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16. Abstract

Rest areas are an important part of our highway system, particularly on the interstate system. This report presents the findings of an extensive investigation to determine requirements for rest areas, with particular emphasis on comfort stations. Many sources of information were used in the study.

Officials in other states were visited and surveyed, rest areas were inspected, comfort stations within the states operated by other agencies were visited, and modular restroom manufacturing facilities were visited. Rest area surveys were conducted, district maintenance personnel were consulted, and complaint letters received by the department were reviewed. Accepted design procedures for determining number of fixtures are presented. An extensive appendix is included, which contains detailed information on the surveys and interviews. Future reports will include specific recommendations.

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INVESTIGATION OF REST AREA REQUIREMENTS— APPENDIX: PERTINENT REST AREA LITERATURE

by

William Thomas Straughan
David W. Fowler
Kirby W. Perry

Research Report Number 442-1, Volume 2

Research Project 3-18-86-442
Design of Rest Area Comfort Stations

conducted for the

Texas State Department of Highways
and Public Transportation

in cooperation with the

U.S. Department of Transportation
Federal Highway Administration

by the

Center for Transportation Research
Bureau of Engineering Research
The University of Texas at Austin

November 1987

PREFACE

The study of rest areas was accomplished with the help of many people. Officials in the states of California, Louisiana, Georgia, Oregon, and Washington graciously consented to be interviewed in person and provided extensive data and resource materials. Personnel in other states agreed to be interviewed by telephone. Officials at the Texas Department of Parks and Wildlife were very helpful in discussing their comfort station designs.

Many people in the Texas State Department of Highways and Public Transportation (SDHPT) gave freely of their time to assist in the study. Mr. E. W. (Bill) Wilson, who served as technical advisor for the study, Robert Hays; and Gordon Turn, of the Building Design Section of the Maintenance Division; met with the study supervisors numerous times and offered many helpful suggestions and constructive criticism.

Thanks are due to the many graduate students and staff members at The University of Texas at Austin who participated.

W. T. Straughan
David W. Fowler
Kirby W. Perry

ABSTRACT

Rest areas are an important part of our highway system, particularly on the interstate system. This report presents the findings of an extensive investigation to determine requirements for rest areas, with particular emphasis on comfort stations. Many sources of information were used in the study.

Highway officials in other states were visited and questioned, rest areas were inspected, comfort stations within the states operated by other agencies were visited, and modular restroom manufacturing facilities were visited. Rest area surveys were conducted, district maintenance personnel were consulted, and complaint letters received by the Texas State Department of Highways and Public Transportation (SDHPT) were reviewed.

Accepted design procedures for determining number of fixtures are presented in this report. An extensive appendix is included, which contains detailed information on the surveys and interviews. Reports 442-4 and 442-5F will include specific recommendations.

SUMMARY

An extensive investigation was conducted to determine requirements for rest areas, particularly comfort stations. Many sources of information were used: officials in highway departments in other states, Texas Parks and Wildlife officials, U.S. Army Corps of Engineers facilities, SDHPT district personnel, and rest area surveys. The information is summarized to permit recommendations to be made in reports 442-4 and 442-5F.

IMPLEMENTATION STATEMENT

The results of this study will be used to formulate design recommendations for rest area comfort stations in Texas. The improvement in design will result in more attractive buildings, reduced maintenance, and improved safety.

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APPENDIX A. PERTINENT REST AREA LITERATURE

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APPENDIX B. TRIP REPORTS

W. T. Straughan
Trip Report

Visit with the State of California, Department of Transportation
December 19, 1985

In Attendance:

J. R. Cropper, Chief, Division of Maintenance	(916) 445-9035
C. E. Chitty, Chief, Office of Highway Maintenance	(916) 445-2210
Duane Frink, Manager, Joint Development Studies, Office of Landscape Architecture	(916) 324-7233
Edward N. Kress, Landscape Architect, Office of Landscape Architecture	(916) 445-2332
Charles W. Wagoner, Architect, Office of Structures Design	(916) 445-4801

"On Thursday, December 19, 1985, I met with five gentlemen serving in various capacities with the California State Department of Transportation. The meeting was prearranged for the purpose of sharing helpful information on the construction, operation, and maintenance of California State Roadside Rest Areas in response to my direct request.

This is a report of the meeting and subsequent visit to an actual California roadside rest area. The format of the first part of the report is in the form of questions and answers with the questions being those that I had prepared in advance of the visit and the responses being those of one or more of the State of California representatives attending the meeting, together with my comments."

Note:"They" mentioned throughout this report refers to State Department of Transportation personnel who were interviewed.

1. How many full service rest areas do you have in operation
   a. on the interstate highway system? 54
   b. on the state highway system? 36
2. How many full service rest areas do you have planned for
   a. the next five (5) years? 5
   b. the foreseeable future? 13
3. What is the number of annual users for which you design a rest area?
   2,000,000.
4. What is your current criterion for spacing?
   The current plan is to close all gaps of 100 miles or more. This will require thirteen more rest areas, for a total of 103.
   The state's original criterion when the program began in 1963 was rest areas 30 miles apart, which would have required 275 rest areas. The budget for this was $6,000,000 vs. today's cost in excess of $4,000,000 per rest area. The first full-service rest area in California was completed in 1965.
5. Do you maintain records on rest area usage? Yes
   What % of vehicles stop?

10% to 13% average for all rest areas. However, some rest areas experience less than 5% usage rate, i.e., those in metropolitan areas that are passed by a high percentage of commuter traffic or those that have a high ADT. On the other hand, some of them in recreational areas or in eastern California experience more than a 25% usage rate.

6. Do you have rest areas adjacent to metropolitan areas and if not why?

   Current policy is not to build rest areas near metropolitan areas, primarily because similar services may be found within the metropolitan area. However, there are six rest areas within 10 to 30 miles of metropolitan areas.

7. Do you provide vending machines or any special services at rest areas?

   None, except for newspapers and REVA stops. (REVA is an acronym for Roadside Ecological Viewing Areas)

8. Do you have any center rest areas (in the median area) and if not, why?

   Not currently. There is a strong belief that rest areas should not be placed in the median because of adverse traffic safety consequences.

9. What are your regulations regarding overnight use?

   6 hours use maximum. This rule is enforced on a selective basis.

10. Are you considering joint facilities or do you currently have any in operation?

    None currently in operation, but they are investigating them for the future. As a matter of policy, the CALTRANS commissioners have requested that the department enter into joint developments with the private sector on any future rest areas.

    For this reason, they have appointed a full time Manager of Joint Development Studies, Duane Frink, who is actively pursuing this avenue. Duane was present at the meeting and he informed us that there are four joint development rest areas under active consideration and that they are authorized to build six. Of these actively underway, only one is not on an interstate highway right-of-way.

    They are using requests for proposals (RFP's) for studies by independent consultants. To date, the private sector has shown a very high degree of interest in jointly participating in the construction and operation of the joint use rest areas. Potential clients are the oil companies, fast food service companies, convenience stores, local mini-service oriented conglomerates, etc.

    Study contracts have been awarded for the three proposed rest areas and in the case of the fourth proposed joint use rest area, they are dealing directly with a large developer who owns several thousand acres along the interstate (Kaiser Development Corp.). The initial study should be complete in mid 1986 and they expect to let the contract for the first joint use facility in 1987.

    At this point in their planning, they are expecting the contractor to provide all required funds for construction, operation and maintenance, with the operator being required to keep the rest area open 24 hours per day, 365 days per year. However, they do not initially plan to insist upon a full-time attendant for all 24 hours per day. Instead, they intend to leave it up to the operator, feeling that, in most every case, the operator would in effect feel the necessity for a full-time attendant for all 24 hours.

    Present sites under consideration are:

    a. On state highway 50 between Sacramento and Lake Tahoe
    b. On interstate 15 in San Bernadino County
    c. On interstate 15 in Riverside County
    d. On interstate 5

    The state highway site will have direct access off the highway while all the interstate joint use facilities will be accessed only by exiting the interstate because of federal regulations prohibiting commercial operations by the private sector along the interstate right of way.

    They do not believe this will be a deterrent to the public use of the facilities because the fact that a rest area is needed at the proposed location coupled with the additional facilities available will more than compensate for the fact that an "off-ramp" must be used to gain access.

    As a matter of fact, they indicated that a much more serious concern is that the traffic may be so high that the interchange capacity may need to be increased, which will remove any economical advantage gained from the lower maintenance and operating costs from going to the joint use concept. However, they hastened to add that this is just one of those things that can be determined only after they have some experience with joint use rest areas.

11. Describe the types of vandalism problems that you have.

    They run the gamut from "drilling toilet partitions" to stealing rest area shrubbery and plants. Since the usage rates

are so high, many rest areas experience usage rates in excess of 2 million visitors per year - the rest areas suffer the same abuse the crimes as is experienced by the whole of society. In general, the state department of transportation representatives present conveyed the impression that they feel the bulk of the problems experienced with vandalism are of their own making, i.e., if the design, construction and maintenance of the facility and equipment therein is not faulty, they would not have nearly as much vandalism. This is an interesting approach as they all seem to in effect, blame themselves for any widespread problem.

When questioned about specific vandalism problems, they mentioned

broken water spigots,
damaged drinking fountains,
defacing of signs,
defacing of REVA (Roadside Ecological Viewing Area) stops,
drilling of toilet partitions (primarily confined to those areas frequented by homosexuals, just outside San Francisco and Los Angeles), and
stealing of sprinklers.

Graffiti are not problems.

12. Do those rest areas with high usage rates have more vandalism?

    Not as a percentage of the total traffic. Their theory is that vandal prone individuals are quite often discouraged by the mere presence of others.

13. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage?

    Yes (especially those near San Francisco and Los Angeles)

14. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs?

    Between 5% and 10% and probably closer to 5%. (This was subsequently modified to be less than 2% in a letter dated January 21, 1986, to Tom Straughan from C. E. Chitty, Chief, Office of Highway Maintenance.)

15. Do you have water wells at all locations?

    Yes.

16. Any water treatment problems?

    None of significance. They all have deep wells.

17. Do you generate power at any locations?

    6 currently (all diesel fuel driven). They generated only as a last resort. Keeping the generator going is more costly than purchasing power.

18. Any solar power in use?

    Not currently.

19. What type of lighting do you recommend
    a. In parking areas? Metal hallide
    b. On building? High pressure sodium
    c. Inside buildings? Recessed fluorescent with vandal resistant covers.

20. Do you provide refrigerated drinking water?

    Yes.

21. Do you provide RV dump stations and, if so, what problems are you experiencing?

    Currently have twenty RV dump stations and are phasing out all 20 of them. They have recently phased out five RV dump stations. They do not have a firmly established timetable, but they feel that they will all shut down within five years. They are trying to make certain that alternate dump stations are provided in the general area before shutting down those in operation.

    RV dump stations are a maintenance and cleaning headache and because of surges in use, it becomes almost impossible to provide for economically designed sewage treatment facilities without experiencing frequent system overloading. The type of chemicals used in RV holding tanks, more specifically, formaldehyde, also presents major problems.

22. Break down the type of sewage treatment facilities in use.
    a. Settling ponds - 25%
    b. Evaporative lagoons - The majority of the settling ponds (all in easternCalifornia) are of the evaporative type.
    c. Septic tanks with leach fields - 70% (one with a "perched" field with 3 to 6 feet of leaching material) - most are seepage pits.
    d. Holding tanks - 2 or 3
    e. Regular municipal sewage treatment system connections - 2 or 3
    f. Packaged plants - 1
23. Do you install doors on the restroom entrances and on toilet partitions? Yes
24. Is any of the restrooms air conditioned? No
25. Do you plan to air condition any restrooms planned for future construction? No
26. How do you ventilate restrooms?
    Some have fans for exchanging air. Air is exhausted through skylights and/or "transom" type screened vents at the top of the wall.
27. How are the restrooms heated?
    Primarily with radiant-heat-type ceiling panels. They do not plan to keep the rooms comfortable, just slightly warmer than outside and warm enough so that plumbing lines and fixtures do not freeze.
28. What is the design life of planned rest areas? 20 years
29. Describe any special features planned for new construction.
    a. Ceramic tile floors and walls in restrooms.
    b. Ceramic tile toilet partitions (metal lath and plaster); stainless steel only as alternate.
    c. Dual restroom facilities, i.e., 2 men's and 2 women's.
    d. Concrete trash receptacles.
    e. Built-in high pressure steam cleaning system to clean ceilings, walls, floors,and fixtures without any hand contact.
    f. Concealed fasteners.
    g. Use heavy duty equipment and construction materials everywhere!
    i. Use wall hung fixtures in restrooms.
    j. Plan the rest area building to be within 350 feet of the parking space.
    k. Use masonry everywhere except on roofs, soffits, facias, benches, sign posts, etc.
    l. Use wood everywhere that people sit.
    m. Waterproof all masonry and all wood with clear waterproofing - initially and every two (2) years.
    n. Make certain the interiors and the exteriorss of the buildings are well illuminated- no dark corners.
    o. Room layouts should ideally be square or slightly rectangular.
    p. Skylights will be used generously and windows eliminated.
    q. Acquisition of surrounding land to be used as a "buffer zone" around the rest areas.
    r. Always provide tw disposal or leach fields for new installations and planto operate one for six months and then operate the other field for six months.
30. Do you contract any maintenance?
    a. Custodial? 50% are currently contracted. Will contract out the remaining rest areas within one (1) year. Each rest area must be attended 16 to 18 hours per day by contract. A responsible person from CAL-TRANS must visit each rest area daily to check on the contractor's performance.
    b. Repairs? Frequently contracted, but normally on an "as needed" or breakdown basis. Repairs are not covered in the typical master rest area custodial service contract. One of the reasons for contracting the maintenance is that it is some instances cheaper and eliminats some real payroll problems because of the state's prevailing wage rate law.

31. Describe your rest area maintenance organization.
    a. The program office with policy making, program review, and compliance responsibilities is in Sacramento.
    b. There are eleven district offices,, organized along geographical lines. These offices handle all administrative aspects of rest area and highway maintenance ,i.e., they develop master specifications and let the contracts for new construction and maintenance contracts.
    c. The district offices are over 2 to 4 maintenance regions, each with a regional maintenance manager.
    d. The regional maintenance manager has 3 to 5 area maintenance superintendents reporting to him.
    e. Each area superintendent is responsible for 4 to 5 maintenance crews. Each crew has a leadman or foreman and they cover 30 to 50 miles of state and federal roads within their area. The crew size varies from 3 to 5 in rural areas to up to 20 in metropolitan areas. The ideal size is seven people. All aspects of highway, rest area, and right-of-way maintenance are handled by these crews.
32. Do you recommend any special enabling legislation or departmental rules? Yes
    a. Provide for state furnished parking areas in popular recreational areas so that cross country skiers, surfers, backpackers, snowmobile enthusiasts, trail bikers, etc. do not dominate rest area parking lots in these areas. The state of California has recently passed enabling legislation for this - charging an annual $10.00 parking fee, which it is felt will pay for the construction and maintenance of these parking areas.
    b. Provide separate state legislation for rest areas that provides for their construction, operation, and maintenance as part of, but separate from, any highway project.
    c. Provision should be made to compensate local community service organizations for their costs incurred in connection with providing services at rest areas, i.e., firefighting, police, ambulance, etc.
    d. Only one state organization should be assigned <u>all</u> police power responsibility for rest areas - not one responsible for parking ramps and roads and a different one for buildings.
33. Are there topics that should be covered that have not been covered by my questions? Yes.
    NCHRP - National Cooperative Highway Research Program. Since federal aid for rest areas is no longer available, there is a study planned to measure the benefits of highway rest areas. A handbook will be developed for use as a means of identifying rest area benefits. The contract is expected to be let in early January, with the results available in 2 years.

DISCUSSION

This section is a brief synopsis of some of the more lengthy discussion topics prompted by my questions.

1. The most costly damage to the state rest areas has been because of fires - almost all of which have emanated from trash receptacles and, for this reason, they really stress the importance of concrete masonry trash receptacles.
2. They stressed the importance of providing a buffer zone around all rest areas as citizens of nearby residential areas are making it very difficult to get improvements, additions, rehabilitations, etc. approved.
3. A means must be provided to compensate local community service organizations for the service they provide.
4. Providing dual facilities for men's and women's restrooms is extremely important. If a unit is down for maintenance when an otherwise non-vandalism-prone individual wants to use it, that person might commit an act of vandalism.
5. Design for ease of maintenance and keep all facilities clean.
6. Maintain all equipment in good working order.
7. Do not just use vandal proof fasteners; conceal all fasteners behind the device or behind trim strips, e.g., mirrors should be bolted to the wall so that they can be removed only from the utility room adjacent to the restroom.
8. Use tile everywhere possible inside restrooms.
9. Make certain that all room interiors are well lighted.
10. Remember to design for heavy duty use. If the rest area is to be in use for 20 years, it can be safely assumed that it will see in excess of twenty million visitors and it should be designed accordingly.
11. The individual managers in attendance all committed to mail me numerous, pertinent items that I requested, such as construction drawings and specifications, cost breakdowns, organization charts, etc.

Rest Area Visit

"During the afternoon of December 19, I visited the "Gold Run" rest area, northeast of Colfax, California, and near the village of Gold Run, California, on U.S. Interstate Highway 80.

The rest area was totally concealed from view from the highway and, as you drove into the area, you were immediately impressed by the beauty of the setting and how well planned the structures were to fit in with their environment.

The restrooms and other facilities were perched on high ground while the setting pond was probably 125 yards away, on low ground and nearly concealed from view by trees, shrubs, bushes, and terrain.

The buildings were very clean - inside and out. Every fixture was in working order. The inside of the restrooms was extremely well illuminated, with attractive, lighter tone colors being used to give one a pleasant feeling. There were no noxious odors and ventilation appeared to be excellent.

The parking areas were absent of any trash as were all picnic areas. It was a pleasant, mild day weatherwise and most people were wearing shortsleeved shirts - without jackets. Usage was not heavy during my visit, but I did count thirty vehicles entering during the hour and a half that I spent there.

There was an RV dump station and even the area immediately around it was clean.

I could see no evidence of vandalism or even any graffiti, any where.

Overall, the facility conveyed the feeling that it was efficiently designed, well maintained, and a functional, pleasant place to visit."

David W. Fowler
Trip Report

Visit with State of Georgia Department of Transportation
February 18, 1986

In Attendance:
Stanley Lord,
Head of Maintenance Division (404) 656-5314

Leon Dobbs,
Engineer, Highway Design

Note:"They" throughout this report refers to State Department of Transportation personnel who were interviewed.

1. How many full service rest areas do you have in operation
   a. on the interstate highway system? There are 18 pairs of rest areas, for a total of 36, not including welcome centers.
   b. on the state highway system? None.
2. How many full service rest areas do you have planned for
   a. the next five (5) years? Four are planned for the future.
   b. the foreseeable future? Included in (a)
3. What is the number of annual users for which you design a rest area?
   The maximum is one million, but the design also depends on the traffic.
4. What is your current criterion for spacing?
   Two hours driving time is the current criterion although in the beginning it was closer than that. Two rest areas have been closed because they were too close to others.
5. Do you maintain records on rest area usage? Yes
   a. What % of vehicles stop? The greatest percentage is about 15 to 20%, near Macon on I-75.
6. Do you have rest areas adjacent to metropolitan area and, if not, why?
   Rest areas are not located near metropolitan areas since the purpose is not to serve the local residents. Problems have been experienced in picnic areas from local residents (not rest areas with comfort stations), as evidenced by litter and congregating teenagers.
7. Do you provide vending machines or any special services at rest areas?
   Currently vending machines are provided in all rest areas. Georgia was one of the first states to provide vending machines, by way of a demonstration project. The state built the building and let contracts to private companies to operate vending machines. The state receives a percentage of revenues and controls costs and products sold. They require the vendor to leave $10.00 in change to reimburse the public for malfunctioning machines. A person has to sign a receipt before taking change. The state performs a study before allowing a price increase of the items sold. The Commission for the Blind has asked to operate the vending facilities, which is their right under law. The State, however, is considering discontinuing vending machine operations since they cannot afford maintenance resulting from vending operations if they do not receive the money. State maps are sold for $0.25 at each rest area. Local government can put up bulletin boards, but no commercial advertising is allowed. Two rest areas have Chamber of Commerce welcome stations to provide local information.
8. Do you have any center rest areas (in the median area) and if not, why?
   No, due to safety reasons. A center rest area is being considered on I-16 in which parking would be separate for each direction, with the comfort station being common for both directions. It will probably not be built.
9. What are your regulations regarding overnight use?
   Overnight parking is not permitted; however, truck drivers who are sleeping are not bothered.

