



p.o. box 28504
raleigh, nc 27611
919.755.0046
obs-la.net

October 5, 2015

Town of Zebulon
Public Works Department
450 E. Horton Street
Zebulon, North Carolina 27597

Attention: Mr. Chris Ray, Director

Reference: Zebulon Greenway Master Plan
Final Project Report

Mr. Ray:

On behalf of obs landscape architects and AMT Engineering we are pleased to provide this Master Plan of the Town of Zebulon Greenway System. We have thoroughly enjoyed the process of working with the town and the community to prepare the recommendations outlined by this plan and report.

We trust that this document will aid the town in pursuing and securing funding and serve as a tool guiding the actual design, implementation, operations and management of the system.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'BHS'.

Brian H. Starkey, PLA / ASLA
Principal / obs landscape architects

A handwritten signature in blue ink, appearing to read 'Michael Surasky'.

Michael Surasky, PE
Project Manager / Engineer / AMT

Project Team / Acknowledgements

Town of Zebulon Board of Commissioners

Robert S. Matheny	Mayor
R. Dale Beck	Commissioner
Don Bumgarner	Commissioner
Beverly Wall Clark	Commissioner
Curtis P. Strickland	Commissioner
Glenn York	Commissioner

Greenway Advisory Committee

Tim Hale	Parks and Recreation Community Center Coordinator
Smith Raynor	NC State Parks
Melissa Seguin	Senior Environmental Scientist - The EI Group, Inc.
Ray Fulghum	Former Planning Board Member
Jasmine Porter	Youth Council Member
Kim Valentine/Denise Nowell	Zebulon Chamber of Commerce
Joe Beck	Parks and Recreation Advisory Board Member
Beverly Clark	Town Commissioner
Dale Beck	Town Commissioner

Town of Zebulon

Joe Moore	Town Manager
Chris D. Ray	Chairman, Zebulon Public Works Director
Robyn Snow	Public Works Administrative Assistant
Mark Hetrick	Planning Director
Greg Johnson	Parks and Recreation Director

Community Groups

Town of Zebulon Youth Council
Town of Zebulon Chamber of Commerce

Parks and Recreation Advisory Board

John Rex Endowment Staff

Phil Bors	Active Living by Design
-----------	-------------------------

Design Consultants

obs landscape architects

Brian H. Starkey, PLA	Principal / Project Manager
Lauren E. Dickson, PLA	Project Planner
Jon Blasco	Project Planner

A. Morton Thomas & Associates

Mike Surasky, PE	Project Manager
Tim Riordan, PE	Project Engineer

Contents

Executive Summary

1	Executive Summary	1
	Introduction	1
	Project Study Area	1
	John Rex Endowment Grant Requirements.	1
	Master Plan Vision.	1
	Guiding Principles.	1
	Benefits of Greenways.	2
	Final Master Plan Recommendations	2

Report

2	Introduction	5
	What is a Greenway?	5
	<i>Recreation</i>	6
	<i>Transportation</i>	6
	<i>Environment</i>	6
	<i>Economic</i>	6
	<i>Community Identity</i>	6
	Guiding Principles.	6
	<i>Connectivity and Accessibility</i>	7
	<i>Equitable Distribution</i>	7
	<i>Collaboration and Coordination</i>	7
	<i>Communication and Engagement of the Community</i>	7
	<i>Development of a Plan Specific to the Needs and Desires of the Community</i>	8
	Design of the Master Plan	8
	<i>Provide Opportunities for Public Involvement in the Planning Process</i>	8
	<i>Provide a Thorough Site Analysis</i>	9
	<i>Identify and Define Connections</i> <i>Between Destinations</i>	9
	<i>Produce a Final Plan That Can Guide Implementation</i>	9

3	Planning Process	11
	Introduction	11
	Planning Jurisdiction	11
	Initial Mapping	11
	John Rex Endowment	12

Community Engagement	12
<i>Meetings</i>	12
<i>Survey Summary</i>	13
<i>Website</i>	13
Site Investigations	13

