

**ColeJenest & Stone**  
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Land Planning  
 Landscape Architecture  
 Civil Engineering  
 Urban Design

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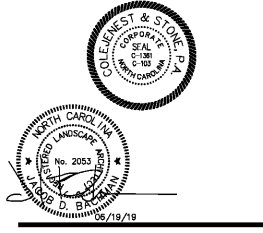
**GRADING AND DRAINAGE PLAN**

Project No. 4493  
 Issued 03/26/19

Revised

Scale: 1"=30'

0 15' 30' 60'



**C-401**

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ColeJenest & Stone, P.A. 2019



**STORM DRAIN SCHEDULE**

UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	SIZE (IN.)	MATERIAL LENGTH (FT.)	SLOPE	UPSTREAM INVERT ELEVATION (FT)	DOWNSTREAM INVERT ELEVATION (FT)	UPSTREAM RIM ELEVATION (FT)
RL-1	RL-2	HDPE 24	1.24	0.01	818.00	817.40	820.76
RL-2	RL-3	HDPE 33	2.09	0.01	817.40	816.70	820.40
RL-3	CI-18	HDPE 18	2.47	0.01	816.70	816.25	820.00
RL-4	CI-17	6 HDPE	36	2.77	818.00	817.00	820.32
RL-5	RL-6	6 HDPE	34	1.46	813.00	812.50	814.90
RL-6	CI-21	6 HDPE	47	2.12	812.50	811.50	814.90
CI-18	CI-17	6 HDPE	88	3.99	811.50	808.00	815.10
CI-17	MH-35A	27 HDPE	38	2.63	799.00	798.00	807.50
CI-10	CI-33	6 HDPE	43	1.15	816.00	815.50	818.50
CI-11	CI-30A	6 HDPE	21	0.94	811.70	811.50	813.24
CI-12	CI-40	6 HDPE	48	2.06	806.00	805.00	812.30
CI-12	CI-8	6 HDPE	76	2.63	808.00	806.00	813.00
ST-42	FES-43	15 RCP	64	0.78	783.50	783.00	786.50
DH-41B	CI-41	15 RCP	23	2.14	808.20	807.70	812.53
CI-43A	CI-41	15 RCP	18	1.67	809.10	808.80	812.20
CI-43	CI-40	15 RCP	71	1.83	804.50	803.20	812.56
CI-40B	CI-40	15 RCP	18	2.86	806.50	805.50	809.40
CI-40	CI-39	15 RCP	21	1.83	803.00	801.70	809.50
CI-39A	CI-39	15 RCP	18	2.86	803.00	802.50	806.50
CI-39	CI-38	15 RCP	38	1.59	801.50	800.90	806.22
CI-38	CI-37	15 RCP	21	0.93	800.70	800.50	804.35
CI-37	MH-36	18 RCP	46	1.64	800.25	799.50	804.35
MH-36	MH-35A	18 RCP	191	1.72	799.30	796.00	812.50
MH-35A	DI-35	18 RCP	60	3.32	793.50	791.50	800.00
DI-35	FES-34	15 RCP	24	1.50	789.60	789.00	800.07
CI-33	CI-31	15 RCP	119	1.00	814.80	813.50	818.50
CI-32	CI-31	15 RCP	42	2.39	814.50	813.50	818.50
CI-31	CI-26	15 RCP	57	2.28	813.30	812.00	817.87
CI-30A	CI-30	15 RCP	59	1.34	811.00	810.20	814.10
CI-30	CI-29	15 RCP	40	1.00	810.00	809.60	814.85
CI-29	CI-27	15 RCP	55	1.00	809.40	808.85	816.00
CI-28	CI-27	15 RCP	110	0.83	809.85	808.85	813.26
CI-27	CI-26B	18 RCP	77	0.71	808.60	808.00	816.20
CI-26B	CI-26A	18 RCP	21	0.92	807.80	807.61	816.20
CI-26A	CI-26	18 RCP	43	0.71	807.61	807.30	816.50
CI-26	CI-23	24 RCP	20	1.49	806.80	806.50	818.50
CI-25A	CI-25	15 RCP	20	1.01	808.80	808.60	812.23
CI-25	CI-24	15 RCP	58	0.86	808.40	807.90	812.23
CI-24A	CI-24	15 RCP	20	2.50	810.00	809.50	813.98
CI-24	CI-23	15 RCP	136	0.88	807.70	806.50	813.98
CI-23	CI-19	24 RCP	187	1.12	805.75	804.00	818.20
CI-22	CI-20	15 RCP	39	2.55	809.00	808.00	812.10
CI-21	CI-20	15 RCP	88	1.09	805.16	804.20	811.98
CI-20	CI-19	15 RCP	54	1.10	804.20	803.60	814.46
CI-19	CI-10	24 RCP	117	1.32	802.85	801.30	816.23
CI-18	CI-17	15 RCP	61	1.32	815.50	814.70	819.60
CI-17	CI-16	15 RCP	28	1.07	814.50	814.20	818.60
CI-16	CI-15	15 RCP	165	1.21	814.00	812.40	819.10
CI-15	CI-14	15 RCP	21	1.44	811.80	811.50	817.47
CI-14	CI-12	15 RCP	41	3.18	813.30	810.00	817.35
CI-13	CI-12	15 RCP	25	3.26	813.80	813.00	818.14
CI-12	CI-11	18 RCP	20	2.97	809.80	809.20	816.50
CI-11	CI-10	18 RCP	65	3.06	809.00	807.00	816.50
CI-10	CI-9	30 RCP	20	1.50	800.80	800.50	814.44
CI-9	CI-8	30 RCP	77	1.43	800.30	799.20	814.37
CI-8	CI-7	30 RCP	97	1.54	799.00	797.50	812.75
CI-7	CI-6	30 RCP	22	1.79	797.50	796.50	810.29
CI-6	MH-5	30 RCP	59	2.05	796.70	796.50	810.66
DI-5B	MH-5	15 RCP	139	2.33	804.50	801.50	808.80
CI-5A	MH-5	15 RCP	35	2.82	804.50	803.50	808.35
MH-5	DI-4	30 RCP	70	5.37	799.00	789.26	809.63
DI-4	HW-3	30 RCP	12	0.50	789.00	789.00	794.89
DCS-2	HW-1	24 RCP-LRI	46	0.65	784.00	783.70	790.91

