

100 Pavement Requirements

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The requirements in this section replace ODOT policies 20-007(P) Pavement Design Policy and 22-009(P) Pavement Type Selection Policy, and standard procedure 520-001(SP) Pavement Type Selection Standard Procedure. Pavement designs for Interstate, US, and State routes, and other Federal-aid routes are to follow the requirements of this section and the procedures set forth in this Manual.

101 Design Responsibility

The districts are responsible for the pavement design for all priority system surface treatments, and general system minor rehabilitations and surface treatments. The districts or the local governing agency is responsible for pavement design for all urban system minor rehabilitations and surface treatments. The local governing agency is responsible for pavement design for Federal-aid routes off the state system. The Office of Pavement Engineering is responsible for the pavement design for all priority system minor rehabilitation.

Pavement design responsibility for all new pavements and major rehabilitations on the state system depends on the size of the project. The pavement design for projects in excess of four lane-miles of mainline driving lanes is the responsibility of the Office of Pavement Engineering. The pavement design for projects less than four lane-miles is the responsibility of the district or local governing agency.

102 Structural Design Period

Pavements must be structurally designed to accommodate the current and predicted traffic needs in a safe, durable, and cost effective manner. Pavement structural design is based on a projection of the anticipated traffic loading. The design period is the number of years in the traffic loading prediction. The design period for pavements is based in part on the geometric design period and the construction material quality specifications.

The design periods listed below are exact values, not maximums or minimums. A shorter design period would result in thin pavements more likely to fail prematurely. A longer design period would not be achievable without corresponding changes to the geometric standards, material quality specifications, and construction procedures.

Other roads not part of the priority, general, or urban systems should use the design period for the most similar roadway and rehabilitation type.

102.1 Priority System Design Period

- New Pavement 20 years
- Major Rehabilitation 20 years
- Minor Rehabilitation 12 years
- Surface Treatments n/a

Surface treatments are applied to structurally sound pavements to correct or reduce deterioration of non-structural surface distresses. They are also used occasionally as short term, stopgap measures on structurally deficient pavements in advance of minor or major rehabilitation; this practice is discouraged however, as patching or spot paving may be more cost effective.

Sound engineering judgment should be used when determining where to apply surface treatments. Output from the pavement management system can assist in identifying appropriate locations and treatment types.

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102.2 General System Design Period

- New Pavement 20 years
- Major Rehabilitation 20 years
- Minor Rehabilitation n/a
- Surface Treatments n/a

Because of the variability of the existing pavement buildup on general system routes, no structural design is required for minor rehabilitation and surface treatments. Output from the pavement management system should be used to assist in the timing and treatment for minor rehabilitation and surface treatments. A 12-year structural design may be used for minor rehabilitation where the existing pavement buildup is known and is relatively uniform.

102.3 Urban System Design Period

- New Pavement 20 years
- Major Rehabilitation 20 years
- Minor Rehabilitation n/a
- Surface Treatments n/a

Urban system minor rehabilitations and surface treatments are determined by or in conjunction with the local governing agency. The guidelines of the urban paving program apply (see the ODOT Program Resource Guide). Output from the pavement management system can assist in identifying appropriate treatments.

103 Subgrade Strength Parameters

The subgrade strength parameters for designing new pavement shall be determined in accordance with the Office of Geotechnical Engineering guidance.

104 Pavement Type Selection

Pavement type selection for new pavement and major rehabilitation projects on the state system in excess of four lane-miles of mainline driving lanes is subject to the requirements of this section.

Pavement type selection for all ramps is subject to the requirements of Section 104.7.

Pavement type selection for minor rehabilitation and surface treatment projects of any length, and new pavement and major rehabilitation projects less than four lane-miles is the responsibility of the district, the Office of Pavement Engineering, or the local governing agency as appropriate.

The requirements of this section do not apply to any roads off the state highway system.

104.1 Pavement Designs Considered

For all pavements built along new alignments, both rigid and flexible pavement shall be considered. Composite pavement may be considered if there is a district or local preference to do so. Neither rigid nor flexible pavement shall be eliminated without justification in accordance with this section.

