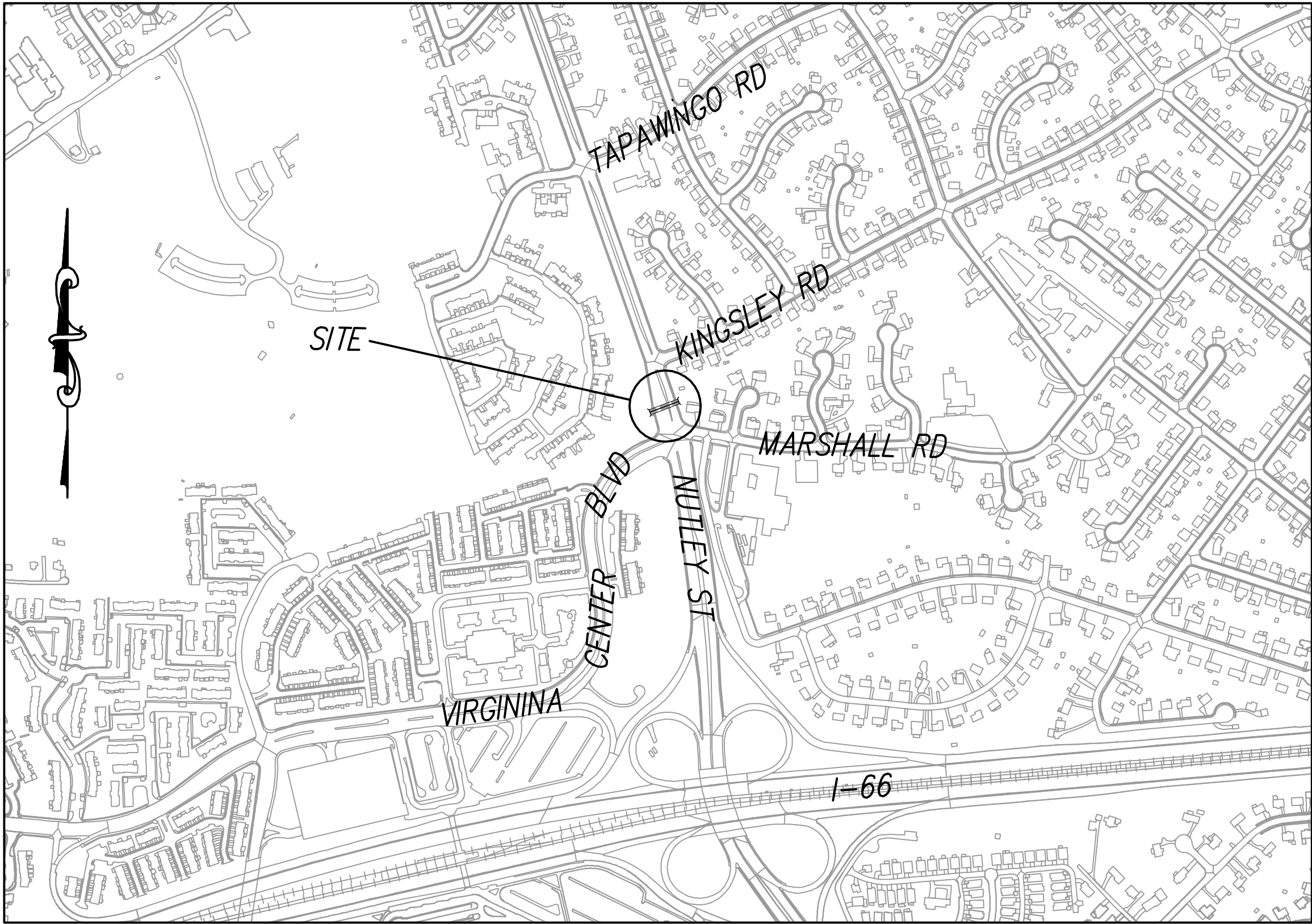


TOWN OF VIENNA



VICINITY MAP

0 500' 1000'
SCALE: 1" = 500'

DEPARTMENT OF PUBLIC WORKS

NUTLEY STREET CULVERT REPLACEMENT PROJECT

SHEET INDEX

- 1 COVER SHEET
- 2 PLAN SHEET
- 3 PROFILE SHEET
- 4 EROSION & SEDIMENT PLAN PHASE 1 & 1A
- 5 EROSION & SEDIMENT PLAN PHASE 2 & 2A
- 6 EROSION & SEDIMENT PLAN PHASE 3 & 3A
- 7 TRANSPORTATION MANAGEMENT PLAN NOTES
- 8 TRANSPORTATION MANAGEMENT PLAN PHASE 1
- 9 TRANSPORTATION MANAGEMENT PLAN PHASE 2
- 10 TRANSPORTATION MANAGEMENT PLAN PHASE 3
- 11 DRAINAGE ANALYSIS

PROJECT DESCRIPTION

THIS PROJECT REPLACES THE EXISTING TRIPLE 36" CULVERTS UNDER NUTLEY STREET NEAR THE INTERSECTION WITH VIRGINIA CENTER BOULEVARD. THE PROJECT AIMS TO IMPROVE DRAINAGE AND MITIGATE FLOODING OF PROPERTIES UPSTREAM OF THE CULVERT BETWEEN KINGSLEY ROAD AND MARSHALL ROAD.

COVER SHEET

Nutley Street Culvert Replacement Project

Town of Vienna, Virginia

WHITMAN, REQUARDT & ASSOCIATES, LLP
3700 Pender Drive, Suite 450, Fairfax, VA 22030

REVISIONS		Date:	COMMENTS
INITIALS			

PROJECT MANAGER: JA Date: 7/14
DESIGN ENGINEER: DMB Date: 7/14
CADD DESIGNER: WRA Date: 7/14

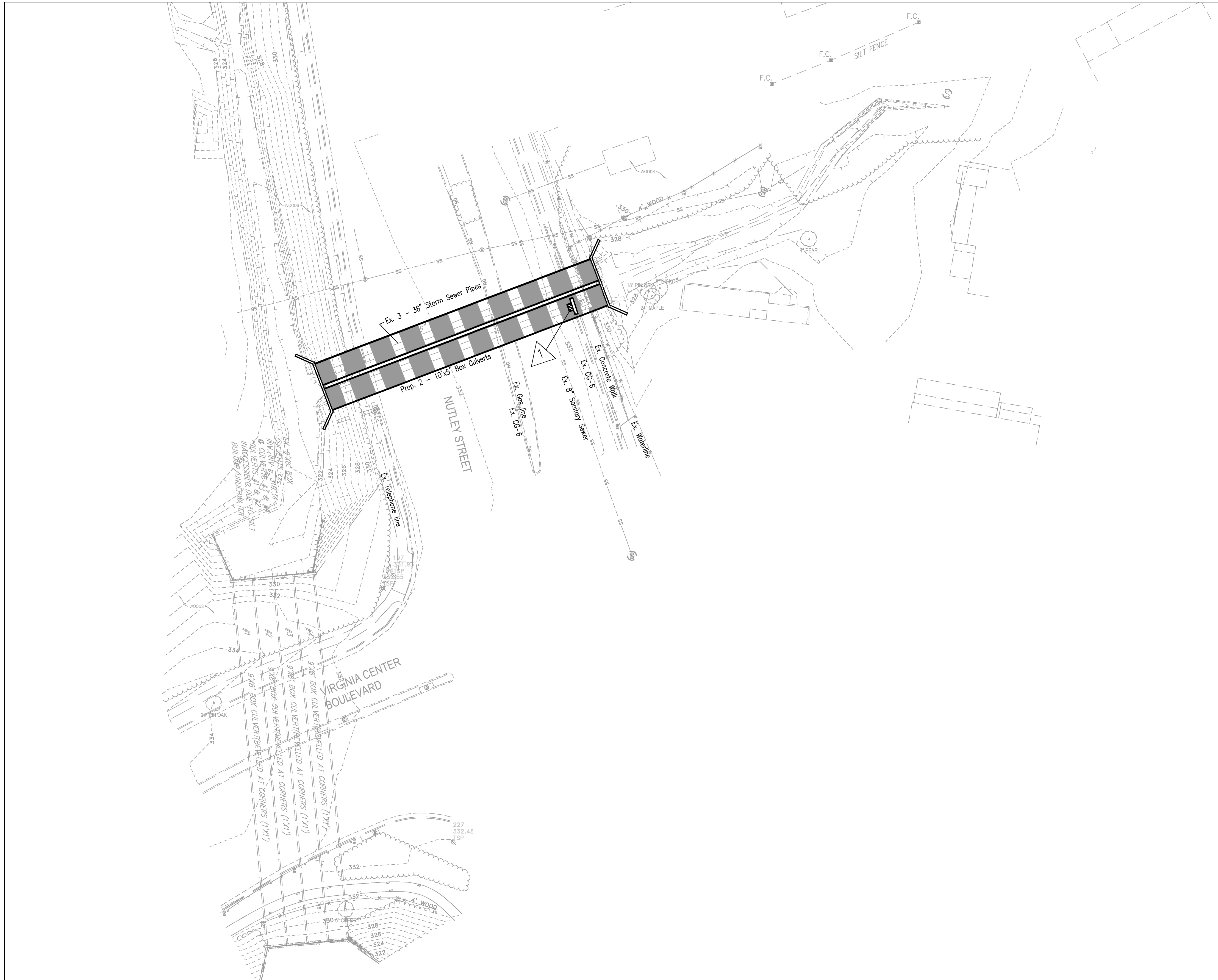
Scale: 1"=500' Project No. _____ Sheet 1 of 11

LEGEND

- 1 EXISTING DRAINAGE INLET TO BE REPLACED WITH EQUIVALENT AND CONNECTED TO BOX CULVERT

0 25' 50'
SCALE: 1" = 25'

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PLAN SHEET

Nutley Street Culvert Replacement Project

Town of Vienna, Virginia

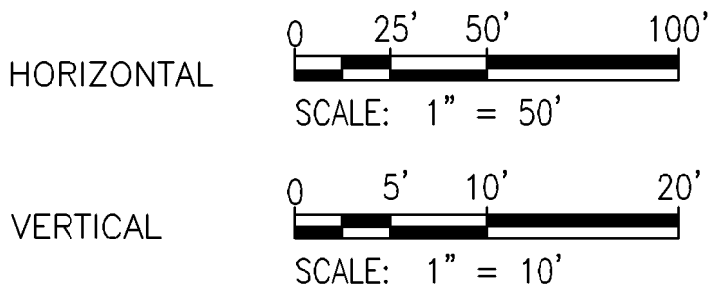
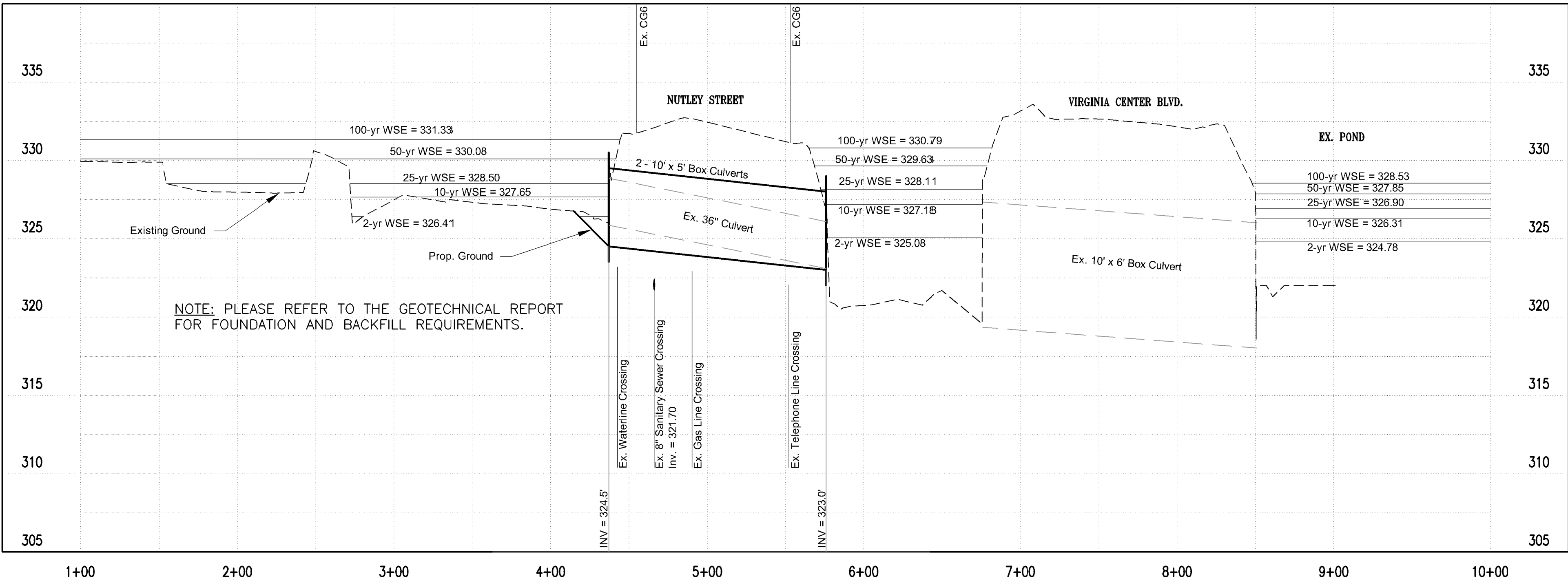
WR&A
WHITMAN, REQUARDT
& ASSOCIATES, LLP
3701 Pender Drive, Suite 400, Fairfax, VA 22030



