APPENDIX A

Index of Tables, Diagrams, Certifications, and Permits:

TABLE A1 – STANDARDS OF STREET DESIGN

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

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.

2. 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 Public Works Director.

6. Radius measured from edge of pavement.

TABLE A2 – STOPPING SIGHT DISTANCE

MINIMUM STOPPING SIGHT DISTANCE (ft)							
Vehicle Speed (mph)	**UPGRADES**			**FLAT**	**DOWNGRADES**		
	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 (ft)**	**Intersection Sight Distance for Passenger Cars**	
		Calculated (ft)	Design (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

TABLE A4 – GREENWAY MINIMUM STOPPING SIGHT DISTANCE

A	English Units - Minimum Length of Crest Vertical Curve (L) Based on Stopping Sight Distance														
%	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 +

TABLE A7 – MANDREL DIMENSIONS

Pipe Type	Pipe Diameter	Minimum Inside Diameter	Inside Diameter with 5% Deflection
Dual Wall	15”	14.85	14.11
	18”	17.93	17.03
	24”	23.90	22.71
	30”	29.89	28.30
Triple Wall	30”	29.62	28.14
	36”	35.40	33.63
	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			Class 3		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

	HIGHWAY		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”

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

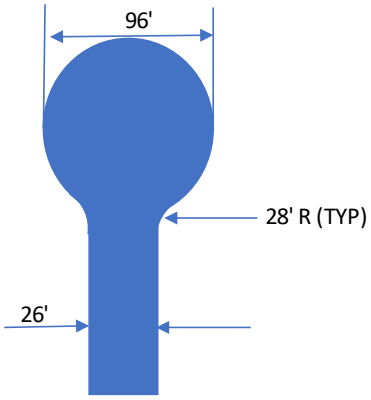
Note: If the length of sewer to be tested is submerged or partially submerged in groundwater, the test pressure shall be increased as required to overcome the actual static pressure exerted by the groundwater. If a test pressure greater than 8 psi results, air testing shall not be used and exfiltration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

TABLE A11 – UTILITY EASEMENT WIDTH CHART

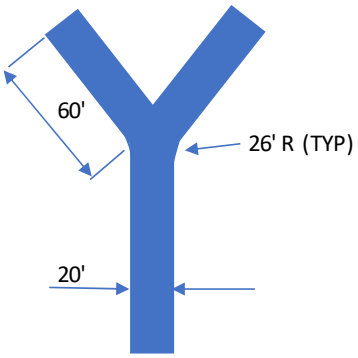
SEWER MAIN PIPE								
Diameter (in)	**Diameter (ft)**	**Min. Bottom Width (ft)**	**Max. depth to bottom of pipe @ Esmt Width (ft)**					
			20'	**25'**	**30'**	**35'**	**40'**	**45'**
8	0.67	2.67	8.67	11.17	13.67	16.17	18.67	21.17
12	1.00	3.00	8.50	11.00	13.50	16.00	18.50	21.00
16	1.33	3.33	8.33	10.83	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 beyond those shown on this chart shall require additional easement width to the nearest 5' increment.								

STORM PIPE									
Pipe Inner Diameter (in)	**Wall Thickness (in)**	**Pipe Outer Diameter (ft)**	**Min. Bottom Width (ft)**	**Max. depth to bottom of pipe @ Esmt Width (ft.)**					
				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
* - Depth beyond those shown on this chart shall require additional easement width to the nearest 5' increment.									

