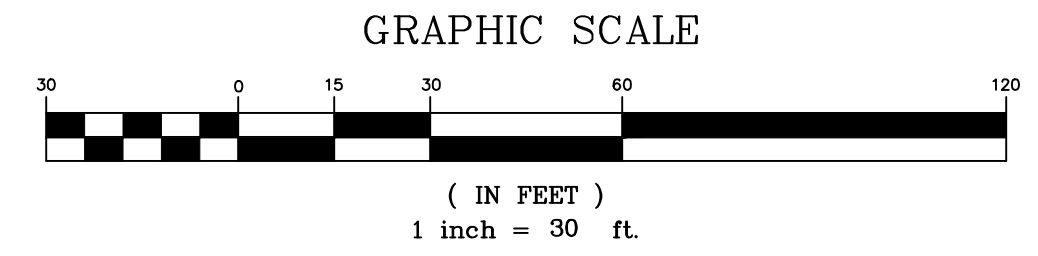
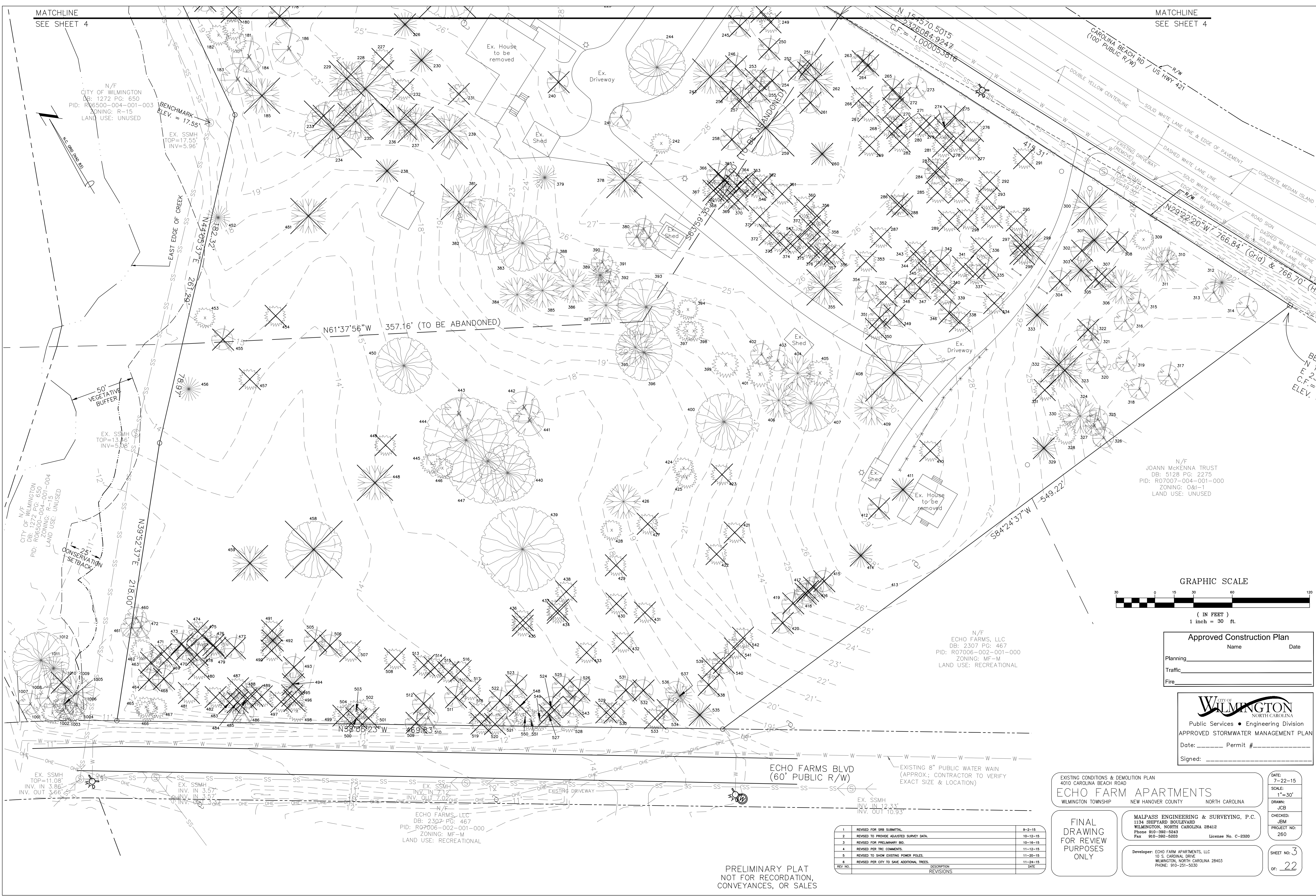






MATCHLINE  
SEE SHEET 4

MATCHLINE  
SEE SHEET 4



Approved Construction Plan

Name	Date
Planning	
Traffic	
Fire	

**CITY OF WILMINGTON**  
 NORTH CAROLINA  
 Public Services • Engineering Division  
 APPROVED STORMWATER MANAGEMENT PLAN  
 Date: \_\_\_\_\_ Permit # \_\_\_\_\_  
 Signed: \_\_\_\_\_

EXISTING CONDITIONS & DEMOLITION PLAN  
 4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
 WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

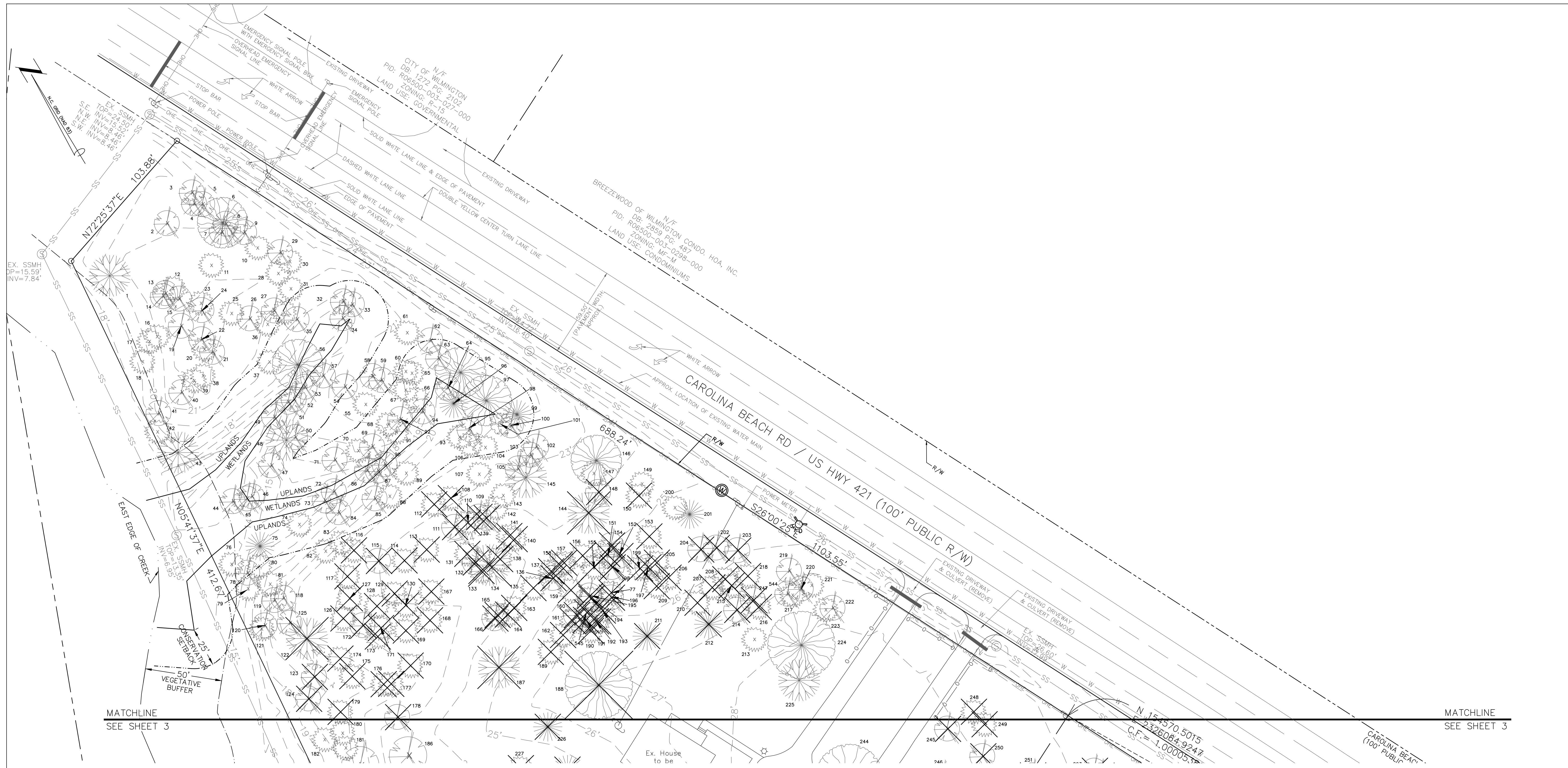
MALPASS ENGINEERING & SURVEYING, P.C.  
 1134 SHIPYARD BOULEVARD  
 WILMINGTON, NORTH CAROLINA 28412  
 Phone 910-392-6243  
 Fax 910-392-5203 License No. C-2320

Developer: ECHO FARM APARTMENTS, LLC  
 10 S. CARDINAL DRIVE  
 WILMINGTON, NORTH CAROLINA 28403  
 PHONE: 910-251-5030

DATE: 7-22-15  
 SCALE: 1"=30'  
 DRAWN: JCB  
 CHECKED: JEM  
 PROJECT NO: 260  
 SHEET NO: 3  
 OF: 22

REV. NO.	DESCRIPTION	DATE
1	REVISED FOR SRB SUBMITTAL.	8-2-15
2	REVISED TO PROVIDE ADJUSTED SURVEY DATA.	10-12-15
3	REVISED FOR PRELIMINARY RIB.	10-14-15
4	REVISED PER TRC COMMENTS.	11-13-15
5	REVISED TO SHOW EXISTING POWER POLES.	11-20-15
6	REVISED PER CITY TO SAVE ADDITIONAL TREES.	11-24-15

PRELIMINARY PLAT  
 NOT FOR RECORDATION,  
 CONVEYANCES, OR SALES



MATCHLINE  
SEE SHEET 3

MATCHLINE  
SEE SHEET 3

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

Traffic \_\_\_\_\_

Fire \_\_\_\_\_

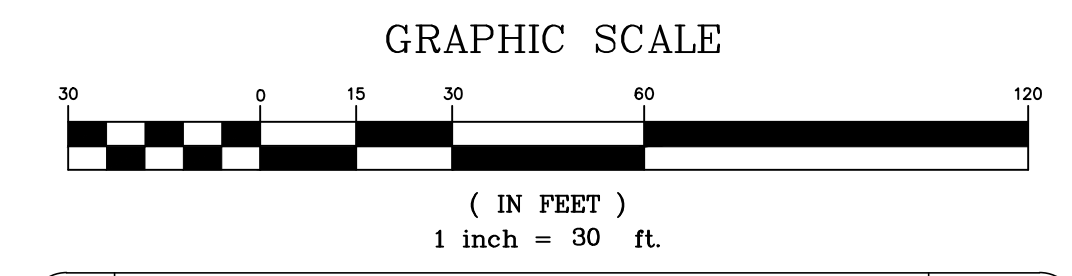
**CITY OF WILMINGTON**  
NORTH CAROLINA

Public Services • Engineering Division

**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_



REV. NO.	DESCRIPTION	DATE
1	REVISED FOR SRB SUBMITTAL	9-2-15
2	REVISED TO PROVIDE ADJUSTED SURVEY DATA	10-12-15
3	REVISED FOR PRELIMINARY BID	10-16-15
4	REVISED PER TRC COMMENTS	11-12-15
5	REVISED TO SHOW EXISTING POWER POLES	11-20-15
6	REVISED PER CITY TO SAVE ADDITIONAL TREES	11-24-15

EXISTING CONDITIONS & DEMOLITION PLAN  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

**MALPASS ENGINEERING & SURVEYING, P.C.**  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-6343  
Fax 910-392-5203 License No. C-2320

Developer: ECHO FARM APARTMENTS, LLC  
10 S. CARDINAL DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE: 7-22-15  
SCALE: 1"=30'  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260  
SHEET NO: 4  
OF: 22

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES

MATCHLINE  
SEE SHEET 6

MATCHLINE  
SEE SHEET 6

N/F  
CITY OF WILMINGTON  
DB: 1272 PG: 650  
PID: R06500-004-001-003  
ZONING: R-15  
LAND USE: UNUSED

BENCHMARK  
ELEV. = 17.55'

EAST EDGE OF CREEK

N47°05'37"E  
261.29'

4" W/C  
CURB CUT

50' VEGETATIVE  
BUFFER

WETLANDS  
UPLANDS

25'  
CONSERVATION  
SETBACK

N/F  
CITY OF WILMINGTON  
DB: 1272 PG: 650  
PID: R06500-004-001-004  
ZONING: R-15  
LAND USE: UNUSED

N39°52'37"E  
218.00'

BUILDING #8

POOL

CLUBHOUSE

INFILTRATION  
BASIN #1

BUILDING #2

MAINTENANCE BUILDING

WET POND

N/F  
ECHO FARMS, LLC  
DB: 2307 PG: 467  
PID: R07006-002-001-000  
ZONING: MF-M  
LAND USE: RECREATIONAL

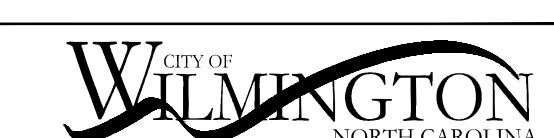
GRAPHIC SCALE



( IN FEET )  
1 inch = 30 ft.

Approved Construction Plan

Name \_\_\_\_\_ Date \_\_\_\_\_  
Planning \_\_\_\_\_  
Traffic \_\_\_\_\_  
Fire \_\_\_\_\_



Public Services • Engineering Division  
APPROVED STORMWATER MANAGEMENT PLAN

Date: \_\_\_\_\_ Permit # \_\_\_\_\_  
Signed: \_\_\_\_\_

ECHO FARMS BLVD  
(60' PUBLIC R/W)

N/F  
ECHO FARMS, LLC  
DB: 2307 PG: 467  
PID: R07006-002-001-000  
ZONING: MF-M  
LAND USE: RECREATIONAL

REV NO.	DESCRIPTION	DATE
1	REVISED FOR SRI SUBMITTAL.	9-2-15
2	REVISED TO SHOW PRIVATE STREET.	10-12-15
3	REVISED FOR PRELIMINARY BID.	10-16-15
4	REVISED PER THE COMMENTS.	11-17-15
5	REVISED TO SHOW EXISTING OFF-SITE TREES ALONG/NEAR WET POND #1 OUTFALL PIPE.	11-20-15
6	REVISED PER CITY TO SAVE ADDITIONAL TREES.	11-24-15
7	REVISED TO PROVIDE SIDEWALK ALONG CAROLINA BEACH RD.	12-14-15

SITE INVENTORY  
4010 CAROLINA BEACH ROAD  
ECHO FARM APARTMENTS  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

FINAL  
DRAWING  
FOR REVIEW  
PURPOSES  
ONLY

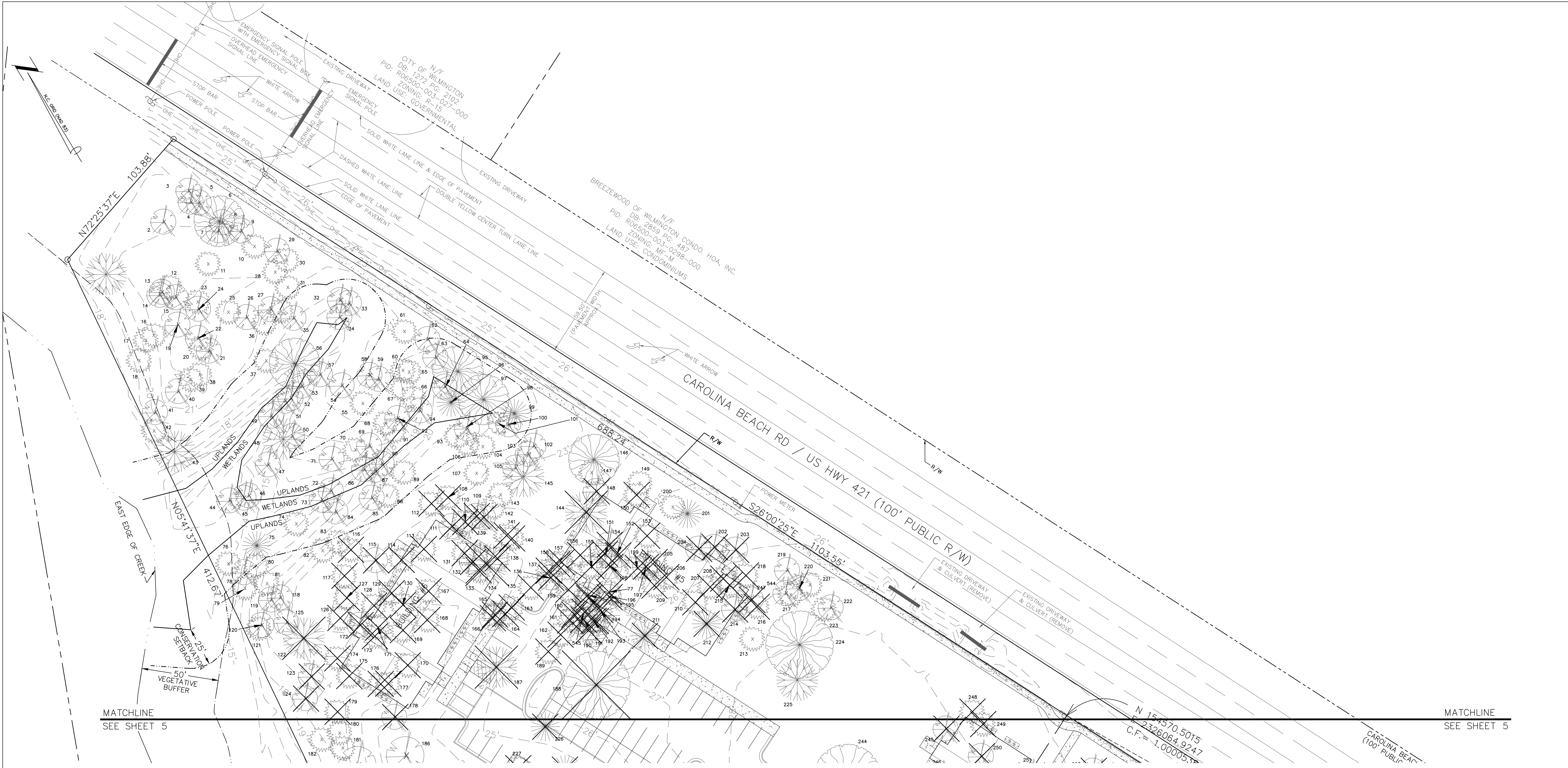
MALPASS ENGINEERING & SURVEYING, P.C.  
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WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE:  
7-22-15  
SCALE:  
1"=30'  
DRAWN:  
JCB  
CHECKED:  
JEM  
PROJECT NO:  
260

SHEET NO: 5  
OF: 22

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES



MATCHLINE  
SEE SHEET 5

MATCHLINE  
SEE SHEET 5

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

Traffic \_\_\_\_\_

Fire \_\_\_\_\_

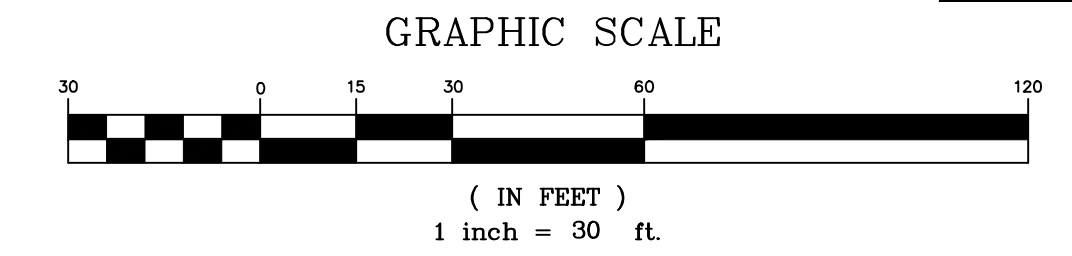
**CITY OF WILMINGTON**  
NORTH CAROLINA

Public Services • Engineering Division

**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_



REV. NO.	DESCRIPTION	DATE
1	REVISED FOR SRI SUBMITTAL	9-2-15
2	REVISED TO PROVIDE ADJUSTED SURVEY DATA	10-12-15
3	REVISED FOR PRELIMINARY RD.	10-16-15
4	REVISED PER TPO COMMENTS	11-17-15
5	REVISED TO SHOW EXISTING POWER POLES	11-20-15
6	REVISED PER CITY TO SAVE ADDITIONAL TREES	11-24-15
7	REVISED TO PROVIDE SIDEWALK ALONG CAROLINA BEACH RD.	12-14-15

SITE INVENTORY  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

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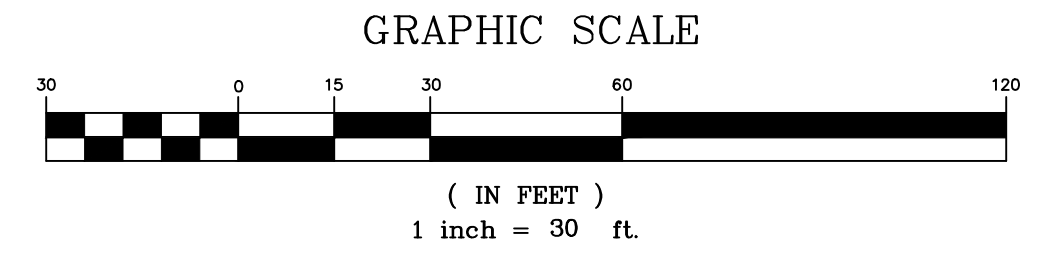
DATE:	7-22-15
SCALE:	1" = 30'
DRAWN:	JCB
CHECKED:	JEM
PROJECT NO.:	260
SHEET NO.:	6
OF:	22

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES

MATCHLINE  
SEE SHEET 8

17,888 SF

MATCHLINE  
SEE SHEET 8



Approved Construction Plan  
Name \_\_\_\_\_ Date \_\_\_\_\_  
Planning \_\_\_\_\_  
Traffic \_\_\_\_\_  
Fire \_\_\_\_\_

**CITY OF WILMINGTON**  
NORTH CAROLINA  
Public Services • Engineering Division  
APPROVED STORMWATER MANAGEMENT PLAN  
Date: \_\_\_\_\_ Permit # \_\_\_\_\_  
Signed: \_\_\_\_\_

N/F  
ECHO FARMS, LLC  
DB: 2307 PG: 467  
PID: R07006-002-001-000  
ZONING: MF-M  
LAND USE: RECREATIONAL

N/F  
ECHO FARMS, LLC  
DB: 2307 PG: 467  
PID: R07006-002-001-000  
ZONING: MF-M  
LAND USE: RECREATIONAL

REV NO.	DESCRIPTION	DATE
1	REVISED FOR SRB SUBMITTAL.	9-2-15
2	REVISED TO SHOW PRIVATE STREET.	10-12-15
3	REVISED FOR PRELIMINARY RB.	10-16-15
4	REVISED PER TRC COMMENTS.	11-12-15
5	REVISED PER CITY TO SAVE ADDITIONAL TREES.	11-24-15
6	REVISED TO PROVIDE SIDEWALK ALONG CAROLINA BEACH RD & CURB CUT NORTH OF BUILDING #8.	12-14-15

SITE PLAN  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

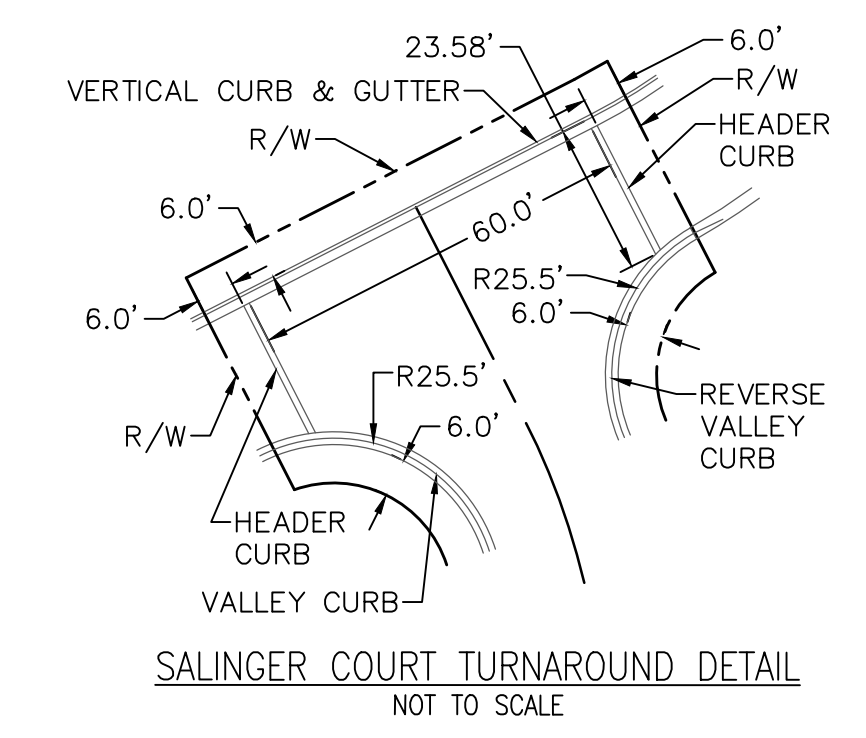
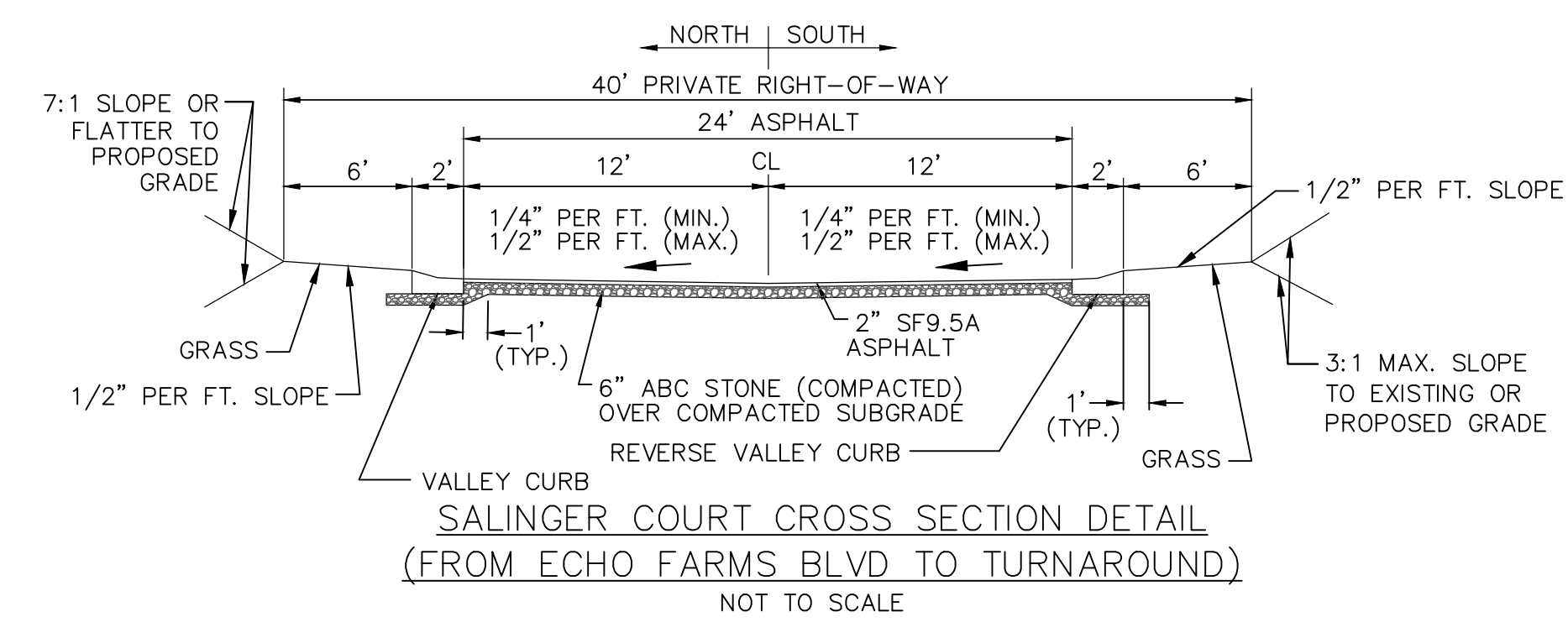
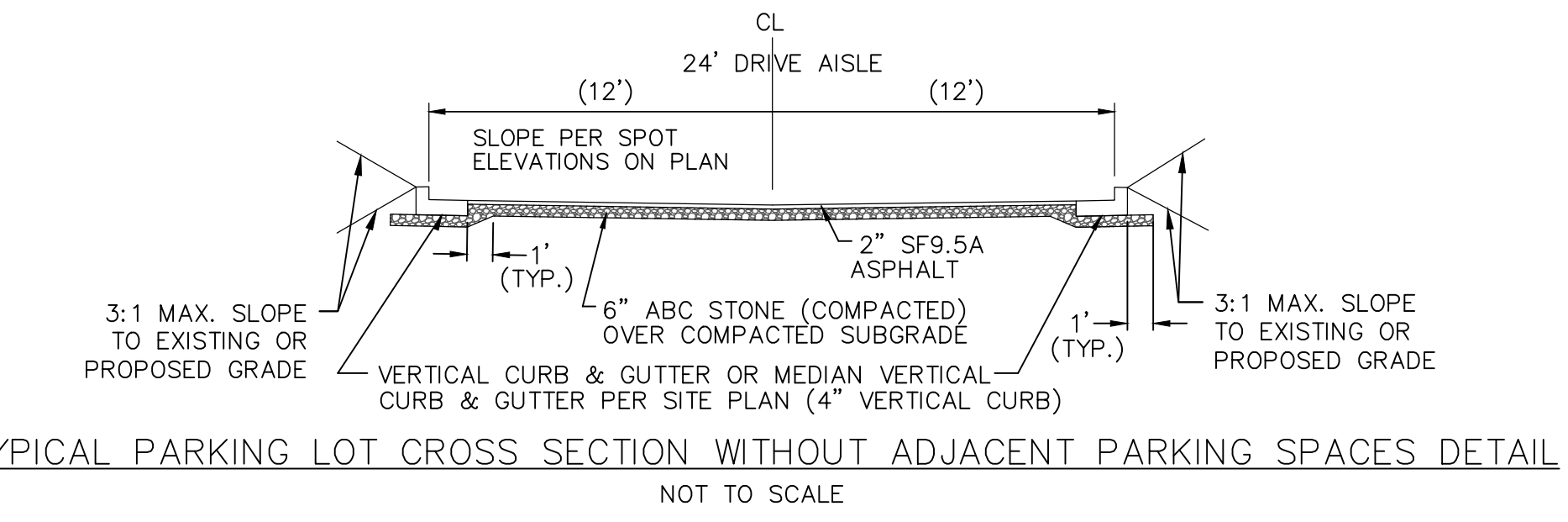
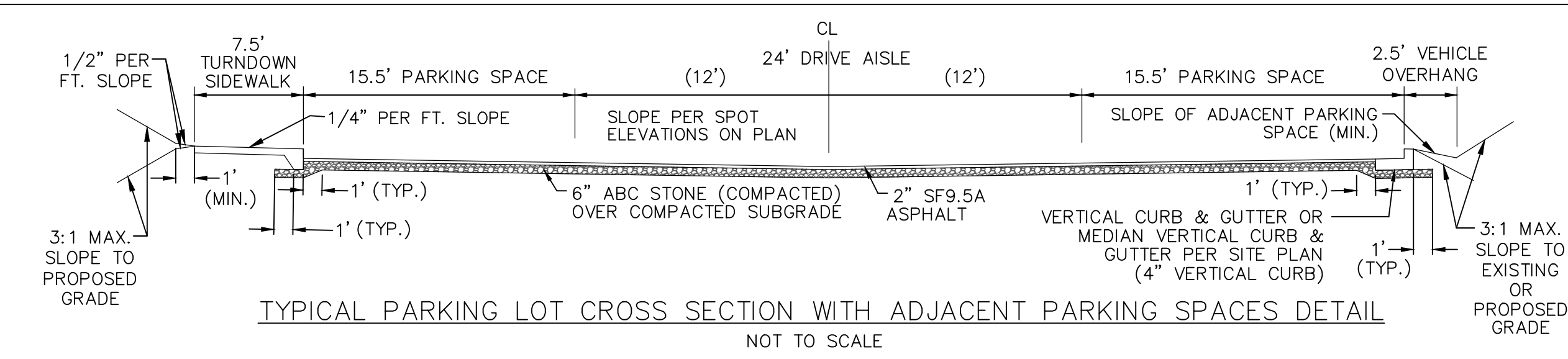
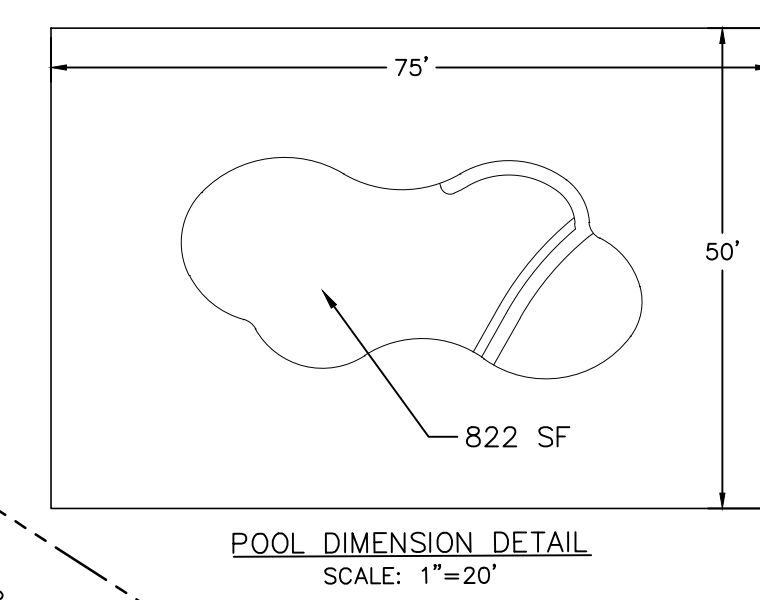
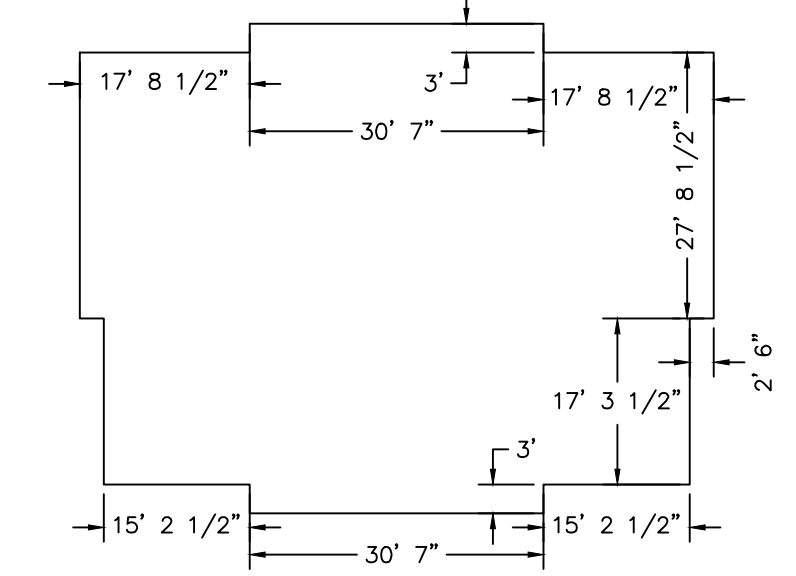
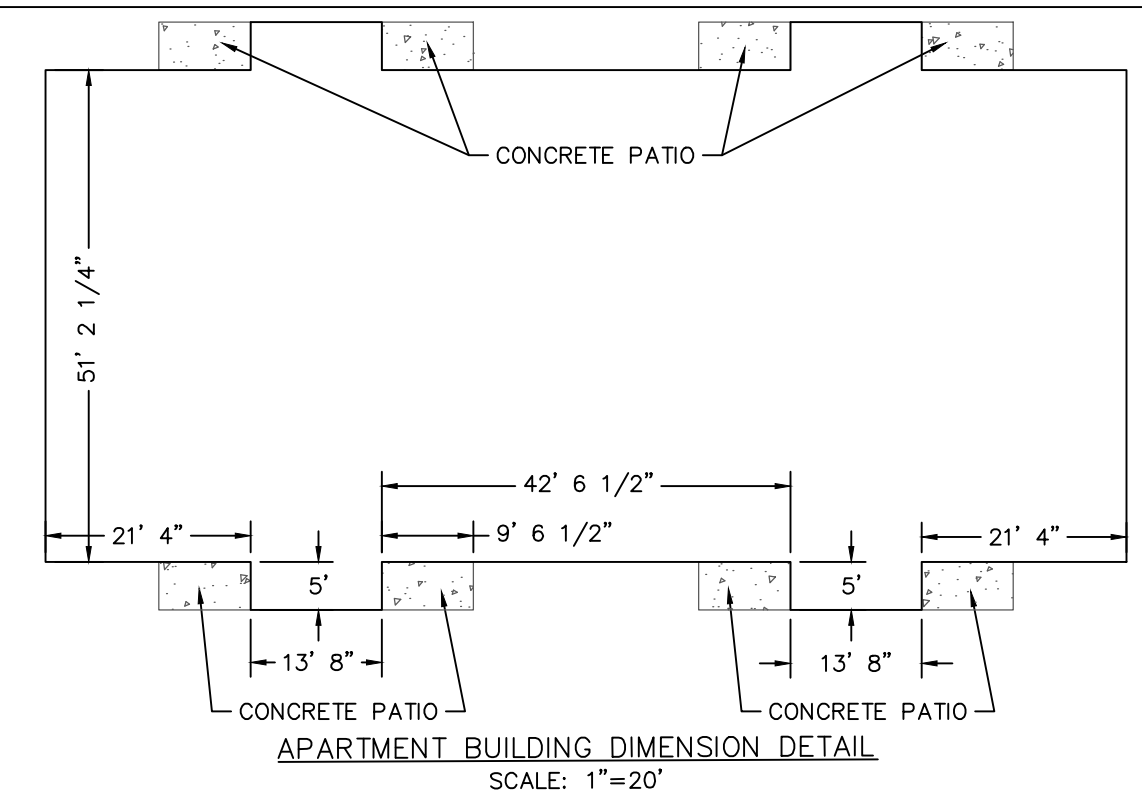
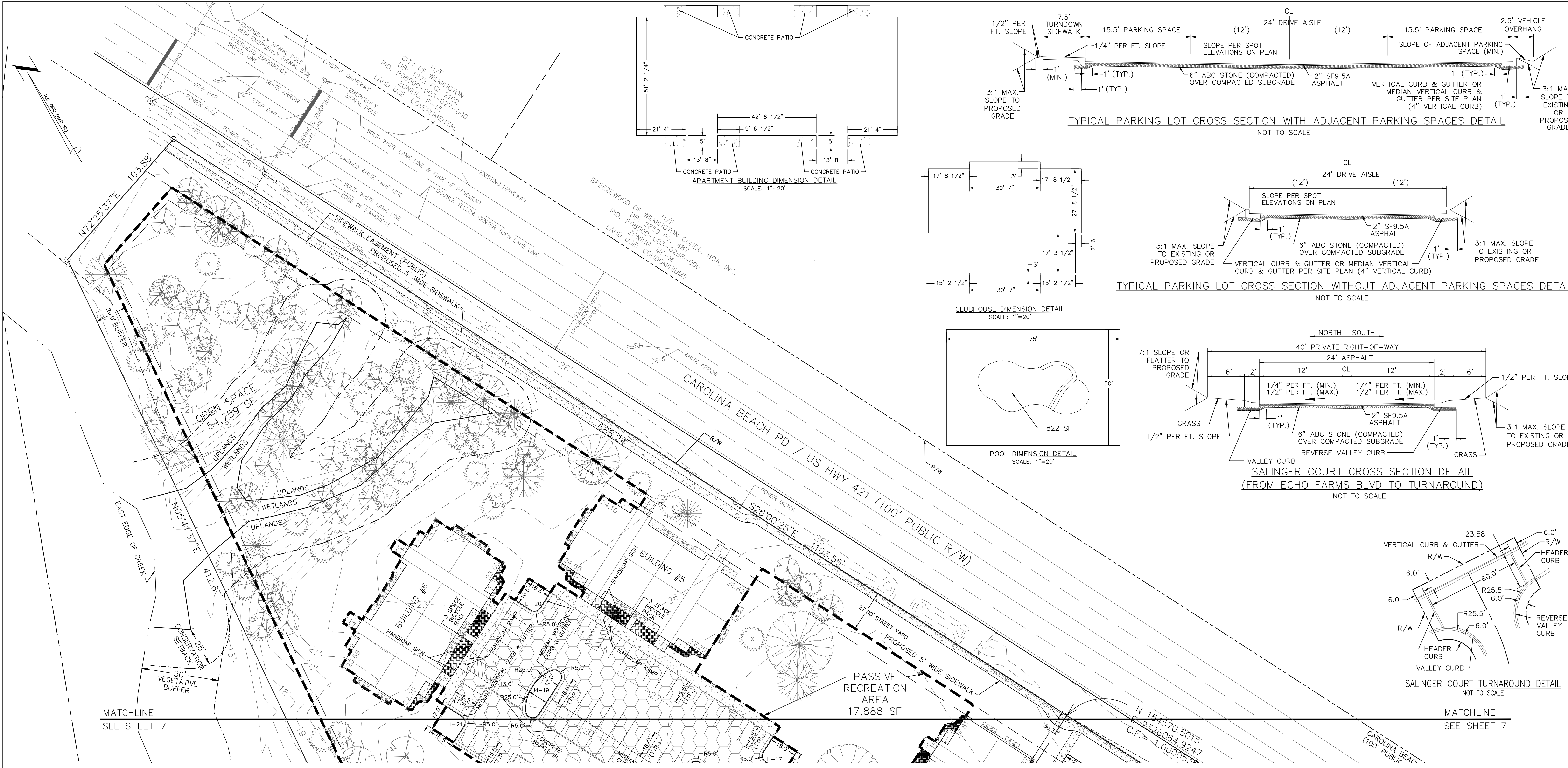
**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-5243  
Fax 910-392-5203 License No. C-2320

