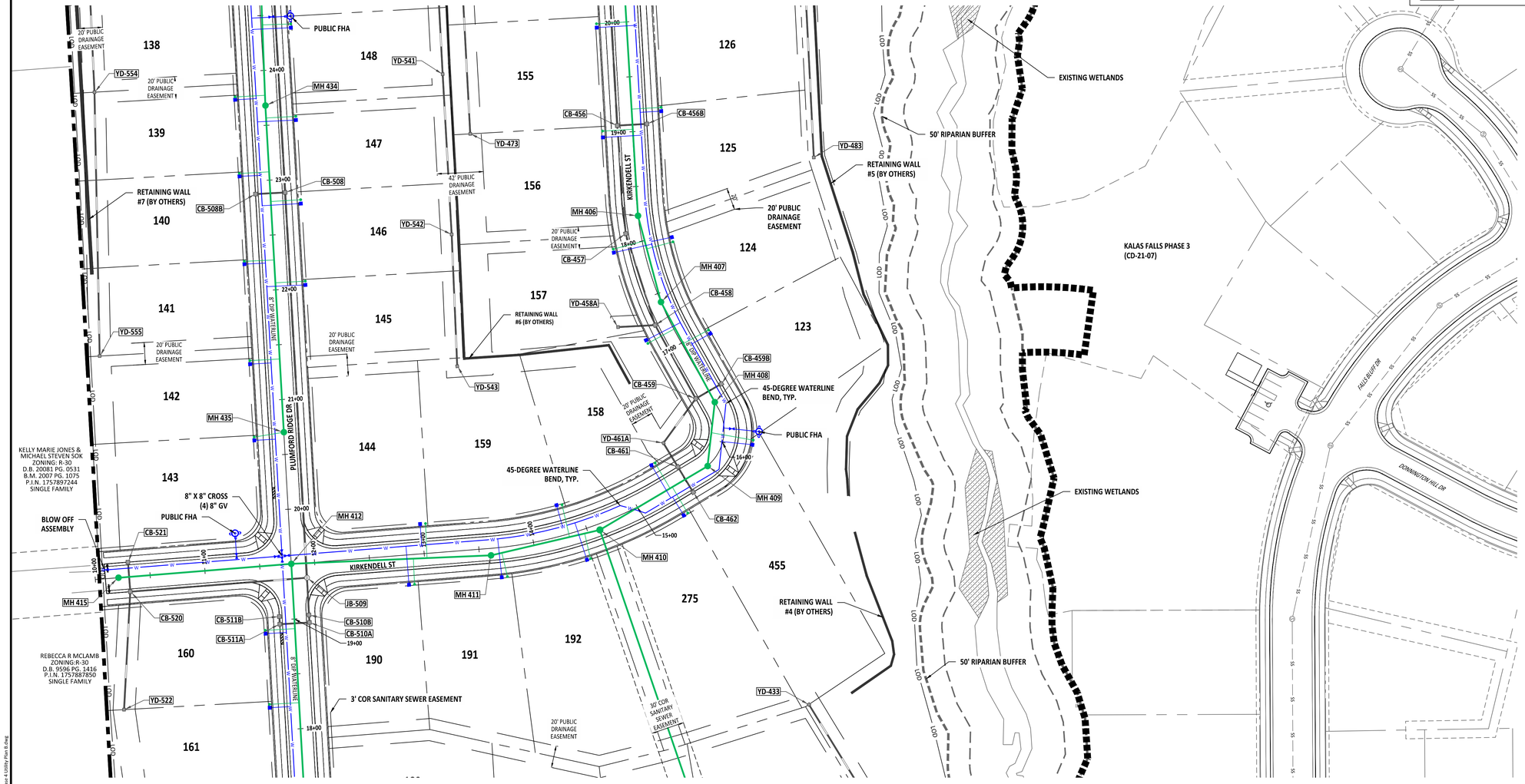


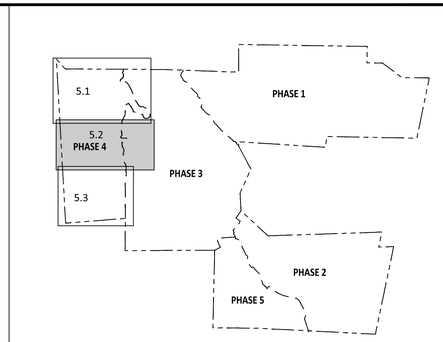


KEY MAP

| LEGEND | |
|---|---|
| PROPERTY LINE | |
| RIGHT-OF-WAY | |
| PHASE LINE | |
| NEUSE RIVER ZONE 2 | |
| NEUSE RIVER ZONE 1 | |
| SURFACE WATER | |
| EXISTING WETLANDS | |

**UTILITY NOTES:**
1. CORUE STANDS FOR CITY OF RALEIGH PUBLIC UTILITY EASEMENT
2. FHA STANDS FOR FIRE HYDRANT ASSEMBLY
3. GV STANDS FOR GATE VALVE
4. WATER SERVICES TO BE COMPRISED OF ¾" TYPE "K" SOFT COPPER PIPE PER CITY DETAIL
5. WATER METERS TO BE ¾" PER CITY DETAIL
6. SEER SERVICES TO BE COMPRISED OF 4" PVC PER CITY DETAIL

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50

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.

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 062383 ENGINEER ROMAN S. COOK

2026.09.08 15:27:05-04'00'

FOR CONSTRUCTION

| 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 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
UTILITY PLAN AREA B

SHEET NO.:
C5.2

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

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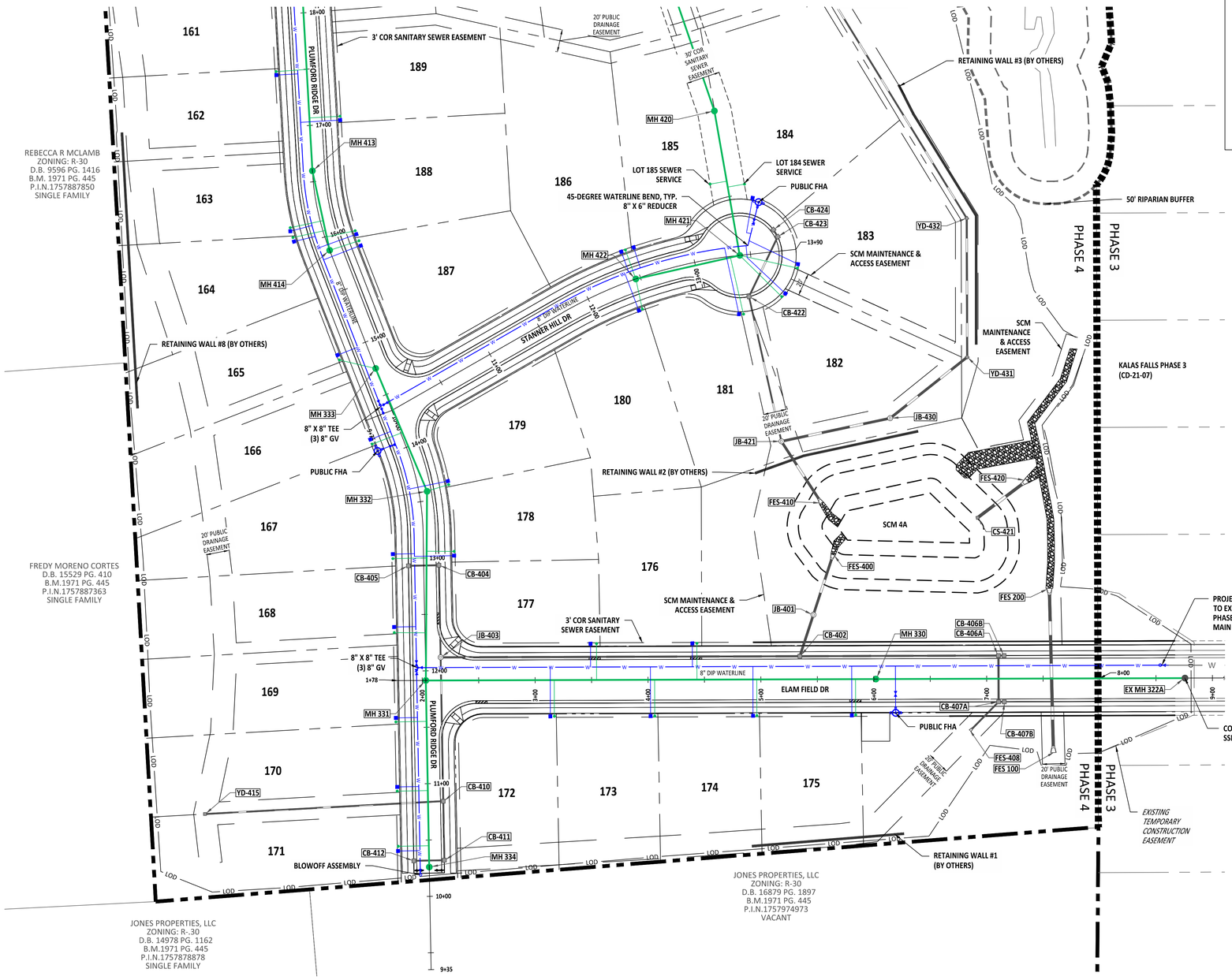


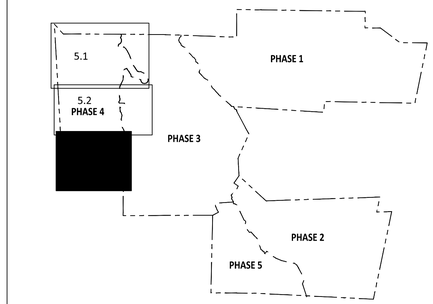


KEY MAP

| LEGEND | |
|---|---|
| PROPERTY LINE | |
| RIGHT-OF-WAY | |
| PHASE LINE | |
| NEUSE RIVER ZONE 2 | |
| NEUSE RIVER ZONE 1 | |
| SURFACE WATER | |
| EXISTING WETLANDS | |

**UTILITY NOTES:**

1. CORUE STANDS FOR CITY OF RALEIGH PUBLIC UTILITY EASEMENT
2. FHA STANDS FOR FIRE HYDRANT ASSEMBLY
3. GV STANDS FOR GATE VALVE
4. WATER SERVICES TO BE COMPRISED OF ¾" TYPE "K" SOFT COPPER PIPE PER CITY DETAIL
5. WATER METERS TO BE ¾" PER CITY DETAIL
6. SEER SERVICES TO BE COMPRISED OF 4" PVC PER CITY DETAIL

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50

ATTENTION CONTRACTORS

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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 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

STIPULATION FOR REUSE


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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:

UTILITY PLAN
AREA C

SHEET NO.:
C5.3

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

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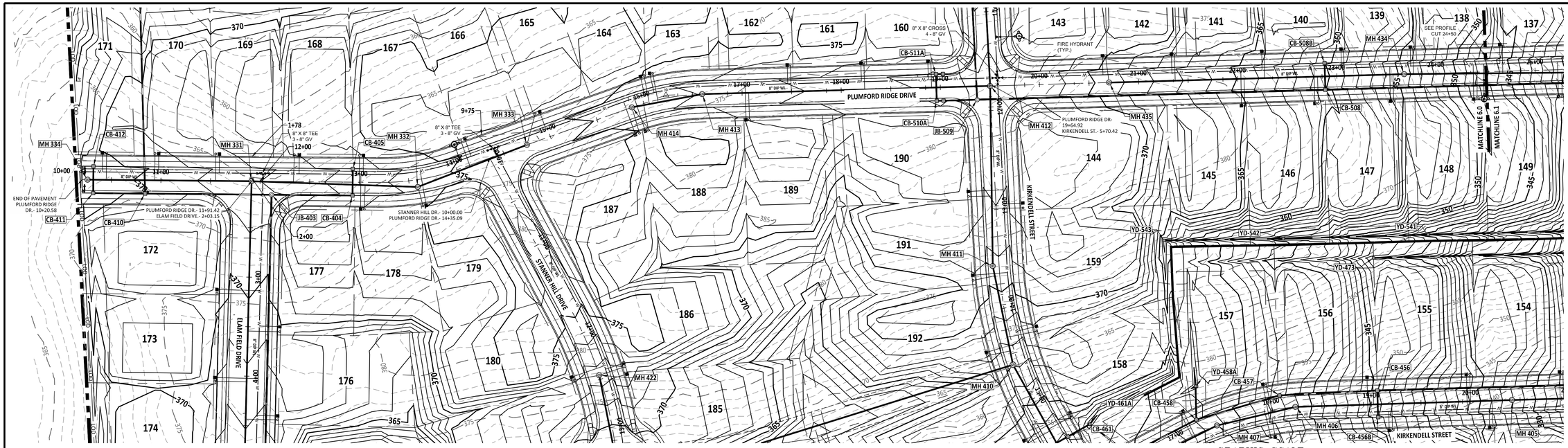


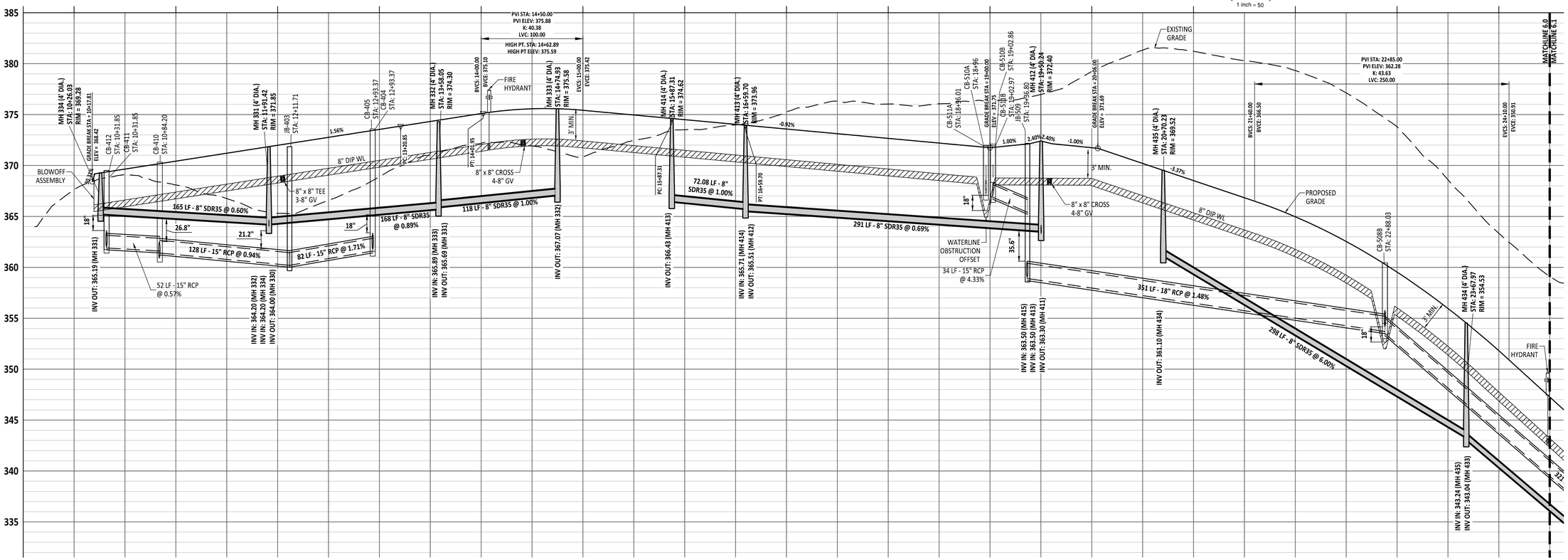

PLUMFORD RIDGE DRIVE PLAN (STN. 10+00 TO 24+50)

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )

1 inch = 50




PLUMFORD RIDGE DRIVE PROFILE (STN. 10+00 TO 24+50)

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 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
PLUMFORD RIDGE DR. PLAN & PROFILE

SHEET NO.:
C6.0

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

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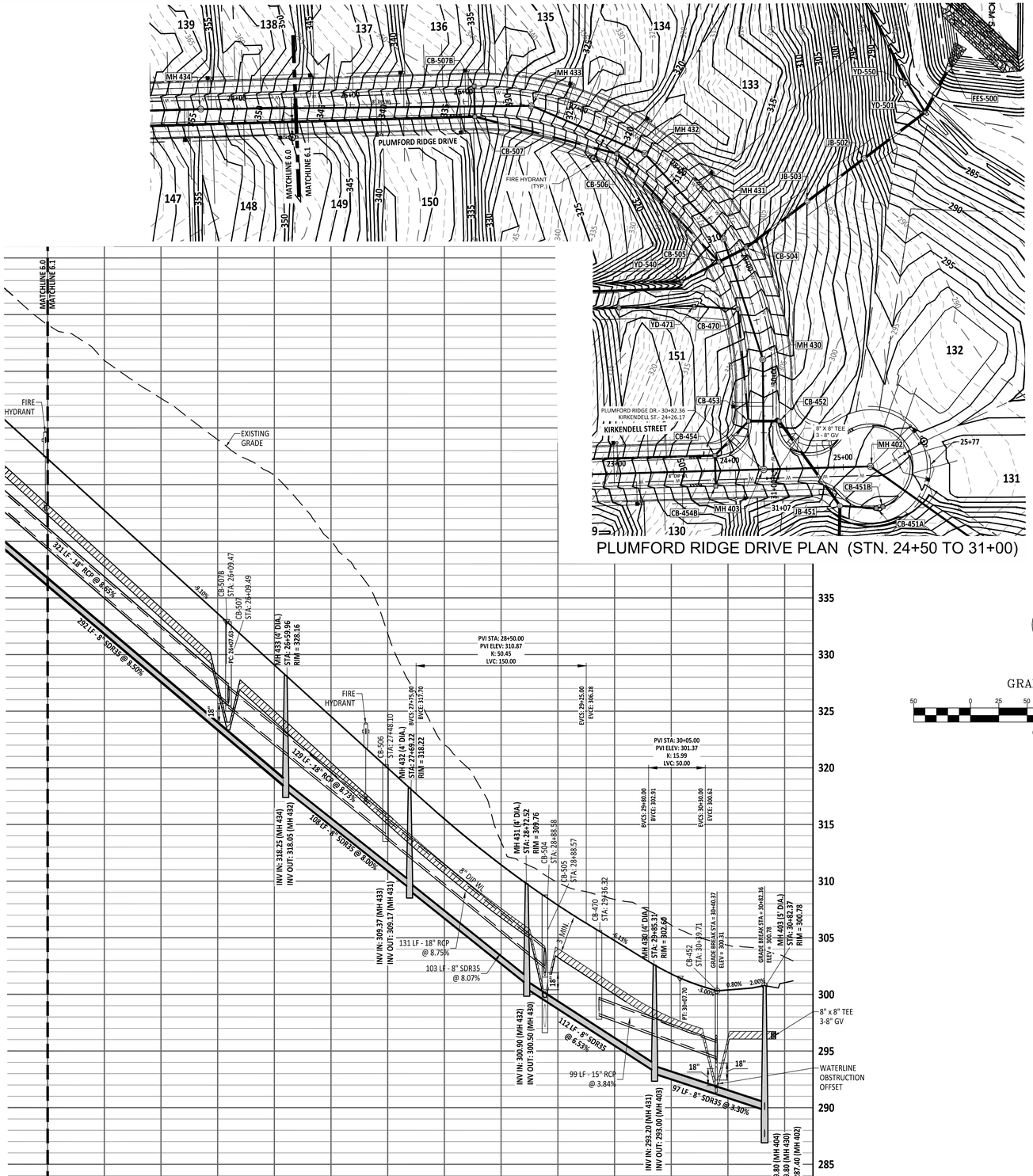


PLUMFORD RIDGE DRIVE PLAN (STN. 24+50 TO 31+00)




PLUMFORD RIDGE DRIVE PROFILE (STN. 24+50 TO 31+00)

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50


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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 082383 ENGINEER ROMAN S. COOK

2026.09.10 15:27:10-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
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| | | |

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
PLUMFORD RIDGE DR. PLAN & PROFILE

SHEET NO.:
C6.1


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


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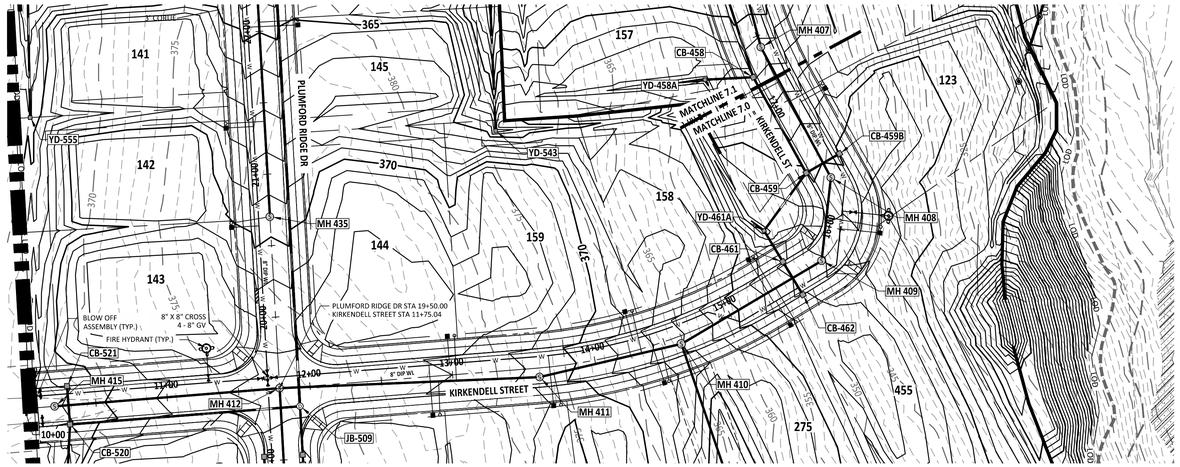


KIRKENDELL STREET PLAN (STN. 10+00 TO 17+25)

GRAPHIC SCALE

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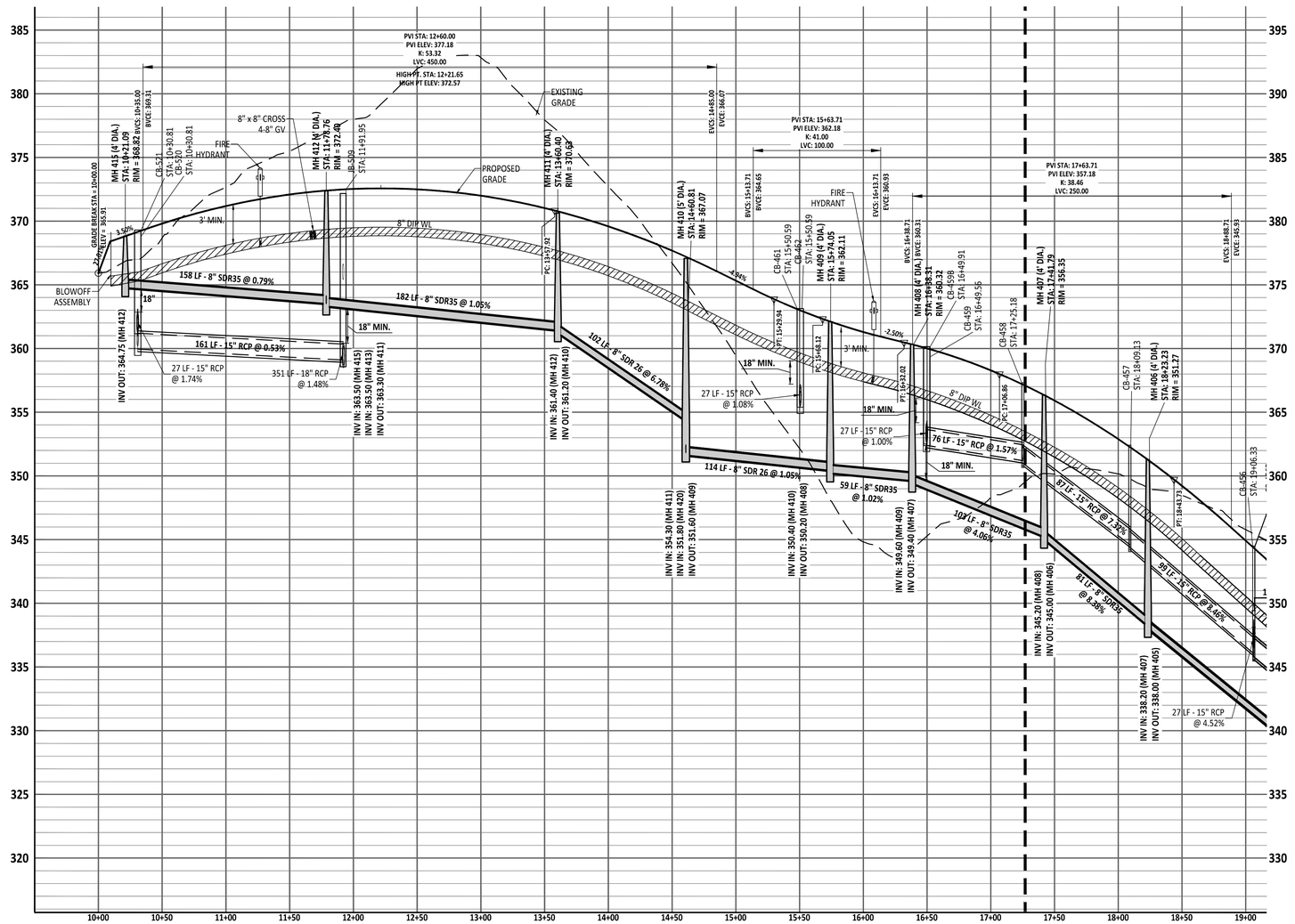
( IN FEET )

1 inch = 50




KIRKENDELL STREET PROFILE (STN. 10+00 TO 17+25)

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 AUTHORITY

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
KIRKENDELL ST. PLAN & PROFILE

SHEET NO.:
C7.0

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

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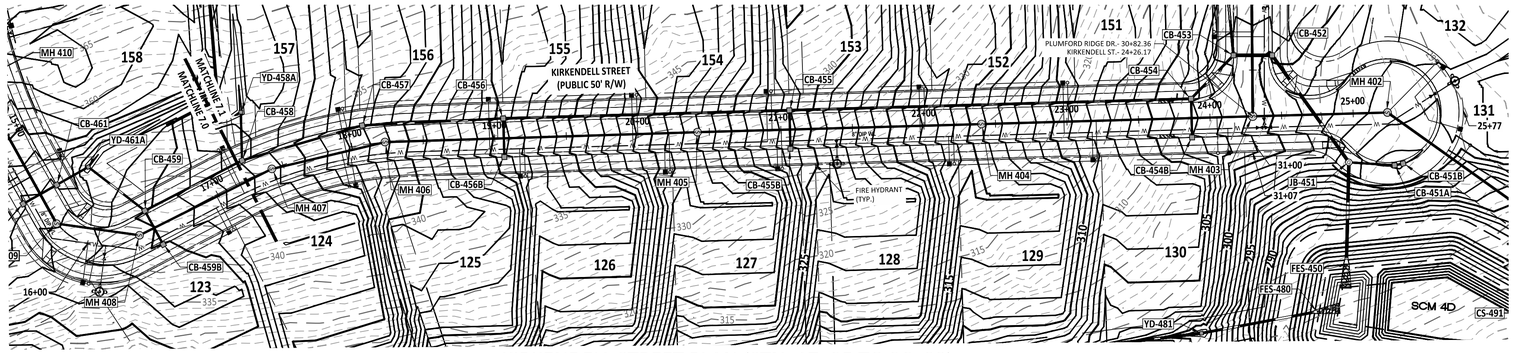


KIRKENDELL STREET PLAN (STN. 17+25 TO 26+00)




KIRKENDELL STREET PROFILE (STN. 17+25 TO 26+00)

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50

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 062383 ROMAN S. COOK
2026.09.10 15:27:14-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
KIRKENDELL ST. PLAN & PROFILE

SHEET NO.:
C7.1

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

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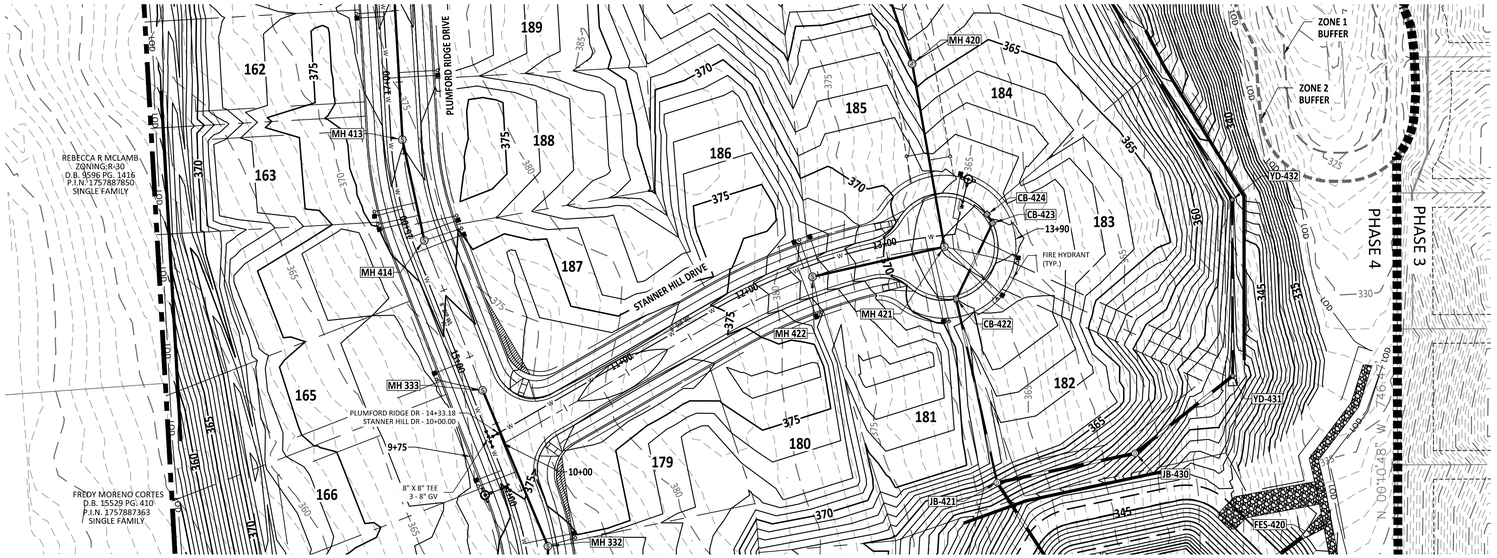
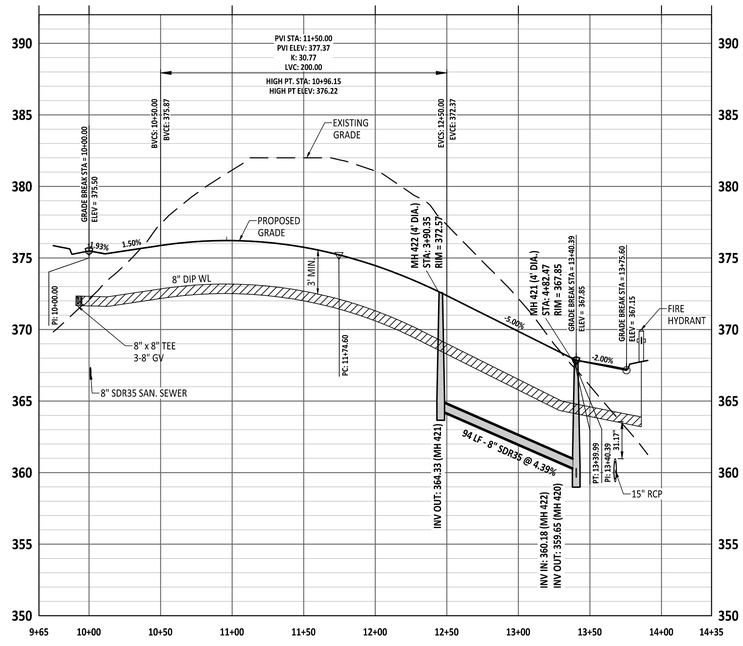



STANNER HILL DRIVE PLAN (STN. 10+00 TO 14+00)

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50




STANNER HILL DRIVE PROFILE (STN. 10+00 TO 14+00)

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 AUTHORITY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 082383 ROMAN S. COOK
Signature Date: 2026.09.08 15:27:15-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
STANNER HILL DR. PLAN & PROFILES

