09/08/95

See Sheet B For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

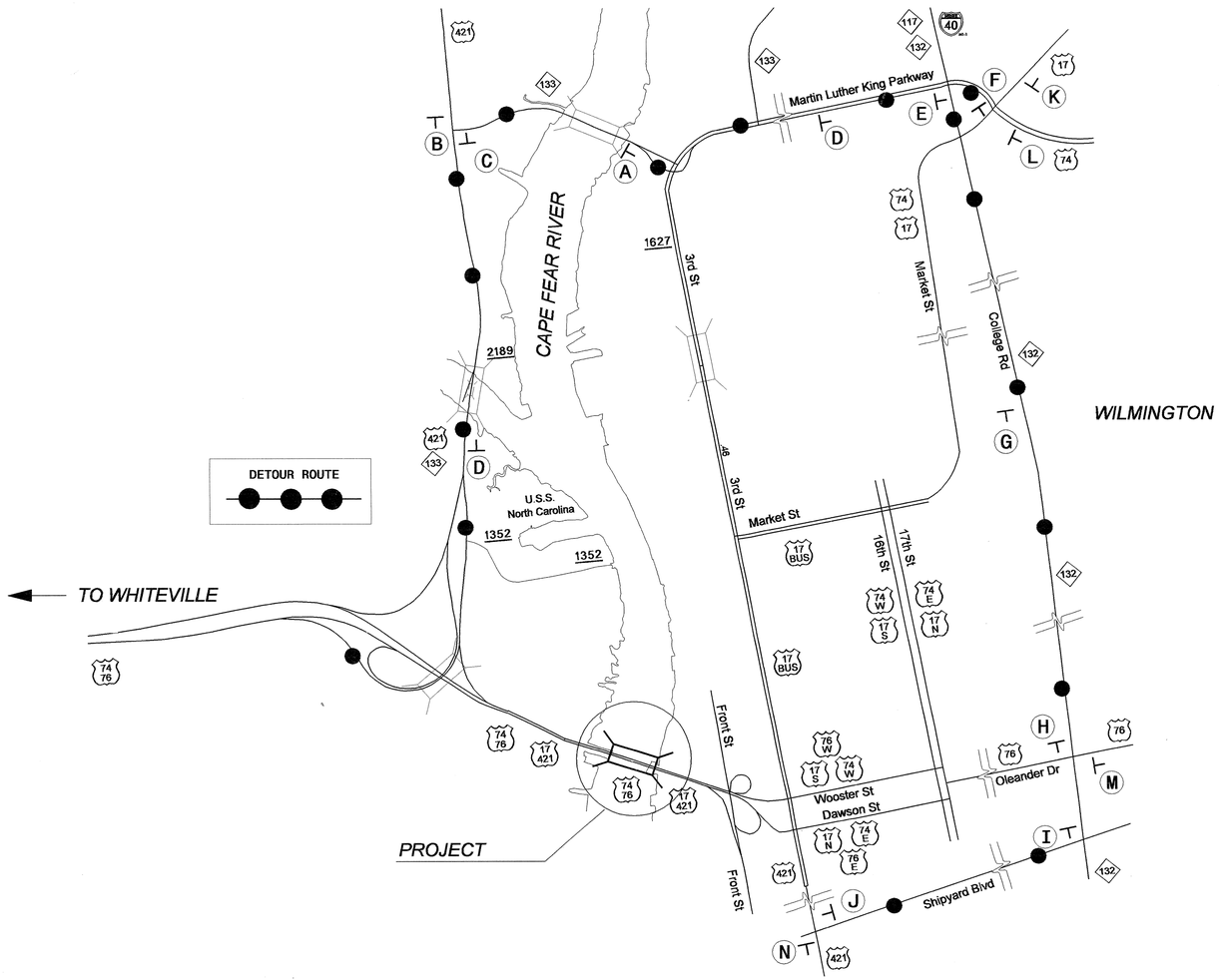
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	40838.3.1	A	65

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

NEW HANOVER – BRUNSWICK COUNTIES

LOCATION: CAPE FEAR MEMORIAL LIFT BRIDGE OVER THE CAPE FEAR RIVER

TYPE OF WORK: REPLACEMENT OF BRIDGE CONTROL SYSTEM



LETTING DATE:

JULY 18, 2006

TIP PROJECT: B-4990

CONTRACT: C 201614

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PROJECT REFERENCE NO.	SHEET NO.
40838.3.1	B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

INDEX OF SHEETS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

NEW BRIDGE CONTROL SYSTEM

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4-08-2005

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INCORPORATED
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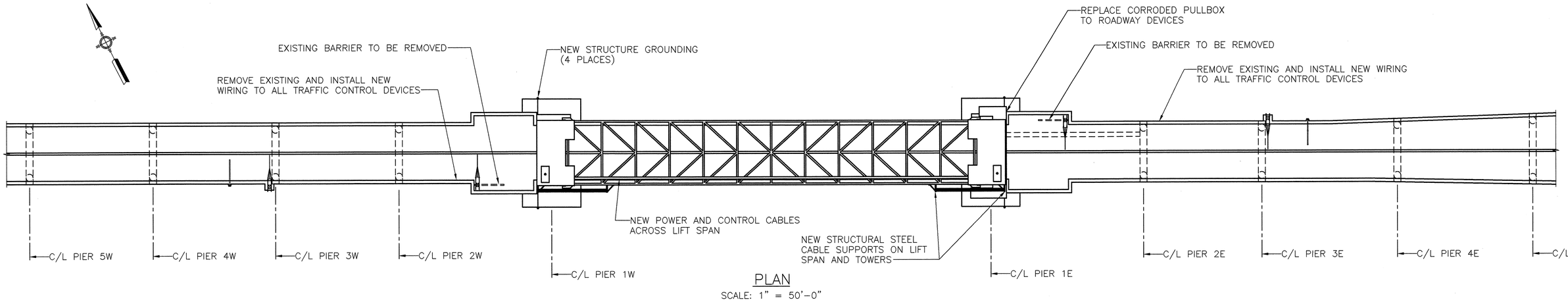
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301



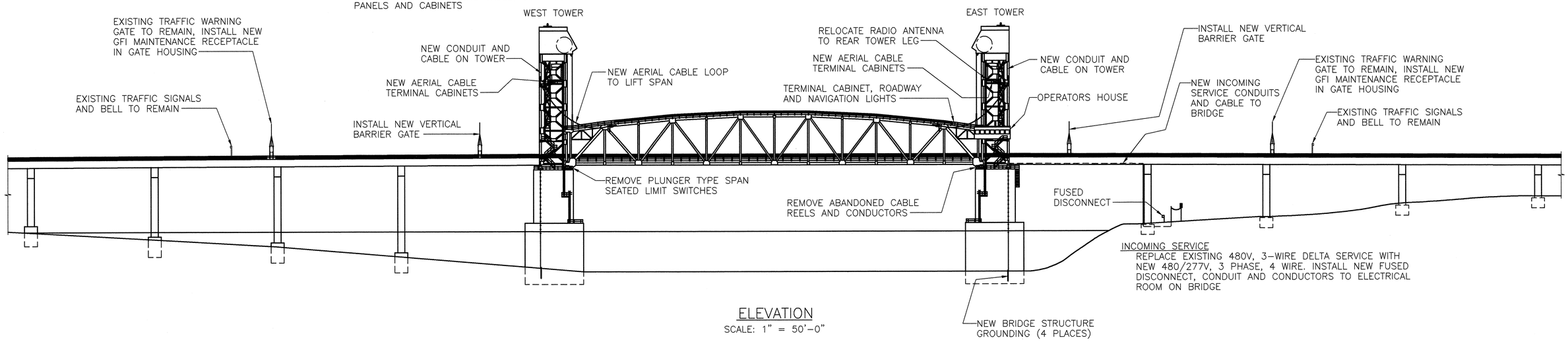
PLAN

SCALE: 1" = 50'–0"

TOWER TOP MACHINERY ROOMS
- INSTALL PLC I/O CABINETS
- REMOVE AND REPLACE ROTARY CAM LIMIT SWITCH
- REMOVE MOTOR TACHOMETERS
- INSTALL NEW AUXILIARY DRIVE GEAR MOTORS, INTERFACING AND CONTROLS
- INSTALL NEW SPAN POSITION RESOLVERS
- INSTALL NEW MOTOR SPEED ENCODERS
- INSTALL NEW BRAKE DISCONNECT SWITCHES IN WEST MACHINERY ROOM
- REMOVE ABANDONED WIRE CABLE, CONTROL PANELS AND CABINETS

LIFT SPAN
- INSTALL NEW CABLES ACROSS LIFT SPAN
- INSTALL NEW JUNCTION BOX FOR LIFT SPAN CIRCUITS
- RECONNECT SPAN NAVIGATION LIGHT FEEDERS
- RECONNECT SPAN ROADWAY LIGHTING CIRCUITS
- REMOVE ABANDONED CONDUCTORS
- INSTALL LIFT SPAN GROUNDING PROVISIONS

OPERATORS HOUSE
- REMOVE EXISTING MOTOR CONTROLS AND INSTALL NEW MOTOR CONTROL CENTER
- REMOVE AND REPLACE VARIABLE SPEED MOTOR DRIVES
- INSTALL NEW PLC CONTROL SYSTEM
- REMOVE AND REPLACE BRIDGE CONTROL CONSOLE
- REMOVE ALL ABANDONED WIRE AND CABLE (EXCEPT SUBMARINE CABLE)
- REMOVE DESIGNATED SWITCHGEAR
- REMOVE MOTOR SECONDARY RESISTORS
- REMOVE AND REPLACE DESIGNATED PANELBOARDS



ELEVATION

SCALE: 1" = 50'–0"

INCOMING SERVICE

REPLACE EXISTING 480V, 3–WIRE DELTA SERVICE WITH NEW 480/277V, 3 PHASE, 4 WIRE. INSTALL NEW FUSED DISCONNECT, CONDUIT AND CONDUCTORS TO ELECTRICAL ROOM ON BRIDGE

GENERAL NOTES:

1. THIS DRAWING INDICATES THE LOCATIONS AND GENERAL DESCRIPTIONS OF THE MAJOR ITEMS OF WORK. CONTRACTOR SHALL REFERENCE THE PLANS AND SPECIFICATIONS FOR COMPLETE DESCRIPTIONS OF REQUIRED WORK AND MATERIALS.
2. SEE SPECIFICATIONS AND SEQUENCE OF CONSTRUCTION DRAWINGS FOR STAGING OF EQUIPMENT REPLACEMENTS AND SYSTEM CHANGE–OVER.
3. UNLESS OTHERWISE DIRECTED BY NCDOT, ALL REMOVALS BECOME PROPERTY OF THE CONTRACTOR.

STRUCTURAL STEEL NOTES:
1. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36, EXCEPT WHEN NOTED OTHERWISE.
2. ALL FASTENERS ARE GALVANIZED 7/8 INCH DIAMETER ASTM A325 HIGH STRENGTH BOLTS, EXCEPT AS NOTED.

WELDING NOTES:
1. MAKE TACK WELDS WITH THE SAME TYPE OF ELECTRODES, AND INCORPORATE IN THE FINAL WELD. NO OTHER TACK WELDING WILL BE PERMITTED.
2. DO NOT WELD WHEN SURFACES TO BE WELDED ARE MOIST OR EXPOSED TO RAIN, SNOW, OR WIND, OR WHEN WELDERS ARE EXPOSED TO INCLEMENT CONDITIONS THAT WILL ADVERSELY AFFECT THE QUALITY OF THE WORK.
3. DO NOT WELD OR BURN WHEN THE TEMPERATURE IS BELOW 40 DEGREES F. PREHEAT AND MAINTAIN THE TEMPERATURE OF THE METAL TO AT LEAST 70 DEGREES F WHEN THE TEMPERATURE OF THE METAL IS BETWEEN 40 DEGREES F AND 70 DEGREES F DURING WELDING OR BURNING. EXTEND THE AREA TO BE HEATED 3 INCHES BEYOND THE WELD IN ALL DIRECTIONS.
4. REMOVE BY APPLICATION OF HEAT ANY MOISTURE PRESENT AT POINT OF WELD. PROVIDE WINDBREAKS FOR PROTECTION FROM DIRECT WIND.
5. PRIOR TO PLACING THE WELD, THOROUGHLY CLEAN ALL PORTIONS OF THE SURFACE TO RECEIVE WELDS OF ALL FOREIGN MATTER, INCLUDING PAINT FILM, FOR A DISTANCE OF 2 INCHES FROM EACH SIDE OF THE OUTSIDE LINES OF THE WELD.
6. WHEN NO WELD SIZE IS SHOWN, PROVIDE THE MINIMUM WELD SIZE PER AASHTO STANDARD SPECIFICATIONS.
7. DO NOT FIELD WELD, EXCEPT WHERE SHOWN ON THE DRAWINGS, WITHOUT PRIOR APPROVAL OF THE ENGINEER.

4-08-2005

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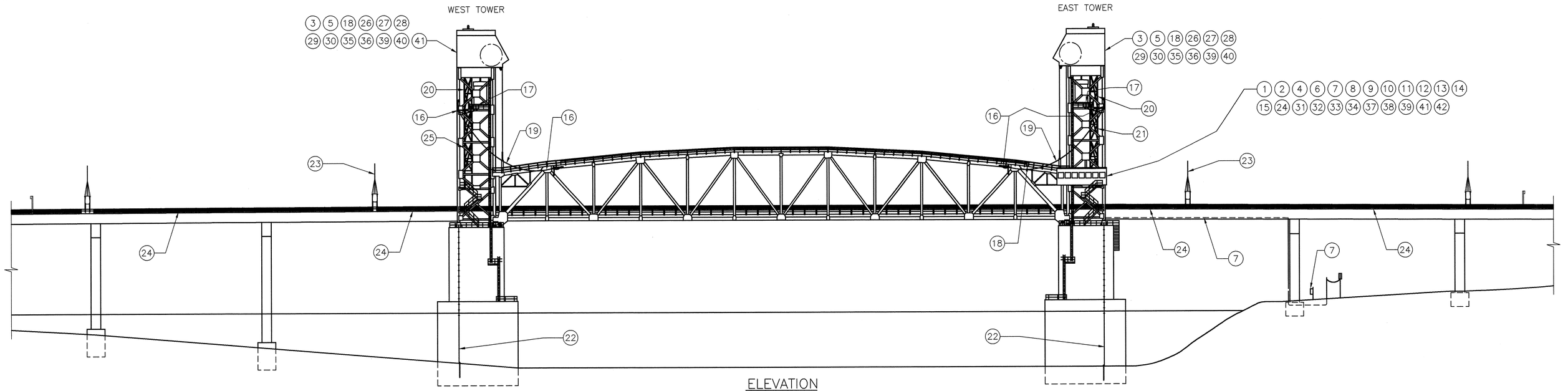
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

ELECTRICAL PLAN AND ELEVATION

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	2 OF 53



ELEVATION

NO SCALE

TASK NO.	TASK
1	INSTALL NEW 600V MAIN DISCONNECT IN AUXILIARY HOUSE SECTION OF THE CONTROL HOUSE.
2	INSTALL NEW 600A MANUAL TRANSFER SWITCH IN AUXILIARY HOUSE.
3	INSTALL NEW 10HP GEARMOTORS AND ASSOCIATED MACHINERY IN THE TOWER TOPS. INSTALL TEMPORARY WIRING AND TEST RUN BRIDGE WITH GEARMOTORS.
4	RELOCATE THE TWO FIXED SECONDARY RESISTOR ASSEMBLIES WITHIN THE ELECTRICAL ROOMS.
5	INSTALL NEW MECHANICAL SPAN HEIGHT INDICATORS.
6	DISCONNECT THE VARIABLE (SWITCHED) SECONDARY RESISTORS AND RELOCATE WITHIN THE ELECTRICAL ROOM.
7	INSTALL NEW SERVICE DISCONNECT, METERING CABINET, CONDUIT AND CABLE FROM SERVICE POLE TO ELECTRICAL ROOM ON BRIDGE.
8	INSTALL THE NEW MOTOR CONTROL CENTER IN THE ELECTRICAL ROOM.
9	RECONNECT INCOMING POWER TO NEW MAIN CIRCUIT BREAKER DISCONNECT AND THE NEW 600A TRANSFER SWITCH. INSTALL TEMPORARY CONNECTION FROM TRANSFER SWITCH TO THE OLD 480V BUS.
10	MAKE PERMANENT CONNECTION, FROM THE NEW TRANSFER TO THE NEW MOTOR CONTROL CENTER. (OLD 480V BUS REMAINS CONNECTED).
11	MAKE PERMANENT CONNECTION FROM THE 300KW GENERATOR TO THE NEW TRANSFER SWITCH.
12	INSTALL THE NEW PLC CABINET IN THE ELECTRICAL ROOM.
13	INSTALL NEW DRIVES IN TEMPORARY LOCATION OPPOSITE THE MCC AND MAKE TEMPORARY CONNECTION TO MCC AND PLC.
14	CONNECT AND TEST ALL POWER, CONTROL AND FIBER OPTIC CONDUCTORS FROM THE MCC AND PLC TO THE WEST MACHINERY ROOM TERMINAL CABINETS AND PLC I/O'S.
15	CONNECT AND TEST NEW POWER AND CONTROL CIRCUITS TO EAST MACHINERY ROOM AND PLC I/O'S.

BRIDGE REMAINS FULLY OPERABLE ON EXISTING DRIVE SYSTEMS.

CONCURRENT TASKS

(THIS WORK MAY BE PERFORMED PRIOR TO, OR DURING THE PRECEDING 15 TASKS.

TASK NO.	TASK
16	INSTALL AERIAL CABLE SUPPORTS ON THE TOWERS AND LIFT SPAN.
17	INSTALL TERMINAL CABINETS ON THE TOWER PLATFORMS.
18	INSTALL TERMINAL BOX ON LIFT SPAN AND POWER AND CONTROL TERMINAL CABINETS IN THE MACHINERY ROOMS.
19	INSTALL NEW AERIAL CABLE SYSTEM, TERMINATE IN THE NEW CABINETS
20	INSTALL NEW CABLE SUPPORTS, CABLE TRAY AND CONDUCTORS FROM MACHINERY ROOMS TO TOWER PLATFORM TERMINAL CABINETS.
21	INSTALL CONDUCTORS FROM ELECTRICAL ROOM (MOTOR CONTROL CENTER) TO AERIAL CABLE TERMINAL CABINETS.
22	INSTALL THE NEW STRUCTURE GROUNDING SYSTEM.
23	REMOVE EXISTING BARRIERS AND INSTALL NEW BARRIER GATES.
24	INSTALL NEW WIRING TO ALL TRAFFIC CONTROL DEVICES (GATES, SIGNAL, GONGS).
25	INSTALL (BUT DO NOT CONNECT) CONDUCTORS FROM WEST ROADWAY AND SPAN LOCK AREA TO WEST AERIAL CABLE TERMINAL CABINETS.
26	INSTALL OPTICAL ENCODERS ON SOUTHEAST AND SOUTHWEST DRIVE MOTORS.
27	INSTALL NEW ROTARY CAM LIMIT SWITCHES. ADJUST, CONNECT TO EXISTING CIRCUITS.
28	INSTALL, BUT DO NOT CONNECT, NEW CIRCUITS FROM BRAKE LIMIT SWITCHES TO PLC I/O'S.
29	INSTALL AND CONNECT CIRCUIT FROM SOUTH MOTOR ENCODER.
30	INSTALL AND CONNECT RESOLVERS TO PLC I/O'S.

SOUTH DRIVE MOTORS, ASSOCIATED ENCODERS AND RESOLVERS ARE NOW CONNECTED TO THE NEW MCC AND PLC. BRIDGE IS OPERATIONAL ON THE OLD DRIVE OR ON THE NEW GEARMOTOR.

TASK NO.	TASK
31	CONNECT EAST AND WEST SPAN LOCKS TO THE NEW MCC. (LOCKS CAN NOW BE MANUALLY ACTUATED FROM MCC TO OPERATE BRIDGE ON THE GEARMOTOR).
32	CONNECT REMAINING DEVICES TO THE NEW MCC INCLUDING BRAKES, GATES, BARRIERS, HEATERS AND ELEVATOR.
33	REMOVE OLD CONTROL CONSOLE. INSTALL NEW CONSOLE, MAKING ALL INTERCONNECTIONS TO NEW CONTROL EQUIPMENT.
34	ENERGIZE, TEST AND ADJUST THE SOUTH MOTOR DRIVE SYSTEM INCLUDING PLC SKEW CONTROL.

BRIDGE IS NOW OPERATIONAL USING THE NEW DRIVE SYSTEM AND THE SOUTHEAST AND SOUTHWEST MOTORS.

TASK NO.	TASK
35	REMOVE NORTHEAST AND NORTHWEST MOTORS TO MOTOR SHOP FOR REFURBISHING.
36	REINSTALL NORTHEAST AND NORTHWEST MOTORS AND ENCODERS.
37	ENERGIZE, TEST, AND ADJUST THE NORTH MOTOR DRIVE SYSTEM.
38	ENERGIZE, TEST AND ADJUST THE SKEW CONTROL SYSTEM.
39	REMOVE SOUTHEAST AND SOUTHWEST MOTORS TO MOTOR SHOP FOR REBURBISHING.
40	REINSTALL SOUTHEAST AND SOUTHWEST MOTORS.
41	REMOVE – OLD AUXILIARY CONTROL CABINETS IN WEST TOWER AND IN AUXILIARY HOUSE. – OLD 480 VOLT SWITCHGEAR IN AUXILIARY HOUSE. – OLD CONTROL BOARD IN AUXILIARY HOUSE.
42	RELOCATE THE NEW FLUX VECTOR DRIVES TO PERMANENT LOCATION.
43	FINAL TEST ENTIRE SYSTEM PER SPECIFICATIONS.

NOTES:

1. THIS DRAWING LISTS THE MAJOR ITEMS OF WORK TO BE PERFORMED. TASKS ARE LISTED IN SEQUENCE ILLUSTRATING THE LEVEL OF SCHEDULING THAT WILL BE NECESSARY TO MINIMIZE BRIDGE OPERATIONAL DOWN TIME. THE CONTRACTOR IS ADVISED THE PERMITTED CONDITIONS UNDER WHICH DOWNTIME OR OUTAGES OF BRIDGE OPERATIONS MAY OCCUR ARE STRICTLY LIMITED. A DETAILED AND REQUIRED SEQUENCE OF CONSTRUCTION, APPROVED BY NCDOT AND THE UNITED STATES COAST GUARD, IS LISTED IN THE SPECIFICATIONS.
2. REQUIRED SPAN BALANCING IS NOT INCLUDED IN THE TASK OUTLINE ADDRESSED ON THIS DRAWING. SEE DETAILED SPAN BALANCING REQUIREMENTS IN THE SPECIFICATIONS.

4-08-2005

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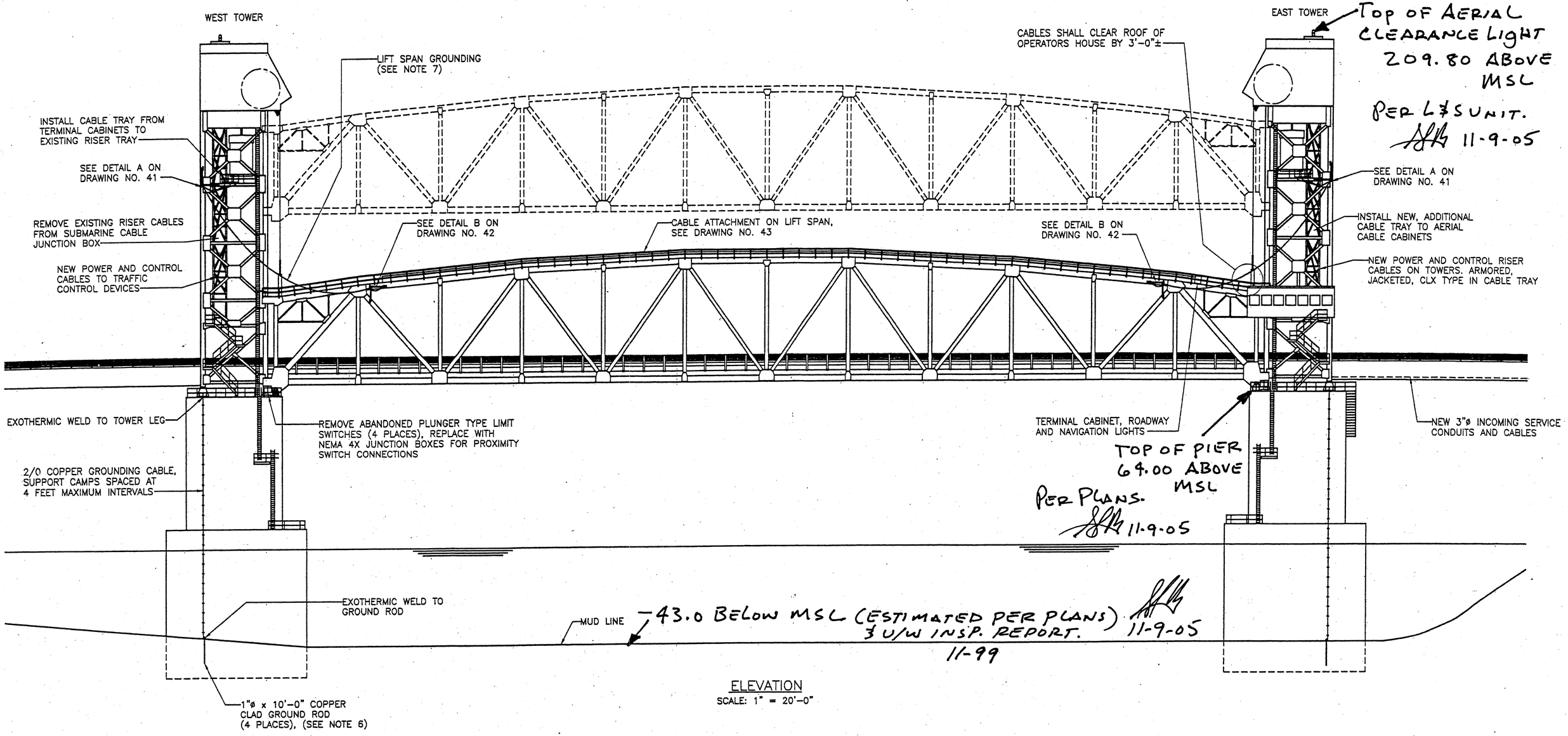
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONSTRUCTION STAGING

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L FASICK	DRAWING NO.	3 OF 53



ELEVATION
SCALE: 1" = 20'-0"

TRUCTURE GROUNDING

1. GROUNDING CABLE SHALL BE STRANDED COPPER. MINIMUM WEIGHT 440 LBS. PER 1000 FEET (APPROXIMATELY AWG 2/0).
2. GROUND RODS SHALL BE COPPER CLAD STEEL.
3. NO SHARP BENDS OR SPLICES PERMITTED IN GROUNDING CABLE. INSTALL WITH RADIUS OVER EDGE OF PIERS.
4. ALL ATTACHMENT HARDWARE SHALL BE DESIGNED SPECIFICALLY FOR SUPPORT OF COPPER GROUNDING CABLES.
5. EXOTHERMIC WELDS SHALL UTILIZE MOLDS DESIGNED FOR ATTACHMENT OF 2/0 COPPER CABLE TO VERTICAL STEEL SURFACES AND TO GROUND RODS.
6. INSTALL GROUNDING SYSTEM UPSTREAM AND DOWNSTREAM AT EAST AND WEST TOWERS.
7. 4/0 COPPER GROUNDING CABLE SHALL BE GROUPED WITH LOOP CABLES. SHALL BE EXOTHERMICALLY BONDED TO TOWER STRUCTURES AND EACH END OF THE LIFT SPAN, TERMINATING AT THOSE LOCATIONS. CABLE SHALL BE INSULATED, HIGH STRAND COUNT, TYPE W.
8. EACH OF THE STRUCTURE GROUNDING INSTALLATIONS SHALL PROVIDE A GROUND CONNECTION NOT TO EXCEED 20 OHMS RESISTANCE. ADDITIONAL GROUNDING PROVISIONS SHALL BE ADDED AS MAY BE REQUIRED TO ACHIEVE 20 OHMS MAXIMUM RESISTANCE.

L. V. Baker 2-08-2005

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

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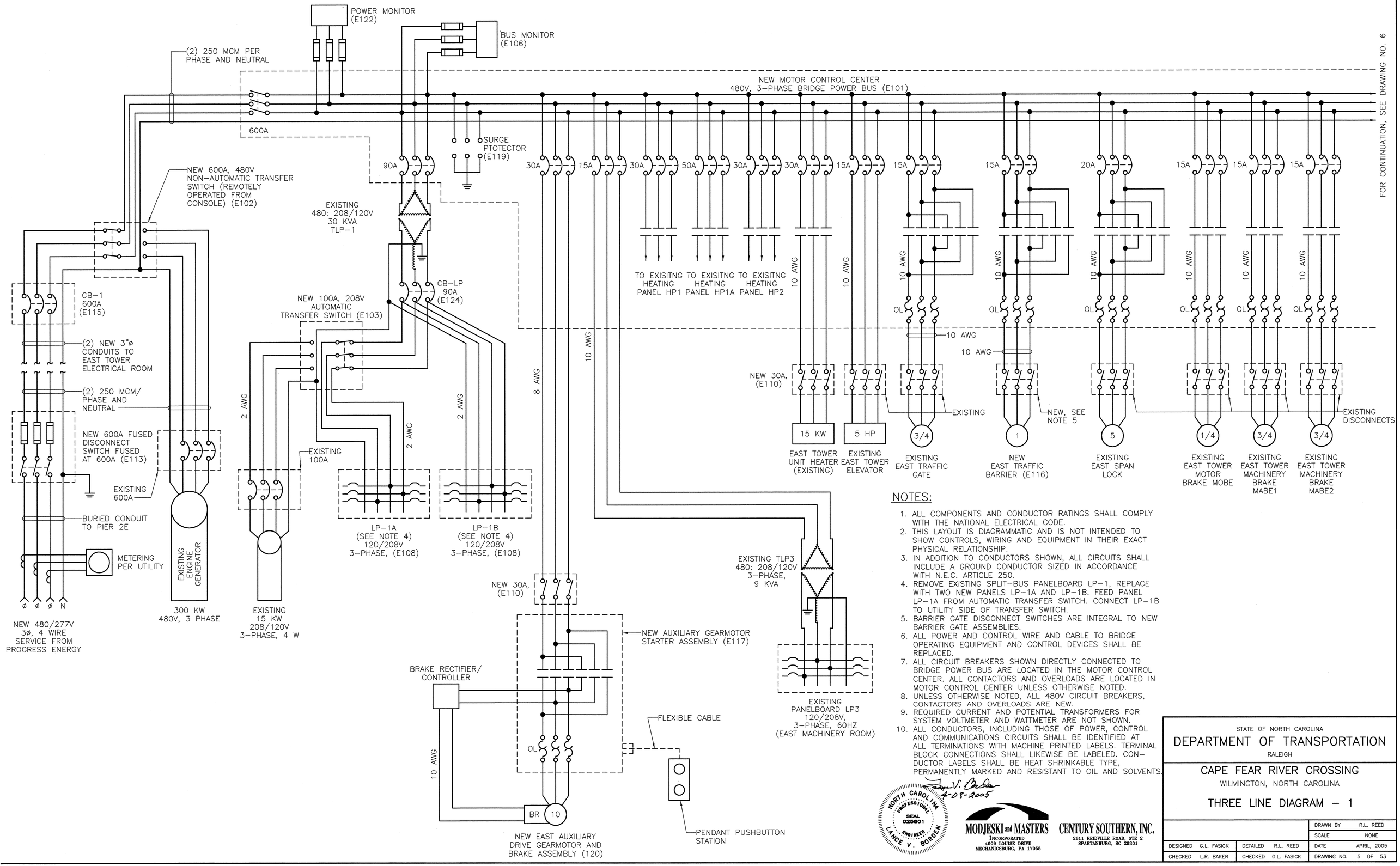
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA
ELECTRICAL ELEVATION AND STRUCTURE GROUNDING

				DRAWN BY	R.L. REED
				SCALE	AS NOTED
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	L.R. BAKER	CHECKED	G.L. FASICK	DRAWING NO.	4 OF 53



NOTES:

1. ALL COMPONENTS AND CONDUCTOR RATINGS SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE.
2. THIS LAYOUT IS DIAGRAMMATIC AND IS NOT INTENDED TO SHOW CONTROLS, WIRING AND EQUIPMENT IN THEIR EXACT PHYSICAL RELATIONSHIP.
3. IN ADDITION TO CONDUCTORS SHOWN, ALL CIRCUITS SHALL INCLUDE A GROUND CONDUCTOR SIZED IN ACCORDANCE WITH N.E.C. ARTICLE 250.
4. REMOVE EXISTING SPLIT-BUS PANELBOARD LP-1, REPLACE WITH TWO NEW PANELS LP-1A AND LP-1B. FEED PANEL LP-1A FROM AUTOMATIC TRANSFER SWITCH. CONNECT LP-1B TO UTILITY SIDE OF TRANSFER SWITCH.
5. BARRIER GATE DISCONNECT SWITCHES ARE INTEGRAL TO NEW BARRIER GATE ASSEMBLIES.
6. ALL POWER AND CONTROL WIRE AND CABLE TO BRIDGE OPERATING EQUIPMENT AND CONTROL DEVICES SHALL BE REPLACED.
7. ALL CIRCUIT BREAKERS SHOWN DIRECTLY CONNECTED TO BRIDGE POWER BUS ARE LOCATED IN THE MOTOR CONTROL CENTER. ALL CONTACTORS AND OVERLOADS ARE LOCATED IN MOTOR CONTROL CENTER UNLESS OTHERWISE NOTED.
8. UNLESS OTHERWISE NOTED, ALL 480V CIRCUIT BREAKERS, CONTACTORS AND OVERLOADS ARE NEW.
9. REQUIRED CURRENT AND POTENTIAL TRANSFORMERS FOR SYSTEM VOLTMETER AND WATTMETER ARE NOT SHOWN.
10. ALL CONDUCTORS, INCLUDING THOSE OF POWER, CONTROL AND COMMUNICATIONS CIRCUITS SHALL BE IDENTIFIED AT ALL TERMINATIONS WITH MACHINE PRINTED LABELS. TERMINAL BLOCK CONNECTIONS SHALL LIKEWISE BE LABELED. CONDUCTOR LABELS SHALL BE HEAT SHRINKABLE TYPE, PERMANENTLY MARKED AND RESISTANT TO OIL AND SOLVENTS.

4-08-2005

NORTH CAROLINA PROFESSIONAL SEAL 025601 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

THREE LINE DIAGRAM – 1

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	5 OF 53

FOR CONTINUATION, SEE DRAWING NO. 5

MOTOR CONTROL CENTER
480V, 3-PHASE BRIDGE POWER BUS

250A | 250A | 250A | 250A

4/0 AWG | 4/0 AWG | 4/0 AWG | 4/0 AWG

NEW FLUX VECTOR DRIVE (E104) | NEW FLUX VECTOR DRIVE (E104) | NEW FLUX VECTOR DRIVE (E104) | NEW FLUX VECTOR DRIVE (E104)

4/0 AWG | 4/0 AWG

350 MCM | 350 MCM

EAST AERIAL CABLE CABINET | EAST AERIAL CABLE CABINET

WEST AERIAL CABLE CABINET | WEST AERIAL CABLE CABINET

350 MCM | 350 MCM

EXISTING 200A DISCONNECT | EXISTING 200A DISCONNECT | EXISTING 200A DISCONNECT | EXISTING 200A DISCONNECT

100 | 100 | 100 | 100

EXISTING EAST DRIVE MOTOR E1 | EXISTING EAST DRIVE MOTOR E2 | EXISTING WEST DRIVE MOTOR W1 | EXISTING WEST DRIVE MOTOR W2

AERIAL CABLE TERMINAL CABINETS

30A | 15A | 30A | 15A | 15A | 15A | 20A | 15A | 15A | 15A

4 AWG | 6 AWG | 6 AWG | 10 AWG

OL | OL | OL | OL | OL | OL | OL

10 AWG | 10 AWG | 8 AWG | 10 AWG | 10 AWG | 10 AWG

NEW 30A (E110) | EXISTING | EXISTING | NEW 30A (E110) | NEW 30A (E110) | NEW 30A (E110)

NEW, SEE NOTE 4 | EXISTING

15 KW | 5 HP | 3/4 | 1 | 5 | 1/4 | 3/4 | 3/4

WEST TOWER UNIT HEATER (EXISTING) | WEST TOWER ELEVATOR (EXISTING) | EXISTING WEST TRAFFIC GATE | NEW WEST TRAFFIC BARRIER (E116) | EXISTING WEST SPAN LOCK | EXISITNG WEST TOWER MOTOR BRAKE MOBW | EXISITNG WEST TOWER MACHINERY BRAKE MABW1 | EXISITNG WEST TOWER MACHINERY BRAKE MABW2

NEW 30A, (E110)

EXISTING TLP2
480: 208/120V
3-PHASE,
9 KVA

BRAKE RECTIFIER/ CONTROLLER

AUXILIARY GEARMOTOR STARTER ASSEMBLY (E117)

FLEXIBLE CABLE

OL

10 AWG

PENDANT PUSHBUTTON STATION

EXISTING PANELBOARD LP2
120/208V,
3-PHASE, 60HZ
(WEST MACHINERY ROOM)

BR | 10

NEW WEST AUXILIARY DRIVE GEARMOTOR AND BRAKE ASSEMBLY (120)

NOTES:

1. ALL COMPONENTS AND CONDUCTOR RATINGS SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE.
2. THIS LAYOUT IS DIAGRAMMATIC AND IS NOT INTENDED TO SHOW CONTROLS, WIRING AND EQUIPMENT IN THEIR EXACT PHYSICAL RELATIONSHIP.
3. IN ADDITION TO CONDUCTORS SHOWN, ALL CIRCUITS SHALL INCLUDE A GROUND CONDUCTOR SIZED IN ACCORDANCE WITH N.E.C. ARTICLE 250.
4. BARRIER DISCONNECT SWITCH, INTEGRAL TO NEW BARRIER GATE ASSEMBLY.

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4-08-2005

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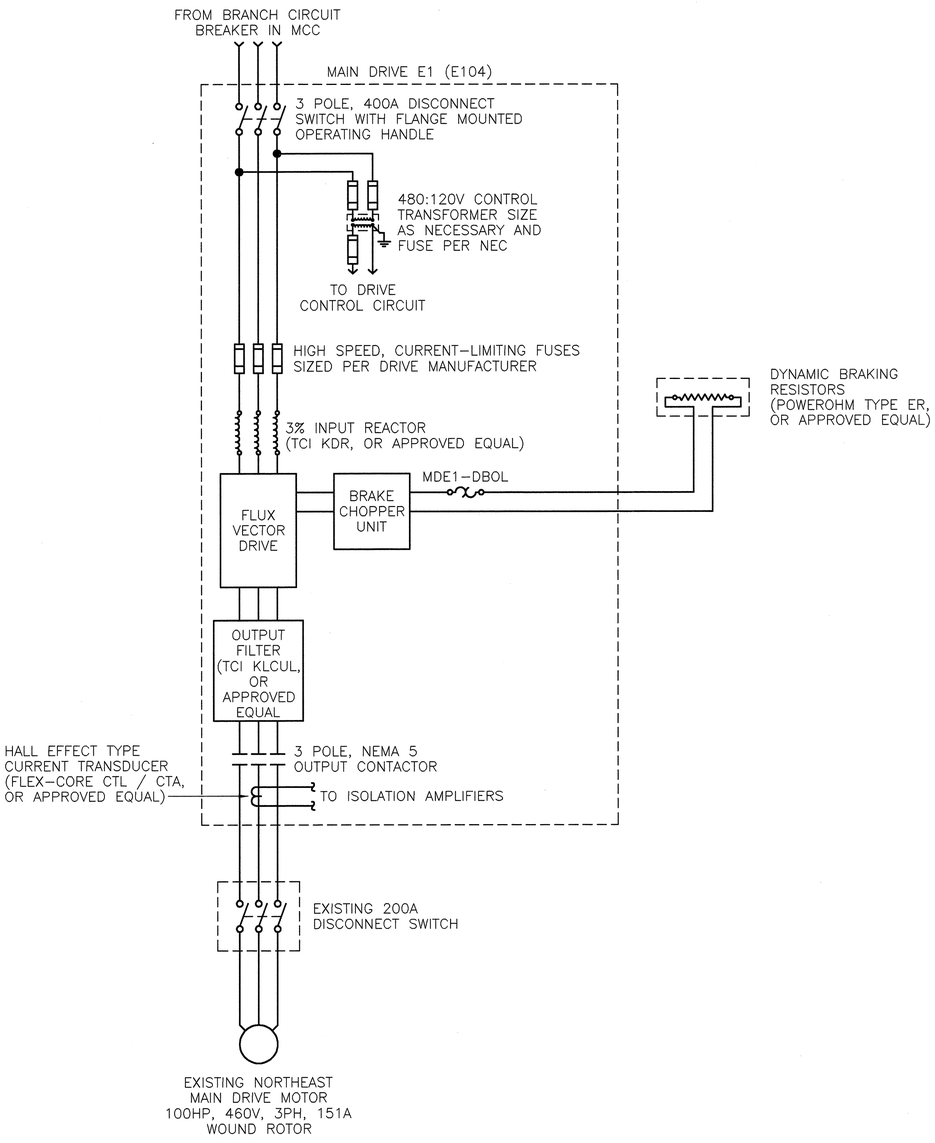
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

THREE LINE DIAGRAM – 2

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	6 OF 53



MAIN DRIVE POWER WIRING

(DRIVE E1 SHOWN, DRIVE E2, W1 AND W2 SIMILAR)

4-08-2005

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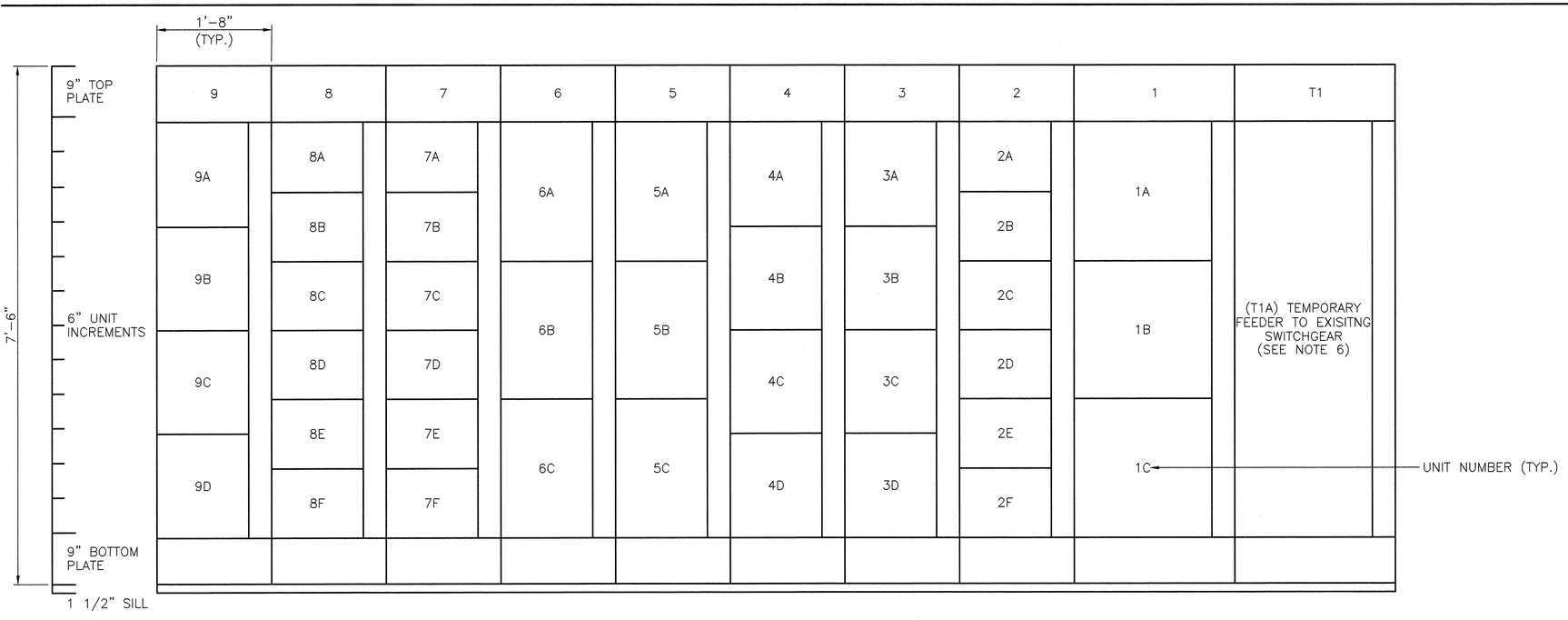
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

MAIN DRIVE POWER WIRING

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	N.E. ALGER	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	G.L. FASICK	CHECKED	G.L. FASICK	DRAWING NO.	7 OF 53



MOTOR CONTROL CENTER
FRONT VIEW
SCALE: 1" = 1'-0"
ELECTRICAL EQUIPMENT ROOM

UNIT SCHEDULE MOTOR CONTROL CENTER

SECTION	UNIT NO.	UNIT TYPE	NAME PLATE/DESCRIPTION	MOTOR HP	CIRCUIT BREAKER	STARTER
T1	T1A	MCB	TEMPORARY FEEDER BREAKER TO EXISTING SWITCHGEAR	—	600A	—
1	1A	MCS	MAIN BUS DISCONNECT	—	600A (1)	—
	1B	INSR	BUS MONITOR	—	—	—
	1C	INSR	POWER MONITOR	—	—	—
2	2A	FCB	PANELBOARD LP-1A/B, (TLP-1)	—	90A	—
	2B	FCB	PANELBOARD LP-2 (TLP-2)	—	15A	—
	2C	FCB	PANELBOARD LP-3 (TLP-3)	—	15A	—
	2D	FCB	EAST TOWER ELEVATOR	5	15A	—
	2E	FCB	WEST TOWER ELEVATOR	5	15A	—
	2F	TVSS	250 KA/PHASE TVSS	—	PER MFG'R.	—
3	3A	FVMH	HEATING PANEL HP1	—	30A	NEMA 1
	3B	FVMH	HEATING PANEL HP1A	—	50A	NEMA 1
	3C	FVMH	HEATING PANEL HP2	—	30A	NEMA 1
	3D	EMTY	SPARE SPACE	—	—	—
4	4A	FVMH	HEATER - EAST MACHINERY ROOM	—	30A	NEMA 1
	4B	FVMH	HEATER - WEST MACHINERY ROOM	—	30A	NEMA 1
	4C	FVR	EAST SPAN LOCK	5	MCP	NEMA 1
	4D	FVR	WEST SPAN LOCK	5	MCP	NEMA 1
5	5A	FCB	EAST MAIN DRIVE E1	100	250A	—
	5B	FCB	EAST MAIN DRIVE E2	100	250A	—
	5C	EMTY	SPARE SPACE	—	—	—
6	6A	FCB	WEST MAIN DRIVE W1	100	250A	—
	6B	FCB	WEST MAIN DRIVE W2	100	250A	—
	6C	EMTY	SPARE SPACE	—	—	—
7	7A	FVNR	EAST MOTOR BRAKE MOBE	1/4	MCP	NEMA 1
	7B	FVNR	EAST MACHINERY BRAKE MABE1	3/4	MCP	NEMA 1
	7C	FVNR	EAST MACHINERY BRAKE MABE2	3/4	MCP	NEMA 1
	7D	FVNR	WEST MOTOR BRAKE MOBW	1/4	MCP	NEMA 1
	7E	FVNR	WEST MACHINERY BRAKE MOBW1	3/4	MCP	NEMA 1
	7F	FVNR	WEST MACHINERY BRAKE MOBW2	3/4	MCP	NEMA 1
8	8A	FCB	EAST AUXILIARY DRIVE	10	30A	—
	8B	FCB	WEST AUXILIARY DRIVE	10	30A	—
	8C	EMTY	SPARE SPACE	—		—
	8D	EMTY	SPARE SPACE	—	—	—
	8E	EMTY	SPARE SPACE	—	—	—
	8F	EMTY	SPARE SPACE	—	—	—
9	9A	FVR	EAST TRAFFIC GATE	3/4	MCP	NEMA 1
	9B	FVR	WEST TRAFFIC GATE	3/4	MCP	NEMA 1
	9C	FVR	EAST BARRIER GATE	1	MCP	NEMA 1
	9D	FVR	WEST BARRIER GATE	1	MCP	NEMA 1

(1) SWITCH RATING

EMTY = EMPTY SPACE (BLANK DOOR)
FCB = FEEDER CIRCUIT BREAKER
FVMH = FULL VOLTAGE MECHANICALLY HELD
FVNR = FULL VOLTAGE NON-REVERSING COMBINATION STARTER
FVR = FULL VOLTAGE REVERSING COMBINATION STARTER
INSR = INSTRUMENTATION SPACE (HINGED DOOR)
MCB = MAIN CIRCUIT BREAKER
MCP = MOTOR CIRCUIT PROTECTOR
MCS = MOLDED CASE SWITCH
TVSS = TRANSIENT VOLTAGE SURGE SUPPRESSOR

NOTES:

1. MOTOR CONTROL CENTER SHALL INCLUDE RED INDICATOR LIGHT FOR "480 VOLT BUS ON"
2. MOTOR CONTROL CENTER CONFIGURATION MAY BE ALTERED WITH APPROVAL OF THE ENGINEER. THE LAYOUT AND INSTALLATION PROCEDURES SHALL COMPLY WITH MANUFACTURES INSTRUCTIONS.
3. FOR LOCATION OF MOTOR CONTROL CENTER IN THE ELECTRICAL EQUIPMENT ROOM, SEE DRAWING NO. 39.
4. PROVIDE NAMEPLATE AT RIGHT TOP CORNER OF EACH UNIT, ATTACHED WITH STAINLESS STEEL OR BRONZE SCREWS. NAME-PLATES SHALL BE 1" x 3", LAMINATED PHENOLIC WITH BLACK BACKGROUND AND WHITE LETTERING WITH DESCRIPTION AS INDICATED IN UNIT SCHEDULE.
5. INSTALL LOCAL POWER MONITOR DISPLAY IN MAIN BREAKER DOOR AT APPROXIMATELY EYE LEVEL.
6. TEMPORARY INCOMING POWER TERMINATIONS WILL BE MADE IN MCC SECTION T1 AND ROUTED TO EXISTING SWITCHGEAR.

