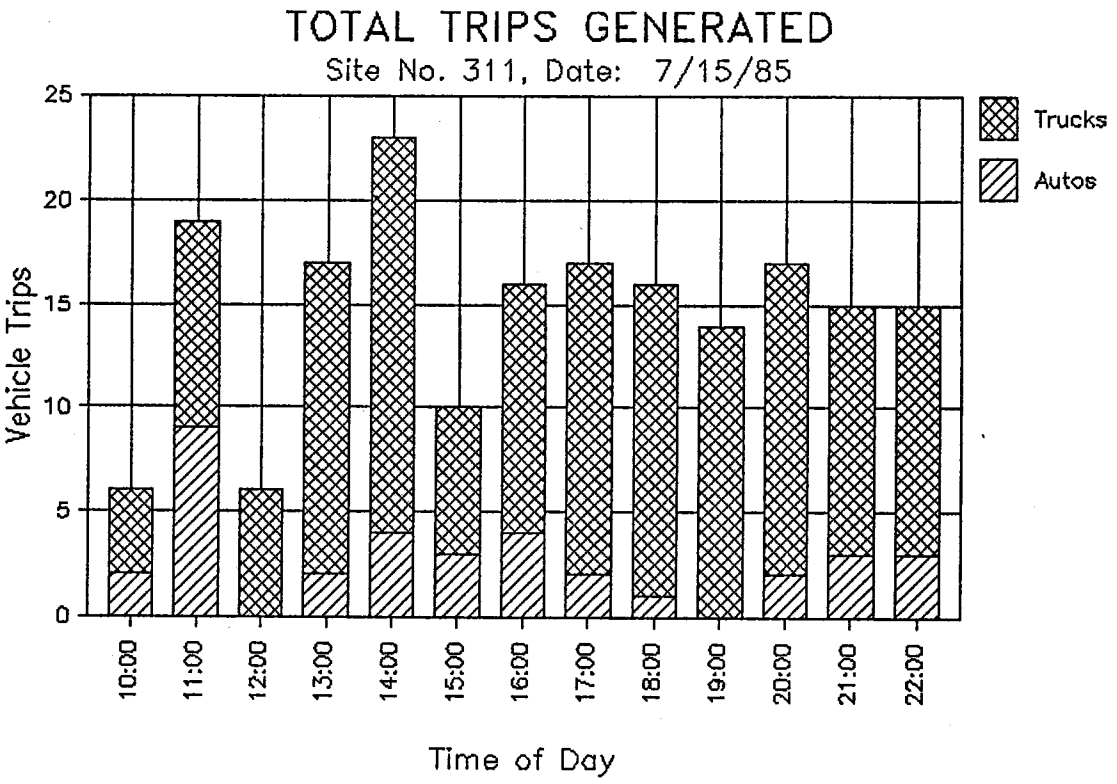
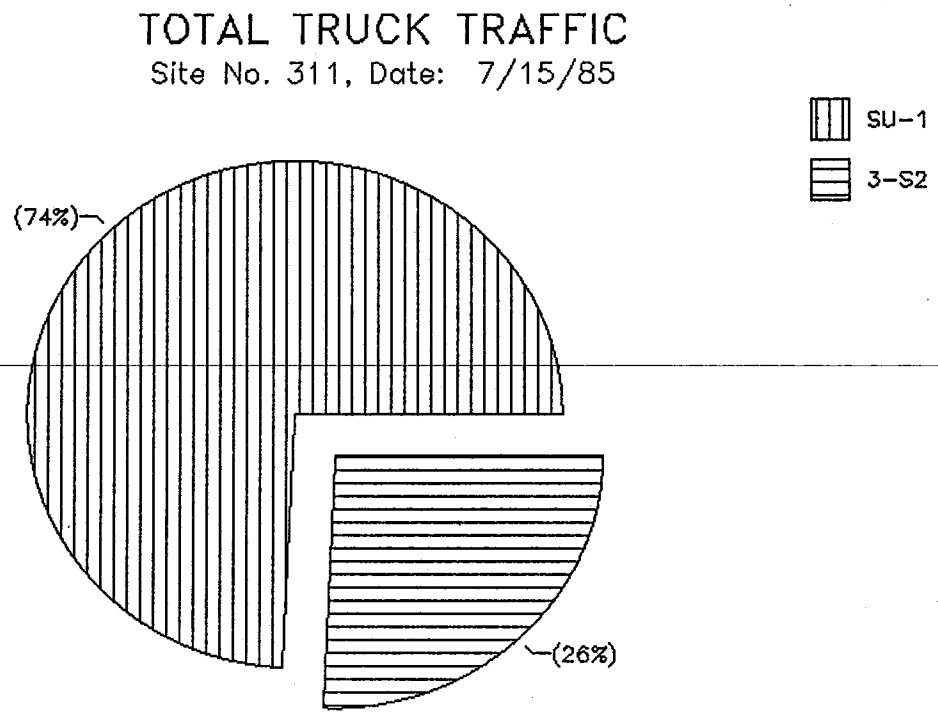


Figure 2.3.1.12-2. Hourly Trip Generation



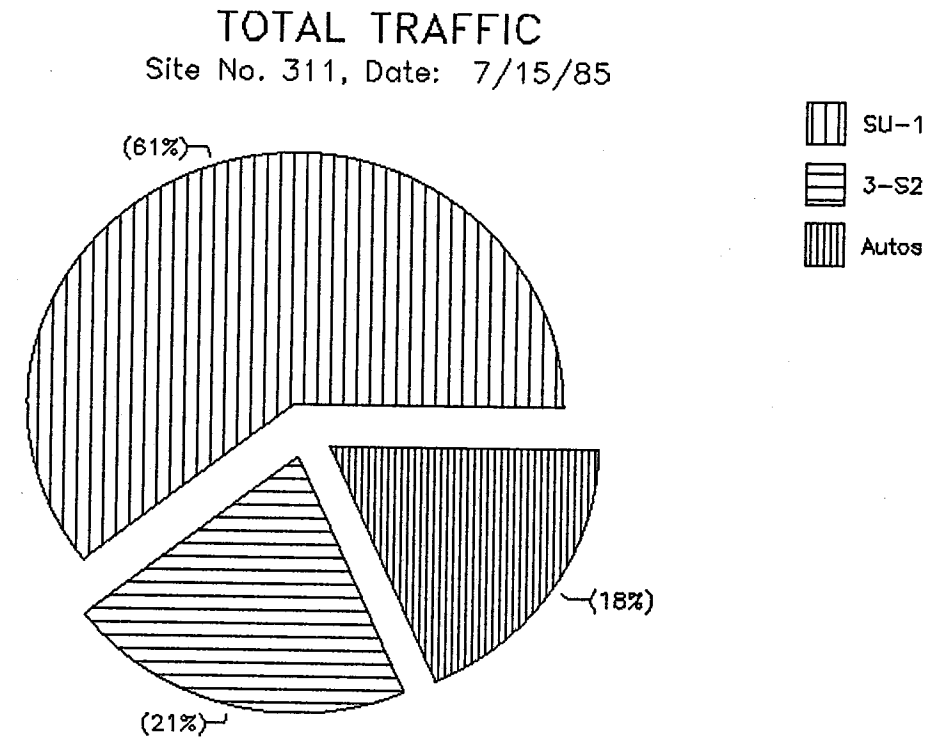


Figure 2.3.1.12-3. Activity Center Vehicle Percentages

Table 2.3.1.12-1. Interview Information

DATE	SORGHUM	CORN	DATE	SORGHUM	CORN
7/13	2	0	8/5	20	0
7/16	8	0	8/6	26	0
7/17	6	0	8/7	22	0
7/18	8	0	8/8	15	0
7/20	4	0	8/9	4	0
7/22	19	0	8/11	0	6
7/23	8	0	8/12	0	21
7/24	7	0	8/13	0	18
7/25	1	0	8/14	1	18
7/26	18	0	8/15	0	8
7/28	23	0	8/22	0	2
7/29	24	0	8/24	1	2
7/30	44	0	8/25	4	2
7/31	26	0	8/26	3	0
8/1	29	0	8/27	1	1
8/2	48	0	8/28	1	0
8/3	36	0	9/3	0	1
8/4	28	0	9/8	1	0

Table 2.3.1.12-2. Traffic Classification Count Summary

Table 2.3.1.12-2A. Activity Center Only

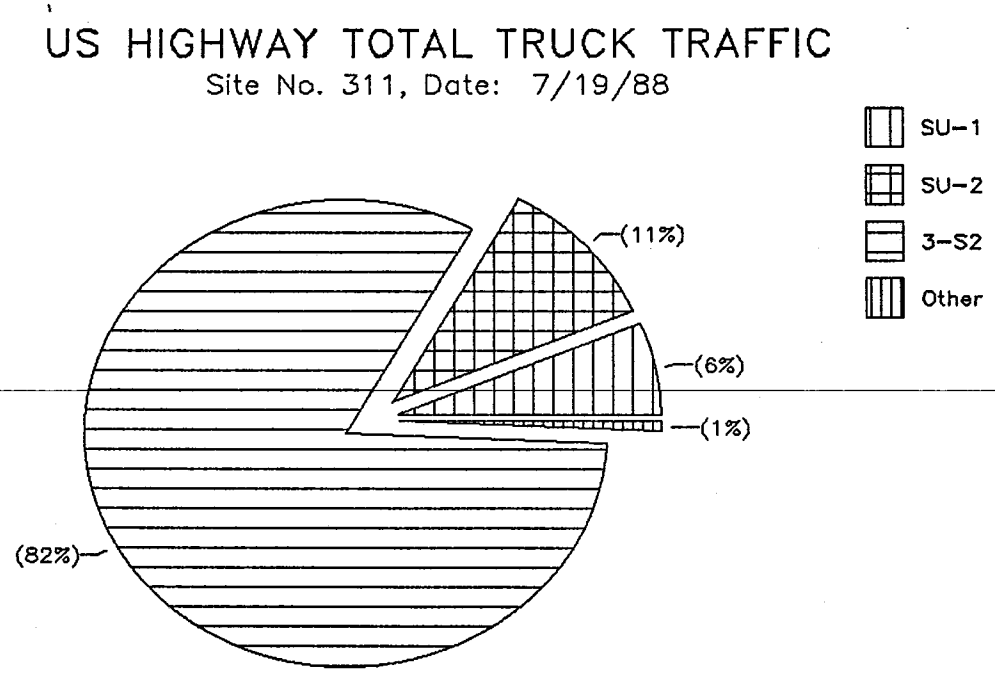
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/15/85	35	116	0	40	2	193	73%	27%	18%	82%
7/19/88	39	11	17	43	0	110	39%	61%	35%	65%

Table 2.3.1.12-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/19/88	4764	47	78	701	6	5596	15%	85%	85%	15%

Table 2.3.1.12-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/19/88	4803	58	95	744	6	5706	17%	83%	84%	16%



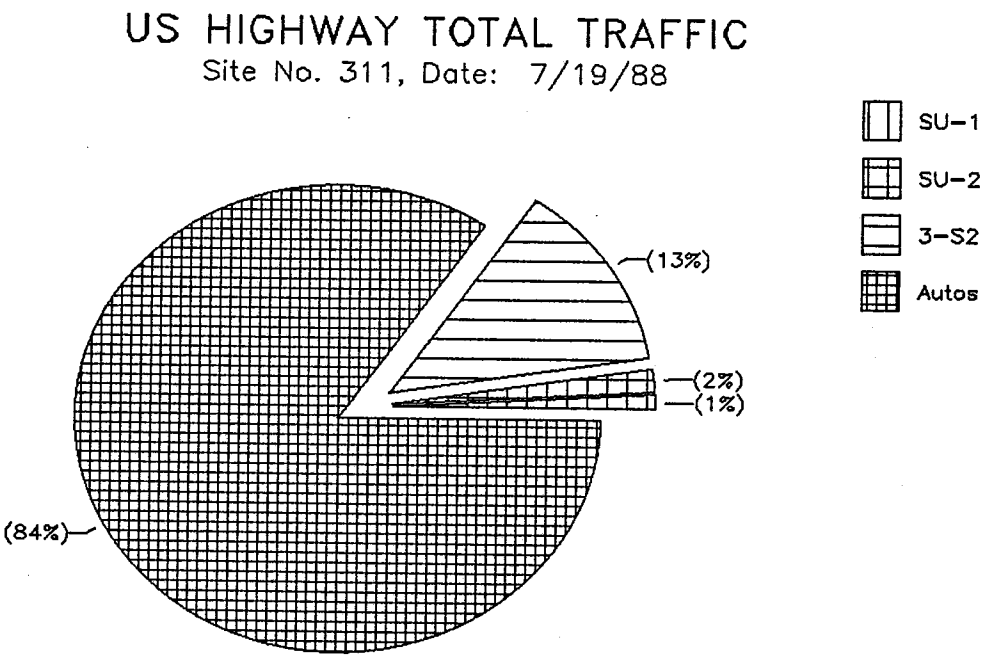


Figure 2.3.1.12-4. Highway Vehicle Percentages

2.3.1.13 Grain Elevator, Site No. 312A

Introduction. The site map shown in Figure 2.3.1.13-1 indicates that access is provided by a State Highway. The activity center is located in a relatively small urban area. Trucks hauling grain to and from this facility serve an area of approximately 50 miles radius. The site is served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.3.1.13-2 shows the truck traffic (in and out) generated by the site during a 13-hour period (10 a.m. to 11 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by the site during this same 13-hour period on July 13, 1988.

Figure 2.3.1.13-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (70%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 43 percent of this total.

An interview was conducted with an official at the site. It was estimated that the facility handles an average of 2500 tons of grain per day. The facility operates one shift per day from 8 a.m. to 11 p.m.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a State Highway. It is estimated that this state highway had an average daily traffic (ADT) of 6,200 vehicles per day in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the highway. Table 2.3.1.13-1 provides a summary of the counts taken. In Table 2.3.1.13-1A, vehicle classification counts for the activity center only are provided. In Table 2.3.1.13-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.3.1.13-1C, a total count of all vehicles on the highway is provided.

Figure 2.3.1.13-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.3.1.13-1C values). The 3-S2 vehicle represents 42 percent of the total trucks counted on this highway. Autos made up 88 percent of the total traffic counted.

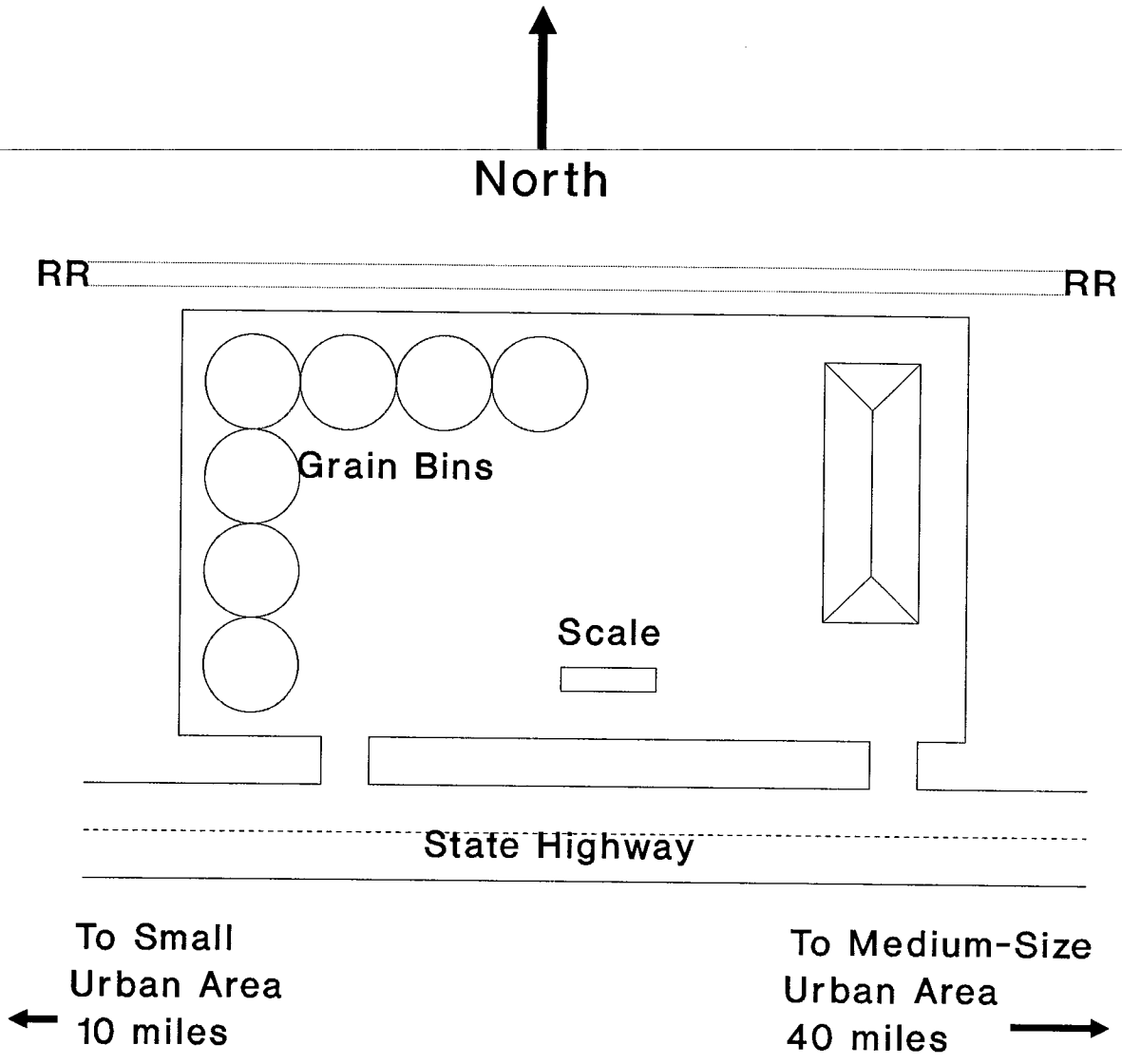
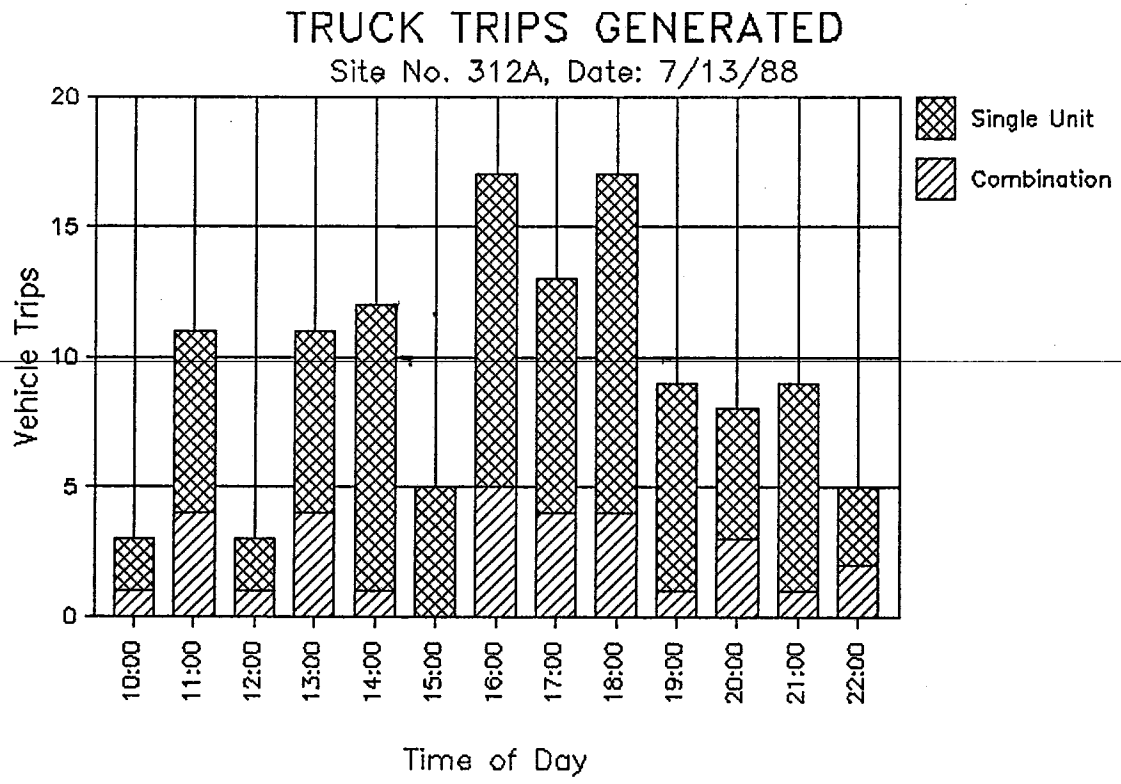


Figure 2.3.1.13-1. Site Map



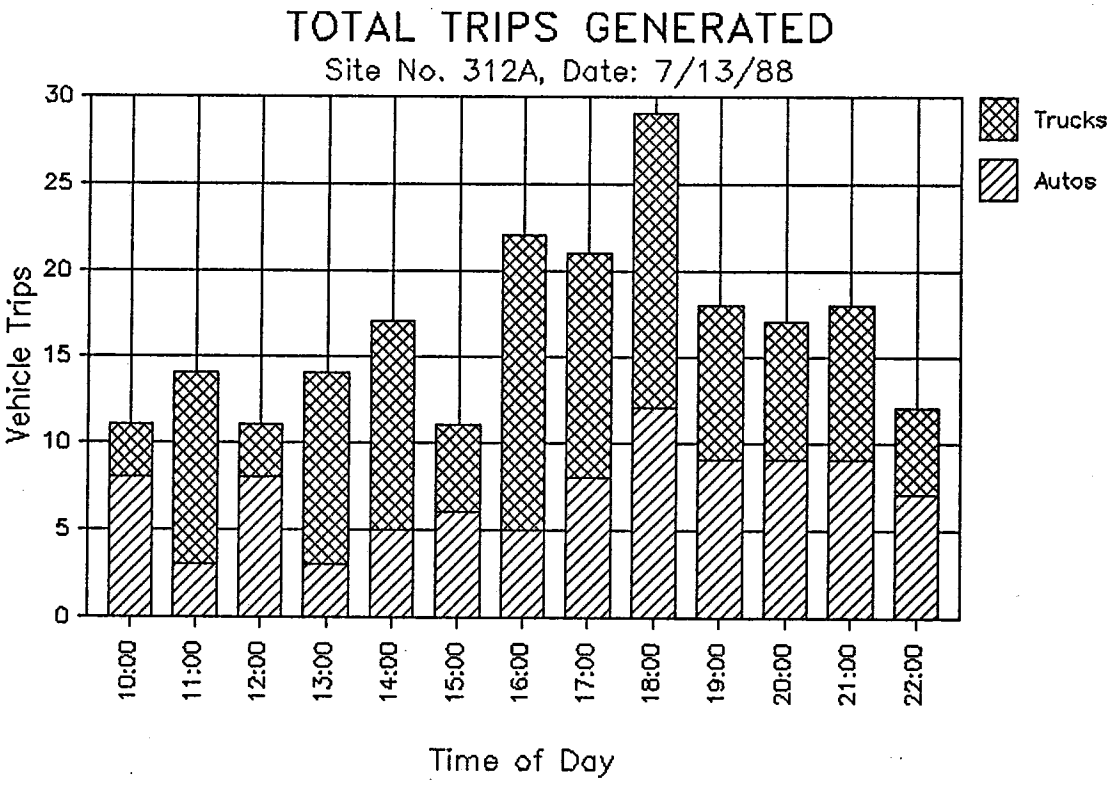
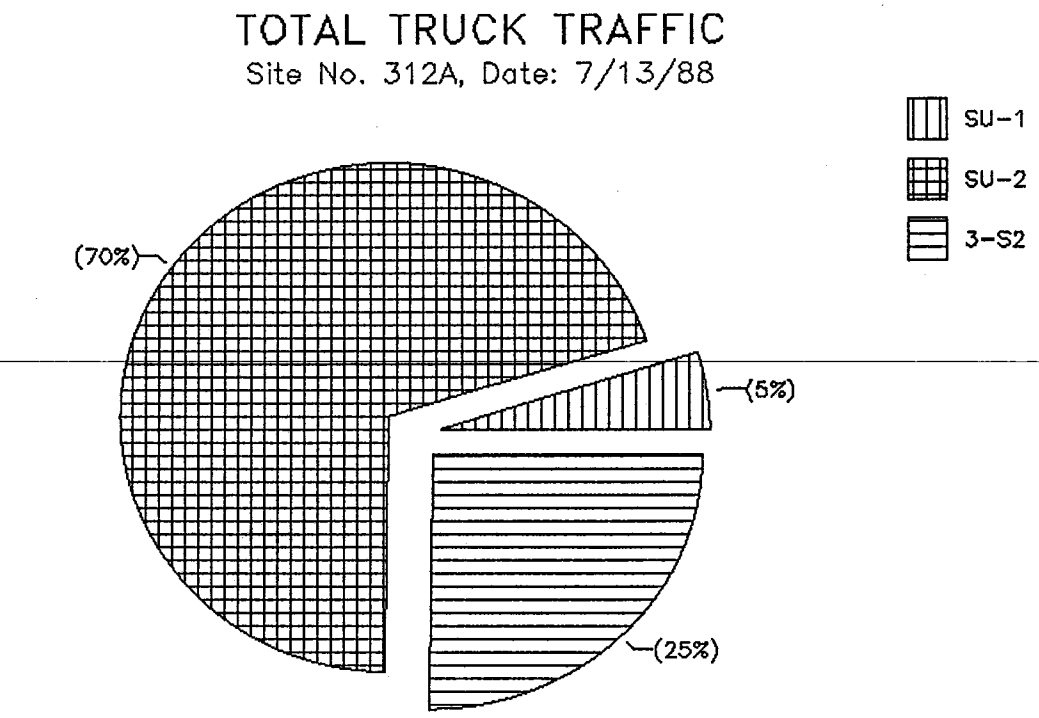


Figure 2.3.1.13-2. Hourly Trip Generation



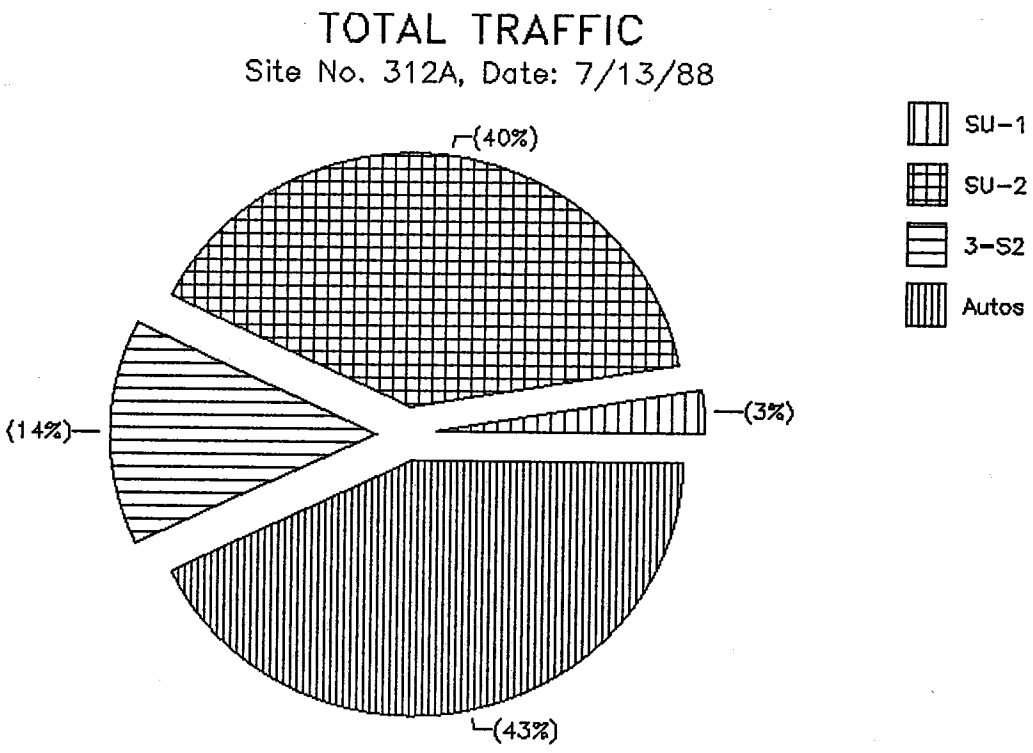


Figure 2.3.1.13-3. Activity Center Vehicle Percentages

Table 2.3.1.13-1. Traffic Classification Count Summary

Table 2.3.1.13-1A. Activity Center Only

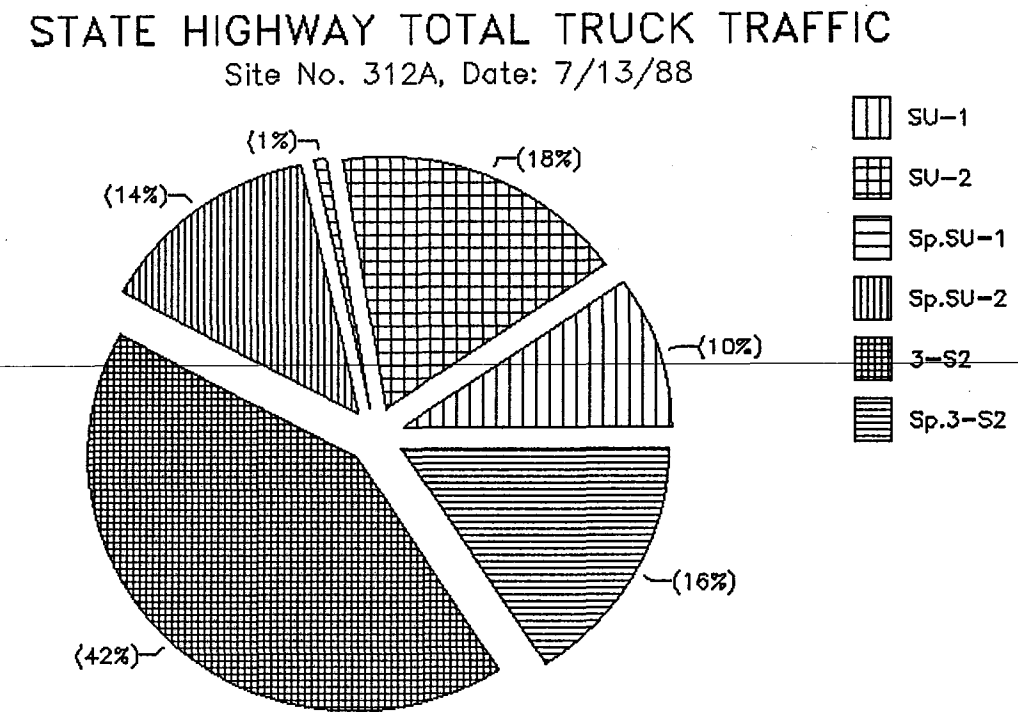
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/13/88	92	6	86	31	0	215	75%	25%	43%	57%

Table 317-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/13/88	4151	41	78	181	0	4451	40%	60%	93%	7%

Table 2.3.1.13-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/13/88	4243	50	223	281	0	4797	49%	51%	88%	12%



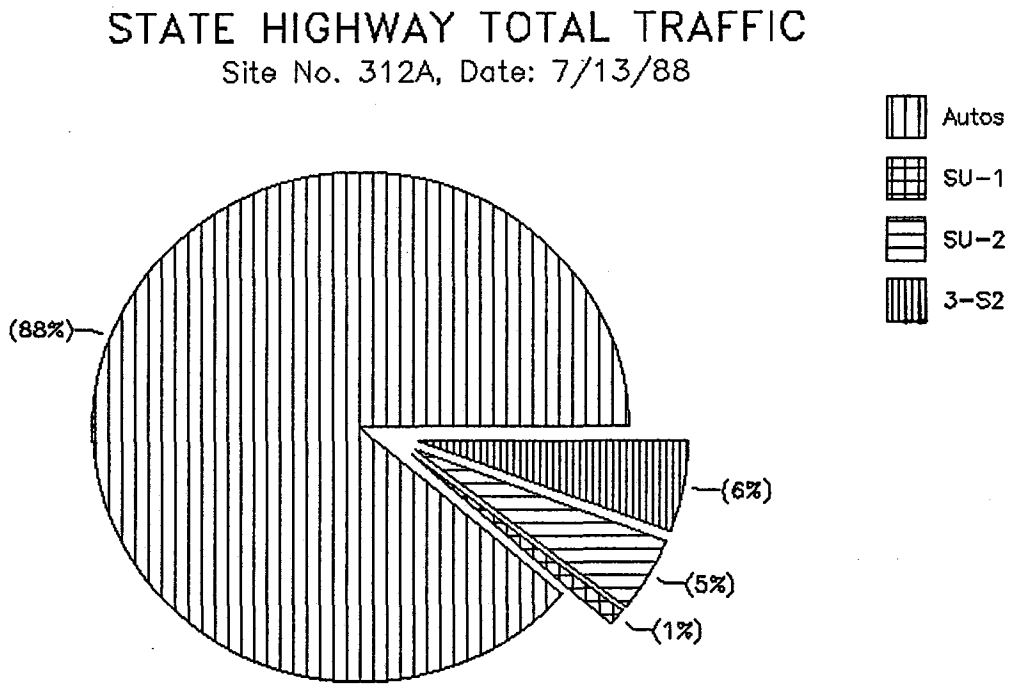


Figure 2.3.1.13-4. Highway Vehicle Percentages

2.3.2 WEIGH-IN-MOTION RESULTS FOR GRAIN

Figures 2.3.2-1 through 2.3.2-13 are cumulative distribution plots of axle weights and gross vehicle weights of grain trucks. The site numbers identified on the plots are the same as those used elsewhere for vehicle classification counts. The weigh-in-motion (WIM) crew identified special-use vehicles associated with each site and coded the vehicle for subsequent evaluation. The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weight. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was typically deployed where a high number of grain trucks could be weighed in a day's time, not necessarily near sites identified for classification counts. The time period during which the WIM system was usually deployed was from about 8 a.m. to about 4 p.m. In other words, the system was not used to monitor night activity.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near special-use traffic generators, lanes used for raw product movement, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked. Weighing sites were not selected adjacent to classification count activity centers simply because none of the roadways provided the desirable qualities noted above.

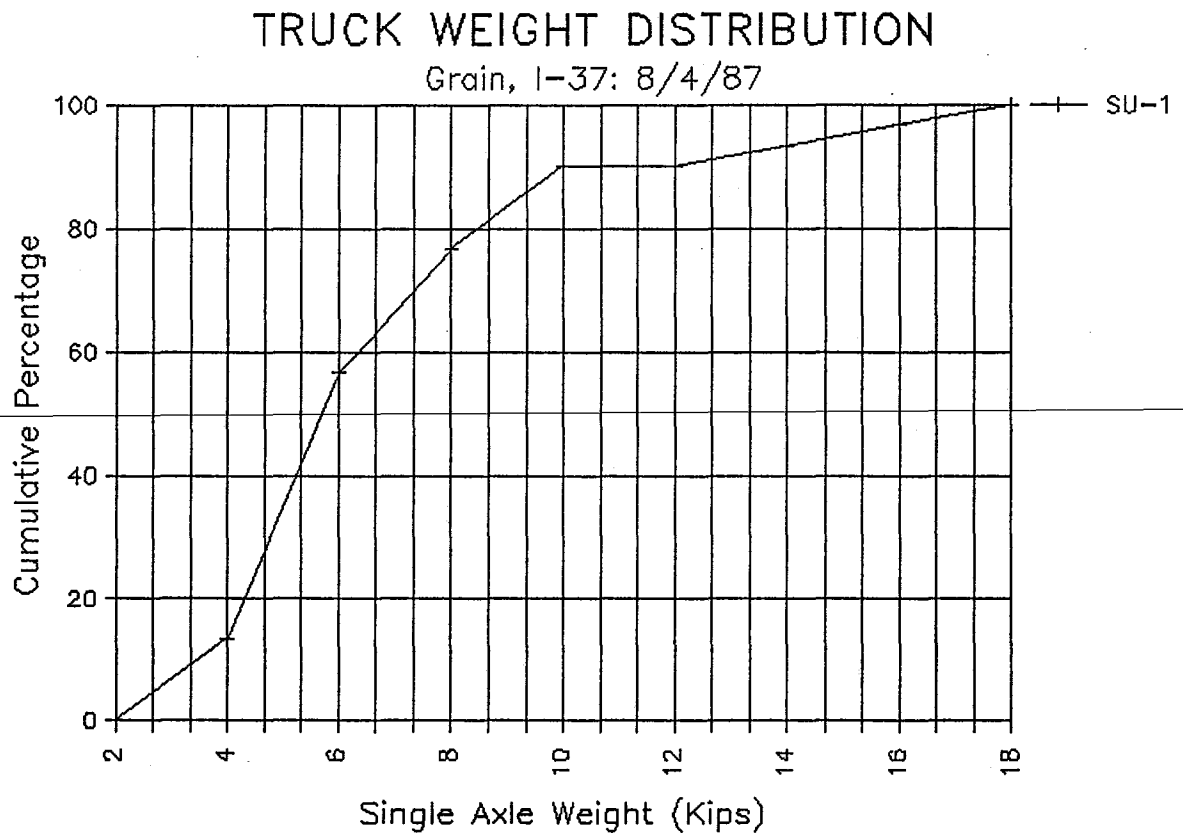


Figure 2.3.2-1 Grain Truck Weights: SU-1, Single Axle, 8/4/87

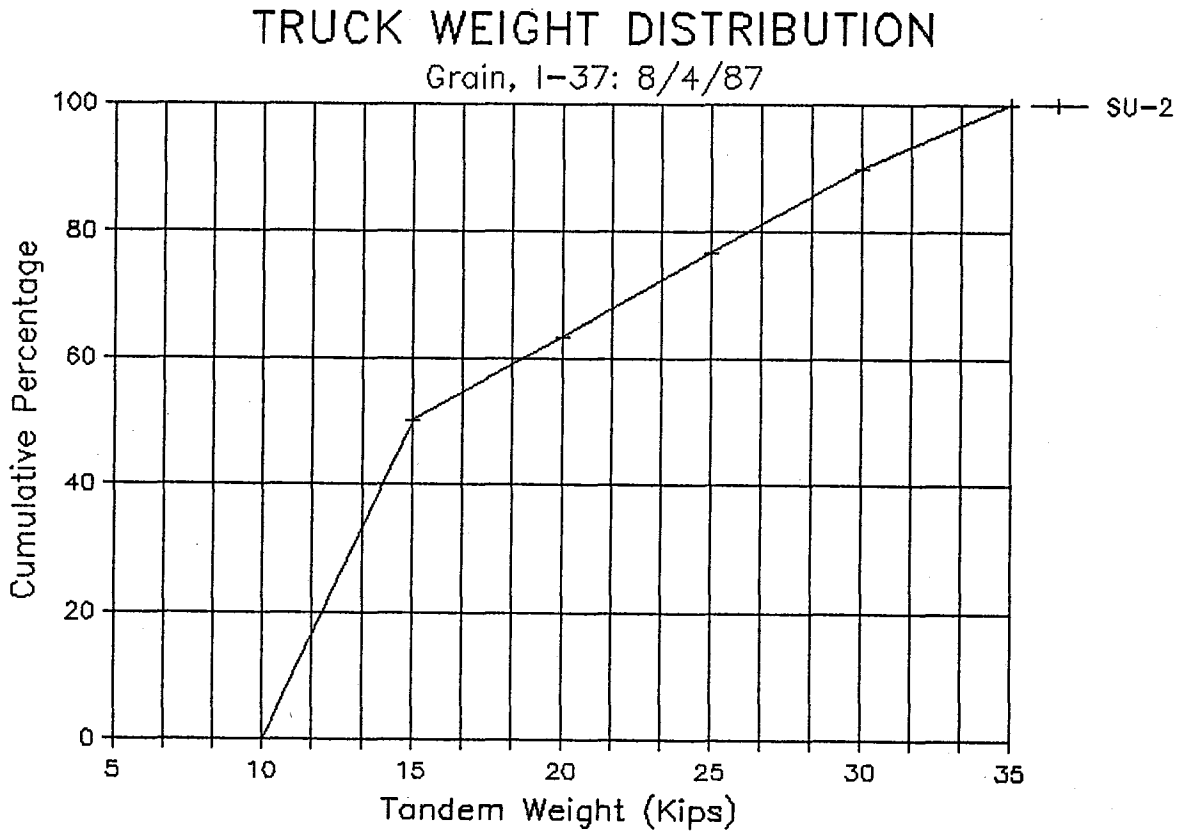


Figure 2.3.2-2 Grain Truck Weights: SU-2, Tandem, 8/4/87

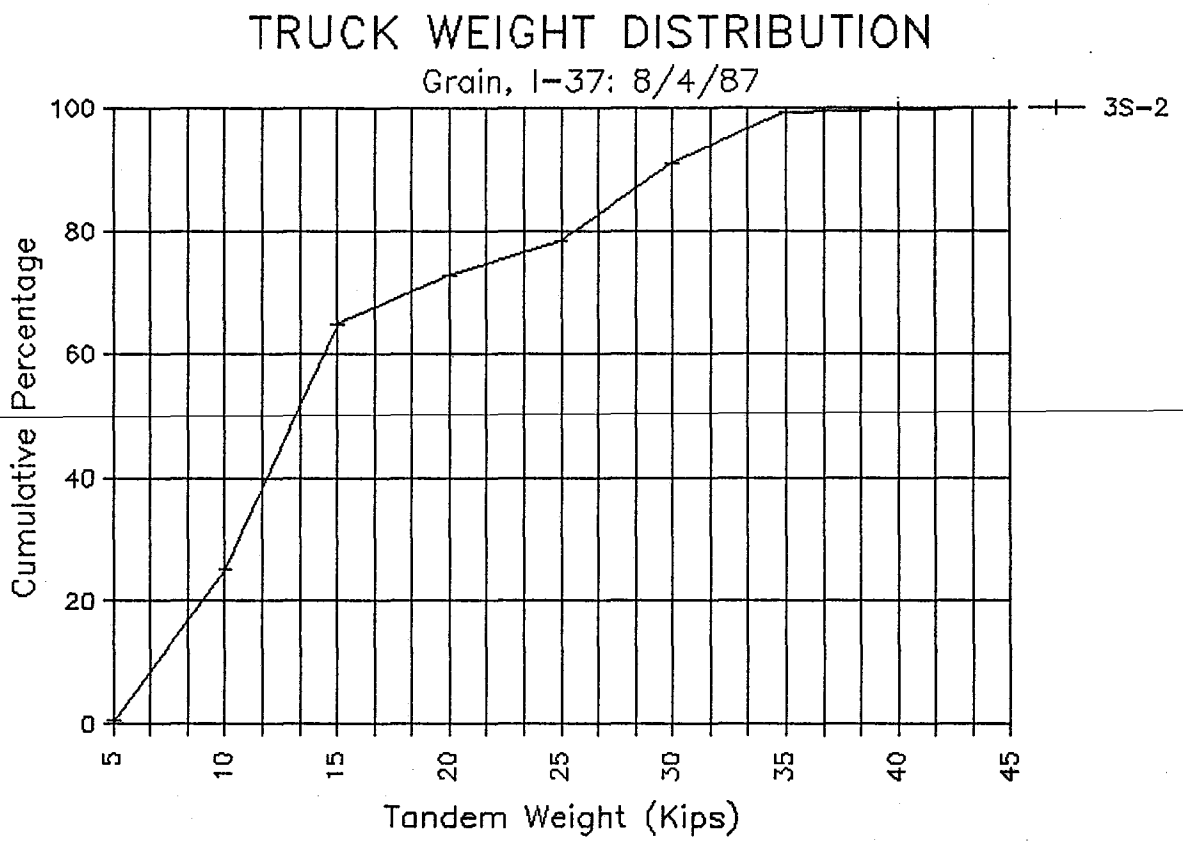


Figure 2.3.2-3 Grain Truck Weights: 3-S2, Tandem, 8/4/87

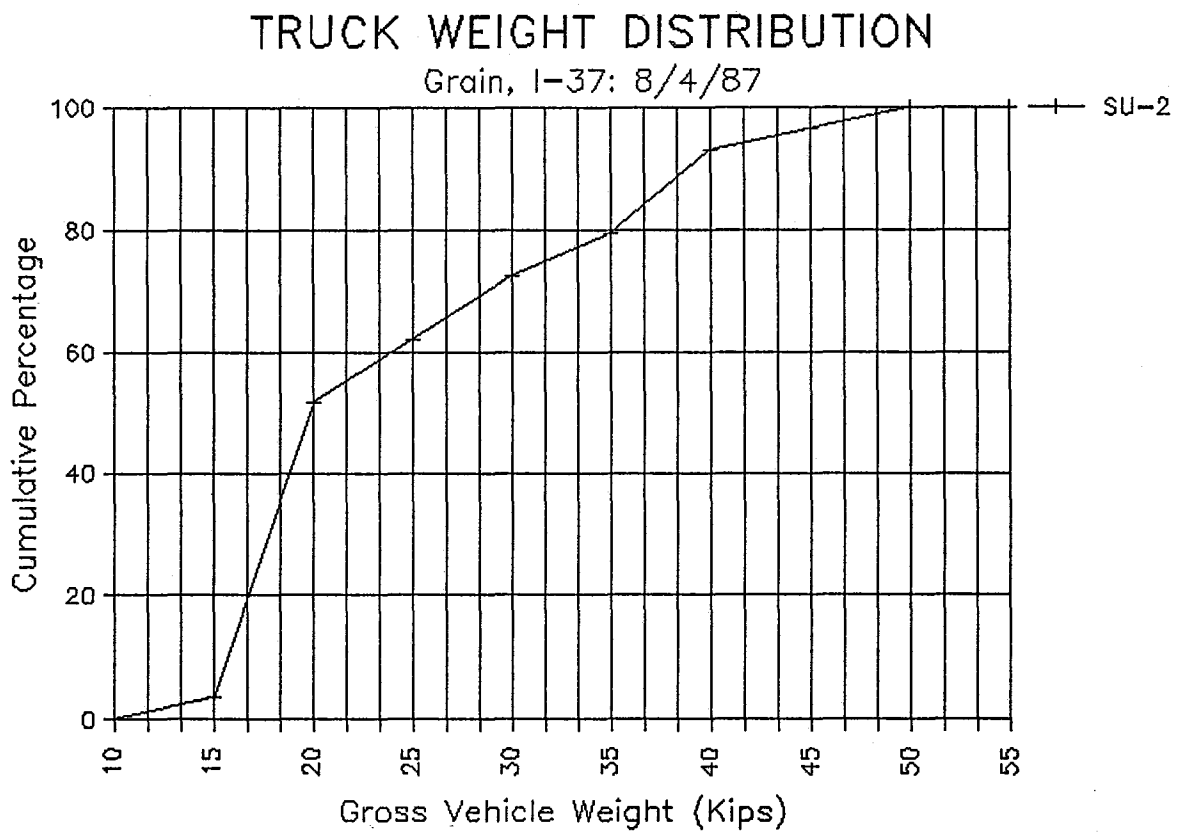


Figure 2.3.2-4 Grain Truck Weights: SU-2, Gross Vehicle, 8/4/87

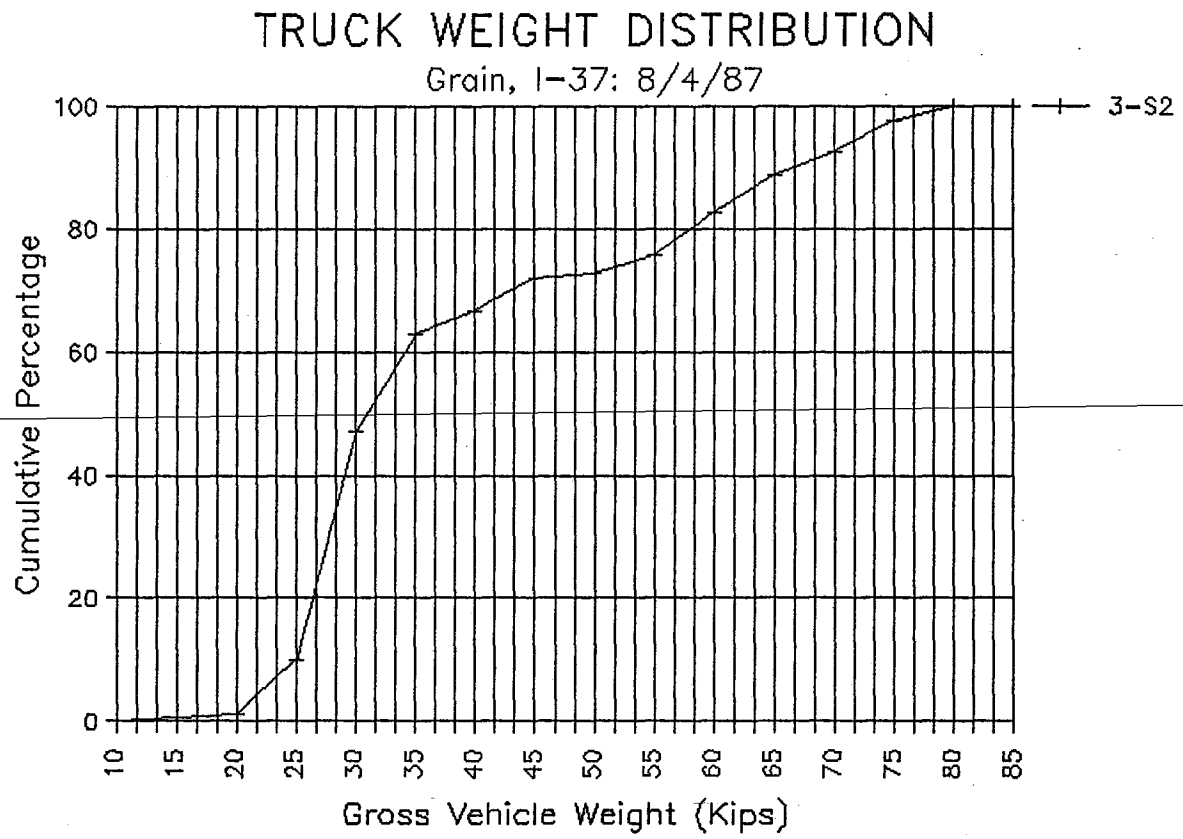


Figure 2.3.2-5 Grain Truck Weights: 3-S2, Gross Vehicle, 8/4/87

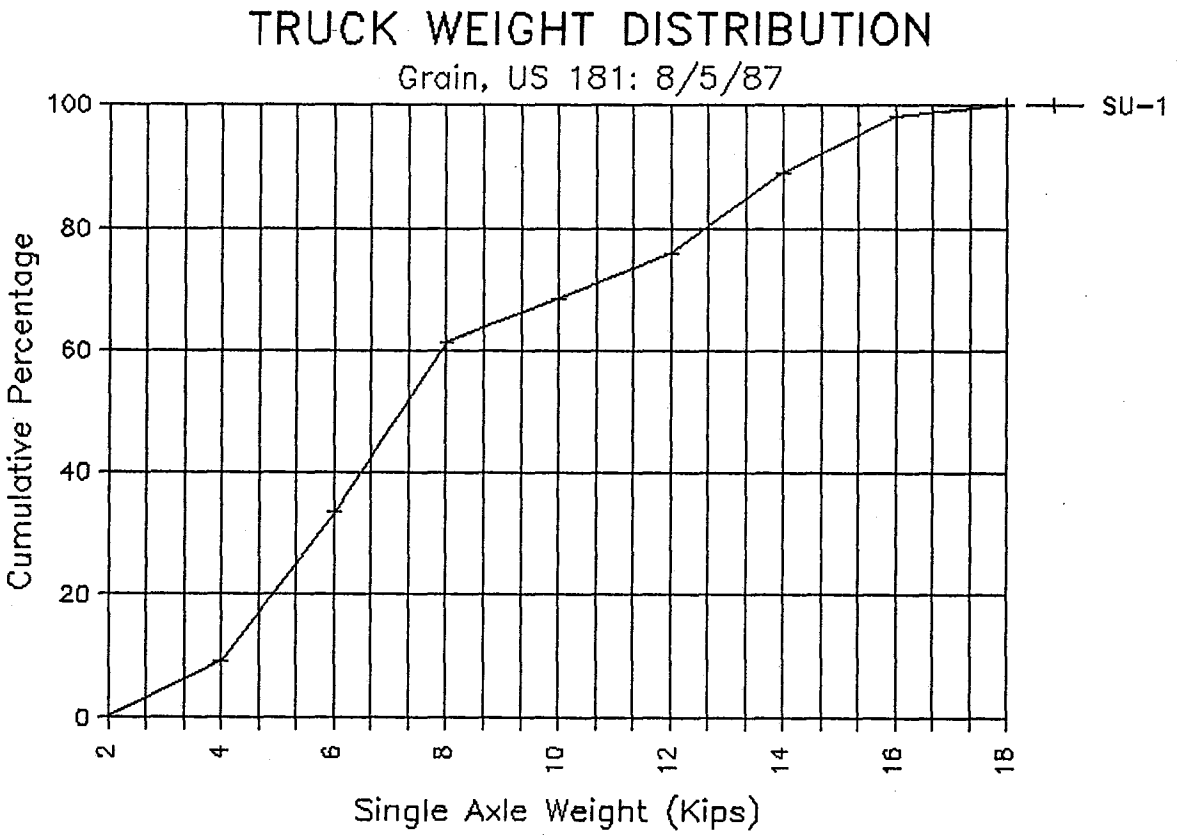


Figure 2.3.2-6 Grain Truck Weights: SU-1, Single Axle, 8/5/87

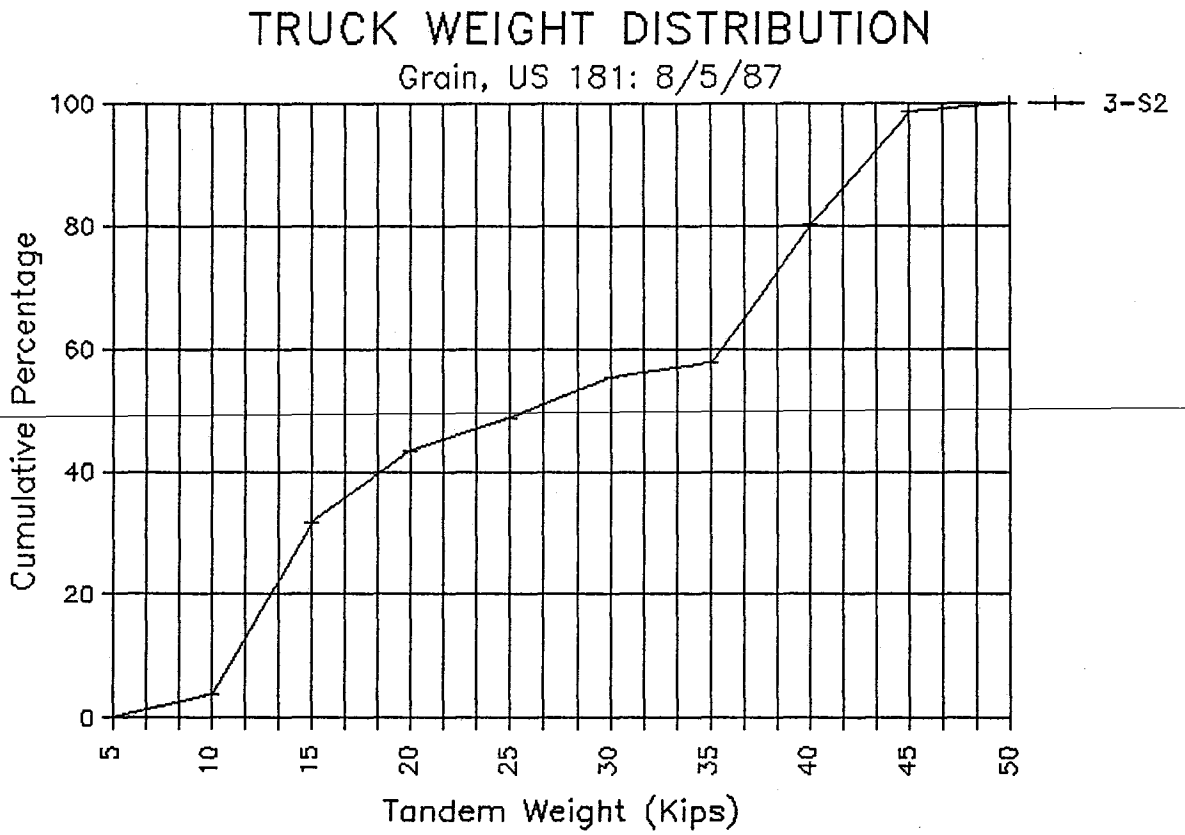


Figure 2.3.2-7 Grain Truck Weights: 3-S2, Tandem, 8/5/87

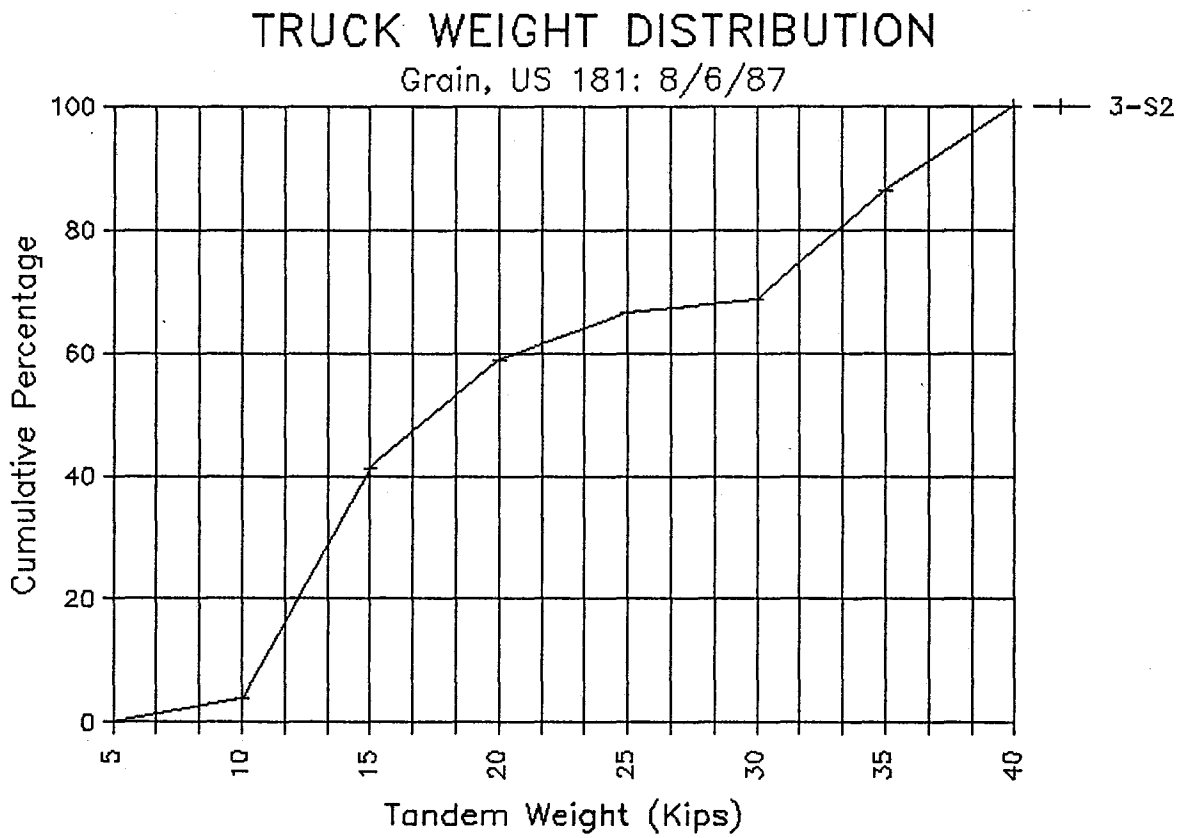


Figure 2.3.2-8 Grain Truck Weights: 3-S2, Tandem, 8/6/87

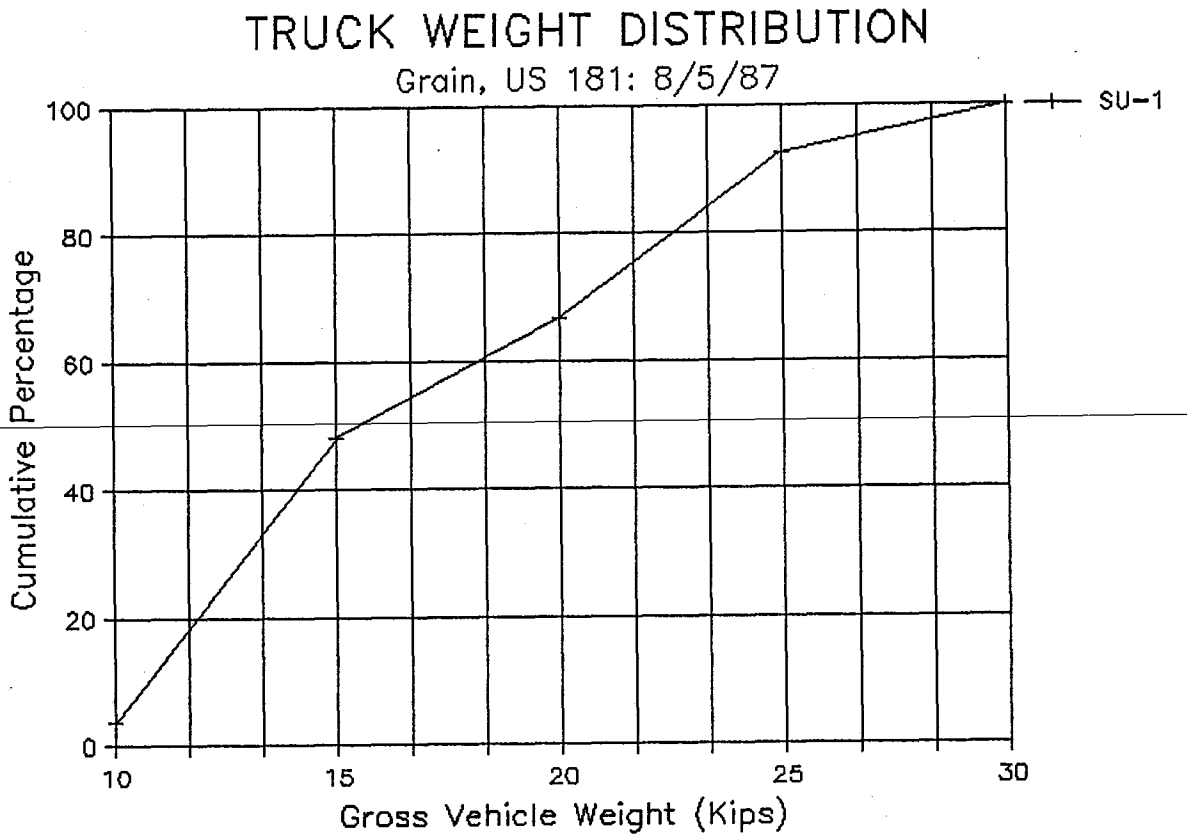


Figure 2.3.2-9 Grain Truck Weights: SU-1, Gross Vehicle, 8/5/87

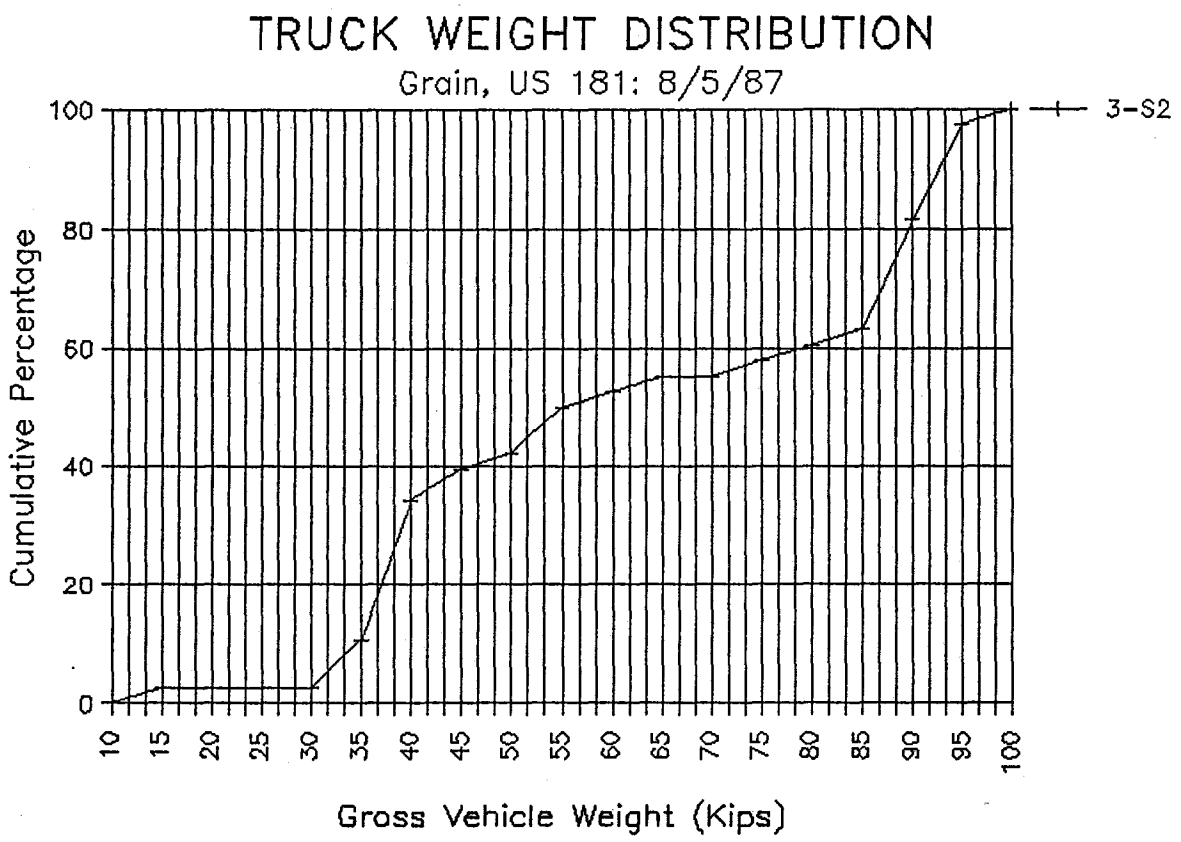


Figure 2.3.2-10 Grain Truck Weights: 3-S2, Gross Vehicle, 8/5/87

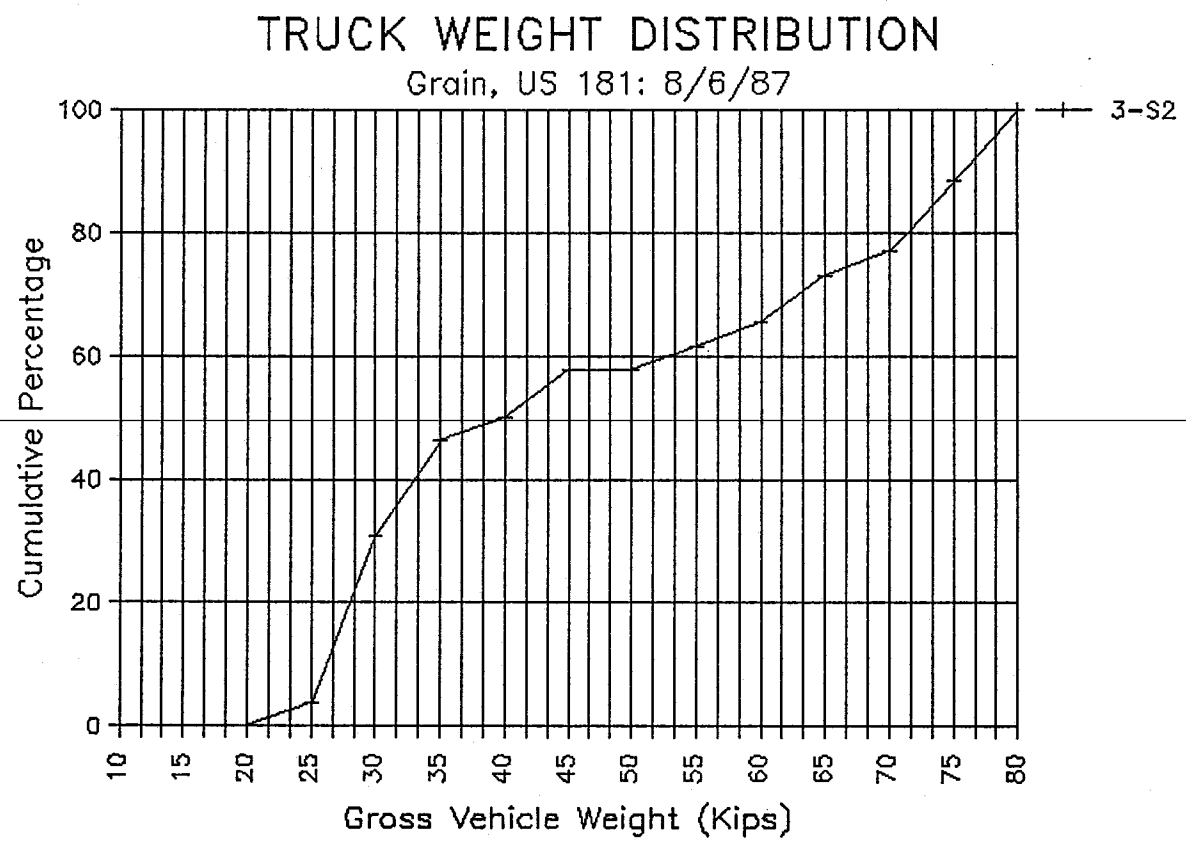


Figure 2.3.2-11 Grain Truck Weights: 3-S2, Gross Vehicle, 8/6/87

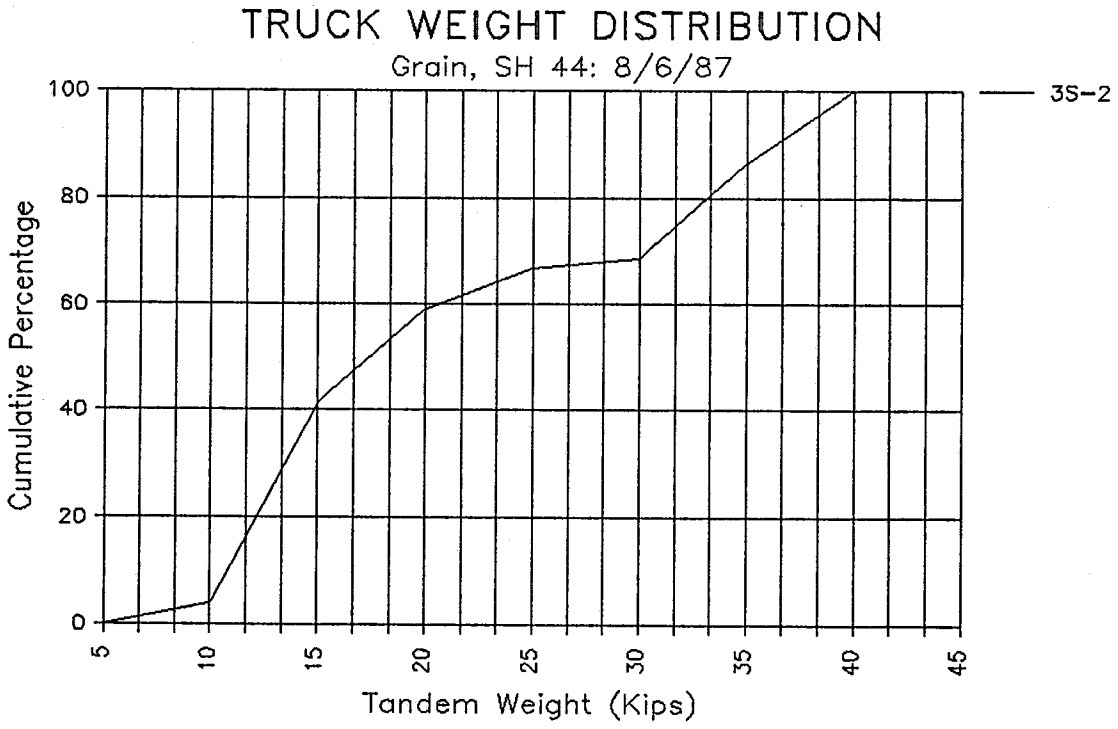


Figure 2.3.2-12 Grain Truck Weights: 3-S2, Tandem, 8/6/87

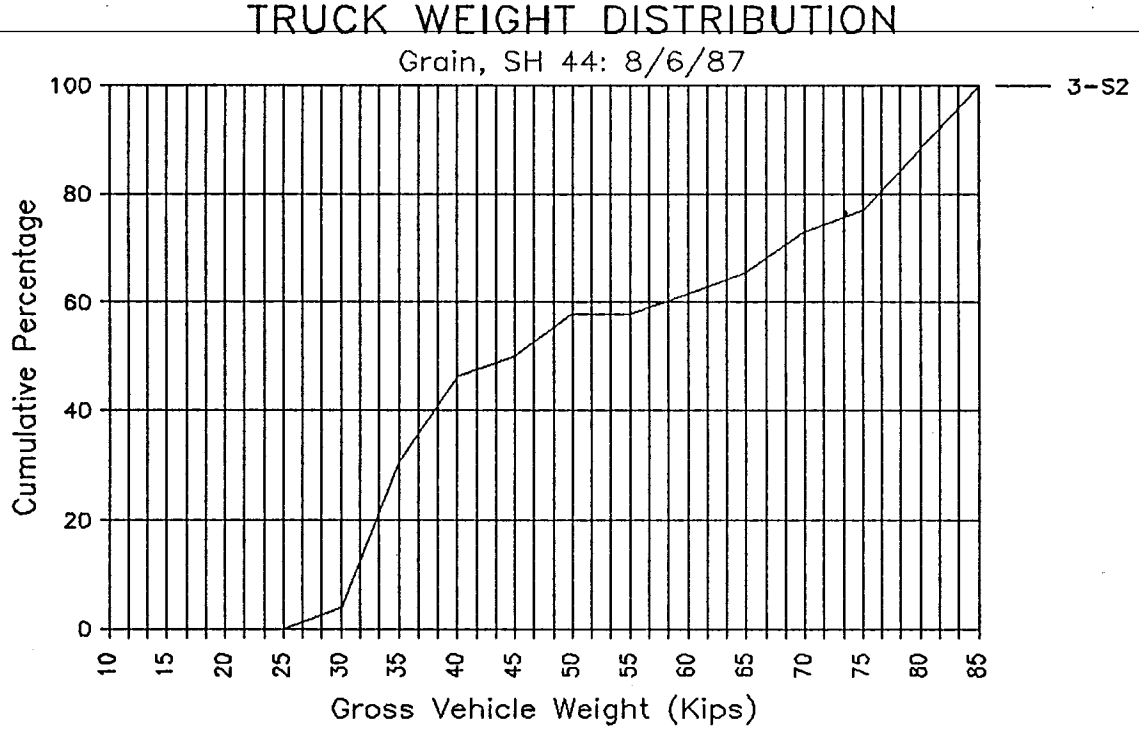


Figure 2.3.2-13 Grain Truck Weights: 3-S2, Gross Vehicle, 8/6/87

2.3.3 STATEWIDE APPLICATION OF SITE-SPECIFIC GRAIN INFORMATION

Twelve grain elevators of various sizes were surveyed in this study in an attempt to obtain an estimate of the total truck trips generated by activity centers of this type. The elevators were divided into three categories: large, medium, and small. The capacity ranges used to define these categories were: greater than 2,000,000 bushels for large, from 800,000 to 2,000,000 bushels for medium, and less than 800,000 bushels for small. Of the elevators surveyed, 5 fall into the small class (site numbers 301, 305, 306, 308A, and 311), and 3 are in the large category (302, 303 and 310).

Table 2.3.3-1 is a summary of field crop production figures and grain storage capacities for every State Department of Highways and Public Transportation District with a breakdown by county. Also shown is the number of elevators by size in each county. The data for this table is for the year 1985 and was provided by the Texas Department of Agriculture (5,6). The column entitled Total Grain Production includes production quantities of barley, corn, oats, rice, rye, sorghum, soybeans, and wheat. The values in the column entitled Total Storage Capacity are not limited to grain warehouses, but include space at feedlots, ports, retail outlets, and all other off-farm storage facilities.

Figures 2.3.3-1 through 2.3.3-14 depict geographic locations where the majority of the grain is produced in Texas along with the leading counties in the production of each of the major grain crops (5,6). Also provided is information on the peak activity periods for the planting and harvesting of various grains. For the purpose of this study, the time of primary interest was the harvesting period. It should be noted that the districts used in these figures are crop reporting districts and not SDHPT districts.

Table 2.3.3-1. Field Crop Production and Storage Capacity Statistics

Elevator Capacities (bu.)
Small - <800,000
Medium - 800,000-2,000,000
Large - >2,000,000

District 1

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Delta	1114	3	0	0	71
Fannin	4864	10	0	0	2134
Franklin	227	0	0	0	0
Grayson	4844	12	2	0	5990
Hopkins	277	0	0	0	0
Hunt	2565	3	1	0	2487
Lamar	3583	5	1	0	3841
Raines	86	0	0	0	0
Red River	1534	2	0	0	278
TOTALS	19094	35	4	0	14801

District 2

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Erath	224	0	0	0	0
Hood	70	0	0	0	0
Jack	416	0	0	0	0
Johnson	2233	3	0	0	532
Palo Pinto	419	0	0	0	0
Parker	75	1	0	0	155
Somervell	9	0	0	0	0
Tarrent	1402	1	2	1	67641
Wise	421	0	0	0	0
TOTALS	5269	5	2	1	68328

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 3

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Archer	1470	4	0	0	173
Baylor	2745	6	0	0	1287
Clay	2034	2	0	0	475
Cooke	1581	4	0	0	381
Montague	1032	1	0	0	20
Throckmorton	1693	3	0	0	226
Wichita	3873	5	1	0	5874
Wilbarger	4082	8	1	0	4722
Young	2233	4	0	0	1174
TOTALS	20743	37	2	0	14332

District 4

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Armstrong	3438	2	0	1	3409
Carson	8722	2	2	0	11583
Dallam	19911	6	1	0	14706
Deaf Smith	15496	5	1	1	29247
Gray	3212	10	0	0	2717
Hansford	15097	6	1	1	17835
Hartley	6190	3	0	0	2693
Hemphill	820	0	0	0	0
Hutchinson	1635	1	0	0	150
Lipscomb	2091	0	0	0	4135
Moore	17331	0	2	0	25908
Ochiltree	10002	2	0	0	11477
Oldham	2846	0	0	0	3096
Potter	2037	4	2	0	26702
Randall	4172	6	0	1	10672
Roberts	419	1	0	0	364
Sherman	13997	2	0	2	9302
TOTALS	127416	50	9	6	173996

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 5

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Bailey	8592	3	1	1	12085
Castro	20156	6	4	1	22080
Cochran	5276	2	1	0	3176
Crosby	1911	3	0	0	1994
Dawson	1759	0	0	0	1370
Floyd	7795	12	1	0	11644
Gaines	2564	3	1	0	6075
Garza	133	0	0	0	0
Hale	17943	16	11	6	79485
Hockley	2198	9	0	1	7141
Lamb	11025	11	1	2	14426
Lubbock	2815	10	2	2	34506
Lynn	920	2	0	0	308
Parmer	25296	4	4	0	38241
Swisher	11668	1	3	0	40995
Terry	1894	4	1	0	8274
Yoakum	2787	1	1	0	3761
TOTALS	124732	87	31	13	285561

District 6

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Andrews	459	0	0	0	0
Crane	0	0	0	0	0
Ector	0	0	0	0	0
Loving	0	0	0	0	0
Martin	566	1	0	0	265
Midland	81	0	0	0	0
Pecos	71	0	0	0	0
Reeves	245	0	0	0	0
Terrel	0	0	0	0	0
Upton	17	0	0	0	0
Ward	0	0	0	0	0
Winkler	0	0	0	0	0
TOTALS	1439	1	0	0	265

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 7

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Coke	391	0	0	0	0
Concho	2063	3	0	0	641
Crockett	26	0	0	0	0
Edwards	13	0	0	0	0
Glasscock	545	2	0	0	39
Irion	0	0	0	0	0
Kimble	22	0	0	0	0
Kinney	154	0	0	0	0
Menard	40	0	0	0	0
Real	16	0	0	0	0
Reagan	22	0	0	0	0
Runnels	4499	9	0	0	2037
Schleicher	132	0	0	0	0
Sterling	93	0	0	0	0
Sutton	26	0	0	0	0
Tom Green	2186	9	0	0	1365
Val Verde	0	0	0	0	0
TOTALS	10228	23	0	0	4082

District 8

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Borden	56	0	0	0	0
Callahan	910	0	0	0	0
Fisher	1799	1	0	0	8
Haskell	3620	9	0	0	785
Howard	437	0	0	0	0
Jones	3949	4	0	0	2604
Kent	214	0	0	0	0
Mitchell	356	0	0	0	0
Nolan	651	2	0	0	990
Scurry	561	1	0	0	177
Shackelford	571	1	0	0	26
Stonewall	849	2	0	0	14
Taylor	4775	5	0	0	1186
TOTALS	18748	25	0	0	5790

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 9

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Bell	6890	8	0	0	7023
Bosque	1348	0	0	0	454
Coryell	2742	3	0	0	384
Falls	4984	4	0	0	1459
Hamilton	1313	1	0	0	178
Hill	11779	10	0	0	4661
Limestone	944	0	0	0	0
McClennen	9579	9	2	0	7305
TOTALS	39579	35	2	0	21464

District 10

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Anderson	820	0	0	0	0
Cherokee	45	0	0	0	0
Gregg	0	0	0	0	0
Henderson	77	0	0	0	0
Rusk	16	0	0	0	0
Smith	100	0	0	0	0
Van Zandt	185	0	0	0	0
Wood	34	0	0	0	0
TOTALS	1277	0	0	0	0

District 11

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Angelina	0	0	0	0	0
Houston	265	1	0	0	139
Nacogdoches	40	0	0	0	0
Polk	175	0	0	0	0
Sabine	0	0	0	0	0
San Augustine	0	0	0	0	0
San Jacinto	0	0	0	0	0
Shelby	29	0	0	0	0
Trinity	0	0	0	0	0
TOTALS	509	1	0	0	139

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 12

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Brazoria	5202	1	2	0	2389
Fort Bend	4810	4	0	0	1202
Galveston	655	0	0	0	0
Harris	2009	4	0	4	35881
Montgomery	0	0	0	0	0
Waller	2885	1	0	0	324
TOTALS	15561	10	2	4	39796

District 13

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Calhoun	5186	5	0	0	1952
Colorado	6519	2	1	0	774
Dewitt	644	3	0	0	669
Fayette	1142	0	0	0	0
Gonzales	866	1	0	0	403
Jackson	8926	6	0	0	2879
Lavaca	1107	4	0	0	581
Matagorda	9291	7	0	0	2672
Victoria	6204	4	1	0	3117
Wharton	22295	11	1	0	7674
TOTALS	62180	43	3	0	20721

District 14

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Bastrop	838	1	0	0	643
Blanco	4	0	0	0	0
Burnet	48	0	0	0	0
Caldwell	1443	2	0	0	1372
Gillespie	900	1	0	0	124
Hays	1064	3	0	0	1444
Lee	286	0	0	0	0
Llano	17	0	0	0	0
Mason	74	0	0	0	0
Travis	3140	3	0	0	529
Williamson	8237	16	0	0	6973
TOTALS	16051	26	0	0	11085

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 15

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Atascosa	1308	4	0	0	615
Bandera	3	0	0	0	0
Bexar	3532	3	0	0	1656
Comal	576	1	0	0	75
Dimmit	81	0	0	0	0
Frio	1910	5	0	0	1403
Guadalupe	2748	10	0	0	2103
Kendall	126	0	0	0	0
Kerr	5	0	0	0	0
La Salle	370	0	0	0	0
Maverick	121	1	0	0	220
McMullen	168	0	0	0	0
Medina	6547	5	0	0	2817
Uvalde	3743	8	1	0	3222
Wilson	2351	0	0	0	0
Zavala	1491	2	0	0	316
TOTALS	25080	39	1	0	12427

District 16

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Aransas	106	0	0	0	0
Bee	7198	3	0	1	3842
Goliad	1385	1	0	0	579
Jim Wells	5566	5	1	0	3986
Karnes	3236	7	0	0	1634
Kleberg	3200	1	0	0	703
Live Oak	2919	3	0	0	957
Nueces	17465	13	6	4	34684
Refurio	6475	3	1	1	5529
San Patricio	7035	4	8	0	15757
TOTALS	54585	40	16	6	67671

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 17

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Brazos	732	3	0	0	715
Burleson	782	0	0	0	0
Grimes	323	2	0	0	1003
Leon	97	0	0	0	0
Milam	5416	7	0	0	1087
Robertson	1027	1	0	0	393
Walker	7	0	0	0	0
Washington	224	0	0	0	0
TOTALS	8608	13	0	0	3198

District 18

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Collin	7702	14	1	0	5503
Dallas	1324	1	1	0	1998
Denton	2383	5	1	0	1671
Ellis	8601	11	0	0	2580
Kaufman	977	4	0	0	444
Navarro	2659	8	0	0	1240
Rockwall	734	1	0	0	104
TOTALS	24380	44	3	0	13540

District 19

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Bowie	1069	3	0	0	1102
Camp	0	0	0	0	0
Cass	0	0	0	0	0
Harrison	14	0	0	0	0
Marion	19	0	0	0	0
Morris	40	0	0	0	0
Panola	2	0	0	0	0
Titus	59	0	0	0	0
Upshur	15	0	0	0	0
TOTALS	1218	3	0	0	1102

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

District 20

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Chambers	3636	2	0	0	512
Hardin	0	0	0	0	0
Jasper	0	0	0	0	0
Jefferson	3804	3	0	0	7252
Liberty	4259	4	1	0	1968
Newton	0	0	0	0	0
Orange	0	0	0	0	0
Tyler	20	0	0	0	0
TOTALS	11719	9	1	0	9732

District 21

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Brooks	315	0	0	0	0
Cameron	9471	9	3	1	11689
Duval	1233	2	0	0	162
Hidalgo	12895	16	2	1	16597
Jim Hogg	84	0	0	0	0
Kenedy	0	0	0	0	0
Starr	2176	2	0	0	808
Webb	0	1	0	0	N/A
Willacy	5692	5	3	0	6854
Zapata	48	0	0	0	0
TOTALS	31914	35	8	2	36110

District 23

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Brown	537	1	0	0	699
Coleman	3497	1	1	0	1067
Comanche	297	0	0	0	0
Eastland	257	0	0	0	0
Lampasas	471	0	0	0	0
McColloch	1452	2	0	0	659
Mills	433	0	0	0	0
San Saba	383	0	0	0	0
Stephens	182	1	0	0	46
TOTALS	7509	5	1	0	2471

Table 2.3.3-1 (Continued). Field Crop Production and Storage Capacity Statistics

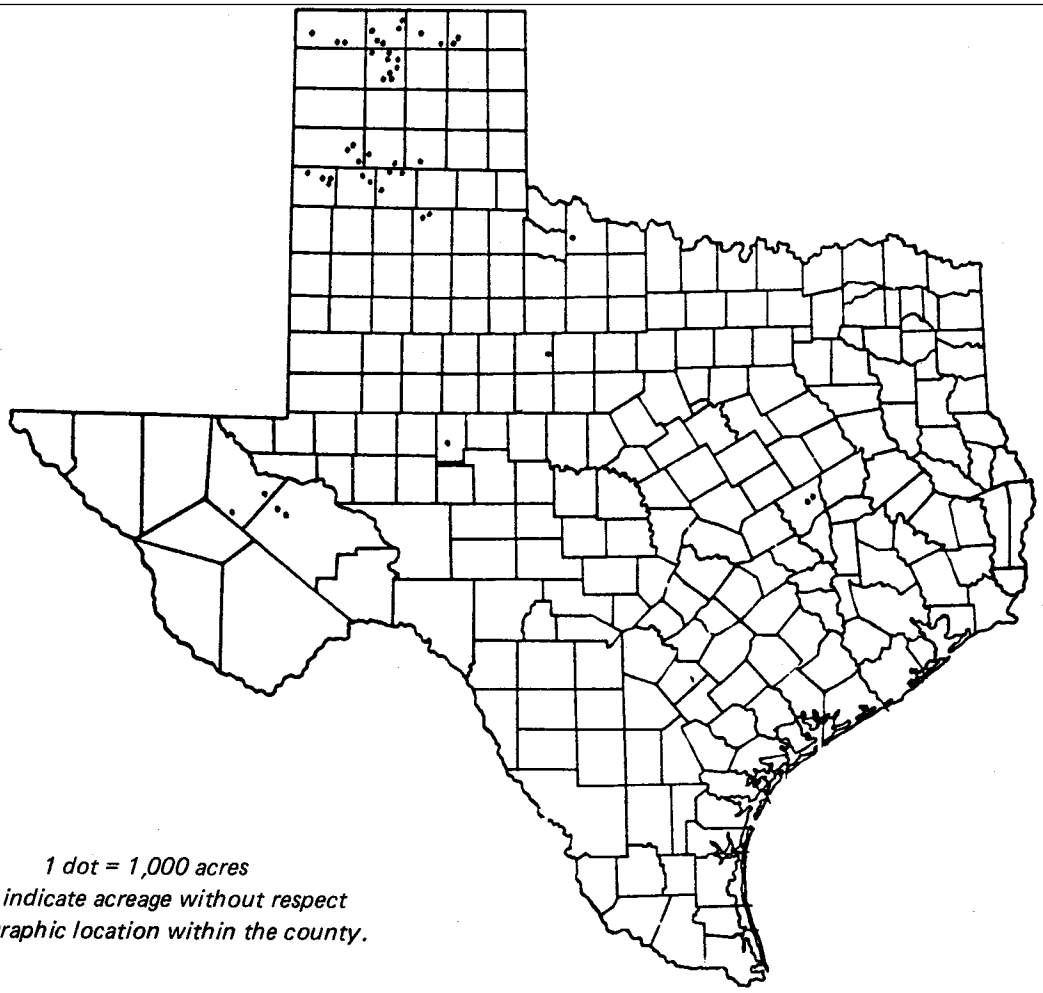
District 24

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Brewster	0	0	0	0	0
Culberson	218	0	0	0	0
El Paso	257	1	0	0	237
Hudspeth	253	0	0	0	0
Jeff Davis	70	0	0	0	0
Presidio	0	0	0	0	0
TOTALS	798	1	0	0	237

District 25

County	Total Grain Production (1000 bu.)	Number of Elevators Small	Medium	Large	Total Storage Capacity (1000 bu.)
Briscoe	1631	6	0	0	1549
Childress	951	2	0	0	209
Collingsworth	867	3	0	0	942
Cottle	453	3	0	0	33
Dickens	566	3	0	0	275
Donley	513	1	0	0	275
Foard	1729	5	0	0	1262
Hall	612	2	0	0	350
Hardeman	3003	7	1	0	3610
King	280	0	0	0	0
Knox	3280	13	0	0	2991
Motley	174	0	0	0	0
Wheeler	2795	5	0	0	591
TOTALS	16854	50	1	0	12087

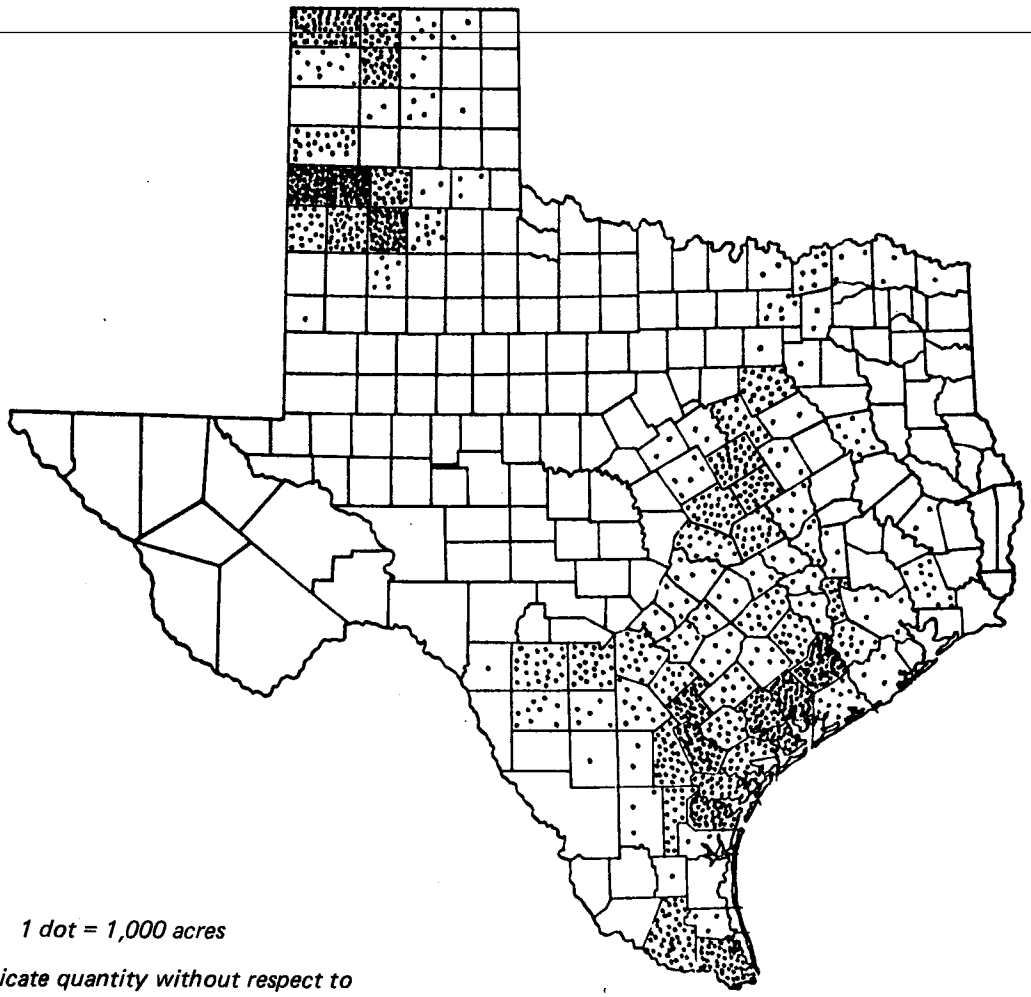
TEXAS BARLEY
Acres Planted
1985



1 dot = 1,000 acres
Dots indicate acreage without respect to geographic location within the county.

Figure 2.3.3-1. Texas Barley Production

CORN
Acres Planted For All Purposes
1985

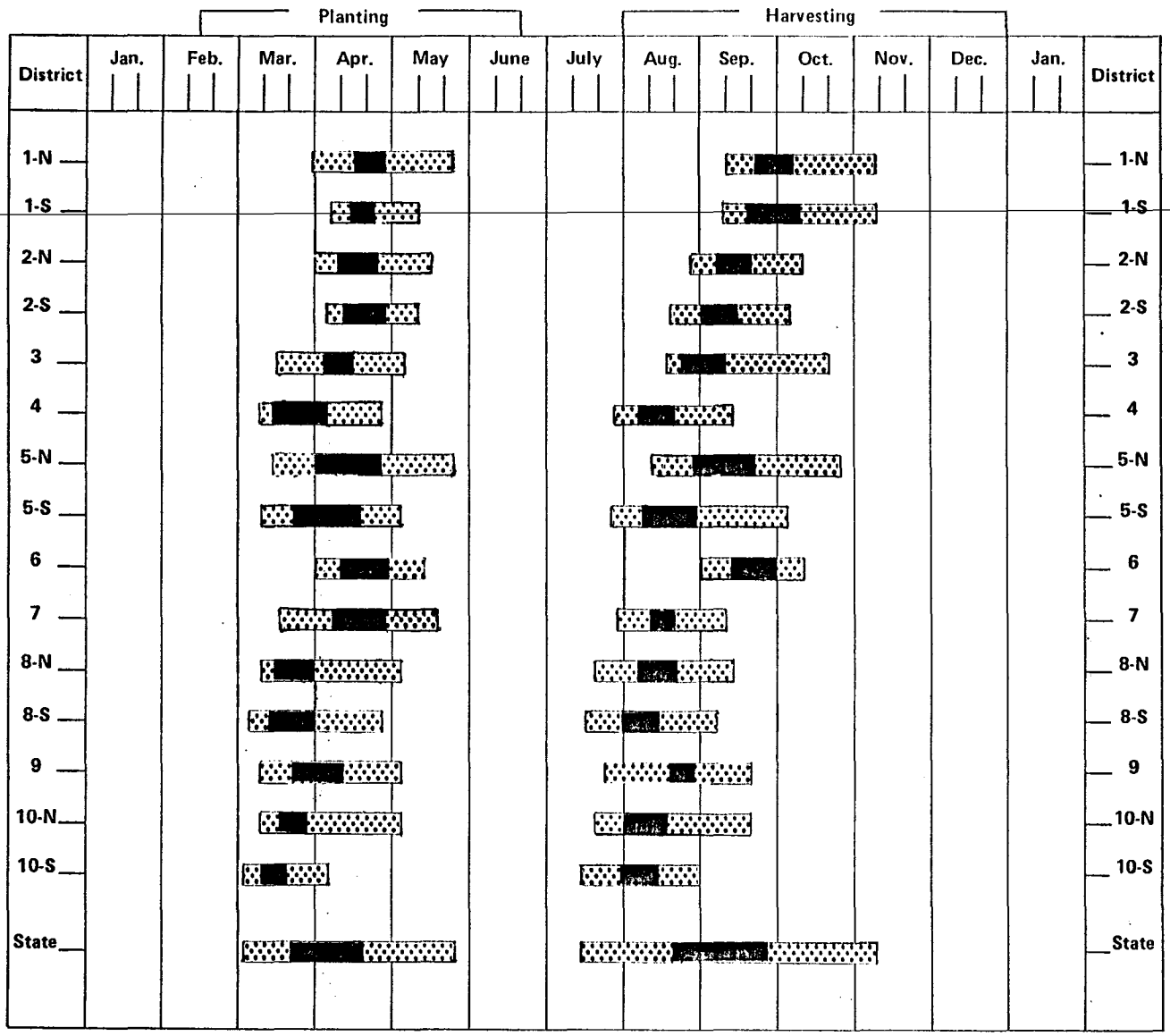


1 dot = 1,000 acres

Dots indicate quantity without respect to geographic location within the county.

Figure 2.3.3-2. Texas Corn Production

CORN: PLANTING AND HARVESTING ACTIVITY
BY CROP REPORTING DISTRICTS, 1985

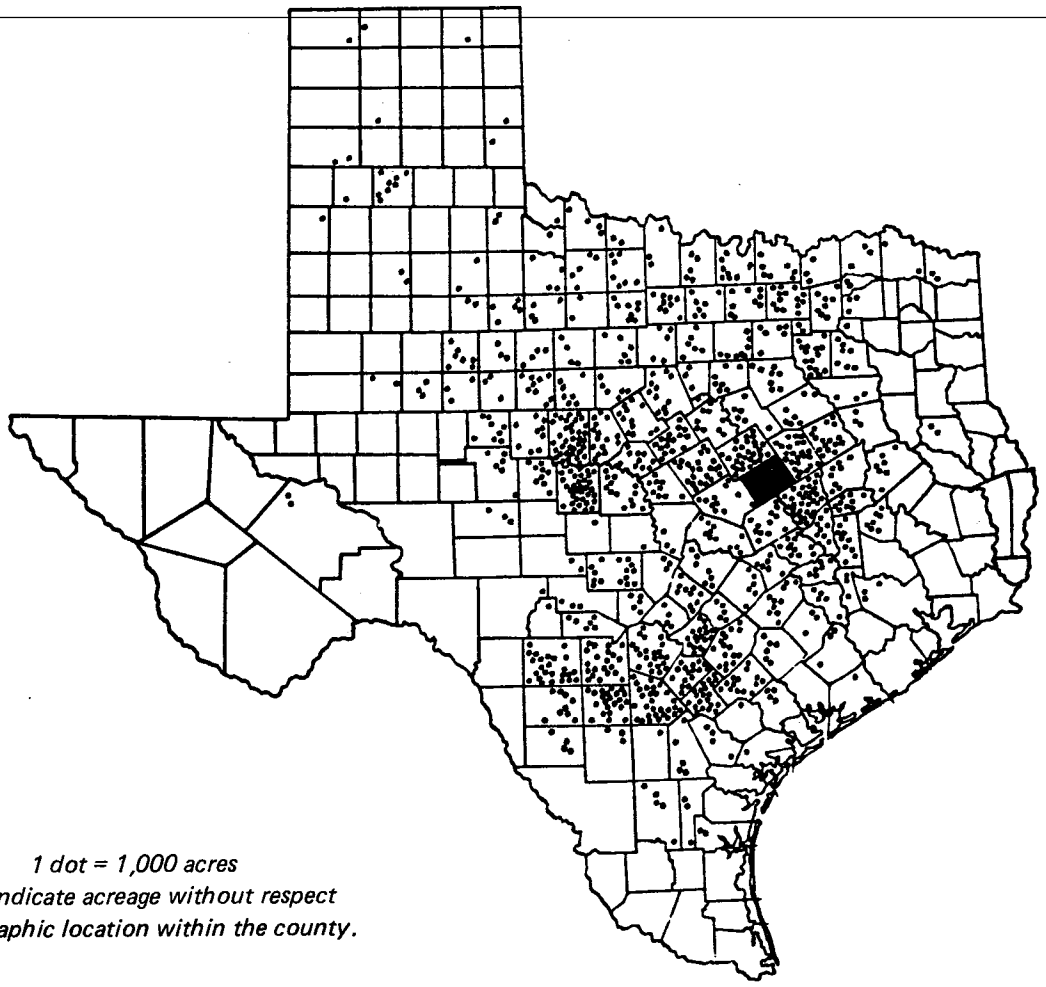


Period of planting or harvesting activity.

Begins when 25 percent of the activity is completed and ends when 75 percent of the activity is completed.

Figure 2.3.3-3. Texas Corn Harvesting and Planting Activity

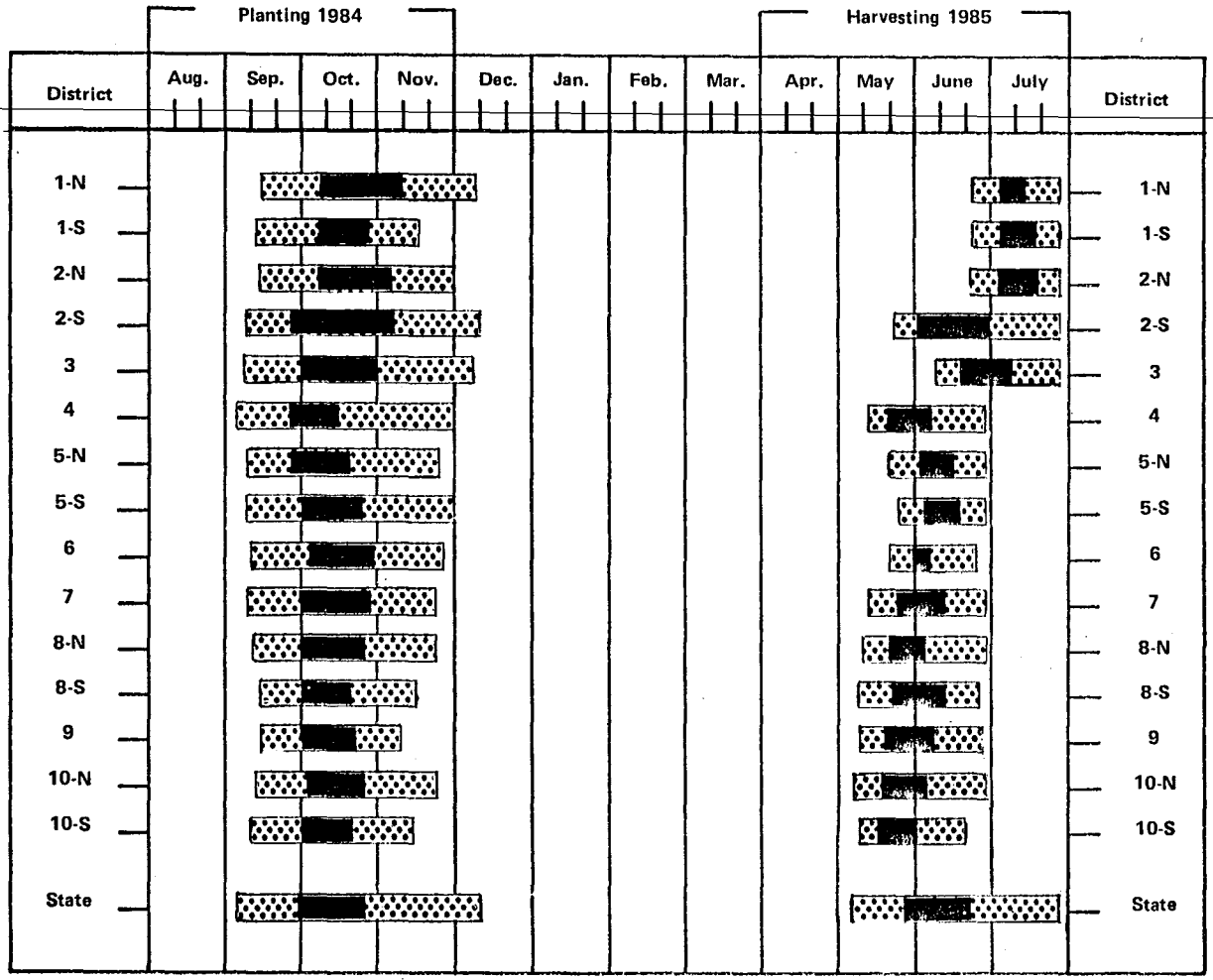
TEXAS OATS
Acres Planted
1985



1 dot = 1,000 acres
Dots indicate acreage without respect to geographic location within the county.

Figure 2.3.3-4. Texas Oats Production

TEXAS OATS
Planting and Harvesting Activity
By Crop Reporting Districts, 1985 Crop

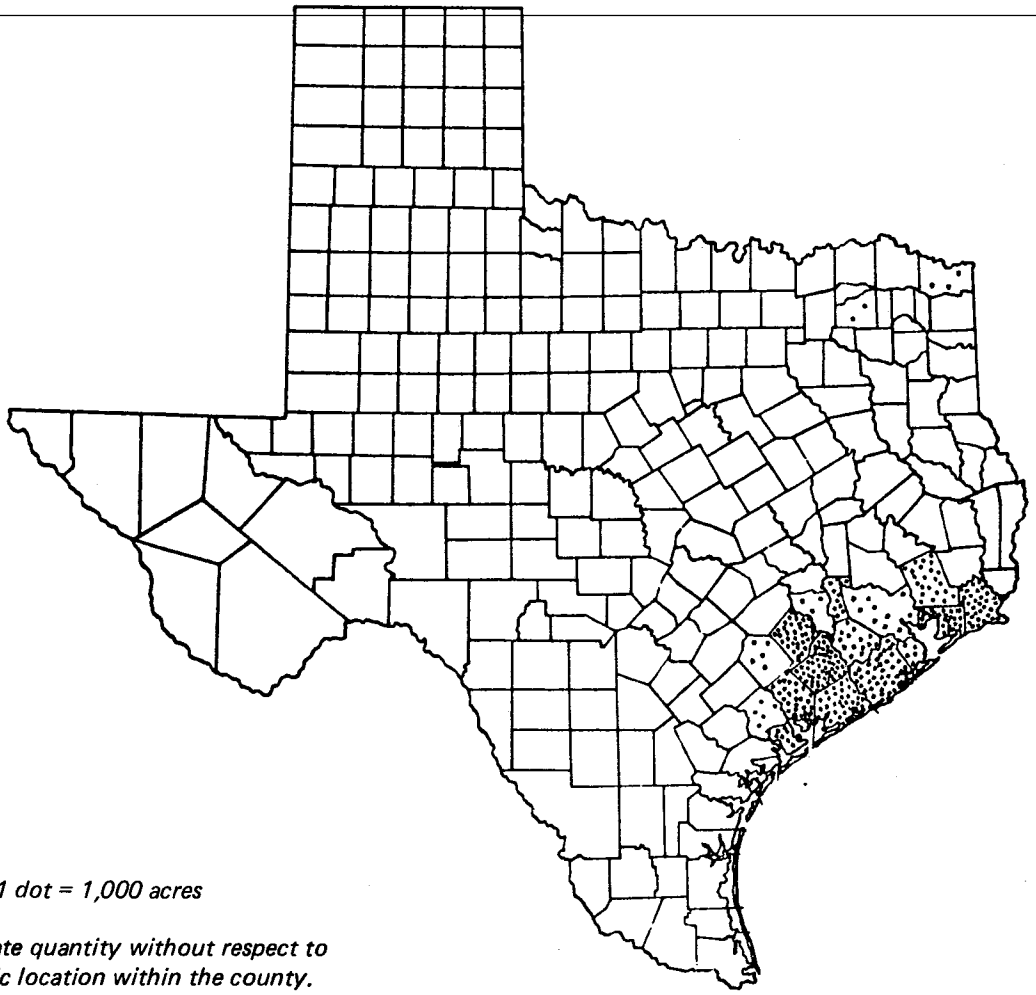


Period of planting or harvesting activity.

Begins when 25 percent of the activity is completed and ends when 75 percent of the activity is completed.

Figure 2.3.3-5. Texas Oats Harvesting and Planting Activity

RICE
Acres Planted
1985

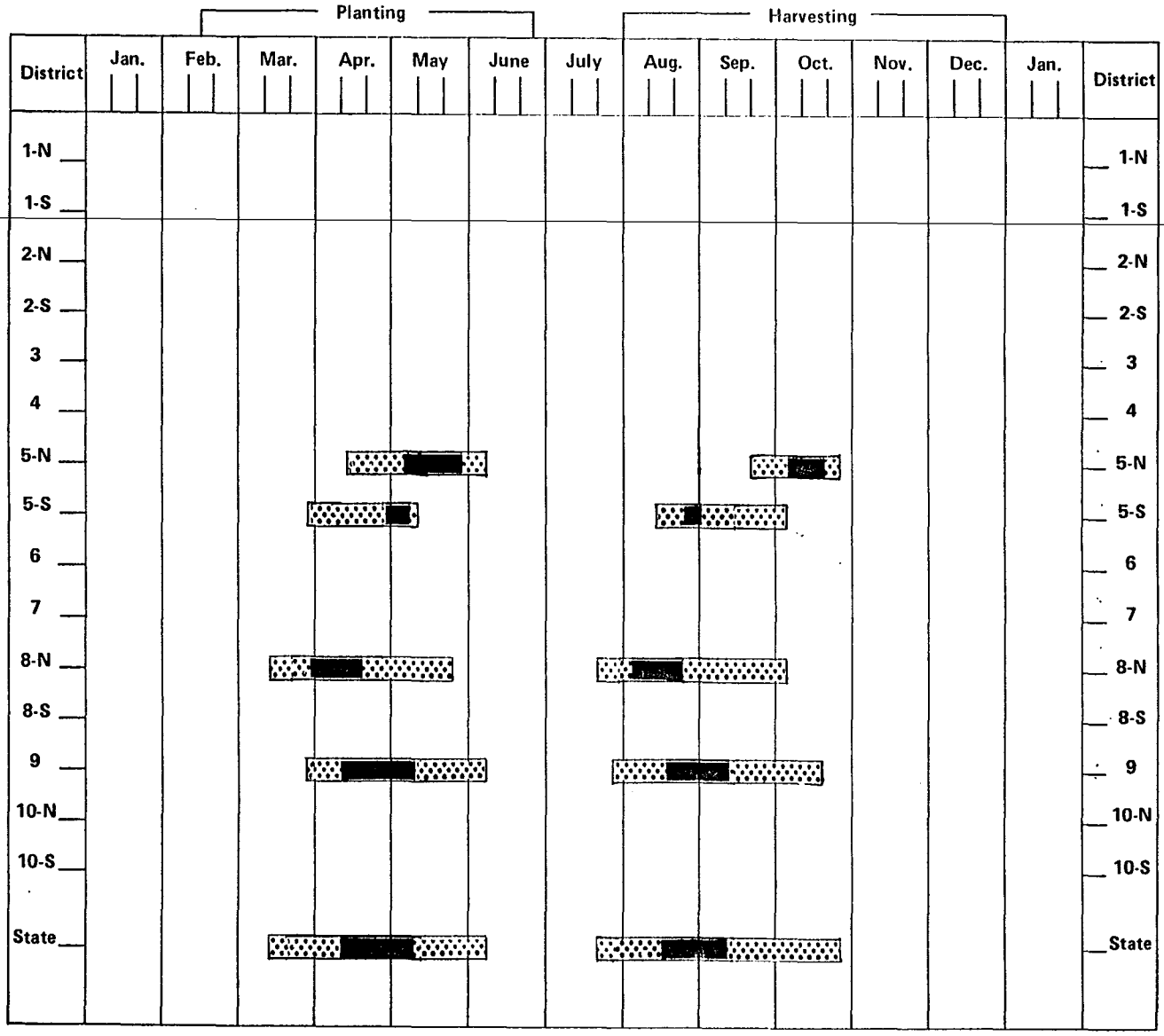


1 dot = 1,000 acres

Dots indicate quantity without respect to geographic location within the county.

Figure 2.3.3-6. Texas Rice Production

RICE: PLANTING AND HARVESTING ACTIVITY
BY CROP REPORTING DISTRICTS, 1985

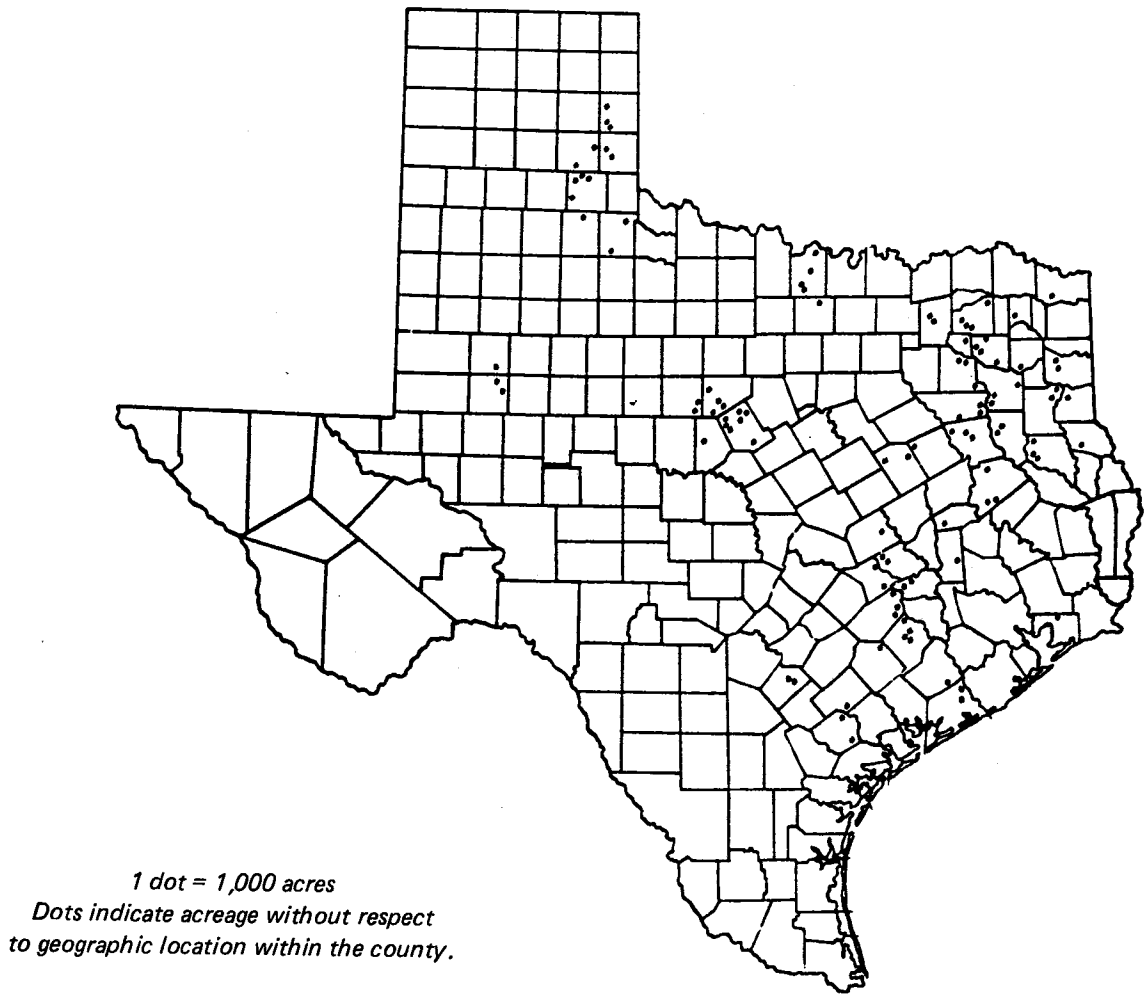


Period of planting or harvesting activity.

Begins when 25 percent of the activity is completed and ends when 75 percent of the activity is completed.

Figure 2.3.3-7. Texas Rice Harvesting and Planting Activity

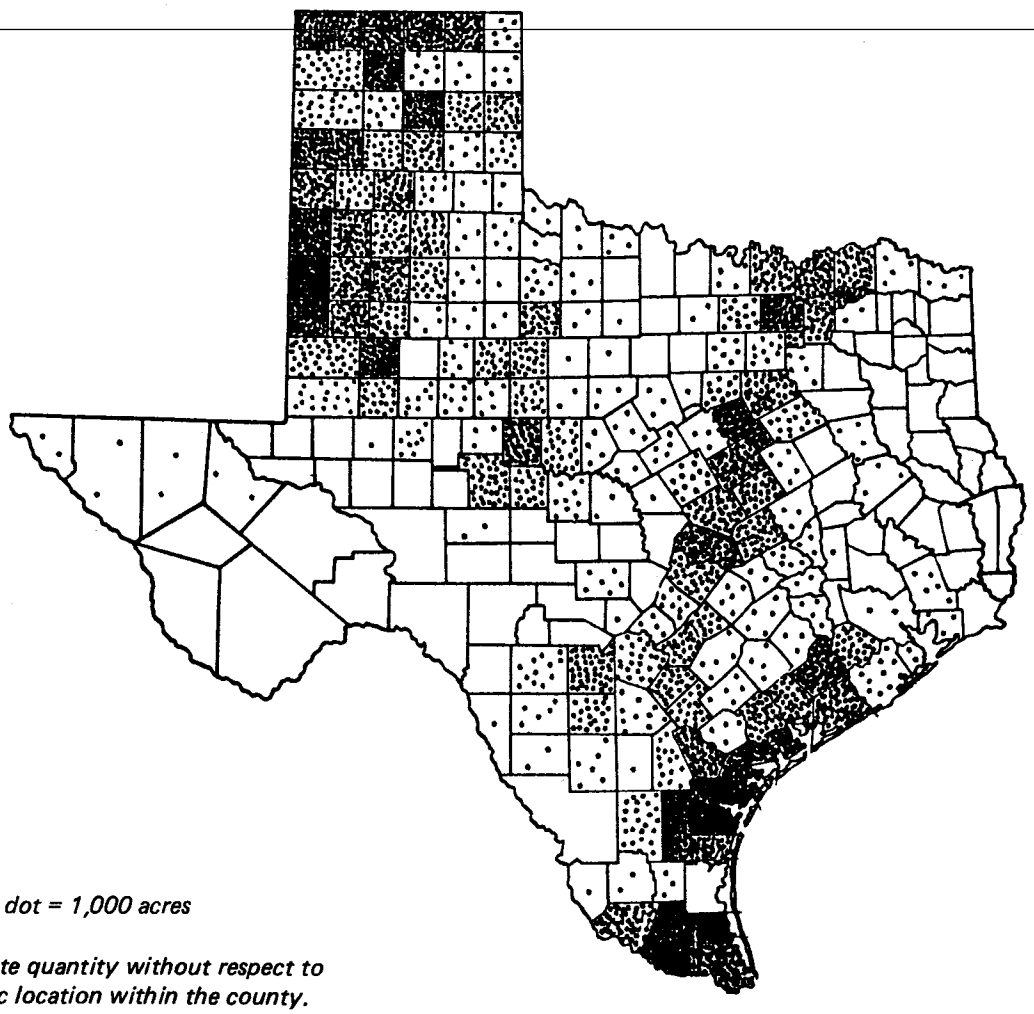
TEXAS RYE
Acres planted
1985



1 dot = 1,000 acres
Dots indicate acreage without respect to geographic location within the county.

Figure 2.3.3-8. Texas Rye Production

ALL SORGHUM
Acres Planted For All Purposes
1985

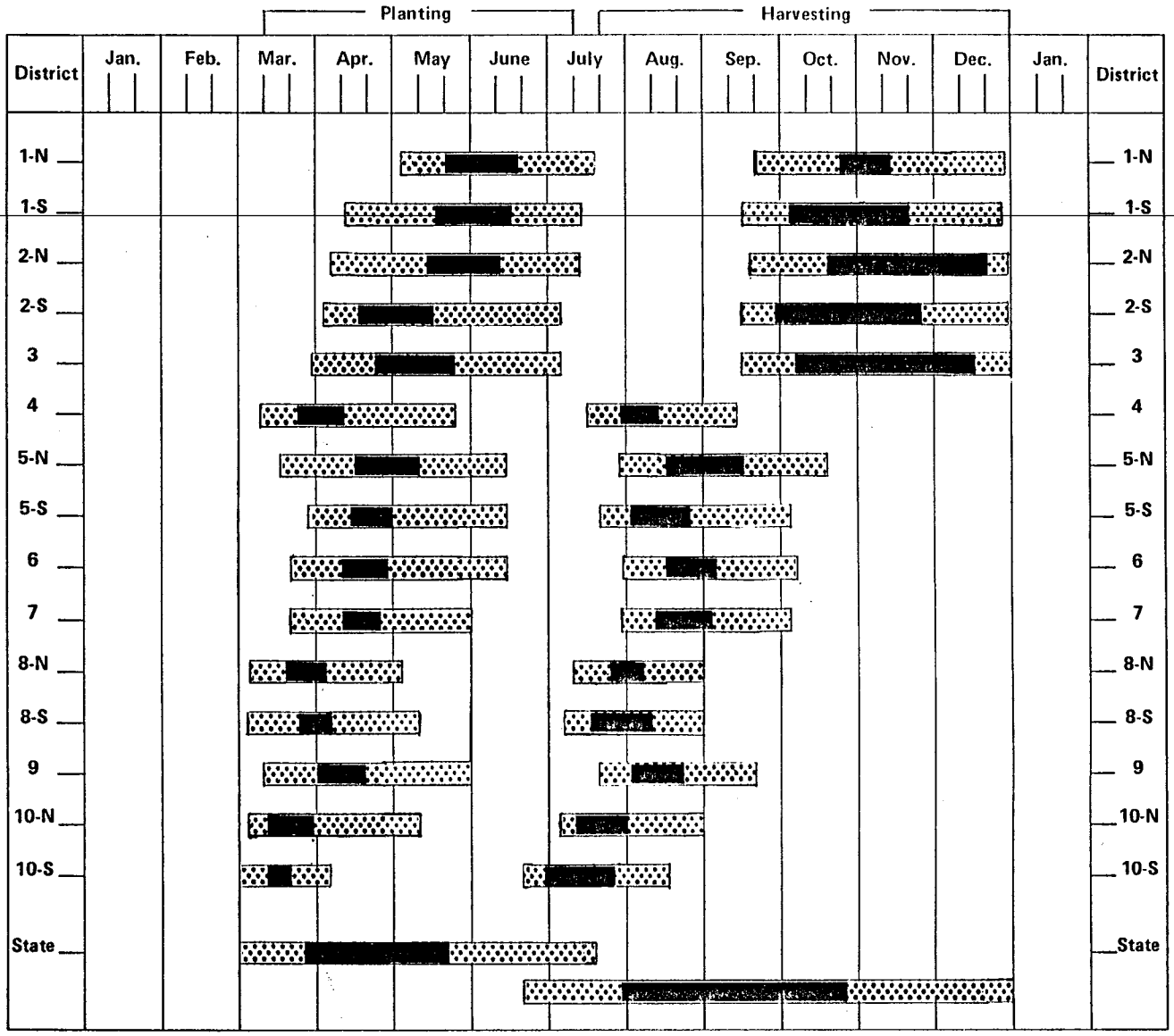


1 dot = 1,000 acres

Dots indicate quantity without respect to geographic location within the county.

Figure 2.3.3-9. Texas Sorghum Production

SORGHUM: PLANTING AND HARVESTING ACTIVITY
BY CROP REPORTING DISTRICTS, 1985

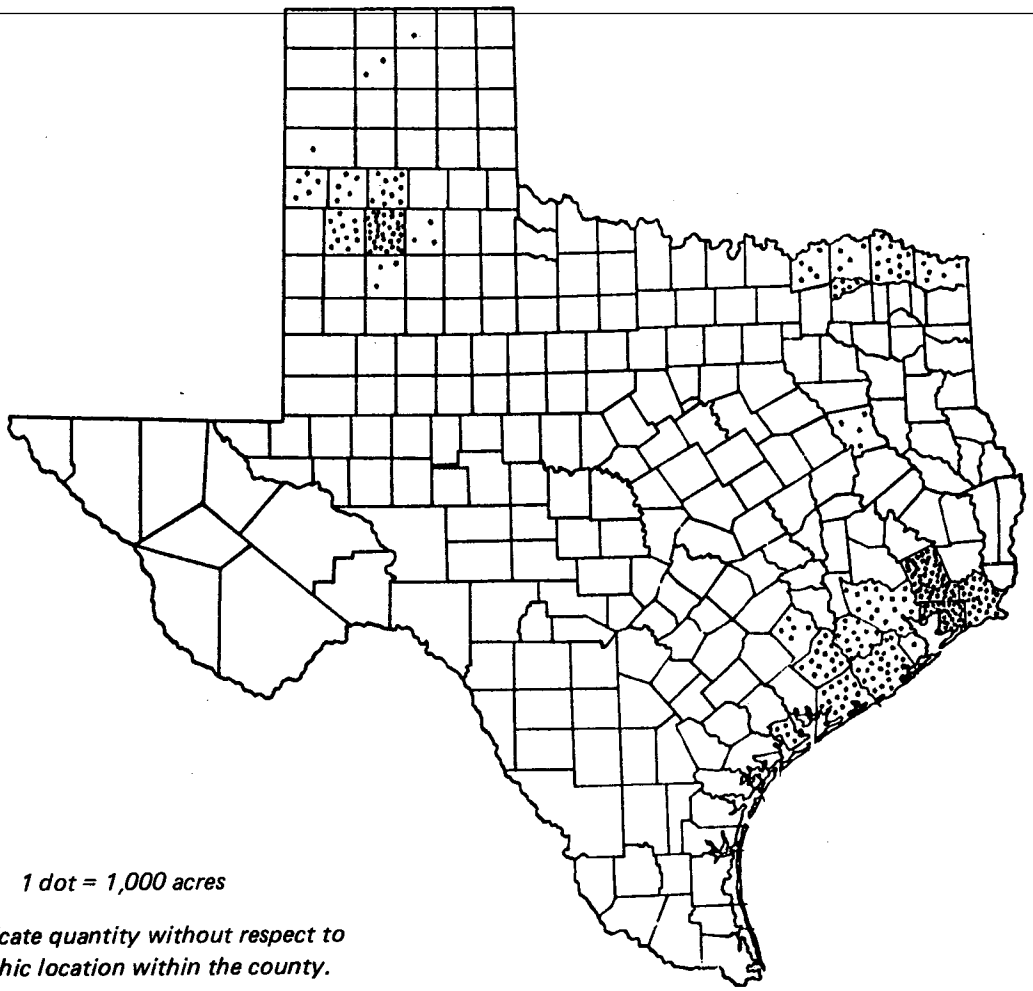


Period of planting or harvesting activity.

Begins when 25 percent of the activity is completed and ends when 75 percent of the activity is completed.

Figure 2.3.3-10. Texas Sorghum Harvesting and Planting Activity

SOYBEANS
Acres Planted For All Purposes
1985

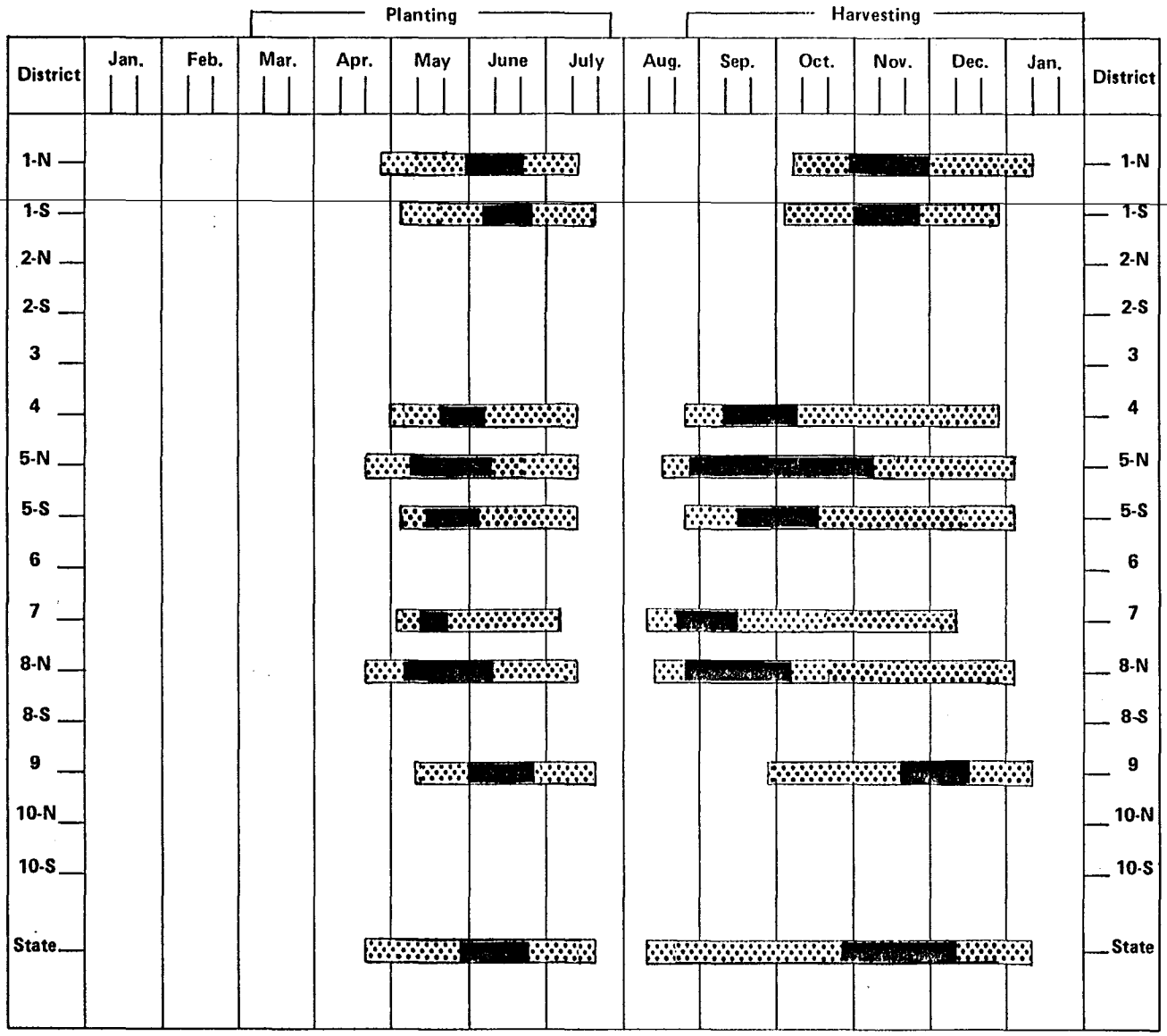


1 dot = 1,000 acres

Dots indicate quantity without respect to geographic location within the county.

Figure 2.3.3-11. Texas Soybean Production

SOYBEANS: PLANTING AND HARVESTING ACTIVITY
BY CROP REPORTING DISTRICTS, 1985

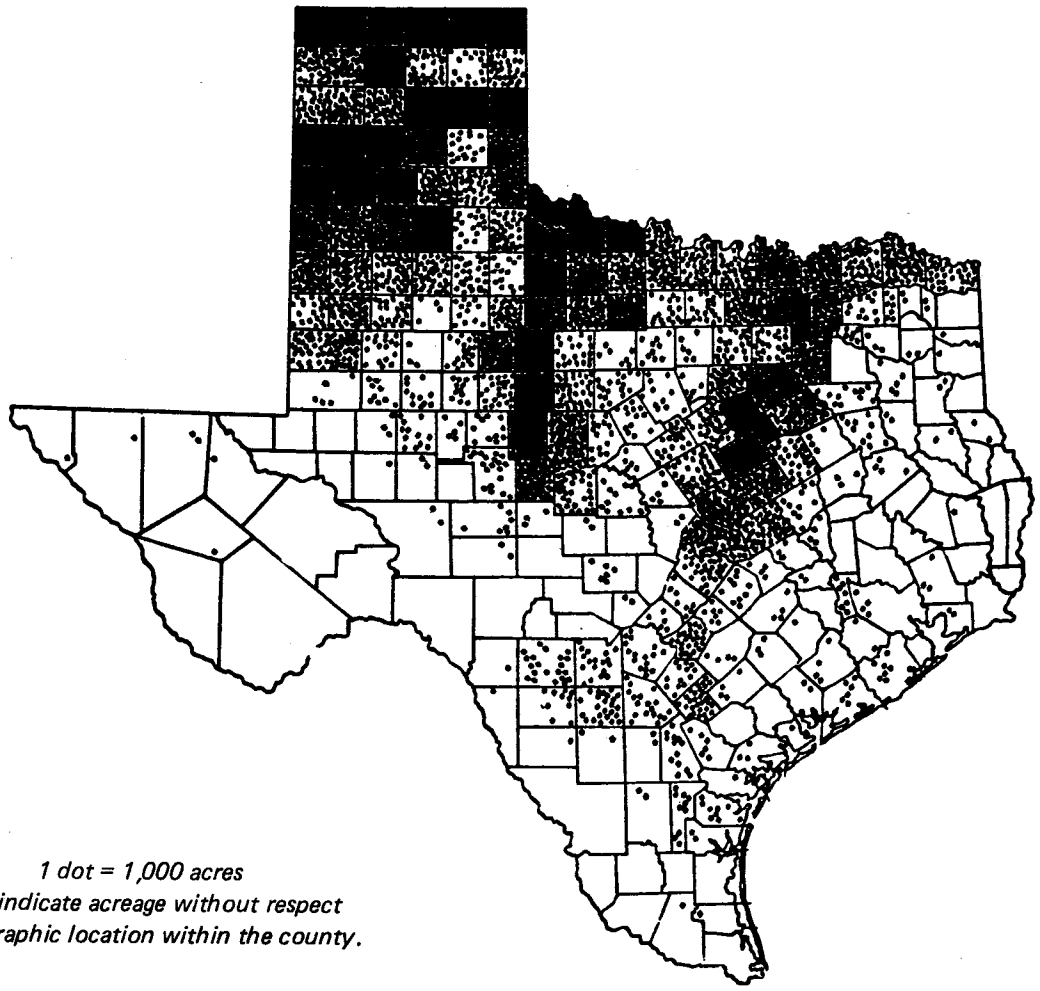


Period of planting or harvesting activity.

Begins when 25 percent of the activity is completed and ends when 75 percent of the activity is completed.

Figure 2.3.3-12. Texas Soybean Harvesting and Planting Activity

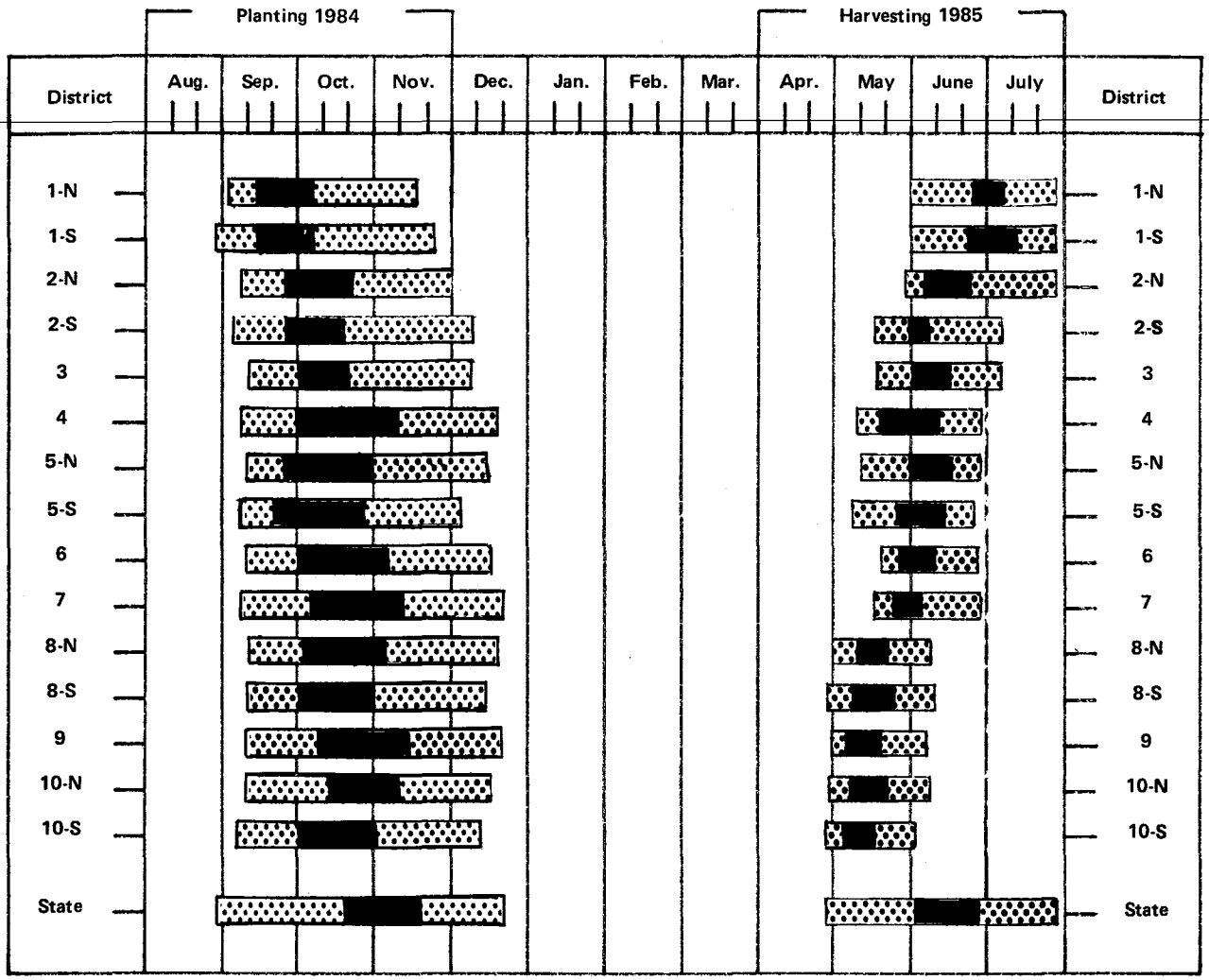
TEXAS WHEAT
Acres Planted
1985



1 dot = 1,000 acres
Dots indicate acreage without respect to geographic location within the county.

Figure 2.3.3-13. Texas Wheat Production

TEXAS WHEAT
Planting and Harvesting Activity
By Crop Reporting Districts, 1985 Crop



Period of planting or harvesting activity.

Begins when 25 percent of the activity is completed and ends when 75 percent of the activity is completed.

Figure 2.3.3-14. Texas Wheat Harvesting and Planting Activity

2.4 CATTLE

2.4.1 CLASSIFICATION COUNTS

2.4.1.1 Cattle Feedlot, Site No. 400

Introduction. The site map shown in Figure 2.4.1.1-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located in the Texas Panhandle just south of a small urban area. This feedlot is located in a rural area, and in terms of size it is a small operation.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.1-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 14-hour period on April 8, 1987.

Figure 2.4.1.1-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (77%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 40 percent of this total.

According to interviews conducted at the feedlot, the average population of the feedlot was approximately 4,000 head of cattle. The number of employees was 15 to 20. From 50% to 75% of the trucks generated by the activity were hauling feed to the facility. Approximately four trips per day are typically generated by trucks hauling grain to the feedlot with approximately one trip per week by trucks hauling molasses, alfalfa, and supplements.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Farm-to-Market Highway near the site. According to SDHPT counts, this highway had an average daily traffic (ADT) of 500 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.1-1 provides a summary of the counts taken. In Table 2.4.1.1-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.1-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.1-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.1-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.1-1C values). The 3-S2 vehicle represents 51 percent of total trucks counted on this highway. Autos made up 58 percent of the total traffic.

