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EVALUATION OF THE SUPPORT REQUIREMENTS FOR THE DISTRICT 2 FREEWAY TRAFFIC MANAGEMENT SYSTEMS

by
Wallace E. Ewell
Supervising Traffic Engineer
State Department of Highways and Public Transportation
District 2
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I. INTRODUCTION

The initiation of a Statewide Freeway Traffic Management Plan and the ensuing installation of the associated equipment in the large Urban Districts may sound like a traffic engineer's dream-come-true, but a failure to provide the necessary financial and personnel support can turn this dream into a nightmare. The supporters of such an undertaking should first perform a realistic in-depth evaluation of the potential costs of operating and maintaining these systems on a statewide basis. Reliance upon "rules-of-thumb", based on simple percentages of the installation costs may be quick and easy, but will not be as reliable as a more intensive evaluation.

The implementation of a Freeway Traffic Management Plan is a very expensive, complex, and tedious undertaking. The concepts may sound simple and translate fairly easily into planning documents, but the detailed design and field installation of the system elements is a real challenge. The belief that the Districts will be able to operate and maintain these new systems with their existing financial and personnel resources for an extended period of time is a myth! The potential tort exposure and possible loss of public confidence that will most assuredly result from attempting to pursue a plan of this complexity and magnitude with inadequate staff and funding will overshadow any partial benefit gained in congestion reduction.

This analysis is an attempt to clarify the anticipated needs for the implementation of the plan supported by District 2.

II. PERSONNEL

The District chose to do the system design "in-house", using existing personnel; The use of consultants was not considered to be a desirable alternative. However, the District is receiving conceptual design support and review for some system automation items from TTI, D-18STO, and D19-EE.

The procurement and training of personnel to operate and maintain this new equipment takes time and cannot be put off until the equipment is delivered and installed. They must be hired and integrated into the existing district organizational structure well in advance of the time of need so that the required training can be planned and conducted.

The operational tasks for the traffic management personnel in District 2 will include system planning, design, performance evaluation, administration and the daily operation of the systems installed on the roadways. It is highly likely that at least two shifts of personnel will eventually be necessary, so some duplication of personnel must be expected.

The system maintenance tasks will include the troubleshooting of equipment malfunctions in the field, bench testing and repair of replaced components and the administration of the preventive and corrective maintenance support efforts required to keep the equipment operating properly.

This equipment incorporates state-of-the-art digital electronics technology, so the acquisition of personnel with advanced formal training in this field is essential. The District's traffic signal technicians may be able to carry some of the initial maintenance load, but the department's recent assumption of additional responsibilities for traffic signal maintenance in local cities has severely limited their opportunity to work on the traffic management systems. They must be supplemented with additional personnel with advanced electronics training.

It is anticipated that as the District's experience with the systems advance and reasonable incident response techniques are developed, additional personnel and equipment will be needed to supplement the existing courtesy patrol resources to carry out the incident management functions on the highways.

III. TRAINING

State personnel must be trained to operate and maintain the new systems. We have included some "package training" in the equipment purchase and installation contracts, but we must also integrate our training with the local government's traffic agencies and law enforcement officials to insure that the mission of the traffic management plan is clearly understood and support is received.

Operational training must go beyond the simple manipulation of the various knobs and levers required to control the equipment. We must provide the operations staff the opportunity to closely evaluate each piece of equipment to determine its advantages and limitations. A through knowledge of the equipment will make it easier to determine its role in the overall plan and optimize its usefulness. The majority of the training will have to be conducted on-the-job. Some will be obtained during the initial "shakedown" phase associated with running acceptance checks on the equipment, but some formal training will probably be needed later. Training of maintenance personnel must include both formal schools and on-the-job experience.

IV. OPERATIONS

The initial system operational duties will involve training, the performance of acceptance checks and gaining familiarity with the new equipment. We hope that most of these activities will take place at the new satellite computer building located near the I-35W/I-20 interchange and at the remote monitoring center at the District Headquarters. This "shakedown" work will include the determination of how to operate and properly interface the equipment with the local driving environment, the building of a computerized statistical data base and the development of appropriate incident response algorithms.

We must devise pre-programmed incident management algorithms; "wargames" if you will, intended to simulate various potential highway incidents. This process will involve detailed studies of the geometrics of the freeways, the identification of points of possible diversion to the city street system and an evaluation of the capacity of parallel arterials. Methods to bypass any freeway incident must be determined and a detailed plan for how the new electronic detection and control equipment is to be used to assist the diversion must be formulated. It would be very useful to devise a computer model of the particular freeway, using a program such as FREQ, so that volume and capacity simulations can be performed to supplement the planning process.

Development of a Traffic Incident Information Center - this task will consist of obtaining the equipment and "contacts" required to monitor the local A. M. radio station's traffic helicopter reports and possible subscription traffic services. It may also be worthwhile to establish a working relationship with the local CB react groups and setup a base station to communicate with other CB groups, such as truckers. Any use of Highway Advisory Radio (H. A. R.) should originate

from this Center. A direct radio or cellular telephone link to the District's safety coordinators, courtesy patrol, Incident Management Teams and the local police traffic units should be considered. This installation may also serve as a media liaison center.

