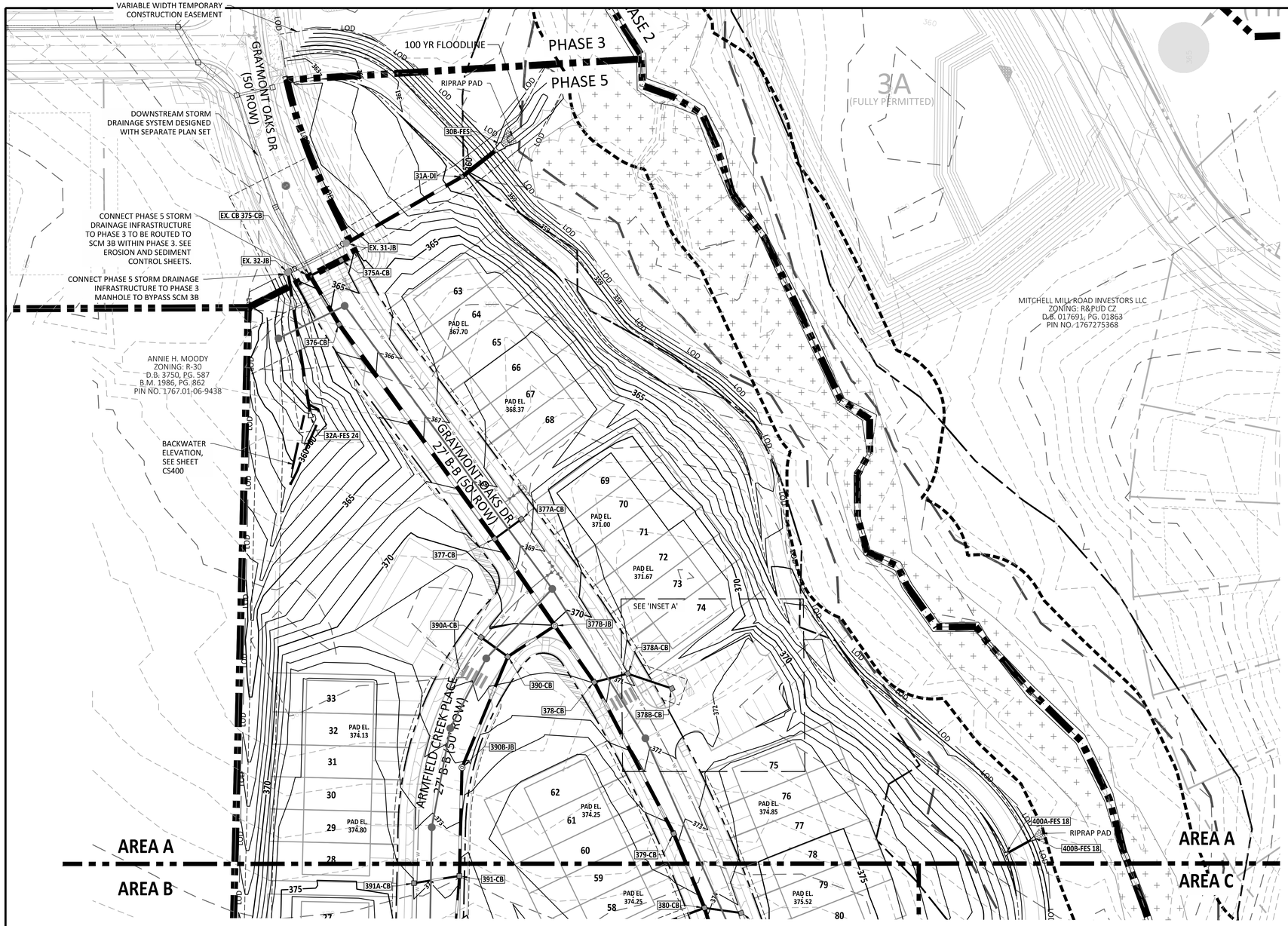


Public
Sewer Collection / Extension System

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

City of Raleigh
Public Utilities Department Permit # S-5618

Public
Water Distribution / Extension System

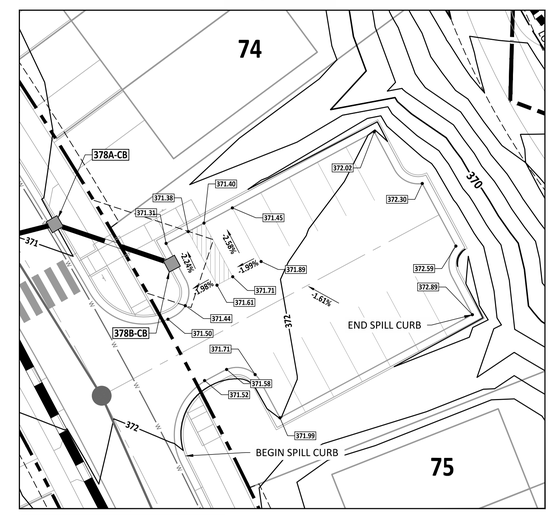
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities Handbook.

City of Raleigh
Public Utilities Department Permit # W-4214

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

SITE LEGEND	
	100 YR FLOODLINE
	PROPERTY BOUNDARY/PHASE LINE
	2' BUILDING RESTRICTION LINE
	50' NEUSE RIVER BUFFER
	PROPOSED SURFACE WATER LEVEL
	RIGHT-OF-WAY
LOD	LIMITS OF DISTURBANCE
	LOT LINE
	WETLANDS
	AMENITY AREA
	CONCRETE
	10' CURB TRANSITION

INSET A



NOTE: SPOT ELEVATIONS WITHIN PARKING LOT ARE ALONG THE EDGE OF PAVEMENT.

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

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

Digitally signed by Jakob Klein
Date: 2025.05.01 07:47:04-04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 36528 JAKOB P. KLEIN

PRELIMINARY
DO NOT USE FOR CONSTRUCTION

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

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 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
GRADING & DRAINAGE AREA A

SHEET NO.:
CG400

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

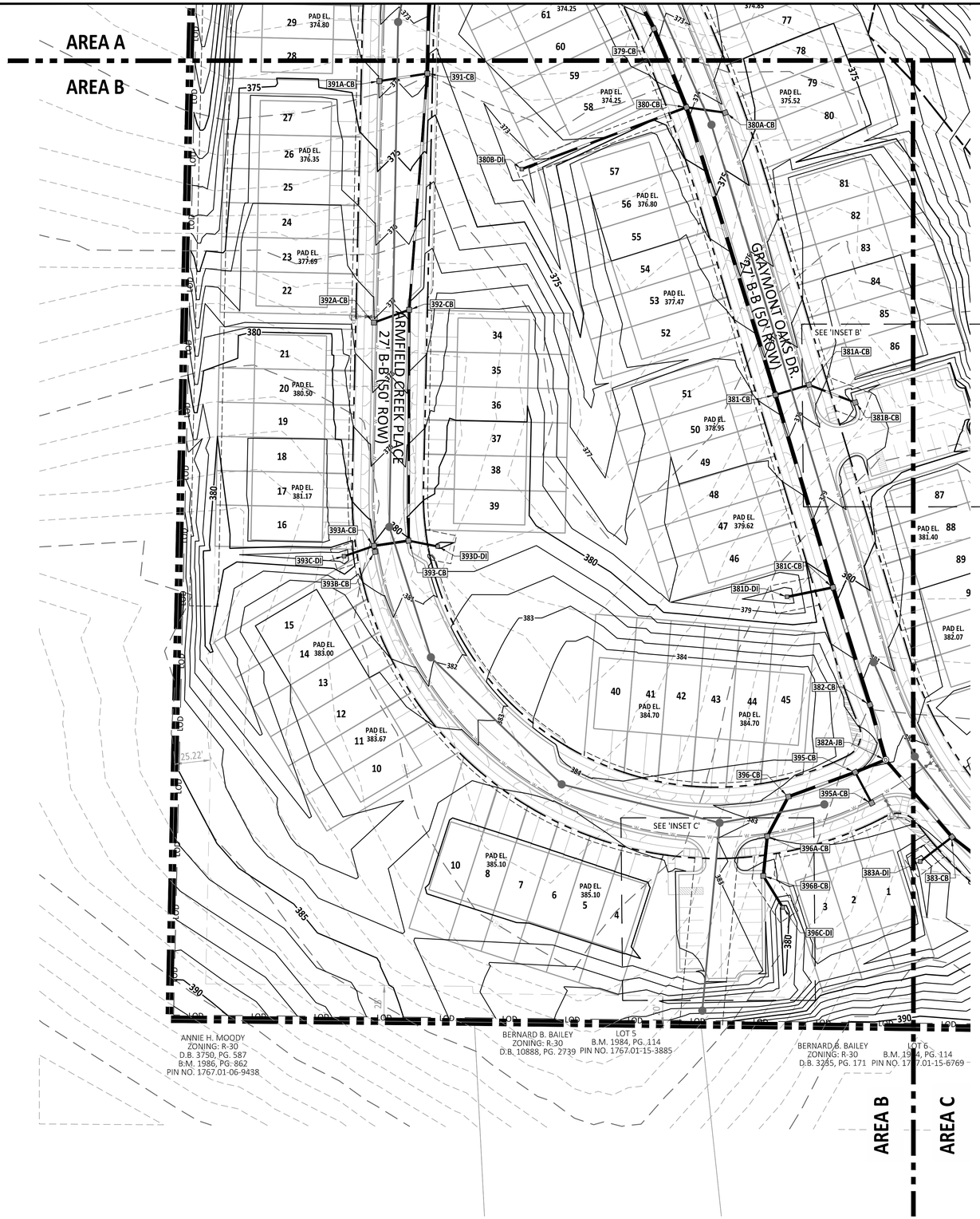
z:\jobs\5900\waddles property\!!!! phase 5 townhomes\CAD\Sheet\construction documents\CG100-101.dwg
2025-05-01

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

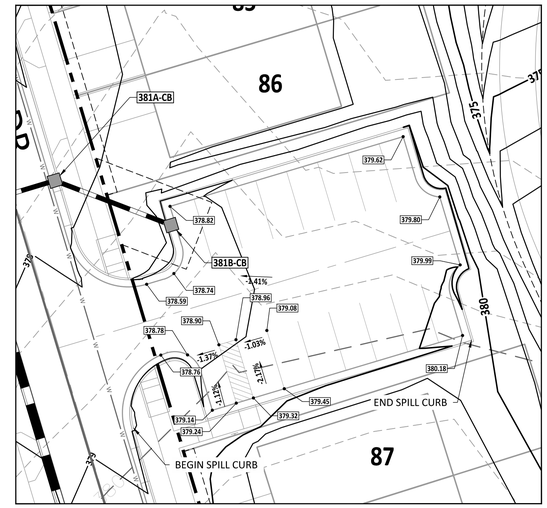
City of Raleigh
Public Utilities Department Permit # S-5618

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

City of Raleigh
Public Utilities Department Permit # W-4214



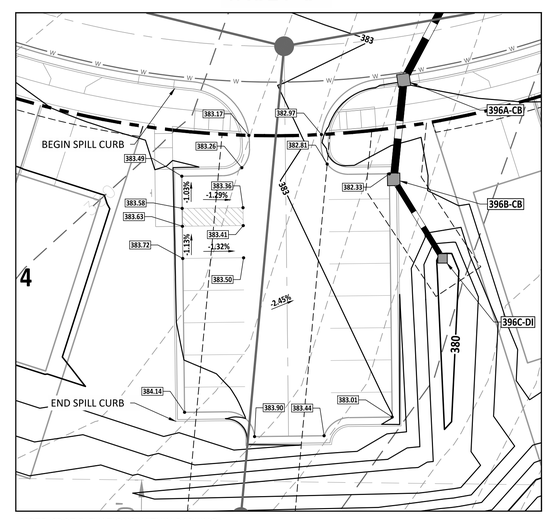
INSET B



NOTE: SPOT ELEVATIONS WITHIN PARKING LOT ARE ALONG THE EDGE OF PAVEMENT.

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

INSET C



NOTE: SPOT ELEVATIONS WITHIN PARKING LOT ARE ALONG THE EDGE OF PAVEMENT.

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

SITE LEGEND

	100 YR FLOODLINE
	PROPERTY BOUNDARY/PHASE LINE
	2' BUILDING RESTRICTION LINE
	50' NEUSE RIVER BUFFER
	PROPOSED SURFACE WATER LEVEL
	RIGHT-OF-WAY
	LIMITS OF DISTURBANCE
	LOT LINE
	WETLANDS
	AMENITY AREA
	CONCRETE
	10' CURB TRANSITION

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

Digitally signed by Jakob Klein
Date: 2025.05.01 11:09:04-04'00'

PRELIMINARY
DO NOT USE FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 065326 JAKOB P. KLEIN

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

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KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

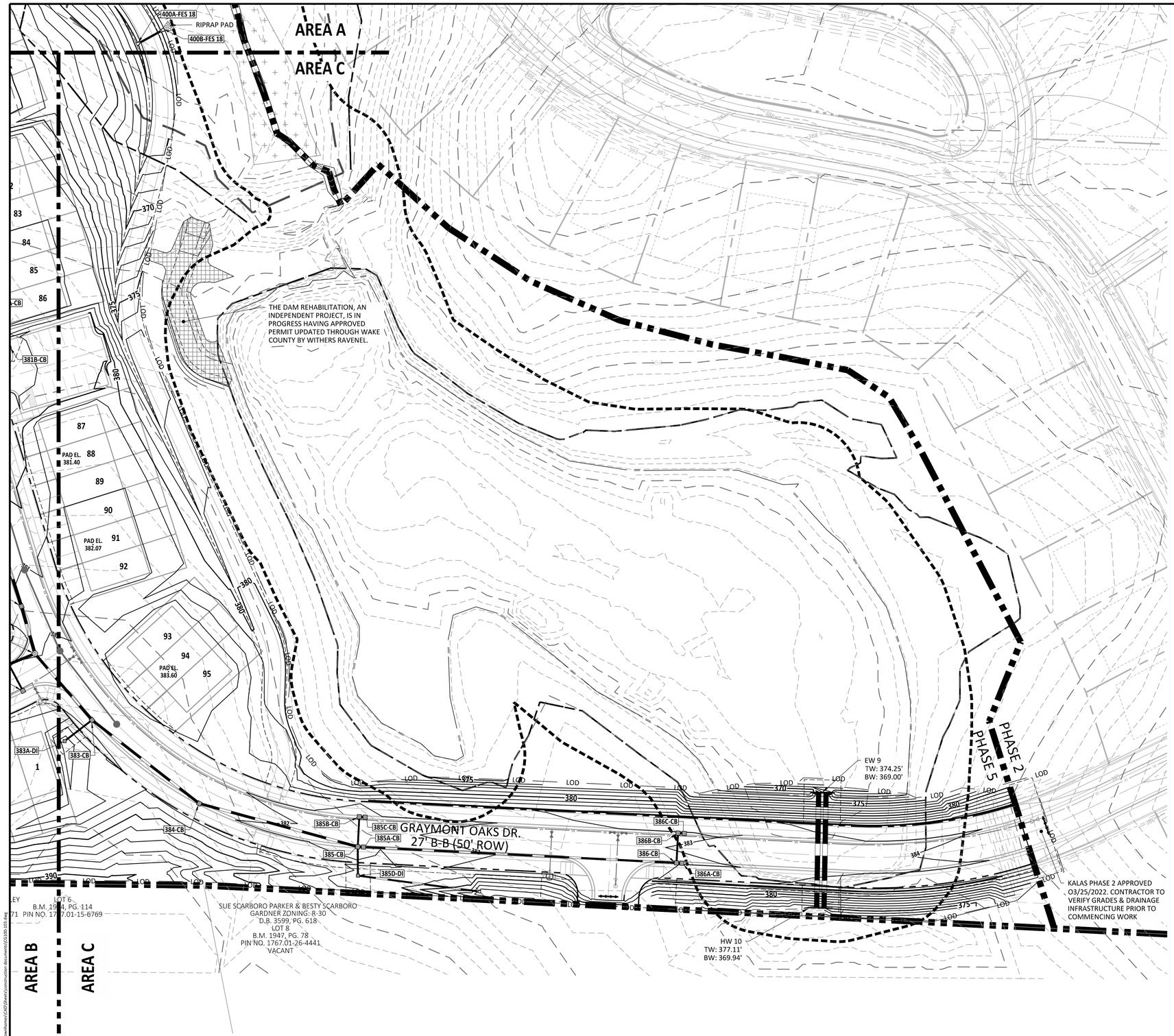
JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
GRADING & DRAINAGE AREA B

SHEET NO.:
CG401

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

J:\Jobs\0900\walden property\!!!! phase 5 townhomes\CAD\sheet\construction documents\CG100-103.dwg
2025-05-01



Public
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City of Raleigh
Public Utilities Department Permit # S-5618

Public
Water Distribution / Extension System
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City of Raleigh
Public Utilities Department Permit # W-4214

SITE LEGEND

	100 YR FLOODLINE
	PROPERTY BOUNDARY/PHASE LINE
	2' BUILDING RESTRICTION LINE
	50' NEUSE RIVER BUFFER
	PROPOSED SURFACE WATER LEVEL
	RIGHT-OF-WAY
	LIMITS OF DISTURBANCE
	LOT LINE
	WETLANDS
	AMENITY AREA
	CONCRETE
	10' CURB TRANSITION

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 ft.

