

CONSTRUCTION RECORDS STUDY

FINAL REPORT

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LOUISIANA HIGHWAY RESEARCH

CONSTRUCTION
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LOUISIANA DEPARTMENT OF HIGHWAYS - RESEARCH & DEVELOPMENT SECTION

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IMPLEMENTATION

In an effort to reduce duplication of records and unnecessary record keeping, the Department has replaced Asphaltic Concrete forms 3076 and 3077 with a teleprinter ticket stamp and issued a form to handle teleprinter breakdown situations. Chapter VI of the Louisiana Department of Highways Construction Manual is to be reviewed and corrected according to this study's findings and the Department's operating procedures. At the same time, the Department is studying areas which are implementable, but which may require special procedures in regard to forms or duplication of records or effort. This is especially true where document usage is initiated because of other sections' needs.

SYNOPSIS

An acute awareness by the Department of the construction record keeping that is necessary, a marked increase over the past few years in the required records, and the nonuniformity with which those records are kept caused the Louisiana Department of Highways to conduct a thorough study of construction documentation practices.

This report attempts to show how LDH tried to solve its record keeping problem by attempting to standardize, reduce, and/or eliminate unnecessary record keeping by project construction personnel.

Of primary concern was the duplication of records and the time needed to maintain duplicate records. The number of apparently unnecessary forms being used was another area of great concern.

In an effort to reduce duplication of records and unnecessary record keeping, the Department has replaced Asphaltic Concrete forms 3076 and 3077 with a teleprinter ticket stamp and issued a form to handle teleprinter breakdown situations. Chapter VI of the Louisiana Department of Highways Construction Manual is to be reviewed and corrected according to this study's findings and the Department's operating procedures. At the same time, the Department is studying areas which are implementable but may require special procedures in regard to forms or duplication of records or effort. This is especially true where document usage is initiated because of other sections' needs.

An attempt was made to develop a standard format for reporting certain items; however, due to the great variance in project types and complexities, the idea of standardized formats was rejected.

Each construction item will be documented as required by Chapter VI of the LDH Construction Manual.

No attempt was made to standardize filing systems, as long as the required files are maintained in logical order.

INTRODUCTION

One of the ever increasing problems encountered by Department engineers is the vast amount of documentation and form processing required on construction projects. Many engineers feel that their roles have been relegated to that of record keeping instead of engineering.

An apparent problem is the nonuniform manner in which records of the same type of work are being kept. Construction records being submitted to Headquarters have very little similarity from project to project. Unnecessary duplication of records and incomplete information are of particular concern. There seems to be very little, if any, reason for keeping the same information in so many places.

Project engineers' filing systems are another area of concern. It seemed that a uniform system of filing should be established, which could be easily understood and utilized by personnel whether they were familiar or not with the project.

A research project was initiated to study the problems and try to establish a uniform system of recording field construction procedures. Along with this, a review of all forms was made in an attempt to eliminate unnecessary forms, revise outmoded forms, and eliminate any unnecessary duplication of information.

The FHWA conducted a similar study which pointed out many of the same problem areas as the Department's study. A copy of their findings is included in the appendix on page 33.

PURPOSE AND SCOPE

The purpose of this study was to determine the extent of change and revision necessary for efficient record keeping and to revise the record keeping process in the field, eliminating irrelevant entries. This study attempted to standardize field records which were systematically kept and to establish a consistently uniform system of office records so project management changes could be made without interruption of project continuity and control.

The scope was limited to construction records, forms, office filing systems, and record keeping at the project engineer level.

METHODOLOGY

Chapter VI of the LDH Construction Manual was thoroughly checked to determine the requirements for field records.

The researchers reviewed several project engineers field recording methods. The District Engineers selected the project engineers to be interviewed based on the ability of the men to keep clear, concise records. The twelve engineers selected represented seven of the nine highway districts. The projects for which they were responsible ranged from rural secondary roads to urban interstate routes.

In checking out apparent duplication of effort points the researchers contacted the Legal Section for an opinion as to what records are legally binding or acceptable in court.

The Estimates Section was asked what records they needed to determine final pay quantities and what major problems they had with the field records submitted to Estimates.

An overview was obtained in regard to project engineers' records as a whole, while an in-depth study was conducted on several specific areas. The findings on the specific areas will be discussed in detail.

From the beginning of the project, the researchers faced a major problem in regard to elimination of forms or books: a record that one project engineer regarded as duplication, another engineer considered as absolutely necessary. Also, a record that several engineers felt was duplication was regarded as a necessity by one or more sections at the headquarters level. The researchers consulted with the Construction and Estimates sections to determine what records could be eliminated or revised to stop duplication.

Another problem was encountered in the area of standardization of formats for records. Each project engineer keeps his records in a different manner. An attempt was made to develop a standard format for pre-printed piling books and one for drainage structures; however, neither attempt was successful.

Consultations with the Construction Section personnel and the Assistant Chief Engineer at that time led the thrust toward standardizing the information contained in the field book, rather than its format. In order to determine the information required for specific items, a committee was established. It was composed of two project engineers, a representative from the Construction Section and one from the Estimates Section. Results of the Committee meeting may be found on page 56 of the appendix.

The consensus among committee members was that Chapter VI of the Construction Manual is, for the most part, clear and complete in detailing how records should be kept. It was decided that the thrust should be to see which forms required by Chapter VI are necessary and which forms, if any, should be eliminated or revised to meet current practices. In order to accomplish this, copies of all forms were obtained and reviewed with representatives from the Construction, Materials and Estimates sections.

Another area deemed to require investigation was the "Method of Measurement" used by engineers on each item for pay purposes; therefore, several project engineers were asked to submit their ideas for changing the measurement methods used by the Department.

A portion of the FHWA Inspection in Depth Program for 1974 covered project documentation and this research project was then temporarily suspended. When their investigation was concluded, the results of the study were combined with those from the Federal Highway Administration's project. Because the findings of both agencies were essentially the same and because a Preconstruction and Construction Management Research Study had been started, the decision was then made by representatives from the FHWA and the Department to terminate the Department's project.

A copy of the FHWA findings is included in the appendix on page 33.

FINDINGS AND RECOMMENDATIONS

Weekly Progress Report, Form 03-10-1075 - Findings (Figure 1, Page 38)

Project Engineers: Most of the project engineers contacted regard this form as time-consuming and unnecessary on a weekly basis. They feel this should be a biweekly report. This comment was made at the beginning of the study, and construction revised the report to include both structures and roadway on one form.

Construction Section: Construction requires submission of the report on a weekly basis because they feel that this is the only means by which the Construction Section is informed of what happens on each project in the State each week. The reports are reviewed by Construction personnel on a continuing basis.

FHWA: In their findings, they feel that the form still needs additional revisions and that consideration should be given to requiring the report on a bi-weekly basis.

Weekly Progress Report, Form 03-10-1075 - Recommendations

For present, leave the requirements for the Weekly Progress Report as they are.

Daily Work Report, Form 03-41-4058 (4053) - Findings (Figure 2, Page 40)

Project Engineers: The engineers contacted feel that this form is just another burden. This form is filled out by the inspectors and contains much of the same information as is normally included on Form 3093, Information for Diary. Thus, there is a duplication of effort since both forms are now being filled out in the field. Primarily a Maintenance form, it is used to facilitate the completion of an Accounting form, the Biweekly Activity Report.

Construction Section: Construction does not require the use of Form 4058. Originally, it was developed as a Maintenance form, and then it was used on construction projects. At one time it was thought that Form 4058 could replace Form 3093, Information for Diary; however, Construction now feels that the Information for Diary form is preferred.

