CRAWFORD, BUNTE, BRAMMEIER
TRAFFIC AND TRANSPORTATION ENGINEERS

1973-2000 / 27 Years / Missouri-Illinois

October 9, 2000

Ms. Connie Heitz
Senior Planner
Zambrana Engineering
2324 Marconi Ave
St. Louis, Missouri, MO 63110

RE: Corps of Engineers
CBB Job # 160-00

Dear Ms. Heitz:

In accordance your request, we have reviewed the alternatives described in the Environmental Assessment of a Proposed Lease at Coralville Lake as they apply to potential traffic impacts. Specifically, we have reviewed four major elements as they pertain to the impact of each alternative on traffic. They include:

1. The trip generation rate of the proposed project;
2. The capacity of the adjacent roadways to accommodate the impact of the proposed development;
3. The Road Improvement Fee Study completed by Johnson County; and
4. Johnson County Road Performance Standards.

Each is discussed further below.

Trip Generation Rate of the Alternatives

According to the Institute of Traffic Engineers (ITE) Trip Generation Manual, the a.m. traffic generation rate for campgrounds (peak hour of adjacent street traffic, same as that used for single-family homes in the chart) is 0.27 per occupied campsite. Based on the MYCA site plan of 12 tent-pad sites and 11 multi-use cabins, if all were occupied, the a.m. peak hour, according to ITE, would be 6.21, the same as approximately 8 single-family homes. The MYCA Lease Alternative proposed that average daily traffic would be 45 vehicles per day and 2 to 4 bus trips per day, which is less than the ITE rate for daily trips to a campsite.

The central lodge proposed by MYCA could attract more traffic during special events. However, it is unlikely that this would be peak hour traffic, and the total potential peak hour traffic associated with these events should be offset by the amount of peak hour traffic the camp will lose during the off-season.

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The a.m. peak hour trip rates of the Reduced Use Alternative was based on a 50 percent reduction in the a.m. peak hour trip rate for the MYCA Lease Alternative, approximately 3 trips. The Alternate Use assumed 15 percent of the total daily trips, approximately 2 trips during the peak hour.

Road Capacity

The Highway Capacity Manual, published by the Transportation Research Board, is used to determine capacity of a roadway under a variety of conditions. It uses a grading system, A through F, with LOS C being considered acceptable in rural areas. Chapter 8 of that manual specifically deals with rural two lane roadways. We utilized the Highway Capacity Software, version 3.2, to determine the LOS on Scales Bend Road utilizing the peak hour trips identified above, and adding on 6 trips in the peak for Alternative 1, the MYCA Lease Alternative, 3 trips in the peak for Alternative 2, the Reduced Use Alternative, and 2 trips in the peak for Alternative 3, Alternate Use.

We also added an additional 86 trips for an even 200 peak trips to see the impact of continued residential development. The results indicated an LOS of B for existing conditions, LOS B under Alternative 1, Alternative 2 and Alternative 3, and LOS C with an additional 115 residences in addition to Alternative 1 trips. Based on a lack of site-specific data, our analysis required us to make a variety of assumptions. We tried to take a conservative approach – the actual LOS is probably better than what we calculated. This is evident in the higher speeds observed by the county on Scales Bend Road – very little delay is occurring in the corridor.

The higher speeds, in fact, suggest that the roadway's current geometric design is better than what it is currently signed at. The county may need to review the current posted speed on the roadway based on prevailing conditions.

A good indication of traffic-associated problems on a rural roadway is the accident rate of the given roadway. It should be noted that the accident rate is not the same as the number of accidents. As traffic volumes rise on a given roadway, so does the number of accidents. This is because more vehicles, especially on rural highways, mean more opportunities for vehicles to pass each other, which leads to more chances for accidents. However, the actual rate of accidents per million of vehicle miles traveled could be the same or be even lower. This would not indicate a problem with the roadway. The information provided by the county in the Johnson County Planning and Zoning Department comments on the Coralville Environmental Assessment is insufficient to determine both the accident rate and the cause of those accidents listed. For instance, if the accidents are related to the narrow width of the road, these might be addressed by road improvements. If the accidents are related to deer or alcohol, road improvements may not reduce these.

Road Improvement Fee Study

Our review of the road improvement fee study indicated that it is a well thought out and rational methodology for determining impact fees to help offset the impact of development. Its stated methodology is based on a.m. peak hour of travel (VMT) in order to keep most road segments functioning at an acceptable level-of-service.

