Having a Regional Transportation Planning Agency Develop, Support, and Facilitate a PMS for Local Agencies

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A unique support relationship for a local agency pavement management system (PMS) has been established in the San Francisco Bay Area. Since 1984 the Metropolitan Transportation Commission (MTC), the regional transportation planning agency for the Bay Area, has supported the development and use of PMS by cities and counties in its region. During the past 7 years, 47 jurisdictions, representing more than half the street and road centerline mileage in the region, are at some stage of implementing and using the Bay Area PMS. MTC trains jurisdictions in PMS concepts, PMS computer applications, and PMS budget result interpretations. MTC conducts quarterly user meetings in which jurisdictions not only direct MTC staff on future modifications to the PMS but also work with one another to assist in PMS implementation. If requested, MTC PMS staff will present PMS budget results to participating jurisdictions to emphasize the importance of pavement management. MTC's continued support and facilitation have been major factors contributing to the success of pavement management at the local level in the Bay Area. This regional agency involvement is believed to be one of the most important innovations in support of local agency PMS.

In 1981 the Metropolitan Transportation Commission (MTC), a multicounty transportation planning agency in the San Francisco Bay Area, began to work with several local public works directors to help them document local agency needs and shortfalls in pavement maintenance within the Bay Area. This was needed to support the directors' requests for additional revenues for pavement maintenance from their locally elected officials. In 1982 MTC released *Determining Maintenance Needs of County Roads and City Streets* (*1*), which showed that Bay Area cities and counties were deferring pavement maintenance projects at a rate of $100 million a year. The report also documented that Bay Area cities and counties had an existing street and road pavement backlog of $300 million to $500 million. This report helped to convince the state legislature to increase the state gas tax from 7 to 9 cents. Of the 2-cent increase, 1 cent went to cities and counties for use on local streets and roads.

During the next 2 years MTC continued to work with a committee of local public works officials to assist them with evaluating and setting priorities for their road and street needs. A major recommendation from this study was that MTC adopt and support a pavement management system (PMS) for local agencies in the Bay Area.

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In 1984, MTC began to develop a PMS (*2*). Six local jurisdictions (three cities and three counties) formed an advisory group that helped MTC monitor the PMS development. ERES Consulting, Inc., was retained by MTC to assist with this effort. The six pilot jurisdictions implemented the PMS in 1984, and by 1991 the PMS had been adopted by 47 Bay Area cities and counties. These jurisdictions are responsible for more than half of the 17,800 local street and road centerline miles in the Bay Area. The PMS has also been adopted by more than 75 other jurisdictions nationwide.

Besides supporting the development of the PMS software, MTC assists in every aspect of PMS implementation and operation. This includes training classes, presentations to directors of city and county public works departments explaining the PMS evaluation results, presentations to local elected boards and councils, and on-call (hotline) support. This support is one of the features that makes the MTC-supported Bay Area PMS successful.

The Bay Area PMS software, data collection, analysis procedures, and documentation were designed under the guidance of users. The programs have expanded, but the emphasis on user interaction has not changed. Users are surveyed to determine whether new procedures are desired and whether old procedures should be maintained or eliminated. MTC would never have embarked on the development of a project-level module or a mapping module without the support of its users. Through the user group meetings, which are held quarterly at MTC's offices, ideas are exchanged not only among MTC staff and personnel from participating jurisdictions, but also among users themselves. Because there are users at all stages of implementation, more-experienced users are willing to help others implement PMSs. It is a unique arrangement in PMS, and it takes place because a regional agency facilitates and promotes its use. This paper looks at three major areas where MTC has aided the implementation of the PMS in the Bay Area. It also looks at some instances in which MTC has assisted local jurisdictions in the continued use of the program after an agency has been through the entire process once. It is hoped that other regional agencies will gain from MTC's experience and adopt a similar program to help their local jurisdictions with PMS implementation.

