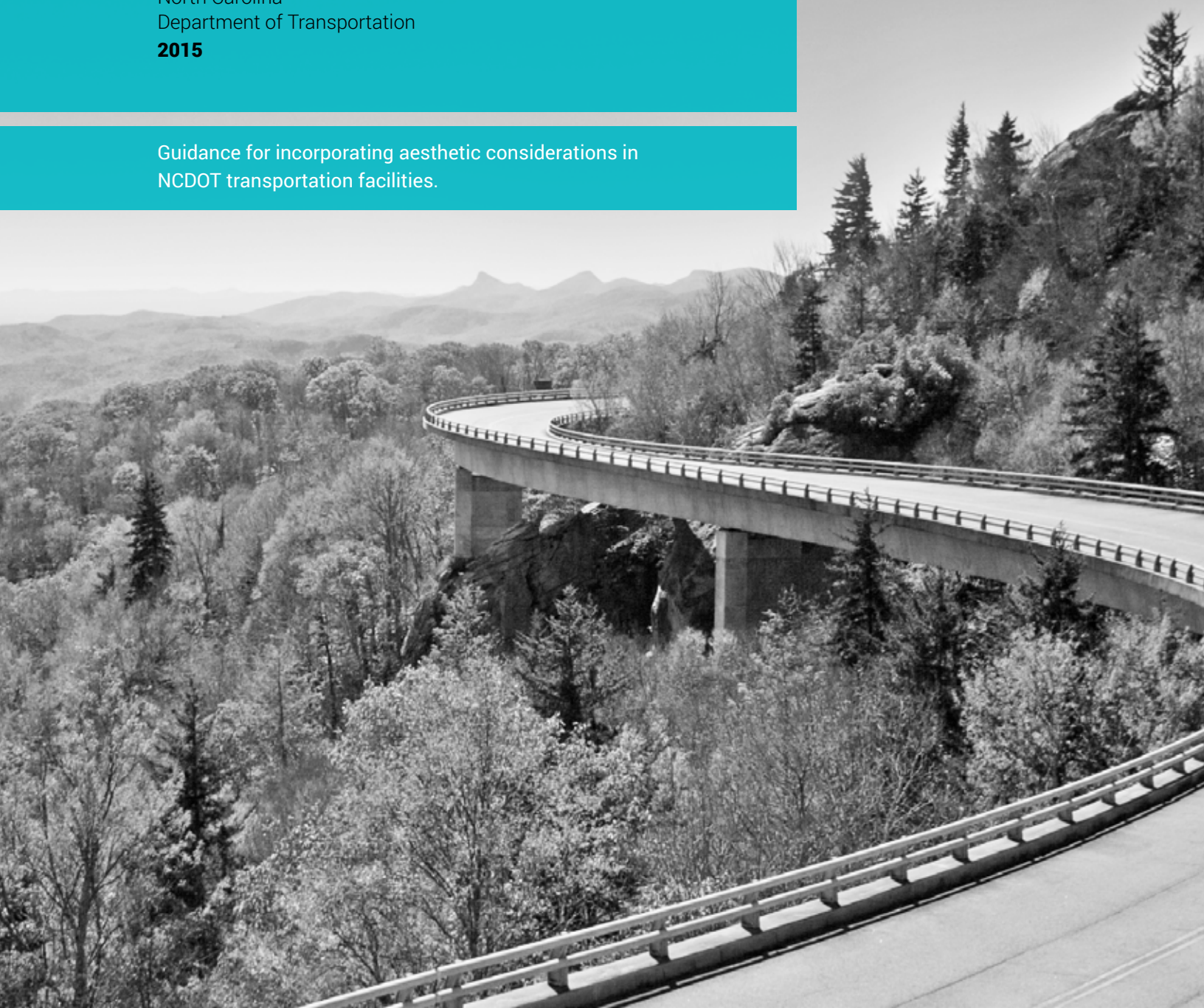
AESTHETICS GUIDANCE **MANUAL**

North Carolina
Department of Transportation
2015

Guidance for incorporating aesthetic considerations in NCDOT transportation facilities.



"Every structural decision is an aesthetic decision."

Transportation Research Board

FOREWORD

Aesthetics in the planning of transportation facilities has increased in importance and has the opportunity to impact our transportation connections and reputation for the State of North Carolina. In recognition of the need to expand and organize this effort, Governor Pat McCrory, the North Carolina Department of Transportation (NCDOT), and the North Carolina Department of Cultural Resources (NCDCR) have developed an *Aesthetics Guidance Manual* and *Pattern Book for Transportation Aesthetics* to incorporate aesthetic considerations in transportation infrastructure across the state. The objective is to promote the importance of and provide guidance for the visual fit between transportation projects and the surroundings in rural, suburban, or urban settings in order to increase the visual experience for all who use the state's transportation infrastructure.

The Manual and Pattern Book are intended to serve those involved in the design and development of transportation facilities, including government officials, NCDOT staff, private and public entities, and citizens. It should be used as both a training tool and a reference document to help better incorporate aesthetic considerations into the creation and beautification of our state's transportation facilities.

"Aesthetics has the opportunity to positively impact our transportation connections and reputation for the State of North Carolina."

NCDOT

ACKNOWLEDGEMENTS

NCDOT has developed an *Aesthetics Guidance Manual* and *Pattern Book for Transportation Aesthetics* that combine aesthetic guidelines and procedures to aid in the design of transportation facilities. This Manual will serve as an active document and is intended for regular updates to appropriately reflect changes in policy and procedural changes within NCDOT and the state as well as continually build upon and expand the divisions, programs, sections, and units included in aesthetic considerations. Below includes a list of active participants in the development of this Manual.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NCDOT DIVISION OF BICYCLE AND PEDESTRIAN TRANSPORTATION

NCDOT DEPUTY CHIEF ENGINEER

- NCDOT Preconstruction
- NCDOT Project Development and Environmental Analysis (PDEA)
- NCDOT Human Environment Section (HES)
- NCDOT Roadway Design Unit (RDU)
- NCDOT Geotechnical Engineering Unit (GEU)

NCDOT FIELD SUPPORT

- NCDOT Roadside Environmental Unit (REU)
- NCDCR Structures Management Unit (SMU)

NCDOT TRANSPORTATION MOBILITY AND SAFETY

- NCDOT Intelligent Transportation System (ITS) and Signals

NORTH CAROLINA DEPARTMENT OF CULTURAL RESOURCES

- North Carolina Arts Council (NCAC)

CONSULTANT TEAM

- AECOM | North Carolina
- Sand County Studios
- Denise New Dickens

"Design is the method of putting form and content together."

Paul Rand

TABLE OF CONTENTS

EXHIBITS

TABLES

LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AFTA	Americans for the Arts
ART	Aesthetic Review Team
CATS	Charlotte Area Transit System
CIP	Cast-in-Place
CMP	Corridor Management Plan
CRZ	Clear Recovery Zone
CSD	context sensitive design
CSS	context sensitive solutions
CTE	Center for Transportation and the Environment
CTP	Comprehensive Transportation Plan
CZIP	Clear Zone Improvement Program
DBPT	Division of Bicycle and Pedestrian Transportation
DNR	Design Noise Report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GEU	Geotechnical Engineering Unit
GIS	geographic information system
GPS	global positioning system
HES	Human Environment Section
HPMS	Highway Performance Monitoring System
HSP	Highway Stormwater Program
IRVM	integrated roadside vegetation management
ITS	Intelligent Transportation System
LED	light-emitting diode
LEDPA	least environmentally damaging practicable alternative
MAP-21	Moving Ahead for Progress in the 21st Century Act
Merger	Merger Process, the NCDOT streamlining efforts for project development and permitting processes
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MSE	mechanically stabilized earth
NAC	noise abatement criteria
NCAC	North Carolina Arts Council
NCDCR	North Carolina Department of Cultural Resources
NCDOT	North Carolina Department of Transportation
NCSHPO	North Carolina State Historic Preservation Office
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places

PDEA	Project Development and Environmental Analysis Branch
PRW	precast retaining wall
PVC	polyvinyl chloride
RDU	Roadway Design Unit
REU	Roadside Environmental Unit
ROW	right-of-way
RPO	Regional Planning Organization
RRR	resurfacing, restoration, and rehabilitation
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users
SEPA	State National Environmental Policy Act
SMU	Structures Management Unit
SRW	segmented retaining wall
STAA	Surface Transportation Assistance Act
STI	Strategic Transportation Investments
STIP	State Transportation Improvement Program
STP-DA	Surface Transportation Program Direct Attributable Program
TAP	Transportation Alternatives Program
TEA-21	Transportation Equity Act of the 21st Century
TNA	Traffic Noise Analysis
TPM	Tri-Project Management Team
TRAC	Toe River Arts Council
TRB	Transportation Research Board
UDOT	Utah Department of Transportation
VIA	Visual Impact Statement

EXECUTIVE SUMMARY

The *Aesthetics Guidance Manual* (Manual) will serve as the primary document for North Carolina to incorporate aesthetic considerations in the design and development of transportation facilities. The directive from Governor Pat McCrory provided impetus for NCDOT and NCDCR to work together to combine aesthetic principles and procedures in the design of transportation infrastructure.

The purpose and intent of this Manual is to promote the importance of and to integrate guidance for the visual enhancement of transportation projects. The aim is for this to be used as an aesthetics reference tool that is regularly updated to reflect new concepts, examples, and strategies related to aesthetics for use by NCDOT staff, municipalities, public and private organizations and companies, and the citizens of North Carolina. Any individual, organization, or public/private agency involved in the planning and development of transportation facilities at all levels of decision making is encouraged to use this Manual to more efficiently incorporate aesthetics into NCDOT projects.

IMPORTANCE OF AESTHETICS

Aesthetic upgrades to transportation facilities, both existing and new, offer many tangible economic and experiential benefits. The value of aesthetics can include benefits to tourism, cost efficiencies, and improved experience and safety.

Tourism: The North Carolina tourism industry may be advertised through branding of the state and its communities. Aesthetics can help define the brand being promoted.

Cost efficiencies: Incorporating aesthetics early into project development can minimize project backtracking, negative public perceptions of transportation facilities, resulting impacts on project development, and important efficiencies with the decision-making process.

Experience: Aesthetic enhancements can change the perception of an area by offering higher quality visual experiences. This has real, qualitative impacts on businesses, residents, and visitors.

Safety: Driver awareness and safety has the potential to be improved from surroundings that have stimulating aesthetic characteristics.

The concept of aesthetics is subjective and is contingent on both community preference and context. Aesthetics in this Manual is defined as the visual enrichment of structural and non-structural elements specific to NCDOT transportation facilities. Aesthetic enhancements is an important factor for our infrastructure to be visually appealing while also being efficient and safe.

SCOPE OF MANUAL

Development of this Manual was based on extensive interviews and meetings with NCDOT division, unit, and group leaders and staff that specialize in transportation focus areas; NCDCR and NCAC; and policy research. This Manual is divided into three sections and can be read collectively and as individual sections. Section A details the framework including the context, basics of aesthetics, and integration of the guidelines and is applicable to all stakeholders and NCDOT projects that pertain to aesthetics. Section B describes the aesthetic process of individual transportation facility focus areas. Section C details implementation strategies. It is recommended that Section A and Section C always be read and referenced in conjunction with chapters from Section B.

FRAMEWORK

The framework for aesthetic considerations is described below and includes context, basics of aesthetics, and integration of the guidelines.

Context

State regions

The cultural, historical, natural, and visual resources in North Carolina can be defined according to three major physiographic classifications, used as an organizing principle for aesthetics. These landscapes are defined as the Mountain Region, the Piedmont Region, and the Coastal Plain Region.

Roadway network

Using the common Federal Highway Administration terminology of classifying roadway systems into three distinct categories according to function allows for stronger communication among stakeholders. This information should be shared with relevant decision-makers to encourage increased efficiency, context-specific needs, and aesthetic considerations in transportation projects.

Land use development

Land use defines a community's growth patterns, strongly influencing the visual impacts of the area. The interconnectivity among the demand for land use, design of the urban form, and supply of the transportation network is important for the sustainable development of towns and regions. Aesthetics and visual considerations of an area are largely dependent on land use planning and should coordinate as appropriate.

Basics of Aesthetics

Peer reviews of other states with aesthetic practices and interviews with NCDOT divisions and units were used to create a series of recommended best practices. These form the basics of aesthetics defined in this Manual and are recommended to be incorporated in the design and development of transportation facilities in North Carolina.

Design elements

Attention should be given to the line, shape, form, texture, and color of a transportation feature. Collectively, these elements establish the visual framework and most directly affect perceptions of transportation facilities and the surrounding environment. Textures and patterns viewed predominantly by motorists can be larger and more dominate where those viewed by pedestrians can be finer and more complicated. The use of horizontal lines in patterns and textures should be minimized. Color should be used to develop harmony within the structure and between the structure and its setting. This includes attention to light versus dark colors, warm versus cool colors, and the combination of colors present in surrounding signs, lights, and railings.

Design principles

Aesthetic elements should be incorporated early in the planning process and included in broader planning frameworks at local and state scales. Broad visions for specific projects, communities, or corridors can be used to help achieve the goals defined in planning frameworks. Creating a design principle is formed from the relationships of visual design elements, building on each other and interacting to influence how a space or sequences of spaces are experienced.

Visual management

Drivers see basic forms, shapes, and colors, but may not see textures or fine level details. It is recommended that aesthetic considerations focus on the placement of an element to create the feeling of visual movement, providing a more stimulating transportation facility for motorists. Those who have a view of the road, such as surrounding residents or businesses, may have a negative visual impact due to permanent views of the roadway or transportation facility. Visual impacts such as this should be given additional consideration and focus on integrating the surroundings, including existing roadway networks and land uses.

The proximity of a viewer to elements has a significant impact on the level of detail perceived and the potential impact of visual resources. Emphasis should be placed on elements in the foreground, with middle-ground and background views typically being less central to the overall viewshed.

Tier approach

Aesthetic design principles vary depending on the visual and landscape character of the corridor and its surrounding. Following a tier approach is recommended as a way to appropriately reflect the surrounding community and environment and should be defined as standard, enhanced, or landmark environments or features.

Integration of Guidelines

Guidelines for aesthetic considerations in NCDOT transportation projects was developed concurrent with existing NCDOT design and development procedures and statewide planning processes.

Aesthetic design process
The ultimate success of incorporating aesthetic considerations into the design and development of transportation facilities is through insertion early in project initiation to project completion. The procedures in this Manual are organized as three phases, each representing a different time frame in NCDOT transportation planning processes. These include project initiation, focus area review, and finalization and implementation. Each phase was developed in coordination with standard NCDOT Project Development processes and should be referenced at all stages of the project to efficiently coordinate steps and responsible parties. Section A, Chapter 4 details the integration of guidelines and Section B provides a step-by-step process for each focus area.

Planning frameworks
Aesthetic considerations should be integrated into a range of planning initiatives to develop a comprehensive vision for improved aesthetics statewide. This Manual should become a useful tool in local, regional, and state planning, policies, and regulations, including general community, functional, and/or special plans.

Stakeholder and public involvement
Diverse stakeholder involvement is one of the keys to success in incorporating aesthetic considerations in the design and development of transportation facilities. This includes coordination early and throughout the planning process with a municipality, public or private agencies, the community, or other stakeholder group(s).

Funding
Funding for aesthetic upgrades of transportation facilities is on a case-by-case basis. Opportunities and greater specificity of funding responsibilities require definition and approval by North Carolina legislative bodies. Generally, funding for aesthetic upgrades above that which NCDOT proposes for a transportation facility is the responsibility of a municipality, public or private agency, or other stakeholder group(s). NCDOT is responsible for including these diverse stakeholder group(s) in order to allow enough time for funding to be procured for aesthetic upgrades. NCDOT is also responsible for distribution of this Manual to stakeholder(s) and other coordination with local, state, or federal regulations that could warrant aesthetic upgrades to transportation facilities.

FOCUS AREAS

Section B of this Manual is focused on the focus areas involved in roadway planning efforts. It is expected and recommended that as an active text this Manual will incorporate a greater number of NCDOT divisions, programs, sections, and units to encompass additional focus areas. The focus areas detailed in Section B include roadways, bridges, noise walls, retaining walls, roadside environment and landscape, bicycle and pedestrian infrastructure, scenic byways, and public art. Each focus area chapter provides technical details of the focus area, existing policies and procedures, planning process and coordination, tier approach, and the incorporation of public art.

IMPLEMENTATION

Incorporation of the project context and aesthetic approaches is important for implementation of this Manual and its principles but also requires specific strategies on a project-by-project basis. NCDOT's Technical Services Division, Division of Highways, and Division of Bicycle and Pedestrian Transportation are responsible for integrating updates and expanding respective focus areas in future iterations of this Manual. It is recommended the Division of Transit and other applicable NCDOT divisions, units, groups, or sections are incorporated as this Manual evolves.

The following strategies are recommended as action items and guidance improvements concurrent with existing NCDOT Project Development processes.

Create an aesthetic vision
At the onset of each transportation project, visual requirements and priorities should be established in coordination with NCDOT and the community or sponsor organization and consider a balance between structural requirements and aesthetic enhancements.

Integrate the aesthetic design process
The ultimate success of incorporating aesthetic considerations into the design and development of transportation facilities is through insertion early in project initiation with coordination through to project completion. It is recommended to follow the step-by-step implementation procedures as defined in this Manual, which run concurrent with standard NCDOT Project Development processes.

Make stakeholder involvement a priority
It is NCDOT's responsibility to facilitate diverse stakeholder exchanges that will offer increased input for aesthetic preferences and decisions. This includes coordination with local officials, stakeholder groups, and the public early in project initiation with coordination through to project completion. This Manual should be distributed by NCDOT to all stakeholders.

Identify funding opportunities
This Manual aims to provide a discussion of and processes required to incorporate aesthetics in transportation facilities. Funding for aesthetic affordances is on a case-by-case basis and subject to change. Opportunities for funding are therefore discussed broadly and it is recommended for greater specificity in further editions of this Manual to be defined by NCDOT, NCDCR, and other North Carolina legislative bodies, as applicable.

Establish maintenance agreements
Maintenance of aesthetic enhancements in NCDOT transportation facilities is the responsibility of the sponsor organization or municipality (or both) unless otherwise negotiated. It is recommended that the maintenance agreement be discussed early in the project. Finalized agreements are recommended to be made in the form of a Memorandum of Agreement or other binding documentation toward the end of project development, before construction.

Conduct an aesthetic evaluation
It is recommended that an aesthetic evaluation take place after a project has incorporated the aesthetic guidelines framed in this Manual. This is advised as a way to develop an archive of aesthetics in practice as it relates to the design and development of transportation facilities. These case studies can be used to identify gaps, evaluate the planning process, gather community opinion on the project, and help develop a catalog of effects and outcomes of aesthetics for future use.

SECTION A
FRAMEWORK

Section A includes the Manual introduction, context, basics of aesthetics, and integration of aesthetics.

"Only as an aesthetic phenomenon is the world justified."

Friedrich Nietzsche

CHAPTER 1

INTRODUCTION

"When I am working on a problem, I never think about beauty, but when I have finished, if the solution is not beautiful, I know it is wrong."

R. Buckminster Fuller

1 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) acknowledges the importance of developing an *Aesthetics Guidance Manual* (Manual) to combine aesthetic principles and procedures in the design of transportation infrastructure. This process encompasses a range of focus areas that contribute to the aesthetics of transportation facilities across the state. Focus areas are NCDOT programs, sections, and units that specialize in key transportation planning disciplines. At the date of this publication, this includes, but is not limited to, roadways, bridges, noise walls, retaining walls, roadside environment and landscape, bicycle and pedestrian infrastructure, scenic byways, and public art.

As a major destination for travel, including leisure, scenic, and business trips, tourism is a $20 billion industry in North Carolina. The connectivity among cultural, historical, and natural destinations is of great importance to NCDOT and the state's citizens, and aesthetics play an important role in the representation of these features.

Importance of Aesthetics

"To ignore aesthetics is irresponsible."
Transportation Research Board, Bridge Aesthetics Sourcebook [1]

Aesthetic Enhancement
Visual enrichment of structural and non-structural elements specific to NCDOT transportation facilities.

Improving the aesthetics of transportation facilities provides an opportunity to increase tourism through branding. Including aesthetics early in the planning process can provide cost efficiencies through integrative rather than add-on aesthetic approaches, and can improve driver awareness and safety through more stimulating highway surroundings.

Creating a reputation for the state of North Carolina as a destination may be accomplished through establishing beautiful transportation facilities that connect attractions, people, and places throughout the state.

The transportation infrastructure in North Carolina is the thread that connects all parts of the state. This image is of the I-26 Scenic Byway in western North Carolina. Image courtesy NCDOT.

Native plantings along a roaday in North Carolina's Piedmont Region. Image courtesy NCDOT.

Aesthetic enhancement is subjective, dependent largely on preference and context, but is defined here as the visual enrichment of structural and non-structural elements specific to NCDOT transportation facilities. Aesthetic value is realized subconsciously, where all structural and non-structural decisions are an aesthetic decision and affect the perception of and response to a place or community, rural or urban. The importance of incorporating aesthetics helps allow our infrastructure to be both efficient and safe while also being recognized as attractive features that respond to the environment in which they are built.

North Carolina Department of Transportation

"Connecting people and places safely and efficiently, with accountability and environmental sensitivity to enhance the economy, health and well-being of North Carolina."
The stated mission of NCDOT

NCDOT is one of North Carolina's largest state government agencies,[2] managing the state's highway, rail, aviation, ferry, bicycle, pedestrian, and public transit needs. Divided into 14 transportation divisions, each having a degree of autonomy,[3] coordination is central to the integration of aesthetic considerations. NCDOT Division of Highways is responsible for building and maintaining the second largest state-maintained highway system in the nation, incorporating over 78,615 miles of highways and 18,540 bridges collectively spanning nearly 380 miles.

Statement of Purpose and Intent

In accordance with a directive from Governor Pat McCrory, NCDOT and the North Carolina Department of Cultural Resources (NCDCR) have worked together to incorporate artistic elements into the state's transportation infrastructure and to make roads more attractive to motorized and non-motorized users. This program, titled "Art that Moves You," is a public-private partnership that focuses on the beautification of transportation infrastructure and increasing tourism through the use of creative site elements including landscaping, artwork, and lighting. As an extension of that program, and to more broadly insert aesthetics into the design and development of transportation facilities, NCDOT has interest in guidelines specific to transportation aesthetics.

The guidelines described herein serve as NCDOT's *Aesthetics Guidance Manual* with the objective to promote the importance of and provide guidance for the visual fit between transportation projects and the surroundings in rural, suburban, or urban settings. This Manual serves as a series of guidelines rather than a prescriptive set of mandates, and is intended to be regularly updated based on new procedures and/or objectives.

The following should be considered when proceeding with the incorporation of aesthetics in transportation facilities: All federally-funded and federally-permitted projects are subject to Section 106 of the National Historic Preservation Act.[4] It is advised that Section 106 resources should integrate with aesthetics processes, and appropriate stakeholders should be involved in aesthetic developments. This Manual does not focus on the evaluation of commissioned art as the North Carolina Public Art on the Right-of-Way (ROW) Policy provides that process. However, stand-alone sculptural artworks integrated into the site serving as gateway features are addressed in Chapter 13.

Advertisements

At the date of this publication, outdoor advertising erected or maintained adjacent to the ROW of the interstate or primary highway system or any outdoor advertising maintained without a permit is considered illegal according to the NCDOT *Logo Signing Manual*.[5] Businesses that have an expressed interest in outdoor advertising are also prohibited from displaying corporate logos or signage along NCDOT roadway systems unless a permit has been granted. The NCDOT *Logo Signing Manual* (upon request) should be consulted for detailed information.

Funding and Maintenance

See Section C for a high level discussion of implementation strategies, including funding and maintenance requirements or opportunities. These are important factors in the success of incorporating aesthetics into transportation projects but vary considerably on a project-by-project basis, requiring greater specificity than what is defined in this Manual.

I-85/US 52 historic bridge across the Yadkin River, North Carolina. Image courtesy NCDOT.

FORMAT AND USE OF GUIDELINES

This Manual is intended for use by NCDOT staff, municipalities, public and private organizations and companies, and the citizens of North Carolina. Those involved in the planning and development of transportation facilities at all levels of decision making are encouraged to use this Manual as a guideline when incorporating aesthetics into NCDOT transportation projects.

Section A | Framework

This Manual is organized to be read collectively and as individual sections. Chapters 1 through 4 are contained within Section A and are applicable to all stakeholders and NCDOT projects that incorporate aesthetics into the planning process. These chapters set the framework for this Manual and should be read and referenced in conjunction with the remaining chapters.

Chapter 1|Introduction
Provides an introduction to this Manual, including the purpose, intent, and methodology.

Chapter 2|Context
Offers background on NCDOT and the context of North Carolina's state regions, including the cultural, historical, natural, and visual resources that exist within the state.

Chapter 3|Basics of Aesthetics
Includes the basic tenets for aesthetic design and visual design principles. Visual resource management is covered and focuses on aesthetic viewsheds. A tier approach is used as an organizing principle of aesthetics in transportation facilities and to define how aesthetic design principles are applied along transportation corridors. Existing policies, procedures, and best practices offer examples and additional guidance for applying recommendations in this Manual.

Chapter 4|Integration of Guidelines
Focuses on contextualizing proposed aesthetic guidelines in the NCDOT Project Development process. This is an important chapter for all stakeholders as it describes how projects are initiated and when aesthetics can and should be introduced in the planning process. Aesthetic considerations are a part of the standard NCDOT National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA)/and Merger Process steps to streamline planning efforts.

Section B | Focus Areas

Chapters in Section B of this Manual describe the aesthetic process of individual transportation facility focus areas. The focus areas included in this Manual to date should expand to incorporate a greater number of NCDOT divisions, programs, sections, and units to encompass additional focus areas. The focus areas are intended to be read as an individual section or sections depending on application and project needs. Section B chapters include:

Chapter 5|Introduction
Provides a brief overview of resources specific to the focus areas described throughout the section.

Chapter 6|Focus Area|Roadways
Includes all roadways and roadway systems throughout North Carolina.

Chapter 7|Focus Area|Bridges
Includes all NCDOT bridges across the state that traverse natural obstacles such as steep topography, rivers, creeks, lakes, and human-made obstacles such as other roads and developments.

Chapter 8|Focus Area|Noise Walls
Includes a type of freestanding wall installed where traffic noise exceeds or is expected to exceed established threshold levels.

Chapter 9|Focus Area|Retaining Walls
Includes walls that minimize impacts to existing natural and human-made resources along roadway systems.

Chapter 10|Focus Area|Roadside Environment and Landscape
Includes landscape plantings within NCDOT ROWs.

Chapter 11 | Focus Area | Bicycle and Pedestrian Infrastructure
Includes the integration of bicycle and pedestrian systems into the overall transportation network across North Carolina.

Chapter 12|Focus Area|Scenic Byways
Includes nationally and state designated scenic byways.

Chapter 13|Focus Area|Public Art
Includes public art in NCDOT ROWs.

Section C | Implementation

Chapter 14|Strategies for Implementation
Details strategies that can be used for implementing aesthetics into NCDOT transportation facilities.

Appendices

Appendix A: Bibliography

Appendix B: Glossary of Terms

Appendix C: Statewide Planning Processes.

Appendix D: Artist Selection Process

Pattern Book

In addition to this Manual, the *Pattern Book for Transportation Aesthetics* provides examples of possible approaches for improving the visual quality of NCDOT transportation projects. The Pattern Book includes photographs, plans, and drawings of various design elements organized according to the tier approach (as described in Section A of this Manual).

Use of Guidelines

The recommended approach for users of this Manual is to read through Section A and Section C in their entirety to familiarize themselves with the function and scope of this Manual. These chapters directly complement the focus area chapters (Section B) and should be read in tandem as applicable to specific NCDOT project(s) being implemented. In combination, these sections provide a common language to effectively communicate aesthetics concepts, definitions, and processes.

The ultimate success of this Manual is dependent on coordination at all levels of NCDOT and with applicable stakeholders, both public and private. The practices proposed in this Manual were designed with the intent to be efficient and effective in order for aesthetic considerations to be included in NCDOT transportation facility projects.

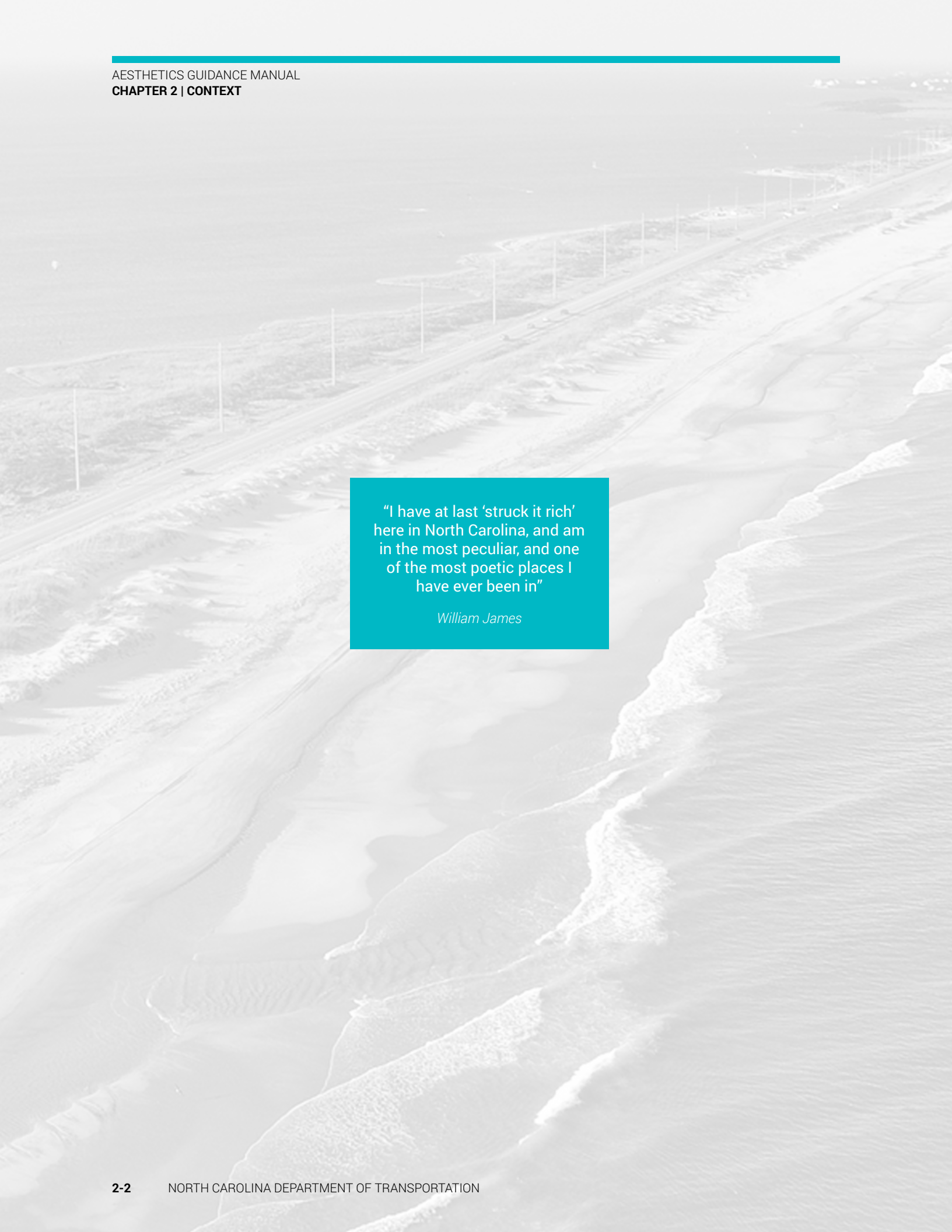
North Carolina's wildflower program has had a significant impact on the visual character of roadways across the state. Image courtesy NCDOT.

"North Carolina is more than a collection of people. We are one state, one people, one family, bound by a common concern for each other."

Michael F. Easley

CHAPTER 2

CONTEXT



"I have at last 'struck it rich' here in North Carolina, and am in the most peculiar, and one of the most poetic places I have ever been in"

William James

2 CONTEXT

The aesthetic context for the purposes of this Manual includes, but is not limited to, cultural, historical, and natural resources, roadway networks, and land use and urban form. These contextual factors can contribute to the visual qualities of aesthetics for self-contained project(s) or element(s) of a project(s) and for the surrounding environment of a project(s). Incorporating context into the process and design of transportation facilities improves the way in which our infrastructure reflects past and present conditions of an area.

NORTH CAROLINA STATE REGIONS

The cultural, historical, natural, and visual resources within North Carolina contribute directly to aesthetics representative of the state. With a rich history spanning over 14,000 years,[6] including key events in America's historical timeline, these culturally and historically significant activities have great importance. These histories have spanned across North Carolina's diverse landscape from the mountains in the west, rolling hills in the central part of the state, to coastal plains along the eastern coast. North Carolina is largely defined culturally, historically, and geographically according to three major physiographic regions. These landscapes are defined[7] as the Mountain Region, the Piedmont Region, and the Coastal Plain Region. This Manual uses these regional classifications as one of the organizing principles for defining aesthetic considerations.

Mountain Region

The Mountain Region is located in the western part of North Carolina where elevations may reach over 5,000 feet. Mountain ranges in this region include the Great Smoky Mountains, the Blue Ridge Mountains, and the Brushy Mountains. Among these peaks, 82 rise between 5,000 and 6,000 feet in elevation and 43 peaks rise over 6,000 feet.[8] Mount Mitchell, at an elevation of 6,684 feet, is the tallest point east of the Mississippi River.

The northern counties in the Mountain Region are commonly known as the state's High Country because of the rugged, mountainous terrain.

North Carolina's physiographic regions. Mountain Region - tan, left; Piedmont Region - green, center; Coastal Plain Region, blue, right. Image courtesy North Carolina Public Schools.

Blue Ridge Mountains, North Carolina. Image courtesy NCDOT.

Saluda, North Carolina. Image courtesy AECOM.

Roadway through the Mountain Region in North Carolina. Image courtesy NCDOT.

Asheville is the major urban area in the region, and there are many small towns scattered throughout the foothills. The region includes ski resorts, public recreation areas, historical sites, and landmark geological formations.

The Mountain Region lies within the Appalachian-Blue Ridge forests ecoregion, with two-thirds covered in hardwood forests that contain more than 120 species of trees.[9] As part of the Tennessee Valley, the transitional terrain between the Piedmont Region and the Appalachian Mountains is known as the foothills, with numerous lower peaks and isolated mountain ranges divided into small river and creek valleys.[10] This region has a variety of rock resources because of the diverse rock types. Sedimentary rock resources include limestone, sandstone, and dolomite, while metamorphic rock resources include argillite, gneiss, marble, quartzite, schist, and slate. Igneous rocks such as granite are also quarried.[11]

Mountain Region Aesthetic Considerations

The Mountain Region has diverse elevation changes that are distinct visually. Proposed color profiles can vary greatly given the diverse color landscape of the region but should generally reflect the earth tones of the surrounding area. Color should be consistent with the surroundings, reflecting earth tones and monochromatic schemes that blend with the blues and greens of the mountains.

The topography of the mountains combined with heavily forested areas offer pronounced aesthetic qualities. Strong horizontal lines contrast with existing terrain and vegetation, while vertical elements accentuate the changes in elevation. Aesthetic elements incorporated into the roadway should reflect the context by offering either visual diversity or continuity. Transportation facilities also should keep with the community character. With a strong history in the arts, a number of towns offer robust and vibrant art initiatives that can be

incorporated into transportation projects within the region. Given the diversity of the Mountain Region's cultural and natural environment, there are a variety of opportunities for aesthetic influences.

Piedmont Region

The Piedmont Region is located in central North Carolina between the Coastal Plain to the east and the Mountain Region to the west. Meaning "foot of the mountain" in French, the Piedmont plateau consists of gently rolling foothills with occasional rock outcroppings. The region contains the state's largest cities and biggest financial institutions.[12] Isolated mountain ranges are scattered along the western part of the region; however, few reach over 1,200 feet in elevation. The region is part of the Southeastern mixed forests ecoregion and has many significant woodland areas.[13]

Along the fall line that separates the Piedmont Region from the Coastal Plain Region are rivers that flow from the older, harder rocks of the Piedmont to the softer substrates of the Coastal Plain. Above the fall line, streams are rocky and shallow.[14] The Piedmont Region consists of an assortment of sedimentary and metamorphic rocks, cut by igneous intrusions. Deep weathering and soil formation in the area yields clay, sand, and gravel. Igneous rocks such as granite are also quarried.[15] Along the fall line, rivers form shoals, low waterfalls, and rapids. Below the fall line, streams are sluggish and smooth-flowing.

Image of Raleigh, North Carolina skyline. Image courtesy Flickr Creative Commons.

Tobacco is one of the most common crops in the Piedmont Region, North Carolina. Image courtesy NCDOT.

Vineyards in the Piedmont Region, North Carolina. Image courtesy AECOM.

Image of the rolling terrain in the Piedmont Region. Image courtesy NCDOT.

Piedmont Region Aesthetic Considerations

Aesthetically, the Piedmont Region has rolling hills and landscapes that are more subtle visually. Color profiles are muted overall. Vibrant colors may be used to define visual focal points. To emphasize context sensitivity of the Piedmont Region, minimizing the visual impact by using muted earth tones of browns and grays, with selected vibrant colors that serve to emphasize key aesthetic elements, is recommended.

The refined Piedmont landscape should be reflected in the design elements of transportation facilities through the use of strong, simple lines and forms that are integrated into the surroundings. Large-scale infrastructure such as bridges or noise walls should be primarily horizontal in nature unless strong vertical elements are desired to be a part of the overall aesthetic design.

In many of the urban areas throughout the Piedmont Region, there is an opportunity for more variety and creativity in the development of transportation facilities due to the density and scale of visual elements in these more urban areas. The incorporation of public art, decorative patterns, and vibrant colors could have applications in specific contexts and can help define and/or reflect the character of a community. Community gateways and other important community features should also be highlighted.

Coastal Plain Region

The Coastal Plain Region consists of the low flatland that stretches for nearly 300 miles along the Atlantic Ocean in the easternmost part of North Carolina. Divided into the Outer Coastal Plain and the Inner Coastal Plain, the region contains not only barrier islands and coastal areas but also numerous marshlands, rivers, and swamplands.

The Outer Coastal Plain is made up of barrier islands known as the Outer Banks and the Tidewater region. The Outer Banks are highly dynamic barrier islands that stretch more than 175 miles along the coast and are separated from the mainland by sounds or inlets. Barrier islands are low sandy islands extending along the coast that are easily affected by wind, tides, and currents that protect the mainland from those forces. Sandy overwash areas of the Outer Banks and the Tidewater (water brought or affected by tides) along the coast are closest to sea level.[16] The Inner Coastal Plain is a higher, drier area extending from the Tidewater region to the fault line that defines the western edge of the Piedmont Region.

Lighthouse on the Outer Banks, North Carolina. Image courtesy NCDOT.

Eastern coast of North Carolina. Image courtesy NCDOT.

Native grass and non-native turf in the backdrop on Brunswick Island, coastal North Carolina. Image courtesy NCDOT.

Sand crane along the coast in North Carolina. Image courtesy James Sipes.

A marsh in the Coastal Plain Region of North Carolina. Image courtesy FHWA.

The Coastal Plain is covered by thick pine and evergreen forests and is part of the Middle Atlantic coastal forests ecoregion. Elevations range from sea level to 1,000 feet above sea level at the Tidewater region.[17]

Coastal Plain Region Aesthetic Considerations

Visually, the Coastal Plain is relatively flat. Color profiles are typically earth tones, consisting primarily of light browns and grays, with blues and greens representative of the water and plant materials. Color palettes may vary depending upon whether the focus is to emphasize the characteristics of the coastal or waterfront areas or to provide contrast to the landscape. Generally, structures should be subdued (earth tones) with darker colors as highlights in order to reduce driver distraction. Components central to the transportation facility may be highlighted using the blues and greens characteristic of the area.

Transportation facilities intended to fit into the surrounding landscape(s) should reflect the immediate flat and horizontal environment. If iconic structures are desired, structures may be tall or vertical to contrast with the surroundings. Bridges in particular offer opportunities for strong visual or tall vertical elements. Typically, bridges are elevated in order to provide sufficient clearance over rivers, streams, and inlets. Large-scale infrastructure such as noise walls also provide opportunities for integrative aesthetic elements that either blend into or create a visual statement to the surrounding environment.

ROADWAY NETWORK

Streets and highways provide connectivity within and between urban and rural areas and are classified by the Federal Highway Administration (FHWA) into three distinct categories according to character of service they are intended to provide. These systems include arterials, collectors, and local roads. Land access (both existing and future) and roadway mobility provide the basis for the classifications, which range from expressways to local roads.

Classifying roadway systems in this way offers commonality of language among stakeholders involved in the development process when planning transportation systems and facilities. Identifying the function of different systems also offers more in-depth studies of the context of that roadway. This allows for more specific transportation upgrades to be determined for increased efficiency, context-specific needs, and aesthetic considerations.

LAND USE DEVELOPMENT

Land use provides a foundation for development activities and defines a community's growth patterns, strongly influencing the visual impacts of the area. The interconnectivity among the demand for land use, design of the urban form, and supply of the transportation network are important for the sustainable development of towns and regions.

Land Use and Urban Form

Land use and urban form are critical elements of development. Land use defines a jurisdiction's planning area and guides the mix, type, structure, and uses as well as the density allowed within a variety of land classifications. Future land use needs are primarily defined in an area's comprehensive plan, which focuses on the vision of a community or region and how they want to grow, allowing for a more cohesive built and natural environment. This vision of future land use directs the urban form of an area. The urban form is the physical shape and structure of the built environment, defined through block lengths, building heights, street grids, and urban, suburban, and rural densities. The urban form is important to provide consistency to the spaces and boundaries of a planning area both structurally and aesthetically.

The interaction of land use and the design of transportation facilities greatly influence urban form and the character of a community. Aesthetic enhancements provide increased opportunities to improve the character and visual environment.

Urban Form and Travel Behavior

The urban form defines the built and natural environment, developed on the foundation of the community's land use. The importance of this relationship influences travel behavior through and within a planning area, affecting the attractiveness,

Mixed use neighborhood that supports multimodal travel in Oregon. Image courtesy Oregon Department of Transportation.

The "urban to rural transect," which identifies land use conditions from rural, suburban, to urban environments. Image courtesy Andres Duany, DPZ.

efficiency, environment, and safety of travel. Land use planning focuses on the physical layout of communities and has a major impact on growth patterns and level of density. NCDOT supports the integration of land use and transportation planning as it may reduce the strain on human-made and natural environments, offering protection of the visual resources throughout North Carolina. Three broad categories of land use types currently exist within North Carolina – urban, suburban, and rural.[18]

Urban Areas

Areas that generally represent a heavy mix of residential, commercial, industrial, and civic activity for a region. Development is dense with a mix of uses. Within urban areas, the intensity of land use often decreases with distance from the urban core. Open areas exist but are generally limited to parks, school playgrounds, or large lawns or wooded areas associated with institutional sites. Common elements include a high level of pedestrian interaction, bicycle activity, and availability of transit.[19]

Suburban Areas

Areas characterized by natural areas, agricultural uses, and limited development, except in towns, villages, or crossroads. Rural areas are distinguished from other area types by their separation from other developed areas.[20]

Rural Areas

Areas characterized by natural areas, agricultural uses, and limited development, except in towns, villages, or crossroads. Rural areas are distinguished from other area types by their separation from other developed areas.[21]

Incompatible land use between a housing estate and a factory in Peterhead, Australia. Image courtesy Flickr Creative Commons.

Mixed use neighborhood in an urban area. Image courtesy AECOM.

"Design can be art.
Design can be aesthetics.
Design is so simple, that's
why it is so complicated."

Paul Rand

CHAPTER 3

BASICS OF AESTHETICS

"Art is the imposing of a pattern on experience, and our aesthetic enjoyment is recognition of the pattern."

Alfred North Whitehead

3 BASICS OF AESTHETICS

The basic tenet of aesthetic design is to create a setting in which the elements of design (line, shape, form, texture, and color) are in harmony with one another. A transportation corridor is a combination of structures and facilities, each with its own purpose and function. Achieving visual harmony requires an understanding of both how the elements of design influence the appearance of each individual structure and the composition of a visually appealing transportation system.[22]

This Manual focuses on consistency and continuity, not uniformity. Design guidelines cannot anticipate every potential project that may arise, so each project needs to be reviewed on a case-by-case basis for aesthetics to be adequately addressed.

The basics of aesthetics in this Manual are not meant to be prescriptive, but to allow for a range of design solutions to help improve aesthetics along North Carolina's transportation facilities.

BASICS OF AESTHETICS

Visual Design Elements

The visual design elements of line, shape, form, texture, and color collectively establish the visual framework and most directly affect perceptions of transportation facilities and the surrounding environment.

Visual Design Element
Establishes the visual framework and categorizes mass and space.

These are tangible elements to the human eye and categorize mass and space in any arrangement or quantity. One or more elements may dominate, but a harmonious composition leads to a successful series of visual design elements.

The Haines Highway, in Haynes, Alaska, is a State Scenic Byway. Image courtesy Lori Stepansky.

The strong, simple lines of this bridge create a visual focal point. Image courtesy Depositphotos.com.

Line

Line is a direct connection between two points and is related to eye movement or flow. Lines visible in the natural landscape include the edges of trees, rivers, landforms, and mountains. Human-made lines on the landscape may include roads, fences, signs, walls, and the outlines of structures. Lines that are long and straight tend to dominate natural settings that consist of predominantly short line segments. Vertical and horizontal lines are considered formal and stable, oblique lines are considered dynamic, and curved lines can be considered dynamic or tranquil. Straight lines tend to be forceful and structural, directing the observer's eye to a point more quickly than curved lines. Curved or free-flowing lines are more organic, graceful, and calming.[23]

The curvilinear lines of planting beds are consistent with organic lines in the landscape, while straighter, more geometric lines are consistent with transportation elements such as roads and bridges. Line is also created vertically by changes in plant height and the height of tree and shrub canopies.[24]

Shape

Shape is defined as a two-dimensional surface delineated by a series of lines that enclose an area. Shape implies spatial form and has height and width, but no depth. Shapes are often the silhouette or simplified representation of what is actually a three-dimensional form, but seen without depth. The lines of a wall, abutment, road edge, sign, or decorative detail combine to create the appearance of shapes.[25]

The jagged, uneven top of this noise wall is visually distracting and overly complex. Image courtesy FHWA.

Form

Form reveals objects in three dimension, adding depth to the height and width of a specific shape. The visual experience of moving through the landscape, over or under a bridge, or along a roadway is greatly influenced by forms of the physical elements that define context. Form is primarily revealed as volumes modeled in light and shadow. A shadow line helps delineate a form or surface and makes them more pronounced. Line and form are closely related. Line is considered usually in terms of the outline or edge of objects, whereas form is more encompassing.[26]

Texture

Texture describes the surface quality of an object than can be seen or felt. Texture helps define form through subtle surface variations and shadings. It can be used to soften or reduce imposing scale, add visual interest, and introduce human scale to large objects such as piers, abutments, and tall retaining walls. Distance alters our perception of texture. When viewed from a distance, fine textures blend into a single tone and appear flat. As a rule, the greater the distance or the larger the object, the coarser or larger the texture should be.[27]

Color

Color can be applied to accentuate, clarify, define, modify, or reduce the visual effects of structural elements. Primary colors are red, blue, and yellow. Orange, green, and violet are secondary colors because they are created by combining two primary colors. Tertiary colors are the fusion of one primary and one secondary color.

Warm colors (reds, yellows, browns, and light tints) tend to emphasize the presence and size of forms, advancing a shape or form object or area toward the observer. Cool colors (blues, greens, purples, and deep shades) diminish the visual importance of elements to which they are applied, making objects appear farther away. Warm colors express action while cool colors are restful. [28] Intensity of color can reverse the effects just noted. Black, white, and grey are neutrals and are compatible with any color. Light colors and tints tend to attract attention as do bright, vivid colors.[29]

Colors are combined into color schemes for practical applications. The three basic color schemes are monochromatic, analogous, and complementary. A monochromatic color scheme consists of different tints and shades of one color.

The curvilinear lines along the plant massing contrasts well with surrounding road geometry. Image courtesy NCDOT.

Analogous color schemes combine colors that are adjacent or side-by-side on the color wheel. Complementary color schemes combine colors directly across the color wheel. [30]

Color is a strong visual element that can be used to create focal points or to visually change distance perspective. The strongest use of color by NCDOT is in the use of large masses of wildflowers within ROWs.

Visual Design Principles

Visual design principles are formed from the relationships of visual design elements, building on each other and interacting to influence how a space or sequence of spaces is experienced.

Visual Design Principles
Influence how a space or sequences of spaces are experienced and are formed from the relationship of visual design elements.

These principles are intangible, perceived qualities and consist of order, proportion, rhythm, harmony, balance, contrast, scale, unity, transition, repetition, and simplicity.

Order

Order refers to the arrangement of components so that they work together as a unit without visual confusion. Components should appear to be in their proper place and function appropriately. For example, order in bridge design is achieved through consistent lines and edges of a structure in a variety of directions.[31]

Proportion

Proportion is the relationship of two or more elements in a design and how they compare with one another. Proportion helps define the relationship between structural components and suggests a level of importance. Elements are said to be in proportion if the visual relationship between the two is harmonious or consistent.[32] In design, the most obvious proportional relationships are based on relative size and shape of the elements. For example, a 20-foot noise wall may visually be proportionate to its surroundings in an urban area with buildings located along the edge of a ROW, but would be visually overwhelming in a rural area.

Rhythm

Rhythm is the regular recurrence of similar design elements. The placement of an element creates the feeling of visual movement. Thoughtful use of rhythm can be used to provide a sense of order and reinforce a driver's understanding of the roadway system. Rhythm reduces confusion in a design and helps lead to a more visually consistent solution.[33] With bridges, rhythms are created by the repetition of similar pier shapes, the spacing of light poles, or post spacing for railings. Trees and other landscape material massings that are evenly spaced can also create rhythm.

Harmony

Harmony is the complementary relationship of similar or identical components. Harmony may be perceived or created in a structure or composition of structures that attains order through the repetition of the same elements, forms, or spaces.[34]

The use of native stones, a low horizontal design, and subdued colors help to visually integrate this bridge in New Mexico into the surrounding landscape. Image courtesy EDAW.

Balance

Balance in design refers to the equilibrium or equality of visual attraction. This includes their relationship to one another and to a central focal point. Symmetrical balance is achieved when one side of the design is a mirror image of the other.[35] With asymmetrical balance, design elements on one side of a design are different than the design elements of the other side, yet the elements are arranged so that there is a sense of balance. Rather than a physical balance, it may also refer to equilibrium of abstract elements of the design such as masses, visual weights, texture, etc. Visual balance is fundamental to all successful compositions.[36]

Contrast

Contrast is the relationship of complementary, opposing design elements. Contrast can relieve monotony and bring a heightened awareness of the elements. Where two dominating components exist, one should be primary and the other supporting.[37] In terms of design, a dominant theme is essential in organizing the design into a pleasing aesthetic experience.[38]

Scale

Scale refers to the size of features in relationship to one another, to a specific structure, and to its surroundings. Size refers to definite measurements, while scale describes the size relationship. The scale of a structure to its surroundings increases in importance based on the speed at which facilities are viewed. We often refer to structures that respond to the size of the human form as having human scale. This is particularly true for a pedestrian bridge, trail, or walkway.[39]

Unity

Unity gives the viewer a sense of completeness as the structure and corridor appropriately apply to all the previous aesthetic qualities. Unity implies harmony where all of the elements are in accord, producing an undivided total effect. Unity provides the observer with the sense that all pieces fit together seamlessly. Unity is emphasized by consistency of character between units in the landscape.[40]

Transition

Transition involves the gradual change from one design element or arrangement to another. Transition can be obtained by the arrangement of objects with varying textures, forms, or sizes in a logical sequential order. Transitioning from a tall vertical element such as a noise wall to a horizontal space such as a grassy area can be accomplished by using retaining walls or plant material that step down in size. An unlimited number of schemes exist by combining elements of various size, form, texture, and color to create transition.[41]

Repetition

Repetition refers to the repeated use of lines, forms, patterns, textures, colors, or other visual characteristics. Too much repetition creates monotony but when used effectively can lead to rhythm, focalization, or emphasis.[42]

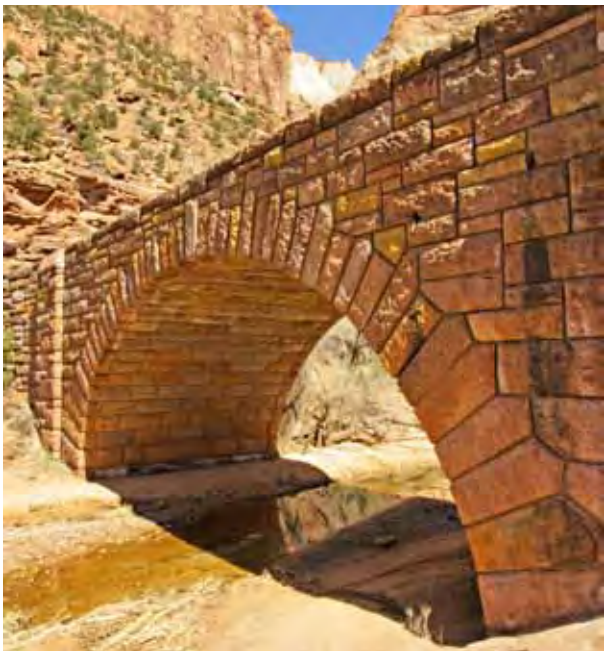
Simplicity

Simplicity goes hand-in-hand with repetition and can be achieved by the elimination of unnecessary detail. Too much variety or detail creates confusion of perception. Simplicity is the reduction of a design to its simplest, functional form.[43]

The white railings on the Historic Columbia River Highway in Oregon create a rhythmic pattern. Image courtesy Dennis Adams.

Changes in color of this wall disrupt the overall visual unity. Image courtesy FHWA.

The strong lines of the roadway and pulloff along the Blue Ridge Parkway in North Carolina define views of the background. Image courtesy Flickr Creative Commons.



The color, texture, and form of this bridge help it blend into the background. Image acquired from DepositPhotos.com.

VISUAL MANAGEMENT

The aesthetic character of a transportation facility is dependent in larger part on how the facility is viewed. Visual sensitivity, defined here as the visual perception of tangible, aesthetic, or structural features, contributes to both positive and negative perceptions of transportation facilities.

Visual Sensitivity
Visual perception of tangible, aesthetic, or structural features.

A planning process that incorporates aesthetic considerations can manage these visual perceptions. Design alternatives are important and should identify aesthetic effects and consider views from and toward the road. Through appropriate assessment of the roadway corridor, the visual focus can be properly managed.

Identify Aesthetic Effects

The first step in defining visual sensitivity is to determine the existing and potential future aesthetics of the surrounding project area. This can include establishing the visual environment, assessing visual resources, and identifying viewer response to resources.[44] A visual baseline can be formed from this analysis, providing a project team with the existing visual resources and experience that will impact the type and scale of aesthetic considerations.

The *Guidelines for the Visual Impact Assessment of Highway Projects*[45] by FHWA provides a good resource for how to analyze visual resources in relationship to transportation facilities. These considerations are defined below and are recommended when visual resources are evaluated, as applicable to the project needs and timeline.

Establish the visual environment[46]

Define the *viewshed* of the project (the surrounding area visible from the project and the areas from which the project can be seen, defined through a set of viewpoints or series of viewpoints). If the project area is large in scale, the viewshed may be divided into subareas with distinctive visual or geographic characteristics, called *landscape units*.

Assess visual resources[47]

Identify existing *visual resources* (natural or man-made features that are dominate in the viewshed). The *visual character* can be described based on the identified landscape units and the respective visual design elements (line, shape, form, texture, color) of those units, individually and collectively. Relationships between the visual character of landscape units can be defined by dominance, diversity, and/or continuity. The type of visual impact can be expressed by *visual quality* (the overall distinctiveness of the project area). Generally, the term is defined by vividness, intactness, and unity.

Identify viewer response to resources[48]

Viewers of a project are those groups who are in the viewshed of the proposed project, either with views of the project or from the project. *Viewer exposure* is the physical location, size, and duration of the viewer group. The types of viewers and viewer exposure comprise the *viewer sensitivity* (the visual preference affected by culture, environment, or history). This is considered a "variable receptivity" to the visible environment.

Viewer response is an important element to consider during the design and development of transportation facilities. The following is a discussion of factors to consider when assessing the aesthetic effects of a transportation project.

View from the road: The view from the road is the viewpoint of motorists traveling down the roadway. Motorists are concerned about visibility within and adjacent to the ROW at high speed. At such rates, drivers see basic forms, shapes, and colors but do not see textures or fine level details. It is recommended that aesthetic considerations avoid monotonous elements along the roadway and focus on creating stimulating transportation facilities for motorists.

Visual sensitivity depends on the number and type of viewers and the frequency and duration of views. Although there may be a large number of motorists on a road, sensitivity tends to be lower for views seen by people driving to and from work or as part of their work. Commuters and non-recreational travelers generally have fleeting views and tend to focus on commuter traffic, not on surrounding scenery. Alternatively, driving for pleasure is a major recreational activity along alternate travel routes that portray the beauty and culture of North Carolina. Viewers using these scenic highways and scenic overlooks have a high visual sensitivity.

View toward the road: For those with views toward the road, such as neighboring land owners/users and the general public, the view is typically more static. Visual resources can have

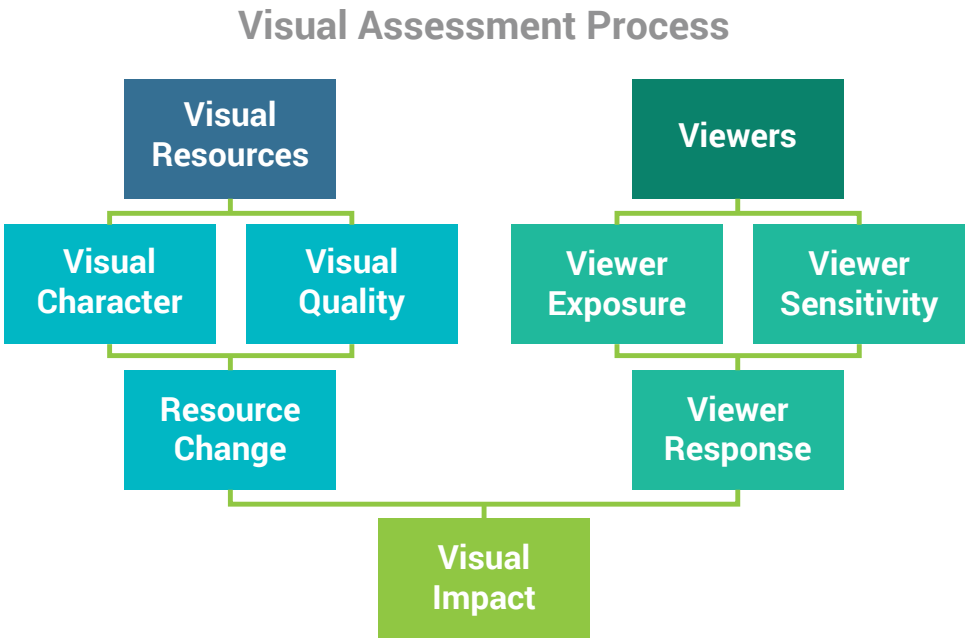


Diagram sourced from FHWA's "Visual Impact Assessment for Highway Projects," guidance for visual impacts in environmental assessments or impact statements for highway projects.

a greater impact because of the longevity of the view. Ideally, a well-designed road fits contextually with the surrounding landscape because its design reflects the focus of community preferences and regional planning efforts. Well-designed transportation facilities are perceived positively. Negative visual impacts to viewers of the road are usually longer lasting than views from the road, so they may be given greater consideration. In residential areas it may be desirable to restrict views toward and from the road through screening from adjacent land uses. Alternatively, in office, commercial, institutional, or industrial zones, maintaining views to and from properties becomes important for advertising.[49]

Foreground, middle-ground, and background: The proximity of a viewer to elements also has a significant impact on the level of detail perceived and the potential impact of visual resources (both for views "of" and "toward" the road).

The viewshed in an urban landscape tends to be controlled. Panoramic views in urban settings are most likely associated with high bridge structures or roads that ascend major topographic features.

The view from the road is dominated by the travel lane and vertical elements that are dominant in the background. Image courtesy James Sipes.

In views of the road, the travel lanes are part of the visual landscape. The more they fit the scene the more the landscape is considered to be scenic. Image courtesy NCDOT.

Viewsheds in rural areas may have less constraining elements, where trees or other vegetation are exceptions. Criteria that may be used to select a key view location include visibility of the project area from the viewpoint, frequency and duration of the public viewing time, and the similarity of the view to a larger portion of the project. The level of visibility is typically defined in terms of viewsheds that are categorized as being foreground, middle-ground, or background.

Foreground: Viewers experiencing the roadway from the foreground perspective can perceive details such as forms, lines, and colors up to a one-quarter mile distance from the viewer. Changes in the landscape view are most significant within the foreground view because they are most immediate to the viewpoint. This is the zone that can be most easily manipulated and improved. Most of the work done by NCDOT is typically in the foreground viewsheds within the ROW. Areas outside the ROW can also be within the foreground viewshed, but since these areas are not within the purview of NCDOT they are not applicable with regard to this Manual.