SHEET NO.:
C10.0

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

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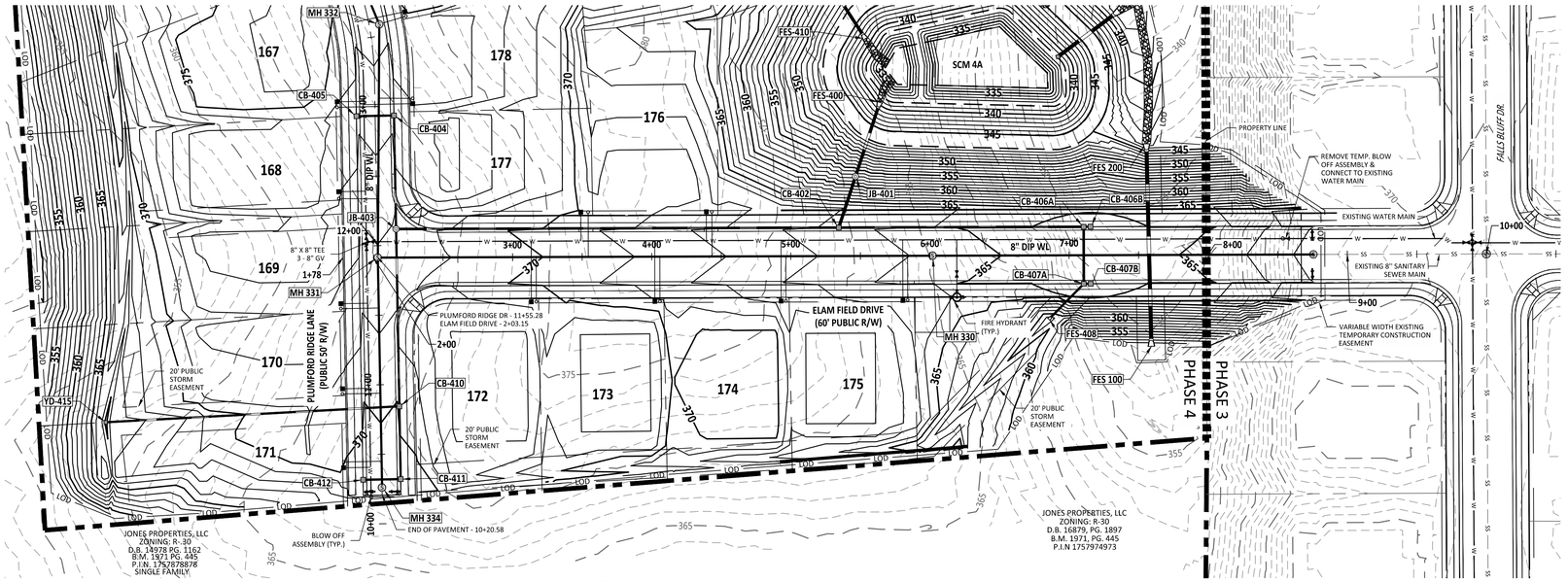
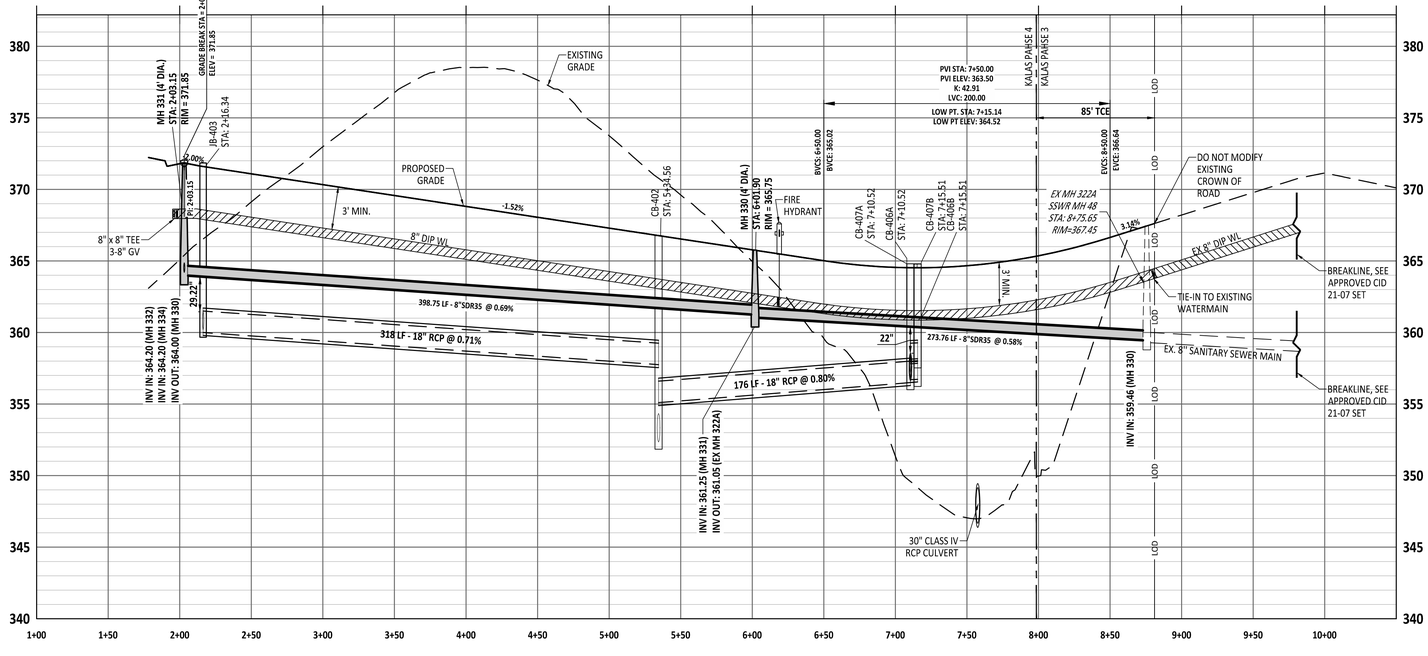



ELAM FIELD DRIVE PLAN

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50




ELAM FIELD DRIVE PROFILE

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 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

STIPULATION FOR REUSE

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# KALAS FALLS PHASE 4

CONSTRUCTION INFRASTRUCTURE DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:

ELAM FIELD CT.
PLAN & PROFILE

SHEET NO.:

C11.0

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

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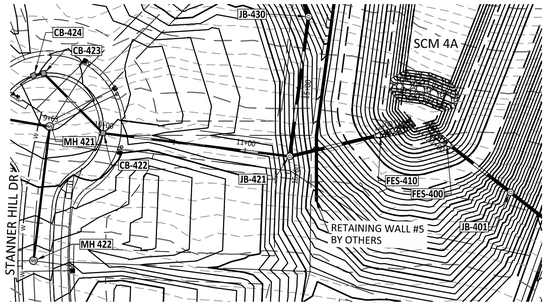
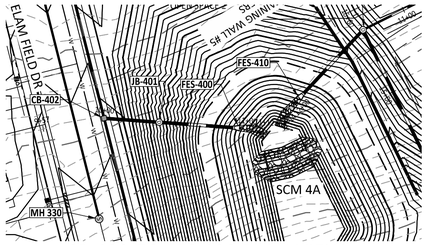
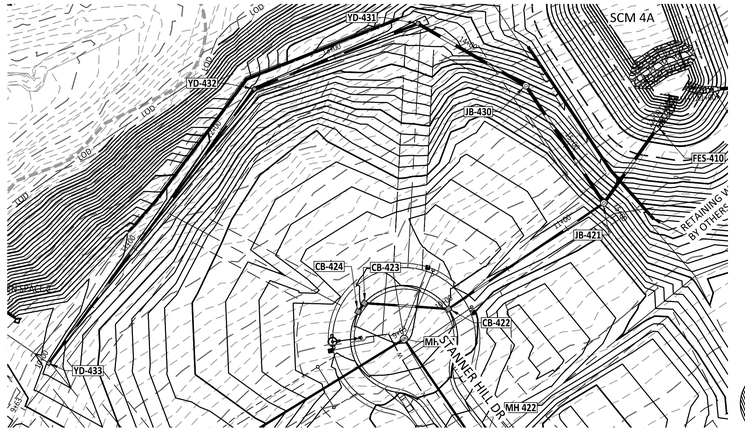


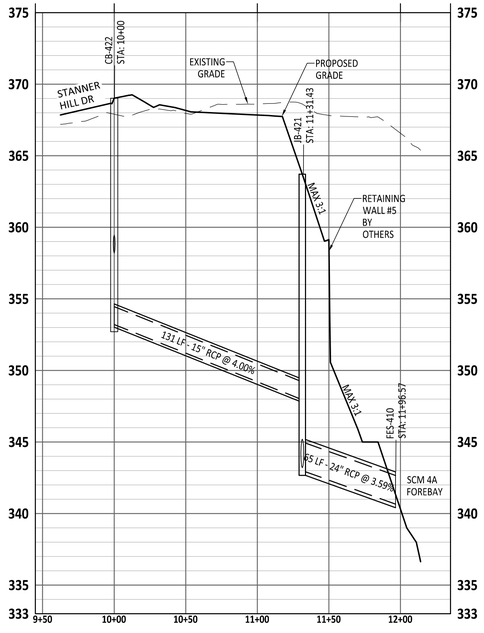

CB 422 TO FES 420 PLAN VIEW



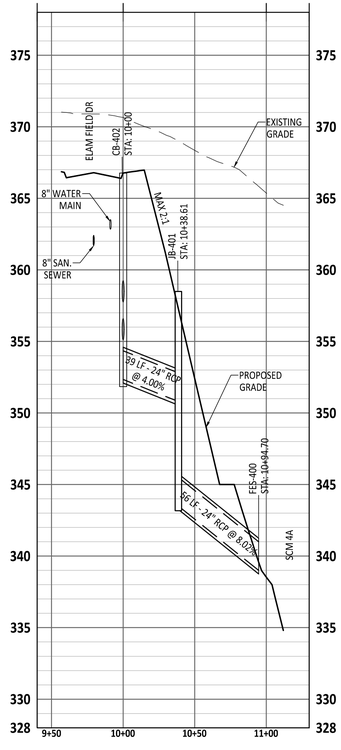

CB 402 TO FES 400 PLAN VIEW



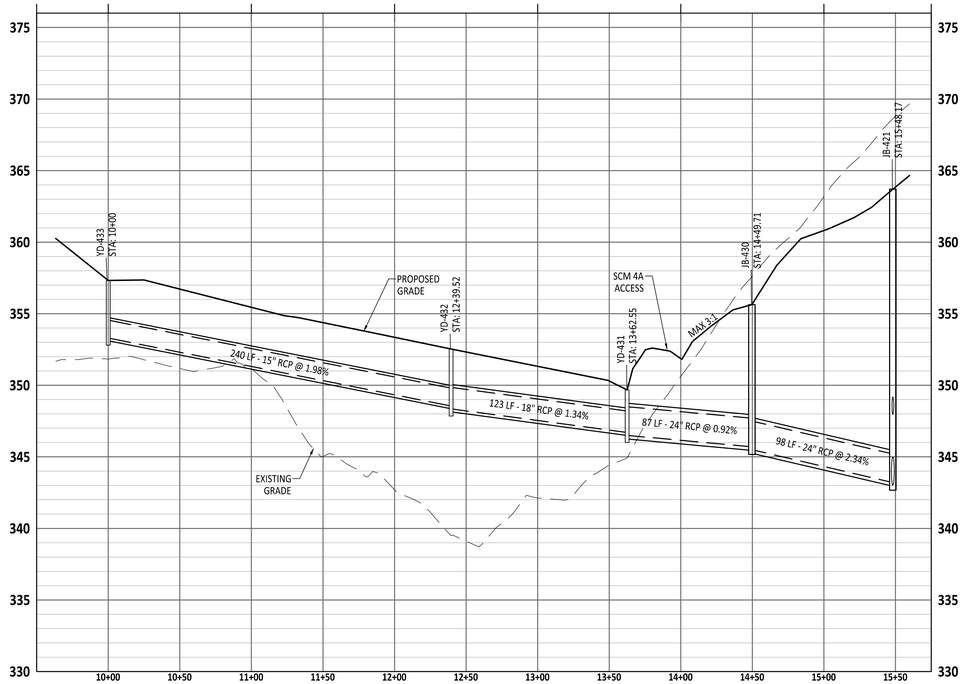

YD 433 TO JB 421 PLAN VIEW




CB 422 TO FES 420 PROFILE VIEW




CB 402 TO FES 400 PROFILE VIEW




YD 433 TO JB 421 PROFILE VIEW

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 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

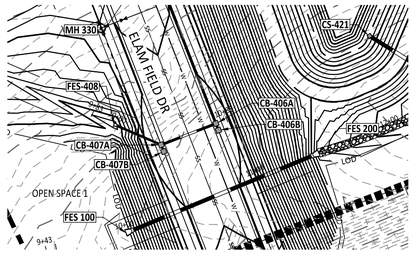
JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
STORM PLAN & PROFILES

SHEET NO.:
C12.0

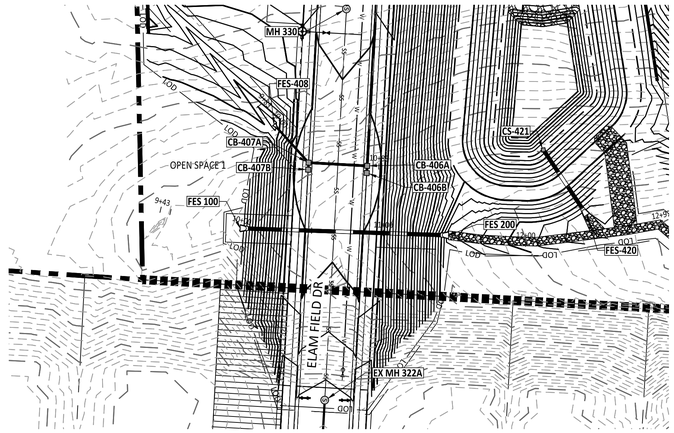
North Carolina 811 811 or 1-800-632-4949
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Walden Property\Plat_Working Dwgs\Phase 4\Sheet Files\Sheet No. 12.0 Phase 4 Offsheet Storm Plan & Profiles.dwg



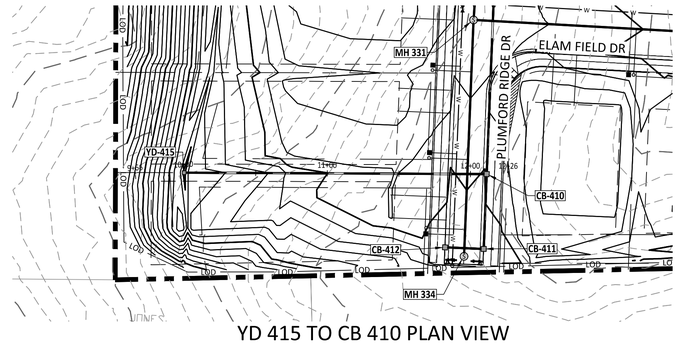

FES 408 TO CB 406A PLAN VIEW

GRAPHIC SCALE



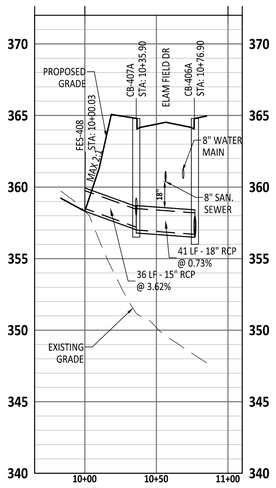

CULVERT CROSSING PLAN VIEW

GRAPHIC SCALE

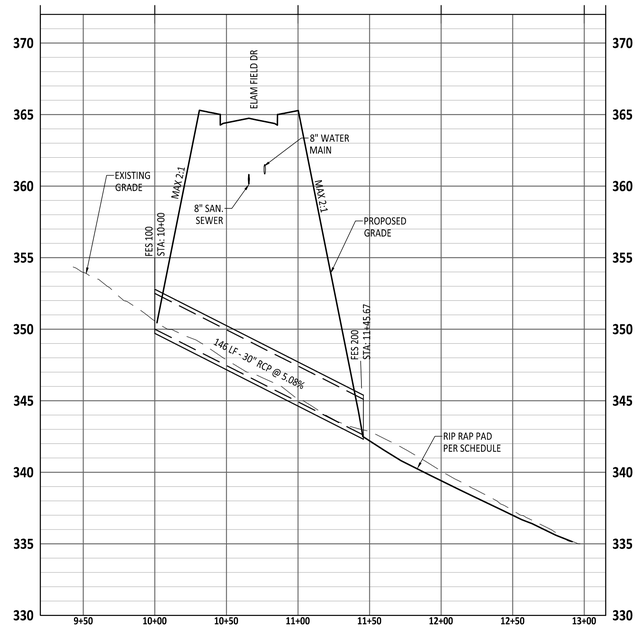



YD 415 TO CB 410 PLAN VIEW

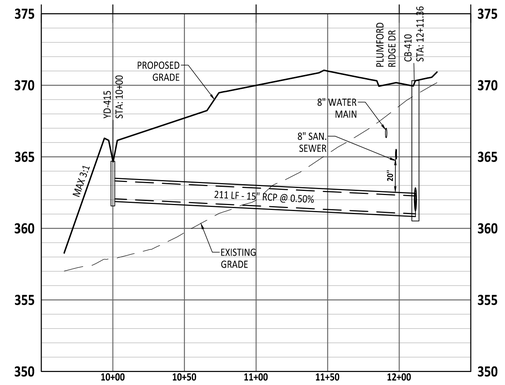
GRAPHIC SCALE




FES 408 TO CB 406A PROFILE VIEW




CULVERT CROSSING PROFILE VIEW




YD 415 TO CB 410 PROFILE VIEW

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 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

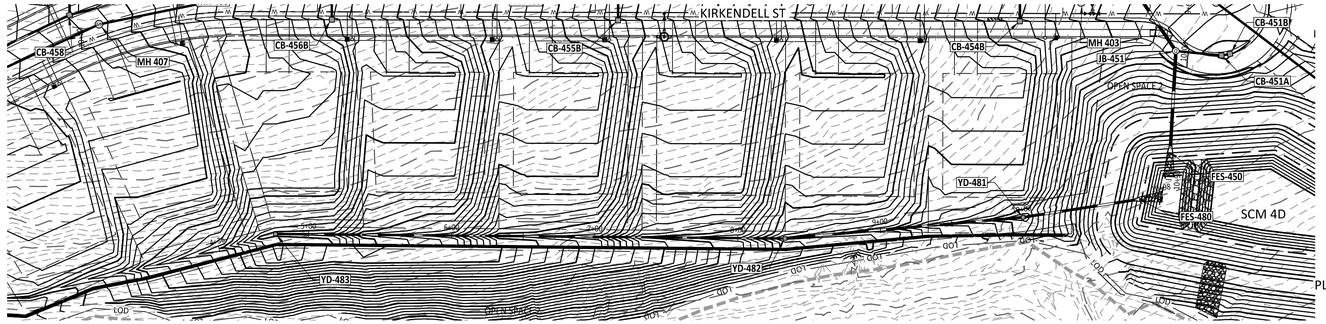
JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
STORM PLAN & PROFILES

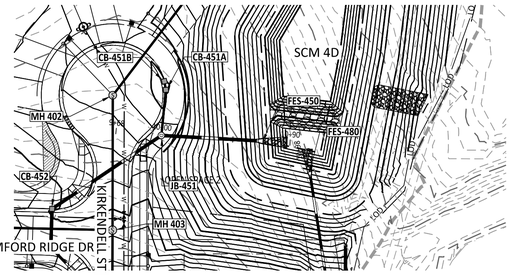
SHEET NO.:
C12.1

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\Workin Property\dwg_Working Dwgs\Phase 4\Sheet Files\Sheet No. 12.1 Phase 4 Offstreet Storm Plan & Profiles.dwg

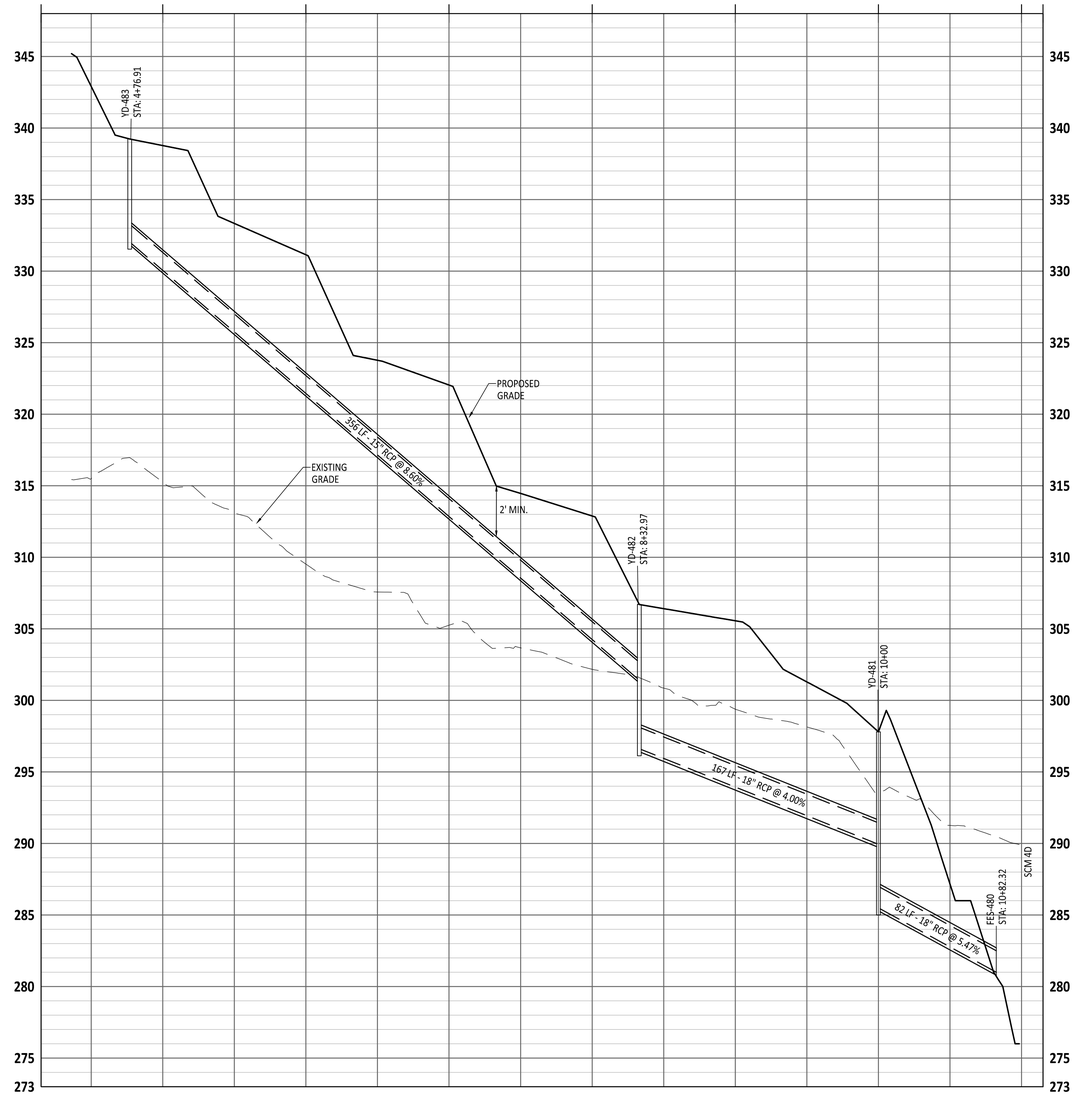



YD 483 TO FES 480 PLAN VIEW

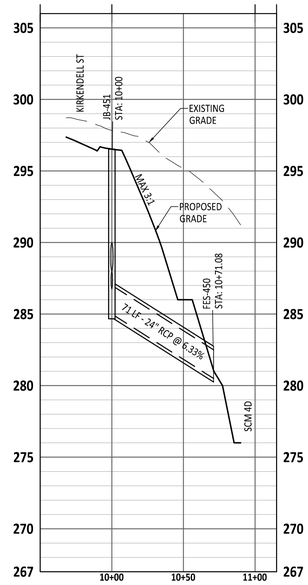



JB 451 TO FES 450 PLAN VIEW

GRAPHIC SCALE
( IN FEET )
1 INCH = 50




YD 483 TO FES 480 PROFILE VIEW




JB 451 TO FES 450 PROFILE VIEW

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 ROMAN S. COOK SEAL 062383 2026.09.08 15:27:22-04'00'

FOR CONSTRUCTION

| 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 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
STORM PLAN & PROFILES

SHEET NO.:
C12.2

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

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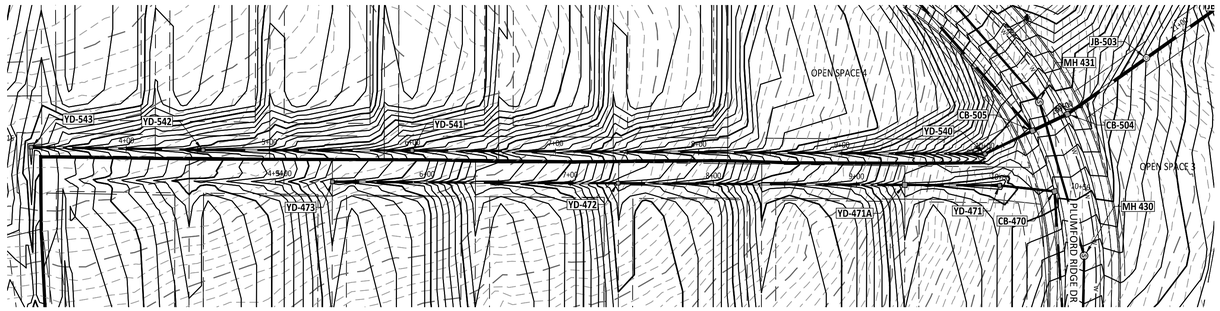
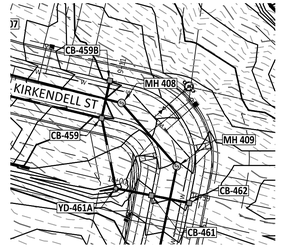



YD 473 TO CB 470 PLAN VIEW

GRAPHIC SCALE

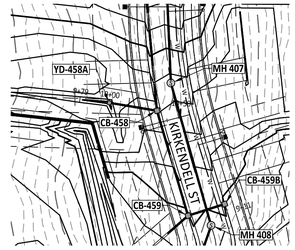
( IN FEET )
1 INCH = 50




CB 459B TO CB 462 PLAN VIEW

GRAPHIC SCALE

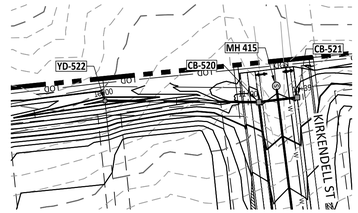
( IN FEET )
1 INCH = 50




YD 458A TO CB 458 PLAN VIEW

GRAPHIC SCALE

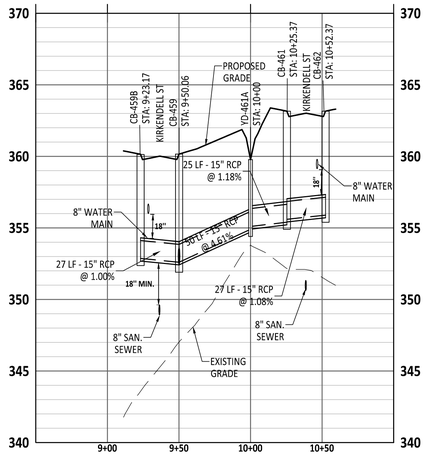
( IN FEET )
1 INCH = 50



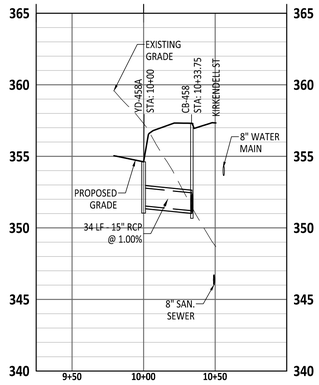

YD 522 TO CB 521 PLAN VIEW

GRAPHIC SCALE

( IN FEET )
1 INCH = 50




CB 459B TO CB 462 PROFILE VIEW




YD 458A TO CB 458 PROFILE VIEW




YD 473 TO CB 470 PROFILE VIEW




YD 522 TO CB 521 PROFILE VIEW

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 052383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

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# KALAS FALLS PHASE 4

CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:

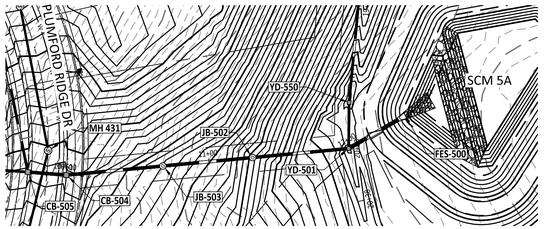
STORM PLAN & PROFILES

SHEET NO.:

C12.3

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 Property\Dwg_Working Dwgs\Phase 4\Sheet Files\Sheet No. 12.3 Phase 4 Offstreet Storm Plan & Profiles.dwg




CB 505 TO FES 500 PLAN VIEW

GRAPHIC SCALE

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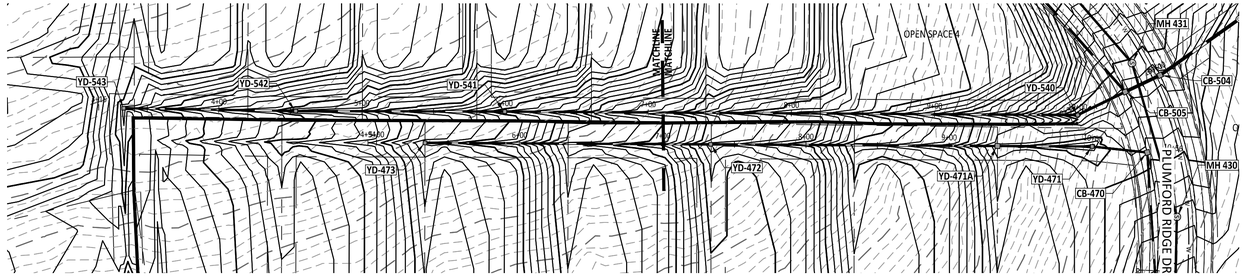
( IN FEET )

1 inch = 50




YD 543 TO CB 505 PLAN VIEW

GRAPHIC SCALE

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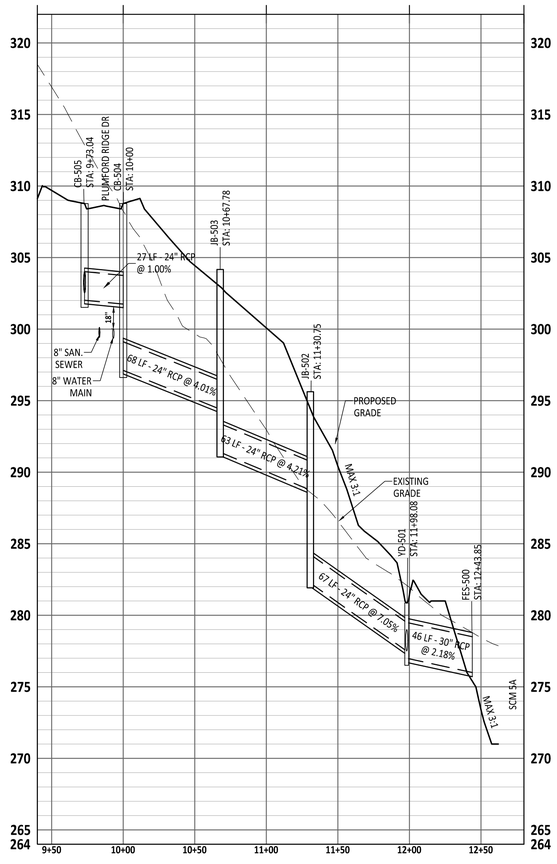
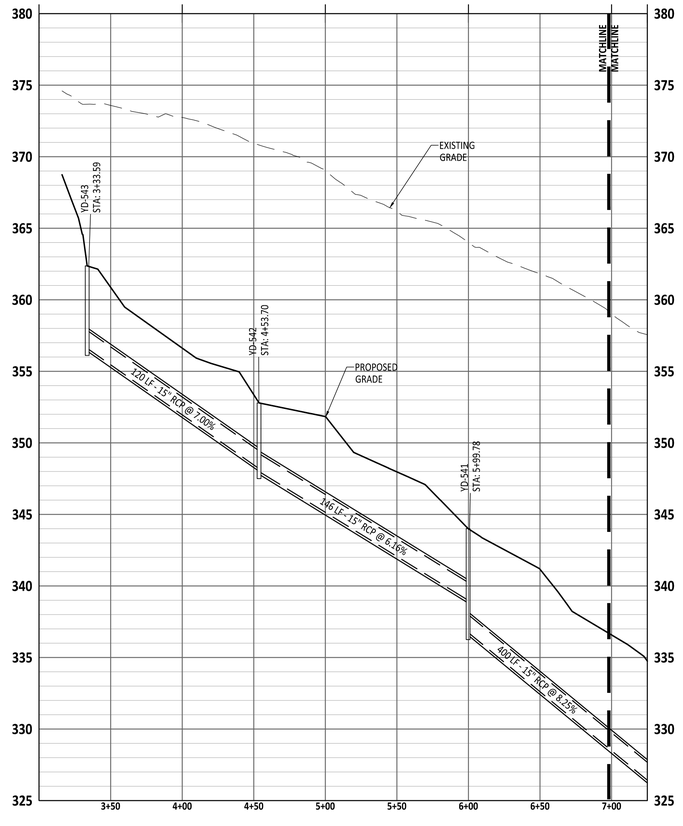
( IN FEET )