MTC AS FACILITATOR

Although the PMS software provides the procedures needed by local agencies to implement network-level PMS (*3*) and

project-level PMS (*4*), the major factor contributing to the success of the Bay Area PMS is the range of support activities provided to users by MTC. One of the reasons that many PMSs are discontinued or not fully used is that the PMS knowledge is developed in one person in each agency (*5*). When that person leaves the position, the expertise is lost and the system is no longer used. Another reason is the perceived complexity of the PMS process in general and the software programs in particular (*5*). To counter these problems, MTC has developed one of the most comprehensive support programs for local agency PMSs in current use. Three major elements of this are user meetings, user services, and budget analysis.

This support must address several types of organization. The nine counties in the Bay Area range from completely urbanized to primarily rural. Of the nearly 100 cities and towns, about a third are responsible for less than 50 mi of roads and streets, a third are responsible for 50 to 150 mi of roads and streets, and a third are responsible for more than 150 mi. Members from each group were among the pilot agencies, and MTC has continued to support agencies in all three groups.

User Meetings

One important support function is holding user meetings at the MTC offices. In the early PMS development stages, the six pilot agencies met monthly. Each agency shared experiences and identified problems with the PMS. This led to the realization that the user meetings should be an integral part of the support structure for the PMS. Training on the PMS elements was instituted as a regular part of these meetings.

The quarterly user meetings have become the focal point for identifying changes and enhancements needed for the PMS. All agencies using the Bay Area PMS are encouraged to attend the meetings. Early in system development, MTC asked the pilot users what they liked and didn't like about the system. If, for instance, two of the jurisdictions wanted the ability to change costs and treatments in the decision tree that was being developed, it was through the user meetings that they expressed their opinions. If they could convince a majority of the six users, the program would be developed accordingly. All decisions about the program were made in this manner.

In the user meetings, the users direct MTC on needed modules or enhancements for the PMS. About once a year the users are surveyed as to what they like most about the program and what features they would like to add. In the past, the development of a project-level module and the development of a mapping module have been rated high priorities. During the user meeting week, subcommittee meetings are often held on the development of major new modules

When the initial computer program was being developed, MTC also conducted training for the participants. The training sessions included (a) establishing a PMS work plan and steering committee, (b) network breaking, (c) identifying distress, (d) interpreting PMS budget results, and (e) PMS computer training.

After the initial release of the PMS program, new users were added. In 1991 there were 47 local cities and counties at some stage of implementation—some into a third or fourth iteration of the program. The significance of the user meetings has not decreased. The meetings now include a wide area of activities. A general user meeting is held in which MTC staff present developments since the last meeting. MTC has established a method of tracking the progress of each user from the time that the user begins PMS implementation to the time he or she is using the PMS to develop the overall city or county budget.

The user meeting is a breeding ground for communication between old and new users. Since the program has been in operation, many of the more-experienced users have made presentations at the user meetings to new and potential users. The user meetings give each user an opportunity to discuss experiences. Those that develop new methods to accomplish a particular task are asked to present them to the other users. The meetings also offer ample time for one-on-one discussion. In effect, the user meeting has become a support group for users to share their thoughts and problems.

Other meetings also occur during the week of the user meeting. MTC provides training sessions on a cyclical basis. Each year there are usually 5 to 10 new users from within the Bay Area. These users need to be trained on establishing a PMS work plan, goals, a steering committee, and such. In a quarterly meeting the basic PMS training sessions are provided in (new) user orientation, network breaking, distress identification, PMS budgeting, and so on. These training sessions, though primarily developed for new users, are also attended by new personnel in established user agencies and those desiring refresher training.

It is essential that this training be available for the experienced users. Many agencies experience staff turnover in the departments responsible for PMS and send their new staff to the meetings. Early on, MTC found that the quickest way for a PMS to be put on a shelf in a city or county was for the individual responsible for PMS to leave or to be promoted. MTC staff is in contact with each of its participating users in the Bay Area and works to get new staff trained in PMS concepts and the correct use of the PMS program.

As users began to expand beyond the Bay Area, MTC realized that not all users would be able to attend the user meetings or the training sessions. To assist users who cannot attend the training sessions, MTC has videotaped five of the training sessions and provides them to jurisdictions at cost. The tapes train users how to break the network, identify distress, and use the microcomputer as it relates to PMS. Agencies in the Bay Area often use the tapes to supplement the training that the MTC staff gives.

