RIVANNA WATER & SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER PUMP STATION, INTAKE, AND TRANSMISSION MAIN

HAZEN NO. 31570-001
MARCH 2026



LOCATION MAP
NOT TO SCALE

HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VIRGINIA 22903

GENERAL SITE INFORMATION

PROPOSED PUMP STATION SITE
EXISTING PUMP STATION, RESERVOIR, AND DAM SITE

PROPERTY:	BEAVER CREEK RESERVOIR
OWNER:	COUNTY OF ALBERMARLE
TOTAL PROPERTY SIZE:	182.55 ACRES
TAX MAP/PARCEL:	57-04
ZONING:	RURAL AREAS
MAGISTERIAL:	WHITE HALL
COUNTY:	ALBEMARLE
STATE:	VIRGINIA
PROPOSED USE:	MUNICIPAL WATER SUPPLY, FLOOD CONTROL, RECREATION
ENGINEER:	HAZEN AND SAWYER 210 RIDGE MCINTIRE ROAD, SUITE 400 CHARLOTTESVILLE, VA 22903
DATUM:	HORZ: NAD83 VIRGINIA SOUTH ZONE VERT: NAVD88

FLOODPLAIN INFORMATION
THIS SITE IS SUBJECT TO THE ALBEMARLE COUNTY FLOOD HAZARD OVERLAY DISTRICT. THIS SITE IS LOCATED WITHIN THE WATERSHED OF A PUBLIC WATER SUPPLY RESERVOIR.

PROJECT AREA WITHIN FEMA ZONE A WITHOUT BASE FLOOD ELEVATION.
REFERENCE: FEMA MAP 51003C0235D, EFFECTIVE FEBRUARY 4, 2005

SETBACKS (MINIMUM)

FRONT:	25'
SIDE :	25'
REAR:	35'

MAX STRUCTURE HEIGHT: 35'

MAXIMUM SQUARE FOOTAGE, FLOOR AREA RATIO, AND LOT COVERAGE:

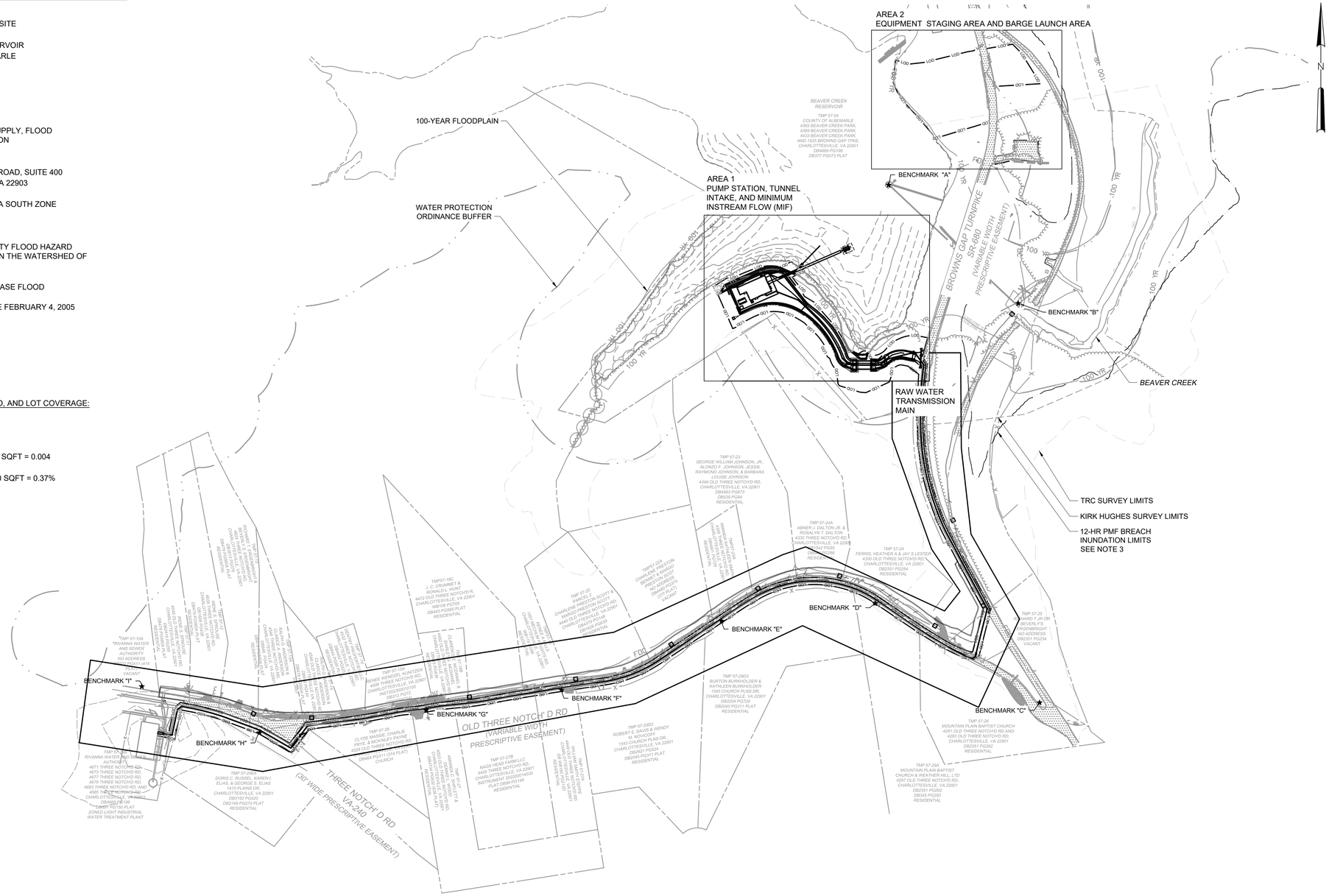
GROUND FLOOR:	3,000 SQFT
LOWER FLOOR:	450 SQFT
IMPERVIOUS AREA:	31,000 SQFT
FLOOR AREA RATIO:	3,450 SQFT / 7,951,880 SQFT = 0.004
LOT COVERAGE:	29,100 SQFT /7,951,880 SQFT = 0.37%

LIMITS OF DISTURBANCE BREAKDOWN:

EXEMPT LINEAR :	1.37 ACRES
TEMPORARY:	1.35 ACRES
SITE LOD:	1.39 ACRES
TOTAL LOD:	4.11 ACRES

SURVEY BENCHMARK INFORMATION

BENCHMARK "A" HOLE ON MANHOLE RIM N:3913722.585 E:11439095.271 ELEV:540.39	BENCHMARK "E" REBAR WITH CAP N:3912550.337 E:11438645.939 ELEV:630.47
BENCHMARK "B" CHISELED SQUARE ON NE CORNER OF CONCRETE SQUARE N:3913404.449 E:11439443.829 ELEV:502.32'	BENCHMARK "F" REBAR WITH CAP N:3912364.987 E:11438215.392 ELEV:629.43 BENCHMARK "G" REBAR WITH CAP N:3912310.743 E:11437851.798 ELEV:644.14
BENCHMARK "C" REBAR WITH CAP N:3912330.873 E:11439501.199 ELEV:617.10	BENCHMARK "H" REBAR WITH CAP N:3912250.276 E:11437403.595 ELEV:645.53
BENCHMARK "D" REBAR WITH CAP N:3912597.813 E:11439059.313 ELEV:619.24	BENCHMARK "I" REBAR WITH CAP N:3912374.386 E:11437087.156 ELEV:649.64



NOTES:

1. SOURCE OF TOPOGRAPHIC SURVEY INFORMATION:

   AREA 1 AND RAW WATER TRANSMISSION MAIN TOPOGRAPHIC INFORMATION PROVIDED BY:
   TRC ENGINEERING, INC
   CHARLOTTESVILLE, VA
   (SURVEY DATED 2024)

   AREA 2
   TOPOGRAPHIC INFORMATION PROVIDED BY:
   KIRK HUGHES AND ASSOCIATES
   CHARLOTTESVILLE, VA
   (SURVEY DATED 2024)

   BATHYMETRIC INFORMATION PROVIDED BY:
   DRAPER ADEN AND ASSOCIATES
   RICHMOND, VA
   (SURVEY DATED 2017)

2. ALL PARCELS ARE ZONED RURAL AREAS UNLESS OTHERWISE NOTED.

3. PMF PROVIDED BY SCHNABEL ON 6/20/2025, DATED FROM 2011 SHAPEFILE. ANALYSIS IS GENERATED FROM PEAK WATER SURFACE ELEVATION OF 561.24 FEET (EXISTING SPILLWAY AND HMR-52 PMP ANALYSIS).

LEGEND:

- TRC SURVEY LIMITS
- KIRK HUGHES SURVEY LIMITS
- WATER PROTECTION ORDINANCE BUFFER
- 100 YR — FEMA FLOOD HAZARD BOUNDARY
- DAM BREAK INUNDATION ZONE BOUNDARY (2011)
- EDGE OF WATER

DRAWING NUMBER LEGEND:

C001
DISCIPLINE IDENTIFIER
DRAWING REFERENCE NUMBER

PROJECT NUMBER: 31570-001

DISCIPLINE IDENTIFIERS:

A	ARCHITECTURE
C	CIVIL / LANDSCAPE
D	DEMOLITION
E	ELECTRICAL
H	HVAC
I	INSTRUMENTATION
M	MECHANICAL
L	LANDSCAPE
P	PLUMBING
S	STRUCTURAL

DRAWING REFERENCE NUMBERS:

00-99

SCALE: 1" = 150'
150 75 0 150'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER: C. RAMO
DESIGNED BY: A. VECCHIO
DRAWN BY: A. VECCHIO
CHECKED BY: M. SANTOWASSO
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

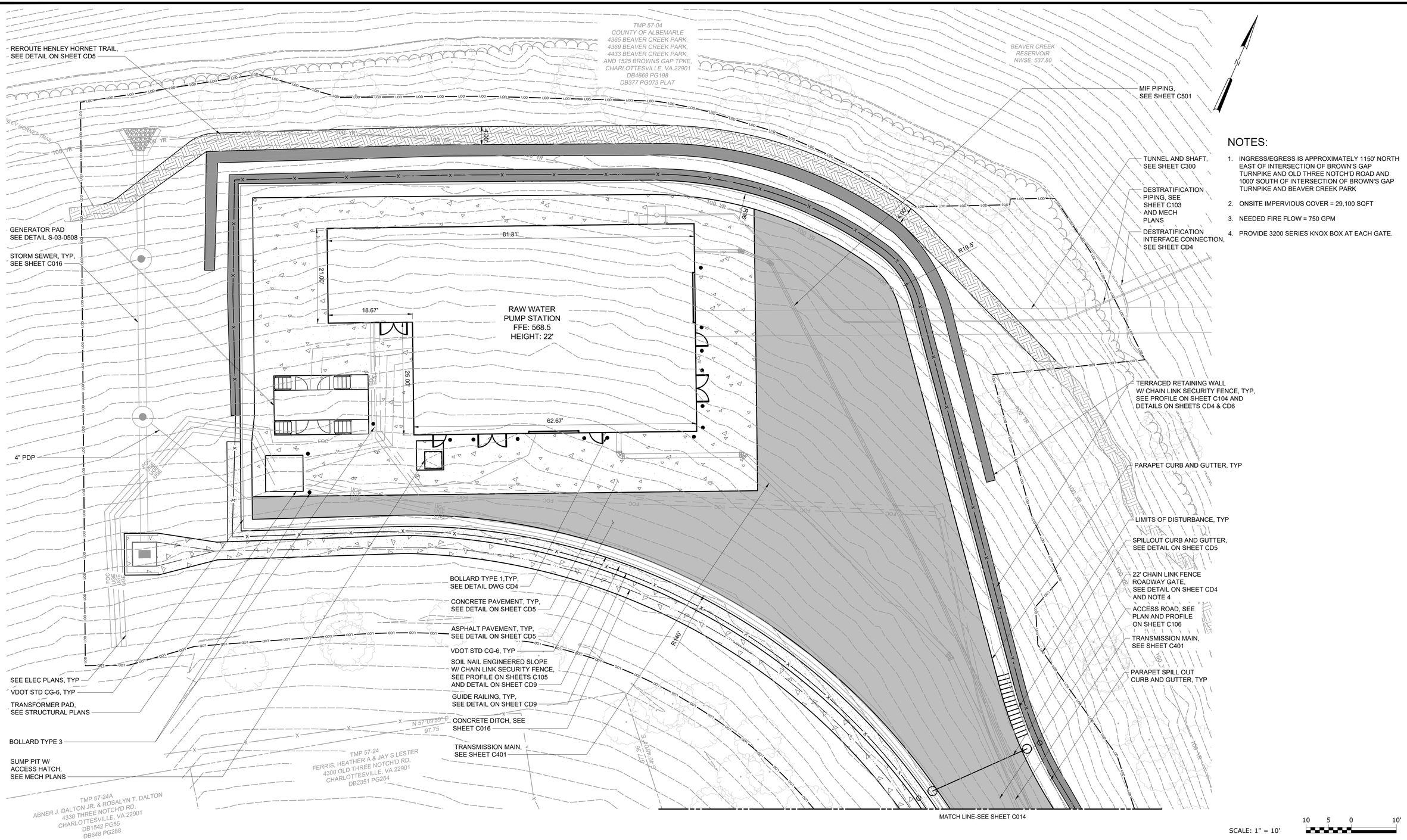
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