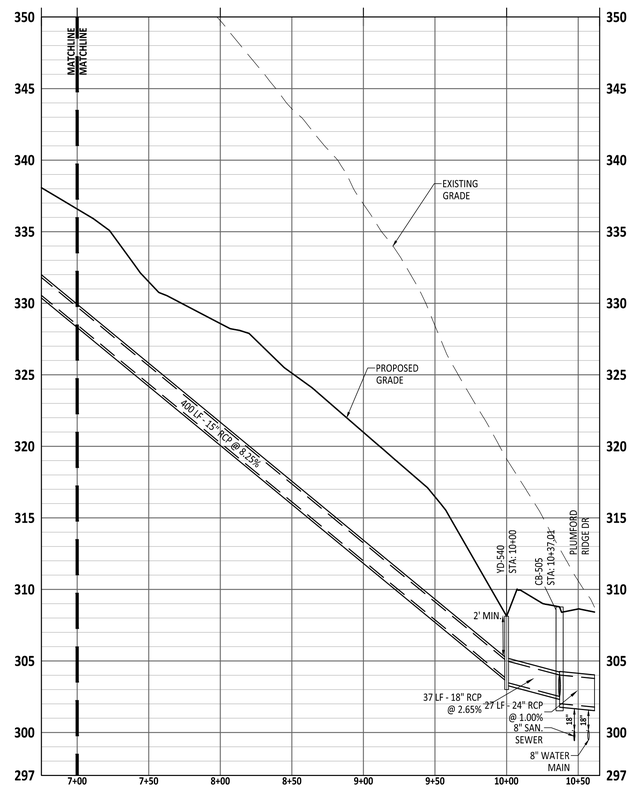
1 inch = 50




CB 505 TO FES 500 PROFILE VIEW




YD 543 TO CB 505 PROFILE VIEW




YD 543 TO CB 505 PROFILE VIEW

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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 AUTHORITY

NORTH CAROLINA PROFESSIONAL SEAL 082383 ENGINEER ROMAN S. COOK

2026.09.08 15:27:26-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

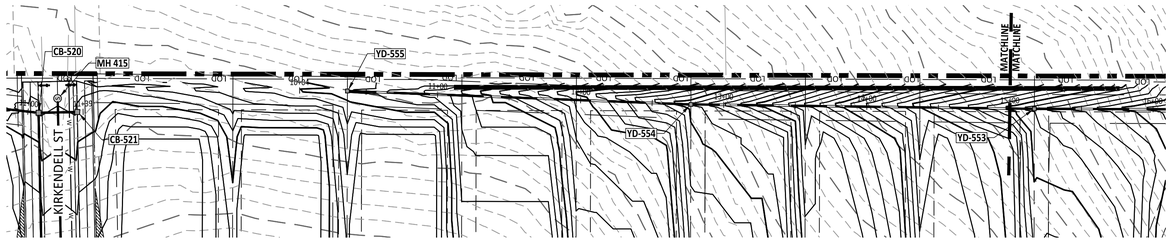
JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
STORM PLAN & PROFILES

SHEET NO.:
C12.4

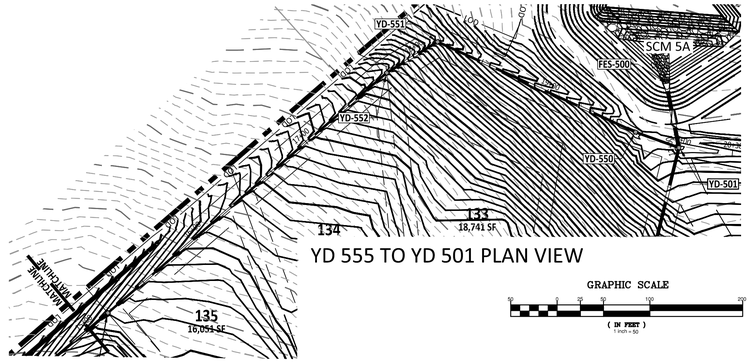
North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

Z:\Jobs\9900\Workfiles Property\Dwgs_Working Dwgs\Phase 4\Sheet Files\Sheet No. 12.4 Phase 4 Offstreet Storm Plan & Profiles.dwg




GRAPHIC SCALE
50 0 25 50 100 200
( IN FEET )
1 inch = 50

YD 555 TO YD 501 PLAN VIEW




YD 555 TO YD 501 PLAN VIEW

GRAPHIC SCALE
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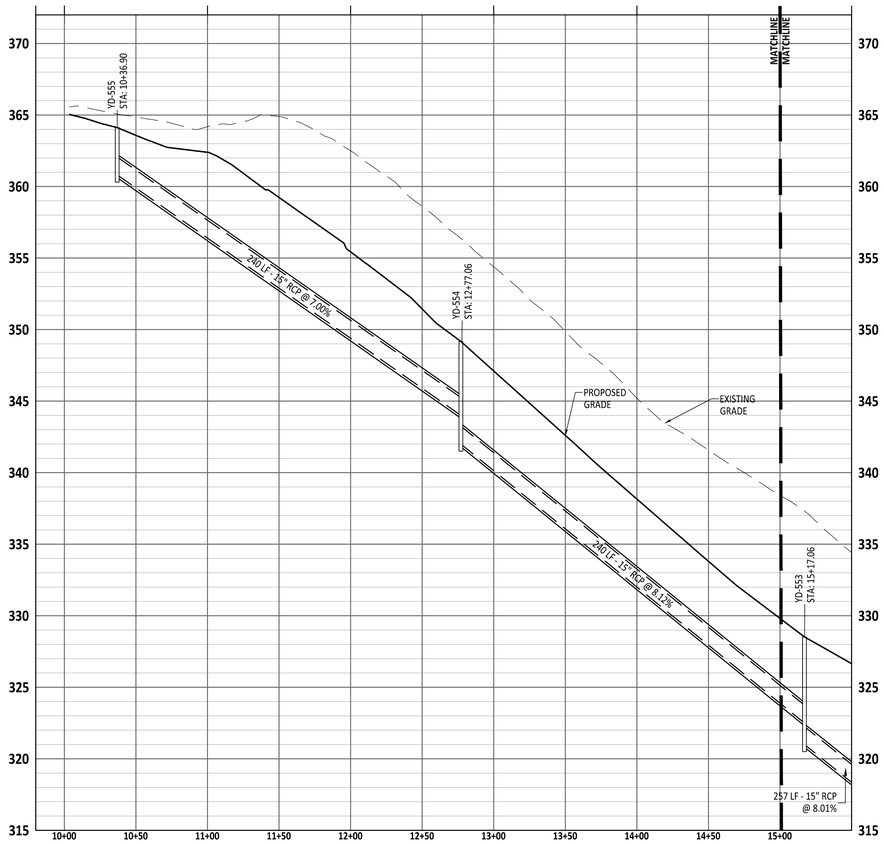
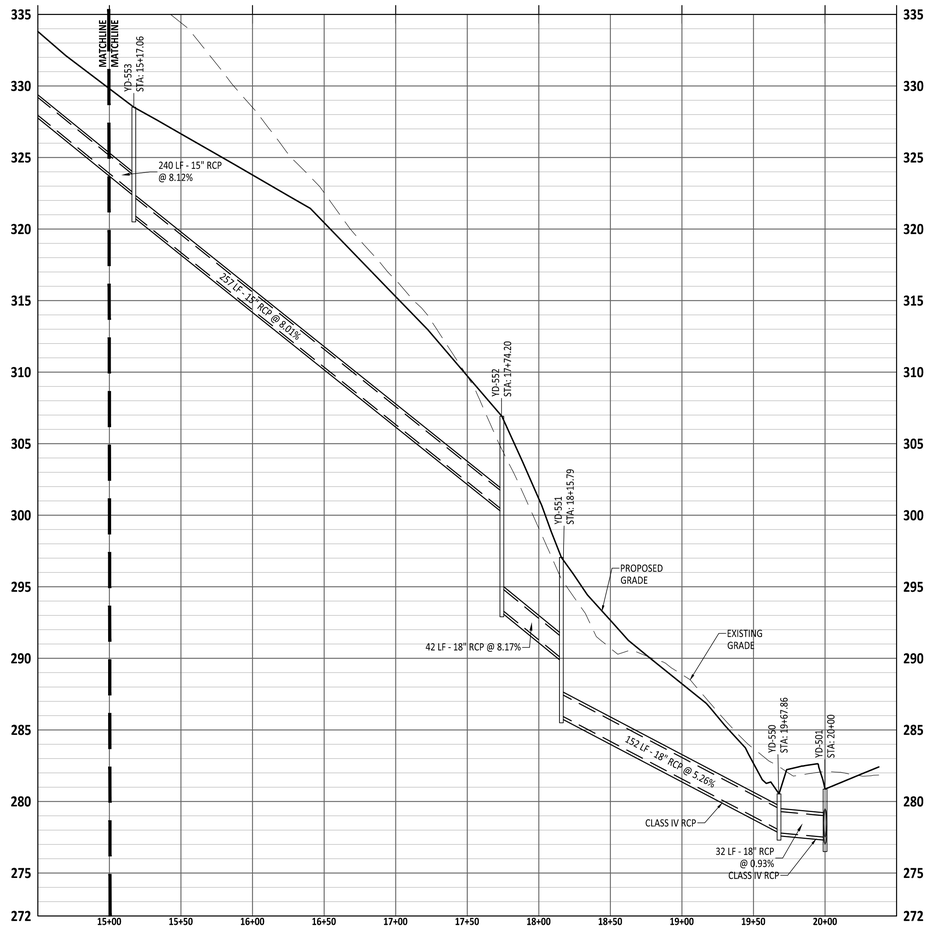
( IN FEET )
1 inch = 50




YD 555 TO YD 501 PROFILE VIEW




YD 555 TO YD 501 PROFILE VIEW

GRAPHIC SCALE
50 0 25 50 100 200
( IN FEET )
1 inch = 50

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

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
062383
ROMAN S. COOK
2026.09.08 15:27:27-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

STIPULATION FOR REUSE

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-00006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
STORM PLAN & PROFILES

SHEET NO.:
C12.5

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

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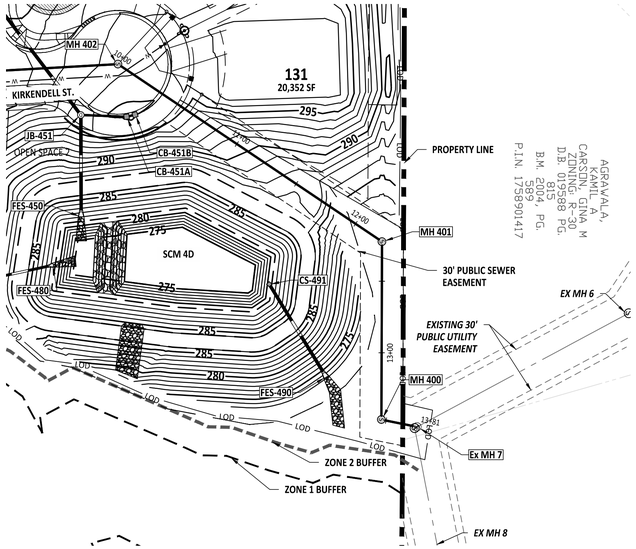
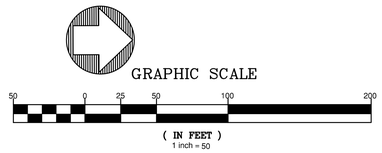
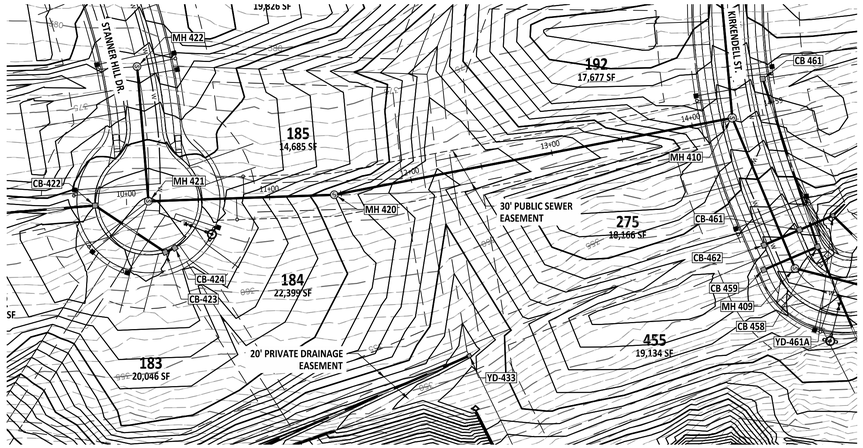
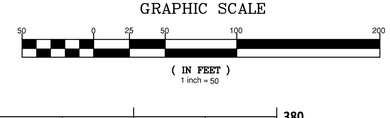


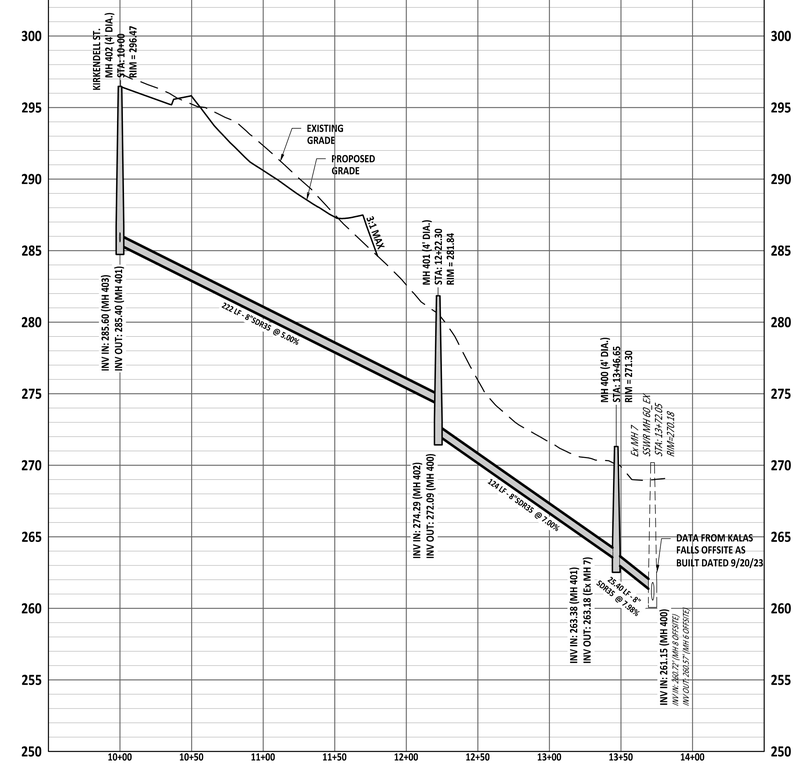

SEWER OUTFALL PLAN MH 402 TO EX MH 7



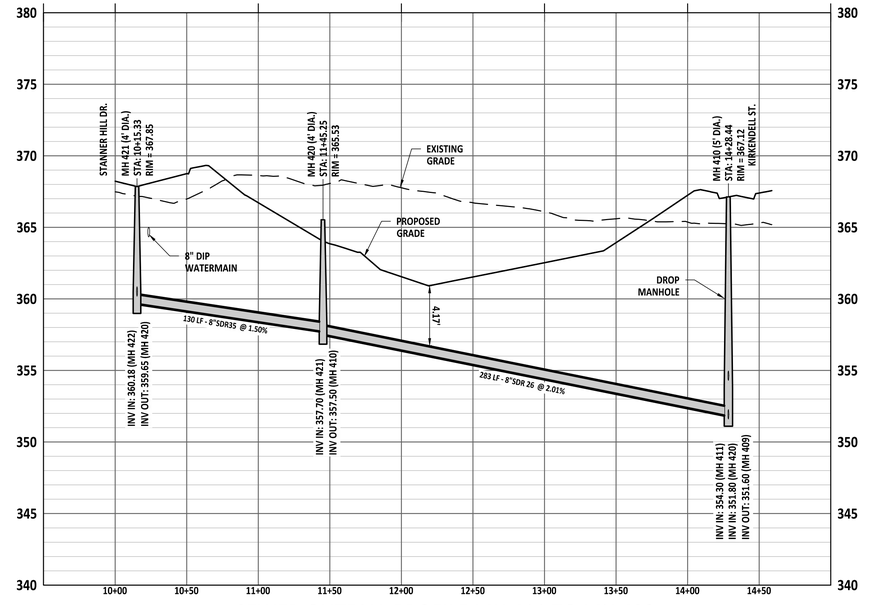




SEWER OUTFALL PLAN MH 411 TO MH 409




SEWER OUTFALL PROFILE MH 402 TO EX MH 7




SEWER OUTFALL PROFILE MH 411 TO MH 409

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 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
SEWER PLAN & PROFILES

SHEET NO.:
C13.0

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

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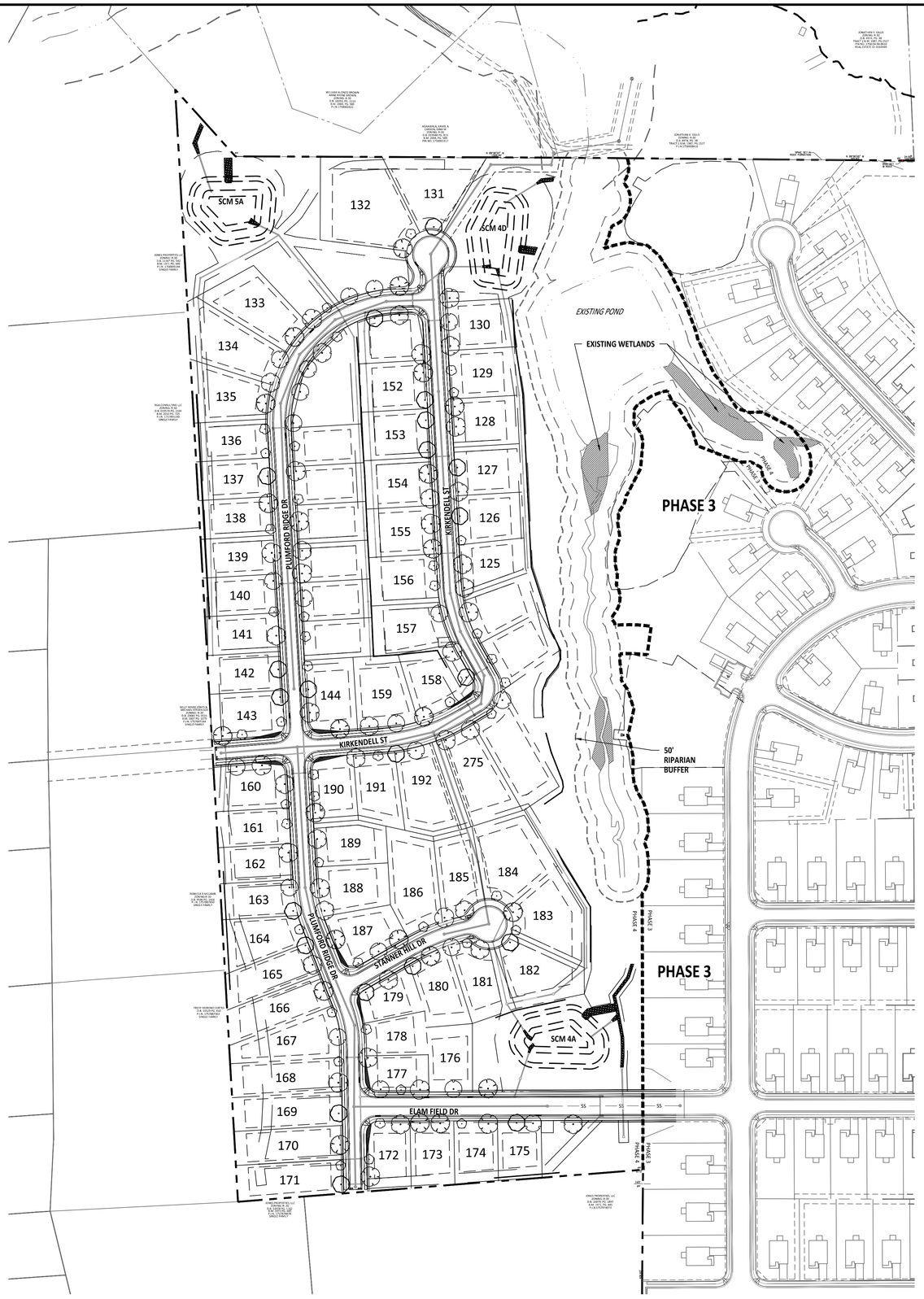


| LANDSCAPE REQUIREMENTS | | |
|---|---|---|
| STREET TREES | REQUIRED | PROVIDED |
| LOCAL STREETS | 1 EVERY 60' ON CENTER | 1 EVERY 60' ON CENTER |

## PLANT SCHEDULE

| SYMBOL | CODE | BOTANICAL / COMMON NAME | CAL | CONT | QTY | REMARKS |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| | BET DUR | Betula nigra 'BNMTF' / Dura Heat® River Birch | 3" Cal. | B&B | 21 | Single straight leader. |
| | CAR PAL | Carpinus caroliniana 'CCSQU' / Palisade® American Hornbeam | 3" Cal. | B&B | 22 | Single straight leader |
| | MAG GR2 | Magnolia virginiana 'Green Shadow' / Green Shadow Sweetbay Magnolia | 3" Cal. | B&B | 22 | Single straight leader. |
| | OST VIR | Ostrya virginiana / American Hophornbeam | 3" Cal. | B&B | 21 | Single straight leader. |
| | QUE PTI | Quercus bicolor `JFS-KW12` / American Dream® Oak | 3" Cal. | B&B | 22 | Single straight leader. |
| | QUE SUP | Quercus phellos 'QPFT06' / Fortitude™ Willow Oak | 3" Cal. | B&B | 22 | Single straight leader. |
| | ULM UQR | Ulmus americana 'UASNZ' / Creole Queen® American Elm | 3" Cal. | B&B | 22 | Single straight leader. |

## GENERAL PLANTING NOTES:

1. All plant material shall conform with the standards set forth by the American Association of Nurserymen, American Standard for Nursery Stock, ANSI.Z60.1.
2. Locate all existing utilities prior to installation of plant material. Notify owner of any discrepancies between field conditions and those shown on the plan.
3. Contractor engaged in landscape installation shall be a landscape contractor registered in the state of North Carolina.
4. Tree protection fence shall be maintained on site until all site work and the final site inspection is completed. The fencing shall be removed prior to the certificate of occupancy (CO) inspection is scheduled
5. Verification of total quantities as shown on the plant list shall be the responsibility of the contractor.
6. All plant groupings shall be mulched as one bed. 3" of triple shredded hardwood mulch shall be used around all plantings.
7. Apply pre-emergent herbicide to all new planting beds at manufacturer's recommended rate prior to installation of mulch.
8. Establish positive drainage in all planting beds and away from buildings.
9. Do not install plant material in impervious soils, (i.e. holes which , when filled with water, do not completely drain within two hours.)
10. Lawn areas shall be seeded with Riviera or Sunstar Bermuda grass 95% coverage (based on a per square yard sample) shall be attained prior to final inspection. All 3:1 slopes shall be stabilized with biodegradable erosion control matting. See detail sheet seeding schedule.
11. General contractor shall be responsible for keeping all equipment & subcontractors away from seeded areas. If damage occurs, through no fault of the owner, areas shall be regraded and reseeded immediately at no additional cost to the owner. Contractor shall water and maintain those areas until they are at 95% coverage at final completion.
12. Install permanent seeding along all roadside ditches and channels within construction limits of project. see erosion control plans for additional information.
13. Areas damaged from plant relocation or other activities of landscape contractor to be reseeded and established at no additional cost to the owner.
14. Mulch shall be replenished as needed, especially after heavy rain events.
15. Contractor is responsible for importing, testing, and preparing the soil on site per the recommendations of a soil test. Plants shall be watered at least 2 times per week unless soil is moist based on core sample or moisture meter reading. Water more frequently during establishment.
16. Remove (either manually or with pesticide treatment) all weeds in mulch areas, plant beds, tree rings, and hardscape areas: including but not limited to nutsedge, grasses, invasive plants, and any non-desirable plant material. This treatment shall occur monthly until the end of the warranty / maintenance period.
17. Mulch line smooth continuous curves.
18. All trees not within a plant bed to be treated with a 6-ft diameter mulch ring (typ).
19. All foundation trees are to be planted a minimum of 8' away from building wall. Notify Owner of any discrepancies.

GRAPHIC SCALE

120 0 60 120 240 480

( IN FEET )
1 inch =120

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4020 Westchase Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

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

NORTH CAROLINA PROFESSIONAL SEAL 082383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
OVERALL LANDSCAPE PLAN

SHEET NO.:
C15.0

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

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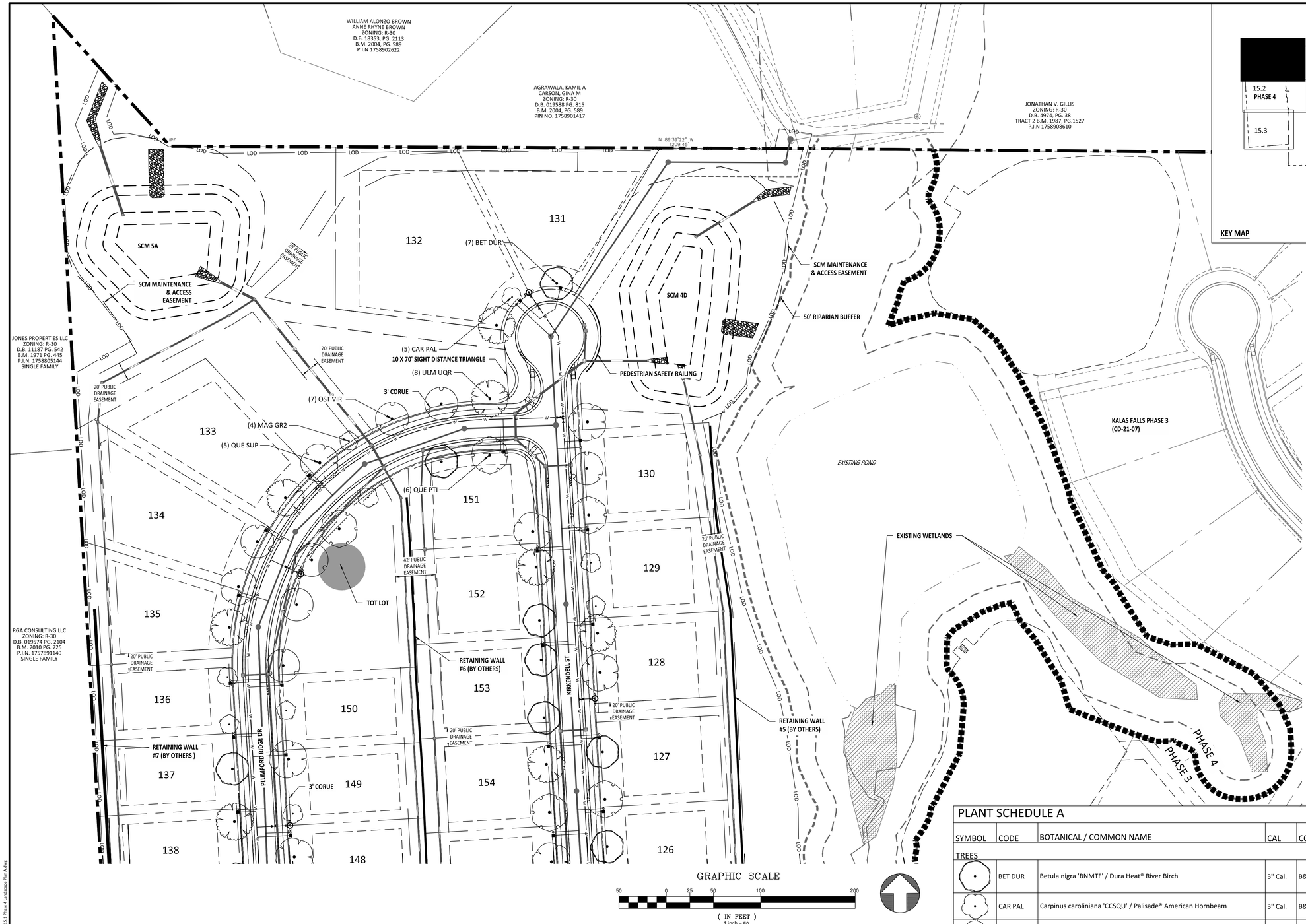


GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )

1 inch = 50

## PLANT SCHEDULE A

| SYMBOL | CODE | BOTANICAL / COMMON NAME | CAL | CONT | QTY | REMARKS |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| | BET DUR | Betula nigra 'BNMTF' / Dura Heat® River Birch | 3" Cal. | B&B | 7 | Single straight leader. |
| | CAR PAL | Carpinus caroliniana 'CCSQU' / Palisade® American Hornbeam | 3" Cal. | B&B | 5 | Single straight leader |
| | MAG GR2 | Magnolia virginiana 'Green Shadow' / Green Shadow Sweetbay Magnolia | 3" Cal. | B&B | 4 | Single straight leader. |
| | OST VIR | Ostrya virginiana / American Hophornbeam | 3" Cal. | B&B | 7 | Single straight leader. |
| | QUE PTI | Quercus bicolor `JFS-KW12` / American Dream® Oak | 3" Cal. | B&B | 6 | Single straight leader. |
| | QUE SUP | Quercus phellos 'QPFT06' / Fortitude™ Willow Oak | 3" Cal. | B&B | 5 | Single straight leader. |
| | ULM UQR | Ulmus americana 'UASNZ' / Creole Queen® American Elm | 3" Cal. | B&B | 8 | Single straight leader. |

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

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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 062383 ROMAN S. COOK

FOR CONSTRUCTION

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:

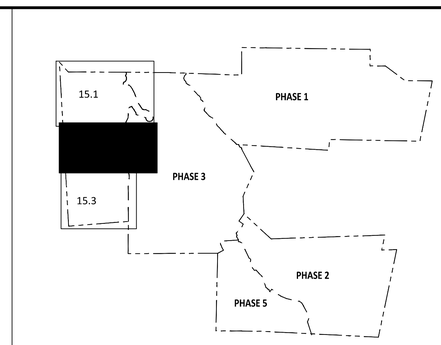
LANDSCAPE PLAN AREA A

SHEET NO.:
C15.1

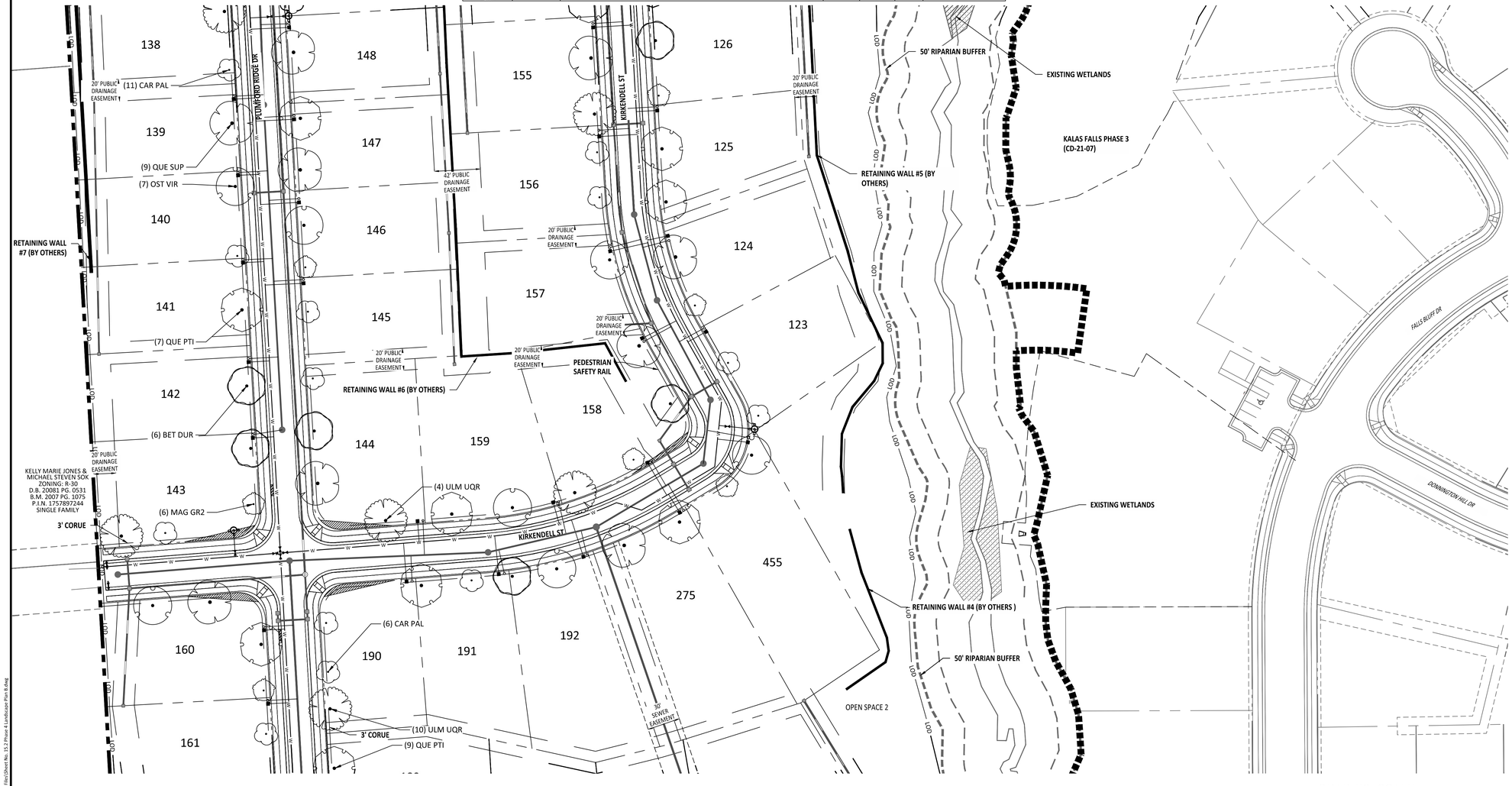
Z:\Jobs\9900\Worksite Property\Mep_Working Dwgs\Phase 4\Sheet files\Sheet No. 15.1 Phase 4 Landscape Plan A.dwg

