RECOMMENDED ACTION AND JUSTIFICATION:  (Policy Item: Yes___  No_X___)

The Public Works Department recommends that the Board of Supervisors accept the Administrative Study for the Vehicle Maintenance Division prepared by Marty Allan and completed in June, 1992.

This study has formed a basis of direction for implementation of better personnel and facilities utilization, inventory control, maintenance systems, record keeping and overall operating procedures.

BACKGROUND AND HISTORY OF BOARD ACTIONS:

The County entered into a Personal Service Agreement with Marty Allan for this study in April, 1992. The scope of the study was to analyze and make recommendations on the current structure and strengths and weaknesses of the Vehicle Maintenance Department. Also, vehicles records were analyzed for levels of maintenance and operating costs.

We feel that Mr. Allan’s report will be very valuable in making decisions for a stronger and more efficient operation. We have already implemented a number of suggestions.

LIST ALTERNATIVES AND CONSEQUENCES OF NEGATIVE ACTION:

Do not approve the report and recommendations; the personnel and operating standards will not be as efficient and cost effective.

COSTS:  \(\) Not Applicable
A. Budgeted current FY $ 
B. Total anticipated costs $ 
C. Required additional funding $ 
D. Internal transfers $ 
SOURCE:  \(\) 4/5th Vote Required
A. Unanticipated revenues $ 
B. Reserve for contingencies $ 
C. Source description: Balance in Reserve Contingencies, if approved: $

SPECIAL INSTRUCTIONS:
List the attachments and number the pages consecutively:

Vehicle Maintenance Administrative Study

CLERK'S USE ONLY
Vote - Ayes: 5  Noes:  0
Absent:  0  Abstained:  0
\(\) Approved \(\) Denied
\(\) Minute Order Attached \(\) No Action Necessary
The foregoing instrument is a correct copy of
the original on file in this office.
Date:  
ATTEST:  MAKGIE WILLIAMS, Clerk of the Board  
County of Mariposa, State of California  
By:  Deputy  

ADMINISTRATIVE OFFICER'S RECOMMENDATION:
This item on agenda as:
\(\) Recommended  
\(\) Not Recommended  
\(\) For Policy Determination  
\(\) Submitted with Comment  
\(\) Returned for Further Action

Comment:

A.O. Initials:

Action Form Revised 5/92
VEHICLE MAINTENANCE

An Administrative Study

for

Mariposa County Public Works

prepared by

Marty Allan

June 1992
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Mignon Marks

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Tom Striplin
Tim Crafts
Office Staff
1. CURRENT STRUCTURE

A. Background Analysis

Vehicle maintenance in Mariposa County is operated by the Public Works Department and is under the direct supervision of the Deputy Road Director. It is divided into two separate facilities with separate funding. Added to this are approximately 33 fire vehicles that are being maintained by a County employee working at the California Department of Forestry (CDF) Station in Mariposa.

The Vehicle Maintenance Shop

The Vehicle Maintenance Shop is funded by the General Fund and takes care of the maintenance of all non-Road Department vehicles, including the Sheriff’s Department. The Vehicle Maintenance Shop is responsible for the maintenance of approximately 86 vehicles. A preventive maintenance program has been recently put into effect, which is set up to check all vehicles every 5,000 miles or 6 months, whichever comes first. It is the responsibility of the user to bring in the vehicle for service based on a sticker placed in the vehicle at the last service. No contact is made and no notices are sent to the user. Cars may or may not be brought in for service in a timely manner. It is a little hit and miss at this time. Warranty work is taken to the particular dealership and must be scheduled to have someone take the vehicle to the dealership and arrange for a loaner or rental car or have someone from the dealership drive the County personnel back to Mariposa. The shop operates on a four day, ten hour per day basis, open Tuesday through Friday from 7:00 a.m. to 5:30 p.m..

The Road Department

The Road Department is funded through the Inter-Governmental Service Fund (IGS) and is responsible for the maintenance of all County roads and the heavy equipment and vehicles used in maintaining the roads. The Road Department’s vehicle maintenance program is more of the emergency repair type. They do not currently have a formal preventive maintenance program. The new supervisor is trying to put together some type of regular maintenance schedule at this time, but is looking for help based on the recommendations made in this report. The shop operates on a four day, ten hour per day basis, open Monday through Thursday from 7:00 a.m. to 5:30 p.m.
The County Fire Department

The County Fire Department is currently using the maintenance facilities of the California Department of Forestry in Mariposa to handle any maintenance that may arise. A Road Department employee was hired by the County to handle the day-to-day maintenance of the engines and has been assisted by mechanics from CDF to handle any major overhauls or repairs. Oil changes, filters, and some minor repairs are being done at the respective fire stations by the volunteer fire fighters and the mechanic. Funding is through the General Fund. Operations are on a five day, eight hour a day basis, Monday through Friday. Information on the maintenance records of the engines and equipment appear to be non-existent or very hard to obtain. The only information available at this time is the total cost of maintenance and wages.

B. FACILITIES ANALYSIS

The Vehicle Maintenance Shop

The Vehicle Maintenance Shop is a three bay, 65 x 40 foot, facility that is used for the repair and maintenance of light trucks and sedans in the County fleet. Currently, all repairs are done on the premises except bodywork and transmissions. The shop uses a manual lubing system as well as a manual parts washing system. Used oil is collected in a 550 gallon tank and is picked up by a recycling firm once it is full. Battery cores are exchanged by the supplying vendor. Antifreeze is recycled at the shop by certified employees. Tires that have bad cores and cannot be recapped are taken to the dump for disposal. There is a comprehensive inventory of parts stored on the premises. The shop has two storage areas but lacks a security or check system to insure the integrity of the inventory. Currently, personnel includes a supervisor and a mechanic. On a chargeable time basis this amounts to approximately 1-1/2 mechanics.