FHWA: In their findings on documentation, the FHWA feels that there is duplication of effort since both forms are filled out. They suggest considering the elimination of Form 4058.

Daily Work Report, Form 03-41-4058 (4058) - Recommendations

Eliminate Form 4058, Daily Work Report, which is a Maintenance form and contains much of the same information included on the Information for Diary, Form 3093.

Project Diary and Information for Diary, Form 03-40-3093 (3093) - Findings (Figure 3, Page 42)

Project Engineers: On the projects visited, inspectors in the field fill out an original and at least one carbon copy of the Information for Diary, Form 3093. These are then brought into the office daily, and the project engineer or his designated representative copies the forms word for word into the Project Diary. This copying process takes several hours. The project engineer reviews and signs the Project Diary. The original forms are then put by date into a folder at the project engineer's office and a copy of the form is forwarded to the District Engineer.

Some engineers think both the forms and the Diary are necessary for any legal proceedings that come up. Others feel that keeping both is unnecessary duplication. Some expressed the belief that all entries should be made directly into the Diary, thus eliminating the form and making the Diary the true legal document. Opponents of the "diary only" system pointed out that there would have to be several diaries since different inspectors would have to make entries at the same time.

Others stated that the Diary should be abandoned and that the forms should be bound and kept as the legal documents. Opponents of the "forms only" system pointed out this would be unwieldy and that some forms could be lost or misplaced since they are loose-leaf.

Most engineers feel that if the forms are kept, they should be held in the project engineer's office only without forwarding copies to the District Engineer's office.

Construction Section: Construction regards the Project Diary as extremely important and believes that it is the legal document. They also feel that recording directly into the diary book is impractical because of the number of inspectors on a job. However, they do not believe that the Diary has to be a word-for-word version of the forms; rather, it should be a compilation and condensation of the material contained on the forms and, as such, a ready and easily obtainable record of each day's proceedings.

Legal Section: The Legal Section feels that the Project Diary is the legal document that judges will accept since it is signed by the project engineer. However, they do not rule out the possibility that the forms might have to be used in certain instances.

Estimates Section: Estimates believes that filling out both Form 3093 and the Project Diary is a necessary duplication of effort and that the current procedure should not be tampered with.

FHWA: The FHWA did not investigate this particular problem.

Project Diary and Information for Diary, Form 03-40-3093 (3093) - Recommendations

The Project Diary should be the official record. It is felt that judges will accept whatever the Department recognizes as the required practice; therefore, the Diary should be a compilation and condensation of the information found on the various Information for Diary forms. At the beginning of the first Diary on a project there should be a notation that the Diary is a compilation and condensation of all Form 3093's for the project. The forms should be bound and kept on file in the project engineer's office so that they are readily available if needed.

Biweekly Activity Report, Form 03-15-4125 - Findings (Figure 4, Page 44)

Project Engineers: All project engineers contacted consider this form an unnecessary, time-consuming burden. This report is an Accounting form which distributes employee and equipment costs among the various projects and functions. A separate report is required for each function occurring on each project; therefore, on a project the engineer's designated representative must fill out reports for Office Engineering, Field Engineering, Annual Leave, Sick Leave, etc. every two weeks. If a project engineer has two projects, the number of required reports can double; with three projects, the number can triple. Project engineers report that preparing the BAR's can take several days each pay period.

Construction Section: The Construction Section agrees with the project engineers that the BAR is a time-consuming problem. However, they do not have the authority to make any decisions relative to this form since it is required by the Accounting Section and not by Construction.

FHWA: In their findings, the FHWA considers filling out the BAR time-consuming and questions whether the savings in data transmission and accounting time for the Accounting Section is commensurate with the time spent preparing the reports in the field. They recommend that the Department review the procedures and requirements in this area.

Biweekly Activity Report, Form 03-15-4125 - Recommendations

Since the BAR is not a Construction requirement, the possibility of altering this procedure should be discussed with the Accounting Section and with the Executive Administrator.

Earthwork Quantities; Earthwork Data Sheet, Form 03-27-0660 (4066); and Earthwork Computations, Form 03-42-0652 (652) - Findings (Figures 5 & 6, Pages 45 & 46)

Project Engineers: As a whole, the project engineers interviewed did not comment much on earthwork. Their primary statement was that earthwork should not be measured by the cubic yard, as the amount of dirt involved doesn't warrant the detail required for cubic yard measurement. Several different methods are used to determine partial estimate quantities for earthwork. The method used depends on the project engineer's preference and/or type of project. The various methods appear to work equally well for determining quantities. No project engineer mentioned Form 4066, a data sheet that was designed to facilitate reporting a percentage estimate of embankment balance points.

Construction Section: The Construction Section raised the question of the necessity for Form 4066, Earthwork Data Sheet. They do not consider the form necessary and asked that Estimates and the FHWA be contacted to see if it is necessary.

Estimates Section: Estimates also indicated they do not need Form 4066 for their computations. The form that interested them is Form 652 which is an Earthwork Computation form for Final Estimates. They feel that Form 652 is necessary because some project engineers just submit adding machine or teleprinter tapes without all the necessary information.

FHWA: FHWA found that several different methods were used for arriving at partial estimate quantities for earthwork--one of which, contractor load count, is contrary to the Construction Manual. They also found that in order to fill out Form 4066, Earthwork Data Sheet, field personnel were manipulating the earthwork figures to fit the form. The form is designed for use with a percentage estimate of embankment balance points; project engineers used other methods and then arithmetically manipulated the figures to fit the form.

Earthwork Quantities, Earthwork Data Sheet, Form 03-27-0660 (4066) and Earthwork Computations, Form 03-42-0652 (652) - Recommendations

Since the various methods used to compute earthwork figures result in accurate estimates, no one method should be required. Any method described in Chapter VI of the Construction Manual should be allowed.

Unless the method for figuring earthwork is a percentage estimate of balance points, the Earthwork Data Sheet, Form 4066, should not be used. Requirements for the Earthwork Computations for Final Estimates, Form 652, should be left as they are.

Piling Records: Record of Piles, Form 03-40-0660 (660); and Summary of Piling, Form 03-40-0661 (661) - Findings (Figures 7 & 8, Pages 47 & 48)

Project Engineers: All project engineers kept extensive piling records; however, some kept piling information in their structure books, while others kept separate books on piling only. They all set up their piling records using the information required on Form 660, Record of Piles. They also completed the form for submission with their field books.

With this apparent duplication of effort in mind and because of the fact that all contacted keep similar records, we developed a format for the piling book (See Appendix, Figure 9, Page 49) and investigated the possibility of preprinting field books with the headings included. Some engineers approved of preprinting books; others did not. The main objection was that each structure is different; a single span bridge does not have the same piling requirements as an elevated causeway structure.

The researchers also investigated the possibility of eliminating Form 660, Record of Piles, and Form 661, Summary of Piling. Almost all of the engineers questioned are in favor of eliminating these forms. The only comment against elimination of Form 660 was that it is what the engineers use as a guideline to set up their books to make sure that all required information is contained in the piling book. Form 661, Piling Summary Sheet, is a recapitulation of attached Record of Piles forms and appears to be of little use to project engineers.

Construction Section: Construction indicated that they have no direct use for Form 660 or 661. The information on Form 660 is sometimes used by Design when preparing plans for the same type of structure; however, it is felt that the field book could be duplicated when necessary.