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

Digitally signed by Jakob Klein
Date: 2025.05.01 15:40:04-04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 065328 JAKOB P. KLEIN

PRELIMINARY
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KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
GRADING & DRAINAGE AREA C

SHEET NO.:
CG402

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

J:\Jobs\1990\watkins property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\CG100-101.dwg
2025-05-01

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Sewer Collection / Extension System
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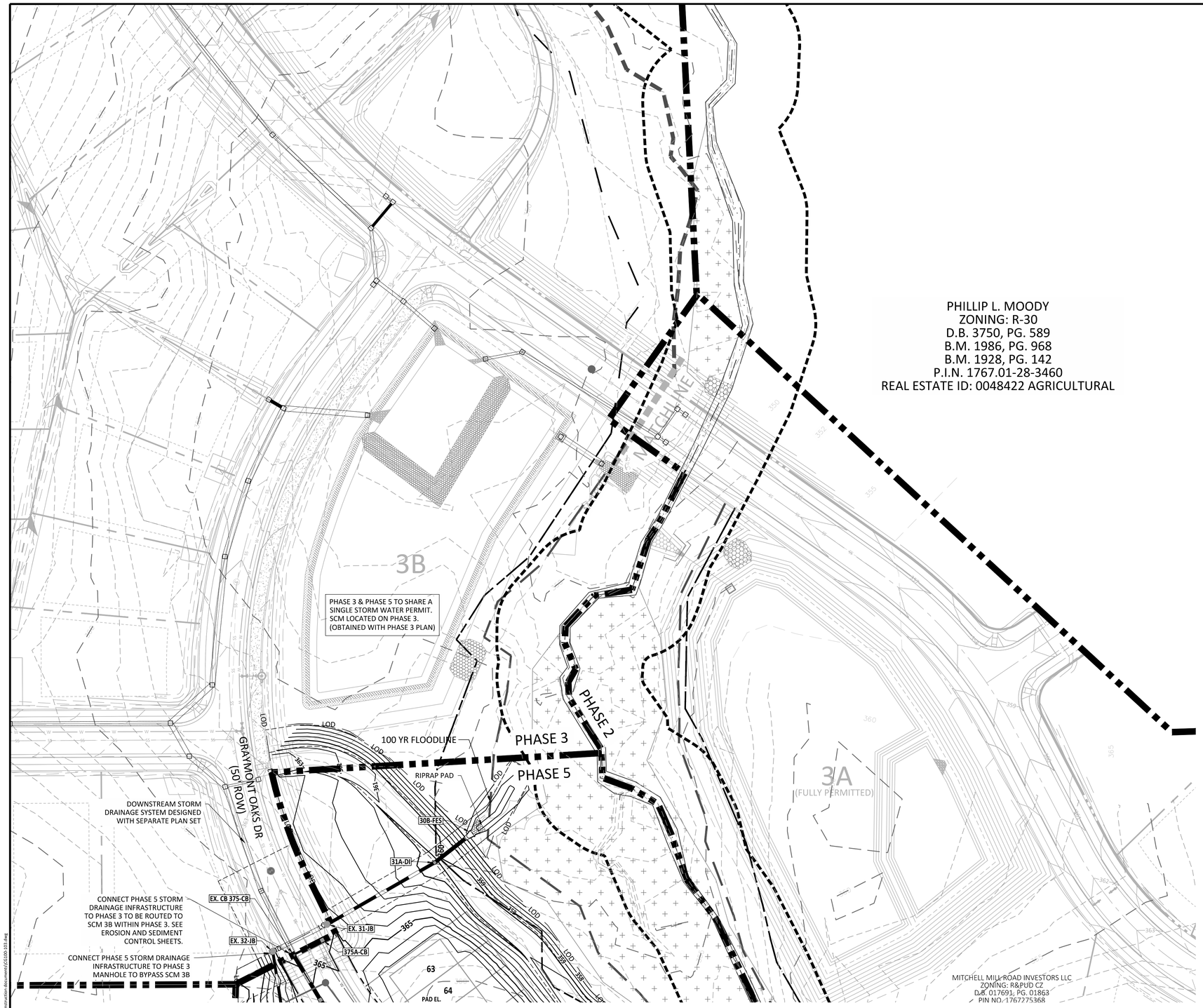
City of Raleigh
Public Utilities Department Permit # W-4214



SITE LEGEND

	100 YR FLOODLINE
	PROPERTY BOUNDARY/PHASE LINE
	2' BUILDING RESTRICTION LINE
	50' NEUSE RIVER BUFFER
	PROPOSED SURFACE WATER LEVEL
	RIGHT-OF-WAY
	LIMITS OF DISTURBANCE
	LOT LINE
	WETLANDS
	AMENITY AREA
	CONCRETE
	10' CURB TRANSITION

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 ft.

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

Digitally signed by Jakob Klein
Date: 2025.05.01 11:12:04-04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 065328 JAKOB P. KLEIN

PRELIMINARY
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STIPULATION FOR REUSE

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
GRADING & DRAINAGE OFFSITE

SHEET NO.:
CG403

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

L:\Jobs\1900\working-property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\CG100-103.dwg
2025-05-01

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City of Raleigh
Public Utilities Department Permit # W-4214

PIPE SUMMARY (ESC)

DOWNSTREAM STRUCTURE	UPSTREAM STRUCTURE	PIPE SIZE	LENGTH	SLOPE	DOWNSTREAM INVERT (FT)	UPSTREAM INVERT (FT)
EW 9	HW 10	48"	94.01	1.00%	369.00	369.94
EW 9	HW 10	48"	94.01	1.00%	369.00	369.94
* EX. CB 374	EX. CB 375	36"	57.00	0.68%	357.90	358.29
EX. 31	EX. 32	30"	48.27	0.50%	353.78	354.03
EX. 32	32A	24"	109.03	2.20%	355.35	357.75
* EX. CB 375	375A	18"	25.75	0.50%	360.63	360.76
* EX. CB 375	376	36"	41.87	1.07%	358.40	358.85
30B	31A	36"	38.07	0.50%	352.90	353.09
31A	EX. 31	30"	98.97	0.50%	353.19	353.68
376	377	36"	196.39	1.64%	358.95	362.17
377B	390	24"	41.68	0.84%	364.00	364.35
377	377A	15"	24.50	0.94%	363.42	363.65
* 377	377B	36"	78.36	1.57%	362.27	363.50
* 377B	378	30"	51.02	1.05%	364.00	364.54
378A	378B	15"	34.56	0.50%	366.20	366.37
378	378A	15"	25.60	1.48%	365.72	366.10
378	379	30"	126.90	1.42%	364.64	366.44
379	380	30"	59.53	1.73%	366.65	367.68
380	380B	18"	123.33	0.54%	368.30	368.97
380	380A	15"	27.45	1.00%	368.75	369.02
380	381	30"	210.96	1.54%	367.78	371.03
381C	381D	18"	32.88	1.09%	374.07	374.43
381	381C	30"	140.88	0.65%	371.43	372.34
381	381A	15"	24.50	0.73%	372.50	372.68
381A	381B	15"	34.75	2.53%	372.80	373.68
381C	382	30"	86.18	0.61%	373.07	373.60
382A	395	24"	23.02	0.50%	375.26	375.38
382	382A	30"	40.12	0.75%	373.70	374.00
382A	383	24"	71.39	0.53%	374.10	374.48
383	383A	15"	28.16	2.24%	376.03	376.66
383	384	24"	110.82	0.50%	374.58	375.13
384	385	24"	133.90	0.50%	375.23	375.90
385	385A	18"	4.68	0.50%	376.00	376.02
385B	385C	18"	4.77	3.56%	376.86	377.03
385D	385E	15"	100.85	0.53%	376.32	376.85
385	385D	15"	23.55	0.72%	376.05	376.22
385	385B	15"	24.49	0.53%	376.45	376.58
385A	386	18"	255.46	0.50%	376.02	377.30
386B	386C	18"	5.02	1.00%	378.18	378.23
386	386A	18"	4.38	1.00%	378.13	378.17
386	386B	15"	24.33	0.70%	377.55	377.72
390	390B	24"	88.90	2.00%	364.57	366.35
390B	391	24"	80.42	2.00%	366.55	368.16
390	390A	18"	24.45	1.02%	364.85	365.10
391	391A	15"	34.06	0.65%	368.81	369.03
391	392	18"	166.12	1.80%	368.68	371.67
392	392A	15"	26.27	1.45%	371.92	372.30
392	393	18"	161.82	1.93%	371.77	374.90
393A	393B	18"	4.23	2.00%	375.39	375.47
393	393D	15"	20.82	0.72%	375.15	375.30
393A	393C	15"	22.25	0.99%	375.42	375.64
393	393A	18"	24.50	0.50%	375.00	375.12
395	395A	15"	24.51	0.73%	376.87	377.05
395	396	24"	49.91	0.50%	375.48	375.73
396B	396C	18"	25.97	0.89%	376.73	376.96
396	396A	24"	31.52	0.50%	375.83	375.99
396A	396B	24"	27.86	0.50%	376.09	376.23
400B	400A	18"	25.59	2.74%	363.30	364.00

***DENOTES CLASS IV RCP, ALL OTHER PIPES ARE CLASS III RCP**

STRUCTURE SUMMARY (ESC)

STRUCTURE NAME	DETAILS
30B-FES	RIM = 356.32 INV IN = 352.90
31A-DI	RIM = 359.06 INV IN = 353.19 INV OUT = 353.09
32A-FES 24	RIM = 360.08 INV OUT = 357.75
375A-CB	RIM = 364.57 INV OUT = 360.76
376-CB	RIM = 365.26 INV IN = 358.95 INV OUT = 358.85
377-CB	RIM = 368.55 INV IN = 362.27 INV IN = 363.42 INV OUT = 362.17
377A-CB	RIM = 368.56 INV OUT = 363.65
377B-JB	RIM = 370.05 INV IN = 364.00 INV IN = 364.00 INV OUT = 363.50
378-CB	RIM = 370.73 INV IN = 364.64 INV IN = 365.72 INV OUT = 364.54
378A-CB	RIM = 370.92 INV IN = 366.20 INV OUT = 366.10
378B-CB	RIM = 371.15 INV OUT = 366.37
379-CB	RIM = 372.89 INV IN = 366.65 INV OUT = 366.44
380-CB	RIM = 373.89 INV IN = 367.78 INV IN = 368.75 INV IN = 368.30 INV OUT = 367.68
380A-CB	RIM = 374.18 INV OUT = 369.02
380B-DI	RIM = 372.50 INV OUT = 368.97
381-CB	RIM = 377.53 INV IN = 371.43 INV IN = 372.50 INV OUT = 371.03
381A-CB	RIM = 377.51 INV IN = 372.80 INV OUT = 372.68
381B-CB	RIM = 378.56 INV OUT = 373.68
381C-CB	RIM = 379.90 INV IN = 373.07 INV IN = 374.07 INV OUT = 372.34
381D-DI	RIM = 377.38 INV OUT = 374.43
382-CB	RIM = 381.39 INV IN = 373.70 INV OUT = 373.60
382A-JB	RIM = 381.95 INV IN = 375.26 INV IN = 374.10 INV OUT = 374.00
383-CB	RIM = 382.71 INV IN = 374.58 INV IN = 376.03 INV OUT = 374.48
383A-DI	RIM = 380.42 INV OUT = 376.66
384-CB	RIM = 382.26 INV IN = 375.23 INV OUT = 375.13
385-CB	RIM = 381.53 INV IN = 376.00 INV IN = 376.45 INV IN = 376.05 INV OUT = 375.90
385A-CB	RIM = 381.66 INV IN = 376.02 INV OUT = 376.02
385B-CB	RIM = 381.59 INV IN = 376.86 INV OUT = 376.58
385C-CB	RIM = 381.71 INV OUT = 377.03
385D-DI	RIM = 381.01 INV IN = 376.32 INV OUT = 376.22

STRUCTURE SUMMARY (ESC)

STRUCTURE NAME	DETAILS
385E-FES 15	RIM = 378.37 INV OUT = 376.85
386-CB	RIM = 382.85 INV IN = 377.55 INV IN = 378.13 INV OUT = 377.30
386A-CB	RIM = 382.87 INV OUT = 378.17
386B-CB	RIM = 382.91 INV IN = 378.18 INV OUT = 377.72
386C-CB	RIM = 382.87 INV OUT = 378.23
390-CB	RIM = 370.18 INV IN = 364.57 INV IN = 364.85 INV OUT = 364.35
390A-CB	RIM = 370.27 INV OUT = 365.10
390B-JB	RIM = 372.10 INV IN = 366.55 INV OUT = 366.35
391-CB	RIM = 373.82 INV IN = 368.68 INV IN = 368.81 INV OUT = 368.16
391A-CB	RIM = 373.84 INV OUT = 369.03
392-CB	RIM = 376.90 INV IN = 371.77 INV IN = 371.92 INV OUT = 371.67
392A-CB	RIM = 377.12 INV OUT = 372.30
393-CB	RIM = 380.04 INV IN = 375.00 INV IN = 375.15 INV OUT = 374.90
393A-CB	RIM = 380.21 INV IN = 375.42 INV IN = 375.39 INV OUT = 375.12
393B-CB	RIM = 380.20 INV OUT = 375.47
393C-DI	RIM = 378.29 INV OUT = 375.64
393D-DI	RIM = 379.93 INV OUT = 375.30
395-CB	RIM = 382.18 INV IN = 375.48 INV IN = 376.87 INV OUT = 375.38
395A-CB	RIM = 382.10 INV OUT = 377.05
396-CB	RIM = 382.59 INV IN = 375.83 INV OUT = 375.73
396A-CB	RIM = 382.84 INV IN = 376.09 INV OUT = 375.99
396B-CB	RIM = 382.17 INV IN = 376.73 INV OUT = 376.23
396C-DI	RIM = 379.55 INV OUT = 376.96
400A-FES 18	RIM = 361.68 INV OUT = 364.00
400B-FES 18	RIM = 360.35 INV IN = 363.30
EX. 31-JB	RIM = 364.91 INV IN = 353.78 INV OUT = 353.68
EX. 32-JB	RIM = 364.48 INV IN = 355.35 INV OUT = 354.03
EX. CB 375-CB	RIM = 364.82 INV IN = 358.40 INV IN = 360.63 INV OUT = 358.29

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

Digitally signed by Jakob Klein
Date: 2025.05.01 14:04:04-04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 065328 JAKOB P. KLEIN

PRELIMINARY
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FOR INFORMATION, ONLY

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1	12/23/2024	CID SUBMITTAL #1

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KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
STORM DRAINAGE TABLES

SHEET NO.:
CD110

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

J:\Jobs\9900\working projects\1111 phase 5 townhomes\CADD\Sheets\construction documents\CD110.dwg

2025-05-01

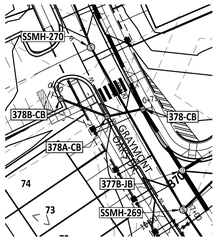
Public
Sewer Collection / Extension System
The City of Raleigh consents to the connection and extension of the City's public sewer system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities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

City of Raleigh
Public Utilities Department Permit # S-5618

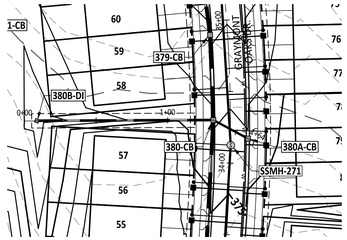
Public
Water Distribution / Extension System
The City of Raleigh consents to the connection and extension of the City's public water system as shown on this plan. The material and Construction methods used for this project shall conform to the standards and specifications of the City's Public Utilities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

