APPENDIX A

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TABLE A1 - STANDARDS OF STREET DESIGN

Street Type	Alley	Local	Collector	Thoroughfare		
Average Daily Traffic (ADT)	100	250	3000 Major	8000 Major		
			1000 Minor	4000 Minor		
Longitudinal Grade	1%	1%	1%			
Min						
Max: level/rolling	10 %	10 %	8 %			
hilly	10 %	10 %	10 %			
(stop/yield) at intersection	5 %	2 %	2 %	See Thoroughfare Plan		
(thru movement) at intersection	5 %	5 %	5 %			
Within 100' of an intersection	5 %	5 %	5 %			
Min Horizontal Centerline Curve Radius		150'	230'			
Min Tangent between Reverse Curves		50'	100'			
Street Intersection Radius ⁽⁶⁾	20'	30'	30'			
Design Speed	15	25 mph	25 mph			
Min	mph					
Max	15	35 mph	35 mph			
Design Vehicle	mph Alley	Local	Collector	Thoroughfare		
•	_			<u> </u>		
Residential	SU-30	SU-30	Bus-45 & SU-30	WB-62		
Non-Residential	SU-30	SU-30	WB-62 or WB-40	WB-62		
Separation (1)(2)(3) driveway -	40'	40'	120'	400'		
driveway	25,	00'	400	250		
driveway - intersection	25'	60° 5°	120' 5'	250'		
driveway - residential prop. line driveway - non-residential prop. line	5' 10'	10'	5 10'	5' 10'		
intersection - intersection	N/A	200'	200'	600'-1000'		
Pavement Schedule (4)(5)	Alley	Local	Collector	Thoroughfare		
surface course (S9.5C)	2"	2-1" Lifts	2-1" Lifts	morouginare		
intermediate course (I19.0C)	0"	2-1 Lins	2.5"	See NCDOT Roadway Design		
base course (residential)	U		or 4" B25.0C	Standards		
base course (residential) base course (non-residential)	N/A		" ABC or 5" B25.0C	Standards		
Max Cul-de-sac Lengths	IN/A	10	ABC 01 3 BZ3.0C			
Zoning	R4, R8	AG, R1, R2	CD, LI, HI	MU, O-I, C-1, GC, PD		
	800'	1000'	1500'	500'		
			R18, CC	1 200		
			300'			
Dead-End Fire Apparatus Access Roads						
Length	0-150'	150'-500'	500'-750'	750'+		
Width	20'	20'	26'			
Vertical clearance	13.5'	13.5'	13.5'	1		
Maximum grade	10 %	10 %	10 %`	Special		
Turnaround required	None		60' "Y" 96' ø Cul-De-Sac mmerhead (Temporary)	Approval Required		

Notes:

- 1. Single-family dwellings and duplex dwellings on individual lots shall be exempt from the minimum separation between driveways as shown in the table above. However, such driveways shall maintain a minimum of 5' of side clearance from residential property lines and 10' for all others.
- City streets: proposed streets which intersect opposite sides of another street (either existing or proposed) shall be laid out to intersect directly
 opposite each other. Intersections which cannot be aligned shall be separated by a minimum length of 200' between survey centerlines.
- 3. For state-maintained streets, reference the NCDOT Policy on Street and Driveway Access to North Carolina Highways.
- 4. Non-residential street pavement design shall be evaluated on a case-by-case basis.
- 5. Prior to substituting B25.0C, approval shall be obtained from the Director of Engineering.
- 6. Radius measured from edge of pavement.

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TABLE A2 – STOPPING SIGHT DISTANCE

	MINIMUM STOPPING SIGHT DISTANCE (ft)													
Vehicle Speed (mph)	U	IPGRADE	S	FLAT	DO	WNGRAD	ES							
	9%	6 %	3 %	0 %	-3 %	-6 %	-9 %							
25	140	145	150	155	160	165	175							
30	180	185	200	200	205	215	230							
35	225	230	240	250	260	275	290							
40	270	280	290	305	315	335	355							
45	320	330	345	360	380	400	430							
50	375	390	405	425	450	475	510							