**RETAINING WALL NOTES**

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE SERVICES OF A QUALIFIED ENGINEER TO COMPLETE THE DESIGN AND SETTING OF ALL PROPOSED SEGMENTAL CONCRETE BLOCK RETAINING WALLS. THE DESIGN OF ALL RETAINING WALLS IS TO BE PROVIDED IN ACCORDANCE WITH THE NORTH CAROLINA STANDARD SPECIFICATIONS FOR RETAINING WALLS, SECTION 1507. THE DESIGN SHALL BE SUBMITTED TO A NORTH CAROLINA LICENSED ENGINEER. A NORTH CAROLINA LICENSED ENGINEER MUST PERFORM CONSTRUCTION OBSERVATION, VERIFYING IN A SEALED LETTER TO THE LOCAL JURISDICTION AUTHORITY THAT THE RETAINING WALLS WERE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED ENGINEERED DRAWINGS, IN COMPLIANCE WITH SECTION 704 OF THE NORTH CAROLINA STATE BUILDING CODE.
- BOTTOM OF WALL ELEVATIONS (BW) REFERENCE THE BOTTOM OF WALL AT FINISHED GRADE. ALL AREAS REFER TO WALL STRUCTURAL PLANS BY OTHERS FOR TOP AND BOTTOM OF FOOTING ELEVATIONS.
- ALL RETAINING WALLS GREATER THAN 4 FT (RESIDENTIAL) OR 5 FT (COMMERCIAL) IN HEIGHT REQUIRE A BUILDING PERMIT PRIOR TO CONSTRUCTION.

