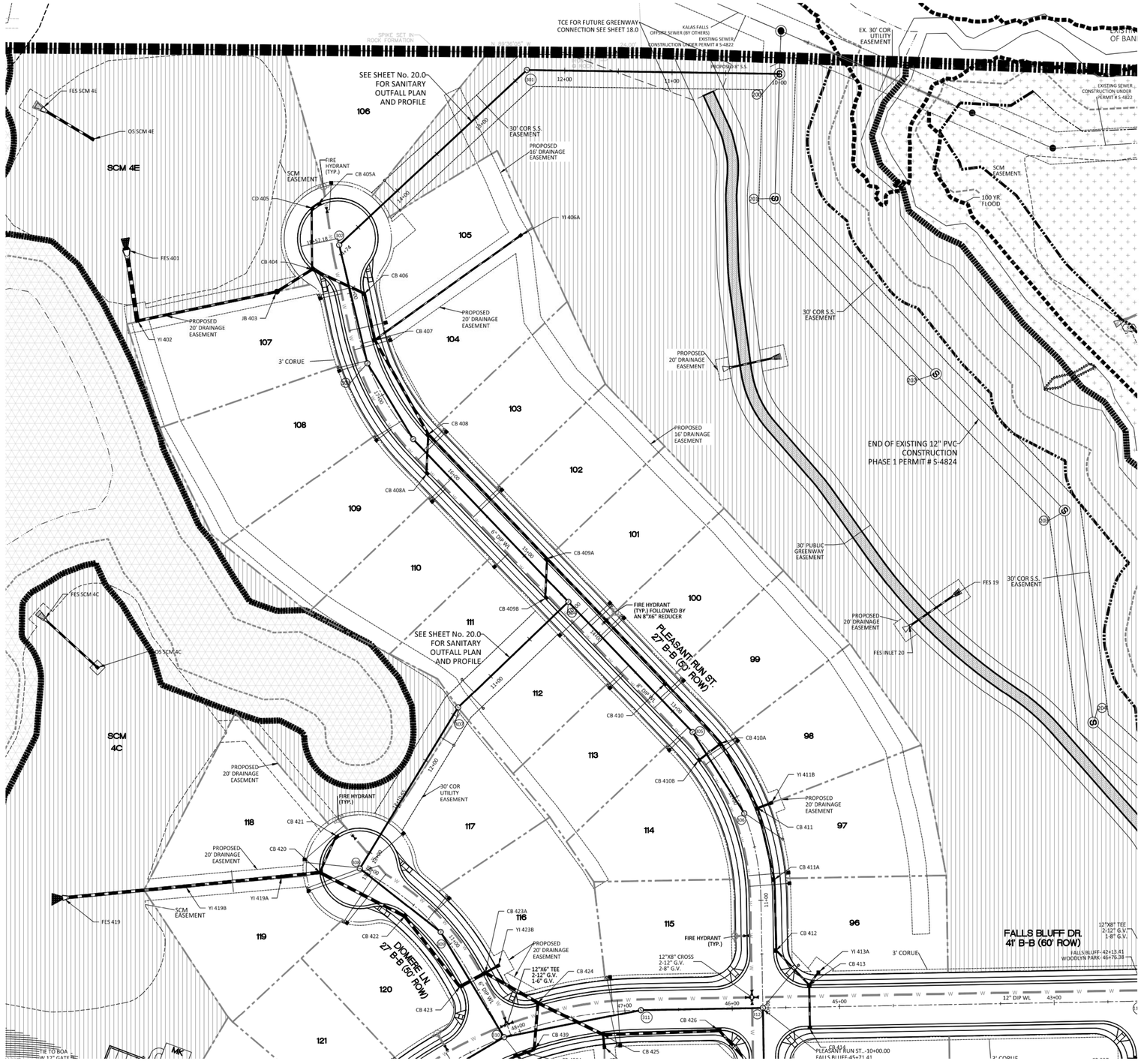
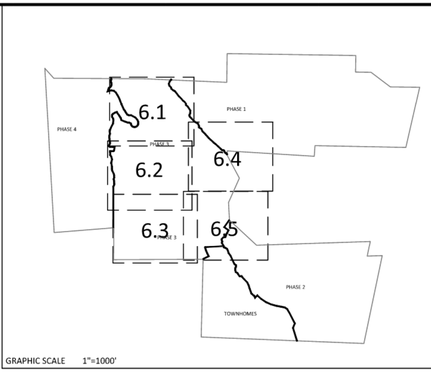
Docusign Envelope ID: 7AC7ED87-6B2D-454D-81F7-2D092E4DF85F





GRAPHIC SCALE 1"=1000'

NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

ATTENTION CONTRACTORS

The Contractor responsible for the extension of water, sewer, and/or reuse, as approved in these plans, is responsible for contacting the Public Utilities Inspector at 919-996-3245 or https://cityworks.raleighnc.gov/pucontractors/New and schedule a Pre-construction meeting prior to beginning any construction.

Raleigh Water must be contacted at (919) 996-4540 at least twenty-four hours prior to beginning any work activity around critical water and sewer infrastructure.

Failure to notify the Divisions in advance of beginning construction, will result in the issuance of monetary fines, and require reinstallation of any water or sewer facilities not inspected as a result of this notification failure.

Failure to call for Inspection, install a downstream plug, have permitted plans on the jobsite, or any other violation of City of Raleigh Standards will result in a fine and possible exclusion from future work in the City of Raleigh.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # S-5617

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # W-4213

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 29510 ENGINEER JOHN R. HARMAN
7/28/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

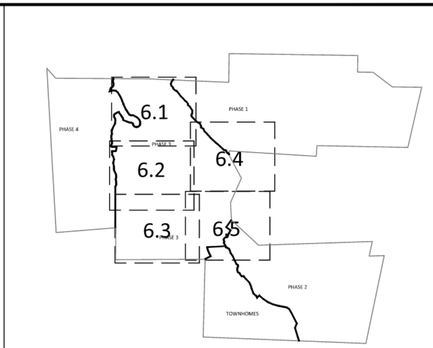
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
PHASE 3 UTILITY PLAN (50 SCALE)

SHEET NO.:
6.1

Z:\Jobs\9900\Kalkins Property\Dwg_Working Dwg\Phase 3\Sheet Files\Sheet No. 6.6-6.5 Phase 3 Utility Plan.dwg
July 29, 2025

Docusign Envelope ID: 7AC7ED87-6B2D-454D-81F7-2D092E4DF85F



GRAPHIC SCALE 1"=1000'

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

ATTENTION CONTRACTORS

The Contractor responsible for the extension of water, sewer, and/or reuse, as approved in these plans, is responsible for contacting the Public Utilities Inspector at 919-996-3245 or https://cityworks.raleighnc.gov/pucontractors/New and schedule a Pre-construction meeting prior to beginning any construction.

Raleigh Water must be contacted at (919) 996-4540 at least twenty-four hours prior to beginning any work activity around critical water and sewer infrastructure.

Failure to notify the Divisions in advance of beginning construction, will result in the issuance of monetary fines, and require reinstallation of any water or sewer facilities not inspected as a result of this notification failure.

Failure to call for Inspection, install a downstream plug, have permitted plans on the jobsite, or any other violation of City of Raleigh Standards will result in a fine and possible exclusion from future work in the City of Raleigh.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # S-5617

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # W-4213

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL
29810
JOHN R. HARMAN
7/28/2025

REVISION:

NO.	DATE:	
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

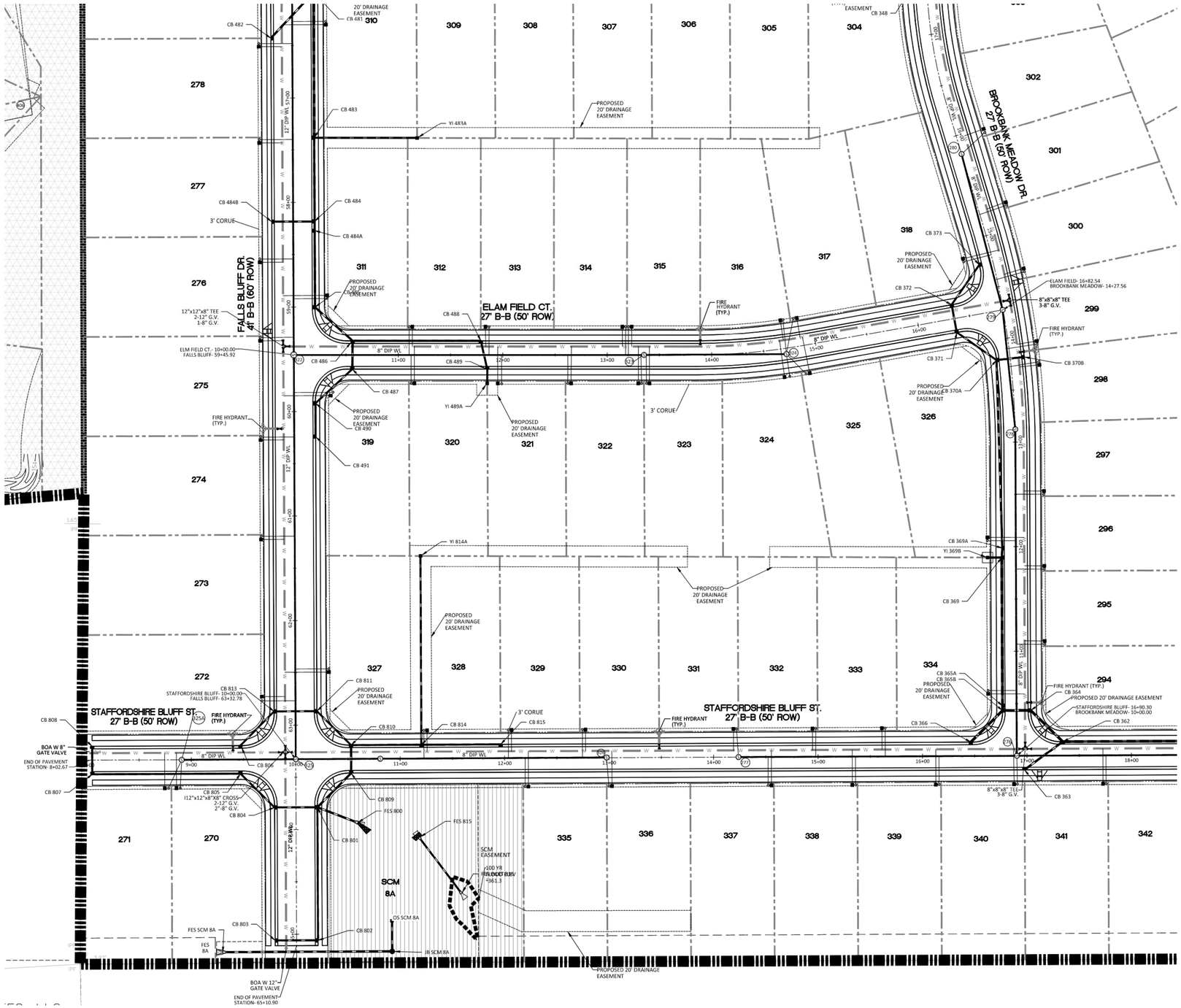
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
PHASE 3 UTILITY PLAN (50 SCALE)

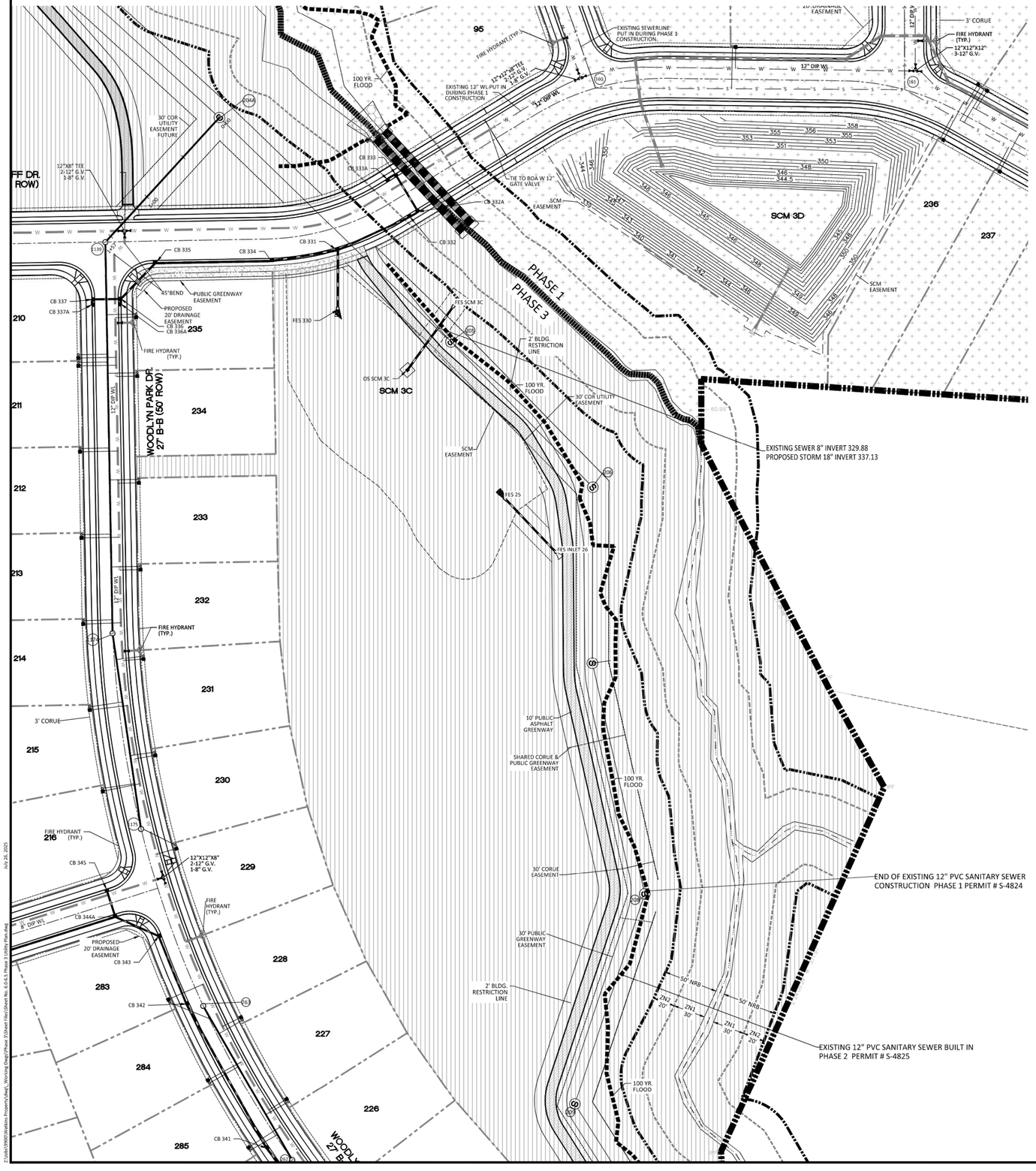
SHEET NO.:
6.2

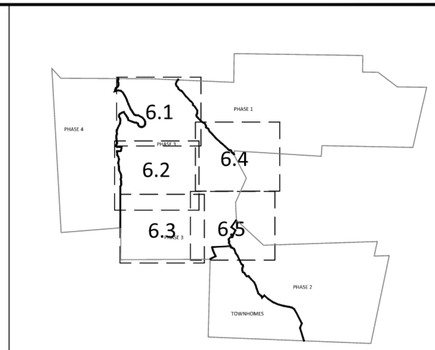
July 29, 2025
Z:\Jobs\9900\Kalkos Projects\Dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No. 6.6-6.5 Phase 3 Utility Plan.dwg

Docusign Envelope ID: 7AC7ED87-6B2D-454D-81F7-2D092E4DF85F


FALLS BLUFF DR.
47' B-B (60' ROW)
ELAM FIELD CT.
27' B-B (50' ROW)
BROOKBANK MEADOW DR.
27' B-B (50' ROW)
STAFFORDSHIRE BLUFF ST.
27' B-B (50' ROW)
STAFFORDSHIRE BLUFF ST.
27' B-B (50' ROW)
SCM 8A
100 YR FLOOD ELEV 361.3
PROPOSED 20' DRAINAGE EASEMENT
SCM EASEMENT
3' CORUE
FIRE HYDRANT (TYP.)
8" DIP WL
12" DIP WL
12" DRAIN
CB 482
CB 483
CB 484
CB 484A
CB 484B
CB 486
CB 487
CB 488
CB 489
CB 490
CB 491
CB 801
CB 802
CB 803
CB 804
CB 805
CB 806
CB 807
CB 808
CB 809
CB 810
CB 811
CB 813
CB 814
CB 815
CB 348
CB 362
CB 363
CB 364
CB 366
CB 369
CB 369A
CB 370A
CB 370B
CB 371
CB 372
CB 373
YI 483A
YI 489A
YI 814A
YI 369B
FES 800
FES 815
FES SCM 8A
FES 8A
OS SCM 8A
IB SCM 8A
ELAM FIELD- 16+82.54
BROOKBANK MEADOW- 14+27.56
ELM FIELD CT.- 10+00.00
FALLS BLUFF- 59+45.92
STAFFORDSHIRE BLUFF- 16+90.30
BROOKBANK MEADOW- 10+00.00
STAFFORDSHIRE BLUFF- 10+00.00
FALLS BLUFF- 63+32.78
12"x12"x8" TEE
2-12" G.V.
1-8" G.V.
8"x8"x8" TEE
3-8" G.V.
12"x12"x8"X8" CROSS
2-12" G.V.
2"-8" G.V.
8"x8"x8" TEE
3-8" G.V.
BOA W 8" GATE VALVE
END OF PAVEMENT STATION- 8+02.67
BOA W 12" GATE VALVE
END OF PAVEMENT STATION- 65+10.90
PROPOSED 20' DRAINAGE EASEMENT
PROPOSED 20' DRAINAGE EASEMENT CB 481
PROPOSED 20' DRAINAGE EASEMENT CB 490
PROPOSED 20' DRAINAGE EASEMENT
PROPOSED 20' DRAINAGE EASEMENT
PROPOSED 20' DRAINAGE EASEMENT

Docusign Envelope ID: 7AC7ED87-6B2D-454D-81F7-2D092E4DF85F





GRAPHIC SCALE 1"=1000'

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

ATTENTION CONTRACTORS

The Contractor responsible for the extension of water, sewer, and/or reuse, as approved in these plans, is responsible for contacting the Public Utilities Inspector at 919-996-3245 or https://cityworks.raleighnc.gov/pucontractors/New and schedule a Pre-construction meeting prior to beginning any construction.
Raleigh Water must be contacted at (919) 996-4540 at least twenty-four hours prior to beginning any work activity around critical water and sewer infrastructure.

Failure to notify the Divisions in advance of beginning construction, will result in the issuance of monetary fines, and require reinstallation of any water or sewer facilities not inspected as a result of this notification failure.

Failure to call for Inspection, install a downstream plug, have permitted plans on the jobsite, or any other violation of City of Raleigh Standards will result in a fine and possible exclusion from future work in the City of Raleigh.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # S-5617

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # W-4213

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 038104 ENGINEER JOHN R. HARMAN
7/29/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

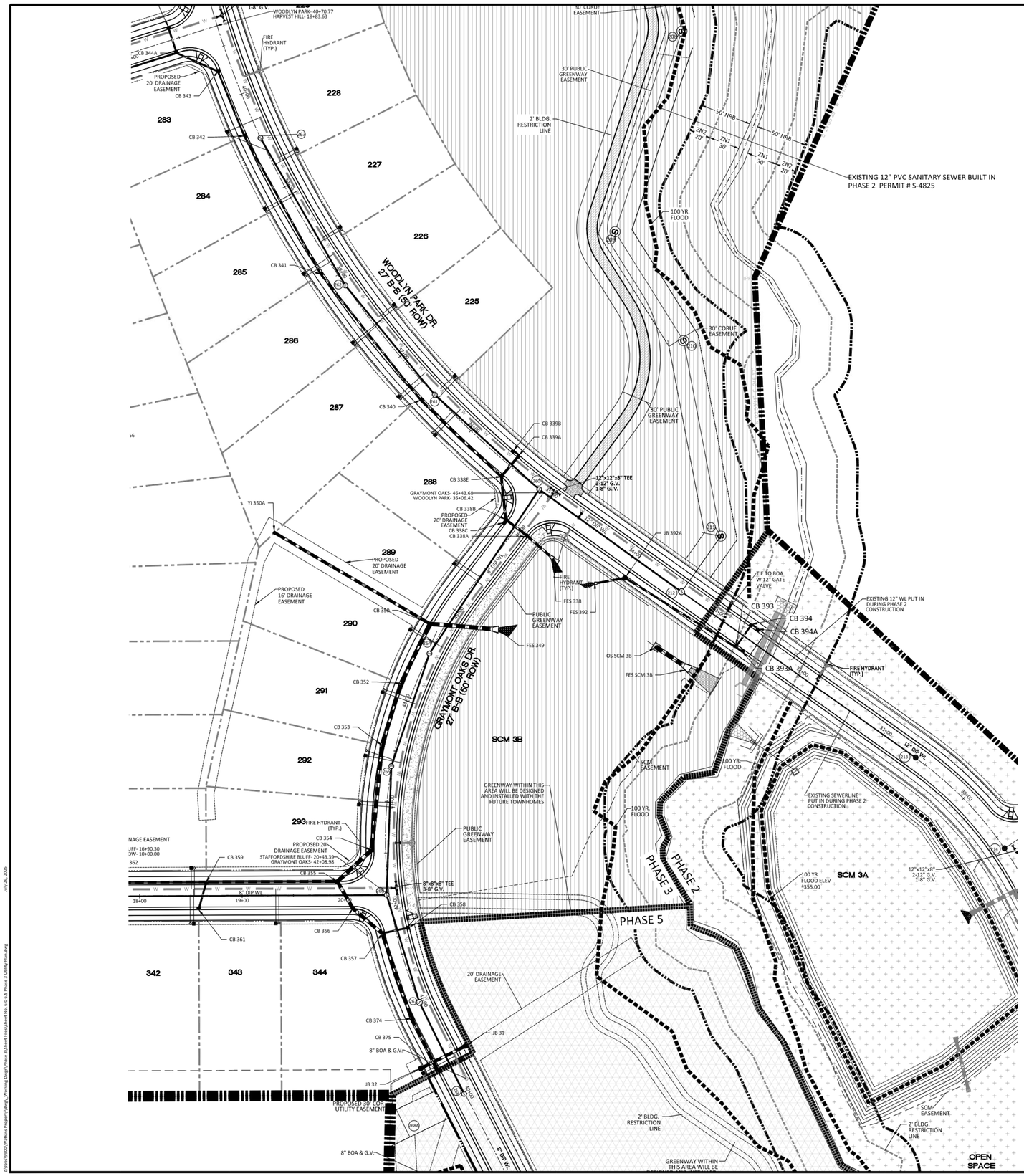
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

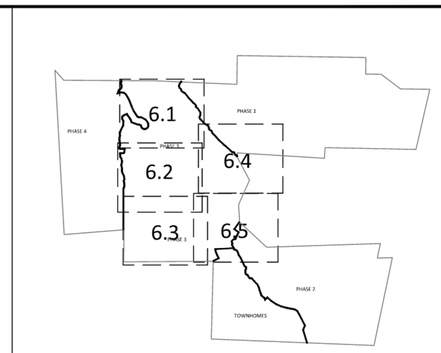
SHEET TITLE:
PHASE 3 UTILITY PLAN (50 SCALE)

SHEET NO.:
6.4

July 26, 2025
Z:\Jobs\9900\Watkins Property\Revit_Working Dwgs\Phase 3\Sheet files\Sheet No. 6.0-6.5 Phase 3 Utility Plan.dwg

Docusign Envelope ID: 7AC7ED87-6B2D-454D-81F7-2D092E4DF85F





GRAPHIC SCALE 1"=1000'

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

ATTENTION CONTRACTORS

The Contractor responsible for the extension of water, sewer, and/or reuse, as approved in these plans, is responsible for contacting the Public Utilities Inspector at 919-996-3245 or https://cityworks.raleighnc.gov/pucontractors/New and schedule a Pre-construction meeting prior to beginning any construction.

Raleigh Water must be contacted at (919) 996-4540 at least twenty-four hours prior to beginning any work activity around critical water and sewer infrastructure.

Failure to notify the Divisions in advance of beginning construction, will result in the issuance of monetary fines, and require reinstallation of any water or sewer facilities not inspected as a result of this notification failure.

Failure to call for Inspection, install a downstream plug, have permitted plans on the jobsite, or any other violation of City of Raleigh Standards will result in a fine and possible exclusion from future work in the City of Raleigh.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit # S-5617

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit # W-4213

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING CORPORATION
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL
038127
JOHN R. HARMAN
ENGINEER
JOHN R. HARMAN
7/28/2025

NO.	DATE	REVISION:
1	7/27/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS: CONSTRUCTION DRAWING COMMENT RESPONSES
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS USTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

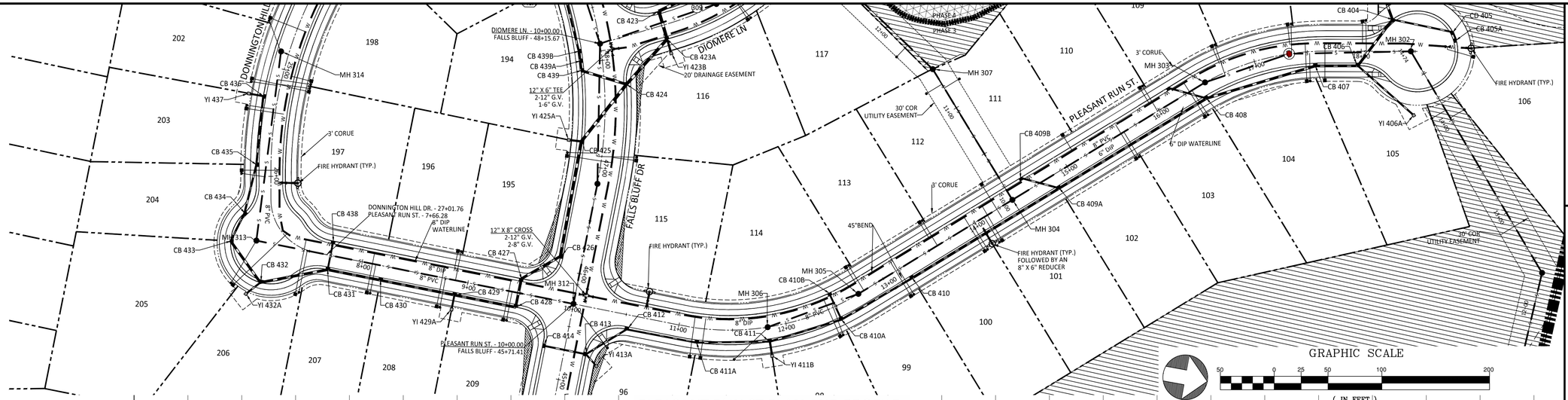
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
PHASE 3 UTILITY PLAN
(50 SCALE)

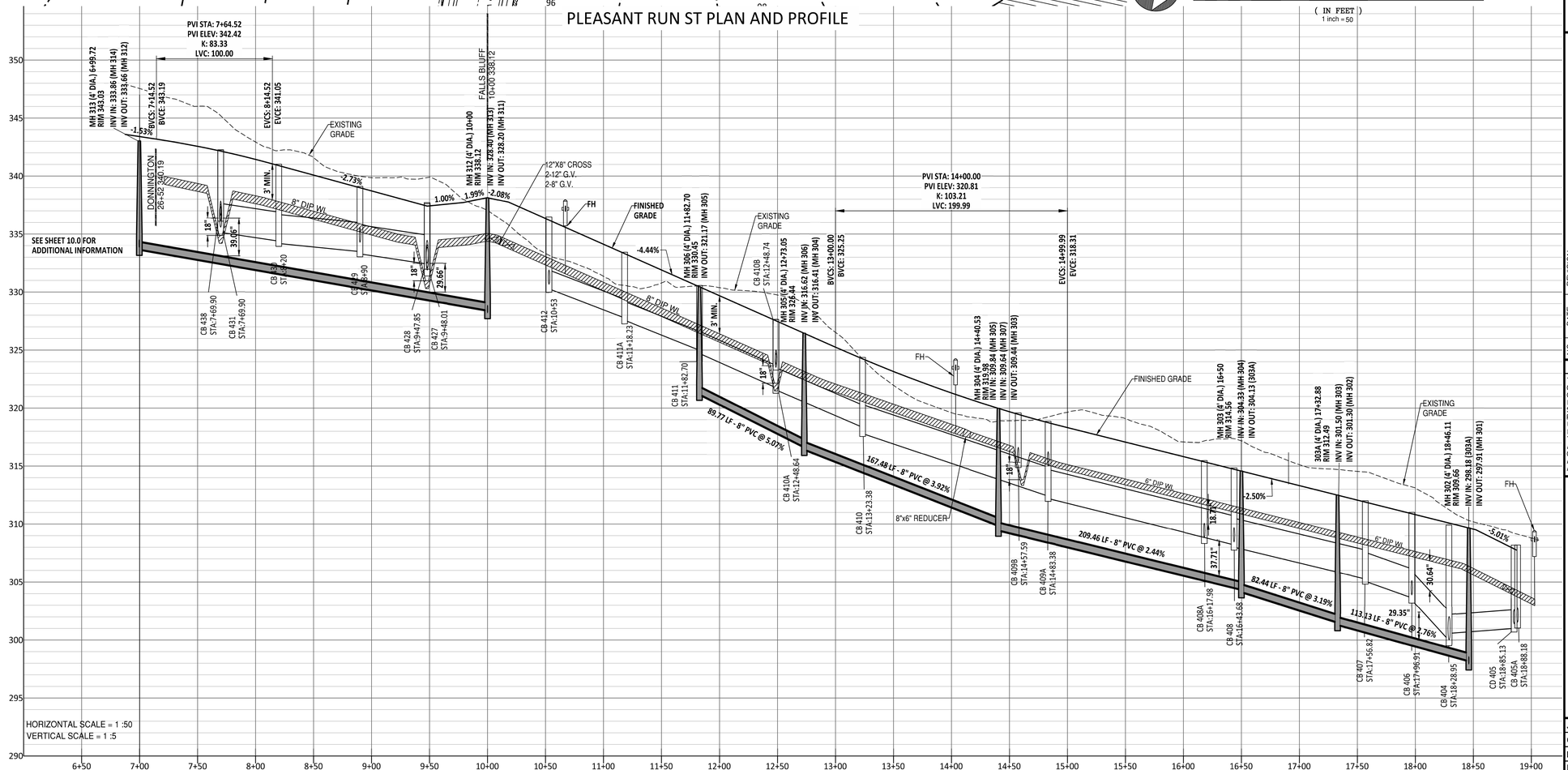
SHEET NO.:
6.5

July 26, 2025
Z:\Jobs\9900\Watkins Property\Plan_ Working Dwgs\Phase 3\Sheet Files\Sheet No. 6.5 & 5 Phase 3 Utility Plan.dwg

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



PLEASANT RUN ST PLAN AND PROFILE



UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

GENERAL NOTE:
1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING CORPORATION
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 29810 ENGINEER JOHN R. HARMAN

NO.	DATE	REVISION:
1	7/31/2024	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
PLEASANT RUN STREET PLAN & PROFILE

SHEET NO.:
7.0

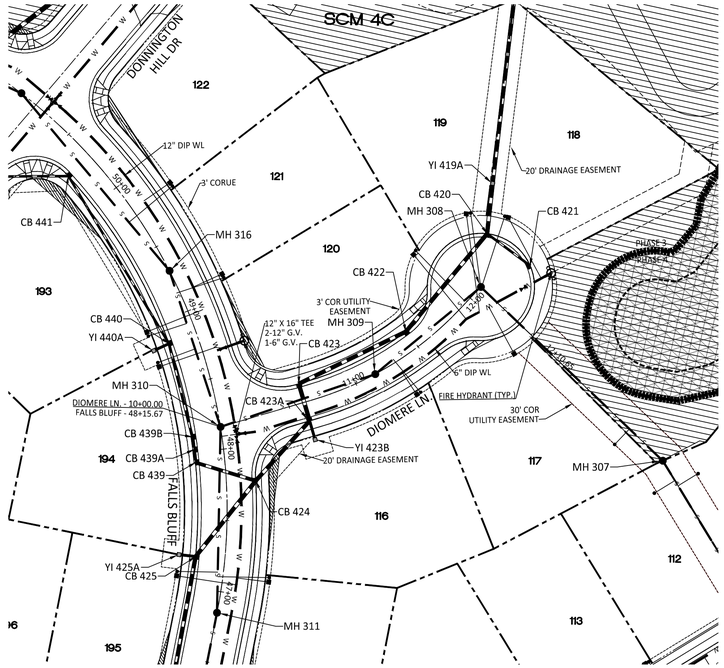
Z:\Jobs\9900\Watkins Property\Dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No. 7.0 Phase 3 Pleasant Run St. Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27

GRAPHIC SCALE

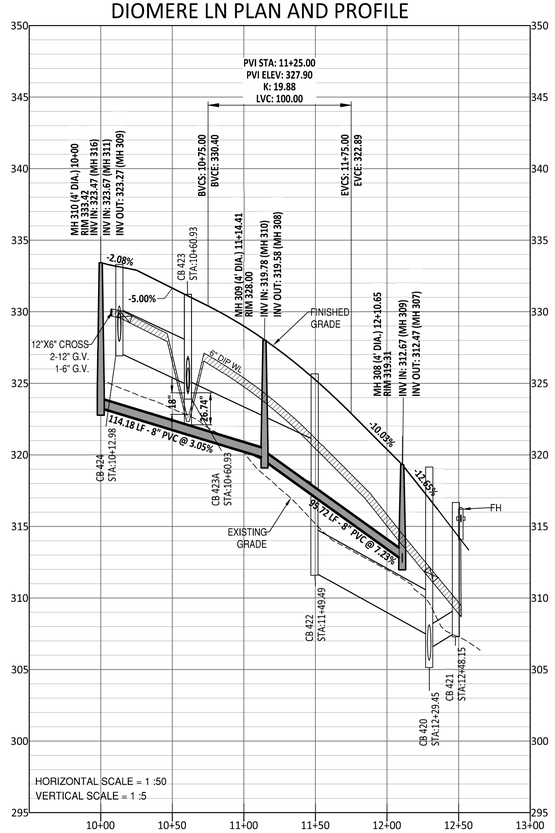
50 0 25 50 100 200

(IN FEET)
1 inch = 50



UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

DIOMERE LN PLAN AND PROFILE



GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA
PROFESSIONAL SEAL
Signed by JOHN R. HARMAN
EXPIRATION DATE
JOHN R. HARMAN
ENGINEER

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT.
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

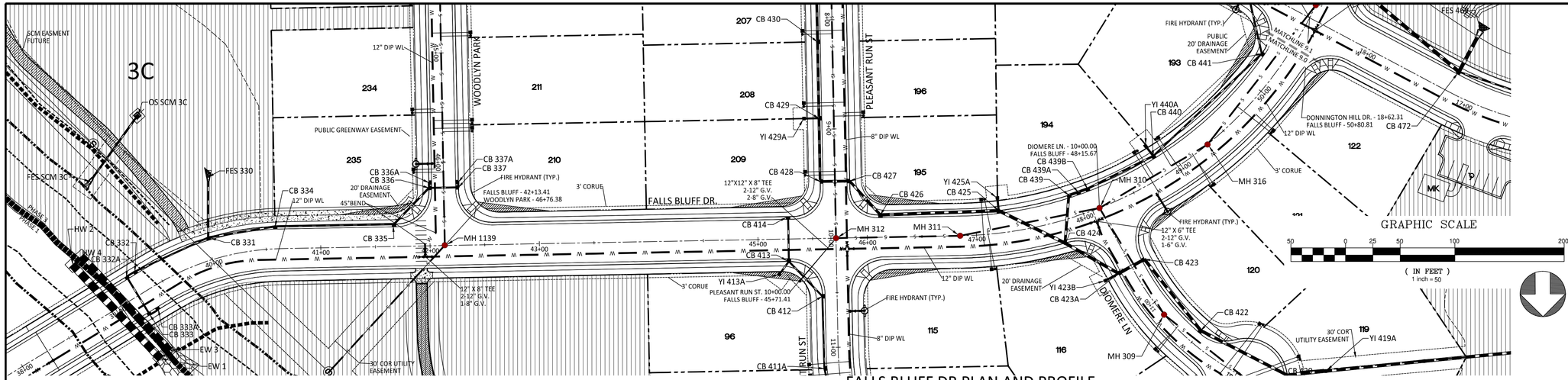
SHEET TITLE:

DIOMERE LANE PLAN & PROFILE

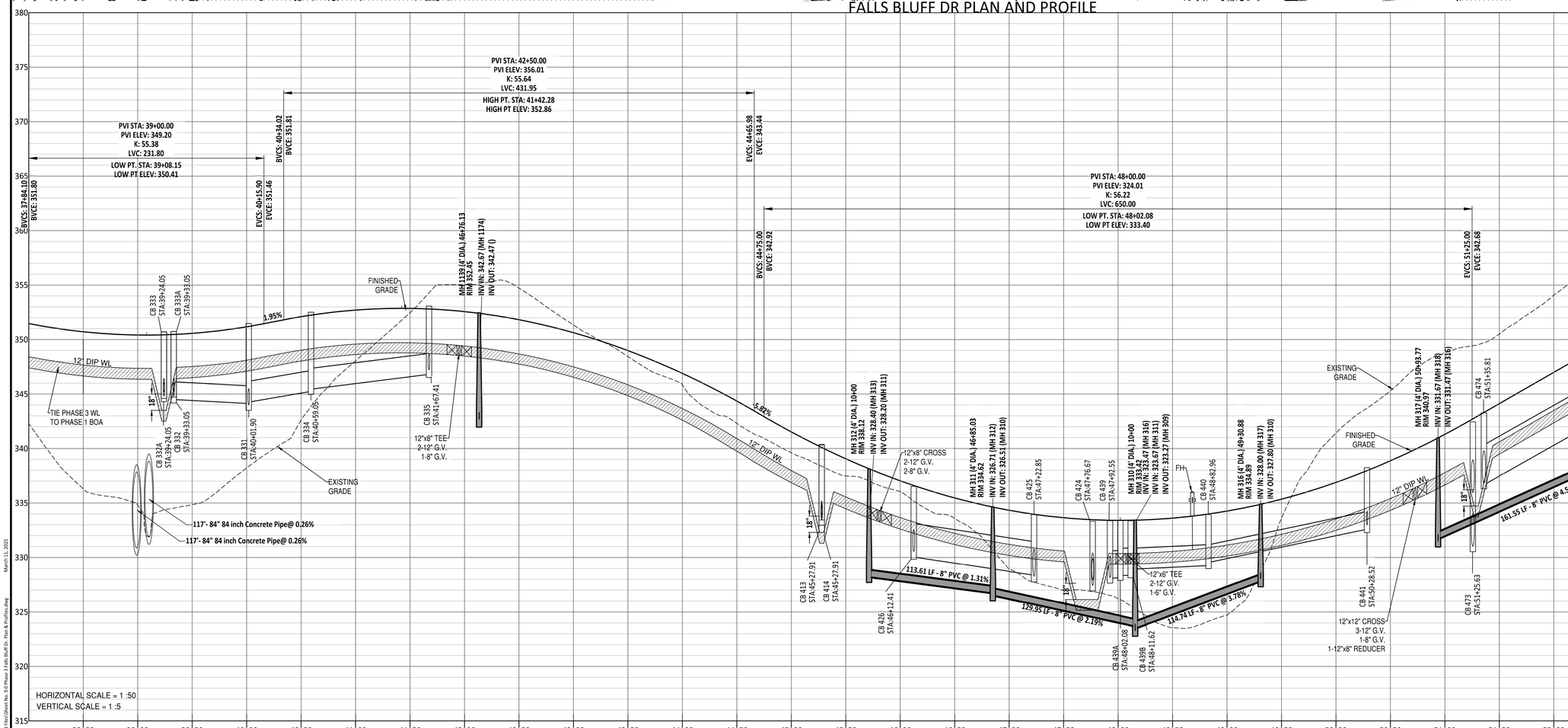
SHEET NO.:
8.0

Z:\Jobs\9900\Watkins Property\Dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No. 8.0 Phase 3 Diomere Ln. Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



FALLS BLUFF DR PLAN AND PROFILE



GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

UTILITIES LEGEND

	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 040966 ENGINEER John R. Harman Registered Professional Engineer JOHN R. HARMAN 5/7/2025

NO.	DATE	REVISION:
1	7/31/2024	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT.
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/17/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

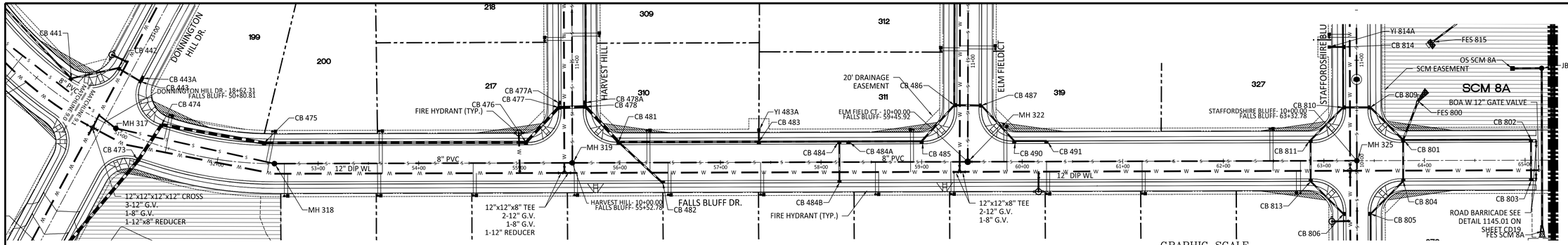
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
FALLS BLUFF DRIVE PLAN & PROFILE

SHEET NO.:
9.0

March 11, 2025
Z:\Jobs\9900\Watkins Property\dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No. 9.0 Phase 3 Falls Bluff Dr. Plan & Profile.dwg

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27

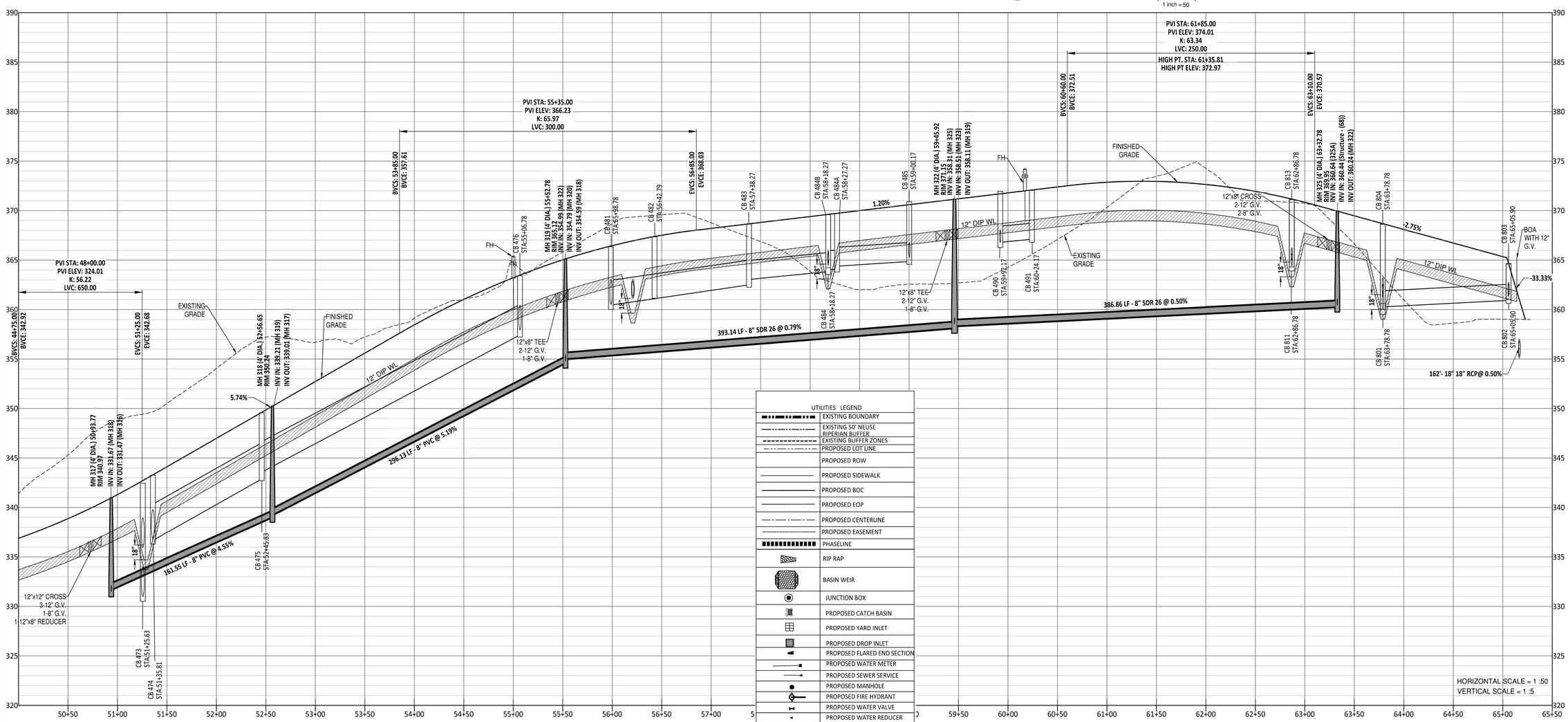


GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

FALLS BLUFF DR PLAN AND PROFILE



UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

GENERAL NOTE:
1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 049822 ENGINEER JOHN R. HARMAN
Signed by: JOHN R. HARMAN
5/12/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW
	9/4/2024	WAKE COUNTY AND CITY OF RALEIGH
2	11/01/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS
3	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
4		CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

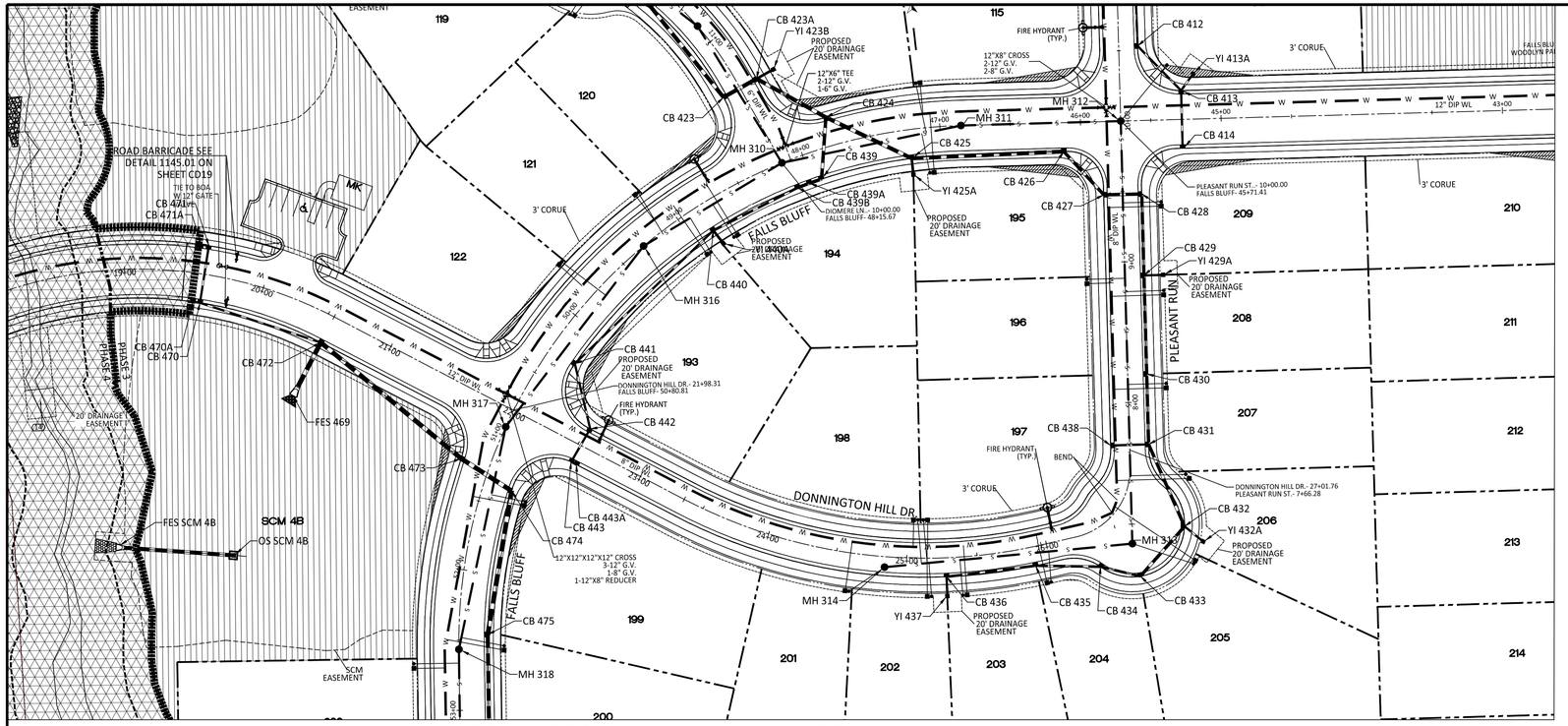
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
FALLS BLUFF DRIVE
PLAN & PROFILE

