VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION:

2022 VIRGINIA COMMUNITY FLOOD PREPARDNESS FUND GRANT

Application

Riverside Memorial Cemetery Shoreline Restoration

Department of Public Works

Division of Environmental Stormwater Management

2233 McKann Ave

Norfolk, VA 23505

Contents

Appendix A: Application Form for Grant Requests for All Categories

Virginia Department of Conservation and Recreation

Virginia Community Flood Preparedness Fund Grant Program

Name of Local Government: _City of Norfolk_____

Category of Grant Being Applied for (check one):

____Capacity Building/Planning

__X___Project

_____Study

NFIP/DCR Community Identification Number (CID)_**510104**_____

If a state or federally recognized Indian tribe, Name of tribe_____

Name of Authorized Official: ____**Dr Larry H. Filer II** _____

Signature of Authorized Official: _____ DocuSigned by: C45AA22E7D6047B... 4/7/2022 | 6:47 AM PDT

Mailing Address (1): 810 Union St

Mailing Address (2): Suite 1101

City: Norfolk State: VA Zip: 23510

Telephone Number: 757-664-4242 Cell Phone Number: (____)_____

Email Address: city.manager@norfolk.gov

Contact Person (If different from authorized official): Justin Shafer

Mailing Address (1): 2233 McKann Ave

Mailing Address (2): _____

City: Norfolk State: VA Zip: 23509

Telephone Number: 757-823-4048 Cell Phone Number: 757-282-8383

Email Address: justin.shafer@norfolk.gov

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

Categories (select applicable project):

Project Grants (Check All that Apply)

- ☐ 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.
- ☑ Wetland restoration.
- ☐ Floodplain restoration.
- ☐ Construction of swales and settling ponds.
- ☑ Living shorelines and vegetated buffers.
- ☐ Structural floodwalls, levees, berms, flood gates, structural conveyances.
- ☐ Storm water system upgrades.
- ☐ Medium and large scale Low Impact Development (LID) in urban areas.
- ☐ 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.
- ☐ Dam restoration or removal.
- ☑ Stream bank restoration or stabilization.
- ☐ Restoration of floodplains to natural and beneficial function.
- ☐ Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.
- ☐
- ☐

- **Location of Project (Include Maps):**
  Campostella-Berkley Area of Norfolk adjacent to Riverside Memorial Cemetery

NFIP Community Identification Number (CID#):(See appendix F____510104_____

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): ___5101040059H_____

Total Cost of Project: _____$1,900,000_____

Total Amount Requested ____$1,520,000_____

Appendix B: Scoring Criteria for Flood Prevention and Protection Projects

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

Applicant Name:	**City of Norfolk**	
Eligibility Information		
Criterion	**Description**	**Check One**
1. 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)?		
Yes	Eligible for consideration	X
No	Not eligible for consideration	
2. Does the local government have an approved resilience plan and has provided a copy or link to the plan with this application?		
Yes	Eligible for consideration under all categories	X
No	Eligible for consideration for studies, capacity building, and planning only	
3. If the applicant is <u>not a town, city, or county</u>, are letters of support from all affected local governments included in this application?		
Yes	Eligible for consideration	X
No	Not eligible for consideration	
4. Has this or any portion of this project been included in any application or program previously funded by the Department?		
Yes	Not eligible for consideration	
No	Eligible for consideration	X
5. Has the applicant provided evidence of an ability to provide the required matching funds?		
Yes	Eligible for consideration	X
No	Not eligible for consideration	
N/A	Match not required	
Project Eligible for Consideration		**☑ Yes** **☐ No**

Applicant Name:	City of Norfolk	
Scoring Information		
Criterion	**Point Value**	**Points Awarded**
6. Eligible Projects (Select all that apply)		
Projects may have components of both 1.a. and 1.b. below; however, only one category may be chosen. The category chosen must be the primary project in the application.		
1.a. Acquisition of property consistent with an overall comprehensive local or regional plan for purposes of allowing inundation, retreat, or acquisition of structures.	**50**	
☑ Wetland restoration, floodplain restoration ☑ 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 ☐ Dam removal ☑ Stream bank restoration or stabilization. ☐ Restoration of floodplains to natural and beneficial function. ☐ Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.	**45**	**45**
1.b. any other nature-based approach	**40**	
All hybrid approaches whose end result is a nature-based solution	**35**	
All other projects	**25**	
7. Is the project area socially vulnerable? (Based on ADAPT VA's Social Vulnerability Index Score.)		
Very High Social Vulnerability (More than 1.5)	**15**	**15**
High Social Vulnerability (1.0 to 1.5)	**12**	
Moderate Social Vulnerability (0.0 to 1.0)	**8**	
Low Social Vulnerability (-1.0 to 0.0)	**0**	
Very Low Social Vulnerability (Less than -1.0)	**0**	

8. Is the proposed project part of an effort to join or remedy the community's probation or suspension from the NFIP?		
Yes	**10**	
No	**0**	0
9. Is the proposed project in a low-income geographic area as defined in this manual?		
Yes	**10**	10
No	**0**	
10. 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?		
Yes	**5**	5
No	**0**	
11. Does this project provide "community scale" benefits?		
Yes	**20**	
No	**0**	0
Total Points		**75**

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION:

VIRGINIA COMMUNITY FLOOD PREPARDNESS FUND GRANT

Narrative

Riverside Memorial Cemetery Shoreline Restoration

Department of Public Works

Division of Environmental Stormwater Management

2233 McKann Ave

Norfolk, VA 23505

Riverside Memorial Cemetery Shoreline Stabilization

Scope of Work and Budget Narratives

Project Information

The City of Norfolk seeks support for stabilization and restoration of a highly eroded bank and shoreline along the Riverside Memorial Cemetery in the Campostella-Berkley area of Norfolk, Virginia (Figure 1). The cemetery was established by a private company in 1910 and purchased by the City of Norfolk in 1971. It has a long history of use by residents of the surrounding community. Early in its history, a monument company was also operated at the cemetery and many ornate statues and monuments can be seen around the cemetery, including the Langley Angel. With elevations up to 15 foot NAVD, Riverside Memorial Cemetery has some of the highest ground elevations in Hampton Roads and during World War II a lookout tower was established at the site to monitor activity along the Elizabeth River. The unnamed creek on the eastern side of the cemetery, hereafter identified as Campostella Creek, was historically a large wetland complex with small creeks draining areas deeper in Campostella-Berkley. The angle of the creek's mouth creates a naturally protected harbor and the adjacent Eastern Branch of the Elizabeth River grew into a major industrial/commercial hub or the region, so over time the wetlands were dredged to create deeper water for industrial activity such as boat building and repair. 1937 aerial imagery (Figure 2) shows approximately half of the current creek having been dredged, with areas closer to the cemetery and further south into the headwaters still retaining wide swaths of wetlands. Further dredging, marine industrial activity, and wind-driven waves from the expanded creek mouth resulted in further loss of wetlands and eventually of the bank up to the cemetery over the following decades. In recent years detailed review of the site in hopes of restoring the shoreline revealed how badly many areas along the bank had eroded, with some vertical or even undercut, threatening numerous graves in the cemetery above.

The 44 acre cemetery is an important community asset to Norfolk and particularly to the surrounding neighborhoods of Campostella-Berkley. Campostella Creek drains south through Campostella and drains a 78 acre watershed that includes residential neighborhoods, an elementary school, several recreation centers, numerous industrial sites, and upcoming mixed used developments aimed at revitalizing the area, such as Sycamore Plaza near the headwater of the creek. The community within the watershed, completely within US Census Tract 51, is an at-risk community with very high social vulnerability (SVI Score = 2.4). Norfolk overall is a low-income community compared to the rest of the state, with a city-wide median household income of $53,253 versus a state-wide median household income of $76,448, and median household income in the project area is far lower at $28,671. The community is also noted to be at high risk for exposure to potential hazardous or toxic materials (Exposure Score = 1.3) and restoration of wetlands in the creek may help to filter pollutants for both community and environmental health.

To address the severe erosion of the cemetery bank and restore the wetland shoreline lost over time, Norfolk proposes to utilize primarily nature-based solutions such as living shoreline techniques, bank fill and grading, green block technology, and planted armored matting. Very limited grey techniques such as rock revetment may be required on several stretches of bank, but the project is projected to be over 95% nature-based solutions. Over 1500 linear feet of shoreline will be stabilized and nearly an acre of historical wetland restored, with front edge protection and sloped design to help protect it from adjacent

Figure 1- Project Area Map

Figure 2- 1937 Aerial Photo of Project Area

impacts. The combined effort will protect and enhance a valuable community asset, provide coastal erosion protection into the future, enhance both aesthetics and wildlife habitat, and improve water quality of a creek through the Campostella neighborhood and the Elizabeth River as a whole with an estimated reduction of hundreds of pounds per year of nitrogen and sediment, as well as thousands of pounds of fine sediments. Restored marshes will also help to slow and absorb tidal flood water forced into the narrow creek during major storm events.

Need for Assistance:

While Norfolk is one of the most populated cities in Virginia and a major hub for commerce, military facilities, and other services, much of its population faces severe economic hardship. Compared to Virginia as a whole, Norfolk is a low-income community, with median household income less than 80% of the statewide metric. The city has an average Social Vulnerability Index score of 0.59, ranking it as having Moderate Social Vulnerability as a whole, however many of the densest population areas are concentrated in 25 census tracts listed as having High or Very High Social Vulnerability, including Census Tract 51 in which the proposed project is located. Attached documents provide additional community demographic, economic, and vulnerability information for Census Tract 51 (Appendix D).

While the City of Norfolk manages a robust budget, including a fee to address operation and maintenance of its stormwater system, the combined impacts of climate change and aging infrastructure are placing stress on the City's ability to address all high priority needs in a timely manner. City departments regularly seek grant and loan support to increase the amount of work accomplished at any given time, leveraging Capital Improvement Funds as matching funds and professional engineers, project managers, scientists, and other staff to manage projects and outside funding sources. As a major city within Virginia, Norfolk's staff have all necessary resources to move projects to completion, with a heightened focus for any awarded grants and loans to stay on budget and schedule.

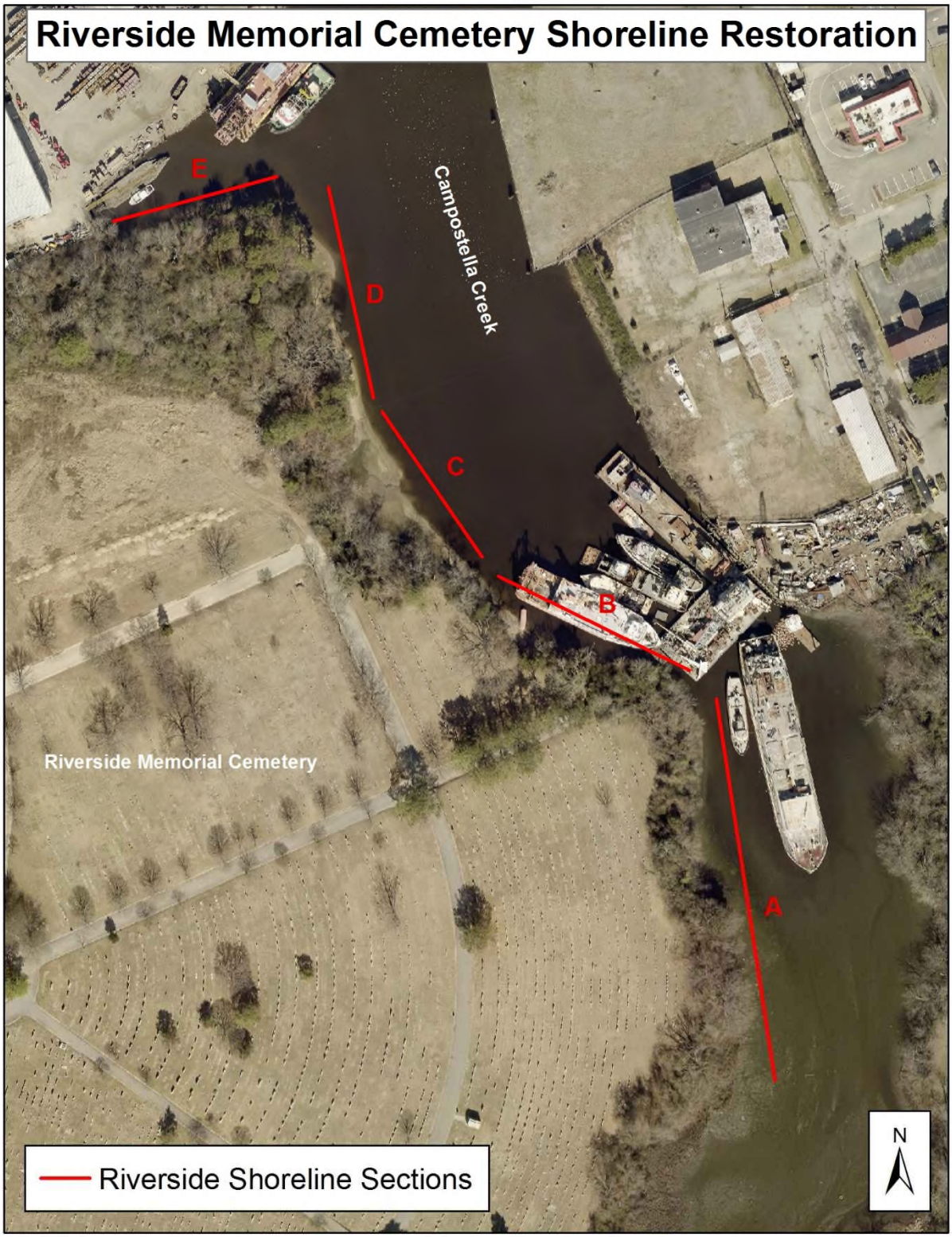
Goals and Objectives:

Norfolk proposes to stabilize the eroding bank at Riverside Memorial Cemetery with various approaches depending on severity of slope and to restore the tidal marsh with a hybrid living shoreline to reduce tidal impacts. These actions will mitigate the immediate risk to the cemetery and provide resilience into the future, while also absorbing flood waters as they move into the creek during large storm events. The project would also provide valuable water quality and wildlife habit improvements in the Campostella Creek and the Eastern Branch of the Elizabeth River. Based off a 30% design, survey, and environmental assessment of the site (see attachments in Appendix D) and follow-up discussions including changes to the 30% design, the project can be broken into seven sections (Figure 3) based off bank height and slope, which averages 10' in height and ranges from 16% to 400% in slope. Table 1 provides shoreline length and average height for each section.

Table 1 – Project Shoreline Section

Shoreline Section	Section Length (ft)	Average Bank Height (ft)
A	500	10
B	400	10
C	275	9
D	180	9
E	170	8

Figure 3- Project Sections



Section A faces southeast, is exposed to little fetch, and is the furthest from major industrial activities. 1937 aerial photos (Figure 2 above) indicate this area had a stable vegetated slope and wide salt marsh at the time. A low riprap or oyster block sill will be constructed between 25 to 40 feet from the toe of slope as a channelward sill, followed by sand fill to raise elevation above the mudflat allowing replanting of low and high marsh species. Sand fill will raise elevation at the toe of slope and the bank will be further stabilized using green wall technologies such as Envirolok vegetated geobags. Inclusion of vegetated geobags rather than planted pavers was a modification from the 30% design to incorporate greater green alternatives. As the shoreline turns north towards Section B, the offshore sill will become larger and bank stabilization will transition to a more hardened structural approach, such as Flexmat vegetated pavers.

Section B faces east to northeast. This portion of the cemetery bank sit closest to the channel of Campostella Creek and is exposed to a moderate fetch from the north. Heavy marine industrial activity is common in the channel from facilities on the opposite side of the creek. Very little vegetated wetlands or mudflats remain across much of this section and historical aerials indicate it had been heavily dredged close to shore by the late 1930s. Two of the most critical slopes along the entire site are found here, nearly vertical with ongoing undercutting and top of bank erosion. Improvements to this section will include a high nearshore riprap sill or revetment, with limited marsh restoration behind the portion closest to the channel to minimize narrowing of the creek at this point. To reduce future impacts on the bank, a more solid structural protection such as Flexamat will be used. Soil fill at top of bank will be required in several areas to provide further protection for threatened gravesites. Where tree removal is necessary to accomplish this, additional plantings will be called for to restore the vegetated buffering and ensure continued tranquility at the cemetery. As the shoreline turns to face north as it meets Section C, the marsh will be widened and bank stabilization will be softened.

Section C faces northeast to east. Despite some dredging of the creek by the late 1930s, historical aerial photos show a 200’ wide salt marsh. Although a significant mudflat remains, erosion from a fetch to the north, heavy marine industrial activity, and a stormwater flume outfall have caused loss of most vegetated wetlands. A large marsh, over 100 feet deep at its widest point from toe of slope, will be re-established through this section of shoreline. The width will allow a large high marsh to be restored closer to the slope, ensuring a long life for the system in the face of sea level rise. A low riprap or oyster block sill will be used to secure the channelward edge. A concrete flume in the center of this section currently serves as an outfall for precipitation runoff for a large portion of the cemetery. Over time the bank surrounding and at the end of this flume has eroded back. Fill will be used to extend the bank and re-establish the slope in this area, then a manhole and pipe will be used to direct water from the road above. A riprap channel will protect the marsh below from runoff. To either side of the outfall, existing slopes are relatively stable and no improvements are expected once sand fill for the marsh raises the toe elevation. As Section C transitions to Sections B and D to either side, requirements for both sill height and slope stabilization will increase.

Section D face east and is subject to wind driven waves from the mouth of the creek and to marine industrial impacts from adjacent properties. Historical aerials show an extensive marsh, similar to Section C; however, the creek has been widened significantly in this section over time and less mudflat or vegetated wetlands remain. The bank is generally more stable through this section, with a forested slope above a lower eroding toe. To protect from wind and boat driven waves, a larger riprap sill will be utilized through this section, with a 20 to 30 foot wide marsh restored behind. Sand fill will tie into a structural slope stabilization such as Flexamat or Envirolok. As the shoreline turns to face north towards Section E, the restored shoreline will narrow and slope protection will transition to heavier Flexamat or riprap revetment.

Section E faces north into a narrow, 100 foot wide side channel, where heavy marine industrial activity is common. Like Section D, this portion of the creek has been heavily modified since the 1930s. A forested slope sits above a heavily eroding and undercut toe. Small pockets of wetlands and mudflat remain. Due to the narrow, heavily used channel riprap revetment or heavy Flexamat will be used to stabilize the toe of slope. A small area of wetland restoration may be possible in the western corner at the end of the creek, but otherwise marsh planting will be limited along this section.

Across the entire site, tree and understory planting will be utilized wherever possible on restored slopes to provide long-term stabilization and greening of the site. Along the offshore sill, piles will be driven as needed or required by permit to mark the location of these hard structures for marine industrial operators and recreational boaters. Where possible or required by permit, any existing marsh or shellfish habitat will be protected or incorporated into the project design.

Approach, Milestones, and Deliverables:

The design for the proposed improvements is underway and expected to be complete by end of 2022, with permit approval potentially extending into early 2023 depending on interagency coordination. The City hopes to issue requests for bids in spring 2023, allowing for the project to begin construction by fall of 2023. No major obstacles are expected for construction, but work may be required from both land and water, so construction could extend over several years across the various sections of the project. Although material and supplies continue to have longer-than-usual lead times under current economic conditions, the City anticipates the project could be fully completed within the required 36 months from signing of agreement, regardless of any delays. Table 2 below provides a summary of the proposed schedule and milestones.

Table 2 - Project Schedule and Milestones

Date	Milestone Activity
March 2023	Project Fully Designed, Approved, and Permitted
May 2023	Request for Bids Initiated
August 2023	Bids Reviewed and Contract Process Initiated
November 2023	Notice to Proceed Issued
September 2025	Construction Complete

The project is being managed through the Department of Public Works- Division of Environmental Storm Water Management. Hazen and Sawyer, an on-call engineering consultant for the City is designing the project and will be retained for construction management assistance. In addition to Norfolk Storm Water staff and consultants, study team members would include Norfolk staff from the Department of Recreation, Parks, and Open Space, the Department of Planning, and the Office of Resilience. Coordination will be conducted with adjacent property owners regarding any necessary modifications to ensure industrial activities can continue in a reasonable manner. Proposed internal team members are noted in Table 3 below and additional consultants, outside team members or interviewees would be sought as needed.