GENERAL
OVERALL SITE PLAN

DATE: MARCH 2026
HAZEN NO.: 31570-001
CONTRACT NO.: 1
DRAWING NUMBER: G003

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PLOT DATE: 3/6/2026 2:40 PM BY: JDOZIER



NOTES:

1. INGRESS/EGRESS IS APPROXIMATELY 1150' NORTH EAST OF INTERSECTION OF BROWN'S GAP TURNPIKE AND OLD THREE NOTCH'D ROAD AND 1000' SOUTH OF INTERSECTION OF BROWN'S GAP TURNPIKE AND BEAVER CREEK PARK
2. ONSITE IMPERVIOUS COVER = 29,100 SQFT
3. NEEDED FIRE FLOW = 750 GPM
4. PROVIDE 3200 SERIES KNOX BOX AT EACH GATE.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	J. MCCLURE
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

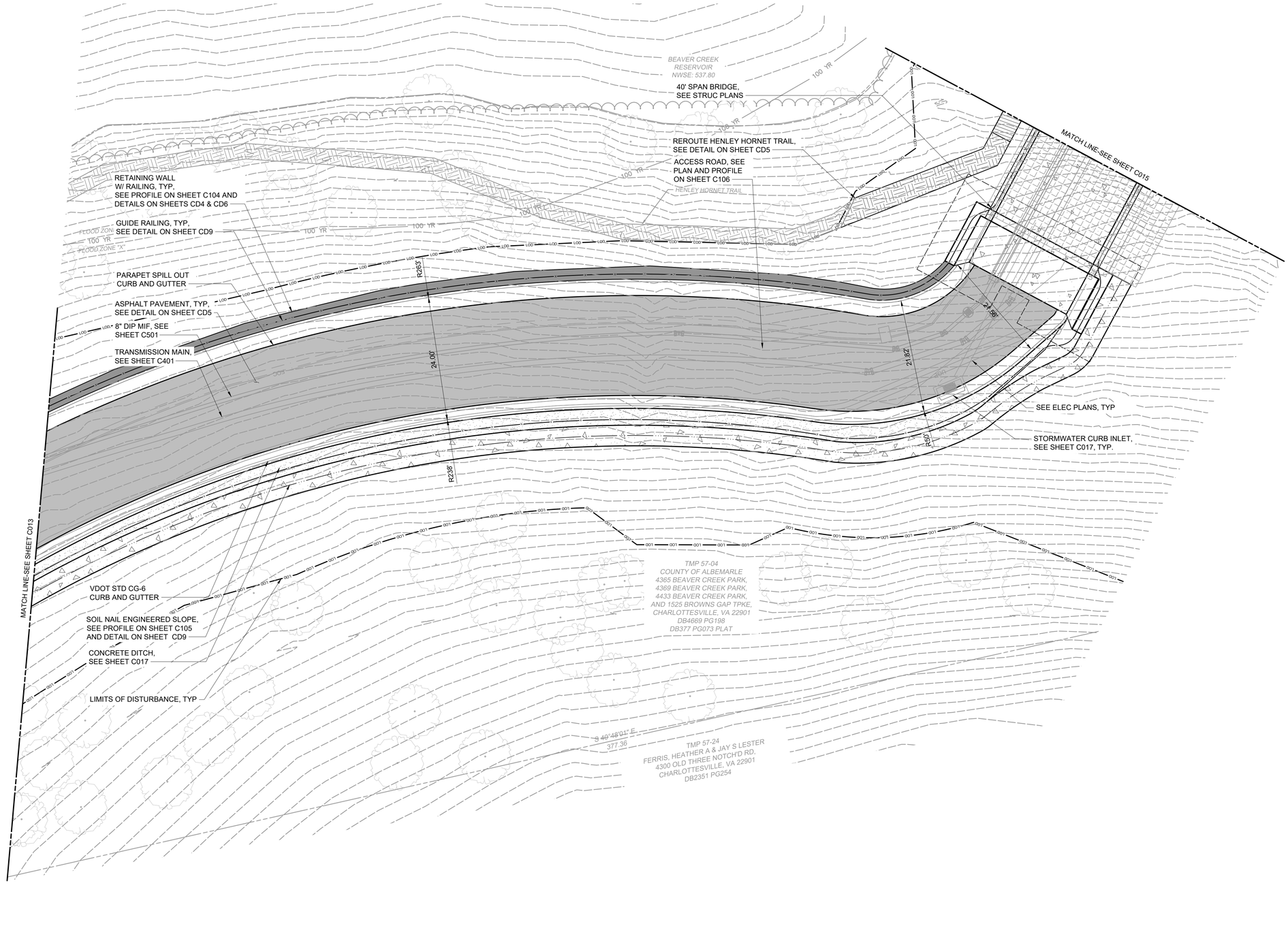
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CIVIL
SITE LAYOUT PLAN - AREA 1A

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	C013

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NOTES:

1. INGRESS/EGRESS IS APPROXIMATELY 1150' NORTH EAST OF INTERSECTION OF BROWN'S GAP TURNPIKE AND OLD THREE NOTCH'D ROAD AND 1000' SOUTH OF INTERSECTION OF BROWN'S GAP TURNPIKE AND BEAVER CREEK PARK
2. ONSITE IMPERVIOUS COVER = 29,100 SQFT
3. NEEDED FIRE FLOW = 750 GPM
4. PROVIDE 3200 SERIES KNOX BOX AT EACH GATE.

SCALE: 1" = 10'

10 5 0 10'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	J. MCCLURE
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

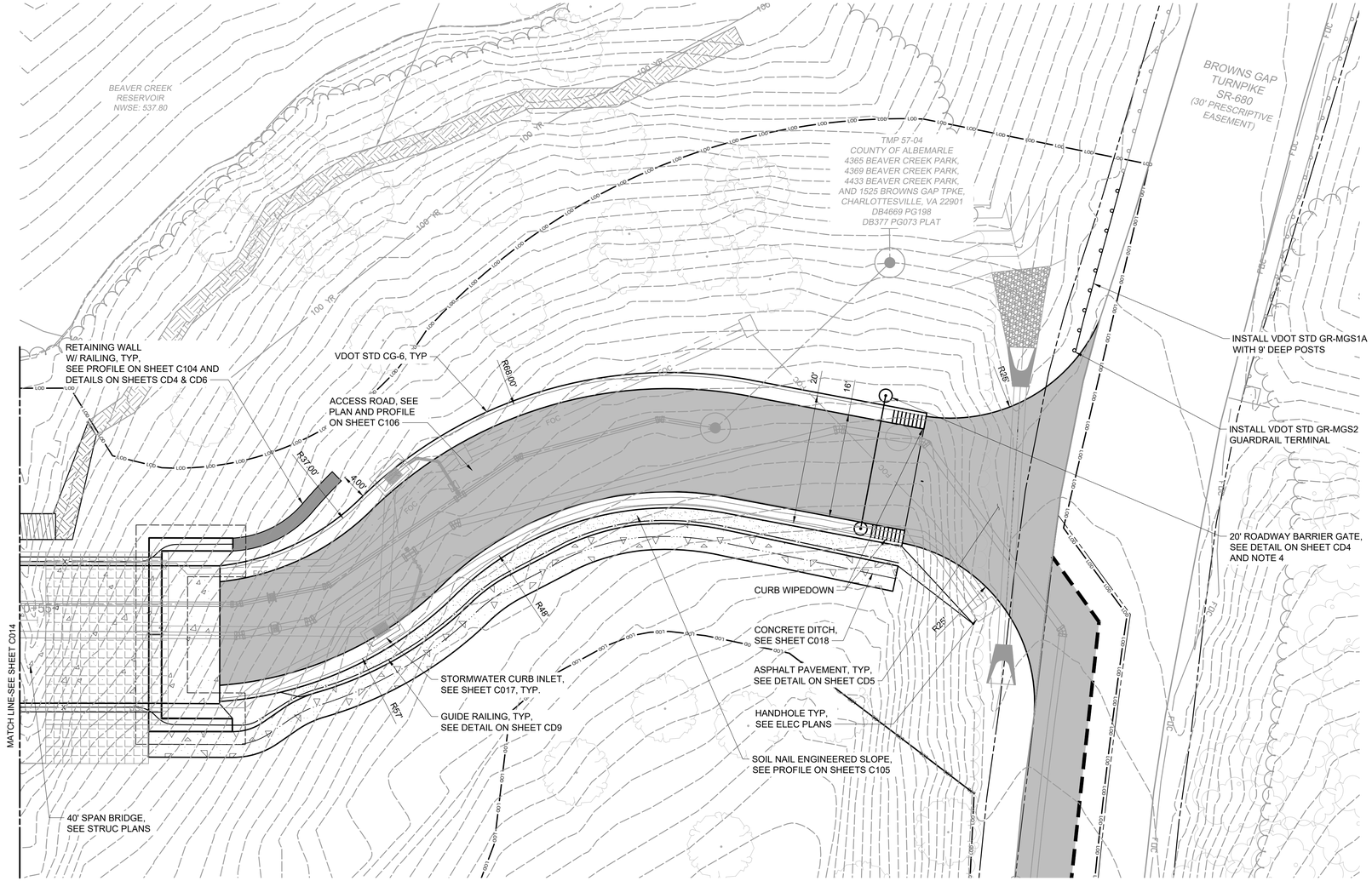
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CIVIL
SITE LAYOUT PLAN - AREA 1B

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	C014

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N

NOTES:

1. INGRESS/EGRESS IS APPROXIMATELY 1150' NORTH EAST OF INTERSECTION OF BROWN'S GAP TURNPIKE AND OLD THREE NOTCH'D ROAD AND 1000' SOUTH OF INTERSECTION OF BROWN'S GAP TURNPIKE AND BEAVER CREEK PARK
2. ONSITE IMPERVIOUS COVER = 29,100 SQFT
3. NEEDED FIRE FLOW = 750 GPM
4. PROVIDE 3200 SERIES KNOX BOX AT EACH GATE.

