2743 - Military Road Culvert Replacement Project

Application Details

Funding Opportunity:	2336-Virginia Community Flood Preparedness Fund - Project Grants - CY24 Round 5
Funding Opportunity Due Date:	Jan 24, 2025 11:59 PM
Program Area:	Virginia Community Flood Preparedness Fund
Status:	Under Review
Stage:	Final Application
Initial Submit Date:	Jan 24, 2025 10:20 AM
Initially Submitted By:	Jennifer Tastad
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mrs. (Salutation) Jennifer (First Name) L (Middle Name) Tastad (Last Name)
Title:	Design Team Supervisor
Email*:	jtastad@arlingtonva.us
Address*:	2100 Clarendon Boulevard Suite 705 Arlington (City) Virginia (State/Province) 22201 (Postal Code/Zip)
Phone*:	703-228-6542 Ext. Phone ###-###-####
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	Arlington County
Organization Type*:	County Government
Tax ID*:	54-6001123
Unique Entity Identifier (UEI)*:	W2J1JAMJ88H7
Organization Website:	https://www.arlingtonva.us/Home

Address*: 2100 Clarendon Boulevard

Suite 705

Arlington Virginia 22201-
City State/Province Postal Code/Zip

Phone*: 703-228-6542 Ext.
###-###-####

Fax: ###-###-####

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: Arlington County

Your locality's CID number can be found at the following link: Community Status Book Report

NFIP/DCR Community Identification Number (CID)*: 515520

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: Mike Moon
First Name Last Name

Mailing Address*: 2100 Clarendon Boulevard, Suite 900
Address Line 1

Address Line 2

Arlington Virginia 22201
City State Zip Code

Telephone Number*: 703-228-6767

Cell Phone Number*: 571-451-9883

Email*: mmoon@arlingtonva.us

Is the contact person different than the authorized individual?

Contact Person*: Yes

Contact: Jennifer Tastad
First Name Last Name

2100 Clarendon Boulevard, Suite 705
Address Line 1

Address Line 2

Arlington Virginia 22201
City State Zip Code

Telephone Number: 703-228-6542

Cell Phone Number: 703-469-6384

Email Address: jtastad@arlingtonva.us

Enter a description of the project for which you are applying to this funding opportunity

Project Description*:

Replacement of a failing, under capacity culvert, which has exceeded its life expectancy.

Low-income geographic area means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local

median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Is the proposal in this application intended to benefit a low-income geographic area as defined above?

Benefit a low-income geographic area*: No

Information regarding your census block(s) can be found at census.gov

Census Block(s) Where Project will Occur*: 1004, 1005

Is Project Located in an NFIP Participating Community?*: Yes

Is Project Located in a Special Flood Hazard Area?*: Yes

Flood Zone(s) (if applicable): AE

Flood Insurance Rate Map Number(s) (if applicable): 51013C0036D eff. 11/16/2023

Eligibility CFPF - Round 4 - Projects

Eligibility

Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these)?

Local Government*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration

Does the local government have an approved resilience plan and has provided a copy or link to the plan with this application?

Resilience Plan*: Yes

Yes - Eligible for consideration under all categories
No - Eligible for consideration for studies, capacity building, and planning only

If the applicant is not a town, city, or county, are letters of support from all affected local governments included in this application?

Letters of Support*: N/A

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Not applicable

Has this or any portion of this project been included in any application or program previously funded by the Department?

Previously Funded*: No

Yes - Not eligible for consideration
No - Eligible for consideration

Has the applicant provided evidence of an ability to provide the required matching funds?

Evidence of Match Funds*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Match not required

Scoring Criteria for Flood Prevention and Protection Projects - Round 4

Scoring

Category Scoring:
Hold CTRL to select multiple options

Project Category*: All hybrid approaches whose end result is a nature-based solution

Is the project area socially vulnerable? (based on ADAPT Virginia?s Social Vulnerability Index Score)
Social Vulnerability Scoring:
Very High Social Vulnerability (More than 1.5)
High Social Vulnerability (1.0 to 1.5)
Moderate Social Vulnerability (0.0 to 1.0)

Low Social Vulnerability (-1.0 to 0.0)
Very Low Social Vulnerability (Less than -1.0)

Socially Vulnerable*: Very Low Social Vulnerability (Less than -1.0)

Is the proposed project part of an effort to join or remedy the community?s probation or suspension from the NFIP?

NFIP*: No

Is the proposed project in a low-income geographic area as defined below?
"Low-income geographic area" means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Low-Income Geographic Area*: No

Projects eligible for funding may also reduce nutrient and sediment pollution to local waters and the Chesapeake Bay and assist the Commonwealth in achieving local and/or Chesapeake Bay TMDLs. Does the proposed project include implementation of one or more best management practices with a nitrogen, phosphorus, or sediment reduction efficiency established by the Virginia Department of Environmental Quality or the Chesapeake Bay Program Partnership in support of the Chesapeake Bay TMDL Phase III Watershed Implementation Plan?

Reduction of Nutrient and Sediment Pollution*: No

Does this project provide ?community scale? benefits?

Community Scale Benefits*: More than one census block

Expected Lifespan of Project

Expected Lifespan of Project*: Over 20 Years

Comments:

Scope of Work - Projects - Round 4

Scope of Work

Upload your Scope of Work
Please refer to Part IV, Section B. of the grant manual for guidance on how to create your scope of work

Scope of Work*: Scope of Work Narrative.pdf

Comments:

Budget Narrative

Budget Narrative Attachment*: Budget Narrative.pdf

Comments:

Scope of Work Supporting Information - Projects

Supporting Information - Projects

Provide population data for the local government in which the project is taking place

Population*: 240000.00

Provide information on the flood risk of the project area, including whether the project is in a mapped floodplain, what flood zone it is in, and when it was last mapped. If the property or area around it has been flooded before, share information on the dates of past flood events and the amount of damage sustained

Historic Flooding data and Hydrologic Studies*: Historical Flooding Data.pdf

Include studies, data, reports that demonstrate the proposed project minimizes flood vulnerabilities and does not create flooding or increased flooding (adverse impact) to other properties

No Adverse Impact*: No Adverse Impact.pdf

Include supporting documents demonstrating the local government's ability to provide its share of the project costs. This must include an estimate of the total project cost, a description of the source of the funds being used, evidence of the local government's ability to pay for the project in full or quarterly prior to reimbursement, and a signed pledge agreement from each contributing organization

Ability to Provide Share of Cost*: Ability to Provide Share of Cost.pdf

A benefit-cost analysis must be submitted with the project application

Benefit-Cost Analysis*: Benefit Cost Analysis.pdf

Provide a list of repetitive loss and/or severe repetitive loss properties. Do not provide the addresses for the properties, but include an exact number of repetitive loss and/or severe repetitive loss structures within the project area

Repetitive Loss and/or Severe Repetitive Loss Properties*: Repetitive Loss Properties.pdf

Describe the residential and commercial structures impacted by this project, including how they contribute to the community such as historic, economic, or social value. Provide an exact number of residential structures and commercial structures in the project area

Residential and/or Commercial Structures*:

As the flood zone does not encompass building structures, residential and commercial structures are not impacted by the Project.

If there are critical facilities/infrastructure within the project area, describe each facility

Critical Facilities/Infrastructure*:

The following critical infrastructure and facilities that would be adversely impacted by the Military Road Culvert flooding:
-115 linear feet of 36? diameter water transmission line runs within the Project limits. The line provides service to 2,335 households.
-Sanitary Pump Station: there is a sanitary pump station located directly adjacent to one of 13 sanitary lift stations in Arlington. Extreme flooding of the pump station could cause expensive damage to the station and cause sewage overflows.
-Roadway transportation network, which supports bus transit, active transportation, and vehicles. Flooding events prevent usage of Military Road and 36th Road North, leading to detours and delays. For first responders, minutes can mean the difference between life and death.
-The Gulf Branch Nature Center is adjacent to the Project area. The Center is in a historic 1920s bungalow and is also the only site in urban Northern Virginia that is on the Virginia Indian Heritage Trail. Culvert flooding blocks access and may cause damage to the facility in extreme events.
-The Madison Community Center is located about 0.7 miles away at 3829 N Stafford Street. It features a multipurpose room, a game room and a fitness room. The center is ADA accessible, with Wi-Fi and restrooms on site. Activities include sports, preschool and senior classes, as well as special events programs.

Explain the local government's financial and staff resources. How many relevant staff members does the local government have? To what relevant software does the local government have access? What are the local government's capabilities?

Financial and Staff Resources*:

The County has technical and financial staff able to manage grant-funded infrastructure projects. The following County staff will be responsible for this project:

-Mohammad Yazdi, Project Manager
-Jennifer Tastad, Engineering Design Team Supervisor
-Soloman Shikur, Engineering Design Team Supervisor
-Michael Morris, Design Engineer

County Department leadership will also be involved, including:
-Mike Moon, Department of Environmental Services Chief Operating Officer
-Greg Emmanuel, Department of Environmental Services Director

The Project team will use AutoCAD Civil 3D, HEC-RAS, Trimble Unity Construct, and MS Office Suite (including MS Project) in the design and management of the project.

Identify and describe the goals and objectives of the project. Include a description of the expected results of the completed project and explain the expected benefits of the project. This may include financial benefits, increased awareness, decreased risk, etc.

Goals and Objectives*:

The Project has three main objectives:

-The Project will seek to flood proof the culvert through an improved design. A climate resilient, flood proof design will prevent flooding of Military Road and adjacent properties, reducing property damage and preventing road closure.
-The Project will improve roadway drainage by upsizing the culvert to convey a 10-year storm event without overtopping onto Military Road in order to prevent flooding of the roadway and adjacent single-family homes. As the culvert is currently at-risk of failure, an improved design will ensure the culvert enters a good state of good repair, which will reduce maintenance costs.
-The County seeks to improve fish passage under Military Road by countersinking the new culvert. Healthy fish passage also requires a culvert large enough to handle swift water during storm events. While American eels have the ability to scale many obstacles and are even known to move over land, vertical barriers, such as culvert walls, are not passable by the species.
-Refer to the attached supporting documentation for additional information pertaining to these goals and objectives.

Outline a plan of action laying out the scope and detail of how the proposed work will be accomplished with a timeline identifying expected completion dates. Determine milestones for the project that will be used to track progress. Explain what deliverables can be expected at each milestone, and what the final project deliverables will be. Identify other project partners

Approach, Milestones, and Deliverables*: Approach Milestones and Deliverables.pdf

Where applicable, briefly describe the relationship between this project and other past, current, or future resilience projects. If the applicant has received or applied for any other grants or loans, please identify those projects, and, if applicable, describe any problems that arose with meeting the obligations of the grant and how the obligations of this project will be met

Relationship to Other Projects*:

The County is working holistically in the Gulf Branch watershed to address water quality concerns. Work includes the Gulf Branch Stream project planned for construction in the County Fiscal Year (FY) 2026, the Gulf Branch Green Streets projects, which started construction in November 2024, and two outfall repair projects currently in design.

The Gulf Branch Green Streets project will implement green stormwater infrastructure in the transportation right of way. The project will add four new bioretention facilities in areas of existing pavement. Together, these facilities will capture and treat previously uncontrolled stormwater runoff from 3.4 acres to protect Gulf Branch.
The Gulf Branch stream project is located upstream of the Military Road culvert. It involves the repair and enhancement of the main channel of Gulf Branch and several of its tributaries, along with the implementation of a Regenerative Stormwater Conveyance best management practice upstream of one of the reaches. The project will create a stable stream channel to accommodate storm flows, protect exposed sanitary sewer pipes and other infrastructure, address active erosion and provide habitat. It will also reduce excess sediment and nutrients being transported downstream and supports the Chesapeake Bay clean-up effort.

Two stormwater outfalls to Gulf Branch will also be repaired in FY26-28. These outfall repair projects are located downstream of the Military Road culvert. The projects will repair failing infrastructure, stabilize eroding outfall channels, and improve habitat.

All of these projects are in the County?s Adopted Capital Improvement Plan FY 2025 ? FY 2034. Committed funding sources are from bonds and U.S. Department of Housing and Urban Development grant Community Project Funding. The County?s stream restoration team will be pursuing a Stormwater Local Assistance Fund grant from the Virginia Department of Environmental Quality as they finalize the Gulf Branch Stream project.

Lastly, there are other infrastructure projects underway in the general vicinity of the Military Road culvert. These include a sanitary sewer force main project beginning construction in summer/fall 2025, a water main replacement project nearing completion, and two transportation projects: the Military Road and Nelly Custis roundabout and Old Glebe Road bridge replacement.

For ongoing projects or projects that will require future maintenance, such as infrastructure, flood warning and response systems, signs, websites, or flood risk applications, a maintenance, management, and monitoring plan for the projects must be provided

Maintenance Plan*: Maintenance Plan.pdf

Describe how the project meets each of the applicable scoring criteria contained in Appendix B. Documentation can be incorporated into the Scope of Work Narrative

Criteria*:

Project Type
Hybrid approach resulting in nature-based solution. (20 points)

Social Vulnerability Index Score
Very low social vulnerability (-1.97). (0 points)

Community Scale of Benefits
More than one census block. (30 points)

Expected Lifespan of Project
Over 20 Years (10 points)

Remedy for NFIP probation or suspension
No. (0 points)

Proposed project part of a low-income geographic area
No. (0 points)

Proposed project implements a Chesapeake Bay TMDL BMP
No. (0 points)

Budget

Budget Summary

Grant Matching Requirement*: Projects that will result in hybrid solutions - Fund 60%/Match 40%

Is a match waiver being requested?

Match Waiver Request No

Note: only low-income communities are eligible for a match waiver.

*:

Total Project Amount (Request + Match)*: $5,057,516.00

**This amount should equal the sum of your request and match figures

REQUIRED Match Percentage Amount: $2,023,006.40

BUDGET TOTALS

Before submitting your application be sure that you meet the match requirements for your project type.

Match Percentage: 40.00%

Verify that your match percentage matches your required match percentage amount above.

Total Requested Fund Amount: $3,034,509.60

Total Match Amount: $2,023,006.40

TOTAL: $5,057,516.00

Personnel

Description	Requested Fund Amount	Match Amount	Match Source
Construction Administration	$0.00	$112,389.00	In kind
	$0.00	**$112,389.00**	

Fringe Benefits

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Travel

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Equipment

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Supplies

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Construction

Description	Requested Fund Amount	Match Amount	Match Source
Construction	$2,758,645.00	$1,736,925.00	In kind
	$2,758,645.00	**$1,736,925.00**	

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
Construction Management and Inspection	$275,864.60	$173,692.40	In kind
	$275,864.60	**$173,692.40**	

Maintenance Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

PreAward and Startup Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Other Direct Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Long and Short Term Loan Budget - Projects - VCFPF

Budget Summary

Are you applying for a short term, long term, or no loan as part of your application?

If you are not applying for a loan, select "not applying for loan" and leave all other fields on this screen blank

Long or Short Term*: Not Applying for Loan

Total Project Amount: $0.00

Total Requested Fund Amount: $0.00

TOTAL: $0.00

Salaries

Description	Requested Fund Amount
No Data for Table	

Fringe Benefits

Description	Requested Fund Amount
No Data for Table	

Travel

Description	Requested Fund Amount
No Data for Table	

Equipment

Description	Requested Fund Amount

No Data for Table

Supplies

Description	Requested Fund Amount

No Data for Table

Construction

Description	Requested Fund Amount

No Data for Table

Contracts

Description	Requested Fund Amount

No Data for Table

Other Direct Costs

Description	Requested Fund Amount

No Data for Table

Supporting Documentation

Supporting Documentation

Named Attachment	Required	Description	File Name	Type	Size	Upload Date
Detailed map of the project area(s) (Projects/Studies)						
FIRMette of the project area(s) (Projects/Studies)						
Historic flood damage data and/or images (Projects/Studies)						
A link to or a copy of the current floodplain ordinance						
Maintenance and management plan for project						
A link to or a copy of the current hazard mitigation plan						
A link to or a copy of the current comprehensive plan						
Social vulnerability index score(s) for the project area						
Authorization to request funding from the Fund from governing body or chief executive of the local government						
Signed pledge agreement from each contributing organization						
Maintenance Plan						
Benefit-cost analysis must be submitted with project applications over $2,000,000. in lieu of using the FEMA benefit-cost analysis tool, applicants may submit a narrative to describe in detail the cost benefits and value. The narrative must explicitly indicate the risk reduction benefits of a flood mitigation project and compares those benefits to its cost-effectiveness.						
Benefit Cost Analysis						
Other Relevant Attachments		Full Compiled Application Package	Arlington CFPF Grant Application FINAL.pdf	pdf	3 MB	01/24/2025 10:06 AM

Letters of Support

Description	File Name	Type	Size	Upload Date
Letter from Gulf Branch Nature Center Staff	Letter of Support for Gulf Branch Culvert Replacement.pdf	pdf	86 KB	01/24/2025 10:04 AM

Resilience Plan

Resilience Plan

Description	File Name	Type	Size	Upload Date
Letter from Certified Floodplain Manager	CFM Approval Letter.pdf	pdf	473 KB	01/24/2025 10:03 AM
Resilience Plan	Arlington County Resilience Plan.pdf	pdf	2 MB	01/24/2025 10:01 AM
Resilience Plan Approval Letter from DCR	Appendix C.pdf	pdf	301 KB	01/24/2025 10:02 AM

Scope of Work Narrative

I. Project Need

The Military Road Culvert Replacement Project (Project) will replace an undersized and failing double culvert with a single, wider culvert under Military Road in Arlington County. Military Road is a commuter collector road that feeds into Virginia State Route 120 (North Glebe Road) to the North and Virginia State Road 29 (Langston Boulevard) to the South. As the Project is on County-owned property, the benefits will accrue to the County and regional users of the roadway. There is presently no flood risk to the surrounding privately owned residential properties.

The Project is necessary to improve the roadway, prevent flooding of nearby roads and structures, to improve fish passage (especially the American eel [Anguilla rostrata]), and to improve downstream conditions in Gulf Branch.

Without CFPF funding, the County has identified local bond funds for the project in its 2025-2034 Capital Improvement Plan.

Challenges

Presently, the 60" double-barrel culvert is insufficiently sized, resulting in the stream frequently overtopping the roadway. Like most of the County's stormwater infrastructure, the culvert was built between 1940 and 1975, a time predating most contemporary stormwater design best practices and regulations. As such, the culvert has exceeded its lifespan. The County conducted emergency repair work in early 2019, only to have to redo the work just several months later. During a 150-year storm event on July 8, 2019, rainfall rates spiked to the equivalent of 7-9 inches per hour, a significant amount of rainfall intensity. Rising stormwater overtopped Military Road, eroded soil underneath a sidewalk to destabilize it, and uprooted a tree, which fell into the fence separating the sidewalk from the culvert. Stormwater flooded the street and deposited significant amounts of sediment onto the roadway. It's only a matter of time before the next record rainfall event requires more repairs to the outdated culvert, or it fails.

Failure of the culvert would have tremendous impact on the community. As a frequently used route in and out of the District of Columbia, a road closure would cost commuters time and money. Damage to utilities located under the culvert could cause untreated sewage to discharge into Gulf Branch. These impacts are in addition to a costly emergency culvert replacement.

Military Road culvert's outfall is several feet above the stream bed, which has led to erosion and prevented fish passage, especially for the American eel. The Project will aim to enable safe passage for species such as the American eel and other observed fish taxa and macroinvertebrates.

Replacing the Military Road culvert is necessary to handle swift flows, but also to improve downstream conditions. Replacing the existing double-barreled culvert with a single arch span design dechannelizes the streams and restores open channel flow, allowing for more natural hydrogeomorphic processes downstream while improving the conditions of the river ecosystem.

Solution

The culvert replacement design doubles the flow capacity to a 10-year design storm event, with a factor of safety to accommodate future increases in storm intensity as expected with climate change. The new culvert design emulates the natural streambed by eliminating the elevation difference between the outfall and streambed to restore healthy fish passage. The overall benefit of a contiguous system with no barriers to fish passage is a more robust assemblage of macroinvertebrates and fish.

The Project will have a positive impact on public safety in addition to the local ecosystem. The enlarged culvert will help reduce flash flooding risk to Military Road and sediment deposits following intense rainstorms. Countersinking the culvert will improve the healthy passage of the American Eel, a keystone species that serves as prey to many fish, mammals, and birds, and helps balance overpopulation of invertebrates and decaying matter.

II. Goals and Objectives

The Project will add discharge capacity necessary for flood risk mitigation from increasingly intense rain events. In addition, the project will eliminate obstacles to upstream migration of the American eel, ensure climate resilience and address aging infrastructure that is at increasing risk of failure. This will decrease damage from heavy rainfall event risks, provide flood prevention and protect adjacent properties, in particular a sanitary sewer pump station.

Objectives

The following objectives are achievable within the agreement period.

a) The Project will address aging infrastructure through the replacement of the failing culvert. To reduce the risk of collapse or damage with the existing culvert, the arch design will provide strength and durability. Completion of this activity will accomplish state of good repair goals. Using the Virginia Department of Transportation's Instructional and Informational Memorandum for Bridge Safety Inspection, Inventory and Inspection Requirements for Bridges and Large Culverts (IIM-S&B-27.12), the County will complete bi-annual maintenance reviews of the culvert to determine if maintenance is needed and to determine the lifespan of the investment (see Appendix A).

b) The Project will ensure climate resiliency through an improved culvert design. This design will be able to handle swift flows during rain events. Dechannelizing the stream and restoring open channel flow is a nature-based solution that will allow for more natural hydrogeomorphic processes downstream and improve the condition of the river ecosystem. Following construction, the County, through the Arlington Flood Water Program, will install a rain gauge and flow sensor to measure stream levels and velocity for several years during rain events to determine if the design is successful at flood prevention.

c) The Project will ensure successful migration of the American eel. The species was once found abundantly in rivers in Virginia; however, development of areas like Arlington County into densely urbanized areas has blocked passage and threatened its survival. The American eel is also prey to numerous protected species, such as American eagle and striped bass. The new culvert design will hold enough water, include upstream pools, and be countersunk to allow for fish to pass during the dry season, unlike the

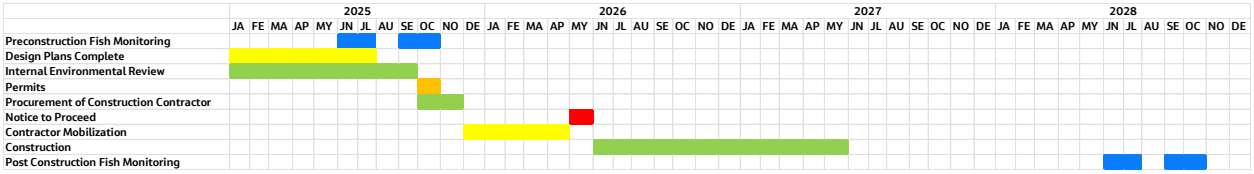
existing structure. Installation of such measures will make it easier for these journeying fish to reach portions of the river. Following construction, the County will measure downstream and upstream counts of the species for up to a year to ensure the migration period is encapsulated, hiring a biologist to determine if successful migration is ensured. Fish monitoring will begin almost a year before construction to capture spring and fall life cycles of the fish and wait approximately one life cycle to begin two-season monitoring following construction. As a result, monitoring might not be complete until almost a year after the culvert is constructed.

III. Work Plan

The major activities of the Project consist of the monitoring of the American eel and other fish in the stream before and after construction, internal environmental review, permitting, procurement, and construction of the new culvert. Contractor services will be procured for the completion of construction within a timeframe of one year. The County will complete all other services as identified in Figure 1.

While there are no required partners for the completion of the Project, the County will need to coordinate with the U.S. Army Corps for the U.S. Army Corps Nationwide Permit, FEMA for the Conditional Letters of Map Revision (CLOMR), the state for the Local Land Disturbing Activity Permit, and the EPA for NEPA.

Figure 1. Project Schedule



Deliverables will consist of the following:

- Pre and Post Construction Fish Monitoring
- Permits (NEPA, U.S. Army Corps Nationwide Permit, CLOMR, and the Local Land Disturbing Activity Permit)
- Construction of Culvert
- As-built Surveys
- Detailed Project Work Plan, Budget, and Schedule
- Final Performance Report

The maintenance plan shall consist of inspections by the County's Water, Sewer, Streets Bureau (WSS) on a rotating schedule, providing for bi-annual inspections of each County-owned bridge structure. These inspections may be performed by County staff or by a contracted entity, depending on resources and needs. The County will maintain records of all inspections.

Approach

If necessary, the County will prepare a detailed Project Work Plan, budget, and schedule, which may result in a revised statement of work following a successful grant funding award announcement. The detailed Project Work Plan will describe, in detail, the activities and steps necessary to complete the tasks outlined in the statement of work. The work plan will include the Project Management Plan which describes Arlington County's approach (including team, team decision-making, roles and responsibilities, as well as address quality assurance and quality control procedures. In addition, the Detailed Project Work Plan will include the Project schedule and a Project budget.

Following grant award announcement, the County will conduct monitoring of fish in the stream, internal environmental review, permitting, and contractor procurement. The contractor will complete construction of the new culvert.

The County will carry out the responsibilities of project management and administration, project reporting and project control requirements, meetings and agency coordination, office engineering, and field engineering. The final reimbursement request and project deliverables (if any) will be submitted within 90 days of the Project's completion date.

IV. Evaluation

The County will conduct pre- and post-Project monitoring of both macroinvertebrate species and fish species under its existing Municipal Separate Storm Sewer System Stormwater Permit and Watershed Management Program. The County conducted baseline monitoring in June 2023 and is committing to extending this monitoring effort as part of its match for CFPF funds. The County Infrastructure Program will cover the cost of monitoring the culvert projects, before and after construction as the cost is minimal. The County plans to begin monitoring almost a year before the construction to capture spring and fall life cycles of the fish and wait approximately one life cycle to start the two-season monitoring after construction; therefore, monitoring might not be finished until almost a year after the culvert is constructed.

The County will consider the Project to be successful if the culvert no longer overtops the roadway during a 10-year storm event, infrastructure ceases to degrade due to aging, and if fish are able to more easily pass through the culvert due to the lowered invert elevation.

Budget Narrative

I. Budget Summary

The estimated total Project cost is $5,057,516, inclusive of work to be completed by third parties to bring the Project to completion. As a non-low-income geographic area, the County is requesting funding for 60% of the Project cost, at a value of $3,034,510. The 40% match of $2,023,006 will be sourced from Arlington County's capital improvement budget through bond funds. Per the letter of funding commitment (see Appendix B), the funds have been secured and are available to use as soon as CFPF funds are obligated, with no restrictions on the use of the funds.

II. Budget Category Detail

Table 2 details the Project budget following the CFPF Budget Narrative Template. Included in the Contracts cost category are the estimated costs for up to four contracts:

- Primary construction contract, which includes estimated escalation of costs over four years and a 25% contingency cost: $4,437,077
- Contract for utility work associated with the Project also includes escalation and a 25% contingency cost: $58,493
- Construction management and inspection, estimated at approximately 10% of the construction cost: $449,557
- Construction administration, estimated at 2.5% of the construction cost: $112,389

The total of all Contracts cost is $5,057,516. Of that total, the County only requests $3,034,510 for the Project. The remainder of the Project's Contracts costs, $2,023,006, will be covered using the County's local match funding.

No costs for County personnel, fringe, travel, equipment, supplies or indirect costs are included in this request. The budget also does not include any pre-award/startup or maintenance costs.

Table 2. Budget Table

Breakout By Cost type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Local Share	$ -	$ -	$ -	$ -	$ -	$ 2,023,006.00	$ -	$ -	**$ 2,023,006.00**
State Share – CFPF Grant	$ -	$ -	$ -	$ -	$ -	$ 3,034,510.00	$ -	$ -	**$ 3,034,510.00**
Pre-Award/Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 5,057,516.00**	**$ -**	**$ -**	**$ 5,057,516.00**

I. Project Information

Population

Arlington County has over 240,000 residents. In the two Census tracts where the Project is located, the population totals 8,338. While the median household income in the County exceeds 80 percent of the state median household income, the County has two Census tracts designated as qualified Opportunity Zones by the U.S. Secretary of the Treasury: Census Tracts 1031 and 1027.01.

Historical Flooding Data

The Project is in a mapped floodplain (Figure 2), being in the 1% annual chance flood hazard zone AE. It was last mapped on 11/16/2023. A 1% flood risk translates to a one-in-four chance of flooding during a 30-year period.

Since 2000, four flood events have occurred to the culvert.

1. One on June 25, 2006 led to floodwater overtopping the culvert and flooding the intersection of Military Road and 36th Road North. Water also reached the Gulf Branch Nature Center adjacent to the culvert. No record of damage associated with the event; however, the County did record cleaning up debris as a result.
2. Two flooding events in 2018 (5/22 and 7/25), which necessitated repairs due to severe erosion.
3. One on July 8, 2019, impacted both the culvert and the adjacent pump station. It left behind debris and large logs that had to be removed repetitively. The 2019 event was a 150-year storm event with rainfall rates spiking to the equivalent of 7-9 inches per hour, indicating significant rainfall intensity. Rising stormwater overtopped Military Road, eroded soil underneath a sidewalk thus destabilizing it, and uprooted a tree, which fell into the fence separating the sidewalk from the culvert. Stormwater flooded the street and deposited significant amounts of sediment onto the roadway leading to $70,000 in repair costs.

In general, heavy rainfall frequently result in reports of American eels being stranded on Military Road and even run over and crushed by cars.

Furthermore, annual inspections from 2020 - 2024 have involved debris and log clearance as well as roadway mud clean up amounting to about $1,000 annually.

Figure 2. FEMA Floodplain Map

No Adverse Impact

While no studies or reports have been complete for the specific Project to determine whether the proposed improvements will have an adverse impact, the proposed improvement has been established to minimize flood vulnerabilities.

Culverts are types of tunnels that are built beneath a road or railway to channel water past an obstacle or to a subterranean waterway. According to FEMA, culverts are generally a very effective strategy for flood mitigation.

Currently, there is a 60” double-barrel culvert underneath Military Road to channel water; however, it is insufficiently sized, resulting in the stream frequently overtopping the roadway. The culvert is also nearing the end of its lifespan which has necessitated emergency repairs. The replacement culvert design doubles the flow capacity to a 10-year design storm event, with a factor of safety to accommodate future increases in storm intensity as expected with climate change. The new design will decrease the risk of flooding to adjacent properties, minimizing subject area flood vulnerabilities.

DEPARTMENT OF ENVIRONMENTAL SERVICES
Office of Sustainability and Environmental Management
2100 Clarendon Boulevard, Suite 705, Arlington, VA 22201
TEL 703-228-4488 FAX 703-228-7134 www.arlingtonva.us

December 18, 2024

Virginia Department of Conservation and Recreation
Division of Floodplain Management
600 East Main Street, 24th Floor
Richmond, VA 23219

RE: Authorization to Apply for Virginia DCR CFPF Grant Opportunity
Commitment to Local Funding Match for Military Road Culvert Replacement Project

To Whom It May Concern,

I am writing to formally authorize the application for grant funding under the Virginia Department of Conservation and Recreation (DCR) Community Flood Preparedness Fund (CFPF) for the replacement of the Military Road culvert. I am also confirming Arlington County's commitment to cover any costs exceeding available grant funds for this project.

The requested funding amount is based on the project's 60% cost estimate and totals $5,057,516 As the project is located in a non-low-income geographic area, the County is requesting funding for 60% of the Project cost. I am verifying the County has the additional funds ($2,023,006) necessary to complete the project.

Should you require additional details or have any queries related to funding, please do not hesitate to contact the Project Manager, Jennifer Tastad (jtastad@arlingtonva.us).

Sincerely,

Michael Moon

Mike Moon
DES Chief Operating Officer

cc: Mark Schwartz
Greg Emmanuel
Michelle Cowan
Jason Papacosma

Appendix B – Authorization to Apply for CFPF Funding

DEPARTMENT OF ENVIRONMENTAL SERVICES
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Sincerely,

Michael Moon

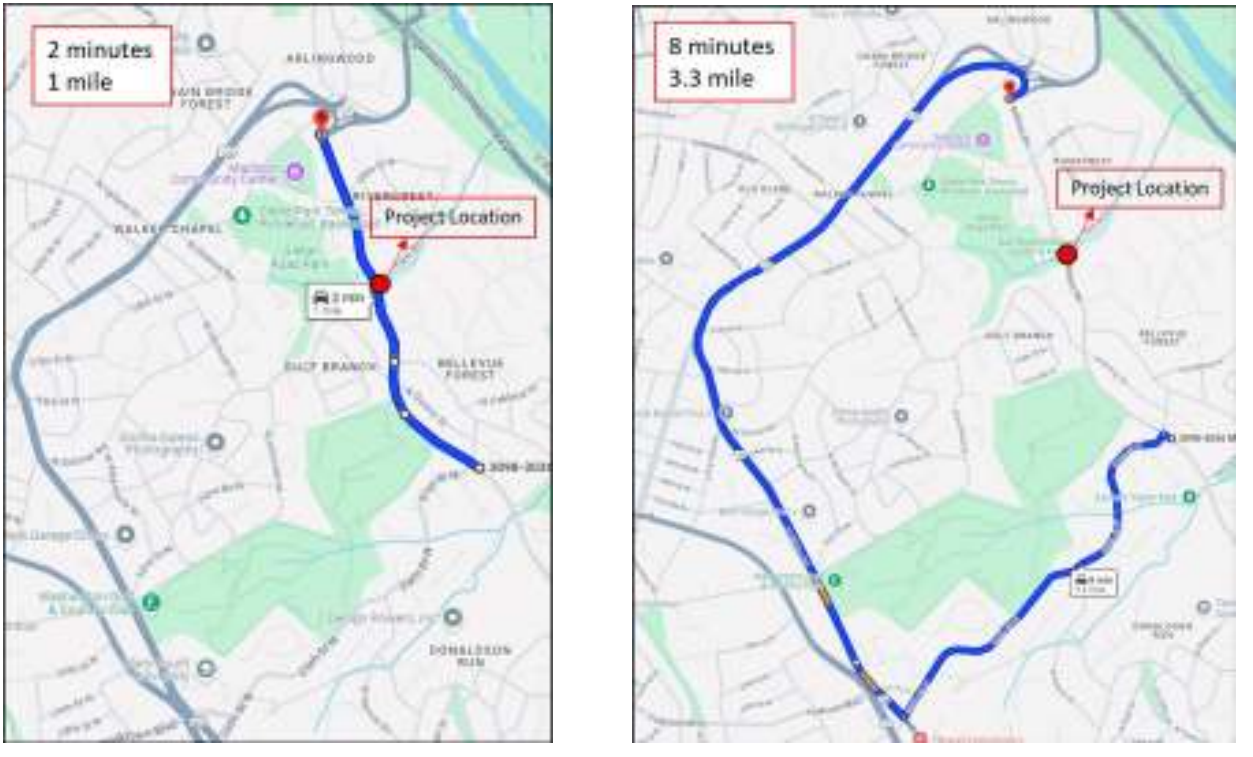
Mike Moon
DES Chief Operating Officer

cc: Mark Schwartz
Greg Emmanuel
Michelle Cowan
Jason Papacosma

Benefit-Cost Analysis

Replacement of the Military Road Culvert is necessary to reduce the risk of flooding impacts to the County's transportation and utility infrastructure, recreation opportunities, and the environment. The costs associated with the structural failure of the Military Road culvert exceed the project's cost.

Figure 3. Military Road Detour Plan Maps

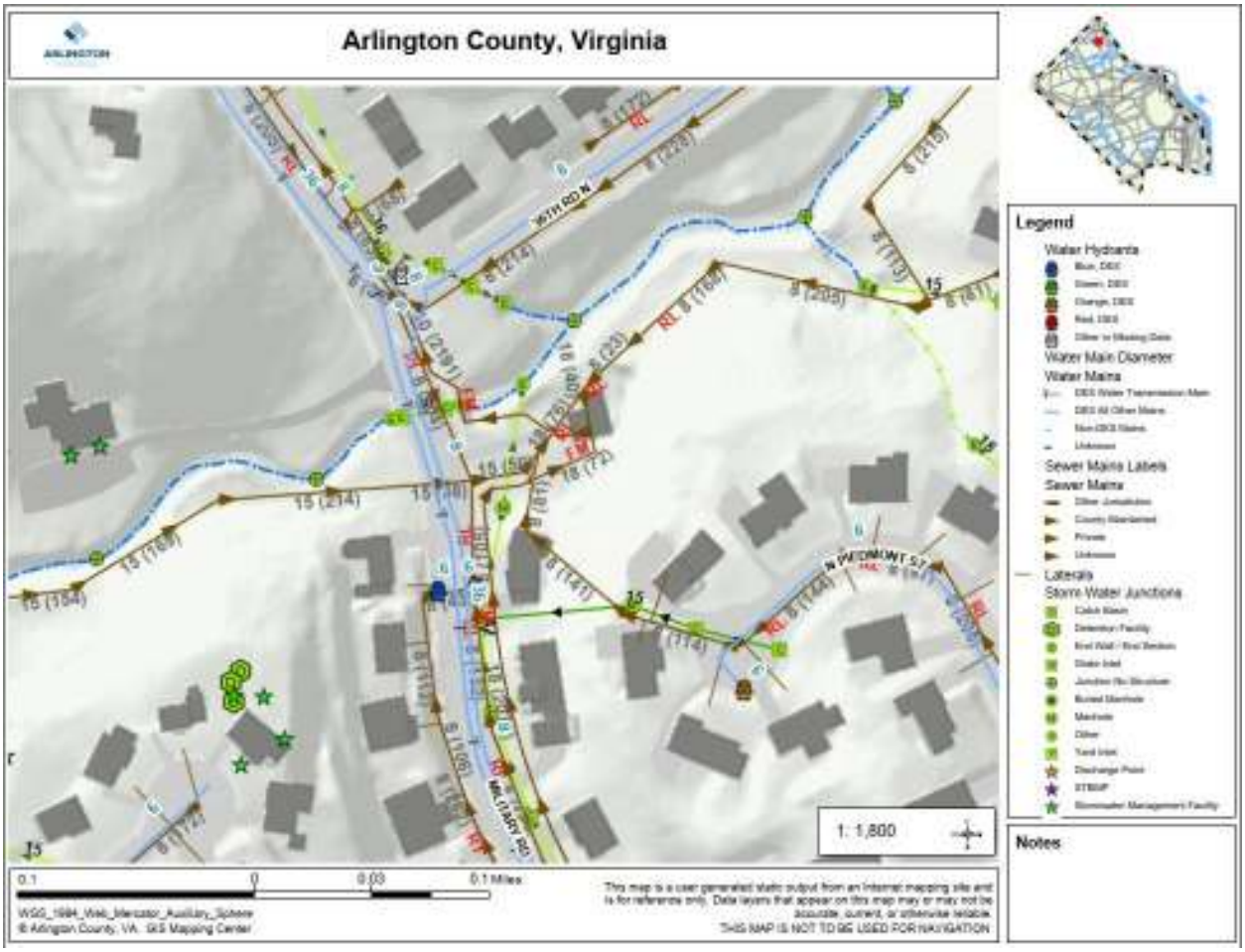


The costs associated with a culvert failure on the transportation network are significant. The culvert is at the intersection of Military Road and 36th Road North. Military Road is a minor arterial road that feeds into Rt 120/Glebe Road and the Chain Bridge, a vital crossing for the County into the District of Columbia. Military Road had an average daily traffic count of 6,200 vehicles per day in 2023. The roadway also supports Arlington Rapid Transit bus routes, 53A and 53B, with an average daily ridership of 2,550 and is also a bike route. Past and future flood events compromise the structural integrity of the culvert and have increased the risk of culvert failure. If the culvert were to fail, the County estimates emergency replacement work would require a detour for 5-6 months. A detour would increase travel time by 6 minutes and travel distance by 2.3 miles for every vehicle-trip (see Figure 3), last approximately 165 days, and would cost $5.6 million in travel delay and increased vehicle operating costs for personal, commercial and transit traffic users. Furthermore, a detour would lead to externalized costs

related to congestion, safety, and emissions of $0.7 million. In sum, the total cost of transportation impacts related to the flood risk to the Military Road Culvert are $6.4 million.

Critical utility infrastructure near the Military Road Culvert is also at risk. Beneath Military Road is a sanitary sewer line that provides service to 2,553 properties (See Figure 4). If the culvert were to fail, a 0.5-mile-long bypass would cost the County $600,000 and take five weeks to become operational. Untreated sewage discharged to the stream for 35 days could cause the County to incur penalties of up to $32,500 per day of violations, for a total of up to $1,137,500 in penalties[1]. Additionally, a sanitary pump station near the Military Road Culvert has experienced minor water intrusion in the past, leading County staff to take precautionary measures, such as site regrading flood barriers for doors and installing some floodproofing equipment to prevent damage from future flood events. Those measures are not expected to prevent a service disruption in an extreme flooding event; however, the County has not yet estimated the cost of a pump station failure due to flooding. The total flood risk cost of utility infrastructure is $1,737,500.