Table 3 – City of Norfolk Project Team

John White, PE	Storm Water Engineer	Public Works
Reynaldo Hernandez, PE	Sr Design/Construction Project Manager	Public Works
Justin Shafer, CFM	Green Infrastructure Project Manager	Public Works
Ted Dudley	Bureau of Cemeteries Manager	Parks and Recreation
Steven Traylor, CA	City Forester	Parks and Recreation
Seamus McCarthy, CFM	Environmental Services Manager	Planning
Kyle Spencer	Chief Resilience Officer (Acting)	Resilience

Relationship to Other Projects:

Stabilization and restoration of shorelines are major components of both water quality and resilience efforts in Norfolk. Norfolk has seen significant fill, dredging, and armoring of coastal areas through time, with many of these efforts resulting in eroding shoreline. Reconnection of floodplains, restoration of wetlands and other aquatic habitats, and modifications to address current and future tidal impacts are often possible in these deteriorated areas, allowing for nature-based solutions rather than repeat of past mistakes. The multiple benefits of these solutions reduce flooding and erosion, improve water quality, enhance wildlife habitat, and provide recreation and aesthetic amenities.

Norfolk has been successful in offsetting City funds with grants, loans, and partnerships to support shoreline restoration efforts. Funders and partners for past and ongoing projects include Virginia Department of Environmental Quality, National Fish and Wildlife Foundation, US Army Corps of Engineers, Chesapeake Bay Foundation, Elizabeth River Project, and many others. Norfolk has a strong history of completing large grant and loan supported projects within both budget and schedule. While material, labor, or weather delays do occur, by initiating design and permitting ahead and applications for this support, Norfolk provides more time for potential construction delays within the timeframe of a given grant or loan.

Maintenance Plan:

The City of Norfolk – Division of Environmental Storm Water Management maintains three full time crews dedicated to maintenance of best management practices, ditches, and shorelines. Crew members are trained in use of equipment and techniques to manage vegetation, grading, and hard structures. City engineers and inspectors monitor all shoreline projects annually and a PM program requires routine or identified maintenance quarterly. Additional monitoring will be provided at this location by Department of Parks and Recreation- Division of Cemeteries staff, to ensure the long-term protection of grave sites. Storm Water fees that fund the Division's operating budget and Capital Improvement Program will be used as necessary to ensure successful operation and maintenance of the facility well into the future.

Criteria:

1. 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 or a recognized state or federal Indian tribe?

The City of Norfolk is an independent city in the Commonwealth of Virginia.

2. Does the local government have an approved resilience plan meeting the criteria as established by this grant manual? Has it been attached or a link provided?

The City of Norfolk submitted a Resilience Plan package in July 2021 and received approval of the plan from Virginia Department of Conservation and Recreation on August 11, 2021. An overview with relevant links is attached.

3. For local governments that are not towns, cities, or counties, have letters of support been provided from affected local governments?

The City of Norfolk is an independent city in the Commonwealth of Virginia.

4. Has the applicant provided evidence of an ability to provide the required match funds?

Match funds for the proposed project are in a currently approved Capital Improvement Plan. An attached Transmittal Form signed by Norfolk's City Manager identifies specific budget accounts and approval to apply funds towards grant match.

5. Has the applicant demonstrated to the extent possible, the positive impacts of the project or study on prevention of flooding?

The project will help to stabilize a high bank and wetland complex eroded over time through coastal and anthropogenic causes. Restored wetlands will also act as a buffer by absorbing tidal waters moving further into the community during major storm events. Resilience of both the Riverside Memorial Cemetery and Campostella community overall will be enhanced.

Budget Narrative:

The City of Norfolk seeks 80% grant funding to support the proposed shoreline restoration and bank stabilization at Riverside Memorial Cemetery. A recently updated opinion of probable cost of construction (OPCC), completed by design consultants Hazen & Sawyer after review of the 30% design phase, estimates the construction to cost $1,900,000. This includes a 30% contingency to address unexpected changes during the remainder of design and increasing costs of construction due to nationwide economic conditions. This cost will fund all necessary materials, supplies, and labor for a qualified contractor to construct the project after a competitive bid process. The City proposes to fund

their 20% match of $380,000 through Storm Water Capital Improvement Program funds for water quality improvements. Design costs are encumbered through existing budget, so all match funding will go towards contracted work, along with the requested $1,900,000 in grant funds. Table 3 shows the consultant supplied OPCC. In addition to the direct funding as included match, Norfolk also commits to managing all remaining or necessary aspects of design, permitting, project management, and public outreach using existing qualified staff. No grant funds are sought for this nor match applied, leaving funds fully available for contracted construction work. Funds proposed as match are authorized through existing approved or upcoming proposed budgets and verified on the attached, signed City Manager Transmittal Form outlining grant and match funds for all Norfolk applications to the current Community Flood Preparedness Fund grant cycle. Upon award of grant funds, the City sets up a special revenue account that includes approved match funds and cash funds to cover awarded grant funding until

reimbursement is received, allowing Norfolk to move projects forward without delays for reimbursement requests.

Table 3- Project Costs

RIVERSIDE CEMETERY LIVING SHORELINE DESIGN					Hazen
OPINION OF PROBABLE CONSTRUCTION COSTS - POST 30% DESIGN					MARCH 2022
NORFOLK DEPARTMENT OF PUBLIC WORKS					BY: KAB/BRT
ITEM	**DESCRIPTION**	**UNIT**	**QUANTITY**	**PRICE**	**EXTENSION**
	PROJECT SETUP				
1	MOBILIZATION AND DEMOBILIZATION	LS	1	10% OF SUM	$ 124,500.00
2	PROJECT VIDEO	LS	1	$ 1,000.00	$ 1,000.00
3	SURVEY AND LAYOUT AND AS-BUILT SURVEY	LS	1	$ 27,900.00	$ 27,900.00
4	DEWATERING	LS	1	$ 100,000.00	$ 100,000.00
	EROSION AND SEDIMENT CONTROL				
5	FURNISH, INSTALL, AND REMOVE TEMPORARY CONSTRUCTION ENTRANCE	EA	1	$ 3,000.00	$ 3,000.00
6	FURNISH, INSTALL AND REMOVE SILT FENCE	LF	262	$ 5.00	$ 1,310.00
7	FURNISH, INSTALL AND REMOVE TREE PROTECTION/PLASTIC SAFETY FENCE	LF	1,823	$ 5.00	$ 9,115.00
8	FURNISH, INSTALL, AND REMOVE TURBIDITY CURTAIN	LS	1	$ 21,750.00	$ 21,750.00
9	FURNISH, INSTALL, AND REMOVE INLET PROTECTION	EA	1	$ 300.00	$ 300.00
	DEMOLITION				
10	CLEARING AND GRUBBING	SF	15,155	$ 5.00	$ 75,778.00
11	SELECT TREE REMOVAL	LS	1	$ 100,000.00	$ 100,000.00
12	REMOVE AND DISPOSE CONCRETE FLUME	LS	1	$ 1,500.00	$ 1,500.00
	BANK STABILIZATION & LIVING SHORELINE				
13	REMOVE AND DISPOSE OF RIVERBED MUCK	LS	1	$ 180,000.00	$ 180,000.00
14	FURNISH AND INSTALL COMMON EARTH BACKFILL	CY	396	$ 40.00	$ 15,900.00
15	FURNISH AND INSTALL TOPSOIL	CY	415	$ 75.00	$ 31,200.00
16	FURNISH AND INSTALL SAND FILL	TON	1,804	$ 65.00	$ 117,300.00
17	FURNISH AND INSTALL GEOGRID	SY	4,876	$ 10.00	$ 48,800.00
18	FURNISH AND INSTALL STONE SILL	LF	752	$ 250.00	$ 188,000.00
19	FURNISH AND INSTALL OYSTER CASTLES	LS	1	$7,000.00	$ 7,000.00
20	FURNISH AND INSTALL COIR FIBER MATTING	SY	622	$ 6.50	$ 4,100.00
21	FURNISH AND INSTALL FLEXAMAT (OR APPROVED EQUAL)	SF	11,736	$ 8.00	$ 93,900.00
	PAVING REPAIR & UTILITY INSTALLATION				
22	FURNISH AND INSTALL CURB INLET	EA	1	$ 5,000.00	$ 5,000.00
23	FURNISH AND INSTALL RCP PIPE	LF	30	$ 225.00	$ 6,800.00
24	FURNISH AND INSTALL 5-FOOT DIA. MANHOLE (7-FOOT HEIGHT)	EA	1	$ 10,000.00	$ 10,000.00
25	FURNISH AND INSTALL ENDWALL	EA	1	$ 4,000.00	$ 4,000.00
26	FURNISH AND INSTALL #57 BEDDING STONE	TON	3	$ 60.00	$ 200.00
	PLANTING				
27	FURNISH AND INSTALL TREES - #3 CONTAINER	EA	8	$ 150.00	$ 1,200.00
28	FURNISH AND INSTALL SHRUBS - #3 CONTAINER	EA	72	$ 45.00	$ 3,300.00
29	FURNISH AND INSTALL TUBELING PLUGS - LOW MARSH	EA	18,039	$ 4.00	$ 72,160.00
30	FURNISH AND INSTALL TUBELING PLUGS - HIGH MARSH	EA	18,039	$ 4.00	$ 72,160.00
31	FURNISH AND INSTALL WATERFOWL EXCLUSION FENCE	SY	4,009	$ 2.50	$ 10,030.00
32	FURNISH AND INSTALL RIPARIAN BUFFER SEED MIX	SY	1,805	$ 6.83	$ 12,330.00
33	FURNISH AND INSTALL TEMPORARY SEED MIX	SY	3,671	$ 0.92	$ 3,380.00
34	FURNISH AND INSTALL MAINTAINED TURF SEED MIX	SY	1,866	$ 9.02	$ 16,840.00
SUBTOTAL - RIVERSIDE CEMETERY LIVING SHORELINE DESIGN (ROUNDED)					$ 1,400,000
	CONSTRUCTION CONTINGENCY (ROUNDED)			30%	$ 500,000
TOTAL - RIVERSIDE CEMETERY LIVING SHORELINE DESIGN (ROUNDED)					$ 1,900,000

Unit price reflects current market bid pricing

Appendix D:

Attachments

- Required Documents Checklist
- Site Map and Condition Photos
- 30% Site Plan and OPCC
- FIRMette
- AdaptVA SVI Map
- Project Area Demographic and Economic Data (Census Tract 51)
- Maintenance and Management Plan
- Authorization to Request Funding
- Approved Resilience Plan
- Links to Additional Required Documents

Scope of Work Narrative	
Supporting Documentation	**Included**
Detailed map of the project area(s) (Projects/Studies)	☑ Yes □ No □ N/A
FIRMette of the project area(s) (Projects/Studies)	☑ Yes □ No □ N/A
Historic flood damage data and/or images (Projects/Studies)	☑ Yes □ No □ N/A
A link to or a copy of the current floodplain ordinance	☑ Yes □ No □ N/A
Non-Fund financed maintenance and management plan for project extending a minimum of 5 years from project close	☑ Yes □ No □ N/A
A link to or a copy of the current hazard mitigation plan	☑ Yes □ No □ N/A
A link to or a copy of the current comprehensive plan	☑ Yes □ No □ N/A
Social vulnerability index score(s) for the project area from ADAPT VA's Virginia Vulnerability Viewer	☑ Yes □ No □ N/A
If applicant is not a town, city, or county, letters of support from affected communities	□ Yes □ No ☑ N/A
Completed Scoring Criteria Sheet in Appendix B, C, or D	☑ Yes □ No □ N/A
Budget Narrative	
Supporting Documentation	**Included**
Authorization to request funding from the Fund from governing body or chief executive of the local government	☑ Yes □ No □ N/A
Signed pledge agreement from each contributing organization	□ Yes □ No ☑ N/A

THE CITY OF NORFOLK

Riverside Memorial Cemetery Shoreline Restoration

Site Condition Photos

Photo 1: Graves Near Eroding Bank

Photo 2: Graves Near Eroding Bank

Photo 3: Graves Near Eroding Bank

Photo 4: Eroding Bank

Photo 5: Eroding Bank and Marsh

Photo 6: Eroding Bank

Photo 7: Eroding Bank and Marsh

Photo 8: Eroding Marsh

Photo 9: Eroding Shoreline and Marsh

City of Norfolk
Department of Public Works

NOT FOR CONSTRUCTION

RIVERSIDE CEMETERY LIVING SHORELINE

30% DESIGN SUBMITTAL
JANUARY 2022

RESPONSIBLE LAND DISTURBER (RLD) DESIGNATION

THE FOLLOWING PERSON ______KERRY BRAY______(PRINT),
______________________ (SIGN), IS IDENTIFIED AS THE RESPONSIBLE LAND DISTURBER WHO WILL BE IN CHARGE OF AND RESPONSIBLE FOR CARRYING OUT THE LAND DISTURBING ACTIVITY. THIS PERSON MEETS THE APPLICABLE REQUIREMENTS OF VIRGINIA CODE SECTION 10.1–563 AND 10.1–566 BY VIRTUE OF THE FOLLOWING (CHECK THE CATEGORY THAT APPLIES):

_______ RESPONSIBLE LAND DISTURBER CERTIFICATE

_______ DCR CERTIFICATION FOR COMBINED ADMINISTRATOR, ADMINISTRATOR, PLAN REVIEWER, INSPECTOR, OR CONTRACTOR

___X___ VA PROFESSIONAL ENGINEER, LAND SURVEYOR, LANDSCAPE ARCHITECT, OR ARCHITECT

RLD CONTACT INFORMATION

NAME: KERRY BRAY

CERTIFICATION/REGISTRATION NUMBER: 53228

COMPANY: HAZEN AND SAWYER

MAILING ADDRESS: 4500 MAIN STREET, SUITE 500, VIRGINIA BEACH, VA 23462

TELEPHONE: (919) 863-9267 FAX:________

EMAIL: KBRAY@HAZENANDSAWYER.COM

THIS DESIGNATION MAY ONLY BE CHANGED BY A PLAN COVER SHEET REVISION THAT MUST BE SUBMITTED TO THE CITY FOR VERIFICATION AND APPROVAL.

UPON AWARD OF THE CONTRACT AND BEFORE ANY LAND DISTURBING ACTIVITY CAN BEGIN, THE CONTRACTOR SHALL EXECUTE AND SUBMIT A RESPONSIBLE LAND DISTURBER NOTIFICATION FORM TO THE DEPARTMENT OF PLANNING, ENVIRONMENTAL SERVICES, ROOM 508, CITY HALL BUILDING, 810 UNION STREET, NORFOLK, VA 23510 TEL: (757) 664–4368. AWARD OF THE CONTRACT WILL RELIEVE THE ABOVE SIGNER OF ALL RESPONSIBILITY.

SITE DATA:

THIS PROJECT IS LOCATED ON CITY PROPERTY ALONG WATERS OF A TRIBUTARY TO THE ELIZABETH RIVER.

PROPERTY ADDRESSES:
1000 E INDIAN RIVER ROAD
NORFOLK, VA 23523
CITY OF NORFOLK: GPIN# 1437608648 & 1437613201

EXISTING LAND USE:
ZONING: OSP: OPEN SPACE AND PRESERVATION
DISTRICT: OPEN SPACE AND PRESERVATION
RIVER BASIN: ELIZABETH RIVER
FLOOD ZONE: AE

PROTECTED SHORELINE	TBD LINEAR FEET
RESTORED SHORELINE	TBD LINEAR FEET
CREATED TIDAL WETLANDS	TBD ACRES

THIS PROPERTY IS LOCATED WITHIN A CITY OF NORFOLK CBPA DESIGNATED INTENSELY DEVELOPED AREA (IDA).

THIS PROJECT LIES WITHIN THE COASTAL RESILIENCE OVERLAY.

LAND DISTURBANCE:

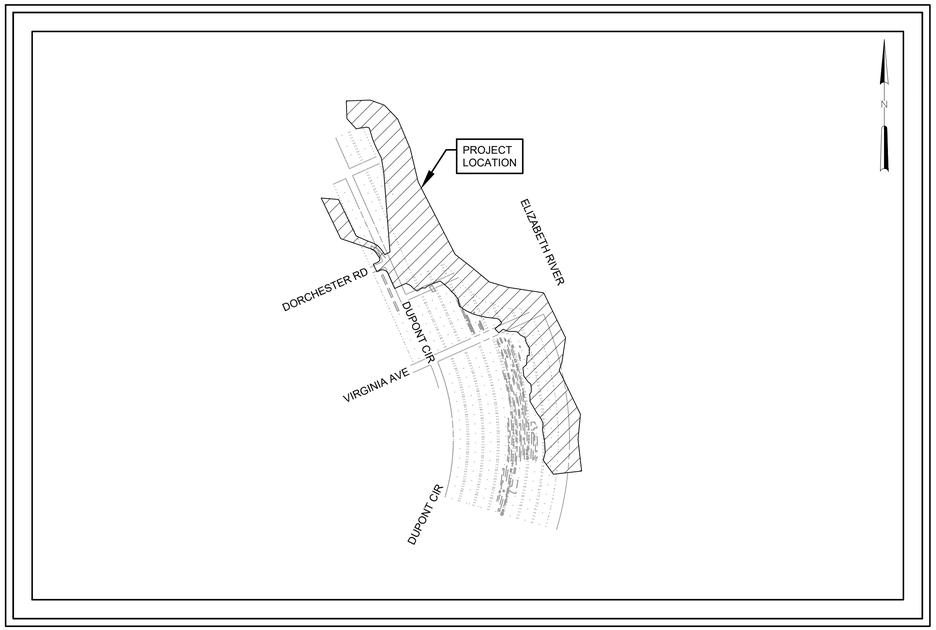
OWNERSHIP OF IMPROVEMENT	CITY OF NORFOLK
TYPE OF IMPROVEMENT	SHORELINE RESTORATION
EXISTING IMPERVIOUS COVER	0.06 ACRES
PROPOSED IMPERVIOUS COVER	0.06 ACRES
LIMITS OF DISTURBANCE	3.05 ACRES

GENERAL NOTE:

1. THE CONTRACTOR SHALL CONTACT THE CITY OF NORFOLK, BUREAU OF ENVIRONMENTAL SERVICES. 664-4368, AT LEAST 48 HOURS PRIOR TO ANY LAND DISTURBING ACTIVITY SO THAT LAND DISTURBING PERMIT CAN BE ISSUED AND A PRE-CONSTRUCTION CONFERENCE SCHEDULED.

RECORD DRAWING AND CERTIFICATION NOTE:

1. THE STORMWATER MANAGEMENT/BMP FACILITY AND ASSOCIATED STORMWATER CONVEYANCE SYSTEM(S) AS PROPOSED FOR THIS PROJECT WILL REQUIRE THE SUBMISSION, REVIEW AND APPROVAL OF A RECORD DRAWING (AS-BUILT) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE CO. RECORD DRAWING AND CONSTRUCTION CERTIFICATION IS REQUIRED TO BE RECORDED AND CHECKED BY A LICENSED SURVEYOR.



PROJECT AREA

SCALE 1" = 200'

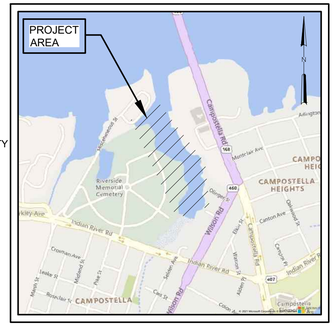
APPROVAL

APPROVED ______________________ ________
DEPARTMENT OF PLANNING & COMMUNITY DEVELOPMENT — SIGNATURE — DATE

APPROVED ______________________ ________
ENGINEERING MANAGER — SIGNATURE — DATE

VICINITY MAP

SCALE 1" = 1000'



STORMWATER NOTE:

1. CONTRACTOR TO CONTACT ENVIRONMENTAL STORM WATER MANAGEMENT AT 823-4089 (48-HOUR NOTICE) FOR PRE-CONSTRUCTION CONFERENCE AND INSPECTION REQUIREMENT WHEN A BMP IS PROPOSED AND/OR TIE-IN TO CITY STORM DRAIN SYSTEM.

