

SWL0D

Department of the Army
Little Rock District, Corps of Engineers
P. O. Box 867
Little Rock, Arkansas 72203

LRDR 1130-2-3

Regulation
No. 1130-2-3

8 April 1970

PROJECT OPERATION

Maintenance Card System

1. Purpose. This regulation establishes a guide for setting up the maintenance card system at locks and dams in the Little Rock District.
2. Scope. This regulation prescribes procedures to be followed in connection with establishing a maintenance card system so as to have a well-planned, properly scheduled, maintenance and inspection program at locks and dams in the Little Rock District.
3. Applicability. This regulation is applicable to all locks and dams in the Little Rock District.
4. References.
 - a. ER 1130-2-303.
 - b. Project O&M Manuals.
5. Introduction. Good maintenance is accomplished by properly trained, capable personnel working under a well-planned, properly scheduled, inspection and maintenance service program, and by excellent performance in meeting the maintenance schedule. Projects have the trained qualified personnel. ER 1130-2-303 establishes the minimum inspection and maintenance service requirements which must be accomplished at all projects.
6. Benefits expected from the card system. The program will accomplish the items listed below. The end result of the program must accomplish items a and b. Items c and d are mandatory in order to successfully accomplish items a and b. The other items mentioned are benefits that each lockmaster can expand to the extent considered useful to him for good project management.
 - a. Assure the accomplishment of all the required preventive maintenance on schedule regularly and in the most economical manner possible.

b. Establish internal control records with the minimum of written reports so that the lockmaster and the Chief of Operations Division can be satisfied that the required maintenance is being accomplished regularly.

c. Provide definite material for use in work scheduling and establish a definite planning routine which will enable the lockmaster to balance the annual workload and distribute it uniformly throughout the calendar year.

d. Provide a prompting system to carry out all planning and scheduling.

e. Show positive justification of existing project personnel and, when necessary, justification for additional personnel.

f. Enable the lockmaster to improve on the existing maintenance schedule with positive maintenance history records.

g. Simplify reassignments when an employee is on sick, emergency, or annual leave.

h. Assist the lockmaster in setting up annual leave schedules.

i. Assist in orienting new employees.

j. Provide material for employee training.

7. Glossary. The terms listed below are used in the instructions for establishing the card system:

a. Maintenance program. The entire project setup for accomplishing project maintenance.

b. Maintenance work schedule. The definite plan of accomplishing all the work assignments.

c. Task. A feature of work required for the accomplishment of project maintenance.

d. Work assignment. A combination of "tasks" which either must or should be accomplished by the same work crew in the course of one operation; also the grouping of "tasks" for efficiency.

e. Work units. This will be a two-part number. The first part will be the minimum number of workers required simultaneously to efficiently and safely accomplish a work assignment. The second part will be the number of hours the group will have to work to complete the assignment. An assignment may have more than one work unit.

f. Additional assignment. Some of the regular work assignments will be inspections to determine the need for maintenance work. Where maintenance work is needed, it will be scheduled as an "additional assignment." Such assignments carry equal importance with regular work assignments.

g. Special assignments. Periodic requirements placed on the projects by higher authority. Their importance as related to the regular assignments will be established by higher authority.

8. Establishing tasks. Initially, break the required maintenance into individual tasks. Write each task and the required frequency on a separate card or sheet of paper. The tasks will be obtained from the O&M Manual and ER 1130-2-303. Also, review District regulations and all other sources that might place a recurring work requirement on the project. All recurring work performed at the project, except clerical duties, must be included in the program regardless of how minor they are.

9. Listing tasks. After all the maintenance tasks have been designated, place them in alphabetical order and assign each a number. Make a list of all the tasks; list the number, the task, and the task frequency. This list of tasks will provide a ready reference of the various tasks and task frequencies to facilitate combining them into work assignments, which is the next step.