TABLE A3 – DESIGN INTERSECTION SIGHT DISTANCE, LEFT TURN FROM STOP

Design Speed (mph)	Stopping Sight Distance	Intersection Sight Distance for Passenger Cars				
	(ft)	Calculated	Design			
		(ft)	(ft)			
15	80	165.4	170			
20	110	220.5	225			
25	155	275.6	280			
30	200	330.8	335			
35	250	385.9	390			
40	305	441.0	445			
45	360	496.1 500				
50	425	551.3	555			

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TABLE A4 - GREENWAY MINIMUM STOPPING SIGHT DISTANCE

Α	Е	nglish	Units -	- Minim	um Le	ngth of	Crest	Vertica	al Curv	e (L) B	ased on	Stoppii	ng Sigh	t Distan	се
%	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
2												30	70	110	150
3								20	60	110	140	180	220	260	300
4						15	55	95	135	175	215	256	300	348	400
5					20	60	100	140	180	222	269	320	376	436	500
6				10	50	90	130	171	216	267	323	384	451	523	600
7				31	71	111	152	199	252	311	376	448	526	610	700
8			8	48	88	128	174	228	288	356	430	512	601	697	800
9			20	60	100	144	196	256	324	400	484	576	676	784	900
10			30	70	111	160	218	284	360	444	539	640	751	871	1000
11			38	78	122	176	240	313	396	489	592	704	826	958	1100
12		5	45	85	133	192	261	341	432	533	645	768	901	1045	1200

1. When S>L = 2S - 900/A

Shaded area represents S = L

2. When $S < L = AS^2/900$

L = Minimum Length of Vertical Curve (ft)

A = Algebraic Grade Difference (%)

S = Stopping Sight Distance (ft)

Height of Cyclist's Eye = 4.5'

Height of Object = 0'

Minimum Length of Vertical Curve = 3'

Source: AASHTO, Guide for the Development of Bicycle Facilities

TABLE A5 - SANITARY SEWER PIPE SIZING & MATERIAL

Material	Pipe Diameter (in)
Solid wall ASTM D3034, SDR 35, Cell Classification 12454	4 -15
Profile wall ASTM F794 Stiffness PS46	18 - 48
Ductile Iron Pipe (DIP) Class 50	All Sizes

TABLE A6 - WATER DISTRIBUTION PIPE SIZING & MATERIAL

Material	Pipe Diameter (in)
PVC SDR 13.5	2 - 4
PVC C900	6 - 12
Ductile Iron Pipe (DIP) Class 350	3 - 12
Ductile Iron Pipe (DIP) Class 250	16 +

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TABLE A7 - MANDREL DIMENSIONS

Pipe Type	Pipe Diameter	Minimum Inside Diameter	Inside Diameter with 5% Deflection
	15"	14.85	14.11
Dual Wall	18"	17.93	17.03
Ճ≋ັ	24"	23.90	22.71
	30"	29.89	28.30
	30"	29.62	28.14
<u>•</u> =	36"	35.40	33.63
rriple Wall	42"	41.31	39.24
- →	48"	47.31	44.94
	60"	59.30	56.34

TABLE A8 – MAXIMUM COVER FOR POLYPROPYLENE PIPE

Diameter	Class 1		Class 2		Clas	Class 4	
	Compacted	95%	90%	85%	95%	90%	95%
12"	39	27	20	9	21	12	11
15"	42	29	21	10	22	12	11
18"	36	25	18	9	19	12	11
24"	31	22	16	7	16	11	10
30"	33	23	17	9	17	11	10
36"	32	22	16	7	16	11	10
42"	32	22	15	7	16	11	10
48"	31	21	15	6	15	10	9
60"	34	23	16	6	16	11	10

TABLE A9 CASING PIPE SIZES

	HIC	SHWAY	RAILROAD			
Pipe Diameter	Casing O.D.	Min. Wall Thickness	Casing O.D.	Min. Wall Thickness		
6"	12.75"	0.188"	12.75"	0.250"		
8"	18"	0.250"	18"	0.312"		
12"	24"	0.250"	24"	0.406"		
16"	30"	0.312"	30"	0.500"		
24"	36"	0.375"	36"	0.5625"		