According to the study, peak hour VMT is critical. "Peak hour trip (PHT) generation rates are most appropriate for assessing the impact of a new development on the need for road improvements. The peak hour trip rates are used because roads must be constructed with capacity limits that meet or exceed the demand placed on them during peak hours of travel." The study goes on to state that the capacity of the chip-sealed roadways in the study area are 1,000 vehicle miles of capacity each during the peak hour. Eight miles is the approximate average trip length.

When the a.m. peak hour trip rate was reviewed for each of the land uses, however, the rates utilized for all land uses other than residential were daily rates, not a.m. peak rates. In addition, these rates did not correspond to the variables quoted in the study. General Office had an a.m. rate of 3.32 per 1,000 feet in the impact fee study – This is the rate the ITE Trip Generation Manual has for employees during a weekday[1]. The rate quoted for general recreation per parking space, 74.38, is the ITE rate for daily trips to an entire campsite.

It is not clear why residential development was so favorably treated in the impact fee system. It is well understood that other land uses are dependent on residences to feed them – no residences means no convenience store or factories or offices. Without the residences, the only uses in this area would be agricultural or recreational, such as the proposed development.

Johnson County Road Performance Standards

According to the recently adopted Johnson County Road Performance Standards, no rezonings shall be approved on oiled chip sealed roads with projected traffic volume greater than 1,000 vehicles per day unless improvement of said road is scheduled within the next two years of the adopted Johnson County five-year road improvement plan. The Performance Standards go on to state that if the prevailing speed exceeds the posted speed limit by 15 mph, then the volume thresholds shall be reduced by 50%. According to these standards, the projected traffic volumes are determined by adding to the existing traffic count the number of existing platted lots with direct access multiplied by eight vehicle trips per day, and the estimated density of development from any currently zoned residential property with direct access multiplied by eight or projected commercial or industrial traffic volumes determined by the ITE Trip Generation Manual.

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[1] Institute of Traffic Engineers Trip Generation Manual, 6th Edition; Volume 2, pp1045

No explanation of how the 1,000 vehicles per day limit was determined was provided. It does not match the American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highway and Streets, 1990 (English Units). This is the "Green Book" and it has been adopted by State, County and Local Agencies across the country including Iowa. According to the manual "Knowledge of ADT volume is important for many purposes … but its direct use in the geometric design of highways is not appropriate because it does not indicate the variation in the traffic occurring during the various months of the year, days of the week, and hours of the day."[2] It goes on to state the 30th Highest Hour (30 HV) is what should be used in design, and this represents about 15 percent of the ADT. In this case, that would be approximately 108 trips, based on an ADT of 720 trips[3].

Conclusions

Based on our analysis, the total amount of trips generated from the any of the alternatives would have a negligible impact on the roadway system. No rational basis exists for any other conclusion. The trip generation is low, lower than the 3-acre single family housing zoning on adjacent properties. No rationale has been presented, from a traffic perspective, why the few peak hour trips associated with even the highest use alternative, the MYCA Lease Alternative, would create a noticeable change in the adjacent roadway LOS. No evaluation of the accident rate has been conducted, but it is extremely unlikely that the small amount of additional traffic associated with the alternatives could materially impact the overall rate on this road.

We do not recommend additional traffic control at the intersection of Scales Bend Road based on traffic volumes. A review of the site distance would be required to determine if geometric restrictions would require additional signing and/or geometric changes.

We appreciate the opportunity we have had to comment on this project. Please feel free to call us if you have any additional questions or comments.

Sincerely,

Craig A. Holan, AICP
Associate

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[2] American Association of State and Highway Transportation Officials, A Policy on Geometric Design of Highway and Streets, 1990 (English Units), Chapter II, pp 54

[3] Traffic Flow Map of Johnson County, Iowa, Iowa Department of Transportation, January 1, 1999

1985 HCM:TWO-LANE HIGHWAYS
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FACILITY LOCATION.... Scales Bend Road
ANALYST..... CAH
TIME OF ANALYSIS..... DHV
DATE OF ANALYSIS..... 09-28-2000
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1.4
PERCENTAGE OF BUSES.....	1
PERCENTAGE OF RECREATIONAL VEHICLES.....	1
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	.9
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	86 / 14
LANE WIDTH (FT).....	10
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	2
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.68	.78	.92
B	5	3.4	3.9	.68	.78	.9
C	5	3.4	3.9	.68	.78	.9
D	5	2.9	3.3	.68	.78	.91
E	5	2.9	3.3	.81	.78	.91