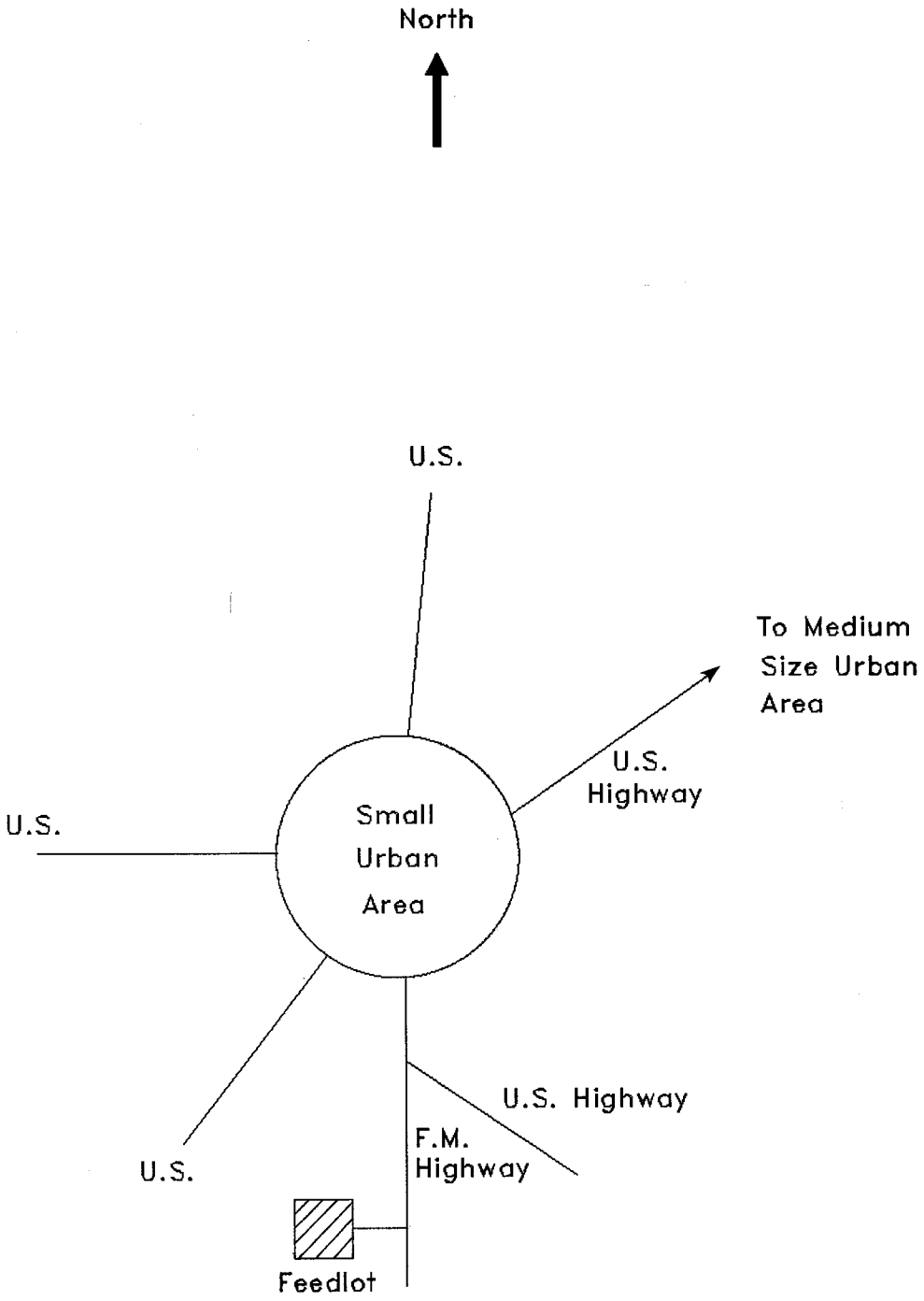
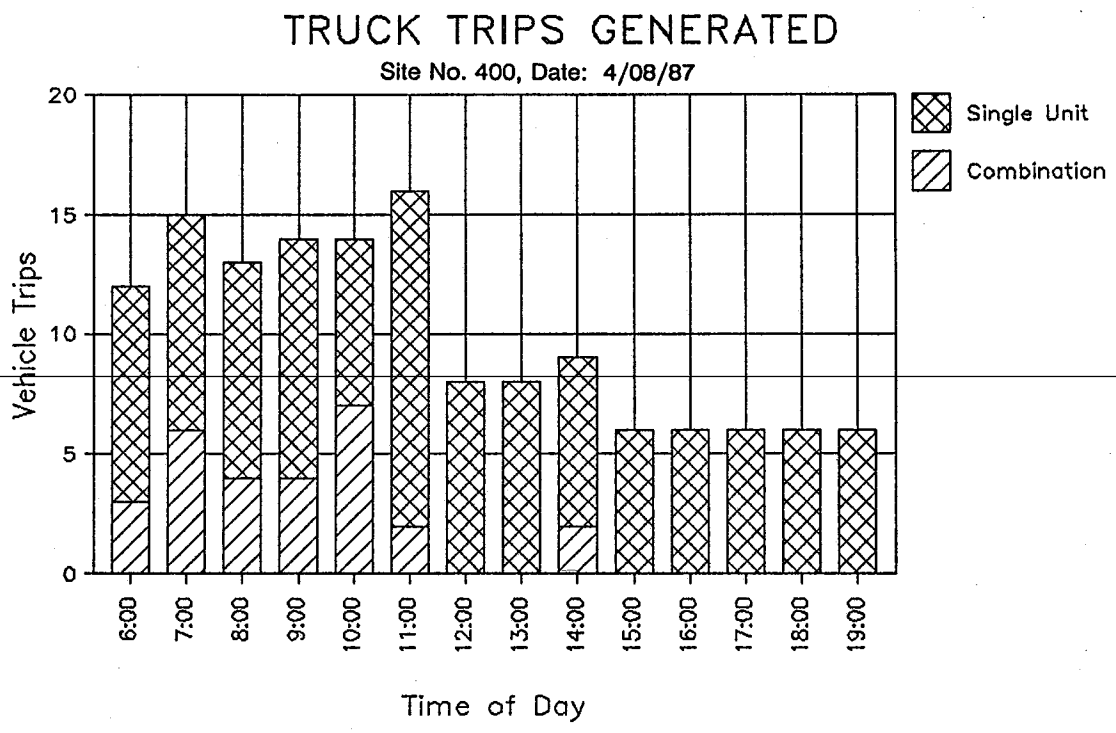


Figure 2.4.1.1-1. Site Map



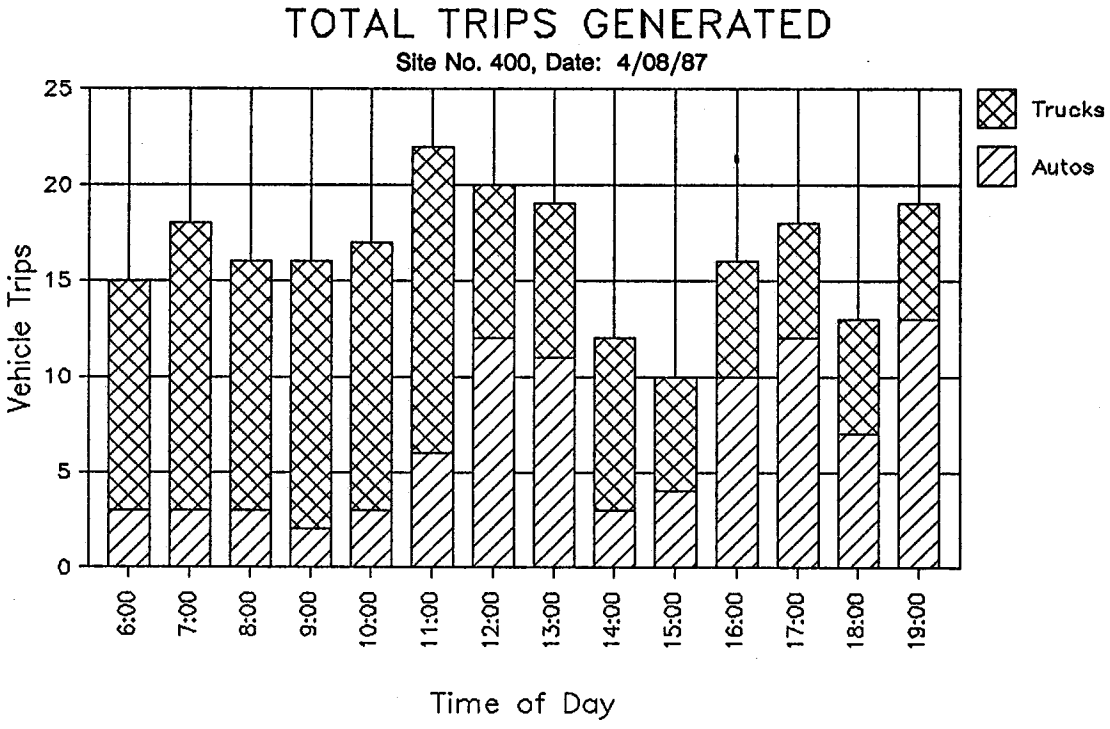
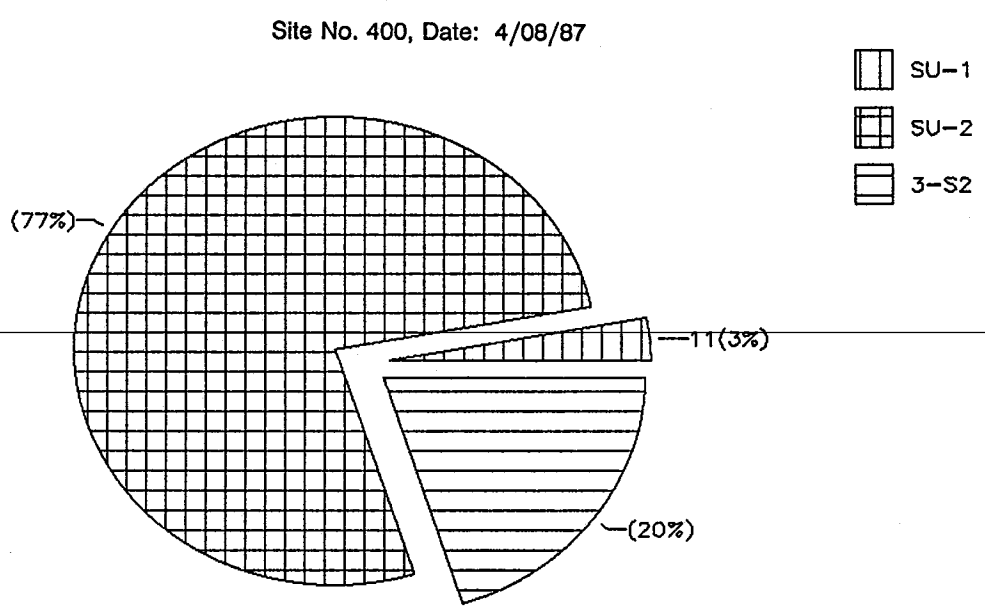


Figure 2.4.1.1-2. Hourly Trip Generation



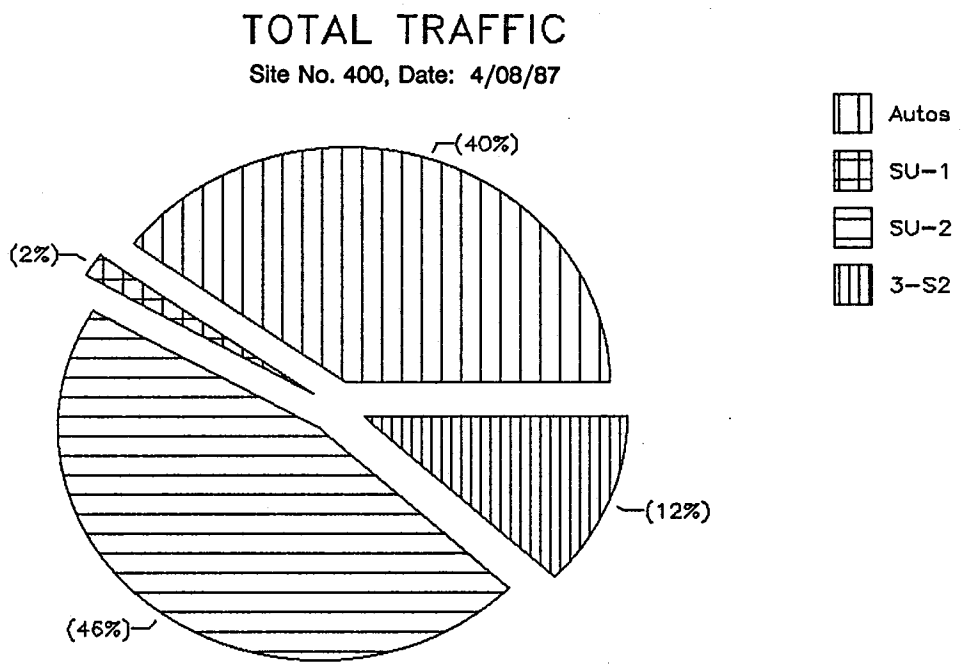


Figure 2.4.1.1-3. Activity Center Vehicle Percentages

Table 2.4.1.1-1. Traffic Classification Count Summary

Table 2.4.1.1-1A. Activity Center Only

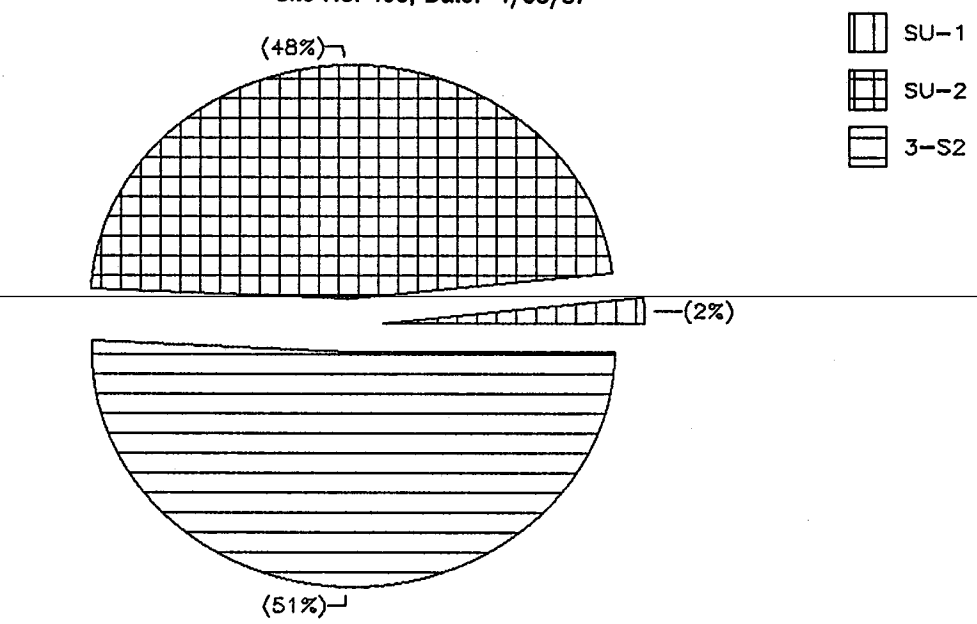
Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
04/08/87	92	4	107	28	0	231	80%	20%	40%	60%
11/11/87	65	7	0	60	5	137	10%	90%	47%	53%

Table 2.4.1.1-1B. Roadway Without Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
04/08/87	216	0	0	42	0	258	0%	100%	84%	16%
11/11/87	205	1	34	98	7	345	25%	75%	59%	41%

Table 2.4.1.1-1C. Roadway With Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
04/08/87	308	4	107	114	0	533	49%	51%	58%	42%
11/11/87	270	40	34	158	12	514	31%	69%	53%	47%



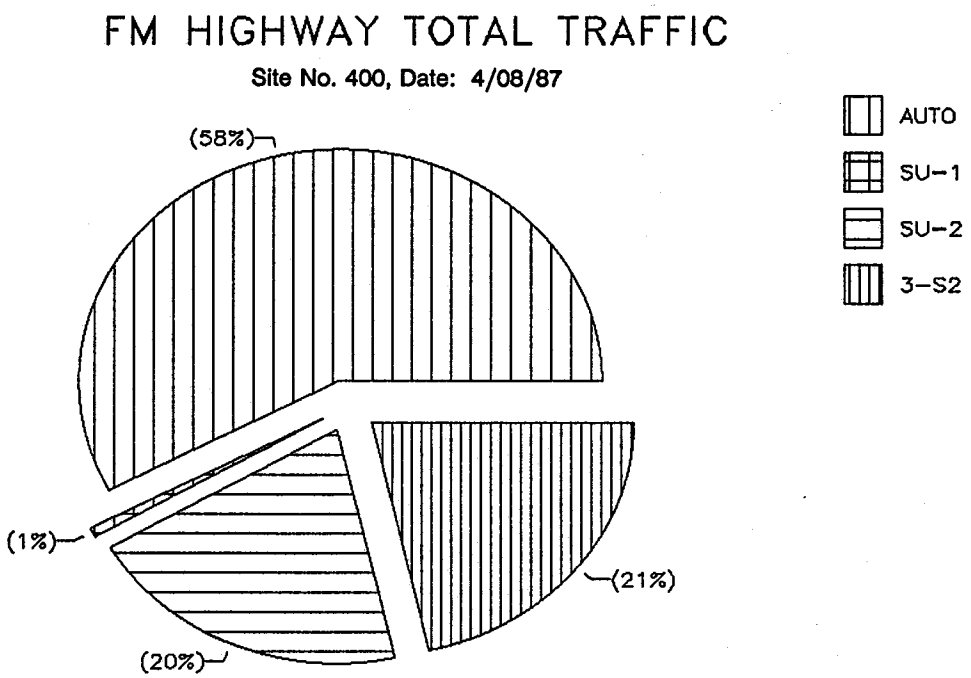


Figure 2.4.1.1-4. Highway Vehicle Percentages

2.4.1.2 Cattle Feedlot, Site No. 401

Introduction. The site map shown in Figure 2.4.1.2-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located northwest of a medium-size urban area. Trucks hauling livestock into this activity center generally came from the southeastern United States and average 1,000 miles of travel. Fed cattle are hauled from this site an average distance of 45 miles to one of three processing plants. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.2-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 14-hour period on August 20, 1986.

Figure 2.4.1.2-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (49%). Also illustrated is the breakdown of total traffic moving to and from the site. Trucks represented 57 percent of this total.

According to the feedlot official who was interviewed, the average population of the feedlot was 14,000 head of cattle. Approximately 10 people were employed at the site. An average of three truck loads of grain are hauled to this feedlot each day.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Farm-to-Market Highway. SDHPT traffic volume counts indicated that this FM Highway had an average daily traffic (ADT) of 210 vehicles per day in 1986. Manual classification counts were conducted in 1986 and 1988 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.2-1 provides a summary of the counts taken. In Table 2.4.1.2-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.2-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. In Table 2.4.1.2-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.2-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.2-1C values). The 3-S2 vehicle represents 67 percent of total trucks counted on this highway. Autos were 67 percent of the total traffic.

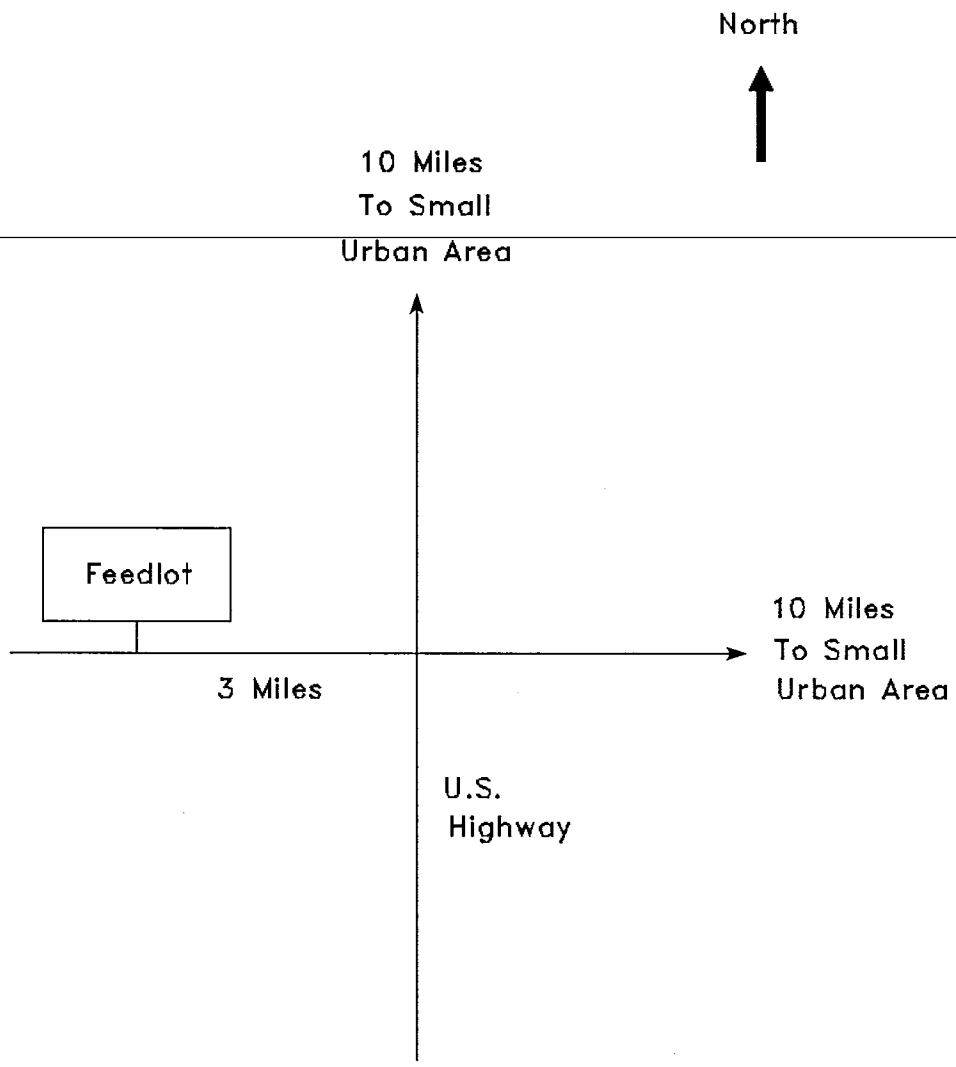
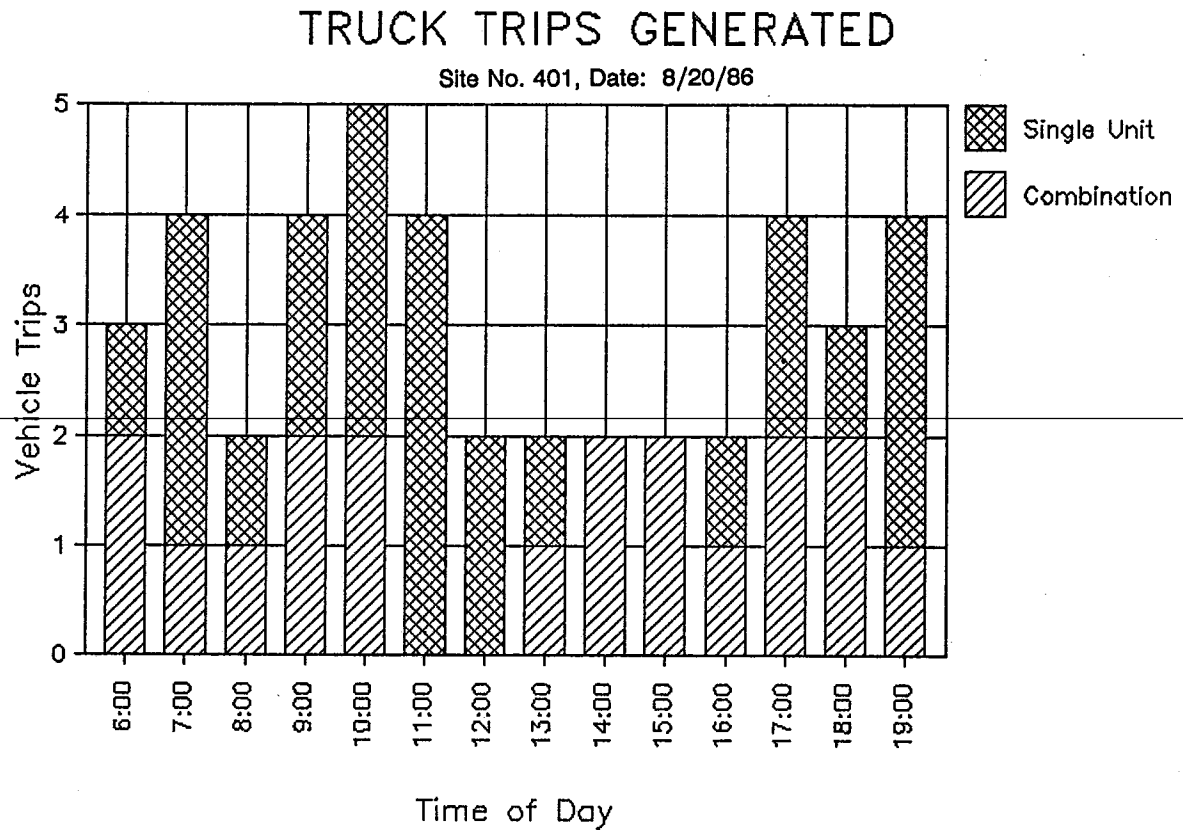


Figure 2.4.1.2-1. Site Map



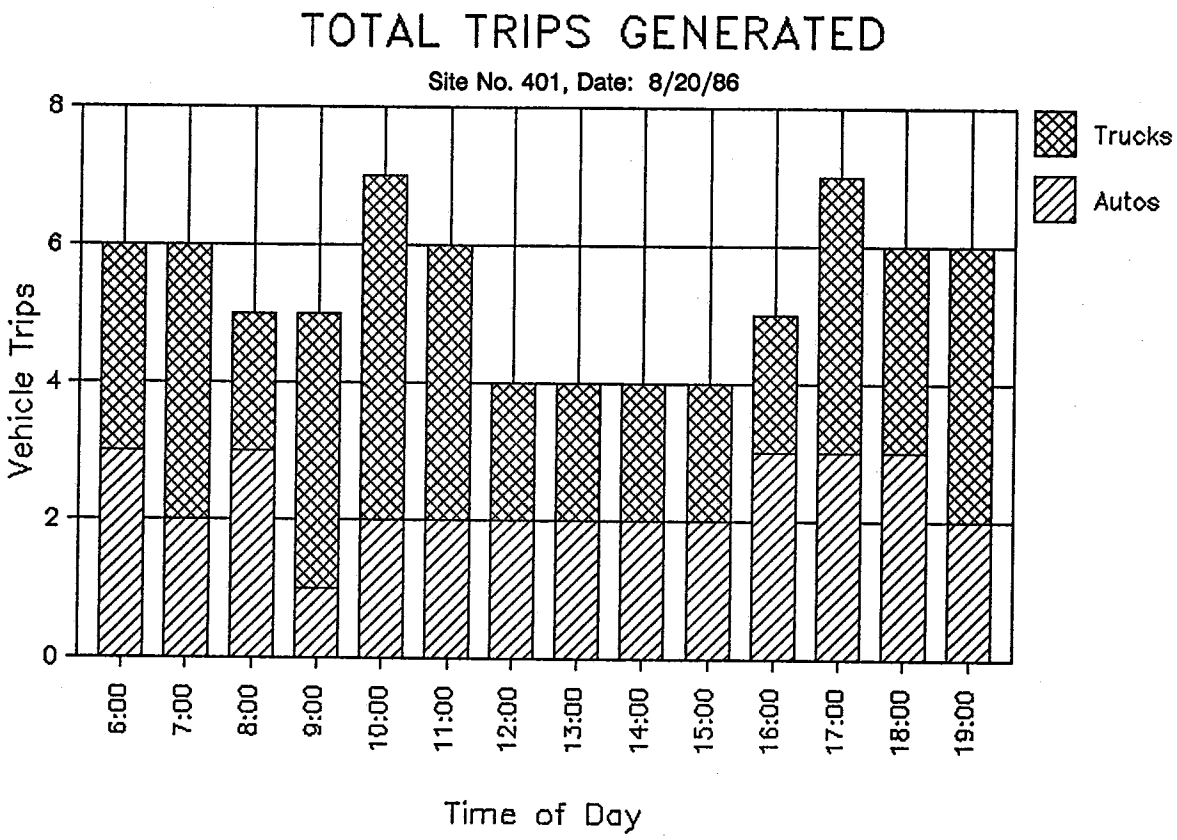
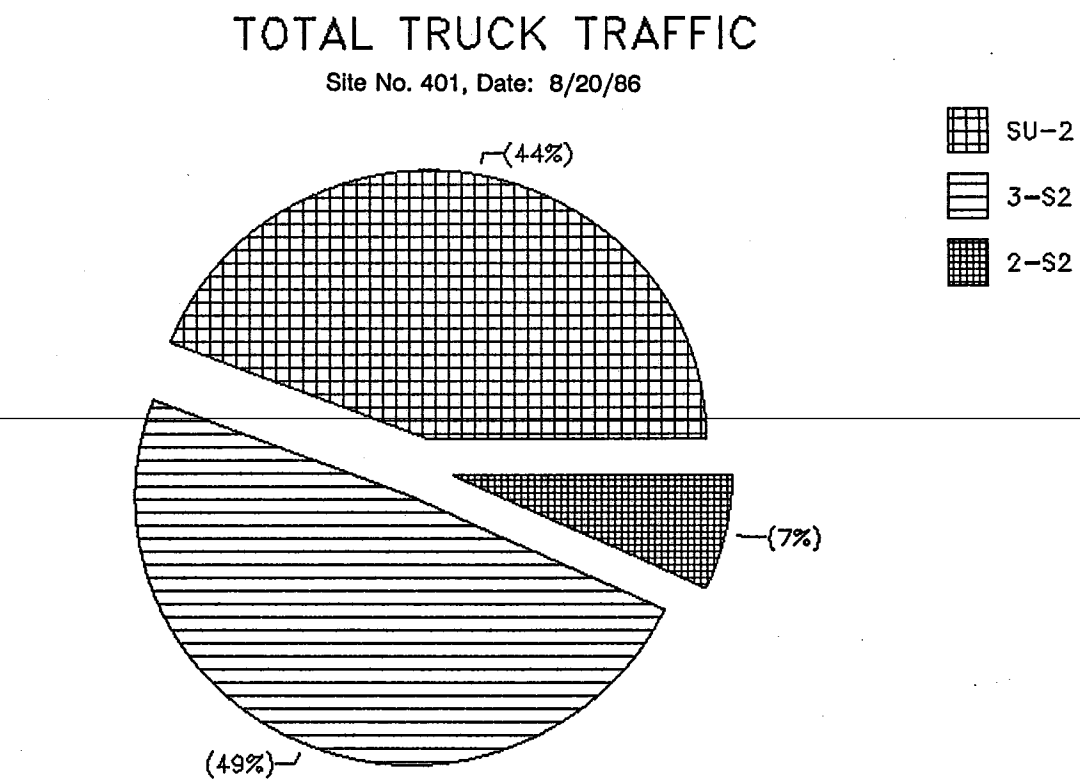


Figure 2.4.1.2-2. Hourly Trip Generation



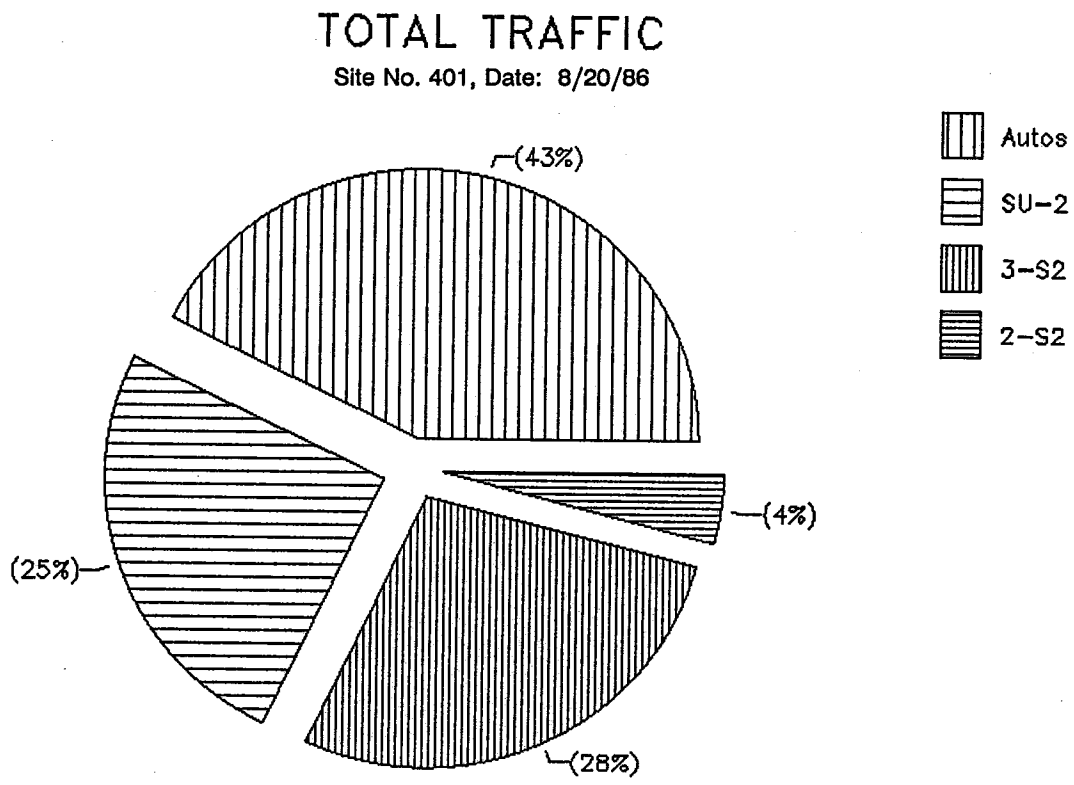


Figure 2.4.1.2-3. Activity Center Vehicle Percentages

Table 2.4.1.2-1. Traffic Classification Count Summary

Table 2.4.1.2-1A. Activity Center Only

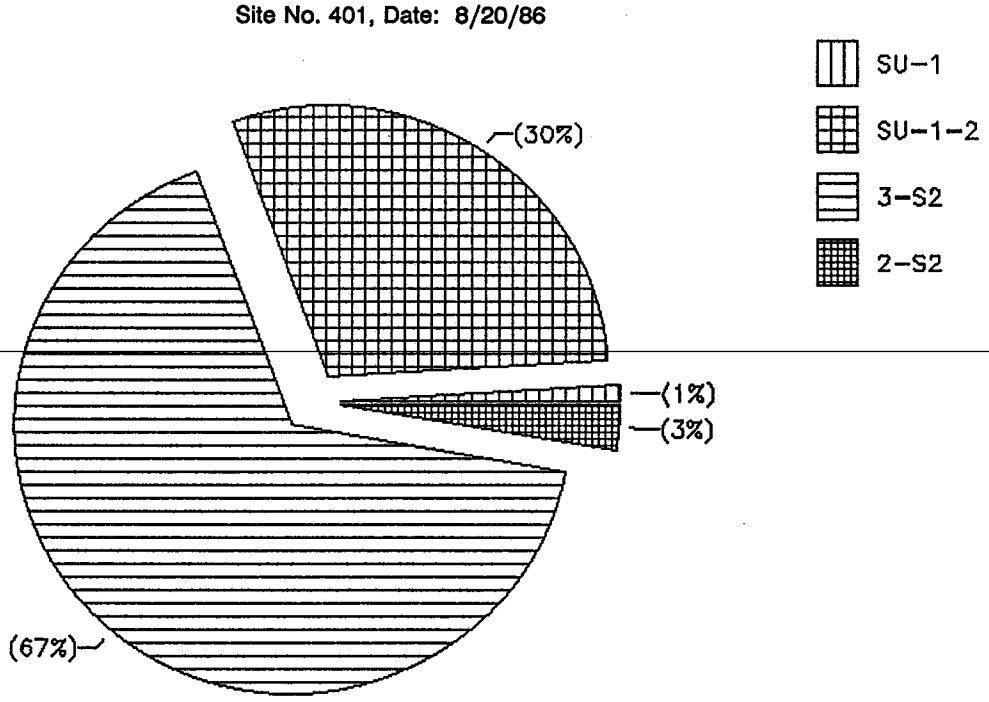
Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-2	3-S2	2-S2	Total	SU	Com.	Cars	Trucks
8/20/86	32	19	21	3	75	44%	56%	43%	57%

Table 2.4.1.2-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	Other	Total	SU	Com.	Cars	Trucks
8/20/86	187	1	3	0	191	100%	0%	98%	2%

Table 2.4.1.2-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2S-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
8/20/86	219	1	32	3	72	0	327	31%	69%	67%	33%



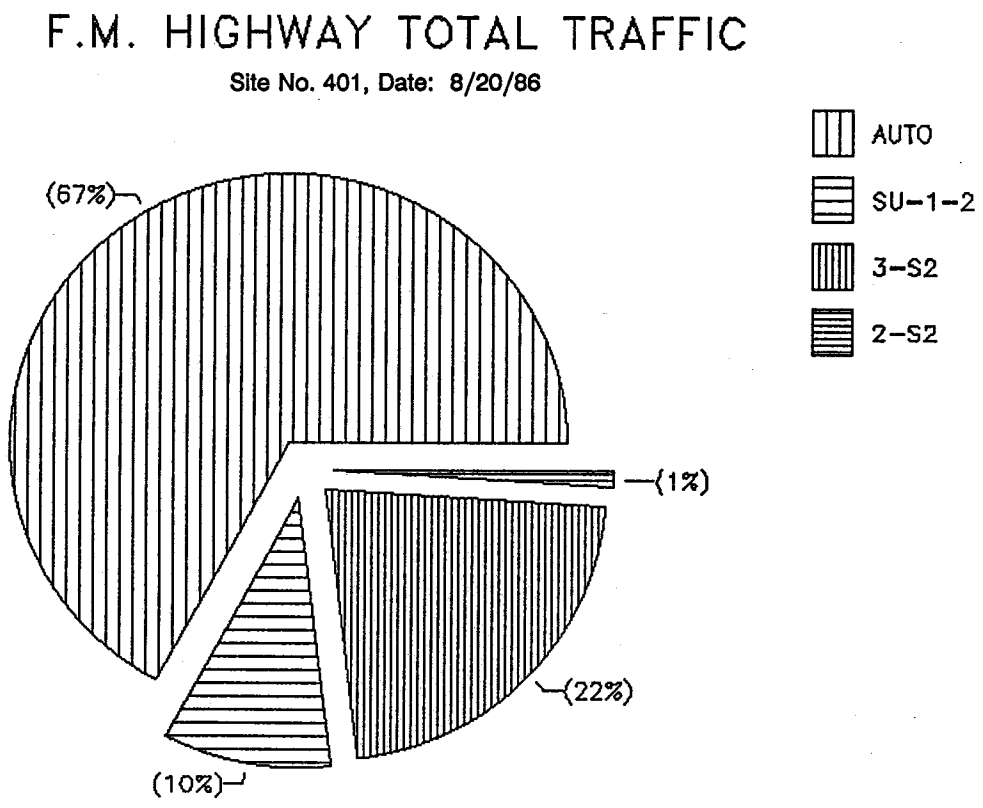


Figure 2.4.1.2-4. Highway Vehicle Percentages

2.4.1.3 Cattle Feedlot, Site No. 402

Introduction. Figure 2.4.1.3-1 is a site map which shows that this feedlot is located in a rural area to the east of a small urban area. Access is provided by a Farm-to-Market Highway. This feedlot is in the extreme northern part of the Panhandle.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.3-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 14-hour period on October 19, 1987.

Figure 2.4.1.3-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (98%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 50 percent of this total. No interview was conducted at this feedlot.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Farm-to-Market Highway with a 1986 average daily traffic (ADT) of 450 vehicles per day. Manual classification counts were conducted in 1987 and 1988 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.3-1 provides a summary of the counts taken. In Table 2.4.1.3-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.3-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.3-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.3-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.3-1C values). The 3-S2 vehicle represents 50 percent of total trucks counted on this highway. Autos made up 66 percent of the total traffic.

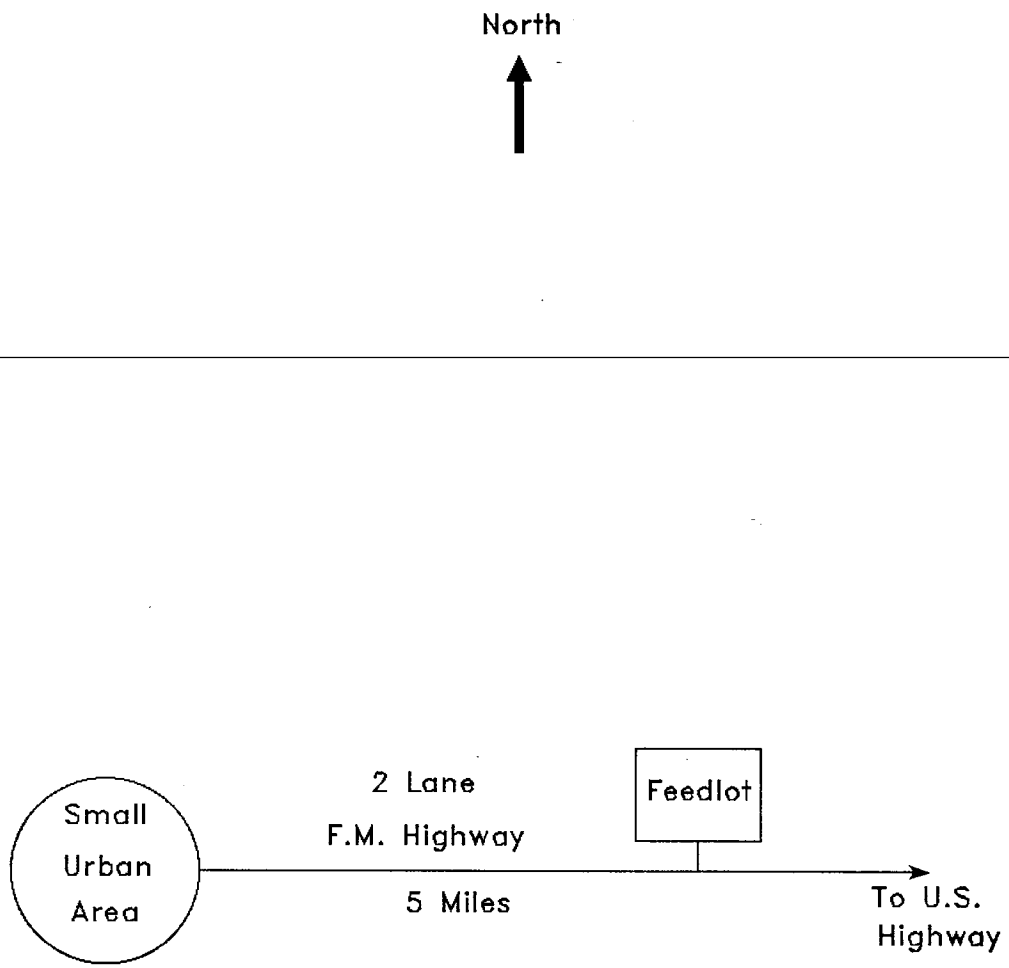
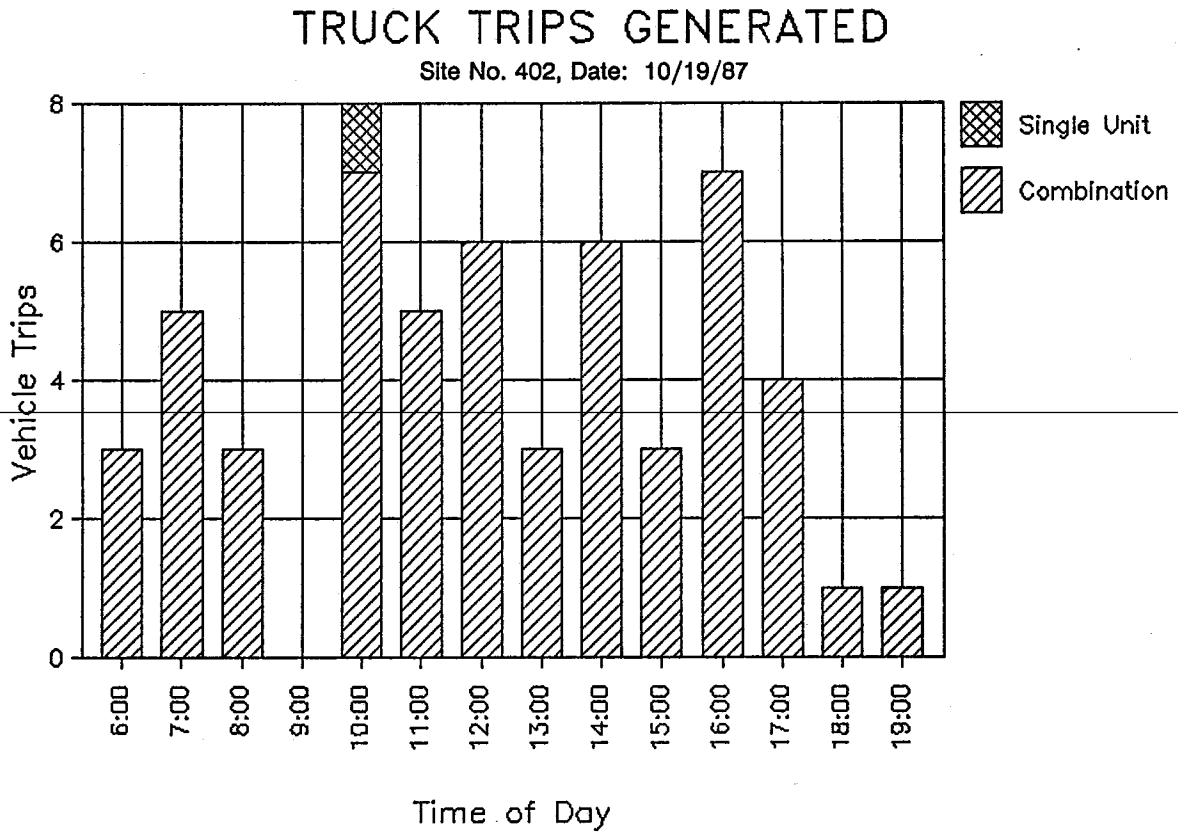


Figure 2.4.1.3-1 Site Map



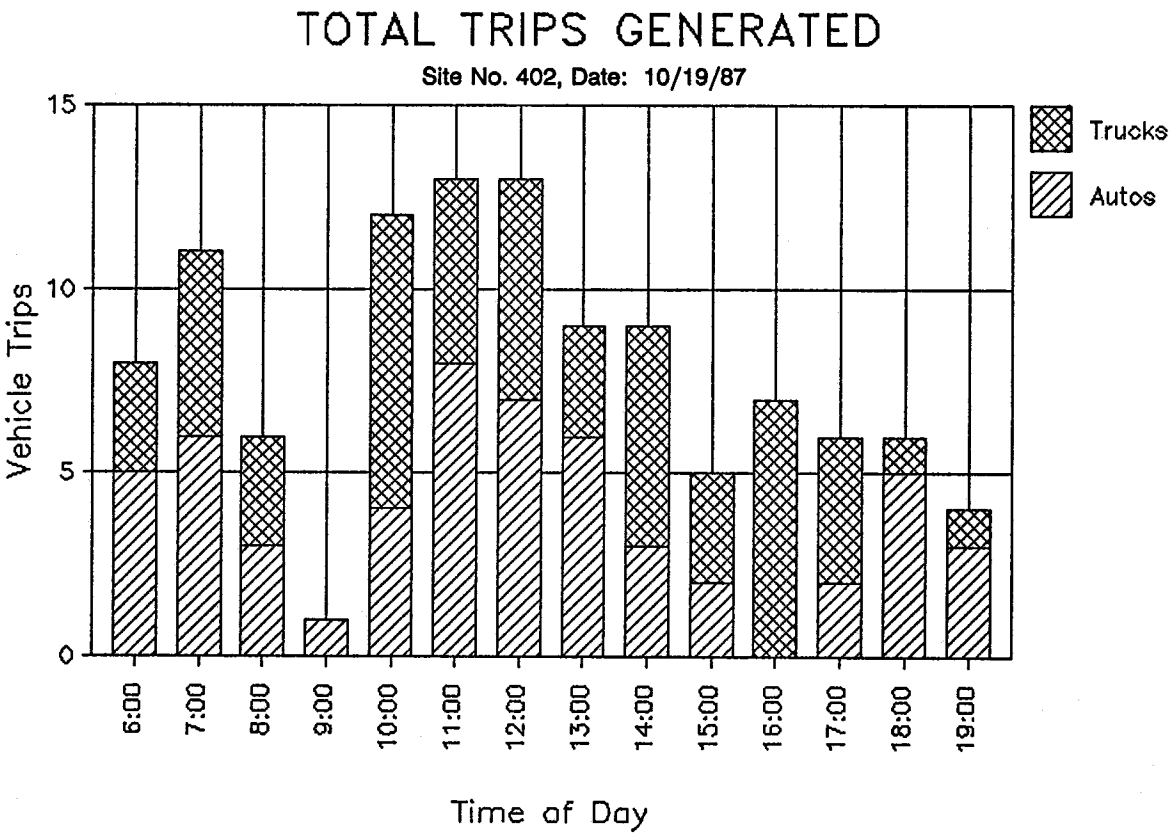
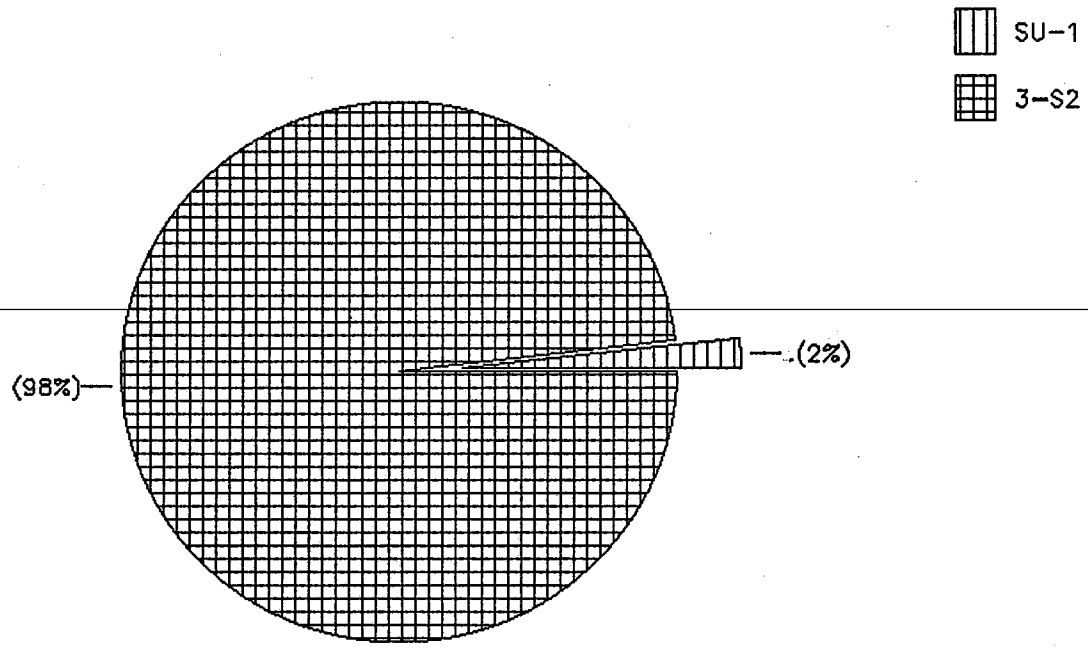


Figure 2.4.1.3-2 Hourly Trip Generation



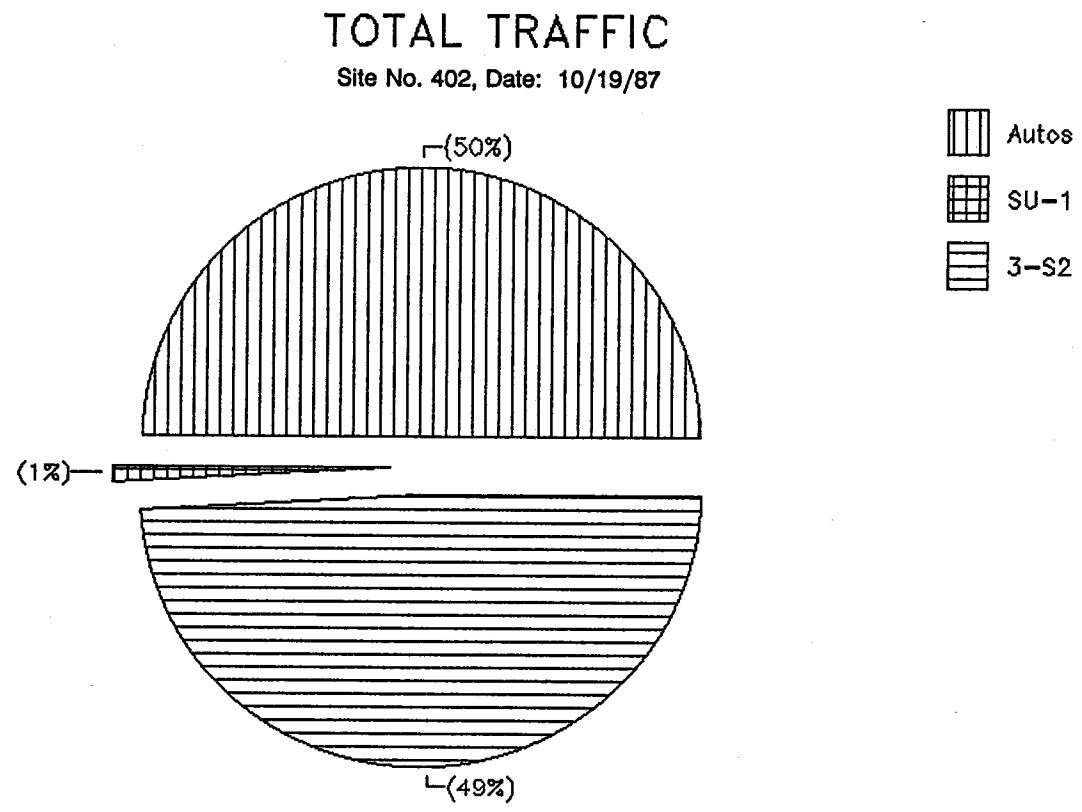


Figure 2.4.1.3-3 Activity Center Vehicle Percentages

Table 2.4.1.3-1. Traffic Classification Count Summary

Table 2.4.1.3-1A. Activity Center Only

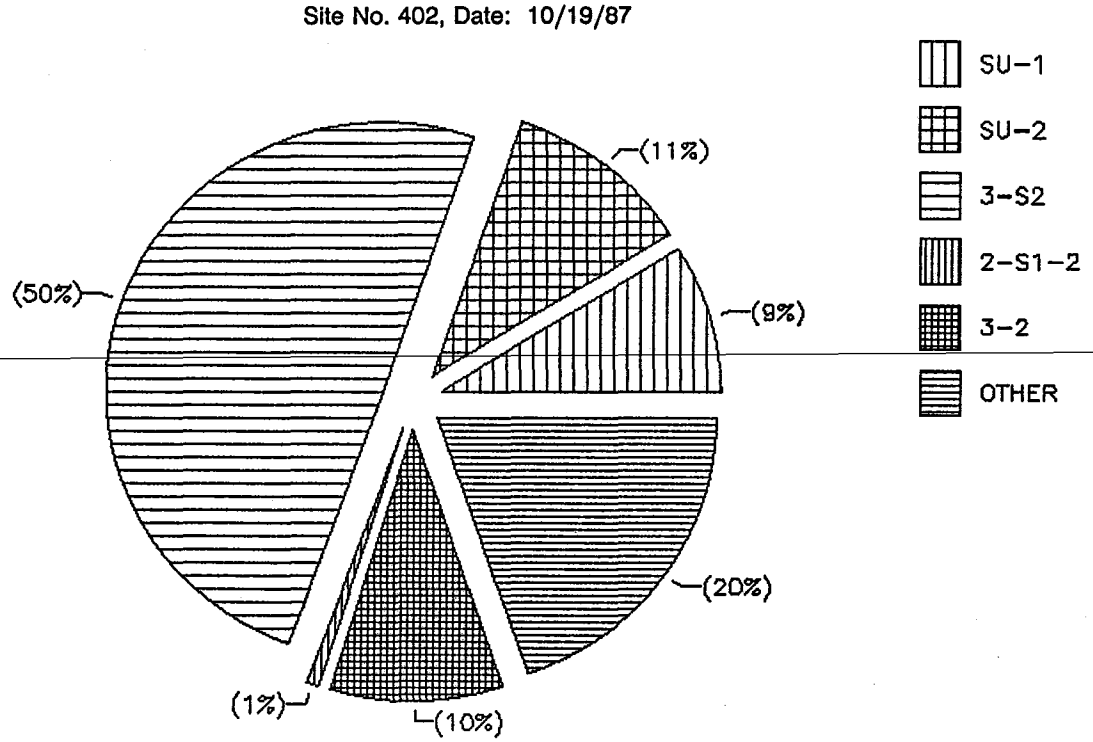
Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
10/19/87	55	1	0	54	110	2%	98%	50%	50%
04/20/88	65	8	0	80	153	9%	91%	42%	58%

Table 2.4.1.3-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/19/87	245	13	17	0	1	24	16	347	29%	71%	71%	29%
04/20/88	281	12	2	0	0	0	0	295	100%	0%	95%	5%

Table 2.4.1.3-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/19/87	300	14	17	1	16	78	31	457	20%	80%	66%	34%
04/20/88	346	20	9	0	0	112	0	487	21%	79%	71%	29%



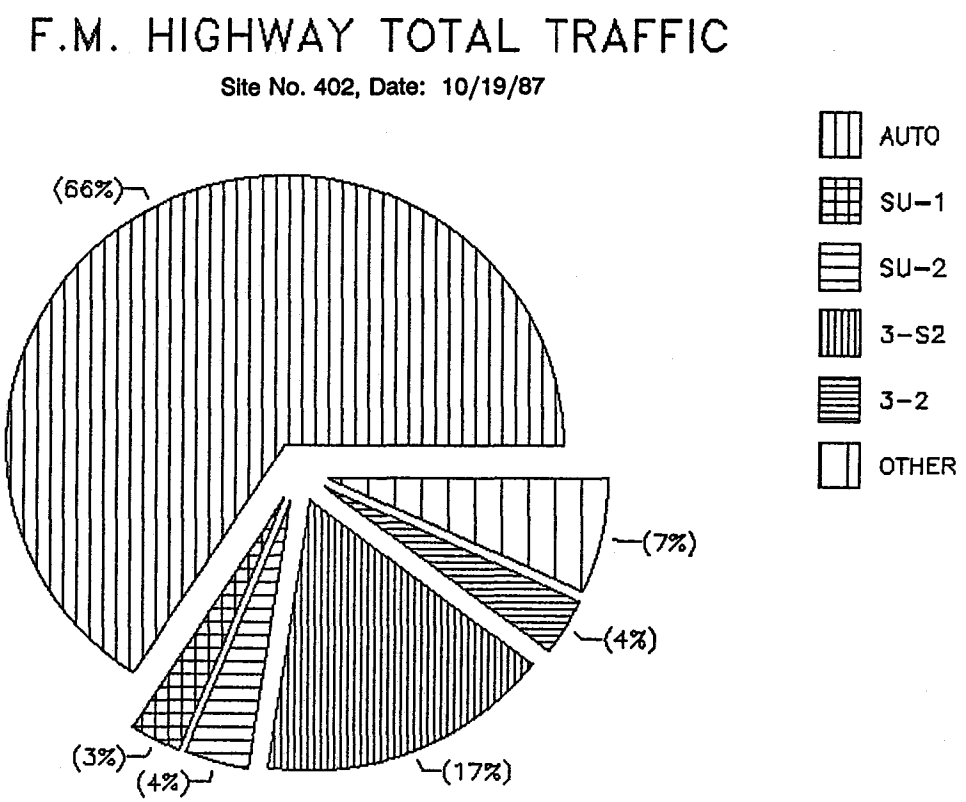


Figure 2.4.1.3-4. Highway Vehicle Percentages

2.4.1.4 Cattle Feedlot, Site No. 403

Introduction. The site map shown in Figure 2.4.1.4-1 indicates that the site is located on a Farm-to-Market Highway. The feedlot is in a rural area 10 miles from the nearest small town and 50 miles southwest of a fairly large urban area in the Panhandle. The feedlot was large in comparison to others studied.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.4-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 14-hour period on November 9, 1987.

Figure 2.4.1.4-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (89%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 39 percent of this total.

An interview was conducted with an official from the feedlot. It was indicated that the average capacity of the feedlot was 65,000 head of cattle. The feedlot employed an average of 40 hourly employees and 5 salaried employees. It was estimated that 90% of the cattle came from out of state, at a 600-mile radius.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 270 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activity on the highway. Table 2.4.1.4-1 provides a summary of the counts taken. First, in Table 2.4.1.4-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.4.1.4-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.4-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.4-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.4-1C values). The 3-S2 vehicle represents 67 percent of total trucks counted on this highway. Autos made up 47 percent of the total traffic.

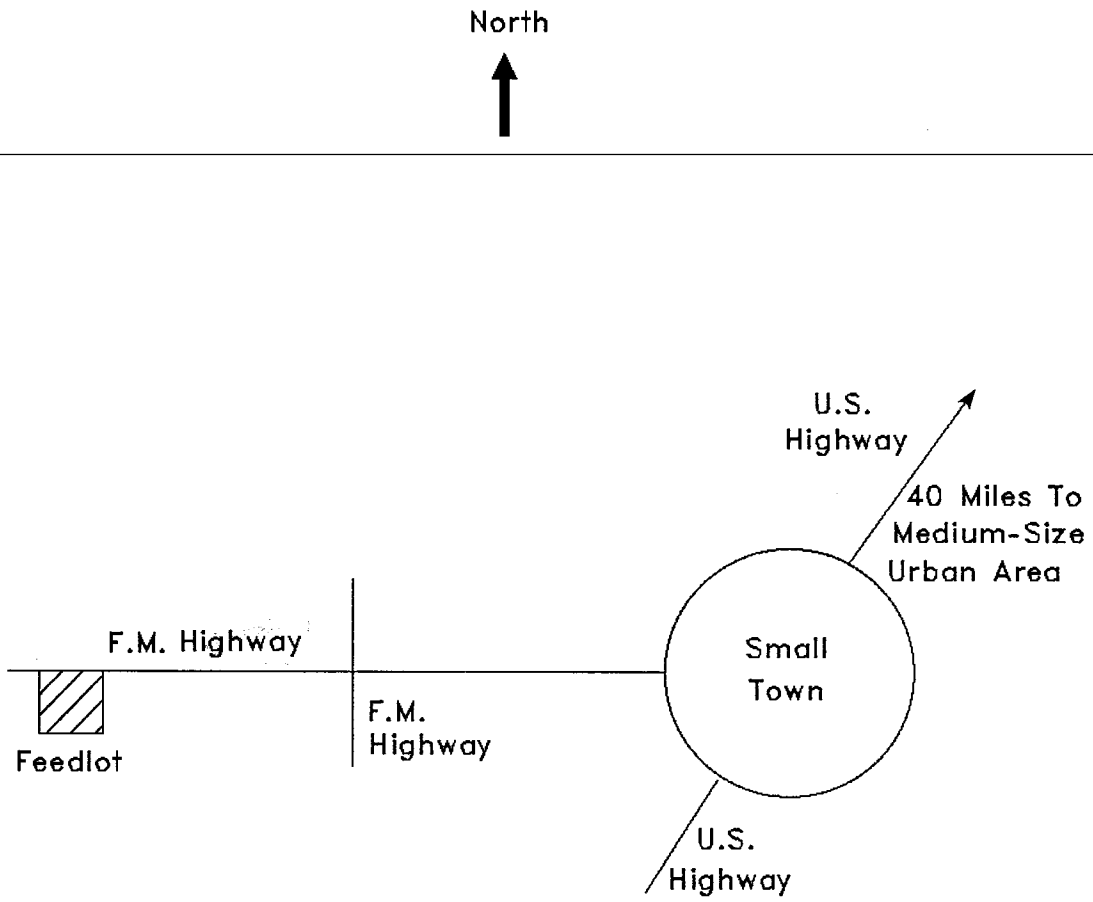
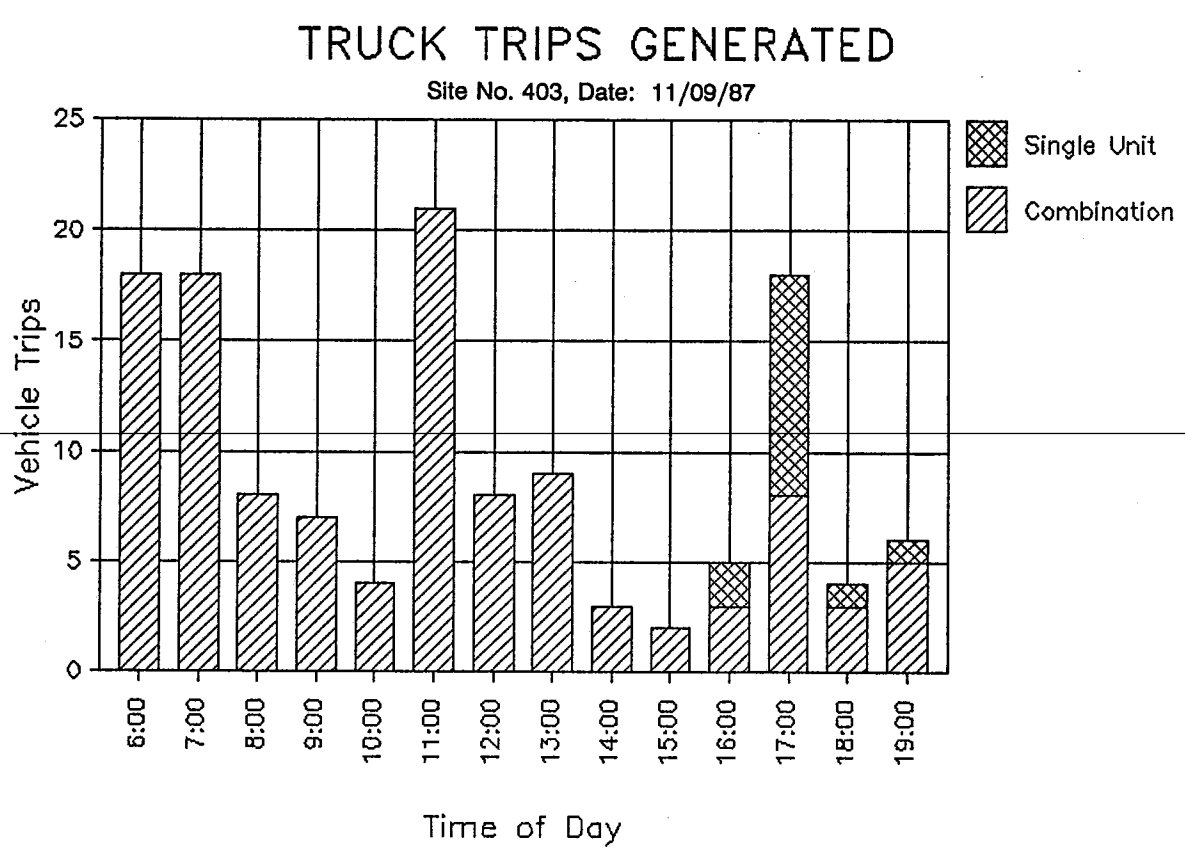


Figure 2.4.1.4-1. Site Map



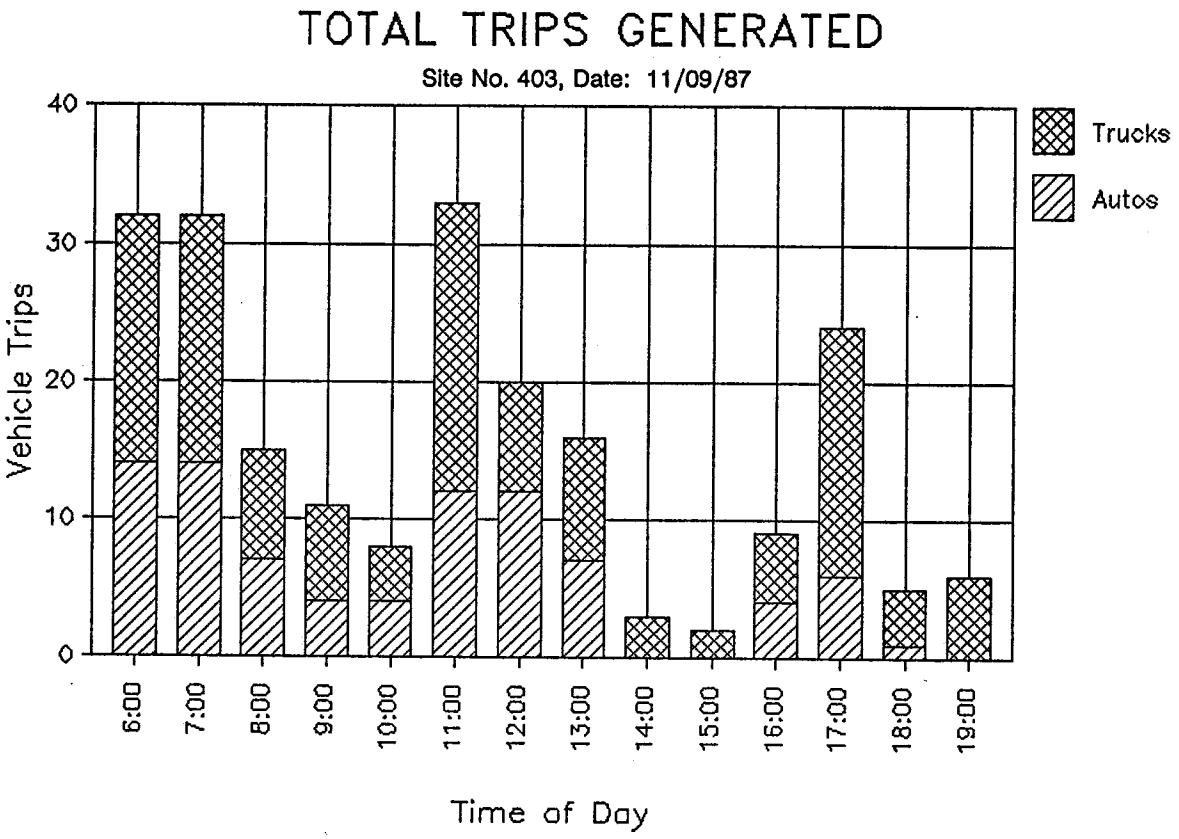
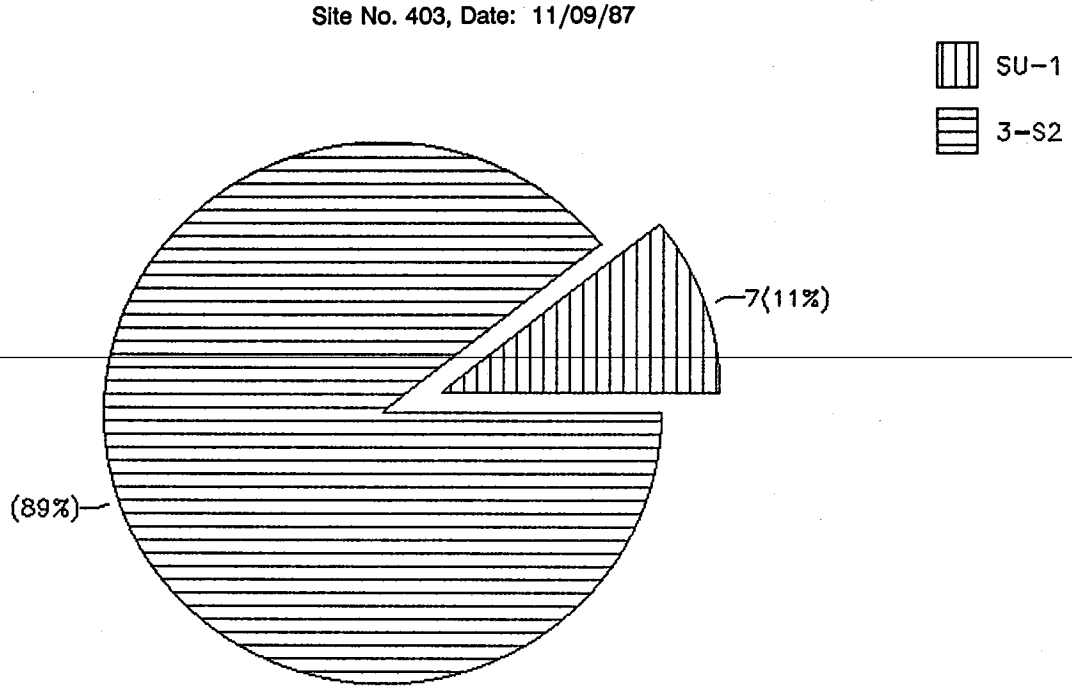


Figure 2.4.1.4-2. Hourly Trip Generation



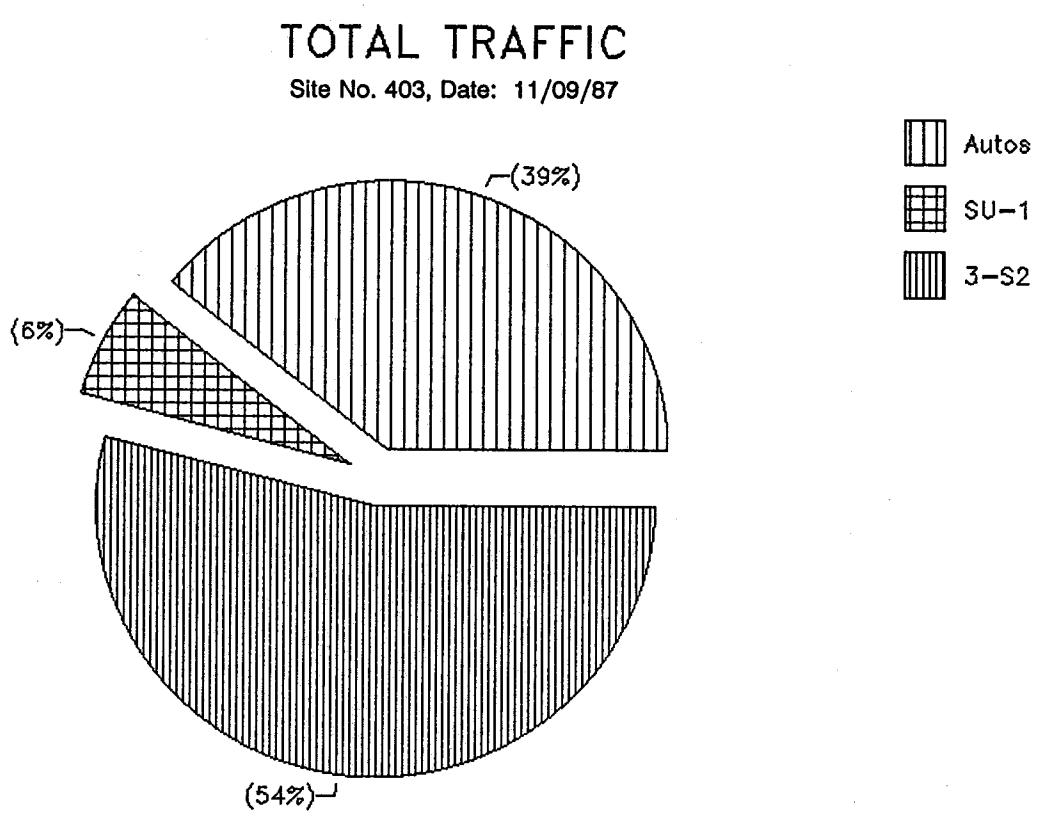


Figure 2.4.1.4-3. Activity Center Vehicle Percentages

Table 2.4.1.4-1. Traffic Classification Count Summary

Table 2.4.1.4-1A Activity Center Only

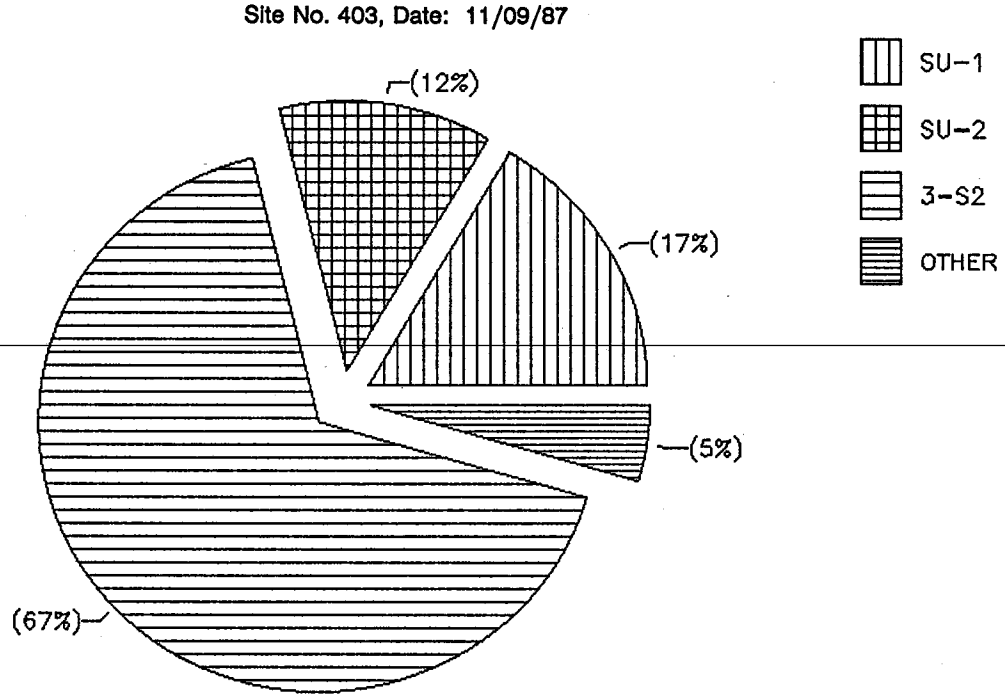
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/7/87	54	16	0	50	43	163	15%	85%	33%	67%
11/9/87	85	14	0	117	0	216	11%	89%	39%	61%

Table 2.4.1.4-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/7/87	156	0	0	8	29	0	193	0%	100%	81%	19%
11/9/87	130	26	30	0	44	11	241	50%	50%	54%	46%

Table 2.4.1.4-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/7/87	210	16	0	8	193	43	470	6%	94%	45%	55%
11/9/87	215	40	30	0	161	11	457	29%	71%	47%	53%



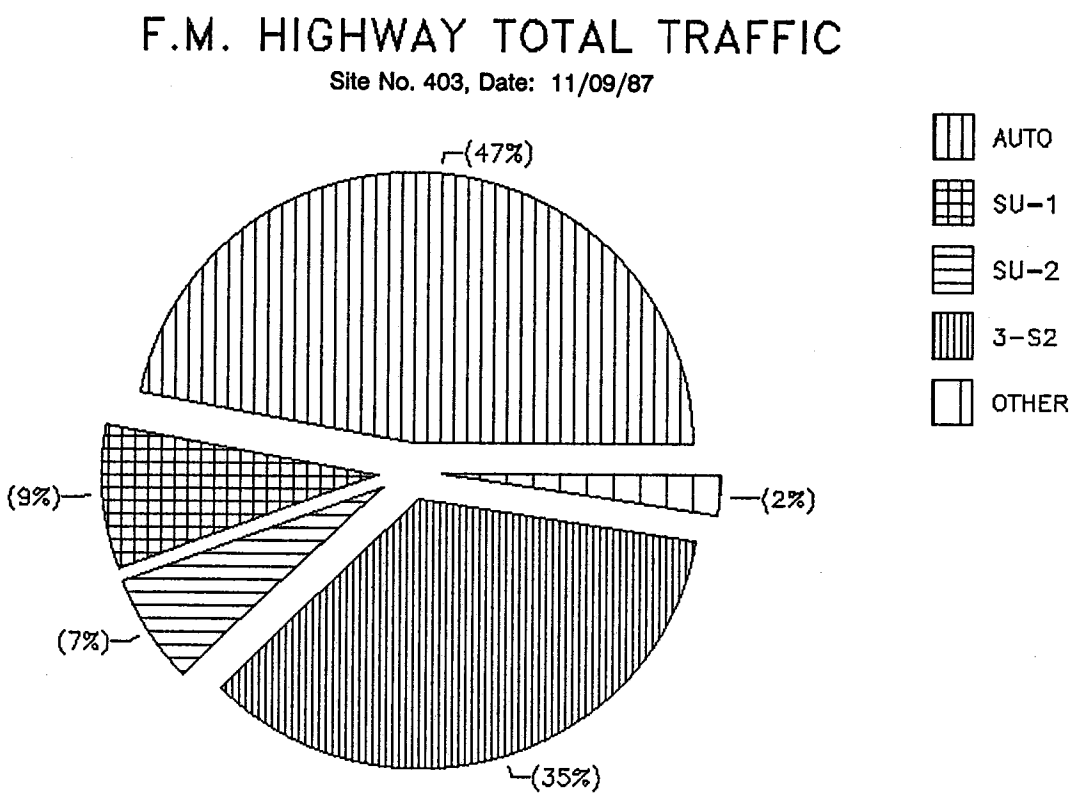


Figure 2.4.1.4-4. Highway Vehicle Percentages

2.4.1.5 Cattle Feedlot, Site No. 404

Introduction. The site map shown in Figure 2.4.1.5-1 indicates that access is provided by a roadway which connects to a Farm-to-Market Highway. The activity center is located west of a relatively small urban area. A total of 70-75 percent of the trucks are from out of state and come from the southern states (Louisiana, Mississippi, and Alabama).

Activity Center Trip-Generating Characteristics. Figure 2.4.1.5-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on April 10, 1987.

Figure 2.4.1.5-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of this site. The only truck class observed was the 3-S2. Also illustrated is the breakdown of total traffic moving to and from the site. Auto traffic represented 62 percent of this total.

An interview was conducted with an official of the feedlot. The average capacity of this facility is approximately 7,000 head of cattle. The number of employees at the feedlot was seven. An average of three loads of feed per day were hauled in by 3-S2 vehicles.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 340 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.5-1 provides a summary of the counts taken. In Table 2.4.1.5-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.5-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.5-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.5-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.5-1C values). The 3-S2 vehicle represents 83 percent of total trucks counted on this highway. Autos made up 77 percent of the total traffic.

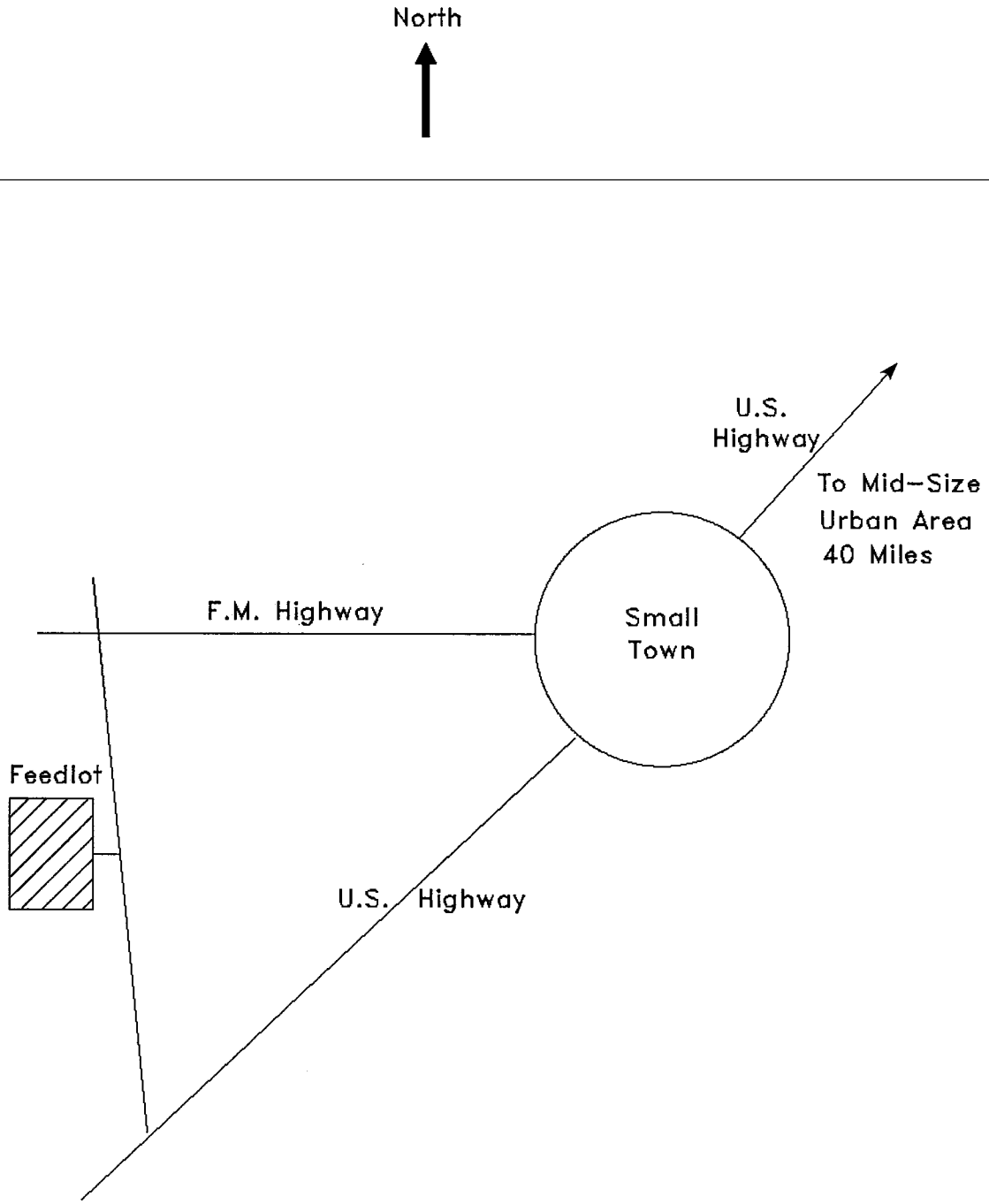
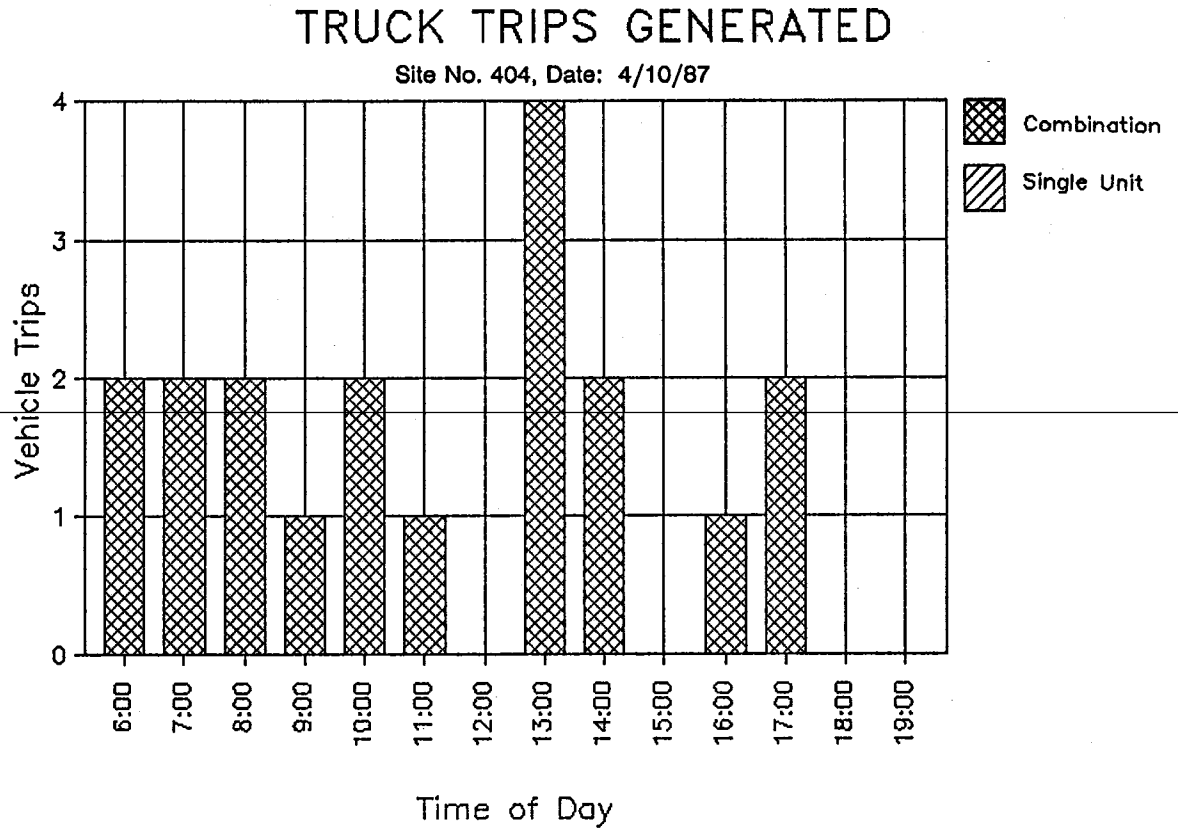


Figure 2.4.1.5-1. Site Map



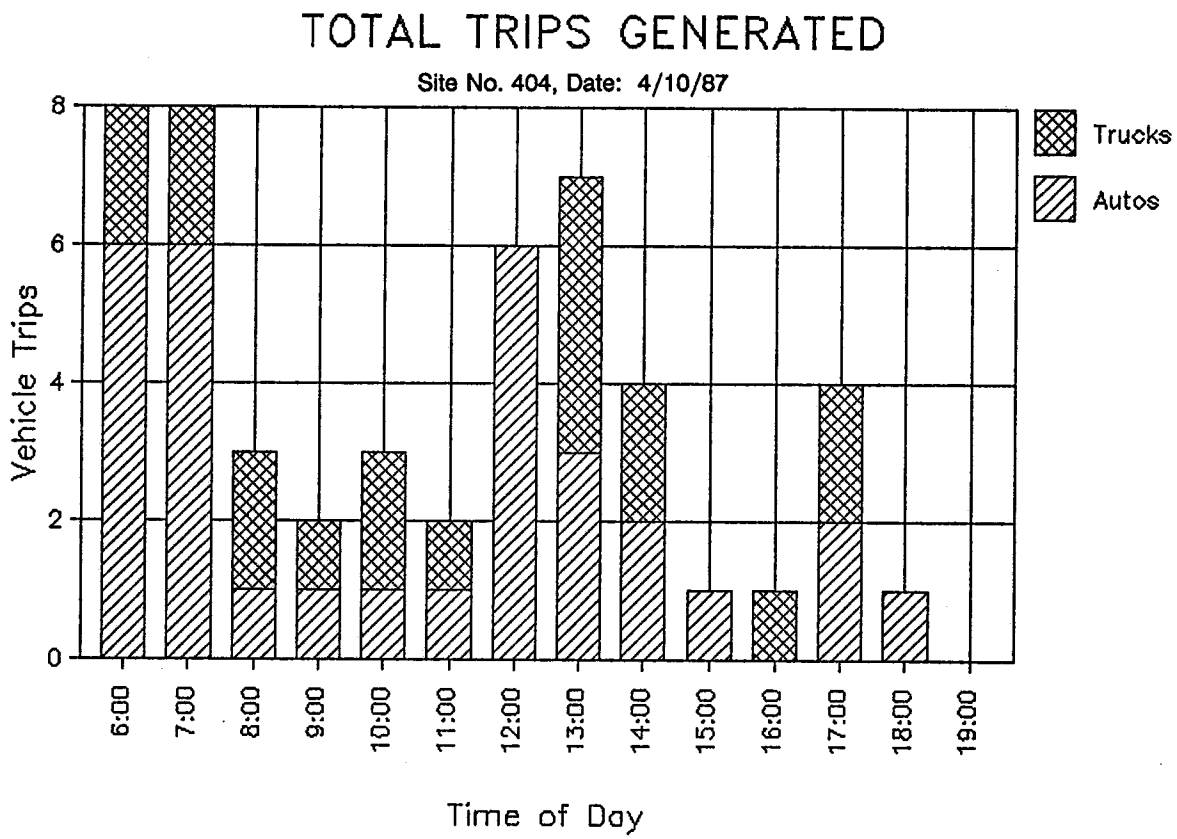
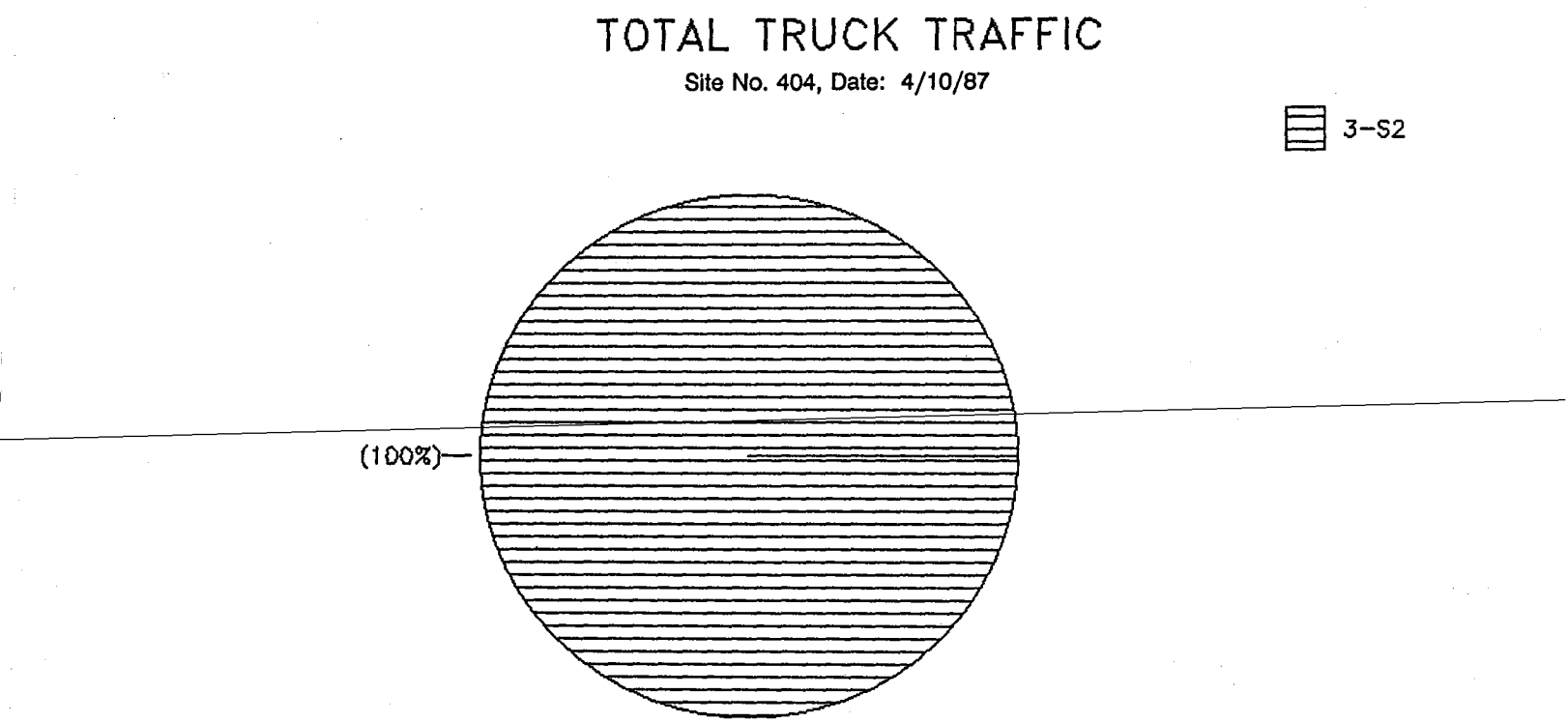


Figure 2.4.1.5-2. Hourly Trip Generation



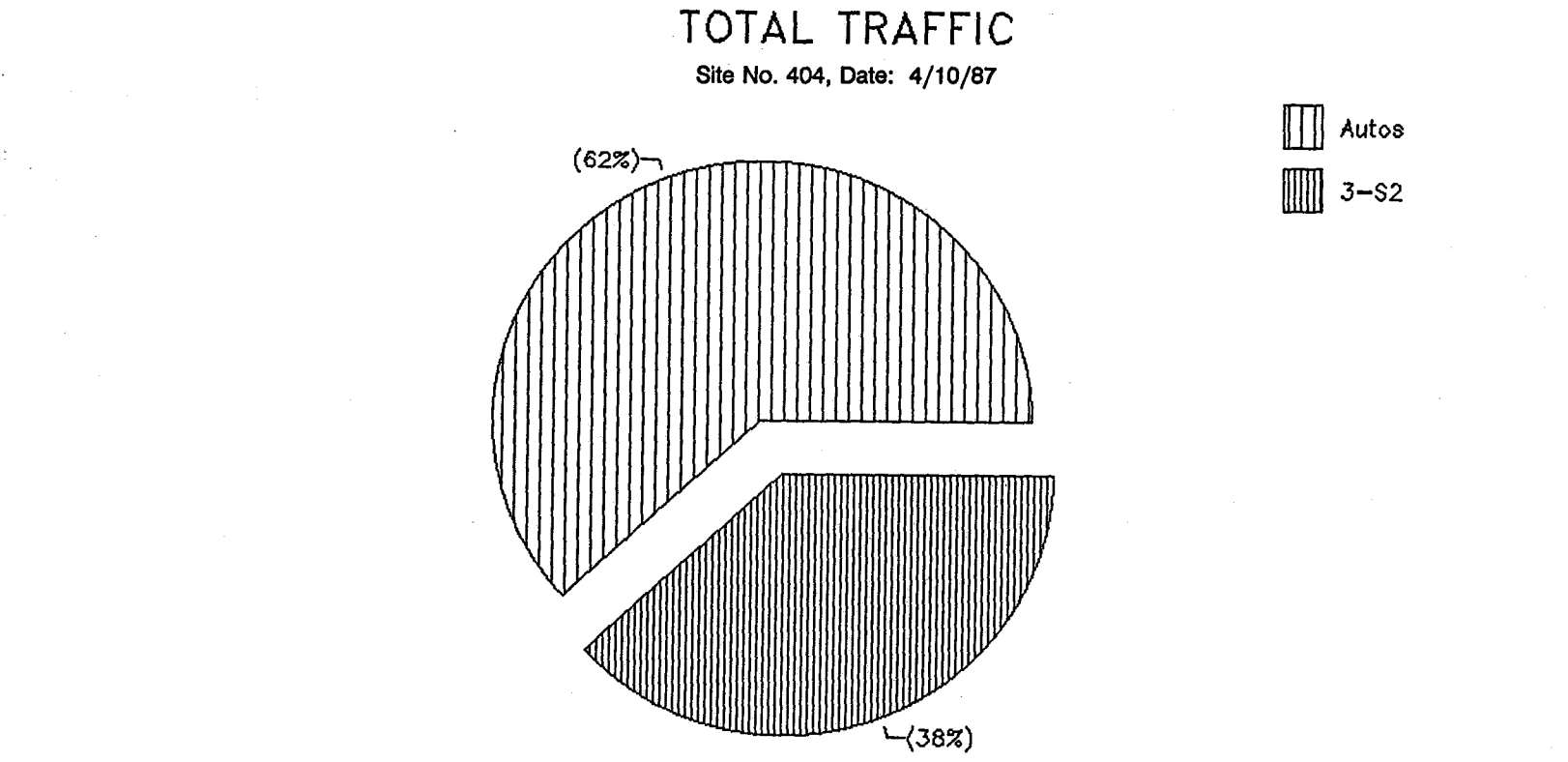


Figure 2.4.1.5-3. Activity Center Vehicle Percentages

Table 2.4.1.5-1. Traffic Classification Count Summary

Table 2.4.1.5-1A. Activity Center Only

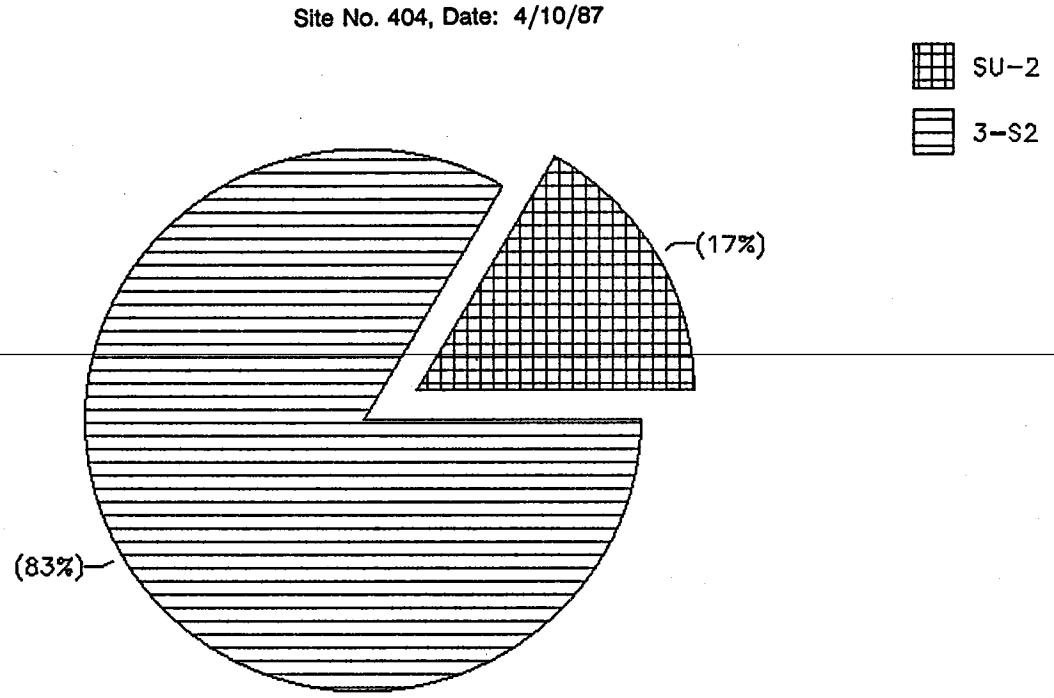
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/20/85	27	0	0	24	0	51	0%	100%	53%	47%
4/10/87	31	0	0	19	0	50	0%	100%	62%	38%

Table 2.4.1.5-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/10/87	49	0	4	1	0	54	80%	20%	91%	9%

Table 2.4.1.5-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/10/87	80	0	4	20	0	104	17%	83%	77%	23%



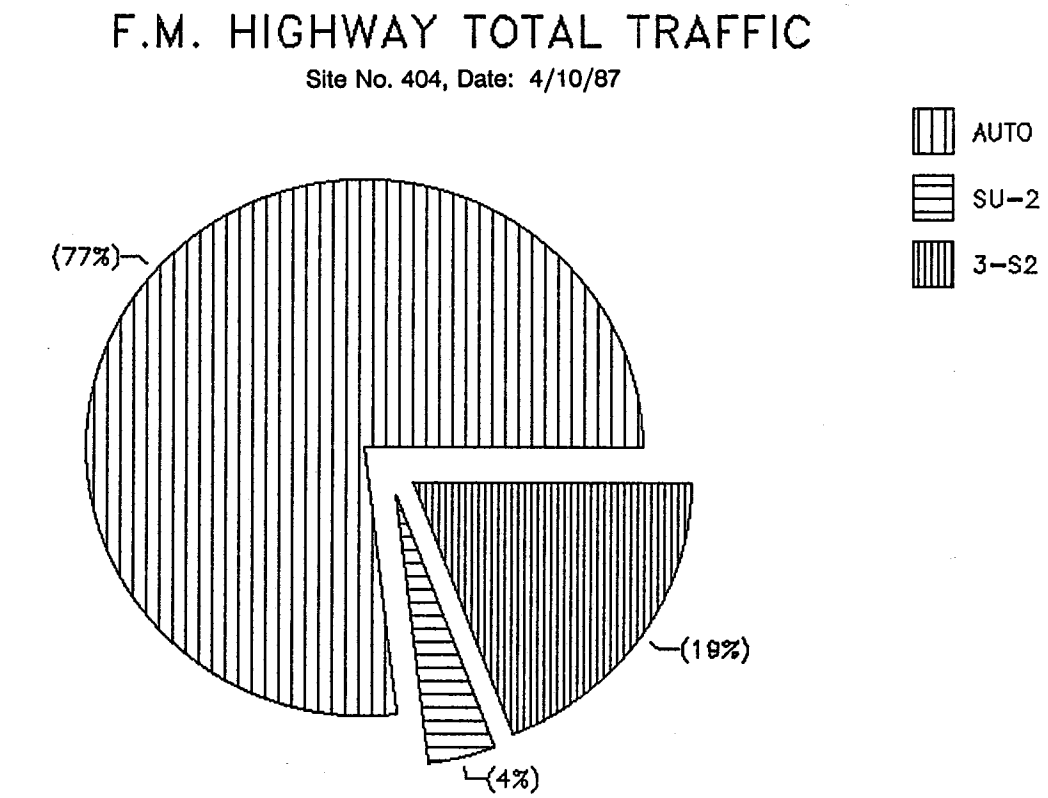


Figure 2.4.1.5-4. Highway Vehicle Percentages

2.4.1.6 Cattle Feedlot, Site No. 405

Introduction. The site map shown in Figure 2.4.1.6-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located 10 miles northwest of a relatively small urban area. Trucks hauling cattle to this site come an average distance of approximately 400 miles. This feed lot was smaller than many studied with a capacity of 20,000 head.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.6-2 shows the truck traffic (in and out) generated by the site during a 13-hour period (6 a.m. to 7 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 13-hour period on November 13, 1987.

Figure 2.4.1.6-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (80%). Also illustrated is the breakdown of total traffic moving to and from the site. Auto traffic represented 63 percent of this total.

An interview was conducted with an official from the feedlot. The average capacity of the feedlot was 20,000 head of cattle. The number of employees at the feedlot was 23 hourly and 5 salaried employees. It was estimated that approximately ten percent of the cattle come from out of state. Approximately eight (8) daily truck loads are required to transport feed to the cattle. Fed cattle are hauled to processing plants which are 10 to 80 miles from the feedlot.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 360 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.6-1 provides a summary of the counts taken. In Table 2.4.1.6-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.6-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.6-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.6-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.6-1C values). The 3-S2 vehicle represents 47 percent of total trucks counted on this highway. Autos made up 67 percent of the total traffic.

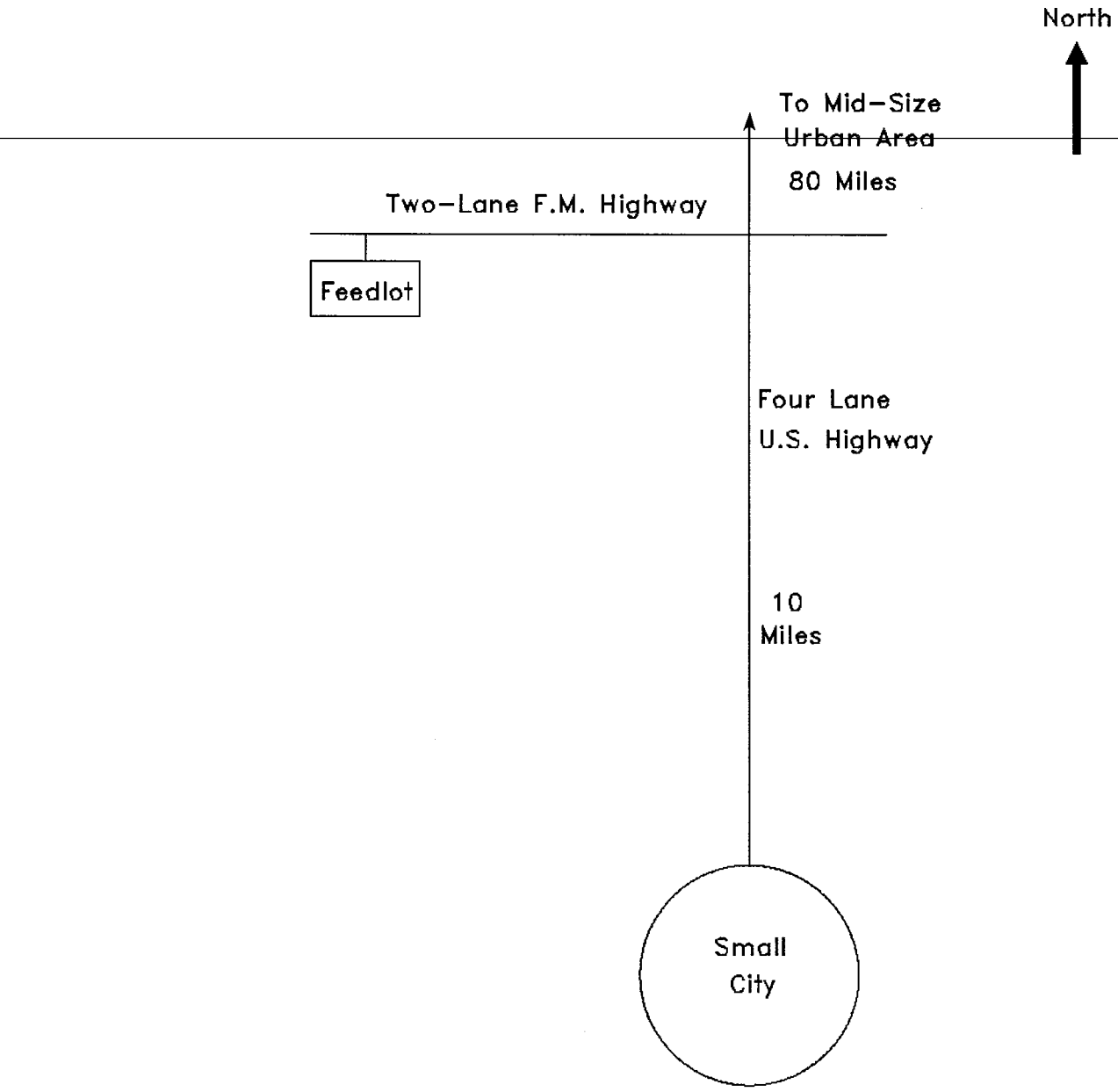
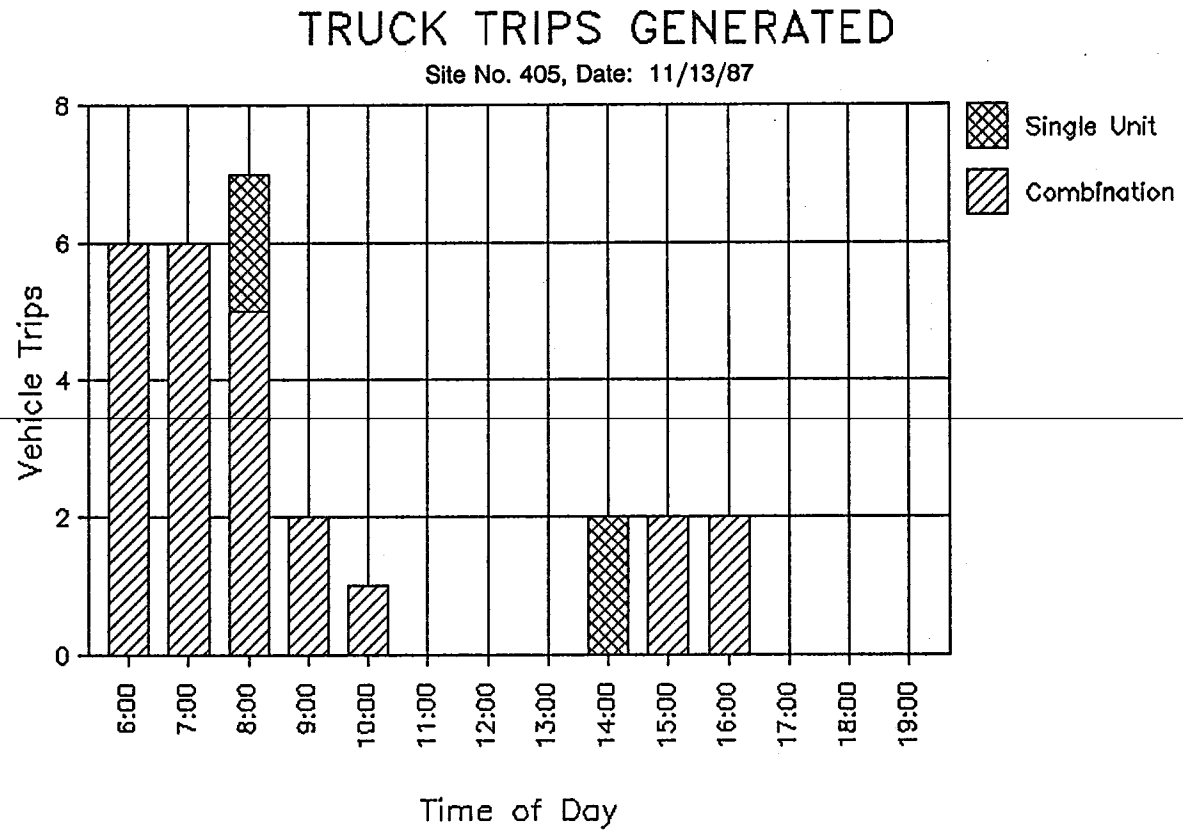


Figure 2.4.1.6-1. Site Map



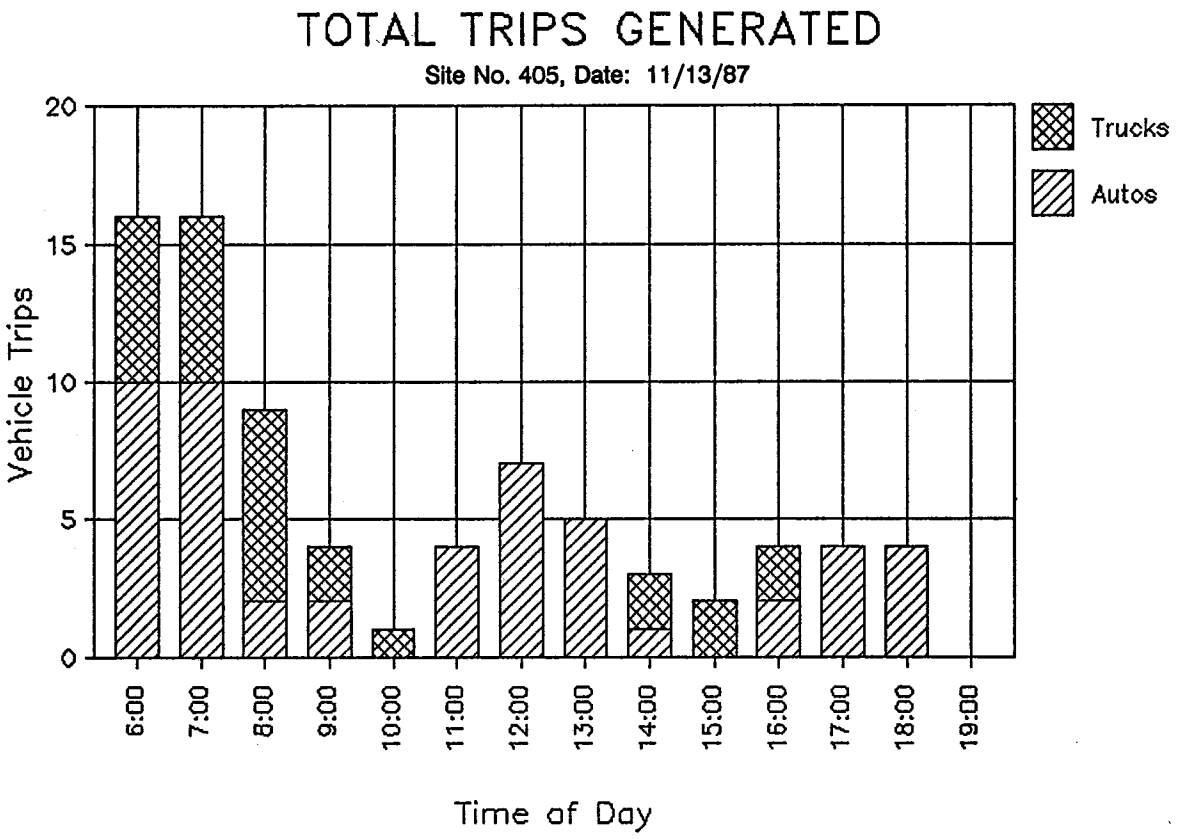
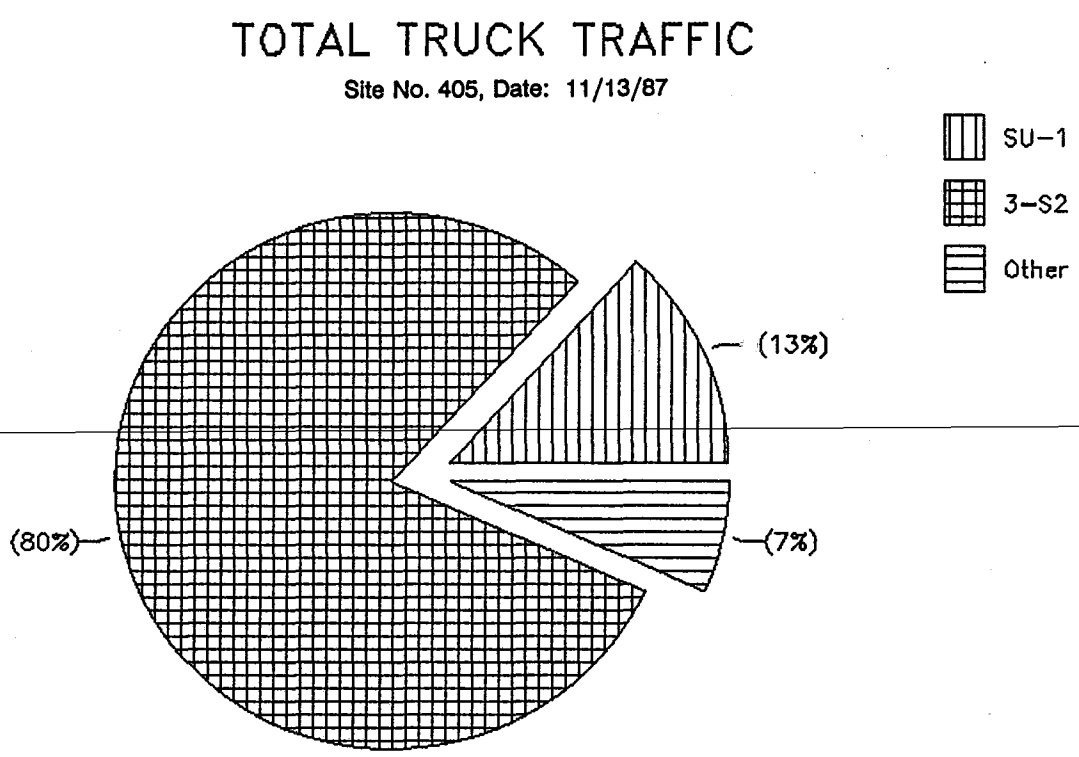


Figure 2.4.1.6-2. Hourly Trip Generation



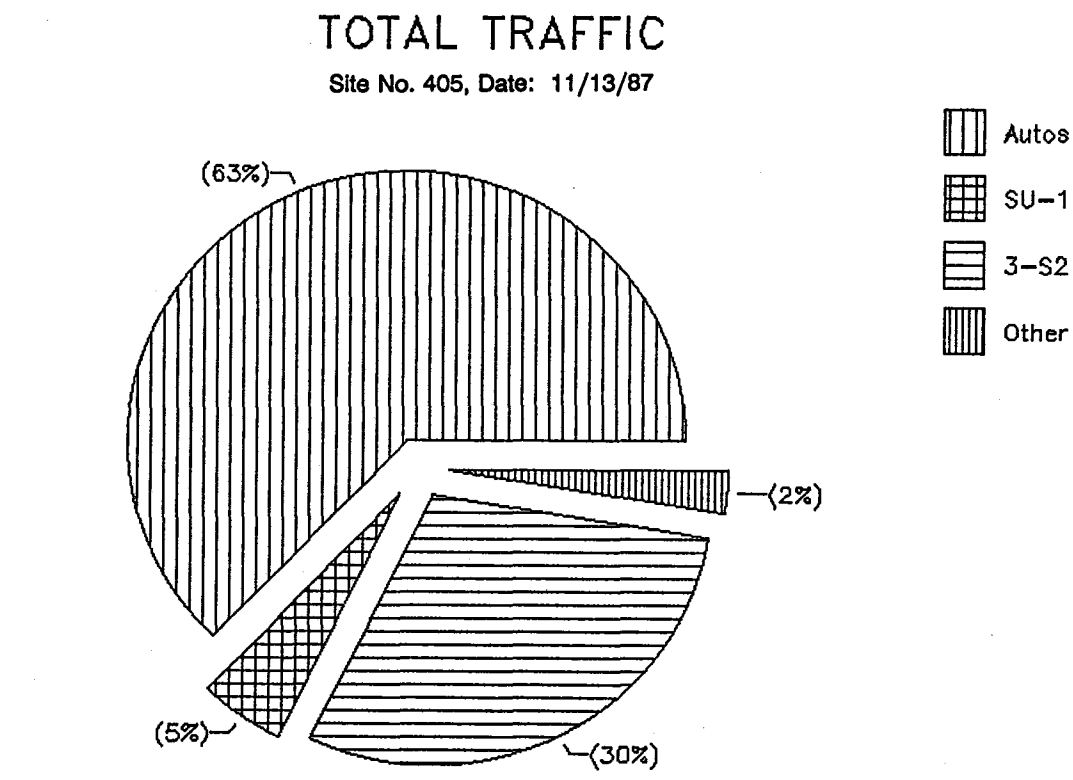


Figure 2.4.1.6-3. Activity Center Vehicle Percentages

Table 2.4.1.6-1. Traffic Classification Count Summary

Table 2.4.1.6-1A. Activity Center Only

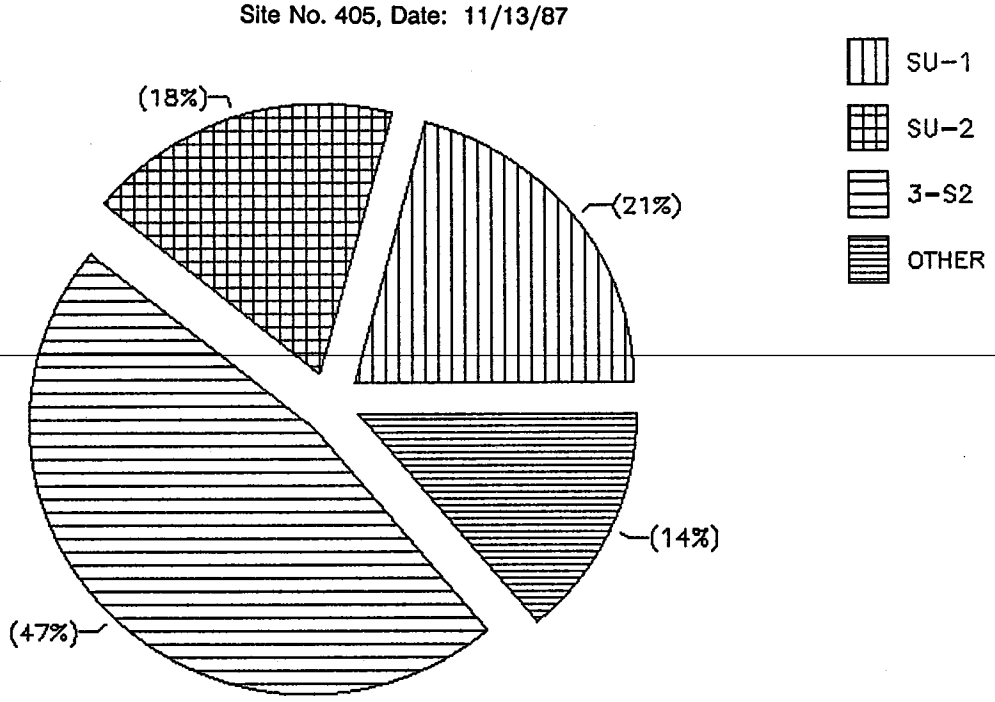
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
11/13/87	51	4	0	24	2	81	13%	87%	63%	37%

Table 2.4.1.6-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
11/13/87	208	23	24	37	16	308	47%	53%	68%	32%

Table 2.4.1.6-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
11/13/87	259	27	24	61	18	389	39%	61%	67%	33%



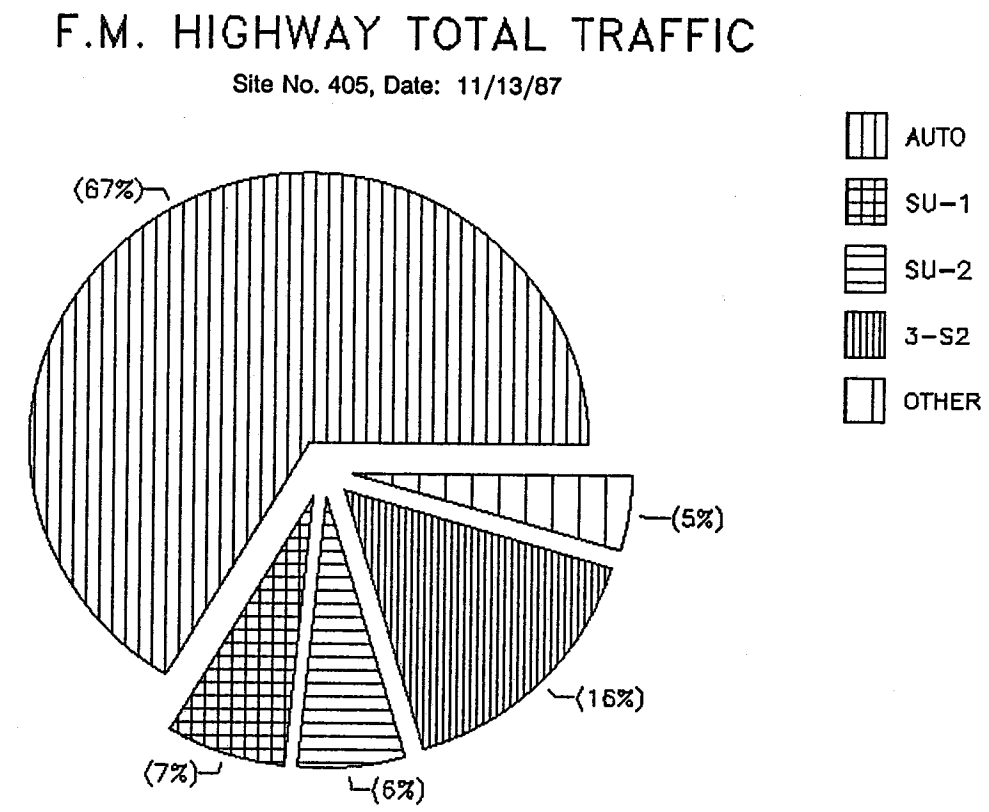


Figure 2.4.1.6-4. Highway Vehicle Percentages

2.4.1.7 Cattle Feedlot, Site No. 406

Introduction. As indicated in Figure 2.4.1.7-1, this site is rural in nature, with access provided by a Farm-to-Market Highway. The site is in the extreme northern Panhandle area of the state. Trucks hauling livestock to this site come from the south plains and the southeastern states.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.7-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 14-hour period on October 28, 1987.

Figure 2.4.1.7-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (52%). Also illustrated is the breakdown of total traffic moving to and from the site. Trucks represented 66 percent of this total.

An interview was conducted with an official from the feedlot. The average capacity of the facility is estimated at 26,000 head of cattle. A total of 35 employees (30 hourly and 5 salaried) worked at the facility. A total of 19 trips daily was estimated as being generated by feed trucks hauling feed to this feedlot.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway approximately five miles from the site. It is estimated that this state highway had an average daily traffic (ADT) of 210 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.7-1 provides a summary of the counts taken. In Table 2.4.1.7-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.7-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.7-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.7-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.7-1C values). The 3-S2 vehicle represents 58 percent of total trucks counted on this highway. Trucks made up 52 percent of the total traffic.

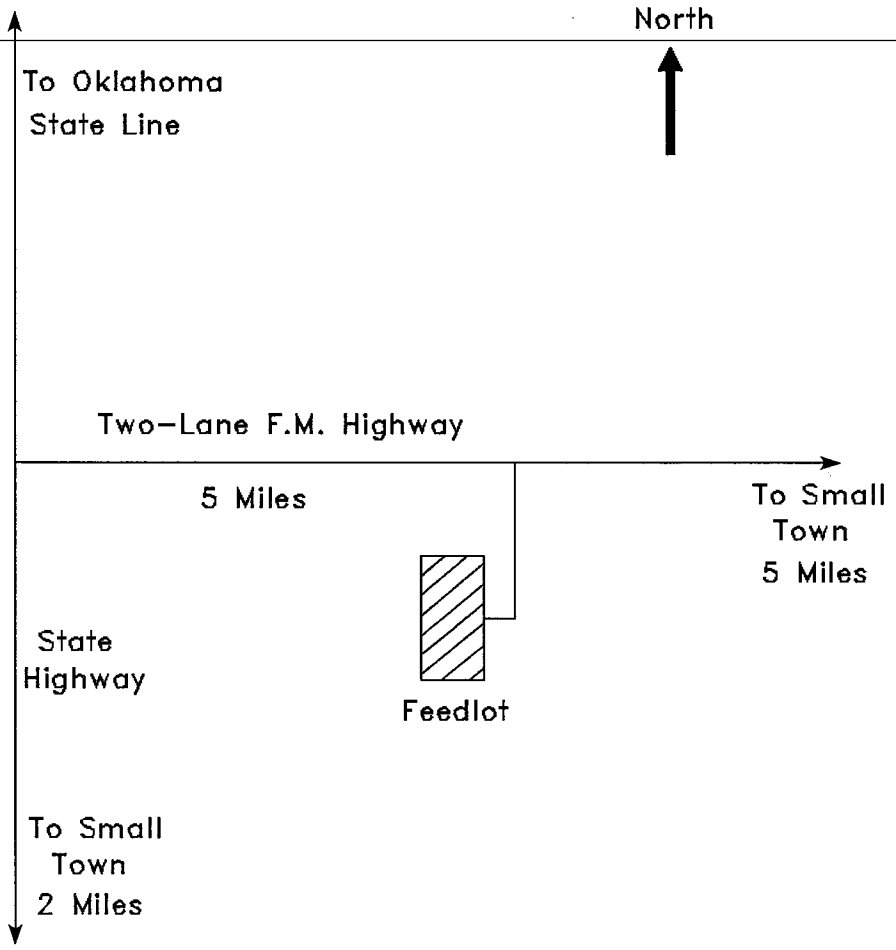
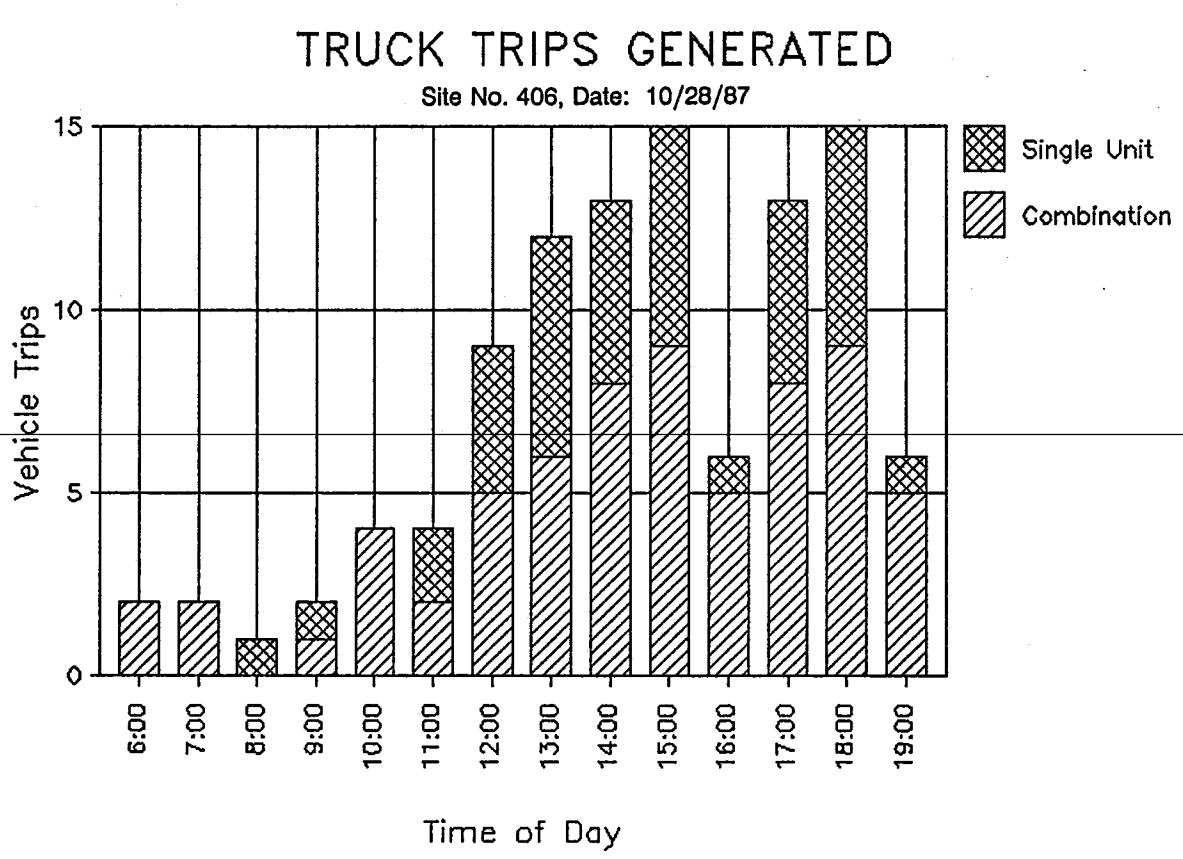


Figure 2.4.1.7-1. Site Map



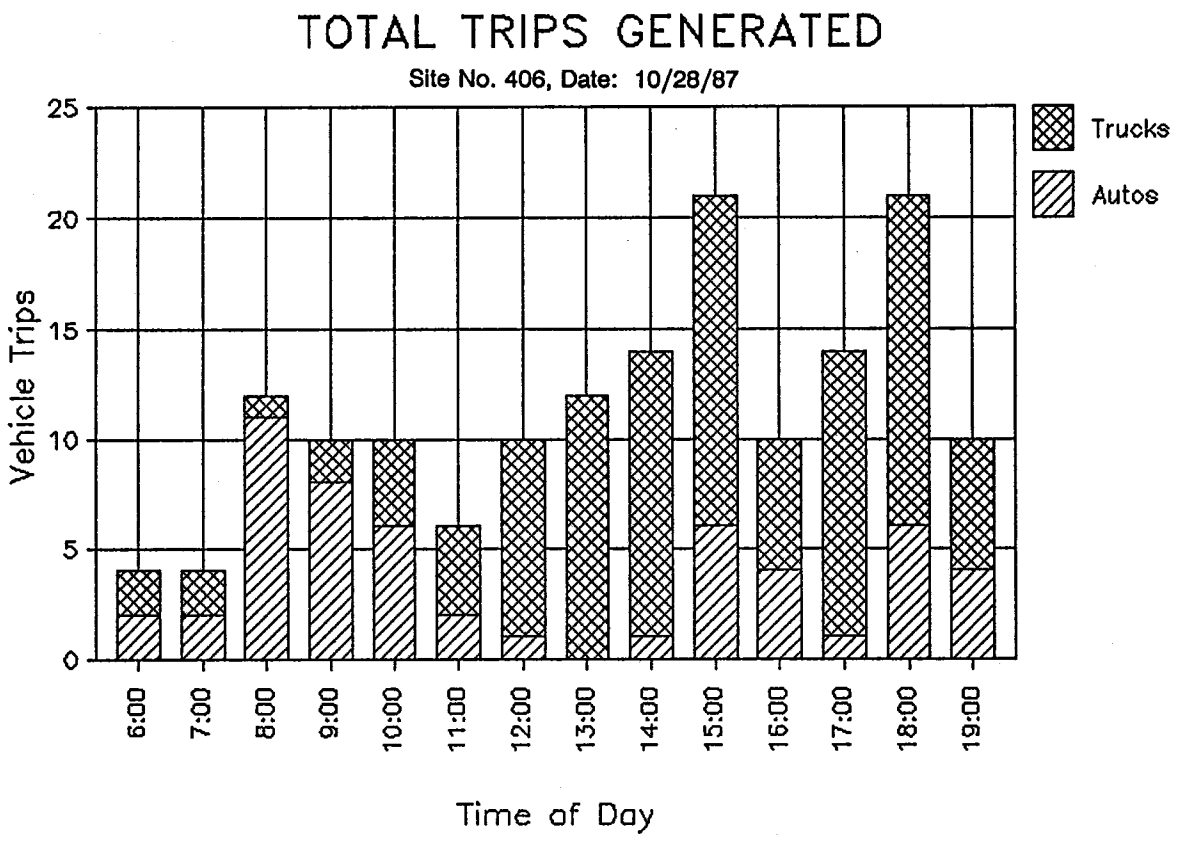
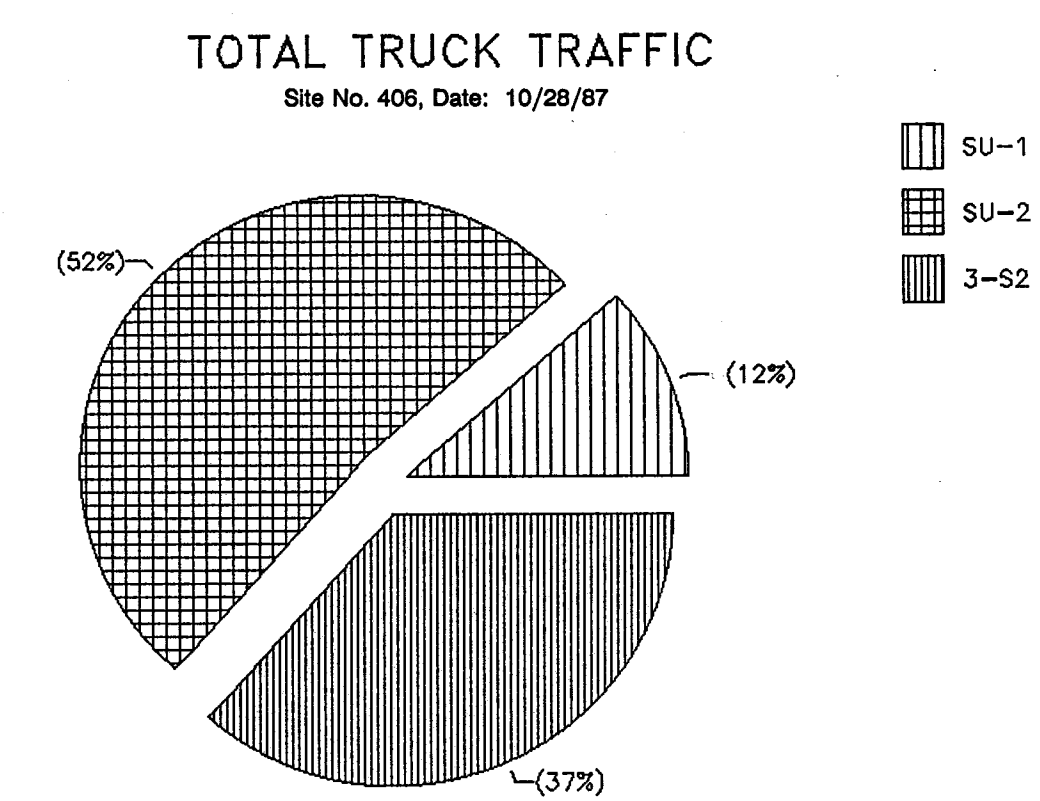


Figure 2.4.1.7-2. Hourly Trip Generation



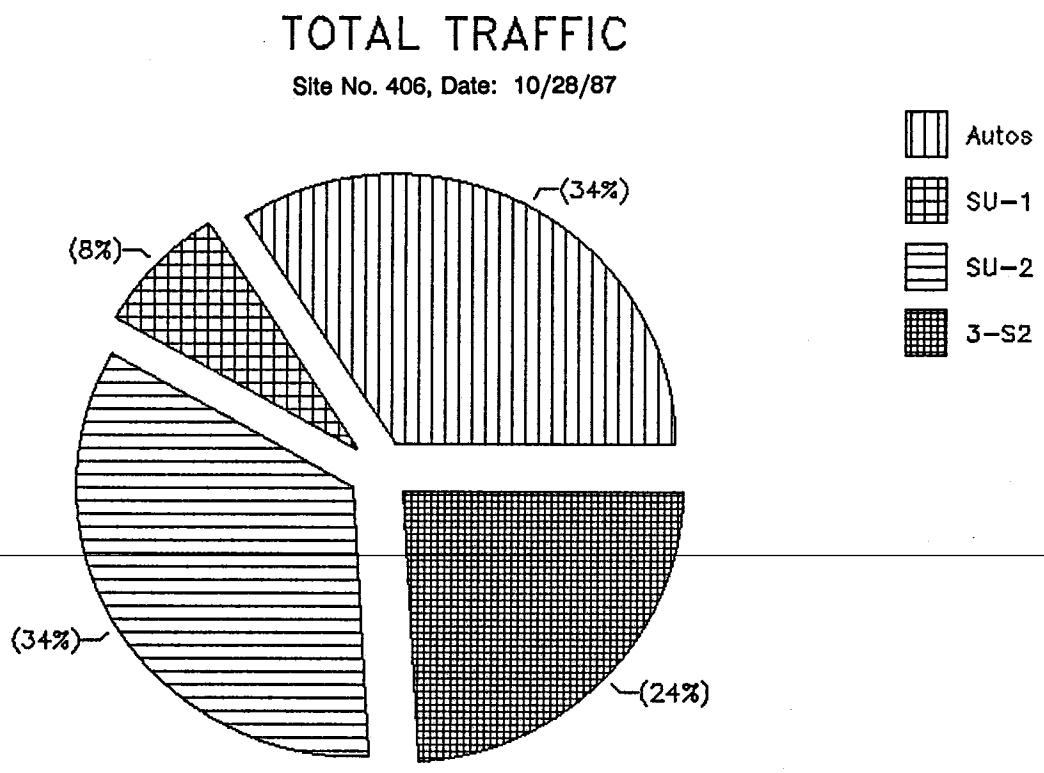


Figure 2.4.1.7-3. Activity Center Vehicle Percentages

Table 2.4.1.7-1. Traffic Classification Count Summary

Table 2.4.1.7-1A. Activity Center Only

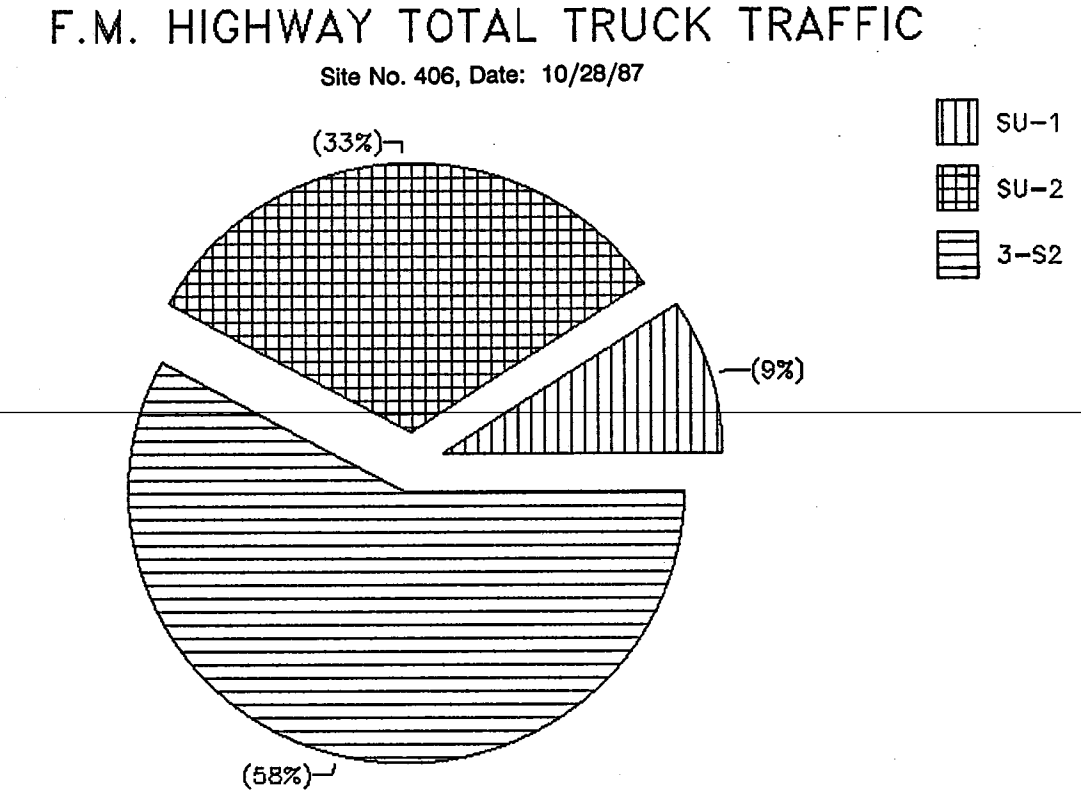
Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
10/20/87	17	2	4	0	23	100%	0%	74%	26%
10/28/87	54	12	54	38	158	63%	37%	34%	66%

Table 2.4.1.7-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/20/87	31	1	0	0	10	42	9%	91%	74%	26%
10/28/87	154	6	10	17	0	187	48%	52%	82%	18%

Table 2.4.1.7-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/20/87	48	3	14	0	10	75	63%	37%	64%	36%
10/28/87	208	21	75	132	0	436	42%	58%	48%	52%



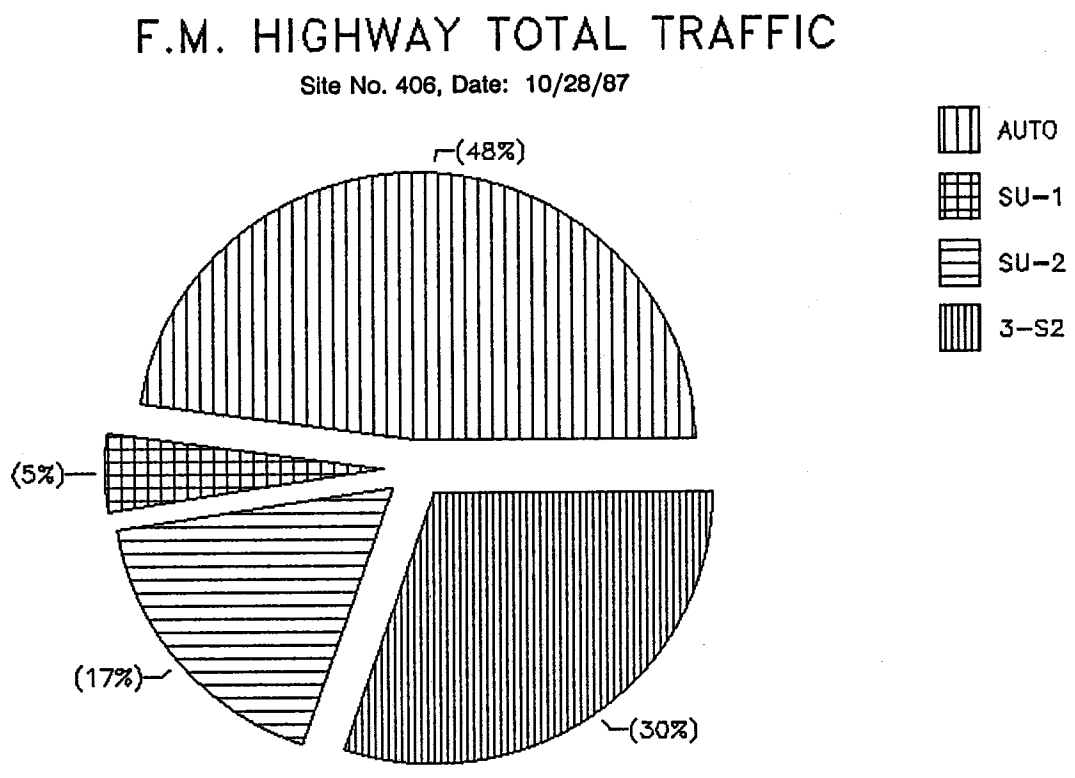


Figure 2.4.1.7-4. Highway Vehicle Percentages

2.4.1.8 Cattle Feedlot, Site No. 407

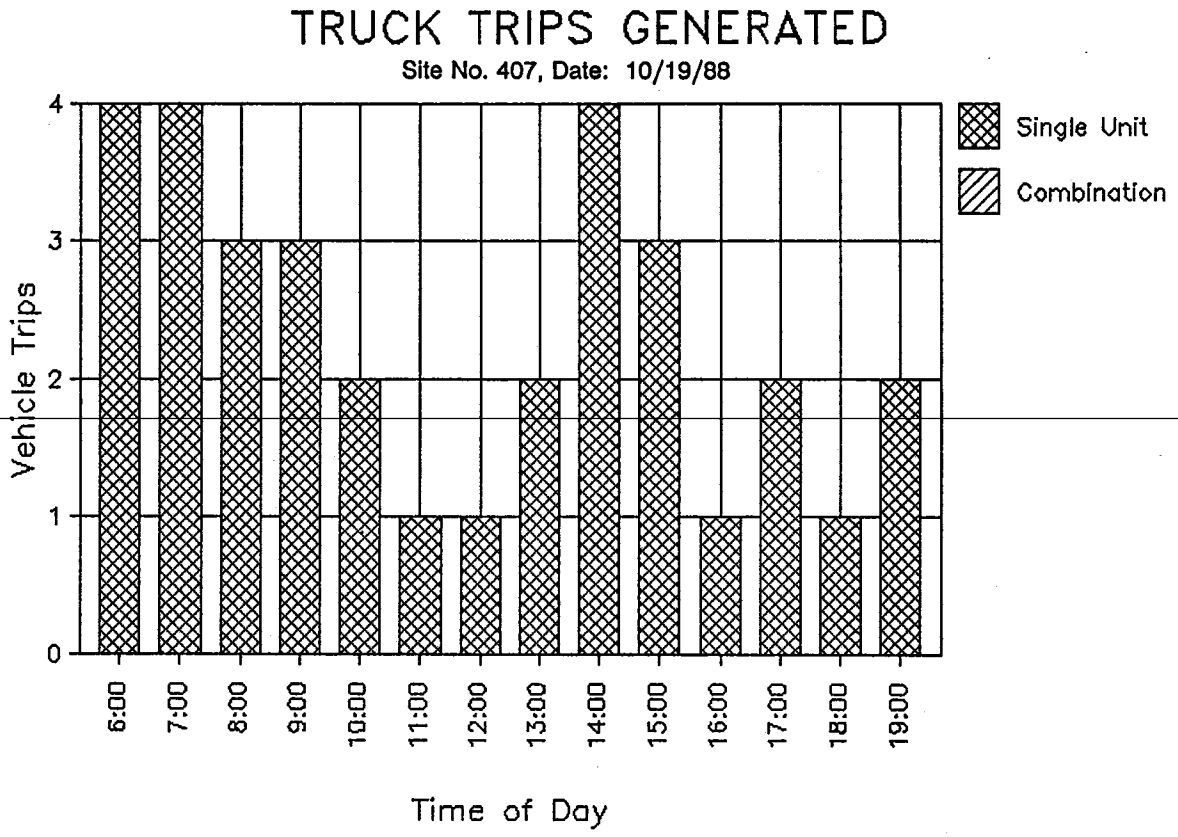
Introduction. This feedlot was located 15 miles west of a medium-sized urban area in the Southern High Plains portion of the Texas Panhandle. Public access was provided by a Farm-to-Market Highway.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.8-1 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 14-hour period on April 19, 1988.