10. Are you considering joint facilities or do you currently have any in operation?
    No, because of stringent legislation which prohibits the sale of gas or other services.
11. Describe the types of vandalism problems that you have:
    (1) Holes in partitions (now use 4-in. CMU with ceramic tile on each side); (2) scratching walls; (3) graffiti; (4) destroying hand dryers; and (5) stealing purses in ladies restroom off of hooks at top of doors. They have moved hooks to midheight of door. More vandalism occurs in restrooms than anywhere else.
12. Do those rest areas with high usage rates have more vandalism?
    No trends are obvious. The State Highway Patrol rides through the rest areas periodically when repeated vandalism occurs. Two internal investigators from the Department of Transportation are available to investigate the causes.
13. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage?
    Not applicable since there are no comfort stations near metropolitan areas.
14. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs?
    Estimated to be 5 to 10%.
15. Do you have water wells at all locations?
    Majority are wells. Some locations use municipal water.
16. Any water treatment problems?
    Samples are tested daily in district labs. Monthly samples are sent to central laboratory. Formerly had separate sources of potable and nonpotable water, but all new rest areas use only potable supply.
17. Do you generate power at any locations? No.
18. Any solar power in use?
    Yes, for hot water at two locations. One is an experimental active system. But solar heating is not cost effective. Many maintenance problems.
19. What type of lighting do you recommend
    a. In parking areas? High pressure sodium because of higher energy efficiency. They are converting mercury vapor fixtures to high pressure sodium fixtures.
    b. On building? Metal halide or high pressure sodium.
    c. Inside building/ In vestibules, recessed mercury vapor. Inside restrooms, fluorescent and natural lighting using clerestories.
20. Do you provide refrigerated drinking water? Yes.
21. Do you provide RV dump stations and if so, what problems are you experiencing?
    Yes. There are not many problems. People clean up after themselves.
22. Break down the types of sewage treatment facilities in use.
    a. Settling ponds? More than one-third (nearly half).
    b. Evaporative lagoons? None.
    c. Septic tanks with leach fields? Less than half.
    d. Holding tanks? None.
    e. Regular municipal sewage treatment system connections?
    Two or three.
    f. Packaged plants? None that are completely self-contained. Some used in connection with settling ponds (precast tanks, etc.).
23. Do you install doors on the restroom entrances and toilet partitions? Yes, on both.
24. Are any of the restrooms air conditioned?
    All are heated; 60% are air conditioned.
25. Do you plan to air condition any restrooms planned for future construction? Yes.
26. How do you ventilate restrooms?
    Clerestory windows can be opened.
27. How are the restrooms heated? Electric.

28. What is the design life of planned rest areas?

    20 years, but they hope buildings last longer than that.

29. Describe any special features planned for new construction.

    Dual facilities, provided by a rolling pull down door in restrooms and the use of two entrance doors. Partitions will be 4-in. CMU with ceramic tile. Floors will be quarry tile. Walls will have 8-ft. ceramic tile wainscot with gypsum board above. Exterior wall construction will be brick veneer on CMU. Some interior framing will be wood. Wood roof framing except steel for longer spans. Concrete picnic tables. Heavy wood or stone seating around comfort stations.

30. Do you contract any maintenance?

    a. Custodial? No.

    b. Repairs? Only on major repair or renovation projects.

31. Describe your rest area maintenance organization.

    Each district has an area manager over maintenance and construction. An assistant manager is in charge of maintenance for several counties. A foreman is in charge of each county. One man under foreman is in charge of water/wastewater and he schedules routine maintenance. Another man is in charge of maintenance of rest areas. Two 8-hr. shifts per day are used. Four attendants are normally used for each rest area (8 for each pair) plus other persons for sewage/water treatment. There are 14 shifts per week, 7 days per week, 40 hours per man. These people also do mowing. Georgia is aware that some other states use mentally retarded groups to provide maintenance, although they do not. A building maintenance crew in each district does building repair, major maintenance, replacement of fixtures, repairing sewage blockage, etc. Someone from the state maintenance office goes out for major problems.

32. Do you recommend any special enabling legislation or department rules?

    No. They are aware that Florida had problems with religious groups locating in rest areas to pass out literature and to solicit funds.

33. Are there any topics that should be covered that have not been covered by my question?

    They use comment cards at each area. Not unusual to get complaints on same day from the same rest area. They receive 30 to 40 per month. Cards first go to district, then to state office. Over half are commendations.

NAME AND ADDRESS _____

_____

_____

DATE _____/_____/_____ TIME _____

DID YOU FIND THE PARK CLEAN? YES _____ NO _____

DID YOU FIND THE RESTROOMS CLEAN? YES _____ NO _____

COMMENTS AND SUGGESTIONS _____

_____

_____

PERSONAL REPLIES TO: George J. Lyons, District Engineer
Georgia Dept. of Transportation
REST AREA P.O. Box 8
52 Tennille, Georgia 31089-0008

INSPECTION TOUR
O F
LOUISIANA REST AREAS

March 26 - March 29, 1986
by
W. T. Straughan

All Louisiana rest areas from the Texas-Louisiana border to Baton Rouge were inspected in preparation for a meeting on March 27, 1986, with the Louisiana State Department of Transportation and Development in Baton Rouge.

While in the Baton Rouge area, subsequent to the meeting, Louisiana rest areas east and south of Baton Rouge were inspected. The return trip to Austin was planned to facilitate the inspection of Louisiana rest areas along Interstate Highway 55 and Interstate Highway 20 in Louisiana. Since this route passed through the state of Mississippi, it was also possible to inspect Mississippi state rest areas along this portion of the route, strictly for comparison purposes. Numerous rest area photographs were taken all along the route.

The first impression one receives upon entering a Louisiana rest area is the pleasing appearance of the setting. It is spacious without being too large. While a typical site has a relatively large number of structures, it is obvious that their placement has been carefully planned. The maintenance of the building exterior and the grounds is excellent.

As one drives into the rest area parking lot near the comfort station, the attractiveness of the exterior of the structure creates a favorable impression. Even though the architectural treatment varies significantly throughout the state rest areas, the exteriors of all rest area structures in each individual rest area are in harmony with that of the comfort station.

At night, the most impressive feature of all Louisiana rest areas is the lighting - especially the lighting of the parking lots, the sidewalks leading to the comfort stations and the general area around the comfort stations (all four sides). In most cases the picnic areas are also well lighted. Outside, one has the feeling that it is daylight. The building entry ways are also well lighted and the building interiors though adequately lighted, do not stand out as exceptional compared to other state rest areas inspected as does the exterior lighting.

The interiors of the Louisiana rest areas while unexceptional are adequate. The comfort stations have exterior doors, floor tile, toilet partitions with doors, ceilings with recessed fluorescent light fixtures, mechanical ventilation, and forced air heating. The interior wall treatment is of two (2) general types:

a) structural glazed tile and
b) epoxy coated concrete blocks (the epoxy is quite thick and provides a surprisingly smooth finish).

The maintenance of the comfort station interior varies somewhat from rest area to rest area dependent upon

a) intensity of use,
b) timing of inspection visit vs. cleaning interval,
c) standards demanded by area management, and
d) rest area attendant performance.

In general, the maintenance was good ,with only one case of just adequate cleanliness noted and two instances of outstanding cleanliness observed. Only two (2) cases of inoperable equipment were observed.

To summarize, the outstanding features of Louisiana rest area facilities are

a) the lighting of the grounds - especially in the vicinity of the comfort stations,
b) the exterior architectural treatment of the buildings,
c) the landscaping, and
d) the size and layout of the sites.

W. T. Straughan
Trip Report

Visit with the State of Louisiana
Department of Transportation and Development
April 16, 1986

In attendance:
Sidney J. Babin, Chief Landscape Architect
Larry N. Hunsinger, Jr., P. E., Road Maintenance Engineer
Norman Kinsella

Various others were contacted by telephone or invited to the meeting to answer questions. One of those contacted was Buddy Pourciau.

Note: "They" throughout this report refers to State Department of Transportation personnel who were interviewed.

1. How many full service rest areas do you have in operation?
   a. on the interstate highway system? 34 total - 17 pairs
   b. on the state highway system? No full service rest areas on the state highway system, but there are numerous roadside parks.
2. How many full service rest areas have you planned for
   a.the next five years? Two pairs along I-49 and one on I-55
   (also planning on renovating many - those that are about 15 to 20 years old.)
   b.the foreseeable future? Several more along I-49.
3. What is the number of annual users for which you design a rest area?
   They use the design guidelines developed by the state of Oregon which their surveys have proven to be realistic and adequate.
4. What is your current criterion for spacing?
   They try to space their rest areas within 45 minutes to an hour driving time apart, but in actually they are probably less than 30 minutes apart on the average along the interstate highway system.
5. Do you maintain records on rest area usage? Yes.
   a. What percent of vehicles stop? 5% to 13% of the ADT, with the low end of the range occurring along roadway segments experiencing a high percentage of commuter traffic.
6. Do you have rest areas adjacent to metropolitan areas and if not, why?
   Yes, but they will not do it again in the future. This is mainly because of vandalism, homosexual activity, and other crimes. They also reported a high vandalism problem wherever a college is located - Hammond - SE Louisiana University - Lafayette - Ruston. The college kids throw late evening parties in them.
7. Do you provide vending machines or any special services at rest areas?
   No, it is against the law in Louisiana. The management does not want them.
8. Do you have any center rest areas (in the median area) and if not, why?
   No, but they do have one in the engineering stages to serve both sides of the interstate to reduce costs, but it will still be a right lane highway exit. An interchange will be built strictly to serve this rest area and nothing else. The rest area is large—in excess of 40 acres — and will be adjacent to a lake which will be provided with boat ramps. This will in effect serve a dual purpose - that of a roadside rest area and a recreational area for fishermen. The lake has already been stocked with fish. It was created by highway crews who by using soil from the area created a hug borrow pit.
9. What are your regulations regarding overnight use?
   It is not allowed by law. It has seldom been necessary to enforce this because it is generally not violated except by truckers sleeping in it in the morning before coming into Baton Rouge. They have never had any real problems with "squatters."

10. Are you considering joint facilities or do you currently have any in operation?

    They have none in operation and they really have not even considered the concept. However, they feel it would have some real merit.

    Normal rest areas run 6 to 10 acres, although they do have some as large as 40 acres.

11. Describe the types of vandalism problems that you have.

    Theft is still a problem - hand dryers, doors, urinals, and toilets are occasionally removed. Vandalism just for the sake of destruction is not really a problem although it is more of a problem in the Lafayette rest area than any other. As long as you maintain the system properly, you will not have significant vandalism problems. The best maintained facility - Holden - has the least vandalism.

12. Do those rest areas with high usage rates have more vandalism? Yes.

13. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage?

    Yes, if close to town, e.g., Lafayette.

14. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs?

    Less than 1.5 percent.

15. Do you have water wells at all locations?

    They have water wells at all but six (6) rest areas where municipal water is purchased.

16. Any water treatment problems?

    They stated that they have no water treatment problems. They do chlorinate at several locations, however.

17. Do you generate power at any locations? No.
18. Any solar power in use? No.
19. What type of lighting do you recommend
    a. In parking area? High pressure sodium.
    b. On building? High pressure sodium.
    c. Inside building? Recessed fluorescent fixtures with vandal resistant covers.
20. Do you provide refrigerated drinking water?

    Only at tourist information centers.

21. Do you provide RV dump stations and if so, what problems are you experiencing?

    RV dump stations are provided at every rest area. The RV dump stations are not separate from the main sewage treatment facilities. They know of no major operational sewage treatment problems associated with the RV dump stations, but they are alert to the possibility and they are watching it closely. They also have not had any incidences of toxic waste dumping.

22. Break down the type of sewage treatment facilities in use.
    a. Settling ponds? Rest areas numbered 10, 11, 13, 33, 34.
    b. Evaporative lagoons? None.
    c. Septic tanks with leach fields? None.
    d. Holding tanks? None.
    e. Regular municipal sewage treatment system connections?

       Only at Lafayette - No. 16.

    f. Packaged plants? Basically, all rest areas are provided with package sewage treatment plants manufactured by Gulfcoast Environmental Services, Pascagoula, Mississippi. Effluent typically goes into the roadside drainage ditch.

       Sewage treatment - Operating attendant makes certain checks and then the Board of Health makes spot checks. Samples are sent to a central laboratory for periodic checks.

23. Do you install doors on the restroom entrances and on toilet partitions? Yes, in all comfort stations.
24. Are any of the restrooms air conditioned?

    Yes. No. 2 and 3, 6 and 7, and at tourist information center buildings. Would strongly recommend against this because of the high operating cost - 100% makeup air must be provided for odor control.

25. Do you plan to air condition any restroom planned for future construction? No.
26. How do you ventilate restrooms?

    Two propeller fans in the ceiling on the men's side and on the women's side, louvers on the doors and operable windows.
27. How are the restrooms heated?

    Forced air systems with the furnace in the mechanical rooms. They have tried slab heating cables, and it is felt that they do a good job; however, they are too costly to repair so that they are being replaced with forced air heating systems as they break down.
28. What is the design life of planned rest areas? 20 years.
29. Describe any special features planned for new construction. They have tentative plans to eliminate toilet stall doors but still provide privacy, e.g., there will not be a "line of sight" between the user and anyone else unless someone enter the occupied space. This is only being considered at this time as a possible cost saving measure. Suggest sloping for RV dumps for better gravity drainage. Using structural glazed tile - all tile construction. They are using lavatories, urinals, toilets with push button operating devices and they are considering electronically controlled fixtures. They recess the flush valves behind permanent construction. Toilet partitions - filled concrete blocks or structural glazed tile, with the latter being the preferred material. Possibly using more maintenance-free exterior materials - brick, vinyl siding, concrete, etc. - not wood - mainly because of mildew problems. They are planning to incorporate skylights or clerestories into the design of future rest area buildings. They would possibly consider a metal roof. They have used wood shingles as a roof covering material. They report excellent success with epoxy coated concrete blocks for a comfort station interior wall covering - 20 mil epoxy coated minimum (3 coats). They claim that this is a very easily maintainable wall surface.
30. Do you contract any maintenance
    a. Custodial? No.
    b. Repairs? Yes - on an as-needed basis; however, most of this type of work is handled either by the rest area attendant or by other district maintenance personnel.
31. Describe your rest area maintenance organization.

    They are organized into nine (9) separate districts with an administration in charge of each district assisted by a district maintenance engineer, and in some districts, a maintenance specialist. Each district is subdivided into parishes each of which is headed by a parish maintenance superintendent to whom the rest area attendant reports (if there are rest areas in the parish). The rest areas are covered seven days a week by two people who typically work 3-1/2 12-hour days per week (each rest area is covered 12 hours per day, 7 days per week). In addition, there exists a head-quarters design review team that periodically inspects rest areas, roadways, drainage, lighting, etc. and files a report for any remedial action required.
32. Do you recommend any special enabling legislation or departmental rules?

    The park attendant should be a higher rated job than it is. It is less than an Equipment Operator I - $713 to $1,115 per month, with 10 promotional steps between the lower and upper figure. Provide uniforms for the rest area attendant. It ensures not only a standardized form of dress but a more distinguishable appearance to the travelling public.
33. Are there topics that should be covered that have not been covered by my questions?

    None.

W.T. Straughan
Trip Report

Visit with the State of Oregon, Department of Transportation
January 3, 1986

In attendance:
Don R. Adams, Maintenance Engineer
Highway Division, Maintenance Section (503) 378-6528

Merlyn Anderson, Landscape Architect
Highway Division (503) 378-3881

Jimmy S. Hansen, P.E.
Highway Division, Bridge Design Section (503) 378-6551

"On Friday, January 3, 1986, I met with three (3) gentlemen serving in various capacities with the Oregon State Department of Transportation. The meeting was prearranged for the purpose of "sharing" helpful information on the design, construction, operation, and maintenance of Oregon State Roadside Rest Areas in response to my direct request.

This is a report of the meeting and subsequent visits to actual Oregon roadside rest areas. The first part of the report is in the form of questions and answers with the questions being those that I had prepared in advance of the visit and the responses being those of one or more of the State of Oregon representatives attending the meeting."

Note:"They" throughout this report refers to State Department of Transportation personnel who were interviewed.

1. How many full service rest areas do you have in operation?
   a. on the interstate highway system? 38
   b. on the state highway system? 34
2. How many full service rest areas have you planned for
   a. the next five (5) years? 2
   b. the foreseeable future? None
3. What is the number of annual users for which you design a rest area?
   It varies - they have a formula based on surveys conducted in 1968, 1969, and maybe one or two in the early 1970's.
4. What is your current criteria for spacing?
   Original criteria - 30 to 50 miles apart (based on a 70 mph speed limit with a stop every 30 minutes) depending upon the availability of acceptable sites for acquisition. On state highways—handled on an "as needed" or demand basis.
5. Do you maintain records on rest area usage?
   No studies conducted during the last ten years.
6. Do you have rest areas adjacent to metropolitan areas and if not, why?
   Two in the Portland area, only. They seem to feel that the need for rest areas is greater in rural or sparsely settled areas, where similar facilities are not available.
7. Do you provide vending machines or any special services at rest areas?
   Traveler Information Gazebos. The State Travel Information Council sells advertising space. These are maintained by the highway maintenance districts. These were originally constructed by the private sector and advertising space sold by the contractor. The Council has taken over and all funds or revenue accrue to the department.
8. Do you have any center rest areas (in the median area) and if not, why?
   There are none and they will not build any because of the traffic safety consequences.
9. Do you have any interstate rest area that does not have a companion rest area on the other side of the divided highway?
   They do have one, on I-205 (Willamette Falls), that does not have a corresponding rest area on the opposite side of the interstate.
10. What are your regulations regarding overnight use?
    18 hours, very infrequently enforced.

11. Are you considering joint facilities or do you currently have any in operation?

    Not considering it. Might be worth considering for state highways, but fundamentally, there have not been any discussions about it.

12. Describe the types of vandalism problems that you have:

    Removal of mirrors

    Stolen light bulbs

    Stolen toilet seats

    Stolen doors

    Drilling of toilet partitions

    Stolen signs

    Stolen toilet bowls

    Pedestrian damage to shrub beds

13. Do those rest areas with high usage rates have more vandalism?

    No. They have less vandalism as a percent of total use.

14. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage?

    They do not really know, but they do figure that the one near Portland (southbound out of Portland on I-5) does have a higher than normal percentage of damage, primarily due to the high level of homosexual activity.

15. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs?

    Rest area maintenance is approximately $1.8 million. Vandalism represents more than 1% but less than 2% of this.

16. Do you have water wells at all locations?

    Deep wells (all over 100 feet) at all except five locations.

17. Any water treatment problems?

    One near Roseburg (Cabin Creek) has a high sodium chloride content. From time to time they put up a sign that states "water is not fit to drink" when aquifer is drawn down. They maintain a routine check. Monthly water samples are taken and sent to the Department of Health for analysis. They chlorinate the water at all locations as a precaution. A chemical analysis is made at every location every three years.

18. Do you generate power at any locations?

    No. They purchase power at all locations. Single phase power is used as many locations where three phase power is available. Convertors are used in only a few areas where large motors are in operation.

19. Any solar power in use? No.

20. What type of lighting do you recommend

    a. In parking area? High pressure sodium.

    b. On building? Incandescent lights on buildings but they really depend upon parking area lighting to illuminate building exteriors.

    c. Inside building? Fluorescent with vandal resistant covers.

21. Do you provide refrigerated drinking water? No.

22. Do you provide RV dump stations and if so, what problems are you experiencing?

    They have twenty RV dump stations.

    RV dump stations are designed with a separate holding tank but effluent joins effluent from the restrooms in most cases. However, some rest areas are designed with separate drain fields for the RV dump stations.

23. Breakdown the type of sewage treatment facilities in use.

    a. Settling tanks - This is the predominant form of treatment. A recent innovation is the use of a pressure distribution system for septic tank effluent. Almost all septic tanks were "undersized" when the rest areas were constructed. They have experienced many failed drain fields because of solids carry over. They have tried to remedy this before by going to low water volume toilets. These are currently in use in three (3) locations and they are very satisfied with this as a low cost solution.

    b. Lagoon - They have one (1) evaporative lagoon at the Boardman rest area where the annual rainfall is "10" or less per year. The lagoon is relatively shallow so that it is not necessary to add oxygen.