Developer: ECHO FARM APARTMENTS, LLC  
10 S. CARDINAL DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE: 7-22-15  
SCALE: 1"=30'  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260  
SHEET NO: 7  
OF: 22

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES



LANDSCAPE ISLAND	TOTAL AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS
LI-1	224.80	0	0
LI-2	288.80	0	0
LI-3	225.12	0	0
LI-4	220.13	0	0
LI-5	248.52	0	0
LI-6	281.12	0	0
LI-7	282.65	0	0
LI-8	339.15	0	0
LI-9	287.15	0	0
LI-10	378.84	0	0
LI-11	378.84	0	0
LI-12	355.84	0	0
LI-13	491.09	0	0
LI-14	609.04	0	0
LI-15	229.69	0	0
LI-16	283.78	0	0
LI-17	292.65	0	0
LI-18	378.84	0	0
LI-19	378.84	0	0
LI-20	267.90	0	0
LI-21	276.15	0	0
LI-22	397.14	0	0
LI-23	367.99	0	0
LI-24	378.84	0	0
LI-25	378.84	0	0
LI-26	276.15	0	0
LI-27	276.15	0	0
LI-28	1,171.14	147.53	12.60
LI-29	278.99	0	0
LI-30	224.31	0	0
LI-31	223.15	0	0
LI-32	217.52	0	0
LI-33	221.34	0	0
LI-34	223.06	0	0
LI-35	288.80	0	0
LI-36	216.67	0	0

**INTERIOR LANDSCAPING ISLANDS**

TREES PER DISTURBED ACRE  
9.86 ACRES \* 15 = 147.9, 148 TREES REQUIRED  
\*SEE LANDSCAPING PLAN FOR PROVIDED TREES

**STREET YARD-CAROLINA BEACH ROAD (PRIMARY FRONTAGE)**  
STREET FRONTAGE = 1,103.55 FT  
REQUIRED STREET YARD = 18 \* 1,103.55 = 19,863.90 SF  
PROVIDED STREET YARD = 27,620 SF  
IMPERVIOUS AREA = 5,508 SF  
PERCENT IMPERVIOUS = 5,508 / 27,620 \* 100% = 19.94%  
\*OVER 15% MAXIMUM BECAUSE MOST OF THE FRONTAGE SIDEWALK REQUIRED BY THE CITY OF WILMINGTON HAD TO BE LOCATED ON THE SITE INSTEAD OF WITHIN THE CAROLINA BEACH RD R/W

**STREET YARD-ECHO FARMS BLVD (SECONDARY FRONTAGE)**  
STREET FRONTAGE = 469.83 - 28 = 441.83 FT  
REQUIRED STREET YARD = 18 \* 441.83 / 2 = 3,976.47 SF  
PROVIDED STREET YARD = 3,474.88 + 593.63 = 4,068.51 SF  
IMPERVIOUS AREA = 234.19 SF  
PERCENT IMPERVIOUS = 234.19 / 4,068.51 \* 100% = 5.76%  
REQUIRED PLANTING = 4,068.51 / 600 = 6.78, 7 CANOPY TREES (OR 3 UNDERSTORY TREES PER 1 CANOPY TREE)

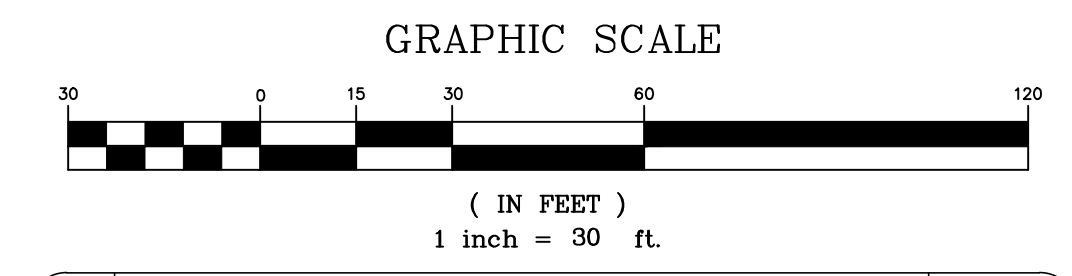
**INTERIOR SHADING**  
PARKING FACILITY AREA (PARKING LOT AREA TO BACK OF CURB (OR SIDEWALK ADJACENT TO PARKING SPACES) MINUS LANDSCAPE ISLANDS PLUS PRIVATE STREET (INCLUDING PORTION WITHIN ECHO FARMS BLVD R/W))  
123,646 SF  
REQUIRED INTERIOR SHADING (IS) = 0.2 \* 123,646 = 24,729.20 SF  
\*SEE LANDSCAPING PLAN FOR PROVIDED INTERIOR SHADING & TREES

**FOUNDATION PLANTING-FRONT OR REAR OF BUILDINGS #1-8 (PER FRONT OR REAR OF BUILDING ADJACENT TO PARKING/DRIVE AISLE)**  
REQUIRED FOUNDATION PLANTING = [(30.73' x 112.54') + (0.5' x 10.62' x 31.86')] \* 0.12 = 455.61 SF  
PROVIDED FOUNDATION PLANTING (BUILDINGS #1 & 3-8) = 508.48 SF  
\*SEE LANDSCAPING PLAN FOR PROVIDED PLANTINGS

**FOUNDATION PLANTING-SIDE OF BUILDINGS #1, 2, 3, 4, 7, & 8 (PER SIDE OF BUILDING ADJACENT TO PARKING/DRIVE AISLE)**  
REQUIRED FOUNDATION PLANTING = [(31.44' x 51.19') + (0.5' x 12.63' x 50.53')] \* 0.12 = 231.43 SF  
PROVIDED FOUNDATION PLANTING (BUILDINGS #1 & 2) = 262.12 SF  
PROVIDED FOUNDATION PLANTING (BUILDINGS #3 & 4) = 236.31 SF  
PROVIDED FOUNDATION PLANTING (BUILDING #7) = 267.45 SF  
PROVIDED FOUNDATION PLANTING (BUILDING #8) = 280.41 SF  
\*SEE LANDSCAPING PLAN FOR PROVIDED PLANTINGS

**FOUNDATION PLANTING-FRONT OF CLUBHOUSE**  
REQUIRED FOUNDATION PLANTING = [(8.98' x 14.09') + (11.31' x 31.43') + (8.98' x 19.98') + (13.81' x 4.61' x 0.5) + 87.47 SF] \* 0.12 = 93.69 SF  
PROVIDED FOUNDATION PLANTING = 169.84 SF  
\*SEE LANDSCAPING PLAN FOR PROVIDED PLANTINGS

**FOUNDATION PLANTING-FRONT OF MAINTENANCE BUILDING**  
REQUIRED FOUNDATION PLANTING = [(10.00' x 20.00') + (0.5' x 6.67' x 20.00')] \* 0.12 = 32 SF  
PROVIDED FOUNDATION PLANTING = 33.42 SF  
\*SEE LANDSCAPING PLAN FOR PROVIDED PLANTINGS



REV NO.	DESCRIPTION	DATE
1	REVISED FOR SRB SUBMITTAL	9-2-15
2	REVISED TO PROVIDE ADJUSTED SURVEY DATA	10-12-15
3	REVISED FOR PRELIMINARY RFD	10-16-15
4	REVISED PER TRC COMMENTS	11-12-15
5	REVISED PER CITY TO SAVE ADDITIONAL TREES	11-24-15
6	REVISED TO PROVIDE SIDEWALK ALONG CAROLINA BEACH RD, STREET YARD CALC. & TREE CALC.	12-14-15

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

Traffic \_\_\_\_\_

Fire \_\_\_\_\_

**CITY OF WILMINGTON**  
NORTH CAROLINA

Public Services • Engineering Division

**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_

SITE PLAN  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

DATE: 7-22-15  
SCALE: 1"=30'  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260

**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
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Developer: ECHO FARM APARTMENTS, LLC  
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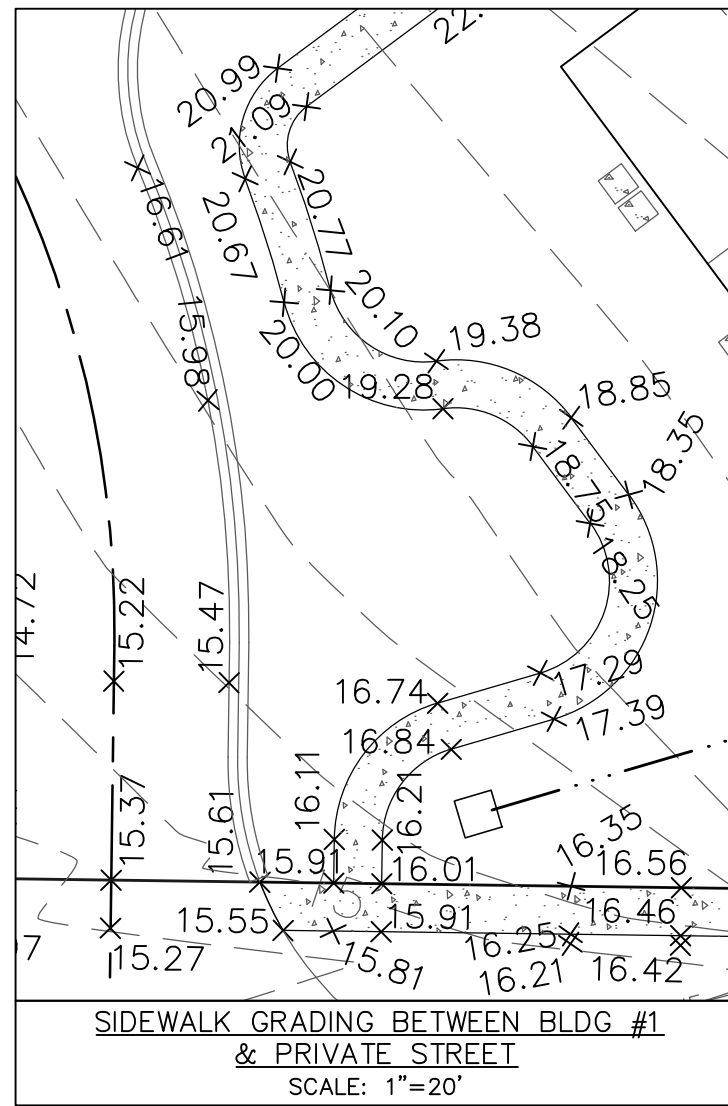
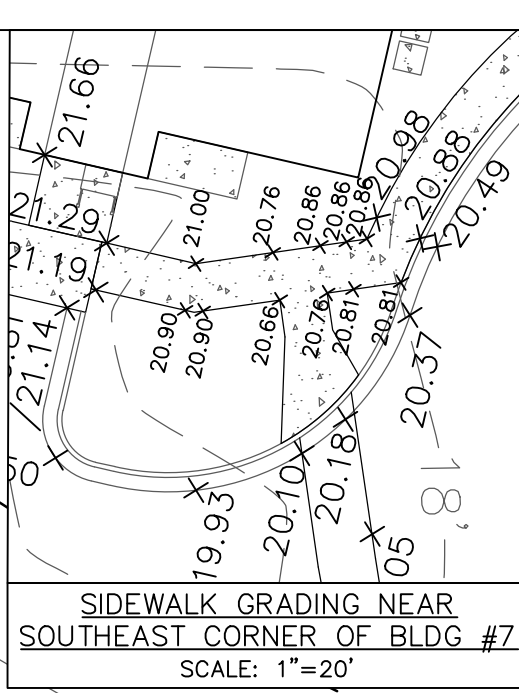
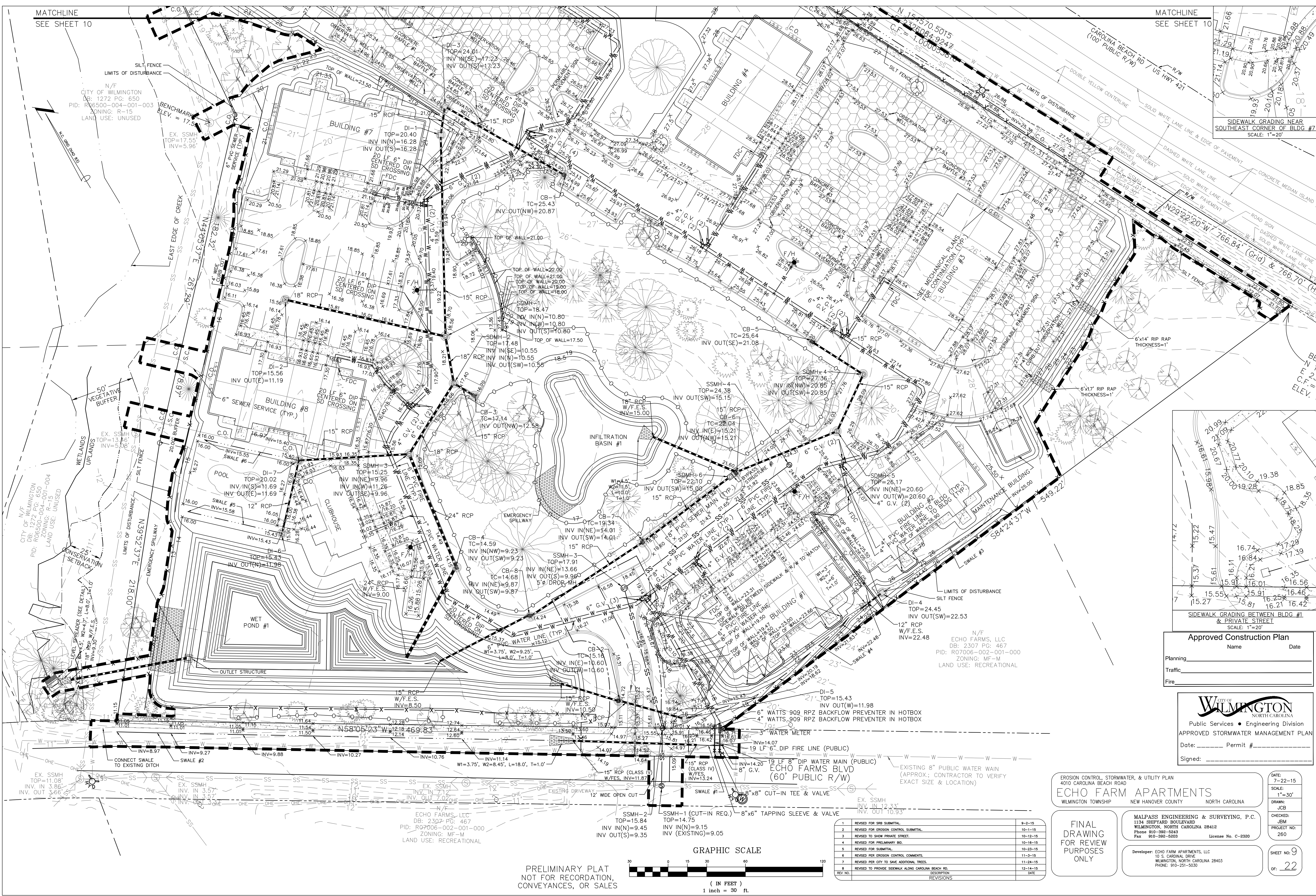
SHEET NO: 8  
OF: 22

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES



MATCHLINE  
SEE SHEET 10

MATCHLINE  
SEE SHEET 10



**Approved Construction Plan**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Planning: \_\_\_\_\_

Traffic: \_\_\_\_\_

Fire: \_\_\_\_\_

**WILMINGTON**  
NORTH CAROLINA

Public Services • Engineering Division

**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_

EROSION CONTROL, STORMWATER, & UTILITY PLAN  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

DATE: 7-22-15  
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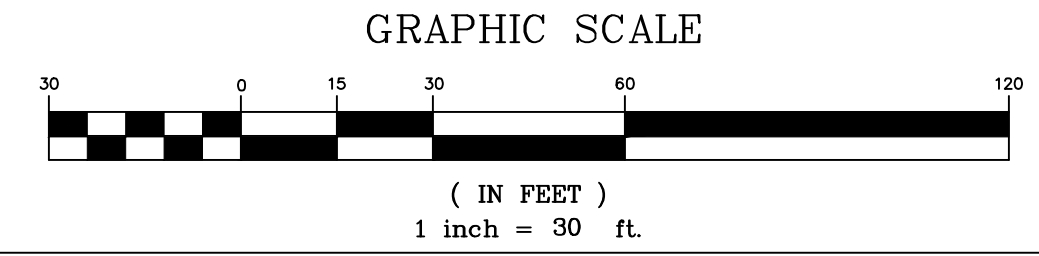
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WILMINGTON, NORTH CAROLINA 28403  
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License No. C-2380

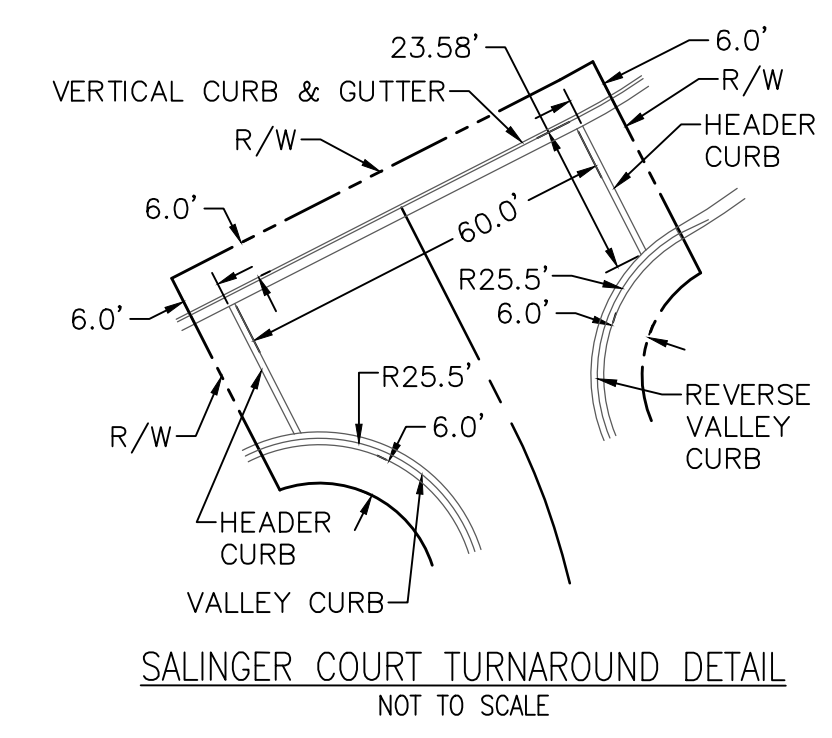
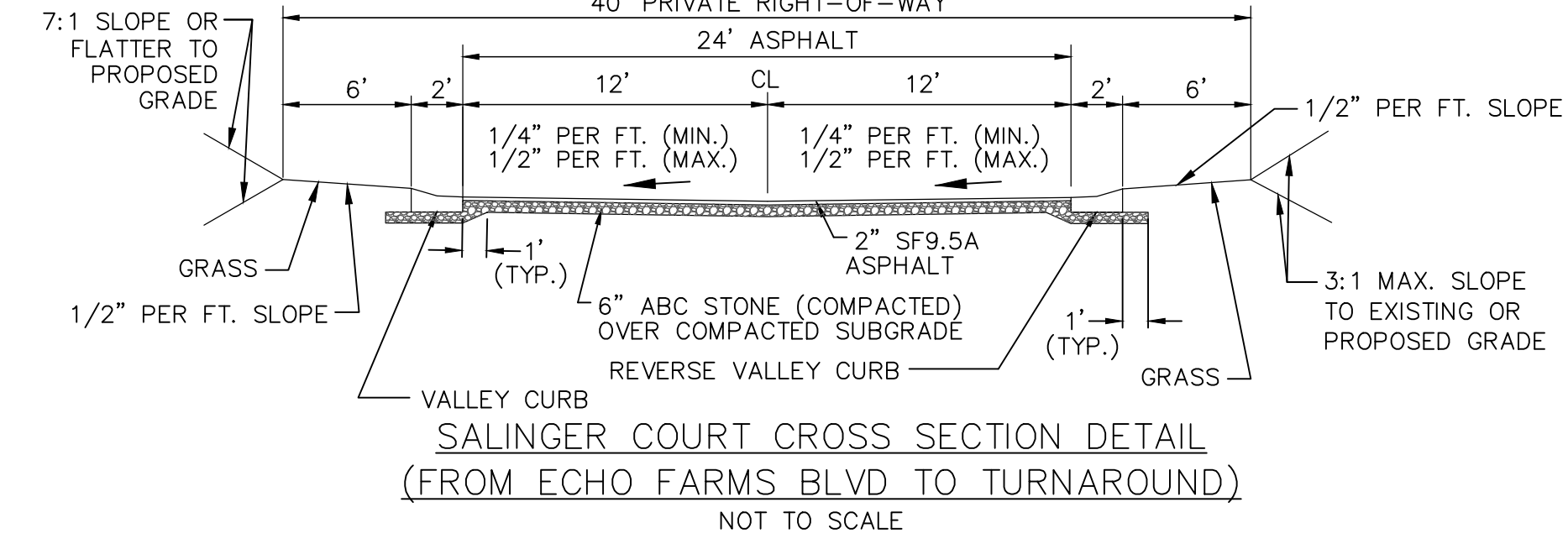
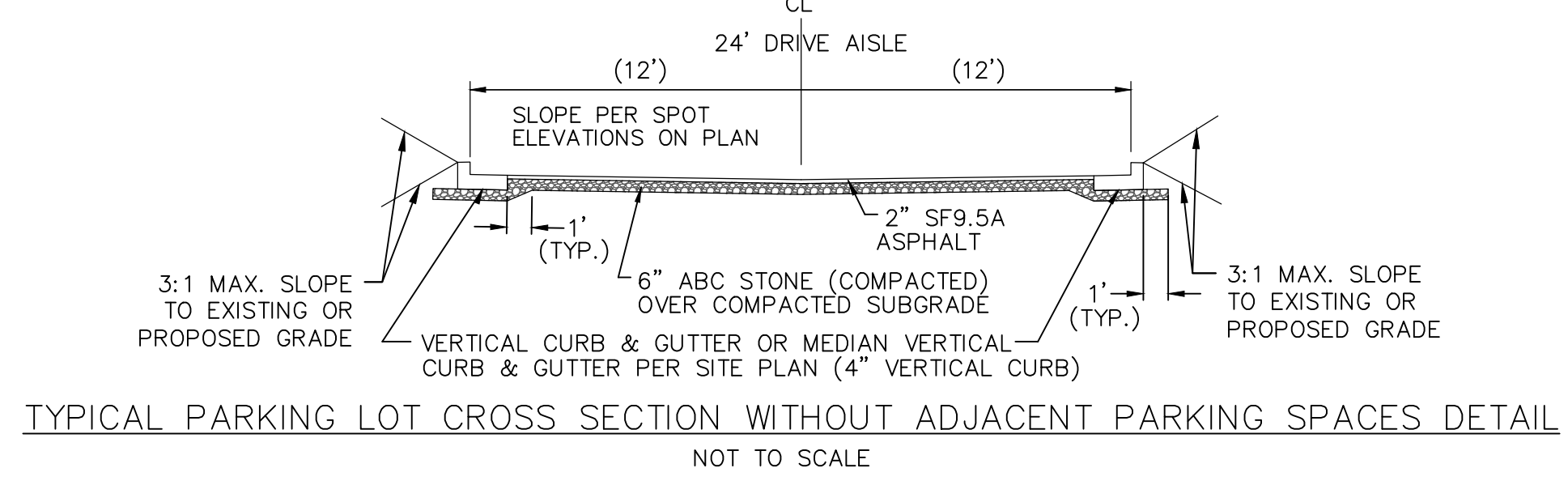
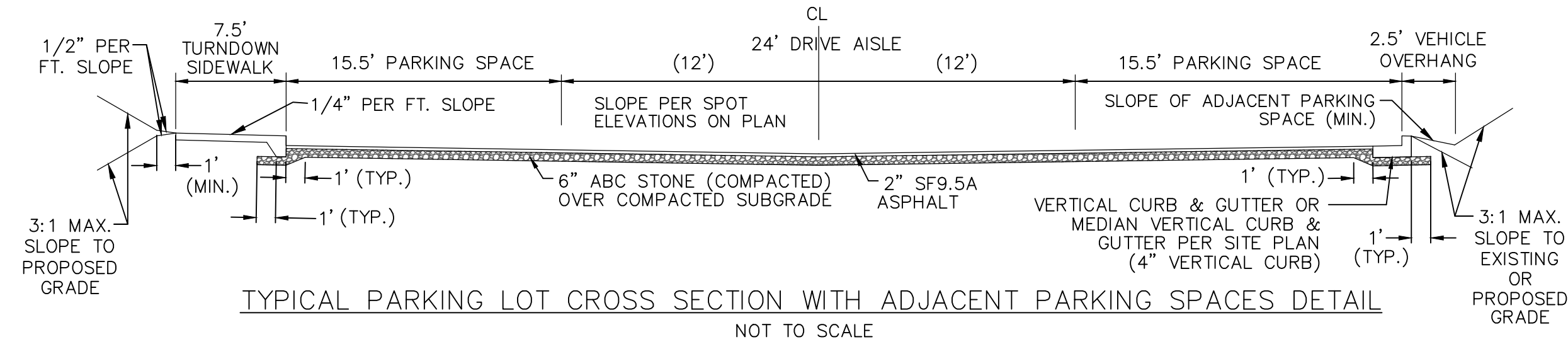
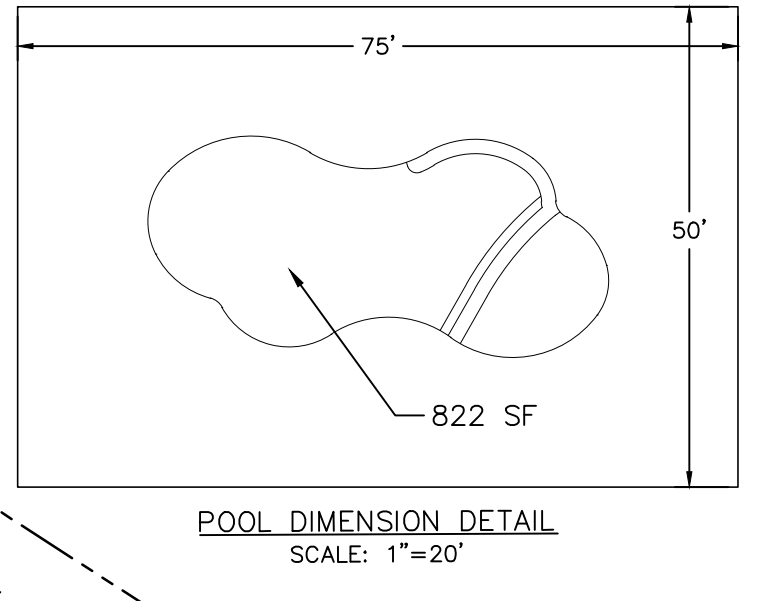
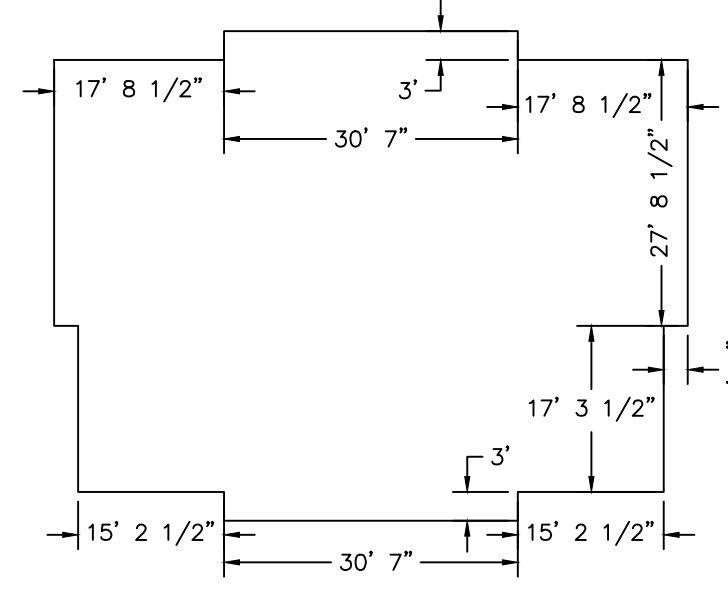
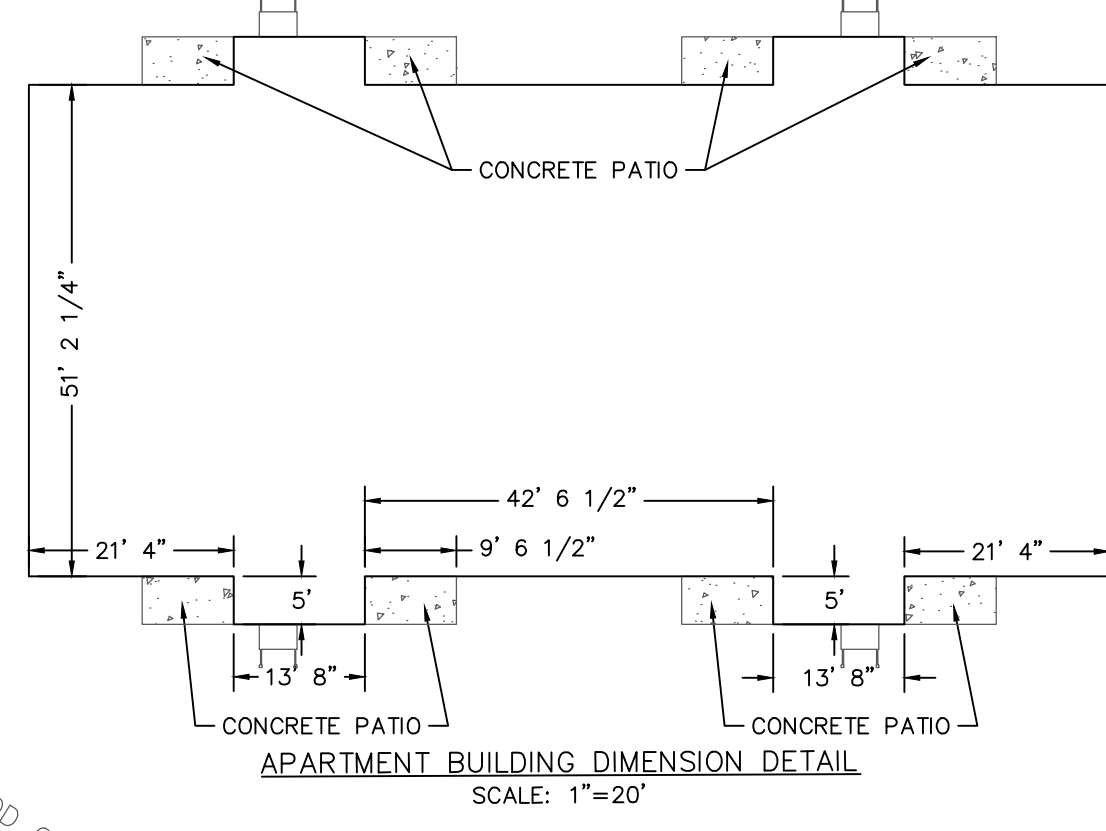
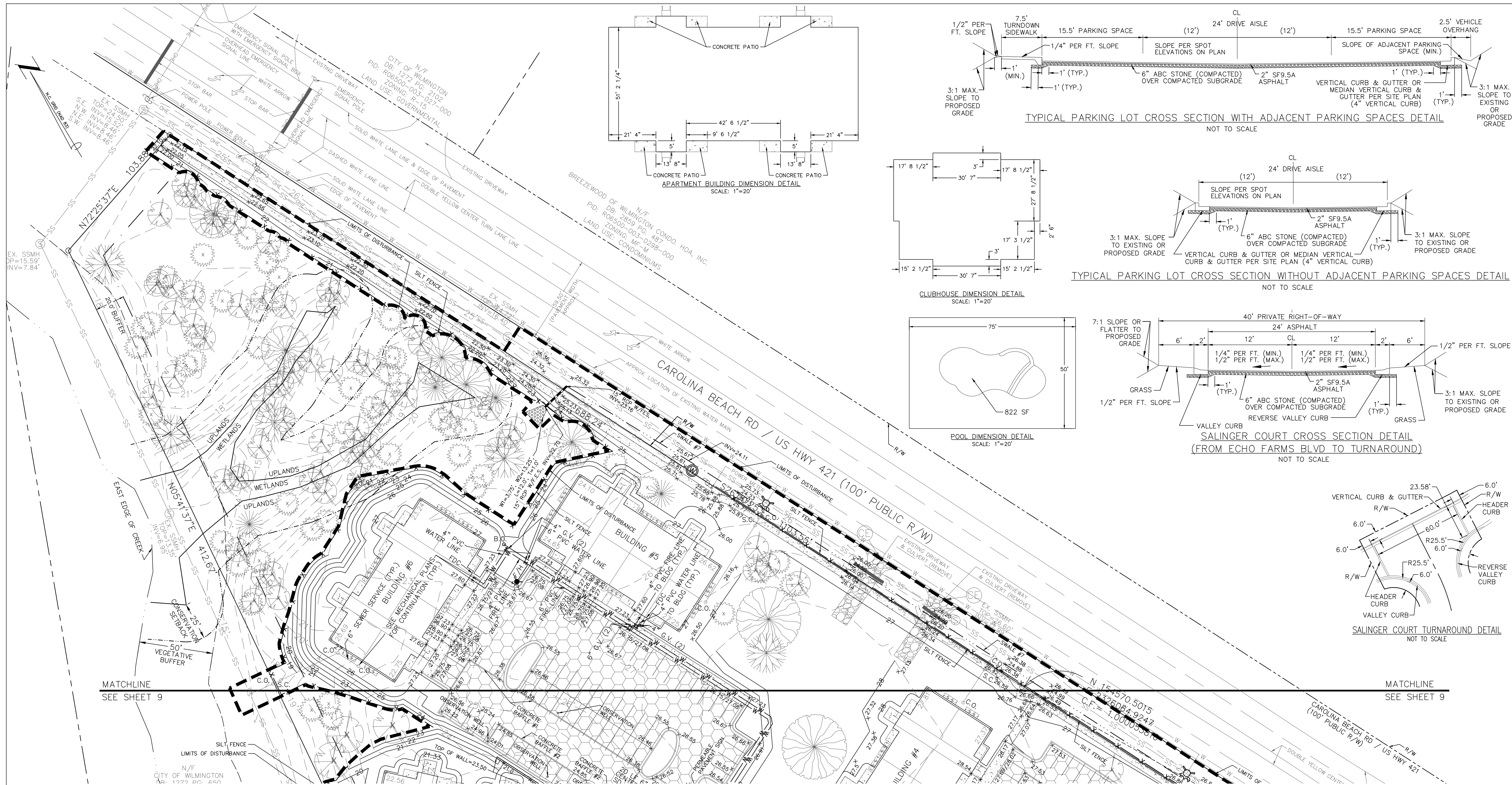
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OF: 22

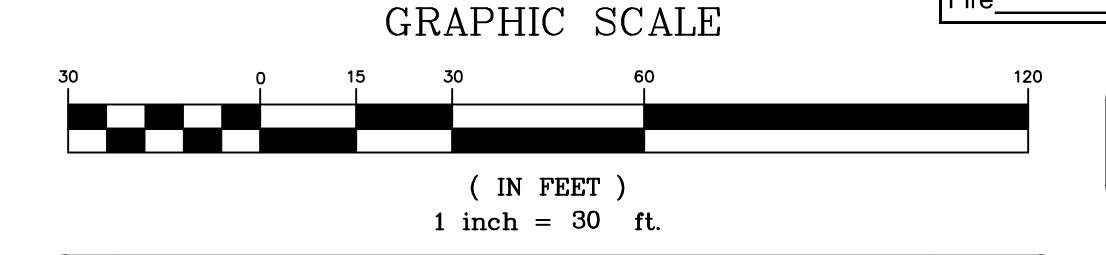
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1	REVISED FOR SRB SUBMITTAL	9-2-15
2	REVISED FOR EROSION CONTROL SUBMITTAL	10-1-15
3	REVISED TO SHOW PRIVATE STREET	10-12-15
4	REVISED FOR PRELIMINARY BID	10-16-15
5	REVISED FOR SUBMITTAL	10-23-15
6	REVISED PER EROSION CONTROL COMMENTS	11-3-15
7	REVISED PER CITY TO SAVE ADDITIONAL TREES	11-24-15
8	REVISED TO PROVIDE SIDEWALK ALONG CAROLINA BEACH RD.	12-14-15



PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES



- UTILITY SEPARATION NOTES**
1. WATER MAINS SHALL HAVE A MINIMUM COVER OF 3'.
  2. SANITARY SEWER MAINS SHALL HAVE A MINIMUM COVER OF 3' OR D.I.P. SHALL BE USED.
  3. HORIZONTAL SEPARATION BETWEEN WATER AND SANITARY SEWER SHALL BE 10' BETWEEN EDGE OF PIPES.
  4. VERTICAL SEPARATION BETWEEN WATER AND SANITARY SEWER: WATER OVER SANITARY SEWER: >18" BETWEEN PIPES OR USE D.I.P. (ON BOTH) 10' ON EITHER SIDE OF CROSSING. SANITARY SEWER OVER WATER: USE D.I.P. (ON BOTH) 10' ON EITHER SIDE OF CROSSING.
  5. HORIZONTAL SEPARATION BETWEEN STORM SEWER & SANITARY SEWER SHALL BE 5' BETWEEN EDGE OF PIPES.
  6. A 24" VERTICAL SEPARATION BETWEEN PIPES SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER. WHERE SEPARATION IS LESS THAN 24" & SANITARY IS OVER STORM USE D.I.P. ON SANITARY SEWER 10' ON EITHER SIDE OF CROSSING. WHERE SEPARATION IS LESS THAN 12" & STORM IS OVER SANITARY BRIDGING IS REQUIRED (SEE SANITARY SEWER DETAIL). WHERE SEPARATION IS 12"-24" & STORM IS OVER SANITARY BRIDGING OR D.I.P. ON SANITARY SEWER 10' ON EITHER SIDE OF CROSSING.
  7. HORIZONTAL SEPARATION BETWEEN WATER AND STORM SEWER SHALL BE 5' BETWEEN EDGE OF PIPES.
  8. VERTICAL SEPARATION BETWEEN WATER AND STORM SEWER: WATER OVER STORM SEWER: >18" BETWEEN PIPES OR USE D.I.P. ON WATER 10' ON EITHER SIDE OF CROSSING. STORM SEWER OVER WATER: USE D.I.P. ON WATER 10' ON EITHER SIDE OF CROSSING.
  9. ALL SANITARY SEWER MANHOLES WITH A DROP OF 30" OR GREATER SHALL HAVE AN INSIDE DIAMETER OF 5' WITH AN INSIDE DROP STRUCTURE.
  10. GRAVITY SANITARY SEWER WITHIN 50' OF WETLANDS SHALL BE D.I.P. AND MEET WATER MAIN MATERIALS, TESTING METHODS AND ACCEPTABILITY STANDARDS (15A NCAC 18C).
  11. SANITARY SEWER MANHOLES MUST BE GREATER THAN 50' FROM WETLANDS, AS MEASURED TO THE CLOSEST OUTSIDE EDGE.



