



# AMERICAN SOCIETY OF HIGHWAY ENGINEERS

## National Project of the Year Award

### OFFICIAL ENTRY FORM

**AWARD CATEGORY** (Check One):  Under \$20 Million  Over \$20 Million

**SPONSORING REGION** (Check One):

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Northeast               | <input type="checkbox"/> Great Lakes   | <input type="checkbox"/> Northwest      |
| <input checked="" type="checkbox"/> Mid-Atlantic | <input type="checkbox"/> North Central | <input type="checkbox"/> Rocky Mountain |
| <input type="checkbox"/> Southeast               | <input type="checkbox"/> South Central | <input type="checkbox"/> Southwest      |

### CONTACT INFORMATION FOR SPONSORING REGION:

**Primary Contact Name:** John M. McDowell, PE **ASHE Region Position:** Awards Chair  
**Phone (Office):** 703-259-3706 **Phone (Mobile):** 703-472-2044 **E-Mail Address:** jmcowell@rkk.com

**Secondary Contact Name:** Nimesh Desai, PE **ASHE Region Position:** President  
**Phone (Office):** 401-645-1405 **Phone (Mobile):** 443-794-9149 **E-Mail Address:** ndesai@dewberry.com

### PROJECT INFORMATION (From Section Entry):

**ENTERING AGENCY/COMPANY'S NAME:** Johnson, Mirmiran & Thompson \*ON BEHALF OF\* Design Joint Venture (see below)  
**PROJECT NAME:** MD 404 Dualization **TYPE:** Design-Build  
**PROJECT LOCATION:** MD 404 between US 50 to east of Holly Road  
**CITY:** Queen Anne, MD to Hillsboro, MD **COUNTY:** Talbot, Queen Anne's, and Caroline counties  
**CONSTRUCTION COST:** \$110,759,062.88 **BUDGETED CONSTRUCTION COST:** \$104,997,777.77  
**PROJECT COMPLETION DATE:** November 20, 2017

**PROJECT OWNER:** Maryland Department of Transportation - State Highway Administration  
**STREET ADDRESS:** 615 Morgnec Road  
**CITY:** Chestertown **STATE:** MD **ZIP:** 21620  
**PHONE:** (410) 810-3270 **FAX:** \_\_\_\_\_  
**CONTACT PERSON:** Mr. Bret Hadzimichalis  
**E-MAIL ADDRESS:** bhadzimichalis@sha.state.md.us

**PROJECT DESIGN FIRM:** (submitted by JMT on behalf of) Wallace Montgomery / Johnson, Mirmiran & Thompson / Rummel, Klepper & Kahl  
**STREET ADDRESS:** 40 Wight Avenue  
**CITY:** Hunt Valley **STATE:** MD **ZIP:** 21030  
**PHONE:** (410) 329-3100 **FAX:** \_\_\_\_\_  
**CONTACT PERSON:** Mr. James W. "Jay" Smith, PE  
**E-MAIL ADDRESS:** jsmith@jmt.com

**PRIME CONTRACTOR:** 404 Corridor Safety Constructors, A Joint Venture of Wagman Heavy Civil / David A. Bramble / Allan Myers MD  
**STREET ADDRESS:** 3290 North Susquehanna Trail  
**CITY:** York **STATE:** PA **ZIP:** 17406  
**PHONE:** (717) 764-8521 **FAX:** \_\_\_\_\_  
**CONTACT PERSON:** Mr. Anthony Bednarik  
**E-MAIL ADDRESS:** awbednarik@wagman.com

**Entry Form Completed By:** Mr. James W. "Jay" Smith, PE **Date:** January 10, 2019

# MD 404 DUALIZATION



## Purpose and Need

MD 404 is a 55-mph principal arterial roadway connecting US 50 to the Delmarva Region on Maryland's Eastern Shore, serving commuters, commercial trucking, local farmers, and tourists. About 20,000 vehicles—roughly 10% trucks—use it daily. During summertime peak travel, volumes jump to nearly 23,000 vehicles, with projected 2035 ADT of 26,000.

The existing, two-lane MD 404 operated at substandard levels of service during summertime peak hours, and corridor-wide collision rates were nearly twice the statewide average. From 2005 to 2014, 402 crashes and 12 fatalities occurred.



Maryland Governor Larry Hogan challenged the MDOT SHA and the A/E/C community to make MD 404 safer and to improve its capacity—as quickly as possible. Original projections targeted a mid-2019 completion. The governor directed the opening of a four-lane roadway by Thanksgiving 2017, half the original three-year schedule

The 9.2-mile project widened the corridor, providing a continuous, dualized four-lane divided highway. Additional improvements included tie-ins with existing dualized roadways; reconfigured intersections; a bridge over Norwich Creek; roadway culverts; rehabilitated pavement; drainage collection/conveyance and stormwater management (SWM) systems; lighting, signing, and pavement markings; intelligent transportation systems (ITS); and landscape plantings.

MDOT SHA issued notice to proceed in June 2016 under a lump sum/fixed firm price contract with the 404 Safety Corridor Safety Constructors (CSC), a Tri Venture contracting team of Wagman Heavy Civil, David A. Bramble, and Allan Myers MD.

## The Design Team and Other Key Members

The Design Joint Venture (DJV) of Wallace Montgomery & Associates, Johnson, Mirmiran & Thompson, and Rummel, Klepper & Kahl served as the Engineer-of-Record supporting the CSC as a direct subcontractor. CSC and the DJV team members comprised the Design Build Team (DBT)

Century Engineering provided Independent Design Quality Assurance (IDQA) review to the DBT for all improvements. The MD 404 project was the first design-build where MDOT SHA required IDQA review of all design elements to ensure compliance with contract documents and the Design Quality Control Plan (DQCP).

McCormick Taylor provided project management and served as General Engineering Consultant for MDOT SHA's Innovative Contract Division.

## How the Team Accomplished the Design

The DBT agreed to subdivide the work into three roadway segments, with each contractor concurrently responsible for a segment. The DJV coordinated services and resources to mobilize the contractors simultaneously, delivered approved construction plans, and sustained the flow of continuous construction work. The DJV prepared 246 final design submissions for bridge and roadway culvert crossings; geotechnical subgrade improvements; rough grading; finish grading, roadway, and drainage/SWM construction; and signage, markings, lighting, ITS; landscaping, and noise abatement/screening.

The DJV team met weekly to coordinate and expedite designs and deliverables and resolve potential conflicts as well as ensure compliance with the DQCP. The DJV developed plans that could be reviewed with minimal comments by holding frequent design coordination meetings with appropriate agencies.



## Complexity

With 400,000 CY of cut and 325,000 CY of fill to accomplish, moving dirt only once was critical to meeting the aggressive schedule. The sheer volume of work was tremendous: 76,600 LF of drainage ditches; 25 cross culverts; and 84,350 LF of environmental site design stormwater facilities, including 110 grass swales, 145 wet swales, 25 bioswales, and four SWM ponds. The team was challenged by the statutory limit of applying a 20-acre maximum grading unit (GU) of construction disturbance throughout the project at any time. Furthermore, the typical section equated to a wide grading footprint

with shallow cuts and fills, leading to large grading areas for comparatively small volumes. 3D models identified how to complete the grading work most efficiently, allowing the contractors to work concurrently within different GUs without exceeding the combined total maximum GU.