They have two (2) facultative lagoons - one at Deadman's Pass Rest Area (near Pendleton, Oregon), and one at the Cow Creek Rest Area (between Roseburg and Grant's Pass, Oregon). The lagoons are 2 to 5 feet deep and consist of three (3) cells at each location occupying about three (3) acres total. The effluent is sprayed over approximately three (3) acres after going through an eight (8) hour holding period after chlorine treatment. The lagoons are designed so that spraying is necessary only during the summer months. The lagoons are all lined with approximately 30 mil PVC over which a 6" deep layer of sand is placed and then covered with a layer of rocks weighting it down. New or rehabilitated rest area design sewage treatment capacity is 10,000 gallons per day.

c. Holding Tanks - They still have numerous sites (estimated at around ten) with holding tanks.
d. Municipal sewage treatment system connections - Six along the interstate highway system.
e. Packaged plants - They had a physical-chemical treatment plant at the Manzanita rest area, but they abandoned it because cost of operation and maintenance was prohibitive (it required a full-time operator). It also was unable to meet the state requirement for BOD and suspended solids.

24. Do you install doors on the restroom entrances and on toilet partitions? Yes.
25. Are any of the restrooms air conditioned?
    No. Only in the tourist information bureaus.
26. Do you plan to air condition any restroom planned for future construction? No.
27. How do you ventilate restrooms?
    Gravity vents on the bottom and exhaust fans near the wall-ceiling junction.
28. How are the restrooms heated?
    Most have ceiling radiant heaters. They have tried cable heat in the floor, but they have discontinued this type of heating system due to operating and maintenance problems.
29. What is the design life of planned rest areas? 20 years.
30. Describe any special features planned for new construction.
    a. Would concentrate on making them more vandal proof.
    b. Use pressure distribution of sewage effluent rather than gravity drain fields.
31. Do you contract any maintenance
    a. Custodial? 10 % to 15% by private contractor (buildings only).
    b. Repairs? On an as needed basis.
32. Describe your rest area maintenance organization.
    There are five (5) maintenance regions headed by a regional maintenance engineer. Each region has three (3) or four (4) district maintenance supervisors. Each district maintenance supervisor has three (3) to eight (8) section crews. Each section crew consists of a minimum of 5 to 6 and a maximum of 20 maintenance workers (with 12 being the normal size). The crews are all headed by a foreman and an assistant foreman and they are typically responsible for 60 miles of highway and right-of-way maintenance.
32. Do you recommend any special enabling legislation or departmental rules?
    Reduce the limit of stay at rest areas. Parking lots tend to become full during peak three (3) day weekend periods.
33. Are there topics that should be covered that have not been covered by my questions?
    Major concern is safety at night at rest areas.

REST AREA VISIT

"During the morning of January 3, 1986, I visited the *Wilamette Falls*, Oregon, rest area located on the southbound side of I-205 near Portland. The rest area was on high ground (above the level of the roadway). It is a small rest area with relatively few parking places. The parking areas were located some distance from the restrooms. The site is very narrow and a housing development abuts the western edge of the property line. There are numerous light stanchions along the walkways leading into the restroom building to provide needed night lighting.

No signs of vandalism were evident and the parking lots and grounds were relatively clean. The restroom maintenance was average.

Within an hour, a visit was also made to the *Baldock* rest area southbound along I-5 south of Portland. This is the largest rest area in the state and consists of two (2) restroom areas. The parking lots are very large and the widely separated grounds are very attractively landscaped, with a tourist information gazebo and a "grove of the states" (the state tree for each state is planted here) to serve the public.

The first restroom facility (in the front part of the property) was well maintained and showed very few signs of vandalism. However, the back restroom facilities were not clean and there was significant evidence of vandalism in the men's restroom. (This back facility was identified as the one attracting more homosexuals than any other in the system).

The Baldock facility has an RV dump station.

The weather was mild (temperatures in the low 50's) with some clouds present. The usage level during both visits was very light."

David Price
Trip Report

Visit with State Department of Highways and Public Transportation

Atlanta District Office and Rest Area Attendants

August 25, 1986

In Attendance:

James Sinclair, Senior Design Engineer (214) 796-2851

Raymond Hudson, District Maintenance Engineer

Bill Ellison, Contractor Employee

ATLANTA REST AREA ATTENDANT QUESTIONNAIRE

1. How many hours per day and days per week is there an attendant present at this rest area? Are there seasonal variations? 12-14 hours/day, every day, 1/2 hour after sunrise to 1/2 hour before sunrise
2. How many attendants are assigned to work at this rest area? One
3. Do you or do any other attendants assigned to this rest area have regular duties at any other rest area or elsewhere in the district? None
4. Are you and the other attendants responsible for rest area landscape maintenance and mowing?
   Yes, except for tree care.
5. Breakdown the approximate percentage of your workday spent
   a. Cleaning the restrooms 15% (~2 hours)
   b. Handling routine repairs of equipment 10%
   c. Picking up trash on the grounds 15%
   d. Mowing and other landscape maintenance 10%
   e. Cleaning after vandalism damage 5%
   f. Repairing vadalism damage 5%
   g. Helping tourists (mechanical repairs etc.) 5%
6. Do you have any plumbing, mechanical, woodworking, or electrical skills? If so, please explain.
   Licensed aircraft mechanic, electrician, qualified in first aid (but there is no first aid kit on the premises.) Baby copperheads have recently been found. Some provision ought to be made either help remove them or assist someone who is bitten.
7. Is the water source at this rest area from a:
   well ___, lake ___, municipal supply X
8. Have you experienced problems with the water system, such as contamination, low pressure, pipes freezing, etc.?
   Very low pressure (after two sprinkler systems are hooked up, the commodes won't flush anymore). Also RV dump backs up in heavy rain.
9. What type of wastewater disposal system is used? municipal sewer ___, septic tank and leach field X, settling pond ___, packaged plant ___, other RV dump
10. Have you experienced any problems with the wastewater treatment system such as toilet blockage and overflows, sink blockage, odors, or other problems? No
11. Are there any water saver toilets installed and if so, discuss any problems you have experienced with them? No. A sprinkling system of some sort is needed with better pressure.

12. Explain the types of vandalism problems you are experiencing at this rest area and describe those that are the most frequent problems. Painting or writing on walls, toilet seat deliberately broken, shingles pulled off roof, built a fire on picnic bench, lots of broken glass, human excrement smeared all over walls and windows.
13. Are there any measures that you feel can be taken to reduce vandalism? Signs warning that a severe fine will be imposed if vandal caught; speed limit signs are needed in the rest area itself. Better response from law officers (one person requested help, waited 3 hours and no one showed up.
14. Do you feel that improvements can be made in safety and security at the rest area in:
    a. lighting No, not since brush from trees removed.
    b. building layout and design The layout of picnic areas and barbecue grills is very good (they rarely get vandalized.)
    c. parking Yes and no; sometimes traffic is too heavy
    d. other 1. Signs; speed limit, litter, vandalism. 2. Wheelchair ramps; lots of handicapped people (especially around telephone and picnic table areas) 3. Signs needed to tell truckers to park in their designated area. 4. Swinging garbage cans are good.
15. What complaints have you heard from rest area users?
    Sometimes people come at night and have parties which disturb others.
16. Are there other items of importance that we have not discussed? Jim duggy brought a steam cleaner out and it helped a great deal. Bill Ellison (rest area attendant) said it probably should be done once a month.
17. General
    a. It is very difficult to schedule operations at the rest area because of: Weather, traffic (to maintain ladies' room it must be totally shut down for a period of time).
    b. This is the first rest area that many tourists see. Since tourism is Texas' #1 industry, it is important that tourists enjoy the time they spend in the State.

ATLANTA DISTRICT OFFICE QUESTIONNAIRE

1. How many full service rest areas do you have in operation?
    a. on the interstate highway system? 3 on I-20 (1 at State Line, 2 west of Marshall); 3 on I-30 (1 at State Line, 2 west of New Boston)
    b. on the state highway system? One on US 59 south of Atlanta, Texas.
2. How many full service rest areas have you planned for
    a. the next five (5) years? Plan one additional rest area in Panola County on US-59
    b. the foreseeable future? Same as above.
3. What is your current average spacing between rest areas? 30 miles
    a. How many miles of interstate highway in your district?
    b. Is the number of rest areas in your district.
       about right ____, too few X , too many ____
4. Do you maintain records on rest area usage? No
    a. What % of vehicles stop? Information is not available.
5. Do you have rest areas adjacent to metropolitan areas and if not, why? One adjacent to Texarkana on I-30.
6. Do you provide vending machines or any special services at rest areas?
    At one pair of rest areas located west of Marshall.
7. Describe the types of vandalism problems that you have: Mostly writing and painting. Some problems with homosexuals drilling holes in partition walls and using rest area as a gathering place (this was a greater problem in the past than it is now).
8. Do those rest areas with high usage rates have more vandalism? Yes, generally.
9. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage? No
10. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs?

11. What is your source of water? wells 3 served by wells , lake none , municipal supply 4
12. Any water treatment problems? No
13. Do you generate power at any locations? No
14. What type of lighting is used in the rest areas in this district? Is it adequate?
    a. In parking areas? Mercury vapor and high pressure sodium vapor — adequate
    b. On buildings? Mercury and high pressure sodium vapor — need more light behind comfort station in some cases.
    c. Inside buildings? Incandescant and high pressure sodium vapor-adequate-lights should burn day and night.
15. Do you provide RV dump stations and if so, what problems are you experiencing?
    RV dumps at all interstate highway locations. None at US 59 rest area. Problems with hoses cut, valves broken, drains stopped by various items (such as cans). Also there appears to be dumping by commercial septic tank cleaning companies (this, of course, overloads the system and produces serious temporary problems with package plants.)
16. Breakdown the type of sewage treatment facilities in use
    a. Settling ponds? No
    b. Evaporative lagoons? No
    c. Septic tanks with leach fields? No
    d. Holding tanks? No
    e. Regular municipal sewage treatment system connections?
    Two locations (Waspen and Texarkana)
    f. Packaged plants? Three locations
17. Do the rest areas have doors on the restroom toilet partitions? Women's side only.
18. Are any of the rest area restrooms heated? No
19. Describe any special features desired for new construction. Comfort station should be completely roofed — not exposed to elements. We notice in other states that the nicer the facilities, the better the public treats them. RV dump stations troublesome from a maintenance and vandalism point of view. For example: objects placed in RV dump stations, such as coke cans, which don't decompose or clog lines. Sometimes sewage is spilled. Water hydrant freezes. Oil or other contaminents are put in.
20. Do you contract any maintenance?
    a. Custodial? Yes, at all locations.
    b. Repairs? No.
21. Describe your rest area maintenance organization.
    Local maintenance by district personnel
22. What measures do you recommend to improve safety and/or security at rest areas in your district?
    Good lighting at all facilities.
23. Do you recommend any special enabling legislation or departmental rules? Not at this time.
24. Are there topics that should be covered that have not been covered by my questions? No.

David P. Whitney
Trip Report

Visit with State Department of Highways and Public Transportation
Odessa District Office and Rest Area Attendants
August 22, 1986

In attendance:

Russel Neal, District Maintenance Engineer (915) 332-0501

Bob Norwood, District Utility Crew Foreman, Maintenance Construction Supervisor III

Winfred McQueen, McKinney Maintenance Construction Foreman III

Troy King, Ft.Stockton Maintenance Construction Supervisor III

Timothy Zawerucha, Midland Maintenance Construction Supervisor III

Louis Phelps*, Andrews Maintenance Construction Foreman III

Merle Miller*, Monahans Maintenance Construction Supervisor III

*These men could not make the meeting but are the supervisors of their respective comfort stations in the event of the need for any further questions.

ODESSA REST AREA ATTENDANT QUESTIONNAIRE

1. How many hours per day and days per week is there an attendant present at this rest area? Are there seasonal variations? 7 days/week, 8 hours/day , 52 weeks/year. Except Andrew: 4 hours/day, 7 days/week, 52 weeks/year
2. How many attendants are assigned to work at this rest area?
   At least 1 attendant for each side of highway
3. Do you or do any other attendants assigned to this rest area have regular duties at any other rest area or elsewhere in the district? 3 days/week, Tim and Bob have average of 1 or 2 people per day.
4. Are you and the other attendants responsible for rest area landscape maintenance and mowing?
   Yes, but SDHPT replaces shrubs.
5. Breakdown the approximate percentage of your workday spent *
   a. Cleaning the restrooms 40% of the time spent by the contractor's men
   b. Handling routine repairs of equipment 10% of the SDHPT maintenance/repair crew
   c. Picking up trash on the grounds 40% of the time spent by the contractor's men
   d. Mowing and other landscape maintenance 20% of the time spent by the contractor's men
   e. Cleaning after vandalism damage 20% of time by the SDHPT-Midland Office's maintenance/repair crew at that station. (absorbed into a, b, c, d for other stations)
   f. Repairing vadalism damage average 2 days per month
6. Do you have any plumbing, mechanical, woodworking, or electrical skills? If so, please explain.
   SDHPT people involved 7% of their time on maintenance.
7. Is the water source at this rest area from a well Most, lake _____, municipal supply Midland
8. Have you experienced problems with the water system such as contamination, low pressure, pipes freezing, etc.? Only for power outages (Rural Cooperative)
9. What type of wastewater disposal system is used?
   municipal sewer _____, septic tank and leach field all (Midland has sump to field), settling pond _____, packaged plant _____, other _____
10. Have you experienced any problems with the wastewater treatment system such as toilet blockage and overflows, sink blockage, odors, or other problems? 2 or 3 times per year back flow. Odors are frequent from drain fields.
11. Are there any water saver toilets installed and if so, discuss any problems you have experienced with them? The only problems were related to learning curve on air pressure adjustment. Needed higher pressure than contractor specified.

12. Explain the types of vandalism problems you are experiencing at this rest area and describe those that are the most frequent problems.
    Writing on the walls, mirrors lost, barking trees, building fires, stealing everything
13. Are there any measures that you feel can be taken to reduce vandalism? No, only police presence. Mineral oil on painted cinder block reduces writing on walls. Ink and marks won't stick to oil impregnated surfaces.
14. Do you feel that improvements can be made in safety and security at the rest area in:
    a. lighting Vandal proof (resistant) light fixtures on buildings and inside
    b. building layout and design Floor drains into trench drains
    c. parking Not enough angle to slow traffic as it passes through
    d. other Water fountains and jug fillers into french drains. Better designed(more maintenance space around water fountains). Drinking fountains outside the building. Blow the french drains clean frequently.
15. What complaints have you heard from rest area users?
    Closed down stations due to electrical outages. Open arbors
16. Are there other items of importance that we have not discussed?
    Truck curbs on outside lanes (many stations curb the drive only on the inside lanes to reduce tendency to run onto sidewalks or into Buildings.

* SDHPT preferred to report on an average work week rather than on a work day basis. Maintenance/repair crew's responsibilies also include all other SDHPT controlled buildings and grounds in the district.

ODESSA DISTRICT OFFICE QUESTIONAIRE

1. How many full service rest areas do you have in operation
    a. on the interstate highway system? 4
    b. on the state highway system? 1
2. How many full service rest areas have you planned for
    a. the next five (5) years? None in 5-year schedule
    b. the foreseeable future? None
3. What is your current average spacing between rest areas? 50-70 miles (originally planned 35-50)
    a. How many miles of interstate highway in your district? 320 miles
    b. Is the number of rest areas in your district
    about right OK, too few ___,too many ___
4. Do you maintain records on rest area usage? No
    a. What % of vehicles stop? No idea
5. Do you have rest areas adjacent to metropolitan areas and if not, why? Very few. (Midland only. It is not too accessible: only by I-20). All stations have low traffic volume
6. Do you provide vending machines or any special services at rest areas? No
7. Describe the types of vandalism problems that you have: Gays drilling holes, writing on walls, breaking fixtures, pulling mirrors off walls
8. Do those rest areas with high usage rates have more vandalism? Just the opposite is true on a percentage use basis, but the repair costs per month are higher.
9. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage?
    No, opposite
10. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs? Less than 10%
11. What is your source of water?
    wells mostly, lake____, municipal supply Midland Only
12. Any water treatment problems? Typical septic tank and drain fields problems. Overflowing, back flow, stoppages
13. Do you generate power at any locations? No

14. What type of lighting is used in the rest areas in this district? Is it adequate?
    a. In parking areas? Mercury vapor. Yes, it's adequate.
    b. On buildings? None
    c. Inside buildings? Incandescent mostly, some flourescent
15. Do you provide RV dump stations and if so, what problems are you experiencing?
    Yes. Midland and Monahans. Nothing in particular.
16. Breakdown the type of sewage treatment facilities in use
    a. Settling ponds? None
    b. Evaporative lagoons? None
    c. Septic tanks with leach fields? 5
    d. Holding tanks? None
    e. Regular municipal sewage treatment system connections? None
    f. Packaged plants? None
17. Do the rest areas have doors on the restroom toilet partitions? None on men's, some on women's (where they have not been broken off).
18. Are any of the rest area restrooms heated? None
19. Describe any special features desired for new construction.
    Could use better truck parking, preferrably off to one end separate from cars but close to comfort station.
20. Do you contract any maintenance?
    a. Custodial? Yes, clean up only.
    b. Repairs? No, doneonly by SDHPT forces
21. Describe your rest area maintenance organization.
    Contractor does custodial work. SDHPT Districts building utilities service crew for repairs, including painting. Resident office forces take care of small repairs.
22. What measures do you recommend to improve safety and/or security at rest areas in your district?
    Better lock-up methods for maintenance storage rooms
23. Do you recommend any special enabling legislation or departmental rules? Better laws to prevent roadside vendors. Now only "NO PARKING-TRAFFIC HAZARD" can be used legally to remove vendors.
24. Are there topics that should be covered that have not been covered by my questions?
    No one could suggest anything which has not already been covered.

David P. Whitney
Trip Report

Visit with State Department of Highways and Public Transportation

San Antonio District Office and Rest Area Attendants

August 21, 1986

In Attendance:

Joe Stockert, Senior Maintenance Engineer (512) 696-1110

Allen Boenic,Seguin Roadway Maintenance Supervisor III

Nolan Reinhard, Seguin Maintenance Technician II

David Price, Research Engineer, The University of Texas at Austin,

Center for Transportation Research (512) 338-0522

Additionally, the custodial contractor's comfort station attendant, Jimmy, was at the station, and he provided us with some of the information . Unfortunately we did not get his last name.

SAN ANTONIO REST AREA ATTENDANT QUESTIONNAIRE

1. How many hours per day and days per week is there an attendant present at this rest area? Are there seasonal variations? 7 days/week, 8 hours/day, 52 weeks/year.
2. How many attendants are assigned to work at this rest area? 2 permanent contract, 1 state man floats over 2.
3. Do you or do any other attendants assigned to this rest area have regular duties at any other rest area or elsewhere in the district? 2 roadside parks & weigh stations, litter, highway debris
4. Are you and the other attendants responsible for rest area landscape maintenance and mowing? Contract maintenance
5. Breakdown the approximate percentage of your workday spent
   a. Cleaning the restrooms 2 hours/ day
   b. Handling routine repairs of equipment 1 hour/month
   c. Picking up trash on the grounds 4 hours/day
   d. Mowing and other landscape maintenance 4 hours/week
   e. Cleaning after vandalism damage 3 to 4 hours/month
   f. Repairing vadalism damage 3 to 4 hours/month
6. Do you have any plumbing, mechanical, woodworking, or electrical skills? If so, please explain.
   Shop people perform repairs (State Department of Highways and Public Transportation building facilities personnel)
7. Is the water source at this rest area from a:
   well _X_, lake _____, municipal supply _____
8. Have you experienced problems with the water system such as contamination, low pressure, pipes freezing, etc.?
   Low pressure with each electrical outage. Freezing in Bexar county station.

9. What type of wastewater disposal system is used?
   municipal sewer _____, septic tank and leach field _____, settling pond _____, packaged plant _____, other holding tank
10. Have you experienced any problems with the wastewater treatment system such as toilet blockage and overflows, sink blockage, odors, or other problems? No, not generally.
11. Are there any water saver toilets installed and if so, discuss any problems you have experienced with them? None
12. Explain the types of vandalism problems you are experiencing at this rest area and describe those that are the most frequent problems. Writing on the walls, removing signs, removing or breaking mirrors
13. Are there any measures that you feel can be taken to reduce vandalism? Day and night patrolman
14. Do you feel that improvements can be made in safety and security at the rest area in:
    a. lighting OK now
    b. building layout and design OK now
    c. parking OK generally, but separate parking areas for trucks, and more parking temporarily to account for repairs — shut down of Bexar (county) station.
    d. other Trailer dump tank at all comfort stations
15. What complaints have you heard from rest area users?
    looking for showers, bums trying to spend the night in the rest area especially inside the restrooms.
16. Are there other items of importance that we have not discussed? Litter collection and disposal should be taken care of by contracts, better (nearer) highway crossovers accessable to contractors. Floor drains should go into ditches rather than sewage treatment plant. Avoid oil in trailer dump.