Middle-ground: Viewers experiencing the roadway from the middle-ground perspective can perceive details such as forms, lines, and colors in masses. The viewshed is typically located from a one-quarter mile to a three mile distance.

Background: Viewers experiencing the roadway from the background perspective are noticing details beyond the middle-ground extending to the horizon or limit of the area that is seen. The viewer can perceive broad forms, lines, wide valleys, distant hills, and mountains.[50]

I-26 in Madison County, North Carolina, dominates the foreground as motorists pass. Image courtesy NCDOT.

Create an Aesthetic Guideline

A successful aesthetic guideline is developed by combining visual design elements and visual design principles. These elements (tangible elements of mass and space) and principles (intangible, perceived qualities) create a series of tenets to help direct the focus of aesthetic decisions and allow for a more cohesive decision-making process.

Aesthetic Guidelines
A series of tenets to help direct the focus of aesthetic decisions and allow for a more cohesive decision-making process.

Establishing aesthetic goals and objectives for a transportation facility will help guide the overall visual design of the final project and may include, but should not be limited to, simplicity and continuity, order and balance, scale and proportion, design for navigation, and/or functional clarity.

Types of Aesthetic Guidelines

Simplicity and continuity

Simplicity and continuity is the use of lean lines, simple form, and uncomplicated patterns to create designs that are visually attractive. Overly complex designs can appear visually distracting and overwhelming. Forms and shapes should be visually related and the number of materials, colors, and textures should be as few as needed. Details should be consistent. No single element should dominate. A consistent visual theme or approach should be maintained.[51]

Order and balance

Highway facilities should appear to naturally progress. Balance between repetition or alternation of elements creates rhythm. Aligning a structure's components promotes harmony. The corridor reveals a sequence of visual experiences over time. Visual chaos of a poorly designed freeway has safety hazard potential.[52]

Scale and proportion

Generally, no single element should dominate a visual composition. The structure's form should have a light appearance that is in scale with the site and other parts of the structure. Aesthetic treatments are limited to areas of the greatest visual impact.[53]

Design principles that help "read the roadway"

Focus should be placed on the use of aesthetics that support the motorist's ability to "read the roadway" and navigate the highway system. Treatments provide users with a clear picture of what is going on around them and what decisions are expected of them. Key facility components are highlighted. Aesthetics work toward reducing stress on drivers that can result from driving in a complex environment or navigating an unfamiliar roadway.[54]

Design principles to achieve functional clarity

Functional clarity involves the use of structures and components that achieve their purpose in a straightforward, logical manner. The facilities appear to have the capacity to perform their function. Key components should have strong visual character while considering the appearance of the collective group.[55]

TIER APPROACH

Aesthetic design principles applied along North Carolina's transportation corridors vary depending upon the visual and landscape character of the corridor and its surrounding.

Visual character is based in large part on cultural and historical significance, natural resources and features, and human-made infrastructure including existing development. These factors contribute to the overall qualitative and subjective experience of an area, where aesthetics can be used to further enhance or promote the interaction with and usage of a particular area.

Landscape character is what makes an area unique by creating what is often referred to as a "sense of place," describing both how the landscape looks and how people interact with the landscape. All landscapes have value, but those with the most variety or diversity typically have the greatest visual appeal and the greatest importance to viewers. Human alterations of an environment can improve aesthetics through elements that unify the landscape while adding balance, harmony, mystery, or variety. Alternatively, character can also be lowered by human alterations through visually disruptive elements.

Basic aesthetic approaches defined according to the area in which the transportation facilities are located serve to more appropriately reflect the surrounding community and environment. A tiered approach to define aesthetic considerations is used to make the design and planning process of transportation facilities more systematic. According to the tiered approach, how an area is defined is subjective, but should aim to follow the general principles of three tiers as described below.

Tier Approach
Defines aesthetic considerations according to projects surrounding the community and environment using a tier system.

Tier 1: Standard

Areas considered standard are where the landform, rock, water, vegetation pattern, and other features have ordinary or common visual quality. Generally, these areas have positive but typical attributes with a basic variety of forms, colors, and textures normally seen throughout the characteristic landscape.

The natural features in these areas have little change in line, shape, form, texture, or color resulting in a landscape with limited variety and diversity. Rock forms and vegetation patterns of any visual consequence are often not present, and these areas generally are not of greater visual quality than other landscapes. The landscape character is often altered to some degree by human activities and lacks a sense of unity or balance. These changes to the natural landscape may not reflect the natural color, shape, edge pattern, or vegetation characteristics of the surrounding landscape.

The standard designs and practices NCDOT uses for transportation facilities are appropriate for areas in North Carolina considered standard and should be addressed using the standard approach.

Tier 2: Enhanced

Areas considered enhanced have greater visual character than standard areas and increased viewer sensitivity for cultural, historical, and natural resources.

In urban areas, enhanced areas can include gateways, historical sites, public open space, recreational areas, and other sites that have

meaning to the community. These areas are typically more visible and have some importance to the community's sense of identity. In rural areas, enhanced areas can include agricultural land, scenic landscapes, native forest lands, small communities, and other areas that include natural resources that are important to the community. Viewer sensitivity is generally higher in these areas as a result of interests in environmental protection, such as scenic byways. Any changes to an enhanced area such as the building of a transportation facility should visually integrate with the landscape and borrow much of the natural form, line, color, texture, and design principles of existing features.

Enhancements or improvements made to standard designs and practices NCDOT uses for transportation facilities should be addressed using an enhanced approach.

Tier 3: Landmark

Areas considered landmark are highly valued areas and landscapes because they have outstanding characteristics or a unique visual quality in the variety of cultural, historical, or natural forms or other features. These areas have strong, positive attributes that are relatively uncommon in a standard or enhanced environment. Areas with rich cultural or historical meaning can be addressed using a landmark approach to commemorate the important features of the area. Examples in North Carolina include, but are not limited to, Biltmore Estate, Wright Brothers National Memorial, and the Bellamy Mansion. Some landmark areas have outstanding natural features and are popular tourist attractions. The Blue Ridge Parkway along the Blue Ridge Mountains is a good example of this type of approach. The Outer Banks, Grandfather Mountain, and Great Smoky Mountains are also areas that require a greater level of aesthetic sensitivity because of their natural resources. Urban areas with great importance can also be addressed with a landmark approach to allow for continuity of the visual character of an area. These urban areas should be defined as limited or extraordinary locales with key features on a broader regional or state-wide scale.

There are two methods of designing landmark facilities, integration or highlighting the transportation facility. Focus may be placed on the integration of line, shape, form, texture, and color with that of the landscape so closely and at such a scale that features are fluidly incorporated into the environment. Alternatively, features may become a work of art that is intended to be highlighted through artful contrast and dominate structural elements. Areas that are of great cultural, historical, or natural importance should have NCDOT transportation facilities that are improved or designed in such a way that they reflect the value of the surroundings, allowing for the facility to be considered a landmark area.

Landmark or improvements made to enhanced designs and practices NCDOT uses for transportation facilities should be addressed using a landmark approach.

The design of the wood rails adds visual interest. Image courtesy NCDOT.

Historic structures are an important part of the existing culture and should be protected. Image courtesy DepositPhotos.com.

POLICIES, PROCEDURES, AND BEST PRACTICES

Policies and Procedures

A number of North Carolina policies and procedures influence how aesthetic considerations are addressed as part of the state's transportation system. Many of the documents reviewed are used by NCDOT to design and/or build transportation facilities and include some level of discussion about aesthetics. See Appendix A: Bibliography for links to the following resources.

"Art That Moves You" (presented 2014)

NCDCR partnered with NCDOT on the public-private "Art That Moves You" program. The program, which was inspired by Governor Pat McCrory, seeks to weave together public art with roads, rail, airports, and ports to promote the growth of the economy and encourage tourism. The program highlights the best of the state's art and culture and integrates it with the transportation infrastructure.[56]

Complete Streets Policy (adopted 2009)

In adopting the *Complete Streets Policy* In adopting the *Complete Streets Policy* (adopted in 2009 and published in 2010), the North Carolina Board of Transportation recognized that "transportation, quality of life, and economic development are all undeniably connected through well-planned, well-designed, and context-sensitive transportation solutions."[57] Under the *Complete Streets Policy*, NCDOT collaborates with cities, towns, and communities during the planning and design phases of new streets or improvement projects. NCDOT developed planning and design guidelines to help provide the transportation options needed to serve the community and complement the context of the area. Community enhancement, sense of place, and aesthetics are included in the Guidelines.[58]

Context Sensitive Design and Context Sensitive Solutions (2003)

The Maryland Department of Transportation, Maryland State Highway Administration, American Association of State Highway and Transportation Officials (AASHTO), and FHWA held a conference in 1998 entitled "Thinking Beyond the Pavement." This conference set out the basic concepts for *Context Sensitive Design (CSD)* and *Context Sensitive Solutions (CSS)*, which are collectively defined as "a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historical, and environmental resources, while maintaining safety and mobility."[59] NCDOT incorporates CSD and CSS in its roadway design.

North Carolina SmART Initiative (2010)

The SmART Initiative was established by NCDCR in coordination with the North Carolina Arts Council (NCAC), civic and government leaders, legislators, tourism and chamber of commerce directors, private developers, and arts leaders.

The layered vegetation along the edge of the roadway helps create a sense of space. Image courtesy NCDOT.

The initiative aims to catalyze arts-driven economic development such as creative placemaking, public art projects and programs, arts and cultural assessment inventories, potential funding sources, details on tax incentives, and models for cultural district programs.[60]

North Carolina Public Art on the Right-of-Way Policy (2011)

The policy is based on the premise that transportation facilities are enhanced by public art elements that provide aesthetic and cultural benefits to a community. The policy also integrates CSS components into the design and operation of transportation facilities across North Carolina.

Best Practices

There is no commonly accepted comprehensive planning process for how to incorporate aesthetics into the planning of transportation facilities. The reviews described below were conducted to glean how other peer states are addressing aesthetic considerations, including approach, aesthetic themes, and/or implementation.

The assessment is representative only of those states reviewed for the purposes of this Manual, as these have included discussions of aesthetics as part of broader roadway, bridge, complete streets, and landscaping considerations.

State of Nevada (2002)

Nevada adopted the *Landscape and Aesthetics Master Plan for the Nevada State Highway System*. This plan established policies, procedures, standards, and guidelines for landscape and aesthetic treatments on Nevada's roads and highways. It provides an enhanced vision for the state highway system, providing recommended policies and guiding principles, describing a three-step planning and design process, and discussing general characteristics that influence landscape and aesthetic planning and design for various classifications of highways, open space, and rest areas. The plan provides examples of varying treatments for those areas; explores alternative funding methods for program management, corridor planning, retrofitting, and maintenance; and looks at future administrative and management implications. Landscape and aesthetics corridor plans have been developed for 11 Nevada highway corridors, providing specific recommendations on implementation strategies.[61]

State of Ohio (2000)

The Ohio Department of Transportation created *Aesthetic Design Guidelines* that incorporate patterns, colors, texture, and landscaping to increase the visual appeal of highways, noise barriers, and bridges for motorists and residents. The guidelines are based on two principles: (1) The basic unit of design is the corridor, and (2) Successful projects use interdisciplinary teams.[62]

State of Texas (2012)

The Texas Department of Transportation (TDOT) addresses the visual characteristics of highways in the *Landscape and Aesthetics Design Manual*, which describes aesthetic approaches for highway design and provides general guidance on the applications. The manual includes (1) Introduction to Landscape and Aesthetics Design, (2) Assessment, Planning, and Design, (3) Project Development Process, (4) Landscape and Aesthetics Guidelines for Common Structural Elements, and (5) Landscape and Aesthetics Guidelines for Common Transportation System Features.[63]

State of Utah (2014)

The Utah Department of Transportation (UDOT) recognizes the importance of aesthetics in the overall quality of the state's highway system. As part of the commitment to "take care of what we have" and "make the system work better," UDOT has developed the *UDOT Aesthetics Guidelines.*

This document is intended to identify a vision for aesthetics on all UDOT projects, and describe how to achieve that vision through a defined process that follows established guidelines. Identifying and achieving a clear vision allows for an appropriate level of resources devoted to aesthetics on all projects.[64]

Federal Highway Administration (1988)

In 1981, the FHWA started the development of the *Visual Impact Assessment Methodology for Highway Projects* to provide guidance for analyzing and quantifying visual impacts for highway proposals.

FHWA Guidelines for the Visual Impact Assessment of Highway Projects (2015)

The most recent update of the 1988 guidance streamlines the process for conducting and writing a Visual Impact Assessment (VIA) caused as a result of potential visual impacts from a highway project. It provides a comprehensive set of guidelines for the basis of conducting a VIA, regulatory context for conducting a VIA, including the EPA's NEPA and other laws and executive orders, and an overview of the new FHWA VIA process.

The document offers relevant processes that may be used in North Carolina, including how to define the visual character of a project, visual effects of transportation projects, and ways to inventory the visual quality of an area.

Transportation Research Board (TRB) (2007)

An article titled "Aesthetics in the Landscape" was published in the TRB's *Transportation Research News* and looks at how the state of Nevada was developing a new system for including aesthetics in transportation.[65]

Blending into the background, these quaint stone bridges lend a charming atmosphere to this section of the Blue Ridge Parkway. Image courtesy FHWA.

" 'Tis the perception of the beautiful
A fine extension of the faculties,
Platonic, universal, wonderful,
Drawn from the stars, and
filtered through the skies,
Without which life would be
extremely dull."

Lord Byron

CHAPTER 4

INTEGRATION OF GUIDELINES

"A concerted effort to preserve our heritage is a vital link to our cultural, educational, aesthetic, inspirational, and economic legacies - all of the things that quite literally make us who we are.

Steve Berry

4 INTEGRATION OF GUIDELINES

INTEGRATION OF GUIDELINES INTO NCDOT PROJECT DEVELOPMENT PROCESSES

Aesthetic considerations should be concurrent with existing NCDOT Project Development processes. This includes inclusion in the design and development of transportation facilities early in the project initiation phase and continue as part of the decision-making process until project completion. Integrating aesthetics offers opportunities to promote tourism through branding of the state and its communities, achieves cost efficiencies associated with incorporating aesthetics early into project development, and improves driver awareness and safety from more stimulating visual experiences. Promoting the many appealing attractions and qualities of North Carolina is accomplished in part through upgrading the way transportation infrastructures are connected. Including these aesthetic elements as a component of the planning process can offer economic and experiential benefits.

In North Carolina, the SmART Initiative organized by NCAC and NCDCR serves as the most important program for implementation of aesthetics. Comprised of civic and government leaders, legislators, tourism and chamber of commerce directors, private developers, and arts leaders, the initiative supports arts-driven economic development such as creative placemaking and public art projects and programs. It is recommended this program be utilized at all stages of the design and development of aesthetic considerations in transportation projects.

METHODOLOGY

Recommendations to integrate aesthetics in NCDOT Project Development processes are based on extensive interviews and meetings with NCDOT division, unit, and group leaders and staff that specialize in the key focus areas,[66] NCAC, and NCDCR. The aesthetic design process as described below was developed as a result of these interviews and meetings, relevant policies and procedures currently used in North Carolina, and aesthetic approaches of peer states. The recommended aesthetic design process is concurrent with existing and standard NCDOT NEPA/SEPA/and Merger Process steps and is specific to retrofit and State Transportation Improvement Program (STIP) transportation facility projects. This allows for a streamlined planning effort for maximum efficiency and effectiveness while maintaining compliance with federal and state laws and regulations.

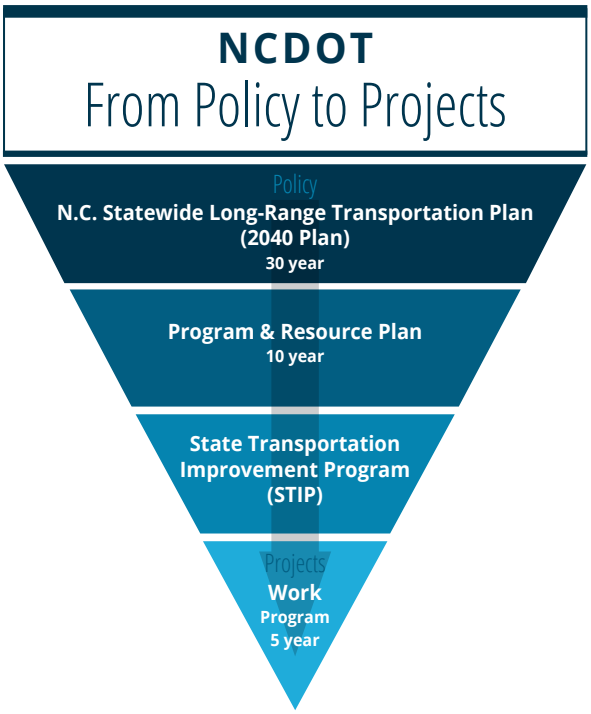
Step-by-step implementation procedures have been developed to define the integration process and responsible parties. The procedures are organized as three phases, each representing a different time frame in the NCDOT planning process. Phase One focuses on project initiation, Phase Two details the focus area review, and Phase Three concentrates on project finalization and implementation. Phase One and Phase Three are applicable to all NCDOT projects, including retrofit and STIP projects that will include aesthetic considerations. Phase Two details focus area types and includes an aesthetic design process with step-by-step implementation procedures.

American Tobacco Trail's I-40 pedestrian bridge in Durham, North Carolina. Image courtesy NCDOT.

Incorporating Aesthetics into Broader Planning Frameworks

To fully integrate aesthetic enhancements in not just our transportation facilities but across the state in a range of planning initiatives, it is recommended the public and private sectors utilize this Manual to develop a comprehensive vision for improved aesthetics. This Manual should become a tool in local, regional, and state planning, policies, and regulations and should be distributed by NCDOT after each update of the document.

It is the responsibility of NCDOT and the project team to incorporate and work with a community, stakeholder group, or public office to integrate desired aesthetic preferences and projects into project selection and development. This includes use by and integration of aesthetic principles in general community plans (county development plan, comprehensive plan, master plan, regional master plan), functional plans (environmental plan, land use plans, park system plan, transportation plan), and/or special plans (special area or site plans, strategic plans).[67] These plans should incorporate and maintain aesthetics in the comprehensive standards and procedures in which they promote.



NCDOT "From Policy to Projects" graphically represents statewide planning processes specific to transportation projects. Image courtesy NCDOT.

Most transportation projects originate from broader planning frameworks that analyze current and projected growth and specify projects for improvements or to accommodate expansion. These planning initiatives for transportation projects include NC Statewide Long-Range Transportation Plan, 2040 Plan (30-year), Program and Resource Plan (10-year), State Transportation Improvement Program, STIP (Prioritization), Work Program (5-year), and other local and regional planning efforts. Long-range goals and investment decisions are recommended on a statewide scale in order to help prioritize and select projects on a local scale. After a project is selected through the statewide planning process, it moves into the NCDOT Project Development process, administered through NCDOT's Project Development and Environmental Analysis (PDEA) branch, for implementation. Some projects that do not require funding from or adhere to federal or state laws may have a different process for implementation.

See Appendix C: North Carolina Statewide Planning Processes for a detailed description of planning frameworks specific to transportation planning.

See the *PDEA Procedures Manual* and the *Merger Process Guide* hosted by PDEA for more information on NCDOT's project development process.

PROJECT DEVELOPMENT

The administration of this Manual is the collective responsibility of the respective NCDOT divisions, programs, sections, and units involved in the design and development of transportation facilities. At the date of this publication, more than 12 different divisions, programs, sections, or units under NCDOT's Technical Services Division, Division of Highways, and Division of Bicycle and Pedestrian Transportation[68] have been involved in the development of this Manual and are detailed in the following chapters according to respective focus area(s).[69]

Three Divisions (Technical Services, Highways, and Bicycle and Pedestrian Transportation) are responsible for integrating updates and expanding respective focus areas in future iterations of this Manual. As an active document, it is intended to incorporate a greater number of divisions, programs, sections, and units as this Manual expands to encompass additional focus areas.

Program Administration

The Tri-Project Managers (TPM), comprised of the designated Roadway Design Project Engineer, PDEA Project Engineer, and the respective NCDOT Division Construction Engineer, will serve as the primary coordinators of aesthetics in transportation projects.[70] The NCDOT Project Group will assist the TPM throughout Project Development. An Aesthetics Review Team (ART), which includes representatives from NCDOT focus areas, is recommended to provide guidance for aesthetically complex projects. The ART will be utilized on an as-needed basis.

See Definition of Key Terms, below, for more information regarding program administration.

Funding

This Manual aims to bring forth the discussion and processes required to include aesthetic considerations in the design and development of transportation facilities. Funding for these affordances is on a case-by-case basis and subject to change. Opportunities for funding are therefore discussed broadly. In future editions of this Manual, it is recommended greater specificity be provided for funding of aesthetic considerations in transportation projects. Specifically, funding opportunities and those responsible for administering funds should be identified. These decisions are to be defined and approved by NCDOT, NCDCR, and other North Carolina legislative bodies, as applicable.

General responsibility of NCDOT

It is imperative for NCDOT to include a municipality, public or private agency, or other stakeholder group(s) early in the project to allow enough time for funding to be identified and secured. In some cases and for large-scale projects, funding can take years to procure. Part of this responsibility includes distribution of this Manual to stakeholder(s). There may be cases where cultural, historical, or natural features could be impacted by a proposed transportation facility and may warrant additional aesthetic treatments. This is on a case-by-case basis and should be discussed and documented in coordination with stakeholder(s), other NCDOT divisions, standard NCDOT NEPA/SEPA/and Merger Process steps, FHWA guidelines, and other local, state, and federal laws or guidelines, as applicable.

General responsibility of stakeholder(s)

Generally, funding for aesthetic upgrades above that which NCDOT proposes for a transportation facility is the responsibility of a municipality, public or private agency, or other stakeholder group(s). The responsible party, the "Project Sponsor(s)," is responsible for, in most scenarios, 100 percent of the cost difference between the transportation facility proposed by NCDOT and the desired aesthetic upgrade(s). All projects are on a case-by-case basis and may have unusual circumstances that warrant aesthetic treatments. The stakeholder(s) and/or Project Sponsor(s) should coordinate with their respective NCDOT Division Leader and other project leaders, as applicable, based on where the project is located geographically.[71]

See Section C: Implementation – Identify Funding Opportunities for additional resources.

Stakeholder and public involvement

Diverse stakeholder involvement is an important component to the success of developing aesthetic preferences and decisions for a transportation project. It is the responsibility of the TPM and other NCDOT project teams to identify and include community groups, private interest, and/or public agencies throughout the project. Metropolitan Planning Organizations (MPO) and Rural Planning Organizations (RPO) are important stakeholders given the long-range nature of planning efforts.

It is the responsibility of these planning entities as well as other stakeholder groups and the public to contact NCDOT with interest in including aesthetics in the design and development of transportation projects. This Manual should be distributed to stakeholders early in the Project Development process.

Public involvement is integral to consensus-driven solutions. Incorporating aesthetic considerations into transportation facilities requires robust communication and meaningful dialogue between the planning team and the public. As proposed in the step-by-step implementation procedures, this communication needs to occur early in the Project Development process and continue beyond the project public hearing through to project finalization.

See Section C: Implementation – Identify Funding Opportunities for additional resources.

Definition of Key Terms

Tri-project managers (TPM)

The TPM is comprised of the designated Roadway Design Project Engineer, PDEA Project Engineer, and the respective NCDOT Division Construction Engineer. At the time this Manual is published, the TPM is an existing group organized by PDEA and currently active in project management of NCDOT transportation projects. The TPM will be responsible for incorporating aesthetics in transportation projects from a decision-making and administrative capacity.

The TPM will include the ART on an as-needed basis and will be responsible for deciding when and to what extent the ART is involved. The TPM will also be responsible for coordinating and overseeing stakeholder and public involvement.

Aesthetics Review Team (ART)

The ART serves in an aesthetics review capacity. The ART is recommended to consist of representatives from NCDOT and NCDCR. The ART will be brought into Project Development by the TPM and will serve on an as-needed basis for aesthetically complex projects that require expertise in certain focus area(s).

Entities represented in the ART include, but are not limited to:

- Bicycle and Pedestrian Division Director
- Human Environment Section (HES) Head
- Human Environment Section, Traffic Noise and Air Quality Group Leader
- Roadside Environmental Unit (REU), State Roadside Environmental Engineer
- Roadside Environmental Unit, Aesthetic Engineering Section Lead
- State Roadway Design Engineer
- State Structures Engineer
- Division Representative
- Senior Program Director and/or designee from NCDCR or NCAC
- FHWA Representative, as applicable

Engagement with the community adds value to project planning, long term. Image courtesy AECOM.

Stakeholders

Stakeholders may include representatives from the city, town, region, MPO, RPO, or members of the public. Stakeholders will be brought into the project by the TPM and/or will contact NCDOT with a desire to be involved in the project. Stakeholders may also include community groups (locally owned business, citizens, or property owners), private interest groups (private developers or companies), or other public agencies (public departments, local, state, or federal agencies). Consultant teams may be involved with certain aspects of design and development of aesthetic features on an as-needed and contractual basis. The TPM will work with the stakeholders to include aesthetic preferences in the design and development of the transportation facility.

NCDOT Project Group

Refers to NCDOT parties that are part of the project planning and development for NCDOT transportation projects. This includes the TPM and other NCDOT division, program, section, and unit representatives.

Project Sponsor(s)

Defined by stakeholders and/or local champion(s) who participate in the design and development of aesthetic considerations and/or take on maintenance and/or funding requirements of the aesthetic upgrades (as applicable). Project Sponsor(s) differ from stakeholders in that they have confirmed responsibility in the aesthetic upgrade versus public opinion only.

Retrofit projects

For the purpose of this Manual, projects that include aesthetic upgrades to existing transportation facilities are defined as retrofit projects. Traditionally, these projects do not follow the same standard NCDOT planning processes that STIP projects follow (see STIP projects, below). In the step-by-step implementation procedures, retrofit projects use the key "1R, 2R, 3R, etc..." to indicate step 1, step 2, step 3, etc., specific to retrofit projects and to differentiate from similar process steps for STIP projects.

STIP projects

For the purpose of this Manual, projects that include aesthetic upgrades to new transportation facilities are defined as STIP projects. In most instances, these projects follow standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT because they require a more stringent review of environmental or social impacts. In the step-by-step implementation procedures, STIP projects use the key "1S, 2S, 3S, etc." to indicate step 1, step 2, step 3, etc., specific to STIP projects and to differentiate from similar process steps for retrofit projects.

AESTHETICS DESIGN PROCESS

The aesthetic design process details the step-by-step implementation procedures for inclusion of aesthetic considerations in NCDOT transportation facility projects.

Phase One includes 10 steps pertaining to project initiation leading up to Phase Two, Focus Area Review, specific to each focus area and detailed in Section B of this Manual. Phase Three includes seven steps pertaining to project finalization and implementation.

> The intent of procedures as defined in this Manual are to run concurrent with existing NCDOT Project Development process, none of which should delay implementation or continuation of NCDOT procedures.

The step-by-step implementation procedures described below represent a condensed version of standard NCDOT NEPA/SEPA/and Merger Process steps. Phases One, Two, and Three define only those steps specific to inclusion of aesthetics in the design and development of transportation facilities.

For a detailed list of typical Project Development processes for NCDOT transportation projects, see Appendix C: Statewide Planning Processes and NCDOT Project Development Process.

Public meetings help encourage community involvement in decisions about aesthetics. Image courtesy EDAW.

Phase One: Project Initiation

See Exhibit 1 for the step-by-step implementation diagram.

The TPM is responsible for the implementation of all phases and steps described below.

Step 1: Initiation of Project Study

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM will begin the project study by establishing administrative procedures required to implement the proposed action or project. This will involve identification of needed background data and information and sending out the project scoping letter. The letter will include the project's concepts and intent and will solicit input with regard to potential project effects and outcomes, both adverse and beneficial. The letter will be distributed to all appropriate NCDOT divisions, programs, sections, and units per NCDOT project initiation standards. Information needed to accompany the letter is a general project description, project limits as appropriate, and location/vicinity map.

Involved parties: TPM

Step 2: Data Collection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM will collect all available information, including aerial photography (ortho photographs) and background data (survey information, environmental identification, social and historical concerns), needed to hold a project scoping meeting, as identified by responses to the scoping letter and standard NCDOT Project Development processes.

Involved parties: TPM, NCDOT Project Group

Step 3: Form NCDOT Project Group

The TPM will consult with the various NCDOT division, program, section, and unit heads to identify specific NCDOT Project Group members. A representative can decline participation on the team if project needs within their area of interest, expertise, or jurisdiction are not associated with the proposed action.

Involved parties: TPM, NCDOT Project Group

Step 4: Project Scoping

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a project scoping meeting will be held by NCDOT to discuss background data, preliminary purpose and need, engineering and environmental inventories, the proposed scope of the project, and potential project issues, opportunities, and desired outcomes. NCDOT Project Group members are invited to attend and provide input. This meeting will include all levels of NCDOT responsible or participating in project development activities. Meetings associated with this step will provide opportunities for early input of possible aesthetic considerations. Scheduling and timeline will also be identified.

Involved parties: TPM, NCDOT Project Group

Step 5: Describe and Define Project

The TPM will lead discussions according to standard NCDOT NEPA/SEPA/and Merger Process steps to define project limits and needs.

Involved parties: TPM, NCDOT Project Group

Step 6: Determine if Aesthetics will be Considered

Based on Step 4 and Step 5, a preliminary determination will be made for incorporating aesthetics into the project based on project type and scope. This will be in the form of an internal discussion of the TPM and NCDOT Project Group. If aesthetic considerations are not confirmed in this step, Step 7 may be skipped.

Involved parties: TPM, NCDOT Project Group

Step 7: Project Aesthetics Coordination One

If potential aesthetic considerations are identified by the TPM and NCDOT Project Group in Step 6, coordination will be completed specific to identifying aesthetic opportunities and NCDOT divisions, programs, sections, and units that should be involved will be contacted. This differs from the scoping meeting in that it is specific to possible aesthetic considerations of the project. If the TPM and NCDOT Project Group determine the project has the potential for aesthetic opportunities and if those are determined to be diverse or complex, ART representatives will be notified requesting participation.

This coordination will be specific to the incorporation of aesthetics in the planning process of the given transportation project. The coordination may be in the form of a meeting conducted by the TPM and NCDOT Project Group. If it results in no aesthetic considerations, Step 8 will serve to identify aesthetic opportunities generated by the stakeholders.

Involved parties: TPM, NCDOT Project Group, ART

Step 8: Stakeholder Outreach for Aesthetics Opportunities

Stakeholders will be identified by the TPM and NCDOT Project Group. This Manual should be made available to the stakeholders during this step. The outreach is intended to convey the general scope of the project to the stakeholders, identify a Project Sponsor (local champion of aesthetic upgrades such as public, private, or community groups), and gauge preliminary ideas and commitment for aesthetic upgrades.

If the stakeholder(s) communicate that there is no interest in aesthetic upgrades, the project will move forward per standard NCDOT Project Development and design processes. Another opportunity will be available for stakeholder(s) to incorporate aesthetic considerations into the design of transportation facilities in the specific focus area public outreach steps.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 9: Project Aesthetics Coordination Two

If potential or additional aesthetic considerations are identified from stakeholder outreach in Step 8, coordination will be completed by the TPM specific to identifying aesthetic opportunities and NCDOT divisions, programs, sections, and units that should be involved will be contacted. This differs from Step 7 in that it is based on potential aesthetic considerations identified by the stakeholders. If the TPM and NCDOT Project Group determine the project has the potential for aesthetic opportunities and if those are determined to be diverse or complex, ART representatives will be notified requesting participation. If the ART is already involved as a result of Step 7, the ART will be coordinated regarding stakeholder outreach.

The TPM will review the feasibility and practicality of potential project(s) including, but not limited to, safety, sight distance and obtrusion, potential of impeded traffic, endangerment of road user, testing of materials, scheduling, and financial viability. Lighting, signage, and drainage should be addressed to the extent possible for aesthetic and structural design considerations. The NCDOT Project Group and ART will assist on an as-needed basis.

The results of Step 9 aim to identify preliminary aesthetics concepts and commitment by the stakeholders to identify a Project Sponsor. This will allow greater coordination and efficiency of incorporating aesthetics later in the project's development and commitment and input from applicable NCDOT divisions, programs, sections, and units.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 10: Project Development

If the transportation facility is defined as a STIP project, standard NCDOT NEPA/SEPA/and Merger Process steps, according to the project development process, will include procedures applicable to all actions involving an environmental review and preparation of functional or preliminary design plans. Scheduling and preliminary cost estimates may also be identified.

Involved parties: TPM, NCDOT Project Group

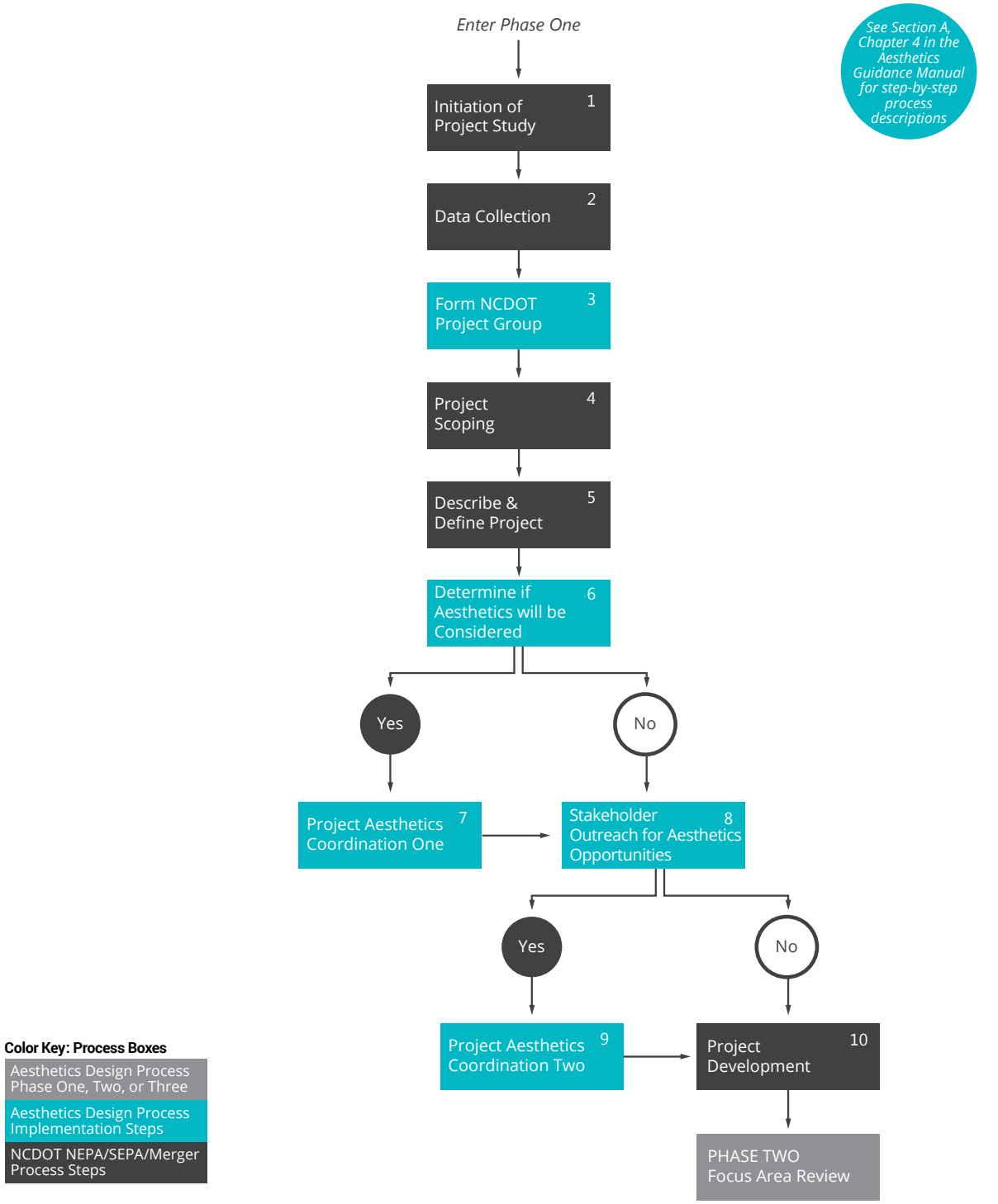
1898 Memorial Park Sculpture, Wilmington, North Carolina. Image courtesy NCDOT.

EXHIBIT 1

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE ONE- PROJECT INITIATION



Phase Two: Focus Area Review

Phase Two includes all step-by-step procedures for the inclusion of aesthetics in NCDOT focus areas. This includes both retrofit and STIP projects.

See Section B for step-by-step implementation diagrams for each focus area.

Phase Three: Project Finalization and Implementation

The TPM is responsible for the implementation of all phases and steps described below.

Step 1: Design Concepts

Design concepts are based on standard NCDOT NEPA/SEPA/and Merger Process steps. The TPM will coordinate with appropriate NCDOT Project Group members and the ART (on an as-needed basis) to begin drafting preliminary design options and aesthetic enhancements based on the results of Phase Two. A review will be completed by the TPM and NCDOT Project Group to address the feasibility and practicality of potential project(s) including, but not limited to, safety, sight distance and obtrusion, potential of impeded traffic, endangerment of road user, and testing of materials. Scheduling and preliminary cost estimates will also be identified.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 2: Public Review

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a public review of draft conceptual designs for both aesthetic considerations and transportation facility requirements will be conducted. The results of the public review will be reviewed by the TPM, and where reasonable and feasible, comments will be incorporated into the aesthetic and transportation facility designs.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 3: Aesthetics Consistency Check One

The TPM will conduct an aesthetic consistency check with assistance from the NCDOT Project Group and the ART (on an as-needed basis) to determine whether all possible and/or desired aesthetic considerations have been studied and/or incorporated. This includes consistency of aesthetics across the project and within the focus area, making sure there is visual cohesion in each aspect of the aesthetic considerations for the project. This step will identify any additional aesthetic opportunities and coordinate appropriately. Lighting, signage, and drainage should be addressed to the extent possible for aesthetic and structural design considerations. The TPM, NCDOT Project Group, and ART will coordinate with the earlier identified Project Sponsor and/or stakeholders, as applicable.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4: Complete Final Designs

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, during the course of the ROW acquisition, NCDOT will be responsible for developing or coordinating the development of final plans for the project. Final design includes quantities, finalized cost estimates, permitting needs, and other additional project requirements. Aesthetic considerations will be incorporated into the final designs.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 5: Aesthetics Consistency Check Two

The TPM will coordinate with the NCDOT Project Group and the ART (on an as-needed basis) to identify final opportunities where aesthetics considerations may be incorporated and check consistency with earlier aesthetic decisions and design considerations. A primary focus of this step will be confirming with the Project Sponsor timeline expectations, financial expectations, and maintenance requirements (as applicable) of the aesthetic upgrade(s).

If additional aesthetic considerations are identified in this step, a redo loop that includes going through procedures in the focus area reviews, conceptual and final designs, and public review (as applicable) will be required to incorporate identified upgrades. Examples of aesthetic consideration that may arise at this stage in project development include landscaping, retaining walls, or bicycle and pedestrian infrastructure.

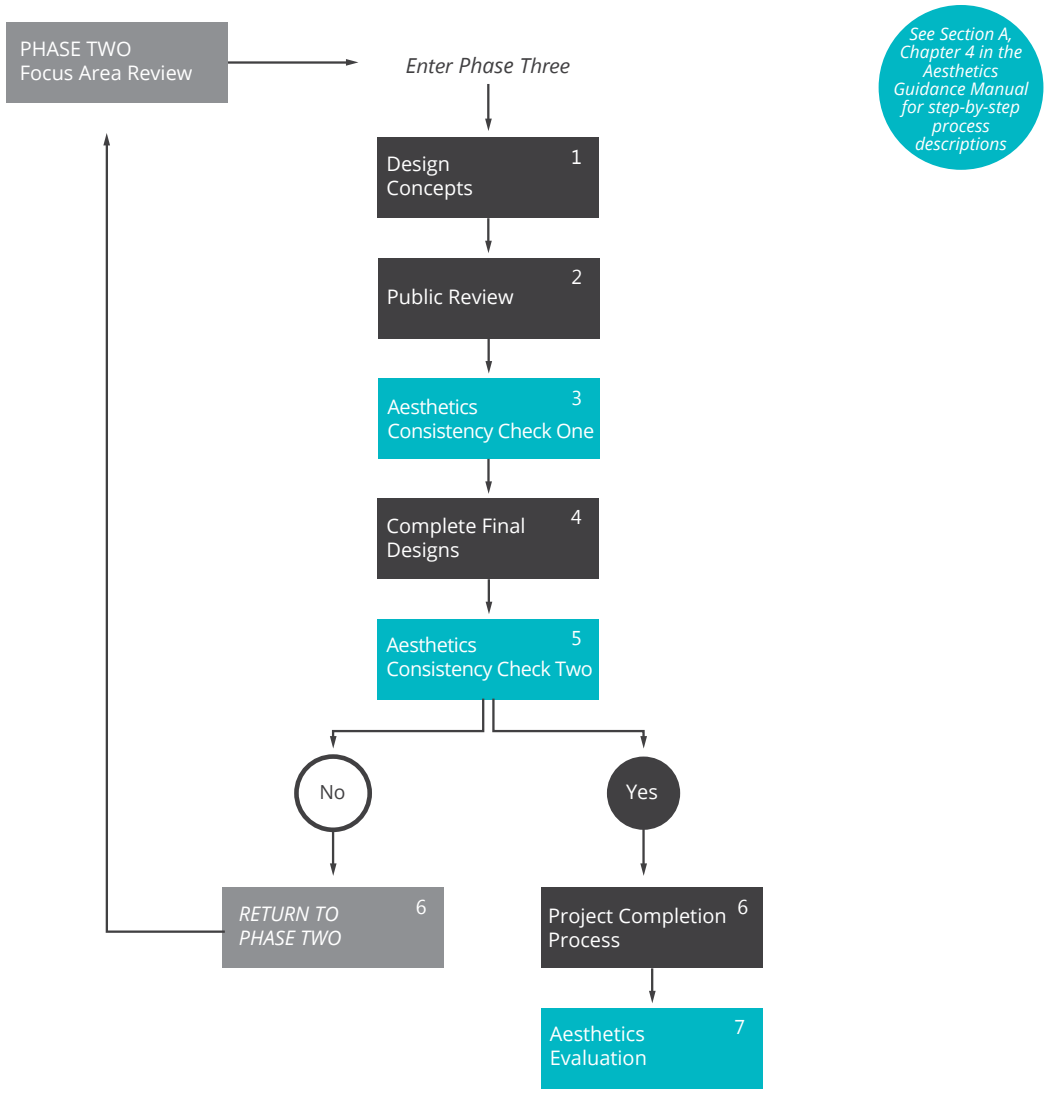
Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

EXHIBIT 2

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE THREE - PROJECT FINALIZATION & IMPLEMENTATION



Color Key: Process Boxes

- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

Step 6: Project Completion Process

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the project completion process includes steps that incorporate changes to design and construction, letting of project, pre-construction meetings, and compliance monitoring. All work, including compliance with environmental conditions, regulatory permit finalization, and maintenance agreements associated with aesthetic considerations, must be completed.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 7: Aesthetics Evaluation

To streamline future aesthetic considerations and upgrades, an aesthetic evaluation will be performed by the TPM, NCDOT Project Group, and the ART (as applicable). This will occur after project completion and include evaluation of goals and outcomes, aesthetic planning processes, participant and community impacts, and a review of the project's life cycle.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

See Section C: Implementation – Conduct and Aesthetic Evaluation for more detailed discussion and resources.

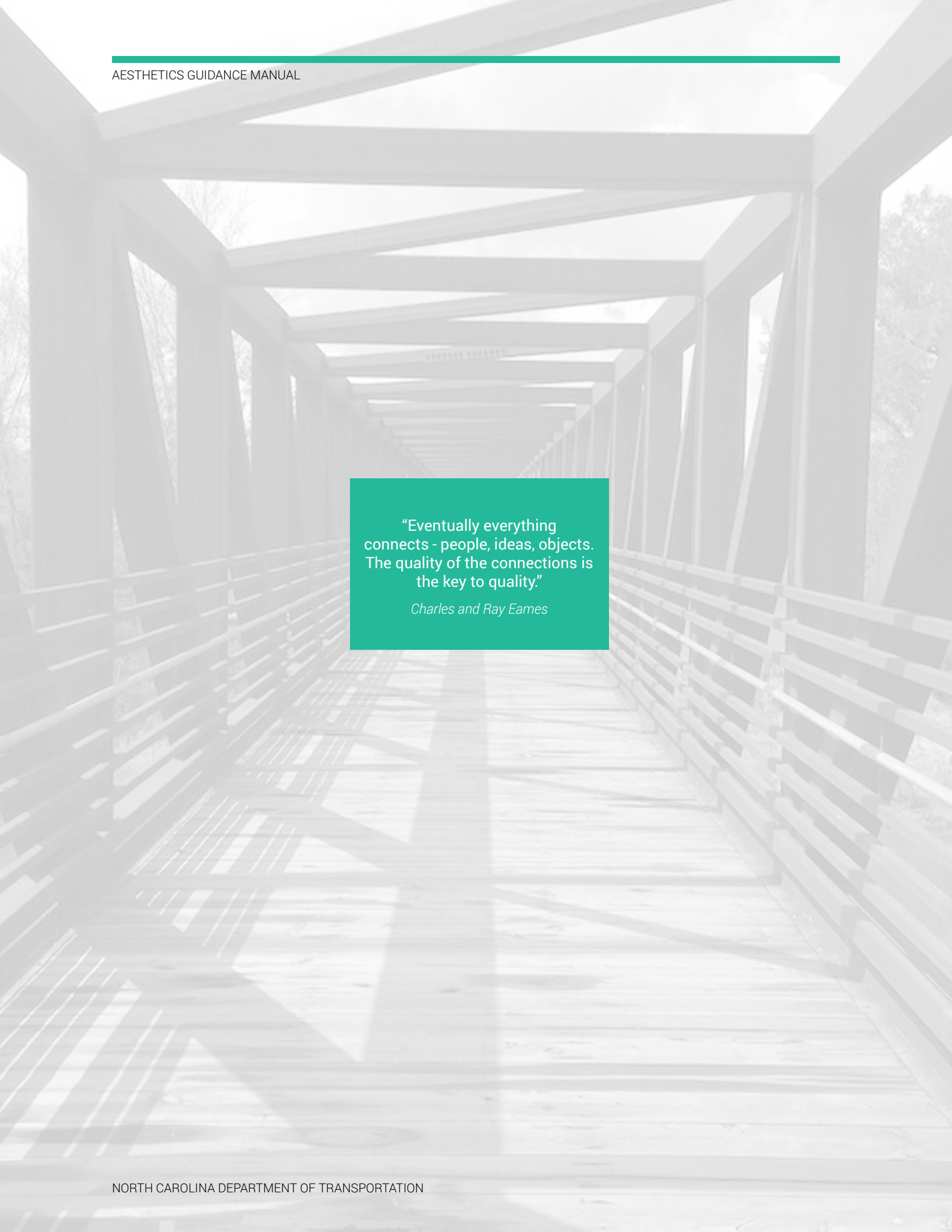
Aesthetic upgrades to a pedestrian streetscape in Rolesville, North Carolina. Image courtesy AECOM.

"Every structural decision is an aesthetic decision."

Transportation Research Board

SECTION B
FOCUS AREAS

Section B details the aesthetic design process of transportation facility focus areas.



"Eventually everything connects - people, ideas, objects. The quality of the connections is the key to quality."

Charles and Ray Eames

CHAPTER 5

FOCUS AREA INTRODUCTION

"Beauty in things exists in the mind which contemplates them."

David Hume

5 FOCUS AREA | INTRODUCTION

Read Chapter 1 through Chapter 4 in Section A before proceeding. This section provides a framework for the purpose and intent of this Manual including the format, context, basics of aesthetics, and integration of the guidelines. These chapters provide a common language to effectively communicate aesthetics concepts, definitions, and processes.

This section, Section B, serves as an independent section of this Manual focused exclusively on focus areas considered to date. It is expected that as an active text this Manual will encompass additional focus areas represented by a greater number of NCDOT divisions, programs, sections, and units.

See Section A, Chapter 4, Integration of Guidelines, for the aesthetic design processes for Phase One and Phase Three of the aesthetic planning process and detailed information regarding the following:

- Program Administration
- Stakeholder and Public Involvement
- Incorporating Aesthetics into Broader Planning Frameworks
- Implementation Procedures
- Project Management
- Definition of Key Terms

The boardwalk and its surroundings in Wilmington, North Carolina, incorporate a number of aesthetic features. Image courtesy AECOM.

"The details are not the details. They make the design."

Charles Eames

CHAPTER 6

FOCUS AREA ROADWAYS

"There's a lot of optimism in changing scenery, in seeing what's down the road."

Conor Oberst

6 FOCUS AREA | ROADWAYS

OVERVIEW

NCDOT Division of Highways is responsible for building and maintaining the roadways within North Carolina. The state is divided into 14 transportation divisions, each managed by a division engineer having jurisdiction over transportation decisions. Each division is divided generally by road miles and geography but not along roadway corridors.[72] With nearly 80,000 miles of roadways to manage, NCDOT roadway planning efforts are considerable.

The roadway context can be defined according to three categories, urban, suburban, or rural. The physical and visual experience of a roadway in these contexts differs greatly and both either impact or are impacted by aesthetic factors. For urban corridors, roadways are generally more linear and visually defined according to surrounding human-made elements such as buildings or other infrastructure. This influences both the alignment and the visual experience of a roadway that traverses an urban area. For rural corridors, roadways are generally defined by natural landforms and vegetation. The alignment has the potential to be non-linear and is visually guided by surrounding views of natural elements. These relationships to the surrounding of a roadway are a factor in aesthetic considerations and alter the perceptions of motorists and viewers of the road. Landmarks play a key role in this perception as well, allowing users to orient themselves along a corridor. Landmarks may be subtle such as a dominant building or an intersection. If developed with intention, they can serve not only as a means of orientation, but also as a source of visual stimulation. Landmarks can also represent cultural or historical importance. Landmarks may be natural elements, enhanced as a landmark element through aesthetic designs.

Increasing mobility and efficiency of movement along roadways are important factors in design. Improving the aesthetic experience of a roadway through improved context sensitivity by working directly with local aesthetic preference has the potential to improve the qualitative experience of a corridor. Ideally, aesthetic considerations of a roadway should be context sensitive and reflect cultural, historical, or natural elements of a community or communities. Strong integration between NCDOT and the public is encouraged to allow for such considerations.

"Passing Through Light" by artist Edwin Redl is a public art project using LED technology at the I-77 and West Trade Street underpass in North Carolina. The lighting provides increased safety for pedestrians and visual appeal for motorists. Image courtesy NCDOT.

ROADWAY TYPES

A variety of roadway types and roadway structures make up the interconnected transportation network in North Carolina. As described in Section A, Chapter 2, the FHWA classifies roadways into three distinct (functional) categories according to character of service they are intended to provide. Broadly, these include arterials, collectors, and local roads.

Roadway Types

In the state of North Carolina, the functional classification has been under review since 2013 in an effort to better reflect independence of urban or rural designations, results of 2010 Census and the Highway Performance Monitoring System (HPMS),[73] and modifications desired from local planning partners.[74] This Manual includes the FHWA functional classifications as well as North Carolina's additional designations.

Freeways

Freeways (55 mph or greater) provide the highest level of service and speed but are considered limited access highways with on and off ramps and no cross-traffic. A freeway is considered a part of the interstate system when an interstate roadway or freeway roadway passes through a large city. Freeways do not have traffic signals or driveways and are, at a minimum, four lanes with a median. See *Table 6-1: Freeways in North Carolina*.

Expressways

Expressways (45 mph to 60 mph) are considered arterials and offer the longest distance of travel with high speeds. These include limited access roadways such as motorways and toll roads providing largely uninterrupted travel, often using partial or full access control. There are no traffic signals along expressways and are, at a minimum, four lanes with a median. See *Table 6-2: Expressways in North Carolina*.

Arterial Roadways

Arterials (45 mph or higher) provide a high level of service and speed with strict control of access and minimal site driveways. This classification has the longest uninterrupted distance for roadways with minor access on and off the system. Arterials can also be classified into major and minor arterials, differing in increased points of access (tightly controlled access points versus major driveways and access points) and moderate-to-low speeds. They are the predominate roadways that connect to other arterials and collector streets. New arterials and improvements to existing arterials are generally funded by the state. Arterials are essential in supporting regional mobility. See *Table 6-3: Arterial Roadways in North Carolina*.

Collector Roadways

Collectors (35 mph or less) are less developed than arterials and function at a lower speed for shorter distances of travel. Their main function is to collect traffic from local roads and connect them to arterials. Many collectors have two lanes and often have exclusive left turn lanes at intersections with major and minor arterials. Collectors are rarely funded by the state, where development and maintenance are managed by local governments. Although collectors provide less mobility than arterials, they are essential in providing connectivity among and between activity centers. See *Table 6-4: Collector Roadways in North Carolina*.

Local Roadways

Locals (25 mph or less) provide the greatest amount of access to land with the least amount of mobility. They consist of all roads except arterials, collectors, expressways, or freeways. Locals connect diverse land uses in a community and generally best serve short travel distances. They are funded by local governments and provide the greatest breadth of connectivity in an urban or rural area. See *Table 6-5: Local Roadways in North Carolina*.

I-485 near Huntersville, North Carolina. Image courtesy James Sipes.

TABLE 6-1
FREEWAYS IN NORTH CAROLINA

Functional Classification	Example
Interstate or Freeway High mobility, low degree of access	US 64 between Rocky Mount & Williamston US 52 between Lexington and Mt. Airy US 74 near Waynesville US 1 between Raleigh and Sanford

Source: Connect NCDOT – Strategic Highway Corridors; FHWA functional Classification of Highways

TABLE 6-2
EXPRESSWAYS IN NORTH CAROLINA

Functional Classification	Example
Expressways and Freeways High mobility, low-moderate access	US 29 in Guilford County US 74 east of I-277 in Charlotte US 221 (Marion Bypass) US 301 north of Wilson

Source: Connect NCDOT – Strategic Highway Corridors; FHWA functional Classification of Highways

TABLE 6-3
ARTERIAL ROADWAYS IN NORTH CAROLINA

Functional Classification	Example
Major Arterials Higher mobility, low degree of access	US 1 (Capital Boulevard) in Raleigh NC 24 (Harris Boulevard) in Charlotte NC 132 (College Road) in Wilmington
Minor Arterials Higher mobility, moderate degree of access	NC 11 (Kenansville Bypass) NC 55 (Holly Springs Bypass) US 117 south of Goldsboro

Source: Connect NCDOT – Strategic Highway Corridors; FHWA functional Classification of Highways

TABLE 6-4
COLLECTOR ROADWAYS IN NORTH CAROLINA

Functional Classification	Example
Collectors Medium mobility, medium degree of access	Any road in North Carolina with a speed limit of 35 mph or less adjacent to an arterial road

Source: Connect NCDOT – Strategic Highway Corridors; FHWA functional Classification of Highways

TABLE 6-5
LOCAL ROADWAYS IN NORTH CAROLINA

Functional Classification	Example
Locals Low mobility, low degree of access	Any local road in North Carolina with a speed limit of 25 mph or less

Source: Connect NCDOT – Strategic Highway Corridors; FHWA functional Classification of Highways

ROADSIDE STRUCTURES

Roadside structures include roadside facilities, historical markers, signage, and other structures that are part of the functionality of North Carolina's roadway system.

Roadside Facilities

Welcome and visitor centers

North Carolina's welcome centers promote thousands of tourism-related businesses to visitors already in the state actively seeking travel information. Each welcome center is located on an interstate highway just inside the state line, and each has an emphasis on information for visitors traveling a particular interstate corridor. Welcome centers and visitor centers are open daily from 8 a.m. to 5 p.m.[75]

Welcome centers can have a strong visual presence and serve as a visual landmark, or they can visually blend into their surroundings by using a more subtle design. At state borders they should convey the identity of the place and make the entry into the state a memorable and inviting experience. The welcome center should be visually appealing both day and night and connect travelers with the natural landscape and scenic views.

The Northwest North Carolina Visitor Center is an example of a landmark visitor center that places an emphasis on aesthetics. The department signed an agreement with Wilkes County and the towns of North Wilkesboro and Wilkesboro where the county and the towns provided land, municipal water, and sewer service for the project and agreed to operate the visitor center. The 10,030 square foot building was designed to be energy efficient, conserve water, and reduce greenhouse gases. The associated high energy and water demands of a typical visitor center mean that NCDOT benefits from sustainable building practices.[76]

Rest areas

North Carolina's highway rest areas offer opportunities for convenient, brief stops and provide easy roadside access to public restrooms, drinking water, and telephones 7 days a week, 24 hours a day. Typically, rest areas are located to take advantage of unique cultural or historical features or scenic views of predominant environmental features while also providing travelers a resting place en route.

Complete rest areas are typically located at 60 mile intervals throughout the state and are generally situated outside of developed areas. A rest area usually requires approximately 25 acres to accommodate the site functions.

Roadside pull-offs

Facilities for drivers along roadways are provided as exits to the highway for a brief period. These pull-offs respond to the landscape character and provide minimal parking to accommodate the abbreviated stay.

Viewpoints

Points of interest along a roadway present opportunities to view unique vistas or special natural resources. Viewpoints might also highlight specific cultural or historical landmarks. Interpretive elements are integrated into the site design with place name signage and travel information elements that establish the relationship between highway and place. Typically, the length of stay is short and parking is limited.[77]

The Madison County Rest Area is located on a bluff and has outstanding views of the surrounding landscape. Image courtesy NCDOT.

Scenic viewpoint overlooking the Great Smoky Mountains in North Carolina. Images courtesy NCDOT.

The Madison County Rest Area reflects the architectural style of its regional location in North Carolina. Images courtesy NCDOT.

Markers

Throughout the state, more than 1,500 silver state highway historical markers describe important stories about North Carolina. These markers include the history behind structures such as churches, libraries, or railroads or people and events such as American Indian tribes, Civil War battles, the civil rights movement, and more. Each marker features global positioning satellite (GPS) coordinates to help orient a visitor seeking to explore these stories.[78]

Signage

Signage is important to help motorists, pedestrians, and cyclists understand critical information related to a transportation corridor. Signs also have a major impact on the aesthetic character of the roadway. The signage support system for a corridor should include structural supports that are consistent in shape and color. Trusses should be simple and as open as structurally possible. Urban freeways often require large sign structures in the concrete median barrier. The detailing of these sign structures requires close coordination between NCDOT's Intelligent Transportation System (ITS) and Signals, Structure Management Unit (SMU), and the Roadway Design Unit (RDU).[79]

On interstate projects or urban freeways with complex interchanges, the designer should request the NCDOT Traffic Congestion and Signing Unit to review the project for possible signage conflicts. Signing plans are the responsibility of the Traffic Engineering and Safety Systems Branch of NCDOT and are consistent with FHWA's Manual of *Uniform Traffic Control Devices*. Upon completion of signing plans and specifications, they will be submitted to the NCDOT RDU for inclusion into roadway plans.[80]

Billboards

Billboards affect the visual quality of the highway because they can obstruct views of scenic features and the natural landscape. The visual impact of billboards in the rural landscape is much greater than the impact generated by billboards in urbanized areas. Standards such as setbacks, not allowing billboards along portions of a road, and size limitations can be established to help minimize these visual impacts.[81] In 2011, new elements were added to a state statute regarding billboard regulation.[82] This includes NCDOT issuance of permits for the erection of new billboards and removal of vegetation within 660 feet of the edge of the ROW of interstate or primary highways. Billboards are limited to areas zoned industrial and commercial, in conformity with rules and regulations of NCDOT.

While local governments control zoning decisions in their communities, there is a long-standing legal battle between the billboard industry and these governments as to which portion of law controls their industry-local ordinances or NCDOT rules.[83]

Regulatory signs

Include stop and yield signs, speed regulations, turn and lane use, directional, parking regulations, traffic signals, railroad, weight limit, and seat belt signs among others.[84]

Warning signs

Include turn and curve, intersection, merge and lane transition, width restrictions, divided highway, hill, clearance, advisory speed, work zone, and slow traffic among others.[85]

Marker signs

Include route markers, junction signs, alternate route signs, turn signs, and directional signs.[86]

Guide and informational signs

Include destination and distance, expressway and freeway, work zone information, general information, and cultural signs.[87]

Tourism and recreational signs

Include general information signs, traveler services, accommodation services, and recreation signs. Tourist-oriented signage includes cultural, historical, recreational, educational, entertainment, or unique commercial activities.[88] Additional signage to consider along roadways include temporary traffic signs, school signs, bicycle signs, and emergency and incident management signs. These signs generally are regulated by federal or state standards and should be coordinated as appropriate.

Place name sign

Includes programs distinctive to the state, region, or communities and are recommended to better connect people to places. The program uses signage to let both locals and visitors gain a better understanding of the unique features around them.[89]

The North Carolina Highway Historical Marker Program designates historical routes in the state. Image courtesy NCDOT.

Standard sign gantry with directional signage. This basic layout of gantry and signage is used throughout North Carolina. Image courtesy NCDOT.

