



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 - E
NC Reg. No. - 25572, AL Reg. No. - 32178

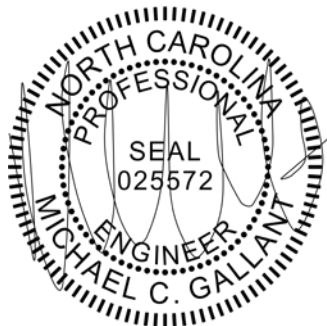
Town of Topsail Beach



Multi-Use Path Economic and Feasibility Study

Prepared by

Michael C. Gallant, PE



2-19-20



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

1. Introduction

The Town of Topsail Beach, in an effort to provide a safe and accessible amenity to Town residents, has asked to have options for a proposed multi-use path (MUP) analyzed for respective costs and feasibility. This study endeavors to evaluate five different options for the Town's consideration. These options are for the construction of a MUP extending from the Town center at Crews Avenue south to Trout Avenue. Possible drainage and future utility impacts are also to be discussed as well as impacts to driveways and landscaping that falls within the public right of way (ROW).

It is important to note that the analysis performed for this study does not include a recent as-built survey of the area and relies primarily on aerial photographs from the Pender County GIS website (2016 Aerials).

The analysis that follows involves the typical costs involved for the construction of the five options. These costs include estimates for both hard and soft costs. Hard costs consist of material and labor for the actual construction of the infrastructure. Soft costs include surveying, analysis, design and permitting of said infrastructure.

2. Future Utility Considerations

The Town has requested as part of this study that the writer consider the impact of the installation of an MUP on future utility infrastructure. The options described below do not propose to impact existing utilities, mainly water mains, in a manner that would be disqualifying. That said the Town has discussed the possibility of a sanitary sewerage collection system. In most cases such a system would be placed on the opposite side of the street from the water line to meet or exceed the required separations between water and sewer lines.

Options 1, 1A, 2 and 2A propose for the MUP to be placed on the eastern side of South Anderson Boulevard. If a sanitary sewer collection network were to be installed, this is the same area where one would expect those lines to be placed. Given the probable depth of the excavations required and the placement of manholes it is likely that a good portion of the MUP, if installed prior to a sewer collection system, would have to be demolished and rebuilt after the work was completed.



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

3. Description of Options

Option 1

Option 1 is the construction of an eight (8) foot wide pedestrian multi-use path (MUP) from Crews Avenue to Trout Avenue along the eastern side of NC Hwy 50 also known as South Anderson Boulevard. This MUP would run parallel to the existing edge of pavement (EOP) at an offset minimum of six (6) feet. The path would be 8 feet wide leaving approximately 10+ feet between the outer edge of the path and the ROW line that defines the front property line of the adjacent properties. This MUP would be constructed from a base course of compact stone and a minimum of one and a half (1.5) inches of asphalt paving. The construction of the paved cross section would mirror NCDOT's requirements for subdivision roads concerning materials, compaction of subgrade and the base course, base course thickness, paving thickness, pavement density and other standard metrics for such work.

Crosswalks at the various intersections with side streets would be required as well as detectable warning plates on each side of each intersection.

This MUP would replace the existing bike path that runs along the same stretch of NC Hwy 50. That path is approximately 3 feet wide (+ or -).

The area near the intersection of Florida Avenue and NC Hwy 50 has had a history of standing water after storm events. This option has allocated funds for installing catch basins on the eastern side of Hwy 50 and installing culverts under the road to direct water to the existing ditch on the western side of the road. This work would have to be approved by NCDOT.

Option 1A

Option 1A is similar Option 1 only the MUP is five (5) feet wide instead of 8 feet wide. This option has been revised to include the addition of a four (4) foot wide bicycle lane on both sides of South Anderson Boulevard.

Option 2

Option 2 mirrors Option 1 in the location and width of a MUP. The only difference is instead of asphalt paving the MUP would be constructed of concrete. This option would include similar requirements for the subgrade and the base course as far as thickness and compaction are concerned. The finished surface would consist of a six (6) inch minimum concrete pour with 6 x 6 welded wire fabric reinforcement.



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

Option 2A

Option 2A is similar Option 1 only the MUP is five (5) feet wide instead of 8 feet wide. This option has been revised to include the addition of a four (4) foot wide bicycle lane on both sides of South Anderson Boulevard.

Option 3

Like the first two options, Option 3 would extend an MUP from Crews Avenue to Trout Avenue. Unlike the other options this MUP would utilize the existing eastern lane of Ocean Boulevard.

Currently, Ocean Boulevard is an NCDOT owned ROW. This option would entail the Town taking over responsibility and ownership for this portion of Ocean Boulevard from NCDOT. In creating a MUP in the eastern lane of the street the remaining lane would have to be designated as a one-way street. This would mean that residents who live on Ocean Boulevard would be allowed to access their property from only one direction. This plan designates the western lane as a southbound one-way street. Review of this option may indicate a preference for the direction of this one-way section to be reversed or to alternate from block to block depending on public input and other concerns.

In order to create the MUP section of the road, flexible bollards would be installed along the centerline of Ocean Boulevard to delineate the MUP. Crosswalks would be installed at cross streets and striping would be included to delineate north and southbound “lanes” in the MUP as well as graphics indicating a pedestrian/bicycle pathway.

The use of flexible bollards allows for access for emergency vehicles into the MUP in an emergency. These bollards would extend in a line along the current centerline of the road at a ten (10) foot spacing and would break for existing driveways and cross streets.

This option would make use of the current pavement structure of Ocean Boulevard. Due to the fact that there would be a likely need for considerable restriping and pavement marking for this option it would be prudent to add a 1.5 inch overlay of asphalt on top of the existing asphalt.

4. Discussion of Analysis

All of the options have been analyzed by listing the hard and soft costs in a spreadsheet format. These spreadsheets can be found in the appendix of this report. The unit costs for each reflect professional experience and input from local contractors who regularly build similar projects. In most cases the costs are on the “high end” of costs for similar work. In addition, a 15% contingency was added to each subtotal to account for possible issues that typically occur in the design, permitting and construction of infrastructure projects. This study is intended to provide a level field of comparison for all of the



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

options. It is not intended to provide the Town with construction documents or estimates based on construction documents. Total costs expressed in this report are most likely within a 25% uncertainty of what actual project costs would be, given the date of this report and the current costs reflected in the marketplace at this time.

5. Discussion of Results

A table of the 5 options and their respective costs is shown below.

OPTION	TOTAL COST	BRIEF DESCRIPTION
OPTION 1	\$ 564,650.00	8 FOOT WIDE MUP ALONG NC HY 50 PAVED WITH ASPHALT
OPTION 1A	\$ 594,688.00	5 FOOT WIDE MUP ALONG NC HY 50 PAVED WITH ASPHALT
OPTION 2	\$ 894,355.00	8 FOOT WIDE MUP ALONG NC HWY 50 , CONCRETE SURFACE
OPTION 2A	\$ 805,483.00	5 FOOT WIDE MUP ALONG NC HWY 50 , CONCRETE SURFACE
OPTION 3	\$ 864,455.00	ONE FULL LANE OF OCEAN BLVD DEDICATED TO A MUP, ONE WAY TRAFFIC LANE, ASPHALT OVERLAY

From the above table the reader can easily compare the costs of the options. Which option is chosen is largely dependent on the needs and desires of the residents of the Town. Some “Pros” and “Cons” for each option are listed below.

Option 1 Pros

- Allows for a wide 8 foot path from Crews Ave to Trout Ave.



Michael C. Gallant PE, PA

Engineering / Consulting / Design

NC Firm C-1989, AL Firm CA - 4338 – E

NC Reg. No. - 25572, AL Reg. No. - 32178

- Asphalt pavement is easily repaired in the case of utility work or other damage to the pavement.
- Replaces the existing bike path that is not deemed sufficient.
- This is the least expensive option.

Option 1 Cons

- Asphalt is not as durable as concrete.
- It is likely that the installation of this MUP will displace landscaping and other items currently in the public ROW.
- This option adds impervious surfaces to an area that already has issues with ponding and standing water after storm events.
- Although this option will be constructed on the NCDOT ROW the Town will be responsible for any and all maintenance and issues with the MUP.
- This option creates surfaces that may prove to be in conflict with future utility installation.

Option 1A Pros

- Allows for a wide 5 foot path from Crews Ave to Trout Ave and the addition of bicycle lanes to both sides of South Anderson Blvd.
- Asphalt pavement is easily repaired in the case of utility work or other damage to the pavement.
- Replaces the existing bike path that is not deemed sufficient.
- Because this option proposes a thinner MUP the impacts to landscaping and other items will be reduced. This option also adds less impervious surface than Option 1.

Option 1A Cons

- Asphalt is not as durable as concrete.
- It is likely that the installation of this MUP will displace landscaping and other items currently in the public ROW.
- This option adds impervious surfaces to an area that already has issues with ponding and standing water after storm events.
- Although this option will be constructed on the NCDOT ROW the Town will be responsible for any and all maintenance and issues with the MUP.
- This option creates surfaces that may prove to be in conflict with future utility installation.

Option 2 Pros

- Allows for a wide 8 foot path from Crews Ave to Trout Ave.



Michael C. Gallant PE, PA

Engineering / Consulting / Design

NC Firm C-1989, AL Firm CA - 4338 – E

NC Reg. No. - 25572, AL Reg. No. - 32178

- Concrete is more durable than asphalt and will likely resist degradation over time needing less maintenance.
- Replaces the existing bike path that is not deemed sufficient.

Option 2 Cons

- Concrete is more expensive than asphalt. This is the most expensive option.
- It is likely that the installation of this MUP will displace landscaping and other items currently in the public ROW.
- This option adds impervious surfaces to an area that already has issues with ponding and standing water after storm events.
- Although this option will be constructed on the NCDOT ROW the Town will be responsible for any and all maintenance and issues with the MUP.
- Concrete is harder to repair when damaged and/or needs to be removed for utility work.
- This option creates surfaces that may prove to be in conflict with future utility installation.

Option 2A Pros

- Allows for a wide 5 foot path from Crews Ave to Trout Ave and the addition of bicycle lanes to both sides of South Anderson Blvd.
- Concrete is more durable than asphalt and will likely resist degradation over time needing less maintenance.
- Replaces the existing bike path that is not deemed sufficient.
- Because this option proposes a thinner MUP the impacts to landscaping and other items will be reduced. This option also adds less impervious surface than Option 1.

Option 2A Cons

- Concrete is more expensive than asphalt.
- It is likely that the installation of this MUP will displace landscaping and other items currently in the public ROW.
- This option adds impervious surfaces to an area that already has issues with ponding and standing water after storm events.
- Although this option will be constructed on the NCDOT ROW the Town will be responsible for any and all maintenance and issues with the MUP.
- Concrete is harder to repair when damaged and/or needs to be removed for utility work.
- This option creates surfaces that may prove to be in conflict with future utility installation.

Option 3 Pros



Michael C. Gallant PE, PA

Engineering / Consulting / Design

NC Firm C-1989, AL Firm CA - 4338 – E

NC Reg. No. - 25572, AL Reg. No. - 32178

- Provides a full traffic lane for pedestrian/ bicycle traffic along the beach strand for easy access to the beach access points.
- Utilizes existing built upon areas and does not add any new impervious areas to the Town.
- This MUP is not adjacent to the busy NC Hwy 50 corridor and its 35 MPH speed zone thus reducing the possibility of traffic accidents between cyclists/ pedestrians and traffic.
- Will most likely result in reduced/slower traffic along Ocean Boulevard.
- This option does not create any surfaces that would impede future utility installation beyond what surface currently exist.

Option 3 Cons

- This is the second most expensive option.
- The Town would have to maintain this street that is currently maintained by NCDOT.
- Some residents may not like the idea of the street they live on being turned into a one-way street.

6. Conclusions

The writer has listed some possible “pros” and “cons” of each option above. The options studied vary in cost from \$564,650.00 to \$894,355.00. This is a spread of \$329,705.00. The writer would strongly suggest that the Town receive input from the public regarding all of the options and weigh the various safety, cost and impact concerns before choosing an option.



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

APPENDIX I

OPTION COST ANALYSIS TABLES

TOPSAIL BEACH MUP OPTION 1

ITEM	UNIT COST	UNIT	NUMBER	EXTENDED COST	DESCRIPTION
SOFT COSTS					
SURVEYING	\$ 35,000.00	NA	1	\$ 35,000.00	AN "AS-BUILT" SURVEY OF THE ROW AREA INCLUDING TOPOGRAPHIC FEATURRES, EXISTING EOP, EXISTING DRIVEWAYS AND MATERIALS, EXISTING LANDSCAPING, STREET SIGNS, POWER POLES ANY GUT WIRES, METER BOXES, UTILITIES, STROM WATER CATCHMENTS WITH INVERTS PIPING SIZES AND MATERIALS
ENGINEERING	\$ 30,000.00	NA	1	\$ 30,000.00	ANALYSIS AND DESIGN OF THE MUP INCLUDING CONSTRUCTION DOCUMENTS AND PROJECT SPECIFICATIONS, PERMIT APLICTAIONS
PERMITTING	\$ 1,500.00	NA	1	\$ 1,500.00	PERMIT FEES FOR NCDEQ AND NCDOT
HARD COSTS					
MOBILIZATION	\$ 12,000.00	NA	1	\$ 12,000.00	MOBILIZATION OF EQUIPMENT
BONDING	\$ 15,000.00	NA	1	\$ 15,000.00	ANY REQUIRED NCDOT CONSTRUCTION BONDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR
TESTING	\$ 15,000.00	NA	1	\$ 15,000.00	ALL RELATED COMPACTION, DENSITY AND THICKNESS TESTING FOR CONSTRUCTION AND VERIFICATION OF DESIGN PARAMETERS
DRAINAGE IMPROVEMENTS	\$ 50,000.00	NA	1	\$ 50,000.00	DRAINAGE IMPROVEMENTS TO DIRECT STORM WATER UNDER NC HWY 50
TRAFFIC CONTROL	\$ 80,000.00	NA	1	\$ 80,000.00	ANY AND ALL REQUIRED TRAFFIC CONTROL MEASURES FOR WORKING IN CLOSE PROXIMITY TO THE NCDOT ROW
ROUGH GRADING	\$ 25,000.00	ACRES	2	\$ 50,000.00	GRADING AND COMPACTION OF THE SUBGRADE PER THECONSTRUCTION DOCUMENTS
BASE COURSE PLACEMENT AND COMPACTION	\$ 12.00	SQ YDS	6100	\$ 73,200.00	PLACEMENT AND COMPACTION OF THE BASE COURSE MATERIALS PER THE SPECIFICATIONS AND DESIGN DOCUMENTS
PAVEMENT PLACEMENT	\$ 13.00	SQ YDS	6100	\$ 79,300.00	PLACEMENT OF THE ASPHALT SURFACE PER THE SPECIFICATIONS AND DESIGN DOCUMENTS INCLUDING THE INSTALLATION OF DETECTABLE WARNING PLATES WHERE REQUIRED
CONSTRUCTION OVERSIGHT	\$ 20,000.00	NA	1	\$ 20,000.00	OVERSIGHT OF THE INFRASTRUCTURE CONSTRUCTION
STRIPING	\$ 3,000.00	NA	10	\$ 30,000.00	ALL CROSSWALK AND OTHER STRIPING PER THE CONSTRUCTION DOCUMENTS