REV NO.	DESCRIPTION	DATE
1	REVISED FOR SRB SUBMITTAL	9-2-15
2	REVISED FOR EROSION CONTROL SUBMITTAL	10-1-15
3	REVISED TO PROVIDE ADJUSTED SURVEY DATA	10-12-15
4	REVISED FOR PRELIMINARY BID	10-16-15
5	REVISED FOR SUBMITTAL	10-23-15
6	REVISED PER EROSION CONTROL COMMENTS	11-2-15
7	REVISED PER CITY TO SAVE ADDITIONAL TREES	11-24-15
8	REVISED TO PROVIDE SIDEWALK ALONG CAROLINA BEACH RD.	12-14-15

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

Traffic \_\_\_\_\_

Fire \_\_\_\_\_

**CITY OF WILMINGTON**  
NORTH CAROLINA

Public Services • Engineering Division

**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_

EROSION CONTROL, STORMWATER, & UTILITY PLAN  
4010 CAROLINA BEACH ROAD

**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

DATE: 7-22-15  
SCALE: 1"=30'  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260

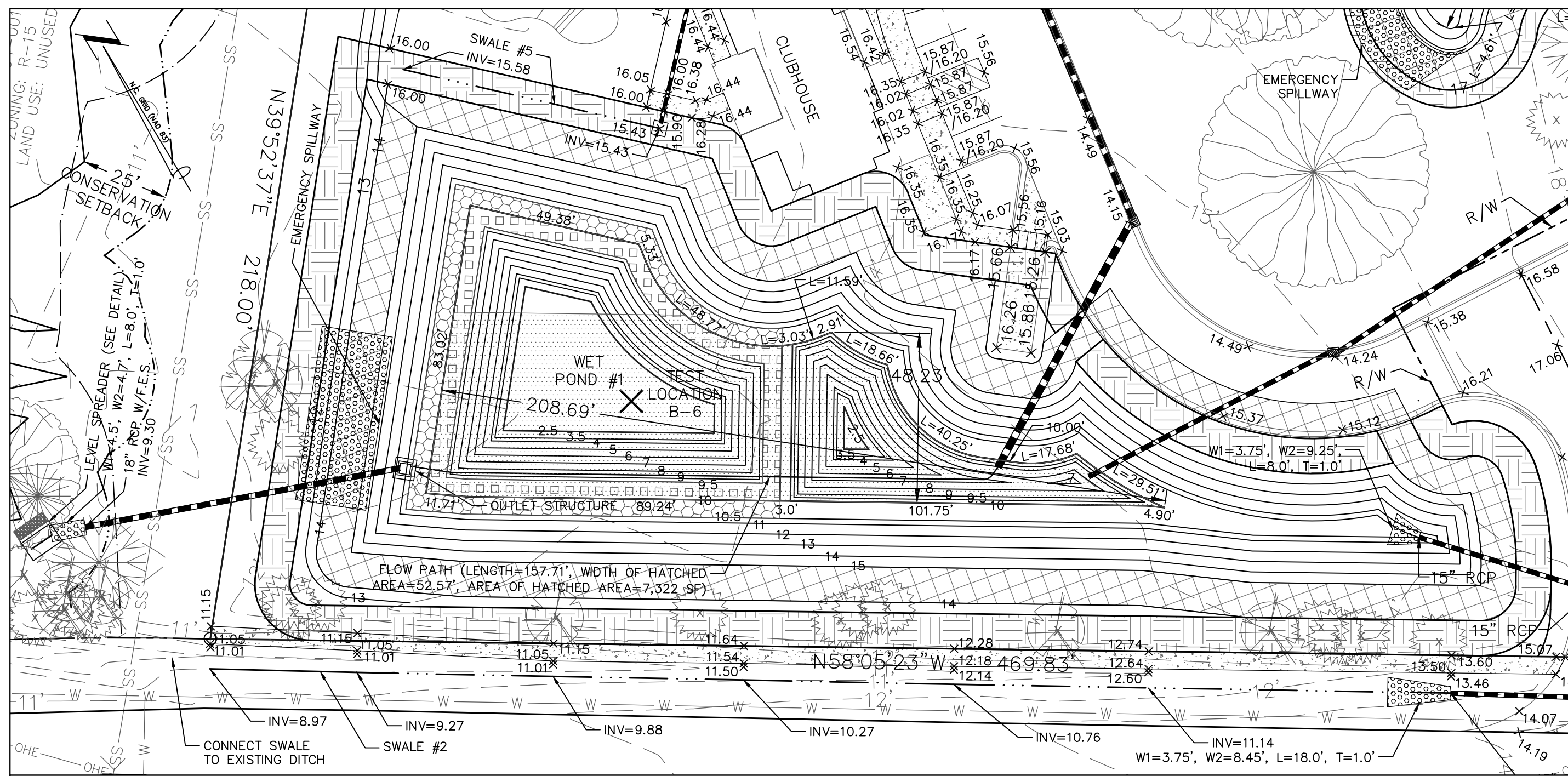
**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-6343 Fax 910-392-6203 License No. C-2320

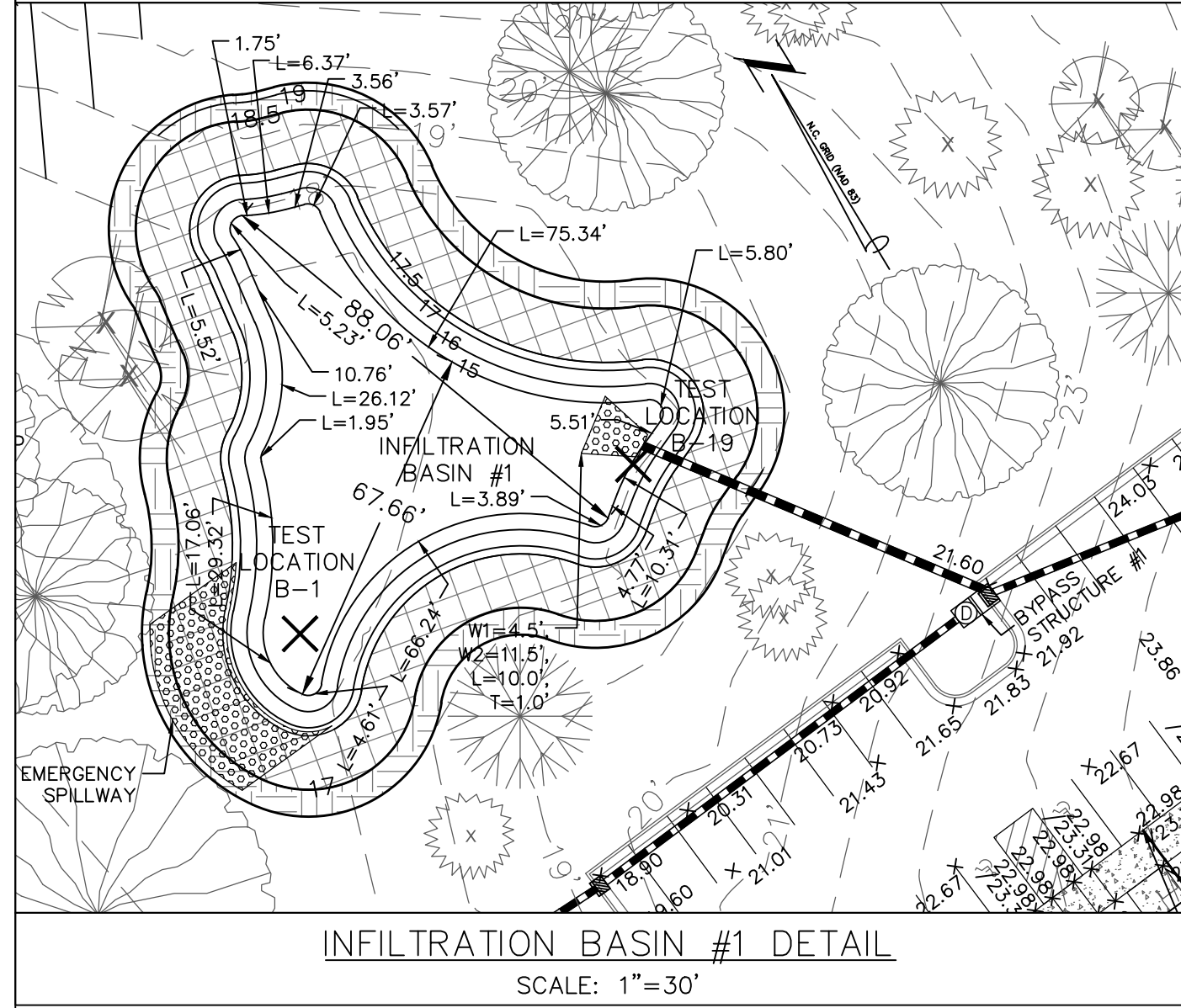
Developer: ECHO FARM APARTMENTS, LLC  
10 S. CAROLINA DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
Phone: 910-251-5030

SHEET NO: 10  
OF: 22

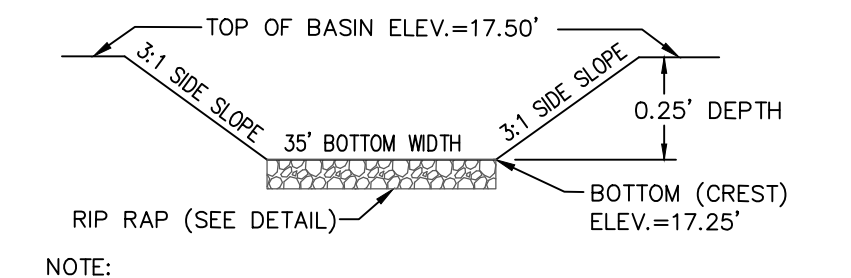




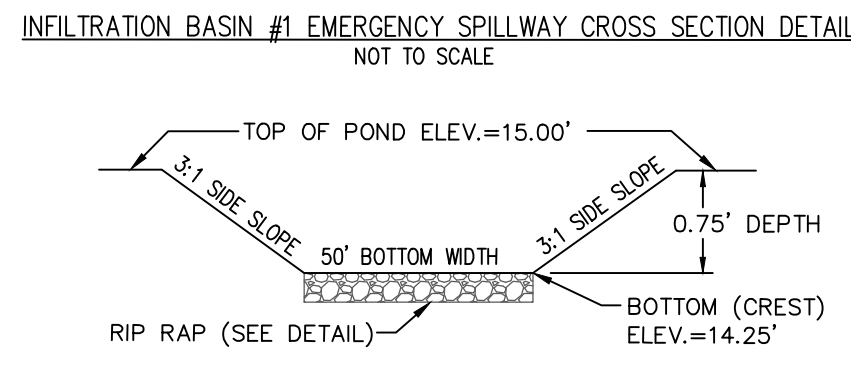
**WET POND #1 DETAIL**  
SCALE: 1"=30'



**INFILTRATION BASIN #1 DETAIL**  
SCALE: 1"=30'



NOTE:  
1. DETAIL IS CROSS SECTION THROUGH THE BASIN EMBANKMENT.  
2. INSTALL A ROW OF SACRIFICIAL BAGS ACROSS ENTIRE WIDTH OF SPILLWAY WITH TOP OF BAG AT ELEVATION=17.25' TO ENSURE RUNOFF CANNOT EXIT THE BASIN UNTIL THE STAGE REACHES ELEVATION=17.25'.

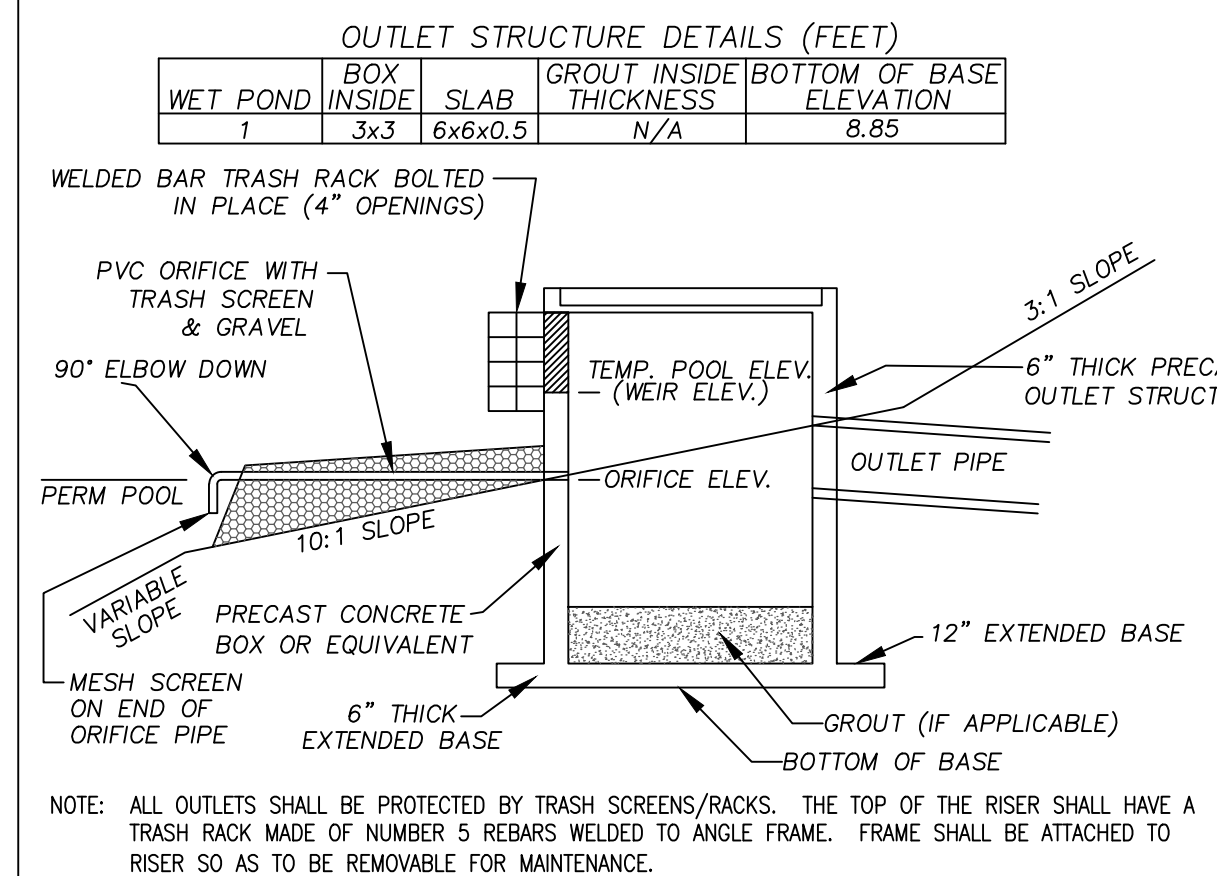


NOTE:  
1. DETAIL IS CROSS SECTION THROUGH THE POND EMBANKMENT.

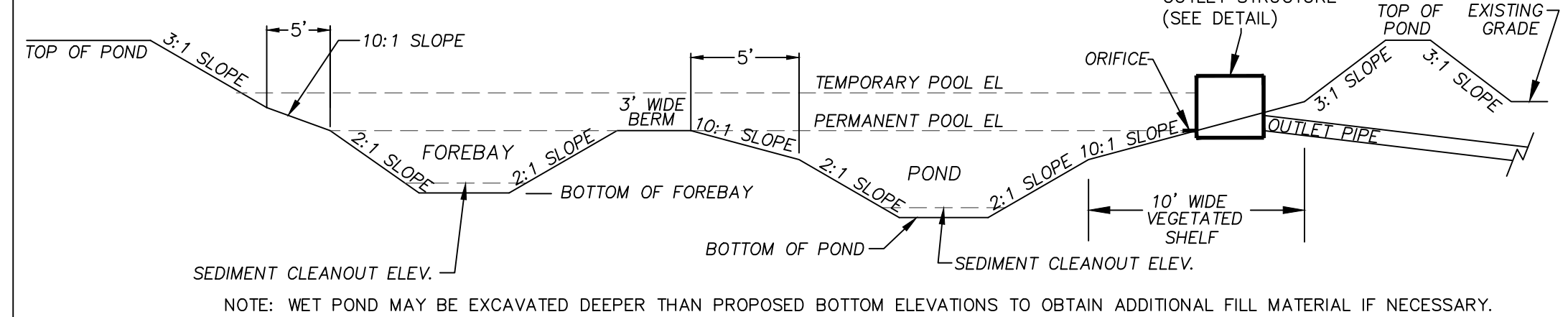
ELEV. (FT.)	AREA (SQ. FT.)	INCREMENTAL VOLUME (CU. FT.)	CUMULATIVE VOLUME (CU. FT.)
10.00	8,713	0	0
10.50	11,799	5,128	5,128
11.00	12,867	6,166	11,294
12.00	15,068	13,968	25,262
13.00	17,351	16,209	41,471
14.00	19,720	18,536	60,007
15.00	22,178	20,949	80,956

ELEV. (FT.)	AREA (SQ. FT.)	INCREMENTAL VOLUME (CU. FT.)	CUMULATIVE VOLUME (CU. FT.)
15.00	2,925	0	0
15.50	3,364	1,572	1,572
16.00	3,817	1,795	3,367
16.50	4,283	2,025	5,392
17.00	4,764	2,262	7,654
17.50	5,260	2,506	10,160

- POND NOTES:**
- TALL FESCUE, BERMUDA GRASS, PENSACOLA BAHIAGRASS, OR REED CANARY GRASS SHALL BE PLANTED ON SLOPES OF WET POND #1 ABOVE ELEVATION=10.50'.
  - TALL FESCUE, BERMUDA GRASS, PENSACOLA BAHIAGRASS, REED CANARY GRASS, OR ANY SHALLOW LAND PLANT VARIETIES FROM THE VEGETATIVE SHELF PLANT SCHEDULE SHALL BE PLANTED AROUND THE FOREBAY IN WET POND #1 FROM ELEVATION=10.00' TO 10.50'. SEE VEGETATIVE SHELF PLANT SCHEDULE FOR PLANTING OF VEGETATIVE SHELF (HATCHED AREA).
  - WET POND #1 SHALL BE USED AS A SEDIMENT BASIN WITH A FAIRLOTH SKIMMER ORIFICE DURING CONSTRUCTION. IT SHALL BE CLEANED OUT PRIOR TO USE AS A WET POND.
  - ALL WATER THAT DRAINS OFF IMPERVIOUS SURFACES SHALL BE DIRECTED INTO THE APPROPRIATE STORMWATER SYSTEM (SEE DRAINAGE AREA MAPS).
  - EMERGENCY SPILLWAY & ENERGY DISSIPATOR TO HAVE FILTER FABRIC UNDERLAYMENT.
  - IF THE POND NEEDS TO BE DRAINED FOR MAINTENANCE OR AN EMERGENCY A PUMP SHALL BE USED TO DRAIN IT.

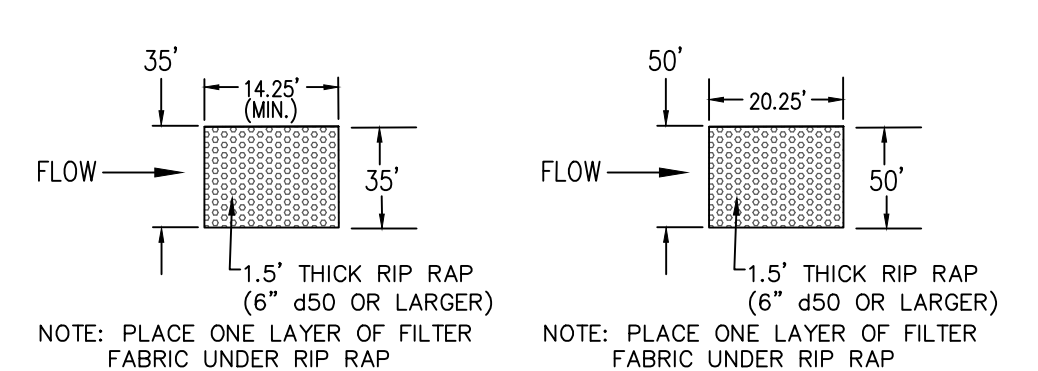
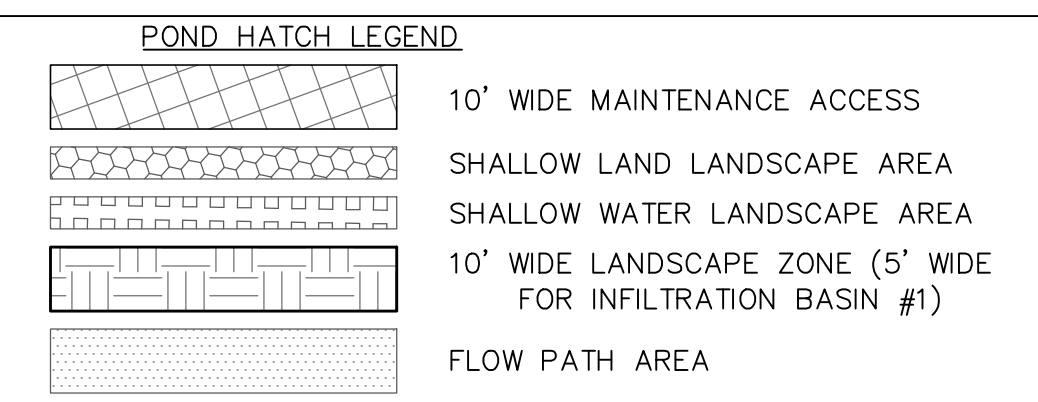


**OUTLET STRUCTURE DETAIL**  
NOT TO SCALE

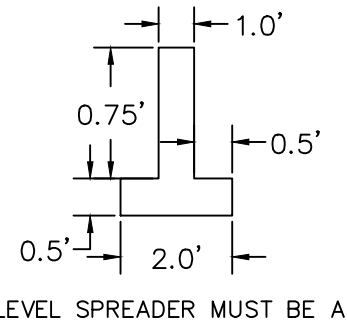


**WET POND #1-FOREBAY & POND SECTION DETAIL**  
NOT TO SCALE

WET POND	TOP OF POND	PERM. POOL	TEMP. POOL	VEGETATED SHELF	FOREBAY TOP	FOREBAY BOTTOM	POND TOP	POND BOTTOM	SEDIMENT CLEANOUT EL.	SEDIMENT CLEANOUT EL.	OUTLET STRUCTURE ELEVATIONS	EMERGENCY SPILLWAY	IMPERVIOUS AREAS (SQUARE FEET)	BUILDINGS	PARKING	SIDEWALKS	OTHER	OFFSITE	TOTAL
1	15.00	10.00	11.20	9.50-10.50	2.50	2.50	3.50	3.50	13.75	0.5	18" RCP @ 9.85	50' @ 14.25	30,773	64,657	8,360	4,838	N/A	108,628	



**LEVEL SPREADER DETAIL**  
NOT TO SCALE

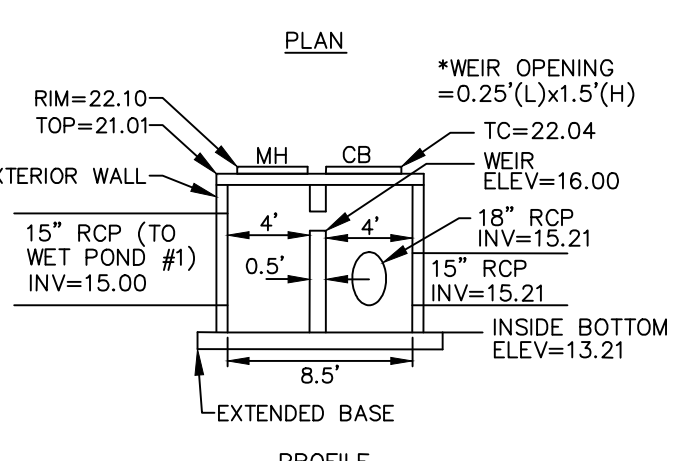
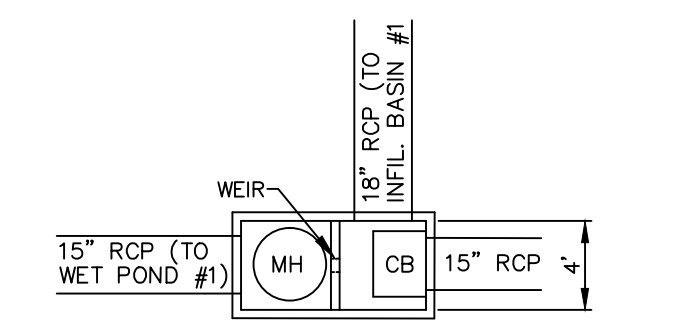


**LEVEL SPREADER LIP & CONCRETE FOOTER DETAIL**  
NOT TO SCALE

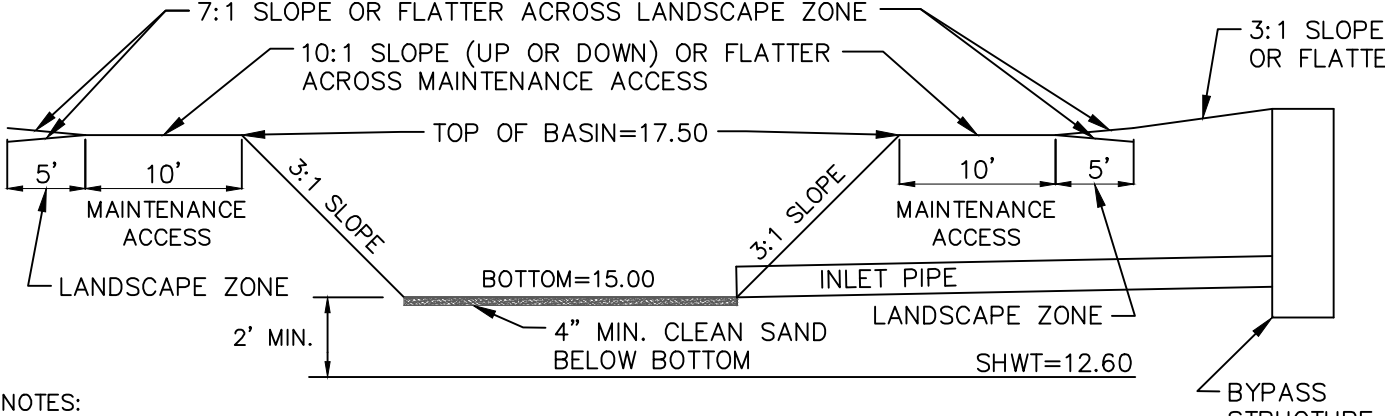
**SEASONAL HIGH WATER TABLE RESULTS**

TEST LOCATION ID	EXISTING GROUND ELEVATION (FEET)*	SHWT (INCHES BELOW GROUND SURFACE)**	SHWT ELEVATION (FEET)**
B-1	16.60	48	12.60
B-2	20.96	38	17.80
B-3	27.98	60	22.98
B-4	26.17	36	23.17
B-5	24.67	66	19.17
B-6	12.47	10	11.64
B-7	14.50	30	12.00
B-8	14.79	36	11.79
B-9	18.18	60	13.18
B-10	27.03	48	23.03
B-11	25.73	16	24.40
B-12	25.47	18	23.97
B-13	26.32	36	23.32
B-14	25.48	48	21.48
B-15	25.71	42	22.21
B-16	25.48	42	21.98
B-17	24.73	42	21.23
B-18	25.57	44	21.91
B-19	17.76	66	12.26
B-20	27.02	52	22.69
B-21	27.05	50	22.89
B-22	26.29	38	23.13
B-23	26.30	42	22.80

\* INFORMATION PROVIDED BY BATEMAN CIVIL SURVEY COMPANY, PC.  
\*\* INFORMATION PROVIDED BY ECS CAROLINAS, LLP.  
\*\*\* CALCULATED BASED ON INFORMATION PROVIDED BY OTHERS

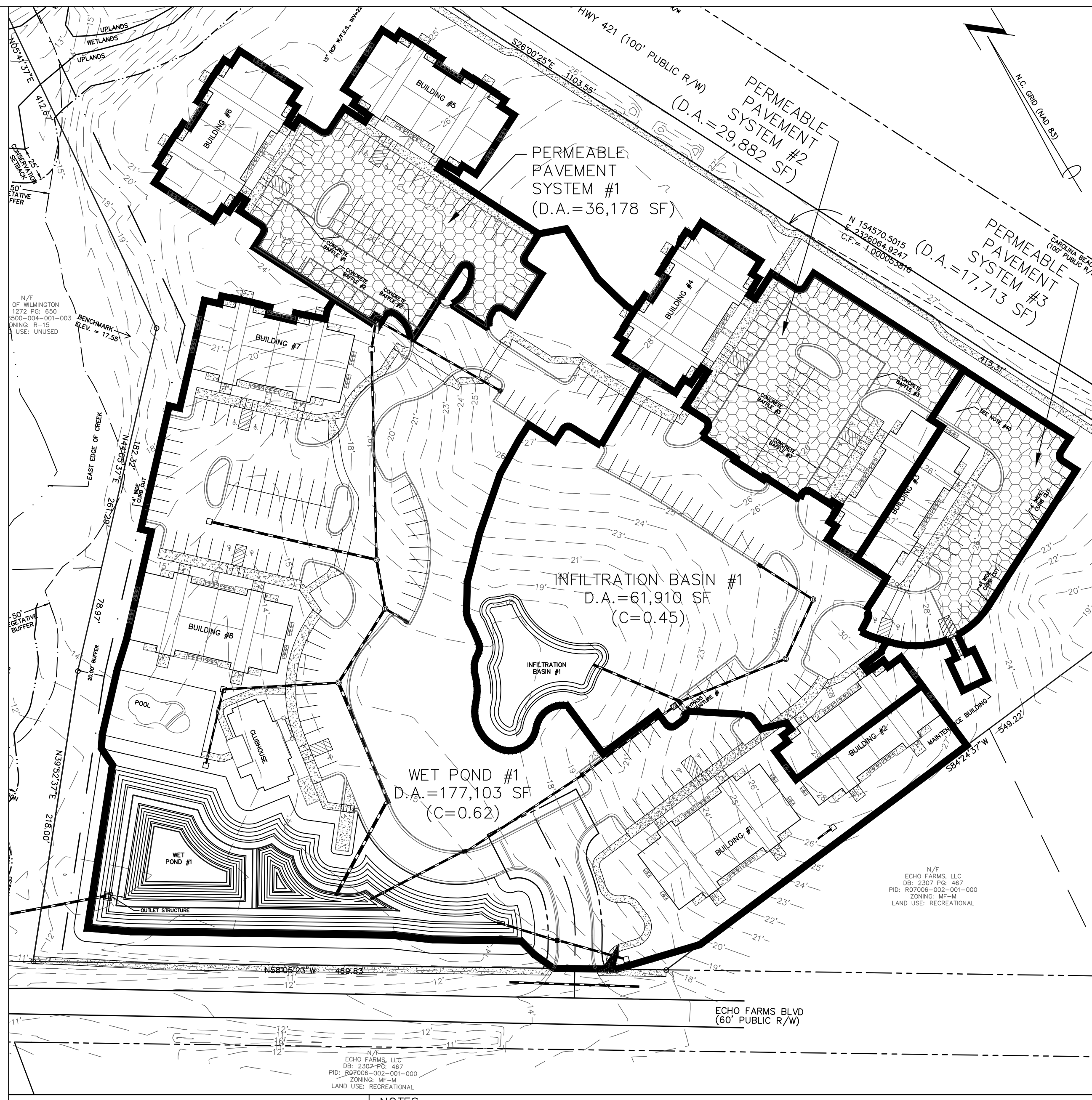


**BYPASS STRUCTURE #1 DETAIL**  
NOT TO SCALE



**INFILTRATION BASIN #1-CROSS SECTION DETAIL**  
NOT TO SCALE

NOTE:  
1. ANY FILL MATERIAL USED TO OBTAIN INFILTRATION BASIN BOTTOM ELEVATION SHALL BE CLEAN SAND (BEACH QUALITY) WITH A PERMEABILITY RATE EQUAL TO OR GREATER THAN 13.0 INCHES/HOUR.



**BMP DRAINAGE AREA MAP**  
SCALE: 1"=60'

NOTES:  
1. D.A. OF PERMEABLE PAVEMENT SYSTEMS EXCLUDE ANY PERVIOUS AREA SHOWN WITHIN D.A. BOUNDARY.  
2. D.A. OF WET POND #1 EXCLUDES D.A. OF INFILTRATION BASIN #1.

LOCATION	PLANT VARIETIES BOTANICAL NAME (COMMON NAME)	SPACING	SIZE	HATCHED SHELF AREA (SF)	PLANTINGS REQUIRED (MIN. 50 PER 200 SF)	PLANTINGS PROVIDED (MIN. 50 PER 200 SF)
*SHALLOW WATER (VEGETATIVE SHELF BELOW PERMANENT POOL ELEVATION; ELEV.=9.50' TO ELEV.=10.00')	Acorus subcordatus (Sweetflag), Alisma subcordatum (Water plantain), Hydrocotyle quadrivalvis (Waterpocket), Iris virginica (Blue flag iris), Juncus effusus var. pygmaeus (Soft rush), Ludwigia spp. (Primrose willow), Peltandra virginica (Arrow arum), Pontederia cordata (Pickerelweed), Sagittaria latifolia (Duck Potato), Sagittaria lancifolia (Bulltongue), Saururus cernuus (Lizard's tail), Schoenoplectus toberamontani (Soft stem bulrush), Schoenoplectus americanus (Three-square bulrush), Scirpus operinus (Woolgrass), Zizaniopsis miliacea (Giant cutgrass)	2' O.C. STAGGERED	5-6" PLUG	1,554.90	389	389
**SHALLOW LAND (VEGETATIVE SHELF ABOVE PERMANENT POOL ELEVATION; ELEV.=10.00' TO ELEV.=10.50')	Asclepias incarnata (Swamp Milkweed), Carex tenera (Quill sedge), Chelone glabra (White Turtlehead), Eupatoriadelphus dubius (Dwarf Joe Pye Weed), Eupatoriadelphus fistulosus (Joe Pye Weed), Eupatoriadelphus maculatus (Spotted trumpetweed), Hibiscus coccineus (Scarlet rose mallow), Hibiscus laevis (Highbush rosemallow), Kosteletzkya virginica (Seashore Mallow), Lobelia cardinalis (Cardinal flower), Lobelia elongata (longleaf lobelia), Lobelia siphilitica (Great blue Lobelia), Rhynchospora colorata (Starrush whitetop), Soocharum baldwinii (Narrow plumegrass)	2' O.C. STAGGERED	5-6" PLUG	1,490.12	373	373

\*AT LEAST 3 DIFFERENT SHALLOW WATER PLANT VARIETIES MUST BE PLANTED.  
\*\*AT LEAST 3 DIFFERENT SHALLOW LAND PLANT VARIETIES MUST BE PLANTED.

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Public Services • Engineering Division

APPROVED STORMWATER MANAGEMENT PLAN

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_

EROSION CONTROL & STORMWATER DETAIL SHEET  
4010 CAROLINA BEACH ROAD

**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

MALPASS ENGINEERING & SURVEYING, P.C.  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-6243 Fax 910-392-6203 License No. C-2320

Developer: ECHO FARM APARTMENTS, LLC  
10 S. CARDINAL DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE: 10-1-15  
SCALE: VARIES  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260