Figure 2.4.1.8-2 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-1 (82%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 51 percent of this total. No interview was granted by feedlot personnel.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway. Manual classification counts were conducted in 1988 as shown in Table 2.4.1.8-1. In Table 2.4.1.8-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.8-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.8-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.8-3 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.8-1C values). The SU-1 vehicles represents 56 percent of the total trucks counted on this highway. Autos made up 82 percent of the total traffic.



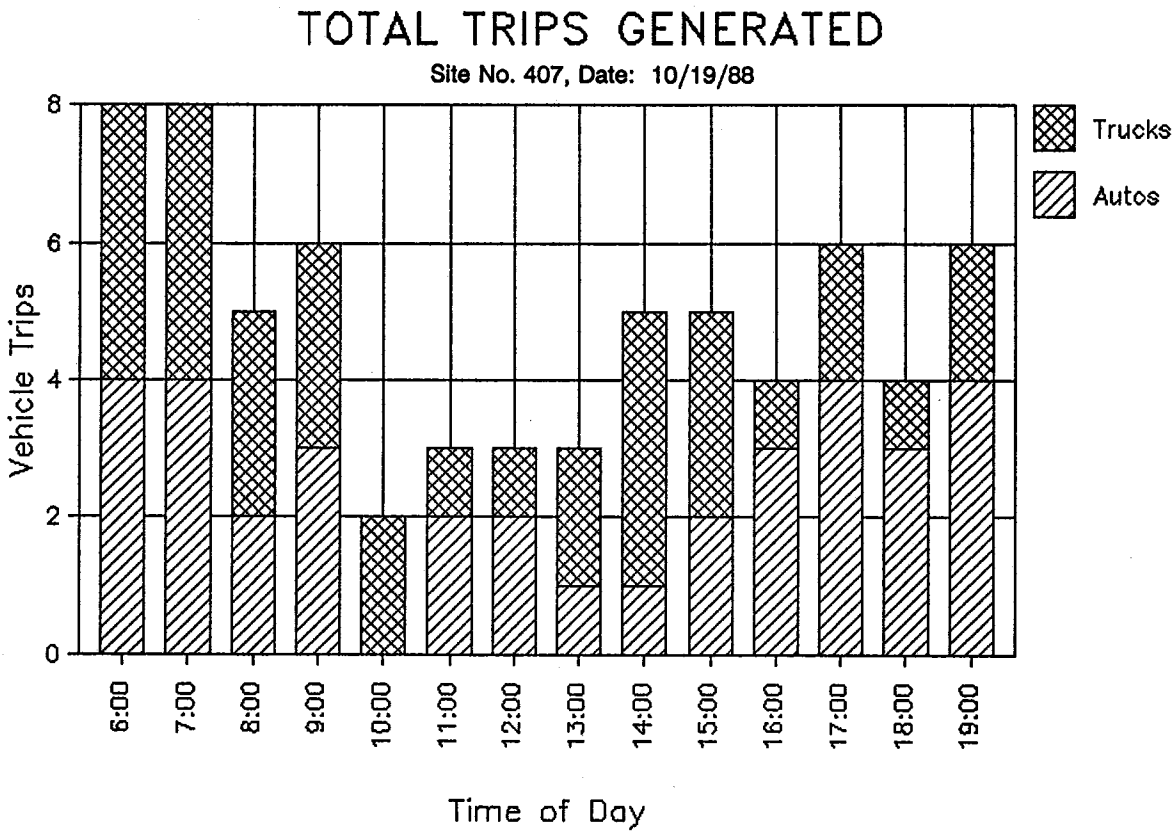
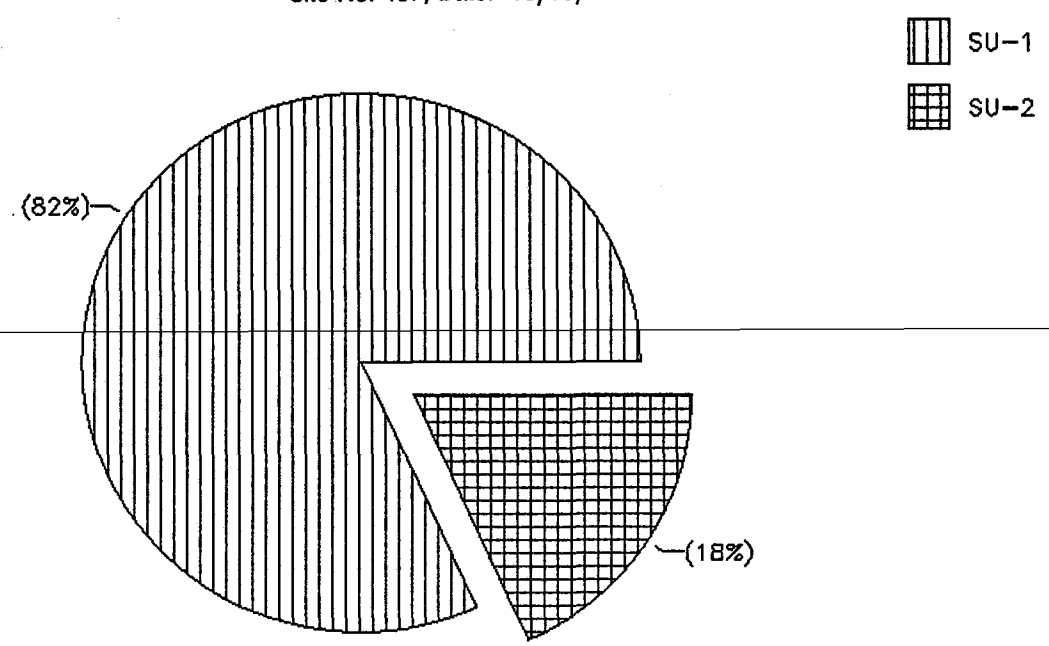


Figure 2.4.1.8-1. Hourly Trip Generation



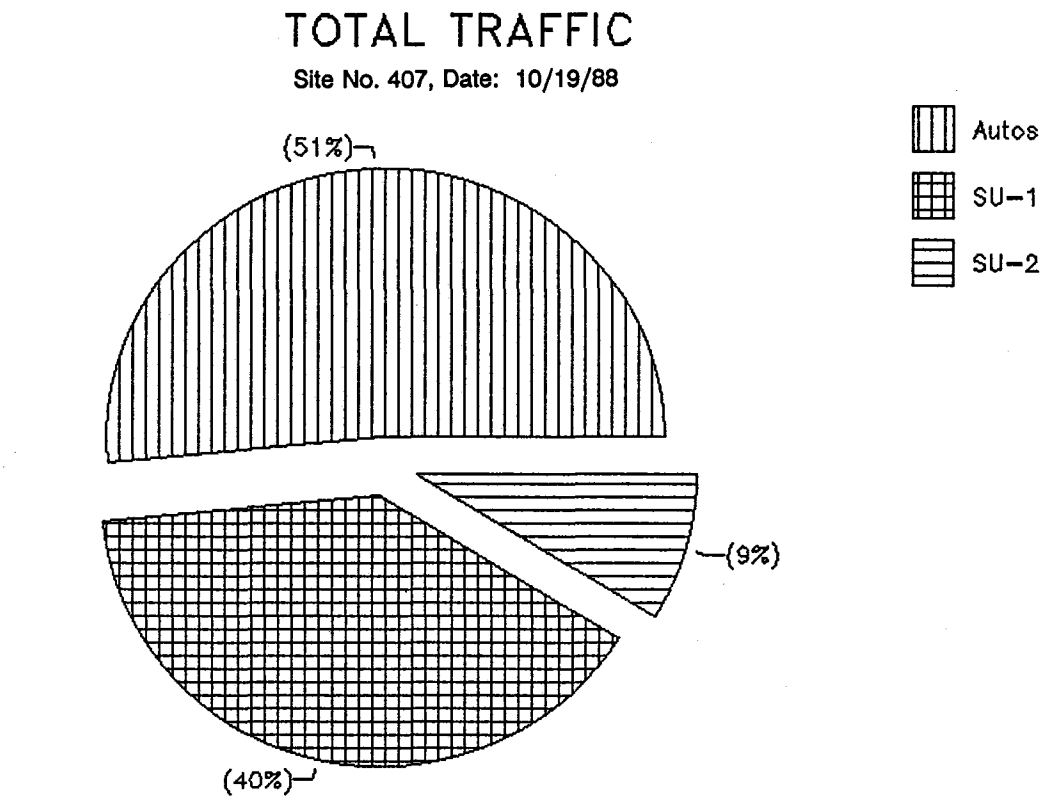


Figure 2.4.1.8-2. Activity Center Vehicle Percentages

Table 2.4.1.8-1. Traffic Classification Count Summary

Table 2.4.1.8-1A. Activity Center Only

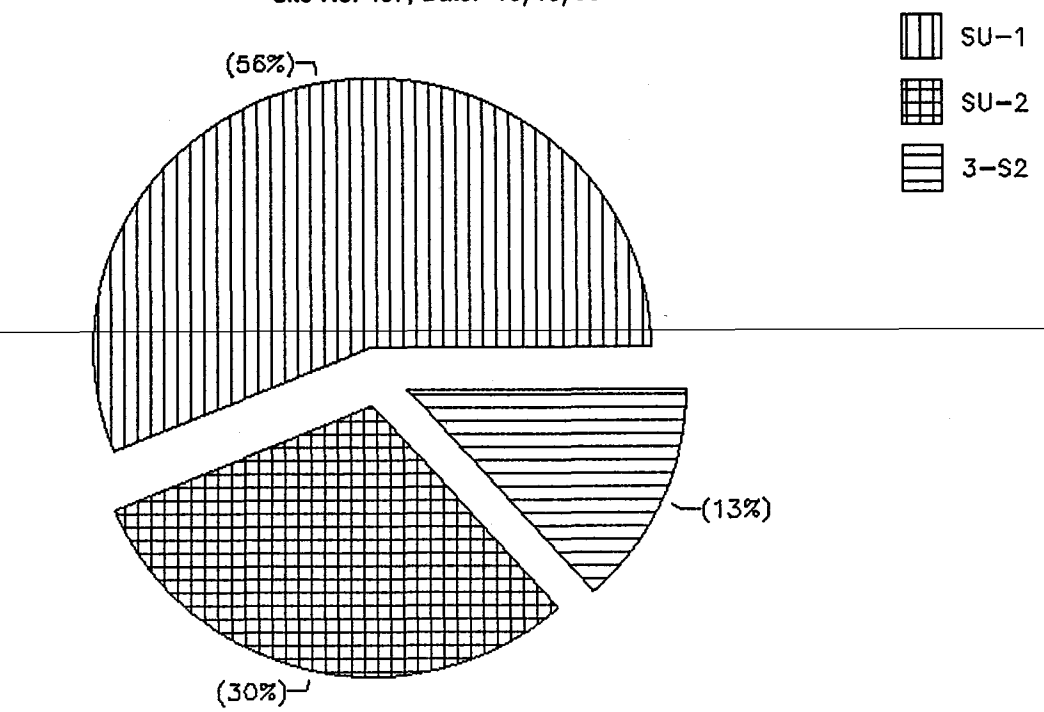
Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
4/19/88	35	27	6	0	68	100%	0%	51%	49%

Table 2.4.1.8-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
4/19/88	377	11	14	2	404	93%	7%	93%	7%

Table 2.4.1.8-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification					% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Total	SU	Comb.	Cars	Trucks
4/19/88	412	50	27	12	501	87%	13%	82%	18%



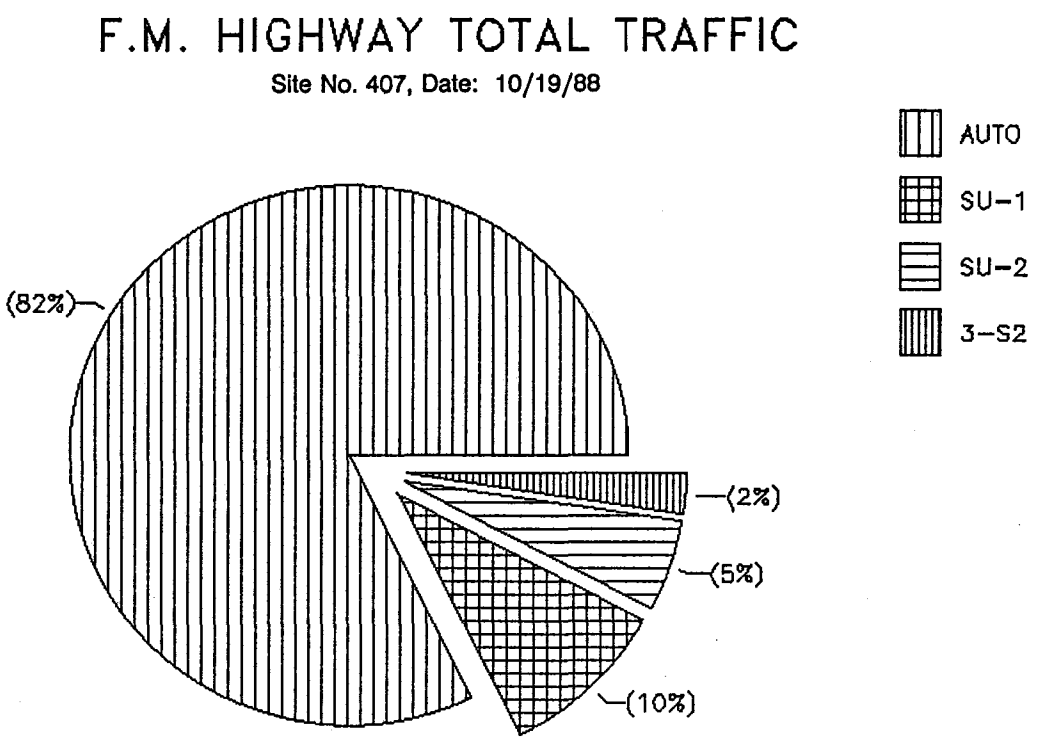


Figure 2.4.1.8-3. Highway Vehicle Percentages

2.4.1.9 Cattle Feedlot, Site No. 408

Introduction. The site map shown in Figure 2.4.1.9-1 indicates access is provided by a U.S. Highway. This feedlot is located in a rural area nine miles from a small urban area. Even though a railroad is located adjacent to the site, no rail service is provided for feed or cattle movement.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.9-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 14-hour period on October 14, 1987.

Figure 2.4.1.9-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (88%). Also illustrated is the breakdown of total traffic moving to and from the site. The autos represented 40 percent of this total.

An interview was conducted with an official at the feedlot. The average number of beef cattle being fed at any one time in 1987 was 25,000 head. A total of 10 hourly employees and 18 salaried employees were reported. Approximately 25 percent of the cattle come from out of state (New Mexico, Oklahoma, Mississippi, etc.). The average distance that the cattle came was estimated at 200 miles. Approximately 80 percent of the trucks are feed trucks which account for about 6 loads, per day.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 4,800 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.9-1 provides a summary of the counts taken. In Table 2.4.1.9-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.9-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.9-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.9-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.9-1C values). The 3-S2 vehicle represents 80 percent of total trucks counted on this highway. Autos make up 57 percent of the total traffic.

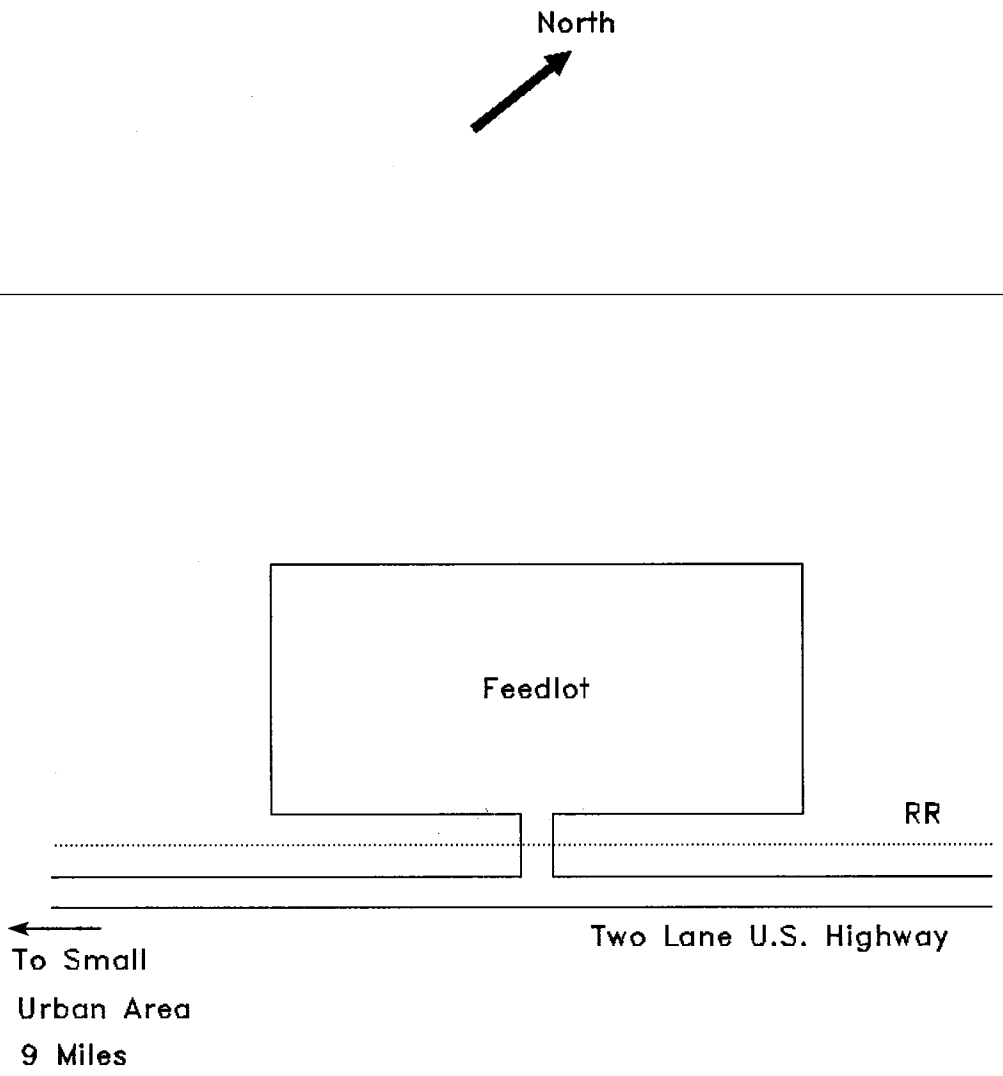
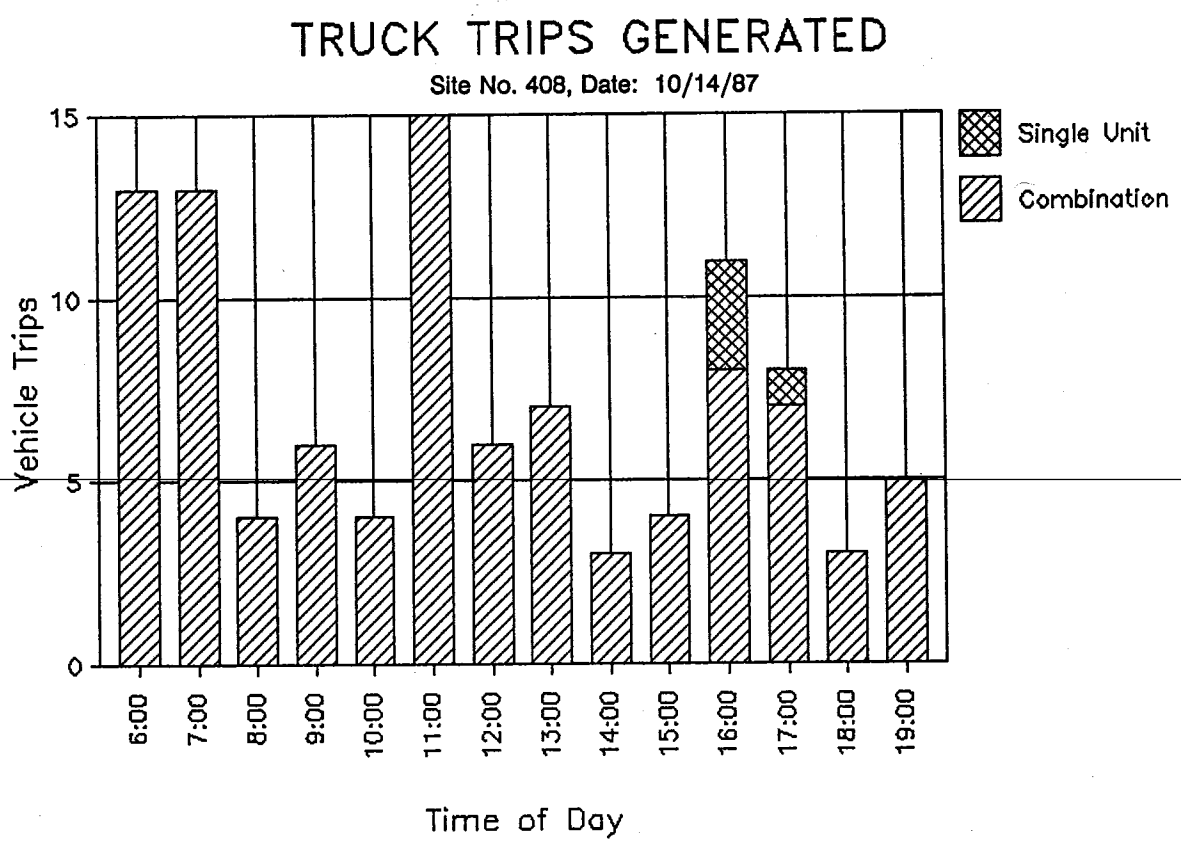


Figure 2.4.1.9-1. Site Map



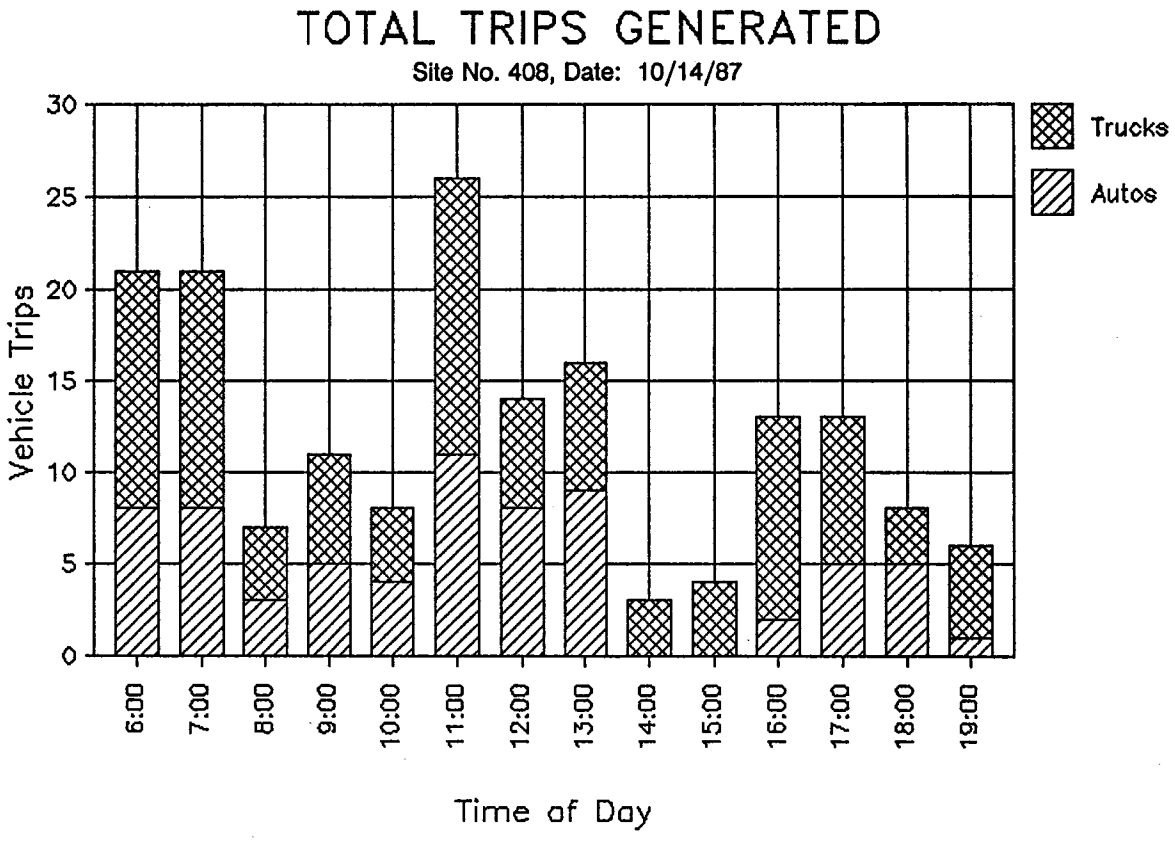
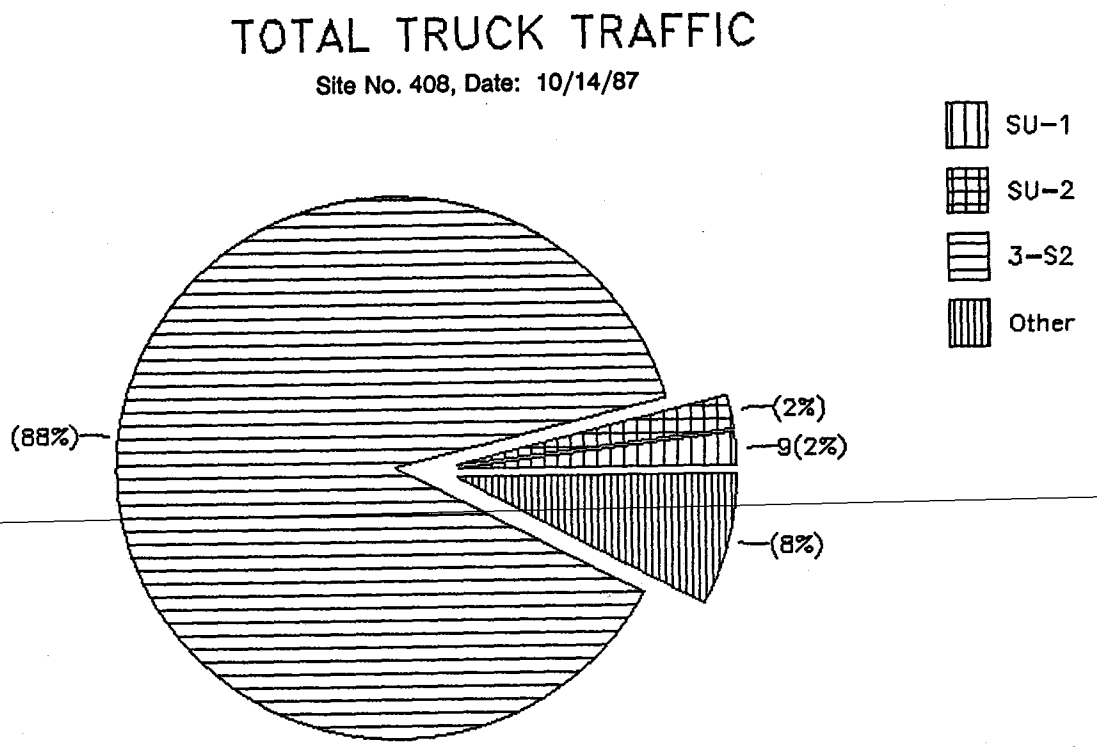


Figure 2.4.1.9-2. Hourly Trip Generation



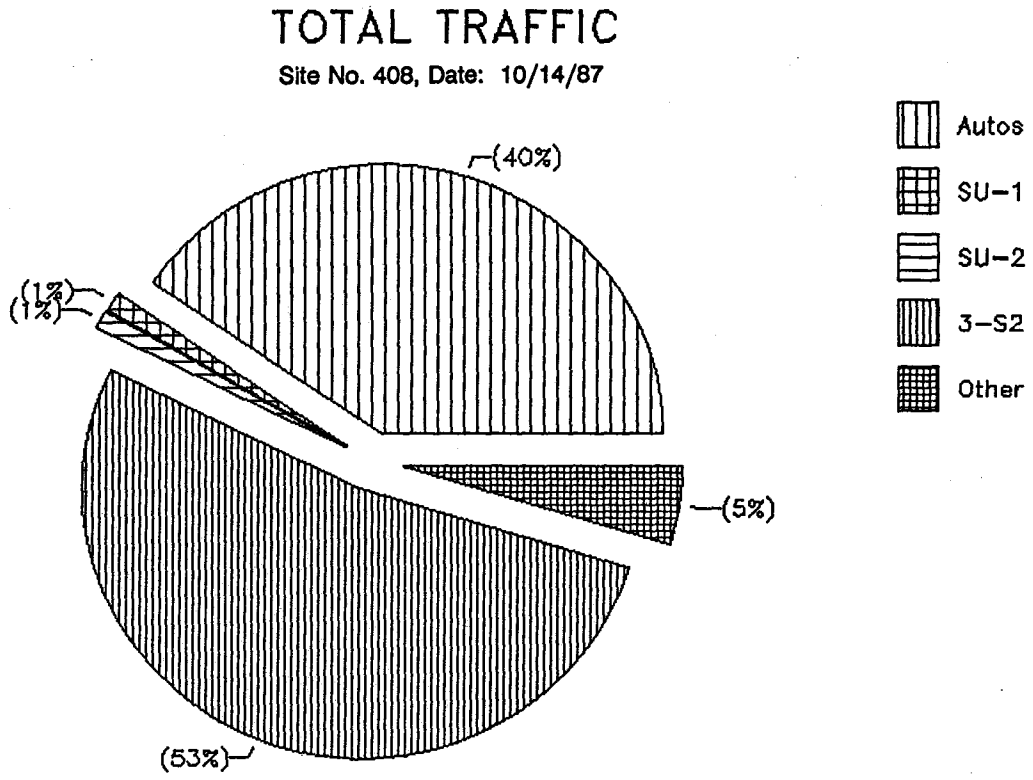


Figure 2.4.1.9-3. Activity Center Vehicle Percentages

Table 2.4.1.9-1. Traffic Classification Count Summary

Table 2.4.1.9-1A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/22/85	59	5	149	34	28[1]	275	71%	29%	21%	79%
10/14/87	69	2	2	90	8	171	4%	96%	40%	60%

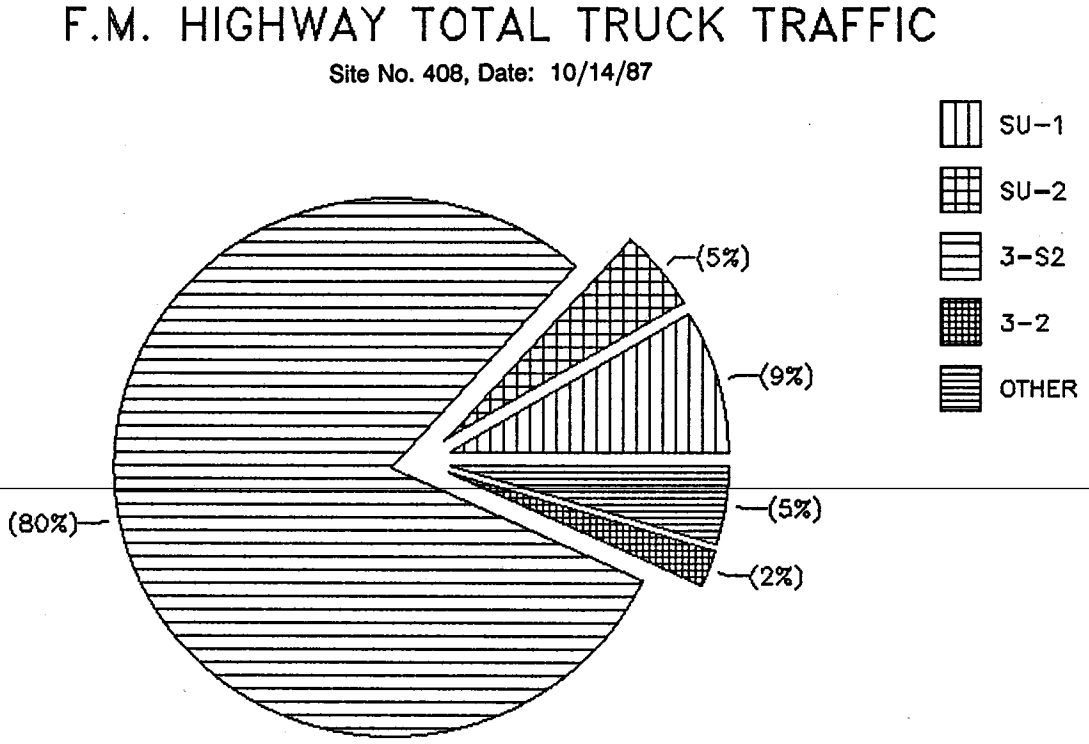
[1]Type of vehicle 2-S2

Table 2.4.1.9-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/14/87	2137	143	81	1	1251	72	3685	14%	86%	58%	42%

Table 2.4.1.9-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/14/87	2206	145	83	1	37	1341	80	3893	14%	86%	57%	43%



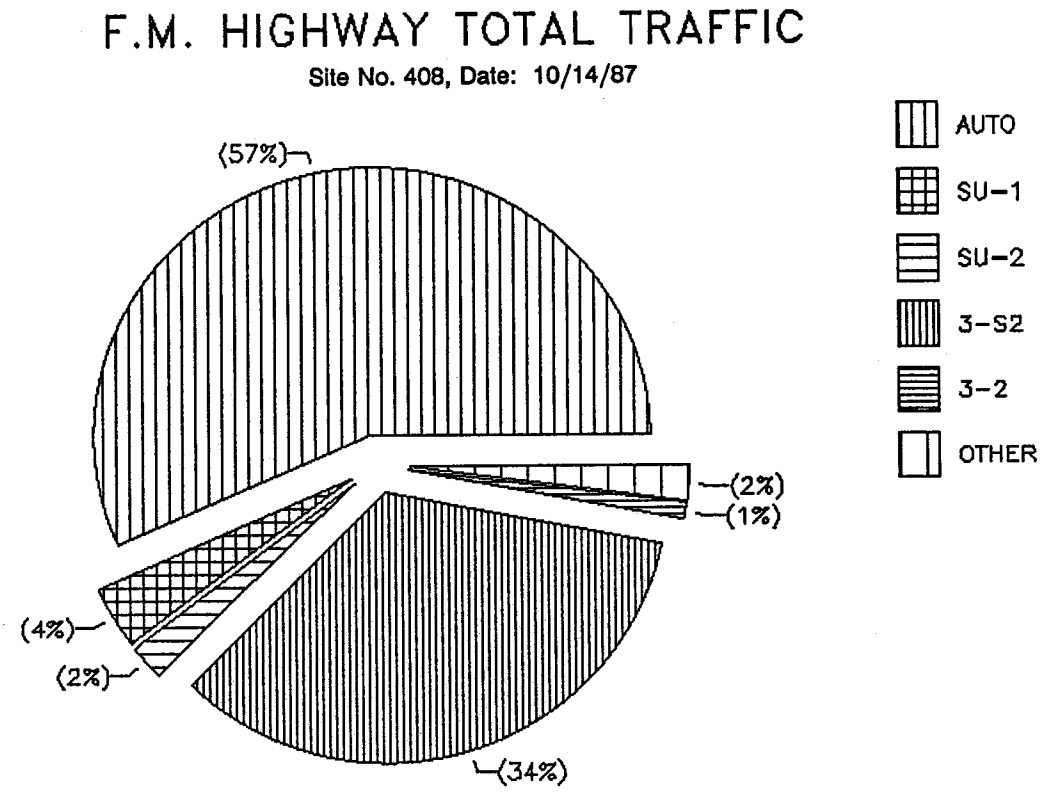


Figure 2.4.1.9-4. Highway Vehicle Percentages

2.4.1.10 Cattle Feedlot, Site No. 409

Introduction. The site map shown in Figure 2.4.1.10-1 indicates this site is provided access by a Farm-to-Market Road. The feed lot is located in a rural area about 5 miles west of an Interstate Highway and about 10 miles south of a medium-size urban area in the Texas Panhandle. This feedlot is one of the largest ones studied, with an average of 58,000 head of cattle being fed at the time of the 1987 count.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.10-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during this same 14-hour period on June 30, 1987.

Figure 2.4.1.10-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (86%). Also illustrated is the breakdown of total traffic moving to and from the site. Auto traffic represented 50 percent of this total.

An interview was conducted with an official at the feedlot. The average capacity of the facility was estimated at 58,000 head of cattle. The number of employees working at this facility was estimated at seven (7) salaried employees and 42 hourly employees. One shift per day from 5:30 a.m. to 4:30 p.m. was utilized. It was estimated that 60% of the cattle come from out of state. Approximately 23 trucks per day haul feed into this feedlot.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 970 vehicles per day in 1986. Manual classification counts were conducted in 1985 and 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.10-1 provides a summary of the counts taken. First, in Table 2.4.1.10-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.4.1.10-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.10-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.10-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.10-1C values). The 3-S2 vehicles represents 77 percent of total trucks counted on this highway. Trucks made up 22 percent of the total traffic.

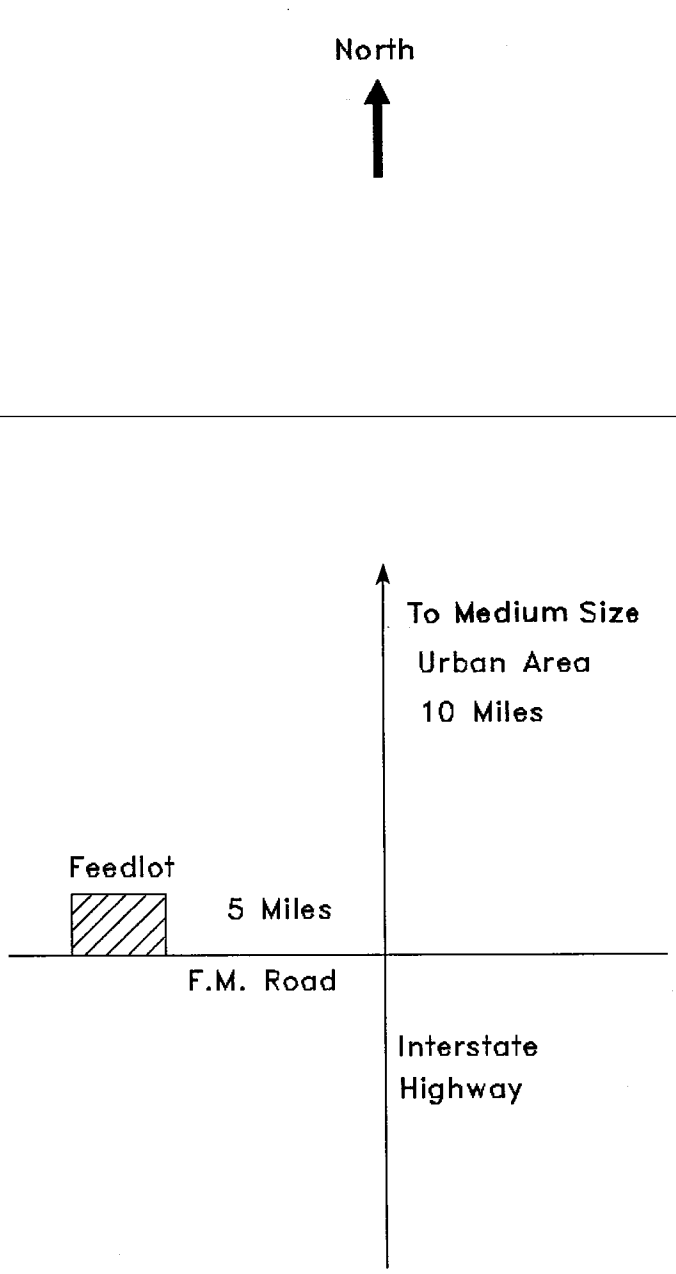
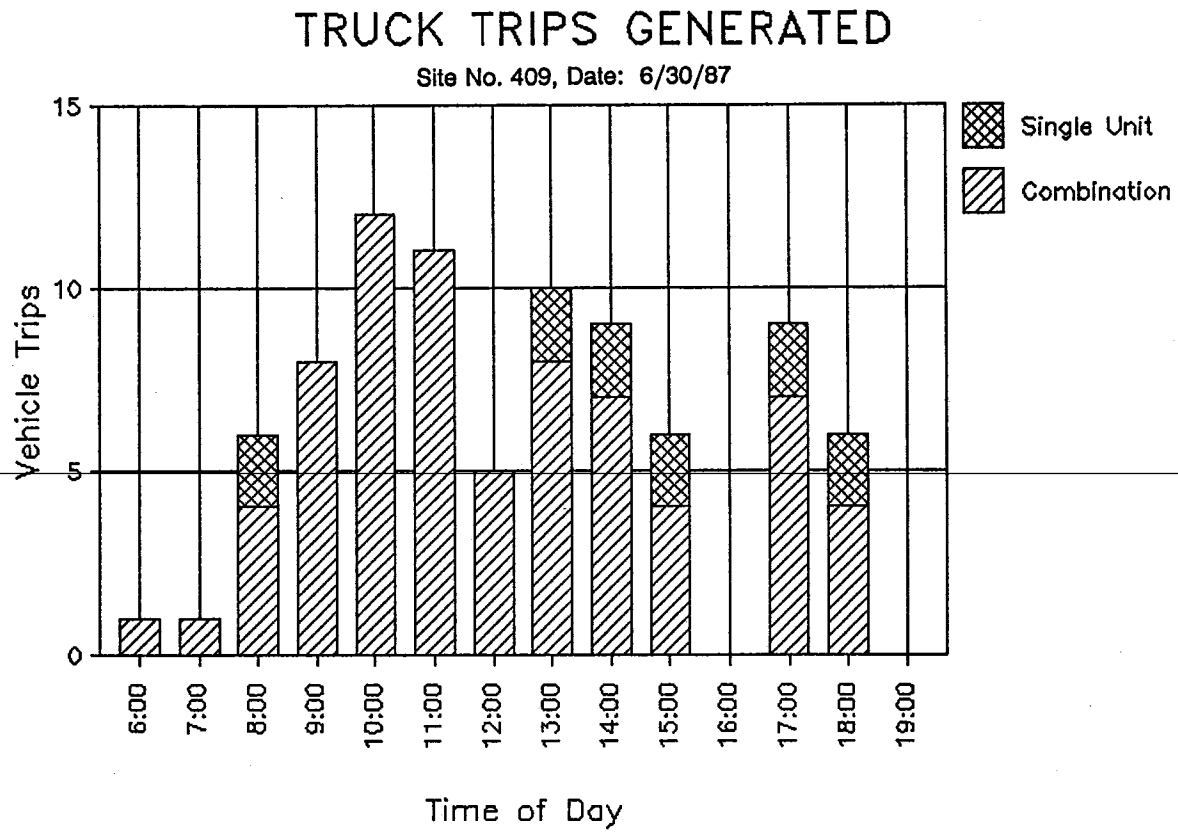


Figure 2.4.1.10-1. Site Map



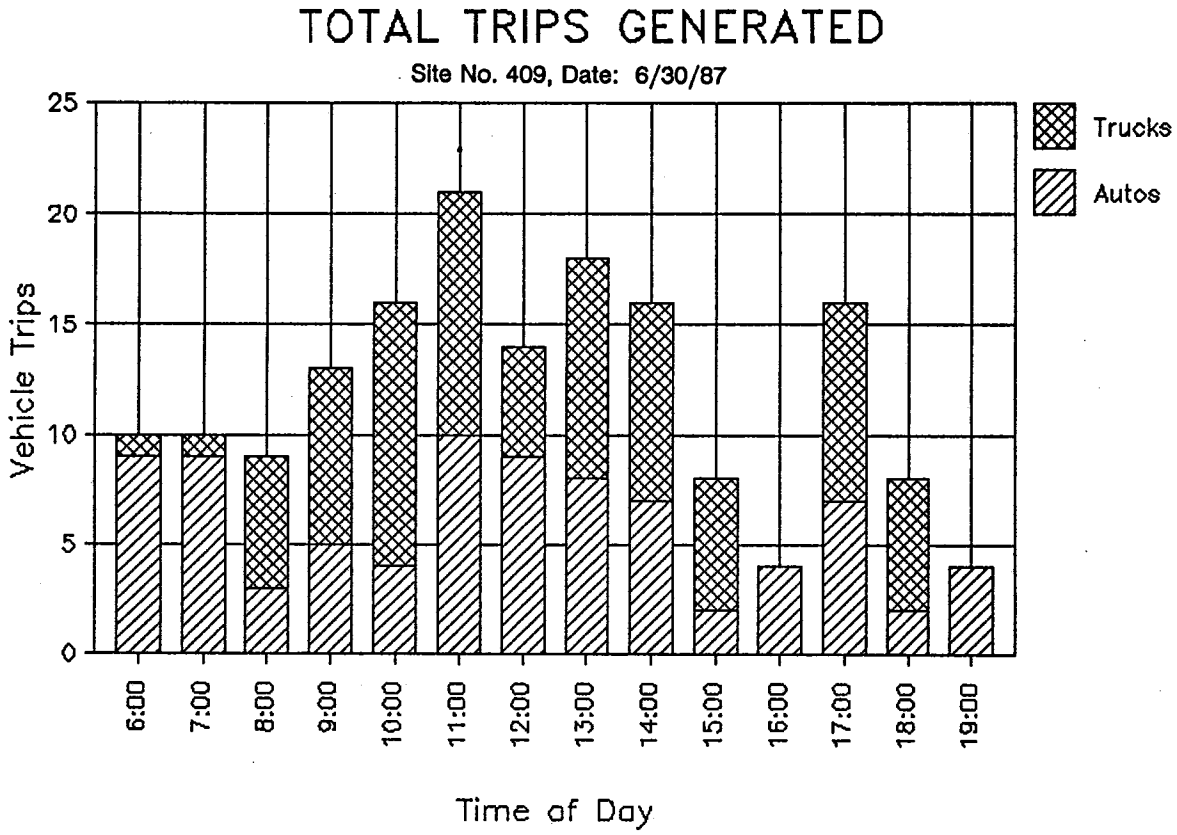
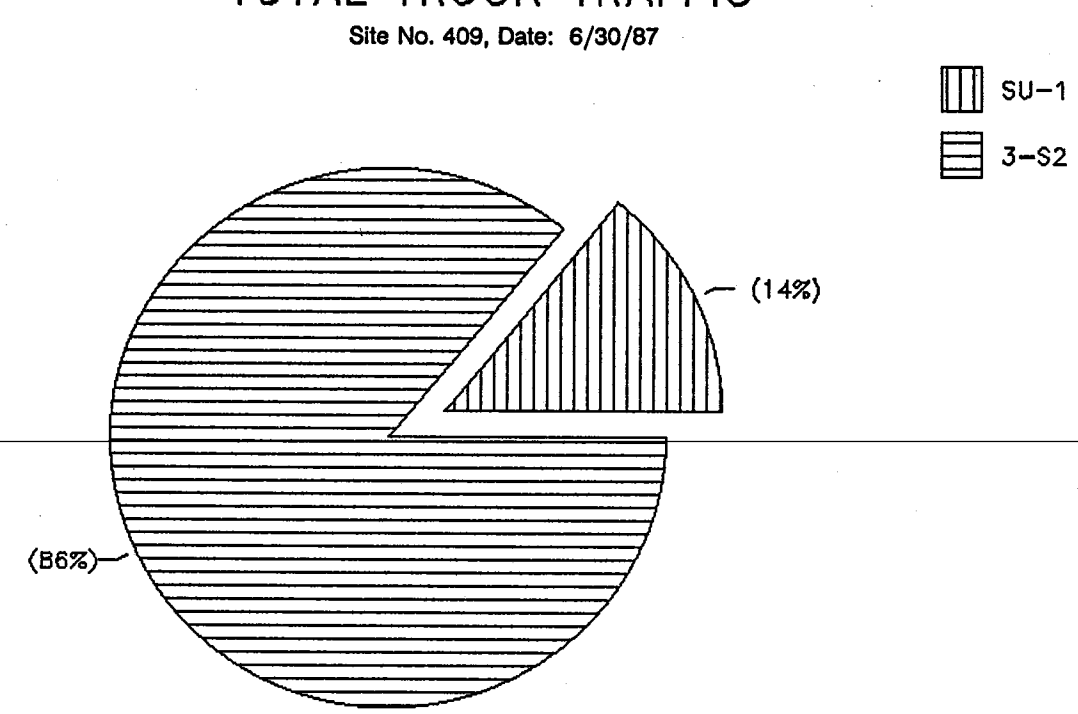


Figure 2.4.1.10-2. Hourly Trip Generation



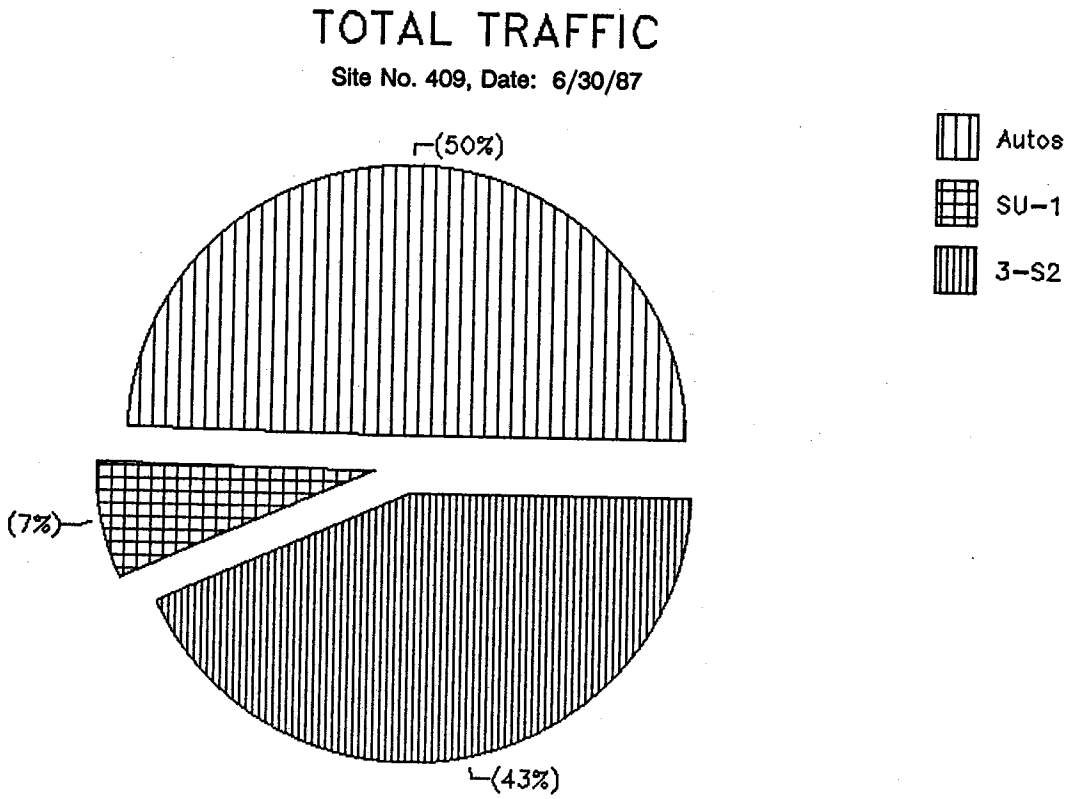


Figure 2.4.1.10-3. Activity Center Vehicle Percentages

Table 2.4.1.10-1. Traffic Classification Count Summary

Table 2.4.1.10-1A. Activity Center Only

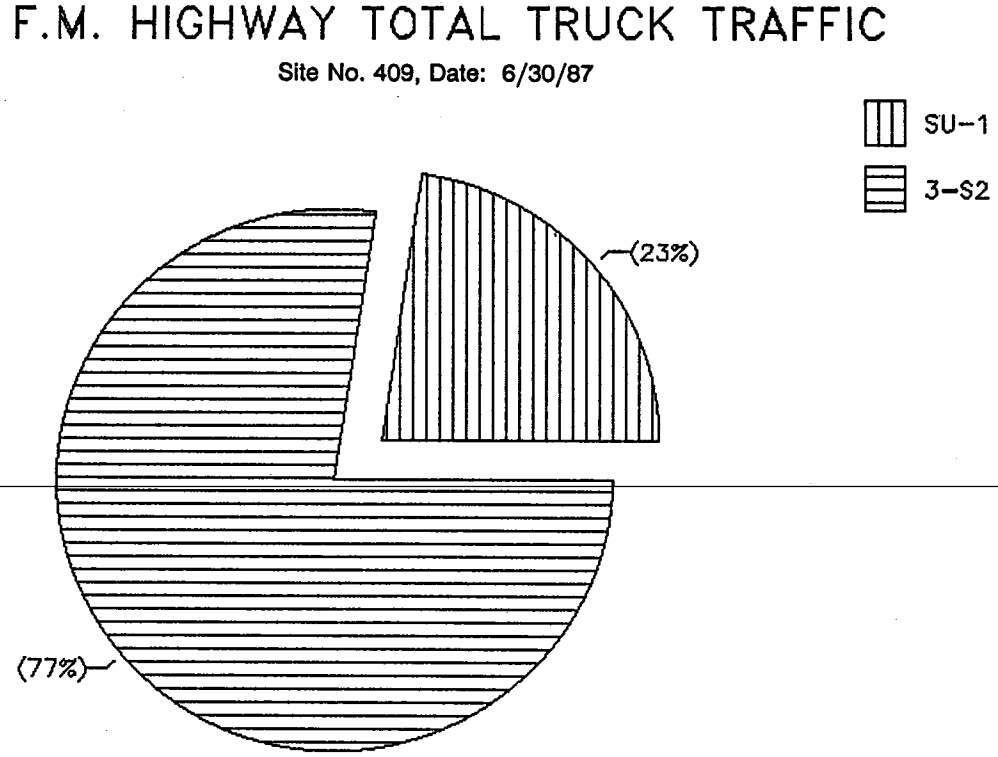
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/22/85	114	18	9	124	4	269	17%	83%	42%	58%
4/06/87	136	0	0	117	0	253	0%	100%	54%	46%
6/30/87	83	12	0	72	0	167	14%	86%	50%	50%

Table 2.4.1.10-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/06/87	262	0	0	9	0	271	0%	100%	97%	3%
6/30/87	270	10	0	3	0	283	77%	23%	95%	5%

Table 2.4.1.10-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/06/87	398	0	0	141	0	539	0%	100%	74%	26%
6/30/87	353	22	0	75	0	450	23%	77%	78%	22%



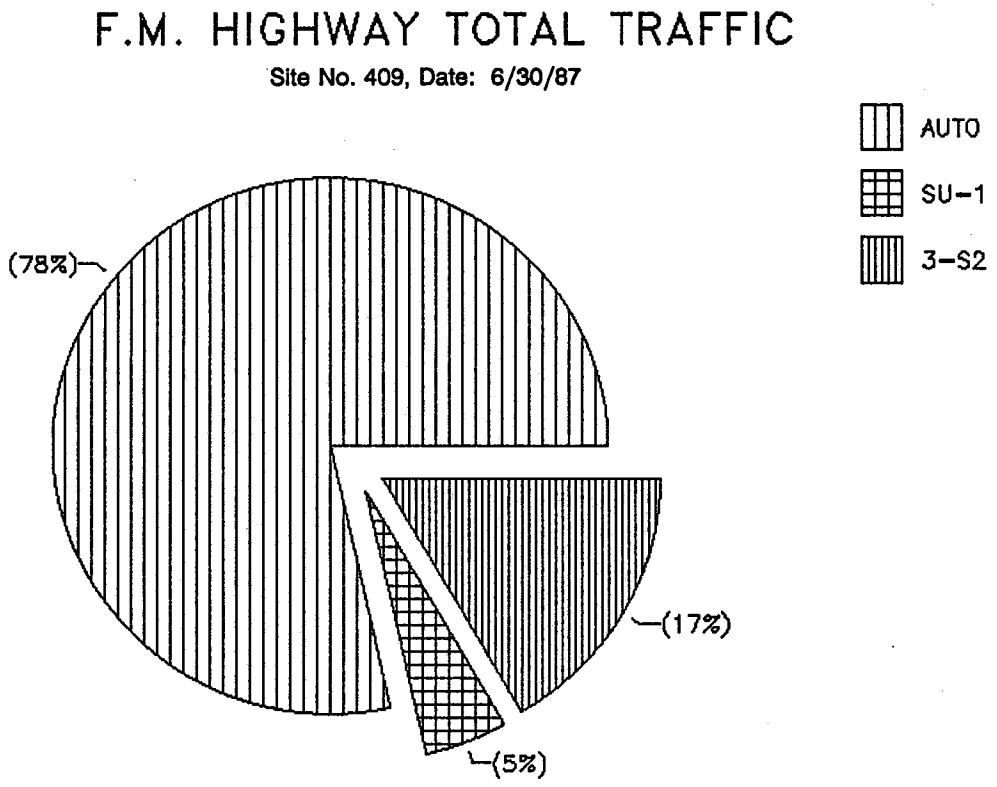


Figure 2.4.1.10-4. Highway Vehicle Percentages

2.4.1.11 Cattle Feedlot, Site No. 410

Introduction. The site map shown in Figure 2.4.1.11-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located in a rural area, 15 miles southwest of a small city and 40 miles south of a medium-sized urban area.

Activity Center Trip-Generating Characteristics. Figure 2.4.1.11-2 shows the truck traffic (in and out) generated by the site during a 14-hour period (6 a.m. to 8 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 14-hour period on October 13, 1987.

Figure 2.4.1.11-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (93%). Also illustrated is the breakdown of total traffic moving to and form the site. The auto represented 37 percent of this total.

An interview was conducted with an official at this feedlot. The average capacity of the feedlot was 45,000 head of cattle. An average of 40 hourly employees and 8 salaried employees worked for the feedlot. Approximately 12 daily truck loads of feed are needed.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 470 vehicles per day in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.4.1.11-1 provides a summary of the counts taken. In Table 2.4.1.11-1A, vehicle classification counts for the activity center only are provided. In Table 2.4.1.11-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.4.1.11-1C, a total count of all vehicles on the highway is provided.

Figure 2.4.1.11-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.4.1.11-1C values). The 3-S2 vehicle represents 65 percent of total trucks counted on this highway. Autos make up 55 percent of the total traffic.

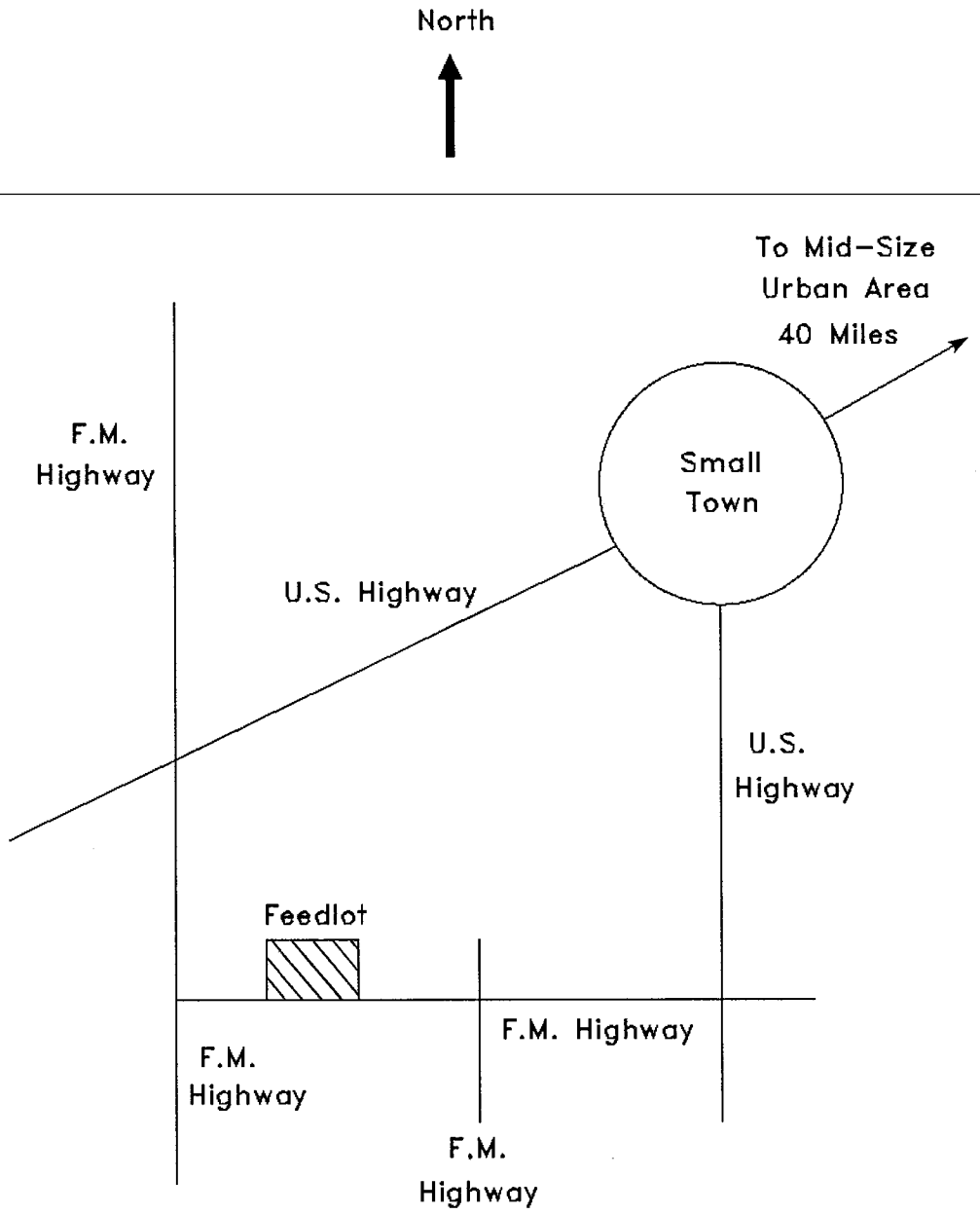
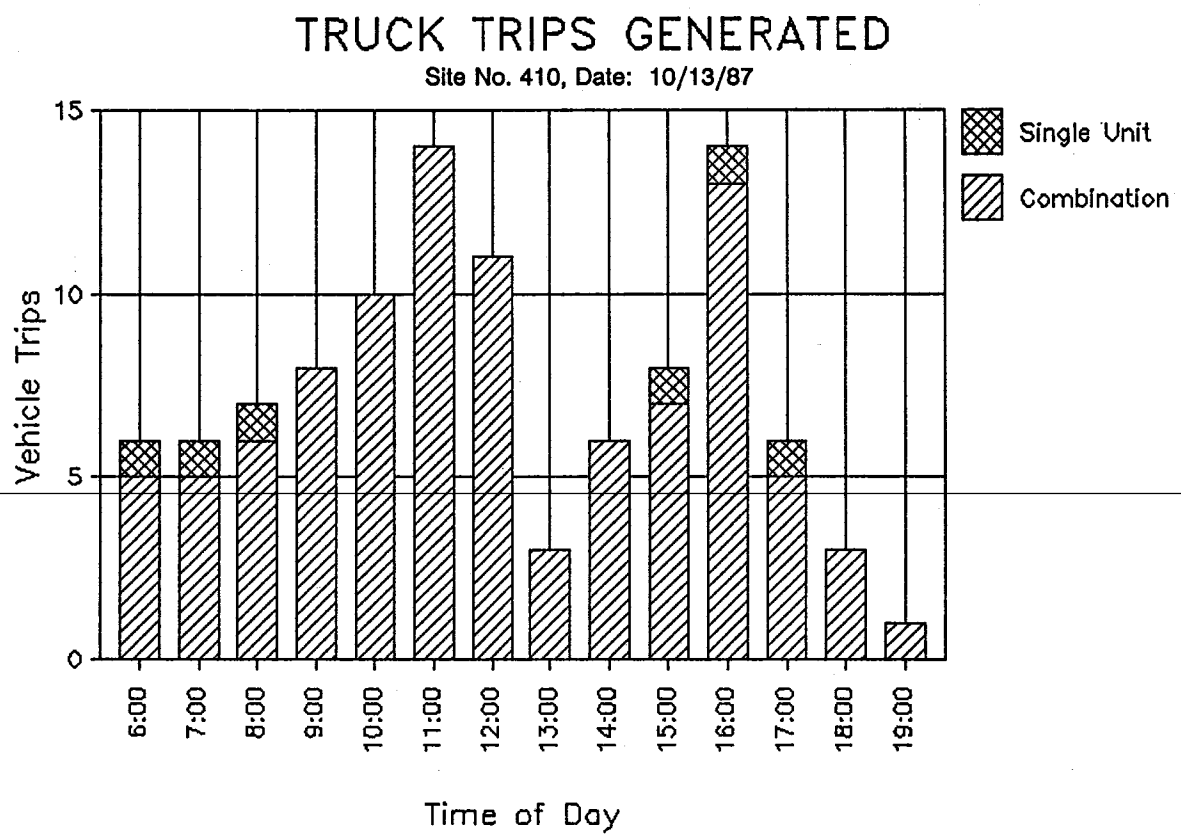


Figure 2.4.1.11-1. Site Map



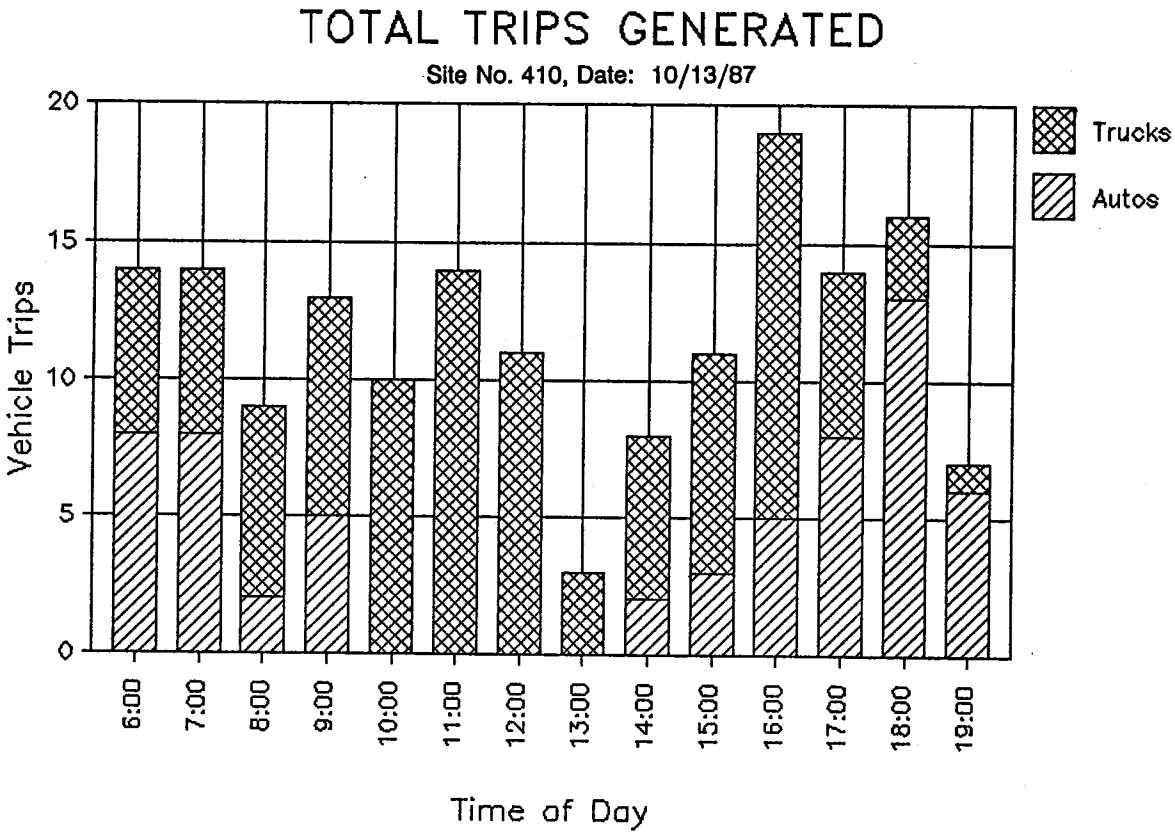
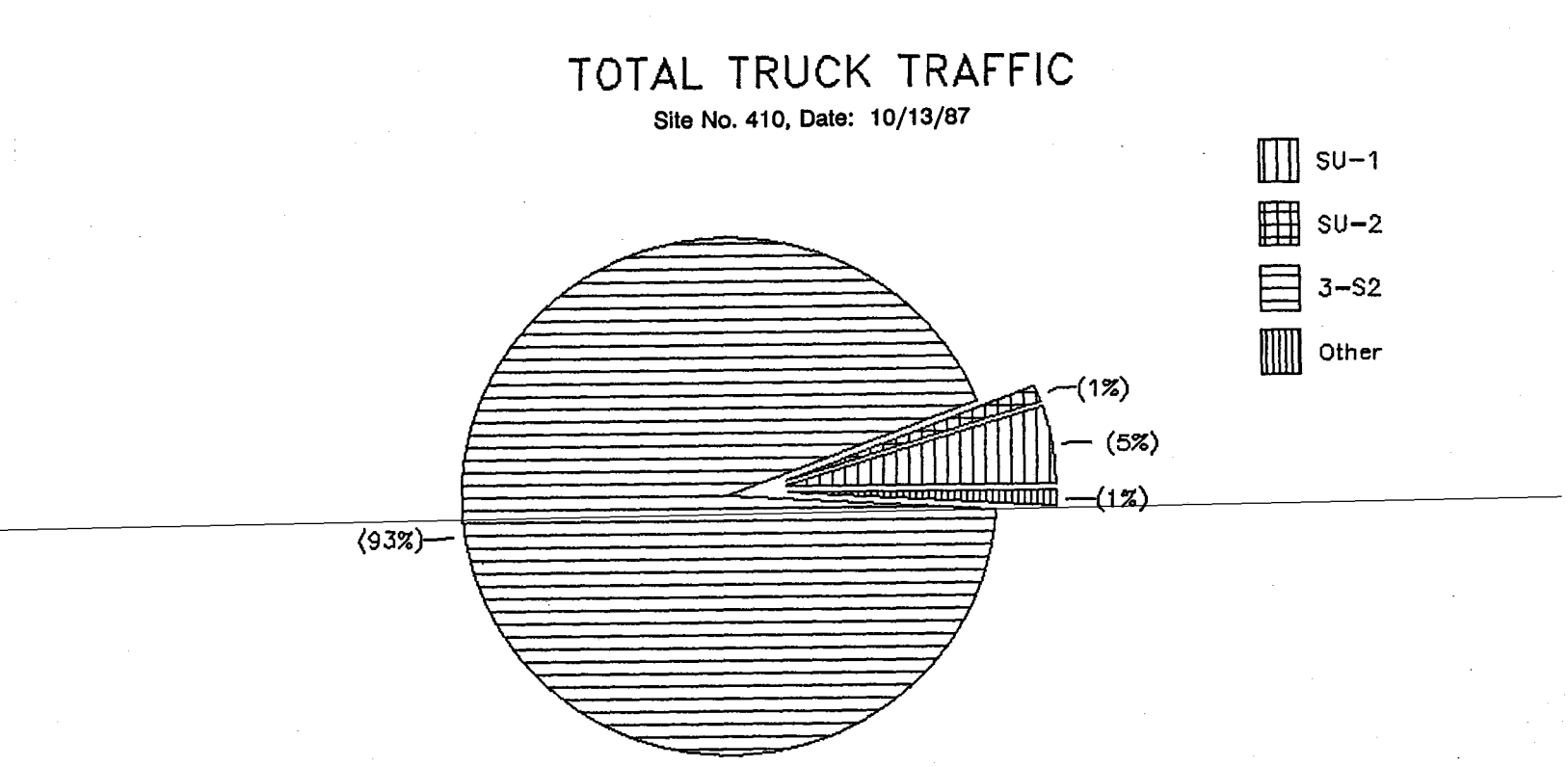


Figure 2.4.1.11-2. Hourly Trip Generation



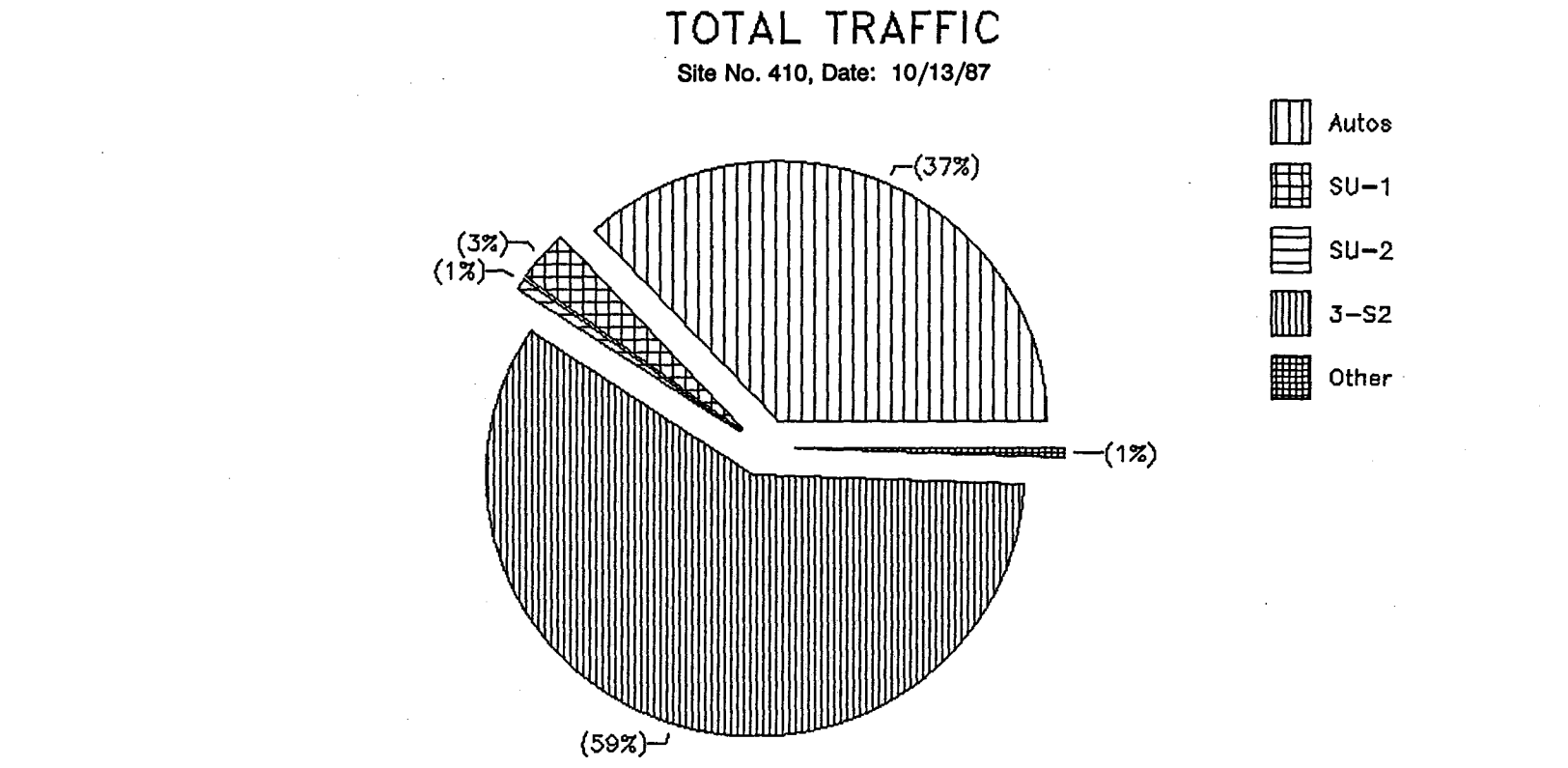


Figure 2.4.1.11-3. Activity Center Vehicle Percentages

Table 2.4.1.11-1. Traffic Classification Count Summary

Table 2.4.1.11-1A. Activity Center Only

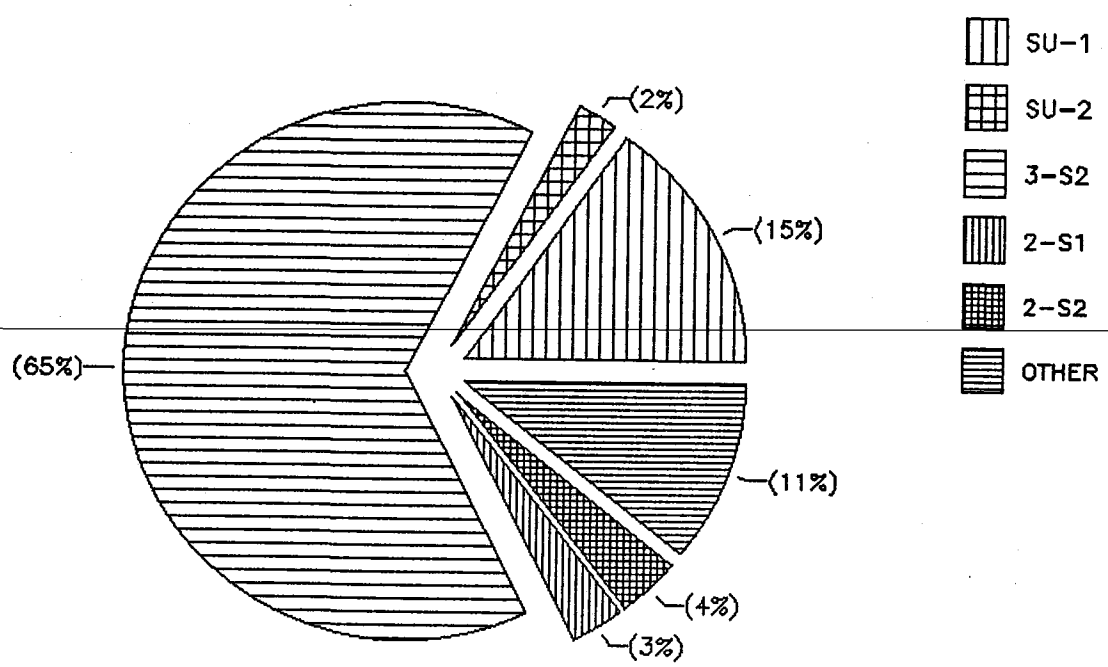
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/13/87	60	5	1	96	1	163	6%	94%	37%	63%

Table 2.4.1.11-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/13/87	265	36	5	8	10	76	28	428	25%	75%	62%	38%

Table 2.4.1.11-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/13/87	325	41	6	8	10	172	29	591	18%	82%	55%	45%



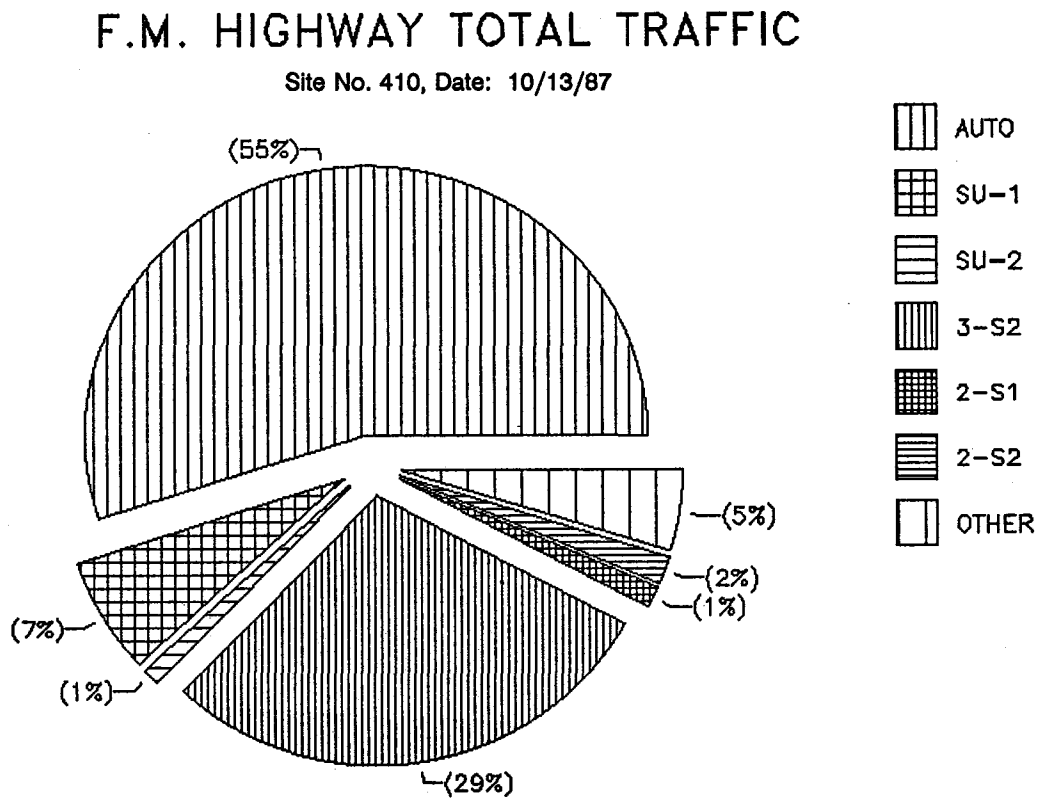


Figure 2.4.1.11-4. Highway Vehicle Percentages

2.4.2 WEIGH-IN-MOTION RESULTS FOR CATTLE

Figures 2.4.2-1 through 2.4.2-9 are cumulative distribution plots of axle weights and gross vehicle weights of cattle trucks. The site numbers identified on the plots are the same as those used elsewhere for vehicle classification counts. The weigh-in-motion (WIM) crew identified special-use vehicles associated with each site and coded the weighed vehicle for subsequent evaluation.

The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weight. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last. Vehicles associated with these activity centers were predominantly 3-S2 cattle trucks or grain trucks.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was typically deployed near cattle feedlots from about 8 a.m. to about 4 p.m. In other words, the system was not used to monitor night activity. Most of the cattle trucks hauled during the daytime, however a few moved at night.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near special-use traffic generators, lanes used for raw product movement, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked. All of the sites selected met these criteria fairly well, although the perfect location was difficult to find.

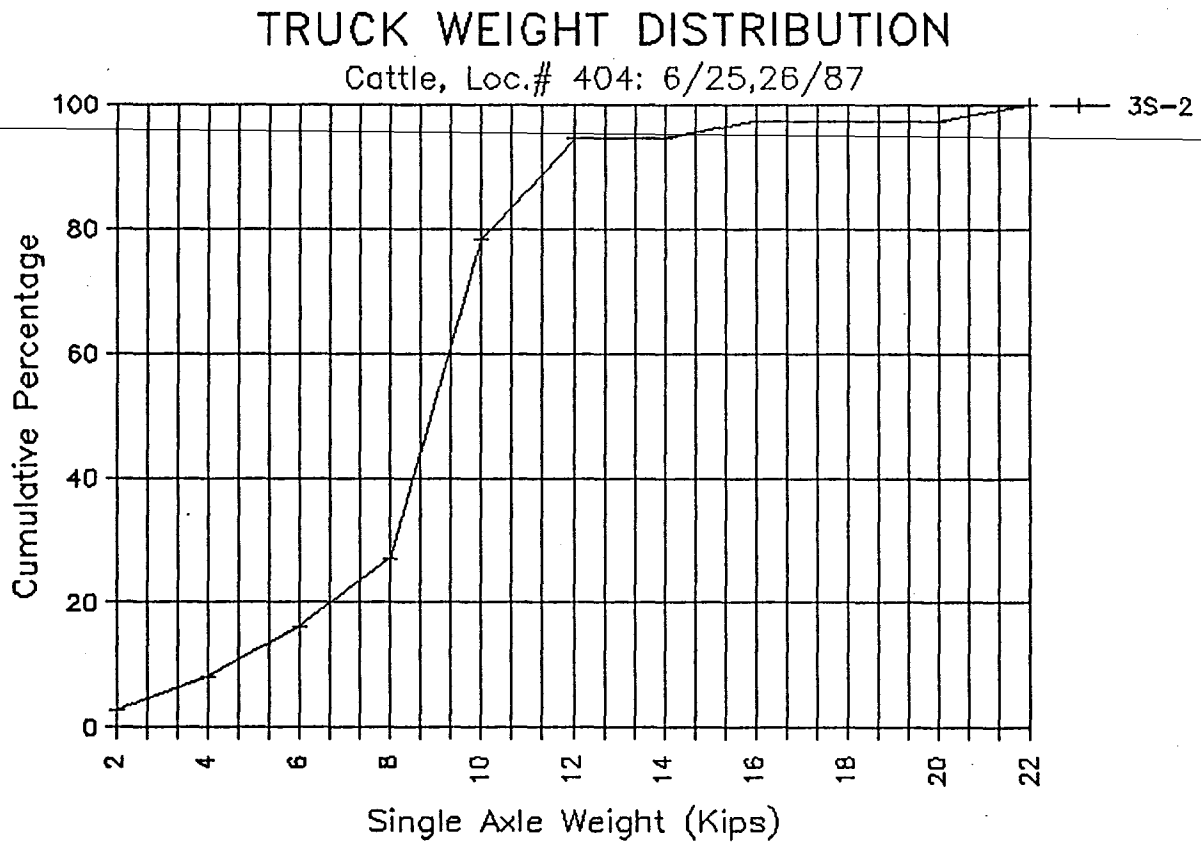


Figure 2.4.2-1 Cattle Truck Weights: 3-S2, Single Axle, 6/25 & 26/87

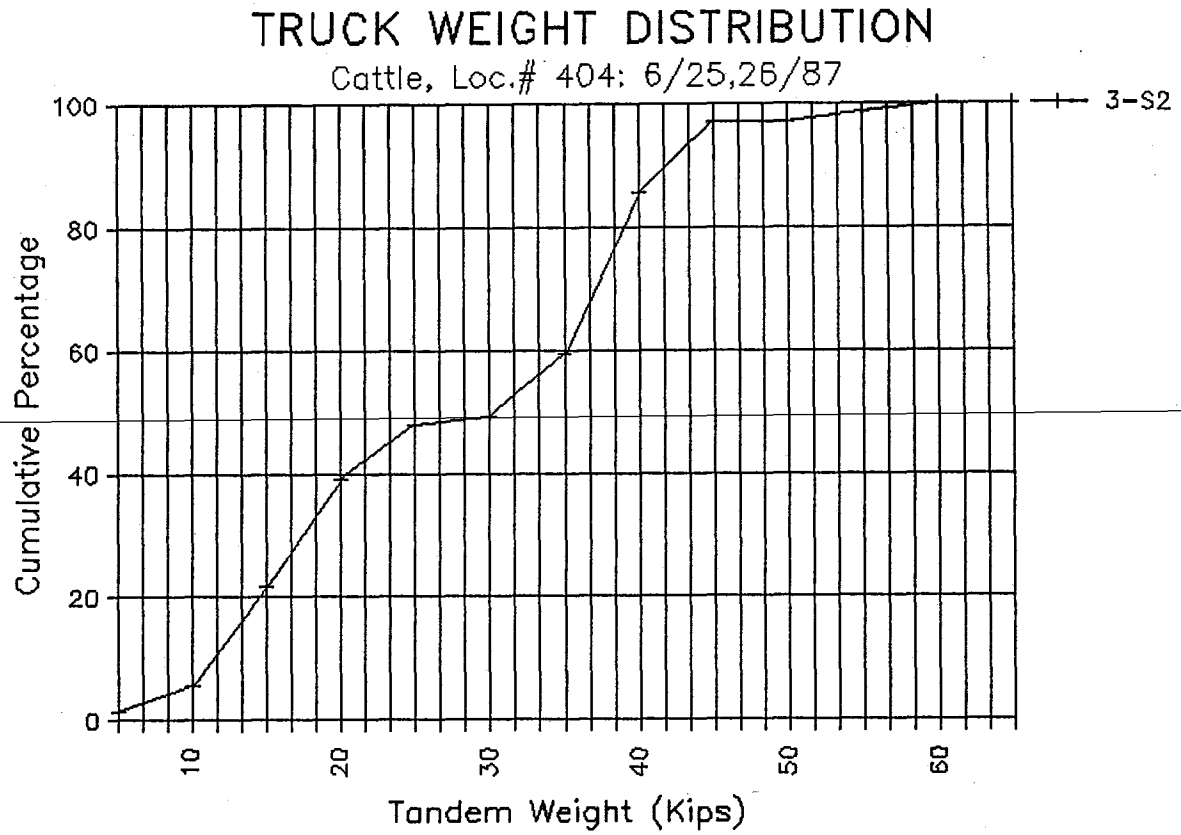


Figure 2.4.2-2 Cattle Truck Weights: 3-S2, Tandem, 6/25 & 26/87

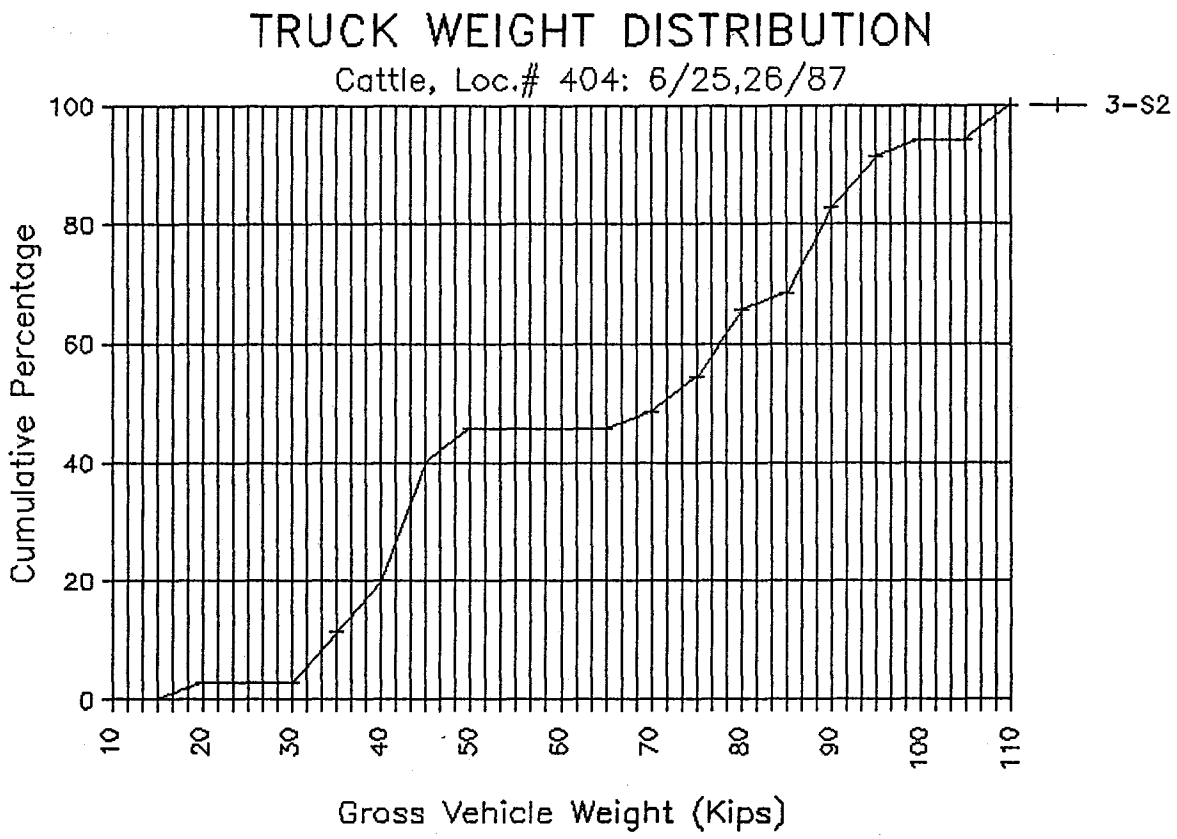


Figure 2.4.2-3 Cattle Truck Weights: 3-S2, Gross Vehicle, 6/25 & 26/87

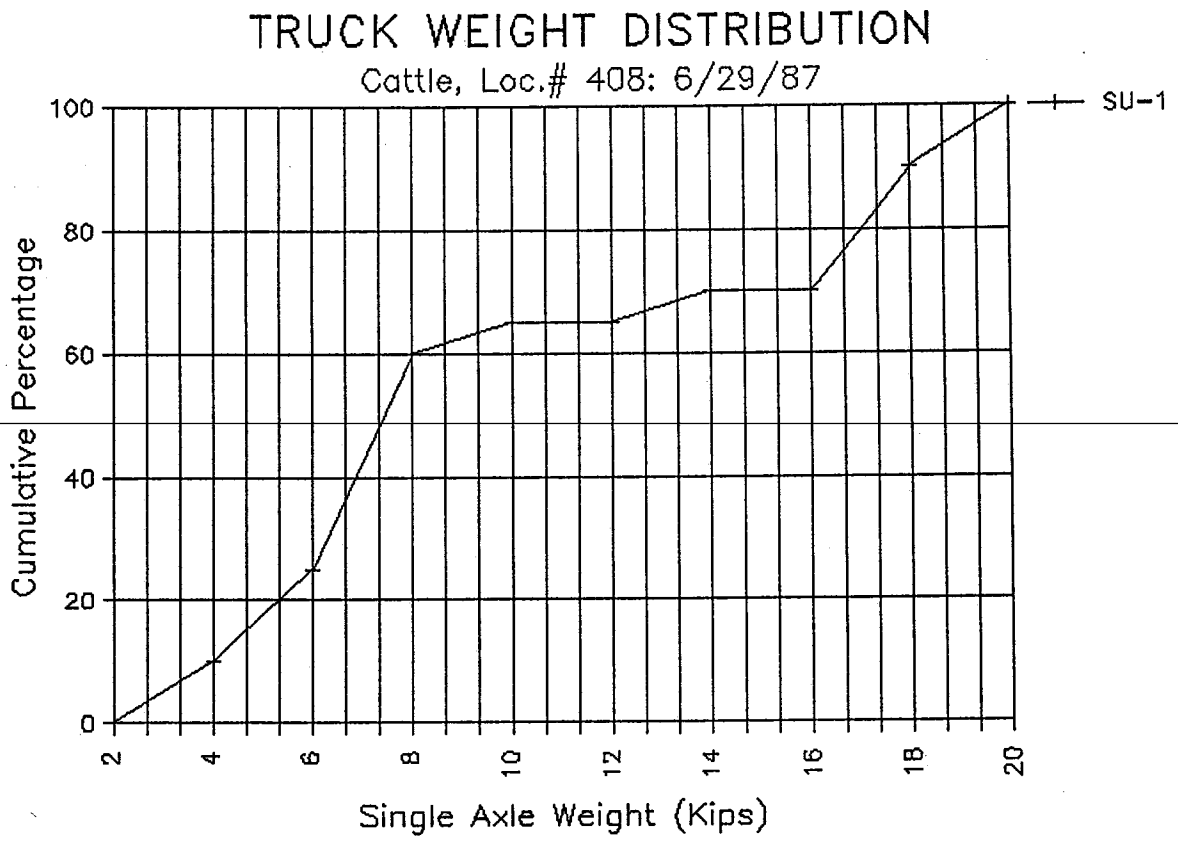


Figure 2.4.2-4 Cattle Truck Weights: SU-1, Single Axle, 6/29/87

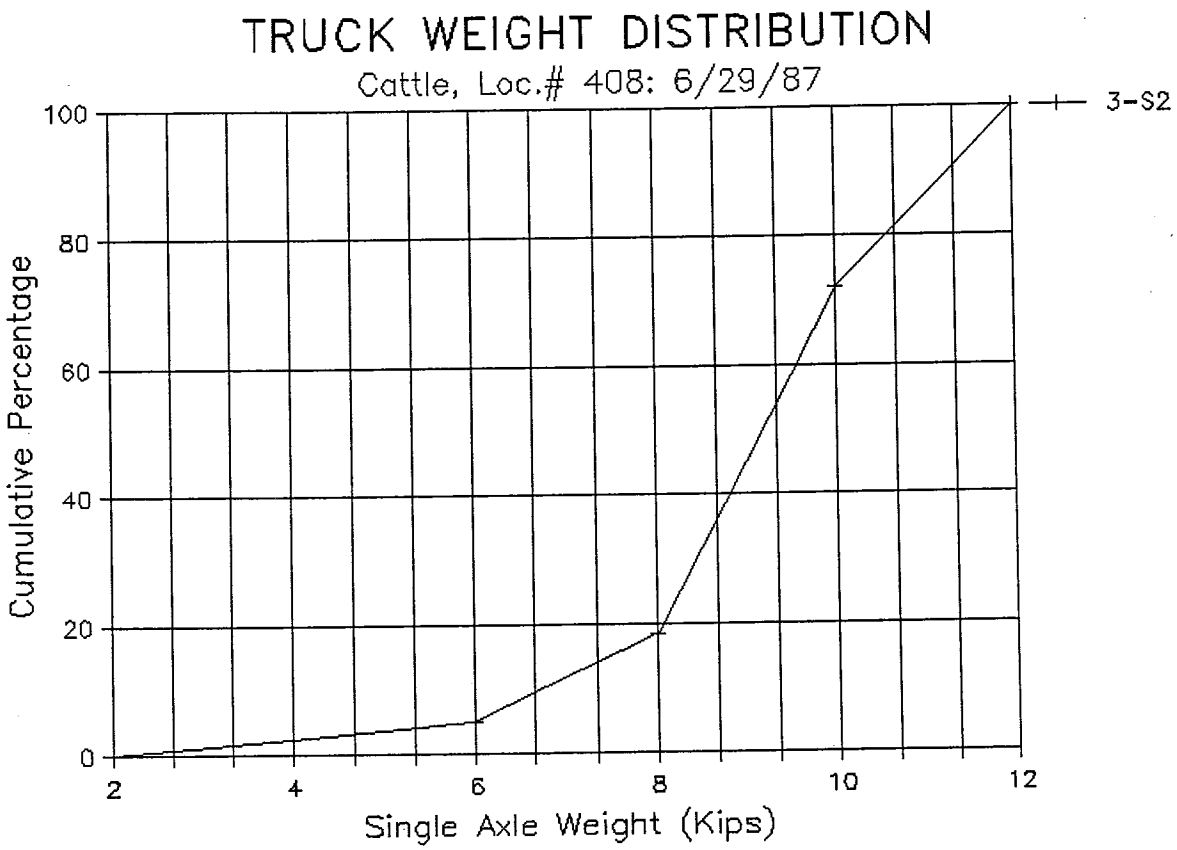


Figure 2.4.2-5 Cattle Truck Weights: 3-S2, Single Axle, 6/29/87

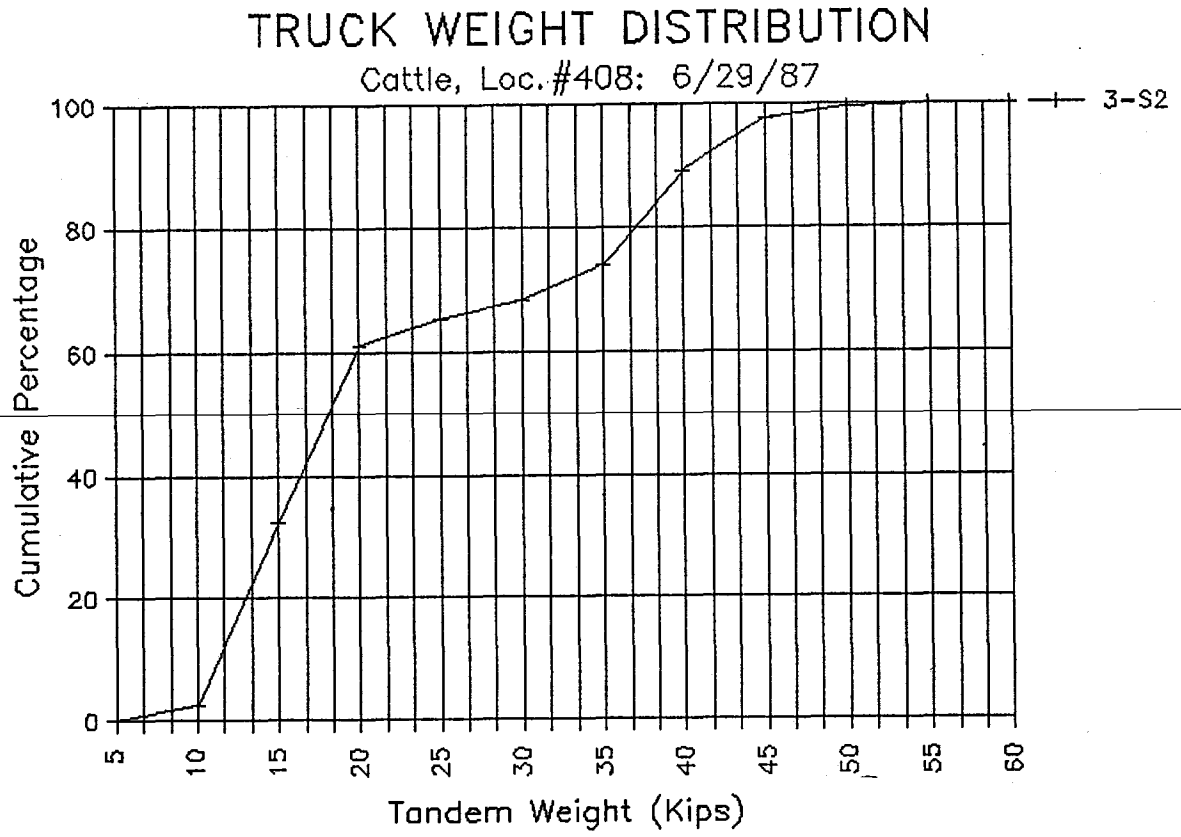


Figure 2.4.2-6 Cattle Truck Weights: 3-S2, Tandem Axle, 6/29/87

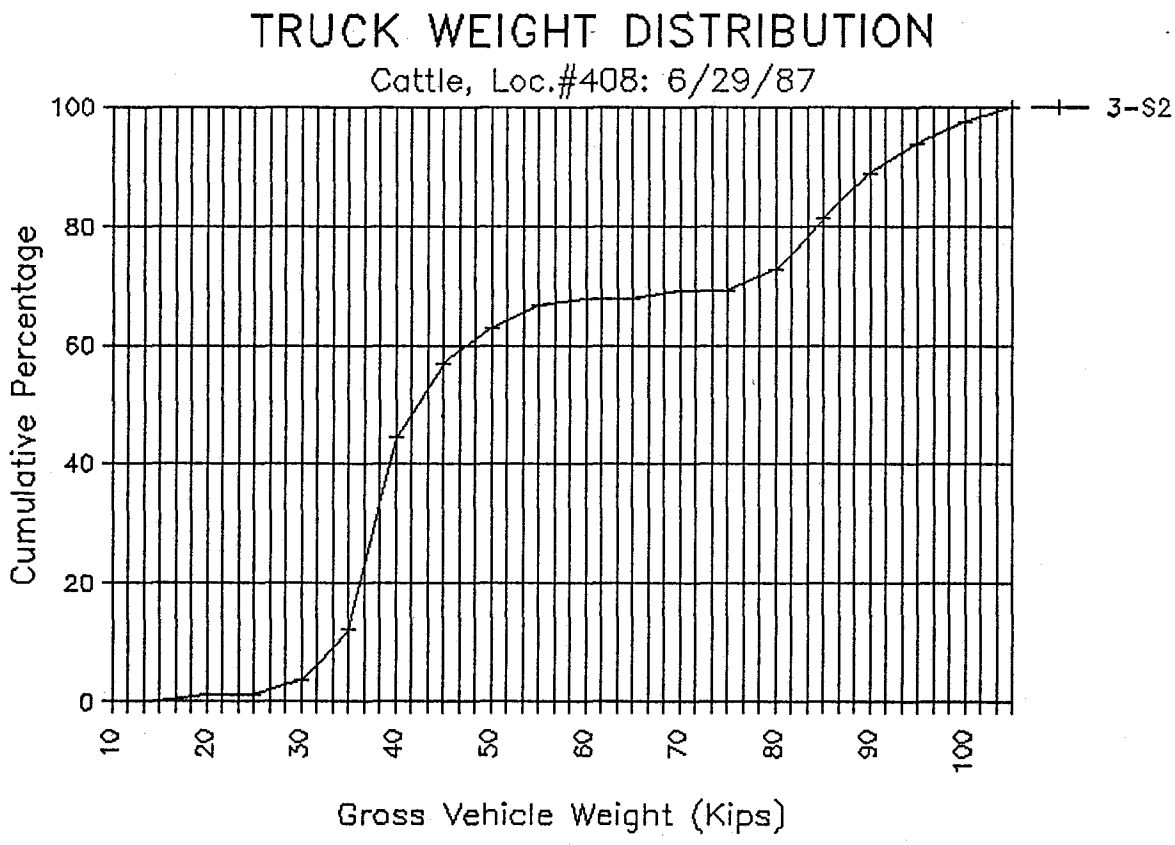


Figure 2.4.2-7 Cattle Truck Weights: 3-S2, Gross Vehicle, 6/29/87

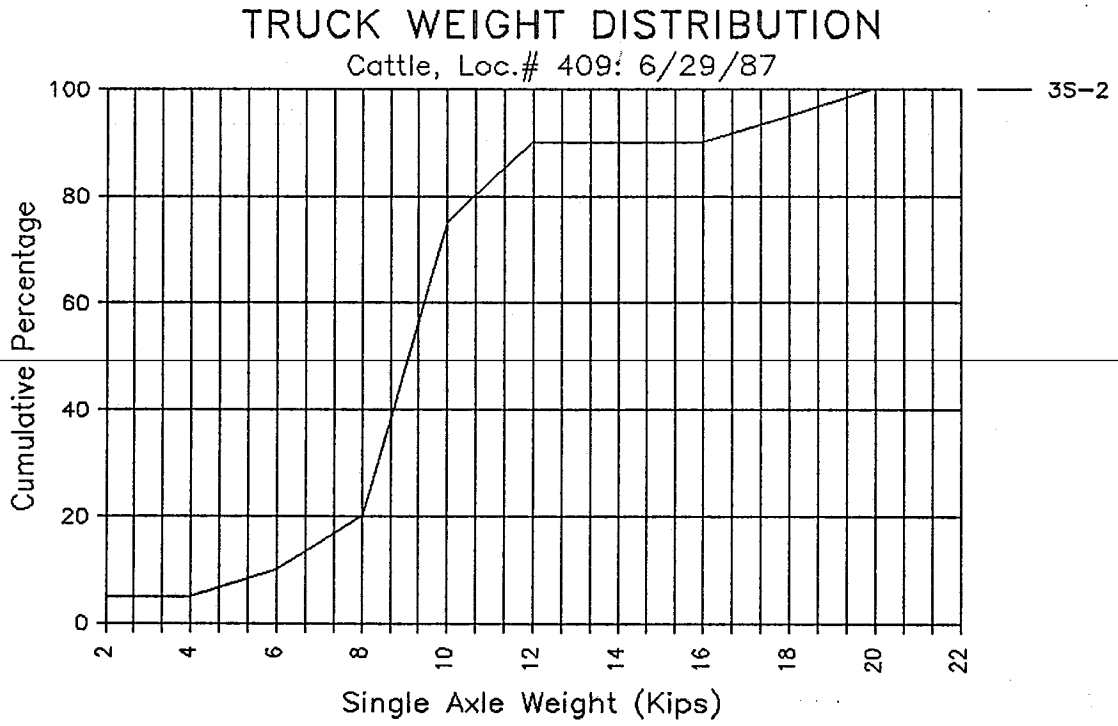


Figure 2.4.2-8 Cattle Truck Weights: 3-S2, Single Axle, 6/29/87

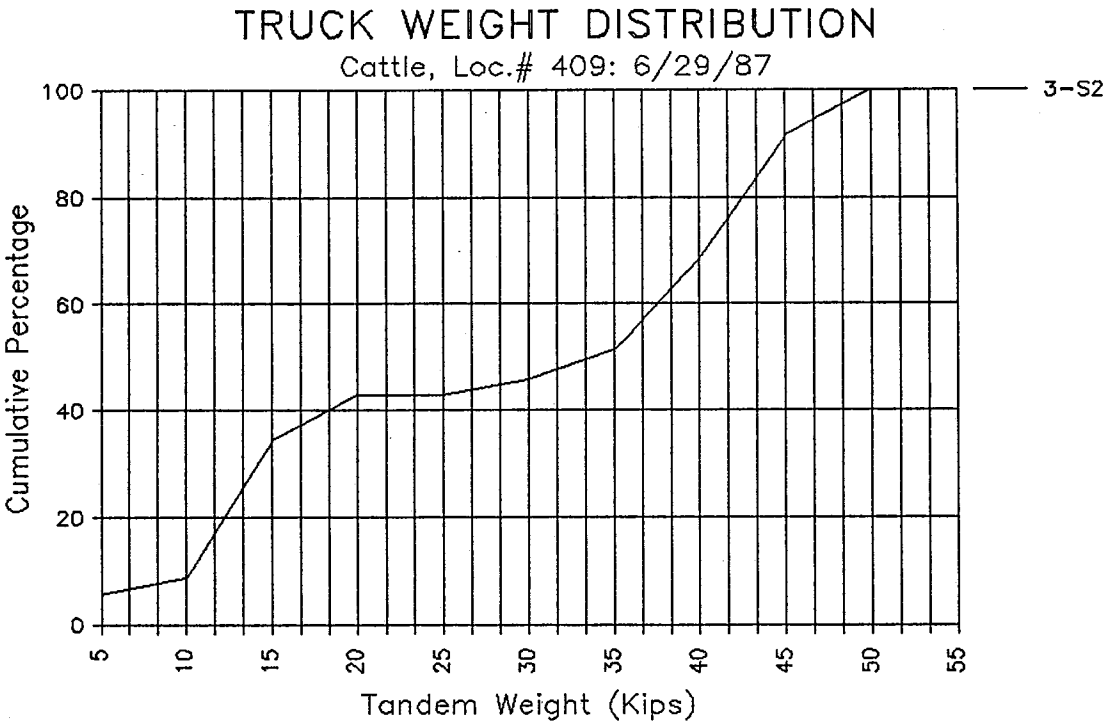


Figure 2.4.2-9 Cattle Truck Weights: 3-S2, Tandem, 6/29/87

2.4.3 STATEWIDE APPLICATION OF SITE-SPECIFIC CATTLE INFORMATION

In a nation where consumers prefer beef over all other sources of meat, the fed-cattle industry has become a major contributor to total agricultural output. Americans consume more beef than any other people. This has caused the demand on U.S. feedlots to reach 23 million head of fed cattle each year.

Due to its climate and geographical location, the state of Texas is known as the cattle-feeding capital of the world. Approximately 23% of all cattle on feed are marketed from Texas feedlots. There are 1,000 feedlots of various capacities located in the state. Table 2.4.3-1 (7) shows the numbers of lots by size group and the numbers of cattle produced annually. The table shows that although there are many lots with capacities less than 1,000 head, the majority of cattle (97%) are marketed from feedlots with capacities greater than 4,000 head. The trend in Texas cattle on feed by quarter of each year is represented graphically in Figure 2.4.3-1.

Within the state, most of the larger feeding operations are concentrated in the Panhandle area. Figure 2.4.3-2 depicts a 35 county area which is responsible for producing approximately 90% of all fed-cattle in Texas (8). The numbers shown in each county are totals for the year 1988. Table 2.4.3-2 lists the total number of feedlots by size located within each of these counties.

SDHPT Districts 4 and 5 are the only two which are included in Figure 2.4.3-2. Of the 4.7 million cattle fed in the 35-county area in Texas, 62 percent were in District 4, and 38 percent were in District 5. Locations of packing plants in the Panhandle area are shown by Figure 2.4.3-3.

The remaining 10% of fed cattle marketed in Texas (outside the Panhandle area) are distributed in feedlots across the state with most of these lots concentrated in an area to the west of San Antonio. Because most of these operations are relatively small and widely dispersed, they do not significantly impact the state's highways as do the larger feedlots.

Table 2.4.3-1 Texas Cattle on Feed

FEEDLOT CAPACITY	Year: 1986 # of Lots	Year: 1986 Cattle Marketed[1]	Year: 1987 # of Lots	Year: 1987 Cattle Marketed[1]
Under 1,000	850	90	849	90
1,000-3,999	20	50	21	55
4,000-7,999	19	180	21	170
8,000-15,999	38	550	36	625
16,000-31,999	40	1400	40	1385
32,000 or more	33	2990	33	2930
TOTAL	1000	5260	1000	5255

[1] Multiply by 1,000 head of cattle.

Source: US Department of Agriculture, Reference (7).

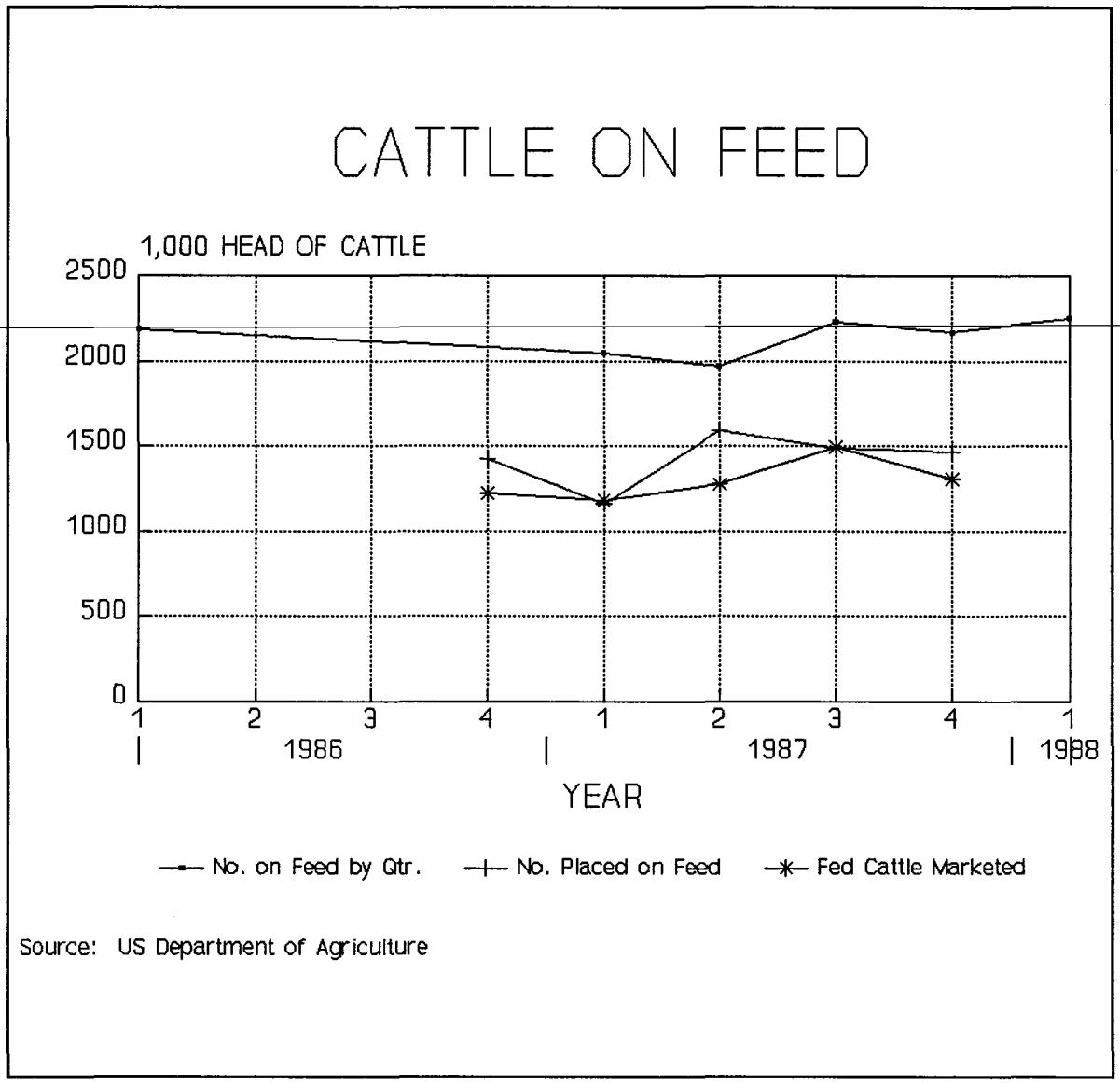


Figure 2.4.3-1 Cattle Fed, Placed, and Marketed

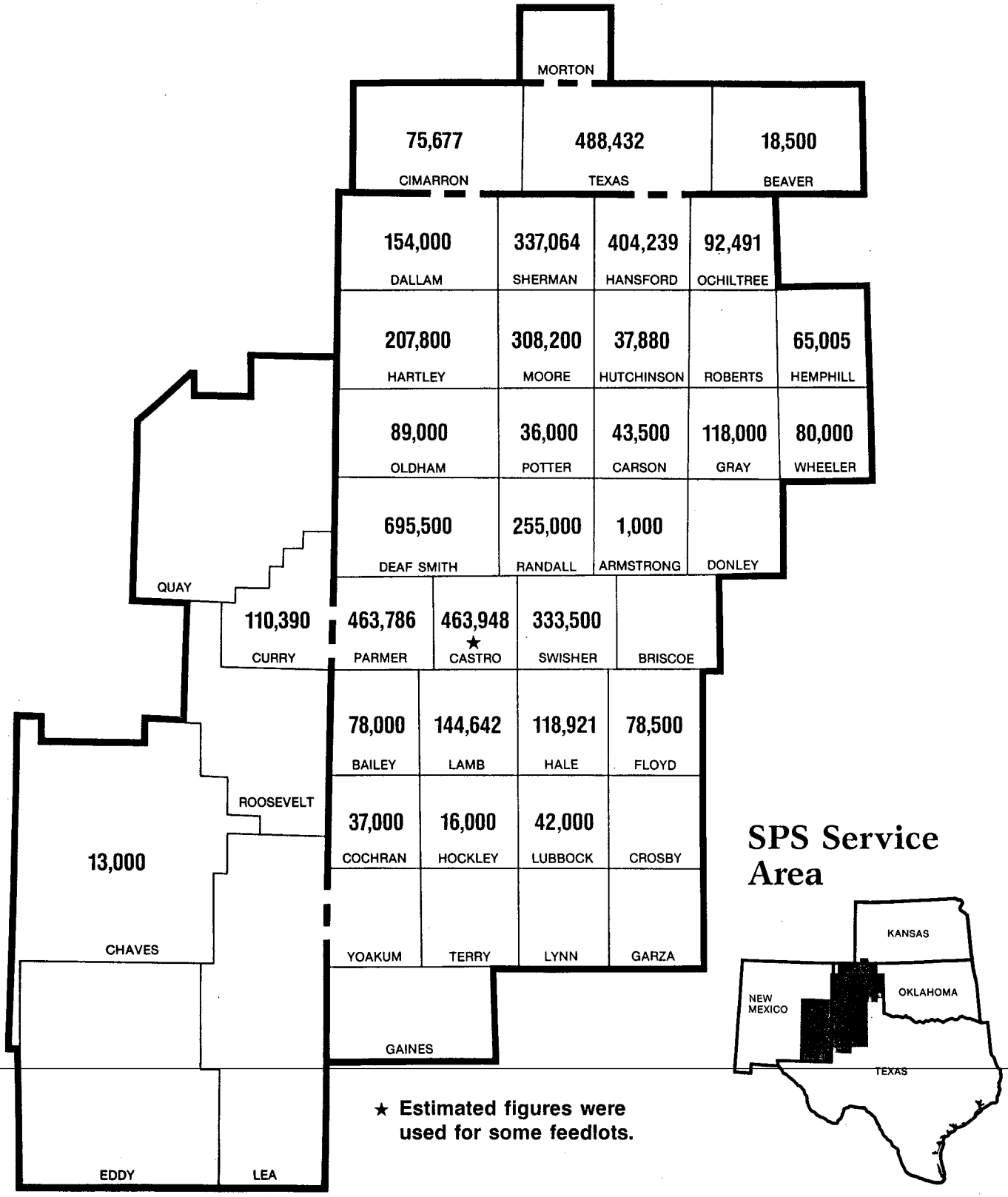


Figure 2.4.3-2 1988 Fed Cattle Summary

Table 2.4.3-2 Feedlot Distribution by County

County	Number of Feedlots			Total Capacity
	5000-20,000 head	20,001-40,000 head	>40,000 head	
Bailey	1	1	0	39,000
Carson	2	0	0	18,000
Castro	8	2	2	244,500
Cochran	0	1	0	36,000
Dallam	2	0	1	75,000
Deaf Smith	3	4	3	311,500
Floyd	0	1	0	35,000
Gray	3	1	0	75,000
Hale	2	1	0	60,000
Hansford	2	4	1	196,500
Hartley	0	1	1	97,000
Hemphill	0	1	0	26,000
Hockley	1	0	0	12,000
Hutchinson	1	0	0	12,000
Lamb	2	2	0	88,000
Lubbock	0	0	1	45,000
Moore	0	1	2	133,000
Ochiltree	1	2	0	66,000
Oldham	1	1	0	32,080

(Continued)

Table 2.4.3-2 (Continued) Feedlot Distribution by County

County	Number of Feedlots			Total Capacity
	5000-20,000 head	20,001-40,000 head	>40,000 head	
Parmer	0	5	2	285,500
Potter	1	0	0	15,000
Randall	0	0	2	113,000
Sherman	3	0	1	113,000
Swisher	0	2	2	166,000
Wheeler	1	1	0	42,500
TOTALS	34	31	18	2,336,580

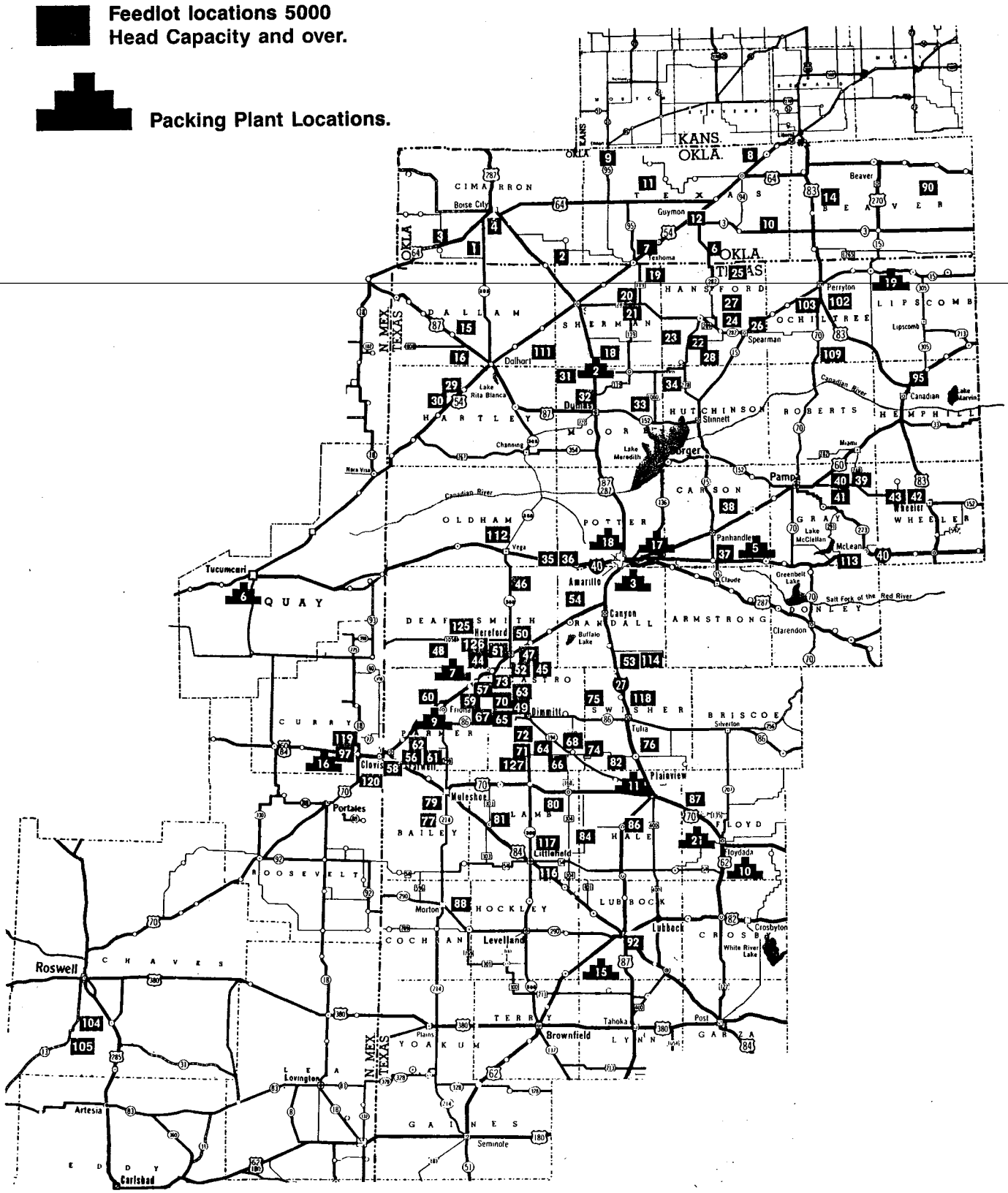


Figure 2.4.3-3 Location of Packing Plants in the Panhandle Area

2.5 LIMESTONE

2.5.1 CLASSIFICATION COUNTS

2.5.1.1 Limestone Quarry, Site No. 500

Introduction. The site map shown in Figure 2.5.1.1-1 indicates that access is provided primarily by a Farm-to-Market Road, but also by a U.S. Highway via a spur route. This site is located between two small urban areas in Central Texas. Two entrances, 0.7 miles apart, provide access to this quarry; one is via the FM Road which is load zoned at 58,320 pounds, while the other requires crossing the FM Road to use the spur route, then access the U.S. Highway. The site activities include an asphalt plant, in addition to the quarry. According to interviews, the only loaded vehicles which use the FM Road are the SU-2's because the loaded 3-S2's exceed the load limit.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.1-2 shows the truck traffic (in and out) generated by this limestone quarry during a 12-hour period from 6 a.m. to 6 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the pit during the same 12-hour period on September 11, 1986.

Figure 2.5.1.1-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. The dominant truck was the 3-S2 (82 percent of all trucks). Also illustrated is the breakdown of total truck traffic generated by this site. Trucks represented 69 percent of all traffic. This gravel pit added 70 combination vehicles and 42 single unit vehicle trips to the State Highway system.

Interviews with plant officials indicated a 1986 average daily production of 1,300 tons shipped by truck. Plant officials calculated number of daily truck loads by dividing daily production by truck capacity. On an annual basis, production is 1.20 million tons of stone. The quarry operates 5 days per week from 6 a.m. to 6 p.m. and on Saturdays from 6:30 a.m. to 12:00 noon. Table 2.5.1.1-1 provides other interview information. Of the 33 loaded 3-S2 vehicles leaving the quarry with stone, 22 of them returned loaded with sand for the asphalt plant located at this site. The number of employees was not revealed.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Farm-to-Market Highway carrying an average daily traffic (ADT) of 4,300 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.5.1.1-2 provides a summary of the counts taken. In Table 2.5.1.1-2A, vehicle classification counts for the activity center only are provided. In Table 2.5.1.1-2B, a count of all vehicles on the FM Highway except special-use vehicles is provided. Finally, in Table 2.5.1.1-2C, a total count of all vehicles on the roadway (sum of 2A and 2B plus special-use vehicles on the roadway) is provided.

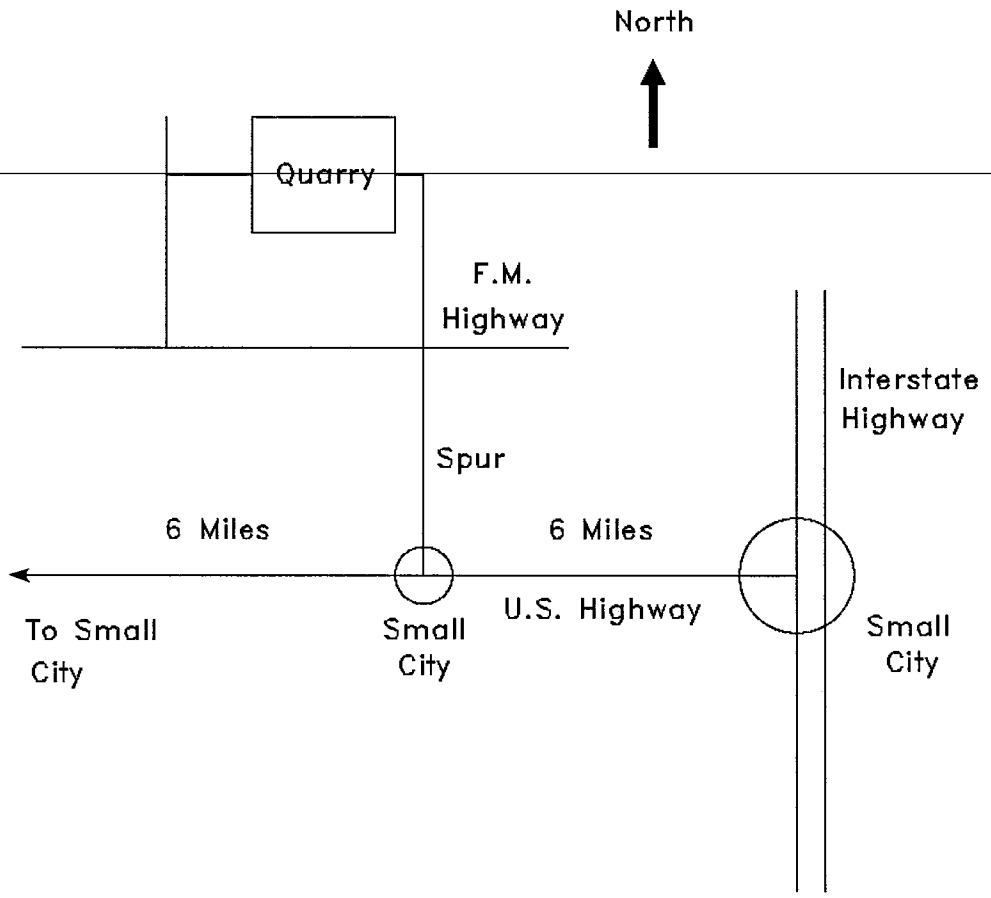
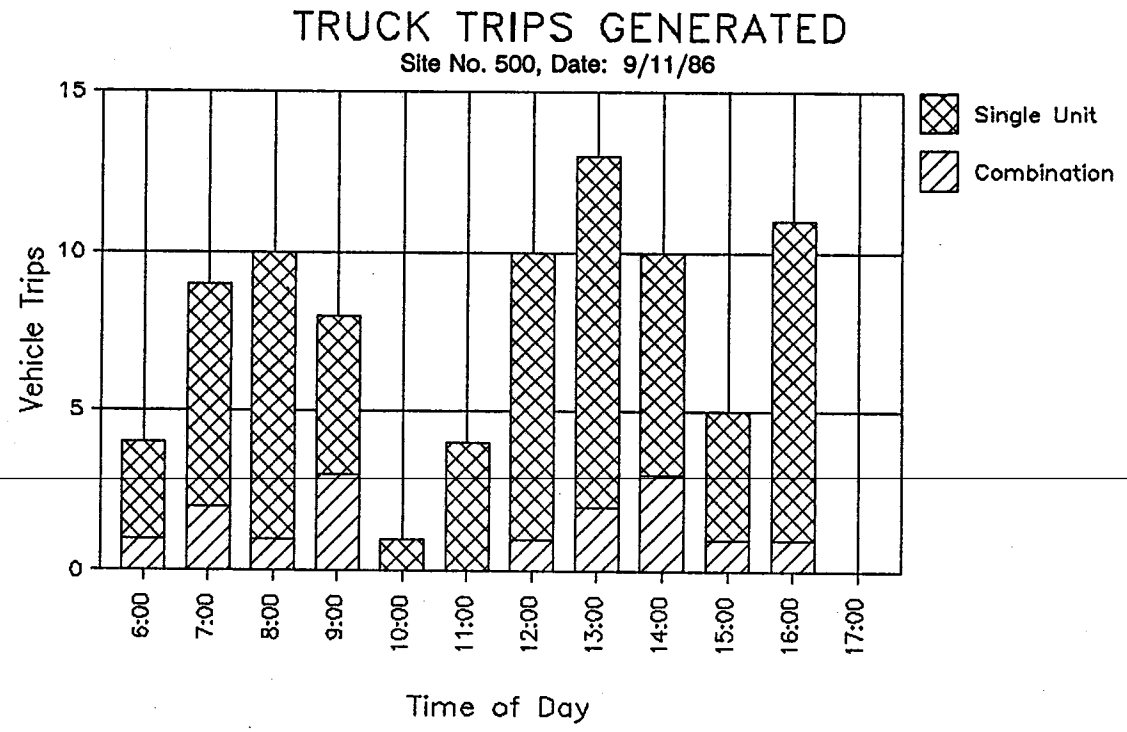


Figure 2.5.1.1-1. Site Map



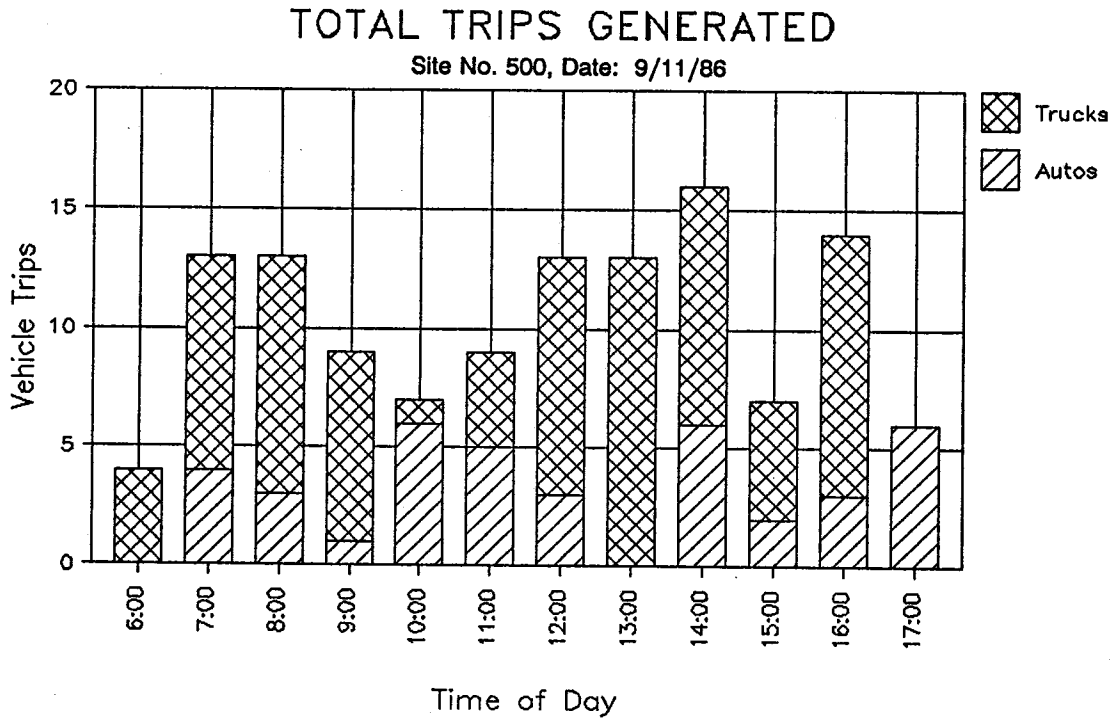
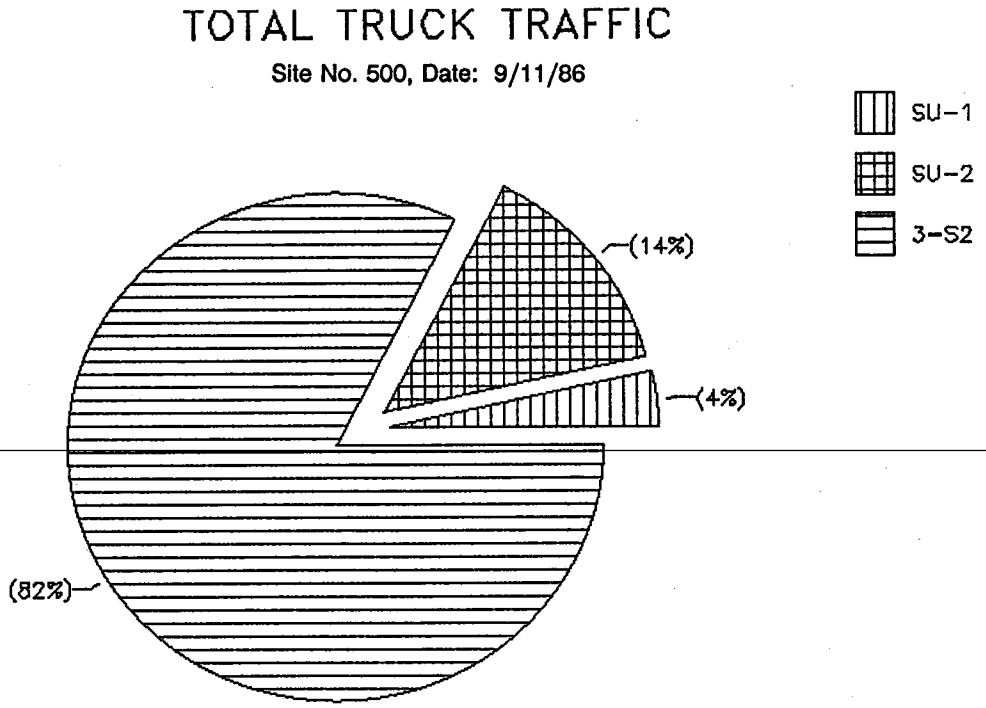


Figure 2.5.1.1-2. Hourly Trip Generation



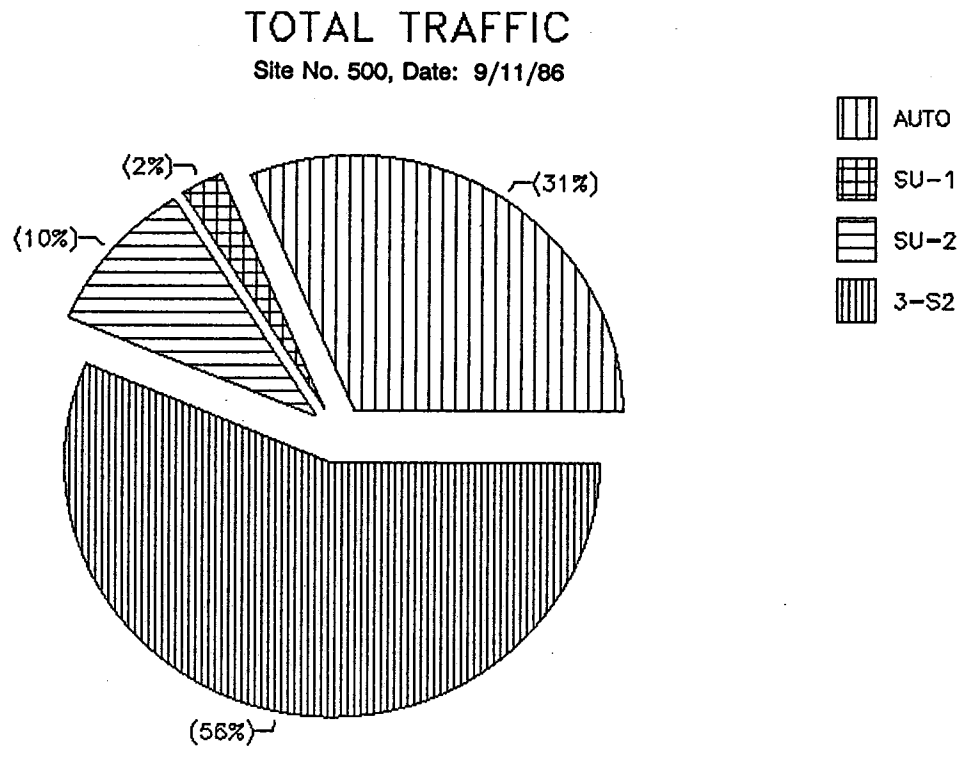


Figure 2.5.1.1-3. Activity Center Vehicle Percentages

Table 2.5.1.1-1. Interview Information

Outgoing (Loaded) Vehicles		
Number of Loads		
	SU	3-S2
Low	---	85
Avg	33	152
High	---	340
Radius of Influence		
	Single	3-S2
	80% within 50 miles	80% within 100 miles
	100% within 100 miles	100% within 100 miles

Figure 2.5.1.1-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.1-2C values). The SU-1 vehicle is the dominant vehicle at 41 percent of total truck traffic. When all vehicles on the roadway are considered together, trucks represent 12 percent of the total traffic stream.

