PROFESSIONAL ENGINEERING SERVICES

WWA PROJECT NO. 217028.00

SITE ASSESSMENT REPORT

FOR

HEDGEROW PARK

ALBEMARLE COUNTY, VIRGINIA

June 20, 2017

Prepared by:

COMMONWEALTH OF VIRGINIA
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6-20-17
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APPENDICES Tab

1.0 INTRODUCTION

1.1 Purpose and Scope

The Albemarle County Facilities and Environmental Services Department has contracted with WW Associates to perform a site assessment for the proposed Hedgerow Park property. The purpose of the site assessment is to assist the County in determining the feasibility of developing the property for use as a public park offering trails for mountain biking, hiking, and horseback riding. The project improvements consist of parking and access for 40 vehicles and 6 equestrian trailers, vault toilets, and a future covered pavilion.

The Hedgerow Park property is situated on Tax Map 75, Parcel 2D and comprises approximately 80 acres. The property is located south of Interstate 64 on the southbound side of Route 29. Challenges for the site include:

- The need for a 400 foot deceleration lane on southbound Route 29.
- Moores Creek is located on the southbound side of Route 29 immediately adjacent to the roadway which requires a stream crossing to access the site.
- Potential for wetlands and stream impacts.
- The project site is located in the floodplain. The placement of fill within the floodplain area needs to be minimized.
- The existing speed limit on Route 29 is 60 mph in front of the project site.
- The 100 foot stream buffer encroaches on the project development area.
- There are critical slopes adjacent to the open field.

1.0 INTRODUCTION

The elements of the site assessment for the feasibility of developing the property for use as a public park are listed as follows:

- The evaluation of Route 29 for a lane shift to allow for a turning lane and shoulder to avoid impacts to the adjacent stream.
- Provide a site layout that takes into account the site challenges.
- The development of concept graphic that depicts the proposed site improvements.
- Provide a conceptual grading plan to further develop the site constraints.
- The preparation of a site assessment report with recommendations and conclusions.
- The generation of an estimated total project cost for the recommended improvements.

2.0 SITE DESCRIPTION

2.1 Existing Site Conditions

The Hedgerow Park site is situated on the property described as Tax Map 75, Parcel 2D and comprises approximately 80 acres. The property is located south of Interstate 64 on the southbound side of Route 29, (Monacan Trail Road). The property is located within the lands designated as the Rural Area in accordance with the Albemarle County Comprehensive Plan adopted June 10, 2015 and is not within the watershed of the drinking water supply protection areas.

Figure 2-1: Hedgerow Park Site

The site is primarily forested with an approximately 2 acre meadow area. The meadow area is the subject location of the proposed Hedgerow Park site. A small stream named Moores Creek runs along the southern edge of the property separating the meadow area from Route 29. A significant portion of the meadow area adjacent to Moores Creek lies within the designated floodplain as shown on FEMA Flood Plain Map number 51003C0246D with an effective date of February 4, 2005. The FEMA Flood Plain Map also indicates that a portion of Route 29 is inundated in front of the Hedgerow Park site during the 100yr storm event. A copy of the FEMA Flood Plain Map for the area is provided in Appendix A and the floodplain is represented on the existing conditions exhibit shown on Figure 2-3.

Figure 2-2: Moores Creek

Moores Creek is provided with a 100 foot minimum stream buffer per the Albemarle County stream buffer ordinance. Since the property is located within the designated

Rural Area the stream buffer for Moores Creek extends 100 feet from the top of stream bank or the to the designated floodplain, whichever is greater as defined in section 17-600(B) of the stream buffer ordinance.

The site is currently accessed through the adjacent parcel located to the south of the subject property. There is an existing driveway serving the residence on the adjacent parcel connecting to Route 29. The existing driveway is approximately 9 feet wide. There is a 50' access easement centered on the driveway that connects to the property for the Hedgerow Park Site. The driveway is provided with a CMP culvert for the stream crossing at Moores Creek and is frequently overtopped during regular storm events.

IF THIS DRAWING IS A REDUCTION
GRAPHIC SCALE MUST BE USED

SCALE: 1" = 80'

80' 0 80'

NO.	REVISION	BY	DATE	NO.	REVISION	BY	DATE

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DESIGNED BY:	JDB
DRAWN BY:	JDB
REVIEWED BY:	HFW
WWA NUMBER:	217028.00

PROJECT: HEDGEROW PARK
CONCEPT PLAN
ALBEMARLE COUNTY, VIRGINIA

TITLE: FIGURE 2-3
EXISTING CONDITIONS

FILE NAME:	DISCIPLINE:	SCALE:	DATE:
EXHIBIT	CIVIL	H: 1"=80' V: N/A	06/20/17

REVISION NUMBER:	--
DRAWING NUMBER:	EX-1
SHEET NUMBER:	1 OF 1

3.0 SITE ASSESSMENT

3.1 Site Access

Utilization of the existing site access provided through the adjacent property was analyzed as part of the site assessment for Hedgerow Park. To support the equestrian recreation proposed for the site the design vehicle utilized in the analysis of the site access was a passenger vehicle/pickup truck pulling a horse trailer. Per the USDA Forest Service *"Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds"* access to the site should be a minimum of 24 feet in width. The existing 9 foot wide driveway is not adequate to support the proposed traffic and would require upgrading to meet this requirement.