SAN ANTONIO DISTRICT OFFICE QUESTIONAIRE

1. How many full service rest areas do you have in operation
   a. on the interstate highway system? 3 on I-10, 2 on I-35
   b. on the state highway system? None
2. How many full service rest areas have you planned for
   a. the next five (5) years? One on I-37
   b. the foreseeable future? None (would like one in Artesia Wells)
3. What is your current average spacing between rest areas? Approximately 60 miles
   a. How many miles of interstate highway in your district? 411 miles
   b. Is the number of rest areas in your district
      about right _____, too few needs at least one more, too many _____
4. Do you maintain records on rest area usage? None
   a. What % of vehicles stop? No way of knowing
5. Do you have rest areas adjacent to metropolitan areas and if not, why? Yes. Within 60 miles of downtown. Some less than 30
6. Do you provide vending machines or any special services at rest areas? At Comal County on I-35 (not maintained by SDHPT). Contract through Austin (for the blind).
7. Describe the types of vandalism problems that you have: Partition panels drilled out and broken. Mirrors broken up. Lavatories broken up. Scratching initials. Maps and map cases stolen.
8. Do those rest areas with high usage rates have more vandalism? Not particularly
9. Do rest areas near metropolitan areas experience more vandalism as a percentage of the total usage?
   Yes

10. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs? Less than 5%
11. What is your source of water? wells mostly, lake _____, municipal supply Comal-Seguin
12. Any water treatment problems? None
13. Do you generate power at any locations? No
14. What type of lighting is used in the rest areas in this district? Is it adequate?
    a. In parking areas? Mercury vapor, yes it is adequate
    b. On buildings? Mercury vapor, yes it is adequate
    c. Inside buildings? Flourescent, yes it is adequate
15. Do you provide RV dump stations and if so, what problems are you experiencing?
    Some do. Kids putting rocks in them.
16. Breakdown the type of sewage treatment facilities in use
    a. Settling ponds?
    b. Evaporative lagoons?
    c. Septic tanks with leach fields? Kerrville
    d. Holding tanks?
    e. Regular municipal sewage treatment system connections? New Braunfels
    f. Packaged plants? Complete treatment plant, Seguin
17. Do the rest areas have doors on the restroom toilet partitions? Yes
18. Are any of the rest area restrooms heated? Yes, the newest ones, in Kerrville and in Luling
19. Describe any special features desired for new construction. full roof decks (to cover interior from rain)
20. Do you contract any maintenance?
    a. Custodial? Yes, on all of the comfort stations.
    b. Repairs? SDHPT does major repairs, electrical, plumbing and structural. Contractor paints with SDHPT supplied paints.
21. Describe your rest area maintenance organization.
    7 days/week, 8 hours/day, 52 weeks/year. Contract system replaced 3 full-time people so that those 3 could work on more vital State Department of Highways and Public Transportation maintenance problems.
22. What measures do you recommend to improve safety and/or security at rest areas in your district? Nothing under present system. Needs manned facility at night but still would be dangerous.
23. Do you recommend any special enabling legislation or departmental rules? If advantages outweigh disadvantages.
24. Are there topics that should be covered that have not been covered by my questions? None

APPENDIX C. SUMMARY OF STATE RESPONSES TO TELEPHONE SURVEY QUESTIONNAIRE

INTRODUCTION

In order to determine some fo the current general trends in roadside rest area design and maintenance practices, a telephone survey of the resident rest area experts of twelve other states' highway departments was conducted.

The Questions and Synopsis of Answers

The questionnaire consisted of fourteen primary questions, several of which had two or more secondary questions. All the states contacted, however, were very cooperative, and the questionnaire typically took less than an hour to complete.

Question 1: With regard to the spacing of rest areas along your highways:

a. What criteria were used to determine the spacing of rest areas when the program was initiated?

Of the twelve states interviewed, six explicitly stated that they initially followed the guidelines of the original Federal Highway Administration (FHWA) rest area report. This report, in fact, called for rest area spacing of approximately 30 miles. The six states in question, however, had interpreted the recommended spacing at anywhere between 20 to 25 miles and 45 to 60 minutes driving time. One state's representative could not recall the exact policy, and the remaining three all interpreted the recommendation to require a spacing of 30 to 40 miles. Four other states also reported originally aiming for a spacing of 30 to 50 miles, but did not explicitly refer to the FHWA report as the origin of this policy. Of the two remaining states, one reported reliance on an old ASSHTO guideline calling for spacing of 40 to 60 minutes driving time, although the exact document title was not known to the state official. The twelfth state admitted having no coordinated rest area plan, and could say only that the decisions were made in the late 1960's and the end result was an average spacing of 100 miles.

b. Was it (the original target spacing) successfully achieved on all sections of interstate highways in the state?

Four states reported full achievement of their original spacing plan. Four other states reported that the full system as originally conceived has not yet been completed, but that those areas still needed for completion of the network (typically only a few sites) were in either the planning or construction phases. Three states reported that spacing plans were altered to a 60 to 70-mile spacing (sometimes expressed in terms of driving time) since the original scheme was developed, and that the new work based on this spacing had been completed. As indicated above, the remaining state (without the coordinated plan) had achieved a spacing of one rest area every 100 miles.

c. What criteria are you using to determine the spacing of rest area projects currently under consideration?

Six states reported that they were satisfied with the current policy. Five of these were among those originally using a 25 to 40 mile spacing, and the sixth was the state following the AASHTO guidelines mentioned earlier. One of these states had to answer this question hypothetically, as there is no more new interstate highway construction planned in that state.

Five other states had all expanded their required spacing to approximately one hour driving time (60 to 70 miles). The last state expressed no specific current policy but stated that four information centers were planned and that in the future they would probably reduce the number of rest areas, as towns along the interstate like to have the business. This, again, was the state without a well-defined spacing plan.

d. Are you happy with these current criteria, or do you feel that they need replacement or modification? (If so, please explain.)

Only one sate was dissatisfied with its current policy. The state in question had completed its whole system based on a 35-mile spacing criteria, and the state official felt that this spacing was too close.

One state took this opportunity to express the concern that they had great difficulty obtaining funding for rest areas after the interstate to be served had been completed. This sentiment was reflected in the comments of another state's representative, who suggested that completion of their rest area system was greatly facilitated by incorporating rest area construction into the construction schedule of the highway itself.

Question 2: What method do you use to determine the size and facilities necessary at a given rest area?

Five states responded to this question by stating that the initial FHWA report also included recommendations for this aspect of design which the states in question employed. Although the report consists mostly of almost raw survey data, one state was able to specify that the implications of these data were that 13% of the Average Daily Traffic (ADT) stopped at a rest area and that all of the average 2.3 people per car used the facilities. In addition, the FHWA recommended a twenty-year design life. Another of these five states stated that this FHWA formulation tended to overestimate the actual required size of the necessary facilities. As a result, this state typically used the FHWA recommendations and they down sized the result with FHWA approval (which has never yet been withheld.)

Minnesota reported using an in-house design formula developed in the late 1970's. This is now an FHWA special publication (number SP-81-1). Another state reported using a hybrid combination of the original FHWA recommendations and the new Minnesota recommendations. In addition, one of the states that has built its present rest areas using the original FHWA formulae stated that any future construction would use the Minnesota formulations. Finally, one state reported using the well known Oregon State design formulae.

The four remaining states all reported using in-house design formulations. Three of these states had essentially a single standard that was used at all sites. One state reported no problems with this practice, another relayed problems of consistent under design, while the third reported problems of both overuse and underuse depending on the specific site. The remaining instate formulation was based on the ADT, and this turned out to be quite similar to the old FHWA formulations, with variations based, according to the official, on some limited state-specific traffic data.

Question 3: Do your rest areas include dual rest room facilities, to assure constant access by the public?

Seven states reported that none of their rest areas incorporated this feature. One of these states felt that this would be a good idea but apparently had not considered it before. Two other states avoided the need to shut down facilities by employing relatively equal numbers of male and female attendants for rest areas, which permits each rest room to remain open for partial use during the cleaning phase.

Four states indicated that while their older facilities did not include this feature, the newer ones did. In fact, one state termed this design feature "*a must.*" Another state reported that the concept was excellent, but their specific design was flawed in such a manner that it caused confusion as to the location of the facilities. As a result, this state tended to solve the cleaning shut-down problem by employing both male and female attendants.

The remaining state indicated that their site specific design policy did not mandate this feature, and it was included in some rest areas but not others. No mention was made of the relative success of these two "types" of rest areas.

Question 4: What is the typical land area occupied by a rest area (acres)?

Eight of the twelve states interviewed reported current rest area sizes averaging between 10 and 20 acres. A ninth reported a current average size of 5 acres but felt that this was too small and that a 10 to 15-acre site would be more appropriate. A tenth state reported the same lower bound of 10 acres but expanded the upper bound to 30 acres.

The two remaining states reported typical rest areas of less than 5 acres. In both cases, the indication was that very narrow right-of-ways lead to compact and often linear designs, which present layout and functional problems to the user's safety and, in particular, result in significant rest area ingress and egress problems.

Question 5: With regard to rest area maintenance operations.

a. How many hours per day and days per week are custodial personnel present at a typical rest area?

To this question, all twelve states reported maintenance service was provided on site seven days per week. The amount of coverage per day did vary to some degree. However six states reported maintenance on site from 16 to 18 hours per day. One of these states, however, stated that 24-hour maintenance was provided at its newer rest areas. Another two of these states also supply a 24-hour maintenance presence at their welcome center facilities.

Only one state reported 24-hour maintenance service at all of its rest areas, saying that they had found the old practice of 8 to-16 hour coverage to be inadequate.

Three of the remaining states reported that on-site maintenance was provided for 12 to 14 hours per day. Finally, the remaining two states supply on-site maintenance for an average of only 8 hours per day. It should be pointed out, however, that one state which had reported 16-hour per day coverage, and another which reported 12 hour-per day coverage reduced their service to 8 hours per day during winter months.

Finally, it should also be noted that one of the states that used 12-hour coverage all year around did hire extra people to increase crew size during the summer tourist season.

b. Do you employ all your maintenance personnel directly, or are some or all of them contracted through private custodial service team?

Five of the twelve states contacted used department employees exclusively in rest area maintenance. Two of these states, however, were seriously considering trying privately contracted maintenance services at the time of the survey. Four other states used a combination of private and departmental personnel. In all four cases, only one rest area was either privately or departmentally serviced. The use of both types of forces typically resulted from a departmental policy which provided that the choice be made at the district level. Of the remaining three states, one employed handicapped workers (from sheltered homes for the mentally handicapped) contracted through a private corporation representing these people exclusively. Another contracted retired workers through a similar corporation. Finally, the remaining state used a combination of departmental employees and mentally handicapped workers.

In all cases where combined forces were used, it was felt that the handicapped or retired workers provided equal or superior service to that provided by departmental workers, and at a lower cost. Both states that contracted handicapped workers had only the highest praise for the dedication of the workers and the quality of the service they provided. This was thought to be due to two factors. First, the handicapped (and retired) workers seemed to truly appreciate the opportunity to contribute to society, an opportunity which they are often denied. Second, departmental workers viewed rest area maintenance as the "low spot on the totem pole", and so had little or no pride in their work.

c. If you employ them directly, do you supply them with uniforms or, if you contract them privately, do you require that they be uniformed?

All twelve states reported some degree of uniformity in appearance. However, in seven of those states, this applied of only to shirt, cap, hard hat, name tag, orange vest, or some other relatively small items. Three other states provided full uniforms (one required contractors to provide them) and required their use. Another state provided badges in addition to uniforms (also requiring their use). Only one state did not require the use of any uniform or other standard article of identification. However, this state did provide a uniform (optional) to its attendants. The official who was interviewed felt that the attendants prefer to wear the uniform rather than personal street clothes because the nature of the work frequently results in permanently soiled clothes.

d. How many custodial personnel are typically involved in the maintenance of a rest area?

Six of the twelve state representatives questioned indicated that a typical rest area crew consisted of only one person at a time, and one of these states assigned a pair of rest areas (both sides of the highway) to this single worker. Three of these states did indicate, however, that during busier times of the year, the crew size was increased to two or three people.

Four other states reported typical crew sizes of two people, but two of these reduced the crew to one during the night time portion of their service period. Of the two remaining states, one reported a typical crew size of two to five people (over the entire 18-hour service period) and the other employed three people over their usual service period (two shifts) but would like to expand this to five people in order to provide more complete and successful 16-hour service.

e. Do these custodial personnel also handle grounds' maintenance, or is that done separately?

All twelve states reported that the regular maintenance crew also handled routine grounds' maintenance. Three states did indicate that extra grounds help was hired during the summer or for special projects such as major landscaping. On the other hand, one state reported that regular rest area maintenance crews were often called upon to assist with highway snow removal during snow emergencies.

f. How frequently do you steam clean the rest rooms?

None of the states interviewed employed steam cleaning of rest rooms at the time of the survey. Only two states mentioned any specific feelings with regard to this procedure, and these were quite opposite. One state was considering instituting this procedure, while the other explicitly stated that steam cleaning did not promise to be a viable solution.

Question 6: Do you now, consider, or have you ever considered, constructing rest areas as joint use operations in cooperation with the private sector (restaurant or convenience store chains, for example?)

It is illegal for a state agency to be involved in for-profit operations on an interstate right-of-way. Nine states cited this reason for not taking advantage of this type of operation. Three of these states did indicate a great interest in the concept if it were made legal on the interstate. Although two of these states also had state laws specifically prohibiting operating any business for profit at any rest area, the remaining seven states seemed to shun the idea simply because it would mean a loss of federal rest area assistance funds (even though these funds would be replaced entirely by private sector funds in an off right-of-way joint-use operation). Two of these seven states did indicate that their rest area system was completed, and so they could not justify replacing already constructed facilities.

Although no private-sector joint-use operations were reported, one state did report rest areas shared with the state tourist bureau, another reported rest areas operated jointly with local chambers of commerce, and a third reported both these types of "joint use" operations.

Finally, one state representative did relay the fact that, on the turnpike in his state, the rest areas were often joint use operations, usually in cooperation with one of two major restaurant chains. This policy is an excellent example of the general attitude toward joint-use operations, that they are an excellent idea, but there are too many barriers to their convenient use on interstate highway systems.

Question 7: What types of construction materials do you use in your rest area interiors? Specifically, we are interested in wall and floor coverings, toilet partitions and doors, ceiling materials, and rest room fixtures?

All twelve states contacted used porcelain tile wall covering. In addition, either quarry tile or ceramic tile was used for rest area floors in eleven states. The twelfth highway department reported the use of concrete rest room floors.

With regard to toilet partitions, eight states presently use stainless steel, but one of these was converting to the use of precast concrete walls, and another suggested the use of concrete but was not yet in the process of a conversion. On the other hand, another of these eight states related the use of aluminum partitions but reported no significant vandalism difficulties.

Of the remaining states, one constructed toilet partitions of solid concrete, another of concrete block, and another used solid plastic toilet partitions.

The subject of ceiling materials seemed to be of little concern to most states. The few who could actually specify the most commonly used material usually described tempered hardboard, acoustical tile, gypsum board, or some other similar material. Simply put, ceilings are not common targets for vandals. The only really unusual ceiling feature mentioned was the use of a drop panel ceiling concealing radiant heat panels.

The final issue of fixture types may be one of the most important decisions to be made. Basically, there are two decisions to be made: first, the choice between wall hung and floor mounted fixtures, and, second, the choice between stainless steel (or occasionally aluminum) and porcelain (vitreous china) as the material from which the fixtures are made.

Most states did not express a strong preference for wall hung versus floor mounted fixtures. Four states did report a predominant use of wall hung fixtures, but one of these was switching to floor mounted fixtures due to decreased vulnerability to vandalism.

The material issue was decided heavily in favor of the porcelain fixture. Ten of the twelve states canvassed reported use of porcelain fixtures. The remaining two states used stainless steel "prison type" fixtures. One important point of interest is that one of the states that used porcelain fixtures said that stainless steel fixtures would be better from a maintenance standpoint but that the aesthetic preferability of the porcelain fixtures had outweighed this advantage.

Question 8: What types of construction materials do you use for the exteriors of current rest area projects, specifically siding, roofing, exterior doors, etc? Do you include special features such as skylights, clerestories, or energy conserving materials? Also, are men's and women's rest rooms directly adjacent, or are they separated by a mechanical room or other facility?

Throughout the survey, every state specifically cited that the majority of the vandalism involved the interior of the rest area. As a result, there was little concern, other than aesthetic, for the exterior materials used. Ten of the twelve states contacted reported primary use of either brick of native stone veneer. One of these states also reported heavy use of wood veneer, and another the use Spanish tile and stucco for some architectural styles. The remaining two states specifically indicated that siding was determined entirely in accord with the architectural style that had been chosen for the specific rest area.

Only one of the twelve states still used an open air roof design at the time of this survey. Of the remaining states, one used composition roof shingles, one used either asphalt or wood shingles, two used flat tar and gravel roofs. Two other used fiberglass shingles, and two used flat built-up roofs (one sheathed with copper). The remaining four states were either unable to specify a material (indicating the relative lack of problems associated with roofing materials) or stated that the decision on roofing material was entirely based on the architectural design of the rest area.

The representative of only one state could indicate a predominantly used exterior door material, and the design specified was for a urethane filled plastic faced door. This, combined with the fact that no other state specified a door material, indicated the same relative lack of concern with exterior vandalism or materials failure.

The idea of natural lighting within a rest area was very popular. Seven of the twelve state representatives interviewed indicated extensive use of clerestories and skylights. Five of these preferred skylights and two had a preference for clerestories. One of the states using skylights did stress the importance of design against hail damage. Both states that had chosen clerestories had special comments. One said that the choice had been made because vandals seemed to like to attack skylights. The other commented that clerestories were accompanied by great heat losses. Nevertheless, the use of natural light was thought to be very beneficial.

Finally, on the issue of rest room separation, every single state reported some separation of the men's and women's rest rooms. The most common devices were pipe chases and mechanical rooms, with four states each. Only one state reported a lobby between the two rest rooms, although one other state was planning to convert its service area to a lobby staffed by the state tourist bureau. One other state said that only its newer facilities were built with separated rooms. Finally, one state claimed to use several different floor plans. While this state's representative was not positive, he did believe that most of those designs did incorporate some type of room between the two rest rooms.

Question 9: Have these choices of building materials been greatly affected by problems with vandalism? If so, have the materials been successful at curbing those problems?

All twelve states reported that virtually all interior materials choices were based on combating vandalism. Fortunately, all twelve states also reported that vandalism had been reduced to "acceptable" levels. The following specifics and exceptions were noted:

1. In one state, the use of stainless steel fixtures had essentially eliminated what was a once-a-week fixture replacement problem.
2. Steel toilet partitions were found ineffective at stopping drilling in one state.
3. In one state, epoxy paint on walls was used to replace tile, which was being broken.
4. The presence of a caretaker was the greatest discouragement to vandalism, according to one state's representative.
5. The state reporting the most concern for vandalism conceded that it occurred primarily during the 14 hours that there was no caretaker present.
6. One state reported stall divider drilling in the "homosexual pattern" (drilling between urinal and first toilet stall only). The problem was solved by installing a 4-inch thick ceramic tile block wall at this location only.

Question 10. Do you provide RV dump stations at rest areas? If so, what type fo sewage disposal system is most commonly used, and is that system usually separate from the system(s) for the rest rooms in the comfort station?

Six states stated that they did not provide RV dump stations at rest areas, but only three states gave specific reasons. One state said that it had provided them in the past, but that they resulted in damaged to the sewage treatment system and a dual sewage treatment system was cost-prohibitive. The second state felt that facilities at camp grounds were sufficient, while the third feared abuse of the facilities through dumping of toxic wastes.

Four other states reported that RV dump stations were provided at most of their rest areas. Three of these reported that they caused many problems. One of these states reported that it had removed the dump stations once, but a public outcry ensued, and they were reinstalled. They also stated that a separate holding tank was used and pumped by a private contractor. A second of these states reported that a separate system was typically used, and further that the problems were extensive, but not out of proportion with those accompanying other types of systems.