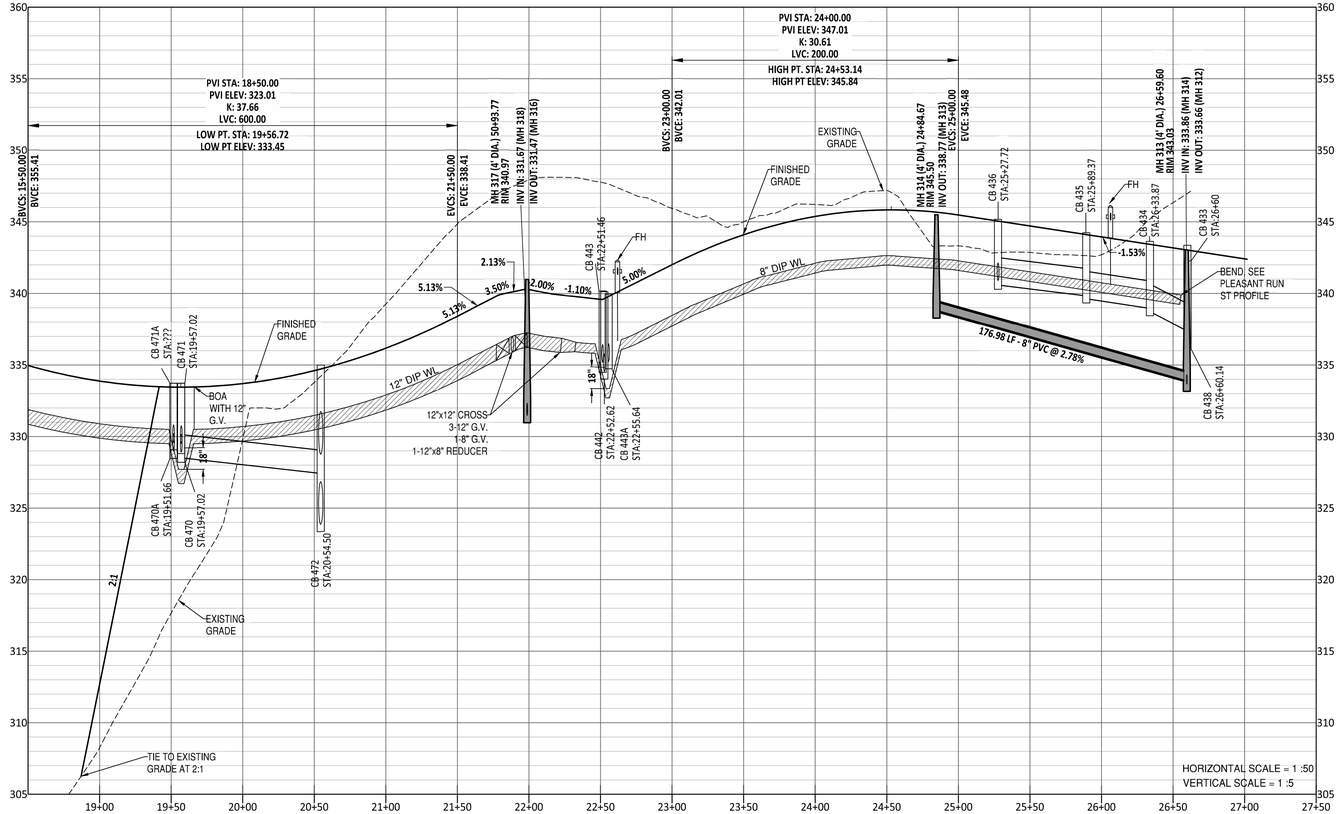
SHEET NO.:
9.1

Z:\Jobs\09000 Worldess Property\Dwgs_Working Dwgs\Phase 3\Sheet files\Sheet No. 9.9 Phase 3 Falls Bluff Dr - Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



DONNINGTON HILL DR PLAN AND PROFILE



UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
	PROPOSED SEWER LINE
— W — W —	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

GENERAL NOTE:
1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 040107 JOHN R. HARMAN ENGINEER JOHN R. HARMAN 3/11/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

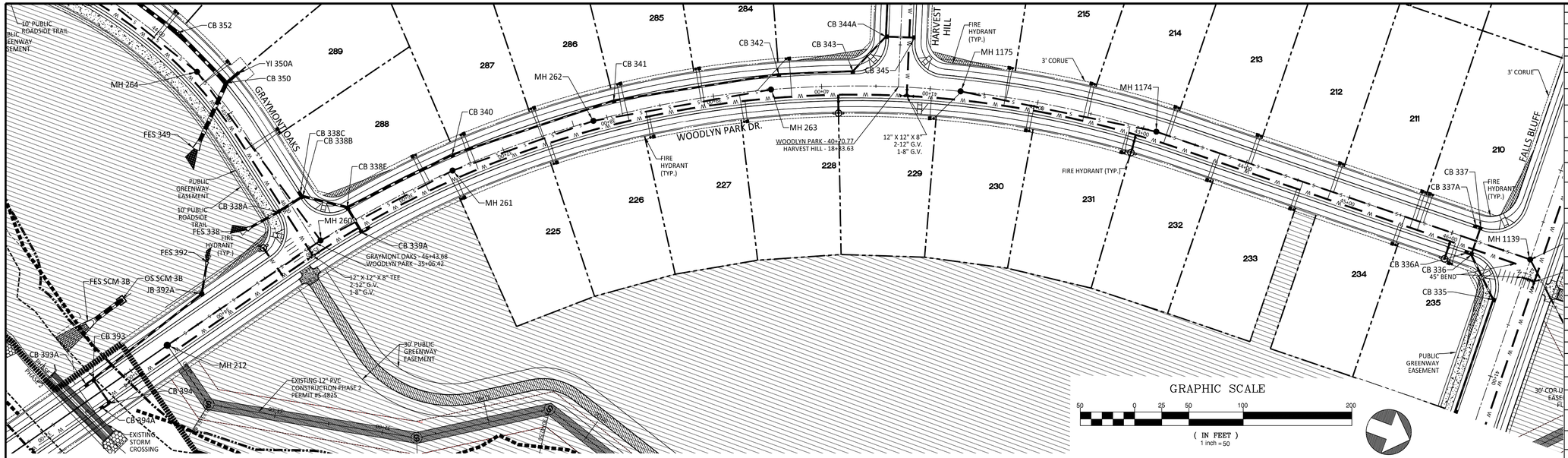
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
DONNINGTON HILL DRIVE PLAN & PROFILE

SHEET NO.:
10.0

Z:\Jobs\9900\Working Property\dwg_Working Dwgs\Phase 3\Donnington Hill Dr. Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



GRAPHIC SCALE

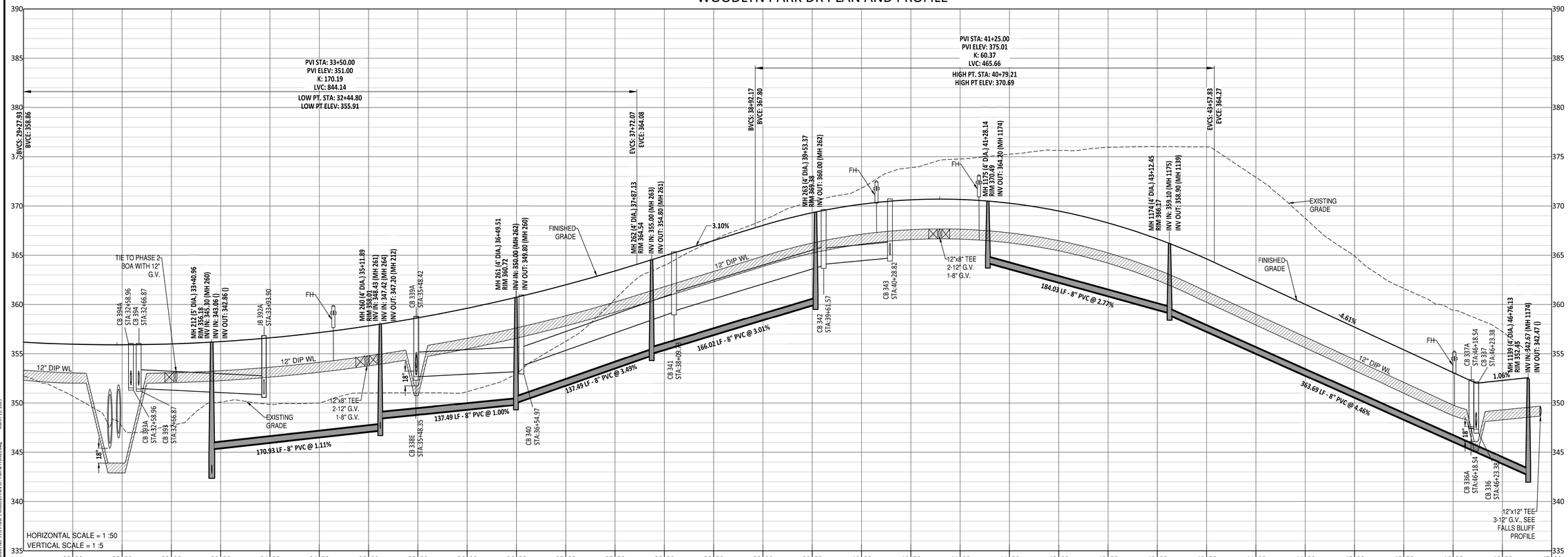
50 0 25 50 100 200

(IN FEET)
1 inch = 50

UTILITIES LEGEND

	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

WOODLYN PARK DR PLAN AND PROFILE



GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

811 North Carolina One Call
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 049722 ENGINEER Prepared by: John R. Harman, PE 1240 Environmental Way Knightdale, NC 27545 JOHN R. HARMAN REGISTERED

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

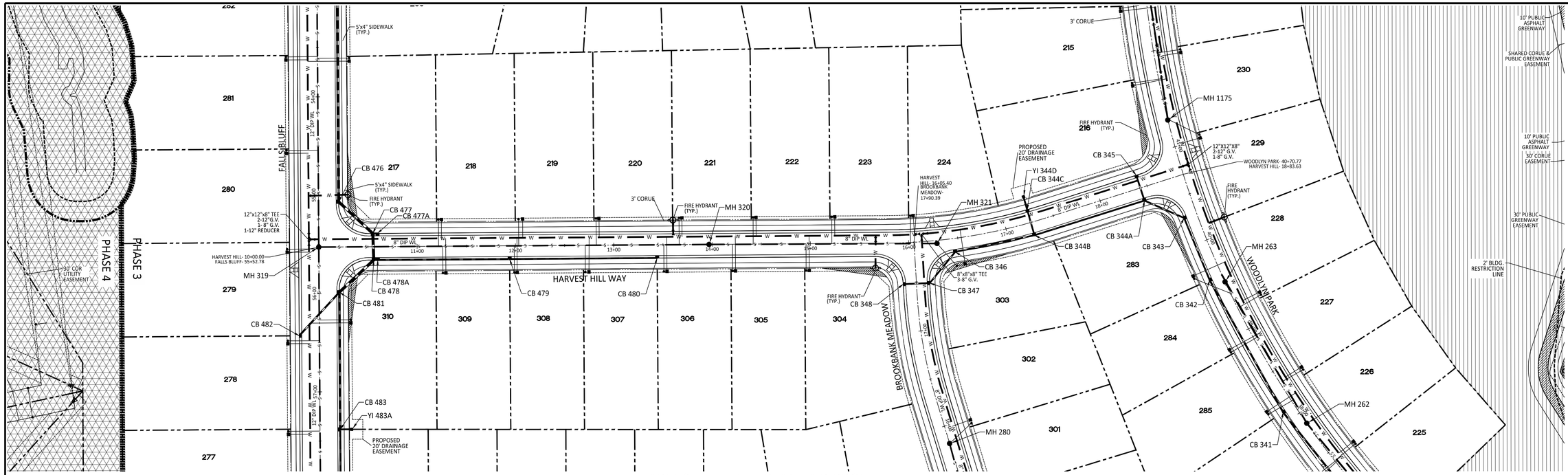
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
WOODLYN PARK DRIVE PLAN & PROFILE

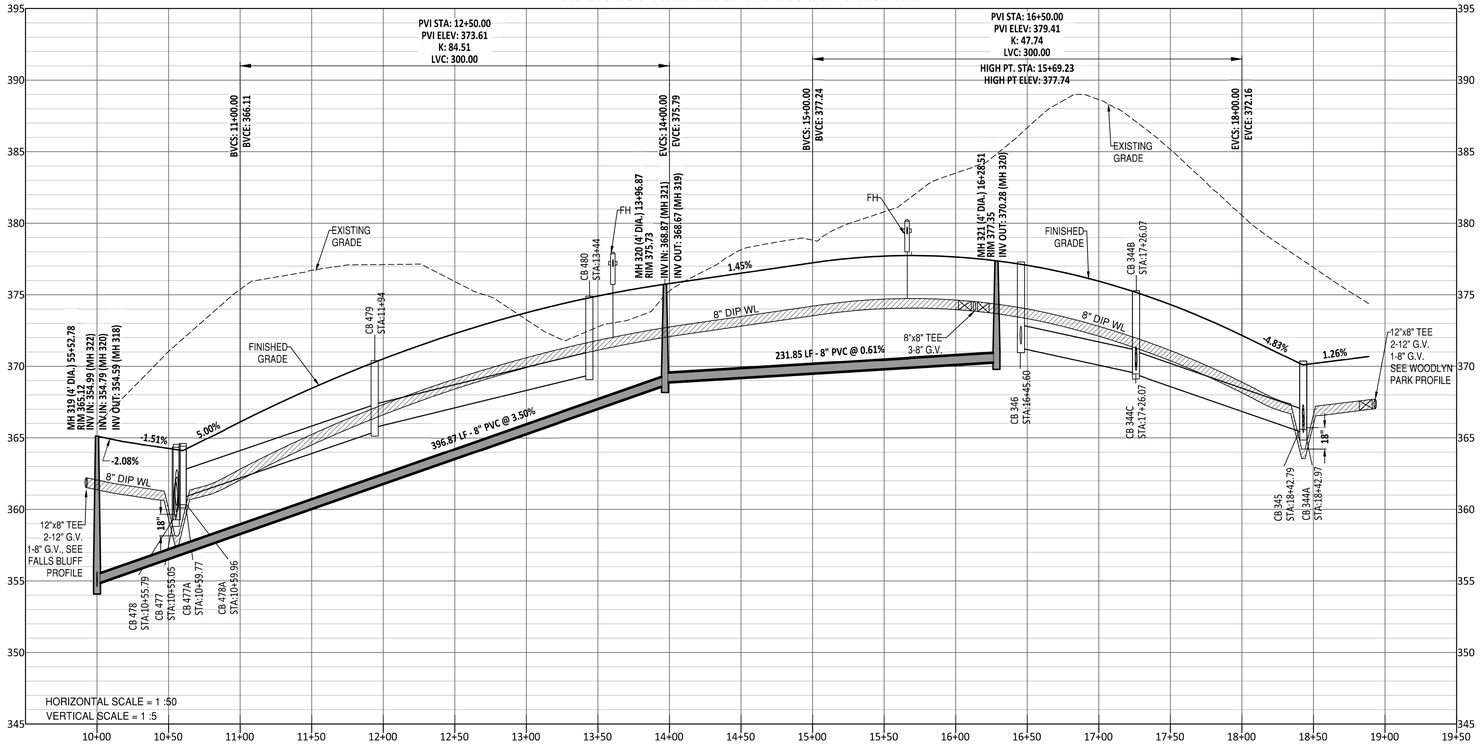
SHEET NO.:
11.0

Z:\Jobs\9900\Working Property\Engineering\Working Dwgs\Phase 3\Sheet files\Sheet No. 11.0 Phase 3 Woodlyn Park Dr. Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



HARVEST HILL WAY PLAN AND PROFILE



UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

GENERAL NOTE:
1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL JOHN R. HARMON ENGINEER 5/17/2025

NO.	DATE	REVISION:
1	7/20/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

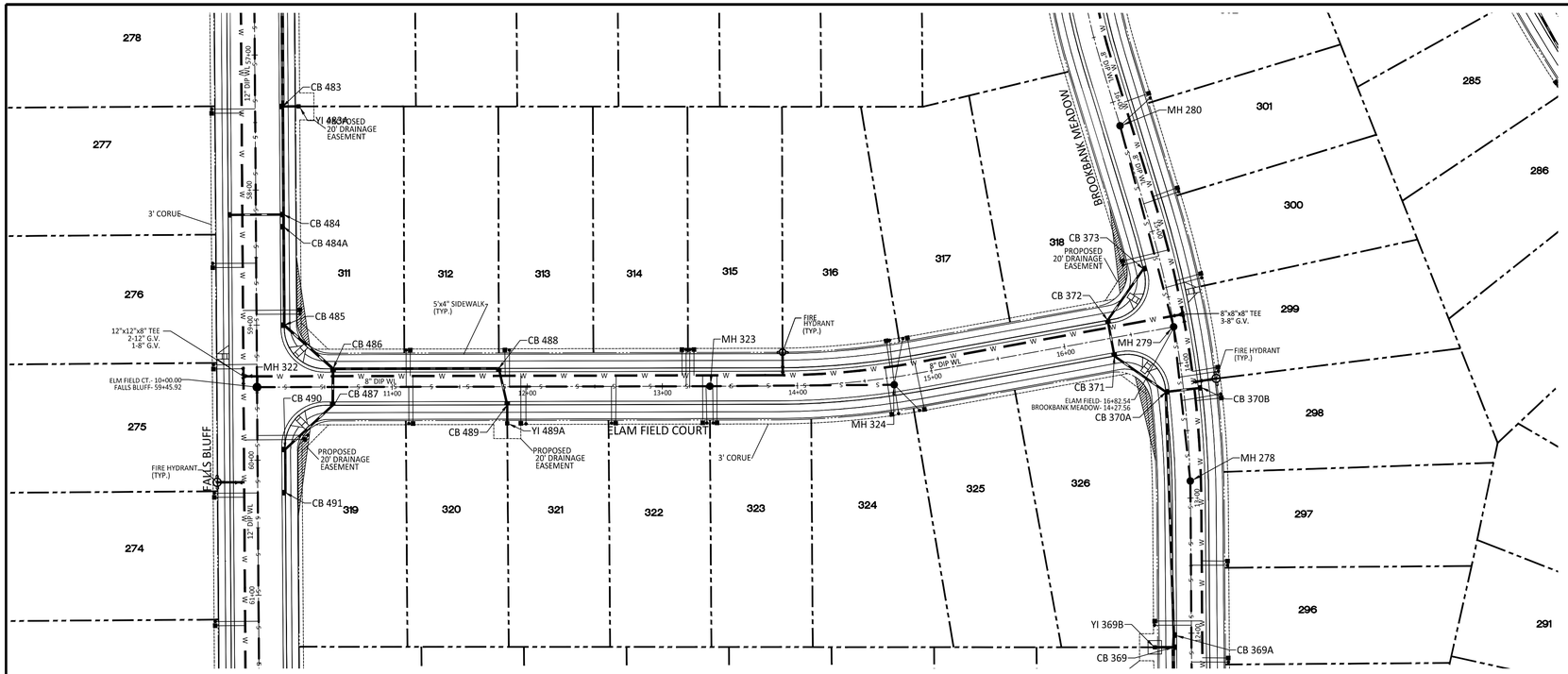
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
HARVEST HILL WAY PLAN & PROFILE

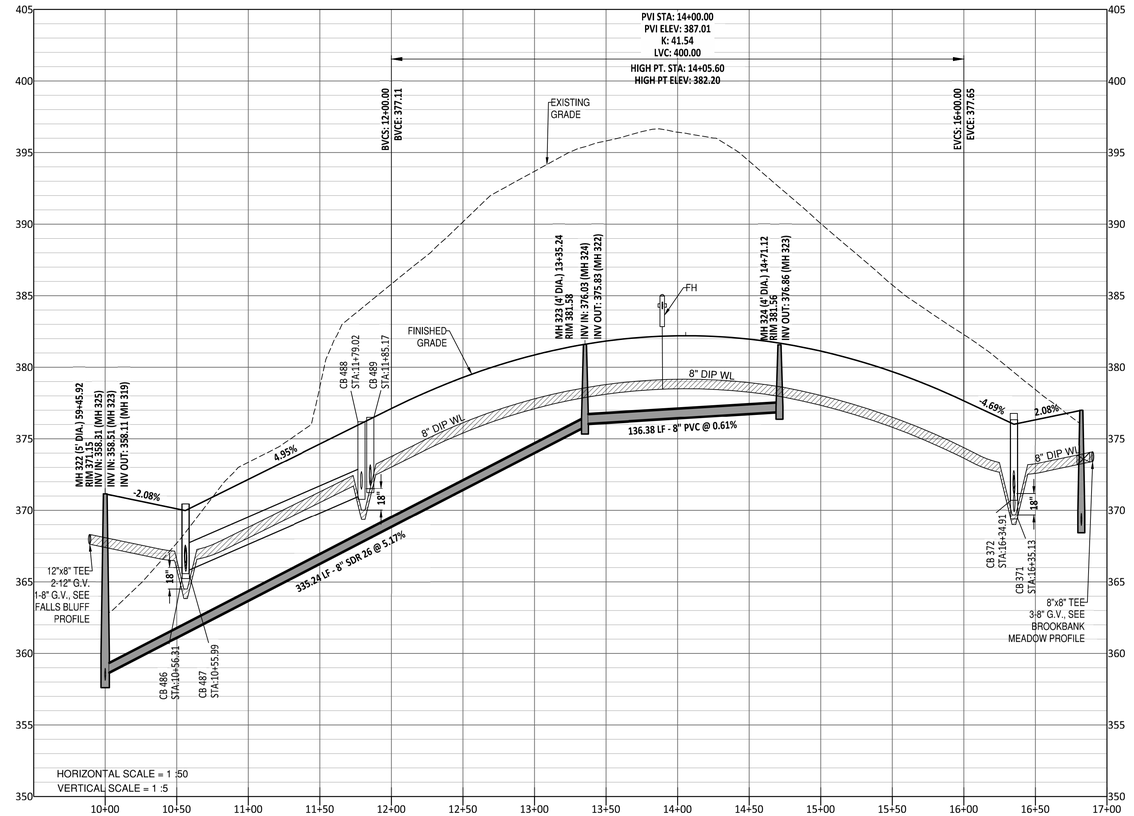
SHEET NO.:
12.0

Z:\Jobs\9900\Walden Property\Dwg_Working Dwgs\[Phase 3]\Sheet files\Sheet No. 12.0 Phase 3 Harvest Hill Way Plan & Profile.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



ELAM FIELD CT PLAN AND PROFILE



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 29810 JOHN R. HARMAN ENGINEERING REGISTERED JOHN R. HARMAN

NO.	DATE	REVISION:
1	7/27/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

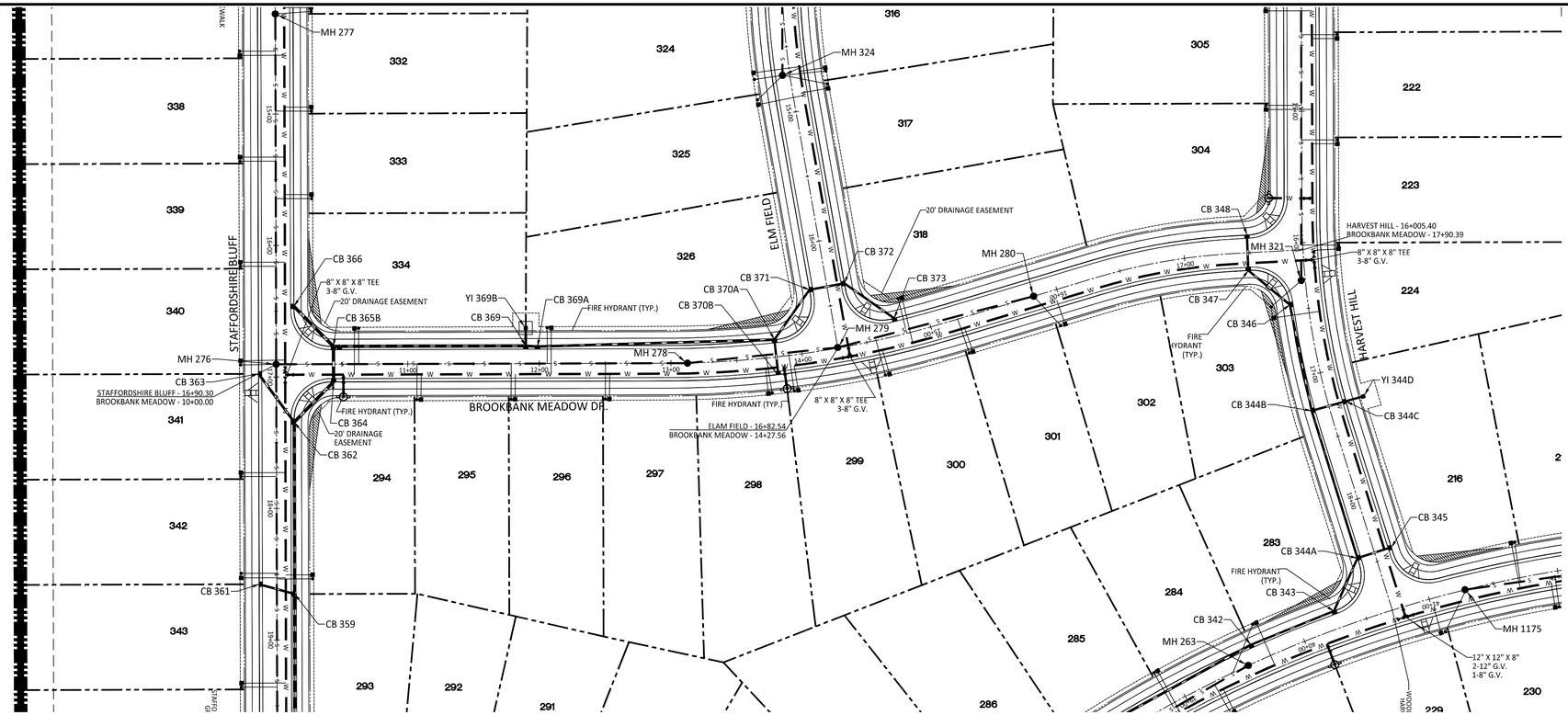
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
ELAM FIELD CT. PLAN & PROFILE

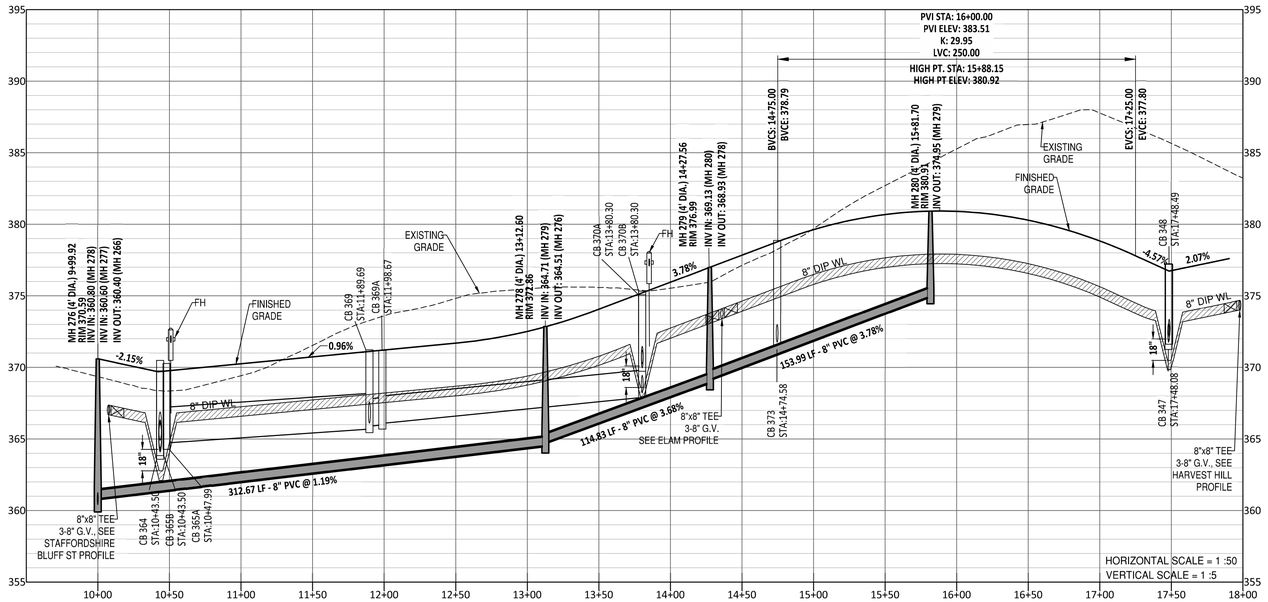
SHEET NO.:
13.0

Z:\Jobs\9900\Walden Property\Dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No. 13.0 Phase 3 Elam Field Ct. Plan & Profile.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



BROOKBANK MEADOW DR PLAN AND PROFILE



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard. Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL JOHN R. HARMAN ENGINEER
JOHN R. HARMAN
5/12/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

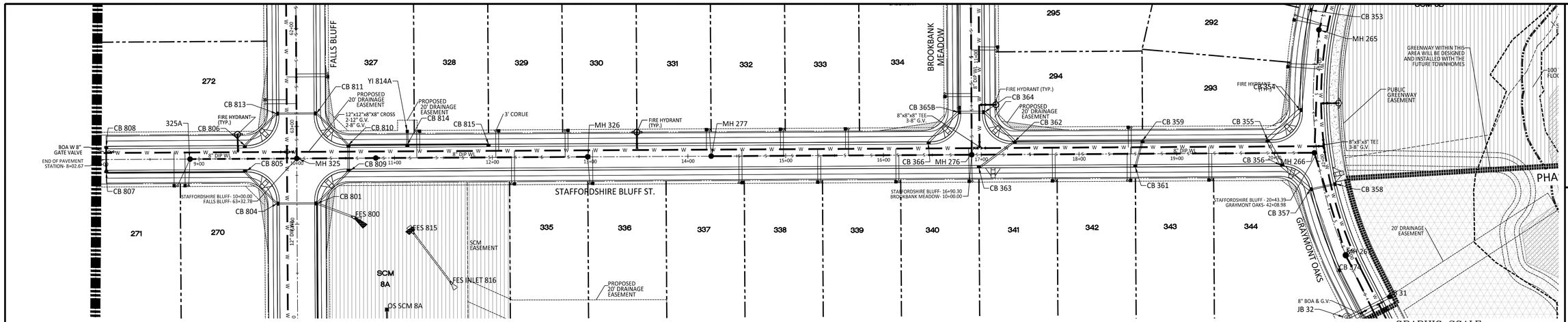
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
BROOKBANK MEADOW DRIVE PLAN & PROFILE

SHEET NO.:
14.0

Z:\Jobs\9900\Watkins Property\Dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No. 14.0 Phase 3 Brookbank Meadow Dr Plan & Profile.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27

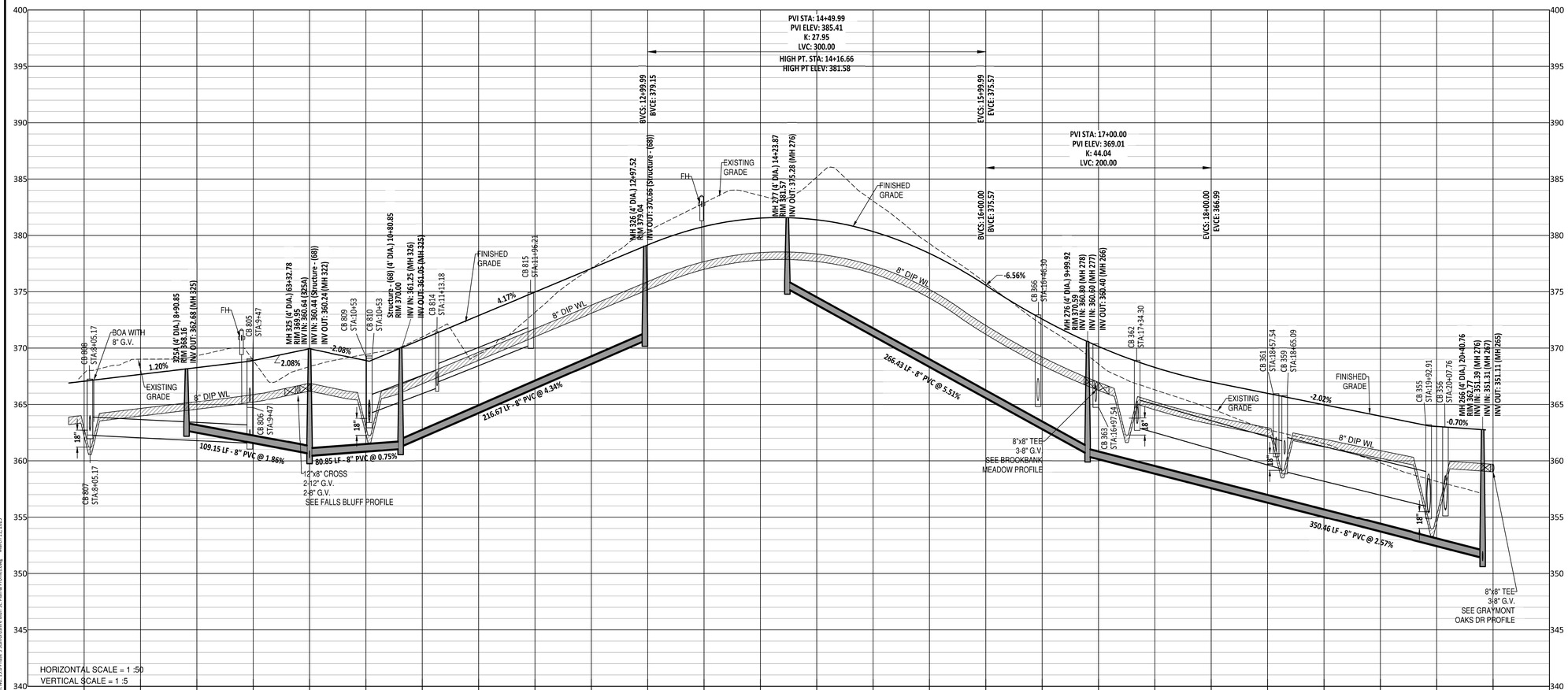


GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

STAFFORDSHIRE BLUFF ST PLAN AND PROFILE



NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

GENERAL NOTE:
1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

North Carolina 811 Know what's below. Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040837 JOHN R. HARMAN SYMMONS COMPANY VOINE JOHN R. HARMAN 5/7/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

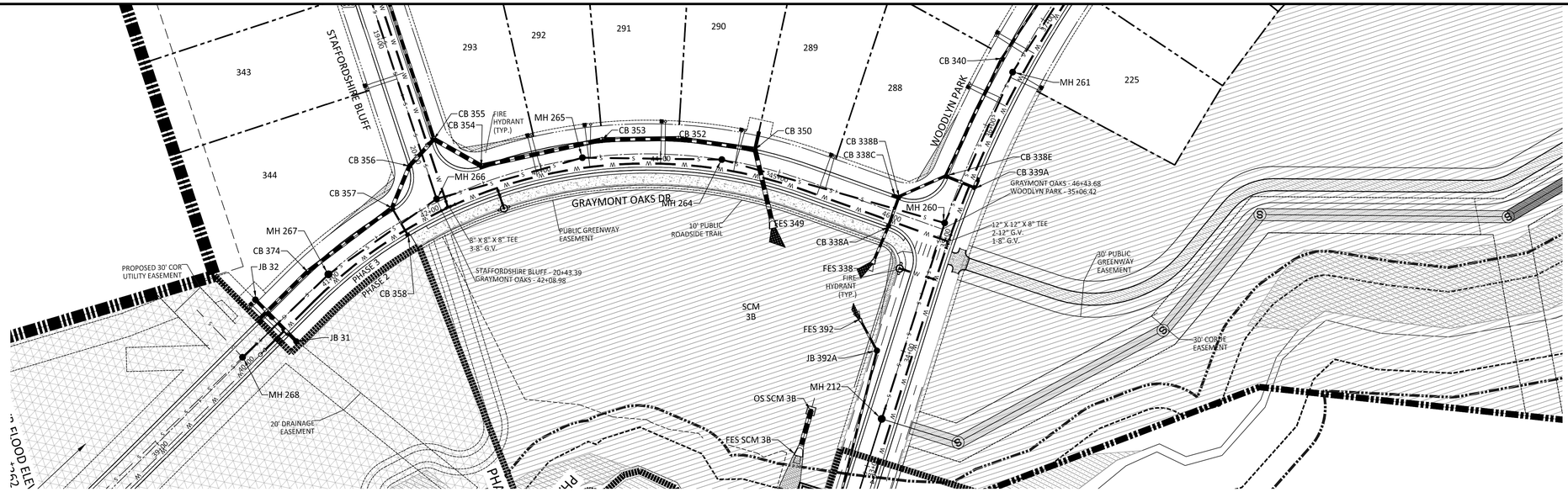
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
STAFFORDSHIRE BLUFF STREET PLAN & PROFILE

SHEET NO.:
15.0

Z:\Job\1990\Working Property\dwg_Working Dwg\Phase 3\Sheet Files\Sheet No. 15.0 Phase 3 Staffordshire Bluff St. Plan & Profile.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

GRAYMONT OAKS DR PLAN AND PROFILE

GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811 Dial 811 or 811.com
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 JOHN R. HARMAN ENGINEER
JOHN R. HARMAN
5/13/2025

REVISION:

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

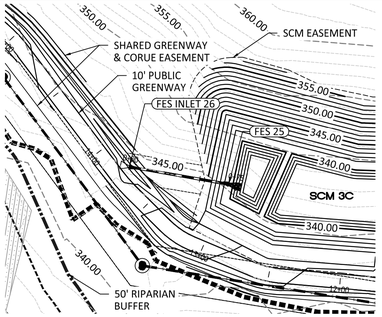
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
GRAYMONT OAKS DRIVE PLAN & PROFILE

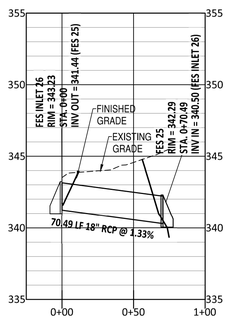
SHEET NO.:
16.0

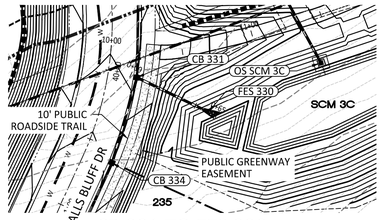
Z:\Jobs\9900\Working Property\Dwgs_Working Dwgs\Phase 3\Sheet Files\Sheet No. 16.0 Phase 3 Graymont Oaks Dr Plan & Profile.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27

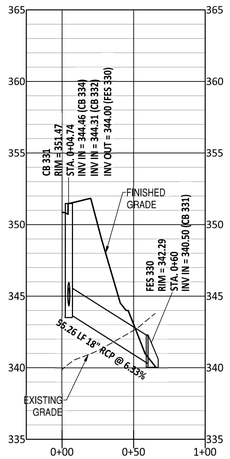


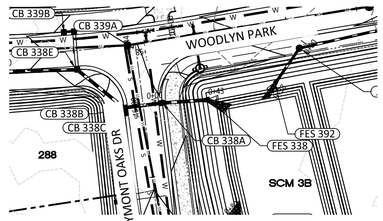
FES 26 TO FES 25



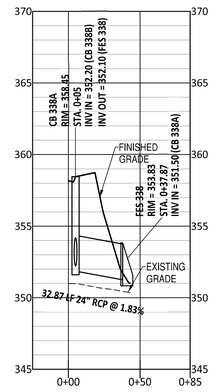


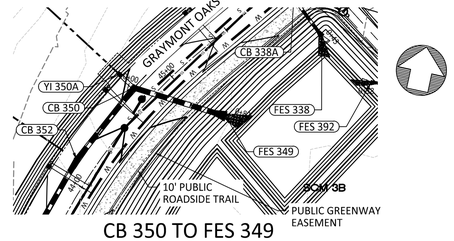
CB 331 TO FES 330



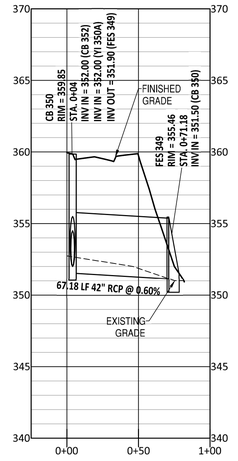


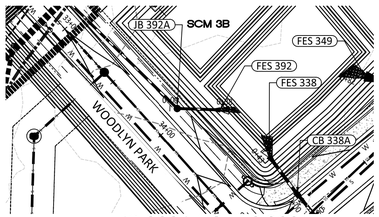
CB 338A TO FES 338



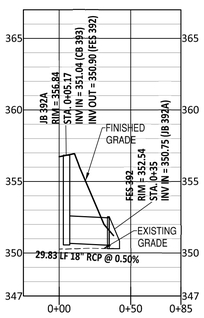


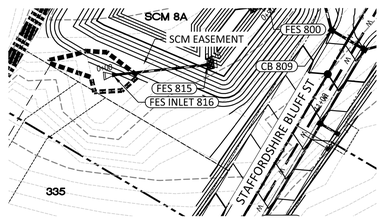
CB 350 TO FES 349



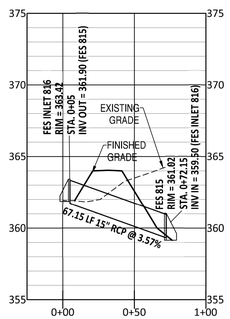


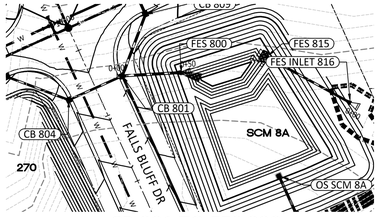
JB 392A TO FES 392



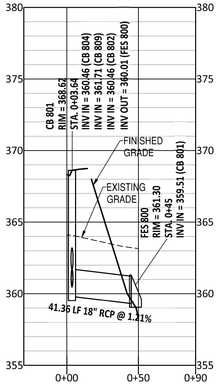


FES 816 TO FES 815





CB 801 TO FES 800



NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 29810 ENGINEER JOHN R. HARMAN
5/12/2025

NO.	DATE	REVISION:
1	7/31/2001	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

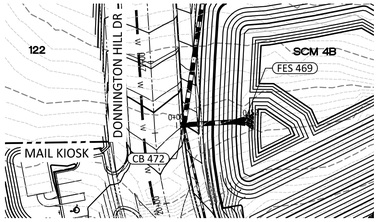
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
OFF STREET STORM PLAN & PROFILE

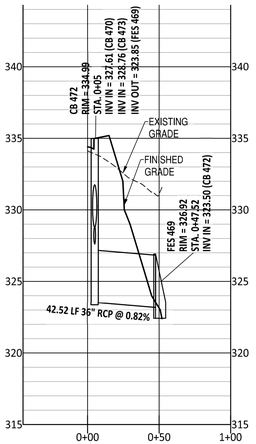
SHEET NO.:
17.0

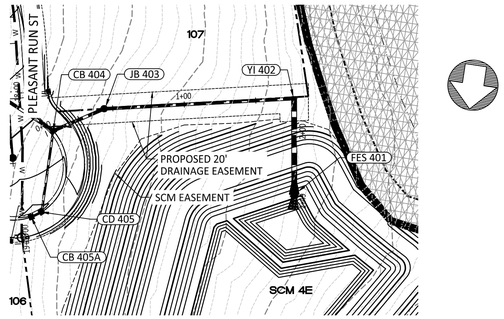
Z:\Jobs\9900\Watkins Property\Dwg_Working Dwgs\[Phase 3]Sheet files\[Sheet No. 17.0 Phase 3 Offstreet Storm Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27

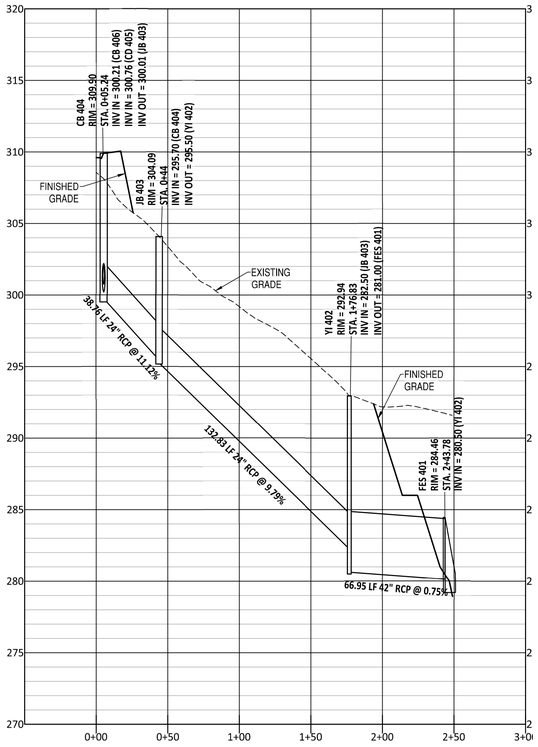


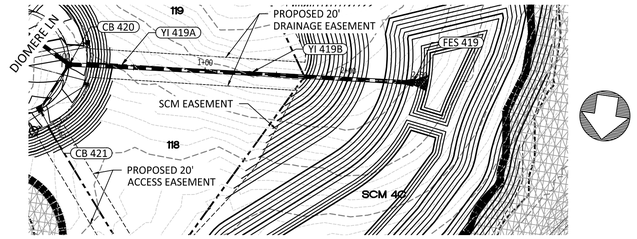
CB 472 TO FES 469



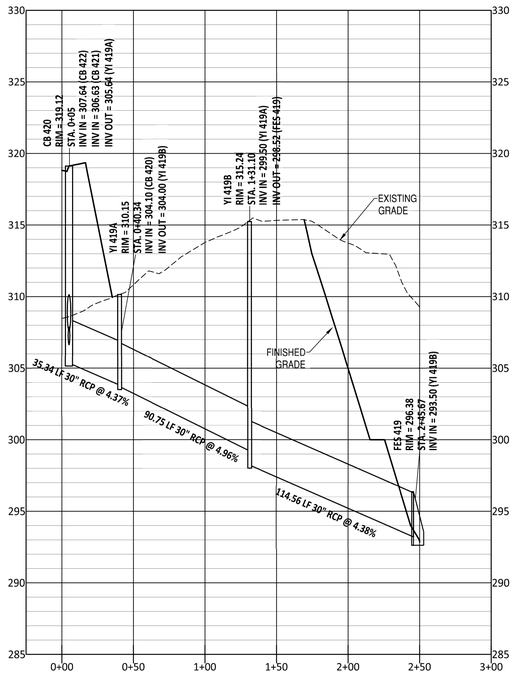


CB 404 TO FES 401





CB 420 TO FES 419



NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 JOHN R. HARMAN

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

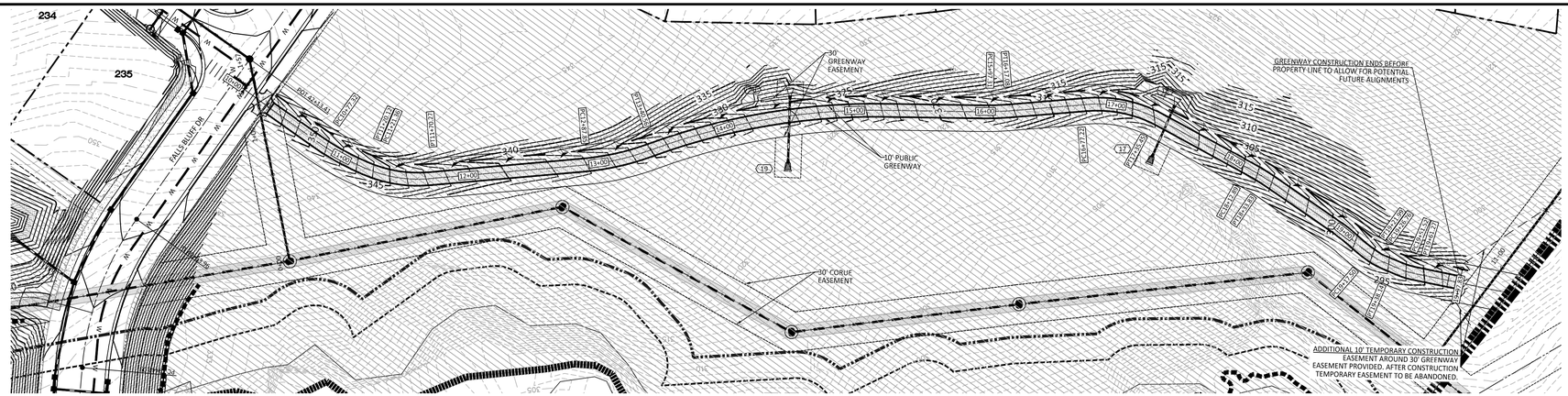
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
OFF STREET STORM PLAN & PROFILE