The DJV, in collaboration with construction staff, provided traffic analysis and developed a corridor-wide transportation management plan to efficiently and safely stage construction activities with minimal delays. Construction sequencing limited the number of traffic shifts, maintained traffic on the existing road while constructing new roadway, then shifted traffic onto the newly-built road to rehabilitate the existing road. A final shift to split traffic between the roadways to allow median construction and facilitated the full opening to traffic. Designers developed cost-effective solutions to limit pavement reconstruction by utilizing wedge/leveling resurfacing, which accelerated construction and minimized MOT phases and user delays. To keep motorists informed, the DBT updated the project website weekly with upcoming construction activities and temporary lane closures, including real-time traffic information from two mobile cameras.

## New Application of Existing Techniques/Originality/ Innovation



The DJV incorporated 13 J-turn and two Maryland-T intersections within the dualized road to eliminate left-turns and crossover movements from intersecting roadways. This approach reduced the potential for severe collisions, minimizing conflicts for motorists entering from intersecting roads. Intersection designs incorporated auxiliary turn lanes with sufficient vehicle storage and mainline deceleration and acceleration merging lengths; AASHTO compliant sight distances; and ample turning geometry to accommodate the wide range of vehicles and equipment types.



Additional safety enhancements included reflective pavement markers, optical class curb markers at the intersections' raised medians and channelization islands, and intersection lighting. Designers incorporated corridor-wide W-beam median traffic barrier to prevent errant median crossover vehicles and resulting head-on collisions.

## Social/Economic Considerations

The CSC team's solutions saved over \$16 million. Approved alternative technical concepts focused on:

- Pavement enhancements that maximized soil cement in lieu of less readily-available graded aggregate materials
- Ultra-thin resurfacing to improve rideability and life-cycle costs of composite concrete and asphalt sections
- Minimizing full depth reconstruction by utilizing wedge/leveling resurfacing of the existing mainline
- Optimized SWM roadside grading to minimize the need for traffic barrier protection
- Vastly improved the safety and capacity of a heavily traveled beach access route
- Enhanced Economic Development through improvements to safety and travel time for goods and services traveling through the corridor

## Safety

Dedication to safety yielded 375,000 injury-free labor hours.

The safety program began with all team members receiving an orientation prior to on-site visits. Many employees received additional training. As the work progressed, the team reviewed safety performance and planning regularly. A "near miss/good catch" program encouraged reporting of potential hazards, along with solutions.

Design improvements eliminated crossover traffic from intersecting streets; provided protected left turns; consolidated access points; and improved intersection geometry all resulting in vastly improved safety.

Throughout the project, design and construction staff collaborated to perform MOT constructability reviews that promoted safe travel through the work zones during construction.



## Aesthetics and Sustainable Features



MD 404 is designated as a hurricane evacuation route for the Delmarva Region. The new MD 404 roadway has upsized culvert crossings to eliminate roadway flooding during 100-year storm events. However, the increased culvert conveyance created the potential for stormwater degradation in the downstream channels during smaller storms. The final project mitigates this by maximizing roadside stormwater quality treatment using linear practices such as bio-swales, wet-swales, and enhanced grass swale facilities and incorporates upstream hydraulic control weir wall structures at the roadway cross culverts. The team's SWM approach to use linear roadside SWM facilities minimized the project footprint while also minimizing wetland/waterway and forest impacts and increased available areas within the ROW for access of the corridor-wide aerial utilities. The project's Environmental Site Design facilities treated an additional 12.7 acres of impervious roadway pavement beyond project requirements.

Even though the corridor's adjacent wetland/waterway and forested area impacts were permitted, MDOT SHA and environmental agencies wanted to further minimize impacts. The DJV adjusted the roadway's profile; reduced the roadside grading by installing traffic barrier, when warranted; minimized culvert lengths; and re-routed the runoff to reduce the number of cross culverts. Utilizing AASHTO's low volume-local roadway criteria, designers reduced the prescribed typical section width for a local access road to minimize permitted wetland impacts. Applying sound engineering design practices, the designers reduced wetland/waterway and forest impacts by 26% and 11%, respectively.

## Meeting and Exceeding Owner's/Client's Needs

Given the accelerated timeframe for completion, the agency offered an incentive to open the four-lane road by November 21, 2017 and disincentives for not meeting this milestone.

Project scheduling and securing permits were challenges in meeting the completion date. A rolling design and construction process was used to provide materials, field resources, and continuous work efforts of grading, structures, and paving. Efficiently securing environmental agencies' approvals for SWM, ESC and construction within waterways was paramount. The roadway dualization required constructing a second bridge crossing of Norwich Creek under time of year restrictions (TOYR) for work within the 10-year floodplain/stream; the dualization also required constructing 11 waterway culvert crossings with instream TOYR. As part of the "rolling" design submissions, the team submitted the proposed waterway culvert crossings' construction submittals in advance of the roadway construction submittals. This approach expedited approvals and facilitated temporary waterway diversions before in-stream work restrictions began.



## The Success

The DBT's innovative methods and approach exceeded the project's purpose and need; met MDOT's goal for "safer, better, faster"; and ensured that the new four-lane road was open on time.

The continuous dualized MD 404 roadway delivers safety and mobility enhancements, improves operations for residents, and eliminates summertime congestion from beachgoing traffic.



January 25, 2019

John M. McDowell, PE, F.ASCE  
RK&K  
12600 Fair Lakes Circle, Suite 300  
Fairfax, VA 22033

RE: ASHE National Project Award – Statement of Commitment

Dear Mr. McDowell:

Johnson, Mirmiran & Thompson (JMT) is pleased to submit our project, MD 404 Dualization, to be evaluated for the 2019 ASHE National Project Award. Please accept this letter as our Statement of Commitment that at least one JMT representative from the project team will attend the awards luncheon. We anticipate other Design-Build team members will also sign up for the event.

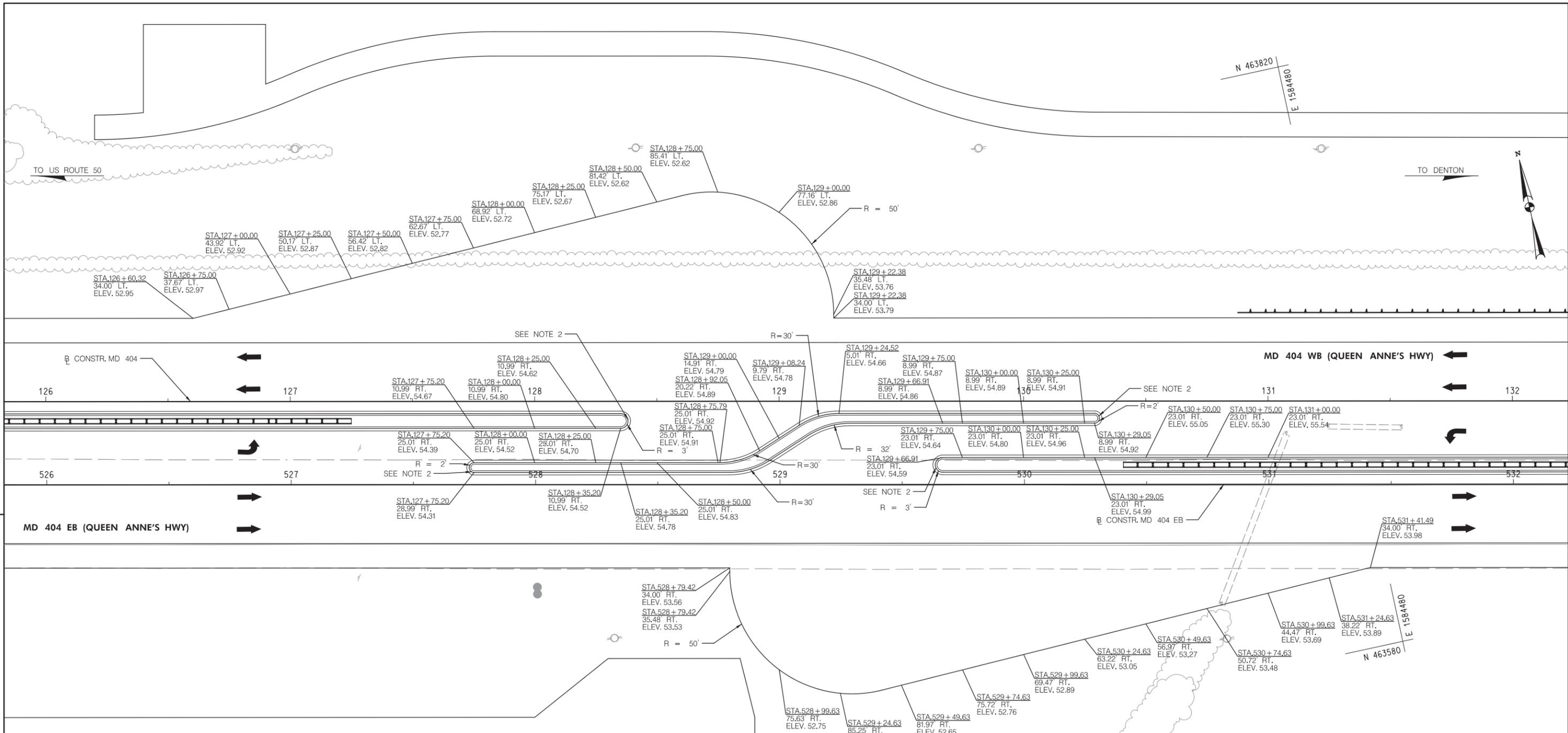
If you have any questions or need further information, please do not hesitate to contact me at 410-316-2274 or [jsmith@jmt.com](mailto:jsmith@jmt.com).