The fourth state reporting many RV dump stations used an activated sludge digester. They also reported few problems despite using a shared system because very large digestion lagoons were used.

One other state reported that it had RV dump stations at a few of its rest areas. The representative of this state reported using many different sewage systems, but they were shared with the regular rest rooms in all cases. In addition, this state reported many problems with RV dump stations. Despite this, the official felt that more should be installed to better serve the travelling public.

Question 11: Do your rest areas include vending machines, restaurants, gift shops, or any other special services?

Aside from pay telephones, the only such special services provided were systems of vending machines. These were provided in seven states, where they are operated by the commission for the blind. It should be pointed out that, in the five states not providing vending machines, such machines were not permissible because of state laws prohibiting for-profit operations on the right-of-way.

Although it could hardly be called a service, one state reported that back projected slide advertising (like that commonly found in airports) was permitted in rest areas, with the state receiving a percentage of sales based on a sliding scale.

Question 12: Do your comfort stations have any other special or innovative features, such as solar or wind power generation?

Surprisingly, only three of the twelve states interviewed had no current solar or wind energy projects. One of these had tried a system of solar hot water heating, but it was in a northern climate and the high winds at the site had rendered the system ineffective.

Eight of the remaining nine states reported only a few operational systems or experimental projects. Seven of these states reported solar systems only. These were all hot water systems except for one photovoltaic system used for charging emergency light batteries. Two of these states reported numerous technical problems and prohibitive cost, while the other five reported at least break-even cost-benefit performances.

One state reported one experimental solar system and one experimental wind power system. Both systems were reported not to be cost effective.

Another state makes heavy use of solar water and space heating. In addition, this state has five operational wind power generation plants at rest areas. Although the state's representative did relate the existence of some problems with the systems, he was generally pleased with the performance of these systems. It should pointed out that this southern state is sunny and dry and in many ways ideally suited for the use of these innovative energy systems.

Other than these energy systems, only one state mentioned any other unusual facilities. This state had set up a wild flower display, several historical information centers, and ten sculpture displays arranged after a nationwide sculpture competition.

Question 13: Do your parking facilities separate private automobiles from large trucks? Is there a separate area for RV's?

The answers to this question were very straightforward. All twelve states separated parking for cars and trucks. On the other hand, only one state provided special parking for RV's. The other eleven states either directed RV traffic to truck parking or allowed the RV driver to choose automobile or truck parking. No problems with parking were reported except for one state's need to increase truck parking. The original undersizing, in the opinion of this state official, was caused by an error in an FHWA model, which did not properly account for night long-term stopping of trucks.

Several states mentioned the existence of laws prohibiting rest area parking for more than a specified duration (typically two to four hours). All of these states reported an essentially intentional lack of enforcement of this law. The typical reason was the added security provided by truckers on the site (even if they are asleep) and the preference of the highway patrol to have drivers asleep in the rest area rather than on the interstate.

Question 14: Is there anything else you have learned in your experience with rest areas that you feel might be helpful to us in our investigation?

As might be expected, this question created many different responses. Many of these have been covered in the context of the previous discussion. Some of the more interesting, unique, or commonly expressed ideas are listed below:

1. Place a radio in the service room. It gives the impression that an attendant is present, and discourages vandalism.
2. Good maintenance is the best way to minimize vandalism.
3. Handicapped service personnel are excellent workers and provide superior service.
4. Make every effort to tie into a municipal sewage treatment system. Even a six figure initial cost will be justified in the long run.
5. Open air rest areas are "pointless".
6. Good relationships and communications with service personnel are of paramount importance.
7. Use low growing vegetation in landscaping. Higher standing plants lead to security problems.
8. Interstate cooperation shows great promise. For example, there is no reason to set up an outbound rest area near a state border when the other state has a much nicer *welcome center* just over the border.

APPENDIX D. OTHER AGENCY MEETINGS AND FACILITY INSPECTION REPORTS

MEETINGS WITH LEGAL COUNSEL

Separate meetings were held with Mr. Dudley Fowler of the Texas State Attorney General's office and with Mr. Ed Shaddock and Dowell Peterson, both of the Texas State Department of Highways and Public Transportation's office of the legal counsel. These two (2) meetings occurred on August 25, 1986, and August 27, 1986, respectively, and they were both attended by Dr. David W. Fowler, Mr. Bill Ward, and W. T. Straughan, all three (3) of whom are associated with The University of Texas.

The purpose of the meeting was to

1. identify the type of litigation involving rest areas that has been previously experienced in order to gain an insight into the problem areas,
2. seek counsel on the type of hazards to avoid in construction, and
3. seek counsel on the legal ramifications involved in the maintenance and operation of rest areas.

The legal counsel could recall only one case involving rest areas that was actually brought to trial and that involved a defective toilet bowl that failed while in use.

Counsel emphasized that design and construction should always satisfy established codes and standards, i.e., handicap standards for ramps, walkways, grab rails, door widths, etc.; architectural standards, for the correct proportion of riser (R) and tread (T) dimensions for steps (e.g., R + T = 17"-18", 2 x R + T = 24"-25", R x T = 70"-75"); national highway standards for rest area entrance and exit signs; etc.

The point was also made that the premises should be well lighted and there should be no hiding places or dark corners where people can "lurk" for assaulting others. The placement of large shrubbery adjacent to a building was one of the examples given of the types of situation to avoid.

As an aid in understanding the legal ramification involved in the maintenance and operation of rest areas, counsel stated that it was important to understand

1. the items that must be proved in any tort case,
2. the responsibility of the Department of Transportation, as a licensor, to the public as a licensee, and
3. questions that must be considered by the jury.

In any tort case, it is incumbent on the plantiff's attorney to prove that

1. there was in fact an accident,
2. negligence on the part of the property owner contributed to the cause of the accident,
3. negligence did in fact cause the accident, and
4. there were damages.

The responsibilities of the licensor to the licensee under the law must be dealt with by the jury in reaching their verdict. The following is a list of the questions that must be considered by the jury:

1. Was there a dangerous condition on the premises?
2. Did the state of Texas know of the condition?
3. Did the licensee know of the condition?
4. Did the state warn of the conditions or make it safe?
5. If the state did not warn of the condition or make it safe, did failure to do so constitute negligence?
6. Did the negligence cause the accident?
7. Amount of the damages?

In summary, counsel stated that, if the department is (1) aware of its responsibilities under the law and (2) diligent in the performance of all design, construction, and maintenance work in accordance with these responsibilities, no legal problems will occur.

W. T. Straughan Trip Report
Visit with the U. S. Army Corps of Engineers Public Use Areas
Along the Shores of Lake Somerville, near Somerville, Texas
May 22, 1986

"On May 22, 1986, I visited the five (5) U. S. Army Corps of Engineers parks located on Somerville Lake near Somerville, Texas.

Numerous rest room buildings manufactured by Intexx Corp. were in use or in the process of final erection and set-up, but none had been there long enough to compare their durability after several seasons of use. Some of the Intexx Corp.

buildings were just "vault" toilets.

The trip did provide the opportunity to compare the older site construction being replaced by the Intexx Corp. buildings. Fundamentally, the manufactured rest rooms represented an upgrade over the rather "rustic" unfinished look of the existing buildings.

Numerous photographs were taken of the exterior and the interior of both building types on site."

W. T. Straughan Trip Report

Inspection of factory manufactured rest rooms at the Rest Room Facilities Division of Intexx Corporation in Ennis, Texas

May 21, 1986

Intexx Corporation Personnel:

Chuck Kaufman, President, Intexx Corporation
Dan McGrath, Eastern Regional Manager, Rest room Facilities Division
Elizabeth Behrens, Sales Representative, Rest room Facilities Division

Address and Phone Number:

Rest room Facilities Division	Intexx Corporation
P. O. Box 778	560 East Plumb Lane
Ennis, Texas 75119	Reno, Nevada 89502
(214) 875-8478	(702) 827-7500

"On May 21, 1986, I visited the Ennis, Texas, manufacturing plant of the Rest Room Facilities division of Intexx Corporation where management and marketing personnel met with me and provided assistance and explanations during a thorough inspection tour of both the manufacturing facilities and their manufactured rest room products.

The plant appeared to have a rest room unit in various stages of completion at every manufacturing station as well as numerous completed units in finished goods storage in the yard. All of this combined to provide an excellent opportunity to inspect a rather wide variety of product from the standpoint of

(1) size,
(2) equipment specifications,
(3) configuration (layout),
(4) all three (3) price ranges,
(5) construction specifications, and
(6) end use.

Numerous photographs were taken and a complete set of literature and specifications were provided as well as an abbreviated set of construction drawings illustrating both some rest room unit construction details and some site construction details. In addition, several samples of RESINALD 87, a solid phenolic material that they offer as a "vandal resistant" optional upgrade for use in toilet partitions and toilet partition doors, were obtained.

Current product designs have evolved over a period of nearly 10 years and it is apparent that considerable engineering and design effort has been involved in the process. The units embody very rugged construction - for example, the minimum roof design snow load is 100 psf and the minimum design wind load is 100 MPH.

A great deal of emphasis is placed on building the structures square and providing for maintaining the squareness in transit as the structure is transported to the site. To more nearly ensure the squareness and for other reasons, the units are totally constructed in the same plant work station in which construction begins - i.e., they are not constructed on an assembly line.

Primary customers are agencies operating recreational parks, i.e., municipalities, counties, states, and some federal agencies. Currently, their largest customer is the U. S. Army Corps of Engineers in Texas. While they are interested in marketing their products to the state highway departments for use as roadside rest area comfort stations, they were unable to identify any that had been placed in operation for this purpose.

Typically, the rest rooms are shipped without any exterior siding which allows the customer to install the type of siding preferred, for harmony with other structures in the park. Most are also shipped without any insulation installed in the wall or ceiling cavities. Intexx Corp. does offer siding and wall and roof cavity insulation options, however.

Some rest rooms are sold as "building shells" only, with all electrical and plumbing work performed on site by the customer. All rest rooms are shipped without a floor, because an integral part of the company's marketing concept is the use of a concrete floor slab, which for the economical standpoint alon, is "poured" on site.

Southern yellow pine (SYP) framing members are normally used throughout the structure, although they will use other materials if the customer requests it, for an extra charge. One rest room that was being prepared for shipment was constructed with all redwood framing members. The company promotes the use of the waterborne preservative treatment solution containing Chromated Copper Arsenate (CCA) on all southern pine framing members. Three (3) levels of treatment are

offered:

(1) Bottom wall plates, only,

(2) all wall plates and vertical wall framing members (Standard Economy buildings), and

(3) all wall and roof framing member (Standard buildings).

Walls have three (3) bottom plates and two (2) top plates, with 5/8" thick structural particleboard using phenol formaldehyde as a binder applied as the interior sheathing. The commercial name of the product they are using is "Redex", made by Louisiana Pacific Corporation.

All walls are built in a separate assembly area and then brought to the appropriate rest room work station for final assembly. First, the complete wall frame except for two bottom plates and one top plate is constructed on a horizontal plane on a work table. Next the interior sheathing is applied and secured using an adhesive and mechanical fasteners.

Coiled fiberglass "sheet stock" is bonded to the sheathing using heat and pressure after it is first placed in tension. It was not possible to personally inspect this process as Intexx corporate management forbade any observations by outsiders.

Roof construction utilizes 4" x 6" SYP rafters and a ridge beam constructed of two (2) 2" x 10" SYP members oriented vertically and joined together with a 2" x 8" SYP center member in a modified "post and beam" configuration. This unique ridge beam arrangement provides space for a wiring raceway down the roof centerline which can be easily concealed by the placement of a 2" x 5" cover plate predrilled for all lighting fixtures.

Roof sheathing normally consists of 2" x 6" tongue and groove (T&G) roof planking covered with two layers of 15-lb roofing felt and fiberglass shingles. Thre hundred-lb class A shingles are used in the Standard building and 200-lb class C shingles are used in the Standard Economy building. The roof sheathing and all roof framing members are left exposed to view from the building interior.

Adhesives are used extensively in the fabrication of assemblies, and metal plate connectors are used extensively to tie all structural building components together - i.e., walls to rafters and walls to walls, rafters to ridge beams, etc.
Perhaps the weakest area of the manufactured rest room construction is in the area of ventilation, as no provision for natural flow through (low ingress - high egress) ventilation appears to have been made. Nor was there any evidence of mechanical ventilation equipment installed.

Upon the completion of the inspection of the plant and the products there, an inspection visit was also made to observe serval rest rooms manufactured by Intexx Corp. in operation at parks operated by the U. S. Army Corps of Engineers. Refer to the separate report of this inspection.

Perhaps the most useful result from the trip for the rest area project is in the finding of a single source for many useful components, such as toilet partitions, low maintenance high pressure sodium interior light fixtures, rugged exterior doors, plumbing fixtures, toilet and lavatory accessories, etc. Intexx Corp. has extensively tested and searched out the most vandal resistant and/or low maintenance designs for these components, which they purchase and/or manufacture and install in their products. All of these items and more are offered for sale as separate components.

TOUR OF TEXAS PARKS AND WILDLIFE DEPARTMENT FACILITIES
MARCH 22, 1986 - MARCH 25, 1986
BY W. T. STRAUGHAN
APRIL 8, 1986
SYNOPSIS

As a result of a meeting with numerous Texas Parks and Wildlife Department management and professional personnel on February 13, 1986 (refer to W. T. Straughan's trip report of that meeting), the decision was made to make an exhaustive survey of the department's facilities.

This decision was based on the facts and opinions outlined below.

1. Extensive meetings with the appropriate U.S. Department of Transportation management and professional personnel coupled with highway rest area visits had already been conducted within the states of
   a. California,
   b. Georgia,
   c. Oregon, and
   d. Washington.

2. A meeting had already been prearranged for March 27, 1986, with the appropriate Department of Transportation management and professional personnel in the state of Louisiana. In addition, a 2-1/2 day day tour of Louisiana highway rest areas was planned.

3. The Texas Parks and Wildlife department has been and currently continues to be actively involved in an expansion and rehabilitation program with five (5) parks currently under construction and at least one more planned for commencement

this year. This, of course, means that

a. The departmental professionals designing and constructing the facilities have been actively engaged in this activity for a number of years and have consequently been able to develop "state of the art" designs based upon current design and current departmental operating experience with current designs.

b. The departmental personnel engaged in operating and maintaining the facilities have experience with current designs.

4. The Texas Parks and Wildlife Department is a "sister" agency to the Texas State Department of Highways and Public Transportation with similar problems operating wholly within the state of Texas.

5. Since there were an average of nearly five (5) comfort stations at the facilities for which an inspection visit was planned, the opportunity for an exhaustive survey existed, all within the state, which could be effectively conducted within a three (3) day period - at minimum cost.

Numerous photographs were taken of the comfort stations, sewage treatment plants, water treatment facilities, etc. during the inspection visits. In addition, a brief written report of the visit to each individual facility was prepared.

Observations common to all parks:

1. All comfort stations have exterior doors.
2. All comfort stations are adequately ventilated, utilizing both natural and mechanical ventilation means.
3. All comfort station equipment in both the men's and women's sides was tested and found to be in operating order unless noted.
4. Extensive use is made of natural lighting inside all comfort stations.
5. Artificial lighting inside the comfort stations varies from adequate to excellent.
6. Exterior artificial lighting in the immediate vicinity of the comfort stations varies from marginal to good.

Annual visitation figures are based on the period of September 1986 to August 1985.

INKS LAKE STATE PARK

Date Visited: March 22, 1986

Annual Visitation: 266,770

Description: 1200 acres along the east side of Inks' Lake. A natural, woody setting with pink granite outcroppings. There is also a nine-hole golf course.

Location: Nearest town is Buchanan Dam.

Conditions: Park was heavily used due to high weekend visitation and good weather.

Comfort Stations: Eight (8) with showers. Photographs were taken of four (4). Two of these were built before 1960 and 2 were built in the early 1970's. No signs of vandalism. Rest rooms were clean in spite of the heavy use.

Construction Observations: Extensive use is made of natural lighting in the comfort stations. All have mechanical ventilation. Good artificial lighting both outside and inside the comfort stations.

Sewage Treatment: Visited the sewage treatment plant and took numerous photographs. This was the largest sewage treatment plant observed on the tour. It is a Marhoff-Precast concrete plant - 45,000 GPD capacity.

ENCHANTED ROCK STATE NATURAL AREA

Date Visited: March 22, 1986

Annual Visitation: 200,375

Description: 1643-acre park dominated by massive granite hills

Location: Nearest town is Fredericksburg.

Conditions: Park was full.

Comfort Stations: Two were visited and photographs taken at each one. Rest rooms were clean, well lighted, and in extremely heavy use. No evidence of vandalism. Exterior landscaping was very attractive including the use of cactus plants.

Construction Observations: One rest room uses solar heating for hot water and one has stainless steel toilet partitions. Metal roofs are used and the building exteriors were stone.

Sewage Treatment: Septic systems

BLANCO STATE RECREATION AREA

Date Visited: March 22, 1986

Annual Visitation: 174,661

Description: 105-acre park situated along both sides of the Blanco River on the outskirts of the city of Blanco, Texas. Limestone rock outcroppings and ledges are present in the park.

Location: Adjacent to the town of Blanco.

Conditions: Although the park was busy, it was the least crowded of any observed on the tour.

Comfort Stations: Photographs taken at two (2) of the three (3) comfort stations. They were both extremely clean. No evidence of vandalism.

Construction Observations: Limestone exteriors on the comfort stations. Very modern construction - tile floors and walls - built in 1983. Good use of natural lighting and natural ventilation. This was the first park in the system to have a solar water heating system installed and the park superintendent states that he has had no operational problems and that he is very pleased with it. The system only has a 240-gallon storage tank so that supplemental electrical heating is required during the non-daylight hours. Exterior doors were louvered for good ventilation.

Sewage Treatment: None. The park sewage is pumped to the city of Blanco sewage handling lines.

PEDERNALES FALLS STATE PARK

Date Visited: March 22, 1986

Annual Visitation: 160,399

Description: 4,800-acre park stretching along both sides of the Pedernales River with Pedernales Falls being the main attraction.

Location: Nearest town is Johnson City.

Conditions: Moderately crowded.

Comfort Stations: Two of three were photographed. All three were extremely clean. No evidence of vandalism.

Construction Observations: Limestone and wood exterior construction with metal roof. Exterior doors were louvered for good ventilation.

Sewage Treatment: Septic systems with leach fields. Photographs taken of RV dump stations.

KERRVILLE STATE RECREATION AREA

Date Visited: March 22, 1986

Annual Visitation: 528,773

Description: 500-acre park adjacent to the shores of Flat Rock Lake on the Guadalupe River. The park is split into two (2) distinct segments by state highway 173, with the section on the southwest side of the highway being much bigger and much more heavily forested.

Location: 3 miles southeast of the town of Kerrville.

Conditions: Moderately use, but not crowded

Comfort Stations: All four (4) were photographed. All were very clean, but the one near the recreation hall needed some touch-up painting. No evidence of vandalism.

Construction Observations: All comfort stations had wind turbine ventilators that provided additional ventilation from inside the comfort station through the roof. All had screened windows and lower wall louvers giving excellent ventilation. Tile was used on the floors and walls in conjunction with marble or granite toilet partitions and doors.

Sewage Treatment: None. Tied into the city of Kerrville municipal sewage treatment system. Two (2) RV dump stations.

Water Treatment: None. The park purchases water from the city of Kerrville.

LOST MAPLES STATE NATURAL AREA

Date Visited: March 23, 1986

Annual Visitation: 102,029

Description: 2,208 acres along the Sabinal River with steep limestone canyons, grassy plateaus, and big tooth maple trees. This park was designated a national natural landmark in 1980.

Location: Nearest town is Vanderpool.

Conditions: Moderately use, but not crowded

Comfort Stations: Two (2) were photographed. General condition and cleanliness were excellent and there was no evidence of vandalism.

Construction Observations: Comfort stations had all tile interiors with high pressure laminates used as veneers on toilet partition doors. Building exterior was cedar.

Sewage Treatment: PEECO package plant - 10,000 GPD capacity. This plant was photographed as well as the RV dump station.

