

Municipal Officials Certificate Training Program

The University of Tennessee

Center for Government Training and Municipal Technical Advisory Service

BUDGET	MAYORS
☒ PUBLIC WORKS	GOVERNING BODIES
DEPARTMENT HEADS	CITY MANAGER
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Street Pavement Management

ARCHIVES
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Intermediate Level
Participant Manual



IN COOPERATION WITH
THE TENNESSEE MUNICIPAL LEAGUE
AND ITS AFFILIATE GROUPS

THE CENTER FOR GOVERNMENT TRAINING

The Center for Government Training was established by The University of Tennessee in response to a request from state and local government officials.

The mission of the Center was to design and implement an effective statewide government training service for state, county, and municipal officials and employees. In carrying out its mission, the Center's staff provides professional consultation, technical assistance, program planning, curriculum development, instructor identification, program promotion, delivery, and evaluation. The Center coordinates and utilizes the resources of four UT campuses and six senior institutions of the State University and Community College System.

The primary goals of the Center include the following:

- Minimize overall administrative and training program costs to state departments and local government entities.
- Minimize duplication of training programs and services throughout the state.
- Coordinate and maximize the utilization of existing capabilities and resources available through institutions of higher education.
- Increase the quantity, quality, and participation levels regarding training services and programs for government officials and employees.
- Coordinate a uniform statewide training and delivery network.
- Provide the mechanism for informing and educating state and local government officials regarding new technologies and research findings applicable to their specific area of responsibility.
- Provide a statewide program delivery service for state department, boards, and commissions mandated to inform and educate government, business, industry, and the general public.
- Improve the quality of government services being provided to the public by increasing the capabilities and productivity of government officials and employees.

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THE UNIVERSITY OF TENNESSEE
CENTER FOR GOVERNMENT TRAINING

STREET PAVEMENT MANAGEMENT

Participant Manual

1987



P.O. Box 24180
Nashville, Tennessee 37202-4180
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LETTER TO PARTICIPANTS

Welcome! We are pleased that you are participating in this training program sponsored by The University of Tennessee's Center for Government Training. You are to be commended for your interest in improving your job skills through continuing education.

The local government field is a challenging one that requires current job knowledge and skills in order to serve the public in the best manner possible. We hope that this training effort will prove beneficial and that you will leave better equipped to meet the demands of your position.

In addition to this particular program, the Center for Government Training offers a variety of courses and seminars throughout Tennessee for local and state government officials. Key in these programs are four certificate series for county officials, municipal officials, supervisors, and secretaries. I encourage you, if you are not already participating in these programs, to consider what they have to offer. Not only do these courses further your understanding of local government issues and sharpen your specific job skills, they also provide an opportunity for you to discuss issues and share ideas with other local government officials.

The Center for Government Training has always stressed quality of education and continues to do so with special emphasis this year as we begin intermediate training in the municipal and county officials series. Courses will be offered to facilitate a higher level of learning and to enhance specific job knowledge.

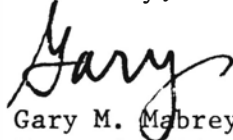
Your comments and suggestions are important to us, and we solicit your input as you attend the various courses. We also welcome suggestions for future program topics.

The material for today's program, Street Pavement Management, was developed by Anderson W. "Andy" Jordan, Senior Public Works Consultant, The University of Tennessee's Municipal Technical Advisory Service. Our sincere thanks is extended to Mr. Jordan.

This manual was emended and edited for use in today's program by Constance R. Smith, Curriculum Administrator for The University of Tennessee, Center for Government Training.

We feel that education should be a life-long process and applaud you in the effort you are making. If our staff can be of service to you now or in the future, please feel free to call upon us.

Sincerely,

A handwritten signature in black ink, appearing to read "Gary", with a stylized flourish at the end.

Gary M. Mabrey, III
Executive Director

STREET PAVEMENT MANAGEMENT

I. INTRODUCTION TO WORKSHOP

- A. Welcome
- B. Completion of Course Forms
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- D. Course Overview
- E. Learning Objectives

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- A. The Achieving Organization
 - 1. Contrasted with the Line Organization
 - 2. The Team Strategy in the Achieving Organization
 - 3. The Vital Signs of an Achieving Organization
- B. Management Models
 - 1. Line/Autocratic Model
 - 2. Team Approach
- C. Summation on Organization

III. EVALUATING YOUR STREET SYSTEM

- A. The Growth Spiral - A Rediscovery of System Needs
- B. Survey Methods
 - 1. Traditional - Sight Survey
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- A. Value of
- B. Criteria for
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 - d. Monterey
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 - f. Maryville

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 - A. Contract Bidding
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- VII. WHY NOT USE A NEW APPROACH TO MANAGING MAINTENANCE OF STREETS?
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 - 1. Defining What PMS Is
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 - 3. Should We Purchase One?
 - 4. Should We Do PMS By Hand or Computer?
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 - A. Developing Regulatory Ordinances
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 - 2. Assessing Local Conditions
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 - 1. Legal Justification
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 - D. Perpetual Care of Utility Cuts
- IX. WRAP-UP AND EVALUATION

LIST OF HANDOUTS

1. Overview
2. Objectives
3. Growth Spiral
4. Knoxville/Knox County Street Classifications
5. Memphis Street Classifications
6. Kingsport Street Classifications
7. Monterey Street Classifications
8. Mountain City Street Classifications
9. Maryville Street Classifications
10. Financial Resources - Outline of MTAS Technical Report
by W. K. Joines
11. Capital Improvement Budgeting
12. Local Government Public Works Standards and Specifications
(Description of Publication)
13. Construction Management Outline
14. ICMA - Management Information Service Report
15. Public Works Maintenance/Management by A. C. Lock
16. PIN Management Report on PMS Issues
17. Street Ordinance

OVERVIEW

The purpose of this course is to give the participants a look into the "specifics" of what it takes to effectively operate a street pavement management program.

The course will focus upon helping the participant to recognize what "type of organization" s/he works for, realizing that the implementation of any program depends upon this.

LEARNING OBJECTIVES

1. Identify the "hidden value" of the system.
2. Define the organizational factors that restrict effectiveness.
3. List ways to accomplish more with less--"more bang for the buck."
4. Cite the most recent innovations in maintenance management systems.
5. List the benefits of manual and computer operation of maintenance management systems.
6. Describe procedures that will improve day to day administration of the street management program.
7. Develop a plan that will extend the life of the street system through improved quality control over penetrations and restoration.

GROWTH SPIRAL

System
or
Community (Pos.)
Fear of Vulnerability (Neg.)

Perception of Need - "Dis-Ease" (Pos.)
Avoidance or Denial of Need (Neg.)

Summons or Confrontation (Pos.)
Hear Rejection (Neg.)

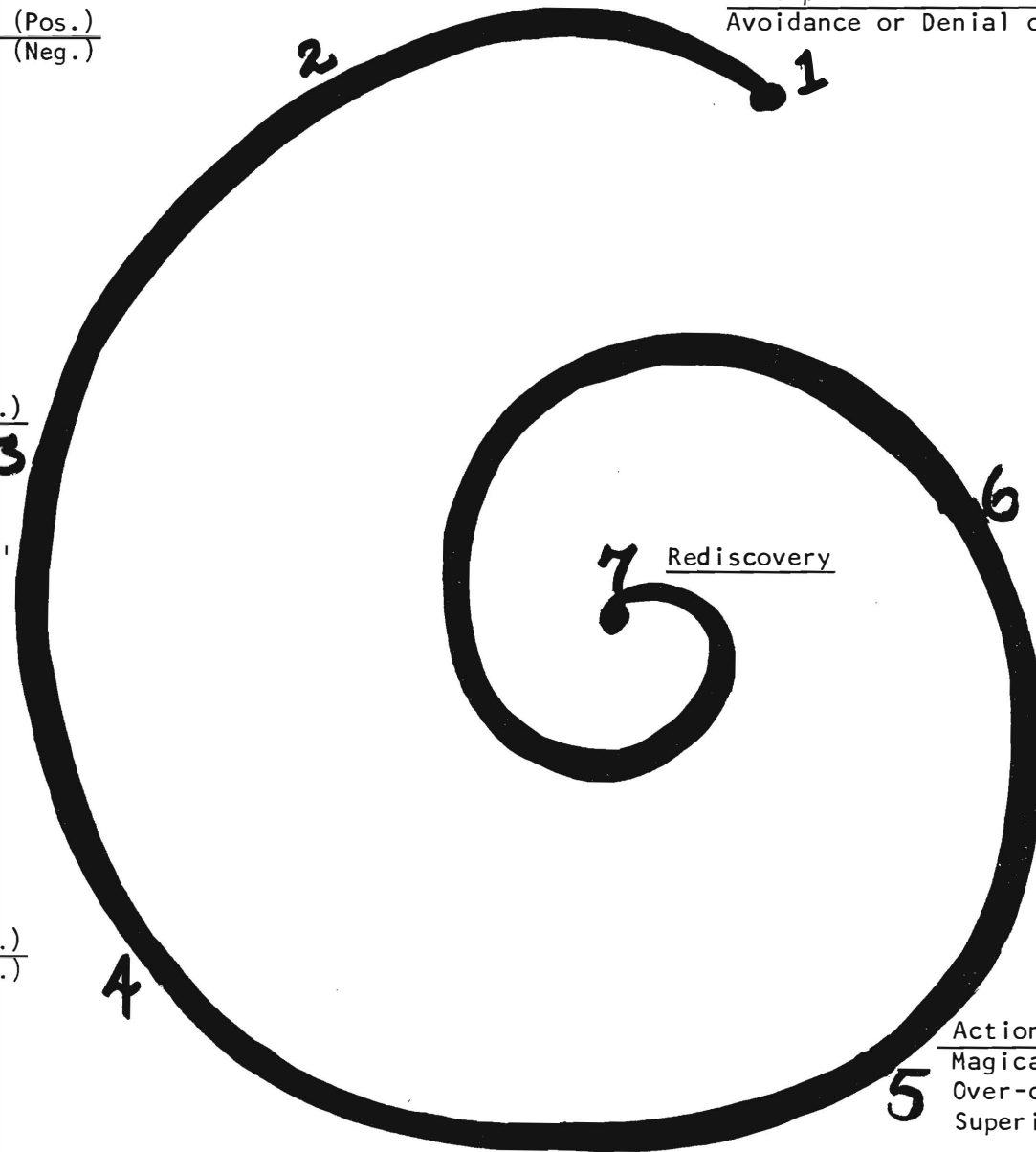
Support System (Pos.)
Resistance (Neg.)