Very truly yours,

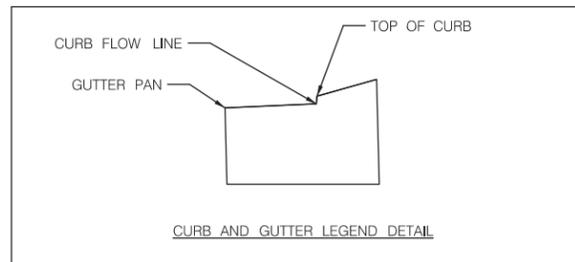
JOHNSON, MIRMIRAN & THOMPSON, INC.

A handwritten signature in blue ink, appearing to read 'James W. Smith', is written over the typed name.

James (Jay) W. Smith, PE  
Vice President



NOTES:  
 1. ALL ELEVATIONS PROVIDED FOR LOCATIONS OF PROPOSED CURB REPRESENT THE TOP OF CURB ELEVATION. SEE CURB AND GUTTER LEGEND DETAIL ON THIS SHEET FOR ELEVATION LOCATION ON PROPOSED CURB. ALL OTHER ELEVATIONS REPRESENT THE PROPOSED PAVEMENT ELEVATION.  
 2. NOSE DOWN MEDIAN STD. NO. MD 645.03



DATUM: NAD 8391 Horizontal  
 NAVD 88 Vertical

**SHA** STATE OF MARYLAND  
 DEPARTMENT OF TRANSPORTATION  
 STATE HIGHWAY ADMINISTRATION  
 HIGHWAY DESIGN DIVISION  
 MD 404 DUALIZATION DESIGN BUILD  
 FROM US 50 TO EAST OF HOLLY ROAD  
 SEGMENT A FINAL ROADWAY STA. 75+ TO STA. 231+

REVISIONS		INTERSECTION DETAIL	
3	REDLINE REVISION NO. 3 NEW SHEET 4-18-2017	SCALE 1" = 20'	ADVERTISED DATE 2016 CONTRACT NO. AW8965170
DESIGNED BY	PJM /MJK	COUNTY	CAROLINE-TALBOT-QUEEN ANNE'S
DRAWN BY	CWW	LOGMILE	
CHECKED BY	SER	HORIZONTAL SCALE	
F.A.P. NO.	SEE TITLE SHEET	VERTICAL SCALE	
DRAWING NO.	ID-A-04	OF	10
		SHEET NO.	27 OF 166