City of Raleigh
Public Utilities Department Permit # W-4214

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



378B-CB TO 378-CB PLAN



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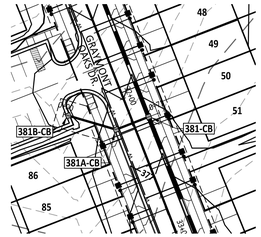
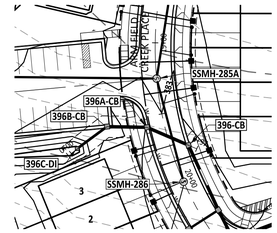
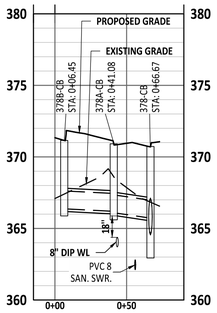


381B-CB TO 381-CB PLAN



396C-DI TO 396-CB PLAN

383A-DI TO 383-CB PLAN



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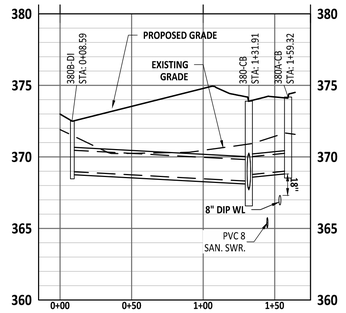

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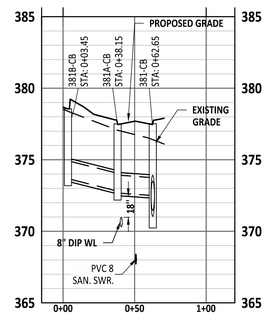

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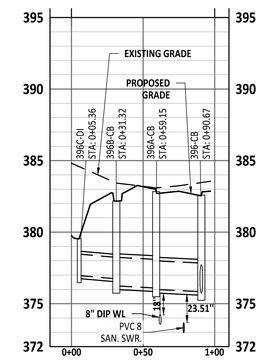

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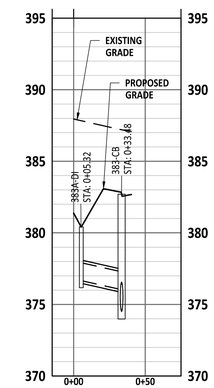
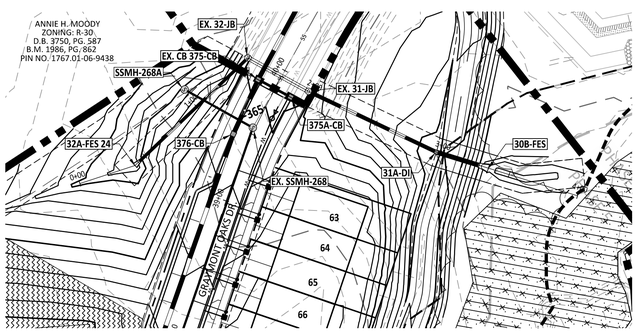
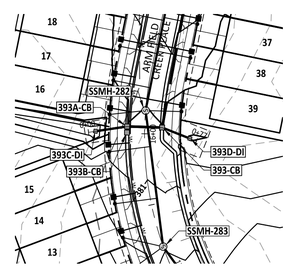


383A-DI TO 383-CB PROFILE



32A-FES 18 TO 30B-FES 30 PLAN



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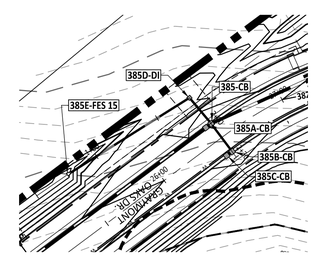
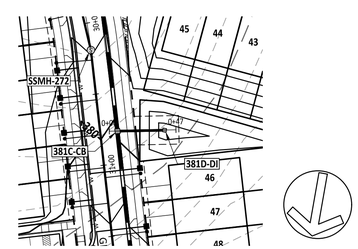


385B-DI TO 385A-CB PLAN



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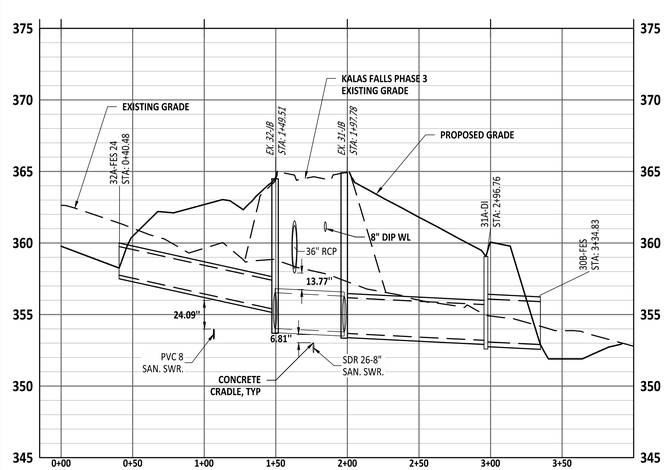

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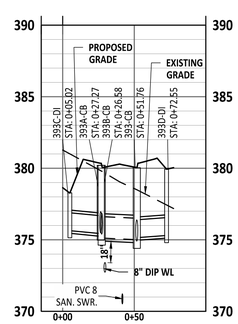

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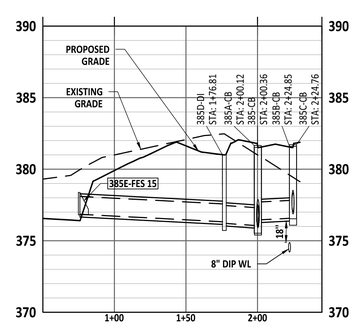
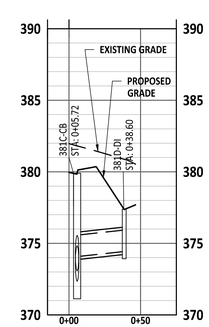


385E-FES TO 385C-CB PROFILE



381C-CB TO 381D-DI PROFILE

Horizontal 50 0 50 100 200
Vertical 5 0 5 10 20
Horizontal Scale 1 inch = 50 ft.
Vertical Scale 1 inch = 5 ft.

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

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

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

Digitally signed by Jakob Klein
Date: 2025.05.01 16:04:00 -04'00'

PRELIMINARY
DO NOT USE FOR CONSTRUCTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 065328 JAKOB P. KLEIN

FOR INFORMATION, ONLY

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE
DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE,
WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
STORM DRAINAGE PLAN & PROFILES

SHEET NO.:
CD200

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

J:\Jobs\9900\watkins property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\CD200.dwg
2025-05-01

Public
Sewer Collection / Extension System
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City of Raleigh
Public Utilities Department Permit # S-5618

Public
Water Distribution / Extension System
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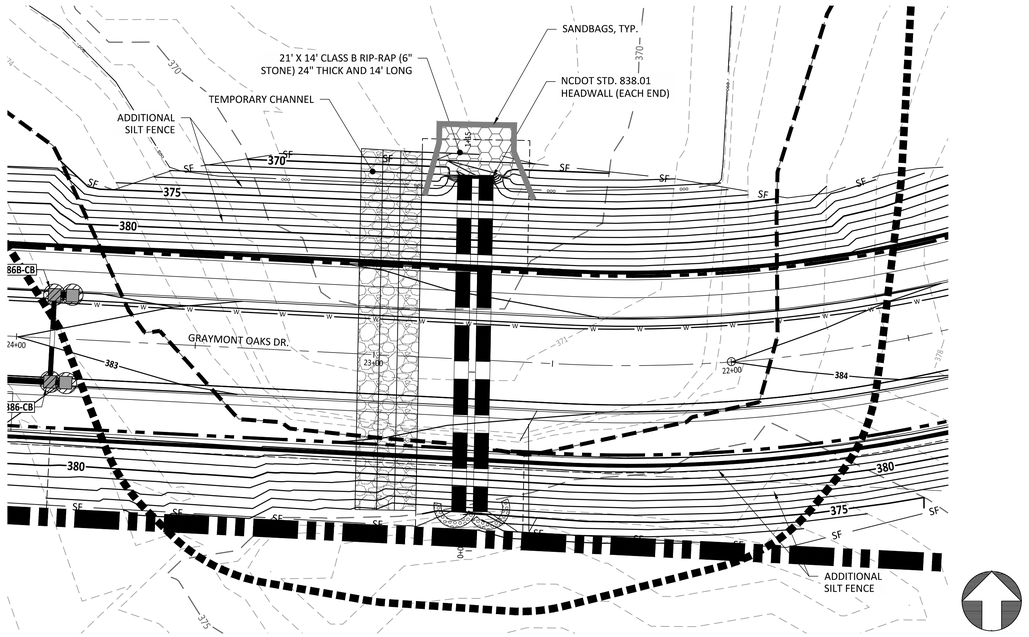
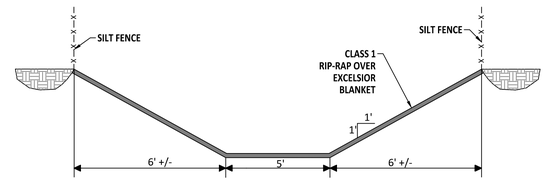
City of Raleigh
Public Utilities Department Permit # W-4214



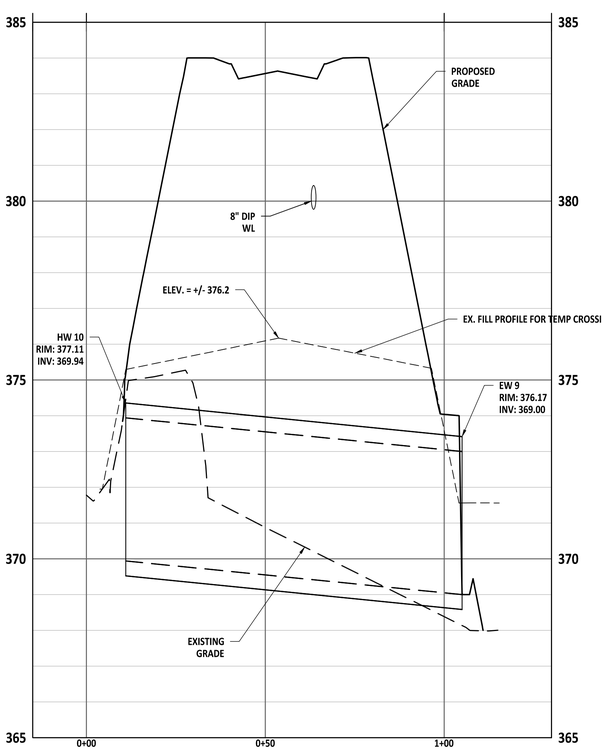
CULVERT CROSSING PLAN



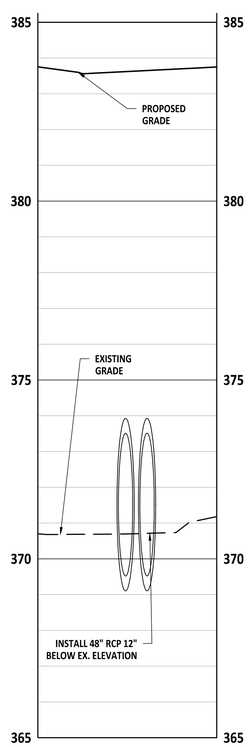
TEMPORARY CHANNEL SECTION

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.



CULVERT CROSSING PROFILE



CULVERT CENTER SECTION

CONSTRUCTION SEQUENCE FOR THE GRAYMONT OAKS CROSSING OF THE EXISTING POND NEAR THE SOUTHERN BORDER OF KALAS FALLS SUBDIVISION SHALL BE AS FOLLOWS:

STAGE 1A CULVERT CROSSING INSTALLATION:

1. CONDUCT A MEETING WITH THE WAKE COUNTY INSPECTOR PRIOR TO PROCEEDING WITH THE CONSTRUCTION OF THE CULVERT CROSSING.
2. PUMP THE EXISTING POND DOWN SO IT IS BELOW THE PROPOSED PIPE INVERTS.
3. INSTALL THE BYPASS CHANNEL AS SHOWN WITH LINING LEAVING A PORTION OF THE BANK ON EACH END TO ACT AS A DAM TO PREVENT WATER FLOW DURING CONSTRUCTION OF THE CHANNEL. (STEPS 4 - 8 SHOULD BE ACCOMPLISHED DURING ONE WORKDAY).
4. DURING A PERIOD OF DRY WEATHER AND WHEN THE WATER LEVEL OF THE POND IS BELOW THE CHANNEL INVERT, REMOVE THE DOWNSTREAM DAM FIRST AND CONSTRUCT THE REMAINDER OF THE CHANNEL TO THE EXISTING POND.
5. REMOVE THE UPSTREAM DAM AND CONSTRUCT THE REMAINDER OF THE CHANNEL TO TIE TO THE LOW AREA INCLUDING LINING.
6. ADD SANDBAGS ACROSS THE LOW POINT AT THE UPSTREAM END TO FORCE THE WATER FLOW INTO THE BY-PASS CHANNEL.
7. ADD SANDBAGS ACROSS THE DOWNSTREAM END OF THE LOW POINT JUST ABOVE THE POINT WHERE THE BY-PASS CHANNEL RE-ENTERS THE POND TO PREVENT FLOW INTO THE LOCATION OF THE PIPE TO BE INSTALLED.
8. SEED/SOD AND STABILIZE ALL DENUDED AREAS ONCE THE CHANNEL IS IN PLACE.
9. THE PUMP IS TO REMAIN ON SITE AND TO KEEP POND ELEVATION AT OR BELOW THE CHANNEL AND PIPE INVERTS.

STAGE 1B CULVERT CROSSING INSTALLATION:

1. OBTAIN PERMISSION FROM THE WAKE COUNTY INSPECTOR TO PROCEED WITH THIS STEP.
2. EXCAVATE AREA AS SHOWN AND INSTALL PIPE WITH HEADWALLS AND DOWNSTREAM RIP-RAP AS SHOWN IN RIP-RAP CROSS-SECTION WITHIN THE WORKABLE AREA.
3. OBTAIN WAKE COUNTY APPROVAL OF THE PIPE INSTALLATION.

STAGE 1C CULVERT CROSSING INSTALLATION

1. WITHIN ONE ACTIVE WORKDAY, REMOVE THE TEMPORARY DAM ON DOWNSTREAM AND UPSTREAM ENDS.
2. REMOVE LINING ON UPSTREAM END OF BY-PASS CHANNEL AND INSTALL EARTHEN DAM ACROSS THE UPSTREAM END OF THE BY-PASS CHANNEL. REUSE SANDBAGS TO FORCE WATER FLOW THROUGH THE PIPE.
3. INSTALL EARTHEN DAM ACROSS THE DOWNSTREAM OF THE BY-PASS CHANNEL AFTER REMOVING THE LINING.
4. REMOVE REMAINDER OF THE BY-PASS CHANNEL LINING AND FILL THE CHANNEL COMPACTING THOROUGHLY IN LAYERS.
5. INSTALL SILT FENCE AT THE TOE OF SLOPES AND TIE TO ENDWALLS AS SHOWN ON THIS PLAN.
6. INSTALL ADDITIONAL SILT FENCE ALONG THE SLOPE AS SHOWN AND AS NEEDED.
7. COMPLETE FILL AROUND THE PIPE TO A LEVEL AT LEAST TWO (2) FEET ABOVE THE TOP OF THE PIPE TO ALLOW CONSTRUCTION EQUIPMENT TO PASS OVER IT.
8. COMPLETE FILL BRINGING THE AREA TO FINISHED GRADE.
9. INSTALL PAVEMENT AND FOLLOW THE SEEDING SCHEDULE FOR ALL BARE AREAS.
10. REFER TO MAIN CONSTRUCTION SEQUENCE FOR OTHER DETAILS.

GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH WAKE COUNTY STANDARDS AND REGULATIONS.
2. THERE SHALL BE NO DISTURBANCE OUTSIDE THE LIMITS SHOWN ON THIS PLAN WITHOUT AN APPROVED PLAN AMENDMENT BY WAKE COUNTY.
3. ALL DISTURBED AREAS SHALL BE SEEDED PER THE SEEDING SCHEDULE.
4. PERMANENT GROUND COVER SHALL BE ESTABLISHED PER NPDES SEEDING SCHEDULE AT EITHER 7 DAYS OR 14 DAYS DEPENDING ON MEASURE AND SLOPE.
5. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SELF-INSPECTION LOG.
6. CUT AND FILL SLOPES THAT ARE 2:1 OR GREATER SHALL BE STABILIZED WITH PERMANENT SLOPE RETENTION DEVICES OR A SUITABLE COMBINATION OF PLANTING AND RETENTION DEVICES. SLOPES GREATER THAN 3:1 SHALL NOT BE STABILIZED WITH TURF GRASS BUT MUST BE STABILIZED WITH VEGETATION THAT REQUIRES MINIMAL MAINTENANCE SUCH AS WEEPING LOVE GRASS, RED FESCUE, OR OTHER APPROVED VARIETY.