Discovery - Ah Ha! (Pos.)
Indecision (Neg.)

Action (Humility) (Pos.)
Magical Insight (Neg.)
Over-confidence (Neg.)
Superiority (Neg.)

Rediscovery

(Do you find yourself "hung-up"
in this area of your growth?)



DESIGN STANDARDS

The purpose of this section is to assist in assuring that sound residential subdivision development will take place in Knox County by the establishment of minimum standards for use in the design of subdivisions.

Streets and Roads

Conformance with the Major Thoroughfare System Plan, the Transportation Improvements Program, and/or the Capital Improvements Program. The subdivision of land and the design of roads servicing such land shall be undertaken in conformance with the Major Thoroughfare System Plan, the Transportation Improvements Program and the Capital Improvement Program of Knox County and the City of Knoxville. Dedication of streets, roads, and right-of-way may be required to assure conformance with the plan or programs.

Relation to Adjoining Road Systems. A subdivision of a parcel of land shall be undertaken in such a manner as to enhance the sound development of the neighborhood in which the subdivision lies. The proposed road system of a subdivision shall generally provide for the continuance of existing or dedicated streets in adjoining or nearby tracts. In addition, dedication of rights-of-way shall be provided to the satisfaction of the Planning Commission for the connection of the subdivision to any adjoining unsubdivided land, to accommodate an increase in traffic resulting from the

subdivision, to provide for harmonious development of the subdivision in relation to the neighborhood in which it lies, and for the general safety and welfare of those benefiting from the subdivision. Any or all of these criteria along with conformance to the Major Thoroughfare System Plan, the Transportation Improvements Program, and/or the Capital Improvements Program may be considered in requiring dedication of right-of-way as a prerequisite for subdivision approval.

Classification of Streets and Roads. Streets and roads shall be functionally classified as follows:

Expressways. Expressways are used only for movement of vehicles, providing for no vehicular or pedestrian access to adjoining properties. Interchange of traffic between an expressway and any other street is accomplished by grade separated interchanges with merging deceleration and acceleration lanes, and no "at grade" intersections are permitted.

Arterial Streets. Arterial streets shall have a minimum right-of-way width of ninety (90) feet. The minimum pavement width shall be forty-eight (48) feet with or without a median strip. Where parking is desired on the right-of-way, an additional eight (8) feet of pavement shall be required for each parking lane. When arterial streets are also state highways, the Tennessee State Highway Department may require standards higher than those stated.

Collector Streets. Collector streets are used more for vehicles than for providing access to adjoining properties. Access to adjacent property should be planned and controlled so that minimum disturbance is made to the traffic-moving efficiency of the collector street.

Minor Collector Streets. Minor collector streets have two (2) open

ends; each end generally connects with a different street. One or more other streets may intersect it between its two open ends. Property fronting on both sides of the street may have access to the street. Minor collector streets may carry through traffic within the immediate vicinity.

Local Streets. Local streets are used primarily for providing access to adjacent properties. Vehicles moving on these streets should have an origin or destination in the immediate vicinity, and all types of through traffic should be eliminated through initial design of its connections with other streets. Local streets may be one of several types:

Marginal access streets are local streets generally having two (2) or more open ends. The ends generally connect with the same street. Other streets may intersect between the ends, and property fronts on only one side of the street. The opposite street side is parallel and adjacent to a higher classification street such as a collector or arterial.

Loop streets are local streets having two (2) open ends with each end generally connecting with the same street. No other streets intersect between its two ends, and property fronts on both sides of the street.

Cul-de-sac streets are local streets having only one (1) open end providing no access to another street. The closed end provides a

turn around circle for vehicles. No other street intersects between the two ends, and property fronts on both sides of the street.

Dead-end streets are similar to cul-de-sacs except that they provide no turn-around circle at their closed end and are not permitted as streets in any proposed subdivision. Stub streets, planned for future continuation are not considered to be dead-end streets.

Alleys. Alleys are minor rights-of-way, dedicated to public use, which afford a secondary means of vehicular access to the back or side of properties otherwise abutting a street, and which may be used for public utility purposes. Alleys generally have two (2) open ends, and each end connects with a different street.

Rights-of Way and Pavement Widths. Widths of rights-of-way and pavements shall be as follows:

Expressways. Expressways shall have a minimum right-of-way width of one hundred fifty (150) feet and two (2) segments of pavement of not less than twenty-four (24) feet each, divided by a median strip. However, specific expressway standards shall be as required by the State Highway Department for all highways built or governed by state standards.

Arterial Streets. Arterial streets shall have a minimum right-of-way width of ninety (90) feet. The minimum pavement width shall be

forty-eight (48) feet with or without a median strip. Where parking is desired on the right-of-way, an additional eight (8) feet of pavement shall be required for each parking lane. When arterial streets are also state highways, the Tennessee State Highway Department may require standards higher than those stated.

Collector Streets. Collector streets shall have a minimum right-of-way width of eighty (80) feet and a minimum pavement width of forty-eight (48) feet. Where parking is desired on the right-of-way, an additional eight (8) feet of pavement shall be required for each parking lane.

Minor Collector Streets. Minor collector streets shall have a minimum right-of-way width of seventy (70) feet and a minimum width of thirty-two (32) feet.

PUBLIC STREETS

GENERAL ARRANGEMENT AND LAYOUT

The street pattern shall be based upon the following general design criteria:

- A. Provide adequate vehicular access to all properties within the development;
- B. Provide street connections to adjacent properties to ensure adequate traffic circulation within the general area;
- C. Provide a local residential street system which discourages through traffic and provides adequate access for fire, police, and other emergency vehicles;
- D. Provide a sufficient number of continuous streets and major thoroughfares, adequately sized to accommodate the present and future traffic demands of an area; and
- E. Provide principal and minor arterials in accordance with the Major Road Plan.

CLASSIFICATION OF PUBLIC STREETS

- A. Arterials - Streets having the primary purpose of carrying through traffic and the secondary purpose of providing access to abutting properties. Arterial streets may be further classified as follows:

1. Limited Access - Streets and highways with the sole purpose of carrying through traffic with the highest degree of mobility and safety. These roads provide no direct access to abutting properties.
2. Principal Arterial - Streets and highways serving major metropolitan activity centers, the highest traffic volume corridors, the longest trip desires, and a high proportion of total urban area travel on a minimum of mileage. Service to abutting land should be subordinate to the provision of travel service to major traffic movements. This stem carries the major portion of trips entering and leaving an urban area, as well as the majority of through movements desiring to bypass the central city, and normally will carry important intraurban as well as intercity bus routes.
3. Minor Arterial - Streets and highways interconnecting with and augmenting the principal arterial system and providing service to trips of moderate length at a somewhat lower level of travel mobility. The system places more emphasis on land access and distributes travel to geographic areas smaller than those identified with the higher system. It includes all arterials not classified as principal or limited access roads.

B. Collectors - Streets penetrating neighborhoods, collecting traffic from local streets and channeling it into the arterial systems. A minor amount of

through traffic may be carried on collector streets, but the systems

primarily provides service access and carries local traffic movements within residential neighborhoods, or commercial and industrial areas. It may also serve local bus routes. Collector streets may be further classified as follows:

1. Major Collector - Streets serving commercial and industrial areas, or large volumes of residential traffic. All cul-de-sac and loop streets serving nonresidential areas shall be classified as major collectors except as specified in B.2. below.
2. Minor Collector - Streets serving low and moderate volumes of residential traffic, and cul-de-sacs and loop streets serving office uses generating less than 1,000 vehicular trips per day.

C. Locals - Residential streets not classified in a higher system, primarily providing direct access to abutting land and to collector streets. They offer the lowest level of mobility and usually carry no bus routes. Service for through traffic is deliberately discouraged.

Local streets may be further classified as follows:

1. Major Local - Streets providing access to abutting residential property and service to other residential streets at a somewhat lower level of mobility than collector streets.

2. Minor Local - Streets similar to major local streets but serving a smaller number of dwelling units; minor local streets provide the minimum level of mobility for two-way traffic.
3. Loop - Streets which make the necessary directional changes to intersect the same street in two different locations without having any other intervening street intersections; a loop street serves abutting properties only.
4. Cul-de-sac - Streets which are dead ends having only one end open for vehicular access and serve only abutting properties.

ACCESS AND CIRCULATION

- A. Arterials - Limited access roads, principal arterials, and minor arterials shall be designated according to the most recently adopted Major Road Plan.
- B. Collectors - The number and general location of collector streets shall be in accordance with the approved Collector Street Plan. In addition, any street which serves or is expected to serve over 200 dwelling units shall be designated as a collector. Streets serving over 200 dwelling units at a density exceeding six (6) units per acre, over 600 dwelling units at any density, or any nonresidential property except as provided in Section 404.2 B.2. shall be designated as major collectors.

C. Locals - Streets not designated as arterials or collector streets shall be designated as major local streets unless they can meet one of the exceptions below:

1. Streets which serve or are expected to serve less than one hundred (100) dwelling units may be designated as minor local streets.
2. Streets which serve or are expected to serve less than fifty (50) dwelling units and meeting the requirements of Section 404.2 C.3. may be designated as loop streets.
3. Streets meeting the requirements of Sections 404.2 C.4. and 404.14 may be designated as cul-de-sacs.

(NOTE: A street shall "serve" a parcel if the street is used or expected to be used as part of the shortest path between such parcel and the nearest arterial street.)

Purpose

The purpose of this section is to assist in assuring that sound subdivision development will take place within the jurisdiction of the Kingsport Regional Planning Commission by the establishment of minimum standards for use in the design of subdivisions.

Streets and Roads

Conformity to the Major Street and Road Plan - The subdivision of land and the design of roads servicing such land shall be undertaken in conformity with the Major Street and Road Plan adopted by the Kingsport Regional Planning Commission.

Relation to Adjoining Road Systems - The subdivision of land shall be undertaken in such a manner as to enhance the development of the neighborhood in which the subdivision is located. The proposed road systems of a subdivision shall provide for the continuation of existing or platted streets in adjoining or nearby tracts. In addition, streets shall be provided to the satisfaction of the Planning Commission for the connection of a subdivision to any adjoining unsubdivided land.

Classification of Streets and Roads - Streets and roads shall be functionally classified as follows:

Freeways and Expressways - A freeway is a limited access facility designed for traffic requiring relatively high operating speeds and having relatively long operating distances. These facilities have complete control of access through the use of grade separations and interchanges. An expressway is a facility serving the same type traffic as the freeways but involves segments containing some at-grade intersections while retaining the other limited access aspects.