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TABLE A10 - AIR TEST TABLE

Length of									
Line (ft)	4	6	8	10	12	15	18	21	24
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30	9:55	11:20
175	0:31	1:09	2:03	3:13	4:37	7:05	8:30	9:55	11:20
200	0:35	1:19	2:21	3:40	5:17	7:05	8:30	9:55	11:20
225	0:40	1:29	2:38	4:08	5:40	7:05	8:30	10:25	13:36
250	0:44	1:39	2:56	4:35	5:40	7:05	8:31	11:35	15:07
275	0:48	1:49	3:14	4:43	5:40	7:05	9:21	12:44	16:38
300	0:53	1:59	3:31	4:43	5:40	7:05	10:12	13:53	18:09
350	1:02	2:19	3:47	4:43	5:40	8:16	11:54	16:12	21:10
400	1:10	2:38	3:47	4:43	6:03	9:27	13:36	18:31	24:12
450	1:19	2:50	3:47	4:43	6:48	10:38	15:19	20:50	27:13
500	1:28	2:50	3:47	5:15	7:34	11:49	17:01	23:09	30:14

Note: If the length of sewer to be tested is submerged or partially submerged in groundwater, the test pressure shall be increased as required to overcome the actual static pressure exerted by the groundwater. If a test pressure greater than 8 psi results, air testing shall not be used and exfiltration testing will be required.

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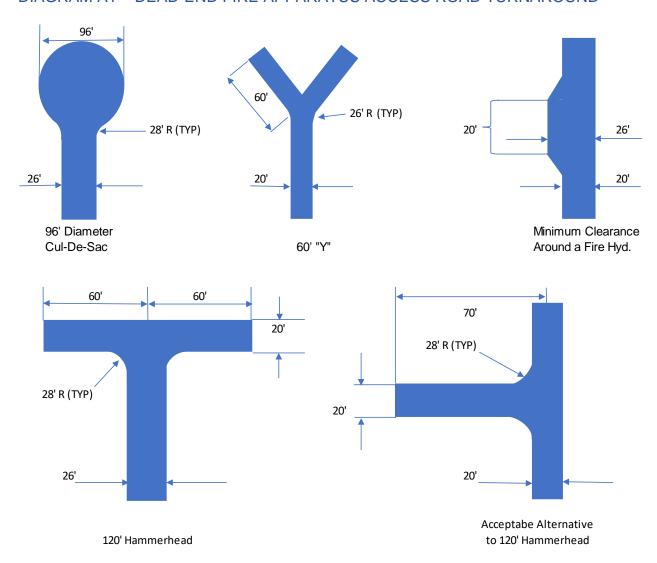
TABLE A11 – UTILITY EASEMENT WIDTH CHART

	SEWER MAIN PIPE													
Diameter	Diameter Diameter Min. Bottom Max. depth to bottom of pipe @ Esmt Width (ft)													
(in)	(ft)	Width (ft)												
8	0.67	2.67	8.67	11.17	13.67	16.17	18.67	21.17						
12	1.00	3.00	8.50	11.00	13.50	16.00	18.50	21.00						
16	1.33	3.33	8.33	10.83	13.33	15.83	18.33	20.83						
24 2.00 4.00 8.00 10.50 13.00 15.50 18.00 20.50														
* - Depth be	yond those sh	own on this char	t shall requ	ire additiona	al easement	width to the	e nearest 5'	increment.						

STORM PIPE									
Pipe Inner	Wall Thickness (in)	Pipe Outer Diameter (ft)	Min. Bottom Width (ft)	Max. depth to bottom of pipe @ Esmt Width (ft.)					
Diameter (in)				20'	25'	30'	35'	40'	50'
15	2.25	1.63	3.63	8.19	10.69	13.19	15.69	18.19	20.91
18	2.50	1.92	3.92	8.04	10.54	13.04	15.54	18.04	20.98
24	3.00	2.50	4.50	7.75	10.25	12.75	15.25	17.75	21.13
30	3.50	3.08	5.08	7.46	9.96	12.46	14.96	17.46	21.27
36	4.00	3.67	5.67	7.17	9.67	12.17	14.67	17.17	21.42
42	4.50	4.25	6.25	6.88	9.38	11.88	14.38	16.88	21.56
48	5.00	4.83	6.83	6.58	9.08	11.58	14.08	16.58	21.71
54	6.25	5.54	7.54	6.23	8.73	11.23	13.73	16.23	21.89
60	6.75	6.13	8.13	5.94	8.44	10.94	13.44	15.94	22.03
66	7.25	6.71	8.71	5.65	8.15	10.65	13.15	15.65	22.18
72	7.00	7.17	9.17	5.42	7.92	10.42	12.92	15.42	22.29