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 108
ACTUAL FLOW RATE: 120

LOS	SERVICE FLOW RATE	V/C
A	41	.03
B	175	.13
C	376	.28
D	583	.43
E	1454	.9

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Scales Bend Road
ANALYST..... CAH
TIME OF ANALYSIS..... DHV
DATE OF ANALYSIS..... 09-28-2000
OTHER INFORMATION.... Alternative 1: MYCA

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1.4
PERCENTAGE OF BUSES.....	1
PERCENTAGE OF RECREATIONAL VEHICLES.....	1
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	.9
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	86 / 14
LANE WIDTH (FT).....	10
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	2
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.68	.78	.92
B	5	3.4	3.9	.68	.78	.9
C	5	3.4	3.9	.68	.78	.9
D	5	2.9	3.3	.68	.78	.91
E	5	2.9	3.3	.81	.78	.91

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 114
ACTUAL FLOW RATE: 127

LOS	SERVICE FLOW RATE	V/C
A	41	.03
B	174	.13
C	375	.28
D	582	.43
E	1450	.9

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Scales Bend Road
ANALYST..... CAH
TIME OF ANALYSIS..... DHV
DATE OF ANALYSIS..... 09-28-2000
OTHER INFORMATION.... Alternative II Reduced Use

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	1.4
PERCENTAGE OF BUSES	1
PERCENTAGE OF RECREATIONAL VEHICLES	1
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.9
DIRECTIONAL DISTRIBUTION (UP/DOWN)	86 / 14
LANE WIDTH (FT)	10
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	2
PERCENT NO PASSING ZONES	100

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.68	.78	.92
B	5	3.4	3.9	.68	.78	.9
C	5	3.4	3.9	.68	.78	.9
D	5	2.9	3.3	.68	.78	.91
E	5	2.9	3.3	.81	.78	.91

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 111
ACTUAL FLOW RATE: 123

LOS	SERVICE FLOW RATE	V/C
A	41	.03
B	175	.13
C	376	.28
D	583	.43
E	1454	.9

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Scales Bend Road
ANALYST..... CAH
TIME OF ANALYSIS..... DHV
DATE OF ANALYSIS..... 09-28-2000
OTHER INFORMATION.... Alternative 3 Alternate Use

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1.4
PERCENTAGE OF BUSES.....	1
PERCENTAGE OF RECREATIONAL VEHICLES.....	1
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	.9
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	86 / 14
LANE WIDTH (FT).....	10
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	2
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.68	.78	.92
B	5	3.4	3.9	.68	.78	.9
C	5	3.4	3.9	.68	.78	.9
D	5	2.9	3.3	.68	.78	.91
E	5	2.9	3.3	.81	.78	.91

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 110
ACTUAL FLOW RATE: 122

LOS	SERVICE FLOW RATE	V/C
A	41	.03
B	174	.13
C	375	.28
D	582	.43
E	1450	.9

LOS FOR GIVEN CONDITIONS: B

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Scales Bend Future
ANALYST..... CAH
TIME OF ANALYSIS..... DHV
DATE OF ANALYSIS..... 09-28-2000
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	1
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	1
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	.9
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	60 / 40
LANE WIDTH (FT).....	10
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	2
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	.68	.94	.95
B	5	3.4	3.9	.68	.94	.94
C	5	3.4	3.9	.68	.94	.94
D	5	2.9	3.3	.68	.94	.94
E	5	2.9	3.3	.81	.94	.94

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 200
ACTUAL FLOW RATE: 222

LOS	SERVICE FLOW RATE	V/C
A	51	.03
B	218	.13
C	469	.28
D	724	.43
E	1805	.9

LOS FOR GIVEN CONDITIONS: C

Land Use: 416
Campground/Recreational Vehicle Park
Independent Variables with One Observation

The following trip generation data are for independent variables with only one observation. This information is shown in this table only; there are no related plots for these data.

Users are cautioned to use these data with care because of the small sample size.