Arterial Streets - These facilities are designed for a minimum of control, are generally located at approximately one mile intervals and connect areas of principal traffic generation. A properly designed major arterial system should help define residential neighborhoods, industrial complexes, commercial centers, and recreational areas.

Collector Streets - This system is designed primarily to collect and distribute traffic between local streets and the major street network. Such streets are used primarily for traffic movement into, from, and within residential, commercial, and industrial areas rather than through such areas.

Minor Collector Streets - This class of streets serves the internal traffic movement within an area of the city, such as a subdivision, and connects this area with a higher classification of the system.

Marginal Access Streets or Frontage Roads - These type streets are streets which are parallel and adjacent to major streets; and which provide access to abutting properties and protection from through traffic. This type street

may be required on commercial, industrial, and multi-family residential developments as well as subdivisions intended for single family dwellings.

Cul-de-sac Streets - Cul-de-sacs are local streets having one only open end providing no access to another street.

Alleys - Alleys are minor rights-of-way, dedicated to public use, which afford a secondary means of vehicular access to the back or side of properties otherwise abutting a street, and which may be used for public utility purposes.

Rights-of-Way and Pavement Widths - Widths of rights-of-way and pavements shall be as follows:

Freeways and Expressways - As specified by the Tennessee Department of Highways.

Arterial Streets - As specified by the Tennessee Department of Highways.

Collector Streets - Collector streets are those shown on the Major Street and Road Plan for the Kingsport Planning Region and shall have minimum rights-of-way and pavement widths as shown in documents recorded as part of that Plan.

Minor Collector Streets - Minor collector streets are not shown on the adopted Major Street and Road Plan since they are designed primarily for the purpose described in Section 62-34. This type street when required

by the Planning Commission shall have a minimum right-of-way width of sixty (60) feet and a minimum pavement width of thirty-two (32) feet.

Local Streets - Local streets shall have a minimum right-of-way width of fifth (50) feet and a minimum pavement width of twenty-eight (28) feet.

Alleys - Alleys shall have a minimum right-of-way width of twenty (20) feet and a minimum pavement width of twenty (20) feet.

Marginal Access Streets - Marginal Access Streets or frontage roads shall have a right-of-way of sufficient width to permit construction of the street as outlined in Section 62-88 of these regulations. The pavement width shall be 22 feet.

DESIGN

A. Widths of Rights-of-Way

The minimum width of right-of-way, measured from lot line to lot line, shall be as shown on the Official Thoroughfare Plan, or if not shown on such plan, shall be not less than as follows:

- (1) Arterial Streets.....80 to 200 feet, as may be required by planning commission. Arterials are primary and secondary highways used primarily for fast or heavy traffic.
- (2) Collector Streets.....60 feet collector streets carry traffic from minor streets to the arterial streets, and include the principal entrance streets of a residential development and streets for major circulation within such development.
- (3) Local Streets.....50 feet minor streets are used primarily for access to abutting properties and are designed to discourage through traffic.
- (4) Marginal Access Streets.....50 feet marginal access streets are minor streets parallel and adjacent to arterial streets; they provide access to abutting properties and protection from through traffic.

(5) Dead-End Streets (cul-de-sacs)...50 feet cul-de-sacs are permanent dead-end streets or courts designed so that they cannot be extended in the future.

(6) Alleys: in commercial or industrial districts.....30 feet;
in residential districts.....20 feet.

Alleys are minor public ways used primarily for service access to the back or side of properties otherwise on a street.

In cases where topography or other physical conditions make a street of the required minimum width impracticable, the planning commission may modify the above requirements. Through proposed neighborhood or local business areas the street widths shall be increased ten (10) feet on each side to provide for movement of vehicles into and out of necessary off-street parking areas without interference to traffic.

Access Streets to Subdivision Boundaries

Sufficient access streets to adjoining properties shall be provided in subdivisions to permit harmonious development to the area.

Street Widths

The minimum width of right-of-way, measured from lot line to lot line, shall be as shown on the Major Thoroughfare Plan and shall be not less than as follows:

- A. Arterial Streets and Highways.....80-150 feet, as may be required. Arterial streets and highways are those to be used primarily for fast or heavy traffic and will be located on the Major Thoroughfare Plan.
- B. Collector Streets.....60 feet. Collector streets are those which carry traffic from minor streets to the major system of arterial streets and highways and include the principal entrance streets of a residential development and streets for major circulation within such a development.
- C. Minor Residential Streets.....50 feet. Minor residential streets are those which are used primarily for access to the abutting residential properties and designed to discourage their use by through traffic.
- D. Marginal Access Streets.....50 feet. Marginal access streets are minor streets which are parallel to and adjacent to arterial streets and

highways and which provide access to abutting properties and protection from through traffic.

- E. Dead-End Streets (cul-de-sacs).....50 feet. Cul-de-sacs are permanent dead-end streets or courts designed so that they cannot be extended in the future.

In cases where topography or physical conditions make a street of the required minimum width impracticable, the planning commission may modify the above requirements.

- F. Alleys.....20 feet. Alleys are minor public ways used primarily for service access to the back or side of properties otherwise abutting on a street.

Streets

1. Classification

Streets and roads are hereby classified according to the function which they are to serve, the type, speed, and volume they will carry, and the required standards of design. The broad categories shall be:

- (a) arteries,
- (b) collectors, and
- (c) land service streets.

The designation in the major street and road plan of arteries and collector does not prevent other streets proposed in or adjoining subdivisions from being similarly classified. Classifications are defined as follows:

(a) Arteries

- (1) Expressways and freeways--those major streets used for traffic of high speeds and high volumes between major urban areas and regions; limited access, partially or fully grade separated intersections, and divided opposing traffic.
- (2) Primary arteries--(A-1) Those major streets used for high speed and high volume traffic between Maryville and other urban centers and regions; access at intersections with other arteries and at major local centers.
- (3) Secondary arteries--(A-2) Those major streets used for traffic of moderate to fast speeds and high volumes between major local centers of employment, recreation, and shopping and suburban

centers; access at intersections with other arteries, collector streets and major local centers.

(4) Tertiary arteries--(A-3) Those other arteries used for traffic of moderate speeds and high volumes which connect the higher classified arteries with each other and with local centers and public facilities; access with other arteries, collector streets, and some minor streets.

B. Collectors--(C) Those major streets used for traffic of moderate speeds and high peak volumes between minor streets and the system of arteries or serving as principal entrance streets or primary circulation routes within a neighborhood or other limited area; access at all other streets and some private ways.

C. Local Service Streets

(1) Residential streets--Those minor streets used for traffic of low speeds and low volumes situated predominantly within a neighborhood or other limited area; access with higher classified streets and private property.

(a) Minor residential streets--(L-1) Those minor streets designed to provide access to abutting residential property and to discourage their use by through traffic.

(b) Loop streets--(L-2) and Cul-de-sacs--(L-3) Those minor streets of short length used for traffic of low speeds and low volumes primarily designed for access to abutting property and so constructed as to originate and terminate in T-intersections

with other minor streets or to terminate in dead-end turn-arounds so designed that they cannot be extended in the future.

(c) Marginal access streets--(L-4) Those parallel and adjacent to arteries and which provide access to abutting property and protection from through traffic.

(d) Alley and service drives--(L-5) Those minor streets used primarily for service access to back or side of property otherwise abutting a street.

(2) Minor industrial or commercial streets--Those minor streets designed to provide access to abutting commercial or industrial property and to discourage their use by through traffic. Industrial or commercial streets may include marginal access streets, cul-de-sacs, and alleys or service drives.

FINANCIAL RESOURCES

Outline of MTAS Technical Report by W. K. Joines

1. State Street Aid Fund

This fund is a specifically directed fund that can only be applied to streets and street-related activities as identified in the MTAS Manual. This Manual is provided as a supplemental handout to this course. Let us now briefly look through this booklet and identify the specific uses that these funds may have.

2. Municipal Street Transportation Assistance Fund (MSTA)

These funds are supplemental monies provided by the State for the specific use of cities on their streets. The MSTA funds are not as restricted as the Street Aid Funds; however, they must be utilized in a manner that can be audited as applied to streets.

3. General Fund

This fund is the basis for all general government operations. It is the pool of monies that is derived from property taxes, business taxes, and other general revenues. Most of the street system's needs relating to maintenance and minor repairs are dependent upon this resource.

4. Federal Aid Urban Funds

These are federal, state, and local matching funds that are apportioned to cities with a population of 10,000 or more. These monies are directed for specific use on designated routes as approved by all of the

participant bodies and offer all related traffic uses, such as construction. These funds add greatly to costs due to federal construction specifications.

5. General Fund Bonds

These monies are for major street construction programs, primarily as a result of the Street Capital Improvements Program as approved by the governing body. The proceeds of the bond sale are generally deposited into a special bond account for the purpose of expending the necessary monies as the program is accomplished.

The art of managing street dollars is obtaining the best available data regarding the street system and its need, as well as knowing other organizational needs. The ability to compete well for additional dollars depends to a great extent upon one's ability to determine organizational needs and to present these needs to authorities. An appreciation for assessing infrastructure needs and presenting these finds through well-prepared capital improvement budget presentations is also essential.

MTAS

municipal technical report

**PREPARATION OF
A CAPITAL
IMPROVEMENT PROGRAM**

**By Eugene E. Burr
Community Development
Consultant**

**Report No. 14
November 1975**

**Municipal Technical Advisory Service
Institute for Public Service
The University of Tennessee
in cooperation with the
Tennessee Municipal League**

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NOTE: The figures displayed with the text are photographic reductions of 20" x 30" panels developed by the author to illustrate presentations made to several Tennessee cities during the HUD-TML-MTAS "capacity building" program.

Figure No. 1 - Local Decision-making Process 3

Identifies the respective roles of the local planning commission, operating agencies, project review committee, and legislative body (council or board) and illustrates the continuing, cyclical nature of the process of planning, implementation, and evaluation.

Figure No. 2 - Project Review: Determination of Priorities 5

Details the project evaluation process and lists the hierarchy of criteria used to "screen" projects to determine their priority in the six-year capital improvements program.

Figure No. 3 - Project Selection/Evaluation: Policies in Action 7

Illustrative of the typical situation a community must face when considering the feasibility of annexation. The questions of costs and benefits, for a hypothetical town, include school capacity vs. enrollment (shown as a percentage of capacity), proximity to jobs (indicated by "industrial park"), and extension of sewer and water service (complicated, in this case, by a high ridge). The importance of

relating such questions to the community's capital improvements program is emphasized.