4-28-2005

NORTH CAROLINA PROFESSIONAL SEAL 022501 ENGINEER LANCE V. BORDEN

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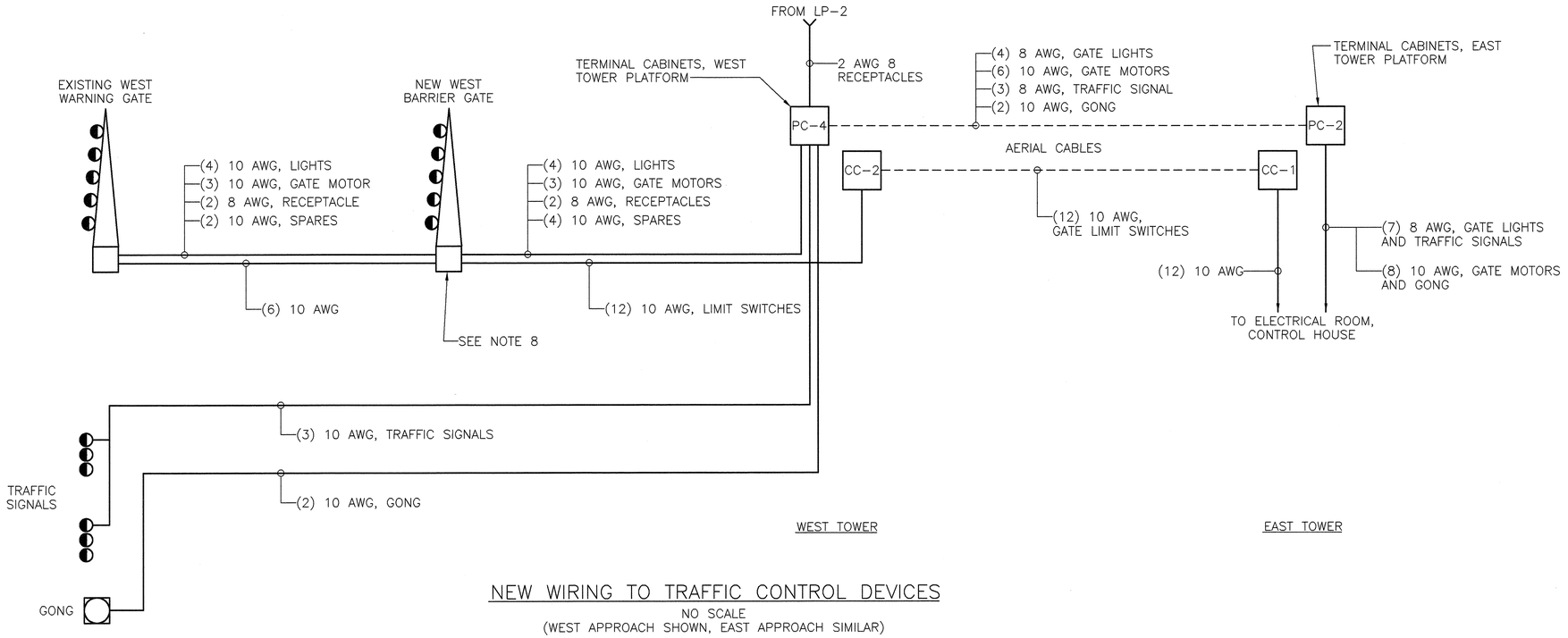
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

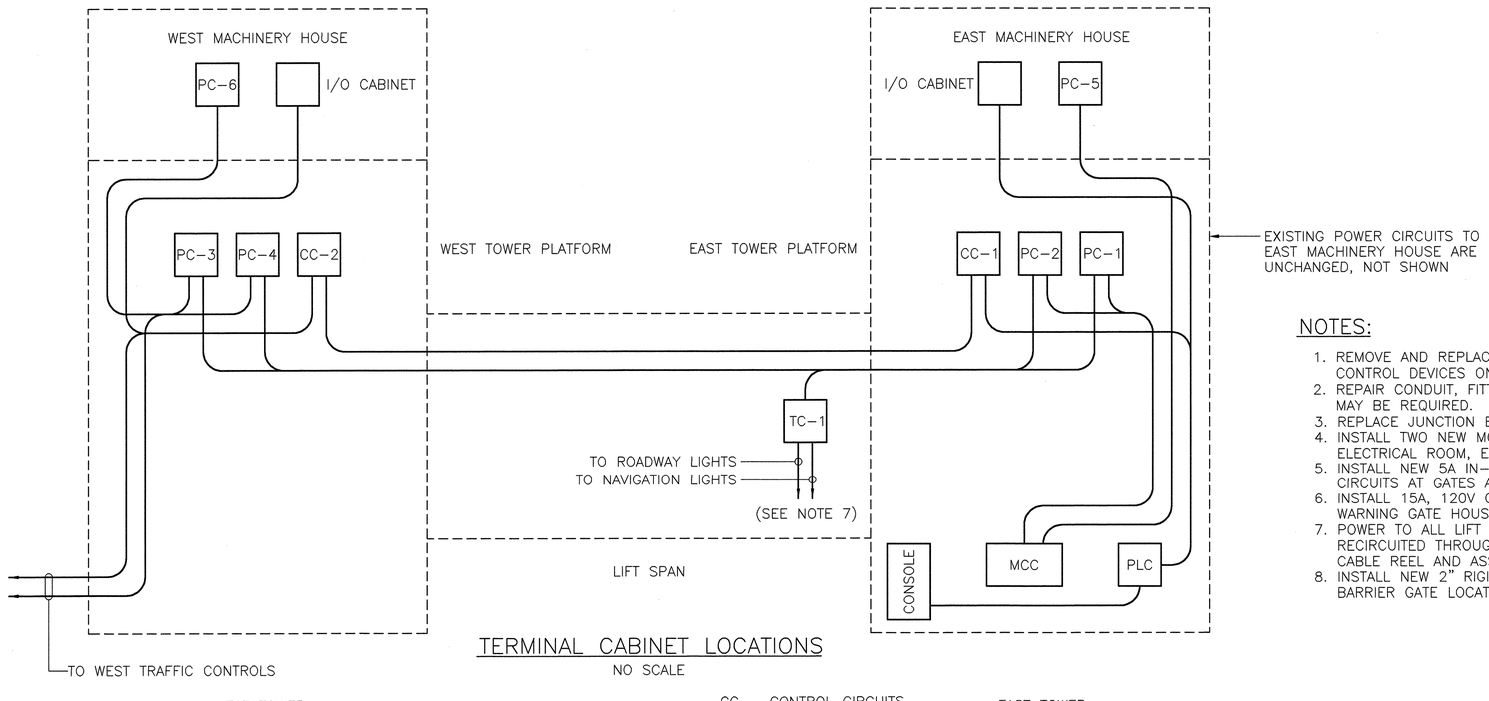
MOTOR CONTROL CENTER

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	8 OF 53



NEW WIRING TO TRAFFIC CONTROL DEVICES

NO SCALE
(WEST APPROACH SHOWN, EAST APPROACH SIMILAR)



TERMINAL CABINET LOCATIONS

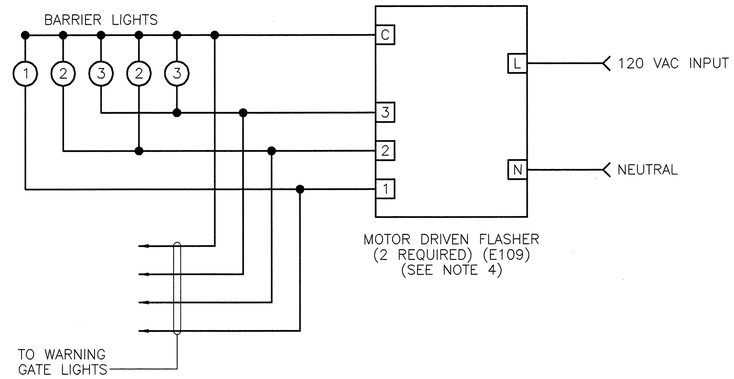
NO SCALE

CC – CONTROL CIRCUITS
PC – POWER CIRCUITS
TC – TERMINAL CABINETS

LEGEND

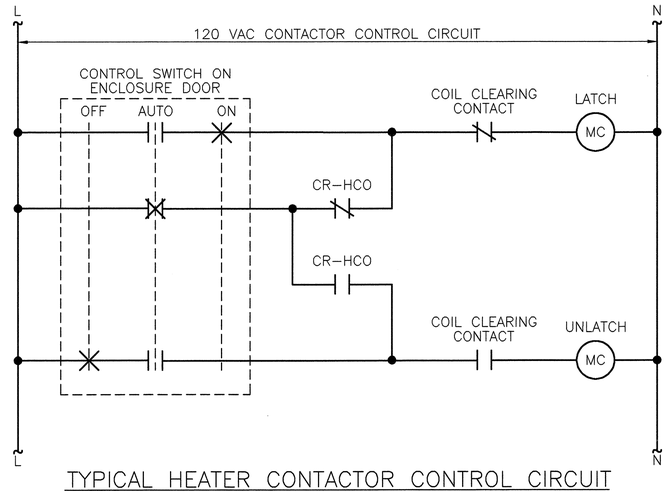
1 – STEADY BURN (END OF GATE ARM)
2 – ALTERNATE FLASH CIRCUIT A
3 – ALTERNATE FLASH CIRCUIT B

FUSES NOT SHOWN (SEE NOTE 5)



TYPICAL, EAST AND WEST APPROACHES

NO SCALE



TYPICAL HEATER CONTACTOR CONTROL CIRCUIT

NO SCALE

NOTES:

1. REMOVE AND REPLACE CONDUCTORS TO ALL TRAFFIC CONTROL DEVICES ON EAST AND WEST APPROACHES.
2. REPAIR CONDUIT, FITTINGS AND JUNCTION BOXES AS MAY BE REQUIRED.
3. REPLACE JUNCTION BOX ON TOP OF EAST PIER (1E).
4. INSTALL TWO NEW MOTOR DRIVEN FLASHERS IN ELECTRICAL ROOM, EAST TOWER.
5. INSTALL NEW 5A IN-LINE FUSES IN WARNING LIGHT CIRCUITS AT GATES AND BARRIERS.
6. INSTALL 15A, 120V GFI RECEPTACLE IN EXISTING WARNING GATE HOUSINGS.
7. POWER TO ALL LIFT SPAN DEVICES SHALL BE RECIRCUITED THROUGH THE AERIAL CABLE. EXISTING CABLE REEL AND ASSOCIATED WIRING TO BE REMOVED.
8. INSTALL NEW 2" RIGID STEEL CONDUIT FROM OLD BARRIER GATE LOCATIONS INTO THE NEW BARRIER GATES.

Lance V. Borden 2005

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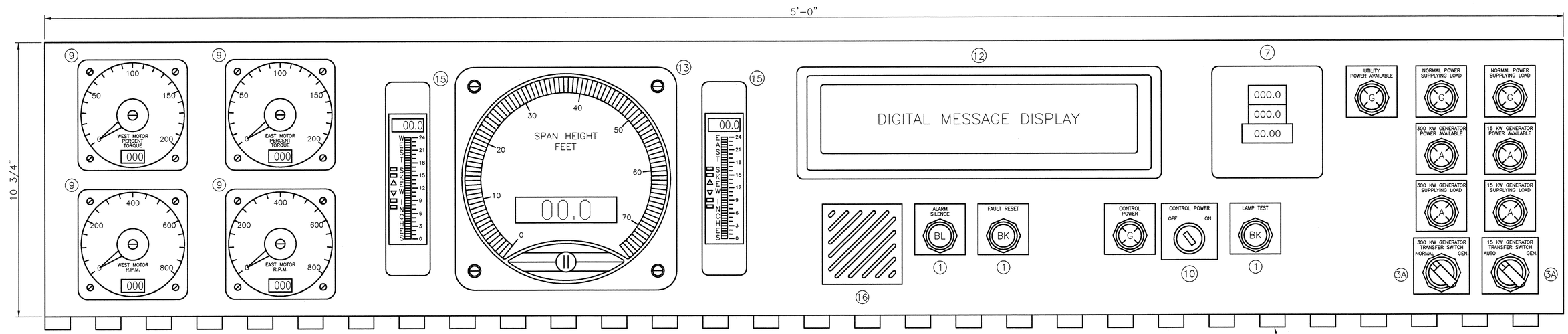
RALEIGH

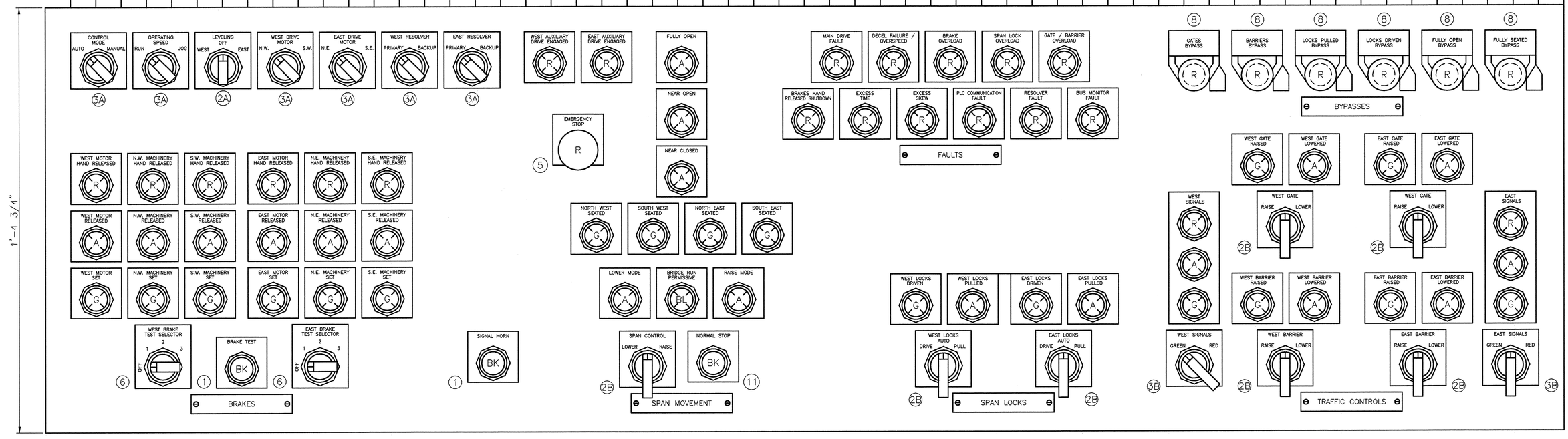
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA
TRAFFIC CONTROLS WIRING, TERMINAL CABINET LOCATIONS

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	9 OF 53



BRIDGE INDICATOR PANEL

SCALE: 6" = 1'-0"

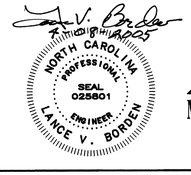


BRIDGE CONTROL PANEL

SCALE: 6" = 1'-0"

NOTES:

1. FOR DEVICE FUNCTION CODE, SEE DRAWING NO. 11.
2. ALL INDICATOR LIGHTS ARE (4A) TYPE.



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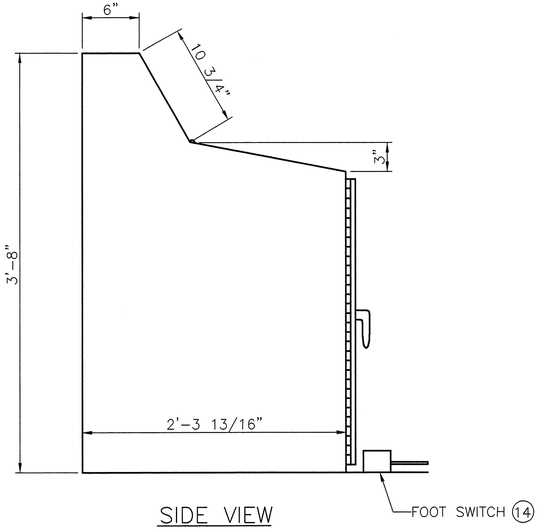
RALEIGH

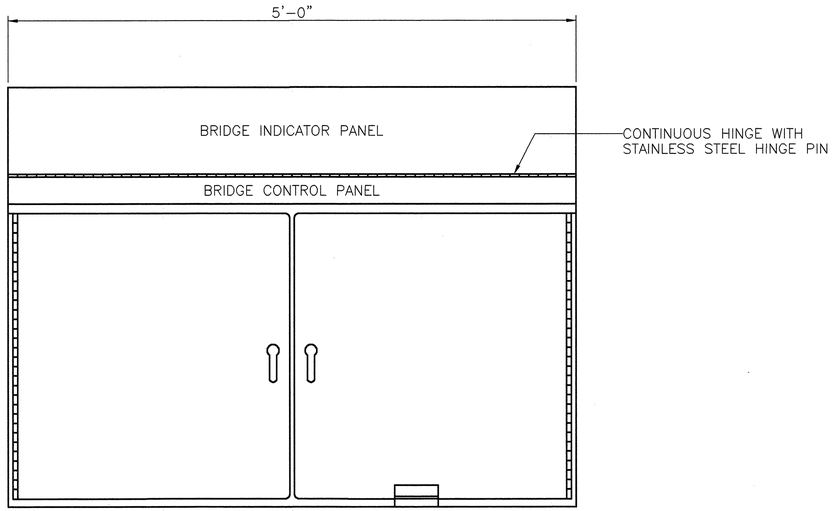
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CONSOLE – 1

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	10 OF 53



SIDE VIEW



FRONT VIEW

CONTROL CONSOLE

SCALE: 1 1/2" = 1'-0"

DEVICE COLOR CODE

A–AMBER
G–GREEN
R–RED
BK–BLACK
BL–BLUE

NOTES:

1. CONSOLE SHALL BE OF BOLT–TOGETHER CONSTRUCTION TO FACILITATE INSTALLATION IN EXISTING CONTROL HOUSE.
2. PROVIDE MINATURE BRASS LOCKS FOR ALL BYPASS SWITCH COVERS (MASTERLOCK NO. 120, OR APPROVED EQUAL). ALL LOCKS FOR BYPASS SWITCHES SHALL BE KEYED ALIKE, BUT DIFFERENTLY FROM LOCKS FOR MCC HOA SWITCHES. PROVIDE 10 SPARE LOCKS AND KEYS.
3. SKEW DISPLAYS SHALL BE CONFIGURED FOR CENTER ZERO WITH THE BAR EXTENDING FROM POSITIVE OR NEGATIVE FROM THE ZERO POINT. BAR SHALL BE GREEN FOR SKEW VALUES OF 0 TO 6 INCHES, YELLOW FOR VALUES BETWEEN 6 AND 12 INCHES, AND RED FOR VALUES GREATER THAN 12 INCHES.

MATERIALS LIST

DEVICE NO.	DESCRIPTION	MANUFACTURER/ MODEL
(1)	30MM MOMENTARY CONTACT PUSHBUTTON, NON–ILLUMINATED, FLUSH HEAD, COLOR AS SHOWN	ALLEN–BRADLEY BULLETIN 800
(2A)	30MM MAINTAINED CONTACT, 3–POSITION SELECTOR SWITCH, SPRING RETURN TO CENTER, STANDARD BLACK KNOB OPERATOR	ALLEN–BRADLEY BULLETIN 800
(2B)	30MM MOMENTARY CONTACT, 3–POSITION SELECTOR SWITCH, SPRING RETURN TO CENTER, BLACK PISTOL GRIP OPERATOR	ALLEN–BRADLEY BULLETIN 800
(3A)	30MM MAINTAINED CONTACT, 2–POSITION SELECTOR SWITCH, STANDARD BLACK KNOB OPERATOR	ALLEN–BRADLEY BULLETIN 800
(3B)	30MM MAINTAINED CONTACT, 2–POSITION SELECTOR SWITCH, PISTOL GRIP KNOB OPERATOR	ALLEN–BRADLEY BULLETIN 800
(4A)	30MM LED PILOT LIGHT, 120 V INPUT, PLASTIC FRESNEL LENS, COLOR AS SHOWN.	IDEC TWTD SERIES
(4B)	30MM MOMENTARY CONTACT ILLUMINATED PUSHBUTTON, WIRED FOR PUSH–TO–TEST PILOT LIGHT OPERATION. COLOR AS SHOWN.	IDEC TWTD SERIES
(5)	30MM ILLUMINATED, MAINTAINED CONTACT, PULL–ON, PUSH–OFF MUSHROOM HEAD PUSHBUTTON. RED BUTTON, RED LEGEND PLATE	ALLEN–BRADLEY BULLETIN 800
(6)	30MM, MAINTAINED CONTACT, 4–POSITION SELECTOR SWITCH. STANDARD BLACK KNOB OPERATOR	ALLEN–BRADLEY BULLETIN 800
(7)	DISPLAY FOR POWER MONITOR (E122). SIMULTANEOUS 3–PHASE VOLTAGE, CURRENT, AND POWER OR FREQUENCY.	ELECTRO INDUSTRIES P34
(8)	30MM MOMENTARY CONTACT PUSHBUTTON, NON–ILLUMINATED, FLUSH HEAD, COLOR AS SHOWN. WITH CLEAR LOCKABLE COVER.	ALLEN–BRADLEY BULLETIN 800
(9)	SWITCHBOARD STYLE 4–1/2" COMBINATION ANALOG AND DIGITAL METER. LEGENDS AND SCALES AS SHOWN. 4–20MA INPUT.	CROMPTON 070 SERIES
(10)	MAINTAINED CONTACT 2–POSITION KEY OPERATED SELECTOR SWITCH. NEMA 4 RATED WITH BRASS KEYS, SPARE KEYS	ALLEN–BRADLEY 800T–H33A
(11)	30MM MOMENTARY CONTACT PUSHBUTTON WITH BLACK MUSHROOM HEAD BUTTON	ALLEN–BRADLEY BULLETIN 800
(12)	RED LED ALPHANUMERIC DISPLAY. 20 CHARACTERS BY 2 LINES.	ALLEN–BRADLEY INVIEW
(13)	RED LED CIRCULAR BARGRAPH AND DIGITAL DISPLAY FOR SPAN HEIGHT. LEGEND AND SCALE AS SHOWN. 4–20MA INPUT.	WESCHLER BG–261
(14)	FOOTSWITCH, ALUMINUM HOUSING SPDT, 10A, 120V MOMENTARY CONTACTS, NON–SKID BASE.	LINEMASTER 81–S
(15)	TRI–COLOR LED BARGRAPH AND DIGITAL DISPLAY FOR SPAN SKEW. LEGENDS AND SCALES AS SHOWN. 4–20MA INPUT.	WESCHLER BV5ATC
(16)	AUDIBLE ALARM. SELECTABLE SOUND AND VOLUME ADJUSTABLE TO 95DB.	SIGNAWORKS KSP

APRIL 8, 2005
NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

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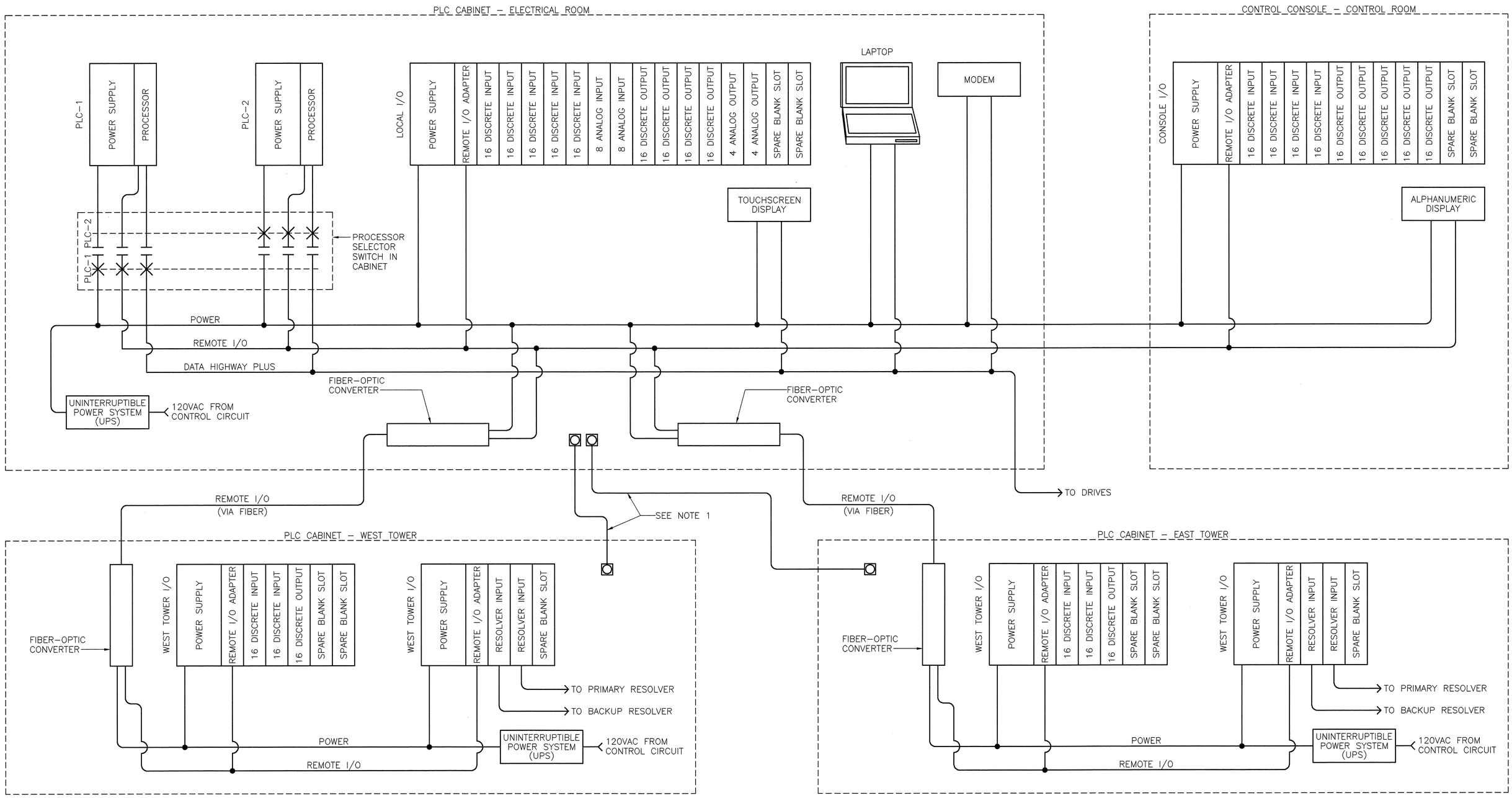
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CONSOLE – 2

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	11 OF 53



PLC LAYOUT

NOTES:

1. PROVIDE BACK–UP TWINAXIAL CABLE BETWEEN THE THE ELECTRICAL ROOM AND TOWER PLC CABINETS. TERMINATE CABLE ON TERMINAL BLOCKS IN CABINETS SUCH THAT CABLE CAN BE SWITCHED INTO SERVICE IF NEEDED.
2. TERMINATE ALL CONDUCTORS ENTERING AND LEAVING ALL PLC CABINETS ON SURGE–SUPPRESSION TERMINAL BLOCKS. COORDINATE SUPPRESSOR TYPE AND VOLTAGE RATING WITH CIRCUITS SERVED.
3. ALL DISCRETE OUTPUT MODULES SHALL BE AC/DC RELAY TYPE.
4. ALL ANALOG INPUT MODULES SHALL BE SELECTABLE (±10V OR ±20MA) TYPE.
5. RESOLVER INPUT MODULES SHALL PROVIDE 18 BIT RESOLUTION WITH A 64:1 MULTI–TURN DUAL RESOLVER. MODULES SHALL BE GEMCO 1746R–2, OR APPROVED EQUAL.
6. FIBER–OPTIC CONVERTERS SHALL PROVIDE REMOTE I/O COMMUNICATION VIA A FIBER OPTIC CONNECTION. MODULES SHALL BE ALLEN–BRADLEY 1771–AF1, OR APPROVED EQUAL.
7. TOUCHSCREEN SHALL BE 15 INCH FULL COLOR TYPE, INSTALLED IN THE ELECTRICAL ROOM PLC CABINET DOOR. TOUCHSCREEN SHALL BE ALLEN–BRADLEY PANELVIEW PLUS 1500 COLOR, OR APPROVED EQUAL.

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN 2005

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WILMINGTON, NORTH CAROLINA

PLC CONTROL SYSTEM LAYOUT

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	12 OF 53

HARDWIRED SYMBOL LEGEND

COIL OF MAGNETIC CONTACTOR OR RELAY
[CR = CONTROL RELAY
IR = INTERPOSING RELAY
MC = MAGNETIC CONTACTOR

INDICATOR LIGHT
(LETTER INSIDE DENOTES COLOR;
R = RED, A = AMBER, G = GREEN)

LIMIT SWITCH CONTACT
(NORMALLY OPEN)

LIMIT SWITCH CONTACT
(NORMALLY CLOSED)

LIMIT SWITCH CONTACT
(NORMALLY OPEN HELD CLOSED)

LIMIT SWITCH CONTACT
(NORMALLY CLOSED HELD OPEN)

CONTACT OF MAGNETIC CONTACTOR OR RELAY
(NORMALLY OPEN INSTANTANEOUS)

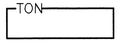
CONTACT OF MAGNETIC CONTACTOR OR RELAY
(NORMALLY CLOSED INSTANTANEOUS)

FUSE

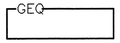
INTERNAL PLC LOGIC SYMBOL LEGEND

CONTACT OF HARDWIRED INPUT OR
INTERNAL PLC LOGIC CONTROL RELAY

BINARY RELAY

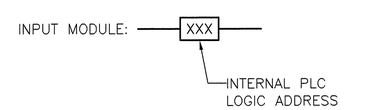


TIMER INSTRUCTION
TON = TIMER ON DELAY



COMPARE INSTRUCTION
GEQ = GREATER THAN OR EQUAL TO
LEQ = LESS THAN OR EQUAL TO
GRT = GREATER THAN

PLC I/O ADDRESS ASSIGNMENT



GENERAL LEGEND

SYMBOL	DESCRIPTION
15KW	15KW GENERATOR
300KW	300KW GENERATOR
CP	CONTROL POWER
CR	CONTROL RELAY
CS	CONTROL SWITCH
DLK1	DRIVE EAST LOCKS
DLK2	DRIVE WEST LOCKS
GEQ	GREATER THAN OR EQUAL TO
I:	INPUT
IL	INDICATOR LIGHT
IR	INTERPOSING RELAY
LEB	LOWER EAST BARRIER
LEG	LOWER EAST GATE
LEQ	LESS THAN OR EQUAL TO
LS	LIMIT SWITCH
LWB	LOWER WEST BARRIER
LWG	LOWER WEST GATE
MC	MAGNETIC CONTACTOR
MDE1	MAIN DRIVE E1
MDE2	MAIN DRIVE E2
MDW1	MAIN DRIVE W1
MDW2	MAIN DRIVE W2
O:	OUTPUT
OL	OVERLOAD
PB	PUSH BUTTON
PLK1	PULL EAST LOCKS
PLK2	PULL WEST LOCKS
REB	RAISE EAST BARRIER
REG	RAISE EAST GATE
RMABE1	RELEASE EAST MACHINERY BRAKE 1
RMABE2	RELEASE EAST MACHINERY BRAKE 2
RMABW1	RELEASE WEST MACHINERY BRAKE 1
RMABW2	RELEASE WEST MACHINERY BRAKE 2
RMOBE	RELEASE EAST MOTOR BRAKE
RMOBW	RELEASE WEST MOTOR BRAKE
RWB	RAISE WEST BARRIER
RWG	RAISE WEST GATE
TMR	TIMER

LOGIC INPUT LEGEND

SYMBOL	DESCRIPTION	ADDRESS
15A	15KW GENERATOR POWER AVAILABLE	I:248
15GP	15KW GENERATOR POWER SUPPLYING LOAD	I:249
15NP	15KW GENERATOR NORMAL POWER SUPPLYING LOAD	I:247
300A	300KW GENERATOR POWER AVAILABLE	I:188
300GP	300KW GENERATOR POWER SUPPLYING LOAD	I:189
300NP	300KW GENERATOR NORMAL POWER SUPPLYING LOAD	I:187
BM	BUS MONITOR	I:153
CR-CP	CONTROL POWER	I:210
CS-CM (AUTO.)	CONTROL MODE - AUTOMATIC	I:115
CS-CM (MAN.)	CONTROL MODE - MANUAL	I:114
CS-EB (ON)	CONTROL POWER - ON	I:100
CS-EB (LOWER)	EAST BARRIER - LOWER	I:110
CS-EB (RAISE)	EAST BARRIER - RAISE	I:111
CS-EBTS (1)	EAST BRAKE TEST SELECT - 1	I:129
CS-EBTS (2)	EAST BRAKE TEST SELECT - 2	I:130
CS-EBTS (3)	EAST BRAKE TEST SELECT - 3	I:131
CS-EDS (NE)	EAST DRIVE SELECT - NORTHEAST	I:218
CS-EDS (SE)	EAST DRIVE SELECT - SOUTHEAST	I:219
CS-EG (LOWER)	EAST GATE - LOWER	I:106
CS-EG (RAISE)	EAST GATE - RAISE	I:107
CS-ER (BACKUP)	EAST RESOLVER - BACKUP	I:244
CS-ER (PRIMARY)	EAST RESOLVER - PRIMARY	I:243
CS-ETS (RED)	EAST TRAFFIC SIGNALS - RED	I:102
CS-L (EAST)	LEVELING - EAST	I:140
CS-L (WEST)	LEVELING - WEST	I:134
CS-SC (LOWER)	SPAN CONTROL - LOWER	I:125
CS-SC (RAISE)	SPAN CONTROL - RAISE	I:122
CS-SL (DRIVE)	SPAN LOCKS - DRIVE	I:118
CS-SL (PULL)	SPAN LOCKS - PULL	I:117
CS-SP (JOG)	SPEED - JOG	I:126
CS-SP (RUN)	SPEED - RUN	I:125
CS-WB (LOWER)	WEST BARRIER - LOWER	I:112
CS-WB (RAISE)	WEST BARRIER - RAISE	I:113
CS-WBTS (1)	WEST BRAKE TEST SELECT - 1	I:137
CS-WBTS (2)	WEST BRAKE TEST SELECT - 2	I:138
CS-WBTS (3)	WEST BRAKE TEST SELECT - 3	I:139
CS-WDS (NW)	WEST DRIVE SELECT - NORTHWEST	I:220
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CS-WG (LOWER)	WEST GATE - LOWER	I:108
CS-WG (RAISE)	WEST GATE - RAISE	I:109
CS-WR (BACKUP)	WEST RESOLVER - BACKUP	I:246
CS-WR (PRIMARY)	WEST RESOLVER - PRIMARY	I:245
CS-WTS (RED)	WEST TRAFFIC SIGNALS - RED	I:104
FTS	FOOT SWITCH	I:121
IR-FSNE	FULLY SEATED NORTHEAST	I:159
IR-FSNW	FULLY SEATED NORTHWEST	I:161
IR-FSSE	FULLY SEATED SOUTHEAST	I:158
IR-FSSW	FULLY SEATED SOUTHWEST	I:160
LS-EAXE (1A)	EAST AUXILIARY DRIVE CLUTCH - INTERLOCK	I:196
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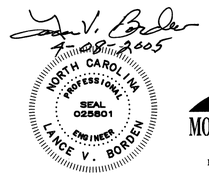
LS-EB (2A)	EAST BARRIER - TRAFFIC SIGNALS INTERLOCK	I:212
LS-EB (3A)	EAST BARRIER - RAISED INDICATION	I:195
LS-EG (3)	EAST GATE - TRAFFIC SIGNALS INTERLOCK	I:211
LS-EG (4)	EAST GATE - LOWERED INDICATION	I:190
LS-EG (5)	EAST GATE - RAISED INDICATION	I:191
LS-ESL1,2 (1)	EAST SPAN LOCK 1 & 2 - DRIVEN INDICATION	I:123
LS-ESL1,2 (2)	EAST SPAN LOCK 1 & 2 - PULLED INDICATION	I:119
LS-SC (4A)	SPAN CONTROL - FULLY OPEN STOP	I:156
LS-SC (5A)	SPAN CONTROL - OVERTRAVEL STOP	I:132
LS-SKE (1)	SKEW SWITCH EAST - CIRCUIT 1	I:230
LS-SKE (2)	SKEW SWITCH EAST - CIRCUIT 2	I:231
LS-SKE (3)	SKEW SWITCH EAST - CIRCUIT 3	I:232
LS-SKE (4)	SKEW SWITCH EAST - CIRCUIT 4	I:233
LS-SKE (5)	SKEW SWITCH EAST - CIRCUIT 5	I:234
LS-SKE (6)	SKEW SWITCH EAST - CIRCUIT 6	I:235
LS-SKW (1)	SKEW SWITCH WEST - CIRCUIT 1	I:236
LS-SKW (2)	SKEW SWITCH WEST - CIRCUIT 2	I:237
LS-SKW (3)	SKEW SWITCH WEST - CIRCUIT 3	I:238
LS-SKW (4)	SKEW SWITCH WEST - CIRCUIT 4	I:239
LS-SKW (5)	SKEW SWITCH WEST - CIRCUIT 5	I:240
LS-SKW (6)	SKEW SWITCH WEST - CIRCUIT 6	I:241
LS-WAXE (1A)	WEST AUXILIARY DRIVE CLUTCH - INTERLOCK	I:197
LS-WB (1A)	WEST BARRIER - LOWERED INDICATION	I:202
LS-WB (2A)	WEST BARRIER - TRAFFIC SIGNALS INTERLOCK	I:214
LS-WB (3A)	WEST BARRIER - RAISED INDICATION	I:203
LS-WG (3)	WEST GATE - TRAFFIC SIGNALS INTERLOCK	I:213
LS-WG (4)	WEST GATE - LOWERED INDICATION	I:192
LS-WG (5)	WEST GATE - RAISED INDICATION	I:193
LS-WSL1,2 (1)	WEST SPAN LOCK 1 & 2 - DRIVEN INDICATION	I:124
LS-WSL1,2 (2)	WEST SPAN LOCK 1 & 2 - PULLED INDICATION	I:120
MDE1-F	FAULT	I:226
MDE1-R	RUN	I:222
MDE2-F	FAULT	I:227
MDE2-R	RUN	I:223
MDW1-F	FAULT	I:228
MDW1-R	RUN	I:224
MDW2-F	FAULT	I:229
MDW2-R	RUN	I:225
OL-EB	EAST BARRIER	I:252
OL-EG	EAST GATE	I:250
OL-LK1	EAST SPAN LOCK	I:145
OL-LK2	WEST SPAN LOCK	I:146
OL-MABE1	EAST MACHINERY BRAKE 1	I:135
OL-MABE2	EAST MACHINERY BRAKE 2	I:136
OL-MABW1	WEST MACHINERY BRAKE 1	I:143
OL-MABW2	WEST MACHINERY BRAKE 2	I:144
OL-MOBE	EAST MOTOR BRAKE	I:133
OL-MOBW	WEST MOTOR BRAKE	I:141
OL-WB	WEST BARRIER	I:253
OL-WG	WEST GATE	I:251
PS-AS	ALARM SILENCE	I:154
PB-BBP	BARRIERS BYPASS	I:206
PB-BT	BRAKE TEST	I:128
PB-ES1	EMERGENCY STOP 1	I:101
PB-ES2	EMERGENCY STOP 2	I:254
PB-FOBP	FULLY OPEN BYPASS	I:215
PB-FR	FAULT RESET	I:242
PB-FSBP	FULLY SEATED BYPASS	I:127
PB-GBP	GATES BYPASS	I:204
PB-LDBP	LOCK DRIVEN BYPASS	I:217
PB-LPBP	LOCK PULLED BYPASS	I:216
PB-LT	LAMP TEST	I:157
PB-NS	NORMAL STOP	I:116
PB-SH	SIGNAL HORN	I:155



MODJESKI and MASTERS
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CENTURY SOUTHERN, INC.
2611 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT LEGEND - 1

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	13 OF 53

LOGIC BINARY LEGEND

SYMBOL	DESCRIPTION
AS	ALARM SILENCE
ASLD	ALL SPAN LOCKS DRIVEN
ASLP	ALL SPAN LOCKS PULLED
BBP	BARRIERS BYPASS
BHRS	BRAKES HAND RELEASED SHUTDOWN
BM	BUS MONITOR
BRP	BRIDGE RUN PERMISSIVE
BT	BRAKE TEST
CMA	CONTROL MODE AUTOMATIC
CMM	CONTROL MODE MANUAL
CP	CONTROL POWER
DF	DECELERATION FAILURE
EBL	EAST BARRIER LOWERED
EBR	EAST BARRIER RAISED
EGL	EAST GATE LOWERED
EGR	EAST GATE RAISED
ES	EMERGENCY STOP
ETL	EAST TOWER LEVELING
ETS	EXCESS TIME SHUTDOWN
ETSYTMR	EAST TRAFFIC SIGNALS YELLOW TIMER
FO	FULLY OPEN
FOBP	FULLY OPEN BYPASS
FR	FAULT RESET
FS	FULLY SEATED
FSBP	FULLY SEATED BYPASS
FSTMR1	FULLT SEATED TIMER 1
FSTMR2	FULLT SEATED TIMER 2
GBP	GATES BYPASS
IL	INDICATOR LIGHTS
JS	JOG SPEED
LDBP	LOCKS DRIVEN BYPASS
LPBP	LOCKS PULLED BYPASS
LT	LAMP TEST
MAF	MAJOR FAULT
MDF	MAIN DRIVE FAULT
MDTMR	MAIN DRIVE TIMER
MIF	MINOR FAULT
ML	MASTER LOWER
MR	MASTER RAISE
NC1	NEAR CLOSED 1
NC2	NEAR CLOSED 2
NO1	NEAR OPEN 1
NO2	NEAR OPEN 2
NS	NORMAL STOP
OS	OVERSPEED
OT	OVERTRAVEL
PCF	PLC COMMUNICATION FAULT
REB	RELEASE EAST BRAKES
RF	RESOLVER FAULT
RS	RUN SPEED
RWB	RELEASE WEST BRAKES
SCCO	SKEW CONTROL CUT-OUT
SKS	SKEW SHUTDOWN
SKW	SKEW WARNING
SS	SEATING SPEED
UPSW	UPS WARNING
WBL	WEST BARRIER LOWERED
WBR	WEST BARRIER RAISED
WGL	WEST GATE LOWERED
WGR	WEST GATE RAISED
WTL	WEST TOWER LEVELING
WTSYTMR	WEST TRAFFIC SIGNALS YELLOW TIMER

LOGIC TIMER LEGEND

SYMBOL	DESCRIPTION	ADDRESS
TMR-ETS	EXCESS TIME SHUTDOWN	T202
TMR-ETSY	EAST TRAFFIC SIGNALS YELLOW	T100
TMR-FS1	FULLY SEATED 1	T205
TMR-FS2	FULLY SEATED 2	T206
TMR-MD	MAIN DRIVE	T209
TMR-ML	MASTER LOWER	T204
TMR-MR	MASTER RAISE	T203
TMR-WTSY	WEST TRAFFIC SIGNALS YELLOW	T103

LOGIC OUTPUT LEGEND

SYMBOL	DESCRIPTION	ADDRESS
AL	ALARM	O:324
CR-EGN	EAST GONG	O:316
CR-ETSR	EAST TRAFFIC SIGNALS RED	O:303
CR-ETSY	EAST TRAFFIC SIGNALS YELLOW	O:301
CR-HCO	HEATER CUT-OUT	O:414
CR-SH	SIGNAL HORN	O:392
CR-WGN	WEST GONG	O:317
CR-WTSR	WEST TRAFFIC SIGNALS RED	O:306
CR-WTSY	WEST TRAFFIC SIGNALS YELLOW	O:305
IL-15A	15KW GENERATOR POWER AVAILABLE	O:425
IL-15GP	15KW GENERATOR POWER SUPPLYING LOAD	O:426
IL-15NP	15KW GENERATOR NORMAL POWER SUPPLYING LOAD	O:424
IL-300A	300KW GENERATOR POWER AVAILABLE	O:365
IL-300GP	300KW GENERATOR POWER SUPPLYING LOAD	O:366
IL-300NP	300KW GENERATOR NORMAL POWER SUPPLYING LOAD	O:364
IL-BHRS	BRAKES HAND RELEASED SHUTDOWN	O:418
IL-BMF	BUS MONITOR FAULT	O:421
IL-BOL	BRAKES OVERLOAD	O:390
IL-BRP	BRIDGE RUN PERMISSIVE	O:415
IL-CP	CONTROL POWER	O:325
IL-DFOS	DECELERATION FAILURE/OVERSPEED	O:416
IL-EAXE	EAST AUXILIARY DRIVE CLUTCH ENGAGED	O:360
IL-EBL	EAST BARRIER LOWERED	O:377
IL-EBR	EAST BARRIER RAISED	O:378
IL-EGL	EAST GATE LOWERED	O:373
IL-EGR	EAST GATE RAISED	O:374
IL-ELD	EAST LOCK DRIVEN	O:331
IL-ELP	EAST LOCK PULLED	O:330
IL-ESK	EXCESS SKEW	O:356
IL-ET	EXCESS TIME	O:359
IL-ETSG	EAST TRAFFIC SIGNALS GREEN	O:371
IL-ETSR	EAST TRAFFIC SIGNALS RED	O:369
IL-ETSY	EAST TRAFFIC SIGNALS YELLOW	O:367
IL-FO	FULLY OPEN	O:326
IL-GBOL	GATES AND BARRIERS OVERLOAD	O:417
IL-LOL	LOCKS OVERLOAD	O:361
IL-MABE1HR	EAST MACHINERY BRAKE 1 HAND RELEASED	O:346
IL-MABE1R	EAST MACHINERY BRAKE 1 RELEASED	O:345
IL-MABE1S	EAST MACHINERY BRAKE 1 SET	O:344
IL-MABE2HR	EAST MACHINERY BRAKE 2 HAND RELEASED	O:352
IL-MABE2R	EAST MACHINERY BRAKE 2 RELEASED	O:351
IL-MABE2S	EAST MACHINERY BRAKE 2 SET	O:350
IL-MABW1HR	WEST MACHINERY BRAKE 1 HAND RELEASED	O:349
IL-MABW1R	WEST MACHINERY BRAKE 1 RELEASED	O:348
IL-MABW1S	WEST MACHINERY BRAKE 1 SET	O:347
IL-MABW2HR	WEST MACHINERY BRAKE 2 HAND RELEASED	O:355
IL-MABW2R	WEST MACHINERY BRAKE 2 RELEASED	O:354
IL-MABW2S	WEST MACHINERY BRAKE 2 SET	O:353
IL-MDF	MAIN DRIVE FAULT	O:358
IL-ML	MASTER LOWER	O:363
IL-MOBEHR	EAST MOTOR BRAKE HAND RELEASED	O:334
IL-MOBER	EAST MOTOR BRAKE RELEASED	O:333
IL-MOBES	EAST MOTOR BRAKE SET	O:332
IL-MOBWHR	WEST MOTOR BRAKE HAND RELEASED	O:337
IL-MOBWR	WEST MOTOR BRAKE RELEASED	O:336
IL-MOBWS	WEST MOTOR BRAKE SET	O:335
IL-MR	MASTER RAISE	O:362
IL-NC	NEAR CLOSED	O:343
IL-NES	NORTHEAST SEATED	O:357
IL-NO	NEAR OPEN	O:328
IL-NWS	NORTHWEST SEATED	O:385
IL-PCF	PLC COMMUNICATION FAULT	O:419
IL-RF	RESOLVER FAULT	O:420
IL-SES	SOUTHEAST SEATED	O:386
IL-SWS	SOUTHWEST SEATED	O:387
IL-WAXE	WEST AUXILIARY DRIVE CLUTCH ENGAGED	O:423
IL-WBL	WEST BARRIER LOWERED	O:379
IL-WBR	WEST BARRIER RAISED	O:380
IL-WGL	WEST GATE LOWERED	O:375
IL-WGR	WEST GATE RAISED	O:376
IL-WLD	WEST LOCK DRIVEN	O:389
IL-WLP	WEST LOCK PULLED	O:388
IL-WTSG	WEST TRAFFIC SIGNALS GREEN	O:372
IL-WTSR	WEST TRAFFIC SIGNALS RED	O:370
IL-WTSY	WEST TRAFFIC SIGNALS YELLOW	O:368
IR-DLK1	DRIVE EAST LOCK	O:302
IR-DLK2	DRIVE WEST LOCK	O:323
IR-LEB	LOWER EAST BARRIER	O:312
IR-LEG	LOWER EAST GATE	O:308
IR-LWB	LOWER WEST BARRIER	O:314
IR-LWG	LOWER WEST GATE	O:310
IR-MDE1	MAIN DRIVE E1	O:401
IR-MDE2	MAIN DRIVE E2	O:402
IR-MDL	MAIN DRIVE LOWER	O:406
IR-MDR	MAIN DRIVE RAISE	O:405
IR-MDW1	MAIN DRIVE W1	O:403
IR-MDW2	MAIN DRIVE W2	O:404
IR-PLK1	PULL EAST LOCK	O:300
IR-PLK2	PULL WEST LOCK	O:322
IR-REB	RAISE EAST BARRIER	O:313
IR-REG	RAISE EAST GATE	O:309
IR-RMABE1	RELEASE EAST MACHINERY BRAKE 1	O:326
IR-RMABE2	RELEASE EAST MACHINERY BRAKE 2	O:327
IR-RMABW1	RELEASE WEST MACHINERY BRAKE 1	O:339
IR-RMABW2	RELEASE WEST MACHINERY BRAKE 2	O:340
IR-RMOBE	RELEASE EAST MOTOR BRAKE	O:325
IR-RMOBW	RELEASE WEST MOTOR BRAKE	O:338
IR-RT	REDUCED TORQUE	O:407
IR-RWB	RAISE WEST BARRIER	O:315
IR-RWG	RAISE WEST GATE	O:311

4-08-2005

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

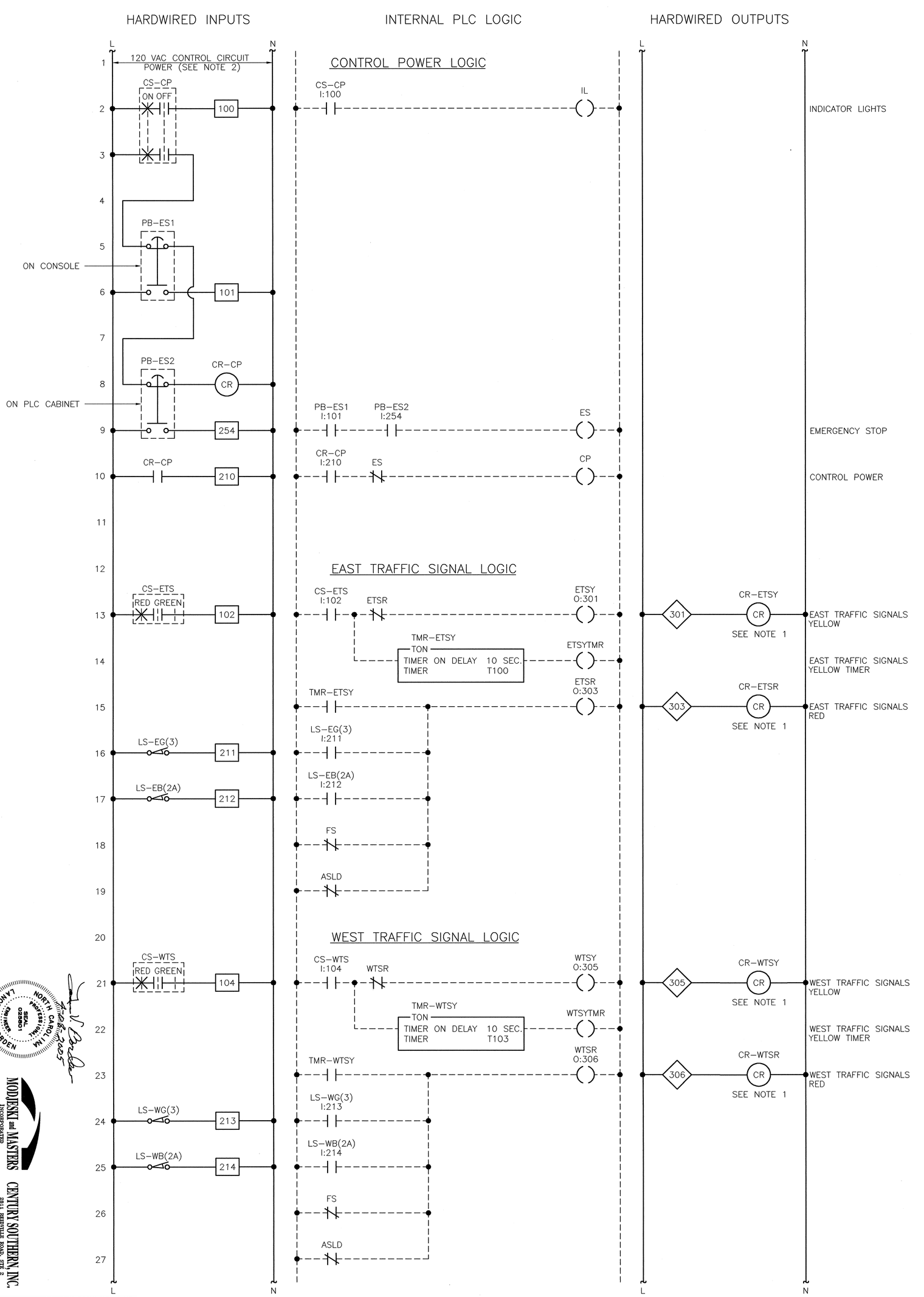
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT LEGEND – 2

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	14 OF 53



NOTES:

1. NEW CONTROL RELAYS, INTERFACE WITH EXISTING TRAFFIC SIGNAL HEADS.
2. THE CONTRACTOR AND CONTROL SYSTEM VENDOR SHALL COORDINATE THE POWER SUPPLY SOURCES FOR THE CONTROL SYSTEM TO ACCOMPLISH SEGMENTING AS FOLLOWS. THE PLC CABINET AND MOTOR CONTROL CENTER SHALL BE FED FROM A CIRCUIT FROM PANELBOARD LP-1A. THE CONSOLE SHALL BE FED FROM A SEPERATE CIRCUIT (BUT ON THE SAME PHASE) FROM PANELBOARD LP-1A. THE EAST TOWER PLC CABIENT SHALL BE FED FROM A CIRCUIT FROM PANELBOARD LP-3. THE WEST TOWER PLC CABINET SHALL BE FED FROM A CIRCUIT FROM PANELBOARD LP-2.