Figure 3-1: Existing Driveway Access

The existing CMP culvert for the driveway provided at the stream crossing at Moores Creek and is frequently overtopped during regular storm events. The stream crossing would need to be improved at this location if the existing access were utilized.

The plat showing the 50 foot access easement on the adjacent parcel indicates that the easement is centered on the existing 9 foot wide driveway. Additional access easement would be required to allow for construction of a new 24 foot wide entrance and stream crossing while maintaining access to the existing residence.

Use of the existing site access provided through the adjacent property is not recommended based on the following:

- The site access road requires a minimum width of 24 feet. Therefore the existing 9 foot wide driveway is not adequate and would require upgrading.

- The existing stream crossing would need to be replaced to prevent the frequent overtopping of the access road during regular storm events.

- Additional access easement would be required to allow for construction of a new 24' wide entrance with stream crossing while maintaining access to the existing residence.

Figure 3-2: Route 29 in Front of Site

A new entrance is therefore proposed with this assessment that would provide direct access to the site from Route 29. The existing speed limit for this portion of Route 29 is 60 mph. Based on a site meeting with VDOT representation the entrance to the site will require the construction of a new 12 foot wide, 400 foot long deceleration lane to provide safe access for users consisting of a 200 foot long turn lane with a 200 foot taper. In accordance with VDOT standards a 10 foot wide shoulder is required along the new deceleration lane.

A lane shift on Route 29 was evaluated for the construction of the new deceleration lane in order to minimize stream impacts along Moores Creek. VDOT requires that all new construction be brought into compliance with the current standards. This would require the construction of a new 10 foot wide shoulder for the entire length of the lane transition on both sides of the affected portion of roadway. Due to the elevation differences between the southbound and northbound lanes on Route 29 within the project area it was determined that a lane shift was not feasible.

Due to the proximity of Moores Creek to Route 29 the new deceleration lane will require the construction of a retaining wall to prevent grading within the stream. Due to the proximity of the new deceleration lane it is recommended that a portion of Moores Creek

be relocated adjacent to the deceleration lane. There is an existing culvert that collects drainage from the median on Route 29 that will need to be extended to allow for the construction of the retaining wall.

Any necessary improvements along Route 29 will need to comply with current VDOT standards including the VDOT Standard WP-2 detail for asphalt pavement widening. The VDOT Standard WP-2 detail requires that a 1 foot wide strip of the existing asphalt layers be removed down to the existing subbase and be replaced adjacent to the new deceleration lane. A copy of the VDOT Standard WP-2 detail is provided in Appendix B of this report.

3.2 Stream Crossing

A bottomless arch culvert is proposed for the stream crossing required for the site access. The bottomless arch culvert will help to minimize any environmental impacts associated with the stream crossing since it will span the stream and maintain the existing stream bed.

In accordance with Section 17-604(C.1.a) of the stream buffer ordinance the stream crossing must be sized at a minimum to accommodate the flows from the 10yr storm event. The flows for the 25yr storm event must be accommodated on residential subdivisions with a single access point. A hydraulic analysis of Moores Creek was performed to determine the flows to the location of the proposed stream crossing and determine the size of the bottomless arch culvert required.

The upstream drainage area to the stream crossing is approximately 3.2 square miles. A drainage area map defining the area to the stream crossing is provided in Appendix C. The drainage area is primarily forested with some farm areas. A summary of the calculated flows is provided in the succeeding table.

Estimated Flows to Stream Crossing	
Storm Event	Flows
10yr	824 cfs
25yr	1,480 cfs

Based upon the hydraulic analysis the bottomless arch culvert will require a minimum 12 foot span and a 6 foot rise to accommodate the flows from the 10yr storm event. It is recommended that the 25yr storm event be accommodated at the stream crossing to minimize impacts to the site access and the floodplain. A bottomless arch culvert with minimum 18 foot span and a 9 foot rise is required to accommodate the flows from the 25yr storm event without overtopping.

Figure 3-3: Typical Bottomless Arch Culvert w/Headwall

Headwalls will be provided on the bottomless arch culvert at the crossing in order to minimize the impacts to the flood plain by reducing the amount of fill required. The bottomless arch culvert will be approximately 35 feet in length to accommodate the width of the 24 foot wide entrance roadway and shoulders.