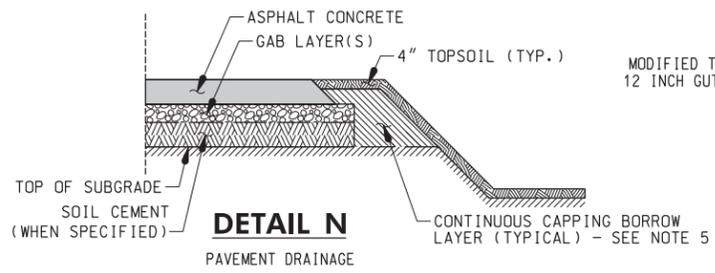
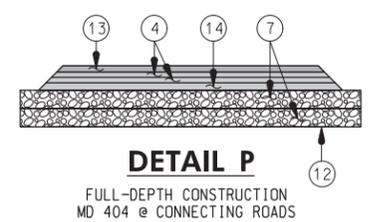
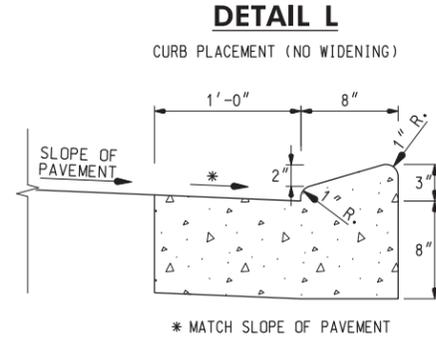
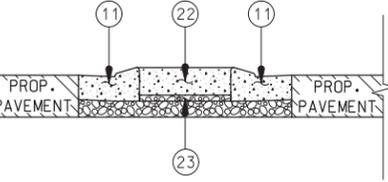
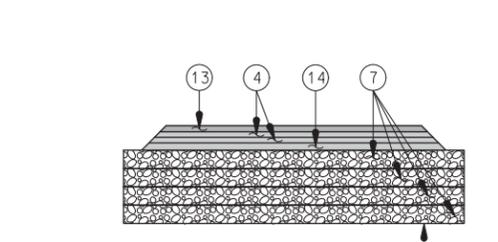
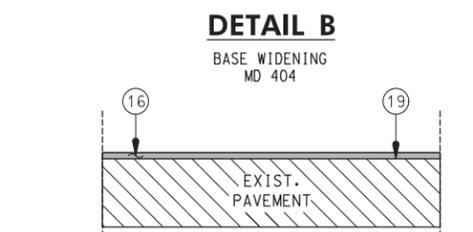
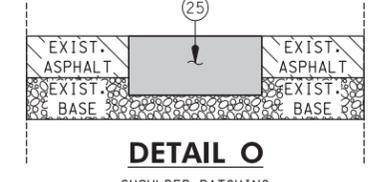
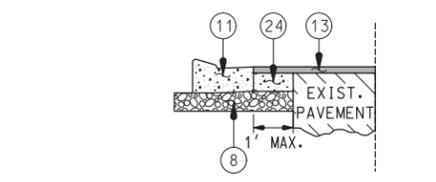
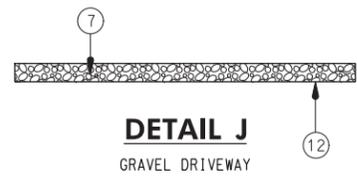
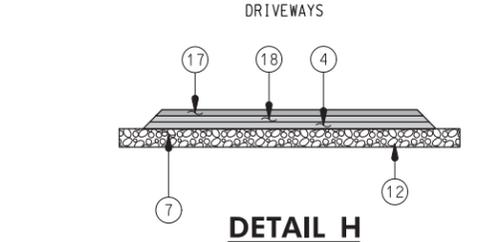
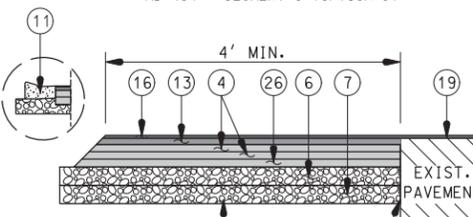
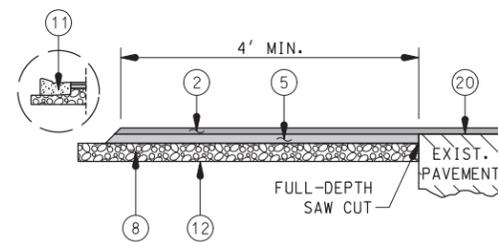
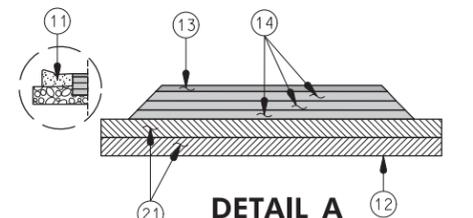
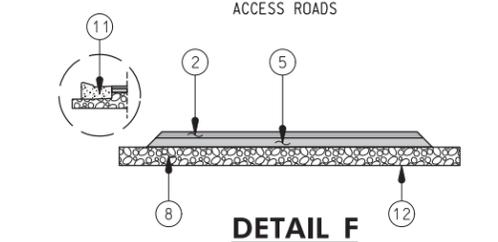
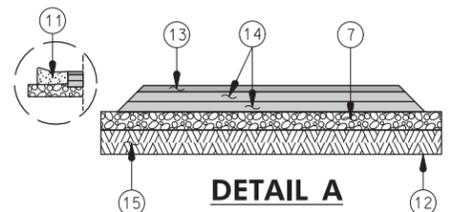
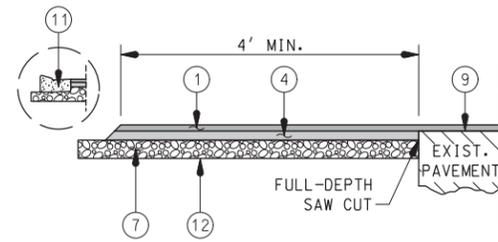
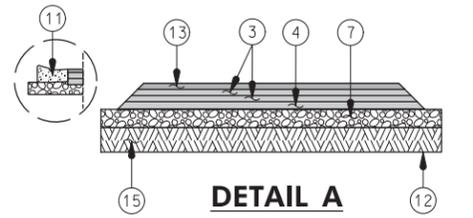
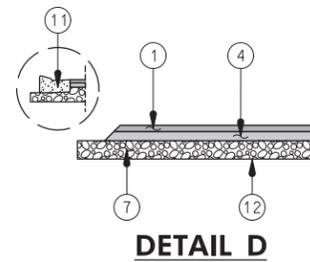
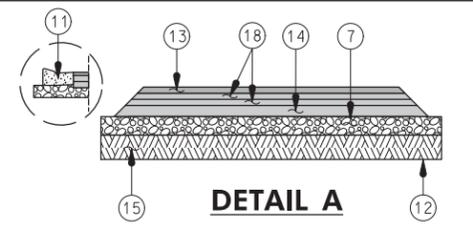


**PAVEMENT LEGEND**

1. 2" SUPERPAVE ASPHALT MIX 9.5 MM FOR SURFACE, PG 64S-22, LEVEL 2
2. 1.5" SUPERPAVE ASPHALT MIX 9.5 MM FOR SURFACE, PG 64S-22, LEVEL 1
3. 2.5" SUPERPAVE ASPHALT MIX 19.0 MM FOR BASE, PG 64S-22, LEVEL 2
4. 3" SUPERPAVE ASPHALT MIX 19.0 MM FOR BASE, PG 64S-22, LEVEL 2
5. 2.5" SUPERPAVE ASPHALT MIX 19.0 MM FOR BASE, PG 64S-22, LEVEL 1
6. 5" GRADED AGGREGATE BASE COURSE
7. 6" GRADED AGGREGATE BASE COURSE
8. 4" GRADED AGGREGATE BASE COURSE
9. TOP OF EXISTING PAVEMENT AFTER 2" GRINDING
10. TOP OF EXISTING PAVEMENT
11. TYPE 'C' COMBINATION CONCRETE CURB & GUTTER: 12" GUTTER PAN, 8" DEPTH. SEE NOTE 6.
12. TOP OF SUBGRADE AND LIMIT OF EXCAVATION
13. 2" SUPERPAVE ASPHALT MIX 12.5 MM FOR SURFACE, PG 64S-22, LEVEL 4
14. 4" SUPERPAVE ASPHALT MIX 19.0 MM FOR BASE, PG 64S-22, LEVEL 2
15. 8" SOIL CEMENT
16. 3/4" ULTRA-THIN BONDED WEARING COURSE, TYPE B, 9.5 MM
17. 2" SUPERPAVE ASPHALT MIX 12.5 MM FOR SURFACE, PG 64S-22, LEVEL 2
18. 2" SUPERPAVE ASPHALT MIX 19.0 MM FOR BASE, PG 64S-22, LEVEL 2
19. TOP OF EXISTING PAVEMENT AFTER 3/4" GRINDING
20. TOP OF EXISTING PAVEMENT AFTER 1.5" GRINDING
21. 6" CAPPING BORROW
22. 8" PLAIN PORTLAND CEMENT CONCRETE PAVEMENT, MIX NO. 7. SEE NOTES 6 AND 7.
23. 3" GRADED AGGREGATE BASE
24. 6" PORTLAND CEMENT CONCRETE, MIX #3. SEE NOTE 8.
25. 6" SUPERPAVE ASPHALT MIX 19.0 MM FOR FULL-DEPTH PATCHING, PG 64S-22, LEVEL 2 (MIN. 2", MAX. 4" LIFT THICKNESS), SEE NOTE 10
26. 3.5" SUPERPAVE ASPHALT MIX 19.0 MM FOR BASE, PG 64S-22, LEVEL 2