Estimates Section: Estimates indicated that neither form is required for their work. As a matter of course, they check one against the other and against the field books to make sure the information agrees. However, Estimates does feel that the piling book could be standardized and this would help them.

FHWA: FHWA found that project engineers set up their records in accordance with Form 660; therefore, they recommend that the requirement for submission of Form 660 be omitted. They, too, feel that if copies of the information are required, the field books could be copied on machines at the District offices.

Piling Records; Record of Piles, Form 03-40-0660 (660) and Summary of Piling, Form 03-40-0661 (661) - Recommendations

A preprinted piling book should not be developed at this point because of differing requirements for different types of structures. The information required for piling should be detailed in Chapter VI of the Construction Manual.

Since the information required for piling is to be detailed in the Construction Manual, and since the piling book so closely resembles Form 660, Record of Piles, this form should be eliminated. If an individual copy of the record is necessary, it could be duplicated from the piling book itself.

Summary of Piling, Form 661, also should be eliminated, especially since the elimination of the form it accompanies is recommended.

Statement of Bridge Material (Timber), Form 03-10-0669 (669) - Findings (Figure 10, Page 50)

Project Engineers: No project engineer commented directly on this form; however, while checking on the piling forms, the researchers discovered that this form appears obsolete. Its main purpose seems to be to make sure all required information is contained in a field book when timber is used, which is not often.

Construction Section: Construction agrees that this form is no longer necessary.

FHWA: FHWA did not investigate this particular form.

Statement of Bridge Material (Timber), Form 03-1-0669 (669) - Recommendations

As with Form 660, the requirements for Bridge Material should be detailed in Chapter VI of the Construction Manual; therefore, Statement of Bridge Material, Form 669, should be eliminated.

Supplier's Teleprinter Ticket; Haul Ticket for Asphaltic Concrete, Form 03-26-0760 (3076); Check Ticket for Asphaltic Concrete, Form 03-26-0770 (3077); and Contractor's Ticket of Delivery - Findings (Figures 11 & 12, Page 51)

Project Engineers: No project engineer commented against these forms, but it appears to the researchers that there is a large amount of double effort here. The asphaltic concrete supplier must furnish a teleprinter ticket with weights shown; then the Department's Plant Technician must fill out a check ticket (Form 3077), which includes the teleprinter information, and must forward the teleprinter ticket and check ticket to the Department's Roadway Technician, he in turn fills out a Haul Ticket (Form 3076), which includes much of the information from the other two sources. Lastly, the technician fills out for the contractor a delivery ticket which contains the same data. Thus, much time is spent copying the same information.

Construction Section: Construction agrees that the repetition of information is unnecessary and that a different procedure, possibly using a rubber stamp, should be developed.

Estimates Section: Estimates advised that all the above mentioned tickets must be reconciled by them, and that requires time to check the separate tickets. They agree that a simpler procedure would aid them in their work.

FHWA: FHWA found that the duplication caused by copying several tickets introduces the possibility for errors, as well as takes up valuable time during the checking process. They recommend developing a procedure which would utilize only the teleprinter ticket.

Supplier's Teleprinter Ticket; Haul Ticket for Asphaltic Concrete, Form 03-26-0760 (3076); Check Ticket for Asphaltic Concrete, Form 03-26-0770 (3077) and Contractor's Ticket of Delivery - Recommendations

Three of the tickets, Form 3076, Form 3077 and Contractor's Ticket of Delivery, should be eliminated immediately. In lieu of Form 3076 and Form 3077, the supplier's teleprinter ticket should be stamped on the back with spaces for the required plant and roadway information. For this purpose a stamp should be placed in each Asphaltic Plant. The Louisiana Department of Highways' Plant Technician should stamp the teleprinter ticket, fill in the required information, initial it and then forward it to the Roadway Technician so he can add pertinent field information and initial it. This suggestion is in the process of being implemented by the Department. A copy of the stamp developed by the researchers is included in the Appendix (Figure 13, Page 52).

In regard to the Contractor's Ticket of Delivery, if the contractor wants a record, it should be his responsibility to keep it.

In the event of teleprinter breakdown, a form containing the pertinent information should be completed by the Plant Technician and the Roadway Technician. This suggestion is also in the process of being implemented by the Department. A copy of the emergency form developed by the researchers is included in the Appendix (Figure 14, Page 52).

Concrete Plant Inspector's Daily Report, Form 1081; Plant Inspector's Daily Report for Concrete, Form 03-40-4041; and Roadway Inspector's Daily Report, Form 03-10-1079 (1079) - Findings

Project Engineers: When originally interviewed, several engineers complained that these forms are obsolete because of the current End Result Specifications. Both Form 1081 and 1079 were originally designed for dry batching. Also, the engineers felt that, especially in regard to the Plant form, the information was recorded in more than one place. Several engineers had ceased keeping plant diaries and were just keeping the forms. The Plant Form (Form 03-40-4041) has since been revised and is used for concrete jobs not under End Result Specifications.

Construction Section: Construction has revised the Plant Form for use with jobs not under End Result Specifications. They agree the Roadway Form (1079) is no longer relevant and feel it should be revised rather than eliminated.

FHWA: FHWA found that both forms are obsolete and of little use. They recommend revising or eliminating both forms.

Concrete Plant Inspector's Daily Report, Form 1081; Plant Inspector's Daily Report for Concrete, Form 03-40-4041; and Roadway Inspector's Daily Report, Form 03-10-1079 (1079) - Recommendations (Figures 15 & 16, Pages 53 & 54)

Form 1081 has already been eliminated. Form 03-40-4041 should be eliminated when all the jobs let prior to End Result Specifications have been completed.

Form 1079 should be revised to conform with current specifications.

Structural Concrete Computations and Drawings - Findings

Project Engineers: The engineers interviewed complained about having to make detailed drawings using plan dimensions and having to recompute structural concrete quantities for structures built in accordance with in either the Standard Plans or Project Plans, since this takes a considerable amount of time. Also, quite often, the results of the time spent computing show very little variance from the plan quantities.

The engineers feel the only detailing and recomputing done in the field should be when the plans are altered in the field. The elimination of recomputing when structures are built according to plan dimensions would greatly reduce the paperwork at the project engineer's level.

Construction Section: Construction indicated they do not require detailed drawings and recomputed concrete quantities for structures built according to Standard Plans. They do require the computations and drawings for structures built according to Project Plans because this enables them to correct mistakes on plans. However, at the time the researchers initially interviewed them, a representative from Construction advised us that they planned to let three projects based on plan quantities without recomputing in the field. This has not been done to date.

Estimates Section: Estimates indicated that they take the project engineer's figures for structures built according to Project Plans and recompute for a third time. Payment is then based on Estimates' computations which may differ only slightly from the plans or from the project engineer's figures.

FHWA: FHWA found that making detailed drawings using plan dimensions and recomputing structural concrete quantities for structures built according to Standard Plans or to Project Plans consumes much time. They recommend checking quantities prior to receipt of bids and that payment be made on the basis of plan quantities.

Structural Concrete Computations and Drawings - Recommendations

Project engineers should be advised that they are not required to detail and recompute Standard Plans for structural concrete.

The computations provided by Design or Consultants should be used and checked directly by Estimates. Design should furnish all computation data with the field books so the project engineer can check actual field dimensions for the as-built plans. The as-built plans are to be submitted with the Final Estimate.