SCALE: 1" = 10'

10 5 0 10'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	J. MCCLURE
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR
CONSTRUCTION

Hazen

HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

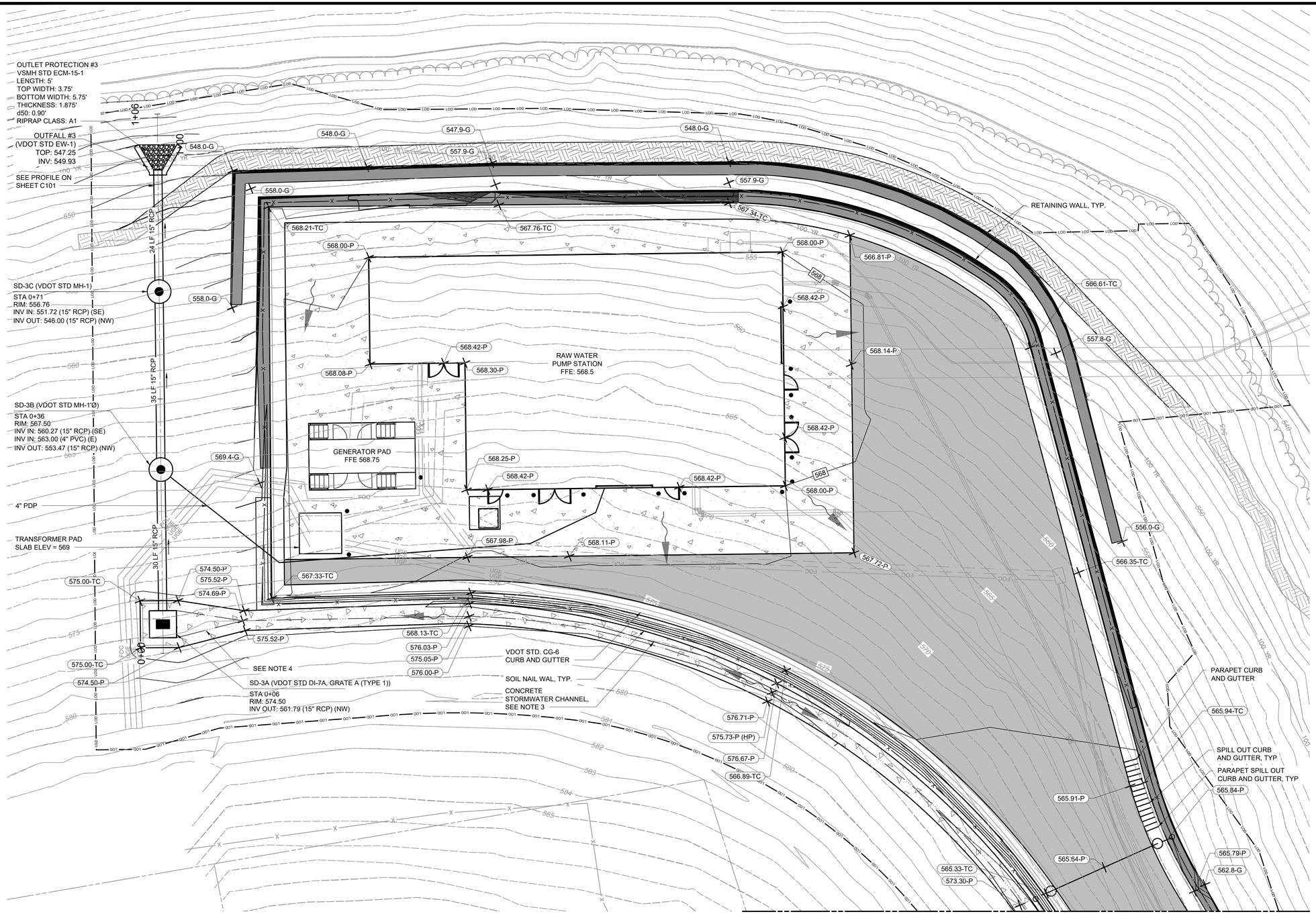
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CIVIL
SITE LAYOUT PLAN - AREA 1C

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	C015

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PLOT DATE: 3/6/2026 2:45 PM BY: JDOZIER



SCALE: 1" = 10'

10 5 0 10'

NOTES:

1. RIM GRADE REPRESENTS GRADE AT CENTER OF STRUCTURE ACCESS LID.
2. CONTRACTOR SHALL MATCH ELEVATION OF OUTER EDGE OF GUTTER PAN TO ELEVATION OF EDGE OF ROADWAY PAVEMENT.
3. CONCRETE DITCH SHALL BE VDOT STD PG-2A, TYPE E.
4. SEE VDOT SHEET 109.01 FOR PLAN FOR TRANSITION OF PAVED MEDIAN DITCH TO MEDIAN DROP INLET GUTTER. CONTRACTOR SHALL PROVIDE CONCRETE GUTTER ON THE NW, SW, AND NE SIDES OF DROP INLET AT A 2H:1V SIDE SLOPE.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. VECCHIO
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

PERMITTING SET
DO NOT USE FOR
CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

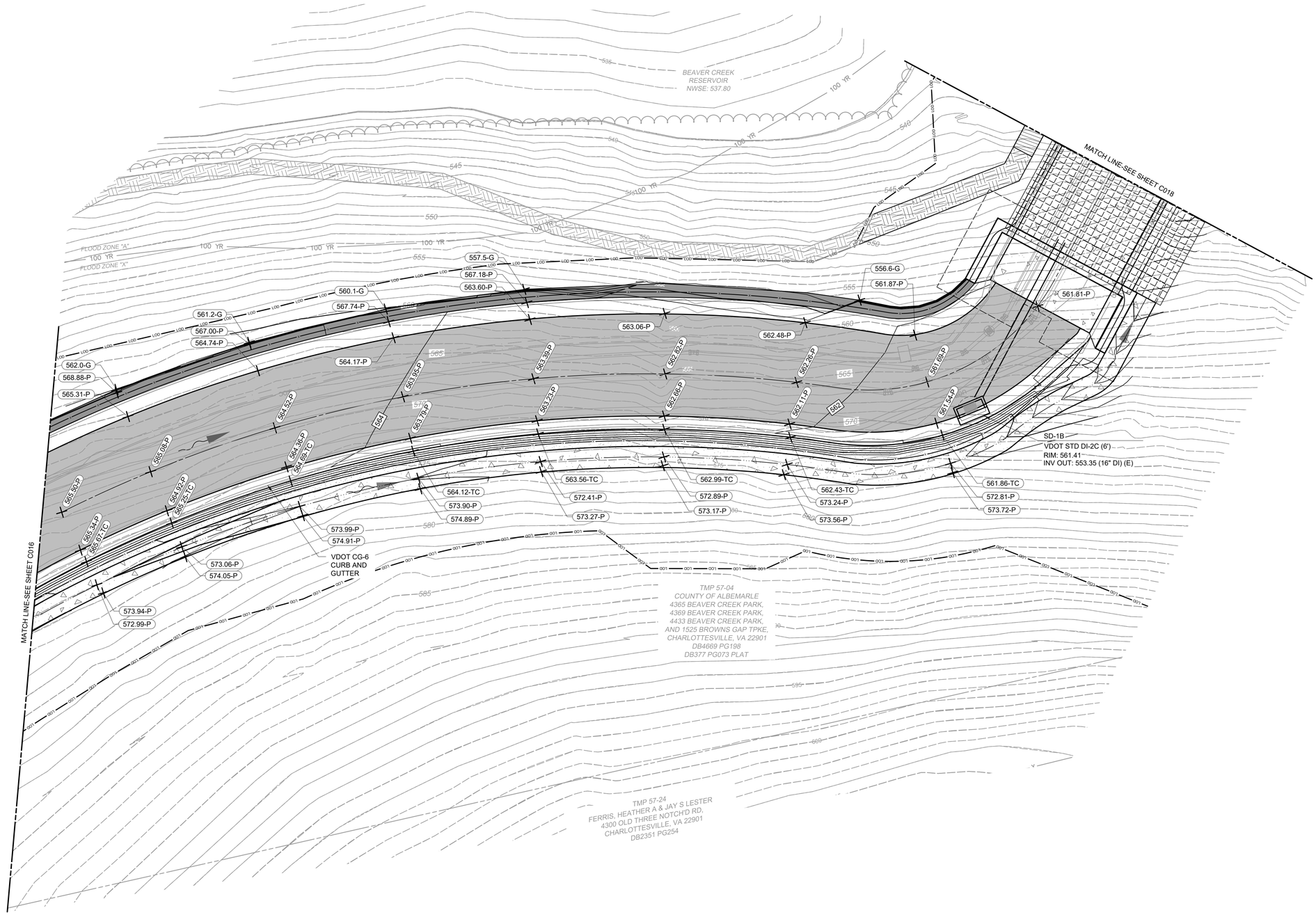
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CIVIL
GRADING AND DRAINAGE PLAN - AREA 1A

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	C016

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PLOT DATE: 3/6/2026 2:45 PM BY: JDOZIER



NOTES:

1. RIM GRADE REPRESENTS GRADE AT CENTER OF STRUCTURE ACCESS LID.
2. CONTRACTOR SHALL MATCH ELEVATION OF OUTER EDGE OF GUTTER PAN TO ELEVATION OF EDGE OF ROADWAY PAVEMENT.
3. CONCRETE DITCH SHALL BE VDOT STD PG-2A, TYPE E, TYP.

SCALE: 1" = 10'

10 5 0 10"

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. VECCHIO
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen

HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

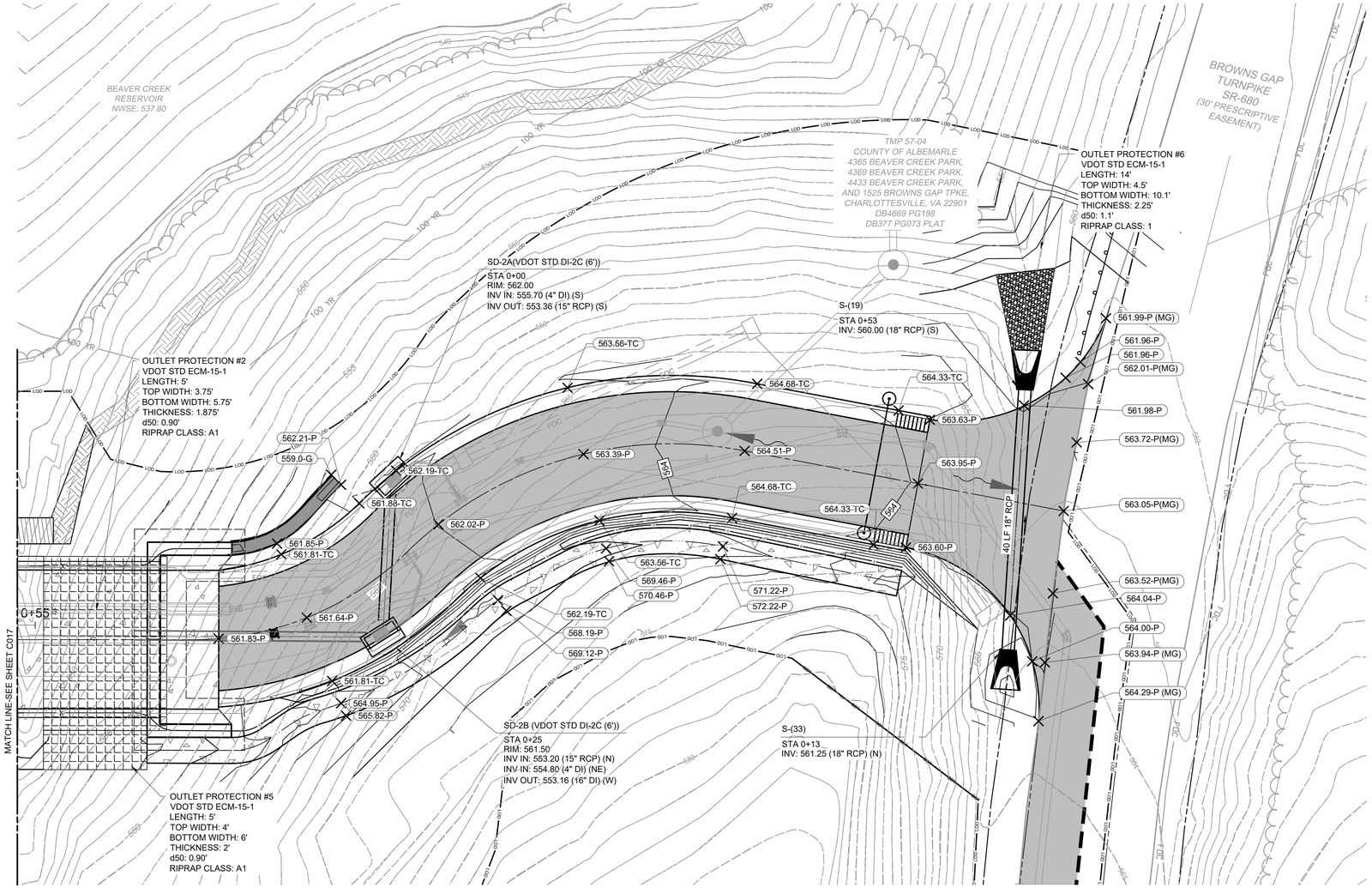
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CIVIL
GRADING AND DRAINAGE PLAN - AREA 1B