Figure No. 4 - Assessment of Fiscal Capacity . . 12

While only two indicators of the community's fiscal capacity are illustrated, the General Fund and Bonded Debt, examination of these factors and the projected deficiencies or reserve capacity makes it possible to relate the scheduling of capital projects to the financial capability of the community in any given year. The ability of the community to borrow on favorable terms is directly affected by the level of bonded debt as it relates to the total assessed valuation (15 per cent is regarded as an upper limit for small cities, 12 per cent for large).

I. INTRODUCTION

In any city, there are two kinds of insight that must be brought together in planning for capital needs. First, there are the department heads or the people actually running the individual program -- the police chief, the fire chief, the parks director, etc. These are the people who best understand their particular programs and needs because they are closest to them, but they are not expected to have a perspective of the total city operations. Second, there is the "overview" of the entire municipal program -- the relationships between all departments, activities, costs, and revenues. This overall perspective is best understood by officials who deal with the entire city -- such as the mayor, city manager, finance officer, and planning director -- but who do not have a first-hand understanding of departmental needs.

The capital improvements program is a way to bring these two types of understanding together. For this reason, it should be organized as a "gathering up" process. One or two central people should be charged with the job of collecting specific proposals from all city departments, screening them, and combining them into a single program that best fits the goals and resources of the total city.

The personnel who should most logically be involved in this annual job will vary from one city to another, depending on the size and organization of the city's staff. But most importantly, the system should be kept simple, understandable, and neatly organized so that each person involved knows what is expected of him. The preparation of the six-year capital improvements program

should be repeated annually by (a) eliminating the first year; (b) adding one more year to the tail end; and (c) reexamining the entire six-year picture.

II. DEVELOPMENT OF PROJECT REQUESTS

This "brief" outlines the steps that should be followed in assembling, evaluating and adopting projects in a capital improvements program.

A. Inventory needs and establish very rough cost estimates.

1. Make a list of departments, or logical divisions of activity, representing the entire range of actual or possible capital investments by the city. (Example: fire, police, parks, sewer, water, other public buildings.) The list will be long or short, depending on the size of the city.

2. Make up a simple form with these headings: "Description of Project," "Very Approximate Cost," "Priority," "Year Needed," and "Justification."

3. Have each department head fill out this form for his department. Under "Priority" he should put A, B., C., D., E., F (see B-1, Page 4). "Justification" should be limited to 50 words or less.

This step will require some consultation to make sure that the department head understands what is requested and that the forms are filled out the same way by everyone.

CAPITAL IMPROVEMENTS PROGRAM

LOCAL DECISION-MAKING PROCESS

PLANNING COMM.

IDENTIFY & ANALYZE
MAJOR INFLUENCES



SET REALISTIC GOALS
FOR COMMUNITY DEVMT



ESTABLISH REQUIREMENTS
FOR PUBLIC FACILITIES

OPERATING AGENCIES

- GENERAL MANAGEMENT AND SUPPORT
- TRANSPORTATION
- ECONOMIC DEVELOPMT
- JUDICIARY/LAW ENFORCEMENT
- PUBLIC EDUCATION
- CULTURE & RECREATION
- HEALTH
- GENERAL WELFARE
- SERVICES TO PROPERTY

PROJECT REVIEW

REVIEW OF
PRIORITIES



DETERMINE DEPT.
OBJECTIVES



INVENTORY FACILITIES
AND NEEDS



ASSESS BENEFITS

FORMAL ACTION

ASSIGN PROJECT
PRIORITIES



ADOPT -YEAR
CAPITAL PROGRAM



FIRST-YEAR
CAPITAL BUDGET



ASSESS FISCAL CAPACITY

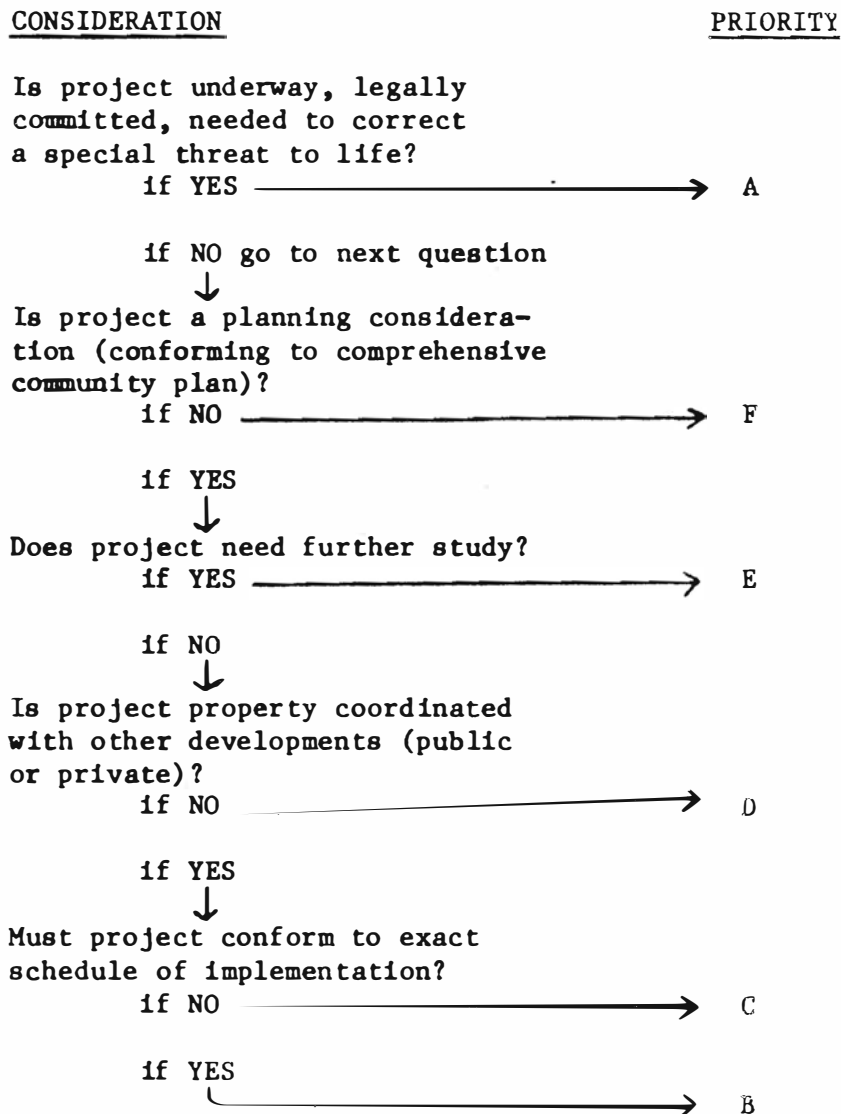
PLANNING ⇨ IMPLEMENTATION ⇨ EVALUATION



MUNICIPAL TECHNICAL ADVISORY SERVICE

B. Tentatively group projects in very rough priority sequence.

1. Assemble the information from these forms into one master list, in which the needs are regrouped by departments and priorities, with priorities assigned on the basis of the sequence of questions:



CAPITAL IMPROVEMENTS PROGRAM

PROJECT REVIEW ○ DETERMINATION OF PRIORITIES

TYPICAL PROJECTS

WATER TREATMENT PLANT
RIVER BRIDGE
PUBLIC HOUSING
HOUSING REHABILITATION
HOSPITAL EXPANSION
FIRE TRUCK
COMMUNITY PARK
SCHOOL



PROJECT CHARACTERISTICS:

LONG LIFE (OVER 5 YRS)
LARGE SIZE (OVER \$1500)

CRITERIA USED IN REVIEW



PROTECTION OF LIFE
MAINTENANCE OF PUBLIC HEALTH
PROTECTION OF PROPERTY
CONSERVATION OF NATURAL RESOURCES
MAINTENANCE OF PHYSICAL PROPERTY
PROVISION OF PUBLIC SERVICES
REPLACEMENT OF OBSOLETE FACILITIES
REDUCTION OF OPERATING COSTS
PUBLIC CONVENIENCE AND COMFORT
RECREATIONAL VALUE
ECONOMIC VALUE
SOCIAL, CULTURAL, AND ESTHETIC VALUE
PROMOTIONAL VALUE (ENCOURAGE DEVMT)



CAPITAL PROGRAM

FIRST-YEAR
CAPITAL BUDGET
AND
FIVE-YEAR
CAPITAL PROGRAM

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2. At this point the list should be carefully screened with an eye to adding and deleting items.

a. If there are certain "new" needs that are not the responsibility of any regular department (such as perhaps a library in a city that has none), forms should be made out for these and added to the others.

b. Delete items that appear to be "pet" projects but cannot be amply justified.

c. Delete items that are not really "capital improvements."

d. Add items that are important to the balanced development of the city but may have been excluded or overlooked by the department heads.

e. Relate project requests to the community's comprehensive plan, with the assistance of the local planner. It is at this initial screening that the planner can be particularly helpful in adjusting the list from a collection of separate departmental requests into a balanced list of capital investments that are tied to the implementation of the city's objectives as expressed in its plan.

3. Through the steps above, the total list can be evaluated to get a "handle" on about how much money is needed and how badly it is needed.

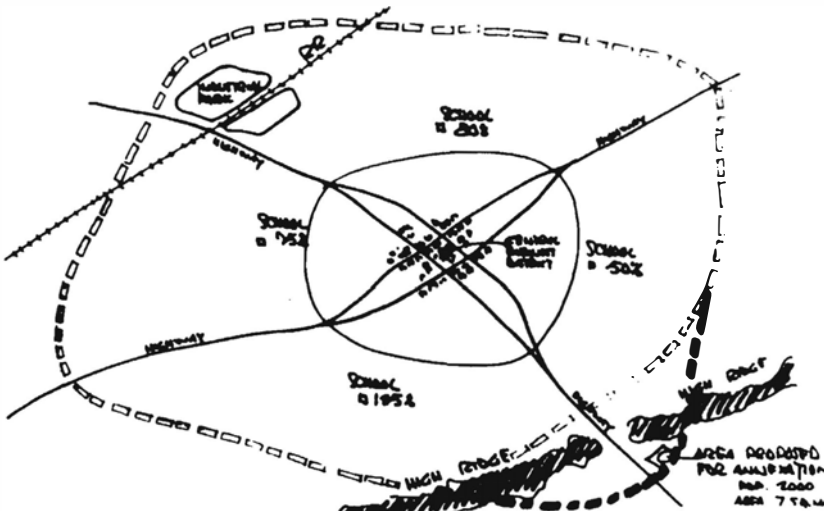
4. Review the results of the work done up to this point with some sort of leadership or policy committee — possibly a committee of the

CAPITAL IMPROVEMENTS PROGRAM

PROJECT SELECTION/EVALUATION ○ POLICIES IN ACTION

POLICY: PROVIDE REQUIRED SERVICES (SEWER, POWER, WATER, SCHOOLS, FIRE & POLICE PROTECTION, STREETS, PARKS) TO ANNEXED AREAS.