Independent Variable	Trip Generation Rate	Size of Independent Variable	Number of Studies	Directional Distribution
Acres				
Weekday	74.38	42	1	50% entering, 50% exiting
Saturday	50.67	42	1	50% entering, 50% exiting
Sunday	41.43	42	1	50% entering, 50% exiting

Campground/Recreational Vehicle Park
(416)

Average Vehicle Trip Ends vs: **Occupied Camp Sites**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

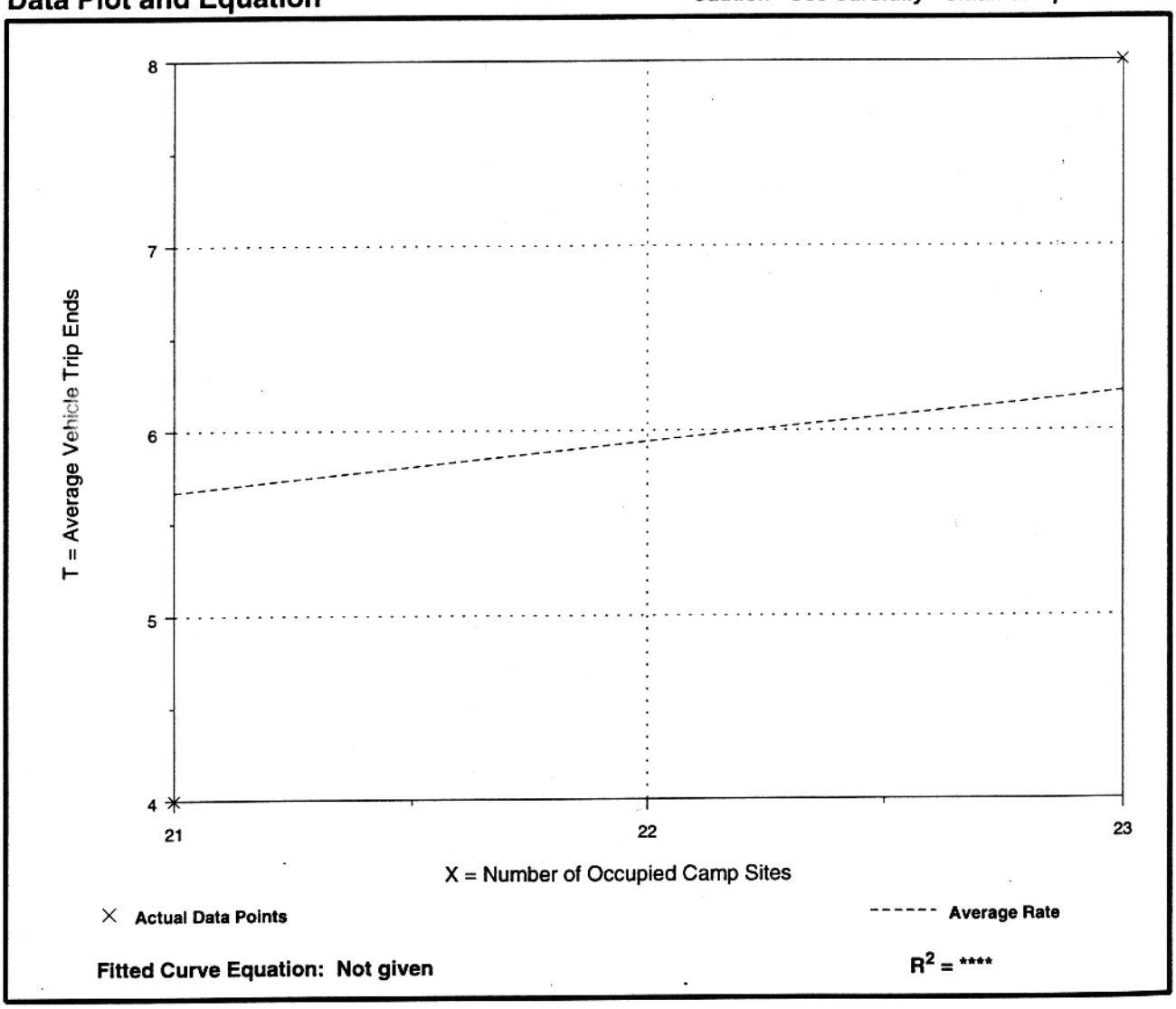
Number of Studies: 2
Average Number of Occupied Camp Sites: 22
Directional Distribution: Not available