The stream crossing and the site are located within the FEMA floodplain and are therefore subject to the requirements of the Albemarle County Flood Plain Overlay District. This will require the completion of a Conditional Letter of Map Revision (CLOMR) to be submitted to and approved by FEMA for the impacts to the flood plain associated with the stream crossing.

Additionally it is recommended that a wetlands and stream delineation be performed to determine impacts to jurisdictional wetlands that may be located within the area of the stream crossing and proposed site improvements. Jurisdictional wetlands are regulated

by the Army Corps of Engineers under Section 404 of the Clean Water Act. A Joint Permit Application will be required to mitigate wetlands impacts associated with the project.

3.3 Site Layout

A conceptual layout of the site was performed as part of the assessment to verify that the desired improvements could be accommodated. The site improvements consist of parking and access for 40 vehicles and 6 equestrian trailers, vault toilets, and a future covered pavilion. The vault toilet has been located outside of the flood plain and stream buffer in accordance with the Stream Buffer Ordinance. The conceptual layout is provided on Figure 3-4 in this section.

The project site lies within the Entrance Corridor for Albemarle County and will require review and approval from the Architectural Review Board (ARB). Landscaping for screening of the parking areas is shown as part of the conceptual layout in accordance with ARB requirements. Additional landscaping is provided along the southern edge of the property to provide a buffer between the project site and the adjacent property owner.

A conceptual grading plan was performed as part of the layout to determine the extent of grading and impacts within the floodplain and to critical slopes. Albemarle County GIS topographic data was utilized to generate the conceptual grading for the site. A maximum 5% slope was maintained across the proposed parking areas. The grading plan shows a 4 to 6 foot cut in the northwest corner of the site.

The area of proposed cut will help serve to offset the impacts to the floodplain created by the fill section required for the stream crossing. The full extent of the impacts to the floodplain will need to be determined with the hydraulic analysis required as part of the Conditional Letter of Map Revision (CLOMR).

FRANCES R. JOSEPH
TAX MAP 75, PARCEL 2B
D.B. 729, P. 239
18.0 ACRES
ZONING: RA

COUNTY OF ALBEMARLE VIRGINIA
TAX MAP 75, PARCEL 2D
D.B. 4639, P. 630
80.08 ACRES
ZONING: RA

BETTIE HUTCHINSON &
CHARLOTTE TOMLIN
TAX MAP 75, PARCEL 01
D.B. 3550, P. 432
30.80 ACRES
~~ZONING: RA~~

BETTIE HUTCHINSON &
CHARLOTTE TOMLIN
TAX MAP 75, PARCEL 9
D.B. 4639, P. 630
10.33 ACRES
~~ZONING: RA~~

100-YR FLOOD PLAIN/
STREAM BUFFER

NEW TREELINE, TYP.

RETAINING WALL, TYP.

RESTROOM

CRITICAL SLOPES, TYP.

FUTURE COVERED
PAVILION

STREAM
RELOCATION

6'x12' BOTTOMLESS
ARCH CULVERT

RETAINING
WALL, TYP.

200' TURN LANE

200' TAPER

EXISTING CULVERT

MOORE'S CREEK

ROUTE 29

620
600
580
560
540
536
532
528
24'

R/W
OHU
Ø PP
MB

IF THIS DRAWING IS A REDUCTION
GRAPHIC SCALE MUST BE USED

SCALE: 1" = 80'

80' 0 80'

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CONCEPT PLAN
ALBEMARLE COUNTY, VIRGINIA

TITLE:
FIGURE 3-4
SITE LAYOUT EXHIBIT

FILE NAME:	DISCIPLINE:	SCALE:	DATE:
EXHIBIT	CIVIL	H: 1"=80' V: N/A	06/20/17

REVISION NUMBER:	--
DRAWING NUMBER:	SP-1
SHEET NUMBER:	1 OF 1

Section 17-603(C) of the stream buffer ordinance states that the following with regards to acceptable uses within a designated stream buffer: "*Water dependent facilities and miscellaneous. Water dependent facilities; water wells; passive recreation access, such as pedestrian trails and bicycle; historic preservation; archaeological activities; provided that all applicable Federal, State and local permits are obtained.*" A determination will need to be made by Albemarle County if the parking area for the proposed park meets this definition and is an acceptable use within the stream buffer.

3.4 Stormwater Management

Stormwater management will need to be provided for the site in accordance with the requirements of the Department of Environmental Quality (DEQ). The site was analyzed for stormwater management requirements based upon the conceptual layout. The total impervious area created with the layout is approximately 0.86 acres.

The site data was entered into the DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet. The spreadsheet indicates that the pollutant load reduction required for the improvements shown is approximately 1.51 pounds/year.