**NOTES**

1. IF NEEDED USE ONE OF THE FOLLOWING ITEMS FOR WEDGE/LEVEL, AS DIRECTED:
  - FOR WEDGE/LEVEL LAYER 2" THICK OR LESS: VARIABLE DEPTH SUPERPAVE ASPHALT MIX 9.5 MM FOR WEDGE/LEVEL, PG 64S-22, LEVEL 2 (MIN 1" AND MAX 2" LIFTS)
  - FOR WEDGE/LEVEL LAYER MORE THAN 2" THICK: VARIABLE DEPTH SUPERPAVE ASPHALT MIX 19.0 MM FOR WEDGE/LEVEL, PG 64S-22, LEVEL 2 (MIN 2" AND MAX 4" LIFTS)
2. BASED ON INFORMATION FROM SOIL BORINGS, CONSTRUCTION HISTORY AND AS-BUILTS, THE EXISTING PAVEMENT STRUCTURE IS EXPECTED TO BE AS FOLLOWS:
  - MD 404 TRAVEL LANES: 5" TO 8" ASPHALT OVER 8" PCC
  - MD 404 SHOULDER: 3.5" TO 7" ASPHALT ON 4" STONE BASE OR ON PCC (EXISTING WB SHOULDER)
3. FOR UTILITY PATCHING - SEE MD SHA STANDARDS 578.01, 578.03, AND 578.03-01. DEPTH OF PATCH SHALL MATCH EXISTING THICKNESSES OF ASPHALT AND CONCRETE. USE THE FOLLOWING MATERIALS FOR UTILITY PATCHING:
  - SUPERPAVE ASPHALT MIX 19.0 mm FOR PARTIAL/FULL-DEPTH PATCHING, PG 64S-22, LEVEL 2 (MINIMUM 2" AND MAXIMUM 4" LIFT THICKNESS)
  - PLAIN PORTLAND CEMENT CONCRETE PAVEMENT TYPE I REPAIR MIX #9 (SEE MD 577.02 THROUGH 577.06)
  - LOAD TRANSFER DEVICE #10 SMOOTH/PLAIN DOWEL BAR 18" LONG, EPOXY COATED, PLACED 12" CENTER TO CENTER ALONG TRANSITION JOINTS, 6" FROM LONGITUDINAL JOINTS - FOR CONCRETE REPAIRS
  - TRENCH AND BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 303
4. IF UTILITY PATCH REQUIRES A 15' OR LONGER COMPOSITE PATCH, USE AN ASPHALT UTILITY PATCH UNLESS OTHERWISE NOTED ON STRUCTURAL DETAILS
5. USE A DAY-LIGHTED TO ROADSIDE DITCH CONTINUOUS LAYER OF FREE-DRAINAGE GRANULAR MATERIAL SUCH AS CAPPING BORROW ALONG THE ROADWAY LOW-SIDE TO DRAIN MD 404 AND ACCESS ROAD FULL-DEPTH AND BASE WIDENING PAVEMENT SECTIONS; REFER TO PAVEMENT DETAIL N.
6. SEE TYPICAL SECTIONS AND PLAN SHEETS FOR CURB CLOSED SECTIONS LOCATIONS. USE MD 620.02-01 FOR STANDARD TYPE C COMBINATION CURB AND GUTTER AND DETAIL M FOR MODIFIED TYPE C COMBINATION CURB AND GUTTER. IF NECESSARY TO ESTABLISH FINAL CURB AND GUTTER ELEVATIONS, USE GRADED AGGREGATE BASE UNDERNEATH.
7. USE LOAD TRANSFER DEVICES EVERY 15' PER NOTE 3 AND #4 SMOOTH/PLAIN MODIFIED J BARS 14" LONG, EPOXY COATED, SPACED 36" CENTER TO CENTER AS LONGITUDINAL TIE DEVICES FOR CUB/SLAB JOINTS (SEE MD 572.61 AND MD 572.61-01)
8. DOWEL BARS ARE NOT NEEDED. MATCH TRANSVERSE JOINTS WITH THOSE OF THE CURB AND GUTTER.
9. USE SHA STD. NO. MD 620.02-01 NOTES IN REFERENCE TO MODIFIED TYPE C COMBINATION CURB AND GUTTER, 12 INCH GUTTERPAN, 8 INCH DEPTH.
10. PATCH ENTIRE WIDTH OF SHOULDER IN REHABILITATION IMPROVEMENT AREAS. PLACE 4" OF GRADED AGGREGATE BASE IF EXISTING BASE MATERIAL IS UNSUITABLE.
11. SEE SHA STANDARDS MD 578.03 AND MD 578.03-1 FOR MAINLINE PATCHING. USER SUPERPAVE ASPHALT MIX 19.0 MM FOR PARTIAL-DEPTH PATCHING, PG 64S-22, LEVEL 2 (MIN. 2", MAX. 4" LIFT THICKNESS)(5" TO 8" EXPECTED FOR COMPOSIT SECTIONS, 8" FOR FLEXIBLE).
12. THE SELECTED DETAIL A OPTION FOR SEGMENT C WILL BE USED CONTINUOUSLY THROUGHOUT SEGMENT C.



**WALLACE MONTGOMERY**  
 ENGINEERS-PLANNERS-SURVEYORS-CONSTRUCTION MANAGERS  
 10150 York Road, Suite 200  
 Hunt Valley, Maryland 21030  
 410.494.9093 Tel / 410.667.0925 Fax  
 www.WallaceMontgomery.com A Limited Liability Partnership

**SHA** STATE OF MARYLAND  
 DEPARTMENT OF TRANSPORTATION  
 STATE HIGHWAY ADMINISTRATION  
 HIGHWAY DESIGN DIVISION  
 MD 404 DUALIZATION DESIGN BUILD  
 US 50 TO EAST OF HOLLY ROAD  
 SEGMENT A FINAL ROADWAY STA. 75+ TO STA. 231+

REVISIONS		PAVEMENT DETAILS	
3	REDLINE REVISION NO. 3 NEW SHEET 4-18-2017	SCALE	N.T.S. ADVERTISED DATE _____ CONTRACT NO. _____
DESIGNED BY	RMB	COUNTY	TALBOT & QUEEN ANNE'S
DRAWN BY	JDW	LOGMILE	_____
CHECKED BY	RMB	HORIZONTAL SCALE	_____
F.A.P. NO.	_____	VERTICAL SCALE	_____
DRAWING NO.	DE-A-01	OF	1
		SHEET NO.	16 OF 166



TO US ROUTE 50

TO DENTON

LEGEND

- ACCESS ROAD WITH CELLULAR CONFINEMENT LOAD SUPPORT SYSTEM
- GRASS ACCESS ROAD
- SPECIMEN TREE
- SHADE TREE
- ORNAMENTAL TREE
- EVERGREEN TREE
- SHRUB
- TURFGRASS ESTABLISHMENT
- WET EMERGENT ESTABLISHMENT
- UPLAND MEADOW ESTABLISHMENT
- LOWLAND MEADOW ESTABLISHMENT
- PROPOSED TREE LINE
- BULB PLANTING ZONE
- LIMIT OF WATERS OF THE U.S.
- LIMIT OF WETLAND BUFFER
- LIMIT OF WETLANDS
- LIMIT OF 100 YR. FLOODPLAIN
- LIMIT OF DISTURBANCE

- NOTES:
- BIOSWALES AND GRASS SWALES SHALL RECEIVE LOWLAND MEADOW ESTABLISHMENT UNLESS LOCATED IN THE MEDIAN WHERE BIOSWALES AND GRASS SWALES SHALL RECEIVE TURFGRASS ESTABLISHMENT.
  - THE ACCESS ROAD WITH CELLULAR CONFINEMENT LOAD SUPPORT SYSTEM SHALL RECEIVE TURFGRASS ESTABLISHMENT.
  - THE GRASS ACCESS ROAD SHALL RECEIVE MEADOW ESTABLISHMENT.
  - BULBS SHALL BE PLANTED IN 3' WIDE DRIFTS OUTSIDE OF THE TURFGRASS ZONE IN LOCATIONS SHOWN ON THE PLANS. BULB SPECIES SHALL BE INTERSPERSED THROUGHOUT THE DRIFTS; INDIVIDUAL SPECIES SHALL NOT BE CONCENTRATED IN ONE AREA.
  - CONTAINER SIZES SHALL MEET ACCEPTED STANDARDS OUTLINED IN ANSI Z60.1 FOR REQUIRED PLANT SIZES.
  - IN LOCATIONS WHERE THE GRASS ACCESS ROAD IS SHOWN OUTSIDE OF THE LOD, NO DISTURBANCE IS OCCURRING, THE EXISTING GRADE DOES NOT REQUIRE ADJUSTING TO MEET REQUIREMENTS OF ACCESS FOR UTILITY COMPANIES, THEREFORE THE LOD HAS NOT BEEN EXTENDED IN THESE AREAS. NEW MEADOW ESTABLISHMENT IS NOT PROPOSED AS EXISTING VEGETATION IS CURRENTLY ESTABLISHED IN THESE AREAS.

