MODIFIED BY EI 92-038 EFFECTIVE 9/15/92, EI 93-031 EFFECTIVE 10/14/93, EI 94-015 EFFECTIVE 6/1/94 & EB 98-045 EFFECTIVE 12/1/98

SUPERSEDED BY EB 01-017 EFFECTIVE 7/5/01

ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: **PROJECT-LEVEL PAVEMENT SELECTION PROCESS**

Subject Code: 7.26

Distribution: 30 Main Office 32 Regions 34 Specials

APPROVED:

M.J. CUDDY, Asst. Commissioner & Chief Engineer, Office of Engineering

Code: EI 92-015
Date: 4/7/92
Supersedes:
Revises: EI 90-023

This Engineering Instruction (EI) is issued to coincide with the Materials Bureau's issuance of the "Pavement Rehabilitation Manual, Volume 2: Treatment Selection". This EI supersedes:

1) The July 3, 1990 memorandum from M. J. Cuddy to All Regional Directors, "Interim Project Level Pavement Design Treatment Selection Process";

2) The July 31, 1990 memo, J. R. Lambert to All Regional Directors, "Project Level Pavement Design Procedures";

3) The November 15, 1990 memo, P. J. Clark to All Regional Design Engineers, "Project Level Pavement Design Procedures"; and

4) The pavement type selection process given in Section 4.01 of the NYSDOT "Highway Design Manual".

A. EFFECTIVE DATE:

This pavement policy becomes effective on April 1, 1992 for projects initiated after that date. The implementation of the pavement rehabilitation/reconstruction portion of this instruction is to be staged as described in Section C below. Other projects currently in progress are to follow the Interim Policy contained in the memos described above.

B. PURPOSE:

The purpose of this EI is to describe the process to be used in selecting the sequence of pavement rehabilitation treatments and/or pavement type when designing projects. The sequence includes the initial treatment as well as the necessary follow-up work over the analysis period of the pavement. Treatment selection shall emphasize lowest life cycle cost, but other factors such as: traffic, drainage characteristics, soil conditions, the environment, and design or construction contraints (e.g. bridge clearance or guide rail height) may contribute to the decision.

This instruction implements "Volume I: Pavement Evaluation" and "Volume II: Treatment Selection" of the "Pavement Rehabilitation Manual" (written by the NYSDOT Materials Bureau) for Department projects. This EI is an essential element in the implementation of the Department's Pavement Management System (PMS). Additionally, it begins to address federal mandates regarding pavement management with a goal of a Department-wide system. The system will include standard processes for: network and project-level condition rating, project selection, pavement design, life cycle costing, selection of a treatment strategy and performance monitoring.

In March 1989 the Federal Highway Administration issued Federal-Aid Highway Program Manual, Volume 6, Chapter 2, Section 4, Subsection 1 (FHPM 6-2-4-1) which established the requirement for pavement management as well as new funding eligibility rules for certain Federal-Aid projects. While four years were allowed (until January of 1993) to develop the total pavement management system, the portions of the FHPM that require a FHWA-approved pavement design process and establish Federal-aid eligibility requirements for pavement rehabilitation projects were effective in January 1989. In December 1991, FHPM 6-2-4-1 was replaced by Federal-Aid Policy Guide, Title 23, Chapter I, subchapter G, Part 626 (or FAPG 23-I-G-626). The FAPG is basically a change in format from the FHPM and has no effect on this EI.

This instruction establishes the pavement design process for rehabilitating pavements required by FAPG 23-I-G-626 and replaces the Highway Design Manual pavement type selection analysis (Section 4.01) for new or reconstructed pavements with the updated version contained in Appendix B of the "AASHTO Guide for Design of Pavement Structures - 1986". Additional guidance for the EI sections or process steps is shown in bold print.

NOTE: This instruction does not change the current NYSDOT pavement thickness design policy shown in Chapter 4.02-4.04 of the Highway Design Manual for new or reconstructed pavement. Table 4-1 is still valid and should be used (unless advised otherwise by the Soil Mechanics Bureau) when designing pavement and subbase course thicknesses. However, since pavement thickness design is also affected by FAPG 23-I-G-626, additional changes to Chapter 4 can be expected as the Department's PMS develops.