LANCE V. BORDEN
SEAL 023501
NORTH CAROLINA PROFESSIONAL ENGINEER
MODJESKI and MASTERS CONSULTING ENGINEERS
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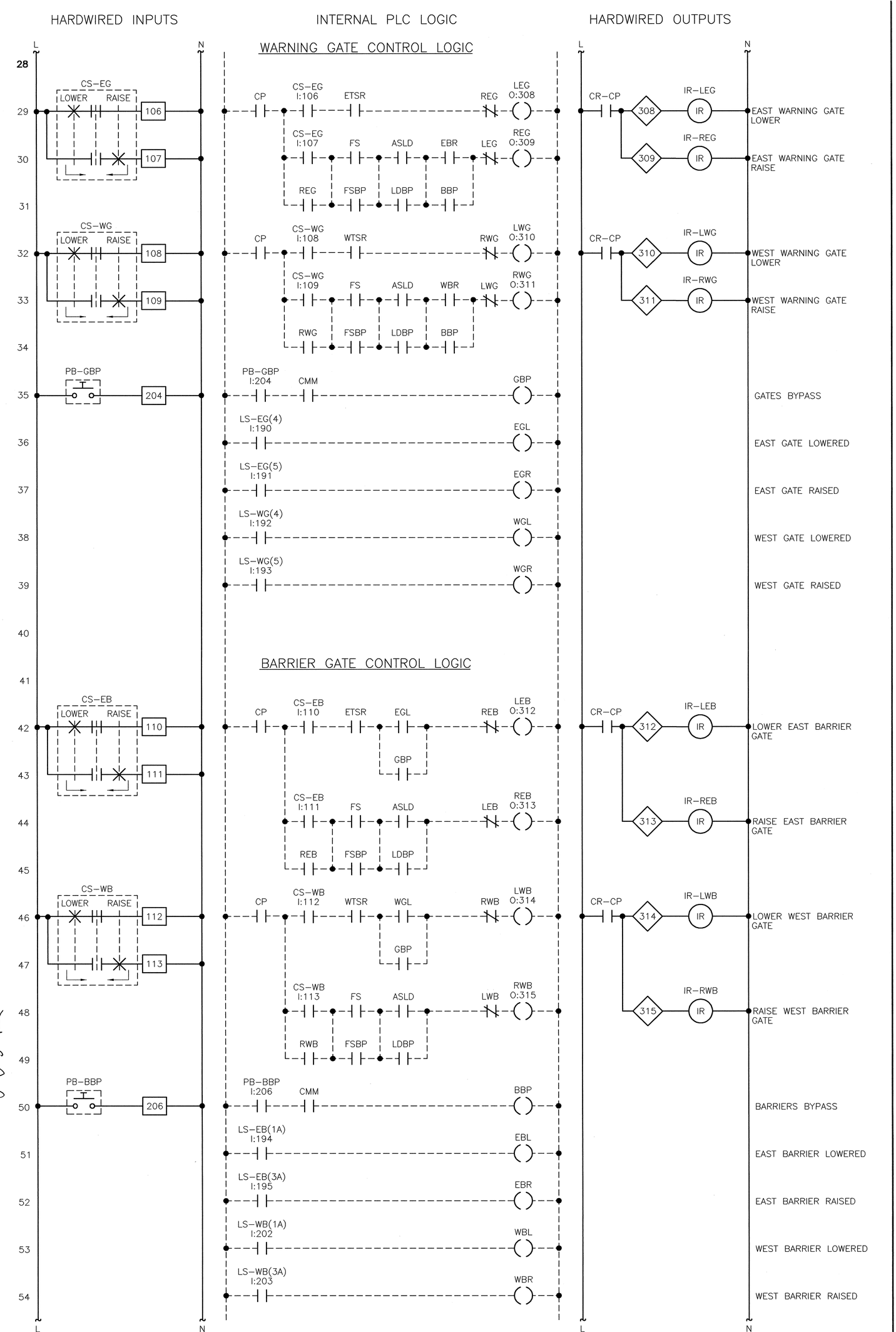
CENTURY SOUTHERN, INC.
231 TRADD ST.
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT - 1

DESIGNED	G.L. FASICK	DRAWN BY	R.L. REED
CHECKED	R.L. REED	SCALE	NONE
CHECKED	G.L. FASICK	DATE	APRIL, 2005
CHECKED	N.E. ALGER	DRAWING NO.	15 OF 53



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MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2311 REDEVELOP ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT - 2

DESIGNED	G.L. FASICK	DRAWN BY	R.L. REED
CHECKED	R.L. REED	SCALE	NONE
CHECKED	G.L. FASICK	DATE	APRIL, 2005
CHECKED	N.E. ALGER	DRAWING NO.	16 OF 53

INTERNAL PLC LOGIC

HARDWIRED OUTPUTS

HARDWIRED INPUTS

GONG CONTROLS

SPAN MOVEMENT CONTROL LOGIC

CONTACT IN BUS MONITOR. CLOSED FOR NO FAULT.

NOTES:

1. INTERFACE WITH EXISTING TRAFFIC WARNING GONGS.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 3

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	17 OF 53

NORTH CAROLINA PROFESSIONAL SEAL 025501 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

INTERNAL PLC LOGIC

HARDWIRED OUTPUTS

HARDWIRED INPUTS

WEST TOWER LEVELING

EAST TOWER LEVELING

NORMAL STOP

MASTER RAISE

MASTER LOWER

FULL OPEN

NEAR OPEN – 2

NEAR OPEN – 1

CS–L I:134

CS–L I:140

PB–NS I:116

FTS I:121

CS–SC I:122

CS–SC I:125

LS–EAXE(1A) I:196

LS–WAXE(1A) I:197

LS–SC(4A) I:156

CS–L WEST OFF EAST

PB–NS

FTS FOOT SWITCH

CS–SC RAISE LOWER

LS–EAXE

LS–WAXE

LS–SC(4A)

GEQ SPAN HEIGHT >= 70 FEET (SEE NOTE 1)

GEQ SPAN HEIGHT >= 68.5 FEET (SEE NOTE 1)

GEQ SPAN HEIGHT >= 62 FEET (SEE NOTE 1)

NOTES:

1. FINAL SETTINGS TO BE DETERMINED IN THE FIELD.

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

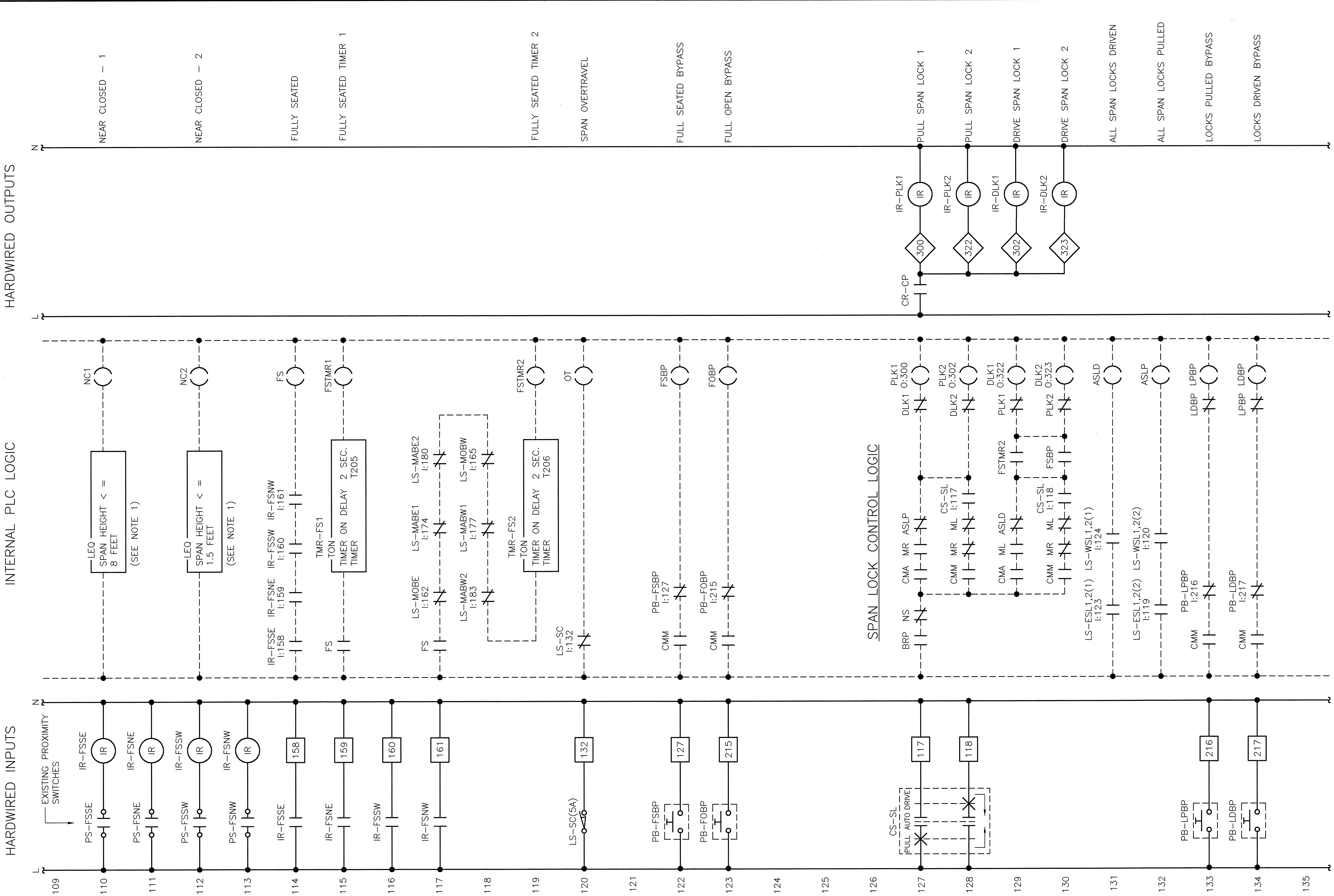
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 4

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	18 OF 53



NOTES:

1. FINAL SETTINGS TO BE DETERMINED IN THE FIELD.

4-8-2005

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025801 LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

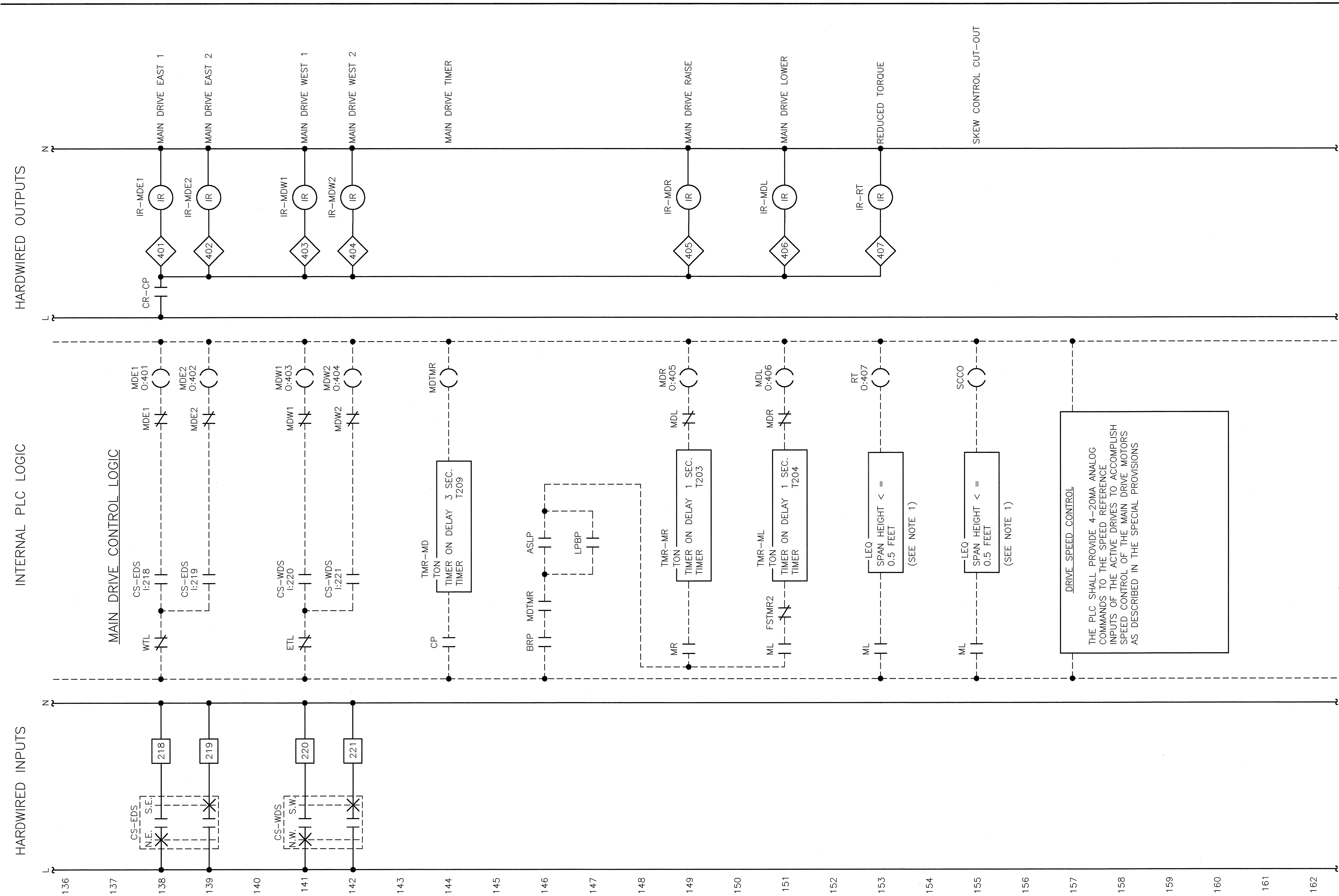
CENTURY SOUTHERN, INC. 2811 REIDVILLE ROAD, STE 2 SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 5

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	19 OF 53



NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025801 LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

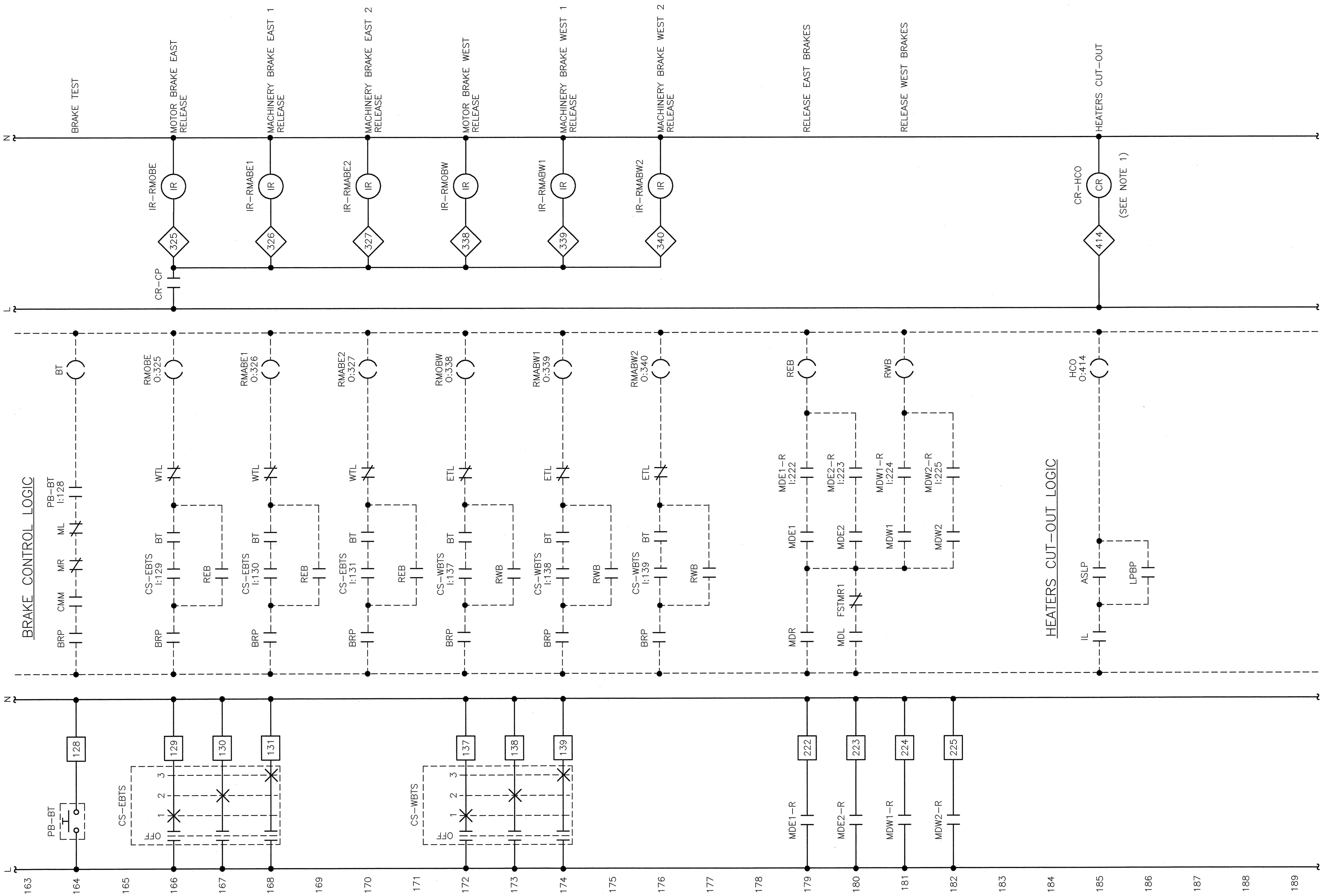
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 6

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	20 OF 53



NOTES:

1. INTERFACE WITH HEATER CONTACTORS CONTROL CIRCUITS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025801 LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

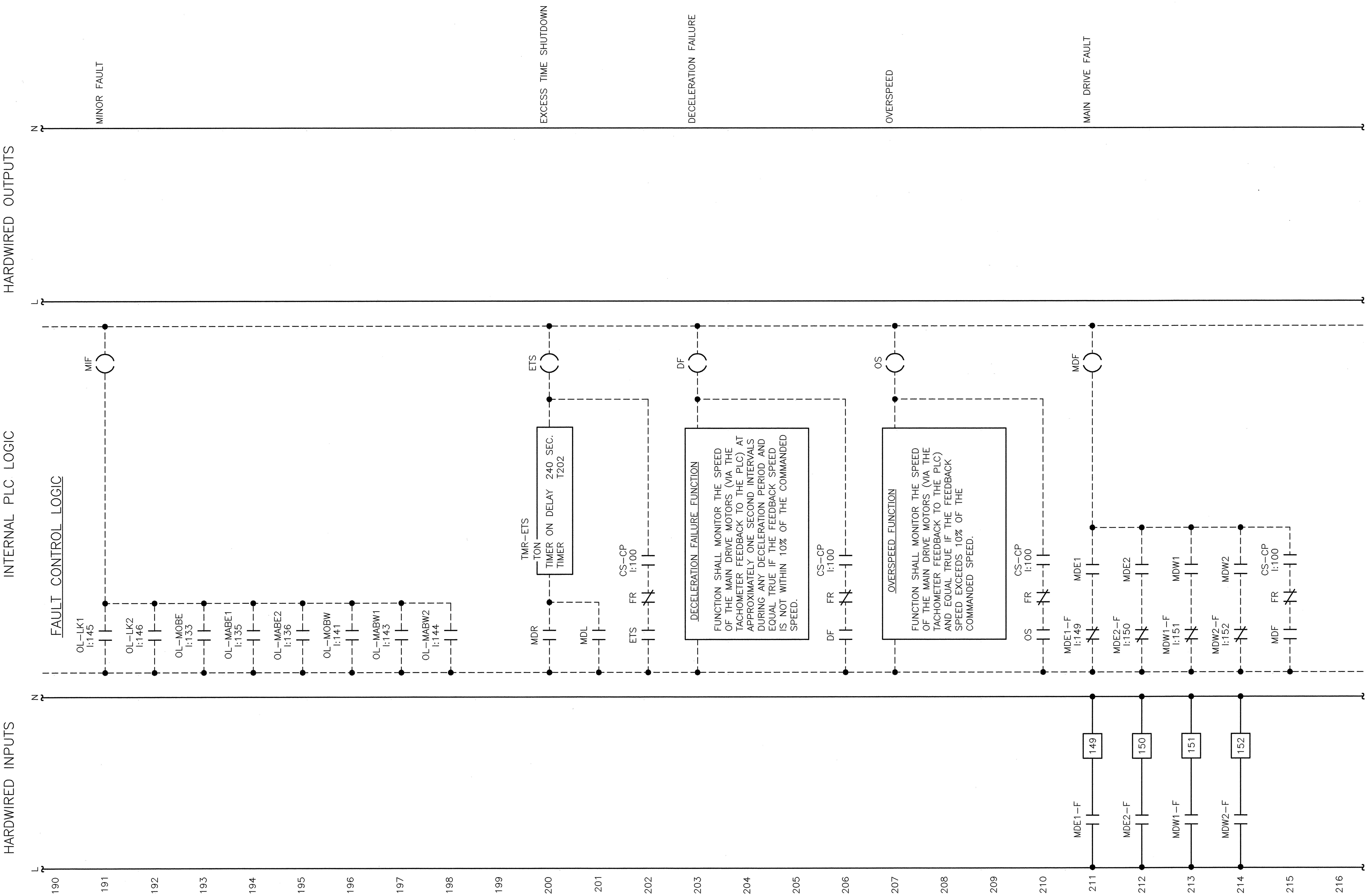
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 7

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	21 OF 53



NOTES:

1. TIMER TO BE ADJUSTED AS MAY BE REQUIRED TO BE COMPATIBLE WITH BRIDGE OPERATING TIME.

4-29-2005

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

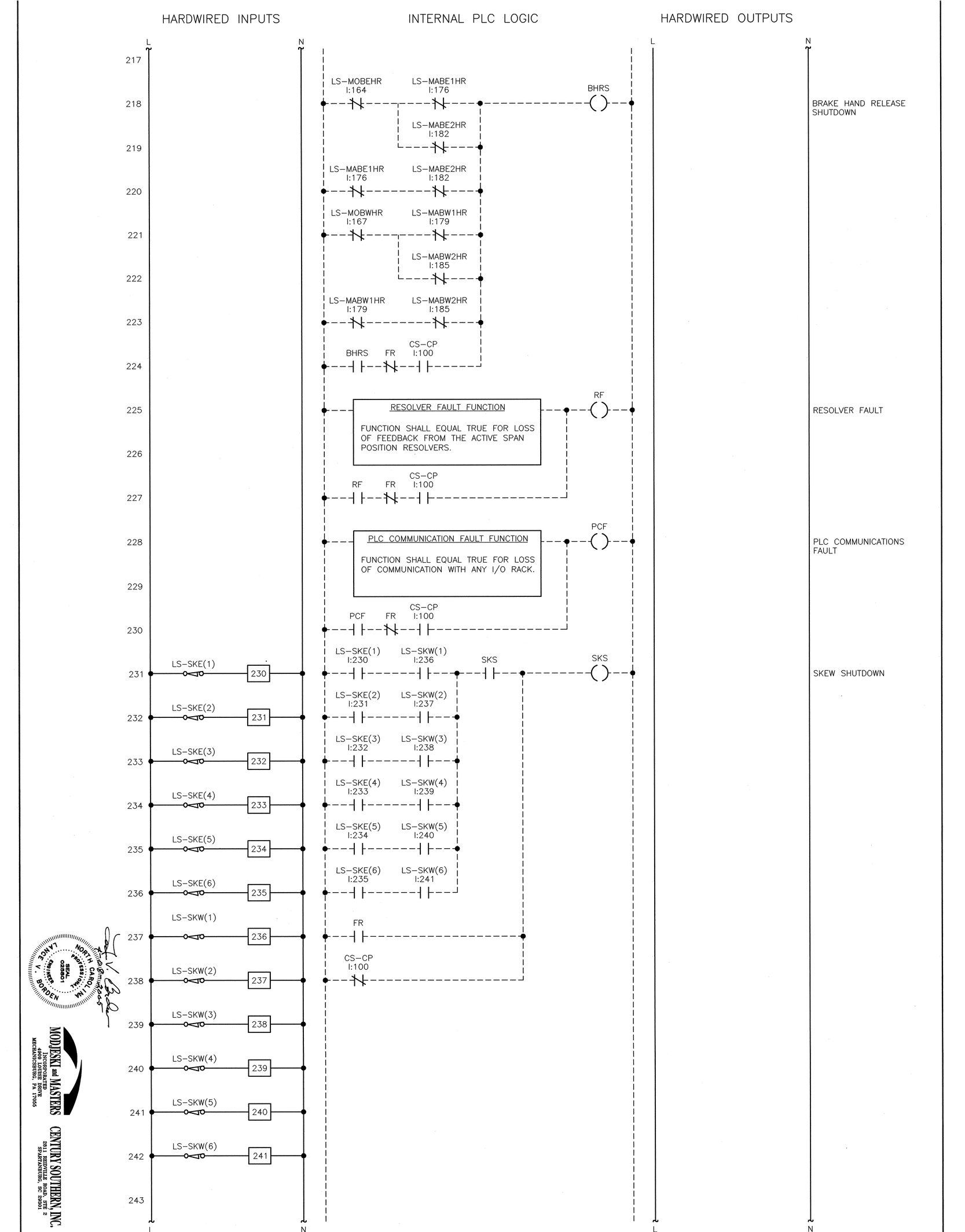
CENTURY SOUTHERN, INC. 2811 REIDVILLE ROAD, STE 2 SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 8

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	22 OF 53



MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2311 REGENCY ROAD, STE 2
SPARTANBURG, SC 29301

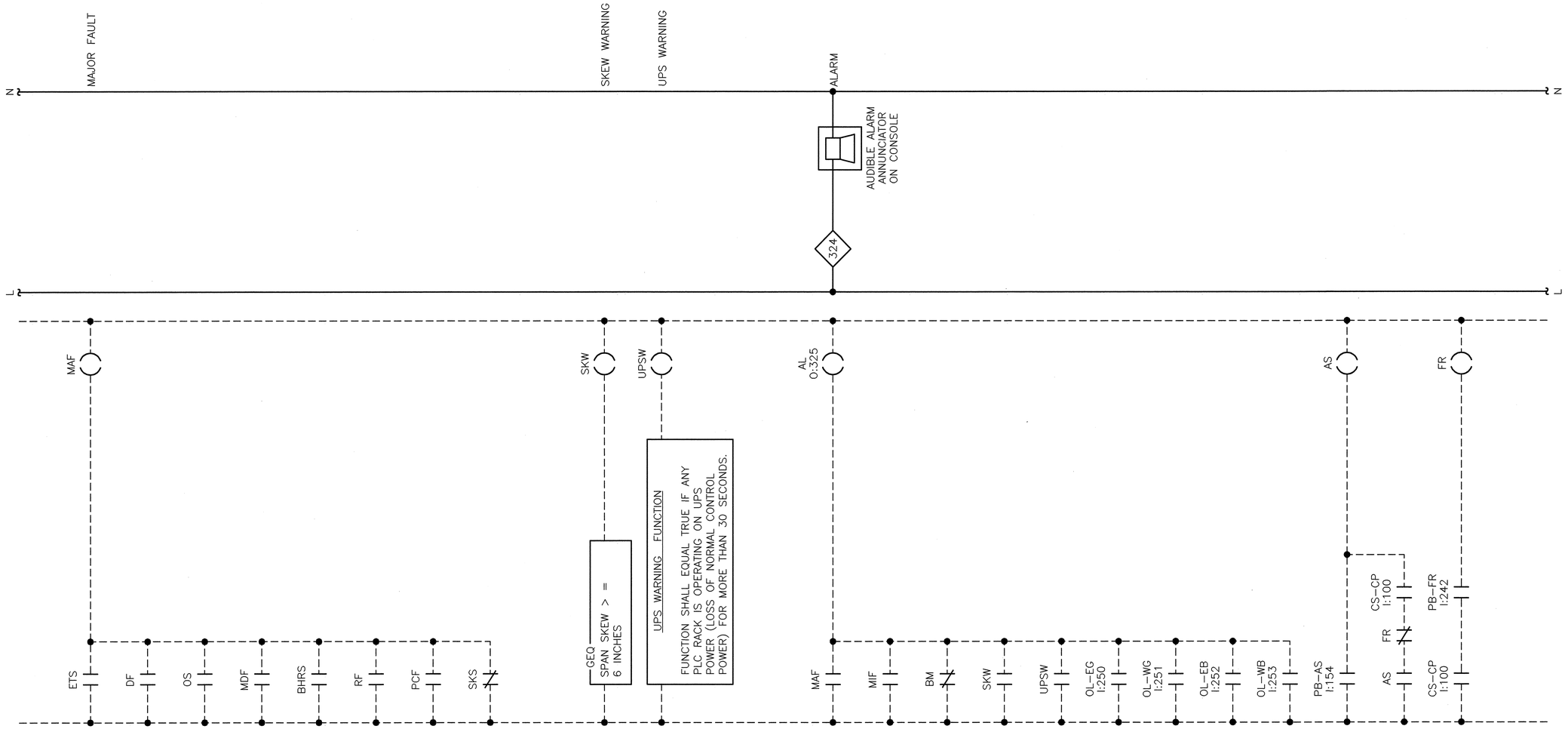
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 9

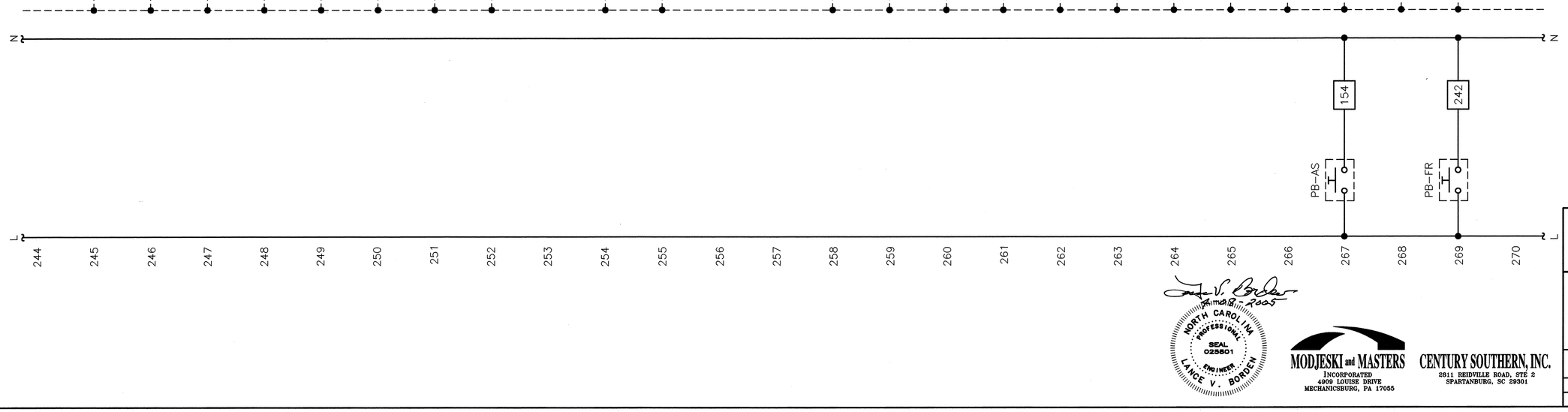
DESIGNED	G.L. FASICK	DRAWN BY	R.L. REED
DETAILED	R.L. REED	SCALE	NONE
CHECKED	G.L. FASICK	DATE	APRIL, 2005
CHECKED	N.E. ALGER	DRAWING NO.	23 OF 53

HARDWIRED OUTPUTS



INTERNAL PLC LOGIC

HARDWIRED INPUTS



MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

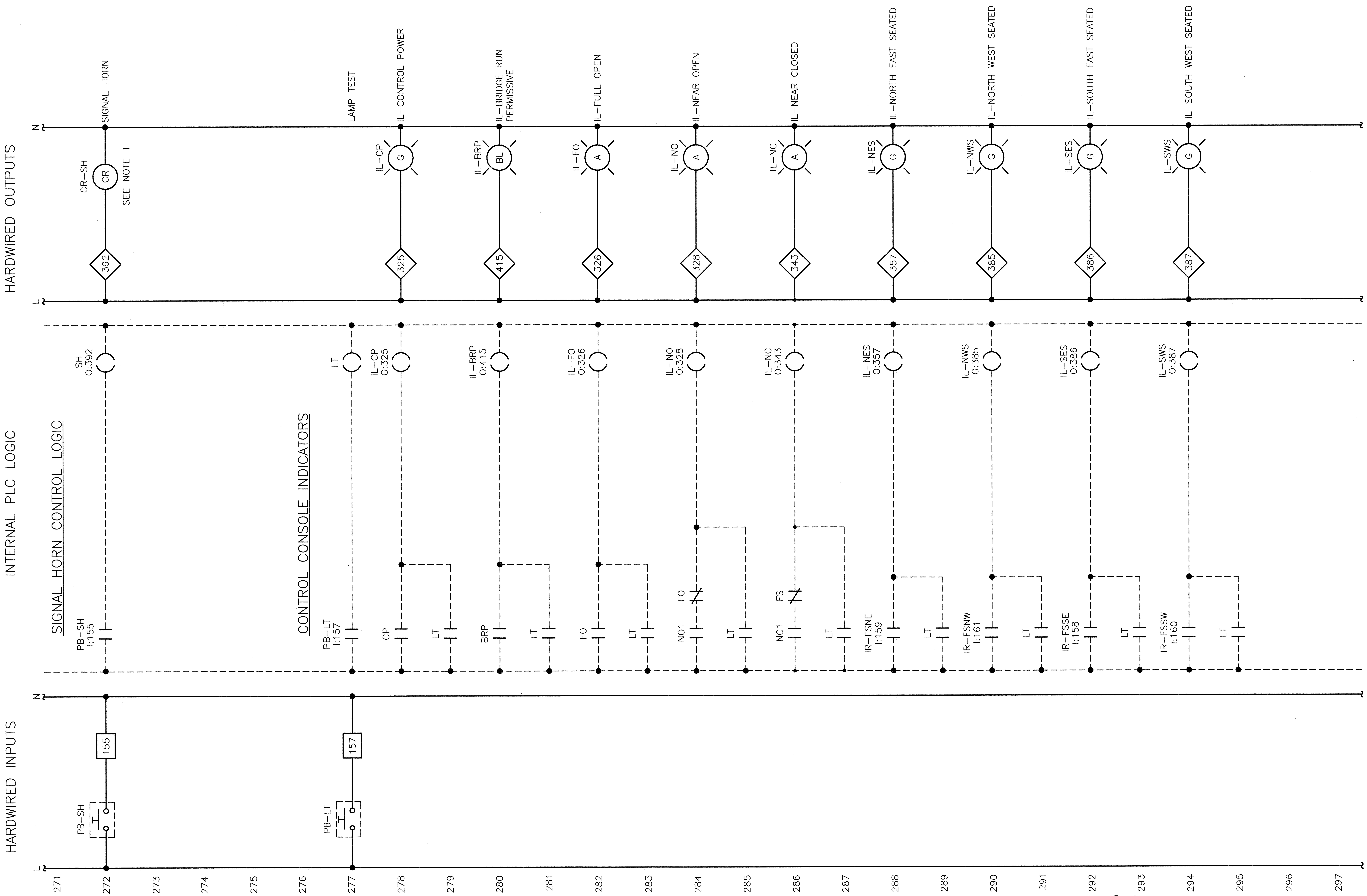
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 10

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	24 OF 53



NOTES:

1. INTERFACE WITH EXISTING SIGNAL HORN CONTROL CIRCUIT.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025801 LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

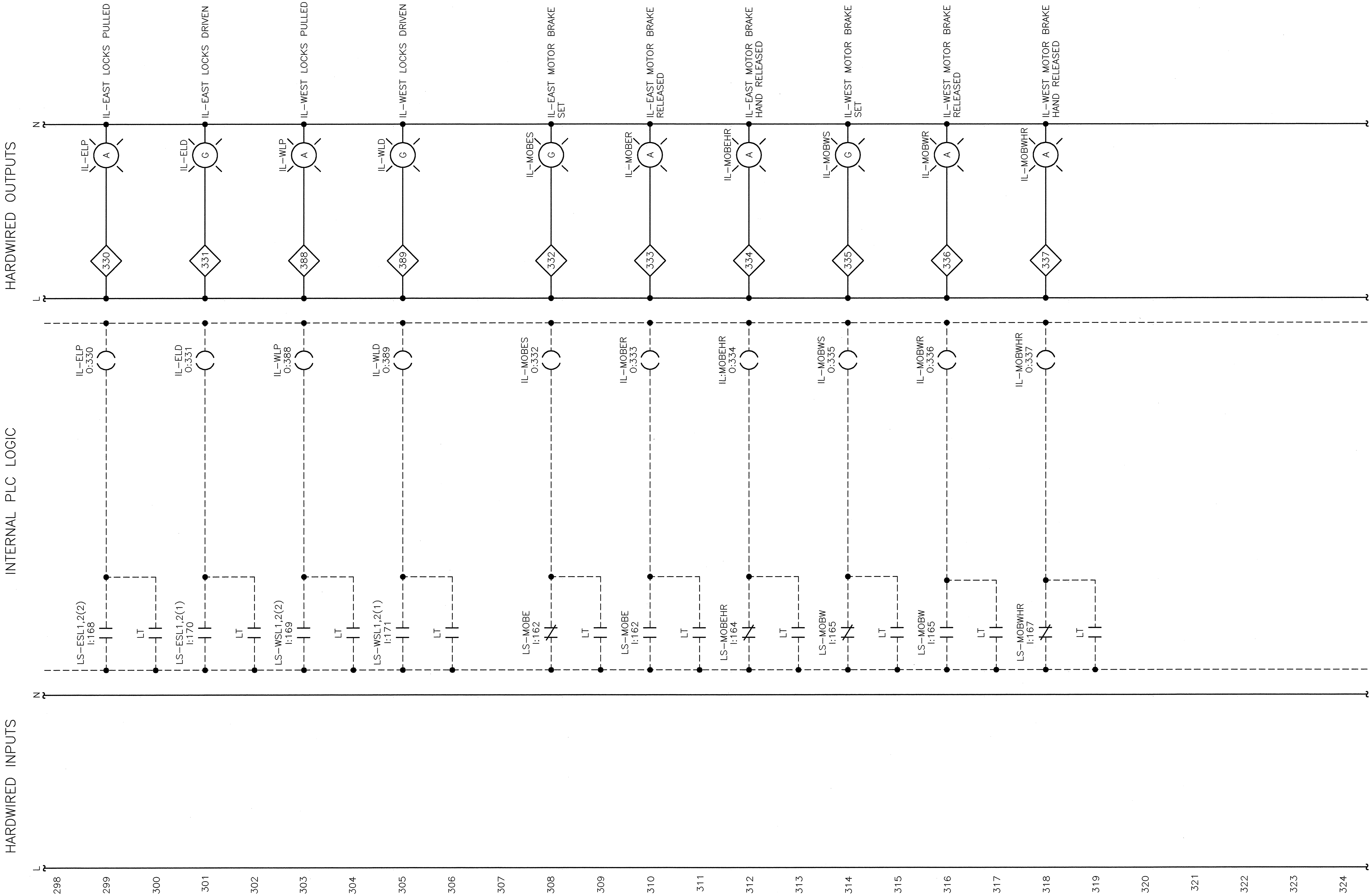
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 11

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	25 OF 53


HARDWIRED OUTPUTS
INTERNAL PLC LOGIC
HARDWIRED INPUTS
N
L
IL–EAST LOCKS PULLED
IL–EAST LOCKS DRIVEN
IL–WEST LOCKS PULLED
IL–WEST LOCKS DRIVEN
IL–EAST MOTOR BRAKE SET
IL–EAST MOTOR BRAKE RELEASED
IL–EAST MOTOR BRAKE HAND RELEASED
IL–WEST MOTOR BRAKE SET
IL–WEST MOTOR BRAKE RELEASED
IL–WEST MOTOR BRAKE HAND RELEASED
IL–ELP
IL–ELD
IL–WLP
IL–WLD
IL–MOBES
IL–MOBER
IL–MOBEHR
IL–MOBWS
IL–MOBWR
IL–MOBWHR
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IL–ELP O:330
IL–ELD O:331
IL–WLP O:388
IL–WLD O:389
IL–MOBES O:332
IL–MOBER O:333
IL:MOBEHR O:334
IL–MOBWS O:335
IL–MOBWR O:336
IL–MOBWHR O:337
LS–ESL1,2(2) I:168
LS–ESL1,2(1) I:170
LS–WSL1,2(2) I:169
LS–WSL1,2(1) I:171
LS–MOBE I:162
LS–MOBEHR I:164
LS–MOBW I:165
LS–MOBWHR I:167
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NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

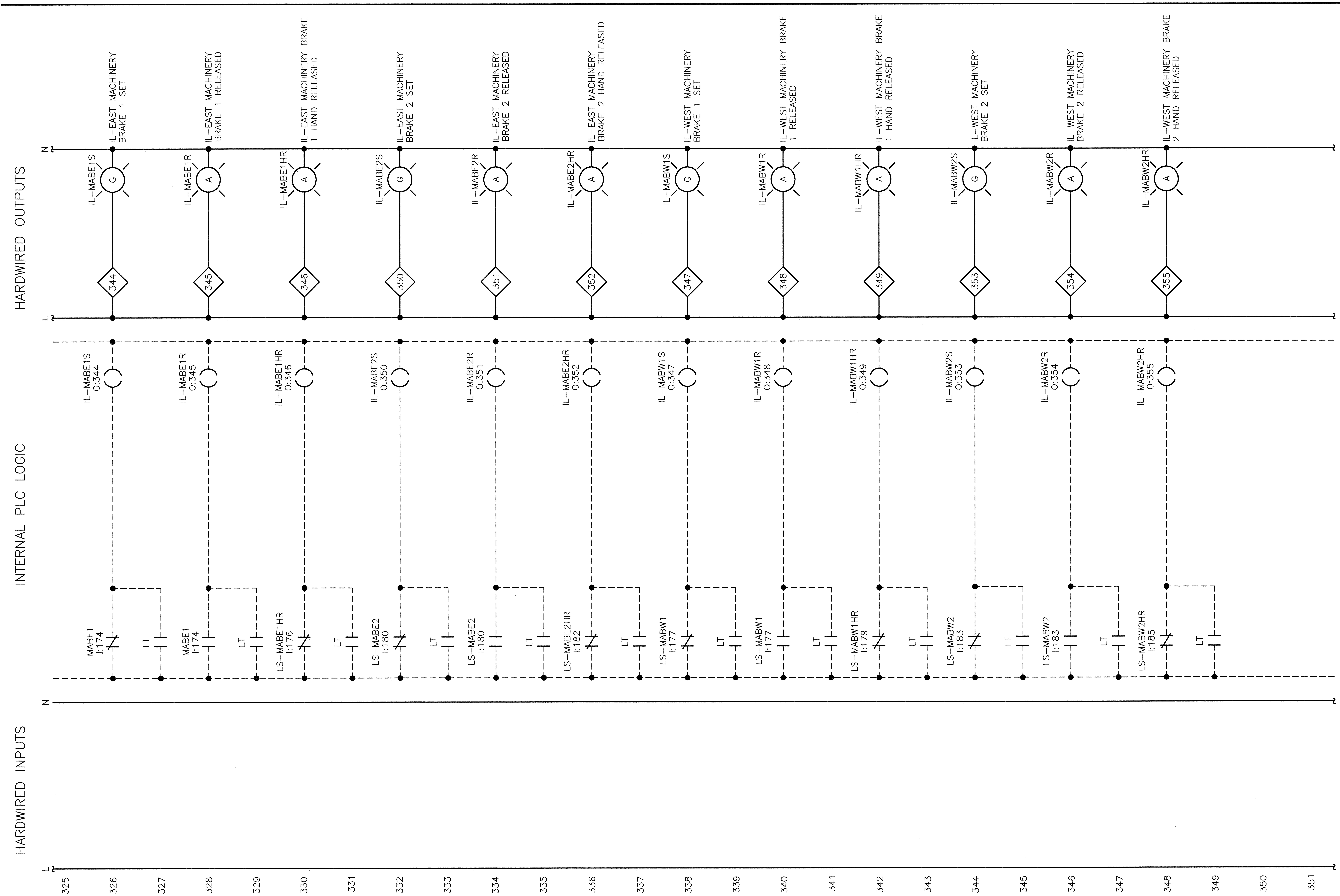
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 12

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L FASICK	DRAWING NO.	26 OF 53



NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC. 2811 REIDVILLE ROAD, STE 2 SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 13

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	27 OF 53

HARDWIRED OUTPUTS

N

L

IL-MAIN DRIVE FAULT — IL-MDF — R — 358

IL-DECEL FAILURE / OVERSPEED — IL-DFOS — R — 416

IL-BRAKES OVERLOAD — IL-BOL — R — 390

IL-LOCKS OVERLOAD — IL-LOL — R — 361

IL-GATE / BARRIER OVERLOAD — IL-GBOL — R — 417

IL-BRAKES HAND RELEASED SHUTDOWN — IL-BHRS — R — 418

IL-EXCESS TIME — IL-ET — R — 359

N

L

INTERNAL PLC LOGIC

IL-MDF O:358

IL-DFOS O:416

IL-BOL O:390

IL-LOL O:361

IL-GBOL O:417

IL-BHRS O:418

IL-ET O:359

HARDWIRED INPUTS

N

MDF

LT

DF

OS

LT

OL-MOBE I:133

OL-MABE1 I:135

OL-MABE2 I:136

OL-MOBW I:141

OL-MABW1 I:143

OL-MABW2 I:144

LT

OL-LK1 I:145

OL-LK2 I:146

LT

OL-EG I:250

OL-WG I:251

OL-EB I:252

OL-WB I:253

LT

BHRS

LT

ETS

LT

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MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

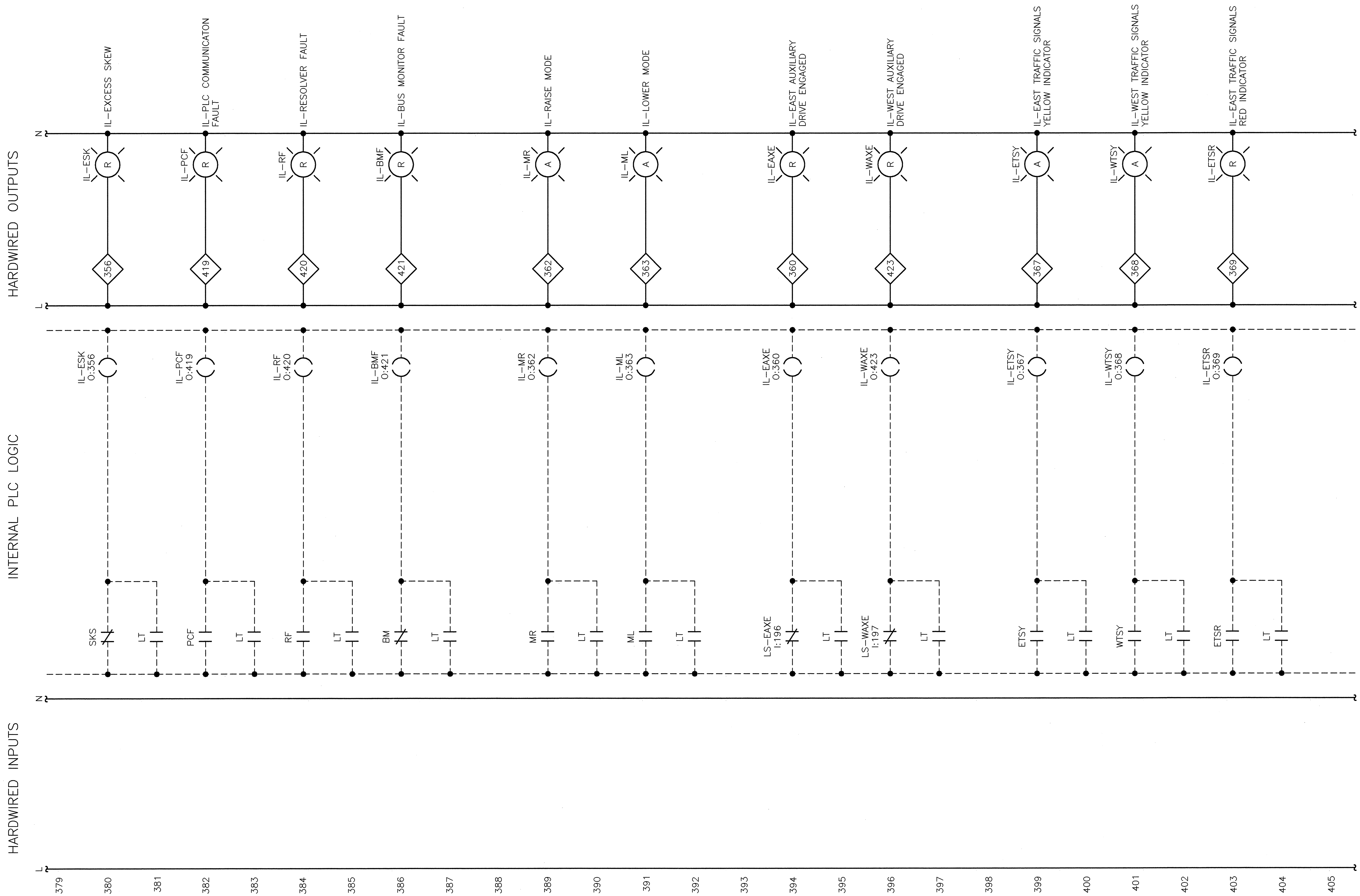
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 14