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	C017

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SCALE: 1" = 10'

10 5 0 10"

NOTES:

1. RIM GRADE REPRESENTS GRADE AT CENTER OF STRUCTURE ACCESS LID.
2. CONTRACTOR SHALL MATCH ELEVATION OF OUTER EDGE OF GUTTER PAN TO ELEVATION OF EDGE OF ROADWAY PAVEMENT.
3. CONCRETE DITCH SHALL BE VDOT STD PG-2A, TYPE E, TYP.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. VECCHIO
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
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CHARLOTTESVILLE, VA 22903

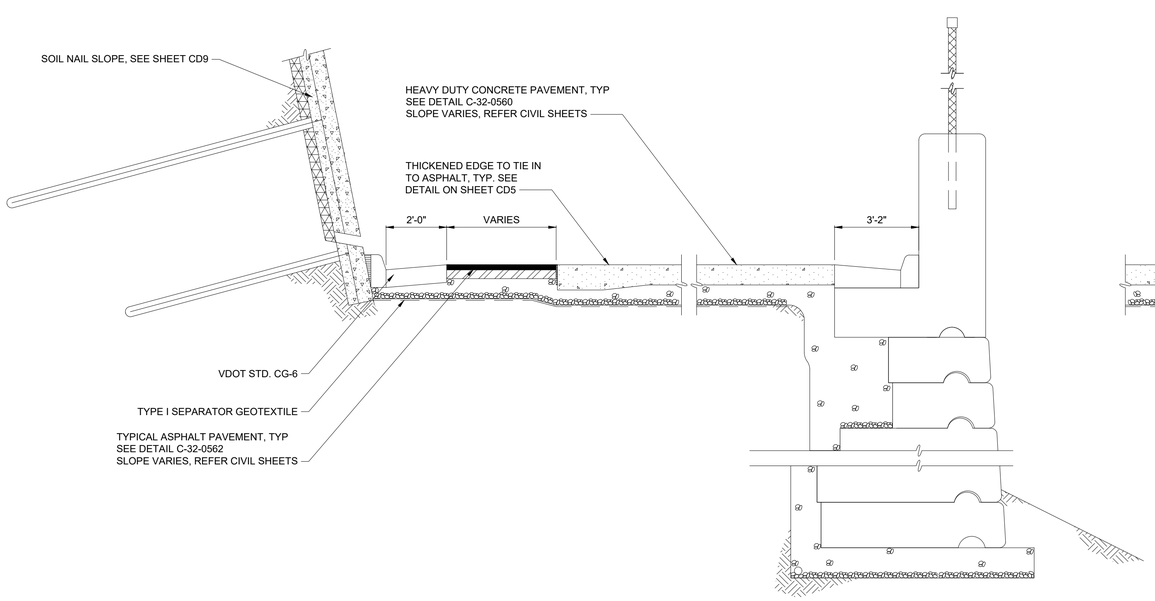
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

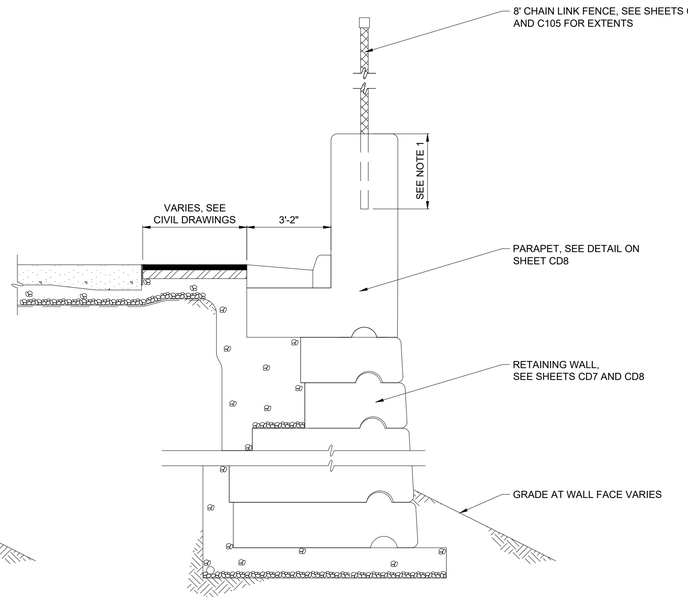
BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CIVIL
GRADING AND DRAINAGE PLAN - AREA 1C

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	C018

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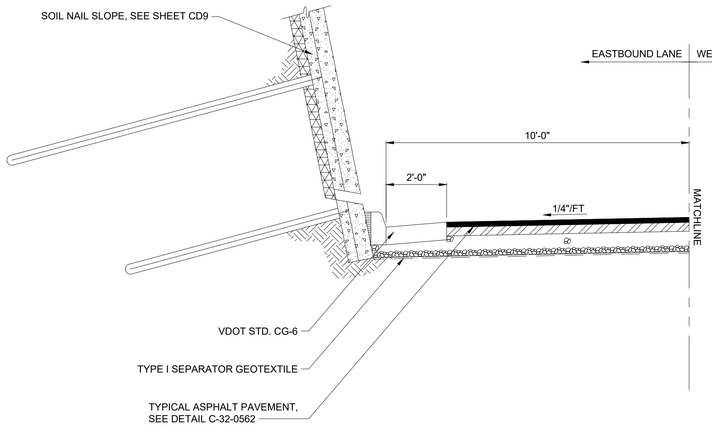


TYPICAL PUMP STATION LOT SECTIONS

NOT TO SCALE

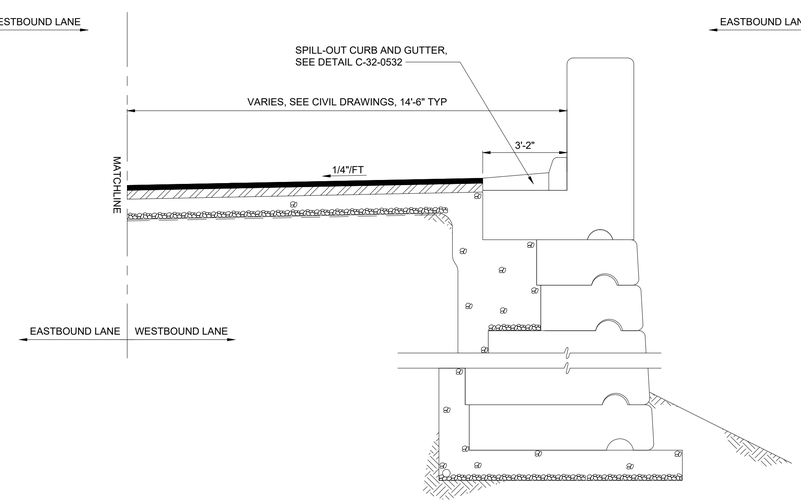
NOTES:

1. CHAIN LINK FENCE POST EMBEDMENT DEPTH SHALL BE DETERMINED BY CHAIN LINK FENCE MANUFACTURER. CONTRACTOR SHALL COORDINATE FENCE POST EMBEDMENT DEPTH WITH BLOCK WALL DESIGN ENGINEER. POST EMBEDMENT SHALL BE SUFFICIENT FOR THE FENCE TO WITHSTAND A UNIFORM LATERAL LOAD OF 0.015KSF ACTING NORMAL TO THE ENTIRE SURFACE OF THE CHAIN LINK FENCE WITHOUT FAILURE IN ACCORDANCE WITH AASHTO. CONTRACTOR SHALL PROVIDE SIGNED AND SEALED CALCULATIONS BY A CURRENTLY REGISTERED PROFESSIONAL ENGINEER IN THE COMMONWEALTH OF VIRGINIA FOR THE FENCE POST EMBEDMENT. FIELD CORE INTO BLOCK AND GROUT IN PLACE PER BLOCK MANUFACTURER INSTALLATION GUIDANCE.



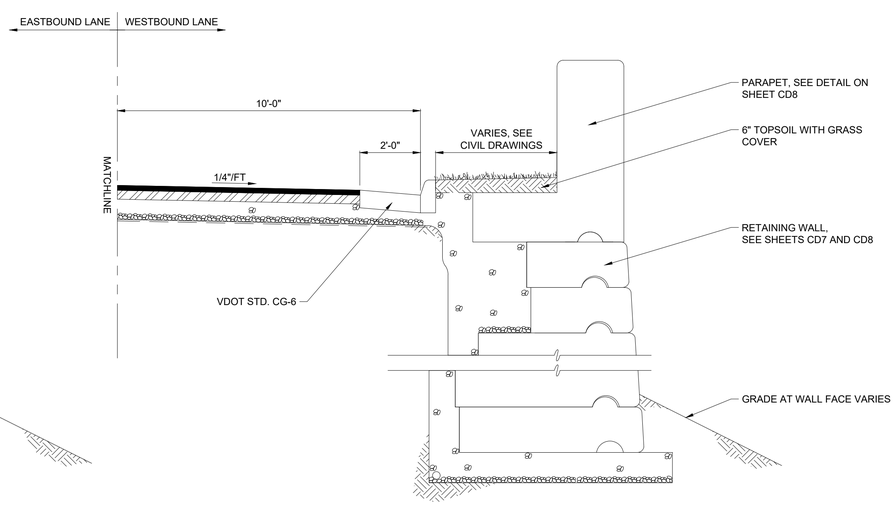
TYPICAL ACCESS ROAD SECTION
EASTBOUND LANE

NOT TO SCALE



TYPICAL ACCESS ROAD SECTION
WESTBOUND LANE - WEST OF BRIDGE

NOT TO SCALE



TYPICAL ACCESS ROAD SECTION
WESTBOUND LANE - EAST OF BRIDGE

NOT TO SCALE

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. ALIEV
DRAWN BY:	A. ALIEV
CHECKED BY:	M. MILLER

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

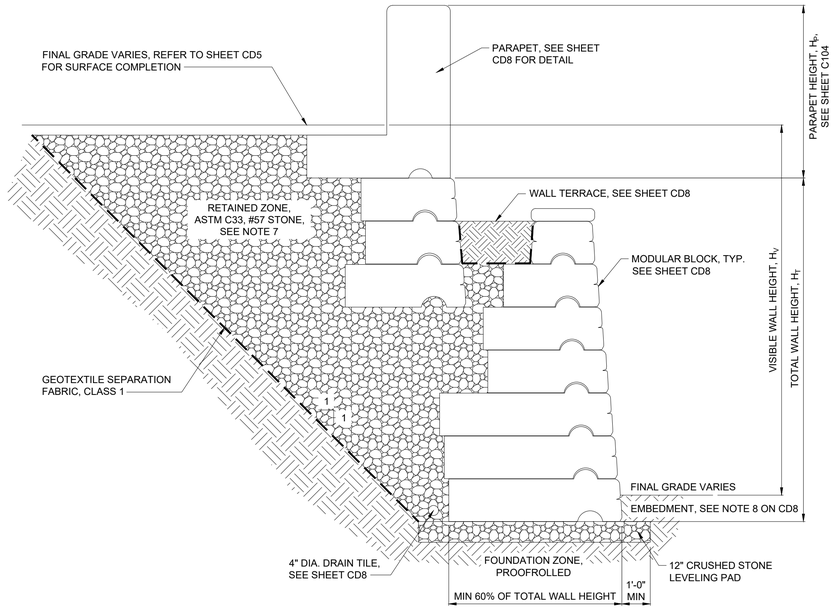
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