**GRADING AND EARTHWORK NOTES**

- CONTRACTOR SHALL CONTACT AGRICULTURE DEPARTMENT 48 HOURS BEFORE CONSTRUCTION.
- REFER TO EROSION CONTROL PLAN FOR CONSTRUCTION SEQUENCE REQUIREMENTS.
- ON-SITE EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION.
- ANY GRADING BEYOND THE SLOPE LIMITS INDICATED ON THE CONSTRUCTION DOCUMENTS IS A VIOLATION OF EROSION CONTROL ORDINANCES AND IS SUBJECT TO A FINE.
- GRADING MORE THAN 12 INCHES MORE WITHOUT AN APPROVED EROSION CONTROL PLAN IS A VIOLATION OF EROSION CONTROL ORDINANCES AND IS SUBJECT TO A FINE.
- PROVIDE A GRADING PLAN IS NOT AN AUTHORIZATION TO GRADE ON ADJACENT PROPERTIES. WHEN FIELD CONDITIONS WARRANT OFF-SITE GRADING, PERMISSION MUST BE OBTAINED FROM THE AFFECTED PROPERTY OWNER(S).
- THE CONTRACTOR SHALL IMMEDIATELY REPORT TO OWNER ANY DISCREPANCIES FOUND BETWEEN ACTUAL FIELD CONDITIONS AND CONSTRUCTION DOCUMENTS AND SHALL WAIT FOR INSTRUCTION PRIOR TO PROCEEDING.
- CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UTILITIES IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION.
- LIMITS OF CLEARING SHOWN ON GRADING PLAN ARE BASED UPON THE APPROXIMATE CUT AND FILL SLOPE LIMITS, OR OTHER GRADING REQUIREMENTS.
- ALL ELEVATIONS ARE IN REFERENCE TO THE SITE BENCHMARK. CONTRACTOR SHALL VERIFY THE BENCHMARK PRIOR TO GROUND BREAKING.
- THE PROPOSED CONTOURS AND SPOT ELEVATIONS SHOWN WITHIN ROADWAYS, PARKING LOTS, AND SIDEWALK ARE REFLECT FINISHED ELEVATIONS INCLUDING PAVEMENT. REFER TO PAVEMENT CROSS SECTION DATA TO ESTABLISH CORRECT SUBBASE OR AGGREGATE BASE COURSE ELEVATIONS TO BE COMPLETED UNDER THIS CONTRACT.
- GRADES SHALL BE ESTABLISHED TO PROVIDE A SMOOTH SURFACE, FREE FROM IRREGULAR SURFACE CHANGES. GRADING SHALL COMPLY WITH COMPACTION REQUIREMENTS AND GRAD CROSS SECTIONS, LIMITS, AND ELEVATIONS INDICATED. WHERE NO SPOT GRADES ARE INDICATED, THE GRADE SHALL BE ESTABLISHED BASED ON INTERPOLATION OF THE ELEVATIONS BETWEEN ADJACENT SPOT GRADES WHILE MAINTAINING APPROPRIATE TRANSITION AT STRUCTURES AND UNINTERRUPTED DRAINAGE FLOW INTO INLETS.
- CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE SUCH THAT RUNOFF WILL DRAIN BY GRAVELY FLOW ACROSS NEW GRADED AREAS TO NEW OR EXISTING DRAINAGE INLETS, OR SHIELD OVERLAND.
- ALL SIDEWALKS, STAIRS, TERRACES AND OTHER PAVED AREAS SHALL SLOPE AWAY FROM BUILDING(S) AT 2.0% MAXIMUM.
- COLEJENEST & STONE, P.A. HAS NOT PERFORMED ANY GEOTECHNICAL EVALUATIONS OF THE SUBJECT PROPERTY AND HAS NOT MADE ANY DETERMINATIONS AS TO THE SUITABILITY OF SOILS FOR USE AS FILL BENEATH PROPOSED BUILDINGS, DRIVEWAYS, PARKING AREAS OR FOR OTHER USES. ALL EARTHWORK SHALL BE COMPLETED IN ACCORDANCE WITH THE RECOMMENDATIONS OF A QUALIFIED GEOTECHNICAL ENGINEER WHO SHALL BE RETAINED BY THE OWNER.