Trip Generation per Occupied Camp Site

Average Rate	Range of Rates	Standard Deviation
0.27	0.19 - 0.35	*

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: Not given

R^2 = ****

Campground/Recreational Vehicle Park
(416)

Average Vehicle Trip Ends vs: **Occupied Camp Sites**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

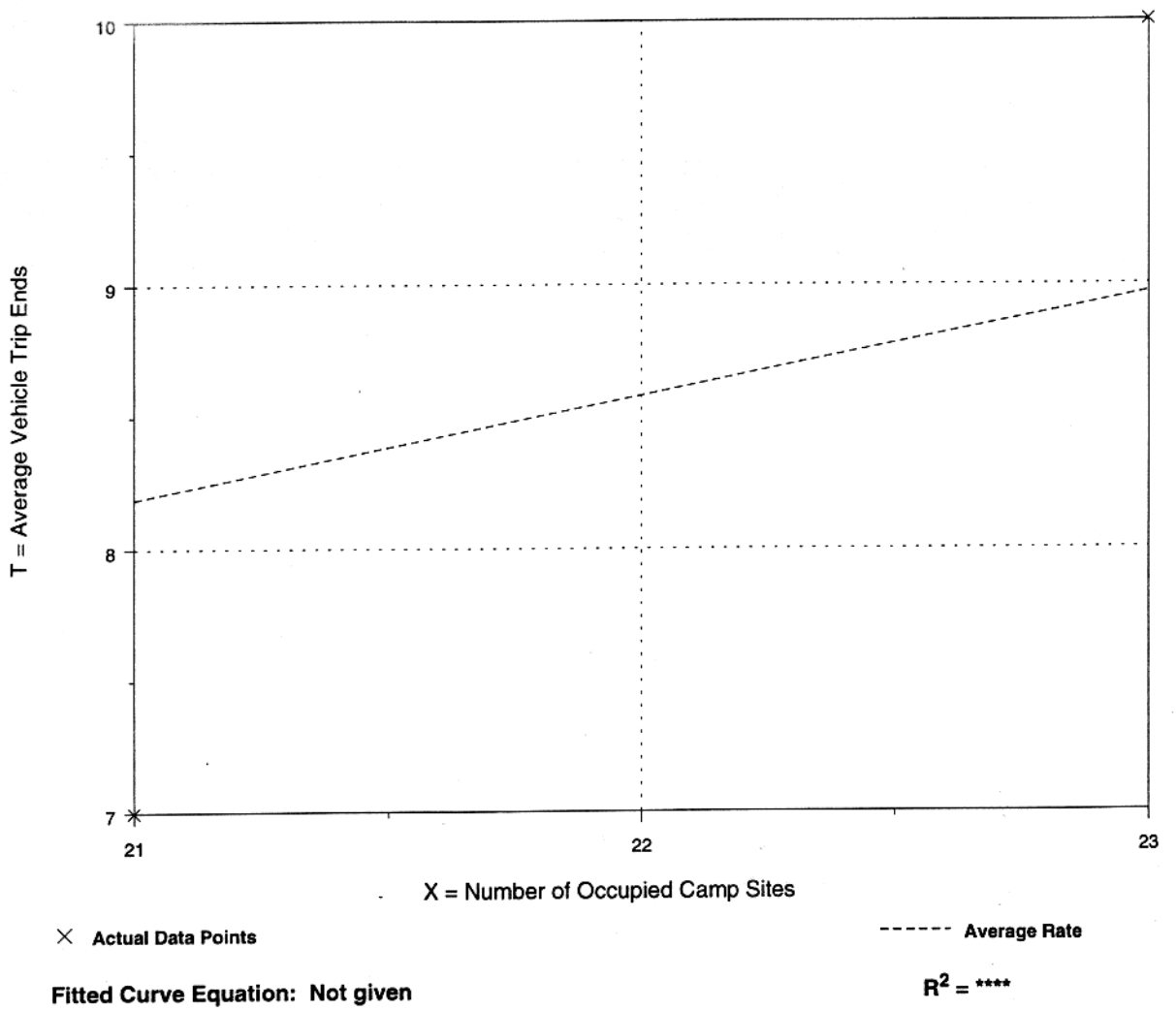
Number of Studies: 2
Average Number of Occupied Camp Sites: 22
Directional Distribution: Not available