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DIAGRAM A1 – DEAD-END FIRE APPARATUS ACCESS ROAD TURNAROUND

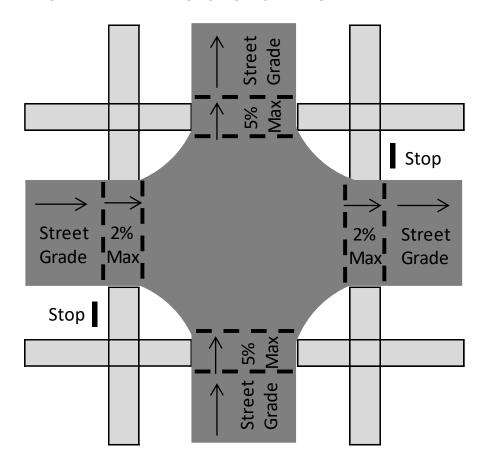


Notes:

- 1. Turnarounds to be contained within R/W.
- 2. Acceptable pavement schedule alternative is 6" ABC, Geotextile, 12" min compacted subgrade to be approved by the Director of Engineering.

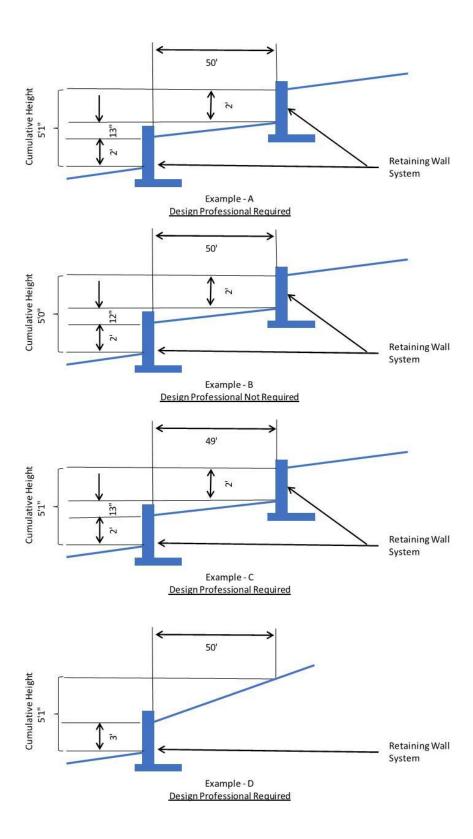
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DIAGRAM A2 – INTERSECTION GRADES



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DIAGRAM A3 - RETAINING WALLS



STORM DRAINAGE CONVEYANCE SYSTEM CERTIFICATION

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As-Built Certification

I,, attest that	this certification, for	the	_ Project, has been	reviewed by me and is
accurate, complete and consistent with	n the information su	ipplied in the plans, s	pecifications, engine	eering calculations, and
all other supporting documentation to t	he best of my know	ledge. I further attest	that to the best of m	y knowledge the Storm
Drainage As-Built Plans have been pr	epared based on a	n accurate account o	f the stormwater pip	ing and appurtenances
installed during construction and any	deviations from th	ne approved construc	ction plans shall no	t adversely impact the
drainage system, discharge points, ar	nd/or adjacent prop	erties analyzed durin	g the approval proc	ess of the construction
plans. Although other professionals r	may have develope	ed certain portions of	this submittal packa	age, inclusion of these
materials under my signature and seal	signifies that I hav	e reviewed this mate	rial and have judged	it to be consistent with
the proposed design.				
SEAL:				
(Date)	-	(Sign	ature)	
	Engineer:			
	Firm:			
	Firm License #:			
	Address:			