For all projects on existing alignment, all major rehabilitation techniques shall be considered. Current major rehabilitation techniques include complete replacement with rigid, flexible, or possibly composite pavement; rubblizing with an asphalt overlay; unbonded concrete overlay; and whitetopping. New or other techniques may be considered as well if applicable. Replacement is applicable to all

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existing pavement types. Rubblize projects and unbonded concrete overlays are applicable to existing rigid or composite pavements. Whitetopping is applicable to existing flexible pavements. No major rehabilitation technique is to be eliminated without justification in accordance with this section.

104.2 Principal Factors

After the potential pavement designs are identified, an engineering review and analysis of the principal selection factors shall be conducted. Application of the principal factors may eliminate some pavement designs from further consideration. If only one pavement design exists after the analysis of the principal factors, it is selected and no further analysis is required.

104.2.1 Research

The Department may wish to conduct research on a new or specific pavement type or treatment. If a project is identified for the research, the pavement type selection and design parameters will be based on the requirements of the research.

104.2.2 Adjacent Existing Sections

When systematically building or rehabilitating multiple pavement sections along a corridor, a single pavement type or treatment may be selected to provide continuity throughout the corridor. Also, short sections adjacent to or between pavements with the same surface type, may be selected to continue the same surface material for continuity. Short sections are generally considered to be less than three centerline miles.

104.2.3 Geotechnical Concerns

The subgrade conditions may eliminate the use of some pavement designs. For example, there is a minimum blow count requirement for rubblize and roll to be considered.

104.2.4 Geometrics

Correcting deficient geometrics and adapting to existing constraints (e.g. bridges) may require replacing much of the existing pavement. When the percentage of pavement requiring replacement becomes large, consideration will be given to eliminating the rehabilitation treatments and proceeding with complete replacement only. Adapting to the existing conditions may also require typical section configurations that do not conform to the design assumptions or could result in premature deterioration.

104.2.5 Amount of New Pavement

On projects with lane additions or other widening, the percentage of new pavement versus the percentage of salvaged pavement may become so large that it is preferable to replace the existing and have all new pavement. New, full depth pavement next to rehabilitated pavement may or may not perform the same and may want to be avoided in some cases.

When the existing pavement can be salvaged and performance differences are not a concern, the new pavement may be selected to match the existing. It is standard practice to maintain one pavement surface type transversely across all adjacent driving lanes.

104.3 Life-Cycle Cost Analysis

A life-cycle costs analysis (LCCA) is prepared if more than one pavement design remains after the principal factors have been applied. The LCCA is prepared by the Office of Pavement Engineering

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with unit price estimates provided by the Office of Estimating. The analysis period for the LCCA is 35 years.

The future rehabilitation timing and treatments used in the LCCA shall be in accordance with Section 700.

A draft version of the completed LCCA is sent to the district and representatives of both paving industries for review. The purpose of the review is to identify any errors and provide comments when applicable. The Office of Pavement Engineering will submit the final LCCA and selection package along with any comments to the Pavement Selection Committee.

If there is no pavement design within 10% of the lowest cost design, the Pavement Selection Committee shall select the lowest cost design.

104.4 Secondary Factors

Secondary factors are evaluated by the Pavement Selection Committee when one or more pavement design is within 10% life-cycle cost of the lowest cost pavement design. The committee may use the secondary factors to pick a single pavement design, or they may select two or more designs for optional bidding. Alternate bidding may also be selected but optional bidding is preferred.¹

104.4.1 Principal Factors

The committee may reconsider any of the principal factors as secondary factors.

104.4.2 Maintenance of Traffic

The Maintenance of Traffic Alternative Analysis (MOTAA) report details possible maintenance of traffic scenarios and the associated costs. This report should be available for the committee to evaluate as a secondary factor.

104.4.3 Smoothness

Smoothness is very important to the travelling public and to the Department. The Department collects ride quality data on a regular basis for new and existing pavements of all types. The initial and ongoing smoothness of a pavement yet to be constructed cannot be predicted but the collected data can indicate trends. The committee may consider expected smoothness as a secondary factor.

104.4.4 Initial Cost

There may be significant differences in the initial costs even when the total life-cycle costs are close. The committee may use differences in the initial costs to select one pavement design.