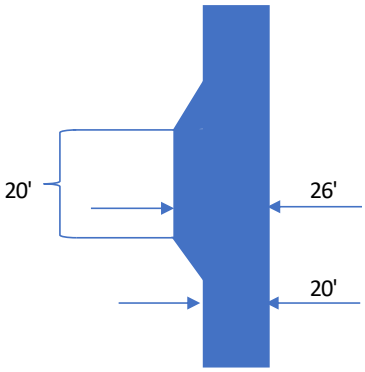
DIAGRAM A1 – DEAD-END FIRE APPARATUS ACCESS ROAD TURNAROUND



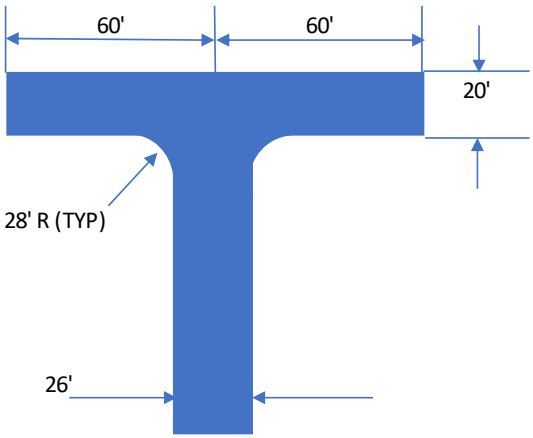
96' Diameter
Cul-De-Sac



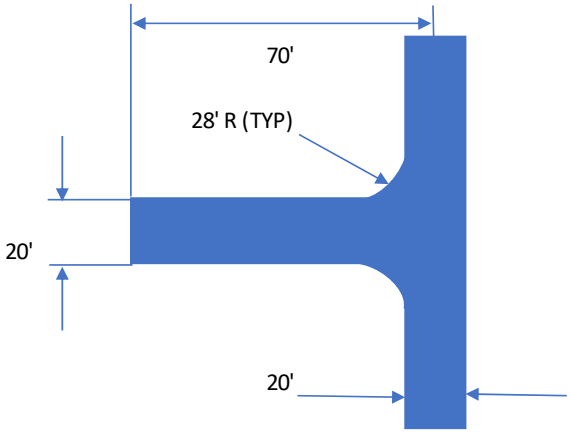
60' "Y"



Minimum Clearance
Around a Fire Hyd.



120' Hammerhead



Acceptabe Alternative
to 120' Hammerhead

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.

DIAGRAM A2 – INTERSECTION GRADES

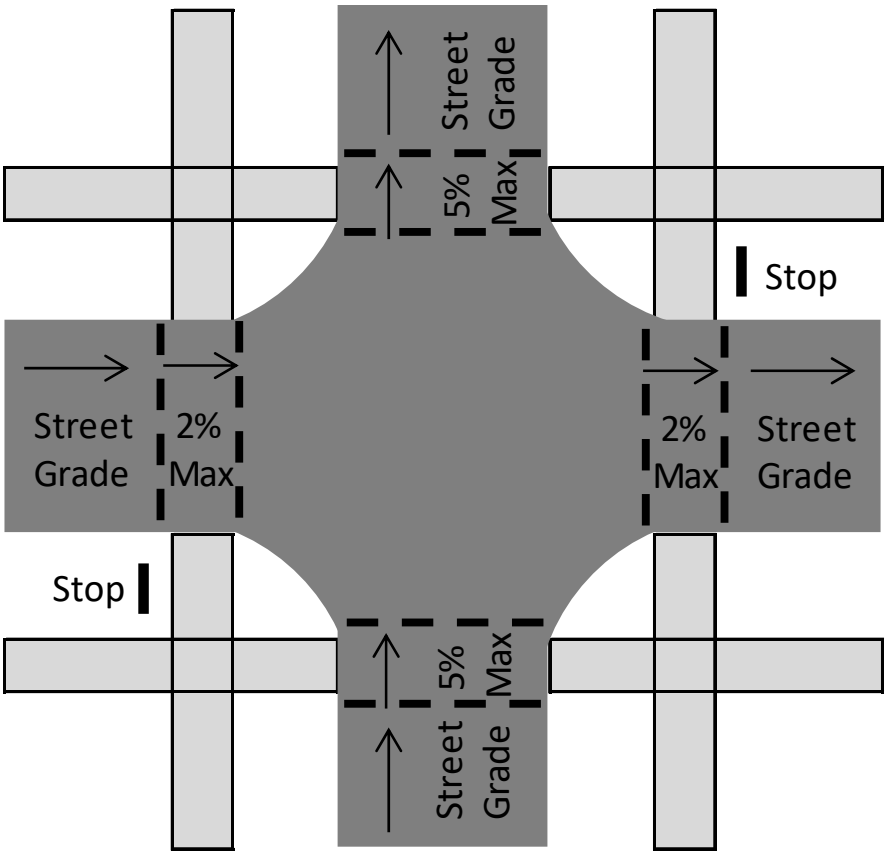
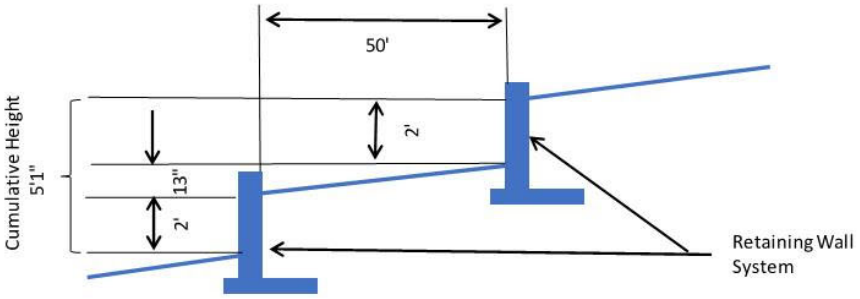
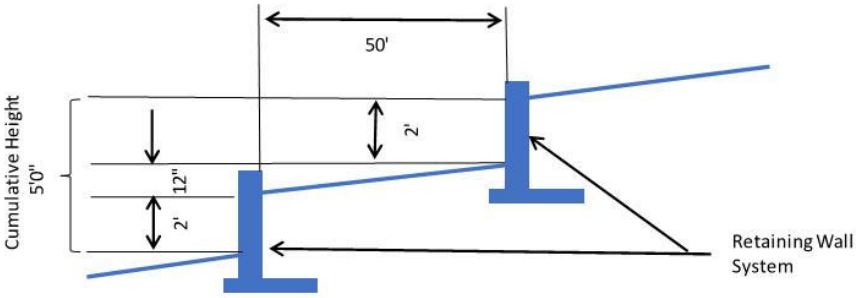