C. APPLICABILITY:

This EI applies to the majority of projects, regardless of funding, that include rehabilitated, reconstructed or new pavement which meet the minimum thresholds below. However, this EI does not apply to minor maintenance work done by Department forces or minor maintenance by contract projects such as asphalt concrete armor coats (1-1/2" maximum thickness), crack filling and joint repairs. These projects will be covered under the Maintenance Project-Level Pavement Management Process which will be

C. **APPLICABILITY**(cont'd):

developed at a later date. More extensive pavement maintenance projects (e.g. resurfacing projects with a pavement thickness greater than 1-1/2") that also meet the thresholds described below, shall follow the process in this EI. Applicability varies depending on the type of project and staging of implementation as shown below and in Figures 1a and b titled "Pavement EI 92-015, Applicability, Major Process Requirements, and Minimum Service Life Requirements", Stage 1 (or Stage 2 in Figure lb)".

1. **Pavement Rehabilitation/Reconstruction Projects -**

The requirements of this EI apply to all pavement rehabilitation/reconstruction projects, including resurfacing projects greater than 1-1/2" thickness, on Rural Arterials and Urban Principal Arterials under NYSDOT jurisdiction (both Federal and State funded) that: (a) are more than one mile long, or (b) include ramps where the sum of full width ramp length is greater than one mile, or (c) have more than one mile of work along one or both roadways of an intersection or interchange. (The one mile lengths are all intended to exclude bridge length). Routes classified as Rural Arterials include Interstate, other Principal Arterials, and Minor Arterials. Routes classified as Urban Principal Arterials include Interstate, other Freeways and Expressways, and other Principal Arterials.

NOTE: The reader is referred to the "Pavement Rehabilitation Manual, Volume II: Treatment Selection" for definitions of technical terms used in this EI such as: pavement rehabilitation, pavement reconstruction, life cycle cost analysis, service life, analysis period, future treatment strategy timelines, etc. Definitions of terms related to the Department's Program and Project Management System (e.g. IPP, EPP and CSSQA) can be found in the "Third Working Draft" of the "Procedure for Managing Projects" by the Program and Project Management Task Force, dated September 3, 1991.

Staging of Pavement Rehabilitation/Reconstruction Projects -

a. **STAGE 1**: Implementation of the pavement rehabilitation/ reconstruction portion of this EI will be done in two stages. The first step, which is effective for projects initiated with an approved Initial Project Proposal (IPP) after April 1, 1992, will only include pavement rehabilitation/reconstruction projects on Rural Principal Arterials with full or partial control of access (such as rural Interstates, Freeways and Expressways) and all pavement rehabilitation/reconstruction projects on Urban Principal

C. **APPLICABILITY** (cont'd):

Arterials meeting the thresholds described in the previous paragraph. (Stage 1 is illustrated in Figure 1a.)

b. **STAGE 2**: The second stage, which is effective on January 1, 1993, will include all pavement rehabilitation/reconstruction projects on all Rural Arterials and on Urban Principal Arterials initiated with an approved IPP after that date that meet the thresholds described in the first paragraph of this section (para. C.1), regardless of access control. (Stage 2 is illustrated in Figure 1b.)

Minimum Rehabilitation Service Life Requirements -

The minimum service life requirements set forth below, and illustrated in Figures 1a and b, are adopted from the eligibility requirements section of FAPG 23-I-G-626. They represent minimum eligibility requirements to receive Federal-aid as well as minimum rehabilitation service life goals for certain classes of highways. These minimum service lives are not meant to override other Department policies that require a longer design life for a particular type of project. For example, the anticipated service lives given in the 11/29/83 "Design Traffic Forecast Policy" or the requirement given in Article 7, Section 12 of the State Constitution that the period of a bond (currently 10 years) not exceed the probable life of the project being bonded, are not affected by this EI.

Except for rural minor arterials, a minimum 8 year rehabilitation service life is required for these projects unless an exception is approved. Rural Minor Arterials have a minimum 5 year rehabilitation service life with no exceptions allowed.

NOTE: The above requirements only pertain to roadways under NYSDOT jurisdiction. However, any project using Federal-aid and meeting the thresholds above, regardless of jurisdiction, must meet the same service life requirements. Federal-aid pavement rehabilitation projects on highway classes not listed above must meet a minimum 5 year service life. Exceptions to the 8 year service life must be obtained from the Regional Director prior to obtaining Design Approval. There are no provisions for exceptions to a 5 year service life.

C. **APPLICABILITY** (cont'd):

2. **New/Reconstructed Pavement Projects** - The pavement type selection analysis part of this process applies to the following types of projects on **all classes of highways regardless of jurisdiction**:

a. All new/reconstructed pavement projects that are more than one continuous centerline mile long, excluding bridge length.

b. Intersection/interchange projects where the length of new/reconstructed pavement along either roadway exceeds a mile, excluding bridge length.

c. Pavement widening projects where the widening involves adding one or more full lanes and the length of the widened section exceeds a mile, excluding bridge length.

