CITY OF EAGAN

PAVEMENT MANAGEMENT PROGRAM

PUBLIC WORKS DEPARTMENT
STREET MAINTENANCE DIVISION

OCTOBER 1997
Revised JANUARY 2000
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PURPOSE

The purpose of a formal Pavement Management Program (PMP) is to establish and maintain a uniform definition and procedure for the application of various maintenance strategies to extend the overall expected life cycle of the City's transportation system in the most economical and efficient manner.

BACKGROUND

Eagan's rural farm community primarily began its change into a developing suburban community with the Cedar Grove housing development in 1959. Prior to that, there were limited isolated residential neighborhoods such as the Valley View Plateau and the McKee Additions. Because Eagan was still a rural township in those early years, the development of these communities and the related street, utility, and drainage systems were constructed and maintained privately by either the developer or local neighborhood associations. Eventually, those public facilities were either transferred to or assumed by the township of Eagan. With the related maintenance, the township slowly began to hire maintenance personnel whose primary objectives were to keep the water pumps running, the sewers flowing and the roads open. The few construction records that were provided to the Township were sketchy at best.

In 1960, the township retained a consulting engineering firm to help plan for the eventual growth and development of the community and to provide limited inspection and observation of new infrastructure construction.

In 1972, Eagan was incorporated as a village and on January 1, 1974, was designated as a City. In 1976, the first City Administrator was hired and in 1978, the City hired its first Public Works Director/City Engineer. During these past 19 years, the City has grown in population from 17,000 (1978) to approximately 61,000 (1997). Obviously, there has been a significant expansion of related infrastructure to the present system of approximately 300 miles of water main, 260 miles of sanitary sewer, 190 miles of storm sewer and 215 miles of local City streets.

Up until the mid-to-late 1980's, the City of Eagan's focus and attention was on its explosive growth and development resulting from the expansion of two new river crossings and the completion of the interstate system in northern Dakota County. With much of the street system being newly constructed, pavement maintenance was primarily reactionary to problems as they occurred, responsive to individual requests or programmed on a year-to-year basis. The need for a long-term maintenance strategy and program was soon becoming evident.

Like everything else, public infrastructure facilities have a limited life cycle. Specific life spans for each type of infrastructure system is influenced by design and technology standards, construction methods, materials, amount and type of use, and environmental impacts. Of all of the infrastructure systems, street pavement has the shortest life cycle. This is primarily due to the extreme physical abuse and exposure to harsh environmental elements in addition to the use of economical bituminous asphalt material in construction as compared to the longer lasting reinforced concrete pavement.
The life span of some of these early streets has already expired and they have been reconstructed. A limited number of additional street mileage that has reached its life cycle remains to be reconstructed. However, the vast majority of our street system is in relatively good condition but will soon be reaching the later stages of its expected life.

**PAVEMENT MANAGEMENT SYSTEM (PMS)**

In 1989, the Public Works Department incorporated a Pavement Management System (PMS) to help identify, inventory, and track not only the growth of the transportation system but also its structural performance and condition. The PMS selected by the City was originally created by the United States Army Corp of Engineers (ACOE), adopted by the Minnesota Department of Transportation (MNDOT) and subsequently modified by the private firm of Braun Intertec for application to local transportation systems within suburban cities.

This Pavement Management System has been incorporated and expanded since 1989. It has also been refined and updated based on new and evolving technology to its current application software program referred to as ICON. It evaluates the condition of a street and estimates where it is in its projected life cycle. Studies by the Federal government, local and regional research agencies and various universities have analyzed a broad spectrum of actual case histories and have “predicted” what a typical life cycle might be for a bituminous surfaced street. Naturally, any individual street’s life can vary significantly depending on the volume and load of traffic, subsoil conditions etc.

The Pavement Management System relies heavily on a rating of the physical condition of a street called the Pavement Condition Index (PCI). This PCI is obtained from a field inspection of every square yard of street surface by the technician who measures both the quantity and the type (severity) of distresses in the pavement. This evaluation is done in accordance with a uniform rating manual. The PMS software program then computes these field measurements and establishes a PCI number (0-100) which is a comparative rating to a new pavement (100). Exhibit A shows the relationship of the PCI to the age of a street and the recommended maintenance strategies and costs.

City roadway segments are field evaluated at a minimum of every three years providing a PCI rating on approximately one third (70 – 80 miles) of our total streets every year. In addition, individual streets are evaluated just prior to a significant rehabilitation project proposed within the next year or when deemed appropriate.