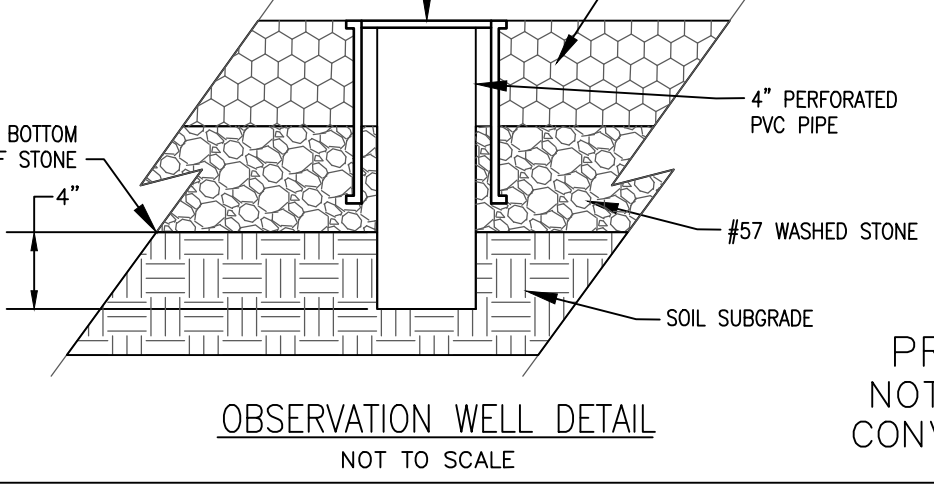
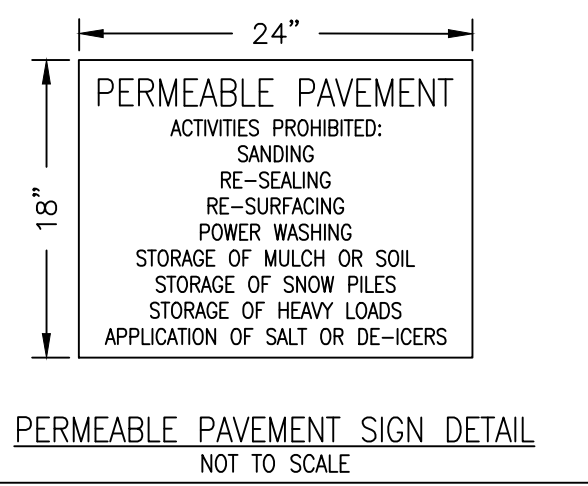
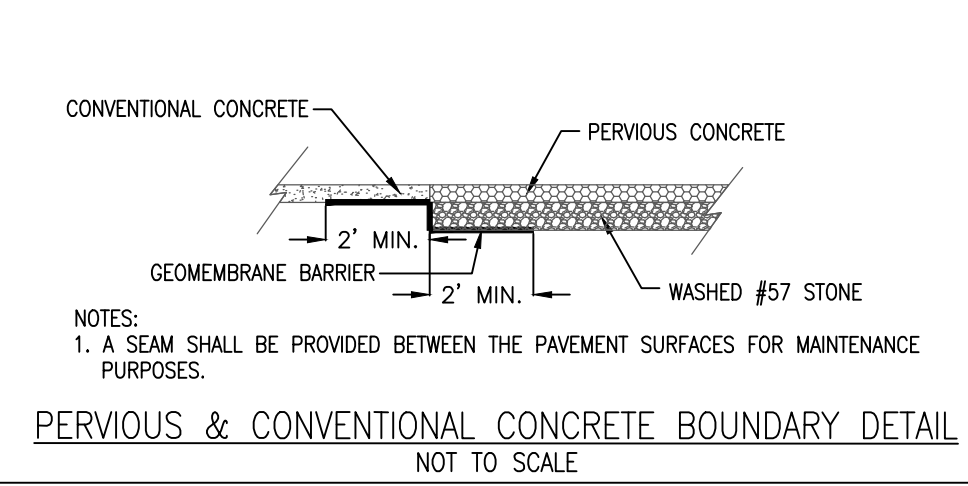
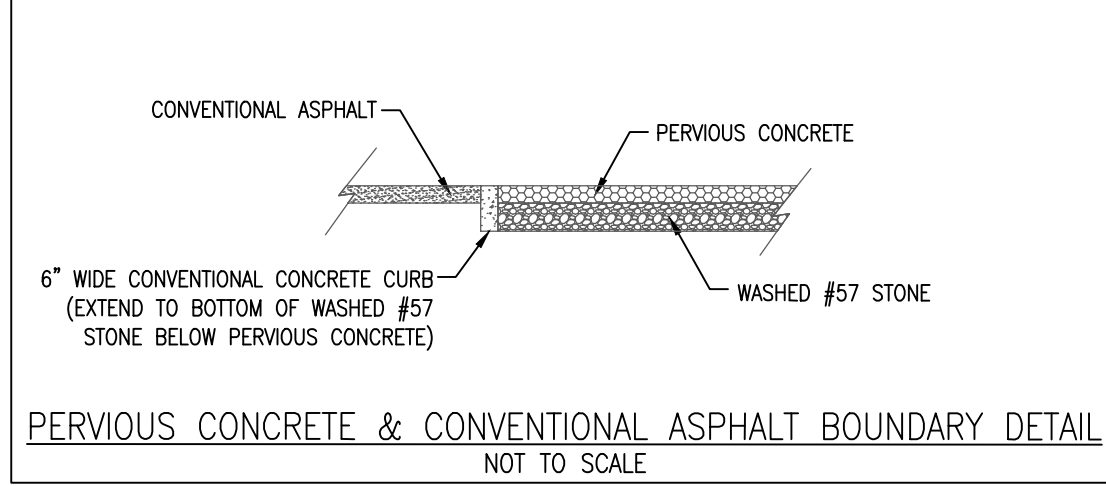
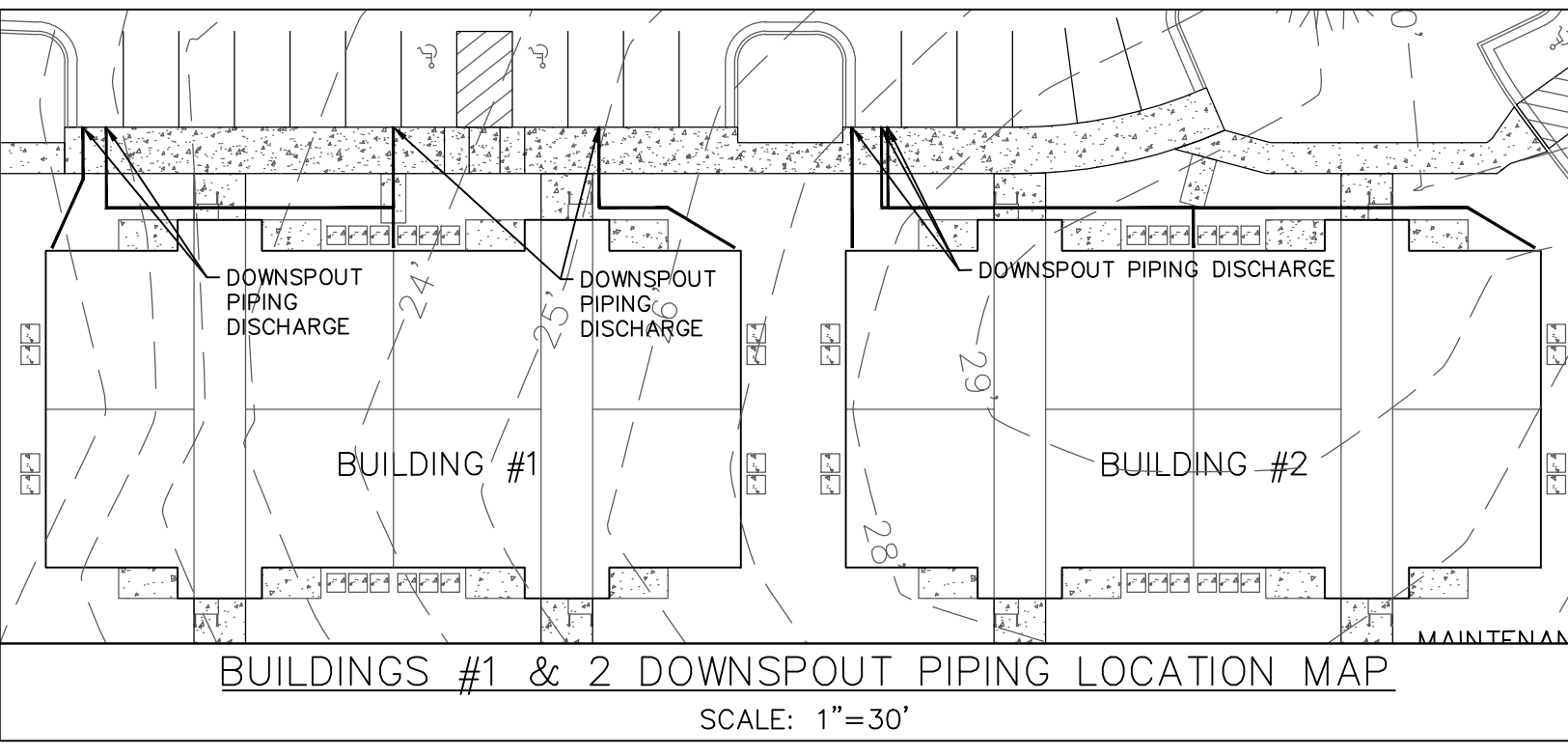
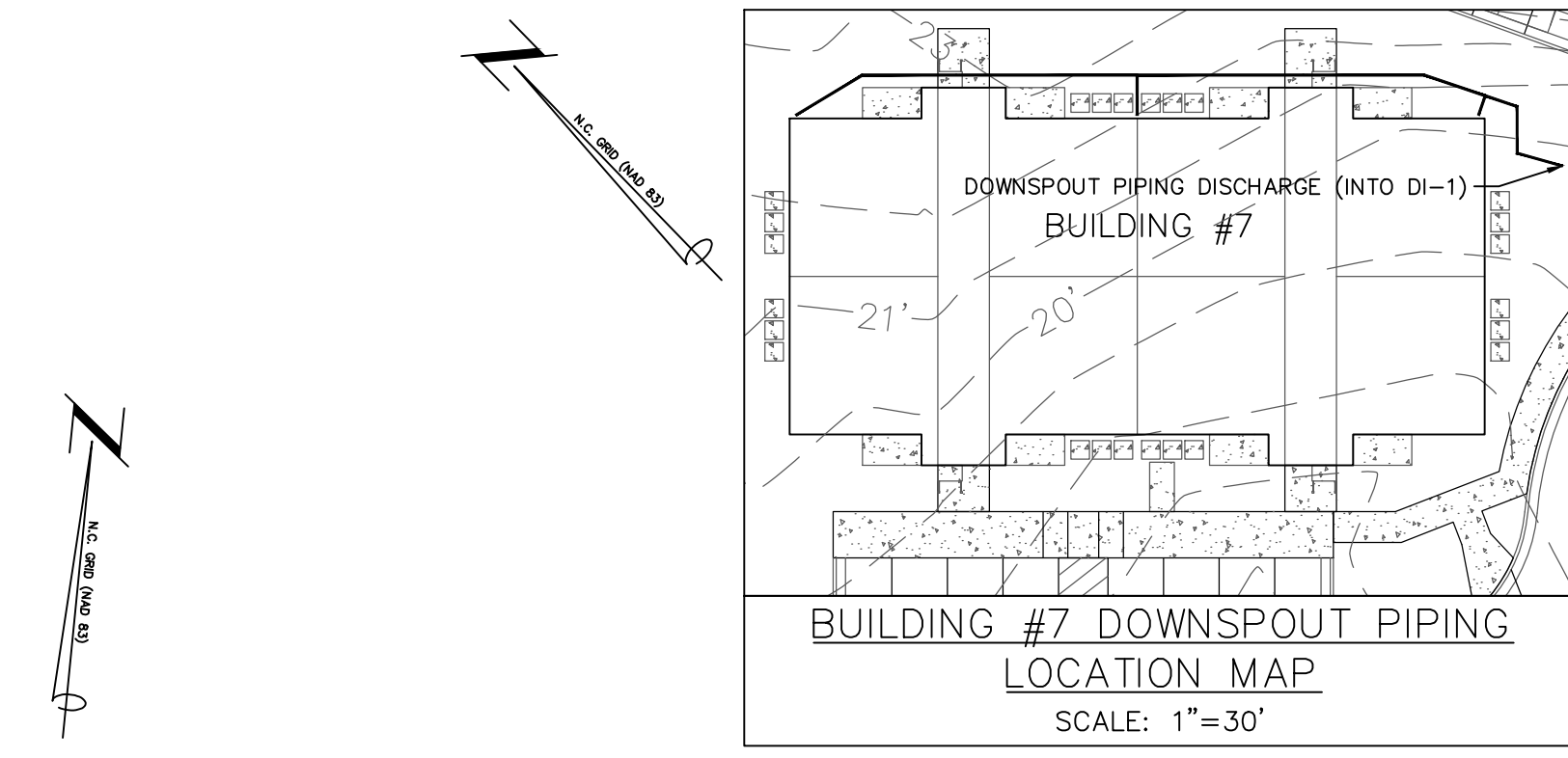
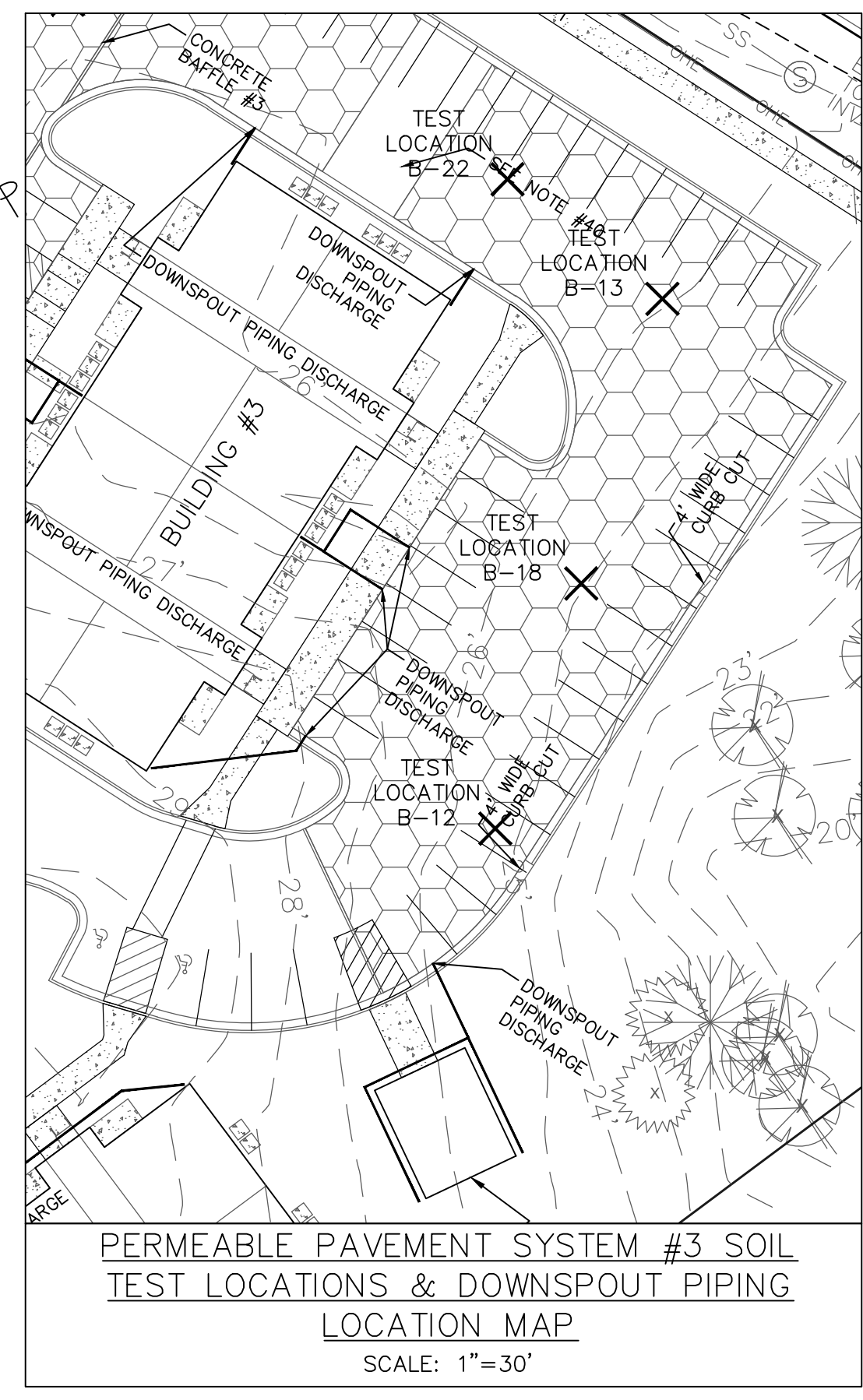
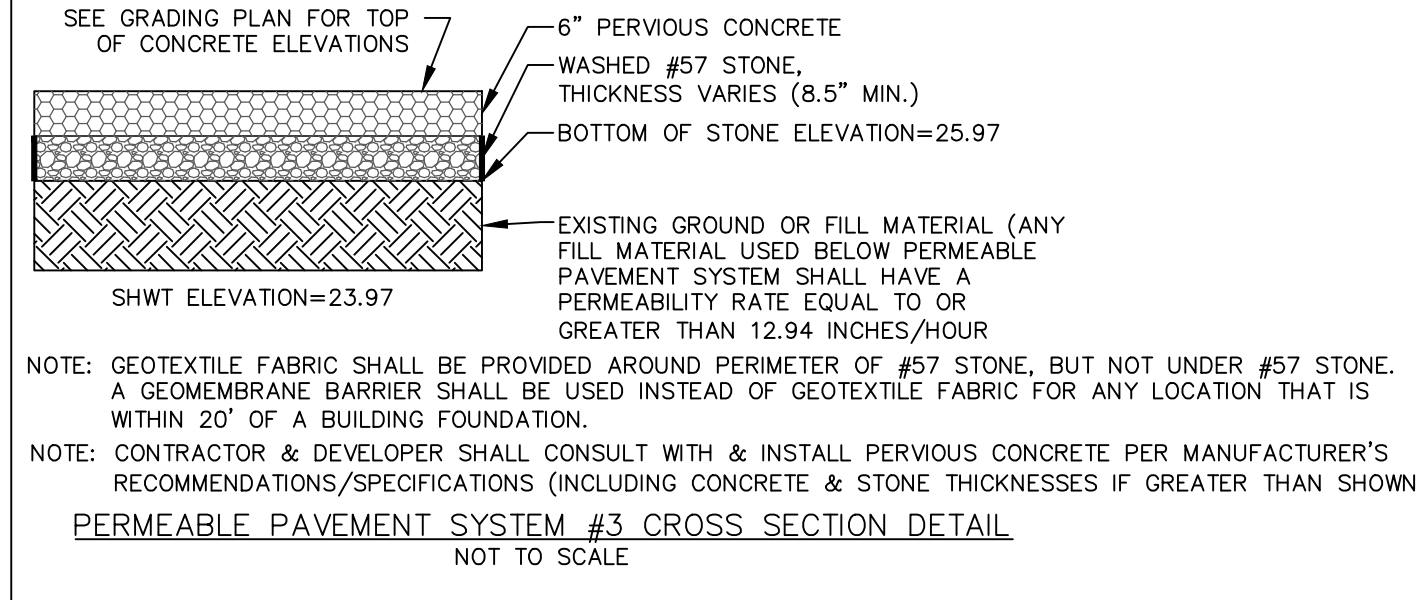
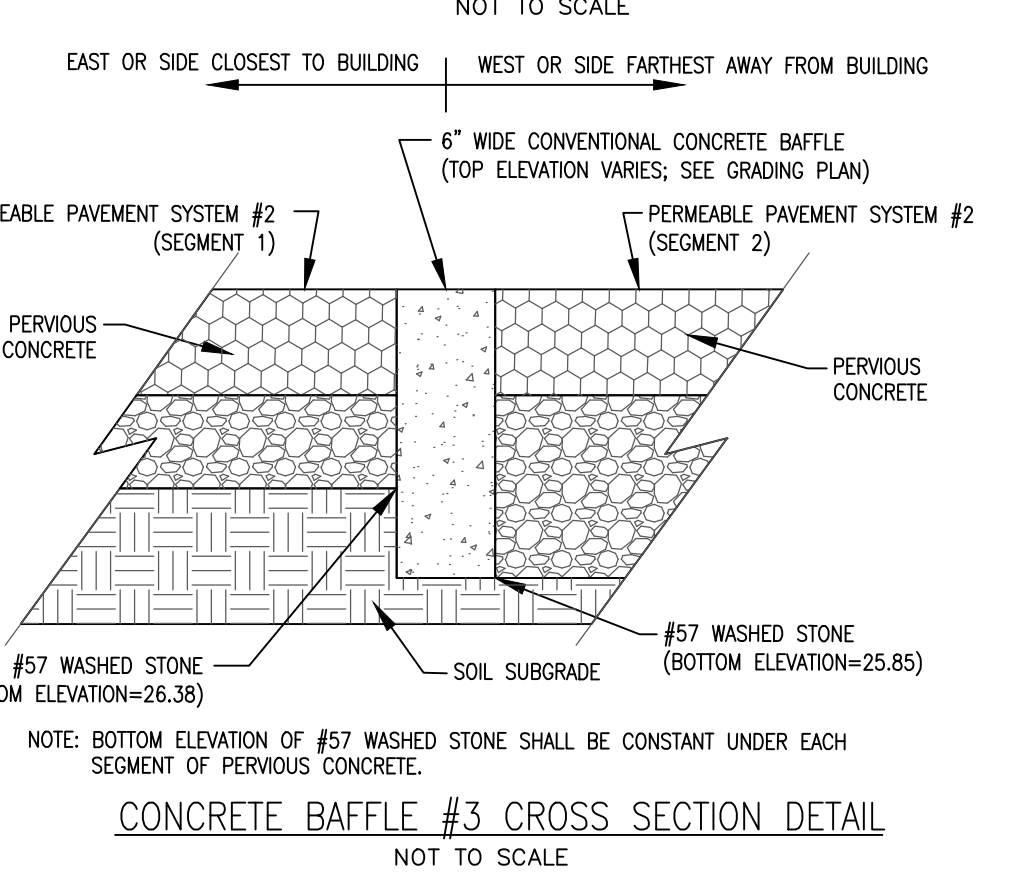
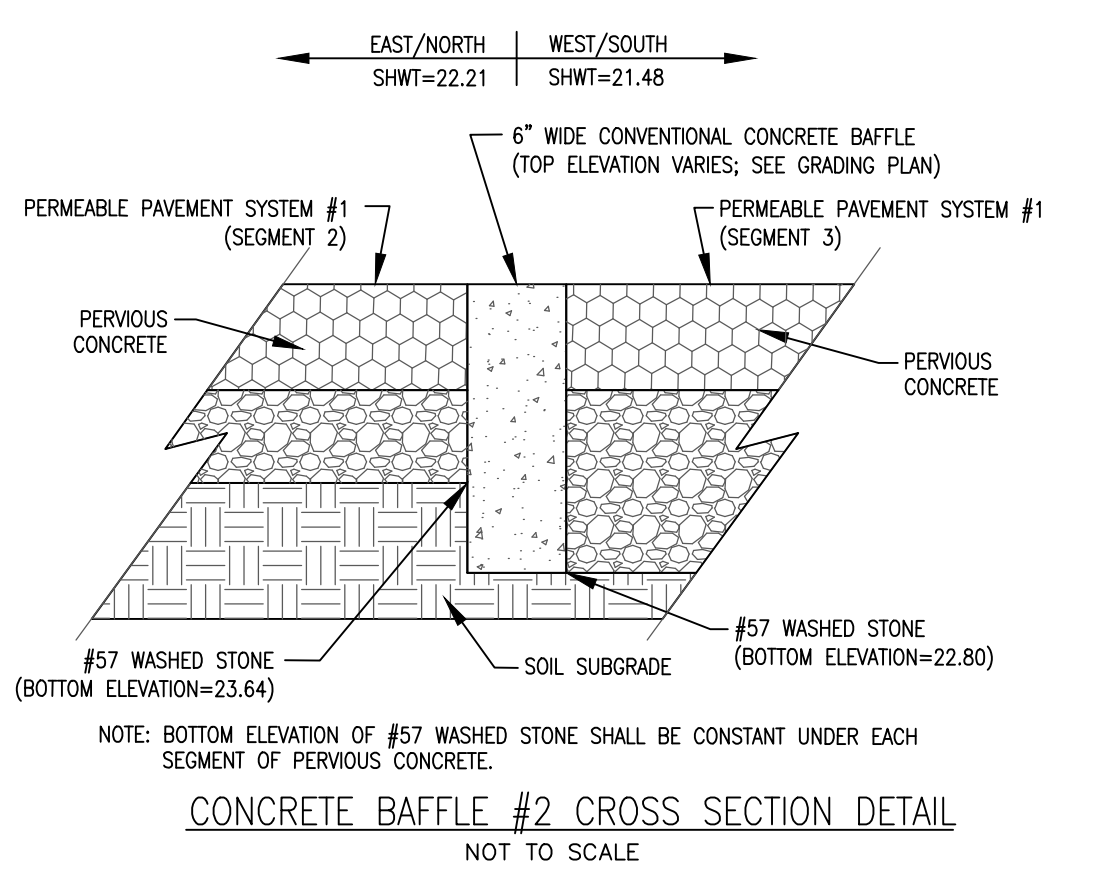
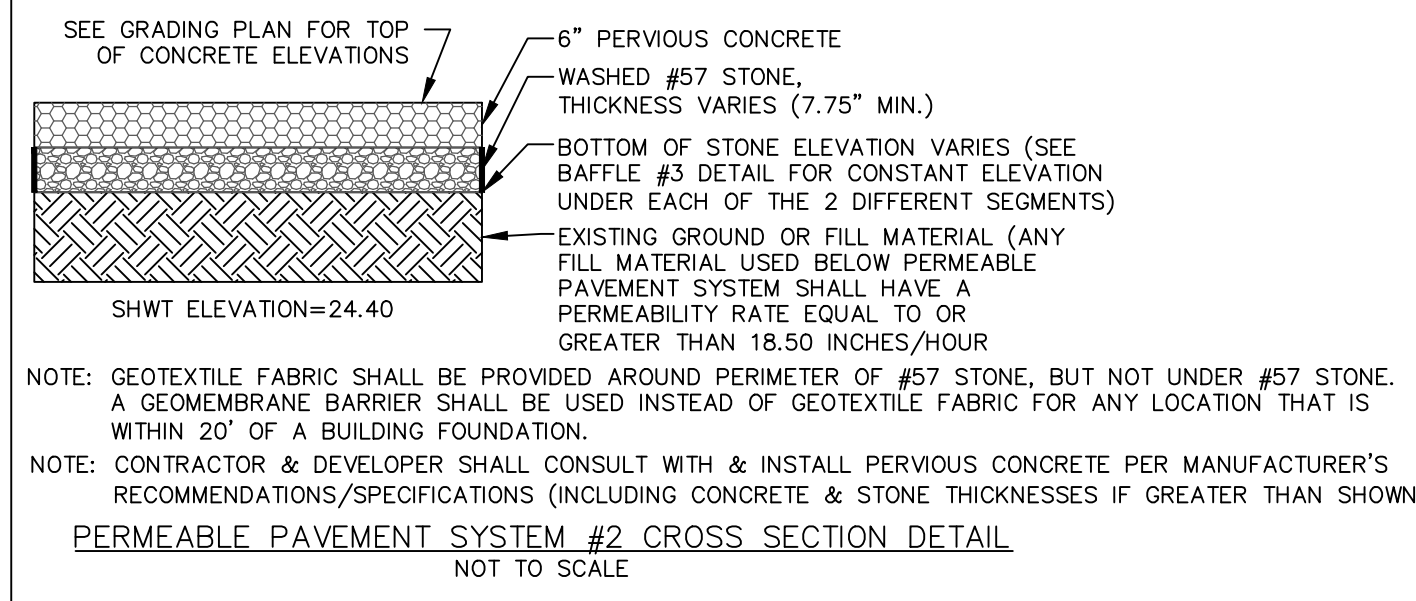
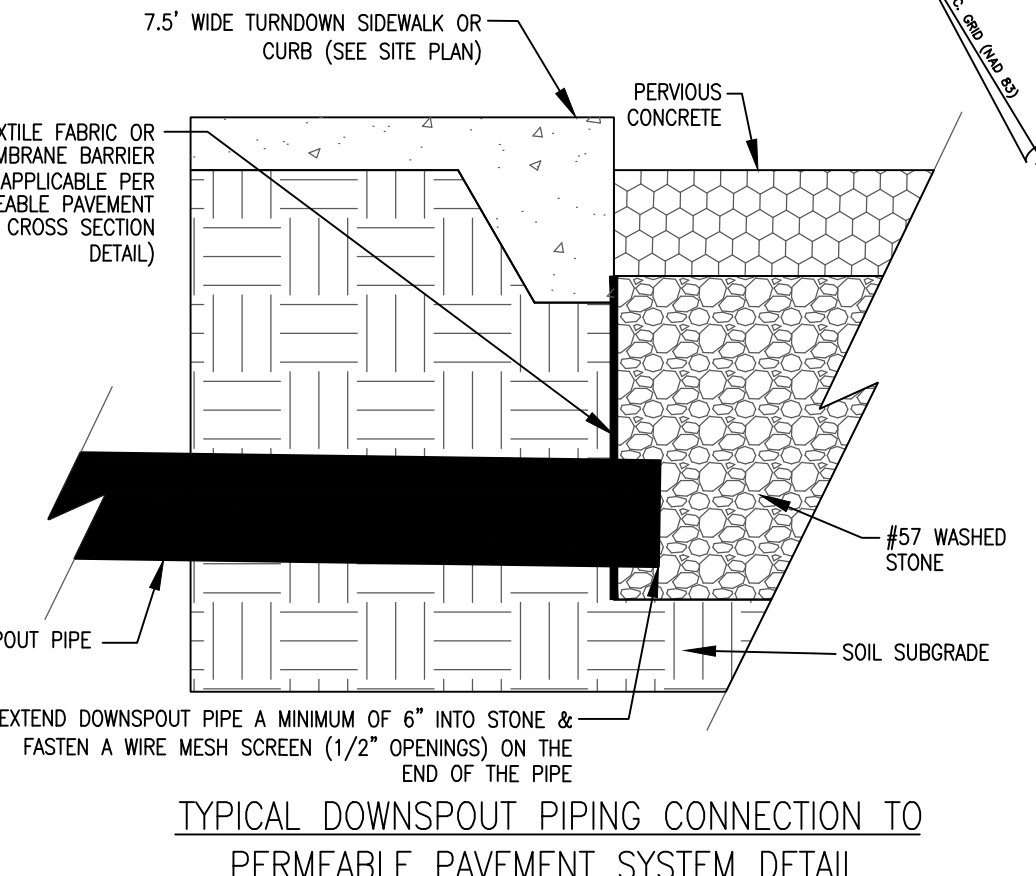
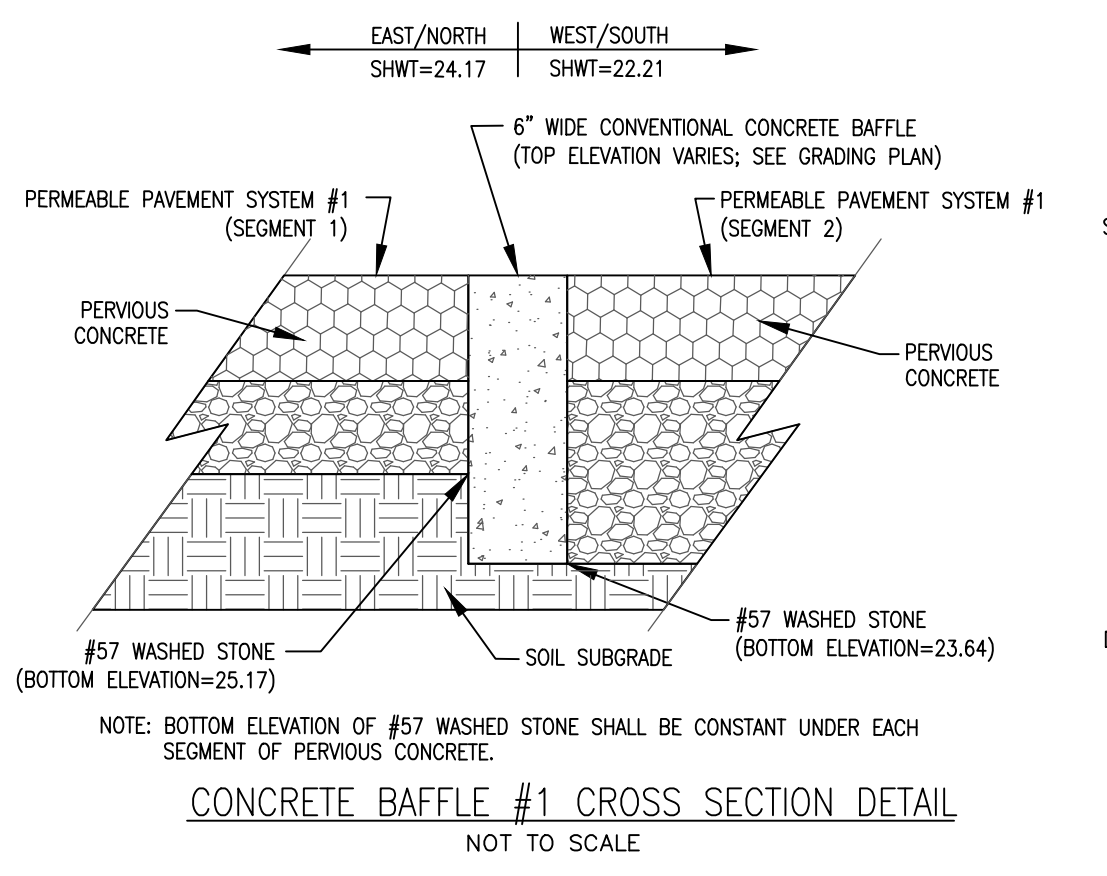
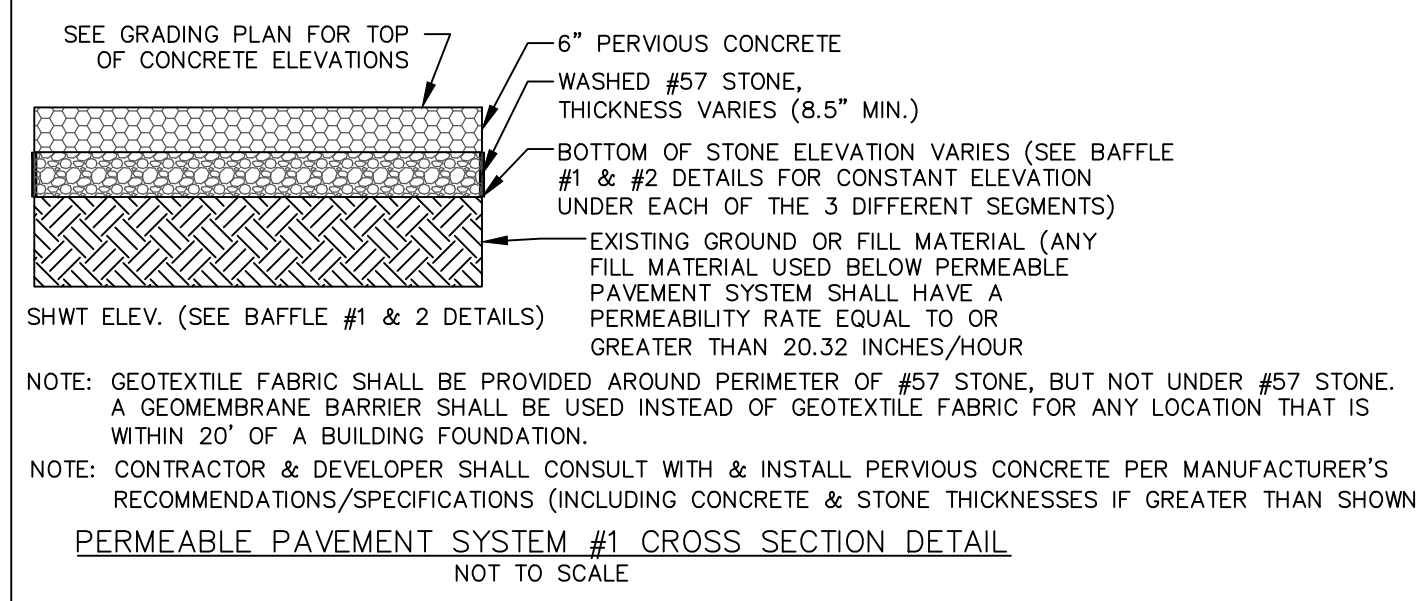
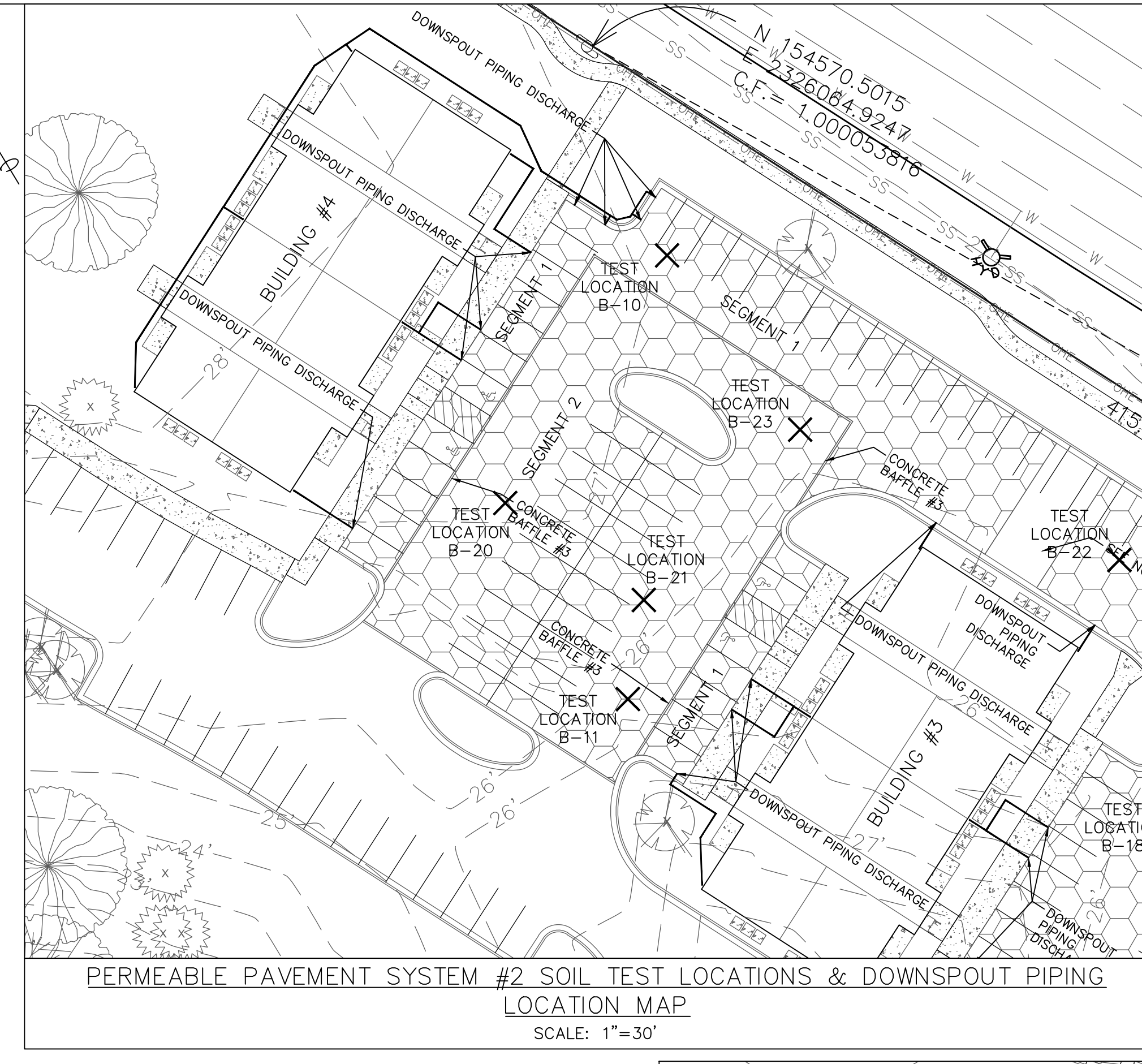
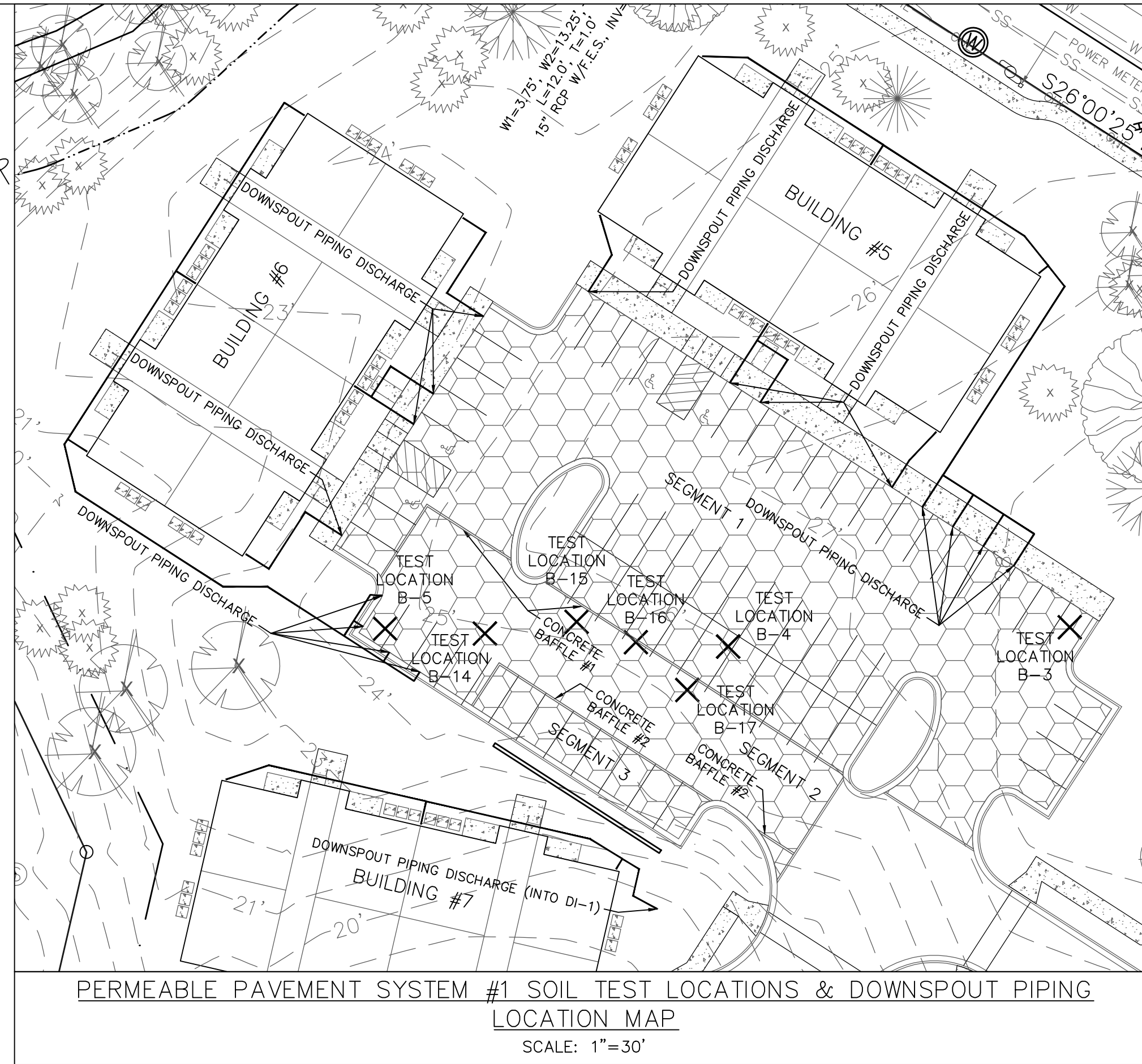
FINAL DRAWING FOR REVIEW PURPOSES ONLY

SHEET NO: 12 OF: 22

REV NO.	DESCRIPTION	DATE
1	REVISED FOR PRELIMINARY BID.	10-16-15
2	REVISED FOR SUBMITTAL.	10-23-15
3	REVISED TO ADD DETAILS.	11-2-15
4	REVISED PER THE COMMENTS.	12-14-15