Welcome sign for the Randolph County Rest Area in Randolph, North Carolina. Image courtesy NCDOT.

Enhanced street signage helps to designate cultural or historical districts. Image courtesy AECOM.

POLICIES AND PROCEDURES

All plans, designs, specifications, and estimates for roadway projects in North Carolina are required to conform to the state's standard practices for highway construction. The *NCDOT Design Manual for Roadway Design* is used to plan many of the roads within the state. Other documents that help define policies and procedures used by NCDOT include, but are not limited to, the latest edition of the following materials:

AASHTO - A Policy on Geometric Design of Highways and Streets (2011)

Details the current design research and practices for highway and street geometric design; commonly referred to as the Green Book.

AASHTO - Roadside Design Guide (2011)

Presents a synthesis of current information and operating practices related to roadside safety.

FHWA Manual on Uniform Traffic Control Devices (2009)

Identifies the nationwide standards for installing and maintaining traffic control devices on all public streets, highways, bikeways, and private roads open to public travel.

NCDOT 2040 Plan (2012)

The 2040 Plan defines North Carolina's vision for a statewide transportation system.

NCDOT Complete Streets Planning and Design Guidelines (2012)

Directs planners and designers of NCDOT to consider and incorporate multimodal alternatives in the design and improvement of appropriate transportation projects.

NCDOT Design Manual for Roadway Design (2012)

Offers general design information, design criteria, and plan preparation guides including design policy interpretation, guardrail, barriers and attenuators, capacity, drainage design, structure design, railroads, interchanges, at-grade intersections, entrances, and miscellaneous design guidelines.

NCDOT Policy on Street and Driveway Access to NC Highway Capacity Manual (2003)

Establishes requirements for the location, design, and construction of street and driveway access connections to the state highway system. The policy includes legal and procedures for permitting.

NCDOT Resurfacing, Restoration, and Rehabilitation Guide (RRR Guide) (2004)

The purpose of RRR projects is to offer a better riding surface, enhance safety, improve operating conditions, and preserve and extend the service life of existing non-freeway facilities. Safety and economic improvements are also major factors.

NCDOT Roadway Standard Drawings for Roads and Structures (2012)

Provides a compilation of standard requirements used by NCDOT for construction contracts and referred to as the standard specifications.

NCDOT Sustainability Blueprint (2013)

The Center for Transportation and the Environment (CTE) is preparing an accountability framework for NCDOT that will institutionalize sustainable principles and practices throughout all phases and functions of NCDOT, including planning, project/ program development, project delivery, and internal operations.

NCDOT Subdivision Roads Minimum Construction Standards (2010)

Details the minimum construction standards for any person or corporation desiring to construct a new subdivision road to be designated as public.

The Surface Transportation Assistance Act (STAA) – Section 130 (1987)

An act passed in 1982 by the federal government governing the movement of trucks and trailers with specific combinations, lengths, or widths.

Context Sensitive Design and Context Sensitive Solutions (2003)

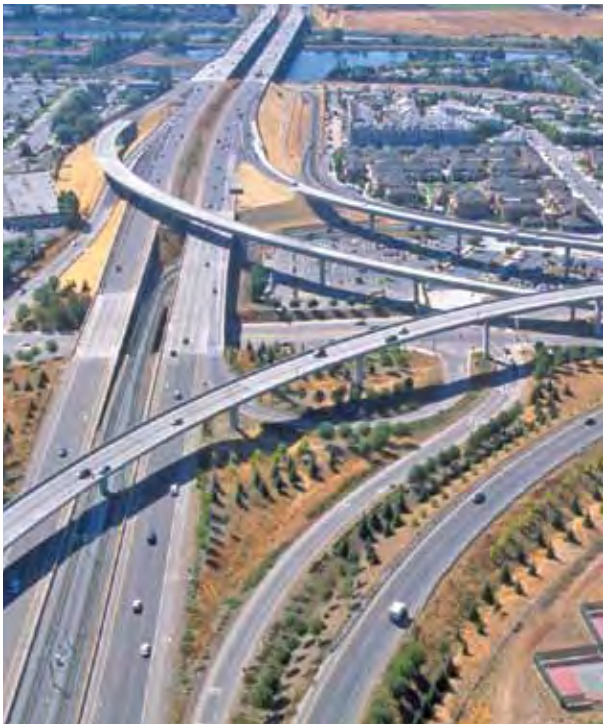
The Maryland Department of Transportation, Maryland State Highway Administration, AASHTO, and FHWA held a conference in 1998 entitled *Thinking Beyond the Pavement*. This conference set out the basic concepts for CSD and CSS, which are collectively defined as "a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historical, and environmental resources, while maintaining safety and mobility." NCDOT incorporates CSD and CSS in its roadway design.

PLANNING PROCESS AND COORDINATION

The development of roadway plans is the responsibility of NCDOT. Completed roadway plans consist of roadway sections, horizontal and vertical alignments, drainage pipes, ditches, structures, and proposed ROW. Also included are basic summaries such as earthwork, guardrail, and pavement removal.

> The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

There are four basic design phases that occur during the roadway design process. These phases are functional design, preliminary design, ROW plan preparation, and final design. The various design phases require coordination with units within NCDOT, including Preconstruction, Structures Management Unit, ROW Branch, Construction Unit, stakeholder groups, and the public.[90]



I-85 / I-87 Interchange in New York State. Image courtesy FHWA.

STEP-BY-STEP PROCESS

The inclusion of roadway aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two: Focus Area Review - Integration of Roadway Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 3 and 4 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

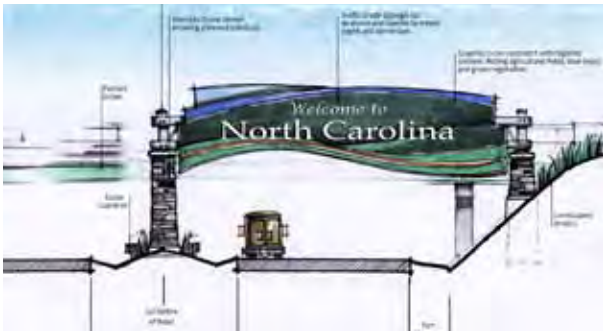
Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group



Gateway design for I-95 in Robeson County, North Carolina. Image courtesy NCDOT.

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the project sponsors of aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the Least Environmentally Damaging Practicable Alternative (LEDPA) (Preferred Alternative under NEPA).

When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the roadway concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 8S and 3R: Aesthetics Community Meeting(s)

The TPM will hold a community meeting (or series of meetings) with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership with the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through a Memorandum of Agreement (MOA) or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

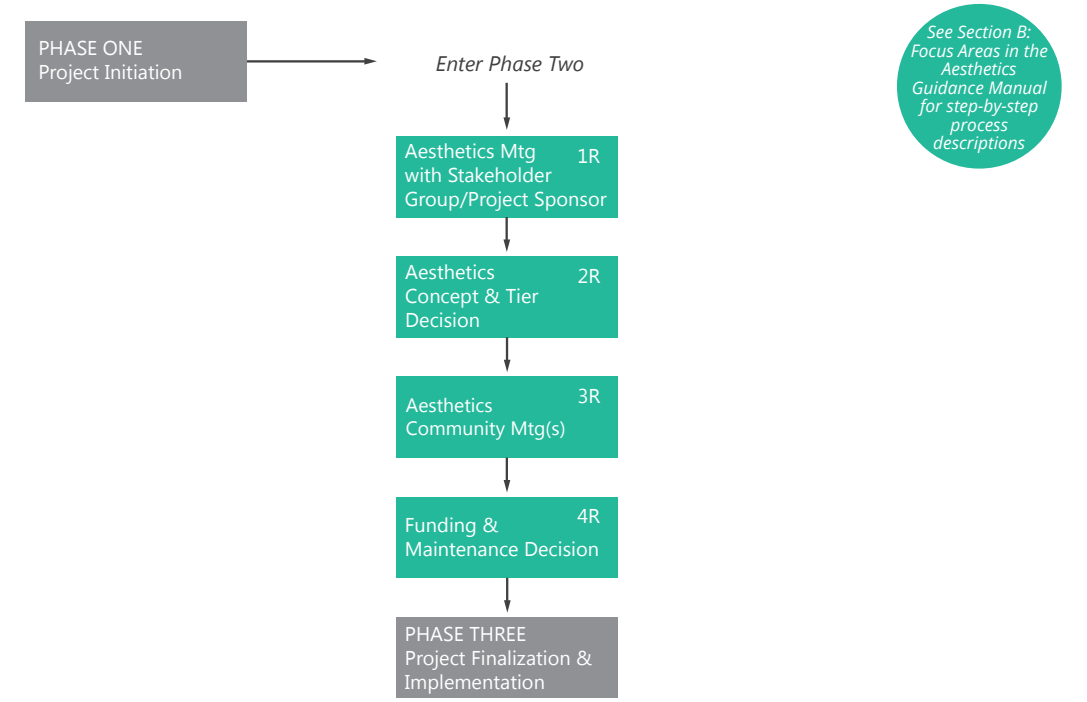
Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

EXHIBIT 3

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

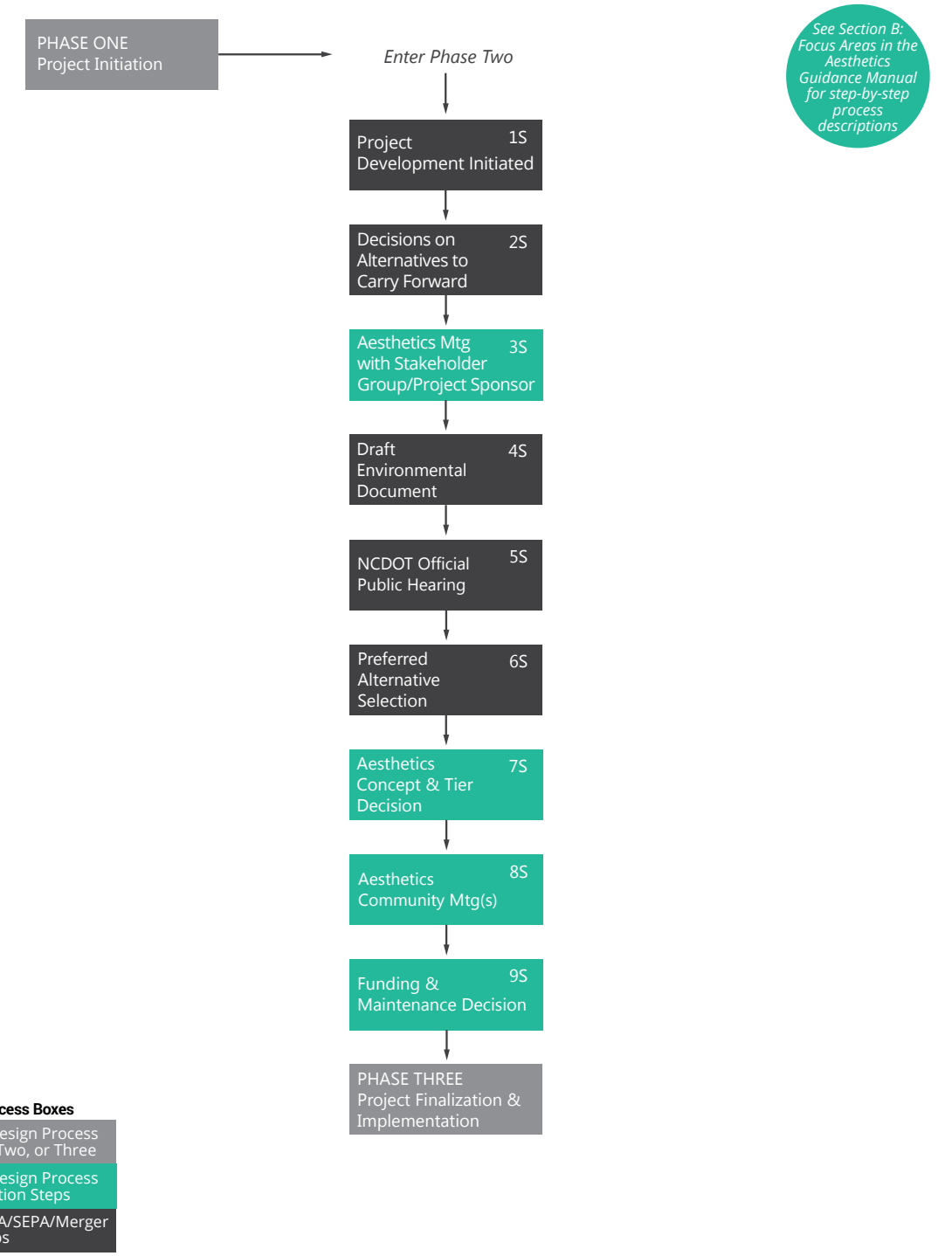
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 4

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - STIP PROJECTS



TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, roadways are categorized according to standard, enhanced, or landmark. The variations between the types of roadways differ based upon the effort to fit the adjacent cultural, historical, natural, and human-made surroundings. Some additional considerations for introducing aesthetic enhancements to complement the transportation facility are discussed below.

For the purposes of this Manual, roads within the state are designated as standard, enhanced, or landmark.

Tier 1: Standard Roadways

In North Carolina, basic roadway standards apply to road types throughout the state. In general, all roadway alignment sections will need to be consistent with design guidance in AASHTO's A Policy on Geometric Design of Highways and Streets to allow for consistency and safety of the transportation facility.

Basic Design Recommendations for Standard Roadways

The following are basic design recommendations for roadways classified as standard according to the tier approach as defined in this Manual.

Design road lines to blend. Road lines should curve gently and blend with the landform by climbing in hollows and dropping on ridge lines. The road should fit into the curves and hills of the land, making the smallest disturbance that is practical and economically feasible. The NCDOT Roadway Design Manual should be used as a reference.

Curve road lines. These should be designed gently in order to blend with natural landforms, dropping on convex slopes and rising in hollows.

Roadway design should be sensitive to the visual character of the landform. Landform can be a dominant element of the roadway, particularly in hilly or mountainous terrain. Exposed rock faces, steep cut slopes, and high fills can be dramatic in scale but are often objectionable if they bisect existing landscape features considered visually pleasant or socially significant. Rock features along the roadway should emulate outcrops and engineered features should reflect the use of native bedrock.

Align roads diagonally. Roads should be aligned diagonally in accordance with slopes in situations where mid-slope roads cannot be avoided. The alignment should vary in response to landform. Reductions to the size of cut-and-fill slopes associated with roadway construction should be made to decrease contrast between a road and the landscape. Cut-and-fill slopes should blend into the surrounding landforms.

Consider line of sight. Avoid locating roads that follow the viewers' line of sight on gentle foreground slopes. Roads should curve away from foreground slopes or cross at another angle.

Tier 2: Enhanced Roadways

Enhancements to a roadway include upgrades such as materials, lighting, or other decorative additions to standard roadways. These enhancements do not require structural changes, but should focus on small improvements to the overall aesthetic quality of the roadway.

Basic Design Recommendations for Enhanced Roadways

The following are basic design recommendations for roadways classified as enhanced according to the tier approach as defined in this Manual.

Employ materials similar to those in the adjacent landscape. This is particularly important in urban centers where the built landscape is dominant. Use native, informal plantings along the roadway in rural areas and more formal/ornamental plantings in urban areas. In the rural setting landscape materials can supplement and link existing landscape features.

Complement color to the surrounding. Use earth-toned paints and stains and self-weathering metals for roadway elements so that they match their surroundings.

Consider lighting. Coordinate upgraded lighting elements that visually enhance the roadway.

Tier 3: Landmark Roadways

Roadways considered landmark have a high level of design because they are integrated into the cultural, historical, natural, and human-made surroundings through consistent design and aesthetic considerations. A higher level of detail is placed on the aesthetics of roadside structures including roadside facilities, markers, and signage.

A view of the Blue Ridge Parkway in autumn. Image courtesy Cardens Design.

Basic Design Recommendations for Landmark Roadways

The following are basic design recommendations for roadways classified as landmark according to the tier approach as defined in this Manual.

Focus on context sensitivity. Display high sensitivity to the cultural, historical, and natural resources of adjacent lands such as wildlife refuges, archaeological sites, and scenic byways. Use plants, materials, and design themes to emphasize the identity and character of place.

Introduce a design theme. Establish a strongly defined design theme as developed in the corridor plan, using materials that will be repeated throughout the corridor. Execute the design in a clear and consistent manner as repetition of designs is the basis for the unique identity.

Use rest areas and welcome centers as gateways. Locate and design complete rest areas and welcome centers to serve as gateways to the state. Incorporate pedestrian-oriented lighting at visitor centers and rest areas.

Consider scenic values when selecting rest area sites. Coordinate rest stops and scenic overlooks and incorporate buffers, screens, and access control in the most sensitive areas.

Address signage. Make sure signage is consistent with other features in terms of size, placement, color, form, and materials. Guidelines specified on NCDOT's Signing and Delineation webpage should be referenced as applicable for existing standards.

CSS Principles

The idea that the geometry of pavement is the primary focus of transportation planning is being gradually overtaken by a shift to a more holistic approach that many are referring to as CSD or CSS. Most transportation projects these days strive to be environmentally sensitive, attractive, and responsive to cultural concerns without having to sacrifice safety and accessibility. Today, every state Department of Transportation (DOT) uses CSS to some degree. CSS can lead to a better working relationship between transportation agencies and stakeholders.[99] CSS principles should be implemented across the state on all applicable roadways. These principles[100] include the following:

- Use interdisciplinary teams
- Involve stakeholders
- Seek broad-based public involvement
- Use a full range of communication strategies
- Achieve consensus on purpose and need
- Address alternatives and all modes of transportation
- Consider a safe facility for users and the community
- Maintain environmental harmony
- Address community and social issues
- Address aesthetic treatments and enhancements
- Use a full range of design choices
- Document project decisions
- Track and meet all commitments
- Use agency resources effectively
- Create a lasting value for the community

PUBLIC ART AND ROADWAYS

Roadside structures like visitor centers, welcome centers, rest areas, and park and ride facilities offer the greatest opportunity to incorporate both enhanced and/or landmark public art into the site or structure. Because these facilities are accessed by vehicle and then by foot, the ability to use pedestrian-scale artwork can create a more intimate experience in contrast to artwork viewed as a vehicle moves along the roadway, which must be larger scale. There is more opportunity to engage the viewer with details about the history and culture of the location and the artistic expressions may take on additional forms. Functional public art works that are designed by artists could be benches, water fountains, plazas, windows, or walls with murals or mosaics. Stand-alone artworks include freestanding sculpture that can be interactive with visitors. Clear visibility and Americans with Disabilities Act (ADA) access for all mobility types are important factors to consider for enjoyment and use by all visitors.

When introducing public art associated with roadways, it is important to consider scale of the artwork and the context for the site. Artwork is more likely to be embraced by the community when there is a public art process, with the community able to provide input and an artist designs specifically for the site. This process fosters ownership and true engagement with the community, reduces vandalism, and creates a sense of pride. Artwork "placed" on a site without specific reference to the context or the community engagement process tends to result in a lack of ownership. Some communities have introduced a revolving exhibition of temporary sculptures placed in the landscape. This kind of program works best in defined urban areas and downtowns where the viewer can enjoy the artwork like an outdoor exhibition. Maps and technology like smart phone apps can give the viewer an instant background about each artwork in the tour.

Artist Barbara Grygutis' 'Standing Leaves, Falling Light' uses perforated stainless steel to create surrealistic leaves. During the day the leaves appear both solid and transparent, allowing a view of the sky and landscape beyond. At night, the interior lights and perforated metal creates a luminous moiré effect. Commissioned by 4Culture for the Overlake Transit Center, Redmond, Washington in 2004. Image courtesy Spike Mafford.

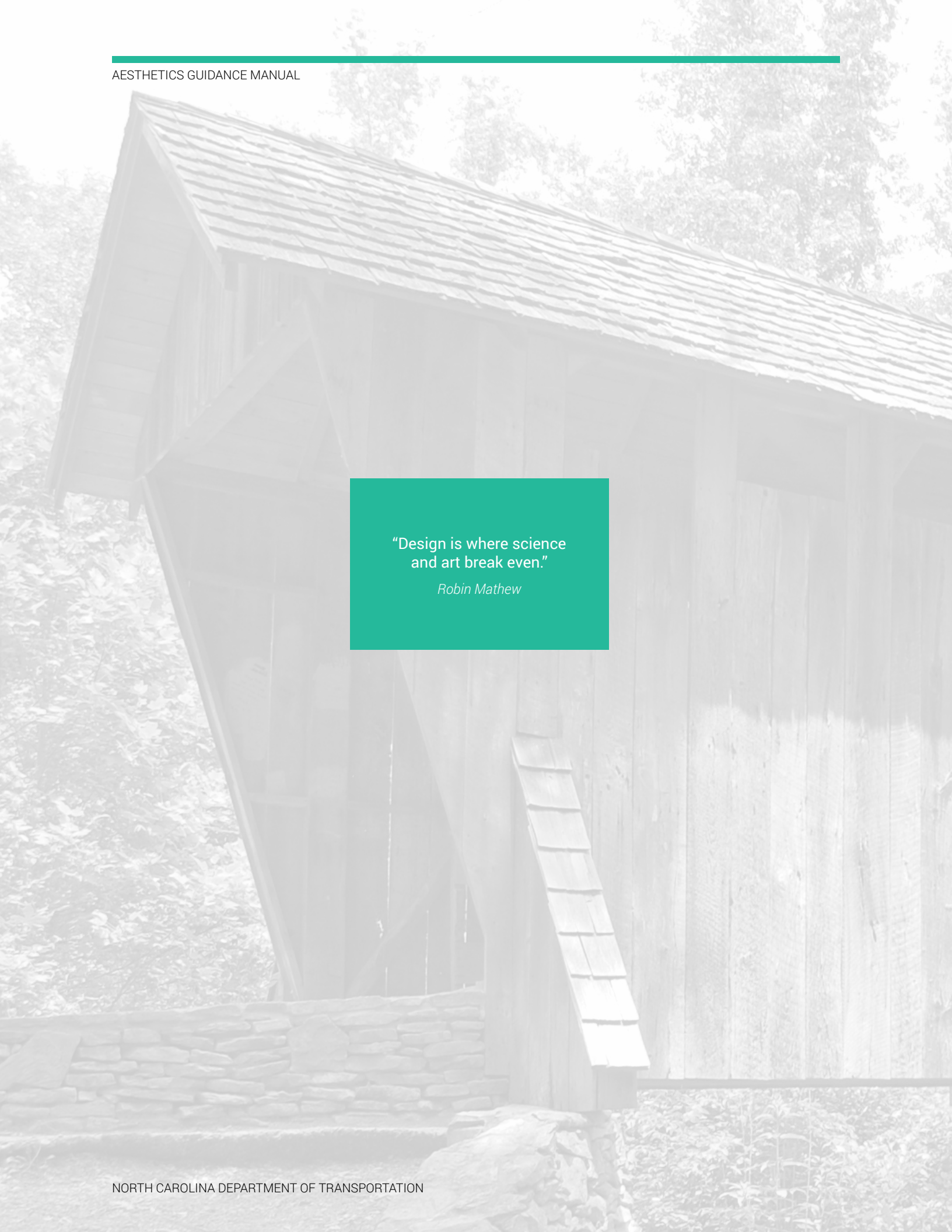
"Sunflower Gate" by Jim Gallucci was part of a temporary roadside art exhibit in Salisbury, North Carolina. Image courtesy NCDOT.

Park and ride structures offer an opportunity for an artist to work with features that create a unique identity for the overall structure or landscape. If there are multiple ride stops, distinctive features such as the architecture or railings can make each stop memorable and orient the user.

Since 2001, TriMet (Portland, Oregon) has been using artist-designed patterns that have been sandblasted onto graffiti-damaged bus shelter glass panels and then reinstalled, reducing costs and waste. New bus shelters are furnished with art panels from the outset. The sandblasted panels minimize future vandalism, improve the appearance of the shelters, and enrich their communities with artwork.

Welcome centers are an opportunity to use landmark artwork to signify the arrival into the state and region. Artwork appropriate to the context of the region and the scale of the site is an opportunity to create a memorable experience for the traveler. The selection of artwork should consider the welcome center's culture, history,

Christine Bourdette's 'Cairns' was inspired by man-made stacks of stones that served as landmarks for navigation and memorials. Cairns is a series of five stacked-slate forms leading to a light rail station in Portland, Oregon. Image courtesy FHWA.



"Design is where science and art break even."

Robin Mathew

CHAPTER 7

FOCUS AREA BRIDGES

"Bridges become frames for looking at the world around us."

Bruce Jackson

7 FOCUS AREA | BRIDGES

OVERVIEW

Each year North Carolina spends $65 million in maintenance improvements for bridges across the state, which includes replacement and preservation of existing bridges.[101] Bridges are some of the most visible components of a road, helping traverse natural obstacles such as rivers, creeks, lakes, and human-made obstacles such as roads and developments.[102]

The state of North Carolina has approximately 18,000 bridges, designed to provide access from one side of a separation to the other in a safe, functional, and economically viable manner. The level of aesthetic treatment varies depending upon the bridge, where the majority in the state are used for utilitarian purposes and have minimal to no aesthetic consideration. Bridges can become an integral part of shaping the identity of a place and its community.[103]

BRIDGE TYPES

Historically, bridges showed a greater emphasis on aesthetic appeal than the bridges built today. This Manual organizes bridges into standard, enhanced, and landmark tiers (see Section A, Chapter 3 for detailed descriptions of tiers).

Bridge Types

Bridges built today are more generally defined by three categories of bridge typologies that include:

Functional bridges

Bridges that respond to utilitarian requirements and are generally constructed under a limited budget. Functional bridges can be classified as being standard bridges or enhanced bridges depending upon the level of consideration and effort placed on increasing the visual appeal.

The Linn Cove Viaduct is one of the most photographed parts of the Blue Ridge Parkway. The viaduct is a 1,243-foot concrete segmental bridge that curves around Grandfather Mountain. It was completed in 1987 at a cost of $10 million and was the last section of the Blue Ridge Parkway to be finished. The Linn Cove Viaduct is recognized internationally as an engineering marvel. Image courtesy NPS public domain.

In North Carolina, the majority of bridges can be categorized as standard functional bridges that address site location needs including overpasses or creek crossings. An increasing number of bridges have a greater level of detail, decoration, and emphasis on community involvement through decorative murals and icons, precast patterns, and stains. Enhanced bridges in communities may include walkways, benches, public art, pedestrian scale lighting, and other features in cases where the community is willing to cover the difference in cost.[104] Examples of enhanced functional bridges include the Laurel Creek Bridge, which carries I-26 over Laurel Creek Gorge in Madison County and the Cape Fear Memorial Bridge in Wilmington. Both bridges are visually striking because of location and functional elements that create aesthetically pleasing forms.

Historical bridges

Historical bridges may be new bridges in a historical district or considered a historic feature if they fall under Section 106 of the National Historic Preservation Act (NHPA). Section 106 requires federal agencies to take into account cultural and historical landmarks and/or properties for transportation projects. State and federal statutes recognize the importance of preserving significant elements of our cultural and engineering heritage. Historically significant bridges are listed or eligible to be listed in the National Register of Historic Places (NRHP) and should be protected wherever possible.[105] Assessing historical bridges for transportation projects takes into account historical context development, management and preservation plans, and rehabilitation practices. Historical bridges add value to their community as cultural assets but also complicate the rehabilitation or reconstruction of structurally deficient or functionally obsolete bridges. Maintaining the cultural and historical integrity of bridges should be of primary concern when structural updates to a bridge or other transportation element (e.g., roadway) are necessary in order to preserve safety and functionality.

See Chapter 11. Focus Area: Bicycle and Pedestrian Infrastructure for multi-use bridges specific to bicycle and pedestrian use.

Landmark bridges

Bridges that place importance on aesthetics and have a high level of design as well as functionality typically have unique characteristic that set them apart from functional bridges.[106] The TRB has defined characteristics of iconic bridges based on survey responses of bridge types. These include:

The use of colored lights under this bridge at the I-77 and West Trade Street underpass in North Carolina increases safety and provides added visual interest. The project is titled "Passing Through Light" by artist Edwin Redl. Image courtesy NCDOT.

Size: Bridges are often characterized by massive size, longer spans, taller towers, or higher superstructures than those of other bridges.

Innovation: Bridges typically provide unique and creative solutions to crossings that may have seemed impossible.

Beauty: Bridges are beautiful to behold. Whether through their form, their color, or their lines, an icon bridge creates a lasting impression.

Location and surrounding: Bridges are custom-made for their surroundings. They are often graced with beautiful settings.

Simplicity: Bridges generally display how they work. They are natural; their behavior is obvious and makes sense.

Landmark: Bridges become landmarks. They are easily recognized by the general public, and take on a symbolism for the people or nation for whom they were built.

Historical significance: Icon bridges frequently hold historical significance.

Longevity: Icon bridges are often characterized by carefully selected materials and constructed with techniques that allow for lengthy lifespan.

North Carolina has one landmark bridge, the Linn Cove Bridge (Viaduct) along the Blue Ridge Parkway. Completed in 1987, the bridge cost $10 million to build and was funded and built exclusively by the federal government. This 1,243-foot concrete segmental bridge curves around the slopes of Grandfather Mountain and consists of 153 precast concrete segments weighing 50 tons each. Bridge segments were precast at an indoor facility, transported to the bridge site, and lowered into place by a custom crane. The result is a bridge that has strong, artistic forms that blend in with the surrounding landscape rather than being imposed upon the landscape.[107]

There has not been a focus to build landmark bridges in North Carolina due to budgetary constraints placed on NCDOT. Enhancements for transportation facilities are the responsibility, financially and otherwise, of the municipality or community group.

Pedestrian bridges are a unique subset of bridge design and are covered in Section B, Chapter 10.

POLICIES AND PROCEDURES

Bridge design in North Carolina is required to conform to the state's standard practices and existing policies. The NCDOT Bridge Policy is used to plan many of the bridges within the state. Other documents that may be used by NCDOT include guidelines from peer states or the TRB.

Aesthetic Bridges Users Guide (2005)

The State of Maryland adopted its guide in 1993 and revised the document in 2005 to include new materials and technologies specific to bridge design and aesthetics. The guidelines present ideas about how aesthetics can be achieved. They have been developed by a multidisciplinary group of bridge engineers, architects, landscape architects, and traffic engineers through the use of cost, safety, and structural considerations.

Aesthetic Guidelines for Bridge Design (1995)

The State of Minnesota's guidelines were developed by the state's Office of Bridges and Structures. The guidelines were written to serve as both a training tool and a reference, and are intended to inspire users to create aesthetically pleasing bridge designs. Although the guidelines focus specifically on bridges, the discussions about aesthetics can be applied to other parts of a broader transportation system.[108]

Bridges along the Blue Ridge Parkway are often constructed using native stones. The curved pattern of the key stones provides an added visual character. Image courtesy Library of Congress.

Bridge Aesthetics Sourcebook (2009)

The Bridge Aesthetics Subcommittee of the TRB developed a website and sourcebook that encourage practitioners to seek aesthetic quality in their bridges through the shapes and sizes of the structural elements instead of depending on the accretion of non-structural add-on features. The recommended guidelines integrate efficiency, economy, and elegance in the design of bridges. The sourcebook focuses on the basics of design, which are presented in a written text.[109]

Bridges Around the World (1991)

Published by the TRB, the books details perspectives and insights of bridge aesthetics and design.[110] Bridge engineers and architects from 16 countries describe the aesthetic appearance of existing bridges.

NCDOT Bridge Policy (n.d.)

The Bridge Policy establishes the controlling design elements of retrofits and STIP bridges and is intended for general use. The primary factors governing the design elements of a bridge are as follows:

- Functional classification of highway facility
- Volume of traffic
- Design speed
- Safety and accident experience
- Urban area boundary
- Bicycle and pedestrian movement[111]

Currently, there is minimal emphasis on bridge aesthetics. The aesthetic details of each bridge are addressed on a case-by-case basis during the planning process.[112]

The support columns for this highway bridge are visually consistent with the adjacent freestanding wall since both have similar colors, textures, and patterns. Image courtesy NCDOT.

PLANNING PROCESS AND COORDINATION

The development of bridge projects in North Carolina is the primary responsibility of NCDOT's SMU. The structure design team leader and the roadway project design engineer work together to coordinate bridge plans and roadway plans to ensure compatibility. A component of the management between the two units is to coordinate aesthetic themes where the NCDOT Visualization Group can assist in preparing visual simulations showing what a new bridge would look like.[113]

The planning and development of bridge projects are a lengthy process and can take years from initial planning discussions to completion for larger projects. Due to the length of this process, aesthetic considerations should begin early in the planning process and include all relevant stakeholders, including the municipality, community leaders, or other involved groups or organizations (including public artists).

The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

In instances where historical landmarks and/or properties may be impacted by transportation projects, including upgrades to an existing bridge or construction of a new bridge, NCDOT must work in coordination with NCDCR to find an approach agreeable to the North Carolina State Historic Preservation Office (NCSHPO) and applicable federal agencies. It is the responsibility of NCDOT to find a solution beyond standard applications as necessary to appropriately protect the historical resource.[114]

Image of the Grassy Creek Bridge in North Carolina. Image courtesy NCDOT.

STEP-BY-STEP PROCESS

The inclusion of bridge aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two: Focus Area Review - Integration of Bridge Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 5 and 6 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the Project Sponsors of aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Historic bridge along I-85, over the Yadkin River near Salisbury, North Carolina. Image courtesy NCDOT.

James Farm Road Bridge along Merritt Parkway in Connecticut. The bridge is reminiscent of Greek architecture with upright wings over arches. Image courtesy Historic American Engineering Record (Library of Congress).

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting will be held to determine the LEDPA/Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/ Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the bridge concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

A multiuse footbridge using "International Orange," selected to complement the natural surroundings and enhance visibility. Image courtesy AECOM.

Step 8S and 3R: Aesthetics Community Meeting(s)

The TPM will hold a community meeting (or series of meetings) with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership among the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

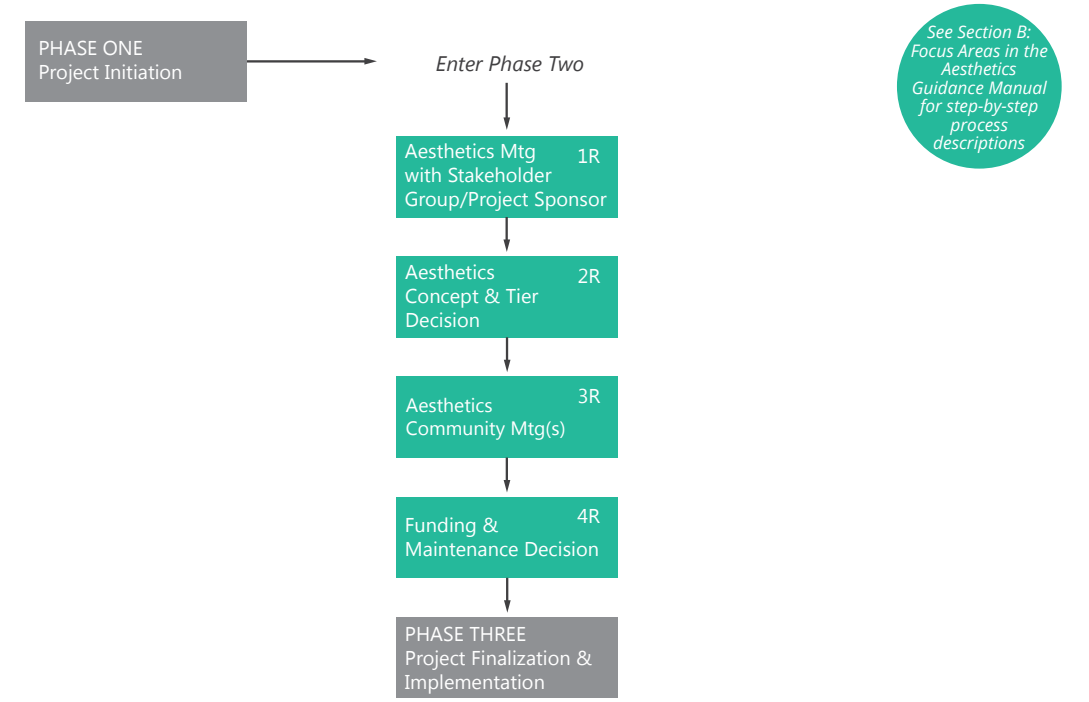
Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

EXHIBIT 5

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 6

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - STIP PROJECTS

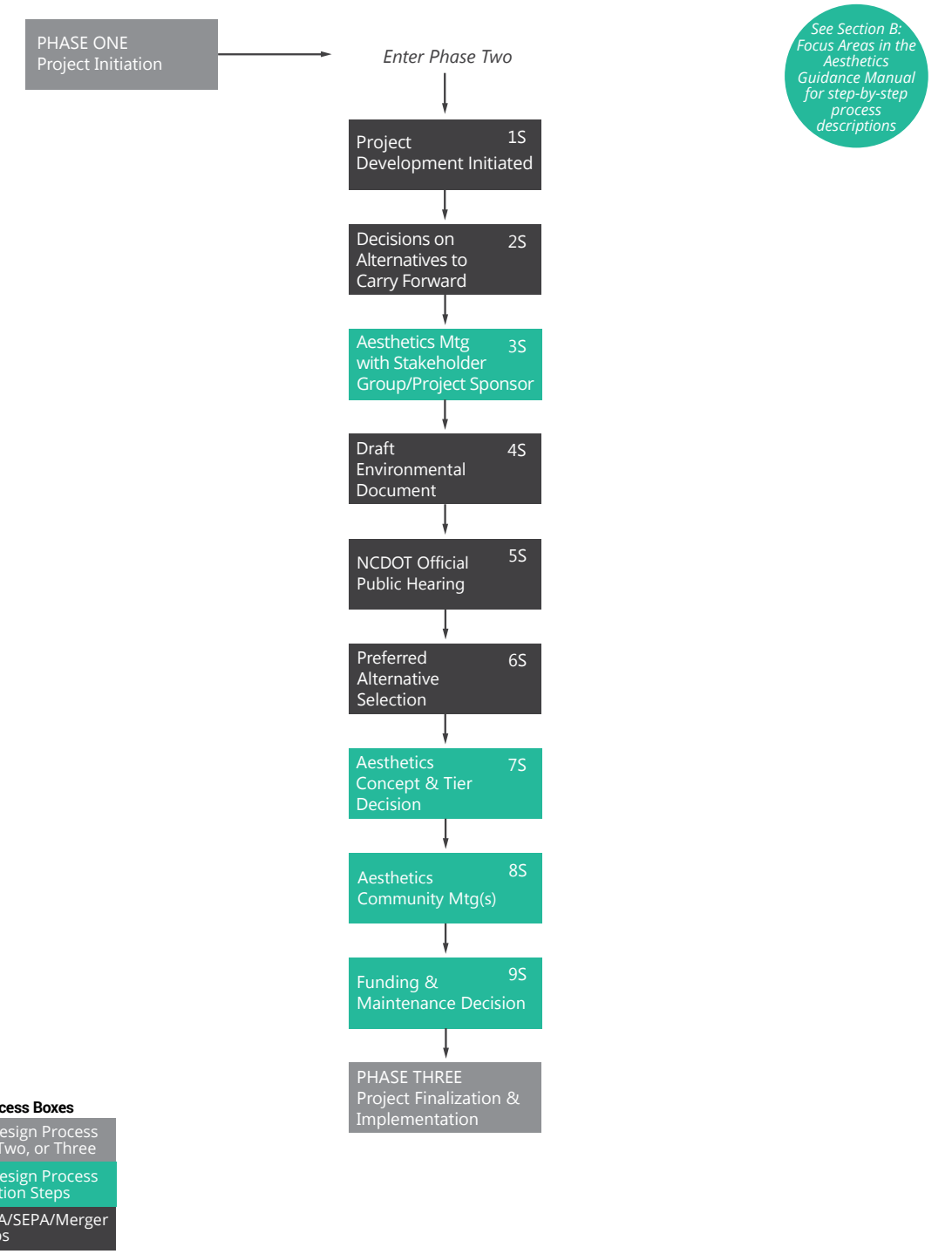


Image of a standard bridge and abutment in central North Carolina. Image courtesy NCDOT.

TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, bridges are categorized here according to standard, enhanced, or landmark, which represent the general levels of aesthetic consideration and effort applied for a particular structure.

The design of bridges requires an understanding of construction materials that offer a greater variety of design options for enhancing aesthetics.

The visual character of a bridge is based on the physical structure of the bridge. The physical features of a bridge that influence this visual character, in order of importance, are as follows:

Vertical and horizontal geometry: The basic form of a bridge is the dominant visual characteristic, especially for larger bridges. The integration of bridge form into the surrounding topography and other structures has a major impact on its visual dominance.

Superstructure: The superstructure is the portion of the bridge that supports the riding surface and connects one substructure element to another. It includes the bridge deck and girders.

Superstructure elements: Superstructure shape, parapet, and railing impact visual character in a more subtle way than bridge decks and beams.

Substructure components: The substructure is the portion of the bridge that supports the superstructure and distributes all bridge loads to below-ground foundations. Pier or bent and abutment or end bent placement and shape have a significant impact on the visual character of a bridge.

Aesthetic details: The color, surface texture, and visual enhancement of elements such as signage, lighting, and landscaping add an additional level of aesthetics.[115]

Traveling over the bridge deck, the driver of a vehicle sees the travel way, bridge railings, and view to either side. If the bridge crosses over another roadway, water, or land, both its side and underneath can be viewed from this perspective. Because they are so visually dominant, the aesthetic quality of bridges is an important consideration. Bridges function as visual landmarks and are a key part of the sense of identity of many major roadways and communities.

Tier 1: Standard Bridges

Standard bridges in North Carolina are typically comprised of prestressed, precast concrete girder or steel plate or wide flange I-girder bridges designed to address the issues of a specific site location. NCDOT has documented standard design plans and standard drawings with details available to NCDOT engineers and engineering consultants serving NCDOT. In general, the concepts below can be used to increase the aesthetic appeal of standard bridges.

Basic Design Recommendations for Standard Bridges

The following are basic design recommendations for bridges classified as standard according to the tier approach as defined in this Manual.

Develop the visual appeal of bridges. Use careful engineering of scale, proportions, and balance of all components and apply the principal of transparency, which is increased with the use of fewer and more slender substructure elements.[116] Abrupt changes in structural dimensions within the limits of a structure should be avoided.

Create unity. Create a visual design unity among surrounding existing and new structures where possible.

Contour grade embankments. Use landscape planting or rock mulch to stabilize embankments where possible.

Incorporate pedestrian needs into design of bridges. Sidewalks and bicycle accommodations should be included in the design of the bridge to help improve connectivity.

Coordinate visual aspects. Coordinate visual aspects of sound walls, retaining walls, and other highway structures into the bridge design.

The underside of a bridge is also part of the overall visual character seen by those traveling on the roadway. Images courtesy NCDOT.

Tier 2: Enhanced Bridges

Enhanced bridges include adding upgrades in the form of precast elements, lighting, and other decorative additions to standard bridges. Incorporating enhancements to a bridge does not require structural changes, but should focus on small improvements that can offer advances to the overall aesthetic quality of the bridge. Many of the bridges in the state are considered standard bridges such as box girder bridges, where addressing the aesthetics of the abutments, girders, piers, and parapets is recommended to enhance the visual character of bridges.

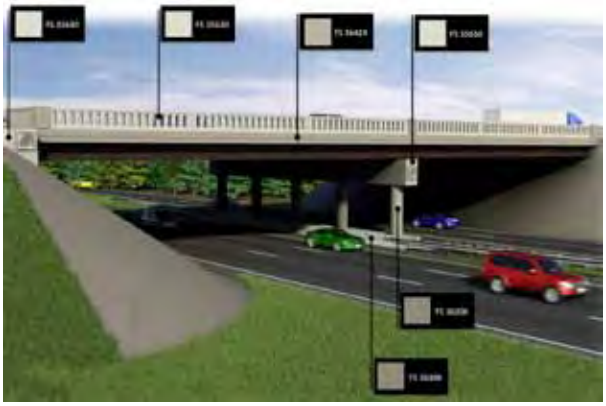
Because of the wide variation of structural systems and bridge types between Tier 1 and Tier 3, enhanced bridges fall into two sub-tiers (Level 1 and Level 2).

Level 1

Enhanced bridges considered Level 1 include mainly cosmetic improvements to conventional NCDOT standard bridge types, such as the use of colors and textures, modifications to traffic barrier rail and/or pedestrian rail, and the use of more visually appealing shapes for substructure columns and caps. Also included in Level 1 enhanced bridges is the addition of other upgrades in the form of precast elements, veneers, lighting, or other decorative additions to standard bridges. Incorporating Level 1 enhancements to a bridge does not necessarily require structural changes, but should focus on small improvements that can offer advances to the overall aesthetic quality of the bridge. Many of the bridges in the state are considered standard bridges, where addressing the aesthetics of the abutments or end bents, girders, piers or bents, and parapets is recommended to enhance the visual character of bridges.

Level 2

Enhanced bridges considered Level 2 may include all of the aesthetic improvements above but would include an emphasis on the visual appeal and elegance of all bridge components and the structure as a whole. This level of enhanced aesthetics would include the use of structural systems that are inherently more visually appealing such as hammerhead or "T" shaped piers, oval or polygonal shaped columns, integral caps, single column or wall piers in place of multi-column bents (where applicable), and closed superstructure types such as concrete or steel boxes and tubs.



A computer graphic image (top) shows the color palette developed for a proposed bridge. A color palette helps ensure visual consistency once the bridge is completed (bottom), and can also be used for other bridges within the state. Images courtesy NCDOT.

Basic Design Recommendations for Level 1 Enhanced Bridges

The following are basic design recommendations for bridges classified as level 1 enhanced according to the tier approach as defined in this Manual.

Incorporate context through materials. Provide aesthetic treatments on bridges that include specialized surface finishes, colors derived from hues seen in the surrounding, and textures and patterns that are visible at highway speeds.

Create a visual design relationship. Coordinate materials, patterns, color, and other design elements.

Use form liners. Using form liners or other surface veneer approaches can enhance the surfaces of a new or existing bridge. Railings, parapets, lighting, banners, place name signs, and other design elements can also enhance a bridge.

Consider handrail and guardrail systems. Rail systems perform an important aesthetic role in the appearance of the bridge. Rail systems help finish the visual statement and help establish the visual character of the bridge. The shape of a rail system should relate to its function, overall aesthetic design and be proportionate to the superstructure.[117]

Use visually light bridge rail structures. Consider open rail design to create a more refined bridge with a lighter appearing span where rails are either concrete or concrete parapet with steel rail on top, specified for crash safety. Maintain scenic views and views to the surrounding landscape where possible.

Ensure ornamental rail systems are functional. The design of ornamental rail systems must address the functional purpose as well as the visual impact of the element.[118]

Incorporate aesthetic considerations in pedestrian screens. The color and construction of materials for pedestrian screens should allow the screen to be as transparent as possible. This will tend to make the screen blend into the background, permitting the bridge structure to dominate the visual composition.[119]

Pedestrian rails can serve an important role in unifying a corridor and adding a level of continuity.

Consider the use of color. Superstructures and substructures constructed of various materials can be stained or painted to blend with or stand out from their surroundings.[120]

Match surroundings with bridge materials. Make sure materials complement bridge structure, color, and the surrounding landscape including finish type, color, and surface patterns. Finishes should be vandalism resistant.

Emphasize signage as a visual element. When a bridge has more than one sign, the vertical dimensions of the signs should be consistent to promote visual continuity.[121] Consider aligning the top of the sign with the top of the railing, and align the bottom of the sign with the bottom of the superstructure for fascia-mounted signs.[122]

Basic Design Recommendations for Level 2 Enhanced Bridges

The following are basic design recommendations for bridges classified as level 2 enhanced according to the tier approach as defined in this Manual.

Use "high-end" treatments. Use at the most visible interchanges, such as gateways.

Preserve and replicate historical or architectural character of existing bridges.

Emphasize character. Slender girders and tall, tapered piers can add to aesthetic character. Keep details simple, pronounced, and easy to distinguish.

Use proportion. Good proportions are fundamental to achieving an aesthetically pleasing bridge structure.[123] Use simple substructure and support features with strong proportional relationships in bridge design and simple geometric shapes to minimize the support profile.[124]

Focus on simplicity and regularity. Use bold and orderly designs that can be viewed at highway speeds considering also the angles and distances from which the designs will be viewed.

Consider the underside of bridges. The underside of bridges will often be prominent because of the height of the bridge, the position of the roadway beneath the bridge, or the location of the bridge.

Use good form for piers and girders. When a bridge has a low profile, the visual impression can be improved by having proportional piers supporting slender girders.[125]

Consider fill embankments and approach rails in concert with the abutment, bridge barrier rail, and superstructure. Materials, height, and attachment details should be carefully considered when connecting guardrails to the bridge.

Basic Design Recommendations for Historical Bridges

The following are basic design recommendations for bridges classified as level 1 enhanced according to the tier approach as defined in this Manual.

Focus on the historical context. Recognize the bridge as a physical record of its time, place, and intended use. Avoid changes that create a false sense of historical development such as adding conjectural features or architectural elements.

Olive Chapel Road bridge, crossing I-540, is an enhanced bridge in North Carolina. Image courtesy NCDOT.

The bridge over US 421 along the Blue Ridge Parkway in North Carolina is an enhanced bridge. Image courtesy NCDOT.

Embrace modifications. Recognize that historical bridges have often been modified during the life of the structure. These modifications have likely acquired historical significance in their own right and should be respected as such.

Use preservation. Preserve distinctive features and construction techniques that characterize the historical bridge.

Salvage and repair, rather than replace. Deteriorated historical features should be salvaged and repaired to the extent allowed by economic and technical feasibility. Where severity of deterioration requires replacement of distinctive features, the new feature should match the old in design, color, texture, and other visual qualities, and where possible, material. Replacement of missing features should be substantiated by documentary, physical, or pictorial evidence.[126]

Clean the surface. If appropriate, clean the surface of the bridge with the gentlest means possible in order to preserve the natural materials and aesthetic nuances.

Differentiate new work from the old work. Alterations should not destroy historical elements that characterize the property. The new work should be compatible with the mass, scale, proportion, and architectural features to preserve the historical integrity of the property.[127]

Tier 3: Landmark Bridges

In North Carolina most bridges are developed with a utilitarian approach. The Linn Cove Bridge (Viaduct) along the Blue Ridge Parkway and the pedestrian bridges at the Museum of Art on I-440 and the ATT Bridge on I-40 are considered landmark bridges in the state (see Chapter 11 for more information on Bicycle and Pedestrian Infrastructure). It is encouraged that a landmark bridge be considered in North Carolina where needed to cross one of the state's many iconic cultural, historical, or urban areas.

Landmark bridges typically (but not always) dominate the visual landscape of their surroundings and are a sight to behold by the traveling public. These structures often elicit an emotional response and leave a lasting impression. Landmark bridges, as the name indicates, truly become landmarks that people recognize and these landmarks, many times, help to define the surrounding vicinity.

Bridge types that fall into this category are suspension bridges, cable stayed bridges, extradosed bridges, arch bridges of all types, and variable depth segmental concrete box girder bridges. Many of the design concepts included in Tier 1 and Tier 2 are also included for landmark bridges.

Basic Design Recommendations for Landmark Bridges

The following are basic design recommendations for bridges classified as landmark according to the tier approach as defined in this Manual.

Consider size and scale. Landmark bridges are typically larger, many times much larger than their surroundings and can be seen from long distances. Landmark bridges nearly always include spans over 200 feet and frequently incorporate spans of 500 feet up to spans over 2,000 feet.

Include innovative or unique designs. Many times this class of structures is so eye-catching because of unique and innovative designs. There are typically no bridges resembling the landmark bridge in the immediate vicinity or wider region.

Integrate light. Portray the form of the bridge by outlining features with illumination or light to create a silhouette or lighting on pier columns.[128]

Focus on simplicity where form follows function. Landmark bridges typically display their structural form as a result of the function of the structural system.

Integrate the surroundings. Sometimes, as in the case of the Linn Cove Bridge (Viaduct), the surroundings can increase a structure's grandeur.

PUBLIC ART AND BRIDGES

Bridges, because of their prominence in the landscape, can become an integral part of the identity of a place and its people. Public art opportunities may be found in bridge abutments, lighting, piers, railings, medians, or other detail elements. Addressing aesthetics during the earliest stages of planning and design and involving an artist can be beneficial as it incorporates a unique skillset to the process. Specifically, the community engagement process involved in planning public art follows CSS principles where the artist can help mitigate community concerns about transportation construction projects. Public art projects take engagement, expertise, and time for the end product to have a positive connection with the community.

It is important to coordinate all structures within a facility or at a particular site, including the bridge structure, noise walls, retaining walls, or other structures in order to create a visual unity within the corridor.

Design motifs used for the Arlington, Virginia Boulevard bridge were inspired by native redbud trees. Heart-shaped leaf patterns and seed pods add texture, and laser-cut leaves are LED back illuminated with programmable reflecting sky tones. The project was designed by Vicki Scuri SiteWorks with AECOM Transportation. Image courtesy Vicki Scuri.

"Create your own visual style, let it be unique for yourself and yet identifiable for others."

Oscar Wilde

CHAPTER 8

FOCUS AREA NOISE WALLS

"A noise barrier should become a complement to the community, not an eyesore."

Federal Highway Administration

8 FOCUS AREA | NOISE WALLS

OVERVIEW

The state of North Carolina has approximately four million square feet of noise barriers along its transportation corridors. Noise is an inherent part of transportation facilities, both for retrofit and newly constructed transportation facilities. Noise walls help to abate the audial impacts of transportation facilities to adjacent uses such as residential or commercial developments.

Noise walls are installed where traffic noise exceeds or is expected to exceed established threshold levels based on NCDOT Traffic Noise Abatement Policy.[129] Walls typically range in height from 10 to 20 feet and are usually located at grade level exposures or cut sections to help reduce the visual impact of the walls. They are also located outside the designated Clear Recovery Zone (CRZ) of a road as a safety measure. Noise walls may take many different forms (see noise wall types, below) but are often freestanding and have a strong visual presence due to size and proximity to the roadway. Freestanding walls may also be used as visual barriers to prevent unsightly views of maintenance or toll equipment or unappealing adjacent uses or to assist with control of access (such as from animals). Both noise walls and freestanding walls are most commonly used by NCDOT for noise abatement.

Incorporating aesthetic considerations into the design of a noise wall offers an opportunity to minimize potential negative visual effects for both motorists and surrounding businesses or residents. Coordination early and throughout the design and development process of noise walls can allow for improved aesthetic experiences.

Concrete piers support precast concrete panels with stone patterns created with form liners. The cap gives the wall a finished appearance. Image courtesy NCDOT.

NOISE WALL TYPES

The FHWA identifies six different types of noise wall systems. NCDOT uses some or a combination of some of the following noise wall types.

Noise Wall Types

Post-and-panel noise walls
Consists of noise barrier panels mounted between foundation-supported posts. Primary elements of this type of barrier include post and post/foundation attachments, panels, and panel to post connections.

Brick and masonry block noise walls
Includes barriers constructed of fabricated brick or masonry block units. Typically, these types of systems are constructed by laying the brick or masonry block in a conventional manner using a continuous spread footing as a base.

Free-standing noise walls
Includes barriers that support themselves. Such barriers typically fall into the following general categories: precast concrete, "planted" or bin type, and stone crib walls.

Direct burial panels
Uses a special panel system that involves burying a portion of one end of the panel (either precast concrete or wood) directly into the ground with no other means of foundation support. With this type of system, the panels are usually full height and the connection to adjacent panels is typically designed as a tongue and groove system.

Cast-in-place concrete noise walls
Constructed at the project site. The construction process includes excavating for the footing, erecting form work, setting reinforcement steel, pouring concrete, surface finishing, and curing.[130]

NCDOT has typically used post-and-panel noise walls with either a smooth or patterned surface. However, the design approach for noise barriers may vary considerably depending upon roadway design constraints.

Most noise wall systems are fabricated off-site in a plant, then transported to the project site, and assembled on-site. Noise wall systems fabricated on-site may include cast-in-place concrete walls.

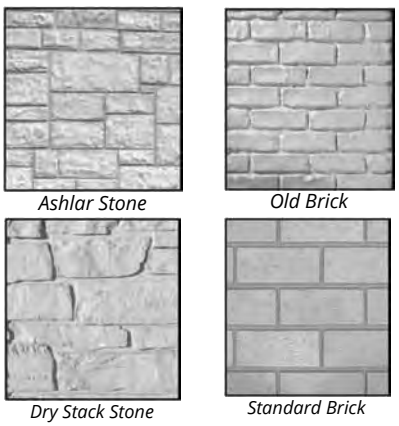
Noise Wall Materials

A variety of materials may be used for noise wall panels and posts. The most common are concrete, brick and masonry block, native stone, or metals. NCDOT typically uses concrete for precast post and panels.

Brick and masonry
Brick is typically manufactured using a clay and sand mix that is fired in a kiln. Masonry block is manufactured using a dry-cast concrete mix. Both brick and masonry block come in several standard formats and are not used often for noise walls due to cost of materials and labor.

Stone
Most stone in North Carolina is produced from granite, argillite (type of sedimentary rock), quartzite (a type of quartz), marble, or sandstone. The North Carolina Granite Company operates one of the largest granite stone quarries in the world at Mount Airy in Surry County, North Carolina. Mount Airy granite is used as ashlar for masonry walls. Stone is not used often for noise walls due to the high cost of materials and labor.

Metals
Three types of metals are most commonly used for walls: (1) steel, (2) aluminum, and (3) stainless steel. Steel is currently the least expensive and most common of all metals used in construction. Aluminum is a lightweight element, while stainless steel is highly durable and corrosion resistant. Of the metals listed, only steel is commonly used on noise walls. Aluminum may be used on bridge noise walls. Transparent panels, wood, and composites are all materials recognized by FHWA, but not used for noise walls by NCDOT.[131]



Four standard patterns used in concrete noise walls using form liners. Image courtesy NCDOT.

POLICIES AND PROCEDURES

Several federal and state regulations that impact how NCDOT addresses noise are available as reference of existing policy and procedures.

Several federal and state regulations that impact how NCDOT addresses noise are available as reference of existing policy and procedures.

Code of Federal Regulations (Title 23, Part 772) Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) 2010)

The regulation considers noise abatement as part of applicable highway construction or improvement projects as a mandatory practice. In this document FHWA left many decisions on how to implement this policy up to individual states' policies. Federal Noise Abatement Criteria (NAC) is presented in these regulations to set minimum highway noise abatement thresholds.

Federal-Aid Highway Act (23 USC §109(i)) (1970)

The Act specifically addresses the analysis of highway traffic noise. This law required FHWA to develop highway traffic noise standards for use in the planning and design of new highway projects. FHWA complied by developing and initiating regulations in February 1973.[132]

FHWA - Highway Traffic Noise: Analysis and Abatement Guidance (2011)

Provides direction for the analysis and abatement of highway traffic noise.

NCDOT Traffic Noise Abatement Policy (2011)

Updated in 2011, the policy includes guidelines for traffic noise evaluation, abatement feasibility and reasonableness, equitable administration of policy and funds, and public and local government outreach.[133]

Brick noise wall. Image courtesy Flickr Creative Commons.

PLANNING PROCESS AND COORDINATION

The standard planning process for noise walls is outlined in the NCDOT Traffic Noise Abatement Policy (2011). NCDOT uses this policy to determine the need for noise abatement and the feasibility and reasonableness of abatement measures.[134] The policy applies to NCDOT Type I projects only, which involve construction of a highway on a new location, a significant alteration of an existing highway, or the addition of auxiliary lanes or ramps and other transportation projects. Currently, noise abatement is not applied to Type II projects, which involve retrofitting of existing roads, maintenance projects, guardrail projects, rehabilitation projects, existing facilities, and addition of auxiliary lanes.[135] Type III projects do not meet the classifications of Type I or Type II projects and do not require noise analysis.

> The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

Community input is a major consideration in reaching a decision on abatement measures. Community residents and representatives should be involved in helping improve the appearance of noise barriers using CSS. For many businesses, maintaining the visual connection to adjacent roadways is important, and this needs to be considered when determining the location and layout of noise walls. Meetings (both formal and informal) are held to provide information as well as to gather comments, opinions, and concerns from the public and local officials.[136]

The public preference voting process, as defined in the Noise Abatement Policy, provides guidelines on public input. The ballot gathers public input on whether a noise abatement measure should be built for the proposed transportation facility project. The Date of Public Knowledge is the public release of the location and potential noise impacts of a proposed highway project. Only those areas that may be impacted by traffic noise are eligible for noise abatement, invalidating the possibility of noise walls in areas based on citizen request.

See the Policy for additional details.

STEP-BY-STEP PROCESS

The inclusion of noise wall aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two: Focus Area Review - Integration of Noise Wall Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 7 and 8 below for the step-by-step implementation diagram.

The TPM and the NCDOT Traffic Noise & Air Quality Group Leader are responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Step 3S: Preliminary Traffic Noise Analysis (TNA)

The TNA is based on current NCDOT Traffic Noise Abatement Policy and in compliance with NEPA/SEPA requirements. Traffic noise abatement for NCDOT highway projects is warranted and must be considered when traffic noise impacts are created.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. Traffic noise impacts by alternative area are included in this evaluation. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the LEDPA/Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group

Step 7S: Design Noise Report (DNR)

The DNR is performed during project final design when a TNA determines noise impacts occur and noise abatement is found feasible and reasonable, per NCDOT policy.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader

Step 8S: Noise Abatement Measures Warranted?