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	28 OF 53


HARDWIRED OUTPUTS
INTERNAL PLC LOGIC
HARDWIRED INPUTS
IL-EXCESS SKEW
IL-PLC COMMUNICATON FAULT
IL-RESOLVER FAULT
IL-BUS MONITOR FAULT
IL-RAISE MODE
IL-LOWER MODE
IL-EAST AUXILIARY DRIVE ENGAGED
IL-WEST AUXILIARY DRIVE ENGAGED
IL-EAST TRAFFIC SIGNALS YELLOW INDICATOR
IL-WEST TRAFFIC SIGNALS YELLOW INDICATOR
IL-EAST TRAFFIC SIGNALS RED INDICATOR
IL-ESK R 356
IL-PCF R 419
IL-RF R 420
IL-BMF R 421
IL-MR A 362
IL-ML A 363
IL-EAXE R 360
IL-WAXE R 423
IL-ETSY A 367
IL-WTSY A 368
IL-ETSR R 369
IL-ESK O:356
IL-PCF O:419
IL-RF O:420
IL-BMF O:421
IL-MR O:362
IL-ML O:363
IL-EAXE O:360
IL-WAXE O:423
IL-ETSY O:367
IL-WTSY O:368
IL-ETSR O:369
SKS LT PCF LT RF LT BM LT MR LT ML LT
LS-EAXE I:196 LT
LS-WAXE I:197 LT
ETSY LT WTSY LT ETSR LT
N L
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NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC. 2811 REIDVILLE ROAD, STE 2 SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

CAPE FEAR RIVER CROSSING

WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 15

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	29 OF 53

HARDWIRED OUTPUTS

IL-WEST TRAFFIC SIGNALS RED INDICATOR	IL-EAST TRAFFIC SIGNALS GREEN INDICATOR	IL-WEST TRAFFIC SIGNALS GREEN INDICATOR	IL-EAST WARNING GATE LOWERED INDICATOR	IL-EAST WARNING GATE RAISED INDICATOR	IL-WEST WARNING GATE LOWERED INDICATOR	IL-WEST WARNING GATE RAISED INDICATOR	IL-EAST BARRIER GATE LOWERED INDICATOR	IL-EAST BARRIER GATE RAISED INDICATOR	IL-WEST BARRIER GATE LOWERED INDICATOR	IL-WEST BARRIER GATE RAISED INDICATOR		
IL-WTSR	IL-ETSG	IL-WTSG	IL-EGL	IL-EGR	IL-WGL	IL-WGR	IL-EBL	IL-EBR	IL-WBL	IL-WBR		
R	G	G	A	G	A	G	A	G	A	G		
370	371	372	373	374	375	376	377	378	379	380		

INTERNAL PLC LOGIC

IL-WTSR O:370	IL-ETSG O:371	IL-WTSG O:372	IL-EGL O:373	IL-EGR O:374	IL-WGL O:375	IL-WGR O:376	IL-EBL O:377	IL-EBR O:378	IL-WBL O:379	IL-WBR O:380		
WTSR	ETSG	WTSG	LS-EG(4) I:190	LS-EG(5) I:191	LS-WG(4) I:192	LS-WG(5) I:193	LS-EB(1A) I:194	LS-EB(3A) I:195	LS-WB(1A) I:202	LS-WB(3A) I:203		
LT	LT	LT	LT	LT	LT	LT	LT	LT	LT	LT		

HARDWIRED INPUTS

406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

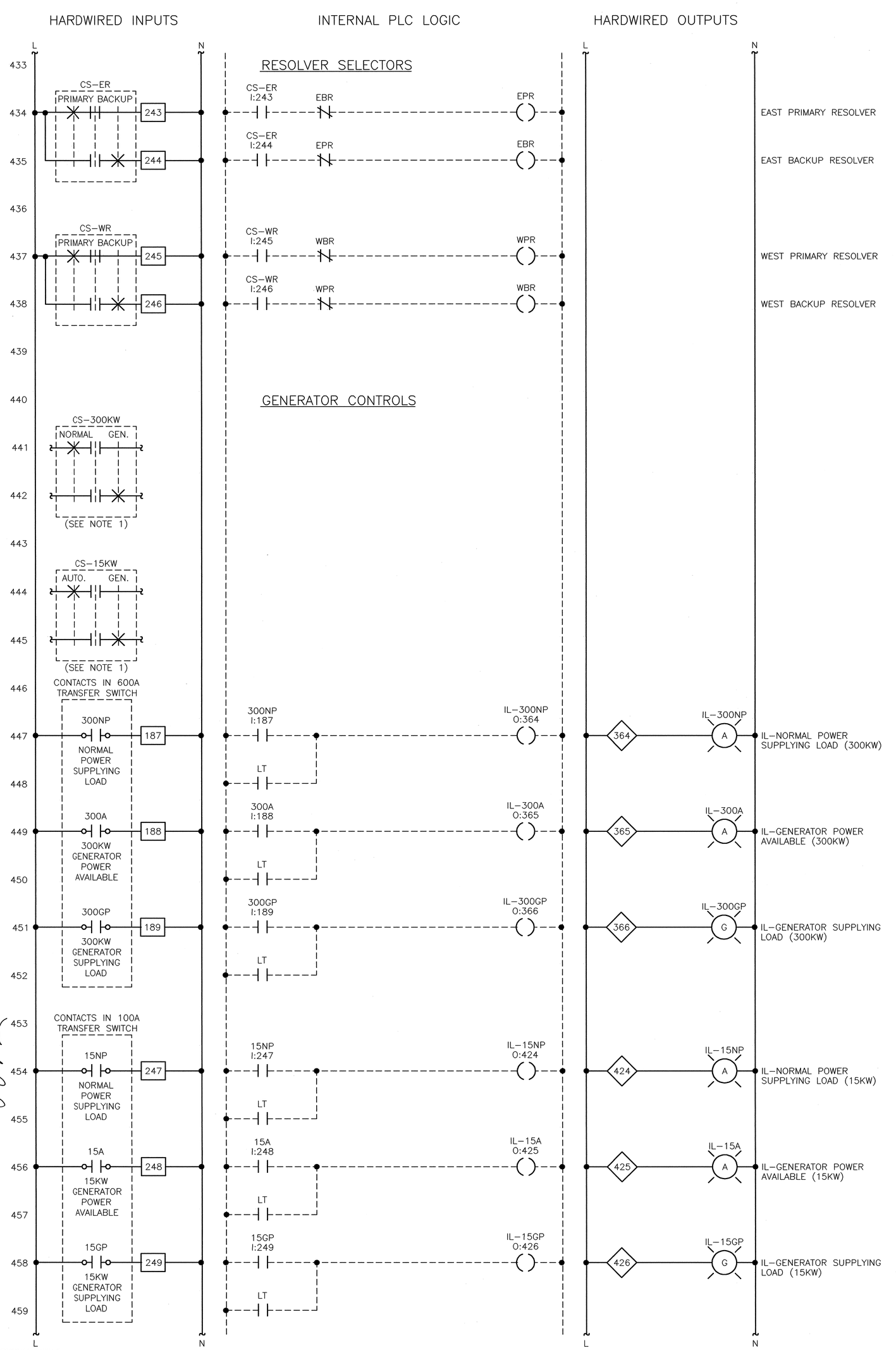
CONTROL CIRCUIT – 16

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	30 OF 53

NORTH CAROLINA PROFESSIONAL SEAL 025501 ENGINEER LANCE V. BORDEN
4/28/2005

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301



NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023801 LANCE V. BORDEN

MODJESKI and MASTERS
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
SPARTANBURG, SC 29301

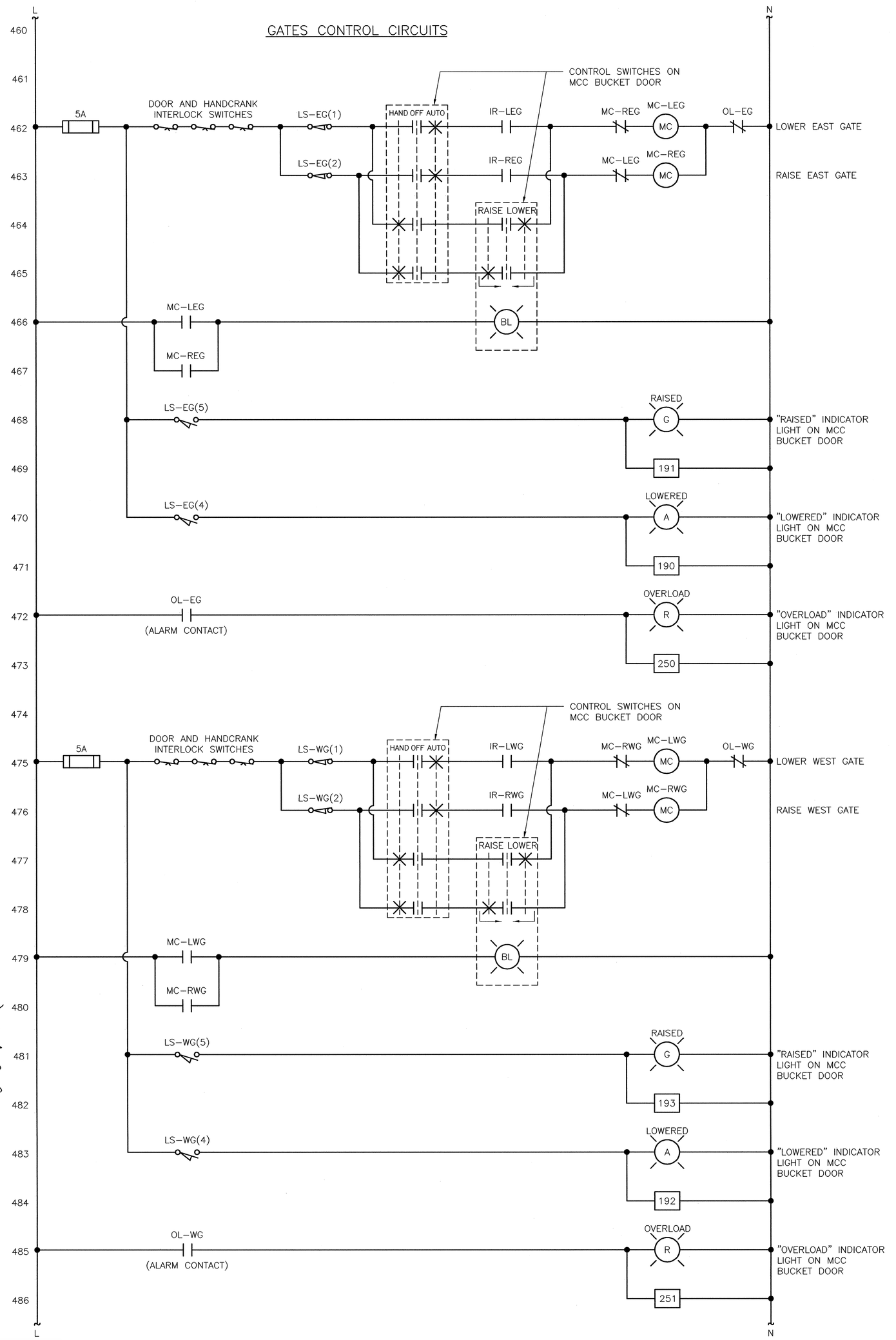
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT - 17

DESIGNED	G.L. FASICK	DRAWN BY	R.L. REED
CHECKED	N.E. AUGER	SCALE	NONE
DETAILED	R.L. REED	DATE	APRIL, 2005
CHECKED	G.L. FASICK	DRAWING NO.	31 OF 53

HARDWIRED LOGIC



NOTES:

1. ALL "HAND-OFF-AUTO" SWITCHES SHALL INCLUDE LOCKABLE COVERS AND MINATURE BRASS LOCKS (MASTERLOCK NO. 120, OR APPROVED EQUAL). ALL LOCKS FOR HOA SWITCHES SHALL BE KEYED ALIKE. PROVIDE 10 SPARE LOCKS AND KEYS.
2. ALL PILOT LIGHTS ARE (4B) TYPE (SEE DRAWING NO. 11 FOR FUNCTION CODES). PUSH-TO-TEST CIRCUITRY NOT SHOWN.
3. ALL FUSES SHALL BE SLOW-BLOW TYPE AND INCLUDE BLOWN FUSE INDICATOR.
4. ALL GATE, BARRIER, AND SPAN LOCK MCC BUCKET DOORS SHALL INCLUDE AN ENGRAVED PLASTIC WARNING LABEL (WHITE TEXT ON RED BACKGROUND) WITH THE FOLLOWING TEXT: "WARNING! USE OF LOCAL CONTROL CIRCUITS DEFEATS ALL OPERATING SEQUENCE INTERLOCKING. USE WITH EXTREME CAUTION." LABEL TEXT SHALL BE 1/4 INCH HIGH.

LANCE V. BORDEN
SEAL 023501
NORTH CAROLINA PROFESSIONAL ENGINEER
MODJESKI and MASTERS CONSULTING ENGINEERS
4900 LOUISE DRIVE
MECHANICSBURG, PA 17055
CENTURY SOUTHERN, INC.
231 STARTEX ROAD
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

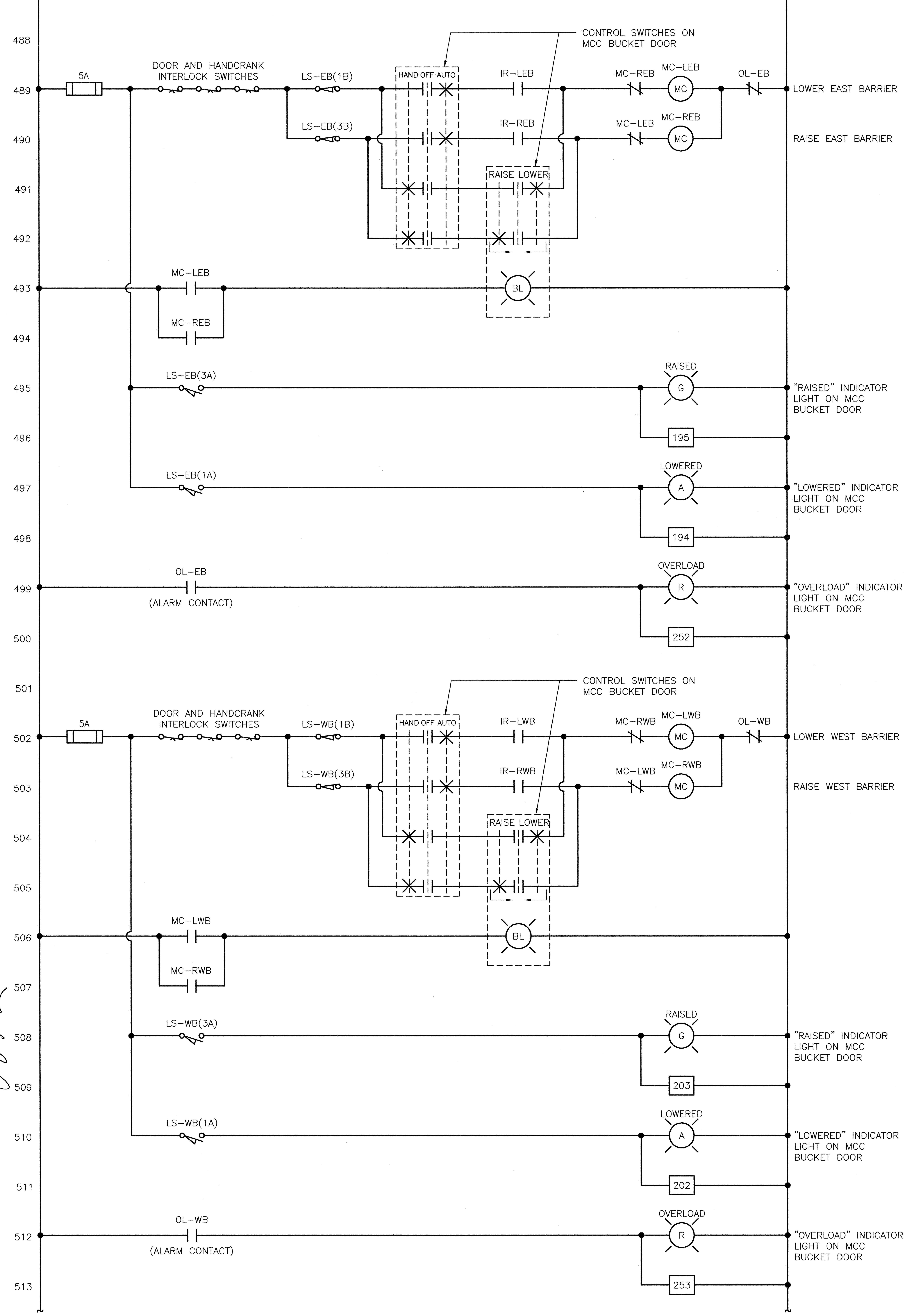
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT - 18

DESIGNED	G.L. FASICK	SCALE	NONE
DETAILED	R.L. REED	DRAWN BY	R.L. REED
CHECKED	G.L. FASICK	DATE	APRIL, 2005
CHECKED	N.E. ALGER	DRAWING NO.	32 OF 53

HARDWIRED LOGIC

BARRIERS CONTROL CIRCUITS



NOTES:

1. ALL "HAND-OFF-AUTO" SWITCHES SHALL INCLUDE LOCKABLE COVERS AND MINATURE BRASS LOCKS (MASTERLOCK NO. 120, OR APPROVED EQUAL). ALL LOCKS FOR HOA SWITCHES SHALL BE KEYED ALIKE. PROVIDE 10 SPARE LOCKS AND KEYS.
2. ALL PILOT LIGHTS ARE (4B) TYPE (SEE DRAWING NO. 11 FOR FUNCTION CODES). PUSH-TO-TEST CIRCUITRY NOT SHOWN.
3. ALL FUSES SHALL BE SLOW-BLOW TYPE AND INCLUDE BLOWN FUSE INDICATOR.
4. ALL GATE, BARRIER, AND SPAN LOCK MCC BUCKET DOORS SHALL INCLUDE AN ENGRAVED PLASTIC WARNING LABEL (WHITE TEXT ON RED BACKGROUND) WITH THE FOLLOWING TEXT: "WARNING! USE OF LOCAL CONTROL CIRCUITS DEFEATS ALL OPERATING SEQUENCE INTERLOCKING. USE WITH EXTREME CAUTION." LABEL TEXT SHALL BE 1/4 INCH HIGH.
5. IF BARRIER GATES ARE EQUIPPED WITH ELECTRIC ACTUATOR DRIVEN ARM LOCKS, BARRIER CONTROL CIRCUITS SHALL INCLUDE PROVISIONS FOR CONTROL OF THE ACTUATOR(S) IN BOTH "HAND" AND "AUTO" MODES. ANY RELAYS REQUIRED FOR CONTROL OF THE ACTUATORS SHALL BE MOUNTED IN THE MCC BUCKET FOR THE BARRIER GATE SERVED. RELAYS SHALL BE "CONTROL RELAY" TYPE AS DESCRIBED IN THE SPECIAL PROVISIONS. POWER AND CONTROL CIRCUITS FOR ACTUATOR(S) SHALL BE FUSED SEPARATELY FROM THE REST OF THE BARRIER CONTROL CIRCUIT(S).

MODJESKI and MASTERS INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

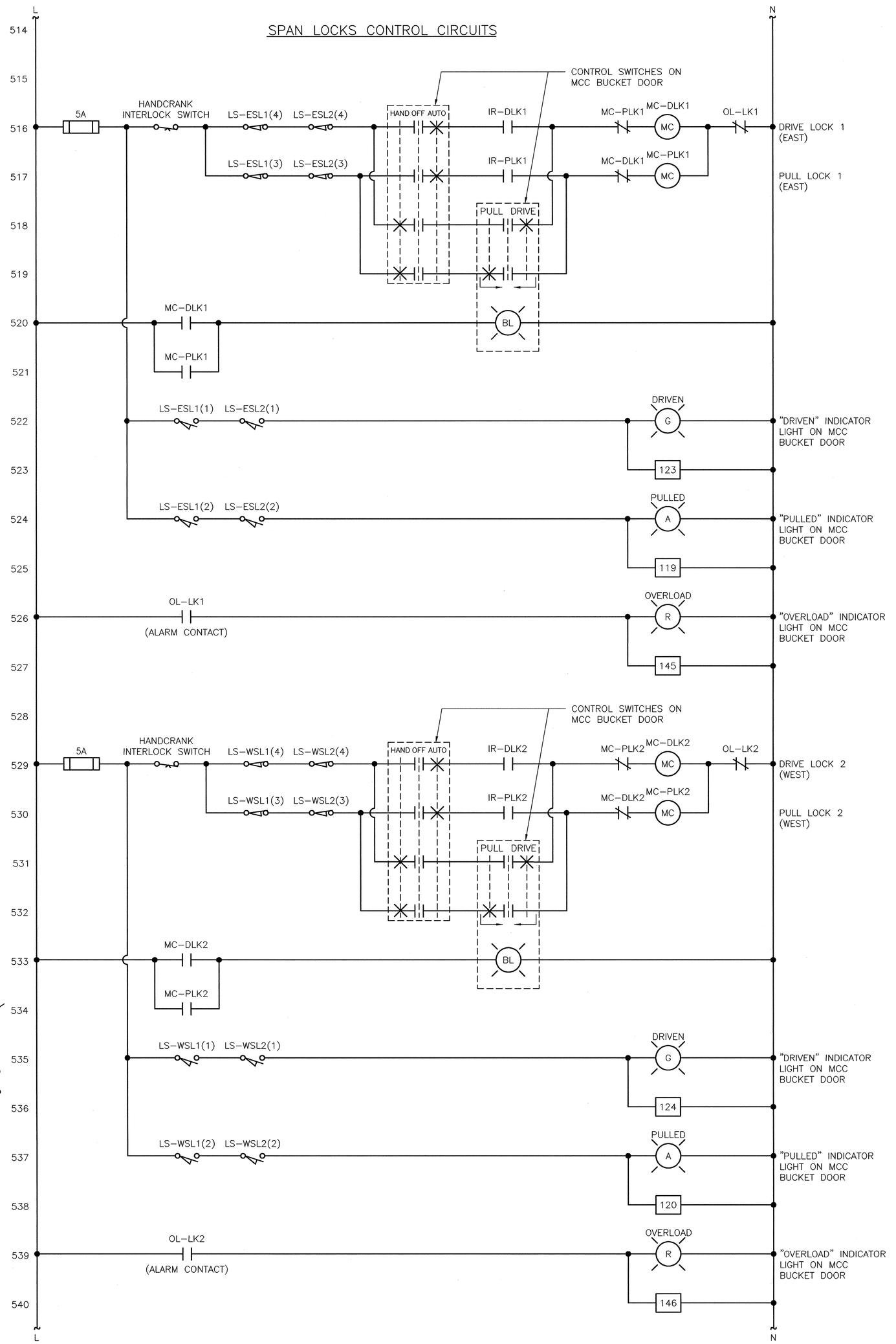
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 19

				DRAWN BY	R.L. REED
				SCALE	NONE
DESIGNED	G.L. FASICK	DETAILED	R.L. REED	DATE	APRIL,2005
CHECKED	N.E. ALGER	CHECKED	G.L. FASICK	DRAWING NO.	33 OF 53

HARDWIRED LOGIC

SPAN LOCKS CONTROL CIRCUITS



NOTES:

1. ALL "HAND-OFF-AUTO" SWITCHES SHALL INCLUDE LOCKABLE COVERS AND MINATURE BRASS LOCKS (MASTERLOCK NO. 120, OR APPROVED EQUAL). ALL LOCKS FOR HOA SWITCHES SHALL BE KEYED ALIKE. PROVIDE 10 SPARE LOCKS AND KEYS.
2. ALL PILOT LIGHTS ARE (4B) TYPE (SEE DRAWING NO. 11 FOR FUNCTION CODES). PUSH-TO-TEST CIRCUITRY NOT SHOWN.
3. ALL FUSES SHALL BE SLOW-BLOW TYPE AND INCLUDE BLOWN FUSE INDICATOR.
4. ALL GATE, BARRIER, AND SPAN LOCK MCC BUCKET DOORS SHALL INCLUDE AN ENGRAVED PLASTIC WARNING LABEL (WHITE TEXT ON RED BACKGROUND) WITH THE FOLLOWING TEXT: "WARNING! USE OF LOCAL CONTROL CIRCUITS DEFEATS ALL OPERATING SEQUENCE INTERLOCKING. USE WITH EXTREME CAUTION." LABEL TEXT SHALL BE 1/4 INCH HIGH.

MODJESKI and MASTERS
CONSULTING ENGINEERS
4000 LOUISE DRIVE
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
231 SPARTANBURG HWY.
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

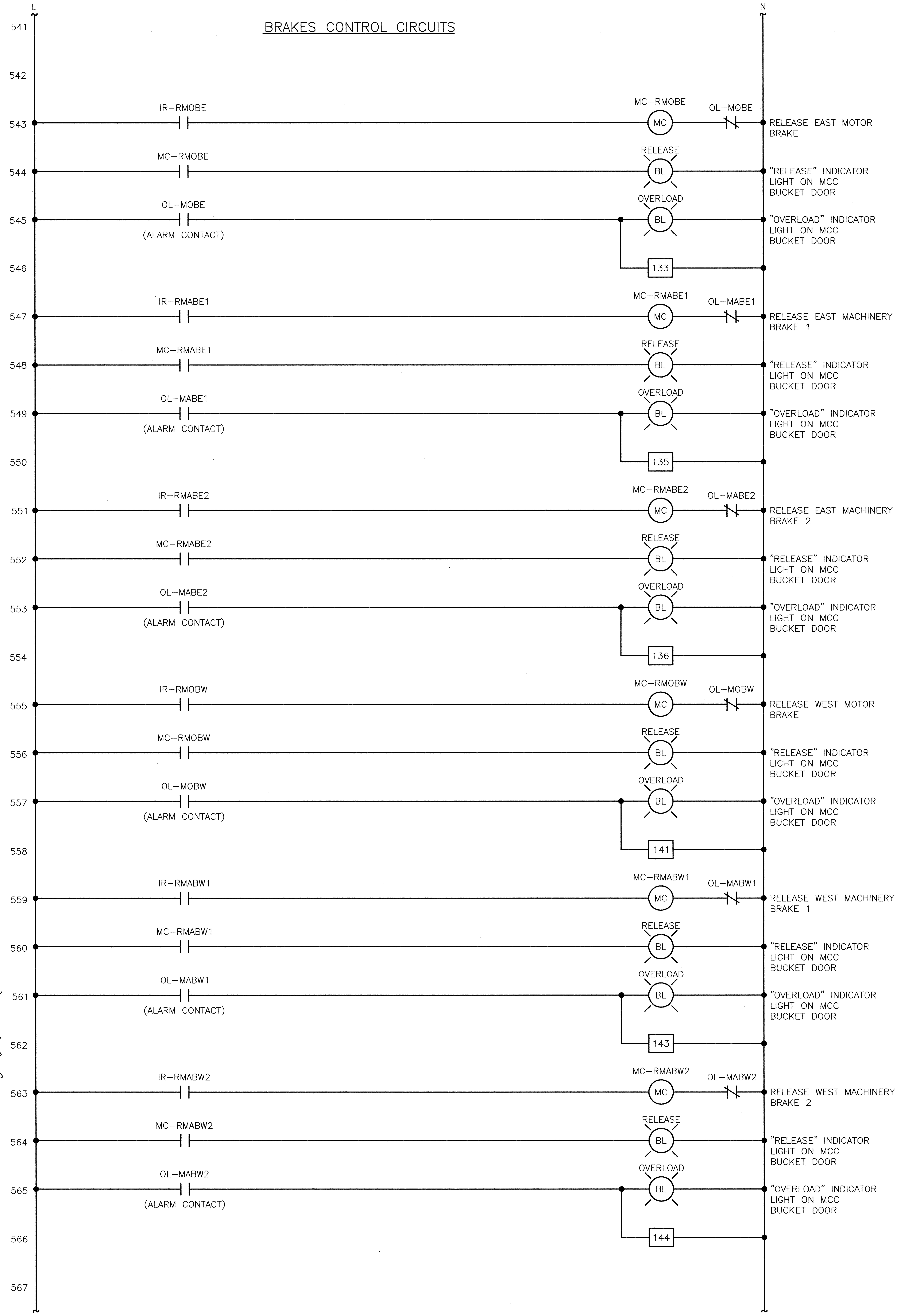
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 20

DESIGNED	G.L. FASICK	DRAWN BY	R.L. REED
DETAILED	R.L. REED	SCALE	NONE
CHECKED	G.L. FASICK	DATE	APRIL, 2005
CHECKED	N.E. ALGER	DRAWING NO.	34 OF 53

HARDWIRED LOGIC

BRAKES CONTROL CIRCUITS



NOTES:

1. ALL PILOT LIGHTS ARE (4B) TYPE (SEE DRAWING NO. 11 FOR FUNCTION CODES). PUSH–TO–TEST CIRCUITRY NOT SHOWN.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025801 LANCE V. BORDEN

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC. 2811 REIDVILLE ROAD, STE 2 SPARTANBURG, SC 29301

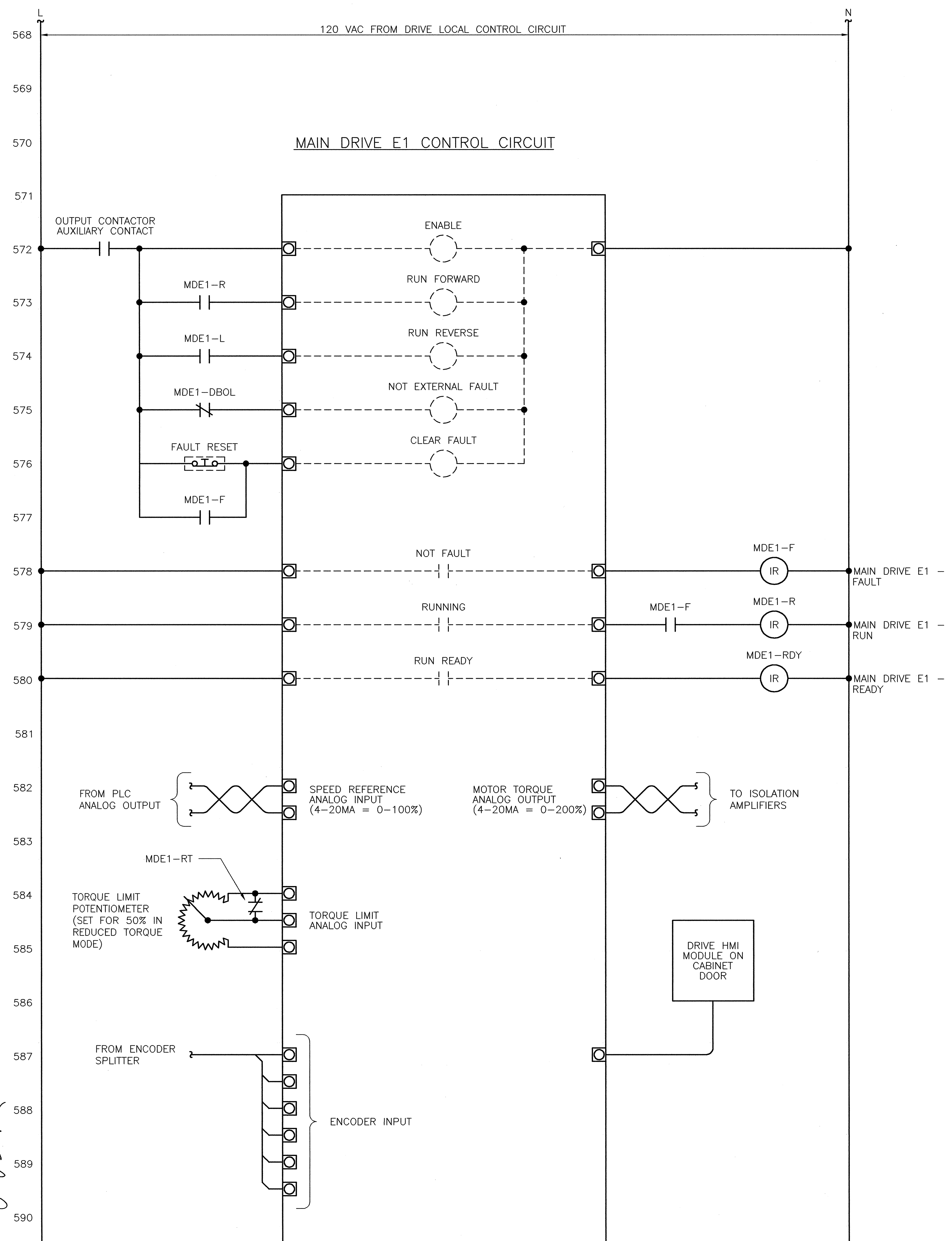
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 21

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO.	35 OF 53

HARDWIRED LOGIC



DRIVE SETTINGS

ACCELERATION TIME	0 SECONDS
DECELERATION TIME	0 SECONDS
STOP MODE	COAST
AUTO START	FALSE
AUTO RESTART	FALSE
MOTOR STALL TIME	20 SECONDS
MAXIMUM TORQUE LIMIT	150% MOTOR RATED

NOTE: THESE SETTINGS MAY REQUIRE ADJUSTMENT IN THE FIELD.

NOTES:

1. DRIVE E1 SHOWN. DRIVES E2, W1, AND W2 SIMILAR.

LANCE V. BORDEN — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025801

MODJESKI and MASTERS INCORPORATED 4909 LOUISE DRIVE MECHANICSBURG, PA 17055

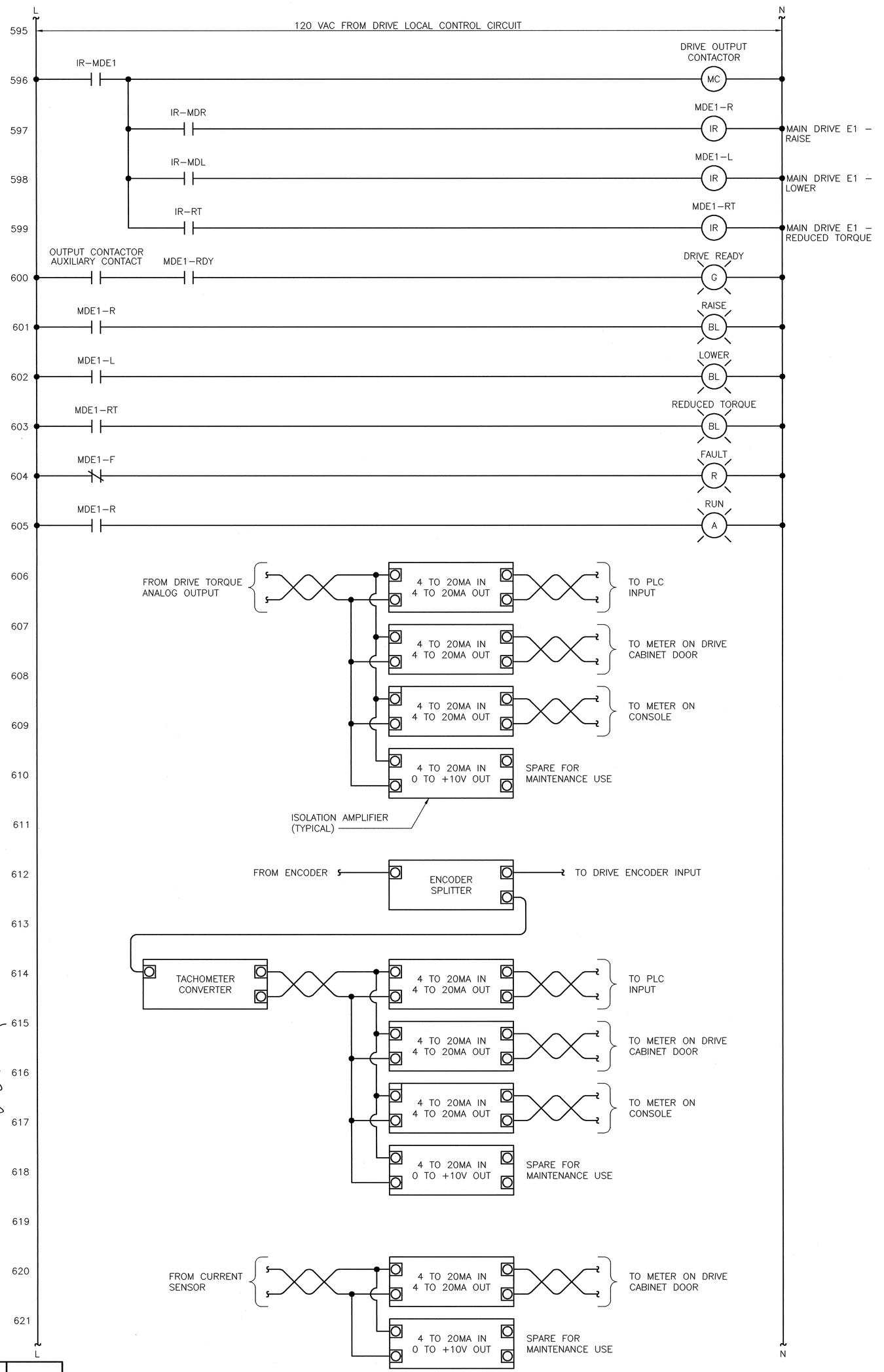
CENTURY SOUTHERN, INC. 2811 REIDVILLE ROAD, STE 2 SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 22

		DRAWN BY R.L. REED
		SCALE NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO. 36 OF 53



NOTES:

1. UNLESS OTHERWISE NOTED, ALL PUSHBUTTONS AND INDICATOR LIGHTS ARE MOUNTED ON THE DRIVE CABINET DOOR. ALL PUSHBUTTONS ARE (1) TYPE, AND ALL INDICTOR LIGHTS ARE (4B) TYPE (SEE DRAWING NO. 11). PUSH–TO–TEST WIRING NOT SHOWN.
2. ISOLATION AMPLIFIERS SHALL BE PHOENIX CONTACT MCR–C–UI–UI–DCI, OR APPROVED EQUAL.
3. ENCODER SPLITTER SHALL BE NORTHSTAR SIGNAL SPLITTER, OR APPROVED EQUAL.
4. TACHOMETER CONVERTER SHALL BE NORTHSTAR RIMTACH F2V, OR APPROVED EQUAL.
5. DRIVE E1 SHOWN. DRIVES E2, W1, AND W2 SIMILAR.

LANCE V. BORDEN SEAL 023601 NORTH CAROLINA PROFESSIONAL ENGINEER
4-7-2005

MODJESKI and MASTERS
CONSULTING ENGINEERS
4000 LOUISE DRIVE
MECHANICSBURG, PA 17055

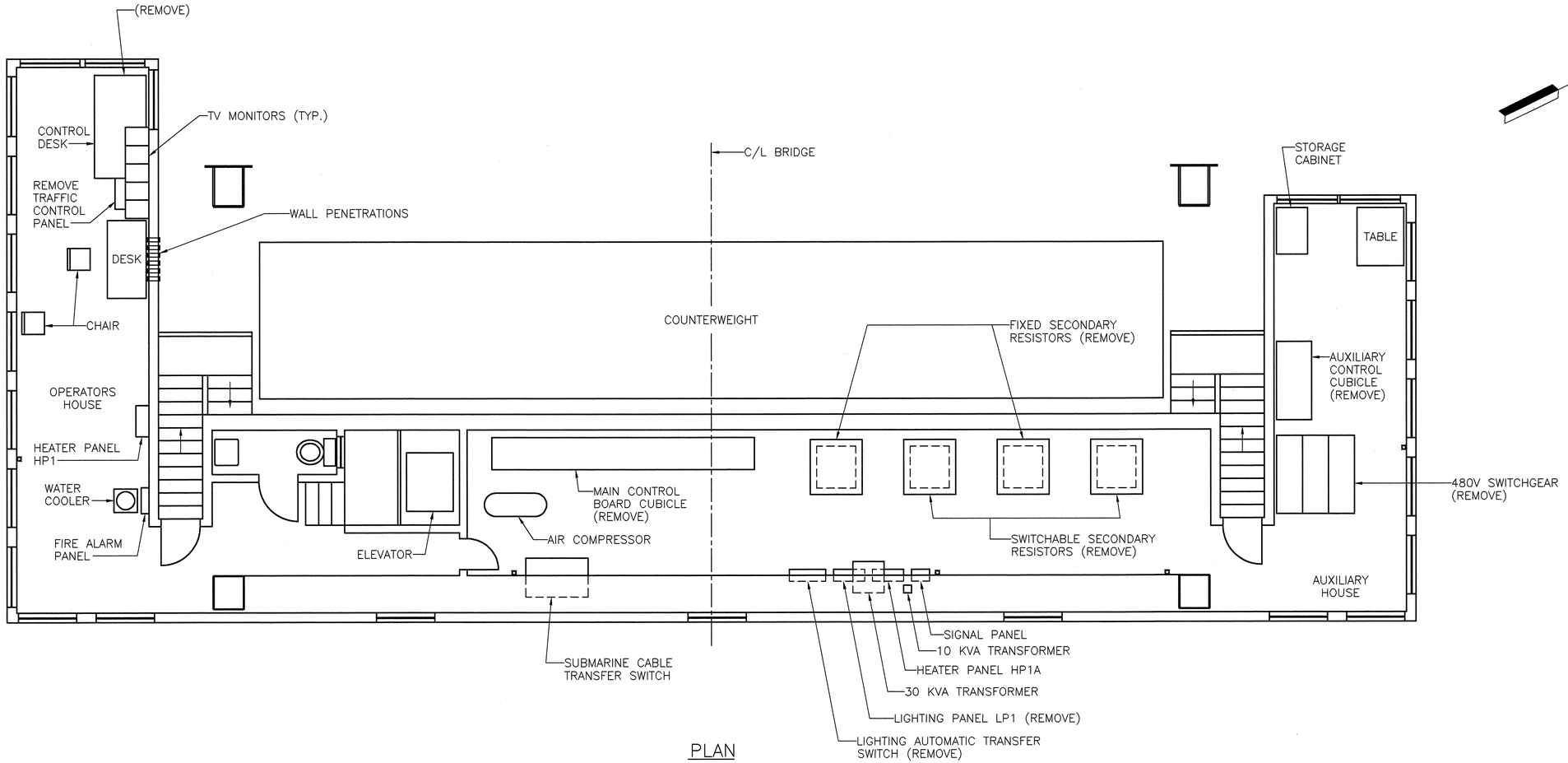
CENTURY SOUTHERN, INC.
231 FAIRFIELD ROAD
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

CONTROL CIRCUIT – 23

DESIGNED	G.L. FISCHL	DRAWN BY	R.L. REED
CHECKED	R.L. REED	SCALE	NONE
CHECKED	G.L. FISCHL	DATE	APRIL, 2005
CHECKED	N.E. ALGER	DRAWING NO.	37 OF 53



PLAN
EXISTING CONTROL HOUSE
SCALE: 1/4" = 1'-0"

NOTES:

1. THIS DRAWING SHOWS THE GENERAL LOCATIONS OF MAJOR ITEMS TO BE REMOVED AND IS NOT INTENDED TO INDICATE ALL OPERATING DEVICES, WIRE AND CABLE TO BE REMOVED OR RELOCATED.
2. REMOVALS SHALL BE IN STRICT ACCORDANCE WITH APPROVED CONSTRUCTION SCHEDULE. REFERENCE SEQUENCE OF CONSTRUCTION SCHEDULE IN THE SPECIFICATIONS.
3. CERTAIN ITEMS OF EXISTING EQUIPMENT WILL BE RELOCATED TO TEMPORARY LOCATIONS AND RECONNECTED PRIOR TO FINAL REMOVAL.
4. EQUIPMENT NOT DESIGNATED FOR REMOVAL SHALL REMAIN IN PLACE.

7-18-2005

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS
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4909 LOUISE DRIVE
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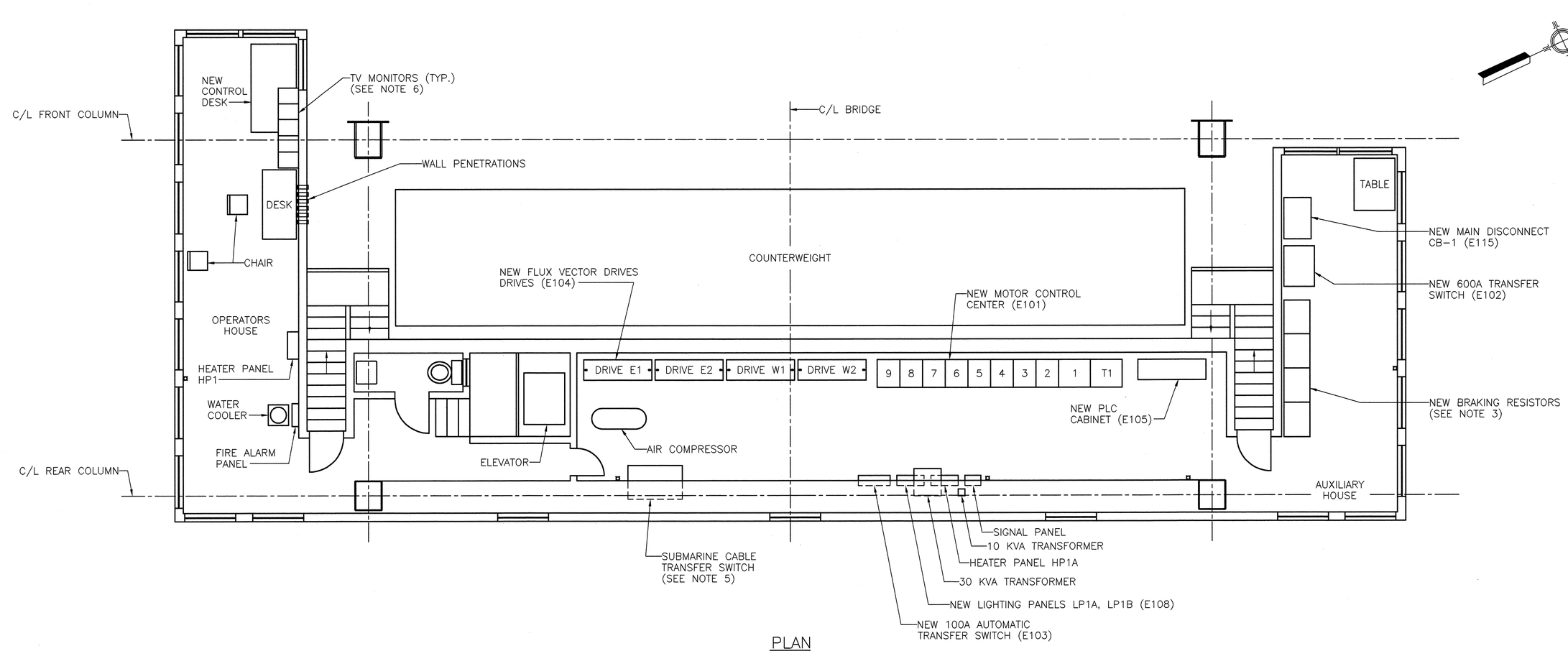
CONTROL HOUSE – REMOVALS

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	38 OF 53



PLAN

CONTROL HOUSE – NEW EQUIPMENT LAYOUT

SCALE: 1/4" = 1'-0"

NOTES:

1. EQUIPMENT NOT LISTED AS "NEW" WILL BE REUSED.
2. FINAL EQUIPMENT LOCATIONS ARE SHOWN. INTERIM LOCATIONS WILL BE REQUIRED DURING CONSTRUCTION.
3. COORDINATE PERMANENT LOCATION OF NEW BRAKING RESISTORS WITH NCDOT.
4. EXISTING OVERHEAD CABLE TRAYS NOT SHOWN.
5. INCOMING SUBMARINE CABLE CONDUCTORS TO REMAIN TERMINATED IN ENCLOSURE. ABANDONED OUTGOING CABLE AND CONDUIT FROM CABLE TRANSFER CABINET TO BE REMOVED.
6. INSTALL FIBER OPTIC RECEIVERS AND INTERFACE TO FAR SIDE (WEST) MONITORS.