Another important service that was touched on earlier is the retraining of users who have a new person assigned to the project. This retraining is the most important step for a city or county to make if they want to continue using the PMS. MTC staff provides the service with either an on-site visit or invites the staff from the jurisdiction to the MTC for training. In some instances MTC has retrained four different people from the same jurisdiction over the past 3 to 5 years.

MTC has recently added technology transfer seminars to the quarterly meetings. They have covered a wide range of topics, from the correct application of slurry seals to overlay design. After each meeting individuals are asked what type of topics should be covered in the next seminar. These seminars have improved the understanding of PMS concepts among

the various groups affected by PMS and have been well attended. MTC has also published a quarterly newsletter for the past 4 years that is distributed at the meeting. The newsletter includes computer tips, new maintenance strategies, potential funding sources for street and road programs, and other such topics. More recently, each newsletter includes an article written by a user; the article describes how the user has benefited from the PMS program. The articles provide impetus for newer users in the program as well as for older users who have not progressed as fast as others.

The general user meetings also provide an opportunity to respond to user questions and concerns about the computer program. MTC has adapted and modified the computer program many times through this process. Many suggestions and recommendations from the users that were not part of the original PMS have now been added. For instance, the program is now able to split and combine sections. This is necessary if a treatment is applied to part of an original section but not the remainder.

User Services

In MTC surveys of users, on-call and on-site assistance is always rated as the highest priority. When MTC developed the PMS computer program, it soon found out someone needed to handle computer hotline calls when users encountered problems. Nothing frustrates a user more than trying to get a report out for the boss but getting only an error message. A few of these incidents will lead to loss of credibility and discontinuance of use.

MTC has instituted a hotline for questions ranging from how to turn on a computer to how to interpret PMS results. MTC staff now tracks all calls to find common problem areas, which are then discussed at the general user meetings. The hotline also provides other information to MTC staff.

MTC originally believed that it was not its responsibility to train public works department staff in DOS or in RBase, the data base manager used in the computer program. Through the hotline questions MTC realized that if the PMS were going to be used properly in every jurisdiction, basic DOS and RBase instruction had to be offered. These classes are now given every 6 months at the MTC offices.

The hotline also helps MTC staff identify user agencies with personnel newly assigned to the PMS or otherwise inexperienced with PMS concepts. The hotlines are used to invite new personnel to the MTC offices for appropriate training in the normal training sessions or in one-on-one sessions.

The most important feature of the hotline is that it provides the answers to users' questions on the spot. In most cases the users can be coached through their problems and will be able to continue using the program. On occasion, when the problem cannot be solved on the phone, MTC staff will go the extra mile. If the problem is urgent, the user will be invited to MTC with the data base and the MTC staff person will "recreate" and correct the problem, or an MTC staff person will make an on-site visit to debug the data base and get the user back on-line. If time is not urgent the user will send the data base to MTC staff for review and debugging. When the data base has been fixed, it is sent back to the user.

Another important service that MTC provides for new Bay Area users is an on-site visit for software installation, distribution of the PMS user guide, and a walkthrough of the PMS program. The on-site visit helps MTC staff determine the experience level of the new user in computers and the type of computer being used, and—probably most important—the user gets to know the individual on the phone should a hotline call be required.

As mentioned previously, MTC has developed a method by which users are tracked through their PMS implementations. When users begin they are assigned an "F." As they move through the PMS process they move up in letters: "E" means they are breaking networks and doing distress surveys; "D" means they are developing budgets, and so on. A user who has reached "A" has made a budget presentation to his or her elected board or council and has begun to implement the maintenance program. MTC makes these ratings every quarter. The ratings help MTC determine if there are users who need special assistance. Most of the time, those jurisdictions needing special assistance are the smaller cities with less than 50 mi of roads. They often do not have the personnel for the PMS implementation. MTC has identified a number of consultants who can help these agencies implement the Bay Area PMS.

The user services component of the PMS has proved to be an invaluable tool in facilitation on the part of MTC. It has built a trust with the local jurisdictions, because they know they have someone to call if problems arise in implementation. Without the user service component, the PMS would have been discontinued in many jurisdictions because of staff turnover.