A level 2 biofilter with a minimum surface area of 2,300 square feet would be required to treat the improvements shown and provide the required removal rate. In accordance with DEQ requirements soil borings would need to be performed for the construction of the biofilter to determine the percolation rate of the soils on the site and the depth to the groundwater table. A low percolation rate is anticipated for the existing soils and any biofilters constructed will need to be provided with underdrains. Conveyance channels would need to be provided to direct runoff from the areas not requiring treatment around the biofilter.

Alternatively the forested area on the site could be placed into a conservation easement to satisfy the water quality requirements for the site. The impervious area created with the proposed layout is minimal in nature. An analysis of the entire parcel with the forested

areas taken into account indicates that no pollutant load reduction is required for the site with this scenario.

DEQ requires that any forested areas utilized for this scenario be placed into a conservation easement. This would not prevent the intended use of the property since recreational trails are allowed within the conserved areas. Based upon this analysis it is recommended that the forested areas on the site be placed into a conservation easement to satisfy the stormwater quality requirements. A summary report from the DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet for this scenario is provided in Appendix D.

Stormwater quantity facilities are not required for the proposed site improvements. The site improvements comprise less than 1% of the contributing drainage area and flows to Moores Creek at the point of analysis. Based upon this analysis the site meets the requirements set forth in Virginia State Code 9VAC25-870-66 for water quantity.

3.5 Estimated Probable Cost

An estimated probable cost for the project was generated based upon the conceptual layout. The estimate includes the construction of the new turn lane and taper with associated retaining wall, the bottomless arch culvert stream crossing, stream relocation, and the proposed site improvements. The estimated total project cost is approximately $2,140,000. The mitigation costs for the stream and wetlands impacts included with the estimated total project cost will need to be validated once the stream and wetlands delineation is completed. A copy of the estimated total project cost worksheet is provided in Appendix E.

3.6 VDOT Recreational Access Program

It is noted that a majority of the estimated construction cost is associated with the construction of the new turn lane and taper with associated retaining wall and the

required stream crossing. A portion of this cost could potentially be offset with a grant through the VDOT Recreational Access Program.

Qualifying recipients can receive up to a $250,000 grant from VDOT for the construction of and improvements to access roads associated with recreational areas. An additional $100,000 in funds matching is also available through the program. The program requirements include:

- A resolution would need to be made and approved by the Board of Supervisors to request the money prior to application for the grant.
- The entrance will need to be reviewed and approved by VDOT.
- The entrance would need to be constructed in accordance with VDOT standards and placed into a dedicated right-of-way.
- Qualification for the grant requires that the project be reviewed and approved by the DCR. Additionally the review process entails that the Director of the DCR designate the site as a public recreation area.
- The site would need to undergo a State Environmental Review Process (SERP) to determine the impacts to the stream and wildlife associated with the proposed improvements.

4.0 CONCLUSIONS & RECOMMENDATIONS

4.1 Conclusions

The purpose of the Hedgerow Park site assessment is to assist Albemarle County in determining the feasibility for developing the subject property for use as a public park. The project improvements consist of parking and access for 40 vehicles and 6 equestrian trailers, vault toilets, and a future covered pavilion.

The Hedgerow Park property is situated on Tax Map 75, Parcel 2D and comprises approximately 80 acres. The property is located south of Interstate 64 on the southbound side of Route 29. The following conclusions were determined for the project site:

- The construction of a new 200 foot turn lane and 200 foot taper will be required to provide safe access into the site off of Route 29.
- The access road to the site will need to be a minimum of 24 feet wide to accommodate pick-up trucks with trailers to support the proposed equestrian uses.
- Retaining walls will need to be provided along the new turn lane and taper to minimize the stream impacts to Moores Creek.
- The construction of a new stream crossing will be required to provide access to the site across Moores Creek.
- The culvert for the stream crossing will need to be sized to convey at a minimum the flows from the 10 yr storm event.
- The project area for the site lies within the 100yr FEMA Floodplain and stream buffer.
- The 100yr FEMA Floodplain serves as the stream buffer for the site since it is located within the Rural Area as defined on the Comprehensive Plan. The 100yr

FEMA Floodplain extends further than 100 feet from the top of the associated stream bank for Moores Creek.

- A Conditional Letter of Map Revision (CLOMR) will need to be performed to determine the impacts to the FEMA Floodplain.
- The site lies within the Entrance Corridor for Albemarle County and will require review and approval from the ARB.
- A determination will need to be made by Albemarle County if the parking area for the proposed park is an acceptable use within the stream buffer.
- The estimated total project cost is approximately $2,140,000. The mitigation costs for the stream and wetlands impacts included with the estimated total project cost will need to be validated once the stream and wetlands delineation is completed.