## PLANT SCHEDULE B

| SYMBOL | CODE | BOTANICAL / COMMON NAME | CAL | CONT | QTY | REMARKS |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| | BET DUR | Betula nigra 'BNMTF' / Dura Heat® River Birch | 3" Cal. | B&B | 6 | Single straight leader. |
| | CAR PAL | Carpinus caroliniana 'CCSQU' / Palisade® American Hornbeam | 3" Cal. | B&B | 11 | Single straight leader |
| | MAG GR2 | Magnolia virginiana 'Green Shadow' / Green Shadow Sweetbay Magnolia | 3" Cal. | B&B | 6 | Single straight leader. |
| | OST VIR | Ostrya virginiana / American Hophornbeam | 3" Cal. | B&B | 7 | Single straight leader. |
| | QUE PTI | Quercus bicolor `JFS-KW12` / American Dream® Oak | 3" Cal. | B&B | 7 | Single straight leader. |
| | QUE SUP | Quercus phellos 'QPFT06' / Fortitude™ Willow Oak | 3" Cal. | B&B | 9 | Single straight leader. |
| | ULM UQR | Ulmus americana 'UASNZ' / Creole Queen® American Elm | 3" Cal. | B&B | 4 | Single straight leader. |




KEY MAP




GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50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Raleigh, NC 27607
919-469-1101


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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

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# KALAS FALLS PHASE 4

CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:

LANDSCAPE PLAN AREA B

SHEET NO.:

C15.2

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

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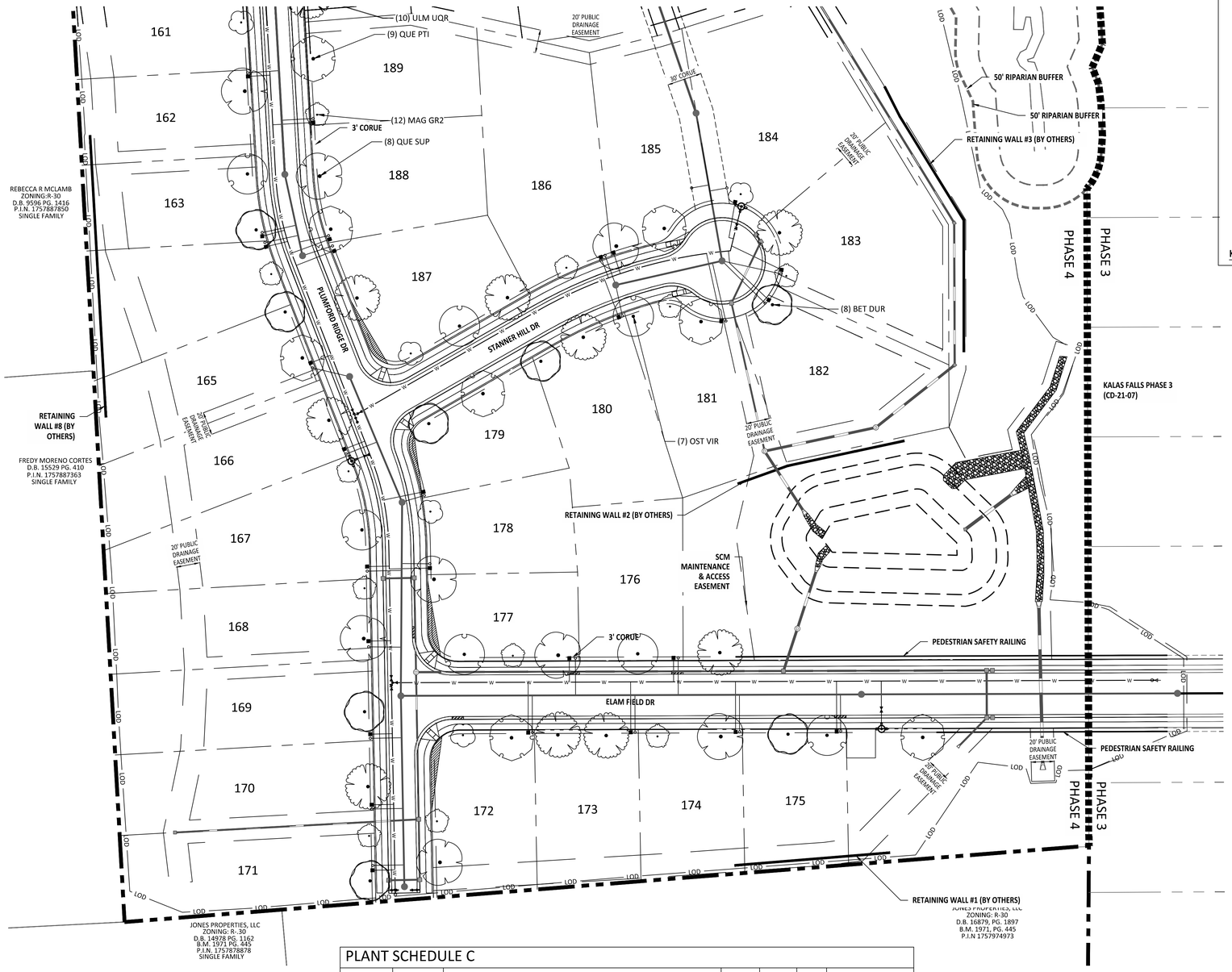


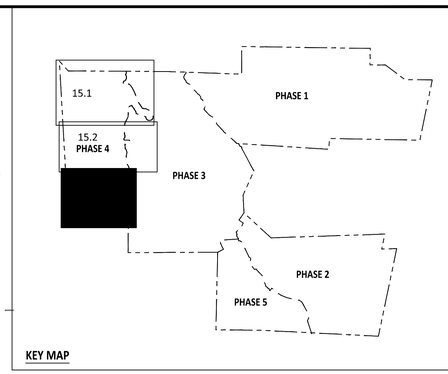


## PLANT SCHEDULE C

| SYMBOL | CODE | BOTANICAL / COMMON NAME | CAL | CONT | QTY | REMARKS |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| | BET DUR | Betula nigra 'BNMTF' / Dura Heat® River Birch | 3" Cal. | B&B | 8 | Single straight leader. |
| | CAR PAL | Carpinus caroliniana 'CCSQU' / Palisade® American Hornbeam | 3" Cal. | B&B | 6 | Single straight leader |
| | MAG GR2 | Magnolia virginiana 'Green Shadow' / Green Shadow Sweetbay Magnolia | 3" Cal. | B&B | 12 | Single straight leader. |
| | OST VIR | Ostrya virginiana / American Hophornbeam | 3" Cal. | B&B | 7 | Single straight leader. |
| | QUE PTI | Quercus bicolor `JFS-KW12` / American Dream® Oak | 3" Cal. | B&B | 9 | Single straight leader. |
| | QUE SUP | Quercus phellos 'QPFT06' / Fortitude™ Willow Oak | 3" Cal. | B&B | 8 | Single straight leader. |
| | ULM UQR | Ulmus americana 'UASNZ' / Creole Queen® American Elm | 3" Cal. | B&B | 10 | Single straight leader. |

GRAPHIC SCALE

50 0 25 50 100 200

( IN FEET )
1 inch = 50

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Raleigh, NC 27607
919-469-1101

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NORTH CAROLINA PROFESSIONAL SEAL 082383 ENGINEER ROMAN S. COOK

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:

LANDSCAPE PLAN AREA C

SHEET NO.:

C15.3

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

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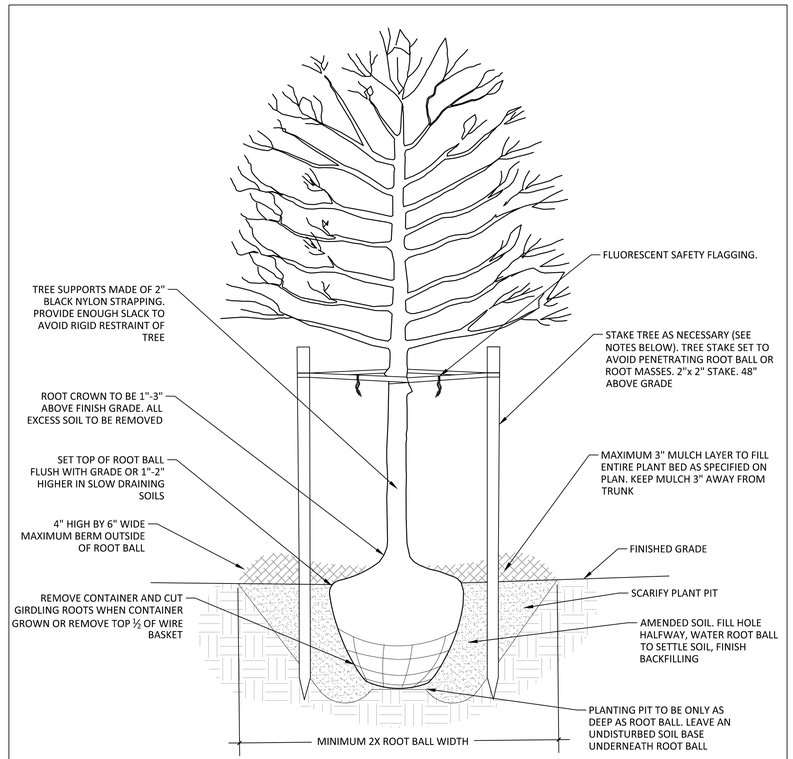


NOTES:

1. ALL TREES SHALL MEET AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-2004)
2. REMOVE WIRE AND NYLON TWINE FROM BALL AND CANOPY.
3. SOAK ROOT BALL AND PLANT PIT IMMEDIATELY AFTER INSTALLATION.
4. DO NOT STAKE OR WRAP TRUNK UNLESS:
   A. TREE HAS A LARGE CROWN.
   B. PLANTING SITE IS CONSISTENTLY WINDY OR IS A STEEP SLOPE.
   C. PLANTING SITE IS SUSCEPTIBLE TO VANDALISM.
6. REMOVE ALL STAKING MATERIAL AFTER 1 YEAR.
7. REMOVE ALL TAGS AND LABELS FROM PLANT MATERIAL.
8. DO NOT HEAVILY PRUNE THE TREE AT PLANTING. ONLY PRUNE CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED.

**1** TYPICAL TREE PLANTING

NOT TO SCALE

P-RE-R-R180115-01

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NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK

FOR CONSTRUCTION

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
LANDSCAPE DETAILS

SHEET NO.:
C15.4

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

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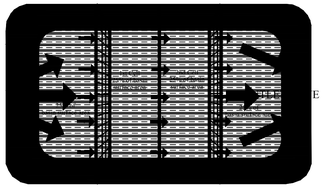
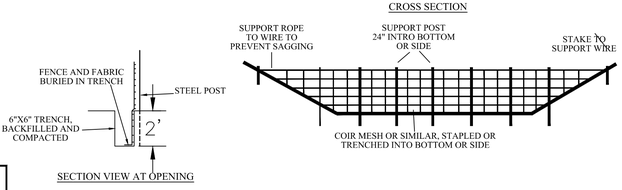


PLAN VIEW

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.

MAINTENANCE NOTES:
1. INSPECT BAFFLES FOR REPAIR ONCE A WEEK AND AFTER EACH 1" RAINFALL.
2. MAINTAIN ACCESS TO BAFFLES AND MAKE ANY REPAIRS IMMEDIATELY.
3. REMOVE SEDIMENT DEPOSITS WHEN IT REACHES HALF FULL.
4. AVOID DAMAGING BAFFLES DURING CLEANOUT AND REPLACE IF DAMAGED.
5. REMOVE BAFFLES AND SEDIMENT DEPOSITS AFTER CONTRIBUTING DRAINAGE AREA HAS BEEN PERMANENTLY STABILIZED.

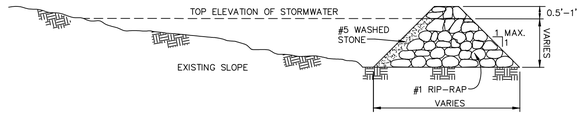
CROSS SECTION



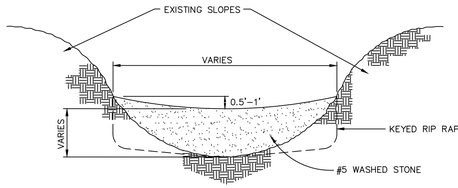

SECTION VIEW AT OPENING

WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

## STANDARD BAFFLES DETAIL 1




SIDE VIEW




FRONT VIEW

CONSTRUCTION NOTES:
1. HEIGHT & WIDTH DETERMINED BY EXISTING TOPOGRAPHY AND SEDIMENT STORAGE REQUIRED.
2. KEY RIP RAP INTO THE DAM FOR STABILIZATION.

MAINTENANCE NOTES:
1. INSPECT CHECK DAMS WEEKLY AND AFTER EVERY RAINFALL EVENT OF 1" OR MORE.
2. REMOVE SEDIMENT AND DEBRIS AS NEEDED.
3. MAINTAIN FLOW THROUGH THE CHECK DAM.

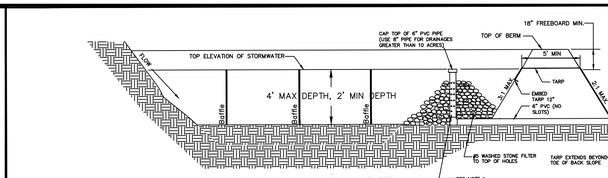



STEP SEQUENCE

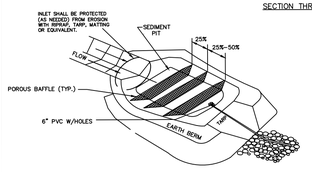
NOTE: REMOVE SEDIMENT ACCUMULATION FROM BEHIND CHECK DAMS TO PREVENT DAMAGE TO CHANNEL VEGETATION. FLOW SHOULD BE MAINTAINED THROUGH THE DAM.

WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

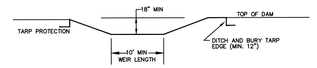
## STANDARD CHECK DAM 2




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. THE TARP USED TO PROTECT THE WEIR SHALL BE WOOD–SUPPORTED. LENGTH OF THE TARP SHALL BE MODIFIED AS 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.

MAINTENANCE NOTES
1. INSPECT WEEKLY AND AFTER EVERY 1" OR GREATER RAINFALL.
2. REMOVE SEDIMENT AND PROPERLY DISPOSED OF WHEN IT REACHES 1/2 FULL.
3. GRAVEL FILTER AROUND RISER SHOULD BE REPLACED AS NEEDED TO ENSURE DEWATERING.
4. CHECK THE STRUCTURE FOR DAMAGE FROM EROSION OR PIPING.
5. ANY RIP RAP DISPLACED FROM DISSIPATER PAD MUST BE REPLACED IMMEDIATELY.

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 DRAINING 3.0 ACRES SHOULD HAVE 3 HOLES PER RING EVERY 3 INCHES ON THE RISER PIPE. THE FIRST RING (3 HOLES) WILL BE SET 6 INCHES FROM THE BOTTOM OF THE RISER.

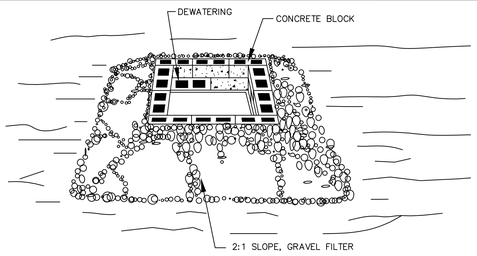
NOTE: ROUND DRAINAGE AREA TO THE NEAREST WHOLE NUMBER TO DETERMINE NUMBER OF HOLES.

WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

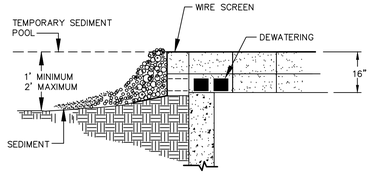
## STANDARD CUSTOM BASIN 3

**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.

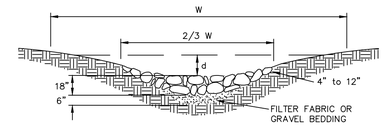



MAINTENANCE NOTES:
1. INSPECT INLET PROTECTION AND REMOVE SEDIMENT AFTER EACH 1" RAIN EVENT.
2. REMOVE SEDIMENT WHEN VOLUME OF THE BASIN IS REDUCED BY ONE-HALF.
3. GRAVEL SHOULD BE REPLACED AND REPAIRS MADE AS NEEDED.

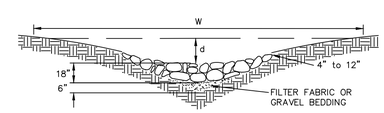



WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

## STANDARD BLOCK & GRAVEL DROP INLET PROTECTION 4



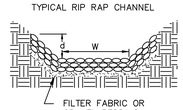

PARABOLIC–SHAPED WATERWAY WITH STONE CENTER DRAIN
(SHAPED BY BULLDOZER)




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.

TYPICAL RIP RAP CHANNEL




TRAPEZOIDAL

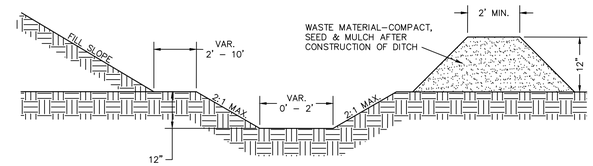
MAINTENANCE NOTES:
–INSPECT RIPRAP DITCH WEEKLY AND AFTER SIGNIFICANT RAIN EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE RIP RAP HAS TAKEN PLACE. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.
–IF EROSION IS EVIDENT PAST END OF RIPRAP DITCH DUE TO RUNOFF DISCHARGING FROM DITCH, INCREASE DIMENSIONS OF RIPRAP PAD PROVIDED SPACE IS AVAILABLE WITHIN THE APPROVED LIMITS OF DISTURBANCE.
–MAINTAIN ALL VEGETATION ADJACENT TO CHANNEL IN A HEALTHY, VIGOROUS CONDITION TO PROTECT DITCH FROM EROSION AND SCOUR DURING OUT–OF–BANK FLOW.

WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

## STANDARD RIP-RAP LINED CHANNELS 5

NOTES:
1. TEMPORARY DIVERSION DITCH TO BE USED TO INTERCEPT FLOW AND/OR DIVERT TO A SEDIMENT CONTROL MEASURE OR BMP.
2. STABILIZE DIVERSION DITCH BERM WITH TEMPORARY SEEDING, MULCH WITH TAC, AND/OR EROSION CONTROL NETTING.

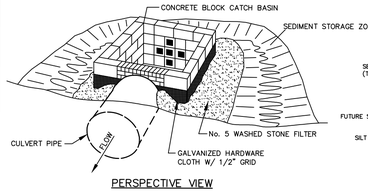
MAINTENANCE NOTES:
1. INSPECT ONCE A WEEK AND AFTER EVERY 1" RAINFALL.
2. SILT SHALL BE REMOVED WHEN DITCH IS ONE–HALF FULL.
3. DITCH SHALL BE RECONSTRUCTED WHEN DAMAGED BY EQUIPMENT OR COVERED BY FILL.
4. CHECK OUTLETS AND MAKE TIMELY REPAIRS AS NEEDED.
5. AFTER DRAINAGE AREA IS PERMANENTLY STABILIZED, PLACE WASTE MATERIAL IN DITCH TO BLEND WITH NATURAL GROUND AND STABILIZE.




CROSS SECTIONAL VIEW

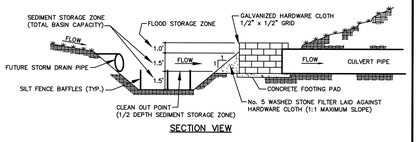
WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

## STANDARD TEMPORARY DIVERSION DITCH 6



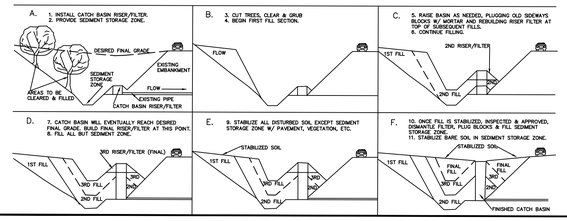

PERSPECTIVE VIEW

MAINTENANCE NOTES:
1. INSPECT INLET PROTECTION AND REMOVE SEDIMENT AFTER EACH 1" RAIN EVENT.
2. REMOVE SEDIMENT WHEN VOLUME OF THE SEDIMENT STORAGE ZONE IS REDUCED BY ONE-HALF.
3. GRAVEL SHOULD BE REPLACED AND REPAIRS MADE AS NEEDED.



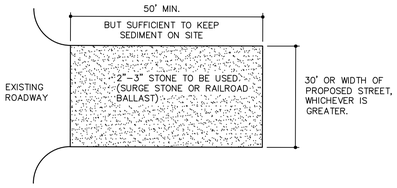

SECTION VIEW

USE OF CATCH BASIN RISER/FILTER ON FILL SITES




WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

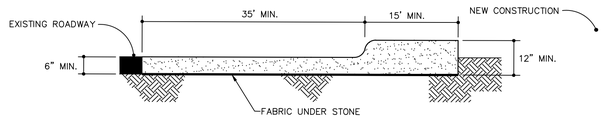
## STANDARD CATCH BASIN RISER/FILTER 7




PLAN VIEW

NOTES:
1. INSTALL SILT FENCE OR TREE PROTECTION FENCE TO ENSURE CONSTRUCTION ENTRANCE IS USED BY VEHICLES.
2. IF MUD IS NOT REMOVED FROM TIRES AFTER VEHICLE TRAVELS OVER STONE, THE TIRES OF THE VEHICLE MUST BE WASHED BEFORE ENTERING PUBLIC ROADS.

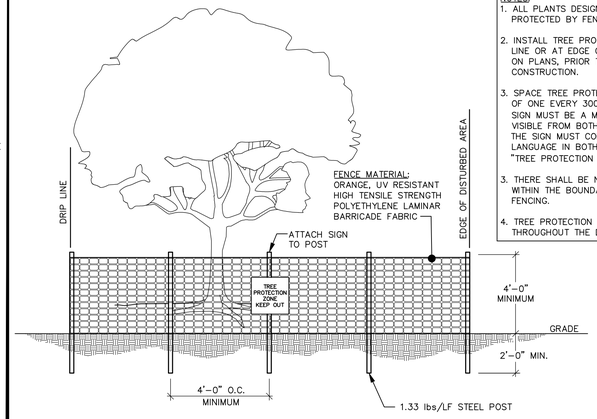
MAINTENANCE NOTES:
1. THE GRAVEL CONSTRUCTION ENTRANCE MUST BE MAINTAINED IN A CONDITION TO PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO ADJACENT ROADWAYS.
2. REPLACEMENT OF STONE MAY BE NECESSARY TO ENSURE THE GRAVEL ENTRANCE FUNCTIONS PROPERLY.
3. REPLENISHMENT OF STONE MAY BE NECESSARY.
4. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE SHOULD BE COMPLETED.
5. ANY MATERIAL TRACKED ONTO THE ROADWAY SHALL BE CLEANED UP IMMEDIATELY.




CROSS SECTION

WAKE COUNTY NORTH CAROLINA
EFFECTIVE: 10/15/2025

## STANDARD CONSTRUCTION ENTRANCE 8




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 9


AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4000 Westchase Boulevard, Suite 440 Office
Raleigh, NC 27607
919-468-1101


NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 062383 ROMAN S. COOK
2026.09.09 15:27:38-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

STIPULATION FOR REUSE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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD1


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


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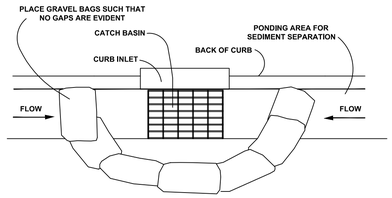


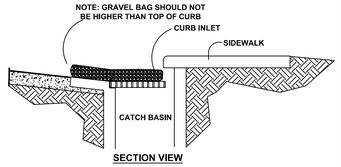

PLAN VIEW

**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. **WHEN INSTALLING CURB INLET PROTECTION DEVICES, NEVER BLOCK THE CURB INLET.**

**MAINTENANCE NOTES:**

1. **INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT (1 INCH OR GREATER), SEDIMENT AND GRAVEL MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.**

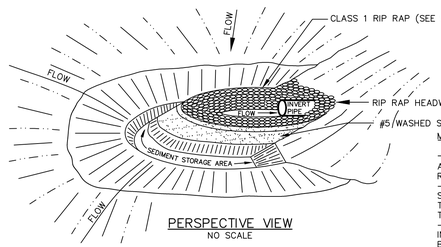



SECTION VIEW

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

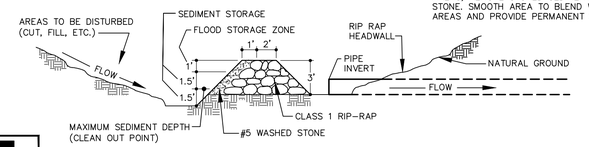
STANDARD GRAVEL BAG CURB INLET PROTECTION **10**




PERSPECTIVE VIEW
NO SCALE

MAINTENANCE NOTES:

-INSPECT INLET PROTECTION AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1 INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY.
-REMOVE SEDIMENT AND RESTORE THE SEDIMENT STORAGE AREA TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP.
-REFRESH STONE AS NEEDED TO RESTORE TO INITIAL INSTALLATION CONDITIONS WHEN STONE BECOMES CLOGGED OR DISLODGED.
-UPON PERMANENT STABILIZATION OF DRAINAGE AREAS, REMOVE STORED SEDIMENT & TEMPORARY STONE. SMOOTH AREA TO BLEND WITH ADJOINING AREAS AND PROVIDE PERMANENT GROUNDCOVER.

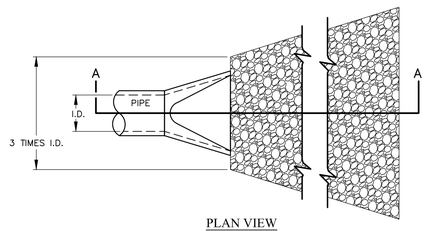



SECTION THRU CATCH BASIN, FILTER AND CULVERT PIPE
NO SCALE

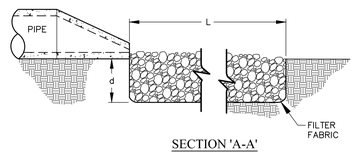
WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

STANDARD HORSESHOE INLET PROTECTION **11**




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.

MAINTENANCE NOTES:

1. INSPECT RIPRAP OUTLET STRUCTURES WEEKLY AND AFTER SIGNIFICANT (1 INCH OR GREATER) RAINFALL EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE, OR IF STONES HAVE BEEN DISLODGED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

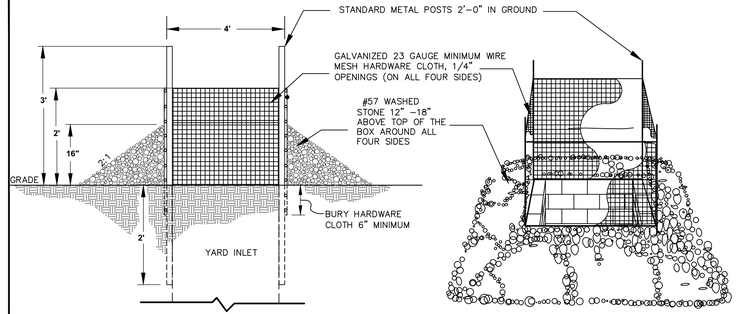
STANDARD PIPE OUTLET TO FLAT AREA NO WELL-DEFINED CHANNEL **12**


AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 Westchase Boulevard, Suite 440 (27607)
Raleigh, NC 27607
919-469-1101


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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2026.09.09 15:27:43-04'00'

FOR CONSTRUCTION




FRONT SECTION VIEW

ISOMETRIC VIEW

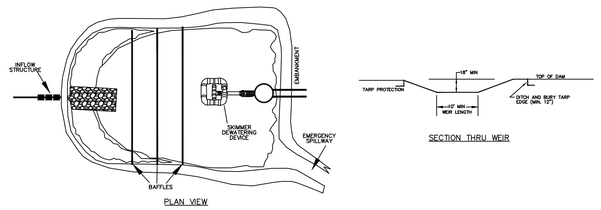
**MAINTENANCE NOTES:**

1. **REMOVE SEDIMENT WHEN HALF HEIGHT OF STONE AND CLEAR HARDWARE OF DEBRIS TO PROVIDE ADEQUATE FLOW FOR SUBSEQUENT RAINS, TAKING CARE NOT TO DAMAGE OR UNDERCUT HARDWARE DURING SEDIMENT REMOVAL.**
2. **REPLACE STONE AS NEEDED.**

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

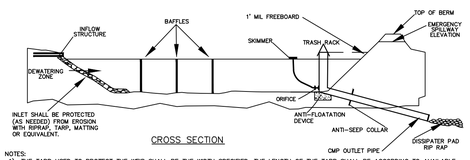
STANDARD GRAVEL YARD INLET PROTECTION **13**




PLAN VIEW




SECTION THRU WEIR




CROSS SECTION

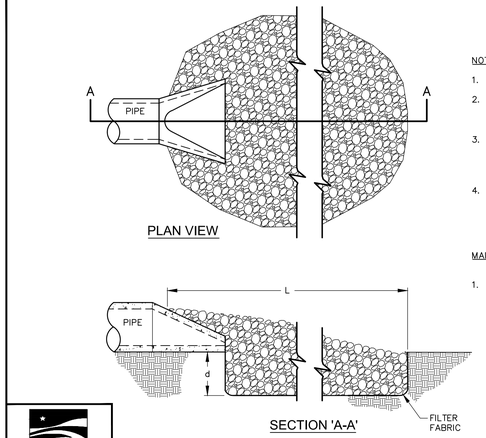
NOTES:
1) THE TARP USED TO PROTECT THE WEIR SHALL BE THE WIDTH SPECIFIED. THE LENGTH OF THE TARP SHALL BE ACCORDING TO AVAILABLE SUPPLY. IF MULTIPLE TARPS ARE TO BE USED, THEN TARPS SHALL BE OVERLAPPED AT LEAST 12". THE UPSTREAM 12" TARP SHALL OVERLAP THE DOWNSTREAM TARP. THE TARP SHALL BE 50 ML. HEAVY DUTY SILVER TARPAULINS OR EQUIVALENT FOR U.V. RESISTANCE.
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) DURING THE CONSTRUCTION PHASE OF THE PROJECT, PERMANENT STORMWATER RISER SHALL ONLY DEWATER FROM THE TOP OF PIPE.
5) POND SHALL NOT BE CONVERTED FOR STORMWATER USE UNTIL APPROVED BY ENVIRONMENTAL ENGINEER.

MAINTENANCE NOTES:
1) INSPECT THE BASIN AND RISER ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT (1 INCH OR GREATER).
2) BASIN SHOULD BE CLEANED OUT WHEN CAPACITY REACHES AN ELEVATION REPRESENTING THAT THE BASIN IS HALF-FULL.
3) MOST OF THE SEDIMENT WILL ACCUMULATE IN THE FIRST BAY, SO THIS SHOULD BE READILY AVAILABLE FOR MAINTENANCE.

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

STANDARD SKIMMER ATTACHED TO PERMANENT RISER **14**




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.