PROJECT MANAGER:	IA	Date: 7/14	REVISIONS	INITIALS	COMMENTS
DESIGN ENGINEER:	DMB	Date: 7/14			
CADD DESIGNER:	WRA	Date: 7/14			

Scale: 25' Project No. 2 of 11

CULVERT PROFILE



THE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

CULVERT PROFILE

Nutley Street Culvert Replacement Project

Town of Vienna, Virginia



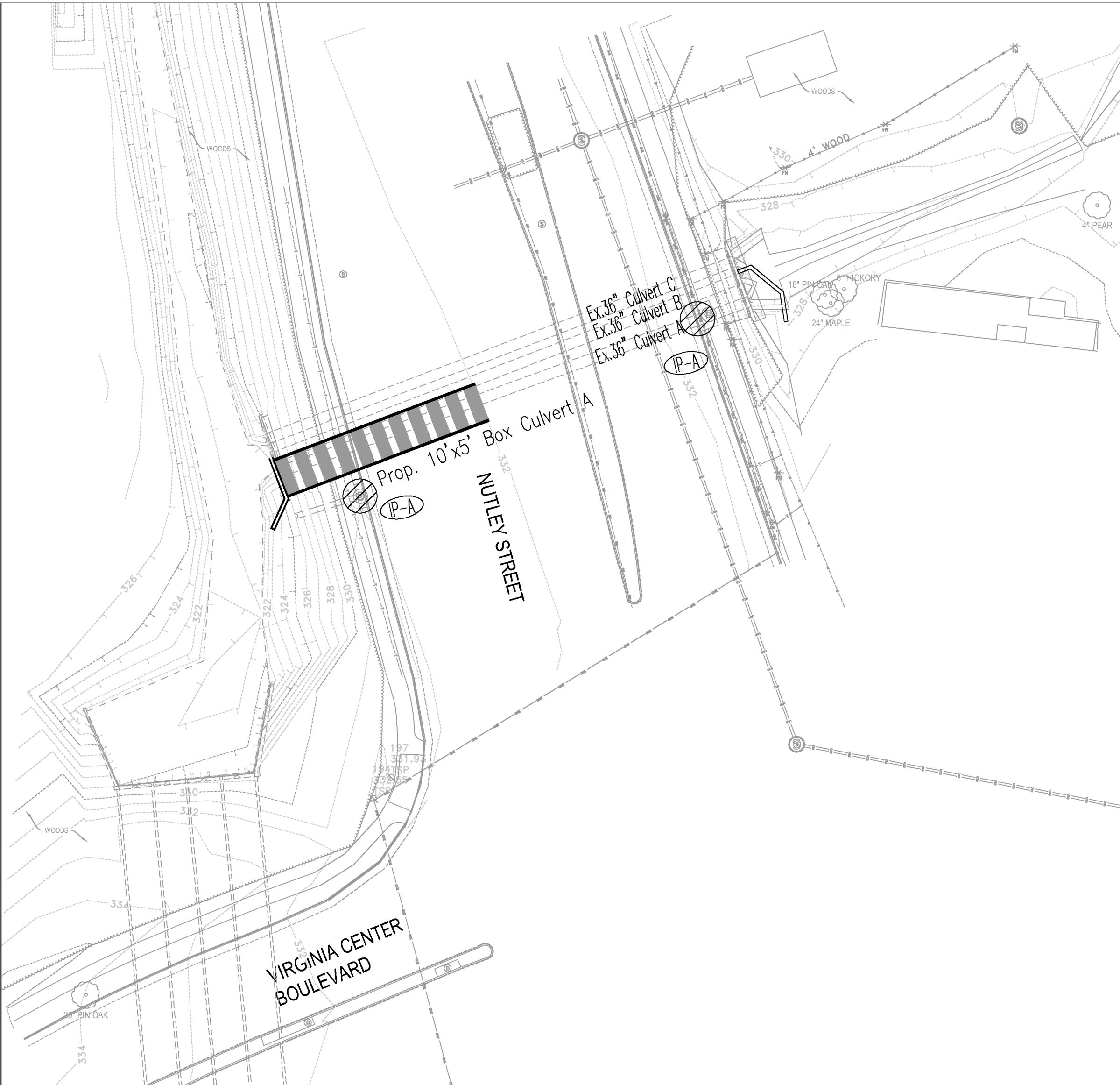
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DESIGN ENGINEER: <u>DMB</u>	Date: <u>7/14</u>			
CADD DESIGNER: <u>WRA</u>	Date: <u>7/14</u>			

Scale: **as shown** Project No. _____ Sheet **3** of **11**

EROSION AND SEDIMENT CONTROL PLAN

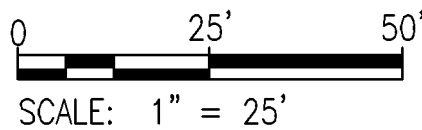
STAGE SEQUENCE OF CONSTRUCTION FOR CULVERTS

PHASE I

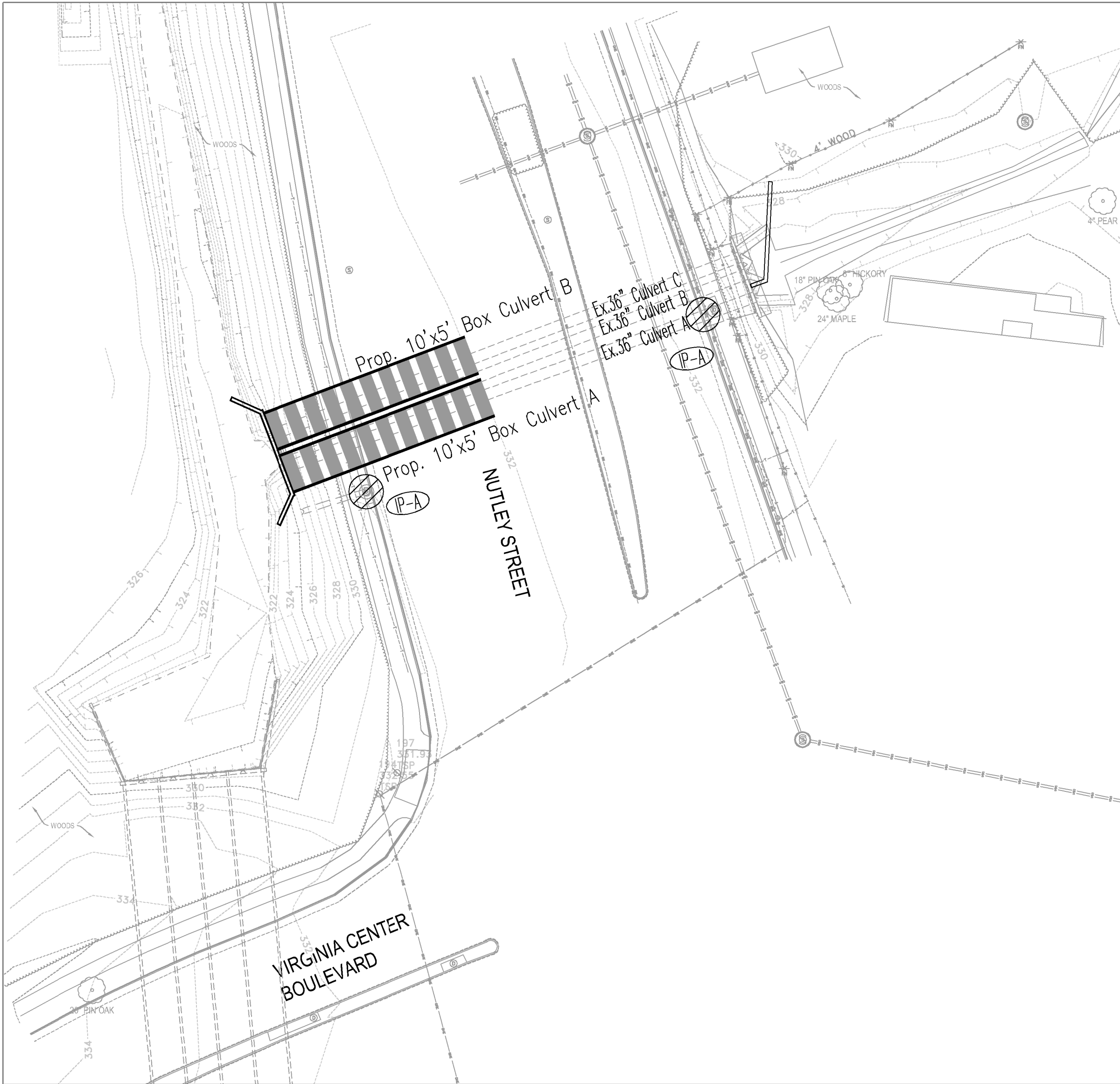


STAGE SEQUENCE OF CONSTRUCTION FOR PHASE 1

1. PLACE COFFERDAM UPSTREAM OF EXISTING 36" CULVERTS A AND B AS SHOWN. STORMWATER WILL FLOW THROUGH EXISTING 36" CULVERT C DURING CONSTRUCTION OF DOWNSTREAM PORTION OF THE PROPOSED 10'X5' BOX CULVERT A.
2. REMOVE DOWNSTREAM PORTION OF THE EXISTING 36' CULVERTS A AND B.
3. CONSTRUCT THE DOWNSTREAM PART OF THE PROPOSED 10' X 5' BOX CULVERT A.
4. MAKE A TEMPORARY CONNECTION BETWEEN THE DOWNSTREAM END OF THE EX. 36" CULVERT A AND THE UPSTREAM END OF THE PROPOSED 10'X5' BOX CULVERT A.
5. REMOVE THE COFFERDAM.



PHASE 1A



STAGE SEQUENCE OF CONSTRUCTION FOR PHASE 1A

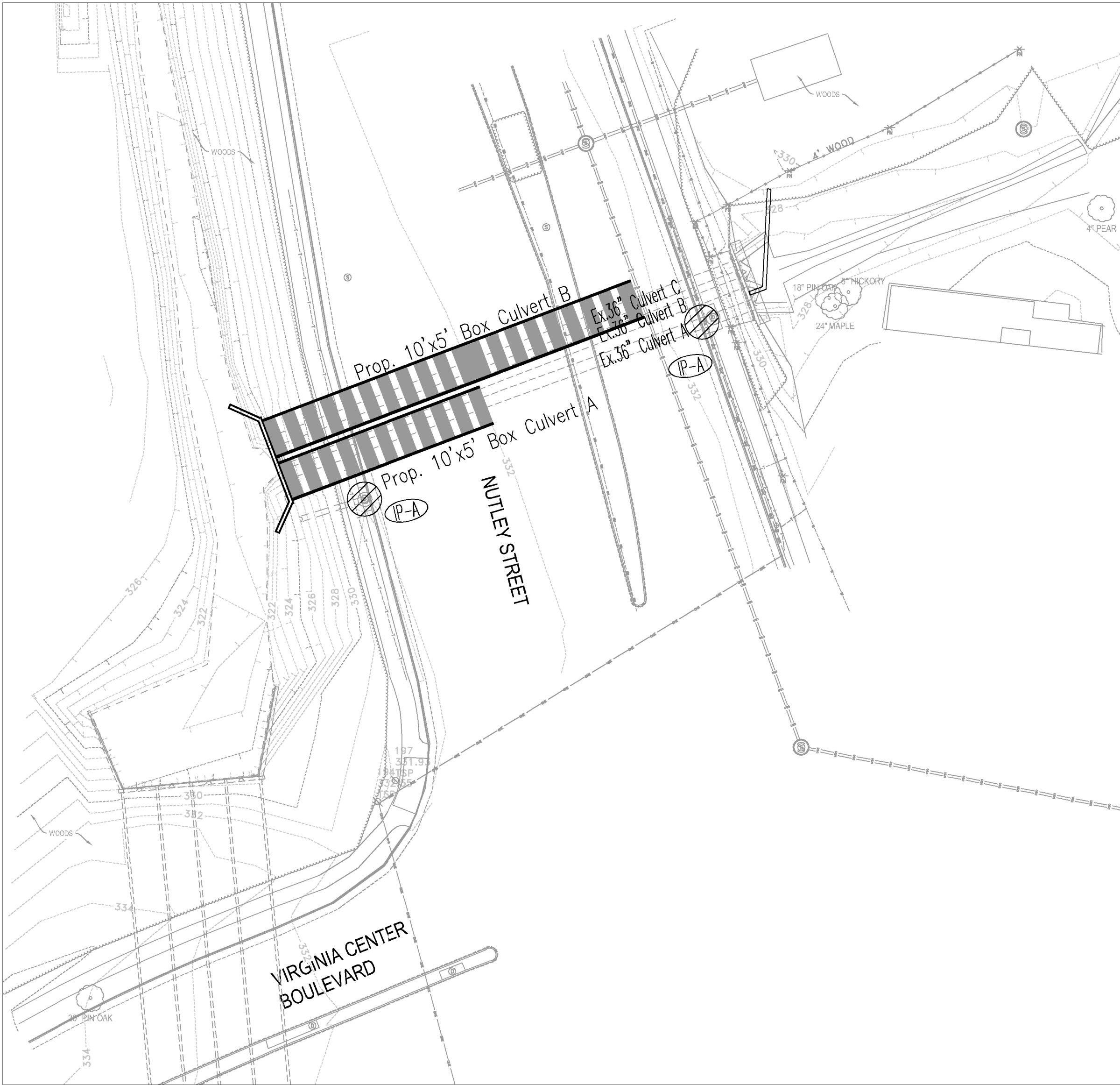
1. PLACE A COFFERDAM UPSTREAM OF EXISTING 36" CULVERTS B AND C. STORMWATER WILL FLOW THROUGH THE REMAINING PORTION OF EX. 36" CULVERT A AND THE DOWNSTREAM PORTION OF PROP. BOX CULVERT A.
2. REMOVE THE DOWNSTREAM PART OF THE EXISTING 36" CULVERT C.
3. CONSTRUCT THE DOWNSTREAM PART OF THE PROPOSED 10' X 5' BOX CULVERT B.