Traffic noise abatement for NCDOT highway projects must be considered when the predicted traffic noise levels for the design year substantially exceed existing noise levels. These specifications are detailed in the July 2011 NCDOT Traffic Noise Abatement Policy.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader

Step 9S: Public Preference Ballot

The public preference ballot incorporates the reasonableness of the noise wall, focusing on a combination of social, economic, and environmental factors. The formal ballot is dispersed to property owners and tenants who occupy a residence or applicable business that receives predicted traffic noise levels. One owner ballot and one tenant ballot (when applicable) are solicited for each predicted noise-impacted property. The ballot determines whether a noise wall will or will not be built, based on public preference.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader

Step 10S and Step 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM and NCDOT Traffic Noise & Air Quality Group Leader will meet with the Project Sponsors of aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

In cases where a community wants a noise wall out of the scope of a NCDOT sponsored roadway project, the community is responsible for 100 percent of the cost of a noise wall.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 11S and Step 2R: Aesthetics Concept and Tier Decision

The TPM and NCDOT Traffic Noise & Air Quality Group Leader will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the noise wall concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 12S and Step 3R: Aesthetics Community Meeting(s)

If results from the public preference ballot determined that a noise wall will not be built, the project will proceed to Phase Three and standard NCDOT NEPA/SEPA/and Merger Process steps. This may be the first in a series of community meetings, as applicable.

For retrofit projects and if results from the public preference ballot in STIP projects determined that a noise wall will be built, the TPM will hold a community meeting with the Project Sponsor to specifically identify aesthetic preferences. Based on these results, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCDOT Traffic Noise & Air Quality Group Leader, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 13S and Step 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership among the TPM and other involved parties and Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

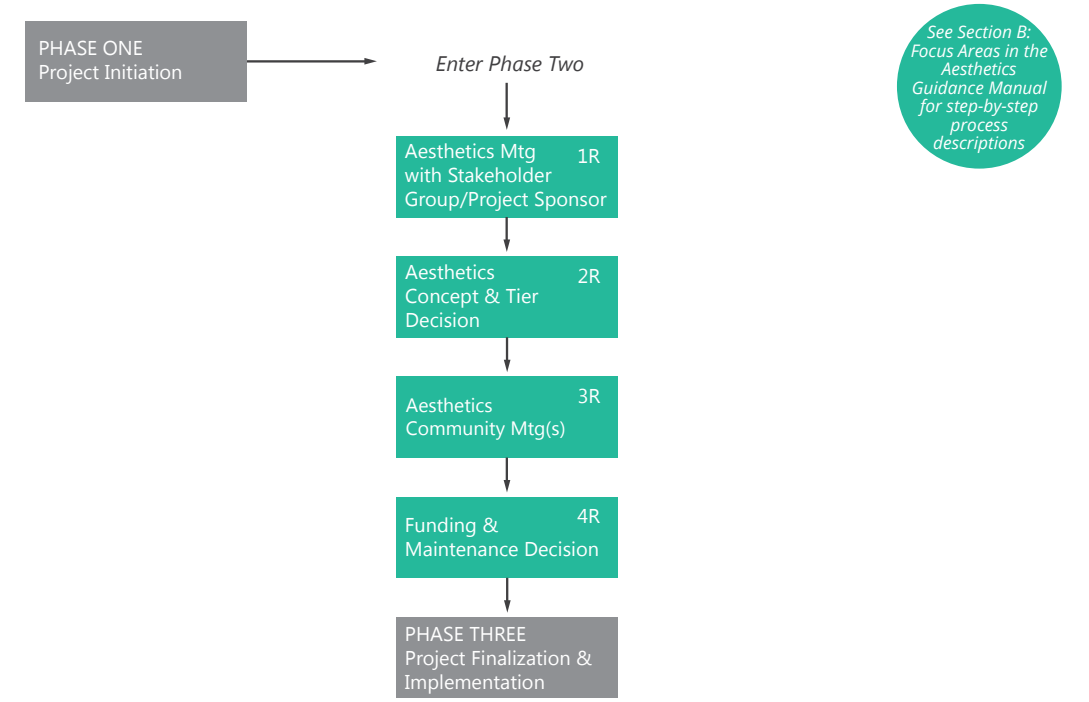
Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

EXHIBIT 7

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

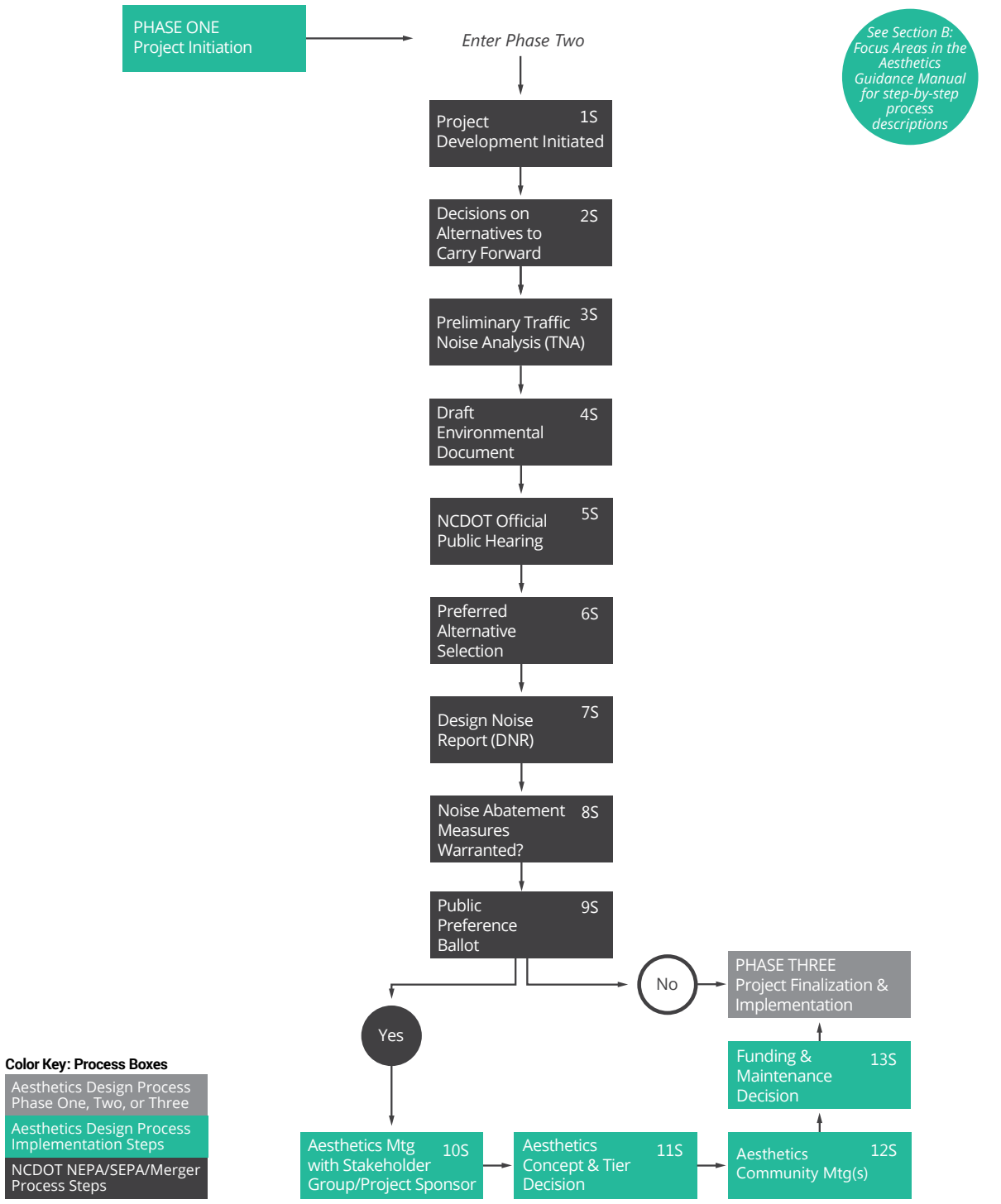
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 8

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - NOISE WALL STIP PROJECTS



TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, noise walls are categorized herein according to standard, enhanced, or landmark. The variations between the types of walls differ based upon the materials used, the level of detail, and the effort to fit the design to complement adjacent cultural, historical, natural, and human-made surroundings.

Tier 1: Standard Noise Walls

The standard noise wall used by NCDOT has historically been constructed of steel piles and concrete panels with exposed aggregate on the roadway side ("front") and a smooth concrete surface on the community side ("back"). More recently, concrete columns are used instead of steel piles. Increasingly, the most common approach has been to use patterns in various textures and colors created using form liners with concrete columns. The upper section of wall has also been left untextured in order to visually create a faux cap. Surfaces have included an option to put textures on the front and back of the walls. It is up to each NCDOT division and/or local government to determine whether the back of a noise wall is smooth or textured.

The most commonly used patterns are ashlar stone, stacked stone, and brick. Form liners are becoming increasingly more affordable as up to 200 panels can be produced from a single form liner. Old brick or weathered brick is easier to produce than new brick. Both are recommended over a new brick texture because the sharper edges of new brick are more likely to break during panel removal. NCDOT allows 10, 12, 15 and 20-foot constructed panel lengths. This helps simplify the construction process.[137]

See the Pattern Book for examples of standard noise walls.

Standard noise wall along a roadway in North Carolina with enhanced landscaping. Image courtesy NCDOT.

This test panel shows how various color stains can change the appearance of a noise wall. A larger precast stone pattern is used along the bottom of the test panel, with a finer texture stone pattern on top. Image courtesy FHWA.

Basic Design Recommendations for Standard Noise Walls

The following are basic design recommendations for noise walls classified as standard according to the tier approach as defined in this Manual.

Select a simple design palette. Choose a simple design palette of material, pattern, color, and texture that coordinates with the visual character of a corridor.[138]

Use complementary colors. Select colors that harmonize with the adjacent landscape and are consistent with the materials palette for the corridor. Typical colors are shades of brown or gray.

Consider both sides of a wall. Consider the appearance of a noise wall both from the roadway and from adjacent properties. Provide visual diversity based on the design theme for the corridor. Consider maintenance when making decisions about materials on both sides of walls.

Use grading to minimize wall height. Aesthetic improvements for walls should be considered in concert with specific site characteristics, available space, cost, and noise protection procedures. Where possible, the height of freestanding walls should be minimized to reduce negative visual impacts. A combination of earth berms and walls can be used to achieve structural integrity and reduce sound while limiting the wall height. On gradually sloping grades, the top of the wall should transition appropriately with the slope to help create a sense of unity. Noise barriers should not be designed with any segment heights greater than 25 feet above the proposed ground line without NCDOT approval.[139]

Consider spacing and organization. Separate walls from other highway structures and set back from travel lanes. Coordinate spacing between structures such as bridges and retaining walls. When practical, avoid attaching walls to concrete barriers and/or retaining structures. When walls are attached to such structures, avoid mixing materials and incompatible forms.[140]

Use a multidisciplinary team. The design approach for noise walls should be comprised of a multidisciplinary team. This may include architects, planners, landscape architects, roadway engineers, acoustic engineers, and structural engineers.

Avoid monotony. The psychological effect of walls on passing motorists should be considered. The design should avoid monotony for the motorist. At roadway speeds, visual perception of noise barriers will tend to be of the overall design of the barrier and its color and surface texture.

Consider context. Designs should be based on the surrounding context. This means different design considerations for dense, urban settings than for open suburban or rural areas. Walls in the Coastal Plain Region could have different aesthetic characteristics than those in the Piedmont or Mountain regions.

Minimize use of walls. To the extent possible, minimize the use of walls in significant viewsheds where they will block the view of the area outside the ROW.

Maintain top line. Preserve a continuous, even, or curvilinear top line along the entire length of the wall, avoiding abrupt, right-angle steps up and down to the extent possible.

Consider the sun. The effects of noise barriers on sunlight and shadows should be considered.

Remember lines. The addition of vertical elements can help break up the strong horizontal lines of most noise walls. Long straight lines are monotonous and make a wall seem longer than it actually is. Vertical lines should be avoided on extremely high walls. Combinations of horizontal and vertical lines may be effective where extreme height is a visual problem.

Colors count. Colors evoke psychological responses. Harmonious colors tend to soothe, contrasting colors tend to attract the eye, and clashing colors irritate.

Tier 2: Enhanced Noise Walls

Enhanced noise walls involve adding an additional level of detail to standard noise walls. This detail could include decorative surfaces, a combination of materials, the addition of emblems and artistic pieces, creative colors and textures, or a combination of all of the above. These walls are typically more visible and enhance the visual character of the roadway corridor. As a general rule, NCDOT does not construct enhanced walls. According to NCDOT criteria, an enhanced noise wall is one that has a greater level of detail and typically incurs greater costs than standard noise walls. Additional funding is allowed by public entities only.

Examples where public entities have contributed financially to create a wall more in keeping with their community identity include when NCDOT widened a 6.2 mile corridor of I-40 in Asheville, North Carolina. The changes involved shifting the horizontal alignment of the noise wall toward the highway, revising the heights of the modeled barrier segment to set the tops of the panels to whole-foot elevations, maintaining vegetation between the edge of the pavement and the ROW in the vicinity of the noise wall, and reevaluating the need for a maintenance gap in the noise wall. The noise walls include patterns of fluted mountains and leaves paid for by the City of Asheville.

See the Pattern Book for examples of enhanced noise walls.

This concrete wall uses form liners to create an Ashlar Stone pattern, and both the panels and concrete piers are stained to create a more muted color. Image courtesy FHWA.

Basic Design Recommendations for Enhanced Noise Walls

The following are basic design recommendations for noise walls classified as enhanced according to the tier approach as defined in this Manual.

Enhance walls. Wall surfaces can be enhanced with texture, color, and graphic displays that are added to the walls. This can be expressed as relief or sunken relief.

Incorporate design considerations. Includes horizontal patterns to minimize vertical massing. Vertical textures and patterns will minimize the visual length of the wall. Vary the grade along the face of the wall and integrate with plantings to minimize the apparent height of a wall. Consider maintenance when making design decisions.[141]

Pay attention to detail. Pay attention to details such as shadow boxes, decorative caps, clean foundations, contrasting elements, and exciting forms and textures. Use appropriate wall caps since they create a more finished appearance for a wall. Wall caps that mimic or follow the shape of the background tend to be less obtrusive.[142]

Create visual breaks and interruptions to avoid monotony along walls. Use staggered and/or curved walls of varying lengths to provide visual interest along extended stretches of sound walls. Shadow patterns can be used for visual interest.[143]

Use special finish options on vertical surfaces. Options that can change the visual appearance of vertical surfaces include form liners, sandblasting, exposed aggregate, pigmented coatings, concrete coatings, architectural veneers, and modular structural units.[144]

Provide landscape planting and setback space between clear zones and walls. Landscape plantings in front of walls will soften the appearance of large wall faces and connect the vertical wall to the horizontal ground plane. Smooth grade transitions help create a more natural relationship between a wall and its surroundings.[145]

Add details that create a sense of place. One enhancement is to add medallions on noise walls. These are not very expensive, are easy to install, and help enhance a community's sense of identity.

Keep things natural. One problem with many walls and abutments is that they try too hard to look natural in very unnatural ways.[146]

Use attractive materials. Stone exhibits a naturally rough, coarse texture that adds visual interest to a wall. Stone veneers are effective if mortar joints are deep enough to produce a three-dimensional look that is emphasized by varying sizes, color, and creating shadows.

Protect natural materials. In some areas, existing vegetation can be preserved in order to reduce the visual impacts of the walls.

Increase size of test panels. It is recommended test panels for all noise wall projects are expanded in size to allow for repeating patterns to have good visual continuity along the joined panel seams. It is also important to show color variations from one panel to the next in order to allow for visual consistency. Panels that include details or textures should also be reviewed to make sure seams are aligned.

Brick noise wall along US 64, outside Apex, North Carolina. A brick pattern form liner was used to add visual interest. The grooves between and selected 'bricks' are painted to keep the wall from being too monotone in color and texture. Image courtesy NCDOT.

The fluted patterns on these precast concrete panels represent the surrounding mountains in Asheville, North Carolina. This technique and level of integration can be considered a landmark noise wall type. Image courtesy NCDOT.

Tier 3: Landmark Noise Walls

A landmark noise wall is one that goes beyond functionality only to create a visual focal point that stands apart from its surroundings. A landmark noise wall can be considered a public art piece that attracts the attention of not only motorists, but others on the roadway and members of a community.

These types of walls can help define a community's sense of identity, or enhance one that already exists. It is intended to be something different and unique and often builds upon the history and culture of a place, but may be more abstract and modernistic. It goes beyond enhancing a standard wall by the use of higher quality materials, native materials, or the level of detail and increased quality.

NCDOT does not currently have a landmark noise wall in the state. Landmark noise walls are considered at the request of major stakeholders, non-profits, or communities that are seeking something out of the ordinary. Additional funding to construct a landmark noise wall is typically provided by stakeholders and communities and is seldom funded by federal or state dollars. NCDOT will consider including landmark noise walls along the state's transportation corridors as long as the additional funding is provided by another government entity.

See the Pattern Book for examples of landmark noise walls.

Basic Design Recommendations for Landmark Noise Walls

The following are basic design recommendations for noise walls classified as landmark according to the tier approach as defined in this Manual.

Focus on simplicity. The key is to make sure landmark noise walls are integrated so they complement the visual character of a community. The color, texture, and pattern of walls have a major influence on a driver's perception of a roadway.[147]

Choose an appropriate visual design subject. Use visual design themes and/or pictorial motifs consisting of simple patterns and distinct surface texture, and carefully design the motifs' composition on the wall. Visual design themes and/or pictorial motifs should be an appropriate subject and scale for the highway segment in which they are located.[148]

Consider the cultural, historical, and natural context of the wall. Incorporate these elements as the dominant visual design of the noise wall to better integrate with the surroundings and reflect the community.

Create works of art. Landmark noise walls function as works of art as much as they do walls. Consider maintenance requirements and potential vandalism impacts when incorporating art.

Address barrier end treatments. The ends of noise barrier systems should be addressed where possible using existing topography with landscaping or the ends of barriers can use a stepping of panels to reduce height.

PUBLIC ART AND NOISE WALLS

Wall art is an opportunity to make a unique, positive statement about a community. The costs of creating distinctive artwork surfaces are minimal in comparison to the enhanced experience for the driver and passerby. Aesthetically enhanced walls can be considered a CSS when the walls are located directly in or near urban areas or are considered gateways into a community. These walls are an opportunity to visually represent the history and culture, or emphasize the natural areas, of a region or, in the case of abstract patterned walls, to make a statement that is aesthetically pleasing.

Noise walls can be turned into a positive attribute when used as a backdrop for large-scale art. Introducing enhanced walls with public art is also a CSS aimed at mitigating undesirable visual impacts of the concrete from the "back" or community side perspective. This is a highly desirable solution that can help deter graffiti and give the public an opportunity to work with an artist on concepts and themes relevant for their community.

It can take months to select and hire an artist. Engaging the community at the earliest possible planning stage regarding interest for enhanced or landmark walls is recommended. This allows a local municipality, arts council, or other organization the ability to hire and include a public artist on the team long before planning designs or construction documents are finalized. Many public artists working on large-scale infrastructure such as noise walls have the skills to produce CAD drawings or compatible drawings and can seamlessly incorporate their designs into larger NCDOT plans. In addition, form liner companies are increasingly able to offer custom liners and are accustomed to working with an artist's designs.

The cost of hiring a public artist to design unique textures or imagery for noise walls, including the cost difference for creating the required form liners, may be an established percentage of the project's total budget. The percentage of the total budget allocated for artwork is not fixed, and depends on the individual agency's ability to fund and maintain enhanced features. A recommended

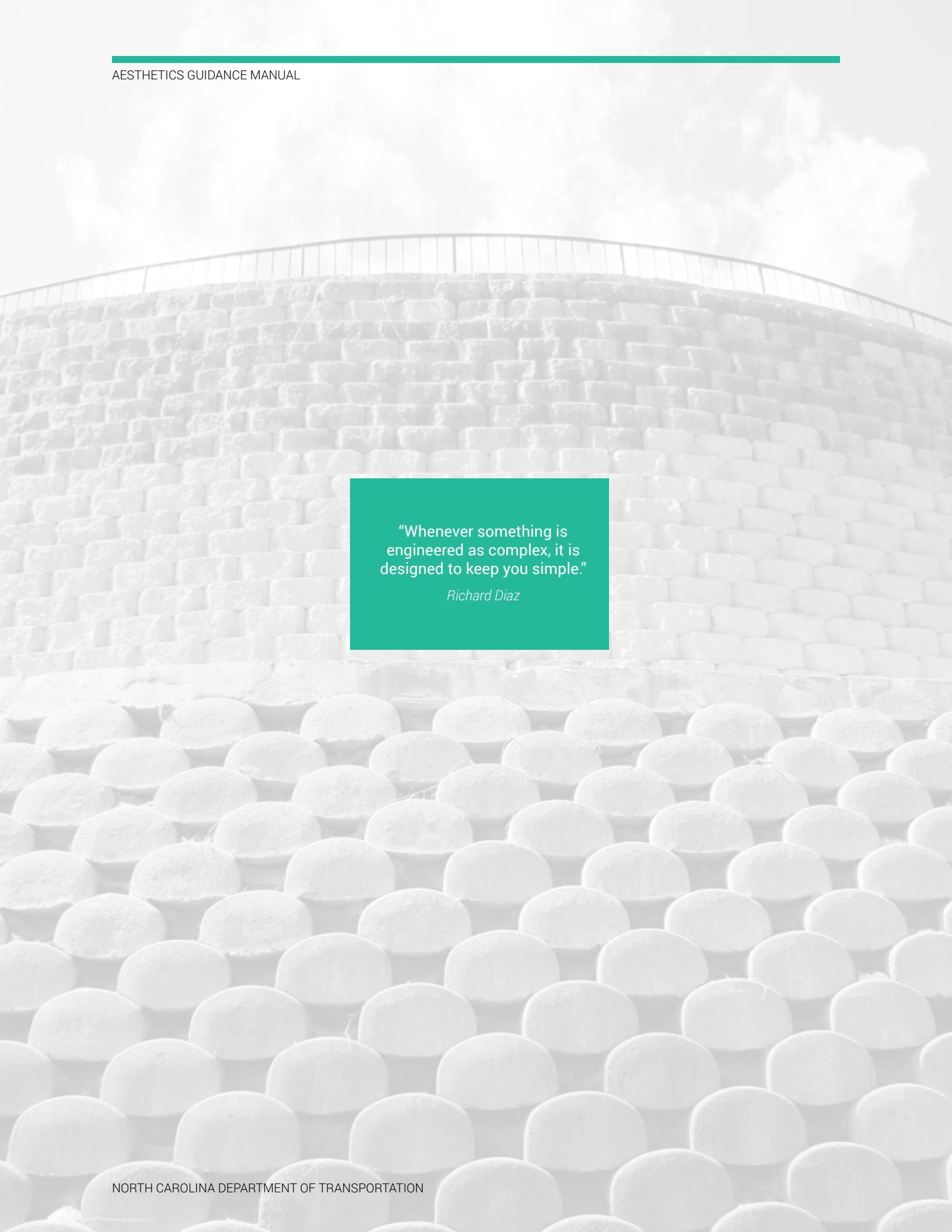
Carefully designed narrative of abstract and representational desert inspired motifs for the "Path Most Travel" were designed by artist Carolyn Braaksma for six miles of Prima Freeway Loop 101 in Scottsdale, Arizona. Artwork is incorporated into both the freeway side and the neighborhood sides of the retention and noise walls. The art celebrates the character of Scottsdale as unique art community. Image courtesy Carolyn Braaksma.

Kevin Berry designed the 1200 foot noise wall in Scottsdale, Arizona (1999). Seven steel fish "swim" along a wave of river rock toward one of the city's canals, a tribute to the importance of water in Scottsdale. The colors, textures, and patterns reflect the pedestrian scale while also encouraging motorists to slow by providing a greater level of visual interest than normally found along neighborhood streets. Image courtesy James Sipes.

standard would be between two and five percent of the total project budget for public art. That amount would include art construction above NCDOT existing standards and the artist's fee for design and construction oversight.

Public art on noise walls should take into consideration the implications of scale and should have a focus on stimulating drivers while not being a distraction. Although the improved aesthetics may reduce mental fatigue and improve driver performance, safety is of utmost importance because art is generally viewed from an increased distance and by people traveling at a higher rate of speed.

In the City of Glendale, Arizona, metal wall art is fastened to noise walls. The walls are made of tan-colored concrete masonry units, with a stone veneer used at the base and near the top of the walls. Image courtesy Creative Design Resolutions.



"Whenever something is engineered as complex, it is designed to keep you simple."

Richard Diaz

CHAPTER 9

FOCUS AREA RETAINING WALLS

"Design is as much a matter of finding problems as it is solving them."

Bryan Lawson

9 FOCUS AREA | RETAINING WALLS

OVERVIEW

In North Carolina, there are approximately 1.4 million linear miles of retaining walls.[149] The NCDOT Geotechnical Engineering Unit (GEU) is responsible for making recommendations on the type and technical details of retaining walls, while the NCDOT RDU and/or PDEA make the decision on the use of a retaining wall for a transportation project.

Retaining walls are structural elements that hold back soil or rock mass, are used to protect embankments from slope failure and/or repair landslides, minimize ROW requirements, shorten bridges (the retaining wall in this application is called an abutment wall), widen roads, and provide property access.[150] Generally, retaining walls are costly and justified for construction when other options such as purchasing the ROW or reinforced slopes are not feasible.[151] Retaining walls are particularly useful in areas where the topography is too steep to transition back to existing grades using the existing ROW or too rocky to use 3:1 slopes or other acceptable gradients. The use of a retaining wall can minimize the footprint of a roadway and minimize visual impacts.[152]

The "Great Wall" along I-5 in Tacoma, Washington, marks the southern edge of the City near South 38th Street. The project was completed between 2003 and 2008 by Vicki Scuri and SiteWorks with the WSDOT Design Team. Image courtesy Vicki Scuri and Siteworks.

Cast-in-place (CIP) concrete facing. Image courtesy NCDOT.

Precast concrete panel with steel H-piles facing. Piles painted gray, not a standard NCDOT practice. Image courtesy NCDOT.

Precast concrete panel with galvanized steel H-piles. Image courtesy NCDOT.

Steel sheet pile facing. Image courtesy NCDOT.

RETAINING WALL TYPES

Many types of retaining walls are used along transportation corridors in North Carolina. Retaining wall types include various approaches to the structural elements of the wall, depending on the needs or requirements of the surrounding transportation system.

Retaining Wall Types

According to NCDOT's *Roadway Design Manual*, retaining wall types are either fill or cut walls. Fill walls are those retaining walls constructed from the bottom up by placing material behind the walls and include gravity, mechanically stabilized earth (MSE), and cantilever concrete retaining walls.[153] Cut walls are those retaining walls constructed from the top down by removing material from in front of the wall and include sheet pile, soldier pile, and pile panel retaining walls.[154]

Gravity retaining walls (fill wall)

Walls that depend on their mass to resist pressure from behind and may have a batter (the receding slope of a wall) that leans back into the slope to improve stability. Many of the older stone walls along the Blue Ridge Parkway and other historical roads include stone gravity walls.

Mechanically stabilized earth (MSE) retaining walls (fill wall)

Walls that are a more modern approach for gravity walls and use precast, segmental blocks, panels, or geocells filled with soil to add stability. MSE walls typically have a modular look to them.[155]

Cantilever concrete retaining walls (fill wall)

Walls made from an internal stem of steel-reinforced, CIP concrete or mortared masonry. These walls can have a smooth or textured concrete surface, a veneer (such as stone or brick), or form liner patterns. More expensive than MSE walls, cantilevered walls are used only when MSE walls are not feasible.

Sheet pile retaining walls (cut wall)

A cantilever cut wall that consists of interlocking sheet piles driven into the ground. Sheet piles are used for temporary shoring (propping for support).

Soldier pile retaining walls (cut wall)

A cantilever cut wall that consists of steel H-piles driven in with concrete using either precast panels or cast-in-place reinforced concrete face.

Pile panel retaining walls (cut wall)
A cantilever cut wall that is a type of soldier pile wall with H-piles in drilled holes and concrete panels.

Soil nail retaining walls (cut wall)
A non-cantilever cut wall that is used in situations with no fill, gaining stability from non-tensioned elements that resist applied earth pressure on the wall.

Anchored retaining walls (cut wall)
A non-cantilever cut wall that gains stability from tensioned anchors that resist applied earth pressure on the wall. Anchored walls are also called "tieback walls."

Abutments
An abutment is the substructure at the end of a bridge span that provides support for the bridge's superstructure. These abutments function as retaining walls that resist lateral movement of the earthen fill of the bridge approach.[156]

Solid abutments that use retaining walls are typically used in urban areas where space is limited, or for narrow bridges. With wider bridges a more open abutment solution is preferred because this approach aesthetically fits better with the flow of the terrain. Wing walls are always used with open abutments, but they vary in terms of length and height.[157]

Retaining walls are also often used to stabilize fill soil through sections of roadway expansion that would be covered by fill slopes. These walls are not typically visible from the road.

Retaining Wall Facings

Six standard wall facings are considered the baseline by NCDOT's GEU and offer greatest affordability and facing options with the potential for diverse aesthetic treatment applications. Aesthetic treatments should focus on facing elements rather than wall types, as aesthetic treatments are dependent on the wall type and vendor options. The standard retaining wall facings recognized by NCDOT include:

Cast-in-place (CIP) concrete
Standard facing is smooth concrete for greatest efficiency in cost and maintenance.

Precast retaining wall (PRW) unit facing. Image courtesy NCDOT.

Segmental retaining wall (SRW) unit racing. SRW units tinted tan, not a standard NCDOT practice. Image courtesy NCDOT.

Precast concrete panel facing. Image courtesy NCDOT.

Shotcrete facing that is sculpted and stained, not a standard NCDOT practice. Image courtesy NCDOT.

Precast concrete panels
Standard facing is smooth concrete panels. Cost and maintenance are greater than that of CIP concrete walls, but is recommended as a standard application due to ease of installation.

Galvanized steel piles
Standard facing is unpainted as painting galvanized pile is costly.

Segmented retaining wall (SRW) units
Standard facing is dry-case segmented retaining unit with split straight face grey block.

Precast retaining wall (PRW) units: Standard facing are wet-cast, large blocks that have a standard rocky face.

This sequence shows an existing retaining wall (top) and two visual simulations (bottom images) showing the use of concrete stains. Images courtesy NCDOT.

Steel sheet piles
Standard facing is exposed sheet piles. There are generally minimal enhancement options for steel sheet piles as they are often located below a bridge or next to railroads. If enhancements were requested, upgrades are costly due to piles having to be driven and/or cantilevered.

Shotcrete
Currently not considered a standard facing by NCDOT. The material can be easily carved for a variation of textures including ashlar stone. Examples in the state include under the I-40 bridge in Morganton and I-40 in Statesville, both of which were stained and sculpted. Standard facing for shotcrete is specified as unsculpted and unstained.

Retaining Wall Materials

A variety of materials may be used for retaining walls. The most common include the following.

Concrete
For CIP concrete retaining walls, concrete is typically delivered on-site premixed by a concrete truck. Precast concrete is prepared at a concrete plant and then delivered to the site.

Brick and masonry
Brick is typically manufactured using a clay and sand mix that is fired in a kiln to increase the brick's strength and durability. Masonry block is manufactured using a dry-cast concrete mix. Both brick and masonry block come in several standard formats, and are often used for retaining walls only if the result matches existing structures within a roadway corridor.

Stone
Most building stone in North Carolina is produced from granite, argillite (type of sedimentary rock), quartzite (a type of quartz), marble, and sandstone that are quarried in regional quarries. Ashlar is often used for masonry walls. Other stone may also be used for retaining walls, but native stone is best for context sensitivity of a wall with the surrounding landscape.

Metals
The most commonly used metals include steel, aluminum, and stainless steel, but are rarely used for retaining walls. Steel is the least expensive and most common of all metals used in construction. Aluminum is lightweight while stainless steel is highly durable and corrosion resistant.

POLICIES AND PROCEDURES

Retaining walls are typically used to solve grading issues associated with roadway projects. As a result, retaining walls typically fall under the policies and procedures that address roadway design.

Roadway Design Manual (2014)

The predominant guiding document for retaining wall specifications and considerations. The document provides general design information, design criteria, and plan preparation guides.

NCDOT Standard Specifications for Roads and Structures (2012)

Provides a compilation of standard requirements used by NCDOT for construction contracts. Specifically, sheet pile retaining walls are described in detail.

Wall Art: Engineered Solutions for Aesthetic Earth Retention (2010)

Describes current retaining wall systems and how to combine best practices in engineering and aesthetics.

A retaining wall constructed of metal piers and precast concrete walls helps create a stable base for a new road. Image courtesy FHWA.

A retaining wall along a local road protects pedestrians and motorists. Image courtesy Flickr Creative Commons.

PLANNING PROCESS AND COORDINATION

Retaining walls are typically included as part of the roadway planning process, including discussion of road geometry, grading and drainage, and site design. Incorporation of retaining walls into transportation projects is generally considered toward finalization of the planning process and sometimes during construction.

During projects with known cultural or historical landmarks or properties, retaining walls will be a part of the early scoping and planning discussions.

> The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

As part of the aesthetic considerations of retaining walls, context sensitivity with the landscape and overall roadway design are important to aesthetic integration. Abutments are typically included as part of the roadway planning process as well as the bridge design process. The aesthetics of an abutment should be considered within the broader purview of the roadway corridor.

STEP-BY-STEP PROCESS

The inclusion of retaining wall aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process.

This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two, Focus Area Review - Integration of Retaining Wall Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 9 and 10 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the Project Sponsors of aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Retaining wall along I-90 near Seattle, Washington. Image courtesy Flickr Creative Commons.

A noise wall is located at the top of a short concrete retaining wall that helps stabilize slopes and provides additional height to make the noise wall more effective. Image courtesy NCDOT.

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the LEDPA/ Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the retaining wall concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 8S and 3R: Aesthetics Community Meeting(s)

The TPM will hold a community meeting (or series of meetings) with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership among the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

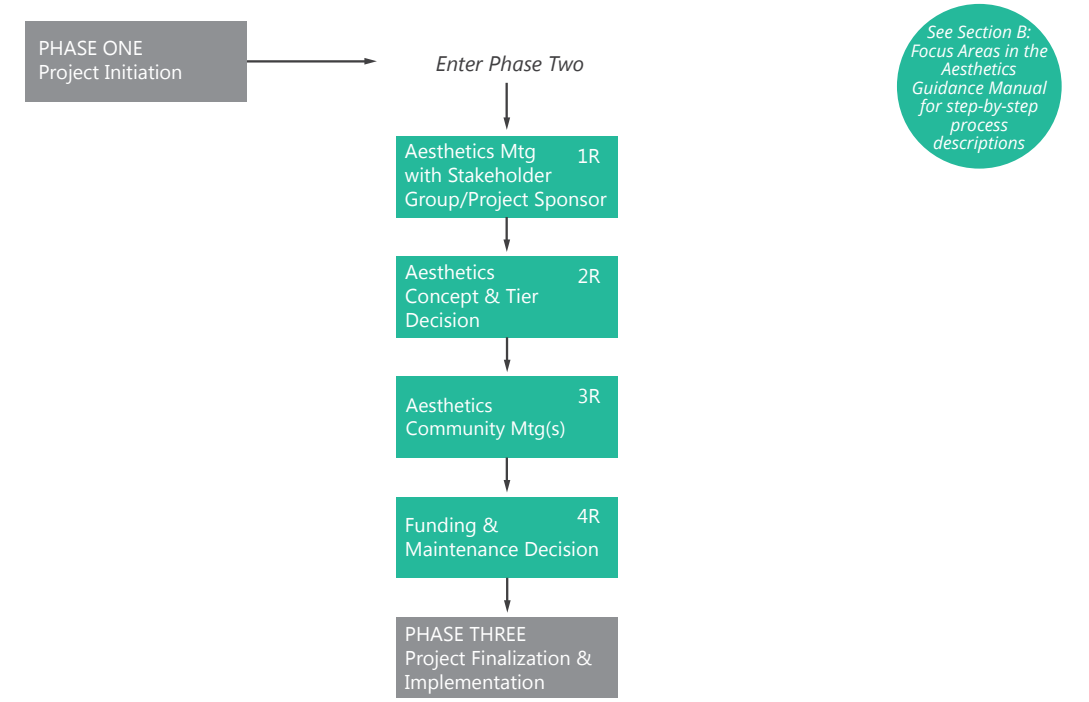
Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

EXHIBIT 9

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

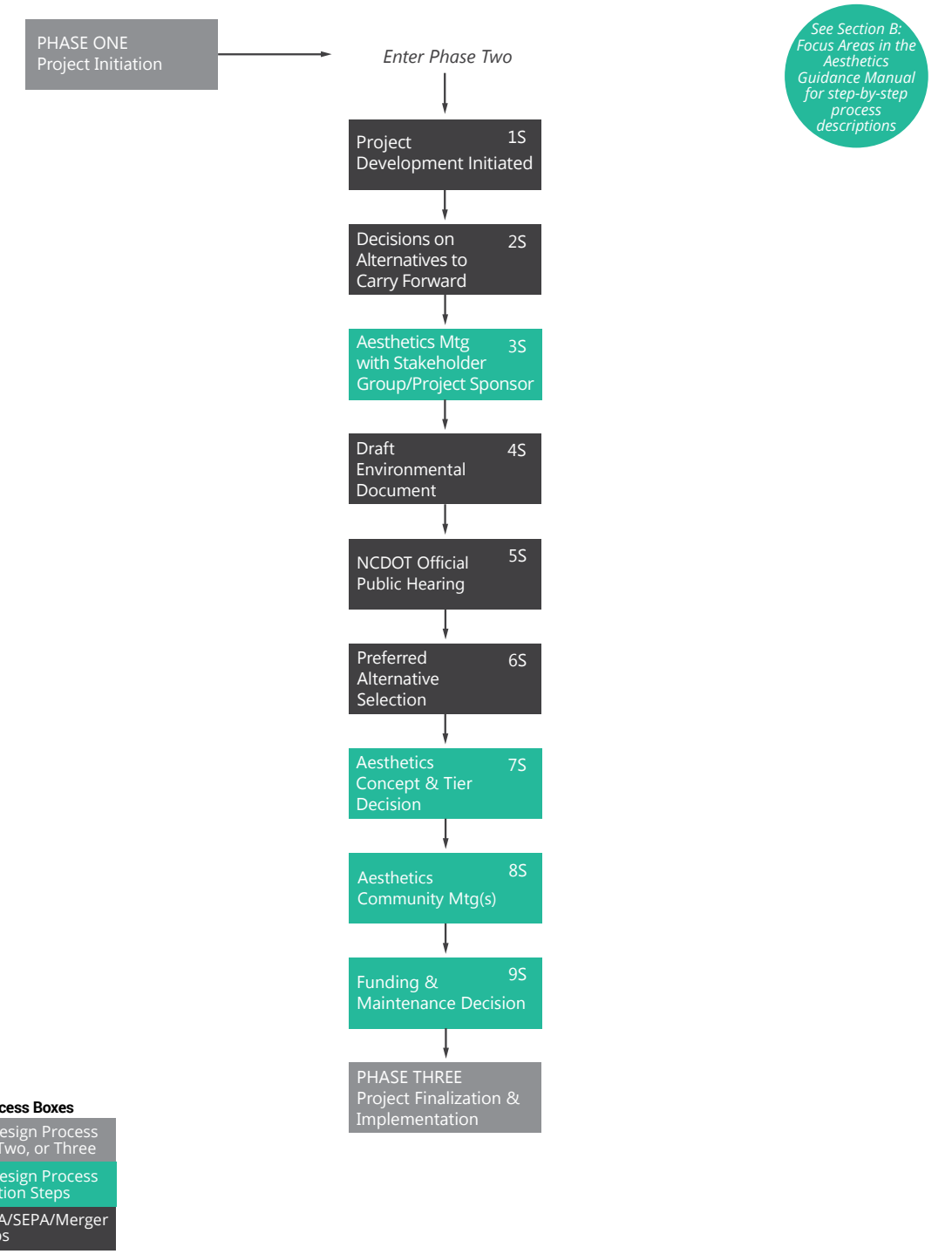
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 10

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - STIP PROJECTS



TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, retaining walls are categorized here according to standard, enhanced, or landmark. The variations between the types of retaining walls vary based upon the materials used, the level of detail, and how well the retaining wall fits the surrounding natural and human-made surroundings.

Tier 1: Standard Retaining Walls

In North Carolina, typical retaining walls have standard wall facing of smooth concrete. Typical wall types can vary largely depending on the roadway context, type, and structural requirements. Most retaining walls are incorporated toward the end of the planning process with little time available to improve a standard wall to an enhanced or landmark wall. For most bridges, NCDOT uses open abutments created by sloping concrete or other hardscape material sloping from the edge of the roadway back to the beginning of a bridge. Closed abutments using retaining walls are often used in areas with limited or costly to acquire ROW, or in areas where cultural and natural resources need to be protected.

See the Pattern Book for examples of standard retaining walls.

Basic Design Recommendations for Standard Retaining Walls

The following are basic design recommendations for retaining walls classified as standard according to the tier approach as defined in this Manual.

Select a simple design palette. Choose a simple design palette of material, pattern, color, and texture that coordinates with the visual character of a corridor. The design palette used for a retaining wall should be consistent with the design palette for the rest of the roadway corridor.

Use complementary colors. Select colors that harmonize with the adjacent environment and terrain, consistent with the material's palette for the corridor. Retaining walls should blend into the landscape in order to reduce visual impacts.

Use grading to minimize wall height. Aesthetic improvements should be considered in concert with specific site characteristics. Use a combination of grading to achieve visual and structural integrity while limiting actual wall height.

Separate walls from other highway structures and set back from travel lanes. When practical, avoid attaching walls to concrete barriers and/or retaining structures. When walls are attached to such structures, avoid mixing materials and incompatible forms.[158]

Use a multidisciplinary approach. The design approach for retaining walls should be multidisciplinary and include architects/planners, landscape architects, roadway engineers, acoustical engineers, and structural engineers.

Consider context. Designs should be based on the surrounding context. This means different design considerations for dense, urban settings than for open suburban or rural areas.

Remember lines. Combinations of horizontal and vertical lines may be effective where the height of a retaining wall is a visual problem.

Colors count. Colors evoke psychological responses. Harmonious colors tend to soothe, contrasting colors tend to attract the eye, and clashing colors irritate.

Consider fencing, guardrails, and railings. Fencing, guardrails, and railings installed on retaining walls should be consistent with or complementary to those found on adjacent bridges. Specifically, these should be considered with potential adjacent noise walls and potential upgrades.

Provide landscaping. Install vegetation as appropriate to minimize the visual effects of retaining wall massing.

Tier 2: Enhanced Retaining Walls

Enhanced retaining walls involve adding an additional level of detail to standard retaining walls. This detail could include decorative surfaces, a combination of materials, the addition of emblems and artistic pieces, and creative colors and textures. These are walls that are typically very visible and do more than provide functionality—they also enhance the visual character of the roadway corridor.

See the Pattern Book for examples of enhanced retaining walls.

Basic Design Recommendations for Enhanced Retaining Walls

The following are basic design recommendations for retaining walls classified as enhanced according to the tier approach as defined in this Manual.

Enhance wall surfaces. Retaining wall surfaces could be enhanced with texture, color, and graphic displays. This graphic can be expressed as relief, surface applied color sealer, surface applied reflective coating, or a combination of all three.

Incorporate design considerations. As a general rule, the tops of retaining walls should be level because a wall with a slanted top looks unstable. If a retaining wall needs to change directions, using a stair-step approach to raise or lower the top of the wall is the preferred approach.

Pay attention to detail. Pay attention to details such as shadow boxes, decorative caps, clean foundations, contrasting elements, and exciting forms and textures. Use appropriate wall caps. Wall caps that mimic or follow the shape of the background tend to be less obtrusive.[159]

Maintain the visual integrity of a retaining wall. Most retaining walls are not so long that they need to be broken up or staggered in order to reduce their visual impacts.[160]

Avoid conflicting patterns. Do not locate a retaining wall using natural stone, or a stone veneer, next to an abutment, noise wall, or other engineering structure with a precast stone pattern since there is a visual contrast between the two.

Use special finish options on vertical surfaces. Options that can change the visual appearance of vertical surfaces include form liners, sandblasting, exposed aggregate, pigmented coatings, integral dyes, concrete coatings, architectural veneers, and modular structural units.[161]

Keep things natural. One problem with many abutments is that they try too hard to look natural in very unnatural ways. Sometimes the best approach is to create a simple architectural representation of a retaining wall that looks authentic. Fake rock patterns that have clearly defined horizontal and/or vertical lines are not authentic.[162]

Use materials that are appropriate to the context. Stone exhibits a naturally rough, coarse texture that adds visual interest to a wall. Stone veneers are effective to mask mortar joints if they are deep enough to produce a three-dimensional look emphasized by shadows.

Protect natural materials. Retaining walls can be used to protect existing vegetation. Preserving existing vegetation can reduce the visual impact of walls by serving as a visual buffer.

Increase size of test panels. Four-foot by four-foot test panels should be required for significant retaining walls that will likely have a visual impact on a roadway corridor. This test will better show color variations from one panel to the next, allowing for visual consistency. Panels with textures should be reviewed to make sure seams are aligned.

Provide landscaping. Install vegetation that serves to minimize the visual effects of a retaining wall but also enhances the overall visual effects.

These precast panels are used to create an abutment for this bridge. Image courtesy FHWA.

Tier 3: Landmark Retaining Walls

A landmark retaining wall is one that goes beyond functionality to create a visual focal point that stands out from its surroundings. There is opportunity to create landmark retaining walls in North Carolina, and it is recommended to provide improved aesthetic considerations to walls throughout the state as a way to develop the cultural or historical and surroundings of a place.

Basic Design Recommendations for Landmark Retaining Walls

The following are basic design recommendations for retaining walls classified as landmark according to the tier approach as defined in this Manual.

Complement the visual character. Integrate the character of the retaining wall with that of the surroundings and of the community. Focus on simplicity, lines, proportion, color, and texture.

Create a finished look for the wall. A landmark wall should have a high level of detail and finish, including caps, smooth grading transitions, and coordinated spacing between structures.

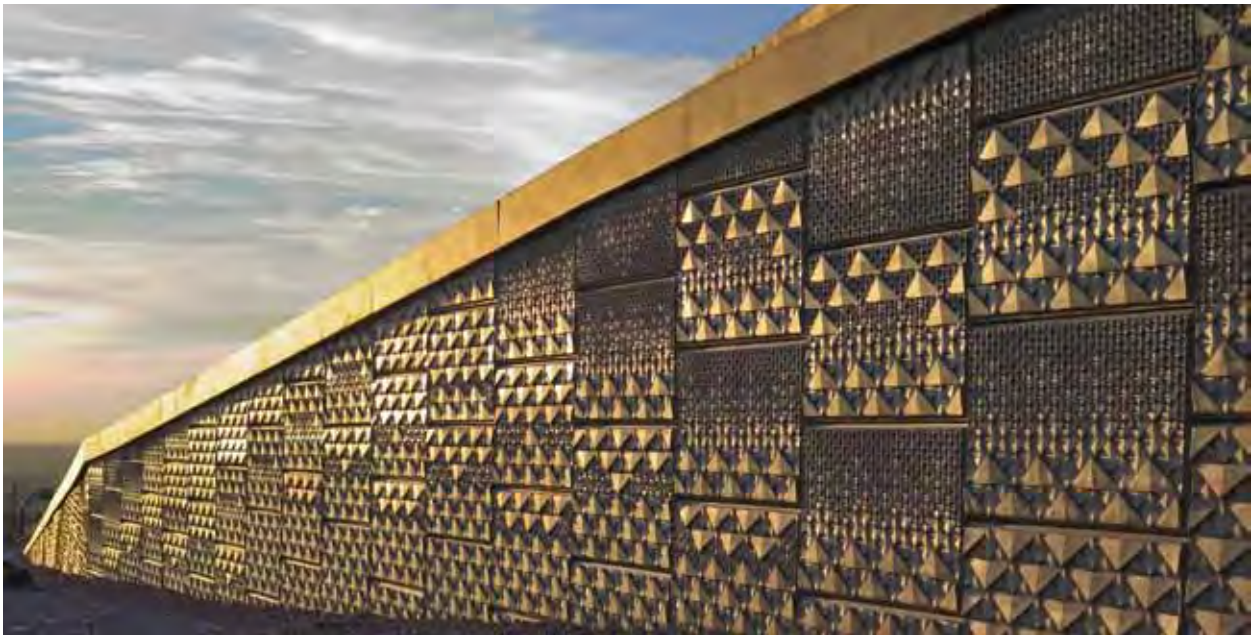
Be innovative and creative with materials. New, innovative, or sustainable materials should be used where possible. This could include LEDs, solar panels, reflective materials, or sustainable materials such as green walls.

Build off the heritage of an area. The stone walls along Paris Pike and Frankfort Pike in Lexington, Kentucky, are considered landmark because they were constructed by slaves and farm workers more than 200 years ago using the native stones found in fields. This combination of cultural value and historical integrity makes these walls unique.

PUBLIC ART AND RETAINING WALLS

Public art on retaining walls should take into consideration the implication of scale and variety as textural features must take into consideration the viewer's speed and distance, where textures will work best when they are simple and repetitive.

The most appropriate sites for aesthetically enhanced retaining walls are in urban settings or gateways where there will be a higher density viewing traffic. Although improved aesthetics may reduce mental fatigue and improve driver performance, wall art on retaining walls should not distract drivers or compromise safety. Retaining walls can become opportunities for public art when an artist is hired to design textures for incorporation into the concrete forms. These designs may be applied to selected portions of the wall where they will be most visible or have the greatest impact.



"The Outer Loop" traverses the Franklin Mountains linking East and West El Paso, Texas, around the perimeter of the City. Designed by Vicki Scuri Siteworks with TxDOT, the pattern motifs are based on geometric mountain faceting and the local diamond back rattler. Image courtesy Vicki Scuri Siteworks.

CHAPTER 10

FOCUS AREA ROADSIDE ENVIRONMENT AND LANDSCAPE

"Nature is painting for us, day after day, pictures of infinite beauty."

John Ruskin

10 FOCUS AREA | ROADSIDE ENVIRONMENT AND LANDSCAPE

OVERVIEW

Roadside elements and vegetation compose a major part of North Carolina's transportation corridors. They frame the overall visual character of the roadway, impact environmental health, and greatly influence the driving experience. NCDOT has stated their environmental mission is to connect people and places safely and efficiently, with accountability and environmental sensitivity.

This sensitivity includes developing design and planning solutions that balance the physical needs of the roadway corridor while protecting and enhancing existing environmental processes and resources. Sensitivity also includes protecting existing vegetative patterns, using revegetation to mitigate environmental impacts, managing erosion, reducing maintenance, buffering adjoining land uses, and enforcing the visual character of the area. It is a priority for NCDOT, where practical, to have an established and aesthetically pleasing forested edge along the state's highways.[163] Protecting existing vegetation during construction or through maintenance initiatives helps preserve existing visual character, mitigates environmental impacts, and results in a healthier environment.

Coastal gateway and landscape design along the US 17 North Carolina/South Carolina state line. Image courtesy NCDOT.

Plantings along bridge abutments have a strong visual impact. The elevation change makes the landscaping visible from long distances, as in this roadside environment feature in western North Carolina. Image courtesy NCDOT.

ROADSIDE ENVIRONMENT AND LANDSCAPE TYPES

Roadside enhancements can be defined according to the following categories.

Landscape Enhancements

- Vegetative screens for distracting or objective views
- Scenic plantings in interchanges or within highway corridors to provide color, texture, and form to improve aesthetics
- Gateway improvements to enhance entrances to the state or a community
- Landscape enhancements to soften the visual impact of structures or slopes
- Landscape enhancements to frame or enhance views
- Planting of wildflower
- Streetscape plantings
- Reforestation and tree canopy re-establishment

Safety Improvements

- Vegetative headlight screens
- Landscape plantings to delineate roadway alignment
- Landscape enhancements to reduce monotony and increase driver alertness
- Landscape plantings for clear zone (re) establishment

Environmental and Mitigation Obligations

- Vegetative buffers for visual or noise abatement
- Historical mitigation plantings
- Stream restoration and wetland reclamation
- Vegetated stormwater protection/filtration systems
- Tree preservation
- Erosion control plantings
- Preservation, restoration, or establishment of native plant species
- Preservation and/or restoration of designated scenic byway intrinsic qualities

Maintenance Reduction Plantings

- Low maintenance plantings at bridge end slopes and other similar locations difficult to mow or maintain
- Low maintenance plantings in interchange or expanded ROW areas to reduce mowing
- Demarcation of no-mow areas along roadsides
- Establishment of native grass stands within clear zones and/or plantings to deter encroachment of overstory trees into recovery areas

Supplemental Plantings

- Promulgation of the state flower and tree
- Special events plantings
- At state welcome center, rest area, and visitor information centers, use of regional indigenous species of plants to promote scenic beauty of topographical regions of North Carolina and to enhance site architecture
- Scenic overlooks and weigh stations
- State or departmental buildings/facilities
- Trails and bicycle paths
- Multimodal facilities

Roadside landscaping should reflect the scale of its surrounding environment. Image courtesy NCDOT.

POLICIES AND PROCEDURES

It is the policy of NCDOT to utilize landscape plantings within highway ROWs where prudent and economically feasible.[164] The purpose of these plantings is to enhance the roadside environment, comply with sediment control statutes, reduce roadside mowing, and enhance the aesthetic quality of roadsides.[165] Some of these policies and procedures specifically address landscaping and roadside enhancements, while others take a broader look at environmental resources such as water quality, environmental sustainability, and wildlife habitat. The Endangered Species Act (ESA) of 1973 protects plant and animal species that are in danger of becoming extinct. Currently, NCDOT protects more than 35 populations of endangered or significantly rare plant species growing along roadsides.[166]

The policies and procedures that determine how landscaping is implemented along North Carolina's highways include, but are not limited to:

Clear Zone Improvement Program (CZIP) (2012)
Developed to resolve large overstory canopy trees that encroach on the roadway. The program utilizes established forestry practices to develop a transitional area between the canopy and clear zone. CZIP utilizes native grasses, wildflowers, and low growing trees to provide shade to limit the migration of larger tree species. The CZIP is expected to utilize native vegetation to improve the natural environment along selected routes. Colorful low-growing trees and native plants can be used to create a richer, more visually robust understory in many of these areas. [167]

Landscape Plans, *Roadway Design Manual* (2014)
Chapter 16 of the *Roadway Design Manual* describes the responsibilities of NCDOT REU and the RDU (see Planning Process and Coordination, below).

NCDOT Standard Specifications for Roads and Structures (2012)
Sections 1060 and 1670 describe standard procedures and methods for integrating landscape elements.

NC Cooperative Extension Service Landscaping for Wildlife with Native Plants (n.d.)
North Carolina State University's resource guide for landscaping with native plants.

NCDOT 2040 Plan (2012)
The 2040 Plan defines North Carolina's vision for a statewide transportation system.

North Carolina General Statute 136-93 (n.d.):
Focuses on the organization of NCDOT. Statute 136-93 addresses openings, structures, pipes, trees, and issuance of permits. Specific to ROW planting, "no tree or shrub in or on any State road or State highways shall be planted, trimmed, or removed . . . without a written permit."

NCDOT Environmental Stewardship Policy (2002)
Developed as a guiding document for its employees, the policy focuses on environmental stewardship in the planning, designing, constructing, maintaining, and managing of transportation projects.

NCDOT Guidelines for Planting within Highway Right-of-Way (n.d.)
Defines procedures for municipalities, civic organizations, or private entities requesting to plant within the highway ROW, including permits, encroachment process, and types and technical specifications of plantings. The guidelines include cross sections for highways and streets showing guidelines for planting trees, shrubs, and groundcovers. The document also addresses distance from the travel lane, vertical clearance, site distances, plant selection, mowing and drainage, traffic operation, and safety. Planting that involves exceptions to these criteria are considered on an individual basis.[168]

NCDOT Highway Landscape Planting Policy (1988)
Defines the purpose of ROW plantings and parameters of landscape elements and offers a high-level review of priorities. Understanding the site context leads to selection of the most appropriate plantings. All plant materials should be selected to provide a valuable landscape amenity that is both attractive and meets sustainability goals. The NCDOT Highway Landscape Planting Policy has established priorities for landscaping and environmental mitigation.

NCDOT Highway Stormwater Program (1998)
Since 1970, NCDOT has been addressing stormwater pollution through the department's sediment and erosion control program. In 1998, NCDOT established the Highway Stormwater Program (HSP) to address other pollutants and sources associated with stormwater runoff.[169]

NCDOT Sustainability Blueprint (2012)

The CTE is preparing an accountability framework for NCDOT that will institutionalize sustainable principles and practices throughout all phases and functions of NCDOT, including planning, project/ program development, project delivery, and internal operations.

NCDOT Tree Planting Initiatives (2012)

Various tree planting initiatives that have resulted in maintained areas and naturalized forested ROW that embody the beauty of the state. Some of these initiatives include the America's Treeways Initiative (1990s), Green Roads Initiative (1990s), Wetland and Reforestation on highway construction projects (2000s), and CZIP concept of using native vegetation (2000s). Additional information and initiatives can be found on the NCDOT website. [170]

NCDOT Wildflower Program (1985)

The NCDOT Wildflower Program began in 1985 as the primary method of incorporating beautification practices along roadsides in the state. Today, wildflowers cover over 3,000 acres along transportation corridors within all 14 highway divisions. The Wildflower Program identifies the wildflowers typically used for roadway projects, naturally occurring flowers along the roadside, and installation techniques used by the REU staff.[171] The program plants 200,000 day lilies annually and maintains 2,500 acres of seedbeds, many of which are marked by wildflower signs. Funding for the program is supported through federal enhancement funds, citizen donations, and proceeds from personalized license plates. [172]

See the program document on NCDOT's website for bed preparation, planting specifications, and seasonal plantings, as well as additional technical support information.[173]

PLANNING PROCESS AND COORDINATION

NCDOT's REU is responsible for NCDOT landscape projects across the state. As defined in the NCDOT *Roadway Design Manual*, the REU is responsible for landscape planting, junkyard screening, erosion control projects, and reforestation.[174]

> The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

The central office of the REU in Raleigh develops landscape planting projects and final plans, which allows for consistency in design solutions and the design process. Incorporating roadside environment and landscape elements into aesthetic considerations is necessary for proactive approaches to these features. Request for landscaping to accompany transportation projects occurs at various stages of planning and construction and it is therefore recommended that REU be involved at critical points throughout the planning project.

Permitting

According to the NCDOT Guidelines for Planting *within Highway Right-of-Way*, the requesting party planting in NCDOT ROW must obtain approval from the municipality or governing body where the ROW is located. This approval is requested through permits. The guidelines should be referenced for details pertaining to the permitting process and changes to the process as a whole, as applicable.

Landscaping is used to reduce the visual image of steep slopes along this bridge in North Carolina. Image courtesy NCDOT.

Tree plantings along the roadside in North Carolina offer visual interest from the diversity in vertical dimension. Image courtesy NCDOT.

STEP-BY-STEP PROCESS

The inclusion of roadside environment and landscape aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures. In most cases, roadside environment and landscape aesthetic considerations are includes at end of Project Development processes.

The step-by-step procedures as described below are included in this section for the purpose of conveying broader planning frameworks and how roadside environment and landscape may be inserted into the planning process. This can help encourage early and continual engagement throughout the design and development of a project.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two, Focus Area Review - Integration of Roadside Environment and Landscape Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 11 and 12 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions and Final Alternative to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the Project Sponsors of the aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Roadside landscaping along highways in North Carolina. Images courtesy NCDOT.

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the LEDPA/ Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the roadside environment and landscape concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Plantings that vary in type, scale, and color offer a stimulating driving experience along the roadside in western North Carolina. Image courtesy NCDOT.

Roadside wildflower planting marked with 'NCDOT Wildflower Program' sign. Image courtesy NCDOT.