Figure 4. Utilities around the Military Road Culvert Map



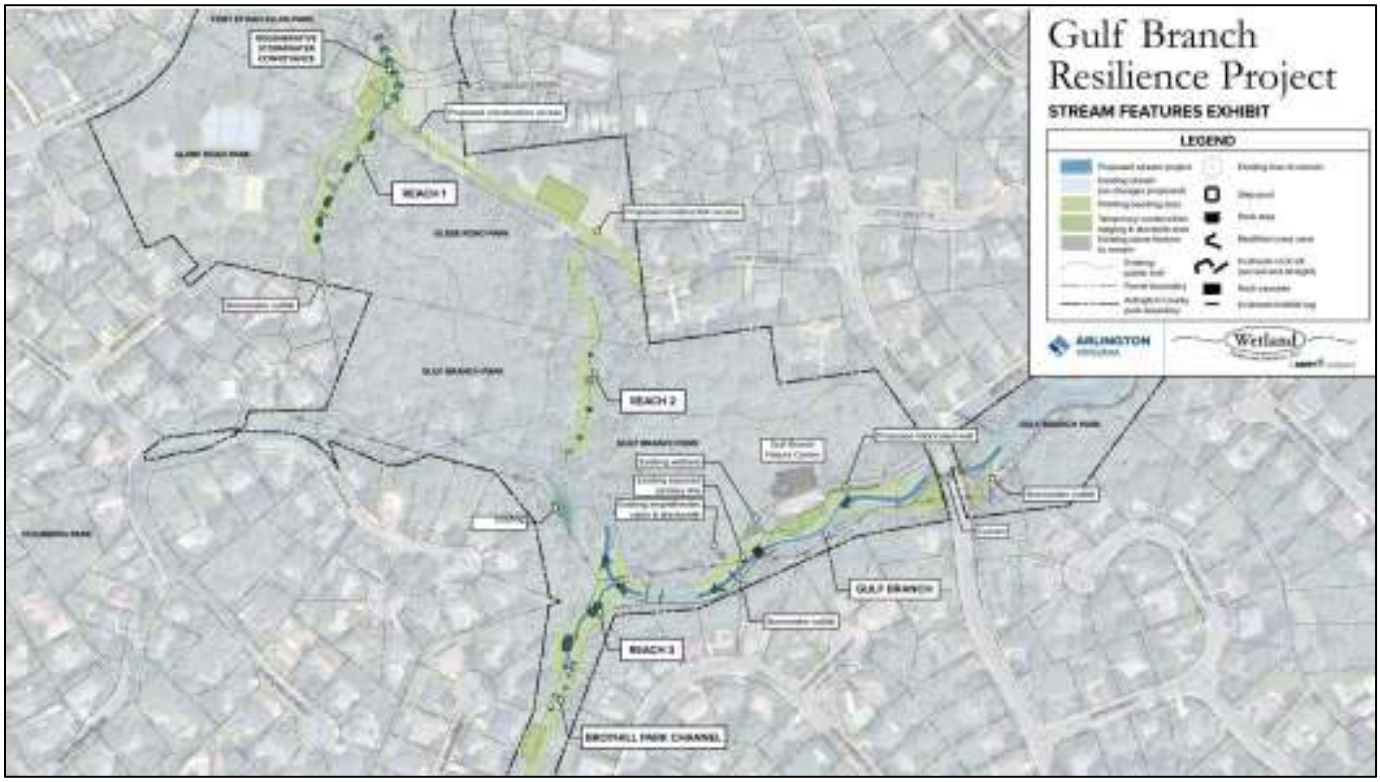
The Gulf Branch Nature Center may be negatively impacted from significant flooding due to the culvert. There is just one access point, a driveway from Military Road that runs parallel to Gulf

[1] Code of Virginia. § 62.1-44.32. Penalties. https://law.lis.virginia.gov/vacodefull/title62.1/chapter3.1/article6/. Accessed on January 7, 2025.

Branch and the Military Road culvert. In a significant flooding event, the water could prevent access to, or potentially washout, the driveway. A repair to the driveway is estimated to take 4-6 weeks and would cost approximately $60,000. The nature center had 7,000 visitors in 2024 but expects visitor counts to increase to pre-pandemic levels, approximately 16,500 visitors per year or 45 visitors a day. Temporary loss of access to the nature center is estimated at $4-12 per hour per visitor based on costs the County charges for outdoor education courses ($718/week for 60 hours of instruction) [2] and the state's charges for access to hiking and fish and wildlife areas ($4/day)[3]. If a flooding event were to compromise access to nature center for 5 weeks to just half of its usual weekly visitors, approximately 158 visitors, at $8 per day, the total cost for the loss of access is $1,264. In sum, the total cost associated with a flooding event on the nature center is $61,264.

The County has prioritized the Military Road Culvert Replacement Project along with the Gulf Branch Stream Restoration (see Figure 5). Properly sizing the culvert for the stream's flow and countersinking it will have environmental benefits that will support the 1,318 linear foot stream restoration. Stream restoration is estimated to remove 86.6 lbs of Total Suspended Solids, 0.06 lb Total Nitrogren, and 0.02 lb Total Phosphorus per linear foot per year. The County does not anticipate nutrient reductions as a result of the Project. On the contrary, the replacement culvert's design emulates the natural stream bed and supports the environmental benefits of restoration.

Figure 5. Gulf Branch Resilience Project Map



[2] Arlington County Public Schools, "Outdoor Lab". https://www.apsva.us/curriculum/outdoor-lab/. Accessed on January 8, 2025.

[3] Virginia Department of Wildlife Resources. Daily Access. https://dwr.virginia.gov/access-permit/#:~:text=The%20cost%20for%20the%20Daily,per%20transaction%20license%20agent%20fee. Accessed on January 8, 2025.

Table 1. Summary of Flooding Risk Costs

Cost Category	Estimated Benefits Realized by Project
Transportation	$6,400,000
Utility Infrastructure	$1,737,500
Recreation	$61,264
Environmental	Not estimated
Total	$8,198,764

The total sum of the project's benefits is $8,198,764. The Project cost is $5,057,516. The cost-benefit ratio of the project is 1.62.

Repetitive Loss and/or Severe Repetitive Loss Properties

There are no repetitive loss and/or severe repetitive loss properties in the drainage shed served by the culvert.

V. Approach, Milestones, and Deliverables

Although the Project is currently only at 60% design, the Project is expected to reach final design by July 2025. Simultaneously, the County will proceed with internal environmental review and agency permitting, completing the process by September 2025.

As Military Road is within the County right-of-way (ROW), the County will not need to acquire ROW and the Project's design does not require easements. As a result, the County will be ready to begin the contractor procurement process in October 2025 following grant obligation. The contractor will be expected to complete all construction activities following a notice to proceed in May 2026. Construction is expected to be complete by May 2027. Fish monitoring activities will be complete continuously, with benchmark data relevant to the project collected from 2025-2028.

The County will prepare a detailed Project Work Plan, budget, and schedule, which may result in a revised statement of work following grant obligation. The detailed Project Work Plan will describe, in detail, the activities and steps necessary to complete the tasks outlined in the statement of work. The work plan will include the Project Management Plan which describes the County's approach.

The County will carry out the responsibilities of project management and administration, project reporting and project control requirements, meetings and agency coordination, office engineering, and field engineering. The final reimbursement request and project deliverables (if any) will be submitted within 90 days of the Project's completion date.

While there are no required partners for the completion of the Project, the County will need to coordinate with the U.S. Army Corps for the U.S. Army Corps Nationwide Permit, FEMA for the Conditional Letters of Map Revision (CLOMR), the state for the Local Land Disturbing Activity Permit, and the EPA for NEPA.

VII. Maintenance Plan

Arlington County's Bridge and Culvert program will regularly inspect and maintain the Military Road Replacement culvert according to the Virginia Department of Transportation's Inventory and Inspection Requirements for Bridges and Large Culverts (IIM-S&B-27.12). Inspections will be conducted by County staff or contractors. See Appendix A.

Appendix A – Virginia Department of Transportation Bridge Safety Inspections: Inventory and Inspection Requirements for Bridges and Large Culverts (IIM-S&B-27.12)

VIRGINIA DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Bridge Safety Inspections	NUMBER: IIM-S&B-27.12
SPECIFIC SUBJECT: Inventory and Inspection Requirements for Bridges and Large Culverts	Date: March 27, 2024
	SUPERSEDES: IIM-S&B-27.11
DIVISION ADMINISTRATOR APPROVAL: /original signed/ Gregory Henion, P.E. State Structure and Bridge Engineer Approved: March 27, 2024	

Changes are shaded

INTRODUCTION:

The attached instructions are intended to complement the National Bridge Inspection Standards (NBIS) found in the Code of Federal Regulations Title 23 Highways – Part 650, Subpart C; *The Manual for Bridge Evaluation* (MBE), published by the American Association of State Highway and Transportation Officials (AASHTO); AASHTO Manual for Element Inspection (MBEI), and the AASHTO Movable Bridge Inspection, Evaluation, and Maintenance Manual. For the remainder of this document the Virginia Department of Transportation shall be referred to as VDOT.

A list of Bridge Safety Inspection Documents referenced in this memorandum may be found at the following – https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/structure-and-bridge/.

DEFINITIONS:

For the purposes of this memorandum, unless otherwise noted, the term 'structure' will encompass both bridges and culverts.

Bridge: Any structure not defined as a culvert and which typically has deck, superstructure and substructure components. Some bridge structures may have integral deck and superstructures – i.e. slab/box beams, T-beams, rigid frames, etc. In these

cases, the deck and superstructure may be considered separately for condition assessment, however, general condition ratings (GCR's) shall not vary by more than one for the deck and superstructure.

Bridge Record: Cumulative information about an individual bridge or culvert meeting the Federal definition of a bridge as defined in the MBE.

Close-up Inspection: Inspection performed while having a clear unobstructed view of the detail or member in question (typically within 12 feet or one lane) such that it can be determined if defects are present. While binoculars (optical enhancements), UAS (Unmanned Aircraft System) and/or robotics can be used to supplement a visual inspection, they shall not be used in lieu of methods and requirements defined herein.

Complex Bridges: This category of structures includes movable, cable-stayed, segmental concrete, and other bridges with unusual characteristics. These types of structures will require specialized inspection procedures or specialized personnel/inspector training and experience. A specialized inspection procedure, additional personnel/inspector training and experience required to inspect complex bridges will be developed prior to the scheduled inspection taking place. The complex bridges shall receive routine and in-depth inspections according to those procedures. These bridges shall be identified in the inventory.

Critical Finding: A structural or safety related deficiency that requires immediate action to ensure public safety.

Culvert: Any structure that has an integral floor system that supports the sidewalls and provides a lined channel. A culvert has no distinction between substructure and superstructure and typically has no deck. Multiple box or pipe culverts will be considered a single structure where the clear distance between openings is less than half of the smaller contiguous opening. Otherwise, each opening shall be considered a separate structure.

Damage Inspection: An unscheduled inspection to assess structural damage resulting from environmental factors or human actions.

Element Inspection: An inspection in accordance with the AASHTO Manual for Bridge Element Inspection and VDOT Supplement that includes defining the total quantity of National Bridge Elements (NBEs), Bridge Management Elements (BMEs) and Agency Developed Elements (ADEs) present and assessing the quantity to be included in the condition states for each element present.

Entities: Localities (municipalities), other agencies, toll authorities and other non- VDOT organizations that own and maintain NBIS-qualifying structures.

Fatigue and Fatigue Prone Details: The definition of fatigue is the tendency of a member to fail at a stress level below its yield stress when subject to cyclical loading. Fatigue prone details are details meeting the AASHTO fatigue detail categories of C through E' on bridges meeting at least one of the following two criteria: either carries a route that has 500 or more trucks per day or carries an interstate route.

Note that the classification of fatigue prone details by category does not apply to all details

and some details may be considered fatigue prone due to other conditions and forces. These conditions will typically cause localized stress concentrations. See attachments for a list of typical fatigue prone details. Engineering judgment is required to recognize and assess structure specific fatigue prone conditions.

Footbridge: A bridge intended for pedestrians, cyclists, animal traffic and horse riders only (not vehicular traffic) and does not cross highways and/or railways.

Hands-on Inspection: An inspection performed within an arm's length of the detail or member being inspected. This is intended to mean the inspector is close enough to touch the member or detail should magnification, testing, measurement or other quantification methods be needed.

In-depth inspection: A routine inspection in combination with inspections of one or more members above or below the water level utilizing advanced techniques in addition to visual techniques to identify deficiencies not readily detectable using routine inspection procedures. This type of inspection will be required for complex bridges or structures identified by VDOT, with pre-defined inspection techniques, for a special assessment of one or more components or the entire structure. Additionally, this type of inspection is commonly associated with determinations of structural integrity of compromised members.

Initial Inspection: The first inspection of a new structure when it becomes part of the highway system and an active record in the inventory. This inspection serves to record required bridge inventory data, establish baseline conditions, and establish the intervals for other inspection types.

Inspection Date: The date on which the field portion of the bridge inspection is completed.

Interim Inspection: Special inspection to assess or monitor structural damage, a structural deficiency, or any other feature of a structure that needs to be inspected on a specific frequency. Interim inspections are typically performed more frequently than the regular inspection. Only those features requiring the interim inspection need to be inspected. A cursory inspection shall be performed of other components, members and elements (with an emphasis on those in fair or poor condition) while inspectors are on site.

Internal redundancy: A redundancy that exists within a primary member cross-section without load path redundancy, such that fracture of one component will not propagate through the entire member, is discoverable by the applicable inspection procedures, and will not cause a portion of or the entire bridge to collapse.

Large Culvert: A culvert that either meets the definition of a Non-NBI structure in this IIM or a culvert that meets the definition of a structure as defined in Federal item 112 (Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges) in the NBIS.

Load path redundancy: A redundancy that exists based on the number of primary load-

carrying members between points of support, such that fracture of the cross section at one location of a member will not cause a portion of or the entire bridge to collapse.

NBI: Abbreviation for "National Bridge Inventory." In the context of this memorandum when a structure is referred to as an NBI structure it meets the federal definition of a bridge as defined in the NBIS.

Non-destructive Testing (NDT): A diverse group of analysis techniques to evaluate the properties of a material, component or system without causing damage.

Non-redundant Steel Tension Member (NSTM): A primary steel member fully or partially in tension, and without load path redundancy, system redundancy or internal redundancy, whose failure may cause a portion of or the entire bridge to collapse. Formerly referred to as Fracture Critical Member (FCM).

NSTM Bridges: Bridges that contain one or more Non-redundant Steel Tension Members. Formerly referred to as Fracture Critical Bridges.

NSTM Inspection: A hands-on inspection of a nonredundant steel tension member.

Non-NBI: A structure to be included in the VDOT Structure Inventory that does not meet the NBI definition above. Structures in this category include, but are not limited to, culverts and bridges less than 20 feet between undercopings of abutments or between springlines of arches and structures which do not carry highway traffic (i.e. railroad structures, pedestrian structures, footbridges, etc.). A culvert in this category can be a single barrel or have a number of barrels where the clear distance between openings is less than half of the smaller contiguous opening and the total hydraulic opening is equal to or greater than 36 square feet. For box culverts, the triangular haunches shall not be excluded from the opening measurement.

Nonscheduled/Damage Inspection: Inspection to assess structural damage resulting from environmental factors or human actions or to inspect changed conditions of elements due to construction or maintenance activities when the NBI schedule will not be adjusted accordingly.

Past Due Inspection: Inspection that did not take place in or before the month it was due.

Pedestrian Bridge: A bridge intended for pedestrians, cyclists, animals and horse riders which may or may not carry vehicular traffic and does cross highways and/or railways.

Qualified Person: An individual qualified and authorized to oversee specific repair or improvement work from which a work completed report is based.

Regular/Routine Inspection: Inspection which meets the requirements of a routine inspection as defined in the NBIS and MBE. In this memorandum, the terms regular and routine are used interchangeably.

Service Inspection: An inspection to identify major deficiencies and safety issues, performed by personnel with general knowledge of bridge maintenance or bridge inspection.

Special Inspection: An inspection scheduled at the discretion of the bridge owner, used to monitor a particular known or suspected deficiency, or to monitor special details or unusual characteristics of a bridge that does not necessarily have defects.

Sufficient Evidence (of work completed): Documentation prepared by a qualified person about repair or improvement work completed that is comprised of each of the following;

- A detailed written description of all work performed, including the condition of the repaired or improved items or elements.

- Photographs of all individual repairs or improvements, with sufficient detail for the NBIS qualified Team Leader to verify the condition of all of the repairs or improvements.

System Redundancy: A redundancy that exists in a bridge system without load path redundancy, such that fracture of the cross section at one location of a primary member will not cause a portion of or the entire bridge to collapse.

Underwater Inspection: Inspection performed by trained and qualified personnel to assess the condition of structural elements and the surrounding channel, which cannot be inspected visually at low water or by wading or probing, and generally requiring diving or other appropriate techniques. Performed as part of the NBI scheduled underwater inspection or to supplement regular or nonscheduled inspections.

Unobstructed View: View of a component or an element that is not visibly obstructed by another object or member, dirt, debris, vegetation, corrosion, etc. This is also applicable to lighting conditions that may cause shadows across components or elements to be inspected.

ROLES AND RESPONSIBILITIES:

Structure and Bridge – Central Office

The Central Office Structure and Bridge Division shall have overall responsibility for the statewide compliance with the inventory and inspection policy standards and procedures of all NBI and VDOT maintained Non-NBI structures.

Structure and Bridge – District

Each District Structure and Bridge Section shall maintain an organization that will inspect, or cause to be inspected, all structures defined in this memorandum as NBI or VDOT maintained Non-NBI structures. Where an NBI structure crosses a boundary between VDOT jurisdiction and a neighboring State, the District Structure and Bridge Section shall determine through a joint written agreement the responsibilities for each entity for that bridge. District Structure and Bridge Sections shall have overall responsibility for compliance with the NBIS and VDOT requirements of all structures within their respective district, including other entities.

The Assistant District Bridge Engineer for Inspection or their designee, typically the

Assistant District Bridge Engineer for Inspection, shall follow the procedures outlined in Table 1 on the following page for notifying entities of their inspection responsibilities within their respective District.

Railroad Structures – District/Consultant

To obtain railroad right of entry agreements, coordination shall be made with the Virginia Department of Transportation, Right of Way and Utilities Division, Rail Section. Advanced coordination should be initiated typically three to six months prior to the inspection due date. Inspectors shall have railroad safety training that would satisfy the respective Railroad (RR) where required. Inspection of the bridge shall be performed after obtaining the Right of Entry Agreement (ROE) and scheduling flagging services with the respective RR utilizing the Rail ROE Permit Request process.

Clearance measurements (horizontal and vertical) are required to be taken at each inspection.

Entity Notification

Table 1 – Procedures for Notifying Entities for Inspections Due

	Reason for Notification	When to Notify	Distribution
1.	Inspection Schedule	6 months in advance of inspections due	NOTIFY ● Official directly responsible for the inspection program in the entity
2.	Follow Up for Inspections Due in Previous Month	Monthly – From 1 to 30 days past the month due	NOTIFY ● Official directly responsible for the inspection program in the entity to determine the status of inspections due in the previous month (has it been inspected, when will it be inspected if it has not been inspected) COPY ● Central Office Structure and Bridge Safety Inspection Program Manager ● Official in the highest authority in the entity being notified.
3.	Follow Up for Inspections 31 to 60 Days Beyond Month Due	Monthly – From 31 to 60 days past the month due	NOTIFY ● Official directly responsible for the inspection program in the entity COPY ● VDOT's Local Assistance Division and the local liaison in the District ● Central Office Structure and Bridge Safety Inspection Program Manager ● Official in the highest authority in the entity being notified.

4.	Subsequent Follow Up for Inspections 61 Days or More Beyond Month Due	Monthly – After 61 days past the month due	NOTIFY ● VDOT's Local Assistance Division and the local liaison in the District COPY ● Central Office Structure and Bridge Safety Inspection Program Manager ● Assistant State Structure and Bridge Engineer for Bridge Safety Inspection ● Official in the highest authority in the entity being notified. ● Official directly responsible for the inspection program in the entity

Notification procedures for load ratings and inventory discrepancies shall be similar to Table 1. When these submissions are not in accordance with the time limits set forth in the NBIS or this memorandum, the District Structure and Bridge Engineer shall notify the entity in accordance with Step 3, 'Follow Up for Past Due Inspections', outlined above and, if necessary, follow up with Step 4, 'Subsequent Follow Up for Past Due Inspections'.

Entities

Each entity shall maintain an organization that will inspect, or cause to be inspected, all structures defined in this memorandum as NBI that are owned or maintained by the entity. Each entity shall have overall responsibility for compliance with the NBIS and applicable VDOT requirements of all NBI structures within their respective jurisdiction.

The NBIS requires VDOT to maintain the structure inventory system of all public roads maintained by public entities that are within Virginia's boundaries. In order to maintain this information each entity must submit all required information, to include structural inventory and appraisal data in accordance with the NBIS, inspection reports in accordance with the NBIS and MBE, and load ratings for all legal vehicles to VDOT in accordance with the policies and procedures set forth in the NBIS and IIM-86. Additionally, for all NBI structures on the National Highway System (NHS), entities shall conduct element inspections and submit all element data to VDOT for entry into the Department's Bridge Management System (BrM). Upon request, copies of the Inspection Summary Report and structure inventory sheets will be provided to the entity when the inspection schedule is transmitted.

Generally, non-NBI structures and large culverts will meet the requirements of this IIM, however, they are not subject to NBIS regulations and may deviate from certain programmatic requirements, with approval from the state-wide Bridge Safety Inspection Program Manager.

Entities are strongly encouraged to use VDOT's most current electronic safety inspection report form for Entities (SB541). Entities may use a different safety inspection report form; however, the contents must, at a minimum, meet the requirements set forth in the NBIS. Reports submitted by Entities shall include both printed and electronic copies.

FREQUENCY OF INSPECTIONS:

All NBI structures shall receive inspections at the frequency indicated in Table 2, in the following section. The District/Entity shall use engineering judgment to inspect the structure more frequently as conditions warrant. VDOT maintained Non-NBI structures and large culverts are not subject to NBIS regulations and may deviate from the frequency indicated in Table 2, with approval from the state-wide Bridge Safety Inspection Program Manager."

Every effort shall be made to inspect each structure in the month the inspection is due. If a structure becomes past due, immediate action shall be taken to inspect the structure and the reason for the inspection being past due documented. As soon as it is known that an inspection is expected not to be performed within the month due, the reasons for the late inspection must be submitted to the Central Office for notification of the FHWA to be considered for an inspection waiver.

Inspections not performed within the month due shall be reported, by the responsible team leaders for VDOT or by the official directly responsible for the inspection within entities, immediately to the Assistant District Bridge Engineer for Inspection to assure that appropriate documentation, including the structure information, reason for the late inspection and the inspection schedule is gathered and submitted to the Central Office Structure and Bridge Division. A copy of the reason for the late inspection shall also be included in the inspection folder.

When construction and/or maintenance activities cause a change to the NBI general condition rating(s), vertical clearance or posted restrictions, the structure must be re-inspected and the changes are required to be made within 30 days after construction has been completed or within 30 days of becoming aware of a possible change. Generally, maintenance work which is considered preventative or restorative (i.e. deck patching, deck overlays, painting, repairing expansion joints, crack repairs…etc.) can be documented by conducting a nonscheduled inspection that will not change the NBI next inspection date.

Table 2 – Frequency of Inspections

FREQUENCY	NBI	NON-NBI
12 months	NSTM Bridges (Fracture Critical)	NSTM Bridges (Fracture Critical) (4)
	Redundant pin and hanger assemblies with evidence of problems such as frozen hanger bars or other questionable conditions	Redundant pin and hanger assemblies with evidence of problems such as frozen hanger bars or other questionable conditions
	Non-redundant pin and hanger assemblies	Non-redundant pin and hanger assemblies
	Structures having a general condition rating (GCR) of '4' or less on one or more of the following: Deck; Superstructure; Substructure; Culvert (1)	Structures having a general condition rating of '4' or less on one or more of the following: Deck; Superstructure; Substructure; Culvert (1)
	Underwater inspections where conditions exist which contribute to a GCR of 4 or less and these conditions can only be inspected by an underwater inspection	Underwater inspections where conditions exist which contribute to a GCR of 4 or less and these conditions can only be inspected by an underwater inspection
24 months	Redundant pin and hanger assemblies except as noted above	Redundant pin and hanger assemblies except as noted above(4)
	Bridges and culverts except as noted above	Bridges, except as noted above, and Culverts with a general condition rating of '5'
		Pedestrian bridges and footbridges.
48 months	Not applicable	Culverts and footbridges(2)(4), except as noted above with GCR of '6' and above.
60 months	Underwater inspections of bridges and culverts	Underwater inspections of bridges and culverts
See footnote (3)	Complex bridges	Not applicable

(1) Only the bridge component(s) (deck, superstructure and/or substructure) which has the general condition rating (GCR) of '4' or less need to be inspected at the interim inspection frequency of 12 months. When conditions exist that justify a GCR of 4 or less and the affected area(s) can only be inspected through an underwater inspection, the underwater inspection frequency shall be reduced to 12 months. However, if the culvert component or 2 or more bridge components for a given structure have a general condition rating of '4' or less, the regular inspection frequency for the entire structure shall be 12 months.

(2) The inspection frequency for footbridges except swing spans and/or NSTM structures may be changed to 48 months if all components have general condition rating of '6' or above.

(3) Complex bridges shall receive an in-depth inspection at the level and frequency detailed in the complex bridge list/procedure. Movable bridges and their inspections are described in detail in the AASHTO "Movable Bridge Inspection, Evaluation and Maintenance Manual".

(4) Structures with features that introduce unique risk factors (e.g. NSTM, Pin & Hanger, frequent permit loads, age, etc.), should be reviewed for isolated conditions that warrant increased inspection frequency. These individual determinations shall be at the discretion of the District Bridge Safety Inspection Engineer. The inspection frequency of NSTM pedestrian and footbridges shall not exceed 12 months.

Clearances

Vertical and lateral clearance restrictions for roadways on and under each NBI structure and each VDOT maintained Non-NBI structure shall be checked during each regular inspection of the structure.

Non-NBI structures owned and maintained by non-VDOT entities which create vertical and lateral clearance restrictions to a roadway maintained by VDOT shall have their vertical and lateral clearances checked at intervals not to exceed 24 months.

Closed Structures

Closed structures, not undergoing construction or maintenance activities, shall be visited by the appropriate VDOT personnel or local entity at intervals not to exceed 24 months to assure the barricades and signage are still functioning as intended and the structure does not pose a risk to the public. Approach photographs (with date stamp included) showing barricades should be taken and included in the bridge file. These inspections shall be documented in the bridge record and should note which VDOT entity performed the inspection. Documentation can be a memo to the bridge file or notes in the Bridge Management System (BrM). Photos should be placed in the bridge file.

LEVEL OF INSPECTIONS AND SPECIAL CATEGORY INSPECTIONS:

All NBI structures shall receive inspections at the same level as defined by the NBIS requirements, MBE, and this document. Element Inspections are required for all VDOT maintained NBI structures except temporary structures, pedestrian and foot bridges, pier or dock structures and under records. Generally, non-NBI structures and large culverts will meet the requirements of this IIM, however, they are not subject to NBIS regulations and may deviate from certain programmatic requirements, with approval from the state-wide Bridge Safety Inspection Program Manager.

Temporary structures in service longer than 90 days shall be entered into the inventory and shall be subject to the same inspection requirements as permanent structures, including determinations of safe load capacity and clearance limits, but excluding Element Inspections. Routine inspection techniques shall be sufficient to quantify the condition and remaining section of structural components. Routine inspections are primarily visual and tactile (i.e. probing, measuring, sounding, etc.) in nature; however, these inspections may include cleaning sheet corrosion in key locations that influence load carrying capacity, dye penetrant testing and/or magnetic particle testing to verify cracking in steel members, removing concrete delamination at isolated locations over traffic, sounding concrete to detect delamination, removing debris as needed to access the element, probing and/or drilling timber members, etc.

For each routine inspection and special category inspection noted below, the report shall document the results of the inspection using notes, sketches and/or photographs. At each subsequent inspection, an on-site comparison with the previously reported conditions is to be made and documented. As a result of these routine and special category inspections, any critical findings (see page 16, “Critical Findings”) and urgent repairs shall

be brought to the attention of the District Structure and Bridge Engineer or designee or the local Entity in an expeditious manner within a timeframe not to exceed 24 hours. If warranted, a critical recommendation shall be issued. Emergency findings shall be reported immediately by the Team Leader while on-site. Contact will normally be initiated by telephone and followed up the same day with email documentation of the findings, including photographs. Once contacted, the District Structure & Bridge Engineer or designee will work with the Team Leader to quantify and assess the situation to determine if it warrants an emergency response or can be addressed through the critical recommendation process.

Pin (or pinned) Connections

During each scheduled inspection of the pin and hanger assembly, each pin assembly shall receive a hands-on inspection and each pin shall receive ultrasonic testing. Where practical, ultrasonic testing of each pin shall be performed from both ends of the pin. A statement about the condition of each pin or groups of pins shall be entered in the inspection report regardless of condition. Separate ultrasonic testing documentation shall be kept in the bridge file and may be included in the inspection report as optional supporting documentation.

Other types of pin connections that will require ultrasonic testing may exist on structures including details such as truss pins, girder pin connections, superstructure to substructure pin connections, etc. The District Structure and Bridge Engineer, or their designee, shall determine the need for this additional level and frequency of testing for these pin connections.

Fatigue Prone Details

Fatigue prone details shall receive a hands-on inspection of fatigue prone categories D, E, and E' details during each inspection. Category C or C' details shall receive a close-up inspection during each inspection. Additionally, other areas that may cause stress concentrations (i.e. out of plane distortion, traffic impacts, copings, field welds, flame cut surfaces, etc.) shall be evaluated and classified as fatigue prone (as applicable) and receive a hands-on or close-up inspection as determined by the District Structure and Bridge Engineer or designee. Bridge records are to include sketches showing category type and location of fatigue prone details and any specific areas that are to be inspected. Inspection reports shall note the fatigue prone details and locations and a statement regarding the method of access used during the inspection. A statement about the condition of each fatigue prone detail or group of details shall be entered in the inspection report regardless of their condition. Structures containing fatigue prone details shall be coded accordingly in the inventory.

Non-redundant Steel Tension Members

Non-redundant steel tension members and their connections (including gusset plates) are to receive a hands-on inspection during each inspection as required. The Non-redundant Steel Tension Member (NSTM) inspection uses visual methods that may be supplemented by NDT for verification and quantification of visual indications. A very detailed visual hands-on inspection is the primary method of detecting cracks. This may

require that critical areas be specially cleaned prior to the inspection and additional lighting and magnification be used. NDT methods may be required for verification and documentation of visual indications and shall be used at the discretion of the Team Leader. Note that it is not acceptable documentation to report a possible crack or to report a visual indication without conclusive determination and quantification of the field condition. Bridge records are to include sketches showing the type and location of NSTM members or details and any specific areas that are to be inspected. Inspection reports shall note the NSTM members or details and locations and a statement regarding the method of access used during the inspection. A statement about the condition of each member or detail or group of details shall be entered in the inspection report regardless of their condition. Structures containing NSTM members shall be coded accordingly in the inventory.

Similar to crack verification in steel members, if an inspection finds areas on NSTM members or their connections (including gusset plates) where corrosion is evident and section loss cannot be quantified or determined by visual and tactile methods, an appropriate non-destructive evaluation technology shall be used to assess the condition and quantify the remaining thickness.

Complex Bridges

Complex bridges are to receive an in-depth inspection in accordance with the complex bridge list/procedure. Bridge records are to include appropriate documentation for any specific details that are to receive in-depth inspection including method of access for the specific location(s).

INSPECTION AND INVENTORY REQUIREMENTS

Determining Structure Numbers (State)

This section may be used as a guide to create new Virginia Structure Numbers. When a structure record is created, the Virginia Structure Number is typically given to a structure based upon which highway system the bridge is located. The following series can be used to create the Virginia Structure Number: For city/county line structures, a 9 should be placed in the second digit of the above series (except for the 100-999 and the 1800 series).

SERIES	EXPLANATION
100-999	Structures in PE or construction phases, structure number was required for billing purposes, no traffic on structure and not replacing an existing structure
1000 – 1999	Primary system (excludes the 1800 series)
1800 – 1899	VDOT maintained in a municipality
2000 – 2999	Interstate system
5000 – 5999	Pedestrian bridges that cross a roadway or railway.
6000 – 6999	Secondary system

8000 – 8999	Municipality maintained
9000 – 9999	Footbridges.

Note there will be exceptions to this guidance and not all Districts will have historically followed the table above. However, for statewide consistency, it is recommended.

New 4-digit Virginia Structure Numbers are assigned by the District Structure & Bridge Engineer or designee. The Virginia Structure Number shall be unique to the county and should be validated to assure no duplication in the inventory for structures open to traffic.

Virginia Structure Numbers for new bridges on a new alignment shall be unique within the county. For replacement structures on the same or similar alignment, the existing Virginia Structure Number shall be reused. If a replacement structure has the same 4-digit Virginia Structure Number within the same county, but is not yet open to traffic as coded in the inventory (i.e. 'G'), then this is valid and is not considered a duplication.

Three digit temporary structure numbers for new structures not yet open to traffic are optional at the District's discretion.

New Structure Numbers (Federal)

The Central Office is responsible for assigning new Federal Structure Numbers and will require the following minimum information from the Districts as part of that process: District, County, route number of roadway carried, feature intersected, maintenance responsibility, and plan number (if known at time of request).

New Federal Structure Numbers are required for new structures on new alignments and total replacement structures on existing alignments. This includes replacement culverts that meet the definition of Large Culvert. Typically for replacement structures, if portions of the old structure remain in the new work (can be superstructure and/or substructure elements), the structure is not considered new but rather reconstructed and a new Federal Structure Number is not required.

Inspections

Prior to opening to traffic, all new and rehabilitated structures, including the constructed portion(s) of each phase of construction where applicable, will be inspected. These inspections can coincide with the final or punch-list inspection coordinated with the Construction Division. The Area Construction Engineer or designee shall contact the District Structure and Bridge Engineer or designee to request the inspections.

Construction work resulting in a rehabilitated structure (i.e. deck/superstructure replacement, widening, etc.) should be documented by conducting a regular inspection that will change the NBI next inspection date.

Each inspection shall include a review of all structure inventory items and element data. Discrepancies shall be corrected. Structure Inventory and Appraisal (SI&A) data sheets are available for taking hard copies into the field for verification.

Documentation of any change in condition which occurs after the date of the most recent inspection shall require a new inspection and inspection report. This inspection shall be of the most relevant type defined in the NBIS. Element condition data and / or General Condition Ratings for a completed inspection shall not be altered to reflect changes in condition which occur after the date of inspection.

The following procedures may be used for follow-up inspections for repair or improvement projects whose scope/intent does not result in change to any General Condition Rating (GCR), according to the Inventory Coding Guide (i.e.: joint repairs, painting, etc):

- At the discretion of the District Structure and Bridge Engineer, a Special Inspection report (of work completed) to document repairs or improvements may be created and signed by an NBIS qualified Team Leader or a Qualified Person. In such cases, field evaluations performed by Bridge Safety Inspection personnel may not be required, at the discretion of the District Bridge Safety Inspection Engineer. Inventory and/or Element data edited as a result of the projects will be determined by the District Safety Inspection Engineer, or designee on a case-by-case basis. In some instances where repair or improvement tasks of different types are performed in the same time period, multiple Qualified Persons may be involved. Generally, Sufficient Evidence of work completed shall be required prior to changing inventory and/or element data.

Apart from the exception noted below, an inspection team shall comprise no fewer than two personnel when performing inspections of any structure. The inspection team shall include a Team Leader (or Senior Inspector) and at least one additional Team Member. A minimum of two personnel on-site enable the members to monitor each other's safety and call for assistance if something were to happen to another Team Member. In certain circumstances and with the approval of the Assistant District Bridge Engineer for Inspection, Team Leaders (or Senior Inspectors) may perform inspections as needed without assistance from a Team Member. Emergency response and acceptance of maintenance work where other personnel are present would both be acceptable circumstances for this variance. Assistance from other sections' personnel is encouraged for safety and physical activities during the inspection if a Team Member is not available. In these instances, all VDOT health and safety regulations and work zone protection standards of practice shall be observed and safety of the Team Leader or traveling public shall not be compromised. Although it is not anticipated that this will be a common occurrence, it may be warranted on a case by case basis.

An inventory 'on' record and an 'under' record (if necessary) shall be created for all structures that require an inspection in accordance with this document and/or the NBIS and the FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges.

Additionally, an inventory 'under' record shall be created by VDOT for Non-NBI structures owned and maintained by Non-VDOT entities which create vertical and lateral clearance restrictions to a roadway maintained by VDOT (including pedestrian bridges). The term 'inspection' in these records will refer to, at a minimum, the clearance checks performed and a review of the required inventory data.

Quality control (QC) and quality assurance (QA) procedures, including qualifications of inspection personnel, shall be in accordance with the current IIM-S&B-78, Subject: Bridge Safety Inspection QC/QA Program.

Report Requirements

Bridge safety inspection reports shall include the following:

- Actual inspection date(s) shall be recorded.
- Ambient weather conditions shall be recorded (i.e. clear and sunny 78 degrees).
- Access equipment and type of Maintenance of Traffic (MOT) shall be noted in the inspection report.
- Special testing equipment used during the inspection shall be noted.
- Special considerations for contacts, access, right of entries and/or other restrictions shall be noted.
- List other persons present during the inspection including but not limited to MOT crew, RR Flagger, QA Reviewer, and / or Special Access operator.

At the discretion of the Assistant District Bridge Engineer for Bridge Inspection, bridge safety inspection reports should include the following:

- Date stamp shown, date-taken available in the meta-data for each image, or the metadata / geospatial data recorded by a mobile device when using InspectX application.
- Unless otherwise approved by the Assistant District Bridge Engineer for Bridge Inspection, new photographs shall be required during each inspection. Old photos can be included for comparison or to show a better picture of a condition (i.e. such as the substructure when the water level was much lower during a past inspection).
- For inspections that overlap in months, the NBI inspection date should be documented as the last date on which field work was completed.

All inspections of VDOT maintained structures shall be documented using VDOT's most current electronic safety inspection report form (SB540).

For general condition ratings of '7' or less, detailed comments supporting these ratings must be included in the report. In addition to detailed comments, photos, sketches and tables may also be needed for deficiency clarification. Current photographs shall be included in the report of all items which warrant a general condition rating of '4' or less.

Any item which shows a change in condition since the previous inspection will be marked to indicate a change since the previous inspection. The method of marking these changes will be clearly noted in the 'Miscellaneous' section of the report. When interim and nonscheduled inspections are performed, the reason for this type of inspection shall be documented in the 'Miscellaneous' section of the report.

Vertical clearances will be documented on a sketch. This sketch will show the minimum vertical clearance for each lane and include the minimum vertical clearance for a ten-foot width of pavement where the clearance is greatest (Federal Item 10). For paved roadways, measurements will be limited to travel lanes and improved shoulders between edges of pavement and only be taken between lateral restrictions (i.e. guardrail, barriers, etc.).

Repair recommendations are to be listed in priority order with the highest priorities listed first. Cost estimates for these repair recommendations are not required.

For bridges having a non-integral wearing surface, the average thickness and nature of the overlay material shall be recorded in the 'Wearing Surface' section of the inspection report. If the wearing surface thickness is not able to be field verified or cannot be taken from bridge plans, a reasonable estimate based on the judgment of the inspector may be used until more accurate measurements can be obtained. If a non-integral wearing surface is not present, the nature of the integral wearing surface shall be recorded under the 'Deck' section of the report and 'None' or 'N/A' shall be recorded in the 'Wearing Surface' section.

The 'Object Marker' section of the inspection report shall note the presence and condition of object markers and other safety features at structures.

The 'Field Posting' section of the inspection report shall note the presence, details of the restriction and condition of any signs indicating weight restrictions, vertical restrictions, or horizontal restrictions. This includes, but is not limited to signs indicating vertical restrictions, narrow bridge, one lane bridge and load postings.

The results of the latest underwater inspection shall be considered when assigning the substructure general condition ratings, and the inspection reports shall contain a statement indicating that these results were considered. The latest underwater inspection report may optionally be attached to the inspection report. If the underwater inspection findings adversely influence the substructure rating or provide additional pertinent information not accessible to the Team Leader, a brief summary of these findings shall be included in the 'Substructure' section of the report.

Structure inventory and appraisal sheets may optionally be included in the inspection report. These inventory sheets shall be reviewed during the inspection and submitted along with the inspection report. A statement should be in the inspection report that the inventory was checked or reviewed. The statement should also include any changes that were made to the inventory.

Additional report requirements may be found in the 'Scour and Stream Channel Documentation' and 'Load Rating Analysis' sections.