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

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

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

Digitally signed by Jakob Klein
Date: 2025.05.01 15:04:04-04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 56528 JAKOB P. KLEIN

PRELIMINARY
DO NOT USE FOR CONSTRUCTION

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

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.

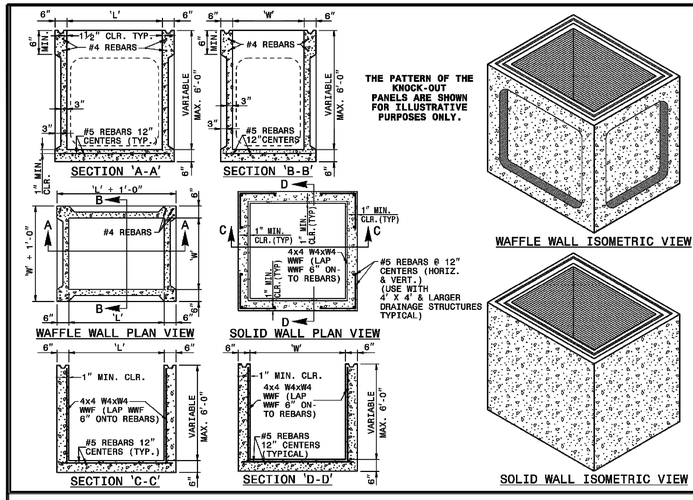
KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
CULVERT CROSSING PLAN & PROFILE

SHEET NO.:
CD201

Z:\Jobs\9900\watkins property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\CD201.dwg
2025-05-01



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

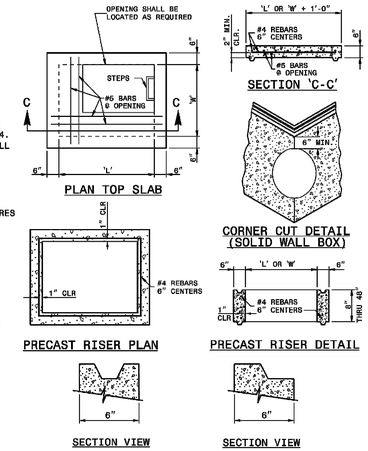
1-24

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.



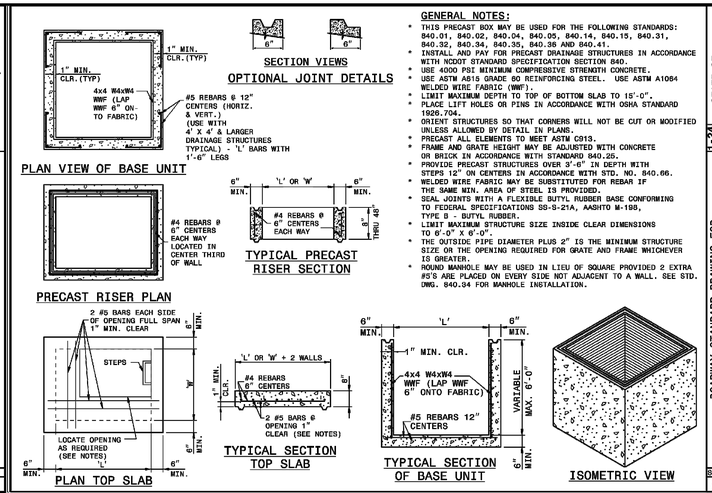
OPTIONAL JOINT DETAILS

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:

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* 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

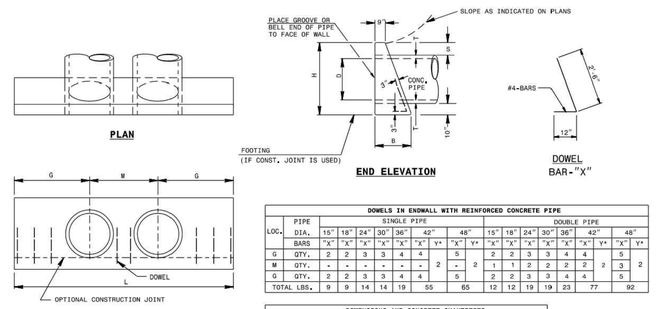
SHEET 1 OF 1
840.46

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

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

Digitally signed by Jakob Klein
Date: 2025.05.01 11:40:04-04'00'

PRELIMINARY
NORTH CAROLINA PROFESSIONAL SEAL 045329 ENGINEER JAKOB P. KLEIN
DO NOT USE FOR CONSTRUCTION
FOR INFORMATION ONLY



DOWELS IN ENDWALL WITH REINFORCED CONCRETE PIPE																	
LOC.	PIPE DIA.	SINGLE PIPE							DOUBLE PIPE								
		15"	18"	24"	30"	36"	42"		48"		15"	18"	24"	30"	36"	42"		48"	
	BARS	"X"	"X"	"X"	"X"	"X"	"X"	Y*	"X"	Y*	"X"	"X"	"X"	"X"	"X"	"X"	Y*	"X"	Y*
G	QTY.	2	2	3	3	4	4		5		2	2	3	3	4	4		5	
M	QTY.	-	-	-	-	-	-	2	-	2	1	1	2	2	2	2	2	3	2
G	QTY.	2	2	3	3	4	4		5		2	2	3	3	4	4		5	
TOTAL LBS.		9	9	14	14	19	55		65		12	12	19	19	23	77		92	

DIMENSIONS AND CONCRETE QUANTITIES										
USING CONCRETE PIPE										
	COMMON DIMENSIONS					SINGLE PIPE		DOUBLE PIPE		
D	H	B	G	T	S	L	YD³	M	L	YD³
15"	3'-3"	1'-8"	2'-9"	2 1/4"	9 1/2"	5'-6"	0.7	2'-2"	7'-8"	1.0
18"	3'-7"	1'-10"	3'-2"	2 1/2"	10"	6'-4"	1.0	2'-7"	8'-11"	1.3
24"	4'-2"	2'-1"	4'-0"	3"	10"	8'-0"	1.5	3'-5"	11'-5"	2.0
30"	5'-0"	2'-6"	4'-7"	4 1/4"	11 1/2"	9'-2"	2.3	4'-3"	13'-5"	3.1
36"	5'-8"	2'-8"	5'-6"	4 3/4"	11 1/2"	11'-0"	3.4	5'-0"	16'-0"	4.5
42"	6'-2"	3'-1"	6'-4"	5 1/4"	11 1/2"	12'-8"	4.5	5'-10"	18'-6"	6.0
48"	6'-9"	3'-5"	7'-2"	5 3/4"	11 1/2"	14'-4"	6.0	6'-8"	21'-0"	8.0

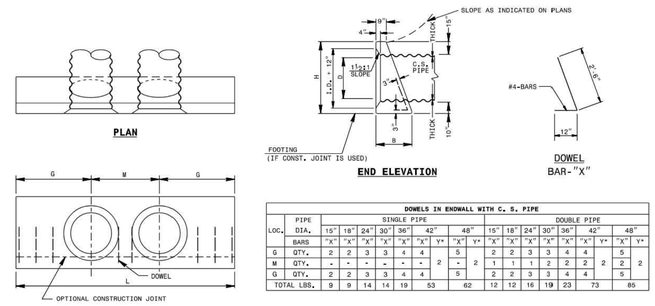
*SEE SHEET 3

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

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS
15" THRU 48" PIPE - 90° SKEW

SHEET 1 OF 3
838.01



DOWELS IN ENDWALL WITH C. S. PIPE																			
LOC.	PIPE DIA.	SINGLE PIPE								DOUBLE PIPE									
		15"	18"	24"	30"	36"	42"		48"		15"	18"	24"	30"	36"	42"		48"	
	BARS	"X"	"X"	"X"	"X"	"X"	"X"	Y*	"X"	Y*	"X"	"X"	"X"	"X"	"X"	"X"	Y*	"X"	Y*
G	QTY.	2	2	3	3	4	4		5		2	2	3	3	4	4		5	
M	QTY.	-	-	-	-	-	-	2	-	2	1	1	1	2	2	2	2	2	2
G	QTY.	2	2	3	3	4	4		5		2	2	3	3	4	4		5	
TOTAL LBS.		9	9	14	14	19	53		62		12	12	16	19	23	73		85	

DIMENSIONS AND CONCRETE QUANTITIES								
USING CORRUGATED STEEL PIPE								
	COMMON			SINGLE PIPE		DOUBLE PIPE		
D	H	B	G	L	YD³	M	L	YD³
15"	3'-4"	1'-8"	2'-6"	5'-0"	0.7	1'-11"	6'-11"	1.0
18"	3'-7"	1'-10"	2'-11"	5'-10"	1.0	2'-3"	8'-1"	1.2
24"	4'-1"	2'-1"	3'-8"	7'-4"	1.4	3'-0"	10'-4"	1.9
30"	4'-7"	2'-4"	4'-5"	8'-10"	2.0	3'-9"	12'-7"	2.7
36"	5'-1"	2'-7"	5'-2"	10'-4"	2.8	4'-6"	14'-10"	3.8
42"	5'-7"	2'-10"	5'-11"	11'-10"	3.8	5'-3"	17'-1"	5.0
48"	6'-1"	3'-1"	6'-8"	13'-4"	4.9	6'-0"	19'-4"	7.5

*SEE SHEET 3

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

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS
15" THRU 48" PIPE - 90° SKEW

SHEET 2 OF 3
838.01

GENERAL NOTES:

CHAMFER ALL CORNERS 1" OR HAVE A RADIUS OF 1".

PLACE 2 #6 "Y" BARS IN THE TOP OF ALL ENDWALL FOR PIPE CULVERTS 42" AND OVER WITH A MINIMUM OF 3" COVER AND A LENGTH OF 6" LESS THAN ENDWALL LENGTH.

CONSTRUCT BOTTOM SLAB WITH FORMS.

DO NOT INTERPRET WALL THICKNESS (T) SHOWN FOR THE THICKNESS ACCEPTABLE, BUT IS USED IN COMPUTING ENDWALL QUANTITIES.

WHEN THE CONTRACTOR ELECTS TO USE A CONSTRUCTION JOINT AT THE BOTTOM OF THE PIPE, PLACE BAR "X" DOWELS IN THE BASE AS SHOWN ON PLANS. SPACE BARS APPROXIMATELY ON 12" CENTERS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

WHEN THE CONTRACTOR ELECTS TO USE A CONSTRUCTION JOINT AT THE BOTTOM OF THE PIPE AND POUR THE BASE SEPARATELY LEAVE THE POUR ROUGH.

USE CLASS "B" CONCRETE.

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

1-18

ROADWAY STANDARD DRAWING FOR
CONCRETE ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS
15" THRU 48" PIPE - 90° SKEW

SHEET 3 OF 3
838.01

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:

DRAINAGE DETAILS

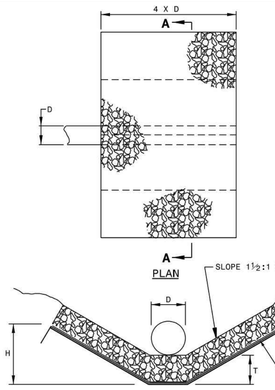
SHEET NO.:

CD500

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

\\jobs\1990\watkins property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\CD500.dwg

2025-05-01

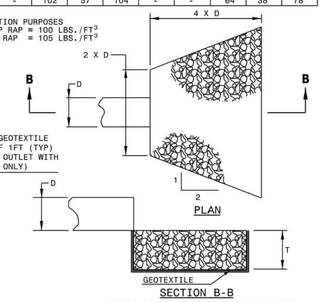


PIPE OUTLET WITH DITCH

H= RIP RAP TO TOP OF PIPE (MAX. H = D + T)
T= 18" CLASS I RIP RAP, UNLESS OTHERWISE SHOWN ON PLANS
T= 12" CLASS 'B' RIP RAP, UNLESS OTHERWISE SHOWN ON PLANS
KEY-IN RIP-RAP

	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	TONS (APPROX.)	S.Y.	TONS	TONS (APPROX.)	TONS	TONS (APPROX.)	S.Y.	TONS	TONS (APPROX.)
12"	2	5	5	2	5	1	4	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



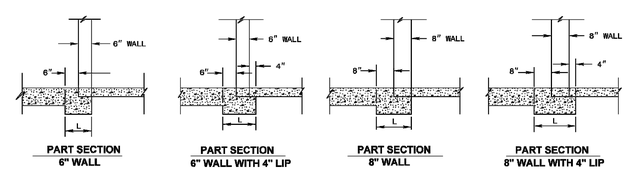
PIPE OUTLET WITHOUT DITCH

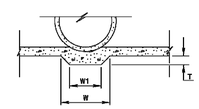
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-24

ROADWAY STANDARD DRAWING FOR
GUIDE FOR RIP RAP AT PIPE OUTLETS

SHEET 1 OF 1
876.02





PART SECTION OF END ELEVATION

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

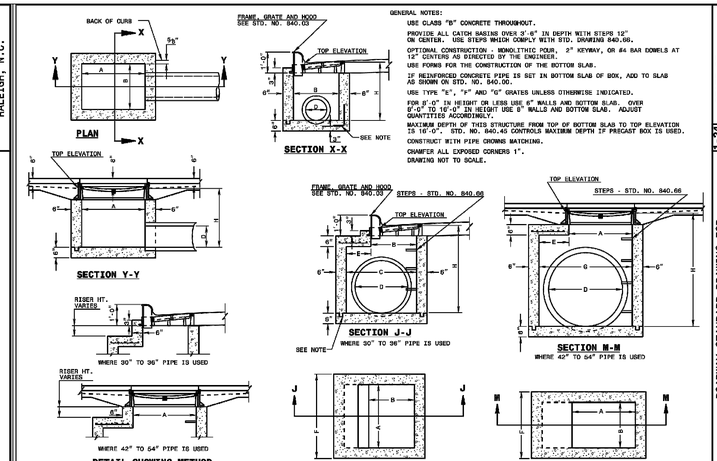
PIPE	"W"	"W1"	"T"	C.Y. QUANTITIES WHEN L IS		
D	DIM	DIM	DIM	12"	16"	20"
12"	1'-1⅞"	0'-7⅞"	0'-2"	0.005	0.007	0.008
15"	1'-3⅝"	0'-9⅛"	0'-2"	0.006	0.008	0.010
18"	1'-5¼"	0'-10⅜"	0'-2"	0.007	0.010	0.012
24"	1'-8¾"	1'-0⅛"	0'-3"	0.011	0.014	0.018
30"	2'-0¼"	1'-2¾"	0'-3½"	0.014	0.018	0.023
36"	2'-3¾"	1'-5⅜"	0'-4"	0.017	0.023	0.025
42"	2'-7⅛"	1'-7"	0'-5¼"	0.025	0.030	0.038
48"	2'-10⅝"	1'-8¾"	0'-5¾"	0.028	0.038	0.047
54"	3'-2⅛"	1'-10½"	0'-6¼"	0.035	0.047	0.058
60"	3'-5⅝"	2'-0¼"	0'-6¾"	0.042	0.056	0.071
66"	3'-9"	2'-2¼"	0'-7¼"	0.050	0.067	0.084
72"	4'-0½"	2'-3¾"	0'-7¾"	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 9'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 9'-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.

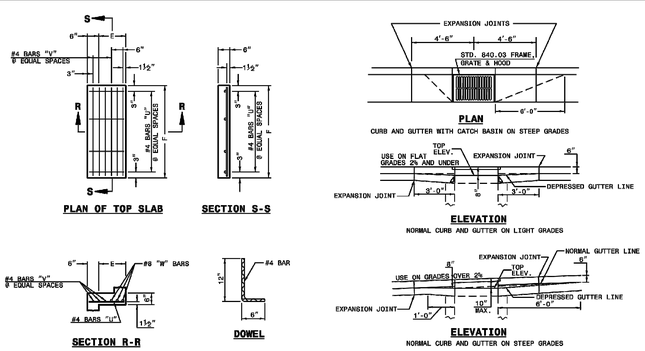
CHAMFER ALL EXPOSED CORNERS 1".
DRAWING NOT TO SCALE.