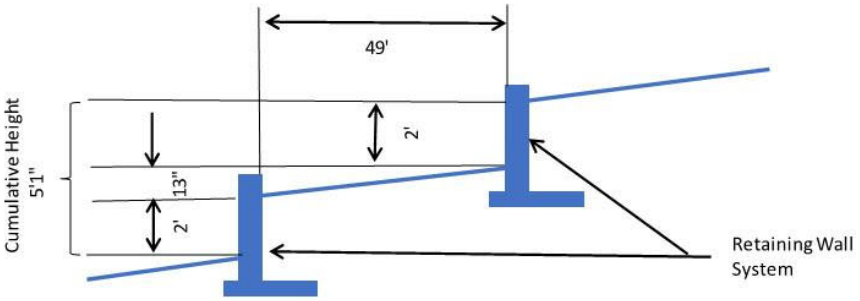
DIAGRAM A3 – RETAINING WALLS



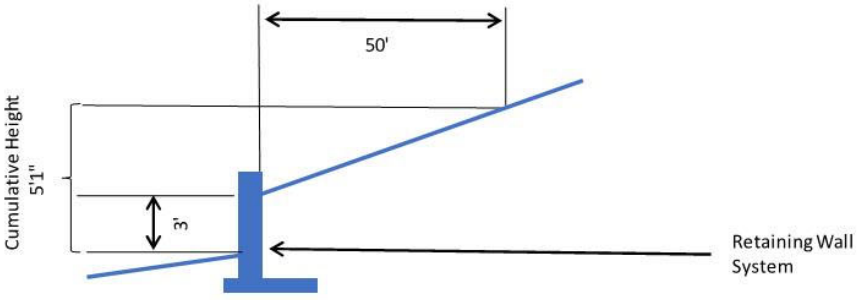
Example - A
Design Professional Required



Example - B
Design Professional Not Required



Example - C
Design Professional Required



Example - D
Design Professional Required

STORM DRAINAGE CONVEYANCE SYSTEM CERTIFICATION

As-Built Certification

I, _____, attest that this certification, for the _____ Project, has been reviewed by me and is accurate, complete and consistent with the information supplied in the plans, specifications, engineering calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the Storm Drainage As-Built Plans have been prepared based on an accurate account of the stormwater piping and appurtenances installed during construction and any deviations from the approved construction plans shall not adversely impact the drainage system, discharge points, and/or adjacent properties analyzed during the approval process of the construction plans. Although other professionals may have developed certain portions of this submittal package, inclusion of these materials under my signature and seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design.

SEAL:

_____ _____

(Date) (Signature)

Engineer:
Firm:
Firm License #:
Address:

STORMWATER CONTROL MEASURE (SCM) CERTIFICATION rev 10-22

As-Built Certification

I, _____, attest that this certification, for the _____Project, has been reviewed by me and is accurate, complete and consistent with the information supplied in the plans specifications, engineering calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the As-Built Plans have been prepared based on an accurate account of the SCM and appurtenances installed during construction and any deviations from the approved construction plans were analyzed and verified to not adversely impact the performance of the SCM during the approval process of the construction plans. Although other professionals may have developed certain portions of this submittal package, inclusion of these materials under my signature and seal signifies that I have reviewed this material, conducted a physical site visit, verified all applicable vegetative plantings have been installed, and have judged it to be consistent with the proposed design.

SEAL:

_____ _____

(Date) (Signature)

Engineer:
Firm:
Firm License #:
Address:

A minimum of 3 photographs of each SCM are required as part of the certification.

RETAINING WALL CERTIFICATION

As-Built Certification

I, _____, attest that this certification, for the _____Project, has been reviewed by me and is accurate, complete and consistent with the information supplied in the plans, specifications, engineering calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the As-Built Plans have been prepared based on an accurate account of the retaining wall system and appurtenances installed during construction and any deviations from the approved construction plans were analyzed and verified to not adversely impact the performance of the wall system analyzed during the approval process of the construction plans. Although other professionals may have developed certain portions of this submittal package, inclusion of these materials under my signature and seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design.