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STORMWATER CONTROL MEASURE (SCM) CERTIFICATION

Licensed Professional Engineer to provide certification statement for each SCM

As-Built Certification			
Project:			
SCM # and Type:			
with the information supplied in the	plans specifications,	s been reviewed by me and is accurate, continuous engineering calculations, and all other support of my knowledge the As-Built Plans have	oporting documentation
construction plans were analyzed a process of the construction plans. package, inclusion of these materia	and verified to not adv Although other profe	nstalled during construction and any deviate versely impact the performance of the SC essionals may have developed certain potential and seal signifies that I have reviewed this engs have been installed, and have judged	CM during the approval ortions of this submittal is material, conducted a
SEAL:			
(Date)	-	(Signature)	
	Engineer:		
	Firm:		
	Firm License #:		
	Address:		

Provide sufficient photographs of each SCM design component as part of the certification.

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RETAINING WALL CERTIFICATION

Engineer:

Firm:

Firm License #:

Address:

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BRIDGE CERTIFICATION

As-Built Certification

I,, attest that the	nis certification, for	the	Project, has b	een reviewed by me
and is accurate, complete and consiste	ent with the informat	tion supplied	in the plans, specifications, engin	neering calculations,
and all other supporting documentatio	n to the best of my	knowledge.	I further attest that to the best of	of my knowledge the
As-Built Plans have been prepared I	based on an accu	rate accoun	t of the bridge and appurtenan	ces installed during
construction and any deviations from	the approved const	ruction plans	s were analyzed and verified to r	not adversely impact
the performance of the bridge analyzed	d during the approve	al process of	the construction plans. Although	nother professionals
may have developed certain portions	of this submittal pa	ckage, inclu	sion of these materials under my	y signature and seal
signifies that I have reviewed this mate	erial and have judge	ed it to be co	nsistent with the proposed desig	n.
0541				
SEAL:				
(Date)			(Signature)	
	Engineer:			
	Firm:			
	Firm License #:			
	Address:			

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CERTIFICATION OF EMBANKMENTS

As-Built Certification

I,, attest that this and is accurate, complete, and consisted documentation to the best of my knowled prepared based on an accurate account installed during construction and any deadversely impact the performance of the other professionals may have developed signature and seal signifies that I have referred.	nt with the information sup dge. I further attest that the of the embankment fill elections from the approvale embankment during the differential portions of this sections.	oplied in the plans, specification to the best of my knowledge the evation, compaction, slope, and yed construction plans were an he approval process of the consubmittal package, inclusion of	As-Built Plans have been slope protection materials alyzed and verified to not struction plans. Although these materials under my
SEAL:			
(Date)		(Signature)	_
	Engineer:		
	Firm:		
	Firm License #:		
	Address:		

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EROSION CONTROL PERMIT APPLICATION

Applicant Contact Information	
Name:	
Phone:	
Project Information	
Type of Construction: (Residential/Commercial):	
Address:	
Parcel & Lot #:	
Disturbed Area (ac):	
Date of land disturbing activity:	
Applicant agrees to the following items: 1. Call One-Call before digging 811 or 1-800-351-1111 and allow 3 business days	before digging.
 Install and maintain in proper working order, erosion control measures as nee from leaving the construction site. 	
3. Remove any sediment and or aggregate discharged onto streets immediately.	
Applicant Signature Date	

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Planning Department 401 Laureate Way Kannapolis, NC 28081 704.920.4350 Planning@kannapolisnc.gov

RESIDENTIAL INSPECTION REQUIREMENTS

There are five (5) inspections required by the City of Kannapolis Engineering Department. These inspections must be completed **before** the Certificate of Occupancy will be issued. Inspections are scheduled through your Citizen Access account and will be performed the next business day, from 8:00am to 5:00pm. No specific inspection time will be provided. There is a \$50.00 reinspection fee for each failed inspection:

1. Driveway Pipe Review:

- This inspection will be after the pipe is in place but not covered
- Verify the correct type of the pipe and installation

2. Driveway Review:

- This inspection should be requested after all forms for Driveway are in place.
- All soft areas in the subgrade have been repaired.
- Before any concrete is poured.
- Driveway should meet all LDSM requirements

3. Sidewalk Review

- This inspection should be requested after all forms for Sidewalk are in place.
- All soft areas in the subgrade have been repaired.
- Before any concrete is poured.
- Sidewalk should meet all LDSM requirements

4. Drainage Review

- This inspection should be requested after fine grading has been completed.
- Lot is graded in general conformity with the plans.
- Lot grading does not negatively impact adjacent properties.
- Existing infrastructure is not impacted by the development.