TOLERANCE NOTES:

1. ALL STORM DRAINAGE SHALL BE INSTALLED WITHIN 0.10' (ONE TENTH OF ONE FOOT) OF THE ELEVATION SHOWN ON THE PLAN, OR AS SPECIFIED IN WRITING BY THE CITY.
2. MINIMUM STORM SEWER SLOPE SPECIFIED ON THE PLAN ARE ABSOLUTE MINIMUM. LESSER SLOPE WILL NOT BE ACCEPTED UNLESS IN WRITING BY THE CITY.
3. CONTRACTOR TO BE RESPONSIBLE FOR ALL CORRECTION COST (I.E. PLAN REVISION, PHYSICAL CORRECTION, ETC.) REQUIRED AS A RESULT OF INSTALLATION NOT MEETING THE TOLERANCE REQUIREMENT.
4. LAND DISTURBANCE: CONFIRM POST-DEVELOPMENT REDUCTION IN IMPERVIOUS COVER WITH THE ADDITION OF CLASS II RIPRAP AND STONE SILL.

CHESAPEAKE BAY PRESERVATION AREA NOTE:

1. THIS PROPERTY IS LOCATED IN THE CHESAPEAKE BAY PRESERVATION AREA (CBPA) AND IS SUBJECT TO CERTAIN DEVELOPMENT REQUIREMENTS AND LIMITATIONS. NO TREE REMOVAL, LAND DISTURBING ACTIVITY OR CONSTRUCTION ACTIVITY CAN BE COMMENCED WITHOUT PRIOR APPROVAL FROM THE CITY OF NORFOLK. PLEASE CONTACT THE BUREAU OF ENVIRONMENTAL SERVICES AT (757) 664-4368 FOR FURTHER INFORMATION.

LANDSCAPING NOTE:

1. CONTACT JACK ERWIN AT (757) 664-4751 OR JACK.ERWIN@NORFOLK.GOV PRIOR TO INSTALLATION OF CBPA TREE MITIGATION.

DA

DESCR

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

COVER SHEET

-
K. BRAY
S. KANE
A. DAVIS

DEPAR

30% DES

ER No:

G1.DWG

JAN 2022

SHEE G1

PLOT DATE: 1/28/2022 10:47 AM BY: BTHARRINGTON Saved by BTHARRINGTON Save date: 1/27/2022 6:56 PM

File: O:\31473-HRD\31473-008\CAD_BIM\GENL\G1 Saved by BTHARRINGTON Save date: 1/27/2022 6:56 PM

ABBREVIATIONS

A	
AATUR	ABANDONED ACCORDING TO UTILITY RECORD
ABND	ABANDONED
AC	ASBESTOS CEMENT
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
AGGR	AGGREGATE
ALT	ALTERNATE
APPROX	APPROXIMATE
ARV	AIR RELEASE VALVE
ASPH	ASPHALT
B	
B	BORING
BFV	BUTTERFLY VALVE
BITUM	BITUMINOUS
BLDG	BUILDING
BM	BENCH MARK
BOC	BACK OF CURB
BOT	BOTTOM
BRG	BEARING
BRK	BRICK
BV	BALL VALVE
C	
CB	CATCH BASIN
CE	CONSTRUCTION EASEMENT
CF	CUBIC FEET
C&G	CURB AND GUTTER
CI	CURB INLET (CATCH BASIN), CAST IRON
CL	CENTER LINE
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CORP	CORPORATION
CORR	CORRIDOR
CY	CUBIC YARD
D	
DATUR	DATA ACCORDING TO UTILITIES RECORD
DI	DROP INLET, DUCTILE IRON
DIA (Ø)	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DIST	DISTRIBUTION
DWG	DRAWING
E	
E	EAST
EA	EACH
ECC	ECCENTRIC
EIP	EXIST IRON PIPE
EL OR ELEV	ELEVATION
ELEC	ELECTRIC OR ELECTRICAL
ENGR	ENGINEER
ENT	ENTRANCE
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQPT	EQUIPMENT
ESC	EROSION AND SEDIMENT CONTROL
EX/EXIST	EXISTING
F	
FH	FIRE HYDRANT
FL	FLOW LINE
FLEX	FLEXIBLE
FLG	FLANGE
FM	FORCE MAIN
FT	FEET
G	
G	GAS, GAS LINE, OR GRADE
GA	GAUGE
GB	GRADE BREAK
GAL	GALLON
GV	GATE VALVE
GW	GUY WIRE
H	
HORIZ	HORIZONTAL
HP	HIGH POINT
HWY	HIGHWAY
HSMH	HYDRODYNAMIC SEPARATOR MANHOLE
HYD	HYDRAULIC, HYDRANT
I	
I	IRON
ID	INSIDE DIAMETER
IN	INCH
INCL	INCLUDED
INV	INVERT
J	
JT	JOINT
L	
L	LENGTH OR ANGLE
LF	LINEAR FEET
LG	LONG
LP	LIGHT POLE OR LOW POINT
M	
MAX	MAXIMUM
MCO	MAINLINE CLEANOUT
MFR	MANUFACTURER
MG	MATCH GRADE
MH	MANHOLE
MHW	MEAN HIGH WATER
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MLW	MEAN LOW WATER
MON	MONUMENT
N	
N	NORTH
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NPW	NON POTABLE WATER
NTS	NOT TO SCALE
O	
OC	ON CENTER
OD	OUTSIDE DIAMETER
OVHD	OVERHEAD
P	
P	PAVEMENT
PL	PROPERTY LINE OR PLATE
PP	POWER POLE
PS	PUMPING STATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PW	POTABLE WATER
PVMT	PAVEMENT
Q	
QTY	QUANTITY
R	
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RED	REDUCER
REF	REFERENCE
REINF	REINFORCING
REQD	REQUIRED
REV	REVISE
RJ	RESTRAINED JOINT
RR	RAILROAD
RT	RIGHT
RW	RAW WATER
R/W	RIGHT OF WAY
S	
S	SOUTH
SAN	SANITARY
SBL	SURVEY BASELINE
SCH	SCHEDULE
SCO	SANITARY CLEAN OUT
SD	STORM OR SITE DRAIN
SECT	SECTION
SF	SILT FENCE
SF	SQUARE FEET
SFM	SANITARY FORCE MAIN
SFMV	SANITARY FORCE MAIN VALVE
SHT	SHEET
SI	SQUARE INCH
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	SANITARY SEWER
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
T	
TBD	TO BE DETERMINED
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TECH	TECHNICAL
TEL	TELEPHONE
THRU	THROUGH
TP	TREE PROTECTION
TPF	TREE PROTECTION FENCE
TPP	TREE PROTECTION PLANKING
TRANS	TRANSFORMER
TYP	TYPICAL
U	
UG	UNDERGROUND
UNK	UNKNOWN
UNO	UNLESS NOTED OTHERWISE
UTIL	UTILITY
V	
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
W	
W	WEST, WIDTH OR WATER
W/	WITH
WET	WETLAND
WL	WATER LINE
W/O	WITHOUT
WV	WATER VALVE
WWF	WELDED WIRE FABRIC

DRAWING INDEX

LEGEND

LINETYPES

- DEMOLITION ITEMS
- EXISTING WETLAND
- TP — TPF — TREE PROTECTION FENCE
- SF — SF — SILT FENCE
- LOD — LIMITS OF DISTURBANCE
- TB — TURBIDITY CURTAIN
- 0 — EXISTING MAJOR CONTOUR
- 1 — EXISTING MINOR CONTOUR
- MHW — MEAN HIGH WATER
- MLW — MEAN LOW WATER

SYMBOLS

- TPP — TREE PROTECTION PLANKING
- ENDWALL
- D — DROP STORM DRAIN MANHOLE
- CURB INLET

PROPOSED LINETYPES

- MATCH LINE
- PIPE
- 1+00 — CENTER LINE
- 0 — MAJOR CONTOUR
- 1 — MINOR CONTOUR
- TOP OF BANK
- TOE OF SLOPE

PROPOSED HATCH

- OYSTER CASTLE
- ROCK SILL
- FLEXAMAT
- MARSH
- COIR MAT
- PROPOSED FILL WITH COIR MAT
- OUTLET PROTECTION
- STAGING AREA

SURVEY LEGEND

CONC.	CONCRETE
TBM	TEMPORARY BENCHMARK
SIZE/TYPE	TREE
M6-4	WETLAND FLAG
	TRAVERSE CONTROL POINT
	ASPHALT PAVEMENT
6"CC	CONCRETE CURB
24"C&G	CONCRETE CURB & GUTTER
	GRAVE MARKER LIMITS
	GRAVE MARKER ROW LIMITS
	HEADSTONE
	PROPERTY LINE
	TREE LINE
TOP OF BANK	TOP OF BANK
	TOE OF SLOPE

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

ABBREVIATIONS, INDEX, AND LEGEND

DESIGNED BY: K. BRAY
DRAWN BY: S. KANE
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

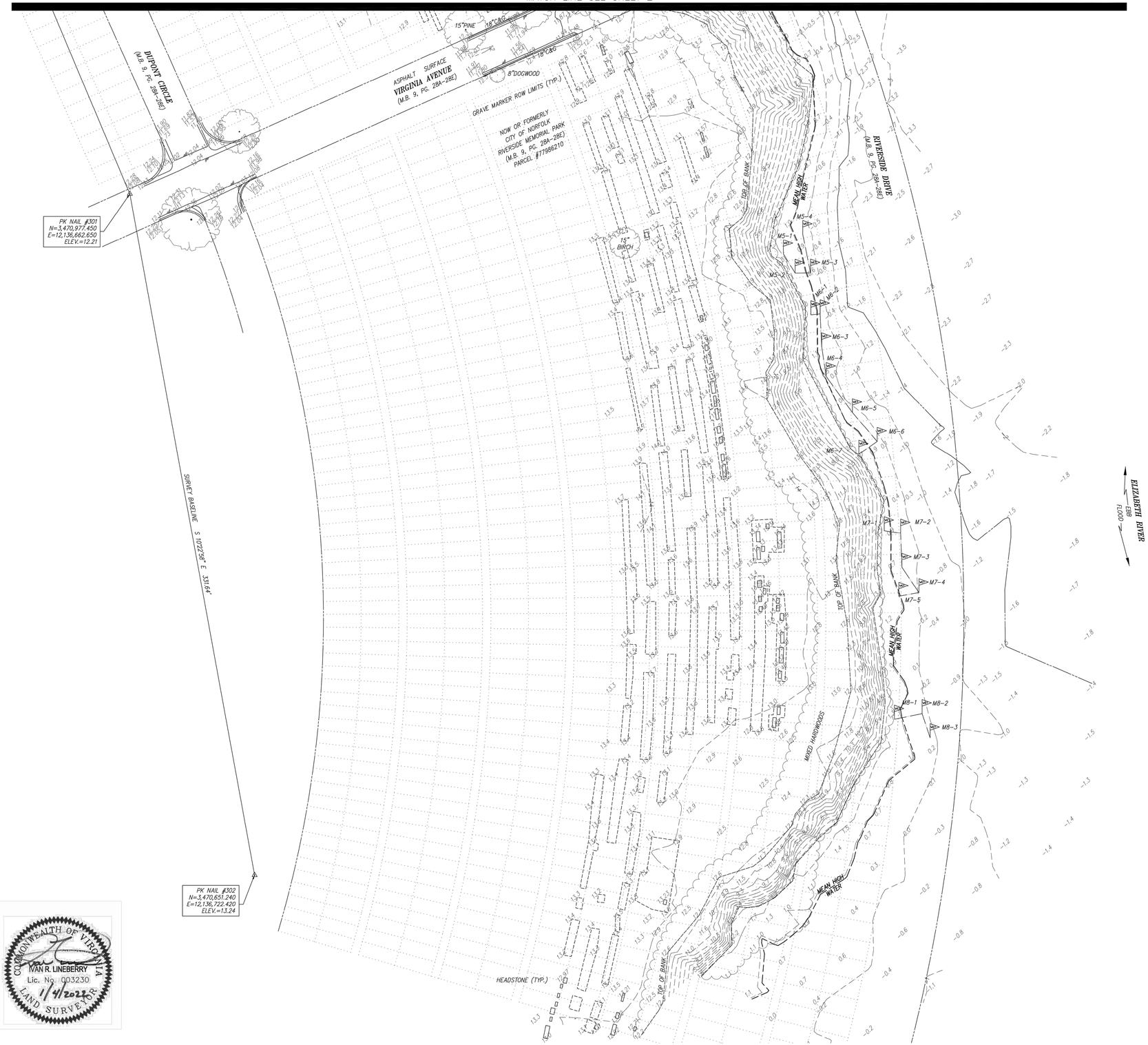
DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

30% DESIGN
NOT FOR
CONSTRUCTION

ER No:	PCTS No:
FILE NAME:	G2.DWG
DATE: JAN 2022	SCALE:

SHEET G2

MATCH LINE SEE SHEET 2



TOPOGRAPHIC SURVEY OF RIVERSIDE MEMORIAL PARK
NORFOLK, VIRGINIA
SCALE: 1"=25'
PMI PROJECT #21-416

SURVEY NOTES:

1. THE MERIDIAN SOURCE OF THIS TOPOGRAPHIC SURVEY IS BASED ON THE CITY OF NORFOLK GEODETIC CONTROL NETWORK, VIRGINIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NORTH AMERICAN DATUM 1983/1993HARN (US SURVEY FEET).
2. ELEVATIONS REFER TO NAVD88(GEOID12a) ESTABLISHED FROM CITY OF NORFOLK CONTROL DISK BR014 (ELEVATION=13.73).
3. THIS SURVEY WAS PREPARED TO SHOW EXISTING FEATURES AS OF 11/17/2021 AND DOES NOT CERTIFY TO CHANGES TO SITE CONDITIONS WHICH OCCUR SUBSEQUENT TO THIS DATE AND OR TO PROPOSED IMPROVEMENTS.
4. THIS SURVEY DOES NOT CONSTITUTE A BOUNDARY SURVEY NOR A SUBDIVISION OF LAND.
5. PROPERTY AND RIGHT-OF-WAY LINES WERE ESTABLISHED USING A COMPILATION OF DEEDS OF RECORD, PLATS OF RECORD AND EXISTING FIELD MEASUREMENTS.
6. THIS SURVEY DOES NOT INTEND TO DEPICT ANY WETLANDS, HAZARDOUS WASTE AND ENVIRONMENTAL FEATURES THAT MAY AFFECT SAID PROPERTY EXCEPT AS SHOWN.
7. AN ELECTRONIC SWEEP OF THE AREAS USING QL-B DESIGNATION TECHNIQUES WAS PERFROMED WITH THIS SURVEY AND NO UNDERGROUND UTILITY DATA WAS FOUND.
8. THIS TOPOGRAPHY SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF IVAN LINEBERRY FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE PLAT, MAP, OR DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

LEGEND

TBM	TEMPORARY BENCHMARK
SIZE/TYPE	TREE
M6-4	WETLAND FLAG
	TRAVERSE CONTROL POINT
	ASPHALT PAVEMENT
6"CC	CONCRETE CURB
24"C&G	CONCRETE CURB & GUTTER
	GRAVE MARKER LIMITS
	HEADSTONE
CONC.	CONCRETE

DIAGRAM OF DATUM PLANE

STATION 8638610, SEWELLS POINT
(VA1983-2001 EPOCH)

MEAN HIGHER HIGH WATER (MHHW)
ELEVATION = 1.15
0.20'
MEAN HIGH WATER (MHW)
ELEVATION = 0.95
0.95'
"NORTH AMERICAN VERTICAL DATUM OF 1988"
(NAVD 88) ELEVATION = 0.00
1.48'
MEAN LOW WATER (MLW)
(NAVD 88) ELEVATION = -1.48
0.13'
MEAN LOWER LOW WATER (MLLW)
ELEVATION = -1.61

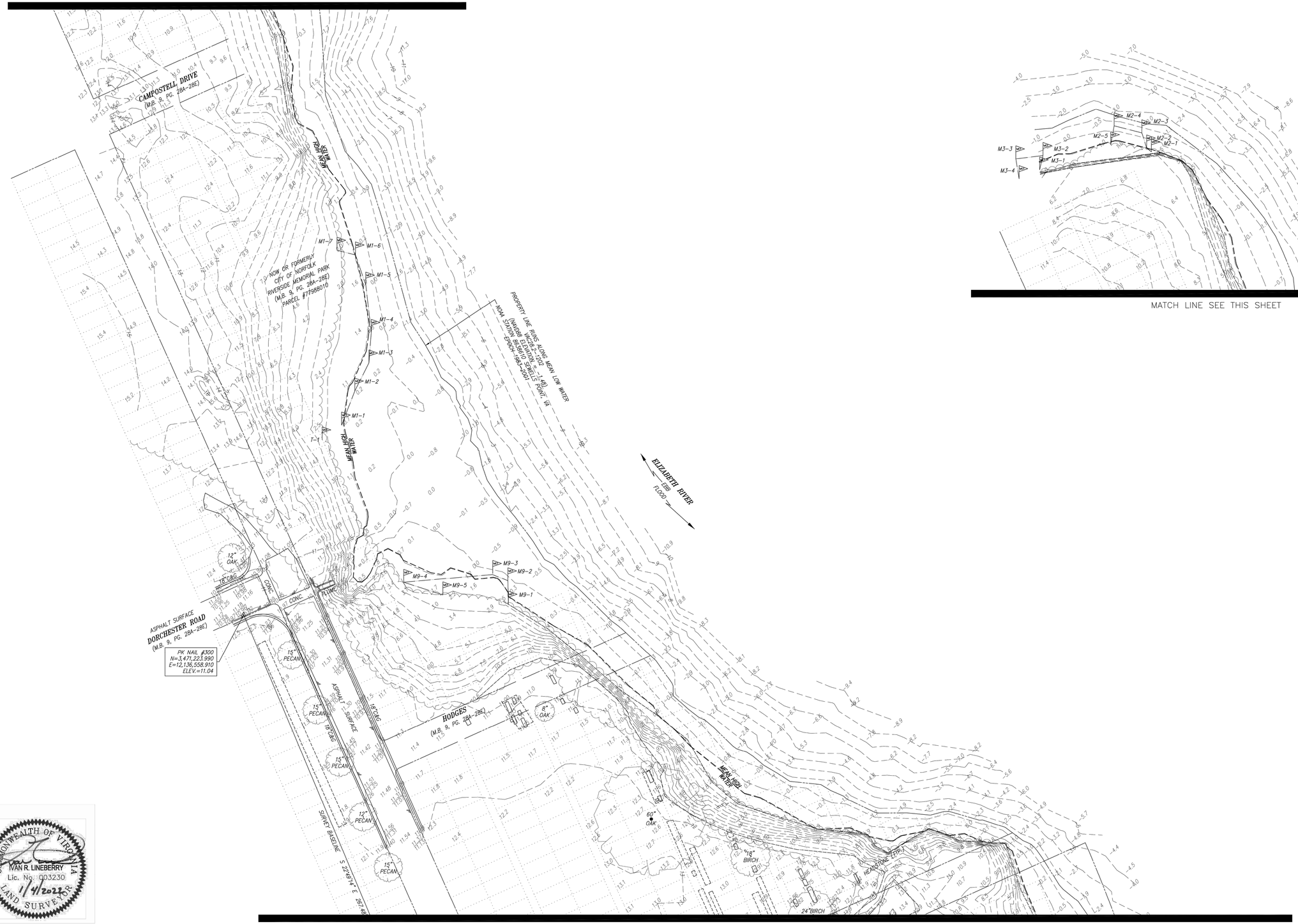
TOPOGRAPHIC SURVEY OF
RIVERSIDE CEMETERY
NORFOLK, VIRGINIA
SCALE 1'=25' JANUARY 4, 2022
SHEET 1 OF 2