A pavement type selection analysis is not required for new/reconstructed ramps with design speeds less than 50 MPH, since the ramp paving material is specified in Sections 4.03.01 and 6.04.06 of the Highway Design Manual.

Since a pavement type selection analysis has been a requirement of the Highway Design Manual for many years, **implementation of this will not be staged.**

NOTE: Reconstruction is intentionally listed under both parts C1 and C2 of this section. The reason for this is that reconstruction is considered to be the ultimate rehabilitation treatment so it falls under the rehabilitation part of this process. However, since reconstruction involves new full depth pavement, a pavement type analysis (to compare asphalt and concrete) is also required similar to a new pavement.

D. **PROCESS:**

This section describes the steps in a pavement project covered by this EI from the project scoping phase through to PS&E. Figure 2 is a process flow chart which illustrates these steps. The intent of this EI is not to create a different parallel design process for pavement design, but instead show where these new pavement process steps fit into the existing Department design process. A description of the steps and responsibility for the steps is shown below.

D. PROCESS (cont'd):

It should be noted that while the Project Developer is responsible for progressing the Expanded Project Proposal (EPP), it is recommended, but not required, that the pavement evaluation, treatment selection and treatment strategies be completed by the Regional Technical Services (RTS) Group, and the life cycle cost analysis and final treatment selection be completed by Design. This is recommended because in most regions Technical Services has the pavement evaluation expertise, while Design is most familiar with and able to incorporate the effect a treatment would have on a project (e.g. a thick overlay may cause guide rail adjustment or bridge clearance problems increasing the costs of certain treatments). However, the actual assignment of these and other job responsibilities are left to the Regional Director. Other alternatives might include a team approach headed by the Project Developer or assignment of many of these tasks to a Pavement Management group.

The Region, after selecting a qualifying pavement project for contract work using the Department's PMS network level conclusions and recommendations, input from Highway Maintenance, Regional Planning, Program Management and other sources, initiates the project via an IPP.

PROJECT SCOPING PHASE

Steps (The step numbers are the same as shown in Figure 2.)

1. Project Developer and Designer -

   Make a preliminary field review of the project and consult and collaborate with Regional Technical Services , the Regional Pavement Management Group or other group designated by the Regional Director. Based on field review, consultation and this EI, determine whether or not the project is a pavement rehabilitation/ reconstruction project that requires a pavement evaluation.

NOTE: A pavement evaluation is generally not required when reconstruction is necessary for reasons other than pavement distress (e.g. a re-alignment project). However, RTS should still provide a statement with the recommended treatment/ pavement type and future work strategy timeline for all viable alternatives to the designer in process step 4. This information is still needed: to enable the designer to prepare the life cycle cost analysis, to complete the "Pavement Evaluation and Treatment Selection Report", and for future use in a pavement treatment "tickler" file.

D. PROCESS (cont'd):

PROJECT SCOPING PHASE

Steps

2. Project Developer -

If project meets the thresholds in this EI, requests pavement evaluation from RTS.

NOTE: A draft Pavement Evaluation and Treatment Selection Report is required for a pavement rehabilitation/reconstruction project before approval of the EPP.

---

3. RTS - Collects data on pavement and shoulder distress, drainage, and subbase condition in accordance with "Pavement Rehabilitation Manual, Volume I: Pavement Evaluation", June 1990 (revised February 1992) and prepares an inventory of distresses, as described in that volume.

4. RTS - Analyzes, compiles and interprets the distress data. The appropriate treatment(s) are then chosen from the "Pavement Rehabilitation Manual, Volume II: Treatment Selection" (Volume II), the traffic is checked, service lives determined, a future work strategy is constructed for each treatment and a written statement is prepared for the designer or the regional pavement management group containing the recommended treatment(s) and the rationale behind the recommendation. (See Process Step 12 in regard to matching treatment service lives to road history.)

Care should be taken in the determination of the "Expected Service Lives" (ESL) of the treatment(s) in the future work strategy. The ESLs given in Volume II are appropriate for highways with Average Annual Daily Traffic counts (AADTs) of 12,000 to 35,000 with about 5-percent trucks. FHWA expects the ESL to be adjusted for highways with traffic outside these limits. Pages 7 and 8 of Volume II provide guidance on the adjustment of the ESL. If the adjusted ESL is less than the minimum 8 years (requiring an exception approval in process Step 12), a different treatment with an adjusted ESL greater than or equal to 8 years should be considered.