4.2 Recommendations

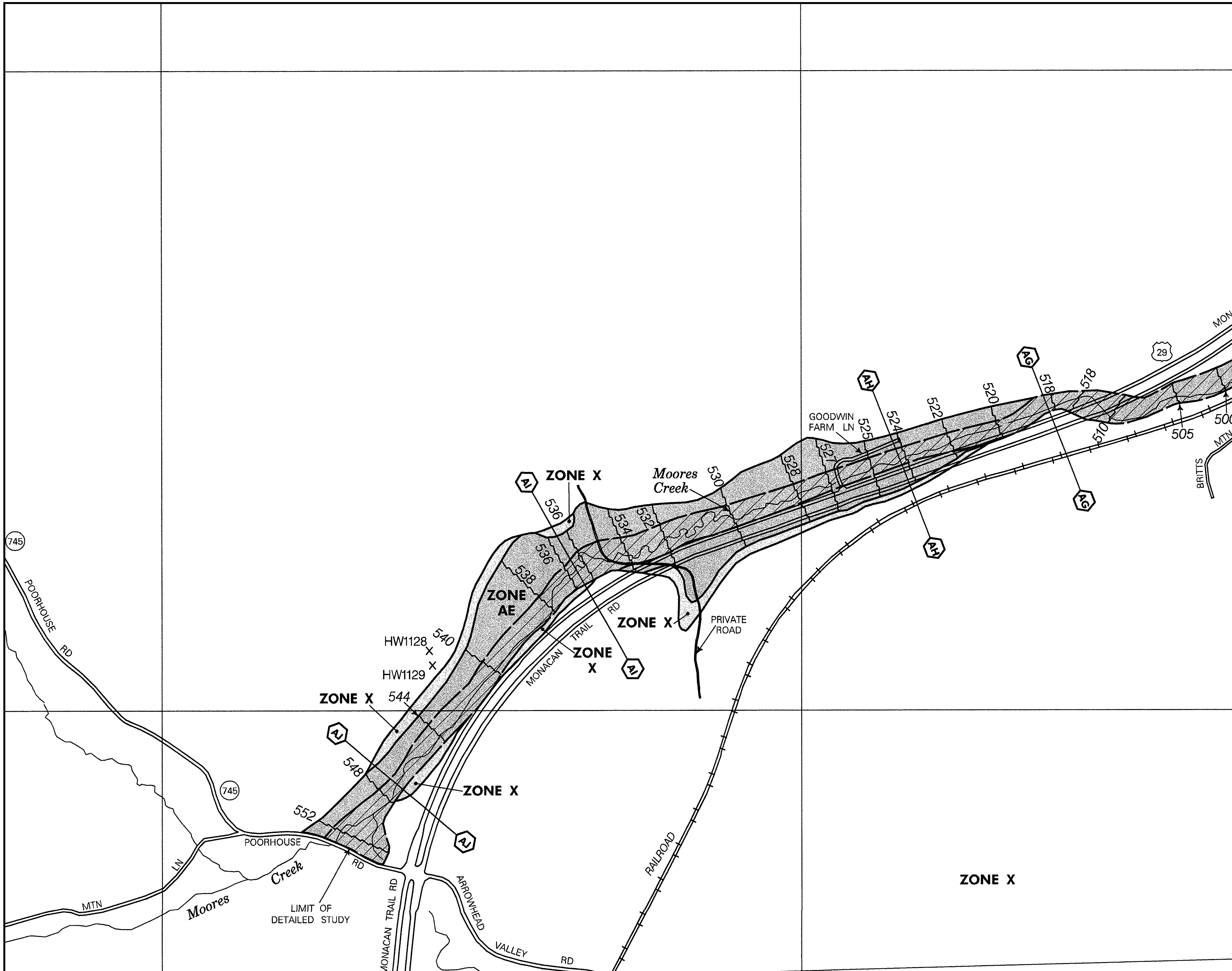
Based upon the conclusions reached with the site assessment we offer the following recommendations:

- A wetlands and stream delineation be performed to determine the impacts to the stream and jurisdictional wetlands.
- A stream relocation may be required on the portion of Moores Creek in the vicinity of the new turn lane and taper to minimize stream impacts.
- A bottomless arch culvert is recommended for the stream crossing to reduce the potential impacts to Moores Creek.
- Headwalls should be provided for the stream crossing to reduce the impacts to the floodplain caused by the placement of a fill section.

- Recommend placing the forested area on the site into a conservation easement to satisfy the stormwater quality requirements for the associated improvements.

We appreciate the opportunity to be of service to Albemarle County on this project and look forward to the next phase for the development of the Hedgerow Park site.