PRECISION MEASUREMENTS, INC.
SURVEYORS - UAS - HYDROGRAPHIC - 3D LASER SCANNING
629 PHOENIX DRIVE, SUITE 100
VIRGINIA BEACH, VIRGINIA 23452
TEL.: (757) 368-0945
FAX: (757 368-9375
www.precisionmeasurements.com
VIRGINIA BEACH - NEWPORT NEWS - RICHMOND
CHANTILLY, VIRGINIA - BALTIMORE, MARYLAND
FORT LAUDERDALE, FLORIDA

0 25 50 75
GRAPHIC SCALE
1" = 25'

COMMONWEALTH OF VIRGINIA
IVAN R. LINEBERRY
Lic. No. 003230
1/4/2022
LAND SURVEYOR

MATCH LINE SEE THIS SHEET



MATCH LINE SEE THIS SHEET

MATCH LINE SEE SHEET 1

VIRGINIA STATE PLANE COORDINATE SYSTEM,
SOUTH ZONE, NAD83(1993HARN)

COMMONWEALTH OF VIRGINIA
IVAN R. LINEBERRY
Lic. No. 003230
1/4/2022
LAND SURVEYOR

TOPOGRAPHIC SURVEY OF
RIVERSIDE CEMETERY
NORFOLK, VIRGINIA
SCALE 1'=25' JANUARY 4, 2022
SHEET 2 OF 2

PRECISION MEASUREMENTS, INC.
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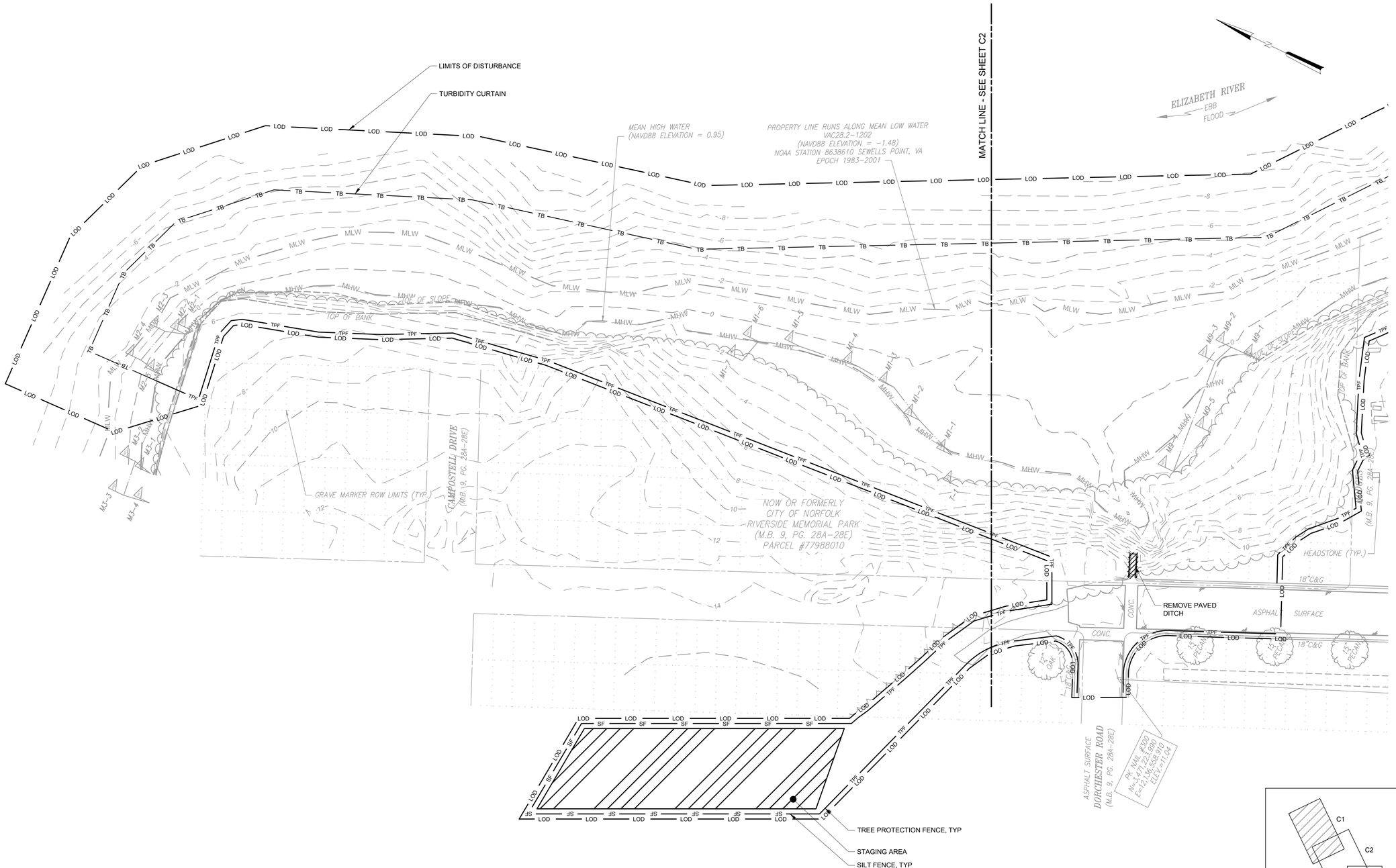
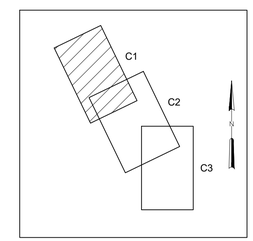
0 25 50 75
GRAPHIC SCALE
1" = 25'



PLAN

SCALE: 1" = 20'



KEY PLAN

SCALE: 1" = 20'

20 10 0 20'

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

DEMOLITION AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 1

DESIGNED BY: K. BRAY
DRAWN BY: B. THARRINGTON
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

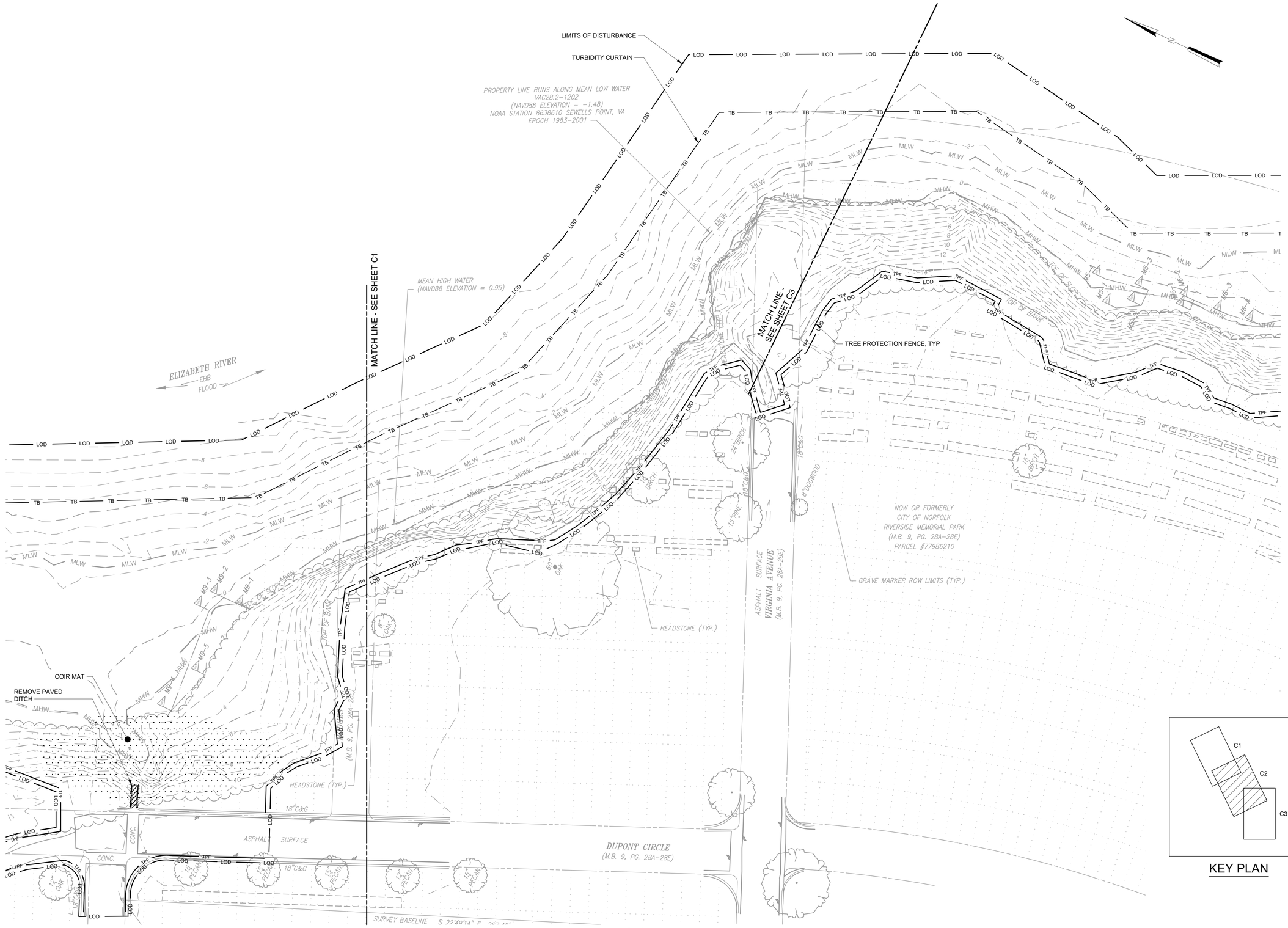
30% DESIGN
NOT FOR
CONSTRUCTION

ER No:	PCTS No:
FILE NAME:	C1.DWG
DATE: JAN 2022	SCALE: AS SHOWN

SHEET C1

PLOT DATE: 1/28/2022 10:48 AM BY: BTHARRINGTON Saved by BTHARRINGTON Save date: 1/28/2022 9:19 AM

File: O:\31473-HRD\31473-008\CAD_BIM\CIVIL\C1 Saved by BTHARRINGTON Save date: 1/28/2022 9:19 AM



PLAN

SCALE: 1" = 20'

KEY PLAN

SCALE: 1" = 20'

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

DEMOLITION AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 2

DESIGNED BY: K. BRAY
DRAWN BY: B. THARRINGTON
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

30% DESIGN
NOT FOR
CONSTRUCTION

ER No:	PCTS No:
FILE NAME:	C2.DWG
DATE: JAN 2022	SCALE: AS SHOWN

SHEET C2

PLOT DATE: 1/28/2022 10:49 AM BY: BTHARRINGTON Saved by BTHARRINGTON Save date: 1/27/2022 7:13 PM

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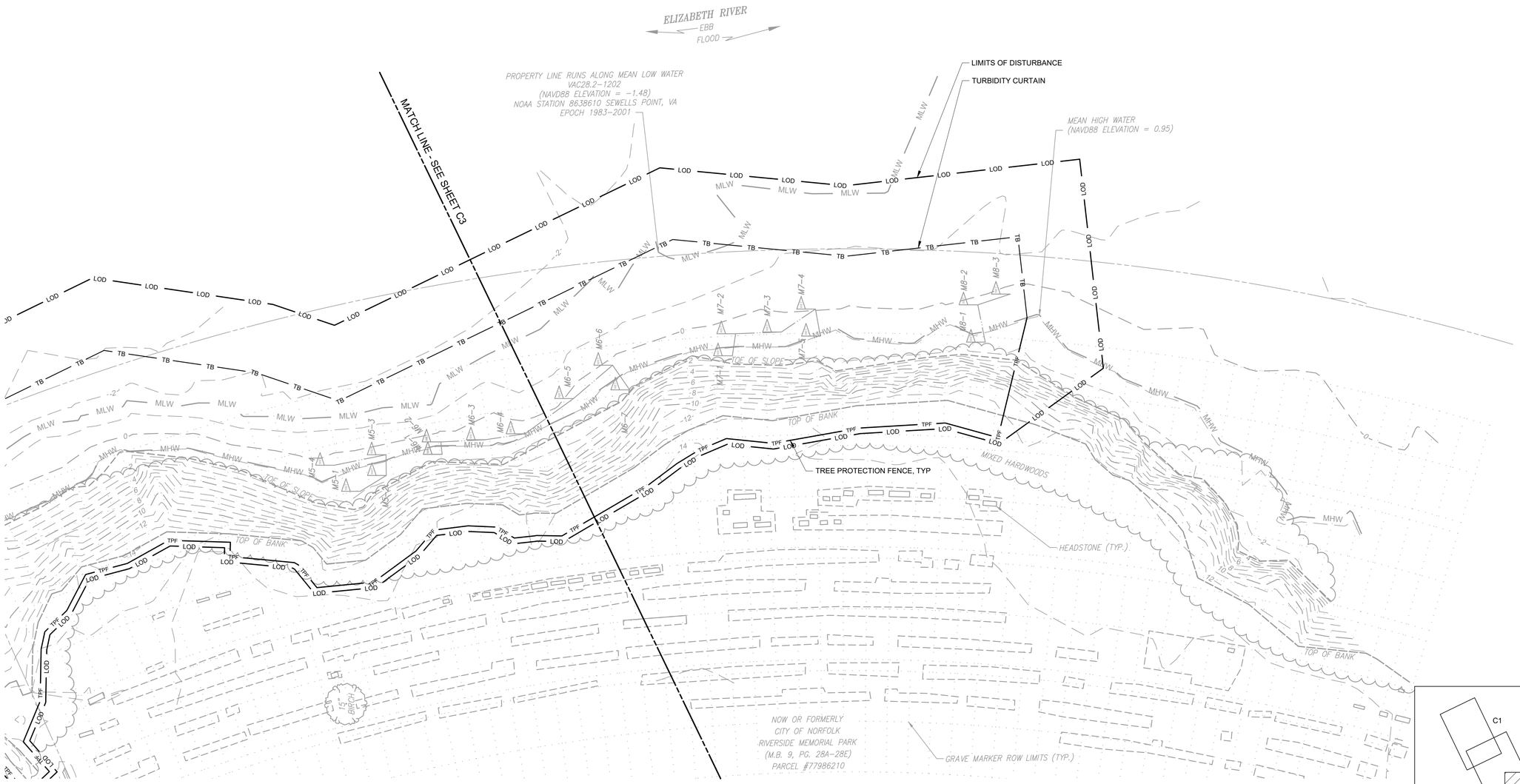
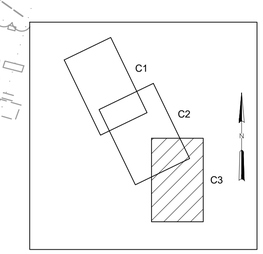


PLAN

SCALE: 1" = 20'



KEY PLAN

SCALE: 1" = 20'

20 10 0 20'

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

DEMOLITION AND EROSION AND SEDIMENT CONTROL
PLAN - SHEET 3

DESIGNED BY: K. BRAY
DRAWN BY: B. THARRINGTON
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

30% DESIGN
NOT FOR
CONSTRUCTION

ER No: PCTS No:
FILE NAME: C3.DWG
DATE: JAN 2022 SCALE: AS SHOWN
SHEET C3

PLOT DATE: 1/28/2022 10:49 AM BY: BTHARRINGTON Saved by BTHARRINGTON Save date: 1/27/2022 4:21 PM

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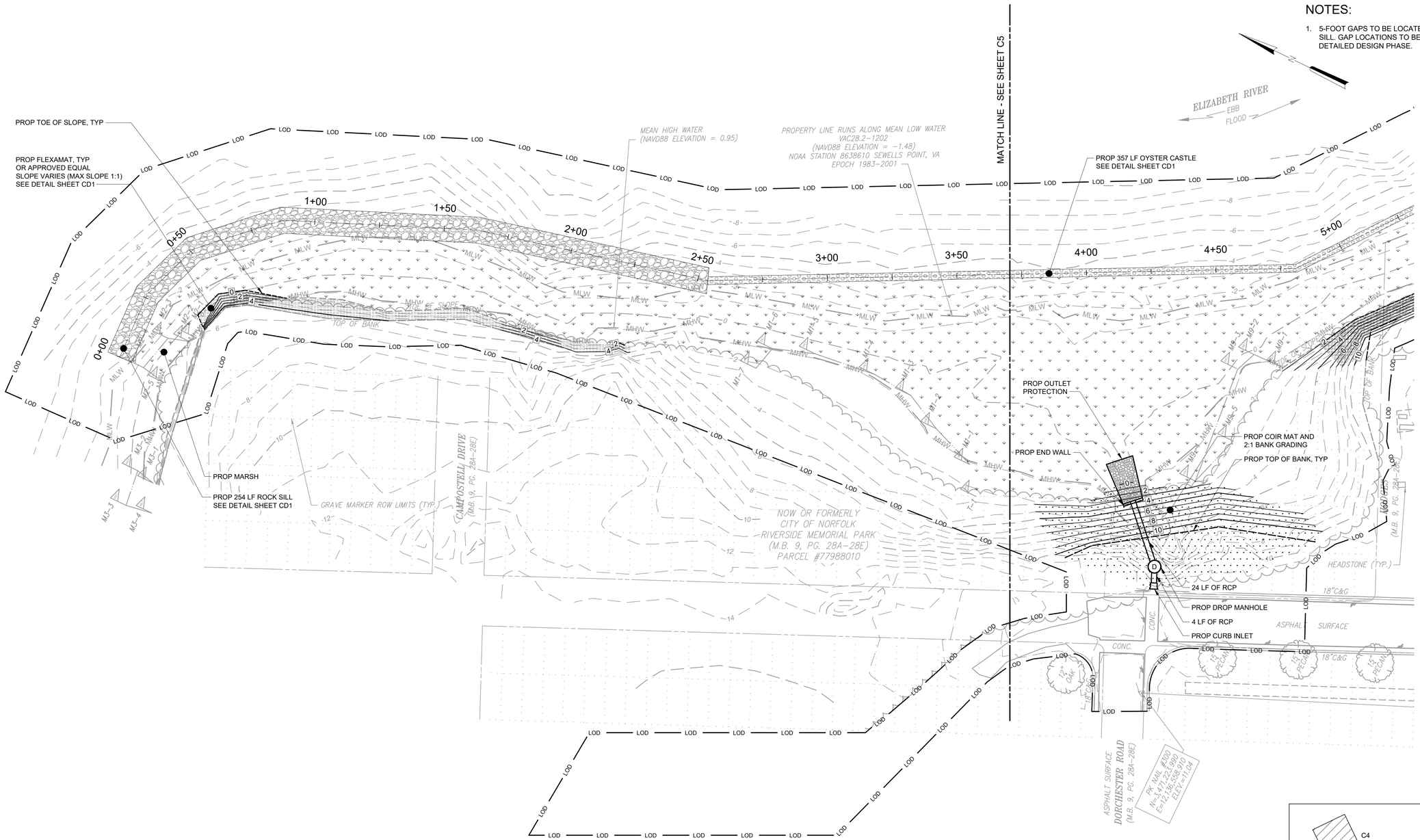
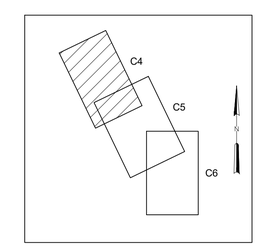
NOTES:

1. 5-FOOT GAPS TO BE LOCATED EVERY 100-FOOT OF SILL. GAP LOCATIONS TO BE DETERMINED DURING DETAILED DESIGN PHASE.