The Road Department

The Road Department shop is a three bay, 80 x 100 foot, facility that is used for the repair and maintenance of 122 pieces of heavy equipment, 25 light trucks and one sedan used for County road maintenance. This facility has been pushed to its limits with the amount of major overhauls needed due to a lack of a preventive maintenance program over the years. Currently, two of the three bays are being used to overhaul trucks and equipment, reducing the facility to one bay to take care of the day-to-day maintenance and repairs. In good weather, some repairs are done outside of the building, but this is inefficient because of the tools and equipment needed to do the work. This shop is manned by a Supervisor, a level I Mechanic and a Mechanics helper. Maintenance of the Road Department fleet is terribly behind due to budget constraints and the lack of qualified personnel.
The County Fire Department

The CDF facility being used by the County Fire Department has only two bays. Major repairs on County fire trucks are done at these facilities with the aid of CDF mechanics. Minor repairs and "preventive maintenance" are usually done at the individual fire stations because of the limited space at CDF. The mechanic spends a great deal of his time driving to and from the fire stations to do his job. CDF has informed me that, as of October 1, 1992, the County will no longer be able to use the facilities for repairs due to the "lack of space" and that they no longer have a contract with the County. Other alternatives will have to be explored, such as, bringing the fleet into the County fleet management system.

C. INVENTORY ANALYSIS

The inventory is kept in at least two places in each shop; in addition, excess tires are stored in a separate shed. Some items are duplicated between the two shops since both work on light trucks. Both shops have excess inventory due to over ordering. Neither shop has an inventory control system that indicates reorder points or reorder quantities; ordering is left to the judgement of the individual floor supervisors. There isn't a formal purchase order or requisition system in operation. Purchases under $100.00 can be made by the floor supervisor without any other approval. Purchases over $100.00 must have three price quotes and be approved by the next level of supervision. According to the information available, the only time purchase orders are used is when a vehicle is purchased. Materials are received by the individual shops and are either put into inventory or directly on a vehicle. The receivers or invoices are held at the shops and turned in to the office twice monthly. Materials that are put directly on a vehicle or piece of equipment are shown as direct-charge, "DC", on the repair order or invoice. This has been a source of confusion with the accounting department since they were picking up the charges in two places; once on the repair order and once from the invoice or receiver.

The Vehicle Maintenance Shop

The inventory records are non-existent in this shop. The shop thought that the office was taking care of inventory and the shop thought the shop was keeping the inventory. It wasn't until I asked to see the records that the error was discovered. As a result, no current inventory records are available. A physical inventory will be taken at the end of the fiscal year, June 30th, to determine the level of inventory and to set it up on the computer. Materials are delivered by some suppliers on a weekly basis. If parts are needed at other times they are either picked up by a County employee, usually the supervisor, or sent by the Via Bus.
The Road Department

Inventory is in several places in this shop. There are two small storage rooms on the main floor and a large storage area over the offices and other storage areas. The two small rooms are set up on a bin system that helps keep the inventory straight. The upstairs storage area was organized by the previous supervisor who knew the location of everything. He has since retired and no one knows what is actually there, since items were never marked by location. A cardex system has been used for at least twenty years and was previously maintained by the shop. The records are currently being maintained in the office. As with the other shop, receivers and invoices are held in the shop and turned in twice monthly. Receivers and usage do not get posted to the inventory cards until after the invoice has been paid and the repair orders posted to the time cards and the IGS Equipment Service and Repair Records. This process could take as long as a month and the records would not reflect what has actually taken place. In reviewing the inventory cards, I found that some of the items have been on the shelf for over twenty years and that many of the items are obsolete or the equipment or vehicle that it was originally ordered for, had been sold. The auditors have expressed an opinion that the storage area should be secured to insure the integrity of the inventory. A physical inventory will be taken of this shop at the end of the fiscal year, June 30th, and be transferred to the computer system.

The County Fire Department

No inventory is kept for the County Fire Department. Parts and supplies are ordered on an as need basis by the mechanic at the time of the repair or maintenance.

D. PERSONNEL

The Vehicle Maintenance Shop

This shop has an Equipment Mechanic Supervisor and an Equipment Mechanic. The mechanic seems to be doing most of the chargeable work in this shop. The supervisor’s chargeable time amounts to approximately forty to fifty percent. Reasons for lack of chargeable time include: telephones, parts runs, scheduling, running tools between shops and other miscellaneous items. It appears that better utilization of his time would increase his chargeable hours and benefit the County. Vacation scheduling causes problems in covering the maintenance requirements of this shop. This shop operates six weeks out of the year with only one mechanic. The Road Shop helps when they can but they have their own problems to deal with.

The Road Department

This shop is manned by a newly named Equipment Mechanic Supervisor, an Equipment Mechanic I and an Equipment Mechanic
Helper. Major changes have taken place over the past nine months in this shop. The previous supervisor retired last year and an interim supervisor was named to temporarily head the department. In May, the County hired a full-time supervisor who was one of the equipment mechanics. This left a void in the department for "qualified" mechanics. The current staff does not have the technical training to do the required repairs without a great deal of supervision, causing this shop to get further behind each week. Vacation scheduling is also a problem in this department since qualified trained mechanics are virtually non-existent, except for the supervisor. Changes will need to be made to the composition of this staff if they are to meet the challenges of the repairs and maintenance of the fleet. A combination of a comprehensive training program and/or new personnel will be required to accomplish the task.

The County Fire Department

Changes in the structure of the fire department have recently been made. The supervision of the maintenance of the fire equipment came under the control of CDF, through an agreement with the County. The County provides funds and a mechanic to handle the repairs and maintenance, with CDF mechanics helping on major repairs. In the first quarter of this year, the Board of Supervisors decided they would hire their own Fire Chief to handle the County Fire Department. Since that time, the mechanic has basically been on his own without direct supervision. His job has been to handle the day-to-day maintenance of the fire vehicles. Currently he travels to the individual fire stations to do minor repairs and to take oil and filters to the volunteers so they can do the "preventive maintenance" on the equipment. He spends a great deal of his time driving between CDF and the fire stations. Any major repairs are still being done at the CDF repair facility, but this will be changing soon.