Appendix A



MAP SCALE 1" = 500'

250 0 500 1000 FEET

PANEL 0264D

FIRM

FLOOD INSURANCE RATE MAP

ALBEMARLE COUNTY, VIRGINIA AND INCORPORATED AREAS AND THE INDEPENDENT CITY OF CHARLOTTESVILLE

PANEL 264 OF 575

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBEMARLE COUNTY	510006	0264	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

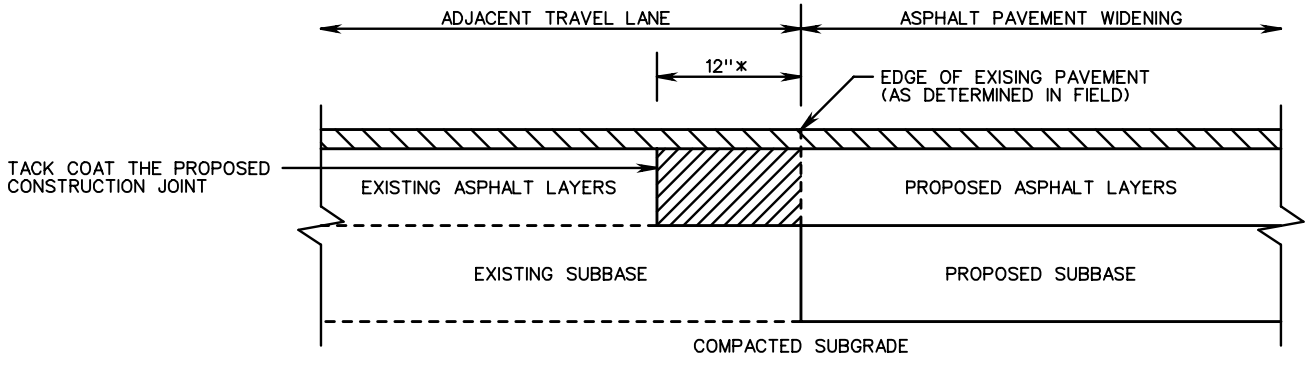
MAP NUMBER 51003C0264D

EFFECTIVE DATE FEBRUARY 4, 2005

Federal Emergency Management Agency

Appendix B

WP-2



CONSTRUCTION JOINT DETAIL

REMOVE EXISTING ASPHALT LAYERS TO EXISTING SUBBASE AND REPLACE WITH PROPOSED ASPHALT WIDENING LAYERS

PROPOSED MINIMUM 1 ½ INCH THICK ASPHALT SURFACE COURSE (SEE NOTE 5)

* MINIMUM 12 INCHES, OR GREATER AS NECESSARY TO ABUT THE FULL THICKNESS OF EXISTING ASPHALT LAYERS AS DETERMINED BY CORES (SEE NOTE 3)

NOTES:

1. ASPHALT PAVEMENT WIDENING SHALL HAVE A PAVEMENT DESIGN IN ACCORDANCE WITH CURRENT VDOT PROCEDURES AND BE APPROVED BY THE ENGINEER.
2. THE PAVEMENT DESIGN FOR ASPHALT PAVEMENT WIDENING SHALL MEET OR EXCEED THE DEPTHS AND TYPES OF THE LAYERS OF EXISTING PAVEMENT. SUBSURFACE DRAINAGE OF THE EXISTING AND PROPOSED PAVEMENT SHALL BE ADDRESSED IN THE PAVEMENT DESIGN.
3. A MINIMUM OF THREE CORES SHALL BE TAKEN ALONG THE CENTER OF THE ADJACENT TRAVEL LANE TO DETERMINE THE TYPE AND THICKNESS OF EXISTING PAVEMENT LAYERS. THESE CORES SHALL BE SPACED NO MORE THAN 500 FEET APART.
4. THE ADJACENT TRAVEL LANE SHALL BE MILLED A MINIMUM DEPTH OF 1 ½ INCHES AND REPLACED WITH AN ASPHALT SURFACE COURSE TO MATCH THE PROPOSED PAVEMENT WIDENING SURFACE COURSE, UNLESS WAIVED BY THE ENGINEER.
5. THE ENGINEER MAY REQUIRE THE MILLING DEPTH OF THE EXISTING PAVEMENT TO BE ADJUSTED TO ACHIEVE AN ACCEPTABLE PAVMENT CROSS-SLOPE AND EFFECTIVE SURFACE DRAINAGE.
6. EXISTING PAVEMENT MARKINGS AND MARKERS WITHIN THE PROJECT LIMITS SHALL BE RESTORED SUBJECT TO THE APPROVAL OF THE ENGINEER.
7. FINAL TRANSVERSE PAVEMENT TIE-IN SHALL CONFORM TO THE REQUIREMENTS OF SECTION 315.05(c) OF THE SPECIFICATIONS EXCEPT THAT ALL JOINTS AT TIE-IN LOCATIONS SHALL BE TESTED USING A 10 FOOT STRAIGHTEDGE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 315.07(a) OF THE SPECIFICATIONS.