- ALL FILL SHALL BE PLACED IN MAXIMUM 8-INCH LIFTS AND COMPACTED. ALL FILL WITHIN LIMITS OF BUILDING AND PAVEMENT AREAS SHALL BE COMPACTED TO 100% OF MAXIMUM STANDARD PROCTOR DENSITY WITHIN THE TOP 12 INCHES AND A MINIMUM 90% OF MAXIMUM STANDARD PROCTOR DENSITY BELOW 12-INCH DEPTH. FILL WITHIN LANDSCAPED AREAS SHALL BE COMPACTED TO MINIMUM 90% OF MAXIMUM STANDARD PROCTOR DENSITY. MAXIMUM STANDARD PROCTOR DENSITIES SHALL BE DETERMINED IN ACCORDANCE WITH ASTM D 998. REFER TO GEOTECHNICAL ENGINEER'S REPORT FOR ADDITIONAL EARTHWORK SPECIFICATIONS AND REQUIREMENTS.
- FOR SLOPE CONSTRUCTION 3:1 AND STEEPER AND EXCEEDING 5 FEET IN VERTICAL HEIGHT, THE CONTRACTOR SHALL COORDINATE WITH A GEOTECHNICAL ENGINEER ON THE SUITABILITY OF SOILS PLANNED FOR THESE SLOPES AND FOLLOW RECOMMENDATIONS SET FORTH BY THE GEOTECHNICAL ENGINEER FOR SLOPE CONSTRUCTION. ALL SUCH SLOPES SHALL BE TRACKED TOP TO BOTTOM AND STABILIZED WITH A ROLLED EROSION CONTROL BLANKET CONSISTING OF POLYPROPYLENE NETTING AND A STRAW/COCONUT FIBER MATRIX, STAKED TO MANUFACTURER'S RECOMMENDATIONS. TOP SOIL PLACEMENT ON SLOPES SHALL BE INSTALLED IN A BRENCHED PATTERN.
- ALL PROJECT SUBGRADE SHALL BE INSPECTED BY THE GEOTECHNICAL ENGINEER. IF THE GEOTECHNICAL ENGINEER DETERMINES THAT UNSATISFACTORY SOIL IS PRESENT, THE UNSATISFACTORY MATERIAL SHALL BE REMOVED AND REPLACED WITH COMPACTED BACKFILL. SUCH ADDITIONAL AUTHORIZED EXCAVATION SHALL BE PAID FOR ACCORDING TO THE CONTRACT PROVISIONS FOR UNIT PRICES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL FILL AND BACKFILL MATERIAL WITHIN 3 PERCENT OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D 998. SOIL MATERIAL THAT EXCEEDS THE OPTIMUM MOISTURE CONTENT BY 3 PERCENT OR MORE, AND IS TOO WET TO COMPACT, TO THE SPECIFIED UNIT WEIGHT, SHALL BE SCATTERED AND AIR DRIED, LIME STABILIZED, OR REMOVED AND REPLACED.
- CONTRACTOR SHALL PROVIDE ALL Dewatering MEASURES NECESSARY, INCLUDING WELL POINTS, SLUMP PUMPS, TEMPORARY SHORING, ETC., TO ENSURE COMPLETION OF STABLE EXCAVATION AND BACKFILL OPERATIONS. GROUNDWATER SHALL BE MAINTAINED A MINIMUM OF 2 FT. BELOW THE BOTTOM OF ALL EXCAVATIONS.
- CONTRACTOR SHALL CONSULT WITH THE GEOTECHNICAL ENGINEER AND PROVIDE ANY AND ALL SHORING DETERMINED TO BE NECESSARY TO PROTECT EXISTING BUILDING FOUNDATIONS OR OTHER ADJACENT IMPROVEMENTS.
- OWNER SHALL ENGAGE A QUALIFIED INDEPENDENT GEOTECHNICAL ENGINEERING TESTING AGENCY TO PERFORM FIELD QUALITY CONTROL TESTING. TESTING AGENCY SHALL TEST COMPACTION OF SOILS IN PLACE ACCORDING TO ASTM D2922, AS APPLICABLE. TEST SHALL BE PERFORMED AT EACH COMPACTED BACKFILL LAYER AT A RATE OF NOT LESS THAN ONE TEST FOR EACH 2500 SF OF FILL AREA OR ONE TEST PER EACH 100 LF OF WALL OR TRENCH LENGTH.
- ALL GRADED OR DISTURBED AREAS BEYOND THE LIMITS OF PAVING, SIDEWALKS, BUILDINGS, ETC., THAT ARE NOT OTHERWISE LANDSCAPED PER THE LANDSCAPING PLAN, SHALL BE STABILIZED WITH A NEW LAWN SEEDING IN ACCORDANCE WITH THE SEEDING SPECIFICATION. CONTRACTOR SHALL MAINTAIN SEEDING AREAS UNTIL A HEALTHY STAND OF GRASS IS ESTABLISHED.