NOTE: All pavement rehabilitation/reconstruction projects covered under this EI are required to have: a distress survey (See Note under process Step 1 for exceptions to this requirement.) conducted in accordance with the current edition of the "Pavement Rehabilitation Manual, Volume I" and one or more treatments with a future work strategy selected from the "Pavement Rehabilitation Manual, Volume II" that are appropriate for the pavement condition. However, alternative treatments, one of which must be reconstruction, and a life cycle

D. PROCESS (cont'd.):

PROJECT SCOPING PHASE

Steps

cost analysis (LCCA) to compare treatments per Volume II, are only required under the following conditions:

a. Alternative treatments, one of which is reconstruction, are required when the initial treatment selection and treatment strategy involve:

- treatments with large amounts of costly preparation work.

- treatments with thick overlays which require changes in adjacent features such as: curb, median barrier, drainage structures, structures.

- treatments whose future work strategies require frequent maintenance and future rehabilitation work.

Comparison of reconstruction with the above types of treatments usually results in reconstruction being a viable choice.

b. The reconstruction alternatives should always be considered as a possibility in the Life Cycle Cost Analysis. The costs of reconstruction using both asphalt cement concrete and portland cement concrete and their future work strategies should be compiled in each Region and used as a reference. These costs will be relatively constant, may be updated easily and used in many projects' analyses.

c. A Life Cycle Cost Analysis is required:

- when two or more alternate treatments with their future work strategies are selected.

- as part of the Pavement Type Selection Analysis when the recommended treatment is reconstruction.

d. A Life Cycle Cost Analysis is not required for rehabilitation treatment comparison when:

- only one treatment is appropriate (e.g. preventive maintenance).

- reconstruction is necessary for reasons other than pavement distress, such as radical realignment or capacity improvements. (However, a LCCA and construction of future work strategy timelines are still required for pavement type comparison as part of the Pavement Type Selection Analysis.)

e. A preliminary version of a computer program has been provided to each region at the training course on the "Pavement Rehabilitation Manual" given by the Materials Bureau in early 1992. The program assists in the construction of the future work strategy timelines and the life cycle cost analysis calculation and documentation. With the ease of running this program and the time savings it provides, it is recommended that alternative treatments and a LCCA comparison be considered for the majority of pavement rehabilitation projects. It is expected that a final version of the program will be distributed in late 1992 by DQAB.

D. PROCESS (cont'd.):

PROJECT SCOPING PHASE

Steps

5. Designer - Reviews pavement evaluation and prepares the preliminary cost estimate for each alternative treatment strategy using the Preliminary Estimate Program (PEP) or the Price Estimating System (PES) or other acceptable method from the "Pavement Rehabilitation Manual, Volume II".

6. Designer - Identifies other factors affecting treatments and/or pavement types and performs a LCCA of alternative strategies using the economic analysis method shown in the "Pavement Rehabilitation Manual, Volume II: Treatment Selection".

NOTE: If the recommended treatment is reconstruction, a preliminary pavement type shall be selected during the scoping phase based on the LCCA. The Pavement Type Selection Analysis is not completed until the Preliminary Design Phase. A LCCA is also required at this stage for new construction to assist in the selection of a preliminary pavement type. Step 9 (below) includes additional guidance in performing the LCCA for new/reconstructed pavement projects.

---

7. Designer - Completes draft of the "Pavement Evaluation and Treatment Selection Report" (PETSR) in accordance with the "Pavement Rehabilitation Manual, Volume II" incorporating: RTS's statement from process step 4; other factors that may influence the decision (e.g. guide rail height, subbase problems, drainage problems, bridge clearance, constructability, maintenance and protection of traffic, etc.); the timeline(s) showing the future work strategy for all viable treatment/pavement type alternatives; the LCCA (if appropriate) and the recommended treatment/pavement type to be used in subsequent estimates of the pavement costs for the project.

NOTE: The objective of the pavement design process is to select a pavement type and/or pavement treatment and a future treatment strategy as described in Volume II which results in the wisest use of funds. However, it is important to consider other factors such as those listed above when making this decision. In those instances when the Region decides to implement a strategy that does not

D. **PROCESS** (cont'd.):

PROJECT SCOPING PHASE

Steps

result in the lowest life cycle cost or if the strategy includes non-standard treatments or pavement designs, the rationale for such a decision must be documented in the PETSR.