PLAN

SCALE: 1" = 20'



KEY PLAN

SCALE: 1" = 20' 20 10 0 20'

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

CIVIL
SITE AND GRADING PLAN - SHEET 1

DESIGNED BY: K. BRAY
DRAWN BY: B. THARRINGTON
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

30% DESIGN
NOT FOR
CONSTRUCTION

ER No:	PCTS No:
FILE NAME:	C4.DWG
DATE: JAN 2022	SCALE: AS SHOWN

SHEET C4

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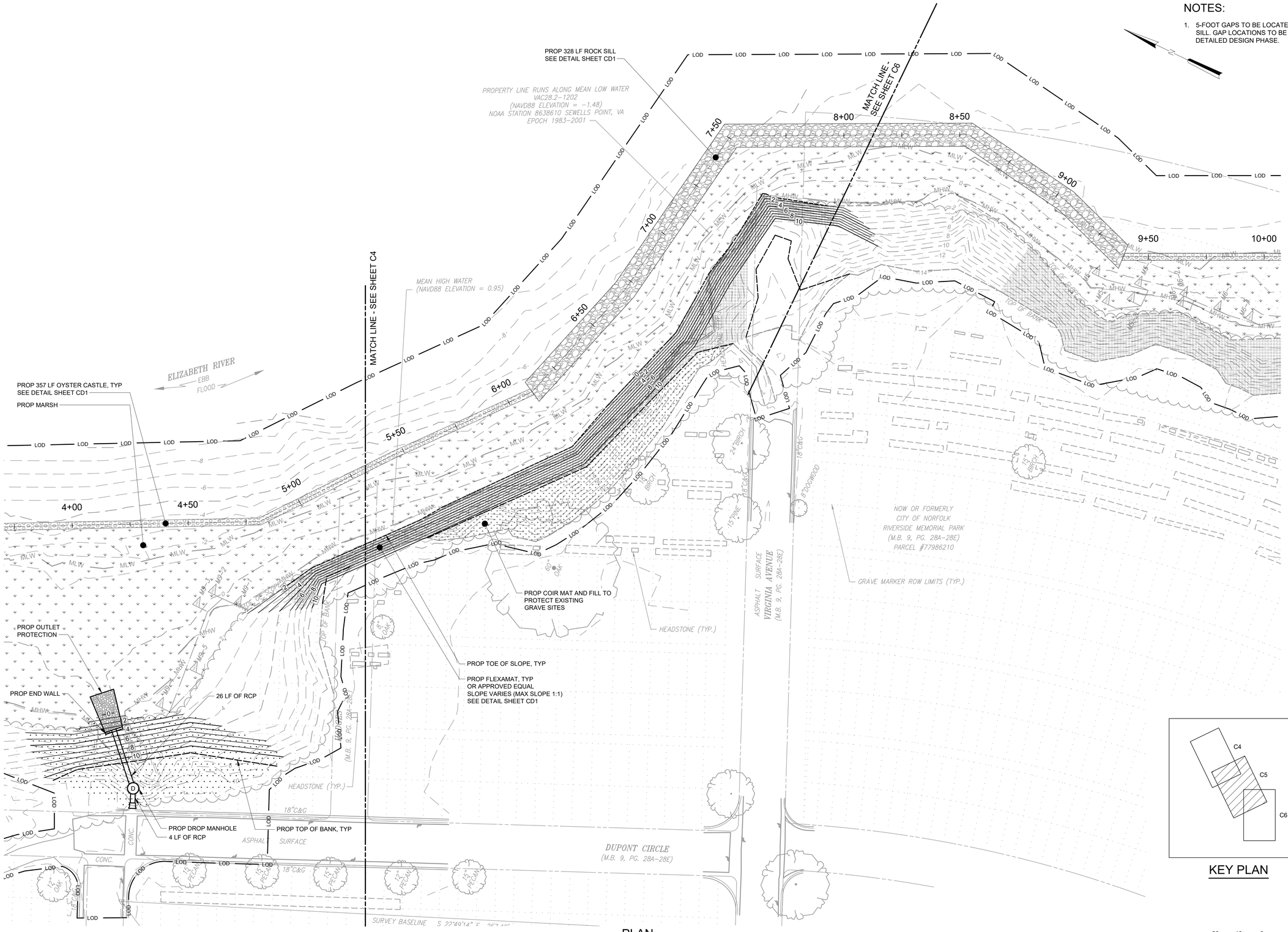
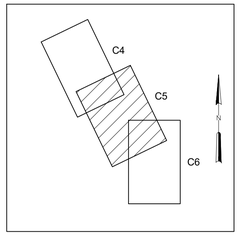
NOTES:

1. 5-FOOT GAPS TO BE LOCATED EVERY 100-FOOT OF SILL. GAP LOCATIONS TO BE DETERMINED DURING DETAILED DESIGN PHASE.



PLAN

SCALE: 1" = 20'



KEY PLAN

SCALE: 1" = 20'

20 10 0 20'

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

CIVIL
SITE AND GRADING PLAN - SHEET 2

DESIGNED BY: K. BRAY
DRAWN BY: B. THARRINGTON
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

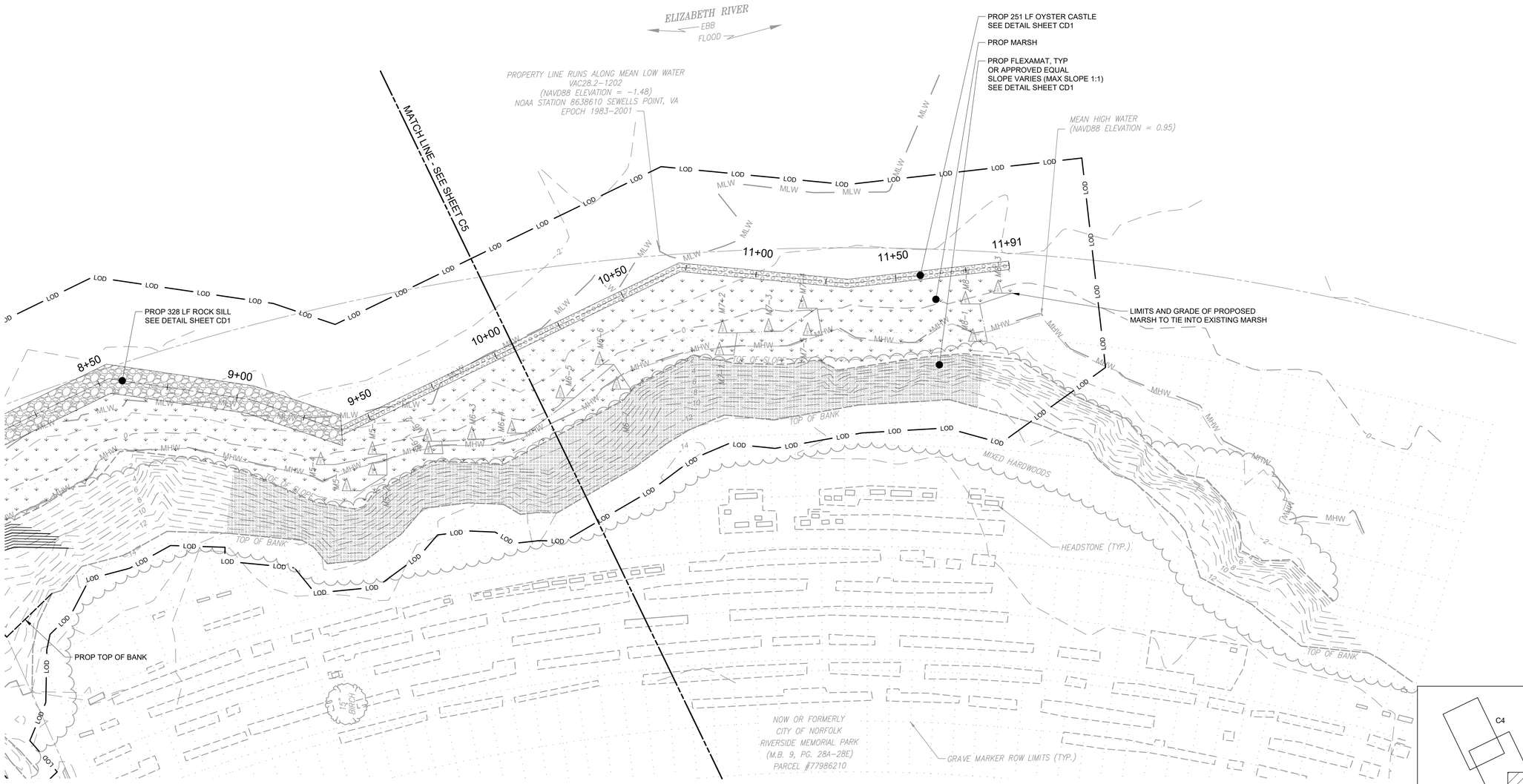
DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

30% DESIGN
NOT FOR
CONSTRUCTION

ER No:	PCTS No:
FILE NAME:	C5.DWG
DATE: JAN 2022	SCALE: AS SHOWN
SHEET	C5

NOTES:

1. 5-FOOT GAPS TO BE LOCATED EVERY 100-FOOT OF SILL. GAP LOCATIONS TO BE DETERMINED DURING DETAILED DESIGN PHASE.



PLAN

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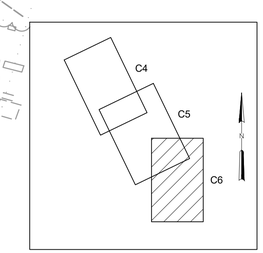

KEY PLAN

SCALE: 1" = 20'

20 10 0 20'

REV.	DESCRIPTION	DATE	BY

Hazen

HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

CIVIL
SITE AND GRADING PLAN - SHEET 3

DESIGNED BY: K. BRAY
DRAWN BY: B. THARRINGTON
CHECKED BY: A. DAVIS
APPROVED BY:
DATE:

DEPARTMENT OF PUBLIC WORKS
2233 McKANN AVENUE
NORFOLK, VA 23509

30% DESIGN
NOT FOR
CONSTRUCTION

ER No:	PCTS No:
FILE NAME:	C6.DWG
DATE: JAN 2022	SCALE: AS SHOWN

SHEET C6

PLOT DATE: 1/28/2022 10:51 AM BY: BTHARRINGTON Saved by BTHARRINGTON Save date: 1/28/2022 10:44 AM

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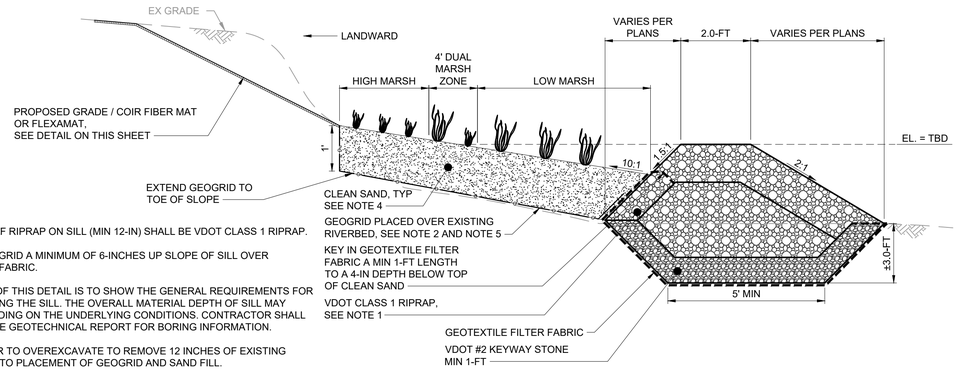
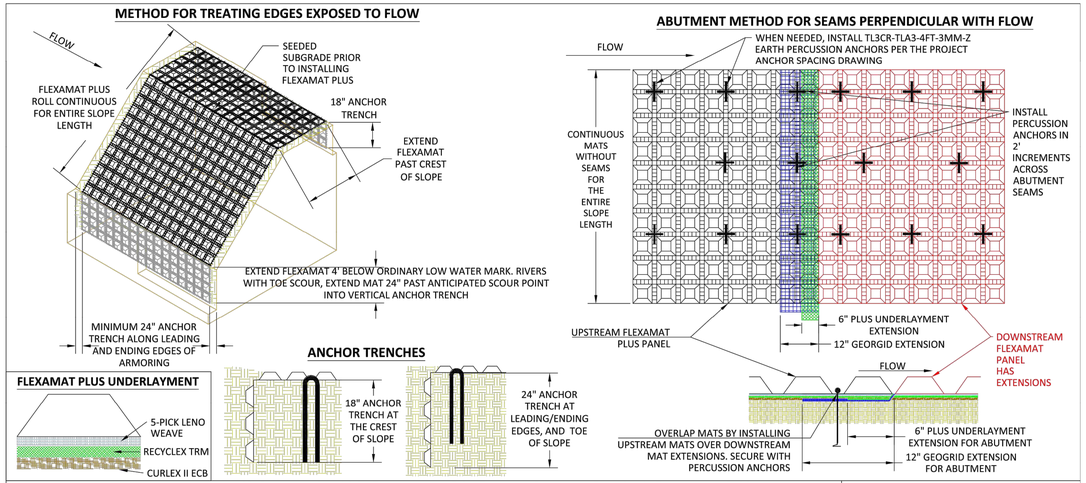


NOTES:

1. TOP LAYER OF RIPRAP ON SILL (MIN 12-IN) SHALL BE VDOT CLASS 1 RIPRAP.
2. EXTEND GEOGRID A MINIMUM OF 6-INCHES UP SLOPE OF SILL OVER GEOTEXTILE FABRIC.
3. THE INTENT OF THIS DETAIL IS TO SHOW THE GENERAL REQUIREMENTS FOR CONSTRUCTING THE SILL. THE OVERALL MATERIAL DEPTH OF SILL MAY VARY DEPENDING ON THE UNDERLYING CONDITIONS. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORT FOR BORING INFORMATION.
4. CONTRACTOR TO OVEREXCAVATE TO REMOVE 12 INCHES OF EXISTING MUCK PRIOR TO PLACEMENT OF GEOGRID AND SAND FILL.
5. GEOGRID TO BE TENSAR TRIAX TX7 OR APPROVED EQUAL.
6. SEE PLANTING PLAN FOR EXACT PLANTING ZONE EXTENTS.

STONE SILL

NTS



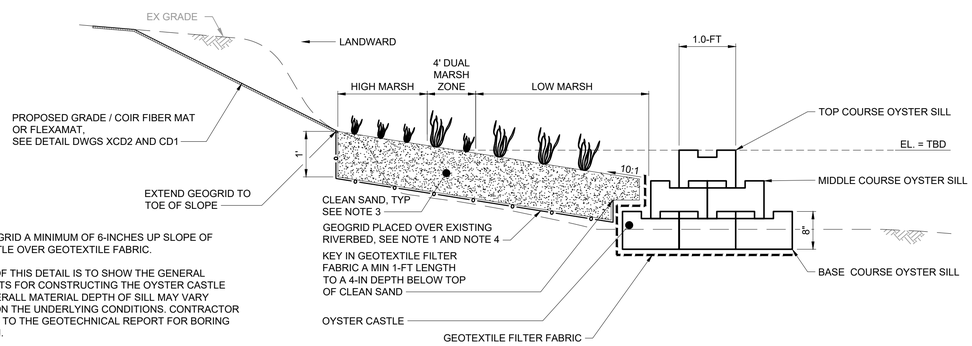
FLEXAMAT PLUS - RIVERBANK STEEP SLOPE ARMORING DETAIL

CONSTRUCTION NOTES:

1. AN ENGINEER OR MANUFACTURER'S REPRESENTATIVE SHALL BE ONSITE FOR THE START OF THE INSTALLATION.
2. ALL SUBGRADE SURFACES PREPARED FOR PLACEMENT OF MATS SHALL BE SMOOTH AND FREE OF ROCKS, STICKS, ROOTS, OTHER PROTRUSIONS, OR DEBRIS OF ANY KIND.
3. PRIOR TO INSTALLING MATS, SEED AND FERTILIZE OVER PREPARED SUBGRADE WITH SITE SPECIFIC MIX.
4. INSTALL FLEXAMAT ROLLS THAT ARE 15.5' WIDE WITH A 12" GEOGRID EXTENSION AND A 6" PLUS UNDERLAYMENT EXTENSION. INSTALLATION WILL START ON THE DOWNSTREAM END OF THE CHANNEL AND WORK TOWARDS THE UPSTREAM END OF THE INSTALLATION.
   - 4.1. THE TOP EDGE OF MAT SHALL EXTEND 3' PAST THE CREST OF SLOPE AND BE EMBEDDED 18".
   - 4.2. PRIOR TO INSTALLING UPSTREAM MATS ENSURE THE GEOGRID AND TRM EXTENSIONS ARE LAYING FLAT ON SUBGRADE. INSTALL UPSTREAM MATS OVER THE GEOGRID-PLUS EXTENSIONS OF DOWNSTREAM MATS.
   - 4.3. WHEN NEEDED, SECURE OVERLAPS USING TL3CR-TLA3-4FT-3MM-Z EARTH PERCUSSION ANCHORS PER THE ANCHOR SPACING DETAIL.
   - 4.4. WHEN NEEDED, INSTALL TL3CR-TLA3-4FT-3MM-Z EARTH PERCUSSION ANCHORS THROUGHOUT THE SLOPE PER THE ANCHOR SPACING DETAIL.
5. EXTEND FLEXAMAT 4' BELOW ORDINARY LOW WATER MARK. RIVERS WITH TOE SCOUR SHALL EMBED THE MAT 24" PAST THE ANTICIPATED SCOUR POINT. FILL AND COMPACT TERMINATION TRENCH WITH SUITABLE FILL.
6. LEADING AND ENDING EDGES OF THE ENTIRE FLEXAMAT SLOPE PROTECTION SHALL HAVE A MINIMUM 24" ANCHOR TRENCH. ANCHOR TRENCH SHALL EXTEND MINIMUM 24" BEYOND THE ANTICIPATED SCOUR POINT.

MOTZ ENTERPRISES, INC.
Flexamat
(513)772-6689
Info@Flexamat.com
Flexamat.com

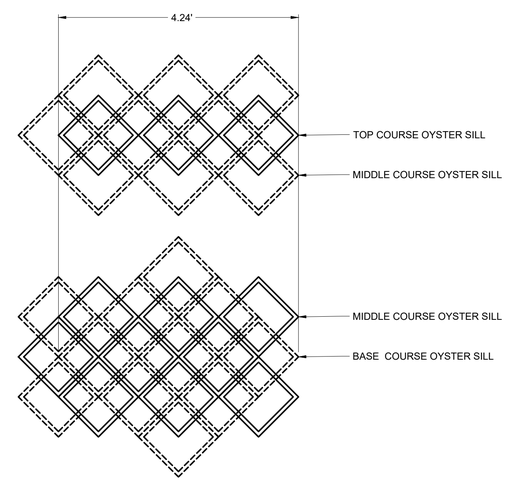
REV - 1



NOTES:

1. EXTEND GEOGRID A MINIMUM OF 6-INCHES UP SLOPE OF OYSTER CASTLE OVER GEOTEXTILE FABRIC.
2. THE INTENT OF THIS DETAIL IS TO SHOW THE GENERAL REQUIREMENTS FOR CONSTRUCTING THE OYSTER CASTLE SILL. THE OVERALL MATERIAL DEPTH OF SILL MAY VARY DEPENDING ON THE UNDERLYING CONDITIONS. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORT FOR BORING INFORMATION.
3. CONTRACTOR TO OVEREXCAVATE TO REMOVE 12 INCHES OF EXISTING MUCK PRIOR TO PLACEMENT OF GEOGRID AND SAND FILL.
4. GEOGRID TO BE TENSAR TRIAX TX7 OR APPROVED EQUAL.
5. SEE PLANTING PLAN FOR EXACT PLANTING ZONE EXTENTS.