Table 2.5.1.1-2. Traffic Classification Count Summary

Table 2.5.1.1-2A. Activity Center Only

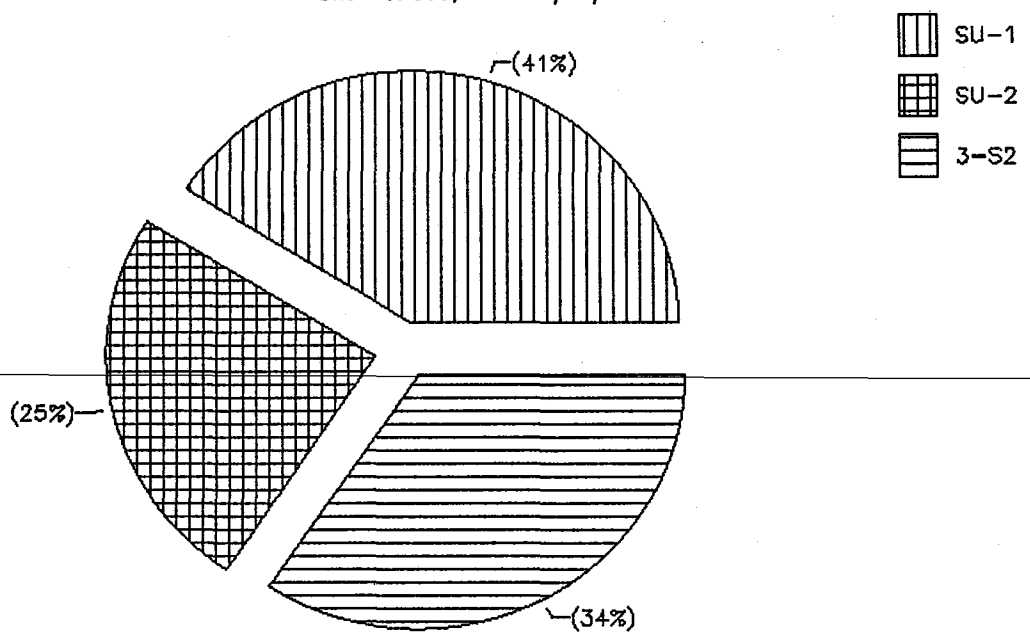
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
9/11/86	39	3	12	70	0	124	18%	82%	31%	69%

Table 2.5.1.1-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
9/11/86	2534	97	0	28	0	2659	78%	22%	95%	5%

Table 2.5.1.1-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
9/11/86	2573	147	89	123	0	2932	66%	34%	88%	12%



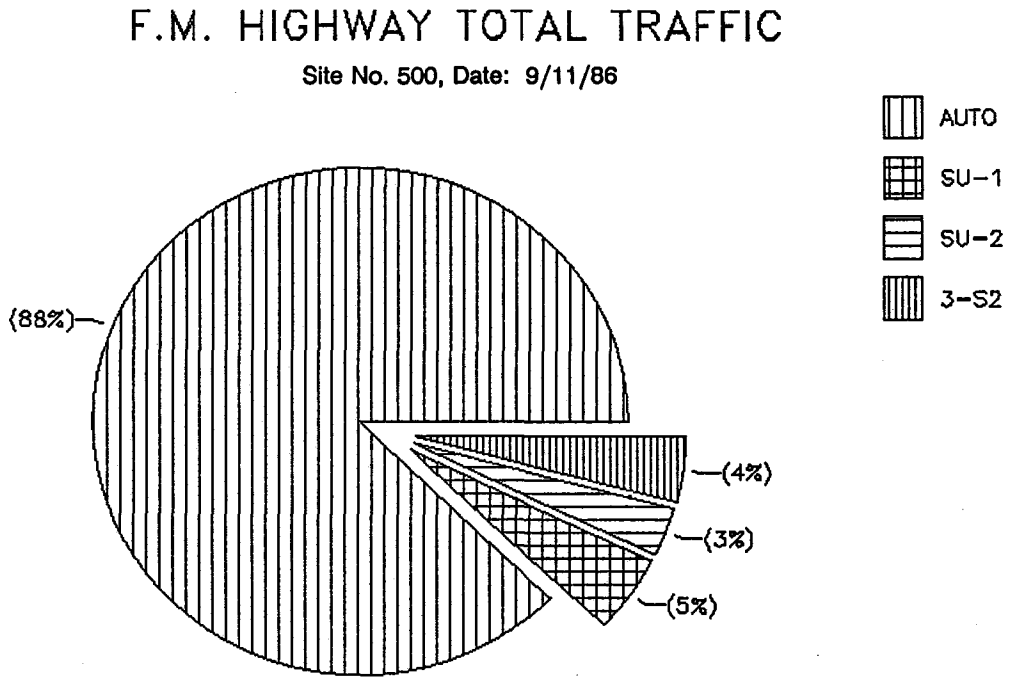


Figure 2.5.1.1-1. Highway Vehicle Percentages

2.5.1.2 Limestone Quarry, Site No. 501

Introduction. The site map shown in Figure 2.5.1.2-1 indicates that access is provided primarily by a State Highway. This site is located three miles north of a small urban area in central Texas. This site did not have an asphalt plant on it; its products include crusher fines and straight base material. No rail service was available at the site.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.2-2 shows the truck traffic (in and out) generated by this limestone quarry during a 12-hour period from 6 a.m. to 6 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the pit during the same 12-hour period on July 9, 1986.

Figure 2.5.1.2-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. The dominant truck was the SU-2 (96 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Trucks represented 80 percent of all traffic. This gravel pit added 190 single unit vehicle trips to the State Highway System.

Interviews with plant officials indicated a 1984 total annual production of 411,922 tons shipped by truck. Plant officials calculated average daily truck loads by dividing daily tonnage produced by the weight hauled per truck. In 1985, the total for the year was 400,604 tons. In 1986, the following total monthly production was reported: 62,499 tons in April, 67,174 tons in May, and 83,292 tons in June. The 1986 average reported production rate was 2,000 tons per day, with a maximum of 3,000 tons per day. The hours of operation were from 6 a.m. to 5:30 p.m. The number of employees at this quarry was 14. Table 2.5.1.2-1 provides other interview information.

Table 2.5.1.2-1. Interview Information

Outgoing (Loaded) Vehicles

Number of Loads	SU	3-S2	SU-2 w/PUP
Low	---	---	--
Avg	30	10	5
High	---	---	--

Radius of Influence (For SU and Combination)

80% within 10 miles 100% within 20 miles

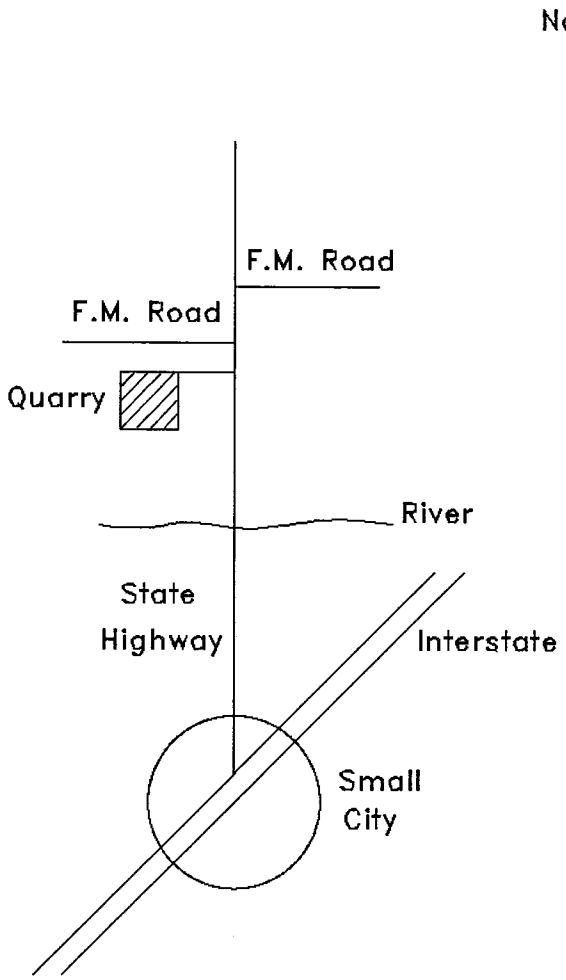
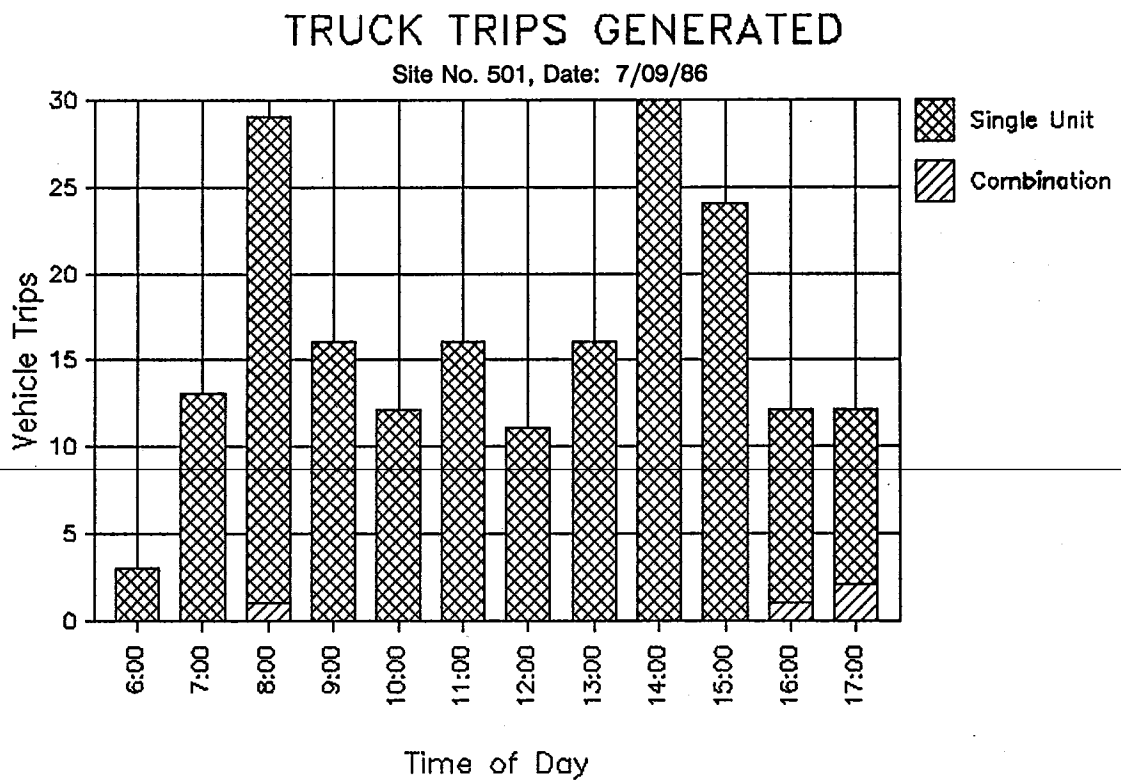


Figure 2.5.1.2-1. Site Map



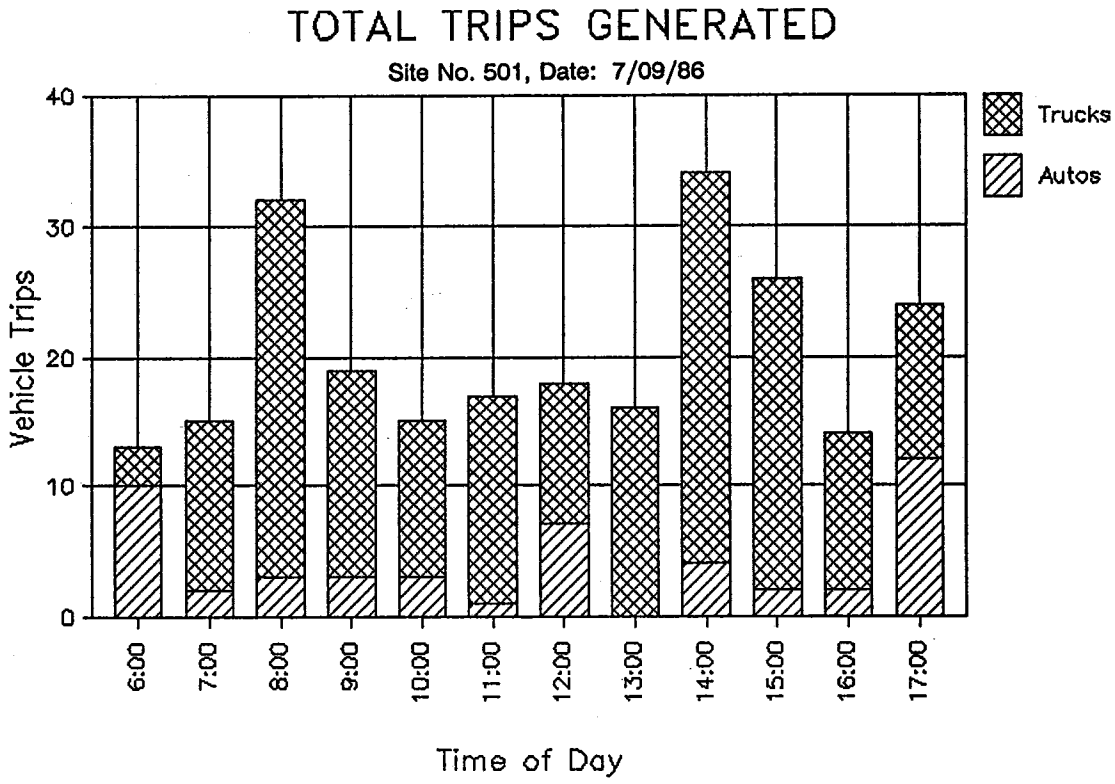
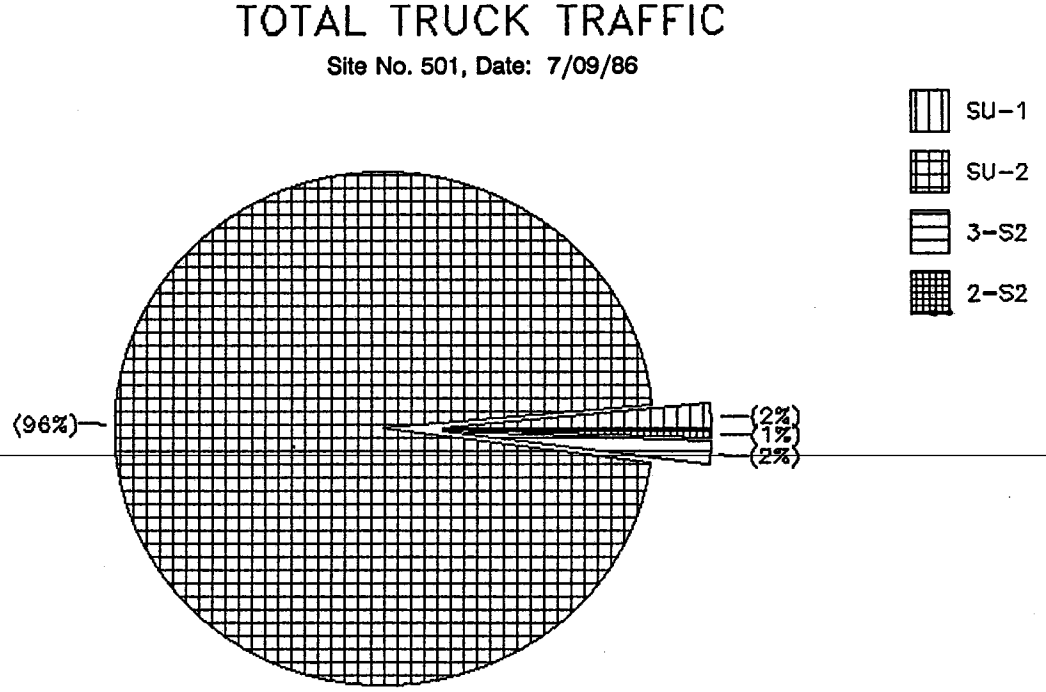


Figure 2.5.1.2-2. Hourly Trip Generation



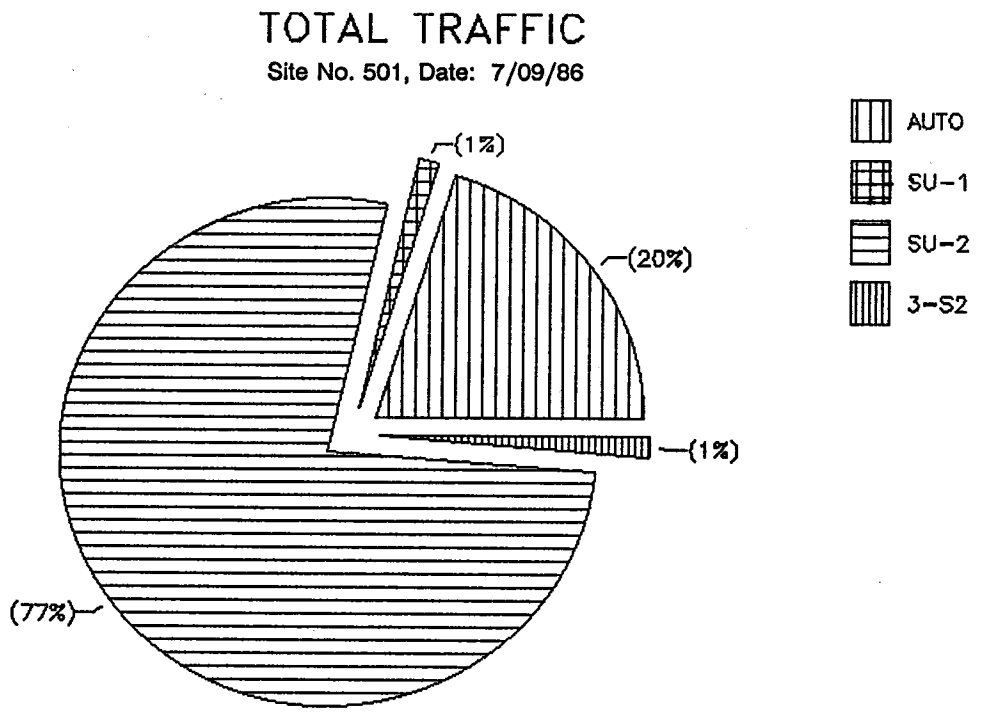


Figure 2.5.1.2-3. Activity Center Vehicle Percentages

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a State Highway carrying an average daily traffic (ADT) of 6,000 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.5.1.2-2 provides a summary of the counts taken. In Table 2.5.1.2-2A, vehicle classification counts for the activity center only are provided. In Table 2.5.1.2-2B, a count of all vehicles on the FM Highway except special-use vehicles is provided. Finally, in Table 2.5.1.2-2C, a total count of all vehicles on the roadway (sum of 2A and 2B plus special-use vehicles on the roadway) is provided.

Figure 2.5.1.2-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.2-2C values). The SU-2 vehicle is the dominant vehicle at 81 percent of total truck traffic. When all vehicles on the roadway are considered together, autos represent 90 percent of the total traffic stream.

Table 2.5.1.2-2. Traffic Classification Count Summary

Table 2.5.1.2-2A. Activity Center Only

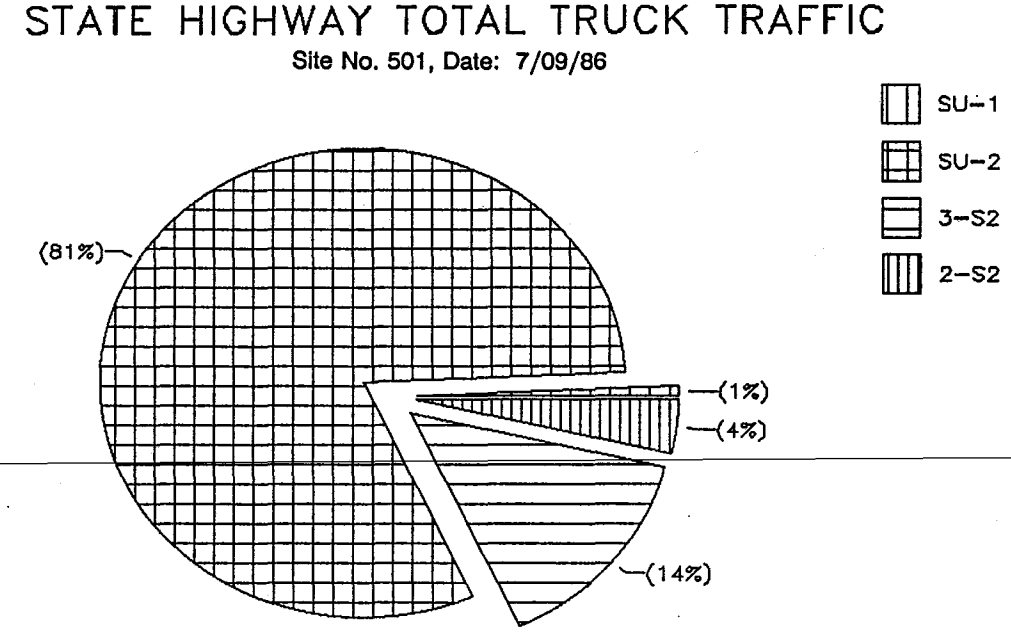
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
6/25/85	30	81	108	4	0	223	98%	2%	13%	87%
7/09/86	49	3	187	3	1	242	98%	2%	20%	80%

Table 2.5.1.2-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
7/9/86	3843	0	160	58	15	4076	69%	31%	94%	6%

Table 2.5.1.2-2C. Roadway With Special-Use

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
7/9/86	3892	3	347	62	17	4318	84%	16%	90%	10%



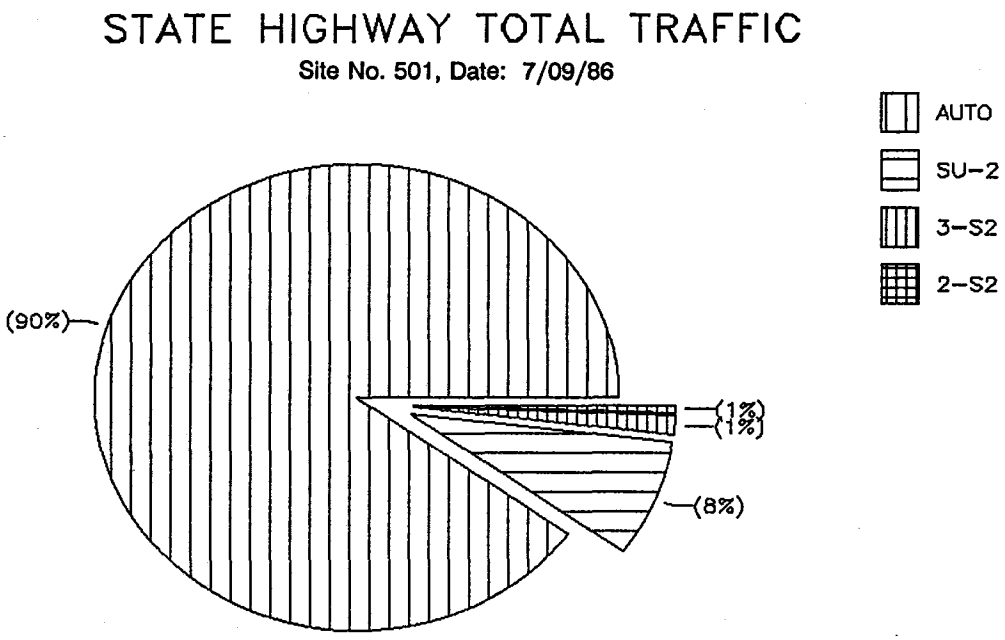


Figure 2.5.1.2-4. Highway Vehicle Percentages

2.5.1.3 Limestone Quarry, Site No. 502A

Introduction. The site map shown in Figure 2.5.1.3-1 indicates that access is provided by a local road which ends at the quarry. The activity center is located south of a small urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.3-2 shows the truck traffic (in and out) generated by the site during an 11-hour period (7 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated at this site during the same 11-hour period on October 14, 1986.

Figure 2.5.1.3-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (59%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 32 percent of this total. It was not possible to obtain an interview with an official at this facility.

Characteristics of Roadway Serving Activity Center. Counts were not obtained on the roadway serving the activity center. Vehicle classification counts for the activity center only are provided. These counts are shown in Table 2.5.1.3-1.

Table 2.5.1.3-1. Traffic Classification Count Summary

Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10/14/86	130	34	163	81	0	408	71%	29%	32%	68%

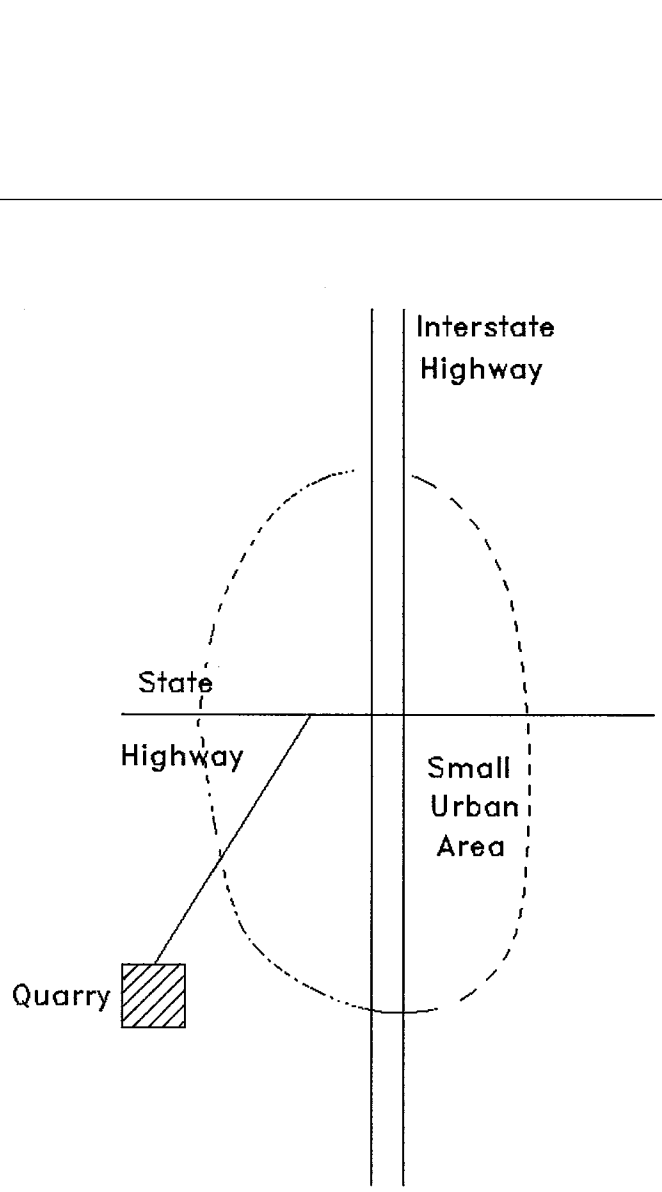
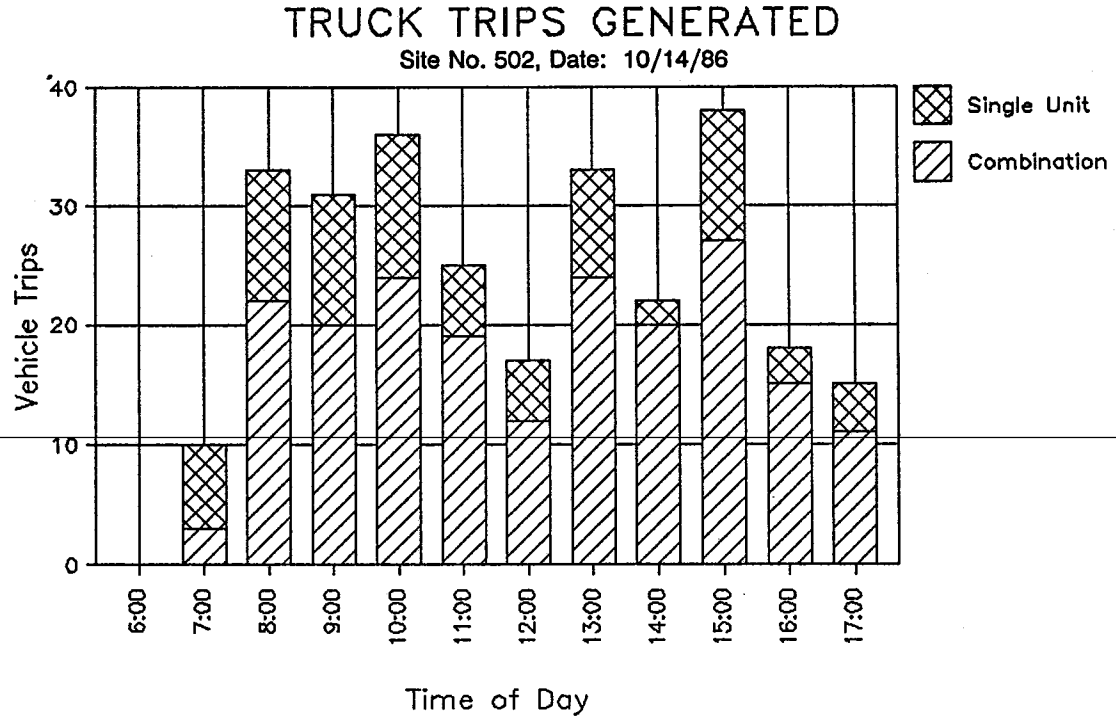


Figure 2.5.1.3-1. Site Map



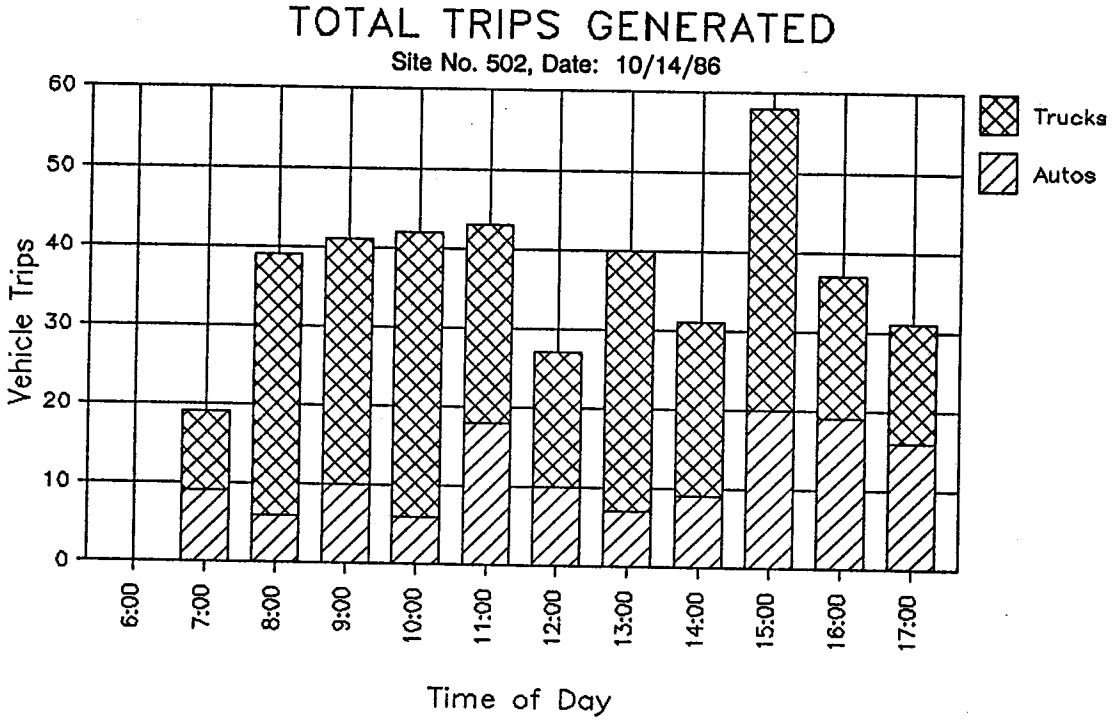
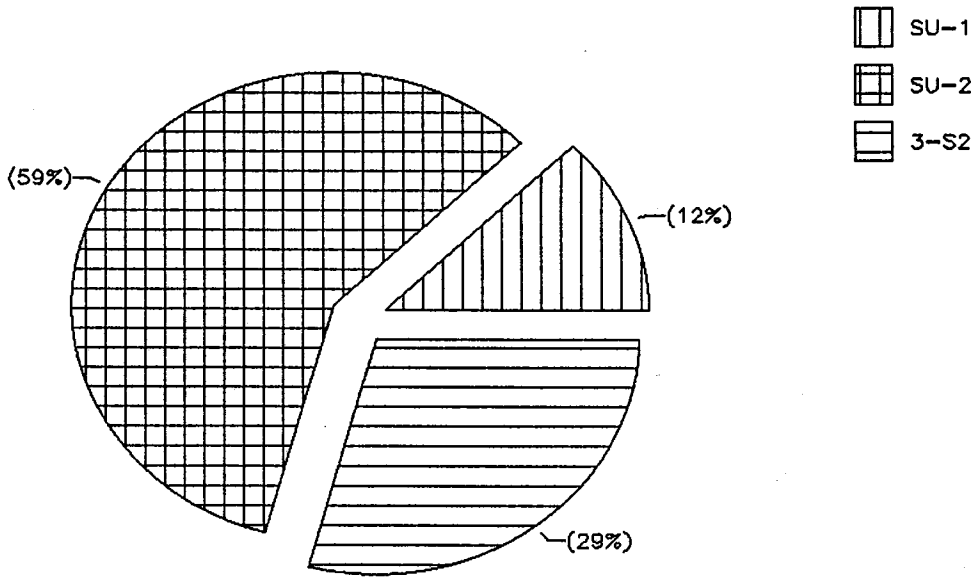


Figure 2.5.1.3-2. Hourly Trip Generation



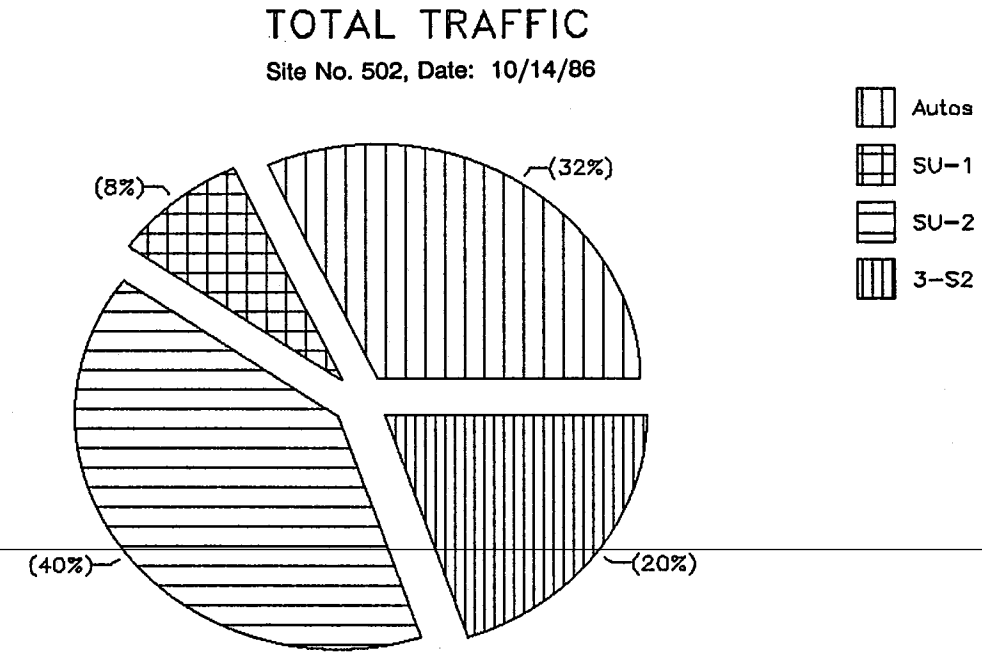


Figure 2.5.1.3-3. Activity Center Vehicle Percentages

2.5.1.4 Limestone Quarry, Site No. 503

Introduction. The site map shown in Figure 2.5.1.4-1 indicates that access is provided directly to a Farm-to-Market Highway which is a major arterial serving as a Loop at the outskirts of a large urban area. Thus, the activity center serves this urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.4-2 shows the truck traffic (in and out) generated by the site during an 11-hour period (6 a.m. to 5 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also illustrates the combination of trucks and autos that were generated by this site during the same 11-hour period on July 16, 1987.

Figure 2.5.1.4-3 illustrates the breakdown by AASHTO classification of the total trucks going in and out of the site. The predominant truck was the 3-S2 combination (48%). Also illustrated is the breakdown of total traffic moving to and from the site. Trucks represented 91 percent of this total.

An interview was conducted with an official at the limestone quarry. The products leaving the site were estimated at an average of 15 single unit trucks and 40 3-S2 trucks per day. For radius of influence, 95% of the material shipped by truck travels within 25 miles to 150 miles. The 30 employees working at the site worked from 7 a.m. to 5 p.m. each day.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 9,000 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.4-1 provides a summary of the counts taken. First, in Table 2.5.1.4-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.4-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.4-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.4-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.4-1C values). The 3-S2 vehicle represents 40 percent of total trucks counted on this highway. Autos make up 78 percent of the total traffic shown.

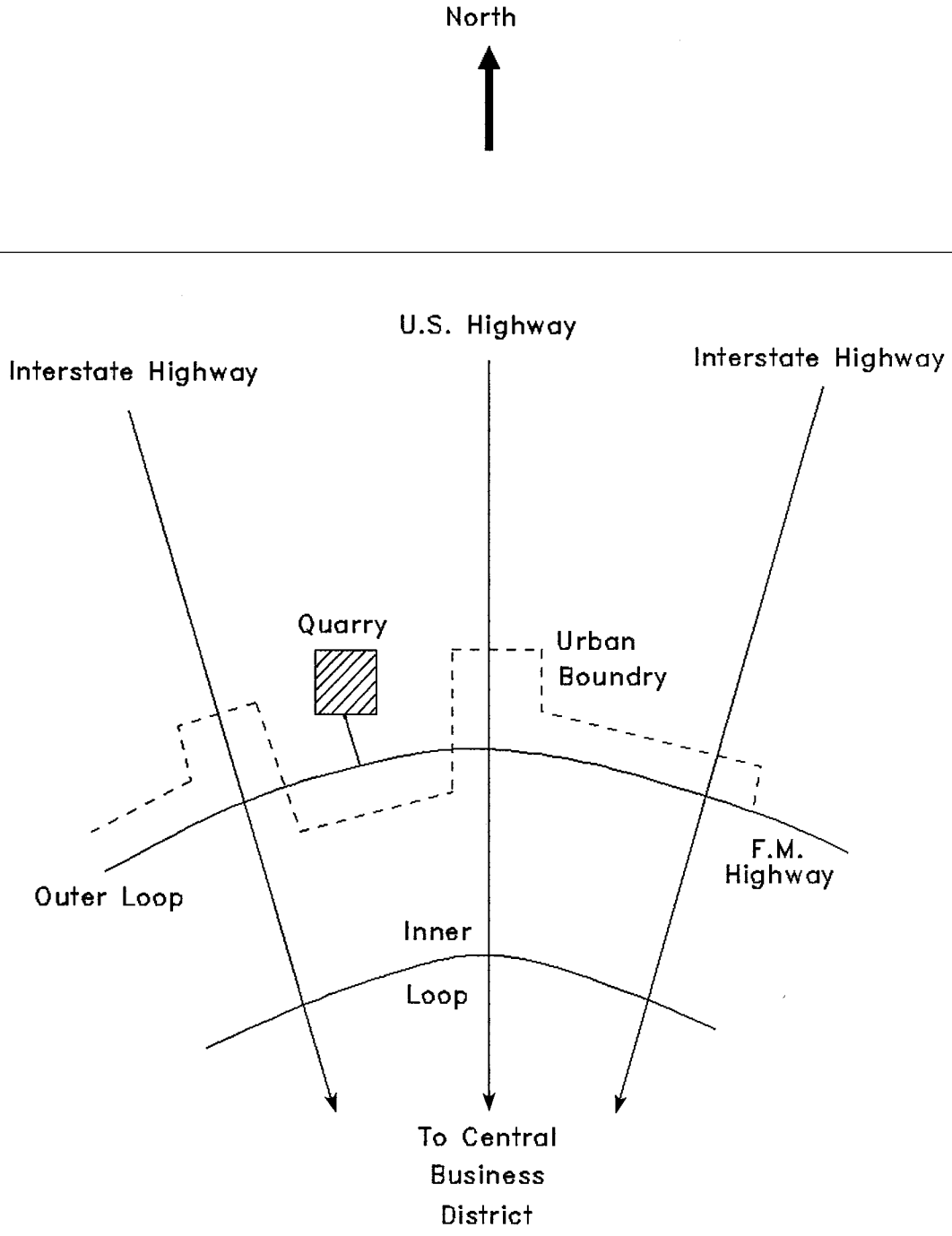
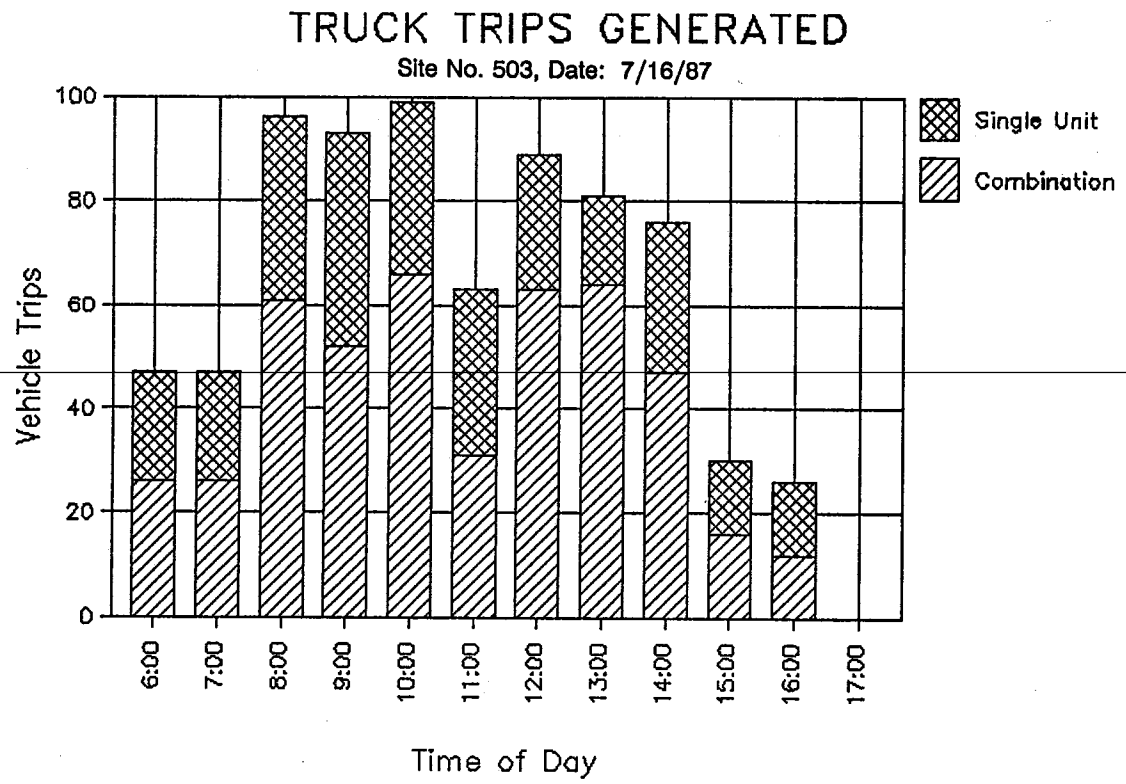


Figure 2.5.1.4-1. Site Map



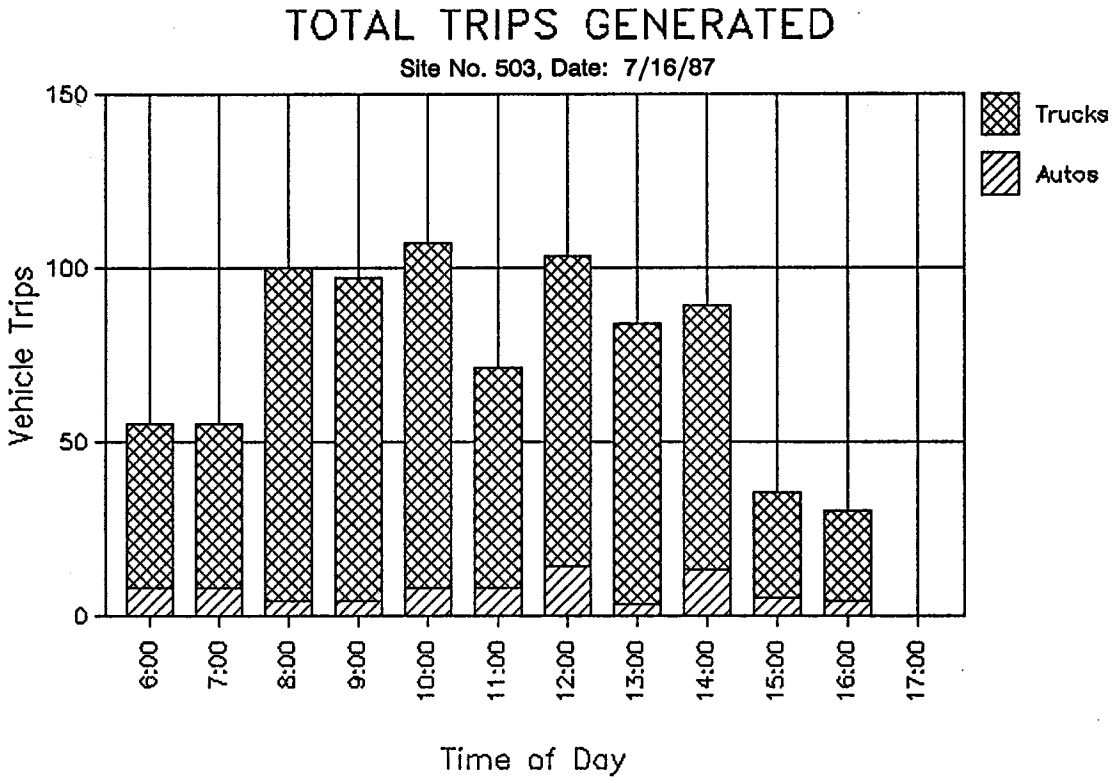
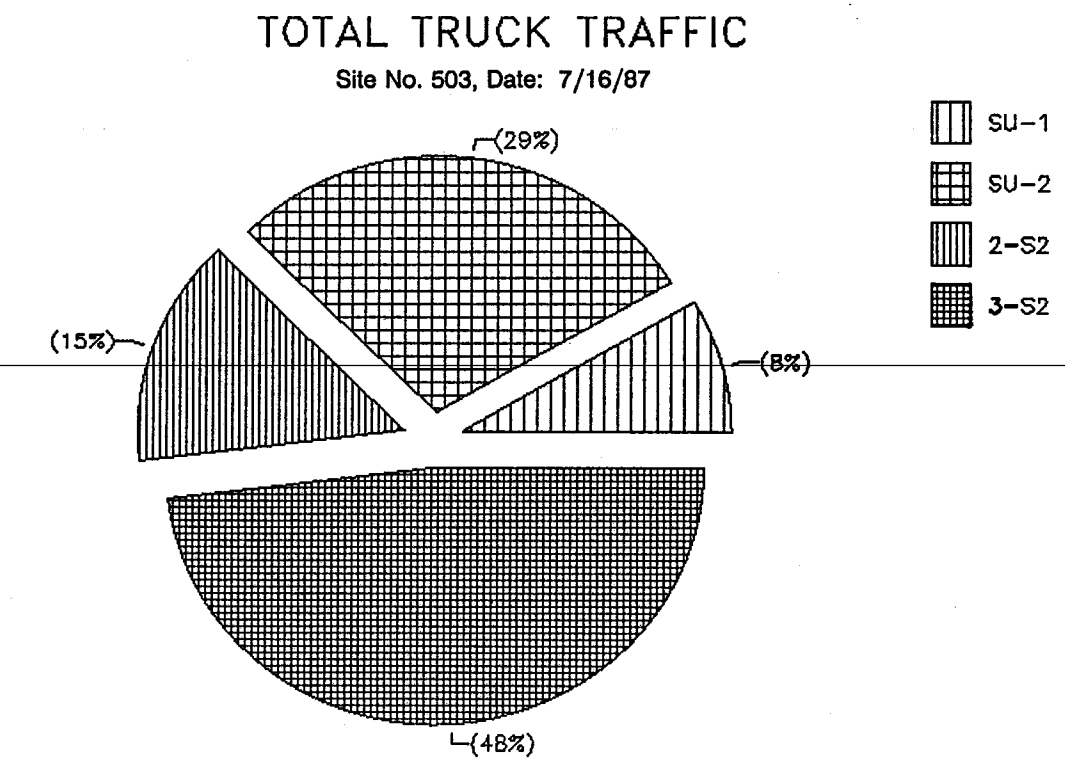


Figure 2.5.1.4-2. Hourly Trip Generation



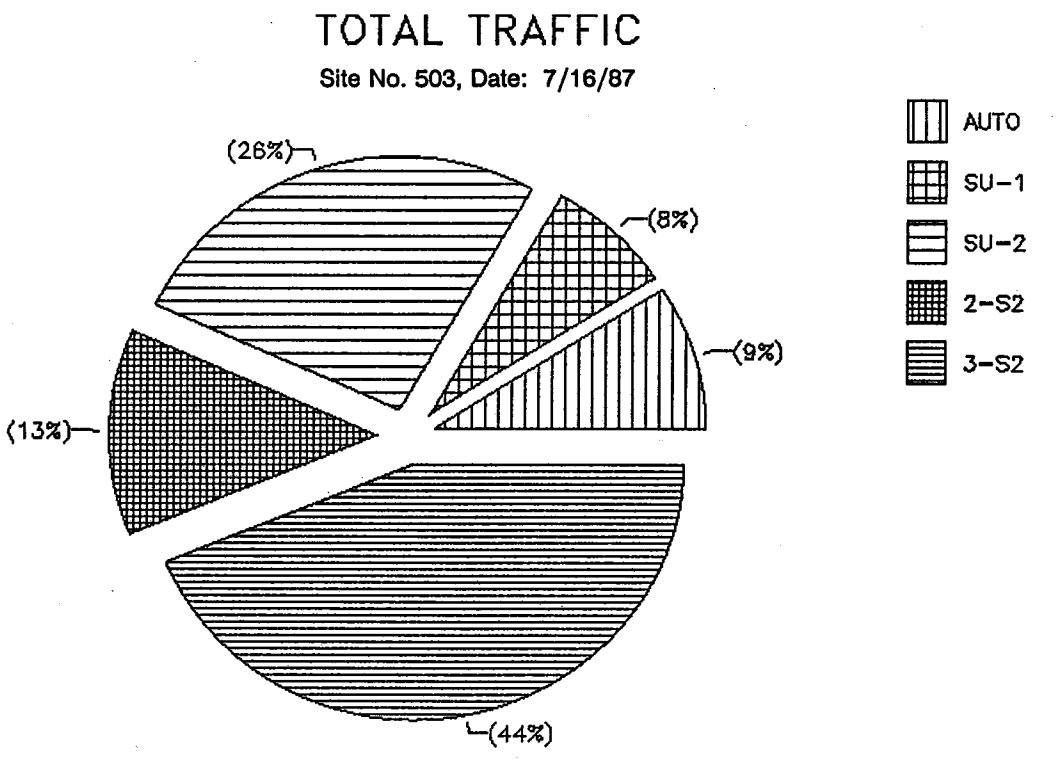


Figure 2.5.1.4-3. Activity Center Vehicle Percentages

Table 2.5.1.4-1. Traffic Classification Count Summary

Table 2.5.1.4-1A. Activity Center Only

Date	Autos	SU-1	SU-2	2-S2	3-S2	Total	% of Trucks SU	% of Trucks Comb.	% of Total Cars	% of Total Trucks
7/15/87	68	53	249	126	291	787	42%	58%	9%	91%
7/16/87	71	59	203	102	336	771	37%	63%	9%	91%

Table 2.5.1.4-1B. Roadway Without Special-Use Traffic

Date	Autos	SU-2	2-S2	3-S2	Other	Total	% of Trucks SU	% of Trucks Comb.	% of Total Cars	% of Total Trucks
7/15/87	5539	414	39	363	0	6355	51%	49%	87%	13%
7/16/87	5624	455	35	339	42	6495	52%	48%	87%	13%

Table 2.5.1.4-1C. Roadway With Special-Use Traffic

Date	Autos	SU-1	SU-2	2-S2	3-S2	Other	Total	% of Trucks SU	% of Trucks Comb.	% of Total Cars	% of Total Trucks
7/15/87	5607	53	663	165	655	0	7143	47%	53%	78%	22%
7/16/87	5695	59	658	137	675	42	7266	46%	54%	78%	22%

2.5.1.5 Limestone Quarry, Site No. 504A

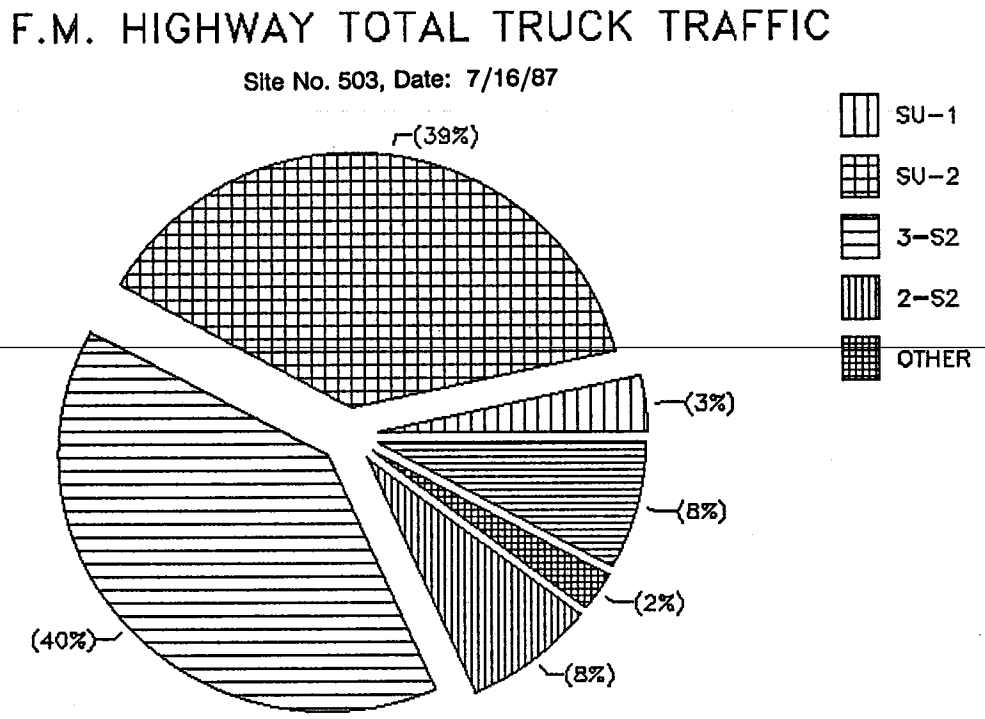
Introduction. The site map shown in Figure 2.5.1.5-1 indicates that access is provided by a four-lane undivided U.S. Highway. The activity center is located approximately 12 miles north of a relatively small urban area. Trucks hauling limestone from this site travel almost exclusively toward the north. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.5-2 shows the truck traffic (in and out) generated by the site during an 11-hour period (6 a.m. to 5 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 11-hour period on April 8, 1986.

Figure 2.5.1.5-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (82%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 21 percent of this total. No interview was conducted at this limestone quarry.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a U.S. Highway. It is estimated that this U.S. Highway had an average daily traffic (ADT) of 2,800 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.5-1 provides a summary of the counts taken. First, in Table 2.5.1.5-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.5-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.5-1C, a total count of all vehicles on the highway is provided. The count of autos at the activity center (Table 2.5.1.5-1A) included three vehicles with trailers.

Figure 2.5.1.5-4 shows the percentages of total traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.5-1C values). The 3-S2 vehicle represents 61 percent of total trucks counted on this highway. Autos make up 74 percent of the total traffic shown.



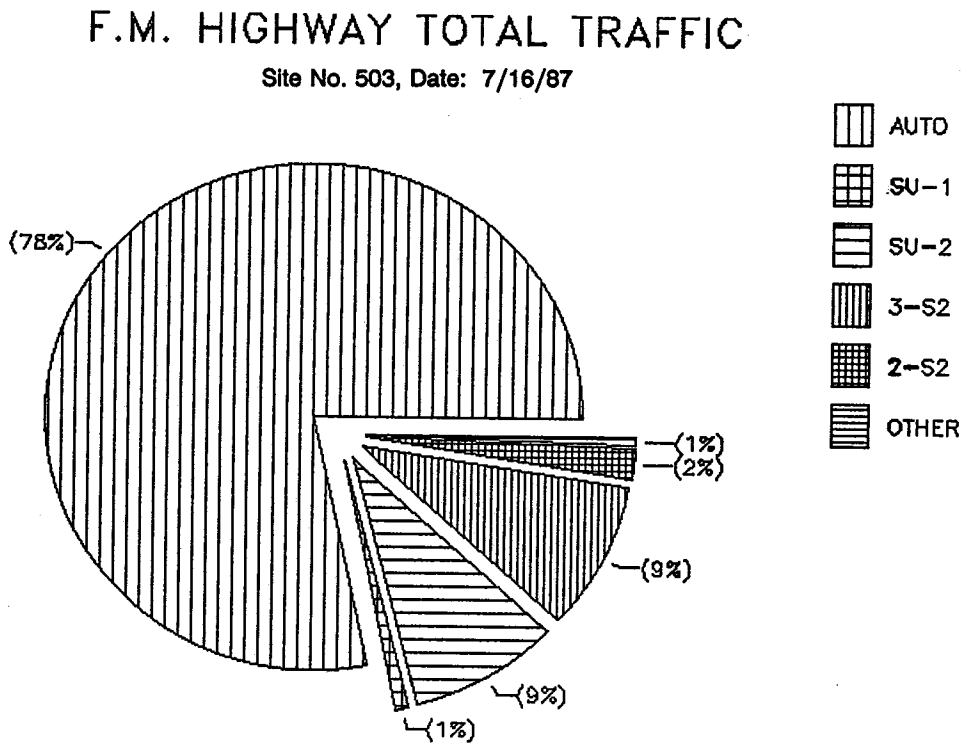


Figure 2.5.1.4-4. Highway Vehicle Percentages

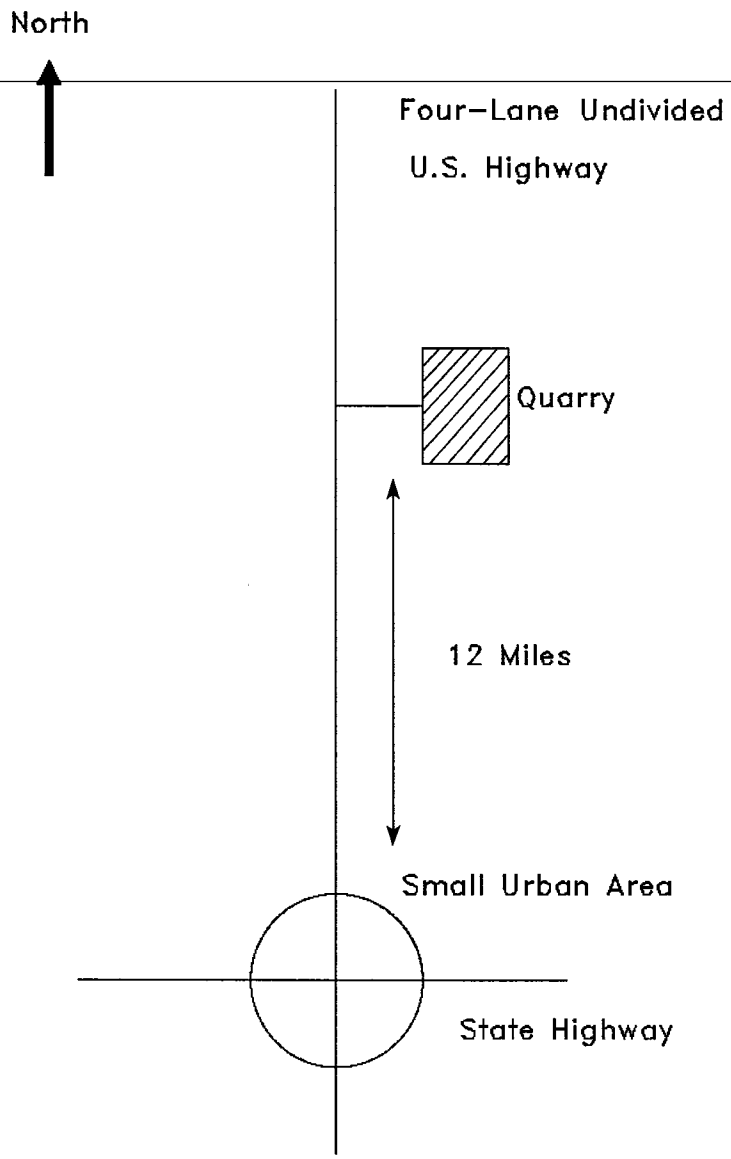
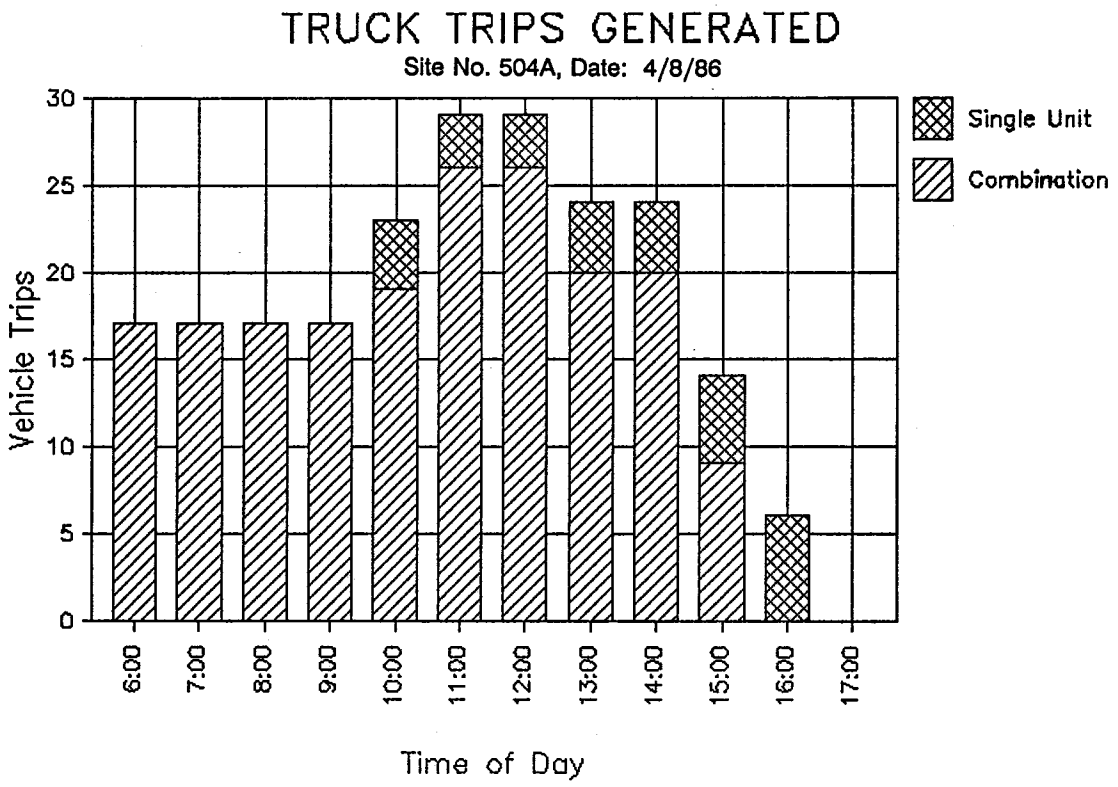


Figure 2.5.1.5-1. Site Map



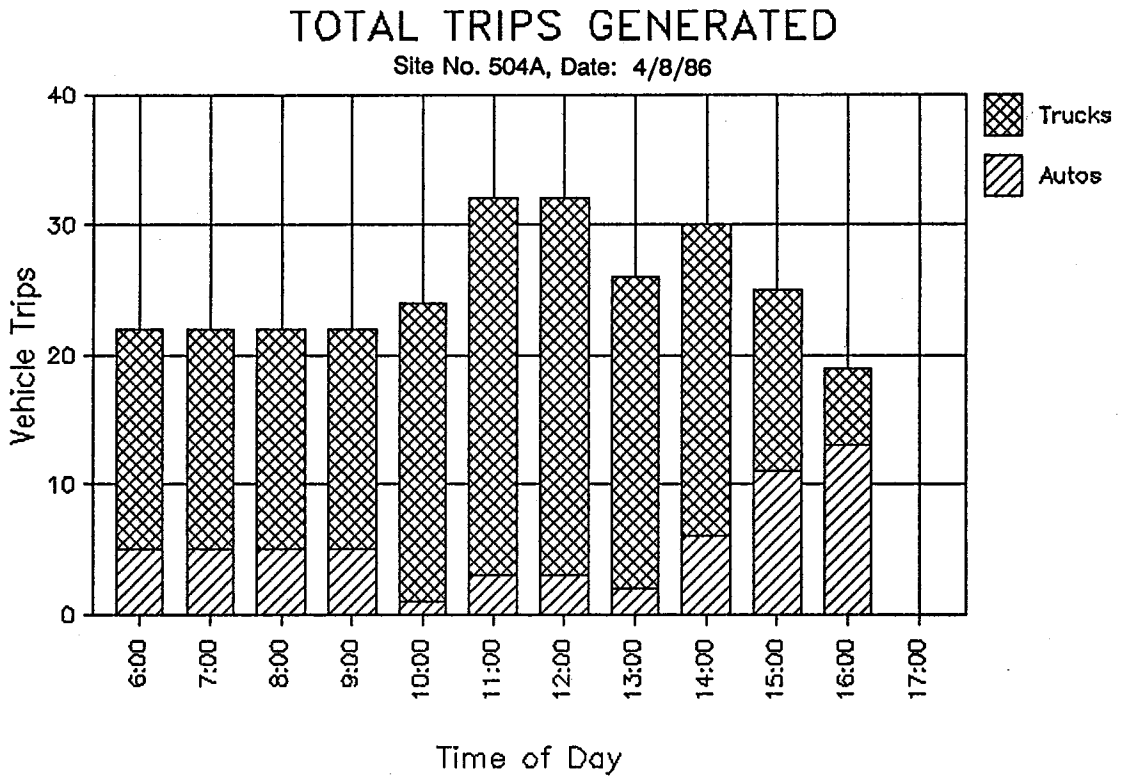
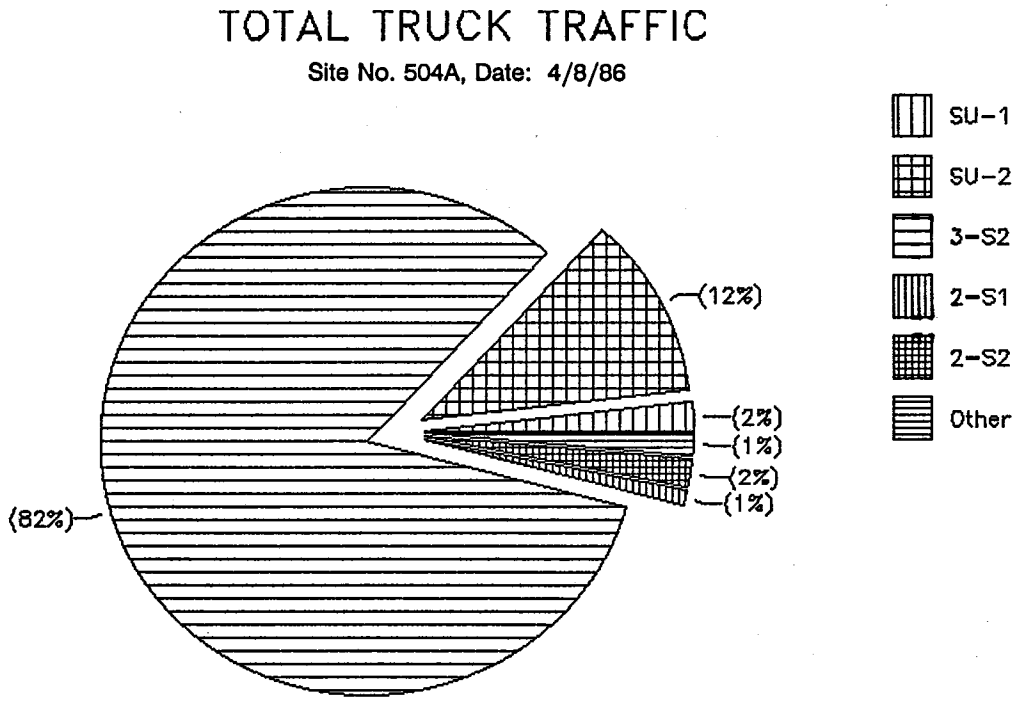


Figure 2.5.1.5-2. Hourly Trip Generation



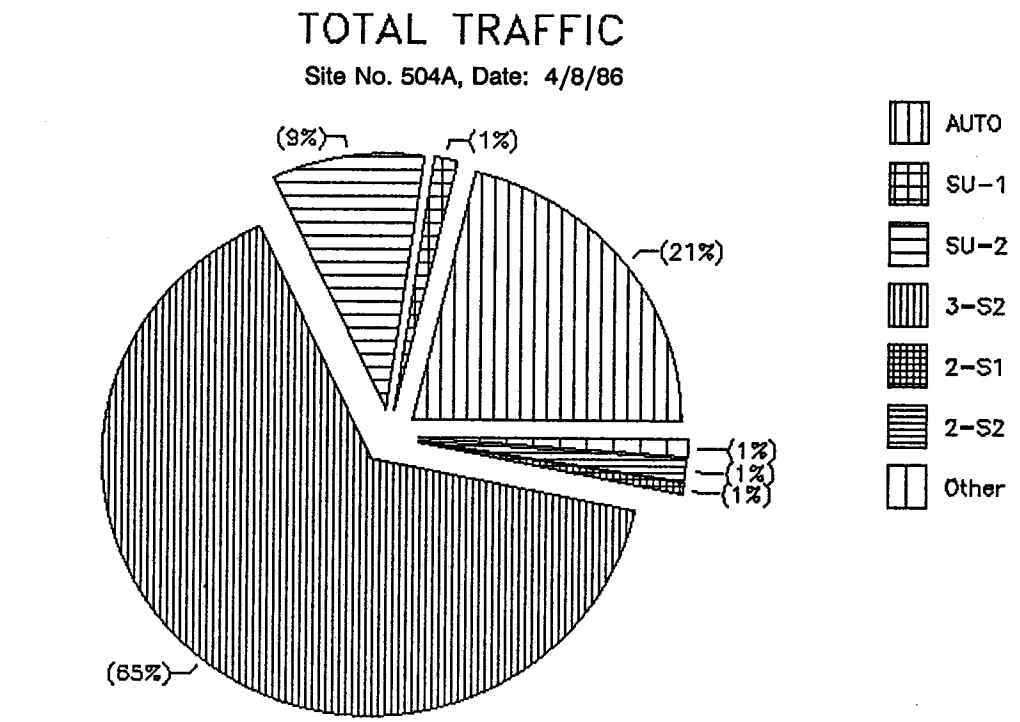


Figure 2.5.1.5-3. Activity Center Vehicle Percentages

Table 2.5.1.5-1. Traffic Classification Count Summary

Table 2.5.1.5-1A. Activity Center Only

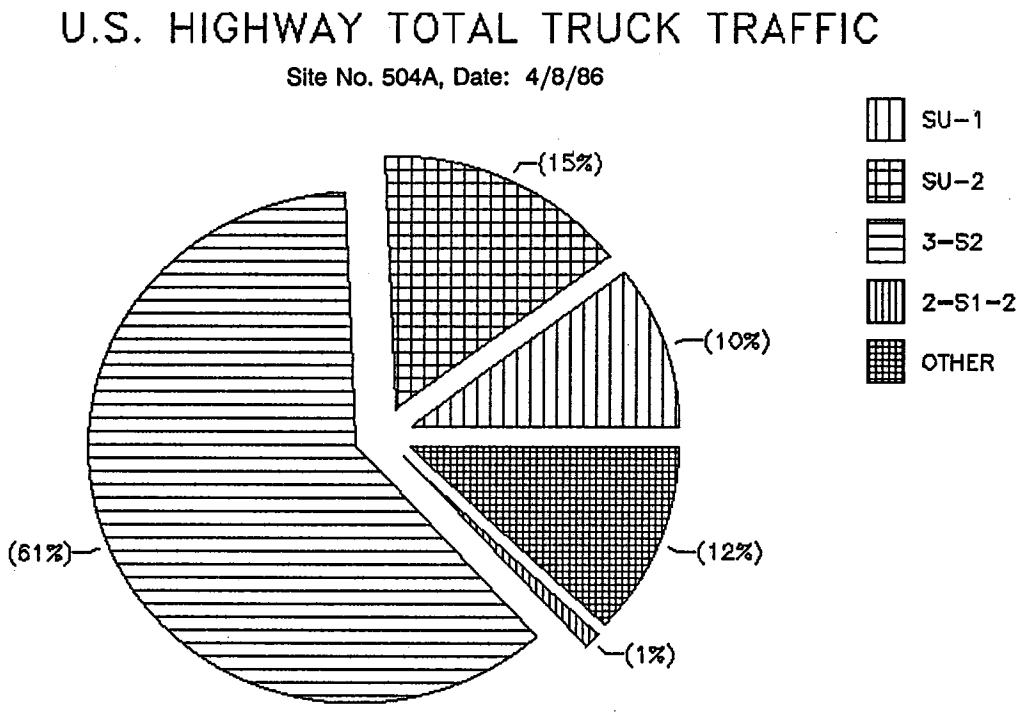
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/8/86	62	4	25	179	6	276	14%	86%	22%	78%

Table 2.5.1.5-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/8/86	1610	54	59	160	0	1883	41%	59%	85%	15%

Table 2.5.1.5-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/8/86	1605	58	84	2	4	339	67	2159	26%	74%	74%	26%



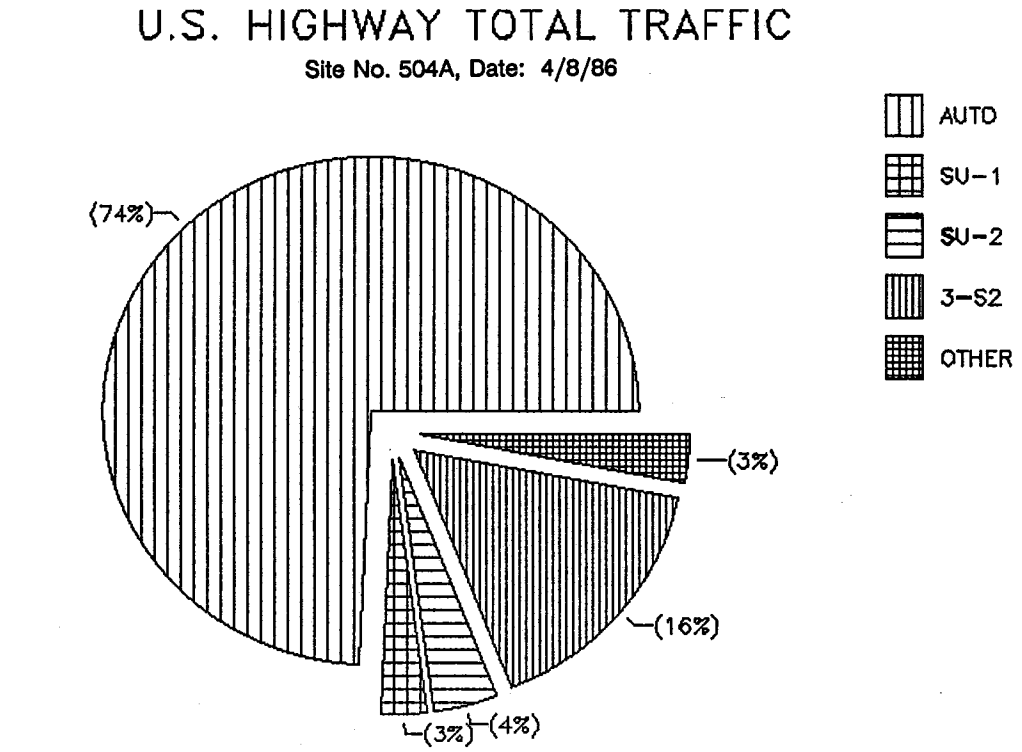


Figure 2.5.1.5-4. Highway Vehicle Percentages

2.5.1.6 Limestone Quarry, Site No. 505A

Introduction. The site map shown in Figure 2.5.1.6-1 indicates that access is provided by a U.S. Highway. The activity center is located south of a small urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.6-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on September 17, 1986.

Figure 2.5.1.6-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (53%). Also illustrated is the breakdown of total traffic moving to and from the site. Autos represented 17 percent of this total. No interview was conducted at this limestone quarry.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a U.S. Highway. It is estimated that this U.S. Highway had an average daily traffic (ADT) of 5,500 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.6-1 provides a summary of the counts taken. First, in Table 2.5.1.6-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.6-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.6-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.6-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.6-1C values). The 3-S2 vehicle represents 63 percent of total trucks counted on this highway. Autos make up 84 percent of the total traffic shown.

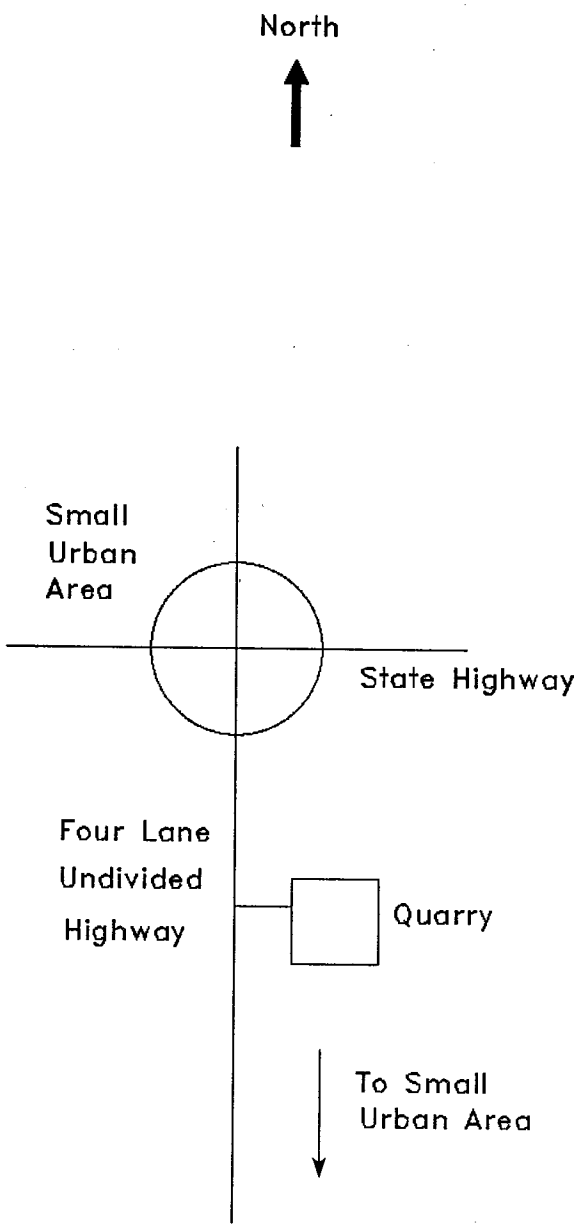
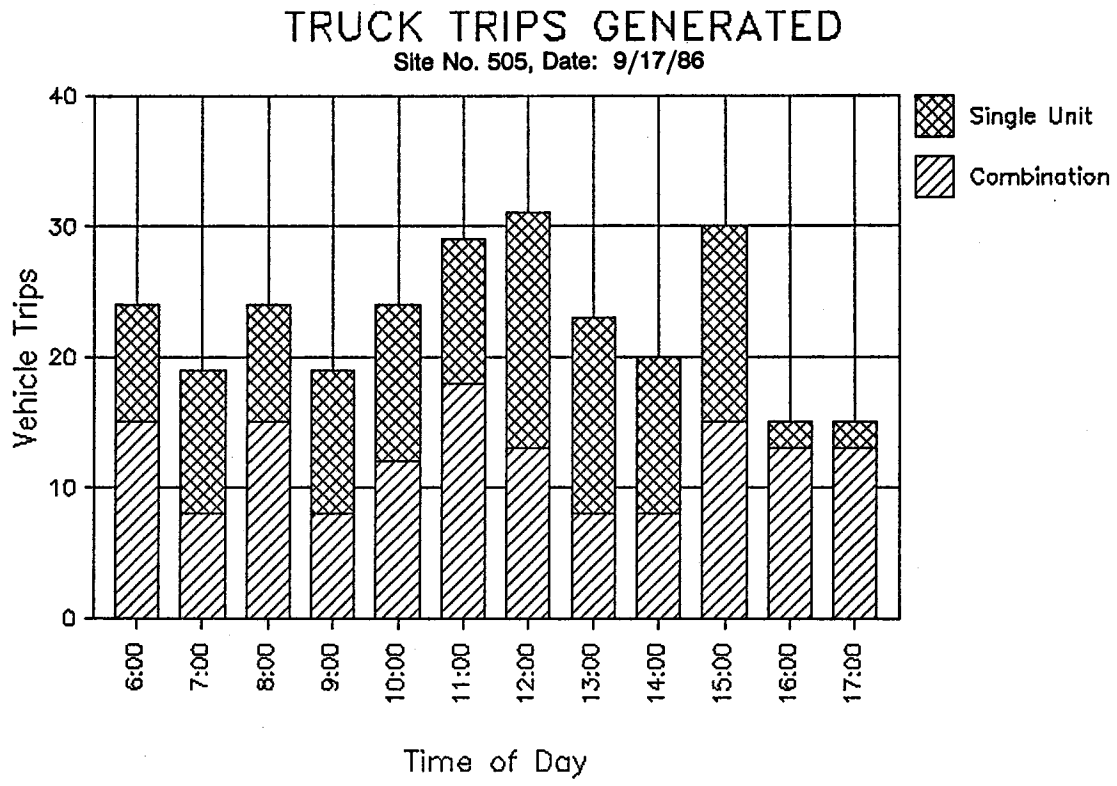


Figure 2.5.1.6-1. Site Map



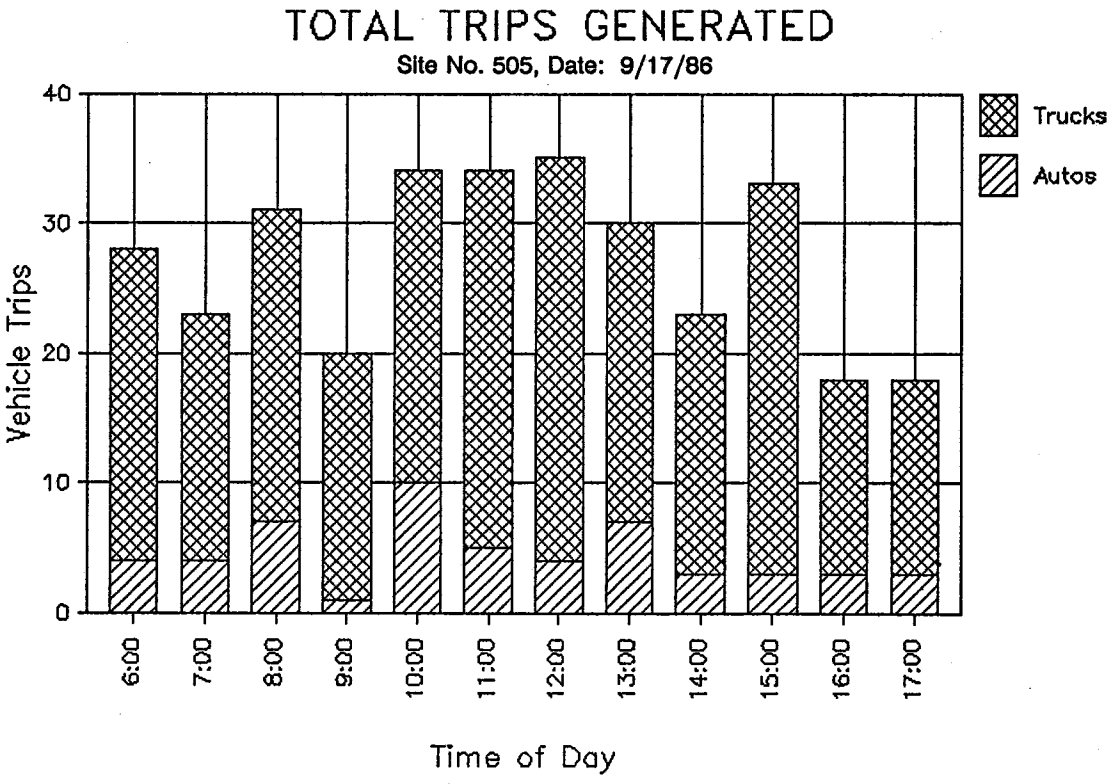
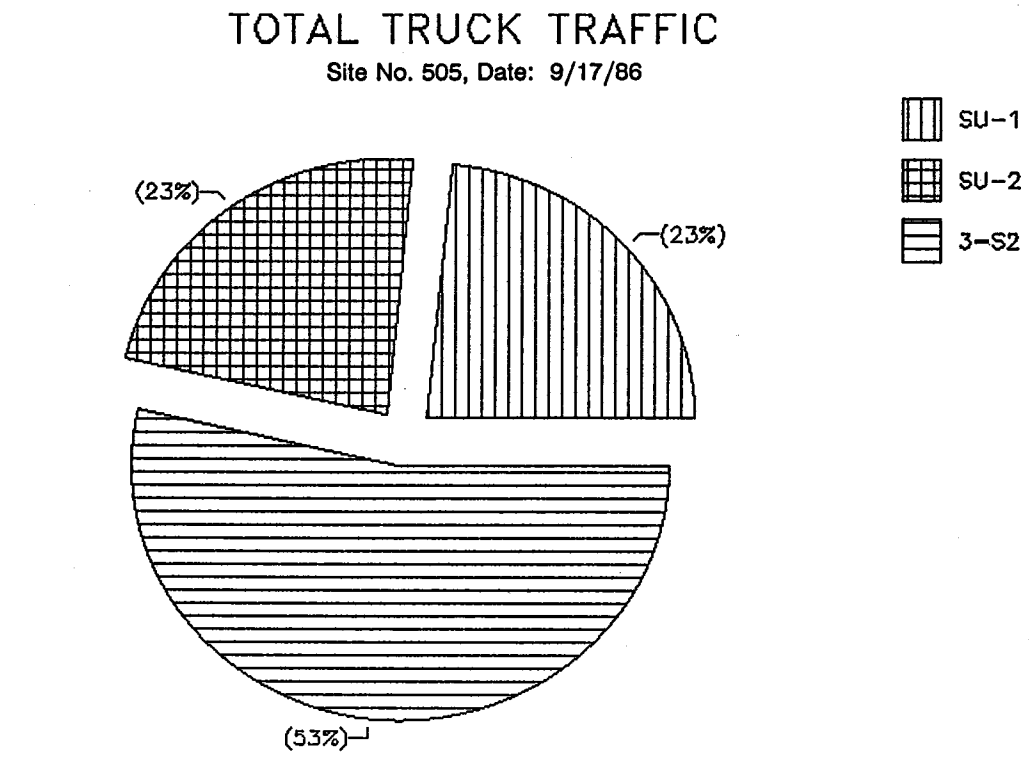


Figure 2.5.1.6-2. Hourly Trip Generation



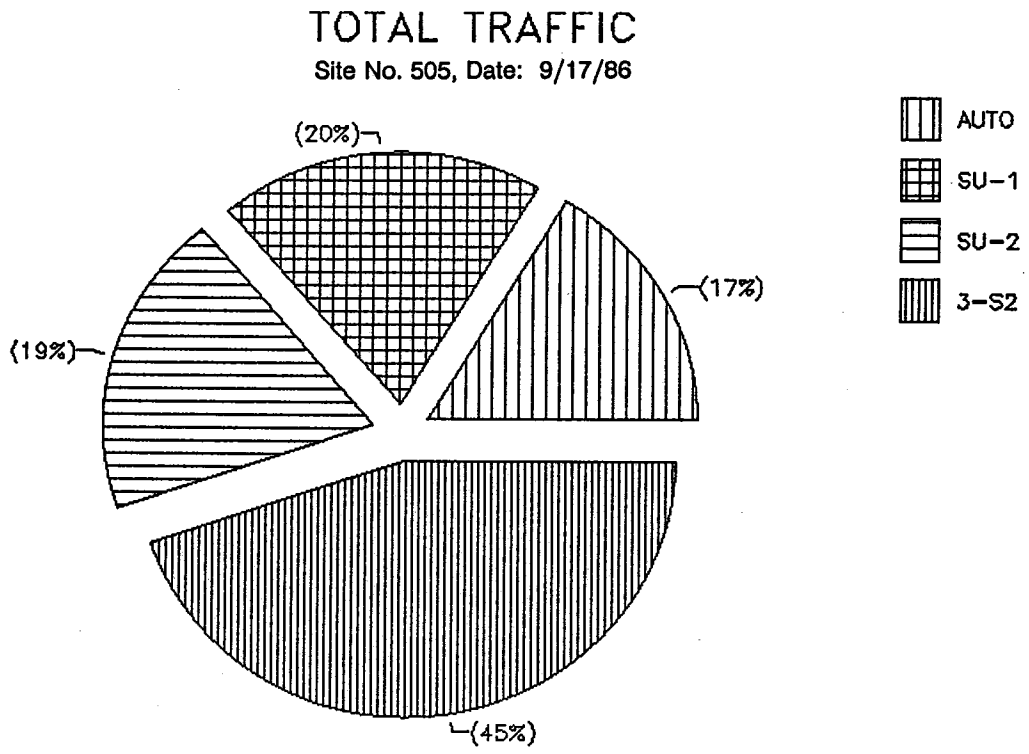


Figure 2.5.1.6-3. Activity Center Vehicle Percentages

Table 2.5.1.6-1. Traffic Classification Count Summary

Table 2.5.1.6-1A. Activity Center Only

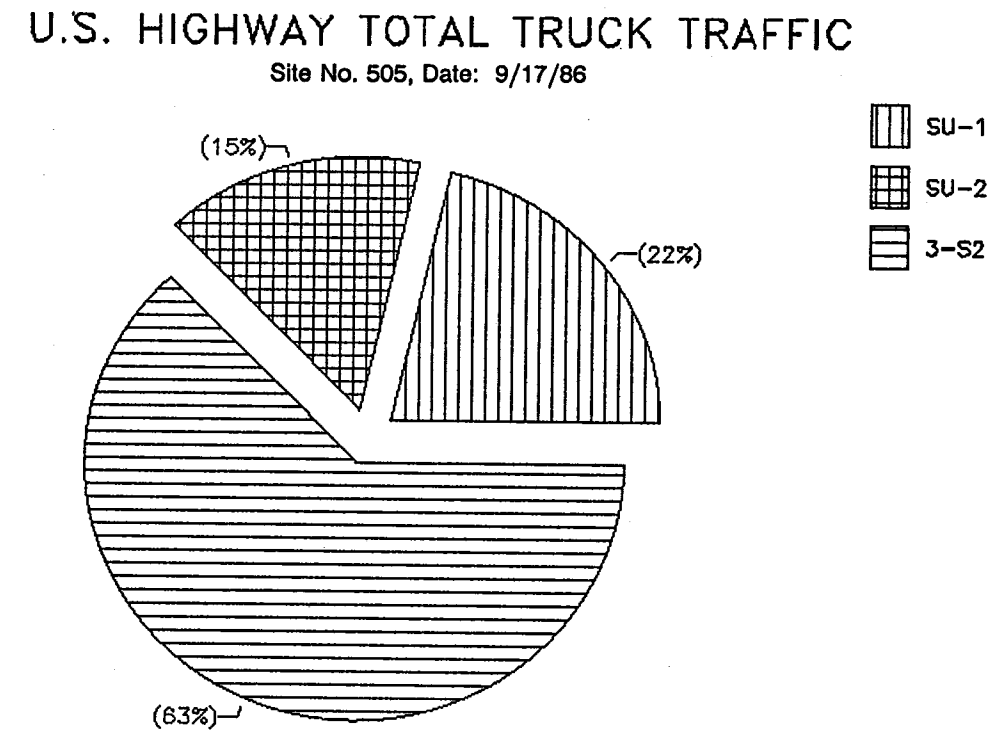
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/17/86	54	64	63	146	0	327	47%	53%	16%	84%
9/19/86	51	32	29	34	42	188	45%	55%	27%	73%

Table 2.5.1.6-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/17/86	3530	77	25	174	0	3806	37%	63%	93%	7%
9/19/86	3215	110	14	192	0	3531	39%	61%	91%	9%

Table 2.5.1.6-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/17/86	3528	144	103	0	420	0	4251	37%	63%	84%	16%
9/19/86	3266	154	51	42	306	0	3819	37%	63%	86%	14%



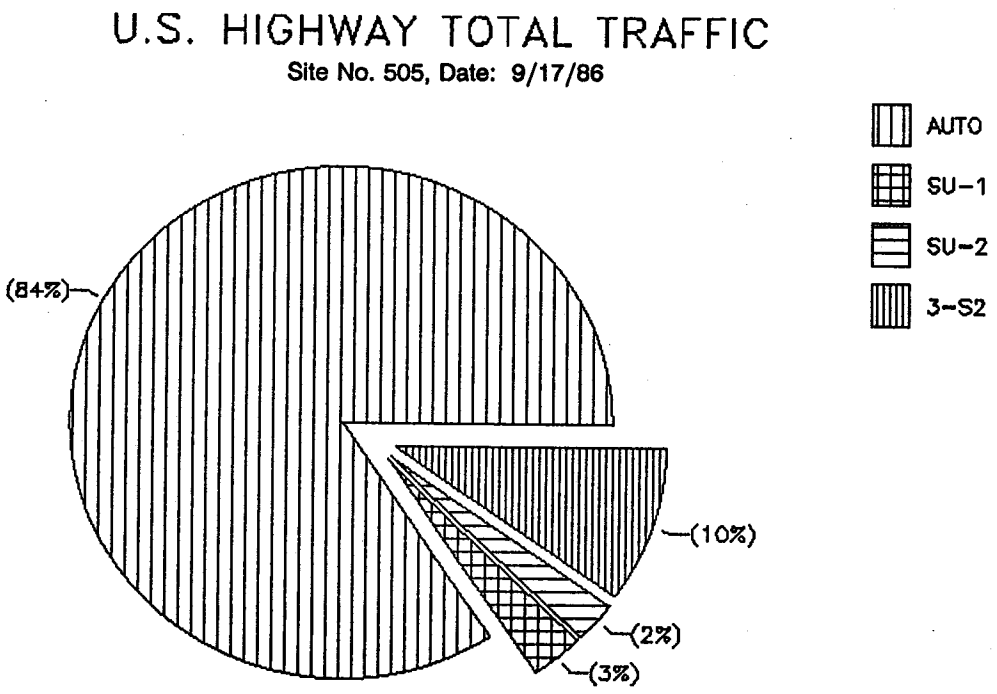


Figure 2.5.1.6-4. Highway Vehicle Percentages

2.5.1.7 Limestone Quarry, Site No. 506

Introduction. The site map shown in Figure 2.5.1.7-1 indicates that access is provided by a roadway which connects to a U.S. Highway. The activity center is located east of a relatively large urban area. Much of the traffic generated by this site is oriented toward this urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.7-2 shows the truck traffic (in and out) generated by the site during an 11-hour period (6 a.m. to 5 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 11-hour period on October 3, 1986.

Figure 2.5.1.7-3 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the site. The predominant truck was the 3-S2 combination (64%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented only 7 percent of this total. No interview was conducted at this limestone quarry.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a U.S. Highway. It is estimated that this U.S. Highway had an average daily traffic (ADT) of 2,000 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.7-1 provides a summary of the counts taken. First, in Table 2.5.1.7-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.7-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.7-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.7-4 shows the percentages of total traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.7-1C values). The 3-S2 vehicle represents 63 percent of total trucks counted on this highway. Autos make up 61 percent of the total traffic.

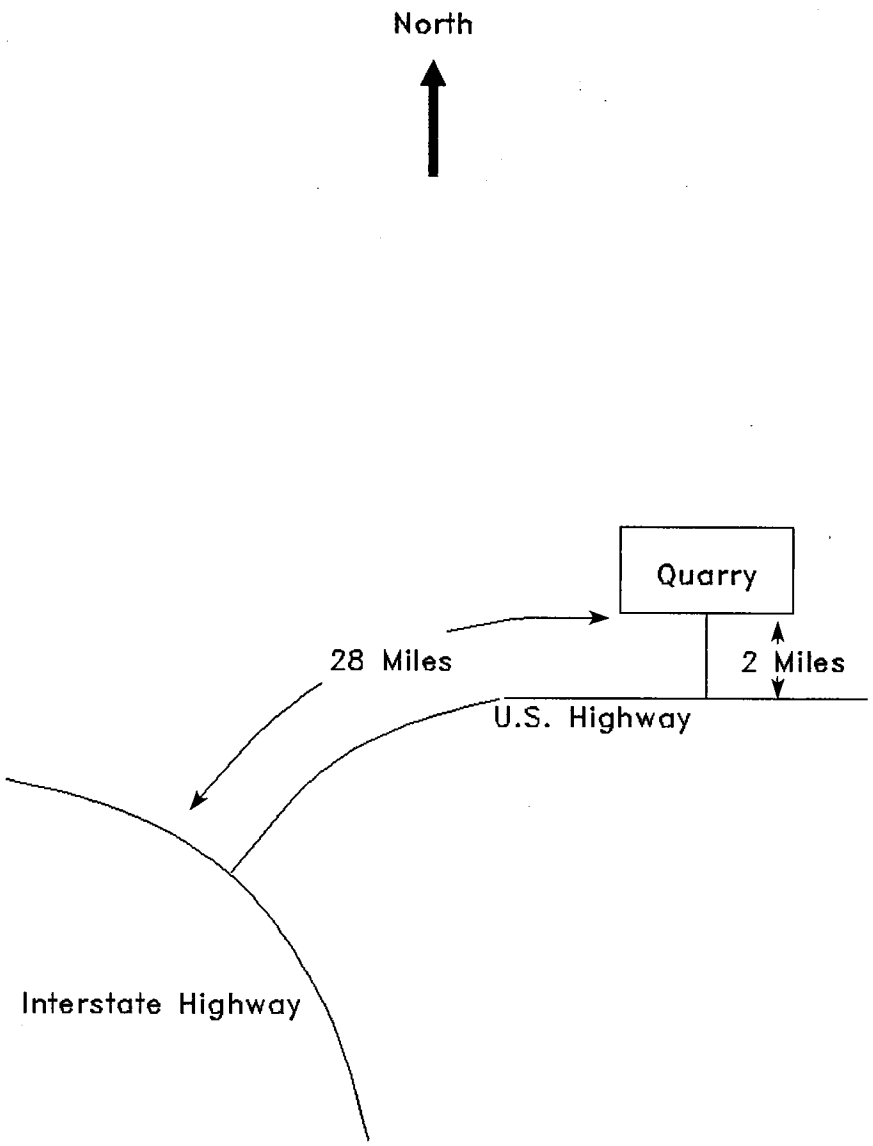
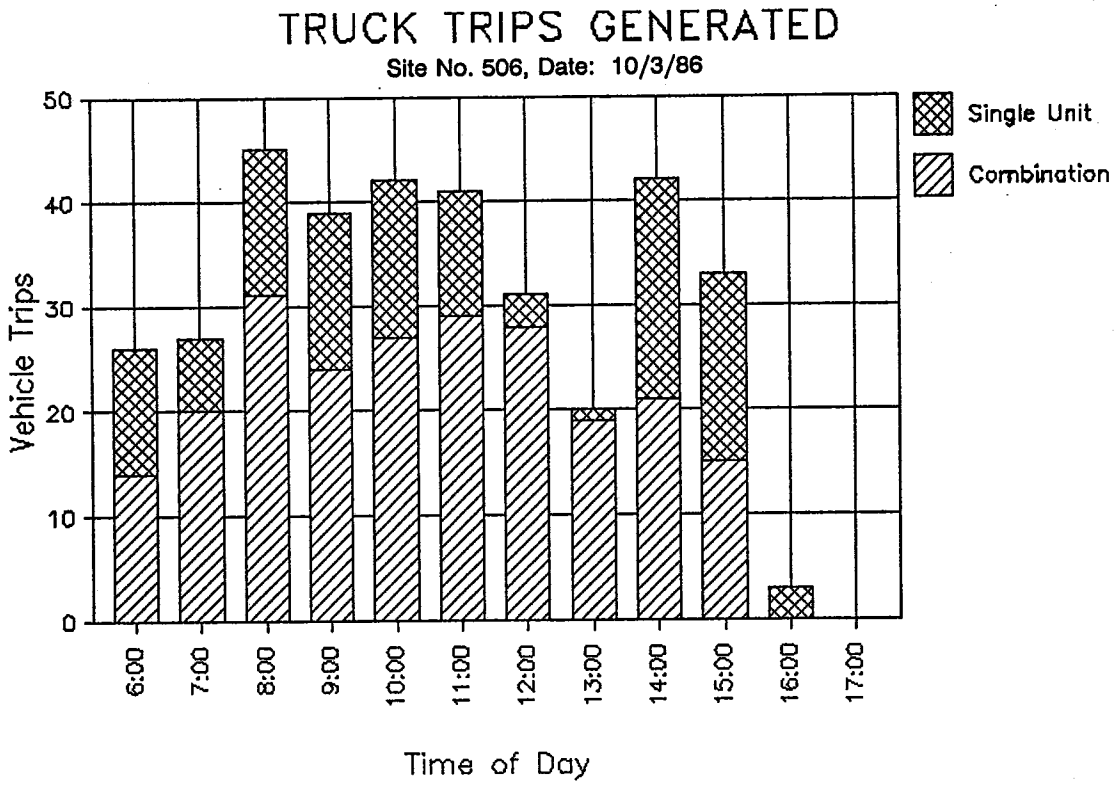


Figure 2.5.1.7-1. Site Map



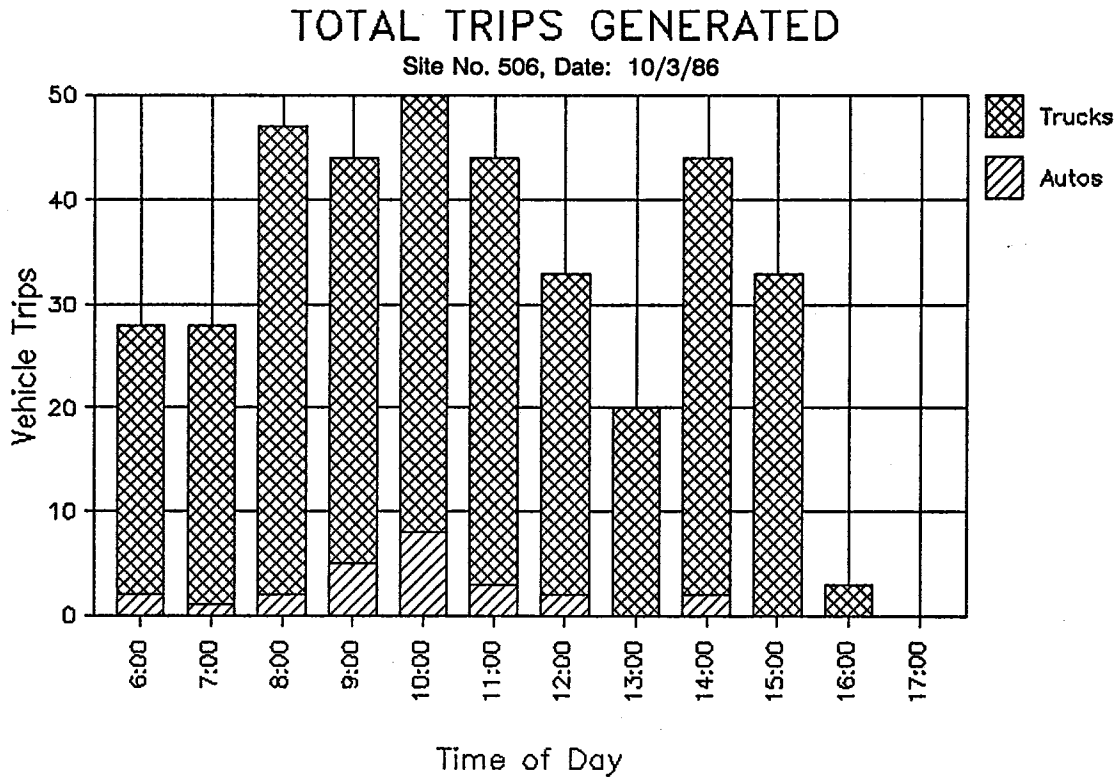
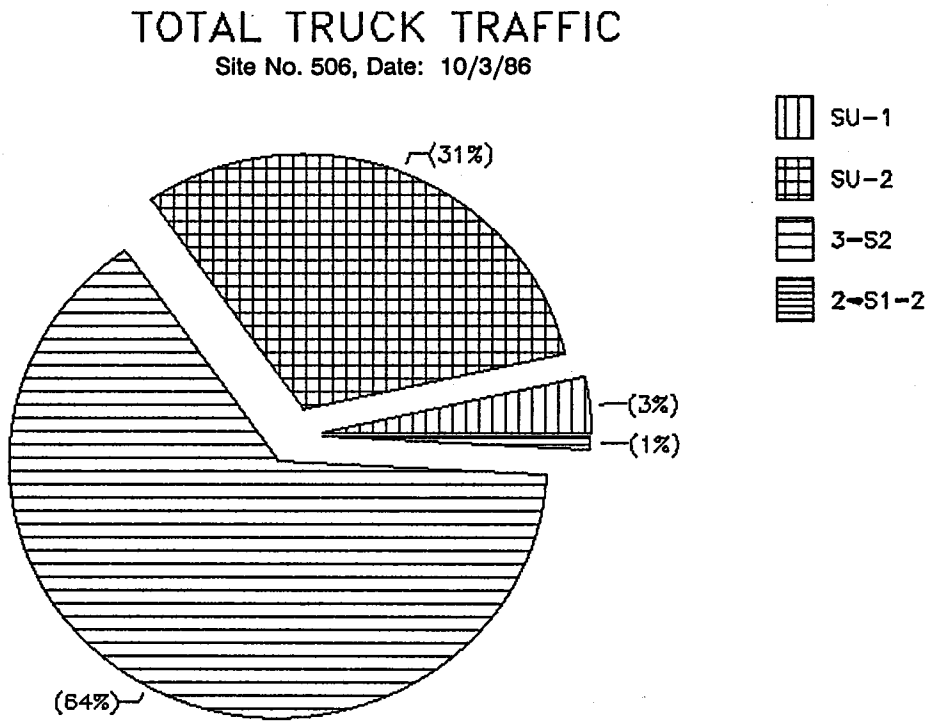


Figure 2.5.1.7-2. Hourly Trip Generation



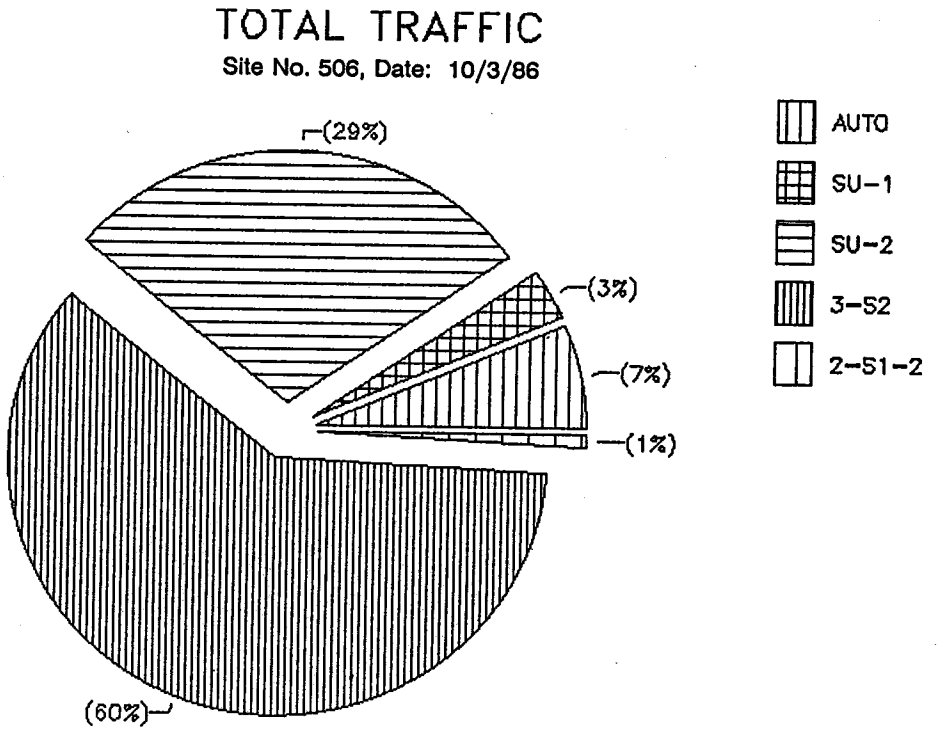


Figure 2.5.1.7-3. Activity Center Vehicle Percentages

Table 2.5.1.7-1. Traffic Classification Count Summary

Table 2.5.1.7-1A. Activity Center Only

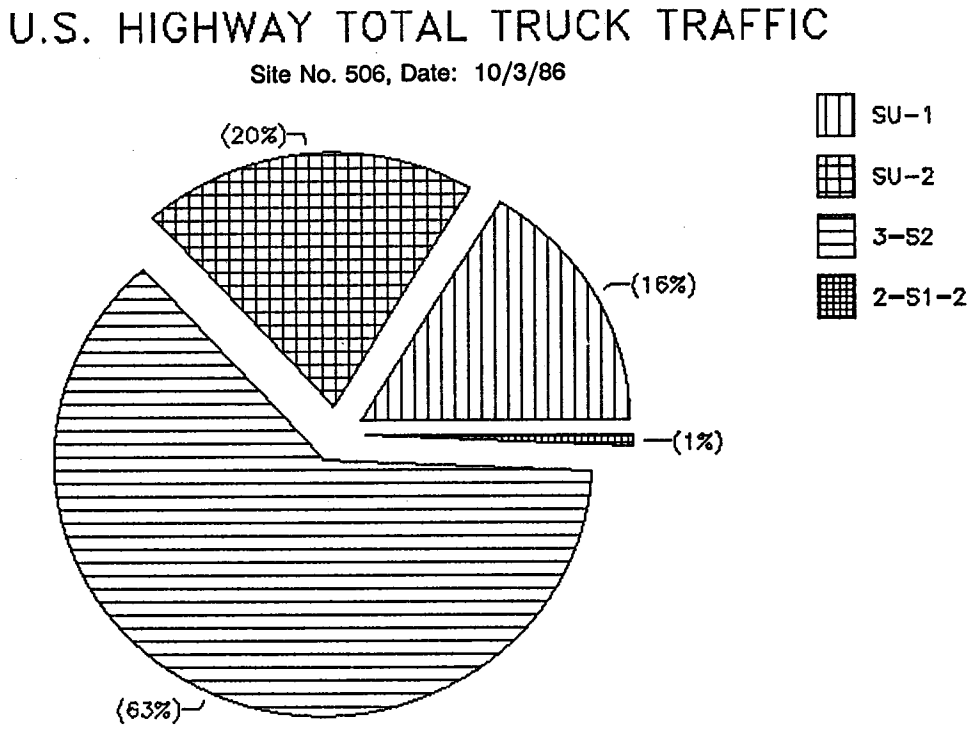
Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	2-S1-2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
10/3/86	25	12	109	225	3	374	35%	65%	7%	93%
10/6/86	21	5	91	74	9	200	54%	46%	11%	89%

Table 2.5.1.7-1B. Roadway Without Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	2-S1-2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
10/3/86	865	55	4	64	1	989	48%	52%	87%	13%
10/6/86	980	52	5	38	5	1080	57%	43%	91%	9%

Table 2.5.1.7-1C. Roadway With Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	2-S1-2	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
10/3/86	890	93	116	356	4	1459	37%	63%	61%	39%
10/6/86	1001	77	98	156	14	1346	51%	49%	74%	26%



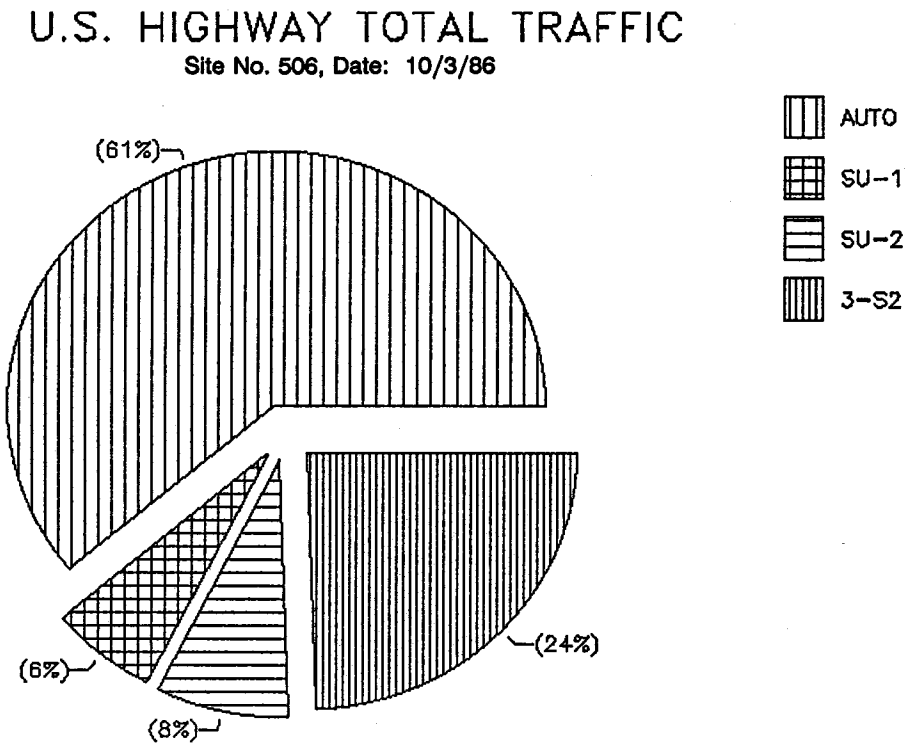


Figure 2.5.1.7-4. Highway Vehicle Percentages

2.5.1.8 Limestone Quarry, Site No. 507A

Introduction. The site map shown in Figure 2.5.1.8-1 indicates that access is provided to the quarry by an urban street. The quarry is about two miles from the outer loop to a large urban area. Traffic counts were conducted on the loop, which is a major arterial. Trips generated by the quarry typically use this loop.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.8-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on July 17, 1986.

Figure 2.5.1.8-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominate truck was the 3-S2 combination (39%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 27 percent of this total. No interview was conducted at this limestone quarry.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway, which is a major arterial serving as an outer loop to this city. This state highway had an average daily traffic (ADT) of 9,000 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.8-1 provides a summary of the counts taken. First, in Table 2.5.1.8-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.8-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.8-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.8-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.8-1C values). The SU-2 vehicle represents 46 percent of total trucks counted on the highway. Autos make up 79 percent of the total traffic shown.

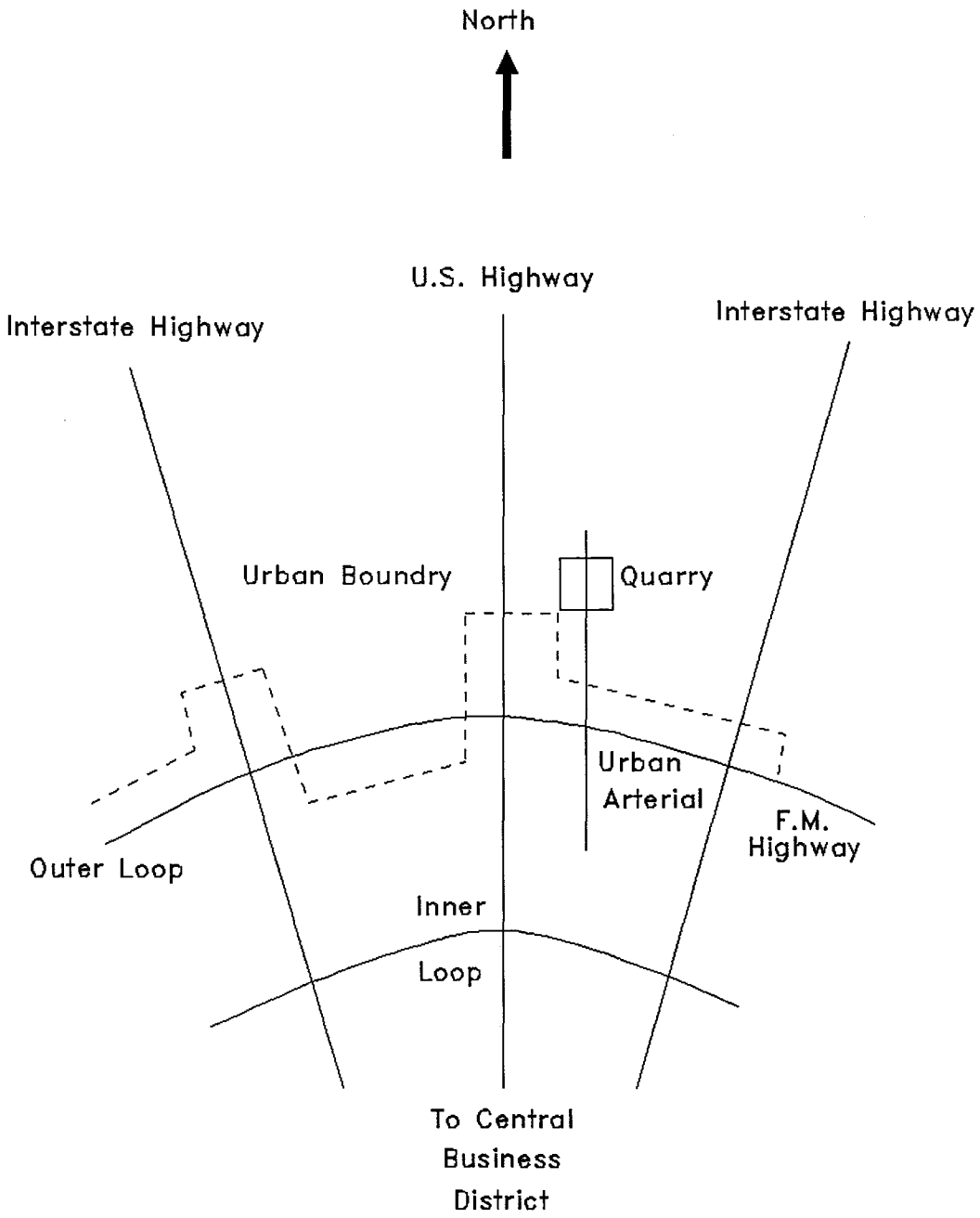
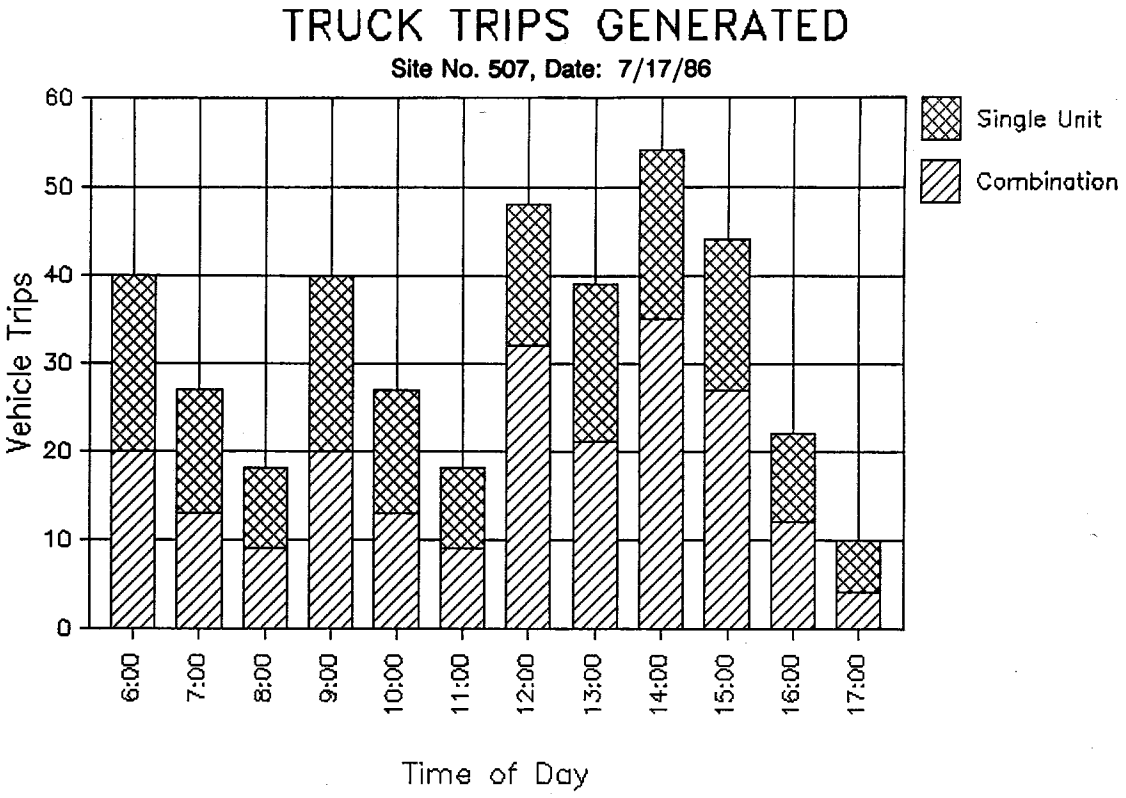


Figure 2.5.1.8-1. Site Map



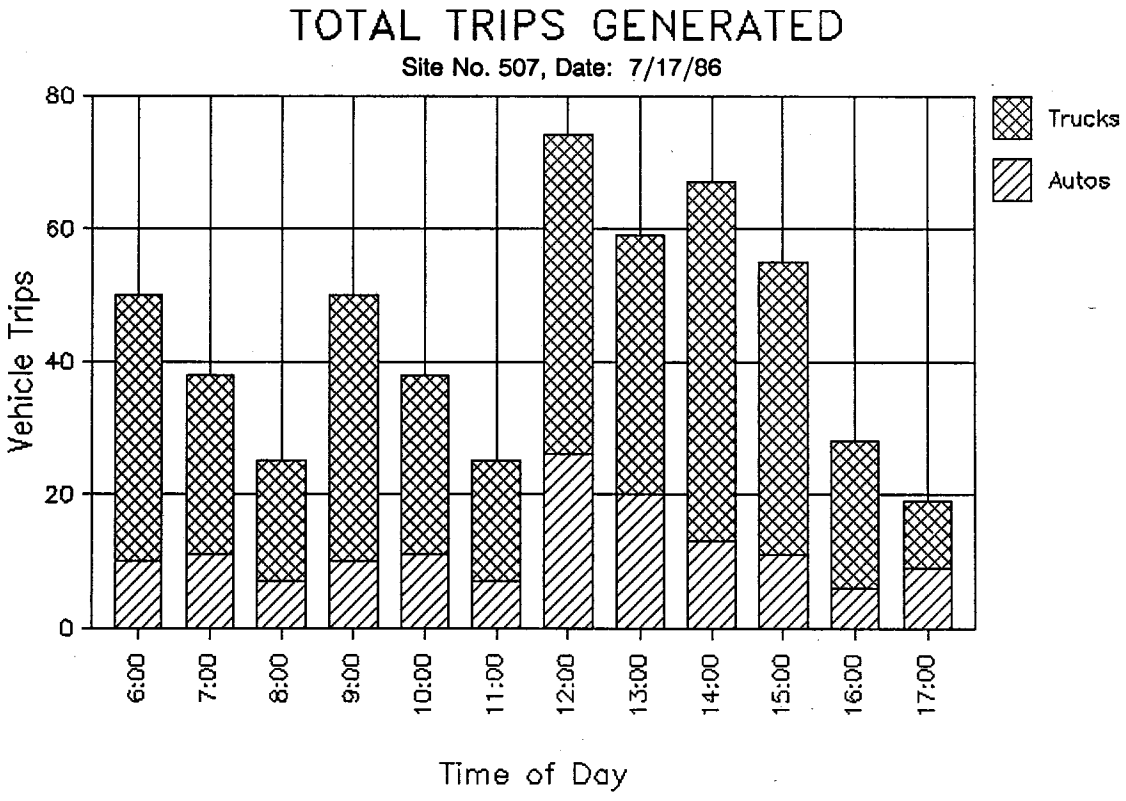
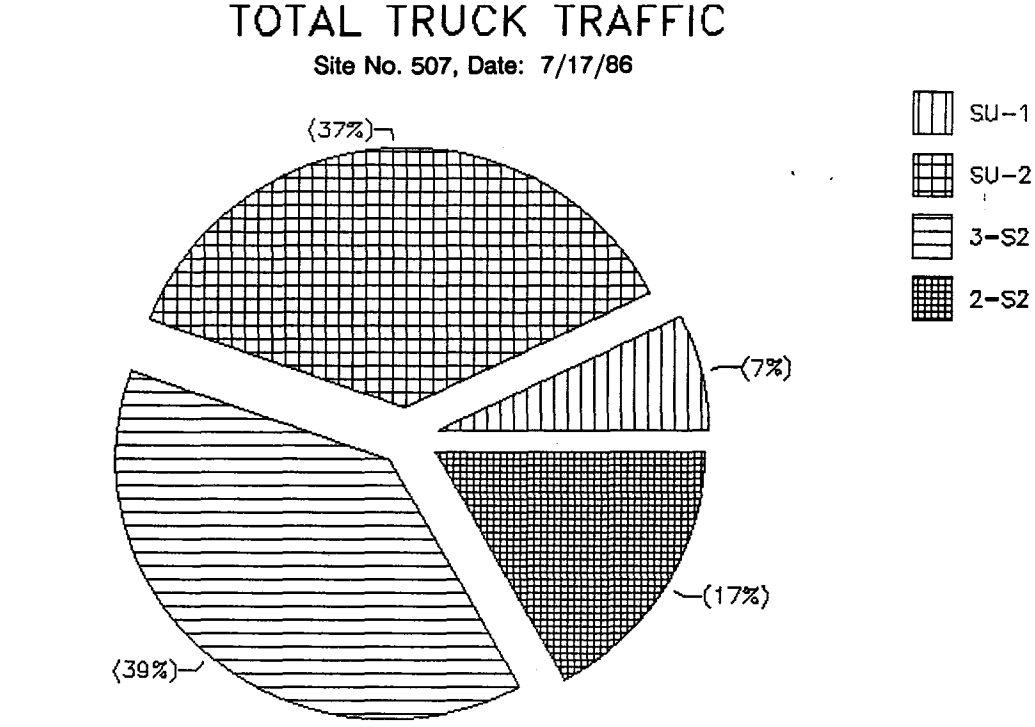


Figure 2.5.1.8-2. Hourly Trip Generation



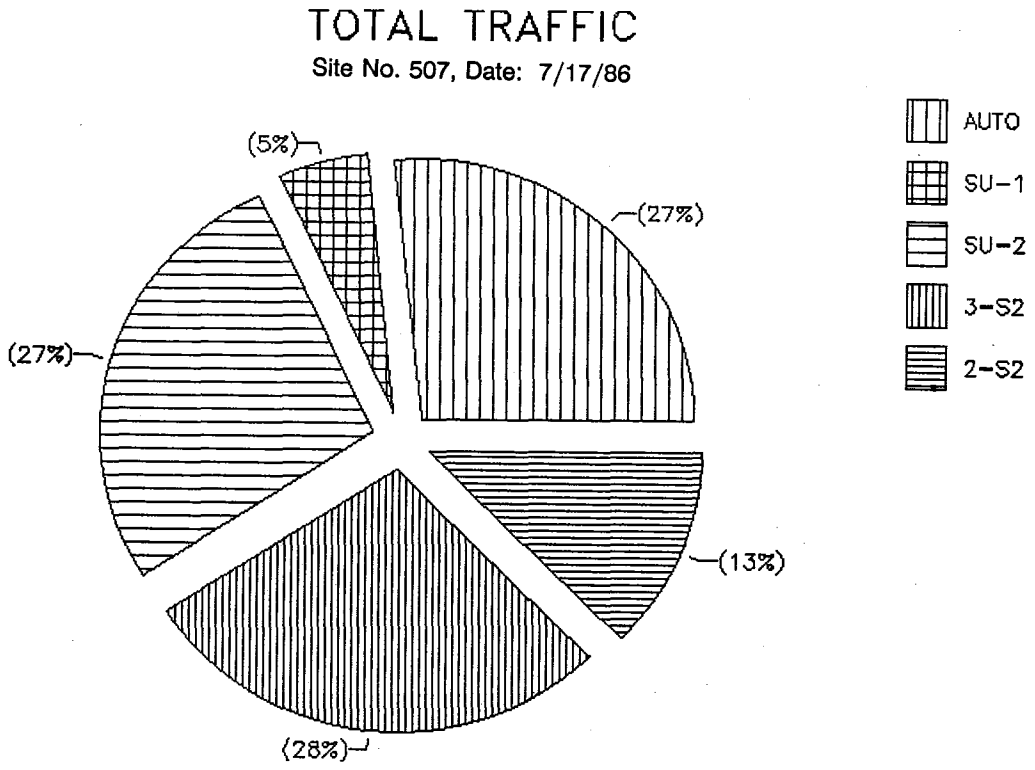


Figure 2.5.1.8-3. Activity Center Vehicle Percentages

Table 2.5.1.8-1. Traffic Classification Count Summary

Table 2.5.1.8-1A. Activity Center Only

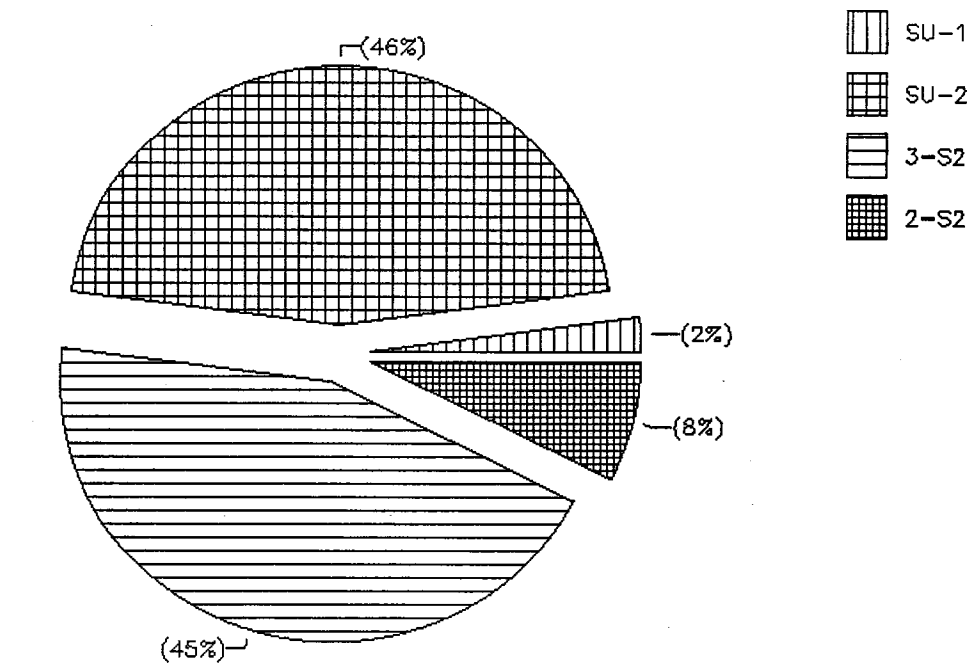
Date	Vehicle Classification Auto	SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
7/17/86	141	28	144	149	66	528	44%	56%	27%	73%
7/18/86	154	34	156	174	55	573	45%	55%	27%	73%

Table 2.5.1.8-1B. Without Special-Use Traffic

Date	Vehicle Classification Auto	SU-1	SU-2	2-S2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
7/17/86	4458	0	397	28	0	406	5289	48%	52%	84%	16%
7/18/86	4533	0	395	3	0	417	5748	48%	52%	85%	15%

Table 2.5.1.8-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification Auto	SU-1	SU-2	2-S2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
7/17/86	4599	28	541	94	555	0	5817	47%	53%	79%	21%
7/18/86	4687	34	159	55	591	0	5526	23%	77%	85%	15%



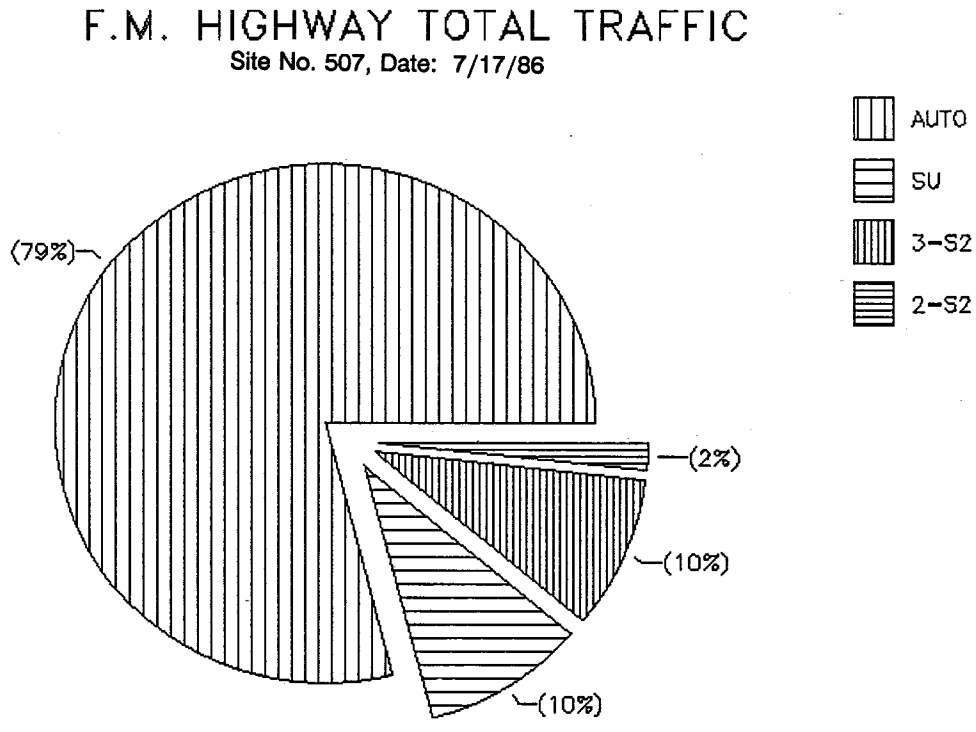


Figure 2.5.1.8-4. Highway Vehicle Percentages

2.5.1.9 Limestone Quarry, Site No. 508

Introduction. The site map shown in Figure 2.5.1.9-1 indicates that access is provided by a roadway which connects to a U.S. Highway. The activity center is located 5 miles west of a small urban area. The site is served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.9-2 shows the truck traffic (in and out) generated by the site during a 10-hour period (7 a.m. to 5 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 10-hour period on September 17, 1986.

Figure 2.5.1.9-3 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the site. The predominant truck was the 3-S2 combination (84%). Also illustrated is the breakdown of total traffic moving to and from the site. Auto traffic represented 5 percent of this total.

An interview was conducted with an official at the plant. The peak period of operation was reported as April through November. The hours of operation were 7 a.m. to 4 p.m. and the average number of hourly employees was 4 with one salaried employee. It was estimated that 80 percent of the products were hauled 25 miles with the other 20 percent hauled as far as 50 miles. An estimated 3 percent of the products were hauled away by rail.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a U.S. highway approximately five miles from the site. This U.S. Highway had average daily traffic (ADT) of 7,600 vehicles per day in 1986. Manual classification counts were conducted in 1986 and 1988 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.9-1 provides a summary of the classification counts conducted. In Table 2.5.1.9-1A vehicle classification counts for the activity center only are provided. In Table 2.5.1.9-1B a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. In Table 2.5.1.9-1C the total roadway traffic plus that generated by this quarry is provided.

Figure 2.5.1.9-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included. The 3-S2 vehicle represented 35 percent of total trucks counted on this highway. Autos made up 89 percent of total traffic.