ASPHALT PAVEMENT WIDENING

FOR WIDENING SUBJECT TO TRAFFIC

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

305
315

REV 11/07

303.02

Appendix C

N

DRAINAGE AREA TO POINT OF ANALYSIS = 3.2 SQ.MILES

Tc = 1.3 HOURS
CN = 56

IF THIS DRAWING IS A REDUCTION GRAPHIC SCALE MUST BE USED

SCALE: 1" = 1500'

1500' 0 1500'

NO.	REVISION	BY	DATE	NO.	REVISION	BY	DATE

ENGINEERS SURVEYORS PLANNERS
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DESIGNED BY: JDB	PROJECT: HEDGEROW PARK CONCEPT PLAN ALBEMARLE COUNTY, VIRGINIA			REVISION NUMBER: --
DRAWN BY: JDB	TITLE: DRAINAGE AREA MAP			DRAWING NUMBER: DA-1
REVIEWED BY: HFW				SHEET NUMBER: 1 OF 1
WWA NUMBER: 217028.00	FILE NAME: DA MAP	DISCIPLINE: CIVIL	SCALE: H: 1"=1500' V: N/A	DATE: 5/31/17

Appendix D

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - Version 3.0

BMP Design Specifications List: **2011 Stds & Specs**

Site Summary

Total Rainfall = 43 inches

Site Land Cover Summary

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	75.80	0.00	0.00	75.80	95
Managed Turf (acres)	0.00	3.30	0.00	0.00	3.30	4
Impervious Cover (acres)	0.00	0.90	0.00	0.00	0.90	1
					80.00	100

Site Tv and Land Cover Nutrient Loads

Site Rv	0.05
Treatment Volume (ft^3)	13,754
TP Load (lb/yr)	8.64
TN Load (lb/yr)	61.82

Total TP Load Reduction Required (lb/yr)	-24.16	**	TP LOAD REDUCTION NOT REQUIRED

Site Compliance Summary

Total Runoff Volume Reduction (ft^3)	0
Total TP Load Reduction Achieved (lb/yr)	0.00
Total TN Load Reduction Achieved (lb/yr)	0.00
Remaining Post Development TP Load (lb/yr)	8.64
Remaining TP Load Reduction (lb/yr) Required	**0.00**

**** TARGET TP REDUCTION EXCEEDED BY 24.16 LB/YEAR ****

Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest/Open (acres)	75.80	0.00	0.00	0.00	0.00	75.80
Managed Turf (acres)	3.30	0.00	0.00	0.00	0.00	3.30
Impervious Cover (acres)	0.90	0.00	0.00	0.00	0.00	0.90
Total Area (acres)	**80.00**	**0.00**	**0.00**	**0.00**	**0.00**	**80.00**

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Reduced (lb/yr)	0.00	0.00	0.00	0.00	0.00	0.00
TN Load Reduced (lb/yr)	0.00	0.00	0.00	0.00	0.00	0.00

Drainage Area A Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	75.80	0.00	0.00	75.80	95
Managed Turf (acres)	0.00	3.30	0.00	0.00	3.30	4
Impervious Cover (acres)	0.00	0.90	0.00	0.00	0.90	1
					80.00	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft^3)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed

Total Impervious Cover Treated (acres)	0.00
Total Turf Area Treated (acres)	0.00
Total TP Load Reduction Achieved in D.A. (lb/yr)	0.00
Total TN Load Reduction Achieved in D.A. (lb/yr)	0.00

Runoff Volume and CN Calculations

	1-year storm	2-year storm	10-year storm
Target Rainfall Event (in)	3.05	3.70	5.58

Drainage Areas	RV & CN	Drainage Area A	Drainage Area B	Drainage Area C	Drainage Area D	Drainage Area E
CN		56	0	0	0	0
RR (ft^3)		0	0	0	0	0
1-year return period	RV wo RR (ws-in)	0.23	0.00	0.00	0.00	0.00
	RV w RR (ws-in)	0.23	0.00	0.00	0.00	0.00
	CN adjusted	56	0	0	0	0
2-year return period	RV wo RR (ws-in)	0.45	0.00	0.00	0.00	0.00
	RV w RR (ws-in)	0.45	0.00	0.00	0.00	0.00
	CN adjusted	56	0	0	0	0
10-year return period	RV wo RR (ws-in)	1.35	0.00	0.00	0.00	0.00
	RV w RR (ws-in)	1.35	0.00	0.00	0.00	0.00
	CN adjusted	56	0	0	0	0

Appendix E

Project:	**Hedgerow Park**
Location:	**Albemarle County**
WWA Project No:	**217028.00**
Date:	**20-Jun-17**
Estimate By:	**JDB**
Checked By:	**HFW**
Status:	
Page:	**1 of 1**

WW ENGINEERS SURVEYORS PLANNERS ASSOCIATES
P. O. Box 4119, Lynchburg, VA 24502, Phone: 434.316.6080
3040 Avemore Square Place, Charlottesville, VA 22911, Phone: 434.984.2700
www.wwassociates.net