10. Consolidation of tasks into work assignments. Study the list of tasks thoroughly before starting to consolidate them into work assignments. Consider all the necessary steps of work required to accomplish each task; briefly outline on the task card the method of accomplishing the task. This is desirable on the more complicated tasks or the tasks that may cover several different locations. Consolidate only enough tasks to make a complete efficient work assignment; worded another way, make a work assignment card on each logical divisible feature of work.

a. As an example, make an assignment card for each of two identical pieces of equipment located adjacent to each other, if the maintenance could logically and efficiently be performed on each piece of equipment independently. This is the case of most of our floodgates and gate hoists.

b. Also, for example, a feature of maintenance may require specially trained specific personnel and/or equipment to be performed on equipment in several locations. Such a feature could have a separate work assignment for each location, but it would probably be more logical and efficient to make it one assignment. The specified employee would obtain the necessary equipment and proceed to each location in turn, making the required maintenance at all locations in order to complete the assignments. It will be better to give a work group two or three assignment cards to be accomplished on one trip, than to find it necessary to break up an assignment and have parts performed at different times and perhaps by different work crews. Some equipment will require monthly, quarterly, and annual maintenance, and each frequency will contain different requirements. The degree of success in planning and carrying out the work schedule will depend on how well the tasks are grouped into work assignments.

11. Filling out the work assignment card. Complete a work assignment card on each work assignment. Use ENG Form 1852, Inspection and Maintenance Record, for this purpose. A copy of this form is shown as exhibit I, inclosure 1 to this regulation. The card will be completed as follows:

a. Equipment. Enter a title for the assignment covered by the card.

b. Location. Location of the assignment to be accomplished. Generally, the assignment title will be sufficient for location. Occasionally, location will be contained in the description as the location may be numerous.

c. Reference. List the source of the maintenance applicable to the assignment. This will be a reference to paragraphs of the O&M Manual, ER 1130-2-303, an LRDR, equipment manufacturer's publications, etc.

d. Personnel. List the personnel required to accomplish the assignment, using the job title rather than the name.

e. File number. Each lockmaster will assign a project file number to each work assignment card. This file number is assigned and used at each project independently, i.e., an identical work assignment at all projects may have a different file number at each project.

f. Inspections due. The frequency at which the assignment will occur, i.e., daily, weekly, monthly, etc.

g. Inspections annually. The number of times the assignment is performed each year.

h. Account number. The cost account number to which labor charges are made.

i. Work units. This will be added to the form immediately under "h." A work unit will consist of the minimum number of workers which must work simultaneously on the assignment and the length of time they will work to complete the assignment. Work units will be listed with two numbers, i.e., 4-24. The first number is the number of personnel required and the second number is the number of hours the unit will work. An assignment with a work unit of 4-24 will require four men working three 8-hour days to complete. Another assignment may require work units of 4-16 and 2-16. This work assignment will require four men working two 8-hour days and then two men working two additional 8-hour days to complete. In breaking down each work assignment to work units, the minimum number of men will be used to accomplish a work assignment safely and efficiently. The lockmaster is responsible for the inspection.

j. Man-hours. To be added to the form immediately under "i." This will be total man-hours required to accomplish the work assignment. Multiply the number of personnel of each work unit times the number of hours the unit works. In the case of work units of 4-16 and 2-16, the total man-hours will be $4 \times 16 = 64$ and $2 \times 16 = 32$ for a total of 96 man-hours.

k. Description of work assignment. The description will take up the remaining space on the front of the form. The work required to accomplish the work assignment should be outlined in sufficient detail to preclude explanation or research each time the work assignment is to be performed. This is where the lockmaster and lock repairman will use their experience in outlining the work which must be done and, to a great extent, the way in which it will be accomplished. Some work assignment descriptions can be complete with one brief remark; others require fuller explanations plus periodic briefing on the requirement and method of accomplishing; and still others of a more complex nature will require separate instruction sheets, check sheets, etc. The description should be set up to include checkpoints, where possible, and each checkpoint will be given an item number. The persons performing the work assignment can check off the items on the back of the form as they are accomplished.