STATE OF MARYLAND  
DEPARTMENT OF TRANSPORTATION  
STATE HIGHWAY ADMINISTRATION  
LANDSCAPE ARCHITECTURE DIVISION

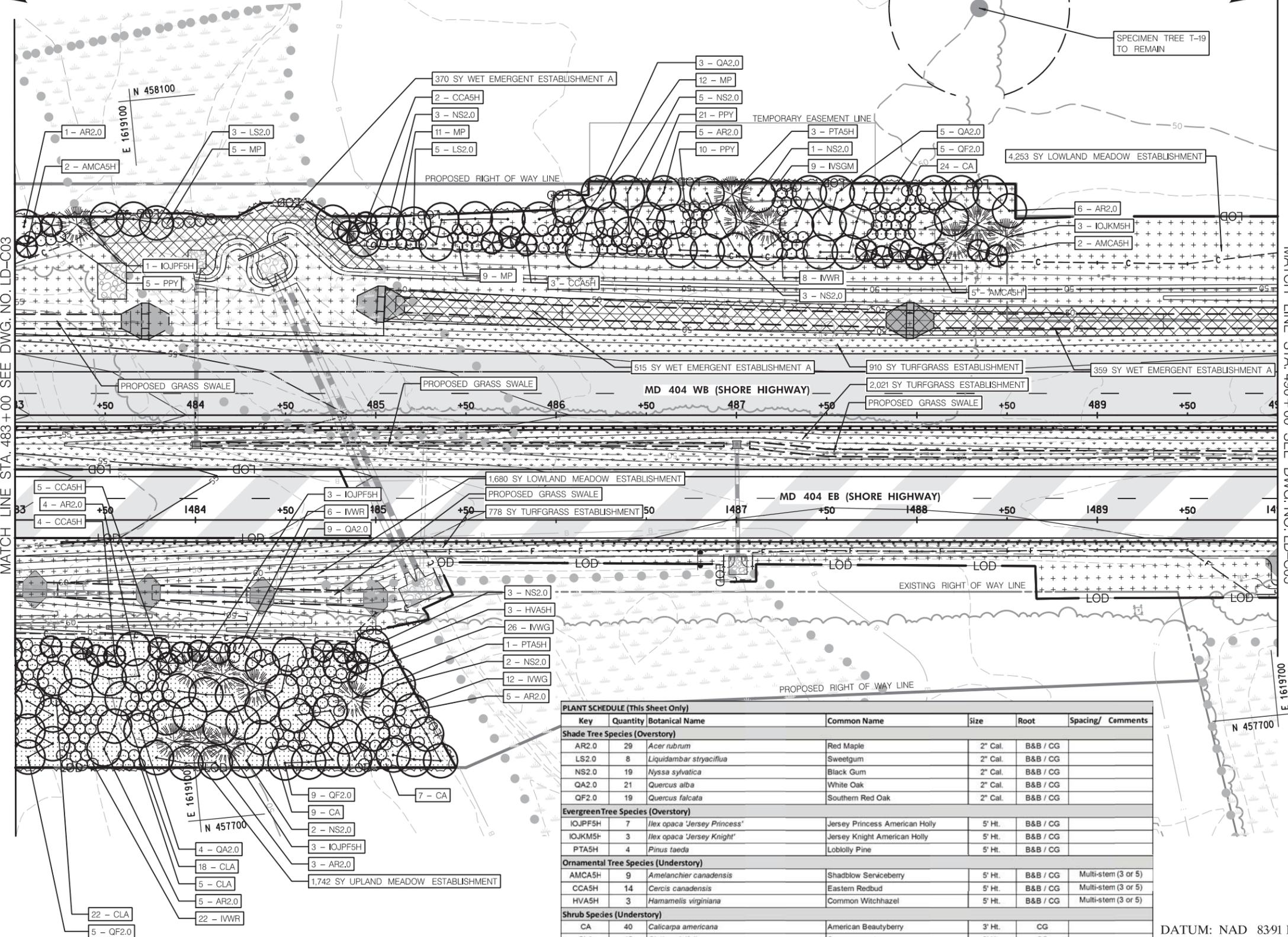
MD 404 DUALIZATION DESIGN BUILD  
US 50 TO EAST OF HOLLY ROAD  
SEGMENT C - STA. 467+11.85 TO STA. 655+18.22

DATUM: NAD 8391 Horizontal  
NAVD 88 Vertical

REVISIONS

**FINAL LANDSCAPE PLAN**

SCALE: 1" = 30'	DATE: 7-6-2017	CONTRACT NO. AW8965170
DESIGNED BY: MMBM	COUNTY: CAROLINE-TALBOT-QUEEN ANNE'S	
DRAWN BY: MMBM	LOGMILE:	
CHECKED BY: MMELJF		
F.A.P. NO. SEE TITLE SHEET		
DRAWING NO. LD-C04 OF 30	SHEET NO. OF	