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			CU.YDS. CONC. IN BOX		DEDUCTIONS ONE PIPE
PIPE	SPAN	WIDTH	WIDTH	SPAN	MIN. HEIGHT					NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	TOTAL LBS.	TOP SLAB	BOTTOM SLAB	BOT. CONC. ADJ. FOR RISER* C.Y.	C.Y. R.C.
D	A	B	C	G	H		E	F												
12"	3'-0"	2'-2"	--	--	2'-9"		--	--	--	--	--	--	--	--	--	--	0.239	0.772	0.018	0.006
15"	3'-0"	2'-2"			3'-0"												0.235	0.829	0.020	0.006
18"	3'-0"	2'-2"			3'-3"												0.235	0.887	0.033	0.049
24"	3'-0"	2'-2"			3'-9"												0.235	1.001	0.059	0.065
30"	3'-0"	2'-2"	3'-4"		4'-3"		1'-2"	4'-0"	4	1'-8"	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	0.181	0.358	1.714	0.132	0.178
42"	3'-0"	2'-2"		4'-5"	5'-3"		1'-8"	3'-2"	4	1'-8"	2	2'-11"	3	2'-11"	32	0.112	0.318	1.739	0.180	0.243
48"	3'-0"	2'-2"		5'-0"	5'-9"		3'-0"	3'-2"	4	2'-8"	3	2'-11"	3	2'-11"	35	0.145	0.352	2.052	0.239	0.317
54"	3'-0"	2'-2"		5'-7"	6'-3"		2'-7"	3'-2"	4	2'-10"	5	2'-11"	3	2'-11"	41	0.180	0.386	2.387	0.297	0.401

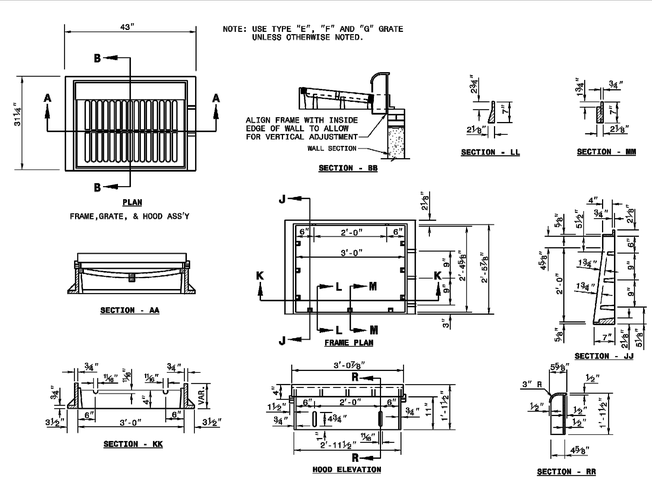
* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

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

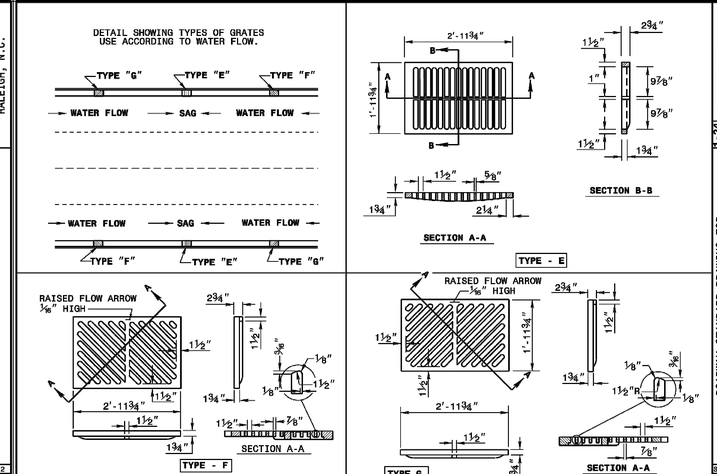


STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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

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

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

Digitally signed by Jakob Klein
Date: 2025.05.01 14:12:04-04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 065328 JAKOB P. KLEIN

PRELIMINARY
DO NOT USE FOR CONSTRUCTION

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
DRAINAGE DETAILS

SHEET NO.:
CD501

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\1990\working property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\CD500.dwg

2025-05-01

NOTES: USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL CATCH BASINS OVER 5'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.

USE #4 BAR DOWELS AT 12" CENTERS

USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.

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

FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 12'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.

MAX. DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 18'-0". STD. DWG. 840.45 OR 840.46 CONTROLS MAX. DEPTH IF PRECAST BOX IS USED.

CONSTRUCT WITH PIPE CROWNS MATCHING.

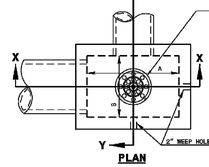
INSTALL 2" WEEPHOLES AS DIRECTED BY THE ENGINEER.

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

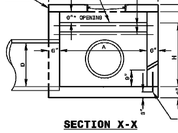
CHAMFER ALL EXPOSED CORNERS 1".

DRAWING NOT TO SCALE.

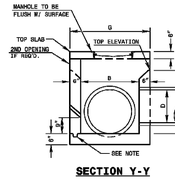
* INCREASE THE SIZE OF THE 6" OPENING TO 8" MAX., AS DIRECTED BY THE ENGINEER BY ADDING 2" TO THE WALL HEIGHT ABOVE THE TOP ELEVATION. ADJUST QUANTITIES ACCORDINGLY.



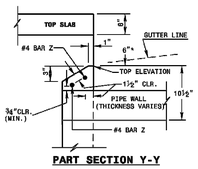
PLAN



SECTION X-X



SECTION Y-Y



PART SECTION Y-Y
SHOWING DETAILS AT OPENING

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

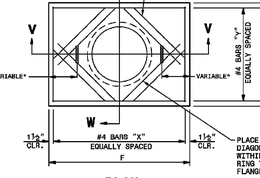
DIM'S OF BOX & PIPE				BARS - W		BARS - X		BARS - Y		BARS - Z		TOP & BOT. SLAB DIMENSIONS		CU. YDS. CONC. IN BOX		TOTAL QUANTITIES BOX & SLABS		DEDUCTION ONE PIPE		DED. ONE SPECIAL OPENING
PIPE	SPAN	WIDTH	HEIGHT			REINFORCING														
D	A	B	H	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	F	G	TOP SLAB	BOT. SLAB	LB. SIZE	YD. FOR H	C.S.	R.C.	YD³
12"	3'-6"	2'-3"	1'-10"	8	3'-8"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.207	0.271	0.250	47	1.046	0.015	0.032	0.046
15"	3'-6"	2'-3"	2'-1"	8	3'-8"	4	3'-0"	6	4'-3"	2	4'-3"	4'-6"	3'-3"	0.207	0.271	0.250	47	1.108	0.023	0.038	0.046
18"	4'-0"	2'-8"	2'-4"	8	3'-0"	5	3'-2"	7	4'-3"	2	4'-8"	5'-0"	3'-8"	0.275	0.340	0.284	61	1.379	0.033	0.049	0.065
24"	4'-0"	2'-8"	2'-10"	8	3'-0"	5	3'-5"	7	4'-9"	2	4'-9"	5'-0"	3'-8"	0.275	0.340	0.284	61	1.521	0.059	0.065	0.053
30"	4'-0"	3'-0"	3'-4"	8	3'-2"	6	4'-3"	8	4'-9"	2	4'-9"	5'-0"	4'-6"	0.352	0.417	0.319	77	1.918	0.092	0.127	0.053
36"	4'-6"	4'-0"	3'-10"	8	3'-7"	8	4'-9"	10	5'-3"	2	5'-3"	5'-6"	5'-0"	0.445	0.510	0.359	84	2.390	0.132	0.176	0.069
42"	5'-0"	4'-6"	4'-4"	8	3'-9"	8	5'-3"	12	5'-9"	2	5'-9"	6'-0"	5'-6"	0.547	0.611	0.399	119	2.914	0.180	0.243	0.069
48"	5'-0"	5'-0"	4'-10"	8	3'-9"	8	5'-9"	13	5'-9"	2	5'-9"	6'-0"	6'-0"	0.663	0.686	0.407	128	3.295	0.230	0.317	0.088

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

1-24

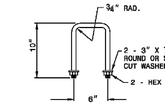
ROADWAY STANDARD DRAWING FOR
CONCRETE OPEN THROAT CATCH BASIN
(WITH MANHOLE)
12" THRU 48" PIPE

SHEET 1 OF 2
840.04

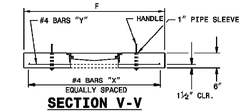


PLAN
PRECAST OR CAST IN PLACE TOP SLAB

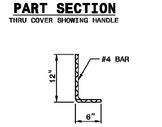
*PLACE HANDLES A MINIMUM 8" FROM OUTSIDE EDGE AND IN A MANNER TO AVOID REINFORCEMENT BARS AS DIRECTED BY THE ENGINEER



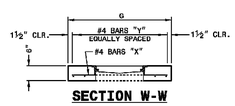
DETAIL OF HANDLE



SECTION V-V



PART SECTION
THRU COVER SHOWING HANDLE



SECTION W-W

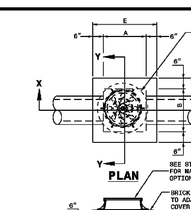
DOWEL

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

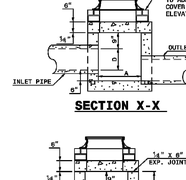
1-24

ROADWAY STANDARD DRAWING FOR
CONCRETE OPEN THROAT CATCH BASIN
(WITH MANHOLE)
12" THRU 48" PIPE

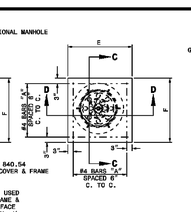
SHEET 2 OF 2
840.04



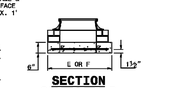
PLAN

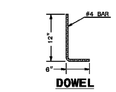


SECTION X-X



SECTION C-C OR D-D





DOWEL

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.

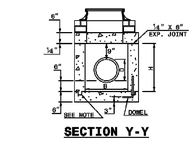
USE FORMS TO CONSTRUCT THE BOTTOM SLAB.

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.



SECTION Y-Y

DIMENSIONS AND QUANTITIES FOR CONCRETE JUNCTION BOXES

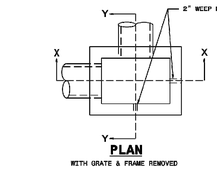
DIMENSIONS OF BOX AND PIPE				REINFORCEMENT BARS "A"		TOP SLAB DIMENSIONS		CUBIC YARDS IN BOX			TOTAL QUANTITIES BOX AND SLABS		DEDUCTIONS FOR ONE PIPE	
PIPE	SPAN	WIDTH	HEIGHT											
D	A	B	H	NO.	LENGTH	E	F	TOP SLAB	BOTTOM SLAB	WALL FT. OF H.	LBS. REINF MIN. "H"	CU. YDS. CONC. MIN. "H"	C.S.	R.C.
12"	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	1.454	0.059	0.065
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	0.176
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"	4'-6"	5'-4"	5'-3"	26	6'-3"	6'-4"	6'-4"	0.743	0.743	0.407	111	3.523	0.235	0.317
54"	5'-10"	5'-10"	5'-9"	28	6'-7"	6'-10"	6'-10"	0.865	0.865	0.444	128	4.283	0.097	0.401
60"	6'-6"	6'-6"	6'-3"	30	7'-3"	7'-6"	7'-6"	1.042	1.042	0.481	145	5.000	0.967	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



PLAN
WITH GRATE & FRAME REMOVED

GENERAL NOTES:

USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL DROP INLETS OVER 5'-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.

MAX.DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 12'-0". STD. DWG. 840.45 OR 840.46 CONTROLS MAXIMUM DEPTH IF PRECAST BOX IS USED.

CONSTRUCT WITH PIPE CROWNS MATCHING.

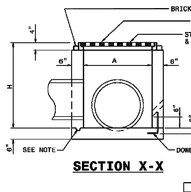
SEE STANDARD DRAWING 840.25 FOR ATTACHMENT OF FRAMES AND GRATES NOT SHOWN.

INSTALL 2" WEEPHOLES AS DIRECTED BY THE ENGINEER.

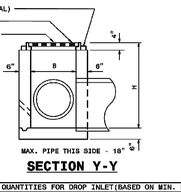
INSTALL STONE DRAINS, OF A MINIMUM OF 1 CUBIC FOOT OF NO. 78M STONE IN A POROUS FABRIC BAG OR WRAP, AT EACH WEEP HOLE OR AS DIRECTED BY THE ENGINEER.

CHAMFER ALL EXPOSED CORNERS 1".

DRAWING NOT TO SCALE.



SECTION X-X



SECTION Y-Y

DOWEL

DIMENSIONS AND QUANTITIES FOR DROP INLET(BASED ON MIN. HEIGHT, H)

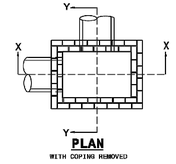
DIMENSIONS OF BOX & PIPE				CUBIC YARDS CONC. IN BOX			DEDUCTIONS FOR ONE PIPE	
PIPE	SPAN	WIDTH	MIN. HEIGHT					
D	A	B	H	BOTTOM SLAB	WALL PER FT. HT.	TOTAL PER FOOT OF HEIGHT H	C.M.	R.C.
12"	3'-0"	2'-0"	2'-0"	0.222	0.222	0.592	0.015	0.026
15"	/	/	2'-3"		/		0.648	0.029	0.036
18"	/	/	2'-6"		/		0.703	0.033	0.049
24"	/	/	3'-0"		/		0.814	0.059	0.065
30"	3'-0"	2'-0"	3'-6"	0.222	0.222	0.925	0.092	0.127

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

1-24

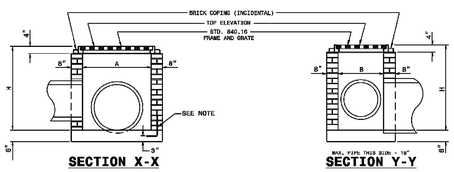
ROADWAY STANDARD DRAWING FOR
CONCRETE DROP INLET
12" THRU 30" PIPE

SHEET 1 OF 1
840.14



PLAN
WITH COPING REMOVED

GENERAL NOTES:
MORTAR JOINTS ½" +/- ⅛" THICK.
USE CLASS "B" CONCRETE THROUGHOUT.
USE FORMS FOR CONSTRUCTION OF THE BOTTOM SLAB.
USE #4 BAR DOWELS AT 12" CENTERS.
DEDUCT FOR PIPE(S) FROM TOTAL CU. YDS. OF BRICK MASONRY.
PROVIDE ALL CATCH BASINS OVER 5'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.
USE BRICK OR CONCRETE BLOCK WHICH COMPLIES WITH THE REQUIREMENTS OF SECTION 840 OF THE STANDARD SPECIFICATIONS.
IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.
FOR 8'-0" IN HEIGHT OR LESS, USE 8" WALL; OVER 8'-0" IN HEIGHT, USE 12" WALL TO 6'-0" FROM TOP OF WALL AND 8" WALL FOR THE REMAINING 6'-0". QUANTITES TO BE ADJUSTED ACCORDINGLY.
MAX.DEPTH OF THIS STRUCTURE FROM TOP OF BOTTOM SLAB TO TOP ELEVATION IS 12'-0". STD. DWG. 840.45 OR 840.46 CONTROLS MAXIMUM DEPTH IF PRECAST BOX IS USED.
CONSTRUCT WITH PIPE CROWNS MATCHING.
SEE STANDARD DRAWING 840.25 FOR ATTACHMENT OF FRAMES AND GRATES.
DO NOT USE BRICK MASONRY DROP INLET IN LOCATIONS SUBJECT TO TRAFFIC.
CHAMFER ALL EXPOSED CORNERS 1".
DRAWING NOT TO SCALE.