PRELIMINARY PLAN  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES

- CONSTRUCTION SEQUENCE FOR INSTALLATION OF PERMEABLE PAVEMENT (NC DENR STORMWATER BMP MANUAL CHAPTER 18)**
- ENSURE ACCEPTABLE CONDITIONS FOR CONSTRUCTION
    - PERVIOUS SURFACES MUST BE GRADED TO DRAIN AWAY FROM THE PERMEABLE PAVEMENT, EXCEPT WHERE THIS IS UNAVOIDABLE, SUCH AS PARKING LOT ISLANDS, AND AREA BETWEEN BUILDINGS & PARKING LOT.
    - IMPERVIOUS AREAS THAT WILL DRAIN TO THE PERMEABLE PAVEMENT ARE COMPLETED.
    - AREAS ADJACENT TO THE PERMEABLE PAVEMENT ARE STABILIZED (VEGETATION, MULCH, STRAW, FIBER BLANKETS, ETC.) IN ORDER TO PREVENT EROSION & POSSIBLE CONTAMINATION WITH SEDIMENTS.
    - CONSTRUCTION ACCESS TO OTHER PORTIONS OF THE SITE IS ESTABLISHED SO THAT NO CONSTRUCTION TRAFFIC PASSES THROUGH THE PERMEABLE PAVEMENT SITE DURING INSTALLATION. INSTALL BARRIERS/FENCES AS NEEDED.
    - WEATHER FORECAST CALLS FOR A WINDOW OF DRY WEATHER TO PREVENT EXCESS COMPACTION OR SMearing OF THE SOIL SUBGRADE WHILE IT IS EXPOSED.
  - EXCAVATE PERMEABLE AREAS & PREPARE SUBGRADE SURFACE
    - EXCAVATE IN DRY SUBGRADE CONDITIONS & AVOID EXCAVATING IMMEDIATELY AFTER STORMS WITHOUT A SUFFICIENT DRYING PERIOD.
    - DO NOT ALLOW EQUIPMENT TO CROSS THE PAVEMENT AREA AFTER EXCAVATION HAS BEGUN.
    - OPERATE EXCAVATION EQUIPMENT FROM OUTSIDE THE EXCAVATION AREA OR FROM UNEXCAVATED PORTIONS OF THE AREA USING AN EXCAVATION STAGING PLAN.
    - USE EQUIPMENT WITH TRACKS RATHER THAN TIRES TO MINIMIZE SOIL COMPACTION WHEN EQUIPMENT ON THE SUBGRADE SURFACE IS UNAVOIDABLE.
    - DIG THE FINAL 9 TO 12 INCHES BY USING THE TEETH OF THE EXCAVATOR BUCKET TO LOOSEN SOIL & DO NOT SMEAR THE SUBGRADE SOIL SURFACE. FINAL GRADING OR SMOOTHING OF SUBGRADE SHOULD BE DONE BY HAND IF POSSIBLE.
    - THE FINAL SUBGRADE SLOPE SHALL NOT EXCEED 0.5%. THE FINAL SUBGRADE SHOULD BE SURVEYED BEFORE PROCEEDING WITH INSTALLATION.
    - MINIMIZE THE TIME BETWEEN EXCAVATION AND PLACEMENT OF THE AGGREGATE.
    - AFTER THE SUBGRADE SLOPE IS VERIFIED, SCARIFY THE SOIL SUBGRADE SURFACE TO MAINTAIN THE SOILS PRE-DISTURBANCE INFILTRATION RATE.
    - TO SCARIFY THE PAVEMENT, USE THE EXCAVATOR BUCKET'S TEETH TO RAKE THE SURFACE OF THE SUBGRADE.
  - TEST THE SUBGRADE SOIL INFILTRATION RATE (INFILTRATION SYSTEMS ONLY)
    - IMMEDIATELY AFTER EXCAVATION & BEFORE THE AGGREGATE IS PLACED, CONDUCT A DIRECT MEASUREMENT OF THE SOIL'S INFILTRATION RATE. INFILTRATION TESTING SHALL BE PERFORMED BY AN APPROPRIATELY-QUALIFIED PROFESSIONAL.
    - RESULTS OF THE INFILTRATION TESTING SHALL BE PROVIDED TO THE ENGINEER.
    - IF THE SOIL TEST SHOWS INFILTRATION RATE(S) THAT ARE LOWER THAN THE RATE(S) USED IN THE DESIGN, THEN ADDITIONAL SCARIFICATION, RIPPING, OR TRENCHING OF THE SOIL WILL BE NEEDED.
    - CONTRACTOR SHALL CONTACT & RECEIVE APPROVAL FROM ENGINEER OF RECORD TO CONTINUE INSTALLATION OF PERMEABLE PAVEMENT.
  - PLACE GEOTEXTILES AND GEOMEMBRANE (IF APPLICABLE)
    - FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR THE APPROPRIATE OVERLAP BETWEEN ROLLS OF MATERIAL. SECURE THE MATERIAL TO EXCAVATION IT DOES NOT MOVE OR WRINKLE WHEN PLACING AGGREGATE.
  - PLACE OBSERVATION WELL(S)
    - PLACE OBSERVATION WELL(S) ACCORDING TO THE PLAN AND VERIFY THAT THE ELEVATIONS ARE CORRECT.
  - PLACE & COMPACT AGGREGATE BASE
    - INSPECT ALL AGGREGATE TO ENSURE THEY ARE CLEAN, FREE OF FINES, AND CONFORM TO THE PLANS.
    - IF AGGREGATE DELIVERED TO THE SITE CANNOT BE IMMEDIATELY PLACED INTO THE EXCAVATION, THEY SHOULD BE STOCKPILED ON AN IMPERVIOUS SURFACE, GEOTEXTILE, OR ON AN IMPERVIOUS MATERIAL TO KEEP THE AGGREGATE FREE OF SEDIMENT.
    - IF AGGREGATE BECOMES CONTAMINATED WITH SEDIMENT, THEN IT SHALL BE REPLACED WITH CLEAN AGGREGATE.
    - BEFORE PLACING THE AGGREGATE, CHECK FOR ANY ACCUMULATION OF SEDIMENTS ON THE FINISHED SOIL SUBGRADE.
    - IF THE EXPOSED SUBGRADE HAS BEEN SUBJECTED TO RAINFALL BEFORE PLACEMENT OF THE AGGREGATE, THEN THE SUBGRADE SURFACE MUST BE SCARIFIED TO BREAK UP THE RESULTING SURFACE CRUST.
    - SLOPES & ELEVATIONS SHALL BE CHECKED ON THE SOIL SUBGRADE AND THE FINISHED ELEVATION OF BASE (AFTER COMPACTION) OR BEDDING MATERIALS TO ASSURE THEY CONFORM TO THE PLANS AND SPECIFICATIONS.
    - THE AGGREGATE SHALL BE SPREAD (NOT DUMPED) BY A FRONT-END LOADER OR FROM DUMP TRUCKS DEPOSITING FROM NEAR THE EDGE OF THE EXCAVATED AREA OR DIRECTLY ON DEPOSITED AGGREGATE PILES. MOISTEN AND SPREAD THE WASHED STONE WITHOUT DRIVING ON THE SUBGRADE. BE CAREFUL NOT TO DAMAGE THE OBSERVATION WELLS DURING COMPACTION.
    - FOLLOW COMPACTION RECOMMENDATIONS BY THE PERMEABLE PAVEMENT MANUFACTURER OR THAT FROM INDUSTRY GUIDELINES.
    - BE SURE THAT CORNERS, AREAS AROUND UTILITY STRUCTURES AND OBSERVATION WELLS, & TRANSITION AREAS TO OTHER PAVEMENTS ARE ADEQUATELY COMPACTED.
    - DO NOT CRUSH AGGREGATES DURING COMPACTION.
  - INSTALL CURB RESTRAINTS AND PAVEMENT BARRIERS
    - EDGE RESTRAINTS AND BARRIERS BETWEEN PERMEABLE IMPERVIOUS PAVEMENT SHALL BE INSTALLED PER THE PLAN. BEFORE MOVING ON TO CONSTRUCTION STEP 8, BE CERTAIN THE DESIGN AND INSTALLATION ARE CONSISTENT.
  - INSTALL PAVEMENT COURSE
    - PERVIOUS CONCRETE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST VERSION OF ACI 522.1 SPECIFICATION FOR PERVIOUS CONCRETE.
    - INSTALLATION OF THE PERVIOUS CONCRETE MAY BE ACCOMPLISHED USING EITHER THE ONE-STEP OR THE TWO-STEP METHOD.
  - PROTECT THE PAVEMENT THROUGH PROJECT COMPLETION
    - IF IT IS NOT POSSIBLE TO INSTALL THE PERMEABLE PAVEMENT AT THE END OF THE SITE CONSTRUCTION TIMELINE, THEN PROTECT THE PAVEMENT UNTIL PROJECT COMPLETION. THIS SHALL BE DONE BY:
      - ROUTING CONSTRUCTION ACCESS THROUGH OTHER PORTIONS OF THE SITE SO THAT NO CONSTRUCTION TRAFFIC PASSES THROUGH THE PERMEABLE PAVEMENT SITE (INSTALL BARRIERS/FENCES AS NEEDED).
      - IF THIS IS NOT POSSIBLE, PROTECT THE PAVEMENT PER THE CONSTRUCTION DOCUMENTS. PROTECTION TECHNIQUES THAT MAY BE USED INCLUDE MATS, PLASTIC SHEETING, BARRIERS TO LIMIT ACCESS, OR MOVING THE STABILIZED CONSTRUCTION ENTRANCE.
      - SCHEDULE STREET SWEEPING DURING AND AFTER CONSTRUCTION TO PREVENT SEDIMENT FROM ACCUMULATING ON THE PAVEMENT.



PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES

**Approved Construction Plan**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Public Services • Engineering Division  
APPROVED STORMWATER MANAGEMENT PLAN

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_

STORMWATER DETAIL SHEET  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

DATE: 10-1-15  
SCALE: VARIES  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260

**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-6243 Fax 910-392-5203 License No. C-2320

Developer: ECHO FARM APARTMENTS, LLC  
10 CAROLINA DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

SHEET NO: 13  
OF: 22

REV NO.	DESCRIPTION	DATE
1	REVISED FOR PRELIMINARY BID.	10-16-15
2	REVISED FOR SUBMITTAL.	10-23-15
3	REVISED TO ADD DETAILS.	11-16-15
4	REVISED TO ADD DETAILS.	11-24-15
5	REVISED TO ADD DETAIL.	12-14-15



**INLET DRAINAGE AREA CHART**

INLET	DRAINAGE AREA (ACRES)
CB-1	0.20
CB-2	0.18
CB-3	0.42
CB-4	0.77
CB-5	0.34
CB-6	0.23
CB-7	0.19
CB-8	0.24
DI-1	0.13
DI-2	0.66
DI-3	0.01
DI-4 & SWALE #3	0.16
*DI-5 & SWALE #4	0.36
DI-6 & SWALE #5	0.91
DI-7	0.23
SWALE #1	1.21
**SWALE #2	1.71
SWALE #6	0.119
SWALE #7	1.131

\*DI-5 D.A. INCLUDES DI-4 D.A.  
\*\*SWALE #2 D.A. INCLUDES SWALE #1 D.A.

**Pipe Table - System #1**

From	To	Size	Length	Slope	D.S. Invert	U.S. Invert
CB-8	Pond	15	78	1.78%	8.50	9.87
CB-7	CB-8	15	103	4.05%	9.87	14.01
SDMH-6	CB-7	15	81	1.19%	14.01	15.00

**Pipe Table - System #2**

From	To	Size	Length	Slope	D.S. Invert	U.S. Invert
CB-4	Pond	24	78	0.29%	9.00	9.23
SDMH-3	CB-4	24	92	0.78%	9.23	9.96
SDMH-2	SDMH-3	18	62	0.91%	9.96	10.55
SDMH-1	SDMH-2	18	34	0.68%	10.55	10.80
DI-2	SDMH-1	18	125	0.31%	10.80	11.19
DI-7	SDMH-3	15	85	0.50%	11.26	11.69
DI-6	DI-7	12	57	0.50%	11.69	11.98
CB-3	SDMH-2	15	16	11.95%	10.55	12.58
DI-1	SDMH-1	15	154	3.51%	10.80	16.28
DI-3	DI-1	15	20	4.25%	16.28	17.23
CB-1	DI-3	15	104	3.46%	17.23	20.87

**Pipe Table - System #3**

From	To	Size	Length	Slope	D.S. Invert	U.S. Invert
CB-6	Pond	18	69	0.31%	15.00	15.21
SDMH-5	CB-6	15	81	6.43%	15.21	20.60
SDMH-4	SDMH-5	15	46	0.51%	20.60	20.85
CB-5	SDMH-4	15	44	0.50%	20.85	21.08

**Pipe Table - System #4**

From	To	Size	Length	Slope	D.S. Invert	U.S. Invert
CB-2	Pond	15	47	0.22%	10.50	10.60
DI-5	CB-2	15	49	2.66%	10.60	11.98

**Pipe Table - System #5**

From	To	Size	Length	Slope	D.S. Invert	U.S. Invert
DI-4	Swale	12	13	0.36%	22.48	22.53

**Pipe Table - Driveway Culvert**

From	To	Size (in)	Length (ft)	Slope (%)	D.S. Invert (ft)	U.S. Invert (ft)
Upstream	Downstream	15 (Class IV)	96	1.43	11.87	13.24

**Pipe Table - Wet Pond #1 Outfall**

From	To	Size (in)	Length (ft)	Slope (%)	D.S. Invert (ft)	U.S. Invert (ft)
Pond	Downstream	18	92	0.60	9.30	9.85

**Pipe Table - Culvert Downstream of Swale #7**

From	To	Size (in)	Length (ft)	Slope (%)	D.S. Invert (ft)	U.S. Invert (ft)
Swale #7	Downstream	15	21	2.20	22.70	23.16

**DRAINAGE AREA MAP-INLETS**  
SCALE: 1"=40'

**GRAPHIC SCALE**

REV NO.	DESCRIPTION	DATE
1	REVISED TO ADD SWALE #7 DRAINAGE AREA & PIPE CHART.	12-14-15

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

Traffic \_\_\_\_\_

Fire \_\_\_\_\_

**WILMINGTON**  
NORTH CAROLINA  
Public Services • Engineering Division  
**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_

**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

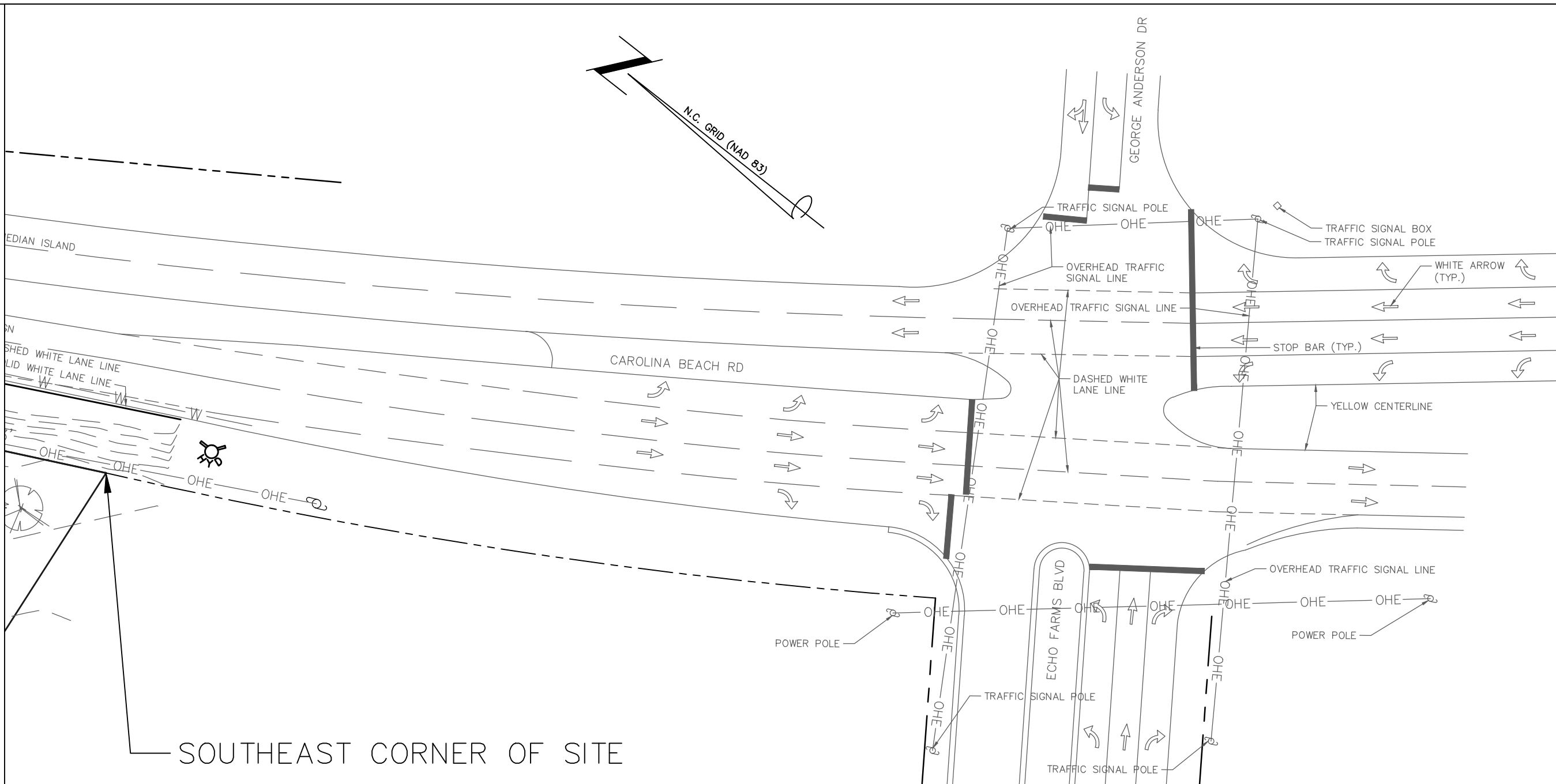
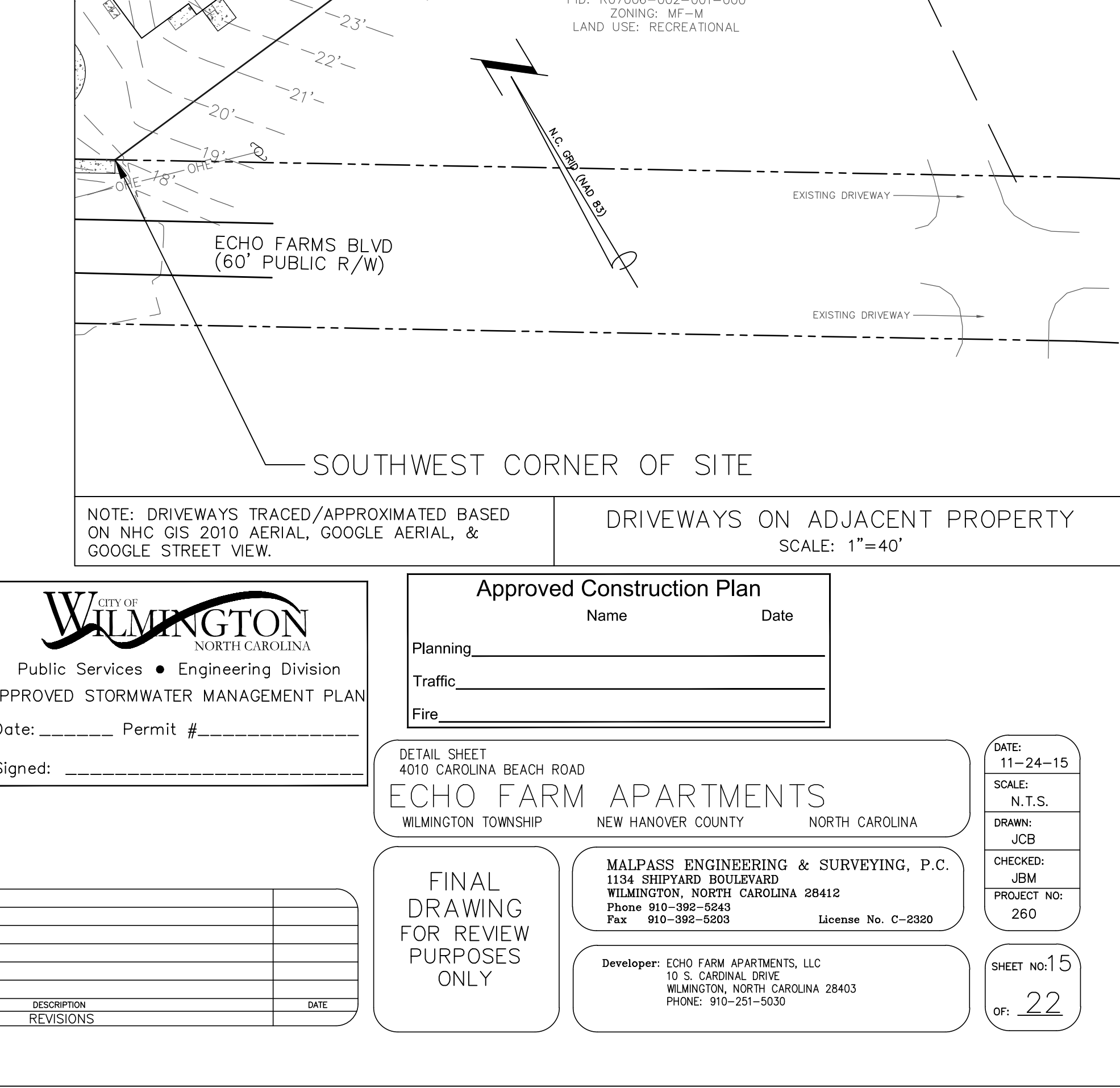
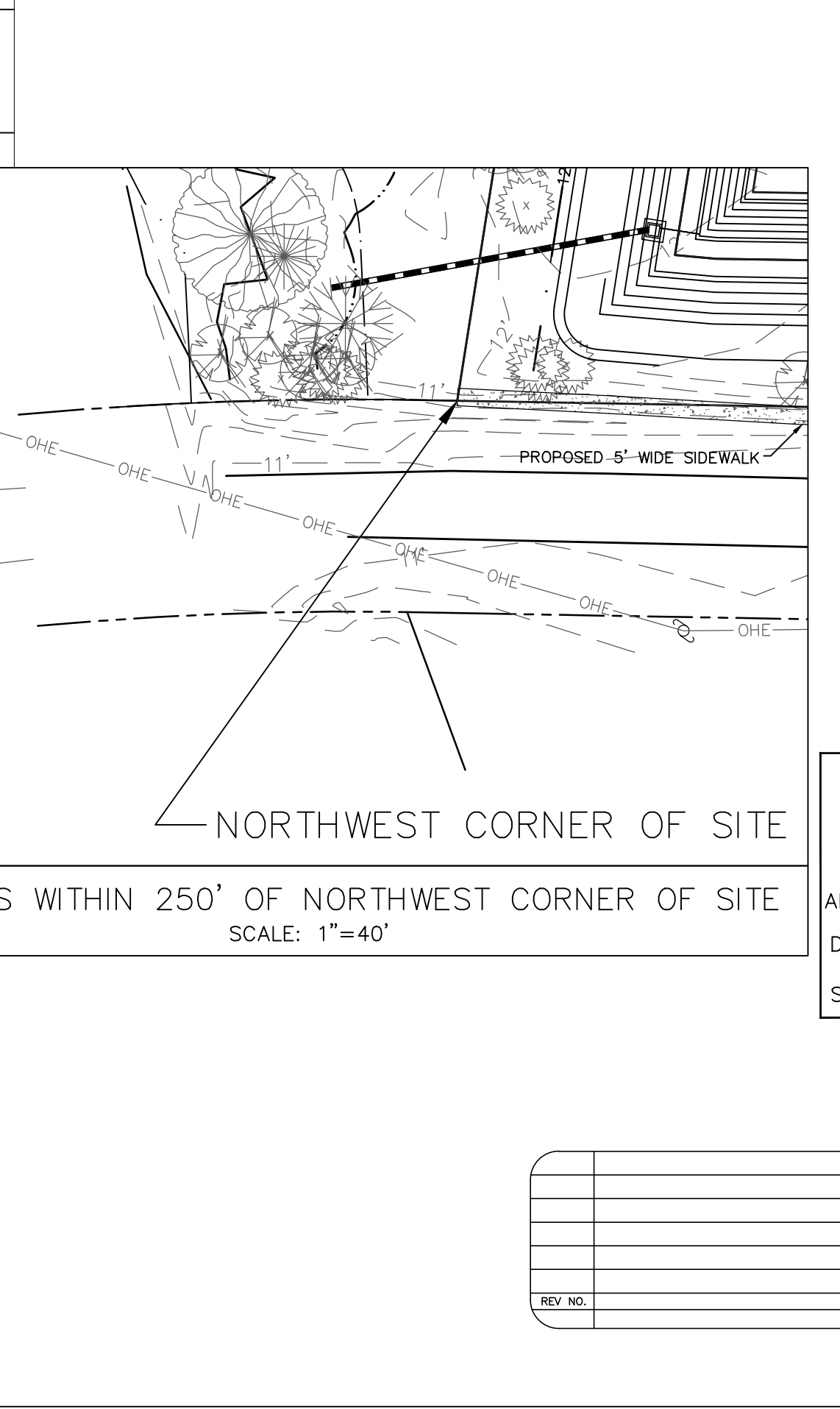
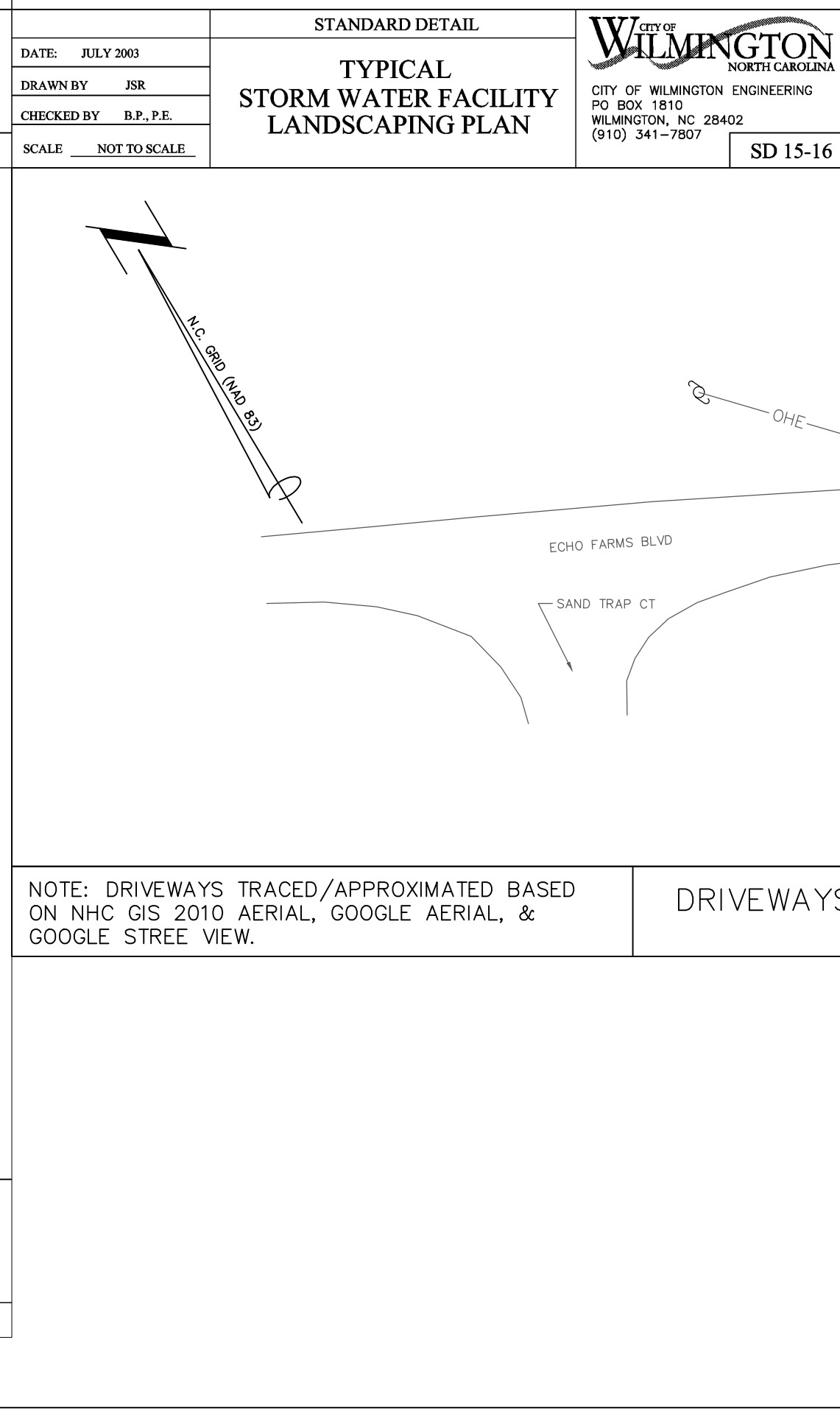
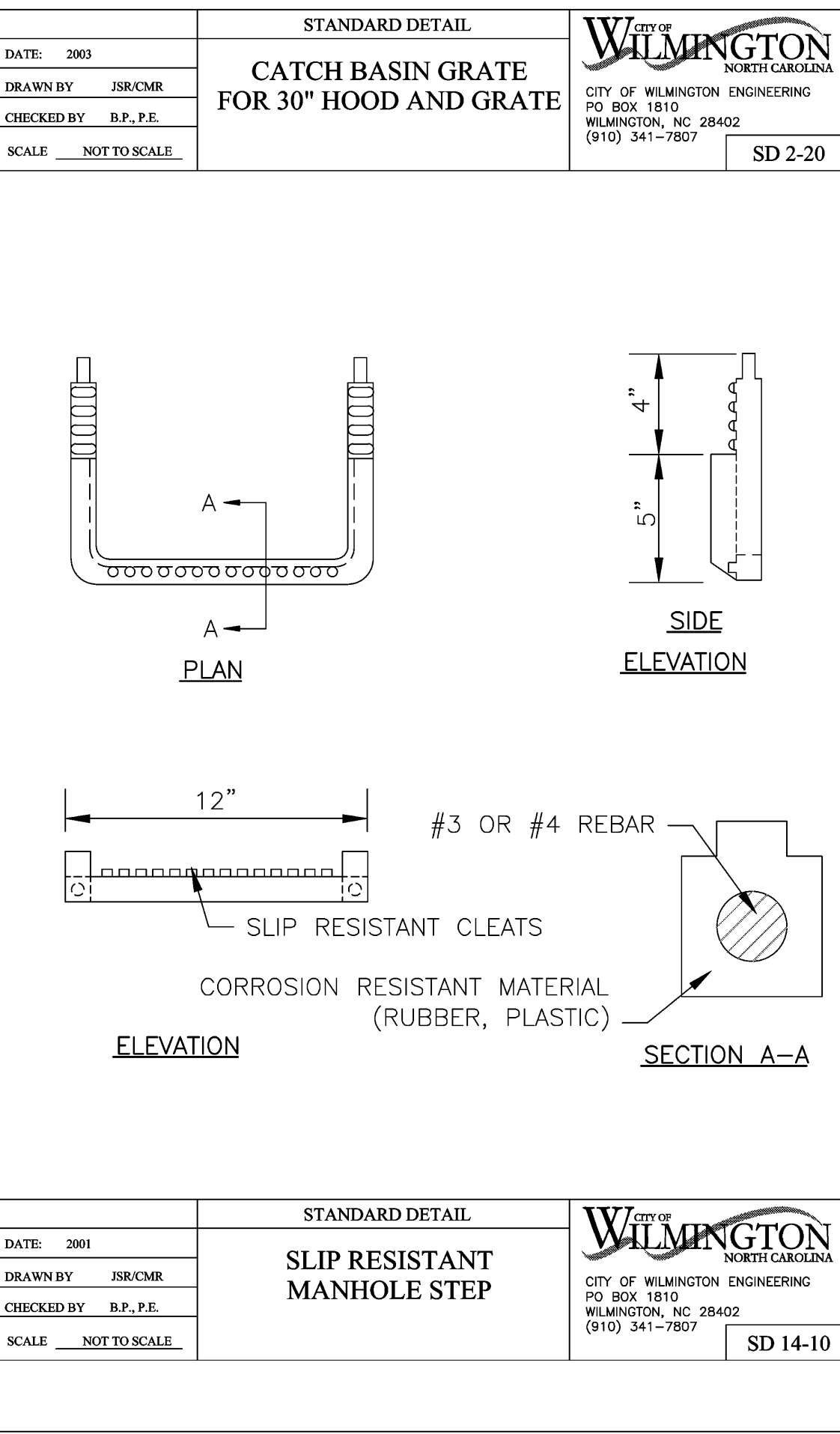
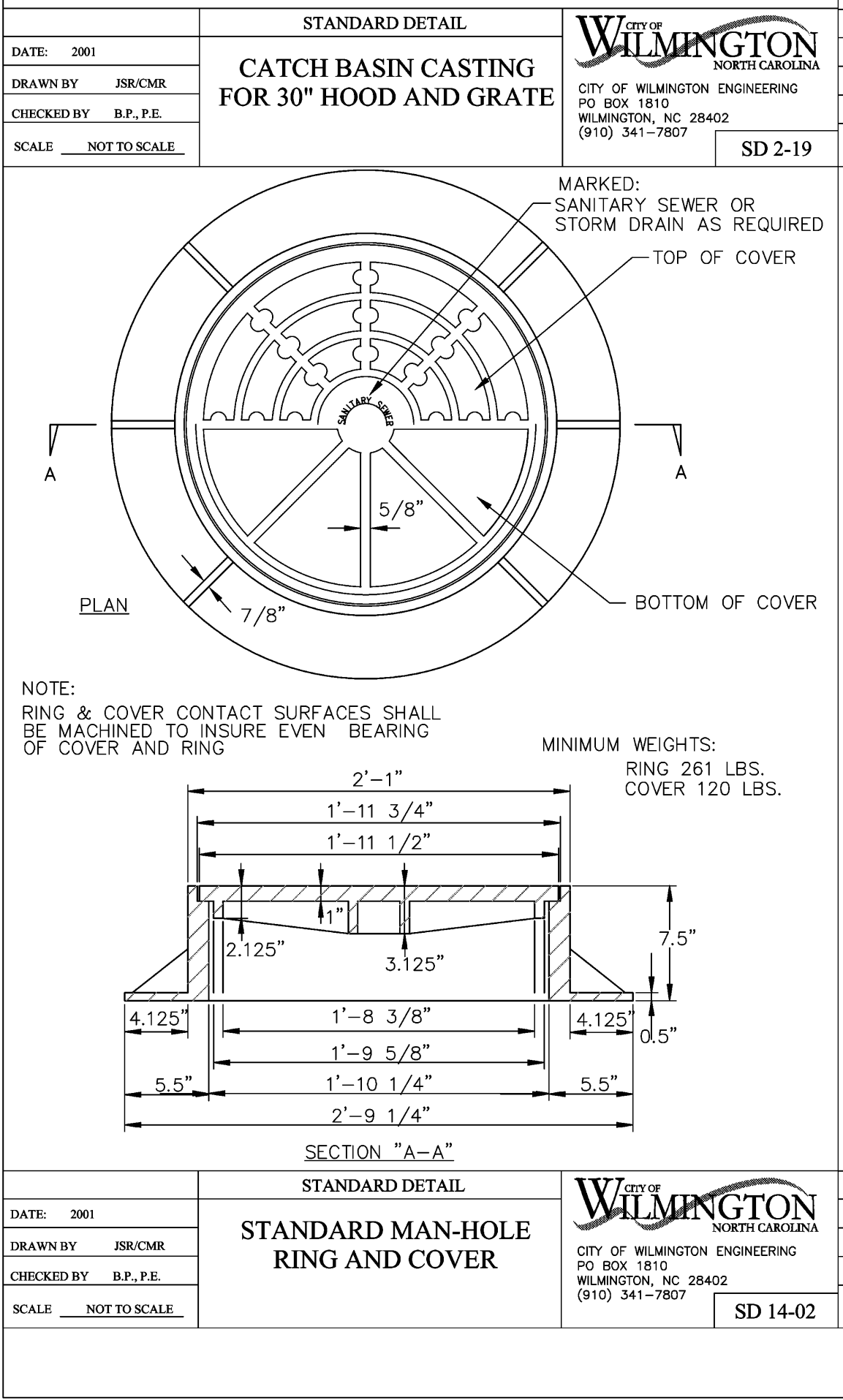
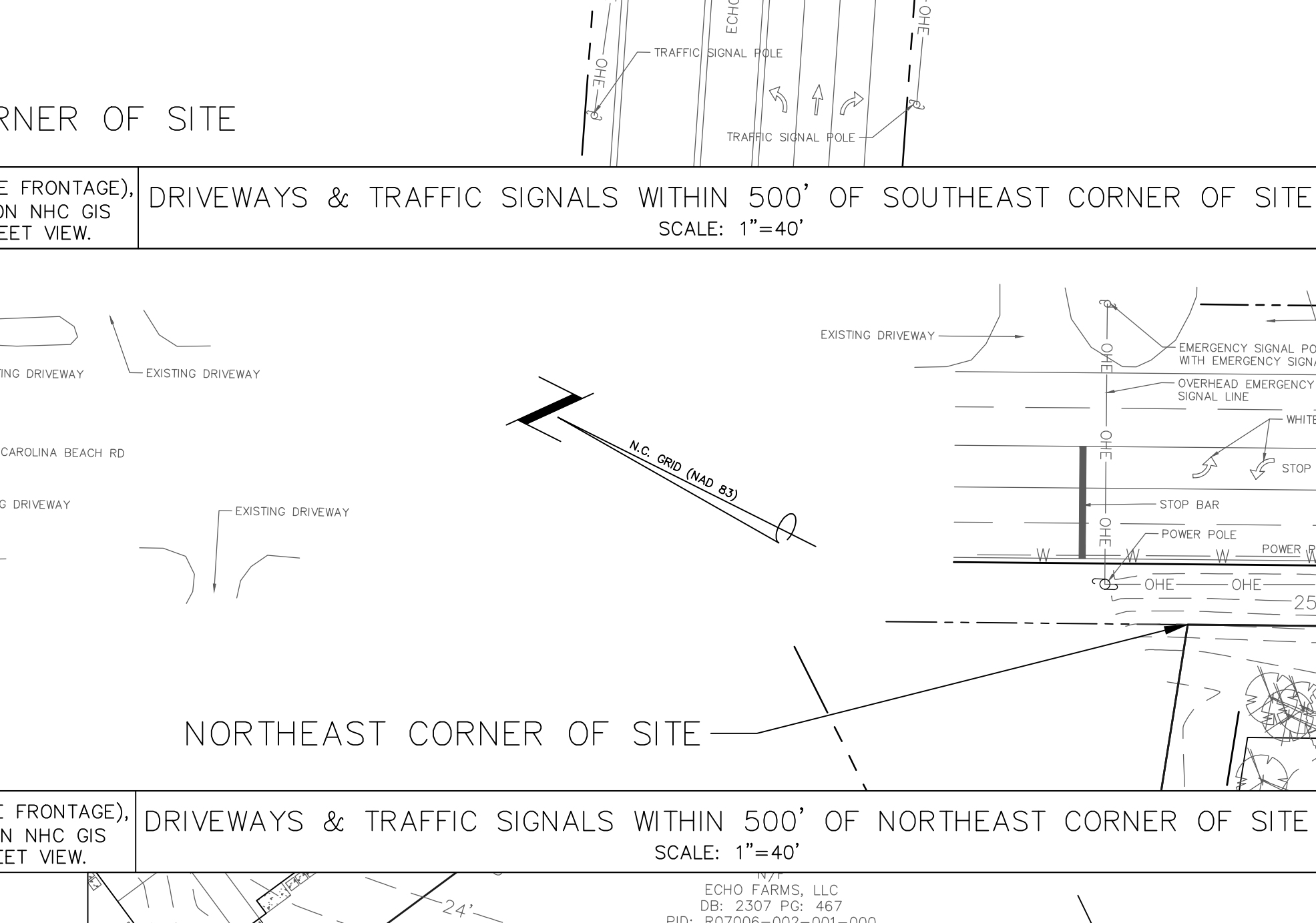
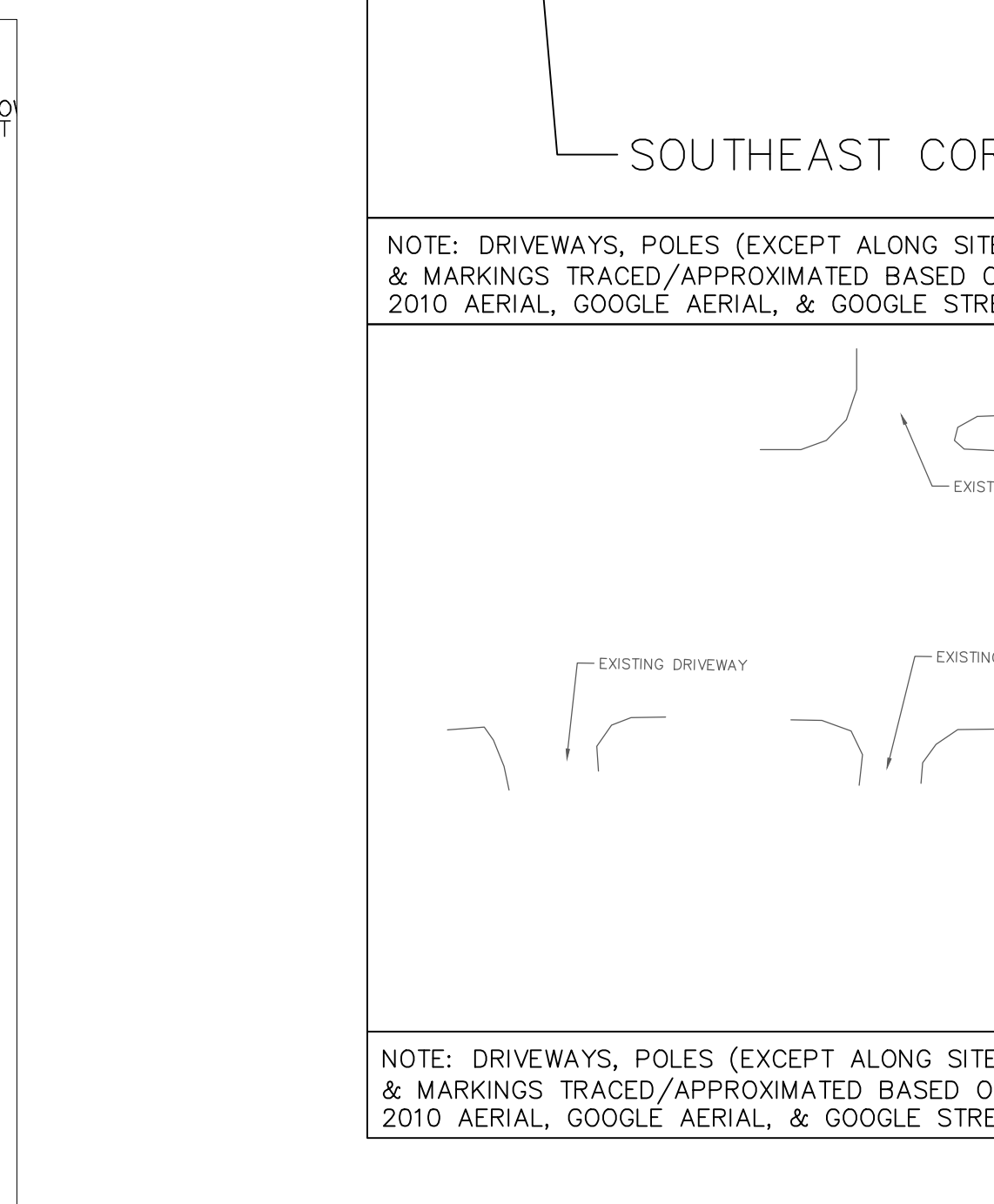
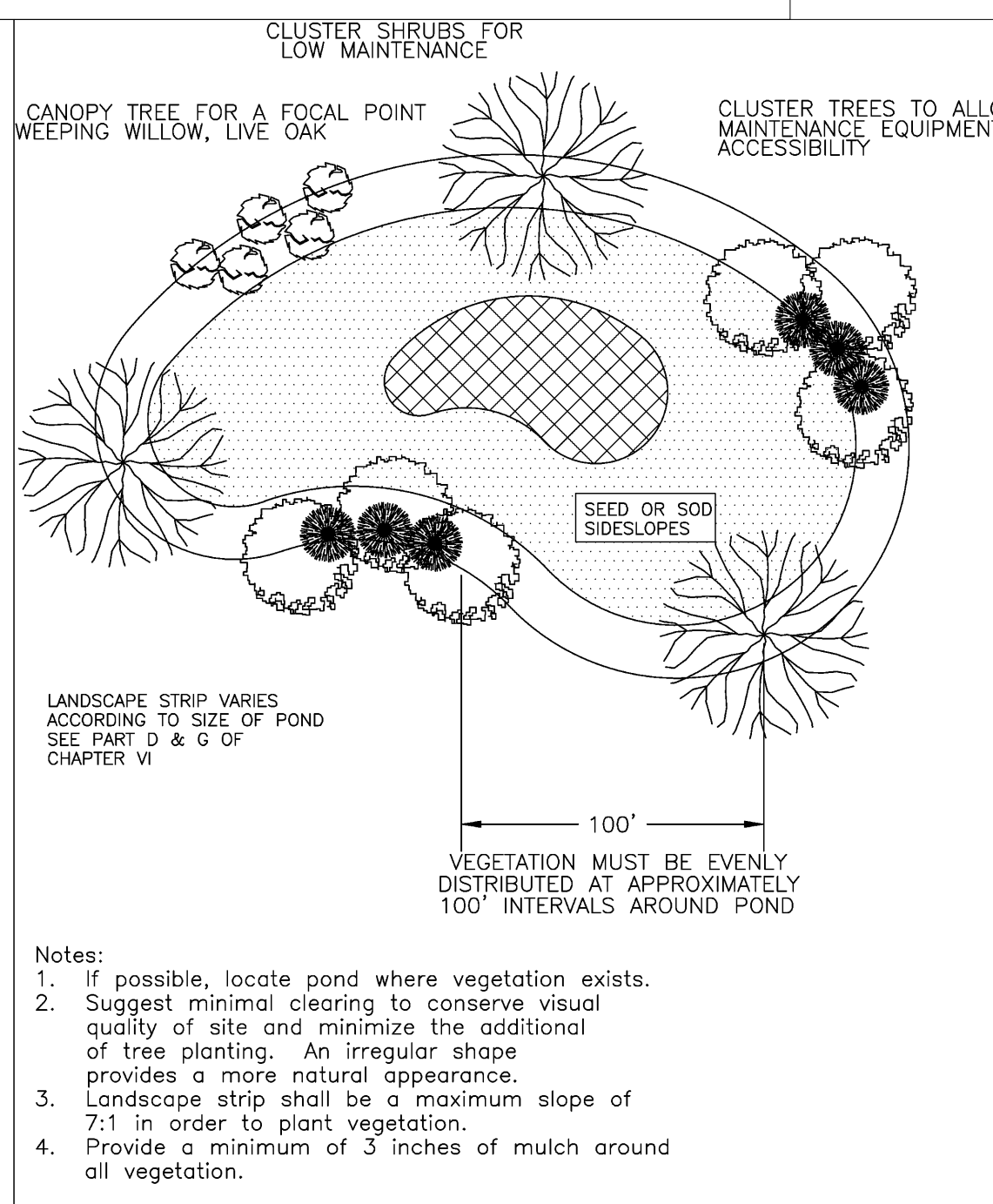
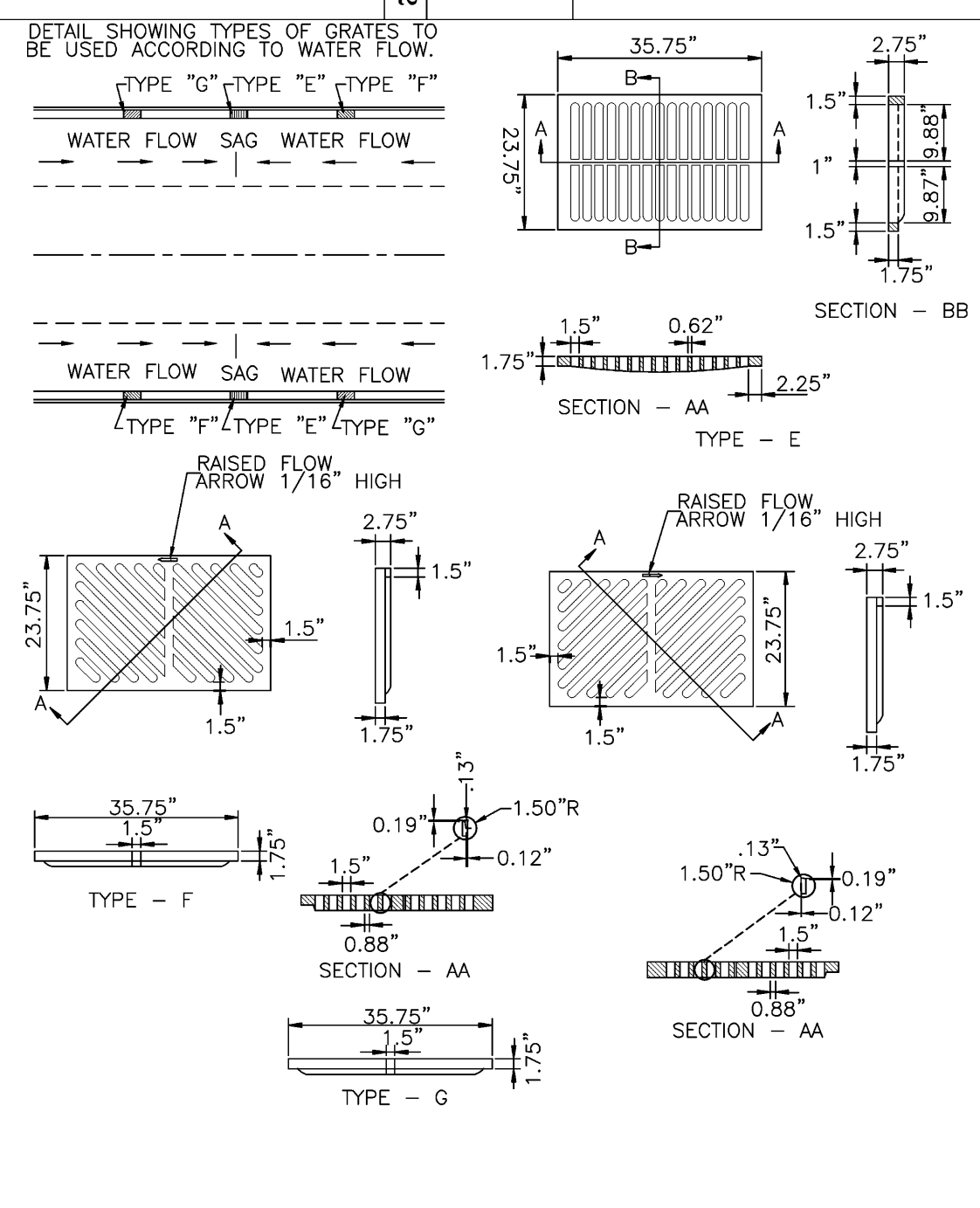
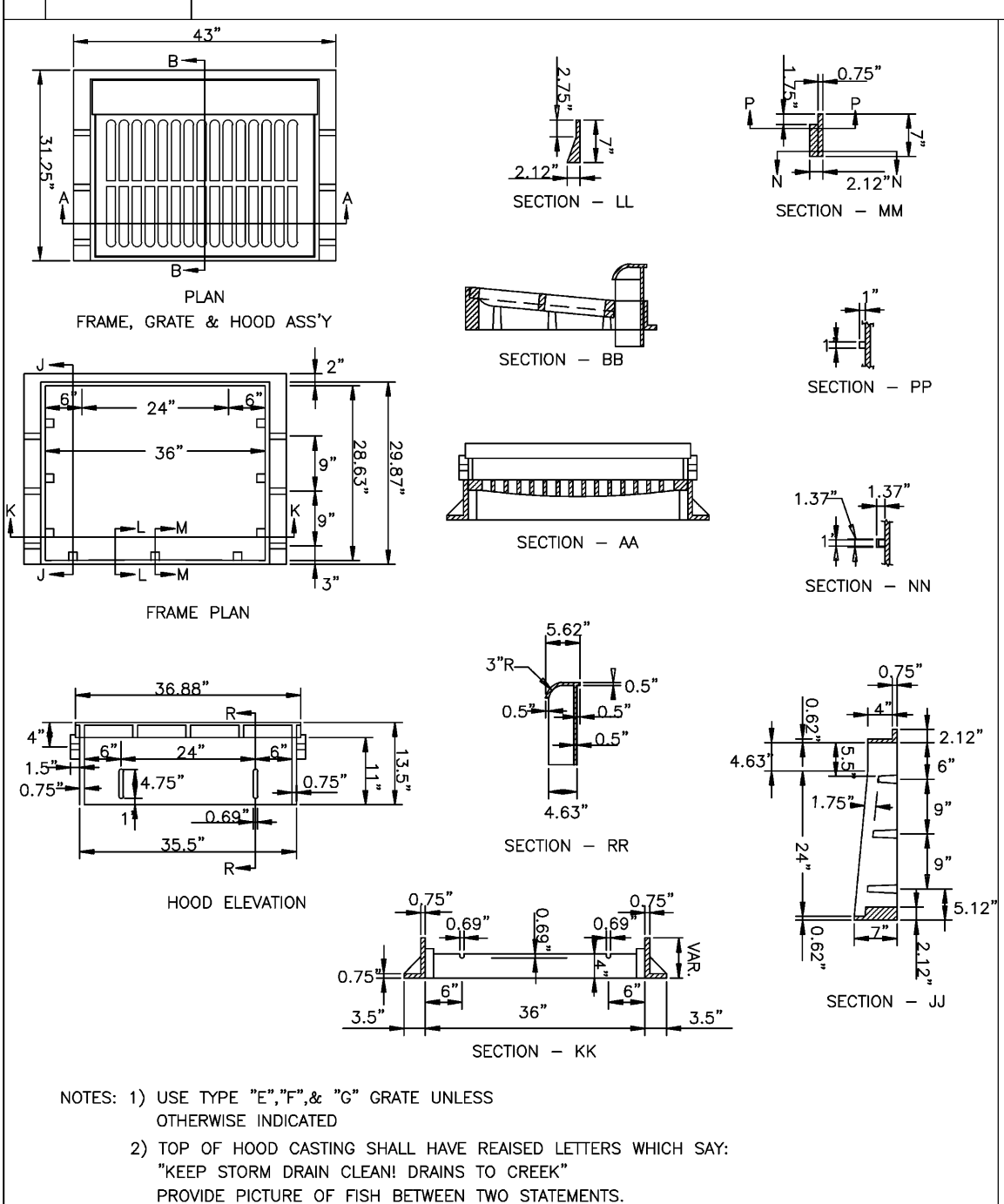
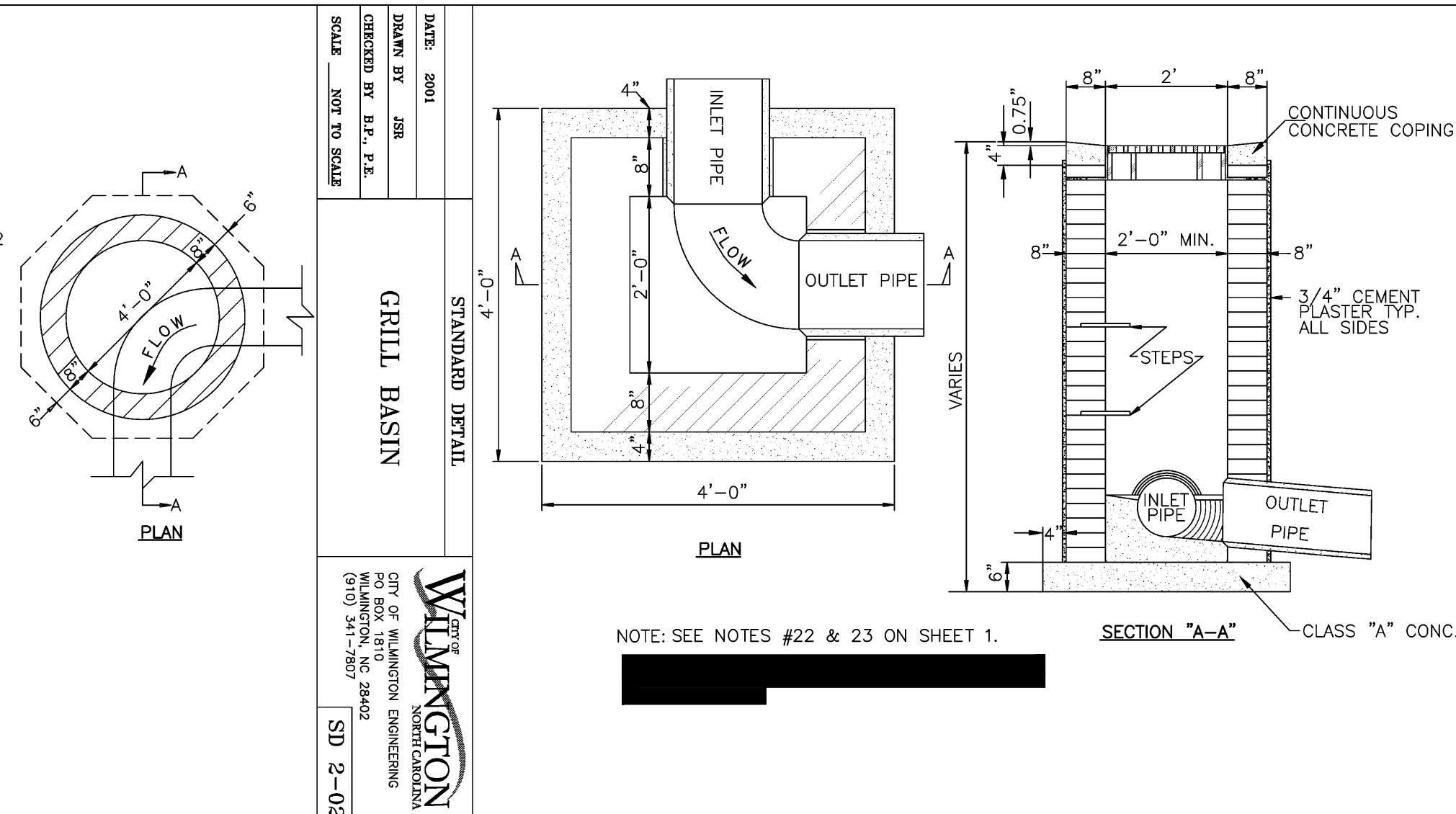
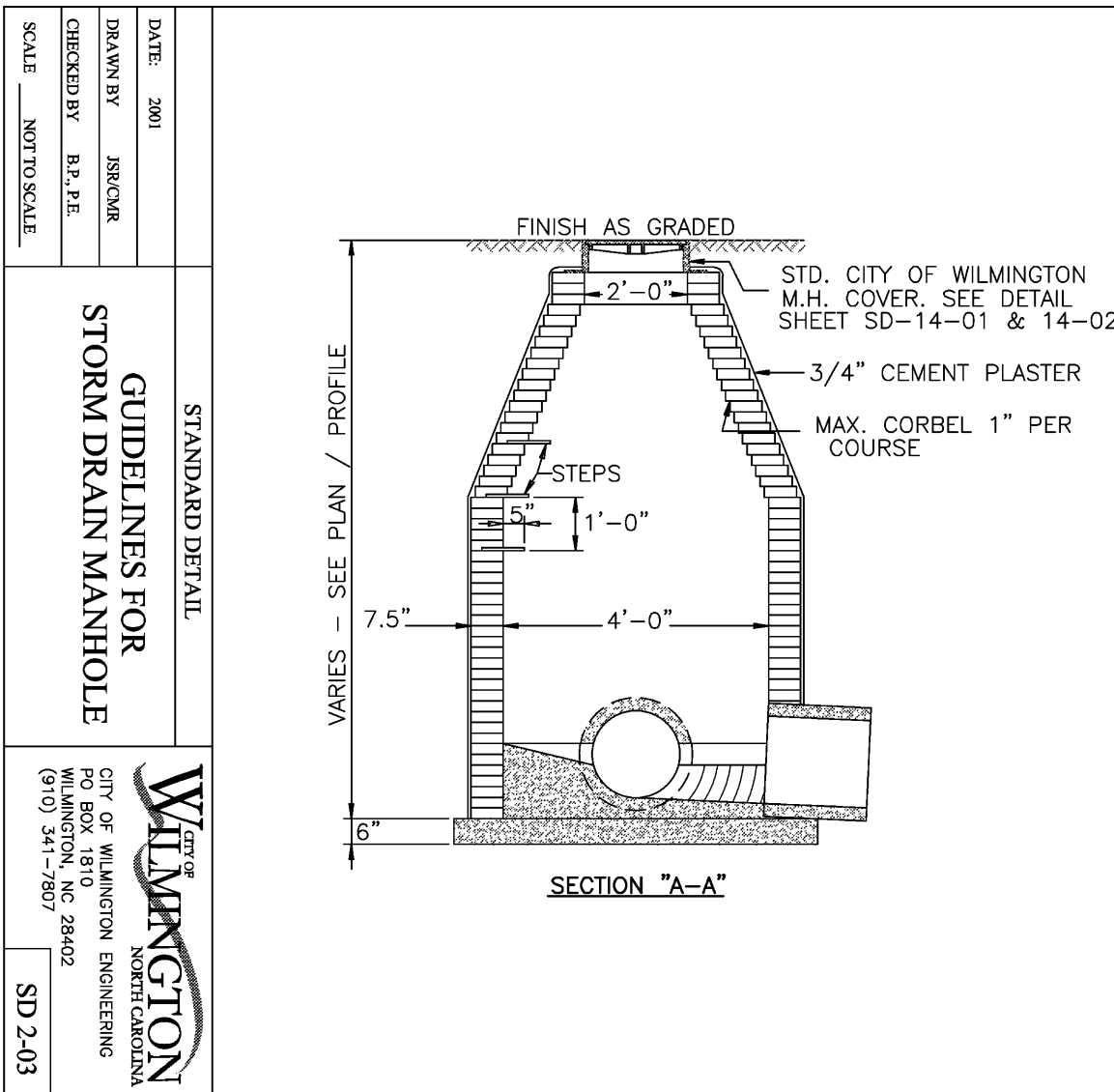
**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-5243  
Fax 910-392-5203 License No. C-2320