ISSUES: ADEQUATE SERVICE
IN EXISTING AREAS?
● RESERVE CAPACITY
IN SERVICE SYSTEMS?
● FEASIBILITY OF
EXTENSION OF
SERVICES REQ'D?
● POTENTIAL REVENUE
FROM PROP. TAXES?
● CONSISTENCY WITH
COMMUNITY GOALS,
OBJECTIVES & POLICIES?



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mayor, a couple of representative council members, the city manager, the finance officer, and planner.

C. Develop preliminary cost estimates for higher priority projects.

At this point, the high priority items should be selected for further detailing. To get some idea of how many items to include, it will be necessary to total the approximate costs and compare this roughly with the results of the next section, "Financing Capital Improvements," which will indicate how much revenue will be available from various sources, including federal and state grants for certain projects.

1. Where necessary to consider unanticipated cost changes and to refine earlier estimates, take the high priority items back to the responsible department heads and have them prepare:

a. Cost estimates based on further justification and engineering. These should be broken-down into component cost items such as land, engineering, paving, etc.

b. An estimate of the increased operating costs that will result from the capital improvement, so that impact on the operating budget can be measured.

c. A description of various financing possibilities. (For example, a sewage treatment plant may be eligible for a 30 per cent federal grant from the Water Pollution Control Administration of the U. S. Department of Health, Education, and Welfare.)

d. An estimate on the length of time required to complete the project.

D. Reevaluate scheduling based on improved data.

1. Based on a comparison of estimated costs and revenues, regroup the projects into two groups, assuming a six-year program:

a. First and second years.

b. Third through sixth years.

E. Prepare final cost estimates.

1. For the first two years, prepare final cost estimates (within 10 per cent of actual).

2. Have plans and specifications prepared -- at least preliminary.

3. Develop a tentative implementation schedule for the first year's projects. This schedule should include when bids would be received, when "notice to proceed" would be issued, and when contract is estimated to be completed as well as other dates of special importance.

F. Prepare report.

1. Prepare and print a simple, readable report which sets forth the six-year program, including the project description, estimated costs, priorities, year needed, year programmed, time required to complete the project, possible methods of financing, and any other pertinent information. (The text should be supplemented by summary tables and location maps.)

2. A possible addition would be to include the more detailed information on the first year with a breakdown of actual sources of revenue.

G. Hold public hearing.

1. Hold a well-advertised public hearing on the report. Distribute the report in advance to various representative citizens' groups.

2. Present the report as a policy recommendation of the city, explaining that it is done annually, etc., and keep a record of reactions, objections, suggestions, etc., to refer to when repeating the process next year.

III. FINANCING CAPITAL IMPROVEMENTS

This section deals with how a city can finance a capital improvements program. It is certainly easy to discover that many things are needed. The city needs a new city hall, better streets, more park areas, an improved utility system; the list goes on almost indefinitely. In the preceding section, we considered identification of community needs and the setting of priorities for the most immediate of these needs. In this section, we hope to briefly discuss how officials might go about deciding how to provide the necessary revenue to finance these needed improvements.

First, who should worry about paying for all these needed projects? The finance officer is the logical candidate. He will need the help of other department heads. For example, the water system supervisor will be of assistance when evaluating certain utility income sources. The city manager and/or mayor also will be involved in the long-range

forecasting and estimate review processes. Various consultants from agencies such as MTAS will be able to provide technical assistance.

The balance of this section outlines the steps to be taken in preparing final income estimates for a capital improvements program.

A. Inventory revenues available.

As with expenditures, an inventory of revenues presently available and expected should be made. In this inventory, carefully record actual receipts during the past three years for each source of income. If any major changes have occurred, note why. This tabulation of receipts will likely reflect some trends that may well be expected to continue in the future.

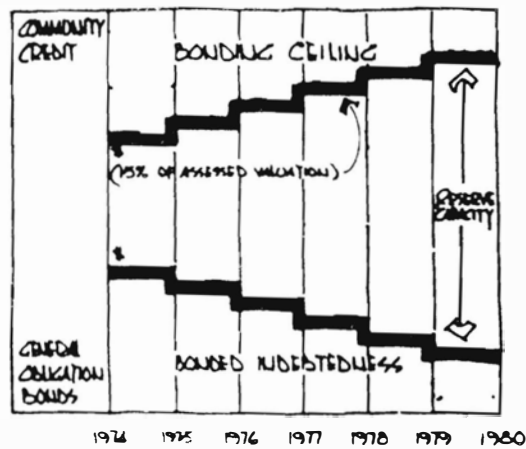
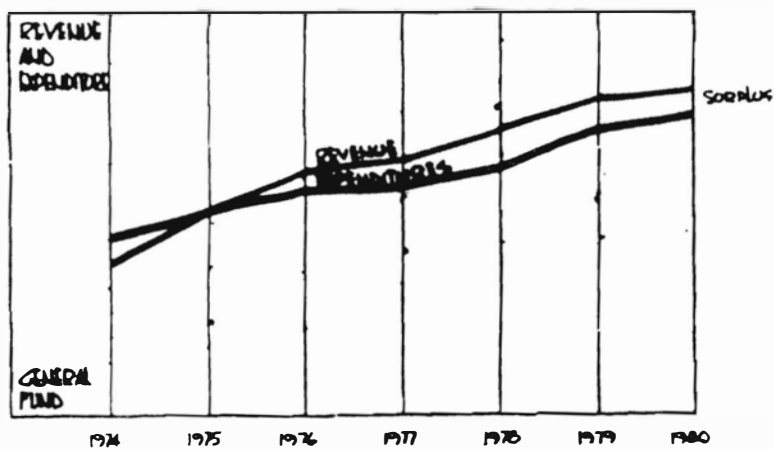
B. Establish a file on the local and area economy.

This file has many uses. Not only is it helpful in forecasting revenues for capital improvements program purposes, but this file is also important in predicting revenues for routine operations as well as special bond programs. Economic indicators such as

- water customers
- electric customers
- gas customers
- school enrollment
- civic and county population
- number of employees by various types of employment
- auto registrations
- postal receipts
- retail sales
- wholesale sales
- per capita income

CAPITAL IMPROVEMENTS PROGRAM

ASSESSMENT OF FISCAL CAPACITY



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bank deposits
building permits
special announcements about new industries or other items affecting the local economy

should be maintained. It is relatively easy to keep this file up-to-date if newspaper clippings are periodically placed in the file as well as regular statements from the bank, post office, other utilities, etc. Be sure to check with your planning commission to see if information such as this has been compiled previously.

C. Identify special income sources.

In addition to usual operating income sources, there are available a number of special methods of financing a capital improvements program:

1. Current Revenue. Because it is dependent on the tax rate and property appraisals, current revenue does not vary significantly from year to year.

2. Bonds. Most cities have the authority to issue general obligation bonds, revenue bonds, special purpose bonds, authority-type bonds, assessment bonds, and short term notes.

3. Federal and State Aid. There are a number of federal and state agencies that have extensive information on financial aid programs available. Listed here are the major agencies that can provide additional information on various types of aid from other governmental agencies:

U. S. Department of Housing and Urban
Development
Federal Aviation Agency

Tennessee state agencies:

Department of Economic and Community
Development
Department of Transportation
State Planning Office, Local Planning
Division
Office of Economic Opportunity
Department of Conservation
Development districts
Municipal Technical Advisory Service,
The University of Tennessee

D. Estimate income available for capital
improvements.

Income available from current revenue should be forecast by major source of funds and by year for the next six years. This should be done by listing the various sources in a column and across from that indicating, in the various years, how much income will be received from each of the sources and totaling this at the bottom of the form. The forecast should be based upon past trends as well as upon current information. The recorder, finance officer, city manager, and/or mayor will likely need to make these "guesstimates" about income.

At this point, estimates of operating expenditures by department for the same period should be made so that the net operating revenue available for capital expenditures may be obtained. The recorder, finance officer, the city manager, and/or the mayor or other general policy group should review the possibilities for special sources of financial assistance as outlined in Section C (see page 13).

From this information, a careful estimate of how much money is available for financing capital improvements on a pay-as-you-go and/or

a bond basis can be determined. This information is combined with data received on various types of grants and loans available.

E. Prepare report on funds available.

As final cost estimates are being prepared on the first two years of the capital improvements program, final evaluation of income available in those years also should be completed. A committee of elected officials and appropriate appointed officials must reach conclusions on just how far they want to go in meeting the community's needs in the first year. A general indication of how much will be done in each of the next five years also should be made.

At this point, the revenue section of the city's capital improvements program report can be prepared.

IV. SUMMARY AND OVERVIEW

As the principal tool for coordinating physical and financial planning, the capital improvements program is essential to implementation of the community's comprehensive planning process. Since that process includes the identification of the community's general goals and specific objectives, the capital improvements program has a critical role in the achievement of those goals and objectives.

Such a program requires the insight and technical knowledge of department heads at the operational level, on the one hand, and the broad understanding of total community needs as seen by the political and administrative leaders on the other. Once developed, the program allows systematic extension of services and construction of facilities and permits more efficient use of local revenue in the process.

By relating the planning of physical improvements to assessment of fiscal capacity (what the community can "afford" to do in a given time period), the credit of the community is protected and planning can proceed on a realistic basis at the same time.

Because the funding of capital projects, through the capital improvements program, is based on a community-wide inventory and comprehensive plan, public funds can be expended more equitably and development will occur which is predictably consistent with the community's interests.

For further reading on this subject:

Capital Programming and Capital Budgeting,
A Manual of Suggested Practice, Municipal
Finance Officers Association, Second
Printing, (1967).

Preparing a Municipal Capital Budget, A TSPC
Staff Guide, Tennessee State Planning
Commission, (1966).

Management Policies in Local Government
Finance, International City Management
Association, (1975).