GARNER STATE PARK

Date Visited: March 23, 1986
Annual Visitation: 321,577
Description: 1420 acres along the Frio River. The scenery varies from grassy meadows to forested areas.
Location: Nearest town is Rio Frio.
Conditions: Very heavy use
Comfort Stations: Ten (10) total. Numerous photographs. General condition and cleanliness were good considering the heavy use. Found one example of graffiti in one (1) comfort station. Found one hot water spigot not working.
Construction Observations: Comfort stations use floor to ceiling windows with fixed sash in the center and screened - openable windows - top and bottom. The stations have very high ceilings with large gable vents on the ends of the building above the gun port windows there. Tile interiors. The exterior appearance of the buildings was "striking" and is supposedly an adaption of the style found in the French-Alsatian settlement of Castroville, which is nearby.
Sewage Treatment: PEECO - precast concrete modular plant - 50,000 GPD capacity.

GUADALUPE RIVER STATE PARK

Date Visited: March 24, 1986
Annual Visitation: 210,123
Description: 1900 acres along the Guadalupe River featuring bald cypress trees and steep limestone canyons
Location: Nearest town is Spring Branch.
Conditions: Heavy use - especially considering that the day of the visit was not a weekend or holiday
Comfort Stations: Photographed three (3). General condition and cleanliness were excellent. No evidence of vandalism.
Construction Observations: Comfort stations have tile interiors and limestone and wood exterior.
Sewage Treatment: PEECO - precast concrete modular - 32,000 GPD. Park superintendent toured the plant and park with me showing me the list of comfort station stations, the central lift station, the holding pond, the spray irrigation fields, the Clevis Multum toilets, and the water treatment and storage facilities. All were photographed.

CHOKE CANYON STATE PARK

Date Visited: March 24, 1986
Annual Visitation: This park had only been open one (1) week and was filled well in excess of capacity.
Description: This newly completed park is one of three units that will ultimately be part of this 12,500 acre complex. One of the other two (2) is under construction. This unit was toured extensively, together with the open unit. The U. S. Army Corps of Engineers is involved in the project as the Frio River was dammed and an entire town, Callahan was moved. The reservoir is far from full as there are another 25 feet yet to be filled. The project did provide an excellent and unique opportunity to observe "state of the art" facility construction by the Texas Department of Parks and Wildlife.
Location: Nearest town is Three Rivers.
Conditions: Park was full.
Comfort Stations: All open comfort stations (3) and some units under construction were photographed.
Construction Observations: Solar heat is being used for the water heating system. Comfort station interiors are tile with stainless steel toilet partitions and doors. All comfort stations are equipped with vending machines (including ice) a concession stand, lockers to rent, and telephones. The exterior is wood with composition roof. Mirrors are back bolted to walls with concealed fasteners. Exterior lighting is excellent as is the building interior lighting. The lighting is controlled by timers which can be overridden by operating the wall switch during the daylight hours.

LAKE CORPUS CHRISTI STATE RECREATION AREA

Date Visited: March 24, 1986
Annual Visitation: 570,792
Description: 350 acres situated in the southeast corner of Lake Corpus Christi. An older facility with fishing piers and marinas and concessions with auto gas.
Location: Nearest town is Sandia.
Conditions: Moderate use
Comfort Stations: Seven (7) comfort stations were photographed. Some stations were not as clean as others. In some stations the mirrors were removed from the walls but no other evidence of vandalism was observed.

Construction Observations: Comfort stations exteriors are wood and limestone with composition roof. Some stations have skylights and two (2) wind driven turbines mounted on the roof venting the inside of the building.

Sewage Treatment: Lakeside racetrack with leaching pit - 25,000 GPD capacity - photographed.

LAKE TEXANA STATE PARK

Date Visited: March 25, 1986

Annual Visitation: 327,656

Description: 575 acres on the west side of Lake Texana

Location: Nearest town is Edna.

Conditions: Heavy use

Comfort Stations: 7 photographed. General conditions and cleanliness was excellent. No evidence of vandalism.

Construction Observations: Natural lighting is excellent. Comfort station exteriors consist of masonite and metal roof. Park superintendent recommends strongly against the use of skylights in the high pitched roofs as they are too difficult to clean. Park superintendent also recommends against the use of masonite as it is not sufficiently durable for building exterior treatment in a high use - high moisture environment.

Sewage Treatment: None. Each comfort station has a lift station which pumps to a central lift station which pumps to the city of Edna's municipal sewage treatment system (10,000 GPD was pumped in the summer).

Water Treatment: The park superintendent conducted a tour of the water treatment facility, which was photographed.

BRAZOS BEND STATE PARK

Date Visited: March 25, 1986

Annual Visitation: 308,590

Description: 4,897 acres situated along the Brazos River

Location: Nearest town is Rosharon.

Conditions: Moderate use

Comfort Stations: Five (5) photographed. Interior of one needs painting. These comfort stations were, in general, less clean than any of the others visited. Found one lavatory faucet not working in one comfort station.

Construction Observations: Comfort stations have cypress exterior or on three (3) sides with concrete block on the back wall and high pitched metal roofs. Interior has brown tile on the floor with concrete walls.

Sewage Treatment: PEECO - precast concrete modular. Visited with Elaine Kinney, sewage treatment plant operator who has seven (7) years experience working with municipal sewage treatment plants. She has a great deal of respect for the PEECO plant, stating that she has observed BOD reductions is as high as 81%.

W. T. Straughan Trip Report
Visit with Texas Parks and Wildlife Department
February 13, 1986

In Attendance:

Jim Bell, Parks Director	(512) 479-4866
Dale Robinson, Chief, Planning & Development Program	(512) 479-4907
Robert L. Singleton, Jr., Architect, Project Planner, Master Planning Branch	(512) 479-4872
Leslie G. Cunningham, Engineer, Development & Repair Branch	(512) 479-4918

Numerous others, as I asked questions that these people felt others should answer. I was unable to get all their names as they were in for only brief periods; however I did get the names of two (2) of them who came in together:

Delbert Buchanan - Maintenance Specialist - South Section

Joe Adair - Maintenance Specialist - North Section

1. How many full service park areas do you have in operation?

   They were unable to answer this question with a precise number but they did state that it was between 80 and 100 depending upon how full service park was defined. They did give me a brochure which lists most of the current facilities.

2. How many full service park areas have you planned or are under construction?

   Six (6) are currently under construction. All are planned for completion within eighteen (18) months. After that, their plans are to complete four (4) parks per year.

3. What are the number of annual uses for which you design a park?

   This is based on complete environment studies that are conducted at each site before any construction begins.

4. What is your current criterion for spacing?

In compliance with the Texas statutes, they are required to have an outdoor recreation plan which is subject to legislative review. Currently they are concentrating on constructing facilities convenient to major metropolitan areas. For example, four parks are currently under construction in and around the Dallas metropolitan area. Another major area of concentration is in acquiring lands in areas of natural and scenic beauty - especially those with historical structures.

5. Do you maintain records on park area usage?

Yes, but since they strictly enforce their rules regarding full occupancy and since most all the parks have full occupancy during the area tourist season, this information would be meaningless for the purposes of our study.

6. Do you have parks adjacent to metropolitan areas and if not, why?

Yes, this is their current area of construction concentration.

7. Do you provide vending machines or any special services at parks?

Concession facilities are provided at all large parks. They are leased on a five-year cycle. The department gets a percentage of the concessionaires' gross income, which all comes back to Fund 64. Their experience with concessionaires ranges from lodges providing overnight sleeping accommodations, convenience stores, restaurants, service stations, fishing piers, marinas, etc. In general, they are very pleased with this joint-use concept and stated that, in at least 80% of the cases, the five-year leases are simply renewed with the current leaseholder.

8. What is the primary reason for siting a park?

The number one drawing card for a park is water sports. For this reason, the department generally tries to make certain this feature is available in park sites developed for recreational purposes.

9. What are your regulations regarding overnight use?

14 days maximum in a 28-day period. This is rigorously enforced during periods of full occupancy. They do have numerous "live-ins", who do have to move out frequently during the peak use season.

10. Are you considering joint facilities or do you currently have any in operation?

Yes, they have been operating with this concept for many years and are anxious to expand its scope to include golf courses, cabins, more marinas, etc. (Refer to the answer to question number 7.)

11. Describe the types of vandalism problems that you have:

Vandalism is not really a problem. The cost of vandalism related repairs would be less than 1/2 of 1%. Park management does receive monthly incidents' reports, but the incidence rate is so low that they don't consider it to be a problem.

They did state that their most frequently reported problem is "graffiti".

They attribute their lack of vandalism problems to the presence of (1) joint-use concessionaires and (2) park management personnel.

12. Do those park areas with high usage rates have more vandalism?

Not necessarily. Their experience indicates that those parks having high incidences of vandalism are those that have a high frequency "day use". People camping overnight are nor nearly as prone to vandalize.

13. Do parks near metropolitan areas experience more vandalism as a percentage?

Yes, because of the high frequency of "day users".

14. Approximately what percentage of your total operating and maintenance budget is used to effect vandalism related repairs?

Significantly less than 1/2 of 1%.

15. Do you have water wells at all locations?

No. Their preferred method is to connect to a locally operated water system; however they do treat water out of lakes and rivers and drill wells. The majority of parks do have wells.

16. Any water treatment problems?

The most significant problem mentioned was one park that purchases water and then has to treat it anyway. They check water daily as required by the state (probably turbidity and chlorine residual checks, but no one present knew) and they send samples to a laboratory once per month for a comprehensive test.

17. Do you generate power at any locations?

No.

18. Any solar power in use?

Yes, at Choke Canyon, Blanco, Lewisville, Ray Roberts parks. They are also investigating the use of wind generated power and photovoltaic power together with the public utilities commission.

19. What type of lighting do you recommend?

    a. In parking area? High pressure sodium
    b. On building? Incandescent
    c. Inside building? Recessed and/or surface mounted fluorescent with vandal resistant covers

20. Do you provide refrigerated drinking water?
    Only at park headquarters and in concession areas, not at comfort stations.
21. Do you provide RV dump stations and, if so, what problems are you experiencing?
    RV dump stations are provided at all areas where camping is permitted. They are planning double dumping stations for all new parks to eliminate traffic jams and congestion where RV's are waiting in line to dump sewage before exiting the park on weekends. Formaldehyde is their number one treatment problem from RV wastes and they plan to separate sewage treatment facilities for RV wastes.
22. Breakdown the type of sewage treatment facilities in use:
    a. Evaporative lagoons? Brazos Bend and Benson State Parks
    b. Septic tanks with leach field? This is the preferred method other thanconnection to a regular municipal sewage treatment plant. However, the volume of waste normally precludes that and they are forced to treat the sewage.
    c. Holding tanks? Still have one or two of these - one is at Summerville.
    d. Regular municipal sewage treatment system connections? 7
    e. Packaged plants? Where they treat their sewage, they use packaged plants except for five (5) parks that use "Racetrack" type sewage treatment plants built by "Lakeside." I have a separate detailed list of their sewage treatment plants.
23. Do you install doors on the rest room entrances and on toilet partitions?
    Yes, and no one present knew of any incidents of toilet partition "peephole" drilling by homosexuals.
24. Are any of the rest rooms air conditioned?
    Only those near park headquarters and those located in concessions except for Brazos Bend, where the comfort station environment in controlled by a heat pump because of the high humidity.
25. Do you plan to air condition any rest rooms planned for future construction?
    No. Dining halls, when constructed, will be air conditioned.
26. How do you ventilate rest rooms?
    Side louvers are mounted low on the walls to which provide make-up air, which is exhausted through the "pipe chase" where the exhaust fans are located.
27. How are the rest rooms heated?
    Forced air system using natural gas where available, with all electric if natural gas is unavailable. They are planning to use solar heated hot water as a primary comfort station heating medium at Lewisville and Bob Sandlin.
28. What is the design life of planned park area buildings?
    They plan for a life of twenty to twenty-five years.
29. Describe any special features planned for new construction.
    a. A central pipe chase will be built for the routing of all pipes and ducts in all future comfort stations. The pipe chase will be heated and provided with an exhaust fan for comfort station ventilation.
    b. They believe in using tile on the floors and the walls and on permanent partitions.
    c. They use stainless steel with high nickel content for toilet partitions and doors.
    d. Electric hand dryers will be provided.
    e. Water saver toilets will be considered. They are installed with good success at Garner, Palo Duro Canyon, and Enchanted Rock State Park.
    f. Stainless steel built-in trash receptacles will be provided.
    g. Skylights or clerestory will be provided.
    h. Masonry is the preferred exterior wall treatment.
    i. Picnic shelters are provided when there are no trees.
    j. Wooden picnic tables with metal legs are provided and placed on concrete slabs.
    k. All metal items susceptible to severe corrosion, such as in coastal areas are hot-dipped galvanized, i.e., pipes (inside and outside), hinge brackets, exterior light fixtures, etc.
30. Do you contract any maintenance
    a. Custodial? No.
    b. Repairs? Very seldom.
31. Describe your park area organization.
    Two operators for the same treatment facility and for park maintenance.
    Park superintendent on site.
    9 - Regional Directors
    2 - Section Directors

Visit to McKinney Falls State Park

On February 13, 1986, I visited the McKinney Falls State Park where I personally inspected all comfort stations.

While this is not representative of planned new construction, it did possess many similar features. All tile floors and walls, built-in trash containers, etc.

The facilities were all very clean and absent of any signs of vandalism save for a few "graffiti" type markings. In general it is an impressive facility. The only semi-crticial comment I would make is that the interior lighting needs improvement. This will, of course, be rectified in new facilities as skylights or clerestories are installed.

APPENDIX E. SUMMARY OF COMPLAINT AND COMMENDATION LETTERS

(Received by the Texas Department of Highways and Public Transportation during the period of January 1984 through July 1985)

SUMMARY OF COMPLAINTS BY REST AREA USERS IN TEXAS
(From letters dated January 1984 through July 1985)

General Category of Complaint	Number of Complaints in Category
Lack of toilet facilities	26
Unsanitary conditions	11
Open air design	9
Maintenance problems	8
Poor design of toilet partitions	3
Poor handicapped facilities	1
Poor lighting	1
Soliciting	1

SPECIFIC COMMENTS AND/OR SUGGESTIONS

- Condition of rest rooms at the rest stop on I-10 just east of San Jacinto River is disgrace to the state of Texas.
- Need a complete rest area between Zapata and Laredo.
- Need rest room facilities at the Brookshire rest area.
- Need more roadside rest room facilities, particularly in the Panhandle and in the South Plains.
- Look at facilities in New Mexico, Arizona, Oregon, Washington, and California.
- Traveling north from Rockport past Victoria, through Houston, there is no rest room facility until one gets north of Livingston.
- Arkansas does a better job with rest areas than Texas does.
- If the state of Texas is too poor to furnish rest rooms, perhaps some portable toilets could be provided. (New Mexico used them in some locations.)
- Need more rest room facilities on highway 59 between Victoria and Houston.
- List of specific problems found in rest areas on I-45 between Dallas and Houston:
    1. doors off stalls, holes in stalls, broken doors;
    2. toilets will not flush;
    3. no soap;
    4. dryers will not work;
    5. mirrors missing;
    6. not clean.

- The mirror breakage problem could be solved with lexan plastic mirrors.
- Need rest room facilities between Houston and San Antonio.
- Soliciting at rest areas between Dallas and Waco, and Dallas and El Paso (suggest "no loitering or soliciting" signs).
- The repairs and modifications of rest areas on I-20 about 15 miles west of Weatherford took more than 4 months to complete.
- The rest area on I-20 from Odessa to Kilgore at mile marker 511 (first rest area east orf Dallas) was marked for handicapped use but the stall would not accommodate the wheel chair.
- Need rest room facilities on highway 37.
- Rest area on I-35 west, south of Fort Worth and Burton, needs improved lighting.
- Need rest room facilities on I-20 west of Abilene.
- Texas should took at rest areas in Mississippi and Alabama.
- Need rest room facilities between Amarillo and Decatur and between Decatur and Denton on Interstate 287.
- State could save money and land by building rest areas in the median strip.

APPENDIX F. REST AREA USER SURVEY

Location: West side of interstate highway 35 in Hays County, Texas. This rest area serves southbound traffic only.

Dates: 3:00 pm, Friday, March 21, 1986 through 3:00 pm, Saturday, March 22, 1986.

A comprehensive 24-hour survey of traffic and people was conducted over a 24-hour period at the rest area identified above, and a large amount of data was collected.

The information presented in this report is categorized as outlined below:

1. Average duration of visit by category of those vehicles diverting to the rest area.

Twenty-four (24) vertical bar charts are presented (one for each hour of the survey period) that plot the average length of time in minutes spent in the rest area for each vehicle category during that particular survey hour. The data do indicate substantial variation in the duration of the rest area visit at different times of day.

2. Hourly percentage breakdown by category of those vehicles diverting to the rest area.

Twenty-four (24) vertical bar charts are presented (one for each hour of the survey period) that plot the percentage by vehicle category of all the vehicles entering the rest area during that particular survey hour.

Automobiles consistently dominated the traffic into the rest area at all hours during the survey but there were significant variations in the vehicular traffic mix with time.

3. Summary of the average time spent in the rest area by vehicle category.

This single-page, vertical bar chart represents a compilation of the total time spent in the rest area of all vehicles in each category divided by the total time spent by all vehicles during the twenty-four (24) hour test period.

The average time spent in the rest area by vans and other forms of recreational vehicles was significantly greater than that by other vehicle types. Automobiles and trucks averaged 7 to 9 minutes in the rest area while trailers, bikes, and buses averaged significantly less time there (between 1 and 4 minutes).

4. Summary of the percentage by vehicle categories of the total vehicles diverting to the rest area.

This single page, vertical bar chart summarizes the percentage that each vehicle category represents of the total vehicles visiting the rest area during the entire twenty-four (24) hour period of survey.

Automobiles dominated the traffic with 61% of the total followed by pickup trucks with 21% of the total. Vans represented 8% of the total while other trucks and other forms of recreational vehicles represented 6% and 4% of the total, respectively.

5. Number of vehicles diverting to the rest area.

This single-page vertical bar chart graphically presents the data collected on the total traffic entering the rest area during each hour.

From this chart it is apparent that there was a significant increase in rest area traffic after 8:00 am that continued to build until the first peak occurred during the noon hour. After 1:00 pm, the traffic into the rest area diminished until it reached the 4:00 pm to 7:00 pm period, when it was again very high.

After 7:00 pm, the rest area traffic steadily declined until 7:00 am.

6. Percentage of southbound traffic diverting to the rest area.

This single page line graph presents the percentage of the total interstate highway 35 southbound traffic that diverted to the rest area during each hour of the twenty-four (24) hour survey period.

The diverting traffic averaged slightly more than 6% during the survey period, and it was surprisingly consistent at this level except during

1. the evening rush hour period, when it averaged less than this, and
2. the late evening and early morning hours, when it averaged more than 6%.

7. Tabulation of user responses to the rest area user survey questions posed on the rest area interview form.

This chart tabulates the results of the specific questions asked of each rest area user polled. A total of 191 questionnaires were completed. (A blank copy of the interview form is included in this report.)

In general, a large majority of the responses were favorable. Notable exceptions were related to the condition of the rest rooms and vending machines. Sixty (60) percent of those polled were on vacation. Surprisingly only thirteen (13) percent of these polled indicated that they would have searched for the next rest area if they had been unable to stop at this rest area. This response may have been influenced by the fact that the previous rest area in the southbound lane of the interstate highway 35 was shut down for renovation and if this rest area had been shut down, also, the driver and passengers would have been apprehensive about the distance to the next "open" rest area.

8. Comments and suggestions from rest area users.

This is a compilation of specific comments made by those users polled who cared to make comments in addition to answering the questionnaire.

The comments indicated a real concern for better traffic safety and personal security measures. In addition, all pollsters indicated that those polled really indicated a desire for more rest areas in Texas and for improved and better maintained facilities - enclosed and heated rest rooms, for example.

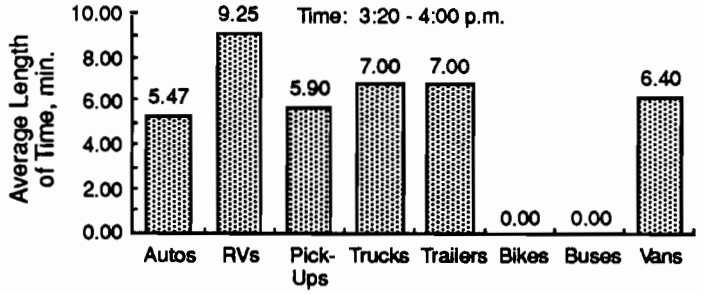

Fig F.1. Average length of time vehicle stayed, by type.