12. Work sheet or board for scheduling assignments. Some type of work schedule sheet or work schedule board is needed to keep track of the work assignments as they are scheduled, in order not to schedule more work in any one day, week, or month than there are personnel to do the work.

a. Arrangement of assignments for scheduling. Sort the work assignment cards into groups by frequency, all the daily assignments together, the weekly assignments together, etc. The work assignments are now ready for placement into a complete work schedule. The frequent maintenance duties are generally minor in terms of time required to accomplish; therefore, they can be assigned to a minimum number of employees, leaving other employees free to work uninterrupted on the major assignments.

b. Scheduling daily assignments. Schedule the daily assignments for a month and enter the assignment number on the line.

c. Scheduling weekly assignments. Each weekly assignment will be given a specific day of the week on which it will be performed. The assignment card number should be written in the block on the work sheet or work board representing the day the work is to be performed. After all weekly assignments have been scheduled on the first full week, fill in the weekly assignments for the rest of the month by duplicating the week just planned.

d. Scheduling monthly assignments. Some monthly assignments will be required on a set date, i.e., first, fifteenth, twenty-sixth, etc. Where a specific date is not required, the assignments will be scheduled on the basis of day-in-the-week and week-in-the-month, i.e., first Tuesday, third Wednesday, fourth Friday, etc. For the purpose of this planning, consider 4 weeks to the month. The assignment card number should be written in the block on the work sheet or work board representing the day the work is to be performed. When the weekly and monthly assignments for 1 month have been scheduled, they can be duplicated on the remaining 11 months.

e. Scheduling assignments with frequency longer than monthly. Review the work assignments with longer than monthly frequency before starting to schedule them. Group those which must or should be accomplished at the same time, such as a quarterly, annually, and biennially maintenance on the same equipment. Next, review the assignments to isolate those which have a controlling influence on the time of year which they must or should be performed. If one assignment in the group of assignments to be scheduled together has a controlling influence on the

scheduling date, the entire group will be scheduled on the required date. If one of the assignments in the group has a quarterly frequency, then one of the inspections will be scheduled to occur with the group and the other three quarterly inspections will be scheduled in their proper order. When scheduling biennial inspections, group two biennial assignments to occur on the same date by scheduling one to fall on the odd-numbered year and the other to fall on the even-numbered year. Also, assignments with greater frequencies can be grouped together by scheduling for different years which will help balance the annual workloads. After scheduling all assignments with a controlling influence, balance out the work schedule with the remaining assignments, giving consideration to the season of year most desirable for each assignment. When scheduling the assignments on the work board or work sheet, give each assignment specific dates; also, enter the assignment file number as each assignment is scheduled. When scheduling the assignments, consider the daily, weekly, and monthly assignments that have already been scheduled. It may be necessary to double up on some assignments, i.e., schedule a major assignment at the same time some minor assignment has been scheduled. This would indicate that either a man must be pulled from the major assignment long enough to perform the minor work or that the minor work will be skipped for that month, week, or day, as the case may be. As each work assignment is scheduled, write at the top of the card the month in which it is scheduled and, where required, add odd- or even-numbered year. In actual operation, the work assignment is due in the month scheduled and not necessarily on the days scheduled during planning. Be realistic in scheduling the time and personnel required to perform a job, and leave free time (floating time) between jobs. Floating time can be used for overrun of the estimated time, special assignments, operations, leave, etc.

f. Scheduling "additional assignments." Additional assignments will not have permanent cards. These assignments result from the regular inspection assignments and will consist of maintenance that must be accomplished. When scheduling a regular assignment which requires inspection, and such inspection is likely to result in maintenance work, estimate from experience the maintenance that may be required and schedule the work in the month desired. Designate such an assignment on a work sheet or work board with a temporary file number by using a "T" prefix with the regular inspection assignment file number. A large amount of maintenance work will be of this nature and time will have to be scheduled for it.