SHEET NO.:
17.1

Z:\Jobs\9900\Walkton Property\dwg_Working Dwg\Phase 3\Sheet Files\Sheet No. 17.0 Phase 3 Offstreet Storm Plan & Profile.dwg March 11, 2025

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27



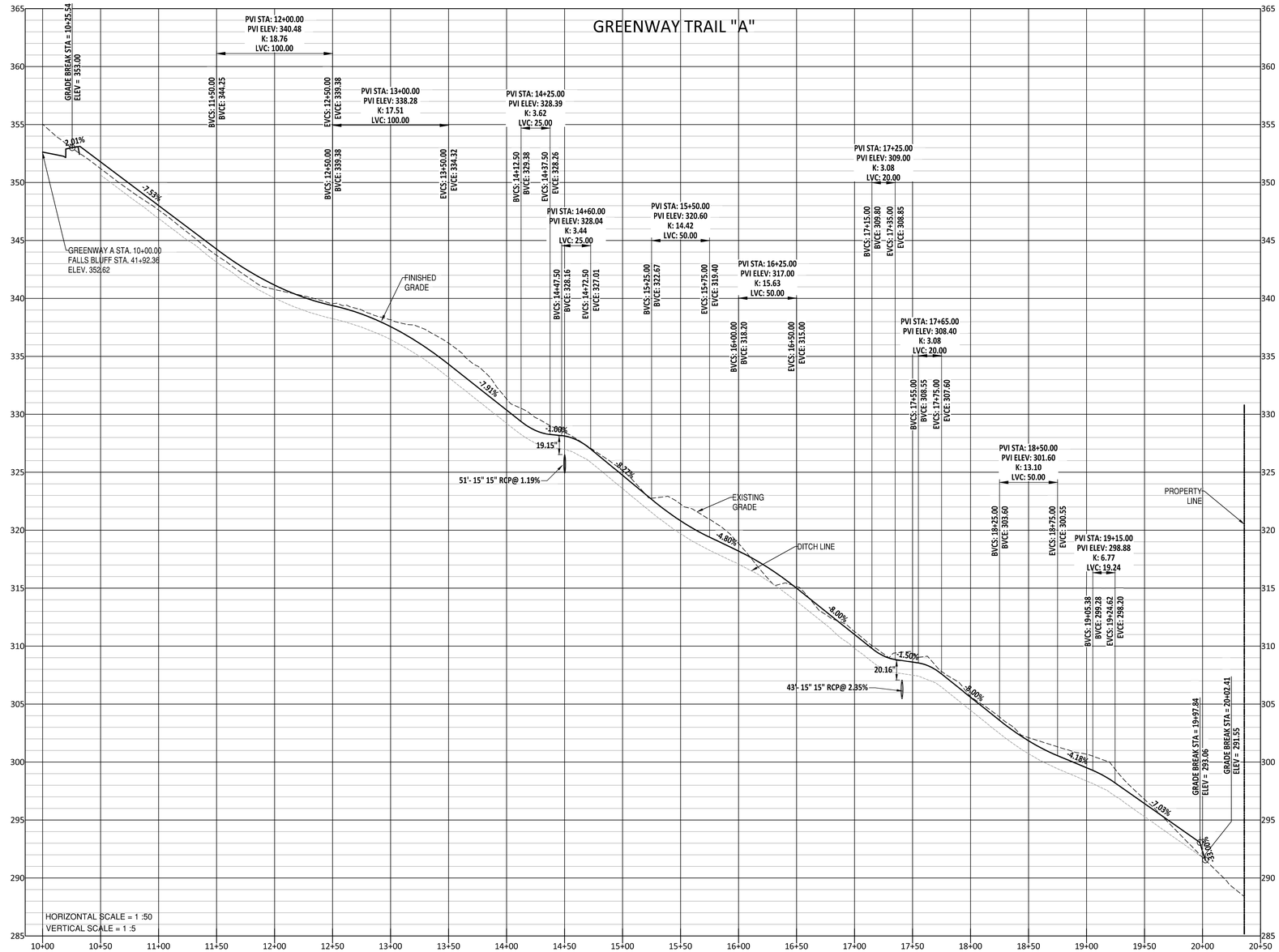
NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

GREENWAY TRAIL "A"



UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 38107 JOHN R. HARMAN REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
GREENWAY TRAIL "A" PLAN & PROFILE

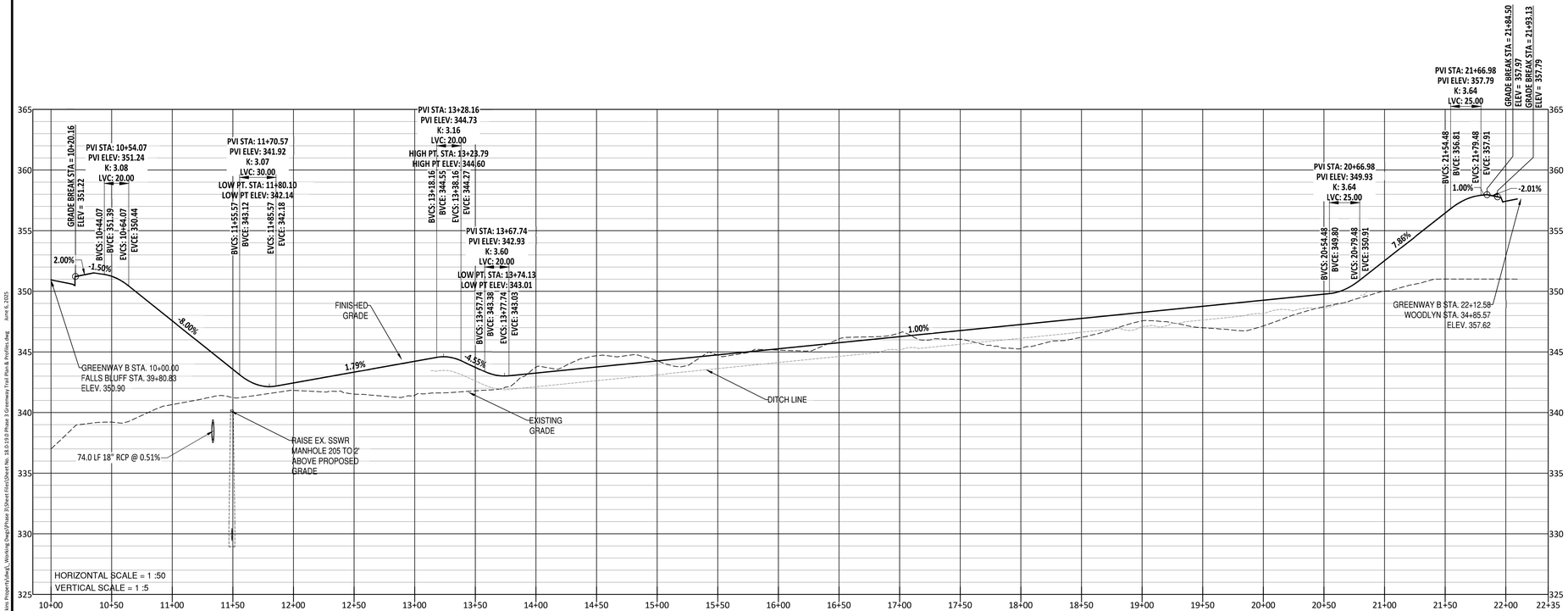
SHEET NO.:
18.0

North Carolina 811 811.ncgov.com
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Working Property\Kelly_Working Dwgs\Phase 3\Sheet Files\Sheet No. 18.0-19.0 Phase 3 Greenway Trail Plan & Profiles.dwg March 11, 2025

Docusign Envelope ID: D521306B-C6D0-4563-9067-85E0854D3002

GREENWAY TRAIL "B"



NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

UTILITIES LEGEND	
	EXISTING BOUNDARY
	EXISTING 50' NEUSE RIPERIAN BUFFER
	EXISTING BUFFER ZONES
	PROPOSED LOT LINE
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED EASEMENT
	PHASELINE
	RIP RAP
	BASIN WEIR
	JUNCTION BOX
	PROPOSED CATCH BASIN
	PROPOSED YARD INLET
	PROPOSED DROP INLET
	PROPOSED FLARED END SECTION
	PROPOSED WATER METER
	PROPOSED SEWER SERVICE
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE
	PROPOSED WATER REDUCER
S S	PROPOSED SEWER LINE
W W	PROPOSED WATER LINE
	PROPOSED STORM WATER
	OPEN SPACE
	FUTURE PHASING
	EXISTING PHASING
	100 YEAR FLOOD EASEMENT

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING CORPORATION
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 040102 JOHN R. HARMAN ENGINEER
JOHN R. HARMAN
6/6/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

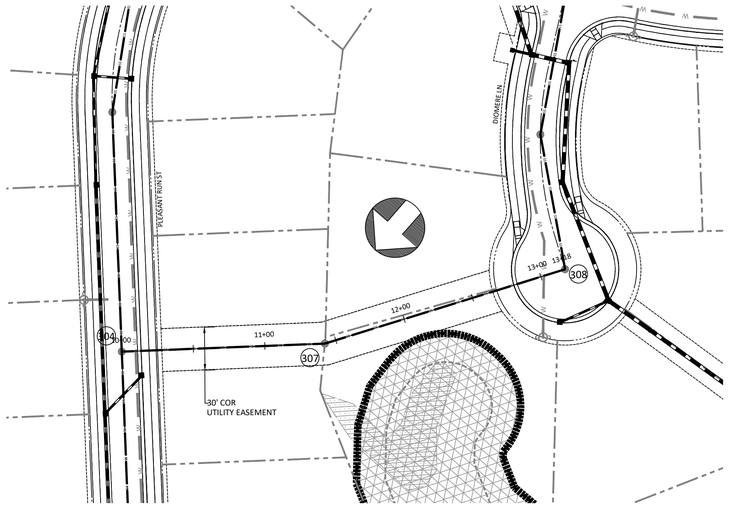
SHEET TITLE:
GREENWAY TRAIL "B" PLAN & PROFILE

SHEET NO.:
19.0

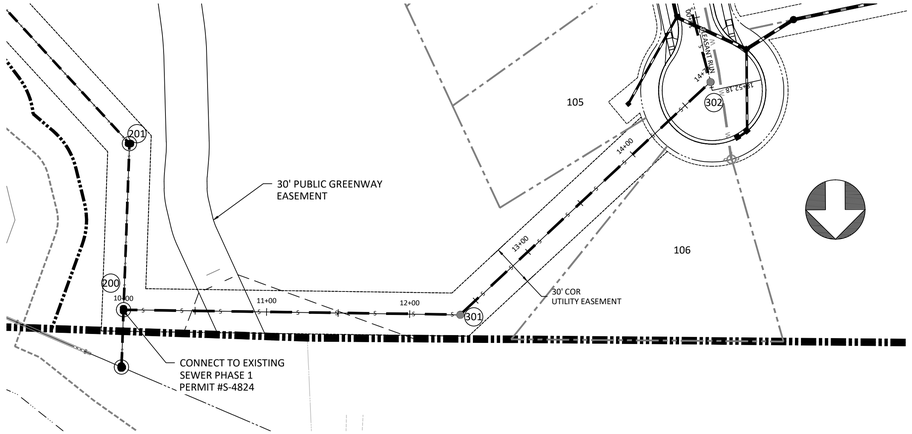
North Carolina 811 811 or 1-800
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Kalas Property\Civil_Working Dwg\Phase 3\Sheet Files\Sheet No. 18.0-19.0 Phase 3 Greenway Trail Plan & Profiles.dwg June 6, 2025

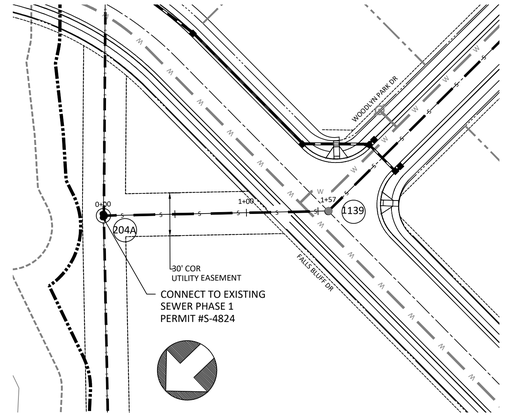
Docusign Envelope ID: 67D08F36-E812-460F-A1E4-843EB8381711



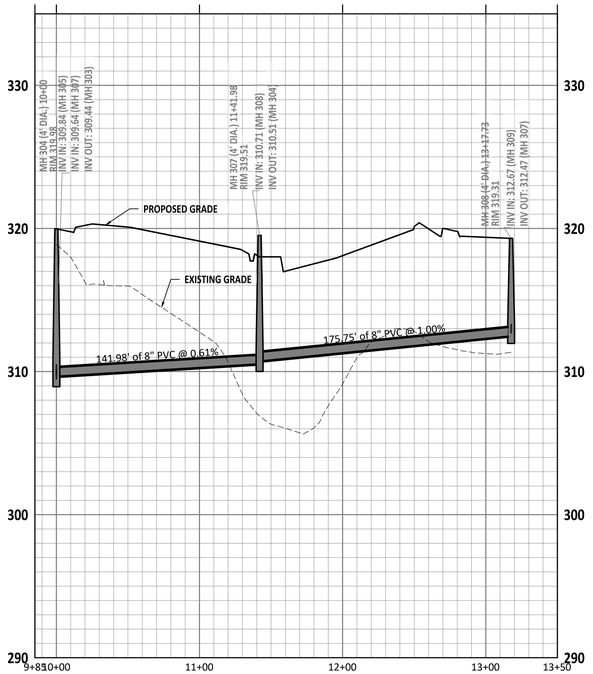
MH# 304 TO MH# 308

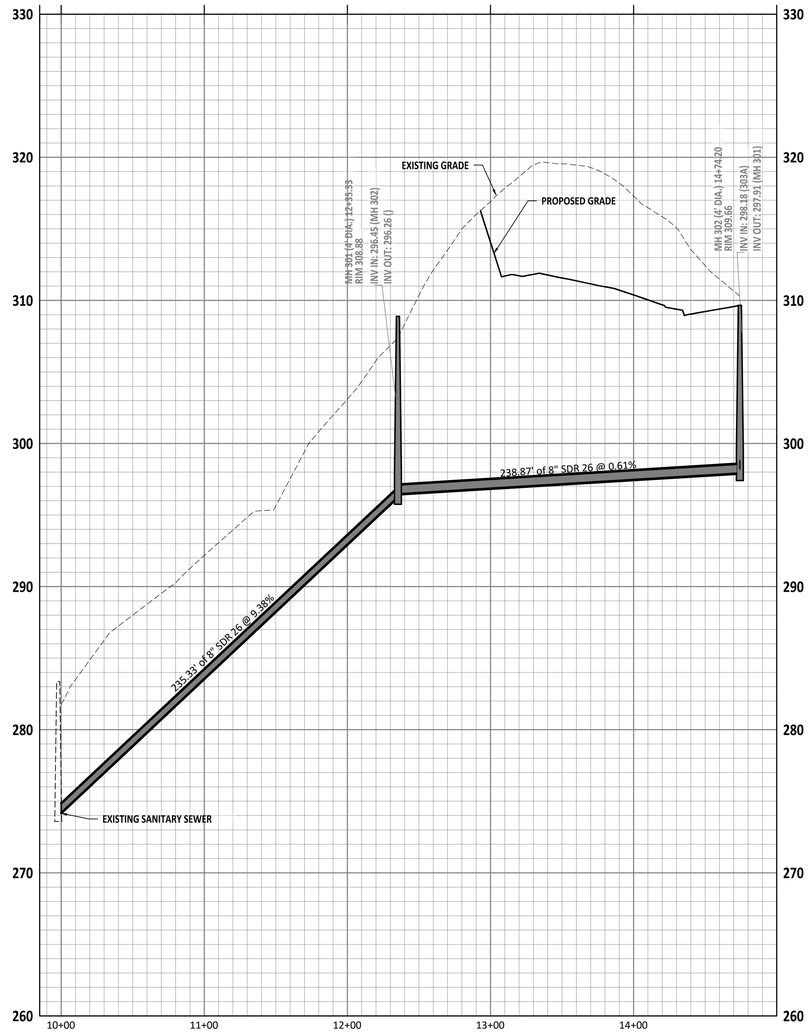


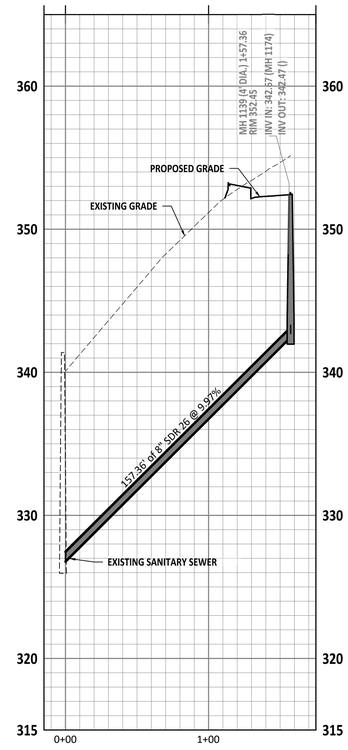
MH# 200 TO MH# 302



MH# 204A TO MH# 1139







GENERAL NOTE:

1. ALL WATERLINE AND STORM CROSSINGS SHALL HAVE A MINIMUM OF 1.5' VERTICAL CLEARANCE. IF THIS CANNOT BE ACHIEVED THEN A CRADLE IS TO BE USED SEE DETAIL S-49 ON SHEET CD10
2. TOWN OF ROLESVILLE INSPECTOR WILL HAVE AUTHORITY FOR FINAL APPROVAL ON ROAD PROFILES THAT ARE DESIGNED WITH A CHANGE IN GRADE THAT IS 6% OR GREATER. THE INSPECTOR WILL NEED TO NOTIFY THE DESIGN ENGINEER ON ANY ROAD CONSTRUCTION THAT ARE NOT ACCEPTABLE IN THE FIELD (INCLUDING ALL INTERSECTION GRADES/CURB RETURNS GRADES).
3. PROPOSED CB (SAG'S) NEED TO BE COORDINATED WITH PVI (LOW POINTS) FOR GRADE.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard. Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 040966 ENGINEER JOHN R. HARMAN Signed by JOHN R. HARMAN 5/19/2025

NO.	DATE	REVISION:

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
SANITARY OUTFALL PLAN AND PROFILE

SHEET NO.:
20.0

North Carolina 811 www.nc811.org
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

April 28, 2025

Z:\Jobs\9900\Kalas Property\Arch_Working Dwgs\Phase 3\Sheet Files\Sheet No. 20.0 Phase 3 Sewer Outfall.dwg

Docusign Envelope ID: F042EDC5-AFA2-48D3-9EBC-68EC290BEC27

NOTE:
A. SIGHT DISTANCE IS THE LENGTH OF ROADWAY AHEAD VISIBLE TO THE DRIVER. THE MINIMUM SIGHT DISTANCE AVAILABLE ON THE ROADWAY SHOULD BE SUFFICIENTLY LONG TO ENABLE A VEHICLE TRAVELING AT OR NEAR THE DESIGN SPEED TO STOP BEFORE REACHING A STATIONARY OBJECT IN ITS PATH.
B. MINIMUM STOPPING SIGHT DISTANCES SHALL BE PROVIDED IN BOTH THE HORIZONTAL AND VERTICAL PLANES FOR PLANNED ROADWAYS AS RELATED TO ASSUMED DRIVER'S EYE HEIGHT AND POSITION.
C. ADEQUATE SIGHT DISTANCE SHOULD BE PROVIDED AT ALL DRIVEWAY ACCESS POINTS AND SHALL BE IN ACCORDANCE WITH THE STANDARDS PROVIDED IN THIS MANUAL.
D. SIGHT TRIANGLES EASEMENTS SHALL BE SHOWN ON ALL NCDOT MAINTAINED ROADWAYS FOR ANY DRIVEWAY ACCESS ACCORDING TO THE MANUAL "POLICY ON STREET AND DRIVEWAY ACCESS TO NORTH CAROLINA HIGHWAYS," AS ADOPTED AND AMENDED BY NCDOT.
E. THIS NOTE MUST BE PLACED ON ALL PLANS:" WITHIN THE AREA OF ABOVE DEFINED SIGHT TRIANGLE, THERE SHALL BE NO SIGHT OBSTRUCTING OR PARTLY OBSTRUCTING WALL, FENCE, SIGN, FOLIAGE, BERMS, OR PARKED VEHICLES BETWEEN THE HEIGHTS OF 24 INCHES AND EIGHT FEET ABOVE THE CURB LINE ELEVATION OR THE NEAREST TRAVELED WAY IF NO CURBING EXISTS."
F. OBJECTS THAT CAN BE PERMITTED IN THE SIGHT DISTANCE TRIANGLE ARE UTILITIES SUCH AS HYDRANTS, UTILITY POLES, UTILITY BOXES, GSI PRACTICES, AND TRAFFIC CONTROL DEVICES. THOSE OBJECTS MUST BE LOCATED TO MINIMIZE VISUAL OBSTRUCTION.

TRANSPORTATION LEGEND	
	PROPOSED LOT LINE
	FLOODLINE
	BUILDING RESTRICTION LINE
	PROPOSED LOT SETBACK
	PROPOSED ROW
	PROPOSED SIDEWALK
	PROPOSED BOC
	PROPOSED EOP
	PROPOSED CENTERLINE
	PROPOSED GRADING
	PROPOSED EASEMENT
	PROPOSED HANDICAP RAMPS
	PROPOSED SIGHT TRIANGLE
MK	MAIL KIOSK LOCATION
	OPEN SPACE
	GREENWAY TRAIL HATCH
	GREENWAY/ROADSIDE TRAIL
	FUTURE PHASING
	EXISTING PHASING
	EXISTING WETLANDS
	PROPOSED PHASELINE

NOTE: THE 100 YEAR FLOOD-LINE AS ON THESE PLANS WERE TAKEN FROM THE FLOOD STUDY PREPARED BY DONLAD A SEVER, PE (024627) OF HUGH J. GILLEECE, III AND ASSOCIATES, P.A.

GRAPHIC SCALE
120 0 60 120 240 480
(IN FEET)
1 inch =120

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ENGINEERING CORPORATION
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047627 BRIAN K. HARMON
JOHN R. HARMON
5/12/2025

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES

STIPULATION FOR REUSE

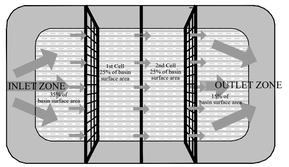
THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
TRANSPORTATION PLAN

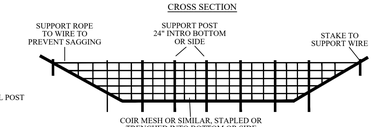
SHEET NO.:
21.0

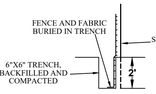


PLAN VIEW

NOTES:
1. BAFFLE MATERIAL SHOULD BE SECURED AT THE BOTTOM AND SIDES USING STAPLES OR BY TRENCHING AS FOR SILT FENCE.
2. MOST OF THE SEDIMENT WILL ACCUMULATE IN THE 1ST BAY, WHICH SHOULD BE READILY ACCESSIBLE FOR MAINTENANCE.
3. PROVIDE 3 BAFFLES (USE TWO IF LESS THAN 20 FEET IN LENGTH). PROVIDE 5 BAFFLES FOR DRAINAGE AREAS GREATER THAN 10 ACRES.
4. BAFFLE SHALL BE 700 G/M2 COIR EROSION BLANKET.
5. TOPS OF BAFFLES SHOULD BE 2 INCHES LOWER THAN THE TOP OF THE BERMS
6. INSPECT BAFFLES FOR REPAIR ONCE A WEEK AND AFTER EACH RAINFALL

CROSS SECTION

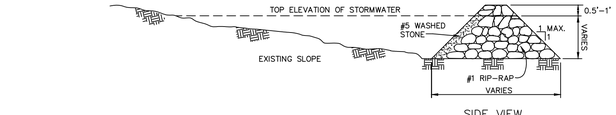




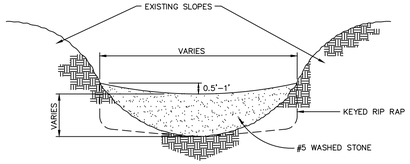
SECTION VIEW AT OPENING

WAKE COUNTY
EFFECTIVE: 01/31/08

STANDARD BAFFLES DETAIL



SIDE VIEW



FRONT VIEW

CONSTRUCTION NOTES:

HEIGHT & WIDTH DETERMINED BY EXISTING TOPOGRAPHY AND SEDIMENT STORAGE REQUIRED.

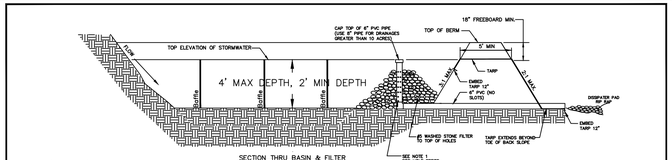
KEY RIP RAP INTO THE DAM FOR STABILIZATION.

STEP SEQUENCE

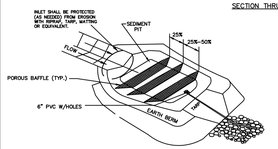
NOTE: REMOVE SEDIMENT ACCUMULATION FROM BEHIND CHECK DAMS TO PREVENT DAMAGE TO CHANNEL VEGETATION. FLOW SHOULD BE MAINTAINED THROUGH THE DAM.

WAKE COUNTY
EFFECTIVE: 01/31/08

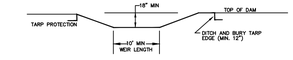
STANDARD CHECK DAM



SECTION THRU BASIN & FILTER



PERSPECTIVE VIEW



SECTION THRU WEIR

GENERAL NOTES

1. DRAW DOWN RISER & BARREL SHALL BE 6" SCH. 40 PVC WITH CLEAN–OUT CAP AND 3/4" HOLES. SEE NOTE 1 FOR NUMBER AND SPACING OF HOLES.
2. TARP REQUIRED TO PROTECT THE WEIR SHALL BE THE WIDTH SPECIFIED. THE LENGTH OF THE TARP SHALL BE ACCORDING TO AVAILABLE SUPPLY. IF MULTIPLE TARPS ARE TO BE USED, THEN TARPS SHALL BE OVERLAPPED AT LEAST 12". THE UPSTREAM 12" TARP SHALL OVERLAP THE DOWNSTREAM TARP. THE TARP SHALL BE HEAVY DUTY SILVER TARPAULINS OR EQUIVALENT FOR UV RESISTANCE.
3. MAINTENANCE: SEDIMENT TO BE REMOVED AND PROPERLY DISPOSED OF WHEN BASIN IS HALF FULL. GRAVEL FILTER AROUND RISER SHOULD BE REPLACED AS NEEDED TO ENSURE DEWATERING.

NOTE 1

HOLE SPECS:

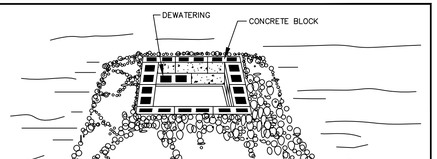
DEWATERING HOLES WILL BE INSTALLED IN SETS OF HORIZONTAL RINGS. THE FIRST SET OF HOLES WILL BE SET 6 INCHES FROM THE BOTTOM OF THE RISER. RINGS WILL CONTINUE UP THE RISER IN INTERVALS OF 3 INCHES. HOLES WILL BE 3/4 INCH IN DIAMETER AND WILL BE SPACED EQUALLY AROUND THE RISER. THE NUMBER OF HOLES PER RING WILL EQUAL TO THE DRAINAGE AREA.

EXAMPLE
A RISER DRAWING 2.0 ACRES SHOULD HAVE 2 HOLES PER RING EVERY 3 INCHES ON THE RISER PIPE. THE FIRST RING (2 HOLES) WILL BE SET 6 INCHES FROM THE BOTTOM OF THE RISER.

NOTE: ROUND DRAINAGE AREA TO THE NEAREST WHOLE NUMBER TO DETERMINE NUMBER OF HOLES.

WAKE COUNTY
EFFECTIVE: 01/31/08

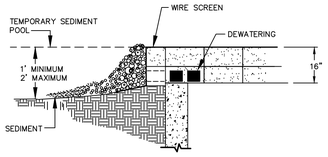
STANDARD CUSTOM BASIN



CONSTRUCTION SPECIFICATIONS

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE IN THE BOTTOM ROW TO ALLOW POOL DRAINAGE. THE FOUNDATION SHOULD BE EXCAVATED AT LEAST 2 INCHES BELOW THE CREST OF THE STORM DRAIN. PLACE THE BOTTOM ROW OF BLOCKS AGAINST THE EDGE OF THE STORM DRAIN FOR LATERAL SUPPORT AND TO AVOID WASHOUTS WHEN OVERFLOW OCCURS. IF NEEDED, GIVE LATERAL SUPPORT TO SUBSEQUENT ROWS BY PLACING 2x4 WOOD STUDS THROUGH BLOCK OPENINGS.
2. CAREFULLY FIT HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2 INCH OPENINGS OVER ALL BLOCK OPENINGS TO HOLD GRAVEL IN PLACE.
3. USE CLEAN GRAVEL, 3/4 TO 1/2 INCH IN DIAMETER, PLACED 2 INCHES BELOW THE TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER AND SMOOTH IT TO AN EVEN GRADE. DOT #57 WASHED STONE IS RECOMMENDED.

MAINTENANCE: INSPECT INLET PROTECTION AND REMOVE SEDIMENT AFTER EACH RAIN EVENT. GRAVEL SHOULD BE REPLACED AND REPAIRS MADE AS NEEDED.

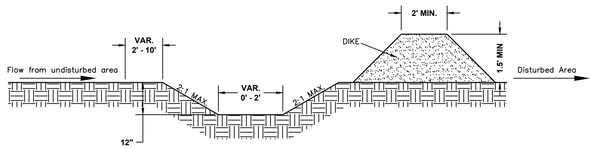


WAKE COUNTY
EFFECTIVE: 01/31/08

STANDARD BLOCK & GRAVEL DROP INLET PROTECTION

NOTES:

1. DIVERSION TO BE USED UPSLOPE OF A CONSTRUCTION SITE TO PREVENT STORM RUNOFF FROM ENTERING THE DISTURBED AREA.
2. IMMEDIATELY LINE AND STABILIZE BEFORE ANY DOWNSLOPE GRADING BEGINS (STABILIZATION MUST OCCUR BEFORE ISSUANCE OF A CERTIFICATE OF COMPLIANCE). STABILIZATION METHOD IS BASED ON VELOCITY OF OFFSITE DRAINAGE.
3. DIVERSIONS SHOULD ONLY BE USED FOR DRAINAGES 5 ACRES OR LESS.
4. ANY SEDIMENT LADEN WATER PRIOR TO STABILIZATION OF THE DIVERSION MUST BE DIVERTED INTO AN APPROVED EROSION AND SEDIMENT CONTROL BMP. CLEAN WATER SHOULD EMPTY INTO AN APPROVED OUTLET DEVICE.



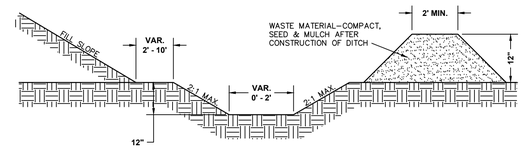
CROSS SECTIONAL VIEW

WAKE COUNTY
EFFECTIVE: 01/31/08

STANDARD CLEAN WATER DIVERSION

NOTES:

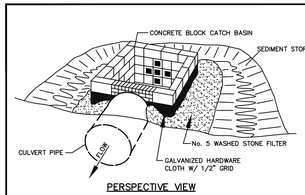
1. TEMPORARY DIVERSION DITCH TO BE USED TO INTERCEPT FLOW AND/OR DIVERT TO A SEDIMENT CONTROL MEASURE OR BMP.
2. SILT TO BE REMOVED WHEN DITCH IS ONE–HALF FULL.
3. DITCH SHALL BE RECONSTRUCTED WHEN DAMAGED BY EQUIPMENT OR COVERED BY FILL.
4. STABILIZE DIVERSION DITCH BERM WITH TEMPORARY SEEDING, MULCH WITH TAC, AND/OR EROSION CONTROL NETTING.



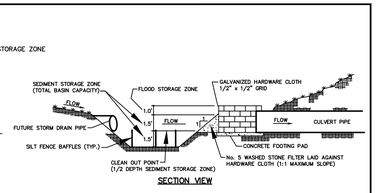
CROSS SECTIONAL VIEW

WAKE COUNTY
EFFECTIVE: 01/31/08

STANDARD TEMPORARY DIVERSION DITCH

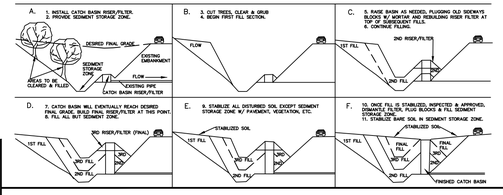


PERSPECTIVE VIEW



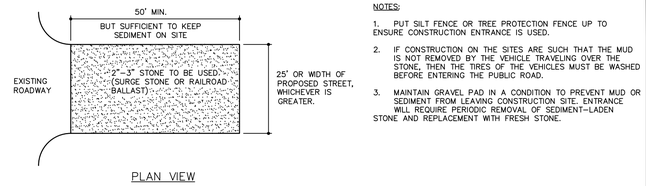
SECTION VIEW

USE OF CATCH BASIN RISER/FILTER ON FILL SITES

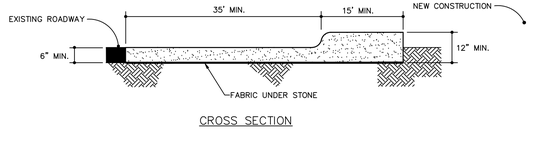


WAKE COUNTY
EFFECTIVE: 01/31/08

STANDARD CATCH BASIN RISER/FILTER



PLAN VIEW



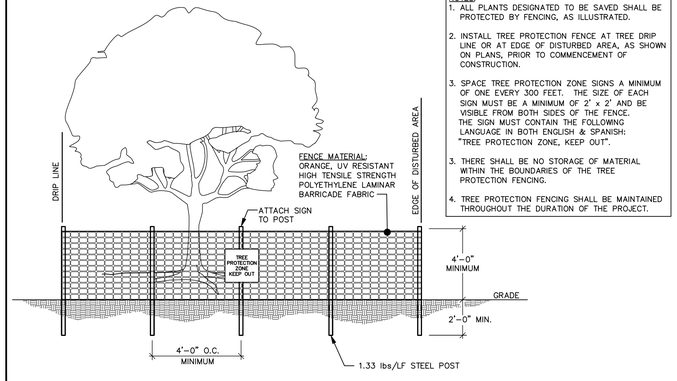
CROSS SECTION

NOTES:

1. PUT SILT FENCE OR TREE PROTECTION FENCE UP TO ENSURE CONSTRUCTION ENTRANCE IS USED.
2. IF CONSTRUCTION ON THE SITES ARE SUCH THAT THE MUD IS NOT REMOVED BY THE VEHICLE TRAVELING OVER THE STONE, THEN THE TIRES OF THE VEHICLES MUST BE WASHED BEFORE ENTERING THE PUBLIC ROAD.
3. MAINTAIN GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING CONSTRUCTION SITE. ENTRANCE WILL REQUIRE PERIODIC REMOVAL OF SEDIMENT–LADEN STONE AND REPLACEMENT WITH FRESH STONE.

WAKE COUNTY
EFFECTIVE: 01/31/08

STANDARD CONSTRUCTION ENTRANCE



NOTES:
1. ALL PLANTS DESIGNATED TO BE SAVED SHALL BE PROTECTED BY FENCING, AS ILLUSTRATED.
2. INSTALL TREE PROTECTION FENCE AT TREE DRIP LINE OR AT EDGE OF DISTURBED AREA, AS SHOWN ON PLANS, PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. SPACE TREE PROTECTION ZONE SIGNS A MINIMUM OF ONE EVERY 300 FEET. THE SIZE OF EACH SIGN MUST BE A MINIMUM OF 2' x 2' AND BE VISIBLE FROM BOTH SIDES OF THE FENCE. THE SIGN MUST CONTAIN THE FOLLOWING LANGUAGE IN BOTH ENGLISH & SPANISH: "TREE PROTECTION ZONE, KEEP OUT".
3. THERE SHALL BE NO STORAGE OF MATERIAL WITHIN THE BOUNDARIES OF THE TREE PROTECTION FENCING.
4. TREE PROTECTION FENCING SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.

TREE PROTECTION FENCE

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:

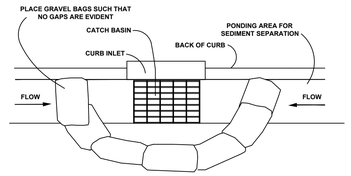
KALAS FALLS CIVIL DETAILS

SHEET NO.:

CD1

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

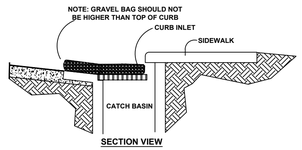
Z:\Jobs\9900\Working Drawings\Phase 3\Civil_Working Dwgs\Phase 3\Sheet Files\Sheet No.CD1-CD19 Phase 3 Details.dwg June 6, 2025



PLAN VIEW

NOTES:

1. PLACE GRAVEL BAG BARRIER ON GENTLY SLOPING STREET, WHERE WATER CAN POND AND ALLOW SEDIMENT TO SEPARATE FROM RUNNOFF.
2. USE SAND BAGS OF WOVEN GEOTEXTILE FABRIC (NOT BURLAP) AND FILL WITH ¾ INCH (OR SMALLER) GRAVEL. BAGS MUST BE LAYERED SUCH THAT NO GAPS ARE EVIDENT.
3. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT. SEDIMENT AND GRAVEL MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.
4. WHEN INSTALLING CURB INLET PROTECTION DEVICES, NEVER BLOCK THE CURB INLET.

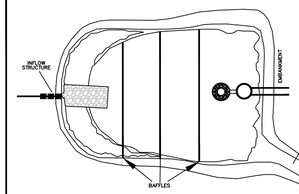


SECTION VIEW

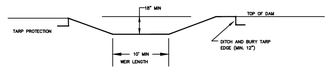
WAKE COUNTY

EFFECTIVE: 01/31/08

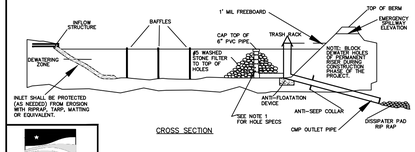
STANDARD GRAVEL BAG CURB INLET PROTECTION



PLAN VIEW



SECTION THRU WEIR



CROSS SECTION

NOTE 1

HOLE SPECS:

DEWATERING HOLES WILL BE INSTALLED IN SETS OF HORIZONTAL RINGS. THE FIRST SET OF HOLES WILL BE SET 6 INCHES FROM THE BOTTOM OF THE RISER. RINGS WILL CONTINUE UP THE RISER IN INTERVALS OF 3 INCHES. HOLES WILL BE ¼ INCH IN DIAMETER AND WILL BE SPACED EQUALLY AROUND THE RISER. THE NUMBER OF HOLES PER RING WILL EQUAL TO THE DRAINAGE AREA.

EXAMPLE:
A RISER DRAINING 2.0 ACRES SHOULD HAVE 2 HOLES PER RING EVERY 3 INCHES ON THE RISER PIPE, THE FIRST RING (2 HOLES) WILL BE SET 6 INCHES FROM THE BOTTOM OF THE RISER.

NOTE: ROUND DRAINAGE AREA TO THE NEAREST WHOLE NUMBER TO DETERMINE NUMBER OF HOLES.

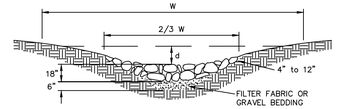
GENERAL NOTES:

1) BASIN SHOULD BE CLEANED OUT WHEN CAPACITY REACHES AN ELEVATION REPRESENTING THAT THE BASIN IS HALF-FULL.
2) PROVIDE A MINIMUM OF THREE POROUS BAFFLES TO EVENLY DISTRIBUTE FLOW ACROSS THE BASIN, REDUCING TURBULENCE.
3) BAFFLE MATERIAL MUST BE SECURED AT THE BOTTOM AND SIDES USING STAPLES OR BY TRENCHING AS FOR A SILT FENCE.
4) MOST OF THE SEDIMENT WILL ACCUMULATE IN THE FIRST BAY, SO THIS SHOULD BE READILY AVAILABLE FOR MAINTENANCE.
5) THE TARP USED TO PROTECT THE WEIR SHALL BE THE WIDTH SPECIFIED. THE LENGTH OF THE TARP SHALL BE ACCORDING TO AVAILABLE SUPPLY. IF MULTIPLE TARPS ARE TO BE USED, THEN TARPS SHALL BE OVERLAPPED AT LEAST 12". THE UPSTREAM 12" TARP SHALL OVERLAP THE DOWNSTREAM TARP. THE TARP SHALL BE 50 MIL. HEAVY DUTY SILVER TARPAULINS OR EQUIVALENT FOR U.V. RESISTANCE.
6) DURING THE CONSTRUCTION PHASE OF THE PROJECT, PERMANENT STORMWATER RISER SHALL ONLY DEWATER FROM THE TOP OF PIPE.
7) POND SHALL NOT BE CONVERTED FOR STORMWATER USE UNTIL APPROVED BY ENVIRONMENTAL ENGINEER.

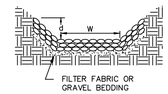
WAKE COUNTY

EFFECTIVE: 01/31/08

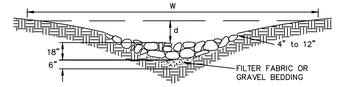
STANDARD CUSTOM BASIN ATTACHED TO PERMANENT RISER



PARABOLIC–SHAPED WATERWAY WITH STONE CENTER DRAIN
(SHAPED BY BULLDOZER)



TRAPEZOIDAL



V–SHAPED WATERWAY WITH STONE CENTER DRAIN
(SHAPED BY MOTOR GRADER)

NOTES:

–TO BE USED WHERE EXCESSIVE STORMWATER VELOCITIES PROHIBIT VEGETATIVE LININGS.

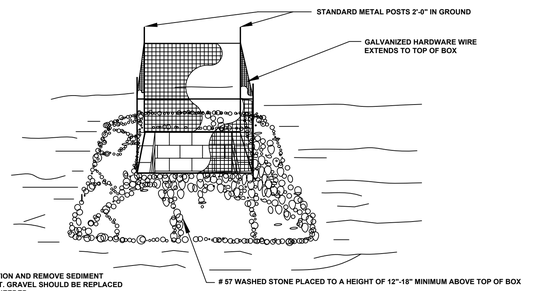
–SIZE OF STONE MUST BE DETERMINED BY APPROPRIATE DESIGN PROCEDURE.

–DIMENSIONS FOR d & W VARIES ACCORDING TO DESIGN.

WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD RIP-RAP LINED CHANNELS



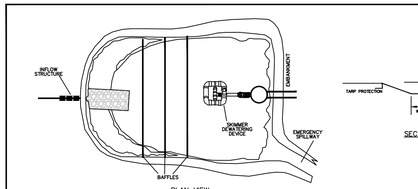
NOTE:

1. INSPECT INLET PROTECTION AND REMOVE SEDIMENT AFTER EACH RAIN EVENT. GRAVEL SHOULD BE REPLACED AND REPAIRS MADE AS NEEDED.

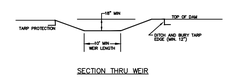
WAKE COUNTY

EFFECTIVE: 01/31/08

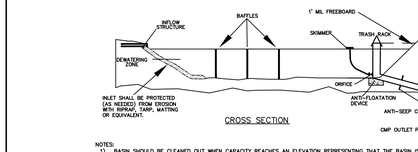
STANDARD GRAVEL YARD INLET PROTECTION



PLAN VIEW



SECTION THRU WEIR



CROSS SECTION

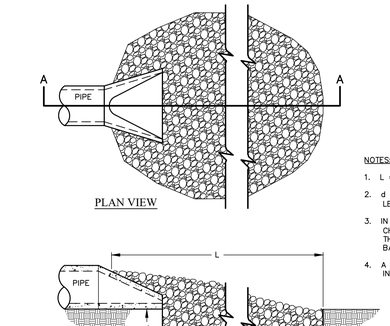
NOTES:

1) BASIN SHOULD BE CLEANED OUT WHEN CAPACITY REACHES AN ELEVATION REPRESENTING THAT THE BASIN IS HALF-FULL.
2) THE TARP USED TO PROTECT THE WEIR SHALL BE THE WIDTH SPECIFIED. THE LENGTH OF THE TARP SHALL BE ACCORDING TO AVAILABLE SUPPLY. IF MULTIPLE TARPS ARE TO BE USED, THEN TARPS SHALL BE OVERLAPPED AT LEAST 12". THE UPSTREAM 12" TARP SHALL OVERLAP THE DOWNSTREAM TARP. THE TARP SHALL BE 50 MIL. HEAVY DUTY SILVER TARPAULINS OR EQUIVALENT FOR U.V. RESISTANCE.
3) PROVIDE A MINIMUM OF THREE POROUS BAFFLES TO EVENLY DISTRIBUTE FLOW ACROSS THE BASIN, REDUCING TURBULENCE.
4) BAFFLE MATERIAL MUST BE SECURED AT THE BOTTOM AND SIDES USING STAPLES OR BY TRENCHING AS FOR A SILT FENCE.
5) MOST OF THE SEDIMENT WILL ACCUMULATE IN THE FIRST BAY, SO THIS SHOULD BE READILY AVAILABLE FOR MAINTENANCE.
6) DURING THE CONSTRUCTION PHASE OF THE PROJECT, PERMANENT STORMWATER RISER SHALL ONLY DEWATER FROM THE TOP OF PIPE.
7) POND SHALL NOT BE CONVERTED FOR STORMWATER USE UNTIL APPROVED BY ENVIRONMENTAL ENGINEER.

WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD SKIMMER ATTACHED TO PERMANENT RISER



PLAN VIEW

SECTION 'A-A'

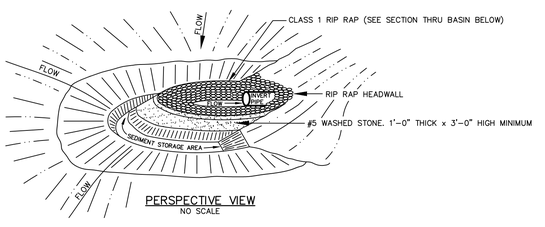
NOTES:

1. L = THE LENGTH OF THE RIPRAP APRON.
2. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 6" (INCHES).
3. IN A WELL–DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" (INCHES) ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.

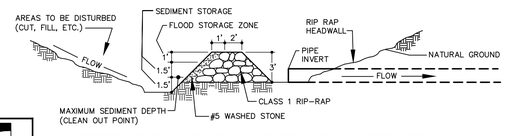
WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD PIPE OUTLET TO WELL-DEFINED CHANNEL



PERSPECTIVE VIEW
NO SCALE

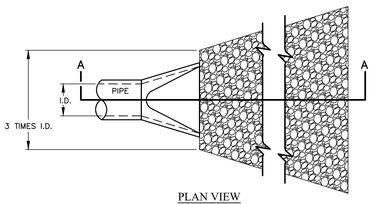


SECTION THRU CATCH BASIN, FILTER AND CULVERT PIPE
NO SCALE

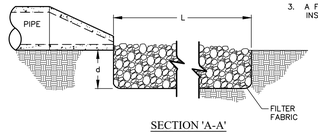
WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD HORSESHOE INLET PROTECTION



PLAN VIEW



SECTION 'A-A'

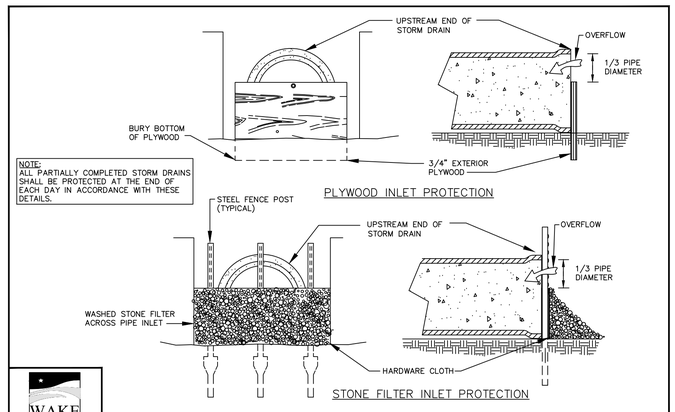
NOTES:

1. L = THE LENGTH OF THE RIPRAP APRON.
2. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 6" (INCHES).
3. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.

WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD PIPE OUTLET TO FLAT AREA
NO WELL-DEFINED CHANNEL



WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD PIPE INLET PROTECTION (PLYWOOD & STONE)

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA ASSOCIATION OF AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C–3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARNIAN

DETAIL SELECTION ONLY

NO.	DATE:	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE, OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

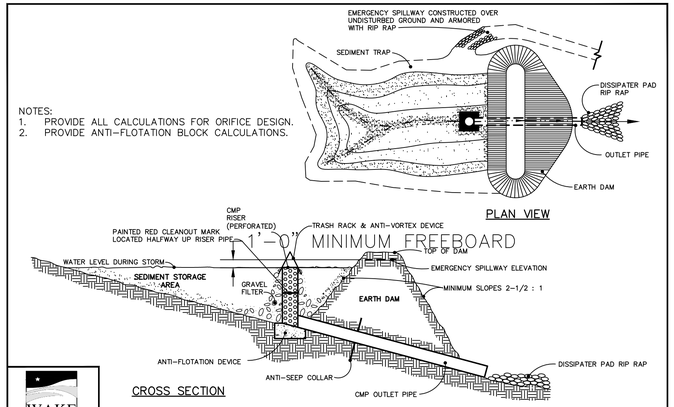
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
KALAS FALLS
CIVIL DETAILS

SHEET NO.:
CD2

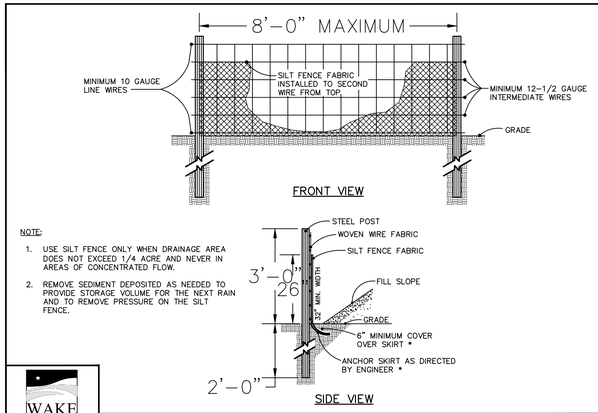
North Carolina 811 Know what's below. Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Workflow Progress\Civil_Workflow Dwgs\Phase 3\Cover Files\Sheet No.'s\CD3 Phase 3 Details.dwg June 6, 2025



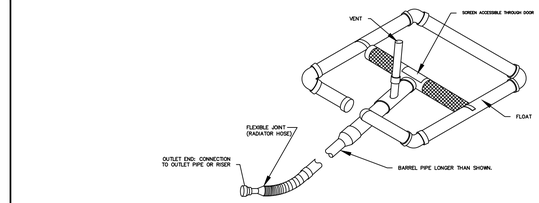
STANDARD RISER-BARREL SEDIMENT BASIN

EFFECTIVE: 01/31/08



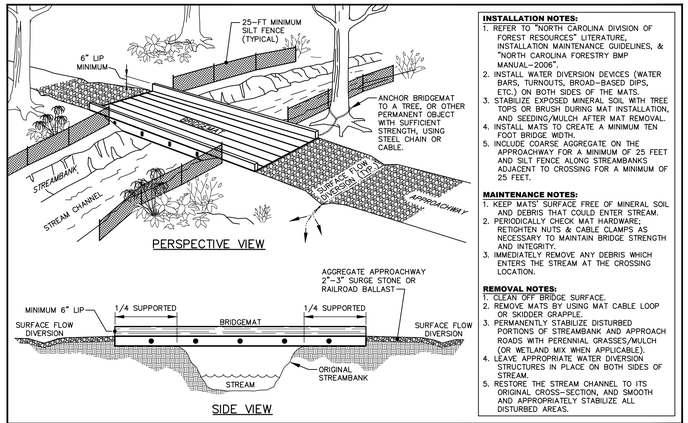
STANDARD TEMPORARY SILT FENCE

EFFECTIVE: 01/31/08



STANDARD SKIMMER DETAIL

EFFECTIVE: 01/31/08



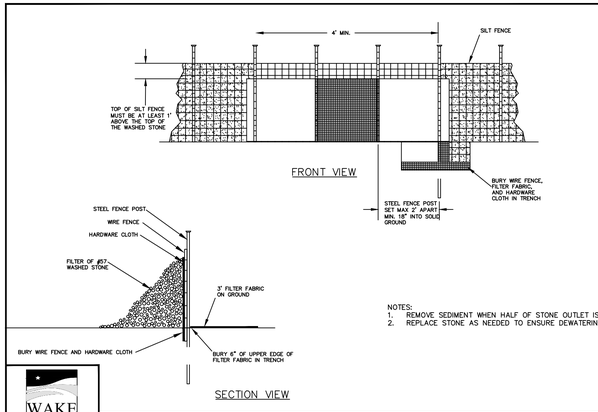
INSTALLATION NOTES:
1. REFER TO "NORTH CAROLINA DIVISION OF FOREST RESOURCES" LITERATURE, INSTALLATION MAINTENANCE GUIDELINES, & "NORTH CAROLINA FORESTRY BMP MANUAL-2006".
2. INSTALL WATER DIVERSION DEVICES (WATER BARS, TURNOUTS, BROAD-BASED DIPS, ETC.) ON BOTH SIDES OF THE MATS.
3. STABILIZE EXPOSED MINERAL SOIL WITH TREE TOPS OR BRUSH DURING MAT INSTALLATION, AND SEEDING/MULCH AFTER MAT REMOVAL.
4. INSTALL MATS TO CREATE A MINIMUM TEN FOOT BRIDGE WIDTH.
5. INCLUDE COARSE AGGREGATE ON THE APPROACHWAY FOR A MINIMUM OF 25 FEET AND SILT FENCE ALONG STREAMBANKS ADJACENT TO CROSSING FOR A MINIMUM OF 25 FEET.

MAINTENANCE NOTES:
1. KEEP MATS' SURFACE FREE OF MINERAL SOIL AND DEBRIS THAT COULD ENTER STREAM.
2. PERIODICALLY CHECK MAT HARDWARE; RETIGHTEN NUTS & CABLE CLAMPS AS NECESSARY TO MAINTAIN BRIDGE STRENGTH AND INTEGRITY.
3. IMMEDIATELY REMOVE ANY DEBRIS WHICH ENTERS THE STREAM AT THE CROSSING LOCATION.

REMOVAL NOTES:
1. CLEAN OFF BRIDGE SURFACE.
2. REMOVE MATS BY USING MAT CABLE LOOP OR SKIDDER GRAPPLE.
3. PERMANENTLY STABILIZE DISTURBED PORTIONS OF STREAMBANK AND APPROACH ROADS WITH PERENNIAL GRASSES/MULCH (OR WETLAND MIX WHEN APPLICABLE).
4. LEAVE APPROPRIATE WATER DIVERSION STRUCTURES IN PLACE ON BOTH SIDES OF STREAM.
5. RESTORE THE STREAM CHANNEL TO ITS ORIGINAL CROSS-SECTION, AND SMOOTH AND APPROPRIATELY STABILIZE ALL DISTURBED AREAS.

STANDARD TEMPORARY STREAM CROSSING OPTION

EFFECTIVE: 01/31/08



NOTES:
1. REMOVE SEDIMENT WHEN HALF OF STONE OUTLET IS COVERED.
2. REPLACE STONE AS NEEDED TO ENSURE DEWATERING.

STANDARD SILT FENCE OUTLET

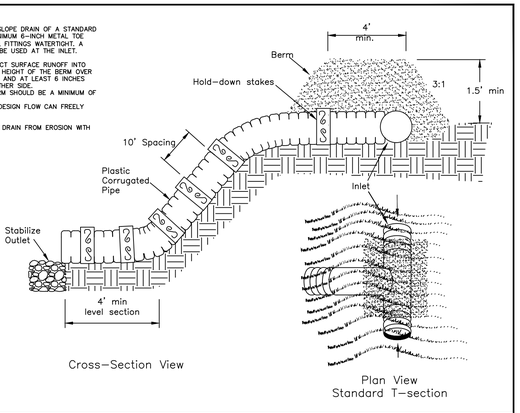
EFFECTIVE: 01/31/08

NOTES:

1. CONSTRUCT THE ENTRANCE TO THE SLOPE DRAIN OF A STANDARD FLARED-END SECTION OF PIPE WITH A MINIMUM 6-INCH METAL TOE PLATE (CROSS-SECTION VIEW). MAKE ALL FITTINGS WATERTIGHT. A STANDARD T-SECTION FITTING MAY ALSO BE USED AT THE INLET.

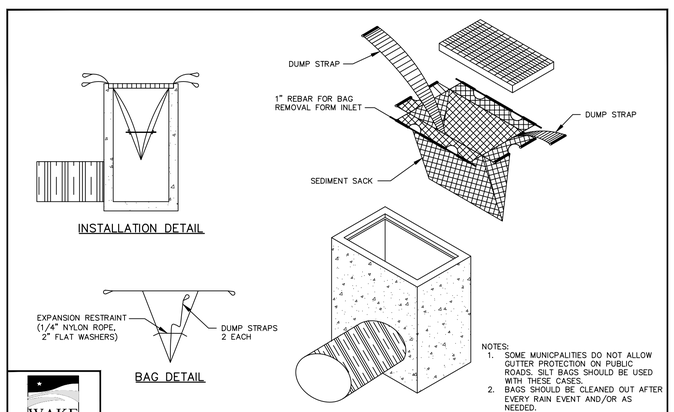
2. USE AN EARTHEN DIVERSION TO DIRECT SURFACE RUNOFF INTO THE TEMPORARY SLOPE DRAIN. MAKE THE HEIGHT OF THE BERM OVER THE DRAIN CONDUIT A MINIMUM OF 1.5 FT AND AT LEAST 6 INCHES HIGHER THAN THE ADJOINING BERM ON EITHER SIDE. THE LOWEST POINT OF THE DIVERSION BERM SHOULD BE A MINIMUM OF 1 FT ABOVE THE TOP OF THE DRAIN SO THAT DESIGN FLOW CAN FREELY ENTER THE PIPE.

3. PROTECT THE OUTLET OF THE SLOPE DRAIN FROM EROSION WITH RIPRAP DISSIPATOR.



STANDARD TEMPORARY SLOPE DRAIN

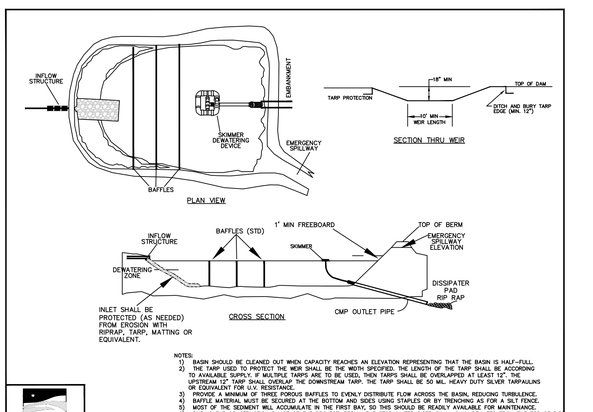
EFFECTIVE: 01/31/08



NOTES:
1. SOME MUNICPALITIES DO NOT ALLOW GUTTER PROTECTION ON PUBLIC ROADS. SILT BAGS SHOULD BE USED WITH THESE CASES.
2. BAGS SHOULD BE CLEANED OUT AFTER EVERY RAIN EVENT AND/OR AS NEEDED.

STANDARD SILT BAG - INLET SEDIMENT CONTROL DEVICE

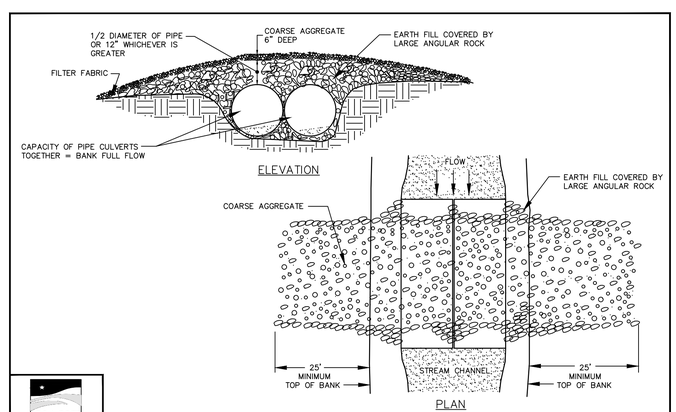
EFFECTIVE: 01/31/08



NOTES:
1) BASIN SHOULD BE CLEANED OUT WHEN CAPACITY REACHES AN ELEVATION REPRESENTING THAT THE BASIN IS HALF-FULL.
2) THE TARP USED TO PROTECT THE WEIR SHALL BE THE WIDTH SPECIFIED. THE LENGTH OF THE TARP SHALL BE ACCORDING TO AVAILABLE SUPPLY. IF MULTIPLE TARPS ARE TO BE USED, THEN TARPS SHALL BE OVERLAPPED AT LEAST 12". THE UPSTREAM 12" TARP SHALL OVERLAP THE DOWNSTREAM TARP. THE TARP SHALL BE 50 MIL. HEAVY DUTY SILVER TARPAULINS OR EQUIVALENT FOR U.V. RESISTANCE.
3) PROVIDE A MINIMUM OF THREE POROUS BAFFLES TO EVENLY DISTRIBUTE FLOW ACROSS THE BASIN, REDUCING TURBULENCE.
4) BAFFLE MATERIAL MUST BE SECURED AT THE BOTTOM AND SIDES USING STAPLES OR BY TRENCHING AS FOR A SILT FENCE.
5) MOST OF THE SEDIMENT WILL ACCUMULATE IN THE FIRST BAY, SO THIS SHOULD BE READILY AVAILABLE FOR MAINTENANCE.
6) DURING THE CONSTRUCTION PHASE OF THE PROJECT, PERMANENT STORMWATER RISER SHALL ONLY DEWATER FROM THE TOP OF PIPE.
7) POND SHALL NOT BE CONVERTED FOR STORMWATER USE UNTIL APPROVED BY ENVIRONMENTAL ENGINEER.

STANDARD SKIMMER BASIN

EFFECTIVE: 01/31/08



STANDARD TEMPORARY STREAM CROSSING

EFFECTIVE: 01/31/08

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4201 Wake Forest Boulevard, Suite 400
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 JOHN R. HARMAN AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS:
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

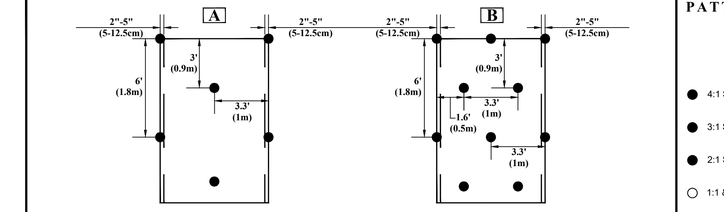
SHEET TITLE:
KALAS FALLS CIVIL DETAILS

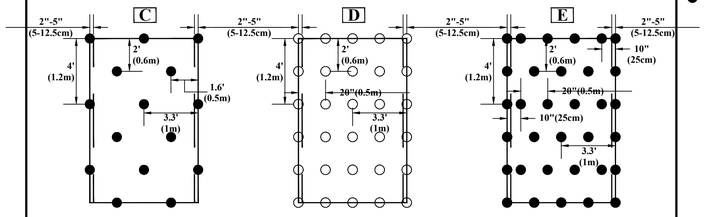
SHEET NO.:
CD3

North Carolina 811 Know what's below. Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Workflow Projects\Revit_Workflow Dwgs\Phase 3\Sheet Files\Sheet No CD3_CD3 Phase 3 Details.dwg
June 6, 2025

STAPLE PATTERN GUIDE





- 4:1 Slopes (A)
- 3:1 Slopes (B)
- 2:1 Slopes (C)
- 1:1 & Steeper Slopes (D)
- Medium/High Flow Channel (D)
- High Flow Channel And Shoreline (E)

NOTES:

* Use ECMDS© for more accurate staple pattern selection.

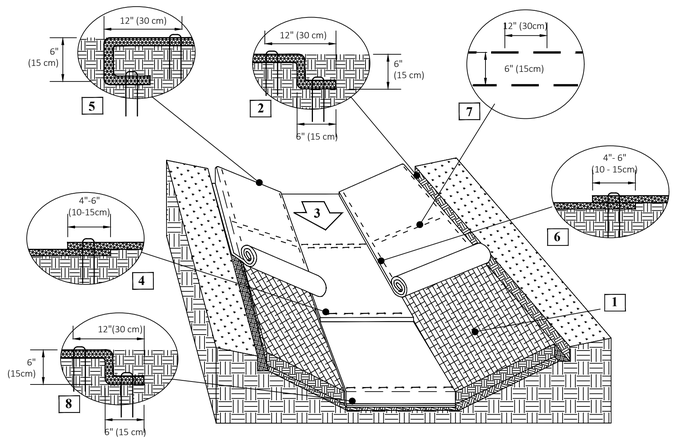
NORTH AMERICAN GREEN

5401 St. Wendel - Cynthiana Rd. PH: 800-722-2040
Poseyville, IN 47633 www.nagreen.com

Disclaimer:
The information presented herein is general design information only. For specific applications, consult an independent professional for further design guidance.

Drawn on: 5-4-17

Drawing Not To Scale

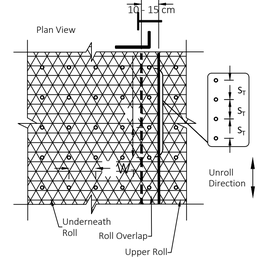


NOTES:
*Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

Instructions

1. Prepare soil before installing rolled erosion control products (RECPs), including any necessary application of lime, fertilizer, and seed. Ground surface must be free of debris, rocks, clay clods and raked smooth sufficient to allow intimate contact of the RECP with the soil over the entirety of the installation.
2. Begin at the top of the channel by anchoring the RECPs in a 6" (15 cm) deep X 6" (15 cm) wide trench with approximately 12" (30 cm) of RECPs extended beyond the up-slope portion of the trench. Use ShoreMax mat at the channel/culvert outlet as supplemental scour protection as needed. Anchor the RECPs with a row of staples/stakes/pins approximately 12" (30 cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to the compacted soil and fold the remaining 12" (30 cm) portion of RECPs back over the seed and compacted soil. Secure RECPs over compacted soil with a row of staples/stakes/pins spaced approximately 12" (30 cm) apart across the width of the RECPs.
3. Roll center RECPs in direction of water flow in bottom of channel. RECPs will unroll with appropriate side against the soil surface. All RECPs must be securely fastened to soil surface by placing staples/stakes/pins in appropriate locations as shown in the staple pattern guide.
4. Place consecutive RECPs end-over-end (Shingle style) with a 4"- 6" (10 - 15 cm) overlap. Use a double row of staples staggered 4" apart and 4" on center to secure RECPs.
5. Full length edge of RECPs at top of side slopes must be anchored with a row of staples/stakes/pins spaced at S_T apart in a 6" (15 cm) deep X 6"(15 cm) wide trench. Backfill and compact the trench after stapling.
6. Adjacent RECPs must be overlapped approximately 4"- 6" (10 - 15 cm) and secured with staples/stakes/pins at S_T.
7. In high flow channel applications a staple check slot is recommended at 30 to 40 foot (9 -12m) intervals. Use a double row of staples staggered 6" (15 cm) apart and 12" (30 cm) on center over entire width of the channel.
8. The terminal end of the RECPs must be anchored with a row of staples/stakes/pins spaced at S_T apart in a 6" (15 cm) deep X 6" (15 cm) wide trench. Backfill and compact the trench after stapling.
9. Fasteners should provide a minimum of twenty pounds of pullout resistance. Six-inch (10 cm) X one-inch (2.5 cm) eleven gauge staples are typically adequate. In loose soils, longer staples may be necessary, twist pins can provide the greatest pullout resistance. In hard or rocky soils, straight pins may by used where staples or twist pins are refused, provided the minimum pullout requirements are met. Bio-degradable fasteners shall not be used with VMax (TRM) or TMax (HPTRM) materials.

Staple Pattern Guide



- Pin / Staple / Twist Pin, as appropriate for field conditions

	Staple Pattern
Dimension	E
W_T	20" (50 cm)
L_T	20" (50 cm)
S_T	18" (45 cm)
Nominal Frequency	3.8 / SY

Figure 1. Minimum Anchor Pattern

Maximum Design Conditions			Anchor Pattern
Shear Stress	Velocity	Wave Heigth	
<= 6 lbs/ft2	<= 14 ft/s	6 in.	F
> 6-8 lbs/ft2	> 14-18 ft/s	12 in.	G
> 8 lbs/ft2	> 18 ft/s	18 in.	H

Figure 2. Minimum Anchor Type

Soil Type	Anchor Type
Clay-Clay Loam	10 in Wire Staple
Silt Loam - Loam	10 in Wire Staple
Sandy Loam	12 in Wire Staple
Sand / Muck <= 6 in	12in Rebar Staple
Sand / Muck 6-12 in	18 in Rebar Staple
Sand / Muck 12-18 in	24 in Earth Anchor + 12 in Rebar Staple
Sand / Muck > 18 in	36 in Earth Anchor + 18 in Rebar Staple

Figure 3. Anchor Patterns for use with Wire/Rebar Staples

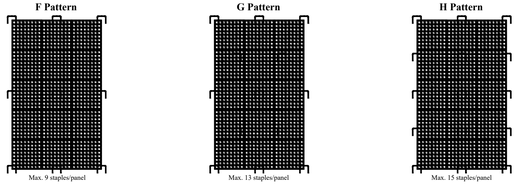
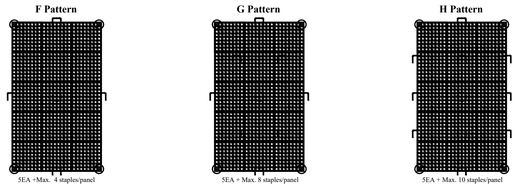


Figure 4. Anchor Patterns for use with Combination of Earth Anchors and Staples



NORTH AMERICAN GREEN

5401 St. Wendel - Cynthiana Rd. PH: 800-722-2040
Poseyville, IN 47633 www.nagreen.com

Disclaimer:
The information presented herein is general design information only. For specific applications, consult an independent professional for further design guidance.

Drawn on: 5-4-17

Drawing Not To Scale

ShoreMax

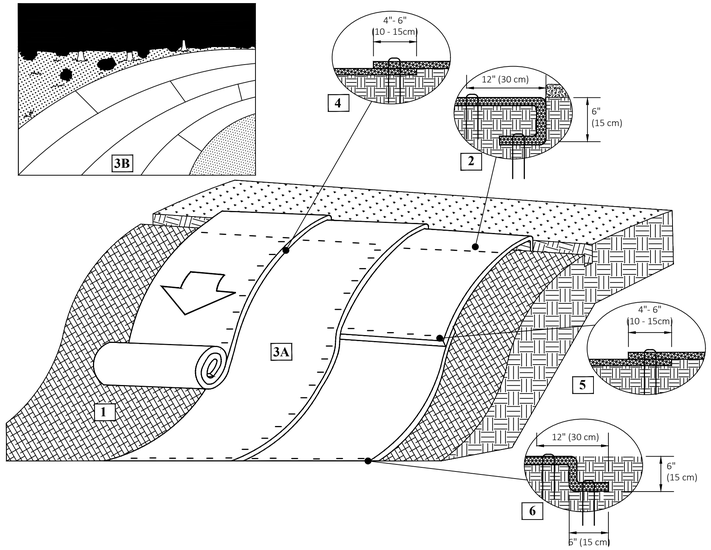
ANCHORING GUIDE

1. When installing ShoreMax mat, the anchor pattern (figure 3 or 4) should be selected based on the expected maximum design conditions (shear stress, velocity, or wave impact) (figure 1).
2. Anchor selection should be based on the soil type and pull-out strength required (figure 2). In soft, highly erodible soils percussion earth anchors may be necessary. Earth anchors can be installed in conjunction with rebar staples (figure 4).
3. When using percussion earth anchors, position anchors in each corner and the center of the panel. Place staples in the appropriate pattern through remainder of mat. Staples can be shared between two adjacent panels.

***Note:**
Number of staples used per panel can be reduced by 30-40% when sharing staples between panels.

- Wire/Rebar Staple

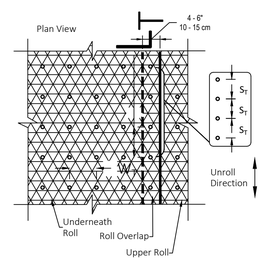
- Percussion Earth Anchor



Instructions

1. Prepare soil before installing rolled erosion control products (RECPs), including any necessary application of lime, fertilizer, and seed. Ground surface must be free of debris, rocks, clay clods and raked smooth sufficient to allow intimate contact of the RECP with the soil over the entirety of the installation.
2. Begin at the top of the slope by anchoring the RECPs in a 6" (15 cm) deep X 6" (15 cm) wide trench. Anchor the RECPs with a row of staples/stakes/pins spaced at S_T apart in the bottom of the trench. Backfill and compact the trench after stapling and fold the roll over downslope. Secure RECPs over compacted soil with a row of staples/stakes/pins spaced at S_T apart across the width of the RECPs.
3. Roll the RECPs (A) down or (B) horizontally across the slope. RECPs will unroll with appropriate side against the soil surface. All RECPs must be securely fastened to soil surface by placing staples/stakes/pins in appropriate locations as shown in the staple pattern guide. RollMax RECPs and ECBs should utilize Staple Pattern C, TRMs and VMax materials should utilize Staple Pattern D.
4. The edges of parallel RECPs must be stapled with approximately 4" - 6" (10 - 15 cm) overlap.
5. Consecutive RECPs spliced down the slope must overlapped with the upstream mat atop the downstream mat (shingle style). The overlap should be 4" - 6" (10 - 15 cm).
6. At the terminal end, secure each mat across the width with a row of staples/stakes/pins spaced at S_T. If exposed to flow, foot traffic, wind uplift or other disruption, trench the terminal end in as shown in detail.
7. Fasteners should provide a minimum of twenty pounds of pullout resistance. Six-inch (10 cm) X one-inch (2.5 cm) eleven gauge staples are typically adequate. In loose soils, longer staples may be necessary, twist pins can provide the greatest pullout resistance. In hard or rocky soils, straight pins may by used where staples or twist pins are refused, provided the minimum pullout requirements are met. Bio-degradable fasteners shall not be used with VMax (TRM) or TMax (HPTRM) materials.

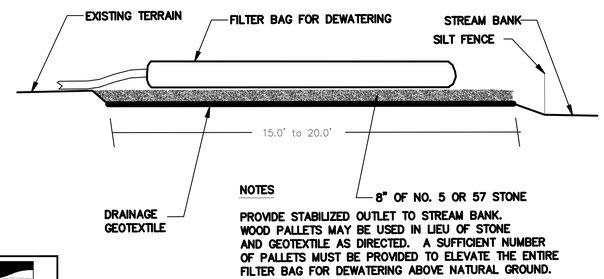
Staple Pattern Guide



- Pin / Staple / Twist Pin, as appropriate for field conditions

	Staple Pattern	
Dimension	C	D
W_T	30" (75 cm)	24" (60 cm)
L_T	30" (75 cm)	20" (50 cm)
S_T	18" (45 cm)	18" (45 cm)
Nominal Frequency	1.7 / SY	3.0 / SY
Application	ECB (Degradable)	TRM (Permanent)

*Note: Staple Pattern A and B used prior to 8/2019 have been discontinued.



WAKE COUNTY

EFFECTIVE: 01/31/08

STANDARD FILTER BAG FOR DEWATERING ACTIVITIES

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4021 Westchase Boulevard, Suite 402
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST, P.A. CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE:	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS:
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3

1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:

KALAS FALLS CIVIL DETAILS

SHEET NO.:

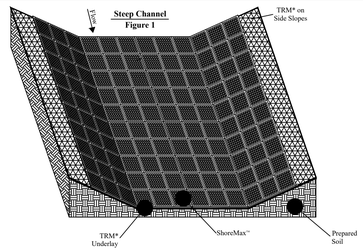
CD4

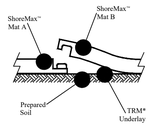
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

June 6, 2025

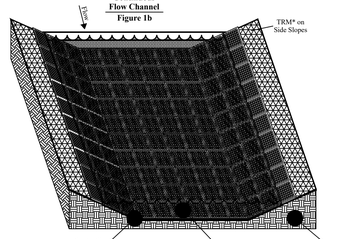
Z:\Jobs\9900\Workfiles Property\Kalas_Working Dwgs\Phase 3\Sheet Files\Sheet No.CD1-CD19 Phase 3 Details.dwg

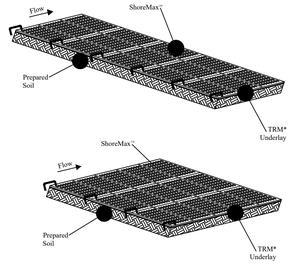
Drawing Not To Scale





Integrated Panel Interlock System
Figure 2





Leading Edge Anchoring
Figure 3

High Scour Line
Low Flow Line

Channel/Downchute/Spillway Plan View

NORTH AMERICAN GREEN
5401 St. Wendel - Cynthiana Rd.
Poseyville, IN 47633
PH: 800-772-2040
www.nagreen.com

Disclaimer:
The information presented herein is general design information only. For specific applications, consult an independent professional for further design guidance.

Drawn on: 5-4-17

ShoreMax™

STEEP CHANNEL/ CHUTE/SPILLWAY DETAIL

* ShoreMax mats can be installed over a variety of underlayments including: sod, turf reinforcement mats (TRMs), geotextiles, and in some cases erosion control blankets (ECBs).

1. Prepare soil before installing erosion control products, including any necessary application of lime, fertilizer, and seed (when installing TRM or ECB underlayment).
2. Install turf reinforcement mat (TRM) over prepared soils according to manufacturer's recommendations.
3. Place ShoreMax mat in the bottom of the channel over the installed TRM (figure 1). The ShoreMax mat should be installed up to the appropriate elevation on the side slope as determined by the engineer. When using multiple panels, connect the panels using the Integrated Panel Interlock System (figure 2). ShoreMax mat can be laid in either direction.
4. For channels carrying continuous water flows, an appropriate geotextile should be placed under the ShoreMax mat for submerged applications (figure 1b).
5. Place staples/anchors in the appropriate pattern. Perimeter staples can be shared between two adjacent panels. In soft or highly erodible soils, percussion earth anchors may be required. View ShoreMax Anchoring Guide, for additional details.
6. At beginning of channel and areas where significant concentrated flows are directed onto the ShoreMax mat, place 1 staple/pin per linear foot along the leading edge of the ShoreMax system, resulting in 1 staple/pin on each corner and gridline (figure 3).

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for these un-attended days (and this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible***. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). • Division staff may waive the requirement for a written report on a case-by-case basis.

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes		
Site Area Description	**Stabilize within this many calendar days after ceasing land disturbance**	**Timeframe variations**
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 10' in length and not slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

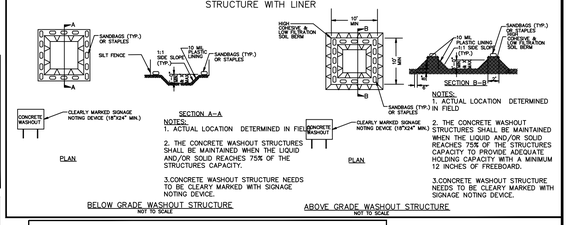
PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY.
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE
NOT TO SCALE

ABOVE GRADE WASHOUT STRUCTURE
Not To Scale

CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

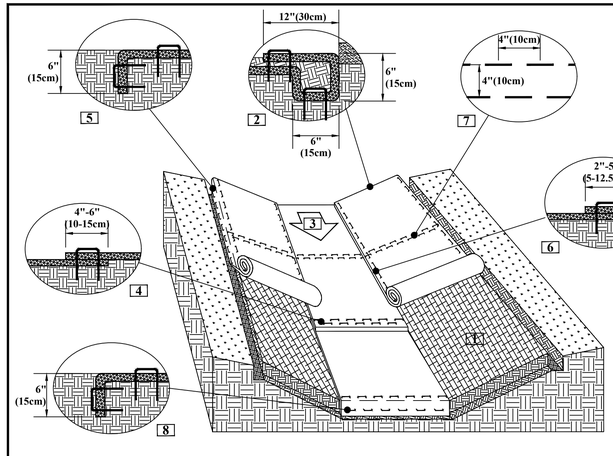
1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19



CRITICAL POINTS
A. Overlaps and Seams
B. Projected Water Line
C. Channel Bottom/Side Slope Vertices

NOTES:
*Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

**In loose soil conditions, the use of staple or stake lengths greater than 6"(15cm) may be necessary to properly secure the RECPs.

Drawing Not To Scale

CHANNEL INSTALLATION DETAIL

1. Prepare soil before installing rolled erosion control products (RECPs), including any necessary application of lime, fertilizer, and seed.
2. Begin at the top of the channel by anchoring the RECPs in a 6"(15cm) deep X 6"(15cm) wide trench with approximately 12"(30cm) of RECPs extended beyond the up-slope portion of the trench. Use ShoreMax mat at the channel/culvert outlet as supplemental scour protection as needed. Anchor the RECPs with a row of staples/stakes approximately 12"(30cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to the compacted soil and fold the remaining 12"(30cm) portion of RECPs back over the seed and compacted soil. Secure RECPs over compacted soil with a row of staples/stakes spaced approximately 12" apart across the width of the RECPs.
3. Roll center RECPs in direction of water flow in bottom of channel. RECPs will unroll with appropriate side against the soil surface. All RECPs must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staple pattern guide.
4. Place consecutive RECPs end-over-end (Shingle style) with a 4"-6" overlap. Use a double row of staples staggered 4" apart and 4" on center to secure RECPs.
5. Full length edge of RECPs at top of side slopes must be anchored with a row of staples/stakes approximately 12"(30cm) apart in a 6"(15cm) deep X 6"(15cm) wide trench. Backfill and compact the trench after stapling.
6. Adjacent RECPs must be overlapped approximately 2"-5" (5-12.5cm) (Depending on RECPs type) and stapled.
7. In high flow channel applications a staple check slot is recommended at 30 to 40 foot (9 -12m) intervals. Use a double row of staples staggered 4"(10cm) apart and 4"(10cm) on center over entire width of the channel.
8. The terminal end of the RECPs must be anchored with a row of staples/stakes approximately 12" (30cm) apart in a 6"(15cm) deep X 6"(15cm) wide trench. Backfill and compact the trench after stapling.

NORTH AMERICAN GREEN
5401 St. Wendel - Cynthiana Rd.
Poseyville, IN 47633
PH: 800-722-2040
www.nagreen.com

Disclaimer:
The information presented herein is general design information only. For specific applications, consult an independent professional for further design guidance.

Drawn on: 5-4-17

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 405
Raleigh, NC 27607
919-468-1101

NORTH CAROLINA BOARD OF EXAMINERS FOR ENGINEERING AND SURVEYING
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
CERTIFICATE OF AUTHORIZATION
C-3881

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE:	REVISION:
1	7/20/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
2	9/4/2024	WAKE COUNTY AND CITY OF RALEIGH
3	11/01/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS:
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
		WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:

KALAS FALLS CIVIL DETAILS

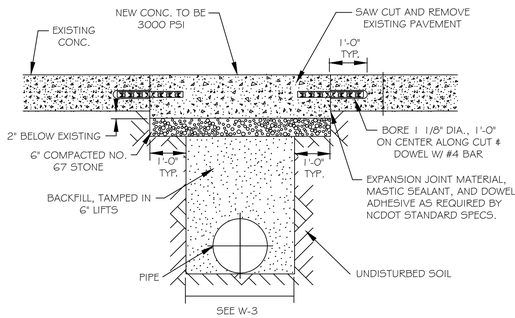
SHEET NO.:

CD5

North Carolina 811 Call Before You Dig
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Updates Property\Final_ Working Dwgs\[Phase 3]Sheet Files\Sheet No.CD1-CD19 Phase 3 Details.dwg

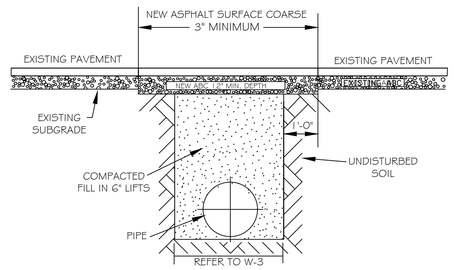
June 6, 2025



NOTES:
1. SEE CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING W-3 FOR ADDITIONAL DETAILS
2. PAVEMENT CUTS WITHIN NCDOT ROW SHALL CONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.
3. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROVED SAW CUT MACHINE.
4. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT. 5. THE FINAL 6" OF FILL SHALL CONSIST OF ABC MATERAIL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT .

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD CONCRETE PAVEMENT PATCH DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-1	RRH	3-31-00	A.B.B.	10-29-10
	A.B.B.	2-8-05	MAB	10-31-13

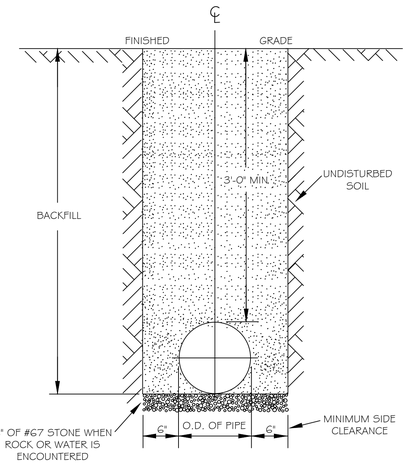


NOTES:

1. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROPRIATE SAW CUT MACHINE.
2. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
3. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT.
4. THE ENTIRE THICKNESS/ VERTICAL EDGE OF CUT SHALL BE TACKED.
5. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 3" THICK.
6. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH LEVEL PATCH.
7. REFER TO CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING, W-3. FOR ADDITIONAL DETAILS.
8. NO HAND PATCHING ALLOWED.
9. PAVEMENT CUTS WITHIN NCDOT ROW SHALL CONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD ASPHALT PAVEMENT PATCH DETAIL

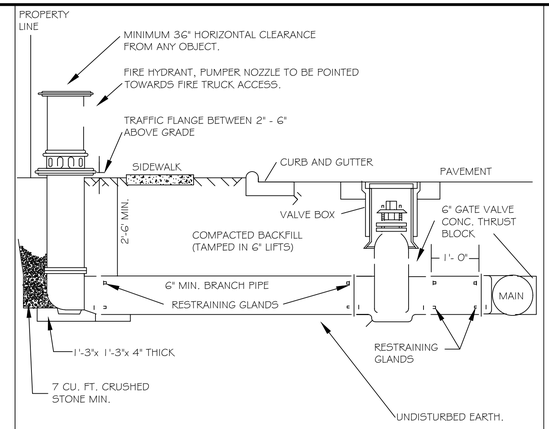
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-2	RRH	3-31-00	A.B.B.	4-16-04
	D.W.C.	11-1-99	J.P.S.	10-29-10



NOTES:
1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4' OR LARGER TO BE USED IN BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS.
5. ACHIEVE 95% COMPACTION IN BACKFILL.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
TRENCH BOTTOM DIMENSIONS & BACKFILLING REQUIREMENTS FOR DUCTILE IRON

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-3	D.W.C.	9-3-99	ABB	2-15-05
	RRH	3-31-00	J.P.S.	10-29-10

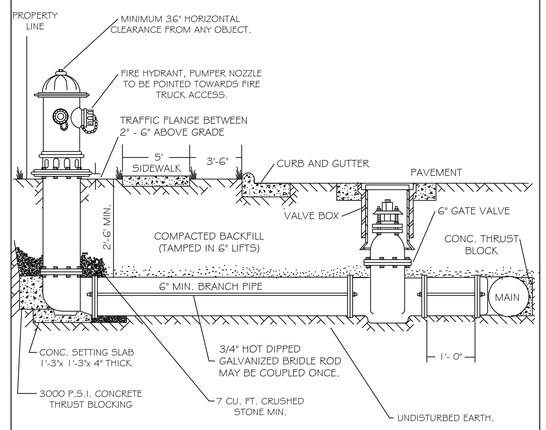


NOTES:
1. FIRE HYDRANT SHALL BE AS MANUFACTURED: MUELLER, AMERICAN DARLING, KENNEDY, M&H, WATEROUS, CLOW, EAST JORDAN IRON WORKS, OR US PIPE.
2. BRANCH PIPE SHALL BE DUCTILE IRON AWWA C150-96
3. 6" GATE VALVE SHALL BE AWWA C500-86 OPEN LEFT
4. STEEL RODS AND BOLTS SHALL BE ¾" HOT DIPPED GALVANIZED
5. FIRE HYDRANTS WILL BE INSTALLED IN TRUE VERTICAL POSITION RODS SHALL NOT BE COUPLED MORE THAN ONCE. IF THE LENGTH FROM THE VALVE TO THE HYDRANT EXCEEDS 20' THEN A MECHANICAL RESTRAINING GLAND WITH A REBAR CAGE SHALL BE INSTALLED NO MORE THAN 10' FROM HYDRANT AND POURED IN CONCRETE. FIRE HYDRANTS TO BE LOCATED IN ROW OR 2 FOOT EASEMENT ADJACENT TO ROW

ANYTIME SITE WORK, CONSTRUCTION, ROAD WORK, OR ANY OTHER WORK CHANGES THE GRADE OF THE FIRE HYDRANT, THE PERSON RESPONSIBLE FOR THE WORK IS RESPONSIBLE FOR ADJUSTING THE FIRE HYDRANT TO STAY WITHIN COMPLIANCE.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD FIRE HYDRANT INSTALLATION DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-4	ABB	4-6-04	PAP	2/17/09
	DHL	2/14/08		

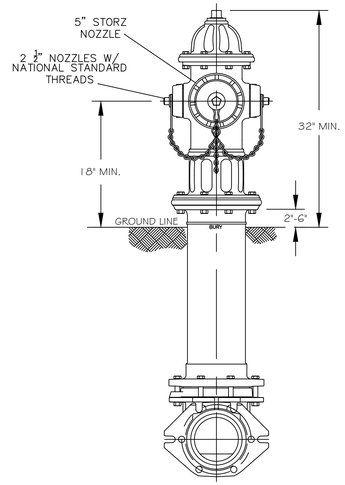


NOTES:
1. FIRE HYDRANT SHALL BE AS MANUFACTURED: MUELLER, AMERICAN DARLING, KENNEDY, M&H, WATEROUS, CLOW, EAST JORDAN IRON WORKS, OR US PIPE.
2. BRANCH PIPE SHALL BE DUCTILE IRON AWWA C150-96
3. 6" GATE VALVE SHALL BE AWWA C500-86 OPEN LEFT
4. STEEL RODS AND BOLTS SHALL BE ¾" HOT DIPPED GALVANIZED
5. FIRE HYDRANTS WILL BE INSTALLED IN TRUE VERTICAL POSITION RODS SHALL NOT BE COUPLED MORE THAN ONCE. IF THE LENGTH FROM THE VALVE TO THE HYDRANT EXCEEDS 20' THEN A MECHANICAL RESTRAINING GLAND WITH A REBAR CAGE SHALL BE INSTALLED NO MORE THAN 10' FROM HYDRANT AND POURED IN CONCRETE. FIRE HYDRANTS TO BE LOCATED IN ROW OR 2 FOOT EASEMENT ADJACENT TO ROW

ANYTIME SITE WORK, CONSTRUCTION, ROAD WORK, OR ANY OTHER WORK CHANGES THE GRADE OF THE FIRE HYDRANT, THE PERSON RESPONSIBLE FOR THE WORK IS RESPONSIBLE FOR ADJUSTING THE FIRE HYDRANT TO STAY WITHIN COMPLIANCE.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD FIRE HYDRANT INSTALLATION DETAIL

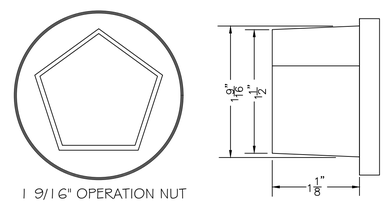
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-4a	ABB	4-6-04		

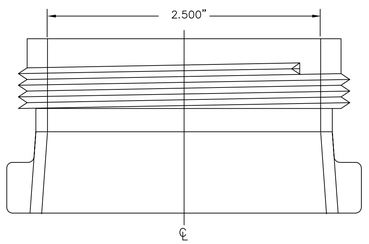


NOTES:
1. ALL PUBLIC FIRE HYDRANTS IN THE CITY OF RALEIGH AND THE MERGER TOWNS OF GARNER, ROLESVILLE, WAKE FOREST, KNIGHTDALE, WENDELL AND ZEBULON SHALL BE PAINTED CHROME YELLOW WITH HIGH REFLECTIVE ALUMINUM SILVER CAPS, BONNETS AND OPERATING NUTS.
2. ALL PRIVATE FIRE HYDRANTS SHALL BE RED.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
RALEIGH, GARNER, KNIGHTDALE, ROLESVILLE, WAKE FOREST, WENDELL & ZEBULON
STANDARD FIRE HYDRANT WITH 5" STORZ PUMPER NOZZLE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-5	MAB	6-30-16		
	KAT	9-15-17		

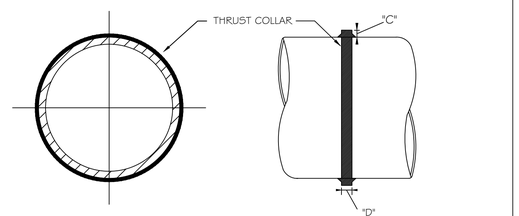


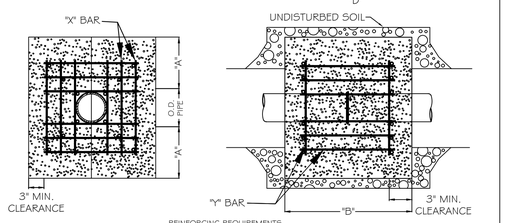


2 1/2" NATIONAL STANDARD OUTLET THREADS

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
HYDRANT OPERATING NUT AND 2 1/2" OUTLET THREADS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-6	RRH	3-31-00	DHL	2-18-08
	A.B.B	4-13-04	J.P.S	11-1-10





REINFORCING REQUIREMENTS

I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"A" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT	NO. REQUIRED
6" - 36"	#5	3'-0"+ O.D. PIPE	1.043 LBS/FT	1'-1"	1.1 LBS. EACH	X-24, Y-12
48" & greater	#6	3'-0"+ O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS. EACH	X-24, Y-12

THRUST COLLAR, AND THRUST SCHEDULE

I.D. PIPE	"A"	"B"	"C"	"D"
6" - 16"	1'-4"	1'-7"	2"	3/8"
20" - 24"	1'-4"	1'-7"	3"	1/2"
30" - 36"	1'-4"	1'-7"	4"	5/8"
48" & greater	1'-8"	1'-9"	6"	7/8"

NOTES:
1. SEE STANDARD DETAIL W-9 FOR THRUST BLOCK LOCATIONS.
2. CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
3. REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
4. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD DETAIL W-3.
5. BACKFILL TAMPED IN 6" LIFTS PER STANDARD DETAIL W-3.
6. THRUST COLLAR MUST BE FACTORY WELDED ON BOTH SIDES ALONG BOTH EDGES OF COLLAR AROUND CIRCUMFERENCE.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
THRUST BLOCKING DESIGN DATA FOR WATER MAINS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-7	RRH	1-21-00	J.P.S.	11-1-10
	D.H.L.	6-18-08		

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811 ncocall811.org
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
2000 Weston Parkway Boulevard, Suite 400-350
Raleigh, NC 27607
919-466-1101

NORTH CAROLINA BOARD OF EXAMINERS FOR ENGINEERING AND SURVEYING CERTIFICATE OF AUTHORIZATION
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS:
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

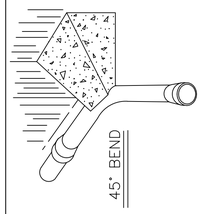
SHEET TITLE:
KALAS FALLS CIVIL DETAILS

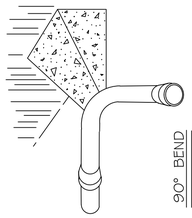
SHEET NO.:
CD6

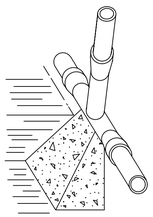
June 6, 2025

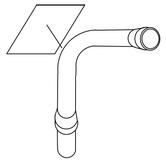
Z:\Jobs\9900\Workfiles\Property\Kalas_Working Dwg\Phase 3\Sheet Files\Sheet No. CD5 CD6 Phase 3 Details.dwg

THRUST BLOCKING









NOTES:
1. CONCRETE SHALL BE 3000 PSI.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO STANDARD DETAIL W-3.
4. SEE STANDARD THRUST BLOCK TABLES, W-10 THRU W-11. FOR AREA OF CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD THRUST BLOCKING VIEWS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-9	D.W.C.	3-1-87	RRH	3-31-00
		9-7-99	D.H.L.	6-18-08

REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS
BASED ON TEST PRESSURE OF 200 P.S.I.