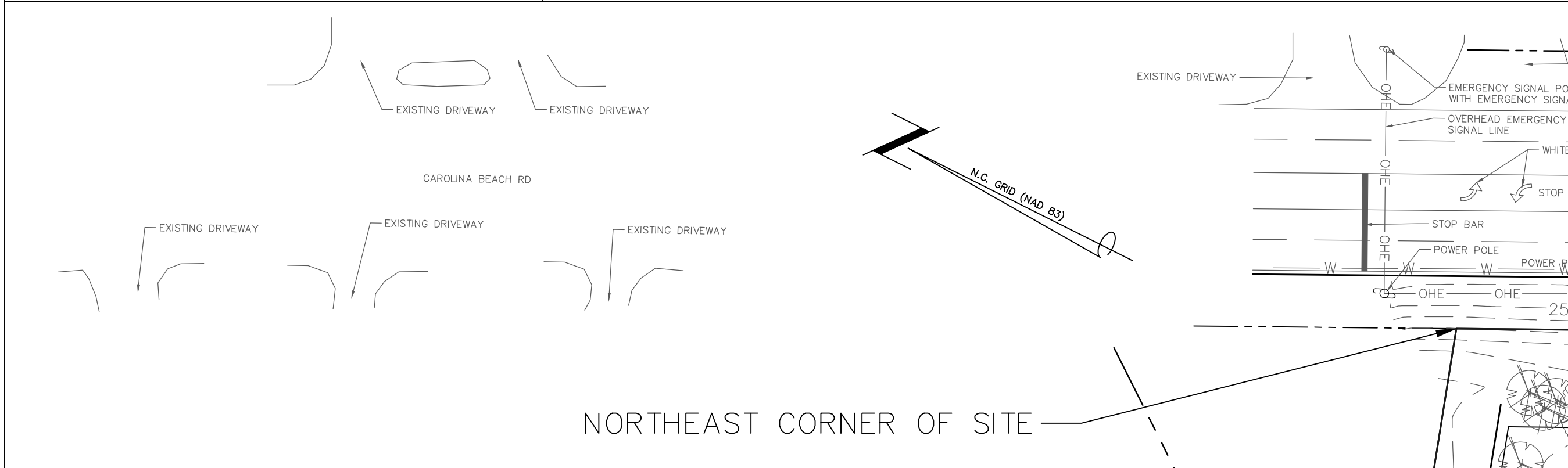
Developer: ECHO FARM APARTMENTS, LLC  
10 S. CARDINAL DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE: 11-24-15  
SCALE: 1"=40'  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260  
SHEET NO: 14  
OF: 22

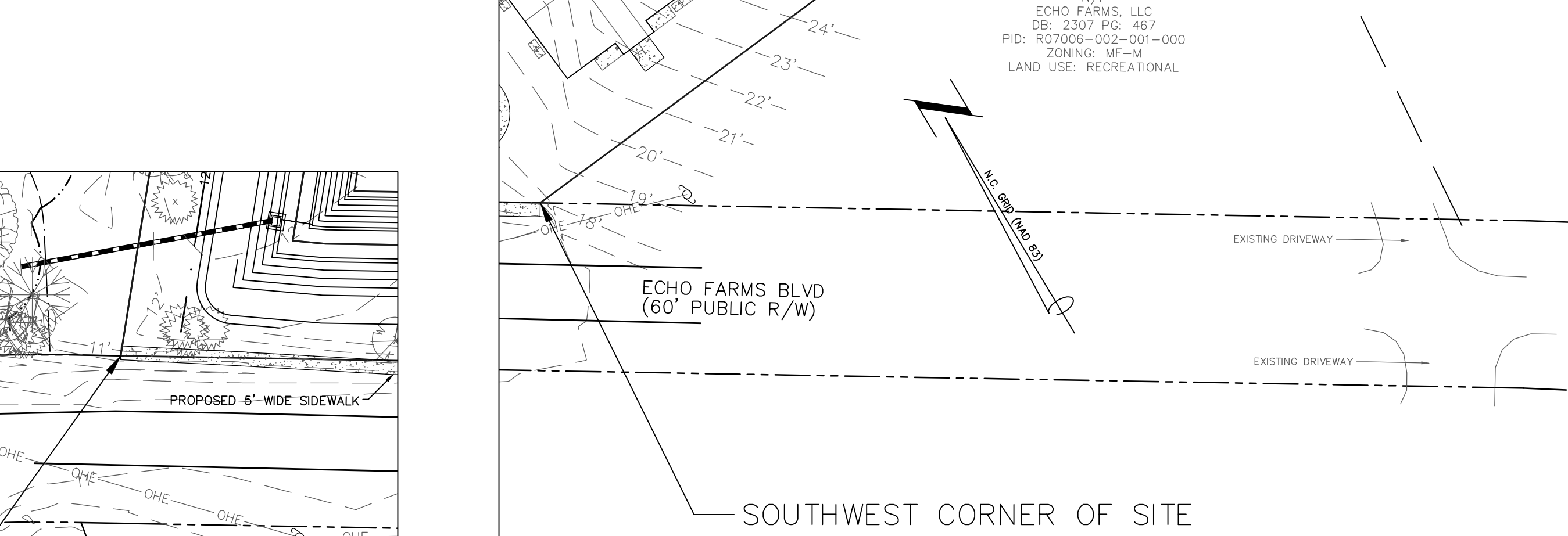
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NOT FOR RECORDATION,  
CONVEYANCES, OR SALES



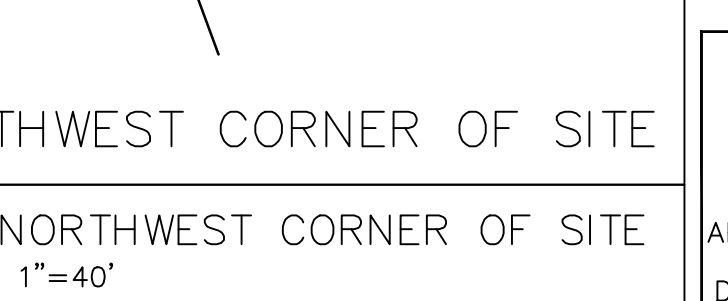
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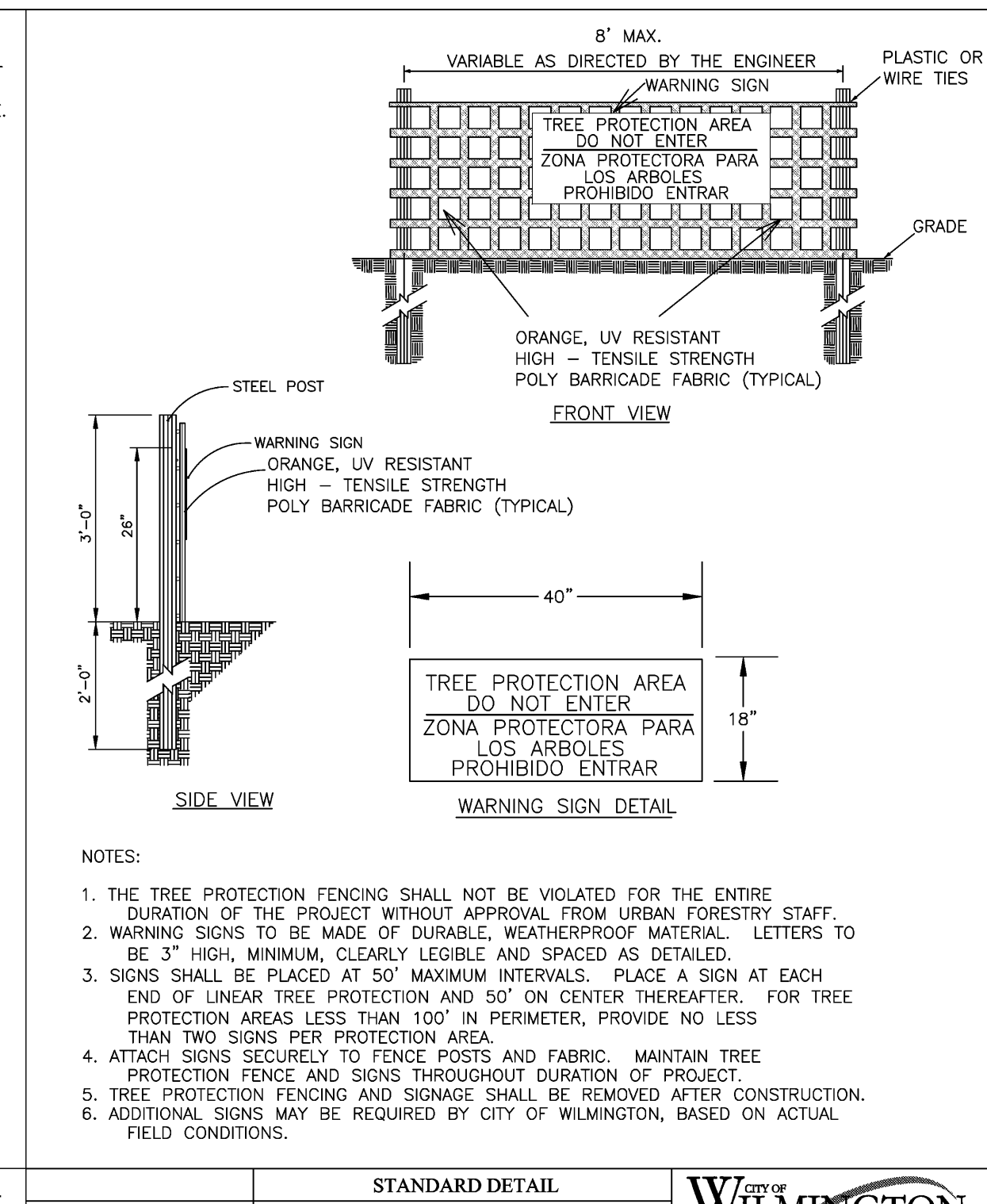
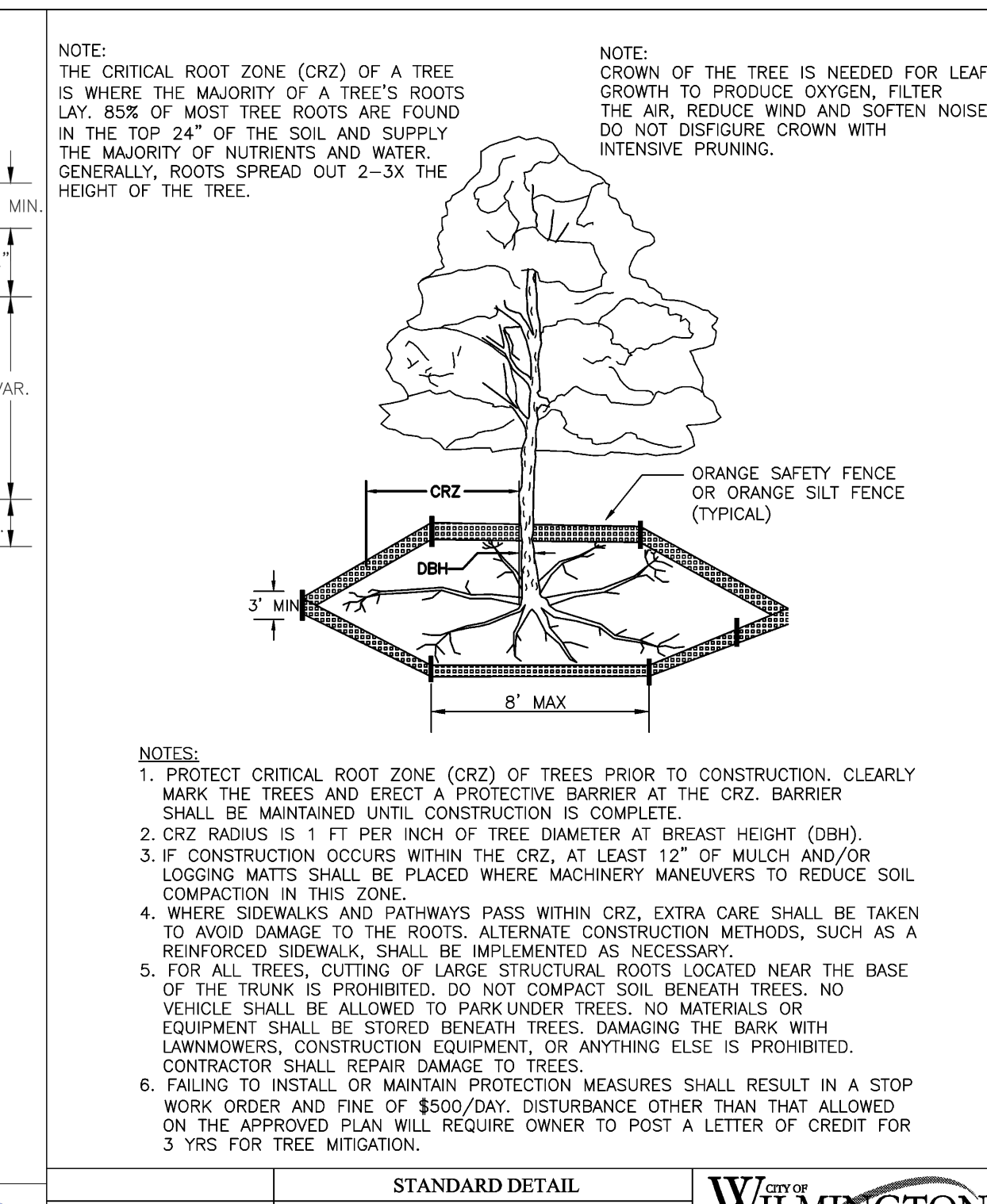
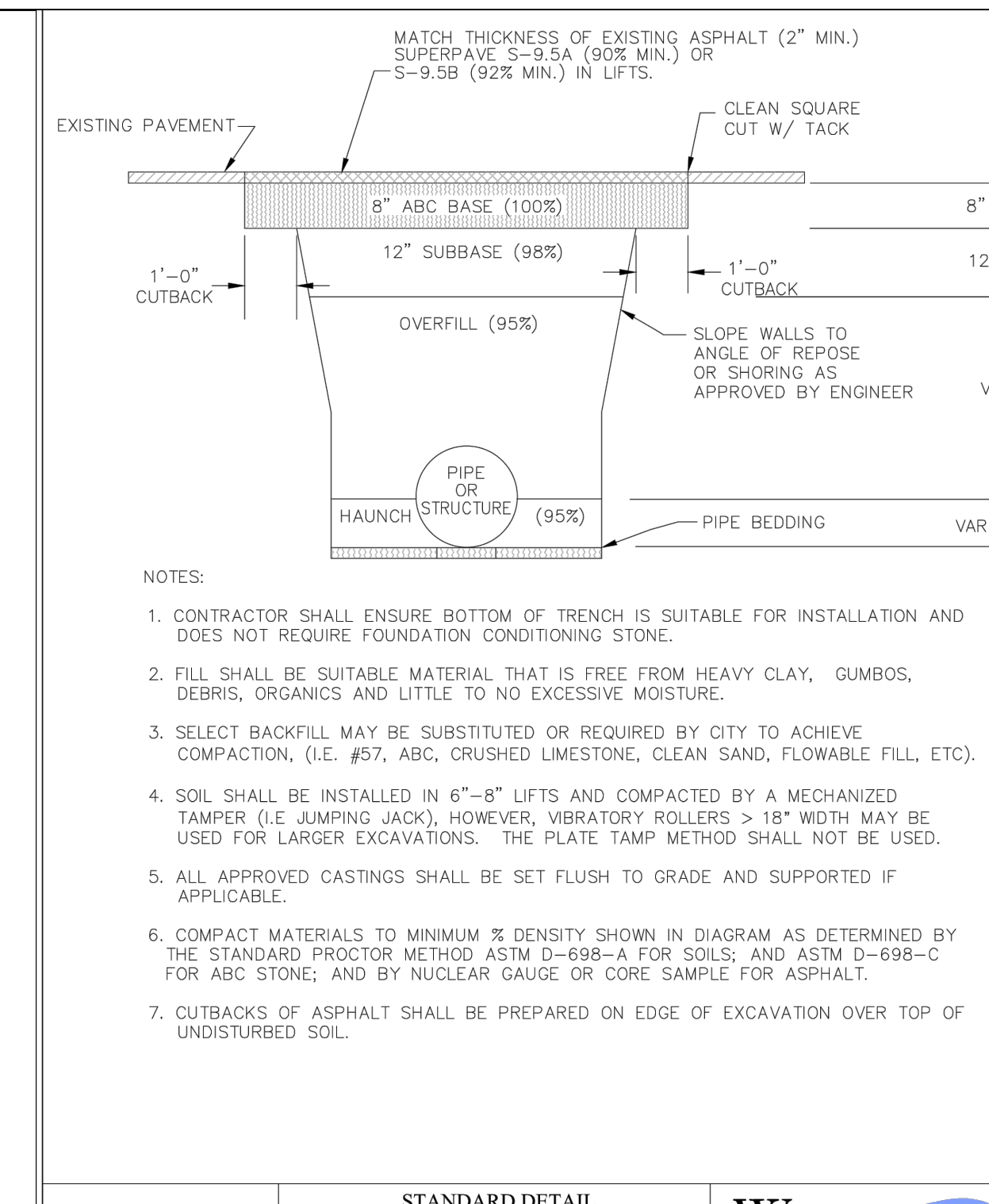
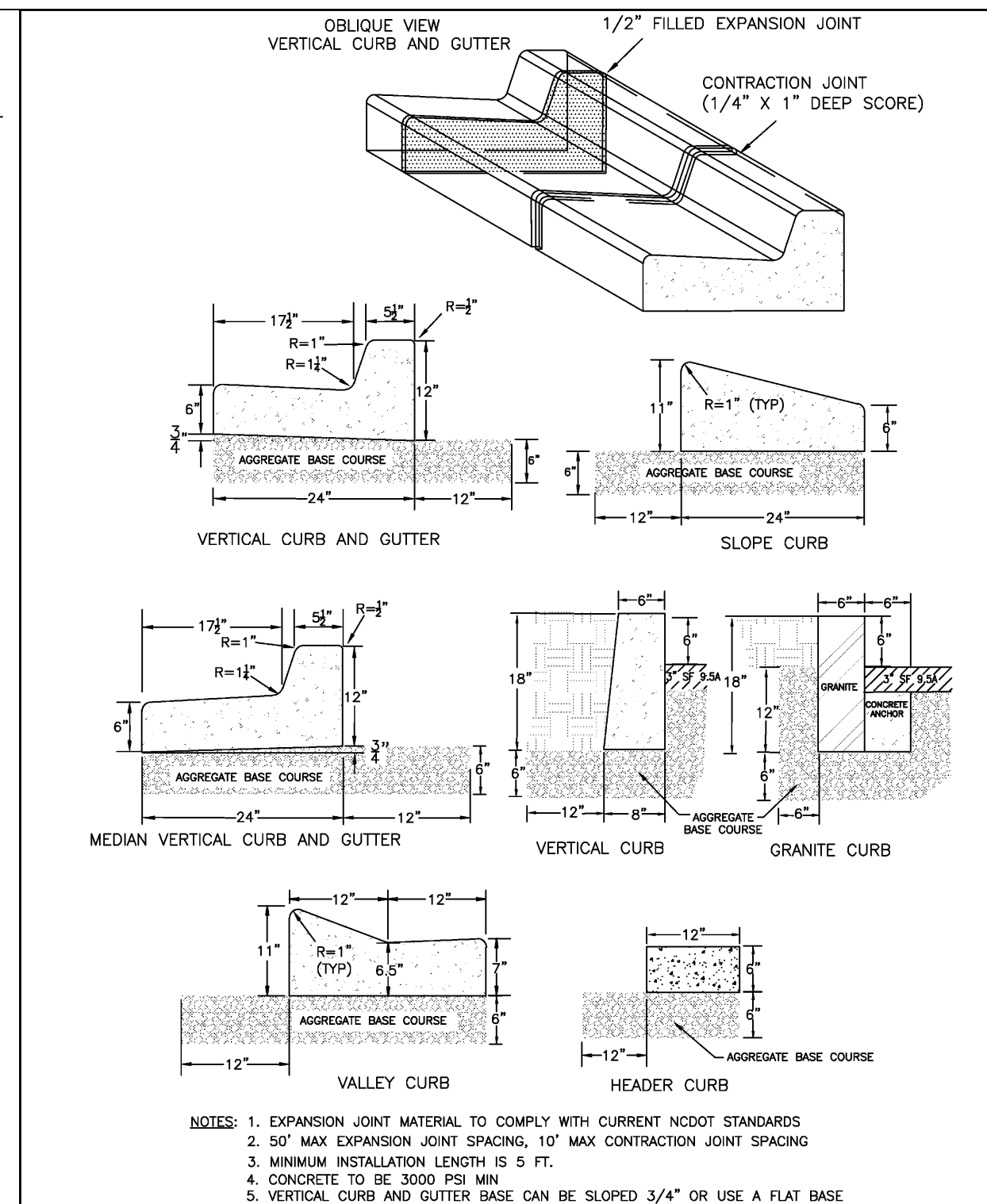
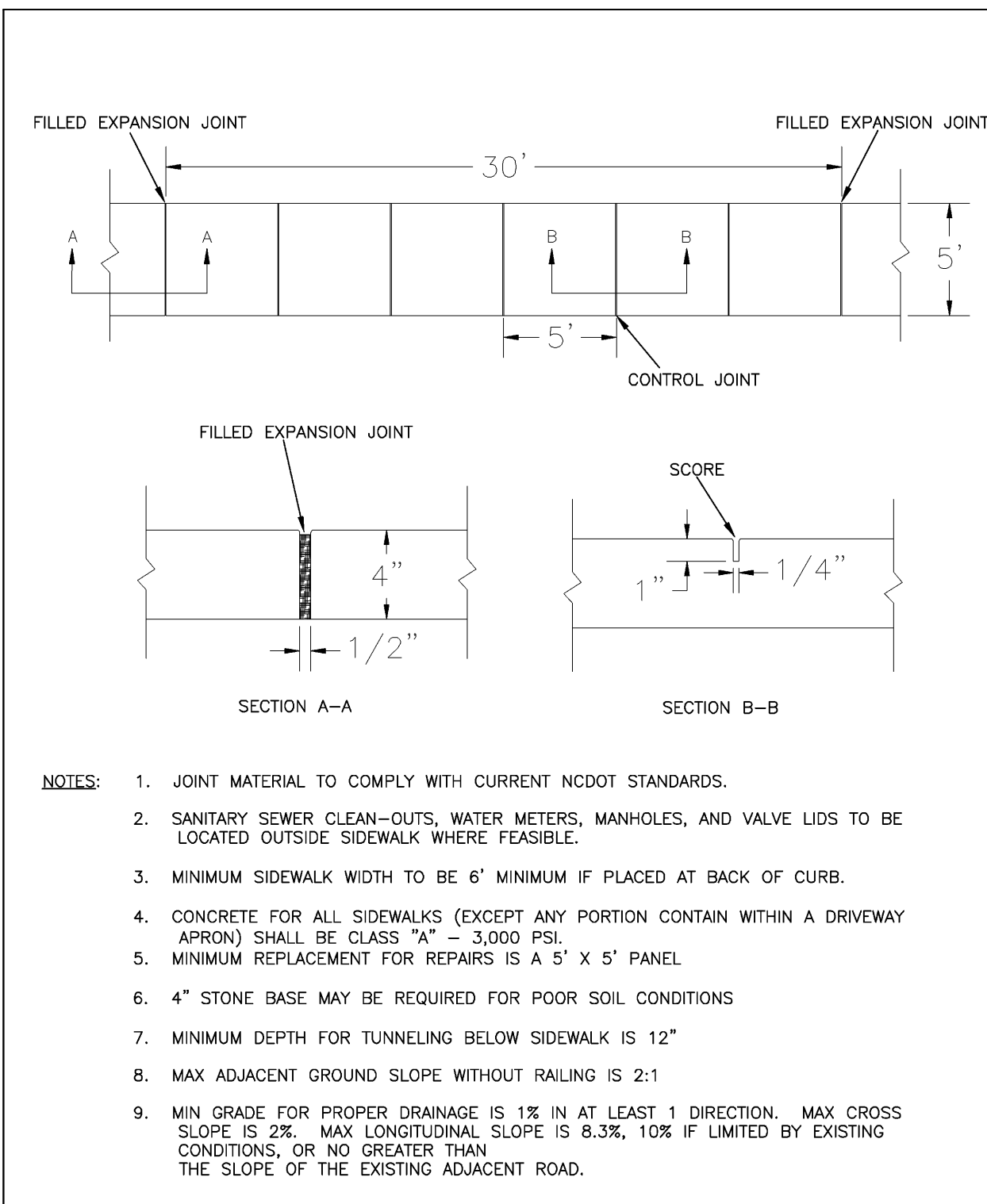