To a limited extent, the system can also be used as a tool to help Public Works managers evaluate what maintenance options might provide the most economical long-term benefit.
PAVEMENT MAINTENANCE STRATEGIES

Bituminous pavement maintenance incorporates a broad spectrum consisting of a variety of methods and strategies that are summarized and defined as follows:

1. PATCH & REPAIR - This involves the repair of the typical “pothole” or other similar small isolated section of structural failure. It involves removal and repair of the street section.

2. CRACK SEAL - Bituminous pavement by design is flexible to accommodate the freeze/thaw cycle of our climate. Subsequently, longitudinal and transverse (thermal) cracking will occur in relatively new pavement and continue throughout its life due to age, traffic, weather, etc. Crack “filling” is the placement of a liquid asphalt emulsion with minimal crack preparation into the void coating the newly exposed internal surface of the pavement to limit further deterioration. Crack “sealing” is the placement of a rubberized sealant in the crack that has been thoroughly cleaned and dried which provides the protective coating and seals out water.

3. SEALCOAT - This is the surface application of an asphalt emulsion followed by the placement of small graded aggregate. It’s a wear-resistant coating that protects pavements from oxidation and the effects of moisture.

4. PREPARATORY PAVEMENT MAINTENANCE - A significant maintenance effort incorporating “isolated” subgrade correction, patch and repair, cracksealing, milling and placement of structural or leveling overlays. It is usually performed 1–2 years before a neighborhood or development is scheduled for a major street rehabilitation effort.

5. MILL & OVERLAY - Milling consists of grinding the old bituminous surface down at the outside perimeters to establish a uniform cross-section of pavement prior to adding a new hot mix overlay. The milling creates an even surface assuring the overall thickness of the new overlay, which is critical to appropriate compaction. An overlay is a structural improvement which renews the street surface extending the lift cycle of the original pavement.
This is a process whereby all existing asphalt pavement is removed through a full-depth milling process, pulverized to a specific gradation, reclaimed and recycled in with the existing aggregate base before a new full depth hot mix asphalt pavement is installed.

This may incorporate the same procedure as reclamation. It may also involve subgrade soil corrections and some removal of aggregate base, which has been contaminated or is sub-standard. Field testing is used to determine the condition of the structural foundation, which must be improved to provide structural strength for the new asphalt pavement.

This becomes necessary when the upper surface layer (1"-2") of a pavement has deteriorated considerably. Significant surface pavement distresses and more extensive "thermal" cracking need to be removed and/or repaired with a full width and uniform depth milling process prior to applying the new overlay bituminous pavement.

This category describes those streets that are below current design standards of width, drainage, curb and gutter, bituminous surface, etc.

Each of these maintenance strategies have their own life cycle as well as its part in extending the life of the overall pavement section. The first two strategies commonly referred to as Localized Maintenance are performed on an as-needed basis as a part of the annual operating budget. The other seven maintenance strategies are more long-term Global structural maintenance improvements performed on a large-scale basis and are primarily funded through a combination of the annual Operating Budget, Major Street Fund and/or Special Assessments to benefiting properties. The localized maintenance strategies have been part of Eagan's operations for most of its history. The other seven maintenance strategies are being incorporated into the City's operations as our streets mature through their life cycle.

Global Maintenance, similar to localized maintenance, was originally a reactive program during the City's growth years. The first major reconstruction program was performed in 1983 in the 24-year old streets of Cedar Grove 1st and 2nd Additions.
The Public Works Department became more proactive in its life extending structural maintenance program with the structural Mill & Overlays within the Eagandale Center Industrial Park (1991), Cedar Industrial Park ('92), and Blue Cross Road ('94). A similar improvement within the Sibley Terminal Industrial Park was denied ('94). The life extending structural overlay maintenance program was expanded into the residential street system in 1996 with the South Hills Addition and continued into the Denmark/Kolstad/Timbershore neighborhoods in 1997.

The Preparatory Pavement Maintenance strategy has recently been implemented in the Evergreen, Hilltop, Donnywood, Meadowlands, Vienna Woods, Surrey Heights, Ridgeview Acres and Wilderness Run Additions in concert with the 5 yr. CIP and in anticipation of the adoption and continuation of this Pavement Management Program.

During this period of time, the City has also continued with its program of Reconstruction and Reclamation of those streets that were near the end of their life cycle along with upgrading numerous other streets to current City standards as well.

Exhibit B shows the history of new street construction and/or rehabilitation of the City’s street system. The implementation of the Pavement Management System and the recommended strategies of the Pavement Maintenance Program can help to level out the maintenance and rehabilitation demands associated with the City’s peak build-out years. It can also extend the pavement’s lifecycle for optimum delivery of service and maximum return on infrastructure investment.