THE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

 WHITMAN, REQUARDT & ASSOCIATES, LLP 3701 Pender Drive, Suite 450, Fairfax, VA 22030	EROSION & SEDIMENT CONTROL		PROJECT MANAGER: <u>JA</u> Date: <u>7/14</u>		REVISIONS INITIALS	COMMENTS
	Nutley Street Culvert		DESIGN ENGINEER: <u>DMB</u> Date: <u>7/14</u>			
	Replacement Project		CADD DESIGNER: <u>WRA</u> Date: <u>7/14</u>			
		Scale: 25		Project No.		Sheet 4 of 11
Town of Vienna, Virginia						

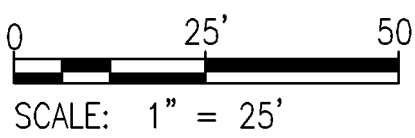
EROSION AND SEDIMENT CONTROL PLAN
STAGE SEQUENCE OF CONSTRUCTION FOR CULVERTS

PHASE II

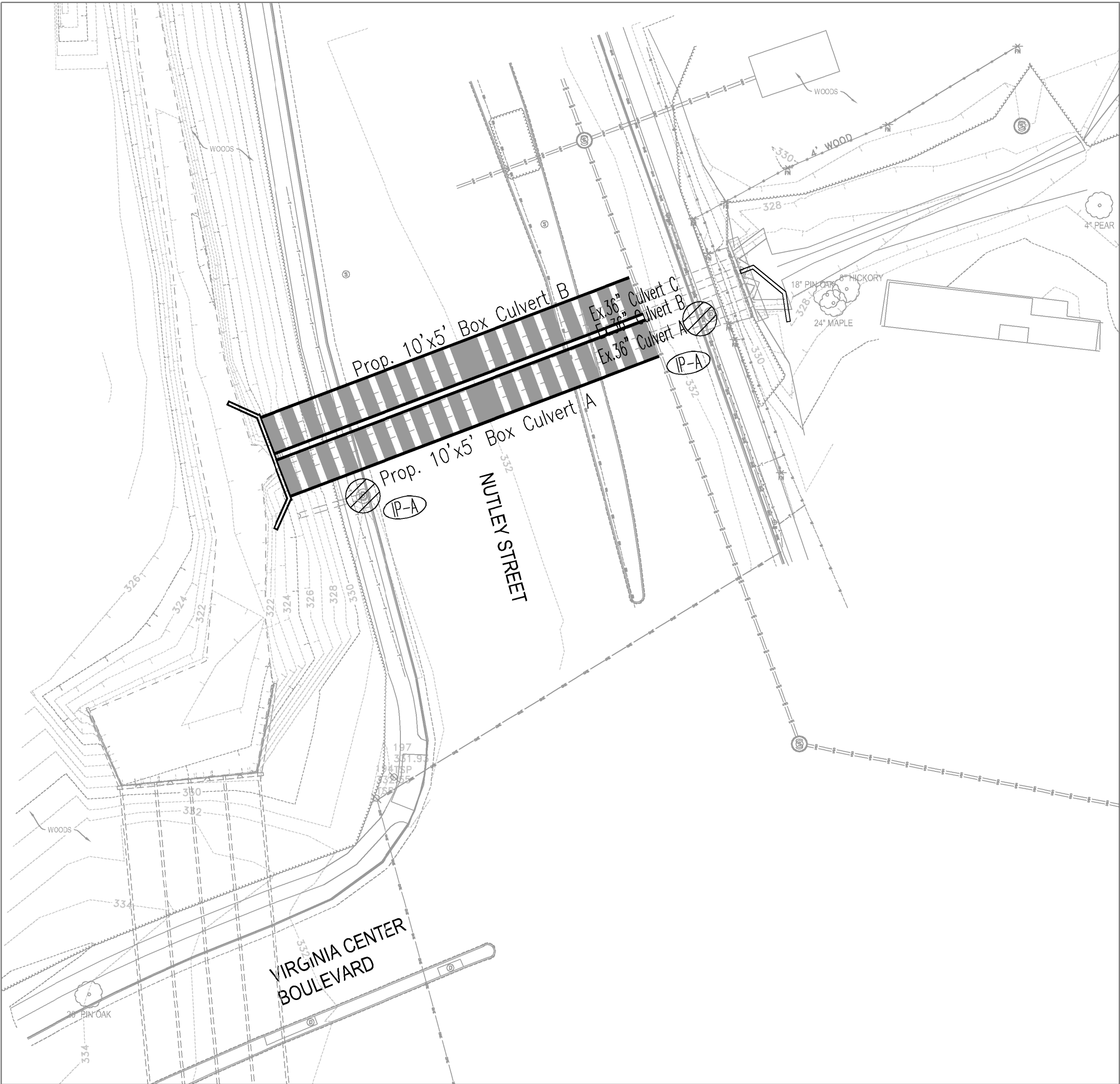


STAGE SEQUENCE OF CONSTRUCTION FOR PHASE 2

1. REMOVE THE MIDDLE SECTION OF THE EXISTING 36" CULVERT C.
2. CONSTRUCT THE MIDDLE SECTION OF THE PROPOSED 10' X 5' BOX CULVERT B.
3. MAKE A TEMPORARY CONNECTION BETWEEN THE DOWNSTREAM END OF THE EX. 36" CULVERT C AND THE UPSTREAM END OF THE PROPOSED 10'X5' BOX CULVERT B.
4. REMOVE THE COFFERDAM.



PHASE IIA



STAGE SEQUENCE OF CONSTRUCTION FOR PHASE 2A

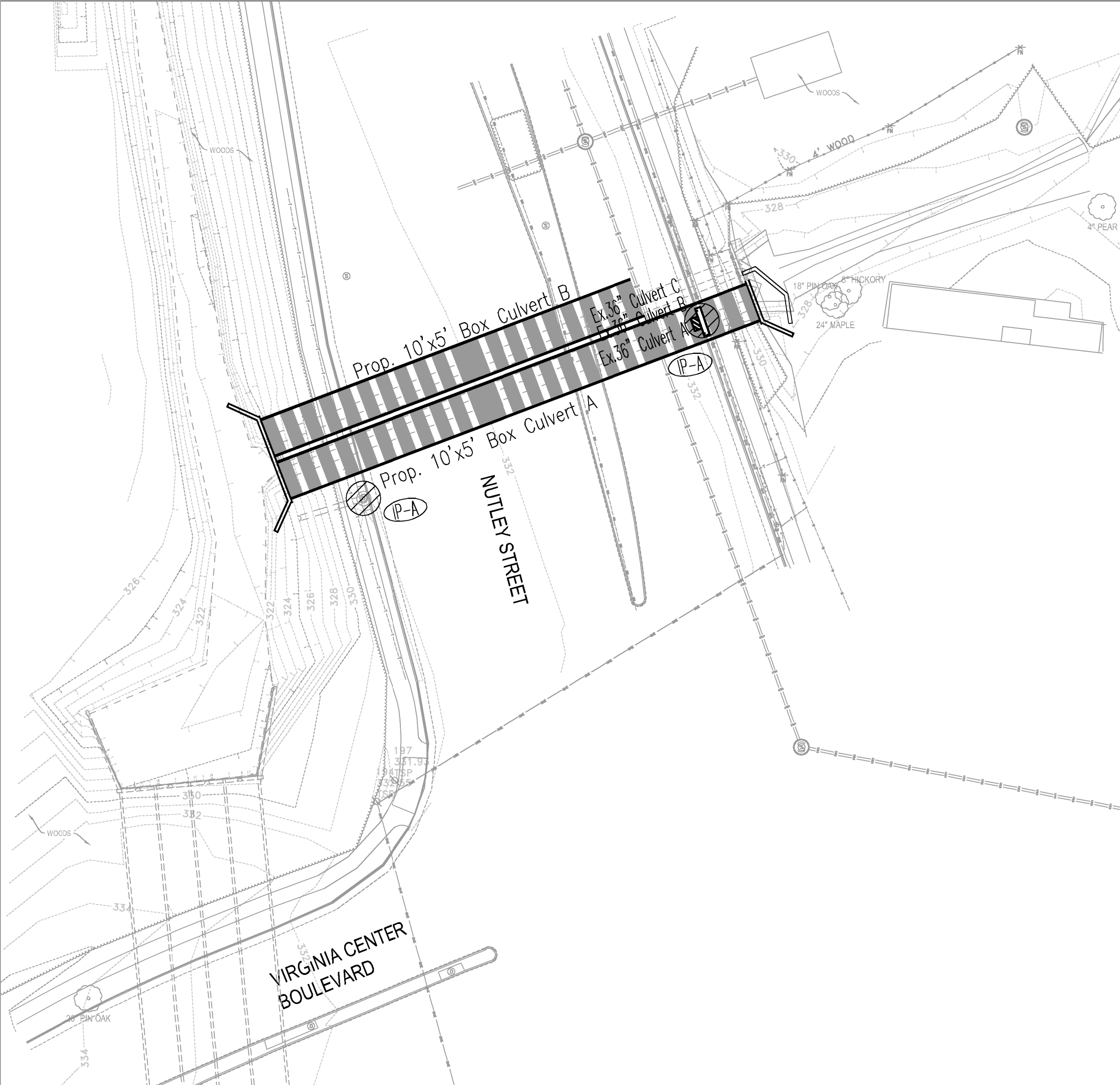
1. PLACE COFFERDAM UPSTREAM OF EXISTING 36" CULVERTS A AND B. THE STORMWATER WILL FLOW THROUGH THE REMAINING PORTION OF EX. 36" CULVERT C AND THE DOWNSTREAM PORTION OF PROP. BOX CULVERT B.
2. REMOVE THE MIDDLE SECTION OF EXISTING 36" CULVERTS A AND B.
3. CONSTRUCT THE MIDDLE SECTION OF THE PROPOSED 10' X 5' BOX CULVERT A.

THE PLANS ARE UNFINISHED AND UNAPPROVED AND
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OR THE ACQUISITION OF RIGHT OF WAY.