E. CURRENT OR POTENTIAL PROBLEMS

Computer and Software

The County purchased a computer system and software in 1988 to provide information on inventories, vehicle maintenance, road maintenance, cost accounting and payroll in one manageable system. Updates have been received on a regular basis and have been installed on the system. Currently, only one person has the knowledge to use the capabilities of the system; he is also responsible for another function. To date, the system is still not fully operational and will need to be expanded to the shops if it is going to be used to its potential. It appears that it will require a major effort and additional training of personnel if this program is to be of any use.
Preventive Maintenance

The age of the fleet and the equipment and lack of a comprehensive preventive maintenance program is taking its toll in increased repair cost and labor. Several vehicles are currently "out-of-service" because of safety violations. These must be corrected soon or the County will be cited by the State for non-compliance. A comprehensive preventive maintenance program must be established to address the safety issues, as well as the California Highway Patrol safety inspections.

Housekeeping

In the Road Department, housekeeping needs to be improved dramatically just for health and safety reasons. Additional equipment will be needed, such as a vacuum system, exhaust ventilation system and an overhead lube system to help alleviate the potential health and safety problems. The Vehicle Maintenance Shop will also require additional equipment to help alleviate potential health and safety problems. Overall, the Vehicle Maintenance facility is in much better shape as far as general housekeeping and appearance.

Inventory Management

The inventory management system now in place needs a major overhaul of its own. No inventory records are available for the inventory currently stored at the Vehicle Maintenance Shop. A less than efficient cardex system is being used by the Road Department where, at any given time, the card inventory and the actual inventory won’t agree because of the time lag in recording receipts and usage. Inventories are accessible to anyone who walks into either shop. State auditors have suggested that the inventory be secured to prevent items not being accounted for properly. There is a need to consolidate inventories and to set reorder points and reorder quantities to eliminate excess and duplicate inventories. Ordered quantities are at the discretion of the supervisor and may or may not reflect how much is required to do the job or how much safety stock should be on the shelf.

Communications

Philosophical and personality conflicts seem to have reduced the level of communication between the shops and management. Input must be give and take, with both sides listening to each other. Structural changes in the reporting system might help alleviate areas of conflict and upgrade morale.

F. STRENGTHS

The strengths seem to be in the abilities and knowledge of the current supervisors and the willingness of the other personnel to do what is needed to get the job done under budget and
facilities constraints. Each of the supervisors appears to be well versed in his area of responsibility and would provide valuable information in implementing a training program. The mechanic in the Vehicle Maintenance facility is well qualified to handle most repair problems and carries the work load in that shop. The office support staff, while able to handle the current work, would be more valuable if used in the shops to handle paperwork, telephones and parts runs to enable the mechanics to do what they were hired for - maintain and repair vehicles and equipment.

The Vehicle Maintenance facility is relatively new and is kept clean, which makes for a better and safer work environment. Additional equipment such as an exhaust ventilation system and overhead lube system would increase the efficiency and safety of the facility.

6. **Weaknesses**

   **Direction**

   There seems to be a general lack of direction or leadership within the vehicle and equipment repair facilities. Several factors have contributed to this situation: 1) Management changes have been frequent over the past year, lending to the confusion, 2) Neither department has a defined procedure manual to give any direction, 3) Communications have been perceived as one way, from top down; no exchange of ideas or listening to what is being said.

   **Computer**

   Implementation of the information system to handle inventory, repairs, maintenance, costing and tracking of the vehicle maintenance function has not been completed. This process was started four years ago and desperately needs to be completed. Currently only one person knows how the system works and he doesn’t use it. Training of additional personnel will be required before the system can become functional. The shops are not connected to the computer system at this time, but should be on-line to eliminate duplication of effort and to facilitate management.

   **Inventory**

   The securing and tracking of the parts inventory needs to be improved. Currently, inventory is received and put on the shelf or on a vehicle. No record of the transaction is kept by the shops, except, possibly, on the repair order. All parts received should go through the inventory system whether they are for shelf stock or a specific vehicle. Receivers are turned in to the office twice monthly and in the case of the Vehicle Maintenance Shop, the bills are prepared for payment but no record of the inventory is made. The receivers for the Road
Department are turned in twice monthly also and are prepared for payment, then the inventory is posted; this process could take as long as a month. All receivers should be posted daily and be turned in to the office on a daily basis, eliminating the chance for them to get lost or misplaced in the shops.

Storage areas are open to anyone who comes into the shops and not all of the items are identified. Excess and obsolete inventory has accumulated as a result of the lack of controls. An effort is currently underway to identify and reduce the amount of obsolete items.

Training

There is an apparent need for a formalized training program for mechanics, especially in the Road Department Shop. Some of the current personnel do not have the training or experience to make required repairs without extensive direct supervision. This problem has reduced the overall efficiency of the department and has led to a backlog of work. When vacations are scheduled, there aren’t enough qualified mechanics to handle the workload.

Facilities

The Road Department Shop is a health and safety hazard. It appears to be in violation of Cal OSHA Title 8 of the California Code of Regulations for housekeeping and ventilation. The shop will need to be expanded or better facility utilization will be required to service the current fleet and the addition of the fire vehicles. The Vehicle Maintenance Shop is in better shape but could also be required by law to install some type of exhaust ventilation system.
H. CURRENT ORGANIZATION STRUCTURE

Deputy Dir. Roads
  └── Acct. Clerk
    ├── Vehicle Maint. Supervisor
    │   └── Vehicle Maint. Mechanic
    │       └── Heavy Equip. Mechanic
    │           └── Heavy Equip. Mechanic I
    └── Heavy Equip. Supervisor
         └── Heavy Equip. Mechanic I
              └── Heavy Equip. Helper

Fire Chief
  └── Fire Dept. Mechanic

I. ACCOUNTING

The Vehicle Maintenance Shop

Costs are accumulated by the vehicle identification number. Time and materials are taken from the repair orders. Fuel is taken from the monthly cardlock bill. Charges made on the Chevron credit cards cannot be tracked at this time to the individual vehicle since the vehicle identification number is not being put on the charge ticket by the user.

Rental fees are charged to each department based on the mileage of the assigned vehicles or any pool vehicles that are used. Rental fees are established annually and include: operations & maintenance, depreciation, overhead, insurance and fuel costs. The mileage figures are calculated from the monthly fuel bill.

The Road Department

Costs are accumulated from trip sheets, repair orders, time cards and fuel logs and summarized on the IGS Equipment Service and Repair Record on a monthly basis. For the local road crews, fuel is purchased locally at the cardlock facility. Outlying
maintenance crews get their fuel from bulk fueling stations located in specific areas of the County and track their consumption on special forms.