4 Inventory and Analysis 15

Introduction	15
Field Investigations	15
<i>Sewer Easements</i>	15
<i>Downtown</i>	17
Mapping	18
<i>Destinations</i>	18
<i>Natural Features</i>	18
<i>Utility Corridors</i>	18
<i>Neighborhoods</i>	19
<i>Downtown</i>	19
<i>Potential Connections outside of the ETJ</i>	19

5 System Components 29

Introduction	29
Trail Types	29
Greenway Trails	29
<i>Spur Trails</i>	30
Urban Trails	30
<i>Sidewalks</i>	30
<i>Roadside Trails</i>	30
<i>Street Crossings</i>	30
<i>Bike Lanes</i>	31
<i>Sharrows</i>	31
Street Classifications	32
<i>Tier 1 Streets</i>	32
<i>Tier 2 Streets</i>	32
<i>Tier 3 Streets</i>	32
Blueways	33
Facilities and Amenities	33

6 Trail System	35
Introduction	35
General Recommendations	36
<i>Corridor #1.</i>	39
<i>Corridor #2.</i>	43
<i>Corridor #3.</i>	47
<i>Corridor #4.</i>	51
<i>Corridor #5.</i>	55
<i>Corridor #6.</i>	59
<i>Corridor #7.</i>	63
<i>Corridor #8.</i>	67
<i>Corridor #9.</i>	71
<i>Corridor #10.</i>	75
<i>Urban Trails</i>	79
<i>Blueway.</i>	83
7 Implementation Strategy	87
Introduction	87
How to Use this Plan.	87
Public Policy	87
Priority Projects.	88
Implementation Process	88
<i>Identify Funding Sources</i>	88
<i>Easement Acquisition</i>	88
<i>Survey.</i>	88
<i>Greenway Corridor Design.</i>	89
<i>Construction Documents</i>	89
<i>Permitting.</i>	89
<i>Construction Administration.</i>	89
<i>Trail Maintenance</i>	89
8 Funding Sources	95
Introduction	95
<i>Town Funding</i>	95
<i>LAPP</i>	95
<i>(Locally Administered Projects Program)</i>	95
<i>Park and Recreation Trust Fund (PARTF)</i>	95
<i>Federal Land and Water Conservation Fund (LWCF)</i>	96
<i>NCDOT Bike and Ped Grants</i>	96

<i>Safe Routes to School/Active Routes to School</i>	96
<i>Wake County Partnership Grant Program</i>	97
<i>NC Department of Public Health/ Federal Dollars for Public Health</i>	97
<i>Urban & Community Forestry Grant Program</i>	97
<i>NC Department of Commerce</i>	98
<i>John Rex Endowment</i>	98
<i>Blue Cross Blue Shield of NC Foundation</i>	98
<i>Triangle Community Foundation (TCF)</i>	98
<i>GlaxoSmithKline's Ribbon of Hope</i>	99
<i>US Department of Agriculture (USDA) Rural Development Grants</i>	99
<i>NC Wildlife Commission</i>	99
Summary	99

9 Design Guidelines 101

Introduction	101
General Design Considerations	101
<i>Greenways as Environmental Protection</i>	101
<i>Sustainability</i>	102
<i>Permitting</i>	102
Design Considerations in Special areas	103
<i>Stream buffers</i>	103
<i>Trails within utility corridors</i>	103
<i>Trails within Roadway Corridors</i>	103
<i>Access points</i>	103
Trail Design.	104
<i>Surfacing</i>	104
<i>Width</i>	105
<i>Shoulders and Clearances</i>	105
<i>Grades</i>	105
<i>Typical section</i>	105
<i>ADA Compliance</i>	106
<i>Crime Prevention through Environmental Design (CPTED)</i>	106
<i>Natural Surveillance</i>	106
<i>Territorial Enforcement</i>	106
<i>Natural Access Control</i>	106