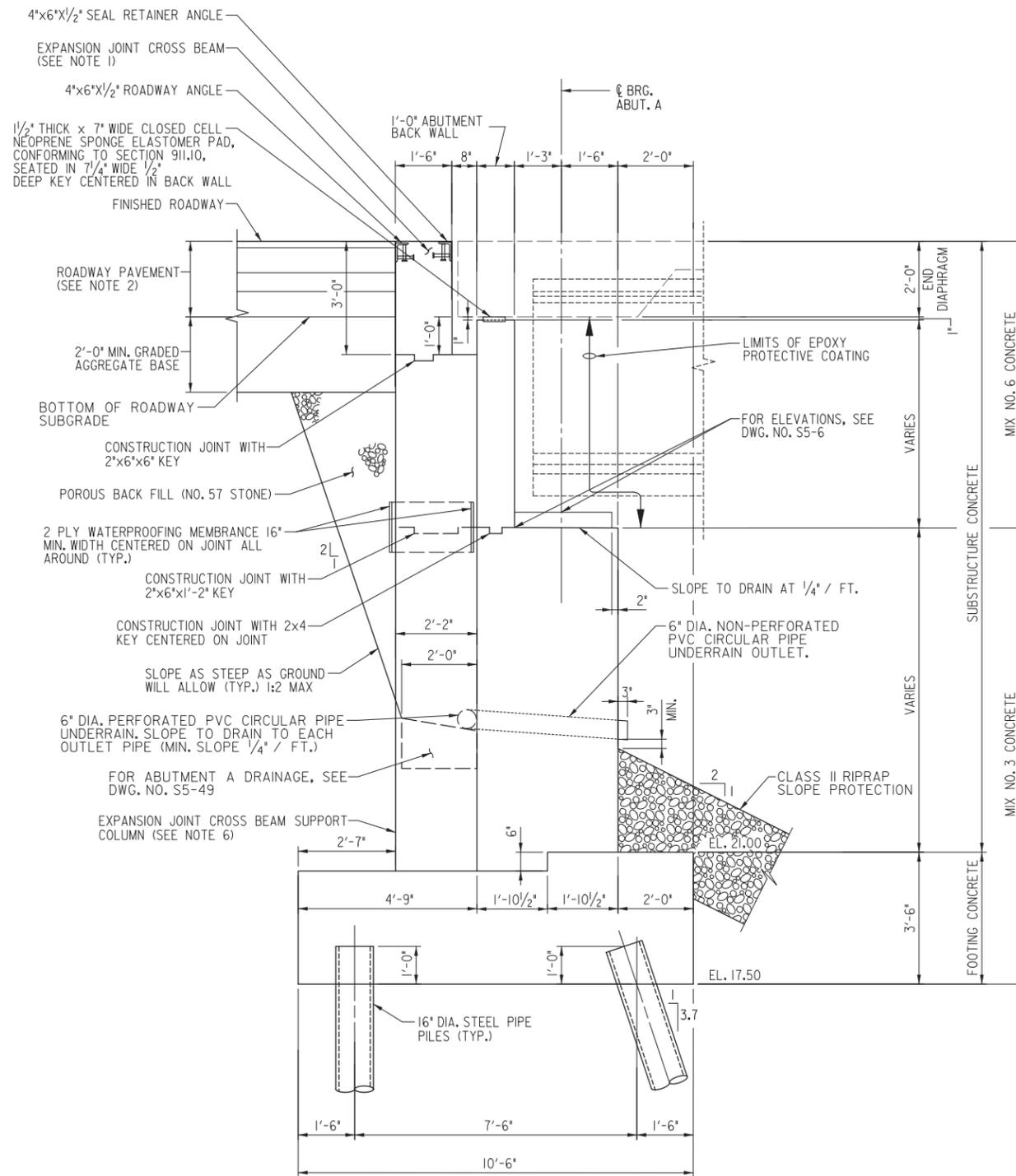


**PLANT SCHEDULE (This Sheet Only)**

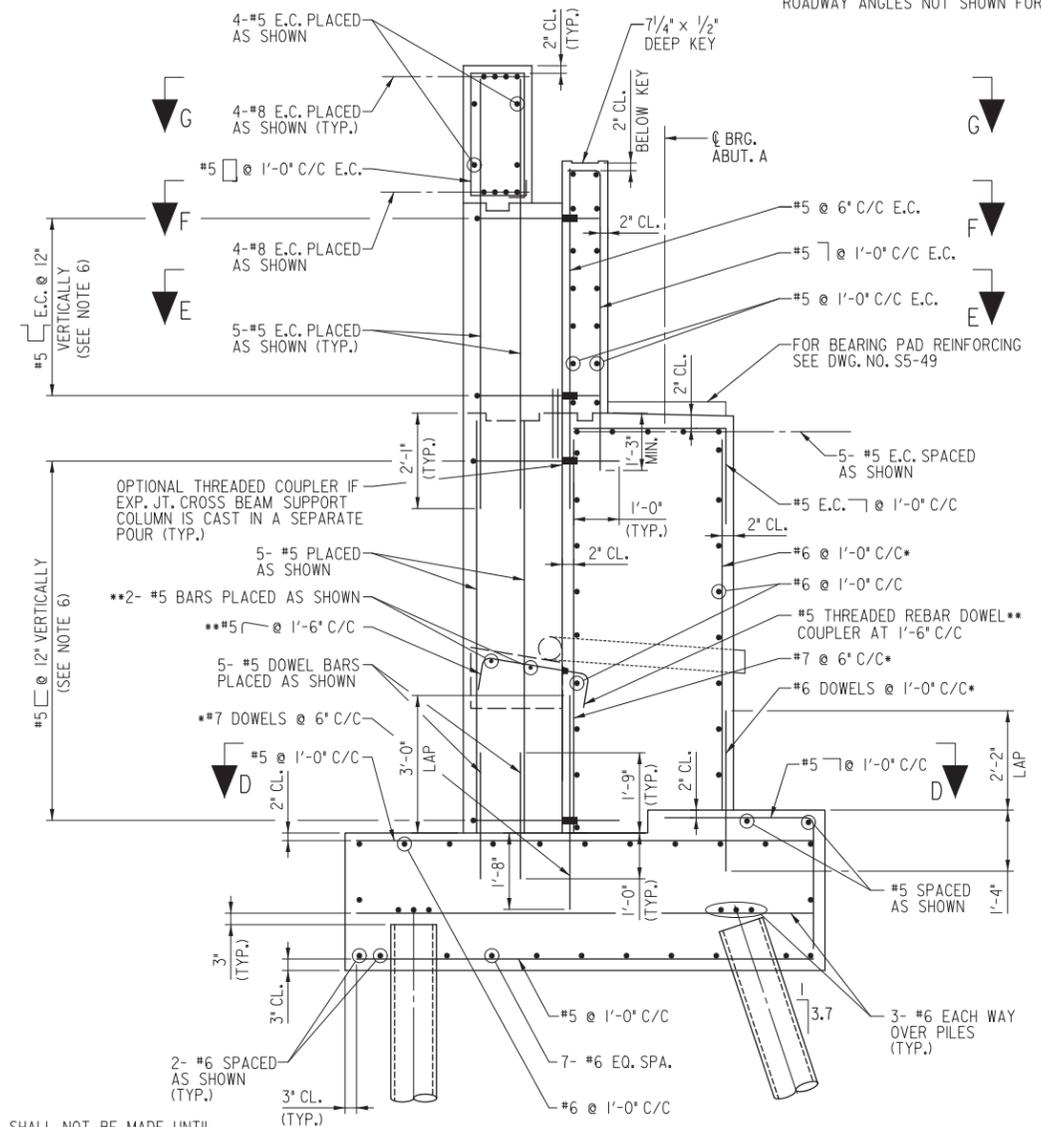
Key	Quantity	Botanical Name	Common Name	Size	Root	Spacing/ Comments
<b>Shade Tree Species (Overstory)</b>						
AR2.0	29	<i>Acer rubrum</i>	Red Maple	2" Cal.	B&B / CG	
LS2.0	8	<i>Liquidambar styraciflua</i>	Sweetgum	2" Cal.	B&B / CG	
NS2.0	19	<i>Nyssa sylvatica</i>	Black Gum	2" Cal.	B&B / CG	
QA2.0	21	<i>Quercus alba</i>	White Oak	2" Cal.	B&B / CG	
QF2.0	19	<i>Quercus falcata</i>	Southern Red Oak	2" Cal.	B&B / CG	
<b>Evergreen Tree Species (Overstory)</b>						
IOJPF5H	7	<i>Ilex opaca 'Jersey Princess'</i>	Jersey Princess American Holly	5' Ht.	B&B / CG	
IOJKM5H	3	<i>Ilex opaca 'Jersey Knight'</i>	Jersey Knight American Holly	5' Ht.	B&B / CG	
PTA5H	4	<i>Pinus taeda</i>	Loblolly Pine	5' Ht.	B&B / CG	
<b>Ornamental Tree Species (Understory)</b>						
AMCA5H	9	<i>Amelanchier canadensis</i>	Shadblow Serviceberry	5' Ht.	B&B / CG	Multi-stem (3 or 5)
CCA5H	14	<i>Cercis canadensis</i>	Eastern Redbud	5' Ht.	B&B / CG	Multi-stem (3 or 5)
HVA5H	3	<i>Hamamelis virginiana</i>	Common Witchhazel	5' Ht.	B&B / CG	Multi-stem (3 or 5)
<b>Shrub Species (Understory)</b>						
CA	40	<i>Callicarpa americana</i>	American Beautyberry	3' Ht.	CG	
CLA	45	<i>Clethra alnifolia</i>	Summersweet	3' Ht.	CG	
IVWG	38	<i>Ilex verticillata 'Winter Gold'</i>	Winter Gold Winterberry	3' Ht.	CG	
IVWR	36	<i>Ilex verticillata 'Winter Red'</i>	Winter Red Winterberry	3' Ht.	CG	
IVSGM	9	<i>Ilex verticillata 'Southern Gentleman'</i>	Southern Gentleman Winterberry	3' Ht.	CG	
MP	37	<i>Morella pensylvanica</i>	Northern Bayberry	3' Ht.	CG	
PPY	36	<i>Photinia pyrifolia</i>	Red Chokeberry	3' Ht.	CG	
<b>Seed Mixes and Treatment</b>						
LOWLAND	5,933	Lowland Meadow Establishment (SY)				
UPLAND	1,742	Upland Meadow Establishment (SY)				
TURF	3,709	Turfgrass Establishment (SY)				
WETA	1,244	Wet Emergent Establishment A (SY)				