DETAILS
ROADWAY AND PARKING LOT SECTION

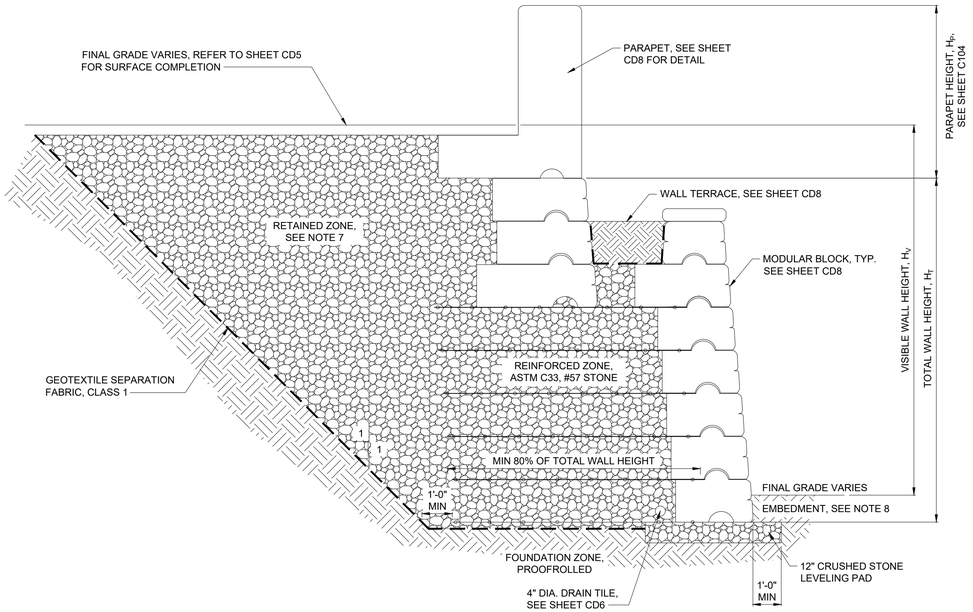
DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	CD6

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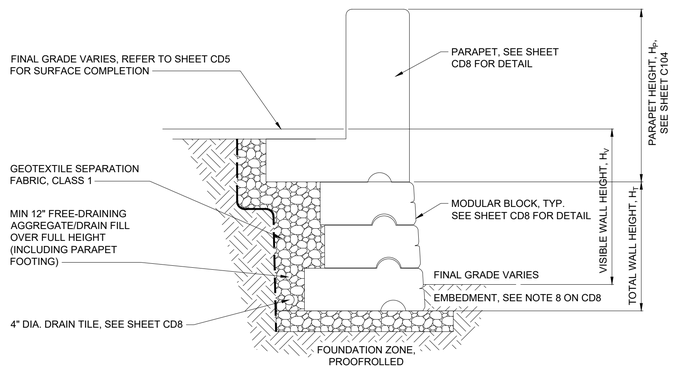
TYPICAL GRAVITY RETAINING WALL SECTION

NOT TO SCALE



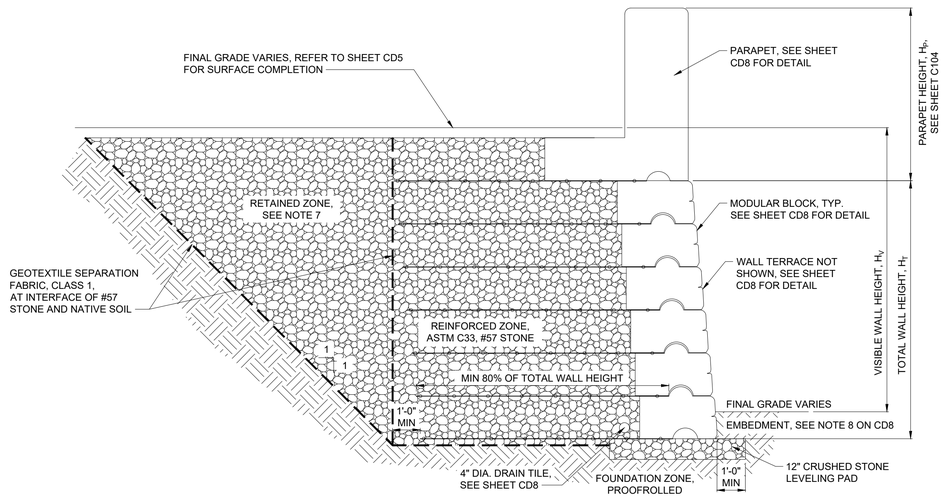
TYPICAL COMBINATION GRAVITY/MSE RETAINING WALL SECTION

NOT TO SCALE



TYPICAL RETAINING WALL SECTION - TOTAL WALL HEIGHT < 8FT

NOT TO SCALE



TYPICAL MSE RETAINING WALL SECTION

NOT TO SCALE

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. ALIEV
DRAWN BY:	A. ALIEV
CHECKED BY:	M. MILLER

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0, 1/2", 1")

PERMITTING SET
DO NOT USE FOR
CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

DETAILS
TYPICAL RETAINING WALL SECTIONS

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	CD7

File: C:_DC\ACCDOCS\HAZEN AND SAWYER\31570-001_BCR WATER PUMP STATION AND INTAKE\PROJECT FILES\01_DESIGN\CIVIL\00_DETAILS\CD7 Saved by AALIEV Save date: 2/24/2026 11:55 AM
PLOT DATE: 3/6/2026 3:00 PM BY: JDOZIER

MODULAR BLOCK RETAINING WALL NOTES:

1. DESIGN: DESIGN OF MODULAR BLOCK WALL IS THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE BASED ON THE REQUIREMENTS ESTABLISHED IN THE CONTRACT DOCUMENTS AND NCMA DESIGN CRITERIA EXCEPT WHERE SUPERCEDED BY REQUIREMENTS IN THE CONTRACT DOCUMENTS. ANY DEVIATION FROM THE REQUIREMENTS ARE SUBJECT TO THE APPROVAL OF THE ENGINEER. DESIGN SHALL BE SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE COMMONWEALTH OF VIRGINIA. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND ENGINEERING CALCULATIONS FOR ALL SECTIONS TO SUPPORT DESIGN. TYPICAL SECTIONS ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY, AND SPECIFIC GEOMETRY SHALL BE DETERMINED BASED ON WALL LAYOUTS AND OTHER PLAN INFORMATION.

2. WALL TYPE: WALLS MAY BE CONSTRUCTED AS A GRAVITY SYSTEM OR AS A MECHANICALLY STABILIZED EARTH (MSE) SYSTEM, OR SOME COMBINATION THEREOF. A HYBRID SYSTEM MAY BE USED PROVIDED THE GRAVITY SYSTEM IS ATOP THE MSE SYSTEM. WHERE THE REINFORCING GRID OF A MSE SYSTEM WOULD CONFLICT WITH BURIED UTILITIES, A HYBRID WALL MUST BE USED TO FACILITATE FUTURE ACCESS TO THOSE UTILITIES. ANY MSE SYSTEM REINFORCING GRIDS MUST BE A MINIMUM OF 4 FT BELOW BURIED UTILITIES. WHERE THE REINFORCING GRID OF A MSE SYSTEM WOULD CONFLICT WITH THE PUMP STATION SHAFT OR ANY DRILLED PIERS, A GRAVITY SYSTEM SHALL BE USED.

   A. FOR GRAVITY SYSTEMS, THE BOTTOM BLOCK DEPTH FOR A GIVEN WALL SECTION SHALL BE A MINIMUM OF 60% OF THE TOTAL WALL HEIGHT OF THAT SECTION.

   B. FOR MSE SYSTEMS, THE REINFORCING GRID SHALL BE A MINIMUM OF 80% OF THE TOTAL WALL HEIGHT OF THAT SECTION.

3. GLOBAL STABILITY: REGARDLESS OF TYPE, STABILITY CRITERIA SHALL BE MET AND SHALL BE CONSTRUCTABLE WITHIN EXISTING EASEMENTS AND SITE CONSTRAINTS. STABILITY CRITERIA INCLUDE INTERNAL, EXTERNAL AND GLOBAL STABILITY.

   A. FOR INTERNAL STABILITY CALCULATIONS, WHEN EARTH REINFORCEMENTS ARE USED, THE FAILURE PLANE SHALL BE ASSUMED TO ORIGINATE AT THE BACK OF THE CONCRETE BLOCKS.

   B. FACTOR OF SAFETY IN BEARING SHALL BE GREATER THAN OR EQUAL TO 2.0. FACTOR OF SAFETY IN SLIDING ALONG THE BASE OF THE STRUCTURE SHALL BE GREATER THAN OR EQUAL TO 1.5. FOR OVERTURNING EVALUATIONS THE RESULTING ECCENTRICITY SHOULD BE LOCATED IN THE MIDDLE TWO-THIRDS OF THE BASE.

   C. FACTOR OF SAFETY FOR GLOBAL STABILITY SHALL BE GREATER THAN OR EQUAL TO 1.5 FOR STEADY STATE CONDITIONS, AND SHALL BE GREATER THAN OR EQUAL TO 1.2 FOR RAPID DRAWDOWN CONDITIONS. GLOBAL STABILITY HAS BEEN EVALUATED BY THE ENGINEER. THE CONTRACTOR'S WALL ENGINEER SHALL ALSO VERIFY GLOBAL STABILITY FOR THEIR SPECIFIC PRODUCT TO VERIFY SUITABILITY WITH THE PROPOSED PRODUCT. MINIMUM WALL BASE WIDTHS TO SATISFY GLOBAL STABILITY ARE SHOWN ON SHEET CD7.

   D. ADDITIONAL BASE WIDTH BEYOND THAT SHOWN MAY BE REQUIRED TO SATISFY STABILITY, AND SHALL BE DETERMINED BY CONTRACTOR'S WALL DESIGN ENGINEER.

4. SOIL SHEAR STRENGTH: SOIL PARAMETERS FOR STABILITY CALCULATIONS ARE AS SHOWN IN TABLE ON THIS SHEET. THE STABILITY ANALYSIS SHALL CONSIDER POTENTIAL SEISMIC LOADS.

5. TERRACING: WALLS IN EXCESS OF 10 FEET IN EXPOSED WALL HEIGHT SHALL INCLUDE A 5.5' TERRACE, AS MEASURED FROM BLOCK FACE-TO-FACE. THE WIDTH OF THE TERRACE MAY BE ADJUSTED TO ACCOUNT FOR THE SELECTED BLOCK SIZE PROVIDED THE MINIMUM 3.5 FT OF PLANTING AREA IS PROVIDED. THE APPROXIMATE ELEVATION OF THE TERRACE IS 558.50 BUT MAY VARY ONE-HALF OF THE BLOCK HEIGHT TO ACCOUNT FOR VARIATIONS IN BLOCK GEOMETRY.

6. WATER LEVEL: WALL DESIGN SHALL INCLUDE A DESIGN WATER LEVEL TO THE 100-YR EVENT (ELEVATION 548.50), AND DRAWDOWN TO THE RESERVOIR NORMAL POOL (ELEVATION 537.80).

7. RETAINED ZONE GEOMETRY: ALL WALLS EQUAL TO OR GREATER THAN 8 FT IN TOTAL WALL HEIGHT SHALL INCLUDE A GRANULAR BACKFILL IN THE RETAINED ZONE BEHIND THE DRAINAGE LAYER FOR GRAVITY WALLS, OR BEHIND THE REINFORCED ZONE FOR MSE WALLS. THE RETAINED ZONE IS DEFINED AS STARTING 1 FT FROM BACK OF THE LONGEST REINFORCING GRID FOR MSE SYSTEMS AND 1 FT FROM BACK OF BOTTOM BLOCK OR ANY EXTENDERS USED FOR GRAVITY SYSTEMS AND THEN EXTENDING TO THE GROUND SURFACE ALONG A 1H:1V SLOPE. GRANULAR BACKFILL MATERIAL USED FOR RETAINED ZONE SHALL BE ASTM C33, #57 STONE. A CLASS 1 GEOTEXTILE FILTER SEPARATION LAYER SHALL BE PROVIDED AT ALL POINTS OF CONTACT BETWEEN #57 STONE AND ONSITE SOIL OR IMPORTED SOIL. FOR MSE WALLS LESS THAN 8 FT IN TOTAL WALL HEIGHT, THE RETAINED ZONE MAY BE EITHER APPROVED BACKFILL OR #57 STONE, AS DETERMINED BY WALL ENGINEER.