SUB TOTAL

\$ 491,000.00

15% CONTINGENCY

\$ 73,650.00

TOTAL

\$ 564,650.00

TOPSAIL BEACH MUP OPTION 1A

ITEM	UNIT COST	UNIT	NUMBER	EXTENDED COST	DESCRIPTION
SOFT COSTS					
SURVEYING	\$ 35,000.00	NA	1	\$ 35,000.00	AN "AS-BUILT" SURVEY OF THE ROW AREA INCLUDING TOPOGRAPHIC FEATURURES, EXISTING EOP, EXISTING DRIVEWAYS AND MATERIALS, EXISTING LANDSCAPING, STREET SIGNS, POWER POLES ANY GUT WIRES, METER BOXES, UTILITIES, STROM WATER CATCHMENTS WITH INVERTS PIPING SIZES AND MATERIALS
ENGINEERING	\$ 30,000.00	NA	1	\$ 30,000.00	ANALYSIS AND DESIGN OF THE MUP INCLUDING CONSTRUCTION DOCUMENTS AND PROJECT SPECIFICATIONS, PERMIT APLICTAIONS
PERMITTING	\$ 1,500.00	NA	1	\$ 1,500.00	PERMIT FEES FOR NCDEQ AND NCDOT
HARD COSTS					
MOBILIZATION	\$ 12,000.00	NA	1	\$ 12,000.00	MOBILIZATION OF EQUIPMENT
BONDING	\$ 15,000.00	NA	1	\$ 15,000.00	ANY REQUIRED NCDOT CONSTRUCTION BONDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR
DRAINAGE IMPROVEMENTS	\$ 50,000.00	NA	1	\$ 50,000.00	DRAINAGE IMPROVEMENTS TO DIRECT STORM WATER UNDER NC HWY 50
TESTING	\$ 15,000.00	NA	1	\$ 15,000.00	ALL RELATED COMPACTION, DENSITY AND THICKNESS TESTING FOR CONSTRUCTION AND VERIFICATION OF DESIGN PARAMETERS
TRAFFIC CONTROL	\$ 80,000.00	NA	1	\$ 80,000.00	ANY AND ALL REQUIRED TRAFFIC CONTROL MEASURES FOR WORKING IN CLOSE PROXIMITY TO THE NCDOT ROW
ROUGH GRADING	\$ 25,000.00	ACRES	2	\$ 50,000.00	GRADING AND COMPACTION OF THE SUBGRADE PER THECONSTRUCTION DOCUMENTS
BASE COURSE PLACEMENT AND COMPACTION	\$ 12.00	SQ YDS	3900	\$ 46,800.00	PLACEMENT AND COMPACTION OF THE BASE COURSE MATERIALS PER THE SPECIFICATIONS AND DESIGN DOCUMENTS
PAVEMENT PLACEMENT	\$ 13.00	SQ YDS	10140	\$ 131,820.00	PLACEMENT OF THE ASPHALT SURFACE PER THE SPECIFICATIONS AND DESIGN DOCUMENTS INCLUDING THE INSTALLATION OF DETECTABLE WARNING PLATES WHERE REQUIRED. ALSO ADDITION OF 4' BIKE LANES TO BOTH SIDES OF S. ANDERSON
CONSTRUCTION OVERSIGHT	\$ 20,000.00	NA	1	\$ 20,000.00	OVERSIGHT OF THE INFRASTRUCTURE CONSTRUCTION
STRIPING	\$ 3,000.00	NA	10	\$ 30,000.00	ALL CROSSWALK AND OTHER STRIPING PER THE CONSTRUCTION DOCUMENTS

SUB TOTAL

\$ 517,120.00

15% CONTINGENCY

\$ 77,568.00

TOTAL

\$ 594,688.00

TOPSAIL BEACH MUP OPTION 2

ITEM	UNIT COST	UNIT	NUMBER	EXTENDED COST	DESCRIPTION
SOFT COSTS					
SURVEYING	\$ 35,000.00	NA	1	\$ 35,000.00	AN "AS-BUILT" SURVEY OF THE ROW AREA INCLUDING TOPOGRAPHIC FEATRURES, EXISTING EOP, EXISTING DRIVEWAYS AND MATERIALS, EXISTING LANDSCAPING, STREET SIGNS, POWER POLES ANY GUT WIRES, METER BOXES, UTILITIES, STROM WATER CATCHMENTS WITH INVERTS PIPING SIZES AND MATERIALS
ENGINEERING	\$ 30,000.00	NA	1	\$ 30,000.00	ANALYSIS AND DESIGN OF THE MUP INCLUDING CONSTRUCTION DOCUMENTS AND PROJECT SPECIFICATIONS, PERMIT APLICTAIONS
PERMITTING	\$ 1,500.00	NA	1	\$ 1,500.00	PERMIT FEES FOR NCDEQ AND NCDOT
HARD COSTS					
MOBILIZATION	\$ 12,000.00	NA	1	\$ 12,000.00	MOBILIZATION OF EQUIPMENT
BONDING	\$ 15,000.00	NA	1	\$ 15,000.00	ANY REQUIRED NCDOT CONSTRUCTION BONDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR
DRAINAGE IMPROVEMENTS	\$ 50,000.00	NA	1	\$ 50,000.00	DRAINAGE IMPROVEMENTS TO DIRECT STORM WATER UNDER NC HWY 50
TESTING	\$ 15,000.00	NA	1	\$ 15,000.00	ALL RELATED COMPACTION, DENSITY AND THICKNESS TESTING FOR CONSTRUCTION AND VERIFICATION OF DESIGN PARAMETERS
TRAFFIC CONTROL	\$ 80,000.00	NA	1	\$ 80,000.00	ANY AND ALL REQUIRED TRAFFIC CONTROL MEASURES FOR WORKING IN CLOSE PROXIMITY TO THE NCDOT ROW
ROUGH GRADING	\$ 25,000.00	ACRES	2	\$ 50,000.00	GRADING AND COMPACTION OF THE SUBGRADE PER THECONSTRUCTION DOCUMENTS
BASE COURSE PLACEMENT AND COMPACTION	\$ 12.00	SQ YDS	6100	\$ 73,200.00	PLACEMENT AND COMPACTION OF THE BASE COURSE MATERIALS PER THE SPECIFICATIONS AND DESIGN DOCUMENTS
CONCRETE FORMING AND PLACEMENT	\$ 60.00	SQ YDS	6100	\$ 366,000.00	FORMING AND PLACEMENT OF THE CONCRETE SURFACE PER THE SPECIFICATIONS AND DESIGN DOCUMENTS INCLUDING THE INSTALLATION OF DETECTABLE WARNING PLATES WHERE REQUIRED
CONSTRUCTION OVERSIGHT	\$ 20,000.00	NA	1	\$ 20,000.00	OVERSIGHT OF THE INFRASTRUCTURE CONSTRUCTION
STRIPING	\$ 3,000.00	NA	10	\$ 30,000.00	ALL CROSSWALK AND OTHER STRIPING PER THE CONSTRUCTION DOCUMENTS

SUB TOTAL	\$ 777,700.00
15% CONTINGENCY	\$ 116,655.00
TOTAL	\$ 894,355.00

TOPSAIL BEACH MUP OPTION 2A

ITEM	UNIT COST	UNIT	NUMBER	EXTENDED COST	DESCRIPTION
SOFT COSTS					
SURVEYING	\$ 35,000.00	NA	1	\$ 35,000.00	AN "AS-BUILT" SURVEY OF THE ROW AREA INCLUDING TOPOGRAPHIC FEATURURES, EXISTING EOP, EXISTING DRIVEWAYS AND MATERIALS, EXISTING LANDSCAPING, STREET SIGNS, POWER POLES ANY GUT WIRES, METER BOXES, UTILITIES, STROM WATER CATCHMENTS WITH INVERTS PIPING SIZES AND MATERIALS
ENGINEERING	\$ 30,000.00	NA	1	\$ 30,000.00	ANALYSIS AND DESIGN OF THE MUP INCLUDING CONSTRUCTION DOCUMENTS AND PROJECT SPECIFICATIONS, PERMIT APLICTAIONS
PERMITTING	\$ 1,500.00	NA	1	\$ 1,500.00	PERMIT FEES FOR NCDEQ AND NCDOT
HARD COSTS					
MOBILIZATION	\$ 12,000.00	NA	1	\$ 12,000.00	MOBILIZATION OF EQUIPMENT
BONDING	\$ 15,000.00	NA	1	\$ 15,000.00	ANY REQUIRED NCDOT CONSTRUCTION BONDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR
DRAINAGE IMPROVEMENTS	\$ 50,000.00	NA	1	\$ 50,000.00	DRAINAGE IMPROVEMENTS TO DIRECT STORM WATER UNDER NC HWY 50
TESTING	\$ 15,000.00	NA	1	\$ 15,000.00	ALL RELATED COMPACTION, DENSITY AND THICKNESS TESTING FOR CONSTRUCTION AND VERIFICATION OF DESIGN PARAMETERS
TRAFFIC CONTROL	\$ 80,000.00	NA	1	\$ 80,000.00	ANY AND ALL REQUIRED TRAFFIC CONTROL MEASURES FOR WORKING IN CLOSE PROXIMITY TO THE NCDOT ROW
ROUGH GRADING	\$ 25,000.00	ACRES	2	\$ 50,000.00	GRADING AND COMPACTION OF THE SUBGRADE PER THECONSTRUCTION DOCUMENTS
BASE COURSE PLACEMENT AND COMPACTION	\$ 12.00	SQ YDS	3900	\$ 46,800.00	PLACEMENT AND COMPACTION OF THE BASE COURSE MATERIALS PER THE SPECIFICATIONS AND DESIGN DOCUMENTS
PAVEMENT PLACEMENT	\$ 13.00	SQ. YDS	6240	\$ 81,120.00	ADDITION OF 4' BIKE LANES TO BOTH SIDES OF S. ANDERSON
CONCRETE FORMING AND PLACEMENT	\$ 60.00	SQ YDS	3900	\$ 234,000.00	FORMING AND PLACEMENT OF THE CONCRETE SURFACE PER THE SPECIFICATIONS AND DESIGN DOCUMENTS INCLUDING THE INSTALLATION OF DETECTABLE WARNING PLATES WHERE REQUIRED
CONSTRUCTION OVERSIGHT	\$ 20,000.00	NA	1	\$ 20,000.00	OVERSIGHT OF THE INFRASTRUCTURE CONSTRUCTION
STRIPING	\$ 3,000.00	NA	10	\$ 30,000.00	ALL CROSSWALK AND OTHER STRIPING PER THE CONSTRUCTION DOCUMENTS

SUB TOTAL	\$ 700,420.00
15% CONTINGENCY	\$ 105,063.00
TOTAL	\$ 805,483.00

TOPSAIL BEACH MUP OPTION 3

ITEM	UNIT COST	UNIT	NUMBER	EXTENDED COST	DESCRIPTION
SOFT COSTS					
SURVEYING	\$ 45,000.00	NA	1	\$ 45,000.00	AN "AS-BUILT" SURVEY OF THE ROW AREA INCLUDING TOPOGRAPHIC FEATRURES, EXISTING EOP, EXISTING DRIVEWAYS AND MATERIALS, EXISTING LANDSCAPING, STREET SIGNS, POWER POLES ANY GUT WIRES, METER BOXES, UTILITIES, STROM WATER CATCHMENTS WITH INVERTS PIPING SIZES AND MATERIALS
ENGINEERING	\$ 25,000.00	NA	1	\$ 25,000.00	ANALYSIS AND DESIGN OF THE MUP INCLUDING CONSTRUCTION DOCUMENTS AND PROJECT SPECIFICATIONS, PERMIT APLICTAIONS
PERMITTING	\$ 500.00	NA	1	\$ 500.00	PERMIT FEES FOR NCDEQ AND NCDOT
HARD COSTS					
MOBILIZATION	\$ 15,000.00	NA	1	\$ 15,000.00	MOBILIZATION OF EQUIPMENT
BONDING	\$ 200.00	NA	1	\$ 200.00	ANY REQUIRED NCDOT CONSTRUCTION BONDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR
TESTING	\$ 15,000.00	NA	1	\$ 15,000.00	ALL RELATED COMPACTION, DENSITY AND THICKNESS TESTING FOR CONSTRUCTION AND VERIFICATION OF DESIGN PARAMETERS
TRAFFIC CONTROL	\$ 80,000.00	NA	1	\$ 80,000.00	ANY AND ALL REQUIRED TRAFFIC CONTROL MEASURES FOR WORKING IN CLOSE PROXIMITY TO THE NCDOT ROW
FLEXABLE BOLLARDS	\$ 250.00	#	700	\$ 175,000.00	PURCHASE AND INSTALLION OF FLEXIBLE BOLLARDS TO DENOTE THE MUP LANE
EXISTING PAVEMENT MILLING	\$ 5.00	SQ YDS	16300	\$ 81,500.00	MILLING THE EXISTING ASPHALT FOR THE ADDITION OF AN OVERLAY
ASPHALT OVERLAY	\$ 15.00	SQ YDS	16300	\$ 244,500.00	PLACEMENT OF AN ASPHALT OVERLAY PER THE CONSTRUCTION DOCUMENTS INCLUDING THE INSTALLATION OF DETECTABLE WARNING PLATES AS REQUIRED.
CONSTRUCTION OVERSIGHT	\$ 20,000.00	NA	1	\$ 20,000.00	OVERSIGHT OF THE INFRASTRUCTURE CONSTRUCTION
STRIPING	\$ 5,000.00	NA	10	\$ 50,000.00	ALL CROSSWALK AND OTHER STRIPING PER THE CONSTRUCTION DOCUMENTS