SECTION VIEW



PLAN VIEW

OYSTER CASTLE

NTS

Hazen
HAZEN AND SAWYER
4500 MAIN STREET, SUITE 500
VIRGINIA BEACH, VIRGINIA 23462
PHONE: 757-497-0490

HAZEN PROJECT NO. 31473-008

NORFOLK DEPARTMENT OF PUBLIC WORKS
RIVERSIDE CEMETERY LIVING SHORELINE

CIVIL
STANDARD DETAILS

K. BRAY
S. KANE
A. DAVIS

DEPAR

30% DES

ER No:

CD1.DWG

JAN 2022 | AS SHOWN

SHEE CD1

DA

DESCR

PLOT DATE: 1/28/2022 10:52 AM BY: BTHARRINGTON Saved by BTHARRINGTON Save date: 1/28/2022 9:58 AM

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RIVERSIDE CEMETERY LIVING SHORELINE DESIGN

Hazen

OPINION OF PROBABLE CONSTRUCTION COSTS - POST 30% DESIGN — MARCH 2022

NORFOLK DEPARTMENT OF PUBLIC WORKS — BY: KAB/BRT

ITEM	DESCRIPTION	UNIT	QUANTITY	PRICE	EXTENSION
	PROJECT SETUP				
1	MOBILIZATION AND DEMOBILIZATION	LS	1	10% OF SUM	$ 124,500.00
2	PROJECT VIDEO	LS	1	$ 1,000.00	$ 1,000.00
3	SURVEY AND LAYOUT AND AS-BUILT SURVEY	LS	1	$ 27,900.00	$ 27,900.00
4	DEWATERING	LS	1	$ 100,000.00	$ 100,000.00
	EROSION AND SEDIMENT CONTROL				
5	FURNISH, INSTALL, AND REMOVE TEMPORARY CONSTRUCTION ENTRANCE	EA	1	$ 3,000.00	$ 3,000.00
6	FURNISH, INSTALL AND REMOVE SILT FENCE	LF	262	$ 5.00	$ 1,310.00
7	FURNISH, INSTALL AND REMOVE TREE PROTECTION/PLASTIC SAFETY FENCE	LF	1,823	$ 5.00	$ 9,115.00
8	FURNISH, INSTALL, AND REMOVE TURBIDITY CURTAIN	LS	1	$ 21,750.00	$ 21,750.00
9	FURNISH, INSTALL, AND REMOVE INLET PROTECTION	EA	1	$ 300.00	$ 300.00
	DEMOLITION				
10	CLEARING AND GRUBBING	SF	15,155	$ 5.00	$ 75,778.00
11	SELECT TREE REMOVAL	LS	1	$ 100,000.00	$ 100,000.00
12	REMOVE AND DISPOSE CONCRETE FLUME	LS	1	$ 1,500.00	$ 1,500.00
	BANK STABILIZATION & LIVING SHORELINE				
13	REMOVE AND DISPOSE OF RIVERBED MUCK	LS	1	$ 180,000.00	$ 180,000.00
14	FURNISH AND INSTALL COMMON EARTH BACKFILL	CY	396	$ 40.00	$ 15,900.00
15	FURNISH AND INSTALL TOPSOIL	CY	415	$ 75.00	$ 31,200.00
16	FURNISH AND INSTALL SAND FILL	TON	1,804	$ 65.00	$ 117,300.00
17	FURNISH AND INSTALL GEOGRID	SY	4,876	$ 10.00	$ 48,800.00
18	FURNISH AND INSTALL STONE SILL	LF	752	$ 250.00	$ 188,000.00
19	FURNISH AND INSTALL OYSTER CASTLES	LS	1	$7,000.00	$ 7,000.00
20	FURNISH AND INSTALL COIR FIBER MATTING	SY	622	$ 6.50	$ 4,100.00
21	FURNISH AND INSTALL FLEXAMAT (OR APPROVED EQUAL)	SF	11,736	$ 8.00	$ 93,900.00
	PAVING REPAIR & UTILITY INSTALLATION				
22	FURNISH AND INSTALL CURB INLET	EA	1	$ 5,000.00	$ 5,000.00
23	FURNISH AND INSTALL RCP PIPE	LF	30	$ 225.00	$ 6,800.00
24	FURNISH AND INSTALL 5-FOOT DIA. MANHOLE (7-FOOT HEIGHT)	EA	1	$ 10,000.00	$ 10,000.00
25	FURNISH AND INSTALL ENDWALL	EA	1	$ 4,000.00	$ 4,000.00
26	FURNISH AND INSTALL #57 BEDDING STONE	TON	3	$ 60.00	$ 200.00
	PLANTING				
27	FURNISH AND INSTALL TREES - #3 CONTAINER	EA	8	$ 150.00	$ 1,200.00
28	FURNISH AND INSTALL SHRUBS - #3 CONTAINER	EA	72	$ 45.00	$ 3,300.00
29	FURNISH AND INSTALL TUBELING PLUGS - LOW MARSH	EA	18,039	$ 4.00	$ 72,160.00
30	FURNISH AND INSTALL TUBELING PLUGS - HIGH MARSH	EA	18,039	$ 4.00	$ 72,160.00
31	FURNISH AND INSTALL WATERFOWL EXCLUSION FENCE	SY	4,009	$ 2.50	$ 10,030.00
32	FURNISH AND INSTALL RIPARIAN BUFFER SEED MIX	SY	1,805	$ 6.83	$ 12,330.00
33	FURNISH AND INSTALL TEMPORARY SEED MIX	SY	3,671	$ 0.92	$ 3,380.00
34	FURNISH AND INSTALL MAINTAINED TURF SEED MIX	SY	1,866	$ 9.02	$ 16,840.00
SUBTOTAL - RIVERSIDE CEMETERY LIVING SHORELINE DESIGN (ROUNDED)					**$ 1,400,000**
	CONSTRUCTION CONTINGENCY (ROUNDED)			**30%**	**$ 500,000**
TOTAL - RIVERSIDE CEMETERY LIVING SHORELINE DESIGN (ROUNDED)					**$ 1,900,000**

Unit price reflects current market bid pricing

THE CITY OF NORFOLK

National Flood Hazard Layer FIRMette

FEMA

76°16'12"W 36°50'18"N

76°15'35"W 36°49'49"N

0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

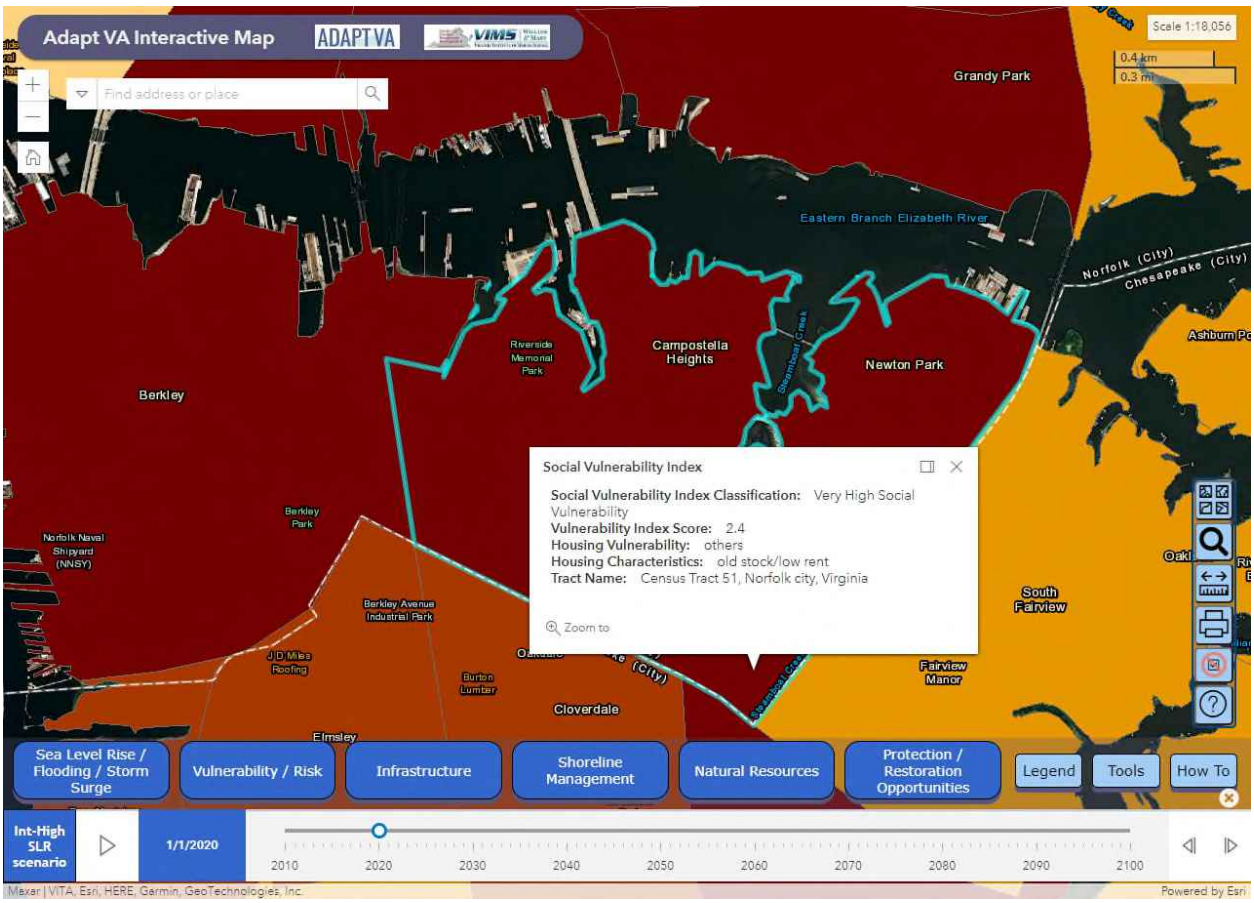
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/4/2022 at 9:33 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

THE CITY OF NORFOLK



Key Facts

517100051.00

517100051.00 (51710005100)

Geography: Census Tract

City of Norfolk

KEY FACTS

4,629

Population

27.3

Median Age

3.0

Average Household Size

$28,671

Median Household Income

EDUCATION

21%

No High School Diploma

30%

High School Graduate

32%

Some College

16%

Bachelor's/Grad/Pr of Degree

BUSINESS

65

Total Businesses

854

Total Employees

EMPLOYMENT

55%

White Collar

23%

Blue Collar

22%

Services

9.9%

Unemployment Rate

INCOME

$28,671

Median Household Income

$14,100

Per Capita Income

$12,451

Median Net Worth

Households By Income

The largest group: <$15,000 (26.1%)

The smallest group: $200,000+ (0.0%)

Indicator ▲	Value	Diff
<$15,000	26.1%	+12.4%
$15,000 - $24,999	16.2%	+7.3%
$25,000 - $34,999	17.2%	+5.9%
$35,000 - $49,999	12.7%	+0.3%
$50,000 - $74,999	8.6%	-11.5%
$75,000 - $99,999	8.9%	-4.2%
$100,000 - $149,999	6.3%	-5.5%
$150,000 - $199,999	4.1%	-1.2%
$200,000+	0.0%	-3.6%

Bars show deviation from Norfolk city

This infographic contains data provided by Esri, Esri and Data Axle. The vintage of the data is 2021, 2026.

Source: This infographic contains data provided by Esri, Esri and Data Axle. The vintage of the data is 2021, 2026.

Demographic and Income Comparison Profile

517100051.00
517100051.00 (51710005100)
Geography: Census Tract

Prepared by Esri

	51710005100
Census 2010 Summary	
Population	4,522
Households	1,487
Families	1,057
Average Household Size	3.03
Owner Occupied Housing Units	464
Renter Occupied Housing Units	1,023
Median Age	24.4
2021 Summary	
Population	4,629
Households	1,519
Families	1,070
Average Household Size	3.04
Owner Occupied Housing Units	507
Renter Occupied Housing Units	1,012
Median Age	27.3
Median Household Income	$28,671
Average Household Income	$42,944
2026 Summary	
Population	4,655
Households	1,527
Families	1,073
Average Household Size	3.04
Owner Occupied Housing Units	534
Renter Occupied Housing Units	993
Median Age	28.5
Median Household Income	$30,328
Average Household Income	$47,790
Trends: 2021-2026 Annual Rate	
Population	0.11%
Households	0.11%
Families	0.06%
Owner Households	1.04%
Median Household Income	1.13%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

April 03, 2022

	51710005100	
2021 Households by Income	**Number**	**Percent**
<$15,000	396	26.1%
$15,000 - $24,999	246	16.2%
$25,000 - $34,999	261	17.2%
$35,000 - $49,999	193	12.7%
$50,000 - $74,999	131	8.6%
$75,000 - $99,999	135	8.9%
$100,000 - $149,999	95	6.3%
$150,000 - $199,999	62	4.1%
$200,000+	0	0.0%
Median Household Income	$28,671	
Average Household Income	$42,944	
Per Capita Income	$14,100	
2026 Households by Income	**Number**	**Percent**
<$15,000	358	23.4%
$15,000 - $24,999	236	15.5%
$25,000 - $34,999	275	18.0%
$35,000 - $49,999	196	12.8%
$50,000 - $74,999	131	8.6%
$75,000 - $99,999	144	9.4%
$100,000 - $149,999	110	7.2%
$150,000 - $199,999	77	5.0%
$200,000+	0	0.0%
Median Household Income	$30,328	
Average Household Income	$47,790	
Per Capita Income	$15,685	

Data Note: Income is expressed in current dollars.

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

April 03, 2022

	51710005100	
2010 Population by Age	**Number**	**Percent**
Age 0 - 4	544	12.0%
Age 5 - 9	573	12.7%
Age 10 - 14	439	9.7%
Age 15 - 19	417	9.2%
Age 20 - 24	330	7.3%
Age 25 - 34	608	13.4%
Age 35 - 44	427	9.4%
Age 45 - 54	491	10.9%
Age 55 - 64	328	7.3%
Age 65 - 74	176	3.9%
Age 75 - 84	129	2.9%
Age 85+	60	1.3%
2021 Population by Age	**Number**	**Percent**
Age 0 - 4	494	10.7%
Age 5 - 9	477	10.3%
Age 10 - 14	444	9.6%
Age 15 - 19	428	9.2%
Age 20 - 24	315	6.8%
Age 25 - 34	627	13.5%
Age 35 - 44	523	11.3%
Age 45 - 54	387	8.4%
Age 55 - 64	446	9.6%
Age 65 - 74	296	6.4%
Age 75 - 84	131	2.8%
Age 85+	61	1.3%
2026 Population by Age	**Number**	**Percent**
Age 0 - 4	482	10.4%
Age 5 - 9	454	9.8%
Age 10 - 14	425	9.1%
Age 15 - 19	385	8.3%
Age 20 - 24	372	8.0%
Age 25 - 34	593	12.7%
Age 35 - 44	541	11.6%
Age 45 - 54	446	9.6%
Age 55 - 64	383	8.2%
Age 65 - 74	360	7.7%
Age 75 - 84	159	3.4%
Age 85+	55	1.2%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

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2010 Race and Ethnicity	**Number**	**Percent**
White Alone	173	3.8%
Black Alone	4,208	93.1%
American Indian Alone	13	0.3%
Asian Alone	20	0.4%
Pacific Islander Alone	1	0.0%
Some Other Race Alone	37	0.8%
Two or More Races	70	1.5%
Hispanic Origin (Any Race)	116	2.6%
2021 Race and Ethnicity	**Number**	**Percent**
White Alone	206	4.5%
Black Alone	4,230	91.4%
American Indian Alone	14	0.3%
Asian Alone	27	0.6%
Pacific Islander Alone	2	0.0%
Some Other Race Alone	51	1.1%
Two or More Races	99	2.1%
Hispanic Origin (Any Race)	166	3.6%
2026 Race and Ethnicity	**Number**	**Percent**
White Alone	208	4.5%
Black Alone	4,254	91.4%
American Indian Alone	14	0.3%
Asian Alone	27	0.6%
Pacific Islander Alone	2	0.0%
Some Other Race Alone	51	1.1%
Two or More Races	99	2.1%
Hispanic Origin (Any Race)	166	3.6%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

AT RISK POPULATION PROFILE

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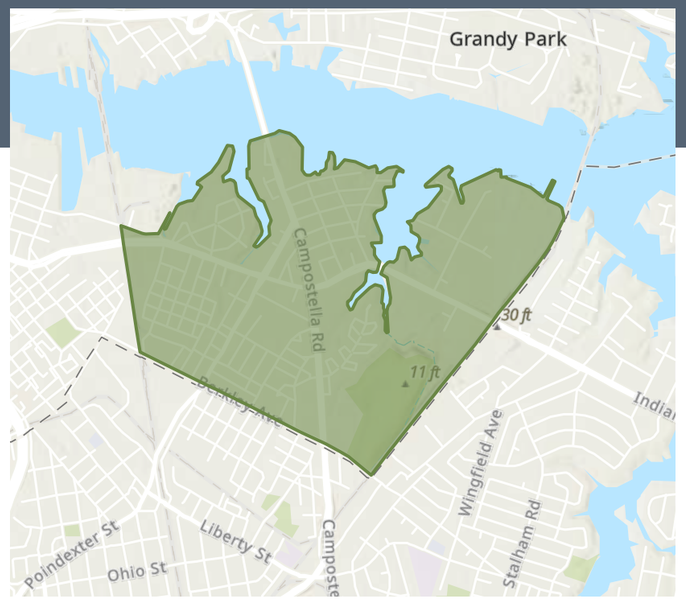
Geography: Census Tract



4,629	1,519	3.04	27.3	$28,671	$224,010	31	69	22
Population	Households	Avg Size Household	Median Age	Median Household Income	Median Home Value	Wealth Index	Housing Affordability	Diversity Index

AT RISK POPULATION

374	488	369
Households With Disability	Population 65+	Households Without Vehicle

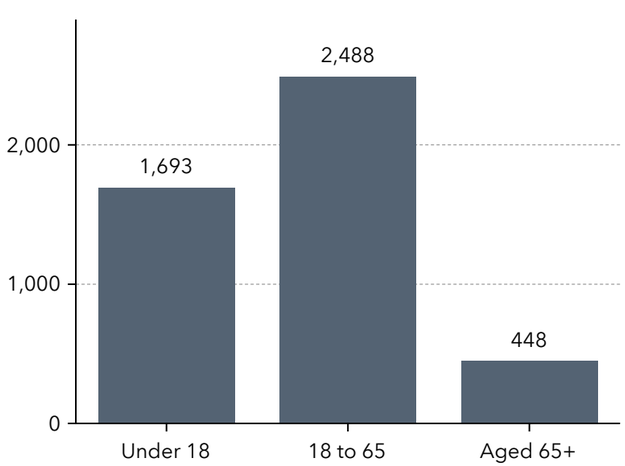
POVERTY AND LANGUAGE

40%	594	0
Households Below the Poverty Level	Households Below the Poverty Level	Pop 65+ Speak Spanish & No English

POPULATION AND BUSINESSES

4,041	65	854
Daytime Population	Total Businesses	Total Employees

POPULATION BY AGE



Language Spoken (ACS)	Age 5-17	18-64	Age 65+	Total
English Only	1,077	2,214	265	3,556
Spanish	0	10	0	10
Spanish & English Well	0	10	0	10
Spanish & English Not Well	0	0	0	0
Spanish & No English	0	0	0	0
Indo-European	0	0	0	0
Indo-European & English Well	0	0	0	0
Indo-European & English Not Well	0	0	0	0
Indo-European & No English	0	0	0	0
Asian-Pacific Island	0	103	0	103
Asian-Pacific Isl & English Well	0	103	0	103
Asian-Pacific Isl & English Not Well	0	0	0	0
Asian-Pacific Isl & No English	0	0	0	0
Other Language	32	64	0	96
Other Language & English Well	32	64	0	96
Other Language & English Not Well	0	0	0	0
Other Language & No English	0	0	0	0

Source: This infographic contains data provided by Esri, American Community Survey (ACS), Esri and Data Axle. The vintage of the data is 2021, 2026, 2015-2019.