Step 8S and 3R: Aesthetics Community Meeting(s)

The TPM will hold a community meeting (or series of meetings) with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership between the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

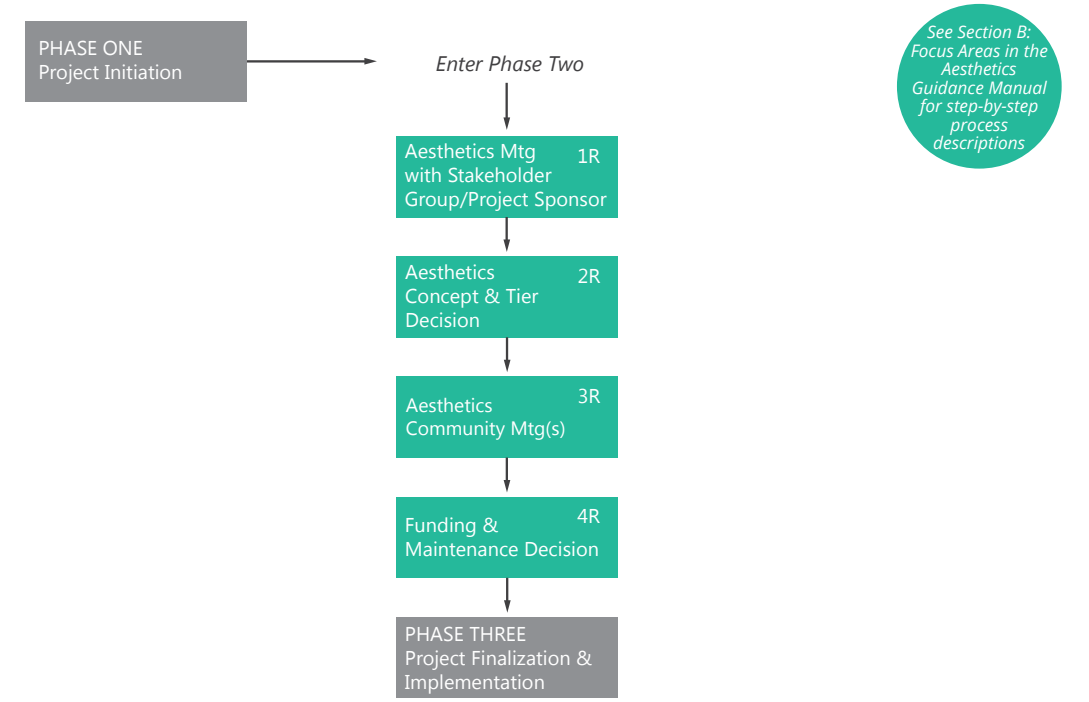
Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

EXHIBIT 11

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

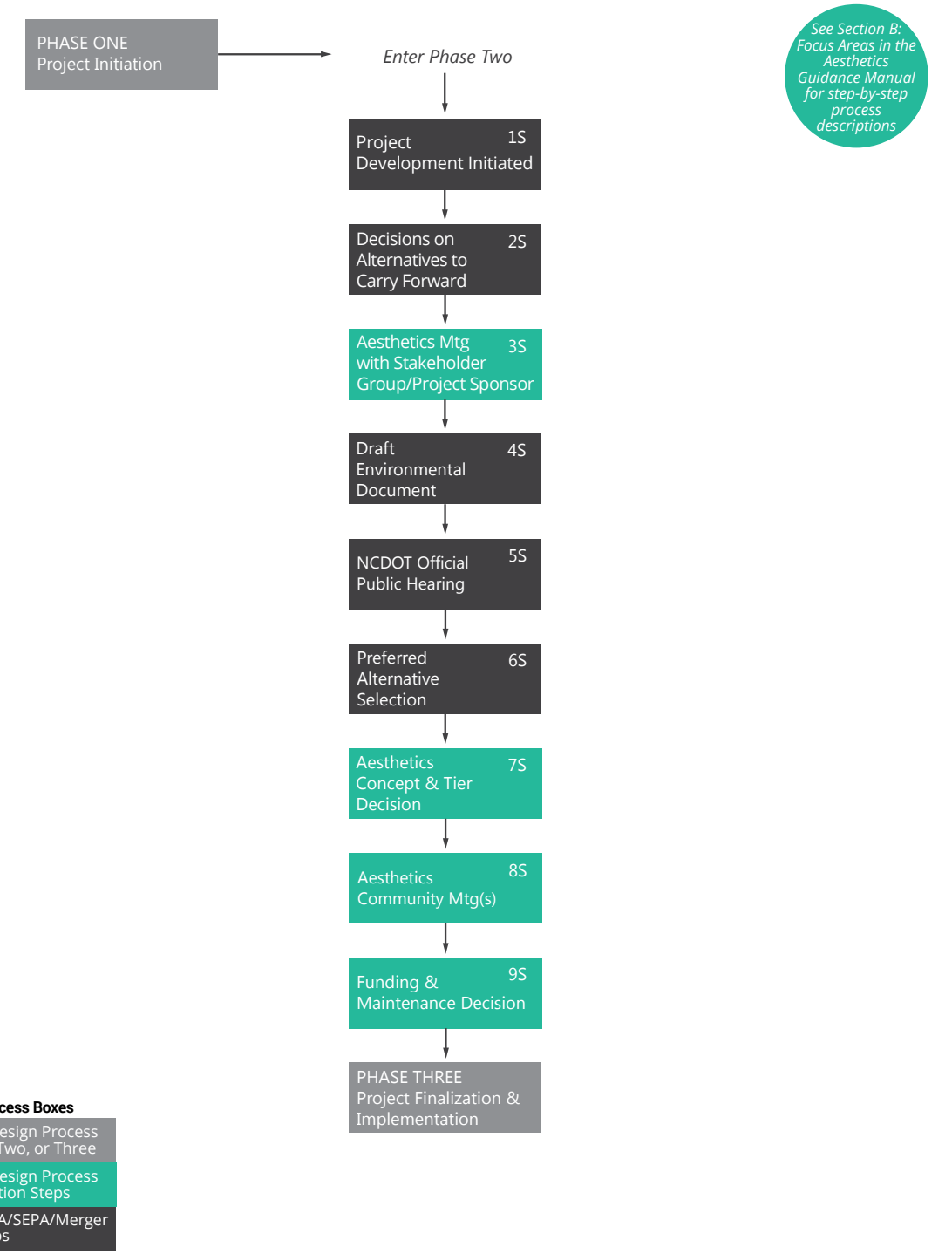
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 12

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - STIP PROJECTS



TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, roadside environment and landscape elements are categorized here according to standard, enhanced, or landmark. The type and scale of environment and landscape elements are to fit the adjacent cultural, historical, natural, and human-made surroundings.

The aesthetic quality of North Carolina's roadsides is influenced by factors such as adjacent land use, cultural resources, existing vegetation, ROW width, and topography. Landscape projects can have a strong impact on the visual character of the state's roadsides. Using the roadside for specialized environmental goals should be carefully considered to be sure that the safety, sustainability, and life cycle costs of the project meet department goals and resources. It is recommended that native and existing vegetation should be used where feasible.

The REU has developed a classification process that is used to define standard categories for landscape initiatives, maintenance, and reforestation efforts. These classifications include rural, urban, municipal, and interstate. Levels of maintenance are classified in terms of the level of effort needed to achieve the anticipated visual and environmental objectives of each level. Maintenance is typically handled by NCDOT or through an MOA with a municipality or community organization. It is important to establish this commitment to maintenance for adequate upkeep of ROW plantings. Reforestation efforts along roadways have resulted in increased visual character of many of the state's corridors. Landscape reforestation is categorized in seven types, with the highest levels requiring the most effort and leading to the most diverse and sustainable landscape.

These classifications for landscape initiatives, maintenance, and reforestation efforts can also be defined in terms of standard, enhanced, and landmark approaches.

Native landscape plantings in British Columbia show autumn colored trees, shrubs, and groundcover plants along a roadside. These types of plantings can be defined as landmark landscape plantings. Image courtesy Deposit Photos.

Standard landscaping along the roadside in North Carolina often includes indigenous vegetation or low-maintenance plantings. Image courtesy NCDOT.

Tier 1: Standard Roadside Environment and Landscape

Standard roadside environment and landscape practices in North Carolina include plantings in accordance with NCDOT REU standards.

Generally, standard plantings include using indigenous vegetation to the extent possible for low-maintenance plantings. This standard is largely influenced by NCDOT who is responsible for plant establishment. After the first year, maintenance is minimal and the landscaping receives limited fertilizing, pruning, mowing, watering, etc.,.[175] Visually, standard plantings should incorporate the surrounding landscape and roadway infrastructure.

See the Pattern Book for examples of standard roadside environment and landscape.

Basic Design Recommendations for Standard Roadside Environment and Landscape

The following are basic design recommendations for roadside environment and landscape elements classified as standard according to the tier approach as defined in this Manual.

Integrate landscape and aesthetics. Start at the onset of planning, design, and engineering of all highway projects, roadside landscape and aesthetics should be integral for all highway projects.

Consider the plant palette. The selected plant palette for the site should complement existing vegetation in the surrounding landscape.

Add visual interest. Use canopy trees, understory trees, shrubs, groundcovers, perennials, and other plant material to help create a healthier environment and complement existing vegetation.

Develop pilot projects for the CZIP. Create templates for the placement, establishment, and maintenance of existing and proposed vegetation.

TABLE 10-1
STANDARD NCDOT ROADSIDE ENVIRONMENT AND LANDSCAPE CLASSIFICATIONS

Landscape Initiatives	
Class	*Initiative*
Rural	Establish natural vegetative stands to cultivate indigenous communities and allow for defined areas of natural succession.
Urban	Establish distinct turf area (beauty edge) and indigenous vegetative buffer/ screens while allowing for defined areas of reforestation and/or selective natural succession (where feasible); be responsive to community's planning objectives.
Municipal	Minimal landscape elements; the road, local maintenance issues, pedestrian interface, and safety responsibilities are priority.
Landscape Maintenance	
Level	*Maintenance*
Natural	Low/No extensive maintenance needs or requirements. The 'establishment period' (associated with project) provides needed support for vegetation to establish. However, once this contract period is over the vegetation reverts to its natural state.
Low	Minimal commitment of labor and equipment in order to maintain moderate level of vegetative health and aesthetic.
Landscape Reforestation	
*Type**	*Description*
I	Standard seedling reforestation to establish native vegetative stands.
II	Mixed seedling, container and/or B&B reforestation to establish native vegetative stands. Defined sustainable landscape initiative to re-vegetate with grasses, herbaceous perennials, shrubs, flowering trees, and forest trees; developing a natural aesthetic and establishing transition zones reflective of nature.
III	Mixed seedling, container, and/or B&B reforestation to establish vegetative stands heavily weighted in species that provide seasonal color, canopy and aesthetic appeal.
IV	Mixed seedling, container, and/or B&B reforestation to establish vegetative stands heavily weighted in species that provide vegetative screening/buffering.

Source: NCDOT REU
*Type is defined according to the REU Landscape Reforestation classification, defined from I-VII

Promote use of native vegetation. Use the integrated roadside vegetation management (IRVM) programs for standards specific to the use of native vegetation. This includes preserving mature trees and/or vegetation to reinforce the existing vegetative edge along the ROW.

Stabilize slope. Use vegetation during construction to reduce erosion, minimize competition, and establish first stage color/canopy plants.

Salvage native plants and topsoil prior to construction. The species to be salvaged depends on location, soils, and analysis of plant value, including the potential survival rate. Use native and proven cultivators for longevity and landscape stewardship.

Collect native seed as part of a specific transportation project. Initiate a process for native seed collection at the start of each project.

Remove invasive species. These can deteriorate economic and environmental quality and cause harm to human health.

Provide adequate growing space for landscape plantings. Consider the moisture and light requirements of plants when designing the landscape plan.

Consider long-term conditioning. Use mulch in establishing planting beds to manage weeds, conserve moisture, and amend the soil. Provide structural soil in urban areas.

Plant street trees. Street trees play an important environmental and community role along streetscape corridors.

Place focus on ground treatment. This includes consistency in size, texture, color, and exposed aggregate mix with the surrounding landscape.

Utilize wildflower in alternative ways. Wildflowers should be planted in patterns consistent with how flowers are found in nature, including organic massing for a natural appearance.

Use limited funding and manpower impacts to an advantage. Use grasses and legumes to prevent roadside erosion and shrubs, trees, and wildflower plantings to help reduce mowing areas and improve roadside aesthetics.

Consider signage. Integrate interpretive signage and additional landscaping at visitor centers.[176]

Vibrant and native landscape plantings enhance the roadway corridor. Images courtesy NCDOT.

TABLE 10-2
ENHANCED NCDOT ROADSIDE ENVIRONMENT AND LANDSCAPE CLASSIFICATIONS

Landscape Initiatives	
Class	***Initiative***
Rural	Establish natural vegetative stands to cultivate indigenous communities and allow for defined areas of natural succession.
Urban	Establish distinct turf area (beauty edge) and indigenous vegetative buffer/ screens while allowing for defined areas of reforestation and/or selective natural succession (where feasible); be responsive to community's planning objectives.
Municipal	Minimal landscape elements; the road, local maintenance issues, pedestrian interface, and safety responsibilities are priority.
Interstate	Develop a 'sustainable landscape' corridor plan, establish natural vegetative stands to cultivate indigenous communities, allow for defined areas of natural succession, minimize exposure of maintenance crews, and integrate attractive gateway elements at state borders.
Landscape Maintenance	
Level	***Maintenance***
Intermediate	Consistent commitment of labor and equipment in order to maintain moderate level of vegetative health and aesthetic intermittent mowing, constant but moderate vegetative management (trimming, fertilizing, spraying), seasonal weed and trash removal.
Landscape Reforestation	
Type*	***Description***
V	Mixed seedling, container, and/or B&B reforestation to establish vegetative stands heavily weighted in species that are indicative of riparian zones, pocosins, and/or wetlands.
VI	Mixed seeding & seedling reforestation to establish vegetative stands (i.e. grasses, legumes, herbaceous perennials, shrubs, flowering trees, and forest trees) that will establish on hard to reach inaccessible slopes. Primary work (seeding, top dressing, etc.) may be completed by helicopter.

Source: NCDOT REU
*Type is defined according to the REU Landscape Reforestation classification, defined from I-VII

Tier 2: Enhanced Roadside Environment and Landscape

Enhanced roadside environment and landscape involves building on the standard approach. It is recommended to do this through utilizing additionally sustainable approaches such as NCDOT's statewide dogwood and redbud initiative (which has successfully established these flowering trees statewide) and wetland mitigation efforts that have improved tree plantings and preservation. Each NCDOT division has enhancement monies that can be used on discretionary projects, including roadside environment and landscape projects, which make way for additional sustainable initiatives and aesthetic considerations to be incorporated into highway plantings.

See the Pattern Book for examples of enhanced roadside environment and landscape.

Basic Design Recommendations for Enhanced Roadside Environment and Landscape

The following are basic design recommendations for roadside environment and landscape elements classified as enhanced according to the tier approach as defined in this Manual.

Emphasize forms and materials. These should be derived from the local area, complement the character of the land, and interpret major design themes from the corridor plan.

Use native plant species. Make sure native plantings are adapted to a specific range of soil types, light conditions, and moisture regimes.

Preserve existing conditions. Retain as much native and existing vegetation, ecosystems, and other natural resources as possible during land clearing and construction to help mitigate environmental impacts, enhance visual quality, and create a healthier environment.[177]

Consider plantings and animal habitat. Provide plants that produce winter cover (evergreens), seeds, fruits, and nectar attractive to birds and butterflies.

Use funding for a more holistic landscape approach. In many roadside landscape and environmental projects, available funding is used for planting and not for design elements such as fencing, hardscape elements, public art, illustrative earthwork, or other design elements.

Landscape plantings have been used by NCDOT to highlight specific events within the state. Creating visual landmarks that increase the aesthetic character of the roadway corridor. Image courtesy NCDOT.

TABLE 10-3
LANDMARK NCDOT ROADSIDE ENVIRONMENT AND LANDSCAPE CLASSIFICATIONS

Landscape Initiatives	
Class	***Initiative***
Rural	Integrate enhancements that support the character of the area (i.e., split rail fence, rock outcroppings, stone walls, hedgerows, etc.).
Urban	Incorporate multiple enhancement components (i.e. formal plantings, hardscape materials, defined gateway elements, etc.). Need to establish a maintenance plan with defined responsibilities (i.e. municipal maintenance agreement).
Municipal	Enhancements are defined to adhere to an extensive planned urban theme; historically and culturally responsive to the community's character. Work closely with the municipality and property owners to incorporate acceptable context sensitive elements. Need to establish a maintenance plan with defined responsibilities (i.e. municipal maintenance agreement).
Interstate	Incorporate various enhancement components (i.e. plantings, hardscape materials, defined gateway elements, etc.) that support the character of the area, are consistent in use, application, and theme, and that reflect the community's planning objectives. Establish a maintenance plan with defined responsibilities (i.e. municipal maintenance agreement).
Landscape Maintenance	
Level	***Maintenance***
High	Substantial commitment of labor and equipment in order to maintain high quality of vegetative health and aesthetics includes frequent mowing, seasonal trimming, fertilization and spraying, and regular trash and weed removal.
Landscape Reforestation	
Type*	***Description***
VII	Seeding, seedling, container and/or B&B establishment of unique regional stands of distinct species (i.e. hemlock bluffs, savannas, pine barrens, rhododendron stands, prairie grasslands, etc.).

Source: NCDOT REU
*Type is defined according to the REU Landscape Reforestation classification, defined from I-VII

Landmark landscaping along the roadside in North Carolina incorporates a range of materials and scales while also considering multi-functional benefits such as stormwater management, building habitat, and context with the surroundings. Image courtesy NCDOT.

Incorporate more than just ROWs. Involve the REU with design of wetland areas within the ROW as well as at visitor centers, scenic overlooks, and other pull-off areas.

Consider stormwater management. Include trails, interpretive signage, and landscape plantings as part of biological retention basins.

Tier 3: Landmark Roadside Environment and Landscape

Landmark environment and landscape areas go beyond enhanced in terms of cultural significance, environmental sustainability, and the level of detail. These landscapes have the highest level of visual appearances that include a more ecologically sound and environmentally sustainable landscape consistent with natural processes and systems.

See the Pattern Book for examples of landmark environment and landscape.

Basic Design Recommendations for Landmark Roadside Environment and Landscape

The following are basic design recommendations for roadside environment and landscape elements classified as landmark according to the tier approach as defined in this Manual.

Consider stormwater runoff. Comply with national requirements by managing and reducing stormwater pollutants from roadways and industrial areas while utilizing creative mitigation strategies such as riparian buffers or bioswales.

Incorporate sustainability. Design sustainable programs that can be managed, implemented, and integrated into NCDOT practices.

Incorporate environment and landscape into existing programs. An example is incorporating plantings as part of the Blue Star Memorial Marker Program.[178]

Focus on building habitat. Coordinate with the North Carolina Wildlife Commission in posting and managing small game wildlife habitat areas.

Take an ecosystem approach to re-vegetate along a corridor. Many transportation projects extend for miles and they can traverse many different landscape types.[179]

Implement a mowing program. This should be accomplished with an environmental perspective to encourage wildflowers, protect rare or endangered plants, and protect or create wildlife nesting areas.

PUBLIC ART AND ROADSIDE ENVIRONMENT AND LANDSCAPE

There is a long tradition of artists working in collaboration with landscape architects to achieve sculptural effects using landforms, hardscape, and color and texture of plantings. Maintenance of the resulting landscape is a major consideration in this type of project and native plant materials are preferred. In working with a landscape architect, the artist may realize opportunities for other kinds of public art, such as freestanding sculpture, hardscaping with paving materials (areas such as plazas, streets, or sidewalks), and low retaining or seat walls. Many public artists are working in CAD or other drawing software and can easily communicate with other design professionals.

It can take up to six months to select and hire an artist, so engaging the community at the earliest possible planning stage about their desire for enhanced or landmark landscape gives the local municipality and/or local arts council the ability to hire and insert the public artist into the team long before construction documents are finalized.

Roadside Structures

See Roadside Structures in Chapter 6. Focus Area: Roadways for incorporation of aesthetics elements for roadside facilities (including welcome and visitor centers, rest areas, roadside pull-offs, and viewpoints), markers (including historical markers), and signage (including billboards and various types of specialty signage).

"Xeriscape Rain Catch" is an art exhibit by artist Robert Tully. The exhibit consists of four carved stones within a bed of native grasses and mulch. Image courtesy Robert Tully.

Mike Roig's "West Wind Sentinel" along Highway 321 at the Southwest Loop Bypass in Lenoir, North Carolina. Image courtesy NCDOT.

CHAPTER 11

FOCUS AREA BICYCLE AND PEDESTRIAN INFRASTRUCTURE

"If you design communities for automobiles, you get more automobiles. If you design them for people, you get walkable, livable communities. "

Paris Glendening & Christine Todd Whitman

11 FOCUS AREA | BICYCLE AND PEDESTRIAN INFRASTRUCTURE

OVERVIEW

NCDOT's Division of Bicycle and Pedestrian Transportation (DBPT) is responsible for integrating bicycle and pedestrian systems into the overall transportation network across North Carolina. Established in 1973, DBPT emphasizes safety, mobility, and accessibility to connect existing conditions with the vision that locals and the state have for improved bicycle and pedestrian infrastructure and networks. These principles are emphasized in the *WalkBikeNC: North Carolina Statewide Pedestrian and Bicycle Plan* created by DBPT and NCDOT's *Complete Streets Planning and Design Guidelines (Complete Streets Guidelines)*, both of which are the dominate guidelines for bicycle and pedestrian planning in the state.

Biking and walking are an important element in North Carolina and can have positive impacts on mobility, economic development, public health, and environmental sustainability.[180] Bicycle and pedestrian infrastructure are key elements in urban, rural, and suburban infrastructure that encourage social interaction and help enhance the health and wellness of residents. A contributing factor to the success of bicycle and pedestrian systems beyond functional considerations are aesthetic features that help enhance and promote these types of facilities as integral to a community.

A pedestrian bridge in North Carolina that is part of the Rails to Trails program. Image courtesy NC Rail-Trails.

BICYCLE AND PEDESTRIAN INFRASTRUCTURE TYPES

Bicycle Infrastructure

More than 78,000 miles of roadways in North Carolina can be used for cycling, where DBPT has mapped and signed more than 5,000 miles of local, regional, and cross-state bicycle route systems. [181] A system of cross-state marked bicycle facilities has also been designated and includes nine routes covering 3,000 miles. Mapping and the creation of signed systems for existing urban bicycle routes in municipalities across the state include major cities and regions such as Asheville, Durham, Greensboro, Mecklenburg/Union counties, Raleigh, Wilmington, Winston-Salem, and many others.[182]

Included below are descriptions of bicycle facilities and treatments sourced from *WalkBikeNC* and the *Complete Streets Guidelines*.

Signed bicycle route[183]

Signed bicycle routes help bicyclists navigate lower-volume street networks. Bicycle signage is an important element of bicycle routes that alerts motorists to the presence of bicycle traffic while providing information to bicyclists.

Shared-lane markings[184]

Shared lane markings (also known as "sharrows") have become more popular as a pavement marking treatment to help align cyclists properly within more complex, urban landscapes that may feature on-street parking, a variety of lane widths, and other factors. Additionally, sharrows help remind motorists of the potential presence of cyclists and their right to be in the main travel lane with automobile traffic.

Bicycle lanes[185]

Dedicated bicycle lanes are the preferred option to provide for the greatest variety of cyclists on streets, particularly those streets with higher volumes and speeds. Bicycle lanes are the backbone of a complete bicycle network, as they visually distinguish a bicycle-only travel lane in which a cyclist does not have to maneuver around motor vehicles and vice versa. Bicycle lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions. A more recent development is the use of green pavement markings to delineate a bicycle lane so as to further separate a cyclist – at least perceptually – from adjacent motorized traffic.

Bicycle infrastructure such as bike lanes and stops help to encourage cycling. Image courtesy Flickr Creative Commons.

Bicycle box[186]

A bicycle box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. Bicycle boxes are typically applied at signalized intersections with high volumes of bicycles and/or motor vehicles, especially those with frequent bicyclist left turns and/or motorist right turns.[187]

Right turn through bicycle lane[188]

Right-turn-only lanes are often used where right-turning motor vehicle volumes warrant an exclusive right-turn lane to improve traffic flow. The correct placement of a bicycle lane is on the left of an exclusive right-turn lane. Incorporating the bicycle lane to the left of the right-turn-only lane enables bicyclists and right turning motorists to sort their paths by destination in advance of the intersection, avoiding last moment conflicts.[189]

Signal detection and actuation[190]

Bicycle detection at traffic signals is used at actuated signals to alert the signal controller of bicycle crossing demand on a particular approach. Bicycle detection occurs either through the use of push buttons or by automated means (e.g., in-pavement loops, video, microwave, etc.). [191]

Bicycle route wayfinding signage[192]

Bicycle signage alerts motorists to the presence of bicycle traffic while providing information to bicyclists. Both bicycle lanes and shared lane markings should include signage, but bicycle signage that identifies a designated bicycle route can be a standalone element. Offering additional wayfinding information with bicycle route signs as appropriate can enhance quality of service and is particularly effective in high-tourism areas.

Other

Descriptions of bicycle facilities and treatments recommended as a supplement to what is defined in the Complete Streets Guidelines are listed below. These infrastructure recommendations are sourced from *WalkBikeNC*[193] and should be incorporated into transportation and aesthetic projects and considerations.

Shared roadway facilities

- Unmarked wide outside lane
- Bicycle boulevard
- "Home zone"

On-street facilities

- Buffered bicycle lane
- Contra-flow bicycle lane
- Left-side bicycle lane
- Advisory bicycle lane
- Uphill climbing lane

Cycle track bikeways

- One-way cycle track
- Raised cycle track
- Two-way cycle track
- Cycle track mixing zone
- Two-stage turn queue box
- Median refuge island for bicycle use
- Combine bicycle lane/turn lane
- Intersection crossing marking

On-street bikeway intersection crossings

- Bicycle signal
- Active warning beacon for bicycle route crossing at unsignalized intersection
- Rectangular rapid flash beacon (RRFB)
- Hybrid beacon for bicycle route crossing of major street
- Off-street bikeway midblock crossings
- Hybrid beacon for off-street path crossings, active warning beacons, and rectangular rapid flash beacons
- Other design treatments
- Colored pavement markings for bicycle facilities

Pedestrian Infrastructure

An important goal for most urban, suburban, and rural communities is to decrease dependency on the automobile and increase walkability. Improving walkability is based in large part on providing the infrastructure and making existing facilities safer and more inviting for pedestrians. This is a critical mobility option for children, the elderly, individuals who do not own or cannot afford a vehicle, and those who choose not to own a car. Through programs such as North Carolina's Complete Streets policy and guidelines, the state has placed value on improving walkable infrastructure. However, there still remain significant improvements to pedestrian network connectivity and safety concerns.

Included below are descriptions of pedestrian facilities and treatments sourced from *WalkBikeNC* and the *Complete Streets Guidelines.*

Walkway along the Cape Fear River in Wilmington, North Carolina. Image courtesy AECOM.

Inlaid Thermoplastic was used to create these crosswalks in Kannapolis, North Carolina. This system consists of imprinting a pattern into a heated asphalt surface.
Image courtesy PatternPaving.com.

Sidewalk and sidewalk buffer zones[194]

Sidewalks are the primary mode of pedestrian travel in most non-rural areas and are a crucial element in any pedestrian network. Sidewalks should be part of a continuous network, connected with crosswalks and separated from traffic with a buffer. Sidewalks are provided on both local and state-owned roads in North Carolina, and should be regularly included as part of ongoing private development. A buffer zone is a strip of land that separates vehicular traffic from the sidewalk or other pedestrian facility. A pedestrian's safety and comfort in the roadway environment is significantly affected by the width and quality of the buffer between the sidewalk and the roadway, especially on streets with heavy traffic volumes. A minimum buffer zone of six to eight feet is desirable, and will vary with the street type and land uses.

A high visibility crosswalk supports pedestrian safety. Image courtesy NCDOT.

Pedestrian lightings[195]

Lighting should be provided near transit stops, commercial areas, or other locations where night-time pedestrian activity is likely. Pedestrian-scale lighting such as street lamps helps to illuminate a sidewalk, and improves pedestrian safety and security.

Pedestrian crossings[196]

Pedestrian crossings and/or crosswalks are another crucial element in any pedestrian network. Crosswalks are used to alert motorists to locations where they should expect pedestrians and to identify a designated crossing location for pedestrians. A crosswalk may be marked or unmarked since, legally, crosswalks exist at all intersections, unless specifically prohibited. Crossing treatments vary depending on a number of factors, including nearby land uses, transit stop locations, and characteristics of the street.

Curb extensions[197]

Curb extensions (also called bulb-outs or bump-outs) are extensions of sidewalks that narrow the street, increase pedestrian visibility, and decrease pedestrian crossing distance. They are an element of traffic calming that prioritizes pedestrian safety, reduces vehicle speeds, and serves to protect on-street parking. Curb extensions should not however intrude into a bicycle lane.

Fairway Chase Linear Park in Queensland, Australia, was designed as a focal point for the surrounding neighborhood. Vegetated bioretention systems were used as landscape features around the park. These systems slow stormwater runoff while also creating a natural buffer to surrounding roadways. Image courtesy AECOM.

Other

Descriptions of pedestrian facilities and treatments recommended as a supplement to what is defined in the Complete Streets Guidelines are listed below. These infrastructure recommendations are sourced from *WalkBikeNC*[198] and should be incorporated into aesthetic projects.

Unsignalized intersections

- Advanced pedestrian warning sign
- Marked crosswalk
- Pedestrian overpass and underpass
- Mini traffic circle
- In-street pedestrian crossing sign
- Advanced yield/stop lines at crossings
- Rectangular rapid flashing beacon
- Right-in, right-out channelization

Signalized intersections

- Pedestrian signal head
- Pedestrian pushbutton actuator and pedestrian detection system
- Right turn on red restriction
- Leading pedestrian interval (LPI)

Midblock crossings

- Pedestrian hybrid beacon
- Raised crosswalk
- Median or crossing island
- Two-stage crossing

Pedestrian paths and sidewalk considerations

- Street trees
- Curb ramps

Access management

- Driveway treatment
- Consolidated driveway

Roadway design

- Chicanes (used to slow traffic)
- Speed humps/tables
- Road diet for decreased crossing distance
- Curb radius reductions
- Sight distance improvements
- High visibility crosswalks

Other design treatments

- Pedestrian signage
- Block length

Multi-Use Infrastructure

Multi-use infrastructure includes facilities that accommodate both bicycle and pedestrian uses simultaneously. These types of features may be located in urban, rural, or suburban areas and often connect other types of bicycle or pedestrian infrastructure.

Included below are descriptions of multi-use facilities and treatments sourced from *WalkBikeNC* and the *Complete Streets Guidelines*.

Multi-use path[199]

A multi-use pathway is physically separated from motor vehicle traffic, and can be either within the highway ROW or within an independent ROW. Multi-use pathways include sidepaths (in the roadway ROW), rail-trails (along or within existing or former railroad ROW), greenway trails (within natural corridors) or other paved facilities built for bicycle and pedestrian traffic. Multi-use paths provide the maximum protection from automobile traffic, except for where they cross roadways at-grade.

Multi-use bridges

Bridges designed exclusively for cyclists and pedestrians that extend multi-use paths and trails across rivers, roads, or other physical elements that create barriers for circulation. These bridges can be simplistic, such as the use of Corten steel bridges, wood bridges, or metal frame bridges. Notable pedestrian bridges in North Carolina include the Pedestrian Bridge over the I-440 beltline in Raleigh or the R. Kelly Bryant, Jr. Pedestrian Bridge over the Durham Freeway in Durham.

Sidepath[200]

Sidepaths are multi-use paths that are located exclusively adjacent to a roadway, typically within the road ROW. These provide space for bicycle and pedestrian travel where on-road bicycle facilities are not feasible due to traffic volumes, speeds, or roadway configuration (such as limited access highways, for example).

Paved shoulders[201]

In many rural areas, four-foot-wide paved shoulders are the typical treatment for accommodating bicyclists. Four-foot-wide paved shoulders allow bicyclists to travel on a paved surface adjacent to through traffic, if desired. Where speeds are 55 mph and above, five-foot-wide or wider paved shoulders are preferred. Paved shoulders are not

Pedestrian bridge in Durham Central Park, Durham, North Carolina. Image courtesy AECOM.

A wide-paved shoulder along a roadway can offer a buffer zone for bicycle or pedestrian users. Image courtesy Flickr Creative Commons.

preferred by some cyclists since the additional separation sometimes does not allow the surface to be 'swept' clear of debris by the passage of motorists.

In rural areas, shoulders may be the only pedestrian facility. Wide shoulders on rural roads allow pedestrians to travel along gravel and sometimes paved surface in a separate space from traffic. Paved shoulders are much preferred over gravel, and offer numerous benefits to all users of the roadway including bicyclists.

For additional information about multi-use infrastructure, see *WalkBikeNC*.

POLICIES AND PROCEDURES

Bicycle and pedestrian infrastructure in North Carolina is guided by NCDOT's DBPT, regions, and communities. *WalkBikeNC* and the *Complete Streets Guidelines* are used to plan many bicycle and pedestrian projects across the state. These and other documents that offer guidance on policies and procedures include, but are not limited to, the latest edition of the following materials:

Americans with Disabilities Act (ADA) (1990)
Requires the use of physical elements such as paved walkways, ramps with handrails, curb cuts and ramps, and minimum width standards to make pedestrian networks accessible to all users. Grades for pathways used by pedestrians cannot exceed five percent unless treated as a ramp.

Bicycle Policy (1991)
The Board of Transportation recognizes bicycling as a "bonafide highway purpose" with the same rights and responsibilities as other highway purposes.

Board of Transportation Resolution Bicycling & Walking in North Carolina, A Critical Part of the Transportation System (2000)
A resolution to make cycling and walking a critical part of the state's transportation system through long-range transportation planning.

Bridge Policy (2000)
Establishes the controlling design elements of retrofits and STIP bridges on the North Carolina highway system, and is intended for general use.

Pedestrian Policy Guidelines (2001)
Provides statewide uniformity in the construction of sidewalks on roadway projects.

NCDOT 2040 Plan (2012)
The 2040 Plan defines North Carolina's vision for statewide transportation system.

NCDOT Context Sensitive Solutions Goals and Working Guidelines (1992/1993)
Emphasizes three guiding principles: to address the transportation need, to be an asset to the community, and to be compatible with the natural and human environment.

NCDOT Complete Streets Planning and Design Guidelines (2012)
Adopted in 2009 the release of the *Complete Streets Guidelines* followed. Complete streets are designed to be safe and comfortable for all users, including

pedestrians, bicyclists, transit riders, motorists, and individuals of all ages and capabilities. The document provides recommendations for planners and designers of transportation infrastructure to accommodate all users of the network, including bicyclists and pedestrians. Tools that can be used in achieving a complete street include road diets, traffic calming, intersection design, designing for pedestrians and bicyclists, transit design features, lane restrictions, and green infrastructure options.

NCDOT Bicycling & Walking in North Carolina: A Long-Range Transportation Plan (1996)

The first statewide bicycle and pedestrian plan in North Carolina. The plan defines five goals to guide and improve bicycle and pedestrian infrastructure. These include provide bicycle and pedestrian facilities, provide comprehensive education and enforcement strategies, institutionalize bicycle and walking considerations at all levels of government, identify and promote safety and enjoyment, and encourage bicycle and walking as a viable transportation mode.

NCDOT, North Carolina's Strategic Highway Safety Plan (2007)

The plan outlines strategies for improving bicycle and pedestrian safety on highways throughout the state. Strategies include: revising the DMV Drivers Handbook, educating on the rights and responsibility of different road users, including law enforcement, imposing stronger penalties for safety violations, and establishing a central governing body for driver education.

North Carolina Statewide Comprehensive Outdoor Recreation Plan 2009-2013 (2008)

Developed by the Division of Parks and Recreation and North Carolina Department of Environment and Natural Resources, the five-year policy plan provides guidance for the Land and Water Conservation Fund program and for other state-administered grant programs.

WalkBikeNC (2013)

The WalkBikeNC: North Carolina Pedestrian and Bicycle Plan was developed in 2013 through a partnership between multiple state agencies and private entities. The plan reviews the current status of bicycling and walking in this state and strategies for improvement and identifies the most efficient ways to apply these strategies. It is based on a five-pillar framework: mobility, safety, economics, health, and stewardship.

PLANNING PROCESS AND COORDINATION

NCDOT supports well-planned and designed transportation systems that are responsive to its context and users. DBPT works closely with other units of NCDOT, state agencies, regional and municipal agencies, and the public throughout the state to encourage, plan, and help implement comprehensive bicycle and pedestrian plans.[203]

> The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

Process Implementation Procedures

Bicycle and pedestrian planning in North Carolina occurs on various scales through a range of agencies, departments, and organizations, both with and beyond the DBPT.[204] Generally, bicycle and pedestrian projects occur at the local or DBPT level and can be defined by two types of projects, independent and incidental.

Independent projects[205]

Those projects where bicycle or pedestrian facilities comprise the entire project. These projects are planned by municipalities based on a perceived local need and submitted to the local MPO or RPO, which then prioritizes all projects received. Based on this prioritization, NCDOT implements as many projects as funding allows. Independent projects are prioritized, funded, and constructed separately from the NCDOT Project Development process (standard NCDOT NEPA/SEPA/and Merger Process steps).

Incidental projects[206]

Those projects included as part of a larger street or highway project. These projects are identified either during NCDOT Project Development and scoping or through the NCDOT "Policies to Projects" process, which begins with long-range goals and investment decisions and ends with a detailed work program that spells out specific projects needed to achieve the goals.

A multi-use trail helps to eliminate conflicts with automobiles. Image courtesy Flickr Creative Commons.

Independent Bicycle and Pedestrian Infrastructure

Independent bicycle and pedestrian projects are locally administered per state and federal laws, where local governments directly match federal dollars to build the defined project. In this scenario, NCDOT's DBPT role is to develop project prioritization on a state level, federal funding decisions, and verify project activities are eligible per these state and federal requirements.

> Most bicycle and pedestrian infrastructure projects in the state are locally administered and funded where the planning and implementation process, including aesthetics considerations, is the responsibility of the local community.

North Carolina has more than 130 municipalities that have completed bicycle and pedestrian plans, 80 percent of which were funded through DBPT's Planning Grant Initiative.[207] Independent projects are often defined through these plans, helping guide the vision a community has for its bicycle and pedestrian infrastructure. Municipalities, counties, and private developers contribute to the planning and implementation of these projects.

Municipalities and counties: Municipalities and counties can implement projects through their own capital improvement programs, tax increment financing, bonds, and other means, including raising property valuation tax rates.

Private developers: Private developers also contribute to pedestrian and bicycle facilities on the local level, most notably sidewalks, bicycle lanes, and greenway trails. These improvements are determined by local zoning ordinances and subdivision requirements that regulate the infrastructure that both public and private entities construct.

Although most bicycle and pedestrian projects are locally administered, this Manual aims to assist local governments in thinking about aesthetic elements for bicycle and pedestrian infrastructure for both independent and incidental projects.

See the below resources for documentation of the bicycle and pedestrian planning process as defined by NCDOT's DBPT.

- **NCDOT Bicycle & Pedestrian Project Development & Design Guidance:** http://www.ncdot.gov/bikeped/planning/walkbikenc/
- **WalkBikeNC: North Carolina Statewide Pedestrian and Bicycle Plan:** http://www.ncdot.gov/bikeped/planning/walkbikenc/
- **NCDOT Planning Guide:** https://connect.ncdot.gov/municipalities/PlanningGrant/Pages/Planning-Guide.aspx

The use of pavers, concrete curbs, landscaping, and site elements such as signage, lighting, and seating create a pedestrian scale streetscape. Image courtesy Flickr Creative Commons.

Incidental Bicycle and Pedestrian Infrastructure

Incidental bicycle and pedestrian projects are part of a roadway project (including retrofit and STIP projects), where it is the responsibility of NCDOT and DBPT to consider bicycle and pedestrian issues during project scoping processes (per standard NCDOT NEPA/SEPA/and Merger Process steps).

Bicycle and pedestrian infrastructure projects defined as incidental may utilize the step-by-step procedures for aesthetic considerations in NCDOT retrofit or STIP projects.

If a community is successful in competing through state prioritization processes (the STIP process, see Appendix C for Statewide Planning Processes) for a bicycle and pedestrian project, including top-tier aesthetic elements, then the project will go through standard NCDOT statewide approval procedures. Most bicycle and pedestrian projects require a Categorical Exclusion (CE),[208] which is a scenario when standard NCDOT NEPA/SEPA/and Merger Process steps do not apply.

Bicycle and pedestrian projects should be selected as a result of the project development process. In instances where a bicycle or pedestrian facility is not included in a planned project but a municipality believes it should be, the municipality is required to notify NCDOT and request inclusion of the facility.[209]

Designated cycling and pedestrian lanes with a buffer between vehicular traffic in New York City, New York. Image courtesy Flickr Creative Commons.

Pedestrian island with vegitative buffer provides safe roadway crossing. Image courtesy FHWA.

Phase Two: Focus Area Review - Integration of Incidental Bicycle and Pedestrian Project Aesthetic Considerations

When bicycle and pedestrian infrastructure projects are defined as an incidental bicycle and/or pedestrian project as part of retrofit or STIP project, they can follow the step-by-step guidance procedures for aesthetic considerations as detailed below.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and

Where bicycle and pedestrian accommodations are part of a roadway project, it is the responsibility of NCDOT to consider bicycle and pedestrian projects during project development.

Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 13 and 14 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the Project Sponsors of the aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, DBPT, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, DBPT, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the LEDPA/Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Pedestrian bridge that crosses Little River near Asheville, North Carolina. Image courtesy NCDOT.

A mixed-use neighborhood accommodates bicycle and pedestrian functions through infrastructure amenities such as bicycle parking and considering the human scale in the design of the surrounding buildings. Image courtesy AECOM.

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the bicycle and pedestrian infrastructure concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, DBPT, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 8S and 3R: Aesthetics Community Meeting

The TPM will hold a community meeting with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, DBPT, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership among the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

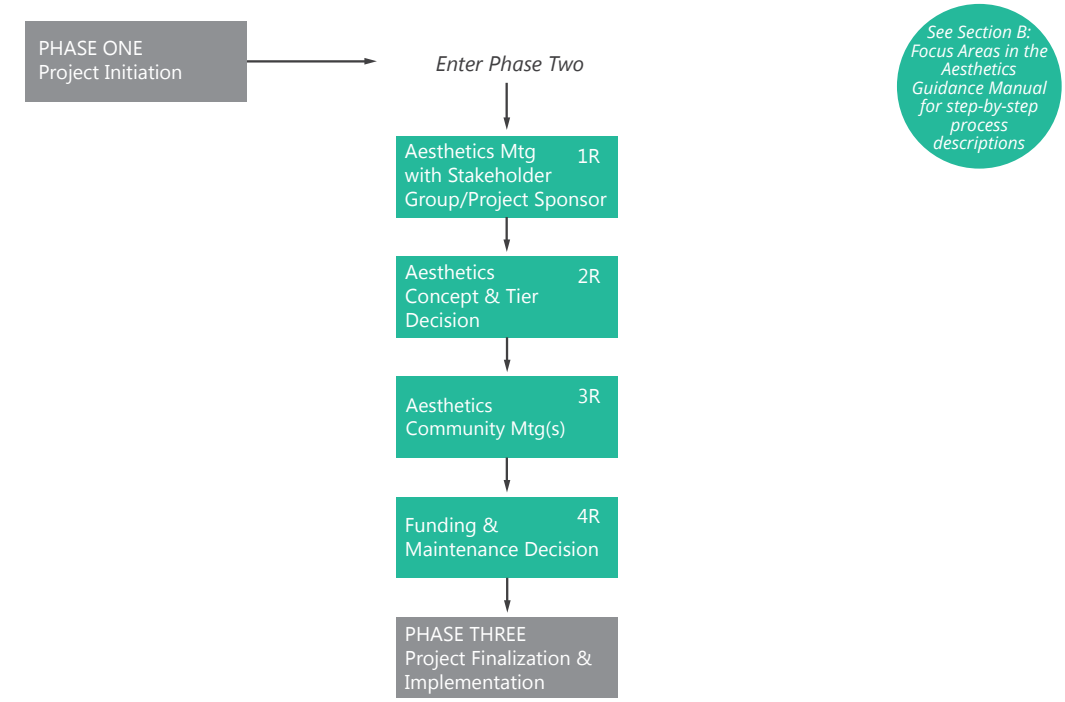
Involved parties: TPM, DBPT, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

EXHIBIT 13

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - INCIDENTAL BICYCLE/PEDESTRIAN RETROFIT PROJECTS



Color Key: Process Boxes

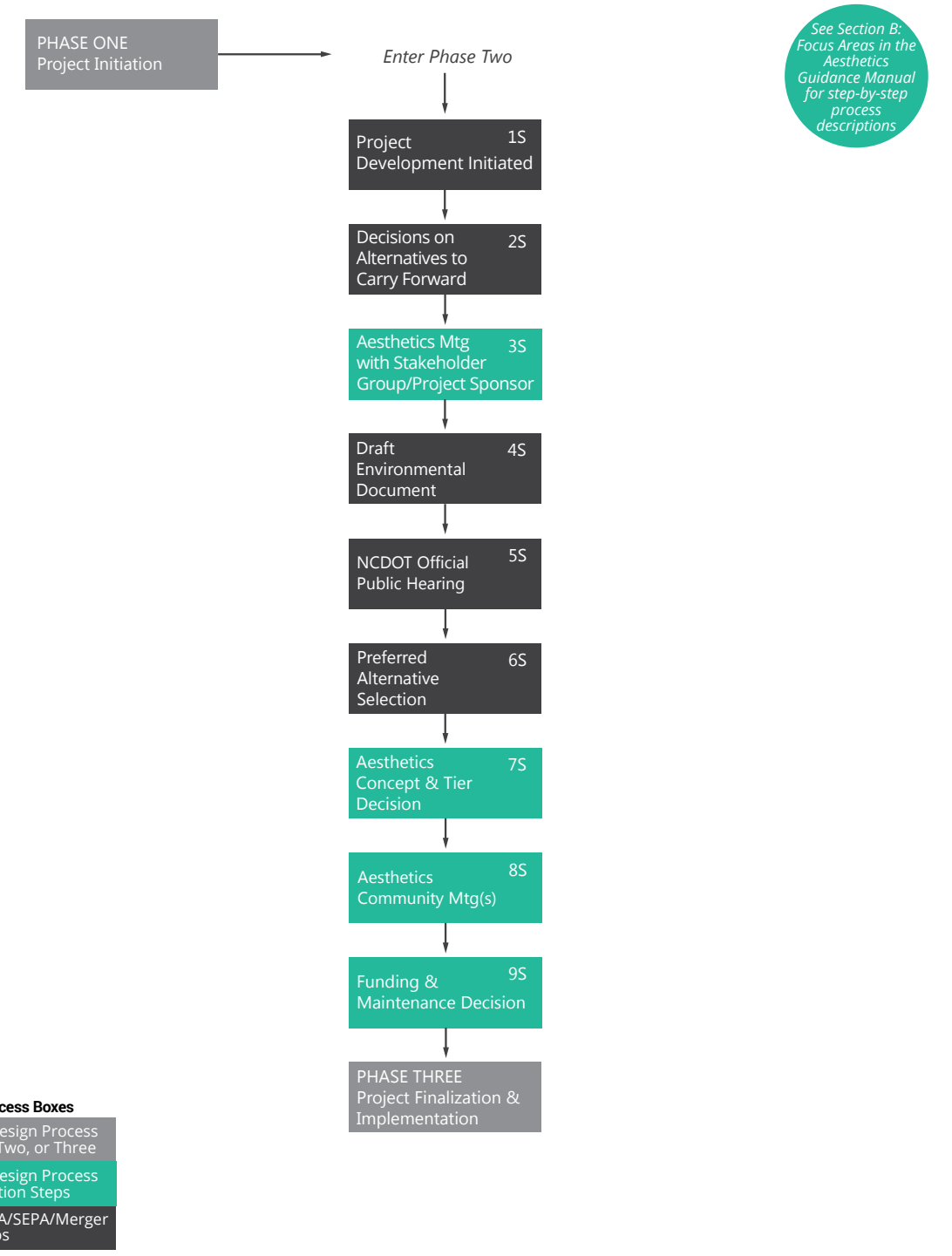
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 14

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - INCIDENTAL BICYCLE/PEDESTRIAN STIP PROJECTS



TIER APPROACH

As defined under Planning Process and Coordination (above), most bicycle and pedestrian projects are locally administered and funded, independent of a roadway project. Local governments are therefore responsible for decisions about how and what type of aesthetic elements should be built into the project, where the decision to incorporate standard or landmark improvements will be based on financial policies NCDOT has with the local government.

Most bicycle and pedestrian infrastructure projects are locally administered and funded. The tier approach should be considered by local governments to include in project scoping for bicycle and pedestrian infrastructure projects.

The following aesthetic recommendations should be utilized on a case-by-case basis by the local community and per state and federal requirements. They are included for local governments to consider in project scoping processes.

Using the tier approach defined in Section A, Chapter 3, bicycle and pedestrian infrastructure are categorized here according to standard, enhanced, or landmark. The difference between standard, enhanced, and landmark aesthetics for bicycle and pedestrian projects is primarily the level of detail, sensitivity, and creativity in applying design elements and principles.

Tier 1: Standard Incidental Bicycle and Pedestrian Infrastructure

Standard bicycle and pedestrian infrastructure focuses on functionality over aesthetics and adds design elements in a practical, affordable manner. Projects should place emphasis on facilities and treatments that maintain affordability and increase efficiency and safety. Examples include standard surfacing options to preserve longevity and allow ease of maintenance, adequate lighting and signage for visibility, or landscaping needed for erosion control, maintenance reduction, or buffering from the street and traffic.

See the Pattern Book for examples of bicycle and pedestrian infrastructure.

Basic Design Recommendations for Standard Bicycle and Pedestrian Infrastructure

The following are basic design recommendations for bicycle and pedestrian infrastructure classified as standard according to the tier approach as defined in this Manual.

Retain character-defining features of the community. This includes features such as road width, sidewalks, street trees, on-street parking, streetlights, and fences.

Introduce features to reduce vehicle speed and increase safety. This could include pedestrian "neck downs" (also referred to as "bulb-outs" or "curb extensions") at intersections and crosswalks.

Include signage on bicycle lanes and shared lane markings. Bicycle signage that identifies a designated bicycle route can be a stand-alone element.

Create an inviting pedestrian environment. Provide crosswalks, street trees, planted medians, benches, and special lighting. Providing a buffer between pedestrians and traffic is important for providing good quality of service.

Focus on the context of a gateway. Enhance the special features and elements of the site selected to become a gateway.[210]

Use art, land graphics, and special plantings sparingly. If used, concentrate at significant interchanges, such as community gateways. Special plantings should be used sparingly in order to reduce maintenance costs associated with upkeep of such plantings.

"Bench 9" by Barry Hehemann serves pedestrians walking the streets in Urbana, Illinois. Image courtesy AECOM.

Tier 2: Enhanced Incidental Bicycle and Pedestrian Infrastructure

Enhanced bicycle and pedestrian infrastructure includes upgrades to standard facilities and treatments while maintaining efficiency and safety. Offering additional wayfinding information with bicycle route signs as appropriate can enhance quality of service. Lighting can be more decorative and more pedestrian in scale, addressing both safety and visual interest. Providing well-designed crossings at intersections or mid-block locations using crossing treatments and signalized intersections encourages walking and helps to safely complete the pedestrian network. Supplemental plantings can be used to add aesthetic diversity, especially at curb extensions, planters along complete streets, trailheads, and other areas that are visible to the community. Paved multii-use paths could be widened to accommodate more users, or use decorative patterns as part of the paving to add visual interest.

See the Pattern Book for examples of bicycle and pedestrian infrastructure.

Basic Design Recommendations for Enhanced Bicycle and Pedestrian Infrastructure

The following are basic design recommendations for bicycle and pedestrian infrastructure classified as enhanced according to the tier approach as defined in this Manual.

Utilize lighting. Use pedestrian-scale lighting such as street lamps to improve safety and security while also providing aesthetic enhancements.

Utilize signage. Utilize signage for wayfinding and improved visual aesthetics.

Consider curb extensions. Also known as bulb-outs, curb extensions are extensions of sidewalks that narrow the street, increase pedestrian visibility, and decrease pedestrian crossing distance. They are also an element of traffic calming that prioritizes pedestrian safety, can reduce vehicle speeds, and can serve to protect on-street parking.[211]

Preserve the character of historical features. This could include elements such as bridge railings, hitching posts, and boardwalks.

The West Orange Trail Bike Bridge in Apopka, Florida, carries trail users over a main thoroughfare. The West Orange Trail is a 22-mile former railway converted to a trail for cyclists and pedestrians. The bridge also functions as a visual landmark and gateway. Image courtesy David Fiedler.

Tier 3: Landmark Incidental Bicycle and Pedestrian Infrastructure

Landmark bicycle and pedestrian infrastructure incorporate aesthetic elements with a unique design approach to help enhance a community's sense of identity. An individual's experience should be enhanced while also improving functionality for cyclists and pedestrians. This may be accomplished through temporary or moveable features, plantings, or public art with a high aesthetic appeal. Facilities and treatments should improve a bicyclist's or pedestrian's ability to safely navigate high-conflict areas through premier infrastructure upgrades.

See the Pattern Book for examples of landmark bicycle and pedestrian infrastructure.

Basic Design Recommendations for Landmark Bicycle and Pedestrian Infrastructure

The following are basic design recommendations for bicycle and pedestrian infrastructure classified as landmark according to the tier approach as defined in this Manual.

Focus on identity. Utilize concepts that establish an identity through unique designs of the walks, trails, and complete streets elements.

Utilize open space. When available, use public or open spaces to define a landmark aesthetic consideration.

Increase visibility between bicyclists and motorists. Bicycle boxes, bicycle stop bars, and lead signal indicators position the cyclist ahead of motorists at intersections.

Improve the pedestrian experience. This could be through elements such as benches, street trees and plantings, or enhanced walking surfaces.

This enhanced streetscape consisting of Civil War era basket quilt paving and seating, designed by artist Jack Mackie, is located at the Ross' Landing Plaza and Park at the Tennessee Aquarium in Chattanooga, Tennessee. Image courtesy Jack Mackie.

In the Louisville, Kentucky, Cast Iron Arts District, each tree guard is designed by artist Jack Mackie. These are part of the 'West Main Street Walking' sticks and are made of cast iron, carved by local carvers with themes based on the history of businesses along West Main Street. Whiskey Barrels Sticks tree guards were a collaboration with William Wallace (carver), Dry Goods & Hardware Store Sticks, and Thomas May (carver). Images courtesy Jack Mackie.

The Reedy Creek Pedestrian Bridge at night, a visual and functional landmark for the community. Image courtesy NCDOT.

Multi-Use Bridges

Pedestrian bridges should be designed as light and graceful structures reflecting their loading and usage. Aesthetically, the superstructure should be kept thin and the lines of the structure flow continuously over the supports and into the ramp or stair sections. Viewers are more aware of scale and detail on a pedestrian bridge than on a vehicular river crossing because of the rate (speed) of travel. Intricate texture patterns and refined handrail details would be appropriate on a pedestrian bridge.

Pedestrian bridges are more elaborate and iconic, helping to create a visual focal point. See the Pattern Book for examples of pedestrian bridges.

Basic Design Recommendations for Multi-Use Bridges

The following are basic design recommendations for multi-use bridges that accommodate bicycle and pedestrian functions.

Keep the bridge light in appearance. Integrate the ramps and stairs into the basic structural form.

Remember context is important. Consider the adjacent community environment and bicycle and pedestrian circulation patterns.

Avoid concrete railings. Try to avoid using concrete railings unless they are also the supporting girder.

Consider lighting. Try to incorporate lighting into the structure to avoid poles and mounts.

Pay particular attention to scale and detail. Bridges designed for bicycle and pedestrian use should be designed with the human scale in mind. This includes textures and horizontal/vertical elements.

Simplify substructure units. This should be considered for ramps and stairs to provide an open, light structural design.

The High Trestle Trail Bridge in Iowa is a landmark bridge that began with design options developed by artist David B. Dahlquist (with RDG Dahlquist Art Studio and RDG Planning & Design) and vetted through a series of public presentations. Public input was an important part of the project, with the artist as facilitator in each community along the trail. These on-site workshops galvanized support in relationship to the heritage of the Italian immigrants that worked in the mines and whose families still live throughout the area. The multi-disciplinary design team collaborated in numerous charrettes among public artist, engineers, architect, lighting designer, owner, and the public. As the site-specific concept evolved, collaboration proved critical in testing related engineering, budget, and solving a myriad of details. A project of this magnitude is a matter of relationship building. It is through collaboration that the public was welcomed into the story and have continued to share it with others. Image courtesy Kun Zhang.

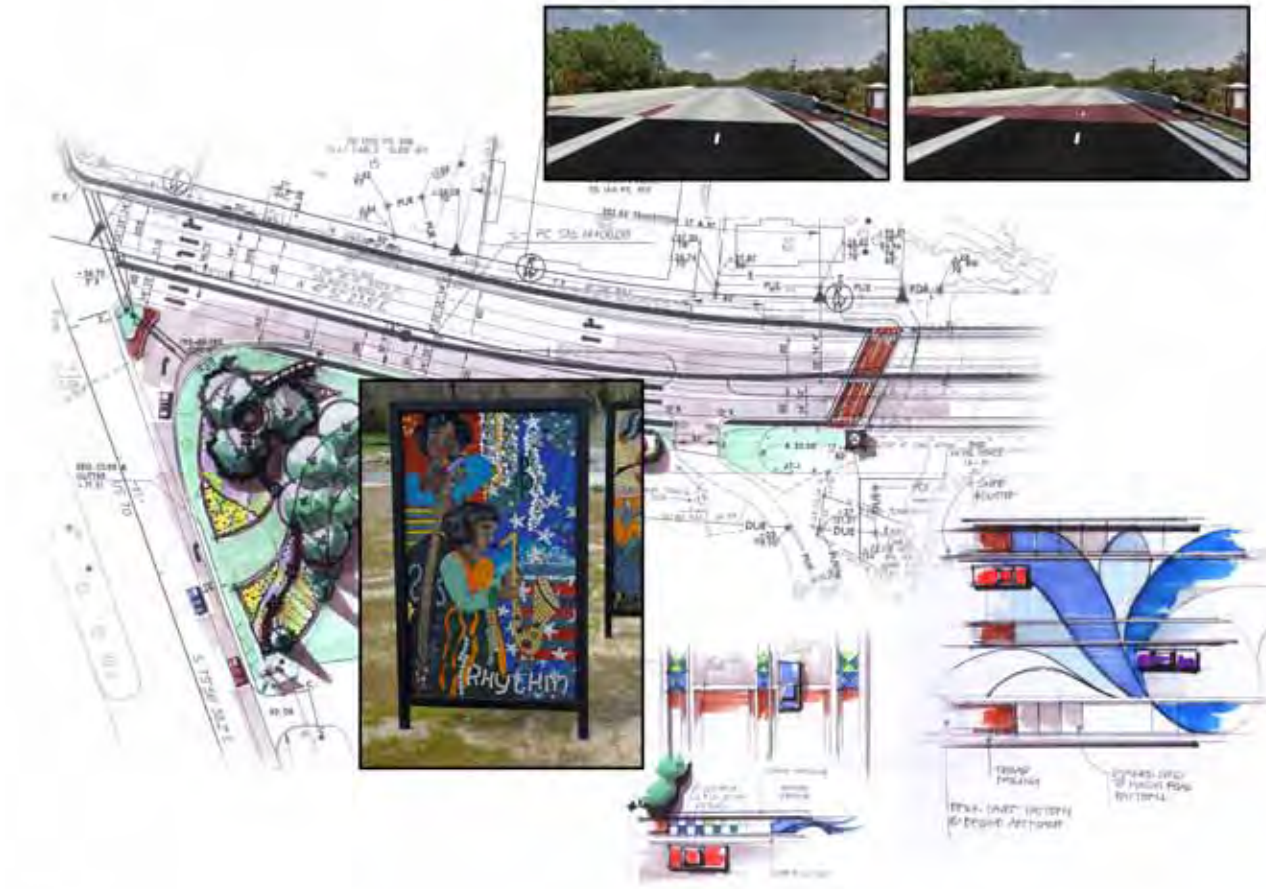
PUBLIC ART AND BICYCLE AND PEDESTRIAN INFRASTRUCTURE

Bicycle and pedestrian infrastructure presents numerous opportunities to enhance aesthetics by incorporating public art. Pedestrian-scaled artwork can generally be playful, offering a positive connection between the community and context of the site. It can tell the story about the history and culture of the place.

Many public artists are working on streetscape projects bringing both urban design and art skills to the team. They are increasingly brought onto design teams to work with engineers, urban designers and landscape architects to humanize and make the street environment more pedestrian friendly.

Pedestrian bridges have increasingly become landmarks with improved aesthetics and public art. They reflect an area's indigenous colors, flora, and fauna and their design motifs are derived from the surrounding landscape.

Mosaic murals on the walls of underpasses throughout Chicago, Illinois, are unique to each community. Image courtesy Flickr Creative Commons.



These drawings prepared by NCDOT show concepts for enhancing the visual character of a bridge crossing as part of the Kingston, North Carolina, Gateway project. Images courtesy NCDOT.

CHAPTER 12

FOCUS AREA SCENIC BYWAYS

"Scenic resources are in part responsible for our emotional attachments to place, and this emotional dimension can make scenic resources difficult to describe or measure."

Scenic America

12 FOCUS AREA | SCENIC BYWAYS

OVERVIEW

The goal of the NCDOT Scenic Byway Program, established in 1990, is to identify and recognize scenic roads that have special or unique characteristics. The U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on one or more identified intrinsic qualities, or cultural, historical, natural, recreational, or scenic characteristics.