On the other hand, there are circumstances under which the Region should consider selecting a rehabilitation treatment or pavement type with the longest service life instead of the minimum life cycle cost. One example when this should be considered would be when the AADT exceeds 35,000 vehicles. Volume II of the Pavement Rehabilitation Manual is based on research and experience with highways having an AADT in the range of 12,000-35,000. Therefore, when evaluating a facility with a greater volume of traffic and the strategy with the lowest life cycle cost would have significant user delay costs associated with maintenance and protection of traffic, then a treatment strategy or pavement type that has the longest service life should be considered. The rationale behind this selection should be documented in the Pavement Evaluation Treatment Selection Report.

---

8. Project Developer or Designer - Secures approval of the EPP and Cost Schedule Scope Quality Agreement (CSSQA) or changes to the CSSQA if changes or disapprovals have caused recycling through the process.

NOTE: The EPP should summarize the existing condition and the recommended treatment resulting from the PETSR in the body of the EPP and include the draft PETSR in the appendix to the EPP.

PRELIMINARY DESIGN PHASES I-IV

Steps

9. Designer - For new/reconstructed pavement projects, confirms pavement type selection decision made in the Project Scoping Phase by performing the Pavement Type Selection Analysis in accordance with "Appendix B, Pavement Type Selection Guidelines" of the "AASHTO Guide for Design of Pavement Structures 1986" (see copy attached). It is important that all factors listed in "Appendix B" that are relevant to the project be considered. The economic analysis (LCCA) should never be the sole determining factor in the pavement type selection decision. However, since the objective of this process is to encourage the wisest use of funds, the Pavement Type Selection Analysis shall contain the rationale behind selecting a pavement type not having the lowest life cycle cost.

D. **PROCESS** (cont'd.):

PRELIMINARY DESIGN PHASES I-IV

Steps

NOTE: The LCCA for the pavement type analysis for a new pavement shall follow the method shown for the reconstruction strategy in the example contained in Volume II of the "Pavement Rehabilitation Manual". Timelines showing future strategies with treatment service lives appropriate for the facility are to be shown for every viable pavement type.

A 4% discount rate shall be used. The benchmark analysis period for which all alternative pavement type strategies will be compared, will consist of the life of the initial paving type that will last the longest, plus the life of one rehabilitation for that particular pavement type. Other proposed pavement types of lesser life should have as many rehabilitation treatments added as necessary to the basic service life in order to meet or exceed the benchmark analysis period. Salvage values should be included for the portion of these treatments that exceed the benchmark analysis period, in order to ensure that the LCCA is equivalent for the different pavement strategies.

---

10. Designer - Performs preliminary design including field review and additional data collection to determine actual quantities. Refines the cost estimate for the recommended pavement strategy using the PEP or PES program. Revises the PETSR if necessary to account for major changes (e.g. major quantity or cost changes or pavement condition changes caused by maintenance performed since the condition survey).

11. Designer - Compares draft PETSR (from the Project Scoping Phase) to current PETSR to insure any quantity/cost change is insignificant. If quantity/cost change is significant, or a lower level treatment (such as "Saw and Seal") is recommended and it will be more than two years from the condition survey to construction, recycles to appropriate step and revises PETSR, LCCA and/or recommended treatment as needed.

NOTE: It has been observed, that when there are more than two years between the condition survey and construction, continued deterioration of the highway during the design period may cause a higher level treatment to become the recommended or favored treatment (e.g. 'Cracking and Seating w/Overlay' vs. 'Sawed and Sealed Overlay'). However, if a higher level treament is already recommended, and further deterioration won't affect the recommended treatment, this two year time limit does not apply. Examples of a higher level treatment would be: reconstruction, rubblizing w/overlay (rigid), a 4" multiple course overlay (flexible).

D. **PROCESS** (cont'd.):

PRELIMINARY DESIGN PHASES I-IV

Steps

12. Designer -

Inserts into the appendix of the design report, the PETSR and/or the Pavement Type Selection Analysis. (Inclusion of the PETSR in the appendix is necessary because of inexperience with a new process.)

Includes in the body of the design report:

a) A description of the existing pavement condition based on the distress survey.

b) For pavement rehabilitation/reconstruction projects, a discussion of the road history and service life of previous treatments. The previous treatment service lives and future design traffic (AADT and percent trucks) should always be checked to determine if any adjustments need to be made to the expected service lives given for the proposed treatments in Volume II of the "Pavement Rehabilitation Manual."

c) The recommended pavement treatment and/or type.

d) Justification for any recommended rehabilitation treatment that has an expected service life between 5 and 8 years.