5. Water and Sewer Review

- This inspection should be requested after sod or seed/straw has been placed.
- Sewer lateral has cast iron cap with stainless steel band and be set to grade.
- Water meter box and irrigation box (if applicable) set to grade.
- No damage to the boxes or clean out.
- Boxes are clear of mud and debris.

Planning Department 401 Laureate Way Kannapolis, NC 28081 704.920.4350 Planning@kannapolisnc.gov

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ENGINEERING INSPECTION PERMIT APPLICATION

	icant Contact Information	
Nam	e:	
Phon	ne:Email:	
Proje	ect Information	
Addr	ress:	PIN:
Contr	ractor Name:	
Ар	plicant agrees to the following iten	ns:
1.	For driveway pipe, driveway, sidewalk, gra Citizen Access email account that will be us	
	Email:	
2.	This Citizen Access email account will be I used by the applicant to schedule the inspect Construct and maintain driveway(s) in absorption on Street and Driveway Access" as add Development Standards Manual	ctions. ute conformance with the current "Policy
3.	Provide proper signs, traffic control and oth traffic in conformance with the current "Manu Streets and Highways" MUTCD	
4.	Contact the City of Kannapolis to determine must be installed 704-920-4221.	e the required size of RCP/HP pipe that
5.	This permit allows one inspection for each each failed inspection, there will be a \$50 through Citizen Access before the reinsp	.00 reinspection fee that must be paid
6.	By signing below, I here indemnify and save damages and claims for damage that may aris	
APPI	LICANT SIGNATURE	DATE

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Right-of-Way Extension/Service

Permit Application

Provide the following information for the construction of facilities in the right-of-way:

Owner/Operator of I	Proposed Line:			
	Email	:		
		-		
		:		
Representative & Po		-		
		:		
		-		
		rmation on Back of Page.		
		σ) and/or City Easements Where	e Installation/Construction is Pr	oposed:
Type of Utility/Extens	sion Service:			
	Diameters	Materials	Length of Pipe	

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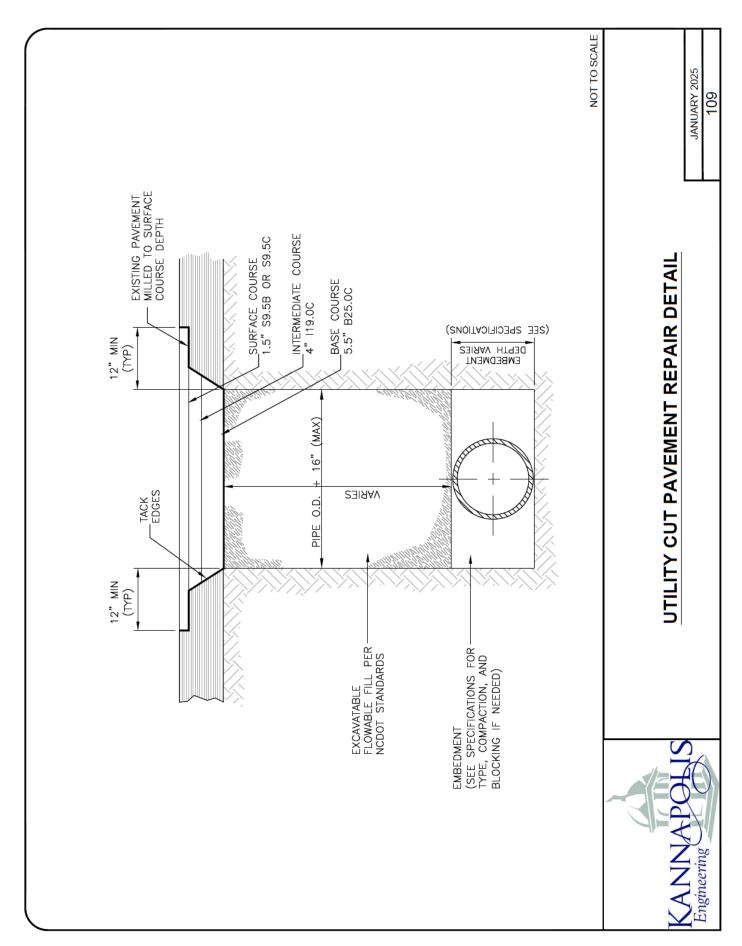
The following requirements and conditions apply to entities requesting installation/construction within rights-of-way/easements within Kannapolis city limits and where Kannapolis utilities are located (this includes NCDOT roadways/rights-of-way):