SEAL:

_____ _____

(Date) (Signature)

Engineer:
Firm:
Firm License #:
Address:

BRIDGE CERTIFICATION

As-Built Certification

I, _____, attest that this certification, for the _____Project, has been reviewed by me and is accurate, complete and consistent with the information supplied in the plans, specifications, engineering calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the As-Built Plans have been prepared based on an accurate account of the bridge and appurtenances installed during construction and any deviations from the approved construction plans were analyzed and verified to not adversely impact the performance of the bridge analyzed during the approval process of the construction plans. Although other professionals may have developed certain portions of this submittal package, inclusion of these materials under my signature and seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design.

SEAL:

_____ _____

(Date) (Signature)

Engineer:
Firm:
Firm License #:
Address:

CERTIFICATION OF EMBANKMENTS

As-Built Certification

I, _____, attest that this certification, for the _____Project, has been reviewed by me and is accurate, complete, and consistent with the information supplied in the plans, specifications, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the As-Built Plans have been prepared based on an accurate account of the embankment fill elevation, compaction, slope, and slope protection materials installed during construction and any deviations from the approved construction plans were analyzed and verified to not adversely impact the performance of the embankment during the approval process of the construction plans. Although other professionals may have developed certain portions of this submittal package, inclusion of these materials under my signature and seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design.

SEAL:

_____ _____

(Date) (Signature)

Engineer:
Firm:
Firm License #:
Address:

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.
2. Install and maintain in proper working order, erosion control measures as needed to prevent sedimentation from leaving the construction site.
3. Remove any sediment and or aggregate discharged onto streets immediately.

_____

Applicant Signature Date

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

RESIDENTIAL INSPECTION REQUIREMENTS

There are currently four inspections that will need to be performed by Kannapolis before you will be able to obtain a CO on the structure. All inspections will be scheduled through Accela the same way that building inspections are scheduled. Below are the four inspection types with a short description of when and what will be needed for the inspection. The request for inspection must be entered before 4 PM to get inspection on the next business day. No specific inspection time will be provided.

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 and Sidewalk are in place.
   - All soft areas in the subgrade have been repaired.
   - Before any concrete is poured.
   - This will be for all driveway and sidewalk located within the right of way.
   - Driveway and Sidewalk must be ready for inspection at the same time.

3. Drainage Review

   - This inspection should be requested after sod or seed/straw has been placed.
   - 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.

4. 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

RESIDENTIAL DRIVEWAY ACCESS PERMIT APPLICATION

Applicant Contact Information

Name: _____

Phone: _____ Email: _____

Project Information

Address: _____ PIN: _____

Contractor Name: _____

Applicant agrees to the following items:

1. For driveway, sidewalk, grading, water/sewer inspections: Notify the Kannapolis Engineering Department by requesting an inspection through Citizen Access Accela Citizen Access Please provide the email contact to be used for these inspections:

Email Contact: _____

2. Construct and maintain driveway(s) in absolute conformance with the current "Policy on Street and Driveway Access" as adopted by the City of Kannapolis Land Development Standards Manual

- ☐ The driveway shall be a minimum of 5' from the adjacent property line.
- ☐ Within the right-of-way, the driveway shall be within a min. of 12' and max. of 20' wide.
- ☐ Within the right-of-way, the driveway shall be a min. of 6" thick concrete unless approved otherwise by the Kannapolis Engineering Department.
- ☐ Driveway pipe & subgrade shall be inspected prior to backfill & material placement

3. Provide proper signs, traffic control and other warning devices for the protection of traffic in conformance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" MUTCD
4. Contact the City of Kannapolis to determine the required size of RCP/HP pipe that must be installed 704-920-4221.
5. By signing below, I here indemnify and save harmless the City of Kannapolis from all damages and claims for damage that may arise by reason of this construction.

APPLICANT SIGNATURE DATE

Right-of-Way Extension/Service
Permit Application

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

Owner/Operator of Proposed Line: _____

Contact Representative & Position: _____

Address: _____

Phone: _____ Email: _____

Contractor of Proposed Line: _____

Address: _____

Phone: _____ Email: _____

Representative & Position: _____

Sub-Contractor of Proposed Line: _____

Address: _____

Phone: _____ Email: _____

Representative & Position: _____

List Additional Sub-Contractors and Their Information on Back of Page.

List All Road Rights-of-Way (City and NCDOT) and/or City Easements Where Installation/Construction is Proposed:

_____

_____

Type of Utility/Extension Service: _____

Diameters	Materials	Length of Pipe

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 and Kannapolis 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 Engineering Director 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