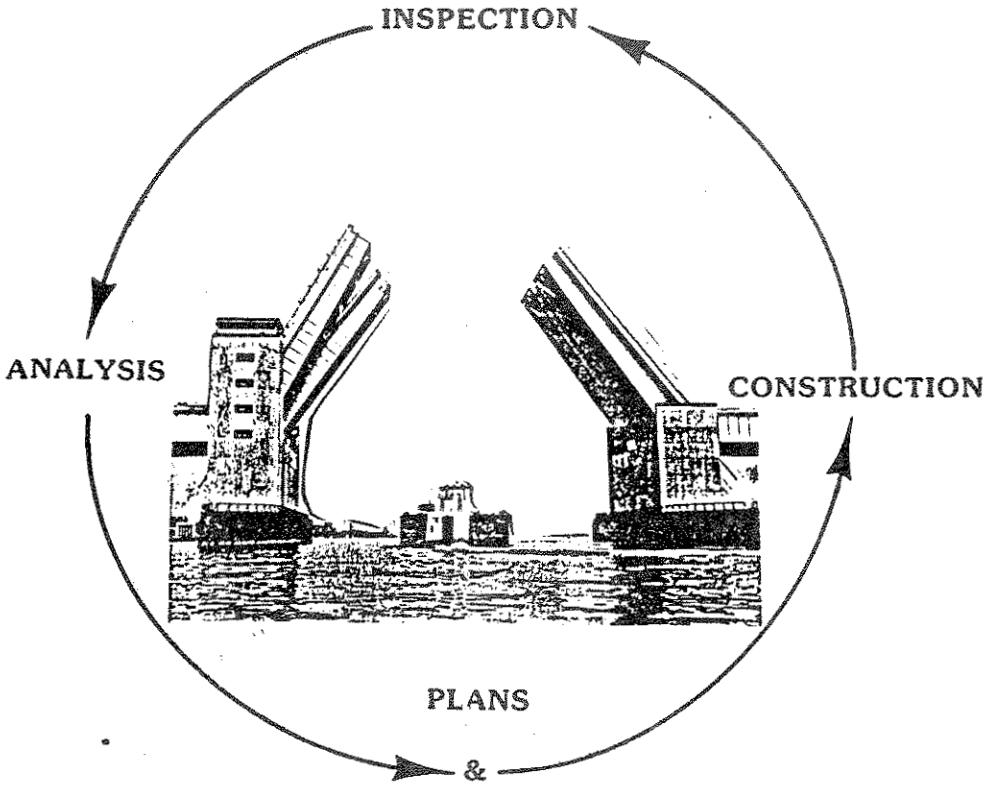
PAPER TRAIL

FROM INSPECTION TO REPAIR



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ORGANIZED 1915

BY

K. C. ROBERTS

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INTRODUCTION

Since 1967, we have generated literally tons of bridge inspection reports, tens of thousands of computer printouts, and developed untold numbers of deficiency lists. All this in an effort to protect the public from such disasters as the Silver Bridge in 1967, the Anclote River Bridge in 1968, and the South Canadian River Bridge in 1977.

However, the important function to be considered is not that of creating sophisticated files, records and statistics but the action that ensues as a result thereof. The action I am speaking of is, of course, the effective preventive maintenance and repairs that have been identified in a well planned and executed inspection program.

Our paper today deals with the methodology of the paper trail from inspection to repair including administrative and managerial decisions that result in effective repairs in a timely manner.

INSPECTORS

As we are all aware, our bridge inspection programs were born in the late 60's and early 70's. Our most important beginning problem and one of our most important objectives today is obtaining and maintaining qualified bridge inspectors. The problem is even more enhanced when we talk about movable bridge inspectors.

Florida originally began an in-house bridge inspection school lasting six weeks which included one week of movable inspection instruction. We began our program by recruiting construction personnel with extensive bridge construction experience.