Obtains/resolves comments on the design report, from Main Office and Regional units in accordance with current design procedures. (It is recommended that the Materials Bureau be sent a copy of the initial design reports from each Region for their review. Later, when the process has been under way several months, only design reports that recommend new or unusual treatment technology should be sent to the Materials Bureau.)

Prior to, or concurrent with requesting Design Approval, obtains approval from the Regional Director for the use of a rehabilitation treatment with a service life between 5 and 8 years. The need for this approval hinges on the functional class of the road as outlined in Figures 1a or 1b.

D. PROCESS (cont'd.):

PRELIMINARY DESIGN PHASES I-IV

Steps

NOTE: FHWA, by memorandum dated March 25, 1992, has advised us that NYSDOT will grant exceptions to the 8 year expected service life on Federal-Aid projects. To conform with the decentralization of design decisions to the Regions under Program and Project Management, this EI delegates this responsibility to the Regional Director. This means that the Regional Director will be granting all ESL exceptions regardless of fund source. It should be noted that on Principal Arterials, FAPG 23-I-G-626 only allows exceptions to the 8 year service life when the proposed rehabilitation strategy is shown to be cost effective based on historical performance data and the LCCA.

---

12. (cont'd):

Once this approval is obtained, requests Design Approval from the person authorized to grant Design Approval following current Department procedures.

NOTE: The memo requesting Design Approval shall include two sentences similar to those shown below. The first sentence, shall describe the recommended pavement type and/or pavement rehabilitation treatment. The second sentence is a statement that the project has complied with this process.

New Descriptive Sentence and Compliance Statement (in body of memo) - "The recommended [insert name of the recommended pavement rehabilitation treatment and/or pavement type] is described in Appendix D of the attached report. This project has complied with the 1992 Project-Level Pavement Design Process."

---

13. Design Approval Authority: Regional Director, Chief Engineer or FHWA -

Approves or disapproves the request for Design Approval including the statement of pavement process compliance.

14. Designer -

If the design is disapproved because of the proposed pavement treatment and/or type, the project is recycled to the appropriate step and the: PETSR, LCCA and/or recommended treatment are revised as needed. The Designer coordinates with the Project Manager to discuss impacts on the CSSQA.

If the design is approved and receives the normal approvals and fund authorizations, the project proceeds to Advance Detail Design Phase V.

D. **PROCESS** (cont'd.):

ADVANCE DETAIL DESIGN PHASE V

Steps

15. Designer -

Finalizes design and refines item costs/quantities using the Price Estimating System (PES).

Obtains/resolves comments on the Advance Detail Plans in accordance with current design procedures.

16. Designer -

Checks back to PETSR (from Design Approval phase) to insure any quantity/cost change relating to the pavement is insignificant. If quantity/cost change is significant, or a lower level treatment (such as "Saw and Seal") is recommended and it will be more than two years from the condition survey to construction, recycles to appropriate step and revises PETSR, LCCA and/or recommended treatment as needed. (Refer to step 11 for guidance on this topic.) Coordinates with the project manager relative to the CSSQA (if necessary) and subsequently obtains approval of the pavement design modification from the authority granting Design Approval.

17. Designer -

Prepares and transmits PS&E with process compliance statements.

NOTE: In Design Phase VI several statements regarding the pavement design process are to be included in the PS&E transmittal memo to act as a checklist for the Project Manager and aid in Regional Quality Control. The statements should be placed under the same item which lists the Pavement Design Approval date and approving authority. (This currently is item number 32 of EI 90-23 "Final PS&E Submission"). The statements must answer questions (a) and (b) as explained below. "Not Applicable" or "NA" after item 32 is not sufficient.

a. Is this a pavement project? State reasons why or why not. For example:

- **"This is not a pavement project because it is a bridge replacement with 1/2 mile total of approach pavement work." or**
- **"This is a pavement project because it includes 3 miles of pavement rehabilitation on an Interstate."**

D. **PROCESS** (cont'd.):

ADVANCE DETAIL DESIGN PHASE V

Steps

If project is a pavement project, continue with remaining questions.

b. Was the pavement design process (EI 92-015) followed and if not, why not? For example:

- **"This project was grandfathered from the pavement design process because it was in Design Phase IV as of 7/3/90." or**
- **"This project was processed in accordance with "EI 92-015, Project-Level Pavement Selection Process" [or the 7/3/90 "Interim Project-Level Pavement Design Process", if appropriate]".**

c. It is no longer necessary to list the Pavement Design Approval Date and approving authority since this EI makes Pavement Design Approval part of the normal DOT Design Approval. Item 32 will be corrected to reflect this in the next revision of the "Final PS&E Submission" EI.