8. EMBEDMENT: MINIMUM WALL EMBEDMENT VARIES WITH WALL HEIGHT, AS SHOWN ON SHEET C104. IN GENERAL, WALLS WITH A TOTAL HEIGHT LESS THAN 10 FT SHALL HAVE A MINIMUM ONE-FOOT EMBEDMENT, WHILE ALL OTHERS SHALL HAVE A MINIMUM TWO-FOOT EMBEDMENT.

9. SURCHARGE LOADS: TRAFFIC SURCHARGE LOADS AT THE TOP OF WALLS SHALL BE AT LEAST 250 PSF WITHIN PAVED AREAS. AREAS WITHOUT A DEFINED SURCHARGE LOAD SHALL INCLUDE A MINIMUM SURCHARGE LOAD OF 50 PSF. ADDITIONAL SURCHARGE LOADS SHALL BE USED FOR TEMPORARY CONSTRUCTION CONDITIONS, AS DETERMINED BY THE CONTRACTOR'S WALL DESIGN ENGINEER.

10. BACK-DRAINAGE: DESIGN SHALL INCLUDE A MINIMUM OF 12 INCHES OF FREE-DRAINING GRAVEL OR DRAINFILL BEHIND ALL BLOCKS, REGARDLESS OF THE INTERNAL DRAINAGE CAPACITY OF BLOCK SYSTEM. A CLASS 1 GEOTEXTILE FILTER SEPARATION LAYER SHALL BE PROVIDED AT ALL POINTS OF CONTACT BETWEEN THE GRAVEL AND ONSITE SOIL OR IMPORTED SOIL. DRAINAGE COLLECTION PIPES OR WEEP HOLES SHALL BE PROVIDED IN ACCORDANCE WITH WALL DESIGNER'S AND MANUFACTURER'S REQUIREMENTS.

11. BATTER: WALL BATTER SHALL BE A MAXIMUM OF 5 DEGREES FROM VERTICAL. BLOCKS SHALL BE PLACED HORIZONTALLY, AND A POSITIVE MEANS OF OBTAINING BATTER SUCH AS PINS, KEYWAYS, OR CONCRETE LIPS SHALL BE PROVIDED. THE TOE OF WALL SHALL BE ADJUSTED AS NECESSARY TO MAINTAIN BATTER; TOP OF WALL ALIGNMENT SHALL NOT BE ADJUSTED.

12. RAILING AND BARRIER: CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR TRAFFIC BARRIER AND RAILING CONNECTION DETAIL TO BLOCK WALL SYSTEM FOR APPROVAL BY ENGINEER. BARRIER CONNECTION SHALL CONSIDER VEHICULAR IMPACTS AND MEET THE REQUIREMENTS OF ASCE-7-10 RISK CATEGORY I.

13. BLOCK TYPE: SEE PROJECT SPECIFICATION FOR APPROVED MODULAR CONCRETE BLOCK SUPPLIERS. BLOCK BLOCK TYPE AND TEXTURED FACE FINISH SUBJECT TO ENGINEER APPROVAL. WIDTH MEASUREMENTS SHALL BE FROM THE BLOCK FACE IGNORING ALL ASPERITIES/DEPTH VARIATIONS IN THE FACING TEXTURE.

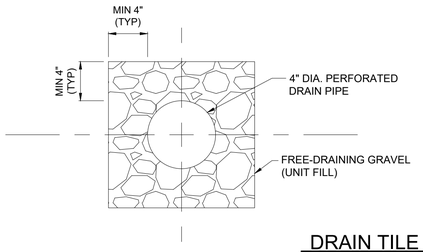
14. ENCROACHMENTS: MODULAR BLOCK RETAINING WALL HAS A CONFLICT BEHIND WALL FACE FROM APPROXIMATE STATION 5+75 TO 6+25 AND AT BURIED UTILITY LOCATION. CONTRACTOR'S WALL DESIGN ENGINEER SHALL ACCOUNT FOR CONFLICTS IN THE WALL DESIGN. THE MINIMUM BASE WIDTH FOR THE WALL AT THE PS SHAFT MAY BE REDUCED IF STABILITY ANALYSIS ACCOUNTS FOR REDUCTION IN LATERAL LOADS DUE TO PRESENCE OF THE STRUCTURAL SHAFT AND/OR IF LOAD TRANSFER BEYOND THE SHAFT IS PROVIDED, BUT IS SUBJECT TO APPROVAL BY THE ENGINEER.

15. FOUNDATION PROOFROLLING: THE WALL FOUNDATION LIMITS, INCLUDING ANY REINFORCED ZONE, SHALL BE PROOFROLLED TO IDENTIFY SOFT OR PUMPING MATERIALS. ALL PROOFROLLING SHALL BE OBSERVED BY THE ENGINEER AND A REPRESENTATIVE OF THE WALL DESIGNER. THE CONTRACTOR SHALL CORRECT ANY UNDESIREABLE OR OBJECTIONABLE MATERIAL IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

16. SEISMIC LOADS: THE PROJECT IS LOCATED IN IBC SITE "C" WITH A POTENTIAL GROUND ACCELERATION OF 0.04g.

TABLE 1 : DESIGN SOIL PARAMETERS

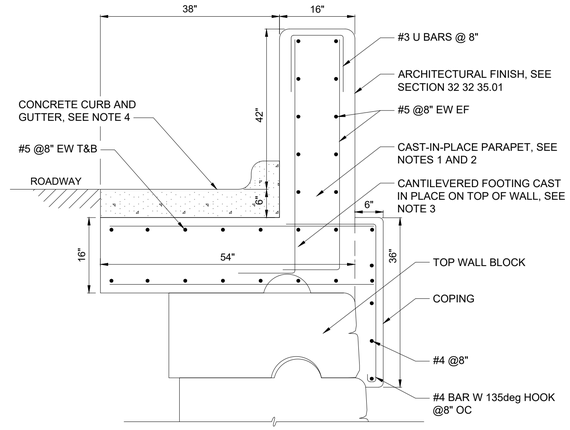
ZONE	BULK UNIT WEIGHT	EFFECTIVE FRICTION ANGLE	EFFECTIVE COHESION	TOTAL FRICTION ANGLE	TOTAL COHESION
REINFORCED ZONE	115 PCF	34 DEG	0 PSF	N/A	N/A
RETAINED ZONE (AGGREGATE)	115 PCF	34 DEG	0 PSF	N/A	N/A
RETAINED ZONE (IN-SITU)	120 PCF	28 DEG	50 PSF	18 DEG	100 PSF
FOUNDATION ZONE	125 PCF	28 DEG	150 PSF	18 DEG	250 PSF

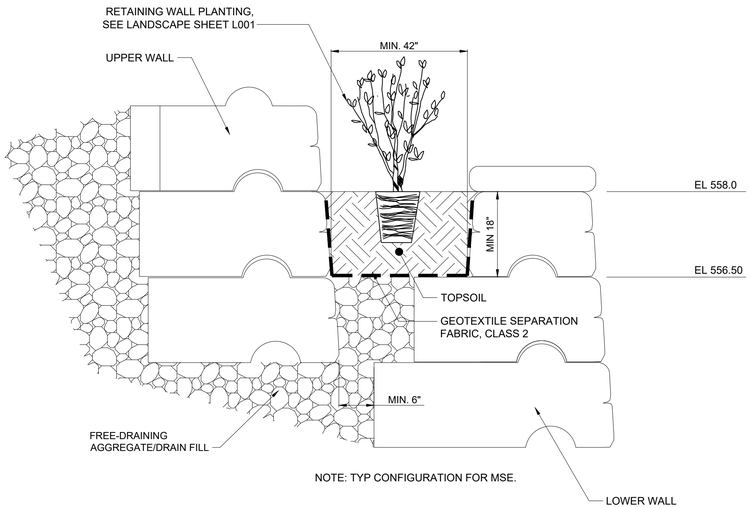


NOTES:

1. WALL MANUFACTURER TO SPECIFY PIPE TYPE, PERFORATION DETAILING AND HOLE PATTERN. PERFORATION SIZE SHALL BE DESIGNED FOR GRADATION OF UNIT FILL.
2. FILTER SOCKS AROUND DRAIN PIPE SHALL NOT BE USED.

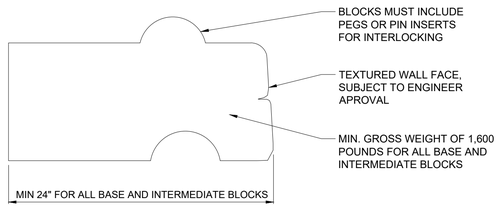
DRAIN TILE DETAIL
NOT TO SCALE



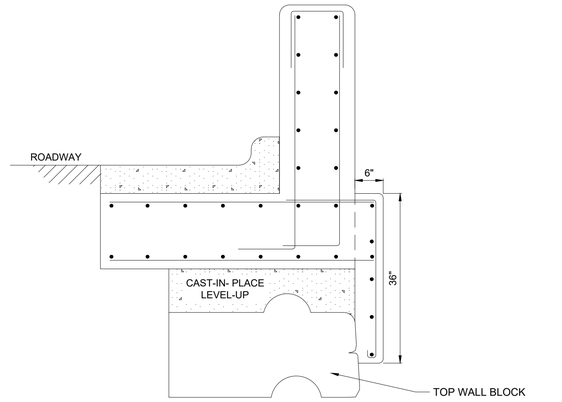


NOTE: TYP CONFIGURATION FOR MSE.

WALL TERRACE DETAIL
NOT TO SCALE



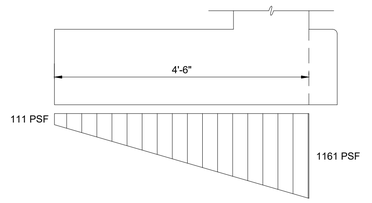
MODULAR BLOCK REQUIREMENTS DETAIL
NOT TO SCALE



PARAPET DETAIL - SLOPING INSTALLATION
NOT TO SCALE

NOTES:

1. PARAPET BLOCKS MAY BE USED IN LIEU OF CAST-IN-PLACE CONCRETE PROVIDED THAT THE BLOCK-BASED PARAPET MEETS ALL REQUIREMENTS IN THE DETAIL ABOVE AND IN SPECIFICATION SECTION 32 32 35.01.
2. CONTRACTOR SHALL PROVIDE EXPANSION JOINTS IN CAST-IN-PLACE PARAPET A MINIMUM OF 50'-0" OC.
3. MODULAR BLOCK WALL DESIGN SHALL INCLUDE SUPPORT AND CONNECTION OF THE CAST-IN-PLACE PARAPET TO THE MODULAR BLOCK WALL. CONNECTION DESIGN AND SOIL REINFORCEMENT SHALL BE IN ACCORDANCE WITH DESIGN METHODS OF THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) 663 DESIGN OF ROADSIDE BARRIER SYSTEMS PLACED ON MSE WALLS. CONNECTION SHALL BE DESIGNED TO RESIST THE FOLLOWING MINIMUM ALLOWABLE LOADS DELIVERED TO THE MODULAR BLOCK WALL:
   A. SLIDING ACTIVE TRANSVERSE TO THE WALL: 0.5 KIPS PER LINEAR FOOT
   B. BEARING PRESSURE DISTRIBUTION AS SHOWN BELOW:
4. EXTEND EDGE OF CURB TO BE FLUSH WITH EDGE OF FOOTER. GUTTER DETAIL ALTERNATES BETWEEN SPILL-OUT GUTTER (C-32-0532) AND VDOT CG-6. REFER TO CIVIL PLANS FOR TRANSITION LOCATIONS.



REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER: C. RAMO
DESIGNED BY: A. LIEV
DRAWN BY: A. LIEV
CHECKED BY: M. MILLER
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

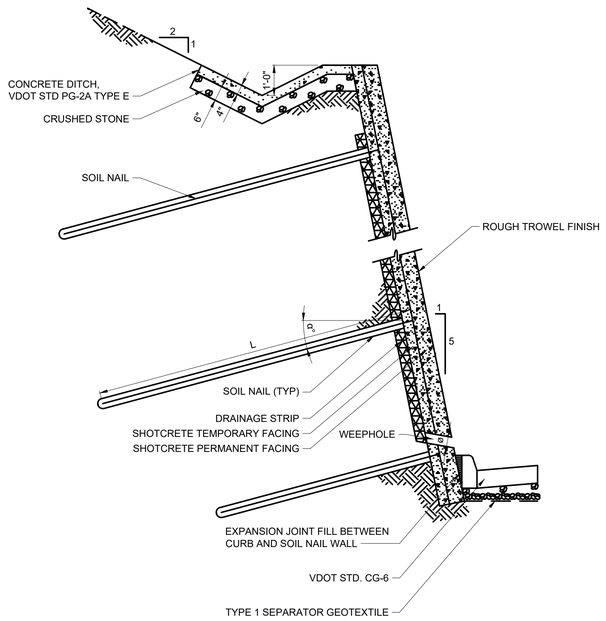
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

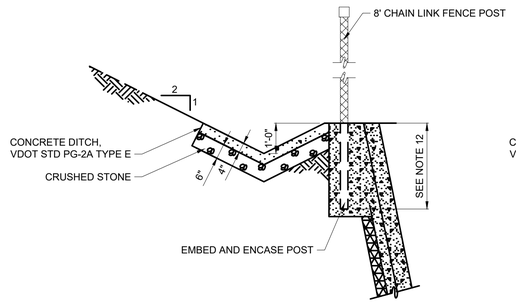
DETAILS
TYPICAL RETAINING WALL NOTES AND DETAILS

DATE: MARCH 2026
HAZEN NO.: 31570-001
CONTRACT NO.: 1
DRAWING NUMBER: CD8

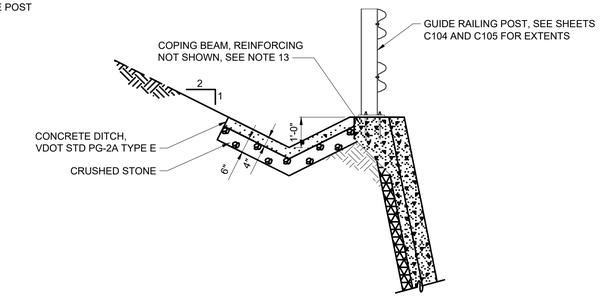
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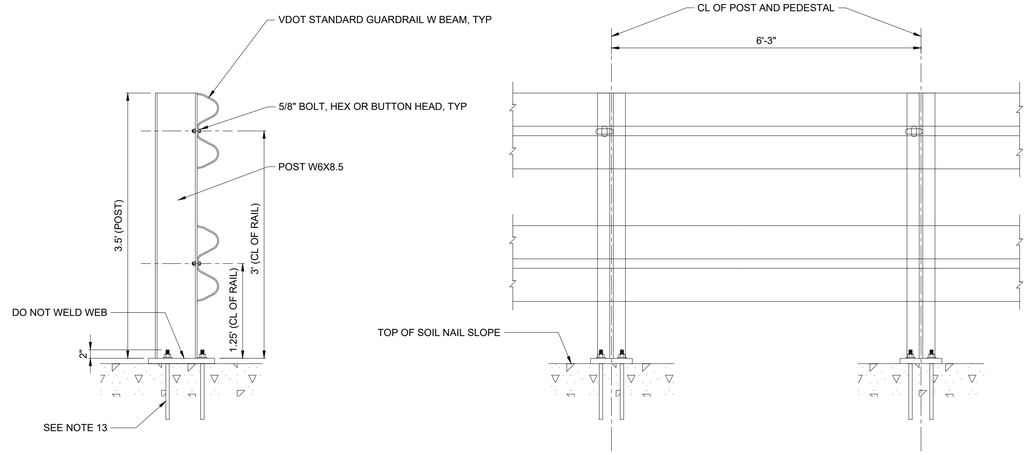
TYPICAL SOIL NAIL SLOPE SECTION
NOT TO SCALE



SOIL NAIL SLOPE TOP SECTION AT CHAIN LINK FENCE POST
NOT TO SCALE



SOIL NAIL SLOPE TOP SECTION AT GUARDRAIL POST
NOT TO SCALE



GUIDE RAILING
NOT TO SCALE

NOTES:

1. SOIL NAIL SLOPE DIMENSIONS AND DRAINAGE TO BE DETERMINED BY CONTRACTOR. SOIL NAIL SLOPE DESIGN AND CONSTRUCTION SHALL COMPLY WITH FHWA GEOTECHNICAL ENGINEERING CIRCULAR NO. FHWA GEC 007 (REPORT NO. FHWA-NHI-14-007, DATED FEBRUARY 2015).
2. THE SOIL NAIL SLOPE SHALL HAVE A BATTER EQUAL TO 1 HORIZONTAL-TO-5 VERTICAL.
3. THE SOIL NAIL SLOPE SHALL HAVE THE FOLLOWING MINIMUM GEOMETRY:
   A. LENGTH (L) SHALL BE AT LEAST 15 FEET. ADDITIONAL LENGTH, AS REQUIRED FOR STABILITY, SHALL BE DETERMINED BY THE CONTRACTOR. IN NO CASE SHALL THE EFFECTIVE HORIZONTAL LENGTH BE LESS THAN 60 PERCENT OF THE TOTAL WALL HEIGHT. UNIFORM NAIL LENGTHS SHALL BE USED.
   B. THE SOIL NAIL INCLINATION (α), AS MEASURED FROM THE HORIZONTAL, SHALL GENERALLY BE 15 DEGREES AND IN ALL CASES BETWEEN 10 AND 20 DEGREES.
   C. THE SOIL NAIL SPACING SHALL BE A MINIMUM OF 3.5 FT AND A MAXIMUM OF 5 FT IN THE HORIZONTAL DIRECTION AND VERTICAL DIRECTIONS. ALL NAILS SHALL BE NO CLOSER THAN 2 FT FROM THE ENDS, TOP AND BOTTOM OF THE WALL.
4. THE ESTIMATED BOND STRENGTH FOR ROTARY DRILLED NAILS IS 8.0 PSI. THE CONTRACTOR SHALL INSTALL SACRIFICIAL NAILS AND PERFORM VERIFICATION LOAD TESTS TO 200% OF THE MAXIMUM DESIGN CAPACITY OF THE NAIL SYSTEM. THE NUMBER OF VERIFICATION LOAD TESTS SHALL BE DETERMINED BY THE CONTRACTOR BUT SHALL BE NO LESS THAN 3 TESTS.
5. THE DESIGN OF THE SOIL NAIL SLOPE SHALL CONSIDER SEISMIC ACCELERATIONS OF 0.04g.
6. SOIL NAIL CONSTRUCTION SHALL INCLUDE CLASS A CORROSION PROTECTION INSTALLED AT THE POINT OF MANUFACTURE. ANY REPAIRS TO THE CORROSION PROTECTION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
7. THE SELECTION OF DESIGN LOADS SHALL CONSIDER SOIL SURCHARGE FROM TOP OF SOIL NAIL SLOPE GRADES, EARTH PRESSURES, TRANSIENT LOADS DURING CONSTRUCTION, SEISMIC EVENTS, ETC.
8. THE MINIMUM SOIL NAIL CENTER BAR SIZE IS #8 AND SHALL BE GRADE 75 STEEL OR BETTER.
9. THE SOIL NAIL SYSTEM SHALL INCLUDE BACK-DRAINAGE WITH WEEP HOLES.
10. THE SOIL NAIL DESIGN SHALL CONSIDER GRADES AT THE TOP OF THE WALL AND INCLUDE PROVISIONS FOR POSITIVE DRAINAGE TO THE TOE OF THE SOIL NAIL SLOPE.
11. CONSTRUCTION JOINTS SHALL BE PROVIDED BY THE SOIL NAIL DESIGNER.
12. CHAIN LINK FENCE POST EMBEDMENT DEPTH SHALL BE DETERMINED BY CHAIN LINK FENCE MANUFACTURER. CONTRACTOR SHALL COORDINATE FENCE POST EMBEDMENT DEPTH WITH SOIL NAIL SLOPE DESIGN ENGINEER. POST EMBEDMENT SHALL BE SUFFICIENT FOR THE FENCE TO WITHSTAND A UNIFORM LATERAL LOAD OF 0.015KSF ACTING NORMAL TO THE ENTIRE SURFACE OF THE CHAIN LINK FENCE WITHOUT FAILURE IN ACCORDANCE WITH AASHTO. CONTRACTOR SHALL PROVIDE SIGNED AND SEALED CALCULATIONS BY A CURRENTLY REGISTERED PROFESSIONAL ENGINEER IN THE COMMONWEALTH OF VIRGINIA FOR THE FENCE POST EMBEDMENT.
13. GUIDE RAILING SHALL BE FLANGE-MOUNTED TO TOP OF COPING BEAM. POST MOUNTING, ANCHOR BOLTS, COPING BEAM DIMENSIONS, AND COPING BEAM REINFORCEMENT SHALL BE DETERMINED BY SOIL NAIL SLOPE DESIGN ENGINEER. POST MOUNTING SHALL BE SUFFICIENT FOR THE GUARDRAIL TO WITHSTAND, WITHOUT FAILURE, A MINIMUM FORCES OF 200 LBS APPLIED IN A DOWNWARD OR OUTWARD DIRECTION WITHIN 2 INCHES OF THE TOP EDGE OF THE GUIDE RAILING IN ACCORDANCE WITH OSHA. CONTRACTOR SHALL PROVIDE SIGNED AND SEALED CALCULATIONS BY A CURRENTLY REGISTERED PROFESSIONAL ENGINEER IN THE COMMONWEALTH OF VIRGINIA FOR THE GUIDE RAILING POST MOUNTING.

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. ALIEV
DRAWN BY:	A. ALIEV
CHECKED BY:	M. MILLER

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE (0, 1/2", 1")

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

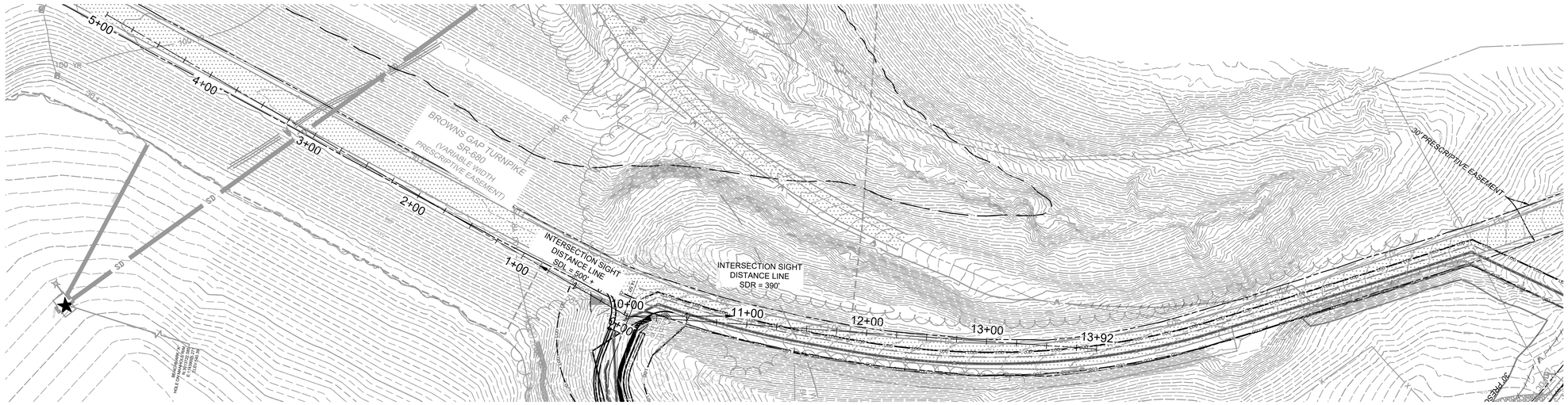
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