Reinforcing Steel - Findings

Project Engineers: Some of the engineers check and record the reinforcing steel as it is used; others figure the amount of steel to be used in advance and prepare their records so that corrections can be made as steel is placed; still others check the steel required against the bar lists provided by the steel fabricators. All methods result in a large number of steel books, yet each engineer thinks his method of recording steel is best. When the engineer corrects the bar lists and then records the information on them in field books or loose leaf files by bar types, size and length, there appears to be unnecessary copying since the bar lists are retained in the project records.

Construction Section: Construction agrees that there are many steel books on each job and that the detailed duplication could possibly be eliminated.

FHWA: When the steel books are prepared directly from the corrected bar lists and the bar lists are retained as part of the project records, the FHWA believes that recording the steel in a field book on a bar-by-bar basis is unnecessary. They recommend that a procedure be used whereby only the weight of steel entered for payment be recorded in the field book with reference being made to the appropriate bar list. They feel that this will eliminate the need for the stacks of reinforcing steel field books that they found on a number of projects.

Reinforcing Steel - Recommendations

Only pounds of steel used should be recorded in the field books for payment purposes. A cross-reference to the corrected bar list should also be included. This would eliminate the large number of books necessary for reinforcing steel.

Drainage Pipe Books - Findings

Project Engineers: As with steel books, several different methods of keeping pipe books were encountered. Each engineer feels his method is the best. Some keep the survey and as-laid information in separate books; others keep all the information in one book. In addition, as-built plans which detail the pipe as the project is constructed are kept. An attempt to standardize the format of pipe books was discarded, because all methods of documentation appeared logical. The researchers did discover that in many cases the pipe books include detailed drawings of pipe taken directly from the plans. Other project engineers make detailed corrections directly on the as-built plans.

Construction Section: Construction is not in favor of standardizing the format of the pipe books, but they agree that detailed drawings of pipe taken from the plans are unnecessary.

Estimates Section: Estimates indicated they have a problem with how inspectors measure the pipe for pay purposes. There are three different methods that must be used, depending on whether the pipe placed is unconfined or confined. They suggest including a description and sketch of how to measure the different kinds of pipe in the front of field books or in the Construction Manual. This is another area where Estimates feels standardizing format would assist them in their work.

FHWA: The FHWA did not investigate this particular area.

Drainage Pipe - Recommendations

No attempt should be made to standardize the format of pipe books as the layout varies depending on size and type of project. However, the pipe book should contain all pertinent information as detailed in Chapter VI of the Construction Manual, with reference to the as-built plans for additional information. Also, the three different methods of measuring pipe should be clearly explained in Chapter VI.

Whether or not the pipe books contain detailed drawings of the pipe as taken from the plans, the pipe should not be extensively redetailed in the Final Estimates Book.

Final Estimates Book - Findings

Project Engineers: All project engineers contacted objected to the detailing required for the Final Estimates Book. Quite often the exact information detailed in a field book has to be recopied word for word into the Final Estimates Book (e.g. Fencing). If not detailed word for word, the same information often has to be entered in both books but in different forms. In other cases, only a reference to the original field book is required. The duplication of information causes a tremendous amount of work for a project engineer's office staff. The project engineers interviewed unanimously agreed that the Final Estimates Book should be a recapitulation of the other field books.

Construction Section: The detailed Final Estimates Book is required by the Construction Section; however, Construction agrees that the Final Estimates Book should be a recap of pay items with a cross-reference back to the field book where the item is detailed.

Estimates Section: Estimates gave the researchers the impression that they like the detailed Final Estimate Book and would like to see the procedure continued.

FHWA: FHWA found that there is considerable duplication between the information entered in the original field book and the Final Estimates Book. They recommend that the Final Estimates Book contain only an index of pay items with reference to the original field book or as-built plans.

Final Estimates Book - Recommendation

The Final Estimates Book should be a recapitulation and should contain only an index of pay items with reference to the original field books and as-built plans.

Method of Measurement - Findings

Project Engineers: The engineers who commented generally feel that the present method used in determining pay quantities are adequate. The comments received included the following.

- 1) Clearing and Grubbing should be measured and paid for by lump sum only.
- 2) Unclassified excavation should be measured and paid for by linear feet.
- 3) Embankment on interchanges should be measured and paid for by lump sum.
- 4) Timber and Precast Bridges should be measured and paid for by linear feet.

See "Method of Measurement Suggestions" in the Appendix, Page 55, for additional explanation.

Construction Section: Construction had initially suggested that the researchers contact the project engineers to get recommendations, since Construction felt that this was an area where the project engineers would encounter problems.

FHWA: FHWA did not investigate this particular area.

Method of Measurement - Recommendations

The recommendations made by project engineers should be evaluated and acted upon by the Construction Section since no conclusions were drawn from the comments received.

Estimates Section Problems - Chapter VI of Construction Manual - Findings

Project Engineers: The project engineers interviewed were those who the Construction Section felt keep more than adequate records. While these engineers might keep their records differently, none of them have encountered problems with the Estimates Section because they all document their work adequately. These engineers feel that the requirements for record keeping for Estimates purposes are outlined in Chapter VI of the Construction Manual. While they might not agree that all the information required is necessary, they conform with the requirements.

Construction Section: Construction agrees that the project engineers interviewed all keep good records and might not be aware of the areas where Estimates constantly encounters problems. They also agree that Chapter VI contains the basic requirements for record keeping for Estimates purposes; however, there may be a problem with the project engineers' using Chapter VI. They feel that revising Chapter VI may help alleviate some of the problems.

Estimates Section: Estimates complained that certain problem areas are continually encountered. The problem areas tend to be chronic with a few project engineers. (See Appendix for findings of Construction Records Committee Meeting.) When these problems arise, Estimates has been calling the project engineer on each one in order to solve it; this process is time-consuming. Estimates feels that most of the problem areas are adequately covered in Chapter VI of the Construction Manual and that the problem lies, not with Chapter VI, but with the failure of certain project engineers to read and follow the procedures outlined therein. What is most needed is enforcement of existing procedures.

FHWA: FHWA did not investigate this particular area.

Estimates Section Problems - Chapter VI of Construction Manual - Recommendations

Chapter VI of the Construction Manual should be reviewed and corrected in view of current operations and any of the above recommendations that are implemented. For instance, the detailed requirements for the Final Estimates Book should be removed if it is decided to make the book a recapitulation. In addition, examples of adequate records and properly completed forms should be included.

Construction has indicated that the problem of enforcing requirements for records is now being effectively handled. At present, Estimates has been instructed to reject any inadequate records by sending them back to the project engineer. The project engineer and the Assistant District Engineer (Construction) must then accompany the corrected records to Baton Rouge so they can answer any additional questions in person.

Project Engineers Filing Systems - Findings

Project Engineers: Each engineer's filing system differs somewhat from the others; however, all reviewed appeared logical and orderly. Of course, the researchers only checked on filing systems of a few engineers. The only comment is that some project engineers rely so heavily on their office personnel that the engineers could not locate records without assistance.

Construction Section: The researchers did not question Construction about filing systems.

FHWA: The FHWA did not investigate this particular area.

Project Engineers Filing Systems - Recommendations

An approved method for establishing a basic filing system should be shown in Chapter VI.

Forms - Findings

Project engineers pointed out a number of what they felt are unnecessary and obsolete forms. Therefore, a copy of every form listed in the Supply Catalog was pulled and checked for usage with Construction, Estimates and the Materials Laboratory. The researchers did not attempt to determine how useful forms were; if a section indicated a need for the form, its necessity was accepted. However, a certain number of these forms may not be necessary. While the forms are continually being reviewed and updated, it is quite possible that a number of forms may no longer be required except as a matter of habit. Also, it appears that once a form has been used for a period of time in the field it is hard to make field personnel stop using it or change to another form, a case in point being that both Form 4058, Daily Work Report, and Form 3093, Information for Diary, are currently in use.