Budget Analysis

Main goals of network-level pavement management are to determine budget needs and to substantiate the impact of budget options on the future condition of the network, future funding needs, stopgap funding needs, and backlog of funds. This information is used at a regional level to help substantiate the need for funding at the regional and state levels. It is also used at the local level to justify budget requests. MTC has developed a program to assist at both levels.

Regional and State

As each user completes the budget portion of the PMS, MTC requests that their data base be sent to MTC. MTC then compares their 5-year budget need to expected revenues for pavement expenditures. A regional aggregate of 25 users shows that on average, San Francisco Bay Area jurisdictions are spending roughly $0.39 when they should be spending $1.00 for maintenance and rehabilitation of pavements.

An earlier version of this regional aggregate was used in 1988, when the California State Senate asked regional agencies statewide to develop a 10-year estimate of needs and expected revenues for streets and roads. Using the city and county data bases that it had at the time, MTC produced a 10-year needs assessment for Bay Area streets and roads; the assessment showed that the Bay Area needed $2.2 billion for pavement maintenance but could only expect just over $1 billion in revenues. These figures were used by the senate to

develop the bills that became Proposition 111 and Proposition 108. These propositions, which were passed in June 1990, increased the gas tax from $0.09 to an eventual $0.18. The increase in the gas tax is expected to raise $15 billion over 10 years, $3 billion of which is to be directed to cities and counties for use on local streets and roads.

MTC staff continues to encourage its users to complete its PMS in order to refine and update its regional aggregate needs and shortfall chart. In this way MTC is able to act as an advocate for additional revenues from a regional perspective.

Local

When a city or county completes its budget portion of the PMS, MTC prepares a document for the jurisdiction that MTC calls a budget option report (BOR). This report

- Reviews historical revenue and expenditure levels for street and road purposes;
- Estimates, from historical spending levels, future revenues for street and roads purposes for a 5-year period;
- Estimates a percentage of future street and road revenues that will be used strictly for pavement maintenance;
- Compares estimated revenues for pavement maintenance against actual need, as derived from PMS estimates;
- Documents ensuing shortfalls and surpluses for a 5-year period on the basis of projected funding;
- Develops other options to compare with the estimated level of pavement maintenance expenditures; and
- Offers recommendations on how the jurisdiction might want to proceed with its pavement maintenance program.

MTC has prepared BORs for 25 jurisdictions. One of the first agencies to receive a BOR was the city of San Leandro, in Alameda County. In April 1986, the BOR was presented to the San Leandro City Council, which informed them that the city's 5-year need for pavement maintenance was $11.5 million. Revenues for pavement maintenance over that period were estimated to be only $5.5 million. Seven months later the council requested that the department of public works and MTC staff deliver a formal presentation on the needed pavement maintenance revenue.

In the meantime, a ballot measure was placed before Alameda County voters that would increase the county's sales tax by a half cent for transportation purposes. Almost 20 percent of the revenue generated from the proposed increase would go to the city and county public works departments for use on streets and roads. In San Leandro's case, the estimated percentage of revenue being returned to them was approximately equal to the $6 million pavement maintenance shortfall. The evening before the vote on the referendum, San Leandro public works and MTC staff went before the city council. The council, after hearing the presentation, determined that if the referendum passed the next day, the portion of funds to be returned to the city would be used for pavement maintenance. Voters passed the referendum, giving San Leandro a steady source of revenue for pavement maintenance.

In July 1988 a BOR was presented to the city council of Vallejo in Solano County, showing a $14 million need and estimated revenues of $6.7 million. The year before using the PMS, Vallejo had a pavement maintenance budget of $900,000. The first year after its use the council devoted $1.4 million to pavement maintenance. Each year since then the council has increased the pavement maintenance budget. For FY 1990–1991 the budget is close to $2 million.

The city of Benicia in Solano County completed its condition survey in late 1989 and received a BOR in early 1990. The BOR showed that it had a $7 million need over 5 years and revenues for pavement maintenance were estimated at $2 million. Using the executive summary of the BOR, public works officials were able to secure an increase for pavement maintenance from $200,000 to $300,000. The city spent this in the first half of FY 1990–1991. The public works department went back to the council to ask for more funds and was able to secure another $400,000. In total, the city of Benicia was able to increase its expenditures to pavement maintenance by 350 percent in 1 year.