MAINTENANCE NOTES:

1. INSPECT RIPRAP OUTLET STRUCTURES WEEKLY AND AFTER SIGNIFICANT (1 INCH OR GREATER) RAINFALL EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE, OR IF STONES HAVE BEEN DISLODGED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

STANDARD PIPE OUTLET TO WELL-DEFINED CHANNEL **15**

| NO. | DATE | REVISION: |
|---|---|---|
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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:

KALAS FALLS CIVIL DETAILS

SHEET NO.:

CD2

**NOTES**

**USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL STONE.**

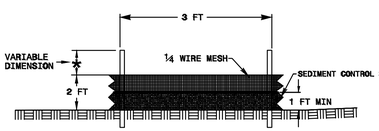
**USE HARDWARE CLOTH 24 GAUGE WIRE MESH WITH ¼ INCH MESH OPENINGS.**

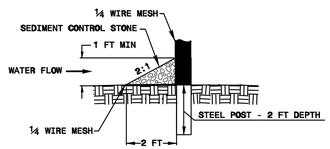
**INSTALL 5 FT. SELF FASTENER ANGLE STEEL POST 2 FT. DEEP MINIMUM.**

**ATTACH HARDWARE CLOTH TO POSTS WITH WIRE STAPLE OR OTHER ACCEPTABLE METHODS.**

**SPACE POSTS A MAXIMUM OF 3 FT.**

**FOR INSTALLATION BETWEEN SECTIONS OF SILT FENCE, EXTEND SEDIMENT CONTROL STONE A MINIMUM OF 12" ON EACH SIDE OF SPECIAL SEDIMENT CONTROL FENCE SECTION.**



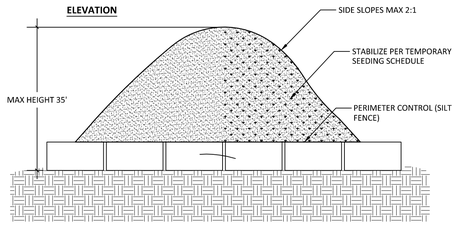




STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-24

ROADWAY STANDARD DRAWING FOR
**SPECIAL SEDIMENT CONTROL FENCE**

SHEET 1 OF 1
1606.01

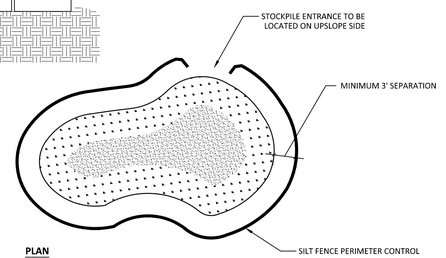



**NOTES:**

1. LOCATE STOCKPILE SO THAT THEY ARE 50FT FROM ANY STORM DRAIN INLET, OPEN CHANNEL, WETLAND, OR WATERBODY. REDIRECT ANY CONCENTRATED FLOW AROUND STOCKPILE USING AN APPROVED EROSION AND SEDIMENT CONTROL MEASURE.
2. SECURE THE PERIMETER OF THE STOCKPILE WITH AN APPROVED EROSION AND SEDIMENT CONTROL PERIMETER DEVICE.
3. IF STOCKPILE IS TO REMAIN INACTIVE FOR MORE THAN 14 CALENDAR DAYS, THE STOCKPILE MUST BE VEGETATED. FOLLOW THE TEMPORARY SEEDING SCHEDULE. THE VEGETATION CHOSEN SHALL LAST THE DURATION OF THE STOCKPILE; THE STOCKPILE SHALL BE RESTABILIZED IF THE TEMPORARY VEGETATION DIES OR EROSION RESULTS.

MAINTENANCE NOTES:

1. SEEDING OR COVERING STOCKPILES WITH TARPS OR MULCH IS REQUIRED AND WILL REDUCE EROSION PROBLEMS. TARPS SHOULD BE KEYED IN AT THE TOP OF THE SLOPE TO KEEP WATER FROM RUNNING UNDERNEATH THE PLASTIC.
2. IF A STOCKPILE IS TO REMAIN FOR FUTURE USE AFTER THE PROJECT IS COMPLETE(BUILDERS, ETC.) THE FINANCIAL RESPONSIBLE PARTY MUST NOTIFY WAKE COUNTY OF A NEW RESPONSIBLE PARTY FOR THAT STOCKPILE.
3. THE APPROVED PLAN SHALL PROVIDE FOR USE OF STAGED SEEDING AND MULCHING ON A CONTINUAL BASIS WHILE THE STOCK PILE IS IN USE.
4. ESTABLISH AND MAINTAIN A VEGETATIVE BUFFER AT THE TOE OF THE SLOPE (WHERE PRACTICAL).




PLAN

1 STOCK PILE
NOT TO SCALE

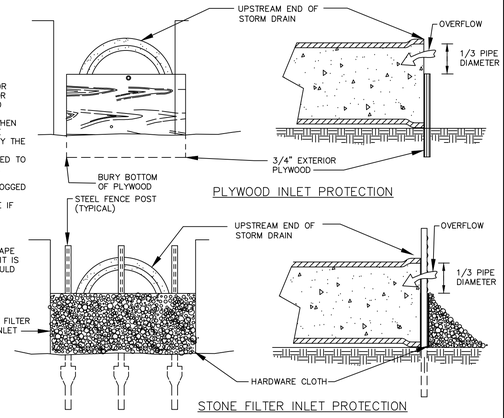
16 P-12

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

**MAINTENANCE NOTES:**

1. INSPECT THE DEVICE AFTER1 INCHES OR GREATER, OVER A 24-HOUR PERIOD FOR DAMAGE, SEDIMENT ACCUMULATION AND PROPER FUNCTION.
2. REMOVE SEDIMENT FROM THE DEVICE WHEN ACCUMULATIONS REACH ONE-HALF THE HEIGHT OF THE BASIN AREA FORMED BY THE DEVICE.
3. REPLACE THE WASHED STONE AS NEEDED TO ALLOW WATER TO DRAIN THROUGH THE DEVICE BETWEEN RAINFALL EVENTS.
4. CLEAN OUT THE DEVICE WHEN IT IS CLOGGED WITH DEBRIS.
5. CHECK PLYWOOD IF DAMAGED. REPLACE IF NEEDED.
6. IF THE DEVICE IS TO REMAIN ON THE PROJECT AT THE COMPLETION OF CONSTRUCTION ACTIVITIES, THE DEVICE SHOULD BE CLEAN AND IN PROPER SHAPE AT THE TIME OF FINAL INSPECTION. IF IT IS REMOVED, ALL ACCUMULATED SILT SHOULD BE REMOVED AND THE AREA SEEDED.




PLYWOOD INLET PROTECTION

STONE FILTER INLET PROTECTION

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

STANDARD PIPE INLET PROTECTION (PLYWOOD & STONE) **17**


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



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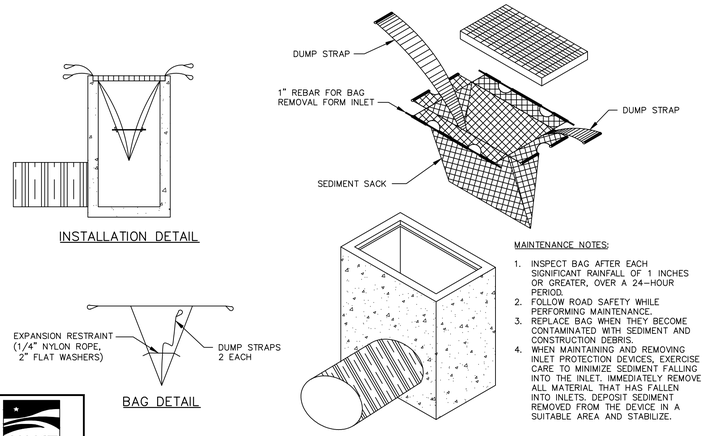



INSTALLATION DETAIL

BAG DETAIL

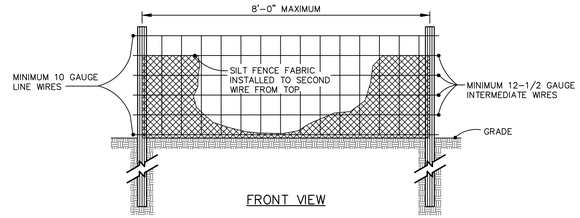
MAINTENANCE NOTES:

1. INSPECT BAG AFTER EACH SIGNIFICANT RAINFALL OF 1 INCHES OR GREATER, OVER A 24-HOUR PERIOD.
2. FOLLOW ROAD SAFETY WHILE PERFORMING MAINTENANCE.
3. REPLACE BAG WHEN THEY BECOME CONTAMINATED WITH SEDIMENT AND CONSTRUCTION DEBRIS.
4. WHEN MAINTAINING AND REMOVING INLET PROTECTION DEVICES, EXERCISE CARE TO MINIMIZE SEDIMENT FALLING INTO THE INLET. IMMEDIATELY REMOVE ALL MATERIAL THAT HAS FALLEN INTO INLETS. DEPOSIT SEDIMENT REMOVED FROM THE DEVICE IN A SUITABLE AREA AND STABILIZE.

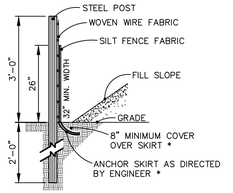
WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

## STANDARD SILT BAG - INLET SEDIMENT CONTROL DEVICE 18




FRONT VIEW




SIDE VIEW

MAINTENANCE NOTES:

1. INSPECT BAG AFTER EACH SIGNIFICANT RAINFALL OF 1 INCHES OR GREATER, OVER A 24-HOUR PERIOD. MAKE ANY REPAIRS IMMEDIATELY.
2. INSPECT THE SILT FENCE TO BE SURE THE BOTTOM OF THE GEOTEXTILE IS KEYED IN PROPERLY.
3. AT A MINIMUM, REMOVE AND DISPOSE OF ALL SILT ACCUMULATIONS WHEN DEPTH REACHES 1/2 THE HEIGHT OF THE GEOTEXTILE. DO NOT UNDERMINE THE FENCE DURING CLEANOUT.
4. DISPOSE OF SEDIMENT BY HAULING IT TO AN APPROVED WASTE SITE WITH APPROPRIATE PERIMETER PROTECTION.
5. REMOVE AND REPLACE DETERIORATED OR CLOGGED SILT FENCE.
6. REPLACE SILT FENCE REMOVED FOR ACCESS AT THE END OF EACH DAY'S OPERATION.
7. INSTALL ADDITIONAL POSTS OR WIRE BACKING IF FENCE IS SAGGING.

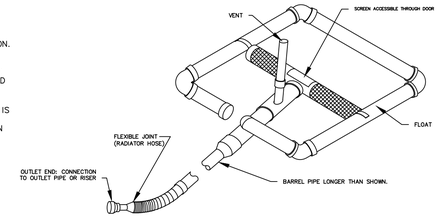
WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

## STANDARD TEMPORARY SILT FENCE 19

MAINTENANCE NOTES:

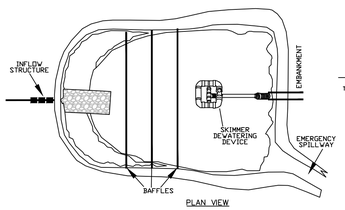
1. INSTALL A PAD FOR SKIMMER TO REST ON STONE OR WOOD PALLETS OR H-BEAM SECTION.
2. INSTALL SKIMMER AND PAD AWAY FROM BAFFLES.
3. ATTACH ROPE TO SKIMMER FOR MAINTENANCE
4. INSPECT THE BASIN ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT (1 INCH OR GREATER).
5. CHECK THE SKIMMER TO MAKE SURE THAT IT IS NOT CLOGGED WITH SEDIMENT.
6. REMOVE SEDIMENT THAT MAY ACCUMULATE ON THE STONE PAD UNDERNEATH THE SKIMMER DEVICE.



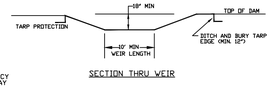

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

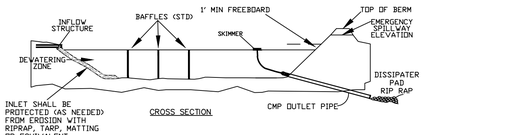
## STANDARD SKIMMER DETAIL 20




PLAN VIEW




SECTION THRU WEIR




CROSS SECTION

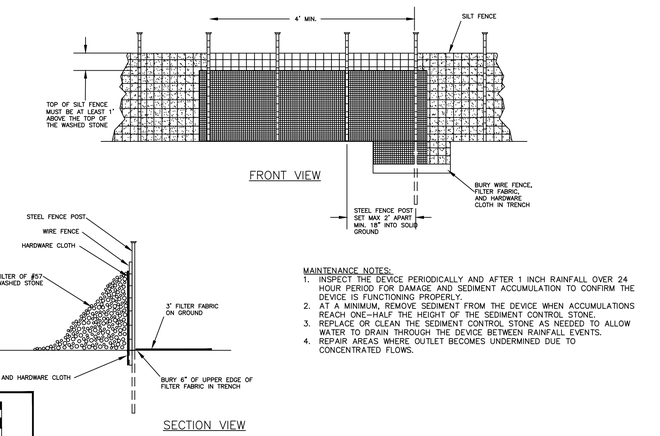
MAINTENANCE NOTES:

1. INSPECT THE BASIN ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT (1 INCH OR GREATER).
2. CLEAN OUT THE BASINS WHEN SEDIMENT ACCUMULATIONS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE FIRST BAFFLE.
3. CHECK THE SKIMMER TO MAKE SURE THAT IT IS NOT CLOGGED WITH SEDIMENT.
4. CHECK THE FABRIC LINED SPILLWAY FOR DAMAGE.
5. CHECK THE COIR FIBER MAT AT THE OUTLET OF THE SKIMMER TO DETERMINE IF A REPLACEMENT IS NEEDED.
6. CHECK THE SKIMMER ANCHOR AND ANCHOR AT AN ANGLE SUCH THAT WATER DOES NOT STAND INSIDE THE BARREL. THIS COULD RESULT IN THE WATER FREEZING AND PLUGGING THE BARREL.
7. REPAIR SEED AND REPLACE MATTING ON THE SIDE SLOPE AREAS THAT HAVE ERODED OR HAVE BECOME DAMAGED BY EQUIPMENT FROM SILT CLEANOUT.
8. REMOVE SEDIMENT THAT MAY ACCUMULATE ON THE STONE PAD UNDERNEATH THE SKIMMER DEVICE.
9. INSPECT THE BAFFLES AFTER EACH RAIN EVENT FOR EROSION DAMAGE AND SEDIMENT ACCUMULATIONS.

WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

## STANDARD SKIMMER BASIN 21




FRONT VIEW




SECTION VIEW

MAINTENANCE NOTES:

1. INSPECT THE DEVICE PERIODICALLY AND AFTER 1 INCH RAINFALL OVER 24 HOUR PERIOD FOR DAMAGE AND SEDIMENT ACCUMULATION TO CONFIRM THE DEVICE IS FUNCTIONING PROPERLY.
2. AT A MINIMUM, REMOVE SEDIMENT FROM THE DEVICE WHEN ACCUMULATIONS REACH ONE-HALF THE HEIGHT OF THE SEDIMENT CONTROL STONE.
3. REPLACE OR CLEAN THE SEDIMENT CONTROL STONE AS NEEDED TO ALLOW WATER TO DRAIN THROUGH THE DEVICE BETWEEN RAINFALL EVENTS.
4. REPAIR AREAS WHERE OUTLET BECOMES UNDERMINED DUE TO CONCENTRATED FLOWS.

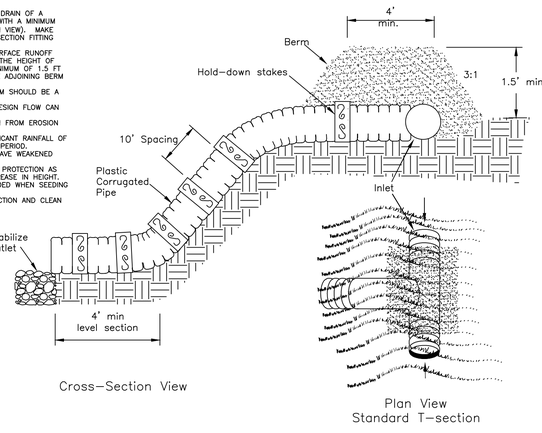
WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

## STANDARD SILT FENCE OUTLET 22

MAINTENANCE 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.
3. THE LOWEST POINT OF THE DIVERSION BERM SHOULD BE A MINIMUM OF 1 FT.
4. ABOVE THE TOP OF THE DRAIN SO THAT DESIGN FLOW CAN FREELY ENTER THE PIPE.
5. PROTECT THE OUTLET OF THE SLOPE DRAIN FROM EROSION WITH RIPRAP DISSIPATOR.
6. INSPECT SLOPE DRAINS AFTER EACH SIGNIFICANT RAINFALL OF 1 INCHES OR GREATER, OVER A 24-HOUR PERIOD.
7. REBUILD EARTH BERMS AND INLETS THAT HAVE WEAKENED DUE TO SCOURING.
8. EXTEND SLOPE DRAINS AND REBUILD INLET PROTECTION AS SLOPE IS BUILT, AFTER EACH 2-FOOT INCREASE IN HEIGHT.
9. REBUILD OR REPAIR SLOPE DRAINS IF NEEDED WHEN SEEDING AND MULCHING IS PERFORMED.
10. REFURBISH CLASS B STONE OUTLET PROTECTION AND CLEAN AS NEEDED.



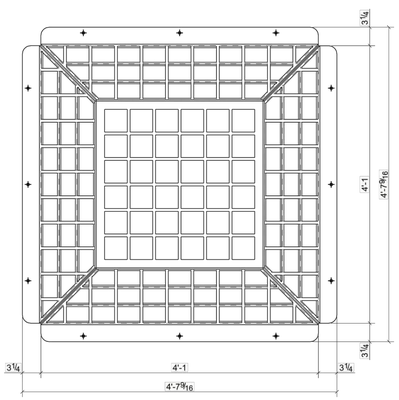

Cross-Section View

Plan View
Standard T-section

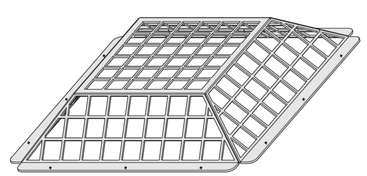
WAKE COUNTY NORTH CAROLINA

EFFECTIVE: 10/15/2025

## STANDARD TEMPORARY SLOPE DRAIN 23




**OR APPROVED EQUAL**



| PRODUCT ID | MATERIAL | COATING | WEIGHT |
|---|---|---|---|
| LVT-4848-P | ASTM A36 MILD STEEL | N/A | 152 LBS. |
| LVT-4848-G | ASTM A36 MILD STEEL | GALVANIZED | 152 LBS. |
| LVT-4848-PC | ASTM A36 MILD STEEL | POWDER COAT | 152 LBS. |
| LVT-4848-SS | 304 STAINLESS STEEL | N/A | 152 LBS. |
| LVT-4848-AL | 6061-T6 ALUMINUM | N/A | 52 LBS. |

**CUSTOM SIZES AVAILABLE**

OPTIONS: HINGED ACCESS, ANTI-VORTEX PLATE

TRASHRACKS.COM
A DIVISION OF J.R.HOE

TITLE: LVT-4848
48" X 48" SQUARE TOP MOUNT RACK
MADE IN THE U.S.A.

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DATE:

PAGE: 24

## Design Criteria

| Drainage Area: | | 5 acres or less | |
|---|---|---|---|
| Dike Design | | Channel Design | |
| Side Slope: | 2:1 or flatter | Shape: | Parabolic, Trapezoidal, or V-Shaped |
| | 3:1 of flatter where vehicles must cross | Side Slope: | 2:1 or flatter |
| | | | 3:1 or flatter where vehicles must cross |
| Width: | 2.0 ft minimum | | |
| Height: | 1.5 ft minimum | Stabilization: | Based on velocity of reaches |
| Freeboard: | 0.5 ft minimum | | |
| Settlement: | 10% of total fill height minimum | | |

NOTES:

1. Remove and properly dispose of all trees, brush, stumps, and other objectionable material. Fill and compact all ditches and gullies that will be crossed by machinery to natural ground level or above.
2. Disk the base of the dike before placing fill.
3. Ensure that the constructed cross section meets all design requirements.
4. Compact the dike by tracking with construction equipment.
5. Divert all sediment laden water into a temporary sediment trap or sediment basin. Runoff from undisturbed areas should empty into an outlet protection device such as a level spreader or riprap outlet structure unless well stabilized natural outlets exist.
6. Ensure that the top of the dike is not lower at any point than the design elevation plus the specified settlement after it has been compacted.
7. Leave sufficient area along the dike to permit machine re-grading and cleanout.
8. Immediately seed and mulch the dike after its construction, and stabilize the flow portion in accordance with design requirements.

Maintenance:

1. Inspect diversion dikes at least weekly and after each rainfall of 1.0 inch or greater.
2. Immediately remove sediment from the flow area and repair the dike.
3. Check outlets, and make timely repairs as needed to avoid gully formation.
4. when area above the temporary diversion dike is permanently stabilized, remove the dike, and fill and stabilized the channel to blend with the natural surface.

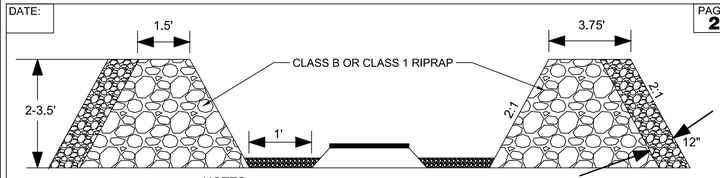
DEQ

## DIVERSION DIKE (PERIMETER PROTECTION)

Effective Date: 9/1/2023
In accordance with the 2013 Design Manual Updates

DATE:

PAGE: 25

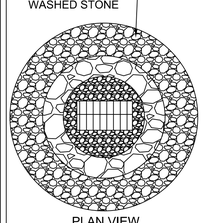



NOTES:

1. Clear the area of all debris that might hinder excavation and disposal of spoil.
2. Grade shallow depression uniformly towards the inlet with side slopes no greater than 2:1. Grade a 1-foot wide level area set 4 inches below the area adjacent to the inlet.
3. Install the Class B or Class 1 riprap in a circle around the inlet. The minimum crest width of the riprap should be 18 inches, with a minimum bottom width of 7.5 feet. The minimum height of the stone is 2 feet.
4. The outside face of the riprap is then lined with 12 inches of NC DOT #5 or #57 washed stone.

MAINTENANCE:

1. Inspect all measures at least weekly and after each rainfall of 1.0 inch or greater; make any repairs immediately.
2. Remove sediment form the sediment pool area when the volume is decreased by half. Stabilize excavated material appropriately.
3. Do not damage or undercut the structure during sediment removal. Remove debris and replace stone as needed. If inlet is covered with wire mesh, clean wire mesh free of debris.




PLAN VIEW

DEQ

## ROCK DOUGHNUT INLET PROTECTION

Effective Date: 9/1/2023
In accordance with the 2013 Design Manual Updates

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4201 Lake Boone Boulevard, Suite 410
Raleigh, NC 27607
919-469-1101

NORTH CAROLINA BOARD OF EXAMINERS AMERICAN ENGINEERING ASSOCIATES SOUTHEAST, P.A. C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2026.09.09 15:27:43-04'00'

FOR CONSTRUCTION

| NO. | DATE: | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS
CIVIL DETAILS

SHEET NO.:
CD3

North Carolina 811 811

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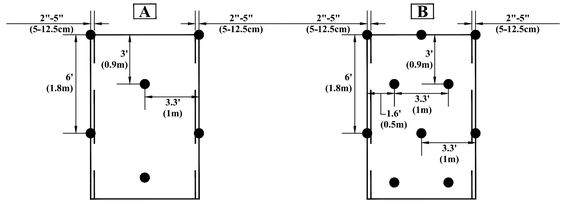
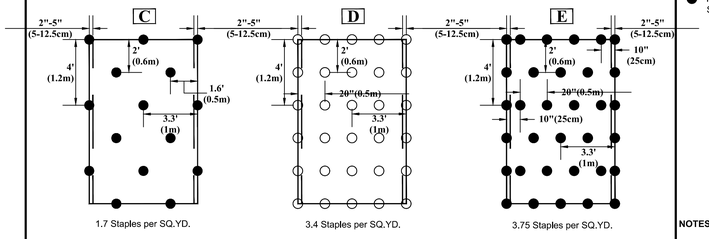



## STAPLE PATTERN GUIDE

- 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**:

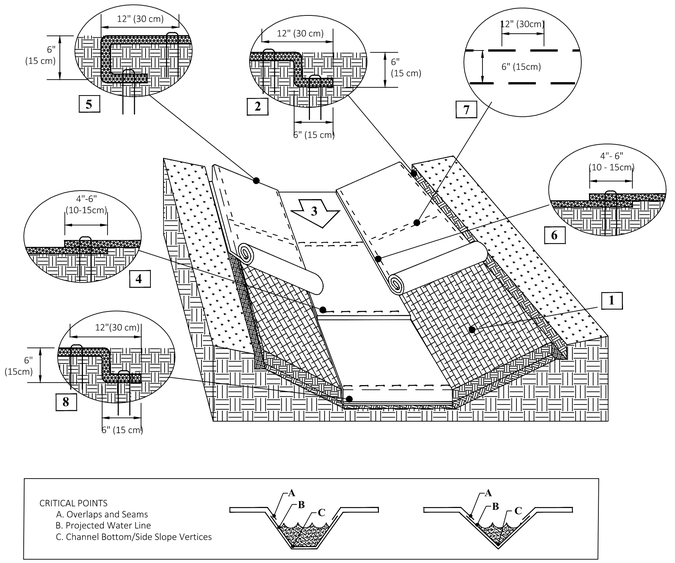
* Use ECMDS® for more accurate staple pattern selection.

Drawing Not To Scale

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

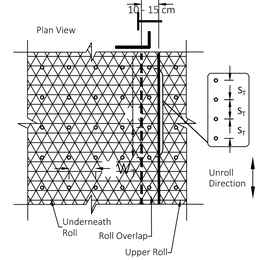



NOTES:
*Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

### 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**

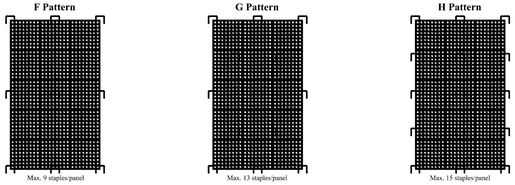
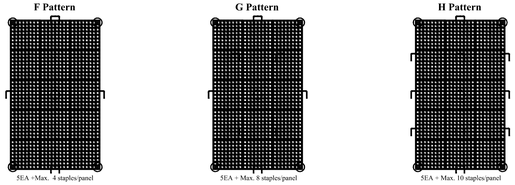



**Figure 4. Anchor Patterns for use with Combination of Earth Anchors and Staples**

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**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

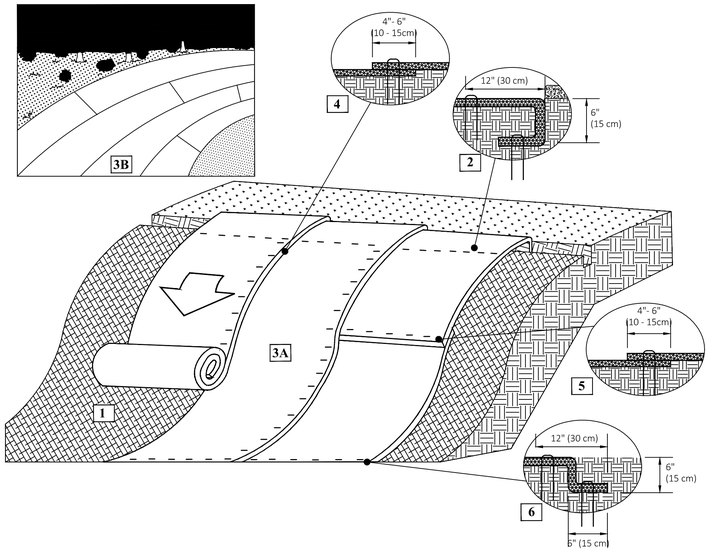
### ANCHORING GUIDE

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

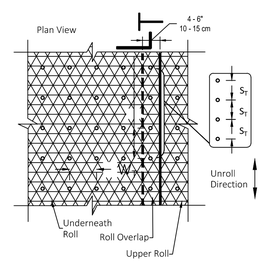
Drawing Not To Scale




### 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.

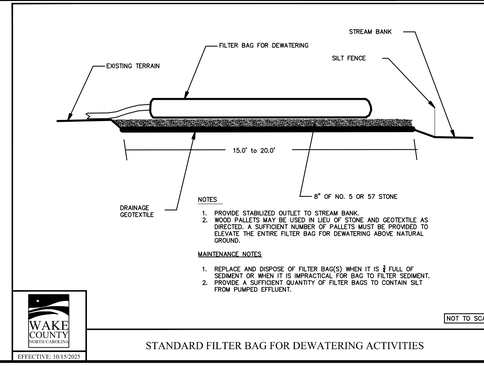
### Staple Pattern Guide




○ 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 NORTH CAROLINA
EFFECTIVE: 10/15/2025

STANDARD FILTER BAG FOR DEWATERING ACTIVITIES

26


AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4700 Westgate Boulevard, Suite 400
Raleigh, NC 27607
919-468-1101


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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2026.09.09 15:27:44-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD4


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


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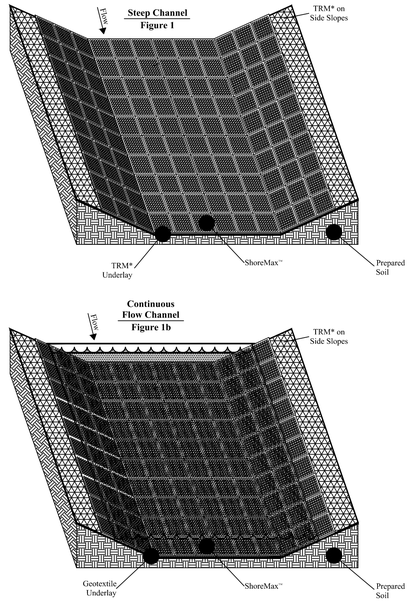
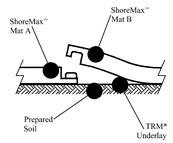
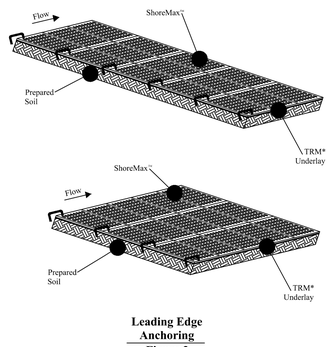



**Integrated Panel Interlock System**
**Figure 2**




**Leading Edge Anchoring**
**Figure 3**


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.<br>If no daily rain gauge observations are made during weekend on holiday periods, and no individual–day rainfall information is available, record the cumulative rain measurement for those unattended days (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<br>2. Date and Time of the inspection<br>3. Name of the person performing the inspection<br>4. Indication of whether the measures were operating properly<br>5. Description of maintenance needs for the measure<br>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<br>2. Date and Time of the inspection<br>3. Name of the person performing the inspection<br>4. Evidence of indicators of stormwater pollution such as oil sheen, flooting or suspended solids or discoloration<br>5. Indication of visible sediment leaving the site<br>6. Description, Evidence, and date 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 record of the following shall be made:<br>1) Actions taken to clean up or stabilize sediment that has left the site limits<br>2) Description, Evidence and date of corrective actions taken<br>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 has visible increased turbidity from the construction activity, then a record of the following shall be made:<br>1) Description, Evidence and date of corrective actions taken<br>2)Records of 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).<br>2. Documentation that the required ground stabilization measures have been provided within the required timeframe or 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 | Document 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 Timeframe (After Discovery) and Other Requirements |
|---|---|
| (a) Visible sediment deposition in a stream or wetland | • Within 24 Hours, an oral or electronic notification.<br>• 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.<br>• If the stream is named on the NC 303(d) list as impaired for sediment–related caused, 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<br>• 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<br>• 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)).<br>• 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.

DEQ NORTH CAROLINA Department of Environmental Quality

## INSPECTION, RECORD KEEPING AND REPORTING

Effective: April 1, 2024


AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4700 Falls of Neuse Boulevard, Suite 400
Raleigh, NC 27607
919-468-1101


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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2023.09.29 15:27:46-04'00'

FOR CONSTRUCTION

### 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 feet 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 50' in length and with slopes steeper than 4:1<br>–7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones<br>–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<br>–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.<br>• Hydroseeding<br>• Rolled erosion control products with or without temporary grass seed<br>• Appropriately applied straw or other mulch<br>• Plastic sheeting | • Permanent grass seed covered with straw or other mulches and tackifiers<br>• Geotextile fabrics such as permanent soil reinforcement matting (PRSM)<br>• Hydroseeding<br>• Shrubs or other permanent plantings covered with mulch<br>• Uniform and evenly distributed ground cover sufficient to restrain erosion<br>• Structural methods such as concrete, asphalt or retaining walls<br>• Rolled erosion control products with grass seed |

Note: The use of techniques listed above which promote and assist in establishment of vegetation does not consitute permanent stabilization prior to the establishment of permanent vegetation.

### 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.

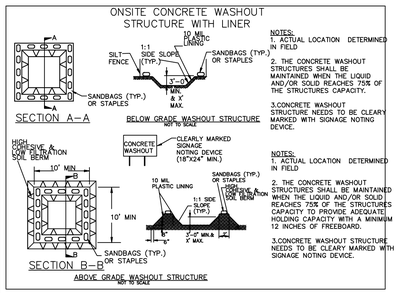
### EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen–material stockpile areas at least 50 feet away from storm drain inlets and surface waters unless it can be shown no other alternatives are reasonably available. It is recommended to locate stockpile areas at least 50 feet away from skimmer basins and anywhere stormwater flow is concentrated.
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.

### 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.

### 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.

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.