At the end of each month, all charges are summarized and entered into the computer for invoicing. Invoices are generated listing labor costs, equipment rentals and materials used. A 5% administration fee is added to the total cost. Invoices are then sent to the various agencies and departments.

J. SIMILAR PROGRAMS

In conducting this study, several types of facilities and agencies were contacted, some were visited to see how they handled their vehicle and equipment maintenance. A common trend among them was the fact that all of the agencies have successful preventive maintenance programs.

Yosemite National Park Maintenance Facility

Yosemite National Park has a very diversified fleet similar to that of Mariposa County, only on a larger scale. They are responsible for the maintenance and repair of all fleet vehicles, road equipment, generators and fire equipment.

Their facility is basically one big old building that houses the parts inventory, fabrication, tire repairs and painting in addition to enough space to work on six or seven pieces of equipment or vehicles at one time. Their situation is a little unique in that part of their fleet, 217 vehicles, is controlled by GSA from Sacramento. GSA sends computer printouts for each vehicle for the scheduling of maintenance and repairs. This fleet increases by 20 to 25 vehicles during the summer tourist season. In addition to this fleet, the Park Service (Department of Interior) fleet has another 275 vehicles and 15 generators.

Servicing of the fleet and equipment is done by a team of seven mechanics and three helpers. Three of the team specialize in minor repairs, lubes and oil changes. One to two of the team are used for fabrication and welding. According to maintenance supervisor, Ken Fipps, the majority of the mechanics time, approximately 80%, is spent on preventive maintenance. Minor dents and scrapes and minor painting are also done at the same time to keep the equipment and vehicles looking new. The service team works staggered shifts to be sure of full-time coverage. The shifts consist of five days at nine hours per day then three days at nine hours per day and one day at eight hours for a total of 80 hours in a two week period. During the winter months, some of the crew are scheduled to work on the weekends to provide service for the snow removal equipment. The mechanic to vehicle ratio is approximately one mechanic to 50 vehicles and equipment. Service intervals are strictly enforced and follow the manufacturers guidelines. Additional personnel includes an office clerk who is currently handling the
scheduling, billing and parts inventory. They are in the process of hiring a parts clerk.

Billing is done on a flat rate basis using the Mitchell Parts/Labor Estimating Guide for time and parts pricing. By using flat rates as a pricing tool, they sometimes make money if they beat the time or they could lose money if the job takes longer. They stock a one week supply of most parts. The majority of their supplies for preventive maintenance comes from Mariposa Auto Parts (NAPA), who makes weekly deliveries on Tuesday. For ordering convenience, NAPA has installed a computer terminal at the Park that can access the inventory at the Mariposa store to determine availability and price. Orders can be placed through the terminal. According to Ken Fipps, prices are comparable or lower than in Fresno.

Mariposa Unified School District

The vehicle maintenance facility, "Bus Barn" as it is called, handles approximately 45 full-size buses, seven mini-buses, 50 other cars and pickup trucks for the School District. They also handle the annual inspection for two fire vehicles for the Mariposa Public Utility District. Like most of the other facilities interviewed, they are struggling with space limitations. The main shop has three bays and a pit, but at times, are limited to only one bay due to the particular type of repair job. The pit is used mainly for regular preventive maintenance and Biennial Inspection of Terminals, "BIT" inspections, required by the California Highway Patrol for "regulated" vehicles. This work is usually handled by the same mechanic all of the time.

The outside facilities consist of three additional covered bays, a tire changing area and a wash rack. They have four certified mechanics, three helpers and a foreman. The foreman is responsible for ordering all parts, scheduling and management of the facilities.

They keep at least one complete set of everything for the buses, (i.e. brakes, drums, wiper motors, seats etc.). They like to keep a one week supply of all regular maintenance items: plugs, points, filters and hoses. Parts for the buses usually have to be ordered from the manufacturer and take time to get. Maintenance items are purchased locally from Mariposa Auto Parts (NAPA).

Being regulated vehicles, bus maintenance is done every 1,000 miles or 45 days, whichever comes first. The School District has had a preventive maintenance program in place for fifteen years and has seen their overall repair cost and labor go down over the years. They depreciate the buses at 200,000 to 250,000 miles, depending on the shape, and all other vehicles at 100,000 miles. The mechanics work five-eight hour days, but work staggered shifts enabling the shop to be open from 6:00 a.m. to
7:00 p.m. Monday through Friday. Shifts run from 6:00 a.m. to 3:00 p.m., 8:00 a.m. to 5:00 p.m. and 10:00 a.m. to 7:00 p.m.. They farm-out all body work, radiators, transmissions, painting, alignments and turning of brake drums.

The California Department of Forestry

The California Department of Forestry follows a very stringent vehicle inspection and maintenance program. They have four levels of inspection for their vehicles and equipment:

1) **Vehicle Safety Inspection** is done annually on every vehicle by the Unit Fleet Manager. 2) **Compliance Inspection** is done on all crew carriers, fire engines and "regulated vehicles", this is done every 90 days in addition to any other inspections.

3) **Administrative Inspection** is done by the Unit Manager on every vehicle, with the frequency determined by the vehicle identification group. 4) **Preventive Maintenance** by group: Group

1) light equipment operating under normal highway conditions, and at relatively high mileage, every 4,000 miles or 90 days, "A" & "B" service (see Appendix A). Group 2) all vehicles over 1-1/2 ton and any/all "regulated vehicles", every 1,000 miles or 30 days, Group 3) construction and miscellaneous field equipment, manufacturer’s recommendations not to exceed six months or 150 hours for oil changes. All other services annually.

The County of Merced

The County of Merced is very similar to Mariposa in that they have separate vehicle maintenance facilities: Vehicle Fleet Maintenance and Road Department/Heavy Equipment Maintenance. They have virtually the same size vehicle maintenance shop, a well equipped three bay facility, but are responsible for more vehicles, 341 vehicles and 88 other pieces of equipment such as, old vehicles, lawnmowers etc. They are staffed with a Fleet Maintenance Manager, one Auto Mechanic I, two Auto Mechanic II, one Auto Mechanic III and a Parts Clerk. This represents a ratio of one mechanic per 85 vehicles.