Updating Inventory Data

The inventory information for all structures shall be updated in accordance with the NBIS.

The inspection report and all inventory data for new, rehabilitated and repaired structures shall be entered into the inventory database within 90 days of opening the structure to traffic, including all VDOT structures and any entity, private, or other structures for which VDOT is responsible for reporting inspection activities to FHWA.

For changes in load rating due to initial or changed conditions the capacity rating shall be in accordance with the current IIM-S&B-86, Subject: Load Rating and Posting Structures (Bridges and Culverts).

Structures that have been closed to traffic shall have the closure indicated in the inventory upon notification that the closure has taken place.

For Bridge Status, structures that are temporarily closed to traffic shall be coded “Closed” (bridge status = 2). Structures that are permanently closed to traffic shall be coded “Permanently Closed” (bridge status = 6). Once the Bridge Status is changed to "Permanently Closed" for a given record, it can **neve**r be changed back. Structures coded as "Permanently Closed" under the *Bridge Status* field in the bridge inventory will be excluded from FHWA submittals of NBI and NBE data. Structures not included in the NBI submittal to FHWA are not eligible to apply for federal funding.

Structures that have temporary conditions not normally present shall be indicated in the inventory as soon as the Assistant District Bridge Engineer for Inspection is made aware of the condition. Examples include temporary restrictions to vertical and horizontal clearances and weight restrictions. Additionally, this also includes temporary structures and structures with temporary shoring and/or repairs with or without a reduction in capacity. See Coding Guide for Federal Item 103 for more information.

INSPECTION FORMS AND DISTRIBUTION:

In addition to the repair recommendations on the bridge safety inspection report for VDOT structures, the District Structure and Bridge Section shall utilize a standard method for notifying other responsible managers of preventive and ordinary maintenance needs. To assist in facilitating this notification, the Structure Preventive Maintenance Form (SB504) may be used. For information purposes a copy of this form has been included in the ‘Attachments’ section of this document.

Copies of all inspection reports are to be placed on the State Structure and Bridge Safety Inspection Team Site within 90 days after the inspection is performed. For VDOT maintained structures, the District Structure and Bridge Section shall send monthly notifications to the responsible Maintenance Manager of completed inspection reports placed on the team site. Each entity should have a similar process, as noted above, to ensure that each structure’s maintenance needs are considered and addressed as appropriate.

District Structure and Bridge Sections and Entities shall maintain a bridge record of each structure within their jurisdiction in accordance with the NBIS, including, but not limited to, the official signed structure inspection reports, damage reports, strengthening, repairs, load rating analysis and capacity data, scour analysis (where available), scour critical plans of action, critical recommendations and related correspondence until the structure is demolished. Once a structure is demolished, the inspection records may be disposed of in accordance with the current records retention policy of each respective organization.

All bridge safety inspection reports are designated Critical Infrastructure Information (CII). This designation identifies information that is not appropriate for public release. Printed copies of the inspection reports shall be protected at all times. Each person who works with protected documents is personally responsible for taking proper precautions to ensure unauthorized persons do not gain access to the reports. Anyone requesting copies of bridge safety inspection reports should be referred to the District Structure and

Bridge Section. District Structure and Bridge Engineers/Entities may release inspection reports of structures within their respective jurisdiction to individuals or parties that have a legitimate business need-to-know in accordance with the latest CII guidelines. Such cases require those non-VDOT individuals or parties to submit a completed and signed 'Multi-Purpose Non-Disclosure Agreement' form to the appropriate District Structure and Bridge Engineer. For information purposes, a copy of this agreement has been included in the 'Attachments' section of this document and the electronic file is available upon request.

CRITICAL RECOMMENDATIONS:

Critical recommendation forms shall be used to notify the responsible manager of conditions identified as posing a threat to structural stability and/or public safety. Critical recommendations can be an emergency condition posing an immediate safety risk or hazard to the structure's integrity and/or traveling public or an imminent condition that could, if left unresolved, result in localized failure of the structure or present a safety issue to the traveling public. Critical recommendations that are considered emergency conditions should be addressed immediately or not to exceed 30 days and those that are imminent conditions should be addressed not to exceed 90 days from date of discovery. Others which will require processing through a formal project shall have a monitoring process in place until work is complete and the critical should be closed out.

Conditions requiring the issuance of a critical recommendation form include, but are not limited to:

1. Critical repairs to NSTM members.
2. Correction of critical scour and/or hydraulic induced problems.
3. General condition rating lowered to a '2' or less for deck, superstructure, substructure or culvert, with the exception of findings related to NSTM Members
4. Immediate work to prevent substantial reduction in a structure's load capacity.

*Issuance of a critical recommendation form is recommended when GCR is lowered to a '3' or less for deck, superstructure, substructure or culvert.

The critical recommendation documentation will identify the problem and provide an action to be taken, including a cost estimate and a time frame for the action to be completed. Possible actions may include, but should not be limited to, immediate repair, posting the structure, closing the structure, inspecting the structure more frequently, performing a structural analysis and/or removing traffic from the affected members.

Upon completion of the follow-up inspection, a copy of the completed critical recommendation documentation shall be included in the bridge record.

The Assistant District Bridge Engineer for Inspection will be responsible for assuring that ~~a~~ critical recommendation documentation is created and updated within the InspectX application for all stages of the process.

All critical findings shall be recorded in the InspectX application for recording and federal reporting purposes. A copy of the paper critical recommendation form may be found at: https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/structure-and-bridge/

VDOT

Upon learning of the need for a critical recommendation to be issued, the District Structure and Bridge Engineer or their designee shall notify the District Bridge Maintenance Manager or the responsible manager in the most expeditious manner available. For personnel with access to the InspectX application, maintenance items may be filed as appropriate. For users without access to InspectX, the Critical Recommendation Form (SB500) will be prepared and transmitted to the responsible manager using the Critical Recommendation Team Site and in accordance with the guidelines therein. For information purposes a copy of this form has been included in the 'Attachments' section of this document.

The subsequent corrective action by the responsible manager and follow-up inspection by the District Structure and Bridge Section shall be documented in the bridge record and ther InspectX application. The follow-up inspection shall be completed within 10 working days upon notification that the corrective action is completed.

Entities

Entities shall use a process similar to that of VDOT for addressing critical findings in accordance with the requirements of the NBIS. A Non-VDOT Critical Recommendation Form (SB501) may be used to notify the responsible manager and document the critical finding. For information purposes a copy of this form has been included in the 'Attachments' section of this document and the electronic template is available upon request.

A copy of the initial notice and a copy of the form noting that the follow-up inspection has been completed shall be provided to the District Structure and Bridge Engineer within 30 days of initial discovery and follow-up inspection, respectively.

District Structure and Bridge Engineers or their designee shall monitor inspection reports from Entities to identify conditions that may warrant the issuance of a critical recommendation form. If a condition is identified as requiring a critical recommendation form, the District Structure and Bridge Engineer or their designee shall:

1. Contact the responsible official for the Entity and inquire about the status of the remedial work on the structure.
2. Emphasize to the responsible official the importance of prompt corrective action.
3. If the Entity's actions are unacceptable, written notification shall be made detailing VDOT's concerns. The District Administrator or appointed representative should sign the written notice. Copies of all correspondence shall be sent to the State Structure and Bridge Engineer and the Central Office Bridge Safety Inspection Program Manager.

The Central Office Structure and Bridge Division will provide assistance as requested by the District after the District has exhausted the remedial actions above.

SCOUR AND STREAM CHANNEL DOCUMENTATION:

The vulnerability of a bridge to scour (Federal Item 113) shall be initially determined through analysis by a hydraulic/geotechnical/structural engineer and/or the design engineer of record. The Scour Design Summary Form, included in the 'Attachments' section of this document, shall be completed for all structures for which scour analysis is performed after August 1, 2018. The Scour Design Summary form shall be completed by the engineer(s) responsible for the design scour analysis, and submitted to the Assistant District Bridge Engineer for Inspection. This form shall be retained in the bridge file for the life of the structure.

The lead inspector shall review Federal Item 113 as a part of each inspection to determine if field conditions warrant a change. All changes to Federal Item 113 will be coordinated with the District Structure and Bridge Engineer or designee and/or the District Hydraulics Section prior to making changes to the inventory database. The Structure & Bridge Scour Condition Form, included in the 'Attachments' section of this document, shall be completed for all structures over water during every routine NBI inspection. The most current version of this form shall be retained in the bridge file.

All scour critical bridges shall be monitored in accordance with their respective plan of action (POA) as applicable. During the inspection of a scour critical bridge, the POA for the structure will be reviewed and updated as necessary. For information purposes a copy of this form has been included in the 'Attachments' section of this document and the electronic template is available upon request.

Channel Cross Section at Fascias

For every structure that crosses a waterway, a channel cross section shall be made along the upstream or downstream fascia of the structure using readings as described in the following paragraph. Channel cross sections along both fascia shall be provided when warranted by field conditions such as channel alignment issues and streambed degradation. Channel cross sections are to be recorded during the initial inspection of each structure. At each regular inspection, current readings are to be taken and compared to the previously recorded cross sections(s) to determine if significant changes have occurred. At a minimum, the latest, initial and previously recorded streambed cross section elevations shall all be recorded on the same sketch for comparison purposes. If the cross section has not changed, a comment that the cross section was checked is to be added to the inspection report and the channel cross section sketch indicating the date(s) that it was checked.

Readings shall be taken along the fascia(s) starting at the substructure unit before the floodplain/channel and ending at the substructure unit beyond the end of the floodplain/channel at intervals sufficient to show a cross section elevation that is representative of the streambed and floodplain.

Readings are vertical measurements taken from a fixed reference line (e.g. the beam underside or the top of parapet) to the streambed or floodplain, and are used to develop a channel cross section between two substructure units. The horizontal distance from the abutment/pier face should be noted at each reading location, which shall follow the

orientation of the structure (e.g. from Abutment A to Abutment B). At each inspection, the waterline shall be referenced to the benchmark, which shall be a fixed point on the structure (e.g. the beam underside or the top of parapet) and shall coincide with the location of one of the channel cross section readings.

If readings were previously taken, new readings shall be taken at the same locations and referenced to the same fixed point on the bridge unless the previous reading have been removed, significantly altered or have become inaccessible. Additional readings shall be taken at locations where obvious changes in the streambed or floodplain are evident to provide an updated elevation. Readings shall be recorded in a fashion similar to that shown on the Sample Channel Cross Section sketch in the 'Attachments' section of this document.

For structures that require an underwater inspection, the lead inspector shall evaluate the existing stream channel and scour conditions during each inspection to the extent that this can be accomplished without diving. If no changes can be observed from the latest underwater inspection report, this will be noted, along with the date of the referenced underwater inspection. If significant changes are detected, normal documentation will be used to the extent possible and the District Structure and Bridge Engineer or designee shall be notified by the lead inspector in the most expeditious manner of the need for an underwater inspection.

Cross section elevation readings and sketches produced during underwater inspections shall be referenced to a common point with readings taken from the above water inspections to establish continuity between the two inspections in referencing the same channel bed elevations.

Channel Profile along a Substructure

Channel profile measurements around the perimeter of a substructure unit shall be documented whenever the inspection of the substructure unit reveals scour that affects or may affect the structural integrity of the substructure unit.

Measurements for the channel profile are not required at substructure units where there is no current or historical evidence of scour, and where any of the following is true;

- The substructure is located within a reservoir, lake, or other body of water which experiences negligible or no flow velocity.
- The substructure is founded on solid rock, or non-scourable material, per plans.
- The substructure consists of a pile bent with no history of significant scour.

Whenever channel profile measurements are required around the perimeter of a substructure, the following procedural requirements shall be observed:

Channel profile at substructure measurements should be documented, as required, during every underwater inspection, or during every routine inspection for structures where no underwater inspection is required. For documentation of the channel profile around an individual substructure unit, all depth measurements shall be reported relative to the elevation of a master reference datum, taken at the substructure unit in question.

- Dimensions of undermining are excepted from this rule.

For each substructure unit, this datum shall be taken at a single location on or directly above the subject substructure, and the precise location (horizontal & vertical) of this reference datum shall be documented.

The master reference datum shall be taken at the first available of the following locations;

- The top of the substructure (pier/pile cap)
- The bottom of deck.
- The bottom face of a superstructure element.
- Top of permanent bridge parapet/railing.
  - *Guardrails shall not be considered permanent railing*.

The same master reference datum shall be used for all subsequent inspections, unless it has been removed, significantly altered or has become inaccessible. Any change in the master reference datum shall be documented on the Channel Profile at Substructure page, and, when possible, historical readings shall be adjusted to accurately correspond to the current datum. Document and report the reference elevation of the water-line, and any and all exposed footing/seal/tremie/caisson/etc., relative to the master reference datum.

For Substructures >20 ft. in length or width, depth measurements shall be taken at intervals between 5 ft. and 10 ft. along each face of the substructure, and at each corner. For Substructures <20 ft. in length or width, depth measurements shall be taken at quarter points along each face of the substructure, and at each corner.

Measurements of scourable material shall be taken by probing into the channel bottom at each depth measurement location, using a metal or similarly rigid rod of at least 4 ft. in length.

Wherever conditions (flow velocity, debris, etc.) prevent the safe and/or accurate collection of this data, hydrographic survey or acoustic imaging may be accepted on a case-by-case basis, with prior VDOT authorization. The channel profile along a substructure shall be recorded in a fashion similar to that shown on the Sample Channel profile Along a Substructure in the 'Attachments' section of this document.

Substructure Undermining

Substructure undermining shall be documented for all substructure units where undermining is present and the substructure unit is not founded directly upon non-erodible rock. Undermining measurements and sketches shall document the following for each undermined area;

- Maximum height
- Total length
- Maximum horizontal perpendicular dimension underneath the footing
- Location relative to the nearest corner of the footing

- Height of undermining and penetration underneath the substructure shall also be measured and documented, if present, for each location where a depth measurement is shown on the Channel Profile at Substructure page.
  - The labeling of these points shall correspond to the alphanumeric labeling on the Channel Profile at Substructure.
- The location and sizes of all piles, shafts, and any other supports present beneath the footing and accessible for inspection shall be documented on the undermining page. Wherever significant variation in the total height of the footing and/or tremie exists, this shall be indicated on the undermining page.

Wherever conditions (flow velocity, debris, etc.) prevent the safe and/or accurate collection of this data, hydrographic survey or acoustic imaging may be accepted on a case-by-case basis, with prior VDOT authorization. Undermining shall be recorded in a fashion similar to that shown on the Sample Scour and Undermining Documentation in the 'Attachments' section of this document.

Stream Alignment Sketch

Stream alignment sketches are used to show the stream alignment relative to the bridge opening and quantify the extent and severity of any existing channel migration, scour, erosion and/or sedimentation. Stream alignment sketches shall be shown in a plan view.

Stream alignment sketches shall be included in the inspection reports for bridges where erosion problems are identified that may affect the structural integrity of one or more substructure units. Additionally, stream alignment sketches shall be used to document any deficiencies in the stream channel that cannot be adequately shown in a photograph.

LOAD RATING ANALYSIS:

Load Ratings shall be performed in accordance with the current IIM-S&B-86, Subject: Load Rating and Posting Structures (Bridges and Culverts). Structural analyses are to be part of each structure's bridge record and will have a completed 'Load Rating Summary Form for Structures' attached to each regular inspection report.

The deterioration levels and rating assumptions are to be reviewed as part of each scheduled inspection. A statement shall be placed in the structural analysis section of the inspection report stating that the rating has been reviewed with respect to the current condition.

When a superstructure GCR changes to a 4 or less, a new load rating is required. Other changes to the GCR for deck, superstructure and substructure shall be reviewed to determine if a new load rating is warranted. Any condition that may affect safe load carrying capacity shall be evaluated to determine if a new load rating analysis is warranted.

STRUCTURE RESTRICTION AND POSTING:

Reduction of weight limits on any structure shall be in accordance with the Code of

Virginia - Title 46.2, Chapter 10 and current IIM policy on load rating (IIM-S&B-86).

Restricted weight limit signs when required, shall be erected in accordance with the latest version of the Virginia Supplement to the Manual of Uniform Traffic Control Devices (MUTCD), Part 2 – Signs, Section 2B.59.

Overhead structures or parts of structures having an actual vertical clearance less than or equal to 14'-6", or vertical clearances less than 12 inches above the statutory maximum vehicle height, whichever is greater, shall be signed in accordance with the latest version of the Virginia Supplement to the MUTCD, Part 2 – Signs, Section 2C.25 (current version at time of publishing: 11th ed. 12/2023).

Should the inspection find that restrictive signs are not in compliance with the Virginia Supplement to the MUTCD, Part 2 – Signs, a form similar to the Bridge Signage Form (SB503)* shall be used to alert the local Residency for secondary routes and the Regional Traffic Operations Centers for primary routes. This notification shall be made in an expeditious manner upon review and acceptance of new posting limits. New or replacement signs shall be erected within 30 days of this notification. If the completed Bridge Signage Form is not returned to Structure & Bridge Division within 45 days, then the District Structure and Bridge Engineer or designee/Entity shall follow-up on the status of the signage. A copy of this form is available on the Bridge Signage Form Team Site and is included in IIM-S&B 86.

LOAD POSTING SIGNS

The Load Posting Signs and Bridge Signage Forms have been referenced in VDOT Structure & Bridge Division's current IIM policy on load rating (IIM-SB-86) and Virginia Supplement to the Manual of Uniform Traffic Control Devices (MUTCD), Part 2 – Signs, Section 2B.59.

The Assistant District Bridge Engineer for Inspection or designee will be responsible for assuring that a Change in Posting notification form and a Bridge Signage Form are created and updated on the Bridge Signage Form Team Site for all stages of the process.

The web-based bridge signage form may be found at the following-
https://covgov.sharepoint.com/sites/vdot-sb-postchng

CC: Chief Engineer
Division Administrators under the Deputy Chief Engineer
Local Assistance Division Director
District Engineers
District Maintenance Engineers
District Construction Engineers
Assistant State Structure and Bridge Engineers
District Structure and Bridge Engineers

Assistant District Bridge Engineer for Inspection

District Bridge Maintenance Managers

Residency Administrators

Regional Traffic Operations Centers

Federal Highway Administration

ATTACHMENTS

Structure Preventative Maintenance Form – Form SB504

Critical Infrastructure Information/Sensitive Security Information (CII/SSI) -Multi -Purpose Non- Disclosure Agreement

Critical Recommendation Form – Form SB500

Non-VDOT Critical Recommendation Form – Form SB501

Sample Channel Cross Section

Scour Critical Plan of Action Template

Typical Fatigue Prone Details

Sample Channel Profile along a Substructure

Sample Scour and Undermining Documentation

Structure & Bridge Scour Design Summary Form

Structure & Bridge Scour Condition Form

Structure and Bridge

INTRA-DEPARTMENTAL MEMORANDUM

Structure Preventive Maintenance Form

City/County: _____ **Federal ID:** _____

Route: _____ **Over:** _____

Structure No.: _____

Inspected By: _____ **Inspection Date:** _

To: _____ **From:** _____ **Date:** _____

District Bridge Maintenance Manager **District Structure & Bridge Engineer**

Inspection by the District Bridge Safety Inspection Team has revealed that the reference bridge requires preventive maintenance. These items, with cost estimates are as follows:

		Approximate Cost	Date Work Performed	Performed By
Seal Expansion Joints	☐			
Clean Deck	☐			
Clean Abutment Seats	☐			
Clean Pier Seats	☐			
Clean Bearings	☐			
Clean Truss Panel Points	☐			
Clear Debris from Scuppers	☐			
Clean Other (Identify)	☐			
*** Clear Debris (Identify)**	☐			
Other (Identify)	☐			

* May include removing silt from boxes/culverts/pipes, or removing debris between steel beams or at piers

The above deficiencies were corrected on the dates indicated above.

Signature: _____

District Bridge Maintenance Manager

Once the deficiency is corrected, please forward the original of this form to the District Structure & Bridge Engineer and copy the Assistant District Bridge Engineer for Inspection.

Form SB504

Critical Infrastructure Information/Sensitive Security Information (CII/SSI)

Multi-Purpose Non-Disclosure Agreement

Retain a copy of both the front and back sides of this form for future reference

VDOT requires CII/SSI be protected and not disclosed to unauthorized persons.

PART A: To Be Completed By Individual VDOT or Company Employee

I agree with the following as a condition of being granted access to CII/SSI:

CII/SSI, which is valuable and sensitive, is protected by law and by strict VDOT policies. The intent of these laws and policies is to assure that CII/SSI will remain confidential - that is, it will be used only as necessary to accomplish VDOT's mission. Disclosure of CII/SSI in any manner that permits interception by unauthorized persons could compromise safety and security and is prohibited. CII/SSI may be released only to persons with a need-to-know.

I might have access to this information in various formats including but not limited to documents and drawings, physical structures, and computer based systems. I have no right or ownership interest in any VDOT CII/SSI. VDOT may at any time revoke my authorization allowing access to CII/SSI.

Willful violation of this agreement may subject me to discipline which might include, but is not limited to, removal from current VDOT projects; exclusion from further VDOT related work; and legal liability. My obligations with respect to the confidentiality and security of all CII/SSI disclosed to me shall survive the termination of any agreement or relationship with VDOT. My execution of this agreement shall not nullify or affect in any manner any other agreement, non-disclosure or otherwise, which I have executed or may execute with VDOT or the Commonwealth of Virginia.

I am obligated to protect this information from unauthorized disclosure in accordance with the terms of this agreement. I will only use CII/SSI that I obtain to perform my legitimate VDOT related duties. I will conduct myself in a strict conformance to applicable laws and VDOT policies governing CII/SSI. I will safeguard the confidentiality of all CII/SSI at all times. I will be responsible for my misuse or my wrongful disclosure of CII/SSI.

Each provision of this agreement is severable. If any administrative or judicial tribunal should find any provision of this agreement to be unenforceable, all other provisions shall remain in full force and effect.

I make this agreement in good faith, without mental reservation or purpose of evasion.

Printed Name	Date
VDOT District/Division OR Company Name	Phone Number
Company Address	
Signature	Signature of Authorized Agent (Not required for VDOT employees)

PART B: To Be Completed By Company Agent Only: In addition to the provisions above, I certify:

All employees of this company involved with this VDOT project, regardless of location, who will have access to CII/SSI, myself included, will complete Part A of the Critical Infrastructure Information/Sensitive Security Information Multi-Purpose Non-Disclosure Agreement. The Agreement will be signed by me and accepted by VDOT prior to being granted access to CII/SSI. We will only access CII/SSI for which we have a need-to-know.

We will safeguard the confidentiality of all CII/SSI at all times. We will conduct ourselves in strict conformance to applicable laws and VDOT policies governing CII/SSI. Obligations with respect to the confidentiality and security of all CII/SSI disclosed to us shall survive the termination of any agreement or relationship with VDOT.

Authorized Company Agent:

Signature of Authorized Agent	Date
Printed Name	Title
Company Name	Phone Number
Company Address	
VDOT Contract Name and Number	

This form is valid for the identified project for a period of two years, while employed by the same company.

Critical Infrastructure Information/Sensitive Security Information (CII/SSI)
Multi-Purpose Non-Disclosure Agreement

Back Page

Retain a copy of both the front and back sides of this form for future reference.

Handling CII/SSI

You are responsible for safeguarding Critical Infrastructure Information/Sensitive Security Information (CII/SSI) in your custody or under your control.

The extent of protection afforded CII/SSI shall be sufficient to reasonably foreclose the possibility of its loss or compromise.

The terms of this clause (*Handling CII/SSI*), including this paragraph, must be included in any dissemination of any document, in whole or in part, that contains CII/SSI.

Protection - CII/SSI shall be protected at all times, either by appropriate storage or having it under the personal observation and control of a person authorized to receive it. Each person who works with protected CII/SSI is personally responsible for taking proper precautions to ensure that unauthorized persons do not gain access to it.

Use and Storage - During working hours, reasonable steps shall be taken to minimize the risks of access to CII/SSI by unauthorized personnel. After working hours, CII/SSI shall be secured in a secure container, such as a locked desk, file cabinet or facility where contract security is provided.

Reproduction - Documents or material containing CII/SSI may be reproduced to the minimum extent necessary consistent with the need to carry out official duties provided that the reproduced material is marked and protected in the same manner as the original material.

Disposal - Material containing CII/SSI shall be disposed of by any method that prevents unauthorized retrieval (e.g. shredding, burning, returning to original source, etc.).

Transmission - CII/SSI shall be transmitted only by VDOT courier, US first class, express, certified or registered mail, or through secure electronic means.

VIRGINIA DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

Route: _____ NBIS (Y/N) _____
Over: _____
County: _____
Str. No.: _____
Located: _____ Mi. To: _____
_____ Mi. From: _____

Critical Recommendation Form

for, Repair and/or Strengthening Inspected By: _____ Inspection Date: _____

WHEN A CRITICAL CONDITION IS DISCOVERED SEND FORM:

To: _____ From: _____ Date: _____
Maintenance Manager
Assistant District Bridge Engineer for Inspection

cc: District Structure and Bridge Engineer
State Structure and Bridge Engineer
District Bridge Maintenance Manager
District Environmental Engineer

AFTER THE CRITICAL CONDITION IS REPAIRED SEND FORM:

To: _____ From: _____ Date: _____
Assistant District Bridge Engineer for Inspection
District Bridge Maintenance Manager

cc: District Structure & Bridge Engineer
State Structure & Bridge Engineer

Federal Structure ID No:0000000000_____

CRITICAL CONDITION REQUIRING IMMEDIATE ATTENTION (≤ 30 days) or (≤ 90 days)

- ☐ Immediate performance of work on NSTM member(s) is needed.
- ☐ Immediate correction of scour and/or hydraulic induced problem is needed.
- ☐ Condition rating of 2 or less for deck, superstructure, substructure and/or culvert, with the exception of findings related to NSTM Members.*
- ☐ Immediate work to prevent substantial reduction in safe load capacity and/or for the safety of the traveling public.

**Issuance of a critical recommendation form is recommended when GCR is lowered to a '3' or less.*

Action required (include date work must be completed):

ESTIMATED COST - $_____

BELOW TO BE FILLED OUT BY RESIDENCY ADMINISTRATOR and/or DISTRICT BRIDGE MAINTENANCE MANAGER WHEN WORK HAS BEEN COMPLETED

Action taken (include date work was completed):

Signature:
District Bridge Maintenance Manager

Follow-up Inspection after work is complete by: _____
Bridge Safety Inspector Date

Form SB500

Municipality/Agency: _____

Non-VDOT Critical Recommendation Form

for, Repair and/or strengthening

Route: _____ NBIS (Y/N) _____
Over: _____
Str. No.: _____
Located: _____ Mi. To: _____
_____ Mi. From: _____
Inspected By: _____ Inspection Date: _____

WHEN A CRITICAL CONDITION IS DISCOVERED SEND FORM:

To: _____ From: _____ Date: _____
(Insert Title of Responsible Manager) Assistant District Bridge Engineer for Inspection

cc: District Structure & Bridge Engineer
State Structure & Bridge Engineer

AFTER THE CRITICAL CONDITION IS REPAIRED SEND FORM:

To: _____ From: _____ Date: _____
Assistant District Bridge Engineer for Inspection (Insert Title of Responsible Manager)

cc: District Structure and Bridge Engineer
State Structure & Bridge Engineer

Federal Structure ID No:0000000000_____

CRITICAL CONDITION REQUIRING IMMEDIATE ATTENTION (≤ 30 days) or (≤ 90 days)

- ☐ Immediate performance of work on NSTM member(s) is needed.
- ☐ Immediate correction of scour and/or hydraulic induced problem is needed.
- ☐ Condition rating of 3 or less for deck, superstructure, substructure and/or culvert.
- ☐ Immediate work to prevent substantial reduction in safe load capacity and/or for the safety of the traveling public.

Action required (include date work must be completed):

ESTIMATED COST - $

BELOW TO BE FILLED OUT BY RESIDENCY ADMINISTRATOR and/or DISTRICT BRIDGE MAINTENANCE MANAGER WHEN WORK HAS BEEN COMPLETED

Action taken (include date work was completed):

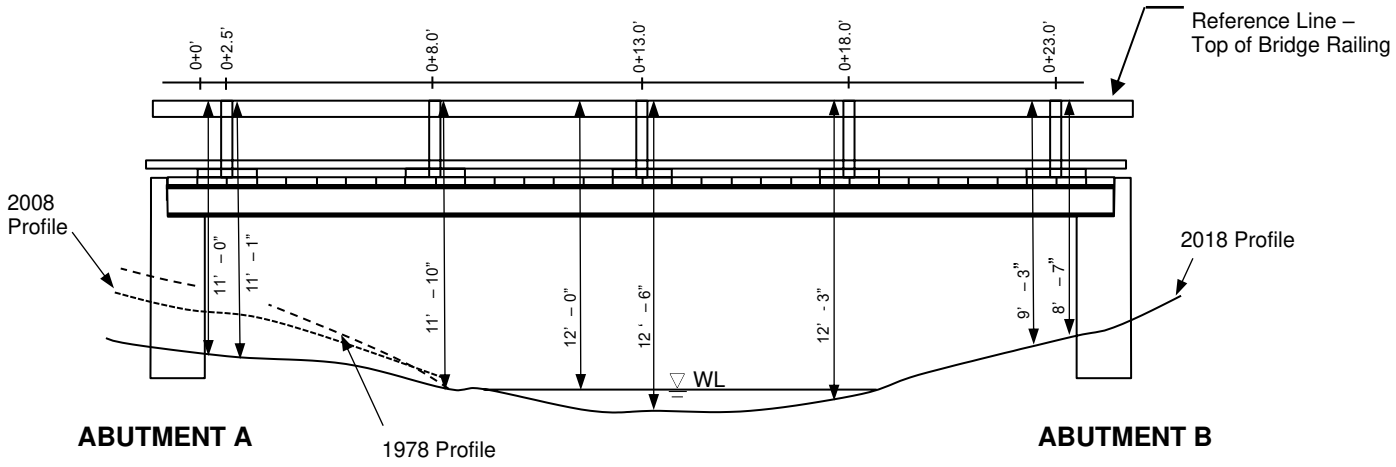
_____

Signature:
(Insert Title of Responsible Manager)

Follow-up Inspection after work is complete by: _____ _____
Bridge Safety Inspector Date

Form SB501

SAMPLE CHANNEL CROSS SECTION



UPSTREAM ELEVATION VIEW

(NTS)

(Looking Downstream)

DATE	STATIONS								COMMENT
	ABUT. A	0+ 2.5'	0+8.0'	0+13.0'	0+18.0'	0+23.0'	ABUT. B	WL	
1978 Original	-	6'-6"	11'–10"	12'- 6"	12'-3"	9'-3"	-	-	
2008 Readings	-	8'-6"	11'– 0"	12'-6"	12'-3"	9'-3"	-	-	
2018 Readings	11'-0"	11'-1"	11'-10"	12'-0"	12'-6"	9'-3"	8'-7"	12'-0"	

Legend:

WL= Water Line

NTS = Not in Scale

Scour Critical Plan of Action

Structure ID	
Federal Aid System of Highways	
FIPS County	
District	
County/City	
Carrying	
Over	
Virginia Structure Number	
Year Built	
Size of Existing Bridge	
Foundation Type	
Scheduled for Replacement	
Detour Length	
Average Daily Traffic	
Source of Scour Critical Rating	
Scour Rating (Item 113)	
Planned Actions	
Other actions	
Prepared by	
Signature	
Date	

TYPICAL FATIGUE PRONE DETAILS

Close visual inspection of fatigue prone details is required. Concentrate on following areas:

- **Distortion in small gaps.**
- **Weld tips (terminations).**
- **Intersecting welds.**
- **Reduction in x-sections.**
- **Skewed bridges.**
- **Wrapped around welds.**

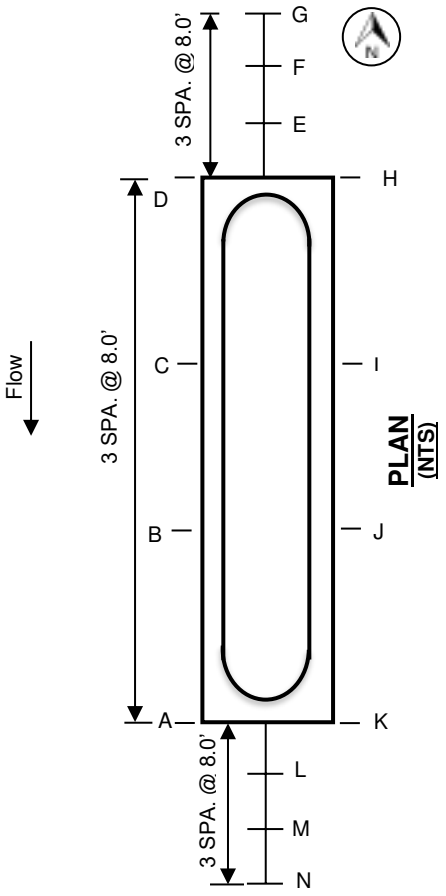
Typical details to inspect for localized fatigue cracking:

1. Lateral connection plates with intersecting welds, weld tips, & gaps or backing bars and tack welds.
2. Transverse connection plates. (Need to be positively connected to both flanges.)
3. Longitudinal stiffener butt welds, fillet welds, and cope holes.
4. Floorbeam to girder connection. (Coped beam flanges or blocked beam flanges.)
5. Rolled beam diaphragm connection. (Also, with coped flanges.)
6. Coverplate end welds and butt welds.
7. Termination of longitudinal coverplate welds. (Not end welded.)
8. Web plate penetration including box pier caps.
9. Web and flange splices. (Particularly field welded - quality may be suspect. Built-up welds)
10. Web cope holes
11. Stringer to floorbeam connections (out-of-plane bending)
    - Stringer framing into Girder webs - Category E or E'
    - Stringer framing into Girder flange - Category E or E'
12. Lateral connection to girders and floorbeams.
13. Backing bar splices. (Backing bars should be continuous. Ideally should be removed, but not practical)
14. Repaired holes with partial or complete plug welds.
15. Tack welds. Near ends of plates. Near end of backing bars. (AWS requires that tack welds be properly removed or incorporated into permanent weld. Identify as potential locations for fatigue cracks.
16. Gouges and arc strikes.
17. Intermittent fillet welds (ie stitch welds). (Category E for web to flange or coverplate to flange)
18. Pin & hanger assemblies.
19. Insert plates in haunched girders.
20. Riveted members (girders & trusses) with tack welds or subject to prying action.
21. Corrosion induced defects.
22. Construction & traffic damaged areas.
23. Field welding of curved girder cross frame members (Category E equivalent) (Check quality of field welds, terminations of welds, undercutting or notch effects)
24. Field welding of attachments to tension areas of webs or flanges after the bridge was built.

STR. NO: _____ **INSP. DATE:** _____ **INSPECTED BY:** _____

Sample CHANNEL PROFILE ALONG A SUBSTRUCTURE

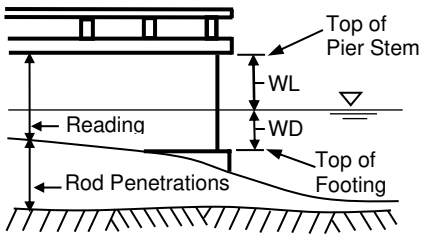
YEAR / STA.	CHANNEL READINGS				ROD PENETRATIONS			
	2005	2010	2014		2005	2010	2014	
A	24.3	23.3	22.1		0	0	0	
B	20.0	21.2	21.3		0	0	0	
C	20.0	20.7	21.3		0	0	0	
D	22.3	21.8	22.2		0	0	0	
E	23.3	22.0	23.1		0	0	0	
F	23.9	21.7	22.1		0	0	0	
G	24.1	21.0	22.3		0	0	0	
H	21.8	21.8	22.1		0	0	0	
I	22.3	22.3	23.0		0	0	0	
J	22.3	22.8	22.4		0	0	0	
K	22.8	23.3	22.4		1.0	0	0	
L	24.3	22.0	22.2		0	0.5	0	
M	24.7	22.0	22.2		0	0.5	0	
N	25.2	21.3	22.0		0	0.5	0	



INSPECTION NOTES:

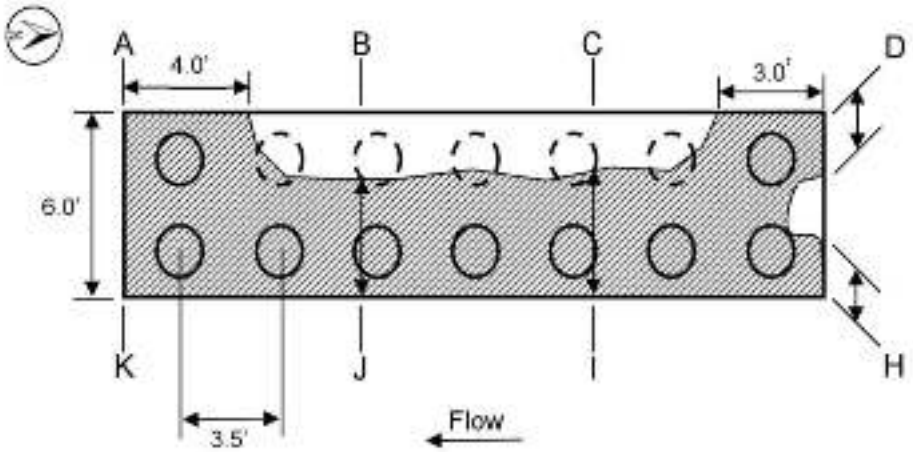
1. Due to the potential for sounding measurement errors presented by submerged debris and other factors, sounding measurements were adjusted according to the measured footing exposure and undermining at each location.

LEGEND:
NTS = Not in scale

REFERENCES	YEAR	COMMENTS
	**2005**	WL @ ST. "A" = 14.3 ft., WD @ ST. "K" = 4.0 ft.
		Footing exposed from Pt. "D" thru "K"
	2010	WL @ ST. "A" = 14.0 ft., WD @ ST. "K" = 4.3 ft.
		Footing exposed at all locations
	2014	WL @ ST. "A" = 12.9 ft., WD @ ST. "K" = 5.4 ft.
		Footing undermined. See undermining documentation for details.

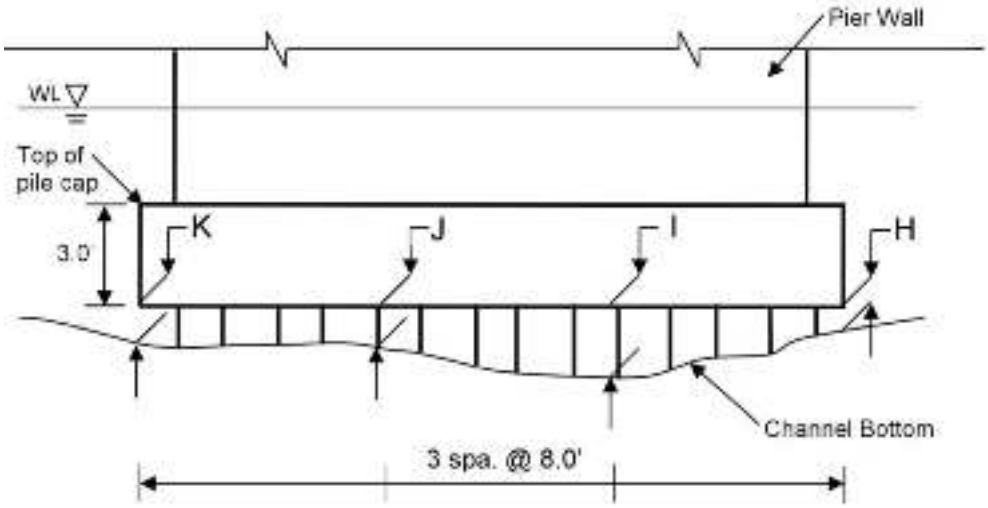
STR. NO: _____ **INSP. DATE:** _____ **INSPECTED BY:** _____

Sample SCOUR AND UNDERMINING DOCUMENTATION



PIER FOOTING PLAN VIEW
(NTS)

HORIZONTAL UNDERMINING READINGS (FT)				
YR. / ST.	2005	2010	2014	
A	6.0	6.0	6.0	
B	0.0	0.0	0.0	
C	0.0	0.0	0.0	
D	2.0	2.0	2.0	
H	1.8	1.7	1.9	
I	3.0	3.5	4.0	
J	2.5	3.0	3.8	
K	6.0	6.0	6.0	



PIER FOOTING ELEVATION VIEW
(NTS)

VERTICAL UNDERMINING READINGS (FT)				
YR. / ST.	2005	2010	2014	
A	3.0	2.0	0.8	
B	0.0	0.0	0.0	
C	0.0	0.0	0.0	
D	1.0	0.5	0.9	
H	0.5	0.5	0.8	
I	1.0	1.0	1.7	
J	1.0	1.5	1.1	
K	1.5	2.0	1.1	

LEGEND:

○ = Timber Pile

▨ = Undermined area

NTS = Not in scale

INSPECTION NOTES:

1. (14) of (14) timber piles are exposed / partially exposed in the undermined area, as verified by probe rod.
2. 2 rows of 7 piles (12" dia.) each, spaced at 3.5' center to center along pier. Pile rows are spaced 3.0' apart. Piles are located approx.1.5' from edge of footing

STRUCTURE & BRIDGE
SCOUR DESIGN SUMMARY FORM
(For all scour evaluations performed after August 1, 2018)

Structure Inventory Information:

VA Structure No.:		**Federal Bridge ID:**	
District (002):		**Year Built (027):**	
County (003):		**VDOT Bridge Plan Number (S13A/B):**	
Route (005D):		**Drainage Area (S193, square miles):**	
Facility Carried (007):		**Latitude (016):**	
Waterway Intersected (006A):		**Longitude (017):**	

Recommended Scour Rating (NBI Item 113) = _____

Substructure Scour Design Information:

This section will aid bridge inspection personnel in assessing a structure during a routinely scheduled inspection, or following a hydrogeological event.

