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1. INTRODUCTION

The U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center (Volpe Center), Acoustics Facility, in support of the Federal Highway Administration (FHWA), Office of Natural Environment, has developed the updated "FHWA Highway Noise Barrier Design Handbook. This document reflects substantial improvements and changes in noise barrier design that have evolved since the original 1976 publication ([ref.1](#)). This Handbook, which is accompanied by a videotape and a companion CD-ROM, addresses both acoustical and non-acoustical issues associated with highway noise barrier design ([ref.2 & 3](#)).

Section 1 presents a general overview, a historical perspective, and the objectives of the handbook. [Section 2](#) presents definitions of terminology used throughout the document. [Section 3](#) describes the acoustical considerations of highway noise barrier design, including a brief discussion on noise barrier performance. [Section 4](#) presents noise barrier types, their descriptions, and special features. [Section 5](#) describes noise barrier materials, including barrier surface texture treatments. [Section 6](#) discusses noise barrier aesthetics. [Section 7](#) describes the utility considerations associated with barrier design. [Section 8](#) describes the structural considerations associated with barrier design. [Section 9](#) describes the safety considerations associated with barrier design. [Section 10](#) details the product evaluation process. [Section 11](#) describes the installation considerations associated with barrier design. [Section 12](#) describes the maintenance considerations associated with barrier design. [Section 13](#) describes the cost considerations associated with barrier design. [Section 14](#) presents the typical barrier design process. [Section 15](#) describes how to assess a barrier's effectiveness, including performance, costs, and community acceptance. [Section 16](#) describes the various tools and information sources that are available to aid in the design process.

1.1 Background

Highway traffic noise has been a Federal, State, and local concern since the first noise barrier was built in 1963. In 1976, the FHWA developed the original "Noise Barrier Design Handbook" to aid State Highway Agencies in solving the problem of highway traffic noise. However, the Handbook was written over two decades ago. Since then, substantial advancements in the methodology and technology of barrier design have occurred in concept, design, and technique. Increased community and motorist interest has fueled the push to provide better, less expensive, and more environmentally-friendly barrier designs.

Increased community and motorist concerns have also fueled the push to improve noise measurement and modeling technologies which aid State transportation agencies in determining which communities need noise abatement. One such tool is the FHWA's recently released highway traffic noise prediction model: the FHWA Traffic Noise Model (FHWA TNM) ([ref.4](#), [ref.5](#), [ref.6](#) and [ref.7](#)) The FHWA TNM is an entirely-new, state-of-the-art computer program used for predicting noise impacts in the vicinity of highways. It uses advances in personal computer hardware and software to improve upon the accuracy and ease of modeling highway traffic noise, including the design of effective, cost-efficient highway noise barriers.

1.2 Objectives

The objectives of this document and accompanying video and CD-ROM are to provide: (1) guidelines on how to design a highway noise barrier that fits with its surroundings and performs its intended acoustical and structural functions at reasonable life-cycle cost; and (2) a state-of-the-art reference of common concepts, designs, materials, and installation techniques for the professional highway engineer, the noise barrier designer, and the non-professional community participant. This handbook may also be used as a guide for other applications such as noise barriers used to attenuate noise from rail lines, as well as noise from other sources which are not necessarily found in transportation. Every effort has been made to address common designs, materials, and installation techniques. However, it is impossible to encompass the proliferation of new concepts and materials entering the market on a daily basis. Therefore, the specific descriptions in this handbook are not to be considered all-inclusive, and are not intended to limit the creativeness of the designer, manufacturer, and construction contractor. Any new theory, design, material, or installation technique not addressed in this handbook should be evaluated with the general fundamentals of durability, safety, and functionality in mind.

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