### 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.

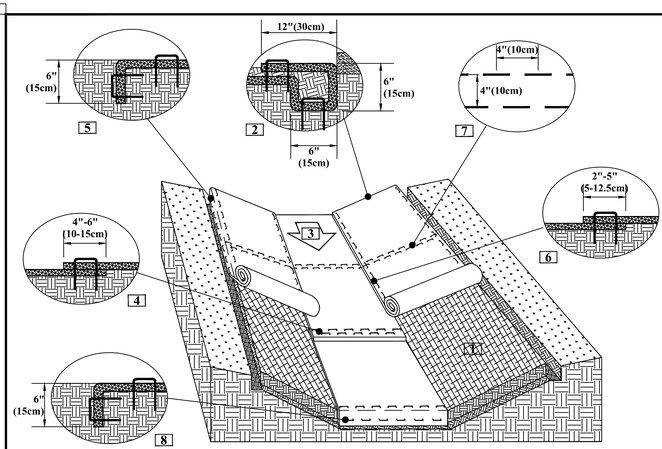
### HERBICIDES, PESTICIDES AND RODENTICIDES

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.

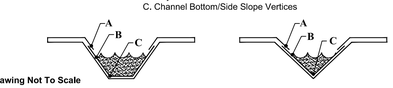
DEQ NORTH CAROLINA Department of Environmental Quality

## GROUND COVER & MATERIALS HANDLING

Effective: April 1, 2024




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




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.

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

### 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.


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



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


Drawn on: 5-4-17

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

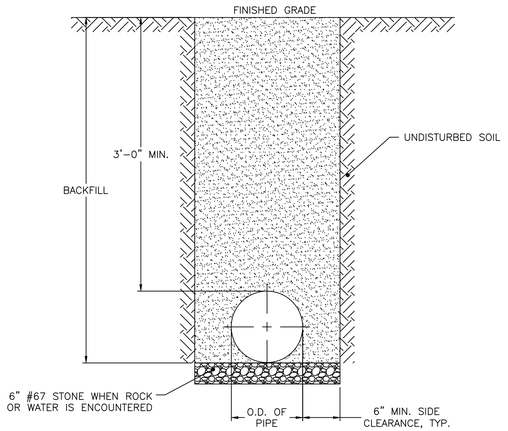
JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD5

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

J:\Jobs\9900\Written Property\Land_Working Dwg\Phase 4\Sheet Files\Sheet No CD1\ CD13 Phase 4 Details.dwg

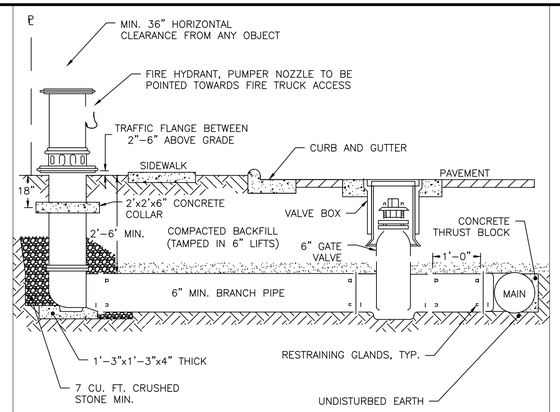



NOTES:
1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS.
5. ACHIEVE 95%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

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | TRENCH BOTTOM DIMENSIONS AND BACKFILLING REQUIREMENTS FOR DUCTILE IRON | |

**W-3**

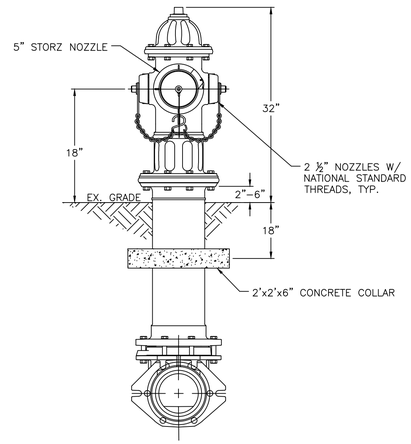



NOTES:
1. FIRE HYDRANT SHALL BE AS MANUFACTURED: MUELLER, AMERICAN DARLING, KENNEDY OR CLOW.
2. BRANCH PIPE SHALL BE DUCTILE IRON AWWA C150.
3. 6" GATE VALVE SHALL BE AWWA C500 OPEN LEFT.
4. RODS AND BOLTS SHALL BE ¾" 316 STAINLESS STEEL.
5. FIRE HYDRANTS WILL BE INSTALLED IN TRUE VERTICAL POSITION.
6. 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.
7. FIRE HYDRANTS TO BE LOCATED IN ROW OR 2.5 FOOT EASEMENT (ON ALL SIDES OF HYDRANT) FOOT EASEMENT ADJACENT TO ROW.
8. 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**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | STANDARD FIRE HYDRANT INSTALLATION (RESTRAINT GLANDS) | |

**W-4**

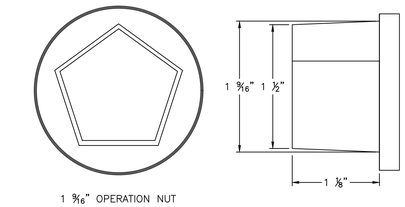



NOTES:
1. ALL PUBLIC FIRE HYDRANTS IN THE CITY OF RALEIGH AND THE MERGER TOWNS OF GARNER, ROLESVILLE, WAKE FOREST, KNIGHTDALE, WENDELL AND ZEBULON SHALL BE PAINTED CHROME YELLOW WITH HIGH REFLECTIVE ALUMINUM SILVER CAPS, BONNETS AND OPERATING NUTS.
2. ALL PRIVATE FIRE HYDRANTS SHALL BE RED.

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | STANDARD FIRE HYDRANT WITH 5" STORZ PUMPER NOZZLE | |

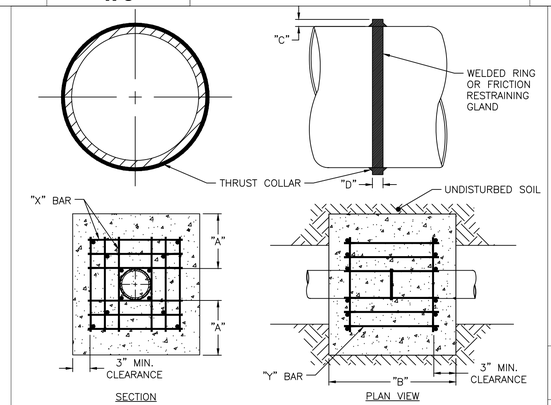
**W-5**




**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | HYDRANT OPERATING NUT AND 2 ½" OUTLET THREADS | |

**W-6**




SECTION — PLAN VIEW

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" | #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" | ⅜" |
| 20"–24" | 1'–4" | 1'–7" | 3" | ½" |
| 30"–36" | 1'–4" | 1'–7" | 4" | ⅝" |
| ≥48" | 1'–8" | 1'–9" | 6" | ⅞" |

NOTES:
1. SEE DETAIL W–9 FOR THRUST BLOCK LOCATIONS.
2. CONCRETE SHALL BE 3,000 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 DETAIL W–3.
5. BACKFILL TAMPED IN 6" LIFTS, SEE DETAIL W–3.
6. THRUST COLLAR MUST BE FACTORY WELDED ON BOTH SIDES ALONG BOTH EDGES OF COLLAR AROUND CIRCUMFERENCE.

**CITY OF RALEIGH**
**STANDARD DETAIL**

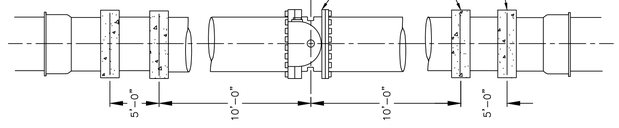
| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | THRUST BLOCKING DESIGN DATA FOR WATER MAINS | |

**W-7**

**W-8**

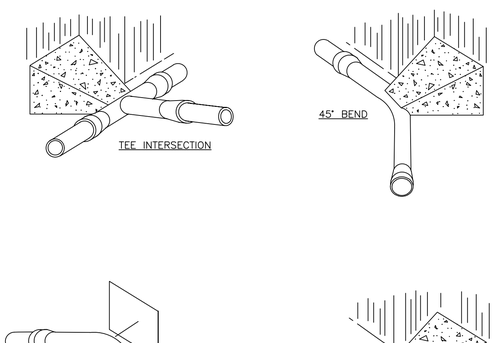
**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | STANDARD THRUST BLOCKING INSTALLATION AT TEES, VALVES, AND DEAD END MAINS | |




THRUST BLOCKING AT VALVES 16" AND LARGER

THRUST BLOCKING




NOTES:
1. CONCRETE SHALL BE 3,000 PSI.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO DETAIL W–3.
4. SEE DETAIL W–10 & W–11 (THRUST BLOCK TABLES) FOR AREA OF CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.

CITY OF RALEIGH
STANDARD DETAIL

| REVISIONS | DATE: 01/15/2025 | NOT TO SCALE |
|---|---|---|
| | THRUST BLOCKING VIEWS | |

W-9

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4021 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 062383 ROMAN S. COOK
2026.09.09 15:27:48-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD6

North 811 Carolina
*** 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\Civil_Working Dwgs\Phase 4\Sheet Files\Sheet No CD1-CD15 Phase 4 Details.dwg

| REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS BASED ON TEST PRESSURE OF 200 PSI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ALL AREAS GIVEN IN SQUARE FEET | | | | | | | | | | |
| SIZE OF BEND | DEGREE OF BEND | STATIC THRUST IN POUNDS | MODERATELY DRY CLAY 4,000 LBS/FT² | SOFT CLAY 2,000 LBS/FT² | 1,600 LBS/FT² GRAVEL/ COARSE SAND | 8,000 LBS/FT² DRY CLAY (ALWAYS DRY) | SAND, COMPACT FIRM 8,000 LBS/FT² | SAND–CLEAN DRY 4,000 LBS/FT² | SOIL 1,000 LBS/FT² QUICKSAND (VERY POOR) | ROCK–POOR 10,000 LBS/FT² |
| 6" | 11 ¼° | 1,108 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| | 22 ½° | 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 ¼° | 1,970 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 |
| | 22 ½° | 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 ¼° | 4,433 | 2 | 3 | 3 | 1 | 1 | 2 | 5 | 1 |
| | 22 ½° | 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 ¼° | 7,881 | 2 | 4 | 5 | 1 | 1 | 2 | 8 | 1 |
| | 22 ½° | 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 |

NOTES:
1. 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.
2. USE 6" 90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

**CITY OF RALEIGH**
**STANDARD DETAIL**

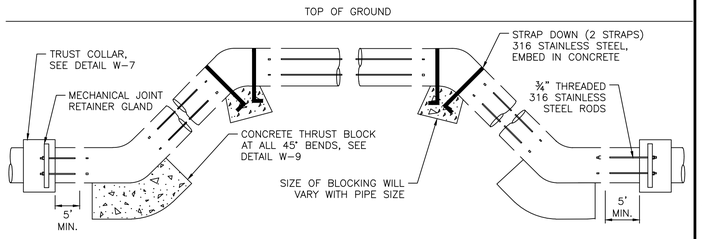
| REVISIONS | DATE: 01/18/2025 | NOT TO SCALE |
|---|---|---|
| | THRUST BLOCKING DESIGN QUANTITY TABLE | |
| | **W-10** | |

| REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS BASED ON TEST PRESSURE OF 200 PSI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ALL AREAS GIVEN IN SQUARE FEET | | | | | | | | | | |
| SIZE OF BEND | DEGREE OF BEND | STATIC THRUST IN POUNDS | MODERATELY DRY CLAY 4,000 LBS/FT² | SOFT CLAY 2,000 LBS/FT² | 1,600 LBS/FT² GRAVE/ COARSE SAND | 8,000 LBS/FT² DRY CLAY (ALWAYS DRY) | SAND, COMPACT FIRM 8,000 LBS/FT² | SAND–CLEAN DRY 4,000 LBS/FT² | SOIL 1,000 LBS/FT² QUICKSAND (VERY POOR) | ROCK–POOR 10,000 LBS/FT² |
| 24" | 11 ¼° | 17,734 | 5 | 9 | 11 | 3 | 3 | 5 | 18 | 2 |
| | 22 ½° | 35,305 | 9 | 18 | 22 | 5 | 5 | 9 | 36 | 4 |
| | 45° | 69,252 | 18 | 35 | 42 | 9 | 9 | 18 | 70 | 7 |
| | 90° | 127,936 | 32 | 64 | 77 | 16 | 16 | 32 | 128 | 113 |
| | PLUG | 90,478 | 23 | 46 | 55 | 12 | 12 | 23 | 91 | 10 |
| 30" | 11 ¼° | 27,709 | 7 | 14 | 17 | 4 | 4 | 7 | 2 | 3 |
| | 22 ½° | 55,163 | 14 | 28 | 34 | 7 | 7 | 14 | 56 | 6 |
| | 45° | 108,206 | 28 | 55 | 65 | 14 | 14 | 28 | 109 | 11 |
| | 90° | 199,900 | 50 | 100 | 120 | 25 | 25 | 50 | 200 | 20 |
| | PLUG | 141,372 | 36 | 71 | 85 | 18 | 18 | 36 | 142 | 15 |
| 36" | 11 ¼° | 39,901 | 10 | 20 | 24 | 5 | 5 | 10 | 40 | 4 |
| | 22 ½° | 79,439 | 20 | 40 | 48 | 10 | 10 | 20 | 30 | 8 |
| | 45° | 155,816 | 39 | 78 | 94 | 20 | 20 | 39 | 156 | 16 |
| | 90° | 287,855 | 72 | 144 | 172 | 36 | 36 | 72 | 288 | 29 |
| | PLUG | 203,575 | 51 | 102 | 122 | 26 | 26 | 51 | 204 | 21 |
| 48" | 11 ¼° | 70,935 | 18 | 36 | 43 | 9 | 9 | 18 | 71 | 8 |
| | 22 ½° | 141,218 | 36 | 71 | 85 | 18 | 18 | 36 | 142 | 15 |
| | 45° | 277,007 | 70 | 139 | 166 | 35 | 35 | 70 | 277 | 28 |
| | 90° | 511,742 | 128 | 256 | 320 | 64 | 64 | 128 | 512 | 52 |
| | PLUG | 361,911 | 91 | 181 | 217 | 46 | 46 | 91 | 362 | 37 |

NOTES:
1. 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.
2. USE 6" 90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/18/2025 | NOT TO SCALE |
|---|---|---|
| | THRUST BLOCKING DESIGN QUANTITY TABLE | |
| | **W-11** | |




ROD REQUIREMENTS

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

STRAP REQUIREMENTS

| STRAP WIDTH | STRAP THICKNESS |
|---|---|
| 1" | 3/16" |
| 1.5" | 3/16" |
| 2" | ¼" |
| 2" | ½" |
| 4" | ½" |

RESTRAINT REQUIREMENTS

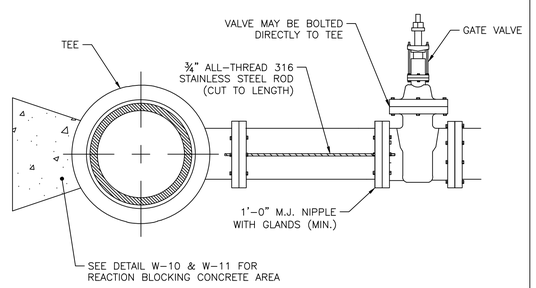
| PIPE DIA | RODDING | RJ GLANDS | THRUST COLLAR | THRUST BLOCKING |
|---|---|---|---|---|
| <12" | X | X | X | |
| ≥12" | X | X | X | X |

"X" DENOTES REQUIRED RESTRAINT.

NOTES:
1. STEEL RODS AND BOLTS SHALL BE ¾" 316 STAINLESS STEEL.
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.
6. EXTERNAL RESTRAINT REQUIRED. INTEGRAL BELL RESTRAINT REQUIRES DIRECTOR'S APPROVAL.

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/18/2025 | NOT TO SCALE |
|---|---|---|
| | STANDARD VERTICAL BEND | **W-12** |



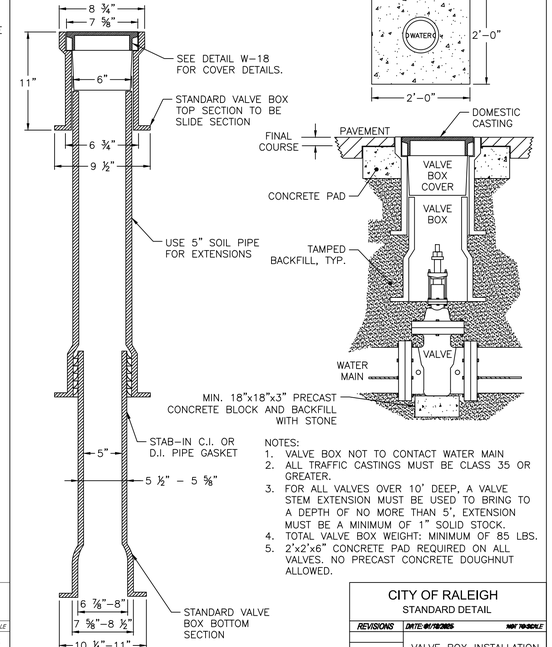

ROD REQUIREMENTS

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

NOTES:
1. STEEL RODS AND BOLTS SHALL BE ¾" 316 STAINLESS STEEL.
2. SEE DETAIL W-10 AND W-11 (THRUST BLOCK TABLES) 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**
**STANDARD DETAIL**

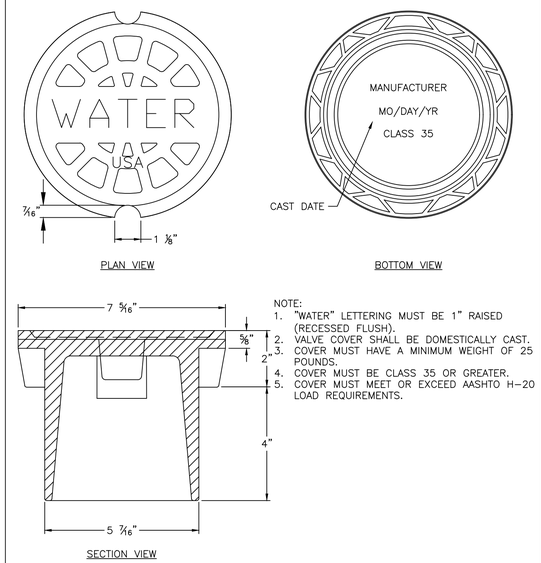
| REVISIONS | DATE: 01/18/2025 | NOT TO SCALE |
|---|---|---|
| | VALVE RESTRAINT AT TEES AND CROSSES FOR LINES (4"–24") | |
| | **W-15** | |




NOTES:
1. VALVE BOX NOT TO CONTACT WATER MAIN
2. ALL TRAFFIC CASTINGS MUST BE CLASS 35 OR GREATER.
3. FOR ALL 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.
5. 2'x2'x6" CONCRETE PAD REQUIRED ON ALL VALVES. NO PRECAST CONCRETE DOUGHNUT ALLOWED.

CITY OF RALEIGH
STANDARD DETAIL

| REVISIONS | DATE: 01/18/2025 | NOT TO SCALE |
|---|---|---|
| | VALVE BOX INSTALLATION AND EXTENSION | |
| | W-17 | |




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

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/18/2025 | NOT TO SCALE |
|---|---|---|
| | 5 ¼" VALVE BOX DROP LID WITH 4" SKIRT | |
| | **W-18** | |


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


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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2025.09.09 15:27:56-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-00006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

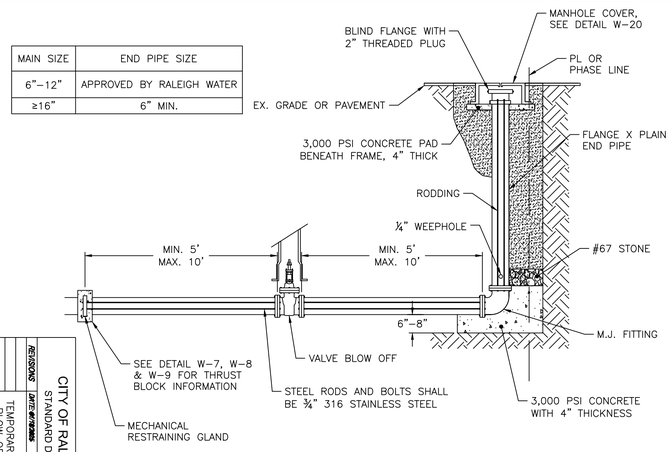
SHEET NO.:
CD7


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\Workflow Process\Revit_Working Dwgs\Phase 4\Sheet Files\Sheet No CD1-CD19 Phase 4 Details.dwg

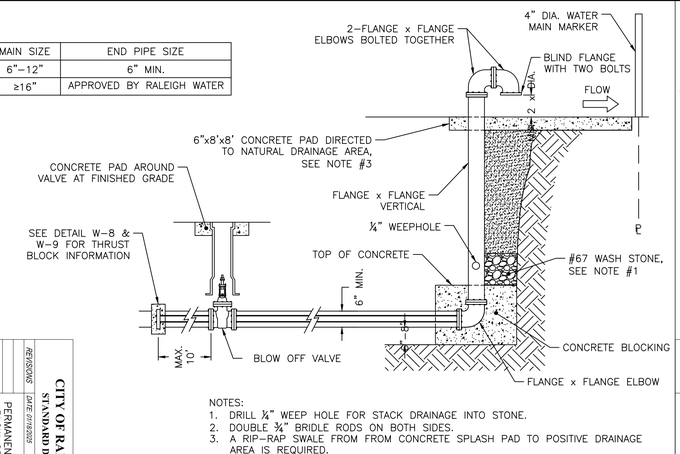
| MAIN SIZE | END PIPE SIZE |
|---|---|
| 6"–12" | APPROVED BY RALEIGH WATER |
| ≥16" | 6" MIN. |




NOTE:
NO ROD COUPLINGS ALLOWED.

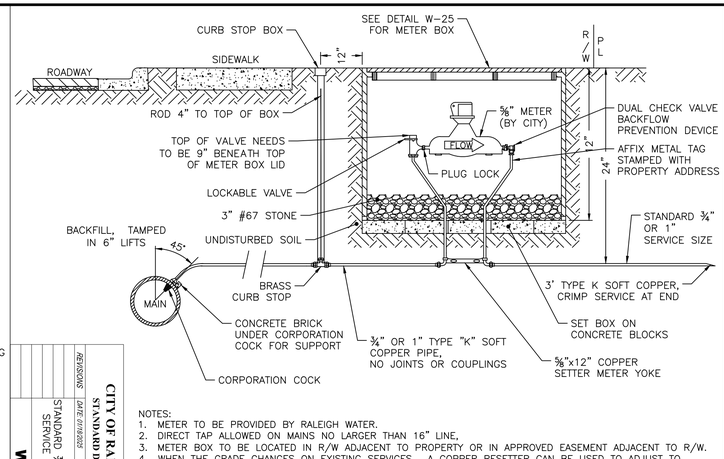
CITY OF RALEIGH
STANDARD DETAIL
TEMPORARY WATER MAIN BLOW OFF ASSEMBLY
W-21

| MAIN SIZE | END PIPE SIZE |
|---|---|
| 6"–12" | 6" MIN. |
| ≥16" | APPROVED BY RALEIGH WATER |



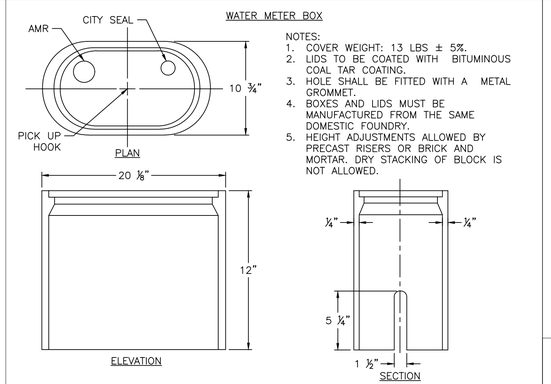

NOTES:
1. DRILL ¼" WEEP HOLE FOR STACK DRAINAGE INTO STONE.
2. DOUBLE ¾" BRIDLE RODS ON BOTH SIDES.
3. A RIP–RAP SWALE FROM FROM CONCRETE SPLASH PAD TO POSITIVE DRAINAGE AREA IS REQUIRED.
4. BOTTOM 90° ELBOW SHALL HAVE BLIND FLANGE ATTACHED WITH TWO BOLTS.
5. INSTALL WATER MAIN MARKER AT R/W OR P/L TO LOCATE MAIN.
6. BURIED ¾" RODS AND BOLTS TO BE 316 STAINLESS STEEL.
7. END PIPE SIZE 6" MIN. OR AS APPROVED BY PUBLIC UTILITIES.

CITY OF RALEIGH
STANDARD DETAIL
PERMANENT WATER MAIN BLOW OFF ASSEMBLY
W-22



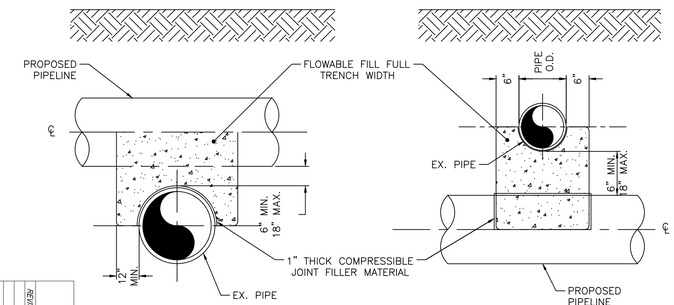

NOTES:
1. METER TO BE PROVIDED BY RALEIGH WATER.
2. DIRECT TAP ALLOWED ON MAINS NO LARGER THAN 16" LINE,
3. METER BOX TO BE LOCATED IN R/W ADJACENT TO PROPERTY OR IN APPROVED EASEMENT ADJACENT TO R/W.
4. WHEN THE GRADE CHANGES ON EXISTING SERVICES, A COPPER RESETTER CAN BE USED TO ADJUST TO GRADE. COPPER RESETTERS ARE PROHIBITED ON NEW SERVICES.
5. CURB STOP BOX SHALL HAVE PLUG STYLE LID WITH PENTAGON BOLT, 1–¼" STEEL UPPER SECTION, AND ARCH STYLE BASE. STEEL STATIONARY ROD TO BE PROVIDED FOR CURB STOP OPERATION.

CITY OF RALEIGH
STANDARD DETAIL
STANDARD ¾" & 1" WATER SERVICE INSTALLATION
W-23



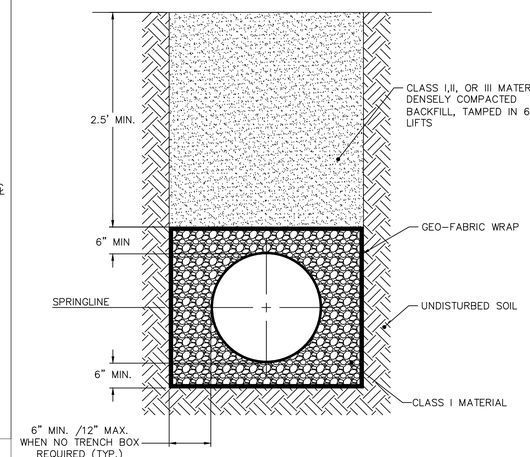

NOTES:
1. COVER WEIGHT: 13 LBS ± 5%.
2. LIDS TO BE COATED WITH BITUMINOUS COAL TAR COATING.
3. HOLE SHALL BE FITTED WITH A METAL GROMMET.
4. BOXES AND LIDS MUST BE MANUFACTURED FROM THE SAME DOMESTIC FOUNDRY.
5. HEIGHT ADJUSTMENTS ALLOWED BY PRECAST RISERS OR BRICK AND MORTAR. DRY STACKING OF BLOCK IS NOT ALLOWED.

CITY OF RALEIGH
STANDARD DETAIL
WATER METER BOX
W-25




NOTE:
NO ENCASEMENT REQUIRED FOR SPACE GREATER THAN 18" FOR WATER LINES.

CITY OF RALEIGH
STANDARD DETAIL
CONCRETE CRADLE PROTECTION FOR WATER LINE CROSSINGS
W-41




CITY OF RALEIGH
STANDARD DETAIL
STANDARD BEDDING DETAIL FOR CCFRPM PIPES
S-1


AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4020 University Boulevard, Suite 440
Raleigh, NC 27607
919-469-1101


NORTH CAROLINA — AMERICAN ENGINEERING ASSOCIATES SOUTHEAST, P.A. — C-3881 — CERTIFICATE OF AUTHORIZATION

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-4006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD8


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


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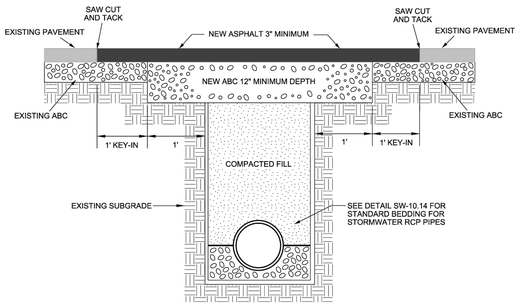
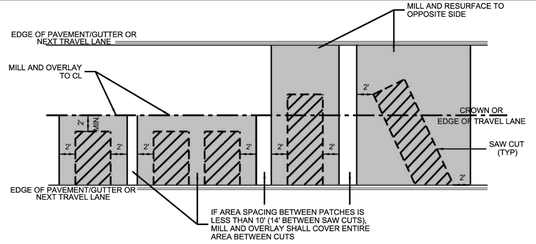



NOTES:

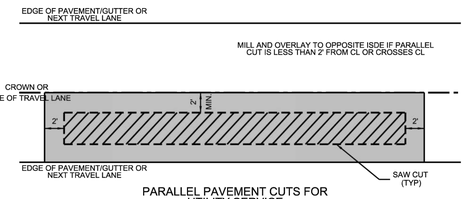
1. THE PAVEMENT EDGE SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT.
2. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED 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. BITUMINOUS BASE OR BINDER MAY BE SUBSTITUTED IF APPROVED BY TRANSPORTATION DIRECTOR OR DESIGNEE.
4. THE ENTIRE THICKNESS/VERTICAL EDGE OF THE 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 AND ROLLED WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH, LEVEL PATCH.

*SHEET 1 OF 2*

| CITY OF RALEIGH STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 8/2020 | NOT TO SCALE |
| DATE: 08/2023 | ASPHALT PAVEMENT PATCH AND RCP PIPE BACKFILL | |
| | **T-10.05.1** | |




LATERAL PAVEMENT CUTS FOR UTILITY SERVICE



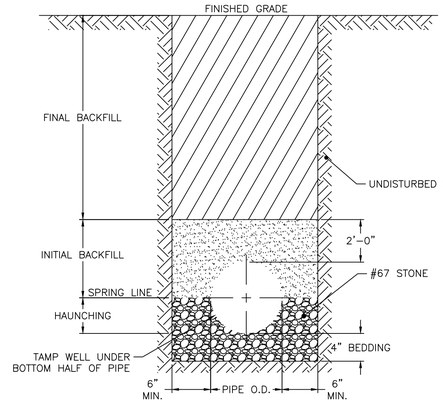

PARALLEL PAVEMENT CUTS FOR UTILITY SERVICE

NOTES:

1. THE PAVEMENT EDGES SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT OR MILLING 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 COMPCATED 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 THE 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, COMPACTED THOROUGHLY AND ROLLED WITH A SMOOTH DRUM ROLLER TO LEVEL PATCH

*SHEET 2 OF 2*

| CITY OF RALEIGH STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 8/2023 | NOT TO SCALE |
| | ASPHALT PAVEMENT PATCH AND RCP PIPE BACKFILL | |
| | **T-10.05.2** | |

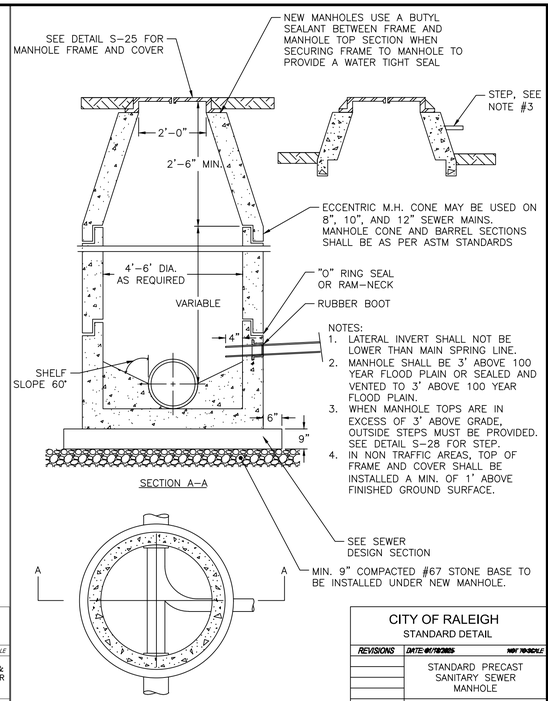



TYPICAL TRENCH BOTTOM DIMENSIONS FOR SDR 35 PVC GRAVITY PIPE

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.