		EROSION & SEDIMENT CONTROL		PROJECT MANAGER: JA Date: 7/14		REVISIONS	
		Nutley Street Culvert Replacement Project		DESIGN ENGINEER: DMB Date: 7/14		INITIALS	
		Town of Vienna, Virginia		CADD DESIGNER: WFA Date: 7/14		COMMENTS	
Scale: 25		Project No.		Sheet 5		of 11	

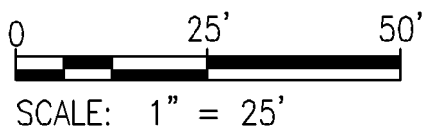
EROSION AND SEDIMENT CONTROL PLAN
STAGE SEQUENCE OF CONSTRUCTION FOR CULVERTS

PHASE III

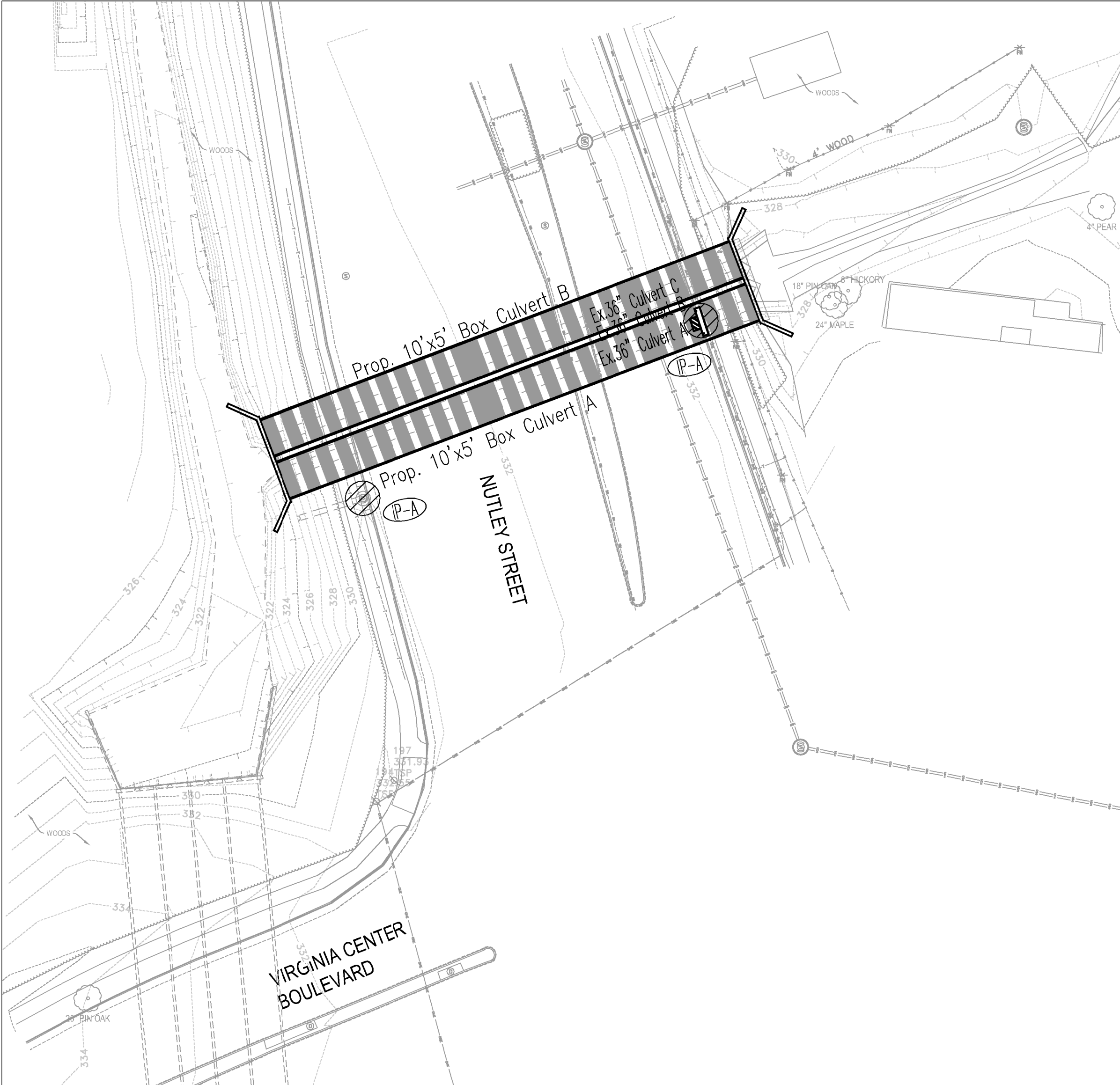


STAGE SEQUENCE OF CONSTRUCTION FOR PHASE 3

1. REMOVE THE REMAINING SECTIONS OF EXISTING 36" CULVERTS A AND B.
2. CONSTRUCT THE UPSTREAM SECTION OF THE PROPOSED 10' X 5' BOX CULVERT A.
3. INSTALL CURB INLET WHICH CONNECTS TO THE PROPOSED 10'X5' BOX CULVERT A.
4. REMOVE THE COFFERDAM.



PHASE IIIA



STAGE SEQUENCE OF CONSTRUCTION FOR PHASE 3A

1. PLACE COFFERDAM UPSTREAM OF EXISTING 36" CULVERT C. THE STORMWATER WILL FLOW THROUGH PROPOSED 10'X5' BOX CULVERT A.
2. REMOVE THE REMAINING UPSTREAM SECTION OF THE EXISTING 36" CULVERT C.
3. CONSTRUCT THE UPSTREAM END OF THE PROPOSED 10' X 5' BOX CULVERT B.
4. REMOVE THE COFFERDAM.

THE PLANS ARE UNFINISHED AND UNAPPROVED AND
ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION
OR THE ACQUISITION OF RIGHT OF WAY.

EROSION & SEDIMENT CONTROL Nutley Street Culvert Replacement Project Town of Vienna, Virginia	PROJECT MANAGER: <u>JA</u> Date: <u>7/14</u> DESIGN ENGINEER: <u>DMB</u> Date: <u>7/14</u> CADD DESIGNER: <u>WRA</u> Date: <u>7/14</u>	REVISIONS INITIALS COMMENTS Date: _____ _____ _____
	Scale: 25 Project No. _____ Sheet 6 of 11	

TRANSPORTATION MANAGEMENT PLAN

GENERAL NOTES

THE CONTRACTOR SHALL PLAN AND EXECUTE THE WORK IN ACCORDANCE WITH THE SEQUENCE OF CONSTRUCTION PLAN UNLESS A CHANGE IS APPROVED OR DIRECTED BY THE ENGINEER. IT IS NOT THE INTENT OF THE SEQUENCE OF CONSTRUCTION PLAN TO ENUMERATE EVERY DETAIL WHICH MUST BE CONSIDERED IN THE CONSTRUCTION OF EACH STAGE, BUT ONLY TO SHOW THE GENERAL HANDLING OF TRAFFIC. UNLESS OTHERWISE APPROVED OR DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL PLAN AND PROSECUTE THE WORK IN ACCORDANCE WITH THE FOLLOWING:


- THE CONTRACTOR IS EXPECTED TO FOLLOW THE TRAFFIC CONTROL PLANS AS PROPOSED. IF THE CONTRACTOR WISHES TO DEVIATE FROM THE PROPOSED TRAFFIC CONTROL PLANS, THE CONTRACTOR SHALL DEVELOP PLANS THAT CONFORM TO THE 2011 VIRGINIA WORK AREA PROTECTION MANUAL: MUTCD, 2009 EDITION; VDOT'S IIM-LD-241; AND VDOT'S 2007 ROAD AND BRIDGE SPECIFICATIONS. THE CONTRACTOR SHALL SUBMIT THE TRAFFIC CONTROL PLAN FOR APPROVAL BY THE ENGINEER PRIOR TO THE INSTALLATION OF ANY TEMPORARY LANE CLOSURE MEASURES. THE CONTRACTOR WILL DEVELOP THE TRAFFIC CONTROL PLAN AT NO COST TO THE PROJECT. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE THE SAFE TRAVEL ON THE ROADWAYS.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE VDOT ROAD AND BRIDGE SPECIFICATIONS DATED 2007: MUTCD 2009 EDITION; THE 2011 VIRGINIA WORK AREA PROTECTION MANUAL; AND AS DIRECTED BY THE ENGINEER.
- AT THE CONCLUSION OF EACH WORKDAY, ALL AREAS EXCAVATED BELOW THE EXISTING PAVEMENT SURFACE AND WITHIN THE CLEAR ZONE, SHALL BE BACKFILLED WITH APPROVED MATERIAL TO FORM AN APPROXIMATE 6:1 WEDGE AGAINST THE EXISTING PAVEMENT SURFACE FOR THE SAFETY AND PROTECTION OF VEHICULAR TRAFFIC. ALL COST FOR PLACING, MAINTAINING, AND REMOVING THE 6:1 WEDGE SHALL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS IN THE CONTRACT AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- EXISTING SURFACE, AGGREGATE BASE AND SUBBASE MATERIAL, WHICH WILL BE DEMOLISHED OR OBLITERATED DURING CONSTRUCTION AND WHICH IS SUITABLE FOR MAINTENANCE OF TRAFFIC, AS DETERMINED BY THE ENGINEER, SHALL BE SALVAGED AND UTILIZED FOR MAINTENANCE OF TRAFFIC PRIOR TO THE USE OF COMMERCIAL MATERIALS. ALL COSTS ASSOCIATED WITH THE REUSE OF THESE SALVAGED MATERIALS FOR MAINTENANCE OF TRAFFIC SHALL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS IN THE CONTRACT AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- PEAK HOURS: 6:00 AM – 9:00 AM AND 3:30 PM – 6:00 PM
NON-PEAK HOURS: 9:00 AM – 3:30 PM

LANE CLOSURES WILL NOT BE PERMITTED DURING THE PEAK HOURS UNLESS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR APPROVAL BY THE ENGINEER PRIOR TO THE INSTALLATION OF ANY TEMPORARY LANE CLOSURE MEASURES. LANE CLOSURES THAT RESTRICT TRAFFIC WILL NOT BE PERMITTED ON SATURDAYS, SUNDAYS, AND ON HOLIDAYS FROM 12:00 NOON THE DAY BEFORE A HOLIDAY UNTIL NOON THE DAY AFTER A HOLIDAY UNLESS APPROVED BY THE ENGINEER. WHEN A HOLIDAY FALLS ON A FRIDAY, LANE CLOSURES ARE NOT PERMITTED FROM NOON THURSDAY UNTIL NOON ON MONDAY. WHEN THE HOLIDAY FALLS ON MONDAY LANE COLSURE ARE NOT PERMITTED FROM NOON FIRDAY UNTIL NOON ON TUESDAY.

- ERADICATE AND RESTRIPE EXISTING PAVEMENT MARKINGS AS NECESSARY TO SHIFT TRAFFIC.
- TEMPORARY LANE WIDTHS SHALL NOT BE LESS THAN 11 FEET.
- AN 18 FOOT CLEAR ZONE AND THE DEFLECTION ZONE OF PHYSICAL BARRIERS SHALL BE MAINTAINED FREE OF PARKED EQUIPMENT AND STORED MATERIAL AND PROTECTED AT THE END OF EACH DAY IN ACCORDANCE WITH THE WORK AREA PROTECTION MANUAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ANY EXISITNG SIGNS, UNLESS OTHERWISE ADVISED BY THE ENGINEER TO REMOVE OR RELOCATE.
- WHEN PROCEEDING FROM ONE STAGE OF CONSTRUCTION TO ANOTHER STAGE OF CONSTRUCTION ANY EXISTING OR CONSTRUCTION PAVEMENT MARKINGS THAT DO NOT ALIGN WITH THE NEW TRAFFIC PATTERNS AND/OR NECESSARY MARKINGS SHALL BE ERADICATED AND RE-STRIPED.
- ALL PAVEMENT MARKINGS AND TRAFFIC FLOW ARROWS ARE SCHEMATIC ONLY. THE ACTUAL LOCATION AND APPLICATION OF PAVEMENT MARKINGS SHALL BE MADE AS PER TEMPORARY PAVEMENT MARKINGS PLANS & IN ACCORDANCE WITH SECTION 704 OF THE VDOT ROAD AND BRIDGE SPECIFICATIONS DATED 2007; THE MUTCD, 2009 EDITION; THE 2008 ROAD AND BRIDGE STANDARDS; OR AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE CONSTRUCTION, SIGNING AND TRAFFIC MANAGEMENT PLAN WITH OTHER ADJACENT PROJECTS UNDER CONSTRUCTION.
- ALL EROSION AND SEDIMENT CONTROL MEASURES AND TEMPORARY DRAINAGE SHALL BE IN PLACE PRIOR TO THE BEGINNING OF CONSTRUCTION.
- THE TMP FOR THIS PROJECT IS CATEGORIZED AS TYPE B, CATEGORY 2.