Forms - Recommendations

Committees from each of the sections (Construction, Estimates and Materials) should immediately review and eliminate any unnecessary forms. This should be done on a continuing basis after the initial review, and care should be taken to notify the field personnel as to which forms are no longer in use or have been revised.

Project Personnel - Findings

Project Engineers: The number of personnel assisting a project engineer can vary from district to district; some have little turnover (rural areas); others have a fairly high turnover rate (New Orleans). This means that record keeping practices vary greatly from one area to another. Few engineers say they have enough personnel to properly inspect and document a job; therefore, they view record keeping as a burden in most cases.

Construction Section: Construction recognizes that personnel in some areas are transient, while in other areas they are more stable. Construction also sees understaffing and other personnel problems at Headquarters and District levels.

FHWA: FHWA did not investigate this particular area.

Project Personnel - Recommendations

The elimination of forms and records as recommended above should relieve some of the pressure on project engineers. Chapter VI should be followed closely; only in special cases should the project engineers find it necessary to keep more extensive records than described in Chapter VI.

Standardization of Project Records - Findings

Project Engineers: Most project engineers interviewed feel that standardization of record keeping as a whole would be impractical because of the varying conditions surrounding different types of projects. For example, the records required for a multi-lane interstate elevated expressway are considerably different in content from those required for a two-lane rural secondary road. Portland Cement Concrete and Asphaltic Concrete roads require different types of records. Even within one classification such as Portland Cement Concrete, the type of records kept are affected by whether the pavement is to be continuously reinforced or to be conventional non-reinforced. Also, since the State has projects under construction that were let prior to the adoption of End-Result Specifications, the engineers must deal with reporting the results of two different concepts.

Project engineers also feel that standardized, uniform records would tend to stifle the initiative of the engineer and discourage him from finding a better way to report and record information.

Construction Section: While they originally were interested in standardizing record keeping as a whole, the Construction Section understood the project engineers reasoning and could see the difficulties that could arise with standard, uniform practices. They feel that as long as the records are adequate for pay purposes and contain the information covered in Chapter VI, the format and arrangement should be left to the discretion of the engineer.

FHWA: FHWA representatives would like to see uniform, standard records so that their visiting engineers could go from one project to another and grasp the overall situation easily. They feel that an overall standard system is feasible and practical.

Standardization of Project Records - Recommendations

Uniform standardization of project records is not recommended at this time because of the differences in types of projects. As long as the information is presented correctly for pay purposes in accordance with Chapter VI, the format and record keeping method should be left to the discretion of the project engineer.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Forms

The researchers reviewed all forms used on construction projects with representatives from the Construction, Estimates and Materials sections. If a section indicated a need for a form, its necessity was accepted. However, we did closely examine a number of forms and arrived at the following conclusions:

1. Eliminate Daily Work Report, Record of Piles, Summary of Piling, Statement of Bridge Material (Timber), Haul Ticket for Asphaltic Concrete (to be replaced by a stamp), Check Ticket for Asphaltic Concrete (to be replaced by a stamp), and Plant Inspector's Daily Report for Concrete (when all jobs let prior to End Result Specifications are completed).
2. Revise Roadway Inspector's Daily Report (concrete).
3. Add form to be used for Asphaltic Concrete in event of teleprinter breakdown.
4. Limit use of Earthwork Data Sheet.
5. Retain Weekly Progress Report, Information for Diary, and Earthwork Computations for Final Estimates.
6. Discuss possibility of altering requirement for Biweekly Activity Report.

All forms should be reviewed on a continuing basis to eliminate and revise forms that are unnecessary or outdated.

Project Records

After evaluating comments from project engineers and the involved headquarters sections, we concluded that Chapter VI of the Construction Manual should contain all requirements for field record documentation, together with examples of adequate records. Therefore, we feel Chapter VI should be reviewed and corrected in view of current operations. We decided to abandon the idea of standardized formats for piling and drainage structure records because different types of projects require different formats. As long as the project engineer's records conform to the requirements of Chapter VI, we believe the format should be acceptable.

Duplication of records or effort was found in several cases; therefore, we concluded that:

1. The Project Diary should be a compilation and condensation of Information for Diary Forms.
2. Structural concrete quantities should be computed by Design and checked by Estimates, not the project engineer, when built according to Standard or Project Plans. The project engineer should compute and detail changes only.
3. Reinforcing steel should be recorded in field books showing only pounds of steel used with a cross reference to corrected bar lists.
4. The Final Estimates Book should be a recapitulation only with reference to original field books and as-built plans.

We also investigated filing systems used by project engineers and decided not to recommend standardizing them at this time.

We found that project engineers are faced with personnel problems; some have staffs with little turnover, whereas others have high turnover rates. Therefore, we concluded that as long as the records are maintained as required by Chapter VI, the filing system and format for documentation should be left to the discretion of the project engineer.

BIBLIOGRAPHY

"Chapter VI, Construction Records," Construction Manual. Louisiana Department of Highways. Baton Rouge: 1972.

APPENDIX

FEDERAL HIGHWAY ADMINISTRATION'S 1974 CONSTRUCTION INSPECTION PROGRAM

PROJECT DOCUMENTATION

Diaries and Work Reports

The normal procedure is for the inspectors to complete daily a Form 3093, Information for Diary. In addition, the inspector completes a Form 4050, Daily Work Report, which contains hours worked and vehicle miles traveled for day. Since many inspectors routinely include this latter information on their Information for Diary form, it appears that the Daily Work Report could be eliminated. It is recommended that this possibility be considered.

Biweekly Activity Reports

This is a report distributing Louisiana Department of Highways employee and equipment costs among the various projects and functions. A separate report is required for each function on each project; thus, a project on which the functions of Office Engineering, Field Engineering, Annual Leave, Compensatory Leave and Sick Leave all occurred during a given reporting period would have five separate reports filed for that period. The number of reports multiply with the number of projects being administered by a project engineer. Those with 6, 7, 8 or more projects could conceivably file 40 or more reports each biweekly reporting period. On those projects visited, it was reported that two to three man-days were required to prepare the Biweekly Activity Reports each pay-period. While this method of reporting may facilitate the accounting process, we seriously question whether the savings in data transmission and accounting time is commensurate with the time expended in preparation of the reports. We strongly recommend that the Department review the procedures and requirements in this area.

Weekly Progress Report

The weekly report form now includes both the roadway and bridge information. This is a marked improvement over the previously required separate reports for roadway and bridges; the latter one having been a very cumbersome report. We do, however, see further possible improvements in the report format. A general listing of contractor labor forces is not required. A listing is required of the supervisory and non-supervisory employees and the number of trucks with drivers. We believe a more appropriate indicator of project progress would be a listing of operators rather than truck drivers. We recommend that such a revision in the report form be considered. We also recommend that consideration be given to requiring the report on a bi-weekly basis rather than weekly.

Earthwork

In the six offices visited, four methods, or combinations of methods, were being used to arrive at partial estimate quantities for earthwork: 1) contractor load count only; 2) load count with backup information; 3) borrow pit cross sections; and 4) percentage estimate of embankment balance points. The use of method 1 is contrary to the construction manual. Project engineers preference or type of project determined the method used.