The Road Department is responsible for approximately 400 pieces of equipment and 18 transit buses with a staff of seven mechanics, including a working supervisor. This equates to a ratio of approximately one mechanic per 67 vehicles. Their mechanics are all sent to classes for certification and licensing. They have an 80 x 300 foot facility with twelve bays: two for lube, two for car maintenance, two hoist (10 wheelers), one for fabrication and five drive-throughs for maintenance and repairs. The County is trying to combine the two facilities to eliminate duplication of personnel, have one parts inventory and improved use of facilities.

The preventive maintenance program has been in place for over fifteen years and has proved to be a major factor in the overall cost reduction for vehicle maintenance and repairs. Regulated
vehicles, ten passenger vans, are serviced every 45 days or 3,000 miles. All other vehicles, including Sheriffs cars, are serviced every 5,000 miles or six months. Brake pads and tires are changed every 10,000 miles on the police vehicles. All vehicles use unleaded regular fuel and 20/50 weight oil, including the police vehicles.

The inventory and billing systems are completely computerized by their in-house programmers. The maintenance files are still being done manually, but are in the process of being computerized. All repairs and maintenance are charged at a flat rate fee using the Mitchell Part/Labor Estimating Guide. As with the case of Yosemite Park Service, Merced County makes money if they beat the standards or could lose money if the job takes longer. Assigned vehicles are charged to the respective departments or agencies at a minimum of 400 miles per month for operations and maintenance and 1,200 mile per month for fleet service replacement. Depreciation is based on 100,000 miles or seven years. Pool vehicles are charged at a flat rate plus mileage. Special equipment is charged at cost. Each department is responsible for reporting the mileage of each vehicle assigned to them at the end of each month.

The County has set up a special Vehicle User Technical Advisory Committee made up of the ten predominate user departments. This Committee is headed by the Transportation Manager and meets on a quarterly basis. The Committee is responsible for ratifying the rates before they are sent to the Board of Supervisors for approval. They also "air out" any concerns they might have regarding maintenance problems or rates. Any"reasonable" request will usually be implemented. The Public Works Director has the final say.
2. RECOMMENDATIONS

The following recommendations are the result of a six week investigation that included extensive research and interviews with various agencies and departments in and out of the County. The recommendations are a starting point for increased efficiency, user satisfaction and management control for vehicle maintenance within the Public Works Department. Some recommendations can be implemented immediately, others will take time.

A. Organization Structure

Organizationally, there is a need to centralize control of vehicle fleet maintenance. The first thing that needs to be addressed is the need for a Fleet Operations Manager that would report to the Assistant Director of Public Works with overall responsibility for maintenance of all vehicles and equipment under County jurisdiction. Under the Fleet Manager should be a Maintenance Supervisor responsible for supervising the work in both shops. An Administrative Clerk responsible for telephones, data entry, parts inventory and other miscellaneous duties, should be added to the shop area freeing, the mechanics to work on vehicles. Based on the Personnel Requirements in the following section, two full-time qualified mechanics are needed in the Vehicle Maintenance Shop, if my recommendations are implemented, bringing the Road Department and Fire Department light trucks under the Vehicle Maintenance Shop. In the Road Department Shop, three full-time qualified mechanics and a full-time helper will be needed to handle the workload. This amounts to a total of nine people in the Fleet Maintenance Department. These nine people have already been included in the proposed 92-93 Fiscal Year Budget in one area or another. It becomes a matter of revising where they are in the organization.
B. Personnel Requirements

Based on a review of the equipment maintenance records from July 1991 to May 1992 and adjusting for twelve months, but without current information on fire engine maintenance, the following manning would be required.

The Vehicle Maintenance Shop

The Vehicle Maintenance Shop is projected to spend approximately 2900 hours for repairs and maintenance on a fleet of 86 vehicles, which averages 33.7 hours per vehicle. A mechanic has approximately 1670 hours of chargeable time available per year. This takes into account vacations, holidays, sick time and non-chargeable time. This calculates out to require 1.7
mechanics to provide maintenance services for the fleet. Under the current structure, one mechanic and one supervisor, you have approximately 1.2 mechanics based on chargeable hours. The time recorded by the mechanics does not include time spent by community service people and trustees that help do general maintenance on vehicles. Without this help, additional time would have to be added to the overall time required by the mechanics. If the Vehicle Maintenance Department takes over the maintenance of the light trucks in the Road Department and the Fire Department, it would add 27 more vehicles to be serviced. This year, due to age of the vehicles in the Road Department, it took approximately 1027 hours to maintain 25 vehicles, which averages 41.1 hours per vehicle. By adding these vehicles to the Vehicle Maintenance Shop, it would require 2.3 mechanics, equating to two full-time qualified mechanics and 30% of the supervisor’s time. Average times spent for maintenance by vehicle classification are shown in Table 1.

### Average maintenance hours/vehicle by Vehicle Classification

<table>
<thead>
<tr>
<th>#of Veh.</th>
<th>Classification</th>
<th>Hours/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Standard Sedan</td>
<td>14.7</td>
</tr>
<tr>
<td>4</td>
<td>Sheriff Sedan, Admin. &amp; UC incl. Sinclair</td>
<td>36.6</td>
</tr>
<tr>
<td>3</td>
<td>Sheriff Sedan, Admin. &amp; UC w/o Sinclair</td>
<td>14.0</td>
</tr>
<tr>
<td>16</td>
<td>Sheriff Patrol</td>
<td>37.8</td>
</tr>
<tr>
<td>14</td>
<td>Sheriff 4 x 4’s-Blazers &amp; Pickups</td>
<td>53.4</td>
</tr>
<tr>
<td>2</td>
<td>Sheriff 4 x 4’s-Blazers UC</td>
<td>19.8</td>
</tr>
<tr>
<td>1</td>
<td>Animal Control Truck</td>
<td>21.0</td>
</tr>
<tr>
<td>3</td>
<td>Search &amp; Rescue</td>
<td>6.2</td>
</tr>
<tr>
<td>7</td>
<td>Small Pickups</td>
<td>8.0</td>
</tr>
<tr>
<td>7</td>
<td>Small 4 x 4’s</td>
<td>12.3</td>
</tr>
<tr>
<td>3</td>
<td>Standard Pickups</td>
<td>18.4</td>
</tr>
<tr>
<td>5</td>
<td>Standard Pickups 4 x 4’s</td>
<td>21.4</td>
</tr>
<tr>
<td>8</td>
<td>Standard 4 x 4’s-Blazer, Bronco</td>
<td>14.6</td>
</tr>
<tr>
<td>2</td>
<td>Vans</td>
<td>17.1</td>
</tr>
<tr>
<td>3</td>
<td>Buses</td>
<td>67.0</td>
</tr>
<tr>
<td>2</td>
<td>Station Wagons</td>
<td>25.8</td>
</tr>
<tr>
<td>1</td>
<td>1 Ton Truck</td>
<td>46.8</td>
</tr>
</tbody>
</table>