Over the years we have continued to improve upon the quality of inspectors and the instruction provided to them. We are currently in the process of upgrading the inspection schools. I say schools because we anticipate having schools specialized in several areas. After we have initiated these schools, inspectors will be certified in a particular area only after successfully completing that program. We plan to certify inspectors in complex, fixed, movable, and segmental construction. The first school to be offered will be movable bridges and should occur early in 1986. Hopefully through more formal education and instruction combined with supervised on the job training, qualified and effective movable bridge inspectors will prevail.

INSPECTIONS

Inspectors are like many other professions and business' in that they produce a product. The product, of course, is a Bridge Inspection Report. The ability of other engineers to utilize the report is directly related to the quality of the inspection and the communication provided therein. Our inspector's instructions are relatively simple, report all known or observed deficiencies. Perform investigative inspection techniques to seek out and identify the cause for such deficiency. Assuming that the inspector is knowledgeable of engineering principles and experienced in maintenance inspection he will also recommend corrective action.

INSPECTION REPORT REVIEW

Florida is comprised of six transportation districts. In an effort to decentralize bridge operations, several years ago structural engineers were established in each District. Inspection reports, once completed by the District Bridge Inspection Engineer and his staff, are forwarded to the District Structural Engineer. The District Structural Engineer performs load analysis' and reviews identified deficiencies for corrective actions.

On a monthly basis, a meeting is held involving the District Structures and Facilities Engineer, District Bridge Maintenance Engineer, District Structural Engineer and the District Bridge Inspection Engineer. These engineers serve as a bridge repair committee. They're function is to establish priorities of repair and determine how the work should be accomplished. The District Structural Engineer will generally make available his analysis and recommend repairs that should be made. In many cases involving complex repairs, especially in movable bridges, a more extensive review or special inspection may be requested by the repair committee. The District Structural Engineer will then coordinate more sophisticated inspection techniques involving experts and specialized professionals.

SPECIALIZED TESTING AND EVALUATION

In many instances we have found it necessary to perform more indepth inspections to accurately identify the deficiency. This involves specialized testing procedures. Some of the procedures used have included, ultrasonic, radioactive, x-ray, computerized field load testing and any other available test that may be applicable to mechanical apparatus.

There are cases that have required very professional expertise. We have sought out those experts that can provide the service of field analysis, accurately identify conditions and recommend corrective action to be taken. One example of this, involved Dr. Bob Gould, P. E., metallurgist of the University of Florida. Dr. Gould had been employed in 1972 to evaluate an eye bar, showing deterioration, in a counterweight of a large lift span. His report included a chart showing potential deterioration rates and ultimately the overstressing of the eye bar unless preventive measures were taken. In 1984 Dr. Gould again was consulted to reevaluate the same eye bar. His conclusions were that preventive maintenance had drastically reduced the deterioration rate. As a result the repair committee tabled major repair plans that had been anticipated.

Another example employed Dr. Larry Oline, P. E., of the University of South Florida, who has performed substantial analysis of Hopkins Frame problems throughout the State. He has designed repair/replacement procedures that we feel will standardize and improve maintenance and repair activities in the future.

We, of course draw upon our own resources in the State Structures Design office here in Tallahassee. There are several mechanical engineers that are available to consult with the districts as needed.

We are in the process of establishing a new position in the State Structures Maintenance office. The person occupying this position will be a mechanical engineer hopefully with design and maintenance experience. We may call him the State Drawbridge Engineer. His duties will be solely to establish maintenance and repair procedures for Florida's drawbridges. He will work very closely with the district to identify repair projects.

IDENTIFICATION OF REQUIRED WORK AND PRIORITIZATION

The district repair committee, upon completion of all test results and evaluations performed by consultant personnel, will meet to discuss action to be taken. A main topic to be discussed and ultimately a decision to be made will be whether the repair can be accomplished by State forces or will a contractor be required. This decision generally is made based on a two point criteria. The first being whether or not the state possesses the level of expertise required to perform the repair. The second, regardless of the first, evaluates the current workload capability.