NOTE: DRIVEWAYS TRACED/APPROXIMATED BASED ON NHC GIS 2010 AERIAL, GOOGLE AERIAL, & GOOGLE STREET VIEW. DRIVEWAYS ON ADJACENT PROPERTY SCALE: 1"=40'



NOTE: DRIVEWAYS TRACED/APPROXIMATED BASED ON NHC GIS 2010 AERIAL, GOOGLE AERIAL, & GOOGLE STREET VIEW. DRIVEWAYS WITHIN 250' OF NORTHWEST CORNER OF SITE SCALE: 1"=40'

<b>Approved Construction Plan</b> Name: _____ Date: _____ Planning: _____ Traffic: _____ Fire: _____	
Approved STORMWATER MANAGEMENT PLAN Date: _____ Permit #: _____ Signed: _____	
DETAIL SHEET 4010 CAROLINA BEACH ROAD <b>ECHO FARM APARTMENTS</b> WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA	
<b>FINAL DRAWING FOR REVIEW PURPOSES ONLY</b>	
DEVELOPER: ECHO FARM APARTMENTS, LLC 10 S. CARDINAL DRIVE WILMINGTON, NORTH CAROLINA 28403 PHONE: 910-251-5030	
DATE: 11-24-15 SCALE: N.T.S. DRAWN: JCB CHECKED: JEM PROJECT NO: 260 SHEET NO: 15 OF: 22	



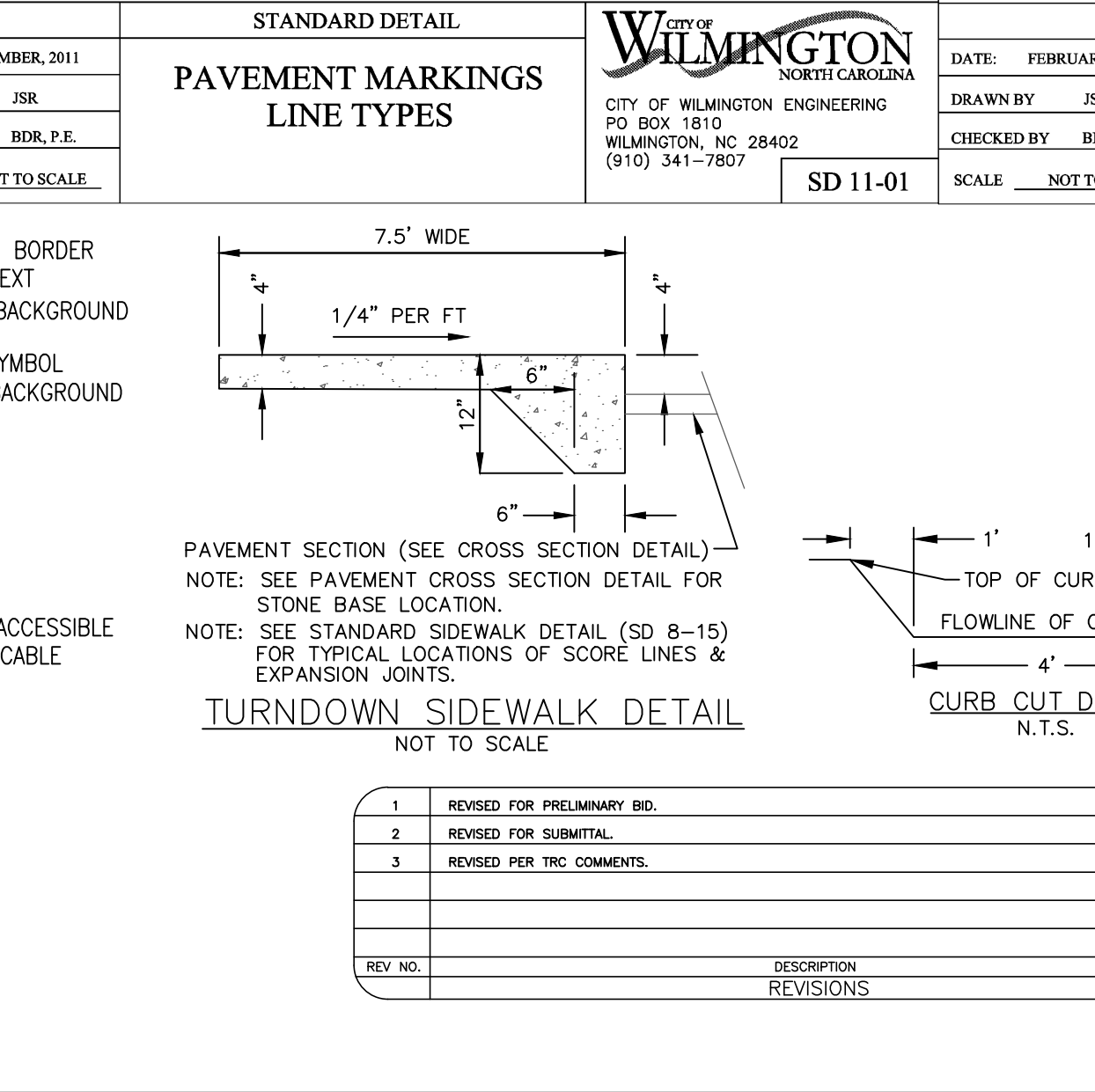
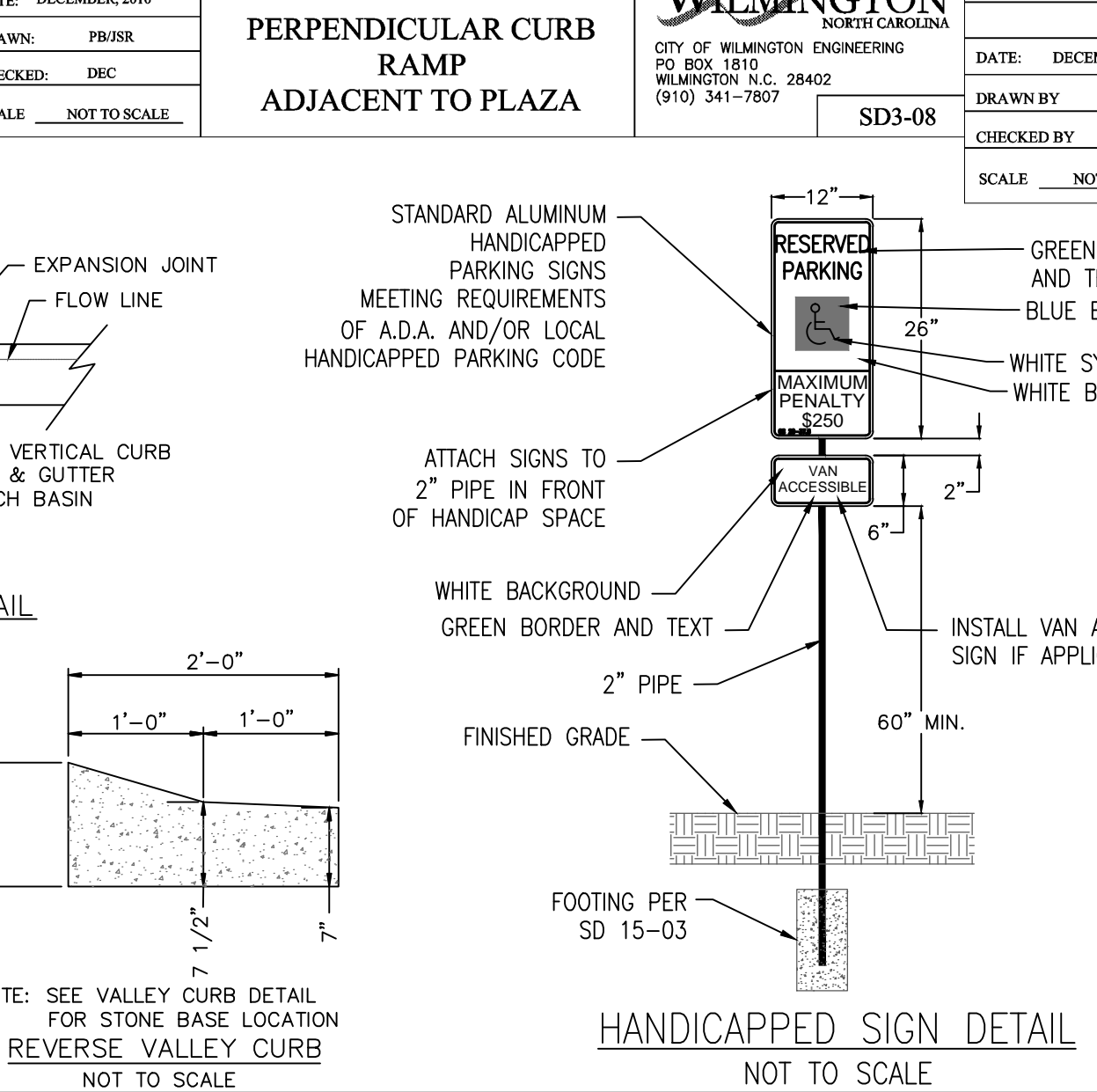
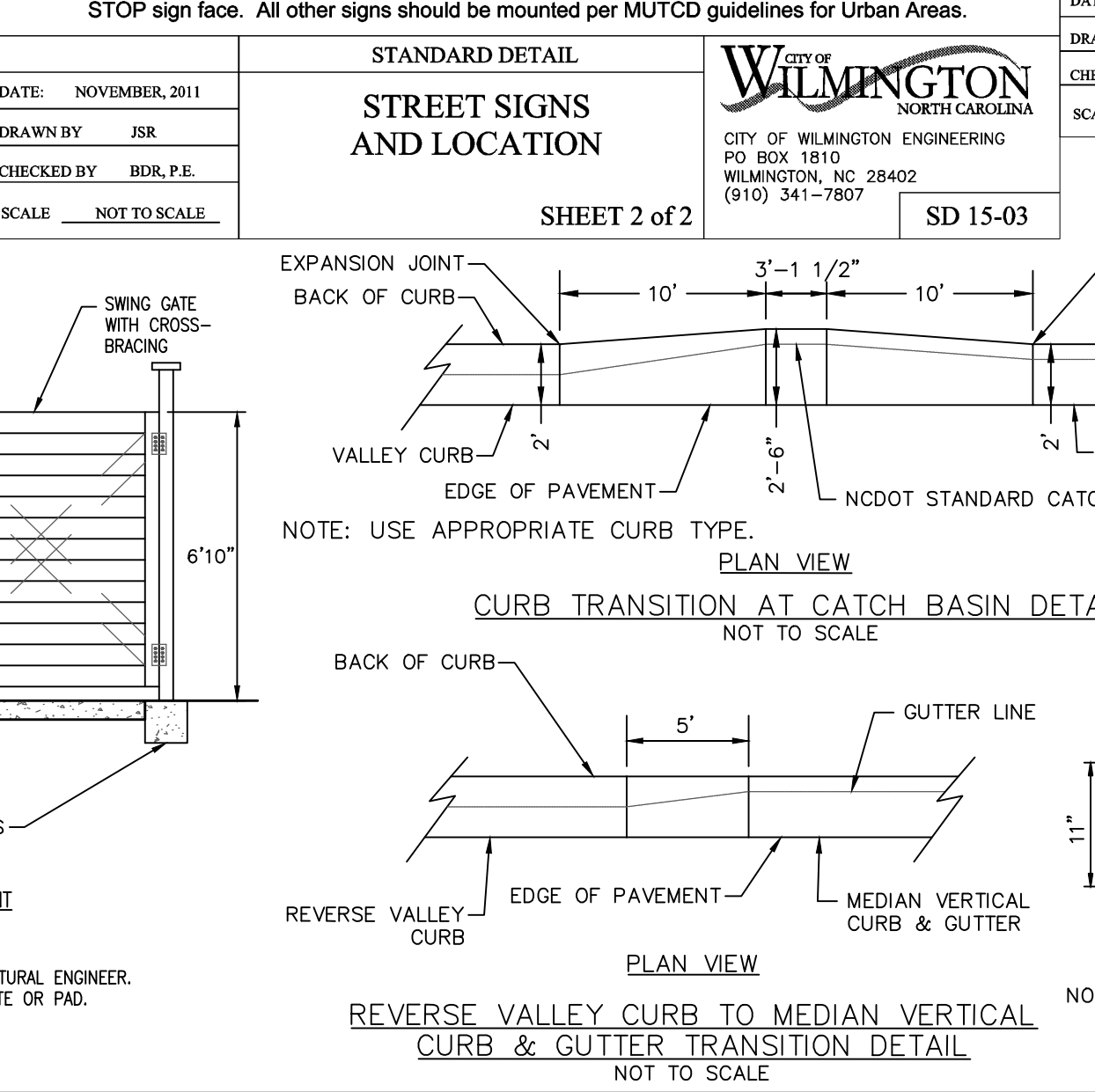
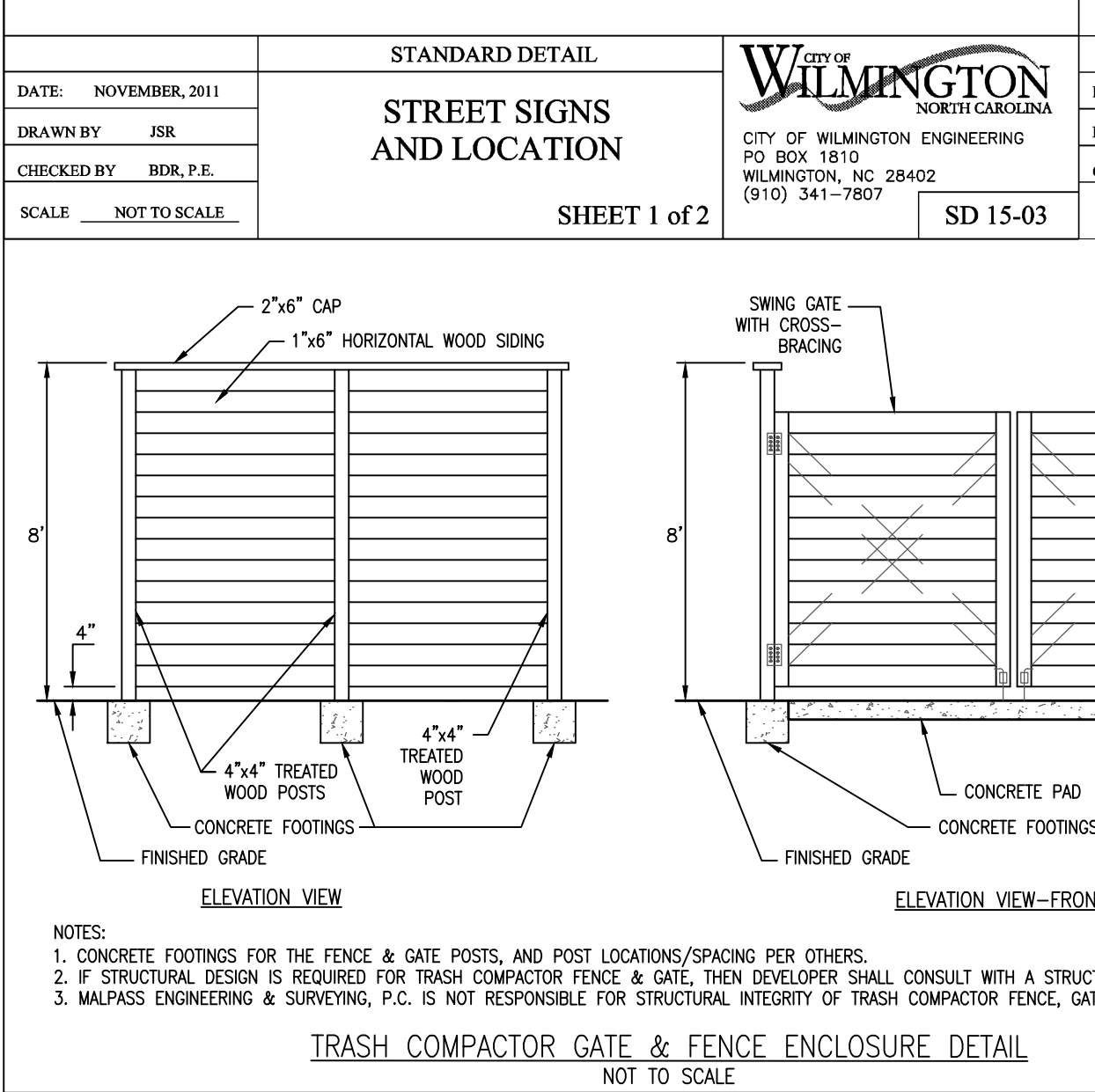
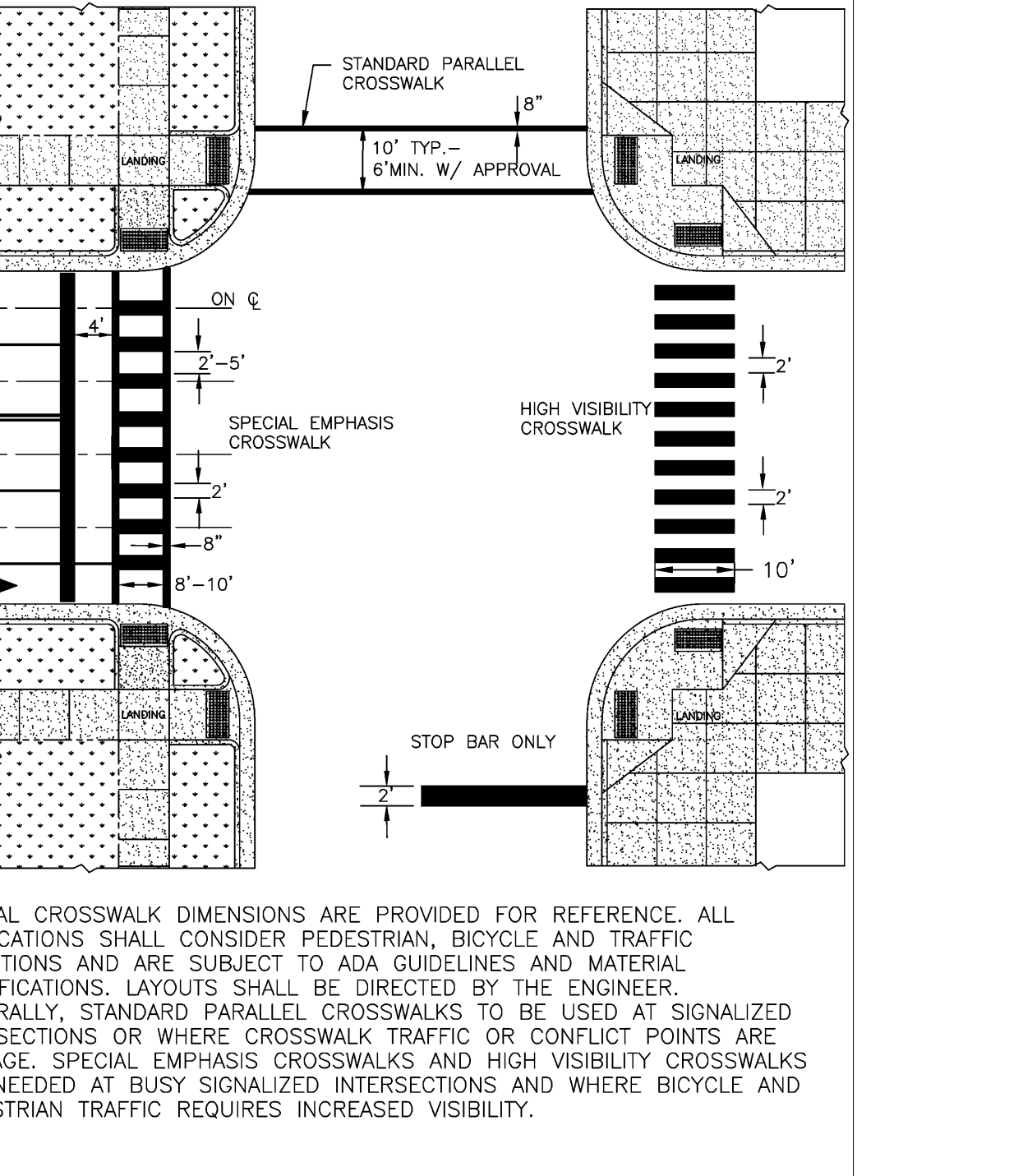
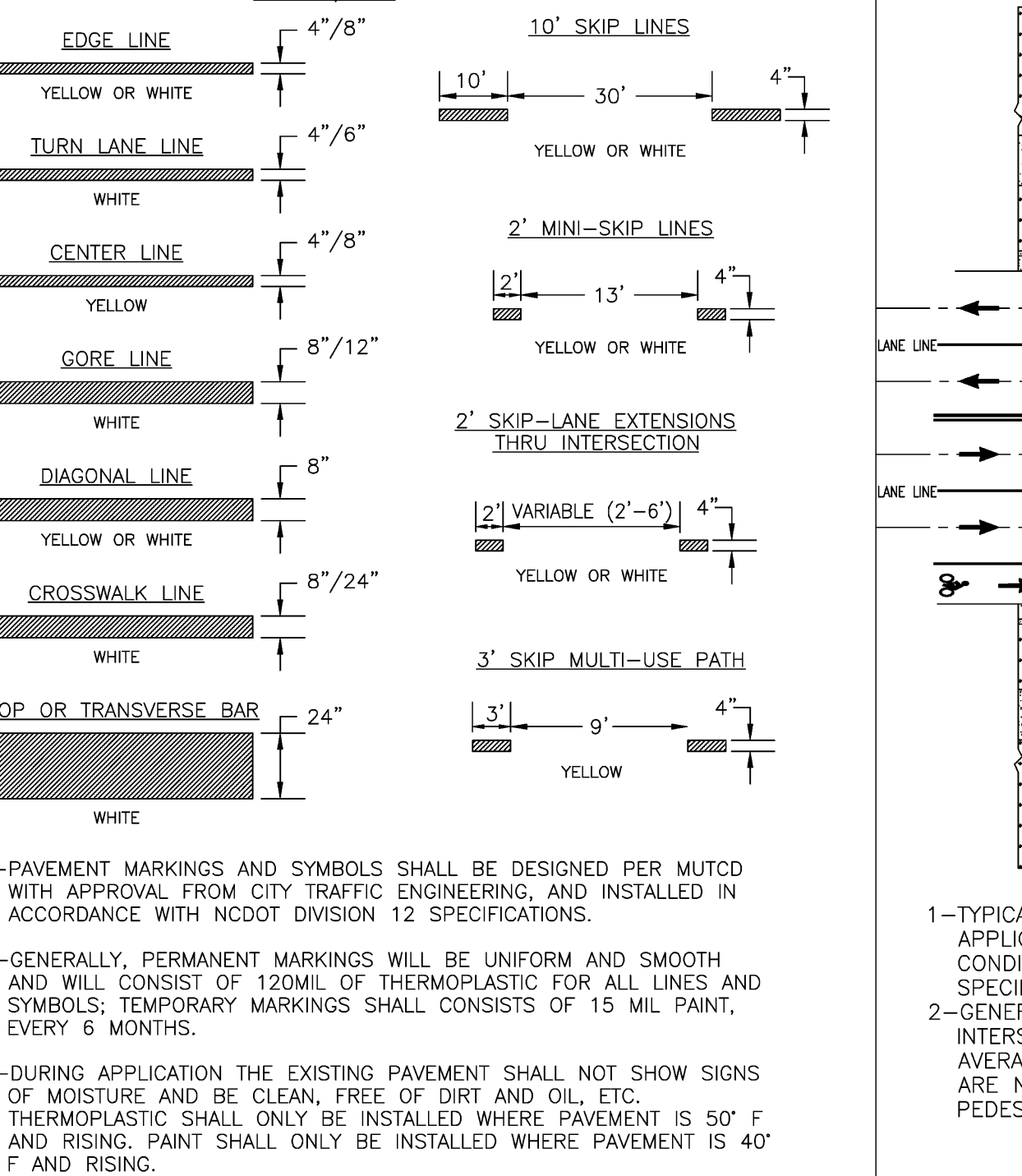
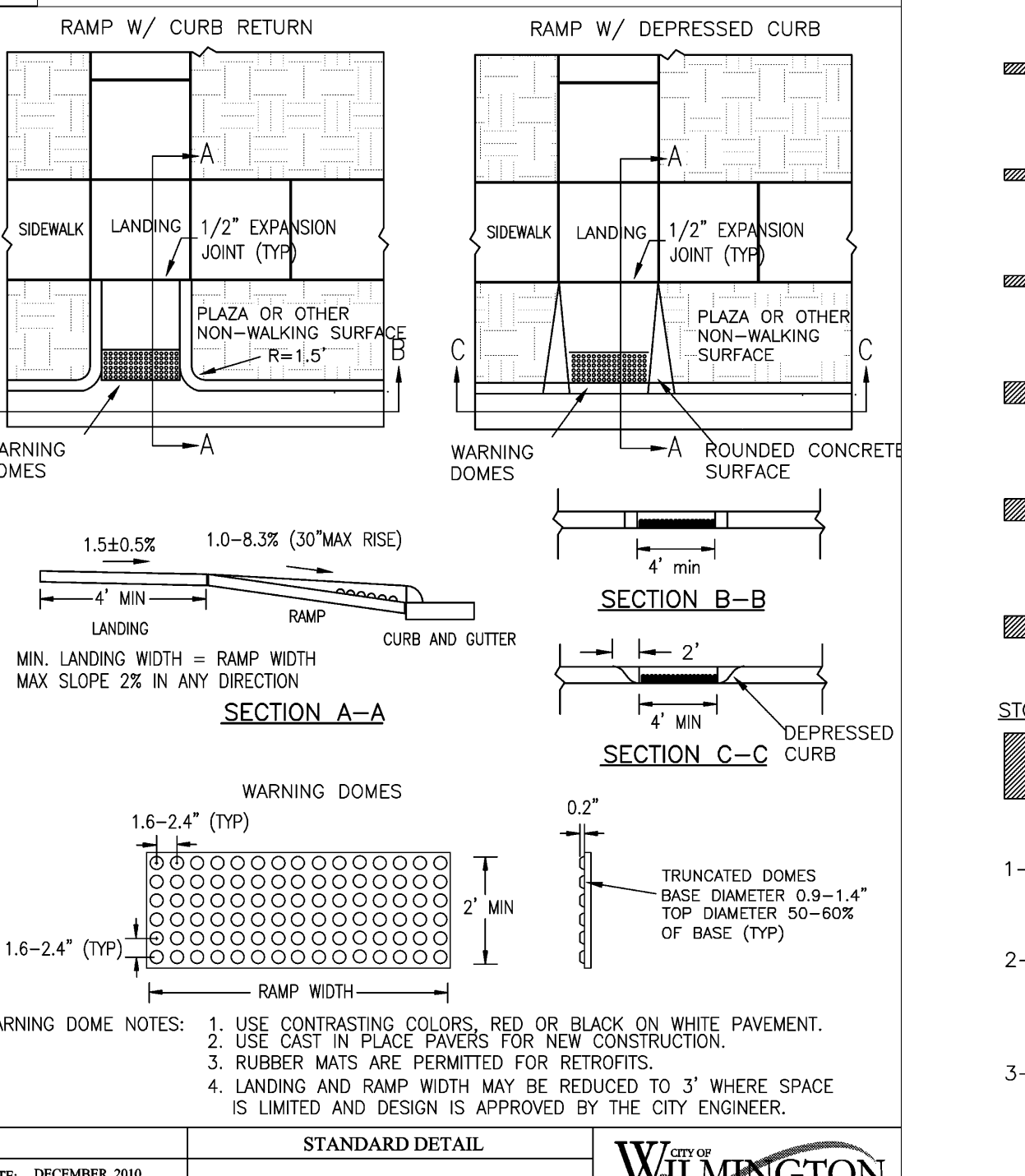
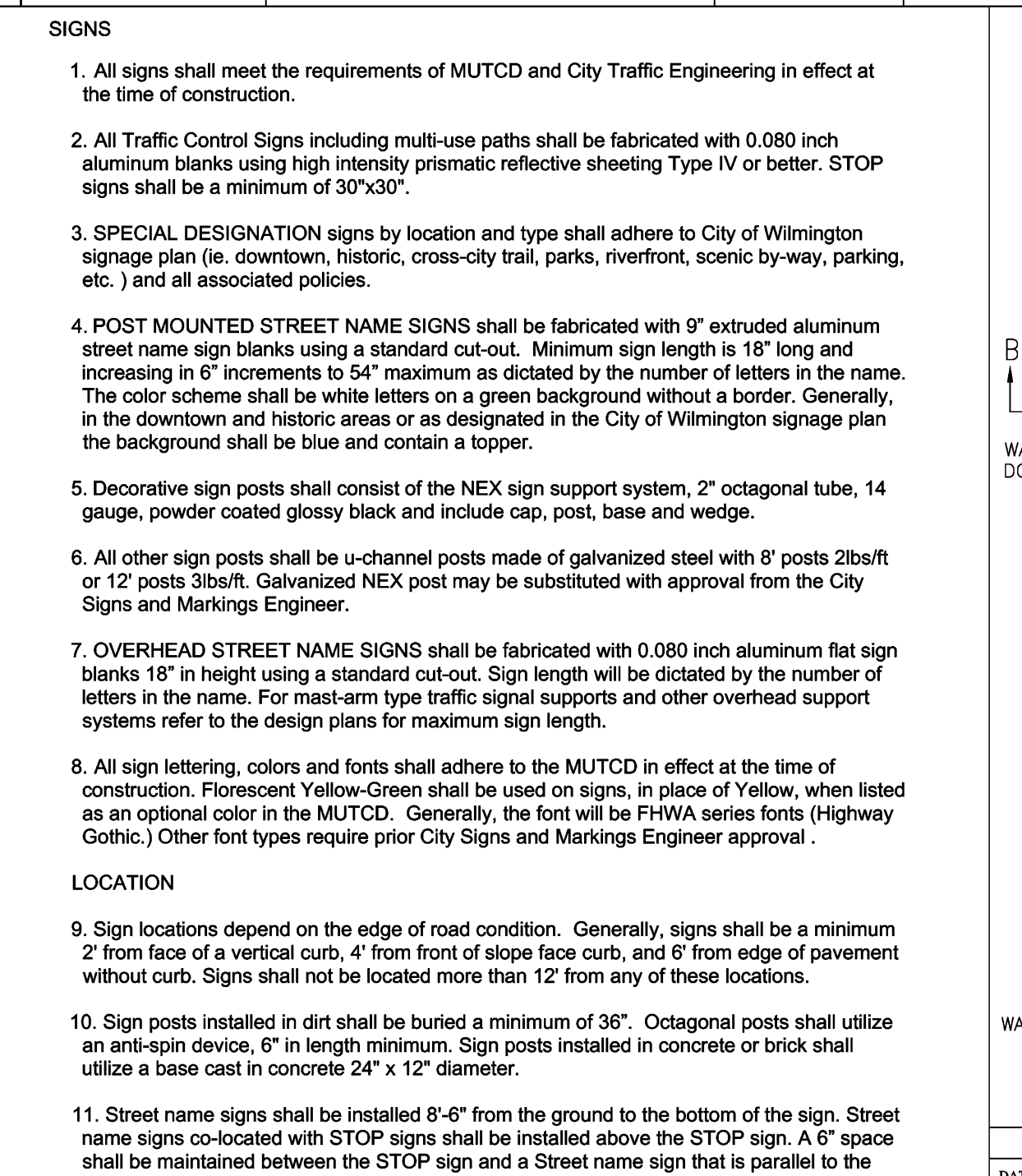
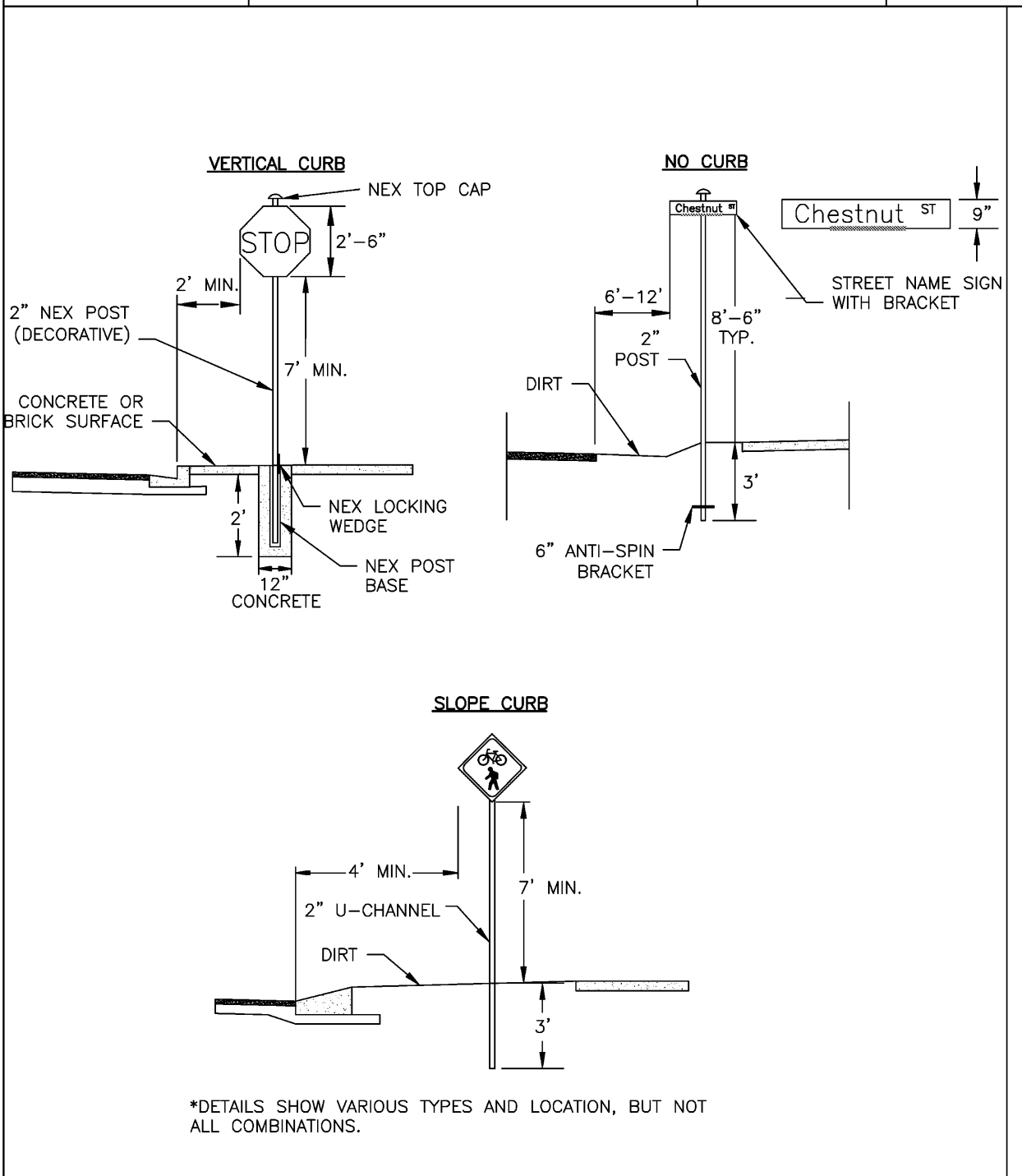
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CHECKED: DEC	SCALE: NOT TO SCALE	SD 3-10

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CHECKED: DEC	SCALE: NOT TO SCALE	SD 3-11