North Carolina scenic byways vary in length from 3 to 173 miles, and in character from crossing the western mountain ranges to traversing the coastal sounds. The routes are marked with North Carolina Scenic Byway signs and in general are highlighted by existing natural resources surrounded by limited development. [213]

SCENIC BYWAY TYPES

There are 55 designated scenic byways across the state that collectively convey the culture and diversity of different regions while providing motorists with safe and distinctive routes. These scenic byways are defined by their "intrinsic quality," which refers to a feature or characteristic of a scenic byway that sets it apart as being distinctive, unusual, or exceptional. These intrinsic qualities include scenic, recreational, historical, educational, scientific, geological, natural, wildlife, cultural, and ethnic resources.

The following list categorizes scenic byways based on the three physiographic regions of North Carolina. [214]

North Durham County Byway. Image courtesy NCDOT.

Mountain Region[215]

- Waterfall Byway
- Nantahala Byway
- Cherohala Skyway
- Indian Lakes Scenic Byway
- Whitewater Way
- Forest Heritage Scenic Byway
- Appalachian Medley
- French Broad Overview
- Historic Flat Rock Scenic Byway
- Drovers Road
- Black Mountain Rag
- Pacolet River Byway
- South Mountain Scenery
- Mission Crossing
- Little Parkway
- New River Valley Byway
- I-26 Scenic Highway
- U.S. 421 Scenic Byway
- Pisgah Loop Scenic Byway
- Upper Yadkin Way
- Yadkin Valley Scenic Byway
- Smoky Mountain Scenic Byway
- Mt. Mitchell Scenic Drive

Piedmont Region[216]

- Hanging Rock Scenic Byway
- Colonial Heritage Byway
- Football Road
- Crowders Mountain Drive
- Mill Bridge Scenic Byway
- Uwharrie Scenic Road
- Rolling Kansas Byway
- Pee Dee Valley Drive
- Grassy Island Crossing
- Sandhills Scenic Drive
- Birkhead Wilderness Route
- Flint Hill Ramble
- Indian Heritage Trail
- Pottery Road
- Devil's Stompin' Ground Road
- North Durham Country Byway
- Averasboro Battlefield Scenic Byway
- Clayton Bypass Scenic Byway
- Scots-Welsh Heritage Byway

Coastal Plain Region[217]

- Blue-Gray Scenic Byway
- Meteor Lakes Byway
- Green Swamp Byway
- Brunswick Town Road
- Cape Fear Historic Byway
- Lafayette's Cultural Trail
- Tar Heel Trace
- Edenton-Windsor Loop
- Perquimans Crossing
- Pamlico Scenic Byway
- Alligator River Route
- Roanoke Voyages Corridor
- Outer Banks Scenic Byway

The Outer Banks Scenic Byway extends the length of coastal North Carolina. Image courtesy Flickr Creative Commons.

The Indian Heritage Trail begins near the Uwharrie Lakes area and ends at the Town Creek Indian Mound in Central North Carolina. Image courtesy America's Scenic Byways.

Views visible along the Blue Ridge Parkway. Images courtesy NCDOT and Flickr Creative Commons.

POLICIES AND PROCEDURES

Policies and procedures that impact the design and designation of scenic byways are described below.

Highway Beautification Act (1965)

Designated in 1965, the act prohibits new billboards along designated scenic byways that are an interstate, part of the national highway system, or federally aided primary roads.

National Scenic Byways Program (1990)

Created by Congress under the Intermodal Surface Transportation Efficiency Act of 1991. The goal is to protect and beautify roadways noted for their cultural, historical, natural, recreational, or scenic qualities.

In the late 1980s, the North Carolina Interagency Task Force investigated the establishment of a scenic byways program within the Board of Transportation based on the National Scenic Byways Program. The Division of Highways in North Carolina proposed that NCDOT preserve historical points of interest along roadways through the use of scenic byways. The Scenic Byway Program guidelines and criteria were approved and by 1990, 31 scenic byways were designated.[218]

State legislation in North Carolina later broadened the scope of scenic byways to designate roads "that possess unusual, exceptional, or distinctive scenic, recreational, historical, educational, scientific, geological, natural, wildlife, cultural or ethnic features." These intrinsic qualities are judged according to their distinctiveness, magnitude, frequency, and intactness. A route must be a minimum of one consecutive mile in length, have legal public access, and contain qualities within the corridor that are not jeopardized. Preference is given to routes with existing adjacent protected areas[219] to help recognize, preserve, and enhance selected roads throughout the United States.[220]

North Carolina Scenic Byways Program (2008)

The program is directed by the Board of Transportation and administered by NCDOT REU. Within the state, scenic byway planning involves the designation or removal of scenic byways, the design, planning, and construction of scenic byway projects, and the corridor.

North Carolina Scenic Byways Administrative Codes, T19A: 02E .1000

Developed originally in 1991, the codes define how scenic byways are nominated, designated, and managed by the NCDOT Division of Highways.[221]

Transportation Equity Act for the 21st Century (TEA-21)

As of June 1998, TEA-21 provided funding for states to develop state roads.

Safe, Accountable, Flexible, and Efficient Transportation Equity Act (August 2005)

A Legacy for Users (SAFETEA-LU) was approved to provide federal surface transportation spending to states and Indian tribes. [222]

The Cape Fear Historic Byway runs through downtown Wilmington, North Carolina. Experiencing the charm of the city is part of the overall byway adventure. Image courtesy America's Scenic Byways.

PLANNING PROCESS AND COORDINATION

The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

Corridor Management Plan

One way to guide development along a scenic byway is to develop a Corridor Management Plan (CMP) that defines planning processes, standards, and criteria for a scenic byway. A CMP is a written plan developed by the communities along a scenic byway that outlines how to protect and enhance the scenic byway's intrinsic qualities and character that define the corridor.[223] Scenic byway status does not automatically warrant additional funding or require that transportation projects or transportation elements be tailored to the scenic byway.

FHWA lists 14 components that must be in any CMP included in a scenic byway's application for national recognition:

- A map identifying corridor boundaries, intrinsic qualities, and different land uses
- An assessment of the scenic byways intrinsic qualities and their context
- A strategy for maintaining and enhancing intrinsic qualities
- A list of the agencies, groups, and individuals who are part of the team
- A strategy to enhance existing development and accommodate new development while preserving intrinsic qualities
- A plan for ongoing public participation
- A review of the roadway's safety and accident record to identify any correctable faults in highway design, maintenance, or operations
- A plan to accommodate commercial traffic
- A listing and discussion of efforts to minimize anomalous intrusions on the visitor's experience

- Documentation of compliance about the control of outdoor advertising
- A plan to make sure that signage will not get in the way of scenery
- Plans for how to market and publicize the scenic byway
- Any proposals for modifying the roadway
- A description of what you plan to do to explain and interpret your scenic byway's significant resources to visitors[224]

CMPs for All-American Roads must also include the following information:

- A narrative on promoting, interpreting, and marketing the scenic byway to attract travelers, especially those from other countries
- A plan to increase tourism and provide facilities that are adequate for the number of visitors induced by the scenic byway's designation as an All-American Road
- A plan for addressing multi-lingual information needs[225]

Most scenic byways in North Carolina do not have CMPs that help define aesthetics or other characteristics. The four scenic byways that do have management plans are (1) Outer Banks Scenic Byway, (2) Forest Heritage Scenic Byway, (3) Cherohala Skyway, and (4) Blue Ridge Parkway. The Outer Banks Scenic Byway, Forest Heritage, and Cherohala Skyway are National Scenic Byways.[226] The Blue Ridge Parkway is an All-American Road. All-American Roads are the most common scenic byways in the nation and must meet at least two out of the six intrinsic qualities for scenic byway designation. Of these scenic byways, the Outer Banks has a corridor advocacy group that provides oversight where many of the other state-designated scenic byways in the state typically are managed by RPOs and MPOs.

Process of Designation or Designation Removal

The North Carolina Scenic Byways application package defines both the designation and removal process for scenic byways within the state.

Designation requires an organization to submit an application to NCDOT. The public participation group within NCDOT holds a public hearing to consider recommended proposals, where the application is reviewed and a report is prepared and submitted to the Board of Transportation. The Board of Transportation is responsible for approving or denying applications on an annual basis.

Removing a scenic byway or a section of a scenic byway is based on the character changing in such a way that it no longer meets the criteria of a scenic byway as specified by the Board of Transportation. A designation removal process is the same as the granting process, where an application must be submitted, voted on, and reviewed by NCDOT before the final Board of Transportation approval or denial.

Additional resources within the North Carolina Scenic Byways application package should be utilized.

Visual Inventory Guide

The guide clarifies elements that influence visual perception. It helps to organize the physical features (land forms, water, vegetation, and cultural), location of elements, significance (distinctiveness, intactness, relevance, and frequency), character of elements (dominance, scale, diversity, continuity, effect, and adverse effect), pattern (line, color, texture, rhythm, foreground, middle-ground, and background), and visual threats (billboard signs, junkyard, landfill, utility lines, junk cars, and blighted property) associated with a scenic byway.[227]

Intrinsic Quality Worksheet

The questionnaire gives relevance to each intrinsic quality for applicants.[228] These include the archaeological, cultural, historical, natural, recreation, and scenic qualities of a scenic byway.

Forest Heritage Scenic Byway is a 65-mile mountain scenic drive in western North Carolina. Image courtesy NCDOT.

STEP-BY-STEP PROCESS

The inclusion of scenic byway aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures.

> The step-by-step procedures as described below are included in this section for the purpose of conveying broader planning frameworks and how scenic byways may be inserted into the planning process. This can help encourage early and continual engagement throughout the design and development of a project.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two: Focus Area Review - Integration of Scenic Byway Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 15 and 16 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the Project Sponsors of the aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements. This should initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the LEDPA/Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the scenic byway concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 8S and 3R: Aesthetics Community Meeting(s)

The TPM will hold a community meeting (or series of meetings) with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier, preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership among the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor

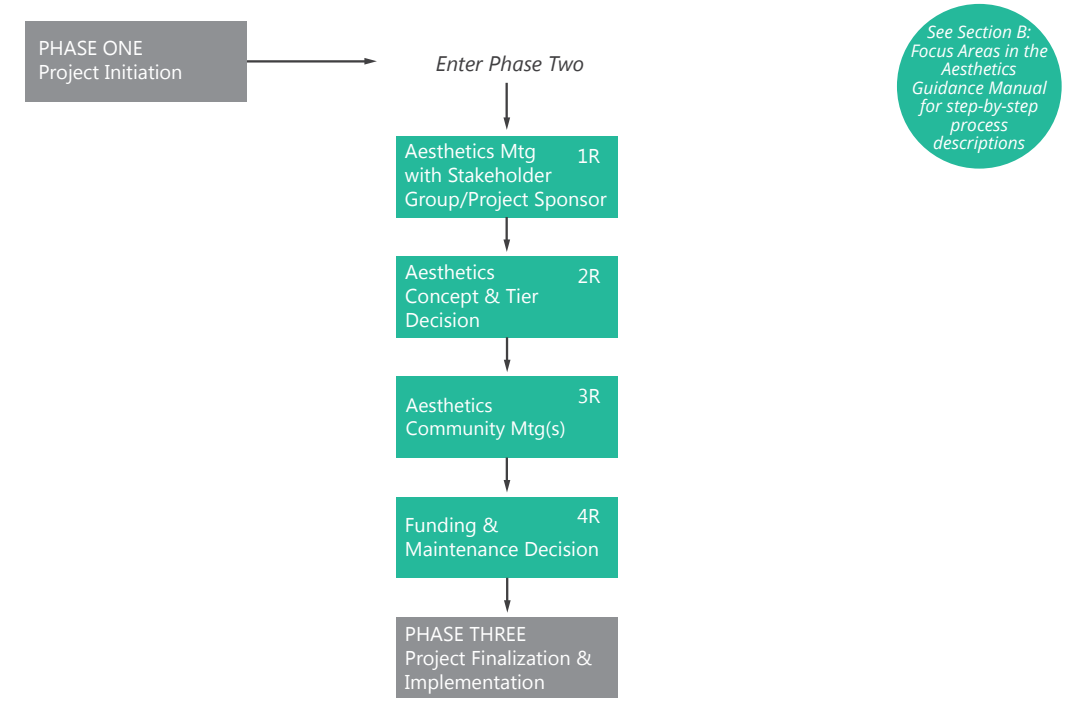
The Scenic Byway along I-26 West extends north out of Buncombe County through Asheville, Weaverville, and Mars Hill. Image courtesy NCDOT.

EXHIBIT 15

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

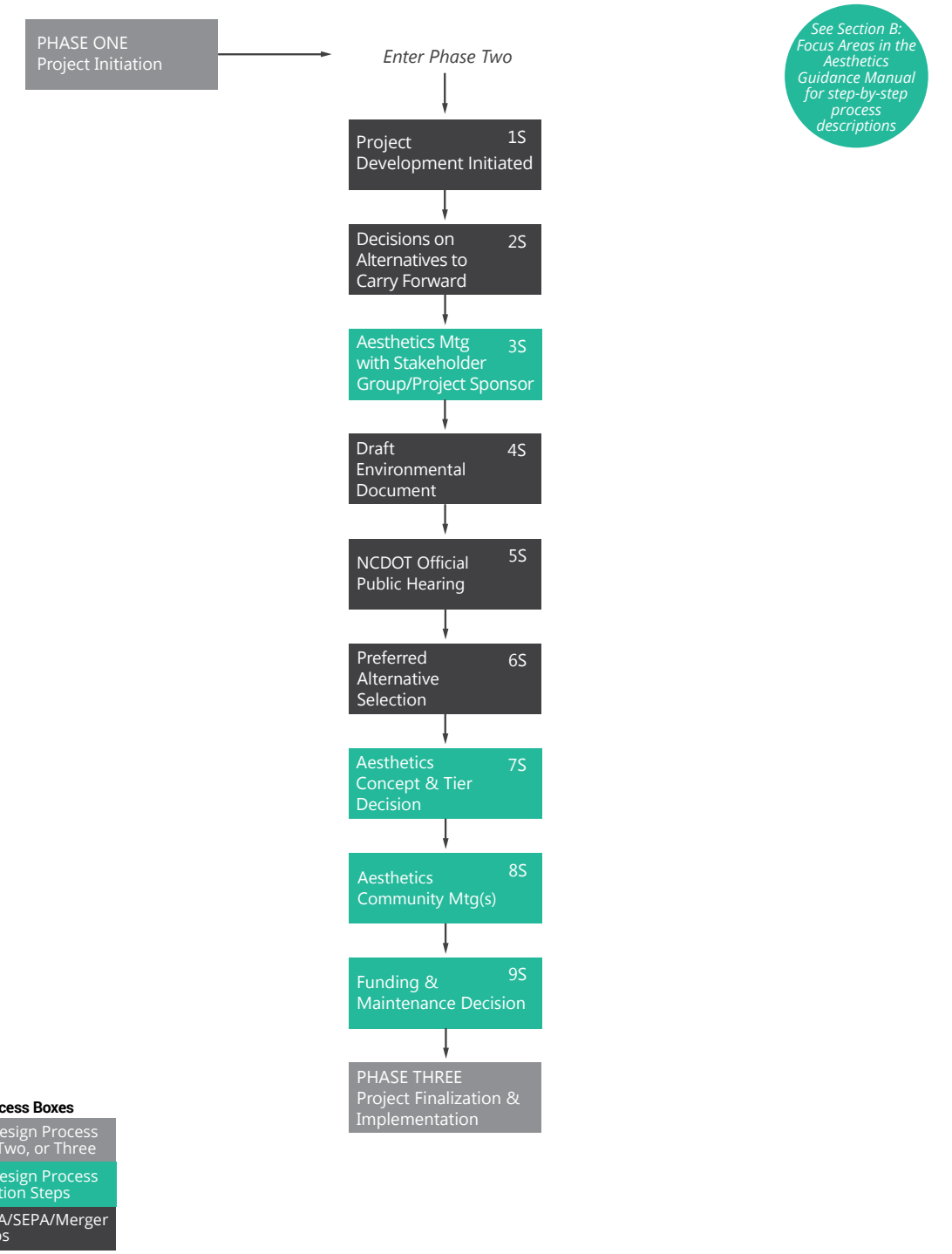
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 16

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - STIP PROJECTS



Bodie Island lighthouse along the Outer Banks Scenic Byway in North Carolina. Image courtesy Flickr Creative Commons.

TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, scenic byways can be categorized here according to standard, enhanced, or landmark. The variations between the types of scenic byways differ based upon the cultural, historical, and natural surroundings.

Tier 1 and 2: Enhanced and Landmark Scenic Byways

Scenic byways in North Carolina are considered either enhanced or landmark, as a road typically has greater qualities than standard characteristics when designated as a scenic byway. The difference between enhanced and landmark depends largely on the intrinsic quality of existing resources and how well the roadway and supportive design solutions are integrated with the surrounding context.

Scenic byways may be considered enhanced when they reflect the local community but have existing natural and cultural resources of a lower quality than surrounding areas. Scenic byways with prominent cultural and natural resources with high visual character may be considered landmark.

Basic Design Recommendations for Enhanced and Landmark Scenic Byways

The following are basic design recommendations for scenic byways classified as enhanced or landmark according to the tier approach as defined in this Manual.

There are no special statewide standards for scenic byways in North Carolina; the same roadway standards apply. Individual projects implemented along a scenic byway may have specific standards that address cultural, historical, natural, and aesthetic issues. According to FHWA, the designation of a scenic byway has four significant benefits: preservation, promotion, pride, and partnerships. Preservation of vistas, roadside scenery, and historical buildings can be facilitated through the program to maintain and improve visual resources.[229]

See the Pattern Book for examples of enhanced and landmark scenic byways.

Provide aesthetic coordination. To meet the goal of visual harmony for both enhanced and landmark scenic byways, the design characteristics of individual elements must be coordinated to provide a clear sense of order, clarity, and continuity.

Enhance driving experience through visual elements. The visual design elements of material, color, texture, pattern, and form all influence the final decisions for a road. The result is not only a green roadway that respects the existing visual character, but also enhances the driving experience.

Consider the influence of history on scenic byways. Many scenic byways are historical in nature, and existing regulations and design solutions for historical structures and landscapes influence design and planning decisions.

Include CSS with greater measure. Although CSS principles are applied to all the roads in the state, the application to projects involving scenic byways should especially be sensitive the intrinsic characteristics of the scenic byway.

Incorporate exterior lighting. Lighting features should be incorporated to enhance the aesthetic qualities of the scenic byway in interesting ways. Coordination with NCDOT safety standards is essential.

Coordinate signage with the byway theme. Signage, both decorative and required, should coordinate aesthetically with the scenic byway theme and NCDOT signange standards. This includes, but is not limited to, directional, way-finding, or welcome signage.

Involve local stakeholders. Community involvement helps develop a range of appropriate design alternatives that protect and enhance valuable resources.[230] CSS principles as applied to landmark solutions have a greater level of detail and integration because of the quality of the existing landscape setting.

Historic and Cultural Resources

The FHWA Historic Preservation and Archaeology Program offers guidance and technical assistance to federal, state, and local governments regarding historical preservation and cultural resources. In 1999, the TRB's Historic and Archeology Preservation in Transportation Committee, with assistance from FHWA and the National Park Service, organized the National Forum on Assessing Historic Significance for Transportation Programs. North Carolina also has its own guidelines for protecting cultural and historical resources. These guidelines are available through NCDOT.[231]

Recommendations for protecting cultural and historical resources along scenic byways include:

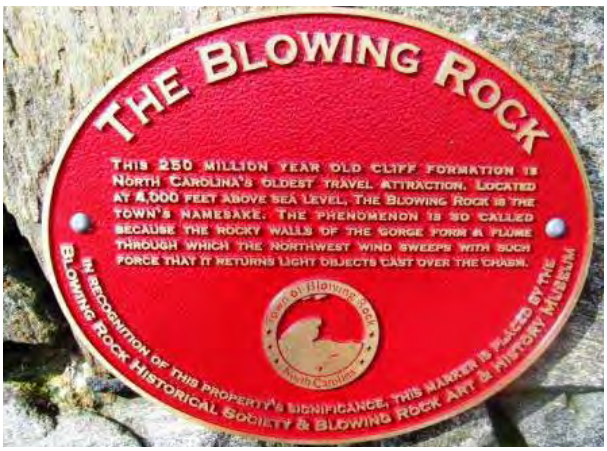
Use upgrading techniques for surrounding elements. Revitalize those properties or features that do not currently contribute in a positive way to the cultural, historical, or scenic character of the scenic byway.

Practice preservation techniques. Maintain individual historical buildings, towns, or roadway elements for the future by following good maintenance and rehabilitation practices. Preserve and protect those characteristics of the scenic byway that contribute in a positive way to the cultural, historical, or scenic character.

Consider using interpretive signage. Interpret the history of the road through signage and place names that identify significant features.

Incorporate pull-offs. Develop pull-offs at historical locations to allow tourists or visitors the opportunity to obtain interpretive information about the scenic byway and surrounding features.

Consider signage. Reduce sign clutter as well as the visual impact of the signs on surrounding areas.[232]



The Blowing Rock is located in Lenoir County, North Carolina. The site is a 4000 foot cliff overhanging Johns River Gorge. Images courtesy Flickr Creative Commons.

PUBLIC ART AND SCENIC BYWAYS

The natural beauty found along scenic byways can be enhanced by public art when adjacent to a town or more heavily populated areas having signalized or lighted intersections or bridges and gateways. Gateway features, unique lighting, bridges, walls, wide medians, and sidewalks are all areas where art can be integrated while maintaining focus on the design aesthetic and unity of the corridor.

The repetition of features can assist to visually connect the corridor. This can be accomplished through the use of consistent materials, forms, and patterns within the scenic byway structures. Artwork can be utilized to tell the story of the culture and history of the scenic byway.

Cultural and heritage tourism is a growing segment of the North Carolina economy, and the incorporation of these elements into scenic byway structures complements this trend.

Along Route 66 Scenic Byway, Grants, New Mexico, the Cultural Corridors commissioned site specific artworks that help create a sense of place within the framework of the community. Each project was $100,000 commission, 75% came from FHWA's Enhancement funds, 15% state funds and 10% local funds and the local community contributed in-kind donation of time, land, maintenance and services. Sculptures like this contribute to serving as landmarks and spur tourism. This sculpture, Fire and Ice is by artist Howard Meehan.

CHAPTER 13

FOCUS AREA PUBLIC ART

"It is art that makes life, makes interest, makes importance and I know of no substitute whatever for the force and beauty of its process."

Carlton Cuse

13 FOCUS AREA | PUBLIC ART

OVERVIEW

Public art as part of transportation projects offers a unique opportunity to bring the experience of art to the communities of which the work aims to reflect and celebrate. These art projects add an essential human dimension to transportation infrastructure while helping to assuage community concerns about the disruptions of construction and potential impacts of transportation projects. Public art may also improve the driving experience and safety of motorists while reinforcing the spirit and identity of cities and towns. To further promote art and beautification efforts in transportation infrastructure while supporting NCDOT's mission of providing the safest and best transportation facilities, the "Art that Moves You "program (see Chapter 3) and other NCDOT initiatives were created. These initiatives recognize the value of art in public spaces, the added value art brings to placemaking, and opportunities to enrich and humanize the built environment.

Creative placemaking is defined by the National Endowment for the Arts as "partners from public, private, non-profit, and community sectors strategically shape the physical and social character of a neighborhood, town, city, or region around arts and cultural activities. Creative placemaking animates public and private spaces, rejuvenates structures and streetscapes, improves local business viability and public safety, and brings diverse people together to celebrate, inspire, and be inspired."[233] The economic development role of public art has many real benefits, including recirculation of residents' incomes locally; reuse of vacant and underutilized land and buildings; job creation in construction, local businesses, and cultural activity; expansion of entrepreneurship; and helping to train and attract art and cultural workers.[234]

Historically, public art has had a long tradition in transportation projects. In the first half of the Twentieth Century, art was commonly incorporated into selected public projects, including parks and surface transportation modes such as pedestrian and bicycle facilities, roadways, and transit. Examples include parkway concepts from visionaries such as Frederick Law Olmstead, which promoted multipurpose greenways and roadways with aesthetic enhancements, including artwork along medians for the enjoyment of pedestrians and motorists alike. The New York City subway system mosaics, murals, grand architecture, and sculpture that graced many early rail stations and roadways promoted multidisciplinary integration of engineering, architecture, and landscape architectural design.

Vertical paddles by artist Ayokunle Odeleye at the 1898 Monument and Memorial Park in Wilmington, North Carolina. Image courtesy James Sipes.

The successful incorporation of art into transportation projects provides benefits that far exceed the cost. As shown from historical examples, art or improved aesthetics enhances the public space, defines the local character, positively differentiates the community, and may provide quantifiable benefits in reduced costs for repairing vandalism such as graffiti. While it may seem burdensome to bring another skillset (artist) to the design and construction team, a growing number of professional, public artists specialize in working with local governments, agencies, and engineering firms. Financial implications of the artist's time and talent are minimal compared to the project costs as a whole. Evidence shows such an initial investment yields permanent benefits. Value added includes:

Enhanced environment. Enhancement of a cityscape, sense of place, or built environment and public infrastructure.

Economic opportunities. Promotion of local urban and economic development through increased opportunities.

Encourages tourism. Encouraging tourism and the discovery of the unique cultural offerings within North Carolina.

Community identify. A sense of community identity through unique functional elements.

Cultural identity. A visual expression of local cultural identity.

Placemaking. Creation of landmarks, directional elements, and defining of neighborhoods and districts.

Represents local memory. Fostering of shared collective memory while giving meaning to place through local and regional history.

Rock Creek pedestrian bridge in Montgomery, Maryland, designed by Vicki Scuri. Image courtesy Vicki Scuri SiteWorks.

PUBLIC ART TYPES

Public art differs from studio art in that public art involves stakeholders that include the community and/or represent the community in its creation. Public art takes into consideration specifics of the site and approaches the design process with an acute awareness of the physical and social contexts. While a public artist is encouraged to create a work reflective of his or her voice, the intent and needs of the community at large must be considered. Public art for transportation projects has unique constraints such as safety requirements. The definition of art can be interpreted broadly, from free-standing sculpture and wall pieces to functional elements such as lighting, railings, seating, or structural walls. In some cases, the artist may be part of an interdisciplinary team in which they contribute to the overall design or development of specific art pieces.

Definition of Key Terms for Public Art

Artist
A practitioner in the visual and design arts, generally recognized by critics and peers as a professional in the field evidenced by his/her education, experience, exhibition record, and artwork production.

Context Sensitive Solutions (CSS)
A collaborative, interdisciplinary approach that involves the community in transportation projects.

Public art
Art or design elements created specifically for use in a public context or place that, through a public or community-based process, influences that context or place in a meaningful way. Public art provides a social function that considers or makes a difference in the way a community relates to that context or place. The term "public art" should be distinguished from "art in public places," which generally refers to art merely deposited in a public place with little or no regard for the public or community, the social function, or context or place.

Public art process
An engagement with the people and place, its history and culture, to create unique artwork that reflects the distinct character of a site. The public art process includes selection of an artist or artwork, composition of an artist selection committee, project reviews and approvals, and integration of the artwork within the transportation project.

Types of Public Art Features

Discrete objects

The traditional approach to public art consists of placing stand-alone sculptures, murals, or other artworks in public spaces as a means to beautify and humanize the environment or to memorialize people or events. Large-scale sculptures enhance roadways and may be located adjacent to the road or in medians or islands. In all cases it is important that art be sized and positioned so that it does not obstruct the visibility of the roadway, vehicles, bicyclists, or pedestrians. Sculptures should also be placed so that requirements for CRZs are met. CRZs designate the appropriate distance to roadside obstructions on the basis of speed and road classification.

Integration of public art and infrastructure

In this approach, artists work on design teams with architects, engineers, landscape architects, and other professionals to create public projects that aspire to the highest aesthetic innovation. This approach may result in artist-designed functional elements, such as bridges and bridge abutments, lighting, noise and retaining walls, railings, or sidewalks.

Master planning

This is an approach in which artists work with community groups, design professionals, and policy makers to identify opportunities for the integration of public art into highway corridors, urban projects such as civic plazas, neighborhood redevelopment districts, and parks.

Urban design and placemaking

Artwork projects can enhance a cityscape by creating a sense of place or improving the design qualities of public infrastructure. Examples of such artist designed projects include bridges, streetscape enhancements, plazas, and parks.

Temporary installations

Temporary installations are non-permanent artworks that may respond to a specific physical or social environment. Temporary projects can involve either a single artist or multiple artists responding to the same subject matter. Temporary artist interventions can help mitigate the appearance of roadway construction fences, bring attention to construction, and calm traffic near work zones in urban or suburban corridors. Some communities also work with artists to put sculptures on temporary display. This type of display is better suited in an urban center where the artwork is more closely viewed by pedestrian traffic and accompanied by an educational program with maps and walking tours.

The Cahuilla Indians' history includes subsistence in their desert environment; the patterns in their woven baskets are considered to be part of the Tribe's identity. This design of Cahuilla basket patterns and plant motifs were used by artist Carolyn Braaksma on the Basket Bridge, which is part of the Bob Hope Overpass in Palm Springs, California, to make up special pieces of the bridge fencing. Images courtesy Carolyn Braaksma.

Areas of application

While many transportation projects can benefit from quality design and the inclusion of art, some areas offer greater potential for such aesthetic treatment. Examples of projects that offer special promise are described below.

Major construction projects: New roadway projects, bridges, highways, noise and retaining walls, rest areas, welcome centers, and other associated facilities have a significant impact on surroundings and provide an opportunity to include artists on teams that plan, design, and engineer all aspects of the project. The artist should be part of the initial stages of project development.

Modernization projects: Bridges, roadways, and other transportation facilities periodically undergo modernization and renovation. Such projects offer opportunities to include public art that responds to the cultural or historical context of the site. Rehabilitation of these facilities and integration of art that represents the local community can reinforce the history in the modern urban setting.

Precast concrete panels - Surface treatment of retaining walls and noise walls for Denver's Transportation Expansion Project of the I-25 Corridor were designed by artist Carolyn Braaksma using precast concrete panels. The artist developed patterns and images for precast concrete retaining and noise abatement walls. Image courtesy Carolyn Braaksma.

Construction mitigation: Temporary art may be commissioned during construction to mitigate the negative economic impacts on businesses and to be used as part of a public outreach program for the community. Safety fencing in a congested work area could become a temporary display of what is to come or welcome drivers into open businesses during construction processes. The use of artwork can frequently reduce the negative impacts of construction in an urban area.

Beautification and revitalization projects: Usually initiated by a local government entity or non-profit organization, beautification and revitalization projects within NCDOT ROWs may offer opportunity for inclusion of public art.

Acceptable Locations for Public Art Features

The following list of corridor types is not exclusive of other potential public art opportunities within NCDOT projects.

Gateway corridors

Examples include gateways leading into a city from its airport, a corridor that forms a gateway to a downtown, a major interstate crossing that serves as the entrance to a region, or a section of the highway at a state border crossing.

Urban high density corridors

Corridors that have ROWs lined by buildings and adjacent streets offer frequent overpass/underpass structures and retaining walls. Locations for public art within this kind of environment could include noise walls from the community side potentially textured to recognize local heritage. Uncluttered and consistent public art should be the goal with the introduction of enhanced aesthetics into the urban corridor. Closely spaced interchanges with bridges may provide opportunities to create landmark bridges.

Urban low density corridors

Corridors that have wider-spaced interchanges and ramps and occasional overpass/underpass structures and retaining walls. This corridor type allows for more variety than the high-density corridor. Public art can become a unifying texture or color pattern that helps create a corridor's cohesive look. Frequently, the desire to screen views of the roadway from neighborhoods creates opportunities for the integration of public art or artist design enhancements. These can establish a sense of place for the traveler and/or mitigate the appearance of a wall or fencing facing a neighborhood.

Suburban corridors

Corridors that have widely spaced interchanges and few overpass/underpass structures or walls. ROWs are lined by office or industrial parks or by residential backyards. Screening unattractive views for travelers offers opportunities for artist designed enhancements. This can help to create a cohesive repetition of similar patterns, shapes, colors, and textures that complement the surroundings and help create a sense of place.

POLICIES AND PROCEDURES

Policies and procedures that impact the design and development of public art are described below.

Context Sensitive Design and Context Sensitive Solutions (2003)

The Maryland Department of Transportation, Maryland State Highway Administration, AASHTO, and FHWA held a conference entitled "Thinking Beyond the Pavement." This conference set out the basic concepts for CSD and CSS, which are collectively defined as "a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historical, and environmental resources, while maintaining safety and mobility." NCDOT incorporates CSD and CSS in its roadway design.

NCDOT Context Sensitive Solutions Goals and Working Guidelines (1992/3)

Emphasizes three guiding principles: to address the transportation need, to be an asset to the community, and to be compatible with the natural and human environment. CSS offers two broad concepts that are central to CSD and not unlike how public art should be approached within transportation projects. These include that each transportation project is unique. That is, the site, circumstances, users, and value systems of the stakeholders are different than any other project regardless of similarities. The other concept includes that the design response must be crafted to meet the unique characteristics of the site and the stakeholders.

NCDOT 2040 Plan (2012)

The 2040 Plan defines North Carolina's vision for a statewide transportation system.

North Carolina SmART Initiative (2010)

The SmART Initiative was established by NCDCR in coordination with NCAC, civic and government leaders, legislators, tourism and chamber of commerce directors, private developers, and arts leaders. The initiative aims to catalyze arts-driven economic development such as creative placemaking, public art projects and programs, arts and cultural assessment inventories, potential funding sources, details on tax incentives, and models for cultural district programs.[235]

North Carolina Public Art on the Right-of-Way Policy (2011)

The policy is based on the premise that transportation facilities are enhanced by public art elements that provide aesthetic and cultural benefits to a community. The policy also integrates CSS components into the design and operation of transportation facilities across North Carolina. Transportation infrastructure should be incorporated into the natural and human environment in a way that best reflects a local community's "aesthetic values and intrinsic qualities." These principles are defined according to both process and best practices, where the policy defines the submission process of public art projects for review, including art on existing transportation facilities and on proposed NCDOT construction projects.

The Manual provides public art best practices in artist and artwork selection processes and describes appropriate contexts for the incorporation of public art within transportation projects. Best practices are defined and include:

Key factors to success of the policy.

- Owner commitment
- Vision
- Design integration
- Funding
- Procurement of artist services
- Early communication between artist and designers

Inclusive artist selection process.

- Seek expert advice for artist selection process
- Create selection panel that includes all sections of the organization and the project to build support
- Screen and shortlist appropriate artists
- Request proposals
- Establish clear objectives and criteria for measurement of success

Contractual challenges to sort out early.

- Artistic freedom issues
- Ownership of the work
- Maintenance
- Warranties
- Schedule

PLANNING PROCESS AND COORDINATION

Engaging a public artist(s) at the earliest possible phases of a transportation project enables the cost benefits and efficiencies that result from integrating the artwork into the design rather than applying artwork at a later date. When a public artist is added to a project design team, aesthetic details can be considered that are more closely in line with community values. These improved details integrated with public art make communities and transportation infrastructure more appealing to the public. The details of the project are most recognizable to the public. A special pattern of brick sidewalks, unique lighting, and ornamental traffic barriers are all elements of a roadway that are easily recognizable and leave an impression. Because of their visibility, the treatment of details is a critical element in good design.

The intent of procedures as defined in this Manual is to run concurrent with standard NCDOT Project Development processes, none of which should delay implementation but provide integration of aesthetic considerations in the design and development of transportation facilities.

Proponents for public art may be local government representatives, agencies, or engaged citizens' groups with interest in the outcome of a NCDOT project. Environmental and public involvement processes offer opportunities for community partnership on the visual and aesthetic qualities of a corridor. Project details to be considered for public art in transportation projects include, but are not limited to, aesthetic tier approach, aesthetics as project branding or placemaking, cost effectiveness, maintenance, safety, and visual design elements and principles.

See Appendix D for artist selection process.

Make-up of an Artist Selection Committee

The composition of the Artist Selection Committee should include public art and visual art professionals. They can provide critical analysis of artistic quality of applicants' past projects and the appropriateness of their skills for the project at hand.

Each Artist Selection Committee should consist of seven to nine voting members as designated below:

- One or two members of the local public art or cultural board
- One or two representatives of the neighborhood association, business, benefactor of the project
- Two arts or design professionals
- One or two members of the community-at-large
- Project NCDOT representative Regional District Director (or project manager)
- Municipal project manager (appropriate planning, engineering, or other department representative)
- Municipal public works and maintenance representative
- A local elected official, if the level of participation is warranted. High profile projects may include an elected official as a voting member, but it is recommended they are invited to review project plans versus having a vote.

While it is difficult to generalize the qualities needed for an artist to be successful in undertaking a transportation public art project, there are several qualities that are positive indicators of success and should be considered during the selection process.

Tile patterning on CMU walls by artist Jack Mackie is based on colors and forms of plants important to the Pueblo People along the Unser Boulevard Escarpment Crossing in Albuquerque, New Mexico. Image courtesy Jack Mackie.

The Mountain Pass along Highway 51 in Phoenix, Arizona, was inspired by the jagged profile of the nearby Piestewa Peak Range. Vines climbing on the chain link fencing transform the safety cage to shade element. Artist Laurie Lundquist designed in collaboration with SVR Inc. Structural Engineers and HDR Inc. Image courtesy Laurie Lundquist.

Criteria for Selection of Artists or Artworks

Creative thinking and problem-solving are critical skill sets to employ when designing to achieve successful transportation projects. Artists may challenge assumptions and constraints in the design process and look at new ways to satisfy the engineering demands of a project. Approaching transportation projects in this way via use of a multidisciplinary design professional team will raise the level of aesthetic quality of the overall project, with final results that are more than individual artistic details or add-ons within the ROW.

Appropriateness to site

Artwork designs should be appropriate in scale, material, form, and content to the immediate social and physical environments with which they relate.

Community values

Consideration must be given to the appropriateness of artworks in the context of local community and social values.

Communication

The ability of the artist to effectively communicate with a variety of groups, including other design professionals, public officials, and community members should be taken into consideration.

Elements of design

Consideration should be given to public art as a genre, judged by standards that include factors in addition to aesthetic. Public art may also serve to establish focal points; terminate areas; modify, enhance, or define specific spaces; establish identity; or address specific issues of urban design.

Media

All forms of visual arts should be considered, subject to any requirements set forth by the project prospectus.

Permanence

Consideration should be given to structural and surface integrity, permanence and protection of the proposed artwork against theft, vandalism, weathering, and excessive maintenance and repair costs.

Public liability

Safety conditions or factors that may bear on public liability must be considered in selecting an artist or artwork.

Qualifications

Artists should be selected based on their qualifications as demonstrated by past work and the appropriateness of their concepts to the particular project.

Quality

Of highest priority are the design capabilities of the artist and the inherent quality of his or her artwork.

Style

Artwork should exhibit lasting qualities that are not trendy and of an aesthetic that is timeless.

Criteria for Public Art

Placement and composition of public art is unique and should be evaluated on a case by-case basis. Prior to approval of public art, a proposal in coordination with the ROW Art Committee should be developed. The committee will review the concept, guide the local agency or design team through the process, and approve the proposal in accordance with North Carolina Public Art on the Right-of Way-Policy.

The following criteria are to be addressed and documented in the public art proposal:

- Whether the public art proponent has secured the funding source, artist, design, fabrication, installation, and maintenance of the proposed art. Whether safe maintenance access and agreements with local agencies for maintenance have been provided for, where appropriate. If there is a potential for vandalism, address this issue in the associated maintenance agreement.
- Whether public art resulted from the specific recommendation(s) of a planning level study.
- The subject of the recommended art.
- The quality of the art or design. Is it of a high caliber and likely to retain its value, as judged by trained arts professionals?
- Visibility considerations. Art visible from the transportation facility must contribute to corridor continuity and the view from the road. Art visible to the community or adjacent to the neighborhood side of a structure may have more flexibility in design than that visible from the main roadway.
- Safety and security considerations where public art must not negatively impact safety nor create an attractive nuisance.
- Potential for traffic distraction. Proposed art must not distract motorists. It must be appropriate for the speed and angle at which it will be viewed.
- Scale and context must be compatible with the surrounding landscape and land use.
- Contribution of the art to community character, connection to site and/or adjacent community; whether the art relates, in form or substance to the cultures, people, natural or built surroundings, or history of the area in which the project is located.
- Impact of the proposed art on social, cultural, and environmental features. In general, NCDOT would not approve the addition of art on a historical structure or within an ecologically sensitive area unless it contributes to the educational enhancement or preservation of the site.
- Compliance with engineering code requirements.
- Whether the project sponsor demonstrates financial responsibility for the public art project.
- Whether the project sponsor uses an artist selection process to select artist or artwork.
- Durability of materials.
- Resistance to vandalism.
- Acceptable maintenance requirements.

"Light and Time Tower" in Raleigh, North Carolina, was designed to diffract sunlight, visible to motorists driving along Capital Boulevard. Designed by Dale Eldred, this 40-foot tower is formed from 20 panels of clear glass. Image courtesy Mark Turner.

Acceptable Public Art features

Public art features that are considered acceptable as part of NCDOT transportation project include, but are not limited to:

- Concrete surface treatments beyond NCDOT standard
- Colored paving, colored pavers, and/or scoring patterns beyond NCDOT standard
- Specially designed benches, trash cans, planters, or other street furnishings
- Lighting and lighting fixtures
- Appropriately-scaled sculptures or art pieces when location meets safety recovery zone and sightline requirements
- Attachments to decorative railings, light poles, or fences
- Decorative features for transportation architecture, including bridges and bridge abutments, noise/retaining walls, rest areas, and/or welcome centers

Unacceptable Public Art features

Public art features that are considered unacceptable as part of NCDOT transportation project include, but are not limited to:

- Kinetic sculptures unless the site context and driver safety are not compromised
- Brightly lit or flashing art
- Art that poses a safety risk or liability
- Small-scale sculptures. The size of a sculpture must be relative to its context and location in the landscape. Artwork that requires the viewer to give close inspection is generally not appropriate for large-scale highway projects
- Art with highly reflective qualities or adverse colors
- Art that is a distraction to drivers or out of context with the surroundings
- Signs or artistic undertakings that promote specific private or corporate business or political interests
- Art with a topic or theme that could cause negative public reaction
- Art that resembles a traffic control device

Procuring Artist Services/Artist Selection

The Federal Transit Administration's (FTA) Third Party Contracting Guidelines, which stipulate procedures for selecting architects for transit projects, can be used as a model for other transportation modes. Examples of artist selection processes are provided in Appendix D of this Manual. The artist selection process would be similar to that of hiring other design professionals and will generally vary among project types, depending upon the nature and scope of the project, characteristics of the site, resources of the community, and state and local statutes. Using the FTA process would include the following factors:

- A justifiable process, demonstrating appropriate use of public funds that gives serious consideration to a variety of artists available and capable of working on the project.
- All artists, regardless of race, color, creed, national origin, sex, or age are eligible for consideration.
- Selection of artists and/or artwork recommended is determined by a panel of art and design professionals, which may include but is not limited to art administrators, artists, curators, and architects.
- The community surrounding the future facility participates in the selection process. This could include all levels of participation, including supplying information, attending panel meetings, and being voting members of the panel. The extent and type of participation should be determined by the commissioning agency and be appropriate to both the project and the community.

The national organization Americans for the Arts (AFTA) provides resources on best practices for artist selection. In AFTA's Public Art Network Issue Paper, "Methods of Artist Selection,"[236] multiple methods of artist solicitation are presented, with the two most common being a request for proposals or a request for qualifications. The author includes lesser used methods such as nomination, direct selection, and slide registry. A request for qualifications tends to favor experienced artists, while a request for proposals favors those with less experience. The recommended method is a five-step process that includes an open call to artists, narrowing of the artist pool through qualification criteria, solicitation of proposals from the artists, artist interviews, and a design contract with the selected artist.

STEP-BY-STEP PROCESS

The inclusion of public art aesthetic considerations in NCDOT projects is detailed below in the step-by-step procedures.

> The step-by-step procedures as described below are included in this section for the purpose of conveying broader planning frameworks and how scenic byways may be inserted into the planning process. This can help encourage early and continual engagement throughout the design and development of a project.

See Section A, Chapter 4 for detailed step-by-step implementation procedures of Phase One and Phase Two of the NCDOT Project Development process. This section provides details regarding project development and implementation procedures, including program administration, stakeholder and public involvement, aesthetics and broader planning frameworks, project management, and definition of key terms.

Phase Two: Focus Area Review - Integration of Public Art Aesthetic Considerations

The guidance below includes step-by-step procedures for retrofit and STIP projects.

Key: Procedures specific to retrofit planning processes are labeled as Step 1R, 2R, 3R, etc. Procedures specific to STIP planning processes are labeled as Step 1S, 2S, 3S, etc.

See Exhibits 17 and 18 below for step-by-step implementation diagrams.

The TPM is responsible for the implementation of all phases and steps described below unless noted otherwise.

Step 1S: Project Development Initiated

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, projects requiring formal environmental documentation under NEPA/SEPA will be determined in collaboration with appropriate agencies (e.g., resource agencies), at appropriate steps in the environmental study, and use of standard methodologies. Preliminary alternatives will be developed, as appropriate.

Involved parties: TPM, NCDOT Project Group

Step 2S: Decisions on Alternatives to Carry Forward

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the TPM and NCDOT Project Group will agree on the alignment refinement, alternatives to carry forward, and finalizing decisions.

Involved parties: TPM, NCDOT Project Group

Steps 3S and 1R: Aesthetics Meeting with Stakeholder Group/Project Sponsor

The TPM will meet with the Project Sponsors of the aesthetic efforts to obtain preliminary feedback from local partners regarding interest in aesthetic improvements.

A NCAC representative and/or the ART (as applicable) will identify the local community public art representative from the municipality and/or local arts council. The NCAC will assist the TPM by inviting a local agency to serve as the project sponsor. If necessary, the NCAC representative can assist the local agency with information and/or public art professional assistance to implement an artist selection process.

The artist selection process can take up to six months. If an agency decides to hire a public artist for the project, they agree to contract with the artist and provide 100 percent of the artist's design fee, construction oversight fee, and costs for materials that go above the standard NCDOT budget for enhancements. The municipality must enter into a ROW Agreement (Encroachment Permit) with NCDOT.

This step should also initiate maintenance responsibilities, cost considerations, and prompt organization to select aesthetics concepts and/or public artists.

Involved parties: TPM, NCAC, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 4S: Draft Environmental Document

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, the environmental document will be completed and impacts will be identified for each of the alternatives that are studied in detail. There will be a discussion of the methodology used to determine elimination of preliminary alternatives.

Involved parties: TPM, NCDOT Project Group

Step 5S: NCDOT Official Public Hearing

NCDOT will hold a public hearing as part of standard NCDOT NEPA/SEPA/and Merger Process steps to gather feedback on project decisions and final alternatives. All involved parties are encouraged to attend to obtain public comments firsthand and discuss aesthetic concerns, as applicable, as part of the public hearing.

Involved parties: TPM, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 6S: Preferred Alternative Selection

Based on standard NCDOT NEPA/SEPA/and Merger Process steps, a meeting with all involved parties will be held to determine the LEDPA/ Preferred Alternative. When all substantive comments submitted by the agencies during the environmental document review and the public hearing/public notice commenting period have been adequately addressed and no new issues have been identified, a LEDPA/Preferred Alternative will be selected.

Involved parties: TPM, NCDOT Project Group, Stakeholders

Step 7S and 2R: Aesthetics Concept and Tier Decision

The TPM will determine with the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor the public art concept and tier decision (of standard, enhanced, or landmark aesthetics). Consensus of the visual and functional requirements will be made. Maintenance and funding considerations will be discussed along with a schedule detailing final commitment dates.

Involved parties: TPM, NCAC, NCDOT Project Group, ART, Stakeholders, Project Sponsor

Step 8S and 3R: Aesthetics Community Meeting(s)

The TPM will hold a community meeting (or series of meetings) with the Project Sponsor to identify aesthetic preferences. Based on the results from the meeting, the NCDOT Project Group, ART (as applicable), Stakeholders, and Project Sponsor will make a determination where reasonable and feasible to proceed with aesthetics concepts and standard, enhanced, or landmark aesthetics.

Involved parties: TPM, NCAC, NCDOT Project Group, ART, Stakeholders, Project Sponsor, Public

Step 9S and 4R: Funding and Maintenance Decision

Based on earlier preliminary cost estimates and the results of the community meeting, funding options will be identified for enhanced or landmark aesthetics. This will be accomplished in partnership among the TPM and other involved parties and the Project Sponsor.

Maintenance and funding agreements will then be secured during this step through an MOA or other binding documentation with the NCDOT (as applicable). Depending on the outcome of the agreements, the aesthetics concept can proceed to Phase Three (Project Finalization and Implementation).

Involved parties: TPM, NCAC, NCDOT Project Group, ART, Stakeholders, Project Sponsor

"Standing Leaves, Falling Light" by artist Barbara Grygutis. Overlake Transit Center, Redmond, Washington. Image courtesy Spike Mafford.

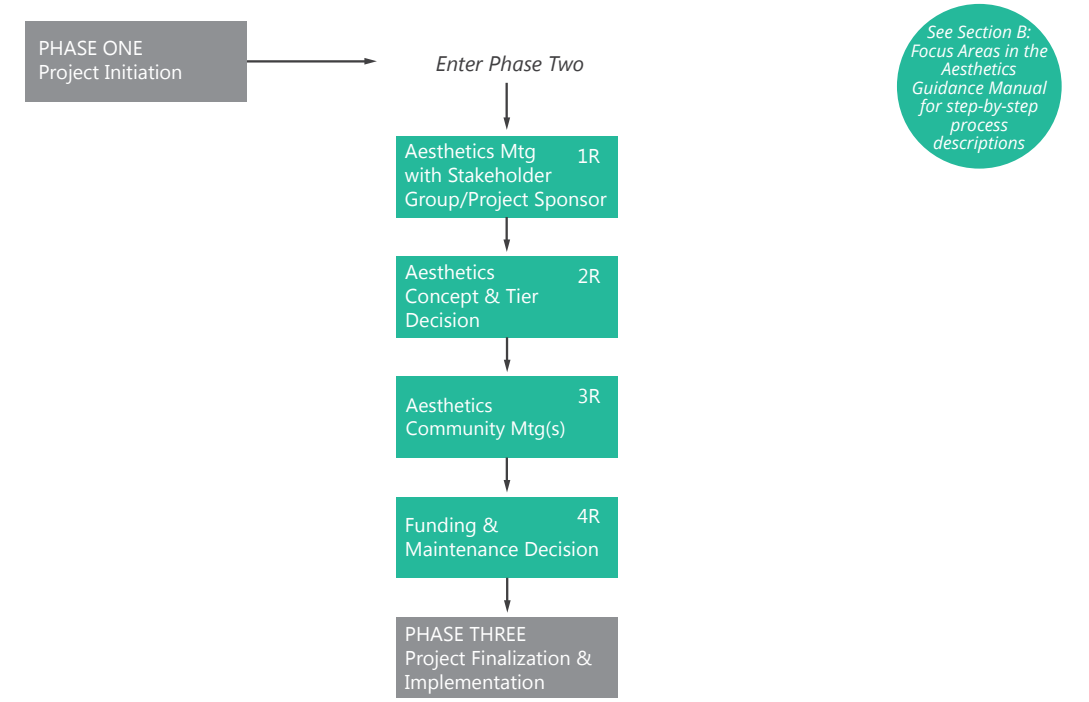
The gateway sculptures are designed by artist Robert Tully. Image courtesy Robert Tully.

EXHIBIT 17

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - RETROFIT PROJECTS



Color Key: Process Boxes

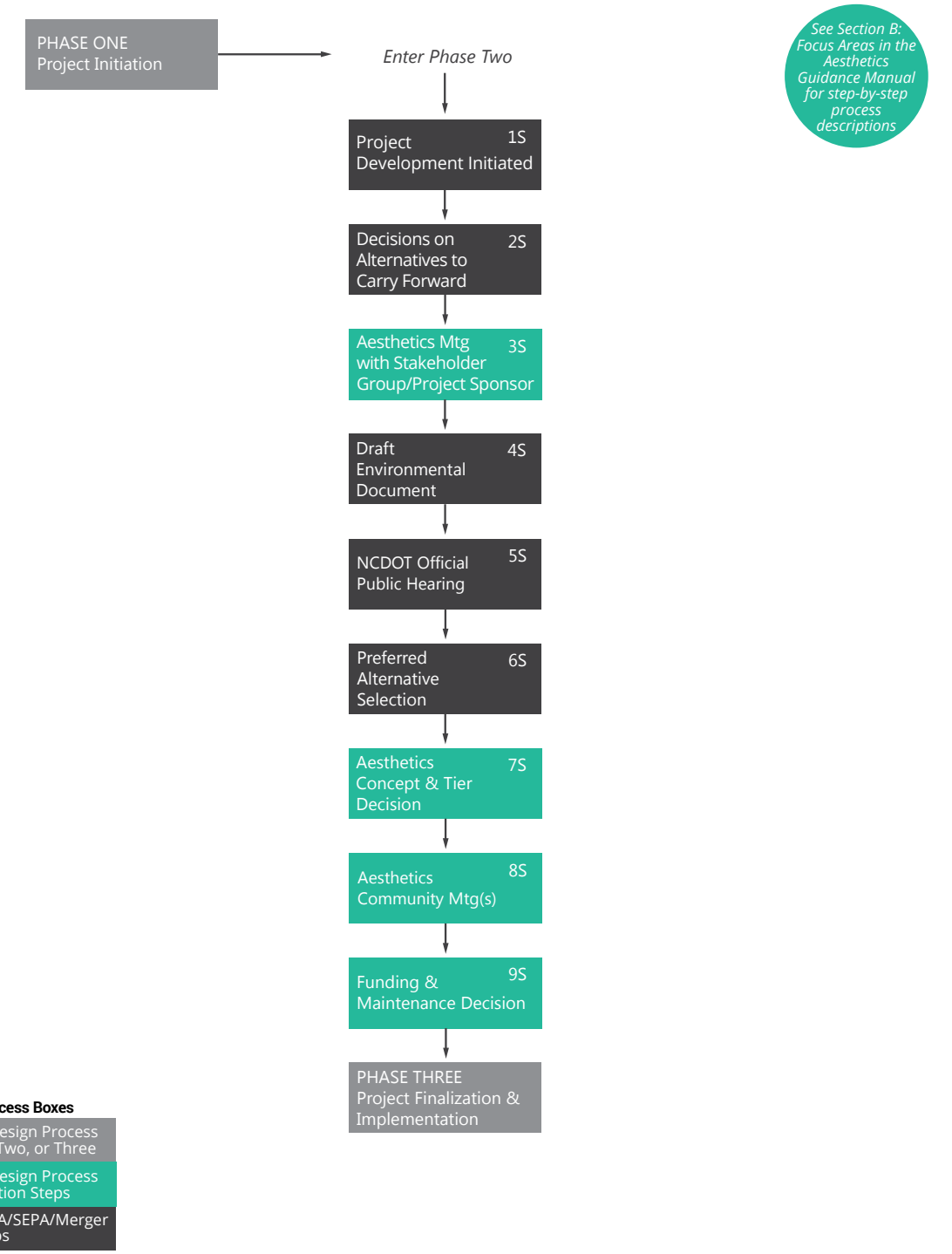
- Aesthetics Design Process Phase One, Two, or Three
- Aesthetics Design Process Implementation Steps
- NCDOT NEPA/SEPA/Merger Process Steps

EXHIBIT 18

AESTHETICS DESIGN PROCESS

Step-by-step implementation process concurrent with standard NCDOT NEPA/SEPA/and Merger Process steps as defined by NCDOT Project Development

PHASE TWO - STIP PROJECTS



TIER APPROACH

Using the tier approach defined in Section A, Chapter 3, public art can be categorized here according to enhanced or landmark tiers. The variations between the types of public art differ based upon the cultural, historical, and natural surroundings.

Tier 1 and 2: Enhanced and Landmark Public Art

Public art in the state's transportation facilities is considered either enhanced or landmark as it currently falls outside of typical NCDOT enhancements to roadways and provides greater aesthetic qualities than standard characteristics.

The difference between enhanced and landmark depends on whether improvements to existing structural elements are incorporated or stand-alone. Integration with the surrounding context including cultural, historical, and environmental features helps define enhanced versus landmark public art aesthetic considerations.

Enhanced Public Art

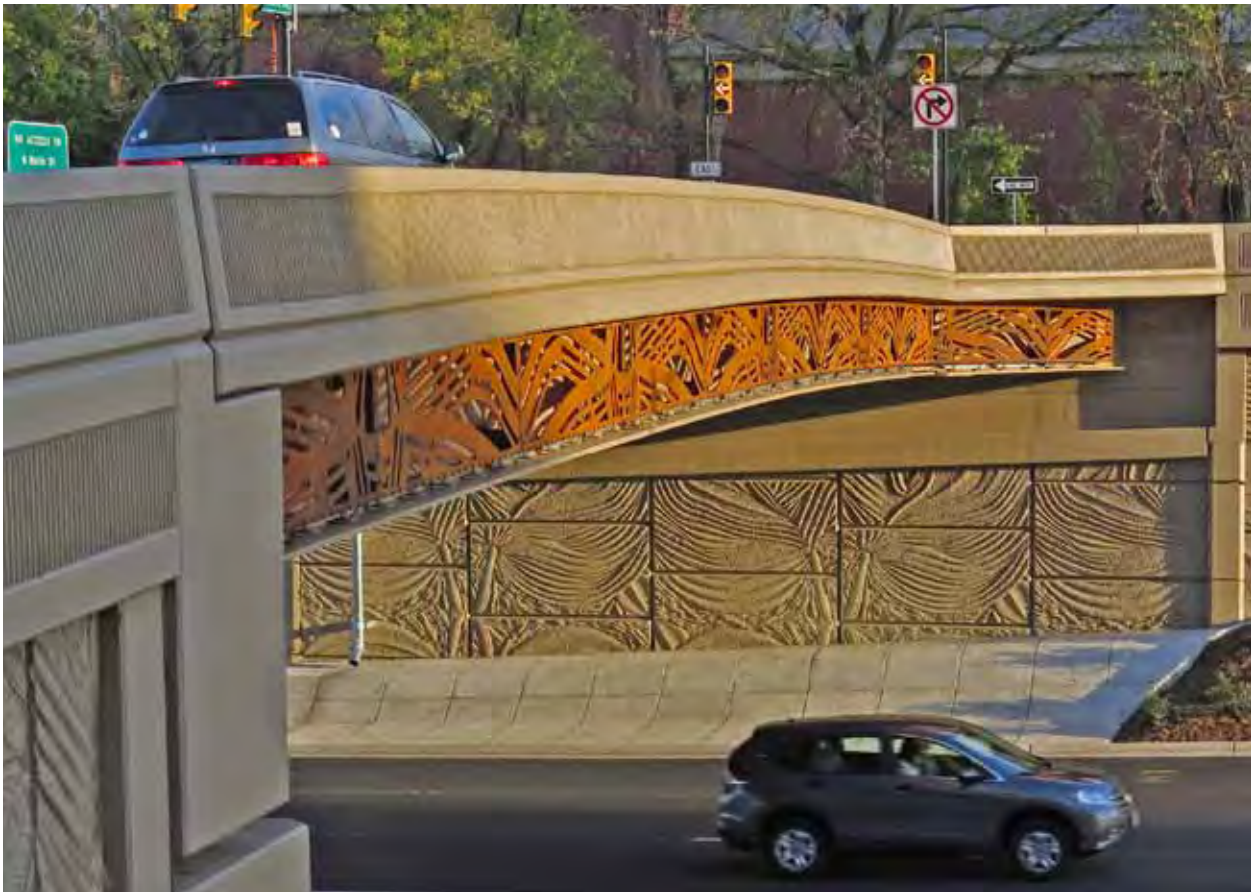
Enhanced areas within the urban or smaller town context include gateways, public open space, historical sites, major recreational areas, and other sites that have meaning for the community. These are areas typically visible and have some importance to the community's sense of identity. By working with the design team early in the CSS/CSD process, the artist can gather inspiration from the community to incorporate natural, historical, or cultural themes into the facility. Aesthetic treatments should be complementary to the overall look of the transportation corridor. The inclusion of public art within a transportation project would elevate or further improve the visual quality of the project adding to its "sense of place."

For enhanced transportation projects, paying the artist a design fee to work within the existing enhancement budget or increasing the budget to include art enhancements can be the most cost efficient approach to enhancing NCDOT projects. Areas for enhancement would likely include noise and retaining walls, bridges, railings, lighting, and other functional elements of the project. These types of public art should be designed with specifications and materials that are durable and require minimal or no maintenance.

Landmark Public Art

Public art can be incorporated into landmark projects and environments. However, careful consideration should be given to these sites because a landmark area is usually notable for its pristine and unique landforms and visual quality. Typically, these areas require a greater level of aesthetic sensitivity because of surrounding natural resources.

Artist Barbara Grygutis completed Luminaries Central Avenue, in Phoenix, Arizona, in 2006. These luminaries of perforated pre-rusted and sealed steel in the medians along Central Avenue create a gateway. Image courtesy Timothy Fuller.



The design motifs designed by Artist Vicki Scuri SiteWorks for the Arlington, Virginia, Boulevard, Highway 50, were inspired by the native redbud trees that once inhabited the site. The heart-shaped leaf patterns and their seed pods add form and texture to concrete MSE walls and to two city entryway bridges at Courthouse Road and 10th Street. Image courtesy Vicki Scuri SiteWorks.