At this point, assuming the work will be by State forces, the District Structures Engineer will determine the design and scope of work that maintenance forces will pursue. Plans or sketches are provided to the District Bridge Maintenance Engineer who plans and schedules the repair. Upon completion he will certify by submitting a correction action report to the District Structural Engineer that the repair has been accomplished.

This is one option by the repair committee. The other is to pursue repair by contract. The contract option may either greatly reduce or increase the paper and time depending on the critical nature of the repair and negative impact on the motoring public. The contract will proceed in a normal fashion or as an emergency.

EMERGENCY DECLARATION

An area that we all do not like to deal with is emergencies. However they will prevail and we must be prepared to take immediate corrective action. I mention this subject because it changes the paper trail drastically.

We have a procedure that requires the Secretary of the Florida Department of Transportation to declare a State of Emergency. Once this has been done the Department may proceed in the most expedite manner possible. If the emergency is drastic enough, plans, bidding requirements and specifications can be waived. In this instance a contract can be negotiated with any contractor available, capable of performing the work. It is possible, through this procedure, to have a contractor on the job in a matter of hours.

In the emergency procedure almost all paper work is accomplished after the fact.

NEEDS FILE

Funding for repairs are currently programmed on a Statewide priority system. The first course of action is to place the proposed repair in the district "needs" file. This is done in priority order. As funds are made available projects are pulled from the needs file and placed in the funded program. We generally work on a two year funded program.

FUND ALLOCATION TO DISTRICT LEVEL

Although we have worked several years on the Statewide priority system we now find that it would be advantageous to allocate funds to individual districts and allow them the flexibility of managing their program entirely.

We will, during this fiscal year, develop a plan to determine each District's allocation. We anticipate that initially the allocation will be based mostly on documented need. However we believe this will eventually evolve into some type of formula that is based on inventory with weighted factors for different bridge types.

The allocation to the District level should give them more manageability of the program, enable the District Structures and Facilities Engineer to reduce the lag time on more critical projects and perhaps reduce some paper work.

PRELIMINARY ENGINEERING

At this stage of the paper trail we are faced with that old decision making time. We have three options we may pursue to bring about a contract ready package.

1. Perform work in-house
2. Joint in-house participation with design consultant
3. Total work effort assigned to a consultant

Option 1 allows us to move quickly in the case of a critical situation especially if Mini-Contract procedures can be used. Mini-Contracts are limited to $150,000 and are handled completely at the District level, (plans, specifications, advertising, award and execution). District production capabilities are limited due to small staffs and insufficient structural design engineers. The decision to perform the work in-house is primarily based on work load and level of design expertise required. If this option is selected production time and letting dates are then established.

Option 2 consists of a joint effort between the structures office and a consultant. This past year we were faced with additional funding for repair projects. In order to meet the production schedule we had to either increase our drafting and design capability or employ a consultant. We advertised for consultant services. The scope was identified as a drafting chore with minor design and engineering requirements. The contract was for a maximum limiting amount for the fiscal year or until budgeted funds were exhausted. As the production schedule advanced projects were assigned to the consultant with directions of the type of repair needed that had been determined by the repair committee. Cost negotiations were conducted for each project assigned. Once agreement was reached, notice to proceed was authorized at the District level.

Option 3 assigns the total work effort to a consultant. This option is generally reserved for projects involving minor and major rehabilitation and not simple repairs. The consultant services may be obtained either of two methods.

For minor rehabilitations, the consultant identified in Option 2 may be used and the process advanced as indicated. Major rehabilitations will require the normal consultant selection process which of course is lengthy and time consuming.

The assignment to the consultant in Option 3 is twofold. First he conducts, using existing reports and records, his own inspection of the subject bridge. Upon completion of his inspection, repairs are identified by him including the scope, methods to be employed, and estimated costs.

The consultant reports this to the Department as his recommendation. The District Structures office in conjunction with the State Structures office then determines what actual repairs will be pursued. This decision will be based on available funds but other factors will have some impact. Some of these factors may be: 1) Desired life expectancy before total replacement. 2) Repair versus rehabilitation, versus retro-fit, and 3). Maintenance of Traffic - may impact type repair available.