Trip Generation per Occupied Camp Site

Average Rate	Range of Rates	Standard Deviation
0.39	0.33 - 0.43	*

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: Not given

R^2 = ****

Campground/Recreational Vehicle Park
(416)

Average Vehicle Trip Ends vs: Occupied Camp Sites
On a: Weekday,
A.M. Peak Hour of Generator

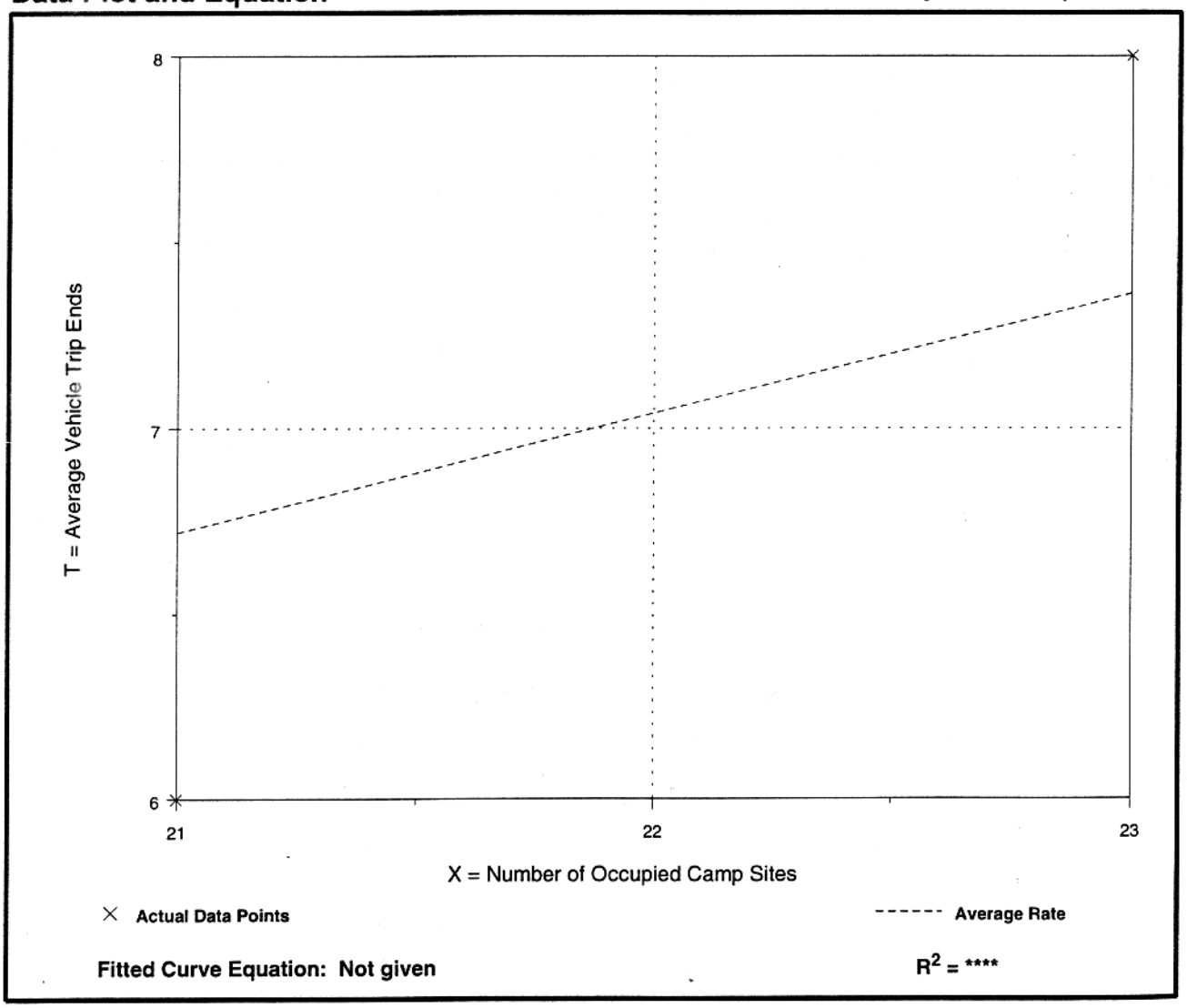
Number of Studies: 2
Average Number of Occupied Camp Sites: 22
Directional Distribution: Not available