TEMPORARY TRAFFIC CONTROL
SIGN SCHEDULE

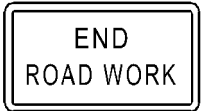
①



ROAD
WORK
AHEAD

W20-1
48" x 48"


②



END
ROAD WORK

G20-2(V)
48" x 24"


③



RIGHT
LANE CLOSED
AHEAD

W9-3R
48" x 48"


④



KEEP
LEFT

R4-V7L
48" x 48"

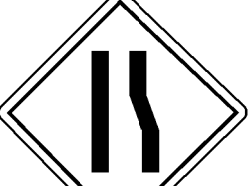
⑤



LANE
ENDS
MERGE
LEFT

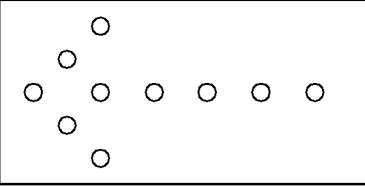
W9-2L
48" x 48"

⑥




W4-2R
48" x 48"

⑦



ILLUMINATED FLASHING
AMBER ARROW
TYPE C

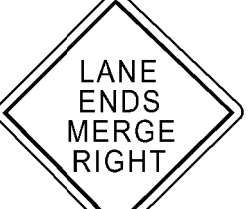
⑧



LEFT
LANE CLOSED
AHEAD

W9-3L
48" x 48"


⑨



LANE
ENDS
MERGE
RIGHT

W9-2R
48" x 48"


⑩



KEEP
RIGHT


R4-V7R
48" x 48"

⑪



W4-2L
48" x 48"

⑫



2
LEFT
LANES CLOSED
AHEAD

W20-5aL
48" x 48"

PUBLIC COMMUNICATIONS PLAN

THE PUBLIC SHALL BE NOTIFIED OF THE EXPECTED SCHEDULE ON VDOT'S WEB SITE FOR THIS PROJECT. INFORMATION OF THE POTENTIAL FOR BACK-UPS DURING THE PEAK HOURS OF OPERATION IS PROVIDED BY THE REGIONAL TRANSPORTATION OPERATION CENTER (TOC).

TRANSPORTATION OPERATIONS PLAN

THE PUBLIC AFFAIRS SECTION AND THE TRAFFIC OPERATIONS CENTER SHALL BE NOTIFIED BY THE CONSTRUCTION PROJECT MANAGER OF LANE CLOSURE INFORMATION FOR DISTRIBUTION ON THE 511 SYSTEM AND VOIS. THE CONSTRUCTION PROJECT MANAGER SHALL BE NOTIFIED ONE WEEK IN ADVANCE OF LANE CLOSURES. EMERGENCY RESPONSE PROFESSIONALS SHALL RESPOND TO TRAFFIC INCIDENTS IN THE WORK ZONE AS SOON AS POSSIBLE. BY NOON ON EACH WEDNESDAY, THE CONTRACTOR WILL SUBMIT TO THE CONSTRUCTION PROJECT MANGER IN WRITING, A REQUEST FOR LANE CLOSURES FOR THE FOLLOWING WEEK.

THE FOLLOWING IS THE CONTACT LIST OF EMERGENCY RESPONSE AGENCIES IN CASE AN INCIDENT OCCURS IN THE WORK ZONE:

POLICE/AMBULANCE/FIRE SAFETY/HAZMAT SPILLS – 911
TRAFFIC OPERATIONS CENTER – (703) 877-3401
VIRGINIA STATE POLICE – (703) 791-3701

FOLLOWING ANY TRAFFIC INCIDENTS, THE SITE SHALL BE CLEARED AND RESTORED FOR NORMAL TRAFFIC OPERATIONS AS SOON AS POSSIBLE.

TRAFFIC INCIDENTS WILL BE INVESTIGATED AND MEASURES INTRODUCED TO REDUCE OCCURRENCES. IF NECESSARY THE MAINTENANCE OF TRAFFIC PLANS MAY BE REVISED IN CONSULTATION WITH VDOT ENGINEER

SEQUENCE OF CONSTRUCTION

INSTALL SIGNING FOR PROJECT LIMITS AS SHOWN IN FIGURE TTC-53.0 OF THE VIRGINIA WORK AREA PROTECTION MANUAL (VA WAPM).

PHASE 1

A) THE CONTRACTOR SHALL CLOSE THE OUTSIDE THRU LANE ON SOUTHBOUND NUTLEY STREET IN ACCORDANCE WITH FIGURE TTC-16.0 OF THE VA WAPM. TRAFFIC SHOULD BE ALLOWED TO MERGE BACK INTO THEIR INTENDED MOVEMENTS AFTER THE CONSTRUCTION WORK ZONE AND BEFORE THE VIRGINIA CENTER BOULEVARD INTERSECTION AS SHOWN ON THE PLANS.

B) REMOVE AND REPLACE THE STORM PIPES AS SHOWN ON PLANS.

PHASE 2

A) THE CONTRACTOR SHALL CLOSE THE INSIDE THRU LANE ON SOUTHBOUND NUTLEY STREET IN ACCORDANCE WITH FIGURE TTC-17.0 OF THE VA WAPM AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL CLOSE THE 2 LEFT LANES ON NORTHBOUND NUTELY STREET BEFORE THE VIRGINIA CENTER BOULEVARD INTERSECTION IN ACCORDANCE WITH FIGURE TTC-18.0 OF THE VA WAPM AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL KEEP THE TWO LEFT TURN LANES OPEN AND CLOSE THE LEFT THRU LANE ON NORTHBOUND NUTELY STREET AT THE VIRGINIA CENTER BOULEVARD INTERSECTION IN ACCORDANCE WITH FIGURE TTC-27.0 OF THE VA WAPM AS SHOWN ON THE PLANS.

B) REMOVE AND REPLACE THE STORM PIPES AND MEDIAN AS SHOWN ON PLANS.

PHASE 3

A) THE CONTRACTOR SHALL CLOSE THE RIGHT LANE ON NORTHBOUND NUTLEY STREET IN ACCORDANCE WITH FIGURE TTC-16.0 OF THE VA WAPM.

B) REMOVE AND REPLACE THE STORM PIPES AS SHOWN ON PLANS.

REVISIONS
INITIALS
COMMENTS
Date: _____

PROJECT MANAGER: IA _____ Date: 7/14
DESIGN ENGINEER: DMB _____ Date: 7/14
CADD DESIGNER: WRA _____ Date: 7/14

Scale: 25 Project No. _____ Sheet 7 of 11

TRANSPORTATION MANAGEMENT PLAN

Nutley Street Culvert
Replacement Project

Town of Vienna, Virginia



WHITMAN, REQUARDT
& ASSOCIATES, LLP
3701 Fender Drive, Suite 430, Fairfax, VA 22030



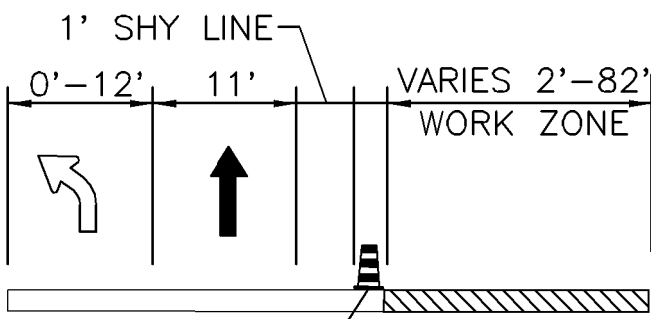
TRANSPORTATION MANAGEMENT PLAN
PHASE 1

POSTED SPEED LIMITS

NUTLEY STREET (RTE. 243)	= 35 MPH
VIRGINIA CENTER BOULEVARD (RTE. 6154)	= 30 MPH
MARSHALL ROAD	= 25 MPH
KINGSLEY ROAD	= 25 MPH

MOT LEGEND

	CONSTRUCTION WORK ZONE
	ARROW BOARD
	SIGN
	GROUP 2 CHANNELIZATION DEVICE
	EXISTING DIRECTION OF TRAVEL
	TEMPORARY DIRECTION OF TRAVEL
	SHADOW VEHICLE



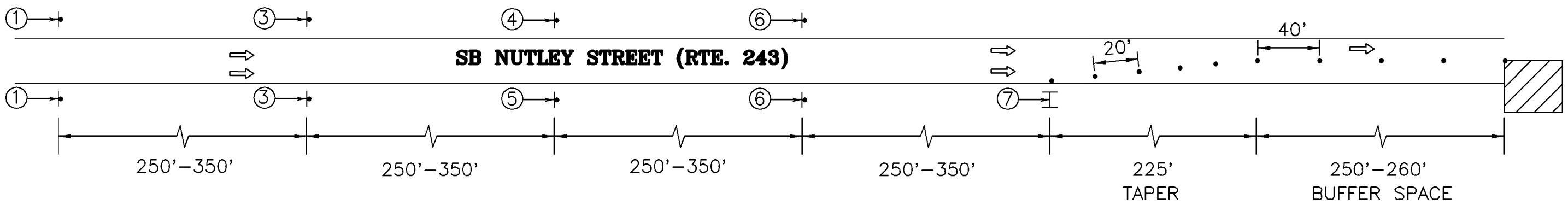
GROUP 2 CHANNELIZING DEVICE

NUTLEY STREET (RTE. 243)
SPEED LIMIT = 35 MPH
OUTSIDE LANE CLOSURE OPERATION ON
A FOUR-LANE ROADWAY (TTC-16.0)

NOTES:

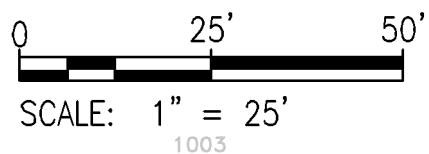
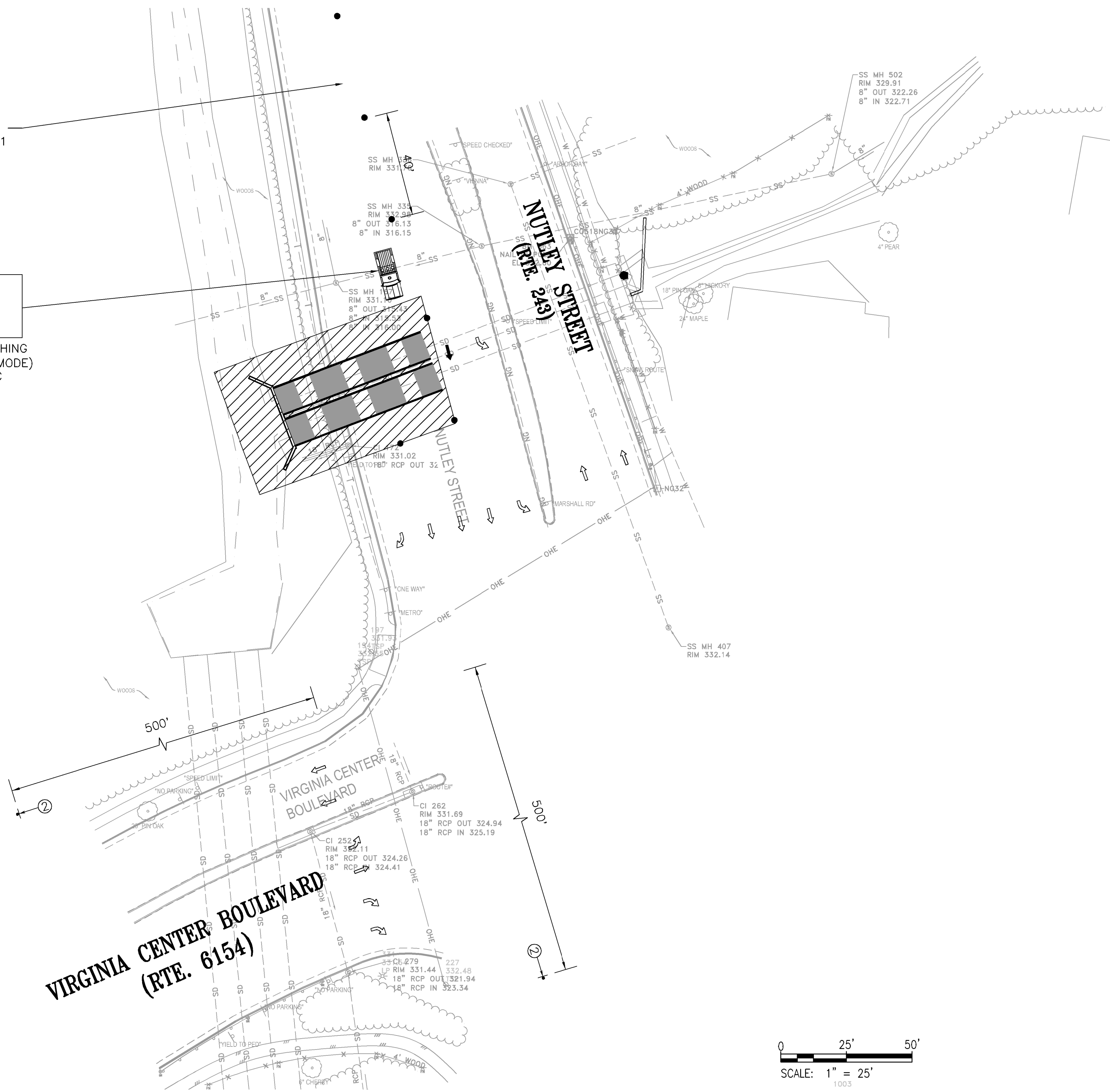
- 1.) SEE SHEET IC(1) FOR SIGN LEGEND.
- 2.) PROJECT LIMITS SIGNING SHALL BE IN ACCORDANCE WITH FIGURE TTC-53.0 OF THE 2011 VA WAPM.
- 3.) OUTSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY SHALL BE IN ACCORDANCE WITH FIGURE TTC-16.0 OF THE VA WAPM.
- 4.) PEDESTRIAN ACCESS THROUGH CONSTRUCTION ZONES SHALL BE MAINTAINED AT ALL TIMES.