ALL AREAS GIVEN IN SQUARE FEET.

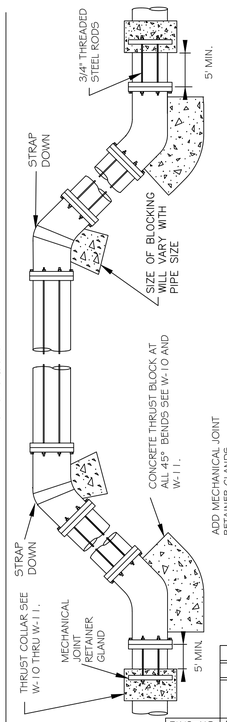
SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY 4000 LBS/FT²	SOFT CLAY 2000 LBS/FT²	1600 LBS/FT² GRAVEL / COARSE SAND	MUCK / SILT / DRY CLAY - ALWAYS DRY	SAND, COMPACT FIRM 8000 LBS/FT²	SAND - CLEAN DRY 4000 LBS/FT²	SOIL 1000 LBS/FT² QUICKSAND - VERY POOR	ROCK - GOOD 10,000 LBS/FT²
6"									
11 1/4°	1,108	1	1	1	1	1	1	2	1
22 1/2°	2,207	1	2	2	1	1	1	3	1
45°	4,328	2	3	3	1	1	2	5	1
90°	7,996	2	4	5	1	1	2	8	1
PLUG	5,655	2	3	4	1	1	2	6	1
8"									
11 1/4°	1,970	1	1	2	1	1	1	2	1
22 1/2°	3,922	1	2	3	1	1	1	4	1
45°	7,694	2	4	5	1	1	2	8	1
90°	14,215	4	8	9	2	2	4	15	2
PLUG	10,053	3	5	6	2	2	3	10	1
12"									
11 1/4°	4,433	2	3	3	1	1	2	5	1
22 1/2°	8,826	3	5	6	2	2	3	9	1
45°	17,312	5	9	11	3	3	5	18	2
90°	31,983	8	16	19	4	4	8	32	4
PLUG	22,619	6	12	14	3	3	6	23	3
16"									
11 1/4°	7,881	2	4	5	1	1	2	8	1
22 1/2°	15,691	4	8	10	2	2	4	16	2
45°	30,779	8	16	19	4	4	8	31	4
90°	56,861	15	29	35	8	8	15	57	6
PLUG	40,213	10	21	25	5	5	10	41	5

REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.

USE 6" - 90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
THRUST BLOCKING DESIGN QUANTITY TABLE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-10	D.W.C.	6-23-99		

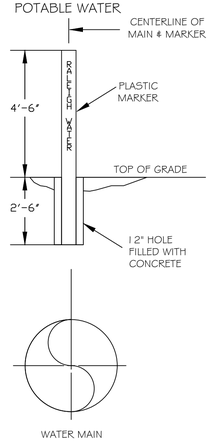


ROD REQUIREMENTS	
SIZE OF 45 BEND	NO. OF RODS REQUIRED
	STATIC THRUST IN POUNDS
6"	2
	4,328
8"	4
	7,694
12"	4
	17,312
16"	8
	30,779
24"	8
	69,252

GENERAL NOTES:
1. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT BENDS.
3. RESTRAINED MECHANICAL GLANDS TO BE USED AT ALL FITTINGS.
4. MUST USE DUCTILE IRON EYE BOLTS WHERE NECESSARY.
5. 3' MINIMUM COVER MUST BE MAINTAINED ON ALL WATER MAINS

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD VERTICAL BEND

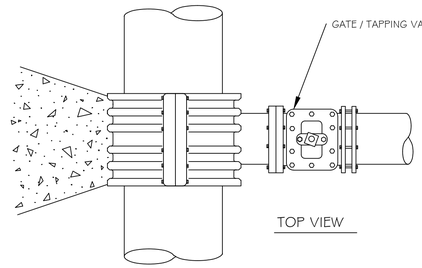
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-12	ABB	4-6-04	J.P.S.	11-1-10
	D.H.L.	6-18-08		



NOTES
1. POTABLE WATER MARKER TO BE BLUE IN COLOR.
2. POTABLE WATER MARKER TO BE LABELED "RALEIGH WATER".
3. TO BE SPACED ALONG CENTERLINE OF MAIN EVERY 300 FEET.
4. MARKERS TO BE ROUND AND 4" IN DIAMETER.

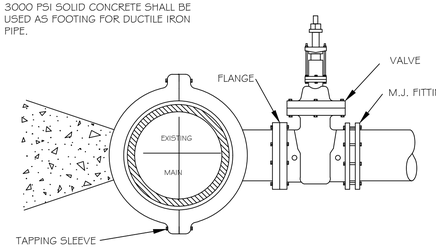
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD MAIN & VALVE MARKERS FOR POTABLE & REUSE WATER IN EASEMENTS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-13	D.W.C.	9-7-99	DHL	8-16-07
	RRH	3-31-00	J.P.S.	11-1-10



TOP VIEW

3000 PSI SOLID CONCRETE SHALL BE USED AS FOOTING FOR DUCTILE IRON PIPE.

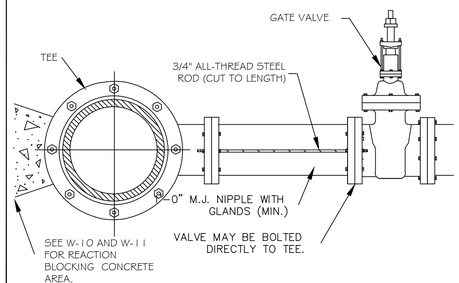


SIDE VIEW

NOTES:
1. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
2. SEE STANDARD REACTION BLOCK TABLES, W-10 AND W-11 FOR AREA OF CONCRETE REQUIRED.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
4" - 24" STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-14	Y.C.A.	12-31-91	RRH	3-31-00
	D.W.C.	9-7-99	J.P.S.	11-1-10

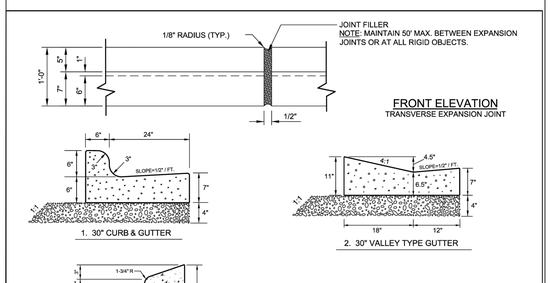


ROD REQUIREMENTS	
NO. OF RODS	BRANCH SIZE
4"	2
6"	2
8"	4
12"	4
16"	6
24"	6
30"	8
36"	8

NOTES:
1. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED.
2. SEE STANDARD THRUST BLOCK, TABLES W-10 AND W-11 FOR CONCRETE.
3. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL FITTINGS.
4. THIS RODDING REQUIREMENT DOES NOT APPLY TO FIRE HYDRANTS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
VALVE RESTRAINT AT TEES AND CROSSES FOR LINES (4"-24")

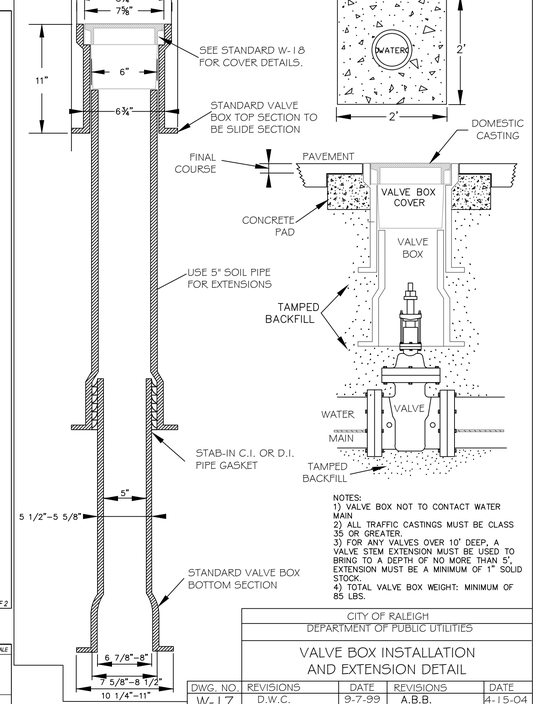
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-15	RRH	3-31-00	D.H.L.	6-16-08
	A.B.B.	4-19-04	J.P.S.	11-1-10



NOTES:
1. 10' MAXIMUM BETWEEN DUMMY JOINTS.
   15' MAXIMUM BETWEEN DUMMY JOINTS ON MACHINE POURS.
2. 1/2" EXPANSION JOINT EVERY 50'.
3. 3000 PSI CONCRETE MINIMUM, 4" SLUMP MAXIMUM.
4. LIQUID MEMBRANE CURING COMPOUND SHALL MEET THE REQUIREMENTS OF SECTION 1026-2 OF NCDOT STANDARDS & SPECIFICATIONS FOR ROADS AND STRUCTURES.
5. ALL CONSTRUCTION JOINTS SHALL BE FILLED WITH JOINT FILLER AND SEALER IN ACCORDANCE WITH NCDOT ROADWAY STANDARD DETAIL 846.01 THE JOINT MATERIAL SHALL CONFORM TO SECTION 1028-2 OF NCDOT STANDARD & SPECIFICATIONS FOR ROADS AND STRUCTURES.
6. REFER TO NCDOT DETAIL 846.01 FOR CURB AND GUTTER SUPERELEVATION RATES.

SHEET 1 OF 2

REVISIONS	DATE: 8/2020	NOT TO SCALE
	CURB AND GUTTER	
	T-10.26.1	



NOTES:
1) VALVE BOX NOT TO CONTACT WATER MAIN
2) ALL TRAFFIC CASTINGS MUST BE CLASS 35 OR GREATER.
3) FOR ANY VALVES OVER 10' DEEP, A VALVE STEM EXTENSION MUST BE USED TO BRING TO A DEPTH OF NO MORE THAN 5', EXTENSION MUST BE A MINIMUM OF 1' SOLID STOCK.
4) TOTAL VALVE BOX WEIGHT: MINIMUM OF 85 LBS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
VALVE BOX INSTALLATION AND EXTENSION DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-17	D.W.C.	9-7-99	A.B.B.	4-15-04
	RRH	3-31-00	DHL	8-16-07

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811 Know what's below. Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 460
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 JOHN R. HARMAN
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

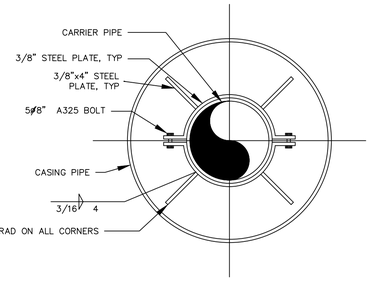
KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
KALAS FALLS
CIVIL DETAILS

SHEET NO.:
CD7

Z:\Jobs\9900\Kalas Property\Civil_Working Dwg\Phase 3\Sheet Files\Sheet No CD3\CD13 Phase 3 Details.dwg June 6, 2025

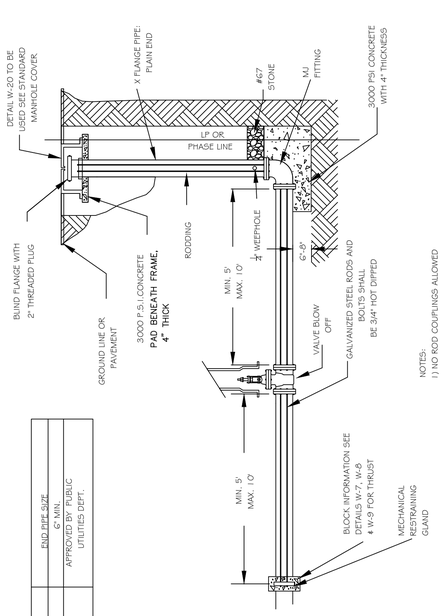


NOTE:

1) USE A MINIMUM OF TWO SPIDERS PER PIPE JOINT ONE FOURTH OF THE PIPE JOINT LENGTH IN FROM BOTH THE BELL AND SPIGOT ENDS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
PIPE ALIGNMENT GUIDE

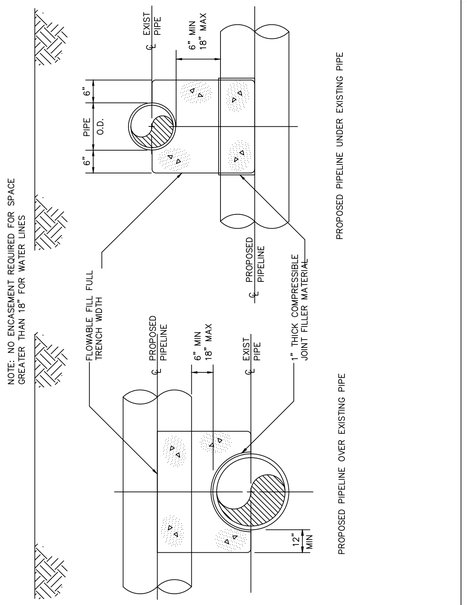
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-40	RRH	3-31-00		
	A.B.B.	4-16-04		



MAIN SIZE	PIPE PIPE SIZE
16" & GREATER	6" MIN.
6" - 12"	APPROVED BY PUBLIC UTILITIES DEPT.

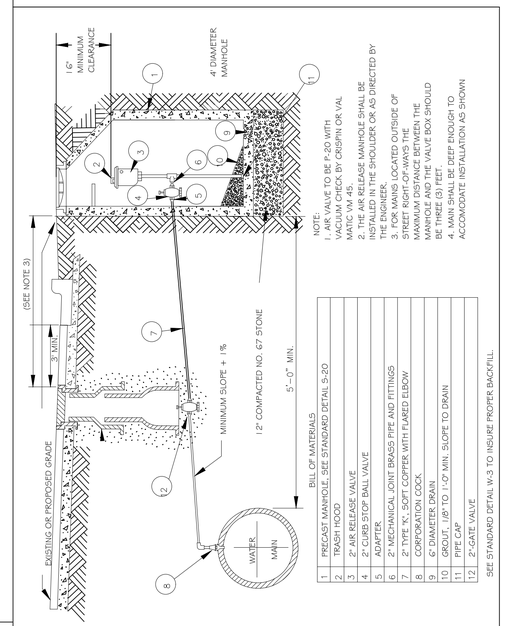
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
TEMPORARY WATER MAIN
BLOW OFF ASSEMBLY

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-21	D.W.C.	12-28-99	A.B.B. ,	4-12-04
	RRH	3-31-00	DHL	8-16-07



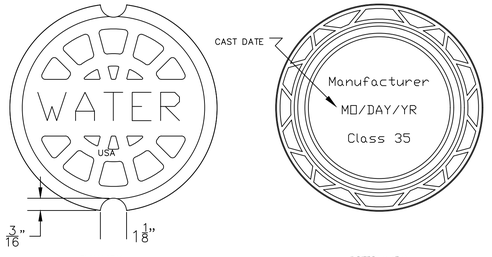
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
CONCRETE CRADLE PROTECTION FOR WATER LINE CROSSINGS

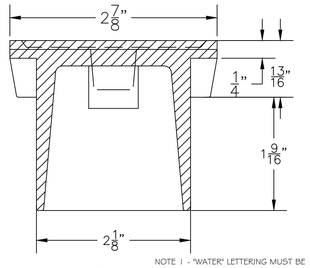
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-41	DHL	2-20-08		



CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD WATER AIR RELEASE VALVE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-19	ABB	10-4-04		2-31-91
	J.P.S.	11-1-10	RRH	6-7-00

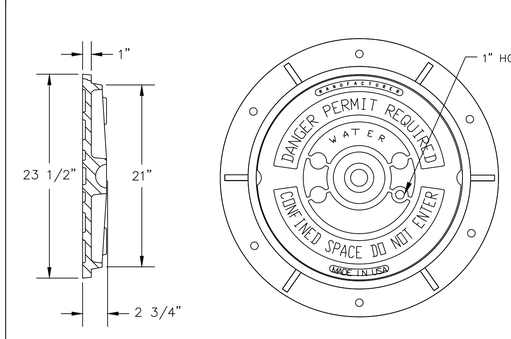


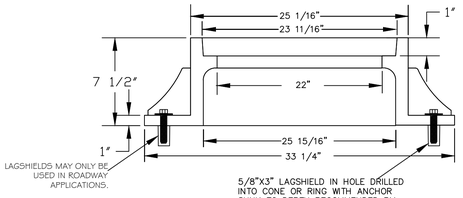


NOTE 1 - "WATER" LETTERING MUST BE 1" RAISED (RECESSED FLUSH)
NOTE 2 - VALVE COVER SHALL BE DOMESTICALLY CAST.
NOTE 3 - COVER MUST HAVE A MINIMUM WEIGHT OF 25 POUNDS.
NOTE 4 - COVER MUST BE CLASS 35 OR GREATER.
NOTE 5 - COVER MUST MEET OR EXCEED AASHTO H-20 LOAD REQUIREMENTS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
5 1/4" VALVE BOX DROP LID WITH 4" SKIRT

DWG. NO.	REVISIONS	DATE		
W-18				



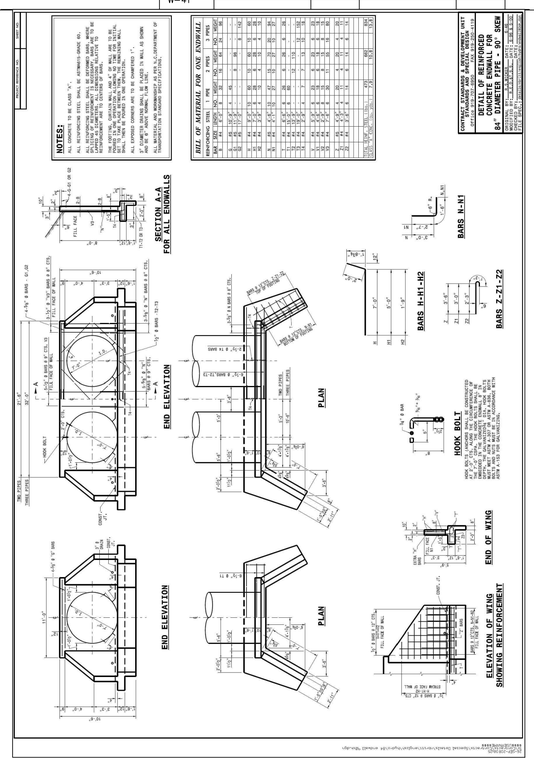


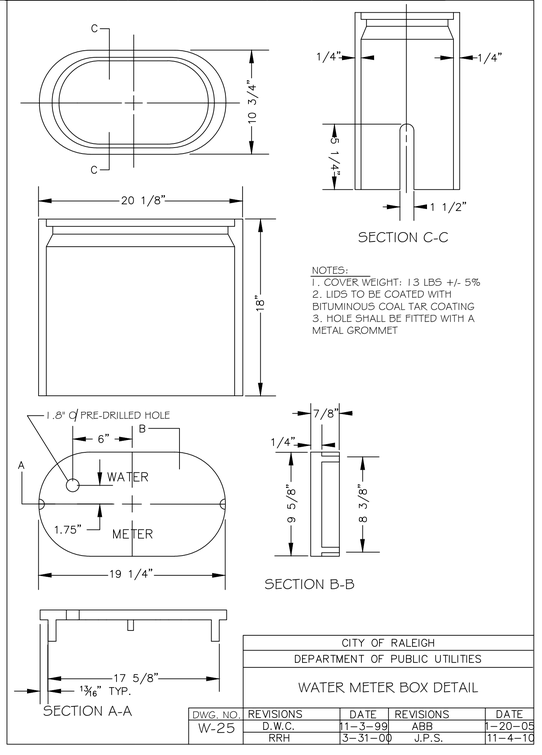
NOTES:

1) ALL MANHOLE FRAMES SHALL BE BE DOMESTICALLY CAST
2) FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS.
3) COVER SHALL WEIGH A MIN. OF 120 LBS.
4) MANHOLES WITHIN PAVED SURFACES SHALL BE CONSTRUCTED IN ACCORDANCE WITH S-29.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD MANHOLE COVER

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-20	A.B.B.	4-8-04		
	D.H.L.	6-18-08		





CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
WATER METER BOX DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-25	D.W.C.	11-3-99	ABB	1-20-05
	RRH	3-31-00	J.P.S.	11-4-10

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811 Know what's below. Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 460
Raleigh, NC 27607
919-469-1101

NOTICE OF LIMITATIONS
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE:	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

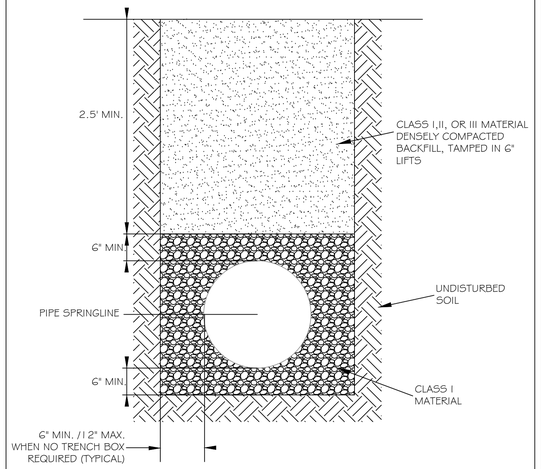
KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

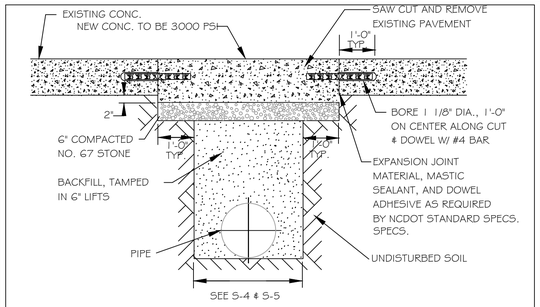
SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD8

Z:\Jobs\9900\Workfiles Property\Final_Working Dwgs\Phase 3\Sheet Files\Sheet No.CD1-CD15 Phase 3 Details.dwg June 6, 2025

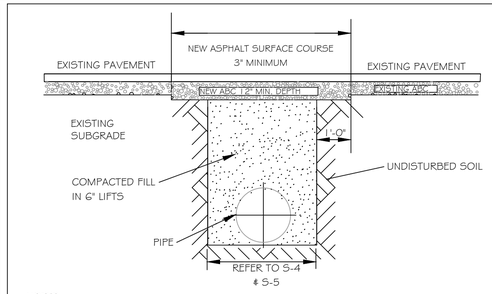


CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD BEDDING DETAILS FOR CCFRPM PIPES				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-1	J.P.S	10-8-10		



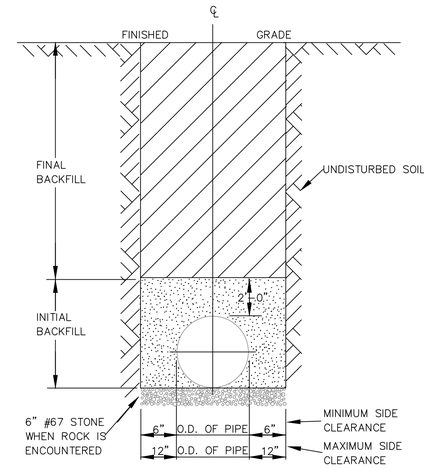
NOTES:
1. See City of Raleigh standards for trenches and pipe bedding (S-4 & S-5) for additional details.
2. Pavement cuts over 5'-0" in width shall be reinforced to N.C.D.O.T. standards.
3. Pavement cuts shall be made with an appropriate saw cut machine.
4. Pavement cuts within NCDOT ROW shall conform to the approved on site encroachment permit.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD CONCRETE PAVEMENT PATCH DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-2	D.W.C.	6-23-99	A.B.B.	4-19-04
	RRH	3-30-00	J.P.S.	10-8-10



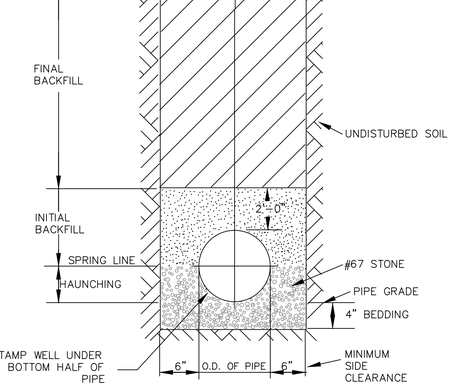
NOTES:
1. IN NCDOT MAINTAINED ROADWAYS ENCROACHMENT PAVEMENT PATCH REQUIREMENTS SHALL TAKE PRECEDENCE.
2. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROPRIATE SAWCUT MACHINE.
3. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
4. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-90 AS MODIFIED BY NCDOT.
5. THE ENTIRE THICKNESS AND VERTICAL EDGE OF CUT SHALL BE TACKED.
6. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 3" THICK.
7. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH LEVEL PATCH.
8. REFER TO CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING (S-4 & S-5) FOR ADDITIONAL DETAILS.
9. NO HAND PATCHING ALLOWED.
10. PAVEMENT CUTS WITHIN NCDOT ROW SHALL CONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD ASPHALT PAVEMENT PATCH DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-3	D.W.C.	11-1-99	A.B.B.	4-19-04
	RRH	3-30-00	J.P.S.	10-8-10



NOTES:
1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.
5. ACHIEVE 80% COMPACTION IN NON-TRAFFIC AREAS, AND 95% COMPACTION IN TRAFFIC AREAS.
6. IF IN EASEMENT 4" TOPSOIL, AND 12" CLEAN SELECT FILL MAY BE REQUIRED.
7. NO BOULDERS 8" IN DIAMETER OR GREATER ALLOWED IN FINAL BACKFILL.

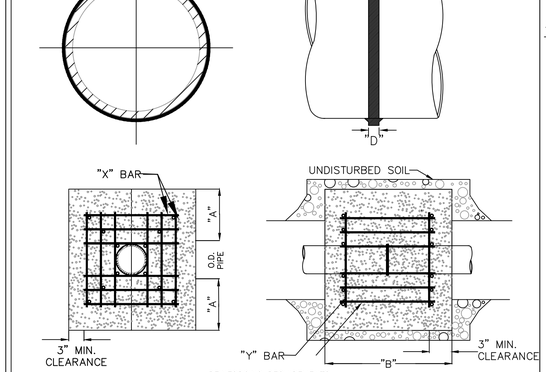
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS & BACKFILLING REQUIREMENTS FOR DUCTILE IRON				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-4	D.W.C.	9-3-99		
	RRH	8-30-00		



TYPICAL TRENCH BOTTOM DIMENSIONS FOR SDR 35 PVC GRAVITY PIPE

NOTES:
1. FOR TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS AND BACKFILLING REQUIREMENTS FOR PVC GRAVITY SEWER MAIN				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-5	TO NOTES	3-1-87	D.W.C.	9-3-99
		7-2-82	RRH	3-30-00



REINFORCING REQUIREMENTS

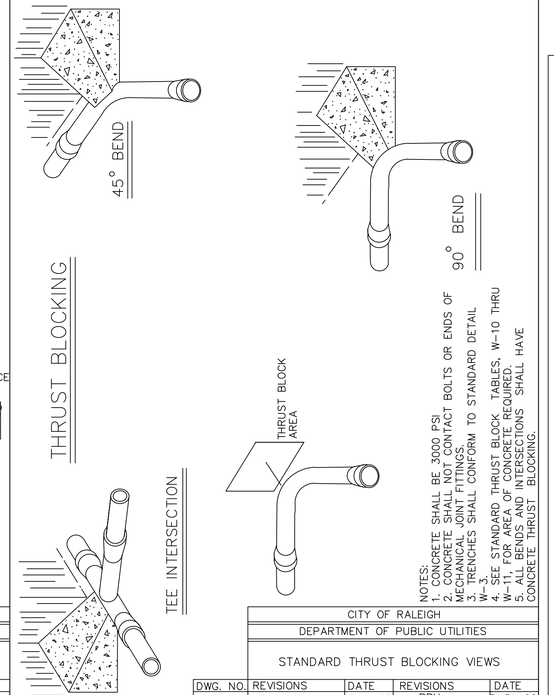
I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT	NO. REQUIRED
6" – 36"	#5	2'-2"+ O.D. PIPE	1.043 LBS/FT	1'-1"	1.1 LBS. EACH	X-24, Y-12
48" & greater	#6	3'-0"+ O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS. EACH	X-24, Y-12

THRUST COLLAR, AND THRUST SCHEDULE

I.D. PIPE	"A"	"B"	"C"	"D"
6" – 16"	1'-4"	1'-7"	2"	3/8"
20" – 24"	1'-4"	1'-7"	3"	1/2"
30" – 36"	1'-4"	1'-7"	4"	5/8"
48" & greater	1'-8"	1'-9"	6"	7/8"

NOTES:
1. CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
2. REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
3. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD DETAIL W-3.
4. BACKFILL TAMPED IN 6" LIFTS PER STANDARD DETAIL W-3.
5. THRUST COLLAR MUST BE FACTORY WELDED ON BOTH SIDES ALONG BOTH EDGES OF COLLAR AROUND CIRCUMFERENCE.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
RESTRAINING COLLAR DESIGN DATA FOR SEWER FORCE MAIN				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-6	RRH		1-21-00	
	D.H.L.		6-18-08	



NOTES:
1. CONCRETE SHALL BE 3000 PSI
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO STANDARD DETAIL W-3.
4. SEE STANDARD THRUST BLOCK TABLES, W-10 THRU W-11, FOR AREA OF CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD THRUST BLOCKING VIEWS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-7		3-1-87	RRH	3-31-00
	D.W.C.	9-7-99	D.H.L.	6-18-08

AERIAL PIPE CROSSING
GENERAL NOTES:

1. ALL MATERIALS UTILIZED ON THESE DETAIL SHEETS SHALL CONFORM TO THE APPROPRIATE SECTIONS OF THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK UNLESS NOTED OTHERWISE HEREIN.
2. RESTRAINED JOINT PIPE AND FITTINGS SHALL CONSIST OF BOLTED RETAINER RINGS AND WELDED RETAINER BARS OR BOLTLESS TYPE WHICH INCLUDE DUCTILE IRON LOCKING SEGMENTS AND RUBBER RETAINERS. BOLTS FOR RESTRAINED JOINTS (IF APPLICABLE) SHALL CONFORM TO ANSI B18.2. RESTRAINED PIPE AND FITTINGS SHALL BE FLEX-RING OR LOK-RING TYPE JOINTS AS MANUFACTURED BY AMERICAN CAST IRON PIPE CO.; TR FLEX AS MANUFACTURED BY US PIPE, SUPER-LOCK AS MANUFACTURED BY CLOW, BOLT-LOK OR SNAP-LOK AS MANUFACTURED BY GRIFFIN PIPE PRODUCTS, OR EQUAL.
3. CONCRETE PROPERTIES SHALL BE AS FOLLOWS:
   CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
   NOMINAL SLUMP = 4 INCHES
   WATER/CEMENTITOUS MATERIALS RATIO = 0.45 (MAX)
   AIR CONTENT = 6% * 1.5%
   CONCRETE SHALL BE COMPOSED OF CEMENT, WATER, COARSE AGGREGATES, FINE AGGREGATES AND AIR. CEMENT SHALL BE TYPE I/II OR II IN ACCORDANCE WITH ASTM C-150. MATERIAL REQUIREMENTS FOR ALL FINE AND COARSE AGGREGATES SHALL CONFORM TO ASTM C-33. COARSE AGGREGATE SHALL BE SIZE No. 57 OR 67. AN APPROVED CLASS 'F' FLYASH MAY BE SUBSTITUTED FOR AN EQUAL AMOUNT OF CEMENT BY WEIGHT UP TO 25%.
4. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4".
5. CONVENTIONAL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 AND SHALL BE PLACED IN ACCORDANCE WITH "RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS" (LATEST EDITION) AS PUBLISHED BY THE CONCRETE REINFORCING INSTITUTE. SPLICES SHALL BE CLASS 'B' CONFORMING TO THE
6. PROVISIONS OF ACI 318 – "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
7. NEOPRENE BEARING PADS SHALL BE FORMED FROM PREVIOUSLY UNVULCANIZED, 100% VIRGIN NEOPRENE, WITH DUROMETER HARDNESS = 50.
   PILES SHALL BE STRUCTURAL STEEL HP12x53 PILES AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36. PILES SHALL BE DRIVEN TO DEPTHS REQUIRED TO OBTAIN AN ULTIMATE BEARING CAPACITY OF NOT LESS THAN TWO TIMES THE DESIGN LOADING OF 30 TONS. PILES SHALL PENETRATE A MINIMUM OF FIFTEEN FEET INTO UNDISTURBED SOIL. IN DRIVING PILES, A METHOD APPROVED BY THE ENGINEER SHALL BE USED WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED. IF REQUESTED BY THE ENGINEER, PILES SHALL BE TESTED TO DETERMINE THE ULTIMATE CAPACITY OF THE PILES. THE METHOD OF LOAD TESTING SHALL CONFORM TO ASTM D1143 AND THE NORTH CAROLINA STATE BUILDING CODE. WHERE PILES ARE EXPOSED, PILES SHALL BE PAINTED AND/OR COATED IN ACCORDANCE WITH THE CITY SPECIFICATIONS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
AERIAL PIPE CROSSING GENERAL NOTES				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-10	D.H.L.	6/16/08		

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.
City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811 811.ncl.net
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4000 Westchase Boulevard, Suite 410
Raleigh, NC 27607
919-469-1101

ROBERT A. CALOIA, JR. AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 NOT VALID WITHOUT ORIGINAL SIGNATURE AND SEAL OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY CDMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

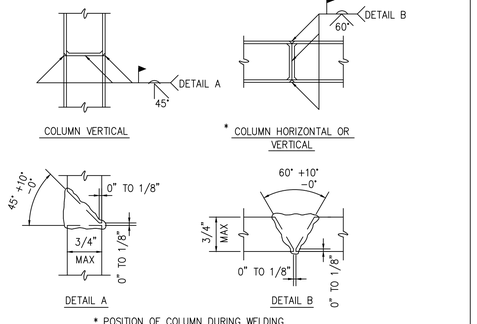
KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

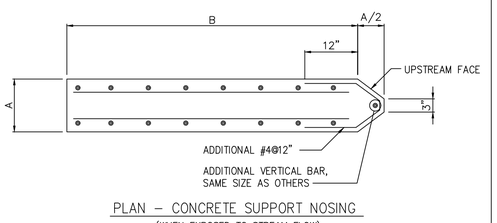
SHEET TITLE:
KALAS FALLS
CIVIL DETAILS

SHEET NO.:
CD9

Z:\Jobs\9900\Wakes Projects\Word_ Working Dwgs\Phase 3\Sheet Files\Sheet No.CD1-CD19-Phase 3 Details.dwg June 6, 2025



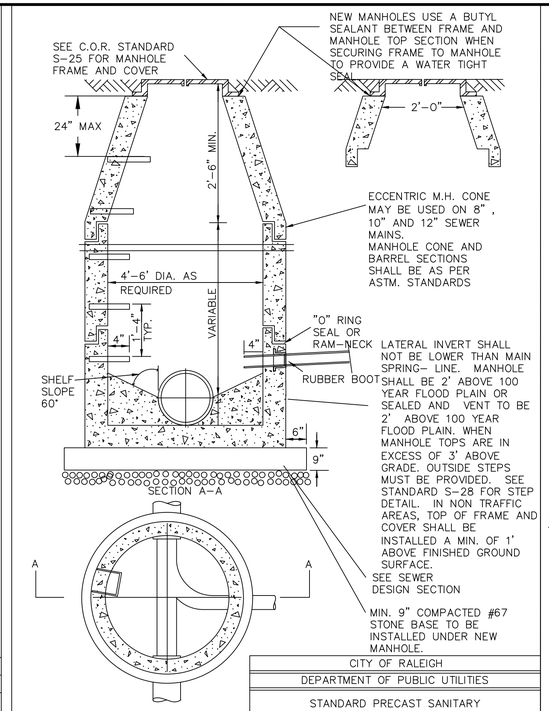
STEEL PILE SPLICE



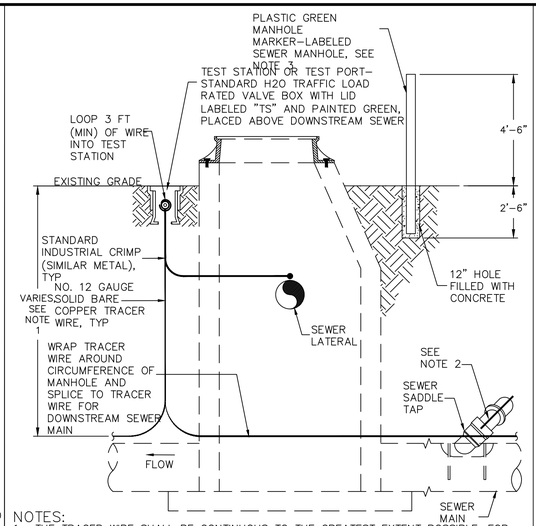
PLAN – CONCRETE SUPPORT NOSING

(WHEN EXPOSED TO STREAM FLOW)

CITY OF RALEIGH			
DEPARTMENT OF PUBLIC UTILITIES			
AERIAL PIPE CROSSING CONCRETE SUPPORT DETAILS			
DWG. NO. S-19	REVISIONS	DATE	REVISIONS DATE
	D.H.L.	6/16/08	



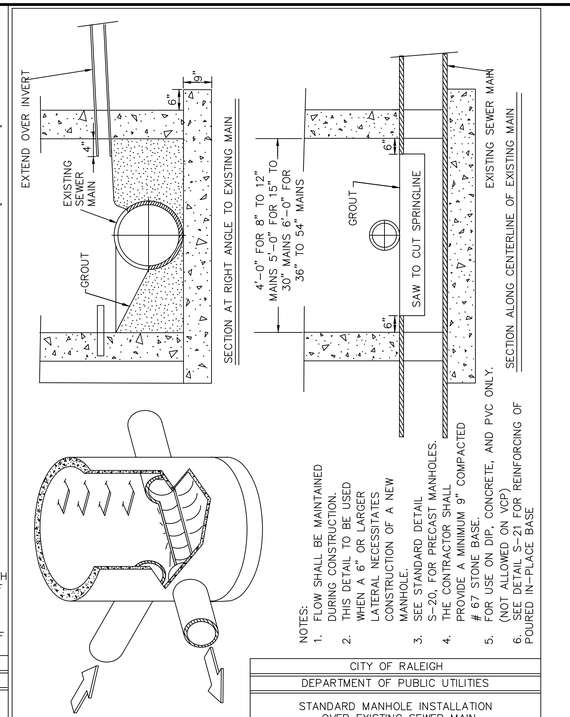
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD PRECAST SANITARY SEWER MANHOLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-20	Y.C.A.	12-31-92	ABB	2-21-05
	RRH	3-30-00	D.H.L.	6-16-08



NOTES:

1. ~~THE~~ TRACER WIRE SHALL BE CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. FOR GRAVITY MAIN AND OR LATERAL INSTALLATIONS LESS THAN 8 FT, THE TRACING WIRE SHALL BE ATTACHED TO THE PIPE. TRACER WIRE SHALL BE LAID FLAT AND SECURELY AFFIXED TO THE PIPE AT 10 FOOT INTERVALS. FOR GRAVITY MAIN AND OR LATERAL INSTALLATION DEEPER THAN 8 FT, THE TRACING WIRE SHALL BE INSTALLED AT A DEPTH OF 7–8 FT. THE WIRE SHALL BE PROTECTED FROM DAMAGE DURING THE EXECUTION OF THE WORK. NO BREAKS OF CUTS IN THE TRACER WIRE SHALL BE PERMITTED.
2. WHERE LATERAL TAPS ARE MADE BY SERVICE SADDLES, THE TRACER WIRE SHALL NOT BE ALLOWED TO TO BE PLACED BETWEEN THE SADDLE AND MAIN.
3. MANHOLE MARKERS SHALL BE PLACED ADJACENT TO MANHOLES AT THE DISCRETION OF OWNER OR OWNER'S REPRESENTATIVE.

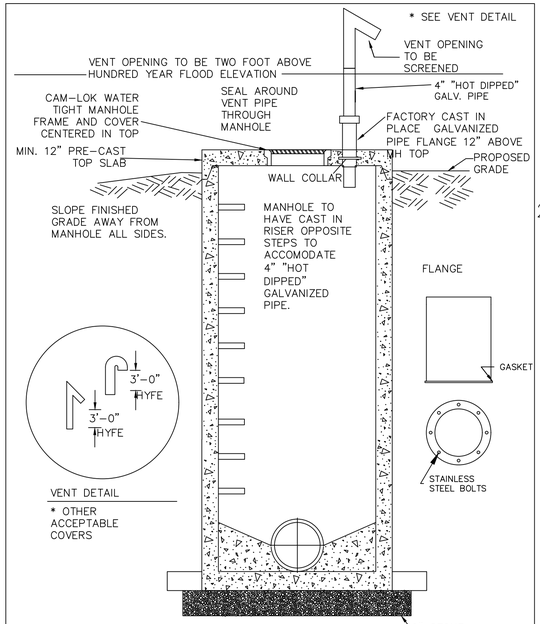
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
GRAVITY SEWER MAIN TRACER WIRE AND MANHOLE MARKER				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-20A	WKD	09-14		



NOTES:

1. FLOW SHALL BE MAINTAINED DURING CONSTRUCTION.
2. THIS DETAIL TO BE USED WHEN A 6" OR LARGER LATERAL NECESSITATES CONSTRUCTION OF A NEW MANHOLE.
3. SEE STANDARD DETAIL S-20, FOR PRECAST MANHOLES.
4. THE CONTRACTOR SHALL PROVIDE A MINIMUM 9" COMPACTED # 67 STONE BASE.
5. FOR USE ON DIP, CONCRETE, AND PVC ONLY. (NOT ALLOWED ON VCP)
6. SEE DETAIL S-21 FOR REINFORCING OF POURED IN-PLACE BASE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE INSTALLATION OVER EXISTING SEWER MAIN				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-22	Y.C.A.	12-31-91	A.B.B.	1-19-05
	RRH	3-30-00	D.H.L.	6/16/08

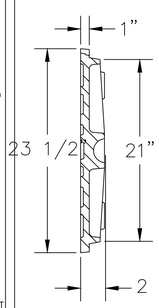


NOTES:

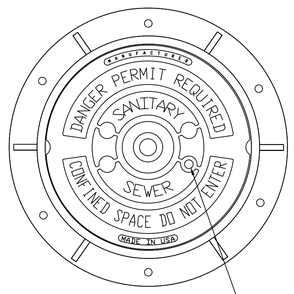
1. VENT MUST BE FACTORY WELDED FABRICATED AND "HOT DIPPED" GALVANIZED.
2.HYFE– Hundred Year Flood elevation

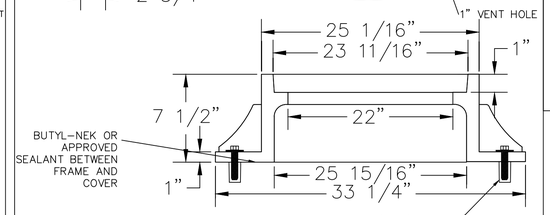
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD SEAL TIGHT MANHOLE WITH VENTED STACK				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-24	D.W.C.	6-7-99	A.B.B.	4-15-04
	RRH	3-30-00	D.H.L.	6/16/08

COVER 120 LBS. MINIMUM



MANHOLE FRAME AND COVER



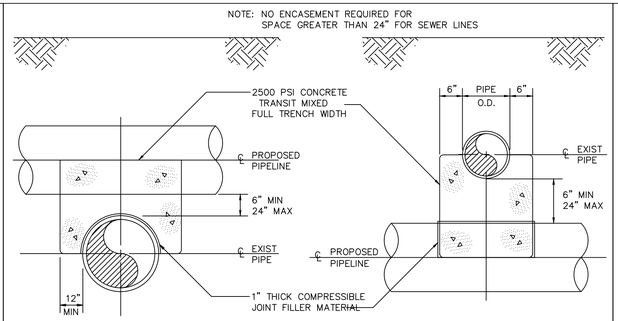


NOTES:

1) ALL MANHOLE FRAMES SHALL BE DOMESTICALLY CAST.
2) FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS. WITHIN PUBLIC ROW AND 160 LBS. WITHIN EASEMENTS.
3) COVER SHALL WEIGH A MIN. OF 120 LBS.
4) ALL MANHOLE FRAMES OUTSIDE OF PAVED SURFACES SHALL BE BOLTED TO THE CONE SECTION OR RING WITH A MINIMUM OF 4 BOLTS PER FRAME.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE COVER				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-25	3-1-87	3-1-87	A.B.B.	2-9-05
	RRH	3-30-00	D.H.L.	6-18-08

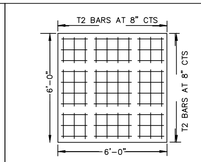
NOTE: NO ENCASEMENT REQUIRED FOR SPACE GREATER THAN 24" FOR SEWER LINES



PROPOSED PIPELINE OVER EXISTING PIPE

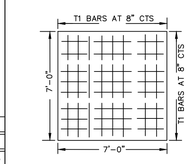
PROPOSED PIPELINE UNDER EXISTING PIPE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
CONCRETE CRADLE PROTECTION FOR SEWER LINE CROSSINGS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-49	DHL	2-20-08		



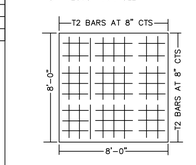
REINFORCED CONC. FOOTING FOR 4" PRECAST MANHOLE

BILL OF MATERIAL FOR 4' MANHOLE				
BAR	SIZE	LENGTH	NO.	WT. LBS.
T2	#5	5'-6"	18	103
CL. "A" CONCRETE TOTAL CU. YDS. 1,000				



REINFORCED CONC. FOOTING FOR 5' PRECAST MANHOLE

BILL OF MATERIAL FOR 4' MANHOLE				
BAR	SIZE	LENGTH	NO.	WT. LBS.
T1	#5	6'-6"	20	136
CL. "A" CONCRETE TOTAL CU. YDS. 1,361				



REINFORCED CONC. FOOTING FOR 6' PRECAST MANHOLE

T1 OR T2 BAR

STRAIGHT BAR

BILL OF MATERIAL FOR 4' MANHOLE				
BAR	SIZE	LENGTH	NO.	WT. LBS.
T2	#5	7'-6"	24	165
CL. "A" CONCRETE TOTAL CU. YDS. 1,778				

* ALL BASES ARE MINIMUM 9" THICK

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
EXTENDED BASE OR CAST-IN-PLACE REINFORCED CONCRETE BASE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-21		3-1-87	ABB	2-9-05
	RRH	3-30-00		

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811 www.811.com

*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates- Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

ALBERT CARSON KING
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
STATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN
		WAKE COUNTY AND CITY
2	9/4/2024	TOWN OF ROLESVILLE CO
3	11/01/2024	CONSTRUCTION DRAWING C
4	3/11/2025	CONSTRUCTION DRAWING C
5	4/28/2025	WAKE COUNTY COMMENT R

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

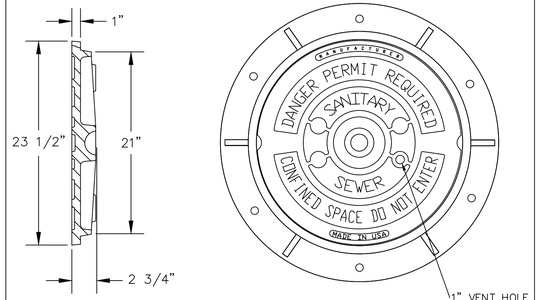
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

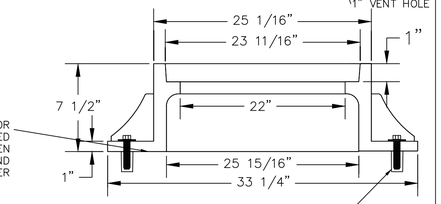
SHEET NO.:
CD10

Z:\Jobs\09900\Wildlife Property\Civil_Working Dwgs\Phase 3\Sheet files\Sheet No CD1-CD19 Phase 3 Details.dwg June 6, 2025

COVER 120 LBS. MINIMUM



MANHOLE FRAME AND COVER

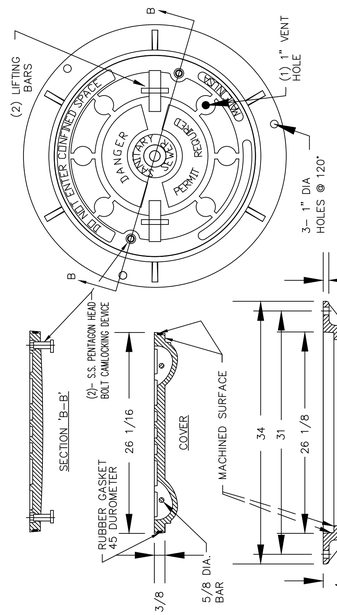


NOTES:
1) ALL MANHOLE FRAMES SHALL BE DOMESTICALLY CAST.
2) FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS. WITHIN PUBLIC ROW AND 160 LBS. WITHIN EASEMENTS.
3) COVER SHALL WEIGH A MIN. OF 120 LBS.
4) ALL MANHOLE FRAMES OUTSIDE OF PAVED SURFACES SHALL BE BOLTED TO THE CONE SECTION OR RING WITH A MINIMUM OF 4 BOLTS PER FRAME.