SUB TOTAL \$ 751,700.00

15% CONTINGENCY \$ 112,755.00

TOTAL **\$ 864,455.00**



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

APPENDIX II

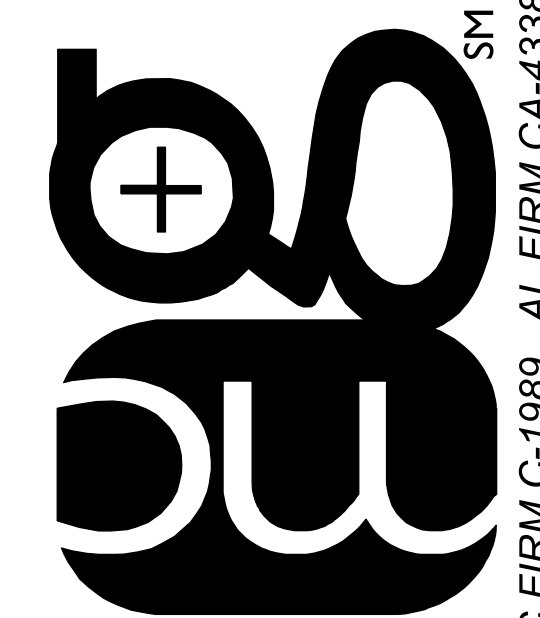
PLAN SHEET FOR OPTIONS 1,2 AND 3

NOTE: Options 1A and 2A mirror Options 1 and 2 but are 5 feet wide as opposed to the eight feet and include additional 4' bike lanes on each side of the existing road shown on the following plan sheets.

OPTIONS 1 AND 2 SHEET A



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM

PO BOX 4039 SURF CITY, NC 28445

910.448.1046

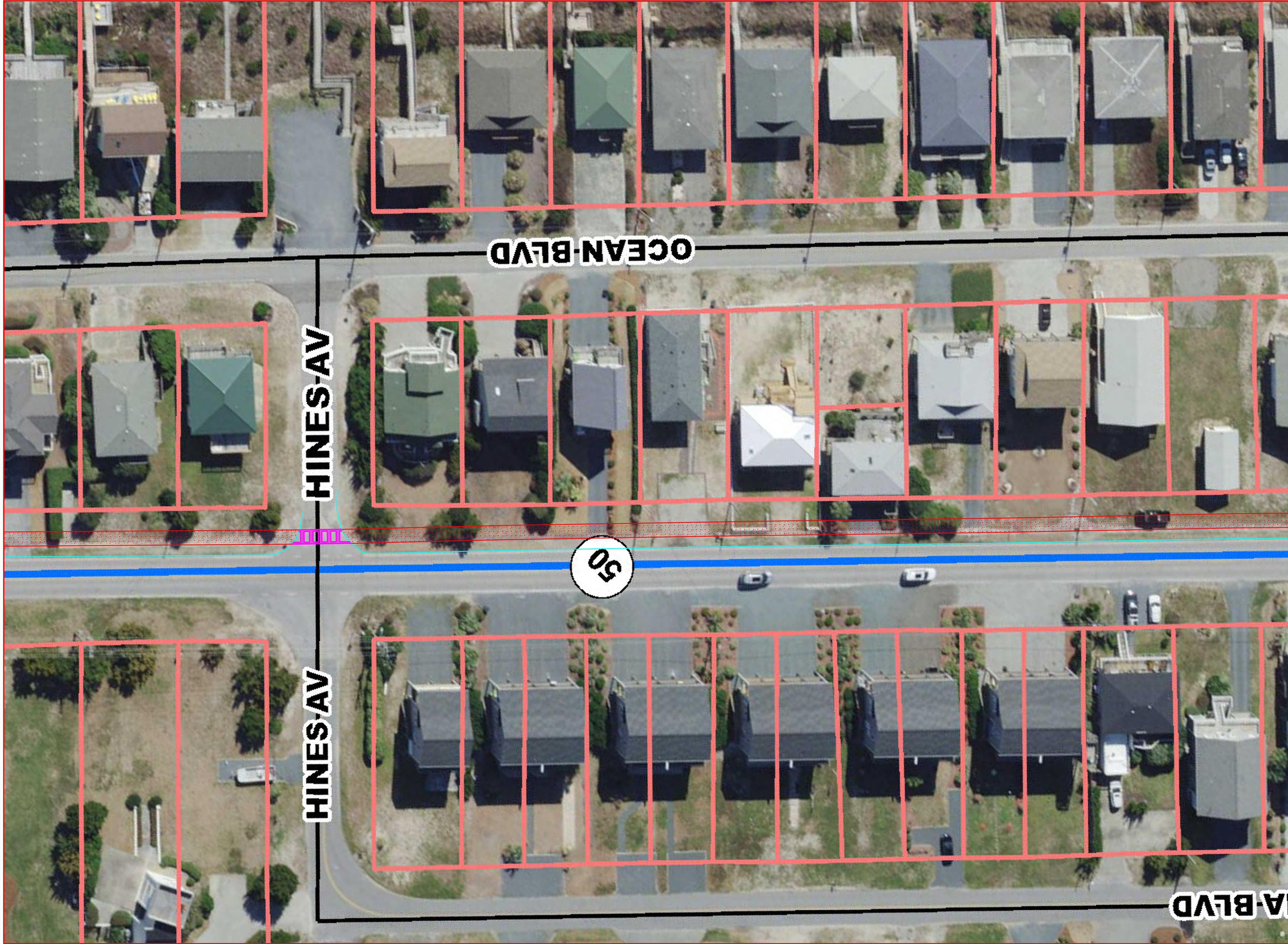
NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

C1

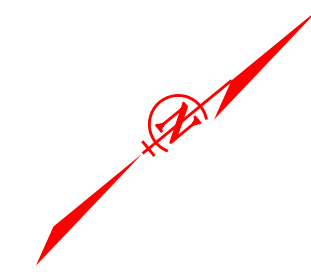
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTIONS 1 AND 2 SHEET B



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA
Engineering / Consulting / Design

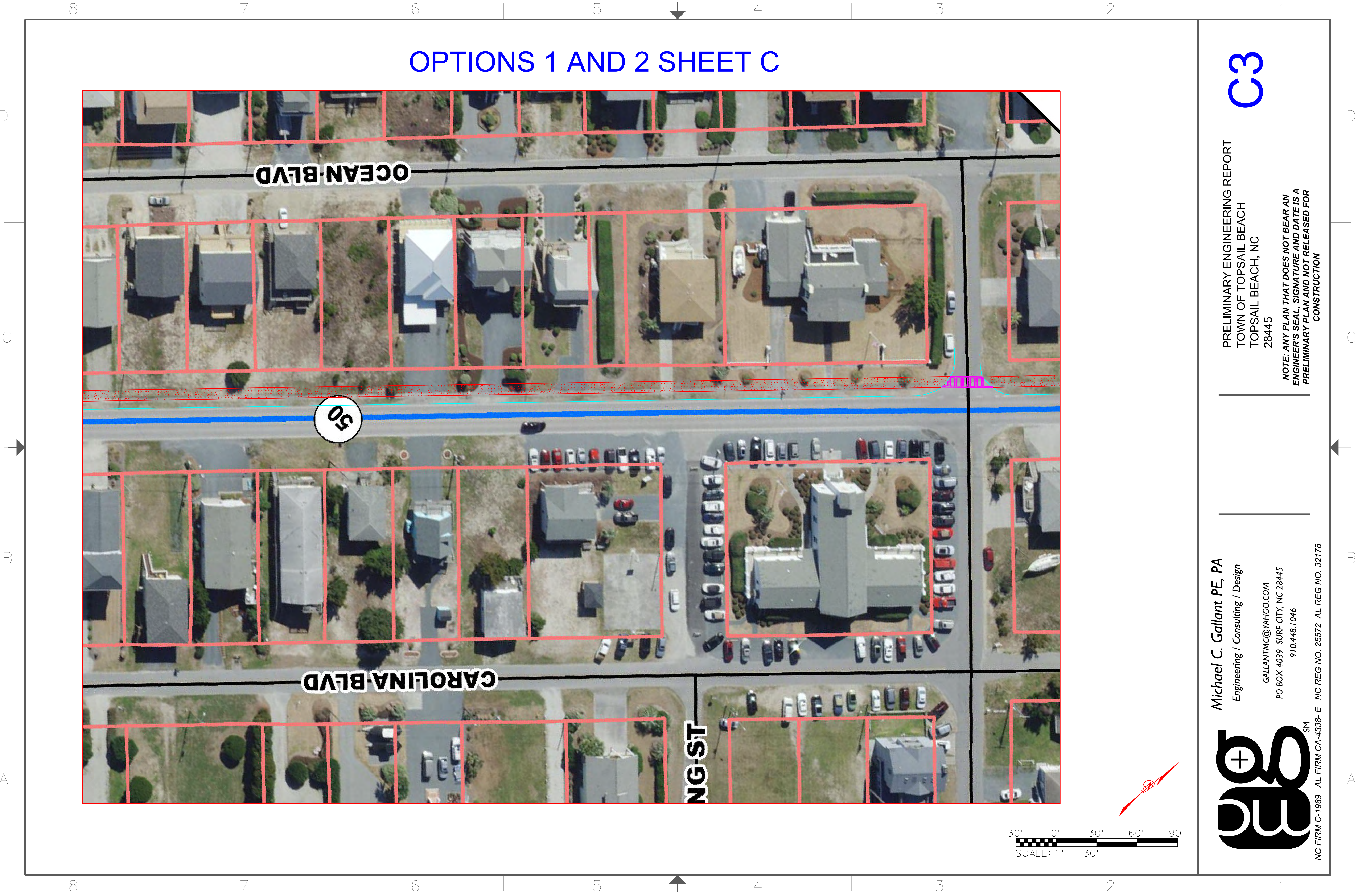
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

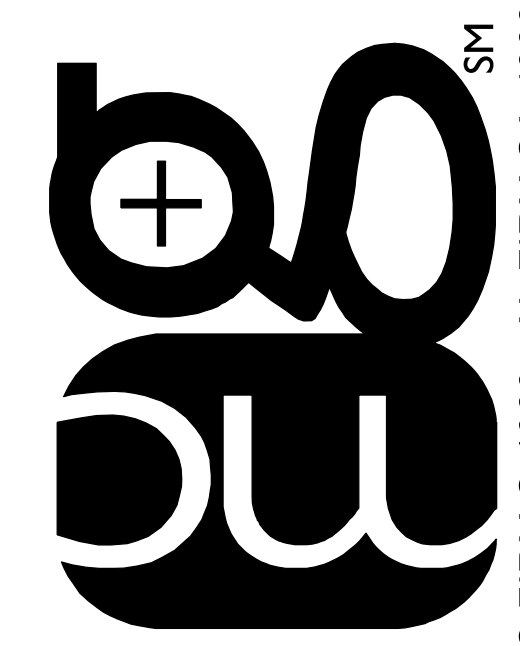
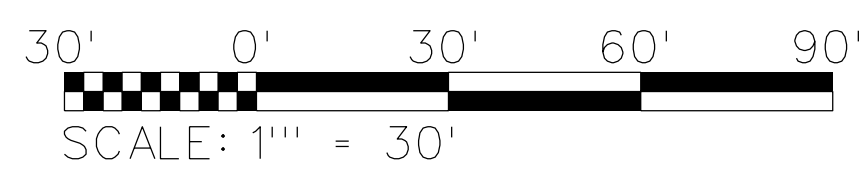
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

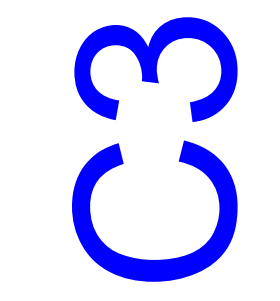
C2



OPTIONS 1 AND 2 SHEET C



Michael C. Gallant PE, PA
Engineering / Consulting / Design
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046
NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178



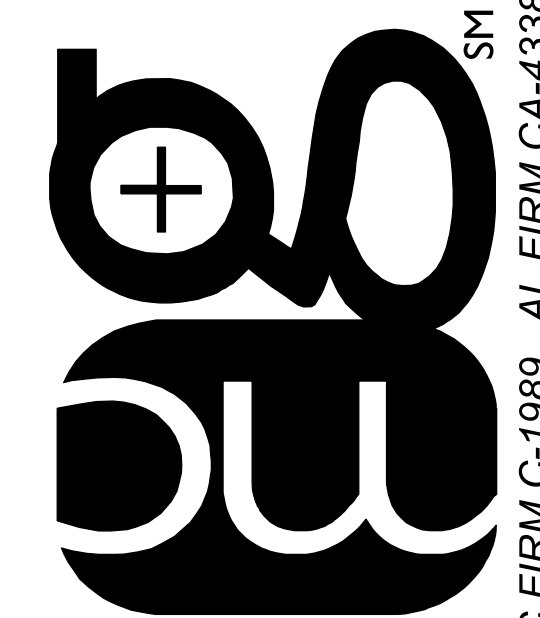
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTIONS 1 AND 2 SHEET D