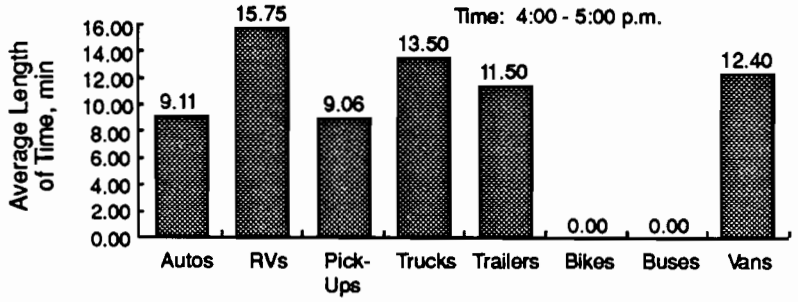

Fig F.2. Average length of time vehicle stayed, by type.

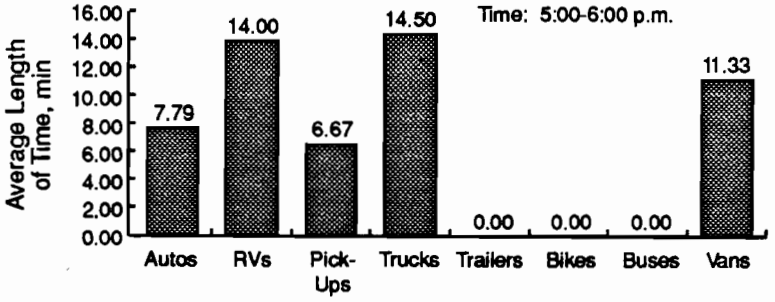

Fig F.3. Average length of time vehicle stayed, by type.

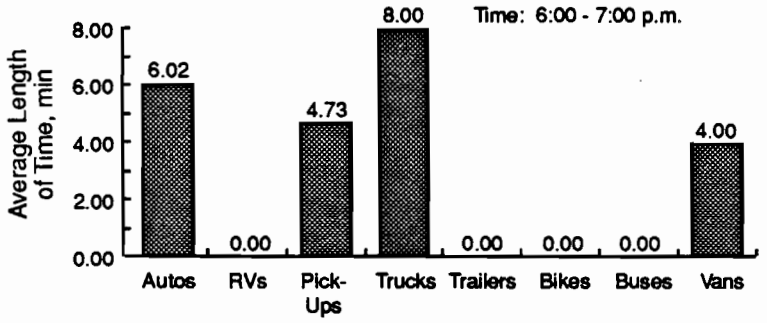

Fig F.4. Average length of time vehicle stayed, by type.

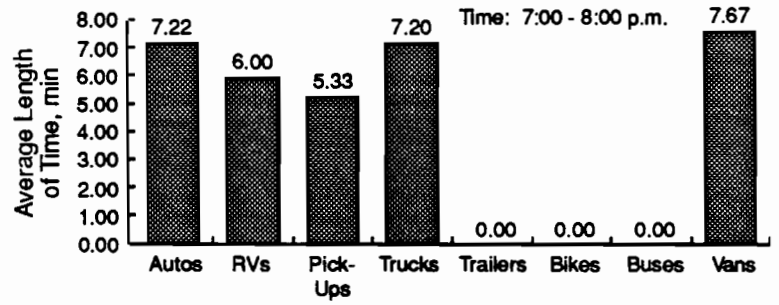

Fig F.5. Average length of time vehicle stayed, by type.

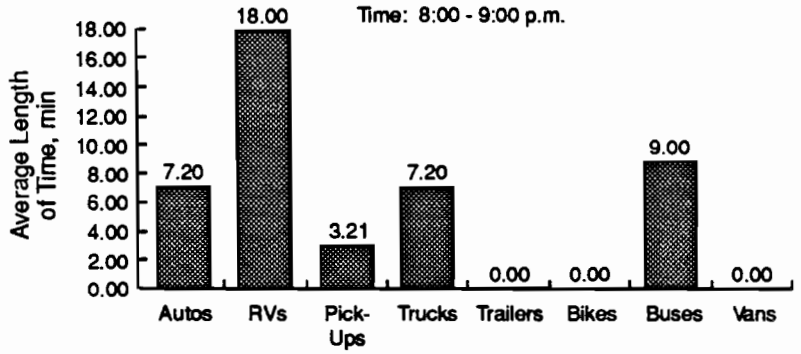

Fig F.6. Average length of time vehicle stayed, by type.

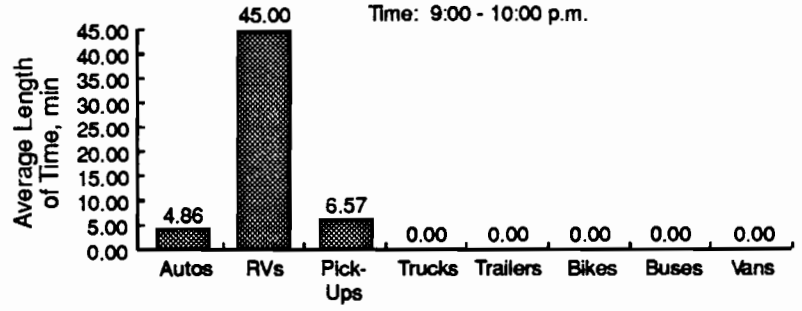

Fig F.7. Average length of time vehicle stayed, by type.

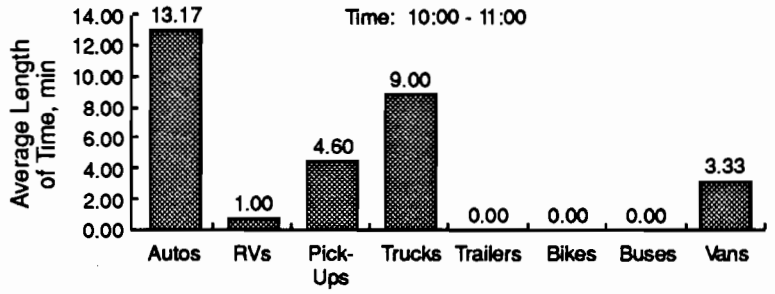

Fig F.8. Average length of time vehicle stayed, by type.

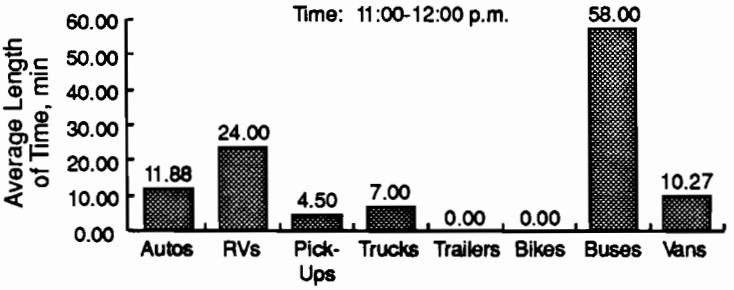

Fig F.9. Average length of time vehicle stayed, by type.

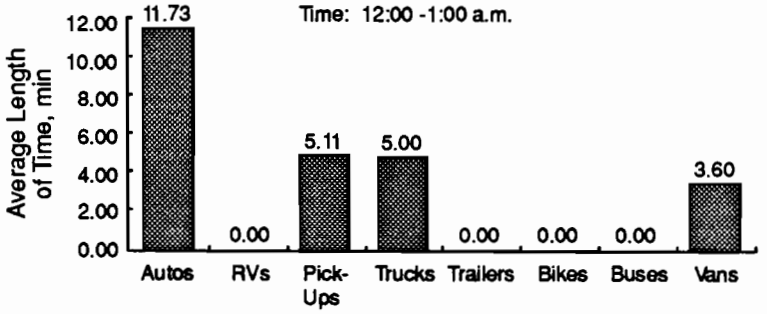

Fig F.10. Average length of time vehicle stayed, by type.

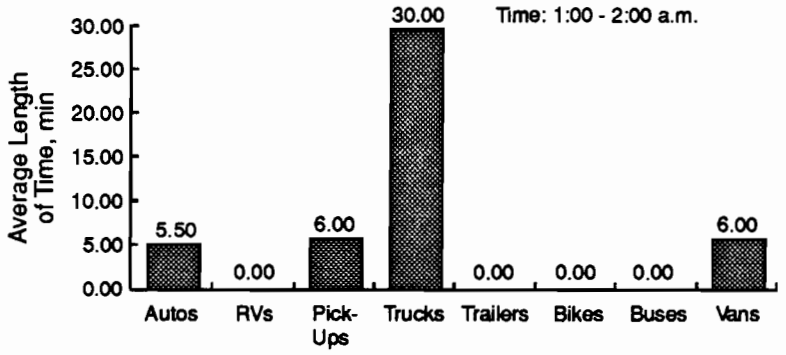

Fig F.11. Average length of time vehicle stayed, by type.

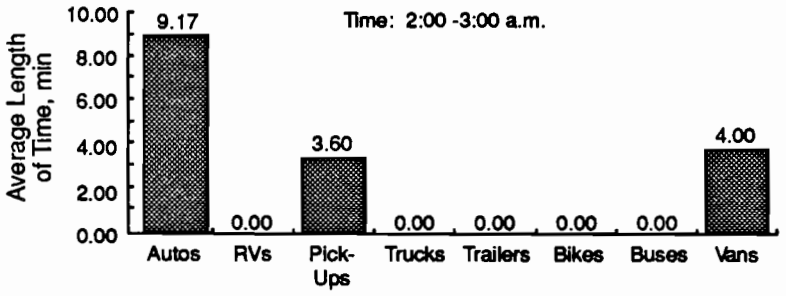

Fig F.12. Average length of time vehicles stayed, by type.

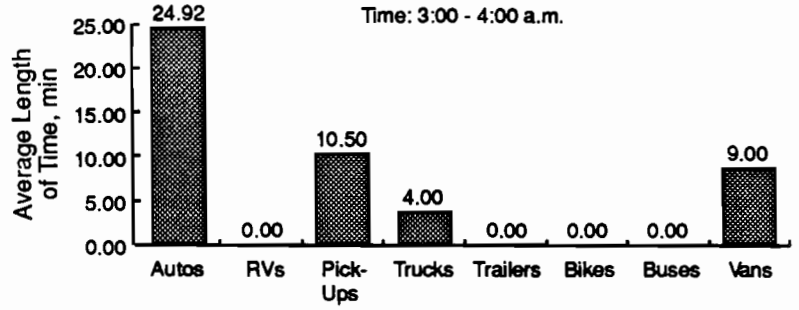

Fig F.13. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

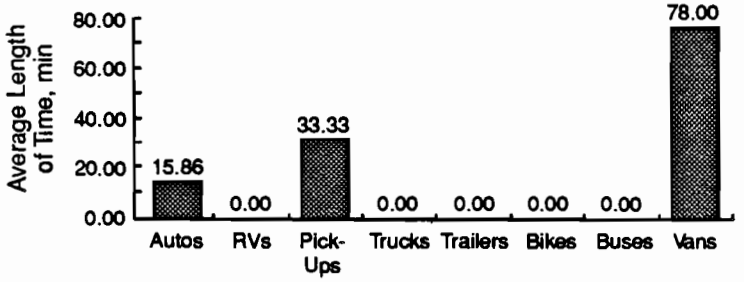

Fig F.14. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

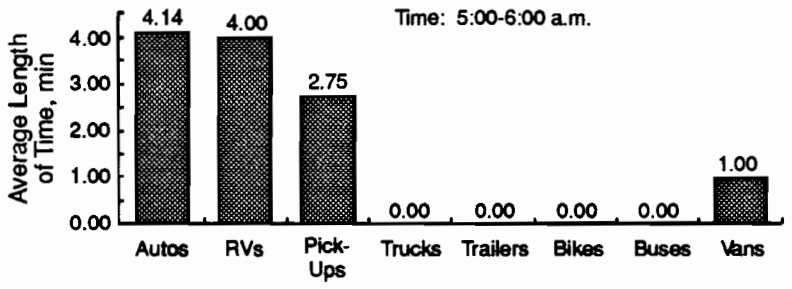

Fig F.15. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

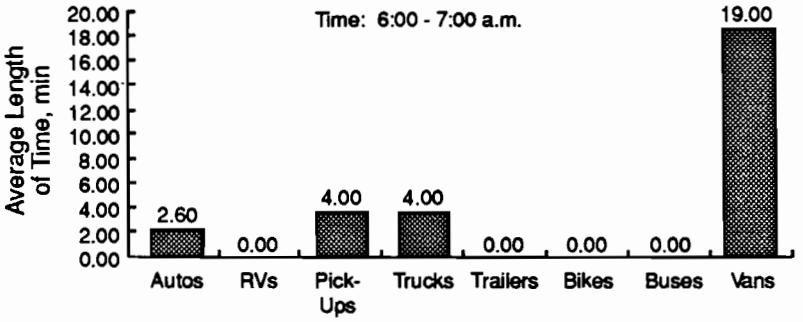

Fig F.16. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

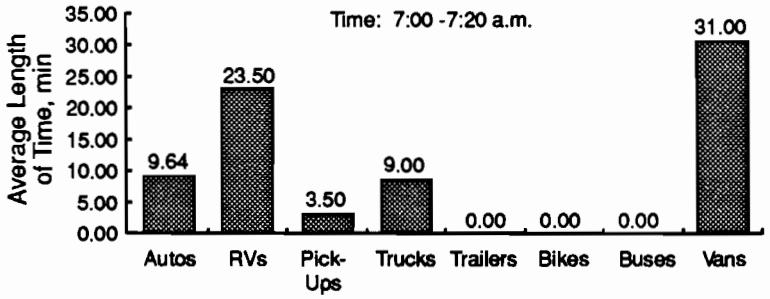

Fig F.17. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

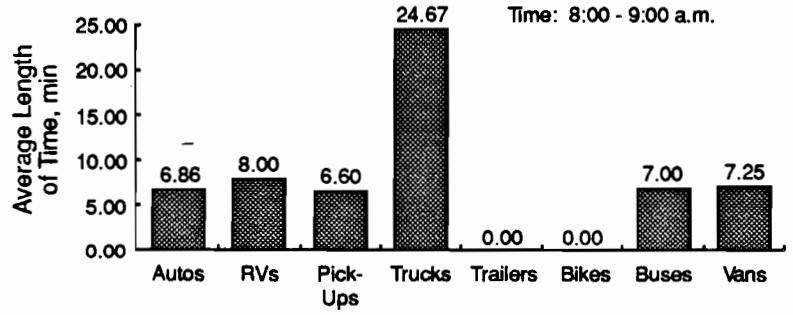

Fig F.18. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

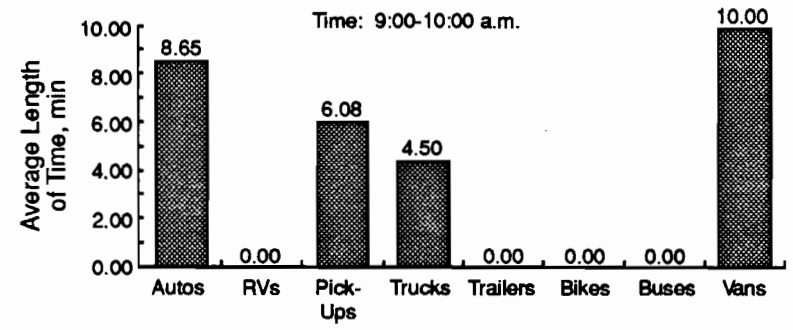

Fig F.19. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

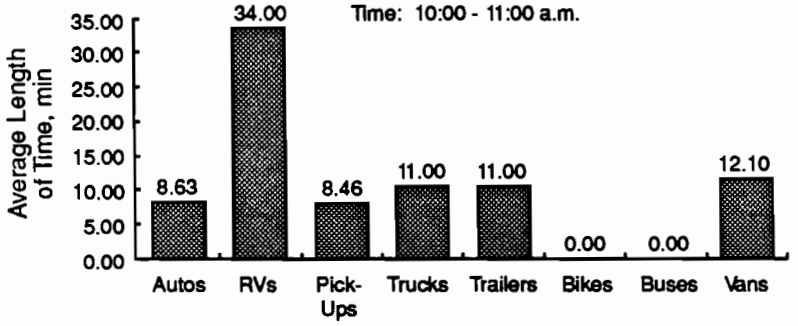

Fig F.20. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

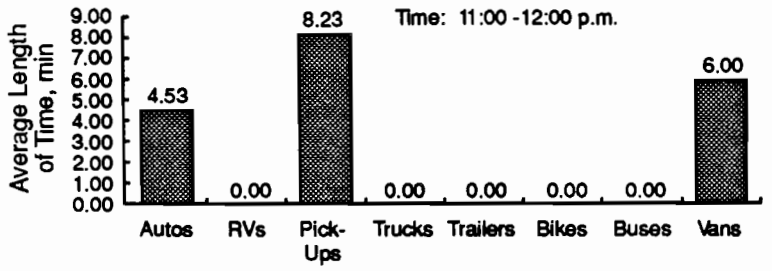

Fig F.21. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

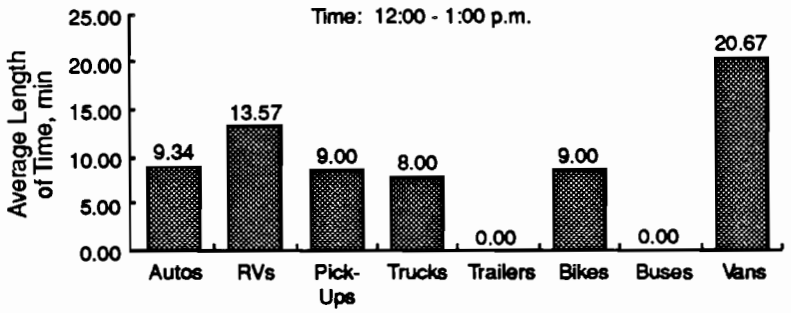

Fig F.22. Average duration of visit, by category, of vehicles diverting to the rest area (tabulated hourly).