WORKZONE APPROACH DETAIL 1
(FIGURE TTC-16.0)
N.T.S.



SEE WORKZONE
APPROACH DETAIL 1

ILLUMINATED FLASHING
AMBER (CAUTION MODE)
TYPE B OR C



THE PLANS ARE UNFINISHED AND UNAPPROVED AND
ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION
OR THE ACQUISITION OF RIGHT OF WAY.

REVISIONS	COMMENTS
Date:	
INITIALS	

PROJECT MANAGER: JA	Date: 7/14
DESIGN ENGINEER: DMB	Date: 7/14
CADD DESIGNER: WRA	Date: 7/14

Scale: 25	Project No.
-----------	-------------

TRANSPORTATION MANAGEMENT PLAN
Nutley Street Culvert
Replacement Project
Town of Vienna, Virginia

WR&A
WHITMAN, REQUARDT
& ASSOCIATES, LLP
3701 Pender Drive, Suite 450, Fairfax, VA 22030



TRANSPORTATION MANAGEMENT PLAN

PHASE 2

POSTED SPEED LIMITS

NUTLEY STREET (RTE. 243) = 35 MPH
VIRGINIA CENTER BOULEVARD (RTE. 6154) = 30 MPH
MARSHALL ROAD = 25 MPH
KINGSLEY ROAD = 25 MPH

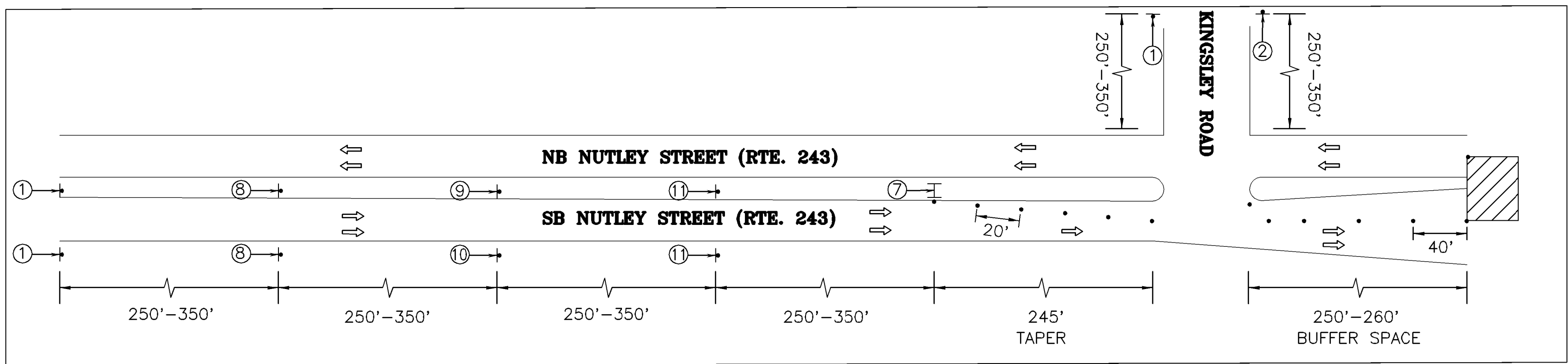
MOT LEGEND

- CONSTRUCTION WORK ZONE
- ARROW BOARD
- SIGN
- GROUP 2 CHANNELIZATION DEVICE
- EXISTING DIRECTION OF TRAVEL
- TEMPORARY DIRECTION OF TRAVEL
- SHADOW VEHICLE

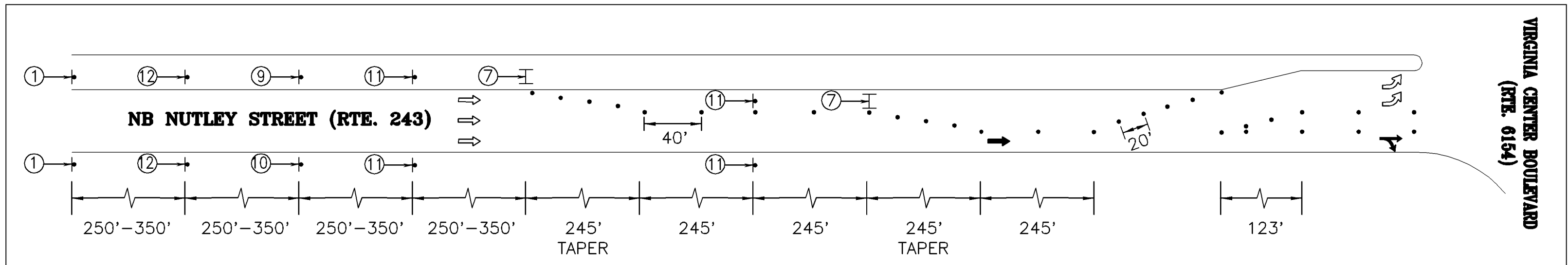
NOTES:

- SEE SHEET IC(1) FOR SIGN LEGEND.
- PROJECT LIMITS SIGNING SHALL BE IN ACCORDANCE WITH FIGURE TTC-53.0 OF THE 2011 VA WAPM.
- INSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY SHALL BE IN ACCORDANCE WITH FIGURE TTC-17.0 OF THE VA WAPM.
- MULTI-LANE CLOSURE OPERATION SHALL BE IN ACCORDANCE WITH FIGURE TTC-18.0 OF THE VA WAPM.
- LANE CLOSURE OPERATION - FAR SIDE OF AN INTERSECTION SHALL BE IN ACCORDANCE WITH FIGURE TTC-27.0 OF THE VA WAPM.
- PEDESTRIAN ACCESS THROUGH CONSTRUCTION ZONES SHALL BE MAINTAINED AT ALL TIMES.

WORKZONE APPROACH DETAIL 1
(FIGURE TTC-17.0)
N.T.S.



WORKZONE APPROACH DETAIL 2
(FIGURE TTC-18.0 & TTC-27.0)
N.T.S.

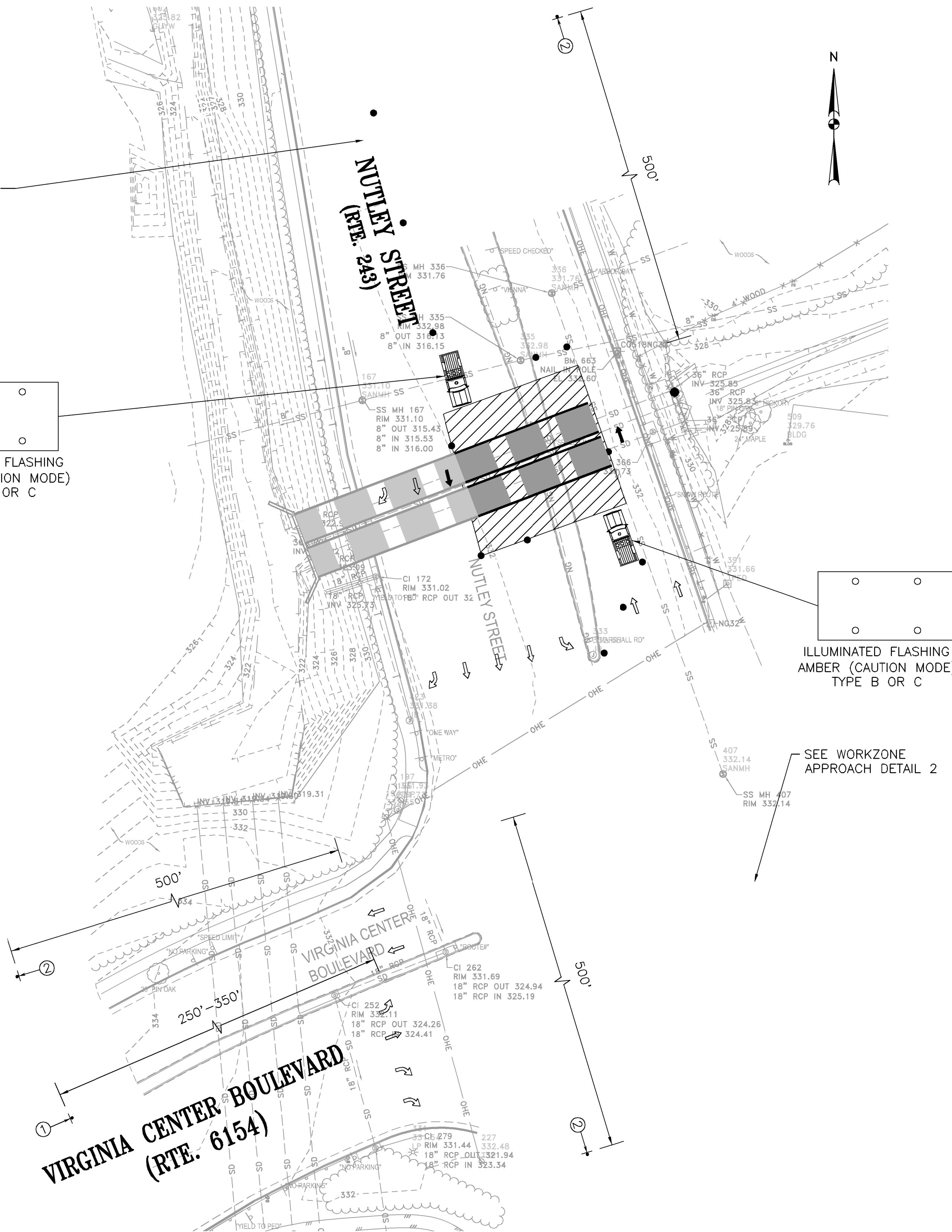


SEE WORKZONE
APPROACH DETAIL 1

ILLUMINATED FLASHING
AMBER (CAUTION MODE)
TYPE B OR C

ILLUMINATED FLASHING
AMBER (CAUTION MODE)
TYPE B OR C

SEE WORKZONE
APPROACH DETAIL 2



0 25' 50'
SCALE: 1" = 25'

THE PLANS ARE UNFINISHED AND UNAPPROVED AND
ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION
OR THE ACQUISITION OF RIGHT OF WAY.

TRANSPORTATION MANAGEMENT PLAN

Nutley Street Culvert Replacement Project

Town of Vienna, Virginia

WR&A
WHITMAN, REQUARDT
& ASSOCIATES, LLP
3701 Federal Drive, Suite 400, Fairfax, VA 22030



PROJECT MANAGER:	IA	Date: 7/14	Revisions	Comments
DESIGN ENGINEER:	DMB	Date: 7/14		
CADD DESIGNER:	WRA	Date: 7/14		

Scale: 25 Project No. 9 of 11

TRANSPORTATION MANAGEMENT PLAN

PHASE 3

POSTED SPEED LIMITS

NUTLEY STREET (RTE. 243)	= 35 MPH
VIRGINIA CENTER BOULEVARD (RTE. 6154)	= 30 MPH
MARSHALL ROAD	= 25 MPH
KINGSLEY ROAD	= 25 MPH