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

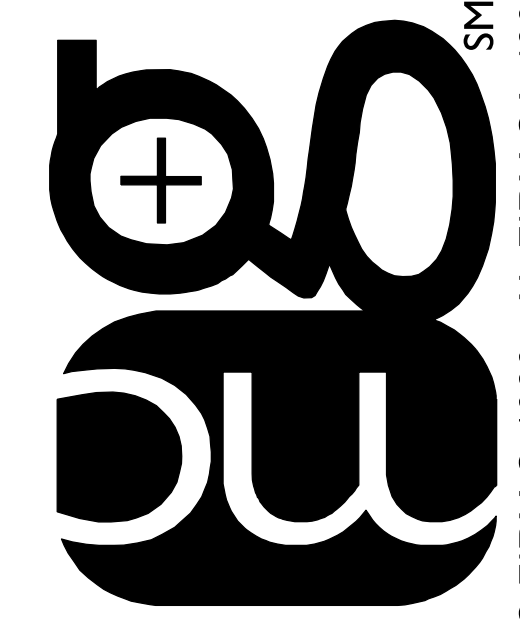
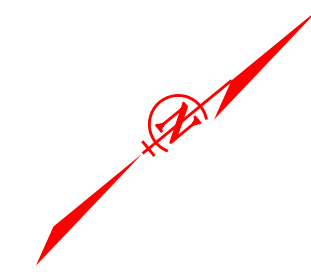
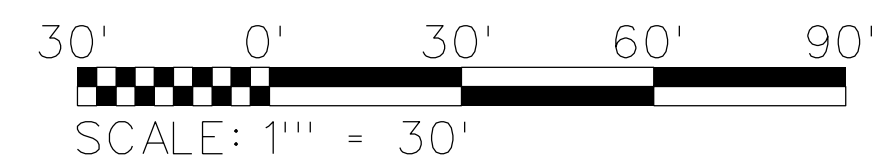
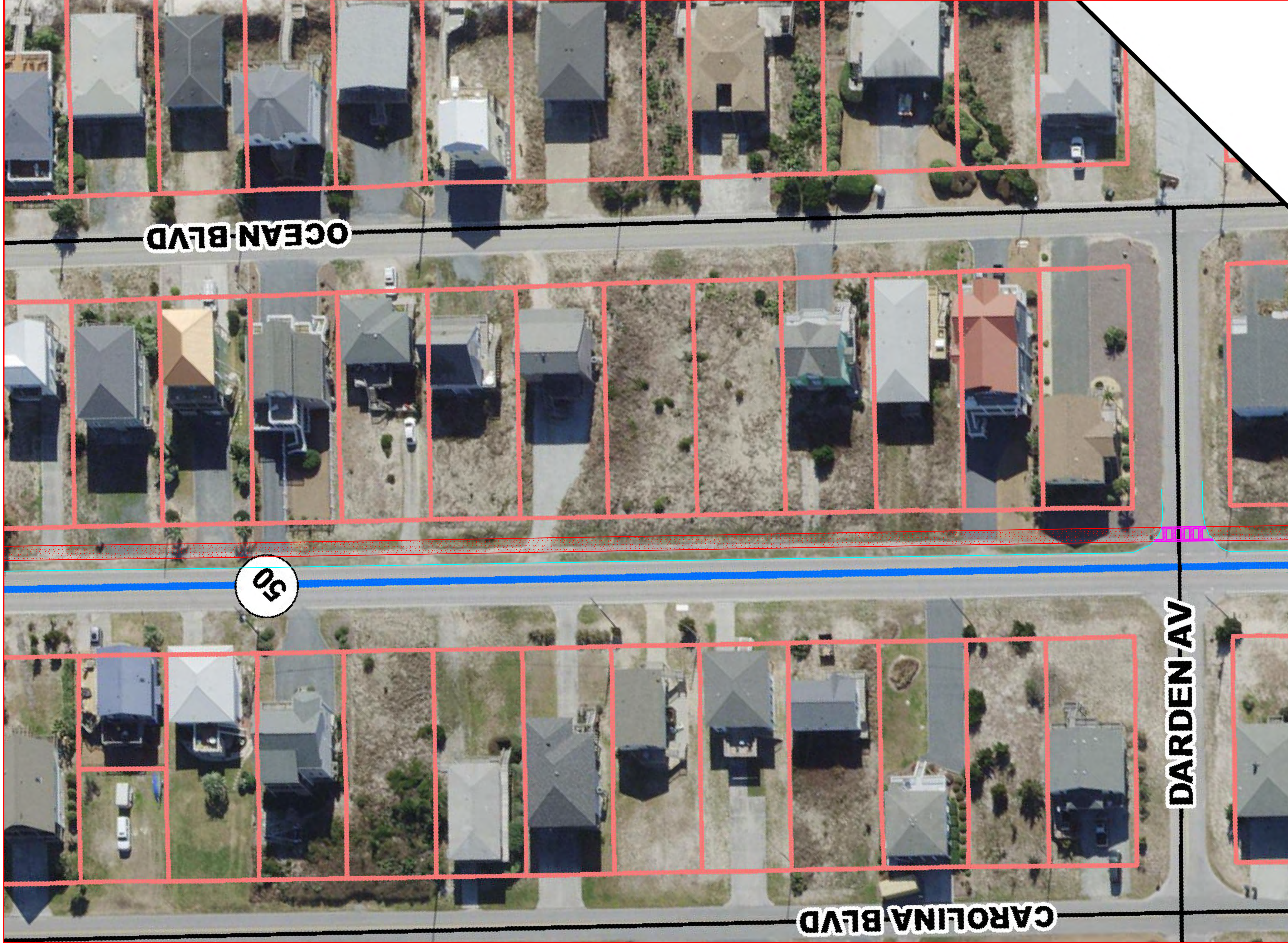
NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C4

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTIONS 1 AND 2 SHEET E



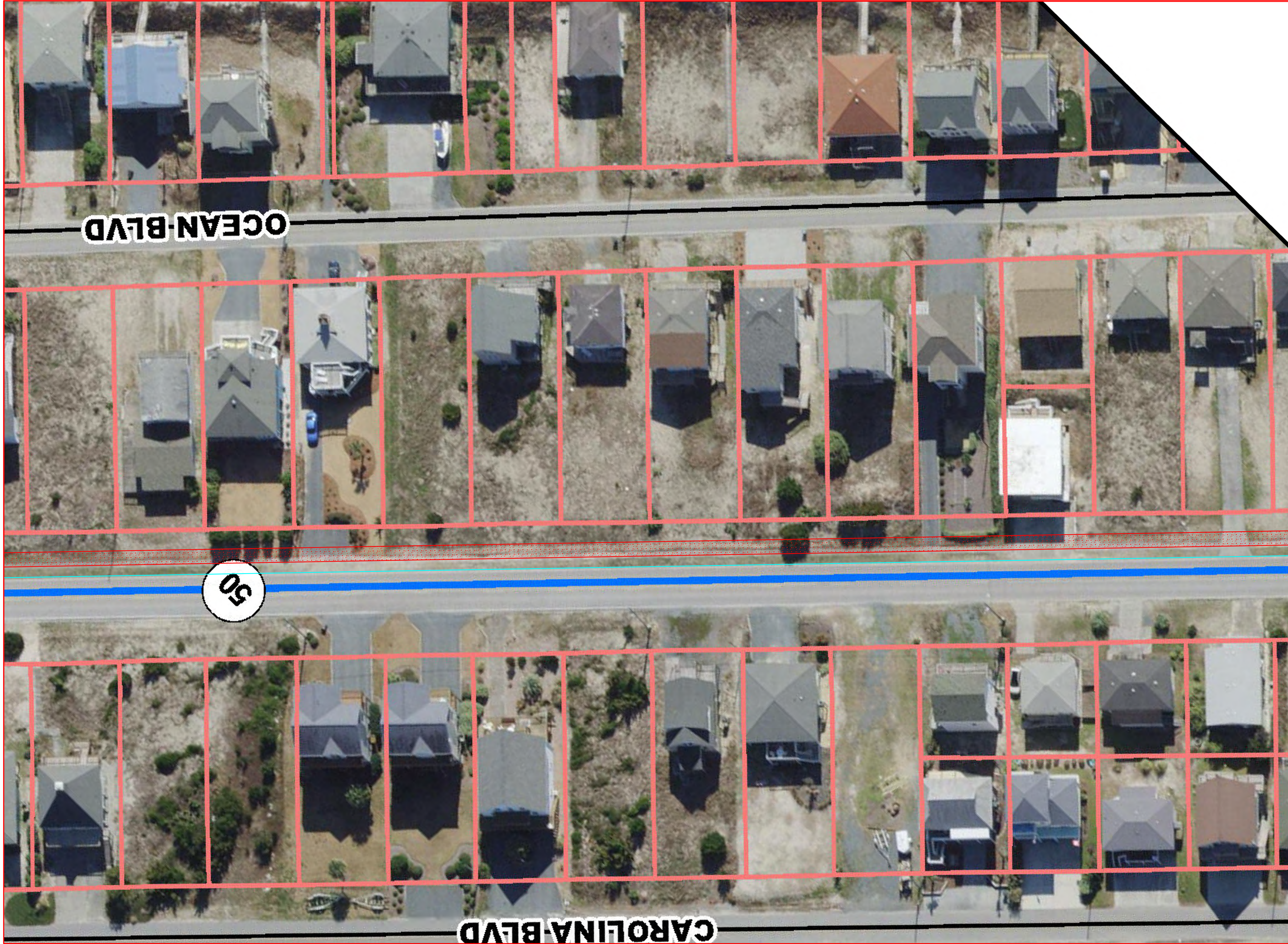
Michael C. Gallant PE, PA
Engineering / Consulting / Design
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046
NC FIRM C-1989 AL FIRM CA-4338- E NC REG NO. 25572 AL REG NO. 32178

C5

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTIONS 1 AND 2 SHEET F



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA
Engineering / Consulting / Design

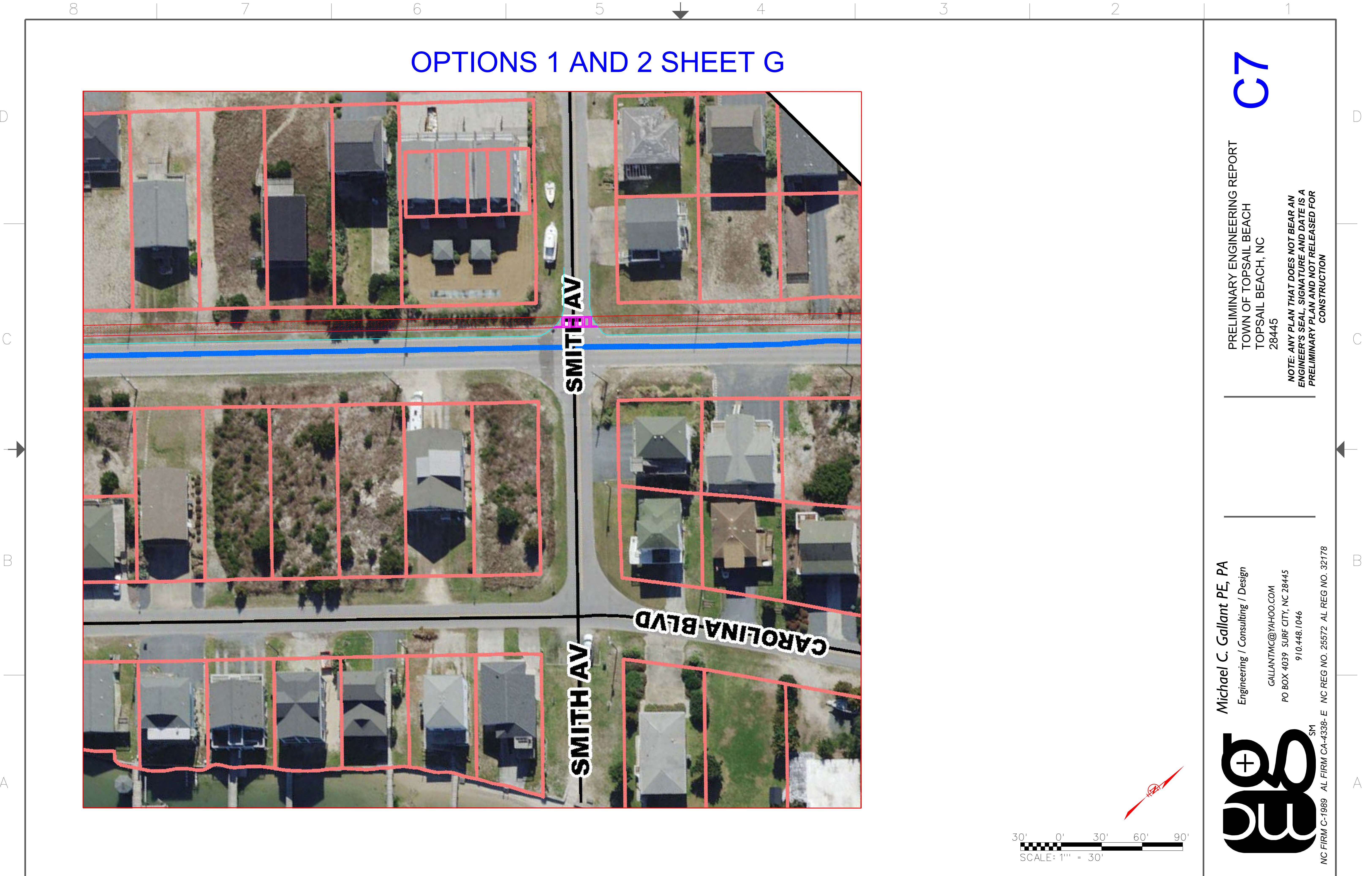
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

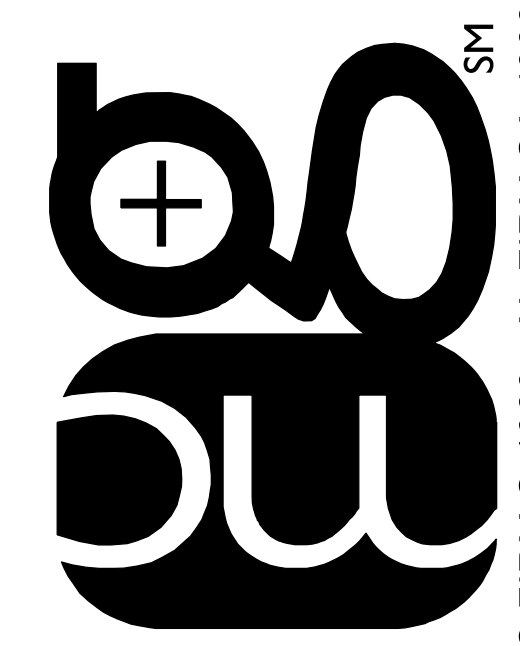
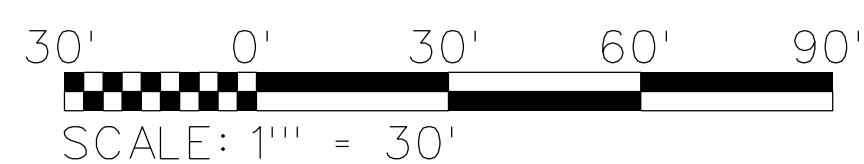
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