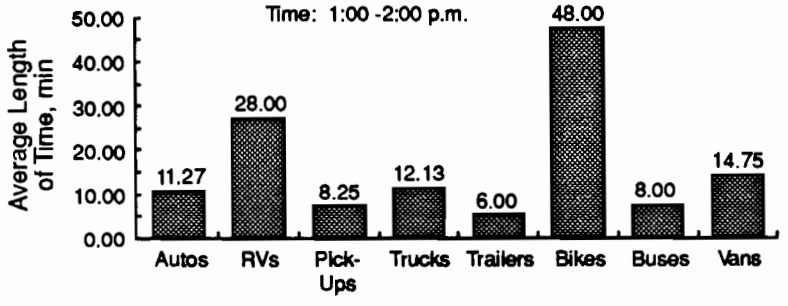

Fig F.23. Average duration of visit, by category, of vehicles diverting to the rest area

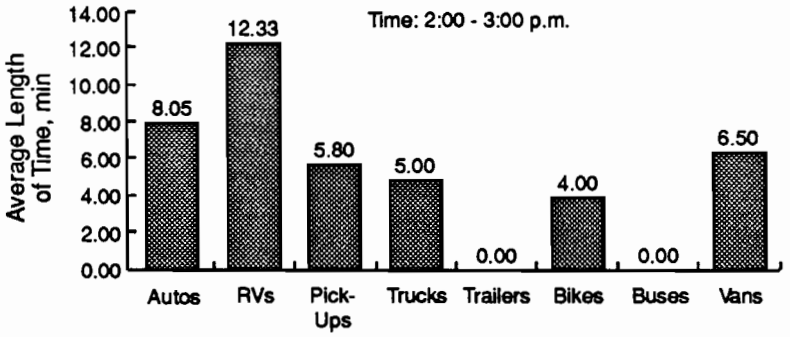

Fig F.28. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

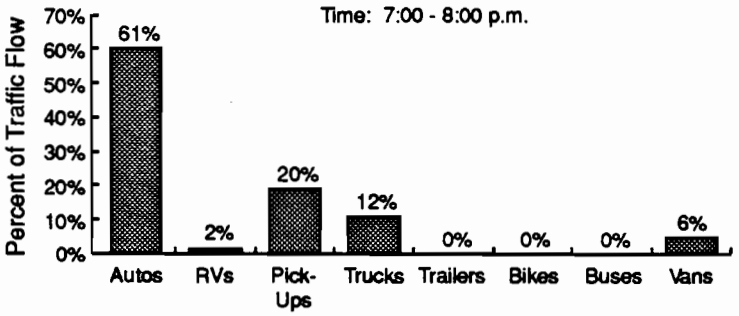

Fig F.29. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

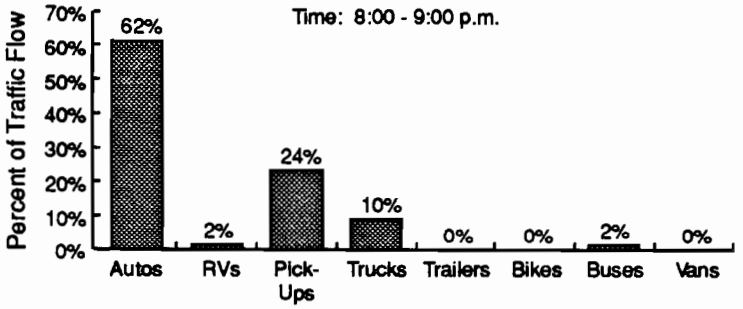

Fig F.30. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

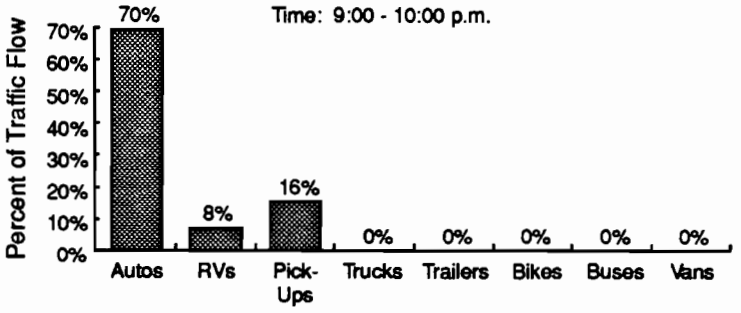

Fig F.31. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

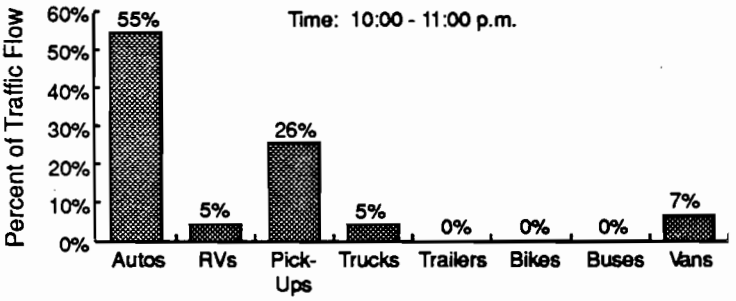

Fig F.32. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

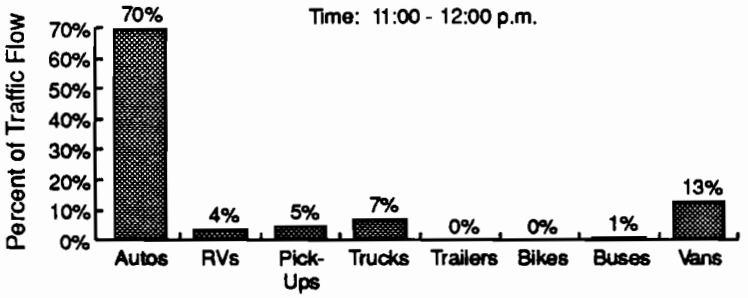

Fig F.33. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

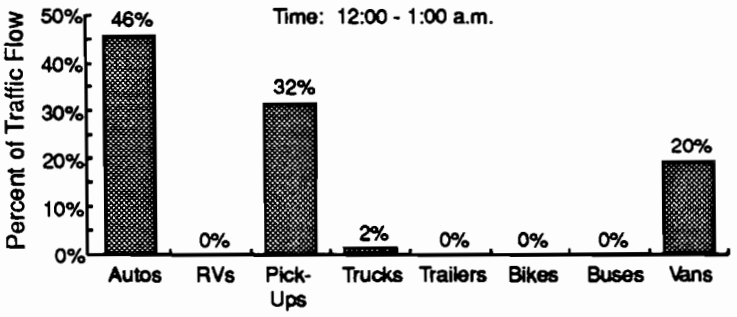

Fig F.34. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

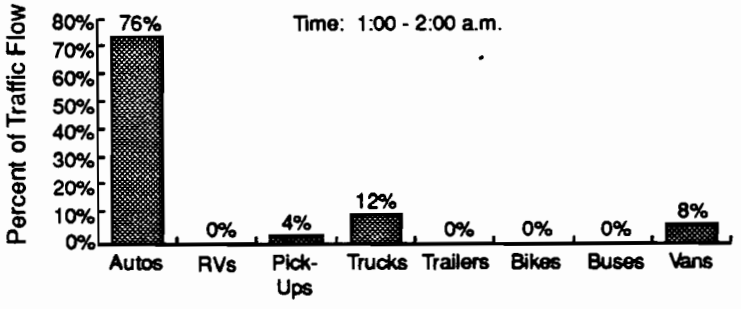

Fig F.35. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

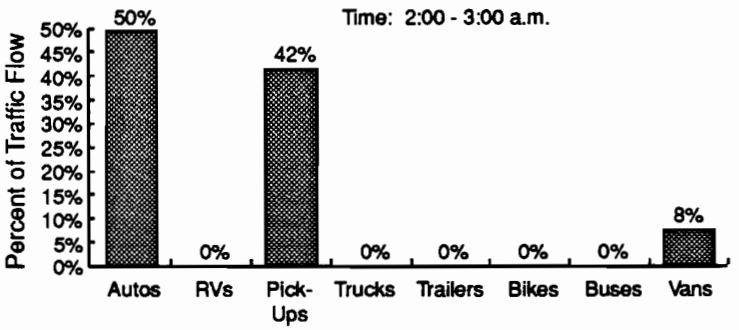

Fig F.36. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

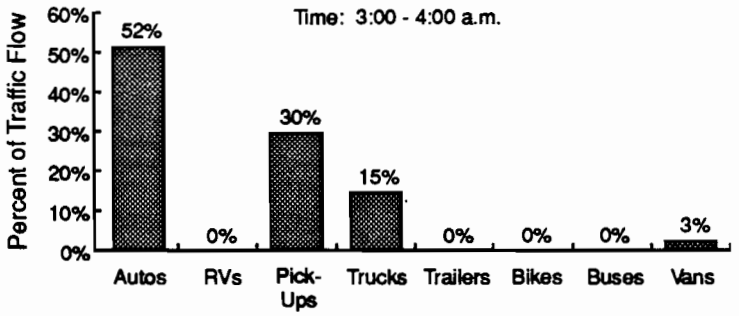

Fig F.37. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

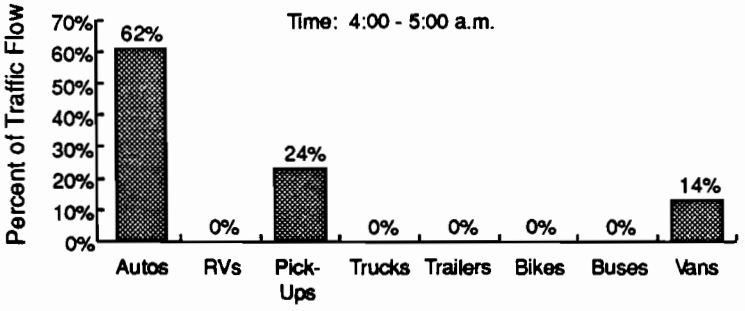

Fig F.38. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

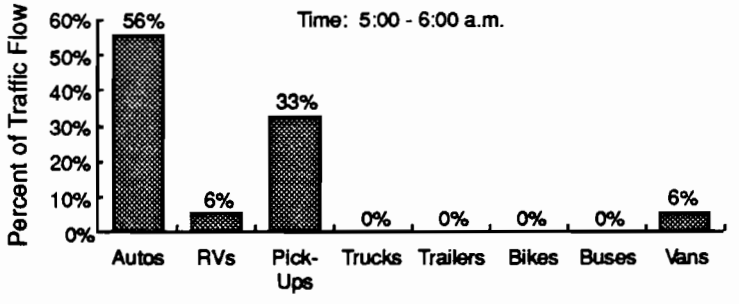

Fig F.39. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

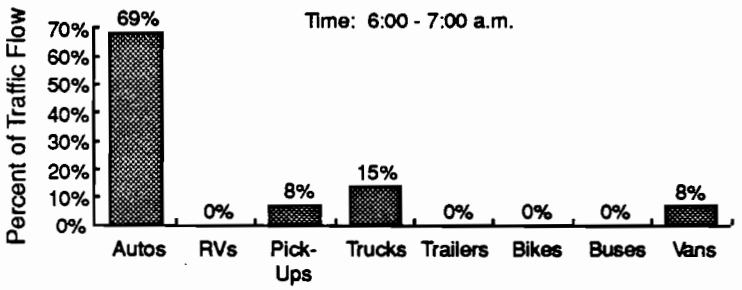

Fig F.40. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

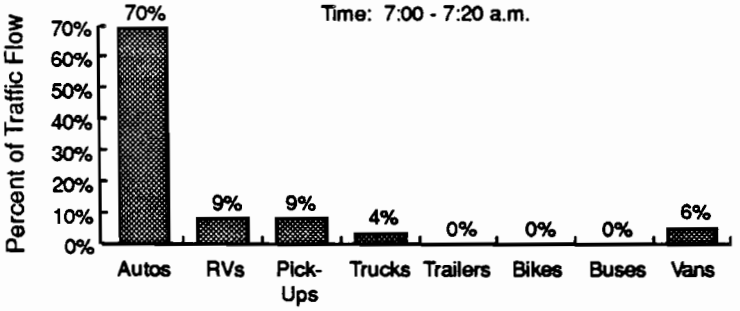

Fig F.41. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated

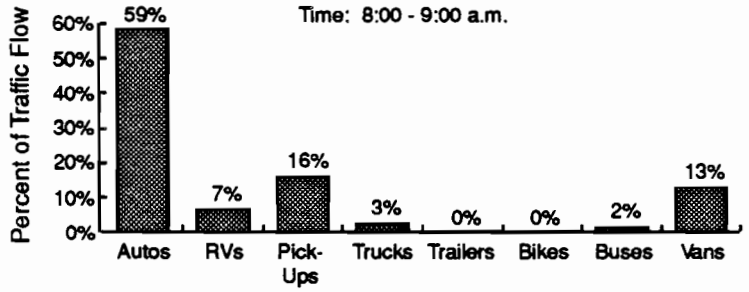

Fig F.42. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

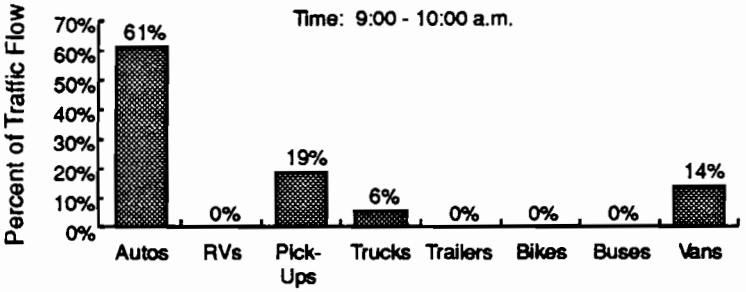

Fig F.43. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

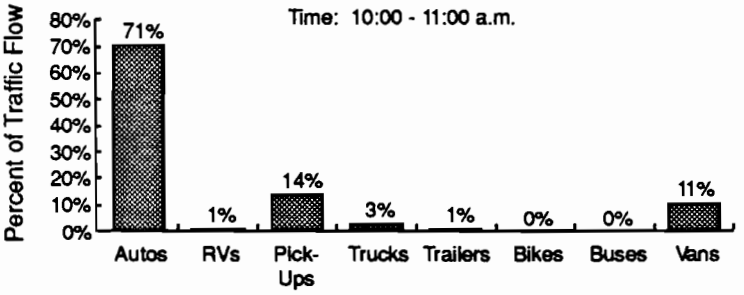

Fig F.44. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

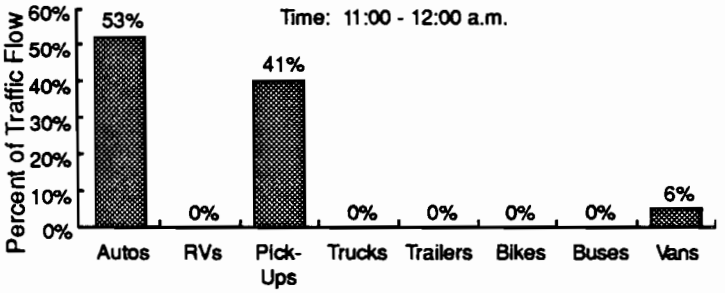

Fig F.45. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

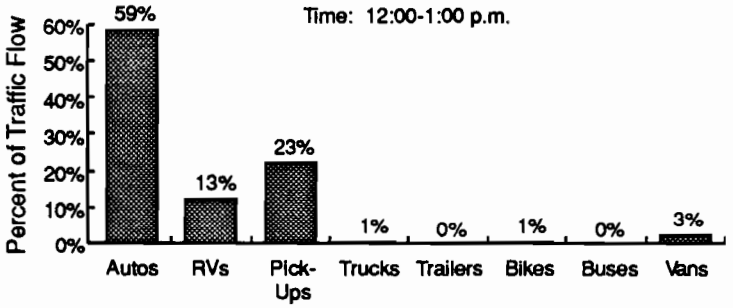

Fig F.46. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

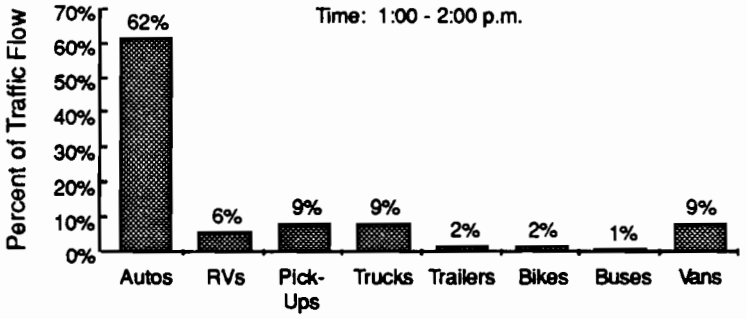

Fig F.47. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

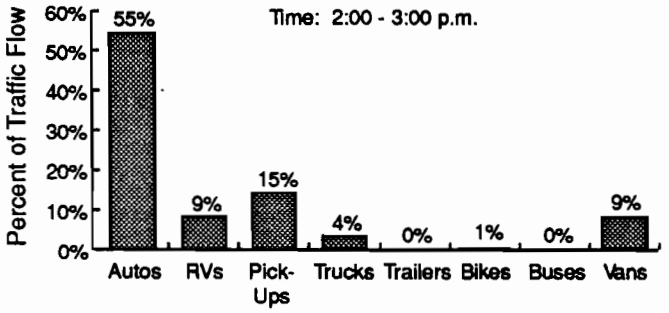

Fig F.48. Hourly percentage, by category, of vehicles diverting to the rest area (tabulated hourly).

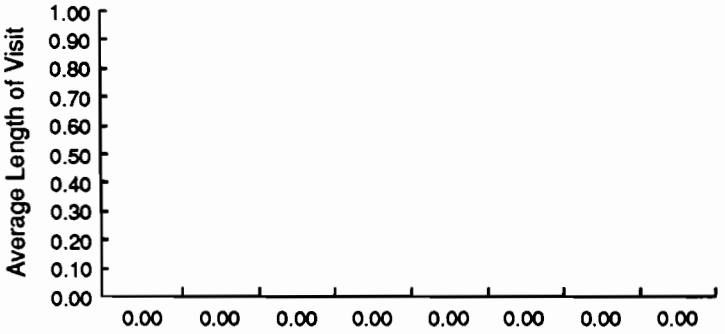

Fig F.49. Summary of average time spent in rest area, by vehicle category (averaged over the entire period).

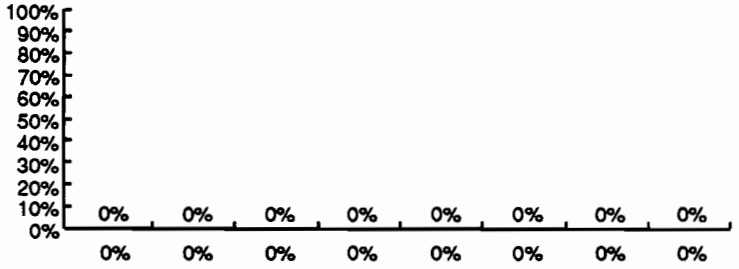

Fig F.50. Summary of percentages, by vehicles diverting to the rest area vehicle categories, of the total of vehicles diverting to the rest area (averaged over the entire test period).

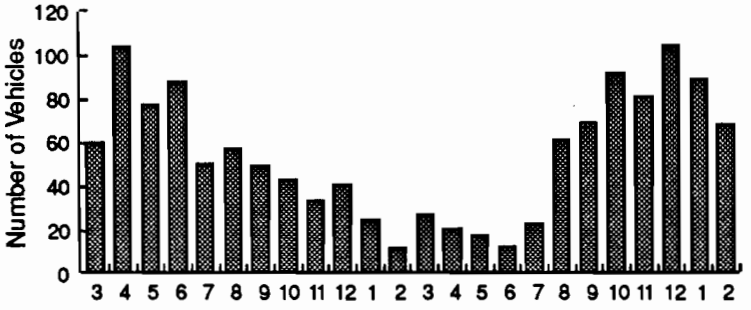

Fig F.51. Number of southbound vehicles diverting to rest area.

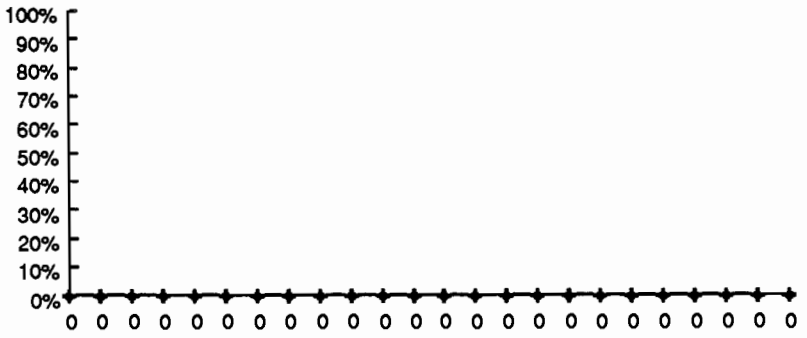

Fig F.52. Percentage of southbound traffic diverting to rest area.

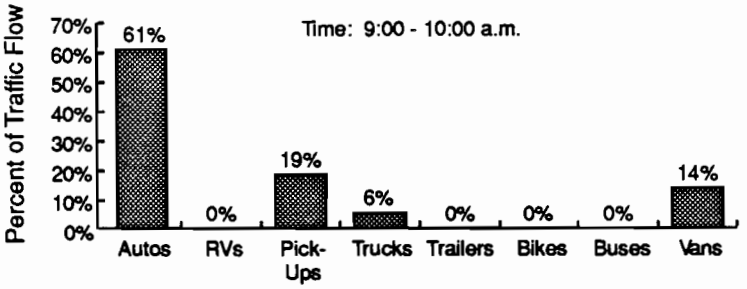

Fig F.53. Rest area interview form.

Facility Used	Condition		
	Good	Fair	Poor
Men's Room	56%	38%	6%
Women's Room	55%	37%	8%
Drinking Water	84%	16%	0%
Telephone	88%	12%	0%
Litter Containers	94%	6%	0%
Vending Machines	70%	23%	7%
Tables or Benches	92%	8%	0%
Grill	95%	5%	0%
Maps	100%	0%	0%
Dump Station	100%	0%	0%
Exercise Pets	90%	10%	0%
Other	100%	0%	0%

Distance of Trip			
0-50	50-100	100-150	150-200

Distance Traveled Since Last Stop			
0-50	50-100	100-150	150-200

Purpose of Trip	Percent
Business	17%
Driving to or from Work	3%
Vacation	60%
Other	19%

Where stop if not here?	Percent
Next Service Station Available	39%
Next Rest Area or Park	13%
Next City or Town	23%
Shoulder of the Highway	12%
Other	12%

How did you learn of this rest area?	Percent
Located from Map	2%
Located from Road Signs	57%
Known from Previous Visits	39%
Other	1%

Fig F.54. Tabulation of rest area user responses to survey questions.