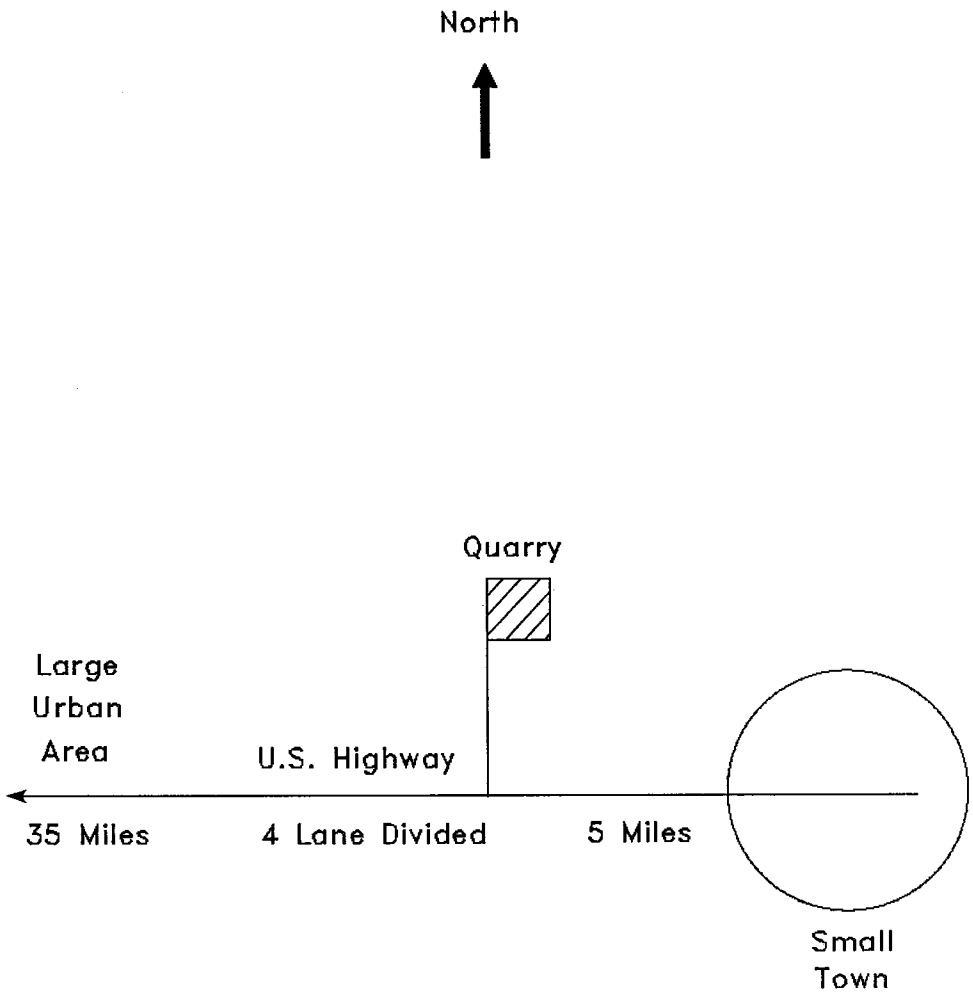
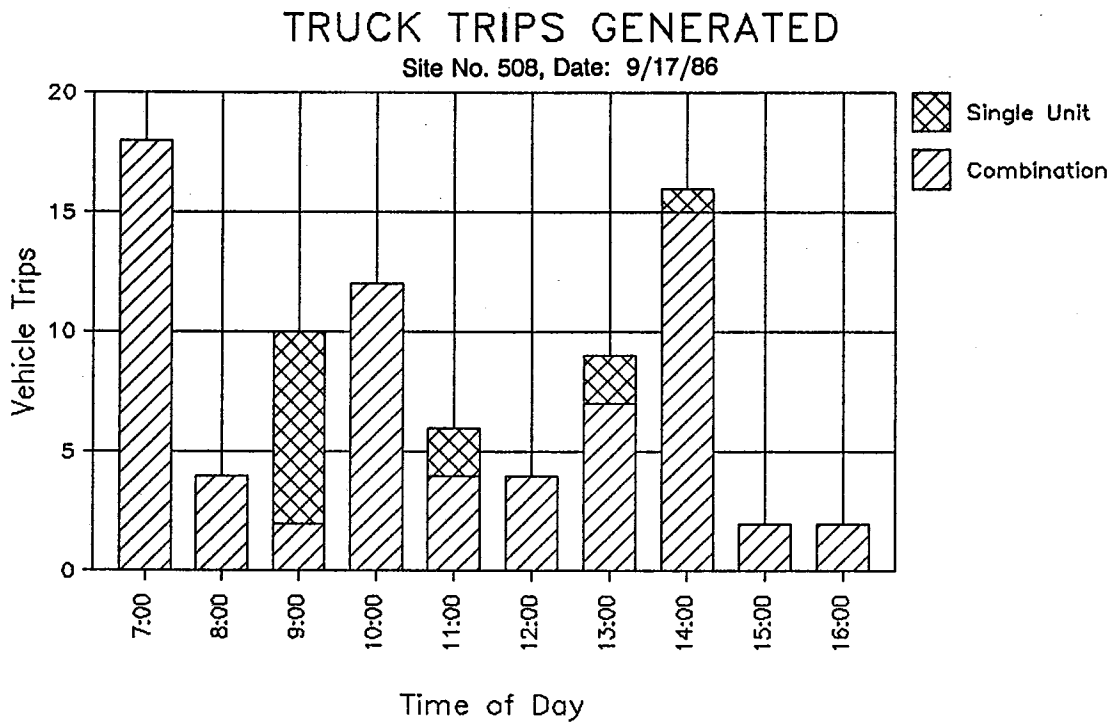


Figure 2.5.1.9-1. Site Map



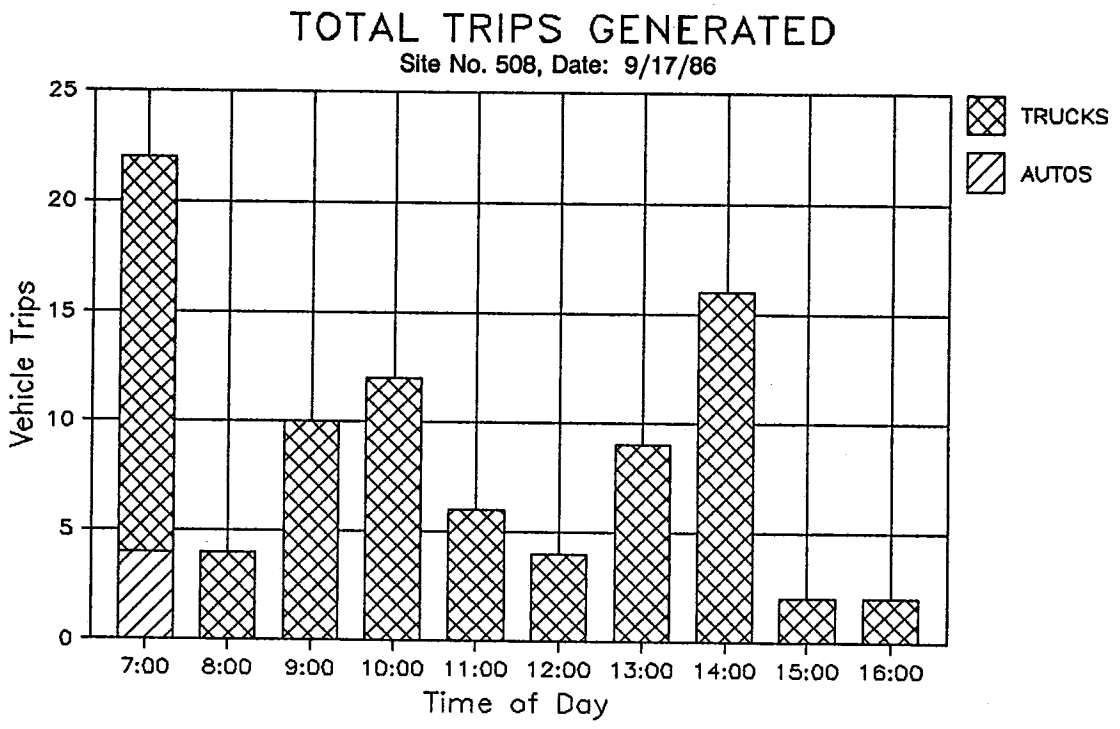
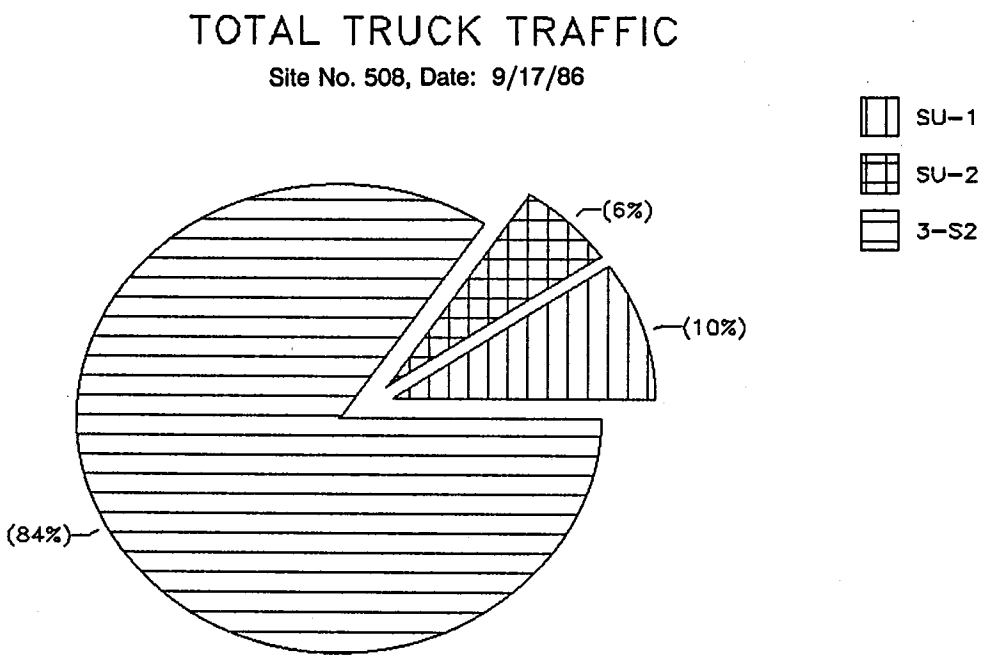


Figure 2.5.1.9-2. Hourly Trip Generation



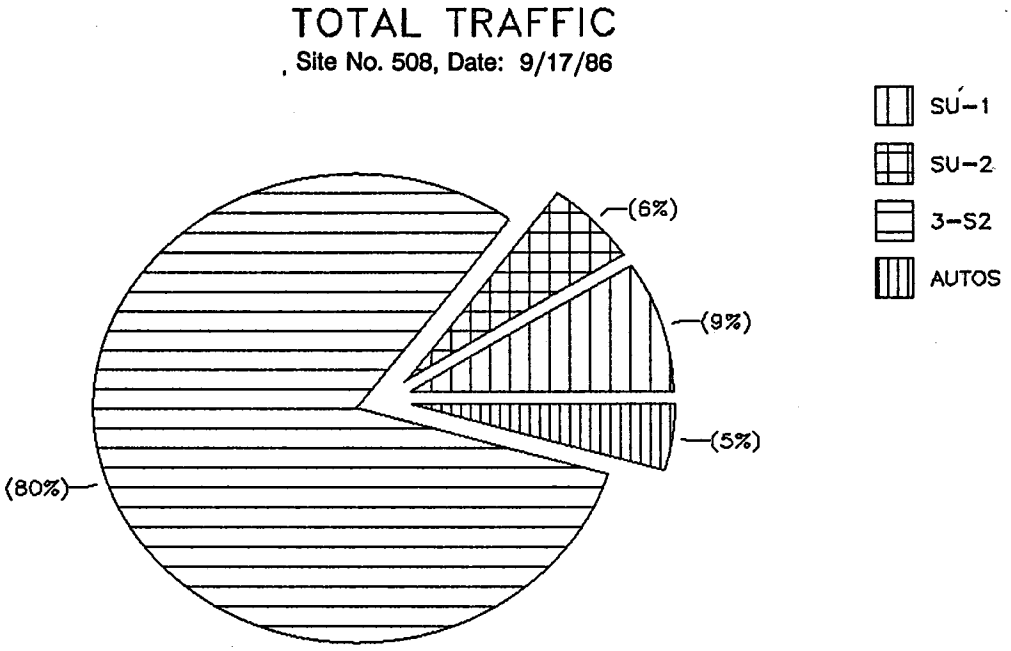


Figure 2.5.1.9-3. Activity Center Vehicle Percentages

Table 2.5.1.9-1. Traffic Classification Count Summary

Table 2.5.1.9-1A. Activity Center Only

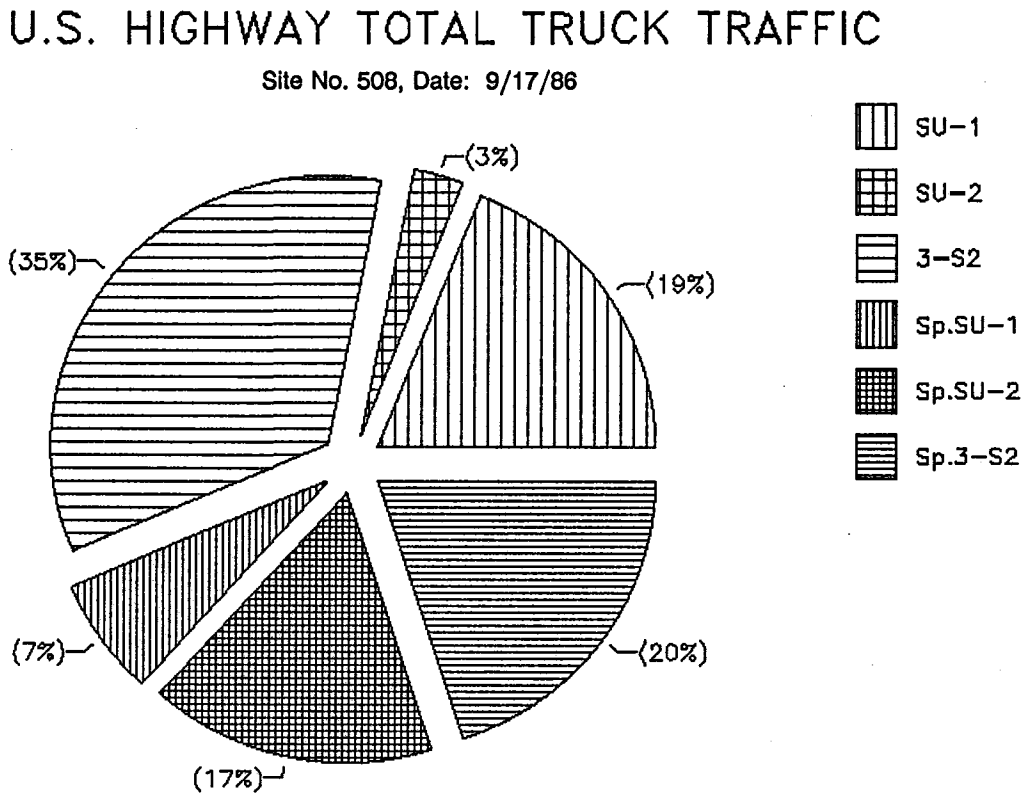
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/17/86	4	4	5	70	0	83	11%	89%	5%	95%

Table 2.5.1.9-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/5/88	2582	53	4	0	0	41	0	2680	58%	42%	96%	4%

Table 2.5.1.9-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/5/88	2586	79	62	175	0	2902	45%	55%	89%	11%



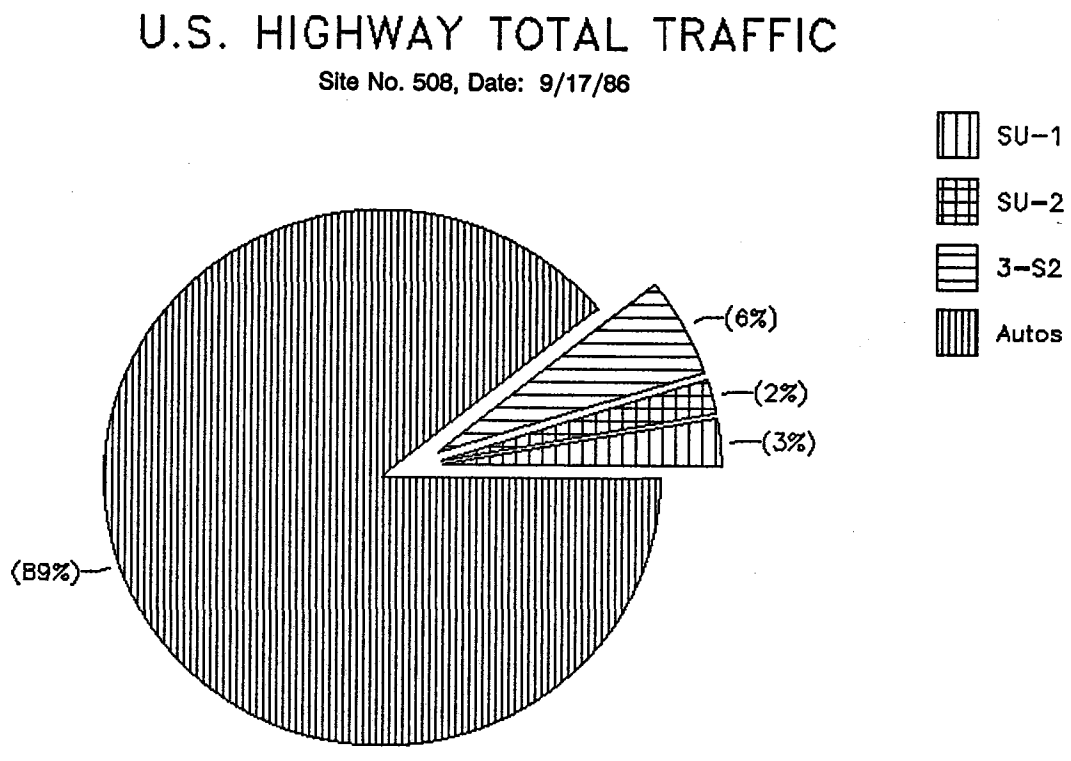


Figure 2.5.1.9-4. Highway Vehicle Percentages

2.5.1.10 Limestone Quarry, Site No. 509

Introduction. The site map shown in Figure 2.5.1.10-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located northwest of a small community where two state highways intersect. Trucks hauling limestone from this site traveled to the south and east when field studies were conducted. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.10-2 shows the truck traffic (in and out) generated by the site during an 11-hour period (7 a.m. to 6 p.m.) and illustrates the fluctuation in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 11-hour period on September 8, 1986.

Figure 2.5.1.10-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (89%). Also illustrated is the breakdown of the total traffic moving to and from the site. Auto traffic represented 16 percent of the total.

An interview was conducted with an official at the limestone quarry. An average of 5,000 tons of rock are hauled from the site per day. The average number of daily truck loads were: 10 single units, 218 3-S2's and 30 3-2 trucks. A total of 51 employees worked at the site and the radius of influence was estimated at 200 miles.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Farm-to-Market Highway. It is estimated that this state highway had an average daily traffic (ADT) of 400 vehicles per day in 1986. Manual classification counts were conducted in 1986 to determine the impact of special-use activities on the highway. Table 2.5.1.10-1 provides a summary of the counts taken. In Table 2.5.1.10-1A vehicle classification counts for the activity center only are provided. In Table 2.5.1.10-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.10-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.10-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.10-1C values). The 3-S2 vehicle represents 95 percent of total trucks counted on this highway. Autos make up 33 percent of the total traffic shown.

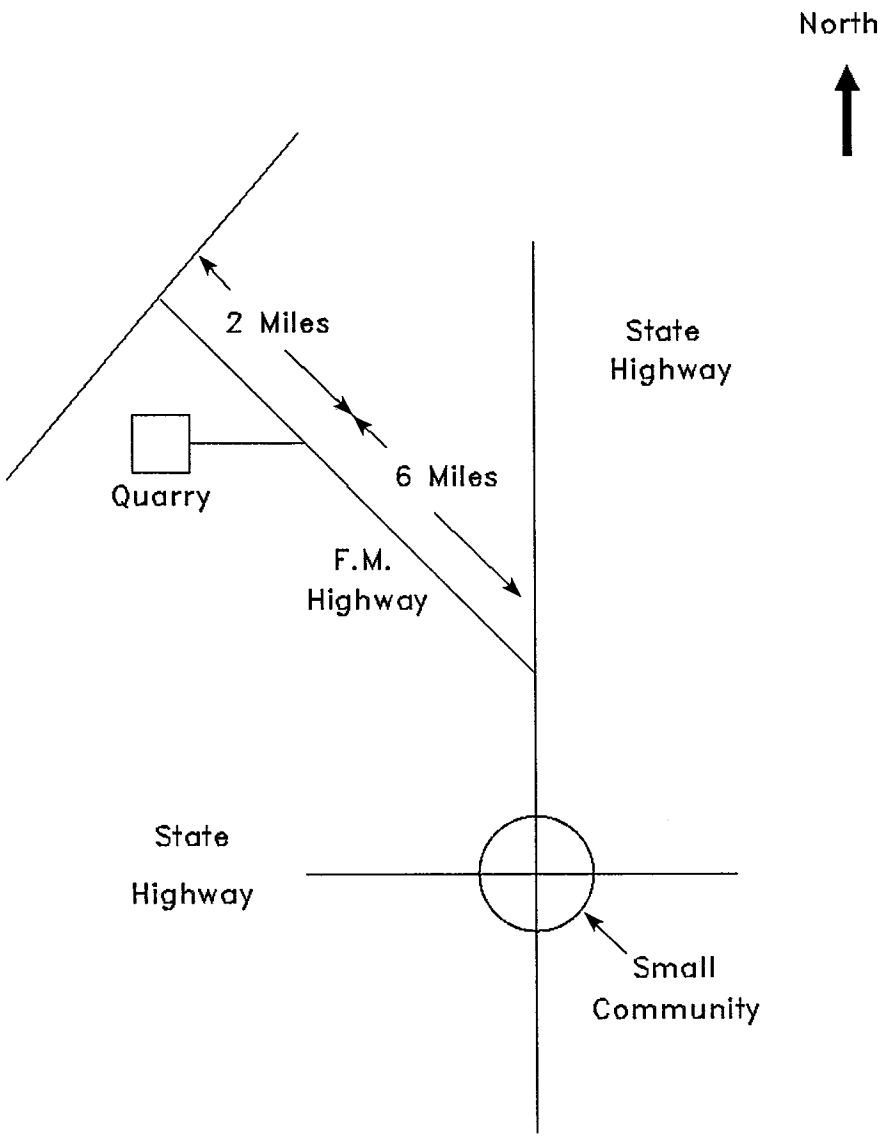


Figure 2.5.1.10-1. Site Map

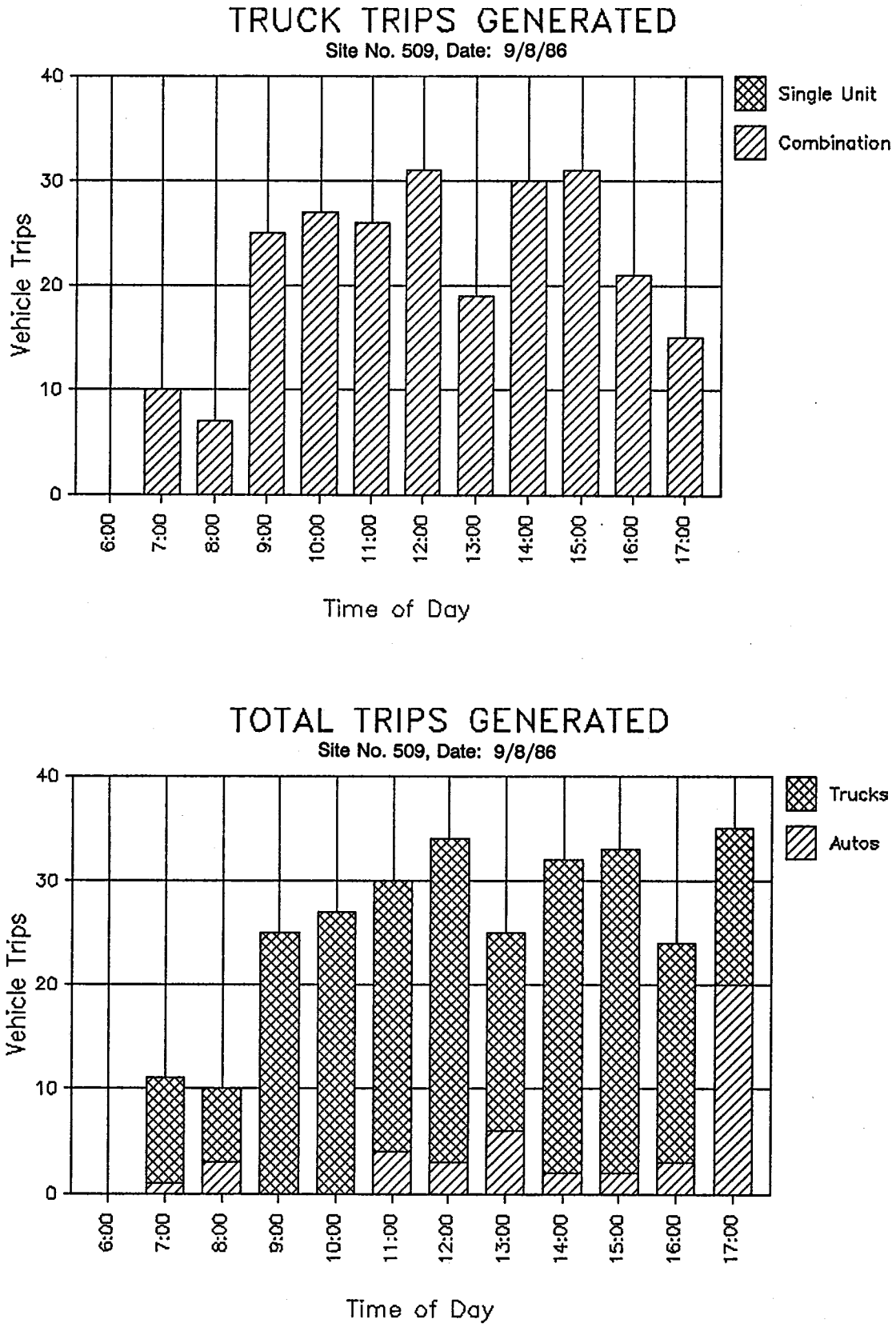


Figure 2.5.1.10-2. Hourly Trip Generation

Table 2.5.1.10-1. Traffic Classification Count Summary

Table 2.5.1.10-1A. Activity Center Only

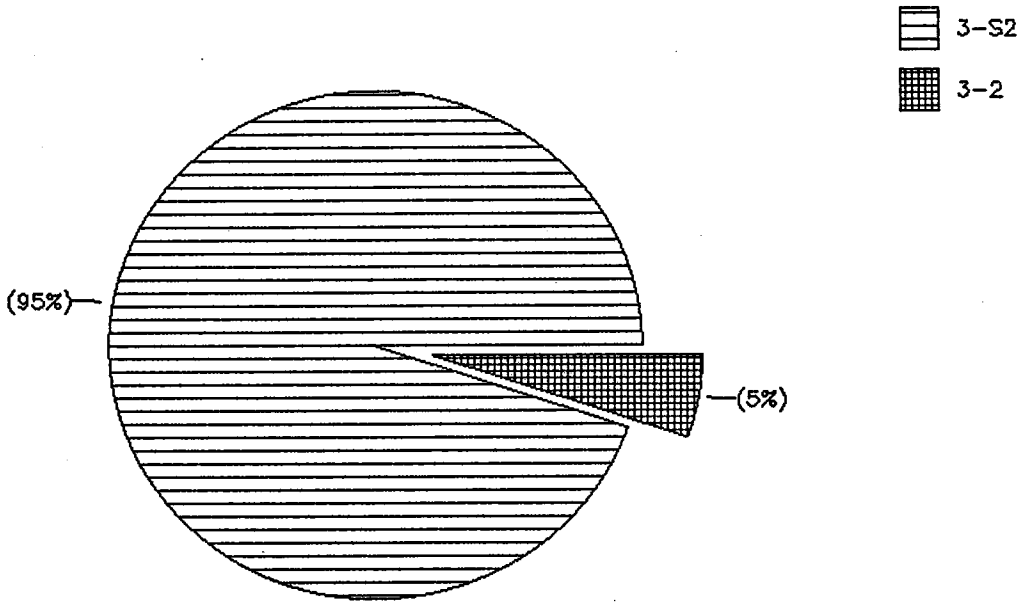
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/18/85	71	18	0	101	32	222	12%	88%	32%	68%
9/08/86	44	0	0	210	27	281	0%	100%	16%	84%

Table 2.5.1.10-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/08/86	205	0	0	136	0	341	0%	100%	60%	40%

Table 2.5.1.10-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
9/08/86	249	0	0	482	27	758	0%	100%	33%	67%



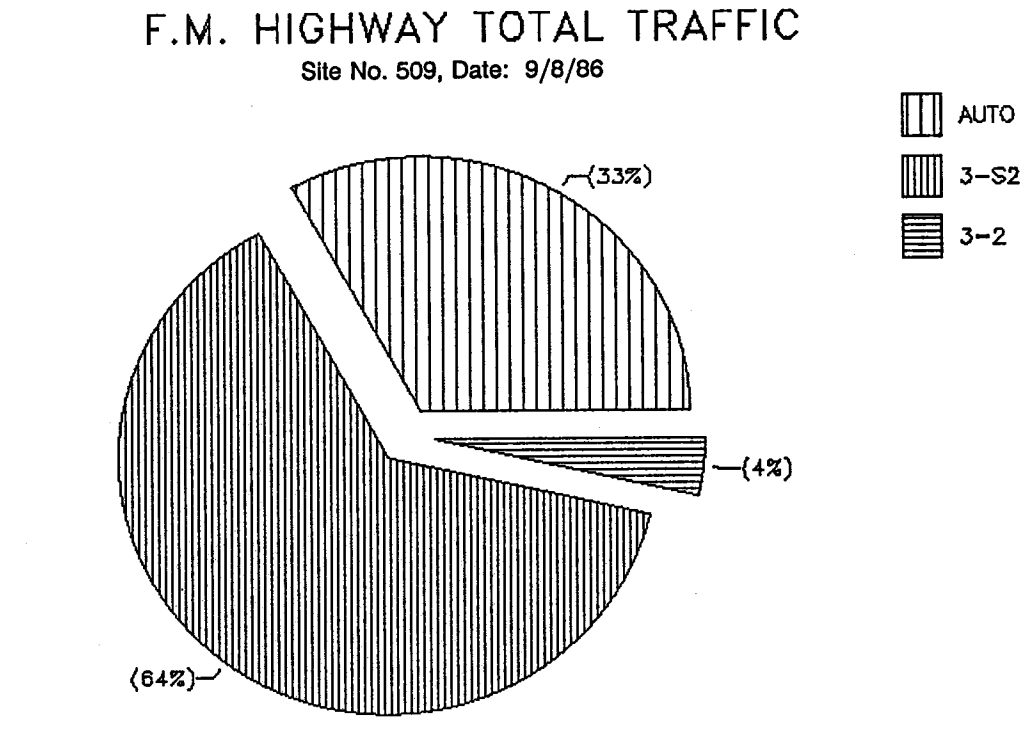


Figure 2.5.1.10-4. Highway Vehicle Percentages

2.5.1.11 Limestone Quarry, Site No. 510A

Introduction. The site map shown in Figure 2.5.1.11-1 indicates this site is provided access by a U.S. Highway, which is a major arterial near a large urban area. This four-lane divided U.S. highway serves as a loop around the east side of the urban area.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.11-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on June 24, 1986.

Figure 2.5.1.11-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the SU-2 (66%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 23 percent of the total.

An interview was conducted with an official at the limestone quarry. The production was estimated at 1000 tons on an average day. The product leaving the site were estimated at 105 single unit truck loads and 45 3-S2's on an average day. The number of employees was 30 and they worked a single shift from 6 a.m. to 5:30 p.m.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a U.S. Highway. It is estimated that this U.S. Highway had an average daily traffic (ADT) of 33,000 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.11-1 provides a summary of the counts taken. First, in Table 2.5.1.11-1A, vehicle classification counts for only the activity center are provided. Second, in Table 2.5.1.11-1B, a count of all vehicles on the highway servicing the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.11-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.11-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.11-1C values). The SU-2 vehicle represent 42 percent of total trucks counted on the highway. Autos make up 83 percent of the total traffic.

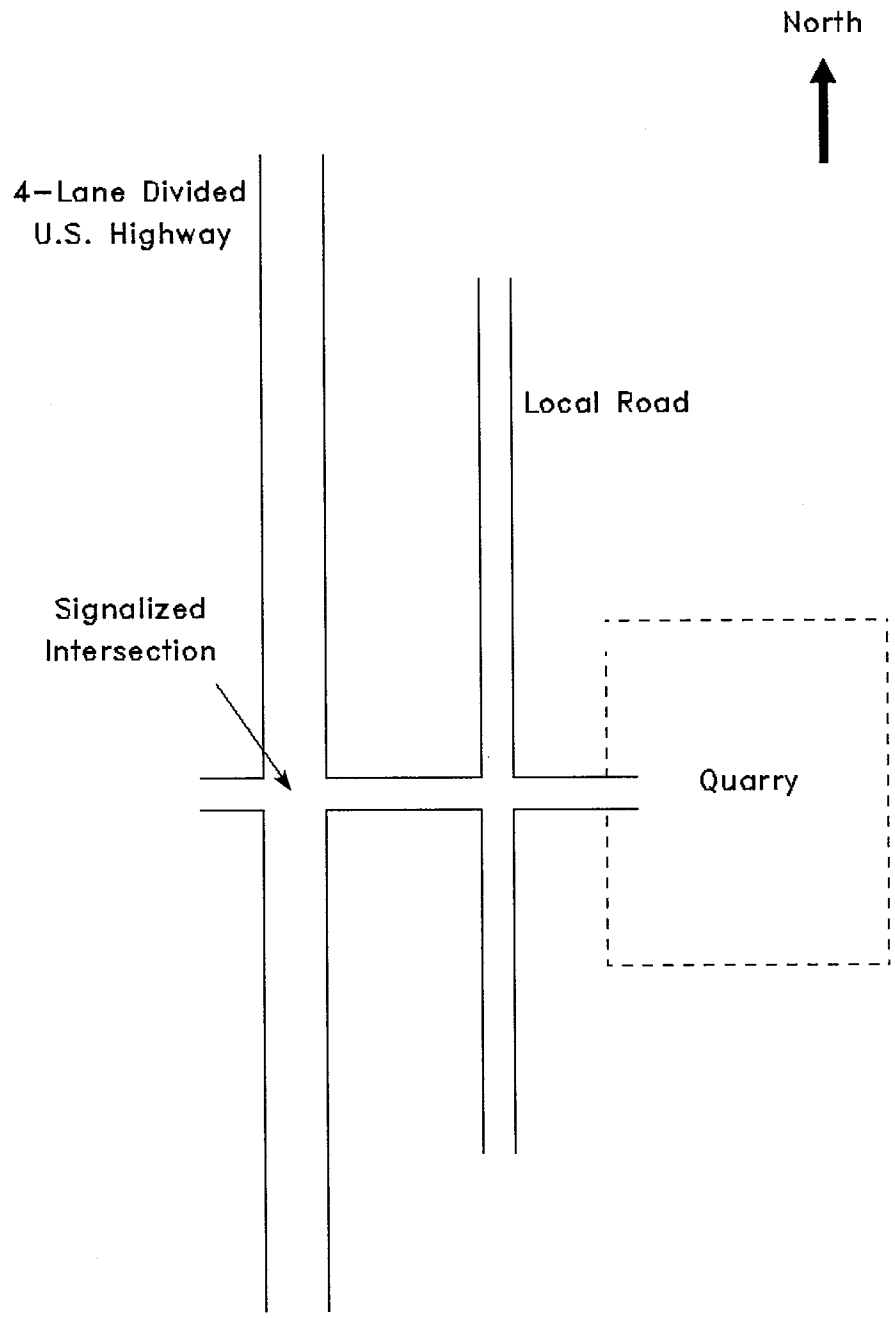
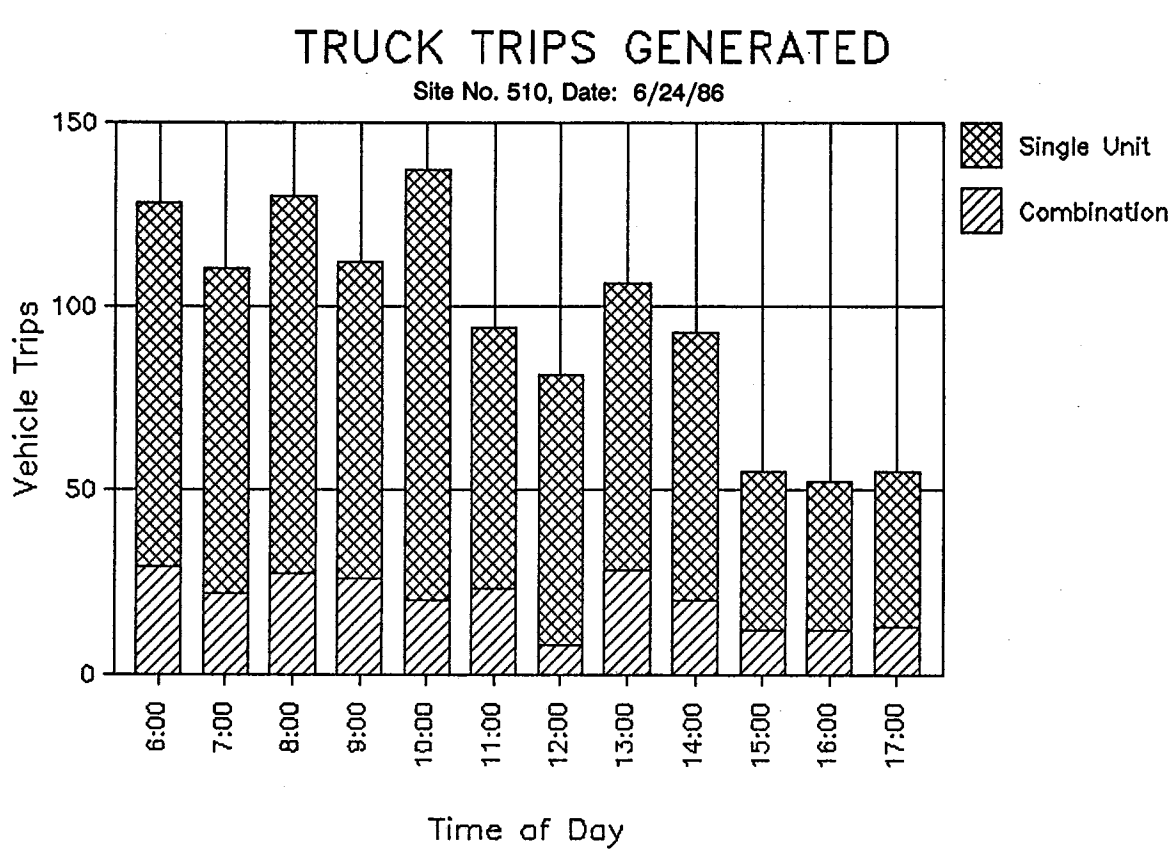


Figure 2.5.1.11-1. Site Map



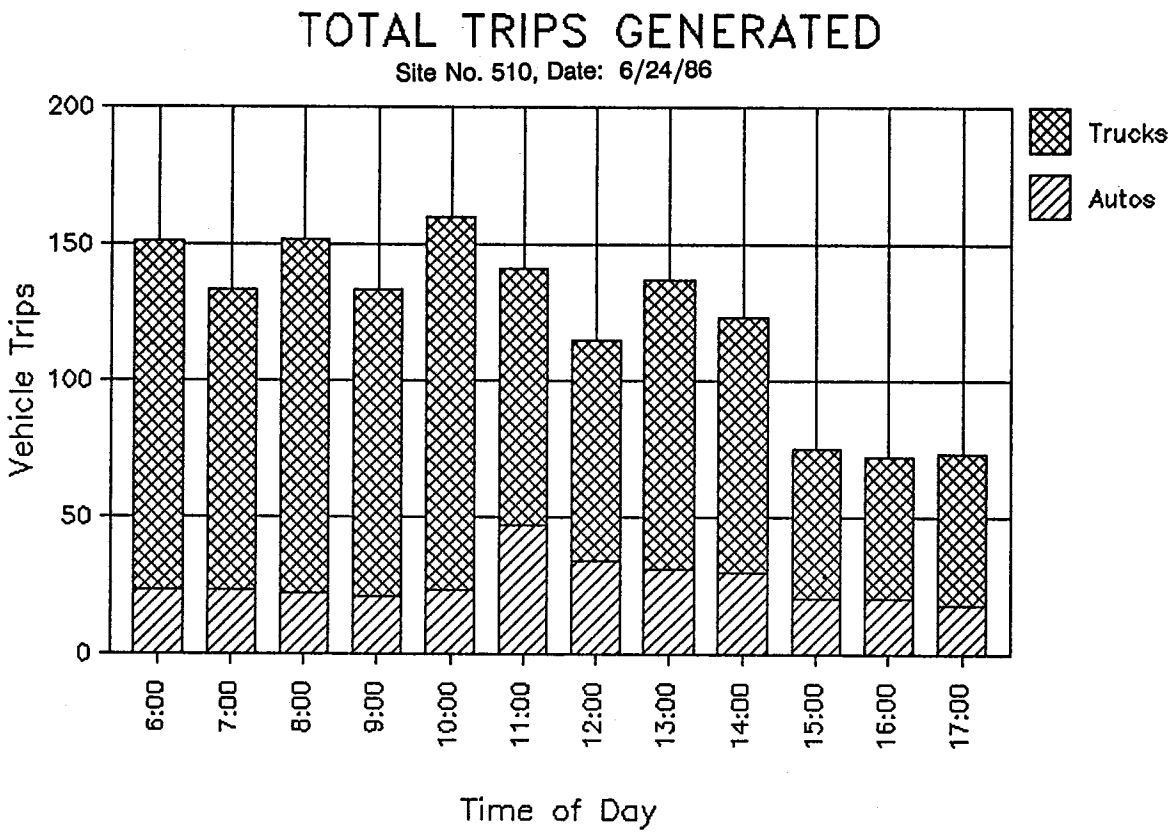
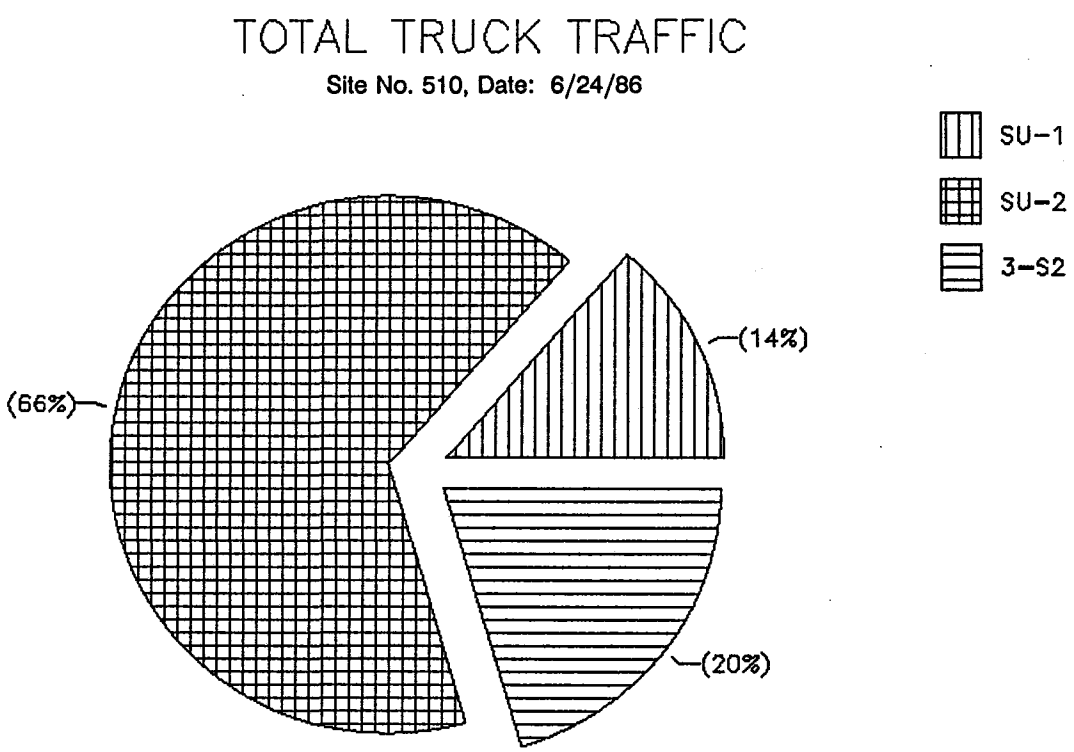


Figure 2.5.1.11-2. Hourly Trip Generation



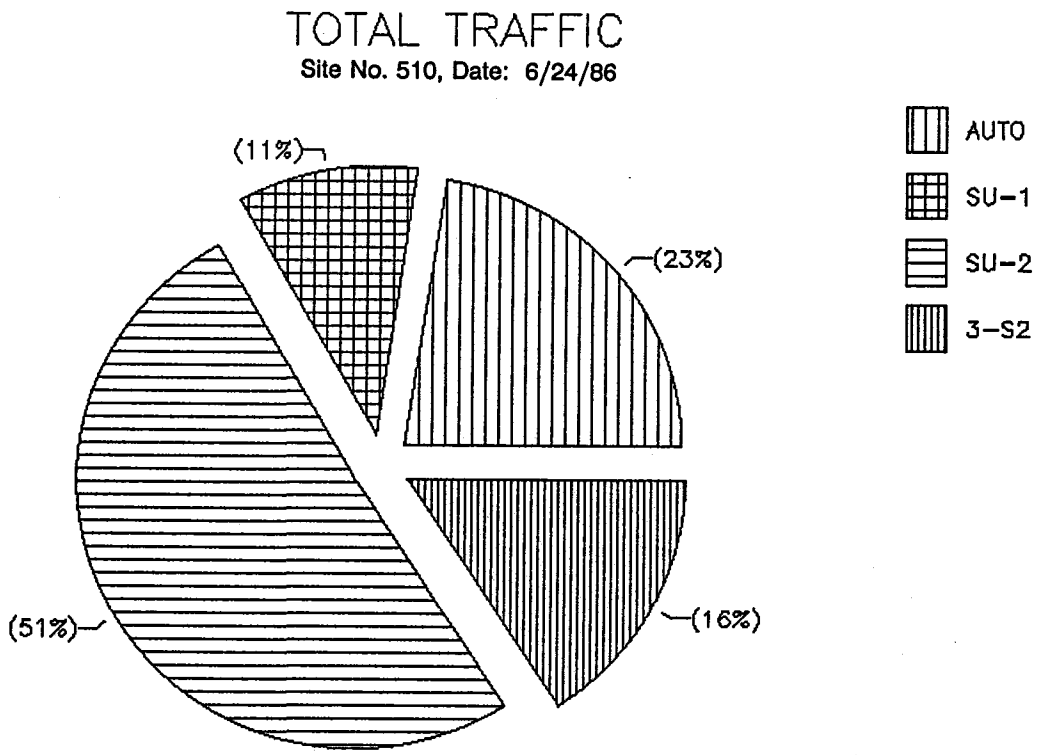


Figure 2.5.1.11-3. Activity Center Vehicle Percentages

Table 2.5.1.11-1. Traffic Classification Count Summary

Table 2.5.1.11-1A. Activity Center Only

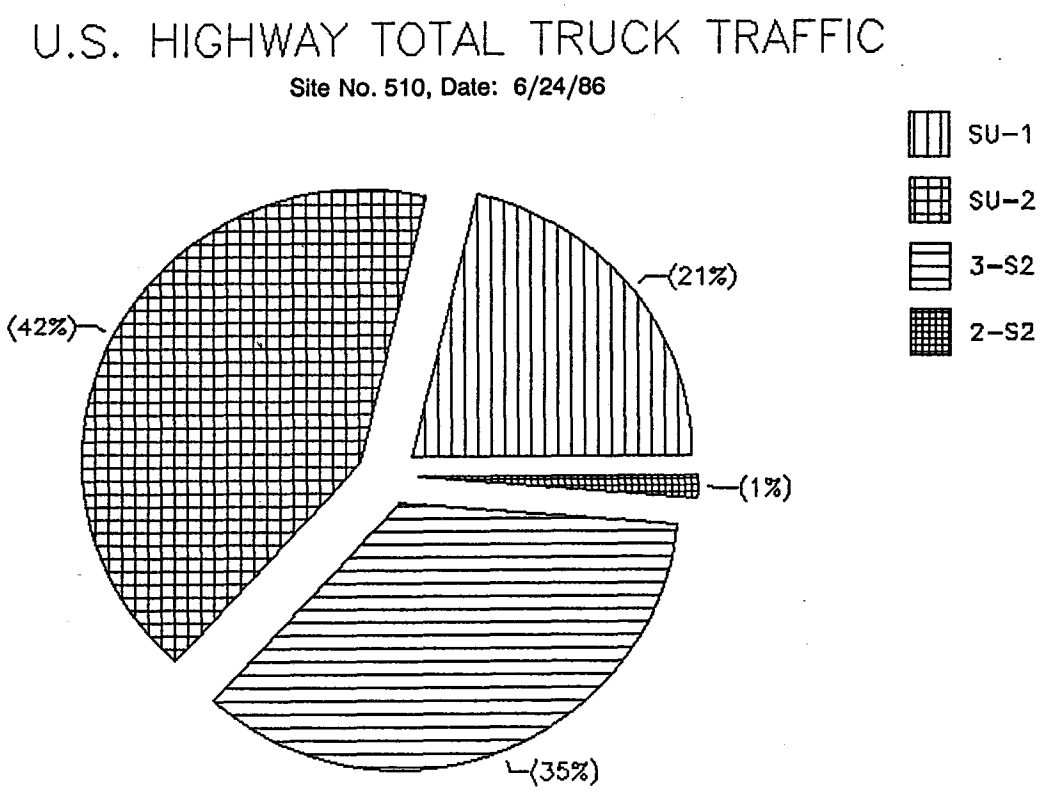
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/10/86	342	222	985	152	10	1711	88%	12%	20%	80%
6/24/86	266	125	601	186	3	1181	79%	21%	22%	78%

Table 2.5.1.11-1B. Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/24/86	13,125	261	247	38	534	0	14205	47%	53%	92%	8%

Table 2.5.1.11-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/24/86	13,391	60	1202	41	1004	3	15701	55%	45%	85%	15%



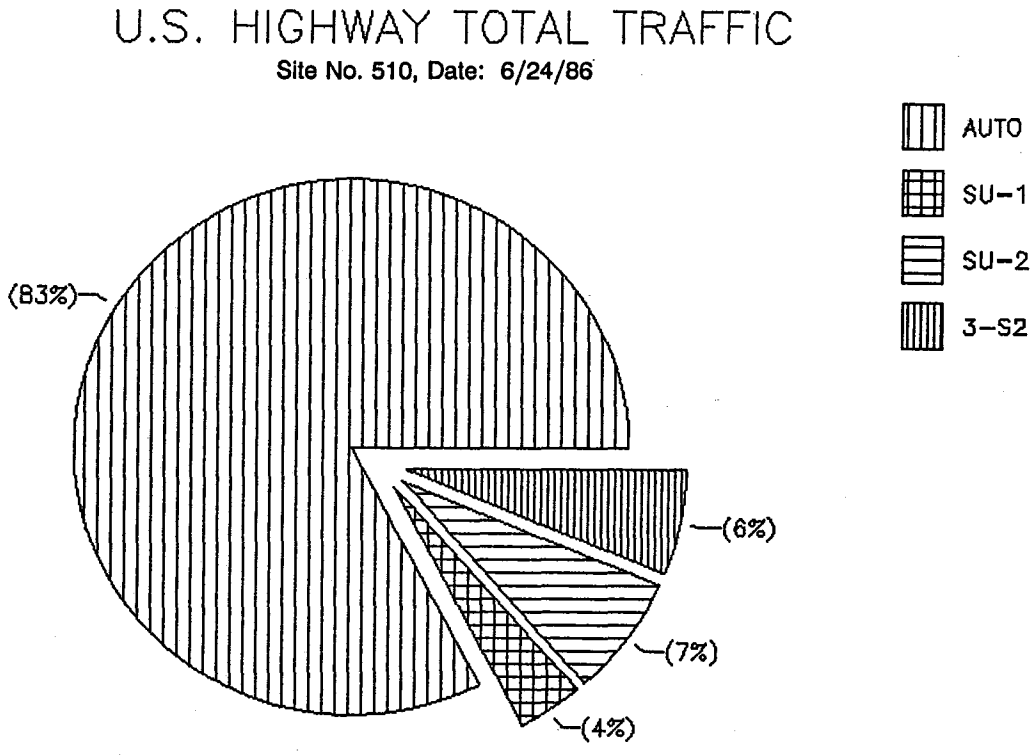


Figure 2.5.1.11-4. Highway Vehicle Percentages

2.5.1.12 Limestone Quarry, Site No. 511

Introduction. Access to this site is provided by a Farm-to-Market Highway. The site is located south of a small urban area and west of a very large urban area. The site is not served by a railroad.

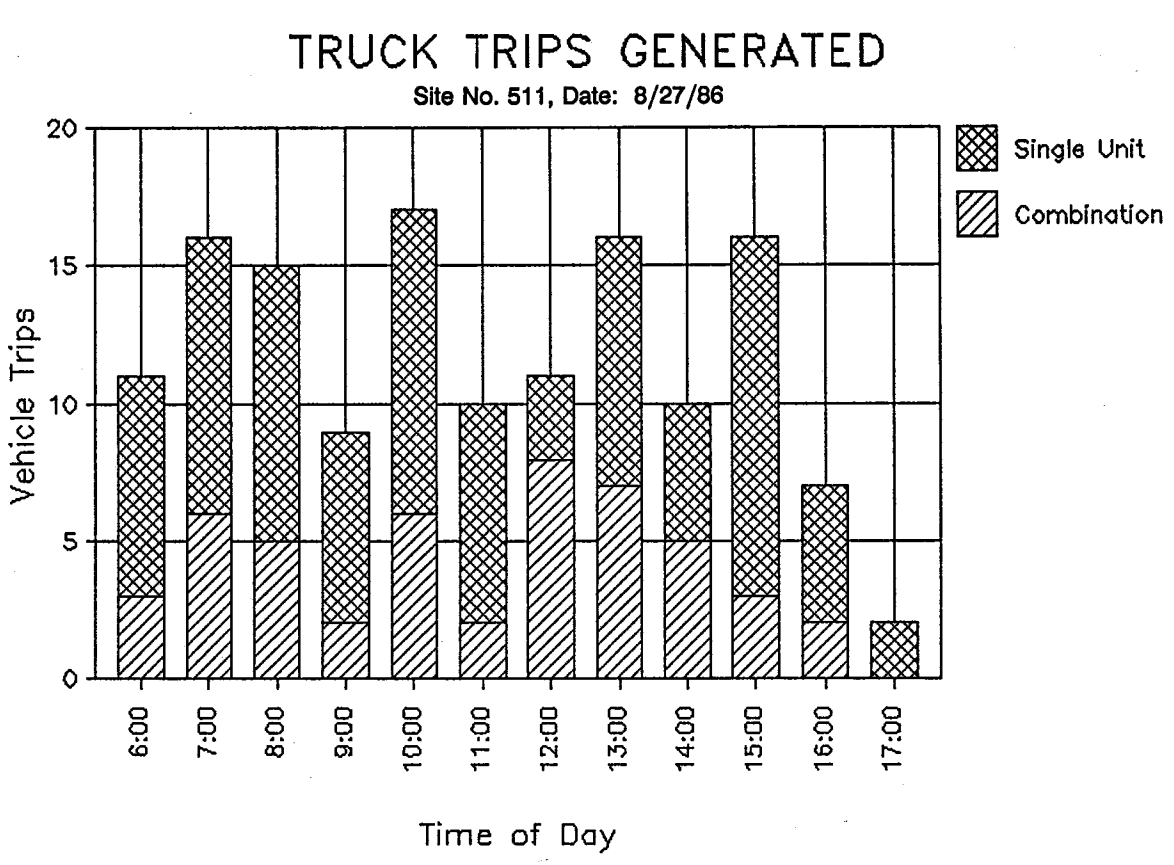
Activity Center Trip-Generating Characteristics. Figure 2.5.1.12-1 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on August 27, 1986.

Figure 2.5.1.12-2 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the site. The predominant truck was the SU-2 (56%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented only 14 percent of this total.

According to interview information, production at this quarry averages 2,000 tons per day. The average daily loads were estimated to be 48 single unit loads and 12 3-S2's loads. The number of employees was not given.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a Farm-to-Market Highway. According to Texas SDHPT traffic counts, this had an average daily traffic (ADT) of 2,300 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.12-1 provides a summary of the counts taken. First, in Table 2.5.1.12-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.12-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.12-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.12-3 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.12-1C values). The 3-S2 vehicle represents 76 percent of all trucks counts on this highway. Autos make up 58 percent of the total traffic.



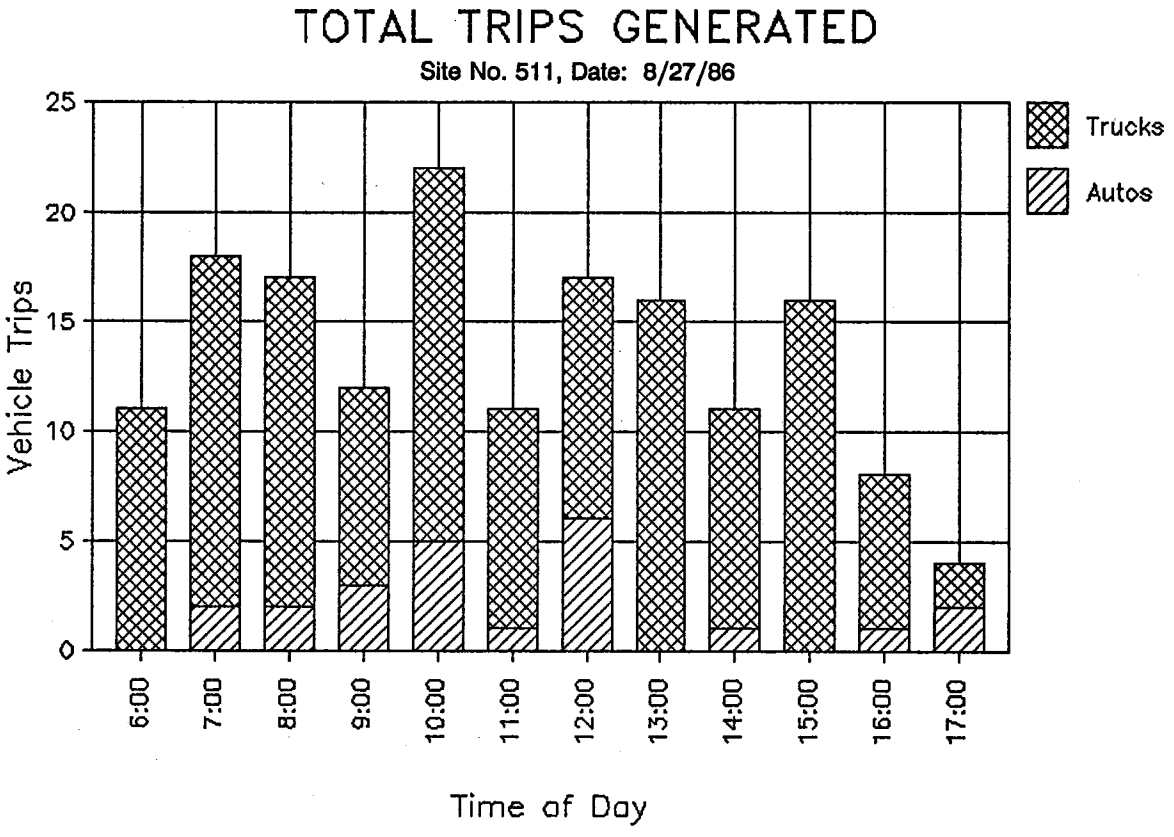
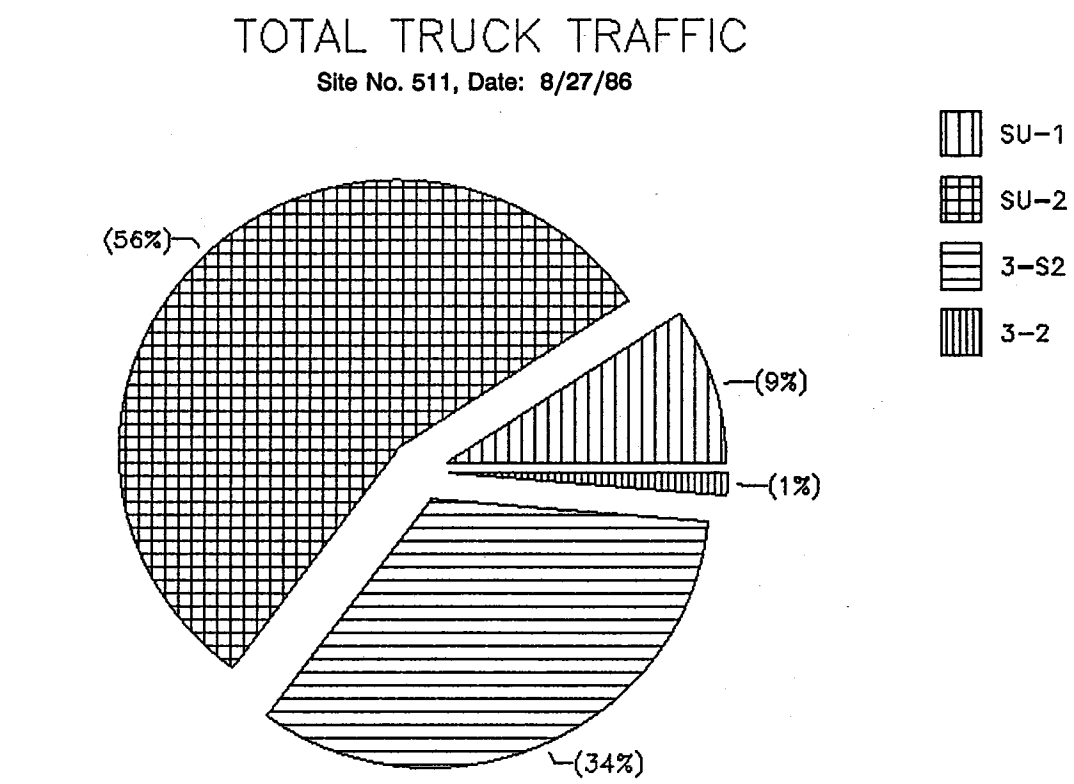


Figure 2.5.1.12-1. Hourly Trip Generation



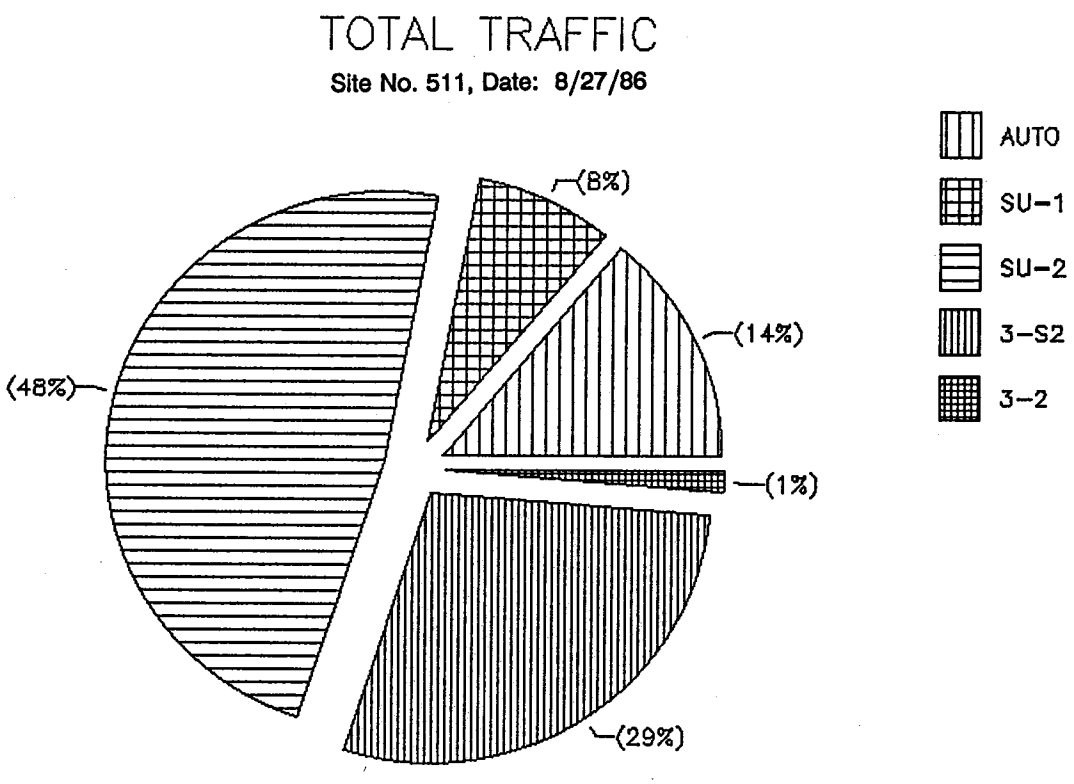


Figure 2.5.1.12-2. Activity Center Vehicle Percentages

Table 2.5.1.12-1. Traffic Classification Count Summary

Table 2.5.1.12-1A. Activity Center Only

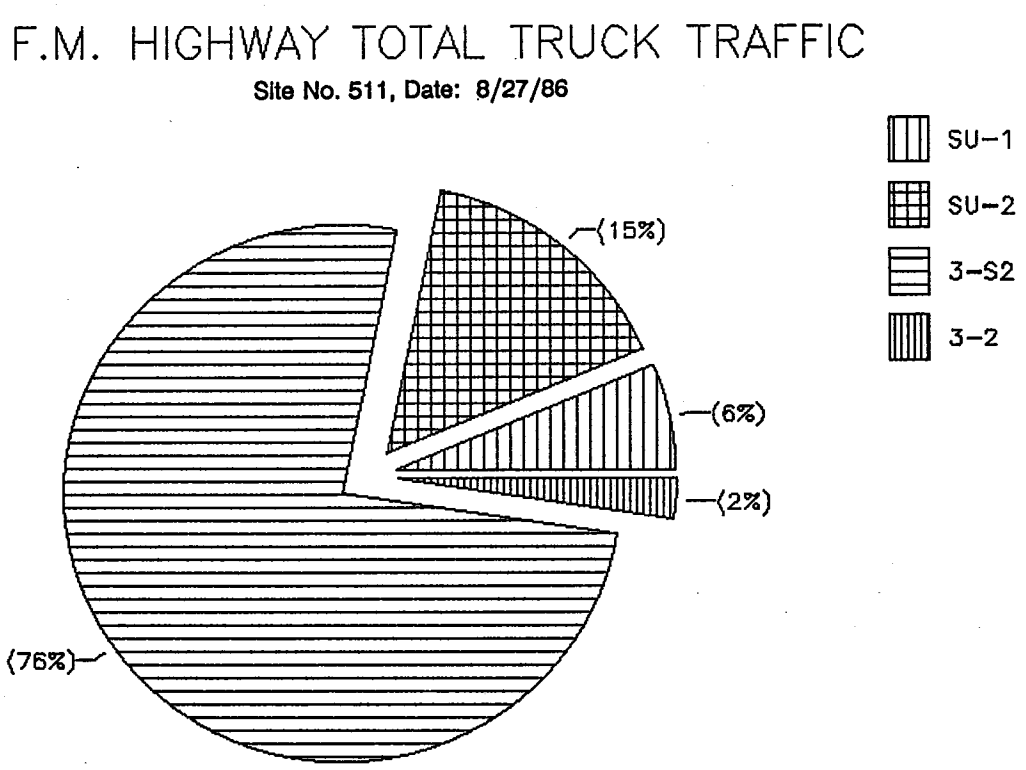
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/27/86	23	13	78	47	2	163	65%	35%	14%	86%

Table 2.5.1.12-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/27/86	745	23	8	379	11	1166	7%	93%	64%	36 %
8/28/86	793	40	5	362	25	1225	10%	90%	65%	35%

Table 2.5.1.12-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/27/86	768	36	86	426	13	1329	22%	78%	58%	42 %



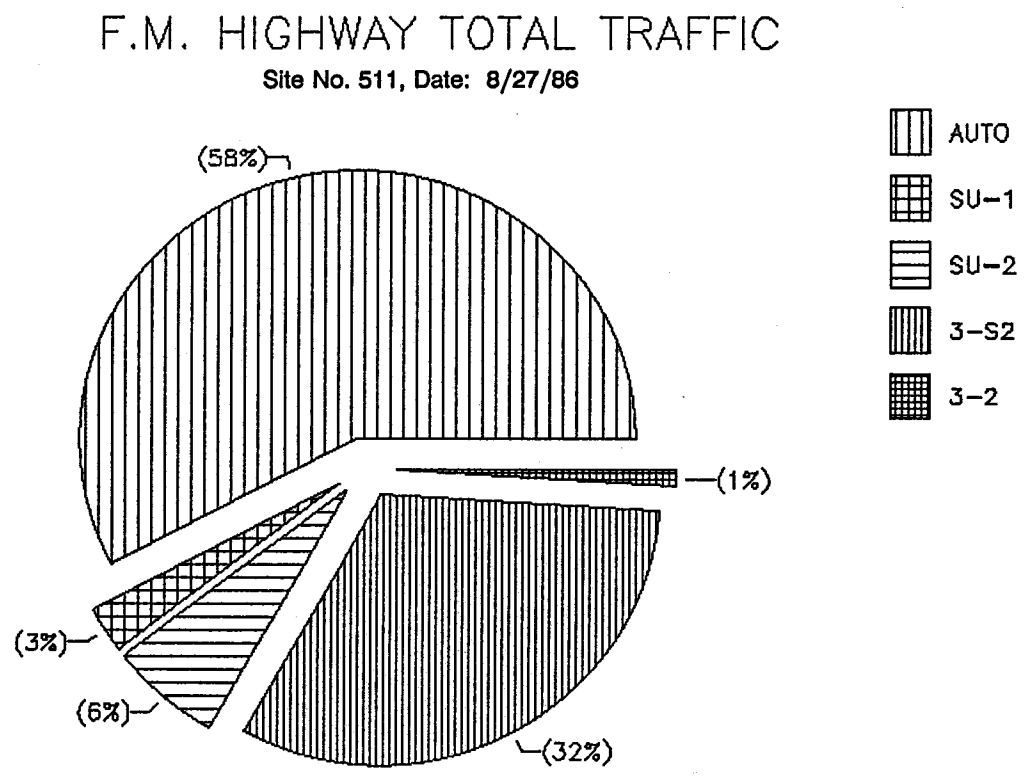


Figure 2.5.1.12-3. Highway Vehicle Percentages

2.5.1.13 Limestone Quarry, Site No. 512

Introduction. The site map shown in Figure 2.5.1.13-1 indicates that access is provided by a County Road which is about 3 miles from a small urban area served by state highways and an Interstate highway. All trucks use the county road toward this urban area. Because this activity center was small, no classification counts were conducted for the activity center or the County road. No rail service was available to the site.

Activity Center Trip-Generating Characteristics. According to records kept by this quarry, the following number of truck loads were recorded during a "typical" five-day week. Auto trips totalled 40 to 60 per week. This was during the summer, which was usually their busiest season.

63 SU-2 Trucks (6 cubic yards)
235 SU-2 w/Pup (12 cubic yards)
33 3-S2 Combinations (18 cubic yards)

Interviews indicated that movement of limestone from this quarry had been relatively slow during that particular summer. Records from the week of December 16 to 20, 1985 (typically off-peak) indicated the following number of trucks loaded during that week.

51 SU-2 Trucks
92 SU-2 w/Pup
94 3-S2 Combinations

If these trips are averaged over a five-day week, the following numbers of trips per day result.

VEHICLE TYPE	PEAK SEASON	OFF-PEAK SEASON
AUTOS	10	10
SU-2	25	20
SU-2 W/PUP	94	37
3-S2	13	38

If the average load of each vehicle is assumed to be 6, 12, and 18 cubic yards for SU-2, SU-2 with pup, and 3-S2, respectively, the total daily volume of stone moved was as follows: peak -- 1,512 cubic yards, and off-peak -- 1,248 cubic yards. One might expect the difference to be greater, but according to interviews, production of stone was relatively slow during this particular summer season.

Of the total trips generated during the peak season, autos are 7 percent, while trucks are 93 percent. The breakdown of trucks is SU-2 19 percent, SU-2 with pup 71 percent, and 3-S2 10 percent.

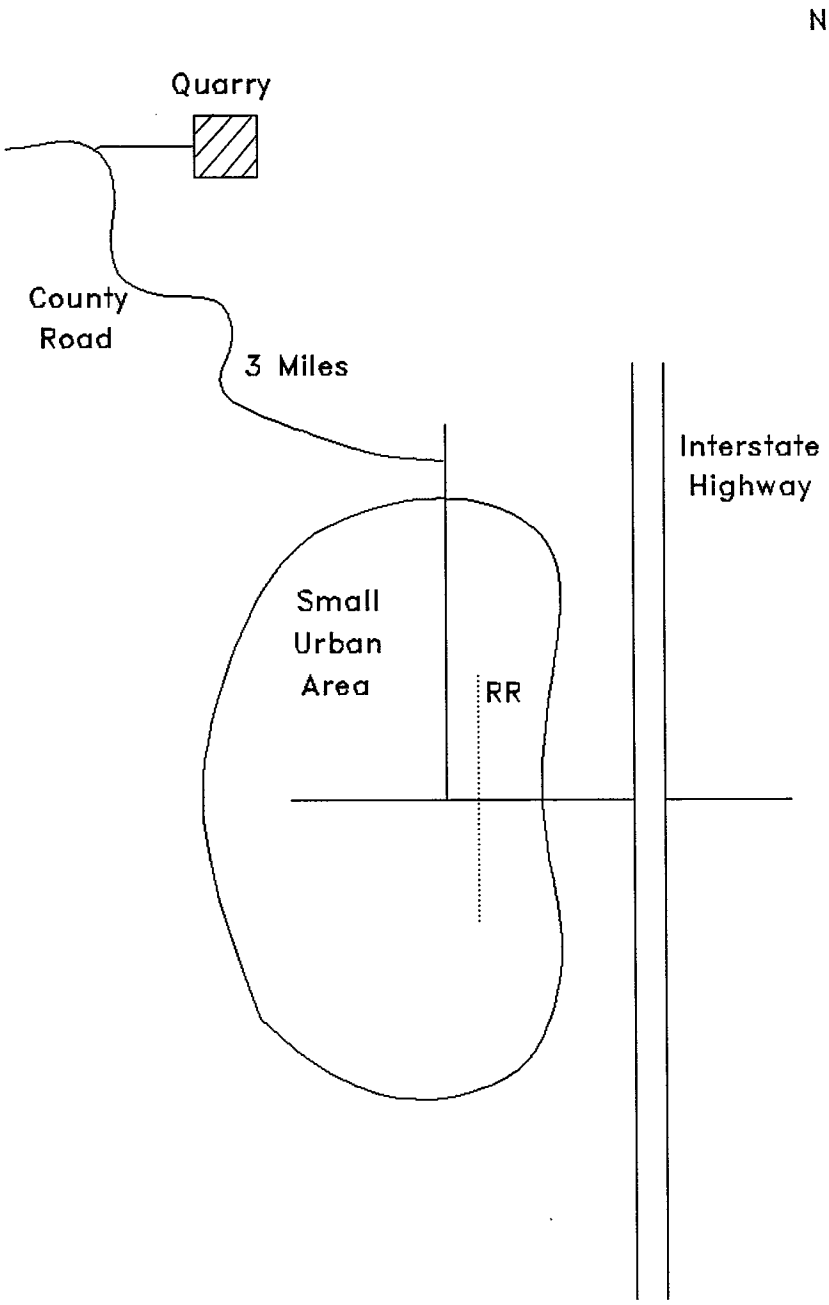


Figure 2.5.1.13-1. Site Map

2.5.1.14 Limestone Quarry, Site No. 513

Introduction. The site map shown in Figure 2.5.1.14-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located several miles southwest of a small urban area. The site is served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.14-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on April 5, 1988.

Figure 2.5.1.14-3 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the site. The predominant truck was the 3-S2 combination (73%). Also illustrated is the breakdown of total traffic generated by the site. Trucks represented 70 percent of this total. No interview information was obtained at this quarry.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a Farm-to-Market Highway. According to SDHPT records, this highway had an average daily traffic (ADT) of 710 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on this highway. Table 2.5.1.14-1 provides a summary of the counts taken. First, in Table 2.5.1.14-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.5.1.14-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.14-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.14-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.14-1C values). The 3-S2 vehicle represents 51 percent of total trucks counted on this highway. Autos make up 80 percent of the total highway traffic.

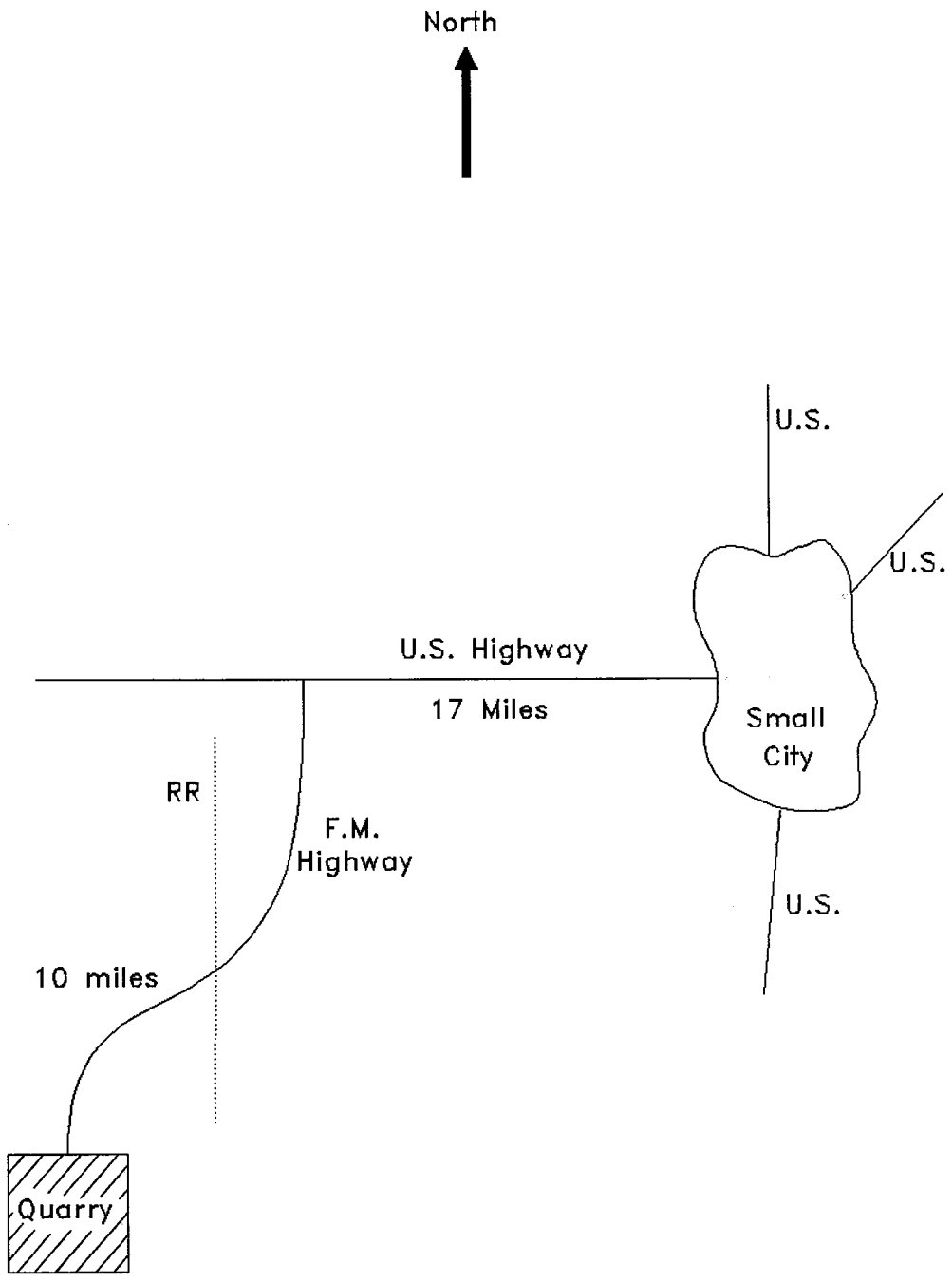
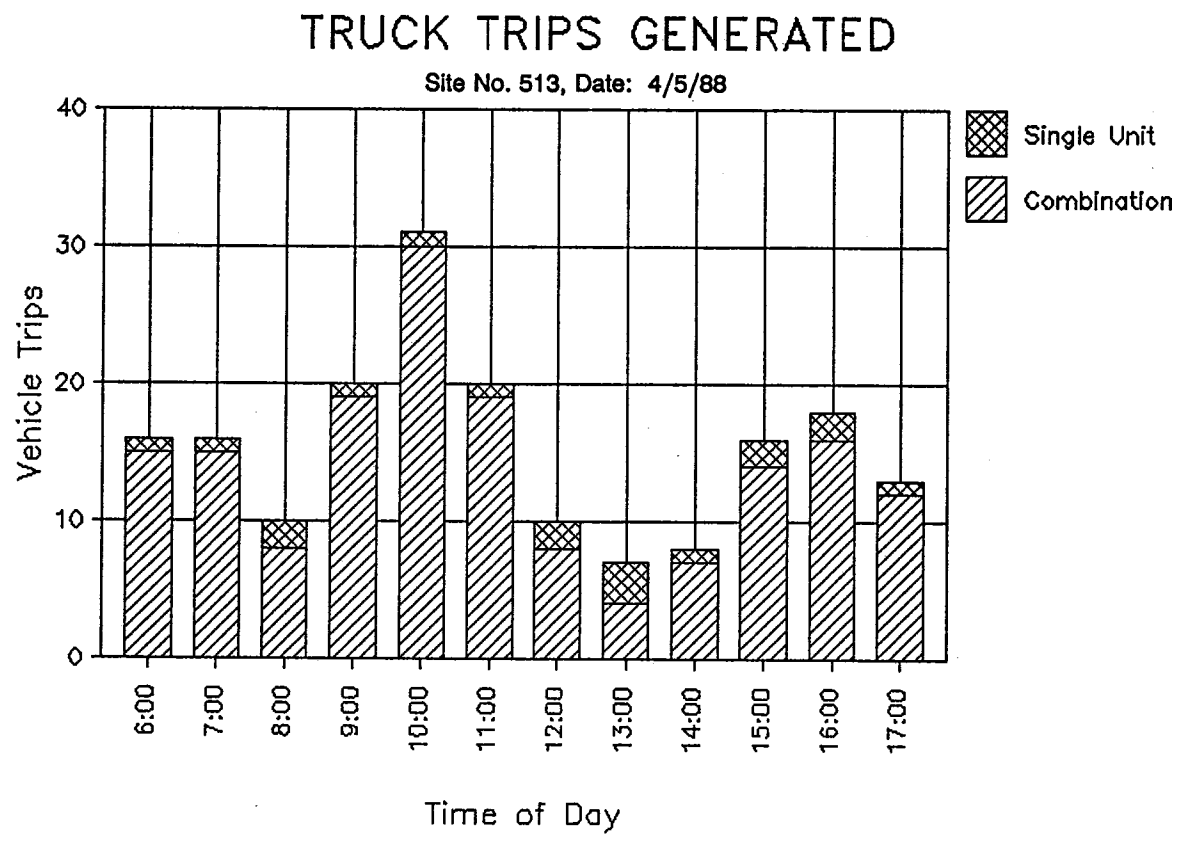


Figure 2.5.1.14-1. Site Map



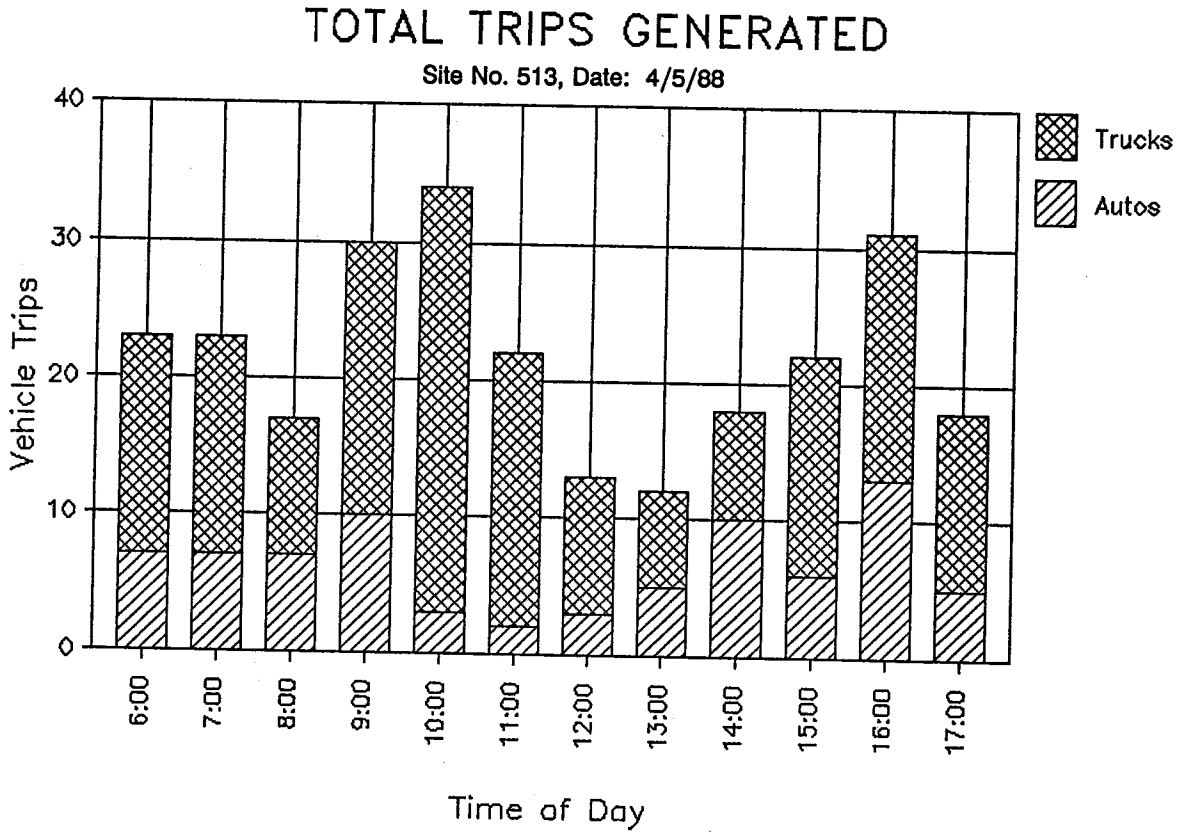
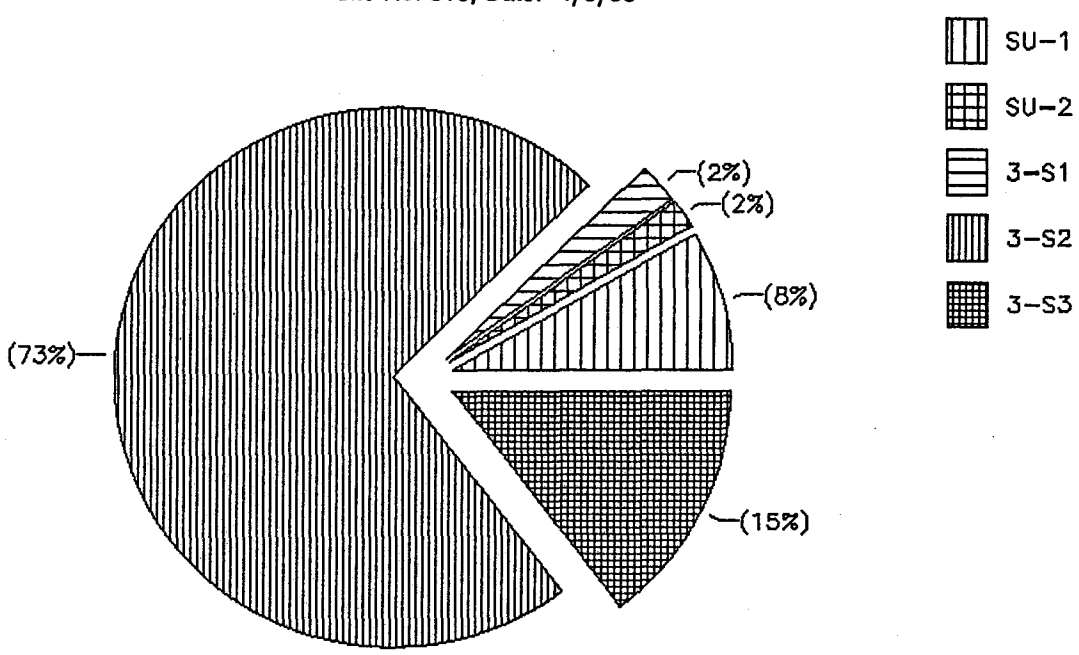


Figure 2.5.1.14-2. Hourly Trip Generation



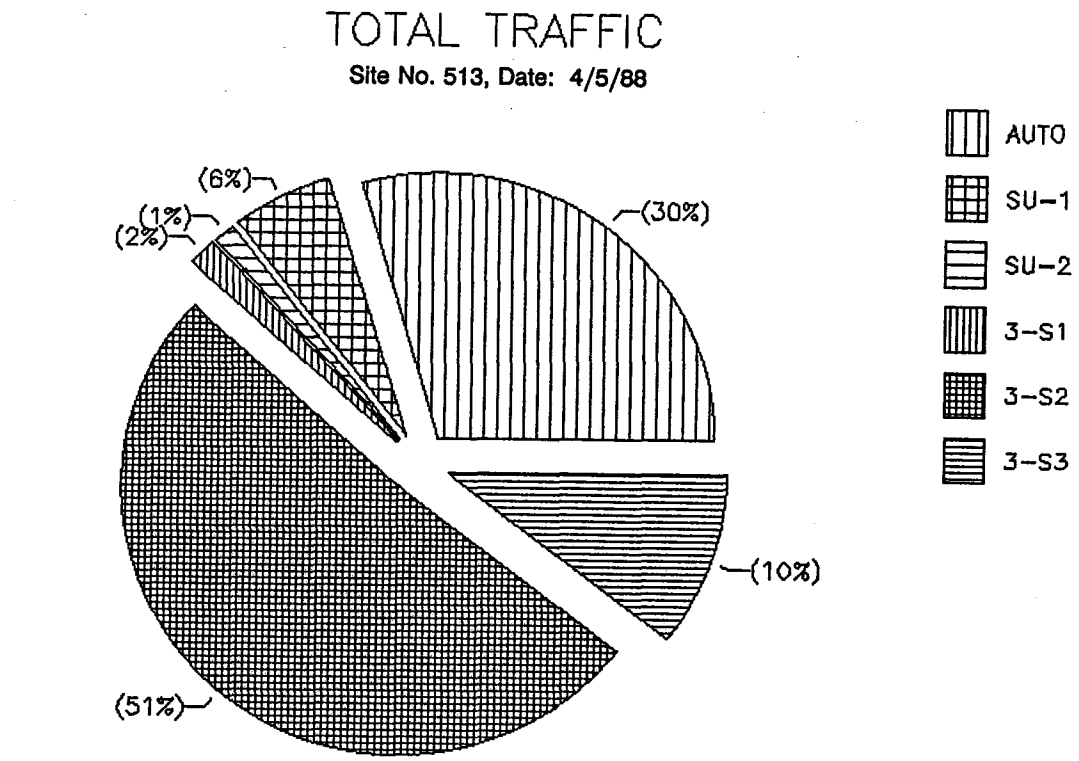


Figure 2.5.1.14-3. Activity Center Vehicle Percentages

Table 2.5.1.14-1. Traffic Classification Count Summary

Table 2.5.1.14-1A. Activity Center Only

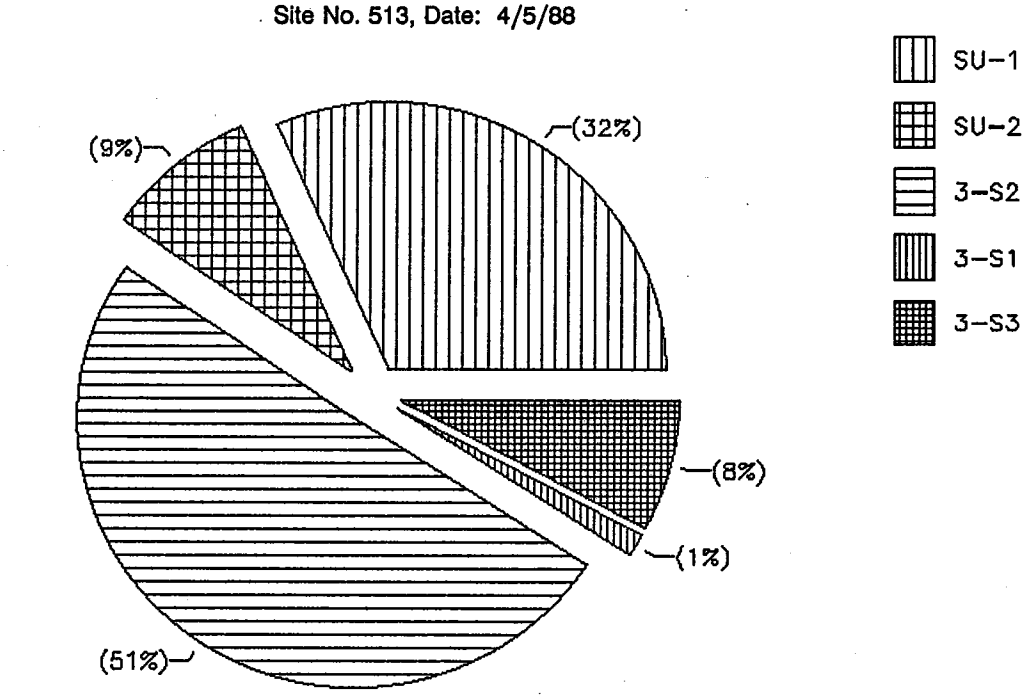
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/13/85	59	12	0	146	0	217	8%	92%	27%	73%
9/29/86	98	20	38	107	0	263	35%	65%	37%	63%
9/30/86	93	18	03	141	0	255	13%	87%	36%	64%
4/05/88	71	14	03	123	29	240	10%	90%	30%	70%

Table 2.5.1.14-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/05/88	1204	88	2	31	0	1325	74%	26%	91%	9%

Table 2.5.1.14-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/05/88	1275	102	28	163	29	1597	40%	60%	80%	20%



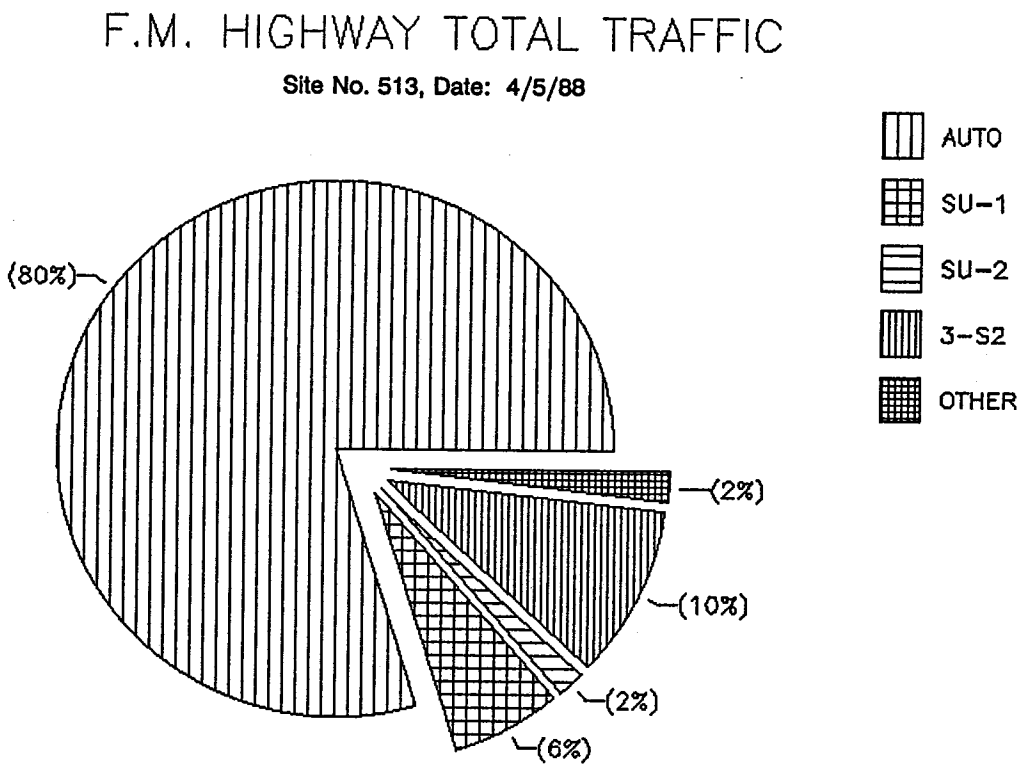


Figure 2.5.1.14-4. Highway Vehicle Percentages

2.5.1.15 Limestone Quarry, Site No. 514

Introduction. Production at this limestone quarry was quite large compared to others statewide. It was located just outside a small community in north-central Texas surrounded by other quarries. Most of the rock hauled from these quarries is carried to the south to a large urban area. Direct access is provided by a State Highway.

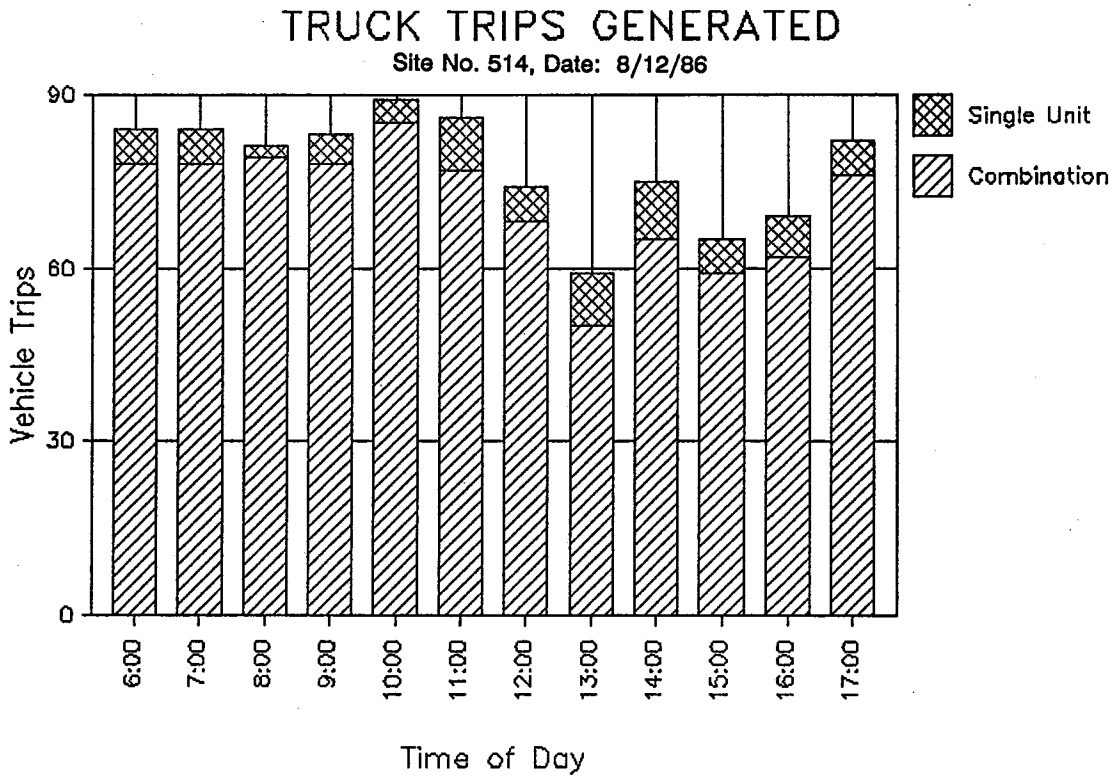
Activity Center Trip-Generating Characteristics. Figure 2.5.1.15-1 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on August 12, 1986.

Figure 2.5.1.15-2 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the site. The predominant truck was the 3-S2 combination (81%). Also illustrated is the breakdown of total traffic moving to and from the site. Autos represented only 25 percent of this total.

Interviews with plant officials indicated an average daily production of 1,300 tons, and a maximum daily production of 1,700 to 1,800 tons. The proportion shipped to the large urban area southward was 99% at a radius of 100 miles. The site was served by a railroad. This quarry worked 4 days for 10 hours each day, and performed maintenance on Fridays.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a State Highway. According to SDHPT, the average daily traffic (ADT) was 4,000 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.15-1 provides a summary of the counts taken. In Table 2.5.1.15-1A, vehicle classification counts for the activity center only are provided, and in Table 2.5.1.15-1B, a total count of all vehicles on the highway serving the activity center. Because roadway traffic was almost entirely made up of special-use vehicles, the table showing non-special-use traffic was omitted.

Figure 2.5.1.15-3 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.15-1C values). The 3S-2 vehicle represented 75 percent of total trucks counted on this highway. Autos made up 54 percent of the total traffic.



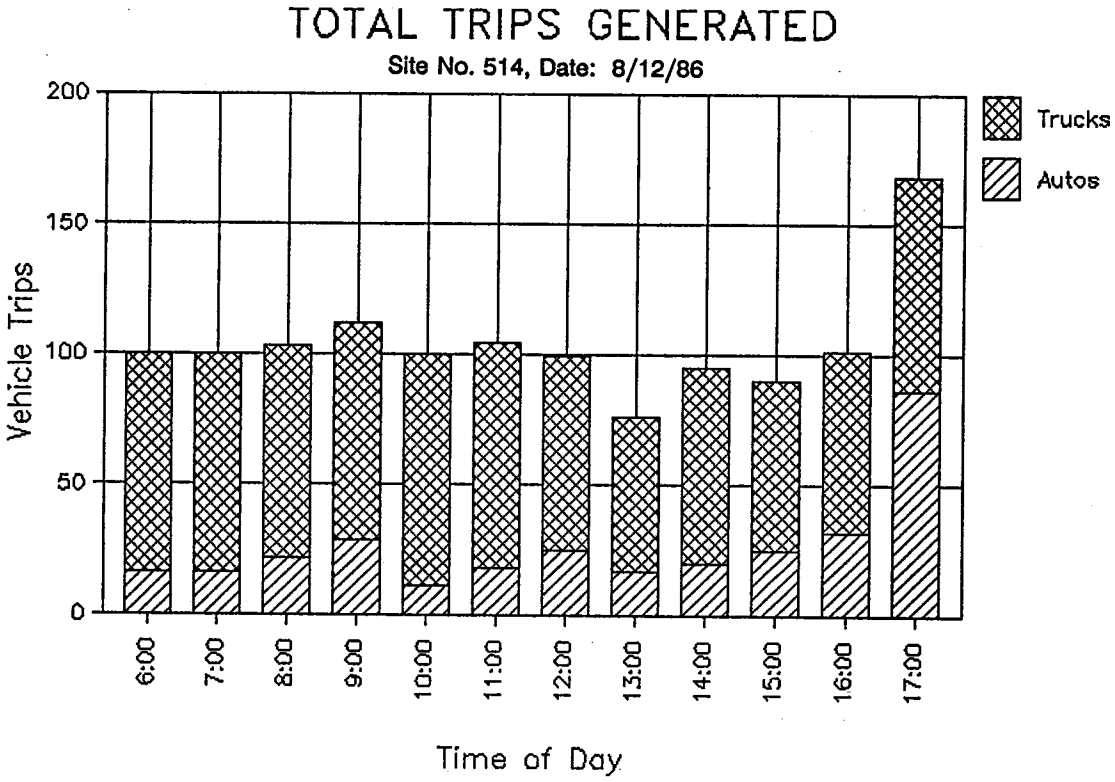
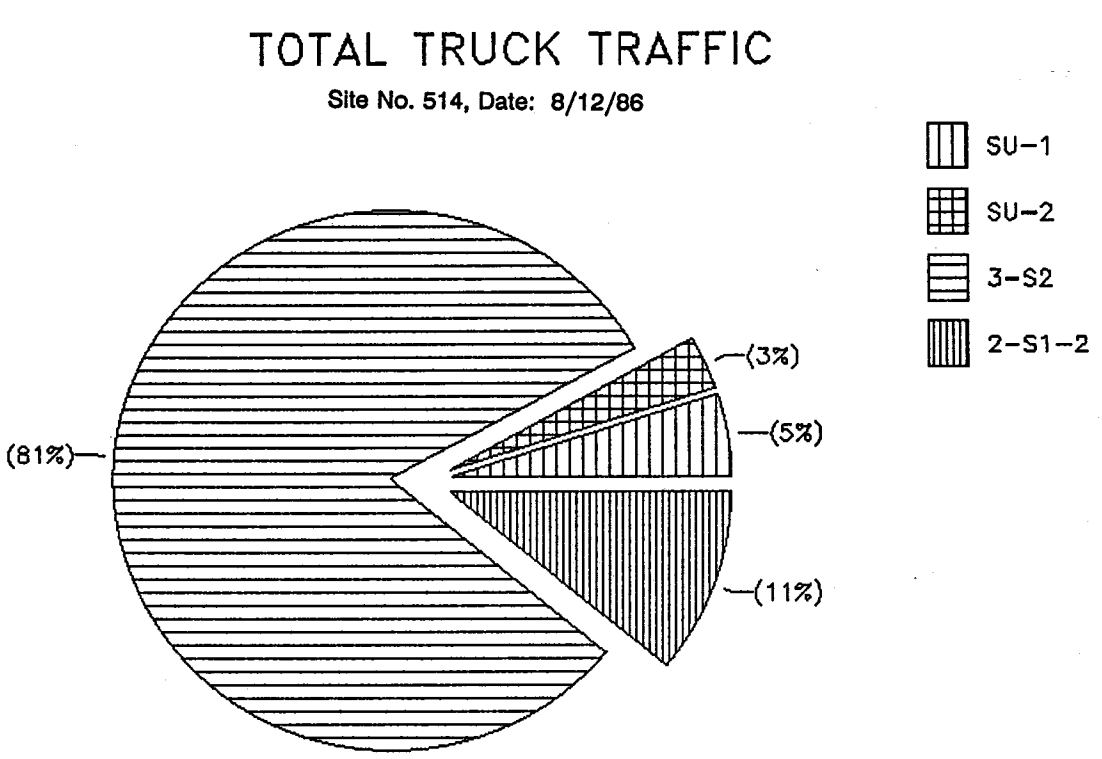


Figure 2.5.1.15-1. Hourly Trip Generation



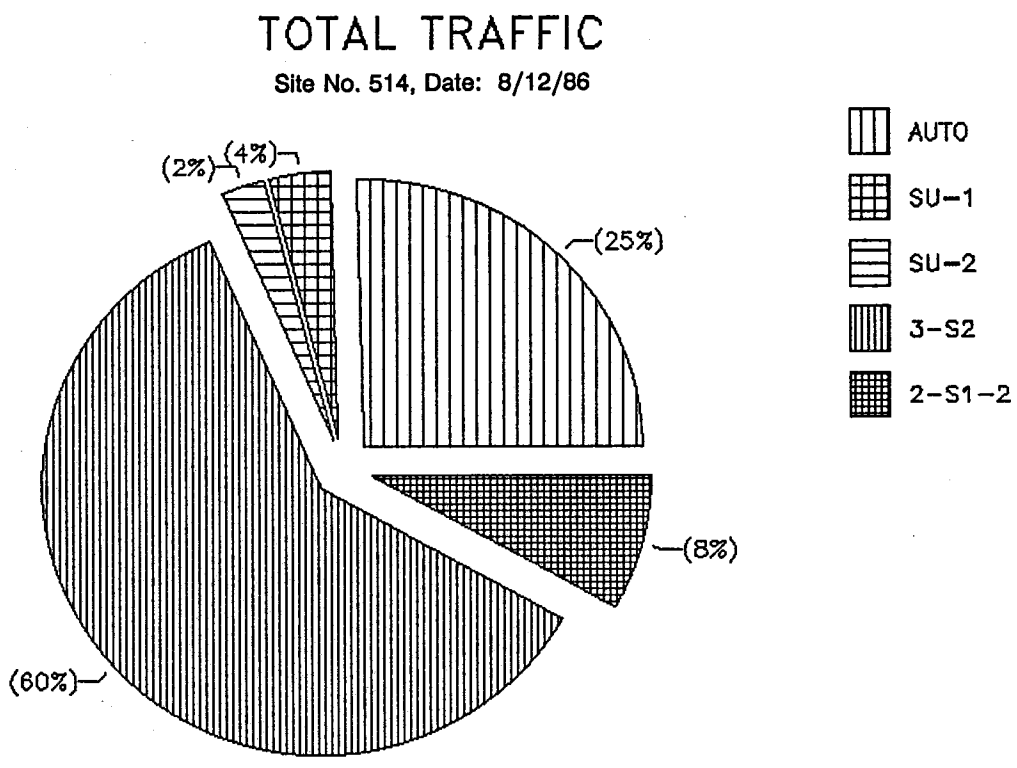


Figure 2.5.1.15-2. Activity Center Vehicle Percentages

Table 2.5.1.15-1. Traffic Classification Count Summary

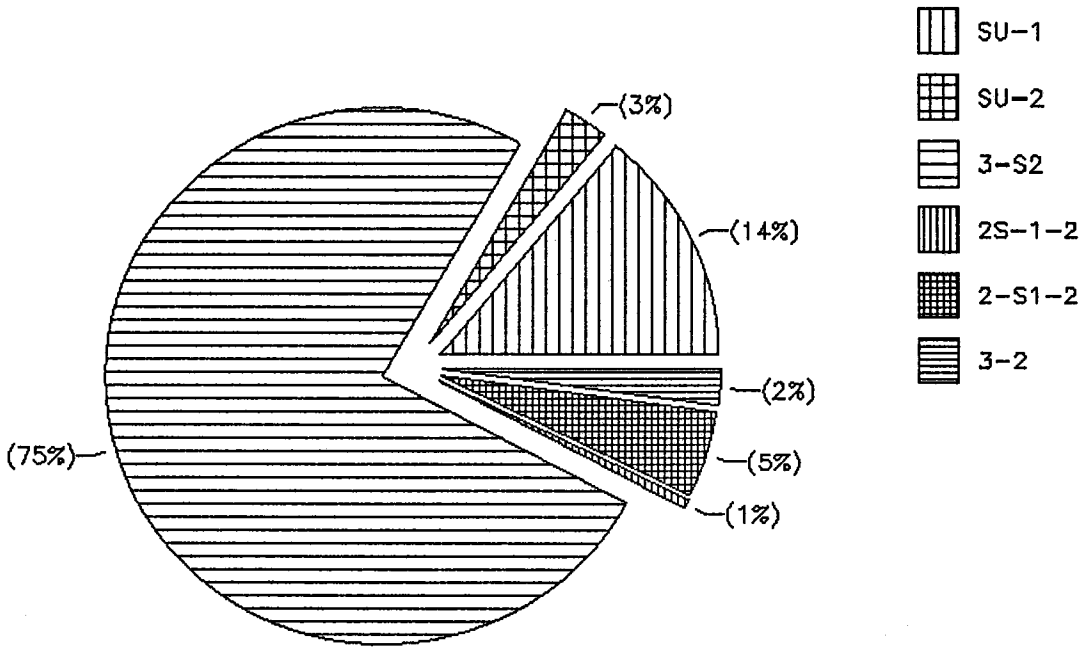
Table 2.5.1.15-1A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
8/12/86	317	46	30	753	102[1]	1248	8%	92%	25%	75%
8/13/86	352	42	6	766	144[2]	1280	5%	95%	28%	72%

[1]Number of 2-S1-2 vehicles
[2]Number of 3-2 vehicles

Table 2.5.1.15-1B. Roadway With Special-Use Traffic

Date	Vehicle Classification									% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	3-2	2-S1-2	Total	SU	Comb.	Cars	Trucks
8/12/86	2259	277	53	6	5	1477	40	102	4219	17%	83%	54%	46%



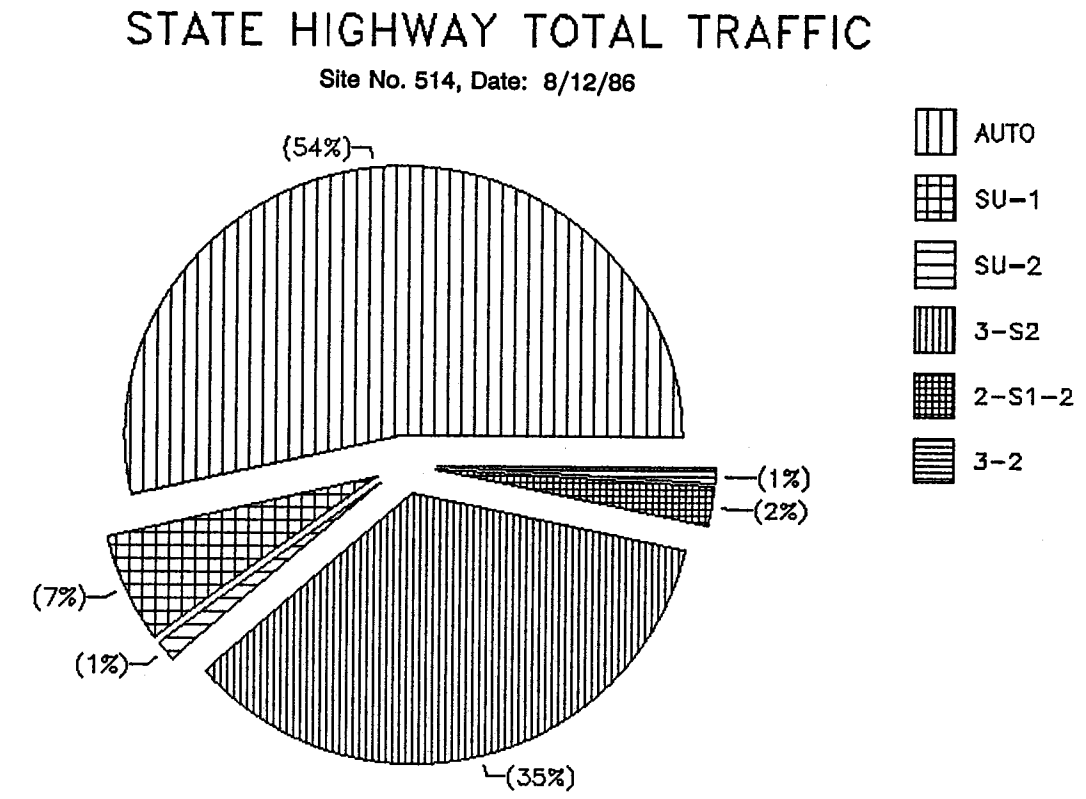


Figure 2.5.1.15-3. Highway Vehicle Percentages

2.5.1.16 Limestone Quarry, Site No. 515

Introduction. The site map shown in Figure 2.5.1.16-1 indicates that access is provided directly by a State Highway. The activity center is located approximately 3 miles west of a small urban area in Central Texas. Trucks hauling from this site travel east to an interstate highway; then the majority go south to a large urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.5.1.16-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on April 9, 1986.

Figure 2.5.1.16-3 illustrates the breakdown by AASHTO classification of the total truck traffic generated by the site. The predominant truck was the 3-S2 combination (71%). Also illustrated is the breakdown of total traffic moving to and from the site. Trucks represented 94 percent of this total. No interviews of officials from the limestone quarry were obtained.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a State Highway. This State Highway had an average daily traffic (ADT) of 4,900 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.5.1.16-1 provides a summary of the counts taken. In Table 2.5.1.16-1A, vehicle classification counts for the activity center only are provided. In Table 2.5.1.16-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.5.1.16-1C, a total count of all vehicles on the highway is provided.

Figure 2.5.1.16-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.5.1.16-1C values). The 3-S2 vehicle represents 67 percent of total trucks counted on this highway. Trucks made up 31 percent of the total traffic on this particular day.

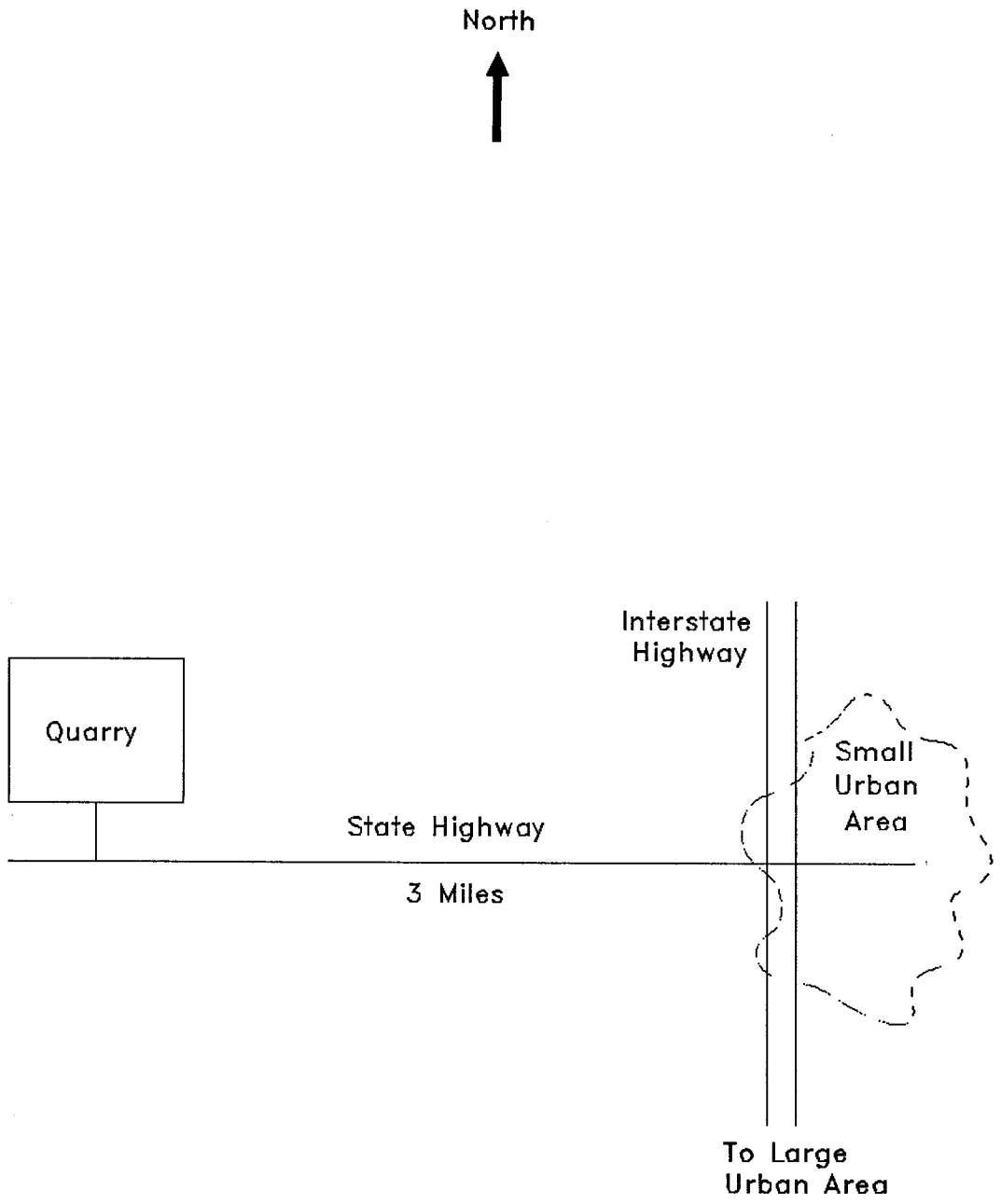
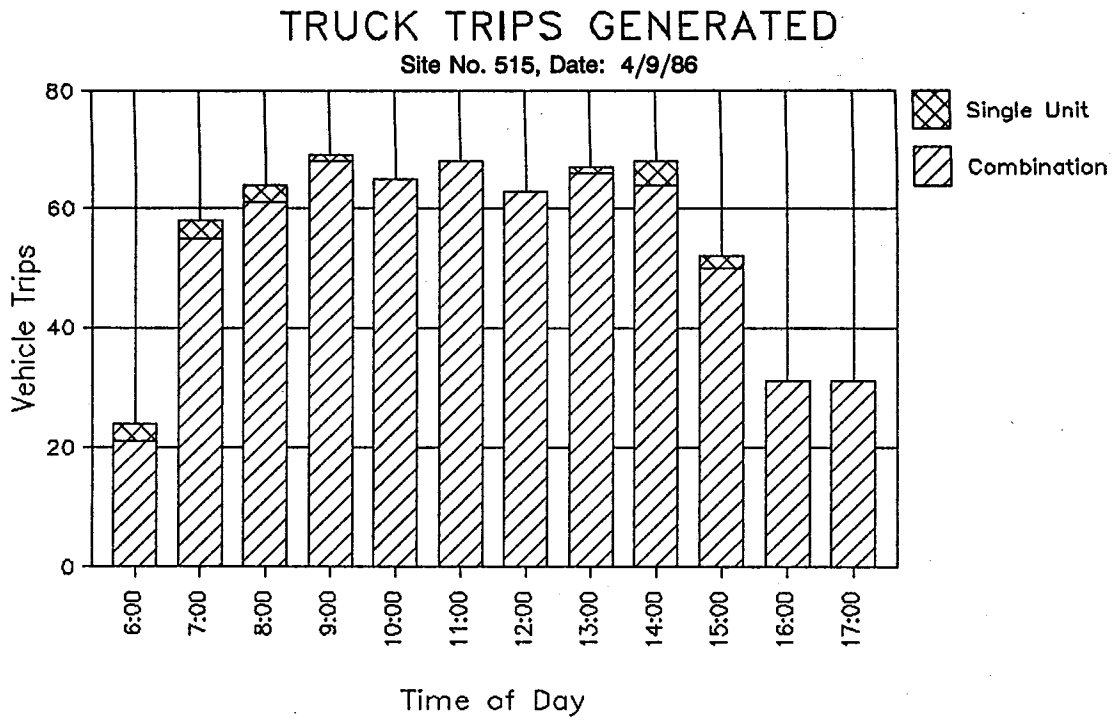


Figure 2.5.1.16-1. Site Map



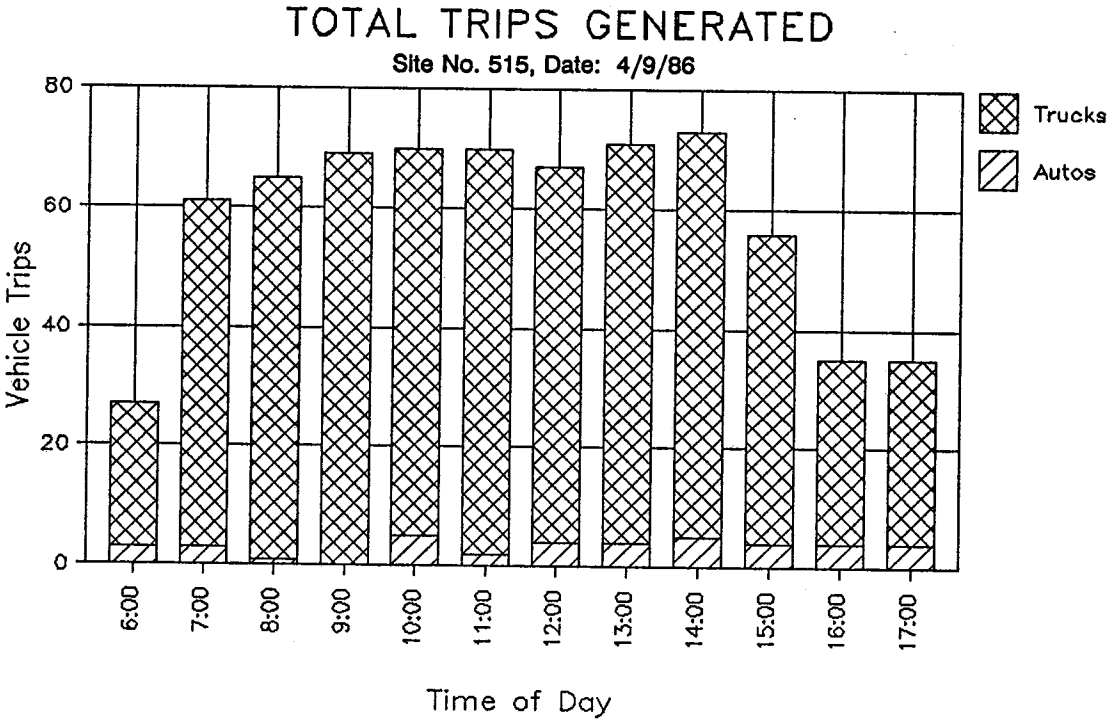
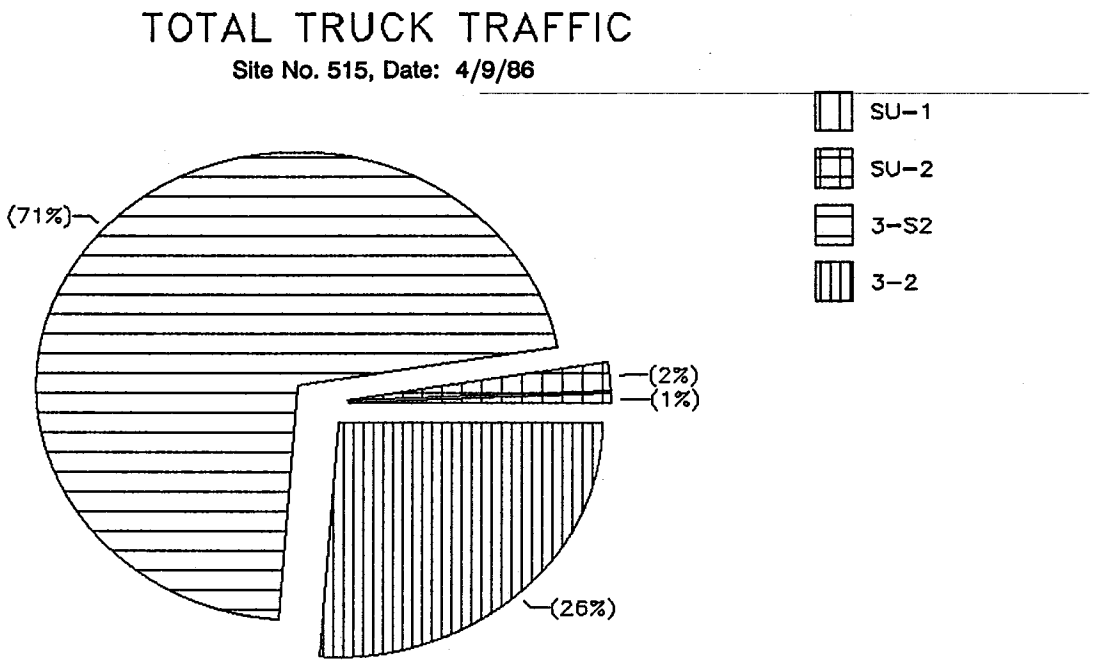


Figure 2.5.1.16-2. Hourly Trip Generation



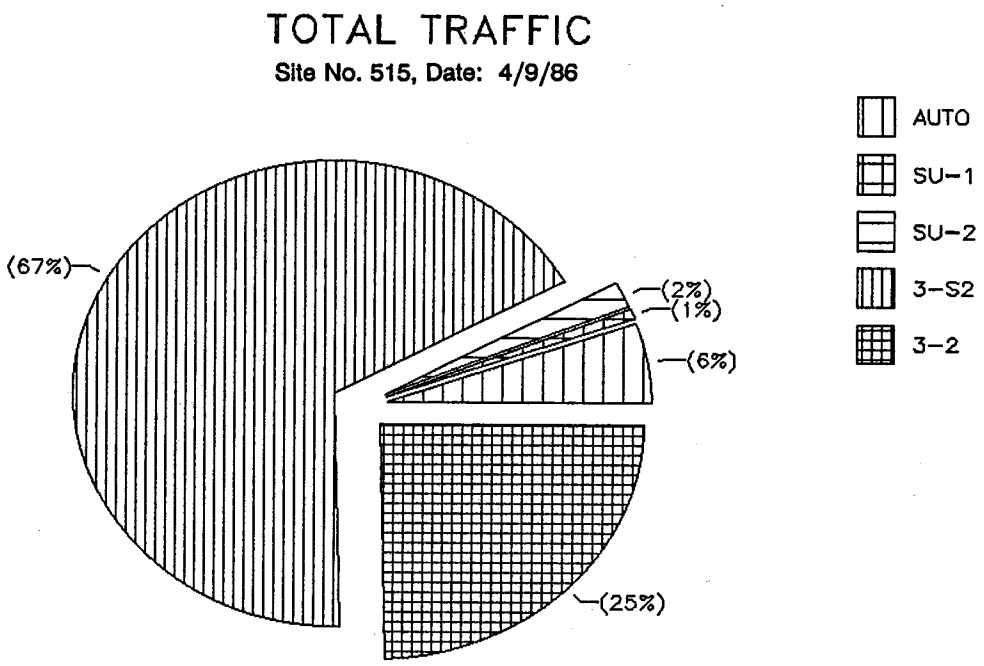


Figure 2.5.1.16-3. Activity Center Vehicle Percentages

Table 2.5.1.16-1. Traffic Classification Count Summary

Table 2.5.1.16-1A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb	Cars	Trucks
6/17/85	106	11	87	638	38[1]	880	13%	87%	12%	88%
4/09/86	39	5	12	471	172[2]	699	3%	97%	6%	94%

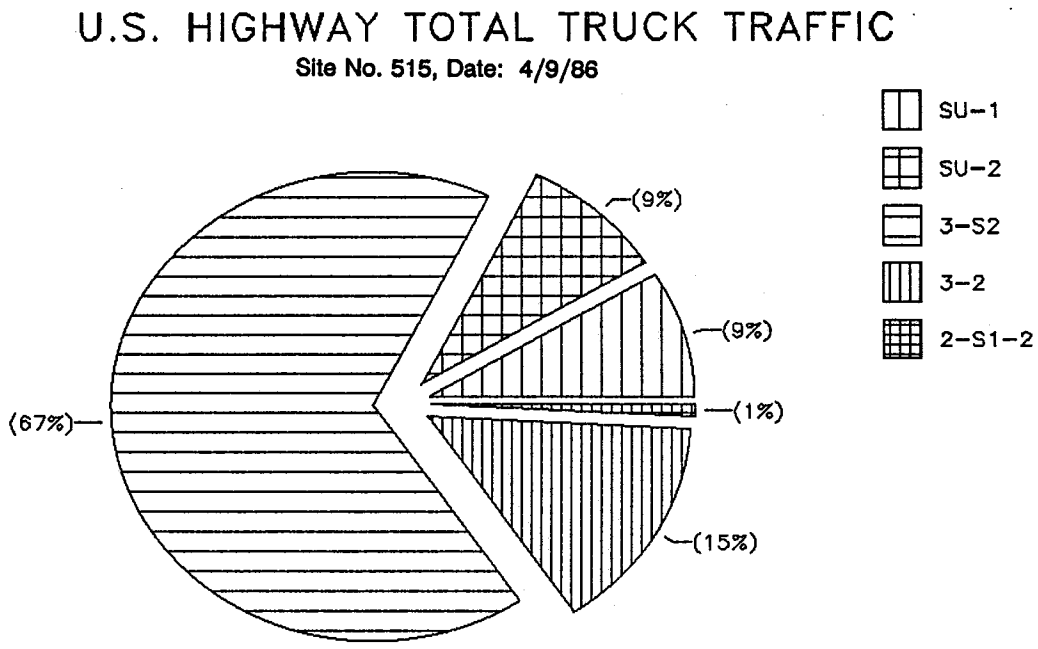
[1] Number of vehicles: 13 SU-2, 25 2-S2
[2] Number of 3-2 vehicles

Table 2.5.1.16-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Other	Total	SU	Comb	Cars	Trucks
4/9/86	2598	98	93	8	2	309	0	3108	37%	63%	84%	16%

Table 2.5.1.16-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	3-2	Total	SU	Comb	Cars	Trucks
4/9/86	2637	103	105	8	2	780	172	3807	18%	82%	69%	31%



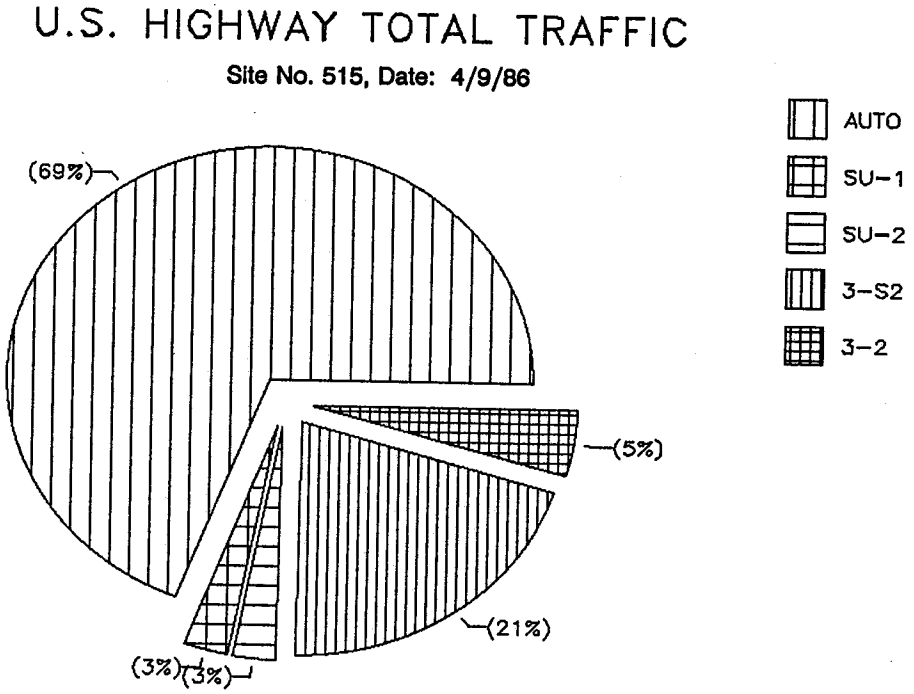


Figure 2.5.1.16-4. Highway Vehicle Percentages

2.5.2 WEIGH-IN-MOTION RESULTS FOR LIMESTONE

Figures 2.5.2-1 through 2.5.2-9 are cumulative distribution plots of axle weights and gross vehicle weights of limestone trucks. The site numbers identified on the plots are the same as those used elsewhere for vehicle classification counts. The weigh-in-motion (WIM) crew identified special-use vehicles associated with each site and coded the vehicle weighed for subsequent evaluation. The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weight. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was typically deployed at limestone quarries from about 8 a.m. to about 4 p.m. In other words, the system was not used to monitor night activity. Most of the limestone trucks hauled during the daytime, so the need to monitor night movement was not apparent.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near special-use traffic generators, lanes used for raw product movement, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked. All of the sites selected met these criteria fairly well, although the perfect location was difficult to find.

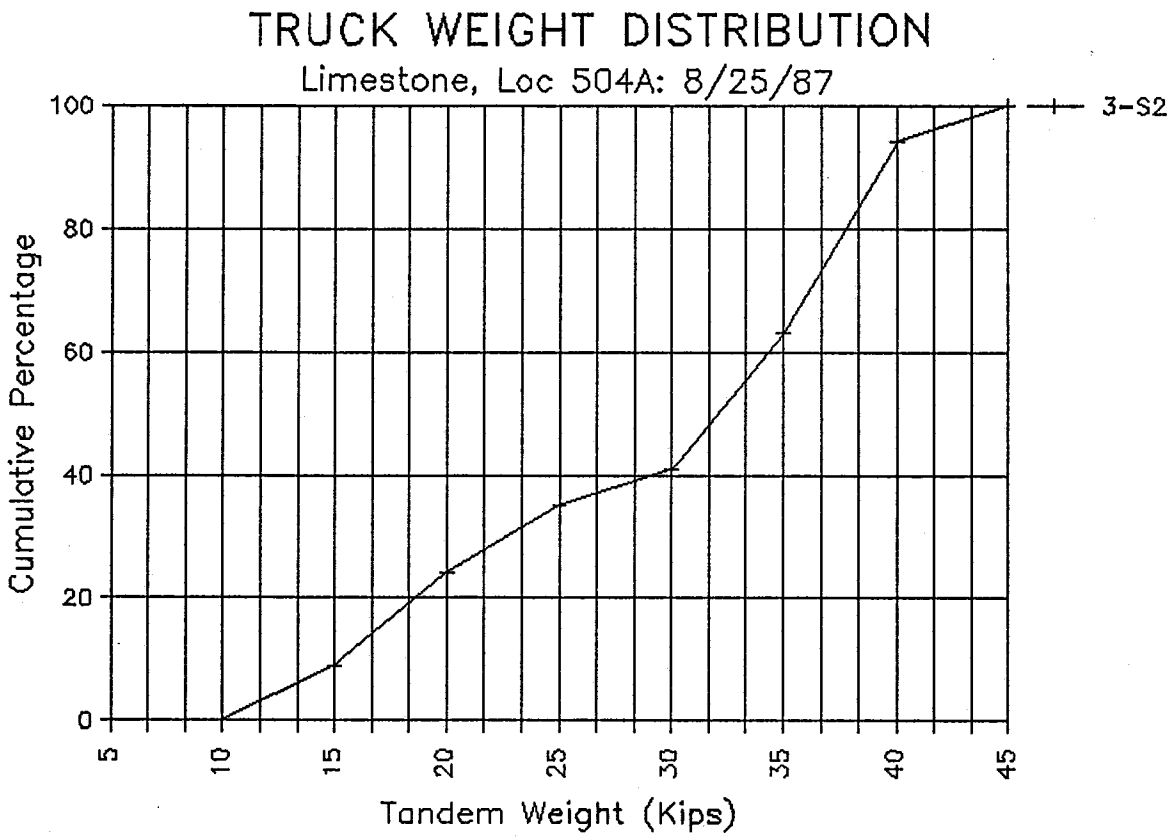


Figure 2.5.2-1 Limestone Truck Weights: 3-S2, Tandem, 8/25/87

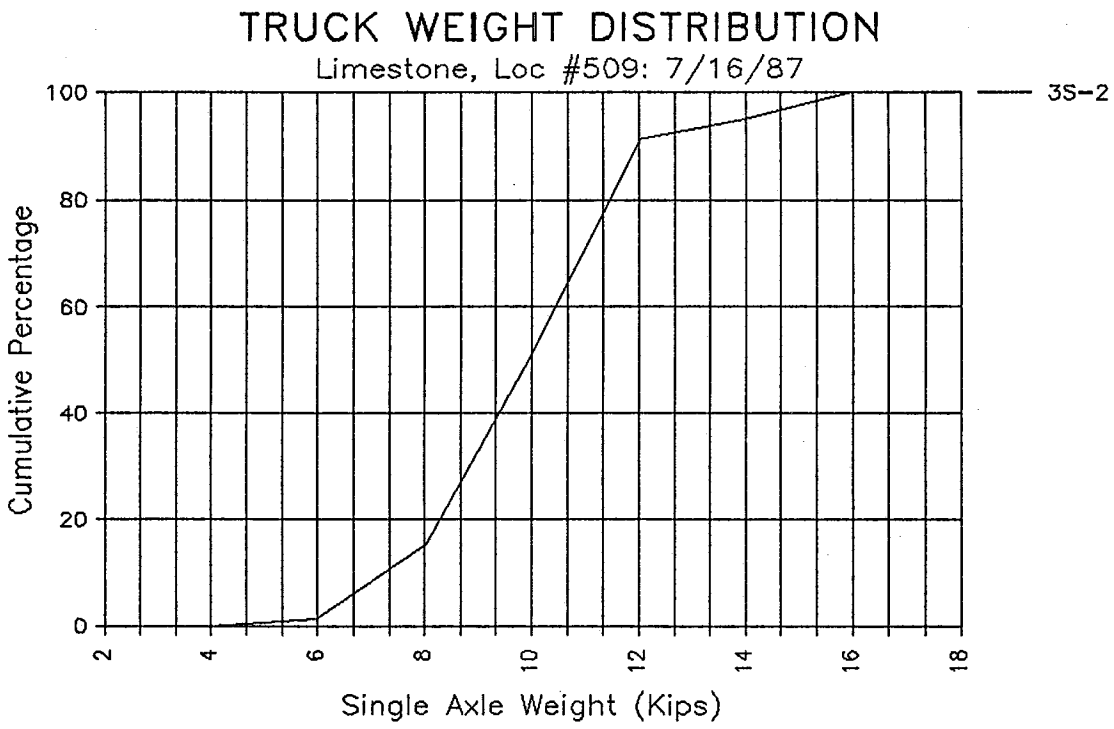


Figure 2.5.2-2 Limestone Truck Weights: 3-S2, Single Axle, 7/16/87

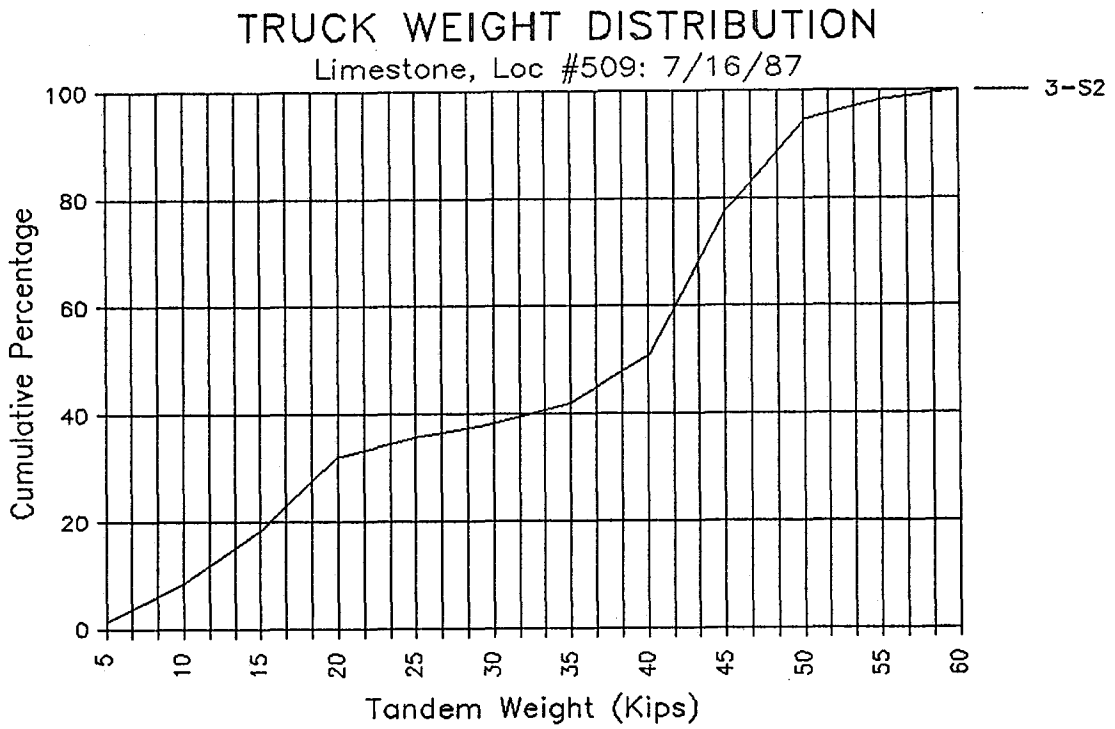


Figure 2.5.2-3 Limestone Truck Weights: 3-S2, Tandem, 7/16/87

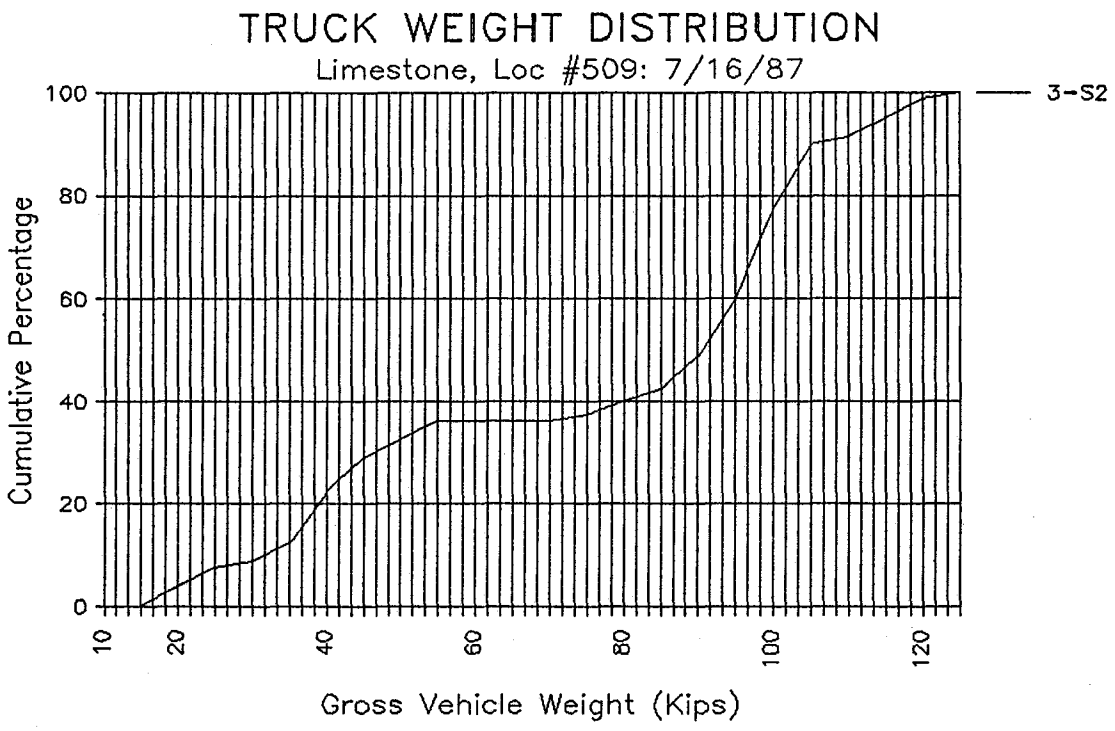


Figure 2.5.2-4 Limestone Truck Weights: 3-S2, Gross Vehicle, 7/16/87

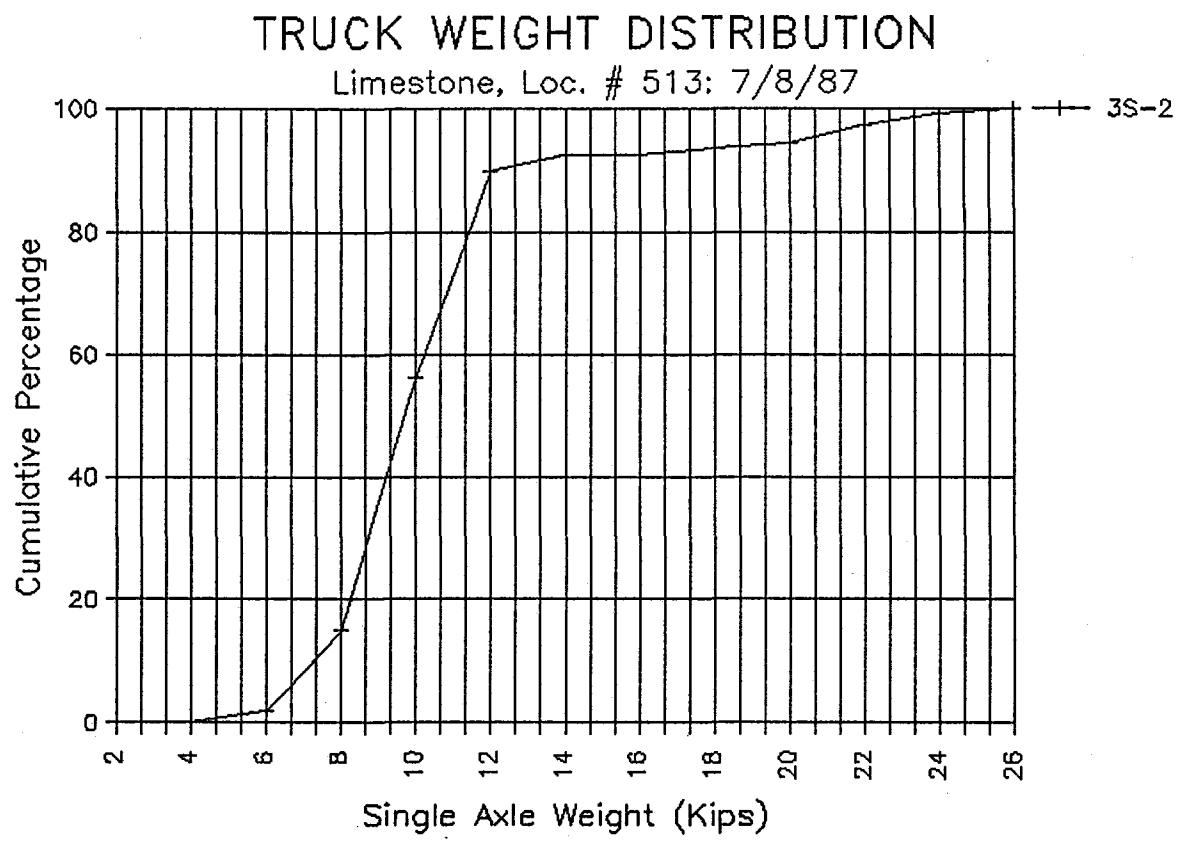


Figure 2.5.2-5 Limestone Truck Weights: 3-S2, Single Axle, 7/8/87

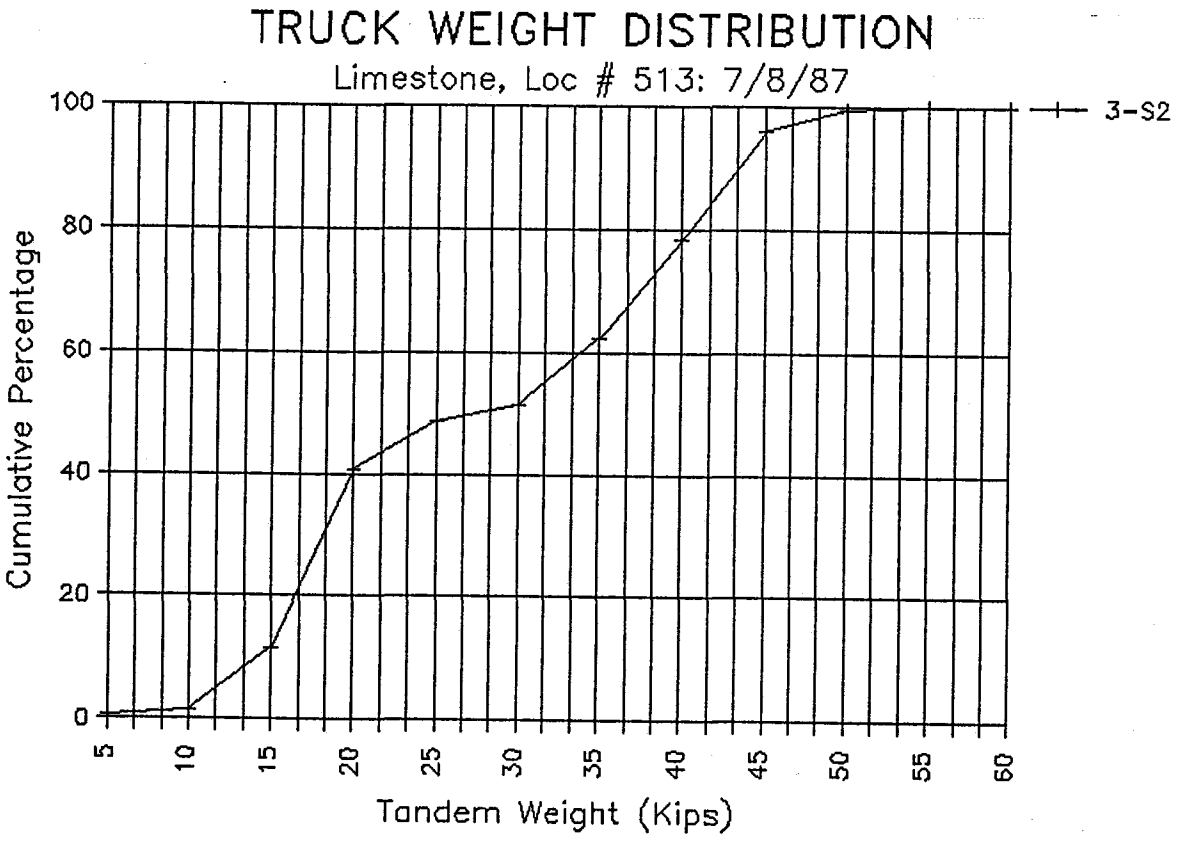


Figure 2.5.2-6 Limestone Truck Weights: 3-S2, Tandem, 7/8/87

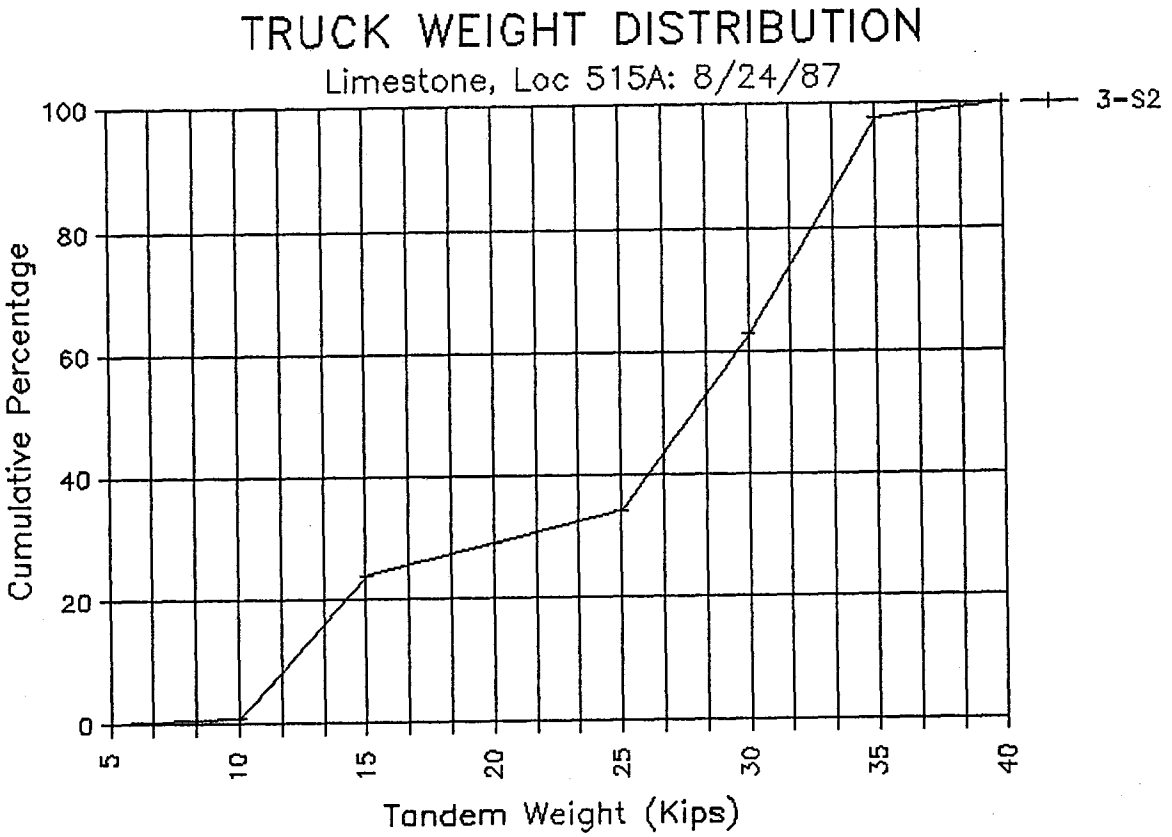


Figure 2.5.2-7 Limestone Truck Weights: 3-S2, Tandem Axle, 8/24/87

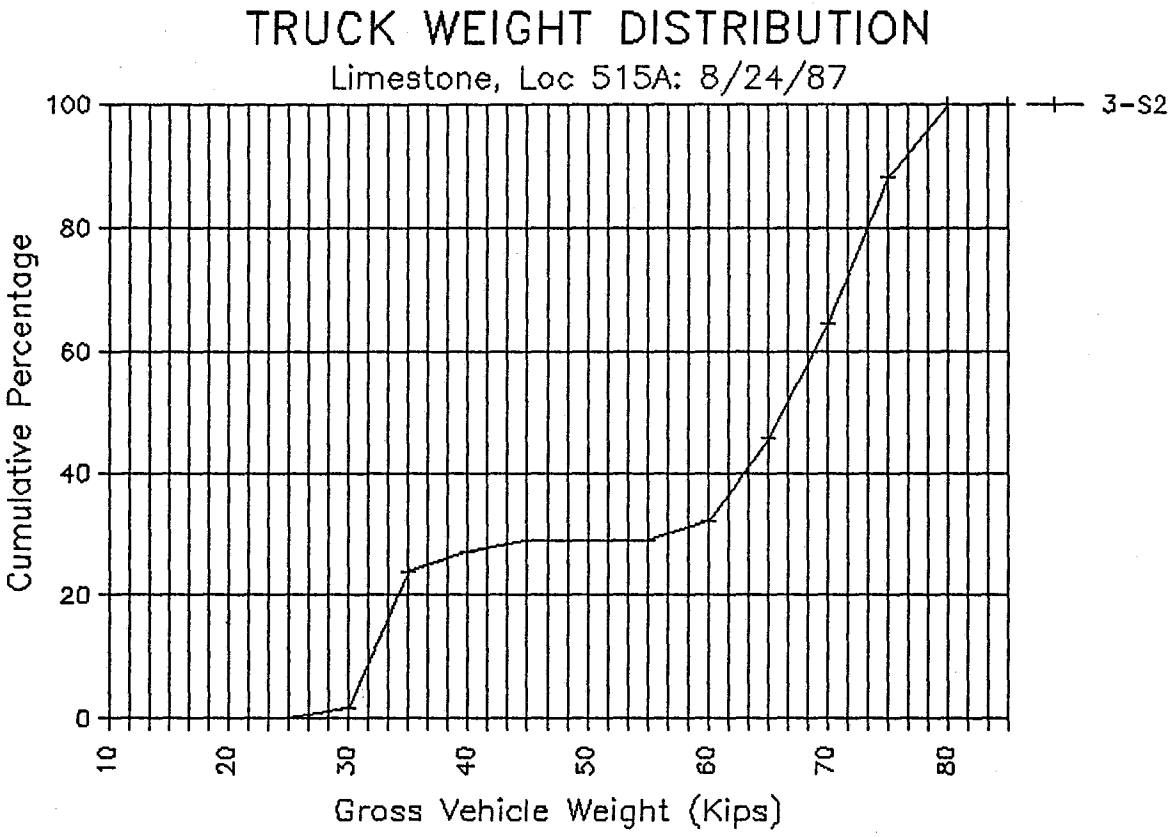


Figure 2.5.2-8 Limestone Truck Weights: 3-S2, Gross Vehicle, 8/24/87

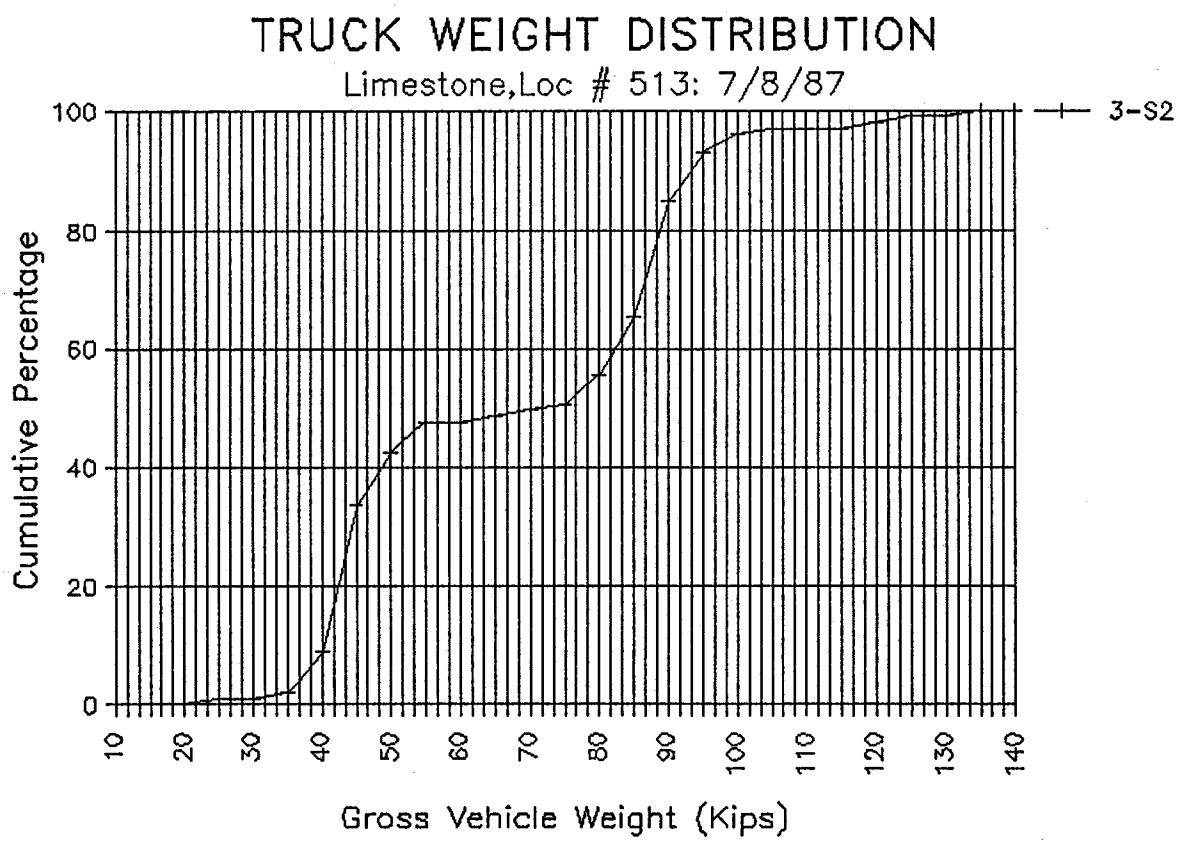


Figure 2.5.2-9 Limestone Truck Weights: 3-S2, Gross Vehicle, 7/8/87

2.5.3 STATEWIDE APPLICATION OF SITE-SPECIFIC LIMESTONE INFORMATION

Table 2.5.3-1 provides a summary of stone production by SDHPT district for the year 1985. This information was supplied by the Texas Bureau of Economic Geology (8).