C6



OPTIONS 1 AND 2 SHEET G



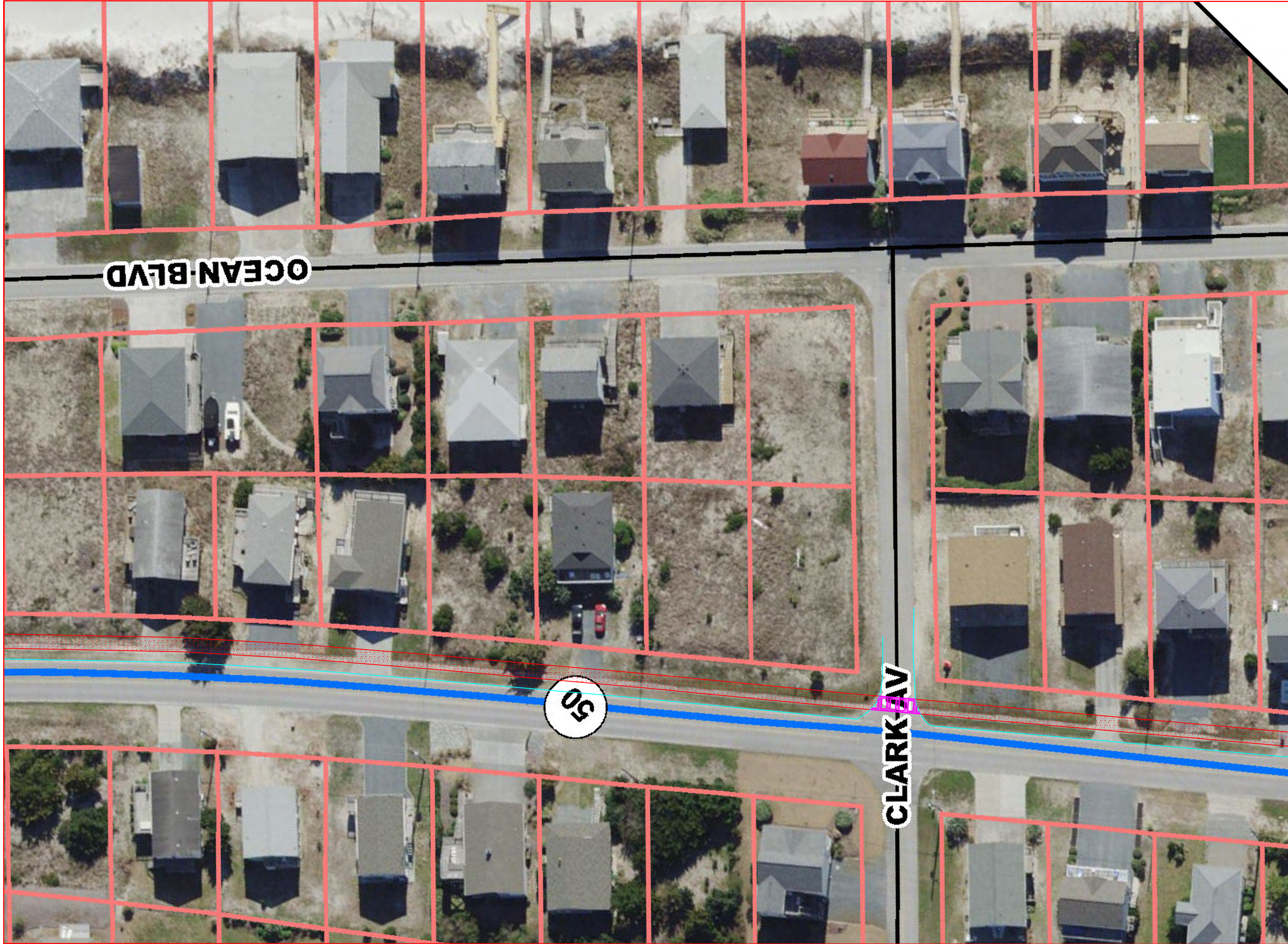
Michael C. Gallant PE, PA
Engineering / Consulting / Design
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046
NC FIRM C-1989 AL FIRM CA-4338- E NC REG NO. 25572 AL REG NO. 32178

C7

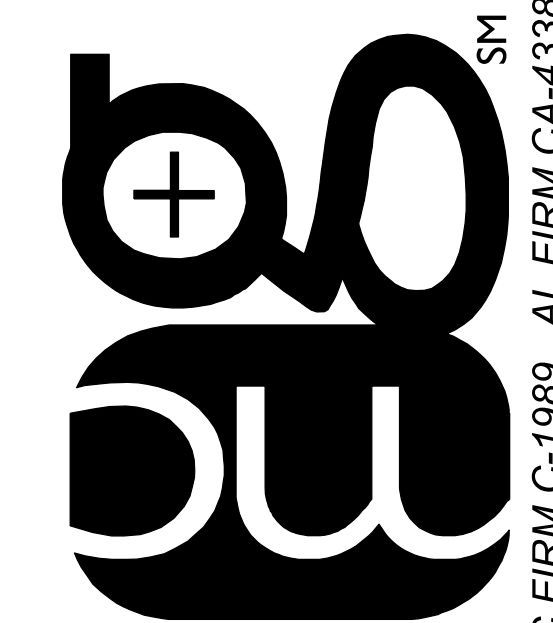
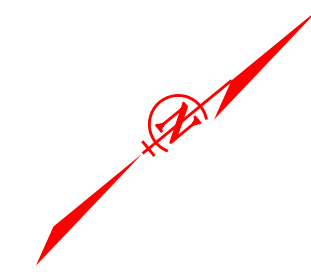
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTIONS 1 AND 2 SHEET H



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

C8

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTIONS 1 AND 2 SHEET I



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA

Engineering / Consulting / Design

GALLANTMC@YAHOO.COM

PO BOX 4039 SURF CITY, NC 28445

910.448.1046

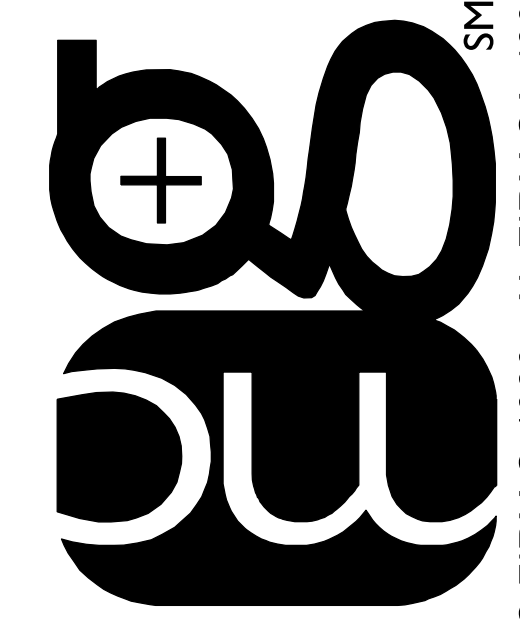
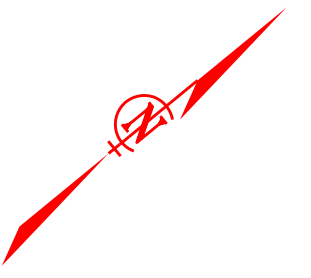
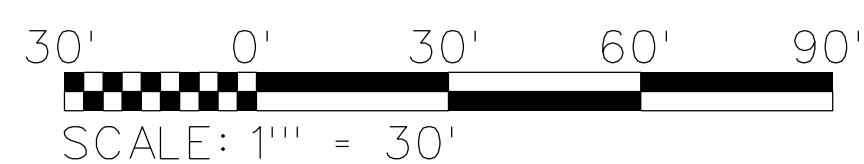
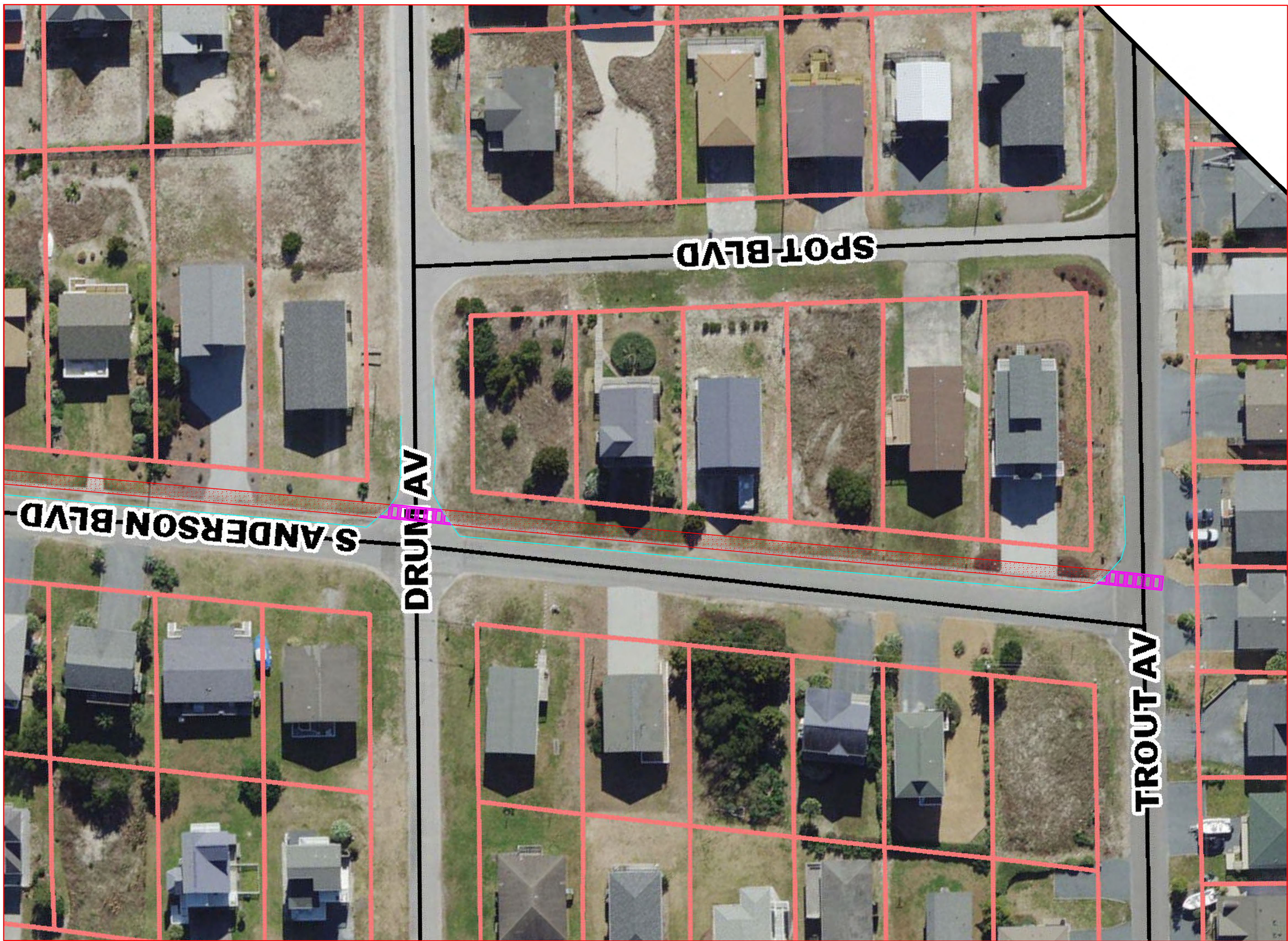
NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

C9

OPTIONS 1 AND 2 SHEET J



Michael C. Gallant PE, PA

Engineering / Consulting / Design

GALLANTMC@YAHOO.COM

PO BOX 4039 SURF CITY, NC 28445

910.448.1046

NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C10

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTION 3 SHEET A



30' 0' 30' 60' 90'
SCALE: 1" = 30'



Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

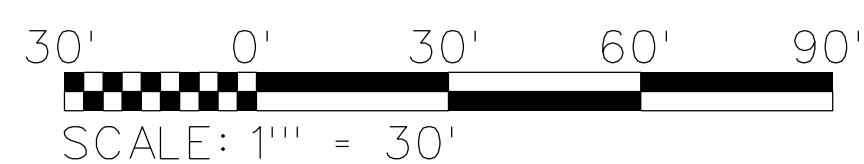
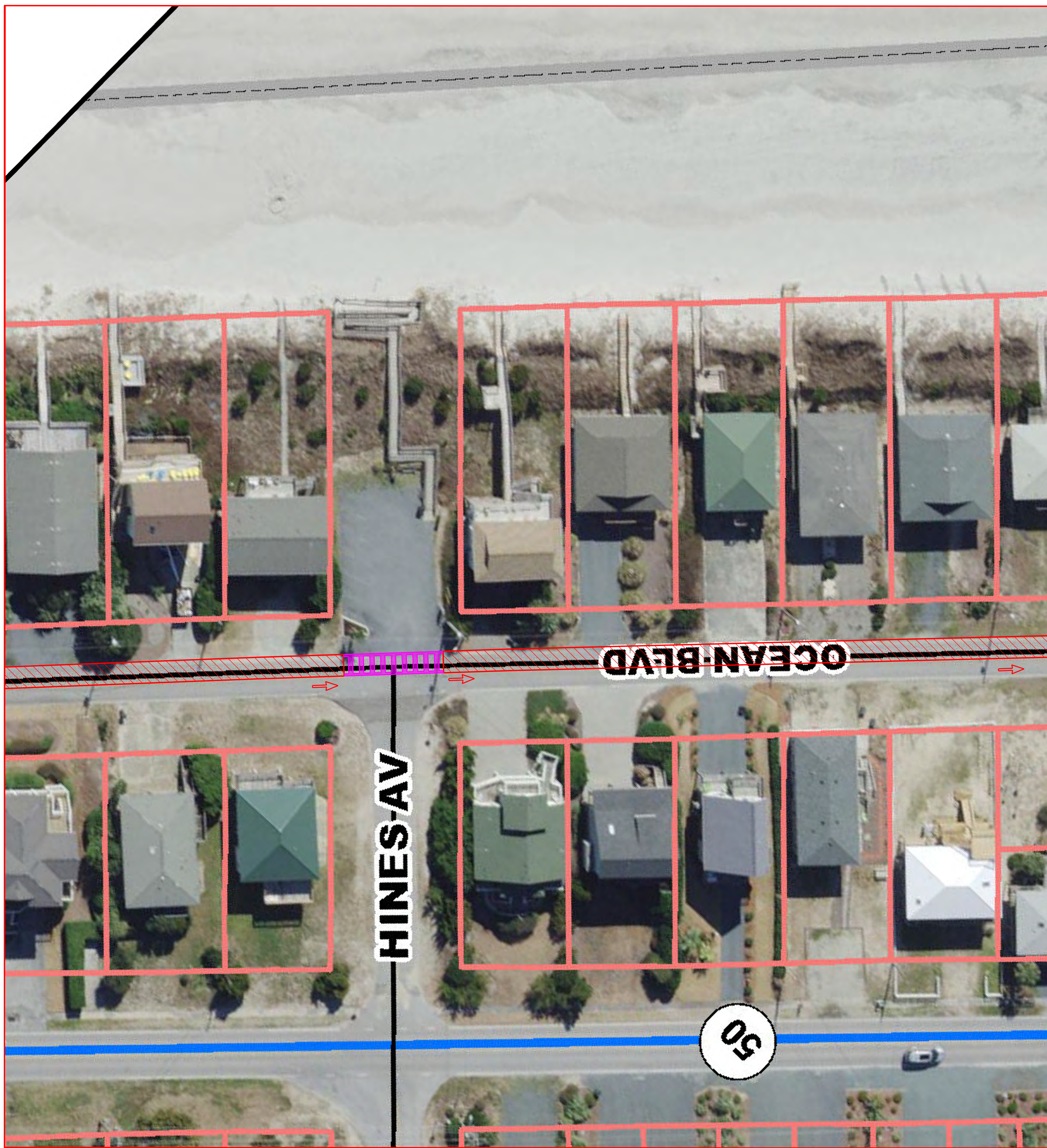
NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C11

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTION 3 SHEET B



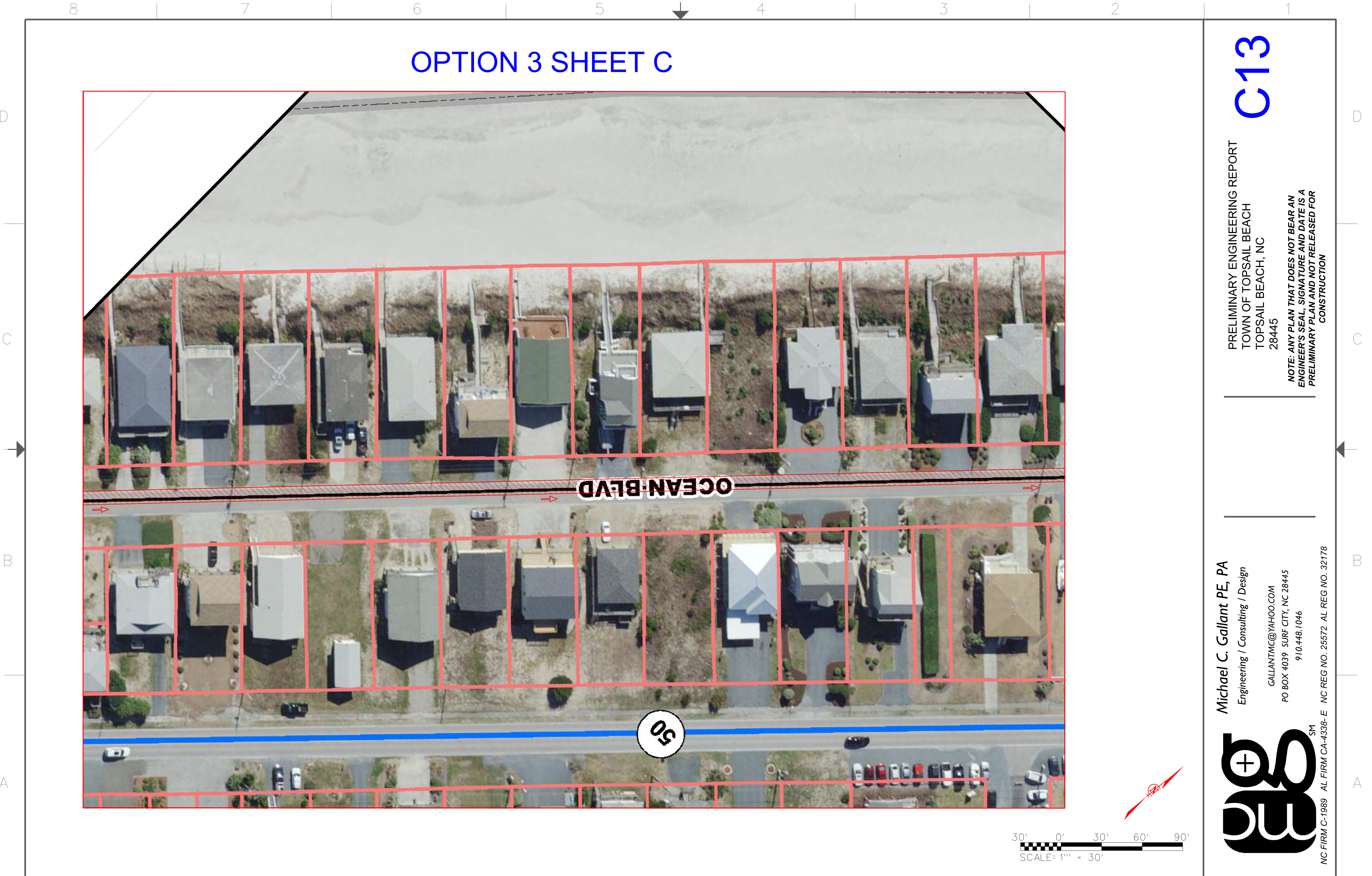
Michael C. Gallant PE, PA
Engineering / Consulting / Design
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

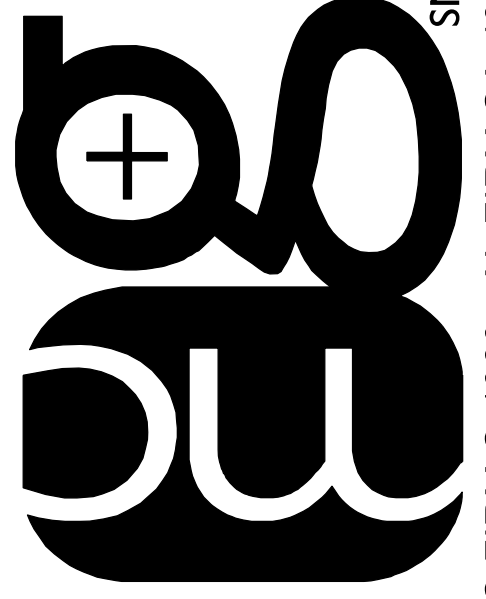
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C12

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION



OPTION 3 SHEET C



Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

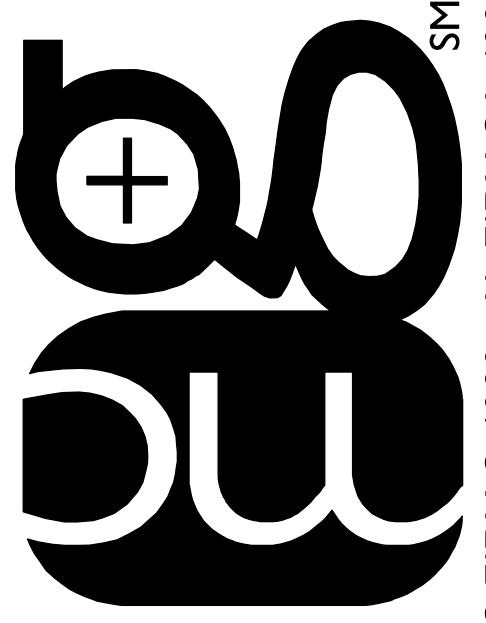
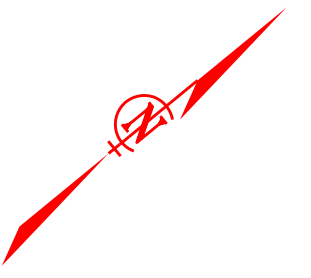
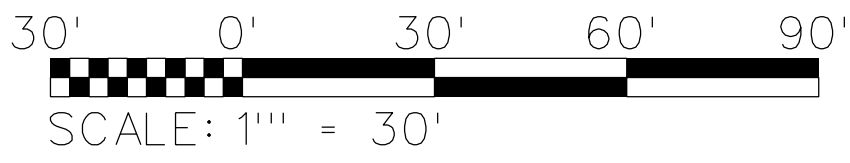
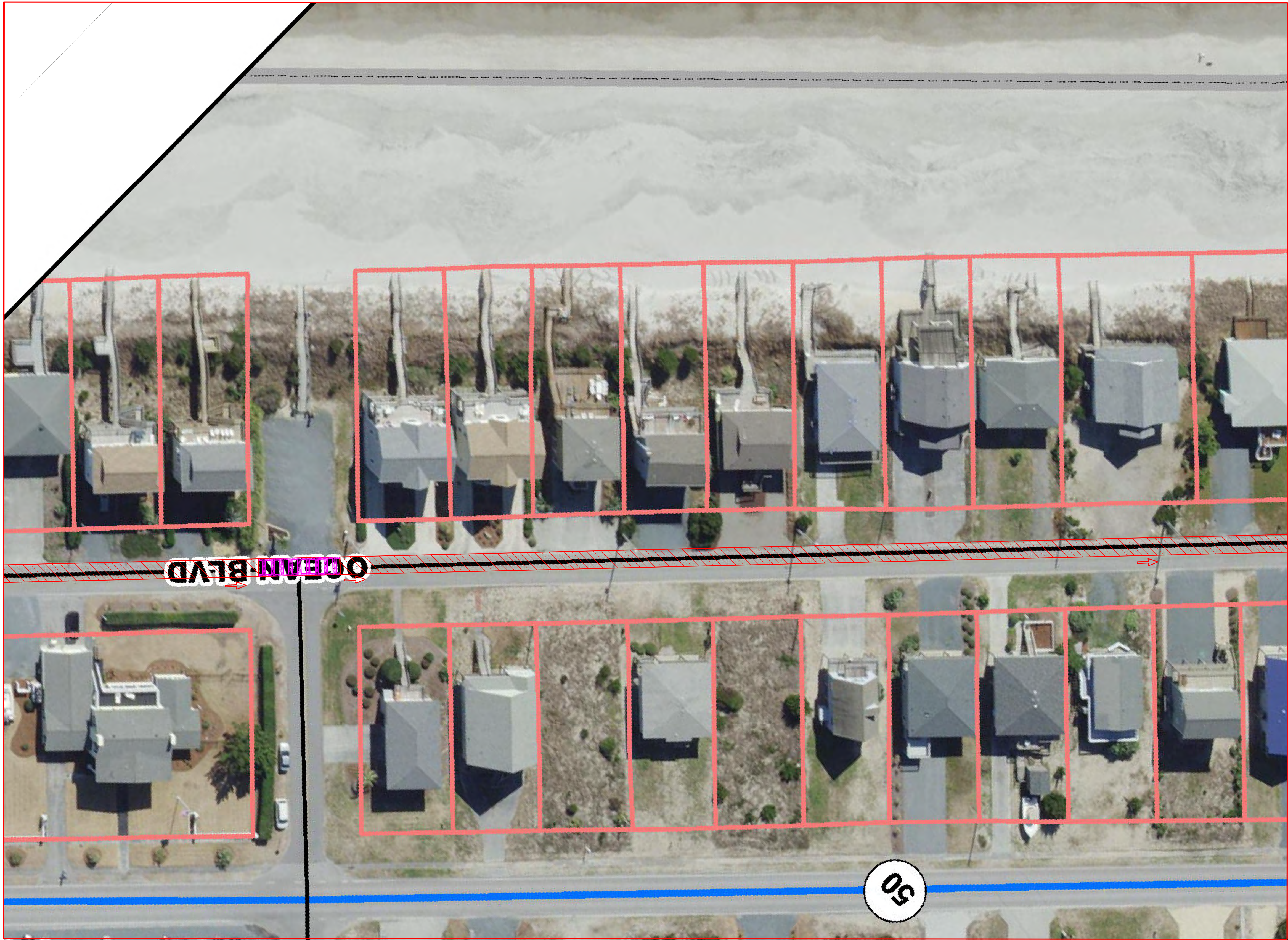
NC FIRM C-1989 AL FIRM CA-4338- E NC REG NO. 25572 AL REG NO. 32178