Table 1

The Road Department

The Road Department vehicle maintenance is projected to spend approximately 4900 hours of mechanics time for repairs and maintenance on a fleet of 76 vehicles and 70 other pieces of road equipment. Of this time, 4720 hours were spent on the 76
vehicles, amounting to an average of 62.1 hours per vehicle. Several of the vehicles included in these hours are still not finished and will require many more hours to complete. Based on 1670 hours available per year per mechanic, it will require 2.95 "qualified" mechanics to service the fleet. By moving the 25 light trucks to the Vehicle Maintenance Shop, 1027 hours would be reduced from the repair time, leaving 3873 hours of maintenance and repairs on the heavy equipment. Many of the hours expended this year have been on MAJOR overhauls on outdated equipment: 190 hours on the sign shop truck, 28.0 to 316.0 hours spent on each of the old dump trucks and some are still not repaired; the average for these alone is over 200 hours each, which has required the time of 1.3 full-time mechanics. Once the equipment is repaired or replaced, the repair time should be substantially less, allowing more time for preventive maintenance. By adding approximately 33 fire engines, it would raise the total maintenance hours to 5,000, requiring a minimum of three full-time "qualified" mechanics plus a mechanic's helper. The current Fire Department mechanic can be brought into the Road Department Shop as one of the mechanics. Table 2 shows the average time spent for repairs by Equipment Classification.
### Average maintenance hours/equipment by Equipment Classification

<table>
<thead>
<tr>
<th># of Units</th>
<th>Classification</th>
<th>Hours/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Standard Pickups</td>
<td>50.4</td>
</tr>
<tr>
<td>9</td>
<td>Standard Pickups 4 x 4's</td>
<td>19.3</td>
</tr>
<tr>
<td>1</td>
<td>Sedan</td>
<td>30.6</td>
</tr>
<tr>
<td>4</td>
<td>Backhoe-Loader</td>
<td>10.2</td>
</tr>
<tr>
<td>7</td>
<td>Graders</td>
<td>60.4*</td>
</tr>
<tr>
<td>6</td>
<td>Loaders-Crawler</td>
<td>8.1</td>
</tr>
<tr>
<td>5</td>
<td>Pumps-Water</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>Pumps-Water (Wheeled)</td>
<td>0.0</td>
</tr>
<tr>
<td>3</td>
<td>Rock Rakes</td>
<td>7.8</td>
</tr>
<tr>
<td>4</td>
<td>Snow Flow, Blades &amp; Rotary</td>
<td>40.4</td>
</tr>
<tr>
<td>4</td>
<td>Snow Flow</td>
<td>26.4</td>
</tr>
<tr>
<td>3</td>
<td>Spreaders, Buckeye</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>Sweepers (Towed)</td>
<td>0.0</td>
</tr>
<tr>
<td>1</td>
<td>TD-25 Dozer (130.0 vandalism) Std.</td>
<td>32.4</td>
</tr>
<tr>
<td>2</td>
<td>Trailers-Pipe</td>
<td>0.0</td>
</tr>
<tr>
<td>5</td>
<td>Trailers-Flat Bed</td>
<td>10.0</td>
</tr>
<tr>
<td>9</td>
<td>Dump Trucks (Water)</td>
<td>202.4*</td>
</tr>
<tr>
<td>4</td>
<td>Dump Trucks (Oil Spray)</td>
<td>201.0*</td>
</tr>
<tr>
<td>3</td>
<td>Dump Trucks 10 Ton (new)</td>
<td>11.2</td>
</tr>
<tr>
<td>1</td>
<td>Mower</td>
<td>56.4</td>
</tr>
<tr>
<td>1</td>
<td>Sprayer</td>
<td>39.6</td>
</tr>
<tr>
<td>1</td>
<td>Shop Pickup</td>
<td>27.0</td>
</tr>
<tr>
<td>1</td>
<td>Sign Shop Truck</td>
<td>189.6</td>
</tr>
<tr>
<td>1</td>
<td>Wheeled Loader</td>
<td>23.0</td>
</tr>
<tr>
<td>1</td>
<td>Survey Wagon</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 2

* Some vehicles still require extensive repair.

### C. Facilities

Both shops are currently limited in available space to do the repairs needed. Additional space would be costly to add, especially under the current budget constraints. The ideal scenario would be to construct or add on to a current facility and have all vehicle maintenance under one roof, allowing a central point for the maintenance staff, services, inventory and management. This is a long-term solution and would require a study of it's own, using an Architect and Space and Design Engineer. The immediate solution to the space limitation is in facilities utilization. Instead of all the employees working at the same time, staggered shifts or adding a second shift could be utilized. This type of scenario would actually decrease the overhead by spreading the costs over more hours. Shifts could be overlapped or completely separated. The final decision would
be based on the qualifications of the personnel. Qualified mechanics would be a definite plus for this scenario. By using a second shift or overlapped hours, more work could be done when the equipment is not needed.