9-28-2005

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

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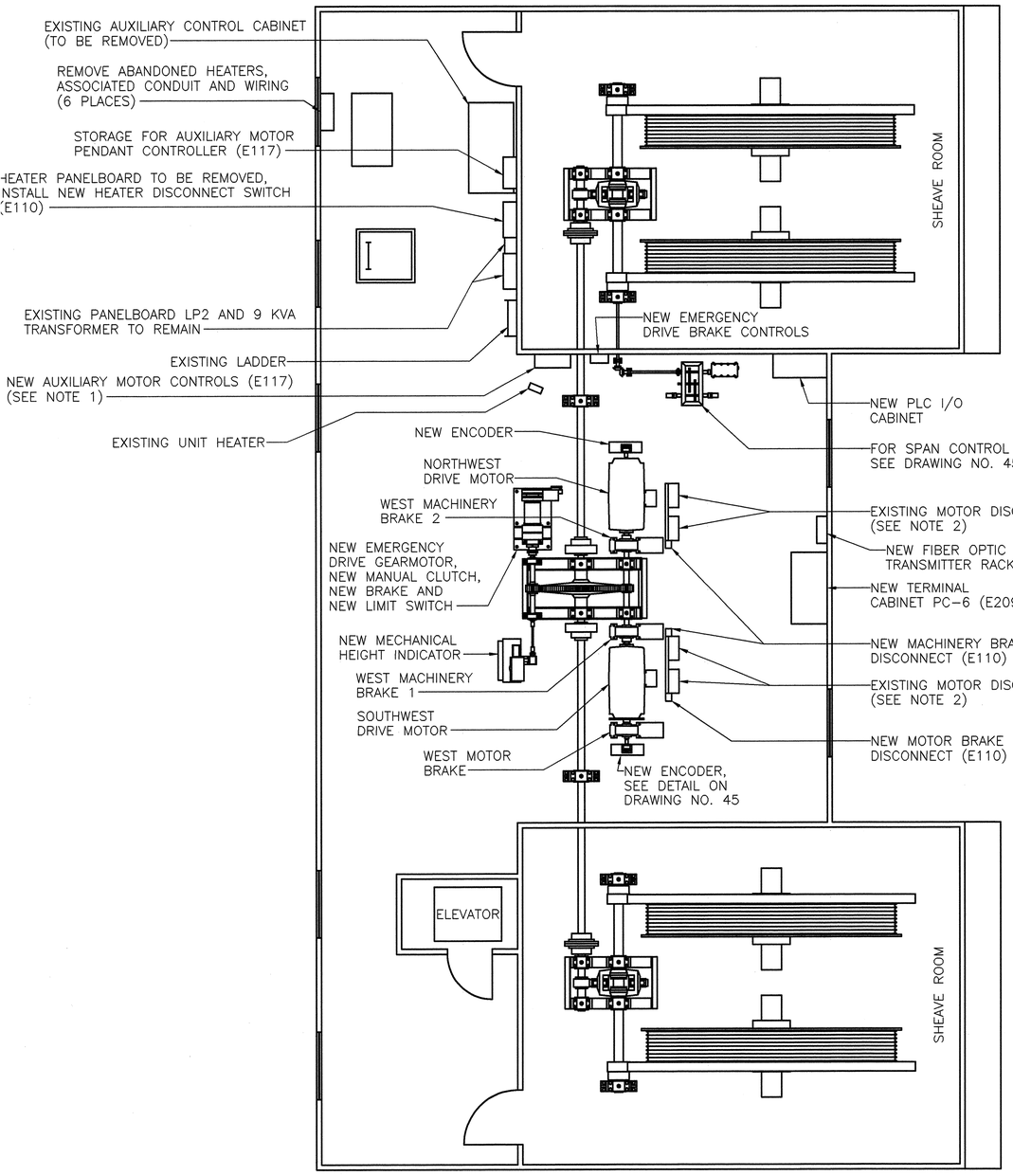
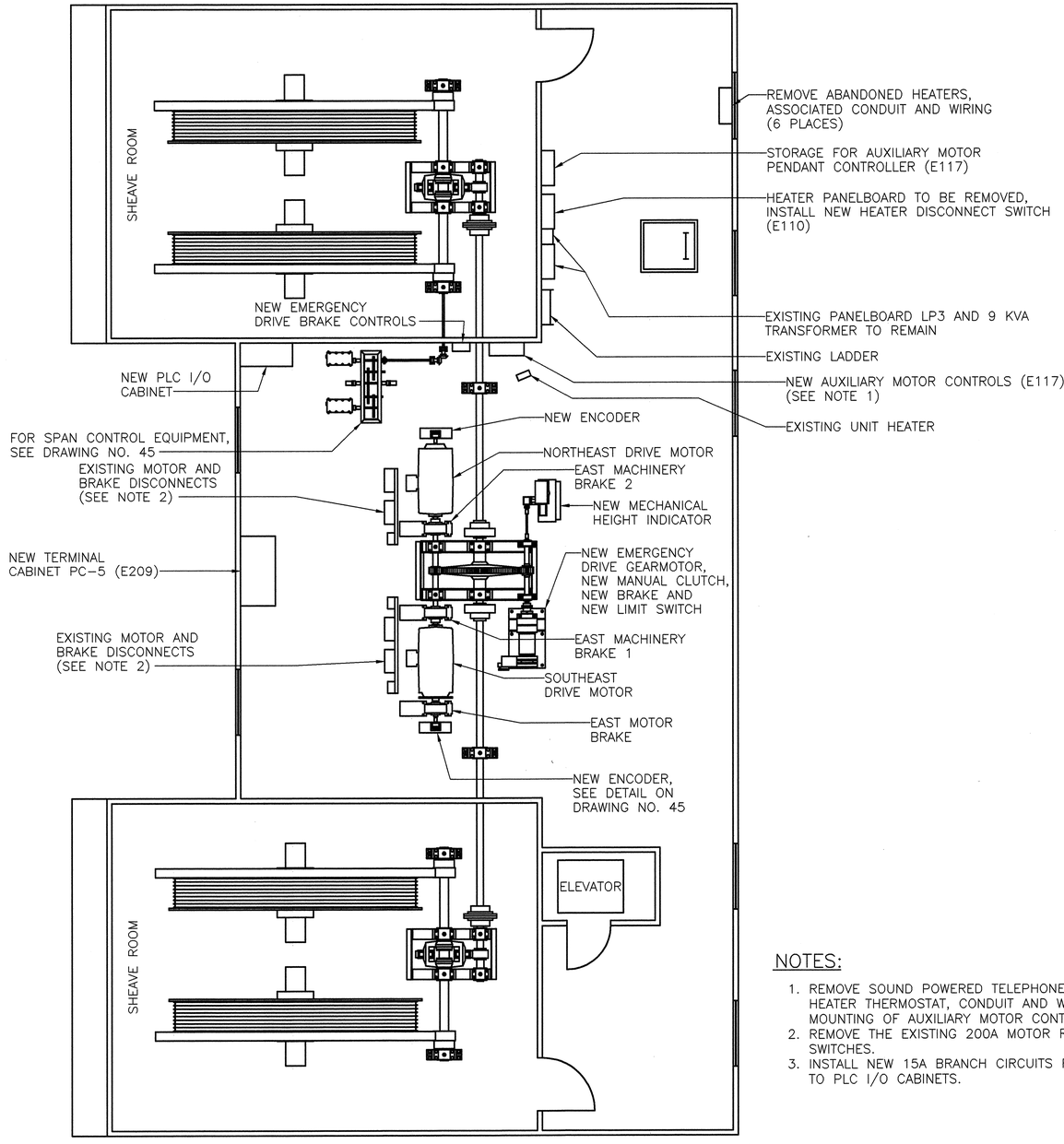
WILMINGTON, NORTH CAROLINA

CONTROL HOUSE – NEW

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	39 OF 53



WEST TOWER



EAST TOWER

PLAN
MACHINERY HOUSE
SCALE: 1/4" = 1'-0"

NOTES:

1. REMOVE SOUND POWERED TELEPHONE AND BELL. RELOCATE HEATER THERMOSTAT, CONDUIT AND WIRING TO FACILITATE MOUNTING OF AUXILIARY MOTOR CONTROL CABINET.
2. REMOVE THE EXISTING 200A MOTOR ROTOR DISCONNECT SWITCHES.
3. INSTALL NEW 15A BRANCH CIRCUITS FROM LP-2 AND LP-3 TO PLC I/O CABINETS.

4-28-2005
NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

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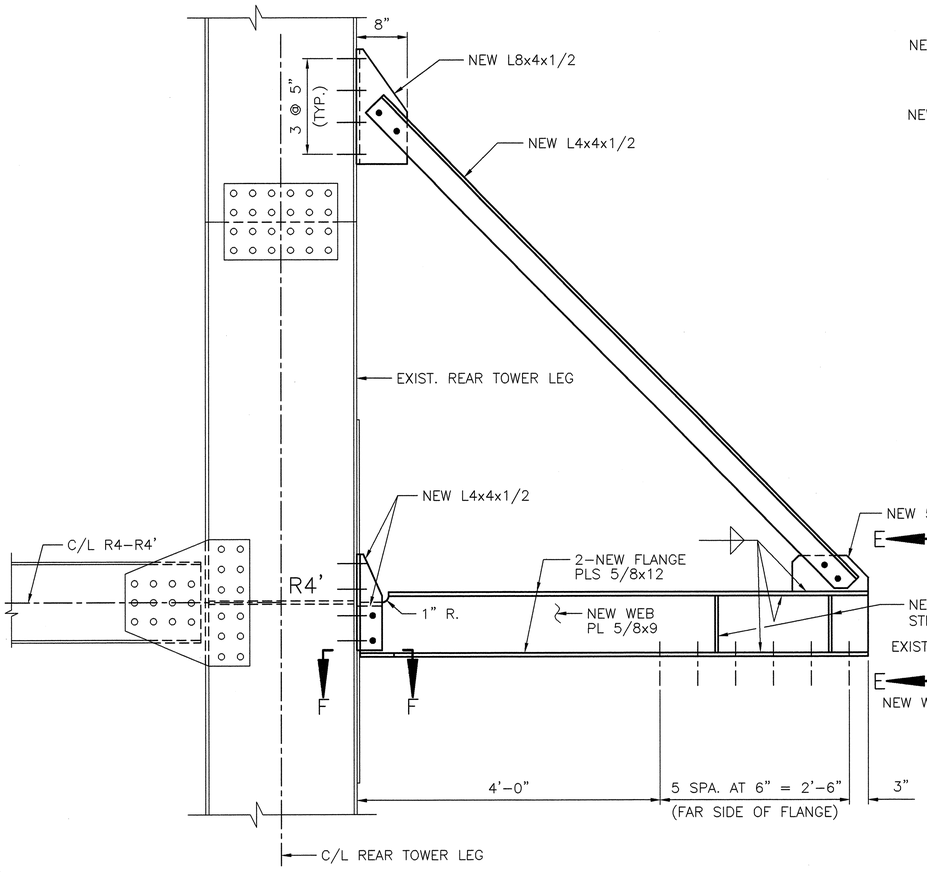
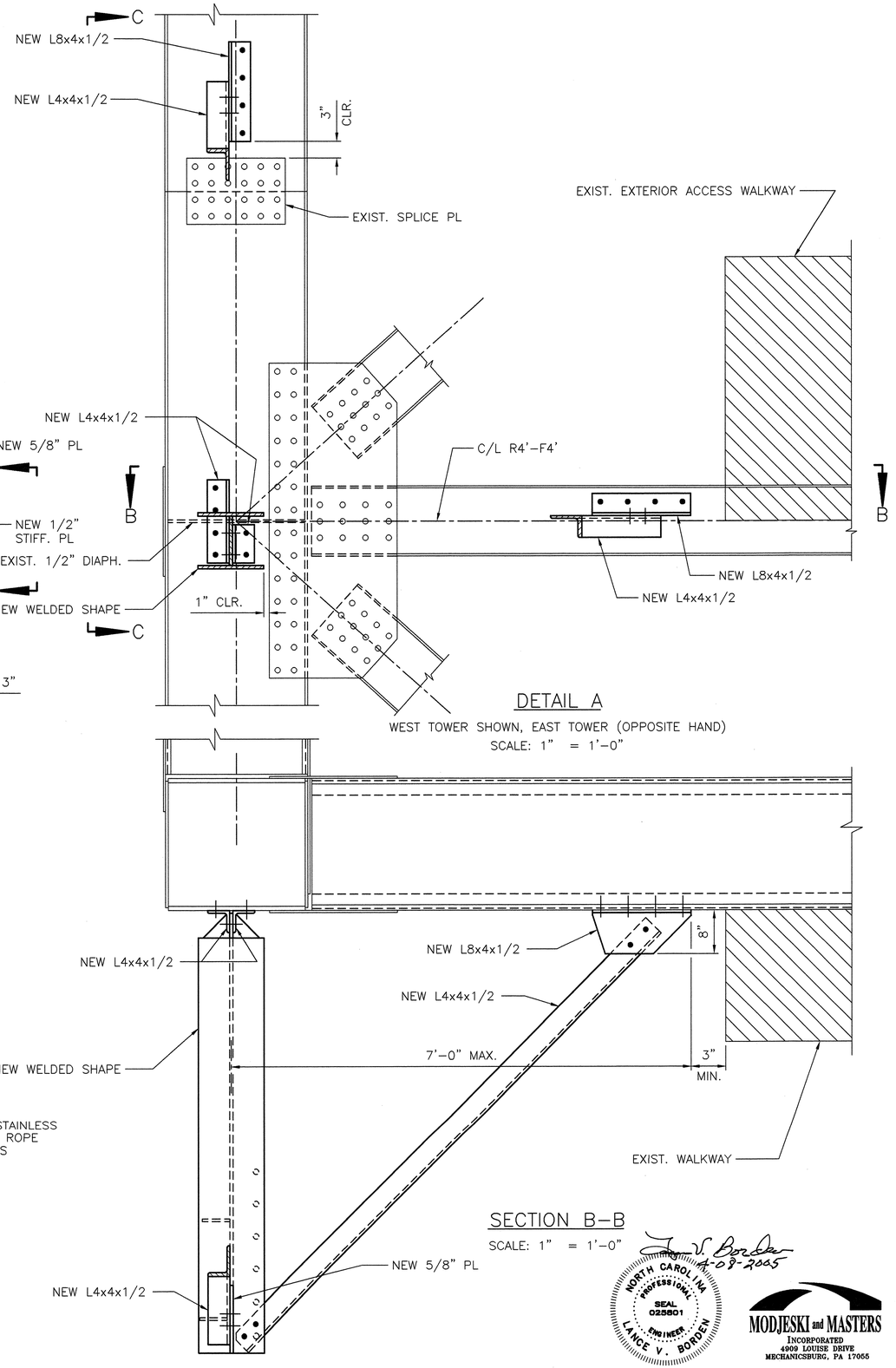
WILMINGTON, NORTH CAROLINA

MACHINERY HOUSE DETAILS

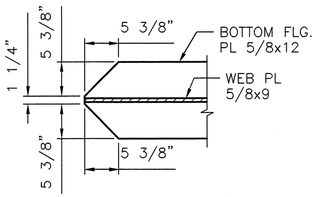
		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	40 OF 53





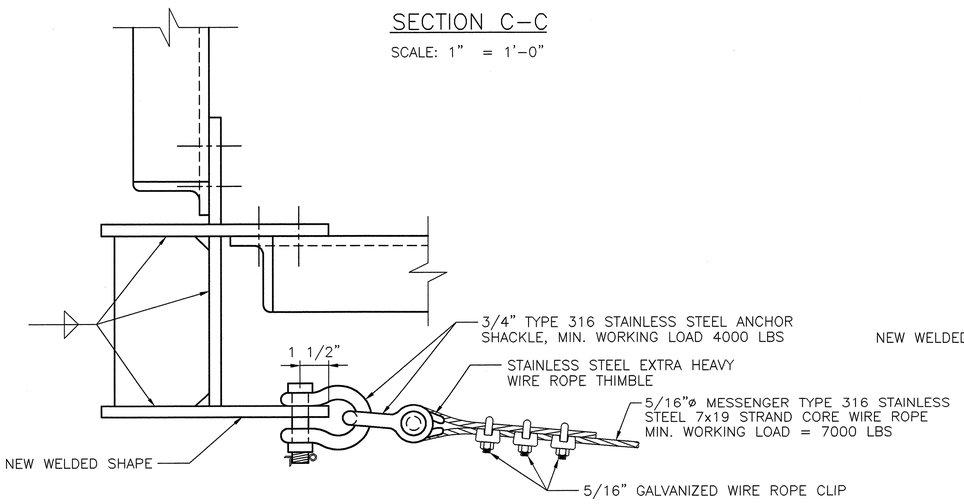
DETAIL A

WEST TOWER SHOWN, EAST TOWER (OPPOSITE HAND)
SCALE: 1" = 1'–0"



SECTION F–F

SCALE: 1" = 1'–0"



SECTION C–C

SCALE: 1" = 1'–0"

SECTION E–E

SCALE: 3" = 1'–0"

SECTION B–B

SCALE: 1" = 1'–0"

NOTES:

1. PROVIDE 7/8 INCH DIAMETER A325 BOLTS.
2. PROVIDE STRUCTURAL STEEL CONFORMING TO A709–GR36 ASTM A36 STEEL MAY BE PROVIDED WITH APPROVAL OF THE ENGINEER.
3. SEE DRAWING NO. 4 FOR LOCATION OF DETAIL A.
4. PROVIDE A PAINT SYSTEM FOR ALL NEW STRUCTURAL STEEL, INCLUDING TOUCH–UP OF ALL AREAS DAMAGED BY THE CONTRACTOR, THAT IS IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS, SECTION 1080–7, SELF–CURING INORGANIC ZINC PRIMER IN THE SHOP. APPLY TWO MORE COATS OF PAINT THAT IS APPROVED BY THE DEPARTMENT EXCEPT FOR FAYING SURFACES. THE TOP COAT OF PAINT SHALL NEARLY MATCH THE COLOR OF THE EXISTING BRIDGE PAINT. PRIOR TO ATTACHING NEW STRUCTURAL STEEL TO THE EXISTING STEEL STRUCTURE, THE FAYING SURFACE OF THE EXISTING STEEL SHALL BE SOLVENT CLEANED TO REMOVE DIRT AND OILS. THESE FAYING SURFACES SHALL BE ROUGHENED BY HAND WITH COARSE SANDPAPER.
5. VERIFY ALL DIMENSIONS, BOTH THOSE SHOWN AND THOSE NOT SHOWN, AND PROVIDE A COPY TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

L. V. Borden 4-08-2005

NORTH CAROLINA PROFESSIONAL SEAL 025601 ENGINEER LANCE V. BORDEN

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INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

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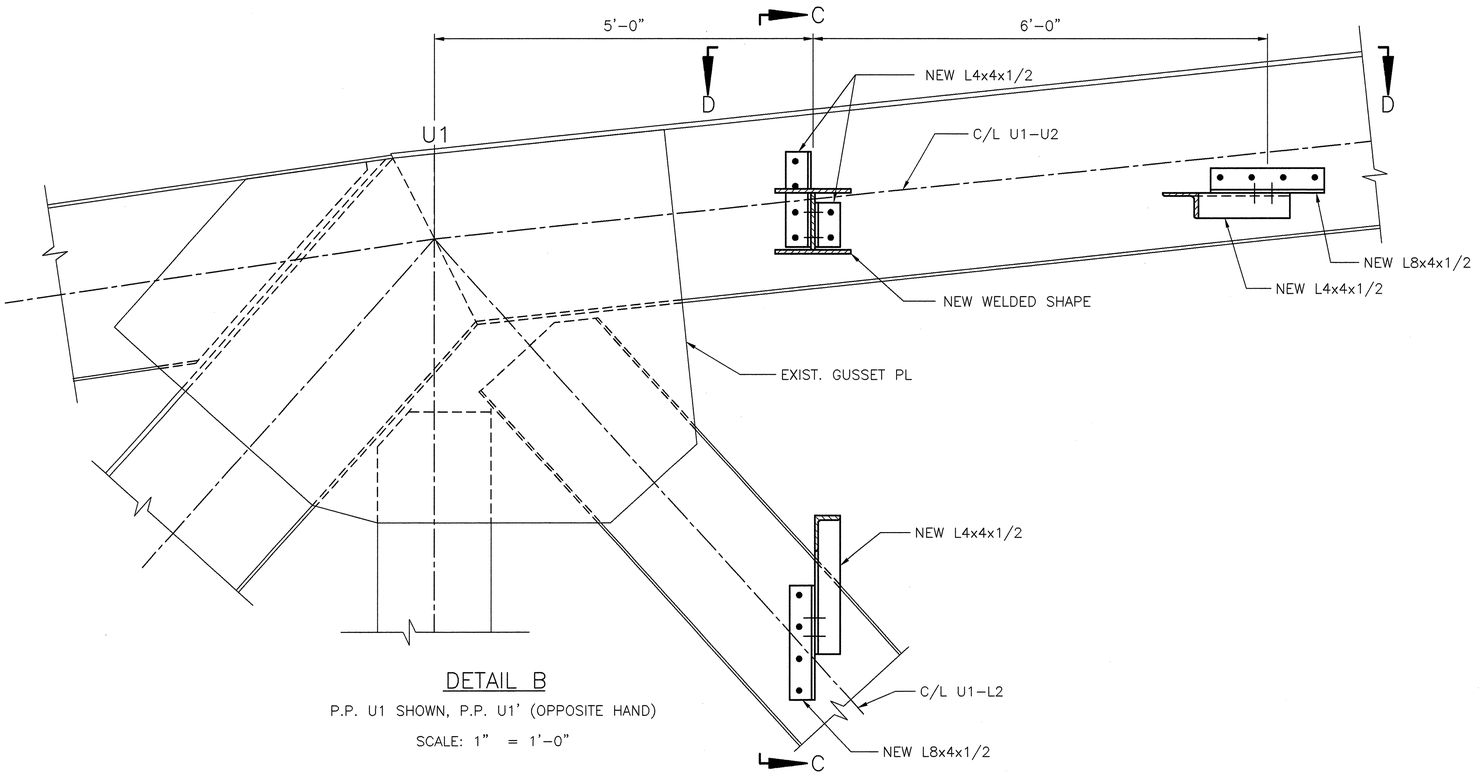
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

AERIAL CABLE SUPPORT – 1

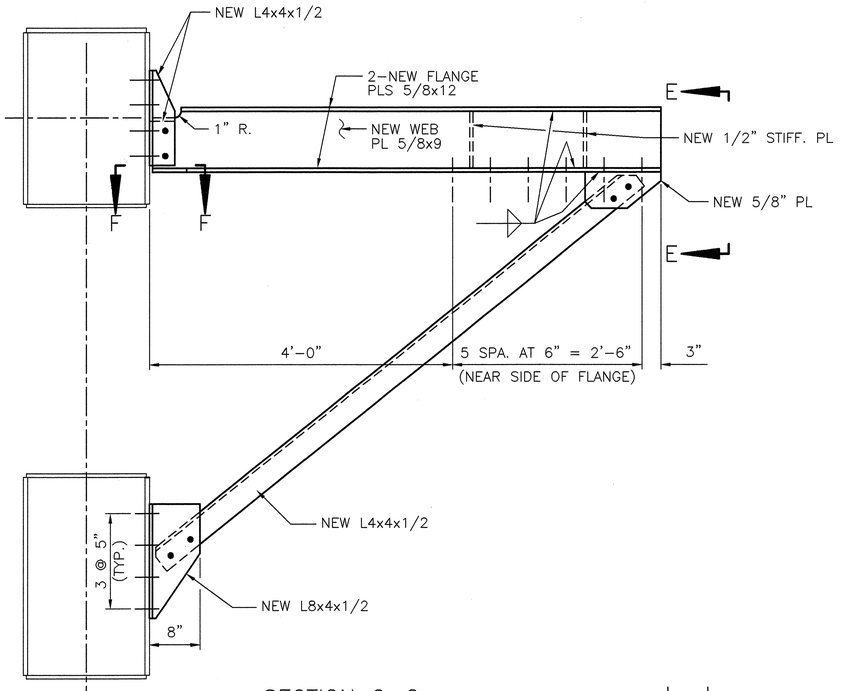
		DRAWN BY	S.L. HERB
		SCALE	AS NOTED
DESIGNED K.W. JOHNS	DETAILED S.L. HERB	DATE	APRIL, 2005
CHECKED M.C. IRWIN	CHECKED M.C. IRWIN	DRAWING NO.	41 OF 53



DETAIL B

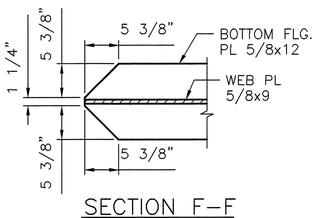
P.P. U1 SHOWN, P.P. U1' (OPPOSITE HAND)

SCALE: 1" = 1'-0"



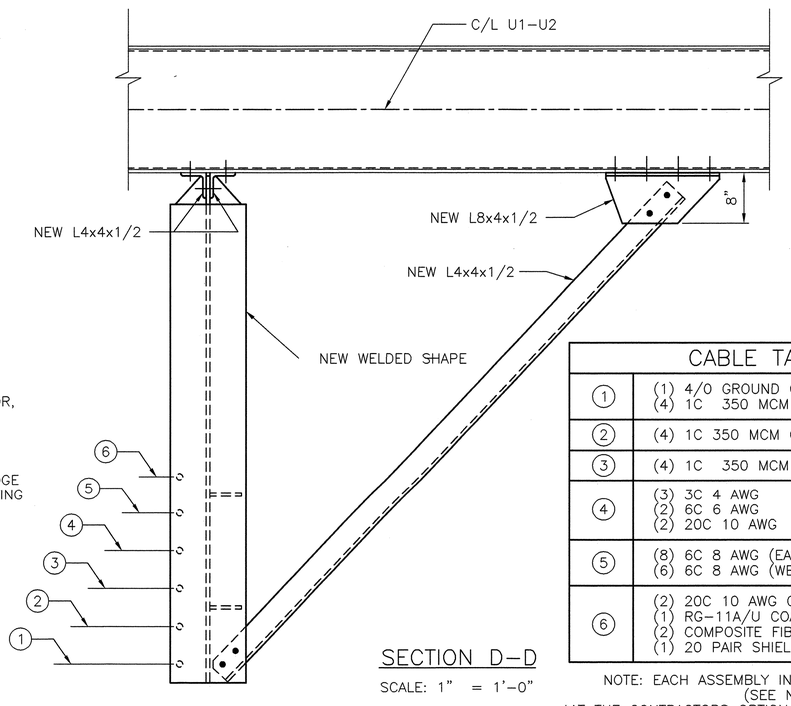
SECTION C-C

SCALE: 1" = 1'-0"



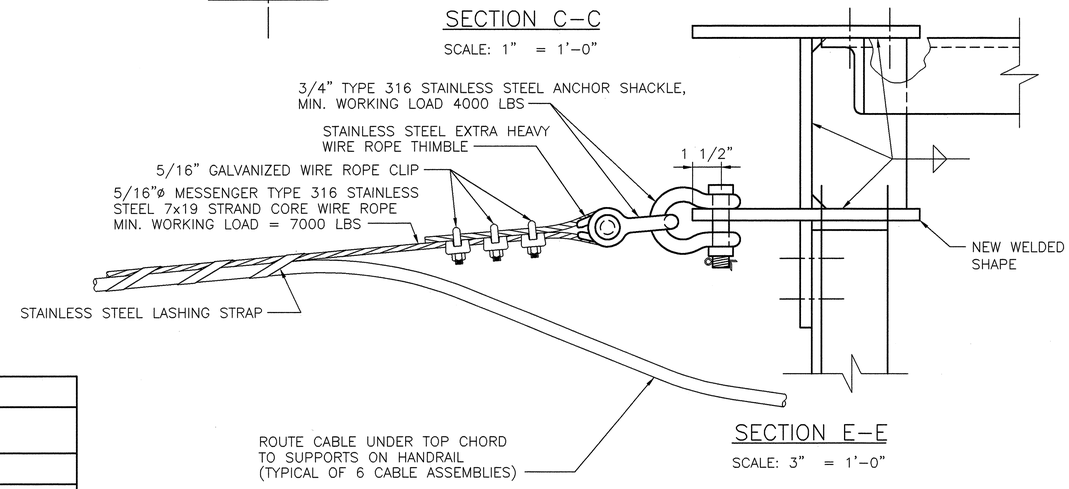
SECTION F-F

SCALE: 1" = 1'-0"



SECTION D-D

SCALE: 1" = 1'-0"



SECTION E-E

SCALE: 3" = 1'-0"

NOTES:

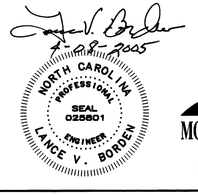
1. PROVIDE 7/8 INCH DIAMETER A325 BOLTS.
2. PROVIDE STRUCTURAL STEEL CONFORMING TO A709-GR36 ASTM A36 STEEL MAY BE PROVIDED WITH APPROVAL OF THE ENGINEER.
3. SEE DRAWING NO. 4 FOR LOCATION OF DETAIL B.
4. PROVIDE A PAINT SYSTEM FOR ALL NEW STRUCTURAL STEEL, INCLUDING TOUCH-UP OF ALL AREAS DAMAGED BY THE CONTRACTOR, THAT IS IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS, SECTION 1080-7, SELF-CURING INORGANIC ZINC PRIMER IN THE SHOP. APPLY TWO MORE COATS OF PAINT THAT IS APPROVED BY THE DEPARTMENT EXCEPT FOR FAYING SURFACES. THE TOP COAT OF PAINT SHALL NEARLY MATCH THE COLOR OF THE EXISTING BRIDGE PAINT. PRIOR TO ATTACHING NEW STRUCTURAL STEEL TO THE EXISTING STEEL STRUCTURE, THE FAYING SURFACE OF THE EXISTING STEEL SHALL BE SOLVENT CLEANED TO REMOVE DIRT AND OILS. THESE FAYING SURFACES SHALL BE ROUGHENED BY HAND WITH COARSE SANDPAPER.
5. VERIFY ALL DIMENSIONS, BOTH THOSE SHOWN AND THOSE NOT SHOWN, AND PROVIDE A COPY TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.
6. THE CABLE TABULATION IS BASED ON REQUIREMENTS FOR THE EQUIPMENT AS SHOWN ON THE PLANS AND DESCRIBED IN THE SPECIFICATIONS, INCLUDING SPARES, AND SHOULD BE CONSIDERED FOR REFERENCE ONLY. THE CONTRACTOR SHOULD PREPARE HIS OWN CABLE TABULATION BASED ON THE EQUIPMENT APPROVED FOR INSTALLATION. EACH CONDUCTOR SIZE SHALL INCLUDE A MINIMUM OF 50 PERCENT SPARES.

CABLE TABULATION

1	(1) 4/0 GROUND CABLE (4) 1C 350 MCM CABLE*
2	(4) 1C 350 MCM CABLE*
3	(4) 1C 350 MCM CABLE*
4	(3) 3C 4 AWG (2) 6C 6 AWG (2) 20C 10 AWG
5	(8) 6C 8 AWG (EAST) (6) 6C 8 AWG (WEST)
6	(2) 20C 10 AWG CABLES (1) RG-11A/U COAXIAL CABLES (2) COMPOSITE FIBER OPTIC/TWIN AXIAL CABLES (1) 20 PAIR SHIELDED AWG 16 CABLE

NOTE: EACH ASSEMBLY INCLUDES 5/16"ø MESSENGER. (SEE NOTE 6)

*AT THE CONTRACTORS OPTION, FOUR CONDUCTOR, 350 MCM CABLE COMPLYING WITH PIECE NO. E205 ON THE EQUIPMENT SCHEDULE MAY BE SUBSTITUTED.



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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

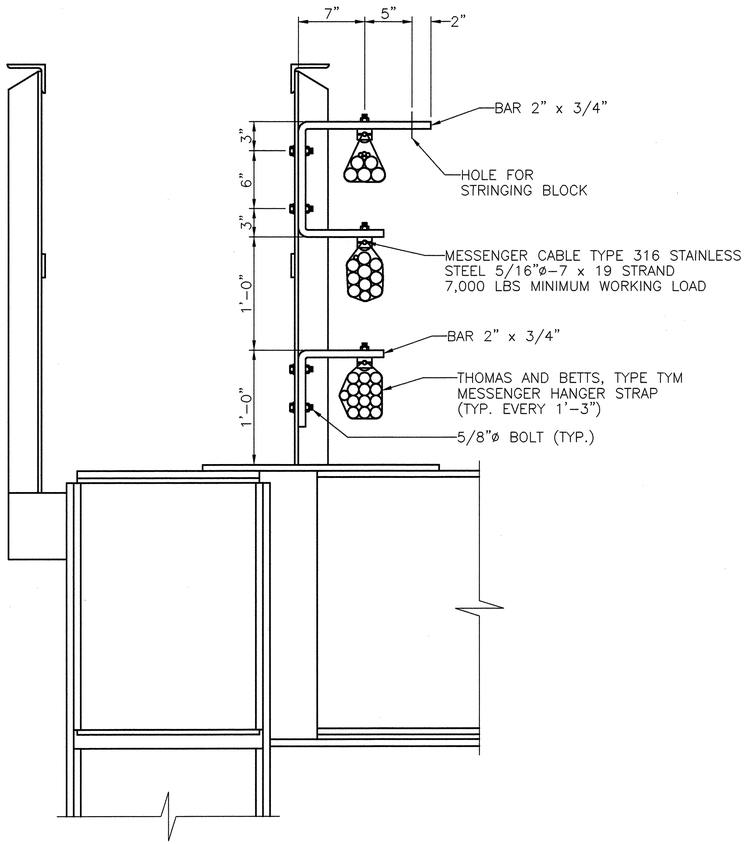
RALEIGH

CAPE FEAR RIVER CROSSING

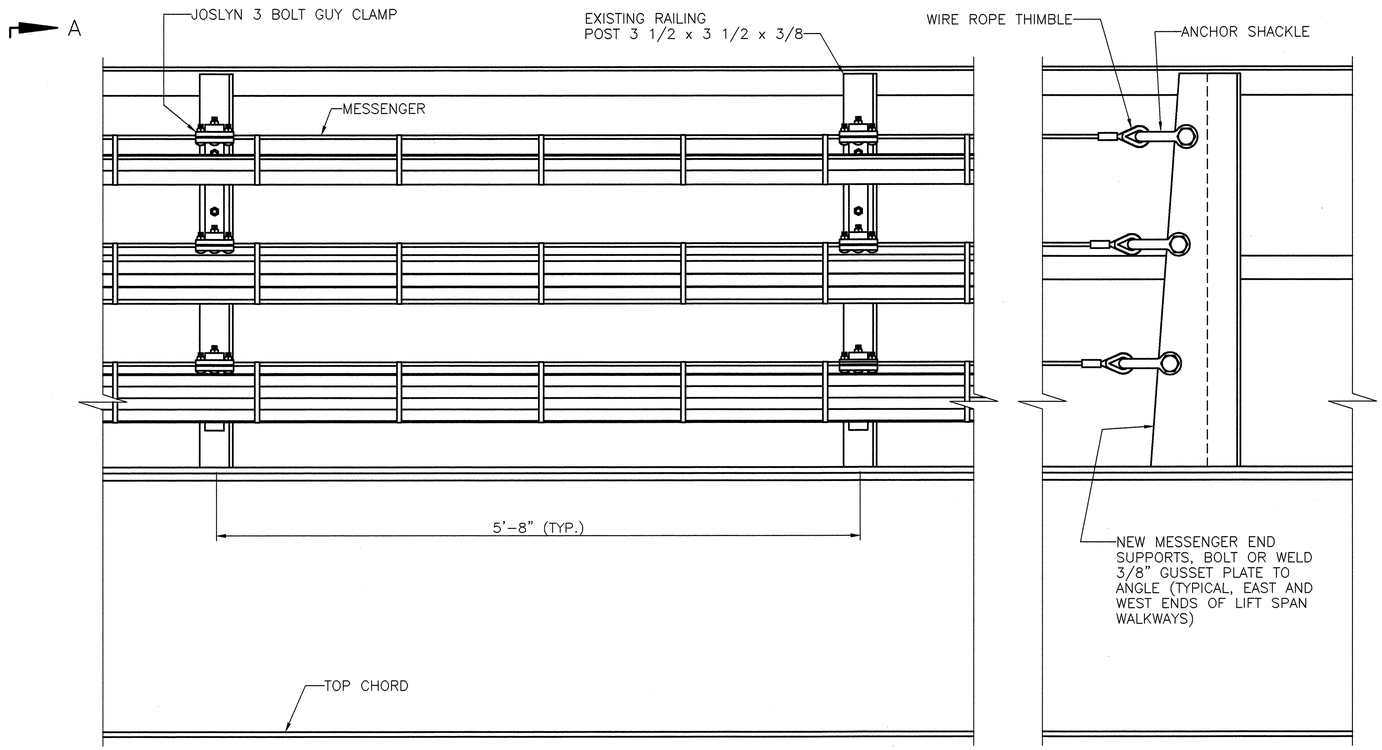
WILMINGTON, NORTH CAROLINA

AERIAL CABLE SUPPORT – 2

				DRAWN BY	S.L. HERB
				SCALE	AS NOTED
DESIGNED	K.W. JOHNS	DETAILED	S.L. HERB	DATE	APRIL, 2005
CHECKED	M.C. IRWIN	CHECKED	M.C. IRWIN	DRAWING NO.	42 OF 53



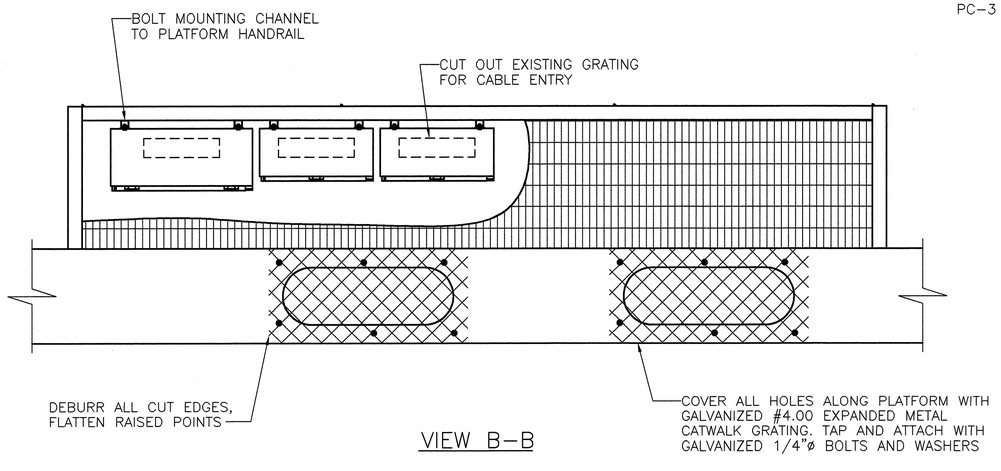
VIEW A-A
SCALE: 1 1/2" = 1'-0"



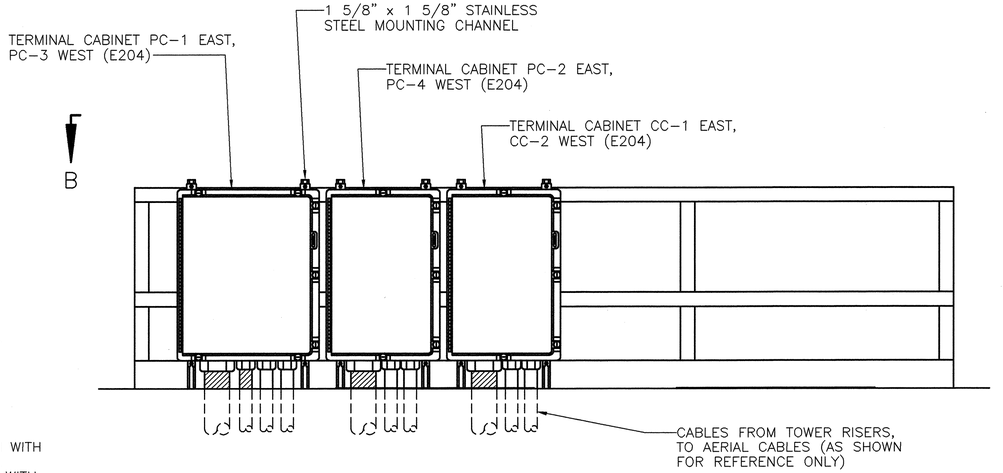
CABLE SUPPORT DETAIL ON LIFT SPAN
SCALE: 1 1/2" = 1'-0"

NOTES:

1. ALL CABLE SUPPORT COMPONENTS SHALL BE CORROSION RESISTANT.
2. MESSENGER SUPPORT BAR MATERIAL TO BE HOT-DIP GALVANIZED.
3. TERMINAL CABINETS SHALL BE PERMANENTLY LABELED WITH THE CABINET DESIGNATION (CC-1, ETC.) ALL CABINETS SHALL INCLUDE WARNING SIGN "DANGER, 480 VOLTS, KEEP OUT".
4. POWER AND CONTROL CABLES TO BE GROUPED SEPARATELY.

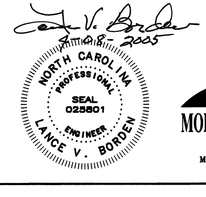


VIEW B-B



ELEVATION

TERMINAL CABINETS AT TOWER PLATFORMS
SCALE: 3/4" = 1'-0"



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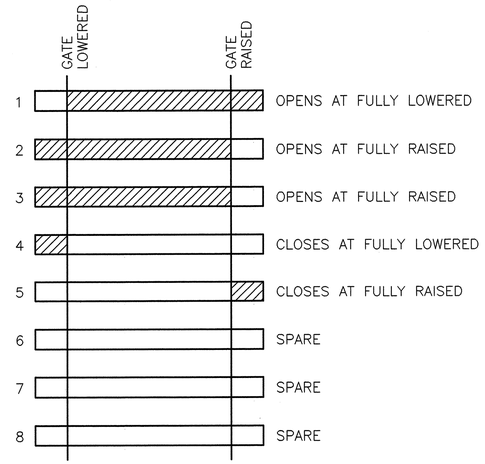
WILMINGTON, NORTH CAROLINA

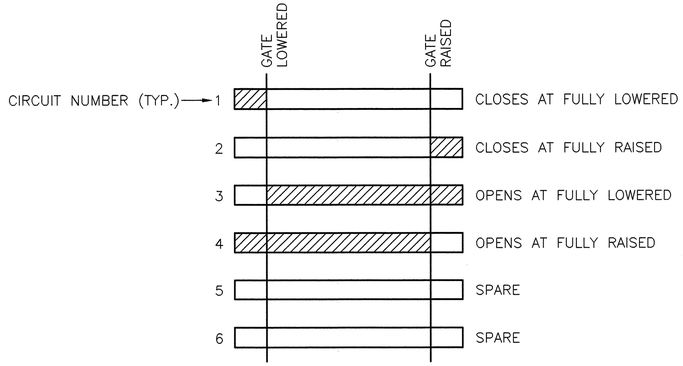
AERIAL CABLE DETAILS

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	43 OF 53



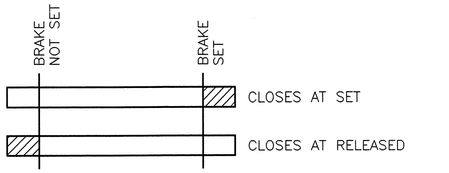
WARNING GATE LIMIT SWITCHES

LS–WG, LS–EG
(EXISTING)



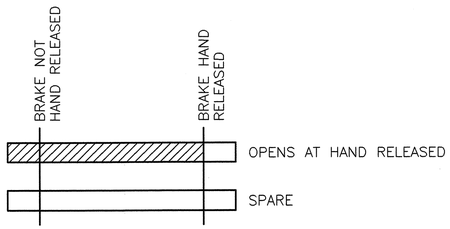
BARRIER GATE LIMIT SWITCHES

(PART OF NEW BARRIER GATE ASSEMBLY)
LS–WB, LS–EB



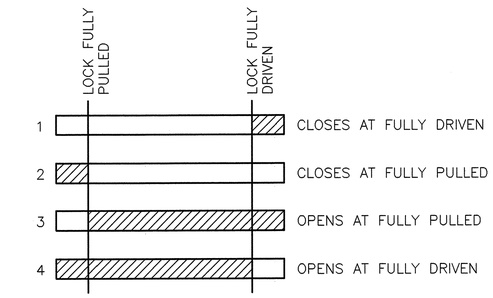
BRAKE LIMIT SWITCHES

LS–MOBE, LS–MABE1, LS–MABW1,
LS–MOBW, LS–MABE2, LS–MABW2



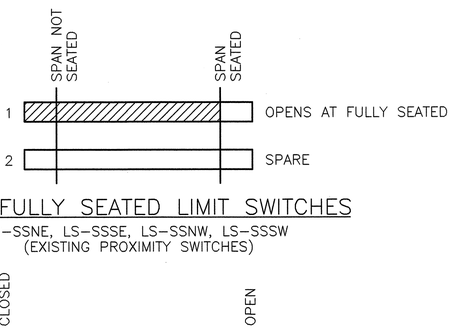
BRAKE HAND RELEASED LIMIT SWITCHES

LS–MOBEHR, LS–MABE1HR, LS–MABE2HR,
LS–MOBWHR, LS–MABW1HR, LS–MABE2HR



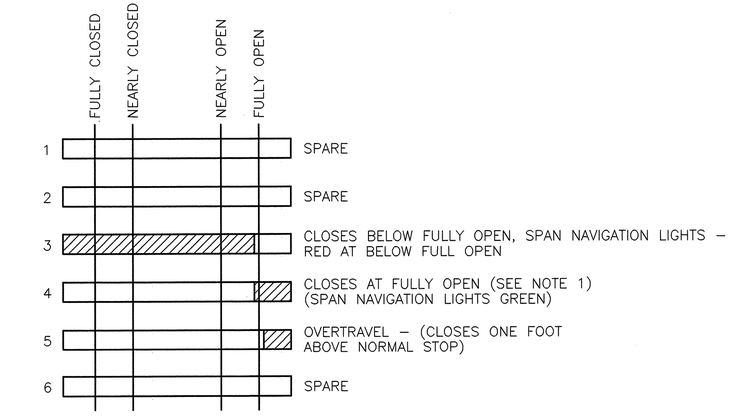
SPAN LOCK LIMIT SWITCHES

LS–ESL, LS–WSL
(EXISTING)



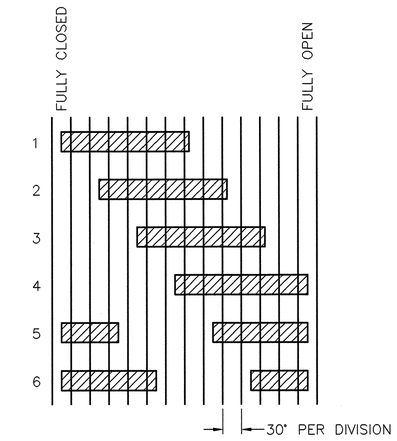
SPAN FULLY SEATED LIMIT SWITCHES

LS–SSNE, LS–SSSE, LS–SSNW, LS–SSSW
(EXISTING PROXIMITY SWITCHES)



SPAN CONTROL LIMIT SWITCH

LS–SC
(E107)



INDIVIDUAL DWELL = 180°
OVERLAP = 120°

SKEW SHUTDOWN LIMIT SWITCH

(2 PLACES)
(E123)

NOTES:

1. THE FULL OPEN SETTING OF THIS SWITCH SHALL BE FIELD DETERMINED SUCH THAT IT SENSES FULL OPEN SLIGHTLY BEFORE THE FULL OPEN SETTING OF THE RESOLVER (I.E. SO THAT THE SPAN NAVIGATION LIGHTS TURN GREEN BEFORE THE MASTER RAISE SEQUENCE IS DE–ENGERIZED AND THE BRIDGE COMES TO A COMPLETE STOP.)
2. BRAKE, SPAN LOCK AND WARNING GATE SWITCHES ARE EXISTING. BARRIER GATE AND SPAN CONTROL SWITCHES ARE NEW.
3. TEST EXISTING LIMIT SWITCHES ON WARNING GATES, SPAN LOCKS AND BRAKES FOR PROPER OPERATION. CLEAR CONTACTS, ADJUST IF NECESSARY.