MTC has found that, though this process is time-consuming, it remains one of its most important roles. One of MTC's major interests in developing and continued support in the PMS is for cities and counties to use the results from the PMS to improve their pavement networks. MTC offers its services to jurisdictions to help them interpret the PMS results and to make presentations to their public works directors and locally elected board or councils to assist with the process. This assistance helps build confidence in the PMS and helps develop competence within the budget development and justifications in the agencies.

Does Facilitation Promote the Use of PMS?

Last year MTC staff analyzed data from the state of California to determine if MTC PMS users were increasing revenues for pavement maintenance.

Each public works department in California is required by law to report the source of its street and road revenues and how and where they are spent. MTC analysis included the period from FY 1980–1981 to FY 1988–1989.

The data for the 9 years were broken down into two analysis periods: FY 1981–1984 and FY 1985–1989. The PMS became available to Bay Area cities in FY 1985. During FY 1981–1984 Bay Area PMS users spent 23.5 percent of total street- and road-related revenues on pavement maintenance, whereas from FY 1985–1989 users spent 37.8 percent: a 62.1 percent increase in expenditures for pavement maintenance. From 1980–1981 to 1983–1984, other Bay Area cities spent 35.5 percent of total street and road revenues on pavement maintenance; from 1984–1985 to 1988–1989 they spent 31.4 percent, an 11.5 percent decrease in expenditures for pavement maintenance.

Pavement maintenance expenditures per mile were also analyzed. Broken down into the same time periods mentioned previously, the data show that MTC PMS user cities spent more than nonuser cities. From 1980–1981 to 1983–1984 MTC PMS users spent an average of $5,294/mi on pavement maintenance. From 1984–1985 to 1988–1989 an average of $10,792/mi was spent, an average increase of 103.9 percent. Other Bay Area cities spent an average of $7,498/mi on pavement maintenance from 1980–1981 to 1983–1984. From 1984–1985 to 1988–1989 an average of $8,949/mi was spent, a 19.4 percent increase.

Resources Devoted to PMS

From July 1984 to February 1986, MTC devoted the equivalent of 5.5 person years to the project. This was the development period. The cost was about $300,000. Since then, MTC has maintained the program at between 4 and 4.5 person years for every fiscal year. This calculation includes all professional staff time as well as support staff time. The cost per year has ranged from $250,000 to $350,000. When MTC embarked on the PMS project, it believed it was important to assist the local agencies in the Bay Area to better maintain their streets and roads. MTC therefore juggled its priorities and, with existing funding, developed and has continued to maintain the PMS. On top of the staff time, MTC has hired consultants. In the development stage the cost to MTC was approximately $180,000. During the past 5 years, MTC has spent an average of $50,000/year on consultant services.

For FY 1990–1991 the cost to support the program was approximately $400,000. Divided between the 47 jurisdictions this amounts to roughly $8,500 each. The cost to develop a PMS at the local level varies from $100 to $300/centerline-mi (*6*). The 47 jurisdictions maintain roughly 9,500 centerline-mi of streets and roads. This would amount to between $950,000 to $2,850,000 if they were to do it on their own.

CONCLUSIONS

MTC provided the Bay Area jurisdictions with PMS software that reduced the cost of adopting a PMS, thereby making use more likely by local agencies. Early in the process, MTC found that training and long-term support were as necessary as the software capabilities in successful PMS application. MTC has developed a series of support services that have proved to be of great value to the successful implementation and use of pavement management at the local-agency level. These services—which include user meetings, user services, and budget analysis—help personnel in agencies get started in PMS with the training and support needed to begin pavement management. They also assist agencies that have been using the PMS with the training and support needed to train and retrain current and newly assigned personnel. The user meetings are a focal point from which MTC takes direction on improving and modifying the software, training, and other support functions. This unique relationship has proved successful and demonstrated that success of PMS at the local-agency level is as much a function of the support available as it is the software. It is hoped that the MTC's experience can be used as a model for PMS support in other regional transportation planning agency areas.

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