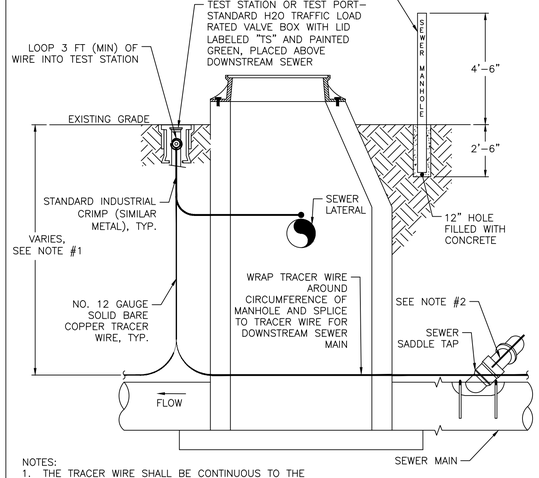
| CITY OF RALEIGH STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 01/19/2025 | NOT TO SCALE |
| | TRENCH BOTTOM DIMENSIONS & BACKFILLING REQUIREMENTS FOR PVC GRAVITY SEWER MAIN | |
| | **S-5** | |




NOTES:

1. LATERAL INVERT SHALL NOT BE LOWER THAN MAIN SPRING LINE.
2. MANHOLE SHALL BE 3' ABOVE 100 YEAR FLOOD PLAIN OR SEALED AND VENTED TO 3' ABOVE 100 YEAR FLOOD PLAIN.
3. WHEN MANHOLE TOPS ARE IN EXCESS OF 3' ABOVE GRADE, OUTSIDE STEPS MUST BE PROVIDED. SEE DETAIL S-28 FOR STEP.
4. IN NON TRAFFIC AREAS, TOP OF FRAME AND COVER SHALL BE INSTALLED A MIN. OF 1' ABOVE FINISHED GROUND SURFACE.

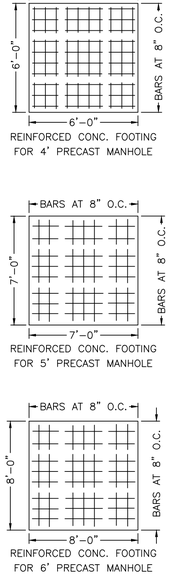
| CITY OF RALEIGH STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 01/19/2025 | NOT TO SCALE |
| | STANDARD PRECAST SANITARY SEWER MANHOLE | |
| | S-20 | |




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 STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 01/19/2025 | NOT TO SCALE |
| | GRAVITY SEWER MAIN TRACER WIRE AND MANHOLE MARKER | |
| | S-20A | |




REINFORCED CONC. FOOTING FOR 4' PRECAST MANHOLE

BILL OF MATERIAL FOR 4' MANHOLE BASE

| BAR SIZE | BAR LENGTH | NO. OF BARS | BAR WT. (LBS.) |
|---|---|---|---|
| #5 | 5'-6" | 18 | 103 |
| CL. "A" CONCRETE TOTAL CU. YDS. | | | 1.0 |




REINFORCED CONC. FOOTING FOR 5' PRECAST MANHOLE

BILL OF MATERIAL FOR 5' MANHOLE BASE

| BAR SIZE | BAR LENGTH | NO. OF BARS | BAR WT. (LBS.) |
|---|---|---|---|
| #5 | 6'-6" | 20 | 136 |
| CL. "A" CONCRETE TOTAL CU. YDS. | | | 1.4 |




REINFORCED CONC. FOOTING FOR 6' PRECAST MANHOLE

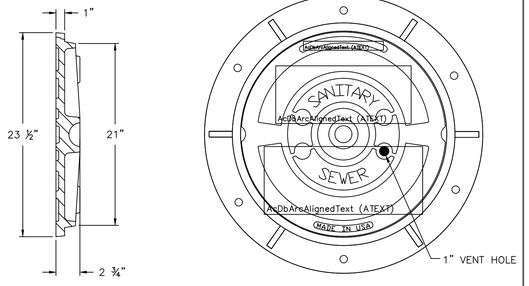
BILL OF MATERIAL FOR 6' MANHOLE BASE

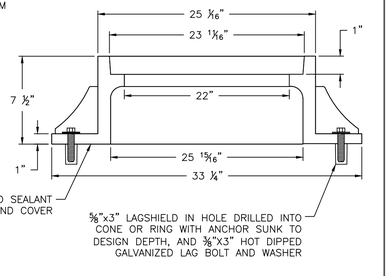
| BAR SIZE | BAR LENGTH | NO. OF BARS | BAR WT. (LBS.) |
|---|---|---|---|
| #5 | 7'-6" | 24 | 165 |
| CL. "A" CONCRETE TOTAL CU. YDS. | | | 1.8 |

* ALL BASES ARE MINIMUM 9" THICK

| CITY OF RALEIGH STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 01/19/2025 | NOT TO SCALE |
| | EXTENDED BASE OR CAST-IN-PLACE REINFORCED CONCRETE BASE | |
| | S-21 | |

MANHOLE FRAME AND COVER

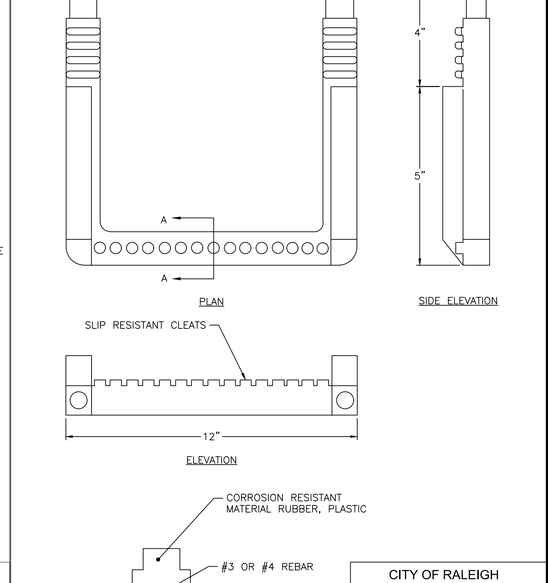



NOTES:

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 STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 01/19/2025 | NOT TO SCALE |
| | STANDARD MANHOLE COVER | |
| | **S-25** | |




| CITY OF RALEIGH STANDARD DETAIL | | |
|---|---|---|
| REVISIONS | DATE: 01/19/2025 | NOT TO SCALE |
| | STANDARD SLIP RESISTANT MANHOLE STEP DETAIL | |
| | S-28 | |

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4700 Homewood Boulevard, Suite 450
Raleigh, NC 27607
919-469-1101

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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2025.09.09 15:27:53-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

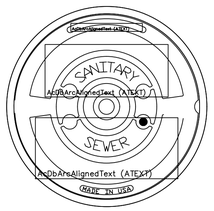
JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

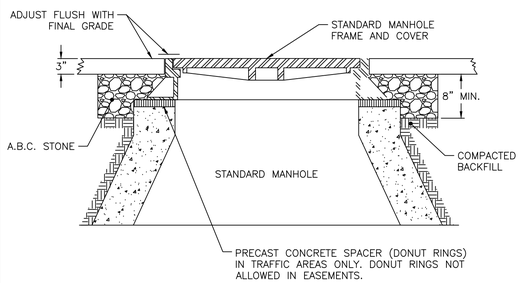
SHEET NO.:
CD9

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\Workbox Projects\Revit_Working Dwg\Phase 4\Sheet Files\Sheet No CD1 CD19 Phase 4 Details.dwg




PLAN




SECTION

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/16/2025 | NOT TO SCALE |
|---|---|---|
| | STANDARD MANHOLE FRAME AND COVER DETAIL WITHIN FRAME SURFACE | |
| | **S-29** | |




STANDARD 4" BRONZE CLEANOUT PLUG



CLEANOUT FERRULE WITH PLUG

STYLES ACCEPTED:
INVERTED NUT
RAISED NUT

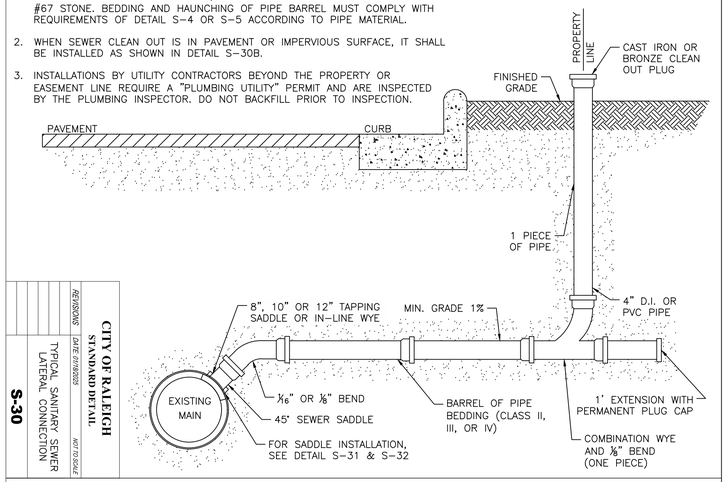
**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/16/2025 | NOT TO SCALE |
|---|---|---|
| | 4" CLEANOUT PLUG | |
| | **S-34** | |

NOTES:

1. THE FULL LENGTH OF THE SERVICE DITCH SHALL BE COMPACTED IN 6" LIFTS WITH MECHANICAL TAMP. ALL TAPS WILL BE MADE USING MECHANICAL TAPPING MACHINE. FOR PVC INSTALLATIONS, SADDLE AND BEND MUST BE BEDDED IN #67 STONE. BEDDING AND HAUNCHING OF PIPE BARREL MUST COMPLY WITH REQUIREMENTS OF DETAIL S-4 OR S-5 ACCORDING TO PIPE MATERIAL.
2. WHEN SEWER CLEAN OUT IS IN PAVEMENT OR IMPERVIOUS SURFACE, IT SHALL BE INSTALLED AS SHOWN IN DETAIL S-30B.
3. INSTALLATIONS BY UTILITY CONTRACTORS BEYOND THE PROPERTY OR EASEMENT LINE REQUIRE A "PLUMBING UTILITY" PERMIT AND ARE INSPECTED BY THE PLUMBING INSPECTOR. DO NOT BACKFILL PRIOR TO INSPECTION.

* SERVICE LATERAL MATERIAL AS REQUIRED

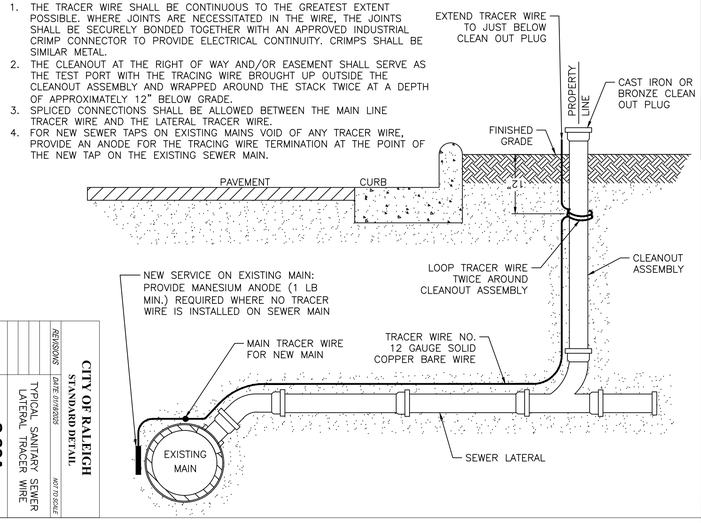



**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/16/2025 | NOT TO SCALE |
|---|---|---|
| | TYPICAL SANITARY SEWER LATERAL CONNECTION | |
| | **S-30** | |

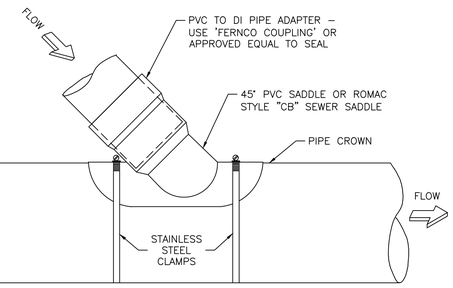
NOTES:

1. THE TRACER WIRE SHALL BE CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. WHERE JOINTS ARE NECESSITATED IN THE WIRE, THE JOINTS SHALL BE SECURELY BONDED TOGETHER WITH AN APPROVED INDUSTRIAL CRIMP CONNECTOR TO PROVIDE ELECTRICAL CONTINUITY. CRIMPS SHALL BE SIMILAR METAL.
2. THE CLEANOUT AT THE RIGHT OF WAY AND/OR EASEMENT SHALL SERVE AS THE TEST PORT WITH THE TRACING WIRE BROUGHT UP OUTSIDE THE CLEANOUT ASSEMBLY AND WRAPPED AROUND THE STACK TWICE AT A DEPTH OF APPROXIMATELY 12" BELOW GRADE.
3. SPLICED CONNECTIONS SHALL BE ALLOWED BETWEEN THE MAIN LINE TRACER WIRE AND THE LATERAL TRACER WIRE.
4. FOR NEW SEWER TAPS ON EXISTING MAINS VOID OF ANY TRACER WIRE, PROVIDE AN ANODE FOR THE TRACING WIRE TERMINATION AT THE POINT OF THE NEW TAP ON THE EXISTING SEWER MAIN.

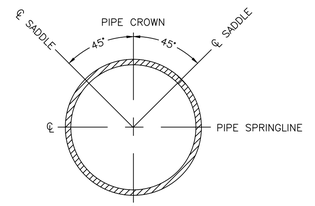



**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/16/2025 | NOT TO SCALE |
|---|---|---|
| | TYPICAL SANITARY SEWER LATERAL TRACER WIRE | |
| | **S-30A** | |




BACKFILL UNDER PVC SADDLE, ADAPTOR, AND CAST IRON BEND WITH #67 STONE AS SHOWN ON DETAIL S-4.

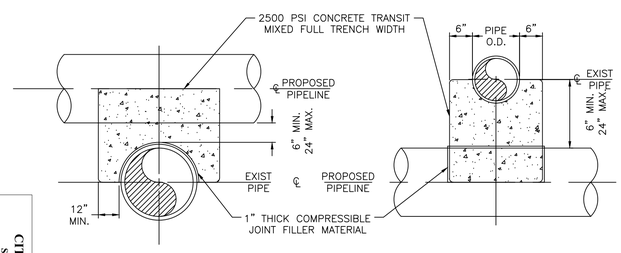



SADDLE INSTALLATION LIMITS

**CITY OF RALEIGH**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/16/2025 | NOT TO SCALE |
|---|---|---|
| | LATERAL SADDLE INSTALLATION DETAIL FOR PVC PIPE | |
| | S-31 | |

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**
**STANDARD DETAIL**

| REVISIONS | DATE: 01/16/2025 | NOT TO SCALE |
|---|---|---|
| | CONCRETE CRADLE PROTECTION FOR SEWER LINE CROSSINGS | |
| | **S-49** | |

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 062383
2026.09.09 15:27:55-04'00'
ENGINEER
RONAN S. COOK

FOR CONSTRUCTION

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD10

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

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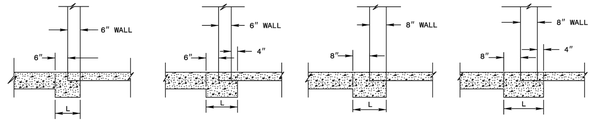
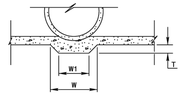



GENERAL NOTES:

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

**TABLES OF QUANTITIES FOR PIPE SET IN PAD**

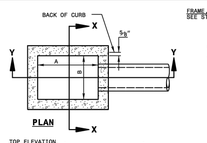
| PIPE | "W" | "W1" | "T" | C.Y. QUANTITIES WHEN L IS | | |
|---|---|---|---|---|---|---|
| D | DIM | DIM | DIM | 12' | 16' | 20' |
| 12" | 1'-1 7/8" | 0'-7 7/8" | 0'-2" | 0.005 | 0.007 | 0.008 |
| 15" | 1'-3 5/8" | 0'-9 1/8" | 0'-2" | 0.006 | 0.008 | 0.010 |
| 18" | 1'-5 1/4" | 0'-10 3/8" | 0'-2" | 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 5/8" | 1'-8 3/4" | 0'-5 3/4" | 0.028 | 0.038 | 0.047 |
| 54" | 3'-2 1/8" | 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 |

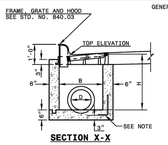
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-24

ROADWAY STANDARD DRAWING FOR
**CONCRETE BASE PAD FOR DRAINAGE STRUCTURES**

SHEET 1 OF 1
**840.00**




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.

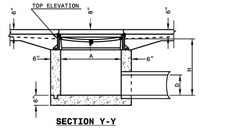
FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 16'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.

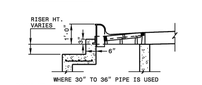
MAXIMUM DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 16'-0". STD. NO. 840.45 CONTROLS MAXIMUM DEPTH IF PRECAST BOX IS USED.

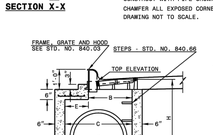
CONSTRUCT WITH PIPE CROWNS MATCHING.

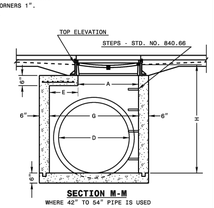
CHAMFER ALL EXPOSED CORNERS 1".

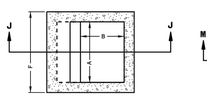
DRAWING NOT TO SCALE.

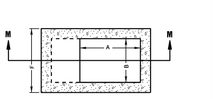


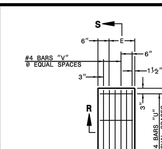



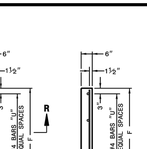

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

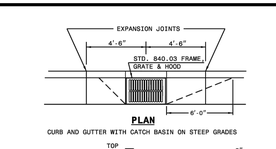
1-24

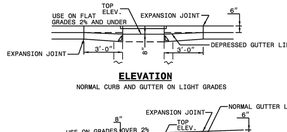
ROADWAY STANDARD DRAWING FOR
**CONCRETE CATCH BASIN**
12" THRU 54" PIPE

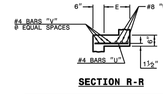
SHEET 1 OF 2
**840.02**

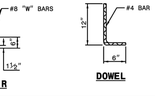


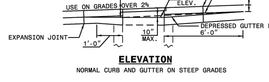




**MINIMUM DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN(BASED ON MIN. HEIGHT, H, WITH NO RISER) ***

| DIMENSIONS OF BOX AND PIPE | | | | | | COVER DIMENSION | | BARS-U | | BARS-V | | BARS-W | | TOTAL LBS. | CU.YDS. CONC. IN BOX | | DEDUCTIONS ONE PIPE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIPE D | SPAN A | WIDTH B | C | G | MIN. HEIGHT H | E | F | NO. | LENGTH | NO. | LENGTH | NO. | LENGTH | | TOP SLAB | BOTTOM SLAB | C.Y. | R.C. |
| 12" | 3'-0" | 2'-2" | --- | --- | 2'-8" | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.235 | 0.772 | 0.015 | 0.026 |
| 15" | 3'-0" | 2'-3" | | | 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'-3" | | | 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" | 5'-3" | 2'-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" | 5'-3" | 2'-2" | 4 | 2'-3" | 3 | 2'-11" | 3 | 2'-11" | 30 | 0.149 | 0.352 | 2.052 | 0.235 | 0.317 |
| 54" | 3'-0" | 2'-2" | | 5'-7" | 6'-3" | | 2'-7" | 5'-9" | 3'-2" | 4 | 2'-10" | 5 | 2'-11" | 3 | 2'-11" | 41 | 0.180 | 0.386 | 2.387 | 0.297 | 0.401 |

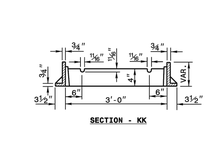
* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

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

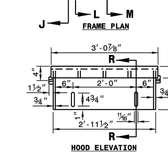
1-24

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

SHEET 2 OF 2
**840.02**

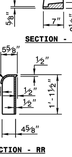


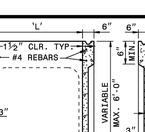

NOTE: USE TYPE "E", "F" AND "G" GRATE UNLESS OTHERWISE NOTED.

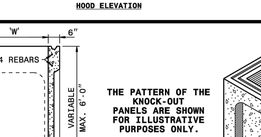


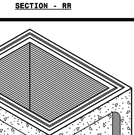


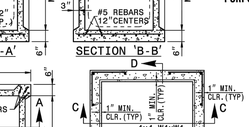




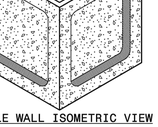







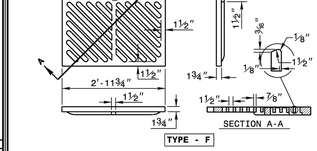


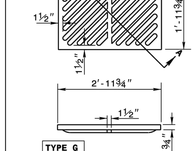

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

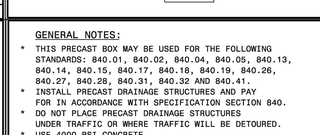
1-24

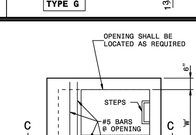
ROADWAY STANDARD DRAWING FOR
**FRAME, GRATES, AND HOOD**
FOR USE ON STANDARD CATCH BASIN

SHEET 1 OF 2
**840.03**



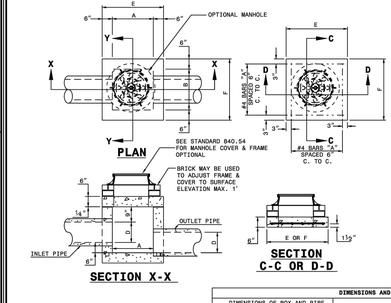




STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-24

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

SHEET 2 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.

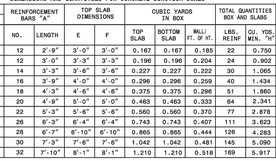
USE FORMS TO CONSTRUCT THE BOTTOM SLAB.

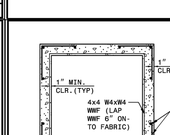
IF REINFORCED CONCRETE PIPE IS SET IN BASE SLAB OF BOX, ADD TO BASE AS SHOWN ON STANDARD NO. 840.00.

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'-0". STANDARD DRAWING 840.45 OR 840.46 CONTROLS MAXIMUM DEPTH IF PRECAST BOX IS USED.




**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 D | SPAN A | WIDTH B | HEIGHT H | NO. | LENGTH | E | F | TOP SLAB | BOTTOM SLAB | WALL/ FT. OF HT. | LBS. REINF | CU. YDS. MIN. 3/4" | C.S. | R.C. |
| 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'-0" | 5'-0" | 5'-3" | 26 | 6'-3" | 6'-0" | 6'-0" | 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" | 0.885 | 0.885 | 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 |

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

1-24

ROADWAY STANDARD DRAWING FOR
**CONCRETE JUNCTION BOX**
12" THRU 66" PIPE

SHEET 1 OF 1
**840.31**




**THE PATTERN OF THE KNOCK-OUT PANELS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY.**




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

1-24

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

SHEET 1 OF 2
**840.45**

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 3'-6" 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.




**OPTIONAL JOINT DETAILS**

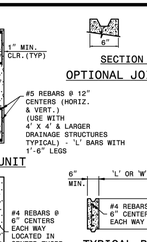
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-24

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

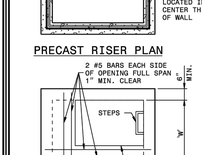
SHEET 2 OF 2
**840.45**




GENERAL NOTES:

* THIS PRECAST BOX MAY BE USED FOR THE FOLLOWING STANDARDS: 840.01, 840.02, 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 3'-6" 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 A FLEXIBLE BUTYL RUBBER BASE CONFORMING TO FEDERAL SPECIFICATIONS SS-S-21A, AASHTO M-198, TYPE B - BUTYL RUBBER.
* 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.

1-24

ROADWAY STANDARD DRAWING FOR
**TRAFFIC BEARING PRECAST DRAINAGE STRUCTURE**

SHEET 1 OF 1
**840.46**


AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4000 Mitchell Mill Boulevard, Suite 4-B
Raleigh, NC 27607
919-469-1101


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

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 062383 ROMAN S. COOK
2026.09.09 15:27:52-04'00'

FOR CONSTRUCTION

| 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 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD11


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



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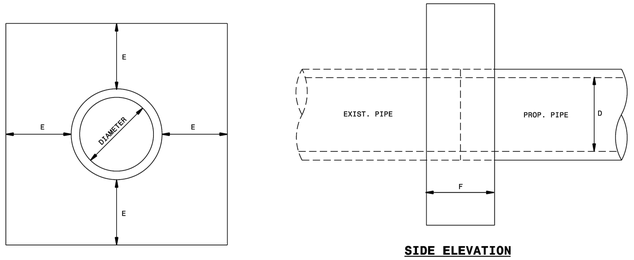



## ELEVATION




## SIDE ELEVATION

GENERAL NOTES:

USE PIPE COLLAR FOR EXTENDING EXISTING CONCRETE PIPE CULVERTS AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER. THIS INCLUDES EXTENDING EXISTING PIPES WITH PIPES OF DIFFERENT MATERIALS.

CONSTRUCT THE PIPE COLLAR WITH CLASS "B" OR BETTER CONCRETE.

OBSERVE ALL REQUIREMENTS OF SECTION 840 OF THE STANDARD SPECIFICATIONS.

* USE 12 INCH DIAMETER VALUES FOR PIPE DIAMETERS LESS THAN 12 INCH.

| D | E | F | CU. YD. |
|---|---|---|---|
| 12" | 12" | 12" | 0.3528 |
| 15" | 12" | 12" | 0.3990 |
| 18" | 12" | 12" | 0.4465 |
| 24" | 12" | 12" | 0.5526 |
| 30" | 12" | 12" | 0.6560 |
| 36" | 12" | 12" | 0.7640 |
| 42" | 12" | 12" | 0.8856 |
| 48" | 12" | 12" | 1.0126 |
| 54" | 18" | 18" | 2.5793 |
| 60" | 18" | 18" | 2.8506 |
| 66" | 18" | 18" | 3.1307 |
| 72" | 18" | 18" | 3.4176 |

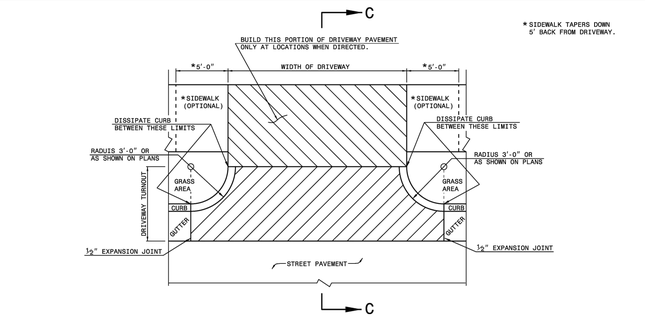
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-24

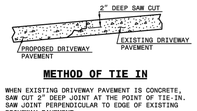
ROADWAY STANDARD DRAWING FOR **PIPE COLLAR**

SHEET 1 OF 1

**840.72**

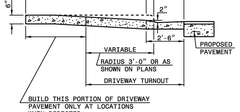



## PLAN
## DETAIL OF DRIVEWAY




## METHOD OF TIE IN

WHEN EXISTING DRIVEWAY PAVEMENT IS CONCRETE, SAW CUT 2" DEEP JOINT AT THE POINT OF TIE-IN. SAW JOINT PERPENDICULAR TO EDGE OF EXISTING DRIVEWAY PAVEMENT.




## SECTION C-C

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

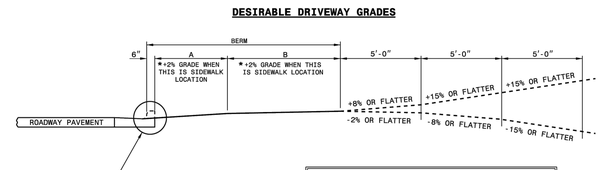
1-24

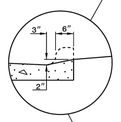
ROADWAY STANDARD DRAWING FOR **DRIVEWAY TURNOUT** RADIUS TYPE

SHEET 1 OF 2

**848.02**

## DESIRABLE DRIVEWAY GRADES

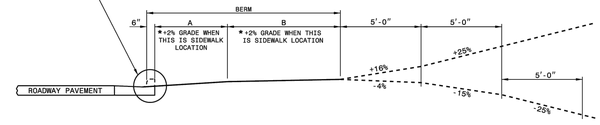



*SIDEWALK LOCATION (DO NOT PLACE SIDEWALK ON BERMS LESS THAN 6' WIDE.)

| DESIRABLE OR MAXIMUM DRIVEWAY GRADES | | | | |
|---|---|---|---|---|
| BERM WIDTH | A | | B | |
| | DIST. | GRADE | DIST. | GRADE |
| 8' 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.

1-24

ROADWAY STANDARD DRAWING FOR **DRIVEWAY TURNOUT** DRIVEWAY GRADES

SHEET 2 OF 2

**848.02**

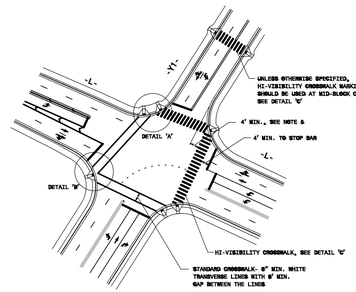

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
2000 West Cornwallis Boulevard, Suite 400
Raleigh, NC 27607
919-468-1101

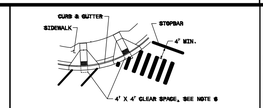

NORTH CAROLINA AMERICAN ENGINEERING ASSOCIATES SOUTHEAST C-3881 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2026.09.09 15:27:56-04'00'

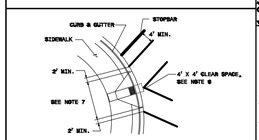
FOR CONSTRUCTION

## CROSSWALK PLACEMENT GUIDANCE

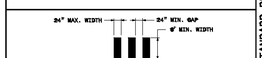



DETAIL 'A'- DUAL CURB RAMPS




DETAIL 'B'- SINGLE DIAGONAL CURB RAMP




DETAIL 'C'- HI-VISIBILITY CROSSWALK

GENERAL NOTES:

1- USE THE DETAILS ABOVE AND THE FOLLOWING NOTES FOR GUIDANCE IN PLACING CROSSWALK MARKINGS. REFER TO NCDOT ROADWAY STANDARD DRAWINGS, MUTCD AND ADA STANDARDS FOR ADDITIONAL GUIDANCE.

2- THE LOCATION AND TYPE OF CROSSWALK MARKINGS SHOWN ON THE ABOVE DETAILS ARE FOR REFERENCE ONLY. LOCATE CROSSWALK MARKINGS AS SHOWN ON THE PROJECT DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER. THE CROSSWALK MARKING TYPE, STANDARD OR HI-VISIBILITY, SHALL BE INSTALLED AS SPECIFIED ON THE PROJECT DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER.

3- THE STANDARD CROSSWALK IS TWO WHITE 6" MIN. TRANSVERSE LINES WITH A 6" MIN. GAP BETWEEN THE LINES. THE HI-VISIBILITY CROSSWALK IS WHITE 24" MAX. WIDE LONGITUDINAL LINES WITH 24" MIN. GAPS BETWEEN LINES, SEE DETAIL 'C'. HI-VISIBILITY CROSSWALKS SHALL BE A MINIMUM OF 6' WIDE. CURB RAMPS SHALL BE WHOLLY CONTAINED WITHIN THE MARKINGS, EXCLUDING ANY FLARES.

4- STOP BARS SHOULD BE PLACED A 4' MIN. IN ADVANCE OF NEAREST CROSSWALK LINE.

5- SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL IS 4' MIN.

6- BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE OF 4' X 4' MIN. SHALL BE PROVIDED WITHIN THE MARKINGS.

7- SINGLE DIAGONAL CURB RAMPS WITH FLARED SIDES SHALL HAVE A SIDEWAY OF CURB 2' MIN. LONG LOCATED ON EACH SIDE OF THE CURB RAMP AND WITHIN THE MARKED CROSSING, SEE DETAIL 'B'.

8- CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE LATEST NCDOT ROADWAY STANDARD DRAWINGS. 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 DETAILS OR A SPECIAL DESIGN.

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

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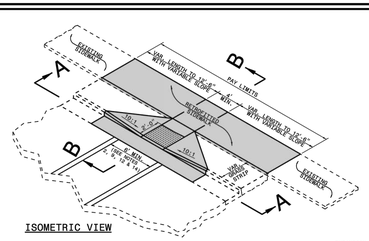
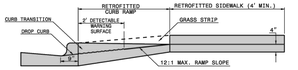
ROADWAY STANDARD DRAWING FOR **PAVEMENT MARKINGS PEDESTRIAN CROSSWALKS**

SHEET 9 OF 9

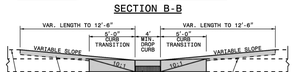
**1205.07**




ISOMETRIC VIEW



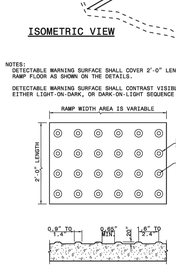

SECTION B-B



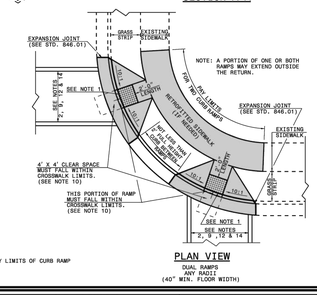

SECTION A-A

NOTES:
DETECTABLE WARNING SURFACE SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.