104.5 Pavement Selection Committee

Pavement type selection for new pavement and major rehabilitation projects in excess of four lane-miles of mainline driving lanes is by the Pavement Selection Committee. The committee is comprised of the following individuals:

- Assistant Director of Transportation Policy
- Deputy Director of Engineering

¹ Optional bidding requires a bidder to submit a bid for only one of two or more options. Alternate bidding requires a bidder to submit bids for all the alternatives.

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- District Deputy Director (of the applicable district)

The committee may call on additional subject matter experts as needed such as for geotechnical or maintenance of traffic issues.

104.6 Reanalysis of Selections

Pavement selections are considered final and not required to be reanalyzed. Projects may be reanalyzed at any time, however. Likely reasons for reanalysis include delays in the project schedule, changes in the project scope, and changes in pavement market conditions.

104.7 Ramp Pavement Type

All new ramps and ramps replaced in their entirety shall follow the requirements of this section. When part of a ramp is being replaced, the requirements of this section should be considered when selecting pavement type. System and service interchanges are defined in the L&D Manual, Volume 1, Section 502 Interchange Design Considerations.

All service interchange ramps, from the crossroad to the nose of the physical gore area, are to be constructed using concrete pavement. The longitudinal joints on concrete ramps are to be constructed in accordance with Standard Drawing BP-6.1 and should never be located in the wheelpaths.

For all system interchange ramps, districts may select the appropriate pavement type.

Pavement thickness design for all ramps is to be in accordance with the Pavement Design Manual. Acceleration and deceleration lanes shall match the pavement surface type of the adjoining mainline pavement.

105 Pavement Edge Treatments

The area beyond the edge of the paved surface must be treated to prevent drop-offs which can present a safety hazard. There are two methods for treating the pavement edge area, the safety edge treatment and the standard edge treatment.

105.1 Safety Edge Treatment

A safety edge is a wedge of pavement beyond the edge of the paved surface angled approximately 30 degrees from the surface to provide for the safe recovery of vehicles if the graded shoulder material has eroded, settled, rutted, etc., instead of a vertical dropoff. Details on safety edge construction are shown in BP-3.2 and BP-8.2.

A safety edge is required on all paving projects on state highways (Interstate, US, and State routes) including mainline highways, collector-distributor roads, and ramps meeting all the following criteria:

- Uncurbed sections only;
- Thickness of new material placed is greater than 1.5 inches (38 mm);
- Less than 4 foot (1.2 m) paved shoulder width on mainline or less than 3 feet (1 m) on ramps;
- At least 1500 feet (450 m) of continuous centerline paving, or less than 1500 feet (450 m) if the adjacent pavement on either end currently has a safety edge; and,
- Legal speed limit is greater than 35 mph.

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Safety edge is not required on any service interchange ramp or anywhere behind the face of guardrail. It is prohibited for any pavement that abuts concrete barrier wall.

Safety edge requires approximately 10 inches (250 mm) of graded shoulder width (6:1 or flatter preferred) available beyond the edge of the paved surface. Plans must include a quantity of Item 209 Preparing Subgrade for Shoulder Paving for the locations where safety edge will be constructed. Include the asphalt needed to construct the safety edge with the surface course asphalt item. Do not include the additional width of safety edge in the square yard (square meter) calculation for concrete pavement.

If safety edge is used on part, but not all, of a project, the plans must indicate where it is or isn't to be used.

Safety edge must be backed up with aggregate, embankment, topsoil, etc., flush with the pavement surface. Do not leave the safety edge exposed.

Safety edge may be used where it is not required. Follow the requirements of Section 105.2 for locations not using a safety edge.

105.2 Standard Edge Treatment

Uncurbed locations not meeting the requirements for safety edge (Section 105.1) must provide material to prevent a drop-off at the edge of the paved surface. On new alignments, this material may be aggregate, embankment, topsoil, or other suitable material as determined on a project basis. On overlays and rehabilitation projects, this material is most often Item 617 Reconditioning Shoulders. In residential or commercial areas topsoil and seeding may be necessary. The exact materials used and the locations are determined on a project basis.