**LEGEND**

- PROPOSED CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED SPOT ELEVATION
- PROPOSED HIGH POINT
- PROPOSED DRAINAGE SWALE
- PROPOSED STORM DRAINAGE
- PROPOSED CURB INLET
- PROPOSED DROP INLET
- PROPOSED MANHOLE
- PROPOSED GRAVEL AND RIPRAP APRON
- PROPOSED HEAD WALL
- FLARED END SECTION

**STORM DRAINAGE NOTES**

- ALL PIPE TO BE INSTALLED AND BIDD'D PER MANUFACTURER'S SPECIFICATIONS. REFERENCE DETAIL 15, SHEET C-805.
- NO VEHICULAR TRAFFIC SHALL BE ALLOWED ACROSS PIPES UNTIL A MINIMUM OF 2" OF COMPACTED COVER HAS BEEN INSTALLED.
- ALL CONSTRUCTION TO MEET OR EXCEED NCDOT AND LOCAL STANDARDS.
- ALL DOWNSPOUS SHALL BE CONNECTED TO STORM DRAINAGE SYSTEM PER DETAIL 9, SHEET C-805.

**STORM DRAIN SCHEDULE NOTES**

- "C" STRUCTURES TO BE CATCH BASINS (NCDOT STD. 840.02).
- "CO" STRUCTURES TO BE CLEAN-OUTS (REFERENCE DETAIL 9/C-805).
- "DI" STRUCTURES TO BE DROP INLETS (NCDOT STD. 840.14).
- "FES" STRUCTURES TO BE FLARED END SECTION (REFERENCE DETAIL 4/C-802).
- "HW" STRUCTURES TO BE HEADWALL (NCDOT STD. 838.80).
- "MH" STRUCTURES TO BE MANHOLES (NCDOT STD. 840.52).
- "OC" TO BE STORMWATER OUTLET CONTROL STRUCTURE (REFERENCE DETAIL 5/C-807).
- "RL" TO BE CONNECTION TO ROOF LEADERS (REFERENCE DETAIL 5/C-805).
- "HDPE" TO BE HIGH-DENSITY POLYETHYLENE PIPE (AASHTO M252 AND AASHTO M254, TYPE S, DUAL WALL WITH SMOOTH INTERIOR).
- "RCP" STRUCTURES TO BE 18" TO 30" RCP (NCDOT STD. 840.04 WITH OPENINGS AT ALL 4 SIDES).
- "RCP" TO BE REINFORCED CONCRETE PIPE (ASTM C 75), CLASS III UNLESS NOTED OTHERWISE.
- "RCP - LRI" TO BE REINFORCED CONCRETE PIPE WITH LEAK-RESISTANT JOINT, O-RING RUBBER GASKET JOINTS WITH EXTERNAL BUTYL JOINT WRAP.
- "US GRATE ELEVATION FOR CI IS AT EDGE OF PAVEMENT.
- "US GRATE ELEVATION FOR DI IS AT CENTER OF GRADE.
- "US GRATE ELEVATION FOR CIH IS AT UP OF OPENING.
- "US GRATE ELEVATION FOR MH OR JB IS AT TOP OF LID.
- "US GRATE ELEVATION FOR CO IS AT TOP OF CAP.

**Order Plans**

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