Substructure Unit(s):	Design Hydrologic Event Frequency (year):	Design Flow Elevation (ft):	Design Scoured Bed Elevation:	Pile Tip / Bottom of Spread Footing Elev.	Foundation Type / Material:

**Group like substructures whenever possible*
***Attach additional sheets, sketches and plans as necessary*

Scour Related Design Considerations and/or Comments:

_____
_____
_____
_____
_____
_____

**Include reference to relevant HEC manual considerations and requirements, and discussion of design scour countermeasures.*

Scour Evaluation Team:

Category	Name
Structural Engineer	
Hydraulic Engineer	
Geotechnical Engineer	

Form Completed By: _____

Name

_____ _____

Signature Date

- STRUCTURE & BRIDGE SCOUR CONDITION FORM

For use during each routine and underwater inspection, to document current scour conditions.

INSPECTION DATE: Click or tap here to enter text.
TO: Bridge File
FROM: Click or tap here to enter text.

SUBJECT: Scour Condition Documentation

District:	Click or tap here to enter text.	Type of Construction:	Click or tap here to enter text.
County:	Click or tap here to enter text.	Facility Carried:	Click or tap here to enter text.
Route:	Click or tap here to enter text.	Feature Intersected:	Click or tap here to enter text.
VA Str. #:	Click or tap here to enter text.	Year Built:	Click or tap here to enter text.
Federal ID:	Click or tap here to enter text.	Year Reconstructed:	Click or tap here to enter text.

Previous NBI Scour Code: Click or tap here to enter text.
Current NBI Scour Code: Click or tap here to enter text.
Source of Current Scour Code:

- ☐ Scour Code Shown on Design Plans
- ☐ Interdisciplinary team review
- ☐ Other (specify): Click or tap here to enter text.
- ☐ Observed low-risk conditions
- ☐ As-Built Plans

Interdisciplinary Engineering Team Review Required?: Choose an item.

**If "Yes", this form and the most recent inspection report must be reviewed by an interdisciplinary engineering team, including the following;*

- *Structural / Bridge Engineer*
- *Hydraulic Engineer*
- *Geotechnical Engineer*

**If "No", only the District Bridge Safety Inspection Engineer signature is required*

SIGNATURES

Title: Click or tap here to enter text.
Name (print): Click or tap here to enter text.
Signature:_____ Date: Click or tap to enter a date.

Title: Click or tap here to enter text.
Name (print): Click or tap here to enter text.
Signature:_____ Date: Click or tap to enter a date.

Title: Click or tap to enter a date.
Name (print): Click or tap here to enter text.
Signature:_____ Date: Click or tap to enter a date.

Additional Scour Assessment and/or Analysis Required?: Choose an item.

Military Road

Culvert Replacement Project

Arlington County Plan

Community Flood Preparedness Fund Grant | January 23, 2025

Contents

Appendices

Application Form

Appendix A: Application Form for Grant and Loan Requests for All Categories

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Virginia Department of Conservation and Recreation
Virginia Community Flood Preparedness Fund Grant Program

Name of Local Government:

Category Being Applied for (check one):

☐ **Capacity Building/Planning**

☑ **Project**

☐ **Study**

NFIP/DCR Community Identification Number (CID) 515520

Name of Authorized Official and Title: Mike Moon, Chief Deputy Director

Signature of Authorized Official: _____

Mailing Address (1): 2100 Clarendon Boulevard

Mailing Address (2): Suite 900

City: Arlington **State:** VA **Zip:** 22201

Telephone Number: (703) 228-4488 **Cell Phone Number:** (___) _____

Email Address: mmoon@arlingtonva.us

Contact and Title (If different from authorized official): Jennifer Tastad

Mailing Address (1): 2100 Clarendon Boulevard

Mailing Address (2): Suite 900

City: Arlington **State:** VA **Zip:** 22201

Telephone Number: (703) 228-6542 **Cell Phone Number:** (703) 469-6984

Email Address: jtastad@arlingtonva.us

Is the proposal in this application intended to benefit a low-income geographic area as defined in the Part 1 Definitions? Yes ☐ No ☑

Categories (select applicable activities that will be included in the project and used for scoring criterion):

Capacity Building and Planning Grants

☐ Floodplain Staff Capacity.

☐ Resilience Plan Development

- ☐ Revisions to existing resilience plans and integration of comprehensive and hazard mitigation plans.
- ☐ Resource assessments, planning, strategies, and development.
  - Policy management and/or development.
  - Stakeholder engagement and strategies.

☐ Other: _____

Study Grants (Check All that Apply)

☐ Revising other land use ordinances to incorporate flood protection and mitigation goals, standards, and practices.

☐ Conducting hydrologic and hydraulic (H&H) studies of floodplains. *Changes to the base flood, as demonstrated by the H&H must be submitted to FEMA within 6 months of the data becoming available.*

☐ Studies and Data Collection of Statewide and Regional Significance.

☐ Revisions to existing resilience plans and modifications to existing comprehensive and hazard.

☐ Other relevant flood prevention and protection project or study.

☐ Pluvial studies.

☐ Studies to aid in updating floodplain ordinances to maintain compliance with the NFIP, or to incorporate higher standards that may reduce the risk of flood damage. This must include establishing processes for implementing the ordinance, including but not limited to, permitting, record retention, violations, and variances. This may include revising a floodplain ordinance when the community is getting new Flood Insurance Rate Maps (FIRMs), updating a floodplain ordinance to include floodplain setbacks, freeboard, or other higher standards, RiskMAP public noticing requirements, or correcting issues identified in a Corrective Action Plan.

Project Grants and Loans (Check All that Apply – Hybrid Solutions will include items from both the "Nature-Based" and "Other" categories)

Nature-based solutions

☐ Acquisition of property (or interests therein) and/or structures for purposes of allowing floodwater inundation, strategic retreat of existing land uses from areas vulnerable to flooding; the conservation or enhancement of natural flood resilience resources; or acquisition of structures, provided the acquired property will be protected in perpetuity from further development, and where the flood mitigation benefits will be achieved as a part of the same project as the property acquisition.

☐ Wetland restoration.

☐ Floodplain restoration.

☐ Construction of swales and settling ponds.

☐ Living shorelines and vegetated buffers.

☐ Permanent conservation of undeveloped lands identified as having flood resilience value by *ConserveVirginia* Floodplain and Flooding Resilience layer or a similar data driven analytic tool, or the acquisition of developed land for future conservation.

☐ Dam removal.

☐ Stream bank restoration or stabilization.

☐ Restoration of floodplains to natural and beneficial function.

Other Projects

☐ Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.

☐ Dam restoration.

☐ Beneficial reuse of dredge materials for flood mitigation purposes

☐ Removal or relocation of structures from flood-prone areas where the land will not be returned to open space.

☑ Structural floodwalls, levees, berms, flood gates, structural conveyances.

☐ Storm water system upgrades.

☐ Medium and large-scale Low Impact Development (LID) in urban areas.

☐ Acquisition of property (or interests therein) and/or structures for purposes of allowing floodwater inundation, strategic retreat of existing land uses from areas vulnerable to flooding; the conservation or enhancement of natural flood resilience resources; or acquisition of structures, provided the acquired property will be protected in perpetuity from further development, and where the flood mitigation benefits will **not be** achieved as a part of the same project as the property acquisition.

☐ Other project identified in a DCR-approved Resilience Plan.

Location of Project or Activity (Include Maps): 38.91964867854048, -77.12003186301797

NFIP Community Identification Number (CID#) : 515520

Is Project Located in an NFIP Participating Community? ☑ Yes ☐ No

Is Project Located in a Special Flood Hazard Area? ☑ Yes ☐ No

Flood Zone(s) (If Applicable): AE

Flood Insurance Rate Map Number(s) (If Applicable): 51013C0036D eff. 11/16/2023

Total Cost of Project: $5,057,516

Total Amount Requested 3,034,510

Amount Requested as Grant 3,034,510

Amount Requested as Project Loan (Long-Term, not including short-term loans for up-front costs)
$0

RVRF Loan Amount Requested as Project Match (Not including short-term loans for up-front costs)
$0

Amount Requested as Short-Term loan for Up-Front Costs (not to exceed 20% of amount requested as Grant) $0

For projects, planning, capacity building, and studies in low-income geographic areas: Are you requesting that match be waived? ☐ Yes ☐ No

For informational purposes only: Supplemental information for loan requests may include but are not limited to the following. This information will be collected AFTER a CFPF award is made, prior to the signing of a grant agreement.

- General Obligation
- Lease, Revenue
- Special Fund Revenue
- Moral obligation from other government entity)
- Desired loan term
- Since the date of your latest financial statements, any new debt
- Pending or potential litigation by or against the applicant
- Five years of current audited financial statements (FY18-22) or refer to website if posted
- Capital Improvement Plan
- Financial Policies
- List of the ten largest employers in the jurisdiction.
- List of the ten largest taxpayers in the jurisdiction

All loan requests are subject to credit review and approval by Virginia Resources Authority.

Appendix C: Checklist All Categories

(Benefit-cost analysis must be included if the proposed Project is over $2 million.)

Virginia Department of Conservation and Recreation

Community Flood Preparedness Fund Grant Program

- [x] Detailed map of the project area(s) (Projects/Studies)
- [x] FIRMette of the project area(s) (Projects/Studies)
- [x] Historic flood damage data and/or images (Projects/Studies)
- [x] A link to or a copy of the current floodplain ordinance
- [x] Non-Fund financed maintenance and management plan for project extending a minimum of 10 years from project close
- [x] A link to or a copy of the current comprehensive plan
- [x] Social vulnerability index score(s) for the project area from VFRIS SVI Layer
- [ ] If applicant is not a town, city, or county, letters of support from affected localities
- [ ] Letter of support from impacted stakeholders
- [x] Budget Narrative
- [x] Supporting Documentation, including the Benefit-Cost Analysis tool or narrative (for projects over $2 million)
- [x] Authorization to request funding from the Fund and/or RVRF Match loan from governing body or chief executive of the local government
- [x] Signed pledge agreement from each contributing organization
- [x] Detailed budget and narrative for all costs

Scope of Work Narrative

I. Project Need

The Military Road Culvert Replacement Project (Project) will replace an undersized and failing double culvert with a single, wider culvert under Military Road in Arlington County. Military Road is a commuter collector road that feeds into Virginia State Route 120 (North Glebe Road) to the North and Virginia State Road 29 (Langston Boulevard) to the South. As the Project is on County-owned property, the benefits will accrue to the County and regional users of the roadway. There is presently no flood risk to the surrounding privately owned residential properties.

The Project is necessary to improve the roadway, prevent flooding of nearby roads and structures, to improve fish passage (especially the American eel [Anguilla rostrata]), and to improve downstream conditions in Gulf Branch.

Without CFPF funding, the County has identified local bond funds for the project in its 2025-2034 Capital Improvement Plan.

Challenges

Presently, the 60" double-barrel culvert is insufficiently sized, resulting in the stream frequently overtopping the roadway. Like most of the County's stormwater infrastructure, the culvert was built between 1940 and 1975, a time predating most contemporary stormwater design best practices and regulations. As such, the culvert has exceeded its lifespan. The County conducted emergency repair work in early 2019, only to have to redo the work just several months later. During a 150-year storm event on July 8, 2019, rainfall rates spiked to the equivalent of 7-9 inches per hour, a significant amount of rainfall intensity. Rising stormwater overtopped Military Road, eroded soil underneath a sidewalk to destabilize it, and uprooted a tree, which fell into the fence separating the sidewalk from the culvert. Stormwater flooded the street and deposited significant amounts of sediment onto the roadway. It's only a matter of time before the next record rainfall event requires more repairs to the outdated culvert, or it fails.

Failure of the culvert would have tremendous impact on the community. As a frequently used route in and out of the District of Columbia, a road closure would cost commuters time and money. Damage to utilities located under the culvert could cause untreated sewage to discharge into Gulf Branch. These impacts are in addition to a costly emergency culvert replacement.

Military Road culvert's outfall is several feet above the stream bed, which has led to erosion and prevented fish passage, especially for the American eel. The Project will aim to enable safe passage for species such as the American eel and other observed fish taxa and macroinvertebrates.

Replacing the Military Road culvert is necessary to handle swift flows, but also to improve downstream conditions. Replacing the existing double-barreled culvert with a single arch span design dechannelizes the streams and restores open channel flow, allowing for more natural hydrogeomorphic processes downstream while improving the conditions of the river ecosystem.

Solution

The culvert replacement design doubles the flow capacity to a 10-year design storm event, with a factor of safety to accommodate future increases in storm intensity as expected with climate change. The new culvert design emulates the natural streambed by eliminating the elevation difference between the outfall and streambed to restore healthy fish passage. The overall benefit of a contiguous system with no barriers to fish passage is a more robust assemblage of macroinvertebrates and fish.

The Project will have a positive impact on public safety in addition to the local ecosystem. The enlarged culvert will help reduce flash flooding risk to Military Road and sediment deposits following intense rainstorms. Countersinking the culvert will improve the healthy passage of the American Eel, a keystone species that serves as prey to many fish, mammals, and birds, and helps balance overpopulation of invertebrates and decaying matter.

II. Goals and Objectives

The Project will add discharge capacity necessary for flood risk mitigation from increasingly intense rain events. In addition, the project will eliminate obstacles to upstream migration of the American eel, ensure climate resilience and address aging infrastructure that is at increasing risk of failure. This will decrease damage from heavy rainfall event risks, provide flood prevention and protect adjacent properties, in particular a sanitary sewer pump station.

Objectives

The following objectives are achievable within the agreement period.

a) The Project will address aging infrastructure through the replacement of the failing culvert. To reduce the risk of collapse or damage with the existing culvert, the arch design will provide strength and durability. Completion of this activity will accomplish state of good repair goals. Using the Virginia Department of Transportation's Instructional and Informational Memorandum for Bridge Safety Inspection, Inventory and Inspection Requirements for Bridges and Large Culverts (IIM-S&B-27.12), the County will complete bi-annual maintenance reviews of the culvert to determine if maintenance is needed and to determine the lifespan of the investment (see Appendix A).

b) The Project will ensure climate resiliency through an improved culvert design. This design will be able to handle swift flows during rain events. Dechannelizing the stream and restoring open channel flow is a nature-based solution that will allow for more natural hydrogeomorphic processes downstream and improve the condition of the river ecosystem. Following construction, the County, through the Arlington Flood Water Program, will install a rain gauge and flow sensor to measure stream levels and velocity for several years during rain events to determine if the design is successful at flood prevention.

c) The Project will ensure successful migration of the American eel. The species was once found abundantly in rivers in Virginia; however, development of areas like Arlington County into densely urbanized areas has blocked passage and threatened its survival. The American eel is also prey to numerous protected species, such as American eagle and striped bass. The new culvert design will hold enough water, include upstream pools, and be countersunk to allow for fish to pass during the dry season, unlike the

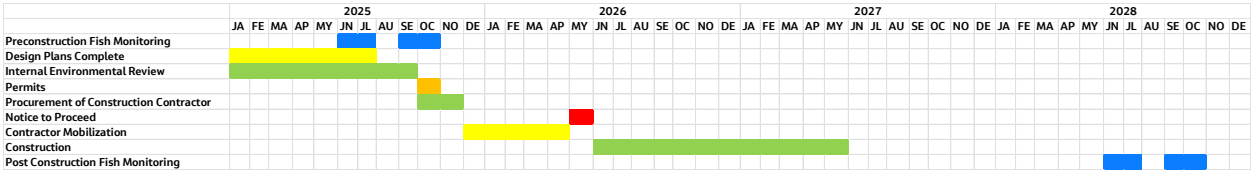
existing structure. Installation of such measures will make it easier for these journeying fish to reach portions of the river. Following construction, the County will measure downstream and upstream counts of the species for up to a year to ensure the migration period is encapsulated, hiring a biologist to determine if successful migration is ensured. Fish monitoring will begin almost a year before construction to capture spring and fall life cycles of the fish and wait approximately one life cycle to begin two-season monitoring following construction. As a result, monitoring might not be complete until almost a year after the culvert is constructed.

III. Work Plan

The major activities of the Project consist of the monitoring of the American eel and other fish in the stream before and after construction, internal environmental review, permitting, procurement, and construction of the new culvert. Contractor services will be procured for the completion of construction within a timeframe of one year. The County will complete all other services as identified in Figure 1.

While there are no required partners for the completion of the Project, the County will need to coordinate with the U.S. Army Corps for the U.S. Army Corps Nationwide Permit, FEMA for the Conditional Letters of Map Revision (CLOMR), the state for the Local Land Disturbing Activity Permit, and the EPA for NEPA.

Figure 1. Project Schedule



Deliverables will consist of the following:

- Pre and Post Construction Fish Monitoring
- Permits (NEPA, U.S. Army Corps Nationwide Permit, CLOMR, and the Local Land Disturbing Activity Permit)
- Construction of Culvert
- As-built Surveys
- Detailed Project Work Plan, Budget, and Schedule
- Final Performance Report

The maintenance plan shall consist of inspections by the County's Water, Sewer, Streets Bureau (WSS) on a rotating schedule, providing for bi-annual inspections of each County-owned bridge structure. These inspections may be performed by County staff or by a contracted entity, depending on resources and needs. The County will maintain records of all inspections.

Approach

If necessary, the County will prepare a detailed Project Work Plan, budget, and schedule, which may result in a revised statement of work following a successful grant funding award announcement. The detailed Project Work Plan will describe, in detail, the activities and steps necessary to complete the tasks outlined in the statement of work. The work plan will include the Project Management Plan which describes Arlington County's approach (including team, team decision-making, roles and responsibilities, as well as address quality assurance and quality control procedures. In addition, the Detailed Project Work Plan will include the Project schedule and a Project budget.

Following grant award announcement, the County will conduct monitoring of fish in the stream, internal environmental review, permitting, and contractor procurement. The contractor will complete construction of the new culvert.

The County will carry out the responsibilities of project management and administration, project reporting and project control requirements, meetings and agency coordination, office engineering, and field engineering. The final reimbursement request and project deliverables (if any) will be submitted within 90 days of the Project's completion date.

IV. Evaluation

The County will conduct pre- and post-Project monitoring of both macroinvertebrate species and fish species under its existing Municipal Separate Storm Sewer System Stormwater Permit and Watershed Management Program. The County conducted baseline monitoring in June 2023 and is committing to extending this monitoring effort as part of its match for CFPF funds. The County Infrastructure Program will cover the cost of monitoring the culvert projects, before and after construction as the cost is minimal. The County plans to begin monitoring almost a year before the construction to capture spring and fall life cycles of the fish and wait approximately one life cycle to start the two-season monitoring after construction; therefore, monitoring might not be finished until almost a year after the culvert is constructed.

The County will consider the Project to be successful if the culvert no longer overtops the roadway during a 10-year storm event, infrastructure ceases to degrade due to aging, and if fish are able to more easily pass through the culvert due to the lowered invert elevation.

Supporting Documents for Project Applications

I. Project Information

Population

Arlington County has over 240,000 residents. In the two Census tracts where the Project is located, the population totals 8,338. While the median household income in the County exceeds 80 percent of the state median household income, the County has two Census tracts designated as qualified Opportunity Zones by the U.S. Secretary of the Treasury: Census Tracts 1031 and 1027.01.

Historical Flooding Data

The Project is in a mapped floodplain (Figure 2), being in the 1% annual chance flood hazard zone AE. It was last mapped on 11/16/2023. A 1% flood risk translates to a one-in-four chance of flooding during a 30-year period.

Since 2000, four flood events have occurred to the culvert.

1. One on June 25, 2006 led to floodwater overtopping the culvert and flooding the intersection of Military Road and 36th Road North. Water also reached the Gulf Branch Nature Center adjacent to the culvert. No record of damage associated with the event; however, the County did record cleaning up debris as a result.
2. Two flooding events in 2018 (5/22 and 7/25), which necessitated repairs due to severe erosion.
3. One on July 8, 2019, impacted both the culvert and the adjacent pump station. It left behind debris and large logs that had to be removed repetitively. The 2019 event was a 150-year storm event with rainfall rates spiking to the equivalent of 7-9 inches per hour, indicating significant rainfall intensity. Rising stormwater overtopped Military Road, eroded soil underneath a sidewalk thus destabilizing it, and uprooted a tree, which fell into the fence separating the sidewalk from the culvert. Stormwater flooded the street and deposited significant amounts of sediment onto the roadway leading to $70,000 in repair costs.

In general, heavy rainfall frequently result in reports of American eels being stranded on Military Road and even run over and crushed by cars.

Furthermore, annual inspections from 2020 - 2024 have involved debris and log clearance as well as roadway mud clean up amounting to about $1,000 annually.

Figure 2. FEMA Floodplain Map

No Adverse Impact

While no studies or reports have been complete for the specific Project to determine whether the proposed improvements will have an adverse impact, the proposed improvement has been established to minimize flood vulnerabilities.

Culverts are types of tunnels that are built beneath a road or railway to channel water past an obstacle or to a subterranean waterway. According to FEMA, culverts are generally a very effective strategy for flood mitigation.

Currently, there is a 60” double-barrel culvert underneath Military Road to channel water; however, it is insufficiently sized, resulting in the stream frequently overtopping the roadway. The culvert is also nearing the end of its lifespan which has necessitated emergency repairs. The replacement culvert design doubles the flow capacity to a 10-year design storm event, with a factor of safety to accommodate future increases in storm intensity as expected with climate change. The new design will decrease the risk of flooding to adjacent properties, minimizing subject area flood vulnerabilities.

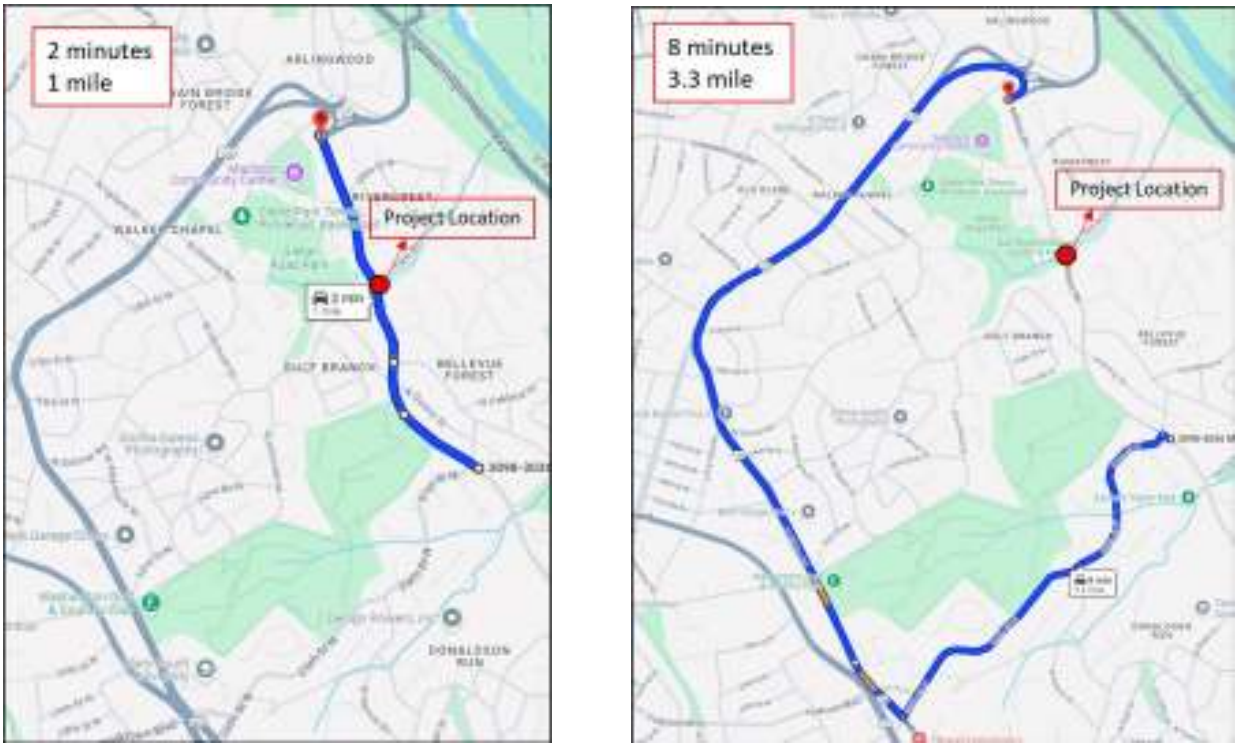
Ability to Provide Local Share of Cost

Arlington County will source its share of the Project cost from bond funds from the County's capital improvement plan. The County expects its cost share to be up to $2,023,006, which it can pay in full prior to requesting reimbursement of grant funding. The Appendix B Authorization to Apply for CFPF Funding includes the County's pledge to provide its local share of cost.

Benefit-Cost Analysis

Replacement of the Military Road Culvert is necessary to reduce the risk of flooding impacts to the County's transportation and utility infrastructure, recreation opportunities, and the environment. The costs associated with the structural failure of the Military Road culvert exceed the project's cost.

Figure 3. Military Road Detour Plan Maps

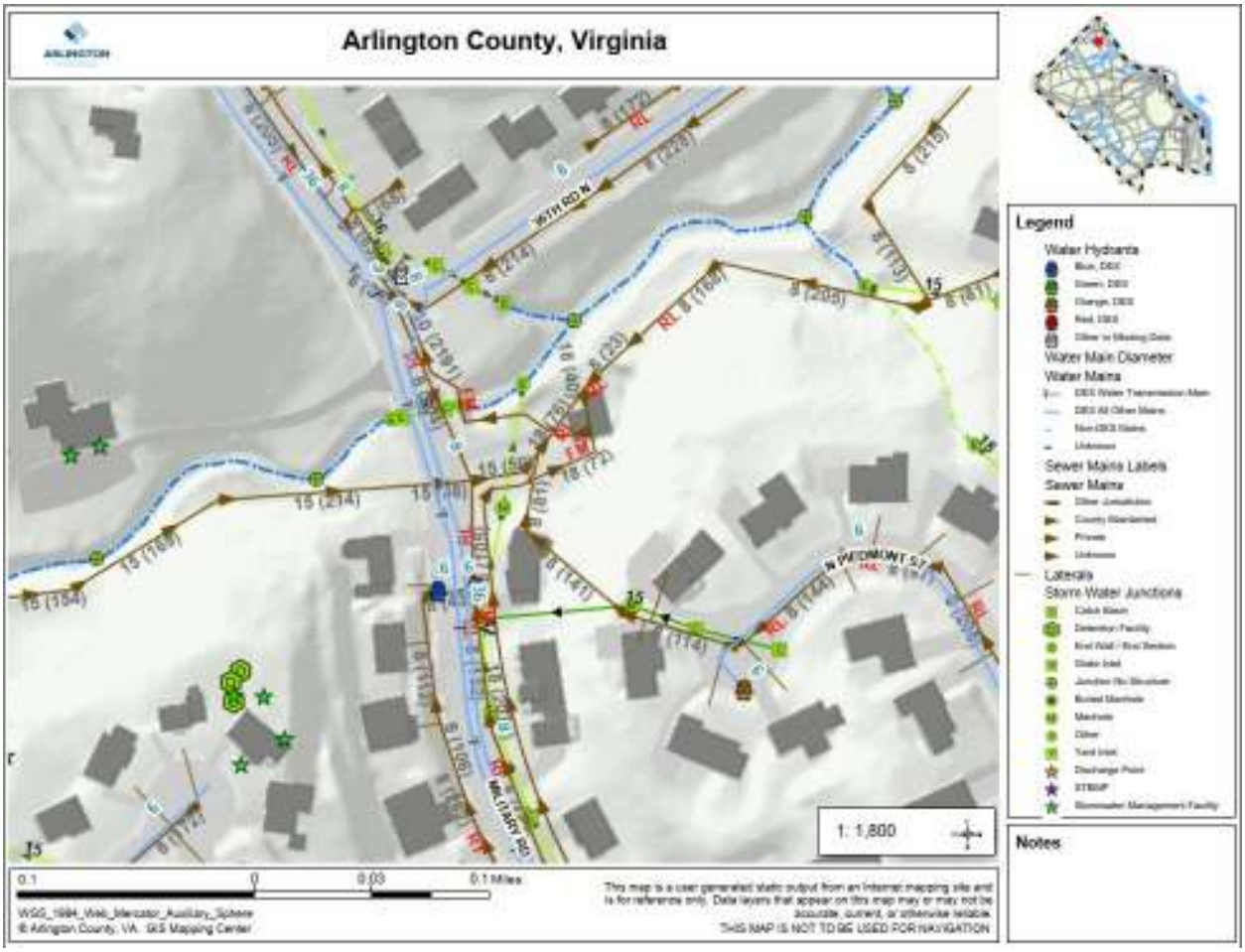


The costs associated with a culvert failure on the transportation network are significant. The culvert is at the intersection of Military Road and 36th Road North. Military Road is a minor arterial road that feeds into Rt 120/Glebe Road and the Chain Bridge, a vital crossing for the County into the District of Columbia. Military Road had an average daily traffic count of 6,200 vehicles per day in 2023. The roadway also supports Arlington Rapid Transit bus routes, 53A and 53B, with an average daily ridership of 2,550 and is also a bike route. Past and future flood events compromise the structural integrity of the culvert and have increased the risk of culvert failure. If the culvert were to fail, the County estimates emergency replacement work would require a detour for 5-6 months. A detour would increase travel time by 6 minutes and travel distance by 2.3 miles for every vehicle-trip (see Figure 3), last approximately 165 days, and would cost $5.6 million in travel delay and increased vehicle operating costs for personal, commercial and transit traffic users. Furthermore, a detour would lead to externalized costs

related to congestion, safety, and emissions of $0.7 million. In sum, the total cost of transportation impacts related to the flood risk to the Military Road Culvert are $6.4 million.

Critical utility infrastructure near the Military Road Culvert is also at risk. Beneath Military Road is a sanitary sewer line that provides service to 2,553 properties (See Figure 4). If the culvert were to fail, a 0.5-mile-long bypass would cost the County $600,000 and take five weeks to become operational. Untreated sewage discharged to the stream for 35 days could cause the County to incur penalties of up to $32,500 per day of violations, for a total of up to $1,137,500 in penalties[1]. Additionally, a sanitary pump station near the Military Road Culvert has experienced minor water intrusion in the past, leading County staff to take precautionary measures, such as site regrading flood barriers for doors and installing some floodproofing equipment to prevent damage from future flood events. Those measures are not expected to prevent a service disruption in an extreme flooding event; however, the County has not yet estimated the cost of a pump station failure due to flooding. The total flood risk cost of utility infrastructure is $1,737,500.

Figure 4. Utilities around the Military Road Culvert Map



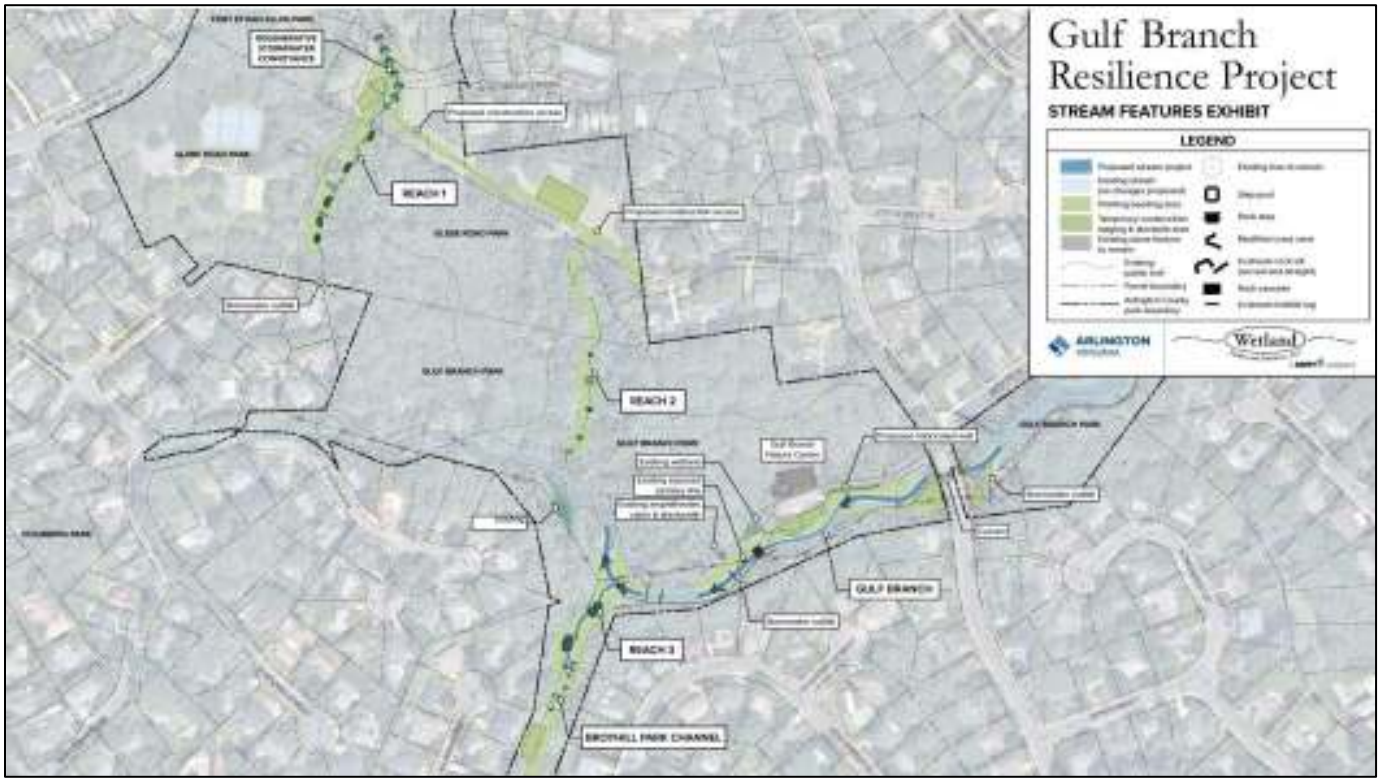
The Gulf Branch Nature Center may be negatively impacted from significant flooding due to the culvert. There is just one access point, a driveway from Military Road that runs parallel to Gulf

[1] Code of Virginia. § 62.1-44.32. Penalties. https://law.lis.virginia.gov/vacodefull/title62.1/chapter3.1/article6/. Accessed on January 7, 2025.

Branch and the Military Road culvert. In a significant flooding event, the water could prevent access to, or potentially washout, the driveway. A repair to the driveway is estimated to take 4-6 weeks and would cost approximately $60,000. The nature center had 7,000 visitors in 2024 but expects visitor counts to increase to pre-pandemic levels, approximately 16,500 visitors per year or 45 visitors a day. Temporary loss of access to the nature center is estimated at $4-12 per hour per visitor based on costs the County charges for outdoor education courses ($718/week for 60 hours of instruction) [2] and the state's charges for access to hiking and fish and wildlife areas ($4/day)[3]. If a flooding event were to compromise access to nature center for 5 weeks to just half of its usual weekly visitors, approximately 158 visitors, at $8 per day, the total cost for the loss of access is $1,264. In sum, the total cost associated with a flooding event on the nature center is $61,264.

The County has prioritized the Military Road Culvert Replacement Project along with the Gulf Branch Stream Restoration (see Figure 5). Properly sizing the culvert for the stream's flow and countersinking it will have environmental benefits that will support the 1,318 linear foot stream restoration. Stream restoration is estimated to remove 86.6 lbs of Total Suspended Solids, 0.06 lb Total Nitrogren, and 0.02 lb Total Phosphorus per linear foot per year. The County does not anticipate nutrient reductions as a result of the Project. On the contrary, the replacement culvert's design emulates the natural stream bed and supports the environmental benefits of restoration.

Figure 5. Gulf Branch Resilience Project Map



[2] Arlington County Public Schools, "Outdoor Lab". https://www.apsva.us/curriculum/outdoor-lab/. Accessed on January 8, 2025.

[3] Virginia Department of Wildlife Resources. Daily Access. https://dwr.virginia.gov/access-permit/#:~:text=The%20cost%20for%20the%20Daily,per%20transaction%20license%20agent%20fee. Accessed on January 8, 2025.

Table 1. Summary of Flooding Risk Costs

Cost Category	Estimated Benefits Realized by Project
Transportation	$6,400,000
Utility Infrastructure	$1,737,500
Recreation	$61,264
Environmental	Not estimated
Total	$8,198,764

The total sum of the project's benefits is $8,198,764. The Project cost is $5,057,516. The cost-benefit ratio of the project is 1.62.

Administration of Local Floodplain Management Regulations

The County is in good standing with the National Flood Insurance Program (NFIP), having an initial Flood Insurance Rate Map (FIRM) created on 10/01/1969, with an updated map on 11/16/23. The current floodplain ordinance can be found here.

Other Necessary Information to Establish Project Priority

Repetitive Loss and/or Severe Repetitive Loss Properties

There are no repetitive loss and/or severe repetitive loss properties in the drainage shed served by the culvert.

Residential and/or Commercial Structures

As the flood zone does not encompass building structures, residential and commercial structures are not impacted by the Project.

Critical Facilities/Infrastructure

The following critical infrastructure and facilities that would be adversely impacted by the Military Road Culvert flooding:

- 115 linear feet of 36" diameter water transmission line runs within the Project limits. The line provides service to 2,335 households.
- Sanitary Pump Station: there is a sanitary pump station located directly adjacent to one of 13 sanitary lift stations in Arlington. Extreme flooding of the pump station could cause expensive damage to the station and cause sewage overflows.
- Roadway transportation network, which supports bus transit, active transportation, and vehicles. Flooding events prevent usage of Military Road and 36th Road North, leading to detours and delays. For first responders, minutes can mean the difference between life and death.

- The Gulf Branch Nature Center is adjacent to the Project area. The Center is in a historic 1920s bungalow and is also the only site in urban Northern Virginia that is on the Virginia Indian Heritage Trail. Culvert flooding blocks access and may cause damage to the facility in extreme events.
- The Madison Community Center is located about 0.7 miles away at 3829 N Stafford Street. It features a multipurpose room, a game room and a fitness room. The center is ADA accessible, with Wi-Fi and restrooms on site. Activities include sports, preschool and senior classes, as well as special events programs.

II. Need for Assistance

Arlington County is a highly urbanized county on the banks of the Potomac River. Approximately 44% of the County's land is impervious and most of its storm sewer system was designed for a 10-year storm. The County is at risk of three types of flooding: interior (pluvial), riverine, and coastal flooding. Recent localized flooding from intense short periods of rainfall have challenged parts of the County's stormwater system. Planning, policies, and projects, like the Military Road Culvert Replacement Project, are necessary to reduce flooding and improve public safety and water quality. The County's resiliency efforts are outlined in its Arlington County Resilience Plan, which was approved by the Department of Conservation and Recreation on January 22, 2025 (see Appendix C).

The Project is located between Census Tract 1004 and 1005, both of which have a Social Vulnerability Index Score of Very Low Social Vulnerability.

The County has technical and financial staff able to manage grant-funded infrastructure projects. The following County staff will be responsible for this project:

- Mohammad Yazdi, Project Manager
- Jennifer Tastad, Engineering Design Team Supervisor
- Soloman Shikur, Engineering Design Team Supervisor
- Michael Morris, Design Engineer

County Department leadership will also be involved, including:

- Mike Moon, Department of Environmental Services Chief Operating Officer
- Greg Emmanuel, Department of Environmental Services Director

The Project team will use AutoCAD Civil 3D, HEC-RAS, Trimble Unity Construct, and MS Office Suite (including MS Project) in the design and management of the project.

Recently, the County has administered the following federal and state grants successfully:

Project: Lynn Street Esplanade and Rosslyn Circle Improvements

Description: Construction of multi-modal improvements on N. Lynn Street, widening Custis Trail and sidewalks, installation of new streetlights and landscaping, upgrading of traffic signals and intersections, and a public art installation.