MOT LEGEND

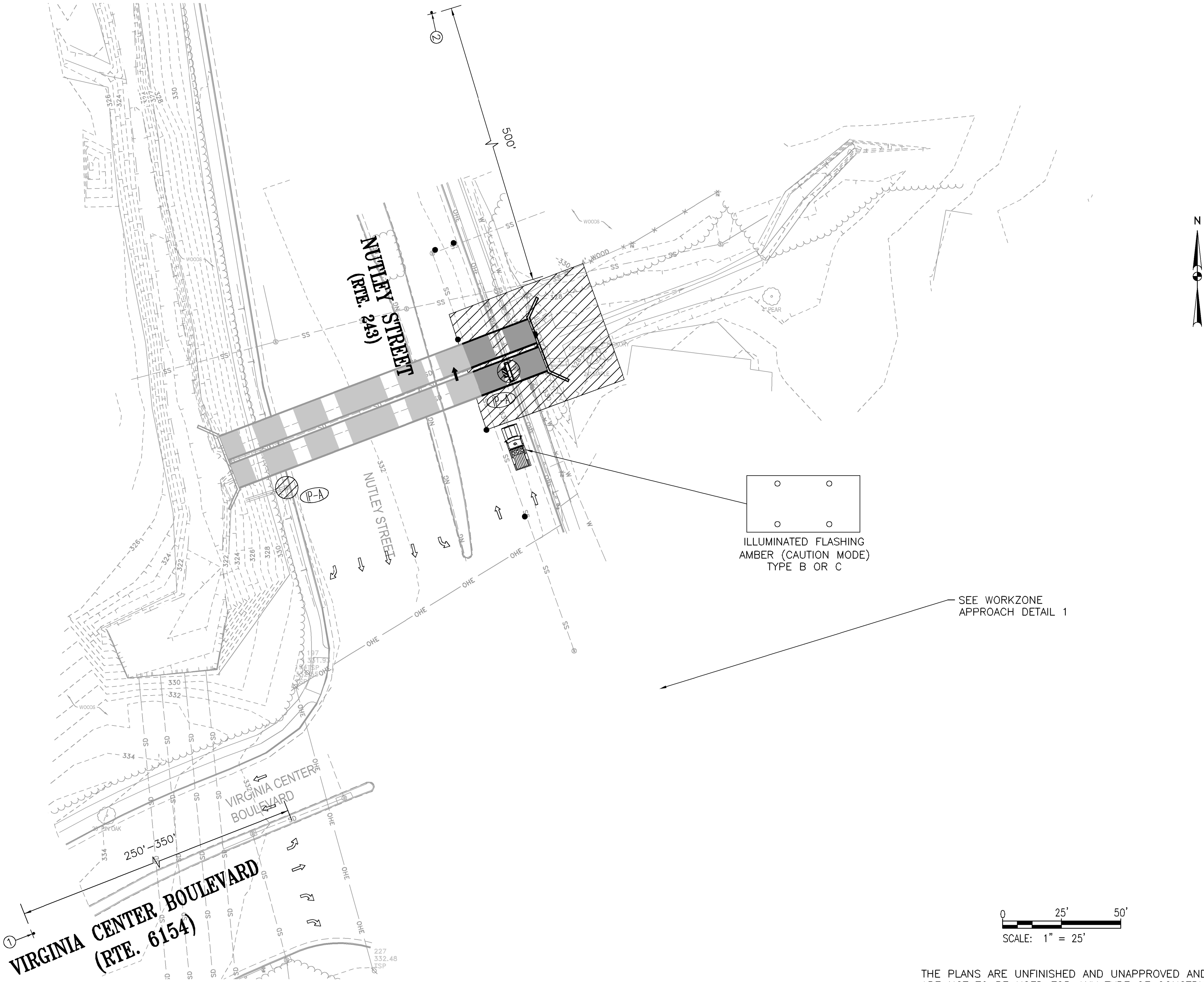
- CONSTRUCTION WORK ZONE
- ARROW BOARD
- SIGN
- GROUP 2 CHANNELIZATION DEVICE
- EXISTING DIRECTION OF TRAVEL
- TEMPORARY DIRECTION OF TRAVEL
- SHADOW VEHICLE

1' SHY LINE
11'
VARIES 2'-60'
WORK ZONE

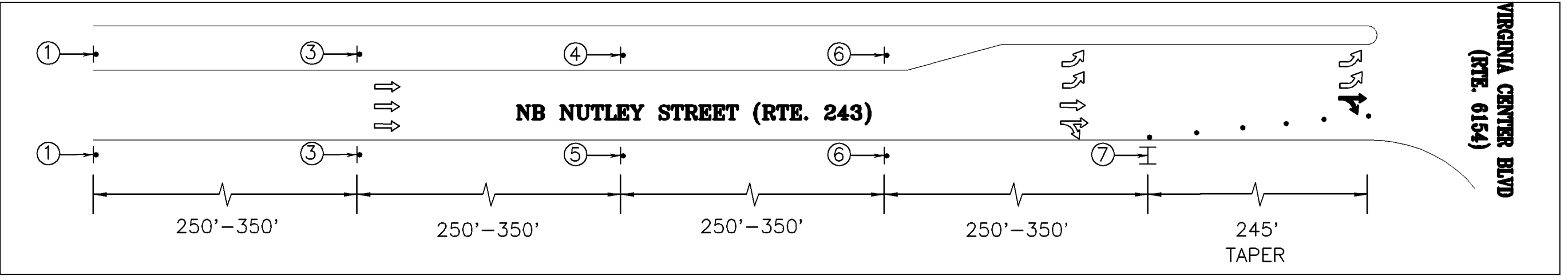
GROUP 2 CHANNELIZING DEVICE

NB NUTLEY STREET (RTE. 243)
SPEED LIMIT = 35 MPH
OUTSIDE LANE CLOSURE OPERATION ON
A FOUR-LANE ROADWAY (TTC-16.0)

- NOTES:
- SEE SHEET IC(1) FOR SIGN LEGEND.
 - PROJECT LIMITS SIGNING SHALL BE IN ACCORDANCE WITH FIGURE TTC-53.0 OF THE 2011 VA WAPM.
 - OUTSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY SHALL BE IN ACCORDANCE WITH FIGURE TTC-16.0 OF THE 2011 VA WAPM.
 - PEDESTRIAN ACCESS THROUGH CONSTRUCTION ZONES SHALL BE MAINTAINED AT ALL TIMES.



WORKZONE APPROACH DETAIL 1
(FIGURE TTC-16.0)
N.T.S.



THE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

REVISIONS	COMMENTS
Date: INITIALS	
Date: INITIALS	
Date: INITIALS	
Date: INITIALS	

PROJECT MANAGER: IA	Date: 7/14
DESIGN ENGINEER: DMB	Date: 7/14
CADD DESIGNER: WRA	Date: 7/14

Scale: 25	Project No.	Sheet 10 of 11
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TRANSPORTATION MANAGEMENT PLAN

Nutley Street Culvert Replacement Project

Town of Vienna, Virginia

WR&A

WHITMAN, REQUARDT & ASSOCIATES, LLP

3701 Fender Drive, Suite 450, Fairfax, VA 22030



DRAINAGE ANALYSIS AND SUMMARY

THE PURPOSE OF THIS PROJECT IS TO IMPROVE THE STORM DRAINAGE IN THE VICINITY OF THE INTERSECTION OF NUTLEY STREET AND VIRGINIA CENTER BOULEVARD (MARSHALL STREET) IN THE TOWN OF VIENNA. THERE ARE EXISTING TRIPLE 36" CULVERTS UNDER NUTLEY STREET AND DOWNSTREAM OF THESE CULVERTS THERE ARE QUADRUPLE 9'X8' CULVERTS UNDER VIRGINIA CENTER BOULEVARD (MARSHALL STREET). THERE IS ALSO AN EXISTING WET POND DOWNSTREAM OF THESE EXISTING CULVERTS THAT RESULTS IN A TAILWATER CONDITION FOR THESE CULVERTS. THEREFORE, THE HEADWATERS UPSTREAM OF THE CULVERTS HAVE THE POTENTIAL TO RISE HIGH ENOUGH IN SOME STORM EVENTS TO FLOOD SOME OF THE DWELLINGS IN THE VICINITY (SEE "IMPACTS OF THE EXISTING AND PROPOSED NUTLEY STREET CULVERTS ON THE ADJACENT DWELLINGS" TABLE BELOW).

WILEY WILSON, WHICH WAS COMMISSIONED BY THE TOWN OF VIENNA, PREPARED A HYDROLOGY AND HYDRAULICS ANALYSIS AND REPORT FOR THIS PROJECT ON MARCH 21, 2013. THE DRAINAGE AREAS TO THE EXISTING CULVERTS AND WET POND WERE DELINEATED WITH THIS STUDY. ADDITIONALLY, THE RUNOFF FROM THESE WATERSHEDS WERE CALCULATED WITH SCS METHOD. THIS STUDY ALSO ANALYZED SEVERAL OPTIONS FOR THE PROPOSED CULVERTS. THE RECOMMENDED OPTION IN THIS STUDY WAS TO REPLACE THE EXISTING TRIPLE CULVERTS UNDER NUTLEY STREET WITH DOUBLE 10.17'x6.44' PIPE ARCH CONCRETE CULVERTS.

WR&A HAS CONFIRMED THE DRAINAGE AREAS AND DISCHARGES FROM THE WILEY WILSON STUDY AND USED THEM TO DESIGN THE PROPOSED CULVERTS. THE OPTIONS THAT WERE DESCRIBED IN THIS STUDY HAVE BEEN REVIEWED AND ANALYZED. IN ADDITION TO THESE OPTIONS, WR&A HAS ALSO ANALYZED REPLACING THE EXISTING TRIPLE 36" CONCRETE CULVERT WITH STANDARD SEVERAL DIFFERENT SIZE CONCRETE BOX CULVERTS WITH DIFFERENT INVERTS. THE BEST RESULTS WERE OBTAINED WITH DOUBLE 10'x5' BOX CULVERTS. THESE BOX CULVERTS WILL IMPROVE THE HYDRAULIC CAPACITY OF THE CULVERT CROSSING, LOWERING THE HEADWATER AND REDUCING THE RISK OF FLOODING TO DWELLINGS IN THE VICINITY. THE FOLLOWING TABLE COMPARES AND SUMMARIZES THE WATER SURFACE ELEVATIONS FOR DIFFERENT STORMS ON THE UPSTREAM SIDE OF THE NUTLEY STREET EXISTING TRIPLE 36" CULVERTS WITH THE PROPOSED WILEY WILSON AND WR&A CULVERTS:

		Headwater Elevations		
Storm	Discharge	Existing 3 - 36" Diameter Culverts	Wiley Wilson 2 - 10.17'x6.44' Pipe Arch Culverts	WR&A 2- 10'x5' Box Culverts
2-Year	135.80	329.48	326.33	326.41
10-Year	270.78	332.10	327.72	327.65
25-Year	325.48	332.28	328.55	328.50
50-Year	393.84	332.54	330.07	330.08
100-Year	441.59	332.70	331.32	331.33

BASED ON THIS TABLE, THE PROPOSED CULVERTS WILL PROVIDE A SIGNIFICANT IMPROVEMENT OVER THE EXISTING CULVERTS FOR ALL STORMS. (THE WATER SURFACE ELEVATIONS FOR THE WILEY WILSON CULVERTS HAVE BEEN CALCULATED BY WR&A WITH HY-8 TO HAVE A RIGHT COMPARISON. THEREFORE THE RESULTS ARE SLIGHTLY DIFFERENT THEN THEIR STUDY)

REPLACEMENT OF THESE PROPOSED CULVERTS WILL REQUIRE A THREE-PHASE MAINTENANCE OF TRAFFICE PLAN TO AVOID A COMPLETE CLOSURE OF NUTLEY STREET. A SUMP CURB INLET LOCATED DIRECTLY ABOVE ONE OF THE CULVERT PIPES MUST ALSO BE REPLACE AND CONNECTED TO THE NEW BOX CULVERT BELOW.

IMPACTS OF THE EXISTING AND PROPOSED NUTLEY STREET CULVERTS ON THE ADJACENT DWELLINGS					
DWELLING ADDRESS	BASEMENT FLOOR ELEV.	ADJACENT GROUND	LOW OPENING	WITH EXISTING 3–36" CULVERTS FLOODS OVER	WITH PROP. 2–10'x5' BOX CULVERTS FLOODS OVER
1001 DELILAH DRIVE	330.11	331.95	330.11	2 YR STORM	50 YR STORM
1003 DELILAH DRIVE	332.25	333.41	332.25	10 YR STORM	100 YR STORM
715 MARSHALL ROAD	328.97	331.33	328.97	LESS THAN 2 YR STORM	25 YR STORM
717 MARSHALL ROAD	326.5*	331.05	331.29	2 YR STORM	50 YR STORM
714 KINGSLEY ROAD	327.3*	331.64	331.99	2 YR STORM	100 YR STORM
712 KINGSLEY ROAD	327.51	330.97	332.89	100 YR STORM	100 YR STORM
710 KINGSLEY ROAD	328.8*	332.84	333.82	100 YR STORM	100 YR STORM

* ESTIMATED BY WILEY WILSON

CULVERT ANALYSIS (HY-8)

BC CONSULTANTS VERIFIED THE SURVEY AND THE EXISTING CULVERT INVERTS. THIS NEW INVERT INFORMATION HAS BEEN USED TO DESIGN THE PROPOSED CULVERTS. THEREFORE, IT MIGHT BE SLIGHTLY DIFFERENT THAN THE WILEY WILSON HYDROLOGY AND HYDRAULIC STUDY.