Technical Assistance

Information and/or technical assistance may be obtained from any of the offices of the Municipal Technical Advisory Service:

KNOXVILLE (headquarters)
1000 White Avenue
The University of Tennessee
Knoxville, TN 37916
615/974-5301

COOKEVILLE
124 South Madison Avenue
Cookeville, TN 38501
615/528-5518

JACKSON
P. O. Box 2784
Jackson, TN 38301
901/423-3710

MARTIN
181 Clement Hall
UT-Martin
Martin, TN 38238
901/587-7839

MEMPHIS
127 Madison Avenue
Memphis, TN 38103
901/523-2535

NASHVILLE
590 Capitol Hill Bldg.
301 Seventh Ave. North
Nashville, TN 37219
615/256-8141

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NOTE: Handout #12, The MTAS Procedures Manual, Local Government Public Works Standards and Specifications, will be circulated for in-workshop use.

CONSTRUCTION MANAGEMENT OUTLINE

- I. INTRODUCTION--TAKING THE FIELD
- II. THE FINANCIAL PLANNING PHASE--GETTING ON BASE
 1. Understanding the Ground Rules
 - State Laws and Regulations
 - Local Requirements
 2. Capital Planning
 - Facility Inventory/Project Identification
 - Priority-setting
 - Assessment of Funding Sources
 - Borrowing
 - Capital Budgeting
 3. Assembling your Team
 4. Project Planning
 - Estimating Capital Costs
 - Estimating Operation Costs
 - Are the Costs Too High?
 - What to Do About High-Cost Projects
 5. Conclusion
- III. THE PRECONSTRUCTION PHASE OF FINANCIAL MANAGEMENT--MOVING TO SECOND
 1. Short-Term Financing
 - Short-Term Financing Alternatives
 - Arbitrage Earnings During Construction
 - Advantage of Short-Term Financing
 2. Designing the Bond Issue
 3. The Construction Contract
 4. The Project Budget
 5. The Cash Flow Forecast
 6. Conclusion
- IV. FINANCIAL MANAGEMENT DURING THE CONSTRUCTION PHASE--ROUNDING THIRD
 1. Establishing Accounting Systems
 2. Processing and Recording Transactions
 3. Investing Construction Funds
 4. Managing the Contract
 5. Monitoring Project Progress
 6. Conclusion
- V. COMPLETING THE PROJECT COMPLETION PHASE--CROSSING THE PLATE
 1. Selling Bonds
 - Marketing the Issue
 - Closing the Sale
 2. Preparing for the Grant Audit
 3. Conclusion
- VI. CONCLUSION--THE POST-GAME WRAPUP

NOTE: Handout #14, the ICMA Management Information Service Report on Street and Road Maintenance, will be circulated for in-workshop use.

PUBLIC WORKS MAINTENANCE MANAGEMENT

by A. C. Lock

Introduction

The day should be past when the street superintendent tells the grader operator, "Go down in the south part of town and get lost the rest of the day." Another one was heard to say, "I drive these streets every day to find jobs for my men to do tomorrow." When asked what kind of records he kept, a sanitation superintendent replied, "The city manager expects me to collect the garbage and I don't have time to do that and keep records both." When asked what he was going to rely on when the city manager asks him for his budget request next year, his answer was, "The manager knows that I installed this new system this year which has reduced personnel by 5 and has reduced my operating expenses by 15 percent, and I believe that is all the explanation I will need." He was then asked what would he then do the following year, and after thinking a minute, he said, "I guess I haven't looked that far down the line."

Too many public works managers let their subordinates get by with this kind of thinking, because of the difficulties involved in changing the situation. Supervisors are too busy to do unnecessary paper work, and possibly they have had experiences in the past that make them reluctant to accept this type of change. Although it should not be forced on them without their input, supervisors should realize that rising costs make it necessary to find ways to do a better job at less cost. No management tool can do away with the need for good personnel, equipment and materials, but sometimes better management can cause these elements to be utilized in more effective ways. Therefore, if we are going to cut costs, it behooves upper management

to overcome the inertia that prevents improvement and refinement. They should take the lead by involving all levels of management and supervision in developing management tools that will use resources in a more efficient and effective way.

Installing any management system is going to require time, patience, planning, communications and other things that public works managers aren't sure they can give. All levels of management must be involved in any new system, and this causes some people to feel threatened. Too many times the people at the lower levels are reluctant to give input even though they may be the most knowledgeable in many of the areas to be investigated. An effort must be made in the beginning and shown all during the process that no one needs to feel threatened and that ideas from all levels are desired.

Any management system change must be initiated by upper management. William Ouchi, a writer on industrial management, has said:

The reasons for starting at the top boil down to one central issue: the lower level employee or manager cannot participate unless those above provide the invitation to do so. If an organization begins by being rigidly hierarchical, evolutionary change must begin at the top of the hierarchy. The only change that can begin at the bottom in such an organization is revolution, and revolution was the solution brought on by the United States labor union movement in its currently antagonistic form.

Workmen today not only want a living wage, they want to contribute to management, and they have something to offer. Therefore, it behooves top

management to put in writing the objectives of the department. This written policy statement should outline the primary objectives of the department, and state its policy in regard to its departments. To this idea, Ouchi has said:

An organization's philosophy can be its most useful tool in uniting the activities of employees through a common understanding of goals and values. A philosophy provides a standard of responses to problems, explains why certain behaviors will be rewarded and accounts for the company image, which may even affect individual self-image.

Management by objectives is one management tool that adapts itself very well in the public works field. Public works is a field where the quantities of the activities may vary from one year to the next, but the activities themselves change very little. Even though the quantities vary, they are predictable. This is the type of operation where this management tool can be effective. This technique calls for objectives to be stated and then a plan to be developed for meeting these objectives. A cycle then occurs whereby a budget is prepared, the work occurs and an evaluation is made. The process is continual as refinements are made to the system. In this system, an ideal is never reached; however, new ideas, equipment, materials, etc., continue to emerge that make the system better.

Initiating this management system is a long and arduous procedure, but the increased efficiency will make the time well spent. Because of the time the design will require, it probably could be done best by an outside consultant.

However, much of the "leg work" can be done by city personnel. The design begins with an inventory of all facilities maintained. This is followed by:

1. Making a list of all maintenance functions or activities performed on all facilities;
2. Setting the acceptable standards of maintenance;
3. Determining the crew size, and equipment and materials required;
4. Developing the annual work program;
5. Translating the work program into dollars, or the annual budget;
6. Scheduling, performing, monitoring and evaluating the program;
and
7. Planning next year's work

Some cities in Tennessee are already using this sytem or similar ones. It is hoped that this material will help public works managers, superintendents, and foremen see the value of administering and planning their work so that the grader operator does not have to "get lost" the rest of the day, or drive the streets in order to find something for his men to do the next day. Hopefully, they will be able to show the city manager, in real numbers, what was accomplished during the year and what can be accomplished next year, if furnished the necessary resources.

THE PLANNING ELEMENTS

Inventory

When initiating this system, the first need is to inventory all faculties (streets, storm sewers, sanitary sewers, water lines, engineering,

etc.) which require maintenance and operation. Although all references are made to maintenance, some departments do a considerable amount of new construction, and this would be incorporated into this system also.

The inventory would include the length and width of all streets, the length and sizes of utility lines, the number and size of all valves, meters, manholes, the buildings that are to be maintained, the acres of parks to mow, etc. The streets would probably be separated into the different categories: local collector, arterial, etc., since each would receive a different level of maintenance. The workers could be trained to collect this information if it is not already available.

Activities

The next job would be to list in detail all maintenance activities that will be performed on each facility. There may be 50 or more maintenance activities just for streets that would include the following:

pothole patching	sewer/water patching
unpaved shoulder maintenance	crack sealing
curb and gutter construction	resurfacing
stockpiling/materials handling	inspection
training	administration
street sweeping	

This task should involve all levels of management and supervision, and will be a time-consuming task. These activities should be placed in a directory, in alphabetical order with their numbers, and with descriptions

where necessary. Everyone involved in the maintenance operation must learn to describe the work in the same way.

Quality Standards

Quality standards are guidelines on how well an activity will be performed, meaning under what conditions it will be done (the grass will be moved when it reaches 16 inches in height or ruts in asphalt will be patched when they are 1½ inches deep), or how often (roadside will be reworked annually or patching will be done as needed). Setting quality standards will require several approaches to determine the level of maintenance that must be given each activity on each facility. What do the citizens require in the way of residential street sweeping? How much street patching will be required? How much more will be required if we have a bad winter? How many miles of water lines will we clean? A review of maintenance history will be required for some activities such as snow plowing: what is the average amount we have done over the last five years? Activities such as seal coats and overlays may be whatever the budget will allow, or if you are lucky, you can depend on the budget authorities to allow you to overlay all streets every 12 years, and chip seal every four to five years. These are the types of questions that must be answered to initiate a maintenance by objectives program.

Activity Standards

After completing the inventory, making the list of activities for each facility, and setting the quality standards, it is now time to bring in all levels of management and supervision, and possibly some of the workers. The

workers may have more input on this element than any other group. This is where the decision is made of reach activity as to the size of the crew, the equipment and materials required and the production rates. One department establishing this system recently found that they had missed some of the production rates by 30 percent during its first year of operation. This was not surprising since very little data were available on which to base the estimates. It also points out the need to continually refine the standards, regardless of whether the refinement is to correct past errors, in order to allow for new ideas or to incorporate new equipment or materials.

This is the time to ensure that you have the correct crew sizes and that you are using the correct equipment. Possibly, it would be helpful to cut out some of the guessing and actually know from field tests what the optimum size crew is and the correct number and type of equipment that is needed. One expert "guessed" that if this was actually done, most crews and equipment would be smaller.

After these tasks are completed, this information is printed on a card called an ACTIVITY STANDARD CARD. Some of the information that will be on the card is as follows:

1. Activity name and code number;
2. Description and purpose of the activity;
3. What level of personnel is in charge;
4. The season of the year that the work should be performed;
5. Crew size, equipment and materials required;
6. The average production rate; and
7. Detailed instruction on how to perform the activity.

At this point, much time has been expended and patience may be short, but hopefully, several people have gotten to know each other better and acquired a lot more respect for each other's knowledge and ability. It is also hoped that they know the work far better than they ever expected to, and are beginning to see the difficulty of making these types of estimates without accurate information.

THE ANNUAL WORK PROGRAM

By this time the inventory has been completed, the activities for each facility have been identified, and an activity standard card has been typed for each activity with the necessary information needed to perform it. The planning process can now begin. How much of each activity are we going to do next year? The answer to that question describes the ANNUAL WORK PROGRAM.