D. **Inventories**

With the fiscal year-end approaching, timing is perfect for changing the inventory system over to the computer. Several areas will need to be addressed. The inventories need to be consolidated into one secure storage area. This should help eliminate duplication and excess inventories between the two facilities. Reorder points and reorder quantities need to be established based on costs, availability and usage of each item. All parts received must be put into the inventory system whether they are for shelf stock or immediate use. This will eliminate errors in accounting and will give an accurate picture of the usage. In computerizing the inventory, it will be necessary to set up a new parts numbering system for each item and to cross reference the vendor parts numbers. The vendors parts numbers will not work for identification in the computer system. This will eliminate the number of items required in the system.

An approved vendor list should be compiled showing the name, address, phone number, contact person and the type of items supplied. An effort should be made to buy more parts locally, negotiating a competitive price for the service and convenience of them stocking for the County.

The inventory should be posted within a day of when it is used or received. All parts should be put marked bins or areas for easy access and identification. Areas can be set up to suit the needs of the Maintenance Supervisor prior to putting the information into the computer system. Receivers should be turned in to the office on a daily basis along with a receiving log. Purchase orders should be used for all purchases to facilitate the tracking of the inventory and cost. They can be either handwritten or typed, depending on the legibility.

E. **Computer and Software**

The County Highway Resource Information System (C.H.R.I.S.) needs to be implemented as soon as possible. Computer terminals need to be placed in one or both of the shops, depending where the administrative and management personnel will be located. Since only one person is currently familiar with the program, additional personnel, especially the Administrative, Fleet Manager and Maintenance Manager will need to be trained on the system. This will need to be done as soon as possible to get the system functional. Enough time and money has already been put into this system for it to be sitting idle.
F. Housekeeping

Housekeeping issues need to be addressed immediately. The Road Department Shop is especially in need of cleaning and organizing. Time needs to be set aside on a daily basis to insure the facilities and equipment are safe and usable. Items needing attention should be noted and repaired or cleaned as soon as possible. Hazardous waste areas should be consolidated and marked accordingly. Walkways should be cleared and marked. Tools and equipment should be cleaned and kept in a specific area so they may be used without having to hunt for them. A clean, uncluttered work place increases worker productivity and morale. The work area should be cleaned once daily at the end of the shift.

G. Training

An in-house training program should be setup to insure productive personnel. The County and the current personnel would benefit greatly from additional training. This would free-up the supervisors to do other work instead of directing each step of a repair project. Levels of proficiency should be established with corresponding pay scales. Certifications and licensing should be included for advancement. This would encourage mechanics to pursue additional training on their own. Many companies provide training videos that can be used in a class situation or taken home for individual viewing. Specific steps and requirements would need to be developed with the input of the supervisors and outside resources. I see this as a long-term situation that would benefit the County over the long run.

H. Accounting

Time and cost accumulation should be done on a daily basis. This would eliminate the mad rush twice a month to get the information into the system for payroll and billing. Projects should be invoiced when they are finished and not at some later date. Monies are not being billed in the current time frame in some instances. Complaints have been made by other departments about receiving their invoices several months after the project was completed. By remaining current with the billing process, cash flow could be increased.

I. Other

Under the current circumstances, the idea of setting up a user committee makes a lot of sense. This would channel any problems the users are having with the program or specific maintenance to the Fleet Manager and the committee for action and eliminate the public forum that is currently being used. Merced County has setup a Vehicle Users Technical Advisory Committee made up of the ten predominate user departments. Mariposa could use a similar type program in its Fleet Maintenance Program. This
committee would be responsible for communicating directly with the Fleet Manager regarding policy, guidelines, rental fees, vehicle replacement and other matters as necessary. They would meet formally on a quarterly basis to discuss matters of interest and annually ratify user fees prior to them being sent to the Board of Supervisors for approval. The Director of Public Works would have the final say in all matters.
3. LEVELS OF VEHICLE MAINTENANCE AND OPERATING COST

A. Classifications

Vehicles are classified into six broad categories: 1) 4 x 4 Pickups, 2) Pickups, 3) Sheriff Office Sedan, 4) Blazers, 5) Regular Sedan and 6) Vans. Research indicates that the classifications should be expanded to cover specific types of vehicles and usages. As indicated in Table 1 of Section 2, maintenance time varies considerably and should be taken into account when setting rental rates. I am recommending that the vehicle classifications be expanded to a minimum of 16 categories, which will cover most areas: 1) Standard Sedan, 2) Sheriff Sedan, Administrative, 3) Sheriff Patrol, 4) Sheriff 4 x 4 Blazer & Pick Up, 5) Sheriff 4 x 4 Undercover, 6) Animal Control Truck, 7) Search & Rescue, 8) Small Pick Up, 9) Small 4 x 4, 10) Standard Pick Up, 11) Standard Pick Up 4 x 4, 12) Standard 4 x 4 Blazer-Bronco, 13) Vans, 14) Buses, 15) Station Wagons and 16) One Ton Truck. In setting up the computer system, classification codes will be required. This should be three or four digit number. Sequence and code to be determined based on system requirements.

The Road Department equipment classifications appear to be sufficient for costing purposes as noted in Table 2 of Section 2. No changes are recommended at this time. Classification codes will be required for these vehicles and equipment as well as the fire engines.

B. Life Expectancy of Vehicles

All County fleet vehicles, including the Sheriff's vehicles, are being depreciated at 120,000 miles, but are not being replaced on this basis. Other factors are being considered in addition to the mileage, such as, condition of vehicle, amount of repairs and vehicle use. This will work okay until you start having to replace engines and transmissions, then you need to start looking at operating costs. When the operating costs exceed the replacement costs, the vehicle should be replaced. Under the current system, these numbers are very difficult to determine. Once the computer system is up and running, this type of analysis should be readily available. There are several vehicles in the fleet that have exceeded 120,000 miles by quite a bit and need to be looked at for replacement. Operating cost information is currently being compiled manually for each vehicle and should be available for analysis in the next couple of months. A strictly enforced preventive maintenance program should prolong
vehicle life and reduce overall costs.

Surveys done by the California Energy Commission (Appendix B) and the American Public Works Association indicate that most government agencies surveyed depreciate and replace vehicles anywhere from 65,000 to 100,000 miles and/or five to seven years, with the exception of police vehicles, which are depreciated between 55,000 to 70,000 miles and/or one to six years. Most agencies do not go beyond 110,000 miles.