C13

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

OPTION 3 SHEET D



Michael C. Gallant PE, PA
Engineering / Consulting / Design

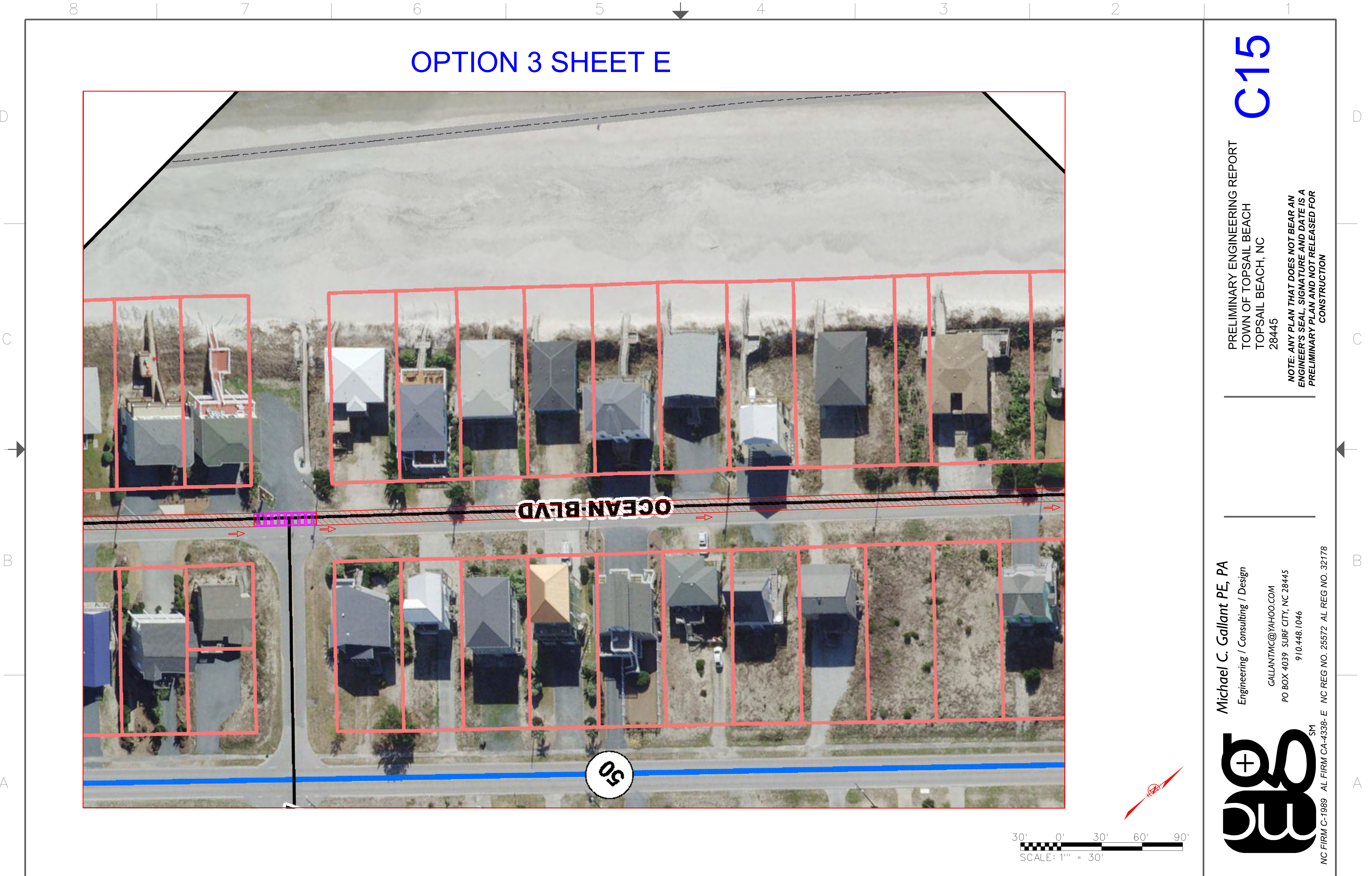
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

NC FIRM C-1989 AL FIRM CA-4338- E NC REG NO. 25572 AL REG NO. 32178

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C14

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION



OPTION 3 SHEET E

C15

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

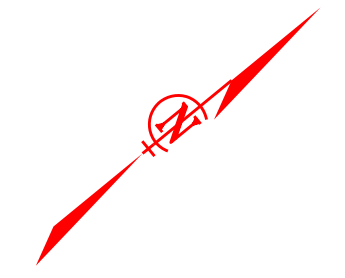
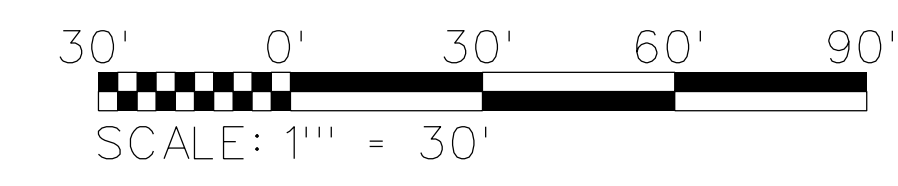
NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

Michael C. Gallant PE, PA
Engineering / Consulting / Design

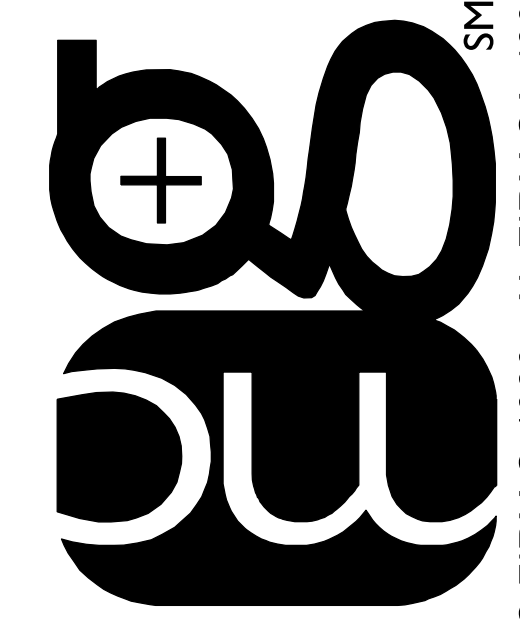
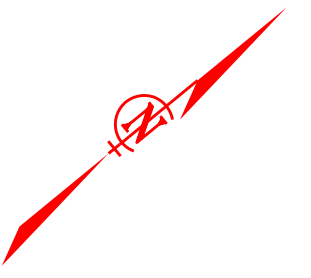
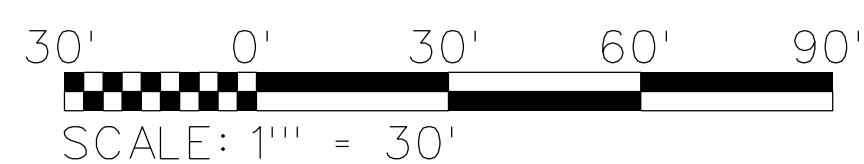
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046



NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178



OPTION 3 SHEET F



Michael C. Gallant PE, PA
Engineering / Consulting / Design

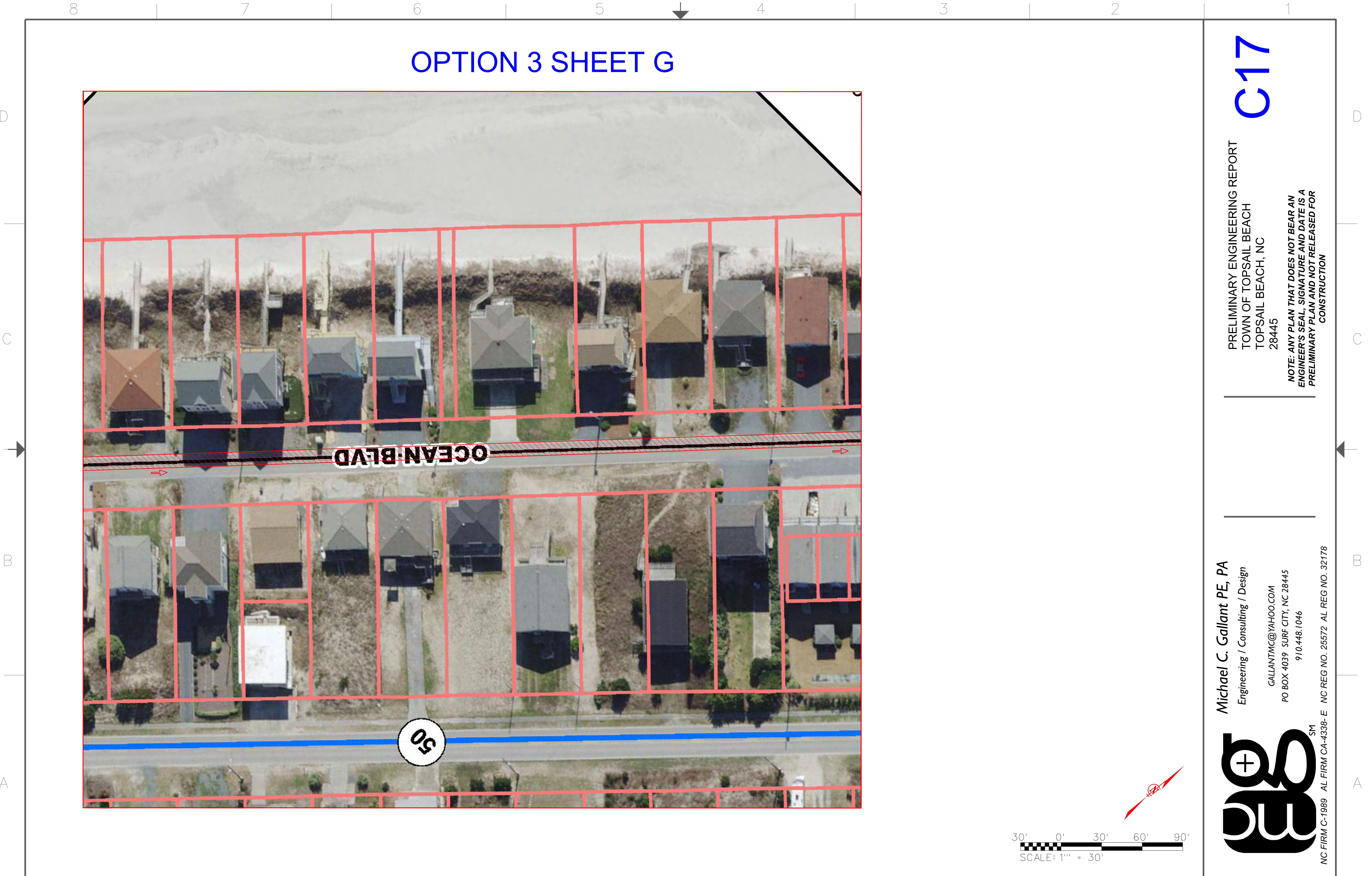
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046

NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

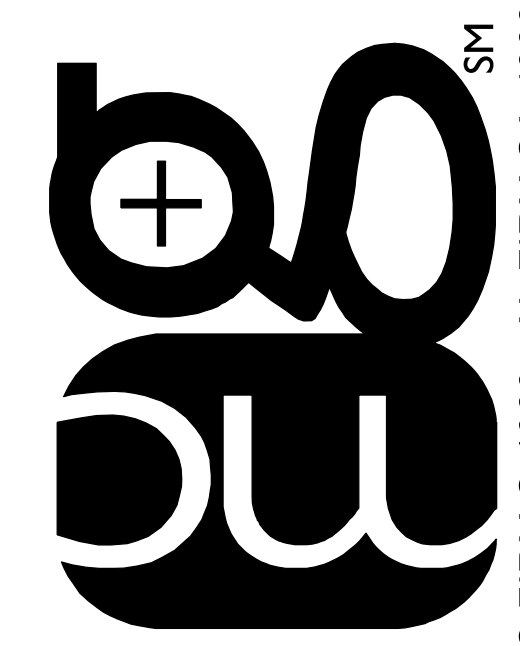
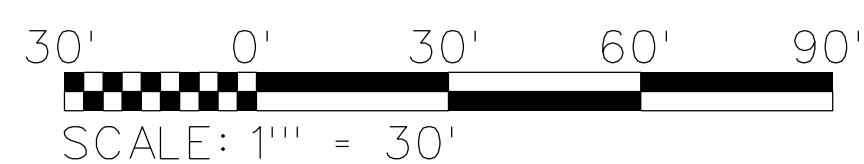
PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C16

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION



OPTION 3 SHEET G

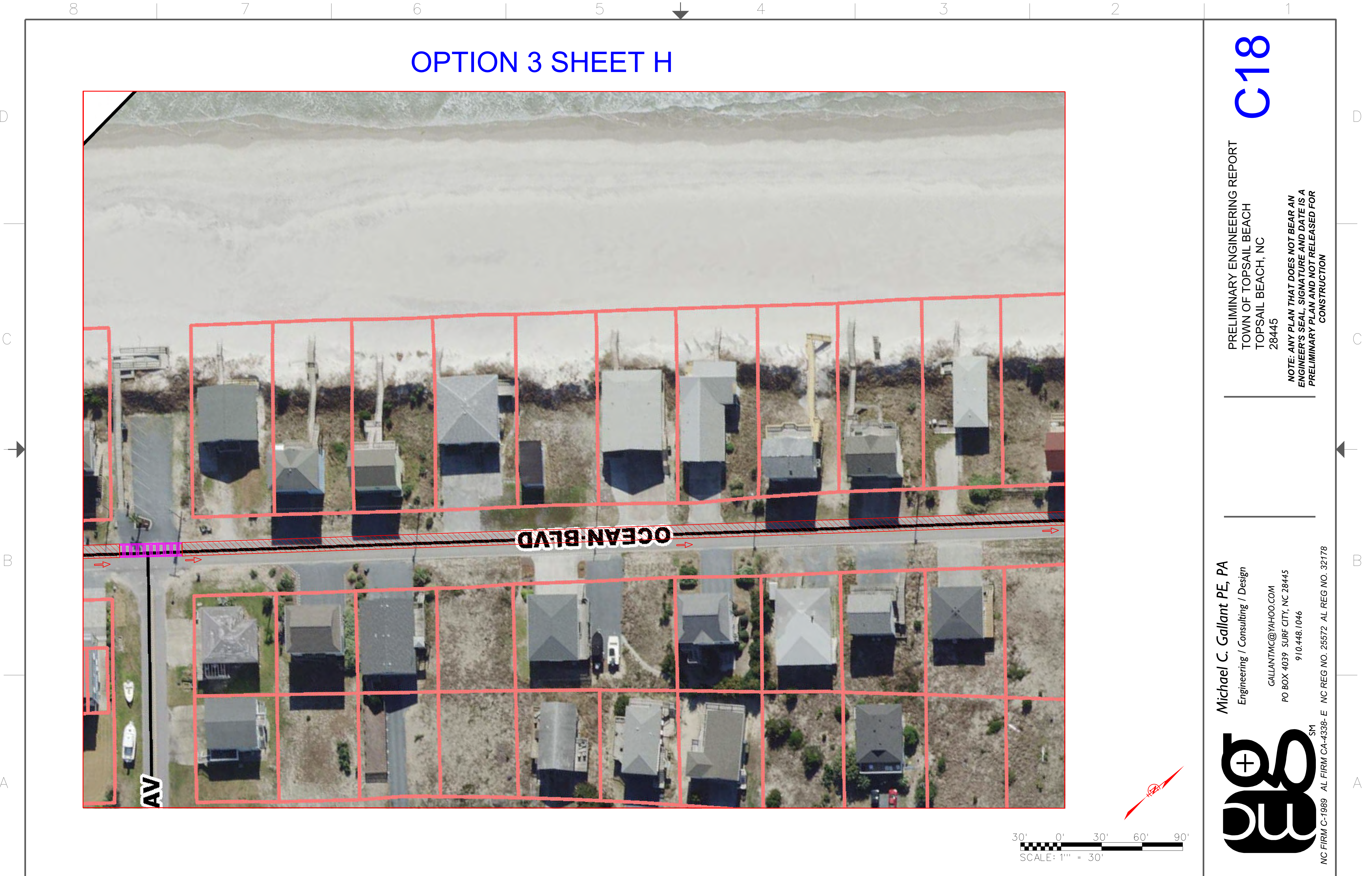


Michael C. Gallant PE, PA
Engineering / Consulting / Design
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046
NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