Landmark artworks can symbolize a special sense of place and help orient visitors like markers or iconic signposts as they move about. Specially designed gateways into an urban area can serve as landmarks. Gateways are areas that define one's entrance into an urban area or a smaller town. They can incorporate a number of design elements, including bridges, stand-alone sculpture, unique landscaping, and specialized lighting. The image of a city is often rooted in the experience of arriving to or departing from the city along a major corridor. Gateways are the primary entrances into a city along these significant corridors and should be clearly defined through monumental sculpture, special landscaping, and unique lighting. Similar considerations apply for major gateways at larger airports and entrances into the state along major interstates.

The scale of artwork is an important component to fit the context of a landmark site and is often costly due to size. Stand-alone sculpture can be commissioned to add to a site with proper consideration for the context of the site. Bridges are already significant landmark features within the urban context because they present a large horizontal feature and can offer the greatest opportunity to have artwork that is integrated into a landmark project.

In 2003, the New Mexico Cultural Corridors Program received a prestigious award for Best Practices For Byways sponsored by the Federal Department of Transportation, AASHTO, and America's Byways Resource Center for a series of commissioned site-specific iconic sculpture/artworks along its Route 66 corridor. These commissioned sculptures serve as landmarks and contribute to the branding and cultural tourism within the state of New Mexico.

To qualify as a landmark work of art, an artwork must be a prominent or conspicuous object or feature on the land that serves as a guide or iconic boundary marker.

Basic Design Recommendations for Enhanced and Landmark Public Art

The following are basic design recommendations for public art classified as enhanced or landmark according to the tier approach as defined in this Manual.

Public art can be added to any project - standard, enhanced, or landmark. However, the preference is for public art that is integrated as part of the infrastructure of the transportation facility. Integrated public art is an efficient means of incorporating greater visual character to functional elements of the transportation facility.

Consider location and composition. The appropriateness of public art is frequently dependent upon its location and composition. An art piece or feature chosen for a noise wall, bridge abutment, or retaining walls along a highway is very different from that which would be appropriate at a rest area or along a trail or bicycle path.

In addition to appropriate placement, NCDOT must balance the requests for proposed public art projects with the need to provide corridor continuity, improve the unity of highway elements, and provide roadsides that do not divert motorists' attention from driving.

Develop a vision for the project. The work of the interdisciplinary team and the community participation process yields a vision that integrates the visual and functional goals of the project. It may reference abstract concepts such as community connections or pride or a concept specific to the heritage or culture of the locality. The documented vision will be used as a guide for the remainder of the project.

Get the community involved. The people who live and work in proximity to the transportation project best recognize the values and constraints of their community. On highly visible projects, the members of the community will be partners in the development process. They will identify, with the artists, the community's important features and introduce their culture and heritage into the process.

Identify the transportation corridor type. Define whether the corridor is rural, urban, or suburban. The goal of the design is to create a unified look within the corridor. NCDOT will identify the corridor type.

These images show close-up views of the ornate railing that is part of the High Water Mark project in Austin, Texas, by artist Deborah Mersky. The railing is stainless steel with porcelain enamel images. Image courtesy Deborah Mersky.

"Rain Gate" is a bench sculpture by artist Robert Tully that serves as an artistic gateway for pedestrians in Wake Forest, North Carolina's new downtown streetscape. Image courtesy Robert Tully.

Leaf Shade Bench by artist Robert Tully is a seating canopy at Jones Avenue in Wake Forest made of small squares of bronze plate welded together. Image courtesy Robert Tully.

Secure all needed skills. The evaluation of the project will indicate the skills that are needed for the interdisciplinary team. The team will integrate the skills and viewpoints of engineers, as well as those of landscape architects, architects, and artists needed to achieve improved visual quality. They will work together to establish project direction and make significant decisions. Developing team consensus is important when identifying aesthetic opportunities and selecting the final concept.

Successful projects use interdisciplinary teams. Any successful project encompasses the efforts of a number of disciplines, each area of expertise contributing to the overall quality and character of the finished project. These guidelines provide techniques and building blocks that will assist project managers and all members of the design team in creating more attractive highways.

As speed increases, foreground detail begins to fade. At higher speeds nearby objects move across the field of view quickly. Since rapidly moving objects cannot be perceived separately, the driver does not see them clearly. Objects at medium distances are seen for only a short time. Distant objects, like the sky or horizon, have permanence and can be clearly understood. The net effect of these characteristics is that the highway itself and its immediate surroundings generally exert the strongest influence on the aesthetic impression. With regard to the surroundings, only grand views, such as a major building or large natural feature, will be seen and understood. Within the highway it is only the larger elements that will be seen. Features that are less than six inches in size will have minimal visual impact.

See the Pattern Book for examples of enhanced and landmark public art.

This project renovates existing infrastructure, creating a gateway entry to the El Paso International Airport and to Downtown El Paso, Texas. Inspired by images of flight and movement, the project includes an array of 50'-tall, functional, illuminated vertical wind turbines with customized radial armatures, paired with sequences of low illuminated sculptures, and arched planters hosting native trees and plants. Image Courtesy Vicki Scuri SiteWorks and Jacobs Inc.

"Beauty is at last revealed not simply as outward visible form, not simply as a matter of appearance, but as a quality implicit in the whole existence, permeating the entire essence of our work.

The essential prerequisite to its achievement is an enthusiastic and sympathetic desire to understand and to satisfy those for whose use we design."

R.H. Evans and H. Houghton-Evans

SECTION C
IMPLEMENTATION

Section C provides strategies for implementing aesthetics into NCDOT transportation facilities.

"Growth is inevitable and desirable, but destruction of community character is not. The question is not whether your part of the world is going to change. The question is how."

Edward T. McMahon

CHAPTER 14

STRATEGIES FOR IMPLEMENTATION

"The world will not evolve past its current state of crisis by using the same thinking that created the situation."

Albert Einstein

14 STRATEGIES FOR IMPLEMENTATION

OVERVIEW

Implementation of this Manual and its principles can be accomplished through the methods and recommendations described in *Section A: Framework* and *Section B: Focus Areas*. Many transportation facilities will also be successfully implemented through strategies on a project-by-project basis.

These strategies and those defined in this section are recommended as action items and guidance improvements aimed to function concurrently with existing NCDOT Project Development processes. The incorporation of these tactics for improved aesthetics in transportation projects will take time and commitment by involved parties but can have a notable impact on our visual experience across the state of North Carolina.

STRATEGIES FOR IMPLEMENTATION

NCDOT's Technical Services Division, Division of Highways, and Division of Bicycle and Pedestrian Transportation are responsible for integrating updates, expanding respective focus areas, and defining additional strategies for implementation in future iterations of this Manual. It is recommended that the strategies detailed below continue to expand as this Manual evolves.

Administration of this Manual is the collective responsibility of respective NCDOT divisions, programs, sections, and units involved in the design and development of transportation facilities.

Displayed at a key entryway to the Charlotte Douglas International Airport, this 60-foot tall by 25-foot wide sculpture titled "Ascendus" was designed by Ed Carpenter. Image courtesy NCDOT.

Create an Aesthetic Vision

Structural decisions in transportation facilities have an aesthetic consequence and should place emphasis on defining a comprehensive vision for the overall aesthetic experience. This includes the harmonization between the aesthetics of the site corridor and surrounding context.

At the onset of each transportation project, visual requirements and priorities should be established in coordination with the community or sponsor organization and consider a balance between structural requirements and aesthetic enhancements. This vision plan should be carried throughout the length of the project and in future facilities to create a comprehensive transportation system. It is the responsibility of the project team, including NCDOT and community representatives, to integrate visual themes into the project where applicable.

Integrate the Aesthetic Design Process

The ultimate success of incorporating aesthetic considerations into the design and development of transportation facilities is through insertion early in project initiation, throughout the decision-making process, design and development, and throughout project completion.

Step-by-Step Implementation Procedures

The procedures were developed in coordination with existing NCDOT Project Development processes and should be referenced at all stages of the project to efficiently coordinate steps and responsible parties. The TPM will facilitate the inclusion of aesthetics early and throughout the project planning process with assistance on an as-needed basis from the ART.

The procedures are organized as three phases, each representing a different time frame in the NCDOT planning process, including project initiation, focus area review, and finalization and implementation. Processes vary by retrofit and STIP projects and are detailed throughout this Manual. By including aesthetic considerations as part of the existing NCDOT planning process, aesthetics can be continually incorporated and vetted by NCDOT staff and Project Sponsors.

Make Stakeholder Involvement a Priority

One of the roles of the TPM in the aesthetic design process is to facilitate diverse stakeholder exchanges that will offer increased input for aesthetic preferences and decisions. With a demonstrated interest in aesthetics as a principle of transportation planning, NCDOT must coordinate with local officials, stakeholder groups, and the public early in project development and continue beyond public involvement through project completion. This Manual should be distributed to all stakeholders early in the project development process to help facilitate aesthetic input.

Visioning exercise at a public meeting in Goldsboro, North Carolina. Image courtesy AECOM.

Stakeholder involvement is an important part of the planning process. Image courtesy James Sipes.

Benefits of diverse stakeholder groups

Including stakeholder input throughout the project allows a broader range of aesthetic ideas and values to be incorporated, while also including a variety of perspectives on visual impacts and how the community (both people and place) may be affected. Increasing the level of involvement from all stakeholders can expand the level of buy-in and support of the project, which aims to reduce any potential discontent with the project or its outcomes. Such transparent and inclusionary practices can save time and cost for the project team and stakeholders while also building relationships.

Types of stakeholders

Stakeholders that should be included in aesthetic decisions for transportation facilities include the following.

Community groups: The community includes residents of a city, town, or region, including locally owned businesses or other citizens that reside or own property adjacent to or surrounding a transportation project. These groups could include community advocacy groups, religious or unaffiliated organizations, the general public, or public or private schools, universities, or trade schools.

Private interest: Most development adjacent to or surrounding a transportation project occurs through actions of private developers that have a key role in providing land or other privately owned facilities, commercial, or residential. These interests could include industry or business associations, developers, or private companies.

Public agencies: Public departments, commissions, or authorities under federal, state, or local jurisdiction are integral to all transportation facility projects, serving as governing entities of policy and/or regulation. These agencies could include governments or local councils/officials, planning departments, MPOs or RPOs, or environmental and social advocacy agencies. Consultant teams may also be involved with certain aspects of aesthetic designs but on an as-needed and contractual basis.

Responsibilities

Including and reaching out to a diverse range of stakeholders on behalf of NCDOT and the project team can be accomplished through steering or advisory committees, working groups specific to an aspect of the project, surveys, or newsletters. It is recommended that opportunities be created for mutual education opportunities between citizens and the project engineer/project team.

Community groups, private interests, or public agencies are encouraged to contact NCDOT with interest in incorporating or upgrading the aesthetics of transportation facilities before or during the project process. Coordination at all levels between NCDOT and stakeholder groups can lead to the ultimate success of implementing aesthetic improvements in our transportation facilities.

Identify Funding Opportunities

Local, state, and private partnerships can offer strategic advantages to implement improvements on a timely basis. Involvement by civic groups can play a prominent role in increasing community awareness about the importance of aesthetic enhancement and then assist in translating that awareness into tangible improvement projects.

Funding for aesthetic affordances is on a case-by-case basis and subject to change. Opportunities for funding are therefore discussed broadly. For greater specificity, it is recommended that in further editions of this Manual funding is to be defined and approved by NCDOT, NCDCR, and other North Carolina legislative bodies, as applicable.

See Section 1, Chapter 4: Integration of Guidelines – Funding for additional funding details, including responsible parties.

Below are broadly defined funding opportunities specific to North Carolina transportation focus areas.

Surface Transportation Program Direct Attributable Program (STP-DA)

The STP-DA is a federal transportation funding program that provides flexible funding to states for highway, bridge, transit capital, intercity mass transportation, bicycle and pedestrian projects. States are required to make some of these funds available to be obligated directly by urbanized areas over 200,000 in population. Direct attributable funds are allocated by MPOs to member jurisdictions. Many MPOs issue a call for projects to be submitted by their member agencies for evaluation in a competitive selection process and in consultation with the state from proposed projects submitted by eligible entities. Currently, projects may be funded up to 80 percent of the total project cost, the rest of the costs are funded via local matching funds.[237]

Moving Ahead for Progress in the 21st Century Act (MAP-21)

MAP-21 contains a funding program called the Transportation Alternatives Program (TAP) to provide for a variety of alternative transportation projects, including many that were previously eligible activities under separately funded programs. The TAP combined and replaced funding from pre-MAP-21 programs, including Transportation Enhancements, Recreational Trails, Safe Routes to School, and several other programs. The state's Strategic Transportation Investments (STI) law requires NCDOT to include TAP-funded projects within the allocation of Division-Needs funding.[238] The TAP project selection process is described as a separately-designed prioritization process in STI. FHWA requires a competitive selection process and elements of public involvement for projects funded by TAP.[239] Under the "community improvement activities" category, projects such as streetscaping and corridor landscaping may be eligible under TAP if selected through the required competitive process. Landscaping and scenic enhancement features, including junkyard removal and screening, may be eligible as part of the construction of any federal-aid highway project under 23 U.S.C. 319, including TAP-funded projects.[240] Like STP projects, TAP projects may be funded up to 80 percent of the total project cost, the rest of the costs are funded via local matching funds. [241]

Public private partnerships. These relationships provide additional opportunities for funding aesthetic improvement projects within the ROW. When private entities collaborate with governmental stakeholders and invest financially there is the potential to install improvements in a timelier manner.

Construction of a noise wall along I-5 in Santa Clarita Valley, California. Triangular patterns reflect the surrounding mountains. Image courtesy California Department of Transportation.

Visitor Center in Randolph County along I-73/74, Southbound. Image courtesy NCDOT.

Funding Specifics of Focus Areas

The following are funding specifics of focus areas as defined in this Manual. For complete funding guidelines and resources, the respective NCDOT focus area division or unit should be contacted.

Roadways, bridges, noise walls, and retaining walls: Currently, NCDOT typically keeps the cost of structural enhancements, including roadways, bridges, noise walls, and retaining walls to a minimum. For each project, NCDOT develops a cost estimate for the entirety of the project (design and implementation) that can serve as a baseline for discussions about potential aesthetic enhancements. If a municipality, public or private agency, or other community or stakeholder group is interested in the aesthetics of one of these features above that which NCDOT proposes, it is the responsibility of the Project Sponsor(s) to provide 100 percent of the cost difference for aesthetic improvements between what traditional highway construction resources cover. NCDOT makes this determination based on cost estimates of standard roadways, bridges, noise walls, and retaining walls in comparison to the proposed enhancements.

For noise walls, if a Project Sponsor(s) insists on the provision of a noise abatement measure deemed not reasonable by NCDOT, a noise wall may be installed provided the local Project Sponsor(s) is financially responsible for all related costs including design, construction, and maintenance. Third party funding of noise abatement measures cannot be used to facilitate sound barrier reasonableness.

Roadside environment and landscape: NCDOT has established funding brackets for landscape projects based on a percentage of the final project cost estimate. The percentage of final project costs that can be utilized for roadside environment and landscape projects include interstate projects (1 percent of project cost), major primary and urban system (0.75 percent of project cost), and rural primary and secondary roads (0.50 percent of project cost). The REU is responsible for monitoring available funding and funding obligations. The funding comes from federal funding and construction funds, which are limited discretionary funds that can also be used for roadside environment and landscape projects.

Bicycle and pedestrian infrastructure: Bicycle and pedestrian projects are generally defined as an independent or an incidental project. Independent projects are locally administered and funded, where funding in most cases is the responsibility of a municipality, county, or private developer. Incidental projects are part of a larger roadway or transportation project, where it is the responsibility of NCDOT to include bicycle and pedestrian issues throughout the project development process. As defined by DBPT's WalkBikeNC plan, the final recommended alternatives selected from the project development process should generally lead to the inclusion of pedestrian and bicycle facilities.[242] If this process is followed and the pedestrian facilities are approved by NCDOT, local cost sharing is required for most projects based on a sliding scale, ranging from a 50/50 split for larger cities to an 80/20 split for smaller communities. If a municipality misses the window to request inclusion of pedestrian facilities, the facility may still be requested if the municipality agrees to cover the full cost.[243]

Scenic byways: The National Scenic Byways Program has available funds for states through grant application to undertake eligible projects. These eligible projects include planning, design, and development of state scenic byways programs; making safety improvements to designated scenic byways; construction along a scenic byway facility; improvements to a scenic byway that will enhance access to an area for the purpose of recreation; protecting historical, archaeological, and cultural resources in areas adjacent to a scenic byway; and developing and providing tourist information to the public.[244]

The Pottery Road Scenic Byway in North Carolina travels from the golf resort community of Pinehurst north to Seagrove, home of the nation's largest community of potters. Image courtesy NCDOT.

Funds through the grant application are to be used for the purpose of planning, designing, and developing state scenic byways programs, including the development of CMPs; developing state and federal agencies' designated scenic byways to make them eligible for designation as National Scenic Byways or All-American Roads; or enhancing or improving designated National Scenic Byways or All-American Roads.[245]

Public art: Public art and artist design upgrades beyond NCDOT standard design must be funded and maintained for its lifetime by the sponsoring local government, stakeholder group, or private agency, and must be accompanied by a resolution from the local governing body and Encroachment Agreement with NCDOT.

Artists may be paid a fixed fee or an hourly wage with a cap, similar to other design professional services. These costs should be all-inclusive and generally (at minimum 0.50 percent of construction costs) should not exceed five percent of construction costs, depending on the scale of the project. Costs for artwork and design enhancements can also be covered through partnerships with arts councils, local municipalities, the private sector, and local initiatives for matching and additional funds.

Some of the changes to MAP-21 that impact funding for public art include funds that may no longer be used for the procurement of sculptures or other items not integral to the transportation facility. Generally, art can be integrated into facility design and landscaping as a capital expense, where incidental costs of incorporating art into facilities and including an artist on a design team are still eligible expenses.[246]

The NCAC SmART Initiative supports public art and provides resources for other private and federal funding sources. Visit the North Carolina arts grants online for additional information.[247] Local arts councils, governments, and private non-profit agencies are eligible to apply for these and other

The SmART Initiative

An arts driven economic development plan for the cities and towns of North Carolina

The North Carolina Arts Council "SmART Initiative." Image courtesy NCAC.

grants to support artists' fees for planning, design, and implementation of art in transportation projects. State and local government funds can be leveraged to attract private foundation and philanthropic support for public art integration into transportation projects. It is recommended that projects with high visibility have a dedicated municipal public art funding that could be a percentage of the capital improvement project budget.

Public art commissions in towns and cities such as Asheville, Cary, Charlotte, Chapel Hill, and Wake Forest support various types of public art commissions that include transit, street enhancements, gateways, greenways, and trails.

The Town of Cary has used public art dollars to hire an artist to design six unique wind screen designs for transit shelters. Each transit route has its own unifying design etched into the wind screen glass that depicts an architectural detail from one of the town's historical buildings. The Charlotte Area Transit System (CATS) has been a leader in the state, incorporating artists' thinking and designs at the inception of their light rail transit projects to create award winning designs. The Town of Chapel Hill has a Public and Cultural Arts Office as a division of the Parks and Recreation Department. The office is dedicated to providing opportunities for local artists to display work and also has a number of programs that work specifically toward engaging artists in community-driven public art pieces. The Town of Wake Forest inaugurated its public art program by commissioning an artist to create unique benches as part of its downtown streetscape improvements.

A commitment at the leadership level is critical to budgeting for creative design, but partnerships with the art community are equally important. In Burnsville, North Carolina the Toe River Arts Council (TRAC), serving Mitchell and Yancey counties, has worked collaboratively with NCDOT and NCAC's SmART Initiative to incorporate public art into the planning of a series of public art gateways along Scenic Highway 19E. TRAC provided the support and administration of a public art process for artist selection and design concepts for the NCDOT Highway 19E project, building public consensus, acceptance, and appreciation for public art that will benefit the scenic byway and Burnsville streets. This demonstrates a good artist selection process that engages NCDOT partners, community leadership, and allies in the art community.

Multi-use bridge along the American Tobacco Trail in Durham, North Carolina. Image courtesy NC Rail Trails.

Establish Maintenance Agreements

Maintenance of aesthetic enhancements in NCDOT transportation facilities is the responsibility of the sponsor organization or municipality (or both) unless otherwise negotiated. An agreement should be made to upkeep facilities such as, but not limited to, landscaping or public art. According to the step-by-step implementation procedures described throughout this Manual, it is recommended that the maintenance agreement be discussed early in project development to make aware the Project Sponsor(s) maintenance requirements of the project. Finalized agreements are recommended to be made in the form of an MOA or other binding documentation toward the end of project development, before construction.

Based on interviews with NCDOT, maintenance is an essential component of aesthetic upgrades on and around transportation infrastructure and should therefore require official agreement to make sure enhancements are maintained for the reasonable life of the facility. Binding documentation such as an MOA can be obtained from NCDOT and should be coordinated with them during project development.

Conduct an Aesthetic Evaluation

It is recommended that an aesthetic evaluation take place after a project has incorporated the aesthetic guidelines and aesthetic design process framed in this Manual. This is advised as a way to develop an archive of aesthetics in practice as it relates to the design and development of transportation facilities. These series of case studies can be used to identify gaps, evaluate the planning process, gather community opinion on the project, and help to develop a catalog of effects and outcomes for future use.

To conduct an aesthetic evaluation, it is recommended that the TPM, NCDOT Project Group, ART (as applicable), Stakeholders, Project Sponsor, and other involved parties coordinate desired outcome(s) of the project early in the planning process. This could include project benefits that go beyond the transportation facility and include qualitative or secondary benefits from improved visual enhancements. Examples include changes in perception of a community or increased land values.

Uses of aesthetic evaluation

The use of aesthetic evaluation can benefit NCDOT, Project Sponsors, stakeholders, and the public for improved aesthetic design process during future projects. Examples of what an aesthetic evaluation could assess include, but should not be limited to:

Gap analysis: Understanding gaps in the aesthetic design and planning process that need improvement will help to identify whether original initiatives or desired outcomes have been met. This can help identify other focus areas that need to be included in aesthetic considerations or additional aesthetic opportunities.

Processes evaluation: The aesthetic design and planning process should be reviewed for efficiency and practicality. This can aid in isolating potential steps that need to be removed or expanded in the planning process or implementation phases.

Participant impacts: Aesthetic decisions have a major impact on community and stakeholder groups regarding surrounding context and qualitative effects. Assessing the experience of the planning process, perception of changed surroundings, and overall public/stakeholder involvement in the planning process can offer important feedback for future projects.

Documentation of effects and outcomes: It will be imperative to develop a catalog of the effects and outcomes, failures, and successes of incorporating aesthetics into the design and development of transportation facilities. This documentation will help establish accountability, the costs and benefits of aesthetics both quantitatively and qualitatively, and case studies that detail funding and maintenance obligations and/or opportunities. This documentation will also inventory the price of each project according to its tier, providing funding scales for transportation projects with aesthetic considerations.

From planning to final implementation, the1898 Memorial Park in Wilmington, North Carolina. Plan view (left) to the opening (right) of artist Ayokunle Odeleye's monument which commemorates those harmed in the racial uprising of that year and honoring those who continue their work for racial progress. Image courtesy NCDOT.

Landscaping can create a pleasing aesthetic through its form and pattern such as these plantings along the North Carolina roadside. Image courtesy NCDOT.

Aesthetic evaluation methods

All project contributors should be actively involved in helping conduct and/or participate in the aesthetic evaluation. This level of involvement will lead to more accurate results and ultimately help improve processes for future projects. Examples of aesthetic evaluation methods include, but should not be limited to:

Comparative analysis: A reflection of early aesthetic visioning processes by the project team and stakeholders. This should be a comparative analysis of initial goals and final outcomes accomplished through interviews and/or surveys.

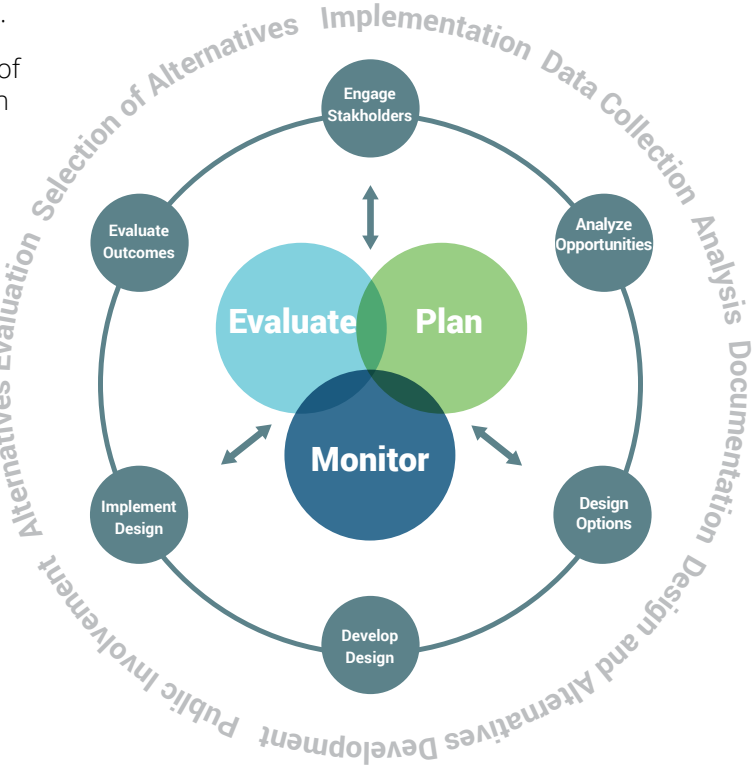
Participant impacts: An assessment of participant involvement and critiques. This can be accomplished through interviews and/or surveys.

Community-level impacts: An assessment of community engagement and reviews of the planning process and the project outcome. This can be accomplished through interviews and/or surveys.

Behavioral monitoring: Identifying potential behavioral changes such as positive or negative responses for motorized or non-motorized users or the perception of a transportation facility. This can be accomplished through monitoring based on initial indicators selected by the project team and user feedback from interviews and/or surveys.

Life-cycle assessment: Long-term review on the positive or negative effects of a transportation facility. The life-cycle should be based on a pre-determined time frame selected by the project team and assessed through monitoring and phased interviews and/or surveys.

Collectively, information gathered through aesthetic evaluations can be used in future aesthetically-driven projects for improved efficiency, cost-effectiveness, and stakeholder involvement.



"Space is the breath of art."

Frank Lloyd Wright

APPENDICES

APPENDICES A-D

Appendices includes bibliography, glossary of terms,
North Carolina statewide planning processes, artist selection processes,
endnotes and cover and divider photograph credits.

"The creative process is not like a situation where you get struck by a single lightning bolt. You have ongoing discoveries, and there's ongoing creative revelations."

Carlton Cuse

APPENDIX A | BIBLIOGRAPHY

INTERVIEW SOURCES

NCDOT Interview with Geotechnical Engineering Unit about retaining walls, *NCDOT Aesthetics Guidance Manual*, North Carolina, December 3, 2014.

NCDOT Interview and working session with NCDOT PDEA about aesthetic design processes, *NCDOT Aesthetics Guidance Manual*, North Carolina, December 3, 2014. Representatives included in the meeting: NCDOT ITS-Signals Structures, NCDOT PDEA, NCDOT REU, NCDOT HES, NCDOT Bike/Ped Division, NCDOT Roadway Design.

NCDOT Interview and working session with NCDOT PDEA about aesthetic design processes, *NCDOT Aesthetics Guidance Manual*, North Carolina, December 15, 2014. Representatives included in the meeting: NCDOT ITS-Signals Structures, NCDOT PDEA, NCDOT REU, NCDOT HES, NCDOT Bike/Ped Division, NCDOT Roadway Design, NCDOT Structures Management Unit, NCDOT Geotechnical Engineering Unit.

NCDOT Interview with Bicycle and Pedestrian Division about bicycle and pedestrian planning, *NCDOT Aesthetics Guidance Manual*, North Carolina, November 19, 2014.

NCDOT Interview with Environmental Operations & Rest Area about NCDOT Art Policy, *NCDOT Aesthetics Guidance Manual*, North Carolina, November 19, 2014.

NCDOT Interview with Eric MidKiff of NCDOT PDEA about aesthetic design processes, *NCDOT Aesthetics Guidance Manual*, North Carolina, August 6, 2014.

NCDOT Interview with NCDCR Arts Council and REU about public art, *NCDOT Aesthetics Guidance Manual*, North Carolina, June 18, 2014.

NCDOT Interview with NCDOT Division 11 engineer about aesthetic design processes, *NCDOT Aesthetics Guidance Manua*l, North Carolina, September 22, 2014.

NCDOT Interview with NCDOT Division 12 engineer about aesthetic design processes, *NCDOT Aesthetics Guidance Manual,* North Carolina, September 16, 2014.

NCDOT Interview with NCDOT Division 7 engineer about aesthetic design processes, *NCDOT Aesthetics Guidance Manual*, North Carolina, September 5, 2014.

NCDOT Interview with NCDOT Division 9 engineer about aesthetic design processes, *NCDOT Aesthetics Guidance Manual*, North Carolina, August 25, 2014.

NCDOT Interview with NCDOT HES, Traffic Noise & Air Quality Group Leader about noise walls, *NCDOT Aesthetics Guidance Manual*, North Carolina, June 18, 2014.

NCDOT Interview with NCDOT Structure Management Unit about roadways, bridges, and other structures in transportation projects, *NCDOT Aesthetics Guidance Manual*, North Carolina, June 18, 2014.

NCDOT Interview with NCDOT Technical Services about aesthetic design processes, *NCDOT Aesthetics Guidance Manual*, North Carolina, August 7, 2014.

NCDOT Interview with Roadside Environmental Unit about environment and landscape, *NCDOT Aesthetics Guidance Manual*, North Carolina, June 19, 2014.

NCDOT Interview with Roadside Environmental Unit about Scenic Byways, *NCDOT Aesthetics Guidance Manual*, North Carolina, June 18, 2014.

ONLINE SOURCES

"'Uniformity' is the Goal, Say Blowing Rock Commissioners," *Blowing Rock News*, April 20, 2014, http://archive.blowingrocknews.com/civics/town-of-blowing-rock/4604-quniformityq-is-the-goal-say-blowing-rock-commissioners.html.

"About," NCDOT, http://www.ncdot.gov/about/.

"Arts in Transit Report," FTA National Transportation Enhancements Clearinghouse, accessed February 2015, http://www.fta.dot.gov/grants/12840_9595.html.

"Bridge Aesthetics Around the World," TRB, http://www.trb.org/Main/Blurbs/154768.aspx.

"Bridge Aesthetics," Waleed Usman, February 3, 2014, http://www.slideshare.net/muhammadwaleedusman/br-aesthetics.

"Context Sensitive Solutions," U.S. Department of Transportation Federal Highway Administration, http://contextsensitivesolutions.org/content/gen/state-profiles/NC.

"Cost of Bridge Aesthetics from a DOT Perspective," Dean Van Landuyt, TxDOT, accessed February 2015, http://www.bridgeaesthetics.org/presentations/2009/09-21502.pdf.

"Defining Characteristics of Icon Bridges," Transportation Research Board, last modified June 18, 2012, http://www.bridgeaesthetics.org/.

"Designing Sidewalks and Trails for Access, Part II: Best Practice Design Guide," U.S. Department of Transportation Federal Highway Administration, updated February 10, 2014, http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/.

"Division of Bicycle and Pedestrian Transportation," NCDOT, http://www.ncdot.gov/bikeped/.

"Division of Highways," NCDOT, http://www.ncdot.gov/doh/.

"Divisions," NCDOT, http://www.ncdot.gov/doh/divisions/.

"Facts for North Carolina's Mountain Region," Economic Development Partnership of North Carolina, accessed February 2015, http://media.visitnc.com/news/facts-for-north-carolina-s-mountain-region.

"Federal-Aid Highway Act of 1970," Cornell University Law School, https://www.law.cornell.edu/topn/federal-aid_highway_act_of_1970.

"Functional Classification of Highways," NCDOT, https://connect.ncdot.gov/projects/planning/Pages/Functional-Classification-of-Highways.aspx.

"Guidelines for Planting within Highway Right-of-Way," NCDOT, accessed February 2015, http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/design/graphics/PlantingGuidelines.pdf.

"Highway Performance Monitoring System (HPMS)," U.S. Department of Transportation Federal Highway Administration, http://www.fhwa.dot.gov/policyinformation/hpms/2010/.

"Highway Stormwater Program," 1998, http://www.ncdot.gov/programs/environment/stormwater/.

"Historic Preservation and Archeology Program," U.S. Department of Transportation Federal Highway Administration, accessed February 2015, http://environment.fhwa.dot.gov/histpres/index.asp.

"Landscape and Aesthetics Corridor Plans," State of Nevada Department of Transportation, accessed February 2015, http://www.nevadadot.com/About_NDOT/NDOT_Divisions/Engineering/Design/Landscape/Introduction.aspx.

"Merger Process Guide," NCDOT, 2012, https://connect.ncdot.gov/resources/Environmental/Pages/Merger-Process-Guide.aspx.

"Mineral Resources of the Southeastern U.S.: the BIG picture," The Teacher-Friendly Guide to Geology, National Science Foundation, accessed February 2015, http://geology.teacherfriendlyguide.org/index.php/minerals-se.

"N.C. Department of Transportation Highway Landscape Planting Policy," NCDOT, accessed February 2015, https://connect.ncdot.gov/resources/Environmental/PDEA%20Procedures%20Manual%20Documents/NCDOT%20Highway%20Landscape%20Planting%20Policy.pdf.

"National Scenic Byways Program," Federal Highway Administration, http://www.fhwa.dot.gov/hep/scenic_byways/fedreg.pdf.

"NC Blue Star Memorial Marker Locations," NCDOT, accessed February 2015, http://www.ncdot.gov/programs/environmental/bluestar/.

"NC Scenic Byways," NCDOT, accessed February 2015, http://www.ncdot.gov/download/travel/scenic_byways.pdf.

"NCDOT introduces plans for new walking, biking paths," Katie Killen, posted on March 19, 2013 at 6:46 AM, updated Tuesday, March 19, 2013 at 7:01 AM, WCNC.com.

"NCDOT Structure." NCDOT, http://www.ncdot.gov/about/structure/.

"Noise Barrier Design - Visual Quality," U.S. Department of Transportation Federal Highway Administration, updated July 6, 2011, http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/keepdown.cfm.

"North Carolina American Indian History Time Line," North Carolina Museum of History, accessed February 2015, http://ncmuseumofhistory.org/learn/ForEducators/Timelines/NorthCarolinaAmericanIndianHistoryTimeLine.aspx.

"North Carolina Arts Grants Online," NCAC, accessed February 2015, https://ncarts.cgweb.org/.

"North Carolina Bridge Information," NCDOT, accessed February 2015, http://www.ncdot.gov/projects/ncbridges/.

"North Carolina Department of Transportation's Tree Planting Initiatives," NCDOT, July 2012, http://www.dcvb-nc.com/ScenicNC/2012_NCDOT_Tree_Planting_Overview.pdf.

"North Carolina Public Art on the Right-of-Way Policy," U.S. Department of Transportation Federal Highway Administration, 2011, http://contextsensitivesolutions.org/content/reading/north_carolina_public_art_on_th/.

"North Carolina Wildflower Program," NCDOT, accessed February 2015, http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/wildflowerbook/.

"North Carolina: Three Distinctive Regions," Trip Advisor, accessed February 2015, http://www.tripadvisor.com/Travel-g28954-c111581/North-Carolina:United-States:Three.Distinctive.Regions.html.

"Northwest North Carolina Visitor Center/Rest Area Fact Sheet," NCDOT, accessed February 2015, http://ncdot.org/download/travel/Wilkes_visitorcenter_factsheet.pdf.

"Pattern and Palette of Place: A Landscape and Aesthetics Master Plan for the Nevada State Highway System," Nevada Department of Transportation, July 3, 2002, http://www.nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_MasterPlan-July3.pdf.

"PDEA Procedures Manual," NCDOT, accessed February 2015, https://connect.ncdot.gov/resources/Environmental/Pages/Environmental-Compliance-Guides.aspx.

"Plan Categorical Exclusion Questions and Answers," U.S. Forest Service, http://www.fs.fed.us/emc/plan_ce/includes/q_as.pdf.

"Rock Resources of the Southeastern U.S.: the BIG picture," The Teacher-Friendly Guide to the Earth Science of the Southeastern US, National Science Foundation, accessed February 2015, http://geology.teacherfriendlyguide.org/index.php/rock-resources-se.

"Rock Resources of the Southeastern U.S.: the BIG picture," The Teacher-Friendly Guide to Geology, National Science Foundation, accessed February 2015, http://geology.teacherfriendlyguide.org/index.php/rock-resources-se.

"SAFETEA-LU," U.S. Department of Transportation Federal Highway Administration, http://www.fhwa.dot.gov/safetealu/.

"Scenic Byways," NCDOT, accessed February 2015, http://www.ncdot.gov/travel/scenic/.

"Section 106 Regulations Summary," Advisory Council on Historic Preservation, updated April 18, 2013, http://www.achp.gov/106summary.html.

"Signing and Delineation," U.S. Department of Transportation Federal Highway Administration, https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx.

"SmART Initiative," North Carolina Arts Council, http://ncarts.org/EconomicDevelopment/SmARTInitiative.aspx.

"Soils of the Southeastern U.S.: a brief review," The Teacher-Friendly Guide to Geology, National Science Foundation, accessed February 2015, http://geology.teacherfriendlyguide.org/index.php/soils-se/brief-review.

"State Transportation Improvement Program Process," NCDOT, accessed February 2015, http://www.ncdot.gov/bikeped/funding/process/.

"Statewide Pedestrian and Bicycle Plan," NCDOT, http://www.ncdot.gov/bikeped/planning/walkbikenc/.

"Surface Transportation Program (STP)," U.S. Department of Transportation Federal Highway Administration, http://www.fhwa.dot.gov/map21/factsheets/stp.cfm.

"The Audible Landscape," U.S. Department of Transportation Federal Highway Administration, updated July 14, 2011, http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/index.cfm.

"Thomas' Legion: The 69th North Carolina Regiment," Matthew D. Parker, accessed February 2015, http://thomaslegion.net/.

"Traffic Noise Abatement Policy," https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20Procedures/2011%20NCDOT%20Traffic%20Noise%20Abatement%20Policy.pdf.

"Transportation Alternatives Program (TAP) Guidance," U.S. Department of Transportation Federal Highway Administration, http://www.fhwa.dot.gov/map21/guidance/guidetap.cfm.

"Transportation Alternatives Program," https://connect.ncdot.gov/projects/planning/MPORPODocuments/TAP%20memo_1113.pdf.

"Transportation Reform," NCDOT, accessed February 2015, http://www.ncdot.gov/performance/reform/default.html.

"WalkBike NC," NCDOT, accessed February 2015, http://www.walkbikenc.com/.

"Welcome Centers," North Carolina Department of Commerce, accessed February 2015, http://www.nccommerce.com/tourism/programs-services/welcome-centers.

"Welcome to Landscape Design & Development," NCDOT, http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/design/.

PUBLISHED SOURCES

AASHTO. *A Policy on Geometric Design of Highways and Streets*. 2011. https://bookstore.transportation.org/collection_detail.aspx?ID=110.

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012. https://bookstore.transportation.org/item_details.aspx?ID=1943.

AASHTO. *Guide Specifications for Structural Design of Sound Barriers*. American Association of State Highway and Transportation Officials Subcommittee on Bridges and Structures. 1989.

Abraham, Ryan and Joe Showers. *Aesthetics, Design Build, and the Workhorse Bridge*. TRM Annual Meeting. January 2007.

Americans for the Arts. *Transportation Enhancements: Part of the Federal Resource Guide Series for Arts Organizations. Resource Guide 3. 2006—2nd Edition*. http://www.americansforthearts.org/sites/default/files/pdf/get_involved/advocacy/TransportationGuide07.pdf.

Bacow, Adele Fleet & Kenneth E. Kruckemeyer, ed. *Bridge Design: Aesthetics and Developing Technologies*. Massachusetts Department of Public Works and the Massachusetts Council on the Arts and Humanities. 1986.

Billington, David. "Bridges as Art." *Civil Engineering Magazine*. March 1990, 50-53.

Blum, Randolph F. *A Guide to Visual Quality in Noise Barrier Design*. Prepared by The Organization for Environmental Growth, Washington, DC, for the U.S. Department of Transportation Federal Highway Administration. 1976. http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/visql/index.cfm.

British Columbia Ministry of Transportation. *Manual of Aesthetic Design Practice*. September 1991.

Causey, Carrie C. "Town gives NCDOT ideas for road widening." *The Weekly Herald*. April 24, 2014. http://www.huntersvilleherald.com/news/2014/4/24/9012/town-gives-ncdot-ideas-for-road-widening.

Center for Craft, Creativity and Design. *On the Road Again: Creative Transportation Design.* 2005. http://www.craftcreativitydesign.org/on-the-road-again-creative-transportation-design/.

Cohen, Saul B., Ed. *The Columbia Gazetteer of North America*. New York: Columbia University Press, 2000. http://web.archive.org/web/20050310104113/http://www.bartleby.com/69/70/P04470.html.

DBPT. *WalkBikeNC: North Carolina Statewide Pedestrian and Bicycle Plan*. 2013. http://www.ncdot.gov/bikeped/planning/walkbikenc/.

Esser, Greg. *Public Art Network Issue Paper: Methods of Artist Selection*. Americans for the Arts. 2004. http://www.creativecity.ca/database/files/library/issue_paper.pdf.

Fenneman, N.M. and D.W. Johnson. *Physiographic Divisions of the Conterminous U.S.G.S.* Geological survey. U.S. Geological Survey, Reston, VA. 1946. http://water.usgs.gov/GIS/metadata/usgswrd/XML/physio.xml.

FHWA. *Flexibility in Highway Design.* "Chapter 1: Overview of the Highway Planning and Development Process." U.S. Department of Transportation Federal Highway Administration. Updated: September 19, 2012. www.fhwa.dot.gov/environment/publications/flexibility/ch01.cfm.

FHWA. *Guidelines for the Visual Impact Assessment of Highway Projects.* 2015, http://www.environment.fhwa.dot.gov/guidebook/documents/VIA_Guidelines_for_Highway_Projects.asp.

FHWA. *Highway Traffic Noise: Analysis and Abatement Guidance.* U.S. Department of Transportation Federal Highway Administration. FHWA-HEP-10-025. December 2011. http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf.

FHWA. *Visual Impact Assessment Methodology for Highway Projects.* U.S. Department of Transportation Federal Highway Administration. FHWA-HI-88-054. 1988. http://www.dot.ca.gov/ser/downloads/visual/FHWAVisualImpactAssmt.pdf.

Figg, Eugene C. "Public Involvement Creates Revolutionary Bridge Design." In *Proceedings of the International Bridge Conference*. Pittsburgh: Engineers Society of Western Pennsylvania. 2001.

Fleming, Gregg G., Harvey S. Knauer, Cynthia S.Y. Lee, and Soren Pedersen. *Noise Barrier Design Handbook.* U.S. Department of Transportation Federal Highway Administration. 2011. http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/design/index.cfm.

Gauvreau, Paul "Innovation and Aesthetics in Bridge Engineering." *Canadian Civil Engineer* 23.5. Winter 2006-2007: 10-12.

Gauvreau, Paul. "Improving the Aesthetic Quality of Bridges Through Education." *TRB Bridge Aesthetics Subcommittee*. June 12, 2012.

Gauvreau, Paul. "The Three Myths of Bridge Aesthetics." In Developments in Short and Medium *Span Bridge Engineering*. Eds. P. H. Brett, N. Banthia, and P. G. Buckland. Montreal: Canadian Society for Civil Engineering. 2002. 49-56.

Goode, Carl, Gail Grimes, Ann Steedly, and Steve Walker. *Noise Wall, Air Quality, Landscaping, and Farmland Impact Issues.* December 15 - 17, 2003. http://www.planning.dot.gov/Peer/NC/NC_DOT.asp.

Gottemoeller, Frederick. *Bridgescape: The Art of Designing Bridges.* 2nd Edition. John Wiley & Sons. 2004. 328 pages.

Hickey, Amanda. "Jacksonville is working with N.C. Department of Transportation to improve medians along Johnson Boulevard." *Daily News* graphic. October 27, 2013.

HNTB Corporation. *Aesthetic Guidance and Action Plan for Transportation Projects*. Miami-Dade Metropolitan Planning Organization. Miami-Dade County, Florida. January 2011.

HNTB Corporation. *Aesthetic Guidelines for Bridge Design.* Prepared for Minnesota Department of Transportation Office of Bridges and Structures. March 1995. http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

Hubbard, Sarah Marie Lillo, Marcy Smalley, and Steven Hubbard. "Art in Transportation: Multimodal Overview." *Monograph: Transit 2010, Volume 2 in Transportation Research Record: Journal of the Transportation Research Board.* 2010. pp. 168-180. http://trid.trb.org/view/2010/C/909947.

Ingram, Dewayne. *Landscape Design - Aesthetic Principles.* CIR536. Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date June 1991. Reviewed October 2003.

LandDesign. *US 64-NC 49 Corridor Study, Land Use Policy Guidelines for Mobility Protection.* Prepared for NCDOT. January 2005. http://www.ncdot.gov/projects/us64phase1/download/US64-NC49_Land_Use_Guidelines.pdf.

Lefler, Hugh T. and Albert Ray Newsome. *North Carolina: The History of A Southern State.* 3rd Rep edition. Umi Research Pr. Date. June 1973.

Markusen, Ann and Anne Gadwa. C*reative Placemaking.* Prepared for the National Endowment for the Arts. 2010. http://arts.gov/sites/default/files/CreativePlacemaking-Paper.pdf.

Meyer, Paul A. *MEMORANDUM To: Managers, Administrators, Clerks, Attorneys, and Planners on Changes to Billboard Regulation.* August 4, 2011.

NACTO. U*rban Bikeway Design Guide.* 2012.

National Association of City Transportation Officials. *Urban Bikeway Design Guide.* August 2013.

National Cooperative Highway Research Program. *NCHRP Report 554 - Aesthetic Concrete Barrier Design.* Transportation Research Board of the National Academies, Washington, DC. 2005.

NCDOT Division of Highways. *North Carolina Scenic Byways Administrative Codes, T19A: 02E .1000.* 1995.

NCDOT. *2040 Plan, North Carolina Statewide Transportation Plan, Challenges and Opportunities.* Prepared by Atkins for the North Carolina Department of Transportation. September 2011. http://www.ncdot.gov/download/performance/2040_ChallengeOpp.pdf.

NCDOT. *Bridge Policy.* North Carolina Department of Transportation Highway Design Branch / Design Services Unit. https://connect.ncdot.gov/projects/roadway/roadwaydesignadministrativedocuments/bridge%20policy.pdf.

NCDOT. *Complete Streets Planning and Design Guidelines.* July 2012. http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.

NCDOT. *Guidance for North Carolina's Comprehensive Transportation Planning (CTP) Process.* North Carolina Department of Transportation, Raleigh, North Carolina. May 11, 2012. https://connect.ncdot.gov/projects/planning/TPB%20Documents/CTP%20Guidance.pdf.

NCDOT. *North Carolina Bicycle Facilities Planning and Design Guidelines.* Produced by Bikecentennial for the North Carolina Department of Transportation, Division of Bicycle and Pedestrian Transportation. January 1994. https://connect.ncdot.gov/projects/BikePed/Documents/Bicycle%20Projects%20Planning%20and%20Design%20Guidelines%20-%20Full%20Version.pdf.

NCDOT. *North Carolina Department of Transportation Logo Signing Manual.* Effective 2004, Revised 2006. https://connect.ncdot.gov/resources/safety/Teppl/TEPPL% 20All%20Documents%20Library/manual.pdf.

NCDOT. *Roadway Design Manual.* https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx.

NCDOT. *Roadway Design Manual.* Part II, Chapter 16: Landscape Plans." Revised November 2007. https://connect.ncdot.gov/projects/Roadway/Roadway%20Design%20Manual/16.%20%20Landscape%20Plans.pdf.

NCDOT. *Standard Specifications for Roads and Structures.* 2012.

NCDOT. *Traditional Neighborhood Development Street Design Guidelines.* July 2000. https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Traditional%20Neighborhood%20Development%20Manual.pdf.

NCDOT. *Traffic Noise Analysis and Abatement Manual.* Effective Date: July 13, 2011. https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20Procedures/NCDOT%20Traffic%20Noise%20Analysis%20and%20Abatement%20Manual.pdf.

Nevada Department of Transportation. *2010-11 Landscape and Aesthetics Community Match Program Procedures Manual: Guidelines, Applications, Instructions, and Forms for the Community Matching Funds and Transportation Art Programs.* 2011. https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

North Carolina Cooperative Extension Service. *Landscaping for Wildlife with Native Plants.* North Carolina State University. 2002.

North Carolina Department of Cultural Resources. "Beautifying the Roads We All Drive On: Art That Moves You." *Adventures in North Carolina Culture.* April 14, 2014. https://ncculturebloggerwordpress.com/.

Ohio Department of Transportation. *Aesthetic Design Guidelines.* 2000. http://www.dot.state.oh.us/policy/AestheticDesign/Documents/ODOTAesthetics.pdf.

Parker, Matthew D. "Three North Carolina Regions: Coastal Plain, Piedmont, and Mountains." 2005-2015. http://thomaslegion.net/threenorthcarolinageographicregionscoastalplainthepiedmontandthemountainsmaps.html#sthash.WkgmSuZb.dpuf.

Parsons Brinckerhoff. "Creating a Gateway to Winston." *Bulletin* Volume 54, December 2013. http://bulletin.pbworld.com/volumes/2013_12/creating_gateway_winston_salem.aspx.

Powell, William S., Ed. *Encyclopedia of North Carolina.* The University of North Carolina Press. November 2006.

Rauseo, Joe. *Effective Noise Barriers: Case Study from North Carolina.* TR News. September 2013. http://onlinepubs.trb.org/onlinepubs/trnews/trnews288.pdf.

Ready, Milton. *The Tar Heel State: A History of North Carolina.* University of South Carolina Press. December 5, 2005.

Sipes, James L., and Matthew L. Sipes. *Creating Green Roadways: Integrating Cultural, Natural, and Visual Resources into Transportation.* Island Press. 2013.

Smith, Greg. *Request for Noise Barriers Texture and Color Preference - I-77 High Occupancy Toll (HOT) Lanes Project.* Letter to Andrew Grant, Assistant Manager of Town of Cornelius, NC. July 26, 2013.

Smith, Gregory A. "Facing the Noise Wall A New Paradigm for North Carolina." NCAMPO Conference. May 16, 2013.

Stabley, Susan. "Don't vote for 'ugly' noise walls, Charlotte City Council tells uptown property owners." *Charlotte Business Journal.* February 10, 2014. http://www.bizjournals.com/charlotte/blog/going_green/2014/02/don-t-vote-for-ugly-noise-walls-charlotte-city.html.

Texas Department of Transportation. *Landscape and Aesthetics Design Manual.* October 2012. http://onlinemanuals.txdot.gov/txdotmanuals/lad/lad.pdf.

TRB. "Aesthetics in the Landscape." *TR News* January-February 2007, Number 248. http://onlinepubs.trb.org/onlinepubs/trnews/trnews248.pdf.

TRB. "High-Performance Aesthetic Bridge Rail and Median Barrier." *Journal Transportation Research Record: Journal of the Transportation Research Board.* Transportation Research Board of the National Academies. Volume 2120 / 2009 Highway Design 2009. pp. 60-73.

TRB. *Bridge Aesthetics Sourcebook—Practical Ideas for Short- and Medium-Span Bridges.* Transportation Research Board Subcommittee on Bridge Aesthetics. March 2009. http://bridgeaesthetics.org/Draft_Bridge_Aesthetics_Sourcebook_March09.pdf.

Utah Department of Transportation. *UDOT Aesthetics Guidelines.* November 5, 2014. http://www.udot.utah.gov/main/uconowner.gf?n=5361113714159942.

Virginia Department of Transportation. *Highway Traffic Noise Impact Analysis Guidance Manual*, Version 4. FHWA Approval: March 15, 2011, Updated: August 06, 2013.

APPENDIX B | GLOSSARY OF TERMS

"**Art That Moves You.**" A transportation beautification program that promotes tourism through the use of creative landscaping, artwork, and lighting.

2040 Plan. Defines North Carolina's vision for a statewide transportation system.

Abutment. A retaining wall supporting the ends of a bridge or viaduct.

Aesthetic design principles. The design principles of order, proportion, rhythm, harmony, balance, contrast, scale, unity, transition, repetition, and simplicity used to define the aesthetic character of a feature or area.

Aesthetic enhancement. Visual enrichment of structural and non-structural elements specific to NCDOT transportation facilities.

Aesthetic guidelines. A series of tenets to help direct the focus of aesthetic decisions and allow for a more cohesive decision-making process.

Aesthetics Review Team (ART). Consists primarily of representatives from NCDOT Division of Highways and NCDCR. The ART is led by the Human Environment Section Head.

Arterials. Major through roads that also accommodate large volumes of traffic.

Artist. A practitioner in the visual and design arts.

Background. Area beyond the middle-ground that extends to the horizon. Viewers can perceive broad forms, lines, wide valleys, distant hills, and mountains.

Balance. The equilibrium or equality of a visual attraction.

Bicycle lane. A portion of the roadway designated by striping, signing, and/or pavement markings for preferential or exclusive use by bicycles and/or other non-motorized vehicles.

Brick and masonry. Brick is typically manufactured using a clay and sand mix that is fired in a kiln to increase the brick's strength and durability. Masonry block is manufactured using a dry-cast concrete mix.

Brick and masonry block noise walls. Walls constructed of fabricated brick or masonry block units.

Cantilevered walls. Walls made from an internal stem of steel-reinforced, cast-in-place concrete or mortared masonry.

Capital improvement costs. Costs of landscape and aesthetic treatments included in the budget when a highway is first constructed or expanded.

Cast-in-place concrete walls. Walls constructed at the project site.

Clear zone. The total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles.

Collectors. Roads that collect traffic from local roads and distribute it to arterials.

Color. Applied to define, clarify, modify, accentuate, or reduce the visual effects of structural elements.

Complete Streets. Streets designed to be safe and comfortable for all users, including pedestrian, bicyclists, transit riders, motorists and individuals of all ages and capabilities.

Context Sensitive Design (CSD) and Context Sensitive Solutions (CSS). A collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historical, and environmental resources, while maintaining safety and mobility.

Contrast. Dynamic relationship of complementary, opposing design elements.

Direct burial panel. A retaining wall system that involves burying a portion of one end of the panel directly into the ground with no other means of foundation support.

Enhanced areas. Generally considered to have greater visual character than standard areas, and there is greater viewer sensitivity for historical and cultural resources.

FHWA Historic Preservation and Archeology Program. Provides guidance and technical assistance to federal, state, and local governments regarding historical preservation and cultural resources.

Foreground. A viewing area within 1/4 mile distance that allows viewers to perceive details such as forms, lines, and colors.

Form. Reveals objects in three dimension, adding depth to the height and width of a specific shape.

Free-standing walls. Walls that support themselves.

Freeways. Limited access roadways such as interstates, motorways, and toll roads that are among the most heavily traveled roadways.

Functional bridges. Utilitarian bridges constructed with a limited budget.

Gravity retaining walls. Walls that depend on their mass to resist pressure from behind.

Harmony. The complementary relationship of similar or identical components.

Historic bridges. Bridges that fall under Section 106 of the National Historic Preservation Act

Iconic or landmark bridge. Bridges that typically have unique characteristics that set it apart from a typical workhorse bridge.

Landmark areas. The highly valued landscapes or design elements because they have a variety of land forms, rock, vegetation patterns, water, and other features of outstanding or unique visual quality.

Line. A direct connection between two points.

Local roads. Local roads that include Main Street, interior roads within communities, and subdivision streets.

Maintenance costs. Costs of long-term activities to protect the public's investment in landscape and aesthetic treatments, such as pruning, replacing plants, painting, and irrigating.

Mechanically stabilized earth (MSE) walls. A more modern approach for gravity walls that use precast, segmental blocks, panels, or geocells filled with soil to add stability.

Middle-ground. A viewshed typically located from between a ¼ mile to 3 mile distance, and provides views of forms, lines, and colors in masses.

Moving Ahead for Progress in the 21st Century Act (MAP-21). Signed into law by President Obama in July 2012. MAP-21, the Moving Ahead for Progress in the 21st Century (P.L. 112-141), replaced SAFETEA-LU, the Safe Accountable Flexible Efficient Transportation Equity Act of 2005, which included specific funds set aside for the Transportation Enhancement program and its 12 authorized activities. MAP-21 establishes the Transportation Alternatives (TA) program, which replaces the funding of pre-MAP-21 programs, including Transportation Enhancements. Under this new program, the eligibility of some of the 12 previously authorized transit enhancement activities has changed. Tourist and welcome center facilities, landscaping and scenic beautification, and the establishment of transportation museums are no longer eligible activities under MAP-21. It does provide needed funds for some landscaping and environmental projects.

Multi-use path. Facility that is physically separated from the roadway and intended for use by bicyclists, pedestrians, and others.

NCDOT Project Manager. Person responsible for overseeing all administration, project planning, approvals and inspections, and pre-construction management for state-funded roadway projects.

Noise walls. Freestanding walls installed where traffic noise exceeds or is expected to exceed established threshold levels.

North Carolina Rail-Trails Program. A program that monitors the state's rail system and actively pursues corridor preservation, retrieval, and conversion to public trails.

Order. Arrangement of components so that they work together as a unity without visual confusion.

Paved shoulders. An outside travel lane with a width of at least 14 feet to accommodate both bicyclists and non-motorized vehicles.

Pedestrian bridges. Used to help extend walks and trails across rivers, roads, or other physical elements that create barriers for circulation.

Post-and-panel noise walls. Noise barrier panels mounted between foundation-supported posts.

Project Team. Project team consisting of NCDOT division, unit, group, or section representatives selected by the Project Manager.

Proportion. Relationship of two or more elements in a design and how they compare with one another.

Public art process. Engagement with the people and place, its history, and culture to create unique artwork that reflects the distinct character of the site.

Public art. Art or design created specifically for a public context or place that influences that context or place in a meaningful way.

Repetition. The repeated use of line, forms, patterns, textures, colors, or other visual characteristics.

Rhythm. The regular recurrence of similar design elements.

Rural areas. Areas characterized by natural areas, agricultural uses, and limited development, except in towns, villages, or crossroads.

Scale. The size of features in relationship to one another, to a specific structure, and to its surroundings.

Shape. A two-dimensional surface defined by a series of lines that enclose an area.

Shared lane. A "standard width" travel lane that both bicycles and motor vehicles share.

Shoulder. A paved portion of the roadway to the right of the travel way designed to serve bicyclists, pedestrians, and others.

Sidewalks. Walkways constructed of concrete, pavers, or other hard surface and are the primary mode of pedestrian travel along most roadways.

Simplicity. Can be achieved by elimination of unnecessary detail.

Standard areas. Landscapes or design elements typical of what is found in North Carolina.

State Transportation Improvement Program (STIP). Establishes a multi-year schedule for all transportation projects, including bicycle and pedestrian-related projects.

Substructure components. The portion of the bridge that supports the superstructure and distributes all bridge loads to below-ground bridge footings.

Suburban areas. Areas along the edges of urbanized areas.

Superstructure. The portion of the bridge that supports the deck and connects one substructure element to another.

Texture. The surface quality of an object than can be seen or felt.

National Scenic Byways Program. Created by Congress under the Intermodal Surface Transportation Efficiency Act of 1991; the goal was to protect and beautify roadways noted for their scenic, natural, historical, cultural, archaeological, or recreational quality.

Transition. The gradual change from one design element or arrangement to another.

Unity. Design element that gives a viewer a sense of completeness as the structure and corridor appropriately apply all the previous aesthetic qualities.

Urban areas. Represent a heavy mix of commercial, residential, and civic activity for a region.

Visual design elements. Includes line, shape, form, texture, and color.

Visual design principles. Influence how a space or sequence of spaces is experienced and is formed from the relationship of visual design elements.

Visual Inventory Guide. Part of the North Carolina Scenic Byway Application to understand those elements that influence visual perception.