Form 4066, Earthwork Data Sheet to Accompany Partial Estimate, is prepared and submitted with each partial estimate on which payment for earthwork is included. The form is designed to be used with method 4 above; however, on some of the projects visited and on numerous other occasions encountered during our routine inspections, it has been found that the earthwork quantities were actually determined by other methods and then arithmetically manipulated for recording on the Form 4066. We recommend that the project engineers be permitted to use any of the acceptable methods for estimating earthwork quantities and that only that support information found necessary be submitted with the estimate.

Piling

Following completion of pile driving on a given structure, Form 660, Record of Piles, is prepared and submitted to the estimate section. Information for the form is obtained from field books, which are set up with the same headings shown on the form. We recommend the requirement for submission of Form 660 be omitted. Should the information be required, the field book pages containing the information could be copied and submitted. Copying machines are available in all District offices and in some project offices.

Asphaltic Concrete

When asphaltic concrete is paid by weight, there are usually four tickets written: 1) the suppliers' teleprinter ticket; 2) the plant inspector prepares a plant ticket from the weights shown on the teleprinter ticket; 3) the roadway inspector prepares a roadway ticket from the information shown on the plant ticket; and 4) the contractor prepares a ticket for delivery to the Louisiana Department of Highways. This procedure involving repeated copying introduces the possibility for errors and since all tickets are later reconciled, much time is spent in checking. We recommend a procedure utilizing only the teleprinter ticket be developed and thus eliminate the need for inspector prepared tickets.

Concrete Pavement Daily Report

A Plant Inspector's Daily Report, Form 1081, and Roadway Inspector's Daily Report, Form 1079, are prepared each day during paving operations. These forms were designed for dry batching at the roadway and are not obsolete in that regard. It appears that these forms are of little use and could possibly be eliminated. If the forms are retained, they should be revised to accommodate modern practices.

Structural Concrete

Much time is consumed in making detailed drawings using plan dimensions and recomputing structural concrete quantities. This procedure is followed even with respect to structures constructed from Standard Plans. Project engineers indicate that significant variances with plan quantities are rarely encountered. This therefore appears to be an unnecessary time-consuming procedure. We recommend detailed checking of quantities prior to receipt of bids and that payment be made on the basis of plan quantities for structural concrete. We strongly recommend this to be the case where Standard Plans are involved.

Reinforcing Steel

In some areas, a procedure is followed whereby all reinforcing steel is recorded in a field book by bar type, size and length. The information recorded is taken in total from the "cut sheet" or bar list furnished by the fabricator. Since the bar is retained as part of the project records, we believe the recording of the reinforcing steel in the field book on a bar-by-bar basis is unnecessary. We recommend a procedure whereby only the weight of steel entered for payment be recorded in the field book with reference being made to the appropriate bar list. This would eliminate the need for the stacks of reinforcing steel field books we have encountered on a number of projects.

Final Estimates

Some items are required to be entered into the final estimate book in the same form and detail in which they are entered in the original field book. On other items, only a reference to the original field book or as-built plans is required to be entered in the final estimate book. We recommend that the final estimate book contain only an index of pay items with reference being made to the original field book or as-built plans as appropriate.

General

The Department has an active research project, Construction Records Study, which we understand has been temporarily suspended. The results of our inspection indicate that there is a need for a thorough and detail study in this area. We, therefore, recommend that the Department continue the research study and that engineering personnel experienced in construction projects activities be assigned to work with the research team.

Daily Resume of Construction Operations and/or Other Work Accomplished

| Day of the Week | Description of Work Done (Approx. acres, cu. yds., lin. ft., etc. and Location) |
|-----------------|---|
| | |

Remarks on Unsatisfactory Progress: _____

Remarks on Progress of Utility Relocation: _____

| Major Items and/or Groups of Items and Percent Complete | | | | | |
|---|---|------|---|------|---|
| item | % | item | % | item | % |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

FIGURE 1 (CONT'D)
FORM 03-10-1075 (BACK)

APPROXIMATE WORK ACCOMPLISHED CONTINUED.

FIGURE 3 (CONT'D)
FORM 03-40-3093 (BACK)

STATE OF LOUISIANA
 DEPARTMENT OF HIGHWAYS
 BIWEEKLY ACTIVITY REPORT

LDH 0315-4125-45156
 REV. 6/73

45156
 UNIT NO. 45156
 ROAD NO. 45156
 DISTRICT NO. 45156

DESCRIPTION
 LOCATION
 DATE

WORK FORCE IDENTIFICATION
 DISTRICT NO. 45156
 UNIT NO. 45156
 ROAD NO. 45156
 EQUIP. NO. 45156

CONTROL UNIT
 UNIT NO. 45156
 EQUIP. NO. 45156

EMPLOYEE TIME & PER DIEM RECORD
 HOURS WORKED AND PER DIEM DAYS

| EMPLOYEE NO. | FIRST WEEK | | | | | | | SECOND WEEK | | | | | | | TOTAL HOURS |
|--------------|------------|---|---|---|---|---|---|-------------|---|---|---|---|---|---|-------------|
| | M | T | W | T | F | S | S | M | T | W | T | F | S | S | |
| 1 NO. | | | | | | | | | | | | | | | |
| 2 NO. | | | | | | | | | | | | | | | |
| 3 NO. | | | | | | | | | | | | | | | |
| 4 NO. | | | | | | | | | | | | | | | |
| 5 NO. | | | | | | | | | | | | | | | |
| 6 NO. | | | | | | | | | | | | | | | |
| 7 NO. | | | | | | | | | | | | | | | |
| 8 NO. | | | | | | | | | | | | | | | |
| 9 NO. | | | | | | | | | | | | | | | |
| 10 NO. | | | | | | | | | | | | | | | |
| 11 NO. | | | | | | | | | | | | | | | |
| 12 NO. | | | | | | | | | | | | | | | |

Transmission Total

MATERIALS USED RECORD
 UNIT OF MEAS. ①
 QUANTITY ②

EQUIPMENT USED RECORD
 DAILY HOURS FOR MILES CHARTERED
 EQUIPMENT NO. ①
 TOTAL HOURS ②

ACCOMPLISHMENT RECORD
 NUMBER OF UNITS ACCOMPLISHED
 FIRST WEEK
 SECOND WEEK

Transmission Total

Transmission Total

Transmission Total

Transmission Total

ACCOUNTING

FIGURE 4
 FORM 03-15-4125

LOUISIANA DEPARTMENT OF HIGHWAYS
 EARTHWORK DATA SHEET TO ACCOMPANY PARTIAL ESTIMATE

PROJ. NO. _____ F.A.P. NO. _____
 EST. NO. _____ PERIOD FROM _____ 19 _____ THRU _____ 19 _____
 ITEM NO. _____ ITEM _____

| STATION TO STATION* | PLAN QUANTITY CUBIC YARDS | % COMPLETE | QUANTITY TO DATE CUBIC YARDS |
|---------------------|------------------------------|------------|---------------------------------|
| | | | |

TOTAL THIS ESTIMATE _____
 LESS PREVIOUS ESTIMATE _____
 CURRENT _____

*Use Balance Points When Applicable

FIGURE 5
 FORM 03-27-0660

STATE OF LOUISIANA
DEPARTMENT OF HIGHWAYS

SUMMARY OF PILING

PILING CLASSIFICATION _____
Type and Size

Project No. _____

Date _____

Bridge No. _____ from Sta. _____ to Sta. _____

length _____ feet, consisting of _____ Bents of _____ feet each.