- 1. The contractor shall contact the City of Kannapolis Engineering Department, 704-920-4200, prior to beginning work within the city limits in order to have an inspector assigned to the project. A preconstruction conference is required between the contractor and all sub-contractors with the City's Inspector.
- 2. The Owner, Operator and/or Contractor shall be responsible for any repairs necessitated by damage that is caused to roadways, sidewalks, landscaping, utilities and all areas within the City of Kannapolis and/or NCDOT rights-of-way or property to the satisfaction and at the direction of the Director of Engineering.
- 3. The City of Kannapolis Land Development Standards Manual (LDSM) shall be followed.
- 4. Directional boring under roadway crossings shall be a ten (10) foot minimum depth under roadways. Also, directional boring shall be at a four (4) foot minimum depth below ground surface.
- 5. All other boring procedures shall be at a four (4) foot minimum depth under roadways and below ground surface.
- 6. The following clearance from the outside wall of any structure, footing or pipe culvert (including tunnels, water lines, sanitary sewer lines, and storm lines) is required:
 - a five (5) foot horizontal clearance from the outside wall; or
 - a five (5) foot vertical clearance with a two (2) foot horizontal clearance from the outside wall
- 7. Provide videos of the installation areas (rights-of-way and easements) before and after construction to the City's Inspector, to determine damage to areas impacted during construction.
- 8. Any sidewalk damaged during construction of the lines shall have the entire panel removed and replaced as part of the repair. Partial repairs of panels shall not be permitted.
- 9. The City of Kannapolis Standard Drawing, "Utility Cut Pavement Repair, #109" shall be used for pavement patching. The City of Kannapolis Standard Drawing, "Concrete Sidewalks, #117" shall be used for concrete sidewalk repair. The City's Inspector assigned to the project will provide additional standard drawings that apply to the project.
- 10. A pre-pour and/or pre-paving meeting and subgrade check with the City's Inspector will be required prior to any concrete pours and/or asphalt placement.
- 11. The use of City water to perform construction activities shall be metered per Land Development Standards Manual Chapter 1 A. General Note 9.
- 12. As-built drawing, CAD file, shape files, and/or boring logs shall be submitted to City within thirty (30) days upon completion of project.
- 13. Work hours are between 7am to 5pm on weekdays. Work shall not be performed on weekends (Saturday-Sunday) or on City observed holidays.