LEGEND

CONTACTS CLOSED

CONTACTS OPEN

4-8-2005
NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

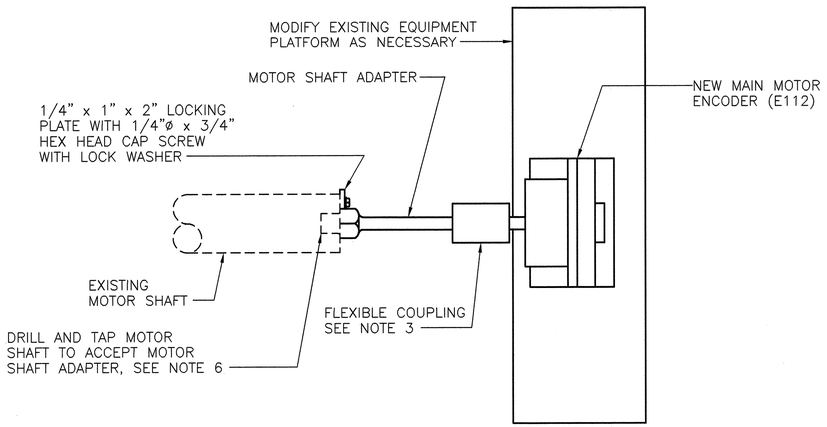
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

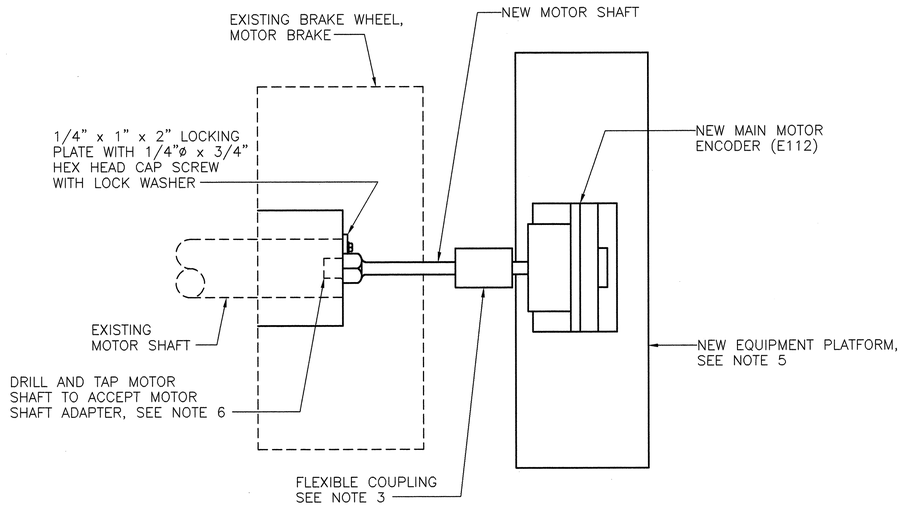
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

LIMIT SWITCH CONTACT SETTINGS

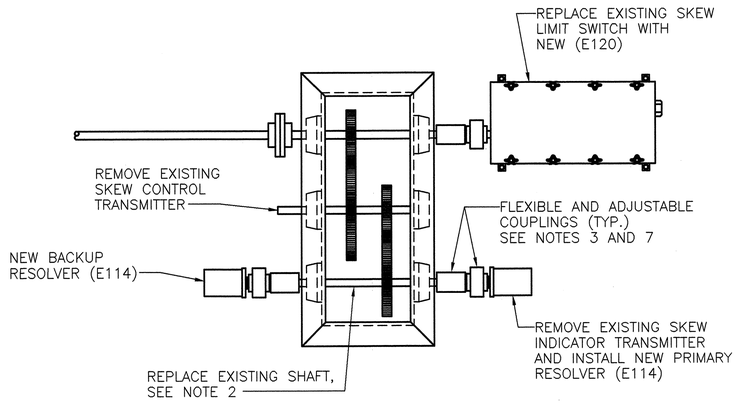
		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	44 OF 53



NORTHEAST AND NORTHWEST MOTORS



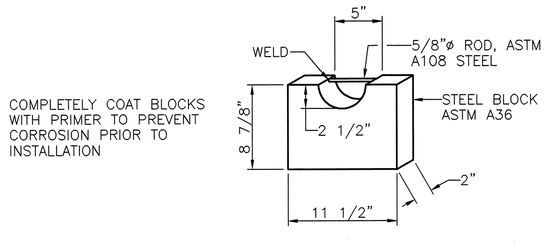
SOUTHEAST AND SOUTHWEST MOTORS



SPAN CONTROL EQUIPMENT
WEST TOWER
SCALE: 1 1/2" = 1'-0"

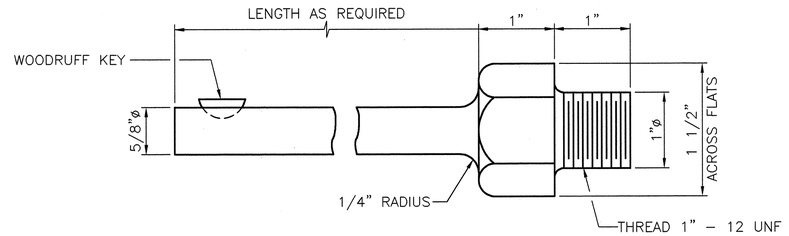
MOTOR ENCODERS DETAILS

SCALE: 3" = 1'-0"



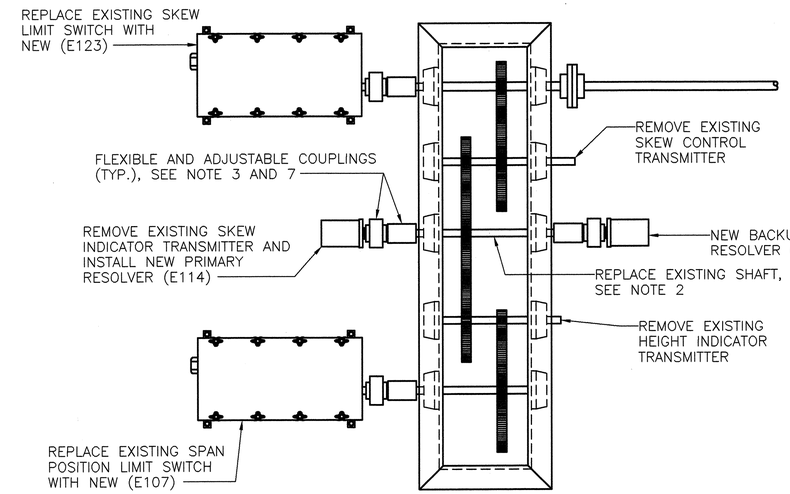
NEW STEEL COUNTERWEIGHT BLOCK

SCALE: 1 1/2" = 1'-0"
800 NEW STEEL BLOCKS REQUIRED

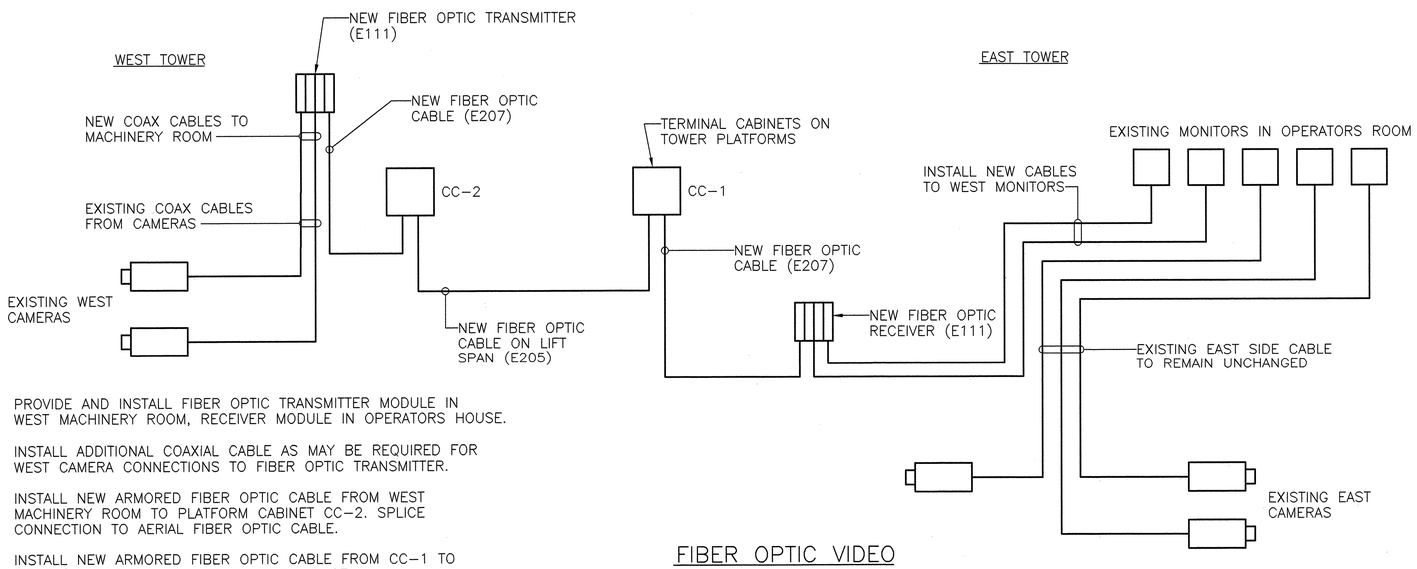


MOTOR SHAFT ADAPTER

SCALE: 1" = 1"



SPAN CONTROL EQUIPMENT
EAST TOWER
SCALE: 1 1/2" = 1'-0"



PROVIDE AND INSTALL FIBER OPTIC TRANSMITTER MODULE IN WEST MACHINERY ROOM, RECEIVER MODULE IN OPERATORS HOUSE.

INSTALL ADDITIONAL COAXIAL CABLE AS MAY BE REQUIRED FOR WEST CAMERA CONNECTIONS TO FIBER OPTIC TRANSMITTER.

INSTALL NEW ARMORED FIBER OPTIC CABLE FROM WEST MACHINERY ROOM TO PLATFORM CABINET CC-2. SPLICE CONNECTION TO AERIAL FIBER OPTIC CABLE.

INSTALL NEW ARMORED FIBER OPTIC CABLE FROM CC-1 TO FIBER OPTIC RECEIVER IN OPERATORS HOUSE.

INSTALL NEW COAXIAL CABLES FROM NEW RECEIVER MODULE TO EXISTING MONITORS.

FIBER OPTIC VIDEO TRANSMISSION SYSTEM

NO SCALE

NOTES:

1. ALL SPAN CONTROL DEVICES SHALL INCLUDE ALL MOUNTING PROVISIONS, ACCESSORIES, AND MISCELLANEOUS HARDWARE NECESSARY FOR PROPER INSTALLATION.
2. REPLACE EXISTING SHAFT ON EXISTING GEAR LG3 WITH NEW DOUBLE EXTENSION STAINLESS STEEL SHAFT TO FACILITATE INSTALLATION OF NEW RESOLVERS.
3. FLEXIBLE COUPLINGS SHALL BE STAINLESS STEEL HELICAL-BEAM TYPE WITH INTEGRAL CLAMP, SUCH AS HELICAL PRODUCTS COMPANY MC7C OR APPROVED EQUAL.
4. MODIFY EXISTING, OR INSTALL NEW, SPAN CONTROL EQUIPMENT PLATFORMS AS NECESSARY FOR MOUNTING NEW DEVICES. NEW WORK SHALL BE OF SIMILAR CONSTRUCTION TO EXISTING PLATFORMS AND PAINTED TO MATCH EXISTING.
5. EQUIPMENT PLATFORM SHALL BE SUPPORTED FROM MOTOR BRAKE SUPPORT FRAME. AVOID INTERFERENCE WITH PERSONNEL LADDER.
6. MOTOR SHAFT ADAPTER MUST RUN CONCENTRIC WITH MOTOR SHAFT C/L WITHIN 0.003" T.I.R.
7. HAND ROTATABLE, ROTATIONAL INDEXER SHALL PROVIDE 100:1 ADJUSTMENT OF SHAFT POSITION AS MANUFACTURED BY HARMONIC DRIVE TECHNOLOGIES, TYPE HDI, OR ACCEPTED EQUAL.

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

4-08-2005

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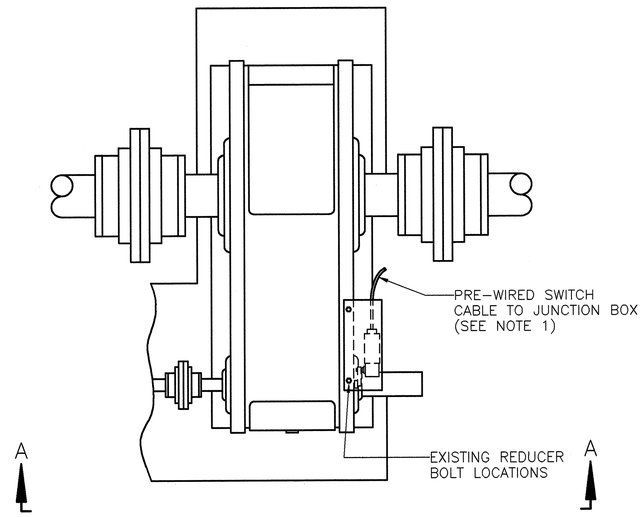
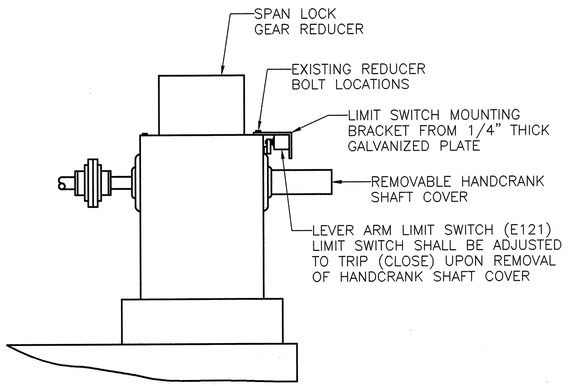
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA
MISCELLANEOUS ELECTRICAL DETAILS - 1

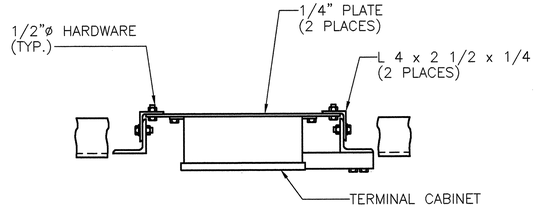
		DRAWN BY R.L. REED
		SCALE AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE APRIL, 2005
CHECKED N.E. ALGER	CHECKED G.L. FASICK	DRAWING NO. 45 OF 53



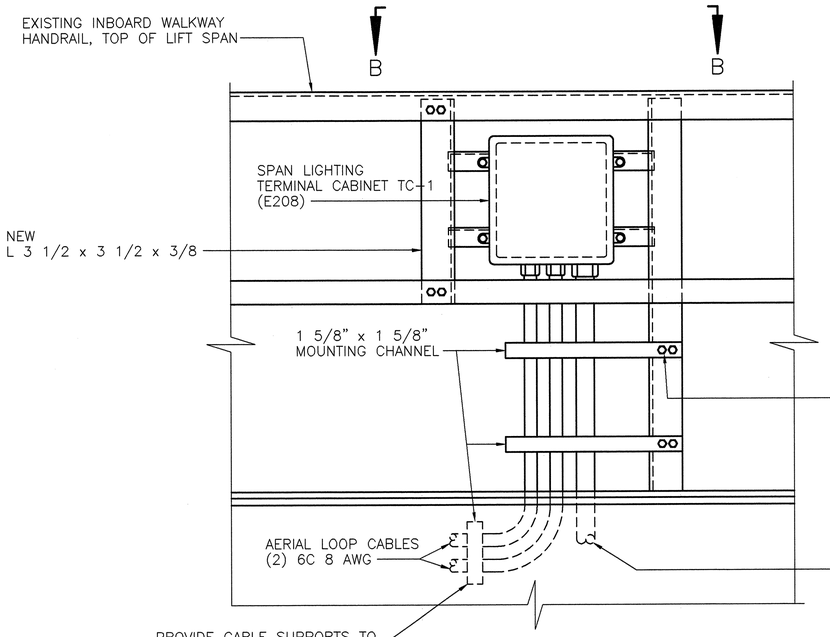
PLAN
SPAN LOCK HANDCRANK INTERLOCK LIMIT SWITCH
SCALE: 1 1/2" = 1'-0"
TYPICAL, EAST AND WEST SPAN LOCK ASSEMBLIES



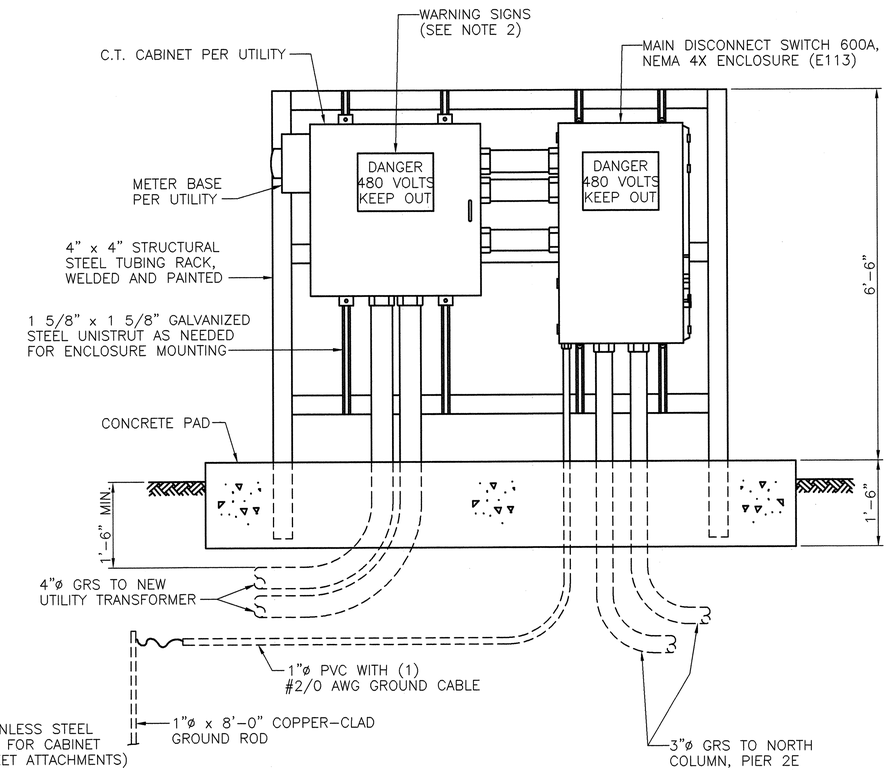
VIEW A-A
SCALE: 1 1/2" = 1'-0"



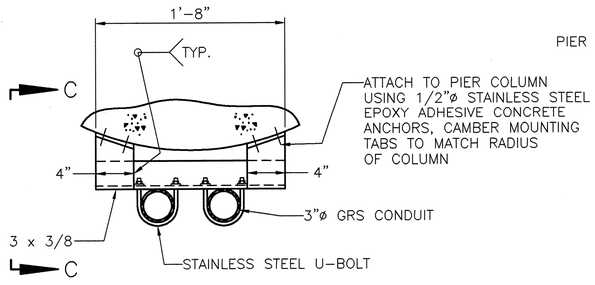
VIEW B-B
SCALE: 1 1/2" = 1'-0"



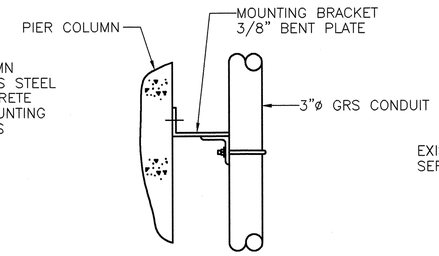
TERMINAL CABINET
ON LIFT SPAN
SCALE: 1 1/2" = 1'-0"
LOOKING NORTH, EAST END OF LIFT SPAN



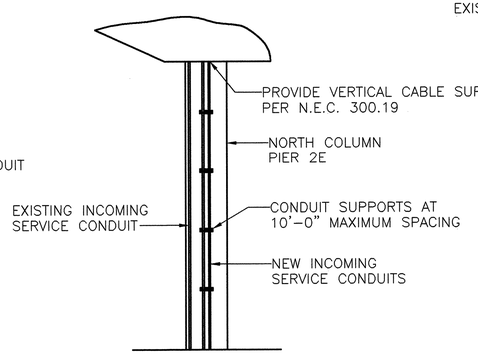
INCOMING SERVICE RACK DETAIL
SCALE: 3/4" = 1'-0"
EXACT LOCATION TO BE DETERMINED IN THE FIELD



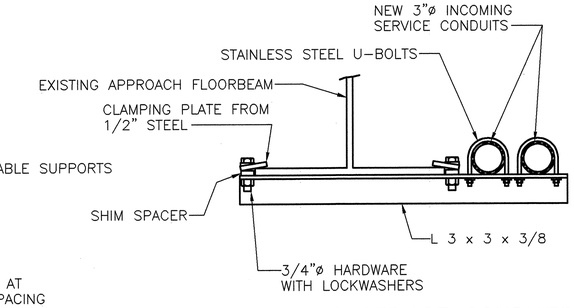
PLAN
CONDUIT MOUNTING AT PIER 2E
SCALE: 1 1/2" = 1'-0"
HOT DIP GALVANIZED AFTER FABRICATION



VIEW C-C
SCALE: 1 1/2" = 1'-0"



ELEVATION
PIER 2E COLUMN
NO SCALE



INCOMING SERVICE CONDUITS
MOUNTING DETAILS
SCALE: 1 1/2" = 1'-0"
(SEE NOTE 3)

NOTES:

1. PROVIDE NEMA 4X JUNCTION BOX FOR LIMIT SWITCH CABLE TERMINATION AND NEW 3/4"ø CONDUIT TO NORTHEAST TERMINAL CABINET PIER 1E, SOUTHWEST TERMINAL CABINET PIER 1W.
2. WARNING SIGNS SHALL BE PERMANENTLY AFFIXED TO EQUIPMENT AND SHALL BE IN ACCORDANCE WITH NATIONAL ELECTRICAL SAFETY CODE REQUIREMENTS.
3. CONDUIT SUPPORT ANGLE, SPACERS AND CLAMPS TO BE HOT-DIP GALVANIZED. UTILIZE STAINLESS STEEL HARDWARE WITH THREAD LOCKER ADHESIVE, LOCKTITE RED OR SIMILAR.

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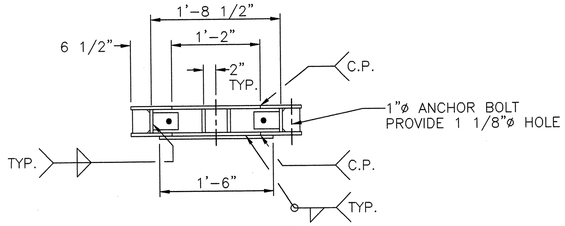
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA
MISCELLANEOUS ELECTRICAL DETAILS - 2

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED Q.C. TON	CHECKED G.L. FASICK	DRAWING NO.	46 OF 53

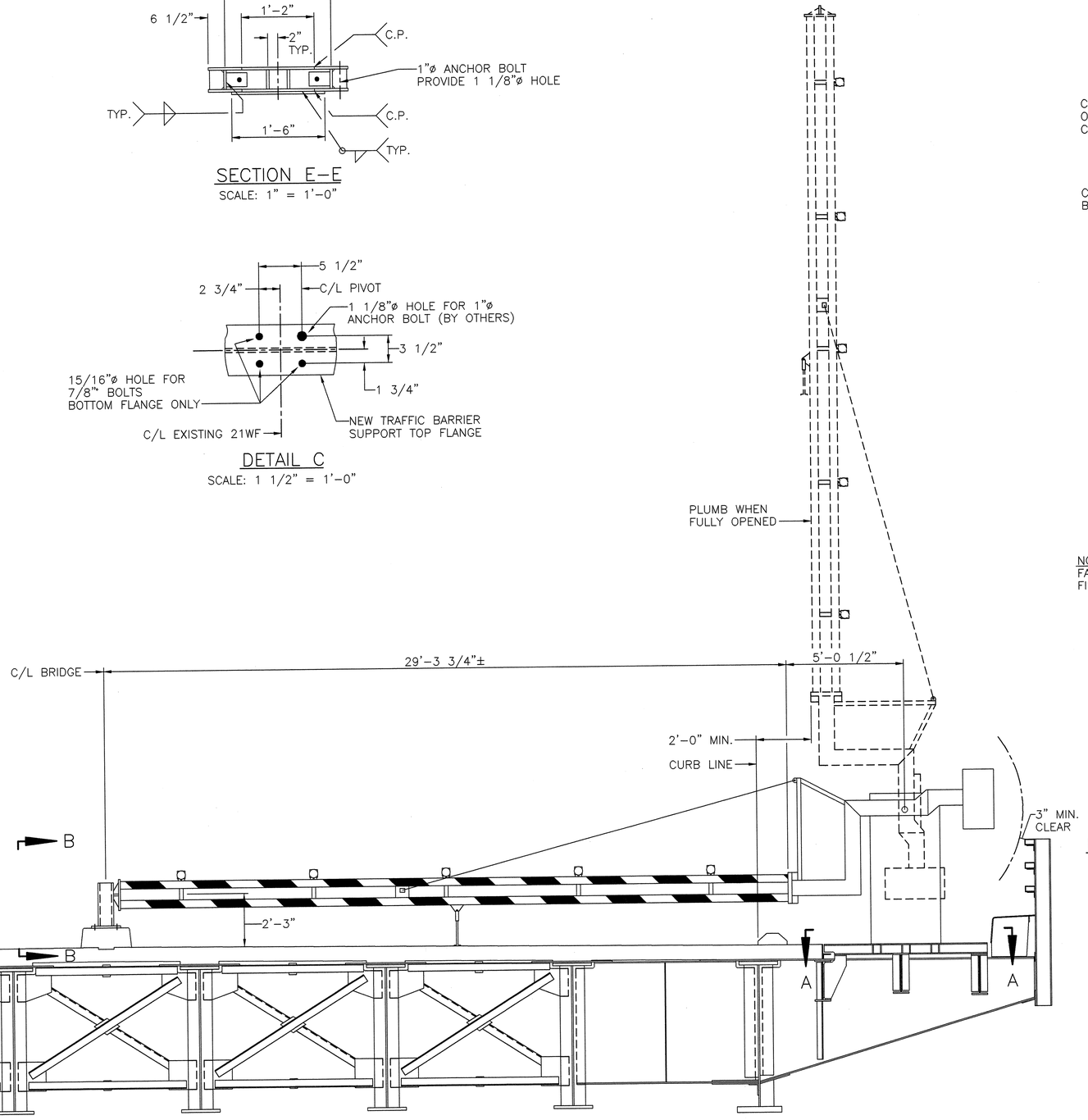


SECTION E-E

SCALE: 1" = 1'-0"

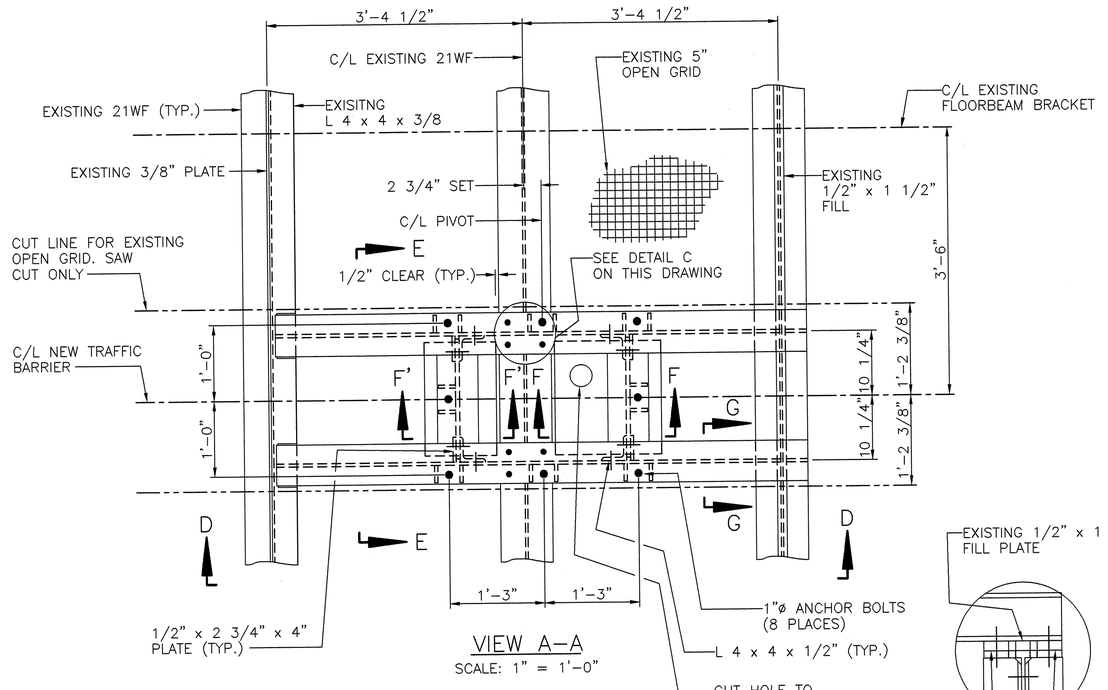
DETAIL C

SCALE: 1 1/2" = 1'-0"



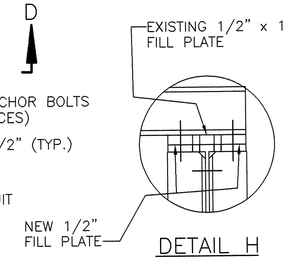
TRAFFIC BARRIER MOUNTING DETAIL

SCALE: 3/8" = 1'-0"



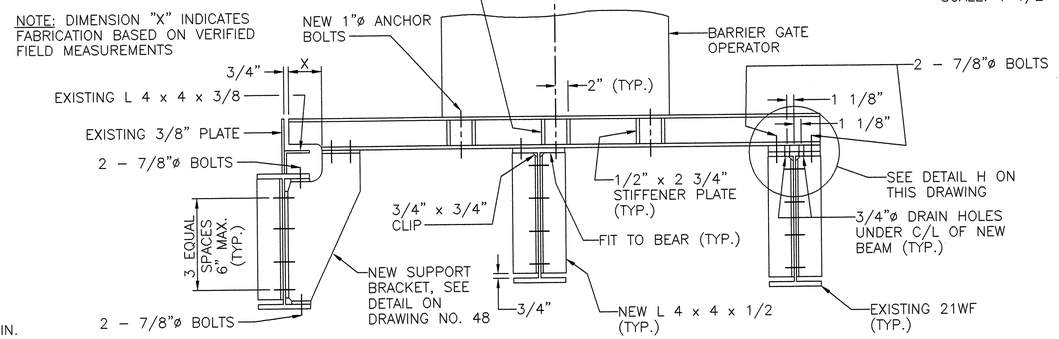
VIEW A-A

SCALE: 1" = 1'-0"



DETAIL H

SCALE: 1 1/2" = 1'-0"



SECTION D-D

SCALE: 1" = 1'-0"

NOTE: DIMENSION "X" INDICATES FABRICATION BASED ON VERIFIED FIELD MEASUREMENTS

NOTES:

1. PROVIDE 7/8 INCH DIAMETER A325 BOLTS.
2. PROVIDE STRUCTURAL STEEL CONFORMING TO A709-GR36.
3. SAW CUT AND REMOVE THE EXISTING OPEN GRID, WITHIN THE LIMITS SHOWN, USING AIR-ARC PROCEDURES. RETAIN THIS PIECE OF GRID AND MODIFY AS REQUIRED TO FILL IN AROUND THE OPERATOR.
4. EMBED ADHESIVE ANCHOR BOLTS 10 INCHES INTO THE MEDIAN OR AS REQUIRED TO PROVIDE A MINIMUM PULL OUT STRENGTH OF 35,000 POUNDS PER ANCHOR BOLT.
5. SAW CUT AND REMOVE A PORTION OF THE EXISTING BOX BEAM MEDIAN, AS REQUIRED. IF AN EXISTING MEDIAN BARRIER SUPPORT POST INTERFERES WITH THE NEW END LOCK, CONTACT THE ENGINEER.
6. PROVIDE A PAINT SYSTEM FOR ALL NEW STRUCTURAL STEEL, INCLUDING TOUCH-UP OF ALL AREAS DAMAGED BY THE CONTRACTOR, THAT IS IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS.
7. VERIFY ALL DIMENSIONS, BOTH THOSE SHOWN AND THOSE NOT SHOWN, AND PROVIDE A COPY TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.
8. FOR SECTION B-B, F-F, F'-F' AND G-G SEE DRAWING NO. 48.

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

4-08-2005

MODJESKI and MASTERS
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SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

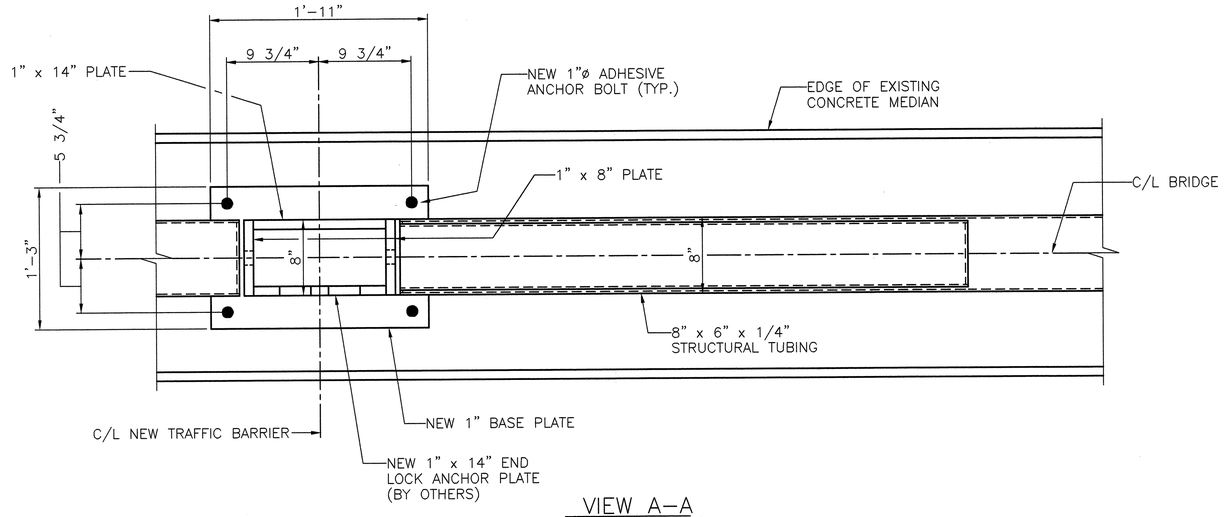
RALEIGH

CAPE FEAR RIVER CROSSING

WILMINGTON, NORTH CAROLINA

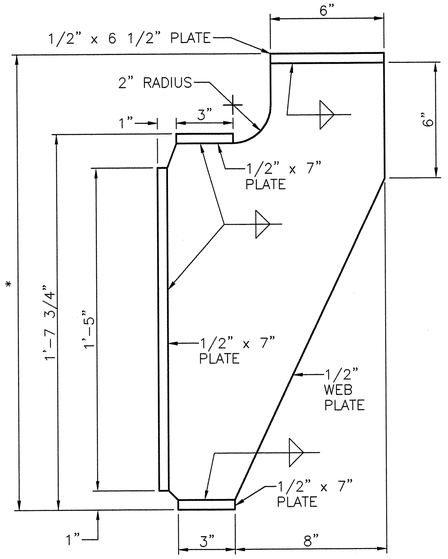
TRAFFIC BARRIER GATE DETAILS - 1

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED K.W. JOHNS	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED M.C. IRWIN	CHECKED M.C. IRWIN	DRAWING NO.	47 OF 53



VIEW A–A

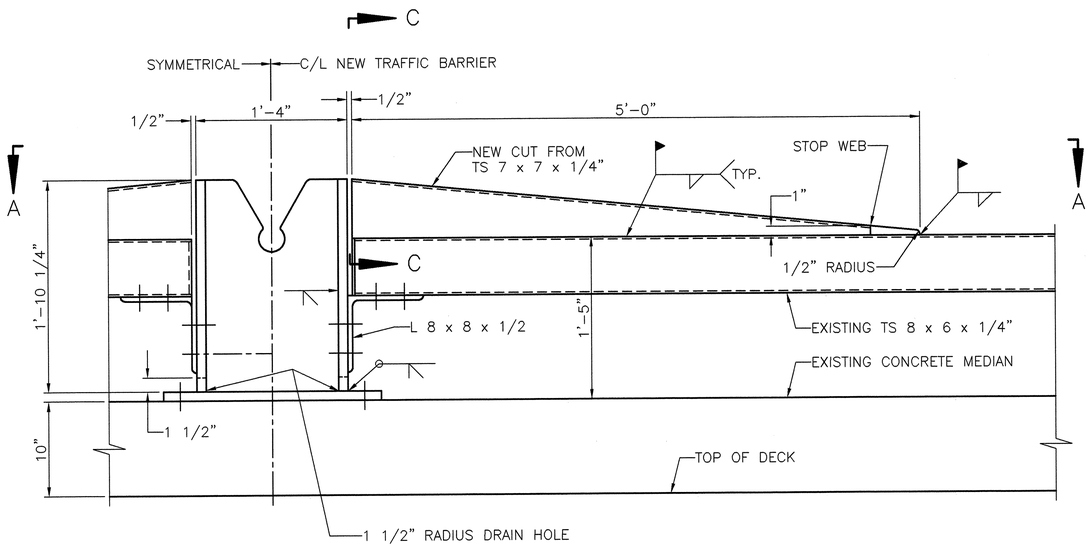
SCALE: 1 1/2" = 1'-0"



*SEE NOTE 7, ON DRAWING NO. 37

TRAFFIC BARRIER BRACKET

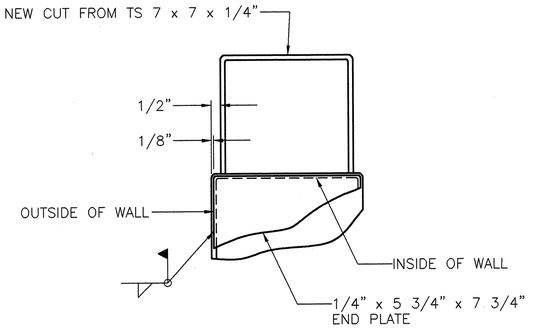
SCALE: 3" = 1'-0"



SECTION B–B

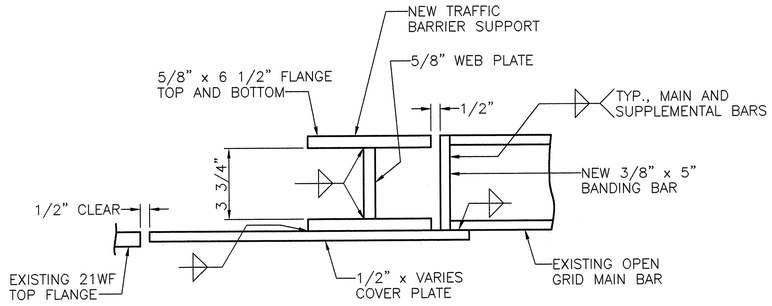
TRAFFIC BARRIER LATCHING DETAIL

SCALE: 1 1/2" = 1'-0"



SECTION C–C

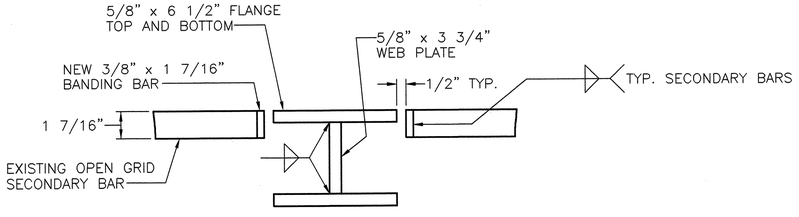
SCALE: 3" = 1'-0"



SECTION F–F SHOWN

SECTION F'–F' SIMILAR

SCALE: 3" = 1'-0"



SECTION G–G

SCALE: 3" = 1'-0"

NOTES:

1. FOR SECTION B–B, F–F, F'–F' AND G–G, SEE DRAWING NO. 47.

MODJESKI and MASTERS
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MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
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DEPARTMENT OF TRANSPORTATION

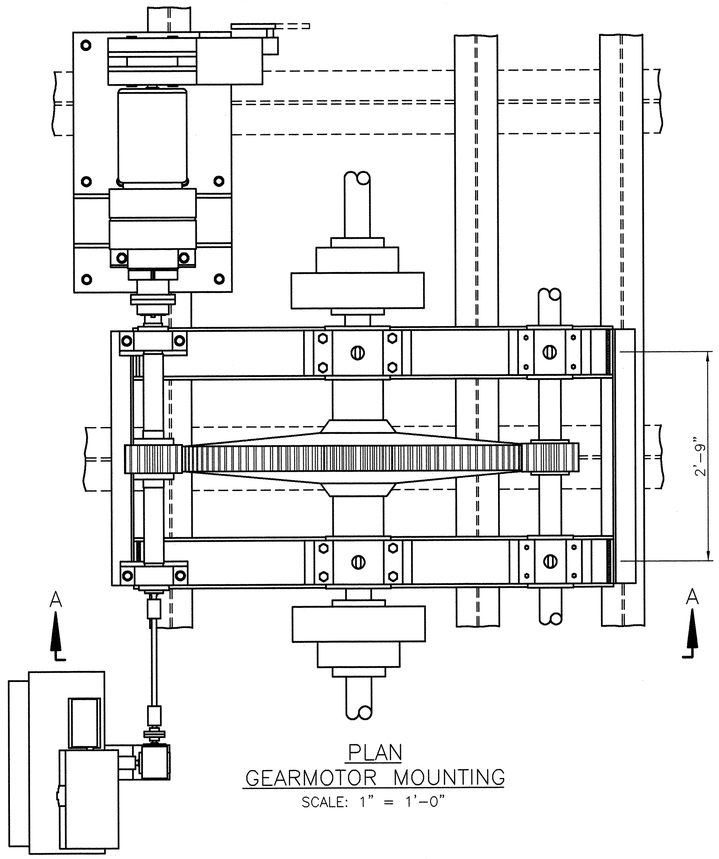
RALEIGH

CAPE FEAR RIVER CROSSING

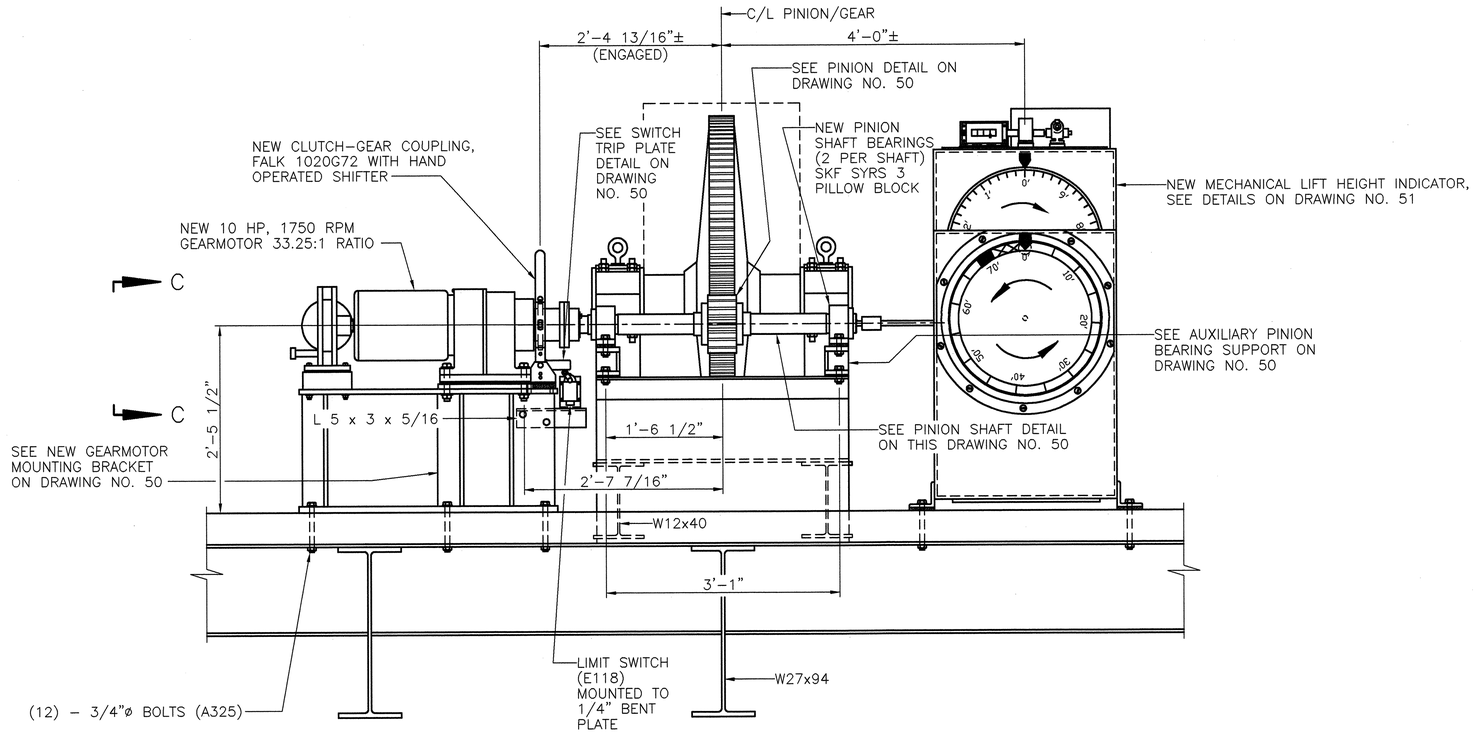
WILMINGTON, NORTH CAROLINA

TRAFFIC BARRIER GATE DETAILS – 2

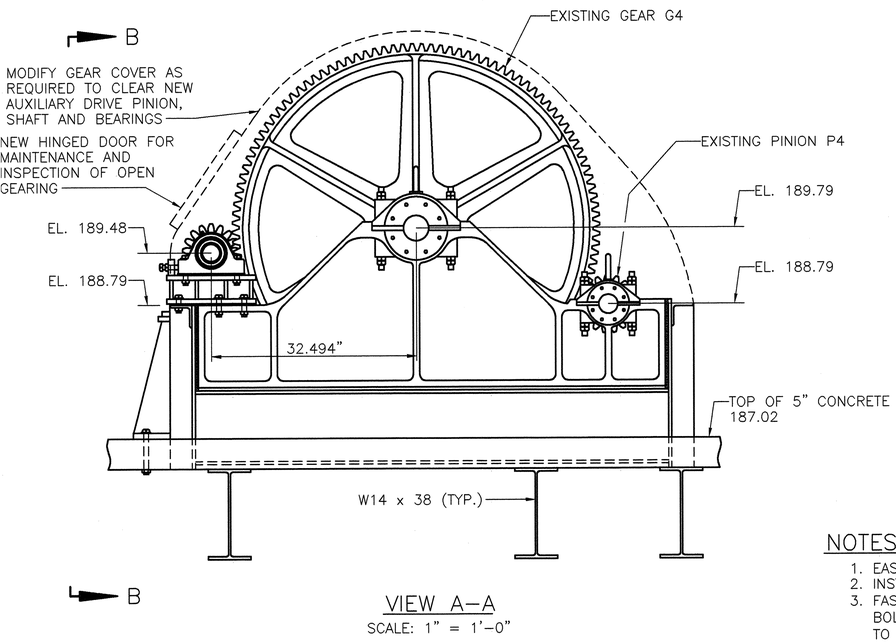
		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED K.W. JOHNS	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED M.C. IRWIN	CHECKED M.C. IRWIN	DRAWING NO.	48 OF 53



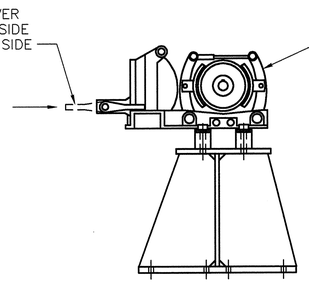
PLAN
GEARMOTOR MOUNTING
SCALE: 1" = 1'-0"



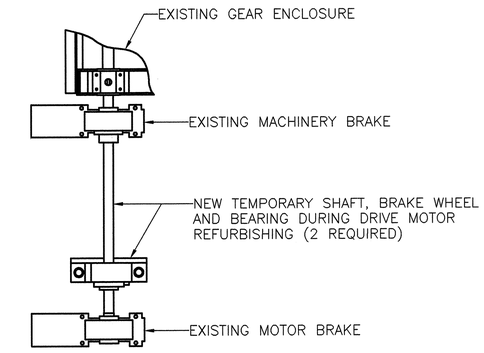
VIEW B-B
SCALE: 1" = 1'-0"



VIEW A-A
SCALE: 1" = 1'-0"



VIEW C-C
SCALE: 1" = 1'-0"



TEMPORARY SHAFT, BRAKE WHEEL
AND BEARING DETAIL
SCALE: 1/2" = 1'-0"

INSTALL TEMPORARY SHAFT, BRAKE WHEEL AND SUPPORT BEARING DURING REFURBISHING OF SOUTHEAST AND SOUTHWEST MAIN DRIVE MOTORS. DIMENSIONS OF THE TEMPORARY COMPONENTS SHALL BE DETERMINED BY FIELD MEASUREMENTS PERFORMED BY THE CONTRACTOR.

NOTES:

1. EAST TOWER SHOWN, WEST TOWER IDENTICAL.
2. INSTALL LIMIT SWITCH (E118) ON CLUTCH MECHANISM.
3. FASTEN TO EXISTING W14x38 FLOORBEAM. OTHER BOLTS FOR GEARMOTOR MOUNTING BRACKET FASTENED TO 1/2" BACKING PLATES UNDER CONCRETE FLOOR. ALL DIMENSIONS FOR MOUNTING GEARMOTOR MOUNTING BRACKET TO BE FIELD VERIFIED PRIOR TO DRILLING.
4. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.

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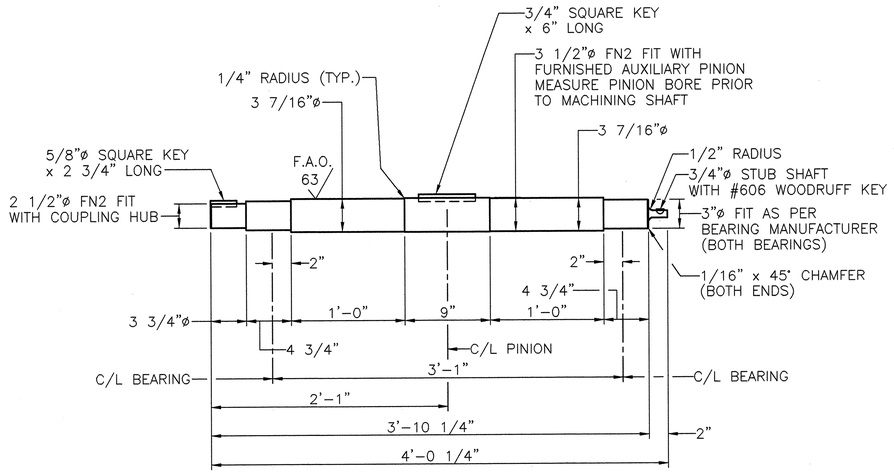
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

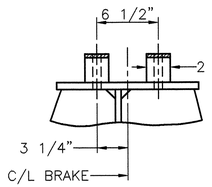
AUXILIARY DRIVE MOTOR ASSEMBLY

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED D.L. MILLER	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED D.M. BARRETT	CHECKED L.R. LENTZ	DRAWING NO.	49 OF 53



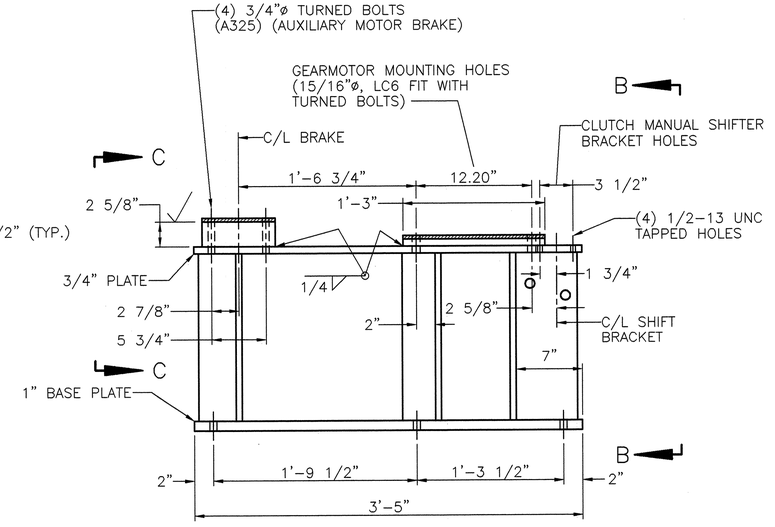
PINION SHAFT DETAIL

SCALE: 1 1/2" = 1'-0"
MATERIAL: FORGED ALLOY STEEL, ASTM A668, CLASS G



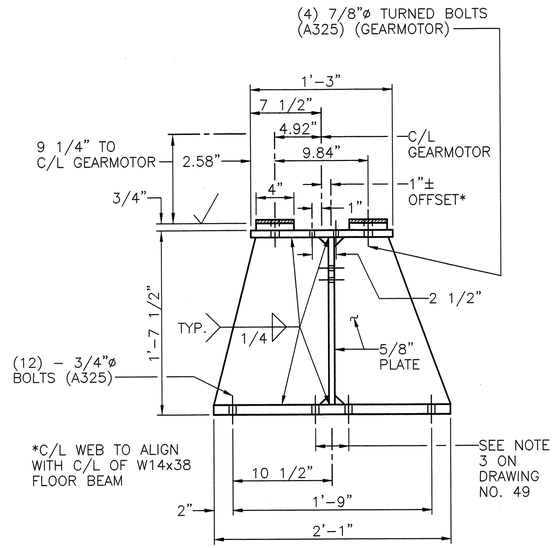
VIEW C–C

SCALE: 1 1/2" = 1'-0"



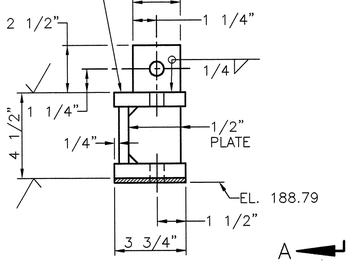
GEARMOTOR MOUNTING BRACKET

SCALE: 1 1/2" = 1'-0"



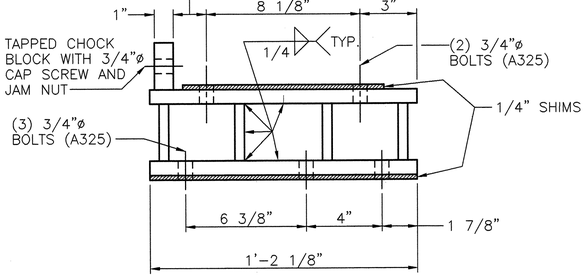
VIEW B–B

SCALE: 1 1/2" = 1'-0"



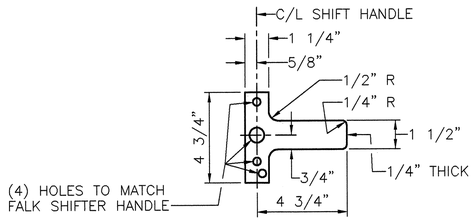
AUXILIARY PINION BEARING SUPPORT

SCALE: 3" = 1'-0"
R.H. SHOWN, L.H. SYMMETRICAL OPPOSITE



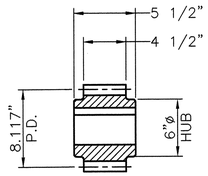
VIEW A–A

SCALE: 3" = 1'-0"



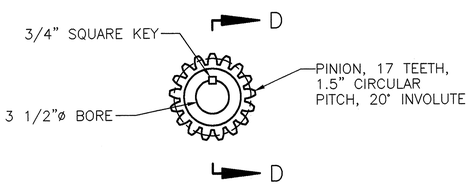
SWITCH TRIP PLATE DETAIL

SCALE: 3" = 1'-0"



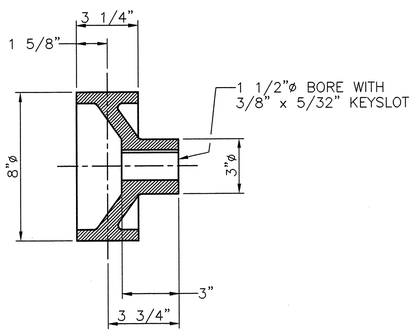
SECTION D–D

SCALE: 1 1/2" = 1'-0"



PINION DETAIL

SCALE: 1 1/2" = 1'-0"
NOTE: PINION TO BE FURNISHED BY NCDOT
DIMENSIONS ARE FOR REFERENCE ONLY
FIELD VERIFY ALL DIMENSIONS



AUXILIARY MOTOR BRAKE BRAKE WHEEL DETAIL

SCALE: 3" = 1'-0"

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
2. WELDMENTS SHALL BE MADE FROM ASTM A572, GRADE 50 STEEL PLATE.
3. √ DENOTES 125 MICROINCH FINISH.
4. PROVIDE 3/8" SHIMS, UNLESS OTHERWISE NOTED.
5. SEE SPECIAL PROVISIONS FOR SHIM PACK SPECIFICATIONS.