DATE: MAY, 2013	DRAWN BY: JSR	CITY OF WILMINGTON NORTH CAROLINA
CHECKED BY: D.E.C., P.E.	SCALE: NOT TO SCALE	SD 1-05

DATE: JAN, 2015	DRAWN BY: JSR	CITY OF WILMINGTON NORTH CAROLINA
CHECKED BY: RDG, P.E.	SCALE: NOT TO SCALE	SD 15-09

DATE: JAN, 2015	DRAWN BY: JSR	CITY OF WILMINGTON NORTH CAROLINA
CHECKED BY: RDG, P.E.	SCALE: NOT TO SCALE	SD 15-09



**Approved Construction Plan**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Planning \_\_\_\_\_

Traffic \_\_\_\_\_

Fire \_\_\_\_\_

Signed: \_\_\_\_\_

**ECHO FARM APARTMENTS**  
 WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

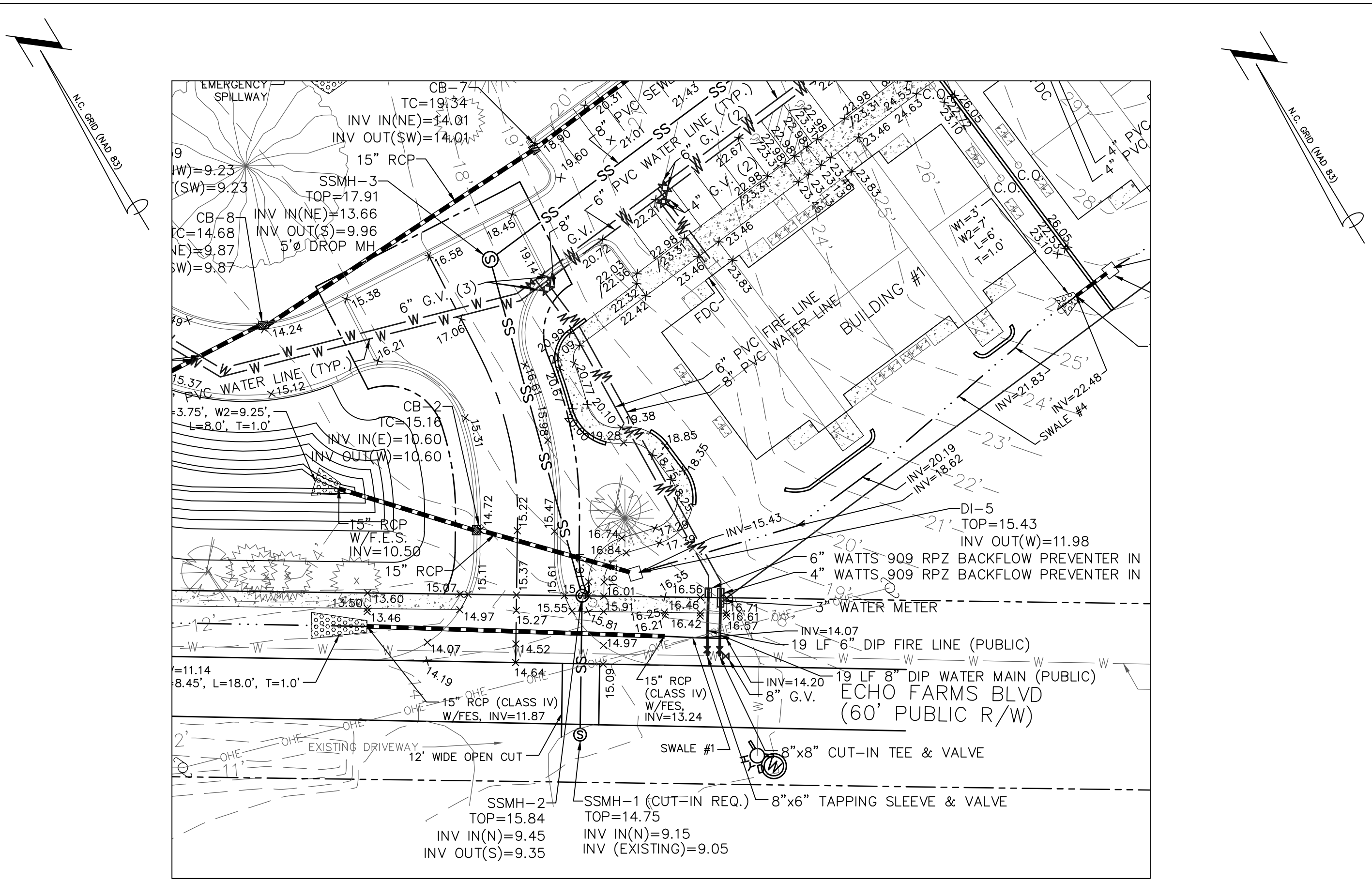
**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
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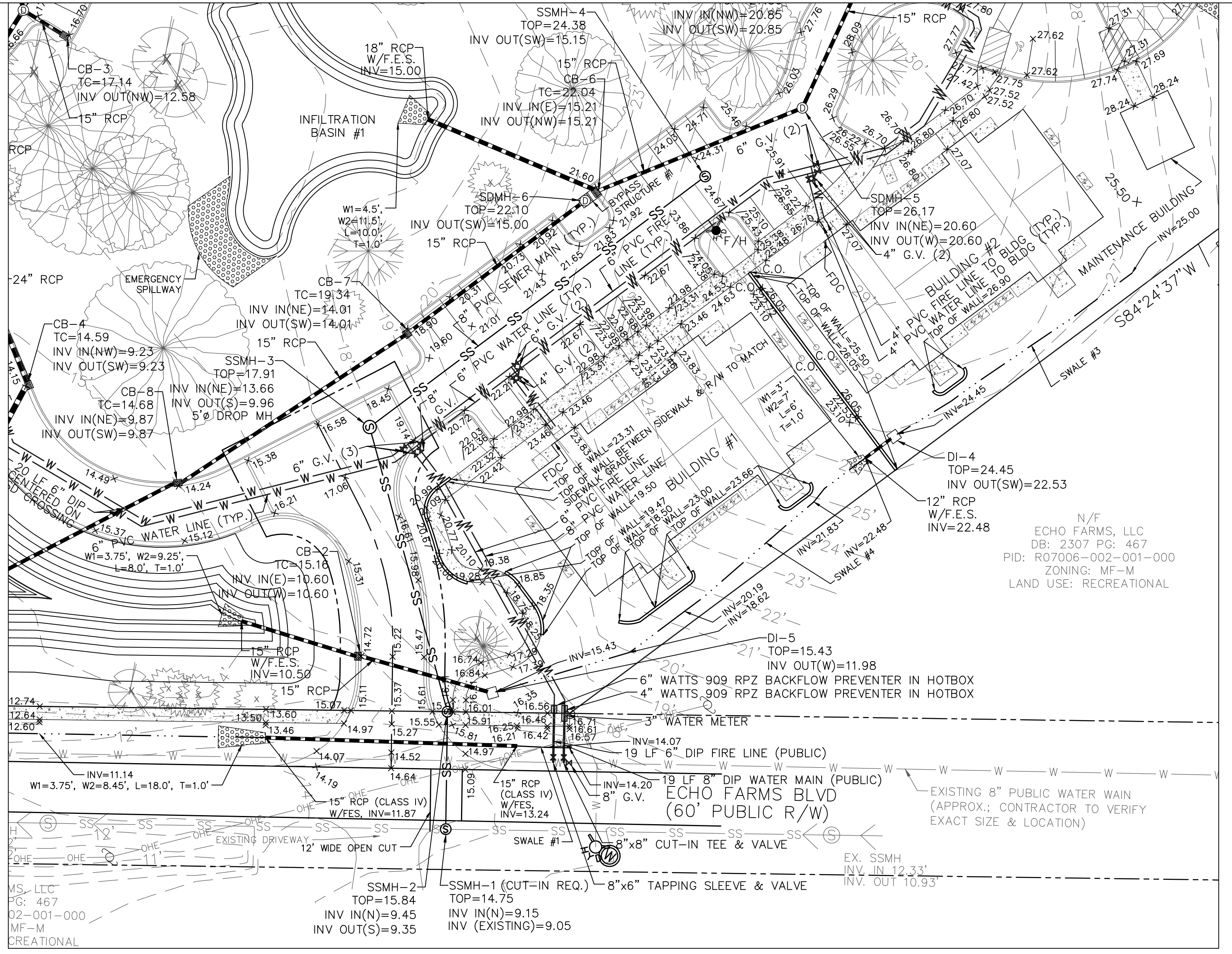
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 WILMINGTON, NORTH CAROLINA 28403  
 PHONE: 910-251-5030

DATE: 10-1-15  
 SCALE: N.T.S.  
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 OF: 22

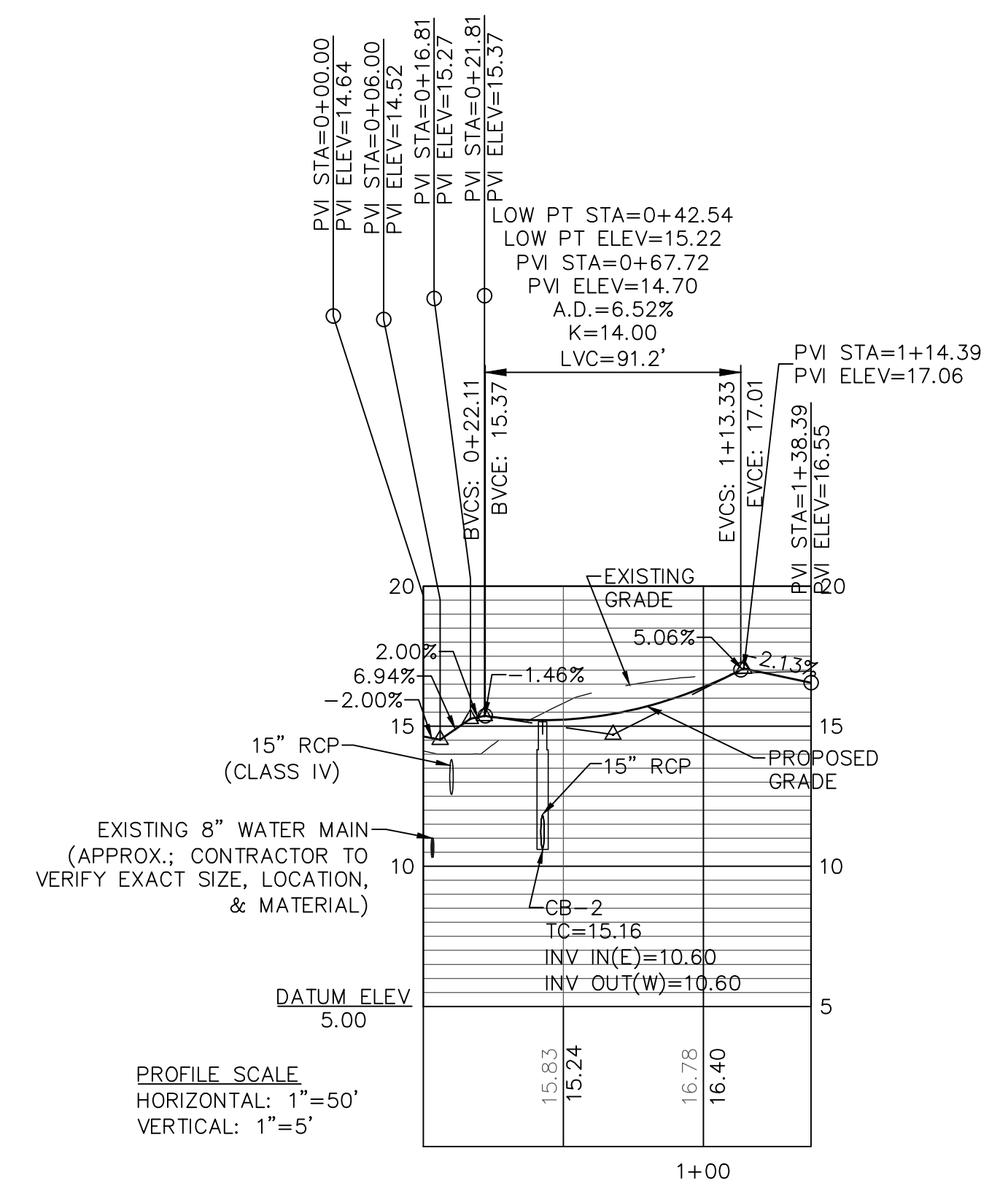




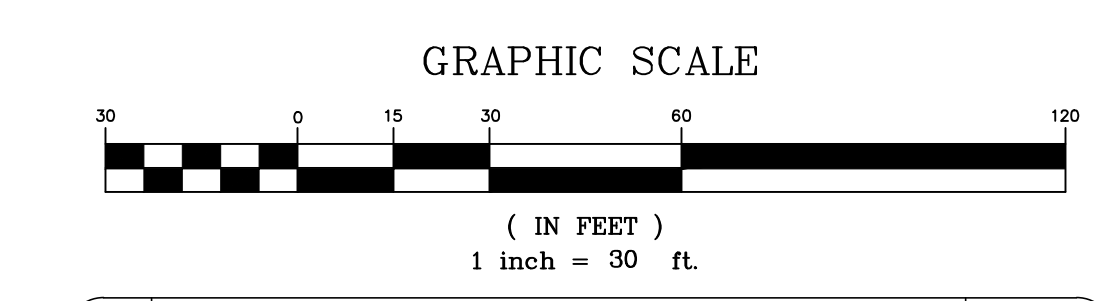
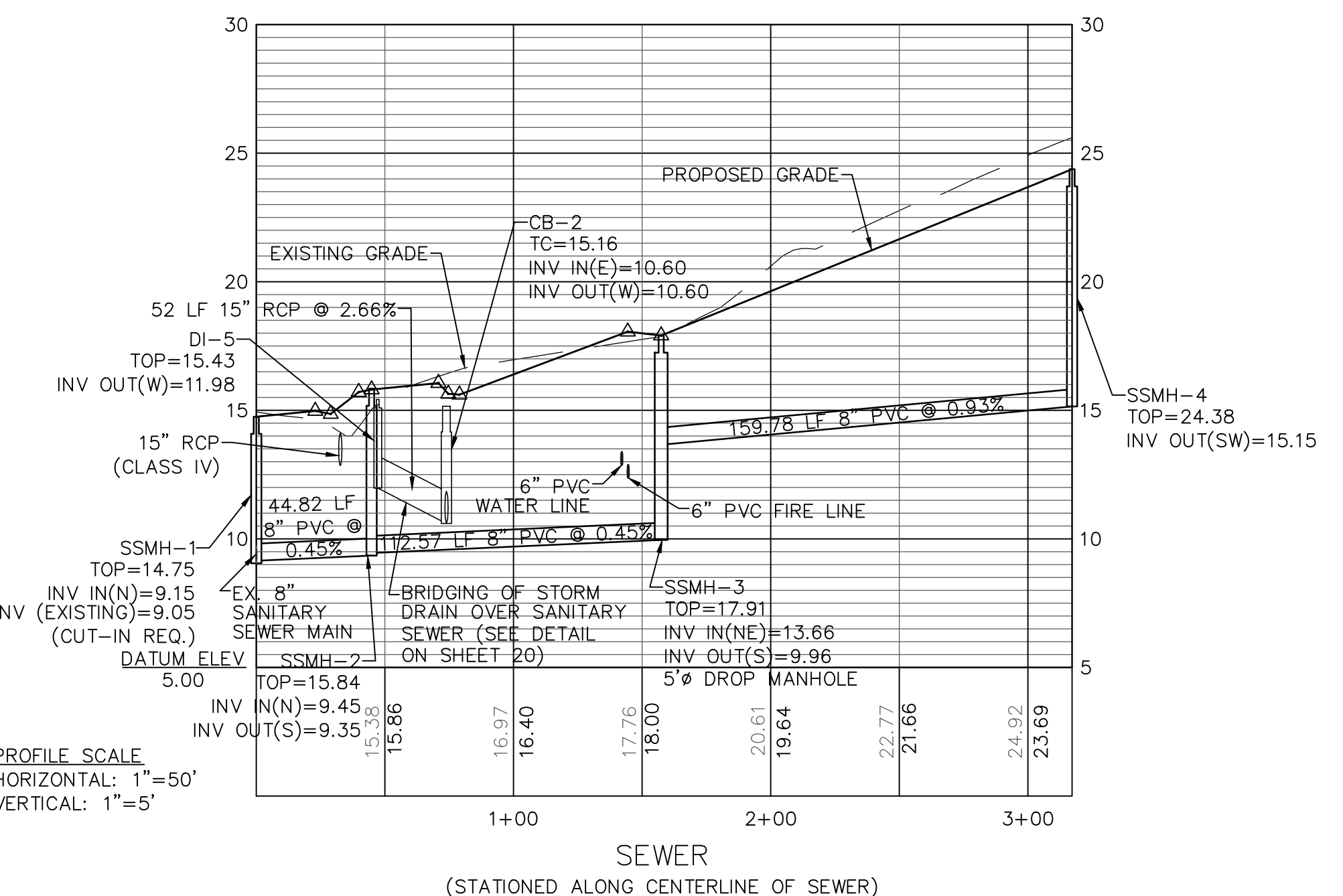
PLAN VIEW SCALE: 1"=30'



PLAN VIEW SCALE: 1"=30'



SALINGER COURT



REV NO.	DESCRIPTION	DATE

PLAN PROFILE  
4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

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10 S. CARDINAL DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE: 12-14-15
SCALE: VARIES
DRAWN: JCB
CHECKED: JEM
PROJECT NO: 260
SHEET NO: 7
OF: 22

MATCHLINE  
SEE SHEET L-2

MATCHLINE  
SEE SHEET L-2

N/F  
CITY OF WILMINGTON  
DB: 1272 PG: 650  
PID: R06500-004-001-003  
ZONING: R-15  
LAND USE: UNUSED

BENCHMARK  
ELEV. = 17.55'

N 15°45'01.5015  
2326064.9247  
C.F. = 1.000033816

CAROLINA BEACH RD / US HWY 421  
100' PUBLIC R/W

EAST EDGE OF CREEK

4" W/8" CURB CUT

20' BUFFER

20' PRIVATE DRAINAGE EASEMENT

25' CONSERVATION SETBACK

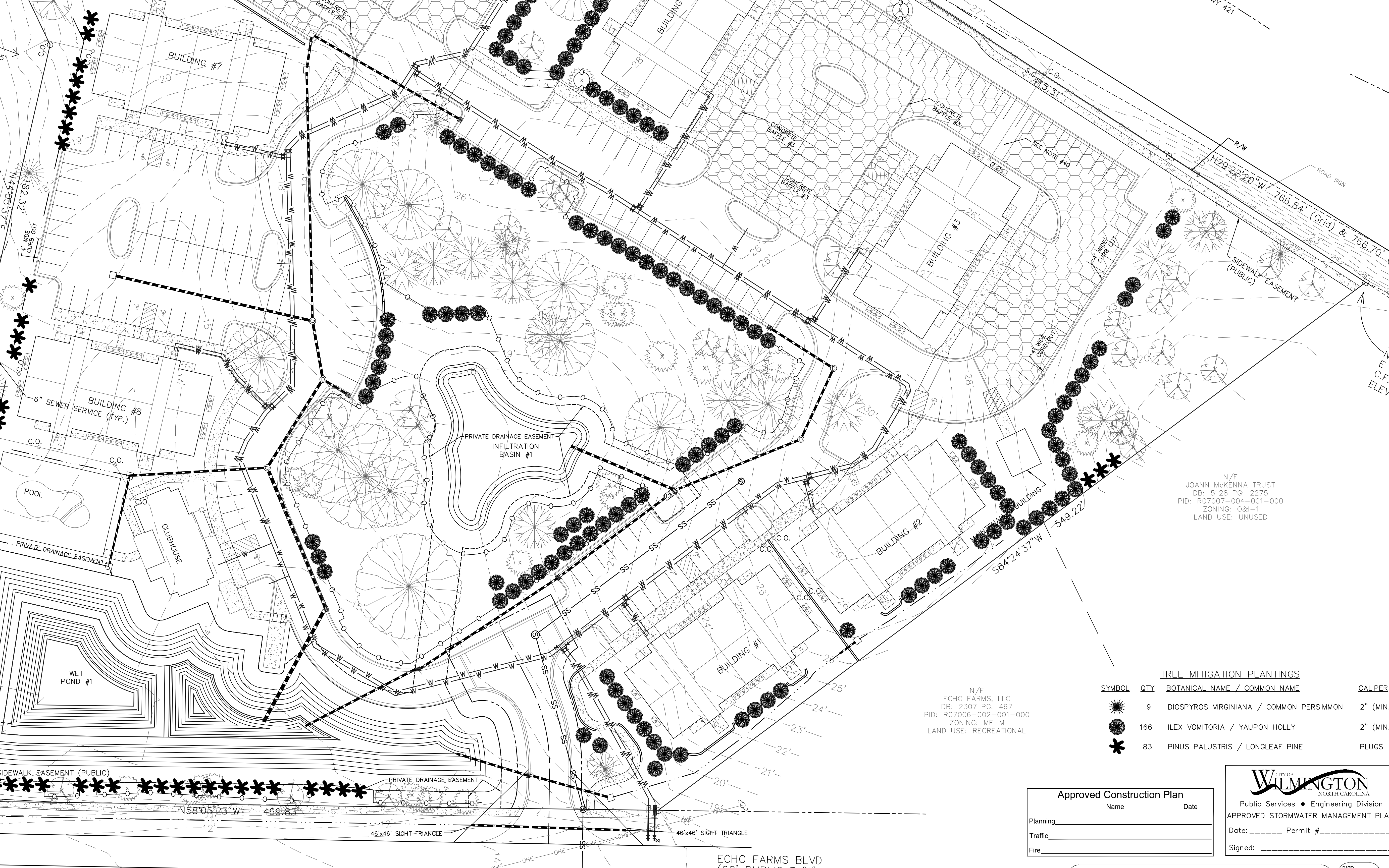
50' VEGETATIVE BUFFER

PRIVATE DRAINAGE EASEMENT

SIDEWALK EASEMENT (PUBLIC)

PRIVATE DRAINAGE EASEMENT

PRIVATE DRAINAGE EASEMENT



N/F  
JOANN McKENNA TRUST  
DB: 5128 PG: 2275  
PID: R07007-004-001-000  
ZONING: O&I-1  
LAND USE: UNUSED

**TREE MITIGATION PLANTINGS**

SYMBOL	QTY	BOTANICAL NAME / COMMON NAME	CALIPER
(Sunburst symbol)	9	DIOSPYROS VIRGINIANA / COMMON PERSIMMON	2" (MIN.)
(Circle with cross symbol)	166	ILEX VOMITORIA / YAUPON HOLLY	2" (MIN.)
(Star symbol)	83	PINUS PALUSTRIS / LONGLEAF PINE	PLUGS

N/F  
ECHO FARMS, LLC  
DB: 2307 PG: 467  
PID: R07006-002-001-000  
ZONING: MF-M  
LAND USE: RECREATIONAL

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

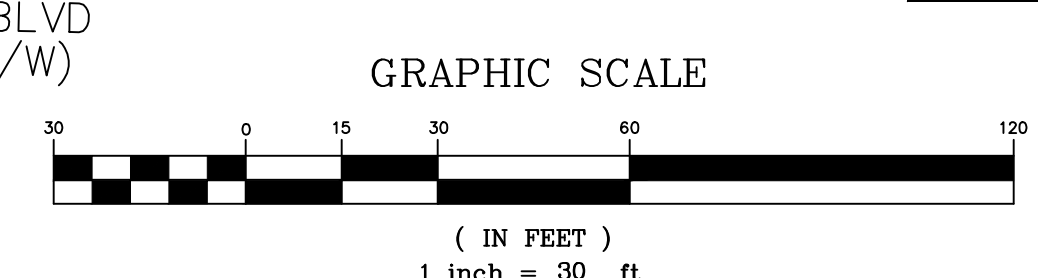
Traffic \_\_\_\_\_

Fire \_\_\_\_\_

**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_



**ECHO FARM APARTMENTS**  
WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

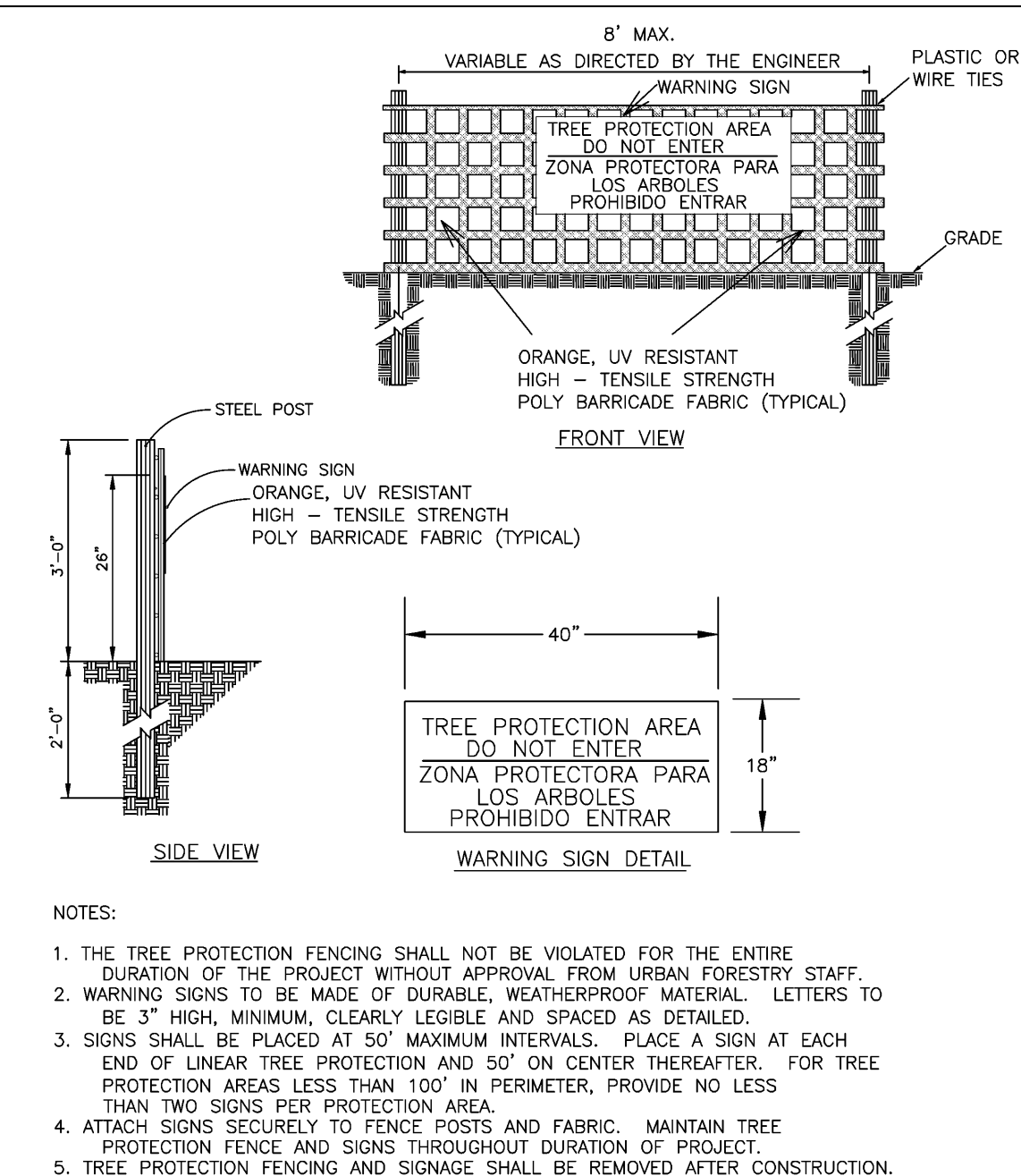
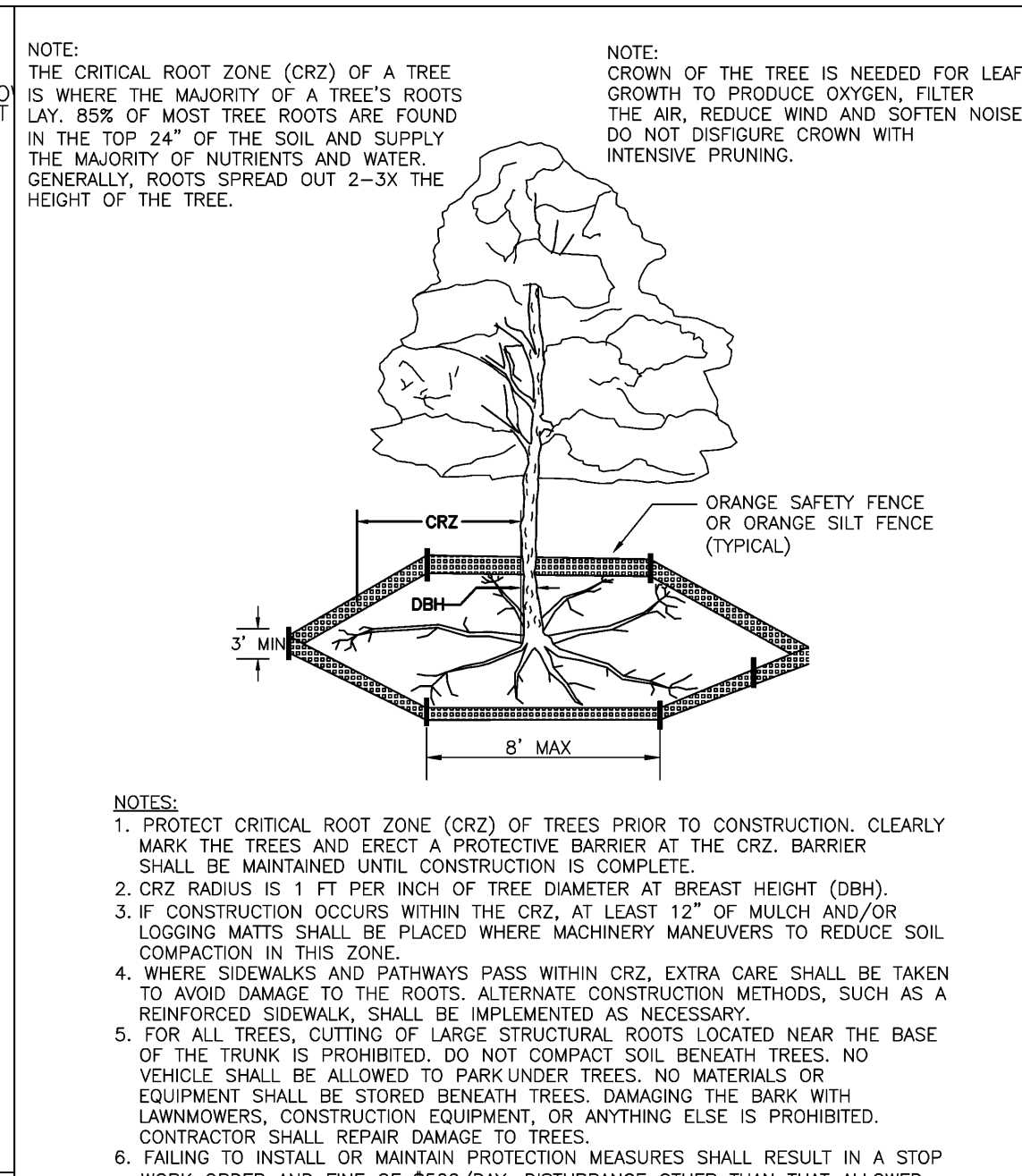
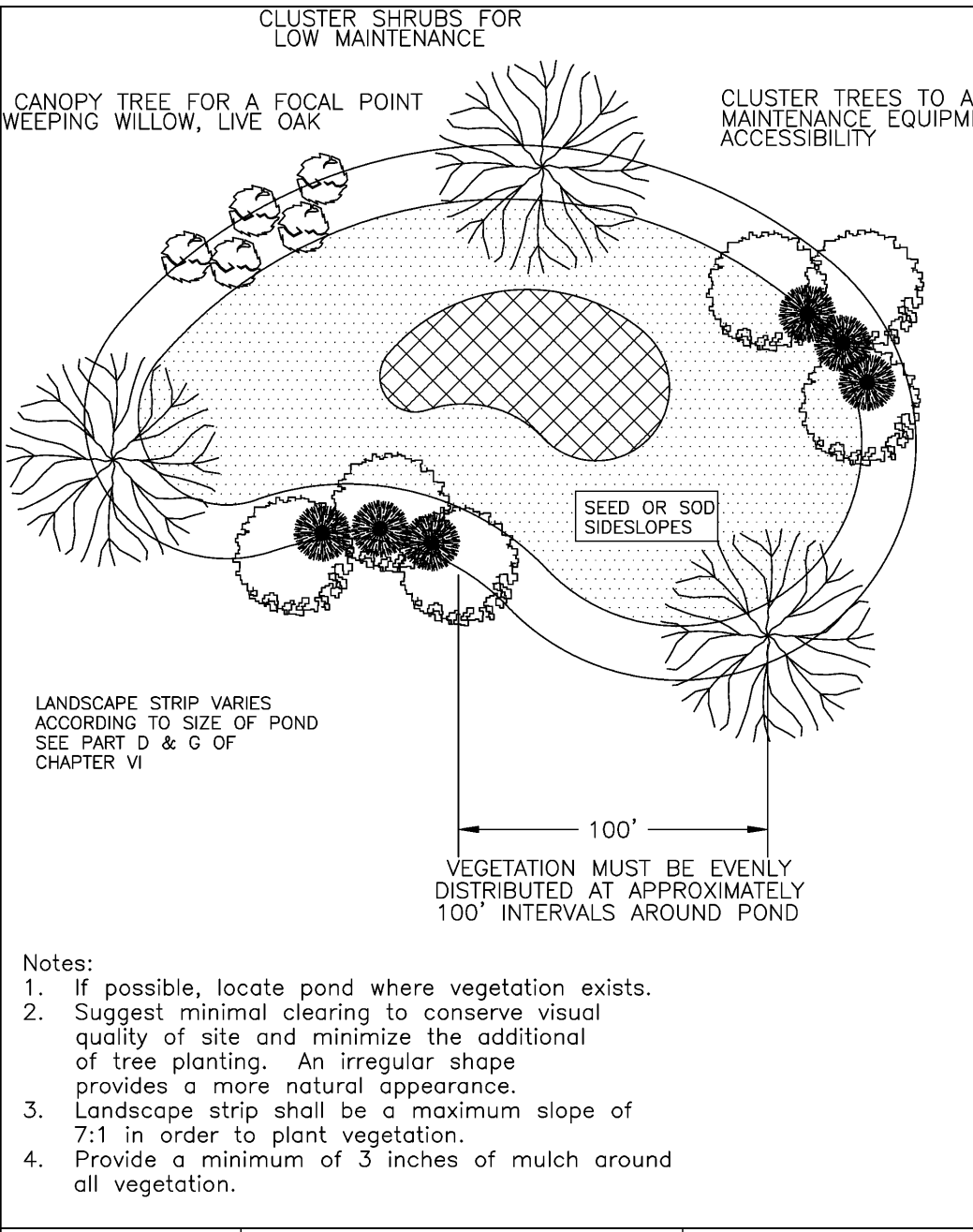
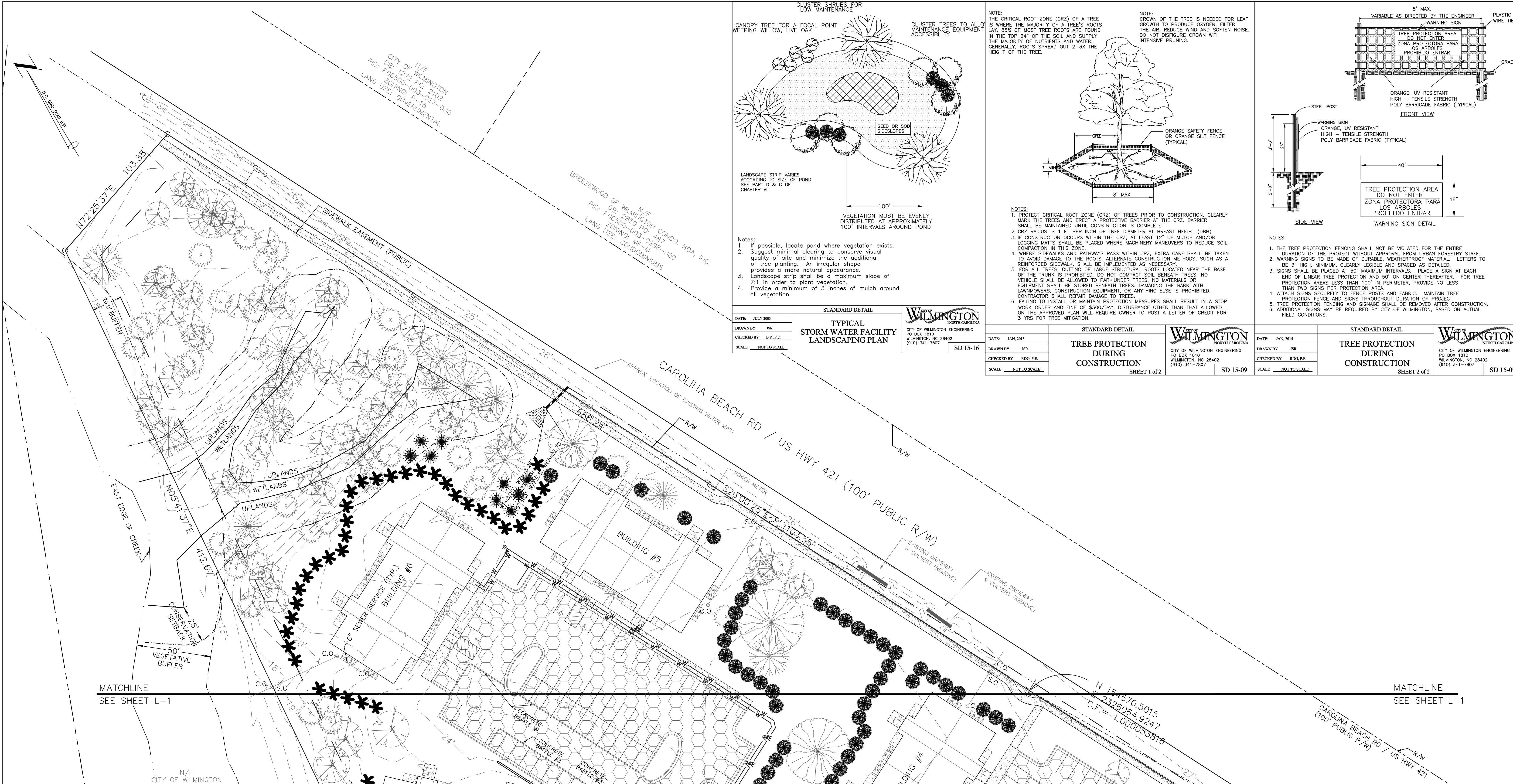
**MALPASS ENGINEERING & SURVEYING, P.C.**  
1134 SHIPYARD BOULEVARD  
WILMINGTON, NORTH CAROLINA 28412  
Phone 910-392-5343 Fax 910-392-5203 License No. C-2320

Developer: ECHO FARM APARTMENTS, LLC  
10 S. CARDINAL DRIVE  
WILMINGTON, NORTH CAROLINA 28403  
PHONE: 910-251-5030

DATE: 11-16-15  
SCALE: 1"=30'  
DRAWN: JCB  
CHECKED: JEM  
PROJECT NO: 260  
SHEET NO: L-1

REV. NO.	DESCRIPTION / REVISIONS	DATE
1	REVISED TO ADJUST LOCATION OF WATER LINE.	12-14-15

PRELIMINARY PLAT  
NOT FOR RECORDATION,  
CONVEYANCES, OR SALES



DATE: JULY 2003  
 DRAWN BY: JSR  
 CHECKED BY: B.F.P.E.  
 SCALE: NOT TO SCALE

**STANDARD DETAIL**  
**TYPICAL STORM WATER FACILITY LANDSCAPING PLAN**

CITY OF WILMINGTON  
 NORTH CAROLINA  
 CITY OF WILMINGTON ENGINEERING  
 PO BOX 1810  
 WILMINGTON, NC 28402  
 (910) 341-7807

SD 15-16

DATE: JAN 2015  
 DRAWN BY: JSR  
 CHECKED BY: RDG, P.E.  
 SCALE: NOT TO SCALE

**STANDARD DETAIL**  
**TREE PROTECTION DURING CONSTRUCTION**  
 SHEET 1 of 2

CITY OF WILMINGTON  
 NORTH CAROLINA  
 CITY OF WILMINGTON ENGINEERING  
 PO BOX 1810  
 WILMINGTON, NC 28402  
 (910) 341-7807

SD 15-09

DATE: JAN 2015  
 DRAWN BY: JSR  
 CHECKED BY: RDG, P.E.  
 SCALE: NOT TO SCALE

**STANDARD DETAIL**  
**TREE PROTECTION DURING CONSTRUCTION**  
 SHEET 2 of 2

CITY OF WILMINGTON  
 NORTH CAROLINA  
 CITY OF WILMINGTON ENGINEERING  
 PO BOX 1810  
 WILMINGTON, NC 28402  
 (910) 341-7807

SD 15-09

MATCHLINE  
 SEE SHEET L-1

N/F  
 CITY OF WILMINGTON  
 DB: 1272 PG: 650

MATCHLINE  
 SEE SHEET L-1

N 15-1570.5015  
 E 2326064.9247  
 C.F. = -1.000053816

CAROLINA BEACH RD / US HWY 421  
 (100' PUBLIC R/W)

**Approved Construction Plan**

Name \_\_\_\_\_ Date \_\_\_\_\_

Planning \_\_\_\_\_

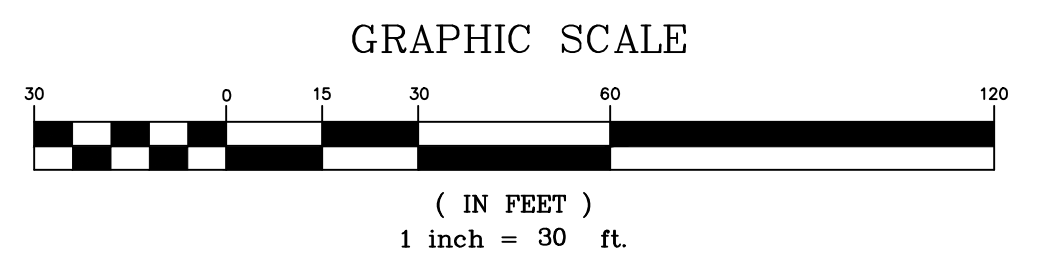
Traffic \_\_\_\_\_

Fire \_\_\_\_\_

Public Services • Engineering Division  
**APPROVED STORMWATER MANAGEMENT PLAN**

Date: \_\_\_\_\_ Permit # \_\_\_\_\_

Signed: \_\_\_\_\_



REV NO.	DESCRIPTION	DATE
1	REVISED TO ADJUST LOCATION OF WATER LINE.	12-14-15

TREE MITIGATION PLAN  
 4010 CAROLINA BEACH ROAD  
**ECHO FARM APARTMENTS**  
 WILMINGTON TOWNSHIP NEW HANOVER COUNTY NORTH CAROLINA

**FINAL DRAWING FOR REVIEW PURPOSES ONLY**

MALPASS ENGINEERING & SURVEYING, P.C.  
 1134 SHIPYARD BOULEVARD  
 WILMINGTON, NORTH CAROLINA 28412  
 Phone 910-392-6343  
 Fax 910-392-5203 License No. C-2320

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**L-2**

PRELIMINARY PLAT  
 NOT FOR RECORDATION,  
 CONVEYANCES, OR SALES