<i>Target Hardening</i>	106
Trail Features	107
<i>Parking areas</i>	107
<i>Trailheads</i>	107
<i>Neighborhood Access</i>	107
<i>Shared Access</i>	107
<i>Vegetation and landscaping considerations</i>	108
<i>Boardwalks</i>	109
<i>Bollards</i>	110
<i>Bridges</i>	111
<i>Underpasses</i>	113
Signage	114
<i>Other Amenities</i>	116

10 Maintenance and Management 117

Introduction	117
Operational Rules and Regulations	117
Maintenance Procedure and Implications	118
Design Considerations	118
<i>Defining Edges</i>	118
<i>Drainage and Erosion Control</i>	119
<i>Pavement</i>	119
<i>Landscape</i>	120
Maintenance Issues and Strategies	120
<i>Assessment techniques</i>	121
<i>Maintenance Issues</i>	121
<i>Maintenance responsibilities</i>	122
<i>Information maintenance</i>	122
<i>Citizen reporting</i>	122
<i>Volunteer Programs</i>	123

List of Charts & Maps

Tables & Charts

Graph of Survey Summary	13
Chart of Requested Amenities	13
Matrix of Prioritization of Trail Corridors	14
Priority Corridor Cost Estimates	90

Maps

Greenway Master Plan.	3
Destinations Map	21
Natural Features Map	23
Utility Corridors Map	25
Natural Features Map	27
Corridor Key Map	37
Corridor #1 Map.	41
Corridor #2 Map.	45
Corridor #3 Map.	49
Triangle East Business Park Master Plan courtesy of CBRE Raleigh	52
Corridor #4 Map.	53
Corridor #5 Map.	57
Corridor #6 Map.	61
Corridor #7 Map.	65
Corridor #8 Map.	69
Corridor #9 Map.	73
Corridor #10 Map	77
Urban Trails Map	81
Blueway Map.	85
Corridor 1 Opportunities and Constraints	91
Corridor 3 Opportunities and Constraints	92
Urban Trails Opportunities and Constraints.	93

Acronyms and Abbreviation Key

AASHTO – American Association of State Highway and Transportation Officials

ABC – Aggregate Base Course

ACOE – Army Core of Engineers

ADA – Americans with Disabilities Act

ADAAG – Americans with Disabilities Act Accessibility Guidelines

ALBD - Active Living by Design

BOC – Board of Commissioners

CAMPO – Capital Area Metropolitan Planning Organization

CDBG – Community Development Block Grant

CDC – Center for Disease Control

CLOMR – Conditional Letter Of Map Revision

CMAQ – Congestion Mitigation for Air Quality

CPTED – Crime Prevention Through Environmental Design

CTG – Community Transformation Grant

DPR – Division of Parks and Recreation

ETJ – Extraterritorial Jurisdiction

FEMA – Federal Emergency Management Agency

GIS – Geographical Information Systems

GSK – GlaxoSmithKline

LAPP – Locally Administered Projects Program

LARC – Land Acquisition Review Committee

LOMR – Letter of Map Revision

LWCF – Land and Water Conservation Fund

MTIP – Metropolitan Transportation Improvement Program

MUTCD – Manual on Uniform Traffic Control Devices

NCDOC – North Carolina Department of Commerce

NCDENR – North Carolina Department of Environment and Natural Resources

NCDOT – North Carolina Department of Transportation

NEPA – National Environmental Policy Act

OSAPAC – Open Space and Parks Advisory Committee

PARTF – Parks and Recreation Trust Fund

RFP – Request for Proposals

RTP – Recreational Trails Program

ROW - Right of Way

STP-DA – Surface Transportation Program – Direct Allocation

STP-EB – Surface Transportation Program – Bike and Pedestrian Federal Funding

SWAP – Sidewalk Assessment Process