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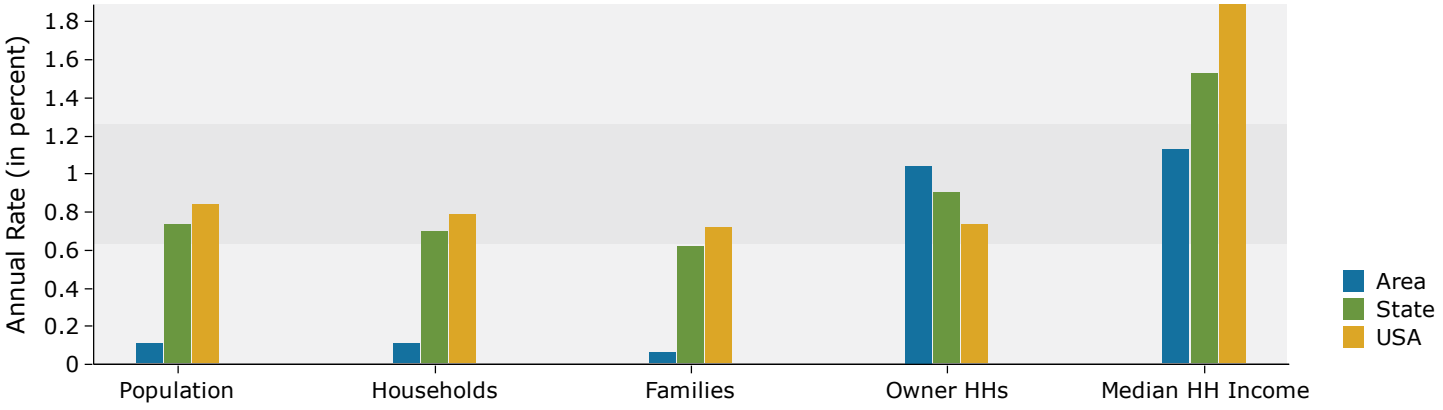
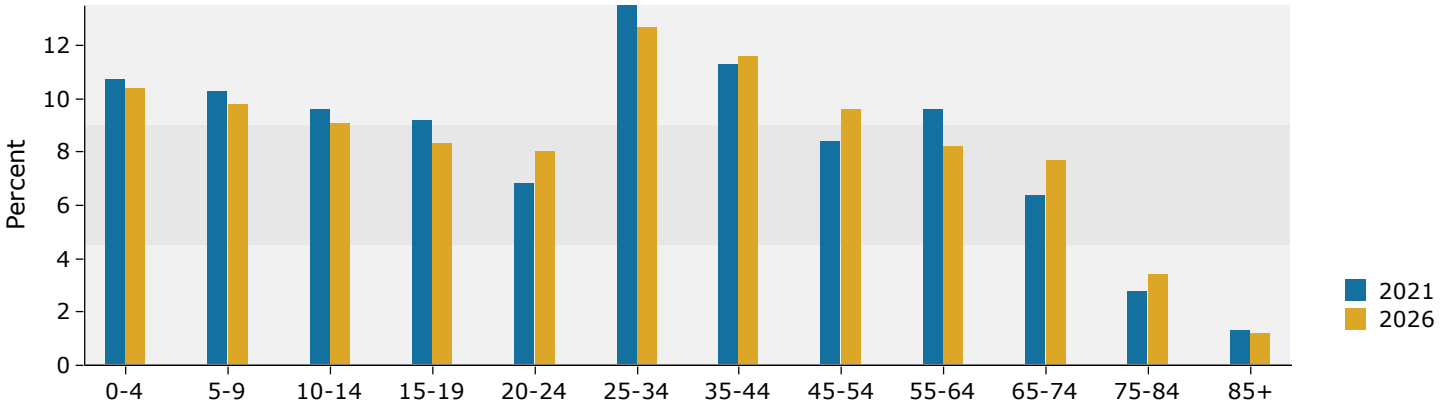
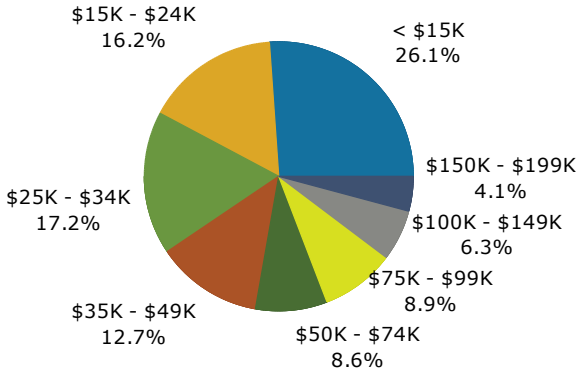
Trends 2021-2026



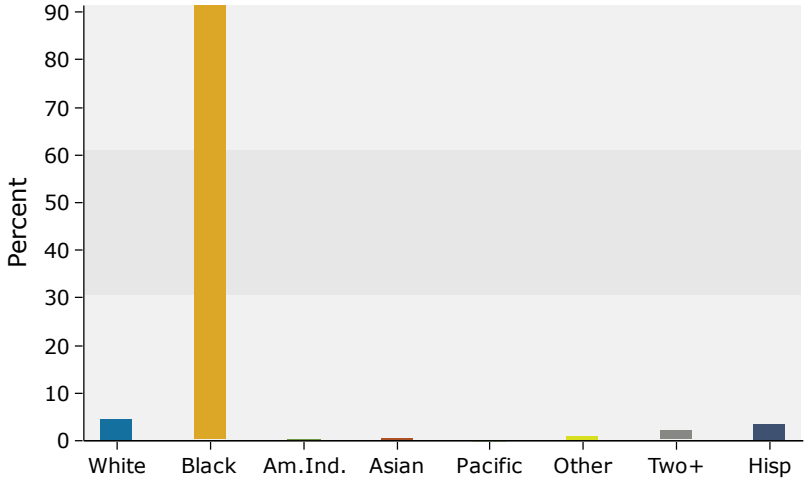
Population by Age



2021 Household Income



2021 Population by Race



Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

April 03, 2022

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Geography: Census Tract

City of Norfolk

COMMUNITY PROFILE

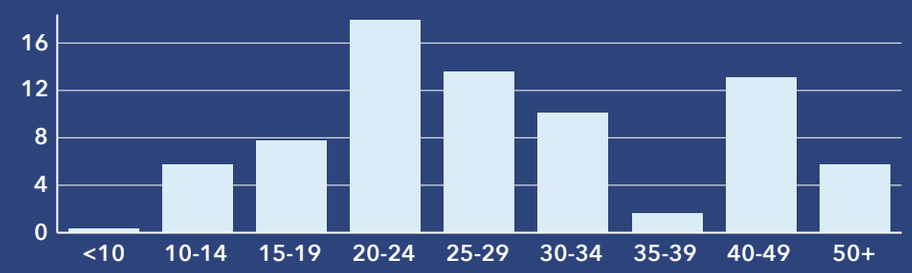
4,629	0.2%	3.04	22.1	27.3	$28,671	$224,010	$12,451	36.6%	53.7%	8.4%
Population Total	Population Growth	Average HH Size	Diversity Index	Median Age	Median HH Income	Median Home Value	Median Net Worth	Under 18	Ages 18-65	Aged 66+

30.2% Services

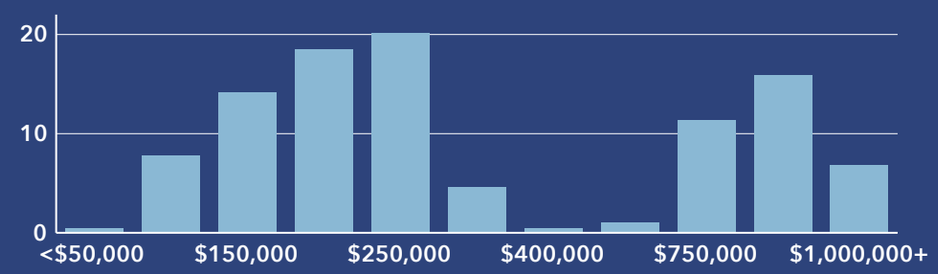
23.1% Blue Collar

46.6% White Collar

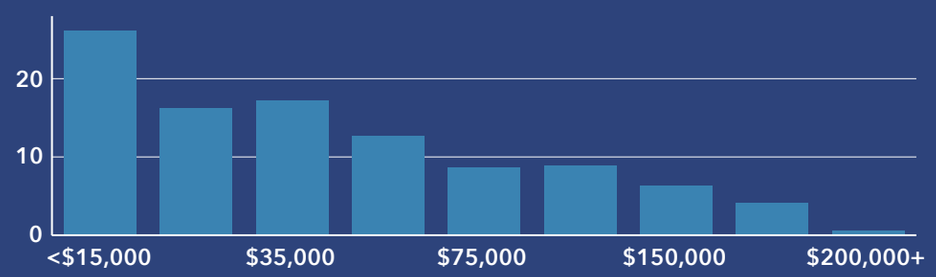
Mortgage as Percent of Salary



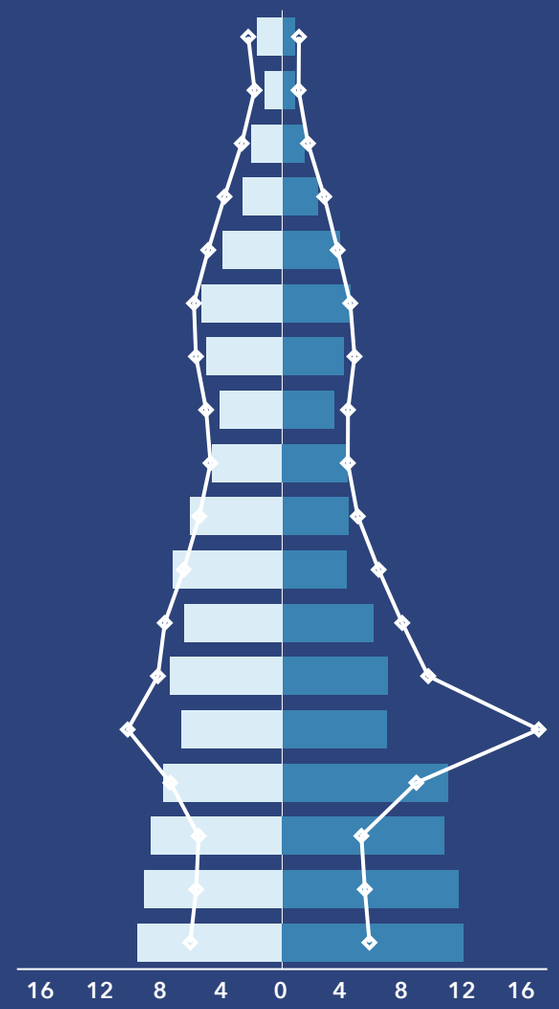
Home Value



Household Income

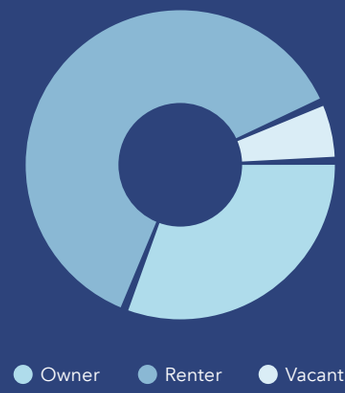


Age Profile: 5 Year Increments

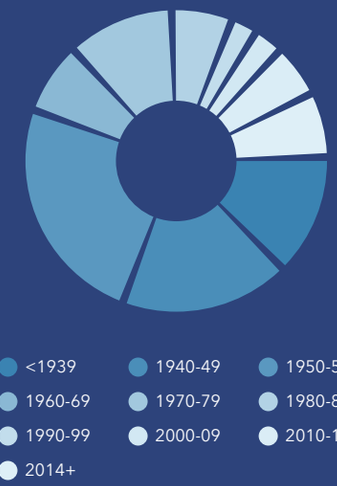


Dots show comparison to Norfolk city

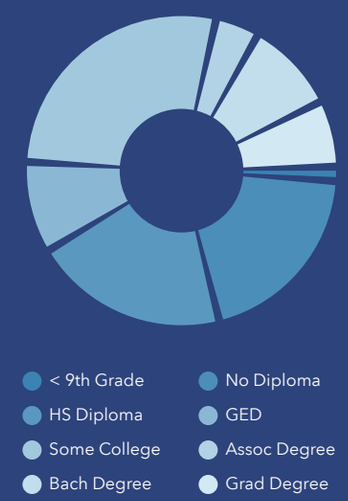
Home Ownership



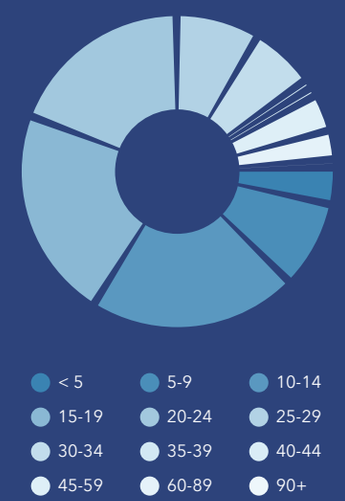
Housing: Year Built



Educational Attainment



Commute Time: Minutes



Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026. Version 1.2

esri THE SCIENCE OF WHERE

Source: This infographic contains data provided by Esri, American Community Survey (ACS). The vintage of the data is 2021, 2015-2019, 2026.

Maintenance and Management Plan

Shoreline restoration projects often provide water quality benefits and are managed as best management practices (BMP) by the City of Norfolk. Department of Public Works- Division of Environmental Storm Water Management is responsible for most public BMPs, including living shorelines. Per Part I, Section B.2.(h) of the City's Municipal Separate Storm Sewer (MS4) permit and section 2.8 of Division of Environmental Storm Water Management's Program Plan, public BMPs are inspected and maintained annually or more often if needed based on inspections or resident concerns. Both documents are linked below. A Division SOP provides additional information and is provided below.

Three dedicated operations crews maintain vegetated features such as shorelines, ponds, and ditches and additional crews are available to assist with structural repairs. On-call contractors are also available for larger maintenance tasks. These crews and contractors are funded through a dedicated storm water fee. The project will be monitored monthly for the first year to ensure no erosion has started and will be inspected at least once per year afterwards. Any necessary repairs to the bank or shoreline vegetation, grading, or structures will be conducted by Division of Environmental Storm Water Management operations staff or on-call contractors.

Norfolk MS4 Permit

Norfolk Division of Environmental Storm Water Management Program Plan

SOP 654

DEPARTMENT OF PUBLIC WORKS
DIVISION OF ENVIRONMENTAL
STORM WATER MANAGEMENT
STORM WATER BMP INSPECTIONS

DATE WRITTEN:	March 8, 2005
DATE REVISED:	June 28, 2017; September 18, 2018; November 25, 2019; February 10, 2020
PREPARED BY:	Kyle Quick, Environmental Specialist; June Whitehurst, Environmental Programs Manager
REVIEWED BY:	John M. White, Storm Water Engineer
FILE PATH:	Enter Link Here
DISTRIBUTION:	Operations Personnel

PURPOSE / OBJECTIVE:

To define guidelines for the inspection and enforcement for the installation and maintenance of all private and city-owned storm water structural best management practices (BMPs). BMPs reduce unwanted contaminants and/or the volume of storm water entering the City MS4 system and local waterways. BMPs are regularly inspected to ensure they are working as designed and maintained in such a manner to not cause flooding, become a nuisance, or impose a threat to health and safety.

RESPONSIBILITIES:

Division – The Department of Public Works, Division of Environmental Storm Water Management is the administrator of the MS4 VPDES Permit, VA0088650. Environmental staff ensures compliance with the VPDES permit associated with BMP inspections to the storm water system. State law requires BMPs to be inspected once every 5-years. The City's MS4 permit requires city-owned BMPs be inspected and maintained once per year.

Environmental Staff develop and maintain a list of BMPs within the geographic boundary of the City of Norfolk. This list is routinely updated following site plan review. Environmental staff conduct routine inspections of both private and public storm water BMPs.

OTHER:

BMPs are used to reduce pollution in and/or volume of storm water runoff, thereby protecting area waterways. Some examples of structural storm water BMPs include infiltration trenches, grass swales, detention basins, retention ponds, oil/grit separators, bioretention basins, manufactured BMPs, etc.

REQUIREMENTS:

1. BMPs are approved for installation after an extensive site plan review by a designated storm water engineer. All pertinent information pertaining to the BMPs are entered into the current BMP tracking database.

2. As part of the site plan approval process, a Declaration of Covenants for Storm and Surface Water Facility and System Maintenance (BMP Maintenance Agreement) should be signed and notarized by the owner or responsible party of the private property being developed to maintain the BMP after construction. That party will remain responsible for all maintenance until the property is sold; at which time the new owner is responsible for maintaining the BMP. A copy of the agreement is filed with the clerk of the court by the owner or responsible party. A copy of the agreement is also maintained in the site plan file at the Division.

3. Storm water management (SWM) facilities or BMPs are required to be installed in accordance with the approved plans, and manufacturers' specifications where applicable. The City of Norfolk Planning Department, Building Safety Bureau will inspect the installation of onsite stormwater piping and structures. The Department of Public Works, Environmental Storm Water Management

staff will inspect the installation of BMPs. Additionally, they also inspect stormwater piping and structures within the City Right-of-Way and piping that ties into the City's MS4 system. During construction, environmental staff will have completed the following procedures:

a. A pre-construction meeting will be scheduled to go over expectations. Pre-construction meetings will be documented.

b. Follow up inspections with the contractor will occur throughout the construction process to verify that the BMPs are installed in accordance with the approved plans. These inspections should take place before any backfilling occurs and should include pictures for documentation. If there is a tie-in to the city system, a storm water inspector will inspect the tie-in.

c. A construction record drawing ("As-built" submission) signed and sealed by a professional registered in Virginia will be reviewed by a storm water engineer or their designee to verify the SWM facilities have been installed per the approved plan.

d. A final inspection will be performed by the environmental staff to ensure that the BMP and contributing drainage areas are stabilized. The inspector will also ensure that the site is free of excessive litter or debris, sediment build up, or erosion, and no deviations from the approved construction record drawing.

e. Upon approval of the construction record drawing and the final inspection, the environmental staff will approve the release of the Certificate of Occupancy (if required) and approval to terminate bonds for stormwater improvements.

4. All privately-owned and city-owned BMP inspections are tracked in the current BMP tracking database. The database enables the Division to maintain inspection data and to ensure inspections are completed on a routine schedule.

5. When an inspection is conducted, the following items are checked to ensure that the BMP will consistently perform its water quality improvement and/or runoff reduction functions.

a. *Sediment Buildup*: Sediment buildup can reduce the effectiveness of the BMP by blocking inlets and outlets, reducing infiltration rates, and reducing effectiveness of pretreatment practices.

b. *Erosion*: Erosion can lead to reduced volume of the BMP and/or structural failure. Erosion is a common problem around inlets and outlets of BMPs, and may also be caused by roots of woody vegetation and animal burrows.

c. *Debris and Litter Removal*: Regular removal of litter and debris is essential to ensure the BMP is working properly. The BMP must be free from debris and litter in or around the BMP structure.

d. *Vegetation*: Vegetation must be established and maintained to guard against erosion and sediment buildup, and to maintain designed pollutant removal rates where applicable. Excessive vegetation clippings must be removed from the BMP and disposed of properly.

e. *Deviation from the Construction Record Drawing*: Verify a property owner, tenant, or other responsible party has not modified a post-construction BMP without written approval from the City of Norfolk Department of Public Works storm water engineer, or their designee.

DEPARTMENT OF PUBLIC WORKS
DIVISION OF ENVIRONMENTAL
STORM WATER MANAGEMENT
STORM WATER BMP INSPECTIONS

f. *Manufactured BMPs*: The owner or responsible party are required to maintain manufactured BMPs in accordance with the manufacturer's specifications, and to provide evidence of continued maintenance by copies of maintenance records and/or photographic proof.

g. *Other Maintenance Concerns*: Refer to the Virginia Department of Environmental Quality Stormwater Design Specifications for other BMP maintenance concerns.

6. The environmental staff will complete an inspection report and track inspections in the current BMP tracking database. The responsible party will either be sent an email or a letter that lists the BMP maintenance discrepancies and includes a copy of the inspection report, if necessary. The responsible party will have a specified time-period to complete the maintenance after the report has been sent. A re-inspection will occur after the allotted time-period to ensure all corrections have been made. If the inspector has had no contact from the property owner, if letters have been returned, or if the discrepancies have not been addressed a Notice of Violation (NOV) may be sent or issued. If no progress occurs after the NOV has been issued, further legal actions should be taken. The City also holds the right to conduct the corrections after proper warning, and then charge the responsible party for any financial obligations. If the BMP is working properly and does not appear to have any maintenance discrepancies, a note will be made in the file and no report will be sent to the responsible party.