Once the decision of what repair or rehabilitation to perform is made by the Department, the consultant then prepares plans and specifications and presents to the Department, a contract ready package.

CONTRACT LETTING

Florida Department of Transportation utilizes two contract types separated by the amount of cost. Mini-Contracts are governed by a maximum payment of $150,000. Florida law prohibits exceeding this designated amount. Mini-Contract procedures allow for shorter time frames in that all administrative functions are performed at the District level.

It follows that normal contract procedures involve contracts where the amount will exceed $150,000. This type of contract requires a greater length of time from plans completion to the letting of a contract and the issuance of the work order. The time frame will be approximately 135 days.

CONTRACT ADMINISTRATION AND INSPECTION

Contract administration is conducted by the Department's construction division. Our construction personnel handles administration and inspection for all new construction, reconstruction, rehabilitation and repair projects in each District.

During the course of maintenance repair and rehabilitation projects, a bridge inspector from the District Structures office will be assigned to assist construction inspectors and to coordinate between the project personnel and the District Structures staff. In the case of movable bridges this function becomes essential due to the fact some problems may not be identified until the mechanical equipment is disassembled.

EVALUATION OF CORRECTIVE ACTION

Inspections are scheduled as soon as construction is completed and the project has been accepted. The inspection is performed by the District Structures inspection staff.

The major objective of this inspection is to evaluate the repair or rehabilitation to determine if it has satisfied the problem of which the corrective action was intended. An assessment of quality is also made and reports filed to comply with the Quality Assessment Program.

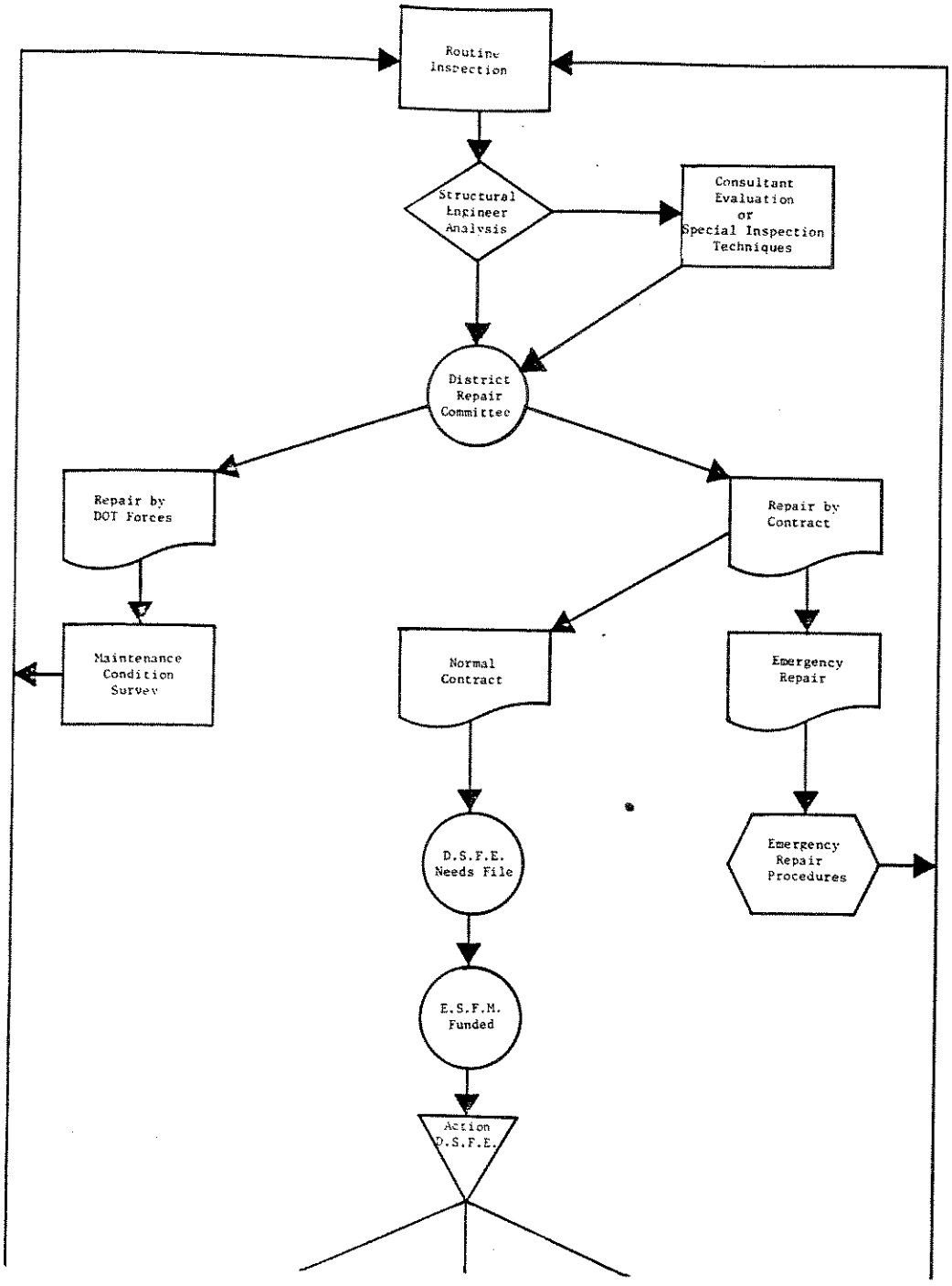
I would like to digress a moment to an earlier section of this paper, Identification of Required Work and Prioritization. Many minor repairs and considerable routine maintenance activities are performed by both District Bridge Maintenance personnel and by personnel under the jurisdiction of area Maintenance Engineers. The work performed by both have always been subject to evaluation during subsequent inspections. This evaluation has generally been viewed from the point of how effective was the repair.