NOTE: The detail "Record of Piling" in _____ Sheet of Form 660 is attached hereto.

| | Feet | Inches Tenths |
|--|------|------------------|
| | | |

GROSS LENGTH OF PILING IN LEADS _____

TOTAL OF ALL CUT-OFFS _____

NET LENGTH REMAINING IN PLACE _____

TOTAL OF ALL CUT-OFFS IN EXCESS OF ONE FT. _____

CERTIFIED

Project Engineer

REMARKS

FIGURE 8
FORM 03-40-0661

Form 3076
HAUL TICKET
DEPARTMENT OF HIGHWAYS, STATE OF LOUISIANA

TICKET NO.
6609-3
BOOK NO.

Received on Project No. _____ Date _____

Hauled From _____

Truck No. _____ Base _____ B. C. _____ W. C. _____

Used Between Sta. _____ and Sta. _____

Thickness Laid _____ Width Laid _____ Side CL _____

Lbs. of Aggregate _____ Lbs. of Asphalt _____

Temp. _____ Signed _____ Inspector _____

m

ROADWAY

FIGURE 11
FORM 03-26-0760

Form 3077
CHECK TICKET
DEPARTMENT OF HIGHWAYS, STATE OF LOUISIANA

TICKET NO.
4202-2
BOOK NO.

Destined For: Project No. _____

Hauled From _____

Truck No. _____ Base _____ B. C. _____ W. C. _____

| | | |
|-------------------------|-----------------------|------------------|
| Lbs. of Aggregate _____ | Lbs. of Asphalt _____ | Total Lbs. _____ |
|-------------------------|-----------------------|------------------|

Temp. _____ Signed _____ Inspector _____

FOR RECORD PURPOSES ONLY m

PLANT

FIGURE 12
FORM 03-26-0770

PROJECT NO. _____ DATE _____

HAULED FROM _____

TRUCK NO. _____ BASE _____ B.C. _____ W.C. _____

TEMP. AT PLANT _____ SIGNED _____
LDH PLANT TECHNICIAN

USED BETWEEN STA. _____ AND STA. _____

THICKNESS LAID _____ WIDTH LAID _____ SIDE CL _____

TEMP. AT SITE _____ SIGNED _____
LDH ROADWAY TECHNICIAN

FIGURE 13
PROPOSED TELEPRINTER TICKET STAMP

FORM (6/78)

STATE OF LOUISIANA
DEPARTMENT OF HIGHWAYS

TICKET FOR ASPHALTIC CONCRETE
(TO BE USED ONLY IN EVENT OF PRINTER FAILURE)

PROJECT NO. _____ DATE _____

PLANT

LBS. AGGREGATE _____ LBS. ASPHALT _____ TOTAL LBS. _____

HAULED FROM _____ TRUCK NO. _____

TEMP. AT PLANT _____ BASE _____ B.C. _____ W.C. _____

*THIS IS TO CERTIFY THAT THE BATCH REPRESENTED BY THIS
TICKET WAS LOADED INTO A TRUCK FOR DELIVERY TO THE JOB SITE*

SIGNED _____ SIGNED _____
PLANT OPERATOR LDH PLANT TECHNICIAN

ROADWAY

USED BETWEEN STA. _____ AND STA. _____

THICKNESS LAID _____ WIDTH LAID _____ SIDE CL _____

TEMP. AT SITE _____ SIGNED _____
LDH ROADWAY TECHNICIAN

FIGURE 14
PROPOSED TICKET FOR ASPHALTIC CONCRETE

STATE OF LOUISIANA
DEPARTMENT OF HIGHWAYS

PLANT INSPECTOR'S DAILY REPORT FOR CONCRETE

State Project No. _____ Date _____
 Name of Supplier _____ Location _____
 Class or Type Concrete _____ Theoretical Cement Factor, bags per cu. yd. _____
 Maximum allowable total water, gals. per bag of cement _____
 Brand of cement _____ Mill location _____ Type _____
 Mixing water, source of supply _____

WATER REDUCING ADMIXTURE

Brand _____ Manufacturer _____ Normal Set _____ Set Retarder _____

AIR ENTRAINING ADMIXTURE

Brand _____ Manufacturer _____

MIX DATA AND PROPORTIONS FROM MIX DESIGN

Cement, lbs. _____
 Fine Aggregate, lbs. (SSD) _____
 Coarse Aggregate, lbs. (SSD) _____
 Specific Gravity, Fine Aggregate (SSD) _____
 Specific Gravity, Coarse Aggregate (SSD) _____
 Water Reducing Admixture, qts. or ozs. _____
 Air Entraining Admixture, oz. _____
 Total Cubic yards batched today _____
 Scales balanced, time _____ AM _____ PM

MOISTURE AND BATCH WEIGHT COMPUTATIONS FOR ONE CUBIC YARD

| | Fine Aggr. | Coarse Aggr. |
|---|------------|--------------|
| Time of Test | | |
| A Wet weight - grams or pounds | | |
| B Dry weight - grams or pounds | | |
| C = A-B Weight of water - grams or pounds | | |
| D Tare weight - grams or pounds | | |
| E = A-B + B-D x 100 Total moisture % | | |
| F Absorption factor % | | |
| G = E-F Free moisture % | | |
| H Lbs. per cu. yd. (SSD) | | |
| I G + 100 x H Corrected weight, lbs. | | |
| J I-H Free water, lbs. | | |
| K = J + 8.34 Free water, gals. | | |
| L Total free water in aggregates plus admixtures, per cu. yd. gals. | | |
| M Max. allowable water, per cu. yd. gals. | | |
| N = M-L Max. allowable added water, per cu. yd. gals. | | |
| Actual water used, per cu. yd. gals. Max. _____ Min. _____ | | |
| Size batch _____ cu. yds. Sand _____ lbs. Gravel _____ lbs. cement _____ lbs. | | |
| Remarks | | |

cc: Chief Const. & Maint. Engr.
 Dist. Engineer
 Materials Engineer
 Project Engineer
 Dist. Lab. Engineer

By _____
 Inspector

FIGURE 15
 FORM 03-40-4041

STATE OF LOUISIANA
DEPARTMENT OF HIGHWAYS

ROADWAY INSPECTOR'S DAILY REPORT
CONCRETE ROADWAY CONSTRUCTION

Project No. _____ Date _____
Name _____
Concrete laid from Sta. _____ to Sta. _____
Lin. Ft. laid this date: Left Rdwy. _____ Right Rdwy. _____
Total laid to date: Left Rdwy. _____ Right Rdwy. _____
Width _____ Section _____ Mix _____
Crown checked _____ Inches. (HIGH LOW)
Subgrade checked _____ Inches. (HIGH LOW)
Mixer Capacity _____ cu. ft.
Mixer started _____ M. Mixer stopped _____ M.
Average Water added at Mixer _____ Gals. Slump _____ Inches
Number batches used _____ Size batch used (Bags) _____
Lin. Ft. of Roadway being cured Left _____
Lin. Ft. of Roadway being cured Right _____
Weather _____
Theo. Yield, lin. ft. per batch _____
Actual Yield, lin. ft. per batch _____
Remarks: _____

Roadway Inspector

cc: Construction Engineer
District Engineer
Testing & Research Engineer
Project Engineer

FIGURE 16
FORM 03-10-1079

METHOD OF MEASUREMENT SUGGESTIONS
RECEIVED FROM PROJECT ENGINEERS

Clearing and Grubbing should be measured and paid for by lump sum only. Measuring area for payment should be omitted.