7. Routine maintenance for any City-owned BMP is conducted by the Division which is submitted in a service request and put into the work management tracking system. The City-owned BMPs must also follow all the guidelines established above.

8. The Norfolk Public Schools BMPs are inspected by the environmental staff, however, the school board facilities manager is the main point of contact for any discrepancies regarding BMP maintenance at school facilities. The school board is responsible for maintaining the BMPs and if major work is required beyond the capabilities of facilities personnel, then they will hire a contractor.

Approved:

_____

John M. White
Storm Water Engineer
Public Works, Division of Environmental Storm Water Management

DS AV

DS TH

DS AMS

THE CITY OF NORFOLK

For CM Office use only:
DTS # _____

DOCUMENT TRANSMITTAL FORM

Use for All City Documents Which Require the City Manager's Staff Approval

*** PLEASE INDICATE IF THERE IS A LEGITIMATE DUE DATE BY WHICH THE CITY MANAGER MUST RESPOND ***

Due Date: ____4/8/2022__ Return Completed Document To: __Stephanie Daniel, Office of Resilience_

DEPARTMENT	Resilience & Stormwater
A. TO BE COMPLETED FOR CONTRACTS, AGREEMENTS, RFPS, AND GRANTS:	
TITLE	DCR Community Flood Preparedness April 2022 Application (2 applications): Riverside Memorial Park Project and USACE Floodwall Project
PARTY (Company and principal's names with which the City is entering into the agreement.)	Virginia Department of Conservation and Recreation (DCR)
EFFECTIVE DATES (Start & end dates)	Upon award with 36-month performance period
TOTAL DOLLAR VALUE	**Riverside Memorial Park Project:** $1,900,000 ($1,520,000 grant request; $380,000 match) **USACE Floodwall Project:** $160,731,286 ($28,127,975 grant request; local match of $28,127,975 and federal match of $104,475,336)
FUNDING SOURCE (Operating or capital budget; budget year; grant or other source. Show account information)	**RIVERSIDE MEMORIAL PARK PROJECT FUNDING SOURCE:** STORMWATER **ACCOUNT:** 2300 35 4305 5583 FY23 ($380,000 for Riverside Memorial Park Project) **USACE FLOODWALL MATCH:** FY23 CIP Funding $28,127,975 and federal match of $104,475,336
TYPE (New or extension)	New Grant Application
SUMMARY OF SCOPE OF SERVICE/ PROGRAM	The City is applying for funds to support the City's USACE Floodwall Project Federal Authorization (Resilience) match requirement and for a project to support shoreline work at Riverside Memorial Park (Stormwater).
CALL OUTS (Indicate any unique circumstances regarding provisions such as procurement protest pending, emergency purchase or other time sensitivity, so forth, along with any other pertinent information)	The grant submission package is due electronically to DCR by 4/8/22 by 4pm EST.
B. TO BE COMPLETED FOR HUMAN RESOURCES DOCUMENTS:	
TYPE OF DOCUMENT:	N/A
BRIEF DESCRIPTION: N/A	

Certificate of Satisfaction: *I (We) hereby certify that all reasonable due diligence has been performed to sufficiently develop the contents and implications of the attached document in a manner to protect and account to the public.* ***Further, all City policies and procedures have been adhered to and therefore, I (we) recommend the City Manager execute this document.***

Justin Shaw	4/4/22	DocuSigned by: Richard Broad EB3D3D3E47F1434...	4/5/2022 | 8:57 AM EDT
Document Owner	Date	Department Head Signature	Date
Matt Simons	4/4/22	Kyle W. Spencer	4/4/22
Document Owner	Date	Department Head Signature	Date

Review by DCM	**Approve** ☐ **Disapprove** ☐	**Review by CM**	**Approve** ☐ **Disapprove** ☐
DocuSigned by: Patrick Roberts AE9580A303EB478...	4/7/2022 | 7:35 AM EDT	DocuSigned by: Troy Hall II C45AA22E7D6047B...	4/7/2022 | 6:47 AM PDT
Deputy City Manager	Date	City Manager	Date

Matthew J. Strickler
Secretary of Natural and Historic Resources and Chief Resilience Officer

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Rochelle Altholz
Deputy Director of Administration and Finance

Nathan Burrell
Deputy Director of Government and Community Relations

Darryl M. Glover
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

August 9, 2021

Matt Simons, AICP CZA CFM
Principal Planner and Floodplain Administrator
Department of Planning and Community Development
810 Union St, Suite 508
Norfolk, VA 23510

RE: City of Norfolk Resilience Plan Second Submission - CFPF

Dear Mr. Simons:

Thank you for providing an overview of your Resilience Plan, and informing DCR of the various plans that the City of Norfolk will be utilizing to fulfill the Resilience Plan submission requirements. After careful review and consideration, the Virginia Department of Conservation and Recreation has deemed the Plan complete and meets all the criteria outlined in the June 2021 Community Flood Preparedness Grant Manual. This approval will remain in effect for a period of three years, ending on August 8, 2024.

The following elements were evaluated as part of this review:

1. **Element 1: It is project-based with projects focused on flood control and resilience. DCR RESPONSE**

    a. Project-based: Nine watersheds—each with a defined geographic area, analysis of community social and environmental characteristics, types of flooding, and a tailored flood resilience strategy divided into 15 project areas, each with discrete projects identified.

    b. Projects focused on flood control and resilience included city-wide and various coastal projects and a specific project in Chesterfield Heights.

2. **Element 2: It incorporates nature-based infrastructure to the maximum extent possible. DCR RESPONSE**

    a. Natural and nature-based flood management measures are identified for use in projects throughout the city in the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*, the *Combined Coastal and Precipitation Flooding Master Plan*, the *Hampton Roads Mitigation Plan* and *A Green Infrastructure Plan for Norfolk: Building Resilient Communities*.

3. **Element 3: It includes considerations of all parts of a locality regardless of socioeconomics or race. DCR RESPONSE**

    a. All parts of a locality: Locality divided into 9 watersheds, with 90 planning districts covering the entirety of the jurisdictional boundary.

    b. Social vulnerability: Social implications of flood hazards and analysis of populations at-risk documented in the USACE *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*, the *Combined Coastal and Precipitation Flooding Master Plan* and in *PlaNorfolk 2030*.

    c. Demographic Analysis: Demographic Analysis conducted by USACE, utilizing U.S. Census Bureau, Bureau of Labor and Statistics, Virginia Employment Commision, and other information from local planning agencies, and incorporated into the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*.

4. **Element 4: It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation. DCR RESPONSE**

    a. Coordination with other projects, plans, and activities: Contains the planning processes and frameworks which outline local and regional plans used by the City and address resilience; and how they have been integrated for flood adaptation planning.

    b. Clearly articulated timeline or phasing for plan implementation: 5 year timeline presented in the *Combined Coastal and Precipitation Flooding Master Plan*. Phased time-line for completion found within *PlaNorfolk 2030, Vision2100*, and *A Green Infrastructure Plan for Norfolk: Building Resilient Communities*. Phased approach for project implementation contained within the Fugro Atlantic *Norfolk Preliminary City-wide Coastal Flooding Mitigation Concept Evaluation and Master Plan Development*. Program phases clearly articulated and an impact statement completed in USACE *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*.

5. **Element 5: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.**

    a. Technically backed water-resources analysis, sea level rise projections, storm surge, and climate change incorporated into the strategic approach presented in the *Hampton Roads Hazard Mitigation Plan*, the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*.

VA DCR looks forward to working with you as you work to make the City of Norfolk a more resilient community. If you have questions or need additional assistance, please contact us at cfpf@dcr.virginia.gov. Again, thank you for your interest in the Community Flood Preparedness Fund.

Sincerely,

Wendy Howard Cooper, Director
Dam Safety and Floodplain Management

cc: Darryl Glover, DCR

Resilience Planning Overview for the City of Norfolk

In response to the resilience planning requirements of the **Community Flood Preparedness Fund** ("the CFPF" or "Fund") outlined within the 2021 CFPF Grant Manual (Appendix G: Elements of Resilience Plans), the City of Norfolk ("the City") has prepared the following Resilience Planning Overview of formal and relevant plans utilized for resilience planning efforts by the City to prioritize potential projects and to assist the City is its efforts to secure funding for such critical resilience plans, studies and projects.

The **Elements of Resilience Plans** taken from Appendix G of the 2021 CFPF Grant Manual, from which communities are expected to highlight the stated resilience planning contents as they related to CFPF grant applications, are as follows:

1. *It is project-based with projects focused on flood control and resilience.*
2. *It incorporates nature-based infrastructure to the maximum extent possible.*
3. *It includes considerations of all parts of a locality regardless of socioeconomics or race.*
4. *It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.*
5. *Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.*

Norfolk's resilience planning elements are not contained within an adopted "stand alone" plan. However, Norfolk's utilizes various plans within a resilience repertoire, which altogether serve multiple needs for various audiences; from technical to public-facing to operational. This Resilience Planning Overview will expressly identify to the grant reviewer, and to the public, how various resilience planning documents of the City of Norfolk satisfy all the CFPF Resilience Plan elements.

The following plans for the City of Norfolk will contribute to this Resilience Planning Overview:

- ***plaNorfolk2030*** (2013, as amended)
- ***Vision2100*** (2016)
- ***Hampton Roads Hazard Mitigation Plan*** (2017)
- ***Combined Coastal and Precipitation Flooding Master Plan*** (2017)
    - Appendix A: ***Norfolk Preliminary City-wide Coastal Flooding Mitigation Concept Evaluation and Master Plan Development*** **(Fugro Atlantic)**
    - Appendix B: ***City-wide Drainage and Watershed Master Plan*** **(Timmons Group)**
- ***A Green Infrastructure Plan for Norfolk*** (2018, as amended)
- ***USACE Coastal Storm Risk Management (CSRM) Feasibility Study and Environmental Impact Statement*** (2019)
- ***Zoning Ordinance of the City of Norfolk*** (2018, as amended)
- ***Development of an Urban Resilience Analysis Framework with Application to Norfolk, VA*** (2016)

Responses are provided below in red based on the various Norfolk plans for the following example resilience elements outlined in Appendix G of the 2021 CFPF Grant Manual:

- ***Equity based strategic polices for local government-wide flood protection and prevention.***
  The ***Hampton Roads Hazard Mitigation Plan*** recommends the highest priority of protection to be reserved towards protection projects for severe repetitive loss areas (Mitigation Actions 8 &

11) in Norfolk. Research in Norfolk has shown that these areas are often places where the most vulnerable residents are housed.

Additionally, Mitigation Action 12 recommends Norfolk begin risk/hazard mitigation efforts equitably by first implementing a major flood control project within the historically black community of Chesterfield Heights; implementation of a $112M HUD project awarded through the National Disaster Resilience Competition (construction currently underway).

- **Proposed projects that enables communities to adapt to and thrive through natural or human hazards.**
  The ***Combined Coastal and Precipitation Flooding Master Plan*** (Norfolk's "Flooding Master Plan") is based on a major multi-year study effort supported by technical analyses and recommendations from Fugro Atlantic within the ***Norfolk Preliminary City-wide Coastal Flooding Mitigation Concept Evaluation and Master Plan Development*** (the "Fugro report"). The Flooding Master Plan is also supporting by a thorough analysis and priority ranking technical guide of the City's drainage conveyance system, ***City-wide Drainage and Watershed Master Plan*** by Timmons Group.

  Together, with this technical supporting documentation, the Flooding Master Plan provides the framework for Norfolk to intelligently review and prioritize flood protections project to enable Norfolk to adapt and thrive to current and future flood threats.

- **Documentation of existing social, economic, natural, and other conditions present in the local government.**
  Sandia National Laboratories provided an analysis framework (***Development of an Urban Resilience Analysis Framework with Application to Norfolk, VA***) for conceptualizing the resilience needs for Norfolk, including vulnerability assessments for critical infrastructure with the context of local economic and logistical impacts. The findings of which have been incorporated into other resiliency plans such as the USACE Coastal Storm Risk Management Study.

  The ***USACE Coastal Storm Risk Management*** **(CSRM)** ***Feasibility Study and Environmental Impact Statement*** presents a robust analysis of the best recommendations for City-wide flood protection measures for the City of Norfolk. This report includes 10% engineered designs for the various flood protection measures recommended throughout the entire community, and a preliminary Environmental Impact Statement is included outlining the existing social, economic, natural conditions, vulnerabilities and stressors within the natural and social environment, as well as proposed impacts. See the various CSRM appendices for these detailed conditions and impact reports.

- **Review of the vulnerabilities and stressors, both natural and social in the local government.**
  See CSRM comment above. Additional overview of the vulnerabilities and stressors can be found in the ***Hampton Roads Hazard Mitigation Plan***.

- **Forward-looking goals, actionable strategies, and priorities through as seen through an equity-based lens.**
  Norfolk remains committed to presenting all action plans through an equity-based lens, as found within the actionable strategies of ***A Green Infrastructure Plan for Norfolk*** and the ***Hampton Roads Hazard Mitigation Plan***. Both plans are tactical, and recommendation are based on a 5-year forward-looking outlay. Recommendations of the Fugro report are based on a 50-year outlay, and recommendations of ***Vision2100*** geared towards the year 2100.

- **Strategies that guides growth and development away from high-risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.**
  Vision2100 is serves a land use guide for the City. The plan divides Norfolk up into four main areas by which the City will focus new investments and make necessary steps to prepare for a changing environment:
  - ✓ Purple: Low Flood Risk / Low Degree of Civic Assets: Establishing Neighborhoods of the Future
  - ✓ Green: Low Flood Risk / High Degree of Civic Assets: Designing New Urban Centers
  - ✓ Yellow: High Flood Risk / Low Degree of Civic Assets: Adapting to Rising Waters
  - ✓ Red: High Flood Risk / High Degree of Civic Assets: Enhancing Economic Engines (protect!)

- **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.**
  Vision2100 provides the framework for selecting the areas suitable for conservation easements. The ***Norfolk Zoning Ordinance*** provides the mechanism for purchasing land conservation easement credits from the Coastal Resilience Overlay through transferring Resilient Quotient points to the Upland Resilience Overlay (requires extinguishment of a density unit – developable dwelling unit). The conservation easement, while recorded on the deed and kept on file with the Planning Department, can be held by the property owner, the Zoning Ordinance also permits it to be placed in a land trust.

- **Identification of areas suitable for property buyouts in frequently flooded areas.**
  See ***Vision2100*** "Yellow" areas (High Flood Risk / Low Degree of Civic Assets: Adapting to Rising Waters) and Coastal Resilient Overlay areas on the Norfolk Zoning Map.

- **Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.**
  A list of all critical facilities is contained within the *Norfolk Emergency Operations Manual* (2020). See Mitigation Action 5 from ***Hampton Roads Hazard Mitigation Plan***: "Purchase and install generators or other continuous power sources for critical facilities and infrastructure. This action may include, but is not limited to pump stations, EOC (Emergency Operations Center), shelters, underpasses and important traffic signals." The critical facilities list is available upon request.

- **Identified ecosystems/wetlands/floodplains suitable for permanent protection.**
  See ***A Green Infrastructure Plan for Norfolk***, this includes an *Action Plan Appendix for Threatened and Endangered Species* within critical floodplain habitats, as well as a detailed ecological inventory with recommendations for floodplain protection measures within an connected open space corridor network.

- **Identified incentives for restoring riparian and wetland vegetation.**
  - The City's Public Works Division of Stormwater Management offers the **Stormwater Fee Reduction Program** for homeowners and businesses who opt to implement water quality improvements on their private property including riparian buffer and shoreline management improvement.
  - **Environmental Conservation Consulting** – Norfolk annually funds a contract to coordinate with residential property owners for implementation of water quality improvements on their private property including riparian buffer and shoreline management improvement through a cost-share program. Property owners get a percentage of the project paid through the contractor via the Environmental Conservation Consulting services contract.
  - Norfolk regularly applies for grants to partner with community organizations for implementation of green infrastructure of public lands – projects are reviewed by the **Watershed Management Task Force** to ensure that projects are furthering the goals and objectives of the adopted ***Green Infrastructure Plan for Norfolk***.

- **A framework for implementation, capacity building and community engagement.**
  The **Watershed Management Task Force** and the recently created Program for Public Information committee are two groups made up of joint staff/citizen/technical expert members, which collectively drive the City's ongoing programing for green infrastructure projects and flood mitigation messaging. Capital Improvement Project funding recommendations from the ***Green Infrastructure Plan for Norfolk*** are also reviewed monthly by the Watershed Management Task Force.

- **Strategies for creating knowledgeable, inclusive community leaders and networks.**
  The 12-member Norfolk Coastal Management Review Board (CMRB) provides recommendations to the 7-member Erosion Advisory Commission, which is partially comprised of members of the CMRB. The CMRB is made up of elected leaders, civic league presidents/community leaders and technical experts from the Virginia Institute of Marine Science, Virginia Marine Resources Commission, Army Corp of Engineers, Old Dominion University Department of Ocean, Earth and Atmospheric Sciences, and city technical staff, providing workshops, seminars and project assessments of coastal mitigation and erosion projects; specifically intended to build grassroots technical capabilities and citizen champions within the community. The Norfolk CMRB and Erosion Advisory Commission is established by City Code and guided by the City's adopted Sand Management Plan.

- **A community dam safety inventory and risk assessment posed by the location and condition of dams.**
  Not applicable in Norfolk – not at dam risk.

- **A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.**
  This general characterization is well documented within the general/comprehensive plan for the City of Norfolk – ***plaNorfolk2030***. This includes dozens of resiliency recommendations for flood risk reduction and communication.

- **Strategies to address other natural hazards that would cause, affect or result from flooding events including:**
  - **Earthquakes.**
  - **Storage of hazardous materials**
  - **Landslides/mud/debris flow/rock falls.**
  - **Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely.**
  - **Preparations for severe weather events including tropical storms or other severe storms, including winter storms.**

  The ***Hampton Roads Hazard Mitigation Plan*** is a FEMA-accredited all-hazards plan.

Required Documents:
Links

FIRM Maps: https://drive.google.com/drive/folders/1zISYqMWhmwSFTz1-5gWA61RVpD1GRy45?usp=sharing

Comprehensive Plan (plaNorfolk2030): https://www.norfolk.gov/DocumentCenter/View/2483

Green Infrastructure Plan: https://www.norfolk.gov/DocumentCenter/View/38067

Vision2100: https://www.norfolk.gov/DocumentCenter/View/27768

Hampton Roads Hazard Mitigation Plan: https://www.hrpdcva.gov/library/view/620/2017-hampton-roads-hazard-mitigation-plan-and-appendices/

Norfolk Floodplain Ordinance: https://www.norfolkva.gov/norfolkzoningordinance/#Norfolk-ZO/3_9_Overlay_Districts_and_Designations.htm#_Toc502655724?TocPath=Article%25203%253A%2520Zoning%2520Districts%257C3.9%2520Overlay%2520Districts%2520and%2520Designations%257C_____7

Commonwealth of Virginia

CFPF, rr <cfpf@dcr.virginia.gov>

City of Norfolk- Virginia Community Flood Preparedness Fund Grant Application

1 message

Shafer, Justin <Justin.Shafer@norfolk.gov> Fri, Apr 8, 2022 at 1:39 PM
To: "cfpf@dcr.virginia.gov" <cfpf@dcr.virginia.gov>
Cc: "Spencer, Kyle" <Kyle.Spencer@norfolk.gov>, "Simons, Matthew" <Matthew.Simons@norfolk.gov>, "Daniel, Stephanie F" <Stephanie.Daniel@norfolk.gov>

Good Afternoon,

On behalf of the City of Norfolk, please find attached a grant application submission for the Virginia Community Flood Preparedness Fund for review and consideration. Due to email size limits, a second application package will be submitted separately.

Please let us know if you have any questions. Thank you for your time and consideration.

Thank you,

Justin Shafer

Project Manager- Water Quality & Green Infrastructure

THE CITY OF NORFOLK

Department of Public Works

Div. of Environmental Storm Water Management

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