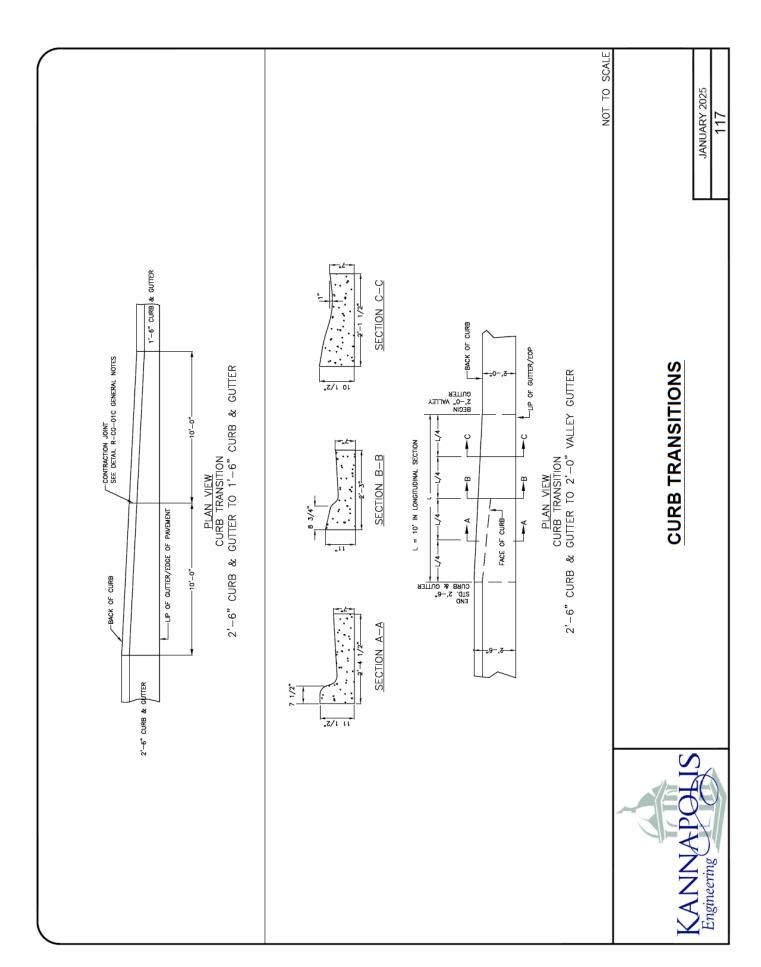
The Director of Engineering may impose additional and reasonable conditions upon the granting of any permit. In the case of noncompliance with these conditions, City reserves the right to stop all work until the facility has been brought into compliance or removed from the right-of-way/easement at no cost to City.

Applicant Authorized Representative Acknowledgement: I have read and understand this right-of-way extension/service permit and the requirements placed upon the Owner/Operator/Contractor/Sub-Contractor. I agree to the conditions listed above to the best of my ability and will fulfill the requirements placed upon this permit application. I certify that all of the information presented in this permit application is accurate to the best of my knowledge. Printed Name, Title Signature Date City of Kannapolis Use Only This Right-of-Way Extension/Service Request is: **Approved** (A copy of this permit showing evidence of approval by City shall be made available at all construction sites for this project. City reserves the right to stop all work unless evidence of approval can be shown.) □ With the following conditions: ______ **Revise and Resubmit** ☐ Provide the following: Rejected Printed Name, Title Signature Date

A-20 Appendix A



A-21 Appendix A



A-22 Appendix A

NOTES:

- THE CONTRACTOR MUST INSTALL A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RP) IMMEDIATELY AFTER THE HYDRANT METER IS SET.
- BACKTOW ASSEMBLIES MUST BE TESTED BY A CERTIFIED TESTER PRIOR TO USE.
 PRIOR TO USE AN INSPECTION BY THE CITY IS REQUIRED FOR ALL HYDRANT METER BACKFLOW PREVENTION ASSEMBLIES.
 EACH TIME THE HYDRANT METER BACKFLOW PREVENTION ASSEMBLY IS RELOCATED IT MUST BE TESTED.
 THE CONTRACTOR WILL BE BILLED TO REPLACE AND INSTALL ANY PARTS NOT RETURNED WITH HYDRANT METER.
 HYDRANT, BACKFLOW ASSEMBLY, AND METER SHALL BE ADEQUATELY INSULATED TO PREVENT FREEZING.
 HYDRANT WRENCH ONLY, NO PIPE WRENCH ALLOWED
 SEE CITY OF KANNAPOLIS LAND DEVELOPMENT STANDARDS MANUAL APPENDIX B FOR LIST OF APPROVED PRODUCTS. 25.4.5.6.7.8

NOT TO SCALE



BACKFLOW PREVENTION ASSEMBLY FOR REDUCED PRESSURE PRINCIPLE HYDRANT METERS

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JANUARY 2025

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