g. Scheduling "special assignments." Special assignments will not have permanent cards. From time to time higher authority will require project improvements which must be accomplished and which may have a definite deadline. A temporary work assignment card can be prepared and the work coordinated with the annual work schedule. Because of an unchangeable deadline on the special assignment, some regular or additional assignments may have to be slipped or skipped. A good work schedule may provide justification for extending a deadline from either an economical or operational standpoint. Generally, the special assignments will not get to the prompting file. However, if they are scheduled for accomplishment at a future date, they should be placed in the file. Each responsible employee should maintain a current list of the special assignments.

h. Nonscheduled assignments. There are a number of assignments which will be performed only under specific conditions. A card will be prepared for each special condition listing the assignments required for the condition. Then, on occurrence of the conditions, the lockmaster will be able to place all the required assignment cards with the maintenance personnel for accomplishment. These assignments cannot be scheduled.

13. Requirement for two complete sets of assignment cards. Two complete sets of work assignment cards and indexes are required, a working set and a permanent set. In the system, the assignment cards will be pulled from the working set and passed on to the responsible employee to perform the assignment. After the assignment has been completed and the card initialed, it will be returned to the file. The permanent set will be filed in numerical order by card file number. The working set will be filed as described in later paragraphs. The permanent set is the permanent record of maintenance cards in the card system. If a work card is lost or becomes badly soiled, a new card can be typed from the card in the permanent set. The permanent set of cards will be free of all typing errors, neat, and correct. They will be kept current, i.e., any change made on the front of the work card will also be made on the permanent card.

14. Indexes required. The required indexes are discussed below. All indexes will be typed on 5 x 8 cards.

a. Separate index for each month. This will include only assignments with a frequency greater than monthly, which are due during the month. A quarterly assignment will be listed on the index for 4 different months. It will be listed on the index

for each month in which it is due. A semiannual assignment will be listed on the index of 2 different months; the 2 months in which the assignment is due. A biennial assignment will be listed on the index for the month on which it is due, and it will be necessary to designate if the assignment is due on odd- or even-numbered years. On frequencies greater than biennially, it will be necessary to list the year next due. List the card file number and assignment title on the index and, if the frequency is other than annual, list the frequency and all months due, in parenthesis, following the title.

b. Index of monthly assignments. The index will include assignments with a frequency greater than weekly but no greater than monthly. A semimonthly frequency assignment will be listed twice on the index; it will be listed on the 2 days on which it is due. The index of monthly assignments will be as follows: First, list the specific dates of the month on which an assignment is due, such as the first, tenth, fifteenth, etc.; then the month will be divided into 4 weeks and each day of each of the 4 weeks will be listed, such as first Sunday, first Monday, etc., then second Sunday, second Monday, etc., and continue through the 4 weeks. After each date or day, list the card file number and title of the assignments due on that day or date. If no assignments are due, write "none."

c. Index of weekly assignments. List the 7 days followed by the card file number of assignments due on each day, or "none" if none are due. After the card file number, give the title of the assignment. Assignments due twice each week will be listed on the weekly index after each day they are due.

d. Index of daily assignments. List assignment card file number, description and, if desired, list the name of the person normally responsible for accomplishing the assignment, in parenthesis, after the description.

15. Requirement for a prompting system (work set). Because there will be a large number of work assignments scheduled throughout all 12 months of the year, a system is needed to remind the supervisors when each work assignment is due. Following is a card-filing arrangement and a procedure for pulling each work assignment card at the proper time. In order to benefit fully from the work schedule, this card file must be established and the prescribed card-file operating procedures followed. An employee must be assigned the direct responsibility of operating the card file and, in the employee's absence, must have alternates

8 Apr 70

who will automatically assume this responsibility. The working set of assignment cards will be used in the prompting file.

a. Principle dividers for the prompting file. The prompting file dividers are (1) weekly, (2) monthly, and (3) over monthly.

b. Subdividers.