Unclassified Excavation should be measured and paid for by the station rather than measured by cross-sectioning and paid for by the cubic yard. Original and final cross-sections at intervals of 100 lin. ft. could be taken to substantiate construction grades; however, these would not be plotted. Expense and man hours required to cross-section not warranted by amount of excavation.

Unclassified Excavation in city sections should be measured and paid for by linear feet rather than by cubic yard. Amount of excavation doesn't warrant expense of cross-sectioning for cubic yard.

Embankment on interchanges should be measured and paid for on lump sum basis rather than measured by cross-sectioning and paid for by the cubic yard. Recommendation is to set grade elevation and pay lump sum when embankment reaches set grade.

Timber and Precast Bridges should be measured and paid for on a linear foot basis. Bulkheads, guardrail, piling and caps could still be separate units.

Construction Records Committee Meeting

The researchers met on October 25, 1973, with a representative from the Headquarters Construction Section, two project engineers and six representatives from the Estimates Section to discuss problems with construction records. The Construction representative explained that the purpose of the meeting was to discover the problems that Estimates has with project engineers' records and to attempt to find a solution. He said that the two project engineers present might not be aware of some of the problem areas since their records were not the ones creating the problems. He further explained that the mechanism for correcting the problems has not yet been fully decided upon. One possibility under consideration was an expansion of Chapter 6 of the Construction Manual in order to clarify and explain the requirements contained therein. In discussing the problem areas, the Construction representative stated that it was hoped that certain record duplication could be eliminated if possible. The representatives from Estimates then spoke on the major problem areas.

Haul Tickets and Truck Measurements

1. Lack of sufficient information. Some people chronically fail to provide all the required information.
 - A. Haul tickets are sent in for trucks for which either no measurements have been provided or else just average dimensions have been supplied but no sketch. These requirements are in the Construction Manual: Item 6.04, par. 2, p. 6-2; Item 6.06, par. 24, p. 6-5; Item 6.08, pp. 6-11 and 6-12; Item 6.09, p. 6-12; Figures 6-10, 6-11, 6-22 and 6-45.
 - B. No explanation is given when pay amount differs from calculated volume. For example, a request will come in to pay for 12 yards laid when truck holds 14 yards and there will be no explanation of what happened to missing 2 yards.

Plan Changes

1. No breakdown of items when more than one project is covered under one contract. (Item 6.13, par. 7 and par. 14, p. 6-13)
2. Incorrect number of plan sheets submitted. ((Item 6.13, par. 2, p. 6-13)
3. Contractor's signature not on plan change when required. (Item 6.13, par. 12, p. 6-13) It was suggested by committee that solution would be to get signature of contractor on all plan changes.
4. Duplication of item numbers on plan change. (Item 6.13, par. 13, p. 6-13)
5. One plan change depending directly on another. Each should stand alone with engineering reasons, documents, sketches and explanation. (Item 6.13, par. 4, p. 6-13; Figures 6-12 and 6-13)
6. Lack of information as to quantities. Previous quantities should be kept on Estimate Data Sheet. (Figure 6-85)

EARTHWORK

1. Cross-section sheets are submitted without being signed. (Item 6.18(2), p. 6-16)
2. Method used for figuring adjustments on cross-section notes when paying for removal of old pavement not shown. There are 2 acceptable ways of figuring this. Just make sure adequate documentation is there so that Estimates will know which method was used.
3. Borrow pit sketches are not in the field books. According to manual, they should be present. (Item 6.18(10e), p. 6-18)
4. Flow line grades are not corrected on as-built plans. (Item 6.18(2), p. 6-16)
5. Turn outs are not being cross-sectioned.
6. Bench marks inadequately referenced and/or referred to. Start with number 1 and progress on. Also need adequate level notes with number, description and elevation. Thereafter, in other references, use number rather than description or elevation. (Item 6.18(3), p. 6-16; Item 6.18(7), p. 5-16.)
7. Undercut areas not being plotted on roadway sections. This needs to be done to prevent overlap or double pay areas. Also, cross-sections of undercut areas are not being taken. (Item 6.18(10b), p. 6-17; Item 6.18(10d), p. 6-18)
8. Blue top grade stakes - grade is taken from plans and entered in field book. When grade is changed, the change is often not reflected on as-builts or in field -books.
9. Bench level notes not adequate. See explanation of adequate notes under #6 above.

10. Field notes in regard to removal areas (walks, driveways, turnouts, etc.) not adequate for pay purposes. P. E. or inspector just enters square yards removed. Need to enter station no. and distance from center line, sketch and details. (Item 6.04, par. 8, p. 6-2; Item 6.06, par. 10, pp. 6-3 and 6-4; Item 6.06, par. 36, p. 6-6)
11. Cross-section when plotted sections don't conform to typical cross-section. Any deviation from typical should be explained, especially if plan change is involved.

RECOMMENDED ADDITION TO EARTHWORK NOTES

1. A recap or summary would be a welcome addition when computations on earthwork are submitted to estimates.

General Comments

1. Field books are not indexed correctly. Some are left out completely; some are not indexed specifically, i.e., there is no breakdown of the book. (Item 6.18(3), p. 6-16)
2. Changes in field books are not explained. If something is voided it should be explained or cross-referenced to where it is corrected. Sometimes, things that are voided in one place are not voided in other applicable records.

Partial Estimates

1. Advancement of payment on stockpiled material is a real problem. (Item 6.06, par. 13-5, p. 6-4)
2. Form E-14 is incorrectly completed. This is monthly report as to working days charged. This form is filled out in Construction Manual and it is in specifications as to what to charge. Problem may be in what is

considered "exception." Also problem with submittal of form. It was suggested that time on both the project engineer's and Estimates part could be saved if the contractor was simply sent a copy of the unsigned original and the original sent to Estimates without contractor's signature, since most contractors refuse to sign the form anyway. (Item 6.06, par. 19 and 20, p. 6-4; Figures 6-2 and 6-3)

3. Question on usefulness of Earthwork Data Sheet - Form 4066. Neither Estimates nor project engineers see usefulness of this form that is an old FHWA requirement. (Item 6.06, par. 37, p. 6-6; Figure 6-5)

Final Estimates

1. Project engineer should submit letters on items in contract that are spelled out in special provisions, i.e. permits for utilities, etc.
2. Field notes not clear - there should be a note of explanation to clarify remarks if out of the ordinary.
3. Reinforcing steel books not clear - especially in regard to splices. (Item 6.04, par. 10 and 11, p. 6-2; Item 6.06, par. 77, p. 6-10)
4. Participating and non-participating items not separated. (Item 6.02, p. 6-1)
5. Pipe records not clear, especially in measurement. If station number, length of pipe, etc. changed, original should be marked out and as-laid information inserted. Also, record confined pipe to nearest .1 foot; therefore clarify 1st paragraph of page 6-23. (Item 6.04, par. 4 and 5, p. 6-2; Item 6.06, par. 50-52, p. 6-7)
6. Good news for project engineers. Don't have to compute concrete for box culverts, etc., when standard plans are used.

Committee Response

The thrust of the Estimates comments was that, as one man from that section said, Chapter 6 should be followed to a "T." It was a consensus of opinion among committee members that Chapter 6 is, for the most part, clear and complete in detailing how records should be kept. It was the feeling of the committee that the problem lies, not with Chapter 6, but with the failure of certain project engineers to read and follow the procedures outlined therein. The general impression developed from this meeting is that further writing and explaining will not help since some engineers do not read and follow what is already set down. What is most needed is enforcement of the existing procedures.