SECTION X-X

SECTION Y-Y

DOWEL

DIMENSIONS AND QUANTITIES FOR DROP INLET(BASED ON MIN. HEIGHT, H)

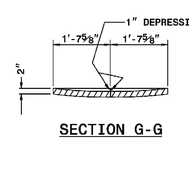
DIMENSIONS OF BOX & PIPE				CUBIC YARDS CONCRETE	CUBIC YARDS BRICK MASONRY		DEDUCTIONS FOR ONE PIPE	
PIPE	SPAN	WIDTH	MIN. HEIGHT					
D	A	B	H	BOTTOM SLAB	WALL PER FOOT HT.	TOTAL PER FOOT OF HEIGHT H MIN. HEIGHT H	C.S.	R.C.
12"	3'-0"	2'-0"	2'-0"	0.268	0.313	0.522	0.020	0.032
15"	/	/	2'-3"	0.268	0.313	0.600	0.031	0.047
18"	/	/	2'-6"	0.268	0.313	0.678	0.044	0.065
24"	/	/	3'-0"	0.268	0.313	0.835	0.079	0.113
30"	3'-0"	2'-0"	3'-6"	0.268	0.313	0.991	0.122	0.170

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

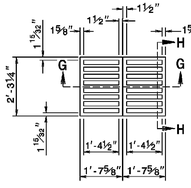
1-24

ROADWAY STANDARD DRAWING FOR
BRICK DROP INLET
12" THRU 30" PIPE

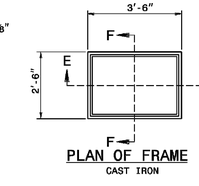
SHEET 1 OF 1
840.15



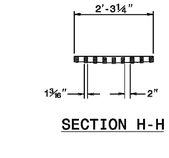
SECTION G-G



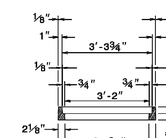
PLAN OF GRATING
CAST IRON



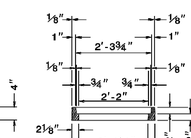
PLAN OF FRAME
CAST IRON



SECTION H-H



SECTION E-E



SECTION F-F

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

1-24

ROADWAY STANDARD DRAWING FOR
DROP INLET FRAME AND GRATES
FOR USE WITH STD. DWG.S 840.14 AND 840.15

SHEET 1 OF 1
840.16

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

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

Digitally signed by Jakob Klein
Date: 2025.05.01 14:19:04-04'00'

PRELIMINARY
NORTH CAROLINA
JAKOB P. KLEIN
56528
ENGINEER
DO NOT USE FOR CONSTRUCTION
FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

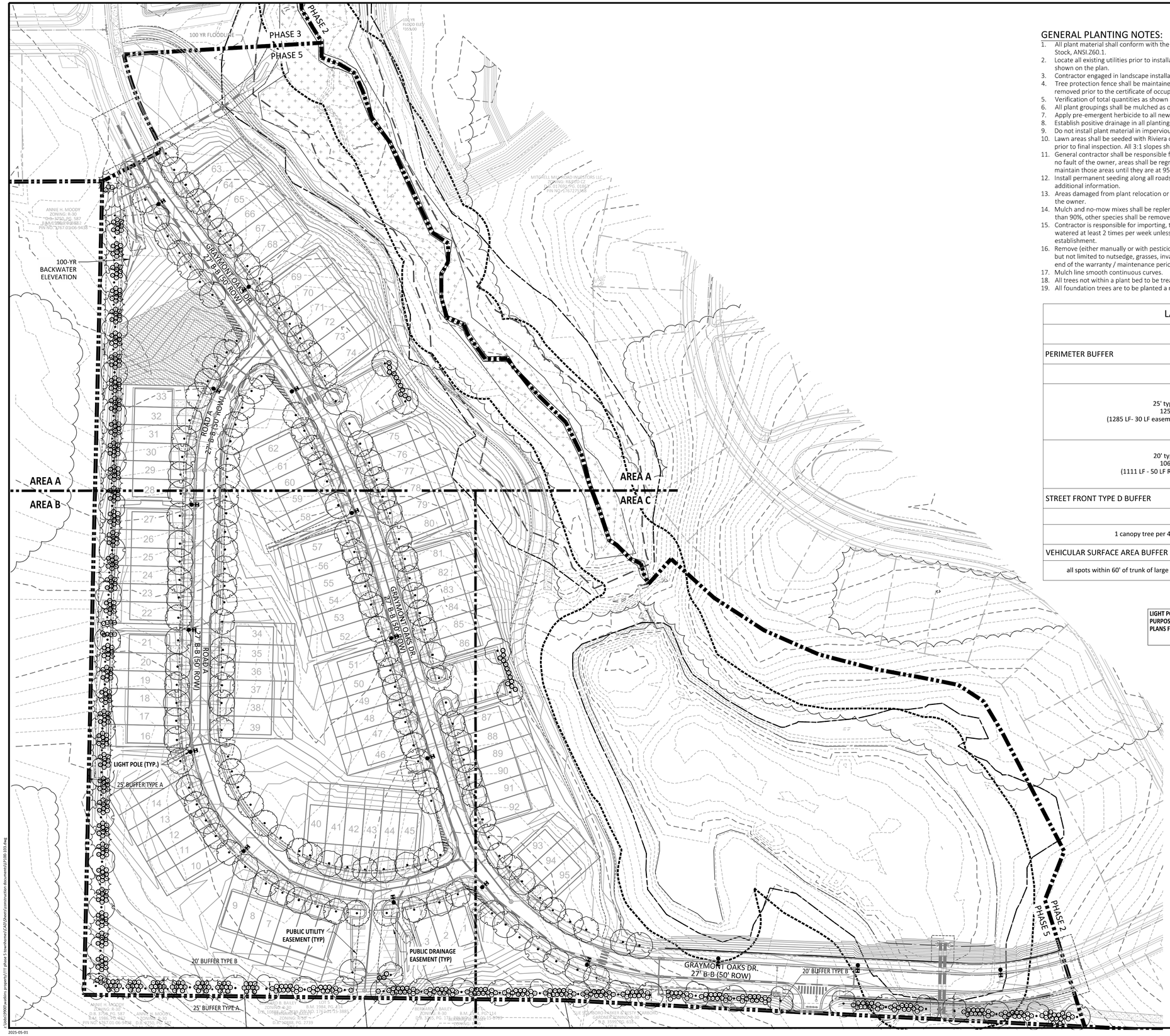
SHEET TITLE:
DRAINAGE DETAILS

SHEET NO.:
CD502

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:\2015\2950\walkins property\!!! phase 5 townhomes\CAD\Sheets\construction documents\CD500.dwg

2025-05-01



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 and no-mow mixes shall be replenished as needed, especially after heavy rain events. If no-mow mix germinates at a rate of less than 90%, other species shall be removed and the area re-seeded.
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 Landscape Architect of any discrepancies.

LANDSCAPE REQUIREMENTS

TYPE			UDO SECTION
PERIMETER BUFFER			
	REQUIRED	PROVIDED	
25' type A 1255 LF (1285 LF- 30 LF easement)	50% of trees and shrubs evergreen Trees 10' between canopies at maturity	207 Evergreen Shrubs + 169 Deciduous Shrubs 22 Evergreen Trees + 21 Deciduous Trees	14.6.7 (1)
20' type B 1061 LF (1111 LF - 50 LF R/W)	50% of shrubs evergreen Trees 20' between canopies at maturity	121 Evergreen Shrubs + 104 Deciduous Shrubs 21 Deciduous Trees	14.6.7 (2)
STREET FRONT TYPE D BUFFER			
	REQUIRED	PROVIDED	
1 canopy tree per 40 LF	73	156	14.6.7 (4)
VEHICULAR SURFACE AREA BUFFER			
all spots within 60' of trunk of large tree			14.7

LIGHT POLES SHOWN FOR COORDINATION PURPOSES ONLY. SEE DUKE ENERGY LIGHTING PLANS FOR DETAILS.

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

North Carolina 811
*** 3 Days Before Digging ***
North Carolina 811
811 or 1.800.632.4949
Remote Ticket Entry
http://nc811.org/remoteticketentry.htm

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

NORTH CAROLINA C-652 ARCHITECTURAL SERVICES

PRELIMINARY - DO NOT USE FOR CONSTRUCTION
FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

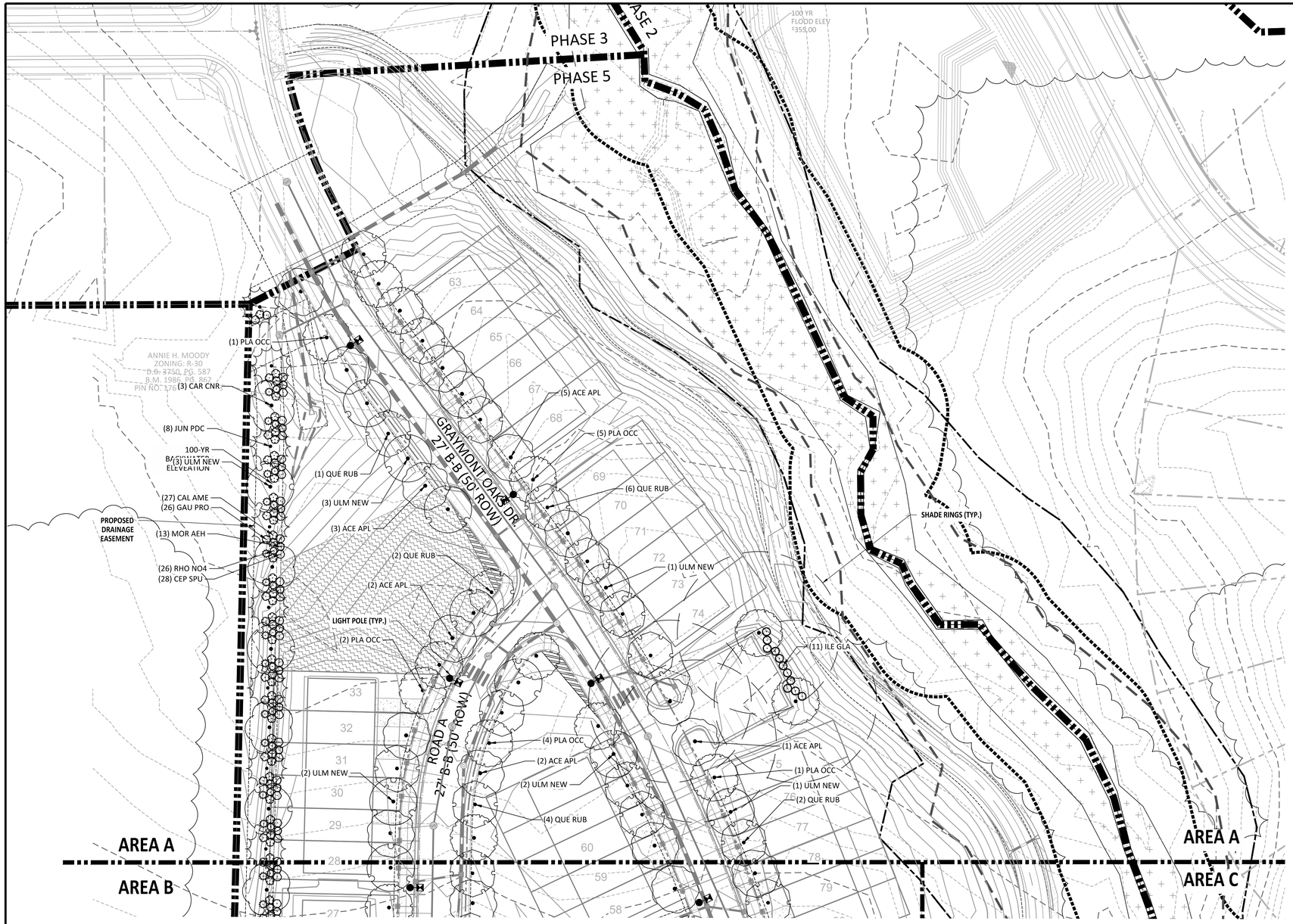
KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:
LANDSCAPE PLAN OVERALL

SHEET NO.:
LP100

2025-05-01



PLANT SCHEDULE AREA A

CODE	BOTANICAL / COMMON NAME	CAL	CONT	SIZE	QTY	REMARKS
CANOPY TREES						
ACE APL	Acer rubrum 'Built to Last' / Built to Last® Red Maple	2.5" Cal.		8' Height Min.	14	Single straight leader.
CAR CNR	Carpinus caroliniana 'CCMTF1' / Collynair® American Hornbeam	2.5" Cal.		8' Height Min.	3	Single straight leader.
PLA OCC	Platanus occidentalis / American Sycamore	2.5" Cal.		8' Height Min.	13	Single straight leader.
QUE RUB	Quercus rubra / Northern Red Oak	2.5" Cal.		8' Height Min.	15	Single straight leader.
ULM NEW	Ulmus americana 'New Harmony' / New Harmony American Elm	2.5" Cal.		8' Height Min.	12	Single straight leader.
EVERGREEN TREES						
JUN PDC	Juniperus virginiana 'Providence' / Providence Eastern Redcedar	2.5" Cal.		8' Height Min.	8	Single straight leader.
CODE	BOTANICAL / COMMON NAME	SIZE	CONTAINER		QTY	REMARKS
DECIDUOUS SHRUBS						
CAL AME	Callicarpa americana / American Beautyberry	18" Height Min.	3 gal		26	Fully rooted.
CEP SPU	Cephalanthus occidentalis 'Sputnik' / Sputnik Buttonbush	18" Height Min.	3 gal		27	Fully rooted.
EVERGREEN SHRUBS						
GAU PRO	Gaultheria procumbens / Wintergreen	18" Height Min.	3 gal		25	Fully rooted.
ILE GLA	Ilex glabra / Inkberry Holly	18" Height Min.	3 gal		11	Fully rooted.
MOR AEH	Morella cerifera 'Nana' / Dwarf Southern Wax Myrtle	18" Height Min.	3 gal		12	Fully rooted.
RHO NO4	Rhododendron catawbiense 'Nova Zembla' / Catawba Rhododendron	18" Height Min.	3 gal		24	Fully rooted.

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)
1 inch = 40 ft.

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

NORTH CAROLINA PROFESSIONAL ARCHITECTURAL SERVICES C-652

PRELIMINARY - DO NOT USE FOR CONSTRUCTION

Lauren Kelly Digitally signed by Lauren Kelly 2025.05.01 10:44:00-04'00'

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

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KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:

LANDSCAPE PLAN AREA A

SHEET NO.:

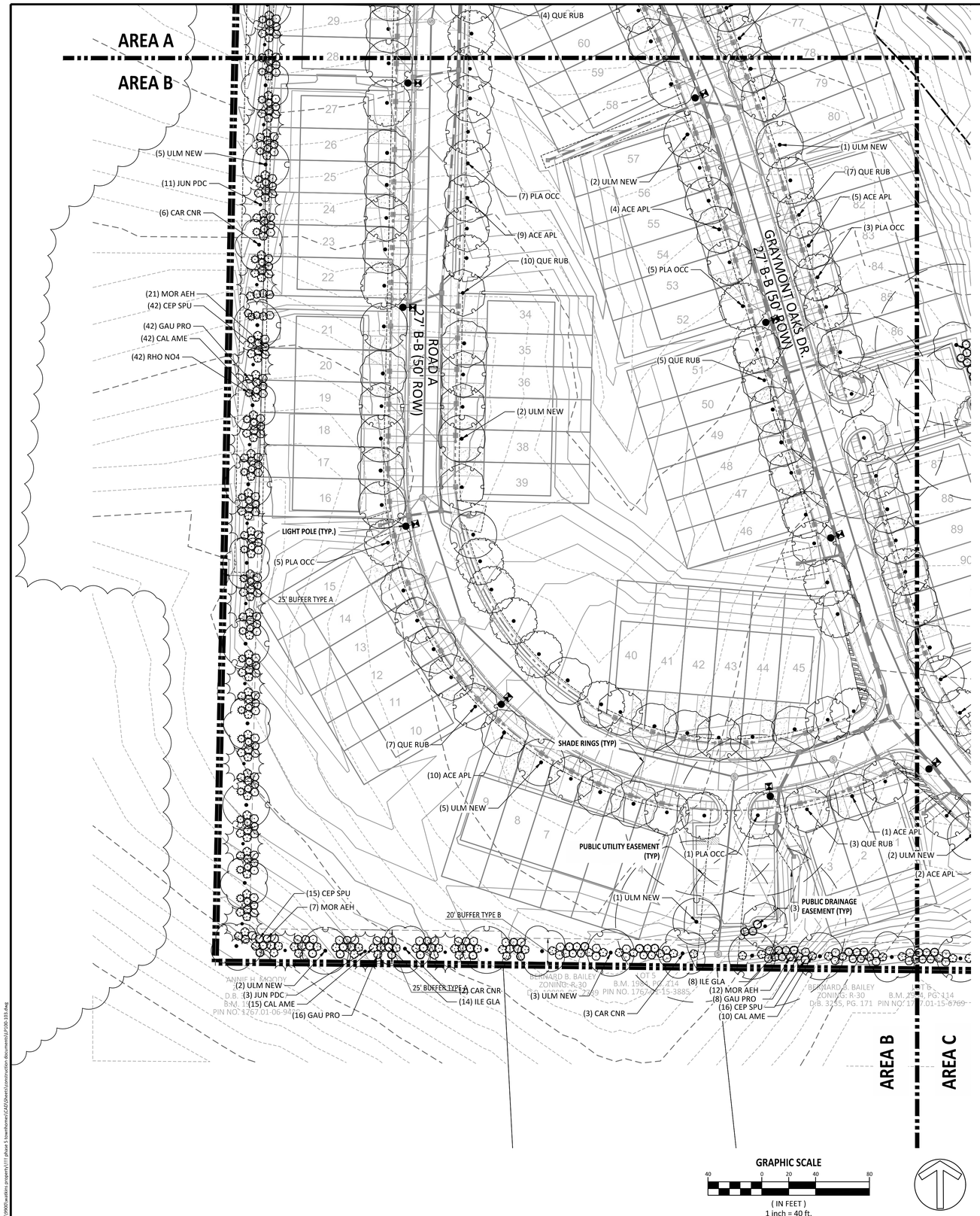
LP401

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 workine projects\!!!! phase 5 townhomes\CADD\Sheets\construction documents\LP200-103.dwg