5/8"X3" LAGSHIELD IN HOLE DRILLED INTO CONE OR RING WITH ANCHOR SUNK TO DESIGN DEPTH, AND 3/8"X3" HOT DIPPED GALVANIZED LAG BOLT AND WASHER.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD MANHOLE COVER

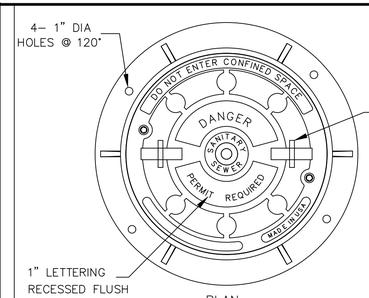
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-25	3-1-87	3-1-87	A.B.B.	2-9-05
	RRH	3-30-00	D.H.L.	6-18-08



Note: solid cover required when water tight manhole specified.

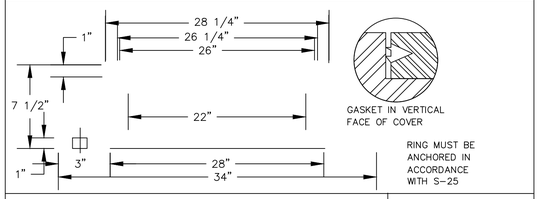
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
FLAT TOP MANHOLE COVER

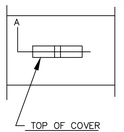
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-25a	3-1-87	3-1-87	A.B.B.	2-9-05
	RRH	3-30-00	D.H.L.	6-18-08



MINIMUM A/G WEIGHT
FRAME 182
COVER 160
TOTAL 342

PLAN





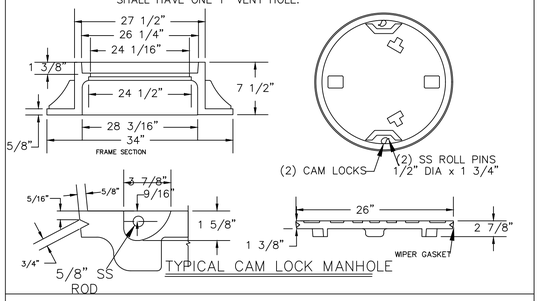
TYPICAL LIFTING DEVICE

5/8" ø STAINLESS STEEL ROD
SECTION A

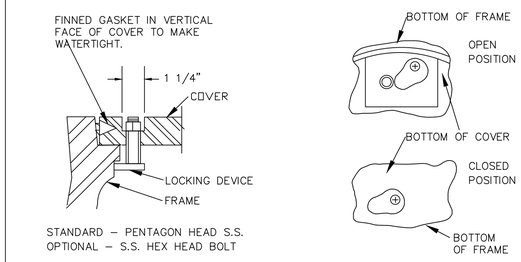
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
MANHOLE FRAME AND WATERTIGHT COVER

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-26	3-1-87	3-1-87	ABB	8-29-05
	RRH	3-30-00	D.H.L.	6/18/08

NOTE: WHEN WATERTIGHT NOT SPECIFIED, TOP SHALL SHALL HAVE ONE 1" VENT HOLE.



TYPICAL CAM LOCK MANHOLE

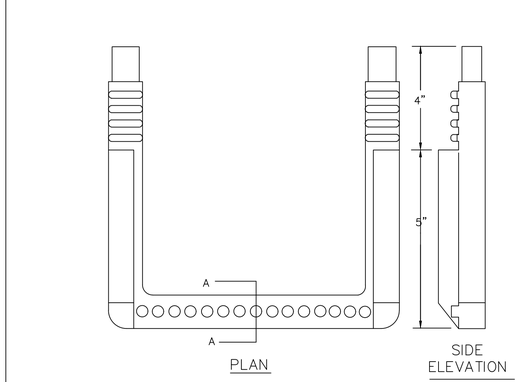


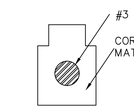
TYPICAL LOCKING DEVICE

RING MUST BE ANCHORED IN ACCORDANCE WITH S-25

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
WATER-TIGHT MANHOLE FRAME WITH CAM LOCK COVER

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-27	RRH	3-30-00		
	DHL	6-18-08		

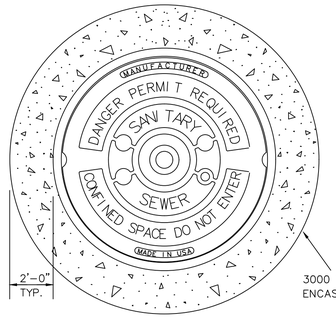




SECTION A - A

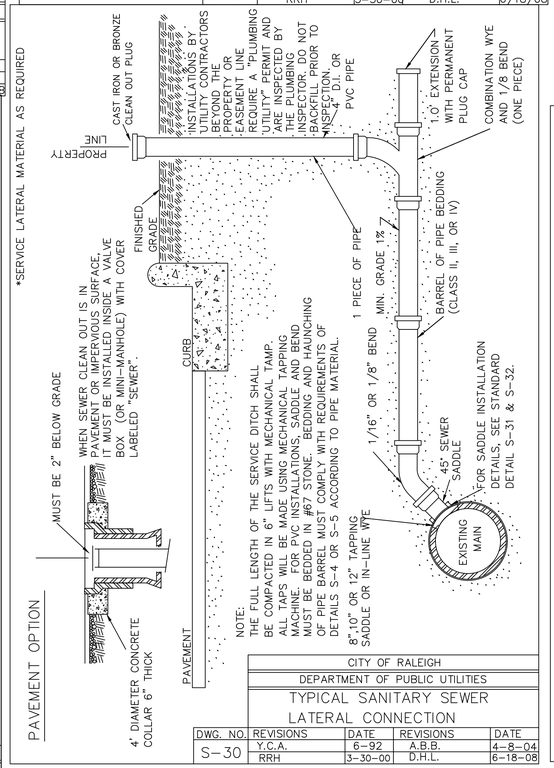
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD SLIP RESISTANT MANHOLE STEP DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-28	RRH	3-30-00		



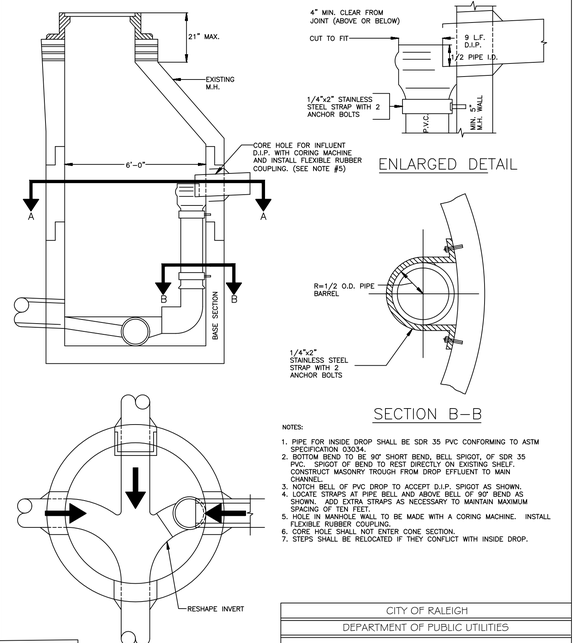
CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD MANHOLE FRAME AND COVER DETAIL WITHIN PAVED SURFACES

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-29	Y.C.A.	12-31-91	ABB	9-20-04
	RRH	3-30-00	DHL	11-29-07



CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
TYPICAL SANITARY SEWER LATERAL CONNECTION

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-30	Y.C.A.	6-92	A.B.B.	4-8-04
	RRH	3-30-00	D.H.L.	6-18-08



NOTES:
1. PIPE FOR INSIDE DROP SHALL BE SDR 35 PVC CONFORMING TO ASTM SPECIFICATION D3034.
2. BOTTOM BEND TO BE 90° SHORT BEND, BELL SPIGOT, OF SDR 35 PVC. SPIGOT OF BEND TO REST DIRECTLY ON EXISTING SHELF. CONSTRUCT MASONRY TROUGH FROM DROP EFFLUENT TO MAIN CHANNEL.
3. NOTCH BELL OF PVC DROP TO ACCEPT D.I.P. SPIGOT AS SHOWN.
4. LOCATE STRAPS AT PIPE BELL AND ABOVE BELL OF 90° BEND AS SHOWN. ADD EXTRA STRAPS AS NECESSARY TO MAINTAIN MAXIMUM SPACING OF TEN FEET.
5. HOLE IN MANHOLE WALL TO BE MADE WITH A CORING MACHINE. INSTALL FLEXIBLE RUBBER COUPLING.
6. CORE HOLE SHALL NOT ENTER CONE SECTION.
7. STEPS SHALL BE RELOCATED IF THEY CONFLICT WITH INSIDE DROP.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
INSIDE DROP MANHOLE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-53	MAB	11-6-13		

Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit #_____

Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # _____

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4021 University Boulevard, Suite 400
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA BOARD OF EXAMINERS FOR ENGINEERING AND SURVEYING
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/27/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

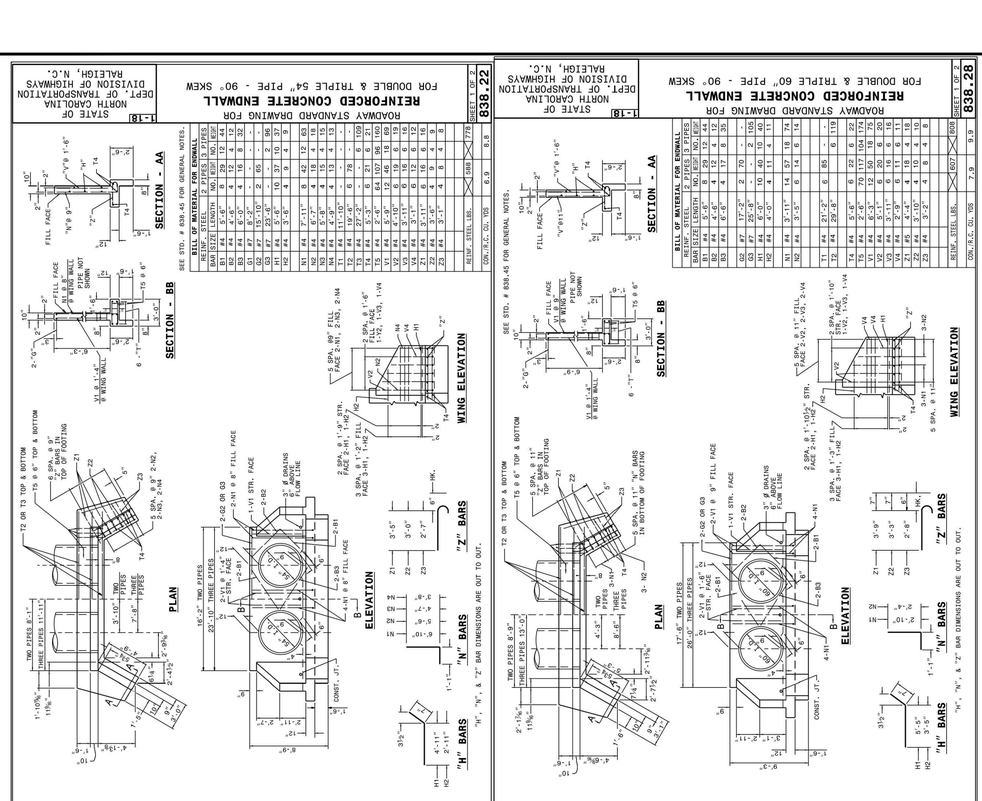
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

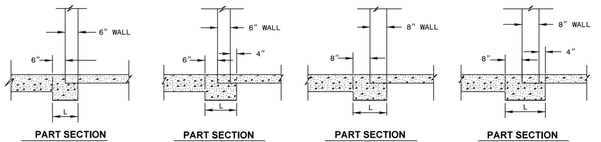
SHEET TITLE:
KALAS FALLS CIVIL DETAILS

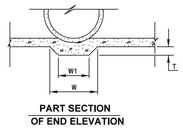
SHEET NO.:
CD11

June 6, 2025

Z:\Jobs\9900\Workfiles Property\Dwg_Working Dwgs\Phase 3\Sheet Files\Sheet No.CD1-CD19 Phase 3 Details.dwg


ROADWAY STANDARD DRAWING FOR
REINFORCED CONCRETE ENDWALL
FOR DOUBLE & TRIPLE 64" PIPE - 90° SKEW
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.22
SHEET 1 OF 2
SEE STD. # 838.45 FOR GENERAL NOTES.
BILL OF MATERIAL FOR ENDWALL
2 PIPES 3 PIPES
REINF. STEEL 1 PIPE
BAR SIZE LENGTH NO. WT. NO. WT.
B1 #4 4'-6" 4 12 6 18
B2 #4 4'-6" 4 12 6 18
B3 #7 8'-3" 2 32 2 32
G1 #7 15'-10" 2 65 - -
G2 #7 17'-3" 2 70 - -
G3 #7 25'-8" - - 2 105
H1 #4 6'-0" 10 40 10 40
H2 #4 4'-9" 4 13 4 13
N1 #4 7'-11" 8 42 12 63
N2 #4 5'-6" 4 9 6 9
T1 #4 12'-8" 6 51 6 51
T2 #4 29'-8" - - 6 119
T3 #4 21'-2" 6 85 - -
T4 #4 5'-6" 6 22 6 22
T5 #4 2'-6" 70 117 104 174
V1 #4 6'-3" 12 50 18 75
V2 #4 3'-11" 6 16 6 16
V3 #4 3'-11" 6 16 6 16
V4 #4 2'-9" 6 11 6 11
Z1 #5 4'-4" 4 18 4 18
Z2 #4 3'-10" 4 10 4 10
Z3 #4 3'-2" 4 8 4 8
REINF. STEEL LBS. 588 778 697 998
CON./R.C. CU. YDS 0.9 8.8 0.9 9.9
SECTION - AA
SECTION - BB
PLAN
ELEVATION
WING ELEVATION
"H" BARS
"N" BARS
"Z" BARS
"H", "N", & "Z" BAR DIMENSIONS ARE OUT TOT OUT.
ROADWAY STANDARD DRAWING FOR
REINFORCED CONCRETE ENDWALL
FOR DOUBLE & TRIPLE 60" PIPE - 90° SKEW
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.28
SHEET 1 OF 2
SEE STD. # 838.45 FOR GENERAL NOTES.
BILL OF MATERIAL FOR ENDWALL
2 PIPES 3 PIPES
REINF. STEEL 1 PIPE
BAR SIZE LENGTH NO. WT. NO. WT.
B1 #4 5'-6" 8 29 12 44
B2 #4 4'-6" 4 12 6 18
B3 #4 6'-6" 4 17 8 33
G1 #7 15'-10" 2 65 - -
G2 #7 17'-3" 2 70 - 105
G3 #7 25'-8" - - 2 105
H1 #4 6'-0" 10 40 10 40
H2 #4 4'-9" 4 13 4 13
N1 #4 7'-11" 8 42 12 63
N2 #4 5'-6" 4 9 6 9
T1 #4 12'-8" 6 51 6 51
T2 #4 29'-8" - - 6 119
T3 #4 21'-2" 6 85 - -
T4 #4 5'-6" 6 22 6 22
T5 #4 2'-6" 70 117 104 174
V1 #4 6'-3" 12 50 18 75
V2 #4 3'-11" 6 16 6 16
V3 #4 3'-11" 6 16 6 16
V4 #4 2'-9" 6 11 6 11
Z1 #5 4'-4" 4 18 4 18
Z2 #4 3'-10" 4 10 4 10
Z3 #4 3'-2" 4 8 4 8
REINF. STEEL LBS. 697 998
CON./R.C. CU. YDS 0.9 9.9
SECTION - AA
SECTION - BB
PLAN
ELEVATION
WING ELEVATION
"H" BARS
"N" BARS
"Z" BARS
"H", "N", & "Z" BAR DIMENSIONS ARE OUT TO OUT.
GENERAL NOTES:
CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".
PLACE 2 #6 "V" BARS IN THE TOP OF ALL ENDWALL FOR PIPE CULVERTS 42" AND OVER WITH A MINIMUM OF 3" COVER AND A LENGTH OF 6" LESS THAN ENDWALL LENGTH.
CONSTRUCT BOTTOM SLAB WITH FORMS.
DO NOT INTERPRET WALL THICKNESS (T) SHOWN FOR THE THICKNESS ACCEPTABLE, BUT IS USED IN COMPUTING ENDWALL QUANTITIES.
WHEN THE CONTRACTOR ELECTS TO USE A CONSTRUCTION JOINT AT THE BOTTOM OF THE PIPE, PLACE BAR "X" DOWELS IN THE BASE AS SHOWN ON PLANS. SPACE BARS APPROXIMATELY ON 12" CENTERS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
WHEN THE CONTRACTOR ELECTS TO USE A CONSTRUCTION JOINT AT THE BOTTOM OF THE PIPE AND POUR THE BASE SEPARATELY LEAVE THE POUR ROUGH.
USE CLASS "B" CONCRETE.
ROADWAY STANDARD DRAWING FOR
CONCRETE ENDWALL AND DOUBLE PIPE CULVERTS
15" THRU 48" PIPE - 90° SKEW
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.01
SHEET 3 OF 4
ROADWAY STANDARD DRAWING FOR
REINFORCED CONCRETE ENDWALL
FOR SINGLE 60" PIPE - 90° SKEW
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.27
SHEET 1 OF 2
SEE STD. # 838.45 FOR GENERAL NOTES.
BILL OF MATERIAL FOR ENDWALL
1 PIPE
REINF. STEEL
BAR SIZE LENGTH NO. WT.
B1 #4 5'-6" 4 15
B2 #4 4'-6" 4 12
B3 #4 6'-6" 4 17
G1 #7 8'-3" 2 32
G2 #7 17'-3" 2 70
G3 #7 25'-8" - -
H1 #4 6'-0" 10 40
H2 #4 4'-9" 4 13
N1 #4 7'-11" 10 41
N2 #4 5'-6" 6 14
T1 #4 12'-8" 6 51
T2 #4 29'-8" - -
T3 #4 21'-2" - -
T4 #4 5'-6" 6 22
T5 #4 2'-6" 70 117
V1 #4 6'-3" 12 50
V2 #4 3'-11" 6 16
V3 #4 3'-11" 6 16
V4 #4 2'-9" 6 11
Z1 #5 4'-4" 4 18
Z2 #4 3'-10" 4 10
Z3 #4 3'-2" 4 8
REINF. STEEL LBS. 409
CON./R.C. CU. YDS 5.6
SECTION - AA
SECTION - BB
PLAN
ELEVATION
WING ELEVATION
"H" BARS
"N" BARS
"Z" BARS
"H", "N", & "Z" BAR DIMENSIONS ARE OUT TO OUT.
ROADWAY STANDARD DRAWING FOR
REINFORCED CONCRETE ENDWALL
FOR SINGLE 60" PIPE - 90° SKEW
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.27
SHEET 2 OF 2
SEE STD. # 838.45 FOR GENERAL NOTES.
BILL OF MATERIAL FOR ENDWALL
1 PIPE
REINF. STEEL
BAR SIZE LENGTH NO. WT.
B1 #4 5'-6" 4 15
B2 #4 4'-6" 4 12
B3 #4 6'-6" 4 17
G1 #7 8'-3" 2 32
G2 #7 17'-3" 2 70
G3 #7 25'-8" - -
H1 #4 6'-0" 10 40
H2 #4 4'-9" 4 13
N1 #4 7'-11" 10 41
N2 #4 5'-6" 6 14
T1 #4 12'-8" 6 51
T2 #4 29'-8" - -
T3 #4 21'-2" - -
T4 #4 5'-6" 6 22
T5 #4 2'-6" 70 117
V1 #4 6'-3" 12 50
V2 #4 3'-11" 6 16
V3 #4 3'-11" 6 16
V4 #4 2'-9" 6 11
Z1 #5 4'-4" 4 18
Z2 #4 3'-10" 4 10
Z3 #4 3'-2" 4 8
REINF. STEEL LBS. 409
CON./R.C. CU. YDS 5.6
SECTION - AA
SECTION - BB
PLAN
ELEVATION
WING ELEVATION
"H" BARS
"N" BARS
"Z" BARS
"H", "N", & "Z" BAR DIMENSIONS ARE OUT TOT OUT.
ROADWAY STANDARD DRAWING FOR
NOTES FOR REINFORCED CONCRETE ENDWALL
STANDARD DRAWINGS 838.21 THRU 838.40
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.45
SHEET 1 OF 1
GENERAL NOTES:
USE CLASS "A" CONCRETE.
CHAMFER ALL EXPOSED CORNERS 1".
ALL DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING STEEL ARE TO CENTERS OF BARS.
PLACE A STONE DRAIN CONSISTING OF ONE (1) CUBIC FOOT OF NUMBER 78M STONE CONTAINED IN A POROUS FABRIC AT EACH WEEP HOLE. PLACE SUBDRAIN FINE AGGREGATE BENEATH, AROUND AND OVER THE STONE DRAIN SO THAT THE STONE DRAIN IS COMPLETELY ENCLOSED BY SUBDRAIN FINE AGGREGATE AT LEAST ONE (1) FOOT THICK. WHERE THERE IS MORE THAN ONE WEEP HOLE IN A WING WALL, PLACE A HORIZONTAL DRAIN OF SUBDRAIN FINE AGGREGATE AT LEAST ONE (1) FOOT SQUARE IN CROSS SECTION TO CONNECT ALL STONE DRAINS. PLACE A VERTICAL DRAIN OF SUBDRAIN FINE AGGREGATE AT LEAST ONE (1) FOOT SQUARE IN CROSS SECTION AT EACH WEEP HOLE TO AN ELEVATION OF TWO (2) FEET BELOW THE SURFACE OF THE EMBANKMENT.
TAPER DETAIL
WING ELEVATION
"H" BARS
"N" BARS
"Z" BARS
"H", "N", & "Z" BAR DIMENSIONS ARE OUT TO OUT.
2'X'2 GRATE
NEENAH R-3210-Q OR APPROVED EQUAL
LIFT LOOPS
PRECAST CONCRETE BASE & RISERS TO BE 4,000 PSI @ 28 DAYS
RCP STORM PIPE (SEE PIPING SUMMARY CHART ON SHEET 3.1)
TO SUIT
6" TYP.
4'
3' X 3' DROP INLET
SCALE: 1" = 1'
ROADWAY STANDARD DRAWING FOR
PRECAST CONCRETE ENDWALL
FOR SINGLE 12" THRU 72" PIPE - 90° SKEW
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
1-18
838.80
SHEET 1 OF 1
NOTES:
THIS PRECAST ENDWALL MAY BE USED FOR THE FOLLOWING STANDARD DRAWINGS: 838.21, 838.22, 838.24, 838.39, 838.51, 838.27, 838.63 AND 838.69.
ALL CONCRETE SHALL BE CLASS A (3,000 PSI) AT 28 DAYS FOR IN ACCORDANCE WITH SPECIFICATION SECTION 838.
USE 4000 PSI CONCRETE.
ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A185 FOR PIPES IN ACCORDANCE WITH PLACEMENT DETAILS.
ROCK SHALL BE PLACED IN ACCORDANCE WITH ROCK RIPRAP GROUTED INTO HEXAMALL AT JOB SITE BY CONTRACTOR
ALL ELEMENTS PRECAST TO MEET ASTM C913
ALL REINFORCING STEEL SHALL BE EPOXY COATED REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".
NOTE: THE MINIMUM BAR SIZE SHALL BE #3 BARS AT 8". ITS THE CONTRACTOR WILL HAVE THE OPTION TO INCREASE THIS BAR SIZE AS NEEDED.
ENDWALL DIMENSIONS
PIPE DIA. | FT. | MIN/MAX H1 (FT.) | MIN/MAX W1 (FT.) | MIN/MAX W2 (FT.) | MIN/MAX T (IN.) | MIN/MAX D (IN.)
1.0 | #5 @ 8" | 1.25/2.00 | 2.00/3.75 | 1.25/1.75 | 3.00/3.75 | 5.50/6.00
1.25 | #5 @ 8" | 1.25/2.00 | 3.00/3.75 | 1.25/2.00 | 3.50/3.75 | 6.50/6.75
1.50 | #5 @ 8" | 1.25/2.00 | 3.00/4.25 | 1.50/2.50 | 3.50/3.75 | 6.50/6.75
2.0 | #5 @ 8" | 1.50/2.50 | 4.00/4.75 | 1.75/2.50 | 4.00/4.25 | 7.50/8.25
2.5 | #5 @ 8" | 2.50/3.50 | 4.00/6.00 | 2.00/3.00 | 4.50/5.50 | 10.00/11.50
3.0 | #5 @ 8" | 3.00/3.50 | 5.00/6.00 | 2.75/3.50 | 5.25/5.75 | 11.50/11.75
3.5 | #5 @ 8" | 3.25/4.50 | 6.00/6.75 | 3.25/3.50 | 6.00/6.75 | 12.00/13.25
4.0 | #5 @ 8" | 3.50/4.50 | 6.00/7.50 | 3.25/4.00 | 6.50/7.25 | 13.00/14.25
4.5 | #5 @ 8" | 4.00/5.00 | 6.50/8.50 | 3.25/4.00 | 7.00/9.25 | 13.50/15.75
5.0 | #5 @ 8" | 4.50/5.00 | 7.00/8.50 | 3.25/4.00 | 7.25/9.25 | 13.75/15.75
5.5 | #5 @ 8" | 4.50/5.00 | 7.50/8.50 | 3.25/4.00 | 7.25/9.25 | 14.00/15.75
6.0 | #5 @ 8" | 4.50/5.00 | 7.50/8.50 | 3.25/4.00 | 7.75/9.25 | 14.75/16.75
SIDE
ELEVATION
PLAN
8" O.C.(TYP.) REFER TO CHART FOR BAR SIZE
CSI/RCP
W1 (FT.)
W2 (FT.)
H1
H2
D
T
AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4917 Waters Edge Boulevard, Suite 400
Raleigh, NC 27606
919-468-1101
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 JOHN R. HARMAN
DETAIL SELECTION ONLY
NO. | DATE | REVISION:
1 | 7/27/2021 | 1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, CITY OF RALEIGH
2 | 9/4/2024 | WAKE COUNTY AND CITY OF RALEIGH
3 | 11/01/2024 | TOWN OF ROLESVILLE CONSULTANT COMMENTS.
4 | 3/11/2025 | CONSTRUCTION DRAWING COMMENT RESPONSES
5 | 4/28/2025 | CONSTRUCTION DRAWING COMMENT RESPONSES
WAKE COUNTY COMMENT RESPONSES
STIPULATION FOR REUSE
THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HERON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON, AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.
KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC
JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024
SHEET TITLE:
KALAS FALLS
CIVIL DETAILS
SHEET NO.:
CD12
North Carolina 811
811 or 1-800-632-4949
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm
Z:\Jobs\9900\Workdirs Property\Civil_Working Dwgs\Phase 3\Sheet Files\Sheet No CD1-CD19 Phase 3 Details.dwg
June 6, 2025





GENERAL NOTES:
USE THIS STANDARD WITH ALL DRAINAGE STRUCTURES
USING REINFORCED CONCRETE PIPE SET IN BASE SLAB.

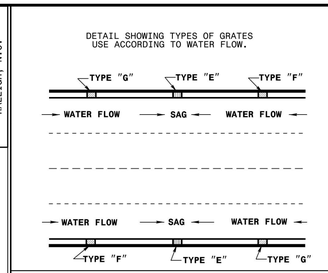
TABLES OF QUANTITIES FOR PIPE SET IN PAD

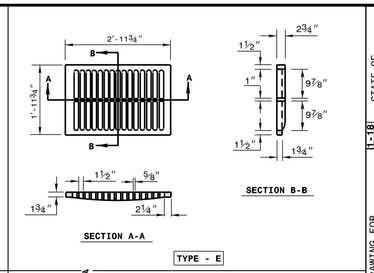
PIPE	"W"	"W1"	"T"	C.Y. QUANTITIES WHEN L IS		
D	DIM	DIM	DIM	12"	16"	20"
12"	1'-1 7/8"	0'-7 5/8"	0'-2"	0.005	0.007	0.008
15"	1'-3 5/8"	0'-9 1/8"	0'-2"	0.006	0.008	0.010
18"	1'-5 1/4"	0'-10 3/8"	0'-2"	0.007	0.010	0.012
24"	1'-8 3/4"	1'-0 1/8"	0'-3"	0.011	0.014	0.018
30"	2'-0 1/4"	1'-2 3/4"	0'-3 1/2"	0.014	0.018	0.023
36"	2'-3 3/4"	1'-5 3/8"	0'-4"	0.017	0.023	0.025
42"	2'-7 1/8"	1'-7"	0'-5 1/4"	0.025	0.030	0.038
48"	2'-10 3/8"	1'-8 3/4"	0'-5 3/4"	0.028	0.038	0.047
54"	3'-1 5/8"	1'-10 1/2"	0'-6 1/4"	0.035	0.047	0.058
60"	3'-5 5/8"	2'-0 1/4"	0'-6 3/4"	0.042	0.056	0.071
66"	3'-9"	2'-2 1/4"	0'-7 1/4"	0.050	0.067	0.084
72"	4'-0 1/2"	2'-3 3/4"	0'-7 3/4"	0.059	0.078	0.098

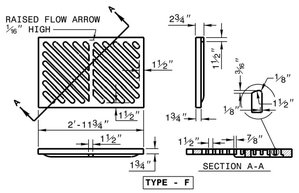
1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

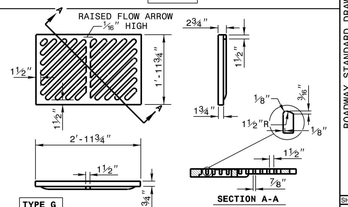
ROADWAY STANDARD DRAWING FOR
CONCRETE BASE PAD FOR DRAINAGE STRUCTURES

SHEET 1 OF 1
840.00





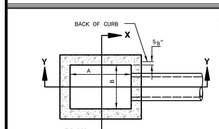


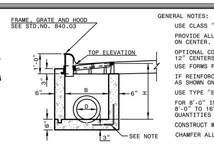


1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

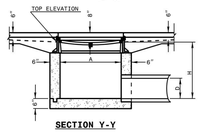
ROADWAY STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

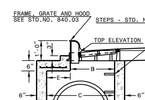
SHEET 2 OF 2
840.03

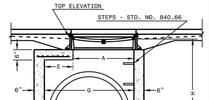


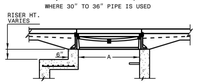


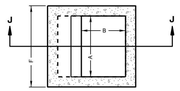
GENERAL NOTES:
USE CLASS "B" CONCRETE THROUGHOUT.
PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.
OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.
USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.
IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.
USE TYPE "E", "F" AND "G" GRATES UNLESS OTHERWISE INDICATED.
FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 16'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.
CONSTRUCT WITH PIPE CROWNS MATCHING.
CHAMFER ALL EXPOSED CORNERS 1".
DRAWING NOT TO SCALE.

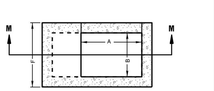








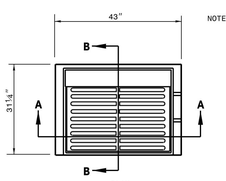




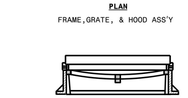
1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

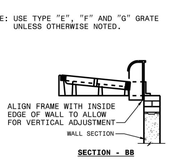
ROADWAY STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

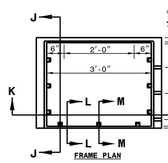
SHEET 1 OF 2
840.02

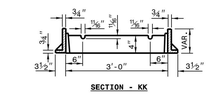


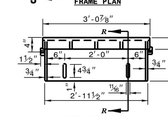
NOTE: USE TYPE "E", "F" AND "G" GRATE UNLESS OTHERWISE NOTED.

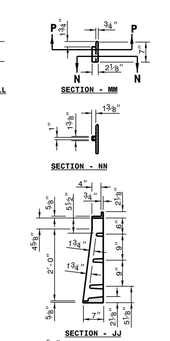








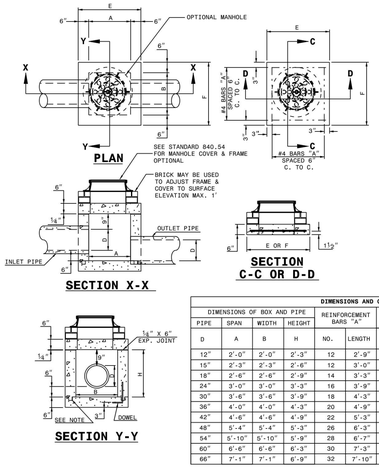




1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

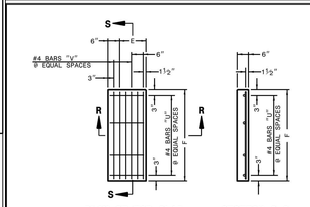
SHEET 1 OF 2
840.03

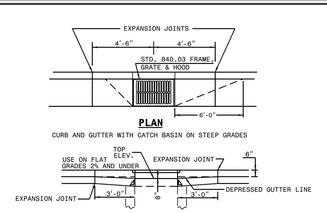


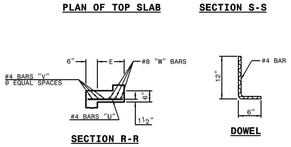
GENERAL NOTES:
CHAMFER ALL EXPOSED CORNERS 1".
USE CLASS "B" CONCRETE THROUGHOUT.
OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.
USE FORMS TO CONSTRUCT THE BOTTOM SLAB.
IF REINFORCED CONCRETE PIPE IS SET IN BASE SLAB OF BOX, ADD TO BASE AS SHOWN ON STANDARD NO. 840.00.
PROVIDE ALL JUNCTION BOXES OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTERS IN ACCORDANCE WITH STD. NO. 840.66.
ADJUST THE STEEL, CONCRETE AND BRICK MASONRY QUANTITIES TO INCLUDE THE ADDITION OF THE MANHOLE (I.E. DIAGONAL BARS SHORTENED AROUND OPENING IN TOP SLAB, ADDITIONAL VARIABLE HEIGHT BRICK MASONRY, OPENING IN TOP SLAB.)
MAX. DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 12 FEET.

DIMENSIONS AND QUANTITIES FOR CONCRETE JUNCTION BOXES

DIMENSIONS OF BOX AND PIPE				REINFORCEMENT BARS "A"		TOP SLAB DIMENSIONS		CUBIC YARDS IN BOX			TOTAL QUANTITIES BOX AND SLABS		DEDUCTIONS FOR ONE PIPE CU.YDS.	
PIPE	SPAN	WIDTH	HEIGHT	NO.	LENGTH	E	F	TOP SLAB	BOTTOM SLAB	WALL/ FT. OF HT.	LBS. REINF	CU. YDS. WIN. "N"	C.S.	R.C.
D	A	B	H											
12"	2'-0"	2'-0"	2'-3"	12	2'-9"	3'-0"	3'-0"	0.167	0.167	0.185	22	0.750	0.015	0.024
15"	2'-3"	2'-3"	2'-6"	12	3'-0"	3'-3"	3'-3"	0.196	0.196	0.204	24	0.902	0.023	0.036
18"	2'-6"	2'-6"	2'-9"	14	3'-3"	3'-6"	3'-6"	0.227	0.227	0.222	30	1.065	0.033	0.049
24"	3'-0"	3'-0"	3'-3"	16	3'-9"	4'-0"	4'-0"	0.296	0.296	0.259	40	1.434	0.059	0.085
30"	3'-6"	3'-6"	3'-9"	18	4'-3"	4'-6"	4'-6"	0.375	0.375	0.296	51	1.860	0.092	0.127
36"	4'-0"	4'-0"	4'-3"	20	4'-9"	5'-0"	5'-0"	0.463	0.463	0.333	64	2.341	0.132	0.178
42"	4'-6"	4'-6"	4'-9"	22	5'-3"	5'-6"	5'-6"	0.560	0.560	0.370	77	2.878	0.180	0.243
48"	5'-4"	5'-4"	5'-3"	26	6'-3"	6'-4"	6'-4"	0.743	0.743	0.407	111	3.623	0.235	0.317
54"	5'-10"	5'-10"	5'-9"	28	6'-7"	6'-10"	6'-10"	0.865	0.865	0.444	126	4.283	0.297	0.401
60"	6'-6"	6'-6"	6'-3"	30	7'-3"	7'-6"	7'-6"	1.042	1.042	0.481	145	5.090	0.367	0.495
66"	7'-1"	7'-1"	6'-9"	32	7'-10"	8'-1"	8'-1"	1.210	1.210	0.518	169	5.917	0.444	0.589







MINIMUM DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN(BASED ON MIN. HEIGHT, H, WITH NO RISER) *

DIMENSIONS OF BOX AND PIPE							COVER DIMENSION		BARS-U		BARS-V		BARS-W		CU.YDS. CONC. IN BOX		DEDUCTIONS ONE PIPE	
PIPE	SPAN	WIDTH	WIDTH	SPAN	MIN. HEIGHT		E	F	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	TOTAL LBS.	BOTTOM SLAB	TOP SLAB (1'-0" CONC IN BOTTOM SLAB)	C.W.	R.C.
D	A	B	C	G	H														
12"	3'-0"	2'-2"	--	--	2'-9"		--	--	--	--	--	--	--	--	--	--	0.235	0.772	0.015	0.026
15"	3'-0"	2'-2"			3'-0"												0.235	0.829	0.023	0.036
18"	3'-0"	2'-2"			3'-3"												0.235	0.887	0.033	0.049
24"	3'-0"	2'-2"			3'-9"												0.235	1.001	0.059	0.085
30"	3'-0"	2'-2"	3'-4"		4'-3"		1'-2"	4'-0"	4	1'-5"	2	3'-9"	3	3'-9"	39	0.123	0.321	1.433	0.092	0.127
36"	3'-0"	2'-2"	3'-10"		4'-9"		1'-8"	4'-0"	4	1'-11"	3	3'-9"	3	3'-9"	43	0.161	0.358	1.714	0.132	0.178
42"	3'-0"	2'-2"		4'-5"	5'-3"		1'-5"	3'-2"	4	1'-8"	2	2'-11"	3	2'-11"	32	0.112	0.318	1.738	0.180	0.243
48"	3'-0"	2'-2"		5'-0"	5'-9"		2'-0"	3'-2"	4	2'-3"	3	2'-11"	3	2'-11"	35	0.145	0.352	2.052	0.235	0.317
54"	3'-0"	2'-2"		5'-7"	6'-3"		2'-7"	3'-2"	4	2'-10"	5	2'-11"	3	2'-11"	41	0.180	0.386	2.387	0.297	0.401

* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

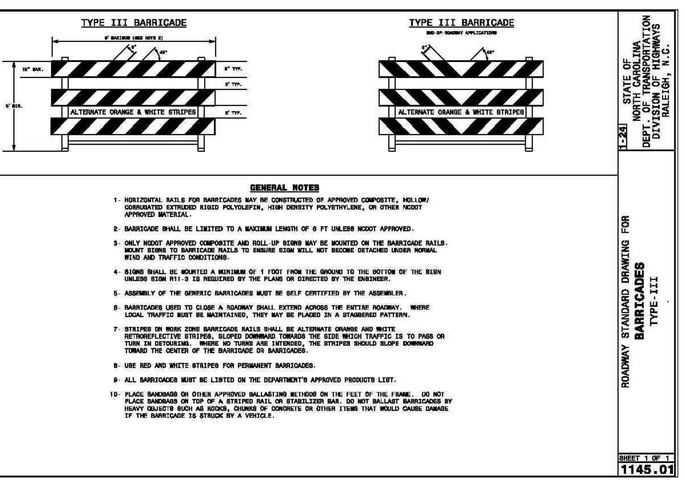
ROADWAY STANDARD DRAWING FOR
CONCRETE CATCH BASIN
12" THRU 54" PIPE

SHEET 2 OF 2
840.02

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR
CONCRETE JUNCTION BOX
(WITH OPTIONAL MANHOLE)
12" THRU 66" PIPE

SHEET 1 OF 1
840.31



GENERAL NOTES

1- HORIZONTAL RAILS FOR BARRICADES MAY BE CONSTRUCTED OF APPROVED COMPOSITE, HOLLOW/ CORRUGATED EXTRUDED RIGID POLYOLEFIN, HIGH DENSITY POLYETHYLENE, OR OTHER NCDOT APPROVED MATERIAL.

2- BARRICADE SHALL BE LIMITED TO A MAXIMUM LENGTH OF 8 FT UNLESS NCDOT APPROVED.

3- ONLY NCDOT APPROVED COMPOSITE AND ROLL-UP SIGNS MAY BE MOUNTED ON THE BARRICADE RAILS. MOUNT SIGNS TO BARRICADE RAILS TO ENSURE SIGN WILL NOT BECOME DETACHED UNDER NORMAL WIND AND TRAFFIC CONDITIONS.

4- SIGNS SHALL BE MOUNTED A MINIMUM OF 1 FOOT FROM THE GROUND TO THE BOTTOM OF THE SIGN UNLESS SIGN R11-3 IS REQUIRED BY THE PLANS OR DIRECTED BY THE ENGINEER.

5- ASSEMBLY OF THE GENERIC BARRICADES MUST BE SELF CERTIFIED BY THE ASSEMBLER.

6- BARRICADES USED TO CLOSE A ROADWAY SHALL EXTEND ACROSS THE ENTIRE ROADWAY. WHERE LOCAL TRAFFIC MUST BE MAINTAINED, THEY MAY BE PLACED IN A STAGGERED PATTERN.

7- STRIPES ON WORK ZONE BARRICADE RAILS SHALL BE ALTERNATE ORANGE AND WHITE RETROREFLECTIVE STRIPES, SLOPED DOWNWARD TOWARDS THE SIDE WHICH TRAFFIC IS TO PASS OR TURN IN DETOURING. WHERE NO TURNS ARE INTENDED, THE STRIPES SHOULD SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

8- USE RED AND WHITE STRIPED FOR PERMANENT BARRICADES.

9- ALL BARRICADES MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST.

10- PLACE BANDSAWN OR OTHER APPROVED BALLASTING METHODS ON THE FEET OF THE FRAME. DO NOT PLACE SANDBAGS ON TOP OF A STRIPED RAIL OR STABILIZER BAR. DO NOT BALLAST BARRICADES BY HEAVY OBJECTS SUCH AS ROCKS, CHUNKS OF CONCRETE OR OTHER ITEMS THAT WOULD CAUSE DAMAGE IF THE BARRICADE IS STRUCK BY A VEHICLE.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

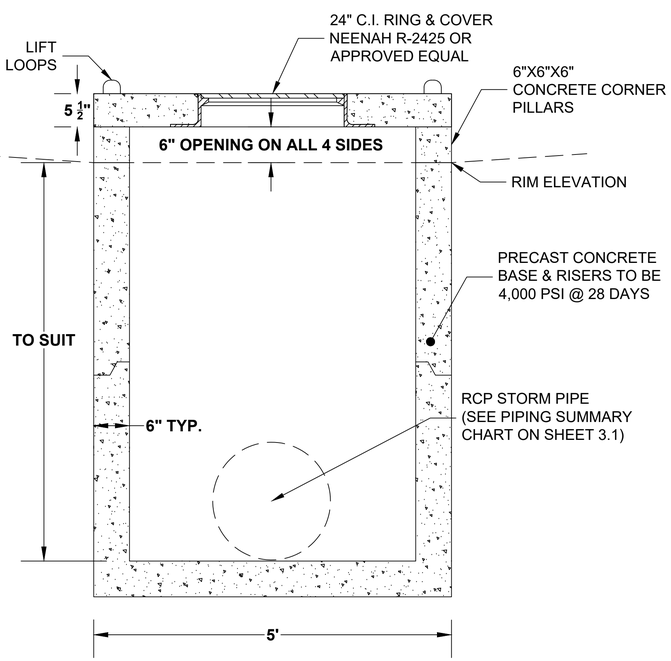
ROADWAY STANDARD DRAWING FOR
FRAME, GRATES, AND HOOD
FOR USE ON STANDARD CATCH BASIN

SHEET 2 OF 2
840.03

1-28 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR
BARRICADES
TYPE-III

SHEET 1 OF 1
1145.01



4' X 4' YARD INLET
SCALE: 1" = 1'

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Blvd., Suite 450
Raleigh, NC 27607
919-468-1101

NORTH CAROLINA
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA
PROFESSIONAL
SEAL
9810
ENGINEER
JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

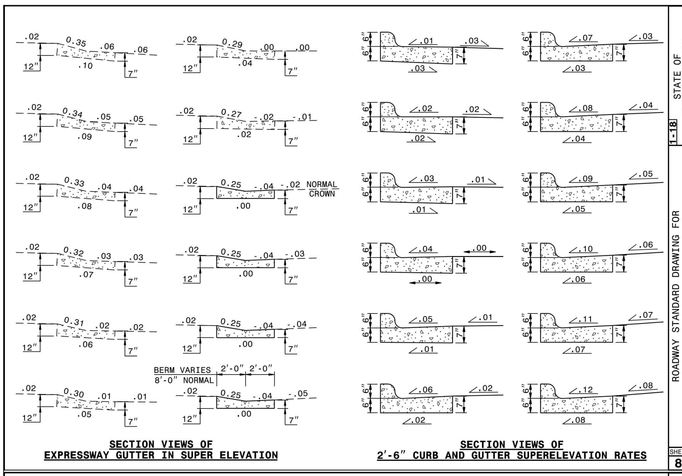
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
KALAS FALLS
CIVIL DETAILS

SHEET NO.:
CD13

North Carolina 811 811.org
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Job\9900\Workline Projects\Final_Working Dwgs\Phase 3\Sheet Files\Sheet No. CD1-CD19 Phase 3 Details.dwg
June 6, 2025

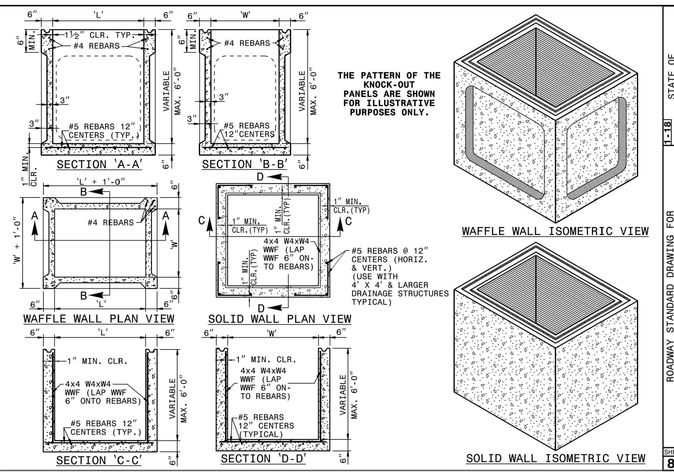


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE CURB, GUTTER AND CURB & GUTTER

SHEET 2 OF 3
846.01

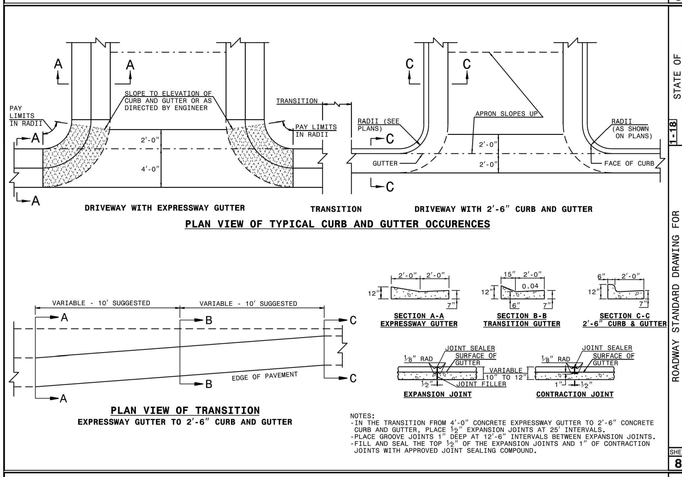


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
PRECAST DRAINAGE STRUCTURE
(SOLID AND WAFFLE WALL)

SHEET 1 OF 2
840.45



NOTES:
-IN THE TRANSITION FROM 4'-0" CONCRETE EXPRESSWAY GUTTER TO 2'-6" CONCRETE CURB AND GUTTER, PLACE ½" EXPANSION JOINTS AT 25' INTERVALS.
-PLACE GROOVE JOINTS 1" DEEP AT 12'-6" INTERVALS BETWEEN EXPANSION JOINTS.
-FILL AND SEAL THE TOP ½" OF THE EXPANSION JOINTS AND 1" OF CONTRACTION JOINTS WITH APPROVED JOINT SEALING COMPOUND.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

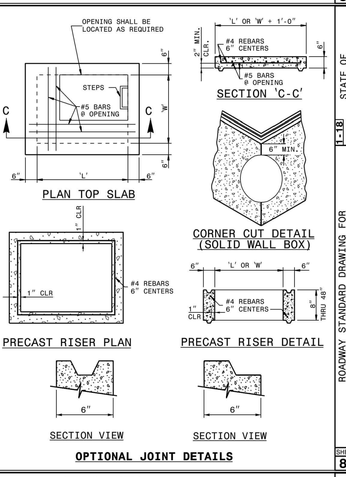
1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE CURB, GUTTER AND CURB & GUTTER

SHEET 3 OF 3
846.01

GENERAL NOTES;

- THIS PRECAST BOX MAY BE USED FOR THE FOLLOWING STANDARDS: 840.01, 840.02, 840.04, 840.05, 840.13, 840.14, 840.15, 840.17, 840.18, 840.19, 840.26, 840.27, 840.28, 840.31, 840.32 AND 840.41.
- INSTALL PRECAST DRAINAGE STRUCTURES AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 840.
- DO NOT PLACE PRECAST DRAINAGE STRUCTURES UNDER TRAFFIC OR WHERE TRAFFIC WILL BE DETOURED.
- USE 4000 PSI CONCRETE.
- PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A1064.
- LIMIT MAXIMUM DEPTH TO TOP OF BOTTOM SLAB FOR WAFFLE WALL STRUCTURE TO 10'-0"; LIMIT SOLID WALL STRUCTURE TO 15'-0".
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- CUT OR FORM OPENINGS FOR PIPE TO PROVIDE REQUIRED SIZE AND LOCATION. ORIENT WAFFLE WALL STRUCTURES SO THAT PIPES ENTER THROUGH THE KNOCKOUT/WAFFLE PANELS ONLY. PIPES MAY ENTER THROUGH THE CORNERS OF SOLID WALL BOXES IF A MINIMUM OF 6" OF WALL IS PROVIDED ABOVE THE HOLE.
- ALL ELEMENTS PRECAST TO MEET ASTM C913.
- FRAME AND GRATE HEIGHT MAY BE ADJUSTED WITH CONCRETE OR BRICK IN ACCORDANCE WITH STANDARD 840.25.
- PROVIDE PRECAST STRUCTURES OVER 4'-0" IN DEPTH WITH STEPS AS DIRECTED BY THE ENGINEER.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
- SEAL JOINTS WITH A FLEXIBLE BUTYL RUBBER BASE CONFORMING TO FEDERAL SPECIFICATION SS-S-21A, AASHTO M-198, TYPE B - BUTYL RUBBER.
- LIMIT MAXIMUM STRUCTURE SIZE TO INSIDE CLEAR DIMENSIONS OF 5'-0" X 5'-0".
- THE OUTSIDE PIPE DIAMETER PLUS 2" OR THE OPENING REQUIRED FOR FRAME AND GRATE IS THE MINIMUM STRUCTURE SIZE WHICHEVER IS GREATER.
- USE MANHOLE FRAME AND COVER AS INDICATED ON THE PLANS. REINFORCE OPENING AS SHOWN ON THIS SHEET.