DETAILS
TYPICAL SOIL NAIL SLOPE SECTION

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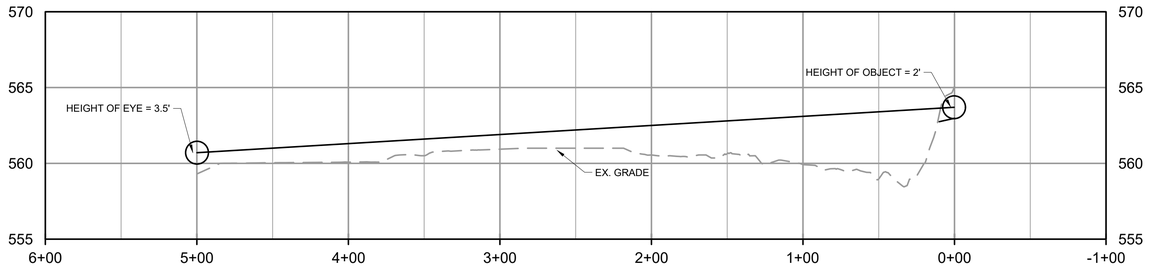
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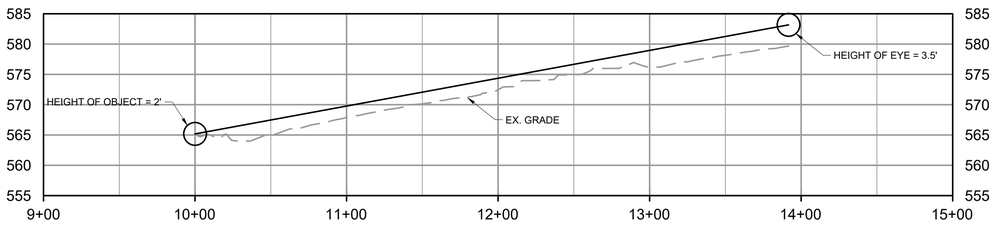
PLAN
SCALE : 1" = 50'

NOTES:

1. DESIGN SPEED = 45 MPH
2. REQUIRED INTERSECTION SIGHT DISTANCE = 500'
3. REQUIRED STOPPING SIGHT DISTANCE = 360'
   W/ 3% DOWNGRADE = 378'



SIGHT DISTANCE LEFT PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 6'



SIGHT DISTANCE RIGHT PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 6'

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

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	J. MCCLURE
DRAWN BY:	J. DOZIER
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
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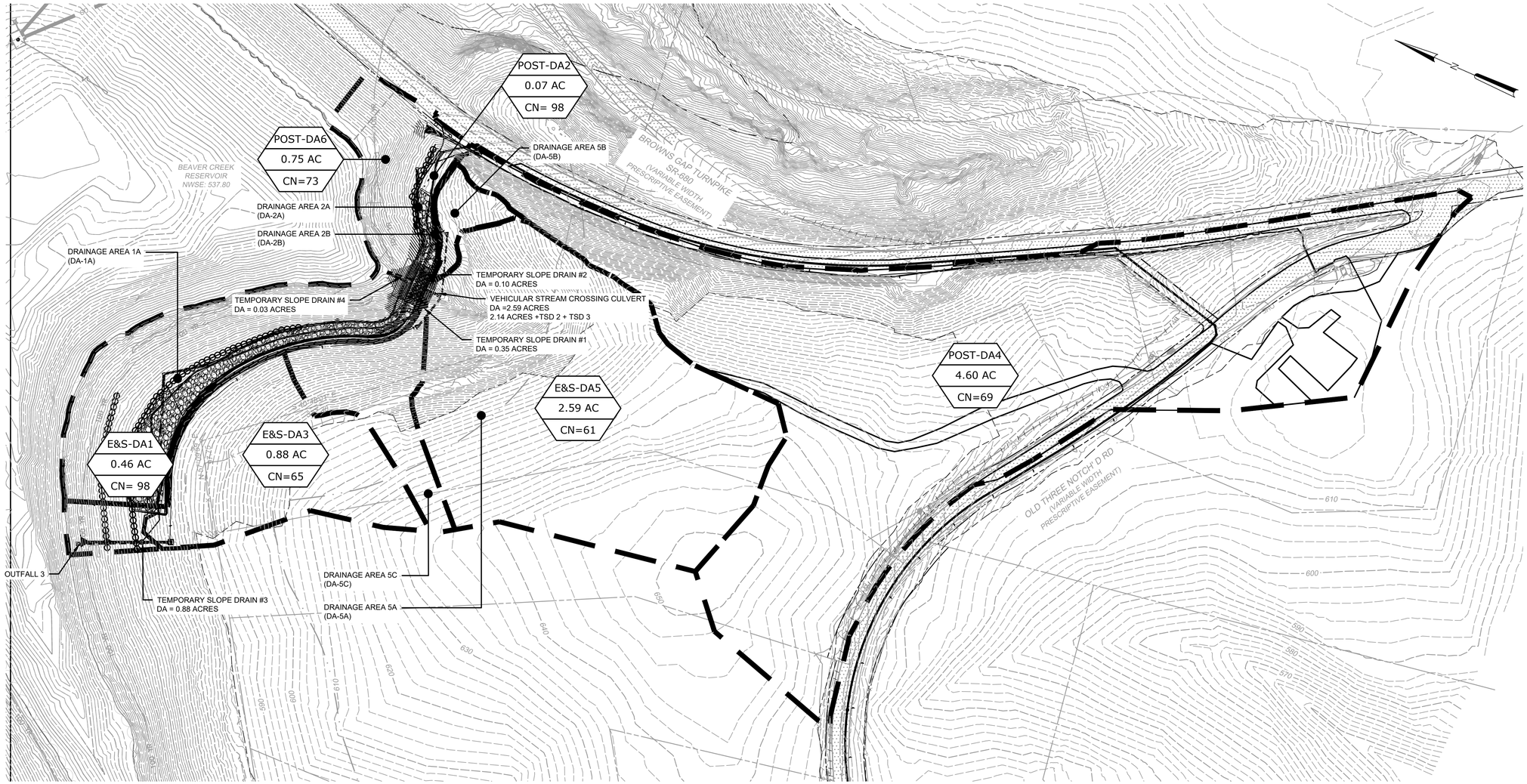
RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CALCULATIONS
SIGHT DISTANCE

DATE:	MARCH 2026
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LEGEND:

DRAINAGE AREA

POST-DEVELOPMENT DRAINAGE AREAS
SCALE: 1" = 60'

SCALE: 1" = 60' 60 30 0 60'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A. VECCHIO
DRAWN BY:	A. VECCHIO
CHECKED BY:	Value

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

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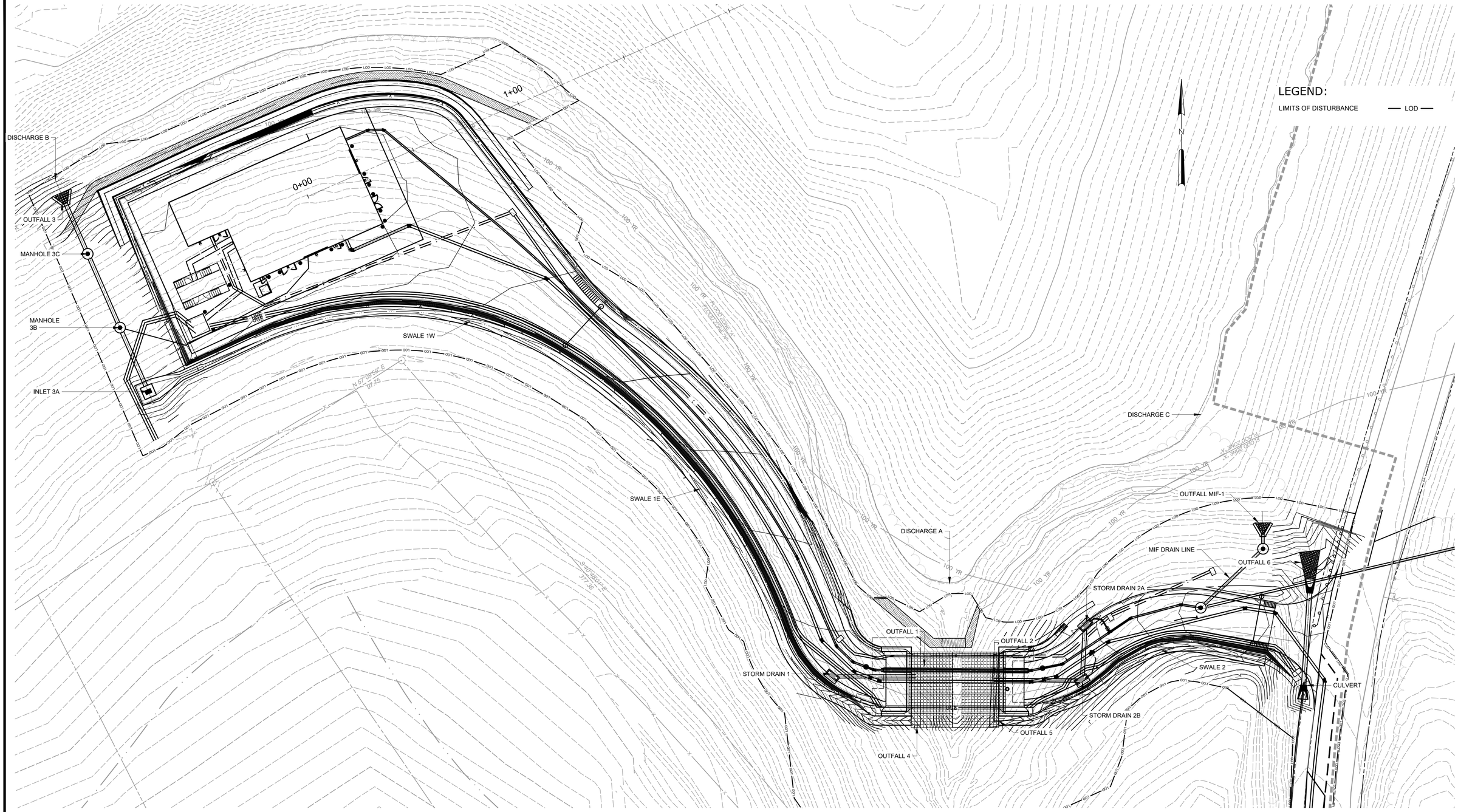
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BEAVER CREEK RAW WATER
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CALCULATIONS
E&S DRAINAGE AREA MAP

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	CA5

File: C:_DC\ACCDOCS\HAZEN AND SAWYER\31570-001_BCR WATER PUMP STATION AND INTAKE\PROJECT FILES\01_DESIGN\CIVIL\00_CALCULATIONS\CA5 Saved by JMCCLURE Save date: 3/5/2026 1:47 PM
PLOT DATE: 3/6/2026 3:03 PM BY: JDOZIER



POST-DEVELOPMENT DRAINAGE AREAS

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	C. RAMO
DESIGNED BY:	A.VECCHIO
DRAWN BY:	A. GARRETT
CHECKED BY:	M. SANTOWASSO

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE — 0 1/2" 1"

PERMITTING SET
DO NOT USE FOR CONSTRUCTION

Hazen
HAZEN AND SAWYER
210 RIDGE MCINTIRE ROAD, SUITE 400
CHARLOTTESVILLE, VA 22903

RIVANNA WATER AND SEWER AUTHORITY
CHARLOTTESVILLE, VIRGINIA

BEAVER CREEK RAW WATER
PUMP STATION
INTAKE AND TRANSMISSION MAIN

CALCULATIONS
POST-DEVELOPMENT ON SITE DRAINAGE
MAP

DATE:	MARCH 2026
HAZEN NO.:	31570-001
CONTRACT NO.:	1
DRAWING NUMBER:	CA6

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