We must also start to forge a solid working relationship with the City of Fort Worth's new Traffic Control Center and start to devise joint operational methodology with their personnel and systems. If we are to co-exist with them, an early financial and physical presence in their almost-completed center is essential.

V. MAINTENANCE

A comprehensive, well organized preventive maintenance program is absolutely essential to insure that the Traffic Management System equipment's operational potential and life expectancy is optimized. The State must realize that they have limited experience with maintaining these "High Tech" electronic systems and be willing to provide the essential personnel, training and budgetary support needed to give the equipment a fair chance of being successful.

A well-conducted maintenance program should be based upon computerized equipment repair and cost histories. A data base that records equipment and individual component failures will provide the opportunity to replace critical items prior to an inopportune failure and make it much easier to determine realistic levels of spare parts stockage and future budgetary submissions. A good preventive maintenance program can significantly reduce the disruptions and cost of equipment downtime. It will also provide useful, real-life statistics for research purposes and to assist the other districts in the development and implementation of their plans.

State personnel should attempt to maintain as much of the new equipment as possible. Reliance upon contracted maintenance places us at the mercy of a very small group of specialized contractors and suppliers. The administration's refusal to allow any sort of proprietary procurement of system components will make the use of contracted maintenance even less attractive, due to the fact that most of the suppliers of this equipment are located out of State and have a very small presence in the local area. The assumption that all of these suppliers are going to open a service or parts outlet in our area to serve their small portion of our equipment is highly unlikely.

The TM System Maintenance program should be based upon the concept of "Quick Response"; the ability to quickly replace a defective major component will minimize the time that the system is "Off Line". The Bench Technicians at the District repair facility can repair and return to service some items, but others will have to be sent to a facility maintained by the Austin Divisions or to the equipment manufacturer. The ability to make this type of system work is based upon the District's being able to maintain a spare parts stockage level of at least 10% of the equipment installed in the field .

Austin should attempt to establish some sort of repair support facility to allow the Districts to take advantage of "volume discounts" for the purchase and repair of major interchangeable components. Interchangeability and standardization would greatly simplify the system maintenance and supply needs and reduce the State's dependence upon outside suppliers. This proposal may be difficult to accomplish in a "low bid" environment for equipment procurement, but the possibility that each District will end up with a different, unique TM System with a variety of unique components will be difficult to maintain and will prove to be a real nightmare when the suppliers of these systems go out of business or are unable to provide parts for older equipment. There is a strong case for buying system components on the State level, like we do traffic signal NEMA equipment, and writing specifications to mandate interchangeability. This would allow D-19 and D-4 to support all of the Districts and possibly to establish a "depot" type repair facility for repairs beyond the District's repair technicians resources.

VI. BUDGET SUPPORT

The planning processes often casually treats the issue of future support obligations as a simple percentage of the system hardware procurement and installation costs. This simplification makes it easy to develop an estimate of possible support costs, but fails to identify what a low-bid construction environment can do to the compatibility aspect of system components and how eventually these support costs are to be distributed within the various State budgetary categories. The "simple percentage" methodology also apparently ignores the fact that the basic support structure does not exist and assumes that the additional percentage is just added to a pre-existing base. It ignores the reality of having to establish an initial structure on which to build to the point where an annual percentage is valid.

Specifically, it ignores the "first costs" of establishing a spare parts pool, obtaining additional support equipment, expanding work and storage spaces and the procurement and training of speciality maintenance and operations personnel. It also fails to address the problems associated with submitting budget proposals for approval at an every-other -year legislative session.

Certain elements of cost are stationary and must be paid each month. Other costs are flexible and are dependent upon the extent of support that is decided upon. Most of the equipment must be connected to a source of electrical power and consequently generate a minimum monthly billing. Also, various system components utilize the commercial telephone network for transfer of data and control commands from remote locations. Paying these bills is not an option if the equipment is to be used at all.

VII. SUMMARY

The plan implementation process must include a consideration of many factors; District and law enforcement support, local motorist personalities and expectations, public education and a clear understanding of the project goals and equipment limitations are just a few of these essential elements. The willingness and patience to adjust implementation schedules to complement the availability of support resources and the fortitude to continue in the presence of skepticism and indecision is essential.

This equipment is not fully automatic and it cannot function without a human interface; like any other piece of machinery, it consumes electrical power, needs regular preventive maintenance, will suffer shotgun wounds and other abuse from those it was intended to save and it will most assuredly occasionally breakdown on its own! It needs human beings to, install, operate, adjust, repair it and dismantle it when it reaches old age. Additional people are needed to prepare the plans, order the spare parts and pay the bills. Of course, none of this can happen without the additional money needed to accomplish all of these tasks.

The allure of a magical mystic force to save us from sure death by traffic strangulation has the potential to blind us to the hard realities of the implementation and support costs of such a miracle. This quest for electronic salvation must be tempered with common sense and a firm commitment by upper echelon management to support the magic with adequate personnel and financial resources. We simply can't let the glitter of the potential benefits blind us to the hard reality of the certain costs.