Funding Source: Virginia Department of Transportation (VDOT) and Federal Highway Administration grant

Total Project Cost: $2,604,425

Project Duration: February 2018 – May 2020

Project: Army Navy Drive Complete Streets

Description: Rebuilding of 0.67 mile of Army Navy Drive as a multi-modal complete street with enhanced street, transit, environmental, and pedestrian facilities.

Funding Source: Northern Virginia Transportation Authority

Total Project Cost: $18,501,000

Project Duration: April 2021 – December 2025

Project: Ballston Pond Wetland Restoration

Description: Retrofit of a dry pond into an improved wetland pond to treat stormwater from I-66 and enhanced wildlife habitat and recreation improvements.

Funding Source: Stormwater Local Assistance Fund (SLAF), Virginia Department of Environmental Quality

Total Project Cost: $5,500,000

Project Duration: December 2021 – June 2023

Project: North Dumbarton Street Upstream Culvert

Description: Replacement of existing metal culverts with a single, open span arch design (similar to the design proposed for the Military Road culvert), storm drain inlets, and stream channel stabilization to reduce future flood risk to properties.

Funding: $5,214,000

Funding Source: Federal funds for Fiscal Year (FY) 2024 as part of VDOT's Six-Year Improvement Plan.

Social Vulnerability Index (SVI)

The Social Vulnerability Score is very low social vulnerability, with a score of -1.97 according to the Virginia Flood Risk Information System (VFRIS) for Block Group 1 census tract 1004.

III. Alternatives

As part of the design process, the County evaluated several different sizes of culverts. Box culverts were initially considered for the project; however, a precast arch was chosen due to faster installation, better hydraulic efficiency, and less materials. Additionally, the County determined that the precast arch provides enhanced stream ecology and is the more aesthetically pleasing option for the area which is frequently visited by the public.

IV. Goals and Objectives

Climate Resiliency - Flood Prevention

As global warming continues to worsen and the effects of climate change continue to grow, higher temperatures and increasingly intense storms are expected year-round in the state.

Increased rainfall will put increasing pressure on existing stormwater infrastructure within the County. Atlantic hurricanes are of special concern in this region. Between 1970 and 2004, the number of major hurricanes (Category 4 or 5) worldwide nearly doubled, now making up approximately 35% of all hurricanes. Major hurricanes in the North Atlantic increased from 16 storms between 1974 and 1989 to 25 storms between 1989 and 2004, a 56% increase. One of the most significant concerns for this region is the potential for catastrophic storm surges along the Potomac River caused by a major hurricane moving up the Chesapeake Bay. Hurricane Isabel in 2003 caused significant flooding due to a roughly 7.2-foot storm surge along the Potomac River shoreline south of Alexandria. Based on the average accelerated rate of sea level rise currently predicted, an equivalent hurricane could generate a roughly 11-foot storm surge by 2100.

While the County has prepared a Stormwater Master Plan (Plan), adopted by the County Board in 2014, the County needs additional funding to accomplish all of the identified improvements needed. The Plan also contains information on the condition of the County's stormwater management systems, streams, and watersheds. As federal and state stormwater regulations have become more stringent, Arlington County has had to balance funding and resources available for meeting the regulatory requirements within today's economic climate. Currently, the majority of the County's existing conditions and resources have been acknowledged and proposed projects have been identified and prioritized.

The Project will seek to flood proof the culvert through an improved design. The existing 60-inch, double-barrel culvert will be replaced with a new 21-foot-wide by 4.2-foot-high by 75-foot-long precast concrete arch culvert. The improvement to the culvert will dramatically increase the resiliency and sustainability of adjacent and nearby infrastructure and greatly benefit the aquatic species present. The new culvert will be well adapted to handle anticipated future climate change impacts as the new design will be capable of withstanding a 10-year storm event and handling swift flows during rain events. Dechannelizing the stream and restoring open channel flow will allow for more natural hydrogeomorphic processes downstream and improve the condition of the river ecosystem.

A climate resilient, flood proof design will prevent flooding of Military Road and adjacent properties, reducing property damage and preventing road closure. This will avoid lengthy reroutes (reducing GHG emissions and ensuring continued rapid response times from first responders), as the roadway connects to Virginia State Route 120 (North Glebe Road) to the north and Virginia State Route 29 (Langston Boulevard) to the south.

State of Good Repair

The Project will improve roadway drainage by upsizing the culvert to convey a 10-year storm event without overtopping onto Military Road in order to prevent flooding of the roadway and adjacent single-family homes. As the culvert is currently at-risk of failure, an improved design will ensure the culvert enters a good state of good repair, which will reduce maintenance costs.

As flooding events are frequent, extraneous costs are frequently experienced. For example, in July 2019, a storm event resulted in severe erosion of the culvert. If not replaced, flood water and debris will likely continue to exceed the capacity of the existing culvert and cause damage to the road and the nearby sanitary pump station.

Successful Migration of the American Eel

The County seeks to improve fish passage under Military Road by countersinking the new culvert. Healthy fish passage also requires a culvert large enough to handle swift water during storm events. While American eels have the ability to scale many obstacles and are even known to move over land, vertical barriers, such as culvert walls, are not passable by the species.

Overfishing in the early 1900s, coupled with the proliferation of dams for hydroelectric power, extirpated the eels in much of their native range in the Chesapeake Bay area. Although the eels are sometimes able to surmount such structures, the serial nature of dams and barriers acts additively, with progressively fewer eels ascending each subsequent barricade. The loss of this keystone species has a deleterious effect on the ecosystem as eels serve not only as prey for many fish, mammal, and bird species, but also serve to balance the overpopulation of invertebrates and decaying matter as American eels feed on live and recently deceased animal matter. While American eels have been found in the stream above and below the Military Road culvert, scaling of the rocks to either reach the culverts or cross the road both present risks of exposure for the eel.

The new culvert design will hold sufficient water for fish to pass during the dry season, unlike the existing structure, which will allow for the American eel to more easily reach portions of the river. This will allow the American eel to balance the overpopulation of invertebrates and reduce the amount of decaying matter. The overall benefit of a contiguous system with no barriers to fish passage will be a more robust assemblage of macroinvertebrates and fish species, which will provide a stable aquatic ecosystem. Returning the ecosystem to more natural conditions will additionally benefit predator species, such as mammals and birds, as these forage organisms provide a basis for sustainability.

V. Approach, Milestones, and Deliverables

Although the Project is currently only at 60% design, the Project is expected to reach final design by July 2025. Simultaneously, the County will proceed with internal environmental review and agency permitting, completing the process by September 2025.

As Military Road is within the County right-of-way (ROW), the County will not need to acquire ROW and the Project's design does not require easements. As a result, the County will be ready to begin the contractor procurement process in October 2025 following grant obligation. The contractor will be expected to complete all construction activities following a notice to proceed in May 2026. Construction is expected to be complete by May 2027. Fish monitoring activities will be complete continuously, with benchmark data relevant to the project collected from 2025-2028.

The County will prepare a detailed Project Work Plan, budget, and schedule, which may result in a revised statement of work following grant obligation. The detailed Project Work Plan will describe, in detail, the activities and steps necessary to complete the tasks outlined in the statement of work. The work plan will include the Project Management Plan which describes the County's approach.

The County will carry out the responsibilities of project management and administration, project reporting and project control requirements, meetings and agency coordination, office engineering, and field engineering. The final reimbursement request and project deliverables (if any) will be submitted within 90 days of the Project's completion date.

While there are no required partners for the completion of the Project, the County will need to coordinate with the U.S. Army Corps for the U.S. Army Corps Nationwide Permit, FEMA for the Conditional Letters of Map Revision (CLOMR), the state for the Local Land Disturbing Activity Permit, and the EPA for NEPA.

VI. Relationship to Other Projects

The County is working holistically in the Gulf Branch watershed to address water quality concerns. Work includes the Gulf Branch Stream project planned for construction in the County Fiscal Year (FY) 2026, the Gulf Branch Green Streets projects, which started construction in November 2024, and two outfall repair projects currently in design.

The Gulf Branch Green Streets project will implement green stormwater infrastructure in the transportation right of way. The project will add four new bioretention facilities in areas of existing pavement. Together, these facilities will capture and treat previously uncontrolled stormwater runoff from 3.4 acres to protect Gulf Branch.

The Gulf Branch stream project is located upstream of the Military Road culvert. It involves the repair and enhancement of the main channel of Gulf Branch and several of its tributaries, along with the implementation of a Regenerative Stormwater Conveyance best management practice upstream of one of the reaches. The project will create a stable stream channel to accommodate storm flows, protect exposed sanitary sewer pipes and other infrastructure, address active erosion and provide habitat. It will also reduce excess sediment and nutrients being transported downstream and supports the Chesapeake Bay clean-up effort.

Two stormwater outfalls to Gulf Branch will also be repaired in FY26-28. These outfall repair projects are located downstream of the Military Road culvert. The projects will repair failing infrastructure, stabilize eroding outfall channels, and improve habitat.

All of these projects are in the County's Adopted Capital Improvement Plan FY 2025 – FY 2034. Committed funding sources are from bonds and U.S. Department of Housing and Urban Development grant Community Project Funding. The County's stream restoration team will be pursuing a Stormwater Local Assistance Fund grant from the Virginia Department of Environmental Quality as they finalize the Gulf Branch Stream project.

Lastly, there are other infrastructure projects underway in the general vicinity of the Military Road culvert. These include a sanitary sewer force main project beginning construction in summer/fall 2025, a water main replacement project nearing completion, and two transportation projects: the Military Road and Nelly Custis roundabout and Old Glebe Road bridge replacement.

VII. Maintenance Plan

Arlington County's Bridge and Culvert program will regularly inspect and maintain the Military Road Replacement culvert according to the Virginia Department of Transportation's Inventory and Inspection Requirements for Bridges and Large Culverts (IIM-S&B-27.12). Inspections will be conducted by County staff or contractors. See Appendix A.

VIII. Scoring Criteria

Project Type

Hybrid approach resulting in nature-based solution. (20 points)

Social Vulnerability Index Score

Very low social vulnerability (-1.97). (0 points)

Community Scale of Benefits

More than one census block. (30 points)

Expected Lifespan of Project

- Over 20 Years (10 points)

Remedy for NFIP probation or suspension

No. (0 points)

Proposed project part of a low-income geographic area

No. (0 points)

Proposed project implements a Chesapeake Bay TMDL BMP

No. (0 points)

Budget Narrative

I. Budget Summary

The estimated total Project cost is $5,057,516, inclusive of work to be completed by third parties to bring the Project to completion. As a non-low-income geographic area, the County is requesting funding for 60% of the Project cost, at a value of $3,034,510. The 40% match of $2,023,006 will be sourced from Arlington County's capital improvement budget through bond funds. Per the letter of funding commitment (see Appendix B), the funds have been secured and are available to use as soon as CFPF funds are obligated, with no restrictions on the use of the funds.

II. Budget Category Detail

Table 2 details the Project budget following the CFPF Budget Narrative Template. Included in the Contracts cost category are the estimated costs for up to four contracts:

- Primary construction contract, which includes estimated escalation of costs over four years and a 25% contingency cost: $4,437,077
- Contract for utility work associated with the Project also includes escalation and a 25% contingency cost: $58,493
- Construction management and inspection, estimated at approximately 10% of the construction cost: $449,557
- Construction administration, estimated at 2.5% of the construction cost: $112,389

The total of all Contracts cost is $5,057,516. Of that total, the County only requests $3,034,510 for the Project. The remainder of the Project's Contracts costs, $2,023,006, will be covered using the County's local match funding.

No costs for County personnel, fringe, travel, equipment, supplies or indirect costs are included in this request. The budget also does not include any pre-award/startup or maintenance costs.

Table 2. Budget Table

Breakout By Cost type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Local Share	$ -	$ -	$ -	$ -	$ -	$ 2,023,006.00	$ -	$ -	**$ 2,023,006.00**
State Share – CFPF Grant	$ -	$ -	$ -	$ -	$ -	$ 3,034,510.00	$ -	$ -	**$ 3,034,510.00**
Pre-Award/Startup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 5,057,516.00**	**$ -**	**$ -**	**$ 5,057,516.00**

Appendix A – Virginia Department of Transportation Bridge Safety Inspections: Inventory and Inspection Requirements for Bridges and Large Culverts (IIM-S&B-27.12)

VIRGINIA DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Bridge Safety Inspections	NUMBER: IIM-S&B-27.12
SPECIFIC SUBJECT: Inventory and Inspection Requirements for Bridges and Large Culverts	Date: March 27, 2024
	SUPERSEDES: IIM-S&B-27.11
DIVISION ADMINISTRATOR APPROVAL: /original signed/ Gregory Henion, P.E. State Structure and Bridge Engineer Approved: March 27, 2024	

Changes are shaded

INTRODUCTION:

The attached instructions are intended to complement the National Bridge Inspection Standards (NBIS) found in the Code of Federal Regulations Title 23 Highways – Part 650, Subpart C; *The Manual for Bridge Evaluation* (MBE), published by the American Association of State Highway and Transportation Officials (AASHTO); AASHTO Manual for Element Inspection (MBEI), and the AASHTO Movable Bridge Inspection, Evaluation, and Maintenance Manual. For the remainder of this document the Virginia Department of Transportation shall be referred to as VDOT.

A list of Bridge Safety Inspection Documents referenced in this memorandum may be found at the following – https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/structure-and-bridge/.

DEFINITIONS:

For the purposes of this memorandum, unless otherwise noted, the term 'structure' will encompass both bridges and culverts.

Bridge: Any structure not defined as a culvert and which typically has deck, superstructure and substructure components. Some bridge structures may have integral deck and superstructures – i.e. slab/box beams, T-beams, rigid frames, etc. In these

cases, the deck and superstructure may be considered separately for condition assessment, however, general condition ratings (GCR's) shall not vary by more than one for the deck and superstructure.

Bridge Record: Cumulative information about an individual bridge or culvert meeting the Federal definition of a bridge as defined in the MBE.

Close-up Inspection: Inspection performed while having a clear unobstructed view of the detail or member in question (typically within 12 feet or one lane) such that it can be determined if defects are present. While binoculars (optical enhancements), UAS (Unmanned Aircraft System) and/or robotics can be used to supplement a visual inspection, they shall not be used in lieu of methods and requirements defined herein.

Complex Bridges: This category of structures includes movable, cable-stayed, segmental concrete, and other bridges with unusual characteristics. These types of structures will require specialized inspection procedures or specialized personnel/inspector training and experience. A specialized inspection procedure, additional personnel/inspector training and experience required to inspect complex bridges will be developed prior to the scheduled inspection taking place. The complex bridges shall receive routine and in-depth inspections according to those procedures. These bridges shall be identified in the inventory.

Critical Finding: A structural or safety related deficiency that requires immediate action to ensure public safety.

Culvert: Any structure that has an integral floor system that supports the sidewalls and provides a lined channel. A culvert has no distinction between substructure and superstructure and typically has no deck. Multiple box or pipe culverts will be considered a single structure where the clear distance between openings is less than half of the smaller contiguous opening. Otherwise, each opening shall be considered a separate structure.

Damage Inspection: An unscheduled inspection to assess structural damage resulting from environmental factors or human actions.

Element Inspection: An inspection in accordance with the AASHTO Manual for Bridge Element Inspection and VDOT Supplement that includes defining the total quantity of National Bridge Elements (NBEs), Bridge Management Elements (BMEs) and Agency Developed Elements (ADEs) present and assessing the quantity to be included in the condition states for each element present.

Entities: Localities (municipalities), other agencies, toll authorities and other non- VDOT organizations that own and maintain NBIS-qualifying structures.

Fatigue and Fatigue Prone Details: The definition of fatigue is the tendency of a member to fail at a stress level below its yield stress when subject to cyclical loading. Fatigue prone details are details meeting the AASHTO fatigue detail categories of C through E' on bridges meeting at least one of the following two criteria: either carries a route that has 500 or more trucks per day or carries an interstate route.

Note that the classification of fatigue prone details by category does not apply to all details

and some details may be considered fatigue prone due to other conditions and forces. These conditions will typically cause localized stress concentrations. See attachments for a list of typical fatigue prone details. Engineering judgment is required to recognize and assess structure specific fatigue prone conditions.

Footbridge: A bridge intended for pedestrians, cyclists, animal traffic and horse riders only (not vehicular traffic) and does not cross highways and/or railways.

Hands-on Inspection: An inspection performed within an arm's length of the detail or member being inspected. This is intended to mean the inspector is close enough to touch the member or detail should magnification, testing, measurement or other quantification methods be needed.

In-depth inspection: A routine inspection in combination with inspections of one or more members above or below the water level utilizing advanced techniques in addition to visual techniques to identify deficiencies not readily detectable using routine inspection procedures. This type of inspection will be required for complex bridges or structures identified by VDOT, with pre-defined inspection techniques, for a special assessment of one or more components or the entire structure. Additionally, this type of inspection is commonly associated with determinations of structural integrity of compromised members.

Initial Inspection: The first inspection of a new structure when it becomes part of the highway system and an active record in the inventory. This inspection serves to record required bridge inventory data, establish baseline conditions, and establish the intervals for other inspection types.

Inspection Date: The date on which the field portion of the bridge inspection is completed.

Interim Inspection: Special inspection to assess or monitor structural damage, a structural deficiency, or any other feature of a structure that needs to be inspected on a specific frequency. Interim inspections are typically performed more frequently than the regular inspection. Only those features requiring the interim inspection need to be inspected. A cursory inspection shall be performed of other components, members and elements (with an emphasis on those in fair or poor condition) while inspectors are on site.

Internal redundancy: A redundancy that exists within a primary member cross-section without load path redundancy, such that fracture of one component will not propagate through the entire member, is discoverable by the applicable inspection procedures, and will not cause a portion of or the entire bridge to collapse.

Large Culvert: A culvert that either meets the definition of a Non-NBI structure in this IIM or a culvert that meets the definition of a structure as defined in Federal item 112 (Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges) in the NBIS.

Load path redundancy: A redundancy that exists based on the number of primary load-

carrying members between points of support, such that fracture of the cross section at one location of a member will not cause a portion of or the entire bridge to collapse.

NBI: Abbreviation for "National Bridge Inventory." In the context of this memorandum when a structure is referred to as an NBI structure it meets the federal definition of a bridge as defined in the NBIS.

Non-destructive Testing (NDT): A diverse group of analysis techniques to evaluate the properties of a material, component or system without causing damage.

Non-redundant Steel Tension Member (NSTM): A primary steel member fully or partially in tension, and without load path redundancy, system redundancy or internal redundancy, whose failure may cause a portion of or the entire bridge to collapse. Formerly referred to as Fracture Critical Member (FCM).

NSTM Bridges: Bridges that contain one or more Non-redundant Steel Tension Members. Formerly referred to as Fracture Critical Bridges.

NSTM Inspection: A hands-on inspection of a nonredundant steel tension member.

Non-NBI: A structure to be included in the VDOT Structure Inventory that does not meet the NBI definition above. Structures in this category include, but are not limited to, culverts and bridges less than 20 feet between undercopings of abutments or between springlines of arches and structures which do not carry highway traffic (i.e. railroad structures, pedestrian structures, footbridges, etc.). A culvert in this category can be a single barrel or have a number of barrels where the clear distance between openings is less than half of the smaller contiguous opening and the total hydraulic opening is equal to or greater than 36 square feet. For box culverts, the triangular haunches shall not be excluded from the opening measurement.

Nonscheduled/Damage Inspection: Inspection to assess structural damage resulting from environmental factors or human actions or to inspect changed conditions of elements due to construction or maintenance activities when the NBI schedule will not be adjusted accordingly.

Past Due Inspection: Inspection that did not take place in or before the month it was due.

Pedestrian Bridge: A bridge intended for pedestrians, cyclists, animals and horse riders which may or may not carry vehicular traffic and does cross highways and/or railways.

Qualified Person: An individual qualified and authorized to oversee specific repair or improvement work from which a work completed report is based.

Regular/Routine Inspection: Inspection which meets the requirements of a routine inspection as defined in the NBIS and MBE. In this memorandum, the terms regular and routine are used interchangeably.

Service Inspection: An inspection to identify major deficiencies and safety issues, performed by personnel with general knowledge of bridge maintenance or bridge inspection.

Special Inspection: An inspection scheduled at the discretion of the bridge owner, used to monitor a particular known or suspected deficiency, or to monitor special details or unusual characteristics of a bridge that does not necessarily have defects.

Sufficient Evidence (of work completed): Documentation prepared by a qualified person about repair or improvement work completed that is comprised of each of the following;

- A detailed written description of all work performed, including the condition of the repaired or improved items or elements.

- Photographs of all individual repairs or improvements, with sufficient detail for the NBIS qualified Team Leader to verify the condition of all of the repairs or improvements.

System Redundancy: A redundancy that exists in a bridge system without load path redundancy, such that fracture of the cross section at one location of a primary member will not cause a portion of or the entire bridge to collapse.

Underwater Inspection: Inspection performed by trained and qualified personnel to assess the condition of structural elements and the surrounding channel, which cannot be inspected visually at low water or by wading or probing, and generally requiring diving or other appropriate techniques. Performed as part of the NBI scheduled underwater inspection or to supplement regular or nonscheduled inspections.

Unobstructed View: View of a component or an element that is not visibly obstructed by another object or member, dirt, debris, vegetation, corrosion, etc. This is also applicable to lighting conditions that may cause shadows across components or elements to be inspected.

ROLES AND RESPONSIBILITIES:

Structure and Bridge – Central Office

The Central Office Structure and Bridge Division shall have overall responsibility for the statewide compliance with the inventory and inspection policy standards and procedures of all NBI and VDOT maintained Non-NBI structures.

Structure and Bridge – District

Each District Structure and Bridge Section shall maintain an organization that will inspect, or cause to be inspected, all structures defined in this memorandum as NBI or VDOT maintained Non-NBI structures. Where an NBI structure crosses a boundary between VDOT jurisdiction and a neighboring State, the District Structure and Bridge Section shall determine through a joint written agreement the responsibilities for each entity for that bridge. District Structure and Bridge Sections shall have overall responsibility for compliance with the NBIS and VDOT requirements of all structures within their respective district, including other entities.

The Assistant District Bridge Engineer for Inspection or their designee, typically the

Assistant District Bridge Engineer for Inspection, shall follow the procedures outlined in Table 1 on the following page for notifying entities of their inspection responsibilities within their respective District.

Railroad Structures – District/Consultant

To obtain railroad right of entry agreements, coordination shall be made with the Virginia Department of Transportation, Right of Way and Utilities Division, Rail Section. Advanced coordination should be initiated typically three to six months prior to the inspection due date. Inspectors shall have railroad safety training that would satisfy the respective Railroad (RR) where required. Inspection of the bridge shall be performed after obtaining the Right of Entry Agreement (ROE) and scheduling flagging services with the respective RR utilizing the Rail ROE Permit Request process.

Clearance measurements (horizontal and vertical) are required to be taken at each inspection.

Entity Notification

Table 1 – Procedures for Notifying Entities for Inspections Due

	Reason for Notification	When to Notify	Distribution
1.	Inspection Schedule	6 months in advance of inspections due	NOTIFY ● Official directly responsible for the inspection program in the entity
2.	Follow Up for Inspections Due in Previous Month	Monthly – From 1 to 30 days past the month due	NOTIFY ● Official directly responsible for the inspection program in the entity to determine the status of inspections due in the previous month (has it been inspected, when will it be inspected if it has not been inspected) COPY ● Central Office Structure and Bridge Safety Inspection Program Manager ● Official in the highest authority in the entity being notified.
3.	Follow Up for Inspections 31 to 60 Days Beyond Month Due	Monthly – From 31 to 60 days past the month due	NOTIFY ● Official directly responsible for the inspection program in the entity COPY ● VDOT's Local Assistance Division and the local liaison in the District ● Central Office Structure and Bridge Safety Inspection Program Manager ● Official in the highest authority in the entity being notified.

4.	Subsequent Follow Up for Inspections 61 Days or More Beyond Month Due	Monthly – After 61 days past the month due	NOTIFY ● VDOT's Local Assistance Division and the local liaison in the District COPY ● Central Office Structure and Bridge Safety Inspection Program Manager ● Assistant State Structure and Bridge Engineer for Bridge Safety Inspection ● Official in the highest authority in the entity being notified. ● Official directly responsible for the inspection program in the entity

Notification procedures for load ratings and inventory discrepancies shall be similar to Table 1. When these submissions are not in accordance with the time limits set forth in the NBIS or this memorandum, the District Structure and Bridge Engineer shall notify the entity in accordance with Step 3, 'Follow Up for Past Due Inspections', outlined above and, if necessary, follow up with Step 4, 'Subsequent Follow Up for Past Due Inspections'.

Entities

Each entity shall maintain an organization that will inspect, or cause to be inspected, all structures defined in this memorandum as NBI that are owned or maintained by the entity. Each entity shall have overall responsibility for compliance with the NBIS and applicable VDOT requirements of all NBI structures within their respective jurisdiction.

The NBIS requires VDOT to maintain the structure inventory system of all public roads maintained by public entities that are within Virginia's boundaries. In order to maintain this information each entity must submit all required information, to include structural inventory and appraisal data in accordance with the NBIS, inspection reports in accordance with the NBIS and MBE, and load ratings for all legal vehicles to VDOT in accordance with the policies and procedures set forth in the NBIS and IIM-86. Additionally, for all NBI structures on the National Highway System (NHS), entities shall conduct element inspections and submit all element data to VDOT for entry into the Department's Bridge Management System (BrM). Upon request, copies of the Inspection Summary Report and structure inventory sheets will be provided to the entity when the inspection schedule is transmitted.

Generally, non-NBI structures and large culverts will meet the requirements of this IIM, however, they are not subject to NBIS regulations and may deviate from certain programmatic requirements, with approval from the state-wide Bridge Safety Inspection Program Manager.

Entities are strongly encouraged to use VDOT's most current electronic safety inspection report form for Entities (SB541). Entities may use a different safety inspection report form; however, the contents must, at a minimum, meet the requirements set forth in the NBIS. Reports submitted by Entities shall include both printed and electronic copies.

FREQUENCY OF INSPECTIONS:

All NBI structures shall receive inspections at the frequency indicated in Table 2, in the following section. The District/Entity shall use engineering judgment to inspect the structure more frequently as conditions warrant. VDOT maintained Non-NBI structures and large culverts are not subject to NBIS regulations and may deviate from the frequency indicated in Table 2, with approval from the state-wide Bridge Safety Inspection Program Manager."

Every effort shall be made to inspect each structure in the month the inspection is due. If a structure becomes past due, immediate action shall be taken to inspect the structure and the reason for the inspection being past due documented. As soon as it is known that an inspection is expected not to be performed within the month due, the reasons for the late inspection must be submitted to the Central Office for notification of the FHWA to be considered for an inspection waiver.

Inspections not performed within the month due shall be reported, by the responsible team leaders for VDOT or by the official directly responsible for the inspection within entities, immediately to the Assistant District Bridge Engineer for Inspection to assure that appropriate documentation, including the structure information, reason for the late inspection and the inspection schedule is gathered and submitted to the Central Office Structure and Bridge Division. A copy of the reason for the late inspection shall also be included in the inspection folder.

When construction and/or maintenance activities cause a change to the NBI general condition rating(s), vertical clearance or posted restrictions, the structure must be re-inspected and the changes are required to be made within 30 days after construction has been completed or within 30 days of becoming aware of a possible change. Generally, maintenance work which is considered preventative or restorative (i.e. deck patching, deck overlays, painting, repairing expansion joints, crack repairs…etc.) can be documented by conducting a nonscheduled inspection that will not change the NBI next inspection date.

Table 2 – Frequency of Inspections

FREQUENCY	NBI	NON-NBI
12 months	NSTM Bridges (Fracture Critical)	NSTM Bridges (Fracture Critical) (4)
	Redundant pin and hanger assemblies with evidence of problems such as frozen hanger bars or other questionable conditions	Redundant pin and hanger assemblies with evidence of problems such as frozen hanger bars or other questionable conditions
	Non-redundant pin and hanger assemblies	Non-redundant pin and hanger assemblies
	Structures having a general condition rating (GCR) of '4' or less on one or more of the following: Deck; Superstructure; Substructure; Culvert (1)	Structures having a general condition rating of '4' or less on one or more of the following: Deck; Superstructure; Substructure; Culvert (1)
	Underwater inspections where conditions exist which contribute to a GCR of 4 or less and these conditions can only be inspected by an underwater inspection	Underwater inspections where conditions exist which contribute to a GCR of 4 or less and these conditions can only be inspected by an underwater inspection
24 months	Redundant pin and hanger assemblies except as noted above	Redundant pin and hanger assemblies except as noted above(4)
	Bridges and culverts except as noted above	Bridges, except as noted above, and Culverts with a general condition rating of '5'
		Pedestrian bridges and footbridges.
48 months	Not applicable	Culverts and footbridges(2)(4), except as noted above with GCR of '6' and above.
60 months	Underwater inspections of bridges and culverts	Underwater inspections of bridges and culverts
See footnote (3)	Complex bridges	Not applicable

(1) Only the bridge component(s) (deck, superstructure and/or substructure) which has the general condition rating (GCR) of '4' or less need to be inspected at the interim inspection frequency of 12 months. When conditions exist that justify a GCR of 4 or less and the affected area(s) can only be inspected through an underwater inspection, the underwater inspection frequency shall be reduced to 12 months. However, if the culvert component or 2 or more bridge components for a given structure have a general condition rating of '4' or less, the regular inspection frequency for the entire structure shall be 12 months.

(2) The inspection frequency for footbridges except swing spans and/or NSTM structures may be changed to 48 months if all components have general condition rating of '6' or above.

(3) Complex bridges shall receive an in-depth inspection at the level and frequency detailed in the complex bridge list/procedure. Movable bridges and their inspections are described in detail in the AASHTO "Movable Bridge Inspection, Evaluation and Maintenance Manual".

(4) Structures with features that introduce unique risk factors (e.g. NSTM, Pin & Hanger, frequent permit loads, age, etc.), should be reviewed for isolated conditions that warrant increased inspection frequency. These individual determinations shall be at the discretion of the District Bridge Safety Inspection Engineer. The inspection frequency of NSTM pedestrian and footbridges shall not exceed 12 months.

Clearances

Vertical and lateral clearance restrictions for roadways on and under each NBI structure and each VDOT maintained Non-NBI structure shall be checked during each regular inspection of the structure.

Non-NBI structures owned and maintained by non-VDOT entities which create vertical and lateral clearance restrictions to a roadway maintained by VDOT shall have their vertical and lateral clearances checked at intervals not to exceed 24 months.

Closed Structures

Closed structures, not undergoing construction or maintenance activities, shall be visited by the appropriate VDOT personnel or local entity at intervals not to exceed 24 months to assure the barricades and signage are still functioning as intended and the structure does not pose a risk to the public. Approach photographs (with date stamp included) showing barricades should be taken and included in the bridge file. These inspections shall be documented in the bridge record and should note which VDOT entity performed the inspection. Documentation can be a memo to the bridge file or notes in the Bridge Management System (BrM). Photos should be placed in the bridge file.

LEVEL OF INSPECTIONS AND SPECIAL CATEGORY INSPECTIONS:

All NBI structures shall receive inspections at the same level as defined by the NBIS requirements, MBE, and this document. Element Inspections are required for all VDOT maintained NBI structures except temporary structures, pedestrian and foot bridges, pier or dock structures and under records. Generally, non-NBI structures and large culverts will meet the requirements of this IIM, however, they are not subject to NBIS regulations and may deviate from certain programmatic requirements, with approval from the state-wide Bridge Safety Inspection Program Manager.

Temporary structures in service longer than 90 days shall be entered into the inventory and shall be subject to the same inspection requirements as permanent structures, including determinations of safe load capacity and clearance limits, but excluding Element Inspections. Routine inspection techniques shall be sufficient to quantify the condition and remaining section of structural components. Routine inspections are primarily visual and tactile (i.e. probing, measuring, sounding, etc.) in nature; however, these inspections may include cleaning sheet corrosion in key locations that influence load carrying capacity, dye penetrant testing and/or magnetic particle testing to verify cracking in steel members, removing concrete delamination at isolated locations over traffic, sounding concrete to detect delamination, removing debris as needed to access the element, probing and/or drilling timber members, etc.

For each routine inspection and special category inspection noted below, the report shall document the results of the inspection using notes, sketches and/or photographs. At each subsequent inspection, an on-site comparison with the previously reported conditions is to be made and documented. As a result of these routine and special category inspections, any critical findings (see page 16, “Critical Findings”) and urgent repairs shall

be brought to the attention of the District Structure and Bridge Engineer or designee or the local Entity in an expeditious manner within a timeframe not to exceed 24 hours. If warranted, a critical recommendation shall be issued. Emergency findings shall be reported immediately by the Team Leader while on-site. Contact will normally be initiated by telephone and followed up the same day with email documentation of the findings, including photographs. Once contacted, the District Structure & Bridge Engineer or designee will work with the Team Leader to quantify and assess the situation to determine if it warrants an emergency response or can be addressed through the critical recommendation process.

Pin (or pinned) Connections

During each scheduled inspection of the pin and hanger assembly, each pin assembly shall receive a hands-on inspection and each pin shall receive ultrasonic testing. Where practical, ultrasonic testing of each pin shall be performed from both ends of the pin. A statement about the condition of each pin or groups of pins shall be entered in the inspection report regardless of condition. Separate ultrasonic testing documentation shall be kept in the bridge file and may be included in the inspection report as optional supporting documentation.

Other types of pin connections that will require ultrasonic testing may exist on structures including details such as truss pins, girder pin connections, superstructure to substructure pin connections, etc. The District Structure and Bridge Engineer, or their designee, shall determine the need for this additional level and frequency of testing for these pin connections.

Fatigue Prone Details

Fatigue prone details shall receive a hands-on inspection of fatigue prone categories D, E, and E' details during each inspection. Category C or C' details shall receive a close-up inspection during each inspection. Additionally, other areas that may cause stress concentrations (i.e. out of plane distortion, traffic impacts, copings, field welds, flame cut surfaces, etc.) shall be evaluated and classified as fatigue prone (as applicable) and receive a hands-on or close-up inspection as determined by the District Structure and Bridge Engineer or designee. Bridge records are to include sketches showing category type and location of fatigue prone details and any specific areas that are to be inspected. Inspection reports shall note the fatigue prone details and locations and a statement regarding the method of access used during the inspection. A statement about the condition of each fatigue prone detail or group of details shall be entered in the inspection report regardless of their condition. Structures containing fatigue prone details shall be coded accordingly in the inventory.

Non-redundant Steel Tension Members

Non-redundant steel tension members and their connections (including gusset plates) are to receive a hands-on inspection during each inspection as required. The Non-redundant Steel Tension Member (NSTM) inspection uses visual methods that may be supplemented by NDT for verification and quantification of visual indications. A very detailed visual hands-on inspection is the primary method of detecting cracks. This may

require that critical areas be specially cleaned prior to the inspection and additional lighting and magnification be used. NDT methods may be required for verification and documentation of visual indications and shall be used at the discretion of the Team Leader. Note that it is not acceptable documentation to report a possible crack or to report a visual indication without conclusive determination and quantification of the field condition. Bridge records are to include sketches showing the type and location of NSTM members or details and any specific areas that are to be inspected. Inspection reports shall note the NSTM members or details and locations and a statement regarding the method of access used during the inspection. A statement about the condition of each member or detail or group of details shall be entered in the inspection report regardless of their condition. Structures containing NSTM members shall be coded accordingly in the inventory.

Similar to crack verification in steel members, if an inspection finds areas on NSTM members or their connections (including gusset plates) where corrosion is evident and section loss cannot be quantified or determined by visual and tactile methods, an appropriate non-destructive evaluation technology shall be used to assess the condition and quantify the remaining thickness.

Complex Bridges

Complex bridges are to receive an in-depth inspection in accordance with the complex bridge list/procedure. Bridge records are to include appropriate documentation for any specific details that are to receive in-depth inspection including method of access for the specific location(s).

INSPECTION AND INVENTORY REQUIREMENTS

Determining Structure Numbers (State)

This section may be used as a guide to create new Virginia Structure Numbers. When a structure record is created, the Virginia Structure Number is typically given to a structure based upon which highway system the bridge is located. The following series can be used to create the Virginia Structure Number: For city/county line structures, a 9 should be placed in the second digit of the above series (except for the 100-999 and the 1800 series).

SERIES	EXPLANATION
100-999	Structures in PE or construction phases, structure number was required for billing purposes, no traffic on structure and not replacing an existing structure
1000 – 1999	Primary system (excludes the 1800 series)
1800 – 1899	VDOT maintained in a municipality
2000 – 2999	Interstate system
5000 – 5999	Pedestrian bridges that cross a roadway or railway.
6000 – 6999	Secondary system

8000 – 8999	Municipality maintained
9000 – 9999	Footbridges.

Note there will be exceptions to this guidance and not all Districts will have historically followed the table above. However, for statewide consistency, it is recommended.

New 4-digit Virginia Structure Numbers are assigned by the District Structure & Bridge Engineer or designee. The Virginia Structure Number shall be unique to the county and should be validated to assure no duplication in the inventory for structures open to traffic.

Virginia Structure Numbers for new bridges on a new alignment shall be unique within the county. For replacement structures on the same or similar alignment, the existing Virginia Structure Number shall be reused. If a replacement structure has the same 4-digit Virginia Structure Number within the same county, but is not yet open to traffic as coded in the inventory (i.e. 'G'), then this is valid and is not considered a duplication.

Three digit temporary structure numbers for new structures not yet open to traffic are optional at the District's discretion.

New Structure Numbers (Federal)

The Central Office is responsible for assigning new Federal Structure Numbers and will require the following minimum information from the Districts as part of that process: District, County, route number of roadway carried, feature intersected, maintenance responsibility, and plan number (if known at time of request).

New Federal Structure Numbers are required for new structures on new alignments and total replacement structures on existing alignments. This includes replacement culverts that meet the definition of Large Culvert. Typically for replacement structures, if portions of the old structure remain in the new work (can be superstructure and/or substructure elements), the structure is not considered new but rather reconstructed and a new Federal Structure Number is not required.

Inspections

Prior to opening to traffic, all new and rehabilitated structures, including the constructed portion(s) of each phase of construction where applicable, will be inspected. These inspections can coincide with the final or punch-list inspection coordinated with the Construction Division. The Area Construction Engineer or designee shall contact the District Structure and Bridge Engineer or designee to request the inspections.

Construction work resulting in a rehabilitated structure (i.e. deck/superstructure replacement, widening, etc.) should be documented by conducting a regular inspection that will change the NBI next inspection date.

Each inspection shall include a review of all structure inventory items and element data. Discrepancies shall be corrected. Structure Inventory and Appraisal (SI&A) data sheets are available for taking hard copies into the field for verification.

Documentation of any change in condition which occurs after the date of the most recent inspection shall require a new inspection and inspection report. This inspection shall be of the most relevant type defined in the NBIS. Element condition data and / or General Condition Ratings for a completed inspection shall not be altered to reflect changes in condition which occur after the date of inspection.

The following procedures may be used for follow-up inspections for repair or improvement projects whose scope/intent does not result in change to any General Condition Rating (GCR), according to the Inventory Coding Guide (i.e.: joint repairs, painting, etc):

- At the discretion of the District Structure and Bridge Engineer, a Special Inspection report (of work completed) to document repairs or improvements may be created and signed by an NBIS qualified Team Leader or a Qualified Person. In such cases, field evaluations performed by Bridge Safety Inspection personnel may not be required, at the discretion of the District Bridge Safety Inspection Engineer. Inventory and/or Element data edited as a result of the projects will be determined by the District Safety Inspection Engineer, or designee on a case-by-case basis. In some instances where repair or improvement tasks of different types are performed in the same time period, multiple Qualified Persons may be involved. Generally, Sufficient Evidence of work completed shall be required prior to changing inventory and/or element data.

Apart from the exception noted below, an inspection team shall comprise no fewer than two personnel when performing inspections of any structure. The inspection team shall include a Team Leader (or Senior Inspector) and at least one additional Team Member. A minimum of two personnel on-site enable the members to monitor each other's safety and call for assistance if something were to happen to another Team Member. In certain circumstances and with the approval of the Assistant District Bridge Engineer for Inspection, Team Leaders (or Senior Inspectors) may perform inspections as needed without assistance from a Team Member. Emergency response and acceptance of maintenance work where other personnel are present would both be acceptable circumstances for this variance. Assistance from other sections' personnel is encouraged for safety and physical activities during the inspection if a Team Member is not available. In these instances, all VDOT health and safety regulations and work zone protection standards of practice shall be observed and safety of the Team Leader or traveling public shall not be compromised. Although it is not anticipated that this will be a common occurrence, it may be warranted on a case by case basis.

An inventory 'on' record and an 'under' record (if necessary) shall be created for all structures that require an inspection in accordance with this document and/or the NBIS and the FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges.

Additionally, an inventory 'under' record shall be created by VDOT for Non-NBI structures owned and maintained by Non-VDOT entities which create vertical and lateral clearance restrictions to a roadway maintained by VDOT (including pedestrian bridges). The term 'inspection' in these records will refer to, at a minimum, the clearance checks performed and a review of the required inventory data.