4-28-2005
NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

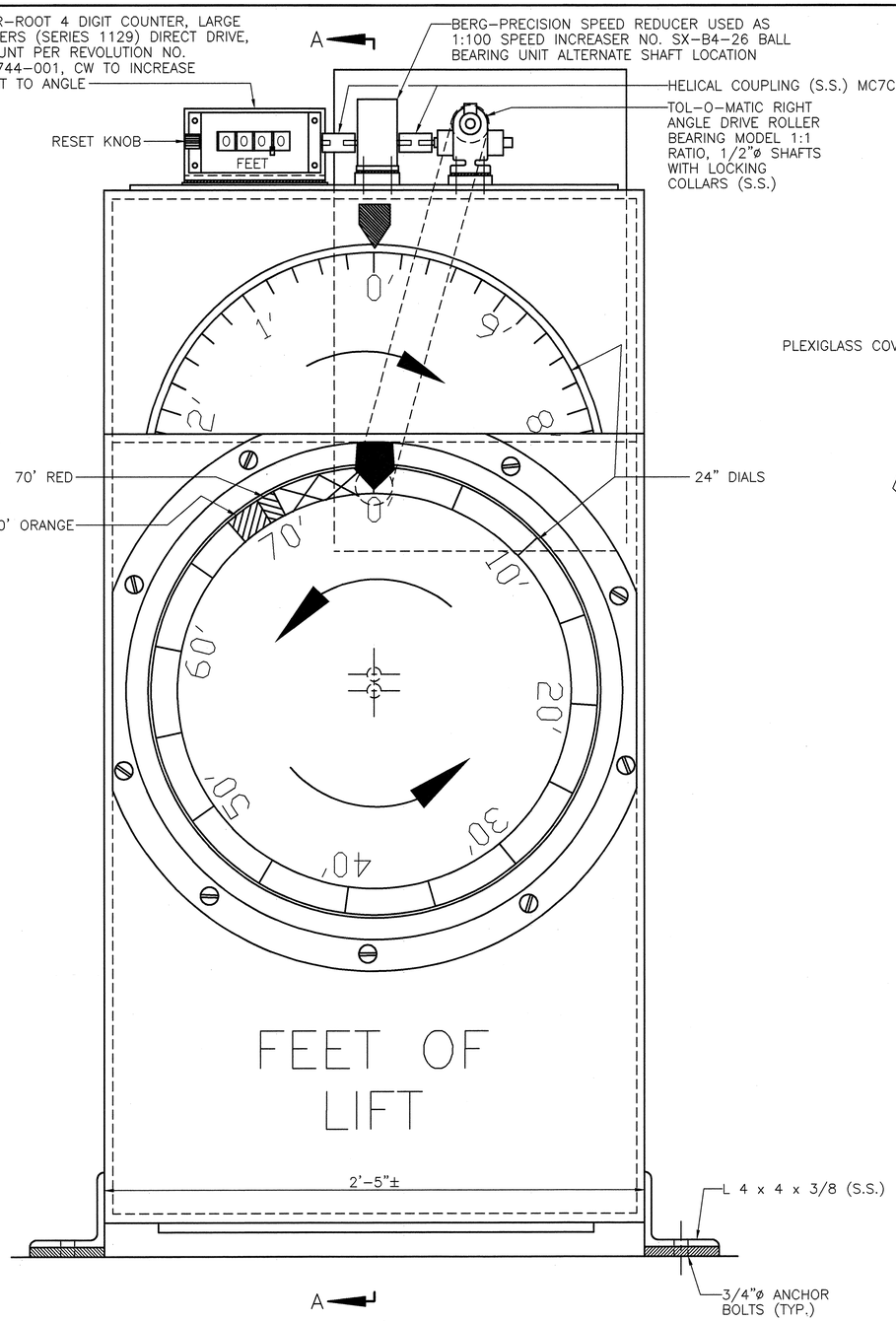
CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

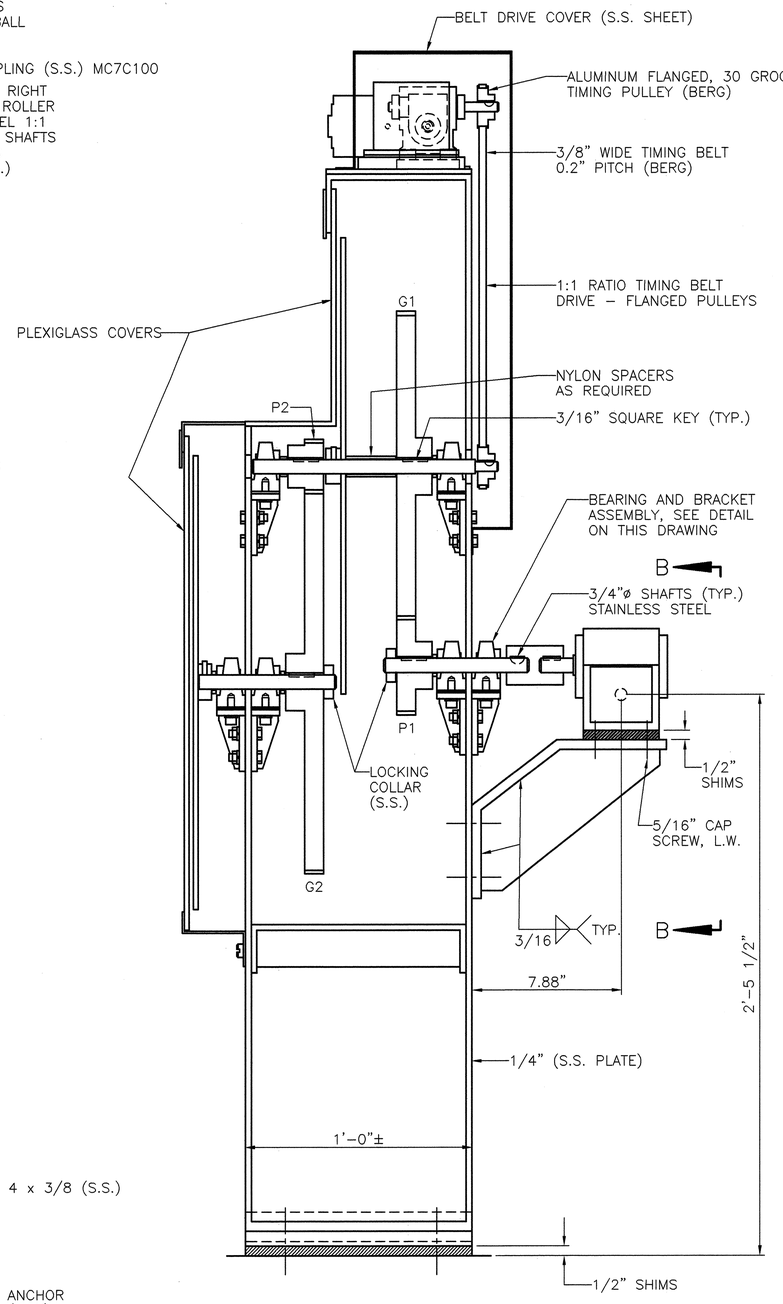
CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

AUXILIARY DRIVE MOTOR DETAILS

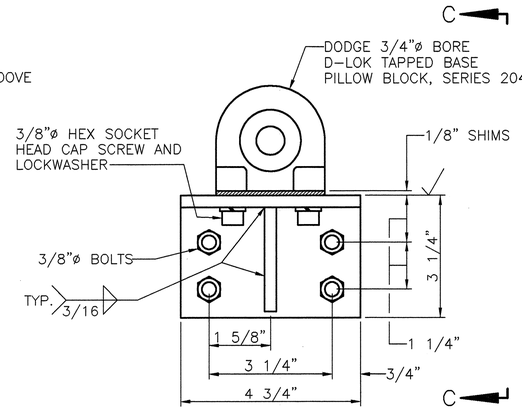
		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED D.L. MILLER	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED D.M. BARRETT	CHECKED L.R. LENTZ	DRAWING NO.	50 OF 53



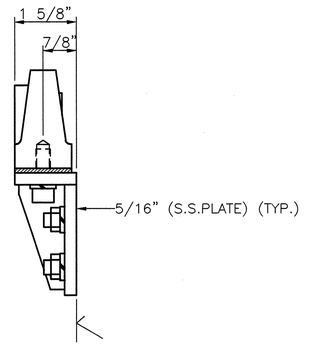
MECHANICAL HEIGHT INDICATOR
SCALE: 3" = 1'-0"



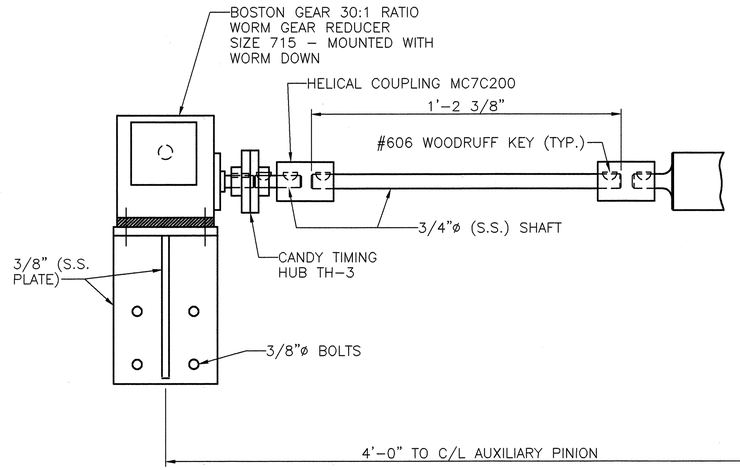
SECTION A-A
SCALE: 3" = 1'-0"



BEARING AND BRACKET ASSEMBLY
SCALE: 6" = 1'-0"



VIEW C-C
SCALE: 6" = 1'-0"



VIEW B-B
SCALE: 3" = 1'-0"

GEAR	NO. TEETH	P.D.	RUSH NO.
P1	60	5.00"	YP1260
G1	192	16.00"	YP12192
P2	32	2.667"	YP1232
G2	240	20.00"	YP12240

GEARING DATA:
ALL 20° P.A. DELRIN,
RUSH GEAR, 12 D.P., 3/4"ø BORE,
3/16" x 3/32" KEYSLOT

NOTES:

1. ALL STAINLESS STEEL PLATE TO BE ASTM A240, TYPE 304.
2. ALL FASTENERS TO BE STAINLESS STEEL. ASTM F593, GROUP 1 OR 2.
3. ALL SHAFTS TO BE STAINLESS STEEL ASTM A276, TYPE 304, COLD DRAWN.
4. LOCKING COLLARS TO BE SPLIT CLAMP TYPE, STAINLESS STEEL. (STAFFORD OR EQUAL).

4.28.2005
NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

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STATE OF NORTH CAROLINA
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RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

MECHANICAL HEIGHT INDICATOR

		DRAWN BY	R.L. REED
		SCALE	AS NOTED
DESIGNED D.L. MILLER	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED D.M. BARRETT	CHECKED D.M. BARRETT	DRAWING NO.	51 OF 53

GROUP 100 EQUIPMENT

PIECE NO.	QUANTITY	NAME	MANUFACTURER	TYPE – MODEL	RATING AND DESCRIPTION
E101	1	MOTOR CONTROL CENTER	ALLEN–BRADLEY	CENTERLINE BULLETIN 2100	FREE STANDING MOTOR CONTROL CENTER SHALL INCLUDE MOUNTING SPACE FOR MOTOR STARTERS, CIRCUIT BREAKERS, OVERLOAD CURRENT MONITORS, PANELBOARDS AND TERMINAL BLOCKS AS SHOWN ON DRAWINGS. ENCLOSURES SHALL BE NEMA 12. ENCLOSURE FINISH SHALL MEET U.L. REQUIREMENTS FOR CORROSIVE RESISTANCE AND DURABILITY AS DETERMINED BY EXPOSURE TO SALT SPRAY, HUMIDITY AND WATER. BUS BARS SHALL BE TIN PLATED COPPER WITH RATINGS AS: 800 AMP HORIZONTAL AND 400 AMP VERTICAL. SERVICE TO BE 480 VOLT, 3 PHASE, 3 WIRE. MOUNTING HARDWARE SHALL BE HOT–DIP GALVANIZED STEEL OR STAINLESS STEEL. SEE DETAILED DESCRIPTION IN SPECIAL PROVISIONS.
E102	1	MANUAL TRANSFER SWITCH	RUSSELELECTRIC	TYPE RMT–MAN	U.L. LISTED 3 POLE, DOUBLE THROW TRANSFER SWITCH IN NEMA 12 CABINET. CONTINUOUS CURRENT RATING OF 600 AMPS, 600 VOLTS AC. SYMMETRICAL SHORT CIRCUIT CURRENT OF 30,000 AMPS AT 480 VOLTS AC. SHALL BE MECHANICALLY HELD AND ELECTRICAL OPERATED BY MEANS OF WATER–TIGHT, MOMENTARY PUSH–BUTTON SWITCHES MOUNTED ON ENCLOSURE OR REMOTELY FROM THE CONTROL CONSOLE. SWITCH SHALL HAVE SINGLE MOTOR DRIVEN TRANSFER MECHANISM IN EITHER DIRECTION, AND SHALL BE EQUIPPED WITH A SINGLE HANDLE FOR DIRECT MANUAL OPERATION OF SWITCH PROVIDING CONTACT–TO–CONTACT TRANSFER SPEED AS MOTORIZED OPERATOR. CONTACTS SHALL BE HIGH SPEED, QUICK MAKE, QUICK BREAK. SHALL INCLUDE CORROSION RESISTANT MOUNTING HARDWARE.
E103	1	AUTOMATIC TRANSFER SWITCH	RUSSELELECTRIC	TYPE RMT	U.L. LISTED 3 POLE DOUBLE THROW, 100A TRANSFER SWITCH, NEMA 12 CABINET. SHALL HAVE UNDIRECTIONAL MOTOR OPERATOR, POSITIVE MECHANICAL INTERLOCK, QUICK–MAKE, QUICK–BREAK PRE–LOADED TRANSFER. SHALL HAVE ADJUSTABLE TIME DELAY FOR TRANSFER TO EMERGENCY AND RETRANSFER TO NORMAL, LOAD TEST SWITCH TO SIMULATE POWER FAILURE, GREEN PILOT LIGHT FOR NORMAL AND RED FOR EMERGENCY POWER, AUXILIARY CONTACTS FOR NORMAL AND EMERGENCY POSITION. SELECTOR SWITCH SHALL PROVIDE MANUAL AND AUTOMATIC MODES WITH PUSH BUTTONS TO SELECT NORMAL OR EMERGENCY SOURCE.
E104	4	MAIN DRIVE	ALLEN–BRADLEY	1336 IMPACT	180 AMPERES (CONTINUOUS) OUTPUT, 460 VOLT, 3 PHASE, TRUE FLUX VECTOR DRIVE. SHALL BE CONFIGURED AND WITH ALL MISCELLANEOUS COMPONENTS AS SHOWN.
E105	1 COMPLETE SYSTEM	PROGRAMMABLE LOGIC CONTROLLER (PLC)	ALLEN–BRADLEY	PLC–5/60	PROGRAMMABLE CONTROLLER SYSTEM INCLUDES ON–LINE AND SPARE PROCESSORS, LOCAL AND REMOTE DISCRETE AND ANALOG I/O, SPECIALTY MODULES, AND ALL RELATED HARDWARE. COMPLETE SYSTEM SHALL INCLUDE ALL INDICATED COMPONENTS, ALL SOFTWARE, AND ALL MISCELLANEOUS HARDWARE AS REQUIRED TO PROVIDE OPERATION AS SHOWN.
E106	1	BUS MONITOR	DIVERSIFIED ELECTRONICS	PBE	TRUE RMS PHASE SEQUENCE AND VOLTAGE BAND MONITOR WITH ADJUSTABLE OVERVOLTAGE, UNDERVOLTAGE, AND TIME DELAY. SHALL BE SUITABLE FOR USE ON 480 VOLT, GROUNDED, 4 WIRE SYSTEMS.
E107	1	ROTARY CAM LIMIT SWITCH	GEMCO	MODEL 1980	6 CAM ROTARY CAM LIMIT SWITCH WITH NEMA 4 ENCLOSURE. SHALL INCLUDE 120V, 10A RATED DOUBLE POLE, DOUBLE THROW SNAP SWITCHES, TIMING DIAL.
E108	2	PANELBOARD LP–1A, LP–1B	SQUARE D	NQOD	U.L. LISTED, WALL MOUNTED, FACTORY ASSEMBLED NEMA 12 PANELBOARD FOR 120/208 VOLT, 3 PHASE, 4 WIRE SERVICE. SHALL INCLUDE MAIN LUGS, BOLT–ON BRANCH CIRCUIT BREAKERS AND SPARES. PROVIDE TYPEWRITTEN CIRCUIT DIRECTORY ON INSIDE OF PANELBOARD DOOR.
E109	2	FLASHER GATE LIGHTS	TRAFFIC PARTS INC. SPRING, TX	TP–505	TWO CIRCUIT ELECTRO–MECHANICAL FLASHER. CONTACTS RATED 120V, 25A. MOTOR 120V, 60 RPM, 60 HZ. SHALL INCLUDE SUB–BASE, COVER AND SPARE PARTS KIT.
E110	5	DISCONNECT SWITCH	HUBBELL	HBLDS3AC	UNFUSED DISCONNECT SWITCH. NEMA 4X ENCLOSURE. 30A, 480V, 3–POLE WITH AUXILIARY CONTACTS. EACH SWITCH SHALL BE PERMANENTLY LABELED WITH NAME OF THE DEVICE CONTROLLED.
E111	1	VIDEO TO FIBER TRANSMITTER	GE SECURITY	S702VT–EST	FIBER OPTIC VIDEO TRANSMITTER AND RECEIVER SYSTEM, SHALL INCLUDE POWER SUPPLIES AND ANY ADDITIONAL INTERFACING AS MAY BE REQUIRED FOR TRANSMISSION OF TWO VIDEO CHANNELS FROM THE WEST SIDE OF THE BRIDGE TO MONITORS IN THE OPERATORS ROOM THROUGH MULTIMODE FIBER OPTIC CABLES.
	1	FIBER TO VIDEO RECEIVER		S702VR–EST	
E112	4	OPTICAL ENCODER	DYNAPAR CORPORATION	SERIES H56	MILL–DUTY INCREMENTAL OPTICAL ENCODER. SHALL BE HIGHLY RUGGEDIZED WITH FOOT MOUNTED NEMA 4 CAST ALUMINUM HOUSING, 5/8" DIAMETER INPUT SHAFT, AND HEAVY DUTY BEARINGS RATED FOR OPERATING TO 3600 RPM. SHALL PROVIDE DIFFERENTIAL LINE DRIVER OUTPUTS.
E113	1	SERVICE DISCONNECT	SQUARE D	CLASS 3110	HEAVY DUTY FUSED SAFETY SWITCH. RATED FOR USE WITH 480/277 VOLT, 3 PHASE, 4 WIRE, 600A SERVICE. SHALL BE U.L. LISTED WITH NEMA 4X STAINLESS STEEL ENCLOSURE. FUSES SHALL BE 600A, CLASS R. SWITCH OPERATING HANDLE SHALL BE PADLOCKABLE. ASSEMBLY SHALL BE RATED FOR 200,000 RMS SYMMETRICAL AMPERES AVAILABLE FAULT CURRENT. INCLUDE GROUNDING PROVISIONS AS SHOWN ON PLANS. MOUNTING HARDWARE SHALL BE STAINLESS STEEL.

GROUP 100 EQUIPMENT (CONTINUED)

PIECE NO.	QUANTITY	NAME	MANUFACTURER	TYPE – MODEL	RATING AND DESCRIPTION
E114	4	RESOLVER	GEMCO	1986–A/1746R–2	ABSOLUTE, BRUSHLESS, 64:1 MULTITURN DUAL RESOLVER. FOOT MOUNTED NEMA 4 HOUSING. OPERATING TEMPERATURE –40 TO –125 CELSIUS. SHALL WITHSTAND 50G'S SHOCK FOR 11 MSEC AND 20G'S VIBRATION AT 200 HZ. INCLUDE MATCHING INPUT MODULE TO PROVIDE 18 BIT RESOLUTION.
E115	1	CIRCUIT BREAKER CB–1	SQUARE D	TYPE MAL	THERMAL–MAGNETIC CIRCUIT BREAKER WITH NEMA 12 ENCLOSURE. SHALL BE 600V RATED WITH 1000A FRAME, 3–POLE 600A CONTINUOUS ADJUSTABLE MAGNETIC TRIP INTERRUPT RATING 30,000A, U.L. LISTED.
E116	2	BARRIER GATE	B & B ELECTROMATIC CORPORATION	VT–6801	VERTICAL TO HORIZONTAL TYPE BARRIER GATE. ELECTRO–MECHANICAL DRIVE WITH 3–PHASE 480V REVERSIBLE MOTOR AND SOLENOID TYPE BRAKE. ARM LENGTHS AND WARNING LIGHTS AS SHOWN ON PLANS. ARMS SHALL UTILIZE ALUMINUM TUBES AND STAINLESS STEEL AIRCRAFT CABLE. HOUSING SHALL BE HOT–DIP GALVANIZED STEEL. SEE DETAILED REQUIREMENTS IN THE SPECIAL PROVISIONS.
E117	2	AUXILIARY GEARMOTOR STARTER	ALLEN–BRADLEY	BULLETIN 505	FULL VOLTAGE REVERSING STARTER, NEMA SIZE 1, 480V, 3 PHASE WITH NEMA TYPE 4 ENCLOSURE. SHALL INCLUDE CONTROL TRANSFORMER (120V) PILOT LIGHTS ON COVER LABELED FOR RAISE AND LOWER AND MANUAL RESET OVERLOAD RELAYS. SHALL INCLUDE 120V AUXILIARY CONTACT. ENCLOSURE SHALL INCLUDE DEAD FRONT PLUG RECEPTACLE FOR ATTACHMENT OF PENDANT PUSHBUTTON CABLE.
	2	PENDANT PUSHBUTTON STATION	HUBBELL	CPB21	NEMA 4X PENDANT PUSHBUTTON STATION. MOMENTARY CONTACT PUSHBUTTONS FOR RAISE AND LOWER, LABELED ACCORDINGLY. SHALL INCLUDE 25 FEET AWG 12 TYPE SOW CABLE WITH PLUG CONNECTION TO STARTER ENCLOSURE.
	2	PENDANT CONTROLLER STORAGE CABINET	HOFFMAN	A–16N166LP	WALL MOUNT NEMA 1 ENCLOSURE 16" x 16" x 6" OR AS REQUIRED FOR STORAGE OF PENDANT CONTROL STATION AND CABLE. LABEL CABINET DOOR ACCORDINGLY WITH PERMANENTLY ATTACHED ENGRAVED LABEL. CABINET SHALL HAVE RECESSED DOOR HANDLE, POLYESTER POWDER COAT FINISH.
E118	2	AUXILIARY DRIVE LIMIT SWITCH	NAMCO	MODEL NO. EA 710	NEMA 4 RATED SINGLE POLE LEVER ARM LIMIT SWITCH. SLIDING, SILVER ALLOY CONTACTS RATED 120V, 10A. SHALL BE SUPPLIED WITH NAMCO ROLLER–TYPE LEVER ARM, LENGTH AS REQUIRED.
E119	1	SURGE PROTECTOR	INNOVATIVE TECHNOLOGY	PTX 320–3Y201–SD	TRANSIENT VOLTAGE SURGE SUPPRESSOR. U.L. 1449 SECOND EDITION LISTED. NEMA 4 ENCLOSURE WITH DEAD FRONT CONSTRUCTION. RATED FOR 320 KA/PHASE ON 3 PHASE 480V SYSTEM. SHALL HAVE AUDIBLE ALARM, L.E.D. PROTECTION FAILURE INDICATORS, EVENT HISTORY INDICATOR. SHALL INCLUDE BUILT–IN 60A FUSES AND DISCONNECT SWITCH.
E120	2	AUXILIARY DRIVE GEARMOTOR	SEW EURODRIVE	MODEL R97DV132M4	U.L. LISTED, 10 HP, 1750 RPM, 480V, 3 PHASE MOTOR WITH ATTACHED FOOT MOUNTED REDUCER REDUCTION RATED SHALL BE 33.25:1.
E121	2	LEVER ARM LIMIT SWITCH	CUTLER HAMMER	E50 6P+	LEVER ARM LIMIT SWITCH RATED NEMA 4X, 6P. SHALL BE U.L. LISTED WITH FACTORY SEALED CORD, EPOXY FILLED SWITCH BODY, DIE CAST ZINC SWITCH BODY. SWITCH CONTACTS SHALL BE RATED TO 600V AND UTILIZE WIPING ACTION TO ASSURE COMTINUITY. SWITCHES SHALL BE DOUBLE POLE RATED 10A AT 120V. LEVER ARM SHALL BE CAST ALUMINUM WITH METAL ROLLER WHEEL. SHALL INCLUDE ALL NECESSARY MOUNTING BRACKETS AND HARDWARE.
E122	1	POWER MONITOR	ELECTRO INDUSTRIES	FUTURA+	THREE PHASE MULTI–FUNCTION (VOLTAGE, CURRENT, POWER, FREQUENCY, ETC.) POWER MONITOR WITH CENTRAL TRANSDUCER MODULE AND REMOTE DISPLAYS. MONITOR SHALL INCLUDE ONE DISPLAY MOUNTED IN THE MCC AND ONE MOUNTED ON THE CONSOLE, AND INCLUDE ALL CURRENT TRANSFORMERS AND OTHER HARDWARE NECESSARY TO PROVIDE PROPER OPERATION.
E123	2	SKEW LIMIT SWITCH	GEMCO	MODEL 1980	6 CAM ROTATING CAM LIMIT SWITCH WITH NEMA 4 ENCLOSURE. SHALL INCLUDE 120V, 10A RATED SINGLE POLE DOUBLE THROW SNAP SWITCHES AND TIMING DIAL.
E124	1	CIRCUIT BREAKER CB–LP	SQUARE D	TYPE KAL	THERMAL MAGNETIC CIRCUIT BREAKER WITH NEMA 12 ENCLOSURE. SHALL BE 600V RATED WITH 250A FRAME 3–POLE, 90A CONTINUOUS ADJUSTABLE MAGNETIC TRIP INTERRUPT RATING 25,000A, U.L. LISTED.

NOTES:

1. QUANTITIES SHOWN ARE FOR INFORMATION ONLY AND DOES NOT INCLUDE SPARES. CONTRACTOR SHALL PREPARE HIS OWN MATERIALS LIST INCLUDING SPARES AS MAY BE SPECIFIED IN THE SPECIAL PROVISIONS.
2. CONTRACTOR SHALL CONFIRM SIZE OF TERMINAL CABINETS, ADJUSTING DIMENSIONS AS MAY BE REQUIRED FOR NUMBER OF TERMINATIONS AND BENDING RADIUS OF CONDUCTORS.

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN
8-2005

MODJESKI and MASTERS
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4900 LOUISE DRIVE
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

ELECTRICAL EQUIPMENT SCHEDULE – 1

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	52 OF 53

GROUP 200 EQUIPMENT

PIECE NO.	QUANTITY	NAME	MANUFACTURER	TYPE – MODEL	RATING AND DESCRIPTION
E201	AS REQUIRED	LIQUID–TIGHT FLEXIBLE STEEL CONDUIT	ELECTRI–FLEX	TYPE LA DIAMETER AS REQUIRED	LIQUID–TIGHT FLEXIBLE STEEL CONDUIT. SPIRAL WOUND HOT–DIPPED GALVANIZED STEEL STRIP SHALL BE COVERED WITH EXTRUDED PVC JACKET. SHALL BE WATERTIGHT, VAPORTIGHT, U.L. LISTED AND IN CONFORMANCE WITH ARTICLE 351 OF THE NATIONAL ELECTRICAL CODE FOR USE INTENDED. SHALL INCLUDE LIQUID–TIGHT FITTINGS AND COUPLINGS.
E202	AS REQUIRED	ARMORED CABLE	OKONITE COMPANY	POWER CABLE	ARMORED POWER CABLES SHALL BE C–L–X TYPE MC, 600 VOLT RATED, 90 DEGREES C RATED, AND CONTAINING BARE SOFT ANNEALED COPPER CONDUCTORS WITH TYPE XHHW INSULATION. SHALL HAVE CLOSE FITTING, IMPERVIOUS, CONTINUOUS, CORRUGATED ALUMINUM C–L–X SHEATH WITH A PVC JACKET. CABLES SHALL BE RESISTANT TO CORROSIVE ATMOSPHERES AND SUNLIGHT.
			ANIXTER	DRIVE CABLE (3) 350 MCM (3) 4/0 AWG	ICEA 3 CONDUCTOR ARMORED AC DRIVE CABLE. CONTINUOUS ALUMINUM SHEATH WITH SUNLIGHT RESISTANT PVC JACKET. CLASS B STRANDED COPPER CONDUCTORS WITH XLP INSULATION. SHALL BE U.L. LISTED WITH ICEA VOLTAGE RATING OF 2000V.
E203	AS REQUIRED	ARMORED CONTROL CABLE	OKONITE COMPANY	16 AWG	ALUMINUM SHEATHED C–L–X TYPE INSTRUMENTATION CABLE, SHALL BE 300 VOLT RATED WITH CLASS B STRANDED CONDUCTORS, 10 SHIELDED PAIRS WITH ALUMINUM–POLYESTER OVER–ALL SHIELD. SHALL BE U.L. LISTED ASTYPE PLTC. CABLE SHALL BE RATED FOR USE IN WET LOCATIONS, CORROSIVE ATMOSPHERES, AND SHALL BE SUNLIGHT RESISTANT.
E204	2	TERMINAL CABINETS PC–1, PC–3	HOFFMAN	36"H x 30"W x 12"D	SINGLE DOOR STAINLESS STEEL ENCLOSURES WITH MOUNTING PANELS, GASKETED DOORS, STAINLESS STEEL HARDWARE. SHALL BE NEMA 4X RATED. SHALL INCLUDE 600V HEAVY–DUTY TERMINAL BLOCKS WITH CONNECTIONS FOR ALL CONDUCTORS INCLUDING SPARES. TERMINALS SHALL BE U.L. LISTED FOR COPPER CONDUCTORS. CABINETS SHALL INCLUDE BREATHER AND DRAIN FITTINGS EQUAL TO CROUSE–HINDS ECD SERIES.
	4	PC–2, PC–4, CC–1, CC–2		36"H x 24"W x 10"D	
E205	7,200 L.F. 200 L.F. 1,200 L.F. 1,200 L.F. 1,200 L.F. 3,300 L.F. 2,400 L.F.	AERIAL CABLE	BIW CABLE SYSTEMS INC.	POWER CABLE	FLEXIBLE POWER AND CONTROL CABLES. TYPE W WITH EXTRA FLEXIBLE STRANDING. THERMOSET INSULATION. JACKET SHALL BE EXTRA HEAVY DUTY, DOUBLE LAYER, REINFORCED THERMOSET NEOPRENE. WEATHER AND SUNLIGHT RESISTANT. SEE SPECIFICATIONS. 1 CONDUCTOR 350 MCM (OPTIONAL – 1,800 L.F., 4C 350 MCM) 1 CONDUCTOR 4/0 AWG 3 CONDUCTOR 4 AWG 6 CONDUCTOR 6 AWG 6 CONDUCTOR 8 AWG 20 CONDUCTOR 10 AWG
	1,200 L.F.			CONTROL CABLE	COMPOSITE CONTROL CABLE WITH JACKETED WIRE ROPE CENTER STRENGTH MEMBER. BLACK, WEATHER RESISTANT NEOPRENE JACKET. SHALL BE AN ASSEMBLY OF THE FOLLOWING CONDUCTORS PLUS FILLERS. (8) 62.5/125 UM GEL FILLED, LOOSE–TUBE FIBER OPTIC (4) 100 OHM TWIN–AXIAL
	600 L.F.				600 VOLT FLEXIBLE CONTROL CABLE. SHALL INCLUDE 10 PAIRS TWISTED SHIELDED AWG 16 WITH OVERALL SHIELD AND WEATHER AND SUNLIGHT RESISTANT REINFORCED THERMOSTAT NEOPRENE JACKET.
E206	1,600 L.F.	COAXIAL CABLE	BELDEN	RG–11/U	RG–11/U COAXIAL CABLE, 75 OHM IMPEDANCE. STRANDED COPPER CONDUCTOR WITH MINIMUM 97% COPPER BRAID SHIELD AND NON–CONTAMINATING BLACK PVC JACKET.
E207	AS REQUIRED	ARMORED FIBER OPTIC	OPTICAL CABLE CORPORATION	TYPE DX–CST	ARMORED FIBER OPTIC CABLE WITH EIGHT 62.5/125 UM FIBERS, STEEL TAPE ARMOR, POLYETHYLENE OUTER JACKET.
E208	1	TERMINAL CABINET TC–1	O–Z GEDNEY	YW–A 12" x 12" x 4"	CAST ALUMINUM JUNCTION BOX. SHALL BE NEMA 4 RATED WITH NEOPRENE GASKETED HINGED DOOR. SHALL INCLUDE HEAVY–DUTY 600V RATED TERMINAL BLOCKS WITH MINIMUM 12 TERMINALS FOR 8 AWG CONDUCTORS. INCLUDE ALL NECESSARY MOUNTING BRACKETS AND HARDWARE.
E209	2	TERMINAL CABINETS PC–5, PC–6	HOFFMAN	48" x 48" x 12"	STAINLESS STEEL ENCLOSURE WITH TWO GASKETED DOORS, MOUNTING PANEL, THREE POINT LATCHING MECHANISM WITH KEY LOCKING HANDLE. SHALL BE U.L. LISTED AND INCLUDE POWER DISTRIBUTION TYPE TERMINALS FOR THE MOTOR CONDUCTORS (ILSCO TYPE PDB, 350 MCM) AND HEAVY DUTY, 600 VOLT RATED, CORROSION RESISTANT, TUBULAR SCREW, CHANNEL MOUNTED TERMINALS FOR ALL OTHER POWER CONDUCTORS (BUCHANNAN 200 SERIES OR SIMILAR). TERMINALS SHALL BE PROVIDED FOR TERMINATING ALL SPARE CONDUCTORS PLUS AN ADDITIONAL 50 SPARE TERMINAL SPACES.

GROUP 200 EQUIPMENT (CONTINUED)

PIECE NO.	QUANTITY	NAME	MANUFACTURER	TYPE – MODEL	RATING AND DESCRIPTION
E210	AS REQUIRED	CABLE TRAY	B–LINE	ALUMINUM	CABLE TRAY SHALL BE LADDER TYPE, WITH NINE INCH RUNG SPACING AND FIVE INCH LOADING DEPTH. TRAY WIDTH SHALL COMPLY WITH NEC ARTICLE 392 FOR TYPE AND NUMBER OF CABLES INSTALLED. RUNGS SHALL BE MARINE TYPE. SHALL BE U.L. LISTED AND IN CONFORMANCE WITH NEMA VE–1. SHALL INCLUDE ALL NECESSARY SUPPORT ANGLES, BRACKETS, HANGERS, SPLICE PLATES, CURVED SECTIONS AND OTHER MISCELLANEOUS TRAY SECTIONS AND HARDWARE AS REQUIRED TO COMPLETE THE CABLE TRAY SYSTEM.

NOTES:

1. QUANTITIES SHOWN ARE FOR INFORMATION ONLY AND DO NOT INCLUDE SPARES. CONTRACTOR SHALL PREPARE HIS OWN MATERIALS LIST INCLUDING SPARES AS SPECIFIED IN THE SPECIAL PROVISIONS.
2. CONTRACTOR SHALL CONFIRM SIZE OF TERMINAL CABINETS, ADJUSTING DIMENSIONS AS MAY BE REQUIRED FOR NUMBER OF TERMINATIONS AND BENDING RADIUS OF CONDUCTORS.

NORTH CAROLINA PROFESSIONAL SEAL 025801 ENGINEER LANCE V. BORDEN

MODJESKI and MASTERS
INCORPORATED
4909 LOUISE DRIVE
MECHANICSBURG, PA 17055

CENTURY SOUTHERN, INC.
2811 REIDVILLE ROAD, STE 2
SPARTANBURG, SC 29301

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CAPE FEAR RIVER CROSSING
WILMINGTON, NORTH CAROLINA

ELECTRICAL EQUIPMENT SCHEDULE – 2

		DRAWN BY	R.L. REED
		SCALE	NONE
DESIGNED G.L. FASICK	DETAILED R.L. REED	DATE	APRIL, 2005
CHECKED L.R. BAKER	CHECKED G.L. FASICK	DRAWING NO.	53 OF 53

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE PROJECT REFERENCE NO.	SHEET NO.
B-4990	TCP-1

PLAN FOR PROPOSED TRAFFIC CONTROL, MARKING & DELINEATION

NEW HANOVER – BRUNSWICK

B-4990

TIP PROJECT:

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS"-ROADWAY DESIGN UNIT-N.C. DEPARTMENT OF TRANSPORTATION-RALEIGH, N.C., DATED JANUARY 2002 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1101.02	TEMPORARY LANE CLOSURES
1101.03	TEMPORARY ROAD CLOSURES
1101.05	WORK ZONE VEHICLE ACCESSES
1101.07	ROLLING ROAD BLOCK OPERATION
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1110.02	PORTABLE WORK ZONE SIGNS
1115.01	FLASHING ARROW PANELS
1135.01	CONES
1150.01	FLAGGERS
1165.01	TRUCK MOUNTED IMPACT ATTENUATOR

INDEX OF SHEETS

LEGEND

GENERAL

- DIRECTION OF TRAFFIC FLOW
- NORTH ARROW
- PROPOSED PVMT. --------- EXIST. PVMT.
- WORK AREA
- REMOVAL OF EXISTING PAVEMENT

TRAFFIC CONTROL DEVICES

- I TYPE I BARRICADE
- II TYPE II BARRICADE
- TYPE III BARRICADE
- CONE
- DRUM
- FLASHING ARROW PANEL (TYPE C)
- TYPE 'B' WARNING LIGHT
- STATIONARY SIGN
- PORTABLE SIGN
- STATIONARY OR PORTABLE SIGN
- WARNING FLAGS
- CRASH CUSHION
- CHANGEABLE MESSAGE SIGN
- TRUCK MOUNTED IMPACT ATTENUATOR (TMIA)
- POLICE
- FLAGGER

PAVEMENT MARKINGS

- CRYSTAL/CRYSTAL PAVEMENT MARKER
- YELLOW/YELLOW PAVEMENT MARKER
- CRYSTAL/RED PAVEMENT MARKER
- PAVEMENT MARKING SYMBOLS

APPROVED: [signature] DATE: 1/20/06

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

PLAN PREPARED BY: N.C.D.O.T. WORK ZONE TRAFFIC CONTROL UNIT

J. S. BOURNE, P.E. — TRAFFIC CONTROL ENGINEER
M. M. MCDIARMID, P.E. — TRAFFIC CONTROL PROJECT ENGINEER
J. P. GALLOWAY, P.E. — TRAFFIC CONTROL PROJECT DESIGN ENGINEER
P. SEYMORE — TRAFFIC CONTROL DESIGN ENGINEER / TECHNICIAN

PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP-2

GENERAL NOTES

ADAPT THE TRAFFIC CONTROL PLANS, WHEN DIRECTED BY THE ENGINEER, TO MEET FIELD CONDITIONS TO PROVIDE SAFE AND EFFICIENT TRAFFIC MOVEMENT. CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS AND ROADWAY DETAILS ARE NOT ATTAINABLE, OR RESULT IN DUPLICATE, OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING OR REMOVAL OF DEVICES.

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT, EXCEPT WHEN OTHERWISE NOTED IN THE PLAN, OR DIRECTED BY THE ENGINEER.

TIME RESTRICTIONS

A) DO NOT CLOSE OR NARROW TRAVEL LANES FOR ALL WORK AS FOLLOWS:

	ROAD NAME	DAY AND TIME RESTRICTIONS
	FROM MEMORIAL DAY TO THE NEXT LABOR DAY	
1.	US 421, US 17 AND US 76	MONDAY THRU THURSDAY 6:00 A.M. TO 9:00 A.M. MONDAY THRU THURSDAY 3:00 P.M. TO 7:00 P.M. FRIDAY THRU SUNDAY 6:00 A.M. TO 9:00 P.M.
	FROM LABOR DAY TO THE NEXT MEMORIAL DAY	
2.	US 421, US 17 AND US 76	MONDAY THRU SATURDAY 6:00 A.M. TO 9:00 A.M. MONDAY THRU SATURDAY 3:00 P.M. TO 7:00 P.M.

B) DO NOT CLOSE OR NARROW TRAVEL LANES DURING HOLIDAYS AND SPECIAL EVENTS AS FOLLOWS:

ROAD NAME	HOLIDAY
US 421, US 17 AND US 76	
	1. FOR ANY EVENT THAT CREATES UNUSUALLY HIGH TRAFFIC VOLUMES, AS DIRECTED BY THE ENGINEER.
	2. FOR NEW YEAR'S, BETWEEN THE HOURS OF 6:00 A.M. DECEMBER 31ST TO 7:00 P.M. JANUARY 2ND. IF NEW YEAR'S DAY IS ON A SATURDAY OR A SUNDAY, THEN UNTIL 7:00 P.M. THE FOLLOWING TUESDAY.
	3. FOR EASTER, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY AND 7:00 P.M. MONDAY.
	4. FOR MEMORIAL DAY, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY TO 7:00 P.M. TUESDAY.
	5. FOR INDEPENDENCE DAY, BETWEEN THE HOURS OF 6:00 A.M. THE DAY BEFORE INDEPENDENCE DAY AND 7:00 P.M. THE DAY AFTER INDEPENDENCE DAY. IF INDEPENDENCE DAY IS ON A SATURDAY OR SUNDAY, THEN BETWEEN THE HOURS OF 6:00 A.M. THE THURSDAY BEFORE INDEPENDENCE DAY AND 7:00 P.M. THE TUESDAY AFTER INDEPENDENCE DAY.
	6. FOR LABOR DAY, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY TO 7:00 P.M. TUESDAY.
	7. FOR THANKSGIVING, BETWEEN THE HOURS OF 6:00 A.M. TUESDAY TO 7:00 P.M. MONDAY.
	8. FOR CHRISTMAS, BETWEEN THE HOURS OF 6:00 A.M. THE FRIDAY BEFORE THE WEEK OF CHRISTMAS DAY AND 7:00 P.M. THE FOLLOWING MONDAY AFTER THE WEEK OF CHRISTMAS.
	9. FOR THE AZALEA FESTIVAL, BETWEEN THE HOURS OF 6:00 A.M. THURSDAY BEFORE THE WEEKEND OF THE AZALEA FESTIVAL TO 7:00 P.M. MONDAY AFTER THE WEEKEND OF THE AZALEA FESTIVAL.
	10. FOR THE RIVERFEST, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY BEFORE THE WEEKEND OF THE RIVERFEST TO 7:00 P.M. MONDAY AFTER THE WEEKEND OF THE RIVERFEST.

C) DO NOT STOP TRAFFIC OR CLOSE ROADS AS FOLLOWS:

ROAD NAME	DAY AND TIME RESTRICTIONS
US 421, US 17 AND US 76	MONDAY THRU SUNDAY 6:00 A.M. TO 10:00 P.M.

D) DO NOT STOP TRAFFIC FOR MORE THAN FORTY-FIVE (45) MINUTES AND DO REOPEN LANES OF TRAFFIC FOR FIFTEEN (15) MINUTES "ON THE HOUR" AS FOLLOWS:

ROAD NAME	OPERATION
US 421NB, US 17SB AND US 76WB	PROPOSED BRIDGE MAINTENANCE OPERATIONS

EXCEPTION TO ABOVE RESTRICTION: CONTRACTOR WILL BE ALLOWED TO CLOSE US 421NB, US 17SB AND US 76WB FOR MAXIMUM TEN NIGHTS WITHOUT REOPENING A LANE TO TRAFFIC. ONE NIGHT IS CONSIDERED TO BE 10:00 P.M. TO 6:00 A.M.

LANE AND SHOULDER CLOSURE REQUIREMENTS

F) REMOVE LANE CLOSURE DEVICES FROM THE LANE WHEN WORK IS NOT BEING PERFORMED BEHIND THE LANE CLOSURE OR WHEN A LANE CLOSURE IS NO LONGER NEEDED, OR AS DIRECTED BY THE ENGINEER.

G) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN 40 FT (12m) OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN SHOULDER USING ROADWAY STANDARD DRAWING NO. 1101.04 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.

H) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING ON THE SHOULDER ADJACENT TO AN UNDIVIDED FACILITY AND WITHIN 5 FT (1.5m) OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN TRAVEL LANE USING ROADWAY STANDARD DRAWING NO. 1101.02 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.

WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING ON THE SHOULDER ADJACENT TO A DIVIDED FACILITY AND WITHIN 10 FT (3m) OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN TRAVEL LANE USING ROADWAY STANDARD DRAWING NO. 1101.02 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.

I) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN A LANE OF TRAVEL OF AN UNDIVIDED OR DIVIDED FACILITY, CLOSE THE LANE ACCORDING TO THE TRAFFIC CONTROL PLANS, ROADWAY STANDARD DRAWINGS OR AS DIRECTED BY THE ENGINEER. CONDUCT THE WORK SO THAT ALL PERSONNEL AND/OR EQUIPMENT REMAIN WITHIN THE CLOSED TRAVEL LANE.

J) DO NOT PERFORM WORK INVOLVING HEAVY EQUIPMENT WITHIN 15 FT (5m) OF THE EDGE OF TRAVELWAY WHEN WORK IS BEING PERFORMED BEHIND A LANE CLOSURE ON THE OPPOSITE SIDE OF THE TRAVELWAY.

TRAFFIC PATTERN ALTERATIONS

K) NOTIFY THE ENGINEER TWENTY ONE (21) CALENDAR DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

SIGNING

L) INSTALL ADVANCE WORK ZONE WARNING SIGNS WHEN WORK IS WITHIN 100 FT (31m) FROM THE EDGE OF TRAVEL LANE AND NO MORE THAN THREE (3) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

WHEN NO WORK IS BEING CONDUCTED FOR A PERIOD LONGER THAN ONE WEEK, REMOVE OR COVER ALL ADVANCE WORK ZONE WARNING SIGNS, AS DIRECTED BY THE ENGINEER, AT NO COST TO THE DEPARTMENT.

M) PROVIDE DETOUR SIGNING OFF THE PROJECT LIMITS.

N) COVER OR REMOVE ALL DETOUR SIGNS OFF THE PROJECT LIMITS WHEN A DETOUR IS NOT IN OPERATION.

O) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

TRAFFIC CONTROL DEVICES

P) WHEN USING ROADWAY STANDARD NO. 1101.02, CONES OR SKINNY DRUMS MAY BE USED IN LIEU OF DRUMS ON US 421, US 17, US 74 AND US 76.

Q) SPACE CHANNELIZING DEVICES IN WORK AREAS NO GREATER THAN TWICE THE POSTED SPEED LIMIT (MPH), EXCEPT 10 FT (3m) ON-CENTER IN RADII, AND 3 FT (1m) OFF THE EDGE OF AN OPEN TRAVELWAY, WHEN LANE CLOSURES ARE NOT IN EFFECT.

R) PLACE TYPE III BARRICADES, WITH "ROAD CLOSED" SIGN R11-2 ATTACHED, OF SUFFICIENT LENGTH TO CLOSE ENTIRE ROADWAY. STAGGER OR OVERLAP BARRICADES TO ALLOW FOR INGRESS OR EGRESS.

S) PLACE SETS OF THREE DRUMS PERPENDICULAR TO THE EDGE OF THE TRAVELWAY ON 500 FT (150m) CENTERS WHEN UNOPENED LANES ARE CLOSED TO TRAFFIC. THESE DRUMS SHALL BE IN ADDITION TO CHANNELIZING DEVICES.

MISCELLANEOUS

T) NOTIFY THE RESIDENT ENGINEER, THE SIGNAL SUPERVISOR (910-341-0300) AND THE CITY TRAFFIC ENGINEER (910-341-4696) AT LEAST TWENTY-FOUR(24) HOURS PRIOR TO CLOSING ANY LANES OR IMPLEMENTING ANY DETOURS.

PHASING

NOTE:

COOPERATE WITH ANY CONTRACTORS WORKING WITHIN OR ADJACENT TO THE LIMITS OF THIS PROJECT TO THE EXTENT THAT THE WORK CAN BE CARRIED OUT TO THE BEST ADVANTAGE OF ALL CONCERNED.

USE INTERMEDIATE CONTRACT TIMES AND LIQUIDATED DAMAGES FOR ALL PHASING OF LANE CLOSURES, ROAD CLOSURES AND EXCEPTIONS TO ROAD CLOSURES ON US 421, US 17 AND US 76.