Trip Generation per Occupied Camp Site

Average Rate	Range of Rates	Standard Deviation
0.32	0.29 - 0.35	*

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: Not given

R^2 = ****

Campground/Recreational Vehicle Park
(416)

Average Vehicle Trip Ends vs: **Occupied Camp Sites**
On a: **Weekday,**
P.M. Peak Hour of Generator

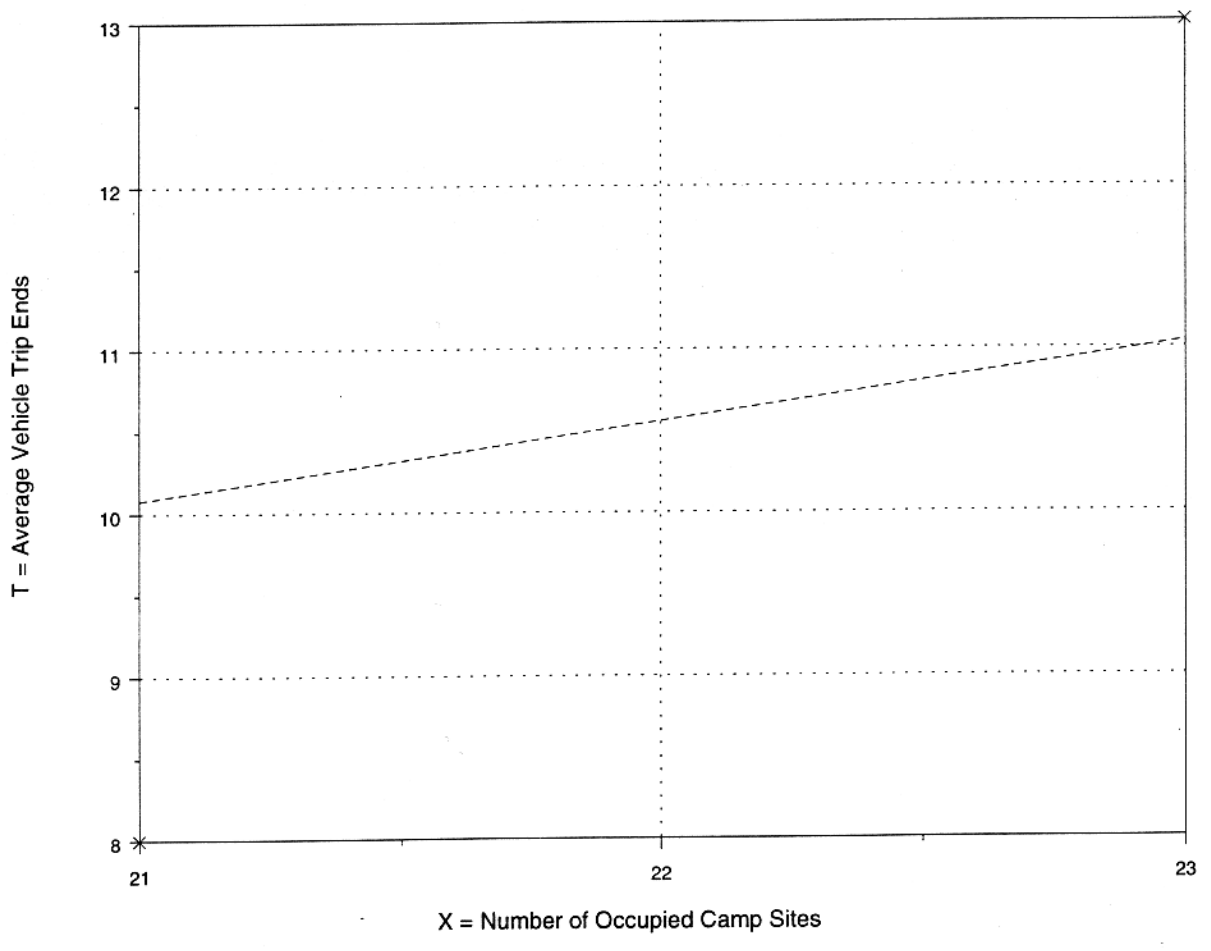
Number of Studies: 2
Average Number of Occupied Camp Sites: 22
Directional Distribution: Not available

Trip Generation per Occupied Camp Site

Average Rate	Range of Rates	Standard Deviation
0.48	0.38 - 0.57	*

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: Not given

R^2 = ****