**FLOURA TEETER**  
landscape architects  
800 North Charles St. Ste. 300  
Baltimore, Maryland 21201  
Phone: 410.528.8395  
Fax: 410.528.8425

NOTE:  
ROADWAY ANGLES NOT SHOWN FOR CLARITY.



SECTION A-A - GEOMETRICS  
SCALE: 1/2" = 1'-0"



SECTION A-A - REINFORCING  
SCALE: 1/2" = 1'-0"

- NOTES:
1. THE EXPANSION JOINT CROSS BEAM POUR SHALL NOT BE MADE UNTIL THE ADJACENT DECK PLACEMENT HAS BEEN COMPLETED.
  2. ROADWAY PAVEMENT DEPTH INCLUDES 2" OF 12.5 MM HOT MIX ASPHALT, 8" OF 19.0 MM HOT MIX ASPHALT, 6" OF GRADED AGGREGATE BASE AND 8" OF SOIL CEMENT.
  3. E.C. DENOTES EPOXY COATED REINFORCING STEEL.
  4. AT THE CONTRACTOR'S OPTION, THE DOWEL BARS AND STEM BARS MAY BE PLACED AS CONTINUOUS BARS. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR THIS OPTION.
  5. ALL DIMENSIONS MEASURED PERPENDICULAR TO  $\phi$  OF BEARING.
  6. THE CONTRACTOR HAS THE OPTION TO CAST THE EXPANSION JOINT CROSS BEAM SUPPORT COLUMN MONOLITHICALLY WITH THE ABUTMENT AND BACKWALL STEM OR IN A SEPARATE POUR. NO ADDITIONAL COMPENSATION WILL BE GIVEN FOR EITHER ALTERNATIVE SELECTED.
  7. USE STRAIGHT THREADED BARS LAPPED TO A  $\square$  BAR IF THREADED COUPLERS ARE USED.
  8. FOR ABUTMENT A PLAN AND ELEVATION, SEE DWG. NO. S5-6.
  9. FOR LOCATION OF SECTION A-A, SEE DWG. NO. S5-6.
  10. FOR ADDITIONAL ABUTMENT A DETAILS, SEE DWG. NO. S5-9.
  11. FOR SECTION D-D, SEE DWG. NO. S5-11.
  12. FOR SECTION E-E, SEE DWG. NO. S5-12.
  13. FOR SECTION F-F, SEE DWG. NO. S5-13.
  14. FOR SECTION G-G, SEE DWG. NO. S5-14.
  15. FOR DETAILS OF ROADWAY JOINT, SEE DWG. NO. S5-42.
  16. FOR DRAINAGE SYSTEM BEHIND ABUTMENT A, SEE DWG. NO. S5-49.
  17. FOR BEARING PAD REINFORCING DETAILS, SEE DWG. NO. S5-49.

- AT THE CONTRACTOR'S OPTION THE DOWEL AND STEM BAR MAY BE PLACED AS A CONTINUOUS BAR. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR THIS OPTION.
- IF 1'-6" WIDTH OF THE CONCRETE BASE IS POURED TO REST ON TOP OF FOOTING, THE REINFORCING MAY BE ELIMINATED. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR THIS OPTION.

STRUCTURAL DETAIL /FINAL SUBMISSION

DWG. NO. S5 - 8

REVISIONS	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
	<p>NEW CONSTRUCTION DUALIZATION OF MD 404 (SHORE HIGHWAY) PRESTRESSED CONCRETE GIRDER BRIDGE NO. 1703204 ON MD 404 WESTBOUND OVER NORWICH CREEK</p> <p><b>ABUTMENT A - SECTIONS I</b></p> <p>SCALE AS SHOWN DATE SEPTEMBER 2016 CONTRACT NO. AW8965170</p> <p>DESIGNED BY P.D.R. COUNTY QUEEN ANNE / TALBOT DRAWN BY D.J.A. CHECKED BY C.L.B. F.A.P. NO. AC-NHPP-300-1(53)N</p>



OTHER CONTRACTS FOR THIS STRUCTURE

2016-09-14\_RFC

STRUCTURE INVENTORY NO. 1703204

SURVEY BOOK NO.

DESIGN: C:\SMD\151160\_001\_MD404\_DB\CADD\Structures\pBR-4001\_MD404.dgn  
PRINT DATE: Friday, September 02, 2016 AT 12:38 PM

SHEET NO. OF INDEXED

# Photo Captions

## **Structure S-5 Over Norwich Creek ( File: MD 404 Plan Sheet 1 Bridge details.pdf)**

Represents one the 26 main roadway crossing structures. Norwich Creek was a Tier 2 sensitive natural resource at the project site. The plan shows the complexity of the bridge abutments and foundation.

## **MD 404 Intersection Details (File: MD404 Plan Sheet 2 J-Turn Layout.pdf)**

Represents one of the roadway safety features incorporated into the design. Elimination of cross over movements resulted in the addition of the J-Turns to allow for local traffic to cross over the roadway and enter the roadway safely.

## **MD 404 Pavement Details (File: MD404 Plan Sheet 2-Pavement Design.pdf)**

Represents the complexity and innovation used in the pavement design including the use of soil cement to minimize the use of aggregates, which were not produced locally and the use of Ultra-Thin Bonded Wearing Surface as an economical alternative to conventional surface mixes.

## **MD 404 – Erosion and Sediment Control Plan -Final Phase (MD404 Plan Sheet 4 Erosion+Sediment Control.pdf)**

Represents the complex erosion and sediment control and stormwater management that was incorporated to protect the environment and promoted sustainability by utilizing environmental site design features.

## **MD 404 – Final Landscape Plan (MD404 Plan Sheet 5 Landscape Plan.pdf)**

Represents the extensive landscape plantings that were incorporated into the project design to make the roadway attractive, provide habitat for wildlife and to seamlessly incorporate the roadway into the scenic and history Maryland Eastern Shore rural setting.

## **Photo Credits**

### **MD 404 at Dulin Road.jpg**

Photographed by: Wallace Montgomery

### **TeamAtWork-MD404WBR-BridgeOverNorwich.JPG**

Photographed by: Wagman Heavy Civil

### **TeamAtWork-MD404WB\_PavingAsphalt-SoilCement.jpg**

Photographed by: MD 404 Corridor Safety Constructors

### **MD404atNorwichCk\_JturnToWB-404FrOldQueenAnne.jpg**

Photographed by: Johnson, Mirmiran & Thompson

### **MD 404 SWM.JPG**

Photographed by: Johnson, Mirmiran & Thompson



WEST  
404  
Wye Mills

EAST  
404