APPENDIX C | NORTH CAROLINA STATEWIDE PLANNING PROCESSES

THE NORTH CAROLINA PLANNING PROCESS

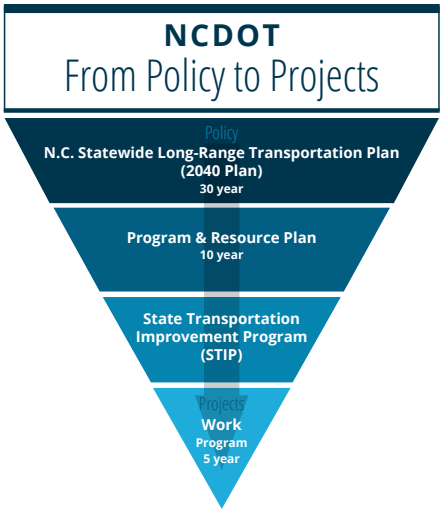
The intent of this Manual is for the aesthetic design process to run concurrent with existing NCDOT planning processes. As described in Chapter 4, integration of guidelines is paramount to the success of including aesthetic considerations in the design and development of transportation facilities. This includes providing guidance on the statewide planning process for decision makers, users, and the public and includes a review of the following:

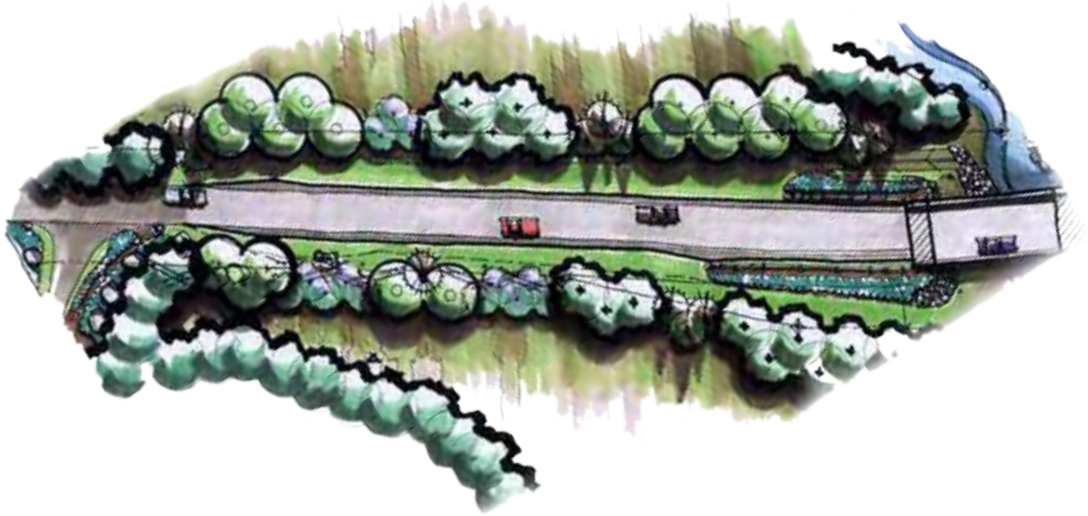
- North Carolina Statewide Long Range Transportation Plan (2040 Plan)
- Comprehensive Transportation Plan (CTP) and Long Range Transportation Plan (LRTP)
- Program and Resource Plan
- State Transportation Improvement Program (STIP)
- Five Year Work Program
- Project Development Process

Statewide planning efforts from project initiation to implementation are detailed, below. These materials are adapted from NCDOT's *Complete Streets Planning and Design Guidelines* (2012) *and WalkBikeNC* (2013).

Statewide Planning

The process for larger street or highway projects begins with the Statewide Transportation Plan (also called the 2040 Plan) and ends with the Five-year Work Program. These plans and programs are briefly summarized, followed by other related statewide plans and initiatives that occur concurrently or chronologically.





Plan schematic of landscape design and development along Little River Road in Henderson County, North Carolina. Image courtesy NCDOT.

North Carolina Statewide Transportation Plan (2040 Plan)

The 2040 Plan provides a blueprint for how North Carolina's transportation system should develop over the next 30 years to meet the needs of its users. The plan reaffirms NCDOT's mission and goals and identifies strategic policy, process, and program improvements, including:

- Work with regional partners to increase flexibility and responsiveness
- Reward entities that better integrate land use and transportation
- Increase funding flexibility to recognize regional, urban, and rural differences
- Strengthen planning processes to recognize diversity

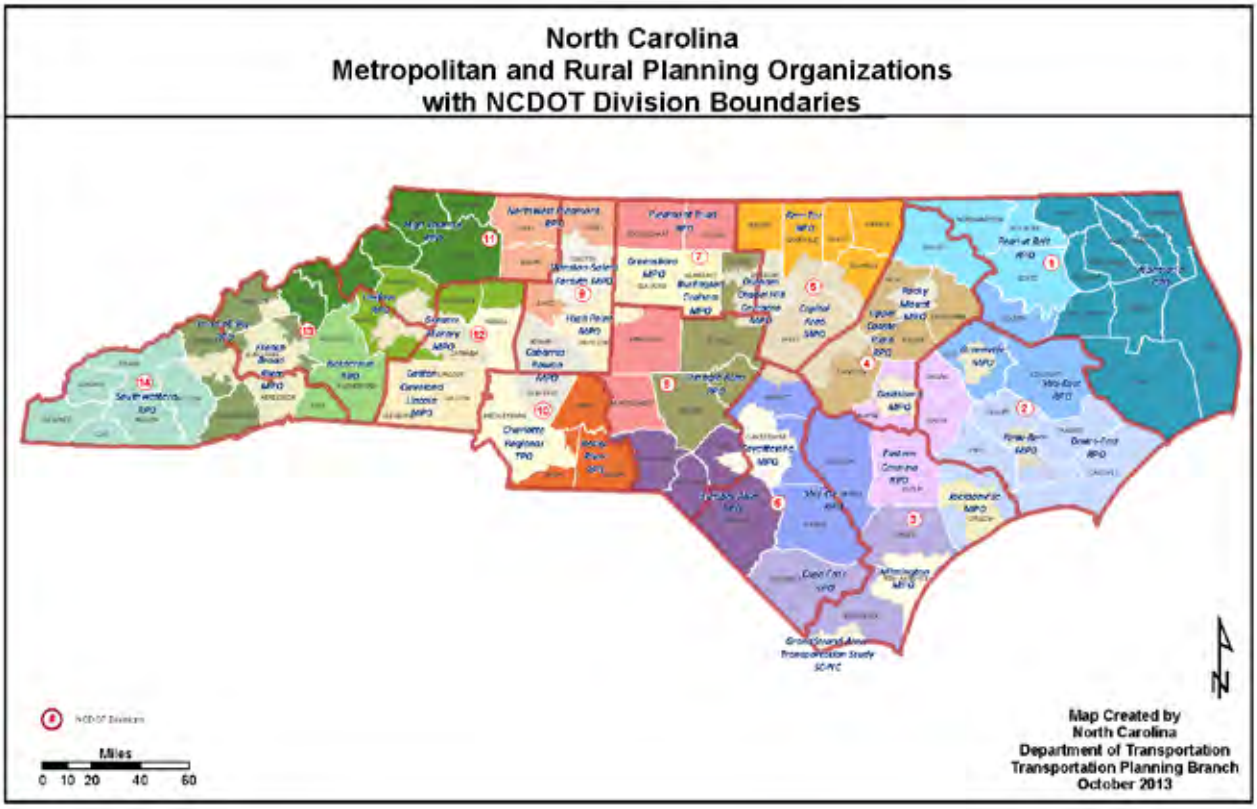
The plan also reviews the current conditions for each mode of transportation, according to Level of Service (LOS) standards (as defined by NCDOT, level of service is the "quality of service from the perspective of the user" and can vary from a "desired state" of LOS A to a failing state of LOS F).

Comprehensive Transportation Plan (CTP), Long Range Transportation Plan (LRTP), Metropolitan Transportation Plan (MTP)

Long range transportation planning identifies anticipated deficiencies and needs for a 25 to 50 year time frame. It is a collaborative process with MPOs, RPOs, and local governments working in partnership with NCDOT.

The Comprehensive Transportation Plan (CTP) lays the long-range vision for the transportation system with specific consideration given to multimodal facilities and is developed to reflect the community's land use vision and context. The CTP essentially serves as an "inventory" of potential projects that could be used to address network deficiencies for roadways, rail, transit, bicycle, and pedestrian infrastructures.

The Long Range Transportation Plan (LRTP) and Metropolitan Transportation Plan (MTP), as required by federal law, should address at least a 20 year time frame and must be financially-constrained as well as meet other federal planning requirements. As such, it serves as a "subset" of



the CTP, where specific projects are first defined. RPOs do not have an LRTP and the STIP (described below) serves as their plan. Unlike the CTP, the LRTP and MTP should only include projects that are feasible or buildable from an environmental, engineering, and cost/benefit perspective. It is important to recognize that, while a project may not be financially feasible within the LRTP/MTP time frame, it may be needed to handle travel demand within the longer timeframe of the CTP. MPOs rank identified projects from their financially-constrained LRTPs/MTPs and submit them into the prioritization process for inclusion in the STIP.

Program and Resource Plan

The Program and Resource Plan is a 10-year project list that addresses transportation needs identified through long-range planning. Potential projects are prioritized by staff from NCDOT, MPOs, and RPOs with the goals of improving safety, mobility, and infrastructure health based on crash data, congestion levels, pavement conditions, and other criteria. This prioritization is called "Strategic Prioritization," which enables NCDOT to apply limited transportation resources to the projects that will best meet NCDOT's mission and goals. The result of this process is a list of North Carolina's transportation needs, unconstrained by fiscal or other considerations.

State Transportation Improvement Program (STIP)

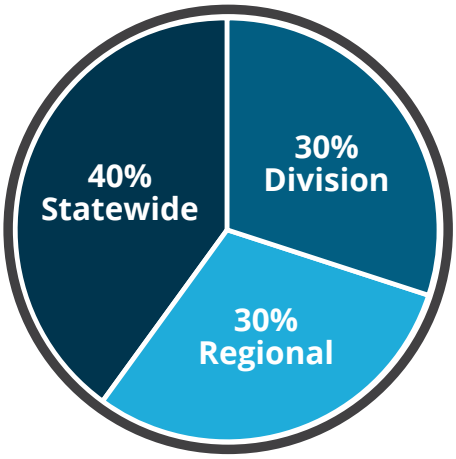
NCDOT publishes a federally required State Transportation Improvement Program (STIP) that is a 7-year subset of the 10-year Project List included in the Program and Resource Plan. The STIP describes the projects to be programmed during the upcoming 7 years. The project list also includes smaller projects, called division-managed construction projects.

For more on the STIP, see www.ncdot.gov/bikeped/funding/process/.

The Metropolitan Transportation Improvement Program (MTIP) is the MPO corollary of the STIP, providing a 7-year forecast of all transportation projects in the metropolitan area boundary. There are currently 19 MPOs in North Carolina. Notably, 11 of these MPOs are Transportation Management Areas, or TMAs. These TMAs receive not only planning monies directly through the federal government that can be used for planning and conceptual design of projects and programs, but also an additional sum of money equivalent to 10% of the Surface Transportation Program funds that can be used for planning, design, right-of-way acquisition, and construction of projects including roadside environment and landscape and bicycle and pedestrian projects.

Five Year Work Program

The Work Program is derived from the Program and Resource Plan. It contains both program and project-level information. The Work Program is an accounting of the state's annual transportation program grouped into Construction & Engineering, Maintenance, Operations, Administration and Transfers. The Work Program is NCDOT's commitment to the projects and services planned for the next five years. Work Program projects are found in the first five years of the (10 year) Project List. The Five Year Work Program is produced and reviewed by the Board of Transportation every year. The first two years of the Work Program are aligned with the biennial budget cycle. The Work Program includes specific pedestrian and bicycle projects throughout the state.



The STI established the Strategic Mobility Formula, a revenue distribution that funds projects in three categories: Division Needs, Regional Impact, and Statewide Mobility. Image courtesy NCDOT.

PROJECT DEVELOPMENT PROCESS

Once a project is defined and prioritized through the planning processes described previously, it moves into the NCDOT Project Development process. This process begins in NCDOT's Project Development and Environmental Analysis (PDEA) Branch. The goal of the project development process is to determine the final design of projects, including aesthetic considerations.

The first step in the project development process is the formation of a design input team. The design input team includes internal NCDOT team members and external team members who work to ensure all users are considered and represent all aspects of the project. The aesthetic design process as defined in this Manual was created with the intention to run concurrent with these existing practices, particularly to include aesthetics early in the project development process and as a part of the design input team.

Fundamental to the project development process, PDEA leads the formation of a National Environmental Policy Act (NEPA) document, as applicable to the project scope. NEPA consists of an evaluation of the environmental effects of a federal undertaking including its alternatives.

Note: For projects where aesthetics are considered that do not require the standard NCDOT NEPA/SEPA/and Merger Process steps and for the purposes of this Manual, those projects are termed "retrofit projects."

Broadly, the steps in the project development process include the following:

1. Establishment of goals and objectives of the project, including the identification of issues and opportunities.
2. Evaluation of existing and future conditions to ensure that the project is appropriate for the area. This includes an assessment of current demand, travel patterns, crashes, evaluation of latent demand, and future demand as a result of anticipated land use changes.
3. Development of alternatives for the project and evaluation of trade-offs to determine a recommended alternative.

The final recommended alternative reflects the ultimate design for the project, including project-specific features and dimensions. The project development process outlined should generally lead to the inclusion of projects for all transportation mode or facility type and include aesthetic considerations throughout the process. If a particular transportation mode or facility type is not included in a planned project but a municipality believes that it should be, currently the municipality is required to notify NCDOT and request inclusion of the facility.

Included following are detailed step-by-step procedures of the NCDOT Project Development process. Highlighted in blue are where the aesthetic design process operates concurrently with the Project Development process.

NCDOT PROJECT DEVELOPMENT PROCESS

PROJECT MILESTONES*	TIME FRAME**
Highlighted fields indicate Aesthetic Design Process steps that are concurrent with NCDOT Project Development steps *See Section A, Chapter 4 and focus area chapters throughout Section B for additional information*	
PE Funding Approved (PFA)	11/4/2013
Request Digital Ortho (TORT)	12/4/2013
Request Digital Mosaic (TMOS)	12/4/2013
Receive Digital Mosaic (FMOS)	4/4/2014
Begin Data Collection (BDC)	4/4/2014
Start of Study Letter (SOSL)	6/4/2014
Internal Scoping Meeting (ISM)	6/4/2014
Req. Traffic Estimate (REQ_TRFE)	6/4/2014
Merger Screening Meeting (MSM)	7/7/2014
Request CCR/Scr. ICE (REQ_CCR/SICE)	7/7/2014
Receive Digital Ortho (FORT)	9/3/2014
Traffic Estimate Complete (TRFE)	2/3/2015
Req. Cap. Analysis (REQ_ICAP)	2/3/2015
Community Char. Report (CCR)	3/2/2015
Scoping Meeting Est (SM_EST)	3/2/2015
Identify Conceptual Alternatives (ALT)	4/2/2015
External Scoping Meeting (ESM)	4/2/2015
Req GEO Alt Eval (REQ_GEOEVAL)	4/6/2015
Capacity Analysis (CAP)	6/3/2015
Public Meeting (PM)	6/8/2015
PE Budget Estimate #1 (PE_BUDGET_1)	6/8/2015
Alternatives Screening Meeting (ASM)	7/6/2015
Indirect & Cumulative Effects (ICE_SCRN)	9/3/2015
Prel. GEO Recommendations (PGEO)	9/8/2015
GEO Alt Eval (GEOEVAL)	12/7/2015
Archaeology Screening (ARCH_SCRN)	1/6/2016
Req. Prel. Hydro Report (REQ_PREHYD)	2/8/2016
Environmental Input Request (EIR)	2/8/2016
CP2 Est (CP2_EST)	4/4/2016
Concurrence Point 1 (CP1)	4/4/2016
CP1 Meeting (CP1M)	4/4/2016
Concurrence Point 2 (CP2)	4/4/2016
CP2 Meeting (CP2M)	4/4/2016
PE Budget Estimate #2 (PE_BUDGET_2)	5/3/2016
RW Estimate (RE_EST)	5/3/2016
Utility Estimate (UTL_EST)	5/3/2016

NCDOT PROJECT DEVELOPMENT PROCESS

PROJECT MILESTONES*	TIME FRAME**
Highlighted fields indicate Aesthetic Design Process steps that are concurrent with NCDOT Project Development steps *See Section A, Chapter 4 and focus area chapters throughout Section B for additional information*	
Plan ITS DEV (ITS_DEV)	5/3/2016
Req. Update Traffic Estimate (REQ_UTRAF)	5/4/2016
Public Meeting (PM)	8/3/2016
Req. Update Cap. Analysis (REQ_UCAP)	9/6/2016
Updated Traffic Estimate Comp. (UTRAF)	9/6/2016
Delineate Wetlands & Streams (DEL_WET)	9/6/2016
Updated Capacity Analysis Comp. (UCAP)	11/3/2016
Historic Survey & Eligibility (HIST)	2/3/2017
Req. Hist. Architect Effects (REQ_HAE)	3/3/2017
Request Air & Noise (REQ_A&N)	3/3/2017
Functional Design Submittal (FDS)	3/3/2017
Functional Design Est (FD_EST)	4/3/2017
Verification Of Wetlands & Streams (VERWET)	5/3/2017
Natural Resources Tech. Report (NRTR)	5/3/2017
Biological Conclusion (BIOCL)	5/3/2017
Community Impact Assess. (CIA)	6/5/2017
Historic Architecture Effects (HAE)	7/3/2017
Preliminary Hydro Report (PHYD)	7/5/2017
Traffic Noise Analysis (TNA)	9/1/2017
Air Quality Analysis (AQ)	9/1/2017
Bridge Length Field Meeting (BLFM)	10/5/2017
Concurrence Point 2A (CP2A)	1/4/2018
CP2A Meeting (CP2AM)	1/4/2018
CP2A Est (CP2A_EST)	1/4/2018
ICE Land Use Assessment (LUSA)	4/3/2018
Draft EIS Approved (DEIS)	8/3/2018
Corridor Public Hearing Rev Meeting (CPHRM)	8/6/2018
Merger Permit Application (MPA)	10/8/2018
Corridor Design Public Hearing (CDPH)	1/4/2019
Post Hearing Meeting (PHM)	2/7/2019
Concurrence Point 3 (CP3)	5/6/2019
CP3 Meeting (CP3M)	5/6/2019
Concurrence Point 4A (CP4A)	5/6/2019
CP4A Meeting (CP4AM)	5/6/2019
Req. Comprehensive. Arch. Survey (REQ_CAS)	5/6/2019
PE Funding Design (PE_DSN)	5/6/2019

NCDOT PROJECT DEVELOPMENT PROCESS

PROJECT MILESTONES*	TIME FRAME**
Highlighted fields indicate Aesthetic Design Process steps that are concurrent with NCDOT Project Development steps *See Section A, Chapter 4 and focus area chapters throughout Section B for additional information*	
Survey Request to Location (TLOC)	5/6/2019
Req. Update Traffic Forecast (REQ_UTRAF)	5/6/2019
CP3 Est (CP3_EST)	7/5/2019
CP4A Est (CP4A_EST)	7/5/2019
PE Budget Estimate #3 (PE_BUDGET _3)	7/5/2019
Comprehensive Arch. Survey (C_ARCHSVY)	7/5/2019
Section 7 Consultation (SECT7)	7/5/2019
PE Budget Estimate #4 (PE_BUDGET_4)	9/6/2019
Updated Traffic Forecast Comp. (UTRAF)	10/7/2019
Req. Update Cap. Analysis (REQ_UCAP)	10/7/2019
Updated Capacity Analysis Comp. (UCAP)	12/6/2019
Design Public Hearing Review Meeting (DPHRM)	12/6/2019
Cultural Resources MOA (CR_MOA)	1/6/2020
Plan Sheets from Location (FLOC)	3/5/2020
Req. Final Pav't Design (REQ_PAV'T)	3/6/2020
Preliminary Utility Analysis & Routing (PUARR)	3/6/2020
Design Public Hearing (DPH)	5/4/2020
25% HYD (25% HYD)	6/8/2020
Post Hearing Meeting (PHM)	7/2/2020
Final EIS Approved (FEIS)	8/5/2020
ROD Approved (ROD)	8/5/2020
Draft Bridge Survey Reports (DBSR)	9/8/2020
Distribute Plans (DP)	9/8/2020
To Hydraulics (THYD)	9/8/2020
Structure Recommendations (STRREC)	9/8/2020
Bridge Survey Reports (BSR)	11/9/2020
Design Noise Report (DNR)	1/5/2021
Prel. Bridge General Drawings (PGD'S)	1/6/2021
Final Pavement Design (PAVEMENT)	1/6/2021
Traffic Staging Concept (TSC)	1/6/2021
Concurrence Point 4B (CP4B)	2/8/2021
Slope Recommendations (SLREC)	2/8/2021
Roadway Foundation Recm'ds (SFR)	5/5/2021
Hydro Recommendations (FHYD)	5/6/2021
HES LDA INFO (HLDA)	6/7/2012
Structure Foundation Recm'ds (SFR)	6/7/2012

NCDOT PROJECT DEVELOPMENT PROCESS

PROJECT MILESTONES*	TIME FRAME**
Highlighted fields indicate Aesthetic Design Process steps that are concurrent with NCDOT Project Development steps *See Section A, Chapter 4 and focus area chapters throughout Section B for additional information*	
Location and Design Approval (LADA)	7/6/2021
R/W Consultation (R/WCONS)	7/6/2021
Final PUE's (PUE)	7/6/2021
RW Estimate (RE_EST)	7/6/2021
Utility Estimate (UTL_EST)	7/6/2021
Final Design Field Inspection (FDFI)	8/5/2021
Traffic Control Plans (TCP)	9/7/2012
PE Budget Estimate #5 (PE_BUDGET_5)	9/7/2012
Final Pavement Design Review (PAV_REV)	9/7/2012
Utility Analysis & Routing (UARR)	10/5/2021
Submit HYD MOA Permit (SUB_CLOMR)	10/7/2021
Submit CLOMR Permit (SUB_CLOMR)	10/7/2021
R/W Plans Complete (RPC)	11/5/2021
Construction Estimate (CONST_EST)	11/5/2021
R/W Acquisition Begins (R/W)	11/8/2021
Concurrence Point 4C (CP4C)	3/4/2022
T+E Species Review-consultation (T&E + C)	4/8/2022
Utility Environ. Permit Drawing (UEP_DWG)	5/6/2022
Utility Co. Notice to Proceed (UTI_NTP)	5/9/2022
Plan/Permit Consistency Review (PPCR)	6/7/2022
Permit Drawings to Natural Systems (PDNES)	7/7/2022
13 month Estimate (13M_EST)	8/8/2022
Utility Parcel Acquisition (UPA)	9/6/2022
Sub. NW 404 / 401 Permit (SUB_NW404/401)	12/7/2022
Sub. Riparian Buffer Authorization (SUB_BUFAUTH)	12/7/2022
Submit IP 404 Permit (SUB_IP404)	12/7/2022
Submit Util. Environ. Permit (SUB_UEP)	12/7/2022
Utility Agreement Plans (UTI_AGRM'T)	1/6/2023
Sub. Util. Agrm't Package (SUB_UTLAP)	2/6/2023
Pre-Let Field Inspection (PLFI)	5/25/2023
Utility Construction Plans (UCP)	6/28/2023
Utility by Others Plans (UOP)	6/28/2023
Obtain Util. Agrm't Package (UTLAP)	6/28/2023
Final Plans to Design (FPD)	6/28/2023
TCP to Design (TCPD)	6/28/2023
Sig. Design & Elec. Detail (S&E_PLN)	6/28/2023

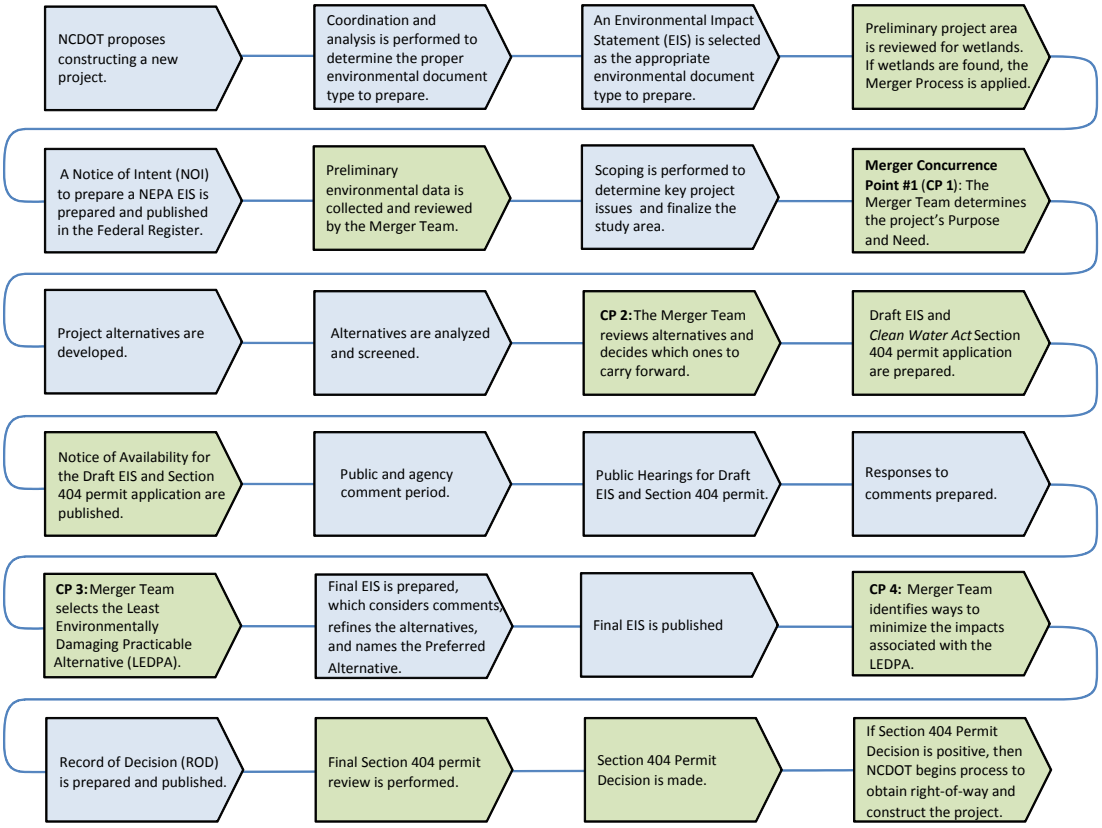
NCDOT PROJECT DEVELOPMENT PROCESS

PROJECT MILESTONES*	TIME FRAME**
Highlighted fields indicate Aesthetic Design Process steps that are concurrent with NCDOT Project Development steps *See Section A, Chapter 4 and focus area chapters throughout Section B for additional information*	
Cable Routing Plans (CABLE RT_PLN)	6/28/2023
Sign & Delineation (SIGN_DEL)	6/28/2023
Erosion Control Plans (ECP)	6/28/2023
Roadway Plans to Cont & Prop (RPCP)	7/6/2023
Structure Plans to Plan Checking (STRPC)	7/6/2023
Obtain HYD MOA Permit (HYD_MOA)	7/7/2023
Obtain CLOMR Permit (CLOMR)	7/7/2023
Structural Plans to Contract Office (SPCP)	7/21/2023
Construction Consultation (CONST_CON)	8/14/2023
Obtain NW 404 / 401 Permit (NW404/401)	8/24/2023
Obtain Riparian Buffer Authorization (BUFAUTH)	8/24/2023
Obtain IP 404 Permit (IP404)	8/24/2023
Obtain Util. Environ. Permit (UEP)	8/24/2023
R/W Certification (R/WCERT)	9/5/2023
Utility Certification (UC)	9/5/2023
Raleigh Letting (LET)	10/17/2023

***** Internal NCDOT Merger Process Milestones
****** Hypothetical time-frame
Source: *NCDOT PDEA at https://connect.ncdot.gov/resources/Environmental/Pages/Merger-Process-Guide.aspx*

The National Environmental Policy Act (NEPA) and NCDOT Merger Process Flow

The blue boxes in the flow chart below are the steps that generally occur in the process of preparing an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA). The green boxes are NEPA steps that are influenced by the Merger01 process, or additional steps included in the Merger01 process. Citizen's guidance for NEPA and guidance for the NCDOT Merger01 processes may be found at http://ceq.hss.doe.gov/nepa/Citizens_Guide_Dec07.pdf and http://www.ncdot.org/doh/preconstruct/pe/Merger01/default.html, respectively.



Source: NCDOT PDEA at http://www.ncdot.gov/projects/us64improvements/download/mergerprocessflow.pdf

APPENDIX D | ARTIST SELECTION PROCESS

ARTIST SELECTION PROCESS

The following tables detail the artist selection process in North Carolina as it occurs at the time of publication of this Manual. The two tables review the selection processes for a design team and proposal selection processes and are titled as follows:

1) Artist Selection for Design Team

2) Art or Art Proposal Selection Process

See Section B, Chapter 13 in this Manual for more information on public art as a part of transportation planning processes.

It is recommended public artist(s) are engaged at the onset of project initiation and continue to be involved until project completion. This allows for increased cost benefits and efficiencies resulting from integrating the artwork into the design rather than add-on application. Including public art in transportation projects also allows for greater consideration of community values within the artwork produced.

Those involved in public art may include local government representatives, agencies, or engaged citizens' groups with interest in the outcome of a NCDOT transportation project.

ARTIST SELECTION PROCESS FOR DESIGN TEAM

(continues on next page)

Agency Initial Meeting With Selection Committee (See Artist Selection Committee Make-up)	Commission Announcement (RFQ) is drafted (if open call is mode of artist selection)	Artist Selection Meeting #1 to determine Semi-Finalists	Semi-Finalist Artists - Invite to Interviews with Agency Selection Committee	Artist Selection Meeting #2 Interviews/ Presentations by Finalists	Commission Contract Process
Agency explains the process (role and responsibilities) Decides how to select artist: a) Open call b) Invitational c) Direct Invite d) Direct Commission Brainstorm vision for public art/or artist created Enhanced Aesthetics /or Landmark Orientation - Review PowerPoint of completed DOT projects incorporating public art/artists on design teams; Site, potential opportunities	Agency writes the RFQ. The committee provides key information relating to mission/vision of the site, project background, artistic goals for the project, and practical considerations. Also site images, maps are provided for the RFQ. Writing the RFQ can take a couple of weeks to complete. The RFQ is posted for 4-6 weeks online and direct emailed to artists. After the RFQ deadline it can take 2 weeks to prepare for the initial review of applicants. Recruit public art experts to prescreen all qualified applications for the #1 panel meeting.	After the preliminary review is done by the public art professionals on the committee, the larger artist selection committee will review a smaller pool of qualified artists that had high scores. This pool may be reduced to 9-16 qualified artists. The artist selection committee reviews, images, resumes and artist statement of interest to narrow selection to semi-finalists through a criteria scoring process. 2-3 semi-finalists are invited for an interview. Semi-finalists receive an honorarium to offset travel to interview.	Agency will contact references prior to contacting Semi-Finalists for interviews Agency will contact semi-finalists to arrange Interview date with the Agency Selection Committee, Key Stakeholders, and NCDOT Advisors. Prior to interview date the Agency sends to all Simi-Finalists : a) vision/goals for the project b) Share any preliminary planning observations from key DOT Advisors to better understand the scope of the project and potential public art opportunities within the project. c) maps, photographs available of the site Artists are expected to prepare their presentation & interview With the scope of the project in mind. NO PROPOSALS are required.	Meet with Semi-Finalists individually to present examples of their past projects and learn about how they approached those projects. Each finalist is given 45 minutes to present with 5-10 minute break in between. There will be committee deliberation time at the end to make finalist decision. Interviews /presentations by Semi-Finalists may be made in person or via online conferencing depending on the Agency's preference of the committee and budget. Typically Semi-Finalists are paid nominal fee to cover travel to interview. NCDOT Resource Committee Member's role is to provide –important feedback on the technical abilities of the artist's past projects and observations about artist's approach to Design Team collaboration. Selection Committee should use predetermined Criteria and scoring sheet to inform deliberations and final artist selection	Agency will draft contract with finalist artist. Notify other applicants of the Committee's selection. Draft of Artist Contract for Master Planning Phase and/or Concept Design Phase Subsequent Design Contract (or Contract Amendment) will be based on approved Concept Designs. Typically Master Planning and Concept Design fee is 5% of project's Enhancement Budget The artist contract must provide: • Scope of Work • Timeline • Schedule of Payment Once draft is developed contract is routed to artist and then to Agency for revisions. An attachment to the contract is a Memo of Understanding. The MOU agreement is between all parties involved contractually with the project. An outline of goals, roles and responsibilities is a good tool for facilitation dialogue and understanding. Clear communication and willingness to work together is key. Final contract is prepared for signatures by all parties.
Meeting date:	RFQ posted: Deadline 4-6 weeks later:	Semi-finalists Selection Meeting date:	Interview meeting date: Interviews are scheduled 2-4 weeks from notification.	Interviews presentation meeting date:	Date draft contract process begins: Date final contract is routed for signature:
2 hour meeting	8-10 weeks	2 hour meeting	1-week reference checks & contacting Simi-Finalists	4 hour meeting	1-2 months

ARTIST SELECTION PROCESS FOR DESIGN TEAM

Artist joins Design Team -Master Planning and/or Design Phase	NCDOT review/approval of Artwork designs	Fabrication	Installation	Documentation of Completed Artwork And Final Approval	Dedication of Artwork (if desired)
Typically Artist Design Fee is based on 15-20% of total Enhancement Budget. A separate artist Contract for Construction/fabrication Oversight will be determined during the final cost estimate at end of Design Phase. Artist Fee amount is based on predetermined # of trips to oversee fabrication, quality control, and installation process. Agency submits preliminary designs to ART & NCDOT Public Art ROW Policy review – if any designs are not fully integrated into functional elements of the project. Fully integrated artist designed enhancements would be concurrently reviewed by Commissioning Agency and NCDOT during the Design Phases process and approvals	Agency submits preliminary review specs for public art prior to application for Artwork review to NCDOT -ART and NCDOT ROW Art Committee reviews NCDOT review is coordinated by ART representative and Art Right of Way Committee ART and NCDOT Art Right of Way Committee should coordinate preliminary review and approvals 6 weeks prior to final Design and before Construction Documents are generated. NCDOT's Public Art Right of Way - encroachment permit process, and maintenance agreement by sponsoring municipality be in place. Or process is integrated as a design element of a transportation construction project. (NCDOT Policy)	Encroachment Approval is granted prior to artist beginning fabrication process. Artist begins fabrication and depending on complexity of artwork this process can take six to twelve months or longer. Artwork should follow other project benchmarks. Payments are made to artist via the payment schedule by the Agency/Artist contract with the approval from contracting agency.	Artist arranges for installation with contracting agency and/or coordination with NCDOT.	Artist documents completed artwork per contract requirements and submits with the final invoice and transfer of title (for stand-alone) to Agency for approval. Artist provides manual for artwork routine maintenance, warranty agreements for materials, list of material vendors if others were employed to assist with artwork fabrication.	Agency may hold a dedication for the completed artwork. This is arranged in collaboration with the artist and NCDOT. Agency should provide honorarium paid to artist if available.
	Preliminary Review 2-weeks	Fabrication Schedule	Installation date:	Final Invoice payment:	Dedication date:
12 – 18 months	2-4 week preliminary art proposal review		1-week – or longer following construction schedule of project		2-3 hours

ARTIST OR ART PROPOSAL SELECTION PROCESS

(continues on next page)

Agency Initial Meeting With Selection Committee (See Artist Selection Committee Make-up)	Commission Announcement (RFQ) is drafted (if open call is mode of artist selection)	Semi-Finalist Artist Selection #1 Meeting	Semi-Finalist Artists Site Visit to meet with Agency Committee	Proposals to NCDOT for Preliminary review	Proposal Presentations/interviews of Finalists (#2 Meeting with Selection Committee)
Agency explains the process (role and responsibilities) Decides how to select artist: a) Open call b) Invitational c) Direct Invite d) Direct Commission Brainstorm vision for public art/or artist created Enhanced Aesthetics Review PowerPoint of completed DOT projects incorporating public art/or artists on design teams, review site, project context	Agency writes the RFQ. The committee provides key information relating to mission/vision of the site, project background, artistic goals for the project, and practical considerations. Also site images, maps are provided for the RFQ. The process of writing the RFQ can take a couple of weeks to complete. The RFQ is posted for 4-6 weeks online and also direct emailed to artists. After the RFQ deadline it can take 2 weeks to prepare for the initial review of applicants. Public art professionals narrow the pool of qualified applicants.	After the preliminary review is done by the public art professionals on the committee, the larger artist selection committee will review a smaller pool of artists that had high scores. This pool may be reduced to 9-15 qualified artists. The artist selection committee reviews, images, resumes and artist letter of interest and narrows selection to semi-finalists through a criteria scoring process. 2-3 semi-finalists are invited for a site-visit. Semi-finalists receive an honorarium	Agency will contact semi-finalists to arrange a site visit to the Agency to meet with Selection Committee, Key Stakeholders, and NCDOT Advisors. At this visit the following occurs with the committee: a) Meet with committee to better understand vision b) Meet with key DOT Advisors from the Design Team to better understand the scope of the project and public art opportunities within the project. c) Tour site d) Photos of the site are taken e) Measurements are taken f) Preliminary site plans are provided and reviewed with the Semi-Finalists Artists are given an average of 6-8 weeks from this date to make proposals	Semi-Finalists provide proposals to Agency & NCDOT representative 3-weeks prior to presentations. NCDOT Artist Selection Committee –Resource Member provides preliminary review and any immediate trouble shooting of the proposal prior to presentation date giving the Semi-Finalist a 1-2 week opportunity to make adjusts to their proposal prior to presentation NCDOT Preliminary review is coordinated by ART representative and Public Art Right of Way Committee-designee ART and NCDOT Public Art Right of Way Committee should coordinate preliminary review within a 2-week window of time	Meet with Semi-Finalists individually to have them present their proposals. Each finalist is given 45 minutes to present with 5-10 minute break in between. There will be committee deliberation time at the end to make finalists decision. Proposal presentations may be made in person or via online conferencing depending on the Agency's preference of the committee and budget. NCDOT Resource Committee Member's role is to provide –important feedback on the technical feasibility of artist's proposal and its integration into NCDOT project or site.
Meeting date:	RFQ posted: Deadline 4-6 weeks later: Prepare for preliminary review by public art expert panelists 2-weeks	Semi-finalists Selection Meeting date:	Site Visit meeting date: 4-6 weeks from this date to make proposals	Preliminary Review 2-weeks	Proposal presentation meeting date:
2 hour meeting	8-10 weeks	2 hour meeting	½ day meetings	2-week preliminary art proposal review	4 hour meeting

ARTIST OR ART PROPOSAL SELECTION PROCESS

Commission Contract Process	Fabrication	Installation	Documentation of Completed Artwork And Final Approval	Dedication of Artwork (if desired)	Commission Contract Process
Agency will draft contract with finalist artist. Other finalists will be notified of the Committee's selection. The finalist artist must provide: • Scope of Work • Timeline • Schedule of Payment Once draft is developed contract is routed to artist and Agency for revisions. NCDOT's Public Art in the Right of Way - encroachment permit process must begin. Art placed on NCDOT transportation right of way shall be provided and maintained by a sponsoring local government agency (city, county, etc.), state or federal agency, or tribal government and is permitted through the encroachment permit process or may be integrated as a design element of a transportation construction project. (NCDOT Policy) Once all revisions are accepted then final contract is prepared and sent for signatures by all parties.	Encroachment Approval is granted prior to artist beginning fabrication process. Artist begins fabrication and depending on complexity of artwork this process can take six to twelve months or longer. Payments are made to artist via the payment schedule by the Agency/Artist contract with the approval from contracting agency.	Artist arranges for installation with contracting agency and coordination with NCDOT.	Completed Artwork is reviewed by Agency and NCDOT prior to final acceptance. Artist documents completed artwork per contract requirements and submits with the final invoice and transfer of title to Agency for approval. Artist provides manual for artwork routine maintenance, warranty agreements for materials, list of material vendors if others were employed to assist with artwork fabrication. Artist provides "As Built" drawings of artwork if design details changed.	Agency may hold a dedication for the completed artwork. This is arranged in collaboration with the artist and NCDOT. Agency should provide travel honorarium to artist if available.	Agency will draft contract with finalist artist. Other finalists will be notified of the Committee's selection. The finalist artist must provide: • Scope of Work • Timeline • Schedule of Payment Once draft is developed contract is routed to artist and Agency for revisions. NCDOT's Public Art in the Right of Way - encroachment permit process must begin. Art placed on NCDOT transportation right of way shall be provided and maintained by a sponsoring local government agency (city, county, etc.), state or federal agency, or tribal government and is permitted through the encroachment permit process or may be integrated as a design element of a transportation construction project. (NCDOT Policy) Once all revisions are accepted then final contract is prepared and sent for signatures by all parties.
Date draft contract process begins: Date final contract is routed for signature:	Fabrication Schedule	Installation date:	Final Invoice payment:	Dedication date:	Date draft contract process begins: Date final contract is routed for signature:
1-2 months		1-week depending on complexity of project		2-3 hours	1-2 months

"In wilderness is the preservation of the world."

Henry David Thoreau

ENDNOTES

CHAPTER 1 | INTRODUCTION

1 http://bridgeaesthetics.org/Draft_Bridge_Aesthetics_Sourcebook_March09.pdf.

2 http://www.ncdot.gov/about/.

3 http://www.ncdot.gov/doh/.

4 http://www.achp.gov/106summary.html.

5 https://connect.ncdot.gov/resources/safety/Teppl/TEPPL%20All%20Documents%20Library/manual.pdf.

CHAPTER 2 | CONTEXT

6 http://ncmuseumofhistory.org/learn/ForEducators/Timelines/NorthCarolinaAmericanIndianHistoryTimeLine.aspx.

7 Hugh T. Lefler and Albert Ray Newsome, North Carolina: The History of A Southern State (1973).

8 http://water.usgs.gov/GIS/metadata/usgswrd/XML/physio.xml.

9 http://media.visitnc.com/news/facts-for-north-carolina-s-mountain-region.

10 http://water.usgs.gov/GIS/metadata/usgswrd/XML/physio.xml.

11 http://geology.teacherfriendlyguide.org/index.php/rock-resources-se.

12 http://web.archive.org/web/20050310104113/http://www.bartleby.com/69/70/P04470.html.

13 http://web.archive.org/web/20050310104113/http://www.bartleby.com/69/70/P04470.html.

14 http://thomaslegion.net/.

15 http://geology.teacherfriendlyguide.org/index.php/rock-resources-se.

16 http://thomaslegion.net/.

17 http://thomaslegion.net/.

18 http://www.ncdot.gov/projects/us64phase1/download/US64-NC49_Land_Use_Guidelines.pdf.

19 http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.

20 http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.

21 http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.

CHAPTER 3 | BASICS OF AESTHETICS

22 https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

23 Dewayne Ingram, Landscape Design - Aesthetic Principles (2003).

24 http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

25 Ingram (2003).

[26] Ingram (2003).

[27] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[28] Ingram (2003).

[29] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[30] Ingram (2003).

[31] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[32] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[33] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[34] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[35] Ingram (2003).

[36] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[37] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[38] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[39] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[40] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[41] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[42] Ingram (2003).

[43] Ingram (2003).

[44] http://www.environment.fhwa.dot.gov/guidebook/documents/VIA_Guidelines_for_Highway_Projects.asp.

[45] ibid. (2015)

[46] ibid. (2015)

[47] ibid. (2015)

[48] ibid. (2015)

[49] James L. Sipes and Matthew L. Sipes, Creating Green Roadways: Integrating Cultural, Natural, and Visual Resources into Transportation (2013).

[50] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[51] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[52] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[53] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[54] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[55] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[56] https://ncculturebloger.wordpress.com/.

[57] http://www.ncdot.gov/download/performance/2040_ChallengeOpp.pdf.

[58] http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.

[59] http://contextsensitivesolutions.org/content/gen/state-profiles/NC.

[60] http://ncarts.org/EconomicDevelopment/SmARTInitiative.aspx.

[61] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[62] http://www.dot.state.oh.us/policy/AestheticDesign/Documents/ODOTAesthetics.pdf.

[63] http://onlinemanuals.txdot.gov/txdotmanuals/lad/lad.pdf.

[64] http://www.udot.utah.gov/main/uconowner.gf?n=5361113714159942.

[65] http://onlinepubs.trb.org/onlinepubs/trnews/trnews248.pdf.

CHAPTER 4 | INTEGRATION OF GUIDELINES

[66] NCDOT programs, sections, and units that specialize in key transportation planning disciplines. At the date of this publication, this includes, but is not limited to, roadways, bridges, noise walls, retaining walls, environment and landscape, walks/trails/Complete Streets, scenic byways, and public art.

[67] Brian W. Ohm of the Department of Urban and Regional Planning at the University of Wisconsin-Madison/Extension (1999).

[68] http://www.ncdot.gov/about/structure/.

[69] NCDOT programs, sections, and units that specialize in key transportation planning disciplines. At the date of this publication, this includes, but is not limited to, roadways, bridges, noise walls, retaining walls, environment and landscape, walks/trails/Complete Streets, scenic byways, and public art.

[70] Interview and working session with NCDOT PDEA (Project Development and Environmental Analysis) about aesthetic design processes, NCDOT Aesthetics Guidance Manual, North Carolina, December 3, 2014. Representatives included in the meeting: NCDOT ITS-Signals Structures, NCDOT PDEA, NCDOT REU, NCDOT HES, NCDOT Bike/Ped Division, NCDOT Roadway Design. Interview and Working session with NCDOT PDEA (Project Development and Environmental Analysis) about aesthetic design processes, NCDOT Aesthetics Guidance Manual, North Carolina, December 15, 2014. Representatives included in the meeting: NCDOT ITS-Signals Structures, NCDOT PDEA, NCDOT REU, NCDOT HES, NCDOT Bike/Ped Division, NCDOT Roadway Design, NCDOT Structures, NCDOT Geotechnical..

[71] http://www.ncdot.gov/doh/divisions/.

CHAPTER 6 | FOCUS AREA: ROADWAYS

[72] http://www.ncdot.gov/doh/.

[73] http://www.fhwa.dot.gov/policyinformation/hpms/2010/.

[74] https://connect.ncdot.gov/projects/planning/Pages/Functional-Classification-of-Highways.aspx.

[75] http://www.nccommerce.com/tourism/programs-services/welcome-centers.

[76] http://ncdot.org/download/travel/Wilkes_visitorcenter_factsheet.pdf.

[77] Sipes and Sipes (2013).

[78] http://www.ncdot.gov/download/travel/scenic_byways.pdf.

[79] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx.

[80] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx.

[81] Sipes and Sipes (2013).

[82] Meyer (2011). During the 2011 session, the General Assembly passed legislation impacting the regulation of outdoor advertising. SB 183 - Selective Vegetation Removal/State Highways (S.L. 2011-397).

[83] Meyer (2011).

[84] Sipes and Sipes (2013).

[85] Sipes and Sipes (2013).

[86] Sipes and Sipes (2013).

[87] Sipes and Sipes (2013).

[88] Sipes and Sipes (2013).

[89] Sipes and Sipes (2013).

[90] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx.

[91] https://bookstore.transportation.org/collection_detail.aspx?ID=110.

[92] Sipes and Sipes (2013).

[93] Sipes and Sipes (2013).

[94] Sipes and Sipes (2013).

[95] Sipes and Sipes (2013)..

[96] Sipes and Sipes (2013).

[97] Sipes and Sipes (2013).

[98] https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx.

[99] NCHRP (2009).

[100] NCHRP (2009).

CHAPTER 7 | FOCUS AREA: BRIDGES

[101] http://www.ncdot.gov/projects/ncbridges/.

[102] Sipes and Sipes (2013).

[103] http://www.ncdot.gov/projects/ncbridges/.

[104] Paul Gauvreau, "Improving the Aesthetic Quality of Bridges Through Education" (2012).

[105] Gauvreau (2012).

[106] Gauvreau (2012).

[107] Interview with NCDOT Structure Management Unit about roadways, bridges, and other structures in transportation projects, NCDOT Aesthetics Guidance Manual, North Carolina, June 18, 2014.

[108] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[109] Gauvreau (2012).

[110] http://www.trb.org/Main/Blurbs/154768.aspx.

[111] https://connect.ncdot.gov/projects/roadway/roadwaydesignadministrativedocuments/bridge%20policy.pdf.

[112] NCDOT Interview with the Structural Engineering Unit.

[113] Interview with NCDOT Structure Management Unit about roadways, bridges, and other structures in transportation projects, NCDOT Aesthetics Guidance Manual, North Carolina, June 18, 2014.

[114] Interview with NCDOT Structure Management Unit about roadways, bridges, and other structures in transportation projects, NCDOT Aesthetics Guidance Manual, North Carolina, June 18, 2014.

[115] http://www.slideshare.net/muhammadwaleedusman/br-aesthetics.

[116] From Page 180 of Bridge Aesthetics Around the World 1991 edited by TRB and article written by Christian Menn.

[117] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[118] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[119] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[120] Interview with NCDOT Structure Management Unit about roadways, bridges, and other structures in transportation projects, NCDOT Aesthetics Guidance Manual, North Carolina, June 18, 2014.

[121] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[122] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[123] http://www.slideshare.net/muhammadwaleedusman/br-aesthetics.

[124] http://www.slideshare.net/muhammadwaleedusman/br-aesthetics.

[125] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

[126] Sipes and Sipes (2013).

[127] Gauvreau (2012).

[128] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

CHAPTER 8 | FOCUS AREA: NOISE WALLS

[129] https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20 and%20 Procedures/2011%20NCDOT%20Traffic%20Noise%20Abatement%20Policy.pdf. https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20Procedures/NCDOT%20Traffic%20Noise%20Analysis%20and%20Abatement%20Manual.pdf.

[130] Interview with NCDOT Human Environment Section (HES),Traffic Noise & Air Quality Group Leader about noise walls, NCDOT Aesthetics Guidance Manual, North Carolina, June 18, 2014.

[131] http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/keepdown.cfm.

[132] https://www.law.cornell.edu/topn/federal-aid_highway_act_of_1970, http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf.

[133] NCDOT (2011).

[134] NCDOT (2011).

[135] https://connect.ncdot.gov/resources/Environmental/Compliance%20Guides%20and%20 Procedures/2011%20NCDOT%20Traffic%20Noise%20Abatement%20Policy.pdf.

[136] NCDOT (2011).

[137] https://connect.ncdot.gov/resources/Environmental/Compliance% 20Guides%20and%20 Procedures/2011%20NCDOT%20Traffic%20Noise%20Abatement%20Policy.pdf.

[138] NCDOT (2011).

[139] Sipes and Sipes (2013).

[140] NCDOT (2011).

[141] http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/keepdown.cfm.

[142] Sipes and Sipes (2013).

[143] Sipes and Sipes (2013).

[144] Sipes and Sipes (2013).

[145] Sipes and Sipes (2013).

[146] Sipes and Sipes (2013).

[147] Sipes and Sipes (2013).

[148] Sipes and Sipes (2013).

[149] Sipes and Sipes (2013).

CHAPTER 9 | FOCUS AREA: RETAINING WALLS

[150] Interview with Geotechnical Engineering Unit about retaining walls, NCDOT Aesthetics Guidance Manual, North Carolina, December 3, 2014.

[151] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx., pp. 6-7.

[152] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx., pp. 6-7.

[153] Interview with Geotechnical Engineering Unit about retaining walls, NCDOT Aesthetics Guidance Manual, North Carolina, December 3, 2014.

[154] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx., pp. 6-7-A.

[155] https://connect.ncdot.gov/projects/roadway/pages/roadway-design-manual.aspx., pp. 6-7-A.

[156] NCDOT Interview with Geotechnical Engineering Unit about retaining walls, NCDOT Aesthetics Guidance Manual, North Carolina, December 3, 2014.

[157] NCDOT Interview with Geotechnical Engineering Unit about retaining walls, NCDOT Aesthetics Guidance Manual, North Carolina, December 3, 2014.

[158] NCDOT Interview with Geotechnical Engineering Unit about retaining walls, NCDOT Aesthetics Guidance Manual, North Carolina, December 3, 2014.

[159] Sipes and Sipes (2013).

[160] Sipes and Sipes (2013).

[161] Sipes and Sipes (2013).

[162] Sipes and Sipes (2013).

[163] Sipes and Sipes (2013).

CHAPTER 10 | FOCUS AREA: ROADSIDE ENVIRONMENT AND LANDSCAPE

[164] http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/design/.

[165] https://connect.ncdot.gov/resources/Environmental/PDEA% 20Procedures%20Manual%20 Documents/NCDOT%20Highway%20Landscape%20Planting%20Policy.pdf.

[166] https://connect.ncdot.gov/resources/Environmental/PDEA%20Procedures%20Manual%20 Documents/NCDOT%20Highway%20Landscape%20Planting%20Policy.pdf.

[167] https://connect.ncdot.gov/resources/Environmental/PDEA% 20Procedures%20Manual%20 Documents/NCDOT%20Highway%20Landscape%20Planting%20Policy.pdf.

[168] http://www.dcvb-nc.com/ScenicNC/2012_NCDOT_Tree_Planting_Overview.pdf.

[169] http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/design/graphics/PlantingGuidelines.pdf.

[170] http://www.ncdot.gov/programs/environment/stormwater/.

[171] http://www.dcvb-nc.com/ScenicNC/2012_NCDOT_Tree_Planting_Overview.pdf.

[172] http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/wildflowerbook/.

[173] http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/wildflowerbook/.

[174] http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/wildflowerbook/.

[175] NCDOT Interview with Roadside Environmental Unit about environment and landscape, NCDOT Aesthetics Guidance Manual, North Carolina, June 19, 2014.

[176] http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/design/graphics/PlantingGuidelines.pdf

[177] Sipes and Sipes (2013).

[178] http://www.ncdot.gov/programs/environmental/bluestar/.

[179] Sipes and Sipes (2013).

CHAPTER 11 | BICYCLE AND PEDESTRIAN INFRASTRUCTURE

[180] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 3-2.

[181] NCDOT (2011).

[182] http://www.ncdot.gov/bikeped/.

[183] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-14 to 6-26.

[184] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-14 to 6-26.

[185] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-14 to 6-26.

[18] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-14 to 6-26.

[187] NACTO Urban Bikeway Design Guide, 2012.

[188] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-16.

[189] https://bookstore.transportation.org/item_details.aspx?ID=1943.

[190] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-16.

[191] NACTO (2012).

[192] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-16.

[193] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-27 to 6-33.

[194] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-12.

[195] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-13.

[196] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-13.

[197] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 6-13.

[198] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-17 to 6-26.

[199] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-12 to 6-15.

[200] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-12 to 6-15.

[201] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 6-12 to 6-15.

[202] http://www.walkbikenc.com/.

[203] NCDOT (2011).

[204] http://www.ncdot.gov/bikeped/planning/walkbikenc/.

[205] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 2-9 to 2-10.

[206] http://www.ncdot.gov/bikeped/planning/walkbikenc/, pp. 2-9 to 2-10.

[207] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 2-17.

[208] A Categorical Exclusion (CE) is a key part of NEPA that provides a "categorical determination, based on agency experience, that certain categories of actions do not result in significant impacts to the human environment, eliminating the need for unnecessary or lengthy documentation in an environmental assessment or environmental impact statement." http://www.fs.fed.us/emc/plan_ce/includes/q_as.pdf.

[209] http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 2-12.

[210] https://nevadadot.com/uploadedFiles/NDOT/Projects_and_Programs/Landscape_and_Aesthetics/LandA_CommMatchManual.pdf.

[211] http://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf.

[212] http://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf.

CHAPTER 12 | SCENIC BYWAYS

213 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

214 North Carolina Scenic Byways Application Package.

215 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

216 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

217 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

218 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

219 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

220 North Carolina Scenic Byways Application Package.

221 North Carolina Scenic Byways Application Package.

222 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

223 North Carolina Scenic Byways Administrative Codes, T19A: 02E .1000 (1995).

22 http://www.fhwa.dot.gov/safetealu/.

225 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

226 North Carolina Scenic Byways Application Package.

227 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

228 http://www.ncdot.gov/download/travel/scenic_byways.pdf.

229 http://environment.fhwa.dot.gov/histpres/index.asp.

230 http://environment.fhwa.dot.gov/histpres/index.asp.

231 http://environment.fhwa.dot.gov/histpres/index.asp.

232 http://environment.fhwa.dot.gov/histpres/index.asp.

CHAPTER 13 | PUBLIC ART

233 http://arts.gov/sites/default/files/CreativePlacemaking-Paper.pdf.

234 http://arts.gov/sites/default/files/CreativePlacemaking-Paper.pdf.

235 http://ncarts.org/EconomicDevelopment/SmARTInitiative.aspx.

236 http://www.creativecity.ca/database/files/library/issue_paper.pdf.

237 http://www.fhwa.dot.gov/map21/factsheets/stp.cfm.

238 https://connect.ncdot.gov/projects/planning/MPORPODocuments/TAP%20memo_1113.pdf.

239 http://www.fmcsa.dot.gov/mission/policy/map-21-moving-ahead-progress-21st-century-act or http://www.fhwa.dot.gov/map21/guidance/guidetap.cfm.

240 http://www.fhwa.dot.gov/map21/guidance/guidetap.cfm.

241 http://www.fmcsa.dot.gov/mission/policy/map-21-moving-ahead-progress-21st-century-act.
https://connect.ncdot.gov/projects/planning/MPORPODocuments/TAP%20memo_1113.pdf.

242 http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 2-12.

243 http://www.ncdot.gov/bikeped/planning/walkbikenc/, p. 2-12.

244 http://www.fhwa.dot.gov/hep/scenic_byways/fedreg.pdf.

245 http://www.fhwa.dot.gov/hep/scenic_byways/fedreg.pdf.

246 Department of Transportation Slides in MAP-21: Opportunities for the Arts in Transportation Presentation, July 9.

247 https://ncarts.cgweb.org/.

COVER AND DIVIDER PHOTOGRAPH CREDITS

COVER

Linn Cove Viaduct along the Blue Ridge Parkway, North Carolina. Image courtesy NPS public domain.

INTRODUCTORY PAGES

Artist Ayokunle Odeleye's monument, 1898 Memorial Park in Wilmington, North Carolina. Image courtesy NCDOT.

Madison County rest area, North Carolina. Image courtesy NCDOT.

Bridge along I-85, over the Yadkin River near Salisbury, North Carolina. Image courtesy NCDOT.

SECTION A

Outerbanks, North Carolina. Image courtesy Flickr Creative Commons.

Charlotte, North Carolina. Image courtesy VisitNC.com.

Chapter 1

Roadside wildflower plantings, North Carolina. Image courtesy NCDOT.

Chapter 2

Pedestrian activity along the streets of Saluda, North Carolina. Image courtesy AECOM.

NC 12, Outer Banks, North Carolina. Image courtesy Flickr Creative Commons.

Chapter 3

Pedestrian bridge detail in Durham Central Park, Durham, North Carolina. Image courtesy AECOM.

Roadside wildflower plantings, North Carolina. Image courtesy NCDOT.

Chapter 4

Blue Ridge Parkway in autumn, North Carolina. Image courtesy Cardens Design.

Stone bridge along the Blue Ridge Parkway, North Carolina. Image courtesy FHWA.

SECTION B

I-26 Scenic Byway, North Carolina. Image courtesy NCDOT.

Retaining walls titled "Airway Gateway" in El Paso, Texas, by Vicki Scuri Siteworks and Jacobs Inc., Image courtesy Scuri Siteworks

Bridge along the Neuse Trail, Raleigh, North Carolina. Image courtesy RaleighNC.gov.

Chapter 5:

Titled "North Ninth Gateway," Salina, Kansas, by Vicki Scuri Siteworks. Image courtesy Scuri Siteworks

Blue Ridge Parkway, North Carolina. Image courtesy Depositphotos.com.

Chapter 6:

"Passing Through Light" by artist Edwin Redl is located at the I-77 and West Trade Street underpass in North Carolina. Image courtesy NCDOT.

Chapter 7:

One of the two remaining covered bridges in North Carolina, the Pisgah Bridge is located on the West Fork Branch of the Little River, within the Uwharrie National Forest, Randolph County, North Carolina. Image courtesy Flickr Creative Commons.

Highway bridge along the Blue Bridge Parkway, North Carolina. Image courtesy NCDOT.

Chapter 8:

Brick noise wall along US 64, outside Apex, North Carolina. Image courtesy NCDOT.

Concrete noise wall with Ashlar stone pattern. Image courtesy FHWA.

Chapter 9

Retaining wall along Finlay Park in Columbia, South Carolina. Image courtesy Flickr Creative Commons.

Retaining wall along the roadside in North Carolina. Image courtesy NCDOT.

Chapter 10

Roadside wildflower plantings and landscaping, North Carolina. Image courtesy NCDOT.

Chapter 11

Wilmington River Park, Wilmington, North Carolina. Image courtesy AECOM.

Chapter 12

I-26 Scenic Byway, North Carolina. Image courtesy NCDOT.

Chapter 13

South Park Bridge by artist Barbara Grygutis gently curves over the Duwamish River in Seattle, Washington. Image courtesy Barbara Grygutis.

SECTION C

I-26 Scenic Byway, North Carolina. Image courtesy NCDOT.

Artist Ayokunle Odeleye's monument, 1898 Memorial Park in Wilmington, North Carolina. Image courtesy NCDOT.

Reinforced earth MSE precast retaining wall along I-70 in Indianapolis, Indiana. Image courtesy Indiana Department of Transportation.

Chapter 14

Wilmington River boardwalk, Wilmington, North Carolina. Image courtesy AECOM.

APPENDICES

Reedy Creek Pedestrian Bridge spans I-440 in Raleigh, North Carolina. Image courtesy NCDOT.

Wrightsville Beach Pier in Wilmington, North Carolina, is a highly prized pedestrian facility. Image courtesy Flickr Creative Commons.

Roadside wildflower plantings and landscaping, North Carolina. Image courtesy NCDOT.

"Tail of the Dragon" Scenic Byway along US 129 in east Tennessee. Image courtesy Wikipedia Creative Commons.

Boardwalk along the North Carolina coast. Image courtesy Depositphotos.com.

BACK COVER

Linn Cove Viaduct along the Blue Ridge Parkway, North Carolina. Image courtesy NPS public domain.

"Design adds value faster than it adds cost.

Joel Spolsky

North Carolina
Department of Transportation
2015