At this point, the information is available to estimate the number of people, equipment and material requirements for each activity, but the question is: How much of each activity are we going to do? Most activities can be estimated fairly precisely. Probably official or unofficial policy exists on many things. An example of unofficial policy would be that for the past several years, the council has allowed \$150,000 for street overlays, and you think you can get about the same amount next year. Official policy is where the council has stated that they want 10 percent of the sewer lines cleaned and checked every year. That means that you will do 10 percent of them next year. In the former case, the manager would work backwards and convert money to labor, material, and equipment. In the latter case, he would use the information on the activity standard cards and convert 10

percent of the sewers into manpower, equipment and materials, and eventually into dollars for the annual budget.

Any requests for additional personnel and equipment should be considered under this exercise so the governing body can see how they fit into the entire scheme.

WORK LOAD LEVELING

After completing a preliminary estimate of the work program, the next thing to do is to level the work load. Remember, one piece of information on the activity standard card is the season of the year that the work is to be done.

One way of doing this is to take a 13-column form, the column to the left for listing the activities, and the other twelve for the months of the year. On this form show the months that each activity can be done. From this, plan what work is going to be done each month. This is called the WORK CALENDAR.

This is the item to think about those rainy days that the workers are going to be in the shop. Are you going to let them play checkers, or read Playboy magazine? If this process is done right, there will be work to do on rainy days. Remember about snow plowing and spreading salt. Try to anticipate everything that is going to happen and plan for it rather than having to react to it.

Most managers want to carry, as nearly as possible, the same number of personnel the entire year; however, this is the time to determine when you will most likely need additional help. Also, this process might help you to decide what work you are going to do by contract. If some important activity cannot be scheduled at the appropriate time, you have the option of contracting it or waiting until next year to schedule it.

Budget Preparation

Going through this process naturally leads you to your budget request. By this time you know what you plan to do along with the resources required to do it, and you are probably better prepared than you ever were for your budget hearing. This adapts itself very well for performance budgeting, but can be translated into whatever form is used. You are prepared to tell the council exactly what you plan to do, its cost and what you will have to delete if you do not receive the amount requested.

When the budget is approved, the work program is automatically authorized. Management and supervision implement the annual work program, and the planners start considering next year's program.

IMPLEMENTING THE PROGRAM

Now we are going to find out how good all those grandiose plans, projections, estimates, etc., really are. Expect some bad projections and estimates. This, like anything else new, is going to have to be "debugged." Soon, however, when everyone is beginning to "get the hang of it", the situation will be like when a public works director was asked whether he liked a new type of equipment that he had recently purchased. His answer was

a flat, "No." When asked if he wished he had purchased the same type he had previously, his answer was, "No, I don't dislike it that much." His obvious meaning was the new type was better than the old, but the new type was not as good as he thought it would be. People will learn to respect the system the more it is used.

Another thing that must be expected is the need for more clerical help. If you are collecting practically no data today, and you begin collecting the amount required by this system, surely more clerical help will be required. Several cities reporting the initiation of a preventive maintenance program in their fleet management operation point out that in the beginning more clerical help is needed, but after awhile, it can be cut back. Probably, the same thing would happen in this case. Nonetheless, this is an extra cost that can be anticipated.

Scheduling

Scheduling is the process of planning ahead and setting a timetable for accomplishing work. Also, it is assigning workers and equipment and estimating the amount of material to do the job. In "Street Cleaning and Street Maintenance Management," written by Roy Jorgensen and Associated, Inc., Gaithersburg, Maryland, work is scheduled for the following reasons:

Coordination. Supervisors can organize crews so their work won't conflict. Effective scheduling ensures that work is organized and coordinated with the activities being done by other crews.

Better decisions. By thinking about the problems ahead of time, supervisors often can resolve them before they become serious. By thinking about the work before it is to be done, a supervisor has time to take many variables into account-- resource availability, timing, maintenance needs and work control factors, just to mention a few.

Continuous operations. Instead of jumping from one job to another, operations will be completed with less interruptions. Effective scheduling results in work being done in a continuous manner. Except for weather and emergency work, a supervisor can assign a crew to the same needed work-- day after day.

Full use of manpower and equipment. Optimum combinations of men and equipment can be assigned to specific jobs. By thinking ahead, a supervisor can organize work so that it is done by optimum combinations of manpower and equipment. This is one of the most important reasons for scheduling work.

The supervisor must continually check the facilities, check personnel rosters, equipment and materials availability and keep an eye on the weather. It is a good idea for a supervisor to always carry a tape recorder with him. When he sees things that need to be done, he can record them and a secretary can transcribe the notes later.

Most experts feel that denial planning should be done two weeks in advance. Detail planning is when the supervisor sits down with a list of complaints, list of work not completed from the last two weeks, the notes that he has collected on work that needs to be done, the work calendar, the activity standard cards, and any other helpful information, and lays out in writing what the crew or crews under his supervision will be doing the next two weeks. This should be submitted to the next level of management for approval.

The BI-WEEKLY SCHEDULE twlls what work will be done, the location, who will do it, and what material and equipment will be needed.

The advantages of putting the bi-weekly schedule in writing, other than the fact that the plan has to be approved by the next level of management, is that it forces the supervisor to plan his work in an orderly fashion, prevents him from overlooking important details, and serves as a useful reference. He can then make daily assignments for the next two weeks.

After the work is authorized, work orders can be issued for the next two weeks. A work order is the authorization for a crew to do one day's work. The work order is also the device that the crew uses to report its action. It shows, among other things, the activity and number, location of the work, date to be accomplished, person in charge, names of crew members, equipment and materials needed, and instructions. On the same form, the crew reports back the time each person and piece of equipment spends on the activity and the amount of material used.

A warning should be sounded about several things:

1. What are you going to do if you plan to patch and it rains?
2. What are you going to do if you plan an activity that requires five people and two fail to show?

All work is not of equal importance. It is mandatory that some activities be completed during a particular season; others are required, but can be done "as needed." Others can be done when nothing else can be. Obviously, the supervisor cannot schedule rain and snow, so a standby schedule should be approved in case bad weather or some other reason prevents him from completing his primary mission.

As has already been mentioned, this, like any other new system, has to be "debugged," and there will probably be numerous frustrations during the first year. Some may favor dropping the system. This would be a sad mistake after going this far. The debugging of the system will look insignificant after working with it for a year or so and seeing the dividends that will come from it. Some of the dividends are:

1. You have your work planned for the next two weeks;
2. Because it is reduced to writing, upper management knows what supervision is doing, and the supervisors know what each other are doing;
3. Instructions to the workmen are simple and in writing;
4. When the city council wants to know what some project will cost, you will have the data on which to base an accurate estimate; and

5. If the city manager asks how long it takes to perform a unit of work on a certain activity, you can tell him by simply checking the appropriate activity standard card.

The street superintendent will still drive the streets every day, but he has already planned that one of his crews is going to mow grass, another is going to patch streets and another will work on baseball backstops. The crews already know the equipment and materials they will need, and they have written instructions on how to perform their assigned activity. The superintendent is driving the streets, not planning the entire operation, but to simply find the locations where the work will be done.

MONITORING THE SYSTEM

If nothing more is done than is already covered, the city would realize a considerable savings. Everyone would be happy because they now follow a logical plan in doing the work. There is no worrying about tomorrow because tomorrow's work is already planned. That is, these things would happen if the department religiously followed the system. Chances are, however, that it would soon lose its "glamour" and supervisors would gradually revert back to the old ways of doing things.

Because of these things and others, some type of accounting system must be devised to see from the work orders, whether or not the original estimates of personnel, equipment and material needs are correct. If a new idea comes along or a new type of backhoe is developed, how do you make accurate judgments in regard to incorporating these things into your system unless you have accurate data?

As a minimum, a department should check the progress made after each two week period to see if the work was completed satisfactorily, and if not, why not, and what to do about it. The information should be recapped monthly with year-to-date summaries and made available to all people with responsibilities. Without this kind of information, you cannot measure any progress, find out where your problems are, nor know what you should bear down on next month. "Keeping score" can touch our egos. If we find out we are doing a good job, it motivates us to do a better one. It allows one crew to be compared to another and, if handled right, can be a motivating force for the entire department.

SUMMARY

It has been the intent of this material to lay out the steps to initiate a workable management by objectives program for any city; to point out the hard work and frustration people will go through to get the system going and the rewards once it is working. It does not undertake to answer every conceivable question that might come up.

It points out that this undertaking must be initiated by top management because no one else has the authority to authorize it. An appeal is made to involve all personnel not only for their expertise but also so that as many as possible can say, "It's my program."

The planning elements are addressed: inventorying all facilities; identifying the work activities of each facility and listing them in a directory with explanations where necessary; explaining quality standards which describe to what degree each activity will be maintained; and preparing the activity standard cards that give information about the activities.

This brings us to the point where we can develop the annual work program, which includes among other things, the preparation of the budget request for the department. It discusses how much of each work activity will be done during the year, and points out that this is the time to start thinking about additional personnel and equipment.

Work load leveling is discussed in this section. This is the process of deciding what work is to be done each month and seeing that an equal amount is planned each month. This is the time to look at the work to be done and to see if some of it should be contracted.

When the planning is complete for the current year, it is time to implement the program to see if it will really work. It is pointed out that probably more clerical help will be required at this time.

Scheduling the work is discussed in detail. Detail planning of work is recommended to be in two week increments. It is suggested that a primary and secondary plan be prepared and submitted to the next level of management for its approval. The reason for the secondary plan is in case of bad weather or some other unforeseen event.

After this, the system must be monitored to see if desired results are obtained. Without this part, the system has value, but there is no way of measuring that value. It is recommended that the work be checked after each two week planning increment to see if the objectives were reached, and to determine what to do if they were not. It was further recommended that the information from the returned work orders be recapped monthly. The recaps should show the amount of work planned for the year on each activity, the amount done that month and the amount done year-to-date in order to see how the "real world" compares to the planned one.

Several years ago, the writer had the privilege to attend a workshop on this subject sponsored by the Education Foundation of the American Public Works Association. The program was presented by the Jorgensen Company, who was mentioned earlier. Shortly before the workshop was held, the City of Tampa, Florida had just set up a Management by Objectives program in the Department of Public Works. Several people from Tampa were present at the workshop. Everyone attested to the fact that there was a great deal of

resistance to it in the beginning, but everyone was now happy with it. The Tennessee Department of Transportation established such a system several years ago.