THE HYDRAULIC CALCULATION FOR THE PROPOSED NUTLEY STREET CULVERT HAS A STARTING TAILWATER ELEVATION EQUAL TO THE HEADWATER ELEVATION OF THE VIRGINIA CENTER BOULEVARD CULVERT. ADDITIONALLY, THE VIRGINIA CENTER BOULEVARD CULVERT HAS A STARTING TAILWATER ELEVATION EQUAL TO THE CORRESPONDING WET POND ELEVATION FOR VIRGINIA CENTER POND. BELOW IS A SUMMARY TABLE INCLUDING THE POND WATER SURFACE ELEVATIONS AND DISCHARGES AT BOTH VIRGINIA CENTER BOULEVARD CULVERT AND NUTLEY STREET CULVERT. THE TABLE BELOW INCLUDES THE HEADWATER ELEVATION FOR VIRGINIA CENTER BOULEVARD CULVERT WHICH IS THE TAILWATER ELEVATION FOR NUTLEY STREET CULVERTS. (SEE PLAN AND PROFILE SHEETS FOR THE LOCATION, LENGTH, AND INVERTS OF THE PROPOSED DOUBLE 10'x5' BOX CULVERTS)

Storm	Existing Pond WSE	Discharge (cfs) @ Existing Virginia Center Culvert	Headwater Elevation @ Existing Virginia Center Culvert	Discharge (cfs) @ Proposed Nutley Street Culvert	Headwater Elevation @ Proposed Nutley Street Culvert
2-Year	324.78	750.17	325.08	135.80	326.41
10-Year	326.31	1,563.30	327.18	270.78	327.65
25-Year	326.90	1,897.20	328.12	325.48	328.50
50-Year	327.85	2,317.40	329.63	393.84	330.08
100-Year	328.83	2,612.57	330.79	441.59	331.33

HY-8 Culvert Analysis Report

Crossing Discharge Data

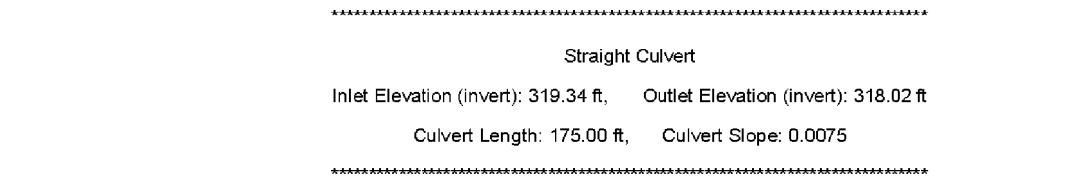
Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: Existing Virginia Center Boulevard Crossing

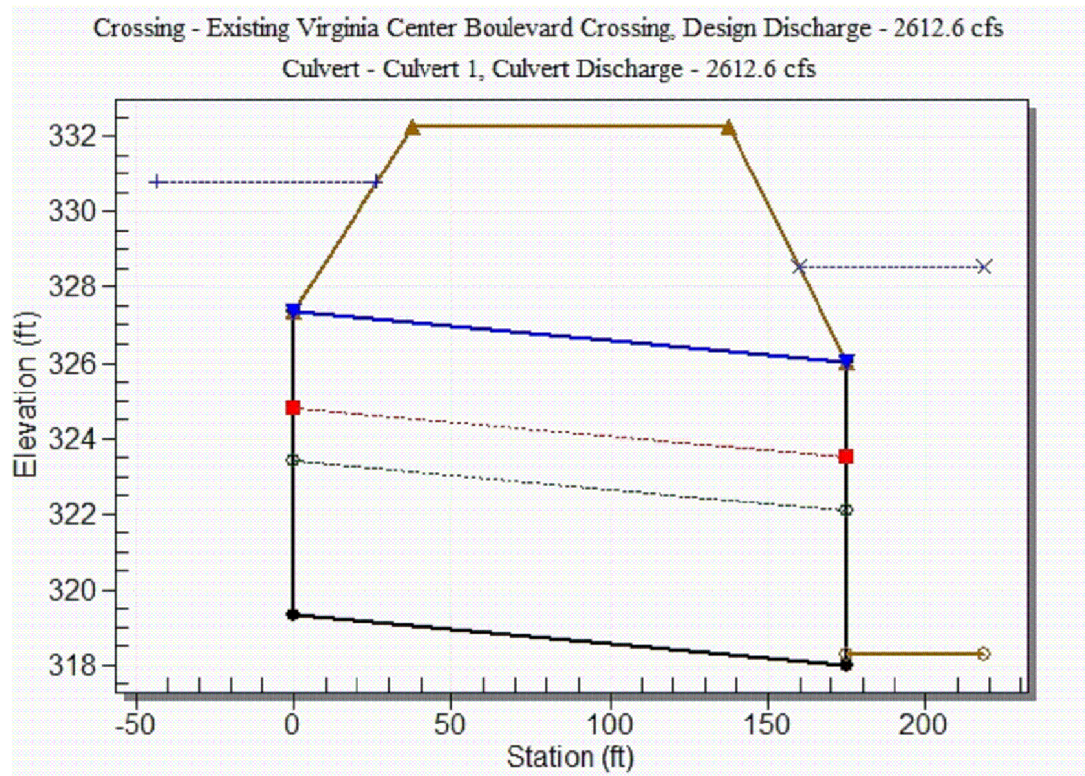
Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
325.08	2 yr	750.17	750.17	0.00	1
327.18	10 yr	1563.30	1563.30	0.00	1
328.11	25 yr	1897.20	1897.20	0.00	1
329.63	50 yr	2317.40	2317.40	0.00	1
330.79	100 yr	2612.57	2612.57	0.00	1
332.27	Overtopping	2612.57	2612.57	0.00	Overtopping

Table 2 - Culvert Summary Table: Culvert 1

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 yr	750.17	750.17	325.08	4.066	5.742	1-S1H	1.576	2.380	6.760	6.510	3.083	0.000
10 yr	1563.30	1563.30	327.18	6.542	7.839	1-S1H	2.796	3.893	8.000	8.040	5.428	0.000
25 yr	1897.20	1897.20	328.11	7.451	8.771	1-S1H	3.297	4.418	8.000	8.620	6.588	0.000
50 yr	2317.40	2317.40	329.63	8.584	10.288	4-FFF	3.715	5.049	8.000	9.580	8.047	0.000
100 yr	2612.57	2612.57	330.79	9.402	11.450	4-FFF	4.056	5.469	8.000	10.260	9.071	0.000



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 319.34 ft

Outlet Station: 175.00 ft

Outlet Elevation: 318.02 ft

Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 9.00 ft

Barrel Rise: 8.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90°) Headwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Existing Virginia Center Boulevard Crossing)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
750.17	324.78	6.51	0.00
1563.30	326.31	8.04	0.00
1897.20	326.90	8.63	0.00
2317.40	327.85	9.58	0.00
2612.57	328.53	10.26	0.00

Tailwater Channel Data - Existing Virginia Center Boulevard Crossing

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 318.27 ft

Roadway Data for Crossing: Existing Virginia Center Boulevard Crossing

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 405.00 ft

Crest Elevation: 332.27 ft

Roadway Surface: Paved

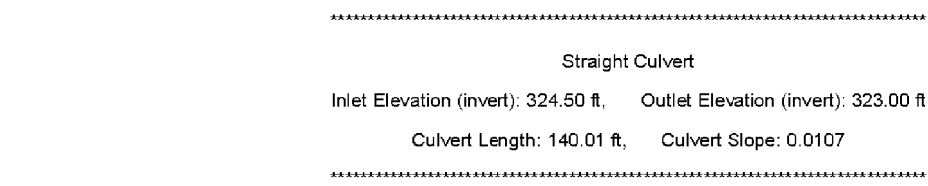
Roadway Top Width: 100.00 ft

Table 4 - Summary of Culvert Flows at Crossing: Prop. Nutley Street Crossing

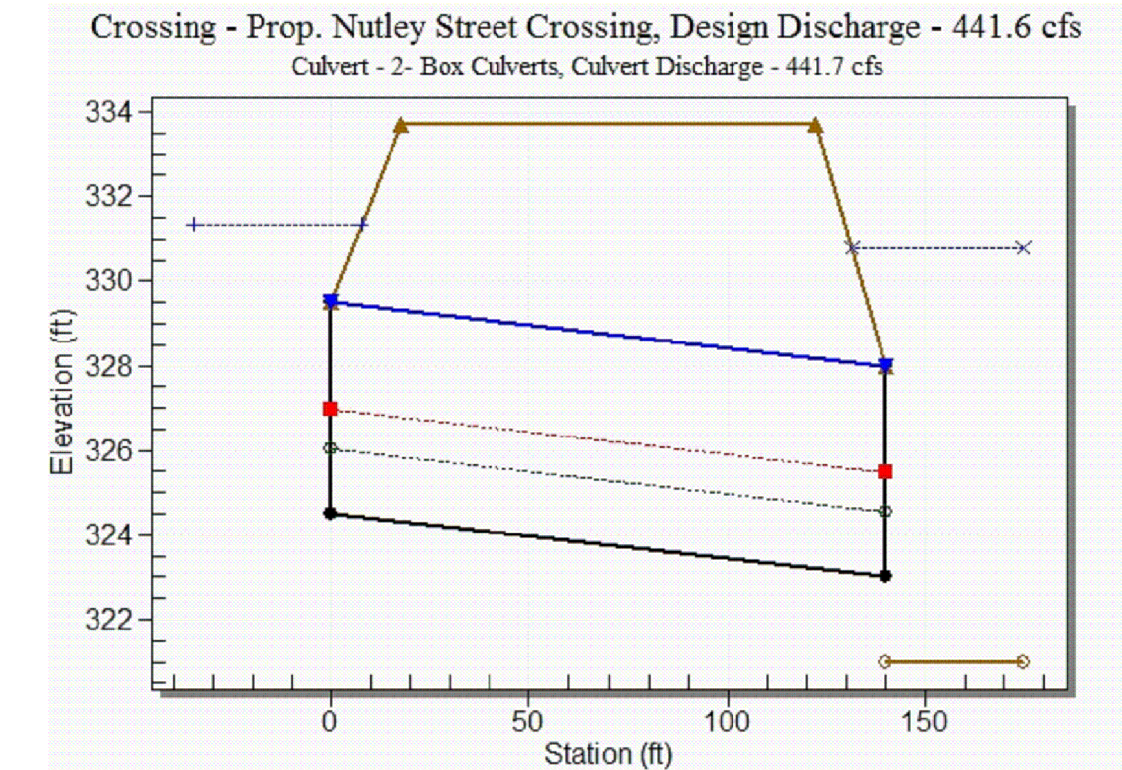
Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	2- Box Culverts Discharge (cfs)	Roadway Discharge (cfs)	Iterations
326.41	2 yr	135.80	135.80	0.00	1
327.65	10 yr	270.78	270.78	0.00	1
328.50	25 yr	325.48	325.50	0.00	5
330.08	50 yr	393.84	394.65	0.00	3
331.33	100 yr	441.59	441.74	0.00	5
331.57	Overtopping	270.78	270.78	0.00	Overtopping

Table 5 - Culvert Summary Table: 2- Box Culverts

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 yr	136.80	135.80	326.41	1.915	0.631	1-JB11	0.699	1.127	2.080	4.080	3.264	0.000
10 yr	270.78	270.78	327.65	3.018	3.152	1-S11	1.118	1.786	4.180	6.180	3.239	0.000
25 yr	325.48	325.50	328.50	3.493	4.000	1-S1F	1.251	2.019	5.000	7.120	3.255	0.000
50 yr	393.84	394.65	330.08	3.851	5.564	4-FFF	1.419	2.295	5.000	8.630	3.947	0.000
100 yr	441.59	441.74	331.33	4.160	6.634	4-FFF	1.533	2.474	5.000	9.790	4.417	0.000



Water Surface Profile Plot for Culvert: 2- Box Culverts



Site Data - 2- Box Culverts

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 324.50 ft

Outlet Station: 140.00 ft

Outlet Elevation: 323.00 ft

Number of Barrels: 2

Culvert Data Summary - 2- Box Culverts

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90°) Headwall

Inlet Depression: NONE

Table 6 - Downstream Channel Rating Curve (Crossing: Prop. Nutley Street Crossing)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
135.80	325.08	4.08	0.00
270.78	327.18	6.18	0.00
325.48	328.12	7.12	0.00
393.84	329.63	8.63	0.00
441.59	330.79	9.79	0.00

Tailwater Channel Data - Prop. Nutley Street Crossing

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 321.00 ft

Roadway Data for Crossing: Prop. Nutley Street Crossing

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:		
Coord No.	Station (ft)	Elevation (ft)
0	125.00	333.73
1	184.50	332.01
2	201.90	332.00
3	218.40	331.80
4	241.80	331.57
5	273.80	331.83
6	278.50	331.99
7	314.60	332.61
8	342.60	332.75
9	354.80	332.63
10	404.00	332.72
11	438.40	332.76
12	455.50	332.67
13	468.10	332.71

Roadway Surface: Paved

Roadway Top Width: 105.00 ft

DRAINAGE ANALYSIS

Nutley Street Culvert Replacement Project

Town of Vienna, Virginia

REVISIONS

Date: _____

INITIALS _____

COMMENTS _____

PROJECT MANAGER: IA Date: 7/14

DESIGN ENGINEER: DMB Date: 7/14

CADD DESIGNER: WRA Date: 7/14

Scale: N/A Project No. 11 of 11