Quality control (QC) and quality assurance (QA) procedures, including qualifications of inspection personnel, shall be in accordance with the current IIM-S&B-78, Subject: Bridge Safety Inspection QC/QA Program.

Report Requirements

Bridge safety inspection reports shall include the following:

- Actual inspection date(s) shall be recorded.
- Ambient weather conditions shall be recorded (i.e. clear and sunny 78 degrees).
- Access equipment and type of Maintenance of Traffic (MOT) shall be noted in the inspection report.
- Special testing equipment used during the inspection shall be noted.
- Special considerations for contacts, access, right of entries and/or other restrictions shall be noted.
- List other persons present during the inspection including but not limited to MOT crew, RR Flagger, QA Reviewer, and / or Special Access operator.

At the discretion of the Assistant District Bridge Engineer for Bridge Inspection, bridge safety inspection reports should include the following:

- Date stamp shown, date-taken available in the meta-data for each image, or the metadata / geospatial data recorded by a mobile device when using InspectX application.
- Unless otherwise approved by the Assistant District Bridge Engineer for Bridge Inspection, new photographs shall be required during each inspection. Old photos can be included for comparison or to show a better picture of a condition (i.e. such as the substructure when the water level was much lower during a past inspection).
- For inspections that overlap in months, the NBI inspection date should be documented as the last date on which field work was completed.

All inspections of VDOT maintained structures shall be documented using VDOT's most current electronic safety inspection report form (SB540).

For general condition ratings of '7' or less, detailed comments supporting these ratings must be included in the report. In addition to detailed comments, photos, sketches and tables may also be needed for deficiency clarification. Current photographs shall be included in the report of all items which warrant a general condition rating of '4' or less.

Any item which shows a change in condition since the previous inspection will be marked to indicate a change since the previous inspection. The method of marking these changes will be clearly noted in the 'Miscellaneous' section of the report. When interim and nonscheduled inspections are performed, the reason for this type of inspection shall be documented in the 'Miscellaneous' section of the report.

Vertical clearances will be documented on a sketch. This sketch will show the minimum vertical clearance for each lane and include the minimum vertical clearance for a ten-foot width of pavement where the clearance is greatest (Federal Item 10). For paved roadways, measurements will be limited to travel lanes and improved shoulders between edges of pavement and only be taken between lateral restrictions (i.e. guardrail, barriers, etc.).

Repair recommendations are to be listed in priority order with the highest priorities listed first. Cost estimates for these repair recommendations are not required.

For bridges having a non-integral wearing surface, the average thickness and nature of the overlay material shall be recorded in the 'Wearing Surface' section of the inspection report. If the wearing surface thickness is not able to be field verified or cannot be taken from bridge plans, a reasonable estimate based on the judgment of the inspector may be used until more accurate measurements can be obtained. If a non-integral wearing surface is not present, the nature of the integral wearing surface shall be recorded under the 'Deck' section of the report and 'None' or 'N/A' shall be recorded in the 'Wearing Surface' section.

The 'Object Marker' section of the inspection report shall note the presence and condition of object markers and other safety features at structures.

The 'Field Posting' section of the inspection report shall note the presence, details of the restriction and condition of any signs indicating weight restrictions, vertical restrictions, or horizontal restrictions. This includes, but is not limited to signs indicating vertical restrictions, narrow bridge, one lane bridge and load postings.

The results of the latest underwater inspection shall be considered when assigning the substructure general condition ratings, and the inspection reports shall contain a statement indicating that these results were considered. The latest underwater inspection report may optionally be attached to the inspection report. If the underwater inspection findings adversely influence the substructure rating or provide additional pertinent information not accessible to the Team Leader, a brief summary of these findings shall be included in the 'Substructure' section of the report.

Structure inventory and appraisal sheets may optionally be included in the inspection report. These inventory sheets shall be reviewed during the inspection and submitted along with the inspection report. A statement should be in the inspection report that the inventory was checked or reviewed. The statement should also include any changes that were made to the inventory.

Additional report requirements may be found in the 'Scour and Stream Channel Documentation' and 'Load Rating Analysis' sections.

Updating Inventory Data

The inventory information for all structures shall be updated in accordance with the NBIS.

The inspection report and all inventory data for new, rehabilitated and repaired structures shall be entered into the inventory database within 90 days of opening the structure to traffic, including all VDOT structures and any entity, private, or other structures for which VDOT is responsible for reporting inspection activities to FHWA.

For changes in load rating due to initial or changed conditions the capacity rating shall be in accordance with the current IIM-S&B-86, Subject: Load Rating and Posting Structures (Bridges and Culverts).

Structures that have been closed to traffic shall have the closure indicated in the inventory upon notification that the closure has taken place.

For Bridge Status, structures that are temporarily closed to traffic shall be coded “Closed” (bridge status = 2). Structures that are permanently closed to traffic shall be coded “Permanently Closed” (bridge status = 6). Once the Bridge Status is changed to "Permanently Closed" for a given record, it can **neve**r be changed back. Structures coded as "Permanently Closed" under the *Bridge Status* field in the bridge inventory will be excluded from FHWA submittals of NBI and NBE data. Structures not included in the NBI submittal to FHWA are not eligible to apply for federal funding.

Structures that have temporary conditions not normally present shall be indicated in the inventory as soon as the Assistant District Bridge Engineer for Inspection is made aware of the condition. Examples include temporary restrictions to vertical and horizontal clearances and weight restrictions. Additionally, this also includes temporary structures and structures with temporary shoring and/or repairs with or without a reduction in capacity. See Coding Guide for Federal Item 103 for more information.

INSPECTION FORMS AND DISTRIBUTION:

In addition to the repair recommendations on the bridge safety inspection report for VDOT structures, the District Structure and Bridge Section shall utilize a standard method for notifying other responsible managers of preventive and ordinary maintenance needs. To assist in facilitating this notification, the Structure Preventive Maintenance Form (SB504) may be used. For information purposes a copy of this form has been included in the ‘Attachments’ section of this document.

Copies of all inspection reports are to be placed on the State Structure and Bridge Safety Inspection Team Site within 90 days after the inspection is performed. For VDOT maintained structures, the District Structure and Bridge Section shall send monthly notifications to the responsible Maintenance Manager of completed inspection reports placed on the team site. Each entity should have a similar process, as noted above, to ensure that each structure’s maintenance needs are considered and addressed as appropriate.

District Structure and Bridge Sections and Entities shall maintain a bridge record of each structure within their jurisdiction in accordance with the NBIS, including, but not limited to, the official signed structure inspection reports, damage reports, strengthening, repairs, load rating analysis and capacity data, scour analysis (where available), scour critical plans of action, critical recommendations and related correspondence until the structure is demolished. Once a structure is demolished, the inspection records may be disposed of in accordance with the current records retention policy of each respective organization.

All bridge safety inspection reports are designated Critical Infrastructure Information (CII). This designation identifies information that is not appropriate for public release. Printed copies of the inspection reports shall be protected at all times. Each person who works with protected documents is personally responsible for taking proper precautions to ensure unauthorized persons do not gain access to the reports. Anyone requesting copies of bridge safety inspection reports should be referred to the District Structure and

Bridge Section. District Structure and Bridge Engineers/Entities may release inspection reports of structures within their respective jurisdiction to individuals or parties that have a legitimate business need-to-know in accordance with the latest CII guidelines. Such cases require those non-VDOT individuals or parties to submit a completed and signed 'Multi-Purpose Non-Disclosure Agreement' form to the appropriate District Structure and Bridge Engineer. For information purposes, a copy of this agreement has been included in the 'Attachments' section of this document and the electronic file is available upon request.

CRITICAL RECOMMENDATIONS:

Critical recommendation forms shall be used to notify the responsible manager of conditions identified as posing a threat to structural stability and/or public safety. Critical recommendations can be an emergency condition posing an immediate safety risk or hazard to the structure's integrity and/or traveling public or an imminent condition that could, if left unresolved, result in localized failure of the structure or present a safety issue to the traveling public. Critical recommendations that are considered emergency conditions should be addressed immediately or not to exceed 30 days and those that are imminent conditions should be addressed not to exceed 90 days from date of discovery. Others which will require processing through a formal project shall have a monitoring process in place until work is complete and the critical should be closed out.

Conditions requiring the issuance of a critical recommendation form include, but are not limited to:

1. Critical repairs to NSTM members.
2. Correction of critical scour and/or hydraulic induced problems.
3. General condition rating lowered to a '2' or less for deck, superstructure, substructure or culvert, with the exception of findings related to NSTM Members
4. Immediate work to prevent substantial reduction in a structure's load capacity.

*Issuance of a critical recommendation form is recommended when GCR is lowered to a '3' or less for deck, superstructure, substructure or culvert.

The critical recommendation documentation will identify the problem and provide an action to be taken, including a cost estimate and a time frame for the action to be completed. Possible actions may include, but should not be limited to, immediate repair, posting the structure, closing the structure, inspecting the structure more frequently, performing a structural analysis and/or removing traffic from the affected members.

Upon completion of the follow-up inspection, a copy of the completed critical recommendation documentation shall be included in the bridge record.

The Assistant District Bridge Engineer for Inspection will be responsible for assuring that ~~a~~ critical recommendation documentation is created and updated within the InspectX application for all stages of the process.

All critical findings shall be recorded in the InspectX application for recording and federal reporting purposes. A copy of the paper critical recommendation form may be found at: https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/structure-and-bridge/

VDOT

Upon learning of the need for a critical recommendation to be issued, the District Structure and Bridge Engineer or their designee shall notify the District Bridge Maintenance Manager or the responsible manager in the most expeditious manner available. For personnel with access to the InspectX application, maintenance items may be filed as appropriate. For users without access to InspectX, the Critical Recommendation Form (SB500) will be prepared and transmitted to the responsible manager using the Critical Recommendation Team Site and in accordance with the guidelines therein. For information purposes a copy of this form has been included in the 'Attachments' section of this document.

The subsequent corrective action by the responsible manager and follow-up inspection by the District Structure and Bridge Section shall be documented in the bridge record and ther InspectX application. The follow-up inspection shall be completed within 10 working days upon notification that the corrective action is completed.

Entities

Entities shall use a process similar to that of VDOT for addressing critical findings in accordance with the requirements of the NBIS. A Non-VDOT Critical Recommendation Form (SB501) may be used to notify the responsible manager and document the critical finding. For information purposes a copy of this form has been included in the 'Attachments' section of this document and the electronic template is available upon request.

A copy of the initial notice and a copy of the form noting that the follow-up inspection has been completed shall be provided to the District Structure and Bridge Engineer within 30 days of initial discovery and follow-up inspection, respectively.

District Structure and Bridge Engineers or their designee shall monitor inspection reports from Entities to identify conditions that may warrant the issuance of a critical recommendation form. If a condition is identified as requiring a critical recommendation form, the District Structure and Bridge Engineer or their designee shall:

1. Contact the responsible official for the Entity and inquire about the status of the remedial work on the structure.
2. Emphasize to the responsible official the importance of prompt corrective action.
3. If the Entity's actions are unacceptable, written notification shall be made detailing VDOT's concerns. The District Administrator or appointed representative should sign the written notice. Copies of all correspondence shall be sent to the State Structure and Bridge Engineer and the Central Office Bridge Safety Inspection Program Manager.

The Central Office Structure and Bridge Division will provide assistance as requested by the District after the District has exhausted the remedial actions above.

SCOUR AND STREAM CHANNEL DOCUMENTATION:

The vulnerability of a bridge to scour (Federal Item 113) shall be initially determined through analysis by a hydraulic/geotechnical/structural engineer and/or the design engineer of record. The Scour Design Summary Form, included in the 'Attachments' section of this document, shall be completed for all structures for which scour analysis is performed after August 1, 2018. The Scour Design Summary form shall be completed by the engineer(s) responsible for the design scour analysis, and submitted to the Assistant District Bridge Engineer for Inspection. This form shall be retained in the bridge file for the life of the structure.

The lead inspector shall review Federal Item 113 as a part of each inspection to determine if field conditions warrant a change. All changes to Federal Item 113 will be coordinated with the District Structure and Bridge Engineer or designee and/or the District Hydraulics Section prior to making changes to the inventory database. The Structure & Bridge Scour Condition Form, included in the 'Attachments' section of this document, shall be completed for all structures over water during every routine NBI inspection. The most current version of this form shall be retained in the bridge file.

All scour critical bridges shall be monitored in accordance with their respective plan of action (POA) as applicable. During the inspection of a scour critical bridge, the POA for the structure will be reviewed and updated as necessary. For information purposes a copy of this form has been included in the 'Attachments' section of this document and the electronic template is available upon request.

Channel Cross Section at Fascias

For every structure that crosses a waterway, a channel cross section shall be made along the upstream or downstream fascia of the structure using readings as described in the following paragraph. Channel cross sections along both fascia shall be provided when warranted by field conditions such as channel alignment issues and streambed degradation. Channel cross sections are to be recorded during the initial inspection of each structure. At each regular inspection, current readings are to be taken and compared to the previously recorded cross sections(s) to determine if significant changes have occurred. At a minimum, the latest, initial and previously recorded streambed cross section elevations shall all be recorded on the same sketch for comparison purposes. If the cross section has not changed, a comment that the cross section was checked is to be added to the inspection report and the channel cross section sketch indicating the date(s) that it was checked.

Readings shall be taken along the fascia(s) starting at the substructure unit before the floodplain/channel and ending at the substructure unit beyond the end of the floodplain/channel at intervals sufficient to show a cross section elevation that is representative of the streambed and floodplain.

Readings are vertical measurements taken from a fixed reference line (e.g. the beam underside or the top of parapet) to the streambed or floodplain, and are used to develop a channel cross section between two substructure units. The horizontal distance from the abutment/pier face should be noted at each reading location, which shall follow the

orientation of the structure (e.g. from Abutment A to Abutment B). At each inspection, the waterline shall be referenced to the benchmark, which shall be a fixed point on the structure (e.g. the beam underside or the top of parapet) and shall coincide with the location of one of the channel cross section readings.

If readings were previously taken, new readings shall be taken at the same locations and referenced to the same fixed point on the bridge unless the previous reading have been removed, significantly altered or have become inaccessible. Additional readings shall be taken at locations where obvious changes in the streambed or floodplain are evident to provide an updated elevation. Readings shall be recorded in a fashion similar to that shown on the Sample Channel Cross Section sketch in the 'Attachments' section of this document.

For structures that require an underwater inspection, the lead inspector shall evaluate the existing stream channel and scour conditions during each inspection to the extent that this can be accomplished without diving. If no changes can be observed from the latest underwater inspection report, this will be noted, along with the date of the referenced underwater inspection. If significant changes are detected, normal documentation will be used to the extent possible and the District Structure and Bridge Engineer or designee shall be notified by the lead inspector in the most expeditious manner of the need for an underwater inspection.

Cross section elevation readings and sketches produced during underwater inspections shall be referenced to a common point with readings taken from the above water inspections to establish continuity between the two inspections in referencing the same channel bed elevations.

Channel Profile along a Substructure

Channel profile measurements around the perimeter of a substructure unit shall be documented whenever the inspection of the substructure unit reveals scour that affects or may affect the structural integrity of the substructure unit.

Measurements for the channel profile are not required at substructure units where there is no current or historical evidence of scour, and where any of the following is true;

- The substructure is located within a reservoir, lake, or other body of water which experiences negligible or no flow velocity.
- The substructure is founded on solid rock, or non-scourable material, per plans.
- The substructure consists of a pile bent with no history of significant scour.

Whenever channel profile measurements are required around the perimeter of a substructure, the following procedural requirements shall be observed:

Channel profile at substructure measurements should be documented, as required, during every underwater inspection, or during every routine inspection for structures where no underwater inspection is required. For documentation of the channel profile around an individual substructure unit, all depth measurements shall be reported relative to the elevation of a master reference datum, taken at the substructure unit in question.

- Dimensions of undermining are excepted from this rule.

For each substructure unit, this datum shall be taken at a single location on or directly above the subject substructure, and the precise location (horizontal & vertical) of this reference datum shall be documented.

The master reference datum shall be taken at the first available of the following locations;

- The top of the substructure (pier/pile cap)
- The bottom of deck.
- The bottom face of a superstructure element.
- Top of permanent bridge parapet/railing.
  - *Guardrails shall not be considered permanent railing*.

The same master reference datum shall be used for all subsequent inspections, unless it has been removed, significantly altered or has become inaccessible. Any change in the master reference datum shall be documented on the Channel Profile at Substructure page, and, when possible, historical readings shall be adjusted to accurately correspond to the current datum. Document and report the reference elevation of the water-line, and any and all exposed footing/seal/tremie/caisson/etc., relative to the master reference datum.

For Substructures >20 ft. in length or width, depth measurements shall be taken at intervals between 5 ft. and 10 ft. along each face of the substructure, and at each corner. For Substructures <20 ft. in length or width, depth measurements shall be taken at quarter points along each face of the substructure, and at each corner.

Measurements of scourable material shall be taken by probing into the channel bottom at each depth measurement location, using a metal or similarly rigid rod of at least 4 ft. in length.

Wherever conditions (flow velocity, debris, etc.) prevent the safe and/or accurate collection of this data, hydrographic survey or acoustic imaging may be accepted on a case-by-case basis, with prior VDOT authorization. The channel profile along a substructure shall be recorded in a fashion similar to that shown on the Sample Channel profile Along a Substructure in the 'Attachments' section of this document.

Substructure Undermining

Substructure undermining shall be documented for all substructure units where undermining is present and the substructure unit is not founded directly upon non-erodible rock. Undermining measurements and sketches shall document the following for each undermined area;

- Maximum height
- Total length
- Maximum horizontal perpendicular dimension underneath the footing
- Location relative to the nearest corner of the footing

- Height of undermining and penetration underneath the substructure shall also be measured and documented, if present, for each location where a depth measurement is shown on the Channel Profile at Substructure page.
  - The labeling of these points shall correspond to the alphanumeric labeling on the Channel Profile at Substructure.
- The location and sizes of all piles, shafts, and any other supports present beneath the footing and accessible for inspection shall be documented on the undermining page. Wherever significant variation in the total height of the footing and/or tremie exists, this shall be indicated on the undermining page.

Wherever conditions (flow velocity, debris, etc.) prevent the safe and/or accurate collection of this data, hydrographic survey or acoustic imaging may be accepted on a case-by-case basis, with prior VDOT authorization. Undermining shall be recorded in a fashion similar to that shown on the Sample Scour and Undermining Documentation in the 'Attachments' section of this document.

Stream Alignment Sketch

Stream alignment sketches are used to show the stream alignment relative to the bridge opening and quantify the extent and severity of any existing channel migration, scour, erosion and/or sedimentation. Stream alignment sketches shall be shown in a plan view.

Stream alignment sketches shall be included in the inspection reports for bridges where erosion problems are identified that may affect the structural integrity of one or more substructure units. Additionally, stream alignment sketches shall be used to document any deficiencies in the stream channel that cannot be adequately shown in a photograph.

LOAD RATING ANALYSIS:

Load Ratings shall be performed in accordance with the current IIM-S&B-86, Subject: Load Rating and Posting Structures (Bridges and Culverts). Structural analyses are to be part of each structure's bridge record and will have a completed 'Load Rating Summary Form for Structures' attached to each regular inspection report.

The deterioration levels and rating assumptions are to be reviewed as part of each scheduled inspection. A statement shall be placed in the structural analysis section of the inspection report stating that the rating has been reviewed with respect to the current condition.

When a superstructure GCR changes to a 4 or less, a new load rating is required. Other changes to the GCR for deck, superstructure and substructure shall be reviewed to determine if a new load rating is warranted. Any condition that may affect safe load carrying capacity shall be evaluated to determine if a new load rating analysis is warranted.

STRUCTURE RESTRICTION AND POSTING:

Reduction of weight limits on any structure shall be in accordance with the Code of

Virginia - Title 46.2, Chapter 10 and current IIM policy on load rating (IIM-S&B-86).

Restricted weight limit signs when required, shall be erected in accordance with the latest version of the Virginia Supplement to the Manual of Uniform Traffic Control Devices (MUTCD), Part 2 – Signs, Section 2B.59.

Overhead structures or parts of structures having an actual vertical clearance less than or equal to 14'-6", or vertical clearances less than 12 inches above the statutory maximum vehicle height, whichever is greater, shall be signed in accordance with the latest version of the Virginia Supplement to the MUTCD, Part 2 – Signs, Section 2C.25 (current version at time of publishing: 11th ed. 12/2023).

Should the inspection find that restrictive signs are not in compliance with the Virginia Supplement to the MUTCD, Part 2 – Signs, a form similar to the Bridge Signage Form (SB503)* shall be used to alert the local Residency for secondary routes and the Regional Traffic Operations Centers for primary routes. This notification shall be made in an expeditious manner upon review and acceptance of new posting limits. New or replacement signs shall be erected within 30 days of this notification. If the completed Bridge Signage Form is not returned to Structure & Bridge Division within 45 days, then the District Structure and Bridge Engineer or designee/Entity shall follow-up on the status of the signage. A copy of this form is available on the Bridge Signage Form Team Site and is included in IIM-S&B 86.

LOAD POSTING SIGNS

The Load Posting Signs and Bridge Signage Forms have been referenced in VDOT Structure & Bridge Division's current IIM policy on load rating (IIM-SB-86) and Virginia Supplement to the Manual of Uniform Traffic Control Devices (MUTCD), Part 2 – Signs, Section 2B.59.

The Assistant District Bridge Engineer for Inspection or designee will be responsible for assuring that a Change in Posting notification form and a Bridge Signage Form are created and updated on the Bridge Signage Form Team Site for all stages of the process.

The web-based bridge signage form may be found at the following-
https://covgov.sharepoint.com/sites/vdot-sb-postchng

CC: Chief Engineer
Division Administrators under the Deputy Chief Engineer
Local Assistance Division Director
District Engineers
District Maintenance Engineers
District Construction Engineers
Assistant State Structure and Bridge Engineers
District Structure and Bridge Engineers

Assistant District Bridge Engineer for Inspection

District Bridge Maintenance Managers

Residency Administrators

Regional Traffic Operations Centers

Federal Highway Administration

ATTACHMENTS

Structure Preventative Maintenance Form – Form SB504

Critical Infrastructure Information/Sensitive Security Information (CII/SSI) -Multi -Purpose Non- Disclosure Agreement

Critical Recommendation Form – Form SB500

Non-VDOT Critical Recommendation Form – Form SB501

Sample Channel Cross Section

Scour Critical Plan of Action Template

Typical Fatigue Prone Details

Sample Channel Profile along a Substructure

Sample Scour and Undermining Documentation

Structure & Bridge Scour Design Summary Form

Structure & Bridge Scour Condition Form

Structure and Bridge

INTRA-DEPARTMENTAL MEMORANDUM

Structure Preventive Maintenance Form

City/County: _____ **Federal ID:** _____

Route: _____ **Over:** _____

Structure No.: _____

Inspected By: _____ **Inspection Date:** _

To: _____ **From:** _____ **Date:** _____

District Bridge Maintenance Manager **District Structure & Bridge Engineer**

Inspection by the District Bridge Safety Inspection Team has revealed that the reference bridge requires preventive maintenance. These items, with cost estimates are as follows:

		Approximate Cost	Date Work Performed	Performed By
Seal Expansion Joints	☐			
Clean Deck	☐			
Clean Abutment Seats	☐			
Clean Pier Seats	☐			
Clean Bearings	☐			
Clean Truss Panel Points	☐			
Clear Debris from Scuppers	☐			
Clean Other (Identify)	☐			
*** Clear Debris (Identify)**	☐			
Other (Identify)	☐			

* May include removing silt from boxes/culverts/pipes, or removing debris between steel beams or at piers

The above deficiencies were corrected on the dates indicated above.

Signature: _____

District Bridge Maintenance Manager

Once the deficiency is corrected, please forward the original of this form to the District Structure & Bridge Engineer and copy the Assistant District Bridge Engineer for Inspection.

Form SB504

Critical Infrastructure Information/Sensitive Security Information (CII/SSI)

Multi-Purpose Non-Disclosure Agreement

Retain a copy of both the front and back sides of this form for future reference

VDOT requires CII/SSI be protected and not disclosed to unauthorized persons.

PART A: To Be Completed By Individual VDOT or Company Employee

I agree with the following as a condition of being granted access to CII/SSI:

CII/SSI, which is valuable and sensitive, is protected by law and by strict VDOT policies. The intent of these laws and policies is to assure that CII/SSI will remain confidential - that is, it will be used only as necessary to accomplish VDOT's mission. Disclosure of CII/SSI in any manner that permits interception by unauthorized persons could compromise safety and security and is prohibited. CII/SSI may be released only to persons with a need-to-know.

I might have access to this information in various formats including but not limited to documents and drawings, physical structures, and computer based systems. I have no right or ownership interest in any VDOT CII/SSI. VDOT may at any time revoke my authorization allowing access to CII/SSI.

Willful violation of this agreement may subject me to discipline which might include, but is not limited to, removal from current VDOT projects; exclusion from further VDOT related work; and legal liability. My obligations with respect to the confidentiality and security of all CII/SSI disclosed to me shall survive the termination of any agreement or relationship with VDOT. My execution of this agreement shall not nullify or affect in any manner any other agreement, non-disclosure or otherwise, which I have executed or may execute with VDOT or the Commonwealth of Virginia.

I am obligated to protect this information from unauthorized disclosure in accordance with the terms of this agreement. I will only use CII/SSI that I obtain to perform my legitimate VDOT related duties. I will conduct myself in a strict conformance to applicable laws and VDOT policies governing CII/SSI. I will safeguard the confidentiality of all CII/SSI at all times. I will be responsible for my misuse or my wrongful disclosure of CII/SSI.

Each provision of this agreement is severable. If any administrative or judicial tribunal should find any provision of this agreement to be unenforceable, all other provisions shall remain in full force and effect.

I make this agreement in good faith, without mental reservation or purpose of evasion.

Printed Name	Date
VDOT District/Division OR Company Name	Phone Number
Company Address	
Signature	Signature of Authorized Agent (Not required for VDOT employees)

PART B: To Be Completed By Company Agent Only: In addition to the provisions above, I certify:

All employees of this company involved with this VDOT project, regardless of location, who will have access to CII/SSI, myself included, will complete Part A of the Critical Infrastructure Information/Sensitive Security Information Multi-Purpose Non-Disclosure Agreement. The Agreement will be signed by me and accepted by VDOT prior to being granted access to CII/SSI. We will only access CII/SSI for which we have a need-to-know.

We will safeguard the confidentiality of all CII/SSI at all times. We will conduct ourselves in strict conformance to applicable laws and VDOT policies governing CII/SSI. Obligations with respect to the confidentiality and security of all CII/SSI disclosed to us shall survive the termination of any agreement or relationship with VDOT.

Authorized Company Agent:

Signature of Authorized Agent	Date
Printed Name	Title
Company Name	Phone Number
Company Address	
VDOT Contract Name and Number	

This form is valid for the identified project for a period of two years, while employed by the same company.

Critical Infrastructure Information/Sensitive Security Information (CII/SSI)
Multi-Purpose Non-Disclosure Agreement

Back Page

Retain a copy of both the front and back sides of this form for future reference.

Handling CII/SSI

You are responsible for safeguarding Critical Infrastructure Information/Sensitive Security Information (CII/SSI) in your custody or under your control.

The extent of protection afforded CII/SSI shall be sufficient to reasonably foreclose the possibility of its loss or compromise.

The terms of this clause (*Handling CII/SSI*), including this paragraph, must be included in any dissemination of any document, in whole or in part, that contains CII/SSI.

Protection - CII/SSI shall be protected at all times, either by appropriate storage or having it under the personal observation and control of a person authorized to receive it. Each person who works with protected CII/SSI is personally responsible for taking proper precautions to ensure that unauthorized persons do not gain access to it.

Use and Storage - During working hours, reasonable steps shall be taken to minimize the risks of access to CII/SSI by unauthorized personnel. After working hours, CII/SSI shall be secured in a secure container, such as a locked desk, file cabinet or facility where contract security is provided.

Reproduction - Documents or material containing CII/SSI may be reproduced to the minimum extent necessary consistent with the need to carry out official duties provided that the reproduced material is marked and protected in the same manner as the original material.

Disposal - Material containing CII/SSI shall be disposed of by any method that prevents unauthorized retrieval (e.g. shredding, burning, returning to original source, etc.).

Transmission - CII/SSI shall be transmitted only by VDOT courier, US first class, express, certified or registered mail, or through secure electronic means.

VIRGINIA DEPARTMENT OF TRANSPORTATION

STRUCTURE AND BRIDGE DIVISION

Route: _____ NBIS (Y/N) _____
Over: _____
County: _____
Str. No.: _____
Located: _____ Mi. To: _____
_____ Mi. From: _____

Critical Recommendation Form

for, Repair and/or Strengthening Inspected By: _____ Inspection Date: _____

WHEN A CRITICAL CONDITION IS DISCOVERED SEND FORM:

To: _____ From: _____ Date: _____
Maintenance Manager
Assistant District Bridge Engineer for Inspection

cc: District Structure and Bridge Engineer
State Structure and Bridge Engineer
District Bridge Maintenance Manager
District Environmental Engineer

AFTER THE CRITICAL CONDITION IS REPAIRED SEND FORM:

To: _____ From: _____ Date: _____
Assistant District Bridge Engineer for Inspection
District Bridge Maintenance Manager

cc: District Structure & Bridge Engineer
State Structure & Bridge Engineer

Federal Structure ID No:0000000000_____

CRITICAL CONDITION REQUIRING IMMEDIATE ATTENTION (≤ 30 days) or (≤ 90 days)

- ☐ Immediate performance of work on NSTM member(s) is needed.
- ☐ Immediate correction of scour and/or hydraulic induced problem is needed.
- ☐ Condition rating of 2 or less for deck, superstructure, substructure and/or culvert, with the exception of findings related to NSTM Members.*
- ☐ Immediate work to prevent substantial reduction in safe load capacity and/or for the safety of the traveling public.

**Issuance of a critical recommendation form is recommended when GCR is lowered to a '3' or less.*

Action required (include date work must be completed):

ESTIMATED COST - $_____

BELOW TO BE FILLED OUT BY RESIDENCY ADMINISTRATOR and/or DISTRICT BRIDGE MAINTENANCE MANAGER WHEN WORK HAS BEEN COMPLETED

Action taken (include date work was completed):

Signature:
District Bridge Maintenance Manager

Follow-up Inspection after work is complete by: _____
Bridge Safety Inspector Date

Form SB500

Municipality/Agency: _____

Non-VDOT Critical Recommendation Form

for, Repair and/or strengthening

Route: _____ NBIS (Y/N) _____
Over: _____
Str. No.: _____
Located: _____ Mi. To: _____
_____ Mi. From: _____
Inspected By: _____ Inspection Date: _____

WHEN A CRITICAL CONDITION IS DISCOVERED SEND FORM:

To: _____ From: _____ Date: _____
(Insert Title of Responsible Manager) Assistant District Bridge Engineer for Inspection

cc: District Structure & Bridge Engineer
State Structure & Bridge Engineer

AFTER THE CRITICAL CONDITION IS REPAIRED SEND FORM:

To: _____ From: _____ Date: _____
Assistant District Bridge Engineer for Inspection (Insert Title of Responsible Manager)

cc: District Structure and Bridge Engineer
State Structure & Bridge Engineer

Federal Structure ID No:0000000000_____

CRITICAL CONDITION REQUIRING IMMEDIATE ATTENTION (≤ 30 days) or (≤ 90 days)

- ☐ Immediate performance of work on NSTM member(s) is needed.
- ☐ Immediate correction of scour and/or hydraulic induced problem is needed.
- ☐ Condition rating of 3 or less for deck, superstructure, substructure and/or culvert.
- ☐ Immediate work to prevent substantial reduction in safe load capacity and/or for the safety of the traveling public.

Action required (include date work must be completed):

ESTIMATED COST - $

BELOW TO BE FILLED OUT BY RESIDENCY ADMINISTRATOR and/or DISTRICT BRIDGE MAINTENANCE MANAGER WHEN WORK HAS BEEN COMPLETED

Action taken (include date work was completed):

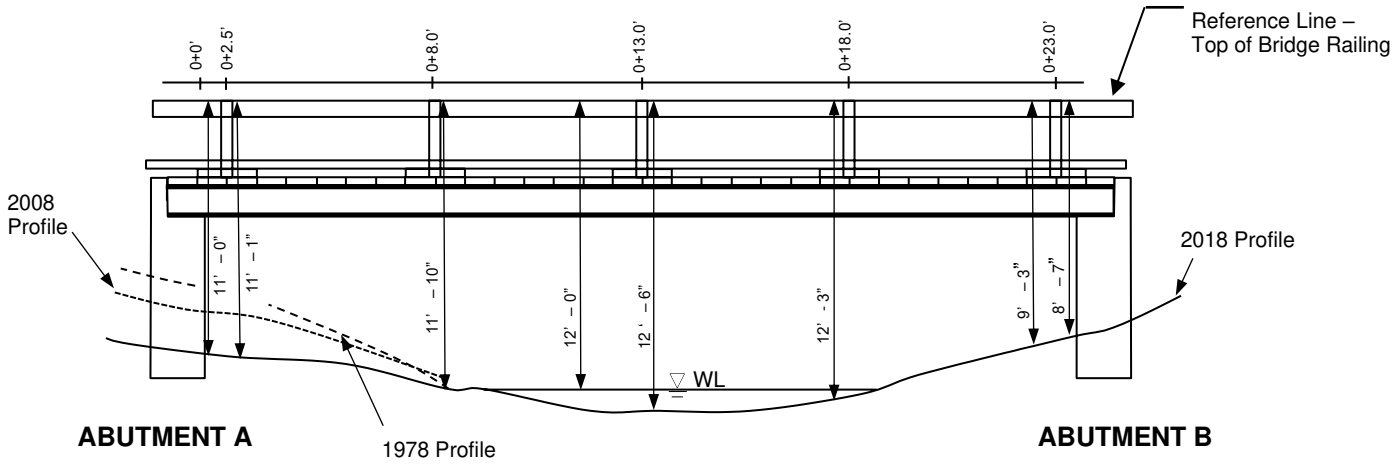
_____

Signature:
(Insert Title of Responsible Manager)

Follow-up Inspection after work is complete by: _____ _____
Bridge Safety Inspector Date

Form SB501

SAMPLE CHANNEL CROSS SECTION



UPSTREAM ELEVATION VIEW

(NTS)

(Looking Downstream)

DATE	STATIONS								COMMENT
	ABUT. A	0+ 2.5'	0+8.0'	0+13.0'	0+18.0'	0+23.0'	ABUT. B	WL	
1978 Original	-	6'-6"	11'–10"	12'- 6"	12'-3"	9'-3"	-	-	
2008 Readings	-	8'-6"	11'– 0"	12'-6"	12'-3"	9'-3"	-	-	
2018 Readings	11'-0"	11'-1"	11'-10"	12'-0"	12'-6"	9'-3"	8'-7"	12'-0"	

Legend:

WL= Water Line

NTS = Not in Scale

Scour Critical Plan of Action

Structure ID	
Federal Aid System of Highways	
FIPS County	
District	
County/City	
Carrying	
Over	
Virginia Structure Number	
Year Built	
Size of Existing Bridge	
Foundation Type	
Scheduled for Replacement	
Detour Length	
Average Daily Traffic	
Source of Scour Critical Rating	
Scour Rating (Item 113)	
Planned Actions	
Other actions	
Prepared by	
Signature	
Date	

TYPICAL FATIGUE PRONE DETAILS

Close visual inspection of fatigue prone details is required. Concentrate on following areas:

- **Distortion in small gaps.**
- **Weld tips (terminations).**
- **Intersecting welds.**
- **Reduction in x-sections.**
- **Skewed bridges.**
- **Wrapped around welds.**

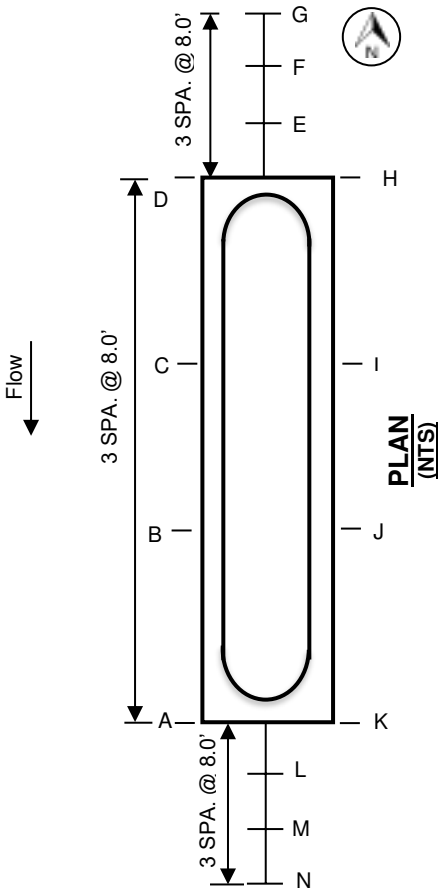
Typical details to inspect for localized fatigue cracking:

1. Lateral connection plates with intersecting welds, weld tips, & gaps or backing bars and tack welds.
2. Transverse connection plates. (Need to be positively connected to both flanges.)
3. Longitudinal stiffener butt welds, fillet welds, and cope holes.
4. Floorbeam to girder connection. (Coped beam flanges or blocked beam flanges.)
5. Rolled beam diaphragm connection. (Also, with coped flanges.)
6. Coverplate end welds and butt welds.
7. Termination of longitudinal coverplate welds. (Not end welded.)
8. Web plate penetration including box pier caps.
9. Web and flange splices. (Particularly field welded - quality may be suspect. Built-up welds)
10. Web cope holes
11. Stringer to floorbeam connections (out-of-plane bending)
    - Stringer framing into Girder webs - Category E or E'
    - Stringer framing into Girder flange - Category E or E'
12. Lateral connection to girders and floorbeams.
13. Backing bar splices. (Backing bars should be continuous. Ideally should be removed, but not practical)
14. Repaired holes with partial or complete plug welds.
15. Tack welds. Near ends of plates. Near end of backing bars. (AWS requires that tack welds be properly removed or incorporated into permanent weld. Identify as potential locations for fatigue cracks.
16. Gouges and arc strikes.
17. Intermittent fillet welds (ie stitch welds). (Category E for web to flange or coverplate to flange)
18. Pin & hanger assemblies.
19. Insert plates in haunched girders.
20. Riveted members (girders & trusses) with tack welds or subject to prying action.
21. Corrosion induced defects.
22. Construction & traffic damaged areas.
23. Field welding of curved girder cross frame members (Category E equivalent) (Check quality of field welds, terminations of welds, undercutting or notch effects)
24. Field welding of attachments to tension areas of webs or flanges after the bridge was built.

STR. NO: _____ **INSP. DATE:** _____ **INSPECTED BY:** _____

Sample CHANNEL PROFILE ALONG A SUBSTRUCTURE

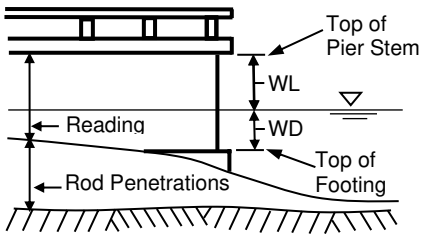
YEAR / STA.	CHANNEL READINGS				ROD PENETRATIONS			
	2005	2010	2014		2005	2010	2014	
A	24.3	23.3	22.1		0	0	0	
B	20.0	21.2	21.3		0	0	0	
C	20.0	20.7	21.3		0	0	0	
D	22.3	21.8	22.2		0	0	0	
E	23.3	22.0	23.1		0	0	0	
F	23.9	21.7	22.1		0	0	0	
G	24.1	21.0	22.3		0	0	0	
H	21.8	21.8	22.1		0	0	0	
I	22.3	22.3	23.0		0	0	0	
J	22.3	22.8	22.4		0	0	0	
K	22.8	23.3	22.4		1.0	0	0	
L	24.3	22.0	22.2		0	0.5	0	
M	24.7	22.0	22.2		0	0.5	0	
N	25.2	21.3	22.0		0	0.5	0	



INSPECTION NOTES:

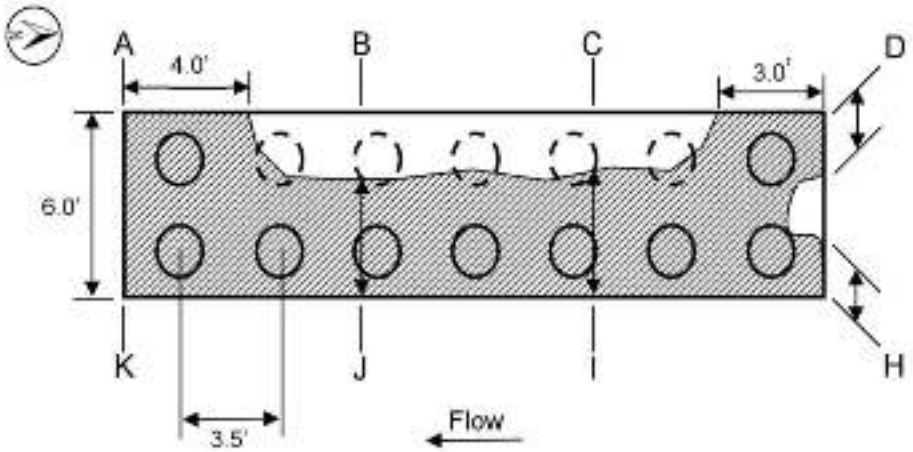
1. Due to the potential for sounding measurement errors presented by submerged debris and other factors, sounding measurements were adjusted according to the measured footing exposure and undermining at each location.