As city officials look for tools to make the dollar go further, MANAGEMENT BY OBJECTIVES should be considered. Individuals desiring more information about the system should contact their MTAS consultant.

NOTE: Handout #16, PIN Advisory Report on PMS Issues, will be circulated for in-workshop viewing.

HANDOUT #17

ORDINANCE NO. _____

AN ORDINANCE REPEALING SECTION 12-201 THROUGH 12-210 OF THE
_____ MUNICIPAL CODE AND IN LIEU THEREOF
ENACTING SECTION 12-201 THROUGH 12-213 REGULATING
EXCAVATIONS, CUTS, OR OPENINGS IN THE PUBLIC STREETS,
ALLEYS, HIGHWAYS, AND CURBINS FOR THE INSTALLATION OF OR
FOR THE REPAIR OF ANY UTILITY, DRAINAGE FACILITY OR
DRIVEWAY; PROVIDING FOR THE ISSUANCE OF PERMITS THEREFORE;
PROVIDING FOR REPLACEMENT AND REPAIR OF STREETS, CURBS,
ALLEYS, HIGHWAYS, AND/OR RIGHTS-OF-WAY AFTER EXCAVATIONS;
PROVIDING FOR THE VIOLATIONS HEREOF; AND PROVIDING OTHER
MATTERS PROPERLY RELATED HERETO.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF _____,
TENNESSEE, as follows:

SECTION I. That Sections _____ through _____ of the _____
Municipal Code be and the same are repealed.

SECTION II. That there is hereby enacted and substituted in lieu of the
repealed sections the following:

SECTION _____. _____. It shall be unlawful for any person, firm, corporation, public or private utility, association, or others, to make any cut or excavation in any street, curb, alley, or public right-of-way in the City without having first obtained a permit, as herein required, and without complying with the provisions of this ordinance; and it shall be unlawful to violate or to vary from the terms of any such permit; provided, however, any person maintaining pipes, lines, driveways, or other facilities in or under the surface of any public right of way may proceed with an opening without a permit when emergency circumstances demand the work to be done immediately, provided the permit could not reasonably and practically have been obtained beforehand. The person shall thereafter apply for a permit on the first regular business day on which the Office of the City Manager is open for business and said permit shall be retroactive to the date when the work was begun; however, said requirement of this section may be waived by the City Manager or his designee.

SECTION _____. Applications. Applications for such permits shall be made to the City Manager or such person designated by him to receive such applications, and shall state thereon the location of the intended excavation or tunnel, the size thereof, the purpose thereof, the person, firm, corporation, public or private utility, association, or others doing the actual excavating, and the name of the person, firm, corporation, public or private utility, association, or others for whom the work is being done, and shall contain an agreement that the applicant will comply with all ordinances and laws relating to the work to be done. Such application shall be rejected or approved by the City Manager or his designee within five (5) working days

of its filing. However, the requirements of this section shall not be constructed to apply to the emergency requirement set forth in Section _____.

SECTION _____. Fee. The fee for such permits shall be set by resolution as adopted by the Council of the City of _____.

SECTION _____. Deposit. It shall be the responsibility of the permittee to place with the City of _____ a cash deposit either by the job or activity or on an annual basis. The amount of the deposit shall be determined by the City Manager or his designee based upon the size and nature of the permitted work within the right of way. The City may use the deposit to cover its cost should a failure of restoration work occur to the public right-of-way facility.

SECTION _____. Manner of Excavating--Barricades and Lights. Any person, firm, corporation, public or private utility, association, or others making any excavation or tunnel shall do so according to the specifications and standards issued by the City of _____'s Engineering Department. Sufficient and proper barricades and lights shall be maintained to protect persons and property from injury by or because of the exactions being made. If any sidewalk is blocked by any such work, a temporary sidewalk shall be constructed and provided which shall be safe for travel and convenient for users. It shall be the responsibility of the permittee to adhere to the Manual on Uniform Traffic Control Devices.

SECTION _____. Drive Cuts. No one shall cut, build, or maintain a driveway across a public right-of-way without first obtaining a permit from the City Manager or his designee and receiving the necessary lines and grades from the City Engineer. Such a permit will not be issued when the contemplated driveway is to be so located or constructed as to create an unreasonable hazard to pedestrian and/or vehicular traffic.

SECTION _____. Restored Street and Curbs. Any person, firm, corporation, public or private utility, association, or others making any excavation or tunnel in or under any street, curb, alley, or public right-of-way in the City shall backfill said street, curb, alley, or public right-of-way according to City specifications and standard promptly upon the completion of the work for which the excavation or tunnel was made. However, the City may allow the utility to place the final surfacing, subject to the City of _____ specifications. Final surfacing will be done by the City at the expense of the entity for which the excavation or tunnel was made, if requested. In case of unreasonable delay in restoring the street, curb, alley, or public right-of-way, the City Manager shall give notice to the person, firm, corporation, public or private utility, association, or others that unless the excavation or tunnel is refilled properly within twenty-four (24) hours, the City will do the work and charge the expense of doing the same to such person, firm, corporation, public or private utility, association, or others. If within this time mentioned the conditions of the above notice have not been complied with, the work shall be done by the City, an accurate amount of the expense involved shall be kept, and the total cost including overhead cost shall be charged to the person, firm, corporation, public or private utility, association, or others, who made the excavation or tunnel.

SECTION _____. Perpetual Care. Any person, firm, corporation, public or private utility, association, or others effecting a public way within the City, shall be responsible for any defects which occur to the public facility within the public way due to workmanship or materials. The cost for repairs shall be the responsibility of the utility owners of the facility which was placed within the City of _____ public way. The City's Public Works Department will be responsible for making the repairs or having the work contracted. The City may allow the utility to make the repair if requested to do so. Repairs shall be made in accordance with specifications furnished by the City of _____.

SECTION _____. Inspection. It shall be the responsibility of any person, firm, corporation, public or private utility, association, or others to call for an inspection of the permitted facility as required by the permit. The permit shall specify, based upon the size and scope of the permitted work, the type of inspection to be required. Should a full-time person be mandated, the cost of this service will be borne by the owner of the permitted work. The permittee is to be bound by the rules and regulations as specified on the permit.

SECTION _____. Specifications. Each permit shall be assigned a set of restoration specification standards. These specifications will be referenced by number and so indicated on the permit. It shall be the responsibility of the City Engineering Department to maintain and provide the specification standards. The permittee may request a copy as required. The cost of the specification shall be limited to reproduction cost and paid by the permittee.

SECTION _____. Insurance. In addition to making the deposit hereinbefore provided to be made, each person applying for such a permit shall file a certificate of insurance or other suitable instrument indicating that he is insured against claims for damages for personal injury as well as against claims for property damage which may arise from or out of the performance of the work, whether such performance be by himself, his subcontractor, or anyone directly or indirectly employed by him. Such insurance shall cover collapse, explosive hazards, and underground work by equipment on the street, and shall include protection against liability arising from completed operations. The amount of the insurance shall be prescribed by the City Manager in accordance with the nature of the risk involved; provided, however, that the liability insurance for bodily injury in effect shall not be in an amount less than \$100,000 for each person and \$200,000 for each accident and for property damages an amount not less than \$50,000, with an aggregate of \$100,000 for all accidents.

SECTION _____. Time Limits. Each application for a permit shall state the length of time it is estimated will elapse from the commencement of the work until the restoration of the surface of the ground or pavement, or until the refill is made ready for the pavement to be put on by the City if the City restores such surface pavement. It shall be unlawful to fail to comply with this time limitation unless permission for an extension of time is granted by the City Manager.

SECTION _____. Supervision. The City Manager or his designee shall from time to time inspect all excavations and tunnels being made in or under any public street, curb, alley, or other public right of way in the City and

see to the enforcement of the provisions of this Ordinance. Notice shall be given to him before the work of refilling any such excavation or tunnel commences and said work may not commence until the inspector arrives at the site or gives verbal permission to proceed.

SECTION _____. Penalty. Any person, firm, corporation, public or private utility, association, or others violating any of the provisions of this Article shall, upon conviction, be fined not less than Ten Dollars (\$10.00) nor more than Fifty Dollars (\$50.00) for each offense; and a separate offense shall be deemed committed on each day during or on which a violation occurs or continues.

SECTION _____. Severability. If any section, subsection, sentence, clause, phrase, or portion of this Ordinance is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions hereof.

SECTION _____. That this Ordinance take effect forthwith upon its final passage, the public welfare requiring it.

MAYOR

ATTEST:

City Recorder

APPROVED AS TO FORM:

City Attorney

Passed on First Reading _____, 19__.

City Recorder

Passed on First Reading _____, 19__.

City Recorder

MANAGEMENT BOOK LIST

1. Peters, Thomas J., and Robert H. Waterman, Jr. In Search of Excellence: Lessons from America's Best-Run Companies. New York: Harper & Row, 1982. 360 pp.
2. Galbraith, Jay R. Organization Design. Reading, MA: Addison-Wesley, 1977. 426 pp.
3. Blake, Robert R. & Jane S. Mouton. Executive Achievement: Making It At The Top. McGraw. 183 pp.
4. Blanchard, Kenneth & others. Leadership and the One Minute Manager: Increasing Effectiveness Through Situational Leadership. Morrow. 111 pp.
5. LeBouef, Michael. The Greatest Management Principle in the World. Putnam. 143 pp.
6. Leavitt, Harold J. Corporate Pathfinders: Building Vision and Values Into Organizations. Dow Jones-Irwin. 229 pp.

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INSTITUTE FOR PUBLIC SERVICE

The UT Board of Trustees in 1971 created the Institute for Public Service (IPS) to coordinate and promote public service activities throughout the University system, excluding services provided through the Institute of Agriculture and the Division of Continuing Education.

The basic goal of the University public service effort continues to be to bring to the citizens of Tennessee--their business, their industry, and their government--the problem-solving capabilities uniquely embodied within their statewide university system.

Public service includes all services offered to those outside The University, including teaching in certain non-degree situations, technical assistance, and applied research which are conducted specifically at the request and for the benefit of non-University organizations in Tennessee.

IPS provides (1) a systemwide focal point for urban and public service, (2) a means to coordinate the various system-level public service activities, and (3) an organizational base for communication and program development that relates to both outside service clientele of The University and the campuses of The University system.

The operating units of the Institute and their dates of creation are: Center for Government Training (1967), Center for Industrial Services (1963), County Technical Assistance Service (1973), Municipal Technical Advisory Service (1949), and Critical Care Education Center (1975).