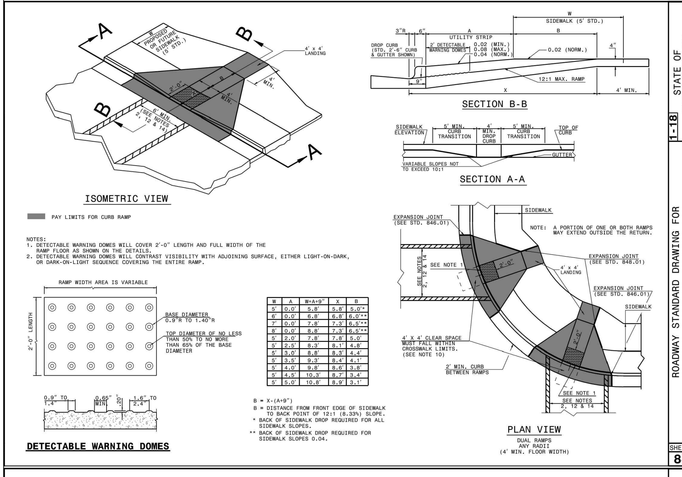


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
PRECAST DRAINAGE STRUCTURE
(GENERAL NOTES AND DETAILS)

SHEET 2 OF 2
840.45



NOTES:
1. DETECTABLE WARNING DOMES WILL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. DETECTABLE WARNING DOMES WILL CONTRAST VISIBILITY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

W	A	B=A+0.5'	S	R
4'	0.0	0.5'	4.5'	4.5'
4'	2.0	2.5'	6.5'	6.5'
4'	4.0	4.5'	8.5'	8.5'
4'	5.0	5.5'	9.5'	9.5'
5'	0.0	0.5'	5.5'	5.5'
5'	2.0	2.5'	7.5'	7.5'
5'	3.0	3.5'	8.5'	8.5'
5'	4.0	4.5'	9.5'	9.5'
5'	4.5	5.0'	10.0'	10.0'
5'	5.0	5.5'	10.5'	10.5'

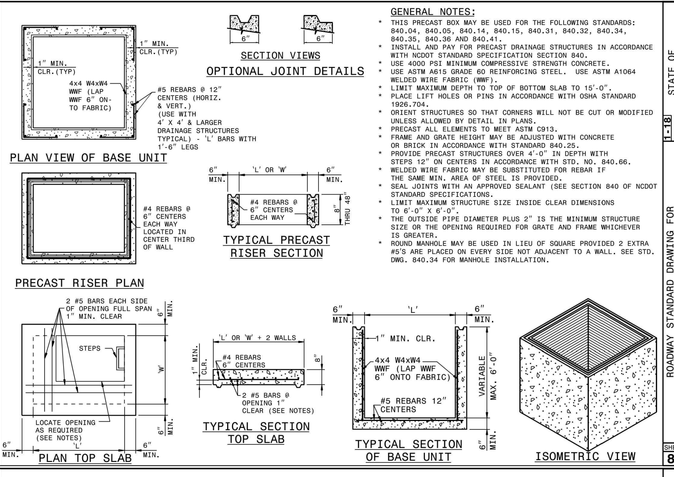
B = A+(4-9')
B = DISTANCE FROM FRONT EDGE OF SIDEWALK TO BACK POINT OF 12:1 (8.33%) SLOPE.
* BACK OF SIDEWALK DROP REQUIRED FOR ALL SIDEWALK SLOPES.
** BACK OF SIDEWALK DROP REQUIRED FOR SIDEWALK SLOPES 0.04.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
CURB RAMP
PROPOSED CURB AND GUTTER

SHEET 1 OF 3
848.05



GENERAL NOTES;

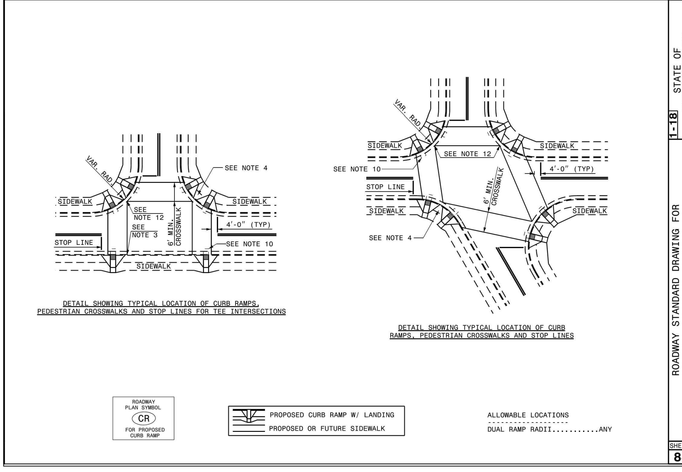
- THIS PRECAST BOX MAY BE USED FOR THE FOLLOWING STANDARDS: 840.04, 840.05, 840.14, 840.15, 840.31, 840.32, 840.34, 840.35, 840.36 AND 840.41.
- INSTALL AND PAY FOR PRECAST DRAINAGE STRUCTURES IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATION SECTION 840.
- USE 4000 PSI MINIMUM COMPRESSIVE STRENGTH CONCRETE.
- USE ASTM A615 GRADE 60 REINFORCING STEEL. USE ASTM A1064 WELDED WIRE FABRIC (WWF).
- LIMIT MAXIMUM DEPTH TO TOP OF BOTTOM SLAB TO 15'-0".
- PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
- ORIENT STRUCTURES SO THAT CORNERS WILL NOT BE CUT OR MODIFIED UNLESS ALLOWED BY DETAIL IN PLANS.
- PRECAST ALL ELEMENTS TO MEET ASTM C913.
- FRAME AND GRATE HEIGHT MAY BE ADJUSTED WITH CONCRETE OR BRICK IN ACCORDANCE WITH STANDARD 840.25.
- PROVIDE PRECAST STRUCTURES OVER 4'-0" IN DEPTH WITH STEPS 12" ON CENTERS IN ACCORDANCE WITH STD. NO. 840.66.
- WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR IF THE SAME MIN. AREA OF STEEL IS PROVIDED.
- SEAL JOINTS WITH AN APPROVED SEALANT (SEE SECTION 840 OF NCDOT STANDARD SPECIFICATIONS.
- LIMIT MAXIMUM STRUCTURE SIZE INSIDE CLEAR DIMENSIONS TO 6'-0" X 6'-0".
- THE OUTSIDE PIPE DIAMETER PLUS 2" IS THE MINIMUM STRUCTURE SIZE OR THE OPENING REQUIRED FOR GRATE AND FRAME WHICHEVER IS GREATER.
- ROUND MANHOLE MAY BE USED IN LIEU OF SQUARE PROVIDED 2 EXTRA #5'S ARE PLACED ON EVERY SIDE NOT ADJACENT TO A WALL. SEE STD. DWG. 840.34 FOR MANHOLE INSTALLATION.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
TRAFFIC BEARING PRECAST DRAINAGE STRUCTURE

SHEET 1 OF 2
840.46

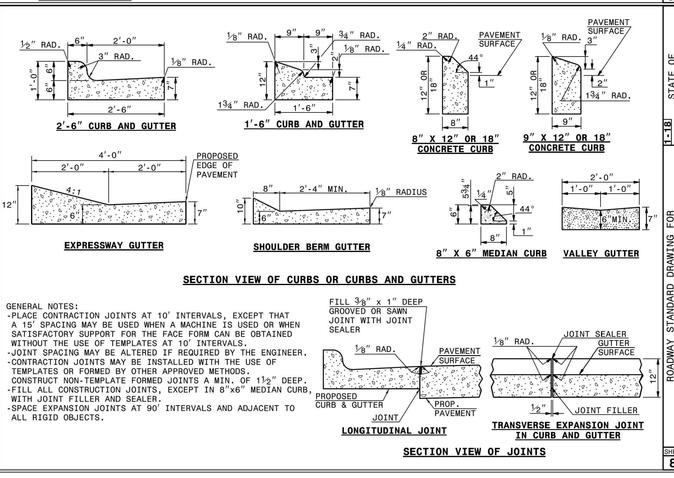


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
CURB RAMP
PROPOSED CURB AND GUTTER

SHEET 2 OF 3
848.05



GENERAL NOTES:
-PLACE CONTRACTION JOINTS AT 10' INTERVALS, EXCEPT THAT A 15' SPACING MAY BE USED WHEN A MACHINE IS USED OR WHEN SATISFACTORY SUPPORT FOR THE FACE FORM CAN BE OBTAINED WITHOUT THE USE OF TEMPLATES AT 10' INTERVALS.
-JOINT SPACING MAY BE ALTERED IF REQUIRED BY THE ENGINEER.
-CONTRACTION JOINTS MAY BE INSTALLED WITH THE USE OF TEMPLATES OR FORMED BY OTHER APPROVED METHODS. CONSTRUCT NON-TEMPLATE FORMED JOINTS A MIN. OF 1½" DEEP.
-FILL ALL CONSTRUCTION JOINTS, EXCEPT IN 8"x6" MEDIAN CURB, WITH JOINT FILLER AND SEALER.
-SPACE EXPANSION JOINTS AT 90' INTERVALS AND ADJACENT TO ALL RIGID OBJECTS.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE CURB, GUTTER AND CURB & GUTTER

SHEET 1 OF 3
846.01

North Carolina 811
"It's Fast, It's Free, It's the Law"
Before You Dig, Call 811
811 or 1-800-632-4949
Remote Ticket Entry
http://ncocc811.org/remoteticketentry.htm

SHEET NO: CD14

SHEET TITLE: KALAS FALLS CIVIL DETAILS

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/NA/LLE/S/AH/DH
DATE: NOV 1, 2024

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

STIPULATION FOR REUSE
THIS DRAWING WAS PREPARED BY AMERICAN ENGINEERING AND IS THE PROPERTY OF AMERICAN ENGINEERING. IT IS NOT TO BE USED IN WHOLE OR IN PART FOR ANY PROJECT OTHER THAN THE PROJECT SPECIFICALLY CONTEMPLATED WITH ITS PREPARATION AND DATE AS LISTED HEREON, AND IT IS NOT TO BE LOANED, COPIED OR REPRODUCED FOR ANY PURPOSE WHATSOEVER, NOR ARE ANY RIGHTS TO BE CONVEYED THEREIN, WITHOUT THE PRIOR WRITTEN CONSENT OF AMERICAN ENGINEERING. ANY UNAUTHORIZED USE OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED PROFESSIONALS FOR PROJECT SITE OR AT A LATER TIME, AND ANY SUCH USE WITHOUT SUCH SERVICES SHALL BE UNDERTAKEN AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO AMERICAN ENGINEERING. ANY SUCH UNAUTHORIZED USE SHALL BE CONSIDERED AND MAY BE CONTRARY TO THE LAW.

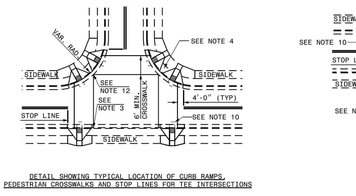
NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

DETAIL SELECTION ONLY

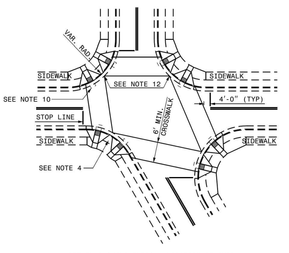
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 BRIAN HARRIS
NORTH CAROLINA ENGINEERING CORPORATION C-3881 AMERICAN ENGINEERING SOUTHEAST, P.A. CERTIFICATE OF AUTHORIZATION

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

CURB RAMPS AND EXISTING SIDEWALK



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES FOR TEE INTERSECTIONS



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES

RESURFACING PROJECTS

PROPOSED CURB RAMP W/ LANDING FOR RESURFACING PROJECTS

EXISTING SIDEWALK

ALLOWABLE LOCATIONS

DUAL RAMP RADII.....ANY

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR **CURB RAMP** EXISTING CURB AND GUTTER

SHEET 4 OF 5 **848.06**

NOTES:

1. CONSTRUCT THE RAMP SURFACE TO BE STABLE, FIRM, AND SLIP RESISTANT. CONSTRUCT THE CURB RAMP TYPE AS SHOWN IN THE PAVEMENT MARKING PLANS OR AS DIRECTED BY THE ENGINEER.
2. LOCATE CURB RAMPS AND PLACE PEDESTRIAN CROSSWALK MARKINGS AS SHOWN IN THE PAVEMENT MARKING PLANS. WHEN FIELD ADJUSTMENTS REQUIRE MOVING CURB RAMPS OR MARKINGS AS SHOWN, CONTACT THE SIGNING AND DELINEATION UNIT OR LOCATE AS DIRECTED BY THE ENGINEER.
3. COORDINATE THE CURB RAMP AND THE PEDESTRIAN CROSSWALK MARKINGS SO A 4'x4' CLEAR SPACE AT THE BASE OF THE CURB RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES.
4. SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL LANE IS 4' MINIMUM.
5. REFER TO THE PAVEMENT MARKING PLANS FOR STOP BAR LOCATIONS AT SIGNALIZED INTERSECTIONS. IF A PAVEMENT MARKING PLAN IS NOT PROVIDED, CONTACT THE SIGNAL DESIGN SECTION FOR THE STOP BAR LOCATIONS OR LOCATE AS DIRECTED BY THE ENGINEER.
6. TERMINATE PARKING A MINIMUM OF 20' BACK OF A PEDESTRIAN CROSSWALK.
7. CONSTRUCT CURB RAMPS A MINIMUM OF 4' WIDE.
8. CONSTRUCT THE RUNNING SLOPE OF THE RAMP 8.33% MAXIMUM.
9. ALLOWABLE CROSS SLOPE ON SIDEWALKS AND CURB RAMPS WILL BE 2% MAXIMUM.
10. CONSTRUCT THE SIDE FLARE SLOPE A MAXIMUM OF 10% MEASURED ALONG THE CURB LINE.
11. CONSTRUCT THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE BASE OF THE CURB RAMP A MAXIMUM OF 5% AND MAINTAIN A SMOOTH TRANSITION.
12. CONSTRUCT LANDINGS FOR SIDEWALK A MINIMUM OF 4'x4' WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION. CONSTRUCT LANDINGS FOR MEDIAN ISLANDS A MINIMUM OF 5'x5' WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION.
13. TO USE A MEDIAN ISLAND AS A PEDESTRIAN REFUGE AREA, MEDIAN ISLANDS WILL BE A MINIMUM OF 6' WIDE. CONSTRUCT MEDIAN ISLANDS TO PROVIDE PASSAGE OVER OR THROUGHT THE ISLAND.
14. SMALL CHANNELIZATION ISLANDS THAT CAN NOT PROVIDE A 5'X5' LANDING AT THE TOP OF A RAMPS, WILL BE CUT THROUGH LEVEL WITH THE SURFACE STREET.
15. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP. THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED.
16. PLACE A ½" EXPANSION JOINT WHERE THE CONCRETE CURB RAMP JOINS THE CURB AS SHOWN IN ROADWAY STANDARD DRAWING 848.01
17. PLACE ALL PEDESTRIAN PUSH BUTTON ACTUATORS AND CROSSING SIGNALS AS SHOWN IN THE PLANS OR AS SHOWN IN THE MUTCD.
18. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT UNIT FOR THE DETAILS OR FOR A SPECIAL DESIGN.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR **CURB RAMPS** NOTES

SHEET 3 OF 3 **848.05**

CURB RAMP AND EXISTING SIDEWALK

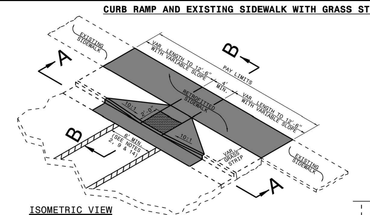
NOTES:
1. CONSTRUCT THE RAMP SURFACE TO BE STABLE, FIRM, AND SLIP RESISTANT. CONSTRUCT THE CURB RAMP TYPE AS SHOWN IN THE PAVEMENT MARKING PLANS OR AS DIRECTED BY THE ENGINEER.
2. LOCATE CURB RAMPS AND PLACE PEDESTRIAN CROSSWALK MARKINGS AS SHOWN IN THE PAVEMENT MARKING PLANS. WHEN FIELD ADJUSTMENTS REQUIRE MOVING CURB RAMPS OR MARKINGS AS SHOWN, CONTACT THE SIGNING AND DELINEATION UNIT OR LOCATE AS DIRECTED BY THE ENGINEER.
3. COORDINATE THE CURB RAMP AND THE PEDESTRIAN CROSSWALK MARKINGS SO A 4'x4' CLEAR SPACE AT THE BASE OF THE CURB RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES.
4. SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL LANE IS 4' MINIMUM.
5. REFER TO THE PAVEMENT MARKING PLANS FOR STOP BAR LOCATIONS AT SIGNALIZED INTERSECTIONS. IF A PAVEMENT MARKING PLAN IS NOT PROVIDED, CONTACT THE SIGNAL DESIGN SECTION FOR THE STOP BAR LOCATIONS OR LOCATE AS DIRECTED BY THE ENGINEER.
6. TERMINATE PARKING A MINIMUM OF 20' BACK OF A PEDESTRIAN CROSSWALK.
7. CONSTRUCT CURB RAMPS A MINIMUM OF 4' WIDE.
8. CONSTRUCT THE RUNNING SLOPE OF THE RAMP 8.33% MAXIMUM.
9. ALLOWABLE CROSS SLOPE ON SIDEWALKS AND CURB RAMPS WILL BE 2% MAXIMUM.
10. CONSTRUCT THE SIDE FLARE SLOPE A MAXIMUM OF 10% MEASURED ALONG THE CURB LINE.
11. CONSTRUCT THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE BASE OF THE CURB RAMP A MAXIMUM OF 5% AND MAINTAIN A SMOOTH TRANSITION.
12. CONSTRUCT LANDINGS FOR SIDEWALK A MINIMUM OF 4'x4' WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION. CONSTRUCT LANDINGS FOR MEDIAN ISLANDS A MINIMUM OF 5'x5' WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION.
13. TO USE A MEDIAN ISLAND AS A PEDESTRIAN REFUGE AREA, MEDIAN ISLANDS WILL BE A MINIMUM OF 6' WIDE. CONSTRUCT MEDIAN ISLANDS TO PROVIDE PASSAGE OVER OR THROUGHT THE ISLAND.
14. SMALL CHANNELIZATION ISLANDS THAT CAN NOT PROVIDE A 5'X5' LANDING AT THE TOP OF A RAMPS, WILL BE CUT THROUGH LEVEL WITH THE SURFACE STREET.
15. CURB RAMPS WITH RETURNED CURBS MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP. THE ADJACENT SURFACE IS PLANTING OR OTHER NON-WALKING SURFACE OR THE SIDE APPROACH IS SUBSTANTIALLY OBSTRUCTED.
16. PLACE A ½" EXPANSION JOINT WHERE THE CONCRETE CURB RAMP JOINS THE CURB AS SHOWN IN ROADWAY STANDARD DRAWING 848.01
17. PLACE ALL PEDESTRIAN PUSH BUTTON ACTUATORS AND CROSSING SIGNALS AS SHOWN IN THE PLANS OR AS SHOWN IN THE MUTCD.
18. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT UNIT FOR THE DETAILS OR FOR A SPECIAL DESIGN.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

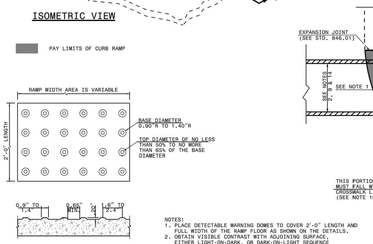
ROADWAY STANDARD DRAWING FOR **CURB RAMP** EXISTING CURB AND GUTTER

SHEET 3 OF 5 **848.06**

CURB RAMP AND EXISTING SIDEWALK WITH GRASS STRIP



PAY LIMITS OF CURB RAMP



DETECTABLE WARNING DOMES

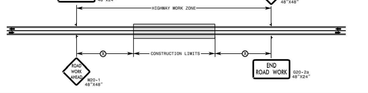
NOTES:
1. PLACE DETECTABLE WARNING DOMES TO COVER 3'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN VISIBLE CONTRAST WITH ADJOINING SURFACE EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR **CURB RAMP** EXISTING CURB AND GUTTER

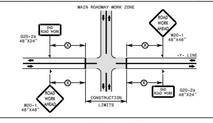
SHEET 1 OF 5 **848.06**

TWO-WAY UNDIVIDED (L-LINES)



POSTED SPEED LIMIT (MPH)	RECOMMENDED MINIMUM SIGN SPACING
≤ 40	500'
45	1000'

ROADWAYS INTERSECTING ALONG TWO-WAY UNDIVIDED WORK ZONE (Y-LINES)



NO STATIONARY -Y- LINE ADVANCE WARNING SIGNAGE IS REQUIRED UNLESS THERE IS MORE THAN 1000' OF CONSTRUCTION ALONG THE -Y- LINE.

GENERAL NOTES

1- DO NOT INSTALL ADVANCE WARNING SIGNS MORE THAN 3 DAYS PRIOR TO BEGINNING OF WORK UNLESS COVERED.

2- SIGNS SHOWN ARE REQUIRED FOR WORK ZONES THAT WILL REMAIN IN EFFECT LONGER THAN 3 CONSECUTIVE DAYS.

3- ALL SIGN SPACING DIMENSIONS ARE APPROXIMATE, FIELD ADJUST AS NECESSARY OR AS DIRECTED.

4- ERECT SIGNS PER RSD 1110.01. PAYMENT FOR WOOD POSTS, 3LB STEEL U-CHANNEL AND SQUARE STEEL TUBING POSTS WITH SIGNS WILL BE MADE ACCORDING TO STANDARD SPECIFICATIONS FOR WORK ZONE SIGNS.

5- WHEN NECESSARY, USE SPLICING IN ACCORDANCE WITH RSD. 1110.01.

6- DO NOT BACK BRACE SIGN SUPPORTS.

LEGEND

STATIONARY SIGN

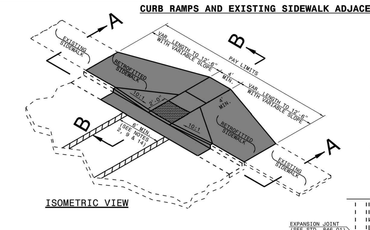
DIRECTION OF TRAFFIC FLOW

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

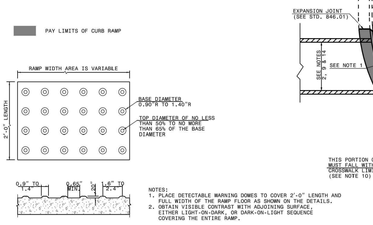
ROADWAY STANDARD DRAWING FOR **WORK ZONE ADVANCE WARNING SIGNS FOR TWO-WAY UNDIVIDED FACILITIES**

SHEET 3 OF 3 **1101.01**

CURB RAMPS AND EXISTING SIDEWALK ADJACENT TO CURB



PAY LIMITS OF CURB RAMP



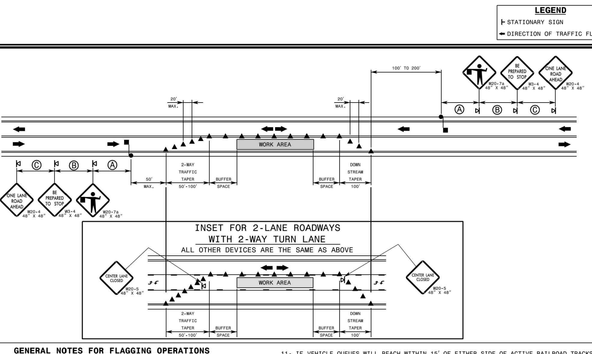
DETECTABLE WARNING DOMES

NOTES:
1. PLACE DETECTABLE WARNING DOMES TO COVER 3'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN VISIBLE CONTRAST WITH ADJOINING SURFACE EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR **CURB RAMP** EXISTING CURB AND GUTTER

SHEET 2 OF 5 **848.06**



GENERAL NOTES FOR FLAGGING OPERATIONS

1- REFER TO RSD. 1101.11, SHEETS 1 & 4, FOR "L" DISTANCE AND SIGN SPACING.

2- INSTALL LANE CLOSURES WITH THE TRAFFIC FLOW, BEGINNING WITH DEVICES ON THE UPSTREAM SIDE OF TRAFFIC.

3- REMOVE LANE CLOSURES AGAINST THE TRAFFIC FLOW, BEGINNING WITH DEVICES ON THE DOWNSTREAM SIDE OF TRAFFIC.

4- PLACE CONES THRU THE WORK AREA AT THE MAXIMUM SPACING EQUAL IN FEET TO 2 TIMES THE POSTED SPEED LIMIT.

5- EXTEND LANE CLOSURES AT THE BUFFER SPACE SUCH THAT STOPPING SIGHT DISTANCE IS PROVIDED TO THE FLAGGER (REFER TO RSD. 1101.11, SHEET 2).

6- DO NOT STOP TRAFFIC IN ANY ONE DIRECTION FOR MORE THAN 5 MINUTES AT A TIME.

7- DRUMS OR SKINNY DRUMS MAY BE USED IN LIEU OF CONES. REFER TO RSD. 1180.01 FOR SKINNY DRUM REQUIREMENTS.

8- USE FLAGGERS TO CONTROL TRAFFIC AT INTERSECTIONS AFFECTED BY THE LANE CLOSURE. SUPPLEMENT FLAGGERS LOCATED AT INTERSECTIONS WITH FLAGGER AHEAD SIGNS (R20-7A) PLACED APPROXIMATELY 500 FT. IN ADVANCE OF THE FLAGGER, FOR SIGNALIZED INTERSECTIONS PLACE SIGNALS IN THE FLASH MODE AND USE LAW ENFORCEMENT.

9- REFER TO THE CURRENT MUTCD FOR FLAGGER CONTROL, REQUIREMENTS, AND PROCEDURES.

10- DO NOT EXCEED A 9 MILE LANE CLOSURE LENGTH UNLESS OTHERWISE SHOWN IN THE TMP OR AS DIRECTED BY THE ENGINEER.

11- IF VEHICLE QUEUES WILL REACH WITHIN 15' OF EITHER SIDE OF ACTIVE RAILROAD TRACKS, PROVIDE A WITNESS AND A RADIO CONSISTENT OFFICER OR FLAGGER TO PREVENT VEHICLES FROM STOPPING WITHIN THE GRADE CROSSING. PROVIDE OFFICER OR FLAGGER EVEN IF AUTOMATIC WARNING MEASURES ALREADY EXIST.

GENERAL NOTES FOR PILOT CAR OPERATIONS

1- USE PILOT CARS WHEN DIRECTED BY THE ENGINEER.

2- IF ROADWAY WIDTH IS LESS THAN 22 FEET, (TOP TO TOP) CONES MAY NOT BE REQUIRED. THE WORK AREA IS DEFINED AS THE SECTION OF THE ENGINEER, CONES MAY BE OMITTED ALONG THE WORK AREA BY USING A PILOT CAR.

3- CONES ARE ALWAYS REQUIRED IN THE UPSTREAM AND DOWNSTREAM TAPERS.

4- MOUNT SIGN G20-4 "PILOT CAR FOLLOW ME" AT A CONSPICUOUS POSITION ON THE REAR OF THE PILOT VEHICLE.

5- DO NOT INSTALL MORE THAN ONE (1) MILE OF LANE CLOSURE AHEAD OF THE PILOT CAR. THE END OF THE MERGE TAPER IS THE END OF THE LANE CLOSURE.

6- ADVISE RESIDENTS AND BUSINESSES WITHIN THE LANE CLOSURE LIMITS ABOUT METHODS OF SAFE EGRESS AND INGRESS FROM DRIVEWAYS DURING FLAGGING AND PILOT CAR OPERATIONS.

LEGEND

FLAGGER

CONE

PORTABLE SIGN

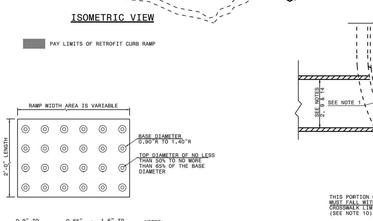
DIRECTION OF TRAFFIC FLOW

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

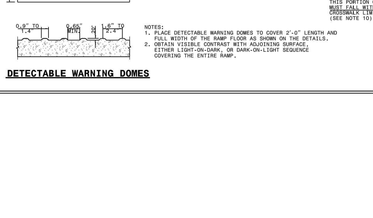
ROADWAY STANDARD DRAWING FOR **TEMPORARY LANE CLOSURES** 2-LANE, 2-WAY ROADWAY-1 LANE CLOSED

SHEET 1 OF 14 **1101.02**

RETROFITTING DETECTABLE WARNING DOMES ONTO EXISTING CURB RAMP



PAY LIMITS OF RETROFIT CURB RAMP



DETECTABLE WARNING DOMES

NOTES:
1. PLACE DETECTABLE WARNING DOMES TO COVER 3'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. OBTAIN VISIBLE CONTRAST WITH ADJOINING SURFACE EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR **CURB RAMP** EXISTING CURB AND GUTTER

SHEET 3 OF 5 **848.06**

811 North Carolina 811
*** 3 Days Before You Dig ***
It's the Law in North Carolina
Ticket Expires 21 Days From Ticket Date
http://ncocc1.org/ncocc/ticketentry.htm

SHEET NO: CD15

SHEET TITLE: KALAS FALLS CIVIL DETAILS

DRAWN BY: SMINALLE/SAH/DH | CHECKED BY: BH/JH | JOB NUMBER: 9900 | DATE: NOV 1, 2024

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

STIPULATION FOR REUSE
THIS DRAWING WAS PREPARED FOR USE ON THE PROJECT AS LISTED HEREON, AND IT IS NOT TO BE USED ON ANY OTHER PROJECT REGARDLESS OF SIMILARITY WITHOUT THE EXPRESS, WRITTEN PERMISSION OF THE ENGINEER. ANY UNAUTHORIZED USE OF THIS DRAWING FOR RE-USE ON ANOTHER PROJECT SITE OR AT A LATER TIME, OR ANY ALTERATION OF THIS DRAWING WITHOUT THE WRITTEN CONSENT OF THE ENGINEER, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO THE ENGINEER. ANY USE OF THIS DRAWING BY ANY PERSON, FIRM OR CORPORATION FOR ANY PROJECT OTHER THAN THE PROJECT SITE OR AT A LATER TIME, OR ANY ALTERATION OF THIS DRAWING WITHOUT THE WRITTEN CONSENT OF THE ENGINEER, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO THE ENGINEER. ANY USE OF THIS DRAWING BY ANY PERSON, FIRM OR CORPORATION WHICH IS NOT A PARTY TO THE CONTRACT FOR WHICH THIS DRAWING WAS PREPARED SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO THE ENGINEER AND MAY BE CONTRARY TO THE LAW.

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

DETAIL SHEET SELECTION ONLY

BRIAN H. HINSON SEAL 9810 PROFESSIONAL ENGINEER NORTH CAROLINA

CERTIFICATE OF AUTHORIZATION AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 REGISTERED NORTH CAROLINA

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

QUICK REFERENCE - "L" DISTANCE TABLE

POSTED SPEED LIMIT (MPH)	ROUTINE CONSIDERING DISTANCE "L" (FEET)											
	LATERAL WIDTH "W" (FEET)											
	1	2	3	4	5	6	7	8	9	10	11	12
20	10	15	20	30	35	40	50	55	60	70	75	80
25	15	30	35	45	55	65	75	85	95	105	115	125
30	15	30	45	60	75	90	105	120	135	150	165	180
35	25	45	65	85	105	125	145	165	185	205	225	245
40	30	55	80	110	135	160	190	215	240	270	295	320
45	45	90	135	180	225	270	315	360	405	450	495	540
50	50	100	150	200	250	300	350	400	450	500	550	600
55	55	110	165	220	275	330	385	440	495	550	605	660
60	60	120	180	240	300	360	420	480	540	600	660	720
65	65	130	195	260	325	390	455	520	585	650	715	780
70	70	140	210	280	350	420	490	560	630	700	770	840

GENERAL NOTES

1- TABLE FOR "L" DISTANCE IS BASED ON CHANNELIZATION TAPER FORMULA FROM THE MUTCD.

WHERE:

SPEED LIMIT	FORMULA
40 MPH OR LESS	$L_{ft} = \frac{W \times S^2}{60}$
45 MPH OR GREATER	$L_{ft} = W \times S$

L = MINIMUM TAPER LENGTH IN FEET (LONGITUDINAL DISTANCE)
W = WIDTH OF OFFSET IN FEET (LATERAL DISTANCE)
S = POSTED OR REGULATORY SPEED LIMIT OR ESTIMATED SPEED IN MPH PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

2- "L" DISTANCE IS FOR APPLICATION WITH CHANNELIZING DEVICE AND PAVEMENT MARKING TAPERS ARE SUITABLE FOR USE WITH TEMPORARY TRAFFIC CONTROL DEVICES, TUBULAR MARKERS, BARRICADES, RAISED ASPHALT ISLANDS, AND VERTICAL PANELS.

DESIGN SPEED (MPH)	MINIMUM SIGHT DISTANCE STOPPING SIGHT DISTANCE (FEET)	MINIMUM SIGHT DISTANCE LONGITUDINAL BUFFER LENGTH (FEET)
30	200	90
35	250	120
40	305	155
45	360	195
50	425	240
55	495	290
60	570	345
65	645	405
70	730	475
75	820	545
80	910	625

GENERAL NOTES

1- TABLES ARE BASED ON THE AASHTO GREEN BOOK "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AND ARE FOR PASSENGER CAR VEHICLES ON WET AND LEVEL ROADWAYS. CONSULT THE AASHTO GREEN BOOK FOR VALUES FOR TRUCKS, ON GRADES, AND ON WET AND ICY ROADWAYS.

2- BUFFER SPACE TABLE IS BASED ON THE BRAKING DISTANCE PORTION OF STOPPING SIGHT DISTANCE FOR WET AND LEVEL PAVEMENTS.

3- USE OF STOPPING SIGHT DISTANCE IN TRAFFIC CONTROL PLAN APPLICATIONS INCLUDES PROVIDING STOPPING SIGHT DISTANCE TO THE FLAGGER, FOR LANE CLOSURES ON MULTILANE ROADWAYS PROVIDE STOPPING SIGHT DISTANCE TO THE FLAGGER, FOR LANE CLOSURES ON MULTILANE ROADWAYS PROVIDE STOPPING SIGHT DISTANCE FOR THE APPROACH LANE(S) AT THE BUFFER SPACE SUCH THAT STOPPING SIGHT DISTANCE ARROW BOARD. EXTEND LANE CLOSURES AT THE BUFFER SPACE SUCH THAT STOPPING SIGHT DISTANCE IS PROVIDED.

4- USE OF MINIMUM PASSING SIGHT DISTANCE TABLE IN TRAFFIC CONTROL PLAN APPLICATIONS INCLUDES PROVIDING PASSING SIGHT DISTANCE REQUIREMENTS FOR PLACEMENT OF PAVEMENT MARKING POSITION PASSING ZONES FOR 2-LANE, 2-WAY ROADWAYS.

TEMPORARY BARRIER FLARE RATES

POSTED SPEED LIMIT (MPH)	UNANCHORED (A:B)	ANCHORED (A:B)
≤ 30	7 : 1	8 : 1
35	8 : 1	9 : 1
40	8 : 1	10 : 1
45	10 : 1	12 : 1
50	11 : 1	14 : 1
55	12 : 1	16 : 1
60	14 : 1	18 : 1
65	15 : 1	19 : 1
70	15 : 1	20 : 1

GENERAL NOTES

1- REFER TO THE 2011 ROADSIDE DESIGN GUIDE ON THE LATEST EDITION.

2- A BARRIER IS CONSIDERED FLARED WHEN IT IS NOT PARALLEL TO THE EDGE OF THE TRAVELWAY.

ADVANCE WARNING SIGN SPACING CHART

POSTED SPEED LIMIT (MPH)	RECOMMENDED DISTANCE BETWEEN SIGNS (FEET)		
	Ⓐ	Ⓑ	Ⓒ
≤ 35	200	200	200
40-50	350	350	350
55	500	500	500
CONTINUOUS URBAN ROAD (SEE NOTE 5)	1000	1000	2100

GENERAL NOTES

1- REFER TO 2009 MUTCD OR THE LATEST EDITION.

2- USE THIS STANDARD DRAWING IN CONJUNCTION WITH OTHER TRAFFIC CONTROL ROADWAY STANDARD DRAWINGS WHERE SIGN SPACING DISTANCES A, B, C, ARE SPECIFIED.

3- APPLY THE ADVANCE WARNING SIGN SPACING CHART WHERE A SERIES OF 2 OR MORE SIGNS ARE INSTALLED TO WARN ROAD USERS OF UNUSUAL OR UNEXPECTED CONDITIONS. THESE CONDITIONS OCCUR, SUCH AS LIMITED SIGHT DISTANCE, OBSTRUCTION INTERFERENCE, ETC.

GENERAL NOTES

1- BALLASTING SHALL BE ACHIEVED BY THE SAND BAG, TIRE SIDEWALL, OR PREFORMED WEIGHTED BASE METHODS. USE THE TIRE BALLAST AS SPECIFIED BY THE MANUFACTURER. DO NOT PLACE BALLAST ON TOP OF DRUMS.

2- IT NECESSARY PLACE THE NAME OF THE AGENCY, CONTRACTOR, OR SUPPLIER ON NON-RETROREFLECTIVE SURFACES. DO NOT SHOW THE LETTERS AND NUMBERS USING A NON-RETROREFLECTIVE COLOR AND NOT ON THE BASE.

3- ALL DRUMS MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCT LIST.

4- REFER TO THE STANDARD SPECIFICATIONS FOR ROAD AND STRUCTURES FOR ADDITIONAL INFORMATION.

GENERAL NOTES

1- DO NOT USE STRAIGHT-LINE CAUTION OR STATIC CHEVRON DISPLAYS.

2- USE A MINIMUM MOUNTING HEIGHT OF 7 FEET FROM GROUND LEVEL TO THE BOTTOM OF THE PANEL FOR TRAILER MOUNTED ARROW BOARDS, EXCEPT ON VERTICAL ADJUSTED TRAILER MOUNTED BOARDS SHALL BE AS HIGH AS PRACTICAL.

3- USE ARROW BOARD ELEMENTS CAPABLE OF A MINIMUM 50 PERCENT DIMMING FROM THEIR FULL RATED BRIGHTNESS. USE AN AUTOMATIC LIGHT SENSING DEVICE TO ADJUST LAMP BRIGHTNESS AS NEEDED.

4- DO NOT USE ARROW BOARDS IN FLASHING ARROW MODE ON 2 LANE, 2 WAY ROADWAY DURING ANY ONE LANE OPERATION, NOR ON MULTILANE ROADWAYS WHEN SHIFTING ALL TRAFFIC LANES LATERALLY.

5- ALL FLASHING ARROW BOARDS MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST.

GENERAL NOTES

1- DIMENSIONS SHOWN ARE MINIMUM VALUES. MOUNT SIGNS SO THEY WILL BE CLEARLY VISIBLE TO APPROACHING TRAFFIC. DO NOT MOUNT SIGNS SO HIGH THAT THEY OBSCURE THE VIEW OF SIGNS MOUNTED AT LOWER HEIGHTS AS DRUMS, BARRIER, OR OTHER OBJECTS.

2- ALL PORTABLE SIGNS AND STANDS MUST MEET OR EXCEED THE REQUIREMENTS OF NCHRP 350 FOR CRASH TESTING. NON-CRASHABLE WORK ZONE SIGNS AND STANDS ARE NOT ALLOWED ON STATE MAINTAINED ROADWAYS.

3- ALL PORTABLE WORK ZONE SIGNS AND STANDS MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST.

GENERAL NOTES

1- POSTS SHALL BE 2½" X 2½" 12 GAUGE STEEL.

2- ANCHORS SHALL BE 3" X 3" 7 GAUGE STEEL.

3- CONNECTIONS SHALL BE AS RECOMMENDED BY THE MANUFACTURER.

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 400
Raleigh, NC 27607
919-468-1101

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 JOHN R. HARMAN

AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/27/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT, WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS.
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS
PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
KALAS FALLS
CIVIL DETAILS

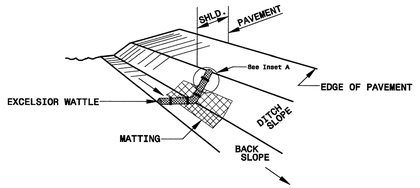
SHEET NO.:
CD16

North Carolina 811 one call it's all we do
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

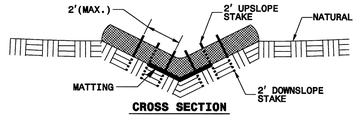
J:\Job\9900\Kimley-Horn\Kalas_Wake\Dwg\Phase 3\Sheet File\Sheet file\CD\CD16 Phase 3 Details .dwg June 6, 2025

WATTLE DETAIL

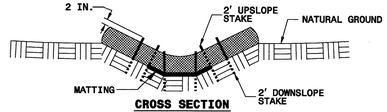
PROJECT REFERENCE NO.	SHEET NO.
X-XXXX	EC-20
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



ISOMETRIC VIEW



CROSS SECTION VEE DITCH



CROSS SECTION TRAPEZOIDAL DITCH

NOTES:

USE MINIMUM 12 IN. DIAMETER EXCELSIOR WATTLE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

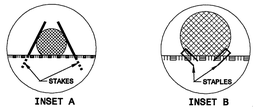
ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.

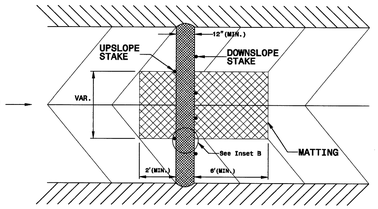
PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

INSTALL MATTING IN ACCORDANCE WITH SECTION 1631 OF THE STANDARD SPECIFICATIONS.



INSET A INSET B



TOP VIEW

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4700 Homewood Court, Suite 450
Raleigh, NC 27607
919-468-1101

NORTH CAROLINA ENGINEERING CORPORATION AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE:	REVISION:
1	7/22/2024	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HERON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3

1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:

KALAS FALLS CIVIL DETAILS

SHEET NO.:

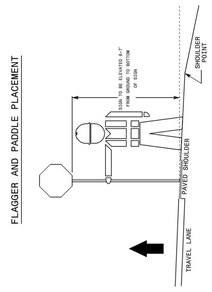
CD17

North Carolina 811 Know what's below. Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

ROADWAY STANDARD DRAWING FOR
FLAGGERS

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. 1-18

SHEET 1 OF 1 **1150.01**



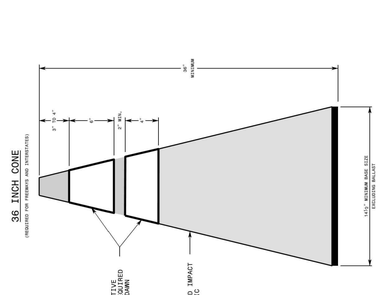
GENERAL NOTES

1. USE HAND SIGNALING DEVICES SUCH AS STOP/SLOW PADDLES, FLASHLIGHTS TO CONTROL TRAFFIC. USE STOP-SLOW PADDLES AS THE PRIMARY DEVICE.
2. FABRICATE STOP-SLOW PADDLES FROM SHEET METAL OR OTHER LIGHT SEMI RIGID MATERIAL. PROVIDE A RIGID HANDLE OF SUFFICIENT LENGTH SO THE PADDLE IS HELD AT 6'-7' ABOVE GROUND LEVEL.
3. PROVIDE STOPPING SIGHT DISTANCE TO EACH FLAGGER STATION. REFER TO RSD. 1101.11, SHEET 2.
4. ILLUMINATE FLAGGER STATIONS DURING NIGHT OPERATIONS.
5. FOLLOW FLAGGER QUALIFICATIONS AND METHODS OF HAND-SIGNALING PROCEDURES IN ACCORDANCE WITH PART VI OF THE MUTCD. REFER TO ROADWAY STANDARD DRAWING 1150.02.
6. ALL FLAGGERS MUST BE CERTIFIED BY AN NCDOT APPROVED TRAINING RESOURCE.

ROADWAY STANDARD DRAWING FOR
CONES

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. 1-18

SHEET 1 OF 1 **1135.01**



GENERAL NOTES

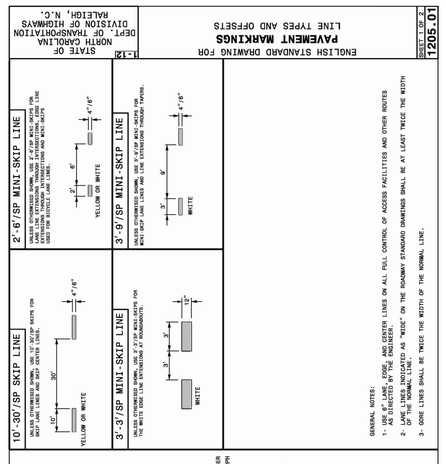
1.- ACHIEVE BALLASTING BY USING SPECIALLY MADE BASES SUCH AS SAND BAG RINGS, DOUBLING CONES, OR BASES THAT CAN BE FILLED WITH BALLAST. SEVENTY PERCENT OF THE WEIGHT OF THE CONE MUST BE IN THE BASE. USE BALLASTS THAT DO NOT PRESENT A HAZARD WHEN STRUCK.

2.- ALL CONES MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST.