Exhibit C summarizes the progressive strategies that are recommended in the Pavement Management Program to extend a pavement’s life to 50-60 years. It also estimates the related costs (in today’s dollars) and the present financing policy and practice.

Exhibit D conceptually shows how timely application of Localized Maintenance, Sealcoating and Overlays can improve a pavement’s condition and extend its life beyond the typical life cycle and the recommended age and/or PCI when various maintenance strategies will be considered.

Exhibit E shows the history of the City’s paved street system’s mileage, age, and overall weighted average PCI for each year.
OBJECTIVES

There are several objectives that the Public Works Department will achieve and implement with the adoption of this Pavement Management Program. They are listed as follows:

1. **Consolidation.** Historically, the Public Works Department has been programming streets for various maintenance strategies on a flexible time frame based on year of original construction. Due to the random development within our City combined with multi-year stage developments within individual subdivisions, it has become inefficient to continue to manage an effective maintenance program in such a random scattered manner. Therefore, both Localized and Global structural maintenance strategies should be performed in a geographical area or neighborhood. This will allow the Public Works Department to efficiently mobilize and mass its resources and provide advanced notification to affected areas. Contractual bid prices will likely be lower as a result of consolidation and the reduction of related mobilization costs.

2. **Extended Life Cycle.** The application of this Pavement Management Program should extend the useful life of our street system to a 50 – 60 year time frame. It will maximize the infrastructure’s initial investment providing a higher level of service delivery for City roadways and a safer, reliable driving surface. In some cases, the program may incorporate segments or streets into maintenance strategies prior to their perceived need in order to obtain a global program efficiency.

3. **Stabilized WorkLoad.** Due to the significant peaks in the City’s growth, a defined Pavement Management Program will allow the staff to apply various maintenance strategies to accelerate or defer certain areas to maximize the deficiencies of our work force. This will help limit the need for contractual maintenance services and help even out the workload for City maintenance staff.

4. **Financial Stability.** The ability to plan and program the most effective maintenance strategy will allow the City to forecast future funding requirements in advance of actual need. This also allows timely application for outside funding opportunities which usually require 2 – 3 years advanced planning.
GOAL
The Goal of this Pavement Management Program will be to continuously maintain the City’s transportation infrastructure system in a safe and fiscally responsible manner. To do so, the Public Works Department will monitor, measure and evaluate the surface condition of all paved streets at least every three years. It will record and plot the Area Weighted Average of the entire system’s age and PCI ratings. Also, it will program and implement the most long-term cost-effective maintenance strategies to insure that the overall Weighted Average PCI rating of any given neighborhood or logical series of street segments will be no less than 45. The global overall Weighted Average PCI rating of all paved streets in the city’s system will be no less than 75.

SUMMARY
The City of Eagan’s Public Works Department Street Maintenance Division has been a leader in the profession in the metropolitan area. Following the best recommended and documented engineering and maintenance strategies, new methods, materials and technologies are constantly being researched, experimented with and implemented by a very professional and dedicated staff. The number of street maintenance employees to the total number of streets being maintained is one of the lowest ratios in the entire metropolitan area. Several instructional videos have been produced and distributed showcasing Eagan’s methods and techniques. Numerous departmental employees have given presentations, conducted training sessions, and provided classroom instruction to other agencies and individuals. We firmly believe that the overall program’s goals, objectives and related strategies presented herein will provide the best level of service to the City of Eagan as well as all stakeholders in our transportation system.

Respectfully submitted,

Thomas A. Colbert, P.E.
Director of Public Works

Arnie Erhart
Supt. of Streets/Eqpt.

Tom Struve
Public Works Coordinator

Attachments
TAC/AE/TS/jj

1/138pavement management program
Revised January 2000
STREET LIFE CYCLE

<table>
<thead>
<tr>
<th>NUMBER RATING</th>
<th>VERBAL RATING</th>
<th>CONDITION GROUPING</th>
<th>TYPICAL MAINTENANCE</th>
<th>ESTIMATED COST/SQ. YD.</th>
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(Not to Scale)
## LIFE CYCLE PAVEMENT MANAGEMENT PROGRAM

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<th>Ave. Cost Per Sq. Yd.</th>
<th>Average C.P.M. Residential 32'</th>
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A - 100% Assessable
B - General Fund/Property Taxes
C - 40% General Fund/60% Major Street Fund
D - 50% Assessable/50% Major Street Fund
E - 75% Assessable/25% Major Street Fund
F - 75% General Fund/25% Major Street Fund

C.P.M. = Cost Per Mile

*Single-family residential only
Refer to assessment policy