C17

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION



OPTION 3 SHEET H

C18

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

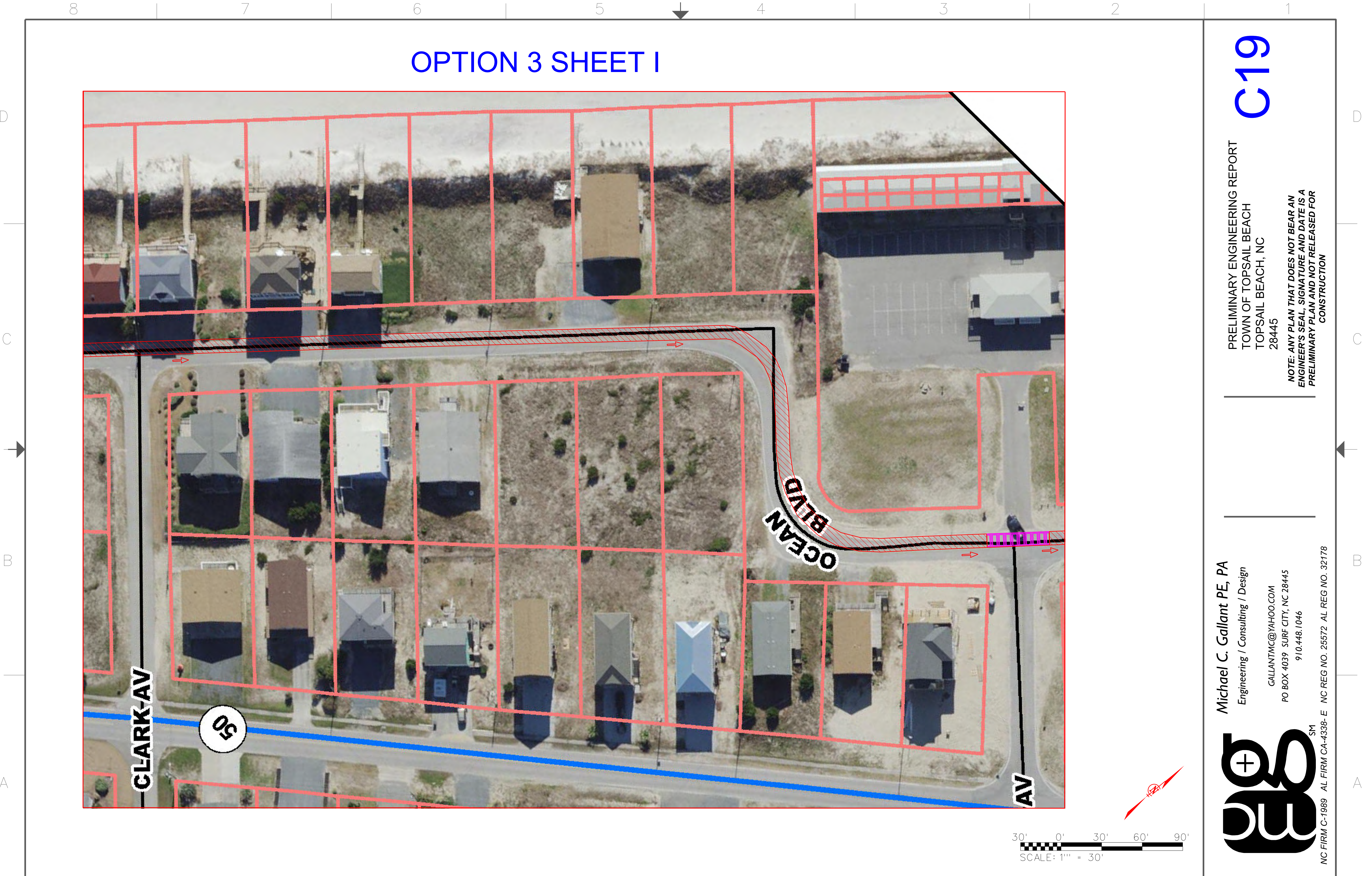
NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046



NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178



OPTION 3 SHEET I

C19

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

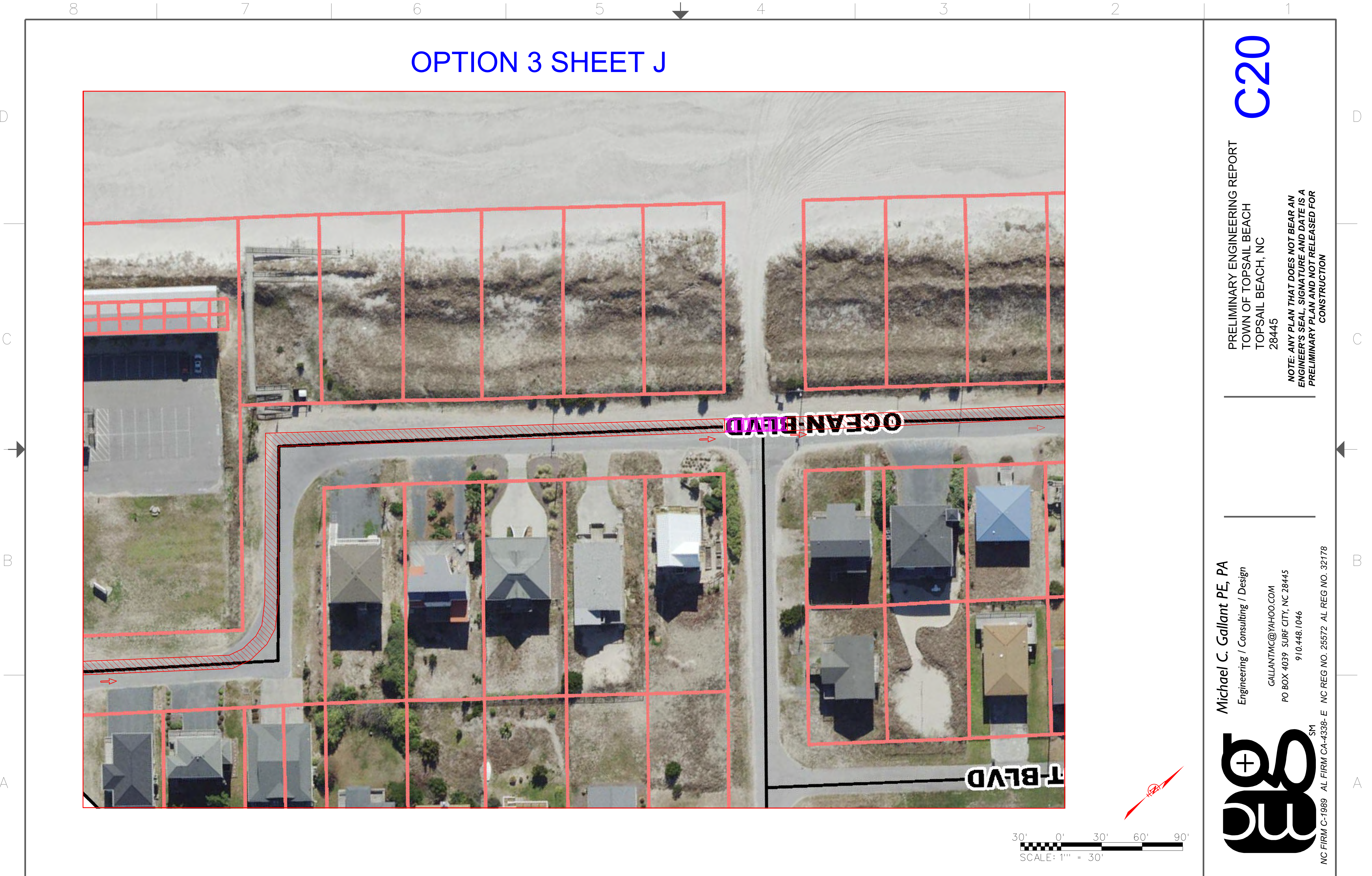
NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046



NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178



OPTION 3 SHEET J

C20

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

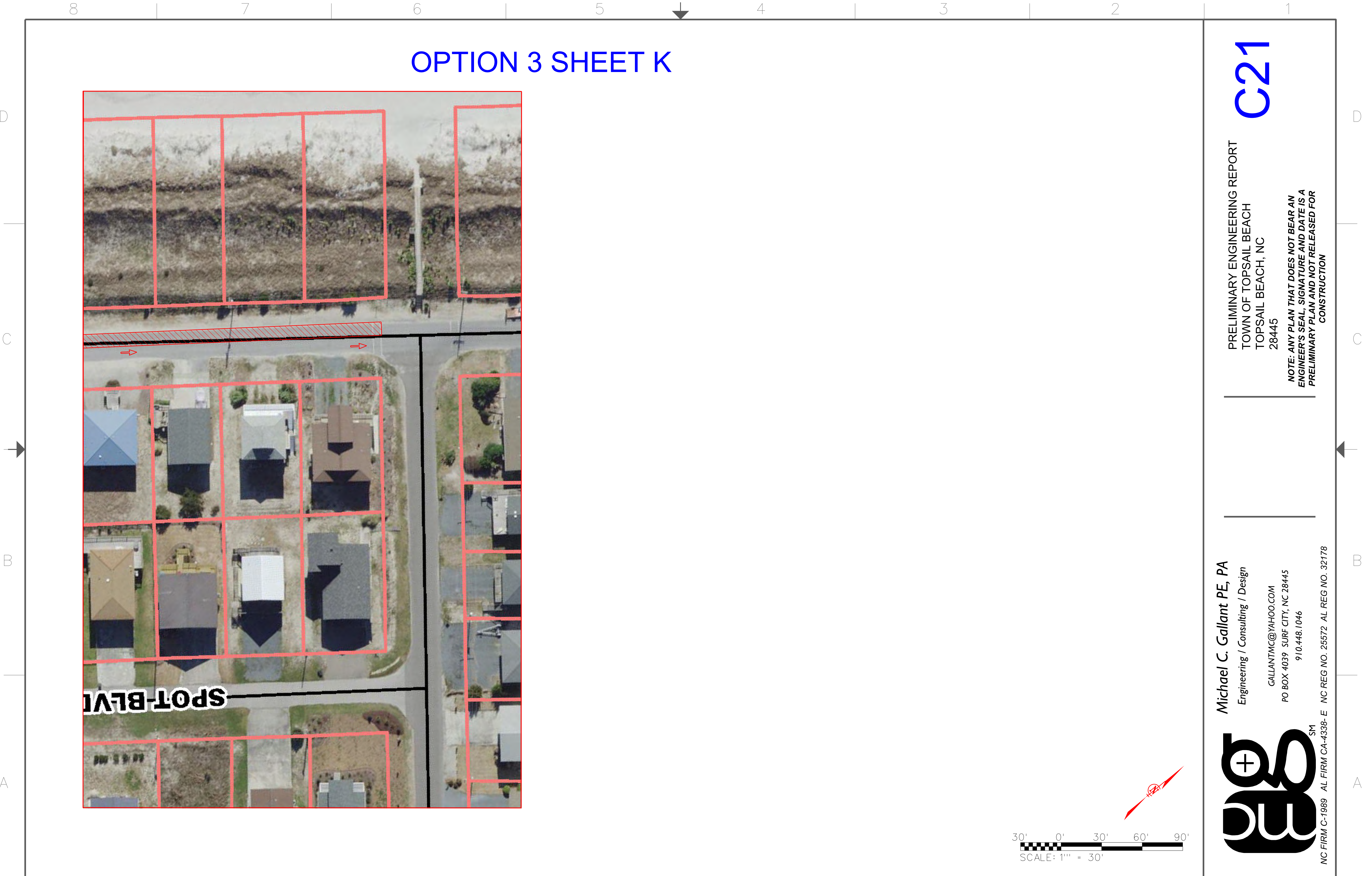
NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

Michael C. Gallant PE, PA
Engineering / Consulting / Design

GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046



NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178



OPTION 3 SHEET K

SPOT-BLVD

C21

PRELIMINARY ENGINEERING REPORT
TOWN OF TOPSAIL BEACH
TOPSAIL BEACH, NC
28445

NOTE: ANY PLAN THAT DOES NOT BEAR AN
ENGINEER'S SEAL, SIGNATURE AND DATE IS A
PRELIMINARY PLAN AND NOT RELEASED FOR
CONSTRUCTION

Michael C. Gallant PE, PA
Engineering / Consulting / Design
GALLANTMC@YAHOO.COM
PO BOX 4039 SURF CITY, NC 28445
910.448.1046



NC FIRM C-1989 AL FIRM CA-4338-E NC REG NO. 25572 AL REG NO. 32178



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 – E
NC Reg. No. - 25572, AL Reg. No. - 32178

APPENDIX III

TYPICAL FLEXIBLE BOLLARD INFORMATION



Michael C. Gallant PE, PA
Engineering / Consulting / Design
NC Firm C-1989, AL Firm CA - 4338 - E
NC Reg. No. - 25572, AL Reg. No. - 32178



<https://www.industrialproducts.com/vestil-opbol-47-orange-plastic-bollard-46-1-2-inch-h-3-7-8-inch-diameter.html>