Table 2.5.3-1 Texas Production of Crushed Stone in 1985

Crushed Stone (1985)

District	Tons	Percent
1	444301	.518
2	17697570	20.6
3	358322	.417
4	1086343	1.27
5	830190	.967
6	2591004	3.02
7	1105354	1.29
8	1433882	1.67
9	7807986	9.10
10	0	0
11	0	0
12	240000	.280
13	0	0
14	18841983	22.0
15	21457466	25.0
16	992768	1.16
17	1000429	1.17
18	5740967	6.69
19	65000	.076
20	70842	.083
21	1393832	1.62
22	0	0
23	1019912	1.19
24	1367333	1.59
25	288131	.336
Total	85833615	100

2.6 SAND AND GRAVEL

2.6.1 CLASSIFICATION COUNTS

2.6.1.1 Sand and Gravel Pit, Site No. 600

Introduction. The site map shown in Figure 2.6.1.1-1 indicates that access is provided by a State Highway. The activity center is located in a rural area. Trucks hauling sand and gravel from this site are drawn primarily to a large urban area to the east of the site. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.1-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. It also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on June 14, 1985. The number of employees working at this site was not obtained.

Figure 2.6.1.1-3 illustrates the breakdown by AASHTO classification of the total traffic entering and leaving the site. The only trucks observed was the 3-S2 combination. Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 26 percent of this total. No interviews were granted at this activity center.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a State Highway carrying an average daily traffic (ADT) of 4,800 in 1986. Manual classification counts were conducted in 1985 and 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.6.1.1-1 provides a summary of the counts taken. First, in Table 2.6.1.1-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.1-1B, a count of all vehicles on the state highway except special-use vehicles is provided. Finally, in Table 2.6.1.1-1C, a total count of all vehicles on the main roadway (sum of 1A and 1B plus special-use vehicles on the roadway) is provided. Included in "other" trucks are 3-2 vehicles (3 axle single unit pulling a pup).

Figure 2.6.1.1-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.1-1C values). The 3-S2 vehicle represents 73 percent of total trucks counted on this roadway. Autos make up 88 percent of the total traffic stream.

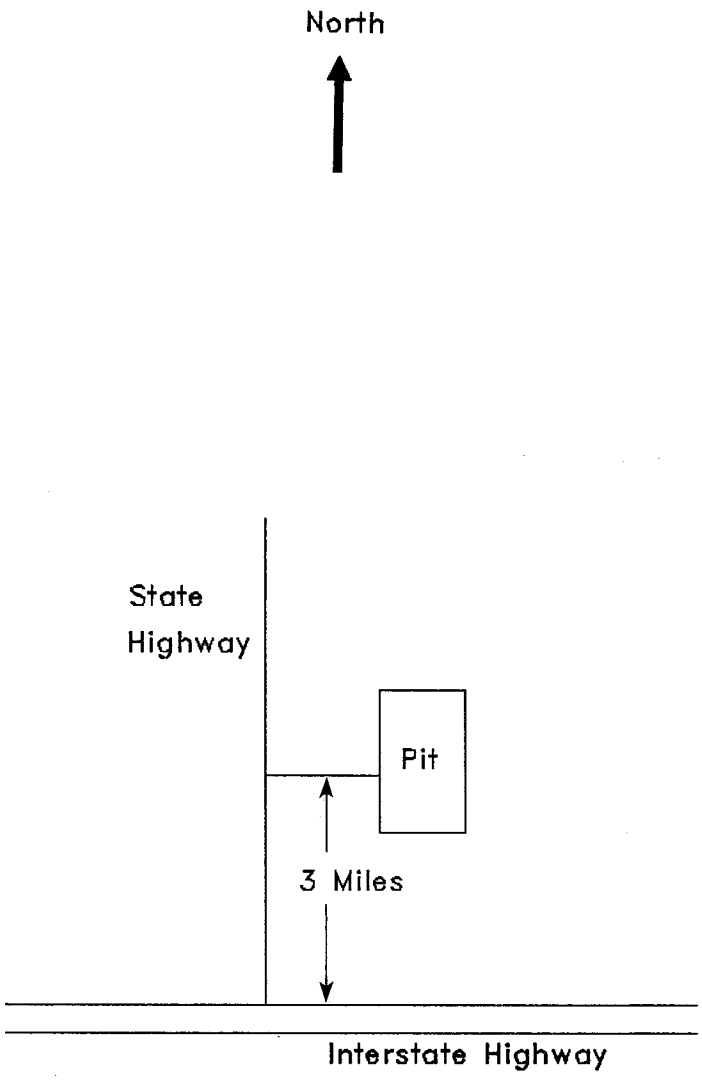
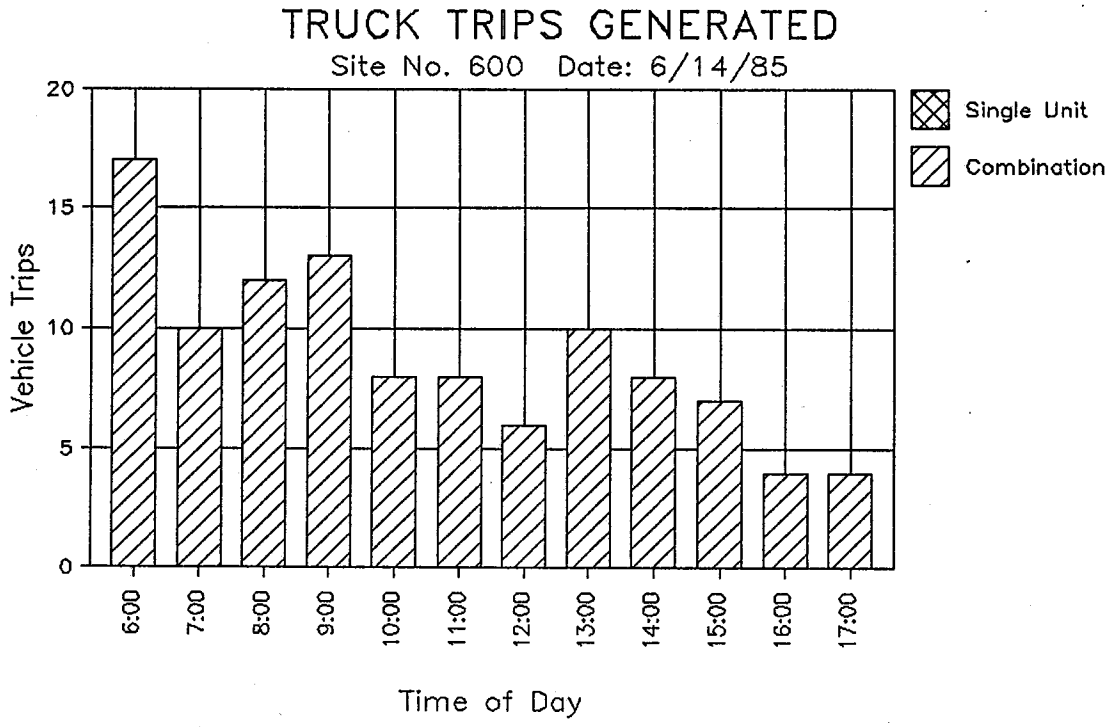


Figure 2.6.1.1-1. Site Map



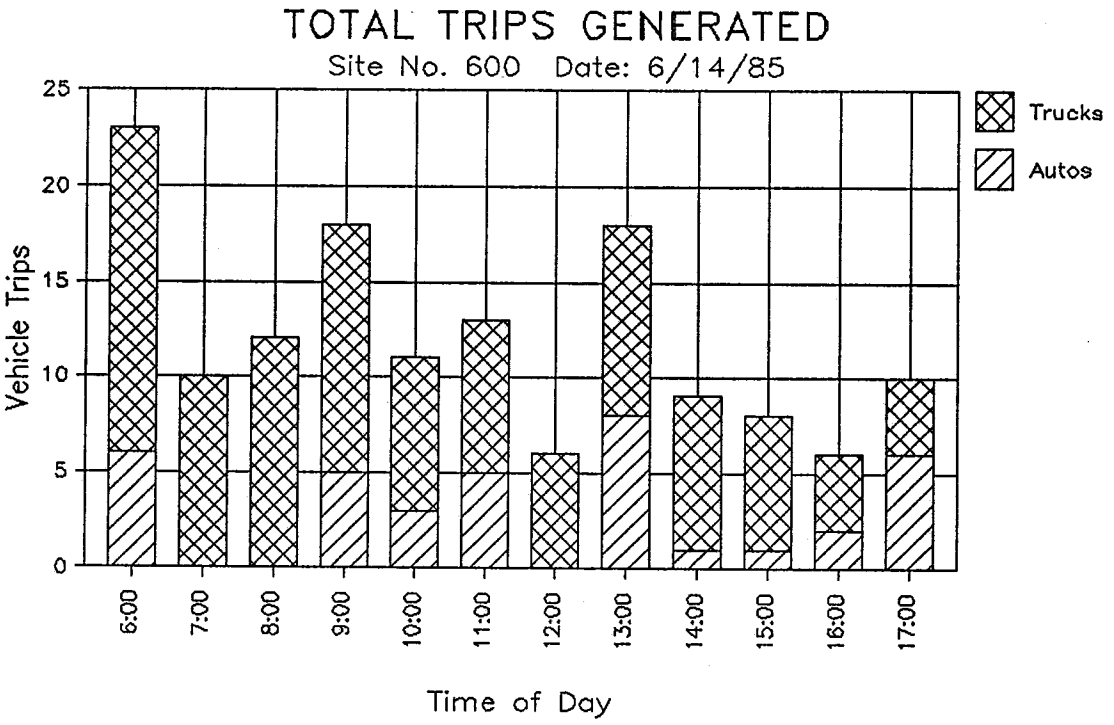


Figure 2.6.1.1-2. Hourly Trip Generation

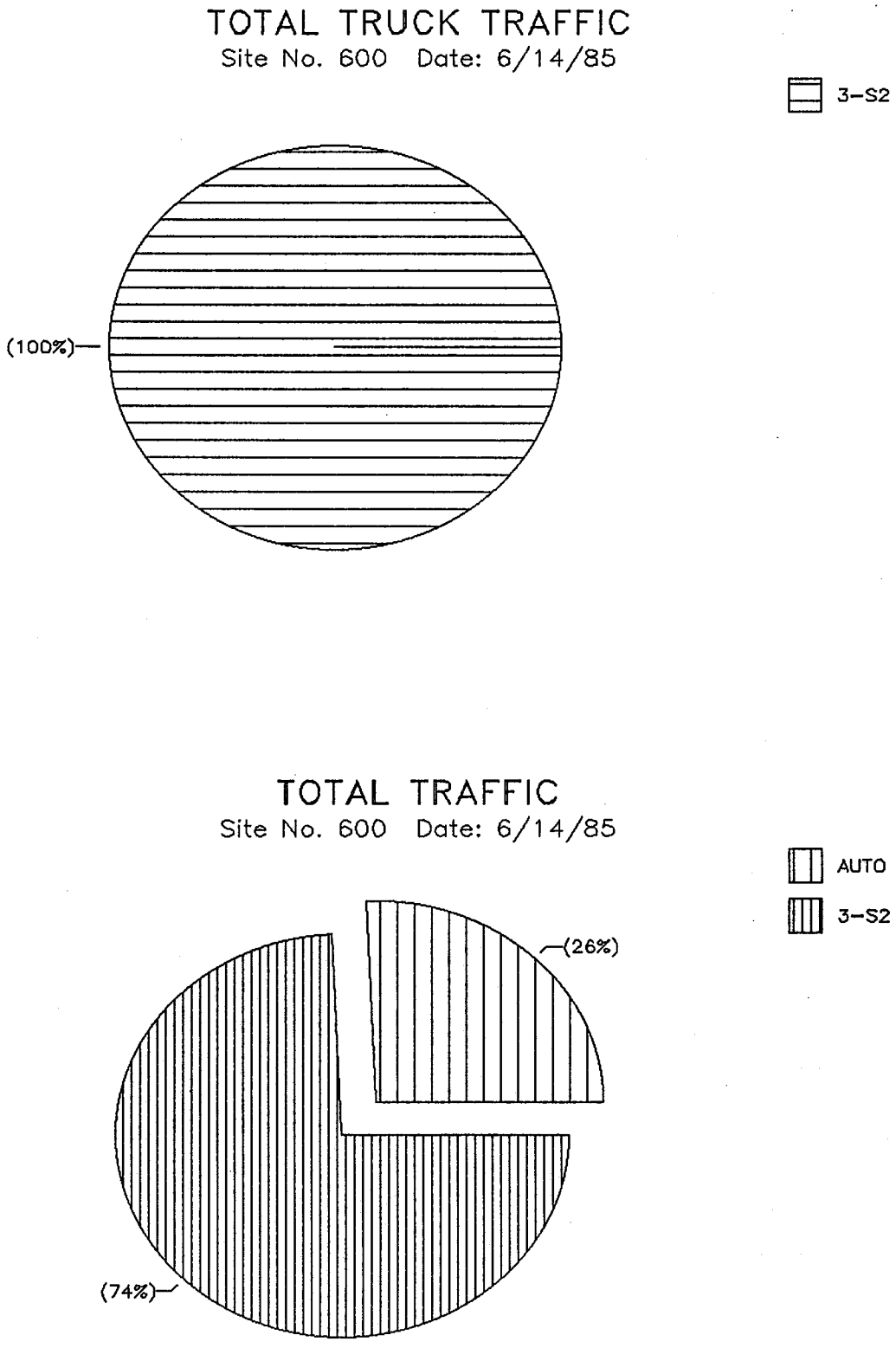


Figure 2.6.1.1-3. Activity Center Vehicle Percentages

Table 2.6.1.1-1. Traffic Classification Count Summary

Table 2.6.1.1-1A. Activity Center Only

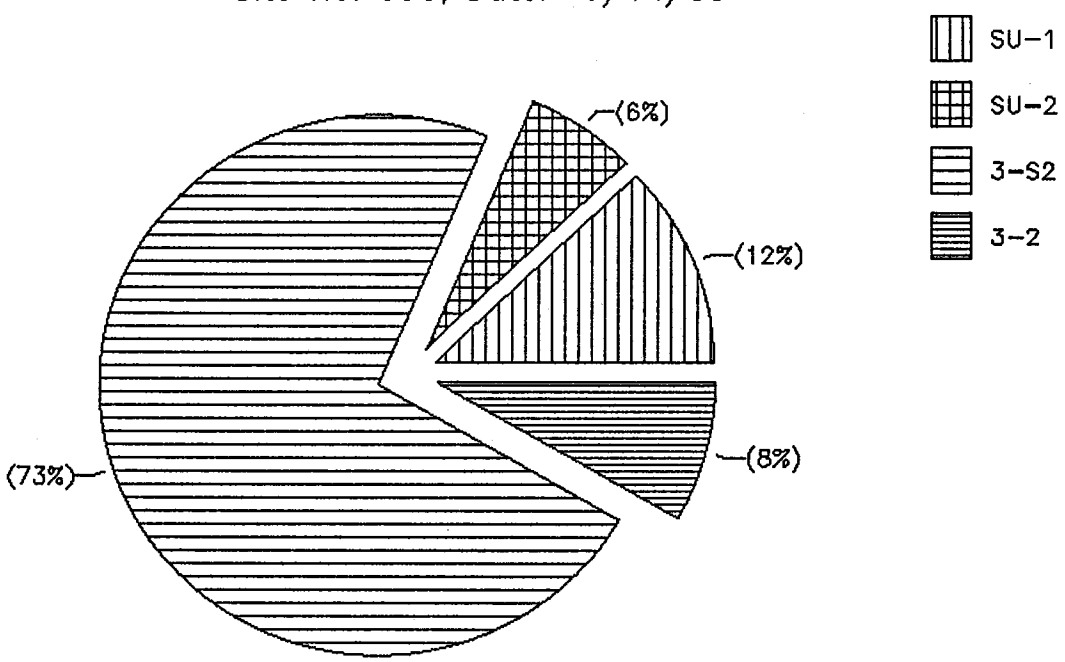
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/14/85	37	0	0	107	0	144	0%	100%	26%	74%

Table 2.6.1.1-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
4/8/88	4510	78	41	331	53	5013	24%	76%	90%	10%

Table 2.6.1.1-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
6/14/85	4547	78	41	463	53	5182	19%	81%	88%	12%



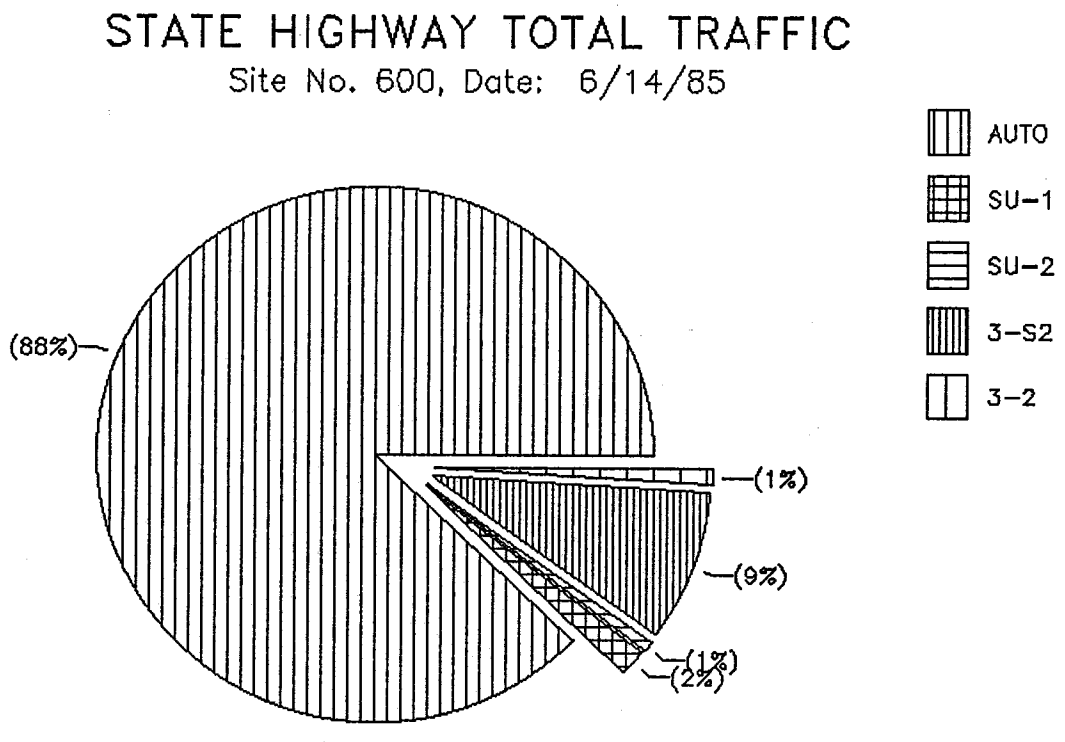


Figure 2.6.1.1-4. Highway Vehicle Percentages

2.6.1.2 Sand and Gravel Pit, Site No. 601

Introduction. The site map shown in Figure 2.6.1.2-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located in a rural area but is near a large urban area. Trucks hauling sand and gravel from this site typically haul within a 20-mile radius. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.2-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. It also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on July 1, 1986. Forty-two employees worked a single shift from 7 a.m. to 5 p.m.

Figure 2.6.1.2-3 illustrates the breakdown by AASHTO classification of the total truck traffic entering and leaving the site. The 3-S2 combination was the predominant truck, accounting for 58 percent of the truck traffic. Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 46 percent of this total.

Interview information indicates average daily production at this pit at 5,350 tons or 1.35 million tons annually. The average number of loads per day was estimated to be 50 single unit trucks and 200 3-S2 combinations.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 3,600 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.6.1.2-1 provides a summary of the counts. First, in Table 2.6.1.2-1A, vehicle classification counts for the activity center only are shown. Second, in Table 2.6.1.2-1B, a count of all vehicles on the Farm-to-Market Highway except special-use vehicles is shown. Finally, in Table 2.6.1.2-1C, a total count of all vehicles on the main roadway is shown.

Figure 2.6.1.2-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.2-1C values). The 3-S2 vehicle represents 56 percent of total trucks counted on this roadway. Autos make up 73 percent of the total traffic stream.

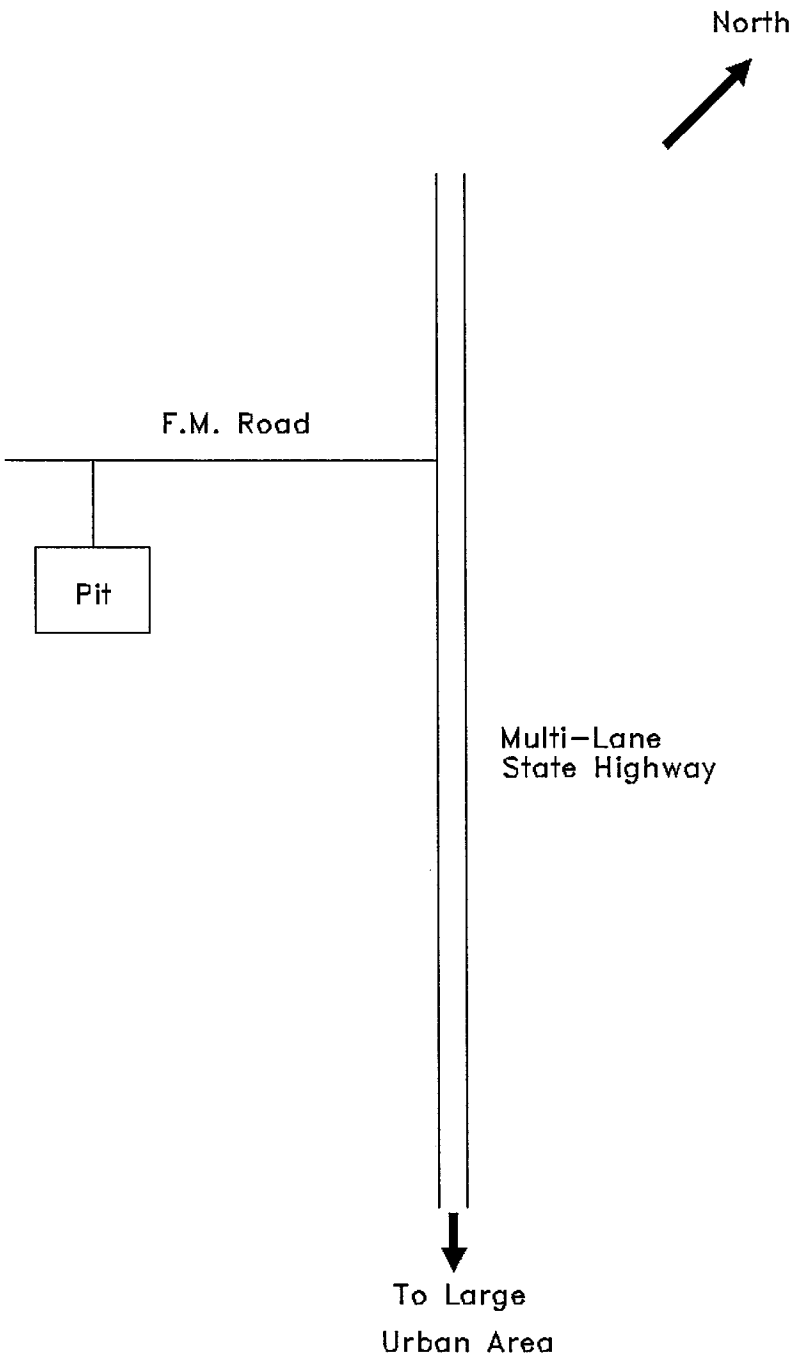
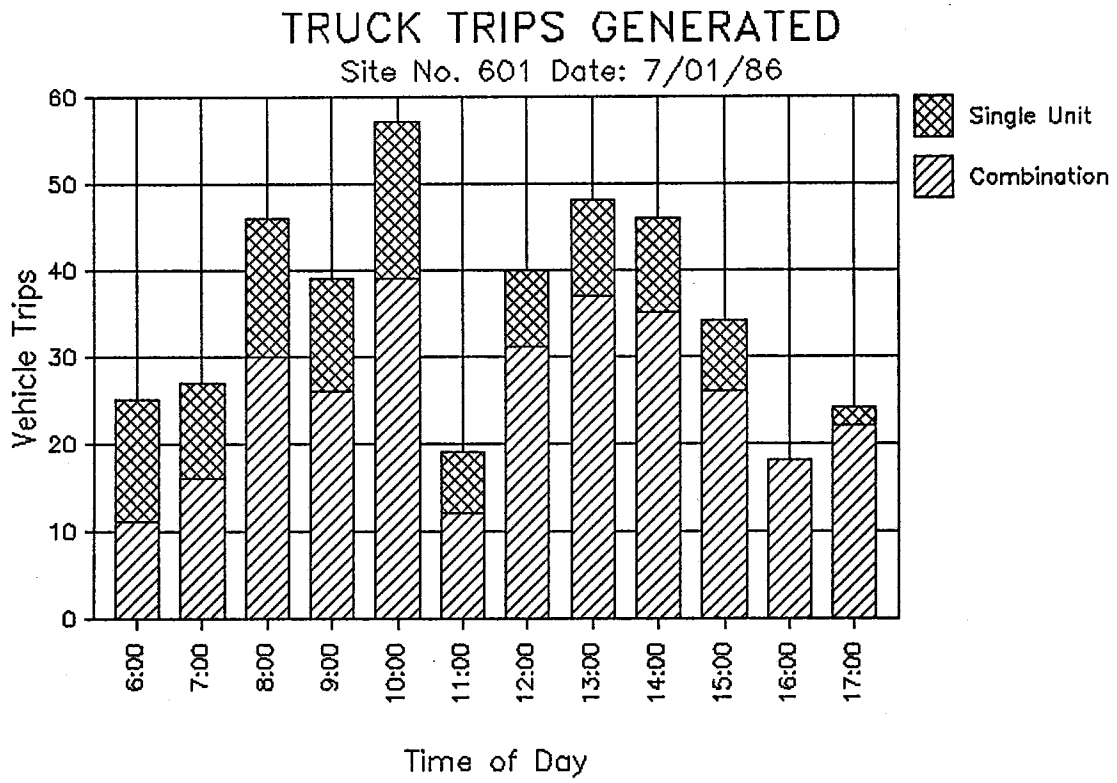


Figure 2.6.1.2-1. Site Map



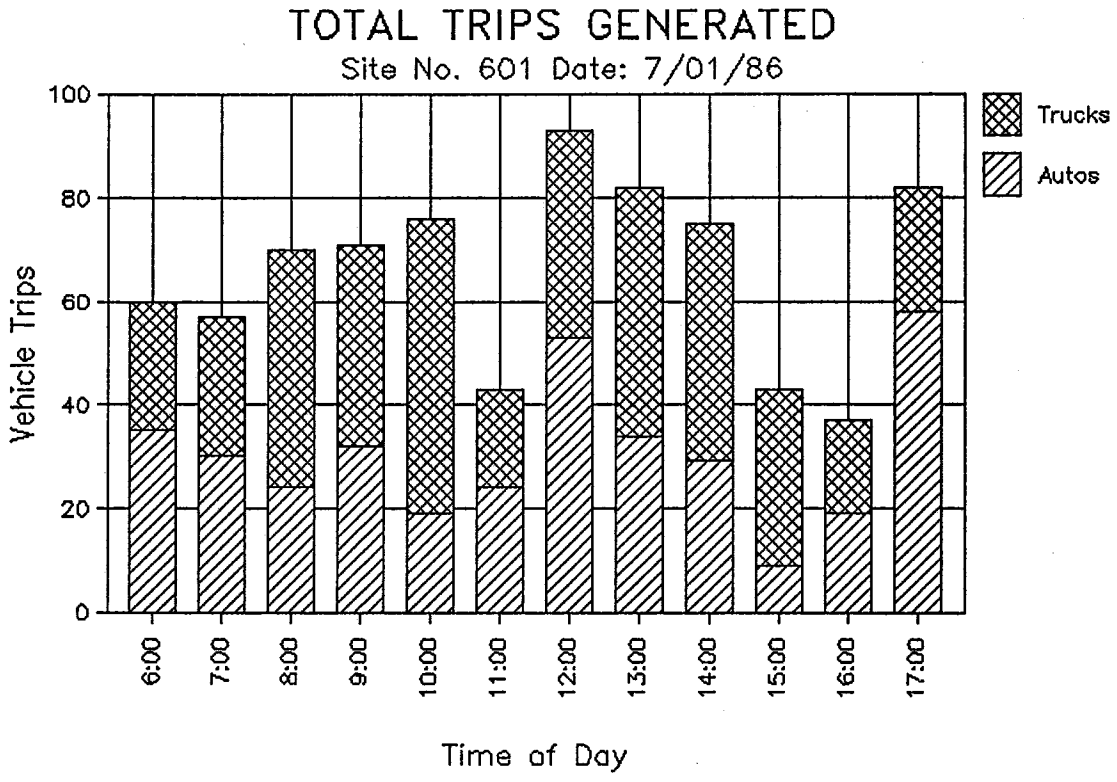
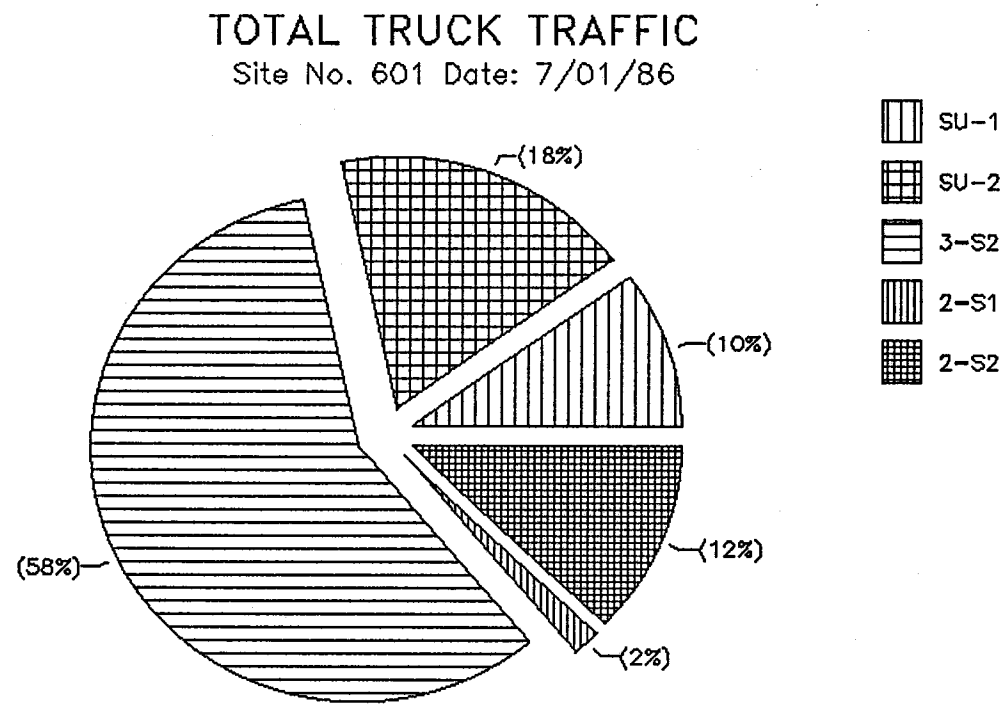


Figure 2.6.1.2-2. Hourly Trip Generation



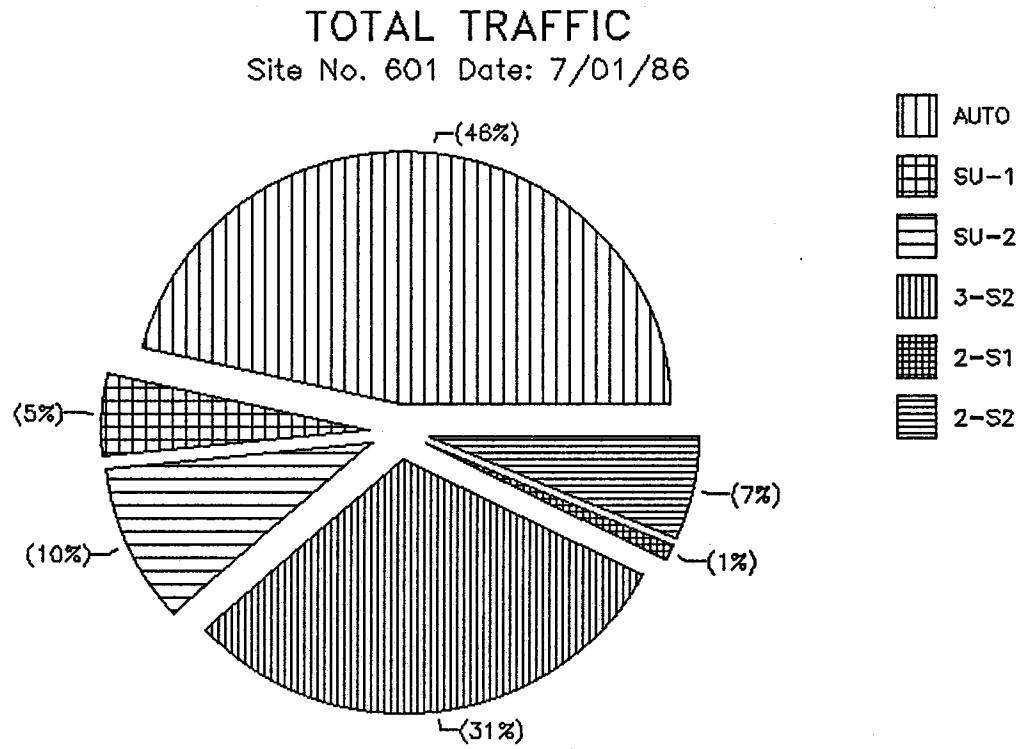


Figure 2.6.1.2-3. Activity Center Vehicle Percentages

Table 2.6.1.2-1. Traffic Classification Count Summary

Table 2.6.1.2-1A. Activity Center Only

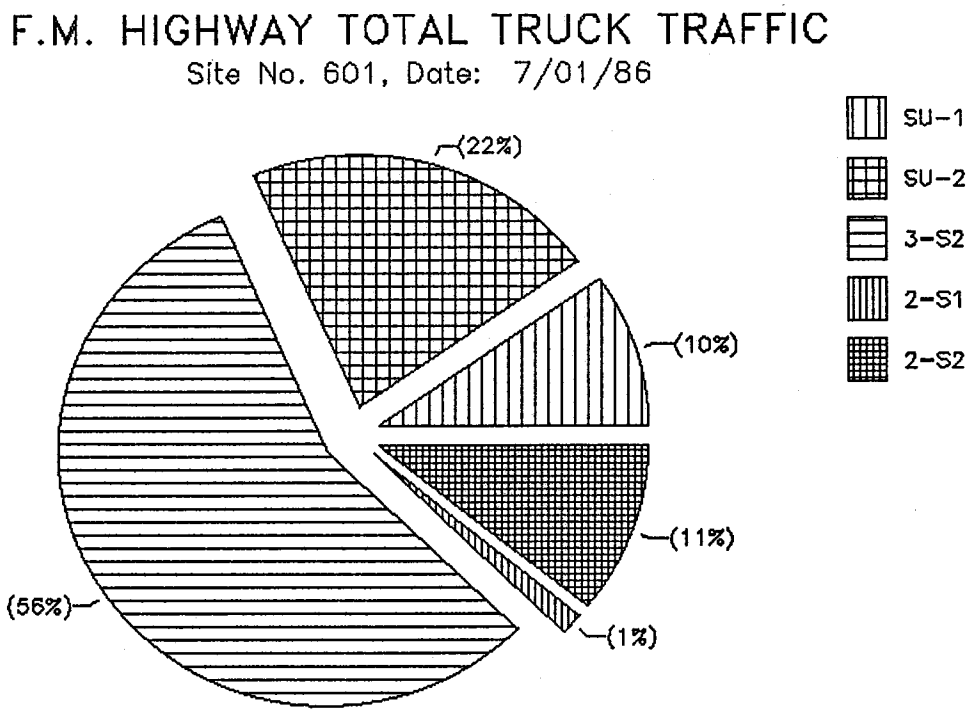
Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	2-S1	2-S2	Total	SU	Comb.	Cars	Trucks
7/01/86	366	42	78	244	7	52	789	32%	68%	50%	50%
7/02/86	363	38	83	204	10	55	753	36%	64%	52%	48%

Table 2.6.1.2-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/01/86	905	4	26	21	0	956	59%	41%	95%	95%
7/02/86	944	4	29	8	0	985	81%	19%	96%	4%

Table 2.6.1.2-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/01/86	1271	46	104	7	52	267	1747	32%	68%	73%	27%
7/02/86	1307	42	112	10	55	214	1740	36%	64%	75%	25%



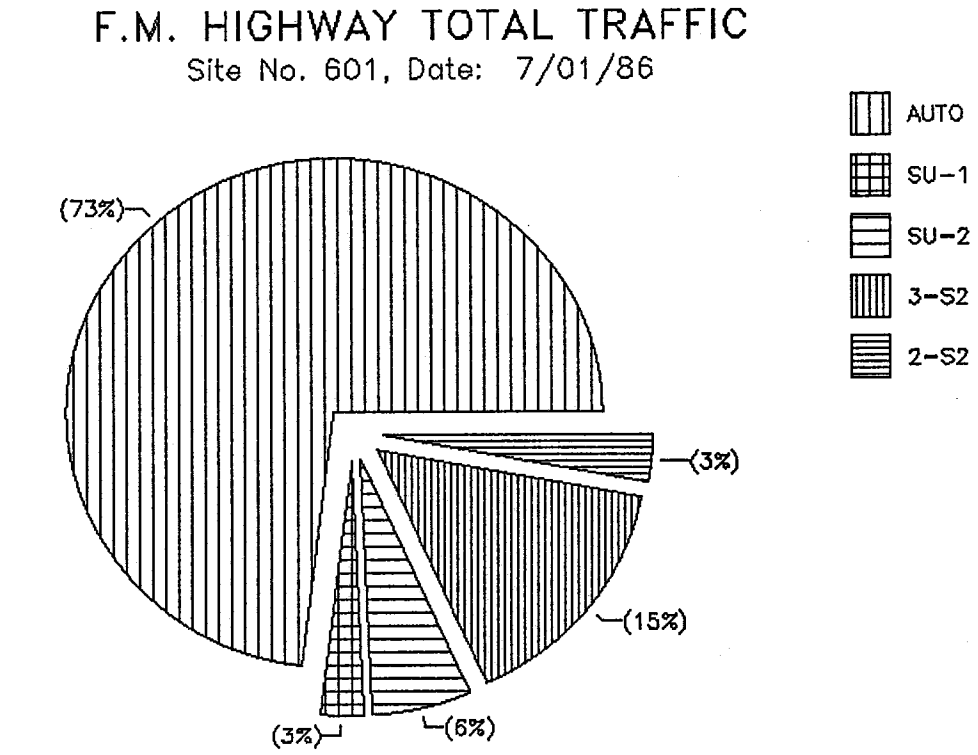


Figure 2.6.1.2-4. Highway Vehicle Percentages

2.6.1.3 Sand and Gravel Pit, Site No. 602

Introduction. The site map shown in Figure 2.6.1.3-1 indicates that access is provided to a state highway via private and local roadways. The activity center is located northeast of a medium-size urban area. Trucks hauling sand and gravel from this site are drawn to this urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.3-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on October 27, 1987. The number of employees working at this site was 11.

Figure 2.6.1.3-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (74%). Also illustrated is the breakdown of total traffic moving to and from the site. Trucks represented 66 percent of this total.

An interview was conducted with an official at the sand and gravel plant. The products leaving the site were estimated at 10 trucks loads on an average day and these loads were all destined for the urban area nearby. The activity center worked only one shift per day from 7:30 a.m. to 5:00 p.m.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was not a state highway but it runs into a state highway a short distance from the activity center. It is estimated that an average daily traffic (ADT) on this state highway was 3,200 in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.3-1 provides a summary of the counts taken. First, in Table 2.6.1.3-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.3-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.3-1C, a total count of all vehicles on the highway (sum of 1A, plus 1B, plus special-use vehicles on the roadway) is provided.

Figure 2.6.1.3-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.3-1C values). The 3-S2 vehicle represents 73 percent of total trucks counted on this highway. Autos make up 91 percent of the total traffic shown.

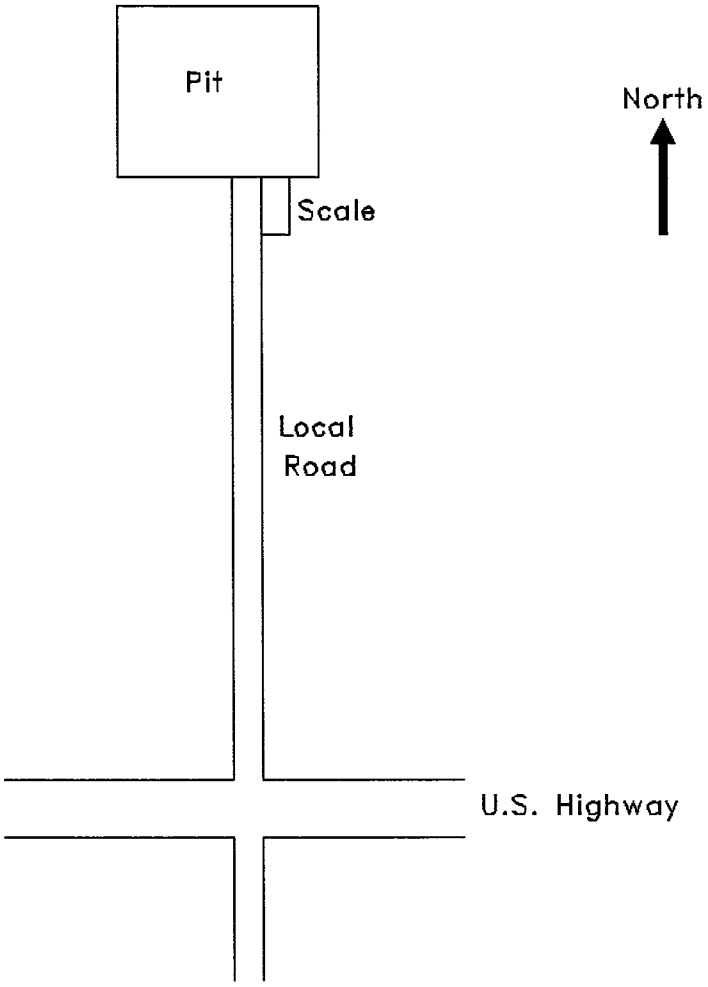
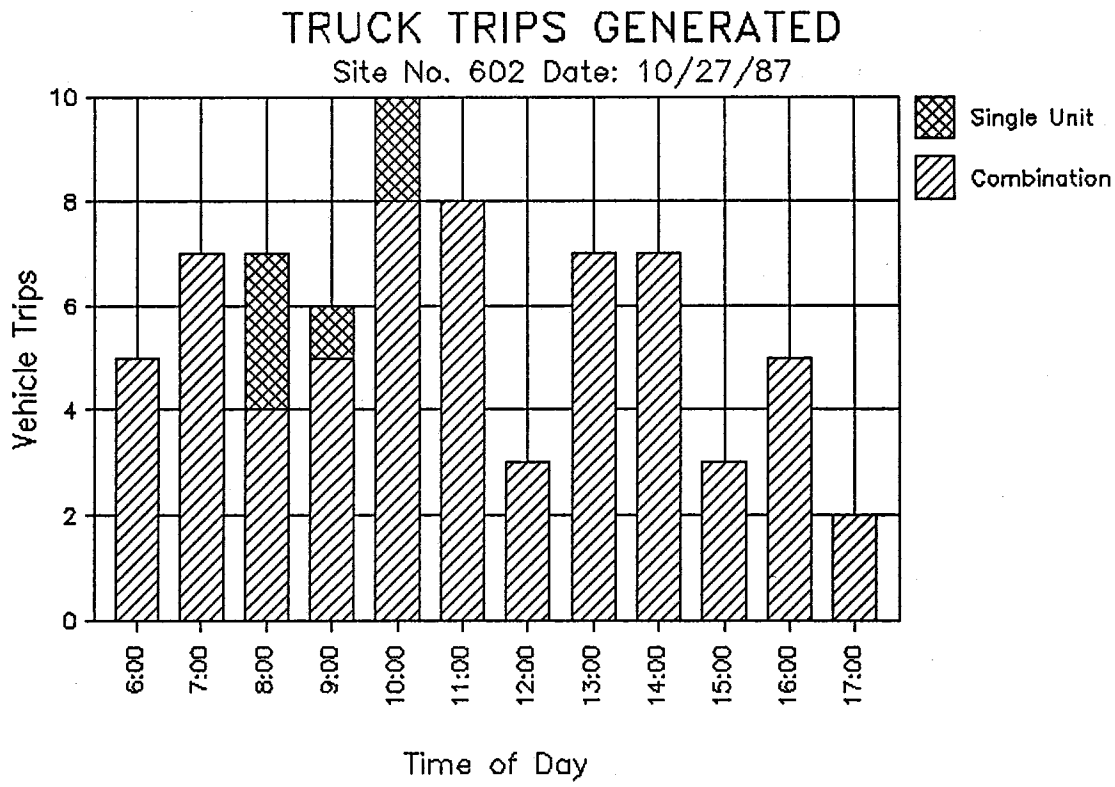


Figure 2.6.1.3-1. Site Map



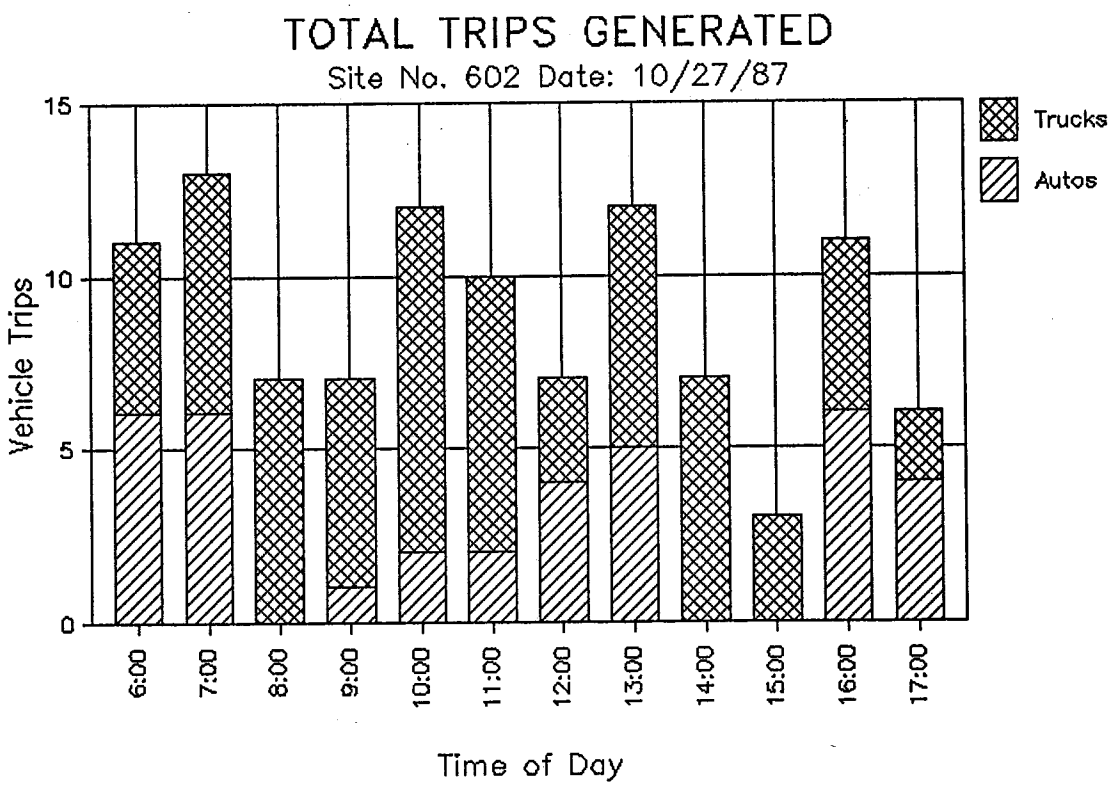


Figure 2.6.1.3-2. Hourly Trip Generation

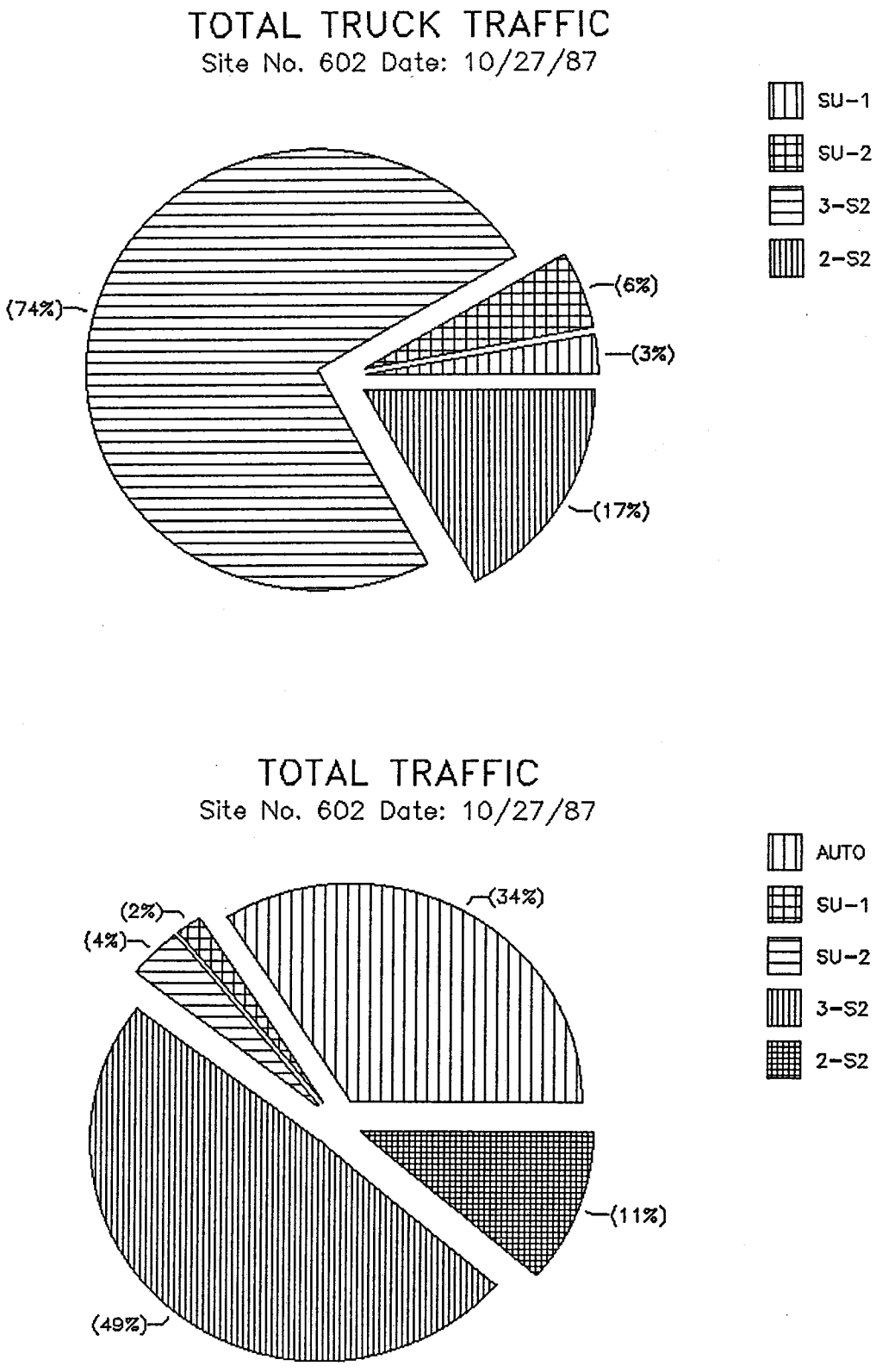


Figure 2.6.1.3-3. Activity Center Vehicle Percentages

Tale 2.6.1.3-1. Traffic Classification Count Summary

Table 2.6.1.3-1A. Activity Center Only

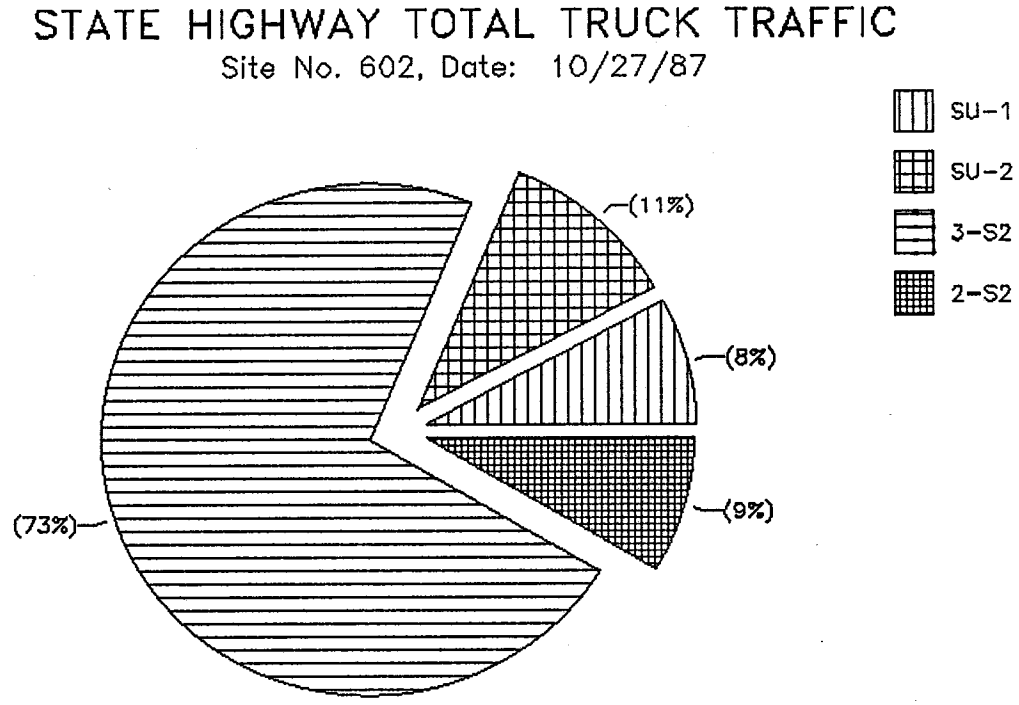
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10-27-86	36	2	4	52	12	106	9%	91%	34%	66%

Table 2.6.1.3-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10-27-87	1373	9	11	49	0	1442	29%	71%	95%	5%

Table 2.6.1.3-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
10-27-87	1409	11	15	101	12	1548	19%	81%	91%	9%



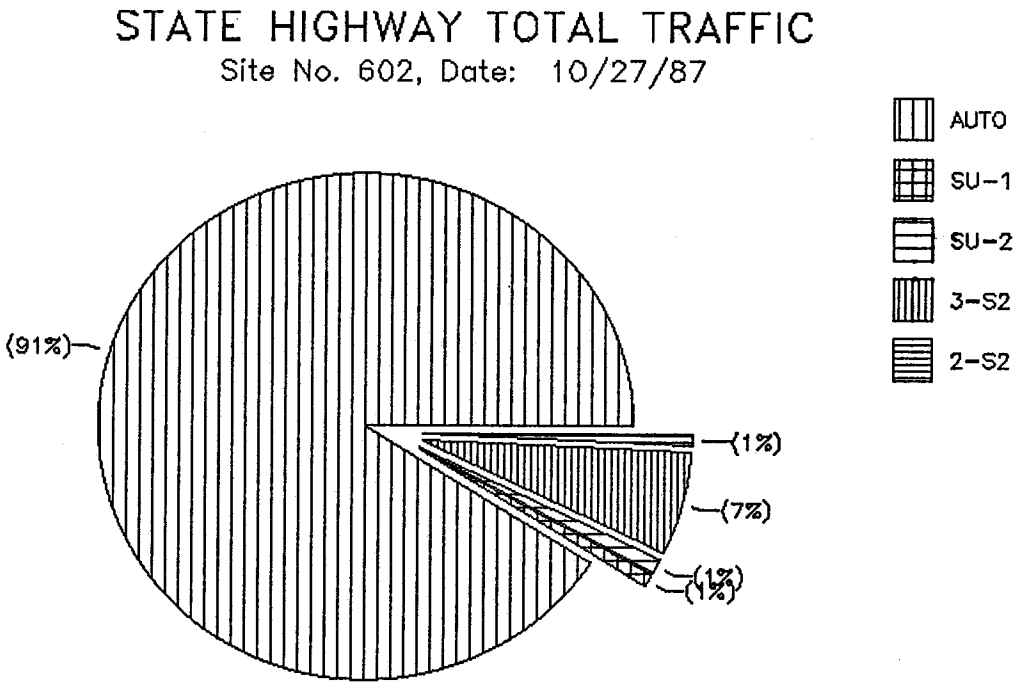


Figure 2.6.1.3-4. Highway Vehicle Percentages

2.6.1.4 Sand and Gravel Pit, Site No. 603

Introduction. The site map shown in Figure 2.6.1.4-1 indicates that access to the activity center is provided by a roadway that connects to a Farm-to-Market Highway. The activity center is located in a rural area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.4-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on October 21, 1987. The number of employees working at this site was not obtained. They worked two shifts from 7:30 a.m. to 6 p.m. and form 6 p.m. to 5 a.m..

Figure 2.6.1.4-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (88%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 52 percent of this total.

An interview was conducted with an official of the sand and gravel plant. The products leaving the plant were estimated at 4 single unit trucks and 65 3-S2 trucks on an average day.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center runs into a Farm-to-Market Highway a short distance from the activity center. It is estimated that this FM Highway had an average daily traffic (ADT) of 370 in 1986. manual classification counts were conducted in 1986 and 1987 primarily to determine the impact of special-use activities on the FM Highway. Table 2.6.1.4-1 provides a summary of the counts taken. First in Table 2.6.1.4-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.4-1B, a count of all vehicles on the FM Highway is obtained with the exception of special-use vehicles. Finally, in Table 2.6.1.4-1C, a total count of all vehicles on the FM Highway (sum of 1A plus 1B plus special-use vehicles on the roadway) is provided.

Figure 2.6.1.4-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.4-1C values). The 3-S2 vehicle represents 66 percent of total trucks counted on this highway. Autos make up 50 percent of the total traffic shown.

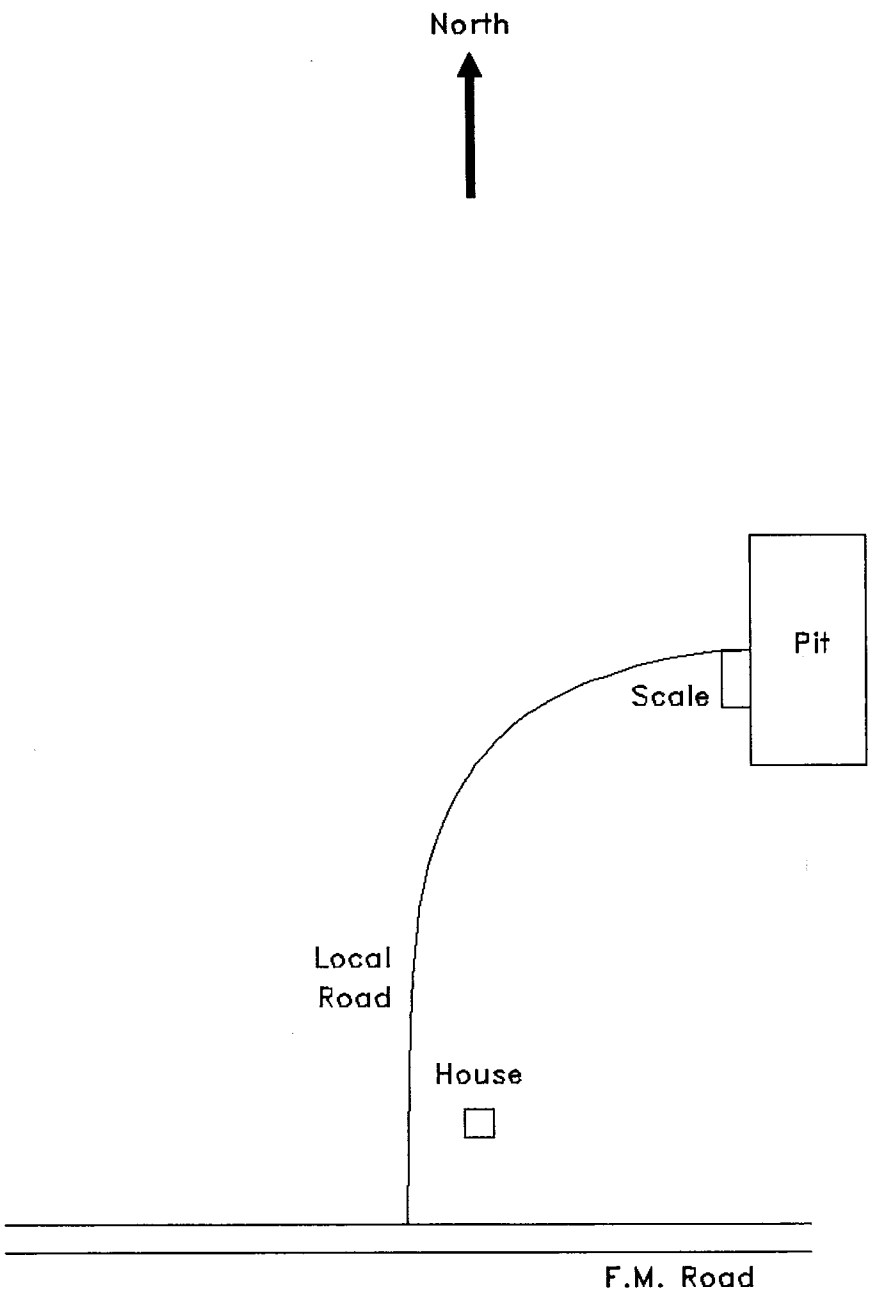
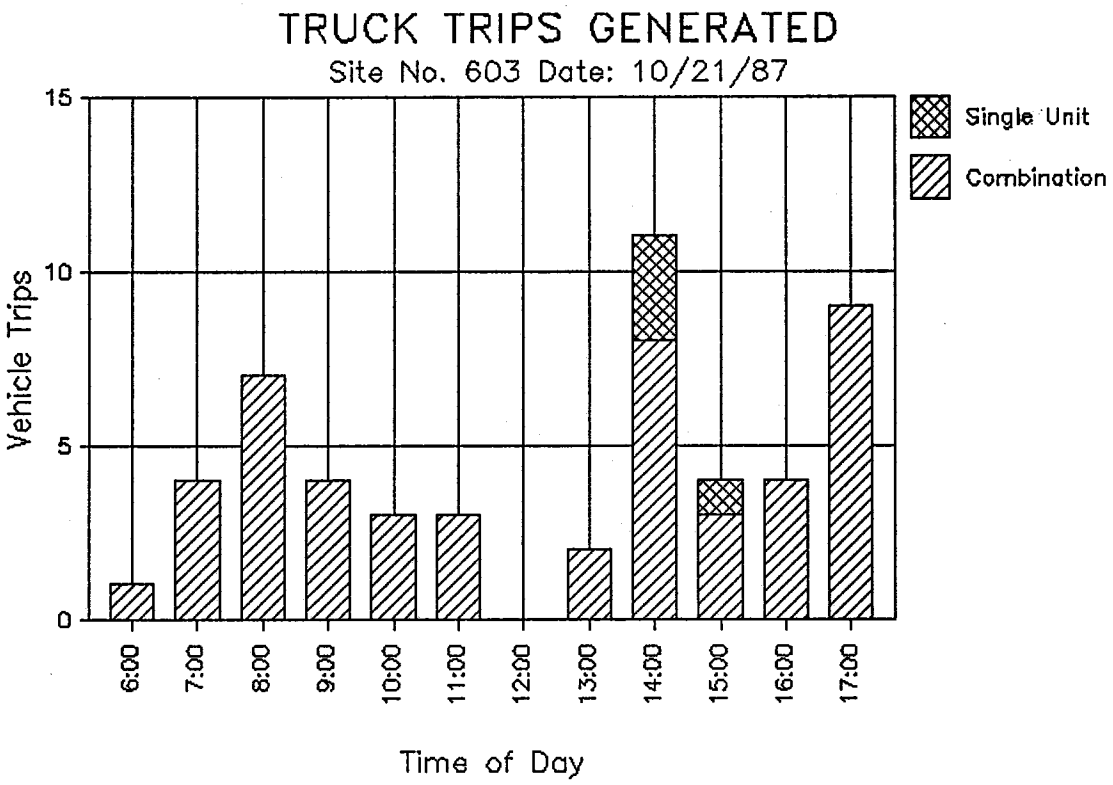


Figure 2.6.1.4-1. Site Map



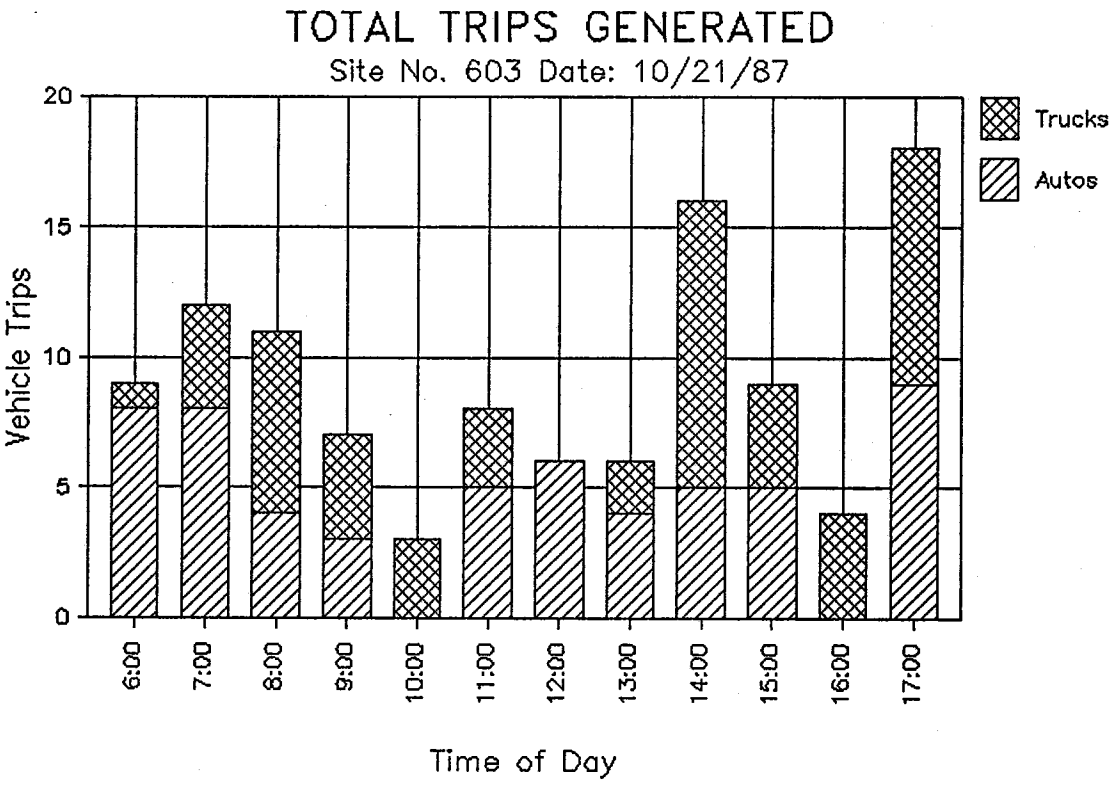
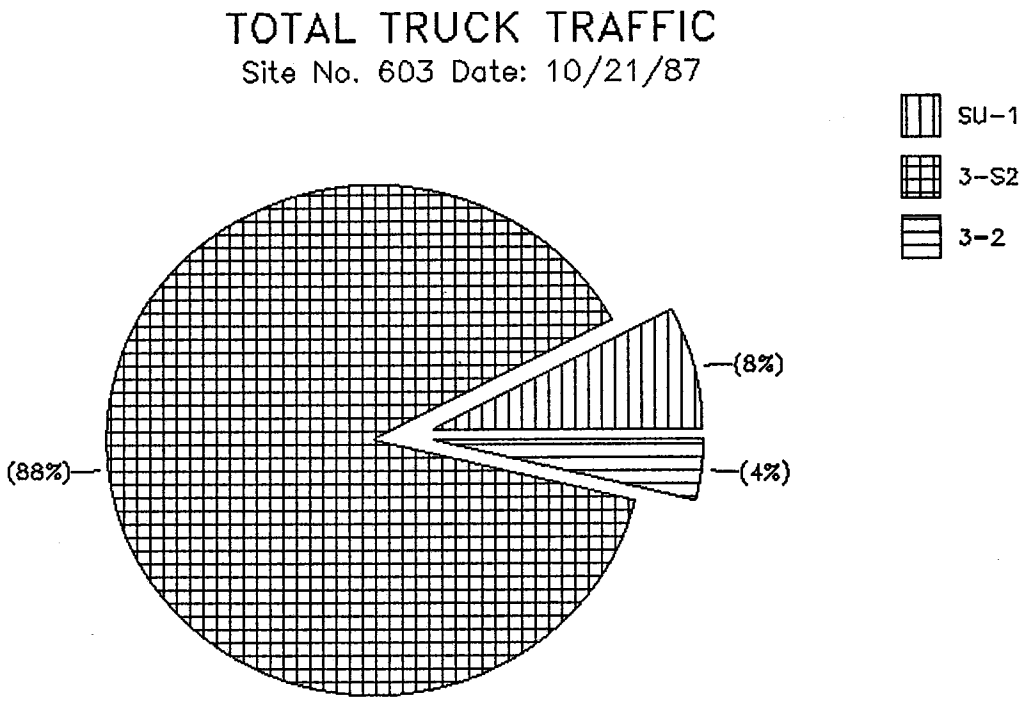


Figure 2.6.1.4-2. Hourly Trip Generation



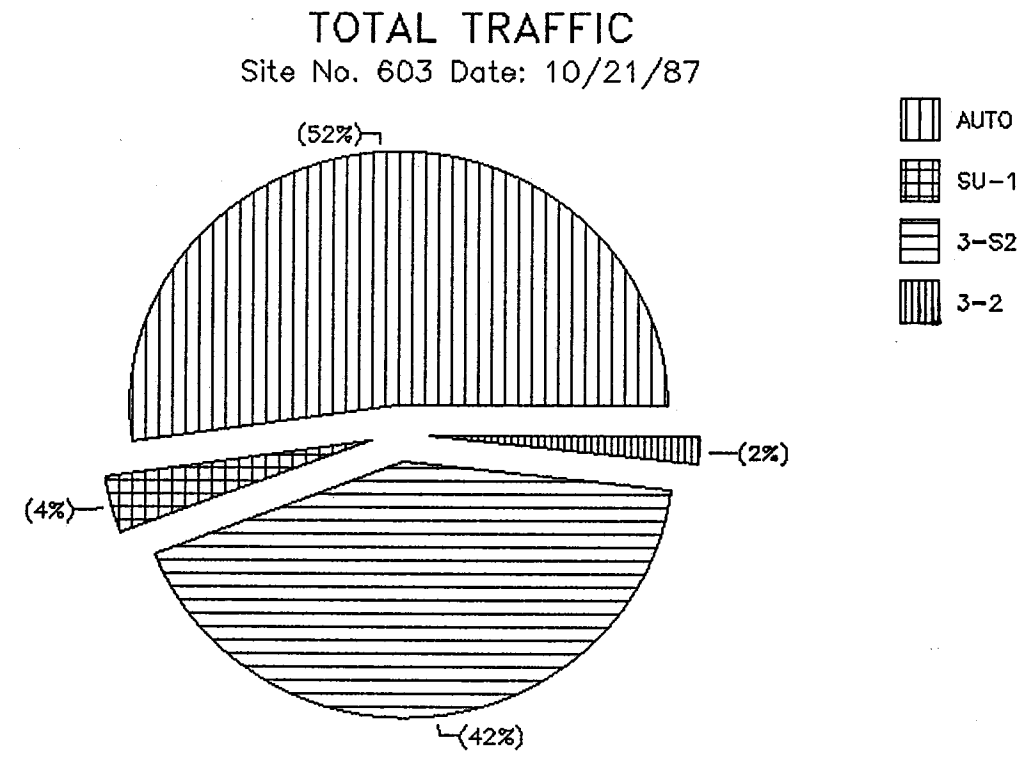


Figure 2.6.1.4-3. Activity Center Vehicle Percentages

Table 2.6.1.4-1. Traffic Classification Count Summary

Table 2.6.1.4-1A. Activity Center Only

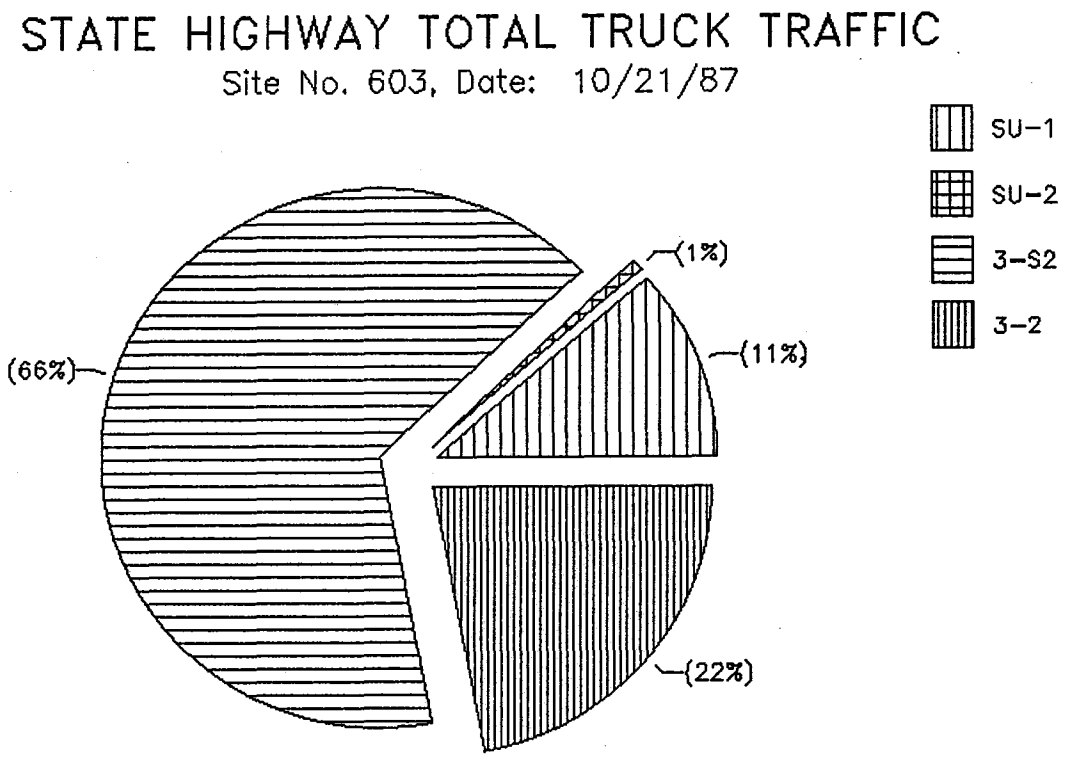
Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
11/13/86	79	0	15	52	0	146	22%	78%	54%	46%
10/21/87	57	4	0	46	2	109	8%	92%	52%	48%

Table 2.6.1.4-1B. Roadway Without Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
11/13/86	208	0	14	3	0	225	82%	18%	92%	8%
10/21/87	81	12	1	46	29	169	15%	85%	48%	52%

Table 2.6.1.4-1C. Roadway With Special-Use Traffic

Date	Autos	Vehicle Classification SU-1	SU-2	3-S2	Other	Total	% of Trucks SU	Comb.	% of Total Cars	Trucks
11/13/86	287	0	29	55	0	371	35%	65%	77%	23%
10/21/87	138	16	1	92	31	278	12%	88%	50%	50%



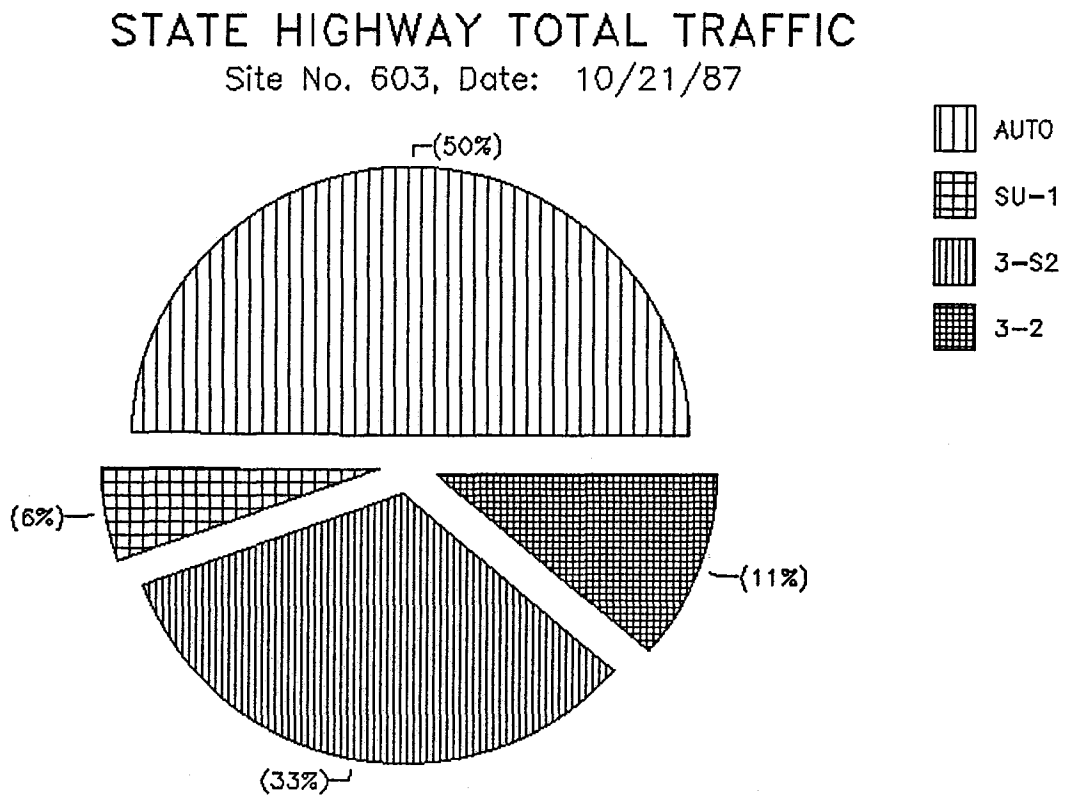


Figure 2.6.1.4-4. Highway Vehicle Percentages

2.6.1.5 Sand and Gravel Pit, Site No. 604A

Introduction. The site map shown in Figure 2.6.1.5-1 indicates that access is provided by a roadway which connects to a State Highway. The activity center is located south of a relatively small urban area. Trucks hauling sand and gravel from this site are serving an area of approximately 150-mile radius from the site. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.5-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during a 12-hour period (6 a.m. to 6 p.m.) on October 11, 1986. The number of employees working at this site was 20.

Figure 2.6.1.5-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (99%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 7 percent of this total.

An interview was conducted with an official at the sand and gravel plant. The products leaving the site were estimated at an average of one single unit truck and 65 3-S2 combinations per day. The activity center worked only one shift from 7 a.m. to 3 p.m. per day.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center intersects with a State Highway approximately five miles from the site. It is estimated that this state highway had an average daily traffic (ADT) of 3,600 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.5-1 provides a summary of the counts taken. First, in Table 2.6.1.5-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.5-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.5-1C, a total count of all vehicles on the highway is provided.

Figure 2.6.1.5-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.5-1C values). The 3-S2 vehicle represents 85 percent of total trucks counted on this highway. Autos make up 75 percent of the total traffic shown.

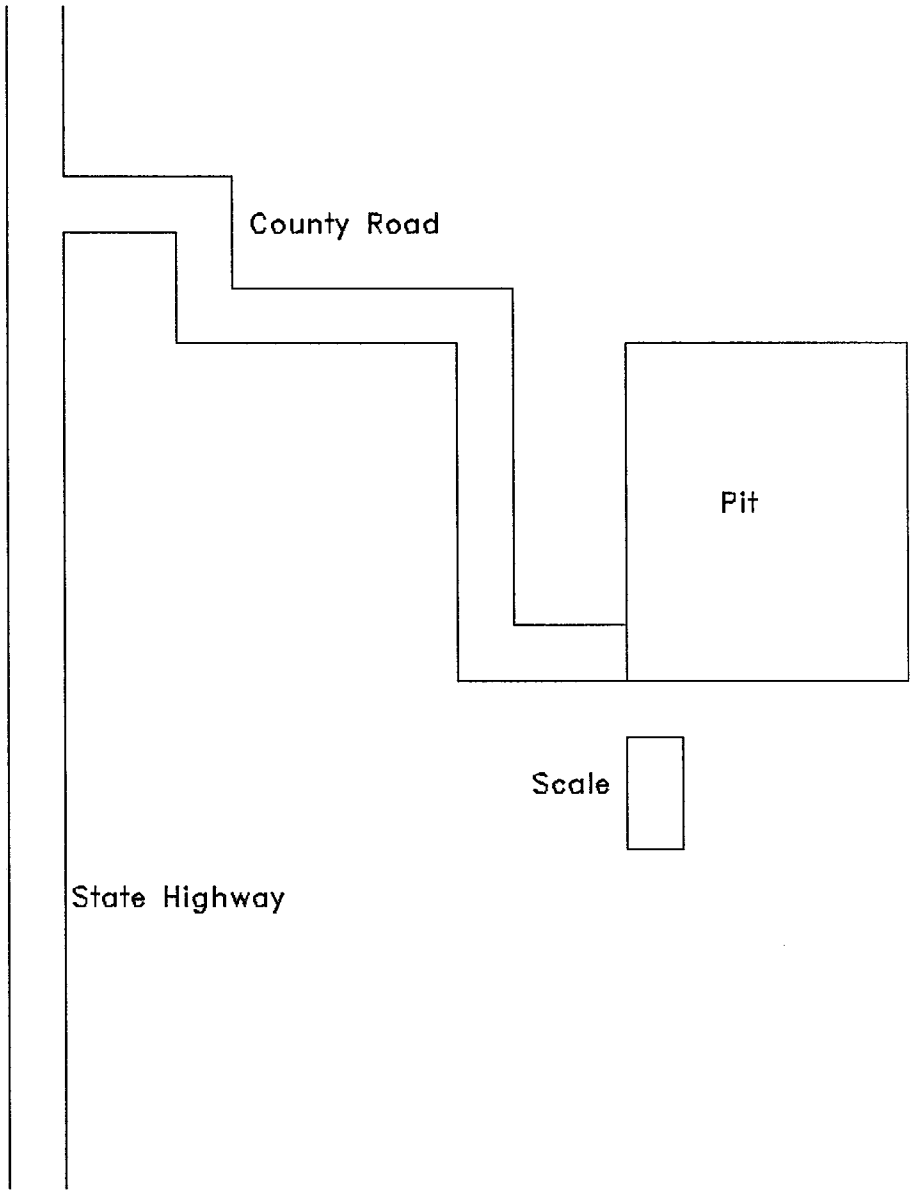
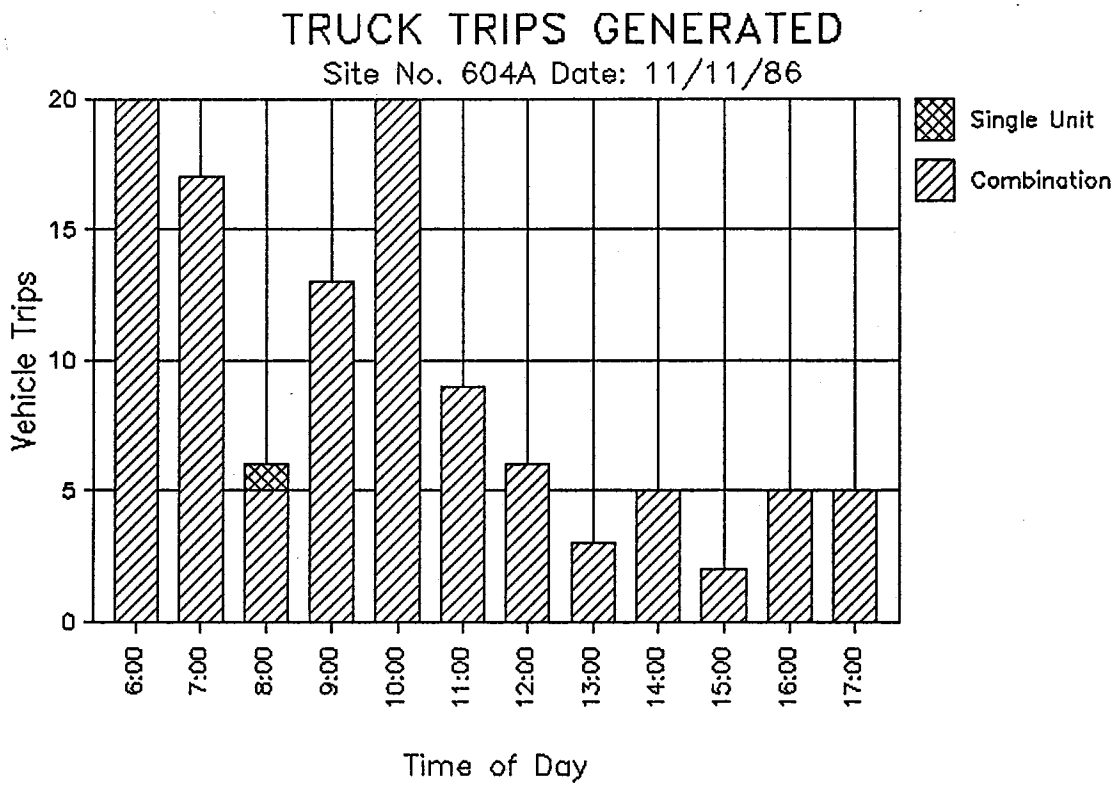


Figure 2.6.1.5-1. Site Map



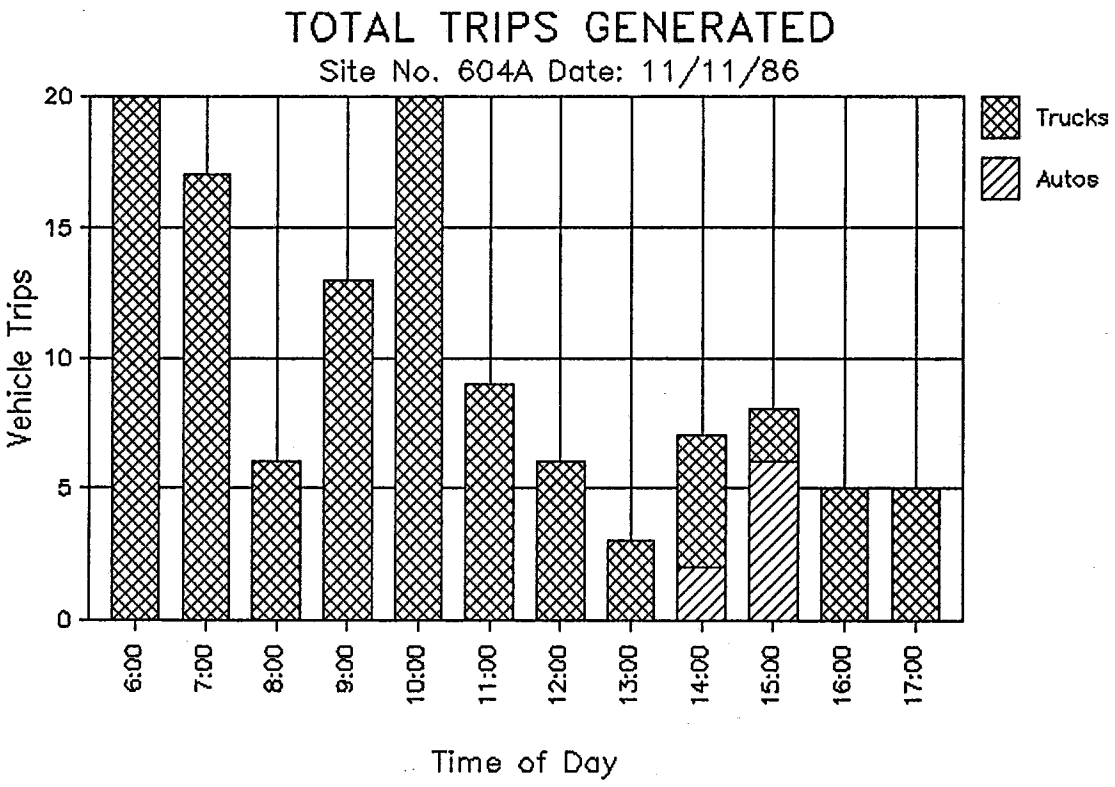
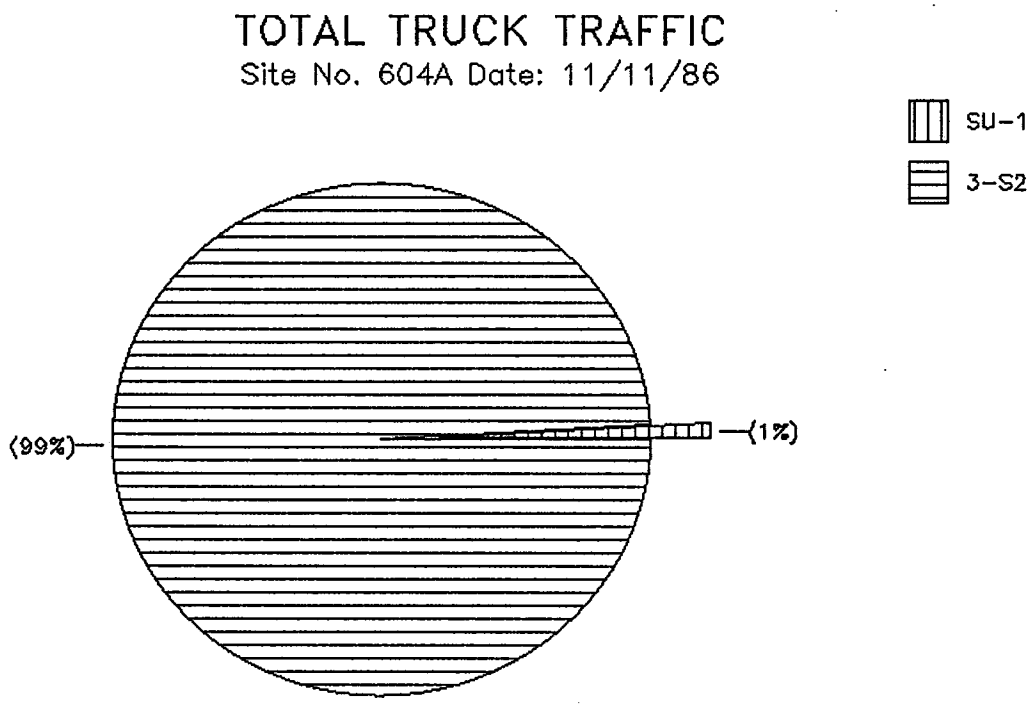


Figure 2.6.1.5-2. Hourly Trip Generation



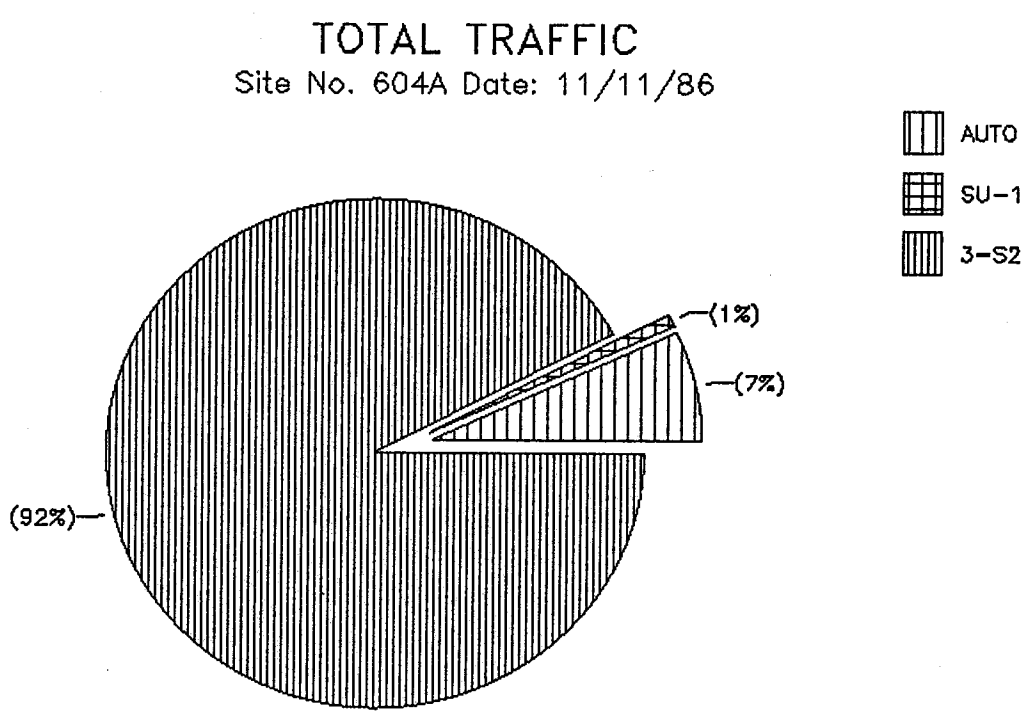


Figure 2.6.1.5-3. Activity Center Vehicle Percentages

Table 2.6.1.5-1. Traffic Classification Count Summary

Table 2.6.1.5-1A. Activity Center Only

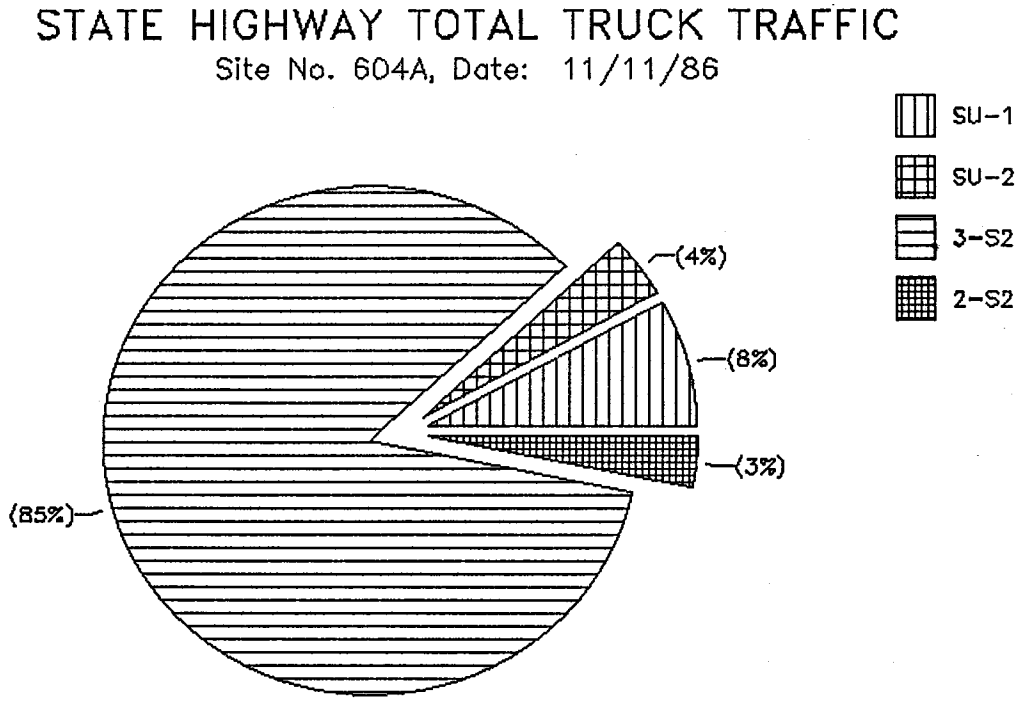
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
11/10/86	0	0	4	92	0	96	4%	96%	0%	100%
11/11/86	8	1	0	107	0	116	1%	99%	7%	93%

Table 2.6.1.5-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
11/10/86	1561	41	18	138	0	1758	30%	70%	89%	11%
11/11/86	1588	41	09	143	0	1781	26%	74%	89%	11%

Table 2.6.1.5-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
11/10/86	1561	41	33	345	6	1986	17%	83%	79%	21%
11/11/86	1596	42	21	446	7	2122	12%	88%	75%	25%



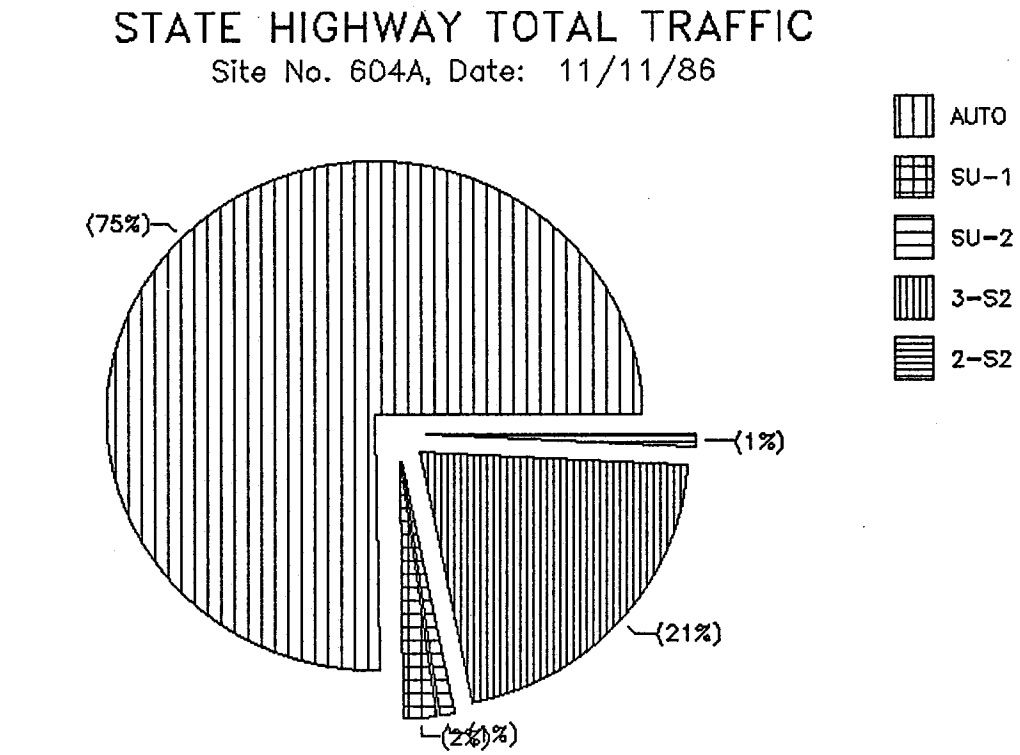


Figure 2.6.1.5-4. Highway Vehicle Percentages

2.6.1.6 Sand and Gravel Pit, Site No. 605

Introduction. The site map shown in Figure 2.6.1.6-1 indicates that access is provided by a U.S. Highway. The activity center is located east of a small urban area. The trucks hauling sand and gravel are drawn to a large urban area located east of the facility. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.6-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on July 16, 1986.

Figure 2.6.1.6-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (98%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 13 percent of this total.

An interview was conducted with an official at the sand and gravel plant. The products leaving the site were estimated at 146 3-S2 combination vehicles on an average day. No information was obtained regarding the number of employees or shift times.

Characteristics of Roadway Serving Activity Center. The highway providing public access to this activity center was a U.S. Highway with an estimated annual daily traffic (ADT) of 5,100 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.6-1 provides a summary of the counts taken. First, in Table 2.6.1.6-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.6-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.6-1C, a total count of all vehicles on the highway (sum of 1A plus 1B plus special-use vehicles on the roadway) is provided.

Figure 2.6.1.6-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.6-1C values). The 3-S2 vehicles represents 88 percent of total counted on this highway. Autos make up 59 percent of the total traffic shown.

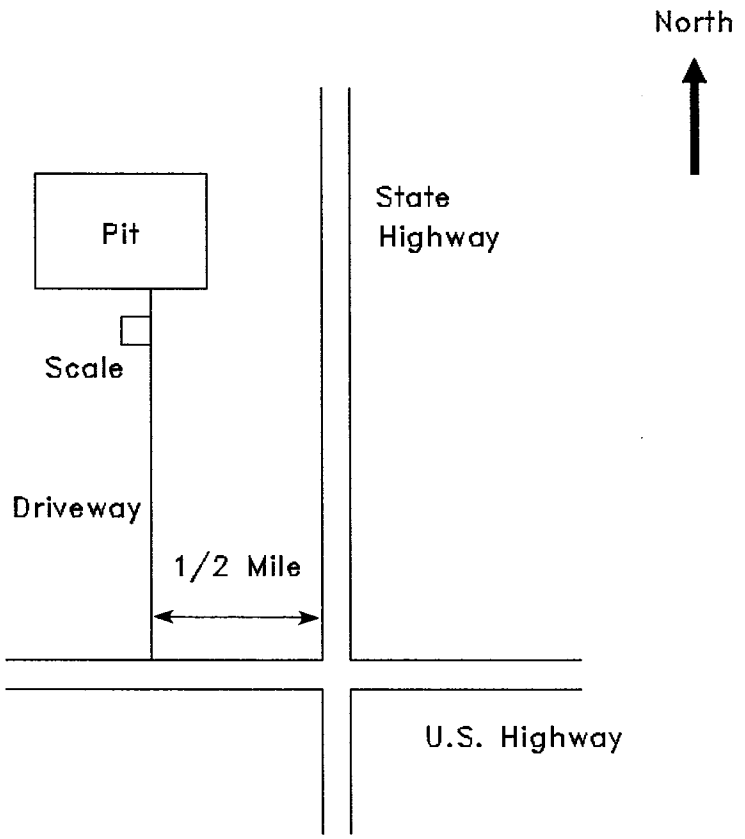
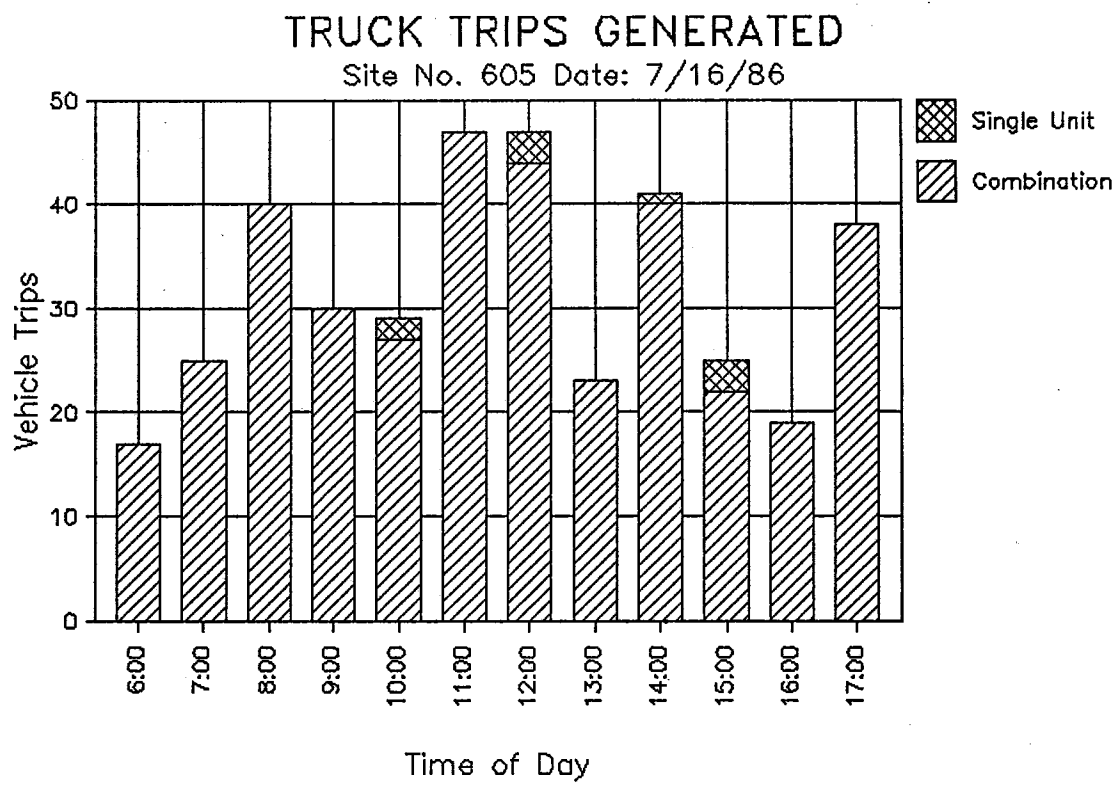


Figure 2.6.1.6-1. Site Map



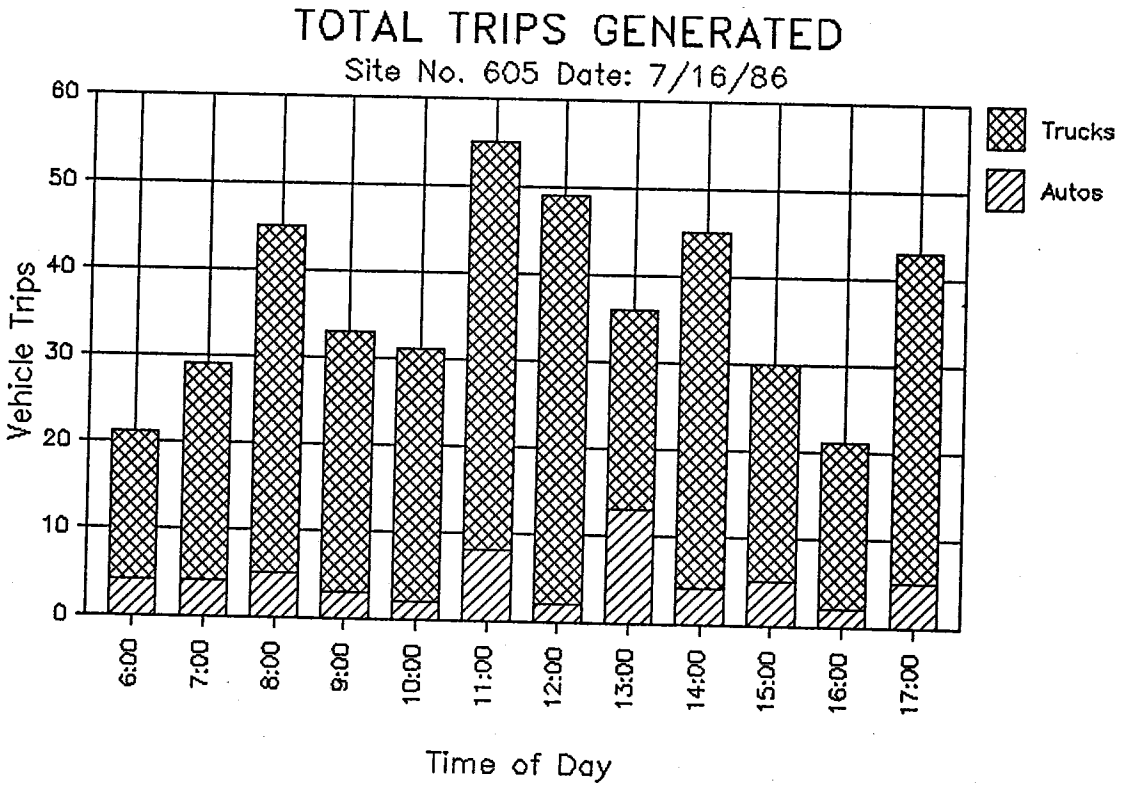
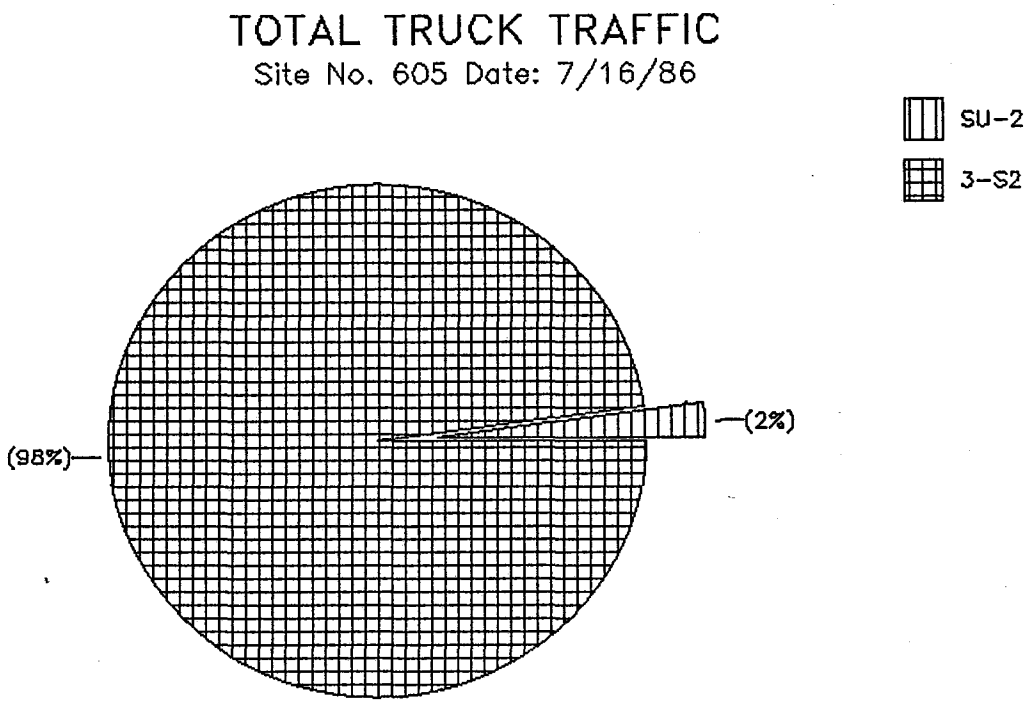


Figure 2.6.1.6-2. Hourly Trip Generation



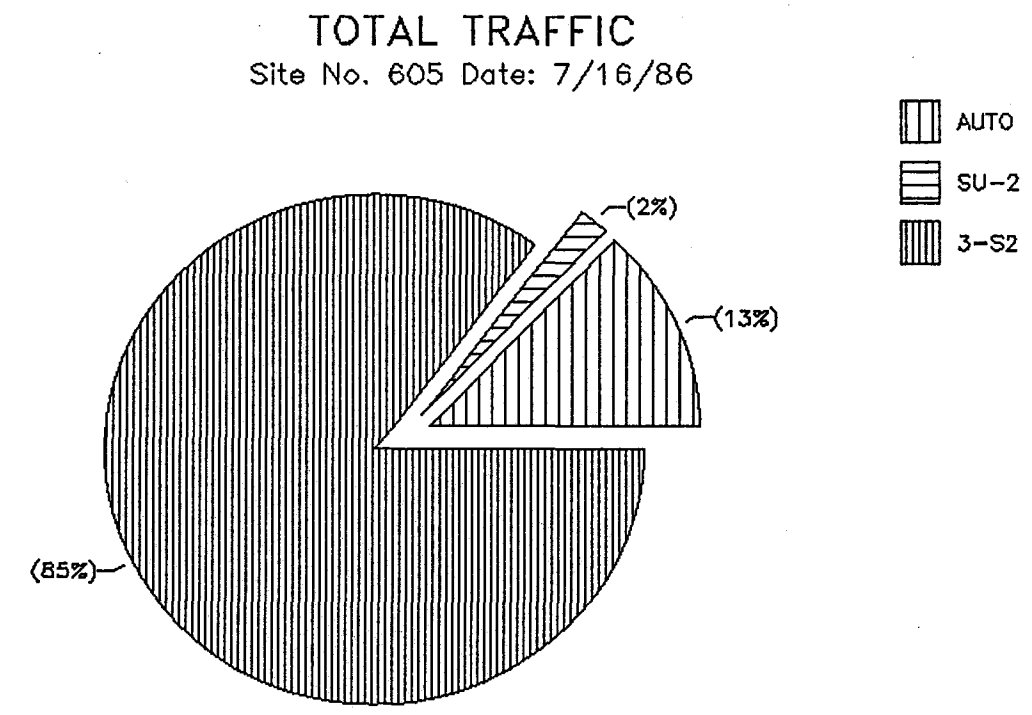


Figure 2.6.1.6-3. Activity Center Vehicle Percentages

Table 2.6.1.6-1. Traffic Classification Count Summary

Table 2.6.1.6-1A. Activity Center Only

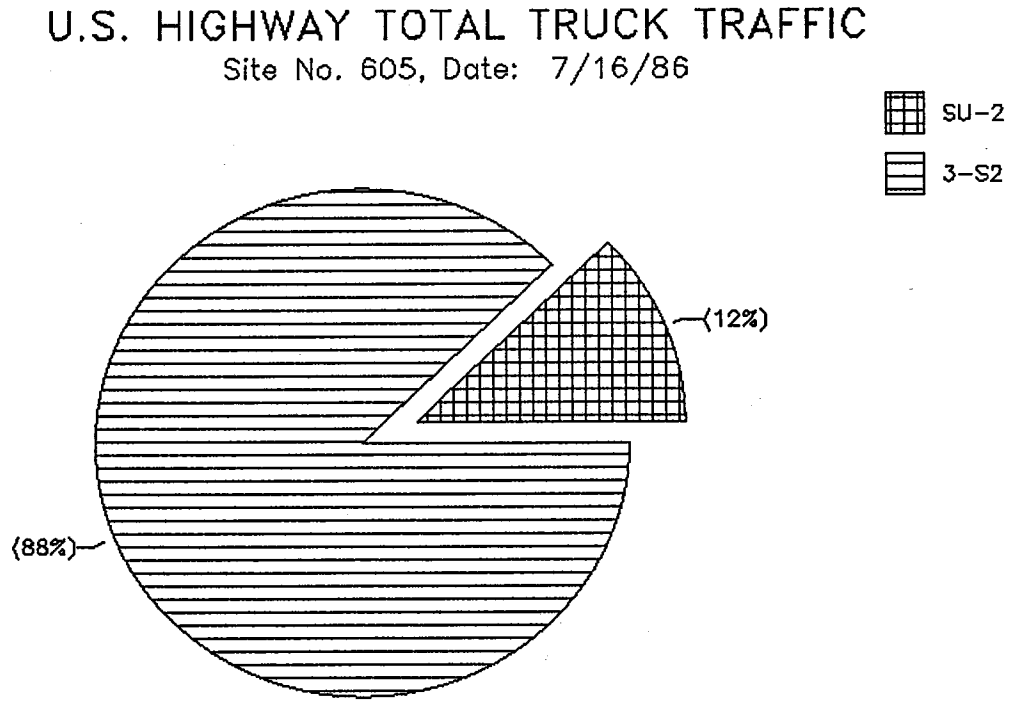
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/15/86	88	4	1	390	5	488	1%	99%	18%	82%
7/16/86	57	1	8	371	0	437	2%	98%	13%	87%

Table 2.6.1.6-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/15/86	1582	35	26	107	0	1750	36%	64%	90%	10%
7/16/86	1389	0	80	118	0	1587	40%	60%	87%	13%

Table 2.6.1.6-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/15/86	1670	39	27	829	5	2570	7%	93%	65%	35%
7/16/86	1446	1	120	866	1	2434	12%	88%	59%	41%



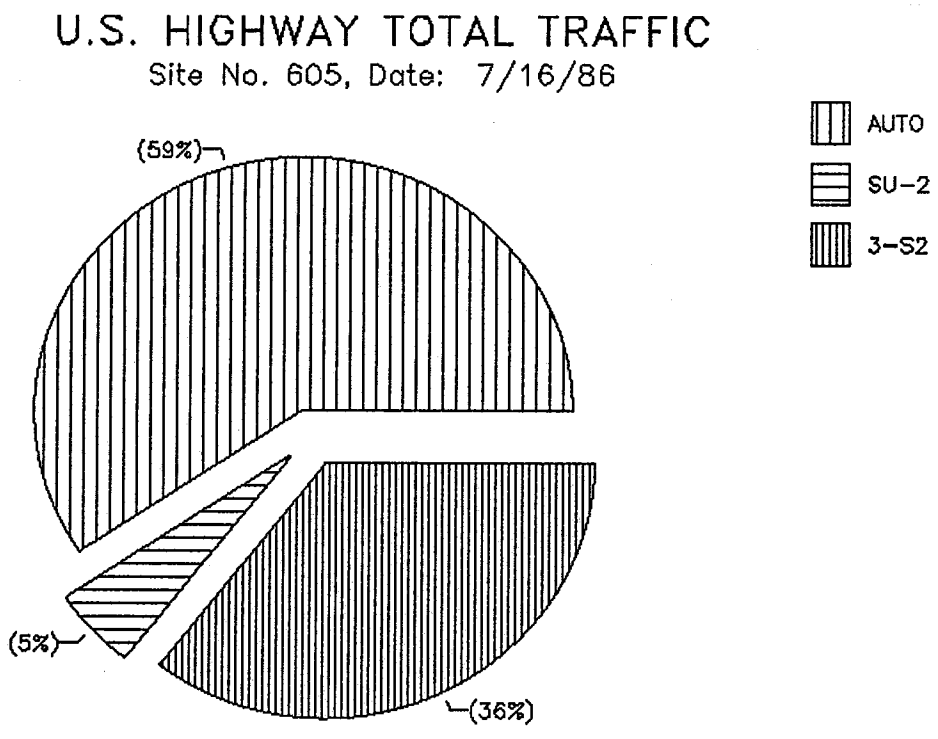


Figure 2.6.1.6-4. Highway Vehicle Percentages

2.6.1.7 Sand and Gravel Pit, Site No. 606

Introduction. The site map shown in Figure 2.6.1.7-1 indicates that access is provided by a Farm-to-Market Highway. The activity center is located west of a small urban area; traffic generated by this site is oriented toward the east. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.7-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. This figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on July 11, 1986.

Figure 2.6.1.7-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (62%). Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented only 14 percent of this total, with trucks being 86 percent. No interview was granted at this sand and gravel plant.

Characteristics of Roadway Serving Activity Center. The roadway providing access to this activity center is a Farm-to-Market Highway. The average daily traffic (ADT) on this highway was 2,600 in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.7-1 provides a summary of the counts taken. First, in Table 2.6.1.7-1A, Vehicle Classification Counts for the activity center only are provided. Second, in Table 2.6.1.7-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.7-1C, a total count of all vehicles on the highway is provided.

Figure 2.6.1.7-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.7-1C values). The 3-S2 vehicle represents 59 percent of total trucks counted on this highway. Autos make up 48 percent of the total traffic shown.

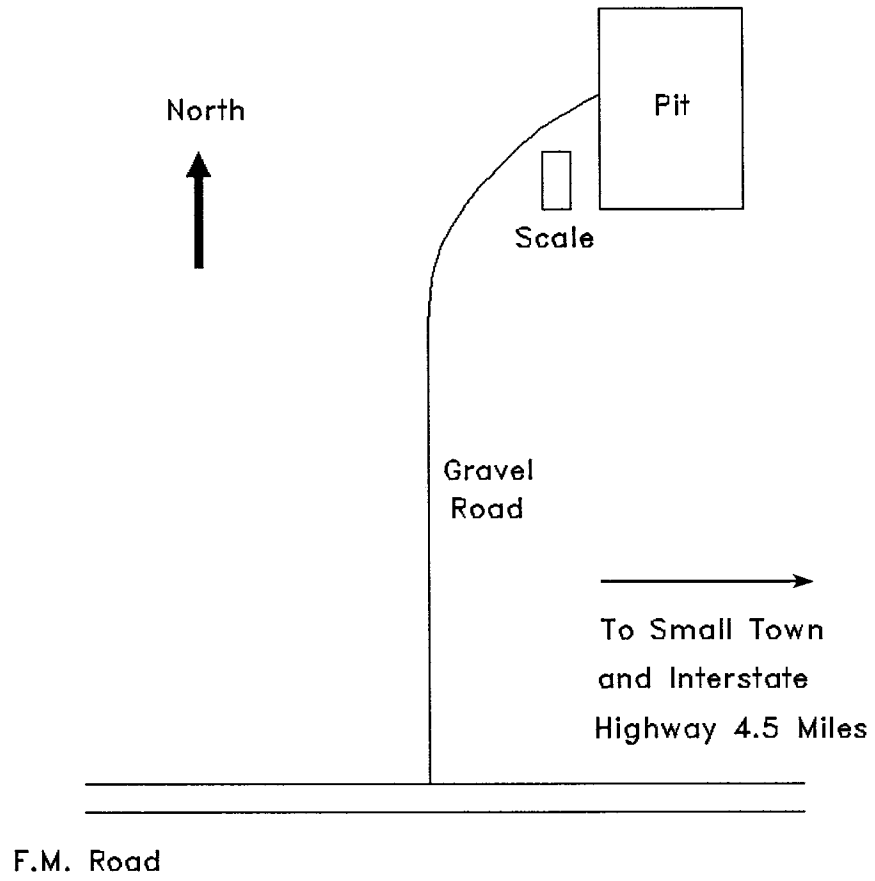


Figure 2.6.1.7-1. Site Map

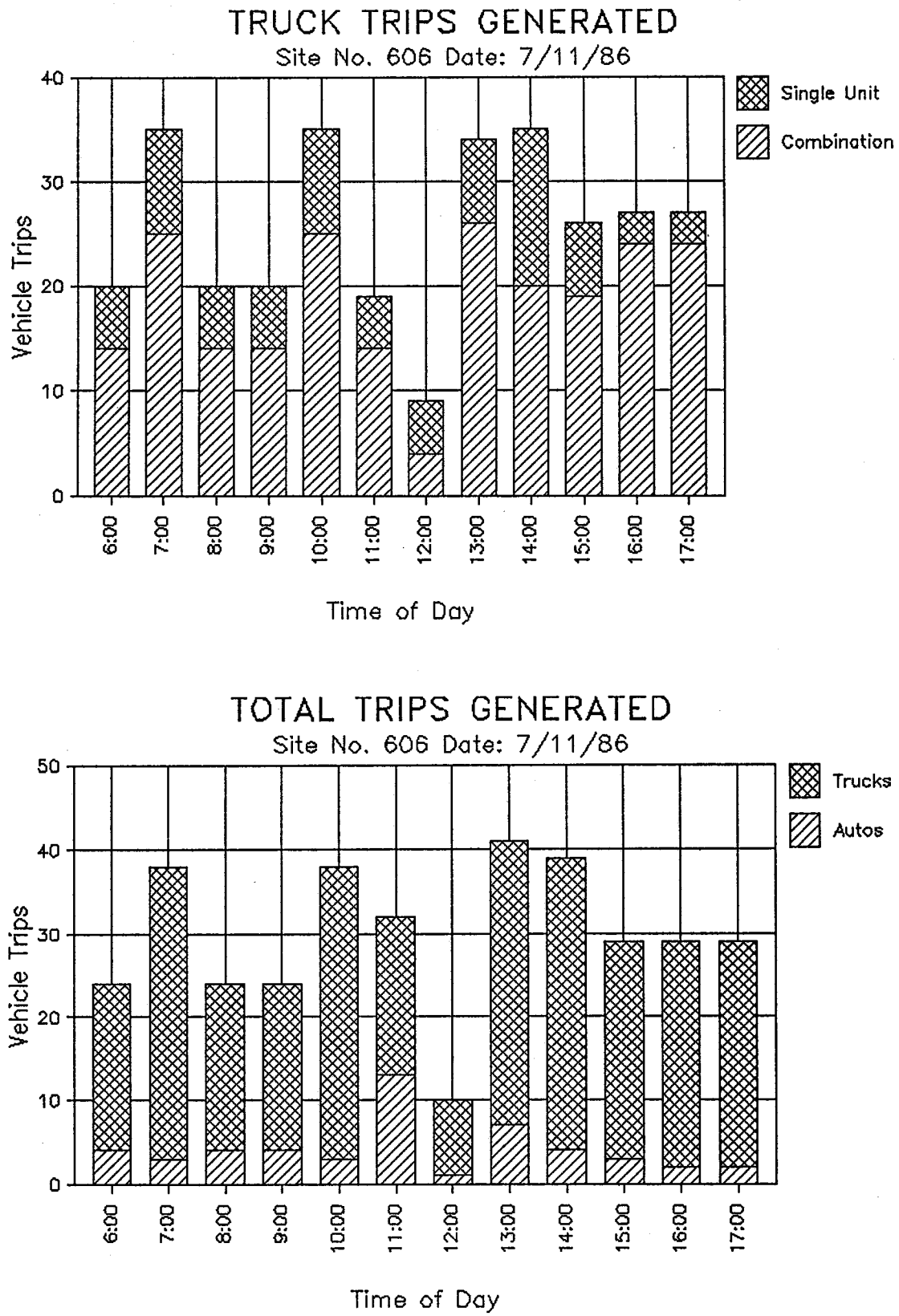
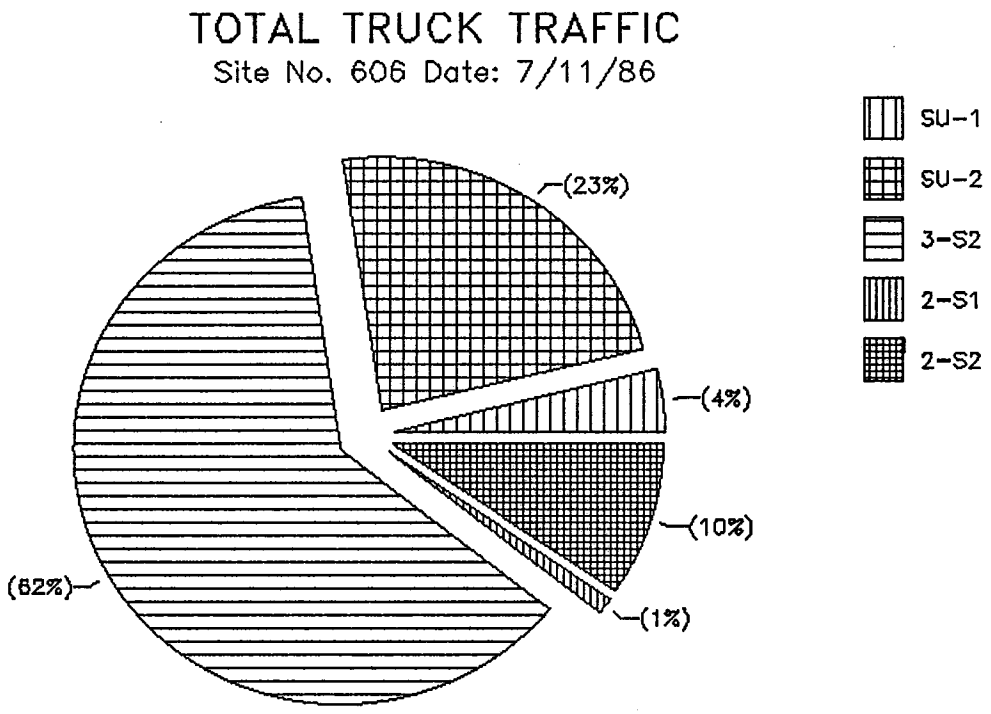


Figure 2.6.1.7-2. Hourly Trip Generation



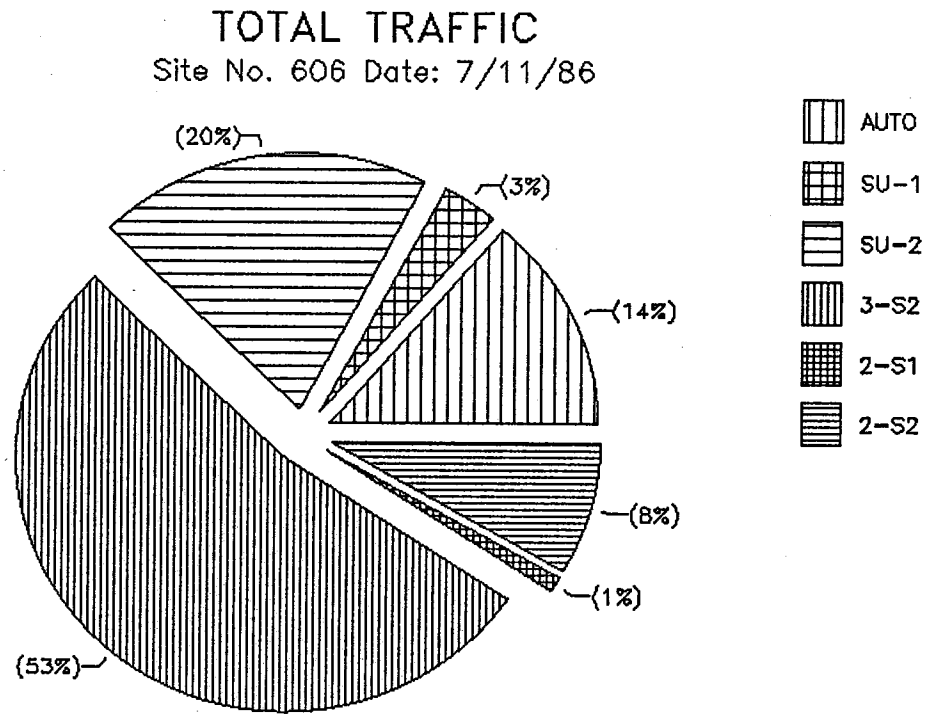


Figure 2.6.1.7-3. Activity Center Vehicle Percentages

Table 2.6.1.7-1. Traffic Classification Count Summary

Table 2.6.1.7-1A. Activity Center Only

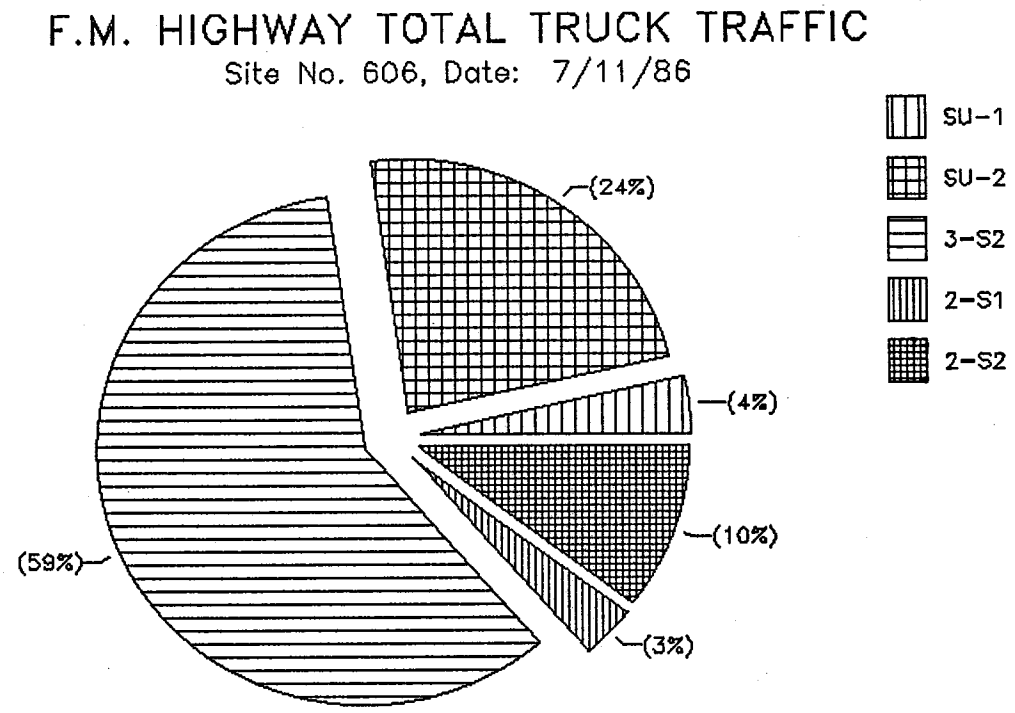
Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/09/86	31	22	54	0	26	194	327	26%	74%	9%	91%
7/10/86	30	7	57	0	40	143	277	26%	74%	11%	89%
7/11/86	50	12	72	3	30	190	357	28%	72%	14%	86%

Table 2.6.1.7-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/09/86	296	12	3	4	5	9	329	45%	55%	90%	10%
7/10/86	348	8	2	6	6	6	376	36%	64%	93%	7%
7/11/86	264	0	5	8	5	8	290	19%	81%	91%	9%

Table 2.6.1.7-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/09/86	327	34	64	4	31	210	670	29%	71%	49%	51%
7/10/86	378	15	68	6	46	154	667	29%	71%	57%	43%
7/11/86	314	12	79	11	35	198	649	27%	73%	48%	52%



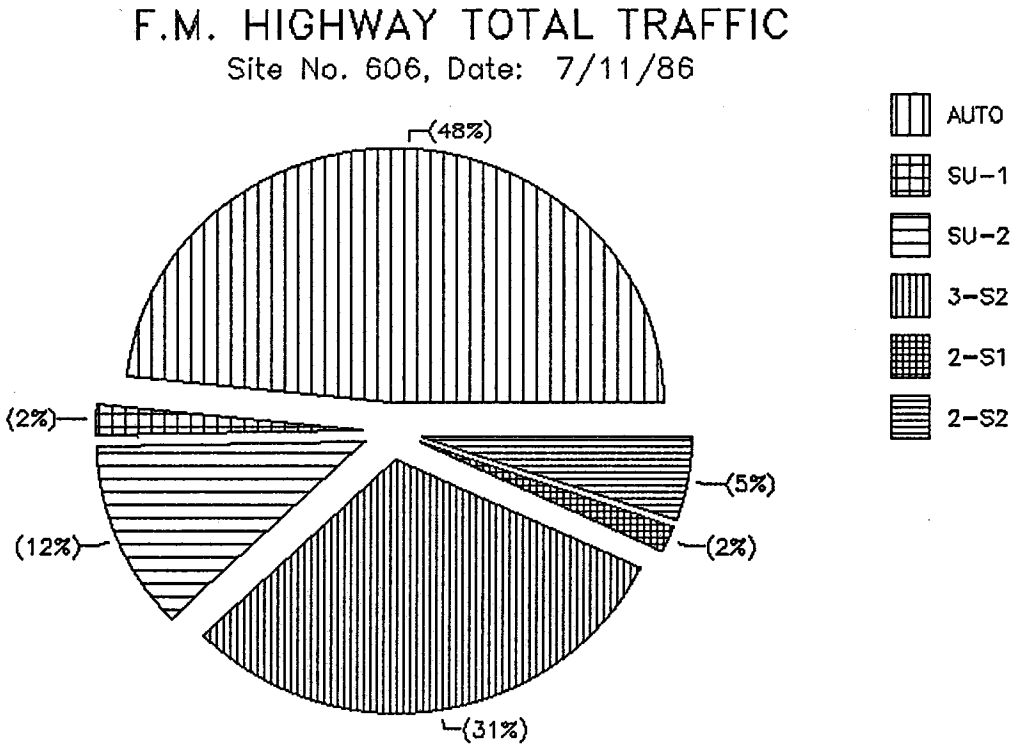


Figure 2.6.1.7-4. Highway Vehicle Percentages

2.6.1.8 Sand and Gravel Pit, Site No. 607A

Introduction. The site map shown in Figure 2.6.1.8-1 indicates that access is provided by a local road. The activity center is located north of a medium-size urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.8-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on July 8, 1986.