(1) Weekly. The weekly section will have a subdivider for each day of the week. On the subdivider, immediately under the day of the week, list the card file number of each work assignment which is due on that day. The work assignment cards listed on a divider will be filed behind that divider. The weekly index will be filed immediately behind the weekly principal divider.

(2) Monthly. The monthly section will have a subdivider for each date (first, tenth, fifteenth, etc.) on which an assignment is due. Also, there will be a subdivider for each day of the week for 4 weeks. This will be first Sunday, first Monday, etc., and second Sunday, second Monday, etc., right through 4 weeks. Immediately under the day on each subdivider, list the card file number of the assignments scheduled for that day. The work assignment cards listed on each subdivider will be filed behind that subdivider. The use of a different color for the tabs of each of the 4 weeks will aid in operation of the card file.

(3) Over monthly. The over monthly section will have a subdivider for each month of the year. The index for each month and all work assignment cards listed in the index will be filed behind the subdivider for that month. Quarterly and semiannually assignments will be filed under the month on which they are next due.

16. Daily assignments. Daily assignments will not circulate through the card file. It will be the responsibility of the lockmaster to determine the daily assignments which are of sufficient importance to justify the employee initialing the back of the card daily. If initialing is required, one line on the back of the card will serve for a pay period. The employee will initial the first square the first day of the pay period, and so on, through the square marked "SR" which would be the fourteenth day of the pay period. Squares would be initialed only on days the assignment is accomplished. Daily assignments can be made on a permanent basis, or they may be rotated regularly. In any event, the lockmaster will be responsible to assure that daily assignments are made. When an employee is absent, his daily duties must be assigned to someone else.

8 Apr 70

17. Assigning employee to operate the prompting system.

Circulation of the cards, pulling the assignment cards when due, picking up the completed assignment cards, and refiling the cards will be the responsibility of the lockmaster or his appointed alternates.

18. Disposition of "filled out" cards. When the back of a work card is completely filled out with entries, a new card can be stapled to the original card. Only the file number and assignment title will be typed on the front side of the new card. When this new card is completely filled in with entries, it will be removed, filed in storage, and another new card attached to the original card. This procedure can continue until the original card becomes worn or soiled, at which time a new card can be typed and the process repeated; the old original card would be filed in storage. "Filled out" cards will be retained at the project until instructed by Chief of Operations Division to dispose of the record.

19. Entries on back of assignment cards. Entries are made on the back of each work assignment card each time the assignment is due. The employee responsible for the assignment will enter the date the work is performed, check off the items as they are done, note in the space provided if a special report is made, and place his initials in the column provided. It is possible that in the performance of some assignments it may be necessary, or advisable, for various current reasons to occasionally omit one or more items of an assignment. Only the items accomplished would be checked on the back of the card for that date. This will provide a record of the items skipped and will avoid skipping the same items repeatedly. If the entire assignment is skipped, the card will be marked "skipped," dated, and initialed. All assignments that are skipped completely will be initialed by the lockmaster. The lockmaster should review each completed assignment to assure that proper entries are made on the card. If desired, man-hours required to perform the assignment can be entered on the card by the lockmaster.

20. Program improvement. Once the initial work schedule is established and put into effect, the lockmaster should continually improve and refine the schedule to safely obtain complete coverage of all maintenance in the most efficient way. It will not be possible to select the best schedule for all assignments initially; therefore, the schedule (due date for an assignment) will be changed any time that a change will improve the program. Also, changes in the composition of the assignment cards will be made as needed.