E. **MONITORING PROCESS COMPLIANCE:**

Under the new Department Program and Project Management System (PPM)* which is currently being introduced into the Department, the roles of the Department Main Office and Regional Offices are changing. Under PPM the Regional Offices will be responsible for "quality control" while the Main Office will be responsible for "quality assurance".

For the purposes of the Pavement Design Process, quality control and quality assurance are defined as follows:

1. Quality Control - Under PPM, compliance with appropriate standards, policies and procedures (i.e. quality control) is the responsibility of the Region. This process was written to include checklists to enable easy monitoring of compliance throughout a project's life. For instance:

* **The reader is referred to the "Third Working Draft" of the "Procedure for Managing Projects" by the Program and Project Management Task Force, dated September 3, 1991 for additional information on PPM.**

E. MONITORING PROCESS COMPLIANCE (cont'd):

Quality Control -

a. The EPP shall include the draft PETSR in the appendix to the EPP and include summarized descriptions of the existing pavement condition and the recommended pavement rehabilitation treatment resulting from the draft PETSR in the body of the EPP. (See Step 8.)

b. The design report has similar requirements to the EPP and additionally includes the Pavement Type Selection Analysis, justification for treatments with 5-8 year service lives, and the pavement treatment/type recommendation. (See Step 12.)

c. The Design Approval request memorandum shall contain a description of the recommended pavement treatment/type and the process compliance statement. (See guidance following Step 12.)

d. The PS&E transmittal memorandum shall contain the process compliance statements. (See guidance following Step 17.)

At each control point in either the PPM process or the design process (e.g. EPP reviews, CSSQA approvals, design report reviews, Design Approval, Advance Plan reviews and PS&E submission) the Project Developer, Job Managers, Project Manager and group or person responsible for Regional quality control are to use these checklists to determine if a project is ready to go to the next phase.

2. Quality Assurance -

a. NYSDOT - The quality assurance role of the Main Office regarding this pavement design process will be handled in conjunction with the quality assurance of other design processes. The way this will be accomplished is still under development, but it is expected that it will be phased in during the transitional "walk phase" of PPM and will be fully operational during the "run phase".

b. FHWA - Quality assurance by FHWA will be accomplished by statewide programmatic reviews. These reviews will monitor the process and ensure that exceptions to the 8 year service life (of rehabilitation treatments) are granted in accordance with FAPG 23-I-G-626.

F. FUTURE STEPS:

There are several steps shown on the attached flowcharts with dashed lines which are not specifically described in this EI. Generally, these are future steps which show how this process is expected to link into the overall Pavement Management System. The steps are also shown to make the Regions aware that they should retain this data to be incorporated into a future Pavement Management Data Base. It is expected that the Pavement Management Implementation office will inform the Regions in the near future as to what data should be saved and the format that should be used.

G. LIST OF ATTACHMENTS:

1. **"Appendix B**, Pavement Type Selection Guidelines" from AASHTO Guide for Design of Pavement Structures 1986. Pages B-1 through B-5.

2. **Applicability Flowchart** - "Pavement EI 92-015, Stage 1 (4/1/92) - 12/31/92), Applicability, Major Process Requirements and Minimum Service Life Requirements, **Figure 1a"**. Sheets 1 and 2.

3. **Applicability Flowchart** - "Pavement EI 92-015, Stage 2 (Begins 1/1/93), Applicability, Major Process Requirements and Minimum Service Life Requirements, **Figure 1b"**. Sheets 1 and 2.

4. **Process Flowchart** - "NYSDOT Project-Level Pavement Selection Process", **Figure 2**. Sheets 1 and 2.

H. CONTACT PERSON:

Any questions regarding this EI should be directed to Carol Hennessy of the Design Quality Assurance Bureau, telephone number 518 457-7278.

Appendix B
PAVEMENT TYPE SELECTION GUIDELINES

B.1 GENERAL

The highway engineer or administrator does not have at his disposal an absolute or undisputable method for determining the type of pavement which should be selected for a given set of conditions. However, the selection of pavement type should be an integral part of any pavement management program.

The selection of pavement type is not an exact science but one in which the highway engineer or administrator must make a judgement on many varying factors such as traffic, soils, weather, materials, construction, maintenance, and environment. The pavement type selection may be dictated by an overriding consideration for one or more of these factors.

The selection process may be facilitated by comparison of alternate structural designs for one or more pavement types using theoretical or empirically derived methods. However, such methods are not so precise as to guarantee a certain level of performance from any one alternate or comparable service for all alternates.