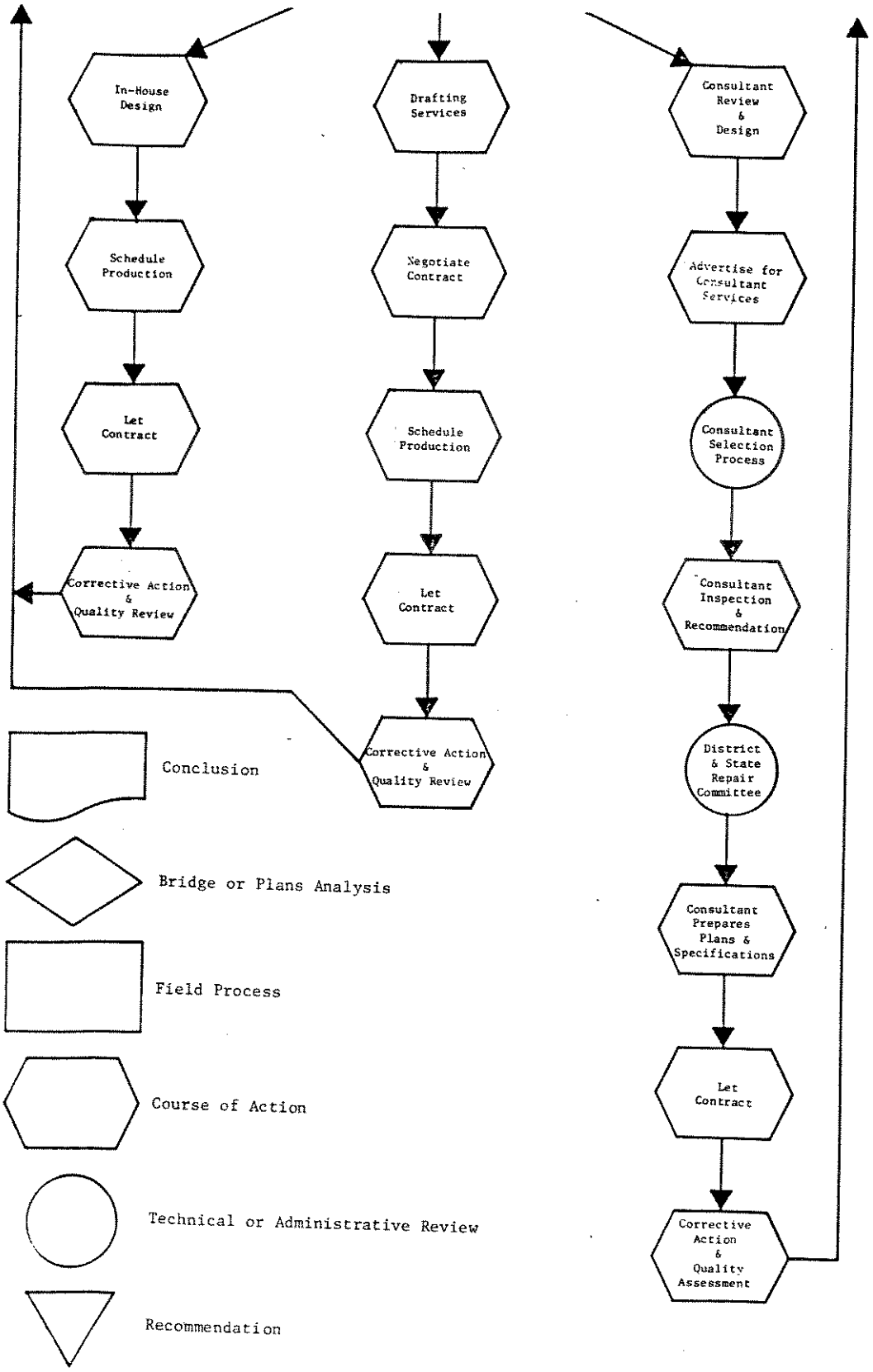
Recently we initiated a new program in Florida dealing with highway maintenance. The program involved the development of Maintenance Condition Standards. The plan was to determine a desired quality level of maintenance and a method of measurement.