2025-05-01



PLANT SCHEDULE AREA B

CODE	BOTANICAL / COMMON NAME	CAL	CONT	SIZE	QTY	REMARKS
CANOPY TREES						
ACE APL	Acer rubrum 'Built to Last' / Built to Last® Red Maple	2.5" Cal.		8' Height Min.	28	Single straight leader.
CAR CNR	Carpinus caroliniana 'CCMTF1' / Collynair® American Hornbeam	2.5" Cal.		8' Height Min.	11	Single straight leader.
PLA OCC	Platanus occidentalis / American Sycamore	2.5" Cal.		8' Height Min.	21	Single straight leader.
QUE RUB	Quercus rubra / Northern Red Oak	2.5" Cal.		8' Height Min.	32	Single straight leader.
ULM NEW	Ulmus americana 'New Harmony' / New Harmony American Elm	2.5" Cal.		8' Height Min.	21	Single straight leader.
EVERGREEN TREES						
JUN PDC	Juniperus virginiana 'Providence' / Providence Eastern Redcedar	2.5" Cal.		8' Height Min.	14	Single straight leader.
CODE	BOTANICAL / COMMON NAME	SIZE	CONTAINER		QTY	REMARKS
DECIDUOUS SHRUBS						
CAL AME	Callicarpa americana / American Beautyberry	18" Height Min.	3 gal		69	Fully rooted.
CEP SPU	Cephalanthus occidentalis 'Sputnik' / Sputnik Buttonbush	18" Height Min.	3 gal		76	Fully rooted.
EVERGREEN SHRUBS						
GAU PRO	Gaultheria procumbens / Wintergreen	18" Height Min.	3 gal		68	Fully rooted.
ILE GLA	Ilex glabra / Inkberry Holly	18" Height Min.	3 gal		25	Fully rooted.
MOR AEH	Morella cerifera 'Nana' / Dwarf Southern Wax Myrtle	18" Height Min.	3 gal		41	Fully rooted.
RHO NO4	Rhododendron catawbiense 'Nova Zembla' / Catawba Rhododendron	18" Height Min.	3 gal		44	Fully rooted.

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

NORTH CAROLINA PROFESSIONAL ARCHITECTURAL SEAL C-652 AMERICAN ENGINEERING SERVICES

NORTH CAROLINA PROFESSIONAL SEAL 018116 LAUREN E. WATKINS

PRELIMINARY - DO NOT USE FOR CONSTRUCTION

Lauren Watkins 2025.05.01 14:02:04 -04'00'

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:

LANDSCAPE PLAN AREA B

SHEET NO.:

LP402

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\watkins property\!!!! phase 5 townhomes\CAD\Sheets\construction documents\LP-100-105.dwg

2025-05-01

PLANT SCHEDULE AREA C

CODE	BOTANICAL / COMMON NAME	CAL	CONT	SIZE	QTY	REMARKS
CANOPY TREES						
ACE APL	Acer rubrum 'Built to Last' / Built to Last® Red Maple	2.5" Cal.		8' Height Min.	7	Single straight leader.
CAR CNR	Carpinus caroliniana 'CCMTF1' / Collynair® American Hornbeam	2.5" Cal.		8' Height Min.	8	Single straight leader.
PLA OCC	Platanus occidentalis / American Sycamore	2.5" Cal.		8' Height Min.	5	Single straight leader.
QUE RUB	Quercus rubra / Northern Red Oak	2.5" Cal.		8' Height Min.	4	Single straight leader.
ULM NEW	Ulmus americana 'New Harmony' / New Harmony American Elm	2.5" Cal.		8' Height Min.	11	Single straight leader.
CODE	BOTANICAL / COMMON NAME	SIZE	CONTAINER		QTY	REMARKS
DECIDUOUS SHRUBS						
CAL AME	Callicarpa americana / American Beautyberry	18" Height Min.	3 gal		25	Fully rooted.
CEP SPU	Cephalanthus occidentalis 'Sputnik' / Sputnik Buttonbush	18" Height Min.	3 gal		50	Fully rooted.
EVERGREEN SHRUBS						
GAU PRO	Gaultheria procumbens / Wintergreen	18" Height Min.	3 gal		27	Fully rooted.
ILE GLA	Ilex glabra / Inkberry Holly	18" Height Min.	3 gal		39	Fully rooted.
MOR AEH	Morella cerifera 'Nana' / Dwarf Southern Wax Myrtle	18" Height Min.	3 gal		39	Fully rooted.

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)
1 inch = 40 ft.

North Carolina 811 Online

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

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

NORTH CAROLINA
C-652
AMERICAN ENGINEERING SERVICES

NORTH CAROLINA
LAUREN E. WHITMAN
18116
2025.05.01
Lauren Whitman 2025.05.01 09:04:04-04'00'

PRELIMINARY
- DO NOT USE FOR CONSTRUCTION

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

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KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE
DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE,
WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:

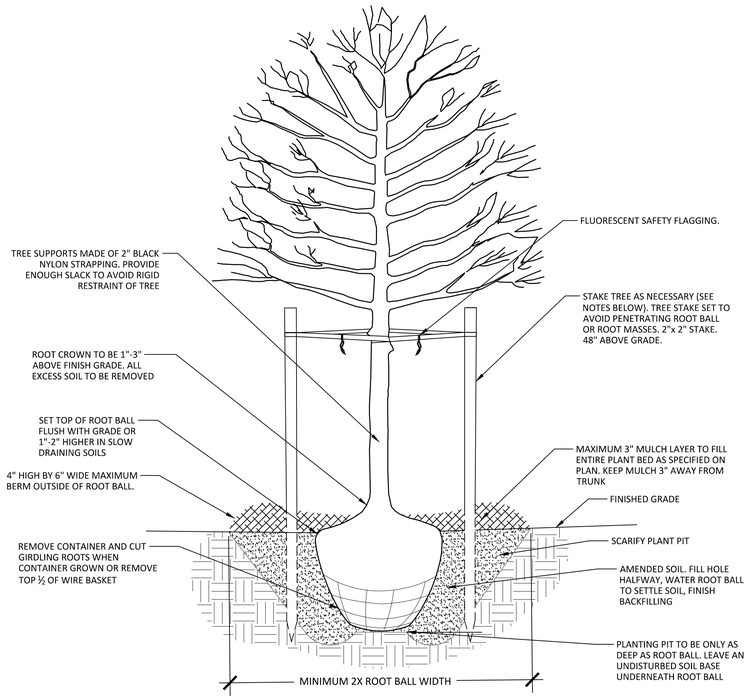
LANDSCAPE PLAN AREA C

SHEET NO.:

LP403

J:\Jobs\9900\workine projects\!!!! phase 5 townhomes\CAD\Sheets\construction documents\LP200-103.dwg

2025-05-01

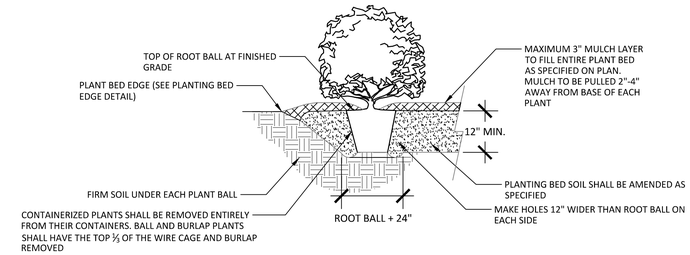


NOTES
1. All trees shall meet American Standard for Nursery Stock (ANSI z60.1-2004)
2. Remove wire and nylon twine from ball and canopy.
3. Soak root ball and plant pit immediately after installation.
4. Do not stake or wrap trunk unless:
   a. Tree has a large crown.
   b. Planting site is consistently 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-R-01

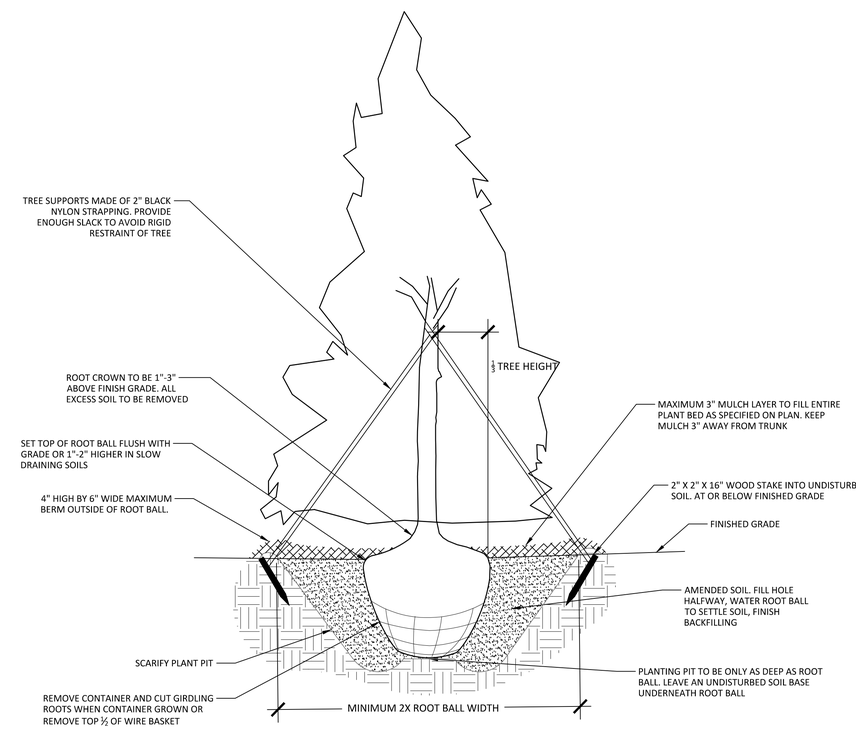


NOTES:
1. SCARIFY ROOT MASS OF CONTAINERIZED PLANTS.
2. PLANT ROOT BALL SHOULD BE INSTALLED 1"-3" MAXIMUM ABOVE FINISHED GRADE.
3. WATER EACH PLANT IMMEDIATELY AFTER INSTALLATION AND BEFORE INSTALLATION OF MULCH.
4. PLANT PITS ONLY FOR SINGLE PLANTS. FOR PLANT BEDS, PREPARE THE ENTIRE BED AREA.
5. SPACING OF SHRUBS VARIES, REFER TO LANDSCAPE PLANS.

2 TYPICAL SHRUB PLANTING

NOT TO SCALE

P-R-02



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.

3 TYPICAL EVERGREEN TREE PLANTING

NOT TO SCALE

P-R-08

North Carolina 811 Call before you dig.
*** 3 Days Before Digging ***
North Carolina 811
811 or 1-800-632-4949
Remote Ticket Entry
http://ncs811.org/remoteticketentry.htm

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

NORTH CAROLINA PROFESSIONAL ENGINEERING FIRM C-652 AMERICAN EA, SERVICES

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT LAUREN E. WATKINS 2005-10-01

PRELIMINARY - DO NOT USE FOR CONSTRUCTION

Lauren Watkins 2025.05.05 10:14:05-04'00'

FOR INFORMATION, ONLY

NO.	DATE	REVISION:
1	12/23/2024	CID SUBMITTAL #1

STIPULATION FOR REUSE

KALAS FALLS
PHASE 5
CONSTRUCTION INFRASTRUCTURE DOCUMENTS
CID-25-01
TOWN OF ROLESVILLE, WAKE COUNTY, NC

JOB NUMBER:	R180115
CHECKED BY:	JK
DRAWN BY:	GE, RC
DATE:	05-01-2025

SHEET TITLE:

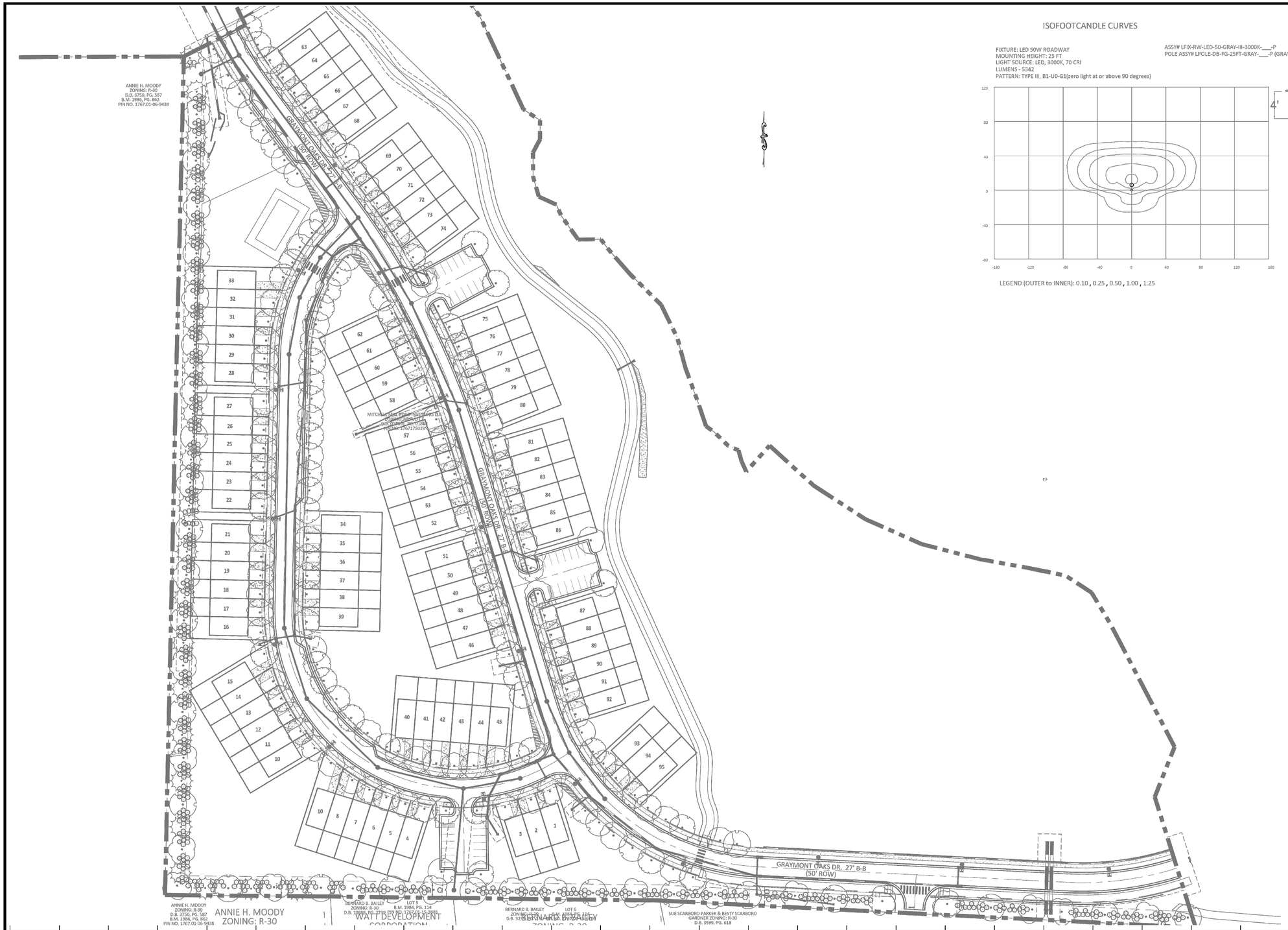
LANDSCAPE DETAILS

SHEET NO.:

LP500

Z:\Jobs\9900\watkins property\111 phase 5 townhomes\CAD\Sheets\construction documents\LP500.dwg

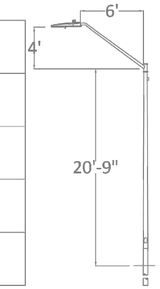
2025-05-01



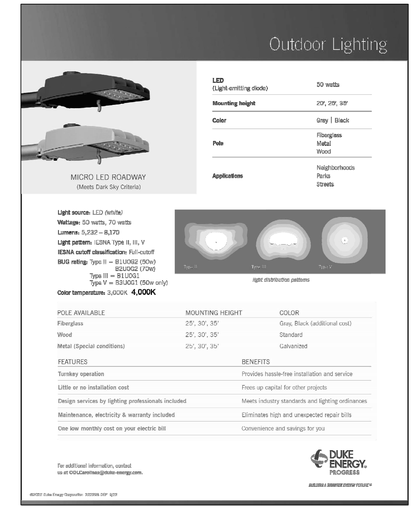
ISOFOOTCANDLE CURVES

FIXTURE: LED 50W ROADWAY
MOUNTING HEIGHT: 25 FT
LIGHT SOURCE: LED, 3000K, 70 CRI
LUMENS - 5342
PATTERN: TYPE III, B1-U0-G1(zero light at or above 90 degrees)