Item	Units	Quantity	Unit Material Cost	Total Material Costs	Unit Labor Cost	Total Labor Costs	Total Unit Costs	Total Cost
Mobilization	LS	1	$0.00	$0	$20,000.00	$20,000	$20,000	$ 20,000
Saw Cut Existing Edge of Pavement	LF	520	$0.00	$0	$8.00	$4,160	$8	$ 4,160
Mill Adjacent Lane 1.5" (1' wide strip)	SY	60	$0.00	$0	$4.00	$240	$4	$ 240
1.5" Asphalt Overlay	Ton	120	$80.00	$9,600	$30.00	$3,600	$110	$ 13,200
Traffic Control	Day	90	$0.00	$0	$1,200.00	$108,000	$1,200	$ 108,000
Asphalt Surface Course (Rt. 29 Turn Lane)	SY	420	$40.00	$16,800	$4.00	$1,680	$44	$ 18,480
Asphalt Intermediate Course (Rt. 29 Turn Lane)	SY	420	$55.00	$23,100	$8.00	$3,360	$63	$ 26,460
Aggregate Base (Rt. 29 Turn Lane)	CY	200	$25.00	$5,000	$8.00	$1,600	$33	$ 6,600
Roadway Retaining Wall (4'-6' Height)	LF	350	$700.00	$245,000	$500.00	$175,000	$1,200	$ 420,000
Tack Coat	SY	420	$1.00	$420	$4.00	$1,680	$5	$ 2,100
Prime Coat	SY	420	$1.00	$420	$4.00	$1,680	$5	$ 2,100
Roadway Striping	LF	800	$3.00	$2,400	$2.00	$1,600	$5	$ 4,000
Turn Lane Markings	EA	2	$400.00	$800	$50.00	$100	$450	$ 900
Road Signage	EA	2	$1,000.00	$2,000	$250.00	$500	$1,250	$ 2,500
3" Asphalt Surface Course (Access Road)	SY	330	$12.00	$3,960	$2.00	$660	$14	$ 4,620
6" Asphalt Intermediate Course (Access Road)	SY	330	$20.00	$6,600	$4.00	$1,320	$24	$ 7,920
Aggregate Base (Access Road)	CY	70	$25.00	$1,750	$8.00	$560	$33	$ 2,310
Structural Plate Bottomless Arch	LS	1	$30,000.00	$30,000	$15,000.00	$15,000	$45,000	$ 45,000
Strip Footing for Arch	LF	70	$200.00	$14,000	$100.00	$7,000	$300	$ 21,000
Arch Head Wall	LF	140	$500.00	$70,000	$700.00	$98,000	$1,200	$ 168,000
Retaining Wall @ Restroom	SF	250	$20.00	$5,000	$10.00	$2,500	$30	$ 7,500
Site Excavation & Topsoiling	CY	3,000	$0.00	$0	$8.00	$24,000	$8	$ 24,000
Earth Backfill	CY	1,200	$0.00	$0	$12.00	$14,400	$12	$ 14,400
Aggregate Base (Parking Area)	CY	750	$25.00	$18,750	$8.00	$6,000	$33	$ 24,750
Wheel Stops	EA	40	$400.00	$16,000	$100.00	$4,000	$500	$ 20,000
Silt Fence	LF	500	$1.00	$500	$2.00	$1,000	$3	$ 1,500
Fine Grading	SY	1,240	$0.00	$0	$8.00	$9,920	$8	$ 9,920
Temporary Seeding	SY	1,240	$0.50	$620	$0.50	$620	$1	$ 1,240
Permanent Seeding	SY	1,240	$0.75	$930	$0.50	$620	$1.25	$ 1,550
Sediment Trap	EA	1	$1,500.00	$1,500	$3,500.00	$3,500	$5,000	$ 5,000
Restroom Facilities	LS	1	$20,000.00	$20,000	$15,000.00	$15,000	$35,000	$ 35,000
Landscaping	LS	1	$20,000.00	$20,000	$15,000.00	$15,000	$35,000	$ 35,000
Wetlands Delineation	LS	1	$0.00	$0	$10,000.00	$10,000	$10,000	$ 10,000
Stream Relocation	LS	1	$80,000.00	$80,000	$40,000.00	$40,000	$120,000	$ 120,000
Permitting	LS	1	$0.00	$0	$20,000.00	$20,000	$20,000	$ 20,000
Stream & Wetland Impact Credits	LS	1	$0.00	$0	$200,000.00	$200,000	$200,000	$ 200,000
Subtotals:				$595,150		$812,300		$ 1,407,450
5.3% Sales Tax on Materials								$ 31,543
						SUBTOTAL		$ 1,438,993
						CONSTRUCTION MARKUP @ 30%		$ 431,698
						CONTINGENCY OF 5%		$ 93,535
						SUBTOTAL		$ 1,964,225
						ENGINEERING FEES @ 9%		$ 176,780
						TOTAL AFTER CONSTRUCTION MARKUP		**$ 2,141,006**