Also, comparative cost estimates can be applied to alternate pavement designs to aid in the decision-making process. The cost for the service of the pavement would include not only the initial cost but also subsequent cost to maintain the service level desired. It should be recognized that such procedures are not precise since reliable data for maintenance, subsequent stages of construction, or corrective work and salvage value are not always available, and it is usually necessary to project costs to some future point in time. Also, economic analyses are generally altruistic in that they do not consider the present or future financial capabilities of the contracting agency.

Even if structural design and cost comparative procedures were perfected, they would not by their nature encompass all factors which should be considered in pavement type determination. Such a determination should properly be one of professional engineering judgement based on the consideration and evaluation of all factors applicable to a given highway section.

The factors which may have some influence in the decision-making process are discussed below. They are generally applicable to both new and reconstructed pavements. One group includes those factors which may have major influence and may dictate the pavement type in some instances. Some of the major factors are also incorporated in the basic design procedures and influence the structural requirements of the pavement design or subgrade and embankment treatments. In such cases they are assigned an economic value for comparative purposes. The second group includes those factors which have a lesser influence and are usually taken into account when there are no overriding considerations or one type is not clearly superior from an economic standpoint. A flow chart of pavement selection procedure incorporating the major and secondary factors is shown in Figure B.1.

B.2 PRINCIPAL FACTOR

1. Traffic

While the total volume of traffic affects the geometric requirements of the highway, the percentage of commercial traffic and frequency of heavy load applications generally have the major effect on the structural design of the pavement.

Traffic forecasts for design purposes have generally projected normal growth in the immediate corridor with an appropriate allowance for changes in land use and potential commercial and industrial development. However, experience over the past several decades has shown that the construction of new major highway facilities diverts large amounts of heavy traffic from other routes in a broad traffic corridor. This, coupled with a decline in the quantity of railroad services, has resulted in a considerable underestimation of traffic growth, particularly commercial traffic. Also, the future availability and cost of motor fuels could result in increased legal loads to which pavement structures could be subjected during their design period.

For these reasons, pavement designs for major facilities should incorporate an appropriate margin of safety in the traffic

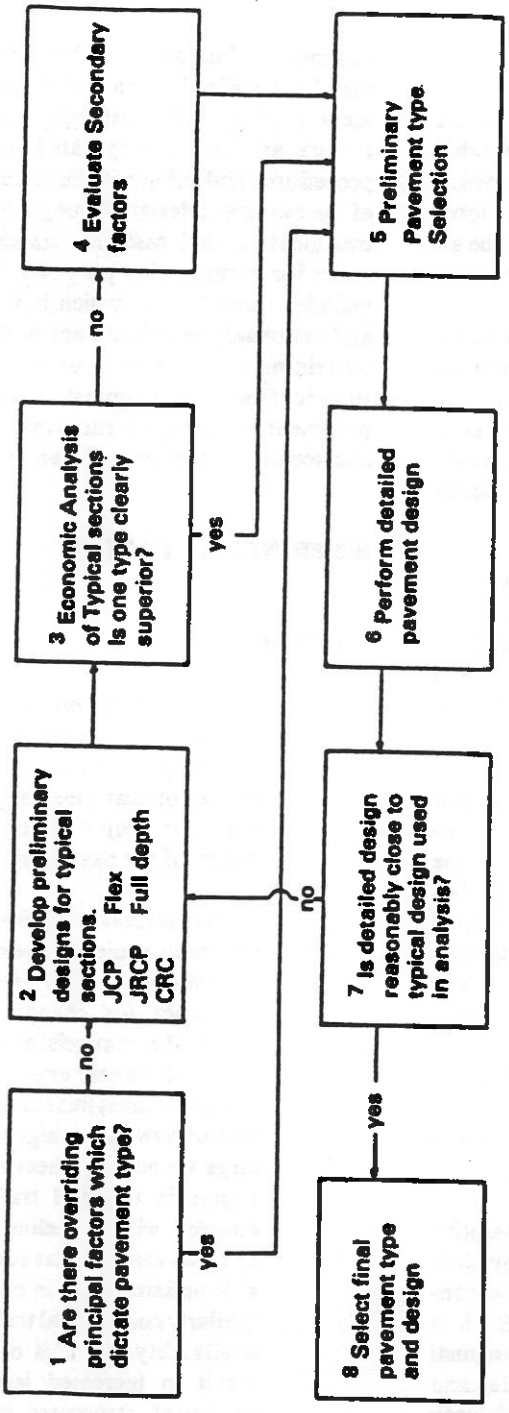

Figure B.1. Pavement type selection process.