Figure 2.6.1.8-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (42%). Also illustrated is the breakdown of total traffic moving to and from the site. Trucks represented 83 percent of this total.

No interview with officials at the sand and gravel site was obtained. The site used a single shift for the work day from 7 a.m. to 5:30 p.m.

Characteristics of Roadway Serving Activity Center. The highway providing public access to this activity center was a local roadway with an estimated annual daily traffic (ADT) of 300 in 1986. Manual classification counts were conducted in 1985 and 1986 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.8-1 provides a summary of the counts taken. First, in Table 2.6.1.8-1A, vehicle classification counts for the activity center only are provided. Second, in Table 601-1B, a count of all vehicles on the roadway serving the activity center except special-use vehicles is provided. This consisted of autos only. Finally, in Table 2.6.1.8-1C, a total count of all vehicles on the highway (sum of 1A , 1B and special-use vehicles on the roadway) is provided.

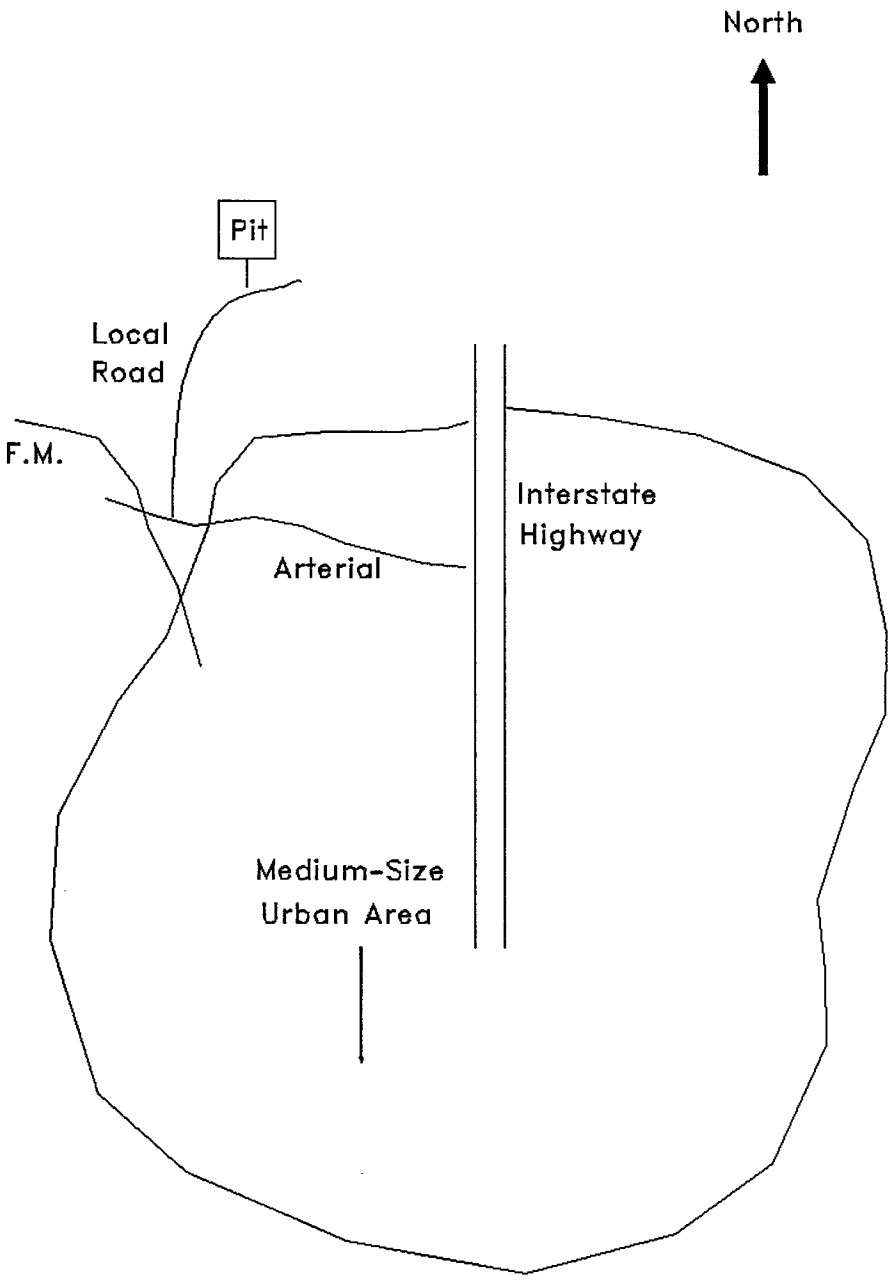


Figure 2.6.1.8-1. Site Map

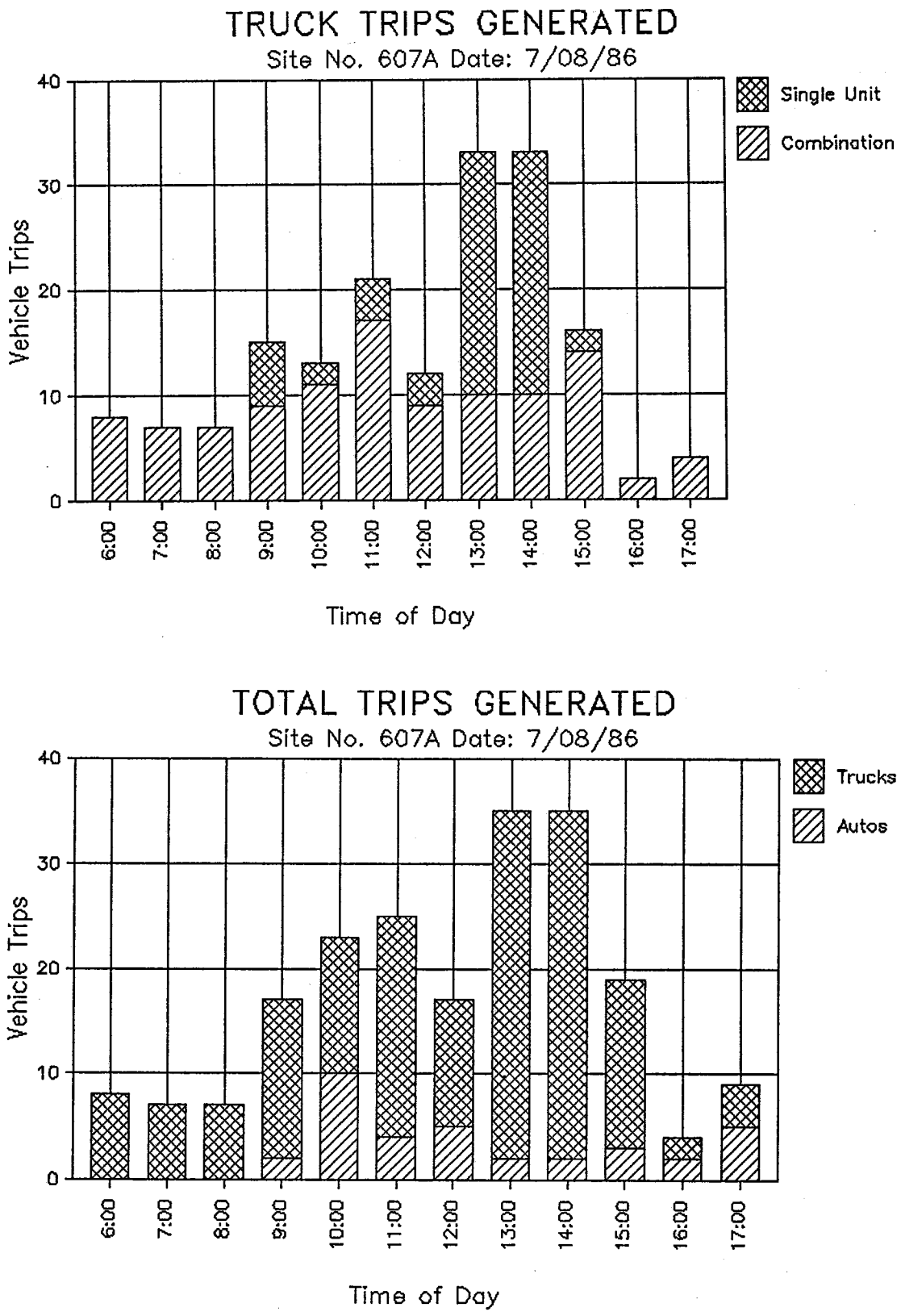
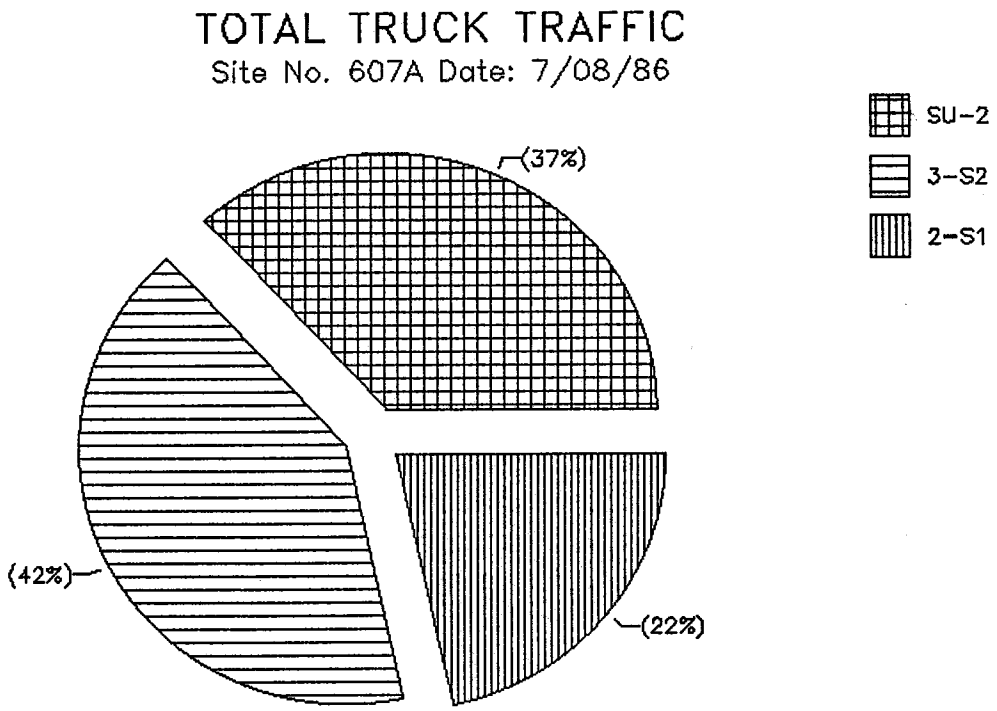


Figure 2.6.1.8-2. Hourly Trip Generation



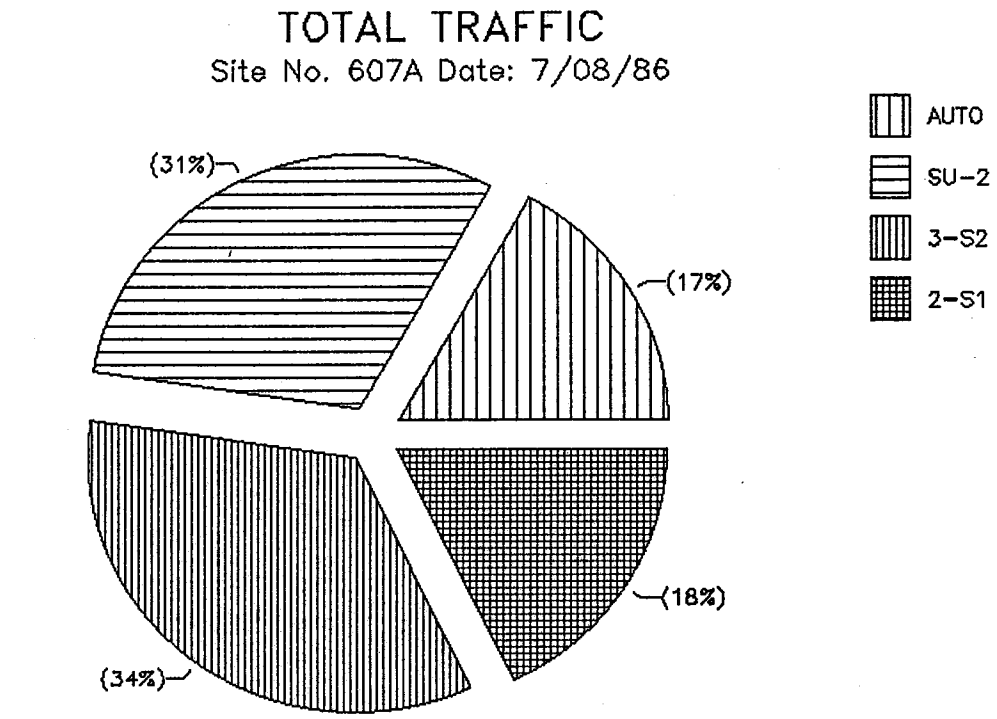


Figure 2.6.1.8-3. Activity Center Vehicle Percentages

Table 2.6.1.8-1. Traffic Classification Count Summary

Table 2.6.1.8-1A. Activity Center Only

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	3-S2	Total	SU	Comb.	Cars	Trucks
6/27/85	23	9	22	0	59	113	34%	66%	20%	80%
6/26/86	31	0	6	7	45	82	12%	88%	38%	62%
6/27/86	32	8	26	2	93	159	27%	73%	20%	80%
7/08/86	35	0	63	37	71	169	47%	53%	21%	79%

Table 2.6.1.8-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/08/86	92	0	0	0	0	92	0%	0%	100%	0%

Table 2.6.1.8-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-2	2S-1	2S-2	3S-2	Total	SU	Comb.	Cars	Trucks
7/08/86	127	166	37	12	126	468	49%	51%	27%	73%

2.6.1.9 Sand and Gravel Pit, Site No. 608A

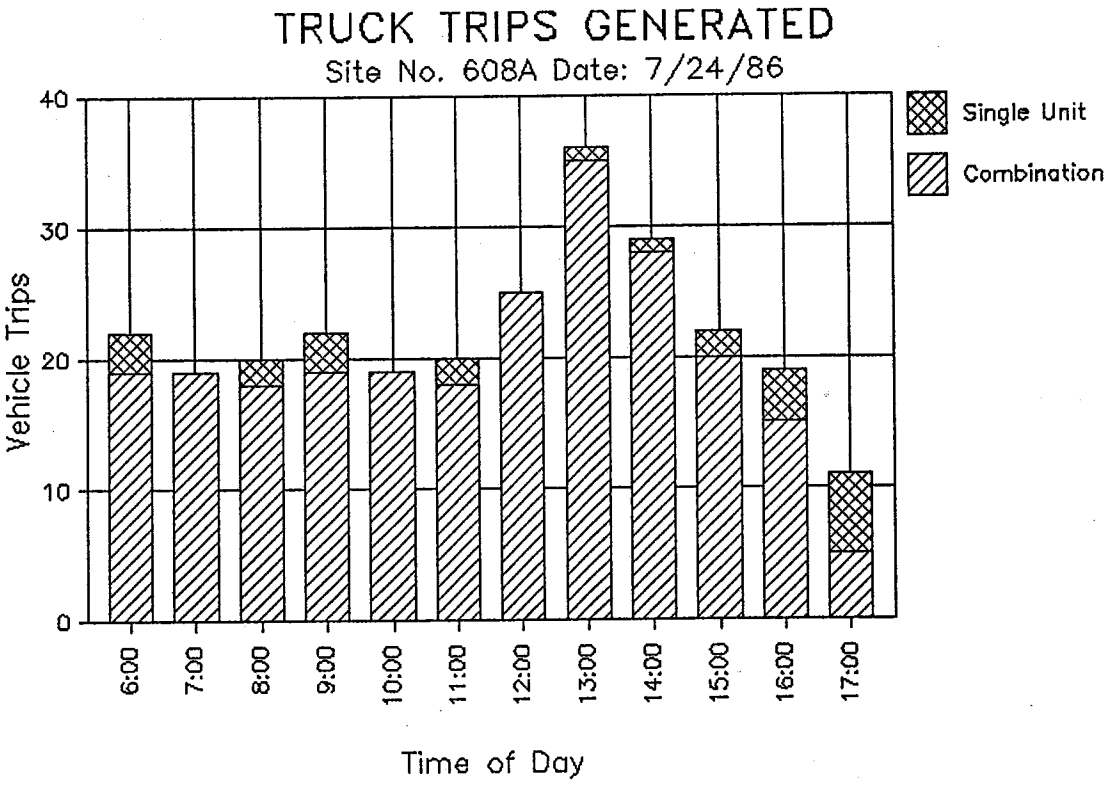
Introduction. This operation was relatively large compared to others located nearby. Trucks hauling from this site haul mostly to a large urban area to the east. They usually travel U.S. and interstate highways to get there. This site was not served by rail.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.9-1 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. The figure also shows the combination of trucks and autos that were generated by this site during the same 12-hour period on July 24, 1986.

Figure 2.6.1.9-2 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the 3-S2 combination (88%). Also illustrated is the breakdown of total traffic moving to and from the site. Auto traffic represented 53 percent of this total. No interviews of officials at this plant were obtained.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway. It is estimated that an average daily traffic (ADT) on this facility was 1,350 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.9-1 provides a summary of the counts taken. First, in Table 2.6.1.9-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.9-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.9-1C, a total count of all vehicles on the highway is provided.

Figure 2.6.1.9-3 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.9-1C values). The 3-S2 vehicle represents 79 percent of total trucks counted on this highway. Trucks make up 41 percent of the total traffic shown.



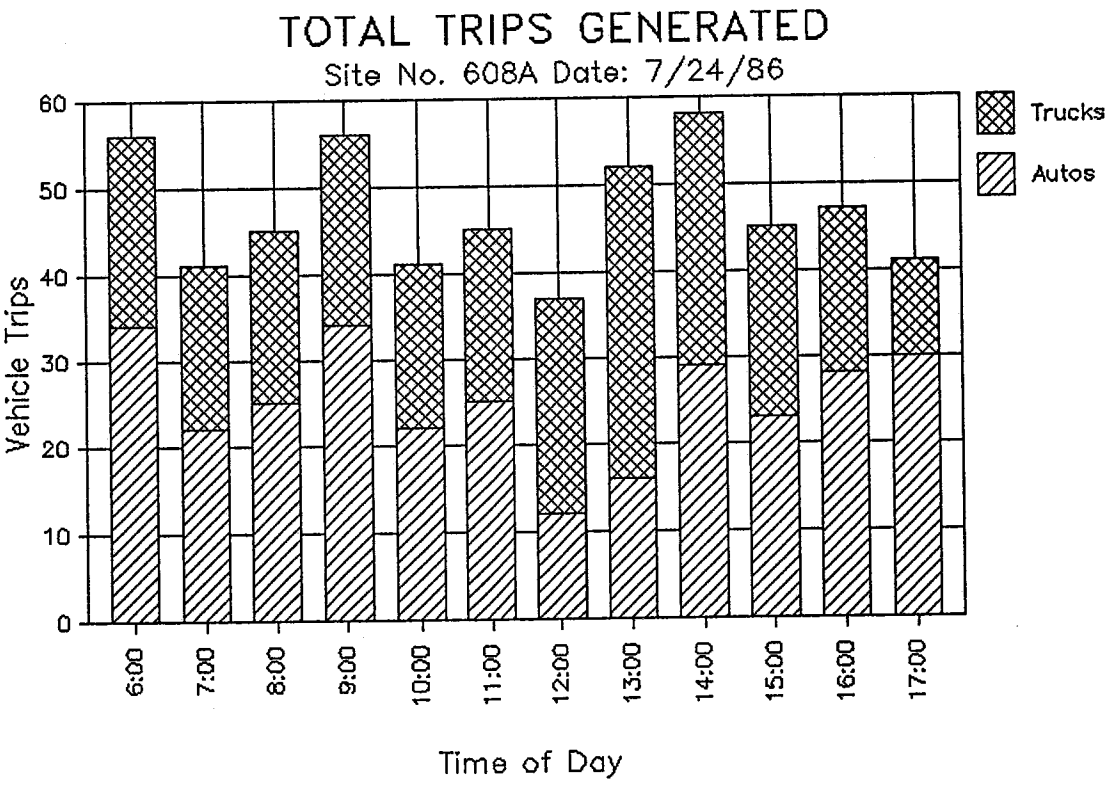
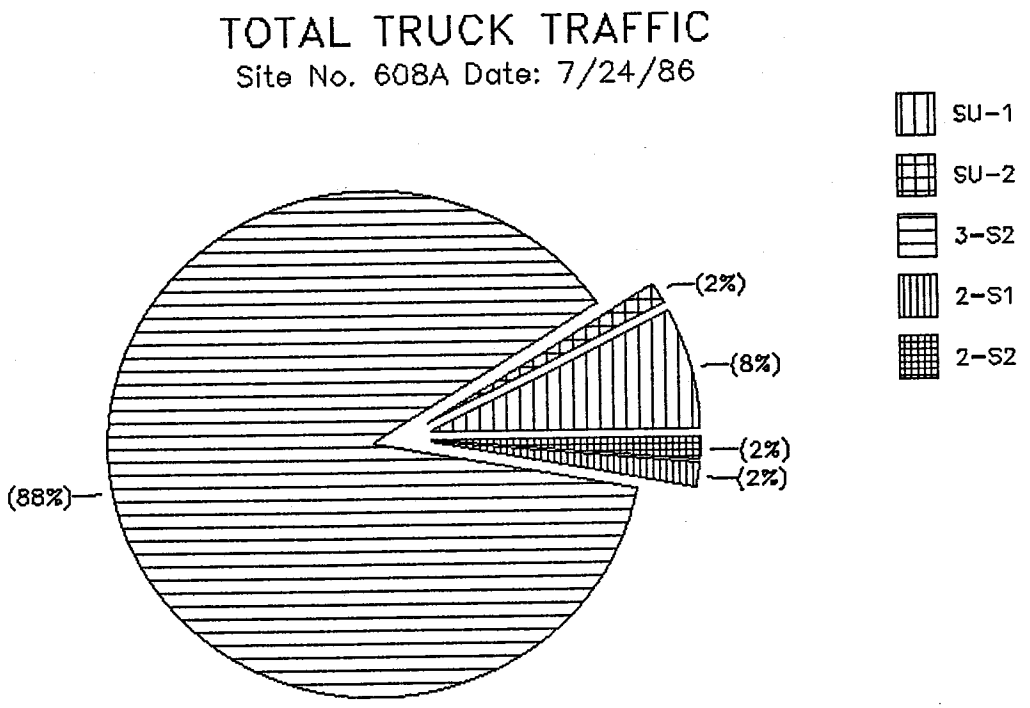


Figure 2.6.1.9-1. Hourly Trip Generation



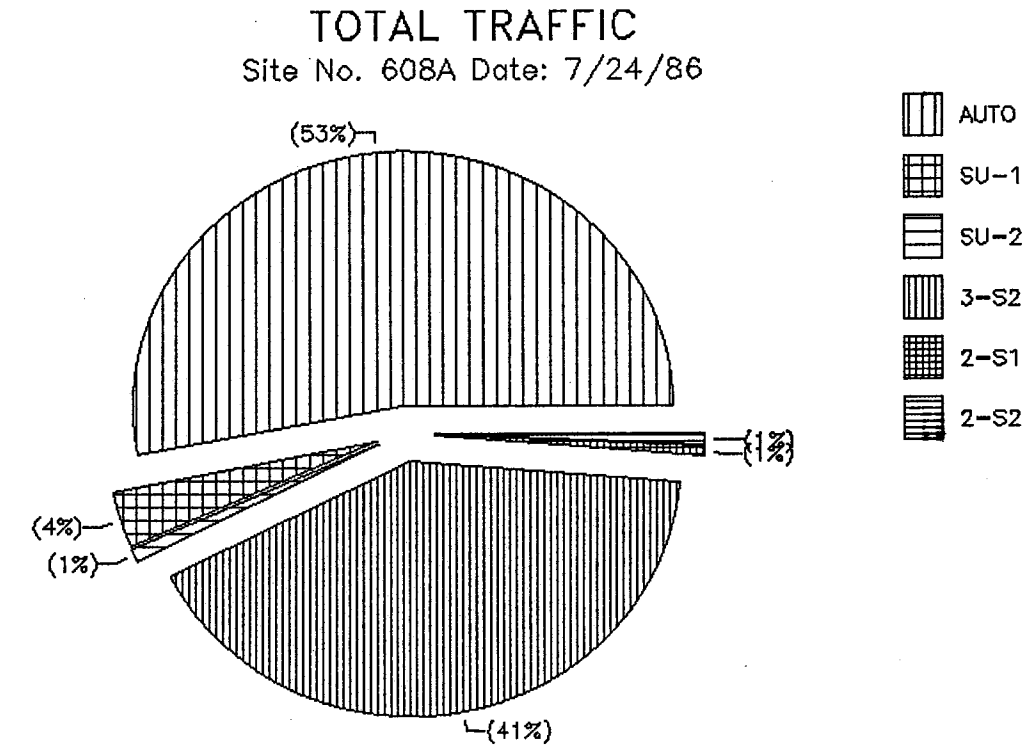


Figure 2.6.1.9-2. Activity Center Vehicle Percentages

Table 2.6.1.9-1. Traffic Classification Count Summary

Table 2.6.1.9-1A. Activity Center Only

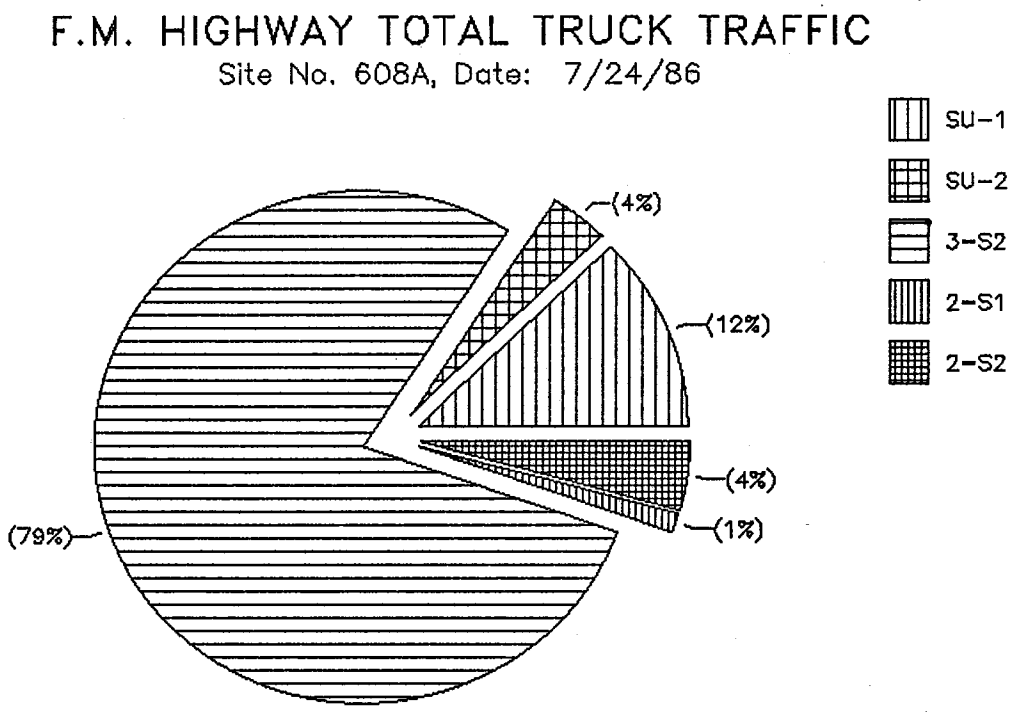
Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/22/86	176	16	4	0	0	94	290	18%	82%	61%	39%
7/23/86	164	4	6	0	0	129	303	7%	93%	54%	46%
7/24/86	300	20	4	4	4	232	564	9%	91%	54%	46%

Table 2.6.1.9-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/24/86	818	76	14	4	30	50	992	52%	48%	82%	18%

Table 2.6.1.9-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	3-S2	Total	SU	Comb.	Cars	Trucks
7/24/86	1118	96	28	8	34	612	1896	16%	84%	59%	41%



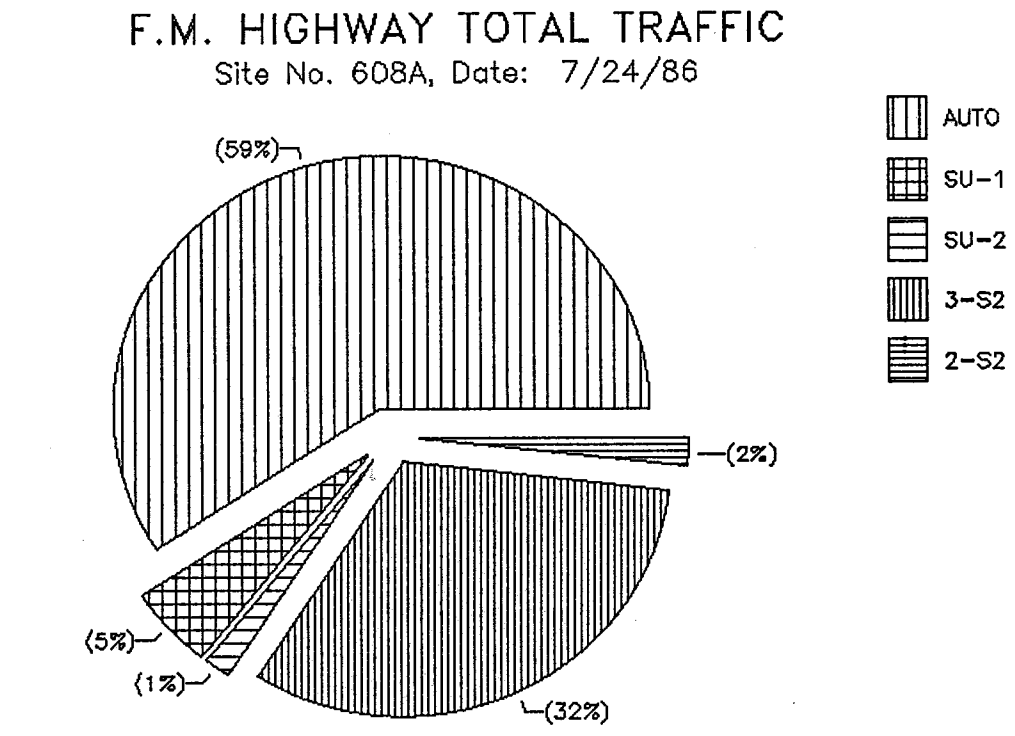


Figure 2.6.1.9-3 Highway Vehicle Percentages

2.6.1.10 Sand and Gravel Pit, Site No. 609A

Introduction. The site map shown in Figure 2.6.1.10-1 indicates that access is provided by a County Road which is about three miles from a U.S. Highway. All trucks hauling from this site use the U.S. Highway to travel west to a small urban area, or west then south to another small urban area. Because this activity center was very small no classification counts were conducted for the entrance or the roadway providing access to the facility. No rail service was available to the site.

Activity Center Trip-Generating Characteristics. On their maximum day, this activity center loads the following number of trucks:

30 Single Unit
10 3-S2

---

40 Total Loads

On July 16, 1986, they loaded a total of 11 trucks. Their average is 25 trucks per day; about 60 percent of these are SU-2 vehicles. For hourly fluctuations, the early morning is the busiest -- from 7:30 a.m. to 10:00 a.m. There are three 3-S2 trucks which haul from this gravel pit; two are owned by the company, the other trucker is an owner-operator. Each of these three trucks makes at least two trips per day from the pit. The minimum haul distance is 5 miles; the maximum is 50 miles. The peak season is March to October, which accounts for 70 percent of their business. The remainder (30 percent) is during the winter season.

Ten employees work at this site; eight of these make trips elsewhere for lunch. Other trips generated include: fuel trucks twice a week, freight delivery twice a week, and other miscellaneous trips totalling 4 (one way) trips per day.

In summary, an average day's total trips (one way) would be as follows:

36 Auto
4 Pick-Up
20 3-S2
30 SU-2

---

90 Total

Of the total trips generated daily, autos or pick-ups are 44 percent; single unit trucks are 33 percent; and combinations are 22 percent.

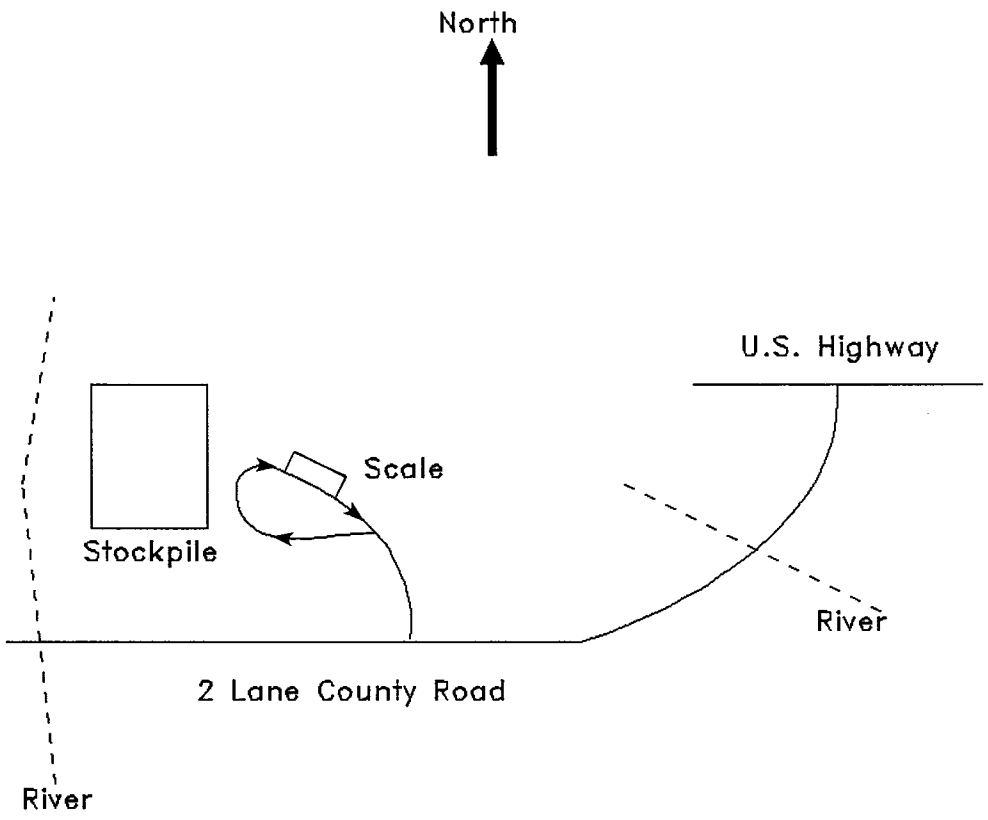


Figure 2.6.1.10-1. Site Map

2.6.1.11 Sand and Gravel Pit, Site No. 610A

Introduction. The site map shown in Figure 2.6.1.11-1 indicates that access is provided by a State Highway. The activity center is located northeast of a relatively large urban area. A major portion of the sand and gravel from this site moves into this urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.11-2 shows the truck traffic (in and out) generated by the site during a 12-hour period (6 a.m. to 6 p.m.) and illustrates the fluctuations in this traffic on an hourly basis. Also shown is the combination of trucks and autos that were generated by this site during a 12-hour period (6 a.m. to 6 p.m.) on October 29, 1987.

Figure 2.6.1.11-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The only type of truck observed was the 3-S2 combination. Also illustrated is the breakdown of total traffic moving to and from the site. The auto represented 10 percent of this total.

An interview was conducted with an official of the sand gravel plant. The number of loaded trucks leaving the plant was estimated at 5 to 10 trucks per day. A total of 16 employees worked at the plant in a daily shift from 7 a.m. to 4:30 p.m. It was estimated that all of the products leaving the plant were utilized within a 100-mile radius.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a State Highway with an estimated average daily traffic (ADT) of 3,000 in 1986. Manual classification counts were conducted in 1987 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.11-1, provides a summary of the counts taken. First, in Table 2.6.1.11-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.11-B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.11-1C, a total count of all vehicles on the highway (sum of 1A and 1B) is provided.

Figure 2.6.1.11-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 602-1C values). The 3-S2 vehicle represents 79 percent of total trucks counted on this highway. Autos make up 90 percent of the total traffic shown.

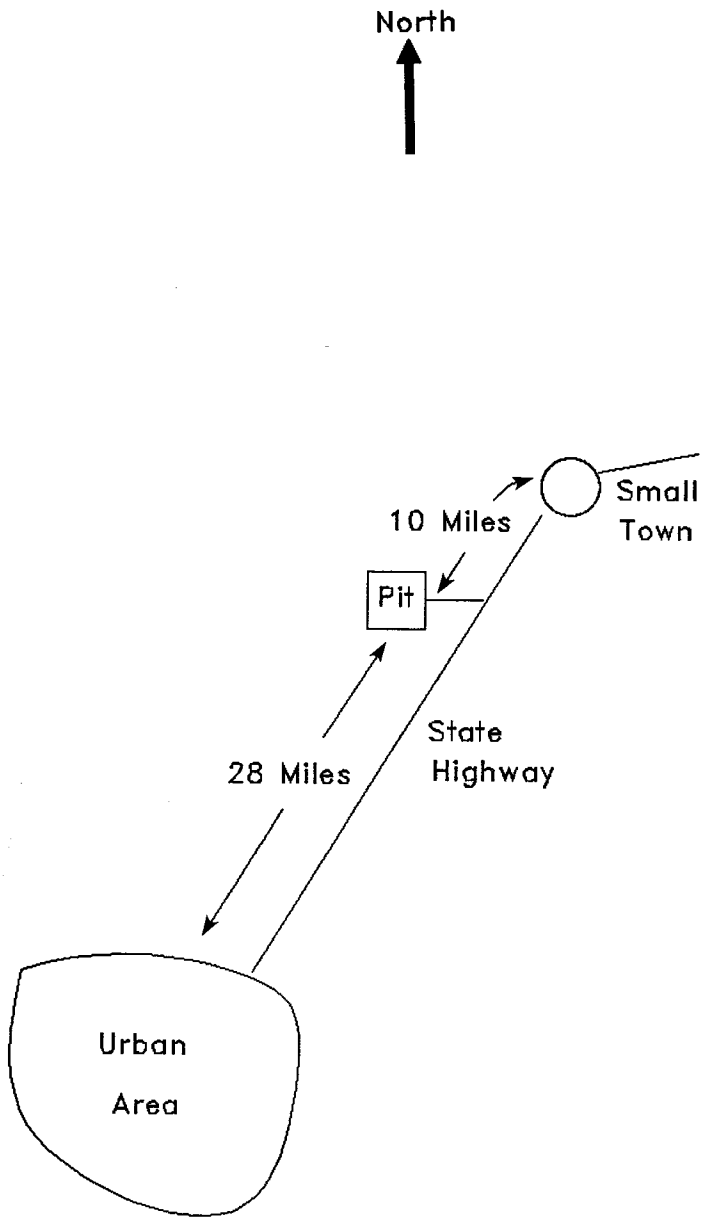
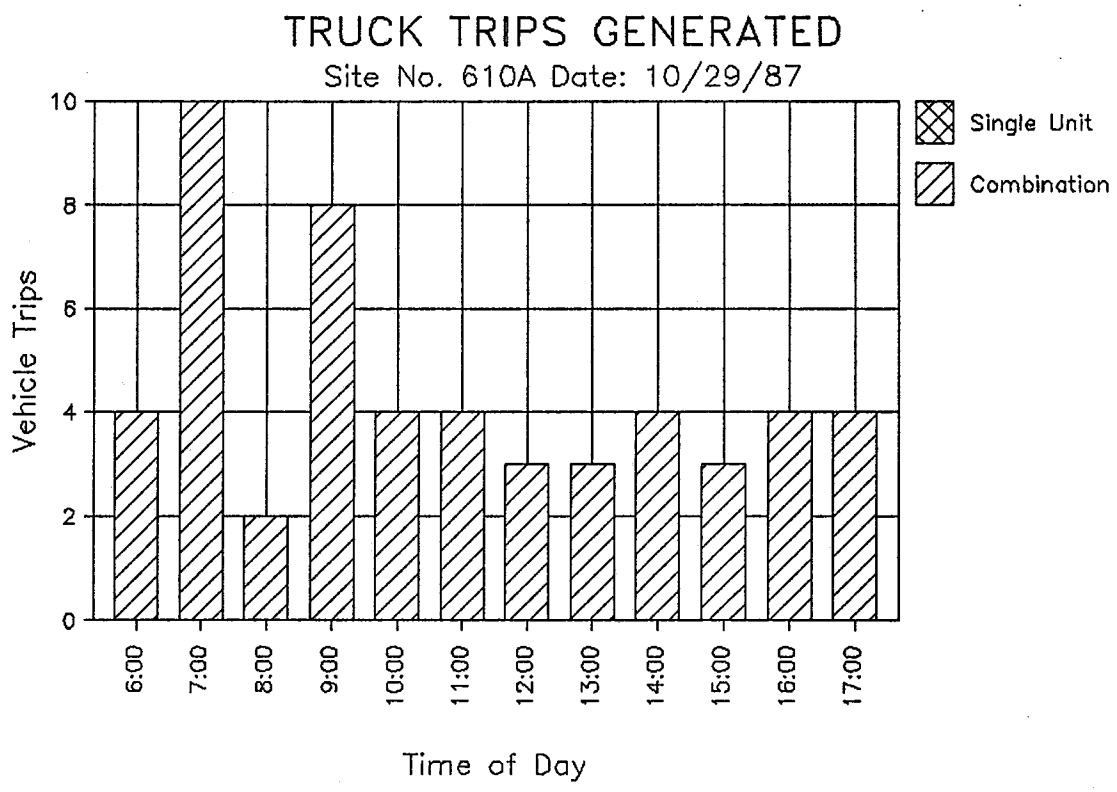


Fig 2.6.1.11-1. Site Map



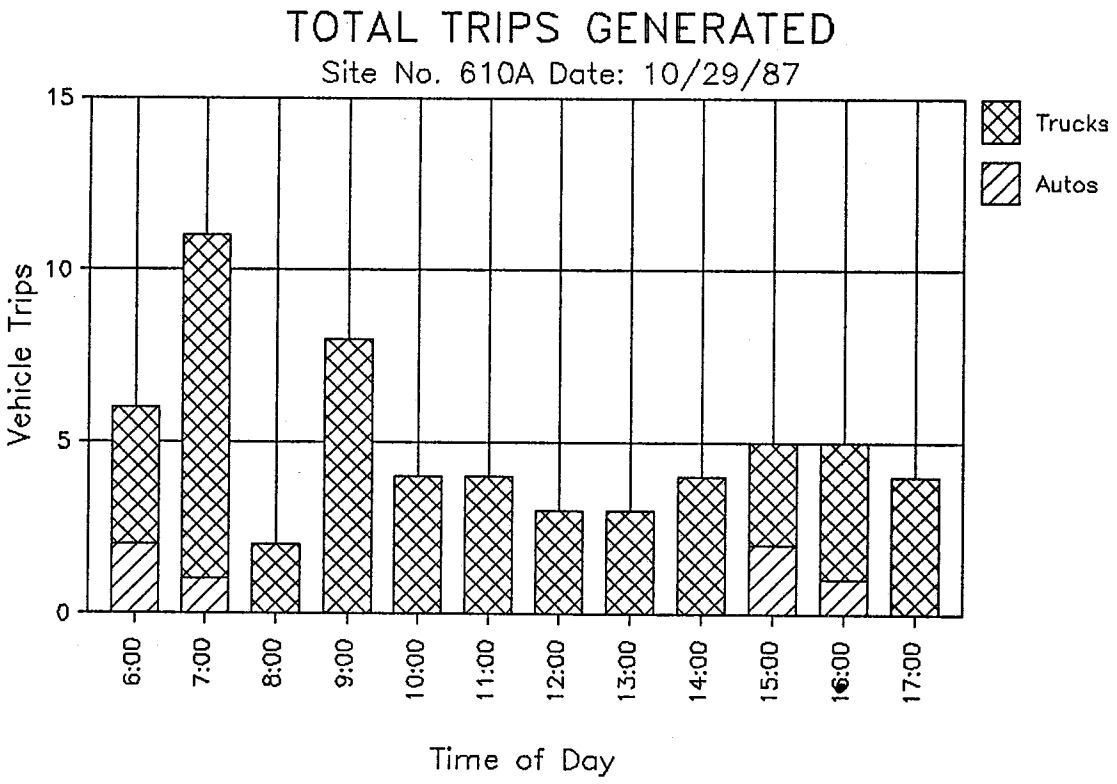
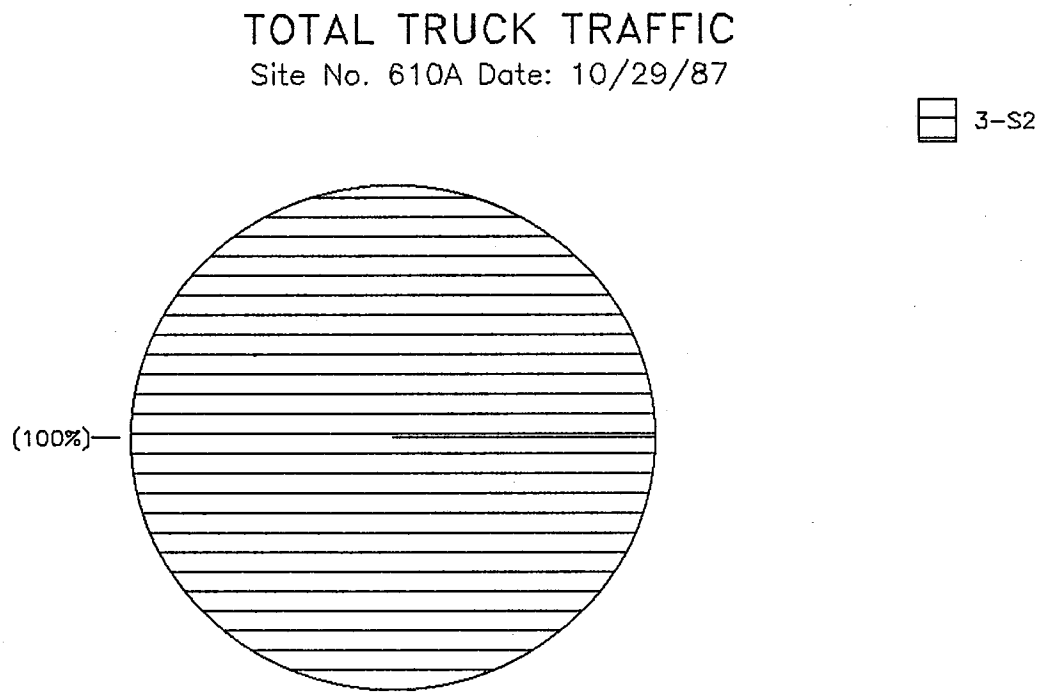


Figure 2.6.1.11-2. Hourly Trip Generation



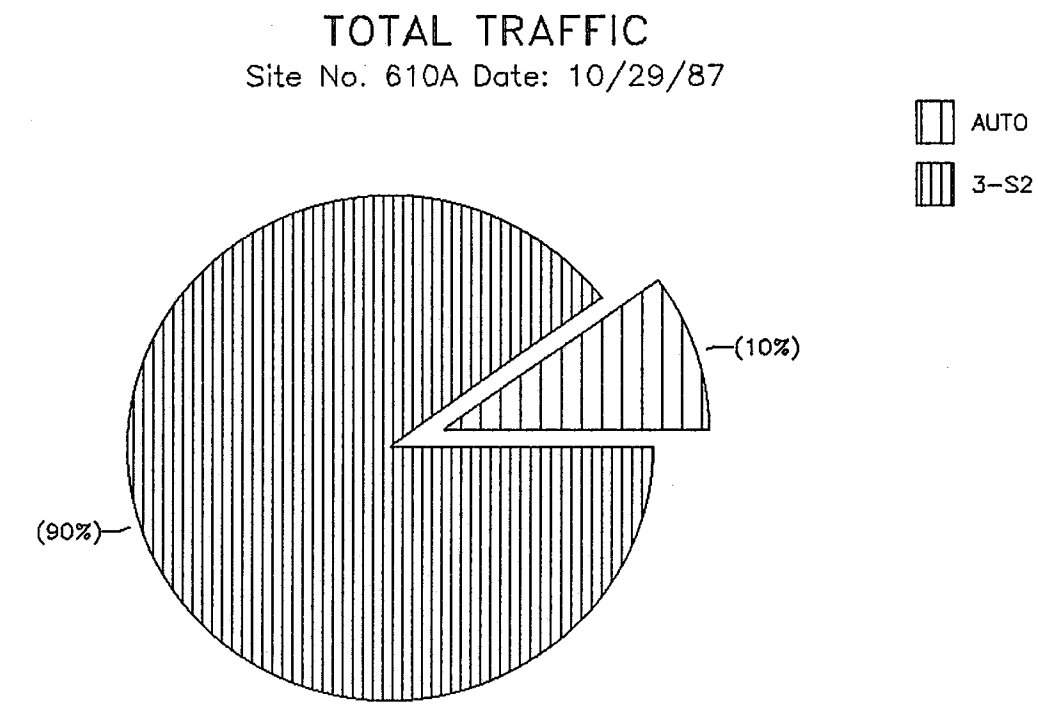


Figure 2.6.1.11-3. Activity Center Vehicle Percentages

Table 2.6.1.11-1. Traffic Classification Count Summary

Table 2.6.1.11-1A. Activity Center Only

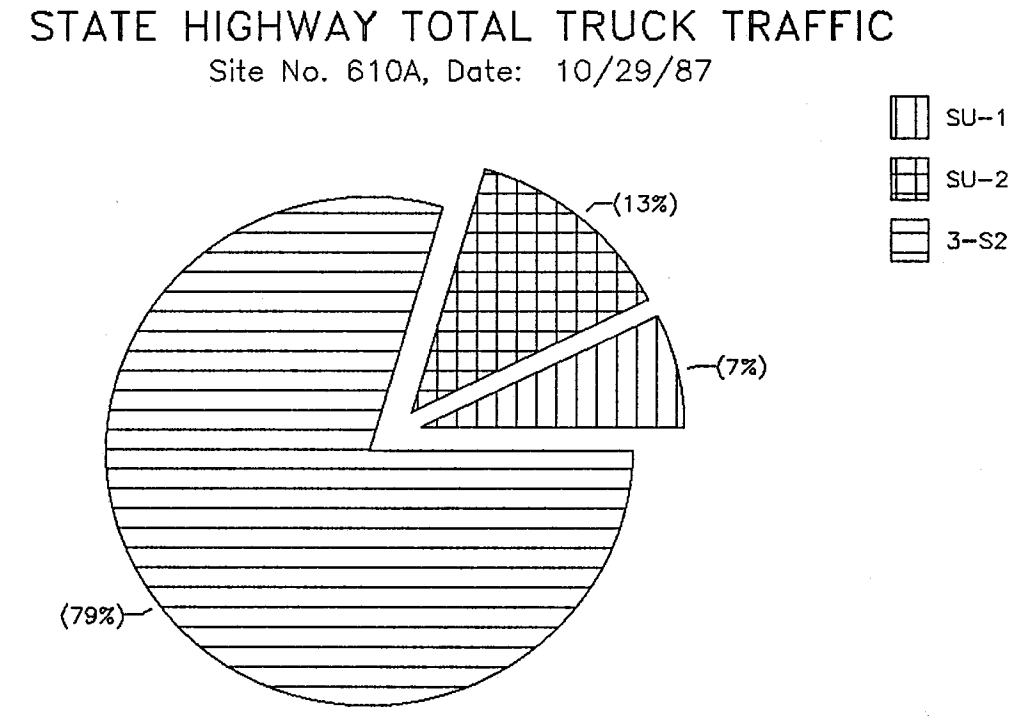
Date	Autos	SU-1	SU-2	3-S2	Other	Total	% of Truck SU	% of Truck Comb.	% of Total Cars	% of Total Trucks
10/29/87	6	0	0	53	0	59	0%	100%	10%	90%

Table 2.6.1.11-1B. Roadway Without Special-Use Traffic

Date	Autos	SU-1	SU-2	3-S2	Other	Total	% of Truck SU	% of Truck Comb.	% of Total Cars	% of Total Trucks
10/29/87	2038	17	23	128	0	2206	24%	76%	92%	8%

Table 2.6.1.11-1C. Roadway With Special-Use Traffic

Date	Autos	SU-1	SU-2	3-S2	Total	% of Truck SU	% of Truck Comb.	% of Total Cars	% of Total Trucks
10/29/87	2044	17	31	186	2278	21%	79%	90%	10%



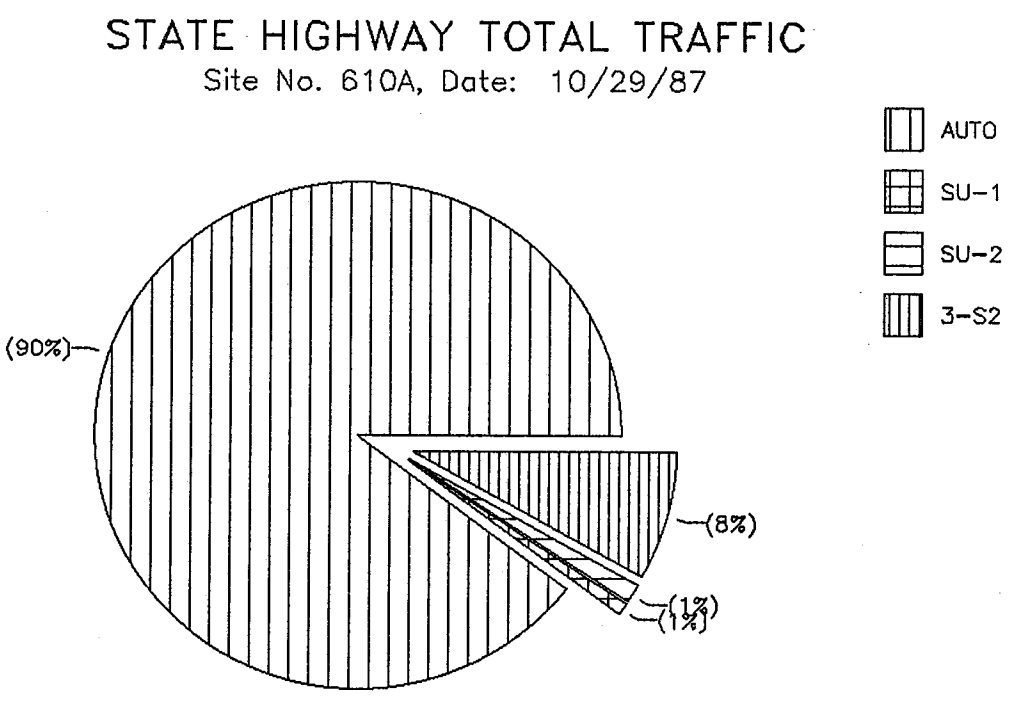


Figure 2.6.1.11-4. Highway Vehicle Percentages

2.6.1.12 Sand and Gravel Pit, Site No. 611

Introduction. The site map shown in Figure 2.6.1.12-1 indicates that access is provided by a local road. The activity center is located northwest of a medium-sized urban area. A major portion of the trucks hauling sand and gravel from this site are drawn to this urban area. The site is not served by a railroad.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.12-2 shows the truck traffic (in and out) generated by the site during a 11-hour period (6 a.m. to 5 p.m.) and illustrates the fluctuations in this traffic on a hourly basis. Also shown is the combination of trucks and autos that were generated by this site during the same 11-hour period on July 8, 1986.

Figure 2.6.1.12-3 illustrates the breakdown by AASHTO classification of the total truck traffic going in and out of the site. The predominant truck was the single unit (SU-2) which was 54 percent of the truck traffic. Also illustrated is the breakdown of total traffic moving to and from the site. Auto traffic represented 28 percent of this total. No interview of officials from the sand and gravel plant was conducted.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway. It is estimated that an average daily traffic (ADT) on this highway was 300 in 1986. Manual classification counts were conducted in 1986 and 1988 primarily to determine the impact of special-use activities on the highway. Table 2.6.1.12-1 provides a summary of the counts taken. First, in Table 2.6.1.12-1A, vehicle classification counts for the activity center only are provided. Second, in Table 2.6.1.12-1B, a count of all vehicles on the highway serving the activity center except special-use vehicles is provided. Finally, in Table 2.6.1.12-1C, a total count of all vehicles on the highway is provided.

Figure 2.6.1.12-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.12-1C values). The 3-S2 vehicle represents 49 percent of total trucks counted on this highway. Autos make up 28 percent of the total traffic shown.

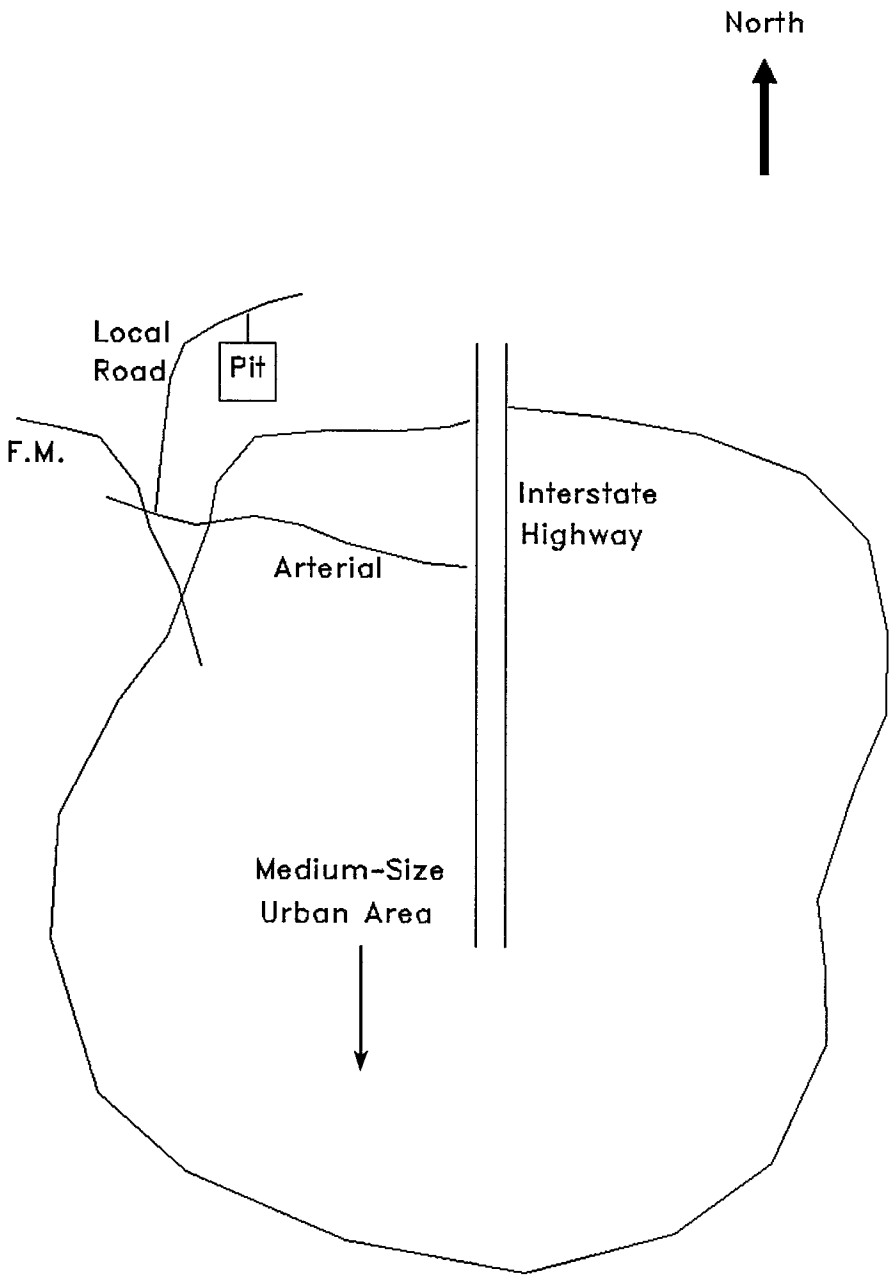
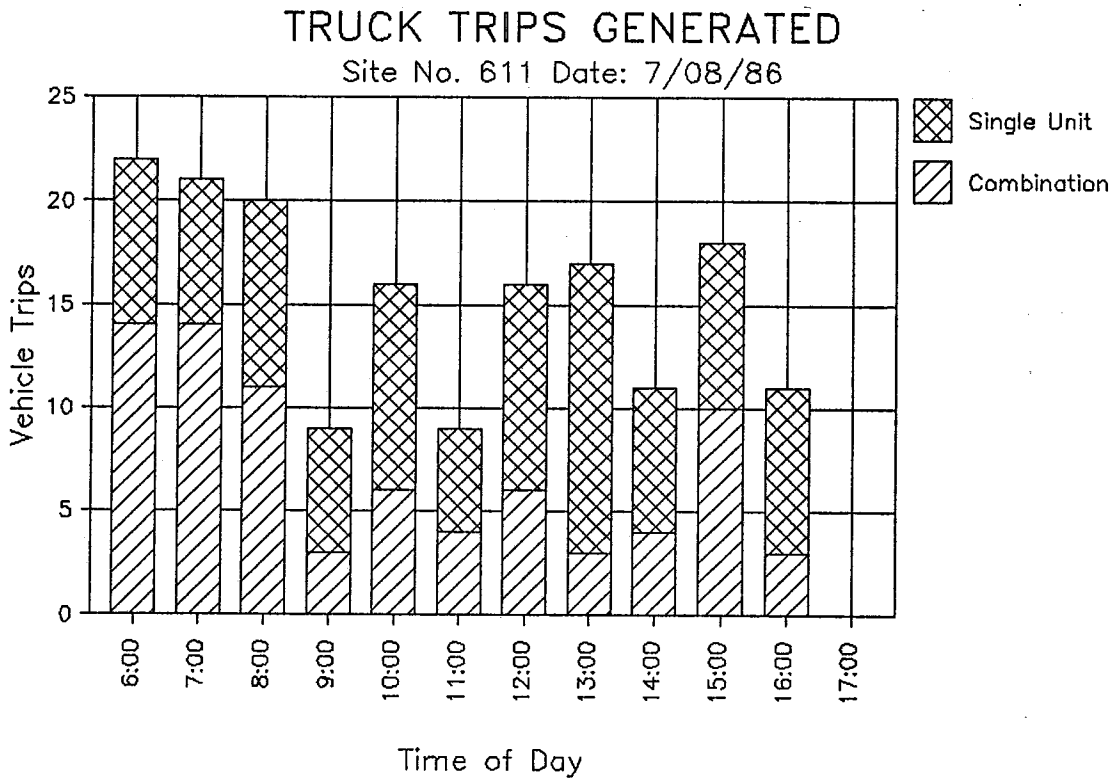


Figure 2.6.1.12-1. Site Map



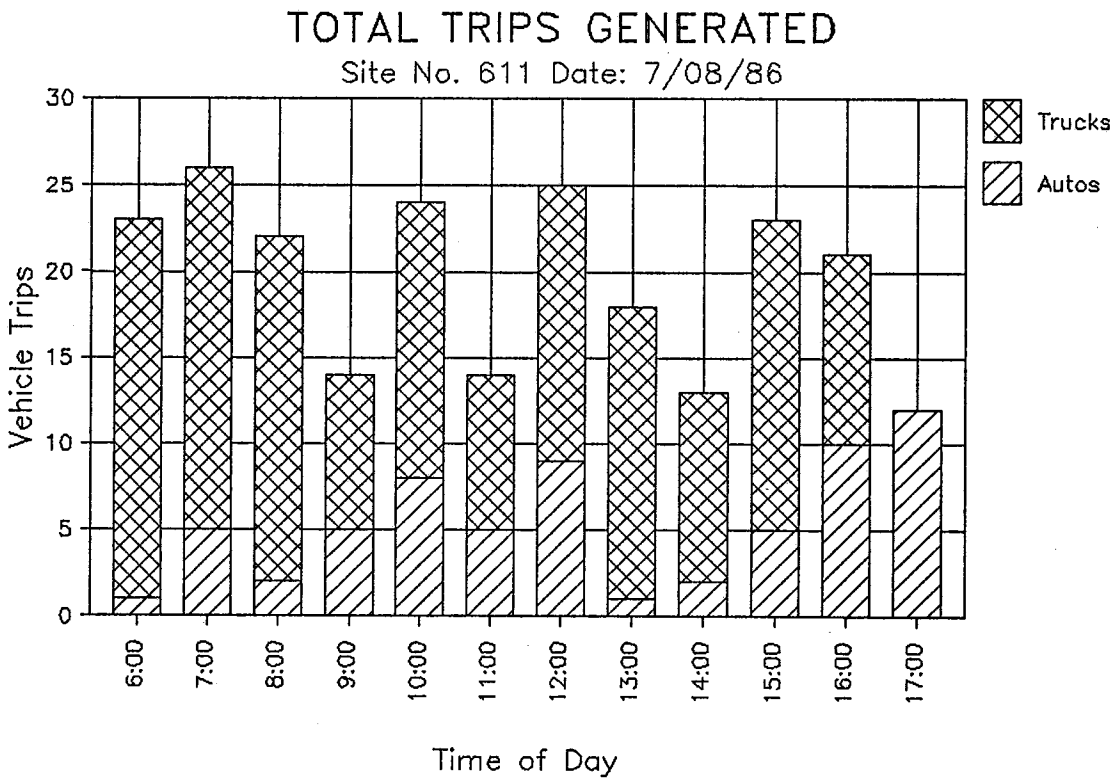
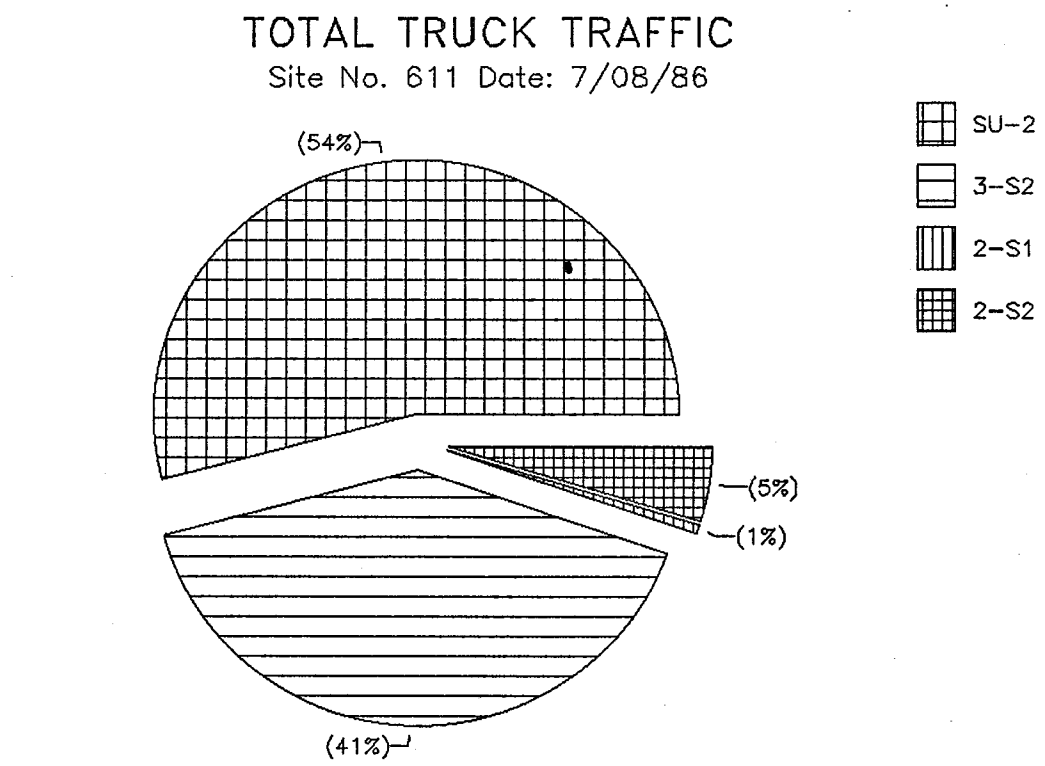


Figure 2.6.1.12-2. Hourly Trip Generation



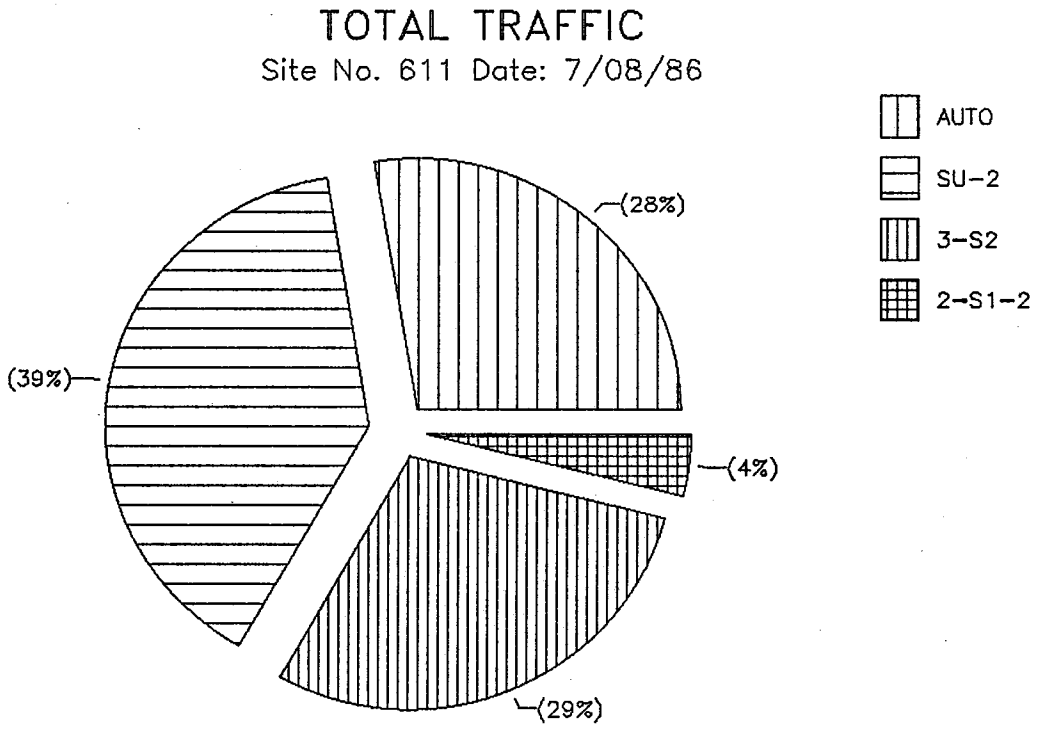


Figure 2.6.1.12-3. Activity Center Vehicle Percentages

Table 2.6.1.12-1. Traffic Classification Count Summary

Table 2.6.1.12-1A. Activity Center Only

Date	Vehicle Classification							% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	Other	3-S2	Total	SU	Comb.	Cars	Trucks
7/08/86	65	0	92	1	8[1]	69	235	57%	43%	29%	71%
4/14/88	52	8	24	0	2[2]	9	95	78%	22%	56%	44%

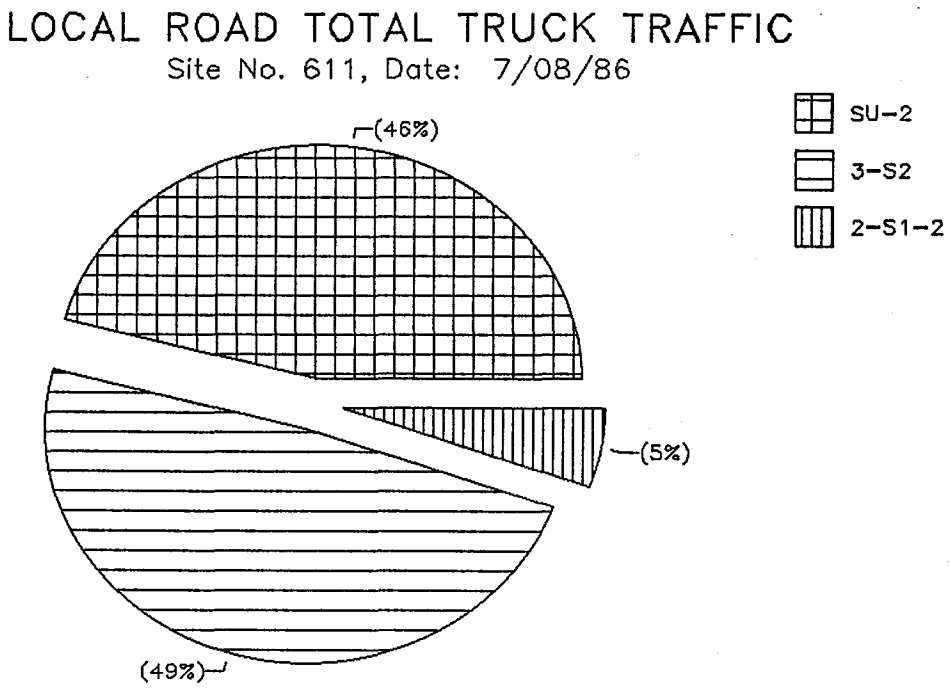
[1]Vehicle type: 2-S2
[2]Vehicle type: 2-S1-2

Table 2.6.1.12-1B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Comb.	Cars	Trucks
7/08/86	57	0	47	18	0	122	57%	43%	29%	71%
4/14/88	196	7	0	0	0	203	100%	0%	97%	3%

Table 2.6.1.12-1C. Roadway With Special-Use Traffic

Date	Vehicle Classification								% of Trucks		% of Total	
	Autos	SU-1	SU-2	2-S1	2-S2	2-S1-2	3-S2	Total	SU	Comb.	Cars	Trucks
7/08/86	122	0	145	1	16	0	153	437	46%	54%	28%	72%
4/14/86	248	15	24	0	0	2	9	298	78%	22%	83%	17%



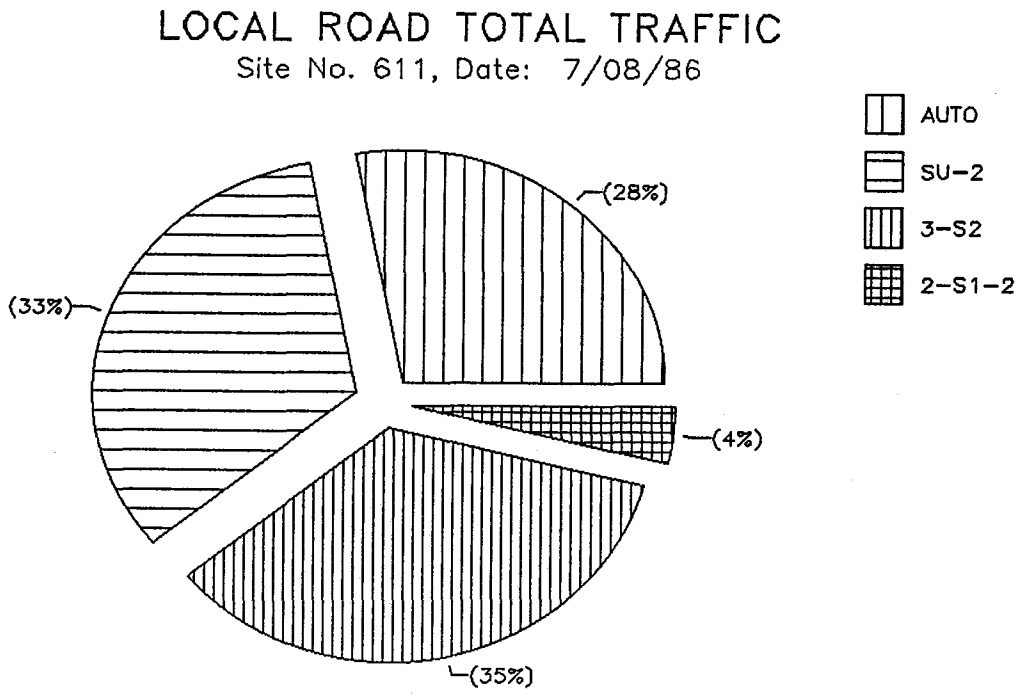


Figure 2.6.1.12-4. Highway Vehicle Percentages

2.6.1.13 Sand and Gravel Pit, Site No. 612

Introduction. The site map shown in Figure 2.6.1.13-1 indicates that access is provided by a County Road which intersects with a U.S. Highway a short distance from the gravel pit. The site is just south of a small urbanized area near a river. Products mined at this location are hauled to various locations in all directions from this small urban area. No rail service is provided.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.13-2 shows the truck traffic (in and out) generated by this sand and gravel operation during a 12-hour period from 6 a.m. to 6 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the pit during the same 12-hour period on April 15, 1988. No traffic peaks are apparent except during the 4 p.m. to 6 p.m. time period. This is primarily automobiles. According to interview information, the plant employs only 10 people, with daily operations beginning at 7:00 a.m. and concluding generally around 4:30 p.m.

Figure 2.6.1.13-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. The predominant truck was the SU-2 (55 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Trucks represented 71 percent of all traffic. This gravel pit added 52 single unit truck trips and 34 3-S2 truck trips to the U.S. Highway. This site increased the truck percentage on this roadway by one percent (from 5 to 6 percent).

Interviews with plant officials indicated average yearly production of 200,000 tons. Other information is provided in Table 2.6.1.13-1.

Table 2.6.1.13-1. Interview Information
Daily Loads Hauled

Outgoing (Loaded) Vehicles

Number of Loads

	SU	3-S2
Low	2	20
Avg	8	---
High	15	180

Radius of Influence

Single Unit

100% within 50 miles 100% within 100 miles

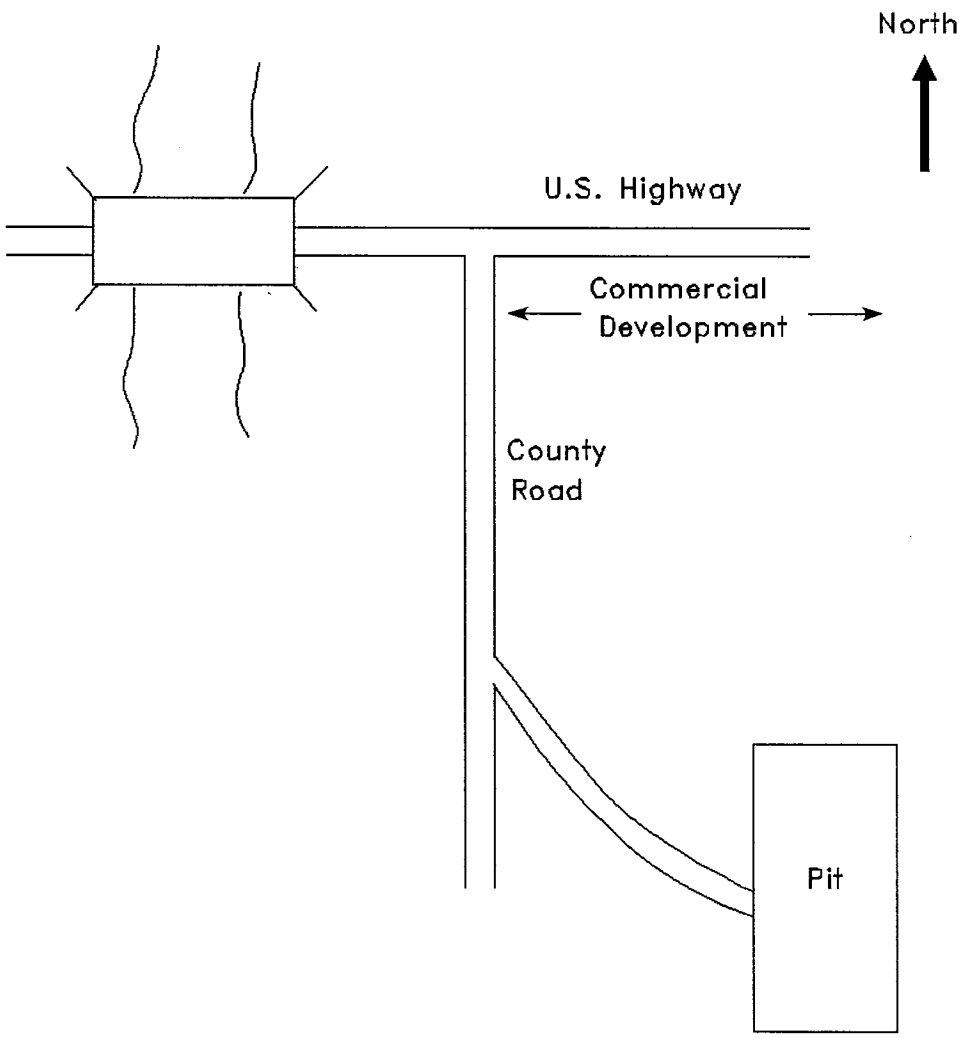
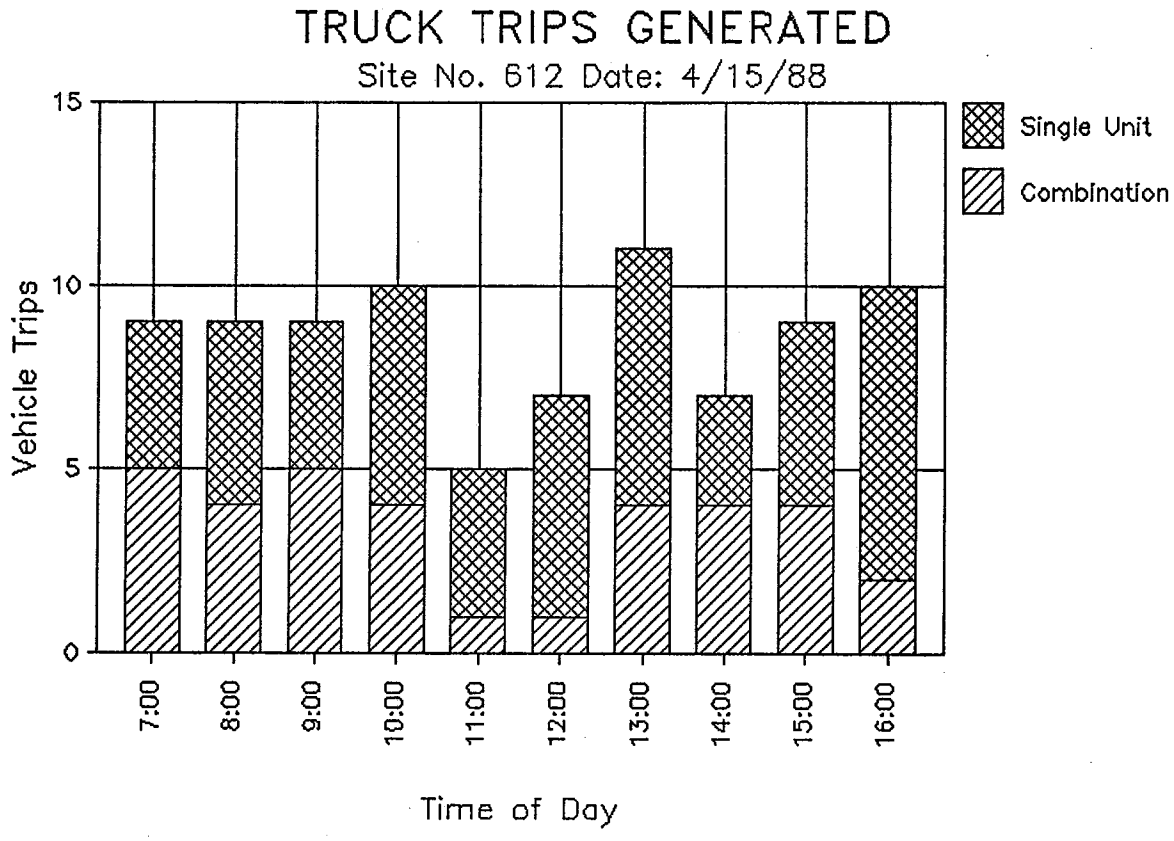


Figure 2.6.1.13-1. Site Map



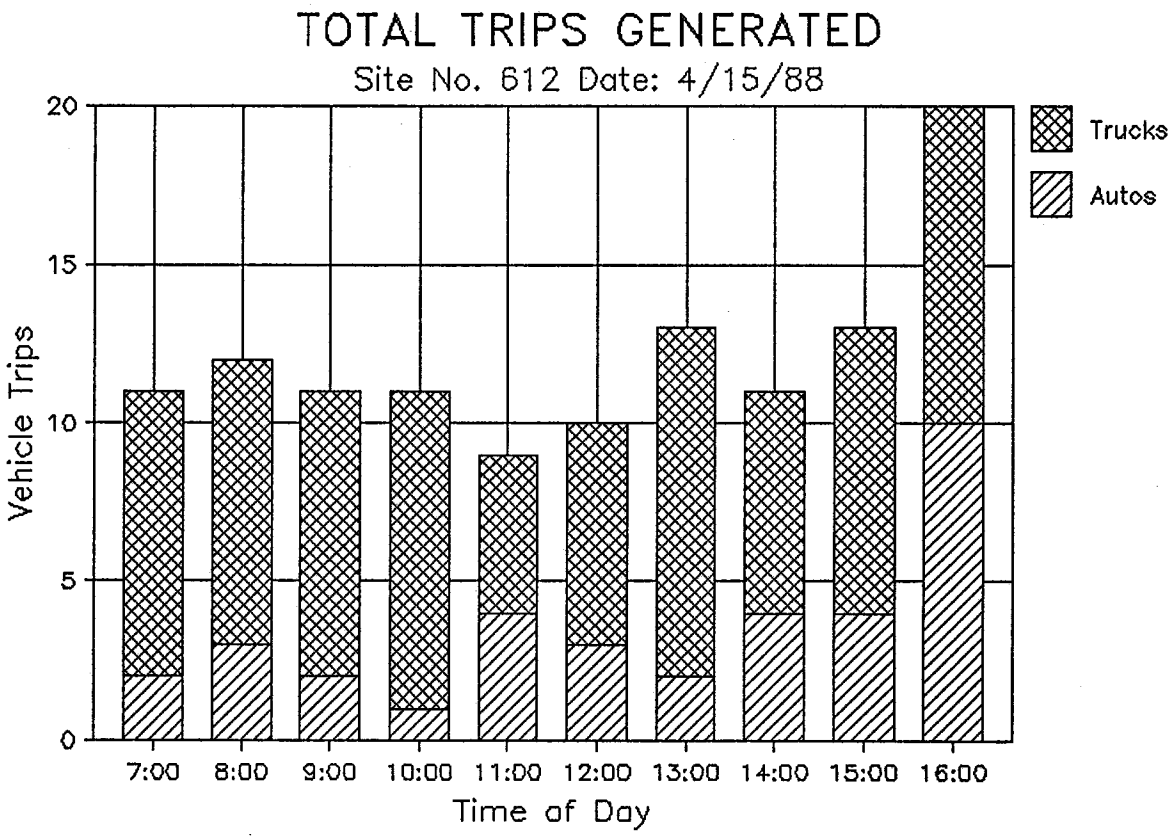
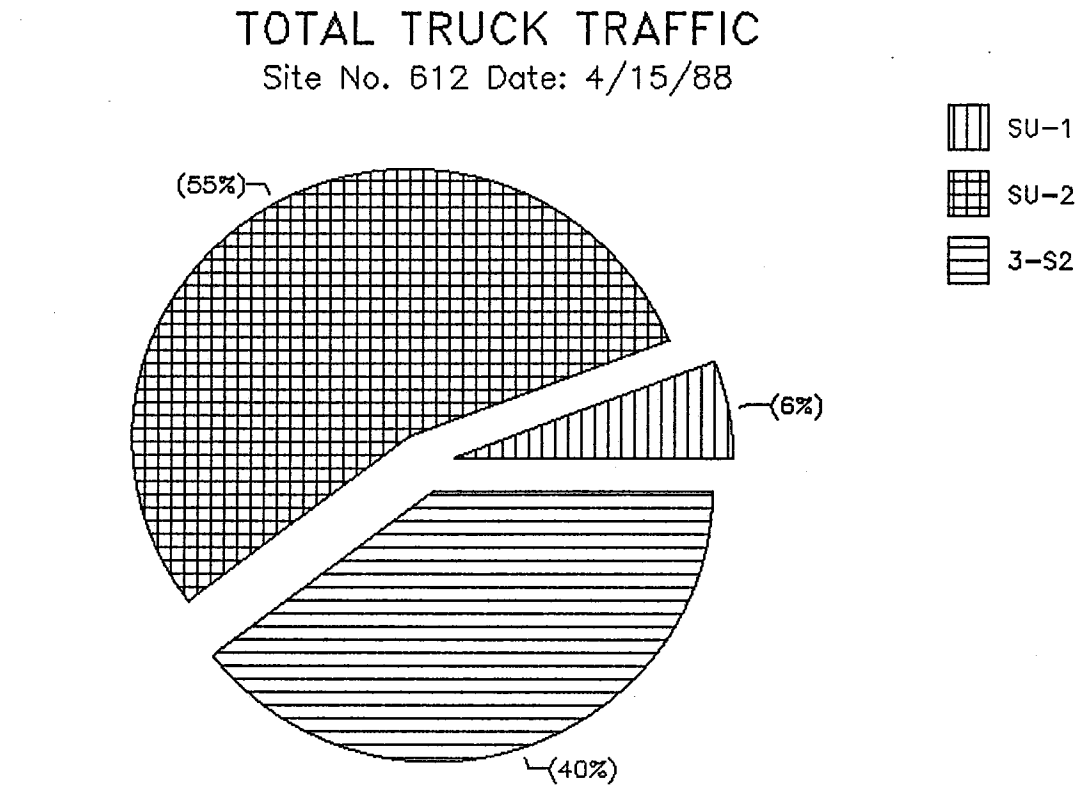


Figure 2.6.1.13-2. Hourly Trip Generation



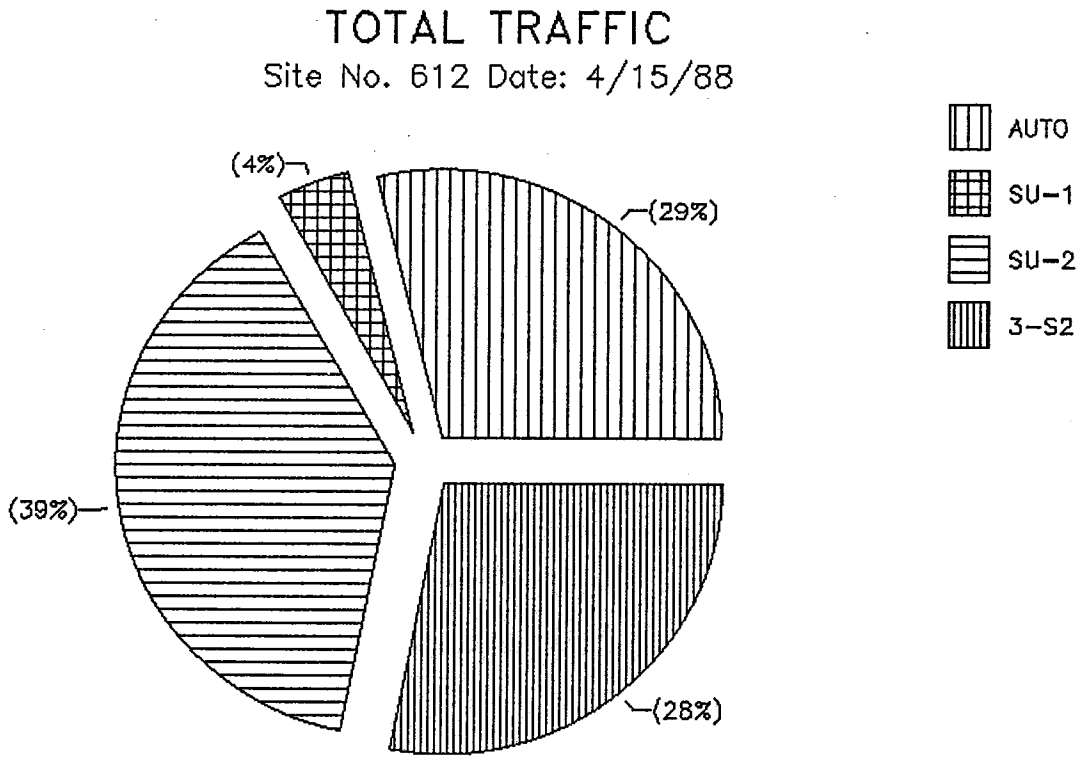


Figure 2.6.1.13-3. Activity Center Vehicle Percentages

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a U.S. Highway carrying an average daily traffic (ADT) of 18,000 vehicles per day in 1986. Manual classification counts were conducted in 1988 primarily to determine the impact of special-use activities on the roadway. Table 2.6.1.13-2 provides a summary of the counts taken. In Table 2.6.1.13-2A, vehicle classification counts for the activity center only are provided. In Table 2.6.1.13-2B, a count of all vehicles on the U.S. Highway except special-use vehicles is provided. Finally, in Table 2.6.1.13-2C, a total count of all vehicles on the roadway (sum of 2A and 2B plus special-use vehicles on the roadway) is provided.

Table 2.6.1.13-2. Traffic Classification Count Summary

Table 2.6.1.13-2A. Activity Center Only

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
4/15/88	48	5	47	34	0	134	60%	40%	29%	71%

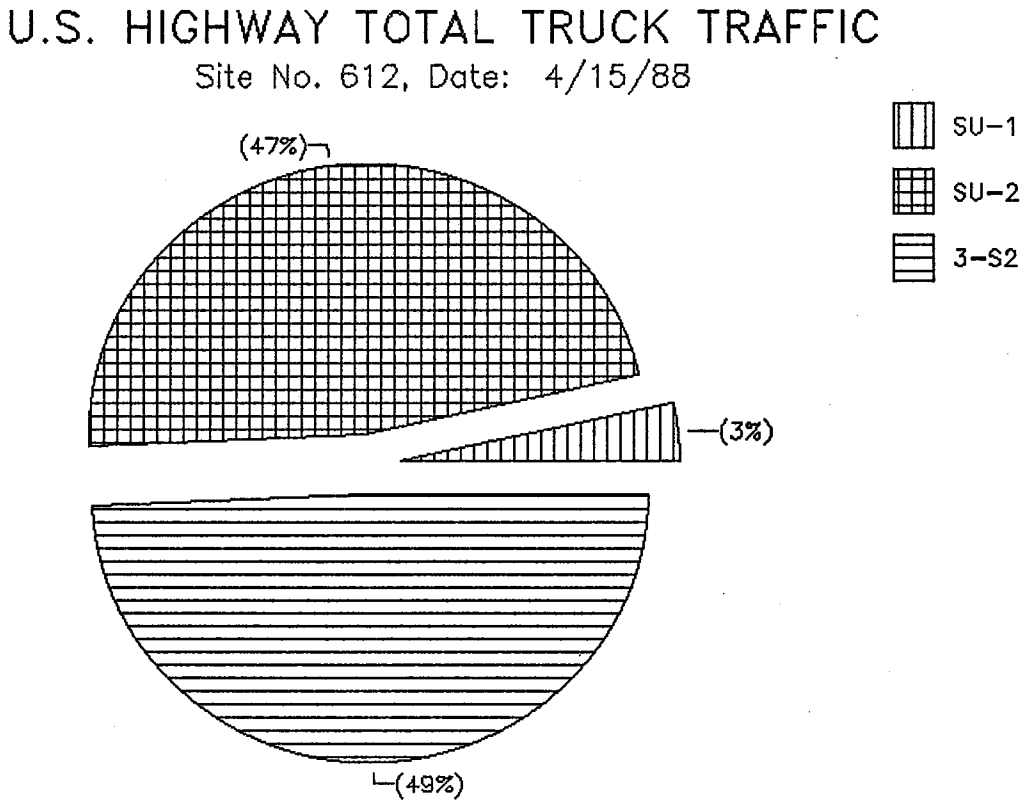
Table 2.6.1.13-2B. Roadway Without Special-Use Traffic

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
4/15/88	14384	23	293	343	0	15043	49%	51%	95%	5%

Table 2.6.1.13-2C. Roadway With Special-Use Traffic

	Vehicle Classification						% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
4/15/88	14432	28	417	400	0	15277	50%	49%	94%	6%

Figure 2.6.1.13-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.13-2C values). The 3-S2 and SU-2 vehicles were 49 percent and 47 percent, respectively, of the total truck traffic. Trucks represented six percent of the total traffic stream on this day.



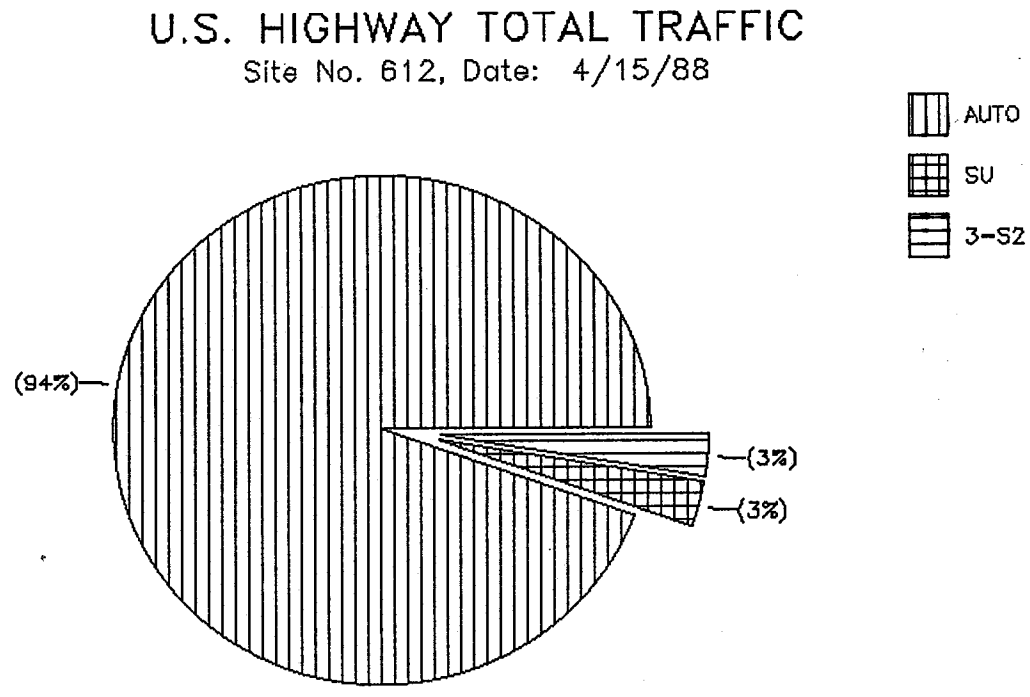


Figure 2.6.1.13-4. Highway Vehicle Percentages

2.6.1.14 Sand and Gravel Pit, Site No. 613A

Introduction. The site map shown in Figure 2.6.1.14-1 indicates that access is provided by a Farm-to-Market Highway which terminates at this site. This gravel pit is just east of a small urbanized area and is near a river. Products mined at this location are hauled to various locations by truck. No rail service is provided.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.14-2 shows the truck traffic (in and out) generated by this sand and gravel operation during an 11-hour period from 6 a.m. to 5 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the pit during the same 11-hour period on October 28, 1986. Two traffic peaks are apparent--one when the pit opened and the other at noon. According to interview information, the plant employs only 15 people, with daily operations beginning at 7:00 a.m. concluding generally around 5:00 p.m. Observations indicated some (slower) activity before this time period.

Figure 2.6.1.14-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. The predominant truck was the 3-S2 (83 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Trucks represented 88 percent of all traffic. During the two days counted, this gravel pit added 102 combination vehicle trips on one day and 140 on another day to the traffic stream. Because this pit was located at the end of this FM Road and few trips were generated near the termination point except by this pit, the traffic percentages on the roadway are almost the same as the activity center entrance traffic.

Interviews with plant officials indicated average daily production of 4,000 tons of material hauled away by truck. This equivalent to an annual production rate of approximately one million tons. Other interview information is shown below.

Table 2.6.1.14-1. Interview Information
Daily Loads Hauled

Outgoing (Loaded) Vehicles

Number of Loads

	SU	3-S2
Low	5	70
Avg	20	100
High	25	125

Radius of Influence (For both 3-S2 and SU)

75% within 60 miles 100% within 200 miles

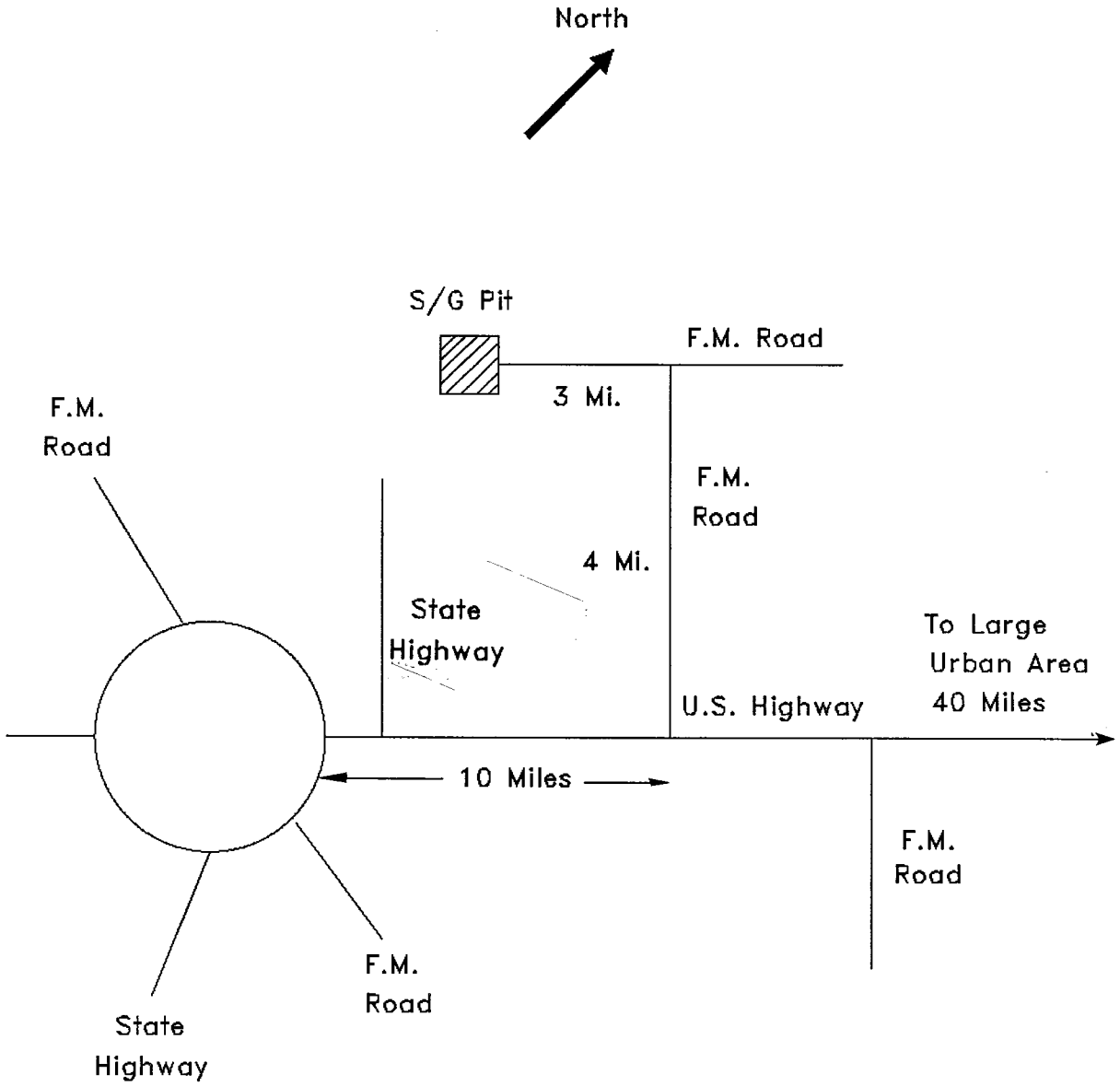
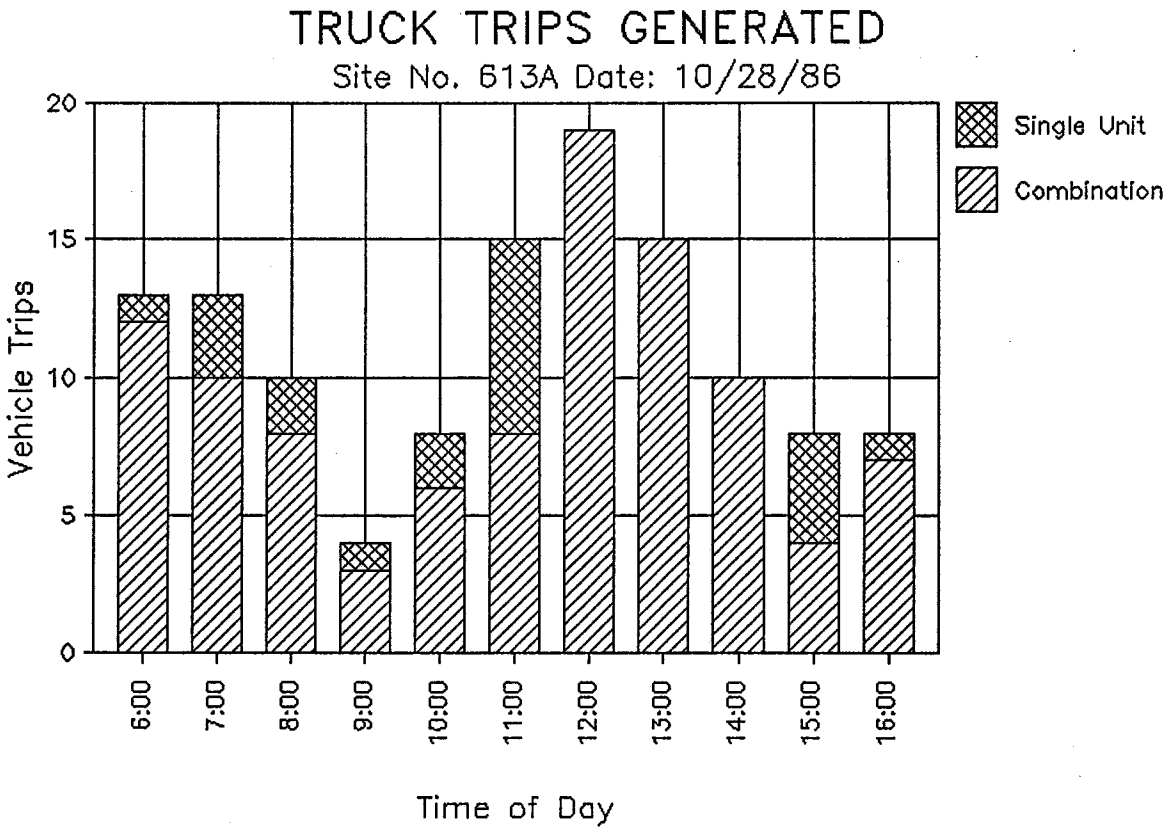


Figure 2.6.1.14-1 Site Map



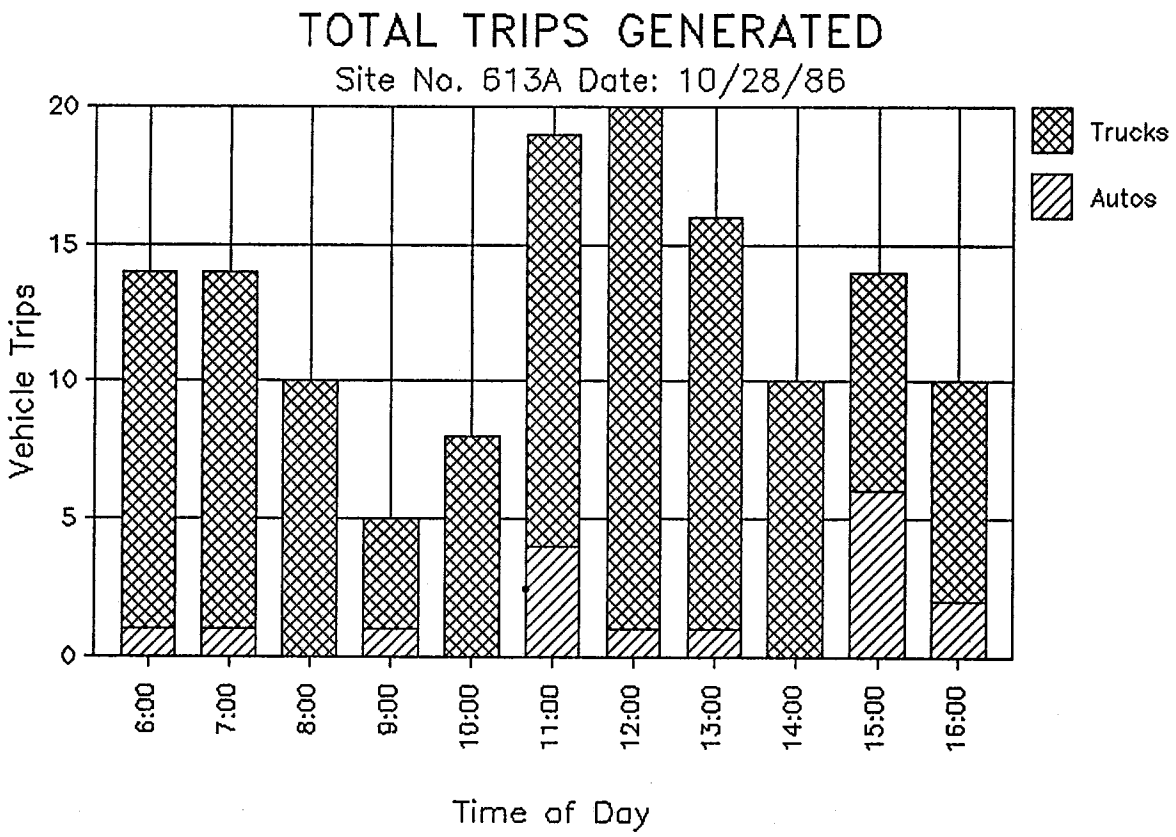
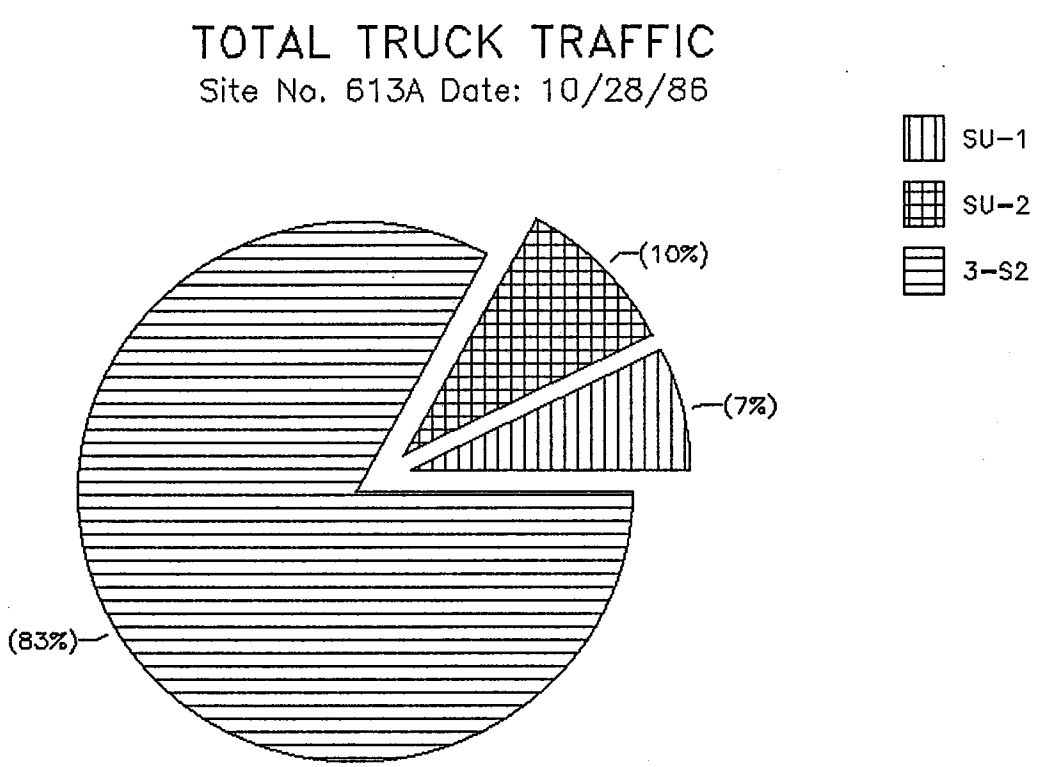


Figure 2.6.1.14-2 Hourly Trip Generation



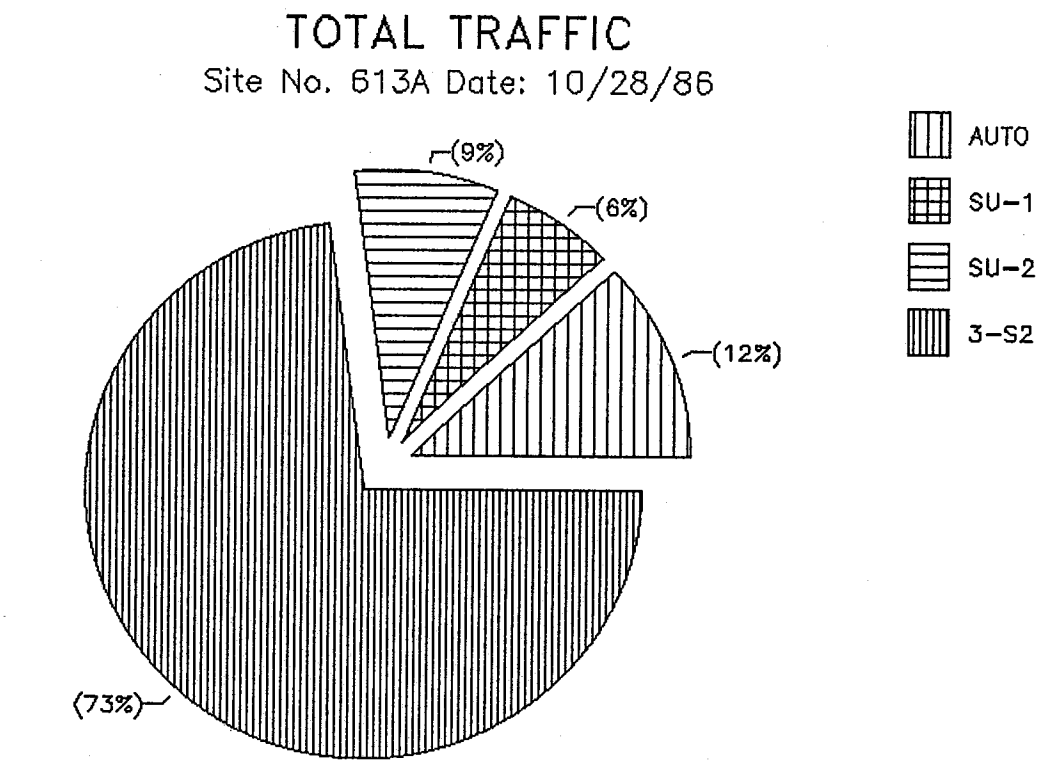


Figure 2.6.1.14-3 Activity Center Vehicle Percentages

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center was a Farm-to-Market Highway carrying an average daily traffic (ADT) of 690 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.6.1.14-2 provides a summary of the counts taken. In Table 2.6.1.14-2A, vehicle classification counts for the activity center only are provided. In Table 2.6.1.14-2B, a count of all vehicles on the U.S. Highway except special-use vehicles is provided. Finally, in Table 2.6.1.14-2C, a total count of all vehicles on the roadway (sum of 2A and 2B plus special-use vehicles on the roadway) is provided.

Figure 2.6.1.14-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included (Table 2.6.1.14-2C values). The 3-S2 vehicle is the dominant vehicle at 83 percent of total truck traffic. When all vehicles on the roadway are considered together, trucks represent 64 percent of the total traffic stream.

Table 2.6.1.14-2. Traffic Classification Count Summary

Table 2.6.1.14-2A. Activity Center Only

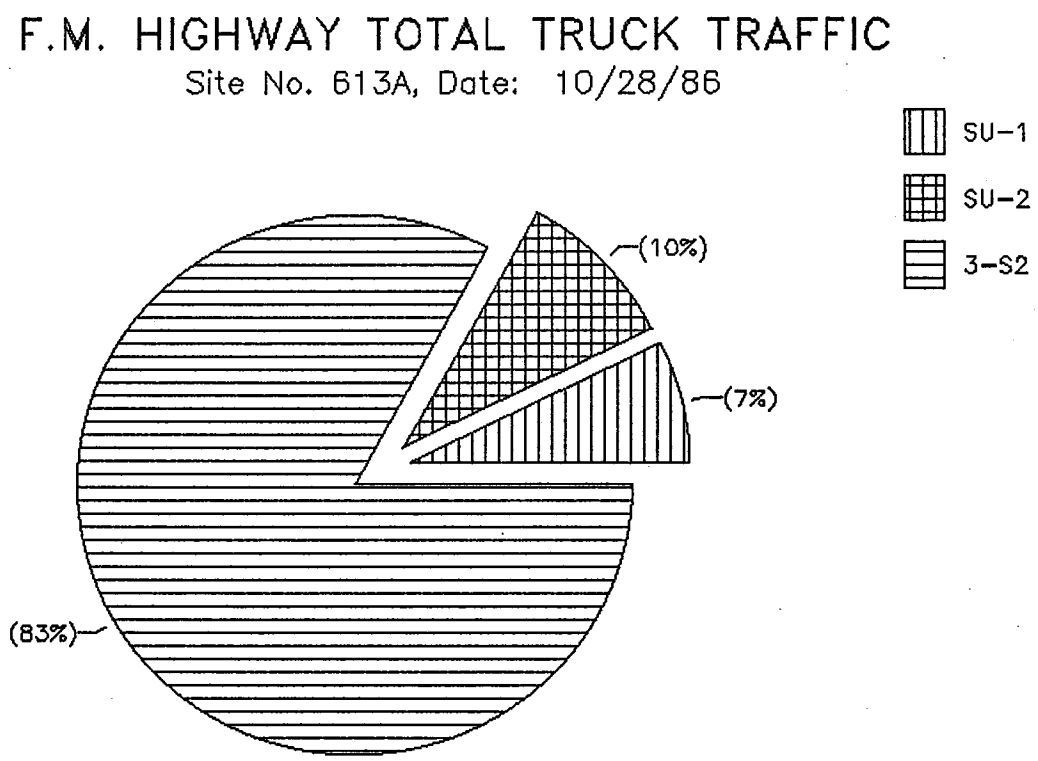
		Vehicle Classification					% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	2-S1-2	Total	SU	Com.	Cars	Trucks
10/28/86	17	9	12	102	0	140	17%	83%	12%	88%
10/29/86	30	7	12	134	6	189	12%	88%	16%	84%

Table 2.6.1.14-2B. Roadway Without Special-Use Traffic

		Vehicle Classification					% of Trucks		% of Total	
Date	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
10/28/86	52	0	0	0	0	52	0%	0%	100%	0%
10/29/86	49	2	0	0	0	51	0%	0%	96%	4%

Table 2.6.1.14-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	2-S1-2	Total	SU	Com.	Cars	Trucks
10/28/86	69	9	12	102	0	192	17%	83%	36%	64%
10/29/86	79	9	12	134	6	240	13%	87%	33%	67%



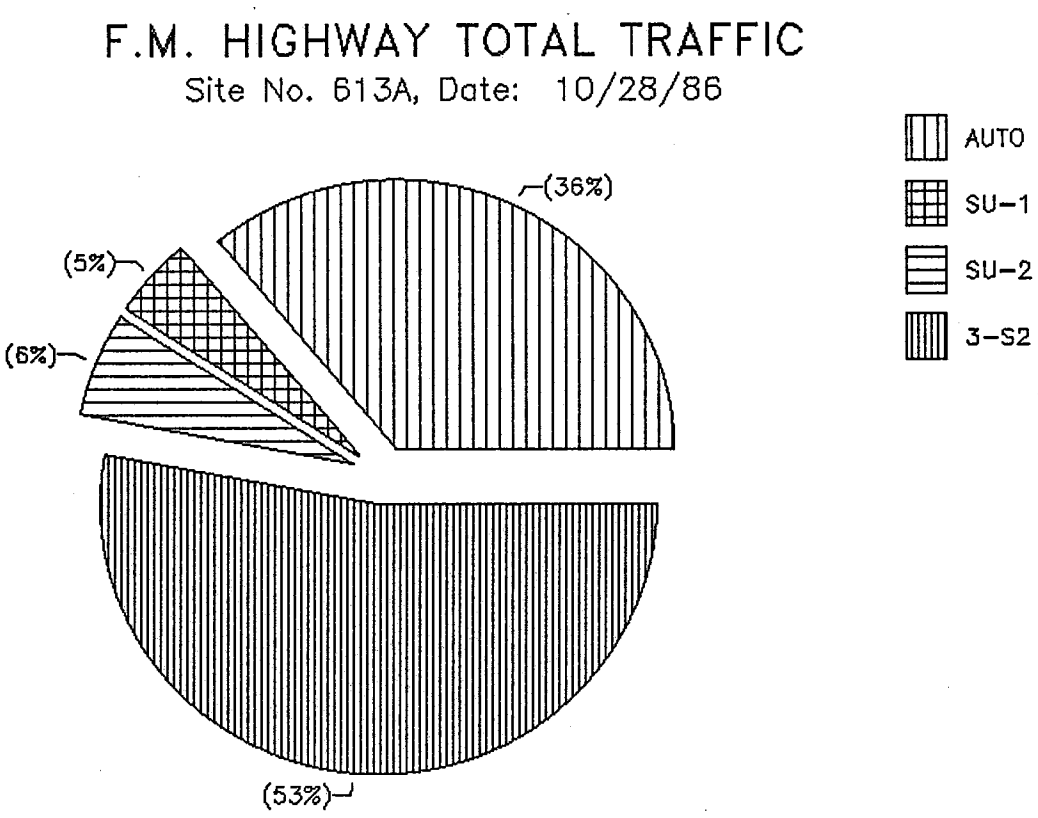


Figure 2.6.1.14-4. Highway Vehicle Percentages

2.6.1.15 Sand and Gravel Pit, Site No. 614

Introduction. The site map shown in Figure 2.6.1.15-1 indicates that access is provided by a U.S. Highway with its entrance only one mile west of a State Highway. This gravel is not near any urbanized areas, but much of the gravel produced in this area is hauled to a large city to the east of this site. No rail service is provided.

Activity Center Trip-Generating Characteristics. Figure 2.6.1.15-2 shows the truck traffic (in and out) generated by this sand and gravel operation during a 12-hour period from 6 a.m. to 6 p.m. and illustrates the fluctuations in this traffic on an hourly basis. Also shown in the figure is the number of trucks and autos that were generated by the pit during the same 12-hour period on July 18, 1986. The scale actually opens at 5 a.m. according to plant officials. About 12 to 15 trucks typically leave during the 5 a.m. to 7 a.m. time period. Also, in the late afternoon from 5 p.m. to 7 p.m., about 10 trucks usually preload for the following day. One traffic peak is evident from the hourly plots--from 3 p.m. to 4 p.m. The plant official interviewed did not disclose the number of employees.

Figure 2.6.1.15-3 illustrates the breakdown by AASHTO classification of the total truck traffic going into and out of the site. The dominant truck was the 3-S2 (80 percent of all trucks). Also illustrated is the breakdown of total traffic generated by this site. Trucks represented 75 percent of all traffic. This gravel pit added 94 combination vehicles and 24 single unit vehicle trips to the U.S. Highway.

Interviews with plant officials indicated a 1986 average daily production of 2,000 tons shipped by truck. This is significantly lower than the 1985 production for this plant. Even the maximum daily production of 4,000 tons in 1986 does not rival the 1985 average daily value of 9,000 tons. Total production for 1985 was 298,047 tons. The reason given for the reduction in 1986 was the loss of business to a local competitor.

The radius of influence for this pit is a maximum of about 100 miles. Ninety percent of the trucks loaded here travel this distance; five percent travel 30 miles; and five percent go 15 miles.

Characteristics of Roadway Serving Activity Center. The roadway providing public access to this activity center is a U.S. Highway carrying an average daily traffic (ADT) of 1,800 vehicles per day in 1986. Manual classification counts were conducted in 1986 primarily to determine the impact of special-use activities on the roadway. Table 2.6.1.15-2 provides a summary of the counts taken. In Table 2.6.1.15-2A, vehicle classification counts for the activity center only are provided. In Table 2.6.1.15-2B, a count of all vehicles on the U.S. Highway except special-use vehicles is provided. Finally in Table 2.6.1.15-2C, a total count of all vehicles on the roadway (sum of 2A and 2B plus special-use vehicles on the roadway) is provided.

Figure 2.6.1.15-4 shows the percentages of total truck traffic and total traffic on the highway when special-use vehicles are included. The 3-S2 vehicle is 65 percent of total trucks and 18 percent of total traffic.

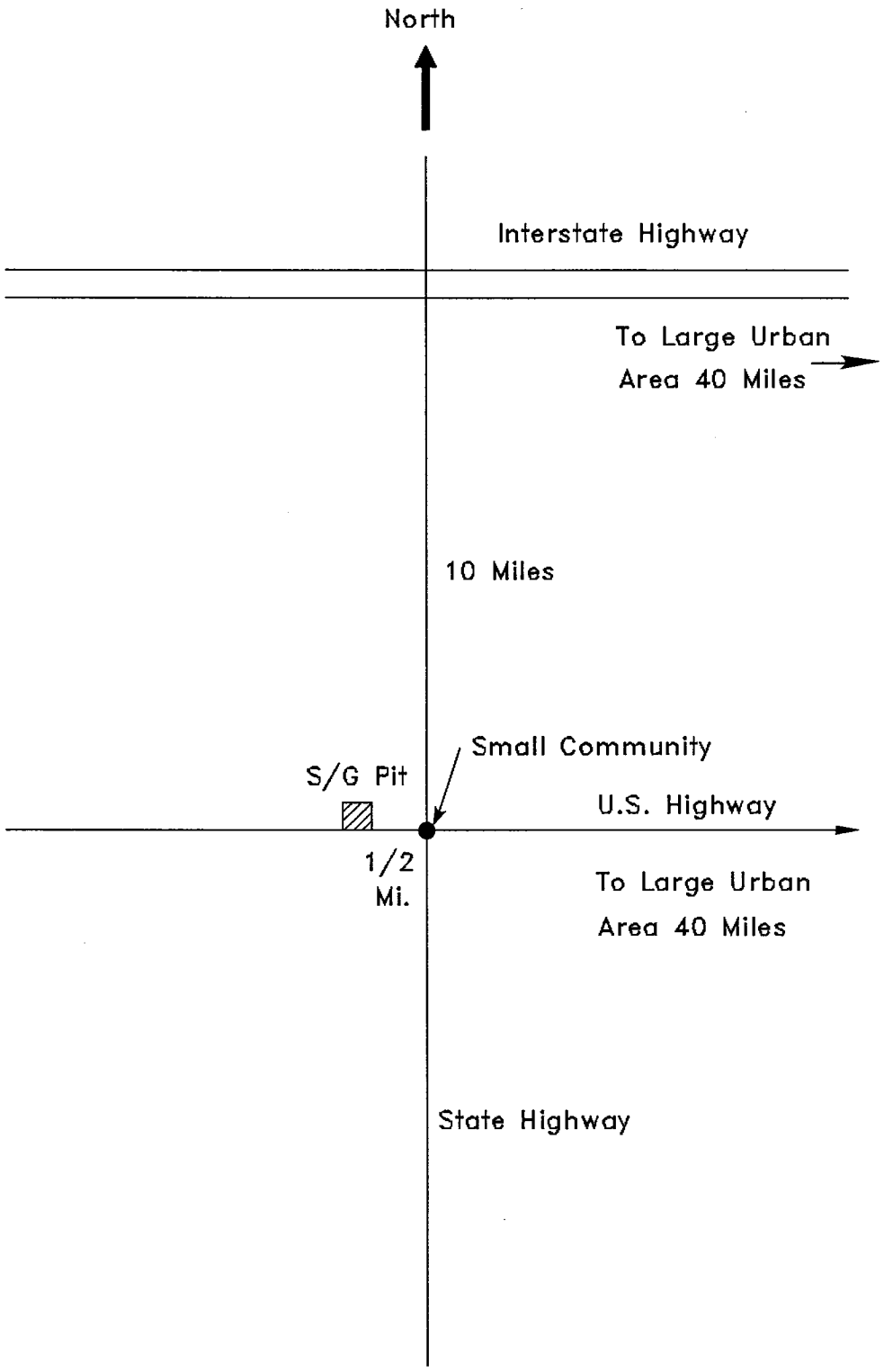


Figure 2.6.1.15-1. Site Map

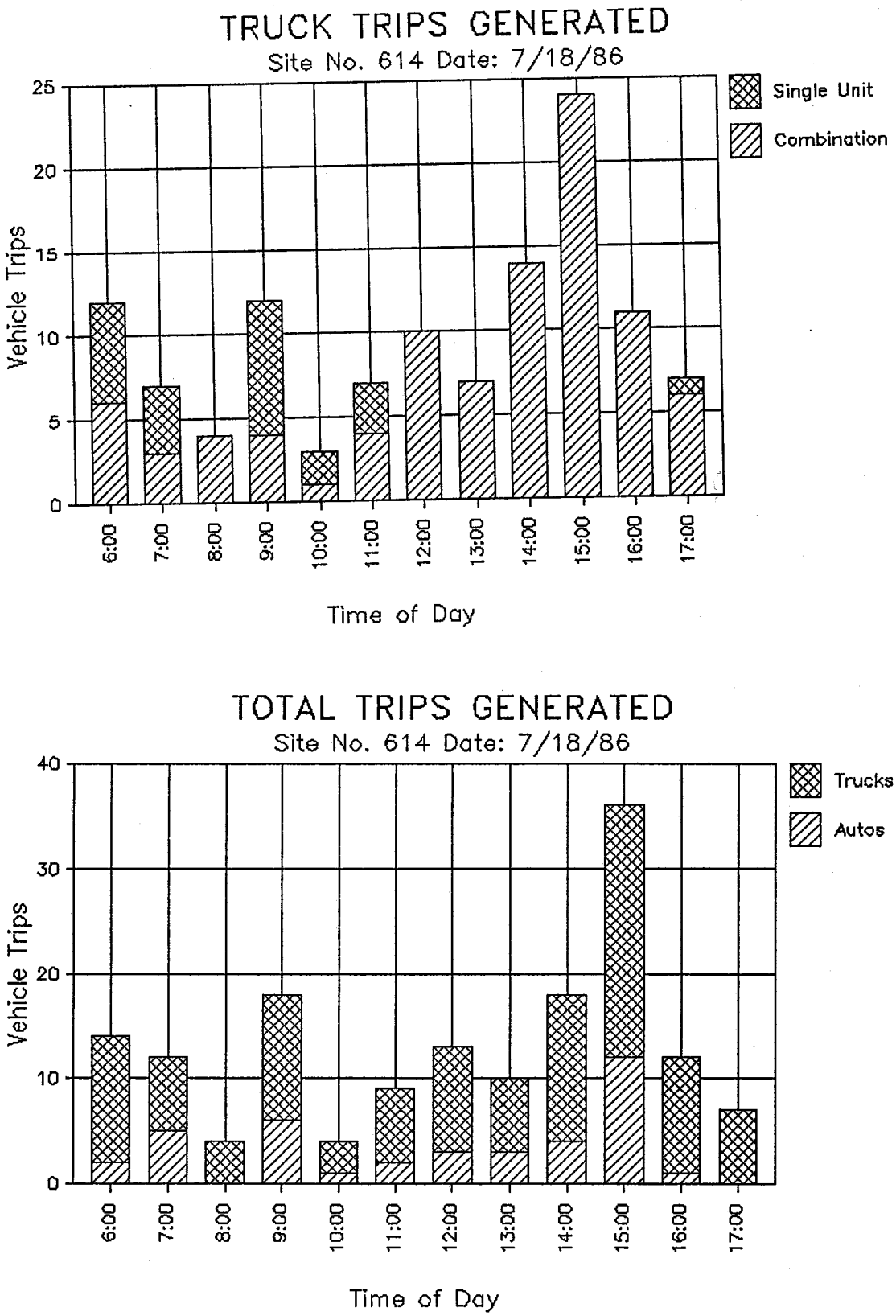
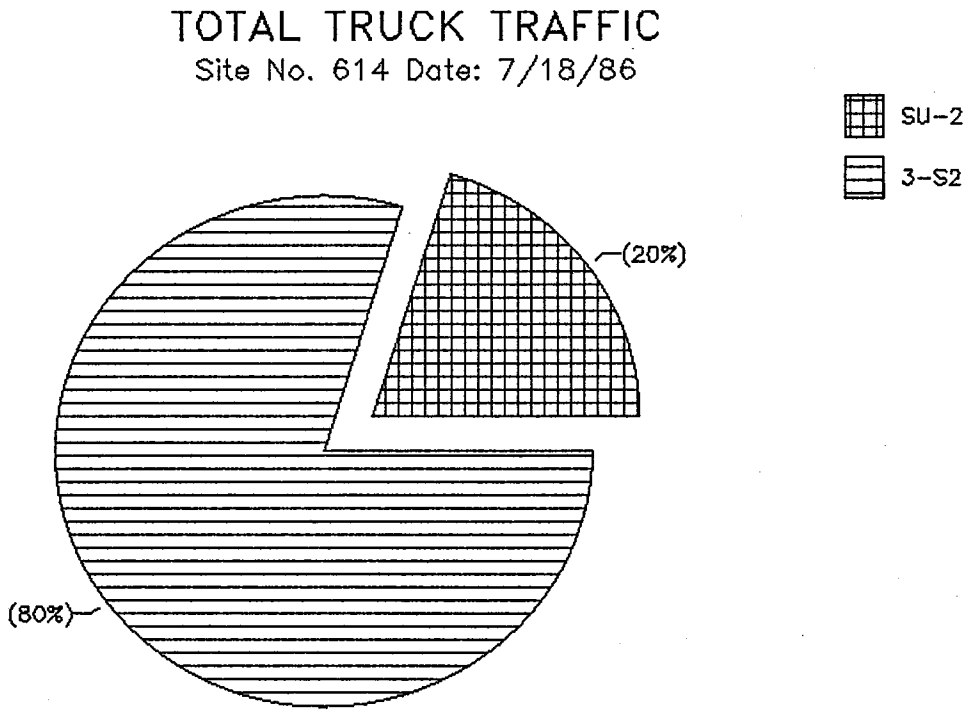


Figure 2.6.1.15-2. Hourly Trip Generation



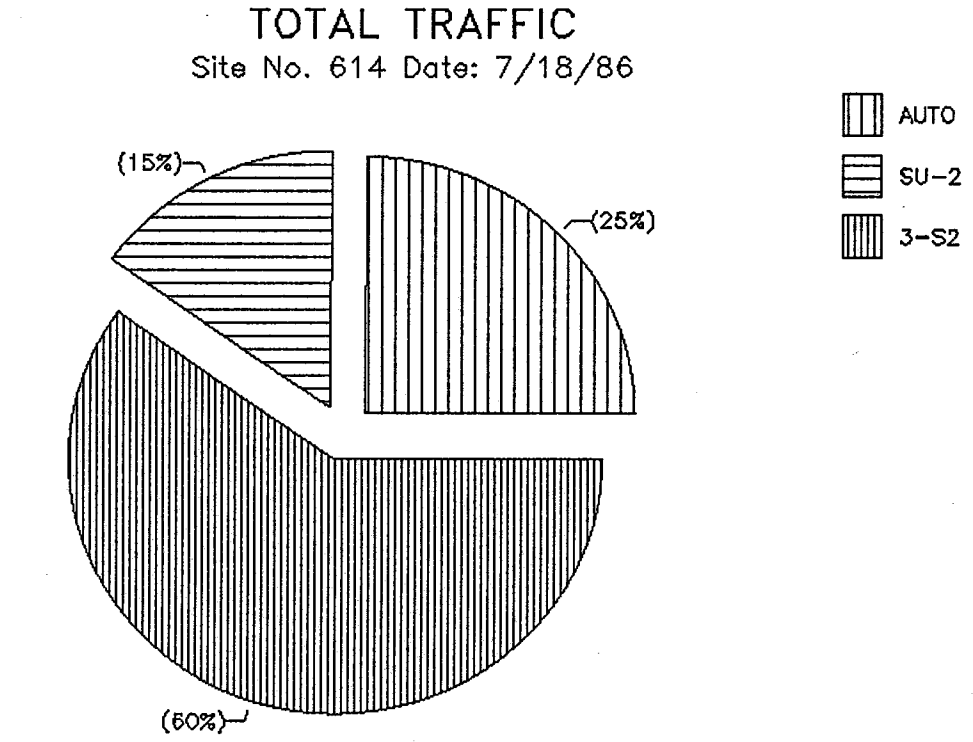


Figure 2.6.1.15-3. Activity Center Vehicle Percentages

Table 2.6.1.15-2. Traffic Classification Count Summary

Table 2.6.1.15-2A. Activity Center Only

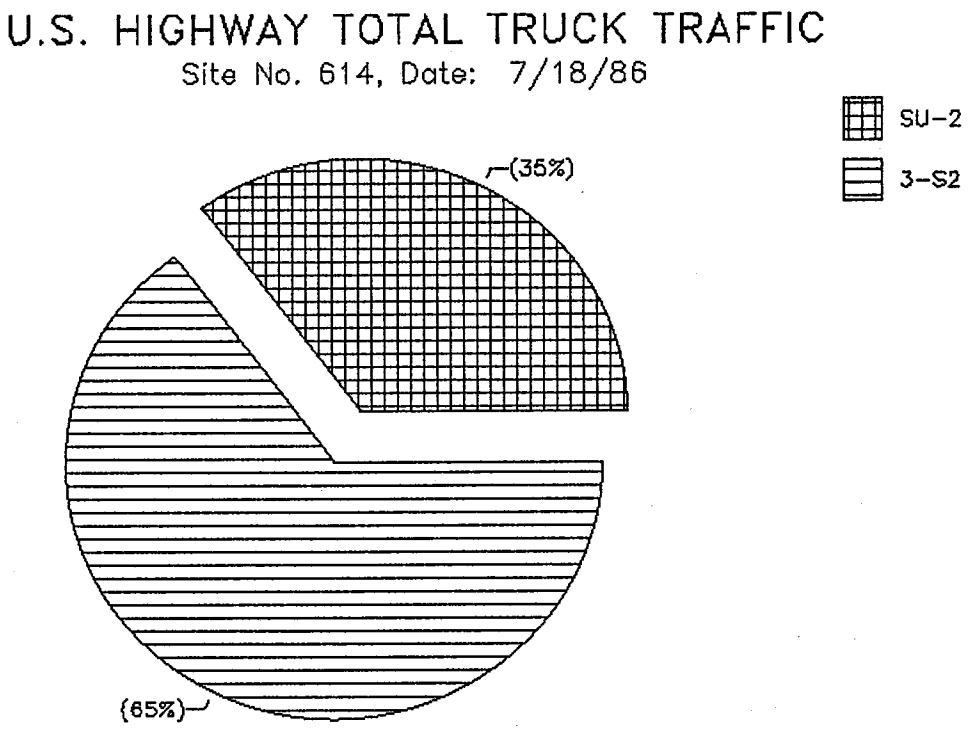
Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
7/18/86	39	0	24	94	0	157	20%	80%	25%	75%

Table 2.6.1.15-2B. Roadway Without Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
7/18/86	1034	0	55	80	0	1169	41%	59%	88%	12%

Table 2.6.1.15-2C. Roadway With Special-Use Traffic

Date	Vehicle Classification						% of Trucks		% of Total	
	Autos	SU-1	SU-2	3-S2	Other	Total	SU	Com.	Cars	Trucks
7/18/86	1073	0	150	277	0	1500	35%	65%	72%	28%



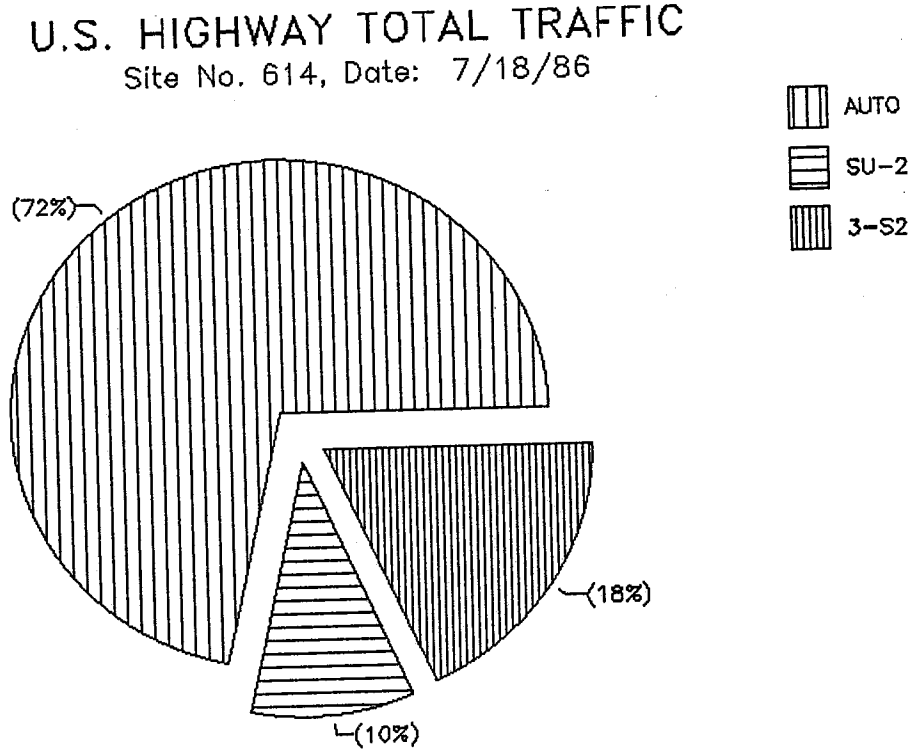


Figure 2.6.1.15-4. Highway Vehicle Percentages

2.6.2 WEIGH-IN-MOTION RESULTS FOR SAND/GRAVEL

Figures 2.6.2-1 through 2.6.2-14 are cumulative distribution plots of axle weights and gross vehicle weights of trucks generated by gravel pits. The site numbers identified on the plots are the same as those used elsewhere for vehicle classification counts. The weigh-in-motion (WIM) crew identified special-use vehicles associated with each site and coded the vehicle weighed for subsequent evaluation.