We are currently carrying this program forward to include the establishment of Maintenance Condition Standards for bridges. This should be complete early in 1986. After development of this program bridge inspectors will be conducting maintenance condition surveys to evaluate the quality of maintenance provided.

CORRECTIVE ACTION REPORT

Finally a corrective action report is completed and transmitted to the official bridge file signalling that the cycle of the paper trail is complete.


Routine Inspection
Structural Engineer Analysis
Consultant Evaluation or Special Inspection Techniques
District Repair Committee
Repair by DOT Forces
Repair by Contract
Maintenance Condition Survey
Normal Contract
Emergency Repair
D.S.F.E. Needs File
Emergency Repair Procedures
E.S.F.M. Funded
Action D.S.F.E.


In-House Design
Schedule Production
Let Contract
Corrective Action & Quality Review
Drafting Services
Negotiate Contract
Schedule Production
Let Contract
Corrective Action & Quality Review
Consultant Review & Design
Advertise for Consultant Services
Consultant Selection Process
Consultant Inspection & Recommendation
District & State Repair Committee
Consultant Prepares Plans & Specifications
Let Contract
Corrective Action & Quality Assessment
Conclusion
Bridge or Plans Analysis
Field Process
Course of Action
Technical or Administrative Review
Recommendation

BACKGROUND DATA

K. C. Roberts

Native - Central Florida - Plant City, Hillsborough County

Employment - State Road Department
January 2, 1964

Construction, surveying and inspection
Auburndale & Lakeland

Maintenance, permits and engineering
St. Petersburg

F. D. O. T. Engineer Training Program
Two Years

Assistant Maintenance Engineer
Tampa
Four Years

Maintenance Engineer
Jacksonville
Eight Years

Current Position - District Structures and Facilities Engineer
District II, Lake City
Three Years