Further study needs to be done to determine the effectiveness of the current depreciation and replacement fund versus the mileage and condition of the fleet. One recommendation that should be explored would be to use a combination of miles and age to determine the depreciation and replacement rates. Then set minimum monthly flat rates for operations and depreciation in addition to the variable mileage rate. This would insure the recovery of costs over a given period of time and would eliminate the assignment of low usage vehicles. Pool vehicles could replace some of the assigned vehicles.

The Road Department equipment, other than the pick up trucks, are depreciated on a combination of total hours operated and age. Currently, equipment is being depreciated from 7,500 to 12,000 hours and/or 5 to 25 years, depending on the equipment. Some of the equipment have undergone extensive overhauls and should be looked at closely to see if the costs have been more than the equipment is worth. In the future, costs analysis should be done prior to major overhauls on old equipment, the results may indicate a different direction. Information gathered in a 1988 survey of Fleet Equipment Managers throughout the United States by APWA Research Foundation indicate that most of the agencies surveyed, depreciate heavy equipment on years of service and depending on the equipment, could range anywhere from 4 years on a dump truck to 30 years on a grader.

C. Levels of Maintenance by Vehicle Group

All fleet vehicles under the care of the Vehicle Maintenance Shop are scheduled for service every 5,000 miles or six months. This service includes: safety check, oil & filter change, lube, inspect brakes, check belts/hoses, check air filter and check antifreeze. At 15,000 miles these additional services are added: pack front wheel bearings, service PCV valve and change transmission fluid. At 20,000 miles these are added to the 5,000 mile service: tune engine, if needed, adjust transmission, and change quadra-track fluid on four wheel drives.

All Road Department vehicles and equipment are scheduled to be serviced every 150 hours. Regulated vehicles; any truck with three axles weighing more than 6,000 pounds, truck tractors, trailers or semitrailers used in combination with the vehicles previously listed, are subject to California Highway Patrol inspections, "BIT", and are required to undergo inspection every
1,000 miles or 30 days.

Preventive maintenance schedules vary slightly among agencies but do not vary by more than 2,000 miles per level of service. All agencies interviewed follow a three tiered schedule for preventive maintenance: "A" Service - 1,000 to 3,000 miles or 30 to 45 days, "B" Service - 4,000 to 6,000 miles or 90 days, "C" Service - 10,000 to 12,000 miles or annually. Heavy equipment is serviced every 150 hours or six months for oil changes and annually for all other services.

Services are performed based on maintenance groups in most agencies. Typical groups are as follows: Group 1) light equipment operating under normal highway conditions, and relatively high monthly mileage, Group 2) all vehicles over 1-1/2 tons and any/all regulated vehicles, Group 3) all construction and miscellaneous field equipment.

D. Fuel and Oil

Virtually all using agencies in the County are using Premium Fuel in the assigned vehicles. According to the Maintenance Supervisor and other agencies in California, this is a waste of money. The majority of the agencies interviewed, including the California Highway Patrol, use Unleaded Regular Fuel in their vehicles. This would amount to a savings of $400 to $600 a month, depending on the usage. The cost of fuel charged on the Chevron Credit Card needs to be tracked to the individual vehicle if the County is to accurately assess the costs of operation.

The County is using the most expensive oil available, according to the suppliers. They feel a lesser grade of oil would perform just as well at $80.00 a barrel less. The Maintenance Supervisor has been doing mileage tests based on the grade of oil, but to-date, no results are available. The majority of the agencies interviewed are using 15/40W for gas vehicles and straight 40W for diesels. The County is using different weights for different applications. More research is needed to determine what is best for the County’s Fleet.
4. **SUMMARY AND CONCLUSIONS**

This study has attempted to identify the strengths and weaknesses of the current vehicle maintenance program; to build on the strengths and to correct the weaknesses. Many areas have been investigated and recommendations made; however, other items have surfaced that are outside the scope of this study that need to be addressed. A mission statement should be developed, a procedure manual written and a comprehensive vehicle and equipment lifetime cost analysis prepared.

The main focus has been to identify ways to improve the current program and alleviate departmental dissatisfaction and public criticism. Hiring a Fleet Manager should be the first order of business. Once this is done, the rest of the program can be implemented. In the interim, several recommendations could be started: change vehicle classifications and prepare computer codes, set up computer worksheets for inventory and vehicles, set up housekeeping guidelines and start implementation, change cardlock system to allow for regular gas only and set up training for the C.H.R.I.S. program.
APPENDIX A.

"A" Service - 1,000 miles or 30 days

1 Brake Adjustment
2 Steering
3 Tires & Wheels
4 Battery
5 Exhaust System
6 Cooling System
7 Fuel System
8 Electrical System
9 Clutch
10 Engine
11 Cab & Chassis
12 Lubrication
13 General

"B" Service - 4,000 miles or 90 days, in addition to "A"

1 Oil Change
2 Oil Filter
3 Air Filter
4 Fuel Filter

"C" Service - 12,000 miles or annually.

1 Wheel Bearings/Seals
2 Brake System
3 Steering Knuckle 4WD
4 Transmission
5 Differential
6 Tune up
7 Cooling System
8 Pumps (Fire)
9 Pump Cases
10 Aux Trans/Trans Case
11 Fire Plumbing
12 Smog Certification
13 Brake Adjustments
14 Steering Components
15 Suspension
16 Electrical System

Complete descriptions of the above services can be found in CDF pamphlet 6805, *Vehicle Maintenance Procedure and Record.*
APPENDIX B

Results from a Survey of Local Government Fleet Managers by the California Energy Commission.

56 Reporting Agencies

Average vehicle to mechanic ratio: 48 to 1
Average training budget: $2404
Average days training per individual: 1
Average preventive maintenance Law Enforcement Patrol Vehicle:
  3,000 to 6,000 miles or 4 to 16 weeks
Average preventive maintenance Administrative Sedans/Light Veh.:
  2,000 to 9,999 miles or 3 to 16 months
35% of agencies responding do not have computers.
13% of agencies work 4-10 hour days.
73% of agencies work 5-8 hour days.
60% of agencies replace sedans within 8 years.
53% of agencies replace sedans within 100,000 miles.
79% of agencies replace sedans within 110,000 miles.