The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weight. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was typically deployed at sand and gravel pits from about 8 a.m. to about 4 p.m. In other words, the system was not used to monitor night activity. Most of the gravel trucks hauled during the daytime, so the need to monitor night movement was not apparent.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near special-use traffic generators, lanes used for raw product movement, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked. All of the sites selected met these criteria fairly well, although the perfect location was difficult to find.

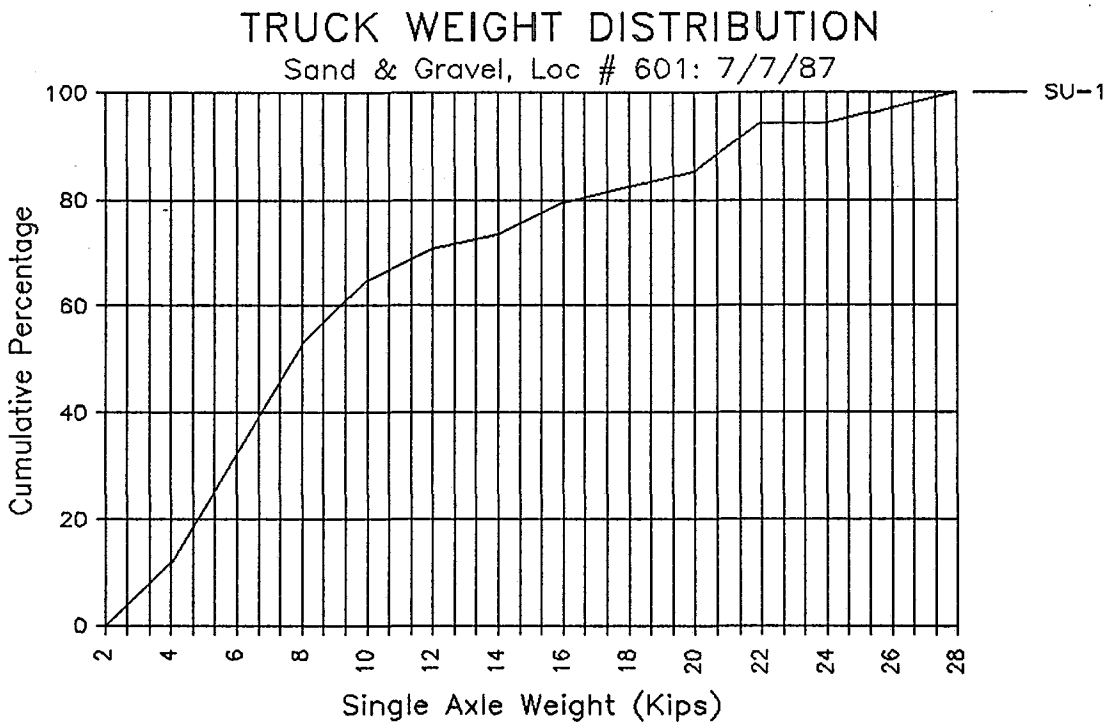


Figure 2.6.2-1 Sand/Gravel Weights: SU-1, Single Axle, 7/7/87

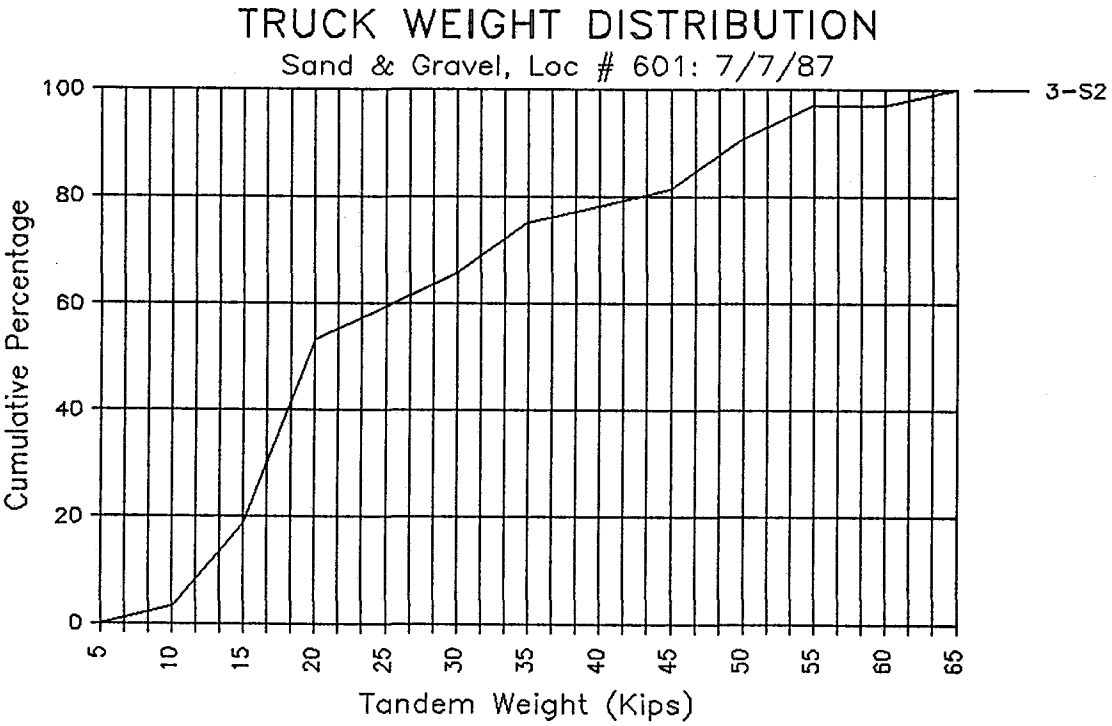


Figure 2.6.2-2 Sand/Gravel Weights: 3-S2, Tandem, 7/7/87

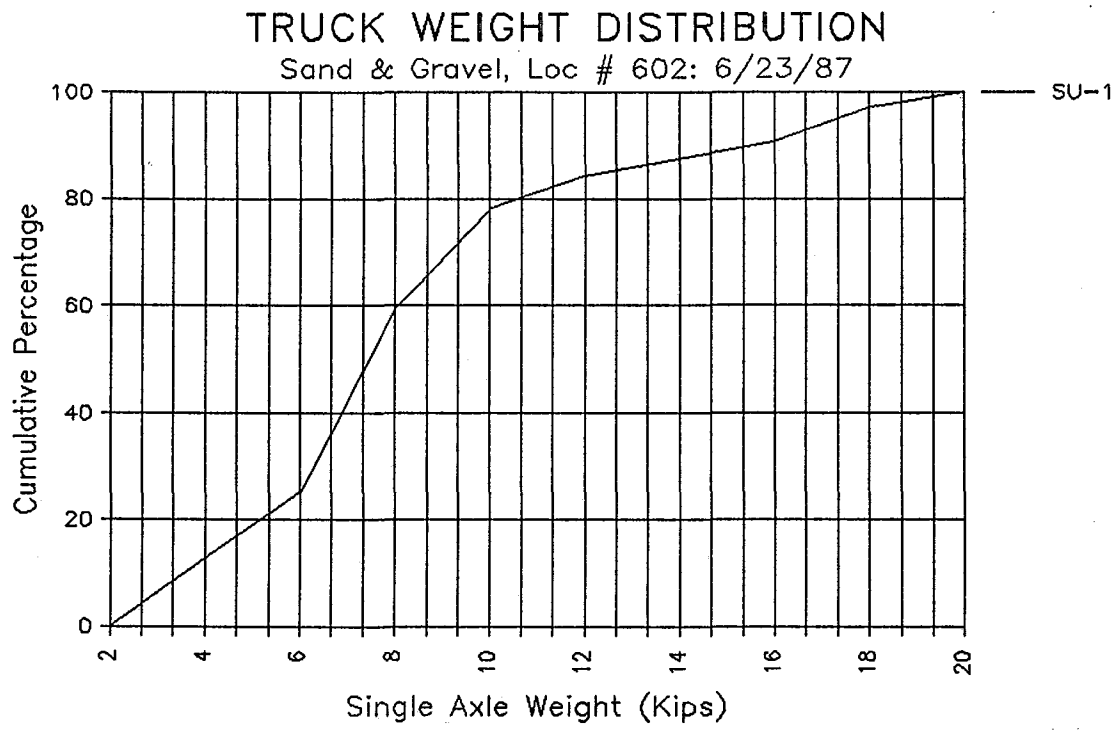


Figure 2.6.2-3 Sand/Gravel Weights: SU-1, Single Axle, 6/23/87

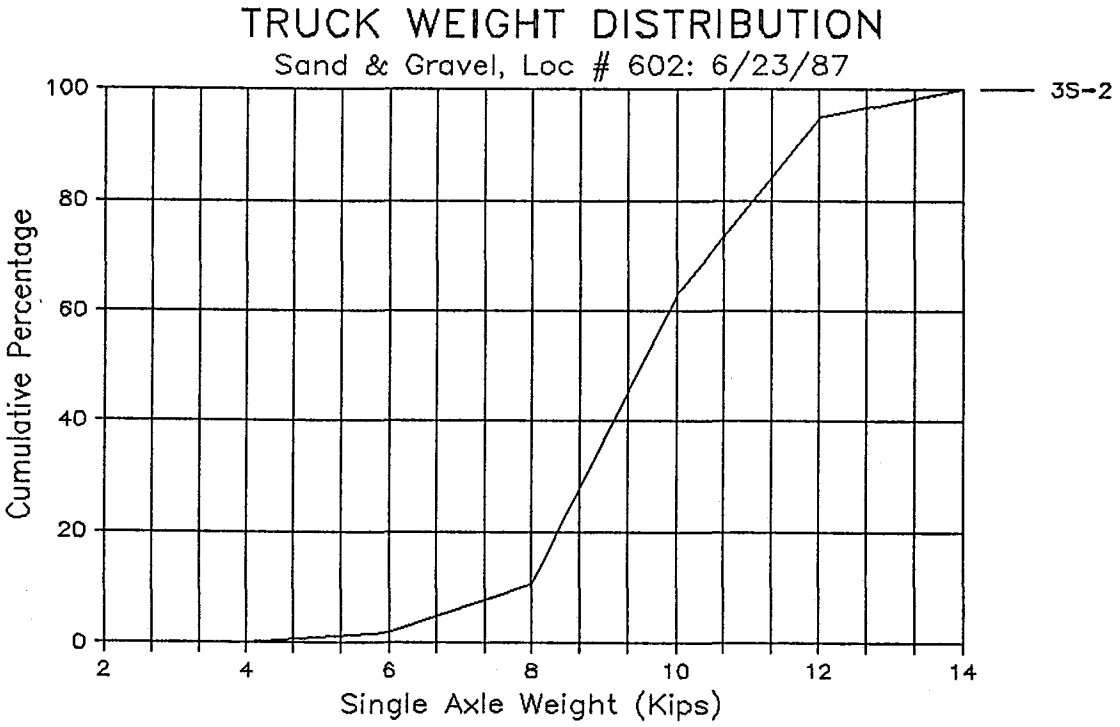


Figure 2.6.2-4 Sand/Gravel Weights: 3-S2, Single Axle, 6/23/87

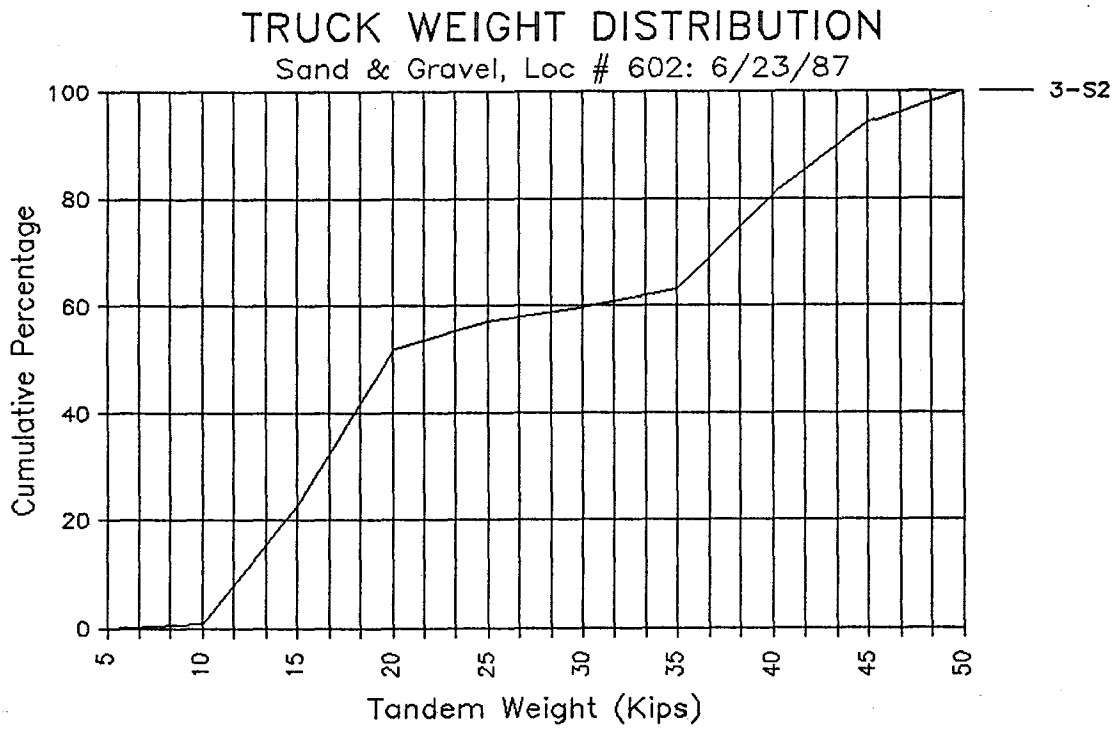


Figure 2.6.2-5 Sand/Gravel Weights: 3-S2, Tandem, 6/23/87

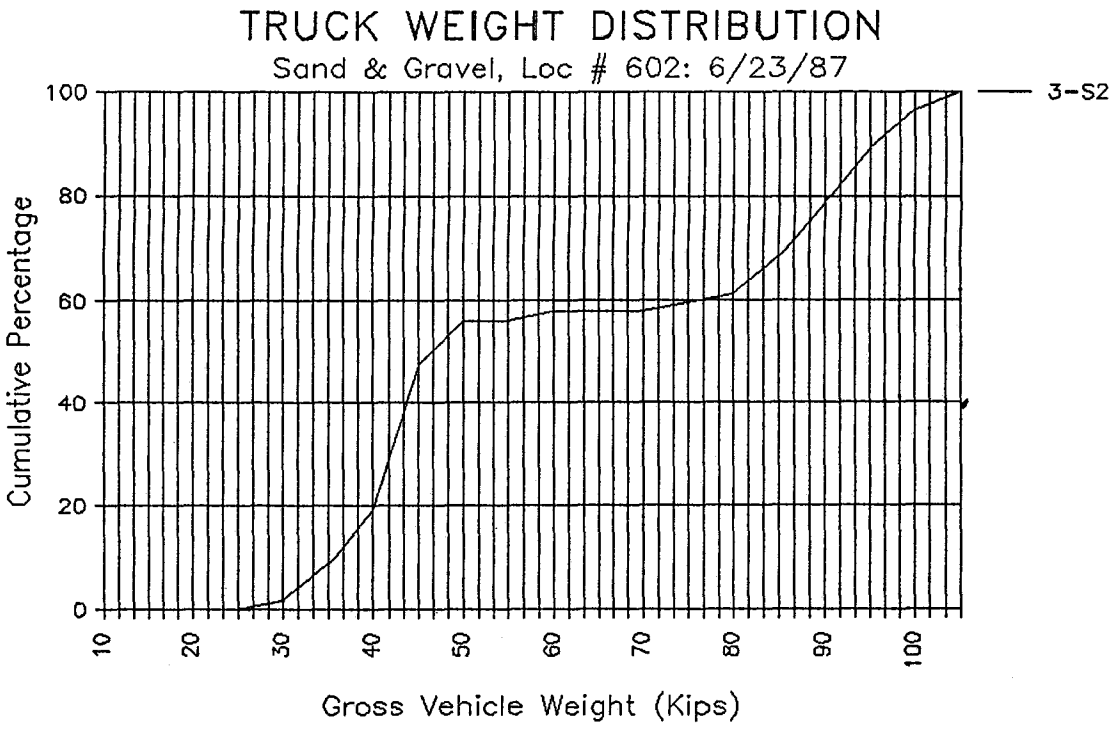


Figure 2.6.2-6 Sand/Gravel Weights: 3-S2, Gross Vehicle, 6/23/87

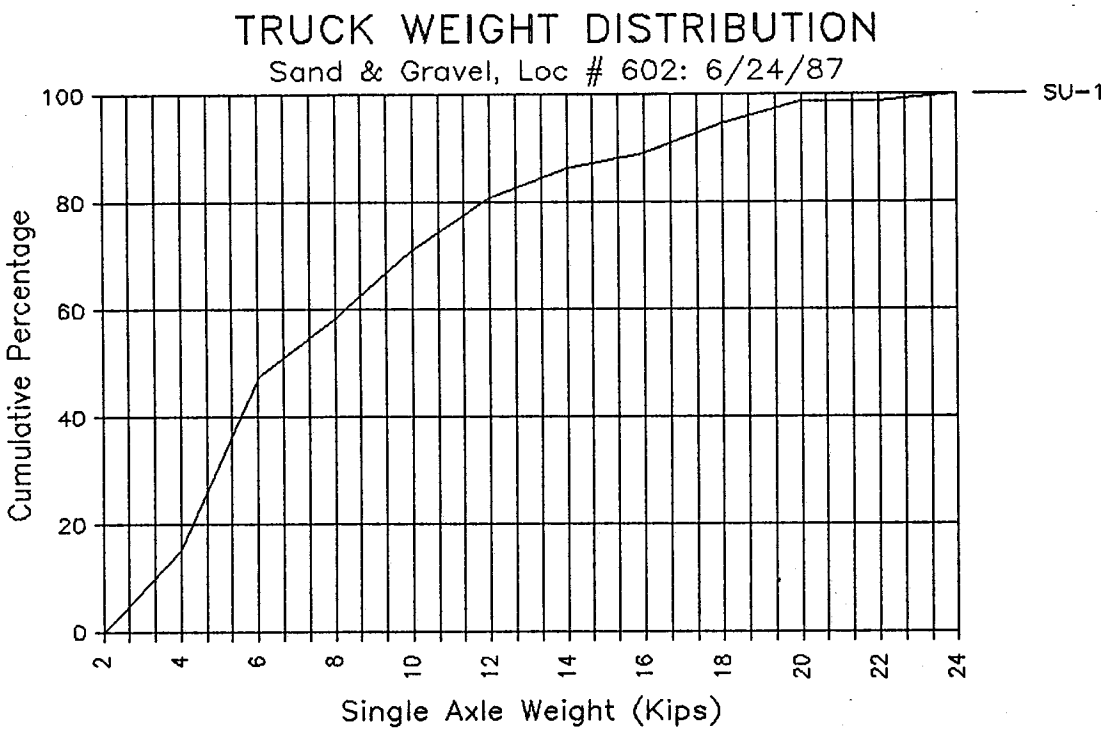


Figure 2.6.2-7 Sand/Gravel Weights: SU-1, Single, 6/24/87

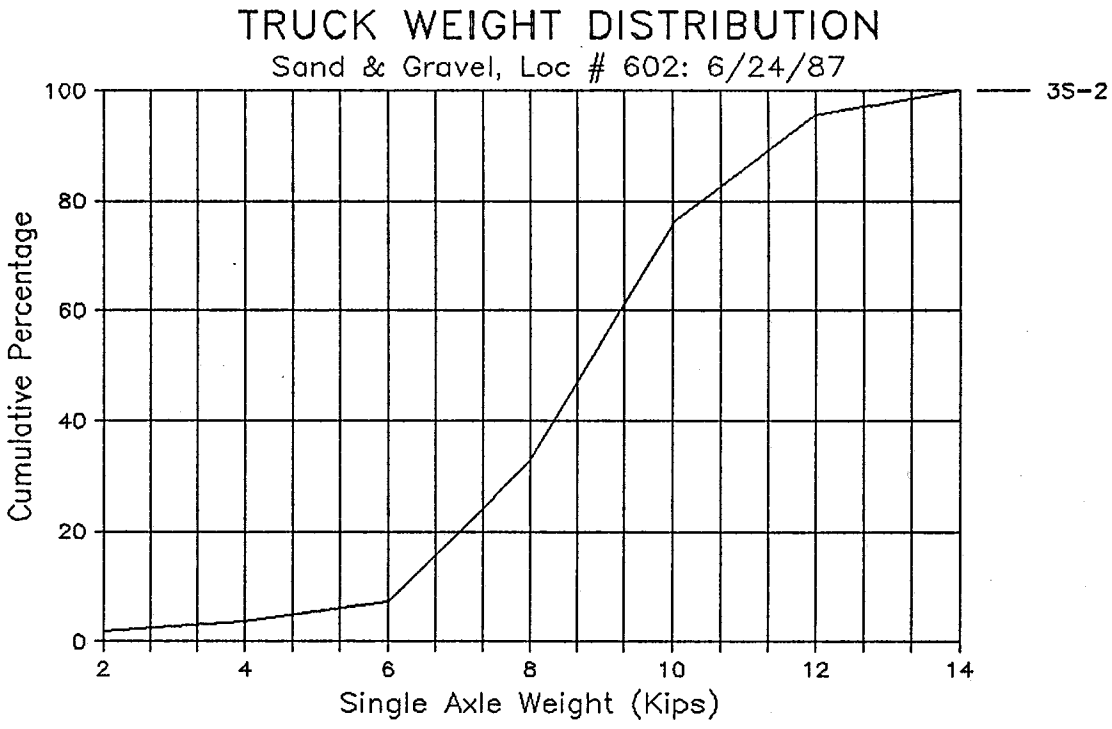


Figure 2.6.2-8 Sand/Gravel Weights: 3-S2, Single Axle, 6/24/87

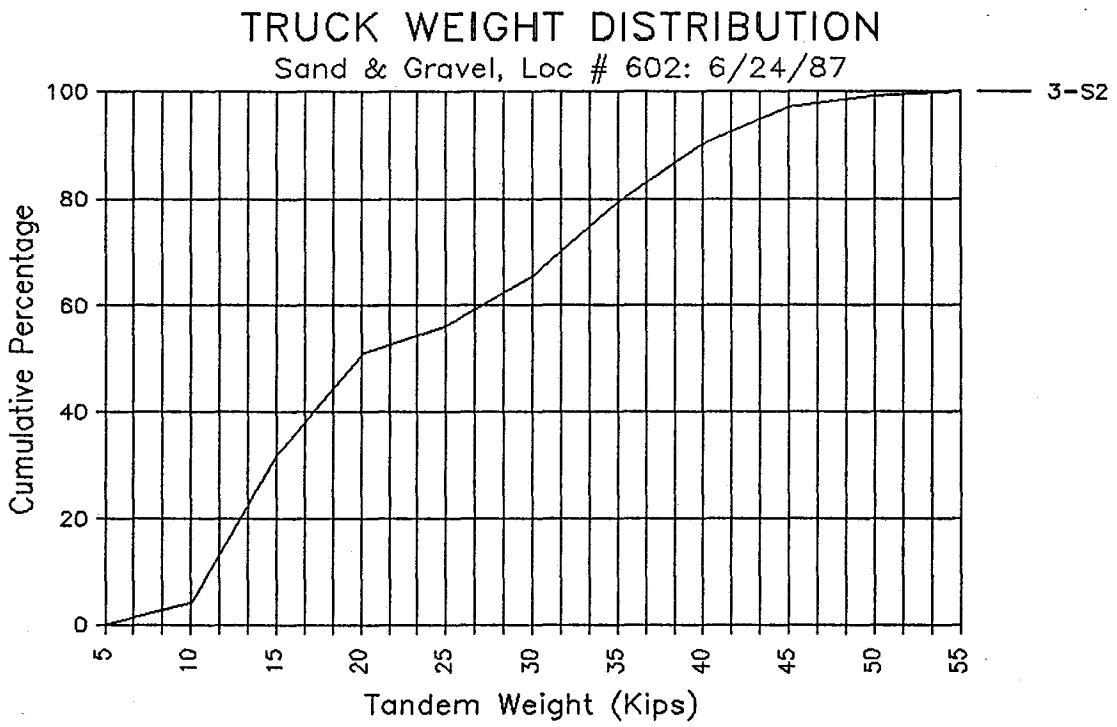


Figure 2.6.2-9 Sand/Gravel Weights: 3-S2, Tandem Axle, 6/24/87

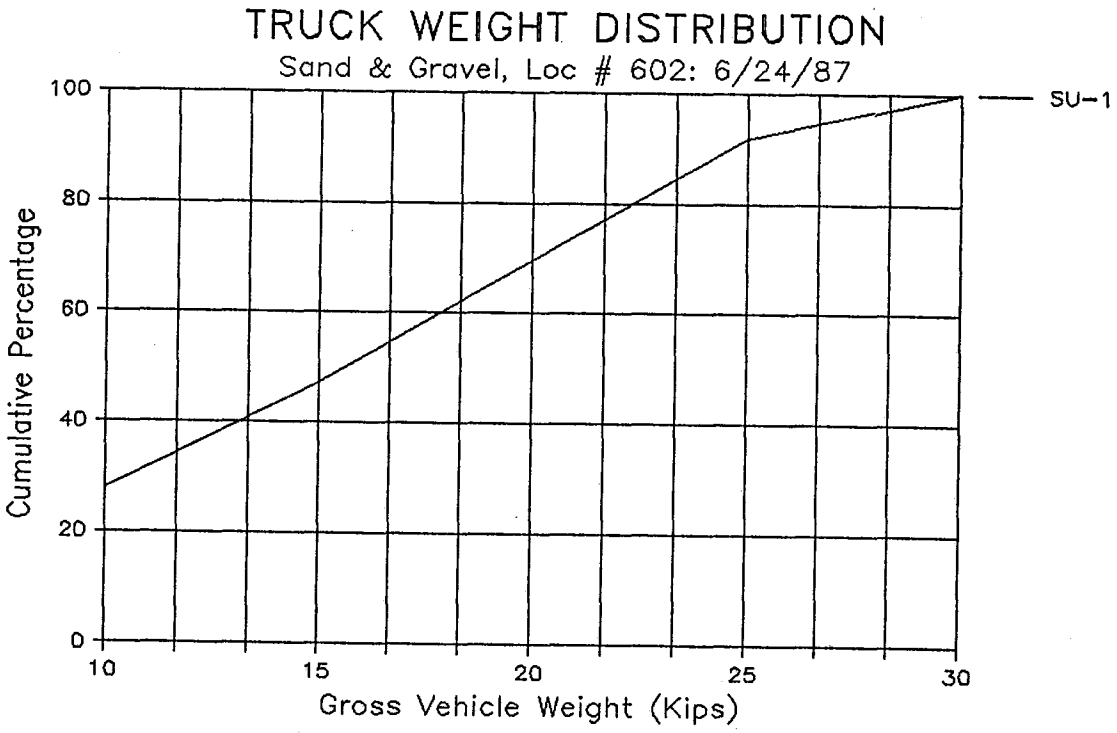


Figure 2.6.2-10 Sand/Gravel Weights: SU-1, Gross Vehicle, 6/24/87

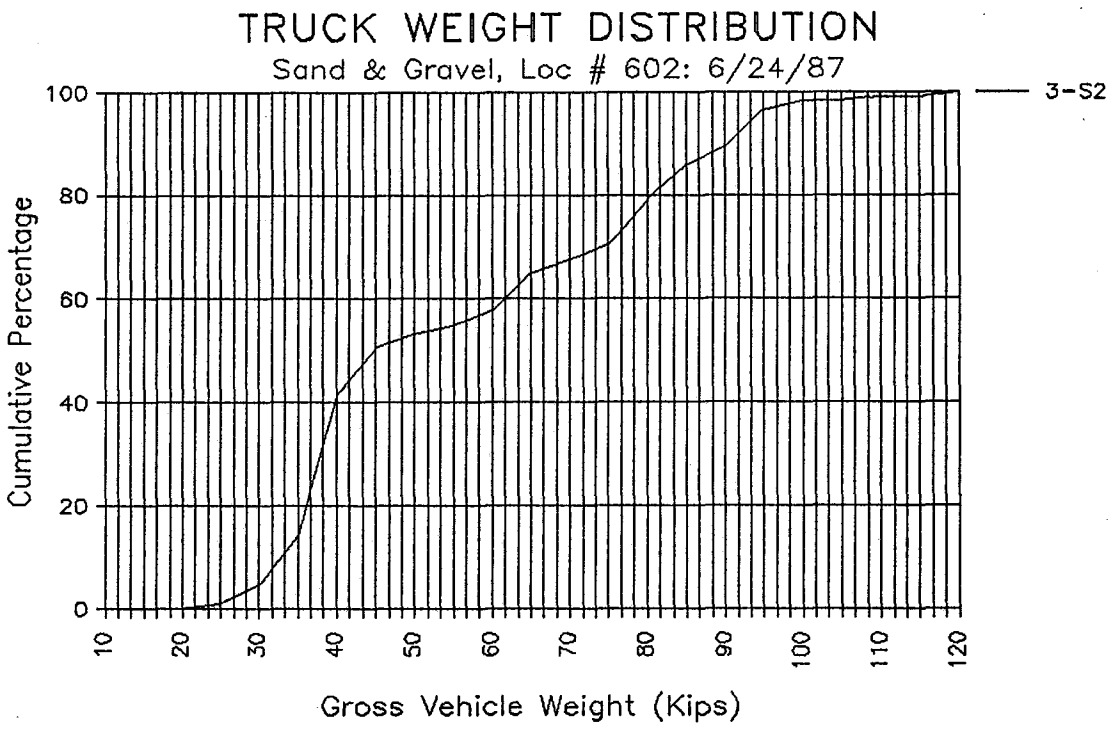


Figure 2.6.2-11 Sand/Gravel Weights: 3-S2, Gross Vehicle, 6/24/87

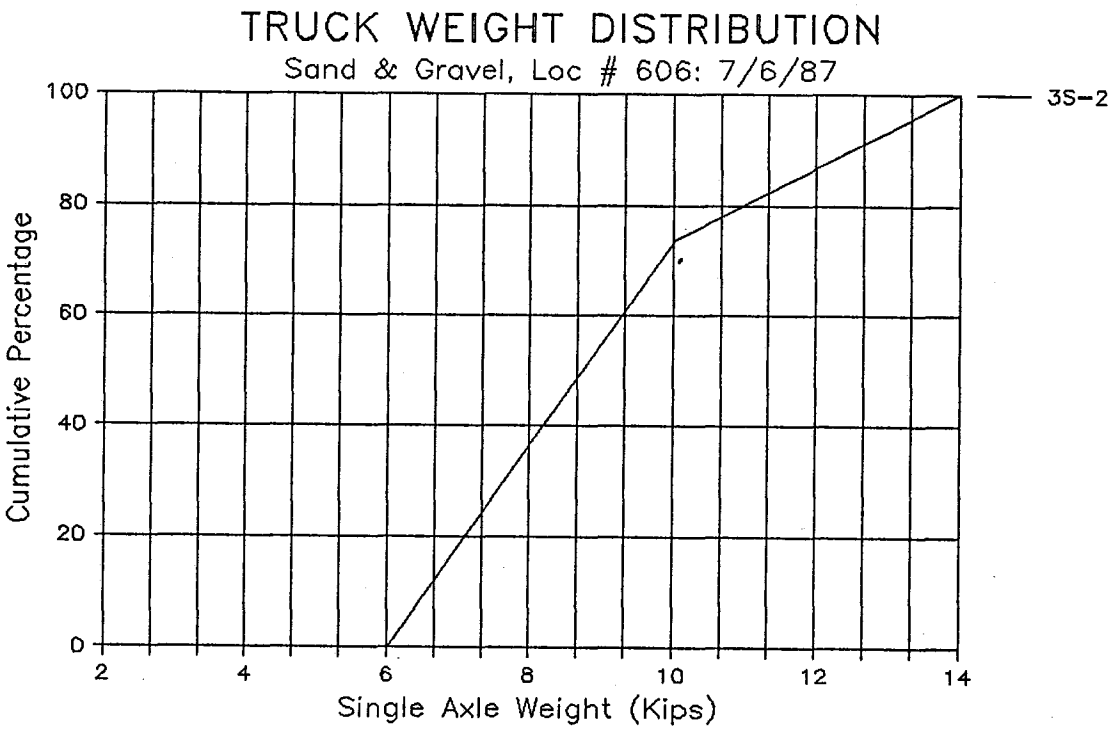


Figure 2.6.2-12 Sand/Gravel Weights: 3-S2, Single Axle, 7/6/87

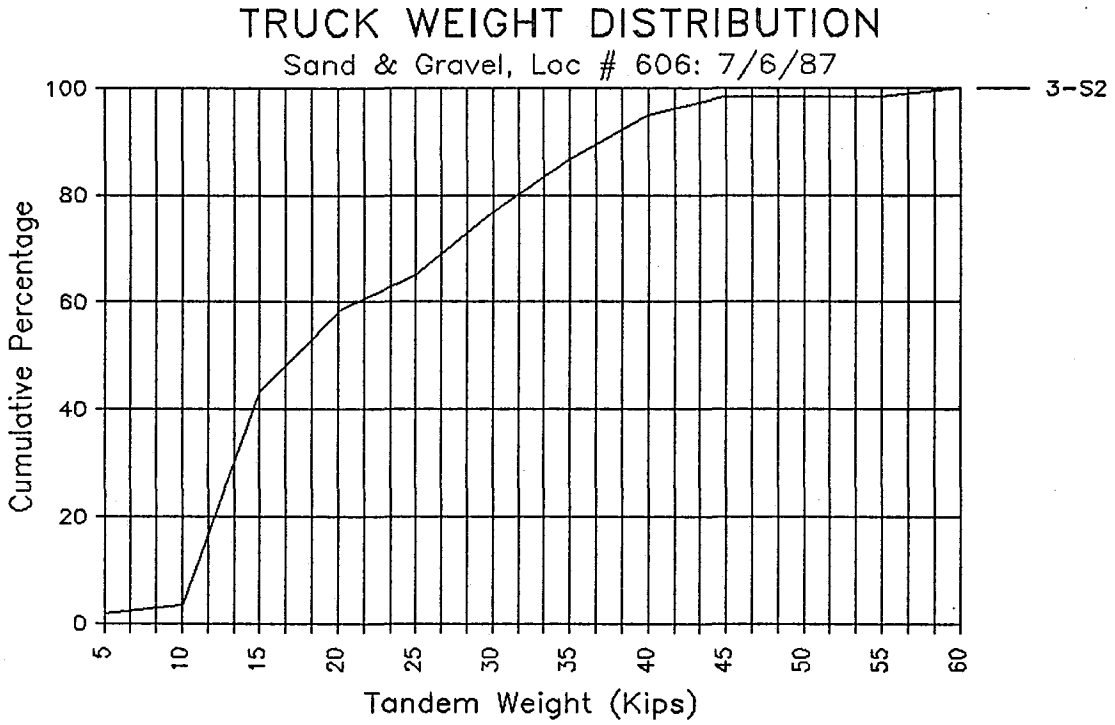


Figure 2.6.2-13 Sand/Gravel Weights: 3-S2, Tandem Axle, 7/6/87

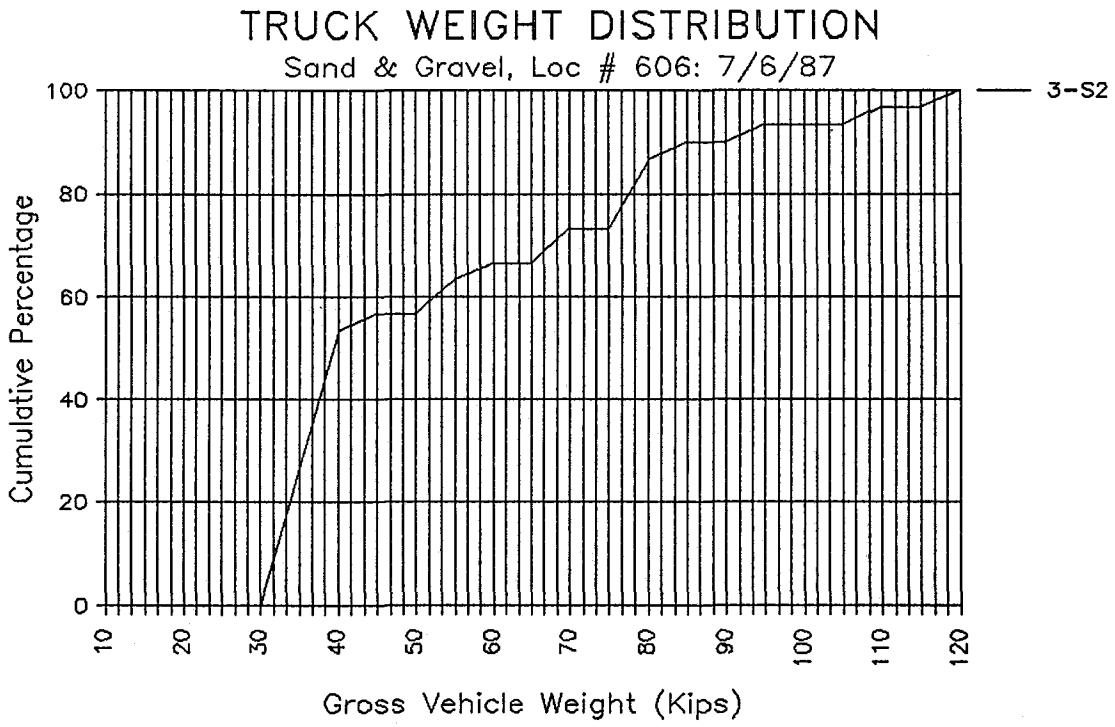


Figure 2.6.2-14 Sand/Gravel Weights: 3-S2, Gross Vehicle, 7/6/87

2.6.3 STATEWIDE APPLICATION OF SITE-SPECIFIC SAND/GRAVEL INFORMATION

Figure 2.6.3-1 depicts graphically the trend in statewide production of sand and gravel. Table 2.6.3-1 indicates the distribution of this commodity throughout the state by SDHPT districts, according to information provided by the Texas Bureau of Economic Geology for 1986 (10).

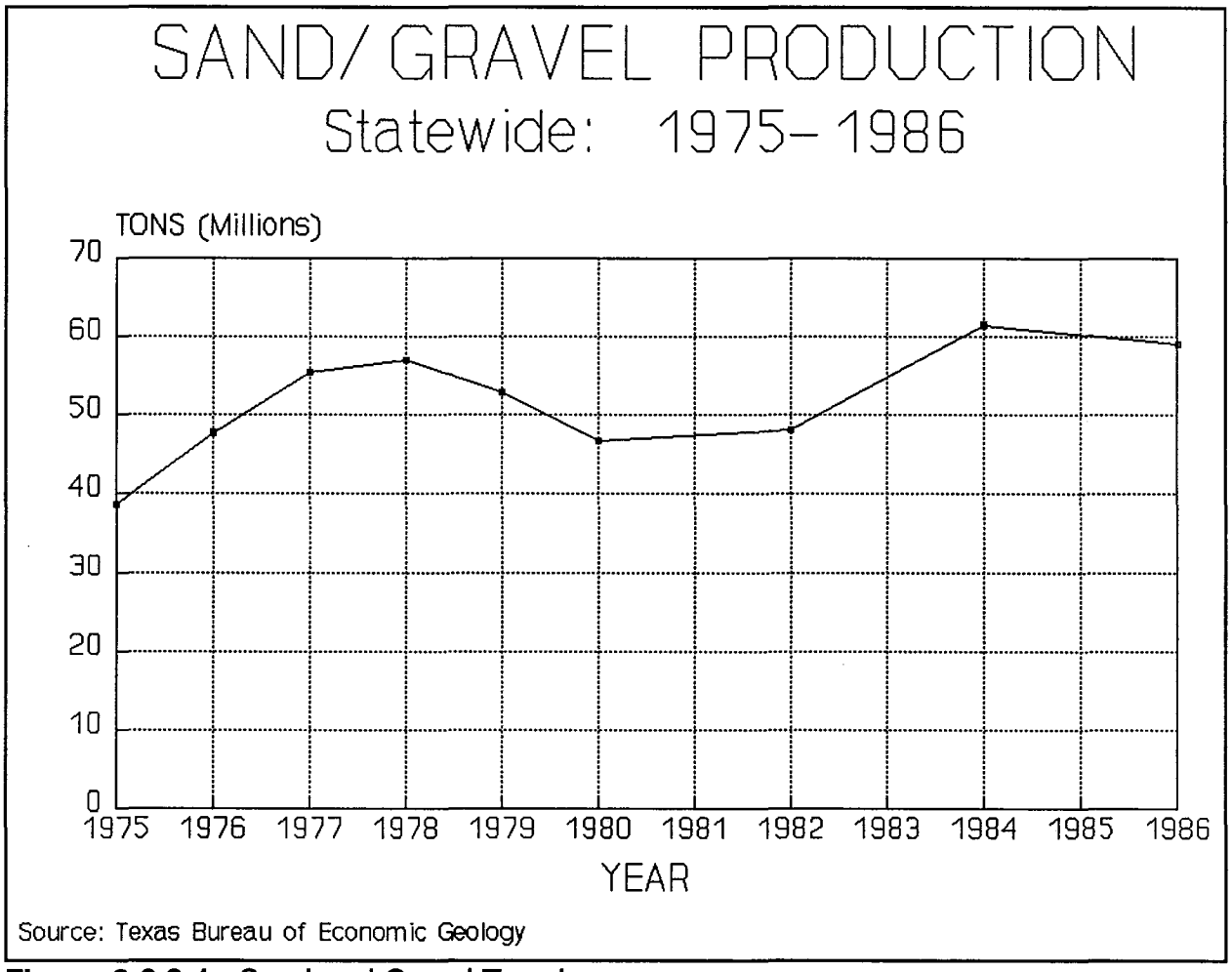


Figure 2.6.3-1. Sand and Gravel Trend

Table 2.6.3-1 Production of Sand/Gravel by SDHPT District

Sand and Gravel (1986)

District	Tons	Percent
1	635341	1.08
2	6740177	11.4
3	150276	.255
4	2620003	4.44
5	183600	.311
6	1170799	1.99
7	534457	.906
8	1043728	1.77
9	3096678	5.25
10	1002359	1.70
11	30000	.051
12	5098977	8.65
13	10778751	18.3
14	6049806	10.3
15	3754454	6.37
16	257559	.437
17	1051213	1.78
18	8199947	13.9
19	189074	.321
20	1728769	2.93
21	1940837	3.29
22	0	0
23	461953	.783
24	1955887	3.32
25	304532	.516
Total	58979177	100

2.7 OILFIELD ACTIVITIES

2.7.1 WEIGH-IN-MOTION RESULTS FOR OILFIELD ACTIVITIES

For impacts of oilfield activity assessed in Project 299, loadometer weight data were used. There were no weight data available on oilfield vehicles per se. Therefore, weigh-in-motion (WIM) data for oilfield activities was included in this project to supplement the findings of Study 299. Figures 2.7.1-1 through 2.7.1-22 are cumulative distribution plots of axle weights and gross vehicle weights of oilfield trucks. The graphs show route numbers where the WIM system was deployed. Farm-to-Market Road 811 in Leon County in east central Texas was one route included; the others were in the Midland/Odessa area. The Railroad Commission District office was instrumental in site selection in the Midland/Odessa area. Areas of oilfield activity were not particularly easy to locate because of the slump in the oil and gas industry. The WIM crew identified special-use vehicles associated with each site and coded the weighed vehicles for subsequent evaluation.

The vehicle types typically weighed were: SU-1, SU-2, 2-S2, and 3-S2. For each vehicle type, there is the possibility of weights on single axles, tandem axles, and gross vehicle weights. The graphs are grouped first by location, then by vehicle type, then by single, tandem, or multiple axle group, with gross weight being provided last.

No adjustments have been made to any of the raw weight data collected by the weigh-in-motion systems. Calibration of the system was checked on a regular basis or when weights varied significantly from typical known weights of a particular vehicle class.

The weigh-in-motion system was typically deployed on roadways near oilfield exploration from about 8 a.m. to about 4 p.m. For the most part, the system was not used to monitor night activity. Efforts aimed at using the WIM system at night were unsuccessful because not enough trucks were operating to gather an adequate sample size.

Appropriate WIM sites needed the following characteristics: speeds over 40 miles per hour, locations near oilfield traffic generators, specific lanes used by trucks entering or leaving the site, a relatively high number of target vehicles (over 100 per day desirable), a good roadway surface, a smooth profile, and a safe location for the WIM van to be parked. All of the sites selected met these criteria fairly well, although the perfect location was difficult to find.

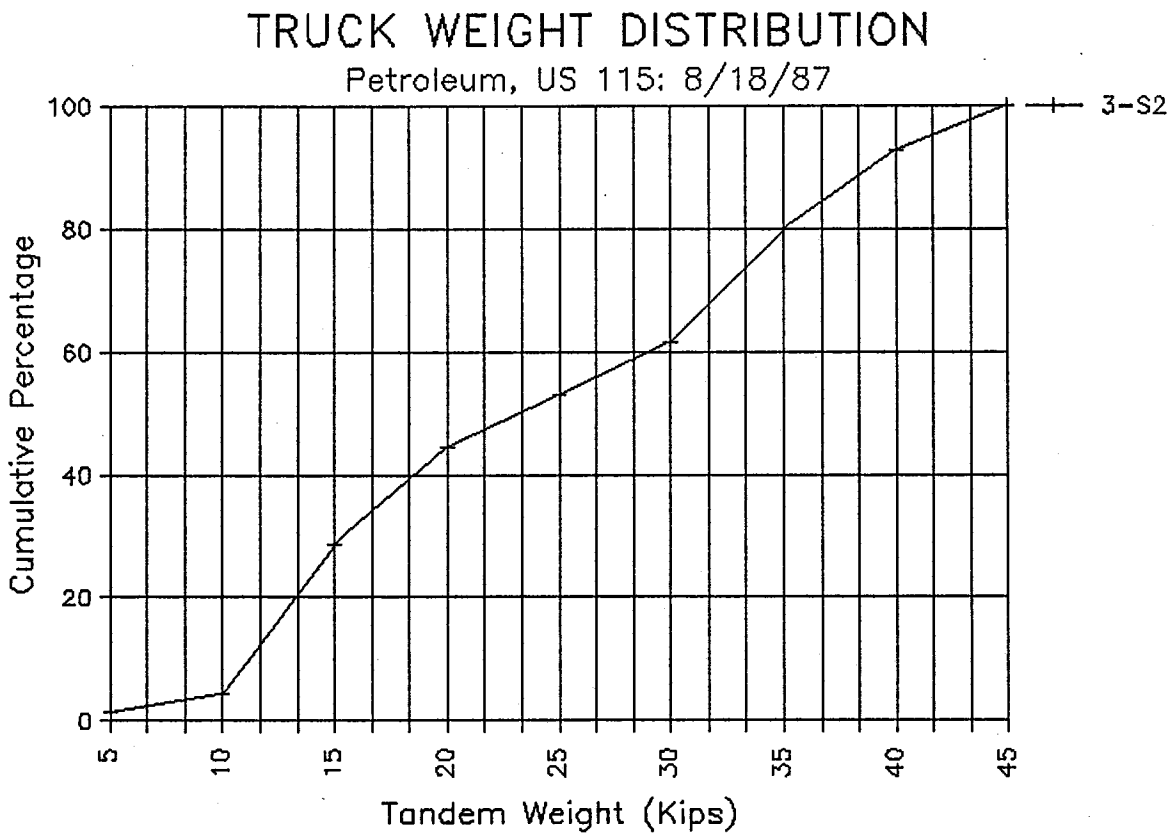


Figure 2.7.2-1 Petroleum Weights: 3S-2, Tandem, 8/18/87

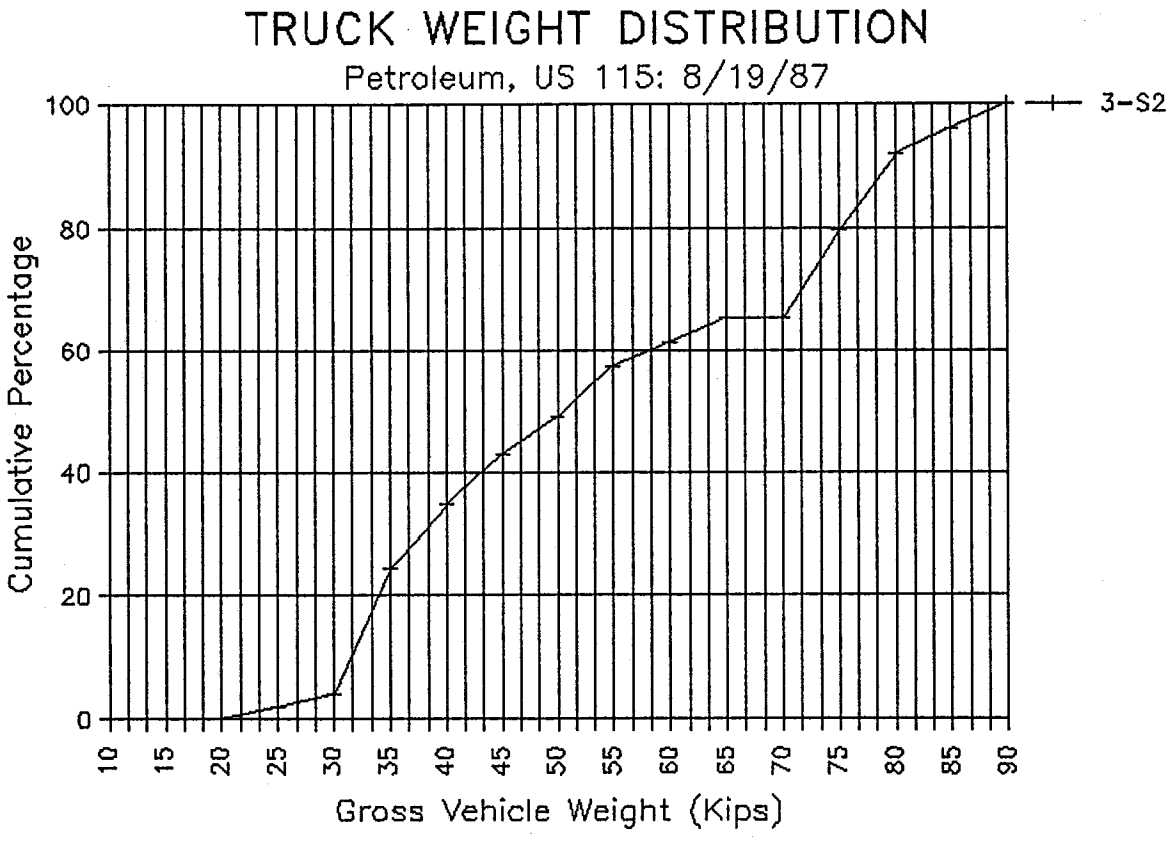


Figure 2.7.2-2 Petroleum Weights: 3S-2, Gross Vehicle, 8/19/87

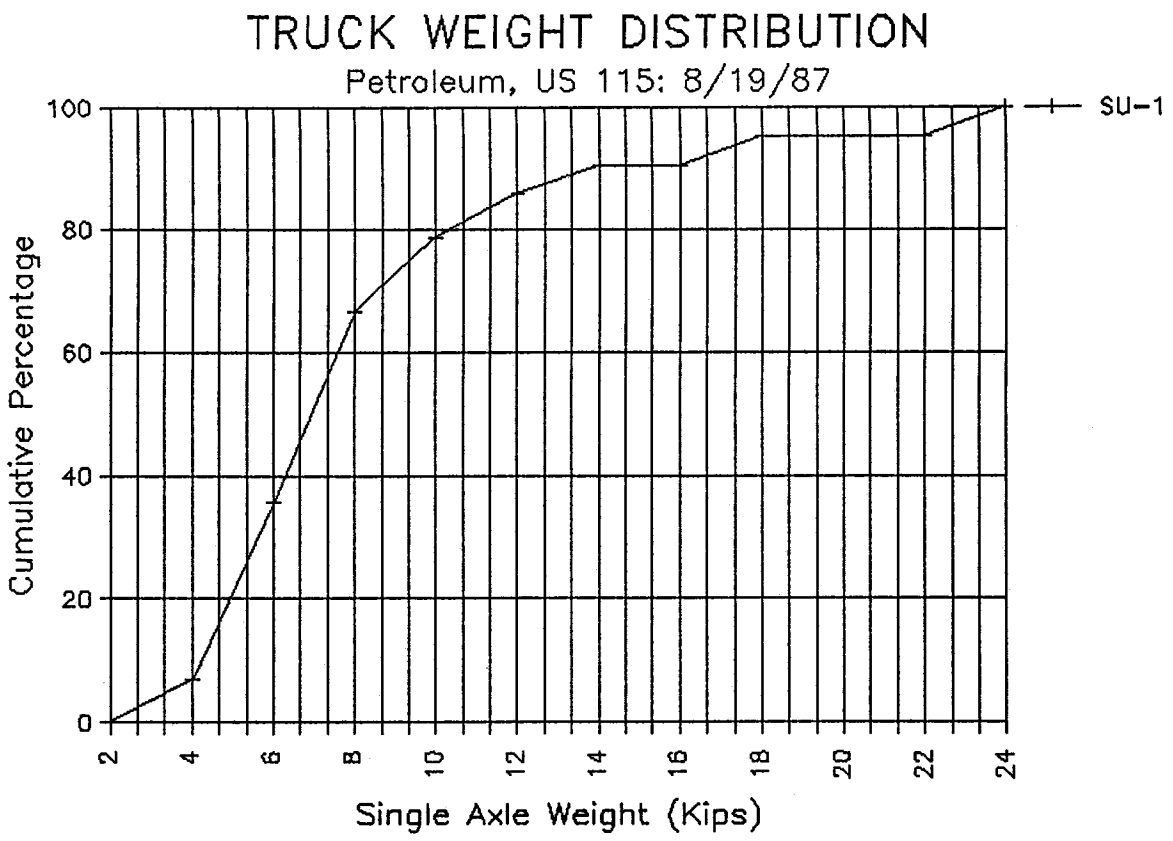


Figure 2.7.2-3 Petroleum Weights: SU-1, Single Axle, 8/19/87

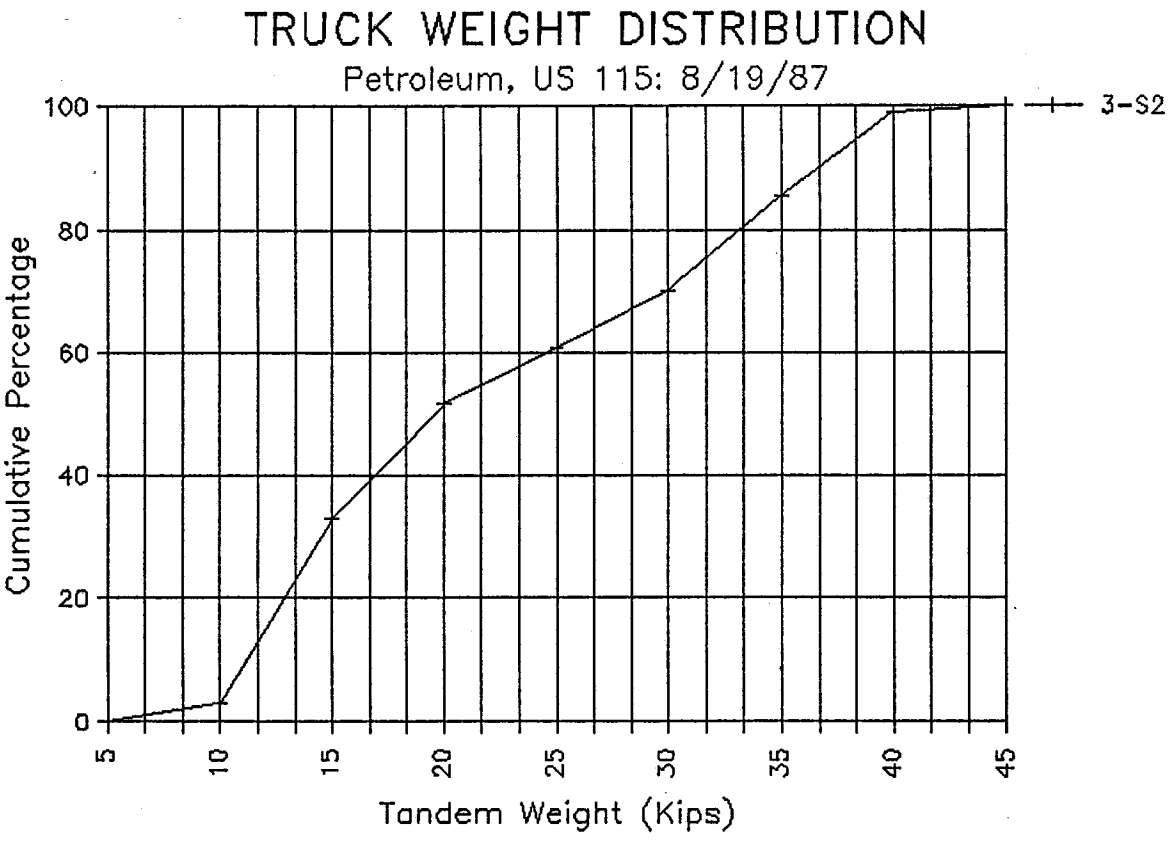


Figure 2.7.2-4 Petroleum Weights: 3S-2, Tandem, 8/19/87

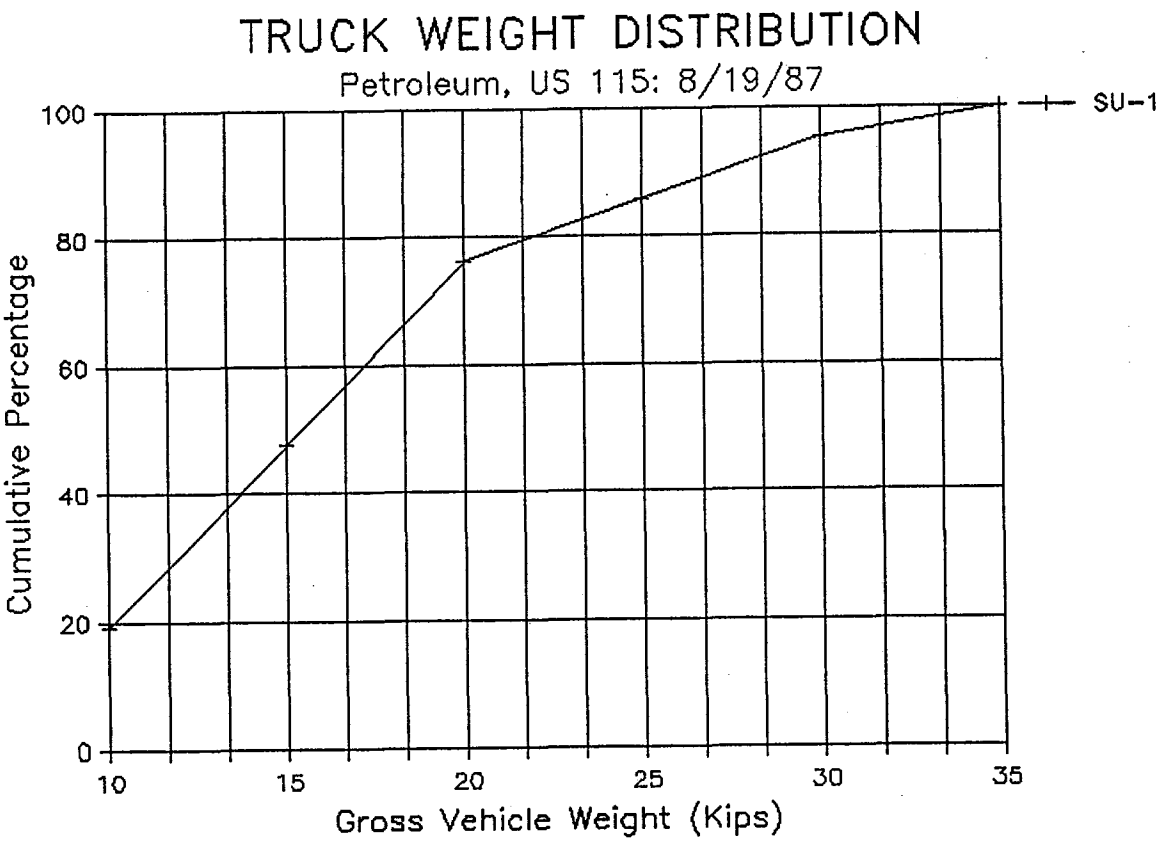


Figure 2.7.2-5 Petroleum Weights: SU-1, Gross Vehicle, 8/19/87

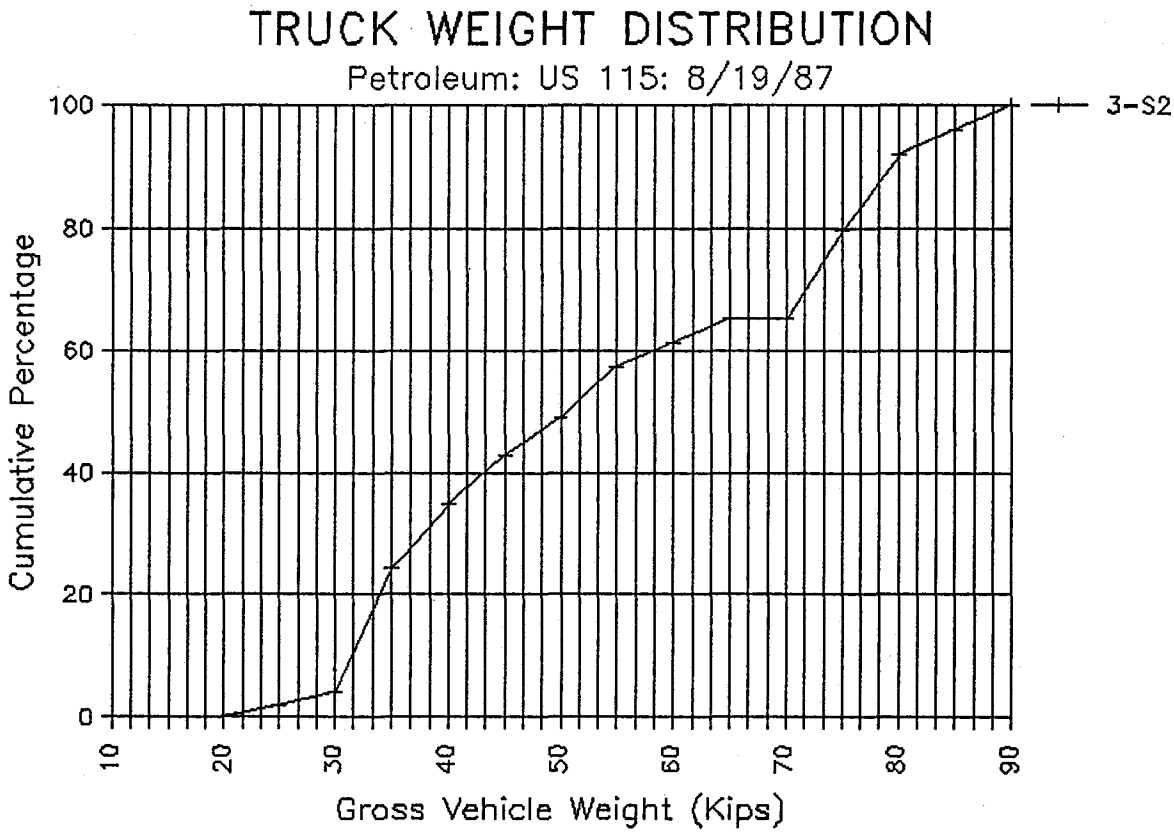


Figure 2.7.2-6 Petroleum Weights: 3S-2, Gross Vehicle, 8/19/87

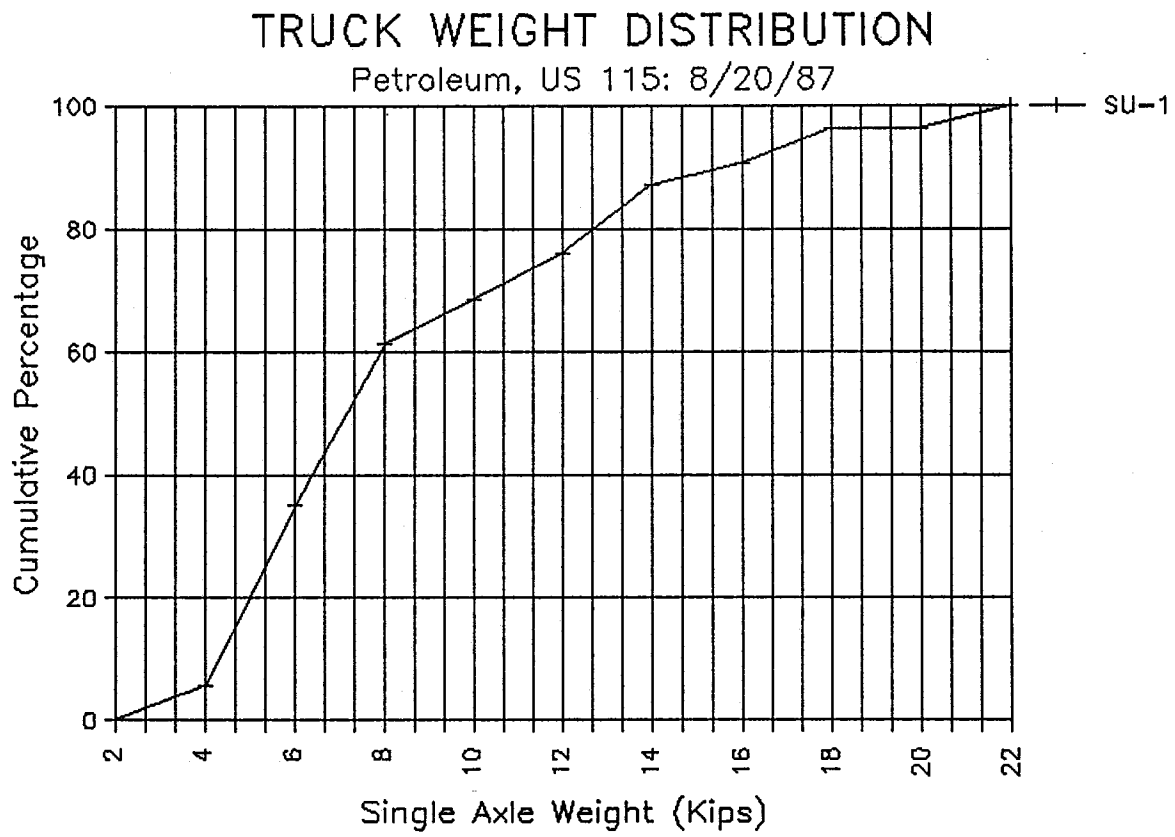


Figure 2.7.2-7 Petroleum Weights: SU-1, Single Axle, 8/20/87

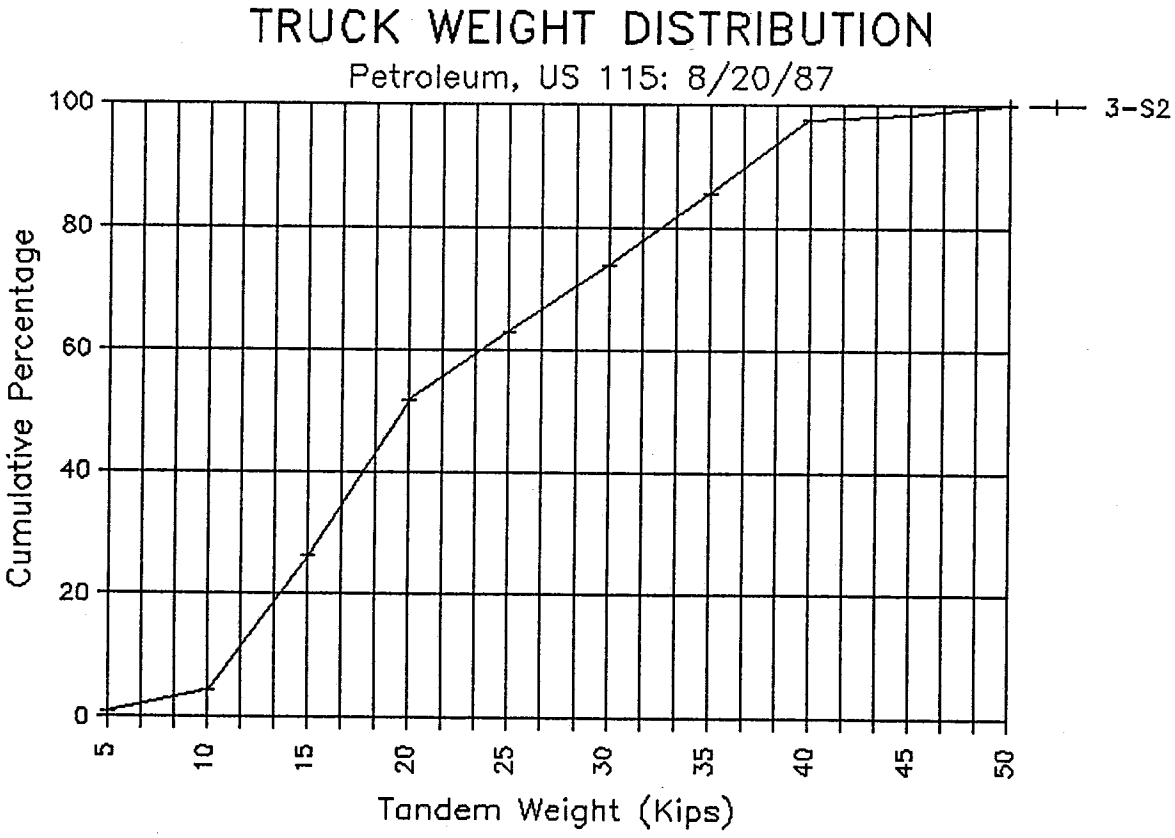


Figure 2.7.2-8 Petroleum Weights: 3S-2, Tandem, 8/20/87

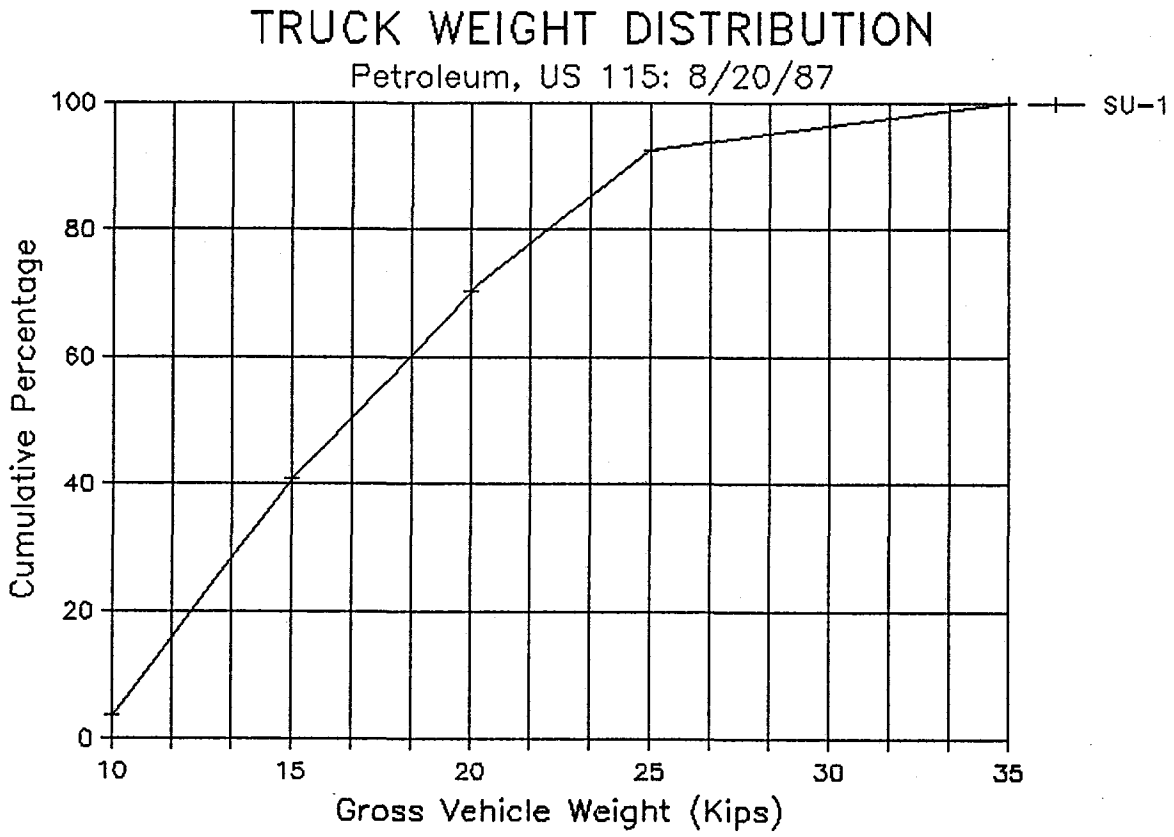


Figure 2.7.2-9 Petroleum Weights: SU-1, Gross Vehicle, 8/20/87

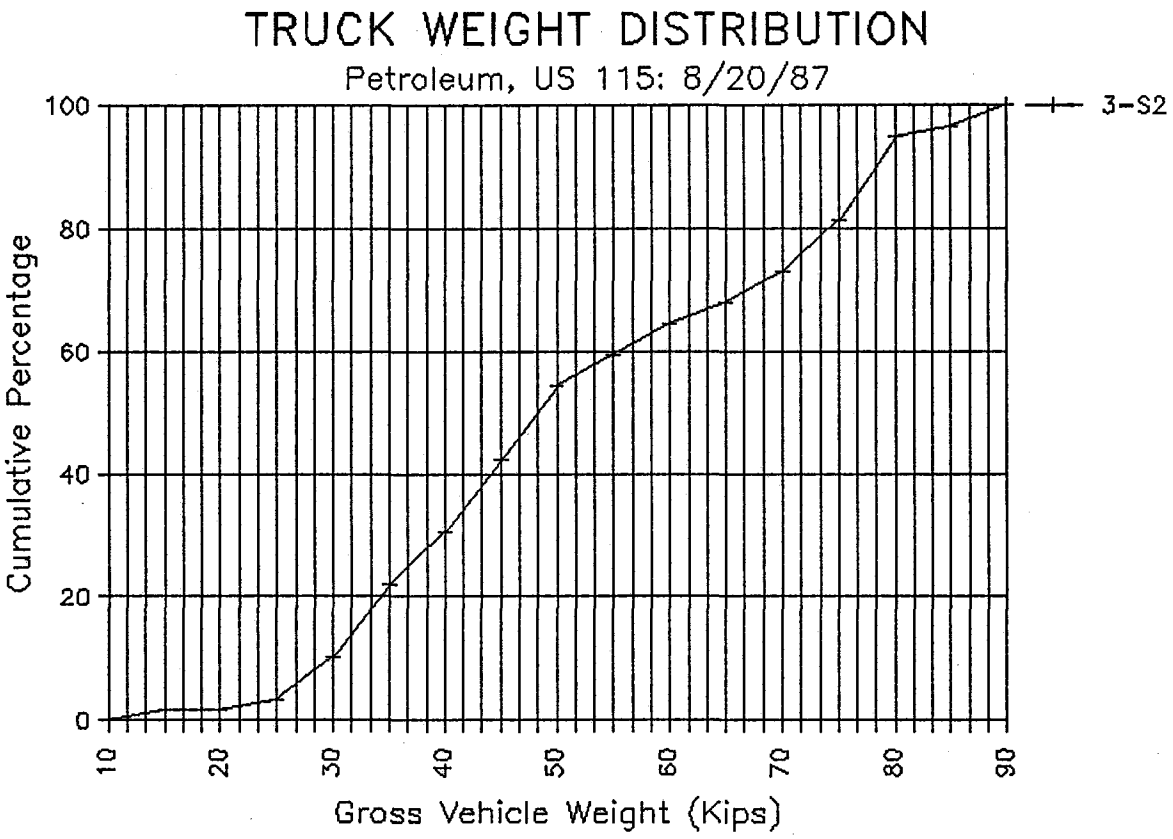


Figure 2.7.2-10 Petroleum Weights: 3S-2, Gross Vehicle, 8/20/87

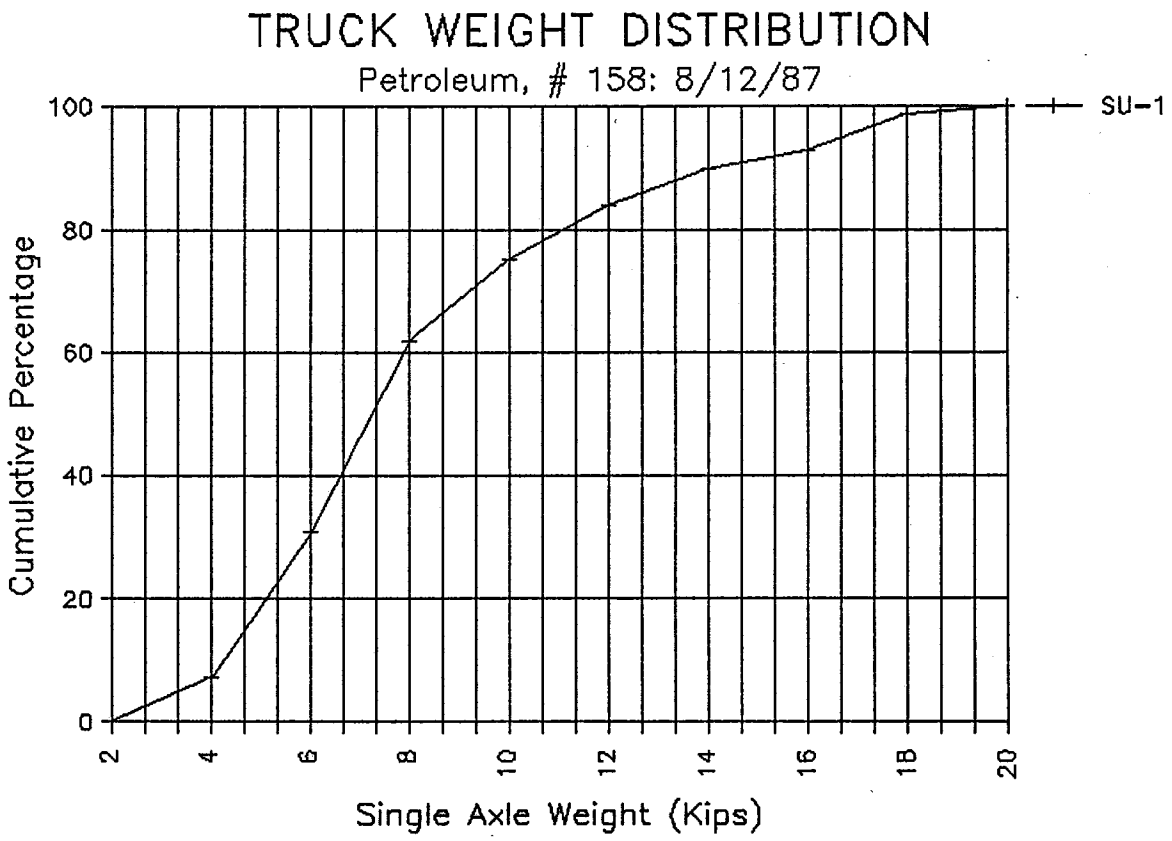


Figure 2.7.2-11 Petroleum Weights: SU-1, Single Axle, 8/12/87

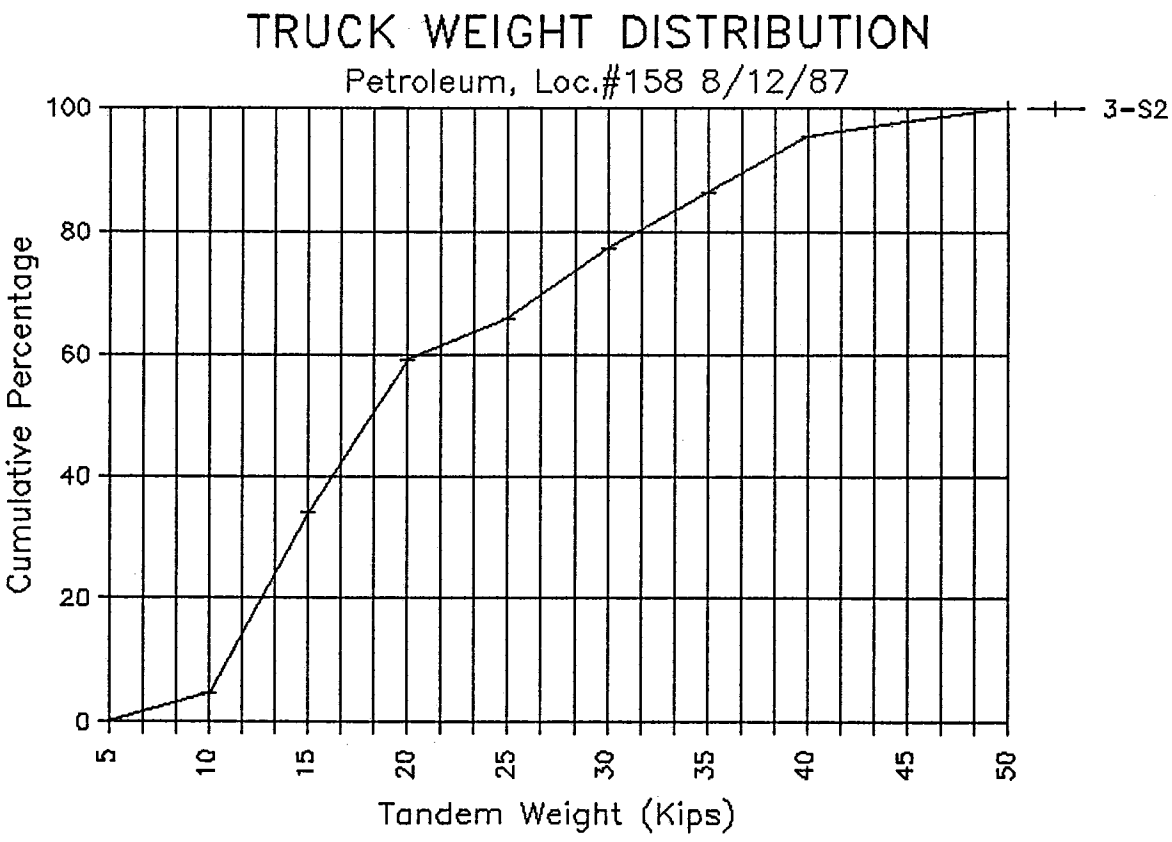


Figure 2.7.2-12 Petroleum Weights: 3S-2, Tandem, 8/12/87

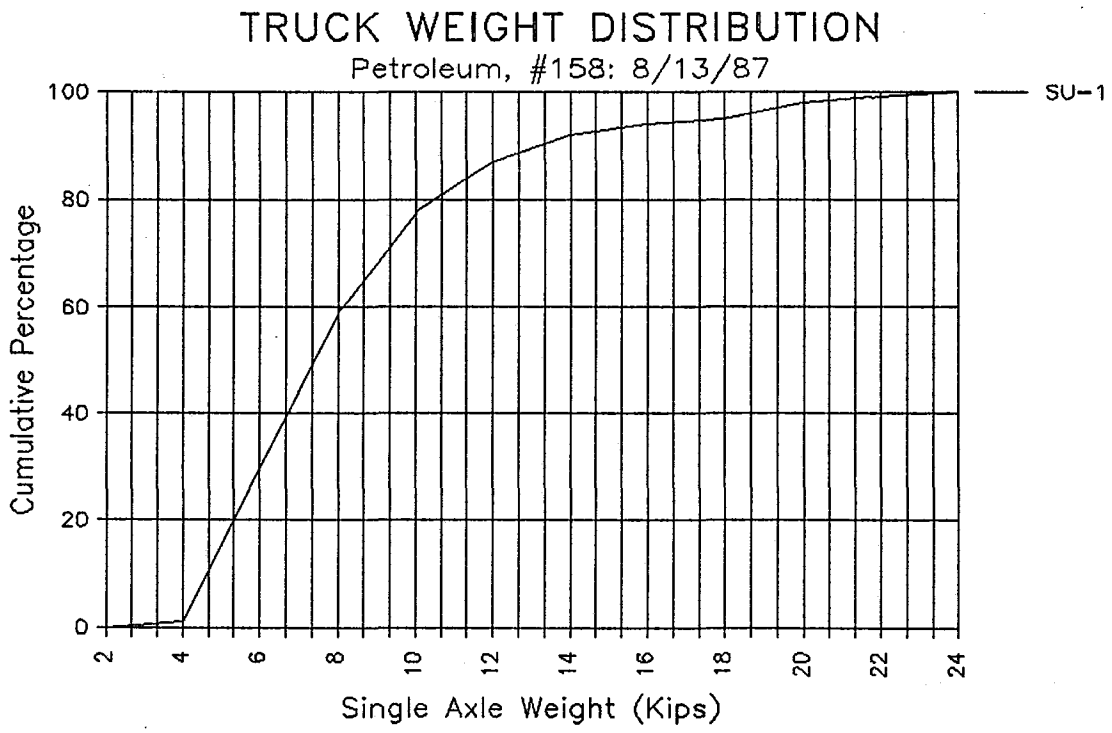


Figure 2.7.2-13 Petroleum Weights: SU-1, Single Axle, 8/13/87

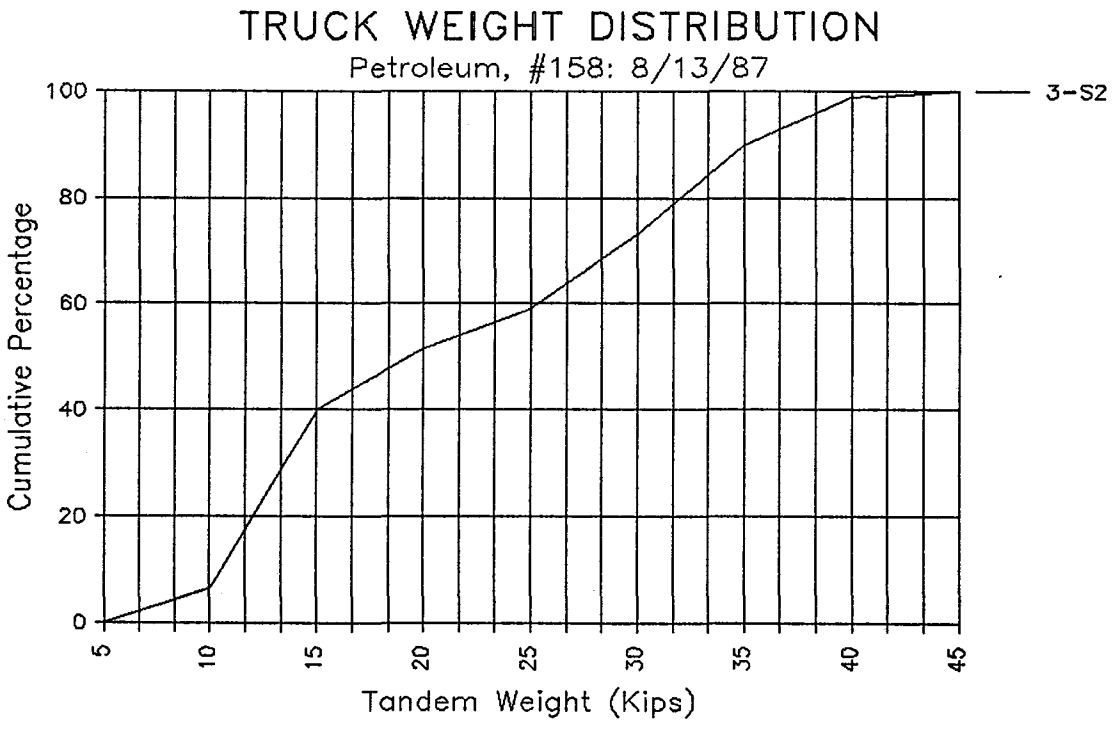


Figure 2.7.2-14 Petroleum Weights: 3S-2, Tandem Axle, 8/13/87

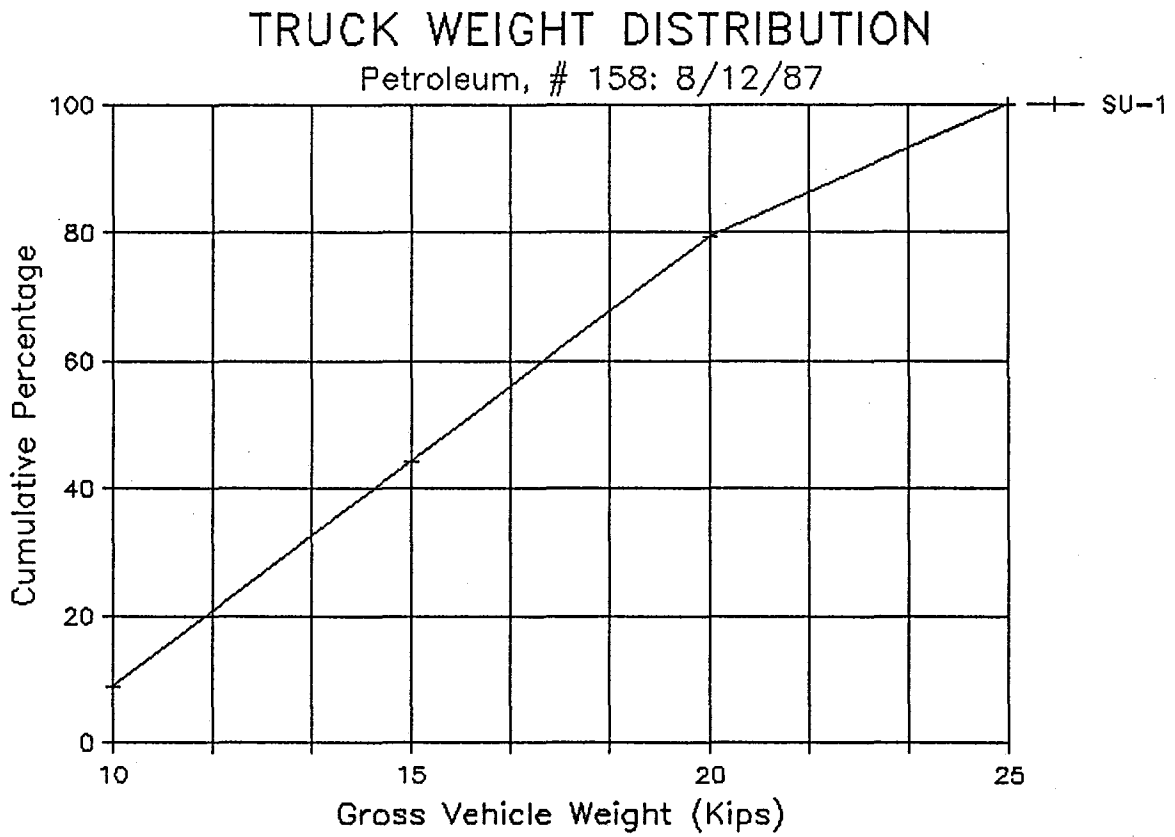


Figure 2.7.2-15 Petroleum Weights: SU-1, Gross Vehicle, 8/12/87

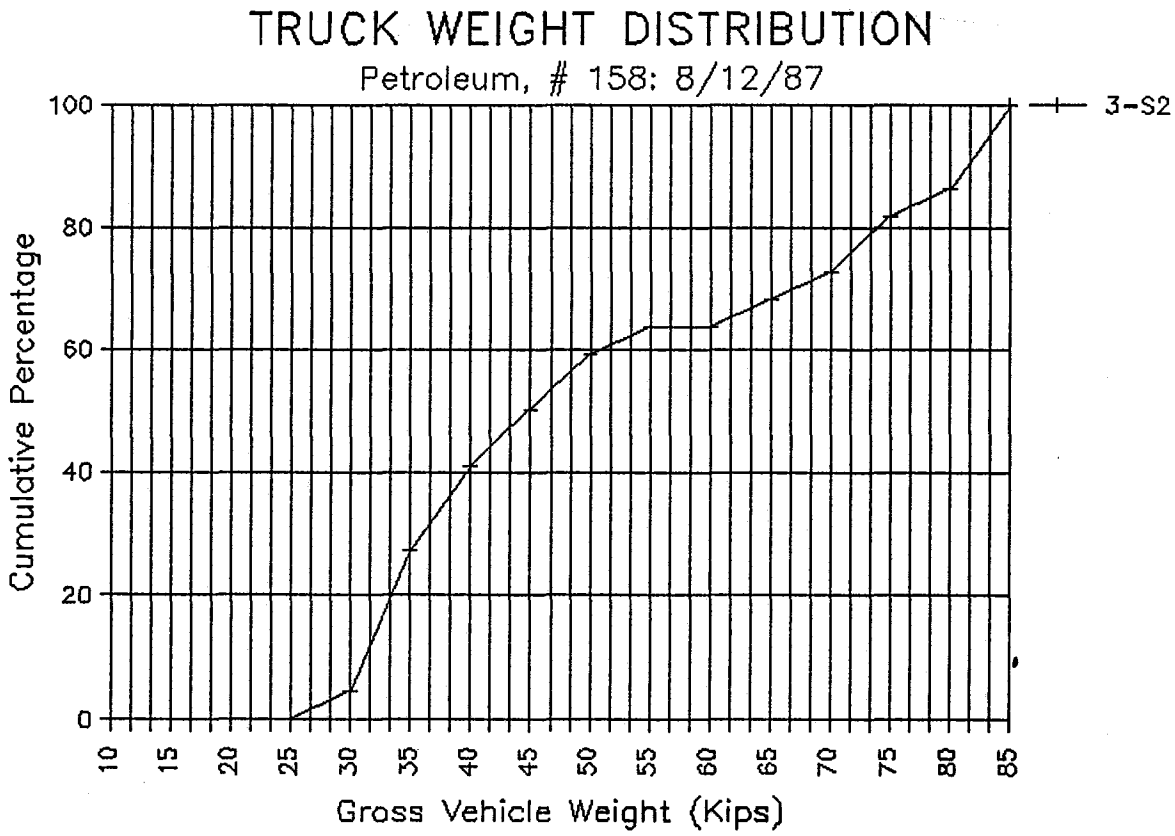


Figure 2.7.2-16 Petroleum Weights: 3S-2, Gross Vehicle, 8/12/87

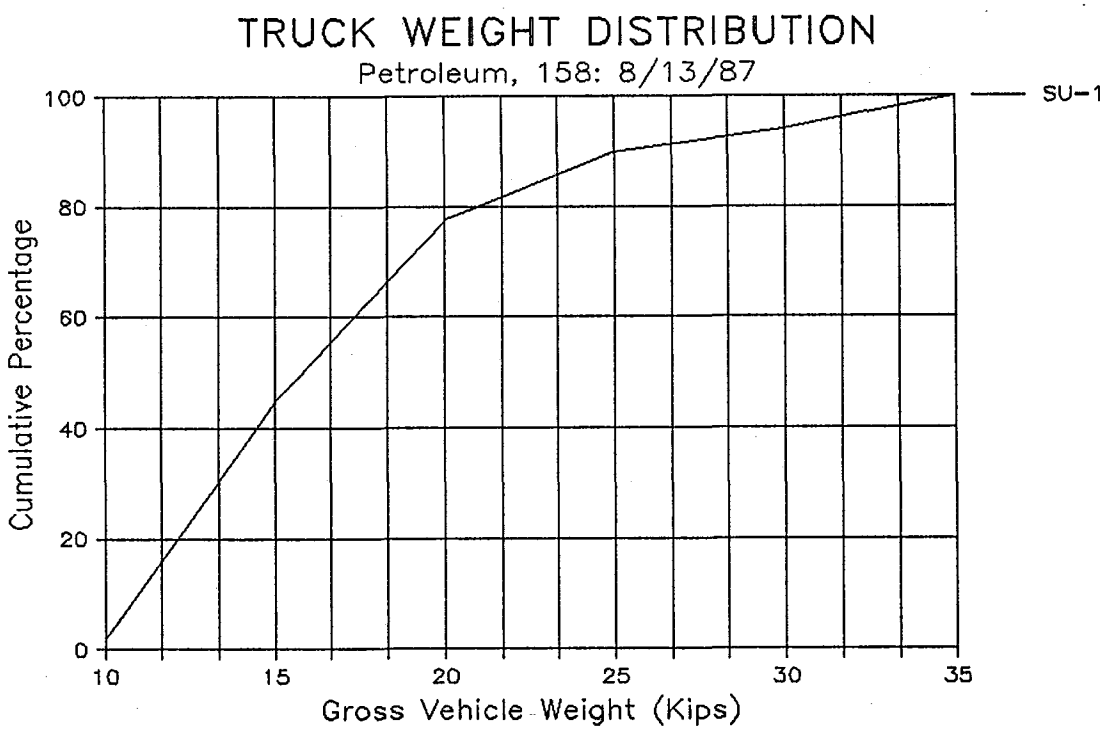


Figure 2.7.2-17 Petroleum Weights: SU-1, Gross Vehicle, 8/13/87

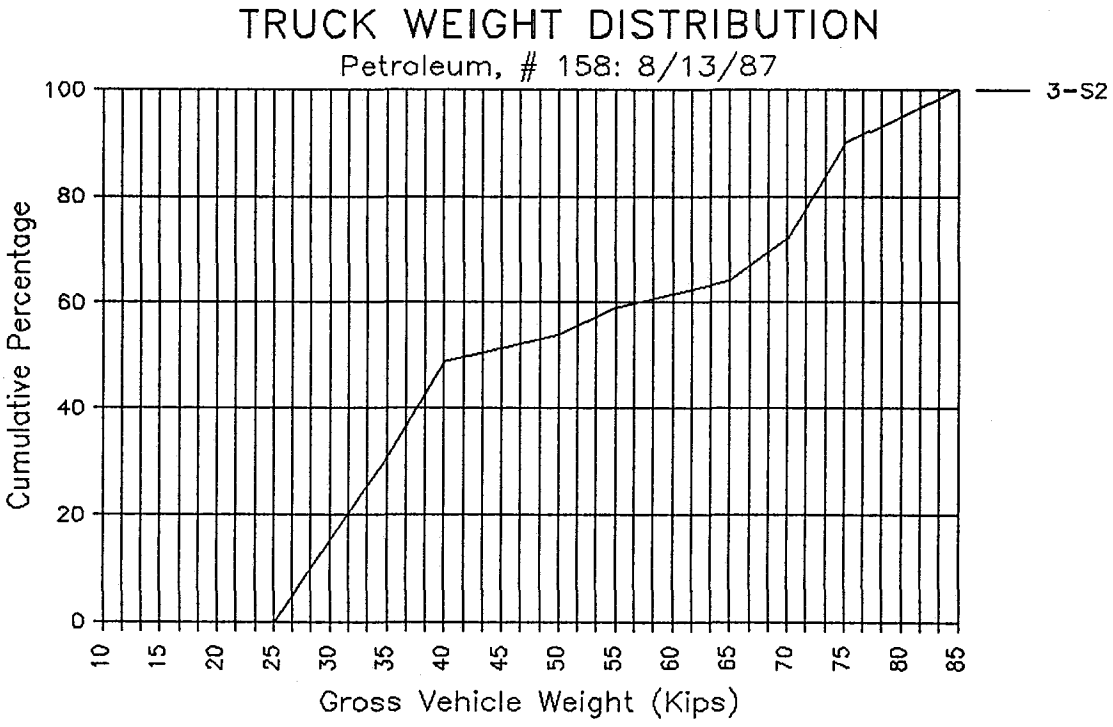


Figure 2.7.2-18 Petroleum Weights: 3S-2, Gross Vehicle, 8/13/87

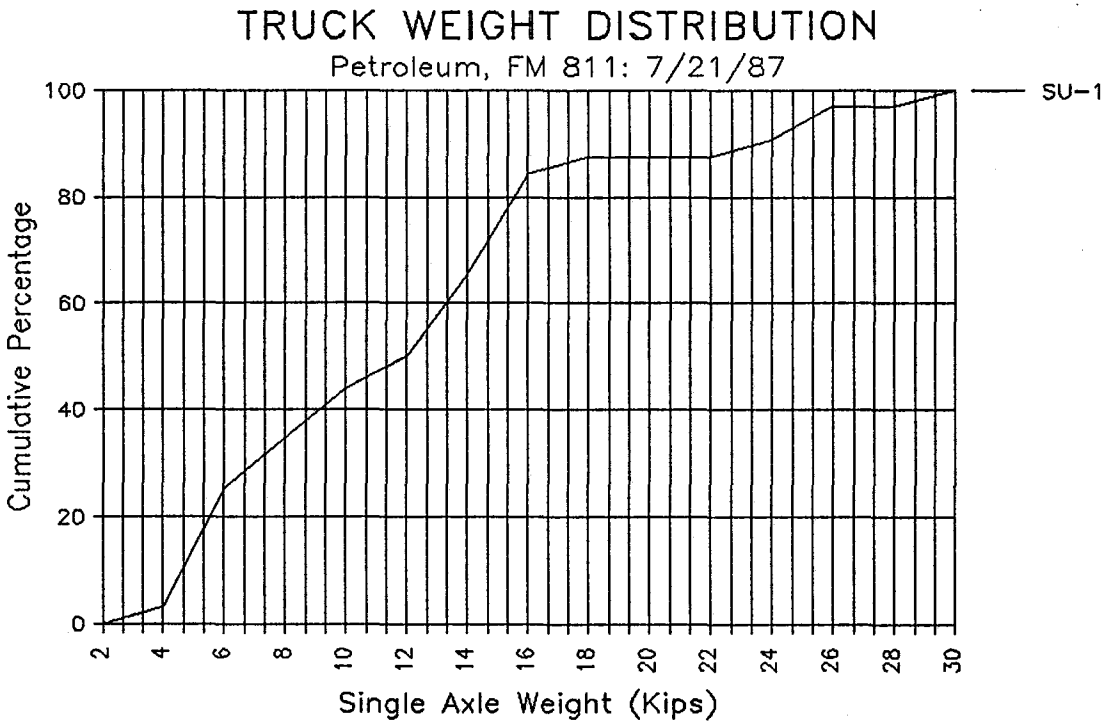


Figure 2.7.2-19 Petroleum Weights: SU-1, Single Axle, 7/21/87

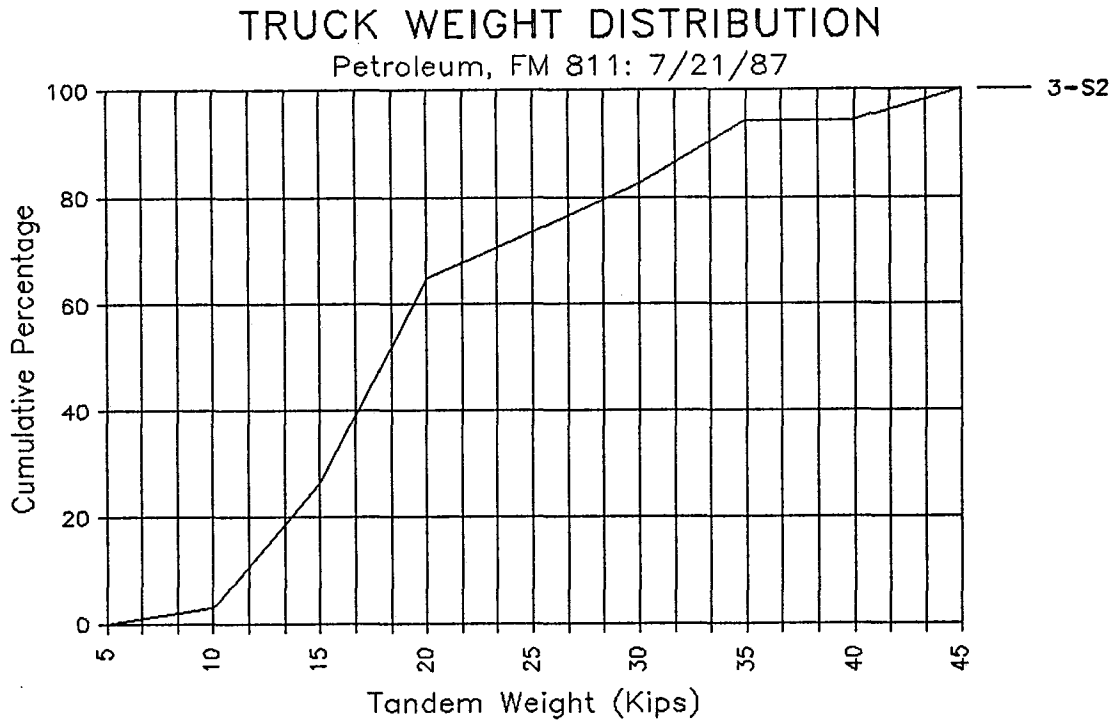


Figure 2.7.2-20 Petroleum Weights: 3S-2, Tandem, 7/21/87

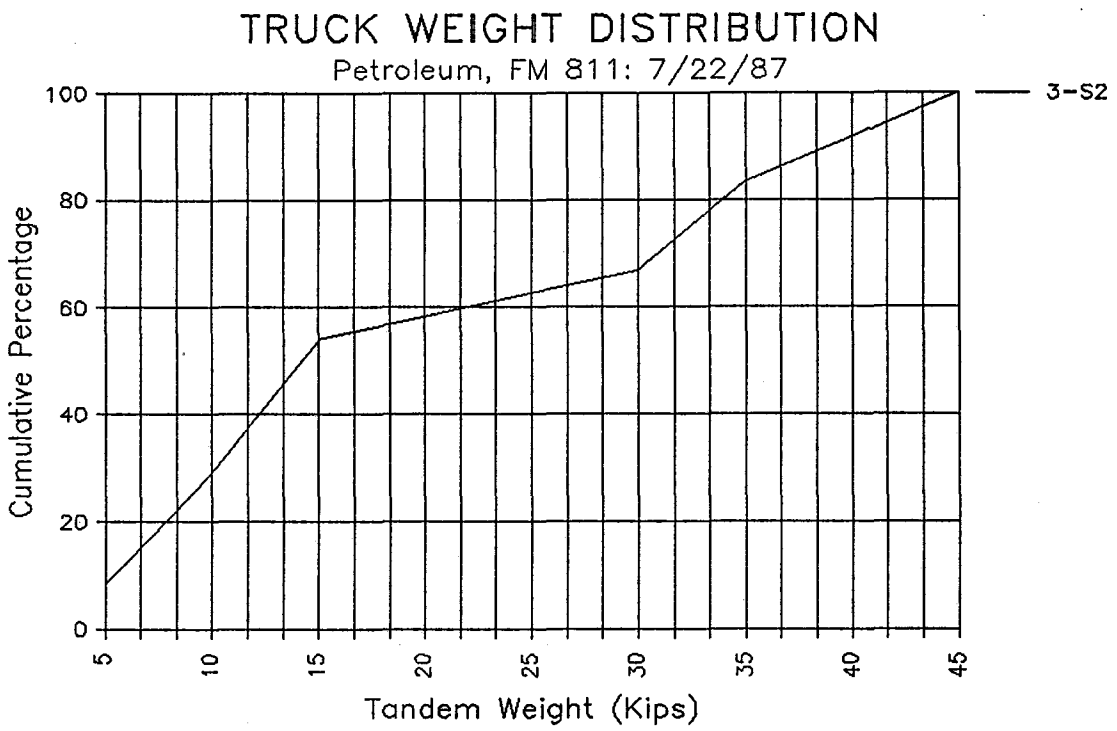


Figure 2.7.2-21 Petroleum Weights: 3S-2, Tandem Axle, 7/22/87

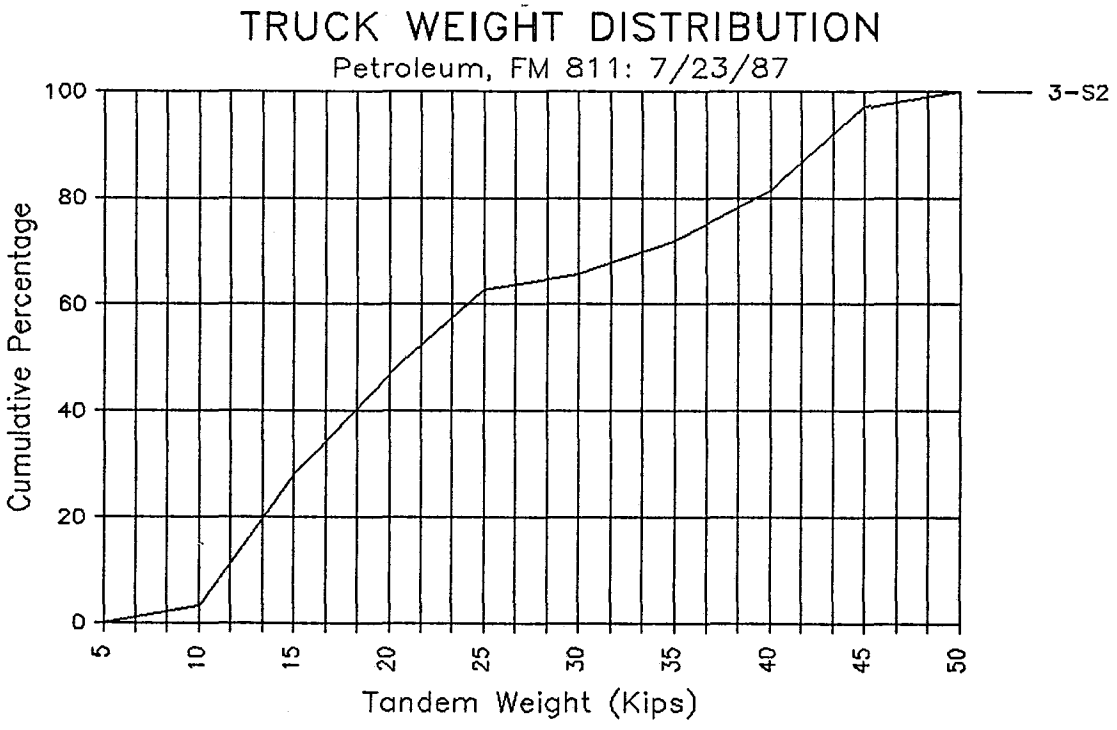


Figure 2.7.2-22 Petroleum Weights: 3S-2, Tandem Axle, 7/23/87

3.0 SUMMARY OF FINDINGS

3.1 CLASSIFICATION COUNTS

3.1.1 TIMBER

There were four types of timber mills included in this study: particle board mills, pulpwood mills, plywood mills, and sawmills. Table 3.1.1-1 is a summary of the classification counts for each mill. The table shows total raw trip-end counts for each day, the maximum daily trips, minimum daily trips, mean (or average) daily trips, and the standard deviation if the number of days counted was two or more.

To summarize and simplify the trip-generating characteristics of timber mills, similar activity centers can be grouped together. Appropriate combining of sites must consider size, type, and unique features of each site. The first consideration must be the type of mill, followed by the size element. The range of sizes appears to be fairly limited with all mill types except sawmills. Consideration of other factors is also important. Considering the two particle board mills, both had other mills on adjoining property, in some cases sharing the same entrances. Therefore, a separate count of the selected mill was not practical. Besides if these same combinations of mills commonly occur elsewhere, the combined count is probably as useful as the count of an individual mill.

Of the two pulpwood mills, Site 121 consistently generated more truck trips than Site 120. According to industry information, raw wood input was greater for Site 120 at 2.56×10^9 pounds for 1986, compared to 2.37×10^9 for Site 121. This may indicate that the differences in field count data are not practically significant.

Of the four plywood mills, Site number 130 is the only hardwood mill. The others use softwood. Site 130 generated significantly fewer truck trips than the others, but the difference may have been due to its size, rather than the type of wood used. At any rate, Site 130 should not be combined with the other sites. Counts at Sites 131, 132, and 133 appear to vary from day to day in a random manner, with Site 131 consistently generating more truck trips than the other two.

Of the six sawmills included in the study, the size element is perhaps the most critical feature in evaluating trip generation. Raw wood input for each of these mills in 1985 and 1986 are shown in Table 3.1.1-2. According to the Texas Forest Service, small sawmills are those which require 1 to 2 million board-feet (0.16 to 0.32×10^8 pounds) of raw timber per year. Large sawmills require at least 9 million board-feet (1.5×10^8 pounds) of raw timber per year. Because the original site selection process included small sites, a decision was made to consider the selected sites to represent all three size categories, instead of only medium and large sizes. Therefore, Sites 141, 142, and 145 are considered large, while Site 140 appears to represent the medium-sized sawmill. Sites 143 and 144 tend toward the small size category.

Table 3.1.1-1 Timber Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
PART.BD.	110	N/A	AUTO	650	879	437		3	437	879	656	220
			SU	31	36	82			31	82	50	28
			COMB.	249	261	353			249	353	288	57
PART.BD.	111	N/A	AUTO	1610	1192	1153		3	1153	1610	1318	251
			SU	31	12	42			12	42	28	15
			COMB.	344	321	431			321	431	365	58
PULPWOOD	120	N/A	AUTO	1012	1093	1005		3	1005	1093	1036	49
			SU	64	68	58			58	68	63	5
			COMB.	236	332	351			332	351	306	62
PULPWOOD	121	N/A	AUTO	1796	1592	1511		3	1511	1796	1633	147
			SU	105	75	90			75	105	90	15
			COMB.	375	447	463			375	463	428	38
PLYWOOD	130	HARDW'D	AUTO	299	626	738		3	299	738	554	228
			SU	13	19	48			13	48	27	19
			COMB.	41	41	70			41	70	51	17
PLYWOOD	131	SOFTW'D	AUTO	402	324	327		3	324	402	351	44
			SU	5	11	9			5	11	8	3
			COMB.	384	379	420			379	420	394	22
PLYWOOD	132	SOFTW'D	AUTO	1010	579	601	454	4	579	1010	661	242
			SU	6	4	2	9		2	9	5	3
			COMB.	368	241	253	178		241	368	260	79
PLYWOOD	133	SOFTW'D	AUTO	598	626	615		3	598	626	616	15
			SU	56	26	30			26	56	37	16
			COMB.	210	289	237			210	289	245	40
SAWMILL	140	MEDIUM	AUTO	123	187	153		3	123	187	154	32
			SU	18	31	10			10	31	20	11
			COMB.	54	70	28			28	70	51	17
SAWMILL	141	LARGE	AUTO	650	733	683		3	650	733	689	42
			SU	14	7	7			7	14	9	4
			COMB.	250	94	135			94	250	160	81

Table 3.1.1-1 (Continued) Timber Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
SAWMILL	142	LARGE	AUTO	232	221	226		3	221	232	226	6
			SU	19	8	16			8	19	14	6
			COMB.	114	56	147			56	147	106	46
SAWMILL	143	SMALL	AUTO	204	176	174		3	174	204	185	17
			SU	27	11	15			11	27	18	8
			COMB.	16	33	34			16	34	28	10
SAWMILL	144	SMALL	AUTO	192	131	73		3	73	192	132	60
			SU	4	5	8			4	8	6	2
			COMB.	20	17	39			17	39	25	12
SAWMILL	145A	LARGE	AUTO	193	180	149		3	149	193	174	23
			SU	5	9	12			5	12	9	4
			COMB.	143	107	104			104	143	118	22

Table 3.1.1-2 Raw Wood Input for Sawmills

Site Number	1985 Input (pounds)	1986 Input (pounds)
140	2.80×10^8	3.52×10^8
141	5.09×10^8	5.92×10^8
142	4.00×10^8	4.00×10^8
143	1.07×10^8	0.99×10^8
144	1.06×10^8	1.20×10^8
145	4.98×10^8	4.87×10^8

3.1.2 PRODUCE

Information provided by the Texas Fruit and Vegetable Association was useful in determining size categories of produce distributors. This information, in addition to site-specific classification counts, was used to group the activity centers by size.

Site number 205 was a "freezer operation" and was the only one in the sample selected. Other sites did not freeze the produce; they inspected, sorted, and crated the produce for immediate shipment via refrigerated vans. Therefore, trip-generating characteristics of site 205 would probably be somewhat different from the other sites for reasons other than size.

Sites 200 and 201 are large; site 202 is a medium size; and sites 203 and 204 are small. The amount of activity at these centers at any given time depends upon the weather, the economy, the particular type of produce they handle, and other factors such as marketing and management. Table 3.1.2-1 is a summary of the daily trip-ends observed at each activity center.

Table 3.1.2-1 Produce Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
PRODUCE	200	LARGE	AUTO	315	243			2	243	315	279	51
			SU	341	73				73	341	207	190
			COMB.	21	88				21	88	55	47
PRODUCE	201	LARGE	AUTO	555				1	555	555	555	N/A
			SU	142					142	142	142	N/A
			COMB.	150					150	150	150	N/A
PRODUCE	202	MEDIUM	AUTO	403				1	403	403	403	N/A
			SU	84					84	84	84	N/A
			COMB.	91					91	91	91	N/A
PRODUCE	203	SMALL	AUTO	110	17			2	17	110	64	66
			SU	47	18				18	47	33	21
			COMB.	16	11				11	16	14	4
PRODUCE	204	SMALL	AUTO	155	354			2	155	354	255	14
			SU	35	55				35	55	45	14
			COMB.	43	37				37	43	40	4
PRODUCE	205	N/A	AUTO	272	164			2	164	272	218	76
			SU	45	12				12	45	29	23
			COMB.	22	2				2	22	12	14

3.1.3 GRAIN

Twelve grain elevators of various sizes were surveyed in this study in an attempt to estimate the total trips generated by activity centers of this type. The elevators were divided into three categories: large, medium, and small. The capacity ranges used to define these categories were: greater than 2,000,000 bushels for large, from 800,000 to 2,000,000 bushels for medium, and less than 800,000 bushels for small. Of the elevators surveyed, 5 fall into the small class (Site numbers 301, 305, 306, 308A, and 311), and 3 are in the large category (302, 303 and 310).

The Texas Department of Agriculture provided information on elevator sizes and locations in the state (5,6). For purposes of this study, the harvest season was most important, simply because that is the peak trip-generating season. Additional information is provided in Section 2.3.3 in this report. Production quantities provided include the following grains: barley, corn, oats, rice, rye, sorghum, soybeans, and wheat.

Information provided in Table 3.1.3-1 was collected during the harvest season. For some of the sites, the data collection occurred near the end of the harvest season, and thus may not reflect absolute peak trip generation rates. This would tend to increase the range of values presented within each size category.

Another factor which can affect trip generation besides the capacity is access to a port facility. For Site 302, this was a very significant factor. During at least one of the days shown in Table 3.1.3-1, a ship was being loaded with grain hauled in by truck.

Table 3.1.3-1 Grain Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
GRAIN	300	MEDIUM	AUTO	444				1	444	444	444	N/A
			SU	71					71	71	71	N/A
			COMB.	121					121	121	121	N/A
GRAIN	301	SMALL	AUTO	39				1	39	39	39	N/A
			SU	33					33	33	33	N/A
			COMB.	10					10	10	10	N/A
GRAIN	302	LARGE	AUTO	53	174			2	53	174	114	86
			SU	20	16				16	20	18	3
			COMB.	613	580				580	613	597	23
GRAIN	303	LARGE	AUTO	76	39			2	39	76	58	26
			SU	76	202				76	202	139	89
			COMB.	30	169				30	168	99	98
GRAIN	304	MEDIUM	AUTO	20	74			2	20	74	47	38
			SU	17	257				17	257	137	170
			COMB.	0	56				0	56	28	28
GRAIN	305	SMALL	AUTO	22				1	22	22	22	N/A
			SU	129					129	129	129	N/A
			COMB.	67					67	67	67	N/A
GRAIN	306	SMALL	AUTO	50				1	50	50	50	N/A
			SU	91					91	91	91	N/A
			COMB.	32					32	32	32	N/A
GRAIN	307	MEDIUM	AUTO	57				1	57	57	57	N/A
			SU	74					74	74	74	N/A
			COMB.	37					37	37	37	N/A
GRAIN	308A	SMALL	AUTO	56	32			2	32	56	44	17
			SU	63	0				0	63	32	31
			COMB.	40	37				37	40	39	2
GRAIN	309A	MEDIUM	AUTO	77				1	77	77	77	N/A
			SU	91					91	91	91	N/A
			COMB.	33					33	33	33	N/A

Table 3.1.3-1 (Continued) Grain Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
GRAIN	310	LARGE	AUTO	103				1	103	103	103	N/A
			SU	420					420	420	420	N/A
			COMB.	136					136	136	136	N/A
GRAIN	311	SMAll	AUTO	39	35			2	35	39	37	3
			SU	28	116				28	116	72	62
			COMB.	43	42				42	43	42	1
GRAIN	312A	MEDIUM	AUTO	92				1	92	92	92	N/A
			SU	92					92	92	92	N/A
			COMB.	31					31	31	31	N/A

3.1.4 CATTLE

All cattle feedlots selected as part of this study were located in the Panhandle area of the state. Feedlots located in other areas to the south have a different feeding cycle than these, possibly affecting their trip-generating characteristics. Feedlot capacity was used as the only sizing criteria. For this evaluation, large feedlots have capacities over 40,000 head of cattle, medium feedlots are in the range of 20,000 to 40,000 head, and small feedlots are between 5,000 and 20,000 head. Section 2.4.3 provides additional information on the locations of feedlots.

According to information published by the Southwestern Public Service Company (SPS), the 1988 capacities of feedlots selected for this study were as shown in Table 3.1.4-1 (8). Table 3.1.4-2 is a summary of the number of trip-ends manually counted at each activity center. The table shows totals for each day, the maximum daily trips, minimum daily trips, mean daily trips, and the standard deviation if the number of days counted was at least two.

Table 3.1.4-1 Feedlot Capacities

Site Number	Capacity	Size
400	20,000	Medium
401	13,000	Small
402	48,000	Large
403	55,000	Large
404	8,000	Small
405	20,000	Medium
406	34,000	Medium
407	12,000	Small
408	35,000	Medium
409	71,000	Large
410	55,000	Large

Table 3.1.4-2 Cattle Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX	DAILY MEAN	STD. DEV.
CATTLE	400	MEDIUM	AUTO	92	65			2	65	92	79	19
			SU	111	7				7	111	59	73.5
			COMB.	28	60				28	60	44	22.6
CATTLE	401	SMALL	AUTO	32				1	32	32	32	N/A
			SU	19					19	19	19	N/A
			COMB.	21					21	21	21	N/A
CATTLE	402	LARGE	AUTO	55	65			2	55	65	60	7
			SU	1	8				1	8	5	5
			COMB.	54	80				54	80	67	18
CATTLE	403	LARGE	AUTO	54	85			2	54	85	70	22
			SU	50	14				14	50	32	25.5
			COMB.	93	117				93	117	105	17
CATTLE	404	SMALL	AUTO	27	31			2	27	31	29	3
			SU	0	0				0	0	0	N/A
			COMB.	24	19				19	24	22	3.5
CATTLE	405	SMALL	AUTO	51				1	51	51	51	N/A
			SU	4					4	4	4	N/A
			COMB.	24					24	24	24	N/A
CATTLE	406	MEDIUM	AUTO	17	54			2	17	54	36	26
			SU	6	66				6	66	36	42
			COMB.	0	38				0	38	19	19
CATTLE	407	SMALL	AUTO	35				1	35	35	35	N/A
			SU	33					33	33	33	N/A
			COMB.	0					0	0	0	N/A
CATTLE	408	MEDIUM	AUTO	59	69			2	59	69	64	7
			SU	144	4				4	144	74	99
			COMB.	62	98				62	98	80	25
CATTLE	409	LARGE	AUTO	114	136	83		3	83	114	111	26.6
			SU	27	0	12			0	27	13	10
			COMB.	128	117	72			72	128	106	30
CATTLE	410	LARGE	AUTO	60				1	60	60	60	N/A
			SU	6					6	6	6	N/A
			COMB.	97					97	97	97	N/A

3.1.5 LIMESTONE

To summarize and simplify the use of trip generation factors of limestone quarries, similar activity centers can be grouped together. This grouping should consider size and unique features of each site. Sites were selected so that none included other activities, such as asphalt plants. Therefore, the size factor is the only one considered. The sizes which are possible create a continuum, and division into categories is somewhat subjective. Little information was available for selecting size categories other than the site-specific counts. Using this information, a logical range for large quarries is over 700 truck trips per day, medium is 201 to 700 truck trips per day, and small is less than 200 truck trips per day. Large sites are: 503, 510, 514, and 515; medium-sized sites are 504, 505, 506, 507, and 509. Small sites are: 500, 501, 508, 511, and 513.

Table 3.1.5-1 is a summary of the number of trip-ends manually counted at each activity center. The table shows totals for each day, the maximum daily trips, minimum daily trips, mean (or average) daily trips, and the standard deviation if the number of days counted was at least two.

Table 3.1.5-1 Limestone Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
LIME-STONE	500	SMALL	AUTO	31				1	31	31	31	N/A
			SU	15					15	15	15	N/A
			COMB.	70					70	70	70	N/A
LIME-STONE	501	SMALL	AUTO	30	49			2	30	49	40	13
			SU	189	190				189	190	189	1
			COMB.	4	4				4	4	4	0
LIME-STONE	502A	MEDIUM	AUTO	130				1	130	130	130	N/A
			SU	197					197	197	197	N/A
			COMB.	81					81	81	81	N/A
LIME-STONE	503	LARGE	AUTO	68	71			2	68	71	70	2
			SU	302	262				262	302	282	28
			COMB.	417	438				417	438	428	15
LIME-STONE	504A	MEDIUM	AUTO	62				1	62	62	62	N/A
			SU	29					29	29	29	N/A
			COMB.	185					185	185	185	N/A

Table 3.1.5-1 (Continued) Limestone Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
LIME-STONE	505A	MEDIUM	AUTO	54	51			2	51	54	53	2
			SU	127	61				61	127	94	47
			COMB.	146	76				76	146	111	49
LIME-STONE	506	MEDIUM	AUTO	25	21			2	21	25	23	3
			SU	121	96				96	121	109	18
			COMB.	228	83				83	228	156	103
LIME-STONE	507A	MEDIUM	AUTO	141	154			2	141	154	148	9
			SU	172	190				172	190	181	13
			COMB.	215	229				215	229	222	10
LIME-STONE	508	SMALL	AUTO	4				1	4	4	4	N/A
			SU	9					9	9	9	N/A
			COMB.	70					70	70	70	N/A
LIME-STONE	509	MEDIUM	AUTO	71	44			2	44	71	58	19
			SU	18	0				0	18	9	9
			COMB.	133	237				133	237	185	74
LIME-STONE	510A	LARGE	AUTO	342	266			2	266	342	304	54
			SU	1207	726				726	1207	967	340
			COMB.	162	189				166	189	178	19
LIME-STONE	511	SMALL	AUTO	23				1	23	23	23	N/A
			SU	91					91	91	91	N/A
			COMB.	49					49	49	49	N/A
LIME-STONE	513	SMALL	AUTO	59	98	93	71	4	71	98	80	18
			SU	12	58	21	17		12	58	27	21
			COMB.	146	107	141	152		107	152	137	20
LIME-STONE	514	LARGE	AUTO	317	352			2	317	352	335	25
			SU	76	48				48	76	62	20
			COMB.	855	910				855	910	883	39
LIME-STONE	515	LARGE	AUTO	106	39			2	39	106	71	47
			SU	98	17				17	98	58	57
			COMB.	676	643				643	676	660	23

3.1.6 SAND AND GRAVEL

To summarize the trip-generating characteristics of sand and gravel pits, similar activity centers can be grouped. This grouping should consider size and unique features of each site. Sites were selected so that none included other activities, such as asphalt plants. Therefore, the size factor is the only one considered. The sizes which are possible create a continuum, and division into categories is somewhat subjective. Little information was available for selecting size categories other than the site-specific counts. Using this information, a logical range for large sites is over 200 truck trips per day; for medium, it is 101 to 200 truck trips per day. Small sites would generate less than 100 truck trips per day. Large sites are: 601, 605, and 606. Sites which are medium-sized are: 600, 604, 608, 611, and 613. Sites which are small are: 602, 603, 607, 609, 610, 612, and 614.

Table 3.1.6-1 is a summary of the number of trip-ends manually counted at each activity center. The table shows raw totals for each day, the maximum daily trips, minimum daily trips, mean (or average) daily trips, and the standard deviation if the number of days counted was at least two.

Table 3.1.6-1 Sand and Gravel Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
SAND AND GRAVEL	600	MEDIUM	AUTO	37				1	37	37	37	N/A
			SU	0					0	0	0	N/A
			COMB.	107					107	107	107	N/A
SAND AND GRAVEL	601	LARGE	AUTO	366	363			2	363	366	365	2
			SU	120	121				120	121	121	1
			COMB.	303	65				65	303	184	119
SAND AND GRAVEL	602	SMALL	AUTO	36				1	36	36	36	N/A
			SU	6					6	6	6	N/A
			COMB.	64					64	64	64	N/A
SAND AND GRAVEL	603	SMALL	AUTO	57	79			2	57	79	68	11
			SU	4	15				4	15	10	6
			COMB.	48	52				48	52	50	2
SAND AND GRAVEL	604	MEDIUM	AUTO	0	8			2	0	8	4	4
			SU	4	1				1	4	3	2
			COMB.	92	107				92	107	100	8

Table 3.1.6-1 (Continued) Sand and Gravel Classification Count Summary

ACTIVITY CENTER TYPE	SITE NUMBER	SIZE	VEHICLE CLASS	DAY 1	DAY 2	DAY 3	DAY 4	NO. DAYS	DAILY MIN.	DAILY MAX.	DAILY MEAN	STD. DEV.
SAND AND GRAVEL	605	LARGE	AUTO	88	57			2	57	88	73	16
			SU	5	9				5	9	7	2
			COMB.	395	371				371	395	383	12
SAND AND GRAVEL	606	LARGE	AUTO	31	30	50		3	30	50	37	9
			SU	248	64	84			64	248	132	82
			COMB.	220	183	220			183	220	208	17
SAND AND GRAVEL	607	SMALL	AUTO	23	31	32	35	4	23	35	30	4
			SU	31	6	34	63		6	63	34	20
			COMB.	59	45	93	71		45	93	67	18
SAND AND GRAVEL	608	MEDIUM	AUTO	176	164	300		3	164	300	213	61
			SU	20	10	24			10	20	18	6
			COMB.	94	129	232			94	232	152	59
SAND AND GRAVEL	609	SMALL	AUTO	36				1	36	36	36	N/A
			SU	34					34	34	34	N/A
			COMB.	20					20	20	20	N/A
SAND AND GRAVEL	610	SMALL	AUTO	6				1	6	6	6	N/A
			SU	0					0	0	0	N/A
			COMB.	53					53	53	53	
SAND AND GRAVEL	611	MEDIUM	AUTO	65	52			2	52	65	59	7
			SU	92	30				30	92	61	31
			COMB.	69	9				9	69	39	30
SAND AND GRAVEL	612	SMALL	AUTO	48				1	48	48	48	N/A
			SU	52					52	52	52	N/A
			COMB.	34					34	34	34	N/A
SAND AND GRAVEL	613	MEDIUM	AUTO	17	30			2	17	30	24	7
			SU	21	19				21	21	20	1
			COMB.	102	134				102	134	118	16
SAND AND GRAVEL	614	SMALL	AUTO	39				1	39	39	39	N/A
			SU	24					24	24	24	N/A
			COMB.	94					94	94	94	N/A

3.2 WEIGH-IN-MOTION SUMMARY

3.2.1 TIMBER

Table 3.2.1-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near timber mills. These values were read from the cumulative distribution graphs included in Section 2.1.2 of this report. These results are raw, unadjusted data.

Table 3.2.1-1 Timber Weigh-in-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
TIMBER	50	85	90	95	98	100
SINGLE AXLE						
SU-1	5.7	9.7	10	15.6	19.3	20
	5	10.3	11.7	16.6	20.7	22
	8.7	12	15.3	19.3	26.3	28
3-S2	7	8.5	9	9.5	12.5	16
	6.2	7.5	7.7	8	8.7	10
	8.8	9.7	9.9	11	11.7	12
TANDEM AXLE						
SU-2	18.3	32.5	33.3	34.5	36.7	40
	18.3	25	30	33.3	36.7	40
	24	40	43.3	51.7	61.7	65
3-S2	18.3	29	30	33.3	35	50
	15	29	31.7	34	36.7	50
	36	41.7	43.3	44	46.7	55
	26.7	38.3	41	43.3	44	45
	23.3	32.5	35	38.3	41.7	45
GROSS VEHICLE WT.						
SU-2	25	39	41	43.3	44	45
	23.5	34	41	43.3	45	50
	32	50	52.5	55	66.7	70
3-S2	43.4	65	68.3	70	73.4	98.3
	35	64	68	71.7	74	80
	72.5	85	88	92	95	105

3.2.2 PRODUCE

Table 3.2.2-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near produce distributors. These values were read from the cumulative distribution graphs included in Section 2.2.2 of this report. These results are raw, unadjusted data.

Table 3.2.2-1 Produce Weigh-in-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
PRODUCE	50	85	90	95	98	100
SINGLE AXLE						
SU-1	8.7	22	23.3	25.4	30.6	32
	6.7	14	17.3	20	22	24
SU-2	6.3	10.7	11.8	13.3	14.3	16
3-S2	11	14.7	16	18.7	22	26
TANDEM AXLE						
SU-2	14	28.5	31.7	36.7	38.3	40
	14	26.7	28.3	31.7	35	45
3-S2	26.7	43.3	46.7	51.7	56.7	65
	26.5	34.5	35.7	38.3	39	40
	16	29	31	33.3	35	40
GROSS VEHICLE WT.						
SU-1	16	26	28.3	30	33.3	35
	14	18.5	19	20	21.7	25
SU-2	21	38.3	40	43.3	48.3	55
	19	31.7	34	41.7	44	55
3-S2	71.7	105	116.7	136.7	143.4	145
	63.3	77	79	81	83.3	85

3.2.3 GRAIN

Table 3.2.3-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near grain elevators. These values were read from the cumulative distribution graphs included in Section 2.3.2 of this report. These results are raw, unadjusted data.

Table 3.2.3-1 Grain Weigh-in-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
GRAIN	50	85	90	95	98	100
SINGLE AXLE						
SU-1	5.5	9	9.9	14.2	16.3	18
	7.2	13	14	15	16	18
TANDEM AXLE						
SU-2	15	27.5	30	32	33.4	35
3-S2	13.4	26.9	30	32.3	34	38.4
	26.7	40.8	42.5	44	45	50
	17.5	34	35.8	37.5	39	40
	17.5	34	35.8	38.4	39	40
GROSS VEHICLE WT.						
SU-1	15.8	23	24	25.3	28.4	30
SU-2	19.8	36	38.4	40.8	46.7	50
3-S2	31	60	65	71.7	76.7	80
	55	90.5	92.5	94	96.7	100
	40	73.4	75	77	79	80
	45	78.4	80.3	83	84.5	85

3.2.5 LIMESTONE

Table 3.2.5-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near limestone quarries. These values were read from the cumulative distribution graphs included in Section 2.5.2 of this report. These results are raw, unadjusted data.

Table 3.2.5-1 Limestone Weigh-in-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
LIMESTONE	50	85	90	95	98	100
SINGLE AXLE						
3-S2	10	11.7	11.9	14	15.4	16
	9.4	11.7	12	21	23.4	25
TANDEM AXLE						
3-S2	32.4	38.5	38	40.3	43.4	45
	40	47	48.5	50.5	55	59
	30	41.8	43.4	44.8	48.4	50.5
	27.8	33.2	34	34.8	36.7	39
GROSS VEHICLE WT.						
3-S2	91	102	105	115.3	120	123.5
	66	74	75.5	78.3	79.4	80
	75	90	93.4	100	121.7	133.4

3.2.4 CATTLE

Table 3.2.4-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near cattle feedlots. These values were read from the cumulative distribution graphs included in Section 2.4.2 of this report. These results are raw, unadjusted data.

Table 3.2.4-1 Cattle Weigh-in-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
CATTLE	50	85	90	95	98	100
SINGLE AXLE						
SU-1	7.4	17.5	18	18.8	19.5	20
3-S2	9	10.7	11.4	12	18	22
	9.2	10.8	11.4	11.6	11.8	12
	9	11.2	14	17.5	18.8	20
TANDEM AXLE						
3-S2	30	39.5	41.7	44.5	53.4	58.3
	18.4	38.4	40	43.4	46.7	51
	35	43.7	44.5	47	48.7	50
GROSS VEHICLE WT.						
3-S2	71.7	91	94	102	108.6	110
	42.5	86.8	90	95.1	100	105

3.2.6 SAND AND GRAVEL

Table 3.2.6-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near sand and gravel pits. These values were read from the cumulative distribution graphs included in Section 2.6.2 of this report. These results are raw, unadjusted data.

Table 3.2.6-1 Sand and Gravel Weigh-in-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
SAND & GRAVEL	50	85	90	95	98	100
SINGLE AXLE						
SU-1	7.7	19.3	20.8	24.2	26	28
	7.3	12.7	15.7	16.8	18	20
	6.7	13.8	16.2	17.7	19.3	24
3-S2	9.6	11.6	11.8	12	12.7	14
	8.9	10.9	11.7	11.9	12.7	14
	8.8	11.7	12.5	13	13.8	14
TANDEM AXLE						
3-S2	19.8	46.7	49.8	52.5	57.5	65
	19.9	41.2	43.4	45	47.5	50
	19.9	37	40	43.2	45	55
	17.5	33.5	36.8	39.7	43.4	60
GROSS VEHICLE WT.						
SU-1	15.6	23.5	24.7	25.3	27.5	30
3-S2	46.6	92.5	95	98.3	101.5	105
	44.8	83.5	90	93.2	96.8	120
	39.4	78.7	83.5	106	116	120

4.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of Report 420-2 highlight the variability in the composition of traffic on all roadway types, even those which are similar by design and by classification. Count stations on Farm-to-Market roadways in the same general area within close proximity of each other indicated significant differences in the traffic stream. The same was found with other roadway types. The truck traffic mix tends to be industry specific, and therefore, the percentage of such vehicles in the traffic stream varies widely between locations on the same road class. This leads to the conclusion that knowledge of the vehicle mix generated by various industries is vitally important. Similarly, the axle distributions and weights are important in planning, designing, and maintaining the state's roadways.

The commodities identified in this study are important to the state of Texas. Their movement occurs throughout the state in every SDHPT district. Some of these commodities are moved by truck to ports for shipment abroad, while some are moved by truck across state lines to several hundred miles away. Some of the commodities such as gravel and limestone occur on a widespread basis throughout the state, while others such as timber, produce and beef cattle are concentrated in a particular region. The activity centers for aggregates, especially sand and gravel pits, are active or inactive depending on local demand, the economy, and other factors. Even when these operations are active for an extended period of time, their intensity is highly variable. This is obvious from the site-specific classification counts presented in this report.

Very little is known about seasonal variations and how they affect most of the special-use commodities. Some of the commodities such as timber and aggregates move year round, depending on demand and weather. Others such as grain and produce are very seasonal, experiencing a relatively short harvest season which causes a peak demand for trucks. Each special-use activity is somewhat unique. Much is still unknown about timber cutting activities and specific routes used, and interaction of trucks with other modes, especially in grain movement. Tracing the movement of special-use products and predicting their future deserves more evaluation.

4.1 RECOMMENDATIONS FOR IMPLEMENTATION

Practical application of the procedures developed and data collected in this study can be used at both the Division and the District level of the SDHPT. The findings are relevant to district administrative, design, and maintenance engineers to accommodate increased traffic demand caused by special-use activities.

4.2 INTERPRETATION

Results of the field data collection phase of Project 420 should prove to be quite useful for evaluating site-specific impacts of any of the special-use commodities investigated. Information provided on statewide application indicates the relative intensities by county and SDHPT district. Findings of the study may not represent some of the smaller activity centers and/or those located away from high concentrations of a particular commodity. One example is cattle feedlots in the southern part of the state.

3.2.7 PETROLEUM

Table 3.2.7-1 is a summary of the axle and gross vehicle weights collected using portable weigh-in-motion (WIM) systems near oil and gas field exploration sites. These values were read from the cumulative distribution graphs included in Section 2.7.1 of this report. These results are raw, unadjusted data.

Table 3.2.7-1 Petroleum Weigh-In-Motion Summary

W-I-M SUMMARY						
COMMODITY	PERCENTAGE WEIGHTS					
PETROLEUM	50	85	90	95	98	100
SINGLE AXLE						
SU-1	7	11.4	13.4	20	23.4	24
	7.3	13.5	15.8	18	21	22
	7.2	12	14	16.7	17.5	19.4
	7.4	11.5	13.4	18.7	21	23
	12	16	23.4	25.4	28.7	30
TANDEM AXLE						
3-S2	23.4	36.5	38.5	41.7	43.8	45
	19	34.5	36.6	38.4	40	43.4
	19.5	34	36.7	39	43.4	49
	18.4	34	36.7	40	46	49
	20	33.4	35	38	40	44
	18	30.5	33.4	40	43.4	45
	14	36	39	42	44	45
	21	41	42.5	44	47	50
GROSS VEHICLE WT.						
SU-1	16	24	26	30	33	35
	16.7	23.2	24	28.8	33.4	35
	16	21	22.5	24	24.8	25
	16	22.4	25	31.5	33.7	35
3-S2	50.5	77	79	84	88.4	90
	51	77.8	79	85	88.3	90
	48.3	76.7	78.3	80	88.3	90
	45	78.3	81.7	83.4	84.7	85
	43.4	73.6	75	80	83.5	85

Cattle typically have a longer feeding cycle there than they do in the Panhandle area. Study findings are not necessarily representative of commodity movement during off-peak seasons. Hauling of raw timber during the rainy season might be less intensive in terms of numbers of trips, but effects on pavements could be more detrimental. Extreme variability in number of trips generated is possible according to field studies as well as interview information.

Results of weigh-in-motion studies were inconsistent. Some of the results indicate that a high percentage of gross vehicle weights and axle weights exceed legal limits. At other sites, the percentage of overweight vehicles was significantly less, according to WIM results. A portion of the difference between sites is due to variables unaccounted for, such as road profile, cross slope, and lack of calibration of the WIM system at each site. Day to day variation at the same sites was less pronounced. The trend in some cases was toward lighter weights (lower percent illegal) the second day when the same site was used two or more consecutive days. One explanation of the reduction may have been trucker awareness of the weighing operation after the first day.

According to results of the case study conducted on a heavily traveled highway near a timber mill, special-use timber traffic can cause a significant reduction in pavement life. Even on this U.S. Highway, the reduction in life of the pavement was about 12 years due to the additional loading imposed by timber traffic. It should be noted that the weigh-in-motion system was not calibrated at every site; therefore, accuracy estimates cannot be made. However, the methodology used in the case study is useful for application elsewhere. A thinner pavement such as that typically used on Farm-to-Market Roads would be impacted to an even greater degree, given the same number and weight of axle loadings.

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