LEGEND:
NTS = Not in scale

REFERENCES	YEAR	COMMENTS
	**2005**	WL @ ST. "A" = 14.3 ft., WD @ ST. "K" = 4.0 ft.
		Footing exposed from Pt. "D" thru "K"
	2010	WL @ ST. "A" = 14.0 ft., WD @ ST. "K" = 4.3 ft.
		Footing exposed at all locations
	2014	WL @ ST. "A" = 12.9 ft., WD @ ST. "K" = 5.4 ft.
		Footing undermined. See undermining documentation for details.

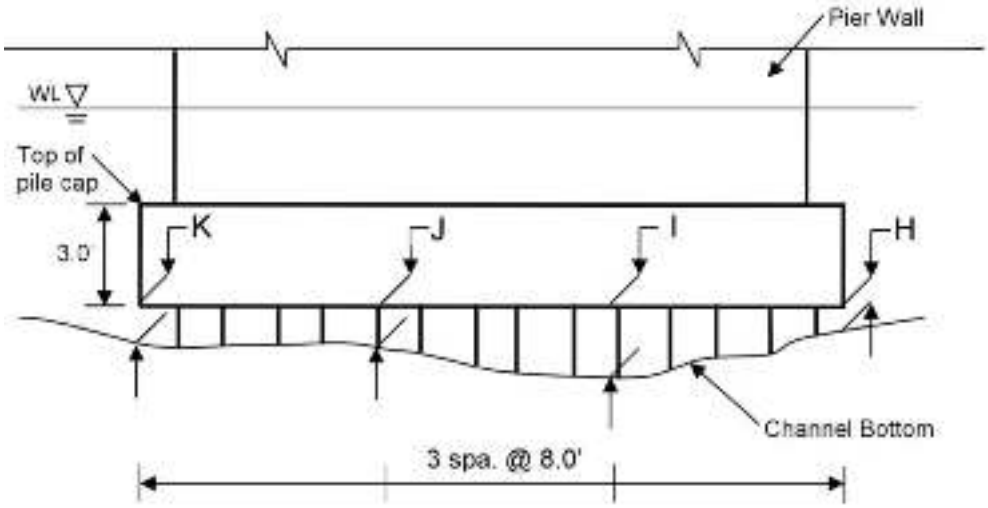
STR. NO: _____ **INSP. DATE:** _____ **INSPECTED BY:** _____

Sample SCOUR AND UNDERMINING DOCUMENTATION



PIER FOOTING PLAN VIEW
(NTS)

HORIZONTAL UNDERMINING READINGS (FT)				
YR. / ST.	2005	2010	2014	
A	6.0	6.0	6.0	
B	0.0	0.0	0.0	
C	0.0	0.0	0.0	
D	2.0	2.0	2.0	
H	1.8	1.7	1.9	
I	3.0	3.5	4.0	
J	2.5	3.0	3.8	
K	6.0	6.0	6.0	



PIER FOOTING ELEVATION VIEW
(NTS)

VERTICAL UNDERMINING READINGS (FT)				
YR. / ST.	2005	2010	2014	
A	3.0	2.0	0.8	
B	0.0	0.0	0.0	
C	0.0	0.0	0.0	
D	1.0	0.5	0.9	
H	0.5	0.5	0.8	
I	1.0	1.0	1.7	
J	1.0	1.5	1.1	
K	1.5	2.0	1.1	

LEGEND:

○ = Timber Pile

▨ = Undermined area

NTS = Not in scale

INSPECTION NOTES:

1. (14) of (14) timber piles are exposed / partially exposed in the undermined area, as verified by probe rod.
2. 2 rows of 7 piles (12" dia.) each, spaced at 3.5' center to center along pier. Pile rows are spaced 3.0' apart. Piles are located approx.1.5' from edge of footing

STRUCTURE & BRIDGE
SCOUR DESIGN SUMMARY FORM
(For all scour evaluations performed after August 1, 2018)

Structure Inventory Information:

VA Structure No.:		**Federal Bridge ID:**	
District (002):		**Year Built (027):**	
County (003):		**VDOT Bridge Plan Number (S13A/B):**	
Route (005D):		**Drainage Area (S193, square miles):**	
Facility Carried (007):		**Latitude (016):**	
Waterway Intersected (006A):		**Longitude (017):**	

Recommended Scour Rating (NBI Item 113) = _____

Substructure Scour Design Information:

This section will aid bridge inspection personnel in assessing a structure during a routinely scheduled inspection, or following a hydrogeological event.

Substructure Unit(s):	Design Hydrologic Event Frequency (year):	Design Flow Elevation (ft):	Design Scoured Bed Elevation:	Pile Tip / Bottom of Spread Footing Elev.	Foundation Type / Material:

**Group like substructures whenever possible*
***Attach additional sheets, sketches and plans as necessary*

Scour Related Design Considerations and/or Comments:

_____
_____
_____
_____
_____
_____

**Include reference to relevant HEC manual considerations and requirements, and discussion of design scour countermeasures.*

Scour Evaluation Team:

Category	Name
Structural Engineer	
Hydraulic Engineer	
Geotechnical Engineer	

Form Completed By: _____

Name

_____ _____

Signature Date

- STRUCTURE & BRIDGE SCOUR CONDITION FORM

For use during each routine and underwater inspection, to document current scour conditions.

INSPECTION DATE: Click or tap here to enter text.
TO: Bridge File
FROM: Click or tap here to enter text.

SUBJECT: Scour Condition Documentation

District:	Click or tap here to enter text.	Type of Construction:	Click or tap here to enter text.
County:	Click or tap here to enter text.	Facility Carried:	Click or tap here to enter text.
Route:	Click or tap here to enter text.	Feature Intersected:	Click or tap here to enter text.
VA Str. #:	Click or tap here to enter text.	Year Built:	Click or tap here to enter text.
Federal ID:	Click or tap here to enter text.	Year Reconstructed:	Click or tap here to enter text.

Previous NBI Scour Code: Click or tap here to enter text.
Current NBI Scour Code: Click or tap here to enter text.
Source of Current Scour Code:

- ☐ Scour Code Shown on Design Plans
- ☐ Interdisciplinary team review
- ☐ Other (specify): Click or tap here to enter text.
- ☐ Observed low-risk conditions
- ☐ As-Built Plans

Interdisciplinary Engineering Team Review Required?: Choose an item.

**If "Yes", this form and the most recent inspection report must be reviewed by an interdisciplinary engineering team, including the following;*

- *Structural / Bridge Engineer*
- *Hydraulic Engineer*
- *Geotechnical Engineer*

**If "No", only the District Bridge Safety Inspection Engineer signature is required*

SIGNATURES

Title: Click or tap here to enter text.
Name (print): Click or tap here to enter text.
Signature:_____ Date: Click or tap to enter a date.

Title: Click or tap here to enter text.
Name (print): Click or tap here to enter text.
Signature:_____ Date: Click or tap to enter a date.

Title: Click or tap to enter a date.
Name (print): Click or tap here to enter text.
Signature:_____ Date: Click or tap to enter a date.

Additional Scour Assessment and/or Analysis Required?: Choose an item.

Appendix B – Authorization to Apply for CFPF Funding

DEPARTMENT OF ENVIRONMENTAL SERVICES
Office of Sustainability and Environmental Management
2100 Clarendon Boulevard, Suite 705, Arlington, VA 22201
TEL 703-228-4488 FAX 703-228-7134 www.arlingtonva.us

December 18, 2024

Virginia Department of Conservation and Recreation
Division of Floodplain Management
600 East Main Street, 24th Floor
Richmond, VA 23219

RE: Authorization to Apply for Virginia DCR CFPF Grant Opportunity
Commitment to Local Funding Match for Military Road Culvert Replacement Project

To Whom It May Concern,

I am writing to formally authorize the application for grant funding under the Virginia Department of Conservation and Recreation (DCR) Community Flood Preparedness Fund (CFPF) for the replacement of the Military Road culvert. I am also confirming Arlington County's commitment to cover any costs exceeding available grant funds for this project.

The requested funding amount is based on the project's 60% cost estimate and totals $5,057,516 As the project is located in a non-low-income geographic area, the County is requesting funding for 60% of the Project cost. I am verifying the County has the additional funds ($2,023,006) necessary to complete the project.

Should you require additional details or have any queries related to funding, please do not hesitate to contact the Project Manager, Jennifer Tastad (jtastad@arlingtonva.us).

Sincerely,

Michael Moon

Mike Moon
DES Chief Operating Officer

cc: Mark Schwartz
Greg Emmanuel
Michelle Cowan
Jason Papacosma

Appendix C – DCR Approval Letter of Arlington's Resilience Plan

Matthew S. Wells
Director

Andrew W. Smith
Chief Deputy Director

Frank N. Stovall
Deputy Director for Operations

Darryl Glover
Deputy Director for Dam Safety, Floodplain Management and Soil and Water Conservation

Laura Ellis
Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

January 22, 2025

Elizabeth Thurber, PE
Department of Environmental Services
2100 Clarendon Boulevard, Suite 705
Arlington, VA 22201

RE: Arlington County Resilience Plan Submission – CFPF

Dear Ms. Thurber,

Thank you for submitting the *Arlington County Resilience Plan* (the Plan) in advance of a submission to Round 5 of the Community Flood Preparedness Fund. After careful review, the Virginia Department of Conservation and Recreation has deemed the Plan complete, meeting all criteria outlined in the Round 5 Grant Manual. This approval will remain in effect for a period of five years, ending on January 22, 2030.

The following elements were evaluated as part of this review:

Element 1: It is project-based with projects focused on flood control and resilience.

The Plan gathers and prioritizes project possibilities drawn from a variety of studies and plans as shown in the three-volume report called the *Risk Assessment and Management Plan* or *RAMP*.

Element 2: It incorporates nature-based infrastructure to the maximum extent possible.

The Plan identifies extensive opportunities to include green infrastructure throughout County stormwater and neighborhood planning, using best practices as bioretention, swales, and "green streets." Countywide stream assessments have led to ongoing restorations and hybrid retrofits.

Element 3: It considers of all parts of a locality regardless of socioeconomics or race.

The Plan explains the County's commitment to equity through prioritized mitigation projects in underserved neighborhoods. Spatial analysis identifying overlaps of flooding, social vulnerability, critical facilities, along with other social and environmental factors informs the resilience strategy.

Element 4: Identifies all flooding occurring within locality, not only within SFHAs, and provides repetitive / severe repetitive loss data.

The Plan includes analysis from the *RAMP* that models interior, riverine and coastal flooding under current and future conditions, going far beyond the FEMA floodplain. As many of the County's

repetitive loss properties are outside the SFHA, this analysis is affecting policy, programming, land use and design guidelines.

Element 5: If property acquisition and / or relocation guidelines are included, equitable relocation strategies are addressed.

The County is building an acquisition program, as detailed in the *FY25-34 Capital Improvement Plan.* It is a fully voluntary program designed to provide overland relief of storm runoff. Any homeowner wishing to take part will be paid full market value based on an independent appraisal.

Element 6: Includes a strategy for debris management.

Debris management in water channels is handled by the County's Water, Sewer and Streets Bureau and Dept. of Parks and Recreation in order to to control potential flooding caused by blockages.

Element 7: Includes administrative procedures for substantial improvement / substantial damage of structures within the SFHA.

The Plan describes and links to substantial improvement / substantial damage permitting procedures triggered by building within a fifteen-foot set back from the Special Flood Hazard Area.

Element 8: It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.

The Plan outlines regional collaboration in overlapping watersheds, shared projects with adjacent jurisdictions and references dozens of other local plans and studies that consider more than flooding in order to create a full, holistic and comprehensive vision for resilience in County communities.

Element 9: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.

The Plan references detailed technical assessments that quantify the County's flood risk. A range of scenarios and timelines are considered in order to inform resilience needs and strategy. Sources include FEMA maps and databases, USACE, NOAA and other state or federal research programs.

DCR looks forward to working with the County to build a more resilient community. Thank you for your interest in the Community Flood Preparedness Fund and your participation in this program.

Sincerely,

Angela Davis
Director, Division of Floodplain Management

cc: Darryl M. Glover, DCR
Brandy Buford, DCR
Jake Shaw, DCR

ARLINGTON
VIRGINIA

DEPARTMENT OF PARKS & RECREATION
Rachael Tolman

3608 Military Road, Arlington, VA 22207
Phone: 703 -228-3403
www.arlingtonva.us

November 12, 2024

To Whom it May Concern:

The Gulf Branch Nature Center staff strongly support the project to replace the culvert that carries Gulf Branch stream under Military Road. During large storms, the stream overflows the road, making it dangerous to access the nature center, unsafe for drivers, causing structural damage to the road, eroding the stream banks and destroying habitat.

The new culvert design will allow better flow through the culvert and will help reduce environmental damage from erosion. The new culvert will improve aquatic habitat by facilitating fish passage upstream, which Is not available with the current infrastructure. The culvert replacement project aims to provide a long-term solution for the nearby residents and the Gulf Branch Nature Center, improving quality of life and reducing the risk of flood damage to properties. Furthermore, the project will contribute to the overall health and sustainability of the Gulf Branch watershed in combination with the other efforts to improve and protect the stream and surrounding area.

Sincerely yours,

Rachael Tolman
DPR Program Manager

DEPARTMENT OF ENVIRONMENTAL SERVICES
Office of Sustainability and Environmental Management
2100 Clarendon Boulevard, Suite 705, Arlington, VA 22201
TEL 703-228-4488 FAX 703-228-7134 www.arlingtonva.us

November 21, 2024

From: Guosheng Qiu, PE, CFM
Design Engineer
Department of Environmental Services
Arlington County Government
2100 Clarendon Boulevard, Suite 705
Arlington, VA 22201

To: Virginia Department of Conservation and Recreation
Division of Floodplain Management
600 East Main Street, 24th Floor
Richmond, VA 23219

RE: Approval of CFPF Grant Application and County Resilience Plan

To Whom It May Concern,

I am a Certified Floodplain Manager (CFM, ASFPM Member ID 32904) working for Arlington County's Office of Sustainability and Environmental Management. I have reviewed both the Resilience Plan and the County's application for grant funding for the replacement of the Military Road culvert under the Virginia Department of Conservation and Recreation (DCR) Community Flood Preparedness Fund (CFPF). I support the submittal of both documents to DCR for review and approval.

Should you require additional details or have any queries related to funding, please do not hesitate to contact the Project Manager, Jennifer Tastad (jtastad@arlingtonva.us).

Sincerely,

Guosheng Qiu, PE, CFM
Design Engineer

cc: Mark Scwartz
Greg Emmanuel
Michelle Cowan
Demetra McBride

ARLINGTON
VIRGINIA

ARLINGTON COUNTY RESILIENCE PLAN

ARLINGTON COUNTY, VIRGINIA

November 20, 2024

Document History and Status

Revision	Date	Description	Author	Checked	Reviewed	Approved
2	November 8, 2024	Draft	Laurens van der Tak, Emmanuel Brainoo	Lauren Linville	Liz Thurber	Laurens van der Tak
3	November 20, 2024	Final	Laurens van der Tak, Emmanuel Brainoo	Lauren Linville	Liz Thurber	Laurens van der Tak

Executive Summary

Purpose

Arlington County, Virginia (the County) is at risk of three types of flooding: (1) interior (pluvial) flooding, (2) riverine flooding, and (3) coastal flooding. Recent localized flooding from intense, short periods of rainfall now challenges parts of the County's stormwater system because of capacity issues, limited overland relief, and climate change. The County's Flood Resilient Arlington program includes a range of policies and projects to enhance the flood resilience of the community, but more can be done (County n.d.l).

This document addresses the resilience planning requirements of the Community Flood Preparedness Fund (CFPF) outlined in Appendix F of the 2024 CFPF Grant Round 5 Manual (DCR and VRA 2024), with the goal of securing grants for critical resilience plans, studies, and projects.

The County has many relevant plans, policies, and ordinances that support its resilience efforts. This Executive Summary provides an overview of relevant documents that support overall resilience goals. The remainder of this Arlington Resilience Plan identifies how existing and ongoing County plans and programs specifically address each of the nine critical elements identified in Appendix F of the 2024 CFPF Grant Manual, which are listed as follows (DCR and VRA 2024):

1. The Resilience Plan is project based with a focus on flood control and resilience
2. The Resilience Plan incorporates nature-based infrastructure to the maximum extent possible
3. The Resilience Plan includes all parts of a community regardless of socioeconomics or race and addresses the flood resilience needs of underserved populations
4. The Resilience Plan identifies flooding issues in all areas of the community, not just Special Flood Hazard Areas (SFHAs), and addresses repetitive loss properties
5. The Resilience Plan includes property acquisitions and includes equitable relocation strategies (if applicable)
6. The Resilience Plan includes a strategy for debris management in water channels and floodplains
7. The Resilience Plan includes administrative procedures for substantial damage or improvement of structures within the SFHA
8. The Resilience Plan includes coordination with other local and interjurisdictional plans and projects and has a timeline for implementation
9. The Resilience Plan is based on the best available science and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps

Plans, Studies, and Initiatives Supporting the Resilience Plan

Arlington's flood resilience planning elements are largely contained within the recently completed Flood Risk Assessment and Management Plan (RAMP; Jacobs 2024). Although the RAMP is not an "adopted stand-alone" plan that addresses all the CFPF Resilience Plan requirements, the County has dedicated funding to its Flood Resilient Arlington efforts (County n.d.l), which, when combined with other County initiatives, incorporates the critical elements described previously. This section identifies how the County's various resilience planning documents satisfy the CFPF Resilience Plan elements.

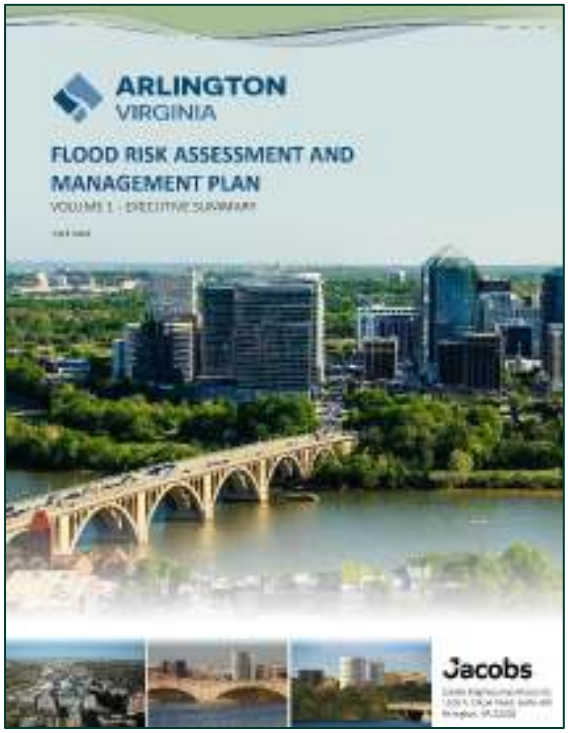


Figure ES-1. Flood Risk Assessment and Management Plan Cover

Source: RAMP Volume 1 (Jacobs 2024)

Each of the following County plans, studies, and initiatives have components that satisfy elements of the CFPF Resilience Plan requirements; together they form a Resilience Plan:

- Flood Resilient Arlington (County n.d.l)
- Flood RAMP (Jacobs 2024):
  - Volume 1, Executive Summary, Watershed Fact Sheets, and Mitigation Strategy Fact Sheets
  - Volume 2, Summary Report, Watershed Maps with Climate Scenarios and Mitigation Strategies
  - Volume 3, Appendices
- Stormwater Management Zoning Study Amendments (adopted March 2023; County n.d.aa)
- Increased stormwater requirements for development (County n.d.r)
- Increased investment in the Stormwater Management Program through bonds and Capital Improvement Plan Fiscal Year (FY) 2025 to FY 2034 (County 2024a)
- Implementation of a stormwater utility fee (County n.d.ac)
- Participation in the National Flood Insurance Program Community Rating System (County n.d.w)
- Voluntary property acquisition (County n.d.af)
- Floodproofing outreach (County n.d.w)
- Storm Sewer Capacity Study (County n.d.y) as part of Stormwater Master Plan (County 2014)
- Four Mile Run Master Plan (R&H et al. 2006)
- Neighborhood Complete Streets Program (County n.d.aj)

- Arlington Neighborhoods Program (County n.d.w)
- Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County (County and IEM 2022)
- Stream Assessment (County n.d.ad)
- Watershed Retrofit Study (County n.d.ag)
- Stormwater Capacity Improvements (County n.d.z)
- Stormwater, Watershed, and Stream Projects (County n.d.ab)
- New types and locations for capacity projects (such as the vault at Cardinal Elementary School [County n.d.e])
- Green Streets Projects (County n.d.o)
- Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan (County n.d.f)
- Chesapeake Bay Preservation Plan (County 2023a)
- Bacteria and Polychlorinated Biphenyls (PCB) TMDL Action Plans (County n.d.d)

Specific excerpts from each plan that satisfy the requirements outlined in the 2024 CFPF Grant Manual (DCR and VRA 2024) Appendix F, are included in Section I, Resilience Plan Elements.

Contents

Appendix

Figures

Acronyms and Abbreviations

AIRE	Arlington County Initiative to Rethink Energy
CDC	Centers for Disease Control and Prevention
CFPF	Community Flood Preparedness Fund
the County	Arlington County
DCR	Virginia Department of Conservation and Recreation
DES	Arlington County Department of Environmental Services
DOC	U.S. Department of Commerce
DPR	Arlington County Department of Parks and Recreation
FEMA	Federal Emergency Management Agency
GI	green infrastructure
GLUP	General Land Use Plan
LDA	land disturbing activity
LGBTQIA+	lesbian, gay, bisexual, transgender, queer, intersex, asexual, and others
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NVRC	Northern Virginia Regional Commission
RAMP	Risk Assessment and Management Plan
RPA	Resource Protection Area
SFHA	Special Flood Hazard Area
SVI	Social Vulnerability Index
TMDL	total maximum daily load
VRA	Virginia Resources Authority

I. Resilience Plan Elements

This section summarizes how existing plans, studies, policies, and initiatives support each of the nine required elements of a Resilience Plan. Section II provides supplemental considerations reflecting additional guidance at the end of Appendix F of the 2024 Community Flood Preparedness Fund (CFPF) Grant Round 5 Manual (DCR and VRA 2024).

The Resilience Plan is Project Based with a Focus on Flood Control and Resilience

For years, Arlington County, Virginia (the County) has experienced significant flooding, with increasing social, infrastructure, public health, and economic impacts. Brief, intense storms, particularly in the summers of 2006, 2018, 2019 and 2020, have caused flash flooding and significant property loss (Figure 1).

Figure 1. Intense Storms, like in 2006, 2018, 2019, and 2020, Caused Significant Street Flooding

To better predict and plan for flooding, the County has developed the Flood Risk Assessment and Management Plan (RAMP; Jacobs 2024), a three-volume report completed in April 2024 that identifies watersheds and critical facilities countywide that are the most vulnerable to flooding. The RAMP does the following:

- Provides an extensive study of flood-vulnerable watersheds based on flood modeling and risk assessments for both current and future stormwater conditions
- Defines impacts of future climate change
- Maps mitigation measures and projects
- Evaluates the costs and benefits of potential flooding solutions

Flood mitigation projects were identified, and benefit-cost analyses were performed for two categories identified as vulnerable: (1) neighborhood problem areas and (2) critical facilities. For neighborhood areas, conceptual flood mitigation projects were developed using either conveyance or storage. These were summarized in the priority vulnerable watersheds in a series of maps. Figure 2 provides one example, and others are included in Volume 2 of the RAMP report.

Benefits were calculated as the difference in estimated annualized risk before and after project implementation, as determined with the Federal Emergency Management Agency (FEMA) Hazus tool (FEMA n.d.).

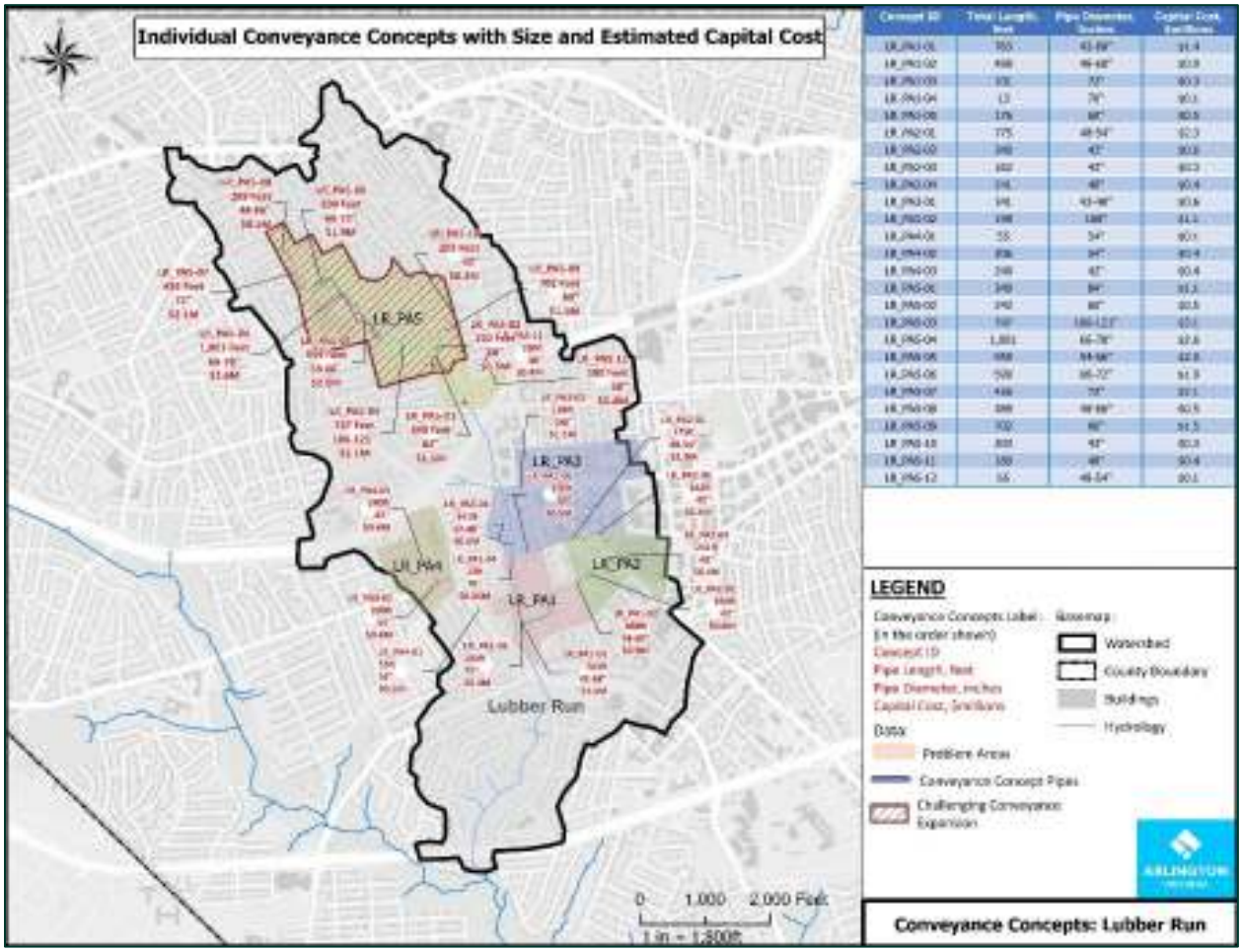
For critical facilities, such as the County Water Pollution Control Plant, alternatives were developed for dry or wet flood proofing, or elevating, at either an asset level, building level, or facility level. Figure 3 shows flood mapping around the Water Pollution Control Plant, which was used to set design flood elevations for evaluation of flood mitigation alternatives.

In addition to these more structural solutions, programmatic solutions serve as an important tool to address flooding countywide and in localized areas. These programmatic solutions include the following:

- Land use planning and risk communication
- Enhanced building design and construction codes for areas at high risk
- Where other solutions are infeasible, overland relief by acquiring and removing structures in flood-prone areas

The County already includes these and many other programmatic solutions in its menu of flood management strategies.

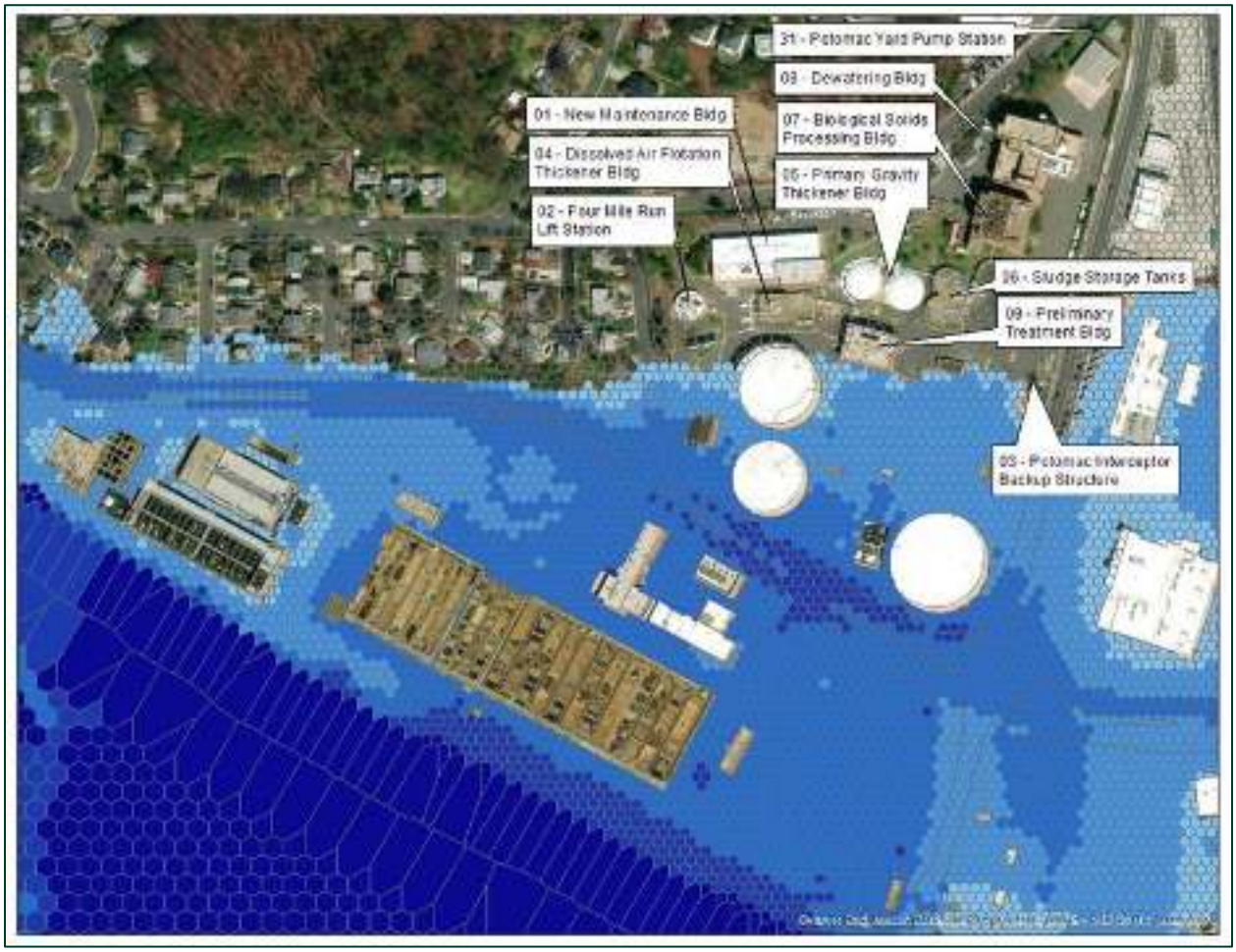
Figure 2. Example Project Concept Map Prepared for Vulnerable Watersheds



Source: RAMP Volume 2 (Jacobs 2024).

ID = identification

Figure 3. Flood Exposure for the Flood Scenario 1 (Climate Change in 2040) 100-year Storm at the Water Pollution Control Plant



bldg = building

The Resilience Plan Incorporates Nature-based Infrastructure to the Maximum Extent Possible

The County has an extensive program of identifying opportunities, evaluating feasibility, and implementing nature-based solutions. These include stream assessments and restoration, as well as green infrastructure (GI) associated with green streets and other green stormwater infrastructure in public spaces. In addition, the County has recently adopted a stormwater utility fee, which includes an incentive program for implementing GI on private property.

The County conducted a Watershed Retrofit Study to identify opportunities for installing facilities to slow down and filter stormwater runoff before it flows into local streams (County n.d.ag). Projects were scored and ranked based on several factors, including runoff reduction, pollutant removal, drainage problem alleviation, feasibility, and maintenance requirements. A ranked list of retrofit projects was developed by watershed. Stormwater facility types included bioretention and dry swales. The County has been steadily implementing GI projects, in particular green streets (County n.d.o), in coordination with the Arlington

Neighborhoods Program (County n.d.w), Stormwater Management Program (County n.d.al), and Neighborhood Complete Streets Program (County n.d.aj).

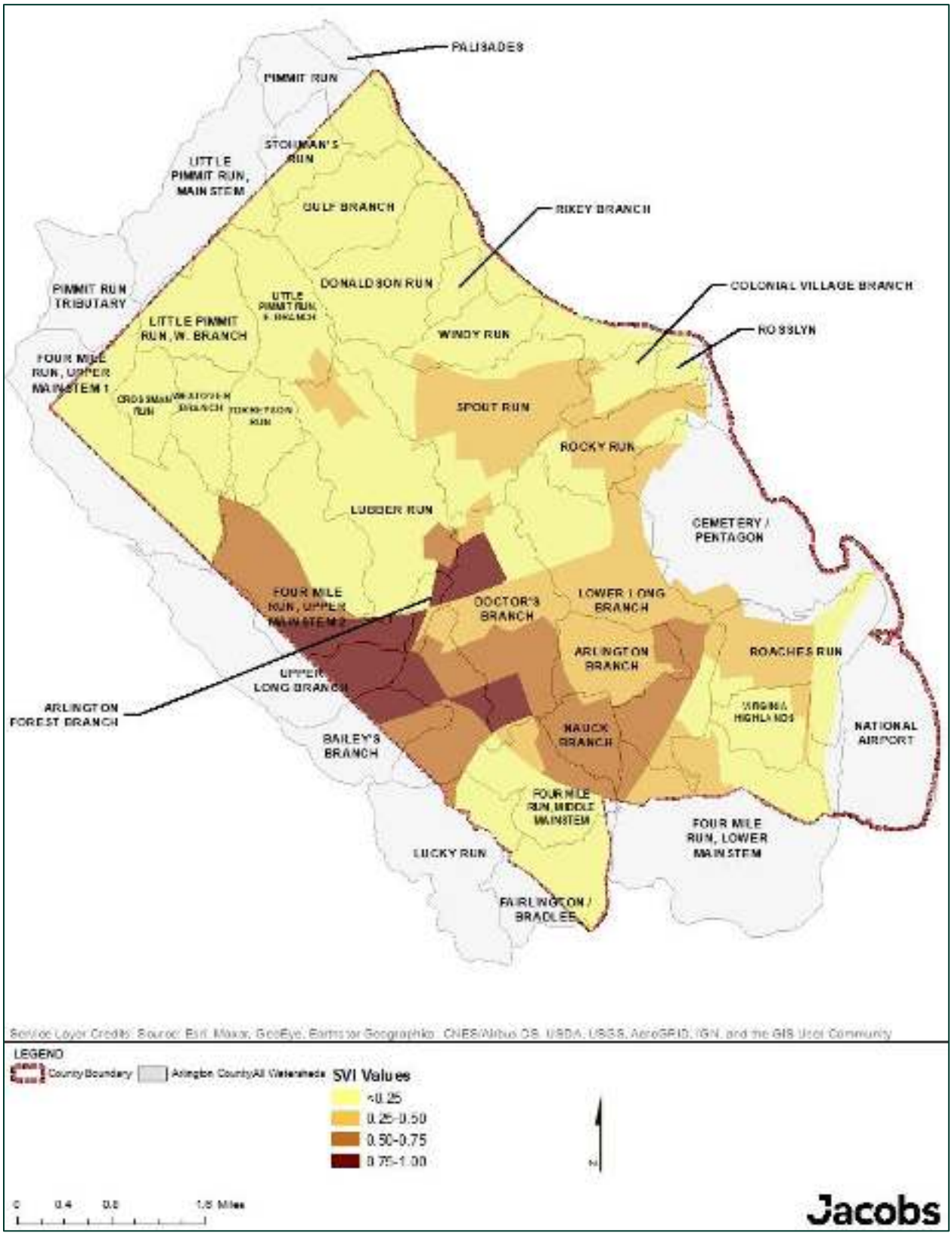
In addition to GI projects, the County has conducted a countywide stream assessment (County n.d.ad) and prioritized stream restoration projects. The County has an ongoing program to implement stream restoration projects that apply natural channel design principles (County n.d.ae).

Although the County's programs for implementing nature-based solutions have been proactive and effective at managing water quality and habitat impacts from development, the County recognizes that more could be done when managing flooding and drainage issues from larger storms to integrate "green and grey" solutions (that is, combining solutions that capture stormwater through watershed retrofits while also implementing conveyance or storage solutions). An example is integrating green streets with projects that expand drainage conveyance solutions (such as larger inlets and larger storm sewers) and considering GI as part of overland relief corridors. The County is working on policies and procedures to improve this integration of green and grey solutions. The RAMP project recommends the County consider "blended solutions and green stormwater infrastructure" as part of detailed feasibility studies that will be needed to implement each resilience project (refer to Section 5.2 of Volume 2 of the RAMP).

The Resilience Plan Includes All Parts of a Community Regardless of Socioeconomics or Race and Addresses the Flood Resilience Needs of Underserved Populations

The County's commitment to equity reaches across the programs, policies, and projects of all County departments and bureaus and is detailed in Realizing Arlington's Commitment to Equity (County 2022). Consistent with this principle, the Stormwater Management Program has identified and prioritized mitigation projects in County watersheds where underserved populations exist (County n.d.al). This commitment is also reflected in the Flood RAMP through explicit analysis of the impacts of flooding and the benefits of mitigation measures on vulnerable communities. This analysis was achieved by mapping areas of high vulnerability using the Centers for Disease Control and Prevention's (CDC's) Social Vulnerability Index (SVI; ATSDR and CDC n.d.) and intersecting those areas with areas of flooding based on detailed hydrologic and hydraulic modeling. Figure 4 shows SVI data overlayed on Arlington County watersheds.