ASSY# LFIX-RW-LED-50-GRAY-III-3000K-____-P
POLE ASSY# LPOLE-DB-FG-25FT-GRAY-____-P (GRAY)



LEGEND (OUTER to INNER): 0.10 , 0.25 , 0.50 , 1.00 , 1.25



OVERALL SITE LIGTHING PLAN - NO GRID

ES100

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Road	✳	0.5 fc	1.1 fc	0.1 fc	11.0:1	5.0:1

Schedule

Symbol	Label	QTY	Description	Number Lamps	Lamp Output	LLF
	A	17	LED 50w Roadway - Type III - 3000K	1	5312	0.85

NO.	DATE	REVISION	BY

DISTANCE CALIBRATION (INCHES)
0 0.5 1.0 2.0 3.0 4.0

LIGHTING DESIGN TOLERANCE

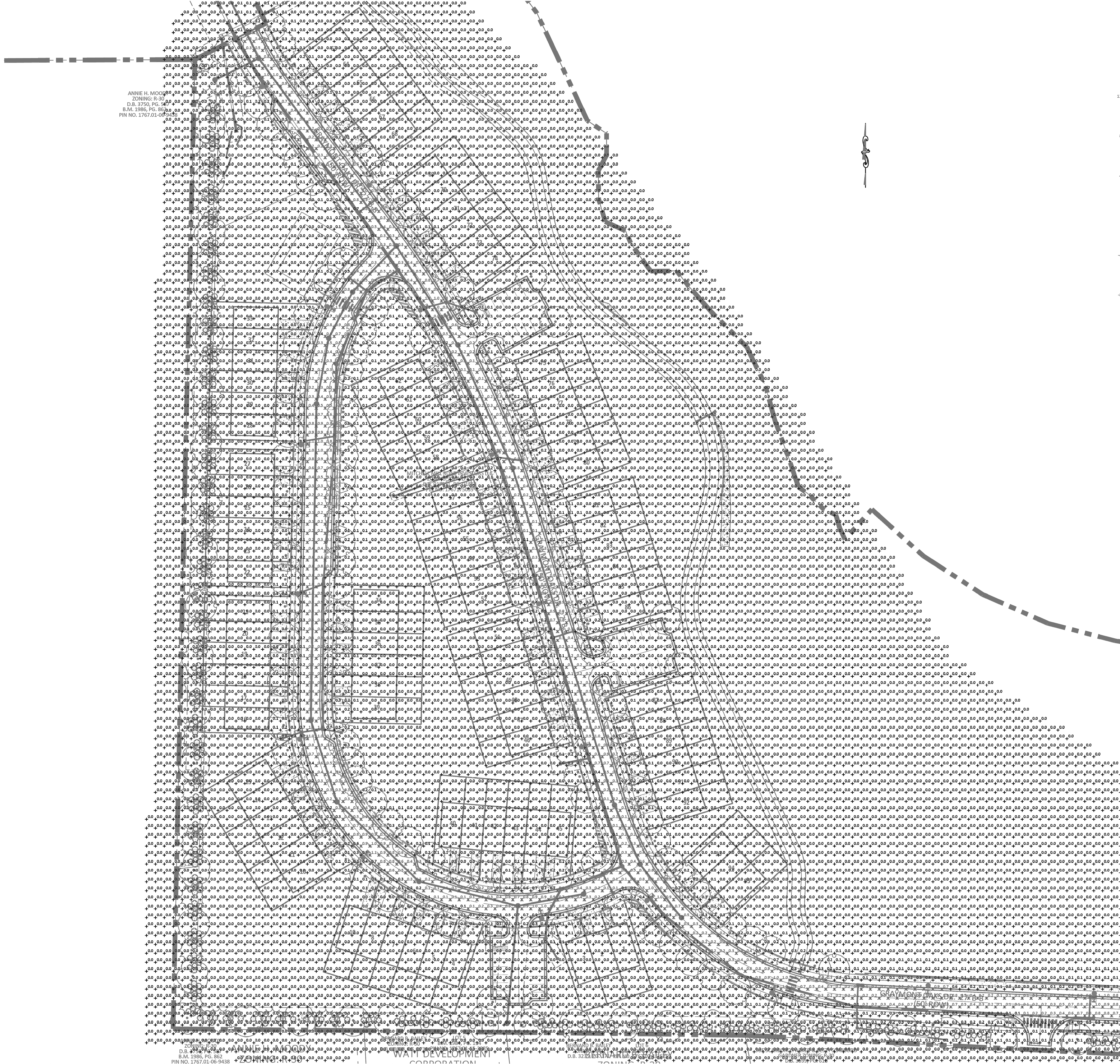
The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

DUKE ENERGY® PROGRESS

PROPRIETARY & CONFIDENTIAL

KALAS FALLS
WAKE FOREST, NC
STREET LIGHTING ARRANGEMENT

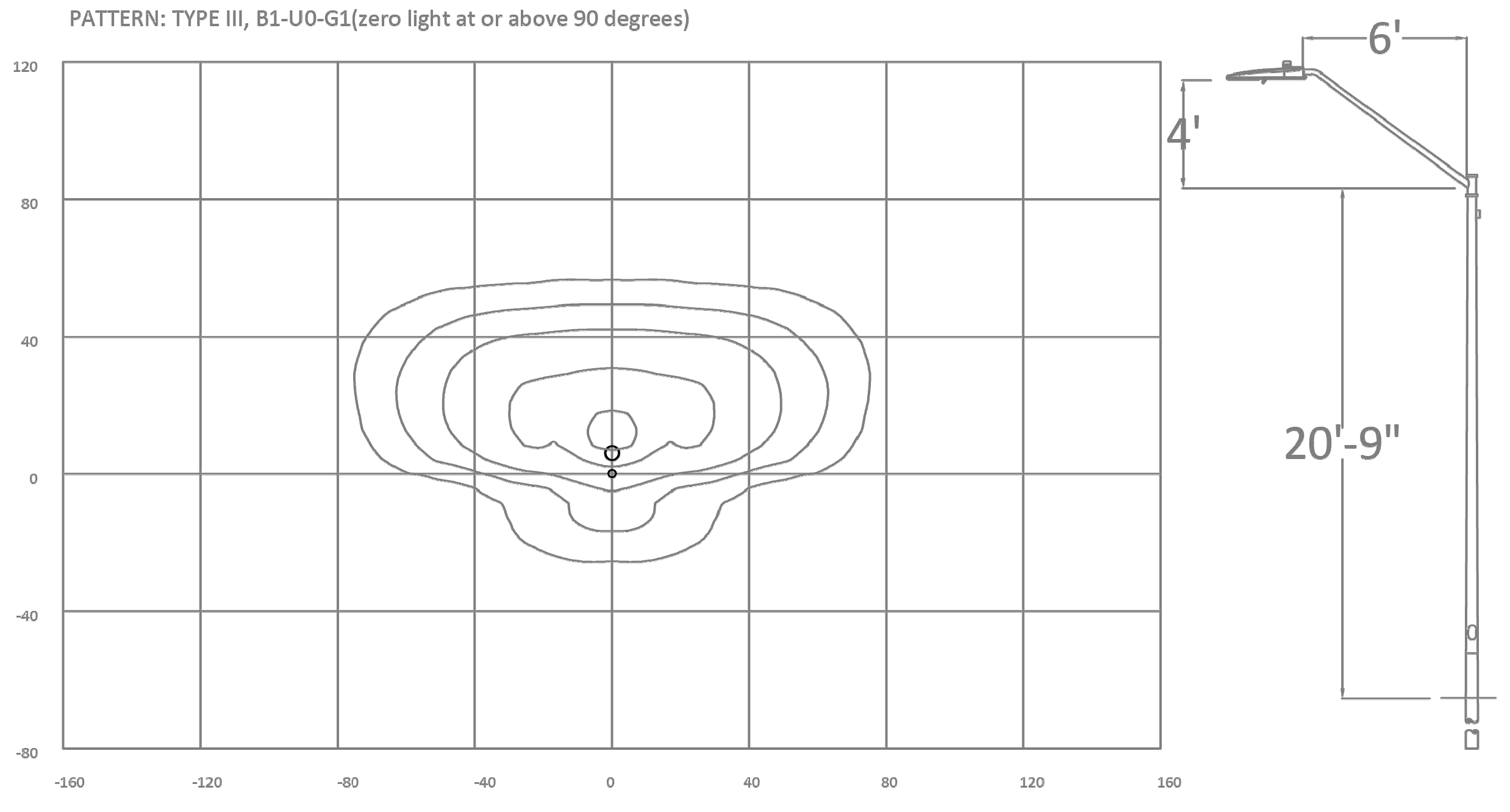
Designed by DUKE ENERGY PROGRESS LIGHTING SOLUTIONS
Reviewed by N. Johnson Scale 1" = 60'
Date 04/02/2025 Size Drawing size "D"
Description LED ROADWAY
Drawing No. 25-0123A Sht. 1 OF 1



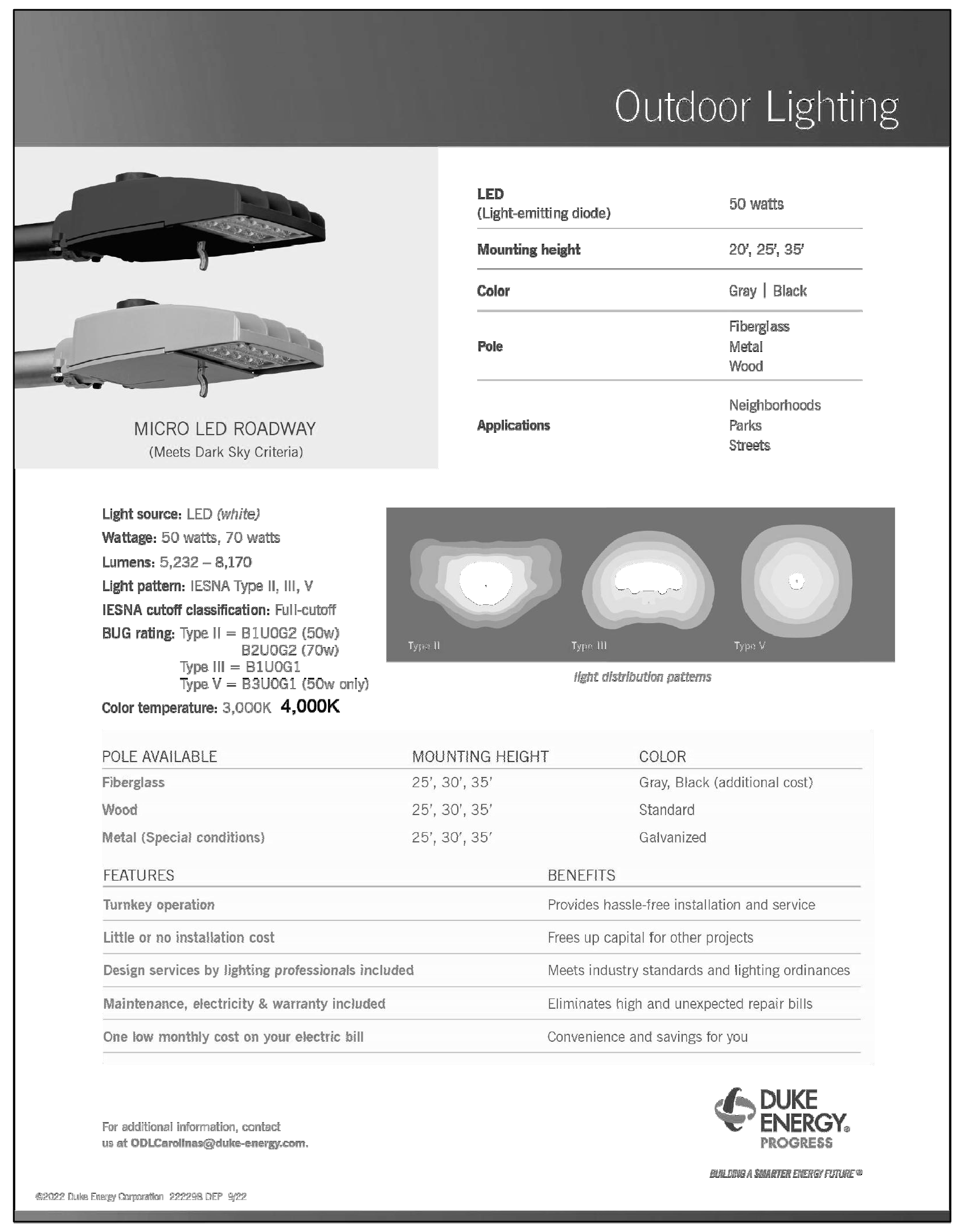
ISOFOOTCANDLE CURVES

FIXTURE: LED 50W ROADWAY
MOUNTING HEIGHT: 25 FT
LIGHT SOURCE: LED, 3000K, 70 CRI
LUMENS - 5342
PATTERN: TYPE III, B1-U0-G1(zero light at or above 90 degrees)

ASSY# LFIX-RW-LED-50-GRAY-III-3000K-___-P
POLE ASSY# LPOLE-DB-FG-25FT-GRAY-___-P (GRAY)



LEGEND (OUTER to INNER): 0.10 , 0.25 , 0.50 , 1.00 , 1.25



Outdoor Lighting

MICRO LED ROADWAY
(Meets Dark Sky Criteria)

LED (Light-emitting diode)	50 watts
Mounting height	20′, 25′, 35′
Color	Gray | Black
Pole	Fiberglass Metal Wood
Applications	Neighborhoods Parks Streets

Light source: LED *(white)*
Wattage: 50 watts, 70 watts
Lumens: 5,232 – 8,170
Light pattern: IESNA Type II, III, V
IESNA cutoff classification: Full-cutoff
BUG rating: Type II = B1U0G2 (50w)
B2U0G2 (70w)
Type III = B1U0G1
Type V = B3U0G1 (50w only)
Color temperature: 3,000K **4,000K**

light distribution patterns

POLE AVAILABLE	MOUNTING HEIGHT	COLOR
Fiberglass	25′, 30′, 35′	Gray, Black (additional cost)
Wood	25′, 30′, 35′	Standard
Metal (Special conditions)	25′, 30′, 35′	Galvanized

FEATURES	BENEFITS
Turnkey operation	Provides hassle-free installation and service
Little or no installation cost	Frees up capital for other projects
Design services by lighting professionals included	Meets industry standards and lighting ordinances
Maintenance, electricity & warranty included	Eliminates high and unexpected repair bills
One low monthly cost on your electric bill	Convenience and savings for you

For additional information, contact
us at ODLCarolinas@duke-energy.com.

DUKE ENERGY. PROGRESS
BUILDING A SMARTER ENERGY FUTURE®

OVERALL SITE LIGHTING PLAN

ES101

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Road	⋇	0.5 fc	1.1 fc	0.1 fc	11.0:1	5.0:1

Schedule

Symbol	Label	QTY	Description	Number Lamps	Lamp Output	LLF
☒ ●	A	17	LED 50w Roadway - Type III - 3000K	1	5312	0.85

NO.	DATE	REVISION	BY

DISTANCE CALIBRATION (INCHES)
0 0.5 1.0 2.0 3.0 4.0

LIGHTING DESIGN TOLERANCE

The calculated footcandle light levels in this lighting design are predicted values and are based on specific information that has been supplied to Duke Energy. Any inaccuracies in the supplied information, differences in luminaire installation, lighted area geometry including elevation differences, reflective properties of surrounding surfaces, obstructions (foliage or otherwise) in the lighted area, or lighting from sources other than listed in this design may produce different results from the predicted values. Normal tolerances of voltage, lamp output, and ballast and luminaire manufacture will also affect results.

DUKE ENERGY® PROGRESS

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KALAS FALLS
WAKE FOREST, NC
STREET LIGHTING ARRANGEMENT
Designed by DUKE ENERGY PROGRESS LIGHTING SOLUTIONS
Reviewed by N. Johnson Scale 1" = 60'
Date 04/02/2025 Size Drawing size "D"
Description LED ROADWAY
Drawing No. 25-0123A Sht. 1 OF 1