DETECTABLE WARNING SURFACE SHALL CONTRAST VISIBLY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.




DETECTABLE WARNING SURFACE




PLAN VIEW

DUAL RAMPS ANY RADII (40" MIN. FLOOR WIDTH)

PAY LIMITS OF CURB RAMP

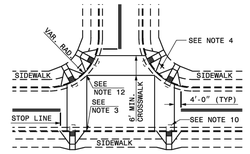
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

1-24

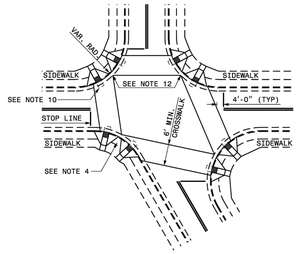
ROADWAY STANDARD DRAWING FOR **CURB RAMP** AND EXISTING SIDEWALK WITH GRASS STRIP

SHEET 2 OF 13

**848.06**




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

ROADWAY PLAN SYMBOL: CR FOR PROPOSED CURB RAMP

PROPOSED CURB RAMP W/ CLEAR SPACE
PROPOSED OR FUTURE SIDEWALK

ALLOWABLE LOCATIONS
DUAL RAMP RADII.....ANY

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

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ROADWAY STANDARD DRAWING FOR **CURB RAMP** CURB RAMP LOCATION

SHEET 5 OF 13

**848.06**

| 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.

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' FROM THE BACK OF 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 CLEAR SPACES FOR SIDEWALK A MINIMUM OF 4'x4' WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION. CONSTRUCT CLEAR SPACES FOR MEDIAN ISLANDS A MINIMUM OF 5'x5' WITH A MAXIMUM SLOPE OF 2% IN ANY DIRECTION. IF CONSTRAINED ON TWO OR MORE SIDES, THE THE CLEAR SPACE SHALL BE 4' MINIMUM X 5' MINIMUM, WITH 5' PROVIDED IN THE DIRECTION OF THE PEDESTRIAN STREET CROSSING.
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 THROUGH THE ISLAND.
14. SMALL CHANNELIZATION ISLANDS THAT CAN NOT PROVIDE A 5'X5' CLEAR SPACE AT THE TOP OF 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, WHERE 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. DETECTABLE WARNING SURFACES WILL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
19. DETECTABLE WARNING SURFACES WILL CONTRAST VISIBLY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

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

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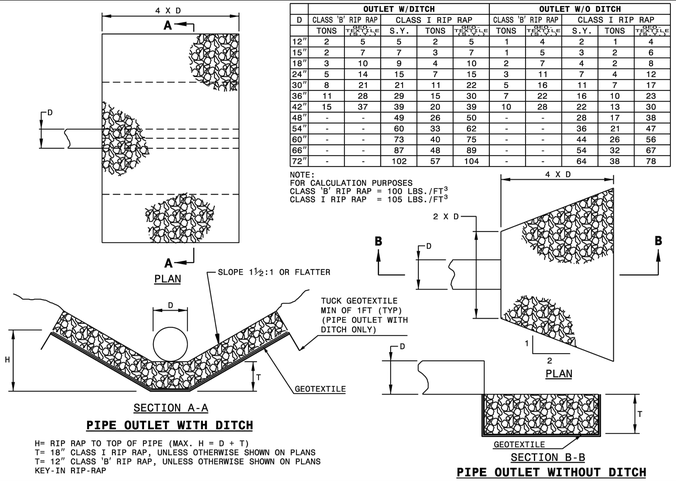
ROADWAY STANDARD DRAWING FOR **CURB RAMP** NOTES

SHEET 13 OF 13

**848.06**




| | OUTLET W/DITCH | | | | | | OUTLET W/O DITCH | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | CLASS 'B' RIP RAP | | CLASS I RIP RAP | | | | CLASS 'B' RIP RAP | | CLASS I RIP RAP | | | |
| | TONS | $Y^3/FT$ | TONS | $Y^3/FT$ | S.Y. | $FT^2/FT$ | TONS | $Y^3/FT$ | S.Y. | $FT^2/FT$ | TONS | $Y^3/FT$ |
| 12" | 2 | 5 | 5 | 2 | 5 | 1 | 4 | 2 | 2 | 1 | 4 | |
| 15" | 2 | 7 | 7 | 3 | 7 | 1 | 5 | 3 | 2 | 6 | | |
| 18" | 3 | 10 | 9 | 4 | 10 | 2 | 7 | 4 | 2 | 8 | | |
| 24" | 5 | 14 | 15 | 7 | 15 | 3 | 11 | 7 | 4 | 12 | | |
| 30" | 8 | 21 | 21 | 11 | 22 | 5 | 16 | 11 | 7 | 17 | | |
| 36" | 11 | 28 | 29 | 15 | 30 | 7 | 22 | 16 | 10 | 23 | | |
| 42" | 15 | 37 | 39 | 20 | 39 | 10 | 28 | 22 | 13 | 30 | | |
| 48" | - | - | 49 | 26 | 50 | - | - | 28 | 17 | 38 | | |
| 54" | - | - | 60 | 33 | 62 | - | - | 36 | 21 | 47 | | |
| 60" | - | - | 73 | 40 | 75 | - | - | 44 | 26 | 56 | | |
| 66" | - | - | 87 | 48 | 89 | - | - | 54 | 32 | 67 | | |
| 72" | - | - | 102 | 57 | 104 | - | - | 64 | 38 | 78 | | |

NOTE:
FOR CALCULATION PURPOSES
CLASS 'B' RIP RAP = 100 LBS./$FT^3$
CLASS I RIP RAP = 105 LBS./$FT^3$

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

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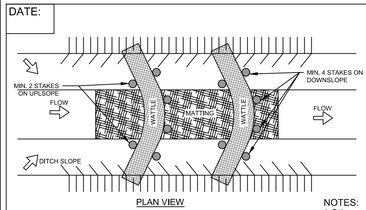
ROADWAY STANDARD DRAWING FOR **GUIDE FOR RIP RAP AT PIPE OUTLETS**

SHEET 1 OF 1

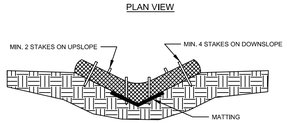
**876.02**

DATE:

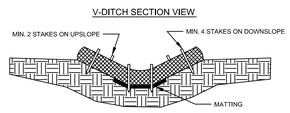
PAGE:



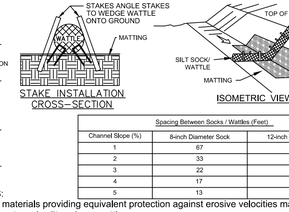

PLAN VIEW




V-DITCH SECTION VIEW




TRAPEZOIDAL DITCH SECTION VIEW




ISOMETRIC VIEW

| Spacing Between Socks / Wattles (Feet) | | |
|---|---|---|
| Channel Slope (%) | 8-inch Diameter Sock | 12-inch Diameter Sock |
| 1 | 67 | 100 |
| 2 | 33 | 50 |
| 3 | 22 | 33 |
| 4 | 17 | 25 |
| 5 | 13 | 20 |

NOTES:
1. Other materials providing equivalent protection against erosive velocities may be substituted for compost use in silt socks or wattles.
2. Fill silt sock/wattle netting uniformly to the desired length such that logs do not deform.
3. Use 24 inch long wooden stakes with a 2 inch x 2 inch nominal cross section.
4. Install silt sock/wattle(s) to a height on slope so flow will not wash around silt sock/wattle and scour slopes, or as directed.
5. Install a minimum of two up-slope stakes and four down-slope stakes at an angle to wedge silt sock/wattle to ground at bottom ditch. Use staples to secure silt sock/wattle to the ground to prevent undermining.
6. The use of flocculants such as Polyacrylamide (PAM) is recommended. Apply flocculants on top of sock/wattle and to matting on either side of sock/wattle according to manufacturer recommended rates. Reapply after each 1.0 inch rainfall.

MAINTENANCE:
1. Inspect all measures weekly and after each rainfall of 1.0 inch or greater. Remove accumulated sediment and any debris.
2. Silt sock/Wattle(s) must be replaced if clogged or torn.
3. If ponding becomes excessive, the silt sock/wattle may need to be replaced with a larger diameter or a different measure.
4. Reinstall if damaged or dislodged.
5. Silt socks/Wattles shall be inspected until land disturbance is compete and the area above the measure is permanently stabilized.

DEQ

## SILT SOCK / WATTLE FOR CHECK DAM

Effective Date: 9/1/2023
In accordance with the 2013 Design Manual Updates

## KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900

CHECKED BY: RC

DRAWN BY: DH, BG, CR, JB

DATE: SEPTEMBER 8, 2026

SHEET TITLE:

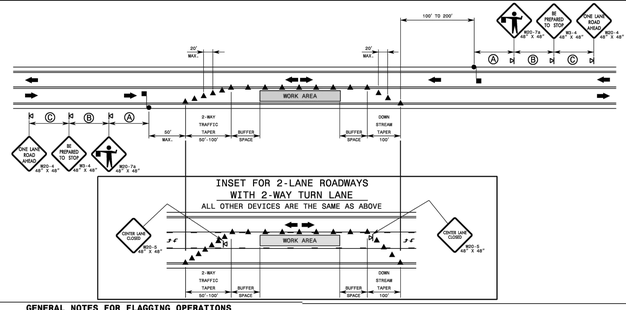
## KALAS FALLS CIVIL DETAILS

SHEET NO.:

CD12

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\Workflow Projects\Field_Working Dwgs\Phase 4\Sheet Files\Sheet No.CD13.CD13-Phase 4 Details.dwg




## 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- FOR POSTED SPEED LIMITS BELOW 45 MPH, CHANNELIZING DEVICE SPACING SHALL BE 20 FEET ON TAPERS AND 40 FEET ON TANGENTS. FOR POSTED SPEED LIMITS OF 45 MPH OR GREATER, THE SPACING SHALL BE EQUAL TO THE POSTED SPEED LIMIT. FOR CONSTRUCTION DEVICE SPACING SHALL BE 40 FEET IN THE TAPERS AND THE SHIFTS AND 80 FEET IN THE TANGENTS.

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 ALL DIRECTIONS OF TRAFFIC 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. WHEN FLAGGERS ARE LOCATED AT INTERSECTIONS WITH STANDARD BASED SIGNALS (M2O2-7A) PLACE APPROXIMATELY LOCATED ON THE APPROACH OF THE FLAGGER'S LOCATION. AT 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 1 MILE LANE CLOSURE LENGTH UNLESS OTHERWISE SHOWN IN THE TMP OR AS DIRECTED BY THE ENGINEER.

11- IF VEHICLE QUEUES WILL REACH WITHIN 100' OF EITHER SIDE OF ACTIVE RAILROAD TRACKS, PROVIDE A UNIFORMED LAW ENFORCEMENT OFFICER OR FLAGGER TO PREVENT VEHICLES FROM STOPPING WITHIN THE GRADE CROSSING. PROVIDE OFFICER OR FLAGGER EVEN IF AUTOMATIC WARNING MEASURES ALREADY EXIST.

12- THIS DETAIL IS APPLICABLE FOR OPERATIONS IN PLACE FOR 72 HOURS OR LESS. FOR LONGER DURATION OPERATIONS, SIGNING AND PAVEMENT MARKINGS MAY NEED TO BE ALTERED.

## GENERAL NOTES FOR PILOT CAR OPERATIONS

1- USE PILOT CARS WHEN DIRECTED BY THE ENGINEER.

2- IF ROADWAY WIDTH IS LESS THAN 22 FEET (EOP TO EOP), CONES MAY NOT BE REQUIRED ALONG THE WORK AREA. AT THE DISCRETION OF THE ENGINEER, CONES MAY BE OMITTED ALONG THE WORK AREA IF 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- UNLESS APPROVED BY THE ENGINEER, DO NOT INSTALL MORE THAN ONE (1) MILE OF LANE CLOSURE, MEASURED FROM THE BEGINNING OF THE MERGE TAPER TO 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

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

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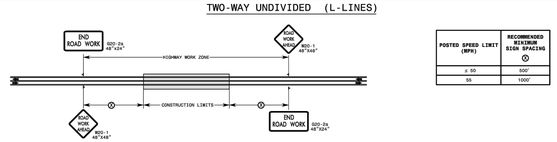
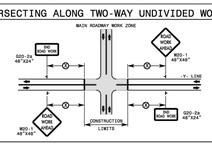
ROADWAY STANDARD DRAWING FOR
**TEMPORARY LANE CLOSURES**
2-LANE, 2-WAY ROADWAY-1 LANE CLOSED

SHEET 1 OF 19
**1101.02**




| POSTED SPEED LIMIT (MPH) | RECOMMENDED MINIMUM SIGN SPACING Ⓐ |
|---|---|
| ≤ 50 | 500' |
| 55 | 1000' |




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 72 CONSECUTIVE HOURS.

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

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

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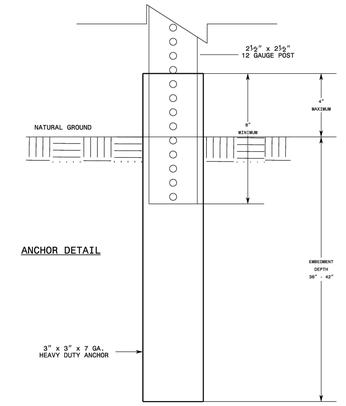
ROADWAY STANDARD DRAWING FOR
**WORK ZONE ADVANCE WARNING SIGNS FOR TWO-WAY UNDIVIDED FACILITIES**

SHEET 3 OF 3
**1101.01**




## 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.

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

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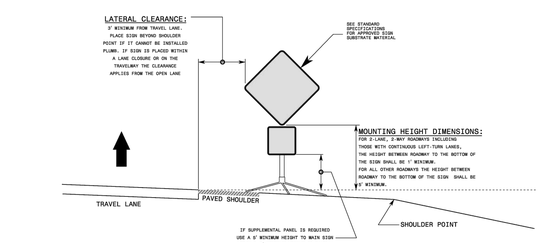
ROADWAY STANDARD DRAWING FOR
**STATIONARY WORK ZONE SIGNS**
PERFORATED SQUARE STEEL TUBING

SHEET 3 OF 3
**1101.01**




## GENERAL NOTES

1- DIMENSIONS SHOWN ARE MINIMUM VALUES. MOUNT SIGNS SO THEY WILL BE CLEARLY VISIBLE TO APPROACHING TRAFFIC EVEN WHEN SIGNS ARE MOUNTED BEHIND TRAFFIC CONTROL DEVICES SUCH AS DRUMS, BARRIER, OR OTHER OBJECTS.

2- USE PORTABLE WORK ZONE SIGNS AND STANDS SPECIFICALLY DESIGNED FOR ONE ANOTHER.

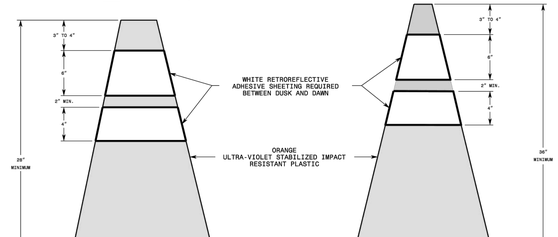
3- ALL PORTABLE WORK ZONE SIGNS AND STANDS MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST.

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

1-24

ROADWAY STANDARD DRAWING FOR
**PORTABLE WORK ZONE SIGNS**
MOUNTING HEIGHT & LATERAL CLEARANCE

SHEET 1 OF 1
**1110.02**




## GENERAL NOTES

1- ACHIEVE BALLASTING BY USING SPECIAL WEIGHTED 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 BALLAST'S THAT DO NOT PRESENT A HAZARD WHEN STRUCK.

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

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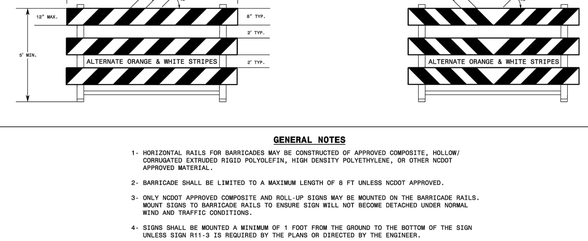
1-24

ROADWAY STANDARD DRAWING FOR
**CONES**

SHEET 1 OF 1
**1135.01**




## 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 STRIPES FOR PERMANENT BARRICADES.

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

10- 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.

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1-24

ROADWAY STANDARD DRAWING FOR
**BARRICADES**
TYPE-III

SHEET 1 OF 1
**1145.01**

AMERICAN Engineering
American Engineering Associates - Southeast, P.A.
4000 Westchase Boulevard, Suite 410
Raleigh, NC 27607
919-468-1101

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

NORTH CAROLINA PROFESSIONAL SEAL 062383 ENGINEER ROMAN S. COOK
2026.05.09 15:28:06-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|

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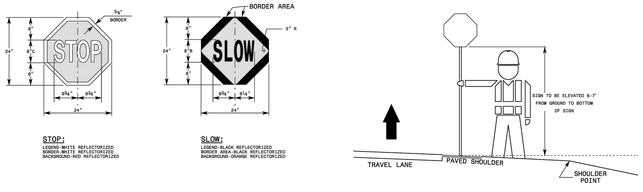
KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE
DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

| | |
|---|---|
| JOB NUMBER: | 9900 |
| CHECKED BY: | RC |
| DRAWN BY: | DH, BG, CR, JB |
| DATE: | SEPTEMBER 8, 2026 |

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD13




## 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 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

6- ALL FLAGGERS MUST BE CERTIFIED BY AN NCDOT APPROVED TRAINING RESOURCE.

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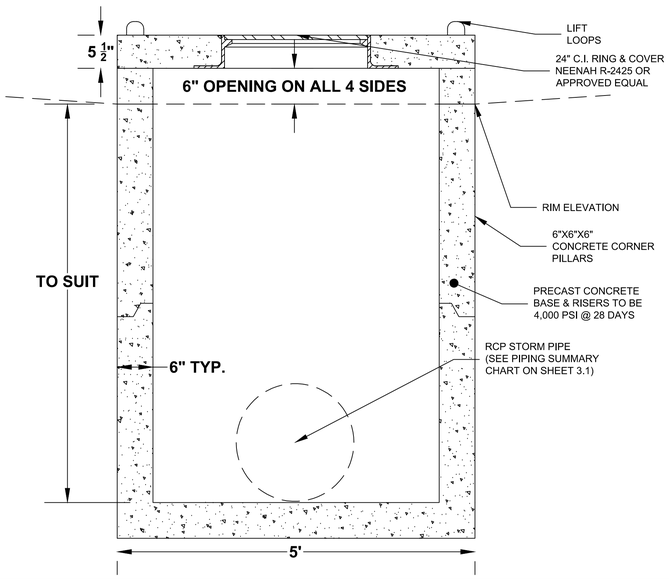
1-23

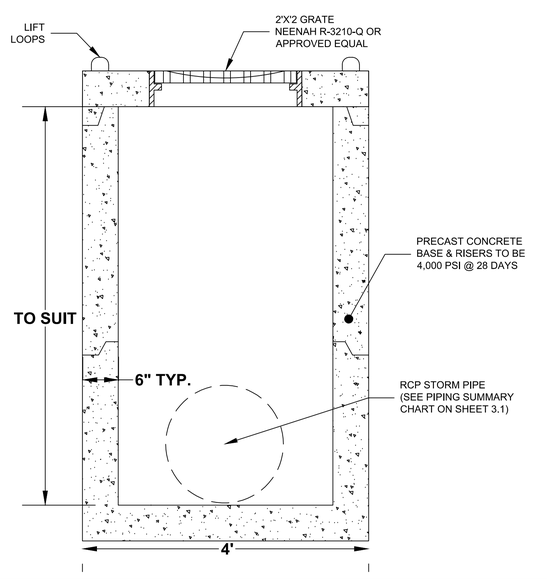
ROADWAY STANDARD DRAWING FOR
**FLAGGERS**

SHEET 1 OF 1
**1150.01**




4' X 4' YARD INLET

SCALE: 1" = 1'




3' X 3' DROP INLET

SCALE: 1" = 1'

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

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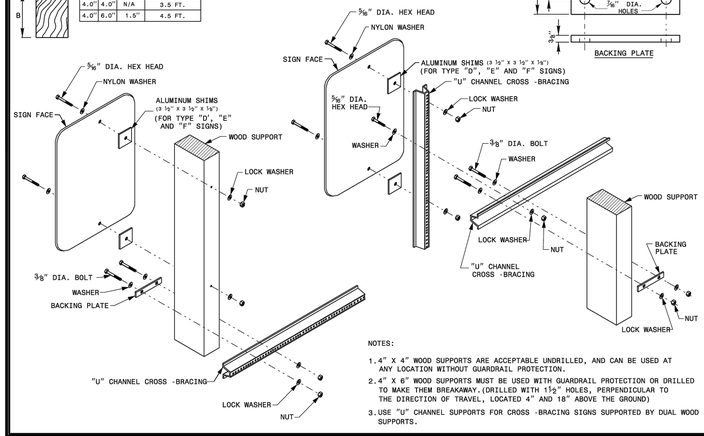
# ATTACHMENT METHODS

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

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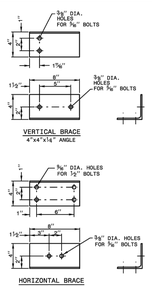
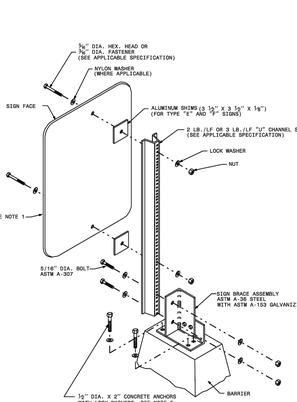
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-24

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

SHEET 2 OF 2
**903.20**




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 SUPPORTS.
3. ERECT WILE 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 1/2" DIAMETER, 2" LONG CONCRETE ANCHORS WITH LOCK WASHERS. USE CONCRETE ANCHORS THAT ARE STAINLESS STEEL OR GALVANIZED IN ACCORDANCE WITH ASTM A-153. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

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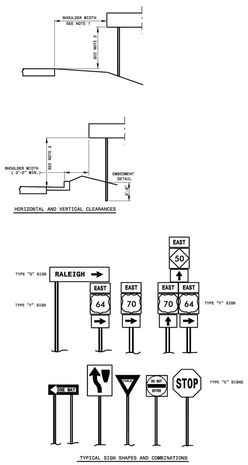
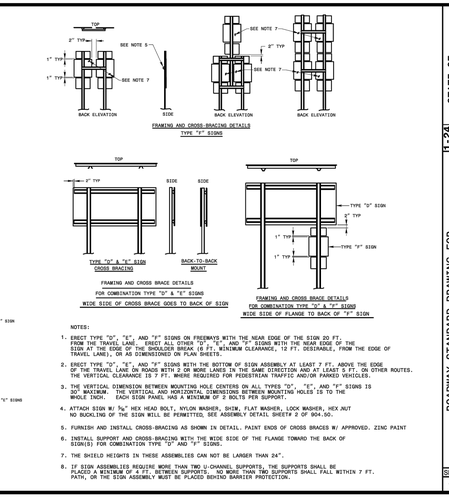
1-24

ROADWAY STANDARD DRAWING FOR
**BARRIER SIGN SUPPORT ASSEMBLY**

SHEET 1 OF 1
**903.30**




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 TYPE "D", "E", AND "F" SIGNS WITH THE NEAR EDGE OF THE SIGN 12 FT. FROM THE EDGE OF THE TRAVEL LANE, WITH A 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 IN THE SAME DIRECTION AND AT LEAST 5 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 ADJUSTABLE. THE VERTICAL DIMENSION BETWEEN MOUNTING HOLES IS TO THE WHOLE INCH. THE SIGN PANEL MUST OVERLAP A MINIMUM OF 2 BOLTS PER SUPPORT.
4. ATTACH SIGN W/ 5/16" HEX HEAD BOLT, NYLON WASHER, SHIM, FLAT WASHER, LOCK WASHER, HEX NUT NO BUCKLING OF THE SIGN WILL BE PERMITTED, SEE ASSEMBLY DETAIL SHEET 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 SUPPORT 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 SUPPORTS. NO MORE THAN TWO SUPPORTS SHALL FALL WITHIN 7 FT. PATH, OR THE SIGN ASSEMBLY MUST BE PLACED BEHIND BARRIER PROTECTION.

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1-24

ROADWAY STANDARD DRAWING FOR
**MOUNTING OF TYPE 'D', 'E' AND 'F' SIGNS ON 'U' CHANNEL SUPPORTS**

SHEET 1 OF 2
**904.50**



















| NO. SUPPORTS | | | |
|---|---|---|---|
| | 2 | 3 * | 4 * |
| P | .207W | .145W | .107W |
| R | .586W | .353W | .202W |

UNITS ON ATTACHED SHEET
*MINIMUM 4 FT. BETWEEN CHANNEL SUPPORTS

HOLE PUNCHING DETAIL

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

1-24

ROADWAY STANDARD DRAWING FOR
**MOUNTING OF TYPE 'D', 'E' AND 'F' SIGNS ON 'U' CHANNEL SUPPORTS**

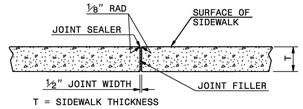
SHEET 2 OF 2
**904.50**

NOTES:

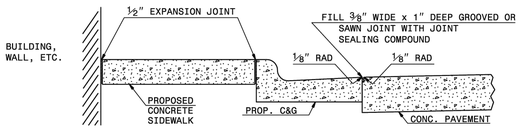
CONSTRUCT STANDARD SIDEWALK 5' WIDE AND 4" THICK UNLESS OTHERWISE DENOTED ON PLANS.

PLACE A GROOVE JOINT 1" DEEP WITH 1/8" RADII IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT WILL BE REQUIRED AT 50' INTERVALS. A 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.

SEE STD. DWG. 848.05 FOR CURB RAMP LOCATION REQUIREMENTS AND CONSTRUCTION GUIDELINES.




TRANSVERSE EXPANSION JOINT IN SIDEWALK



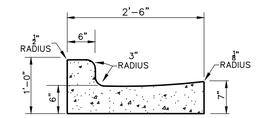

DETAILS SHOWING JOINTS IN CONCRETE SIDEWALK

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

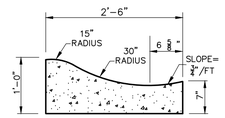
1-24

ROADWAY STANDARD DRAWING FOR
**CONCRETE SIDEWALK**

SHEET 1 OF 1
**848.01**




30" STANDARD CURB & GUTTER



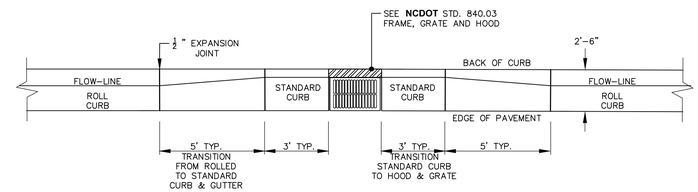

30" ROLLED CURB

NOTES:

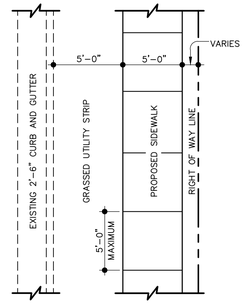
1. CONCRETE SHALL BE 3000 PSI.
2. CONTRACTION JOINTS SHALL BE SPACED AT 10' INTERVALS OR 15' INTERVALS WHEN A MACHINE IS USED.
3. EXPANSION JOINTS SHALL BE SPACED AT 50' INTERVALS.
4. FINISH ALL CONCRETE WITH CURING COMPOUND.
5. FOLLOW ALL APPLICABLE ACI REQUIRMENTS.
6. ROLLED CURB SHALL ONLY BE USED FOR APPROVED APPLICATIONS.

CURB & GUTTER DETAIL

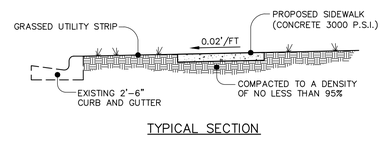
NTS



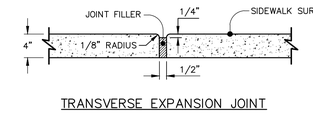

CONCRETE CURB AND GUTTER TRANSITION
(ROLLED CURB TO STANDARD CURB)




PLAN VIEW




TYPICAL SECTION




TRANSVERSE EXPANSION JOINT

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.
4601 Six Forks Road Boulevard, Suite 440
Raleigh, NC 27609
919-469-1101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AMERICAN ENGINEERING ASSOCIATES SOUTHEAST
C-3881

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 062383 ROMAN S. COOK
2026.09.09 15:28:02-04'00'

FOR CONSTRUCTION

| NO. | DATE | REVISION: |
|---|---|---|
| | | |

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KALAS FALLS PHASE 4
CONSTRUCTION INFRASTRUCTURE DRAWINGS
CID-26-0006
0 MAINLY FARM ROAD
WAKE COUNTY, NC

JOB NUMBER: 9900
CHECKED BY: RC
DRAWN BY: DH, BG, CR, JB
DATE: SEPTEMBER 8, 2026

SHEET TITLE:
KALAS FALLS CIVIL DETAILS

SHEET NO.:
CD14


North Carolina 811 Before You Dig
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North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
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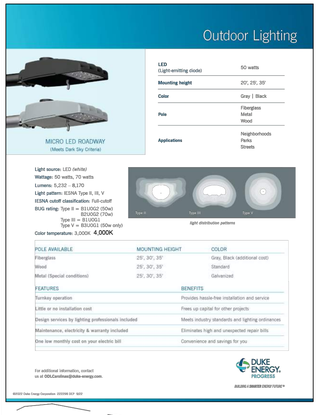
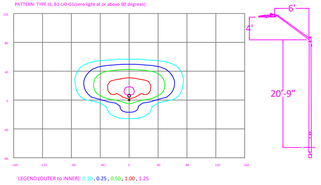



ISOFOOTCANDLE CURVES




## Statistics

| Description | Symbol | Avg | Max | Min | Max/Min | Avg/Min |
|---|---|---|---|---|---|---|
| Street | | 0.5 fc | 1.1 fc | 0.0 fc | N/A | N/A |

Schedule

| Symbol | Label | QTY | Description | Number Lamps | Lamp Output | LLF |
|---|---|---|---|---|---|---|
| | A | 26 | LED 50w Roadway - Type III - 3000K | 1 | 5312 | 0.85 |




| NO. | DATE | REVISION | BY |
|---|---|---|---|
| REV B | 07/14/26 | UPDATED SITE PLAN | NJ |

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

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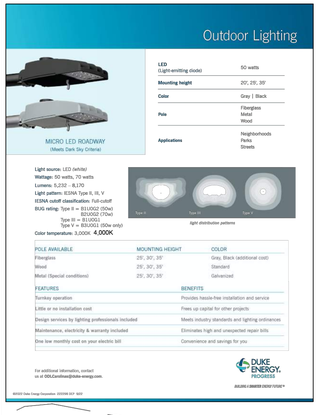
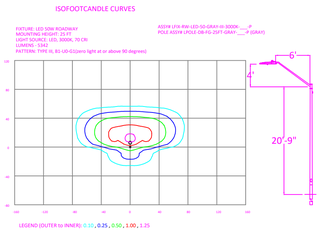
KALAS FALLS IV
WAKE FOREST, NC
STREET LIGHTING ARRANGEMENT

Designed by DUKE ENERGY PROGRESS LIGHTING SOLUTIONS
Reviewed by N. Johnson
Scale 1" = 60'
Date 07/14/2026
Size Drawing size "D"
Description LED ROADWAY
Drawing No. 26-0111B
Sht. 1 OF 1




## Statistics

| Description | Symbol | Avg | Max | Min | Max/Min | Avg/Min |
|---|---|---|---|---|---|---|
| Street | | 0.5 fc | 1.1 fc | 0.0 fc | N/A | N/A |

Schedule

| Symbol | Label | QTY | Description | Number Lamps | Lamp Output | LLF |
|---|---|---|---|---|---|---|
| | A | 26 | LED 50w Roadway - Type III - 3000K | 1 | 5312 | 0.85 |




| NO. | DATE | REVISION | BY |
|---|---|---|---|
| REV B | 07/14/26 | UPDATED SITE PLAN | NJ |

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

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KALAS FALLS IV
WAKE FOREST, NC
STREET LIGHTING ARRANGEMENT

Designed by DUKE ENERGY PROGRESS LIGHTING SOLUTIONS
Reviewed by N. Johnson Scale 1" = 60'
Date 07/14/2026 Size Drawing size "D"
Description LED ROADWAY
Drawing No. 26-0111B Sht. 1 OF 1