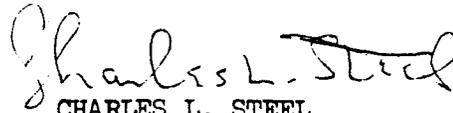
21. Training. The improvement of the program can best be obtained by a continuous maintenance training program. Some class or group training, plus plenty of on-the-job training, can make up a good program. This training on the job need not and should not be a special period set up for this specific purpose, but should be informal discussion during the actual work. During the work, point out better methods or procedures for accomplishing the work, and explain the need or reason for the maintenance. Do not confuse everyday performance of the work with on-the-job training; on-the-job training will be instruction by a supervisor while doing the work. Another form of on-the-job training would be discussion during inspection of completed work. During inspection of completed work, suggestive improvements could be worked in with praise on the accomplishments. When reviewing completed work, it is often too easy for a supervisor to overlook the accomplishments and the effort that went into them, and to see only the things omitted or not performed just the way they should be. Praise of accomplishment plus the right suggestive improvements will encourage self-improvement on the part of the employees, which in turn will improve the quality and efficiency of the maintenance program. The work schedule will enable the supervisor to pick out ideal times and work projects to review with the employees. It is even advisable for supervisors to tentatively schedule some of these training reviews so that such training will be a planned definite part of the maintenance program. The work assignment cards (description of the assignment) will provide good discussion topics and smooth the way for suggested improvements. The work assignment cards will also be good basic material for class or group training.

22. Conclusion. When setting up work assignments, and when establishing and carrying out a training program, the goal of the entire program is preventive maintenance; proper servicing of the equipment, plus adjustments, repairs, and replacements before a breakdown occurs. A large percentage of O&M money is spent to insure that the facility, all of it, will be operative and will function properly when needed. If the maintenance program does not accomplish this, then the major part of our maintenance work and money spent will be wasted effort. Personnel performing preventive maintenance, must learn to recognize wear and to make replacements and repairs before the breakdown occurs. Breakdowns have been experienced which could and should have been prevented under the most reasonable preventive maintenance program. Breakdowns also have been experienced which could not have been prevented by any reasonable preventive maintenance program. While no breakdown at all would indicate excessive preventive maintenance, frequent breakdown or a breakdown of the obviously preventive nature is an indication of improper

LRDR 1130-2-3
8 Apr 70

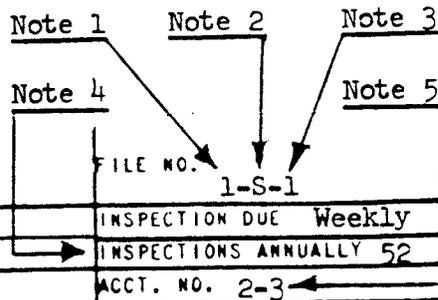
maintenance schedule, poor results in meeting the schedule, low quality maintenance, or a combination of the three. It is the purpose of the project maintenance program to improve on the maintenance schedule by having positive maintenance history records, assurance of meeting the schedule regularly, and improving quality of maintenance through improved procedures and through employee training.

1 Incl
Exhibit I


CHARLES L. STEEL
Colonel, CE
District Engineer

DISTRIBUTION A

EXHIBIT I



DM FORM 1852
1 AUG 50

INSPECTION AND MAINTENANCE RECORD

EQUIPMENT	INSPECTION DUE Weekly
LOCATION	INSPECTIONS ANNUALLY 52
INSPECTION AND MAINTENANCE REFERENCE	ACCT. NO. 2-3
PRINCIPAL ITEMS INCLUDED FOR SERVICE AND LUBRICATION	

Card Code

- Note 1 - "1" indicates weekly, "2" monthly, "3" over monthly.
- Note 2 - "S" indicates card is filed in "S" section of the weekly file.
- Note 3 - "1" denotes the card number in "S" section of the weekly file.
- Note 4 - 52 weekly inspections per year.
- Note 5 - "2" indicates that a crew of two is required, "3" manhours per person.

Color Code for Cards

- Weekly maintenance - Yellow
- Monthly maintenance - Red
- Over Monthly - Green (the frequency of maintenance is more than 30 days apart)*

* The inspection (and maintenance) due date is located on the card index.