ENGLISH STANDARD DRAWING FOR
PAVEMENT MARKINGS
LINE TYPES AND OFFSETS

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. 1-12

SHEET 1 OF 2 **1205.01**

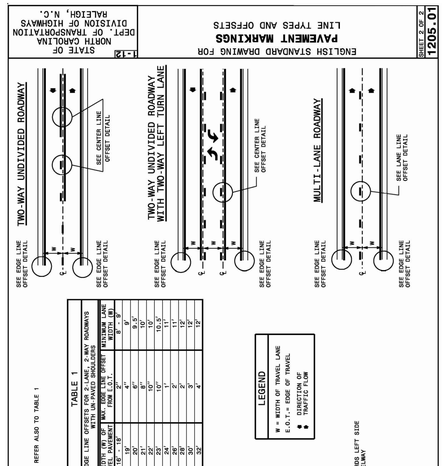


GENERAL NOTES:
1- USE 4" LANE, EDGE, AND CENTER LINES ON ALL FULL CONTROL OF ACCESS FACILITIES AND OTHER ROUTES AS DIRECTED BY THE ENGINEER.
2- LANE LINES INDICATED AS "MINI" ON THE ROADWAY STANDARD DRAWINGS SHALL BE AT LEAST TWICE THE WIDTH OF THE NORMAL LINE.
3- GORE LINES SHALL BE TWICE THE WIDTH OF THE NORMAL LINE.

ENGLISH STANDARD DRAWING FOR
PAVEMENT MARKINGS
LINE TYPES AND OFFSETS

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. 1-12

SHEET 2 OF 2 **1205.01**

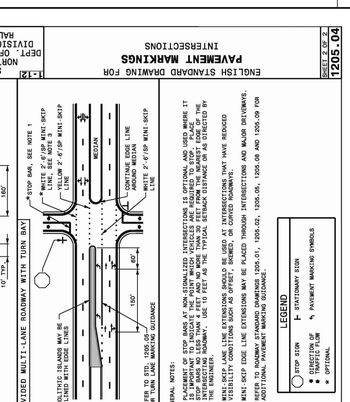


TRAVEL PAVEMENT WIDTH	EDGE LINE OFFSET FROM E.O.T.	W WIDTH (IN)
	2"	6"
18' - 19'	2"	8
20'	2"	8"
21'	2"	10"
22'	2"	10"
23'	2"	10"
24'	2"	12"
25'	2"	12"
26'	2"	12"
27'	2"	12"
28'	2"	12"
29'	2"	12"
30'	2"	12"
31'	2"	12"
32'	2"	12"

ENGLISH STANDARD DRAWING FOR
PAVEMENT MARKINGS
INTERSECTIONS

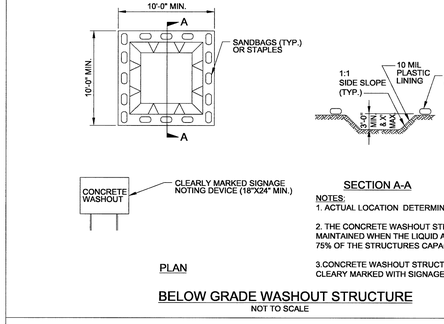
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. 1-12

SHEET 2 OF 2 **1205.04**



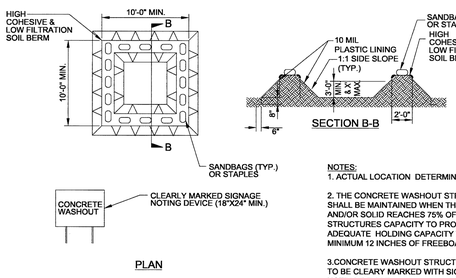
GENERAL NOTES:
1- PLACEMENT OF STOP BARS AT NON-SIGNALIZED INTERSECTIONS IS OPTIONAL AND USED WHERE IT MAY BE DESIRABLE TO DESIGNATE A SPECIFIC LOCATION FOR STOPPING. PLACE THE STOP BARS NO LESS THAN 4 FEET AND NO MORE THAN 30 FEET FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY. USE 10 FEET AS THE TYPICAL SETBACK DISTANCE OR AS DIRECTED BY THE ENGINEER.
2- MINI-SKIP LANE LINE EXTENSIONS SHOULD BE USED AT INTERSECTIONS THAT HAVE REDUCED LANE WIDTHS, TURN LANES, AND/OR CHANNELIZATION ISLANDS.
3- MINI-SKIP EDGE LINE EXTENSIONS MAY BE PLACED THROUGH INTERSECTIONS AND MAJOR DRIVEWAYS.
4- REFER TO ROADWAY STANDARD DRAWINGS 1205.01, 1205.02, 1205.05, 1205.08 AND 1205.09 FOR ADDITIONAL PAVEMENT MARKING GUIDANCE.

ONSITE CONCRETE WASHOUT
STRUCTURE WITH LINER



NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY.
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE
NOT TO SCALE

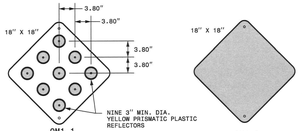


NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE:

ABOVE GRADE WASHOUT STRUCTURE
NOT TO SCALE

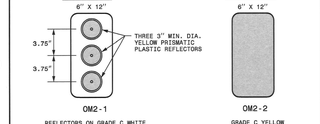
Z:\Jobs\9900\Working Property\Arbor_Working Dwgs\Phase 3\Sheet Files\Sheet No.CD1-CD19-Phase 3 Details.dwg June 6, 2025

TYPE I OBJECT MARKERS



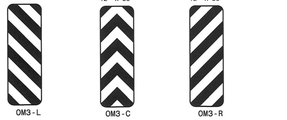
NOTES:
1- MATERIAL- .125" ALUMINUM PANEL.

TYPE 2 OBJECT MARKERS



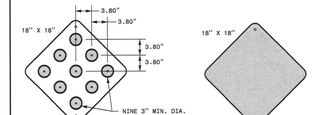
NOTES:
1- MATERIAL- .125" ALUMINUM PANEL.

TYPE 3 OBJECT MARKERS



NOTES:
1- GRADE C YELLOW RETROFLECTIVE SHEETING WITH ALTERNATING BLACK AND YELLOW STRIPES.
2- STRIPES SLOPE DOWNWARD AT 45 DEGREES TOWARD THE SIDE OF THE OBSTRUCTION WHICH TRAFFIC IS TO PASS.
3- MATERIAL-.125" ALUMINUM PANEL.

TYPE 4 OBJECT MARKERS(END OF ROAD)



NOTES:
1- MATERIAL- .125" ALUMINUM PANEL.

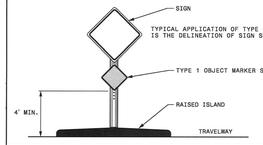
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

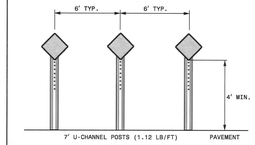
ROADWAY STANDARD DRAWING FOR
OBJECT MARKERS
TYPES

SHEET 1 OF 1
1264.01

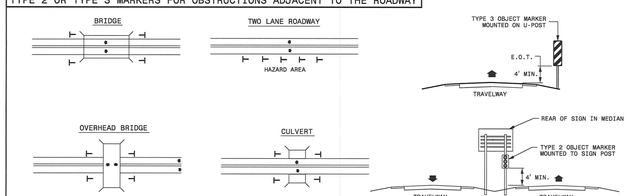
TYPE 1 OR TYPE 3 MARKERS FOR OBSTRUCTIONS WITHIN THE ROADWAY



TYPE 4 MARKERS FOR END OF ROADWAY



TYPE 2 OR TYPE 3 MARKERS FOR OBSTRUCTIONS ADJACENT TO THE ROADWAY



TYPICAL APPLICATIONS OF TYPE 2 OR TYPE 3 OBJECT MARKERS INCLUDES DELINEATION OF BRIDGE PIERS, ABUTMENTS, HANDRAILS, CULVERT HEADWALLS, NARROW SHOULDERS, DROP-OFFS, OR OTHER UNDESIRABLE CONDITIONS WHEN GUARDRAIL OR OTHER ROADSIDE PROTECTION IS NOT IN PLACE.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

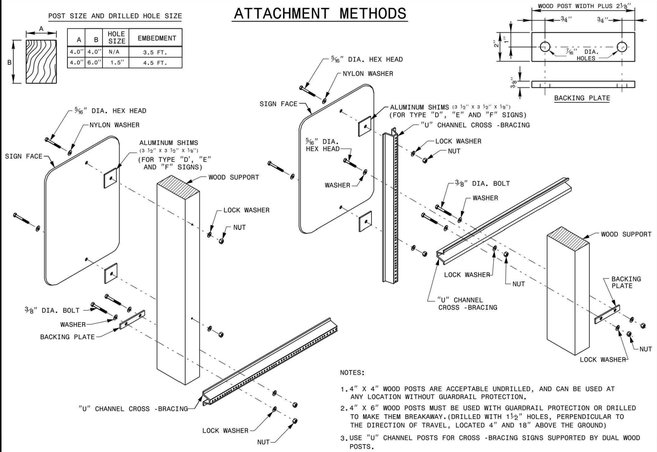
ROADWAY STANDARD DRAWING FOR
OBJECT MARKERS
INSTALLATION

SHEET 1 OF 1
1264.02

ATTACHMENT METHODS

POST SIZE AND DRILLED HOLE SIZE

A	B	HOLE SIZE	EMBEDMENT
4.0"	4.0"	N/A	3.5 FT.
4.0"	6.0"	1.5"	4.5 FT.



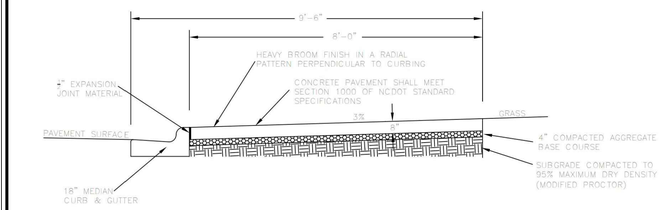
NOTES:
1. 4" X 4" WOOD POSTS ARE ACCEPTABLE UNDRILLED, AND CAN BE USED AT ANY LOCATION WITHOUT GUARDRAIL PROTECTION.
2. 4" X 6" WOOD POSTS MUST BE USED WITH GUARDRAIL PROTECTION OR DRILLED TO MAKE THEM BREAKAWAY.(DRILLED WITH 1½" HOLES, PERPENDICULAR TO THE DIRECTION OF TRAVEL, LOCATED 4" AND 18" ABOVE THE GROUND)
3. USE "U" CHANNEL POSTS FOR CROSS -BRACING SIGNS SUPPORTED BY DUAL WOOD POSTS.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

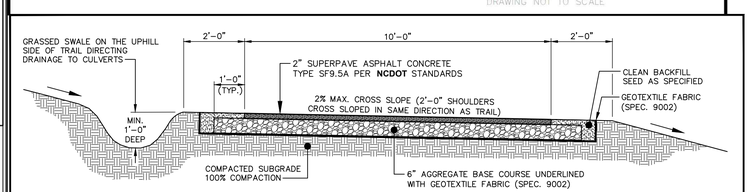
1-18

ROADWAY STANDARD DRAWING FOR
MOUNTING OF TYPE 'D', 'E', AND 'F' SIGNS ON WOOD POSTS

SHEET 2 OF 2
903.20

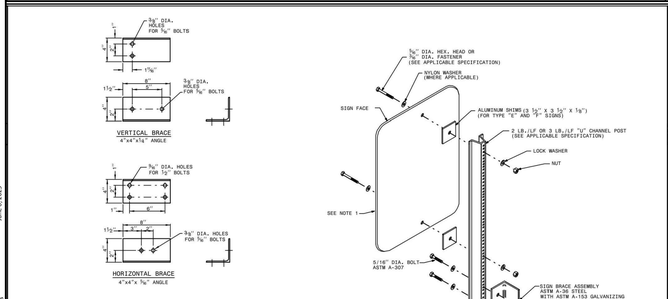


DRAWING NOT TO SCALE



NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR RE-ESTABLISHING ALL SLOPES DISTURBED BY CONSTRUCTION.
2. NO ABOVE GROUND UTILITIES OR UTILITY SURFACE COVERS/PLATES/MANHOLES SHALL BE LOCATED WITHIN TRAIL AND SHALL BE MINIMUM 2 FEET FROM THE EDGE OF TRAIL. RAISED MANHOLES SHALL BE MINIMUM 4 FEET FROM TRAIL EDGE.
3. ALL TRAILS SHALL BE LOCATED MINIMUM 5 FEET FROM THE BACK OF CURB.
4. SIDE SLOPES SHALL NOT EXCEED 3:1. CUT & FILL SLOPES SHALL TIE INTO EXISTING SLOPES TO CREATE AN EVEN TRANSITION.
5. CROSS SLOPE TYPICALLY TO LOW SIDE BUT CROSS SLOPE TO INSIDE OF DOWNHILL CURVES, WITH GRADUAL TRANSITIONS BETWEEN ANY CROSS SLOPE DIRECTION CHANGES.

STANDARD 10-FT/STREET-SIDE TRAIL ASPHALT GREENWAY TRAIL



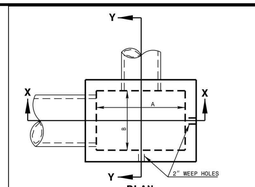
NOTES:
1. MAXIMUM SIGN SIZE IS 9.0 SQUARE FEET IN MAXIMUM WIND VELOCITY OF 80 MPH.
2. ERECT TYPE "E" AND "F" SIGNS WITH THE SAME SPECIFICATIONS AS "TYPICAL INSTALLATION OF SIGNS MOUNTED ON "U" CHANNEL POSTS.
3. ERECT MILE MARKERS WITH THE SAME SPECIFICATIONS AS "MILEPOST DETAILS AND PLACEMENT". SEE ROADWAY STANDARD NUMBER 904.40.
4. APPLICABLE SECTIONS OF THE NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES SHALL BE IN EFFECT.
5. ATTACH THE BRACE TO THE BARRIER BY MEANS OF ½" DIAMETER, 2" LONG CONCRETE ANCHORS WITH LOCK WASHERS. USE CONCRETE ANCHORS THAT ARE STAINLESS STEEL OR GALVANIZED IN ACCORDANCE WITH ASTM A-152. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
BARRIER SIGN SUPPORT ASSEMBLY

SHEET 1 OF 1
903.30



NOTES: USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.

OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.

USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.

IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.

FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 16'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.

CONSTRUCT WITH PIPE CROWNS MATCHING.

INSTALL 2" WEEPHOLES AS DIRECTED BY THE ENGINEER.

INSTALL STONE DRAINS, OF A MINIMUM OF 1 CUBIC FOOT OF NO. 78M STONE IN A POROUS FABRIC BAG OR WRAP, AT EACH WEEP HOLE OR AS DIRECTED BY THE ENGINEER.

CHAMFER ALL EXPOSED CORNERS ¾".

DRAWING NOT TO SCALE.

* INCREASE THE SIZE OF THE 6" OPENING TO 8" MAX., AS DIRECTED BY THE ENGINEER BY ADDING 2" TO THE WALL HEIGHT ABOVE THE TOP ELEVATION. ADJUST QUANTITIES ACCORDINGLY.

MIN. DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN (BASED ON MIN. HEIGHT, H1)

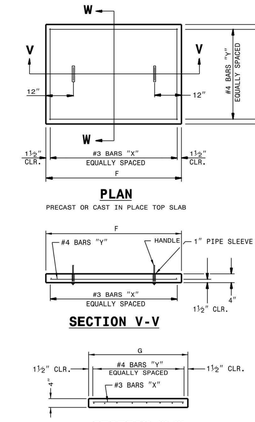
DIM'S OF BOX & PIPE				REINFORCING						TOP & BOT. SLAB DIMENSIONS		CU. YDS. CONC. IN BOX			TOTAL QUANTITIES BOX & SLABS		DEDUCTION ONE PIPE		DEC. ONE THROAT OPENING
PIPE D	SPAN A	WIDTH B	HEIGHT H	BARS - Y NO.	BARS - Y LENGTH	BARS - Y NO.	BARS - Y LENGTH	BARS - Z NO.	BARS - Z LENGTH	F	G	TOP SLAB	BOT. SLAB	WALLS	LBS. OF REINF.	CU. YDS. CONC.	C.S.	R.C.	YD³
12"	3'-6"	2'-3"	1'-10"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.181	0.271	0.250	27	1.046	0.015	0.032	0.046
15"	3'-6"	2'-3"	2'-1"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.181	0.271	0.250	27	1.108	0.023	0.036	0.046
18"	4'-0"	2'-8"	2'-4"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.226	0.340	0.284	35	1.379	0.033	0.049	0.053
24"	4'-0"	2'-8"	3'-10"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.226	0.340	0.284	35	1.521	0.059	0.065	0.053
30"	4'-0"	3'-6"	3'-4"	5	4'-3"	9	4'-9"	2	4'-9"	5'-0"	4'-6"	0.278	0.417	0.315	43	1.916	0.092	0.127	0.053
36"	4'-6"	4'-0"	3'-10"	5	4'-9"	10	5'-3"	2	5'-3"	5'-6"	5'-0"	0.340	0.510	0.352	51	2.390	0.132	0.178	0.059
42"	5'-0"	4'-6"	4'-4"	5	5'-3"	12	5'-9"	2	5'-9"	6'-0"	5'-6"	0.407	0.611	0.389	64	2.914	0.180	0.243	0.066
48"	5'-0"	5'-0"	4'-10"	5	5'-9"	13	5'-9"	2	5'-9"	6'-0"	6'-0"	0.444	0.666	0.407	68	3.298	0.235	0.317	0.066

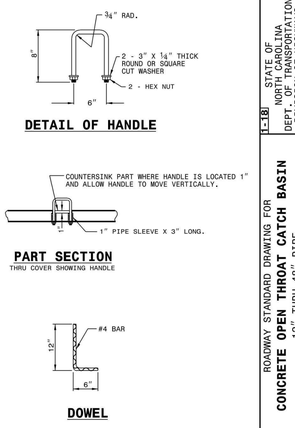
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE OPEN THROAT CATCH BASIN
12" THRU 48" PIPE

SHEET 1 OF 2
840.04



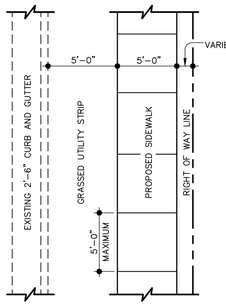


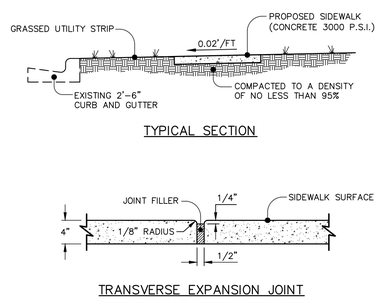
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE OPEN THROAT CATCH BASIN
12" THRU 48" PIPE

SHEET 2 OF 2
840.04





NOTES:
1. TRANSVERSE EXPANSION JOINTS TO BE A MAXIMUM OF 50 FEET.
2. ALL CONCRETE TO BE FINISHED WITH CURING COMPOUND.
3. A 6 INCH DEPTH IS REQUIRED AT LOCATIONS OF DRIVEWAY CROSSINGS, AT STREET INTERSECTIONS (ALONG THE LENGTH OF RADIUS CURB RETURNS), AND IN THE HANDICAP RAMPS.

STANDARD CONCRETE SIDEWALK

DETAIL No.
03000.07
SHEET 1 OF 2

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4021 Stirrup Creek Boulevard, Suite 400 (27617)
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA BOARD OF EXAMINERS FOR ENGINEERING AND SURVEYING
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881
CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 9810 ENGINEER JOHN R. HARMAN

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/21/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT.
2	9/4/2024	WAKE COUNTY AND CITY OF RALEIGH
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

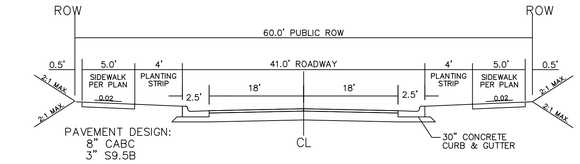
JOB NUMBER:	9900
CHECKED BY:	BH/JH
DRAWN BY:	SM/MA/LL/ES/AH/DH
DATE:	NOV 1, 2024

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD18

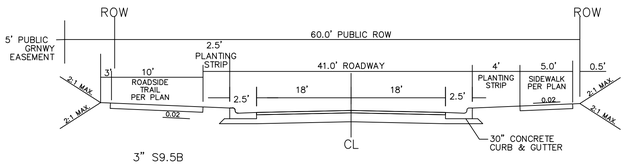
North Carolina 811 Know what's below.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Workfiles Property\Civil_Working Dwgs\Phase 3\Sheet files\Sheet file CD_CD18 Phase 3 Details.dwg June 6, 2025



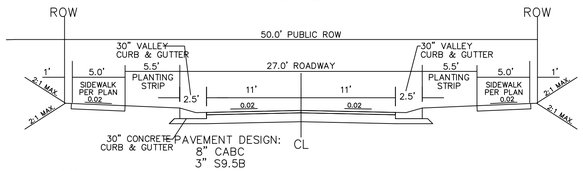
NOTE:
1. NORMAL CROWN OF 0.02 UNLESS OTHERWISE DIRECTED BY TOWN ENGINEER.
2. ASPHALT WILL BE INSTALLED AT A MIN. 1.5" LIFTS.

41' B-B ON A 60' R/W
TYPICAL SECTION



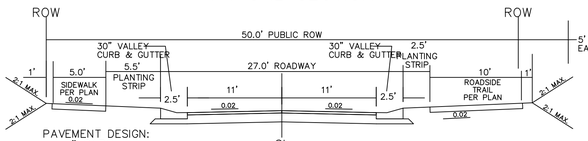
NOTE:
1. NORMAL CROWN OF 0.02 UNLESS OTHERWISE DIRECTED BY TOWN ENGINEER.
2. ASPHALT WILL BE INSTALLED AT A MIN. 1.5" LIFTS.

41' B-B ON A 60' R/W
TYPICAL SECTION



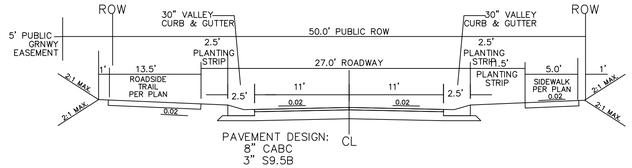
NOTE:
1. NORMAL CROWN OF 0.02 UNLESS OTHERWISE DIRECTED BY TOWN ENGINEER.
2. ASPHALT WILL BE INSTALLED AT A MIN. 1.5" LIFTS.

27' B-B ON A 50' R/W
TYPICAL SECTION



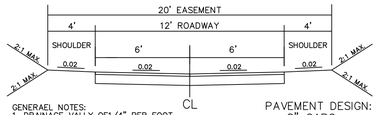
NOTE:
1. NORMAL CROWN OF 0.02 UNLESS OTHERWISE DIRECTED BY TOWN ENGINEER.
2. ASPHALT WILL BE INSTALLED AT A MIN. 1.5" LIFTS.

27' B-B ON A 50' R/W
TYPICAL SECTION



NOTE:
1. NORMAL CROWN OF 0.02 UNLESS OTHERWISE DIRECTED BY TOWN ENGINEER.
2. ASPHALT WILL BE INSTALLED AT A MIN. 1.5" LIFTS.

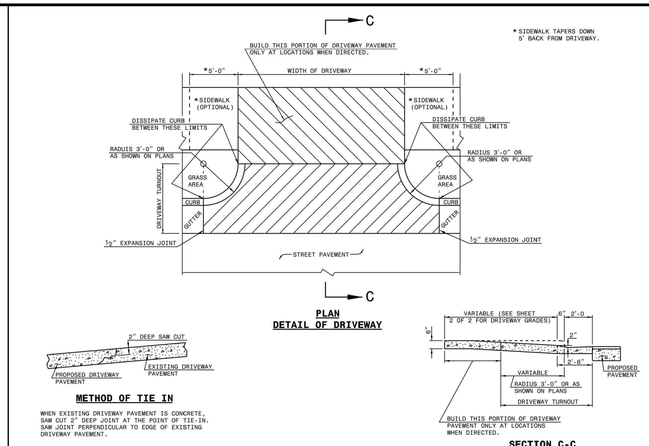
27' B-B ON A 50' R/W
TYPICAL SECTION



GENERAEL NOTES:
1. DRAINAGE VALLY OF1/4" PER FOOT UNLESS OTHERWISE DIRECTED.
2. PAVEMENT DESIGN AS NOTED.
3. SEE DRIVEWAY DETAIL FOR ROAD INTERSECTIONS.

PAVEMENT DESIGN:
8" CABC
2" S9.5B

12' E-E IN A 20' EASEMENT
TYPICAL SECTION



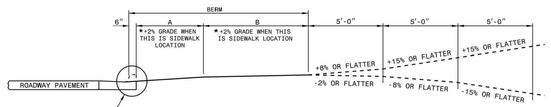
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
DRIVEWAY TURNOUT
RADIUS TYPE

SHEET 1 OF 2
848.02

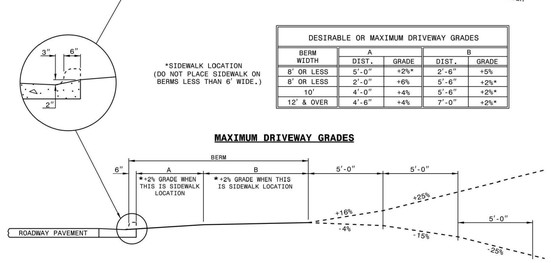
DESIRABLE DRIVEWAY GRADES



*SIDEWALK LOCATION (DO NOT PLACE SIDEWALK ON BERMS LESS THAN 6' WIDE.)

DESIRABLE OR MAXIMUM DRIVEWAY GRADES				
BERM WIDTH	A		B	
	DIST.,	GRADE	DIST.,	GRADE
6' OR LESS	5'-0"	+2%*	2'-6"	+5%
8' OR LESS	2'-0"	+6%	5'-6"	+2%*
10'	4'-0"	+4%	5'-6"	+2%*
12' & OVER	4'-6"	+4%	7'-0"	+2%*

MAXIMUM DRIVEWAY GRADES



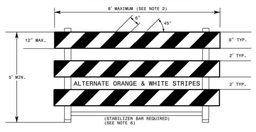
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

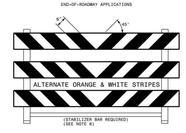
ROADWAY STANDARD DRAWING FOR
DRIVEWAY TURNOUT
DRIVEWAY GRADES

SHEET 2 OF 2
848.02

TYPE III BARRICADE



TYPE III BARRICADE



GENERAL NOTES

1- HORIZONTAL RAILS FOR MAY BE CONSTRUCTED OF APPROVED COMPOSITE, HOLLOW/CORRUGATED EXTRUDED RIGID POLYOLEFIN, HIGH DENSITY POLYETHYLENE, OR OTHER NCDOT APPROVED MATERIAL.

2- BARRICADE SHALL BE LIMITED TO A MAXIMUM LENGTH OF 8 FT UNLESS NCHRP 350 CRASH TESTED FOR CATEGORY II DEVICES AND NCDOT APPROVED.

3- ONLY NCDOT APPROVED COMPOSITE AND ROLL-UP SIGNS MAY BE MOUNTED ON THE BARRICADE RAILS. MOUNT SIGNS TO BARRICADE RAILS TO ENSURE SIGN WILL NOT BECOME DETACHED UNDER NORMAL WIND AND TRAFFIC CONDITIONS.

4- SIGNS SHALL BE MOUNTED A MINIMUM OF 1 FOOT FROM THE GROUND TO THE BOTTOM OF THE SIGN UNLESS SIGNS R11-3 OR R11-4 ARE REQUIRED BY THE PLANS OR DIRECTED BY THE ENGINEER.

5- BARRICADE MUST BE NCHRP 350 FOR CATEGORY II DEVICES AND NCDOT APPROVED WITH STABILIZER BAR OR ADEQUATE LATERAL BRACING.

6- ASSEMBLY OF THE GENERIC BARRICADES MUST BE SELF CERTIFIED BY THE ASSEMBLER.

7- BARRICADES USED TO CLOSE A ROADWAY SHALL EXTEND ACROSS THE ENTIRE ROADWAY. WHERE LOCAL TRAFFIC MUST BE MAINTAINED, THEY MAY BE PLACED IN A STAGGERED PATTERN.

8- STRIPES ON WORK ZONE BARRICADE RAILS SHALL BE ALTERNATE ORANGE AND WHITE RETROREFLECTIVE STRIPES, SLOPED DOWNWARD TOWARDS THE SIDE WHICH TRAFFIC IS TO PASS OR TURN IN DETOURING. WHERE NO TURNS ARE INTENDED, THE STRIPES SHOULD SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

9- USE RED AND WHITE STRIPES FOR PERMANENT BARRICADES.

10- ALL BARRICADES MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST.

11- PLACE MANUFACTURER'S NAME AND FEDERAL HIGHWAY ADMINISTRATION'S NCHRP 350 APPROVAL LETTER NUMBER ON BARRICADE FRAME.

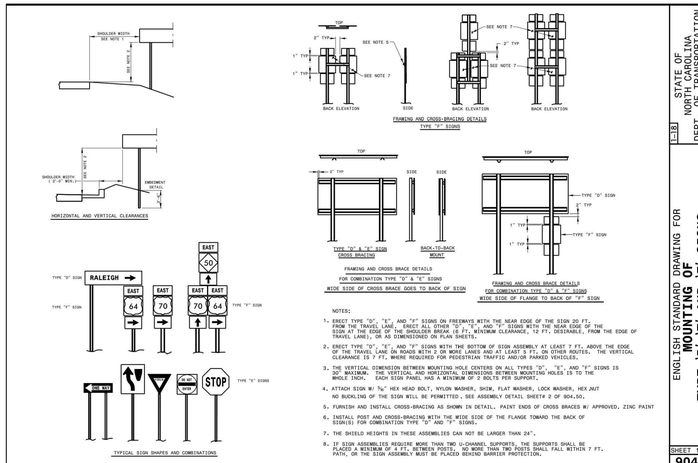
12- PLACE SANDBAGS OR OTHER APPROVED BALLASTING METHODS ON THE FEET OF THE FRAME. DO NOT PLACE SANDBAGS ON TOP OF A STRIPED RAIL OR STABILIZER BAR. DO NOT BALLAST BARRICADES BY HEAVY OBJECTS SUCH AS ROCKS, CHUNKS OF CONCRETE OR OTHER ITEMS THAT WOULD CAUSE DAMAGE IF THE BARRICADE IS STRUCK BY A VEHICLE.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
BARRICADES
TYPE-III

SHEET 1 OF 1
1145.01



NOTES:
1. CURB SHALL BE TAPERED TO FINISH FLUSH WITH SIDEWALK.
2. BEGINNING RADIUS SHALL NOT ENCROACH ON ADJACENT PROPERTIES BASED ON A PROJECTION OF THE PROPERTY LINE FROM THE RIGHT OF WAY TO THE CURB LINE.
3. SIDEWALK SECTION SHALL BE REQUIRED ALONG ALL STREETS.
4. THE TOWN IS NOT RESPONSIBLE FOR VEHICLES THAT DRAG DUE TO GRADE OF DRIVEWAY. THE DRIVEWAY IS PRIVATELY MAINTAINED.
5. ALL CONCRETE SHALL BE 3,000 PSI.

DRIVEWAY APRON

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ENGLISH STANDARD DRAWING FOR
MOUNTING OF SIGNS
TYPE 'D','E' AND 'F' SIGNS ON 'U' CHANNEL POSTS

SHEET 1 OF 2
904.50

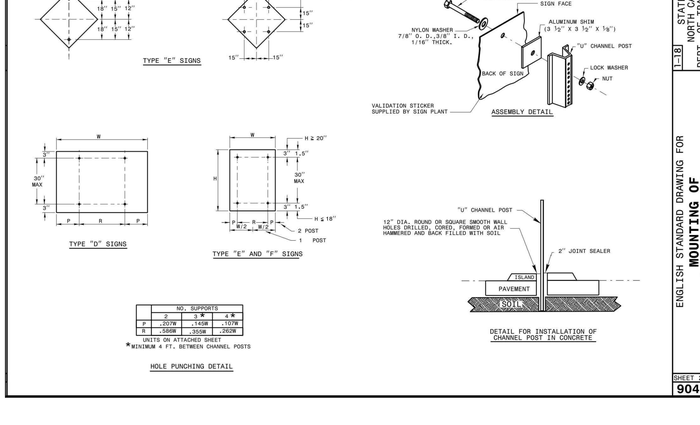
NOTES:
1. ERECT TYPE "D", "E", AND "F" SIGNS ON FREEWAYS WITH THE NEAR EDGE OF THE SIGN 20 FT. FROM THE TRAVEL LANE. ERECT ALL OTHER "D", "E", AND "F" SIGNS WITH THE NEAR EDGE OF THE SIGN AT THE EDGE OF THE SHOULDER BREAK (8 FT. MINIMUM CLEARANCE, 12 FT. DESIRABLE, FROM THE EDGE OF TRAVEL LANE), OR AS DIMENSIONED ON PLAN SHEETS.
2. ERECT TYPE "D", "E", AND "F" SIGNS WITH THE BOTTOM OF SIGN ASSEMBLY AT LEAST 7 FT. ABOVE THE EDGE OF THE TRAVEL LANE ON ROADS WITH 2 OR MORE LANES AND AT LEAST 8 FT. ON OTHER ROUTES. THE VERTICAL CLEARANCE IS 7 FT. WHERE REQUIRED FOR PEDESTRIAN TRAFFIC AND/OR PARKED VEHICLES.
3. THE VERTICAL DIMENSION BETWEEN MOUNTING HOLE CENTERS ON ALL TYPES "D", "E", AND "F" SIGNS IS 30" MAXIMUM. THE VERTICAL AND HORIZONTAL DIMENSIONS BETWEEN MOUNTING HOLES IS TO THE WHOLE INCH. EACH SIGN PANEL HAS A MINIMUM OF 2 BOLTS PER SUPPORT.
4. ATTACH SIGN W/ ⅜" HEX HEAD BOLT, NYLON WASHER, SHIM, FLAT WASHER, LOCK WASHER, HEX NUT NO BUCKLING OF THE SIGN WILL BE PERMITTED, SEE ASSEMBLY DETAIL SHEETS 2 OF 904.50.
5. FURNISH AND INSTALL CROSS-BRACING AS SHOWN IN DETAIL. PAINT ENDS OF CROSS BRACES W/ APPROVED, ZINC PAINT
6. INSTALL POST AND CROSS-BRACING WITH THE WIDE SIDE OF THE FLANGE TOWARD THE BACK OF SIGN(S) FOR COMBINATION TYPE "D" AND "F" SIGNS.
7. THE SHIELD HEIGHTS IN THESE ASSEMBLIES CAN NOT BE LARGER THAN 24".
8. IF SIGN ASSEMBLIES REQUIRE MORE THAN TWO U-CHANNEL SUPPORTS, THE SUPPORTS SHALL BE PLACED A MINIMUM OF 4 FT. BETWEEN POSTS. NO MORE THAN TWO POSTS SHALL FALL WITHIN 7 FT. PATH, OR THE SIGN ASSEMBLY MUST BE PLACED BEHIND BARRIER PROTECTION.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-18

ENGLISH STANDARD DRAWING FOR
MOUNTING OF SIGNS
TYPE 'D','E' AND 'F' SIGNS ON 'U' CHANNEL POSTS

SHEET 2 OF 2
904.50



NO. SUPPORTS			
2	3 *	4 *
P	.207W	.145W	.107W
R	.586W	.359W	.282W

UNITS ON ATTACHED SHEET
*MINIMUM 4 FT. BETWEEN CHANNEL POSTS

HOLE PUNCHING DETAIL

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 405
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9810 JOHN R. HARMAN
AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

DETAIL SELECTION ONLY

NO.	DATE	REVISION:
1	7/27/2021	1ST REVIEW FROM TOWN OF ROLESVILLE CONSULTANT,
		WAKE COUNTY AND CITY OF RALEIGH
2	9/4/2024	TOWN OF ROLESVILLE CONSULTANT COMMENTS:
3	11/01/2024	CONSTRUCTION DRAWING COMMENT RESPONSES
4	3/11/2025	CONSTRUCTION DRAWING COMMENT RESPONSES
5	4/28/2025	WAKE COUNTY COMMENT RESPONSES

STIPULATION FOR REUSE

THIS DRAWING WAS PREPARED FOR USE ON THE SPECIFIC SITE, NAMED HEREON, CONTEMPORANEOUSLY WITH ITS ISSUE DATE AS LISTED, HEREON. AND IT IS NOT SUITABLE FOR USE ON A DIFFERENT PROJECT SITE OR AT A LATER TIME. USE OF THIS DRAWING FOR REFERENCE OR EXAMPLE ON ANOTHER PROJECT REQUIRES THE SERVICES OF PROPERLY LICENSED ARCHITECTS AND ENGINEERS. REPRODUCTION OF THIS DRAWING FOR REUSE ON ANOTHER PROJECT IS NOT AUTHORIZED AND MAY BE CONTRARY TO THE LAW.

KALAS FALLS PHASE 3
1832 ROLESVILLE ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: BH/JH
DRAWN BY: SM/MA/LL/ES/AH/DH
DATE: NOV 1, 2024

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD19

North Carolina 811
*** 3 Days Before Digging ***
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Walden Property\Civil\1_Working Dwgs\3Phase 3\Sheet Files\Sheet No.CD1-CD19 Phase 3 Details.dwg
June 6, 2025

Outdoor Lighting

MICRO LED ROADWAY
(Meets Dark Sky Criteria)

LED (Light-emitting diode)	50 watts
Mounting height	20', 25', 35'
Color	Gray | Black
Pole	Fiberglass Metal Wood
Applications	Neighborhoods Parks Streets

Light source: LED (white)
Wattage: 50 watts, 70 watts
Lumens: 5,232 – 8,170
Light pattern: IESNA Type II, III, V
IESNA cutoff classification: Full-cutoff
BUG rating: Type II = B1U0G2 (50w)
B2U0G2 (70w)
Type III = B1U0G1
Type V = B3U0G1 (50w only)
Color temperature: 3,000K **4,000K**

light distribution patterns

POLE AVAILABLE	MOUNTING HEIGHT	COLOR
Fiberglass	25', 30', 35'	Gray, Black (additional cost)
Wood	25', 30', 35'	Standard
Metal (Special conditions)	25', 30', 35'	Galvanized

FEATURES	BENEFITS
Turnkey operation	Provides hassle-free installation and service
Little or no installation cost	Frees up capital for other projects
Design services by lighting professionals included	Meets industry standards and lighting ordinances
Maintenance, electricity & warranty included	Eliminates high and unexpected repair bills
One low monthly cost on your electric bill	Convenience and savings for you

For additional information, contact us at ODLCarolinas@duke-energy.com.

DUKE ENERGY. PROGRESS

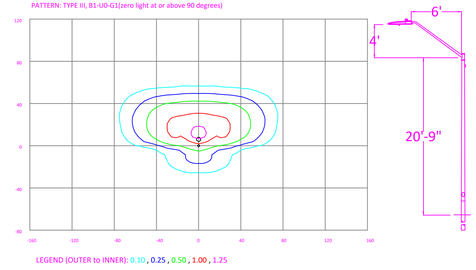
BUILDING A SMARTER ENERGY FUTURE®

©2020 Duke Energy Corporation 203398 DCP 5/20

ISOFOOTCANDLE CURVES

FIXTURE: LED 50W ROADWAY
MOUNTING HEIGHT: 25 FT
LIGHT SOURCE: LED, 3000K, 70 CRI
LUMENS : 5342
PATTERN: TYPE III, B1-U0-G1(zero light at or above 90 degrees)

ASSY# LFIX-RW-LED-50-GRAY-III-3000K-____-P
POLE ASSY# LPOLE-DB-FG-25FT-GRAY-____-P (GRAY)



LEGEND (OUTER to INNER): 0.10 , 0.25 , 0.50 , 1.00 , 1.25

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Road	✳	0.4 fc	1.0 fc	0.1 fc	10.0:1	4.0:1

Schedule

Symbol	Label	QTY	Description	Number Lamps	Lamp Output	LLF
◆ ●	A	58	LED 50w Roadway - Type III - 3000K	1	5312	0.85

NO.	DATE	REVISION	BY

DISTANCE CALIBRATION < INCHES >
0 0.5 1.0 2.0 3.0 4.0

LIGHTING DESIGN TOLERANCE

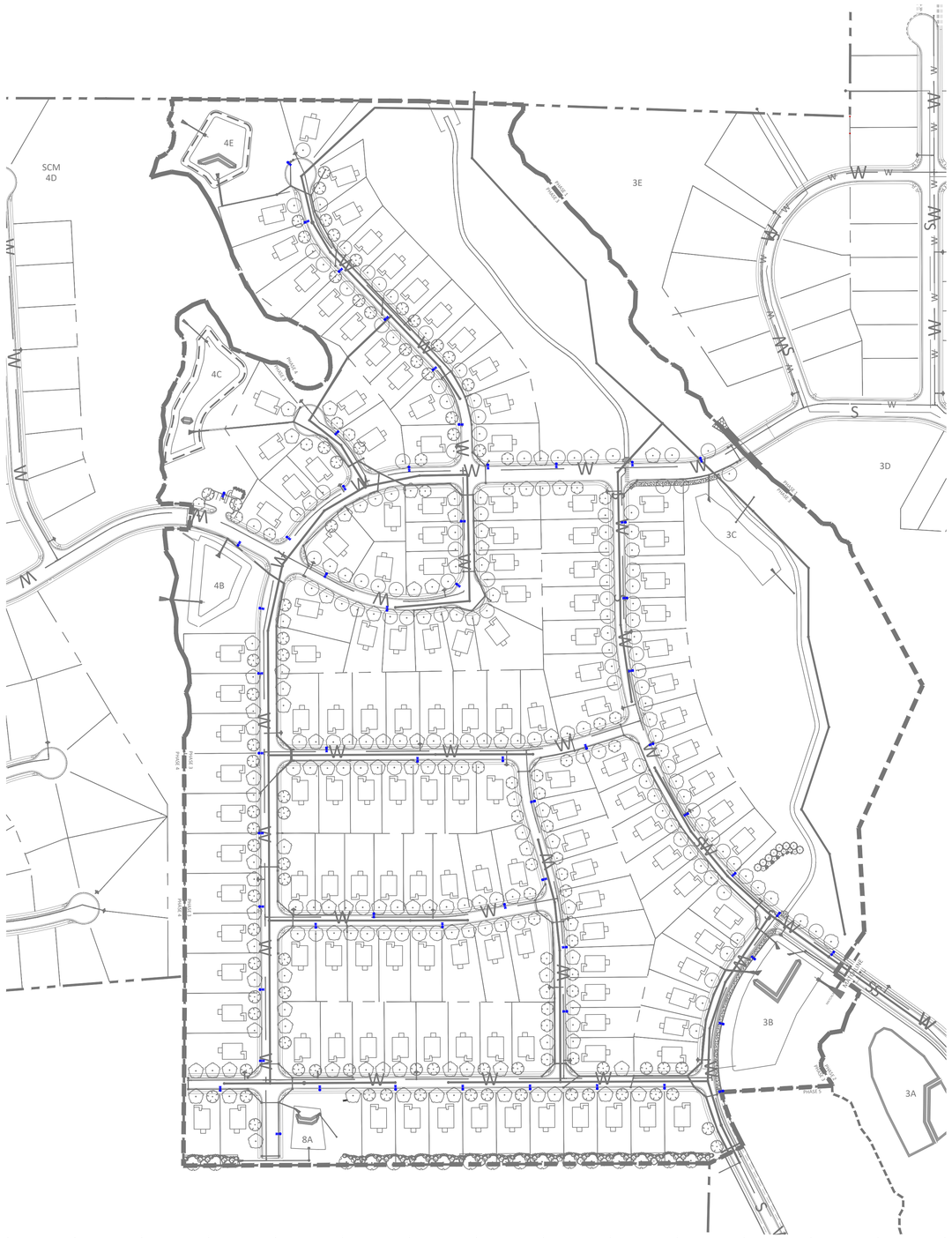
The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

DUKE ENERGY® PROGRESS

PROPRIETARY & CONFIDENTIAL

This document together with the concepts and designs presented herein, presented as an instrument of service, is the sole property of Duke Energy, and is intended only for the specific purpose and prospective client as stated in the title block of this drawing. Any use, copying, reproduction or disclosure of the drawing, design or any information contained herein by the prospective customer or other entities, including without limitation, architects, engineers, or equipment manufacturers is hereby expressly prohibited and shall not be permitted absent prior written consent from, and payment of compensation to Duke Energy. Duke Energy disclaims any liability or responsibility for any unauthorized use of or reliance on this document.

KALAS III
WAKE FOREST, NC
STREET LIGHTING ARRANGEMENT
Designed by DUKE ENERGY PROGRESS LIGHTING SOLUTIONS
Reviewed by N. Johnson Scale 1" = 150'
Date 05/05/2025 Size Drawing size "D"
Description LED ROADWAY
Drawing No. 25-0179A Sht. 1 OF 1



Outdoor Lighting

MICRO LED ROADWAY
(Meets Dark Sky Criteria)

LED (Light-emitting diode)	50 watts
Mounting height	20', 25', 35'
Color	Gray | Black
Pole	Fiberglass Metal Wood
Applications	Neighborhoods Parks Streets

Light source: LED (white)
Wattage: 50 watts, 70 watts
Lumens: 5,232 – 8,170
Light pattern: IESNA Type II, III, V
IESNA cutoff classification: Full-cutoff
BUG rating: Type II = B1U0G2 (50w)
B2U0G2 (70w)
Type III = B1U0G1
Type V = B3U0G1 (50w only)
Color temperature: 3,000K **4,000K**

light distribution patterns

POLE AVAILABLE	MOUNTING HEIGHT	COLOR
Fiberglass	25', 30', 35'	Gray, Black (additional cost)
Wood	25', 30', 35'	Standard
Metal (Special conditions)	25', 30', 35'	Galvanized

FEATURES	BENEFITS
Turnkey operation	Provides hassle-free installation and service
Little or no installation cost	Frees up capital for other projects
Design services by lighting professionals included	Meets industry standards and lighting ordinances
Maintenance, electricity & warranty included	Eliminates high and unexpected repair bills
One low monthly cost on your electric bill	Convenience and savings for you

For additional information, contact us at **OOLCarolinas@duke-energy.com.**

DUKE ENERGY. PROGRESS

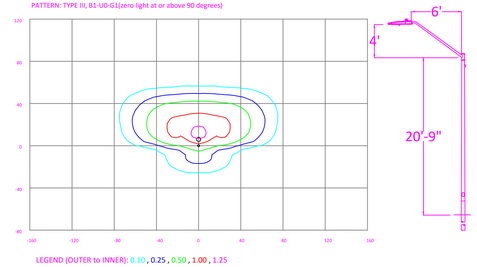
BUILDING A SMARTER ENERGY FUTURE®

©2023 Duke Energy Corporation 215709B DCP 5/23

ISOFOOTCANDLE CURVES

FIXTURE: LED 50W ROADWAY
MOUNTING HEIGHT: 25 FT
LIGHT SOURCE: LED, 3000K, 70 CRI
LUMENS : 5342
PATTERN: TYPE III, B1-U0-G1(zero light at or above 90 degrees)

ASSY# LFIX-RW-LED-50-GRAY-III-3000K-____-P
POLE ASSY# LPOLE-DB-FG-25FT-GRAY-____-P (GRAY)



LEGEND (OUTER to INNER): 0.10 , 0.25 , 0.50 , 1.00 , 1.25

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Road	✳	0.4 fc	1.0 fc	0.1 fc	10.0:1	4.0:1

Schedule

Symbol	Label	QTY	Description	Number Lamps	Lamp Output	LLF
⧓ ●	A	58	LED 50w Roadway - Type III - 3000K	1	5312	0.85

NO.	DATE	REVISION	BY

DISTANCE CALIBRATION (INCHES)
0 0.5 1.0 2.0 3.0 4.0

LIGHTING DESIGN TOLERANCE

The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

DUKE ENERGY® PROGRESS

PROPRIETARY & CONFIDENTIAL

This document together with the concepts and designs presented herein, presented as an instrument of service, is the sole property of Duke Energy, and is intended only for the specific purpose and prospective client as stated in the title block of this drawing. Any use, copying, reproduction or disclosure of the drawing, design or any information contained herein by the prospective customer or other entities, including without limitation, architects, engineers, or equipment manufacturers is hereby expressly prohibited and shall not be permitted absent prior written consent from, and payment of compensation to Duke Energy. Duke Energy disclaims any liability or responsibility for any unauthorized use of or reliance on this document.

KALAS III
WAKE FOREST, NC
STREET LIGHTING ARRANGEMENT

Designed by DUKE ENERGY PROGRESS LIGHTING SOLUTIONS
Reviewed by N. Johnson Scale 1" = 150'
Date 05/05/2025 Size Drawing size "D"
Description LED ROADWAY
Drawing No. 25-0179A Sht. 1 OF 1