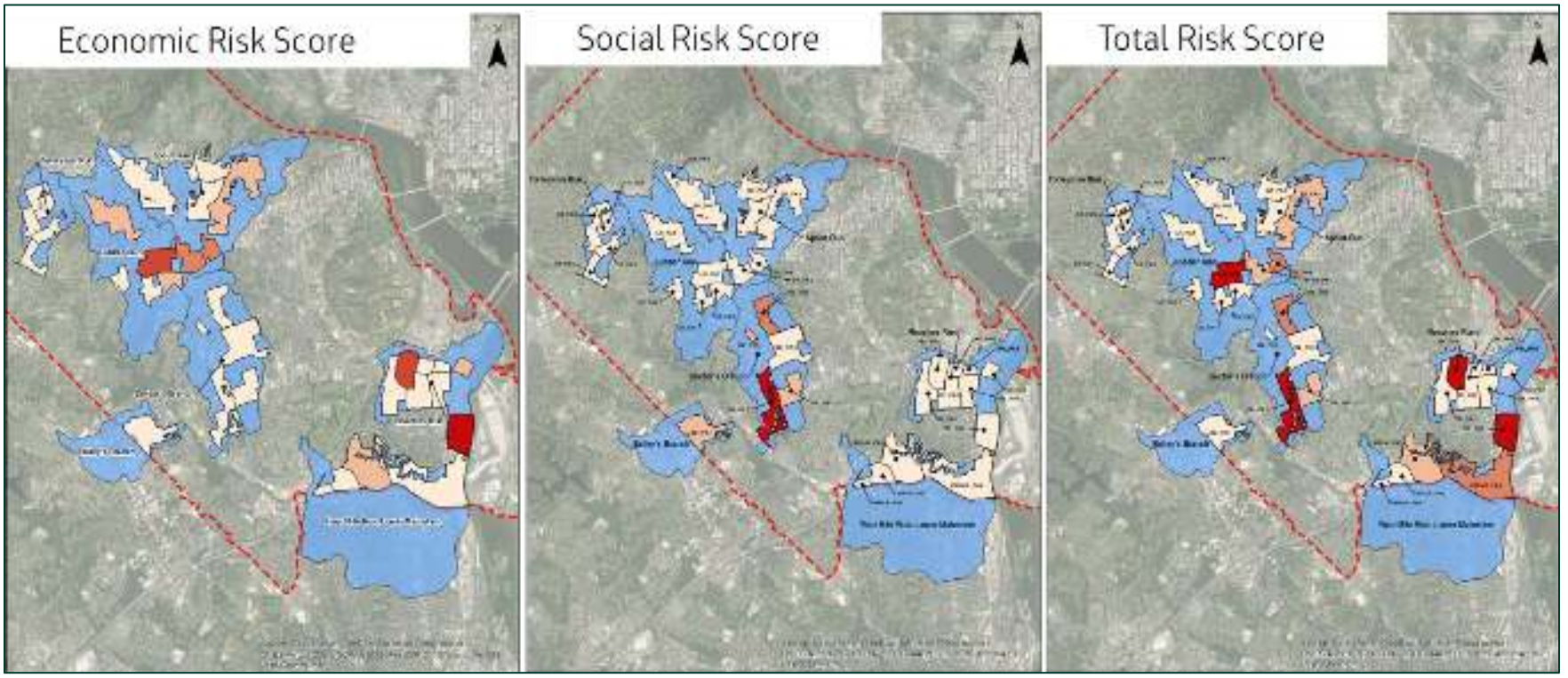
Figure 4. Social Vulnerability Index Values and Arlington County Watersheds



Thirty-six watersheds are either wholly or partly within Arlington County. The RAMP analyzed 15 of the most critical watersheds based on several factors, including the likelihood of significant flooding, past flood complaints and impacts, and the presence of critical facilities. These 15 watersheds were then assessed for flood vulnerability based on current conditions and projected climate-driven rainfall intensity and flood impacts in 2040 and 2070, resulting in 7 watersheds for a more detailed "problem area" flood risk assessment. For the RAMP, flood modeling and risk assessments were conducted considering climate change for urban interior, riverine, and coastal flooding. The modeling determined areas of the County, critical facilities, and vulnerable groups that are most susceptible based on current and projected flooding with climate change. Detailed risk assessments were conducted for watersheds with the highest vulnerability. FEMA's (n.d.) Hazus tool was applied to assess current and projected future damages at the neighborhood and watershed scale. Alternatives were developed for flood mitigation risk based on economic, environmental, and social equity criteria with a benefit-cost analysis methodology. Strategies included storage, conveyance, overland relief, and policy and programmatic alternatives.

This approach demonstrated the importance of considering social vulnerability in the benefit-cost analysis, resulting in a different prioritization of problem areas compared to an analysis based solely on monetary damages. The analysis also demonstrated the need to analyze all sources of flooding, with interior flooding representing a significant flood risk well outside FEMA floodplains (Figure 5).

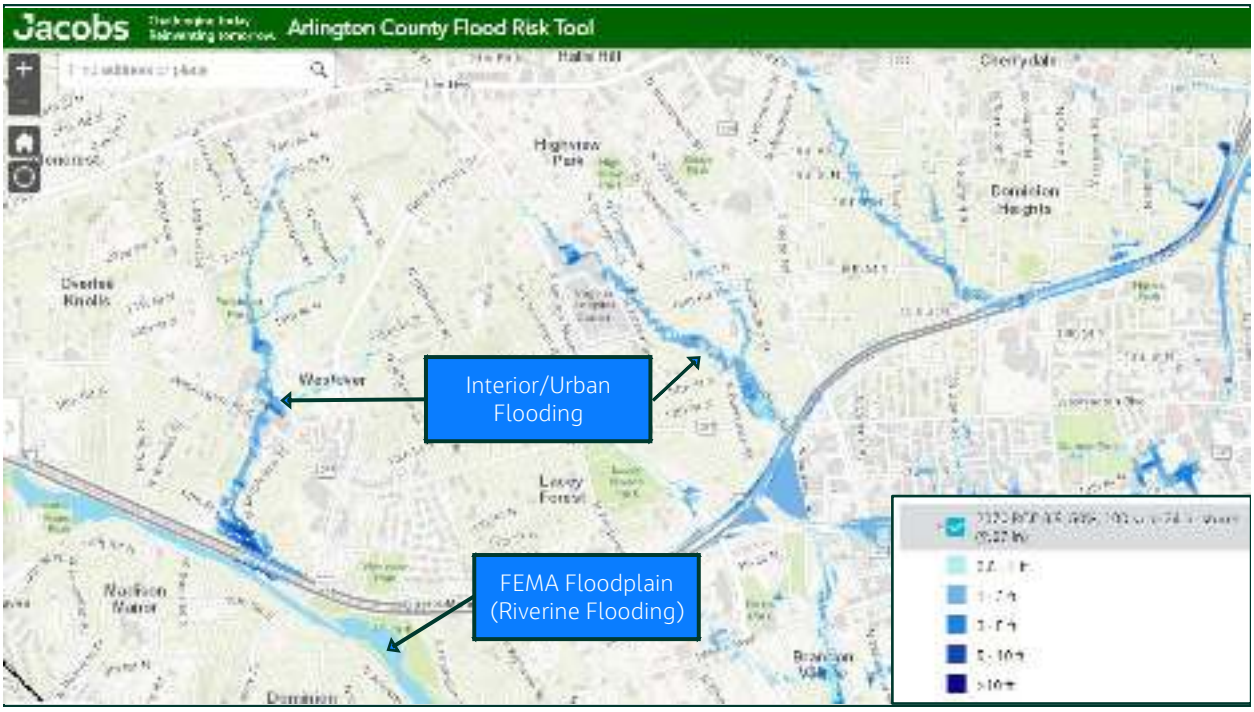
Figure 5. Problem Area Comparative Results Shows the Importance of Integrating Economic and Social Risk in the Prioritization of Problem Areas for Flood Mitigation



The Resilience Plan Identifies Flooding Issues in all Areas of the Community, Not Just SFHAs, and Addresses Repetitive Loss Properties

The analysis conducted for the RAMP also demonstrated the need to analyze all sources of flooding, with interior flooding representing a significant flood risk well outside FEMA Special Flood Hazard Areas (SFHAs). The RAMP modeled all types of flooding (interior flooding, riverine flooding, and coastal flooding) under current and future climate conditions. Given the flood events of 2006, 2018, 2019, and 2020, when repetitive flood losses occurred well outside FEMA floodplains, much of the RAMP's emphasis was on those areas of urban interior flooding. Figure 6 illustrates the flooded areas for interior flooding versus the mapped FEMA floodplain.

Figure 6. Interior (Urban) Flooding is a Bigger Risk to Arlington County Residents, Businesses, and Infrastructure than Riverine Flooding in the FEMA SFHA



Such interior flooding issues will require more comprehensive solutions, including policy and programmatic, and infrastructure solutions that factor in climate change, and adaptive solutions that include land use planning, design guidelines, and property acquisition to allow for overland relief.

The Resilience Plan Includes Property Acquisitions and Includes Equitable Relocation Strategies (If Applicable)

Arlington County has a program for voluntary property acquisition to reduce flood risk (County n.d.af). The County is purchasing some properties on a voluntary basis to provide overland relief or expand the storm system capacity and reduce flood risk to the community. Because the program is voluntary, it does not include a provision to assist with relocation.

The program is in the early stages and will, by necessity, take place in phases as properties are acquired. The properties currently targeted for potential acquisition are those in interior flooding areas, typically far from SFHA but subject to repetitive losses.

The Resilience Plan Includes a Strategy for Debris Management in Water Channels and Floodplains

Debris management in water channels and floodplains is handled by the County's Water, Sewer, Streets Bureau and the County Department of Parks and Recreation (DPR; for tree issues) on an as-needed basis. A large team of representatives from several County departments evaluates the county after large storms (like in 2019) and determines the necessary cleanup efforts.

The Resilience Plan Includes Administrative Procedures for Substantial Damage or Improvement of Structures within the SFHA

Building permits for structures within 15 feet (landward) of the SFHA are flagged during the Land Disturbing Activity/Stormwater Permit Overview (LDA; County n.d.r) application process and sent to designated permit reviewers. These reviewers will perform an analysis (usually based on an appraisal) to determine if the proposal is greater than the 50% threshold to be considered a substantial improvement as defined by the County Floodplain Ordinance. Refer to Attachment A for the County's Construction Certificate Management Procedures under the National Flood Insurance Program (NFIP) Community Rating System (County n.d.w).

The Resilience Plan Includes Coordination with Other Local and Interjurisdictional Plans and Projects and Has a Timeline for Implementation

The County participates in the Four Mile Run Watershed Program, which is coordinated by the Northern Virginia Regional Commission (NVRC; n.d.). Four Mile Run watershed is shared with the City of Alexandria, the City of Falls Church, and Fairfax County, and it includes shared sections of SFHA. The Four Mile Run Channel Maintenance and Dredging Project is coordinated with the City of Alexandria (County n.d.m).

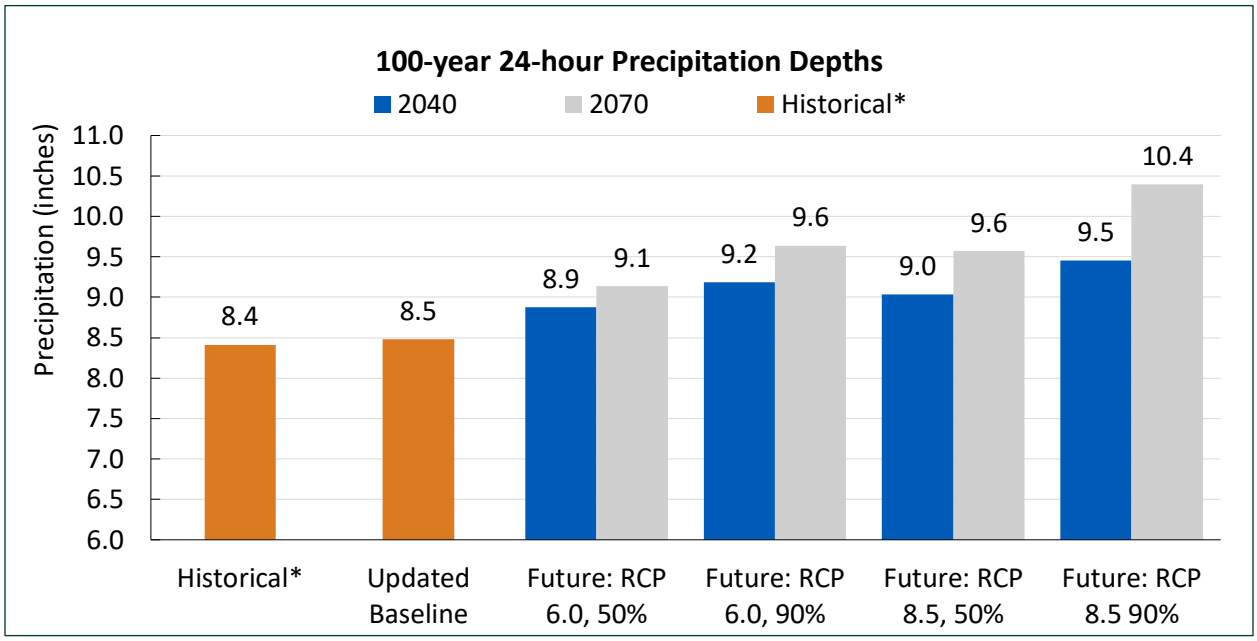
The County regularly coordinates and participates with regional planning organizations and professional societies such as Metropolitan Washington Council of Governments (MWCOG), NVRC, Virginia Municipal Stormwater Association (VAMSA), U.S. Army Corps of Engineers (USACE), VFMA, and various civic associations.

The Resilience Plan Is Based on the Best Available Science and Incorporates Climate Change, Sea Level Rise, Storm Surge, and Current Flood Maps

The RAMP relied on best available science at the time to develop climate projections for rainfall intensity, duration, and frequency (IDF) for interior and riverine modeling, as well as sea level rise for coastal storm surge modeling. Details are in Appendix A in Volume 3 of the RAMP (Jacobs 2024) report. National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Volume 2 (DOC et al. 2006) rainfall data were updated to include the most recent rainfall records. IDF projections were then prepared for a range of greenhouse gas emission scenarios and time horizons. The Representative Concentration Pathway (RCP) 8.5 projections for 2040 and 2070 were selected. Figure 7 shows the projections for the 100-year 24-hour storm.

Projections were developed for the 10-year through 500-year storms. In addition, sea level rise projections from NOAA were reviewed, and the NOAA Intermediate High curve was selected to evaluate the impacts of storm surge.

Figure 7. Rainfall Projections for Arlington County for 100-year Storm



*Historical: NOAA Atlas 14, based on 15 stations in region

II. Additional Considerations in Arlington Resilience Plan

In addition to the 9 required elements discussed in Section I, Appendix F of the 2024 CFPF Grant Manual provides an additional list of 16 considerations to help guide the development and identification of strategies and documents needed for a successful Resilience Plan. This section summarizes how the County's existing plans or initiatives address each of these considerations.

Strategic policies for local government-wide flood protection and prevention that include considerations of all parts of a locality regardless of socioeconomics or race and address flood resilience needs of underserved populations within the community.

The County adopted a new floodplain ordinance in October 2023 (County 2023b). New FEMA Flood Insurance Rate Maps were adopted in November 2023.

As mentioned previously, the RAMP extends the analysis of flood risk in Arlington County on a countywide basis to include areas subject not only to current riverine and coastal flood risk, but also existing and projected future areas of interior flooding, largely where legacy streams were encased in culverts decades ago, and extends riverine and coastal flooding maps to reflect climate change. As explained previously, the RAMP purposefully considered underserved populations so that risk assessment methods reflected these communities and not just traditional estimates of economic damage, which tend to prioritize areas of greater assessed value and/or economic activity.

Proposed projects that enable communities to adapt to and thrive through natural or human hazards.

The Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County (County and IEM 2022) includes a high-level assessment of risk to multiple natural and human hazards. Although the overall risk rating is low, the report includes some recommendations to address improvements to the NFIP Community Rating System (County n.d.w) and interior flooding. As noted previously, the County has made significant strides in this respect, adopting an updated floodplain ordinance and completing the Flood RAMP (Jacobs 2024), which identifies specific capital projects and policy recommendations to improve resilience. The County's Community Rating System rating has improved from Class 8 to Class 7 this year.

The County has been including blended solutions to flood mitigation for many years. Two examples of blue/green projects follow:

1. The West Little Pimmit Run Storm Sewer Upgrade consisted of 1,600 linear feet of storm sewer upgrades designed to address flooding that occurred in 2006 (County n.d.ah). The project was designed with two green street facilities, one in the island of John Marshall Drive (Figure 8; County n.d.q) and the other on North Kensington Street (County n.d.t).

Figure 8. John Marshall Drive Green Street

This green street was a part of the larger West Little Pimmit Run Storm Sewer Upgrade project that increased the capacity of the storm sewer through this neighborhood.
Source: County, n.d.q.

2. Headwaters of Donaldson Run Outfall Repair (County n.d.j) was a project that installed storm sewer to pick up runoff from the public street, which was causing erosion. The receiving stream was then restored from the improved outfall to the connection point with a previously completed stream restoration project. The result was a completely restored stream tributary.

Both projects provided elements of traditional "grey" storm conveyance infrastructure, such as storm drainage pipes, and "green" infrastructure, such as stream restoration and bioretention facilities. The projects included a balance of blue/green blended flood mitigation solutions.

Documentation of the County's of existing social, economic, natural, and other conditions present in the local government.

Refer to both the Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County (County and IEM 2022) and the RAMP (Jacobs 2024) reports for detailed documentation of social, economic, natural, and governance conditions for the County.

Review of the vulnerabilities and stressors, both natural and social, in the local government.

Refer to both the Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County (County and IEM 2022) and the RAMP (Jacobs 2024) reports for detailed documentation of vulnerabilities and stressors for the County.

Forward-looking goals, actionable strategies, and priorities that incorporate protections for all impacted parts of a locality.

In addition to the goals and strategies in Flood Resilient Arlington program (County n.d.l), the RAMP report (Jacobs 2024), the stream (County n.d.ad) and watershed (County n.d.ag) assessments, and the green streets programs (County n.d.o), the Arlington County Initiative to Rethink Energy (AIRE) (County n.d.c) has cross-cutting technologies encompassing all-of-government strategies to reduce greenhouse gas emissions and execute a Community Energy Plan, with a goal of achieving the County's 2050 greenhouse gas emissions reduction target for carbon neutrality.

Strategies that guide growth and development away from high-risk locations, which may include strategies in comprehensive plans, other land use plans or ordinances, or other studies, plans, or strategies adopted by a local government.

The County performed the Stormwater Management Zoning Study Amendments study (adopted in March 2023; County n.d.aa), which proposed amendments to existing zoning standards applicable to public stormwater management facilities to enable greater flexibility in their siting and construction. In addition, the Public Spaces Master Plan recommends

modernizing zoning standards for more flexible public space master planning and development (WRT 2019). The stormwater zoning amendments made it easier to locate flood mitigation measures by making the zoning requirements consistent throughout Arlington County, where, previously, certain flood mitigation facilities were treated inconsistently under differing zones. In addition, the County is currently developing flood resilient design guidelines and recommendations for a zoning overlay.

The General Land Use Plan (GLUP) establishes policy for land use decisions and development in Arlington County. The GLUP is implemented through several processes, some of which protect areas of high flood risk or sensitive environmental areas (County 2023c). Specifically, the Zoning Ordinance, Sector and Area Plans, Use Permit process, and Site Plan process are used by planning staff and reviewers to direct development away from high flood risk areas, mitigate flood risk, improve stormwater conveyance systems, improve water quality, or protect sensitive environmental areas (County n.d.ai, n.d.ak, n.d.am).

An example of how these are implemented for flood resilience is the recent zoning study amendments, which streamlined and standardized the treatment of flood mitigation measures, such as public underground detention facilities and stormwater pump stations (County n.d.aa). Another example is the recently adopted Plan Langston Boulevard area plan, which calls for specific flood mitigation and resilience measures and provides incentives for resilient development (County n.d.u). The Use Permit and Site Plan processes incorporate reviews from stormwater engineers, watershed planners, and flood plain staff, whose main focus is on flood risk mitigation, stormwater capacity improvements, watershed protection, and water quality improvements (County n.d.ak, n.d.am). Code requirements are enforced via these reviews, and voluntary resilience measures are requested and approved.

Proposed acquisition of land or conservation easements or identification of areas suitable for conservation, particularly areas identified as having high flood attenuation benefit by ConserveVirginia or similar data driven tools. Identification of areas suitable for property buyouts in frequently flooded areas.

Most stream valleys are protected as Resource Protection Areas (RPA) under the Chesapeake Bay Preservation Ordinance, which often coincide with FEMA floodplains (County n.d.x). Many of these stream valley areas were acquired by the County or have restrictions on development and require review by the County.

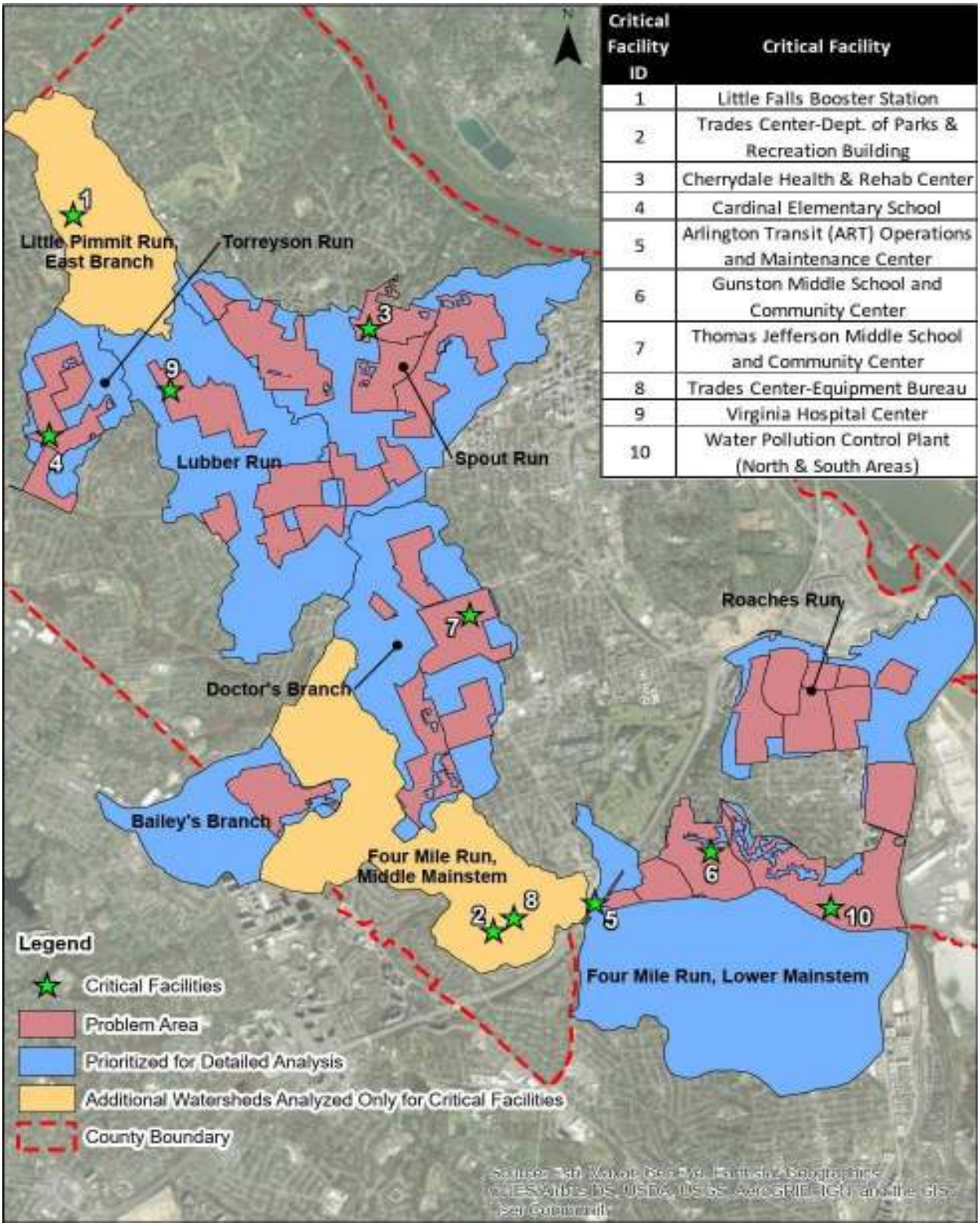
Voluntary property acquisition (County n.d.af) is one tool being used by the County to reduce flood risk, as described in the FY25 to FY34 Capital Improvement Plan approved by the County Board in July 2022 and updated in 2024 (County 2024a). The County is purchasing some properties on a voluntary basis to provide overland relief or expand the storm system capacity and reduce flood risk to the community. The County DPR and Department of Environmental Services (DES) are coordinating regarding maintenance of the lots that have been acquired. Budget has been appropriated for maintenance of these properties. The County is considering creating a new asset class in their asset inventory to account for the lots that are acquired for overland relief pathways.

A Flood Resilient Arlington provides a Story Map and other information pertaining to a range of public-private options the County is considering, including overland relief corridors and the use of available public space for storm facilities (County n.d.l).

Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.

The Flood RAMP builds on the inventory of critical facilities from the Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County (County and IEM 2022) to assess those critical facilities (both public and private) that are vulnerable to flooding. Of those vulnerable to flooding, 10 were further prioritized for detailed flood risk assessments and subsequent evaluations of alternatives. A summary of the facilities that were prioritized is included in RAMP Volume 2 and shown on Figure 9. A complete list of facilities identified and evaluated for vulnerability is in Appendix D, Vulnerability Assessment, in RAMP Volume 3 (Jacobs 2024).

Figure 9. Arlington County Critical Facilities and Problem Areas Selected in RAMP for Detailed Risk Assessments



Identified ecosystems, wetlands, and floodplains suitable for permanent protection.

In addition to RPAs and floodplains, Arlington County has a rare magnolia bog located within a park that was protected through a flood and erosion mitigation project. The County also follows state and federal requirements for wetlands. The County has established the Four Mile Run Restoration Master Plan (R&H et al. 2006) for a living shoreline project in Four Mile Run. In addition, the County's floodplain management is integrated into the Public Space Masterplan (WRT 2019) and Forestry and Natural Resources Plan (County 2023d).

Identified incentives for restoring riparian and wetland vegetation.

The County's recently adopted stormwater utility includes a credit program described in the Stormwater Credit Manual (County 2024b). The program includes incentives (reductions in stormwater fees) for installation of stormwater facilities and voluntary actions to promote water quality and habitat. These include incentives for conservation landscaping and tree planting.

The County's LDA process requires all projects with an LDA permit to show tree conservation measures and provides credits for providing canopy trees (County n.d.s).

A framework for implementation, capacity building, and community engagement.

The County has comprehensive flood resilience public engagement and information processes for engaging the community on program implementation and capacity building; for example, the County regularly participates in meetings of the Arlington County Civic Federation. At the County Manager's Office, the Communications and Public Engagement team is responsible for enterprise-wide communications and civic engagement (County n.d.g) and has developed and implemented strategies for creating knowledgeable, inclusive community leaders and networks.

About 50 standing advisory groups provide input to the County Board on a variety of issues (County n.d.i). From time to time, the Board also creates ad hoc committees and task forces for limited terms to focus on projects of immediate concern. At each January organizational meeting, the Board designates a County Board liaison to each commission (County n.d.a).

A number of groups also provide guidance to the County Manager on specific topics. Every meeting of each County advisory group is open to the public.

The County relies on the hard work of its many civic-minded volunteer commissioners to help it make decisions that benefit the community. Membership in all of these groups is voluntary. The list of commissions and advisory groups follows:

- Alexandria/Arlington Regional Workforce Council
- Arlington Commission for the Arts
- Arlington Neighborhoods Advisory Committee
- Audit Committee
- Aurora House Citizens' Advisory Committee
- Bicycle Advisory Committee[a]
- Board of Equalization of Real Estate Assessments
- Board of Building Code Appeals
- Board of Zoning Appeals[b]
- Chesapeake Bay Ordinance Review Committee[a]
- Child Care Initiative

- Civil Service Commission
- Clarendon Live Entertainment Group
- Climate Change, Energy and Environment Commission
- Commission on Aging
- Commission on the Status of Women
- Community Development Citizens Advisory Committee
- Community Advancing Resilience and Readiness Together[a]
- Community Criminal Justice Board
- Community Housing Finance Corporation Board
- Community Oversight Board
- Community Services Board
- Crystal and Pentagon Cities Council
- Disability Advisory Commission
- Economic Development Commission
- Fire Prevention Code Board of Appeals
- Fire Trial Board
- Fiscal Affairs Advisory Commission
- Food Security Task Force
- Form Based Code Advisory Working Group[a]
- Forestry and Natural Resources Commission
- Historical Affairs and Landmark Review Board
  - Design Review Committee
- Housing Commission
- Human Rights Commission
- Industrial Development Authority
- Information Technology Advisory Commission
- Joint Facilities Advisory Commission
- LGBTQIA+ Advisory Committee[a]
- Military and Veterans Affairs Committee[a]
- Natural Resources Joint Advisory Group
- Neighborhood Complete Streets Commission
- Park and Recreation Commission
- Partnership for Children, Youth and Families
- Pedestrian Advisory Committee[a]
- Planning Commission
  - Long Range Planning Committee
  - Site Plan Review Committee
  - Zoning Committee
- Police Contract Towing, Advisory Board
- Police Trial Board
- Public Facilities Review Committee
- Social Services Advisory Board
- Sports Commission

- Tenant-Landlord Commission
- Transit Advisory Committee[a]
- Transportation Commission
- Trespass Towing Advisory Board

[a] *Membership is appointed by the County Manager (as opposed to the County Board).*
[b] *The Board of Zoning Appeals is appointed by the Arlington County Circuit Court.*

A community dam safety inventory and risk assessment posed by the location and condition of dam.

There are no high-risk dams in Arlington County.

A characterization of the community.

Refer to both the Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County (County and IEM 2022) and the RAMP (Jacobs 2024)reports for detailed characterization of Arlington County's population, economics, cultural and historic resources, dependence on the built environment, and infrastructure, as well as the risks posed to infrastructure.

The RAMP (2024) and the Stormwater Master Plan (County 2014) include descriptions of flooding from climate change, riverine flooding, sea level rise, tidal events, or storm surges and other weather.

The Arlington County Profile (CPHD 2024) provides a comprehensive profile of the County. The Arlington County Profile is an annual report providing statistical information including demographics, development, employment, transportation, community resources, and more. The Profile has been updated for 2024 and includes data topics, key facts and takeaways, and planning corridor statistics.

- Profile 2024 (CPHD 2024a)
- Profile 2024 Interactive Summary by Planning Corridor (County 2024b) highlights population and housing statistics by planning corridor. Refer to the three dashboard pages:
  - Population, Housing, and Jobs by Corridor
  - 2023 Development Activity
  - Office and Residential Land Use by Corridor
- Profile open data (County n.d.v)

For more information about Arlington's history, amenities, and highlights, refer to Arlington Fast Facts (County n.d.b).

Strategies to address other natural hazards, where applicable, that would cause, affect, or result from flooding events, including the following:

- Earthquakes: The County conducts an earthquake drill every year through public convocations such as the Great Southeast Shakeout Day (County n.d.n).
- Storage of hazardous materials: The Help With Hazardous Materials webpage provides information about hazardous materials storage and permits. The Hazmat Team includes firefighters and paramedics (County n.d.p).

- Landslides, mud, debris flow, and rock falls: The Construction Pollution Prevention webpages provide information about handling debris (County n.d.f). Landslides are not applicable to Arlington County.
- Dam failures: There are no high-hazard dams in Arlington County.
- Wildfires: Prevention of wildfires that would result in denuded lands making flooding, mudslides, or similar events more likely is handled by the Fire Prevention Office (County n.d.k). Arlington County has regulations on outdoor burning, fireworks, and similar activities that are intended to prevent wildfires. The Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County lists wildfires as a low risk for Arlington County (County and IEM 2022).
- Severe weather: Through the Department of Public Safety Communications and Emergency Management (PSCEM), Arlington County maintains its mission to be prepared for emergencies and respond effectively. PSCEM oversees and coordinates emergency Plans and Resources, engages with the community to prepare for an emergency or disaster, and operates the Emergency Communications Center (9-1-1 Center) and Arlington Alert program, which sends alerts about local traffic, hazardous weather, major events, and more.

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Appendix A
Construction Certificate Management Procedures under NFIP Community Rating System

National Flood Insurance Program
Community Rating System

Construction Certificate Management Procedures

Arlington County, Virginia

July 2024

The **Department of Environmental Services (DES), Development Services Bureau, and the Department of Community Planning and Housing (CPHD), Inspection Services Division (ISD)** are responsible for the administration of permitting, inspection, and review of all construction, along with the management and maintenance of all building permit files and administrative documents (building guides, applications, forms, etc.) related to building and development. All inspections and permit/plan reviews are conducted by these two departments, as well as all permit approvals.

Currently, all building permit applications are automatically screened by DES to determine if the parcel is located within a Special Flood Hazard Area, or within 15 ft. (in the landward direction). If it is determined that a parcel is within a Special Flood Hazard Area, the application is routed to DES for review and approval.

The purpose of this document is to explain the County's administrative procedures for review of Elevation Certificates and all other required floodplain-related construction certificates including, but not limited to, Floodproofing Certificates, and engineered flood opening certificates. These procedures outline the guidelines for the submittal of required certificates; the responsibilities of reviewing agencies; the location where the certificates and other related documents are to be stored/archived; and the process for making such certificates available to the public.

TYPES OF CERTIFICATES REQUIRED

Section 48-55 of the Arlington County Floodplain Ordinance requires that new construction and/or substantial improvements to existing structures must maintain a minimum 15-foot setback from a Special Flood Hazard Boundary as follows:

A. *All new construction of and substantial improvements to residential structures shall be set back fifteen (15) feet horizontally in the landward direction from the location of the base flood elevation boundary.*

B. *All new construction of and substantial improvements to nonresidential structures shall be set back fifteen(15) feet horizontally in the landward direction from the location of the base flood elevation boundary, unless such structures are floodproofed.*

New commercial construction; substantial improvements to an existing structure; or repairs to a substantially damaged building to be floodproofed in accordance with paragraph B. above, will require a submission to the Inspection Services Division of an Elevation Certificate, and any other applicable floodplain-related certificate such as a Floodproofing Certificate for Non-Residential Structures, and a certification of engineered flood openings for the development.

CERTIFICATE SUBMITTAL REQUIREMENTS

The applicant shall submit an Elevation Certificate with the building permit application. The Elevation Certificate will be reviewed to determine if the proposed design complies with the Arlington County Floodplain Ordinance, Chapter 48, of the Arlington County Code.

Once construction of the building is completed, and all adjacent site grading is finalized, a certified Finished-construction Elevation Certificate must be submitted by the applicant showing the "as-built" characteristics of the building. A Finished-construction Elevation Certificate must be submitted, reviewed, corrected (if necessary), and approved by the County before a **certificate of occupancy or final approval of the building permit** is issued. At this point, all other required certificates must also be submitted and reviewed.

If a Floodproofing Certificate for Non-Residential Structures is required for a floodproofed non-residential building, an Elevation Certificate is not required for purposes of the National Flood Insurance Program (NFIP). A complete and certified Floodproofing Certificate must be submitted through the Arlington Permit Online Portal upon completion of construction before making a request for issuance of a certificate of occupancy.

When engineered flood openings are installed in the foundation of a building, and the Elevation Certificate indicates that they were installed (Sections A8d and A9d on the Elevation Certificate), an Engineered Opening Certification must be submitted with the Elevation Certificate to verify compliance and the insurance rate. The developer must submit either the International Code Council® Evaluation Service (ICC-ES) form for the engineered opening, or an individual certification. Individual certifications must include the following, at a minimum:

1) An identification of the building (address) containing the installed engineered openings.
2) The certifying professional's name, title, address, type of license, the state issuing the license, signature, and seal.
3) A statement certifying the design of the openings will automatically equalize hydrostatic flood loads on exterior walls by allowing for the automatic entry and exit of floodwaters; and
4) A description of the range of flood characteristics tested or computed for which the certification is valid, such as rates of rise and fall of floodwaters.

REVIEW OF ELEVATION CERTIFICATES

All finished-construction Elevation Certificates shall be submitted through the **Online Arlington Permit Portal.** If the certificate is for an address located within the SFHA or the 15 ft. setback in the County's tracking system, it will be forwarded to the **DES - Development Services Bureau** for review of any associated supporting documentation compliance.

Upon receipt of the Elevation Certificate, **DES - Development Services Bureau** will review the permit application for approval. A **final building permit** will not be issued until the Elevation Certificate and supporting documentation are approved.

DES INTERNAL REVIEW PROCESS

1. DES will review Elevation Certificates, and Finished Construction Elevation Certificates for minimum form submittal criteria requirements within ten business days of submittal to ensure required forms are completed correctly.

2. Resubmittal of an Elevation Certificate, or a Finished Construction Elevation Certificate containing inaccurate or incomplete information in Section C2, or other parts of the form, may/will be required before formal review and approval.
3. Upon completion of a certificate review, DES will provide the applicant written comments and approval conditions.
4. Comments and approval conditions may be provided in a separate document/memo.
5. Comments and approval conditions may also be included in Section G of the form.
6. DES review of an Elevation Certificate or the Finished Construction Elevation Certificate will be done within ten (10) business days after staff confirms all minimum submittal criteria and information on the respective form has been met.
7. DES will not sign off on the approval of a building permit until the review and approval of either certificate above is completed.

COUNTY STORAGE AND MAINTENANCE OF CERTIFICATES AND ASSOCIATED DOCUMENTS

Elevation Certificates and associated documents and permits, other required construction certificates, and related permit application documentation, will be stored Online in the County's **Onbase Permitting Archives** as prescribed by State and County records retention policies and practices.

AVAILIBILITY OF CERTIFICATES AND RELATED DOCUMENTS REQUESTED BY THE PUBLIC

Requests by the public for a copies of Elevation Certificates, Finished Construction Elevation Certificates, or any other related documents can be made by filing a Virginia FIOA request through the County's online **FOIA request portal** using this link: Freedom of Information Act (FOIA) – Official Website of Arlington County Virginia Government (arlingtonva.us) The County will respond to a FOIA request within five (5) business days of receiving such request. If the County's response will require more time than the five-day period, the County may exercise its allowed option for an extension of seven (7) additional business days to prepare and return a response. The requestor will be informed in writing should an extension be necessary.

FOIA responses may include charges associated with the research, production, and reproduction of requested documents. Applicable exemptions may apply.

ACKNOWLEGEMENTS:

Luis D Araya 7-26-24

Luis Araya, Chief, DES-Development Services Bureau Date

7/26/2024

Shahriar Amiri, Chief building official, CPHD, Inspection Services Division Date

Appendix C – DCR Approval Letter of Arlington's Resilience Plan

Matthew S. Wells
Director

Andrew W. Smith
Chief Deputy Director

Frank N. Stovall
Deputy Director for Operations

Darryl Glover
Deputy Director for Dam Safety, Floodplain Management and Soil and Water Conservation

Laura Ellis
Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

January 22, 2025

Elizabeth Thurber, PE
Department of Environmental Services
2100 Clarendon Boulevard, Suite 705
Arlington, VA 22201

RE: Arlington County Resilience Plan Submission – CFPF

Dear Ms. Thurber,

Thank you for submitting the *Arlington County Resilience Plan* (the Plan) in advance of a submission to Round 5 of the Community Flood Preparedness Fund. After careful review, the Virginia Department of Conservation and Recreation has deemed the Plan complete, meeting all criteria outlined in the Round 5 Grant Manual. This approval will remain in effect for a period of five years, ending on January 22, 2030.

The following elements were evaluated as part of this review:

Element 1: It is project-based with projects focused on flood control and resilience.

The Plan gathers and prioritizes project possibilities drawn from a variety of studies and plans as shown in the three-volume report called the *Risk Assessment and Management Plan* or *RAMP*.

Element 2: It incorporates nature-based infrastructure to the maximum extent possible.

The Plan identifies extensive opportunities to include green infrastructure throughout County stormwater and neighborhood planning, using best practices as bioretention, swales, and "green streets." Countywide stream assessments have led to ongoing restorations and hybrid retrofits.

Element 3: It considers of all parts of a locality regardless of socioeconomics or race.

The Plan explains the County's commitment to equity through prioritized mitigation projects in underserved neighborhoods. Spatial analysis identifying overlaps of flooding, social vulnerability, critical facilities, along with other social and environmental factors informs the resilience strategy.

Element 4: Identifies all flooding occurring within locality, not only within SFHAs, and provides repetitive / severe repetitive loss data.

The Plan includes analysis from the *RAMP* that models interior, riverine and coastal flooding under current and future conditions, going far beyond the FEMA floodplain. As many of the County's

repetitive loss properties are outside the SFHA, this analysis is affecting policy, programming, land use and design guidelines.

Element 5: If property acquisition and / or relocation guidelines are included, equitable relocation strategies are addressed.

The County is building an acquisition program, as detailed in the *FY25-34 Capital Improvement Plan.* It is a fully voluntary program designed to provide overland relief of storm runoff. Any homeowner wishing to take part will be paid full market value based on an independent appraisal.

Element 6: Includes a strategy for debris management.

Debris management in water channels is handled by the County's Water, Sewer and Streets Bureau and Dept. of Parks and Recreation in order to to control potential flooding caused by blockages.

Element 7: Includes administrative procedures for substantial improvement / substantial damage of structures within the SFHA.

The Plan describes and links to substantial improvement / substantial damage permitting procedures triggered by building within a fifteen-foot set back from the Special Flood Hazard Area.

Element 8: It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.

The Plan outlines regional collaboration in overlapping watersheds, shared projects with adjacent jurisdictions and references dozens of other local plans and studies that consider more than flooding in order to create a full, holistic and comprehensive vision for resilience in County communities.

Element 9: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.

The Plan references detailed technical assessments that quantify the County's flood risk. A range of scenarios and timelines are considered in order to inform resilience needs and strategy. Sources include FEMA maps and databases, USACE, NOAA and other state or federal research programs.

DCR looks forward to working with the County to build a more resilient community. Thank you for your interest in the Community Flood Preparedness Fund and your participation in this program.

Sincerely,

Angela Davis
Director, Division of Floodplain Management

cc: Darryl M. Glover, DCR
Brandy Buford, DCR
Jake Shaw, DCR