STEP 1: PERFORM THE PROPOSED BRIDGE MAINTENANCE OPERATIONS USING EITHER (A) THE LANE CLOSURE SEQUENCE OR (B) THE ROAD CLOSURE SEQUENCE LISTED BELOW ACCORDING TO LANE AND ROAD CLOSURE REQUIREMENTS AS AGREED UPON BY THE ENGINEER.

A) BRIDGE MAINTENANCE OPERATIONS USING THE LANE CLOSURE SEQUENCE:

USING TCP-8 AND TCP-9, INSTALL ALL WORK ZONE ADVANCE WARNING SIGNS ON ALL ROADS AND APPROACHES AND CHANGEABLE MESSAGE SIGNS (CMS) AT DESIGNATED LOCATIONS PRIOR TO ANY BRIDGE MAINTENANCE OPERATIONS ON THE CAPE FEAR MEMORIAL BRIDGE.

USING ROADWAY STANDARD 1101.02 SHEET 3 OF 7, ROADWAY STANDARD 1101.02 SHEET 4 OF 7 AND TCP-4, CLOSE EITHER OUTSIDE OR INSIDE LANE OF TRAFFIC ON CAPE FEAR MEMORIAL BRIDGE AND PERFORM PROPOSED BRIDGE MAINTENANCE OPERATIONS AS AGREED UPON BY THE ENGINEER.

REMOVE ALL TRAFFIC CONTROL SIGNING AND DEVICES AND REOPEN ALL LANES OF CAPE FEAR MEMORIAL BRIDGE.

B) BRIDGE MAINTENANCE OPERATIONS USING THE ROAD CLOSURE SEQUENCE:

USING TCP-8 AND TCP-9, INSTALL ALL WORK ZONE ADVANCE WARNING SIGNS ON ALL ROADS AND APPROACHES AND CHANGEABLE MESSAGE SIGNS (CMS) AT DESIGNATED LOCATIONS PRIOR TO ANY BRIDGE MAINTENANCE OPERATIONS ON THE CAPE FEAR MEMORIAL BRIDGE.

USING ROADWAY STANDARD 1101.03 SHEET 7 OF 9 AND TCP-3, INSTALL AND COVER ROAD CLOSURE AND DETOUR SIGNING FOR US 421, US 17 AND US 76.

USING ROADWAY STANDARD 1101.07 SHEET 2 OF 2, ROADWAY STANDARD 1101.02 SHEET 3 OF 7, ROADWAY STANDARD 1101.03 SHEET 7 OF 9, TCP-3 AND TCP-4, UNCOVER ALL ROAD CLOSURE AND DETOUR SIGNING, PLACE US 421SB, US 17NB AND US 76EB ONTO OFF-SITE DETOUR, CLOSE ALL INBOUND LANES AND ONE OUTBOUND LANE OF CAPE FEAR MEMORIAL BRIDGE, MANEUVER EQUIPMENT TO THE DESIGNATED AREA(S) AND PERFORM PROPOSED BRIDGE MAINTENANCE OPERATIONS.

USING ROADWAY STANDARD 1101.07 SHEET 2 OF 2 AND TCP-4, PLACE US 421NB, US 17SB AND US 76WB ONTO OFF-SITE DETOUR, CLOSE ALL OUTBOUND LANES OF CAPE FEAR MEMORIAL BRIDGE, PERFORM PROPOSED BRIDGE MAINTENANCE OPERATIONS AS AGREED UPON BY THE ENGINEER.

REMOVE/RECOVER ALL TRAFFIC CONTROL SIGNING AND DEVICES AND REOPEN ALL LANES OF CAPE FEAR MEMORIAL BRIDGE.

STEP 2: REPEAT STEP 1A OR STEP 1B UNTIL ALL PROPOSED BRIDGE MAINTENANCE OPERATIONS HAVE BEEN COMPLETED AS AGREED UPON BY THE ENGINEER.

APPROVED: [signature] DATE: 1/20/06

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

GENERAL NOTES AND PHASING

SCALE:	NONE
DATE:	04-17-06
DWG. BY:	PS
DESIGN BY:	JPG
REVIEWED BY:	MMM

DIVISION OF HIGHWAYS TRAFFIC ENGINEERING BRANCH

REVISIONS	
CADD FILE	

19-APR-2006 10:37
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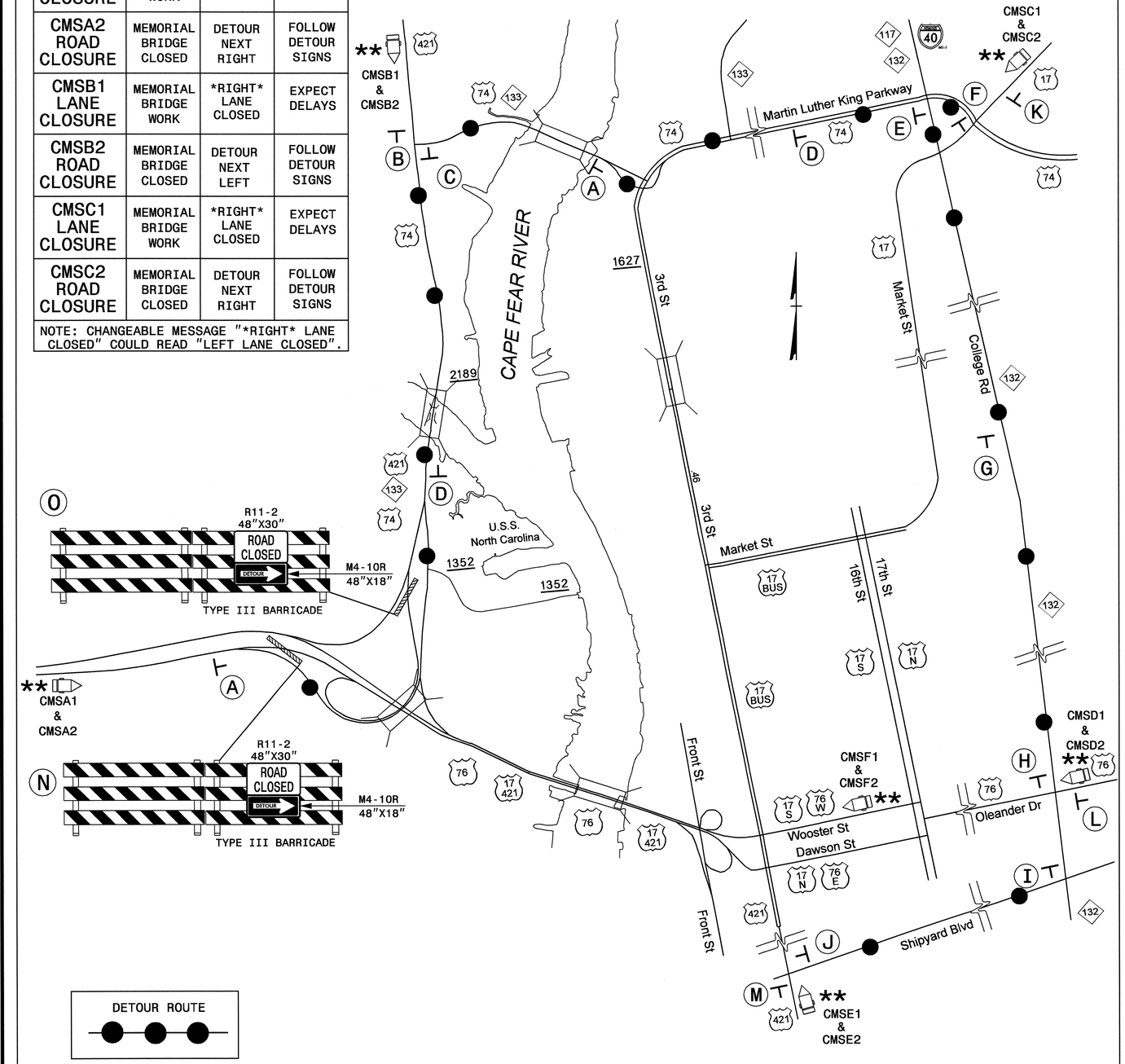
daeymore AT WZTC206427

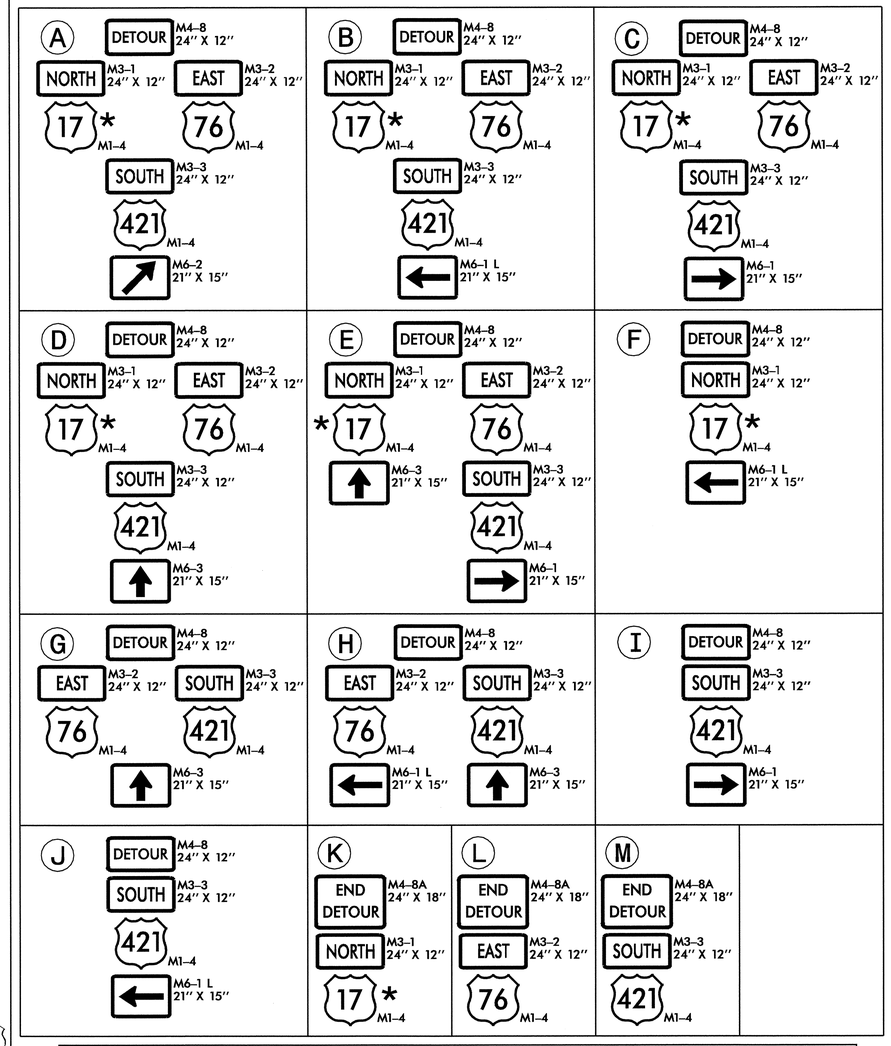
PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP-3

INBOUND DETOUR ROUTE AND CMS MESSAGES FOR CAPE FEAR MEMORIAL BRIDGE

CHANGEABLE MESSAGE SIGNS MESSAGES FOR CAPE FEAR MEMORIAL BRIDGE			
**	MESSAGE 1	MESSAGE 2	MESSAGE 3
CMSA1 LANE CLOSURE	MEMORIAL BRIDGE WORK	*RIGHT* LANE CLOSED	EXPECT DELAYS
CMSA2 ROAD CLOSURE	MEMORIAL BRIDGE CLOSED	DETOUR NEXT RIGHT	FOLLOW DETOUR SIGNS
CMSB1 LANE CLOSURE	MEMORIAL BRIDGE WORK	*RIGHT* LANE CLOSED	EXPECT DELAYS
CMSB2 ROAD CLOSURE	MEMORIAL BRIDGE CLOSED	DETOUR NEXT LEFT	FOLLOW DETOUR SIGNS
CMSC1 LANE CLOSURE	MEMORIAL BRIDGE WORK	*RIGHT* LANE CLOSED	EXPECT DELAYS
CMSC2 ROAD CLOSURE	MEMORIAL BRIDGE CLOSED	DETOUR NEXT RIGHT	FOLLOW DETOUR SIGNS

NOTE: CHANGEABLE MESSAGE "*RIGHT* LANE CLOSED" COULD READ "LEFT LANE CLOSED".





* NOTE:

1) ROUTE DESIGNATIONS MAY CHANGE PENDING THE COMPLETION OF OTHER PROJECTS. COORDINATE WITH THE DIVISION TRAFFIC OFFICE AT 910-341-0300 TO KEEP DETOUR ROUTES CURRENT.
2) TYPE III BARRICADES ARE SHOWN ON TCP-3, TCP-4 AND TCP-5 AND ARE TO BE USED ONLY DURING ROAD CLOSURES.
3) USE CHANGEABLE MESSAGE SIGNS (CMS) FOR LANE CLOSURES AND ROAD CLOSURES.
4) CMS_1 ARE LANE CLOSURE MESSAGES. CMS_2 ARE ROAD CLOSURE MESSAGES.
5) USE TCP-3, TCP-4 AND TCP-5 FOR LOCATIONS AND APPROPRIATE MESSAGES OF EACH CMS.

APPROVED [signature] DATE: 4/26/06

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

INBOUND DETOUR ROUTE AND SIGNING

SCALE:	NONE
DATE:	04-17-06
DWG. BY:	PS
DESIGN BY:	JPG
REVIEWED BY:	MMM

DIVISION OF HIGHWAYS TRAFFIC ENGINEERING BRANCH

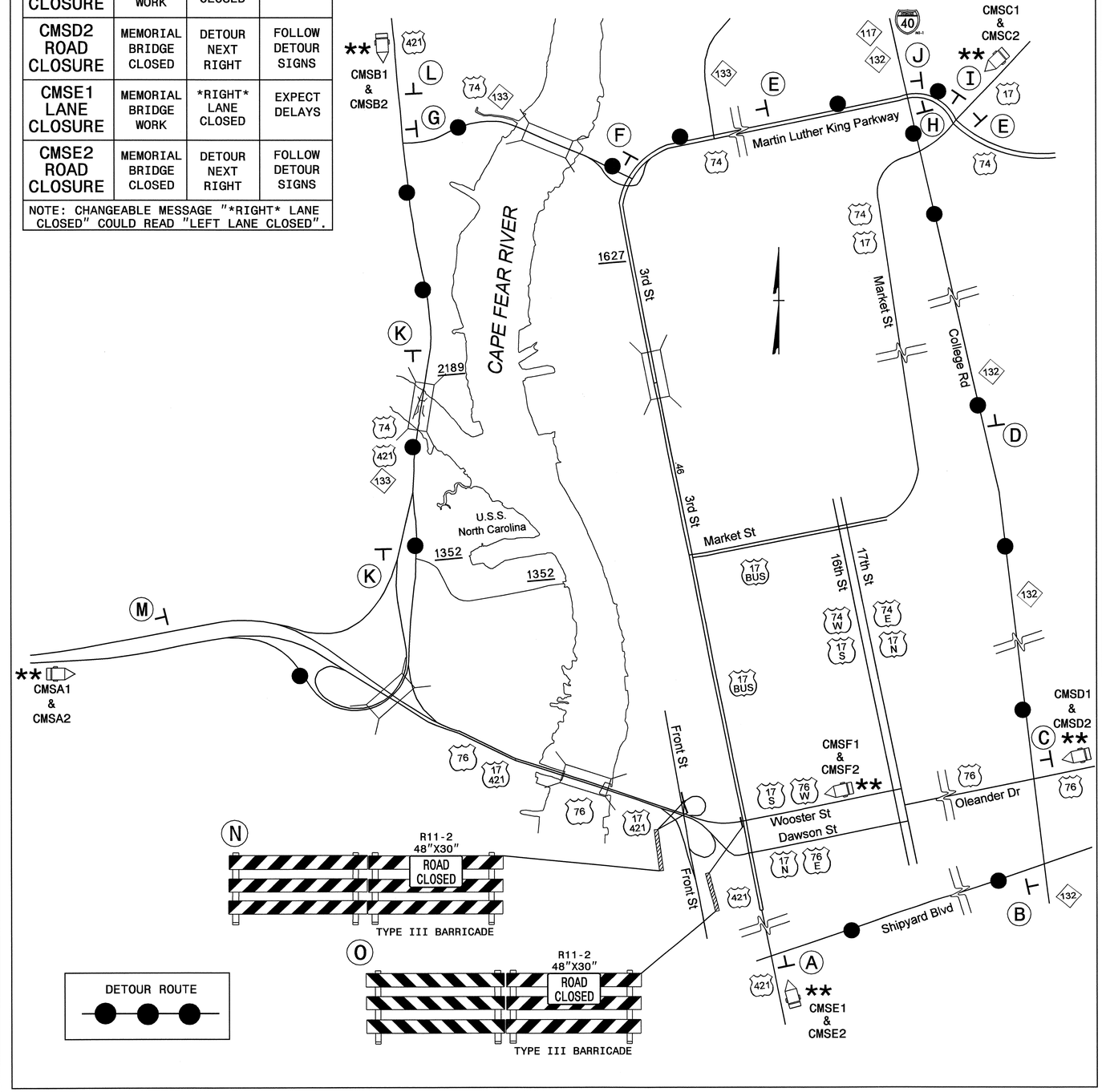
REVISIONS	
CADD FILE	

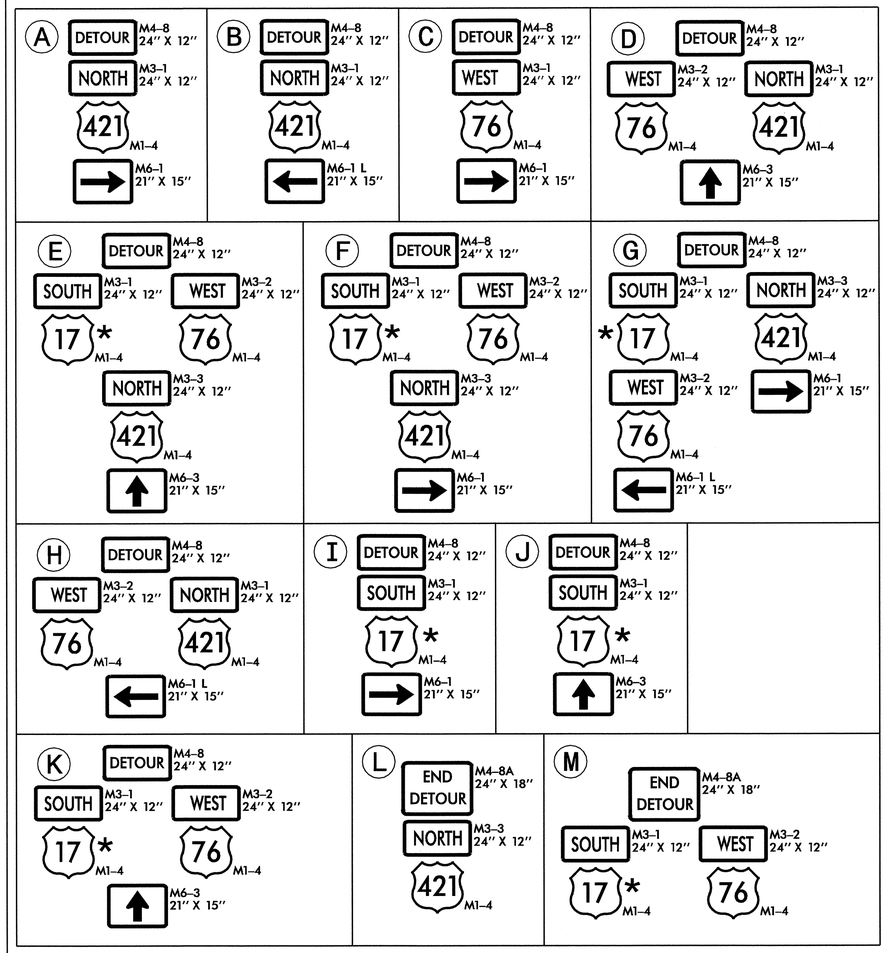
PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP-4

OUTBOUND DETOUR ROUTE AND CMS MESSAGES FOR CAPE FEAR MEMORIAL BRIDGE

CHANGEABLE MESSAGE SIGNS MESSAGES FOR CAPE FEAR MEMORIAL BRIDGE			
**	MESSAGE 1	MESSAGE 2	MESSAGE 3
CMSD1 LANE CLOSURE	MEMORIAL BRIDGE WORK	*RIGHT* LANE CLOSED	EXPECT DELAYS
CMSD2 ROAD CLOSURE	MEMORIAL BRIDGE CLOSED	DETOUR NEXT RIGHT	FOLLOW DETOUR SIGNS
CMSE1 LANE CLOSURE	MEMORIAL BRIDGE WORK	*RIGHT* LANE CLOSED	EXPECT DELAYS
CMSE2 ROAD CLOSURE	MEMORIAL BRIDGE CLOSED	DETOUR NEXT RIGHT	FOLLOW DETOUR SIGNS

NOTE: CHANGEABLE MESSAGE "*RIGHT* LANE CLOSED" COULD READ "LEFT LANE CLOSED".





* NOTE:
1) ROUTE DESIGNATIONS MAY CHANGE PENDING THE COMPLETION OF OTHER PROJECTS. COORDINATE WITH THE DIVISION TRAFFIC OFFICE AT 910-341-0300 TO KEEP DETOUR ROUTES CURRENT.
2) TYPE III BARRICADES ARE SHOWN ON TCP-3, TCP-4 AND TCP-5 AND ARE TO BE USED ONLY DURING ROAD CLOSURES.
3) USE CHANGEABLE MESSAGE SIGNS (CMS) FOR LANE CLOSURES AND ROAD CLOSURES.
4) CMS_1 ARE LANE CLOSURE MESSAGES. CMS_2 ARE ROAD CLOSURE MESSAGES.
5) USE TCP-3, TCP-4 AND TCP-5 FOR LOCATIONS AND APPROPRIATE MESSAGES OF EACH CMS.

APPROVED: [signature] DATE: 4/20/06

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

OUTBOUND DETOUR ROUTE AND SIGNING

SCALE:	NONE
DATE:	04-17-06
DWG. BY:	PS
DESIGN BY:	JPG
REVIEWED BY:	MMM

DIVISION OF HIGHWAYS TRAFFIC ENGINEERING BRANCH TRAFFIC CONTROL UNIT

REVISIONS

CADD FILE

19-APR-2006 10:38
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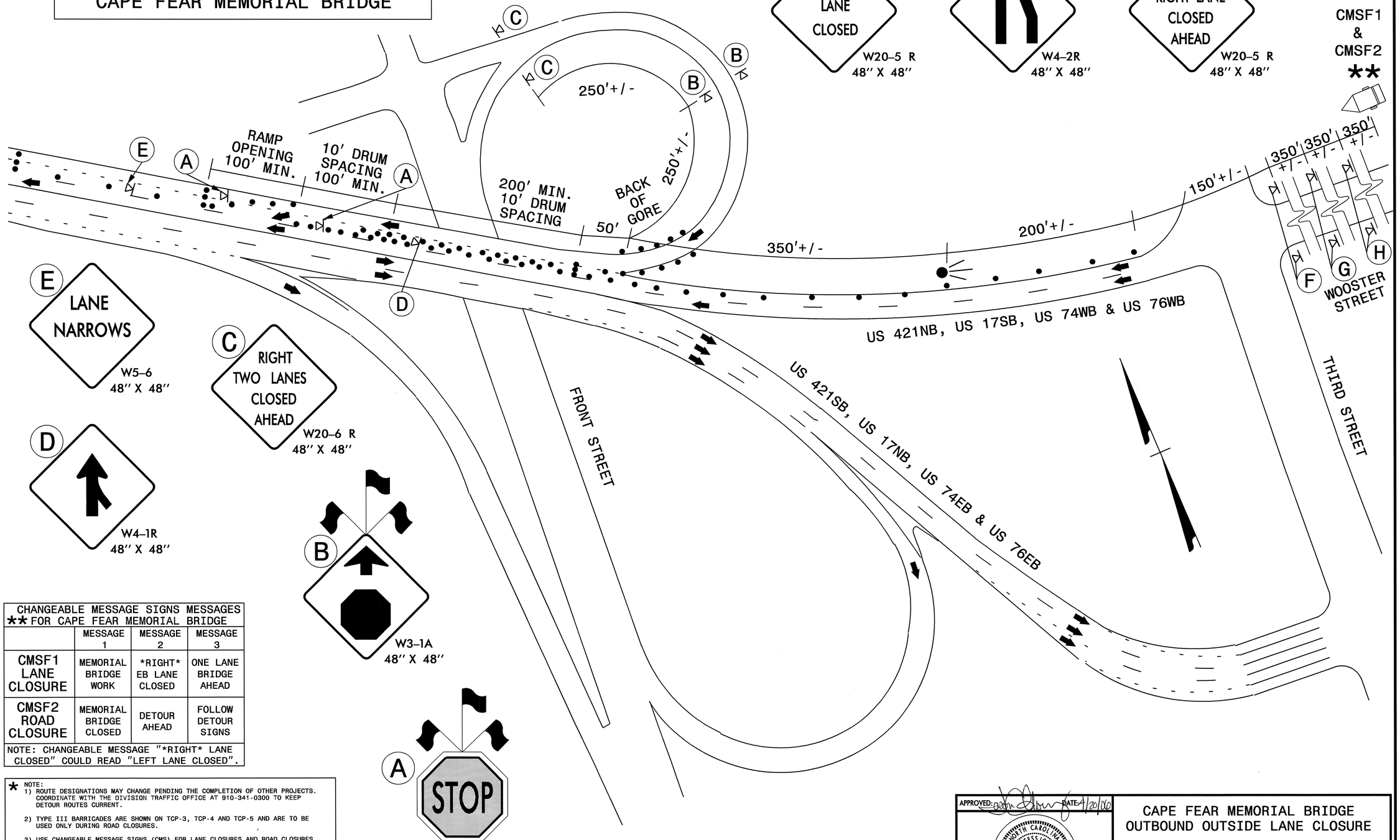
dseymore AT WZTC2006427

PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP-5

OUTBOUND OUTSIDE LANE CLOSURE AND CMS CLOSURE MESSAGES FOR CAPE FEAR MEMORIAL BRIDGE



F RIGHT LANE CLOSED
W20-5 R
48" X 48"

G
W4-2R
48" X 48"

H RIGHT LANE CLOSED AHEAD
W20-5 R
48" X 48"

CMSF1 & CMSF2 **

E LANE NARROWS
W5-6
48" X 48"

C RIGHT TWO LANES CLOSED AHEAD
W20-6 R
48" X 48"

D
W4-1R
48" X 48"

B
W3-1A
48" X 48"

A STOP
R1-1
48" X 48"

CHANGEABLE MESSAGE SIGNS MESSAGES ** FOR CAPE FEAR MEMORIAL BRIDGE			
	MESSAGE 1	MESSAGE 2	MESSAGE 3
CMSF1 LANE CLOSURE	MEMORIAL BRIDGE WORK	*RIGHT* EB LANE CLOSED	ONE LANE BRIDGE AHEAD
CMSF2 ROAD CLOSURE	MEMORIAL BRIDGE CLOSED	DETOUR AHEAD	FOLLOW DETOUR SIGNS
NOTE: CHANGEABLE MESSAGE "*RIGHT* LANE CLOSED" COULD READ "LEFT LANE CLOSED".			

* NOTE:
1) ROUTE DESIGNATIONS MAY CHANGE PENDING THE COMPLETION OF OTHER PROJECTS. COORDINATE WITH THE DIVISION TRAFFIC OFFICE AT 910-341-0300 TO KEEP DETOUR ROUTES CURRENT.
2) TYPE III BARRICADES ARE SHOWN ON TCP-3, TCP-4 AND TCP-5 AND ARE TO BE USED ONLY DURING ROAD CLOSURES.
3) USE CHANGEABLE MESSAGE SIGNS (CMS) FOR LANE CLOSURES AND ROAD CLOSURES.
4) CMS_1 ARE LANE CLOSURE MESSAGES. CMS_2 ARE ROAD CLOSURE MESSAGES.
5) USE TCP-3, TCP-4 AND TCP-5 FOR LOCATIONS AND APPROPRIATE MESSAGES OF EACH CMS.

APPROVED: [signature] DATE: 4/20/06

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029904 JASON P. GALLOWAY

CAPE FEAR MEMORIAL BRIDGE OUTBOUND OUTSIDE LANE CLOSURE

SCALE:	NONE
DATE:	04-17-06
DWG. BY:	PS
DESIGN BY:	JPG
REVIEWED BY:	MMM

DIVISION OF HIGHWAYS — NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — WORK ZONE TRAFFIC CONTROL UNIT

REVISIONS

CADD FILE

PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP- 6

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

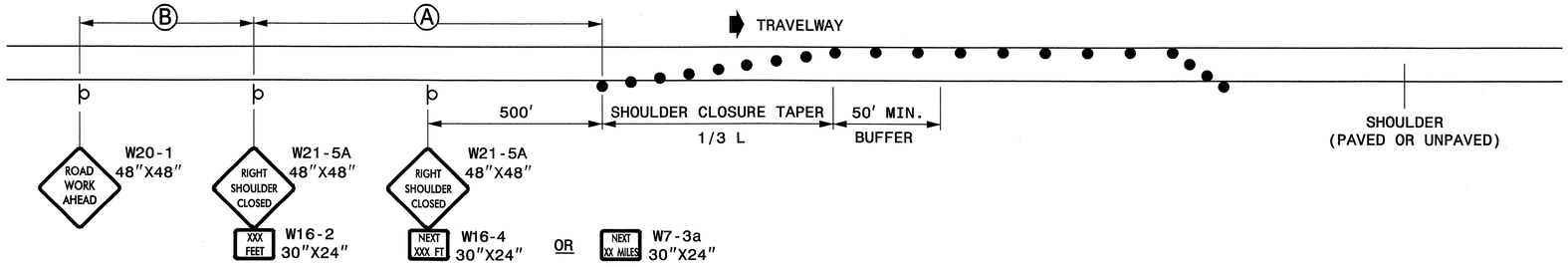
ENGLISH STANDARD DRAWING FOR

TEMPORARY SHOULDER CLOSURES

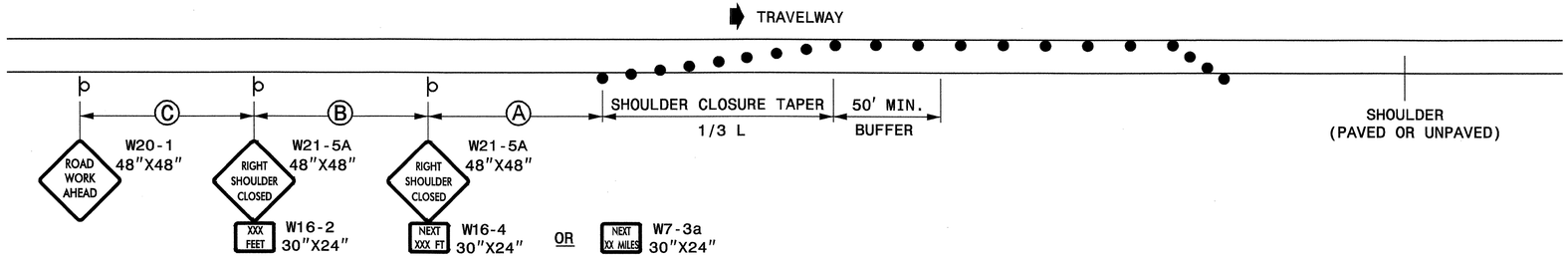
SHEET 1 OF 1

1101D04

SHOULDER CLOSURE ON CONTROLLED ACCESS FACILITIES - 55 MPH OR ABOVE

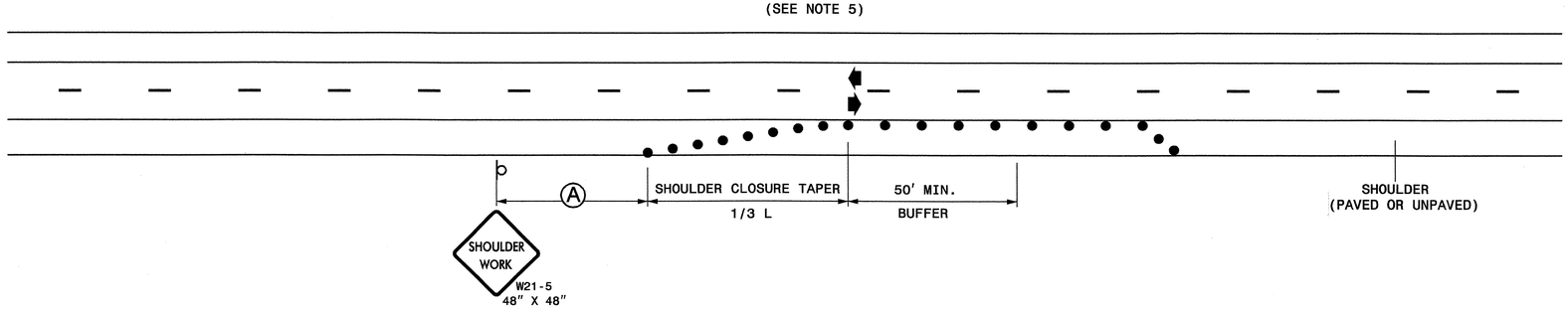


SHOULDER CLOSURE ON OTHER DIVIDED FACILITIES - 55 MPH OR LESS



SHOULDER CLOSURE ON TWO-LANE, TWO-WAY ROADWAYS

(SEE NOTE 5)



LEGEND

- ● DRUM
- ♭ STATIONARY OR PORTABLE SIGN
- ➧ DIRECTION OF TRAFFIC FLOW

GENERAL NOTES

1- PLACE SHOULDER CLOSURE SIGNS ON THE SAME SIDE AS THE SHOULDER THAT IS CLOSED.
2- PLACE DRUMS IN THE SHOULDER TAPER AT THE MAXIMUM SPACING EQUAL IN FEET TO THE POSTED SPEED LIMIT. THE MAXIMUM SPACING OF DRUMS ALONG THE WORK AREA IS EQUAL IN FEET TO 2 TIMES THE POSTED SPEED LIMIT.
3- USE STATIONARY SIGNS FOR LONG TERM OPERATIONS (LONGER THAN 3 DAYS).
4- REFER TO STD. 1101.11 SHEETS 1, 3, & 4, FOR "L" DISTANCE, AND SIGN SPACING.
5- THE TWO-LANE, TWO-WAY DRAWING MAY BE APPLIED TO UNDIVIDED, MULTI-LANE FACILITIES.

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-06

ENGLISH STANDARD DRAWING FOR

TEMPORARY SHOULDER CLOSURES

SHEET 1 OF 1

1101D04

APPROVED: M. McDiarmid DATE: 11/9/05

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025895 ENGINEER MEREDITH M. McDIARMID

REPLACEMENT DETAIL
FOR RSD 1101.04

SCALE:	NONE
DATE:	11-08-05
DWG. BY:	MRM
DESIGN BY:	JPG
REVIEWED BY:	MMM

DIVISION OF HIGHWAYS TRAFFIC ENGINEERING BRANCH TRAFFIC CONTROL UNIT

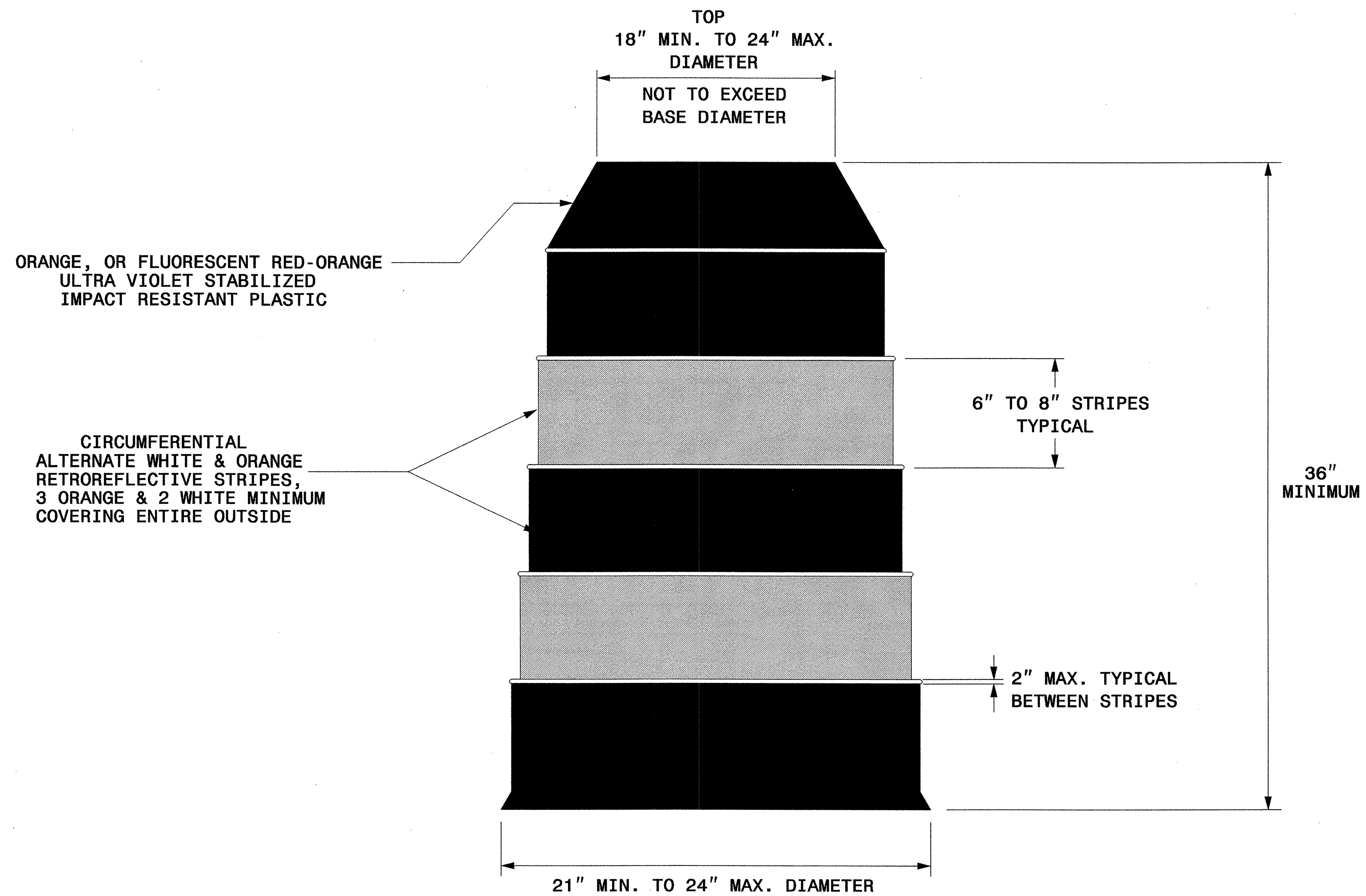
REVISIONS

CADD FILE

PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP- 7

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
DRUMS



GENERAL NOTES

-BALLASTING SHALL BE ACHIEVED BY THE SAND BAG, TIRE-SIDEWALL BALLAST, OR PREFORMED WEIGHTED BASE BALLASTING METHODS. DO NOT PLACE BALLAST ON TOP OF THE DRUM, NOR AS TO PRESENT A HAZARD WHEN STRUCK.

-IF NECESSARY PLACE THE NAME OF THE AGENCY, CONTRACTOR, OR SUPPLIER ON NON-RETROREFLECTIVE DRUM SURFACES. SHOW THE LETTERS AND NUMBERS USING A NON-RETROREFLECTIVE COLOR AND NOT OVER 2" IN HEIGHT.

SHEET 1 OF 1
1130D01

STATE OF
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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
DRUMS

SHEET 1 OF 1
1130D01

APPROVED: MM McDiarmid DATE: 5/16/05

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025895 ENGINEER MEREDITH M. McDIARMID

REPLACEMENT DETAIL FOR RSD 1130.01

SCALE:	NONE
DATE:	8/02
DWG. BY:	MMM
DESIGN BY:	MMM
REVIEWED BY:	MMM

REVISIONS

CADD FILE

25-APR-2005 16:59
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PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP- 8

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-05

ENGLISH STANDARD DRAWING FOR

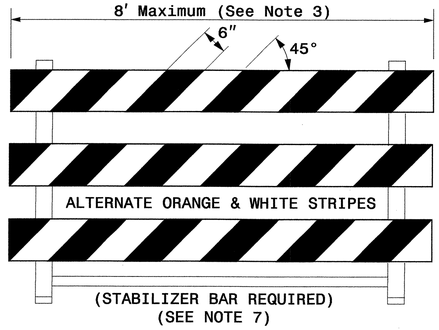
BARRICADES

TYPE-III

SHEET 1 OF 1

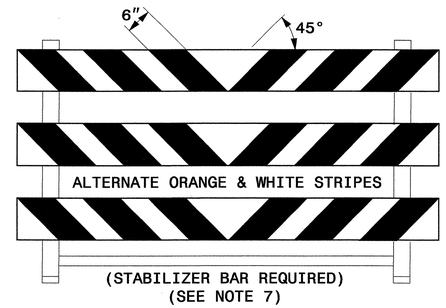
1145D01

TYPE III BARRICADE



TYPE III BARRICADE

END-OF-ROADWAY APPLICATIONS



GENERAL NOTES

1) HORIZONTAL RAILS FOR TYPE-III BARRICADES MAY BE HOLLOW/CORRUGATED EXTRUDED RIGID POLYOLEFIN, HIGH DENSITY POLYETHYLENE, OR OTHER NCDOT APPROVED RAILS. BARRICADE RAILS OF FRANGIBLE PLASTICS SUCH AS PVC MAY NOT BE USED. IF APPROVED PLASTIC TYPE RAILS ARE USED, THEY MUST BE FLAME TREATED BY THE MANUFACTURER SO THAT REFLECTIVE SHEETING MAY ADHERE PROPERLY.

2) BARRICADES AND BARRICADE RAILS ARE APPROVED AS A SINGLE UNIT.

3) BARRICADE SHALL BE LIMITED TO A MAXIMUM LENGTH OF 8 FT UNLESS NCHRP 350 CRASH TESTED AND NCDOT APPROVED.

4) ONLY NCDOT APPROVED COMPOSITE AND ROLL-UP SIGNS MAY BE MOUNTED ON THE BARRICADE.

5) SIGNS MOUNTED ON BARRICADES SHOULD NOT COVER MORE THAN 50 PERCENT OF THE TOP TWO RAILS OR 33 PERCENT OF THE TOTAL AREA OF THE THREE RAILS.

6) USE TYPE VII, VIII OR IX SHEETING ON BOTH SIDES OF THE RAILS.

7) BARRICADE MUST BE NCHRP 350 AND NCDOT APPROVED WITH STABILIZER BAR OR ADEQUATE LATERAL BRACING.

8) ASSEMBLY OF THE GENERIC BARRICADES MUST BE SELF CERTIFIED BY THE ASSEMBLER.

9) BARRICADES USED TO CLOSE A ROADWAY SHALL EXTEND ACROSS THE ENTIRE ROADWAY. WHERE LOCAL TRAFFIC MUST BE MAINTAINED, THEY MAY BE PLACED IN A STAGGERED PATTERN.

10) STRIPES ON WORK ZONE BARRICADE RAILS SHALL BE ALTERNATE ORANGE AND WHITE RETROREFLECTIVE STRIPES, SLOPED DOWNWARD TOWARDS THE SIDE WHICH TRAFFIC IS TO PASS OR TURN IN DETOURING. WHERE NO TURNS ARE INTENDED, THE STRIPES SHOULD SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES. USE RED AND WHITE STRIPES FOR PERMANENT BARRICADES.

11) SEE APPROVED PRODUCTS LIST FOR MANUFACTURERS OF APPROVED BARRICADES.

12) PLACE MANUFACTURER'S NAME AND FEDERAL HIGHWAY ADMINISTRATION'S NCHRP 350 APPROVAL LETTER NUMBER ON BARRICADE.

13) USE SANDBAGS PLACED ON THE LOWER PART OF THE FRAME FOR BALLASTING. DO NOT PLACE SANDBAGS ON TOP OF A STRIPED RAIL. DO NOT BALLAST BARRICADES BY HEAVY OBJECTS SUCH AS ROCKS, CHUNKS OF CONCRETE OR OTHER ITEMS THAT WOULD CAUSE DAMAGE IF THE BARRICADE IS STRUCK BY A VEHICLE.

STATE OF
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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-05

ENGLISH STANDARD DRAWING FOR

BARRICADES

TYPE-III

SHEET 1 OF 1

1145D01

APPROVED: MMM McDiarmid DATE: 5/16/05

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 025895 ENGINEER MEREDITH M. McDIARMID

REPLACEMENT DETAIL FOR RSD 1145.01

SCALE:	NONE
DATE:	11/04
DWG. BY:	MMM
DESIGN BY:	MMM
REVIEWED BY:	MMM

DIVISION OF HIGHWAYS TRAFFIC ENGINEERING BRANCH TRAFFIC CONTROL UNIT

REVISIONS

CADD FILE

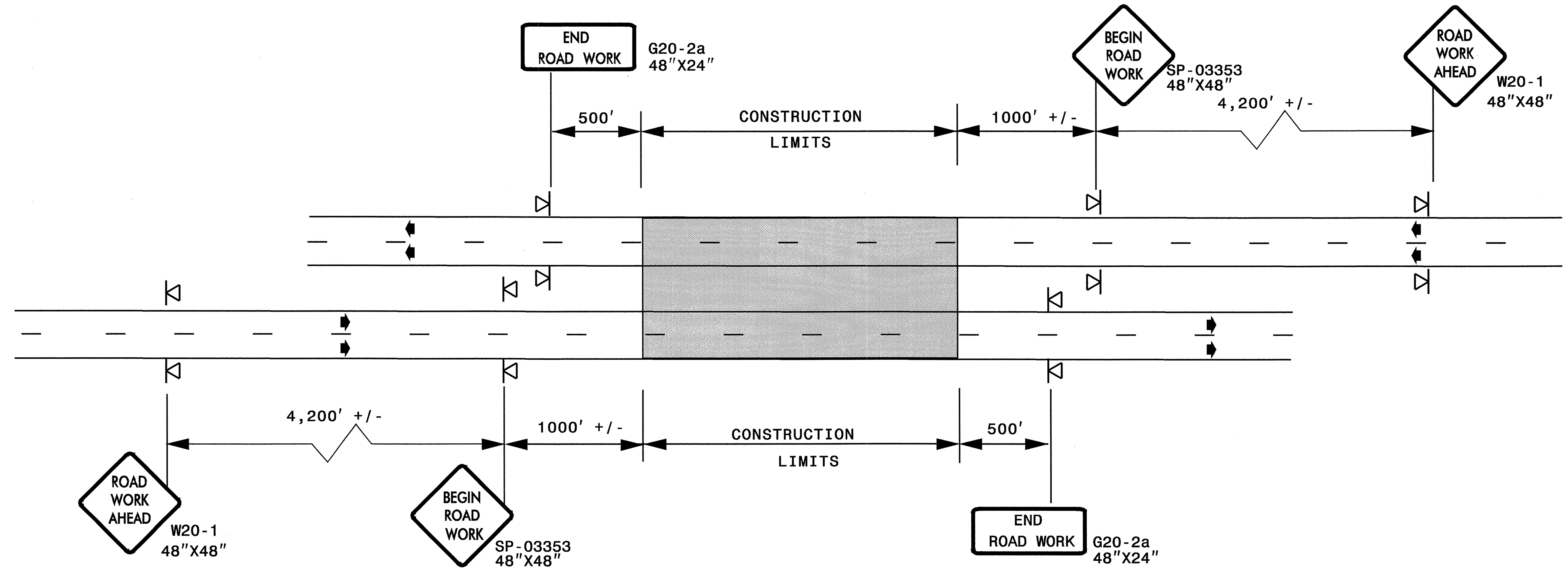
25-APR-2005 17:00
d:\barricades\typeIII.dgn
wjacas AT TET\22240

PROJ. REFERENCE NO.	SHEET NO.
B-4990	TCP-9

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ADVANCED WORK ZONE WARNING SIGNING FOR FREEWAYS (4 LANES OR GREATER)

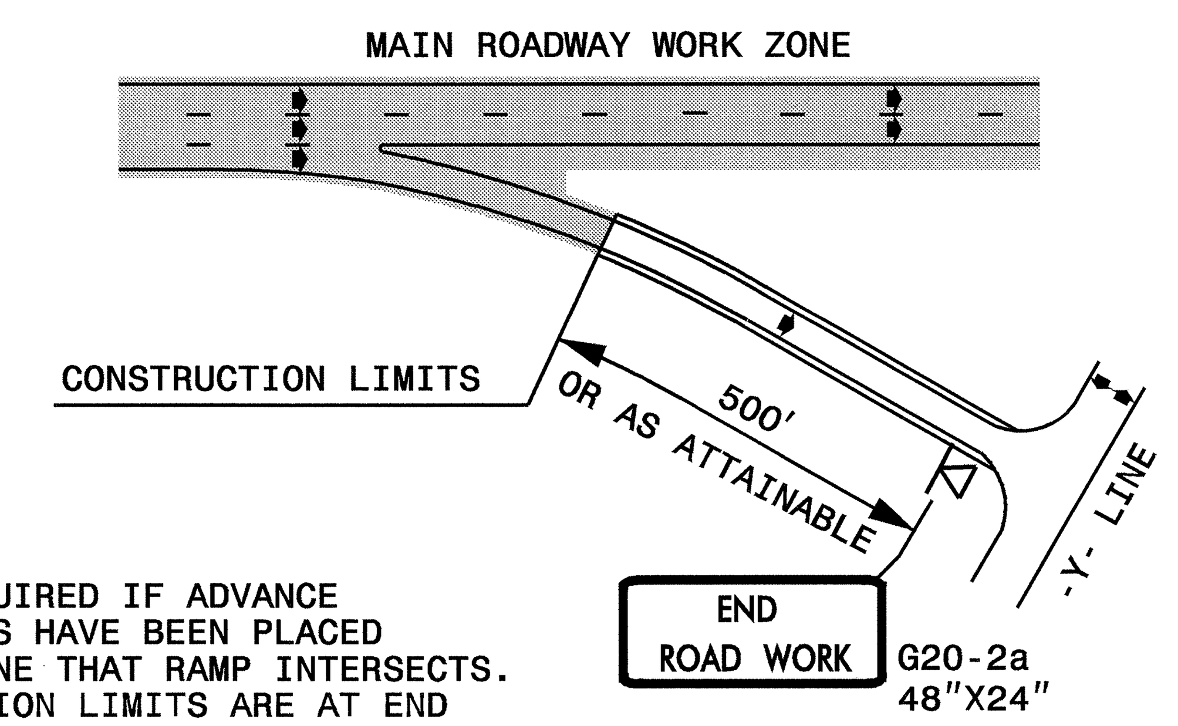
DETAIL A



ROADWAYS INTERSECTING ALONG FREEWAY WORK ZONE (Y-LINES)

DETAIL B

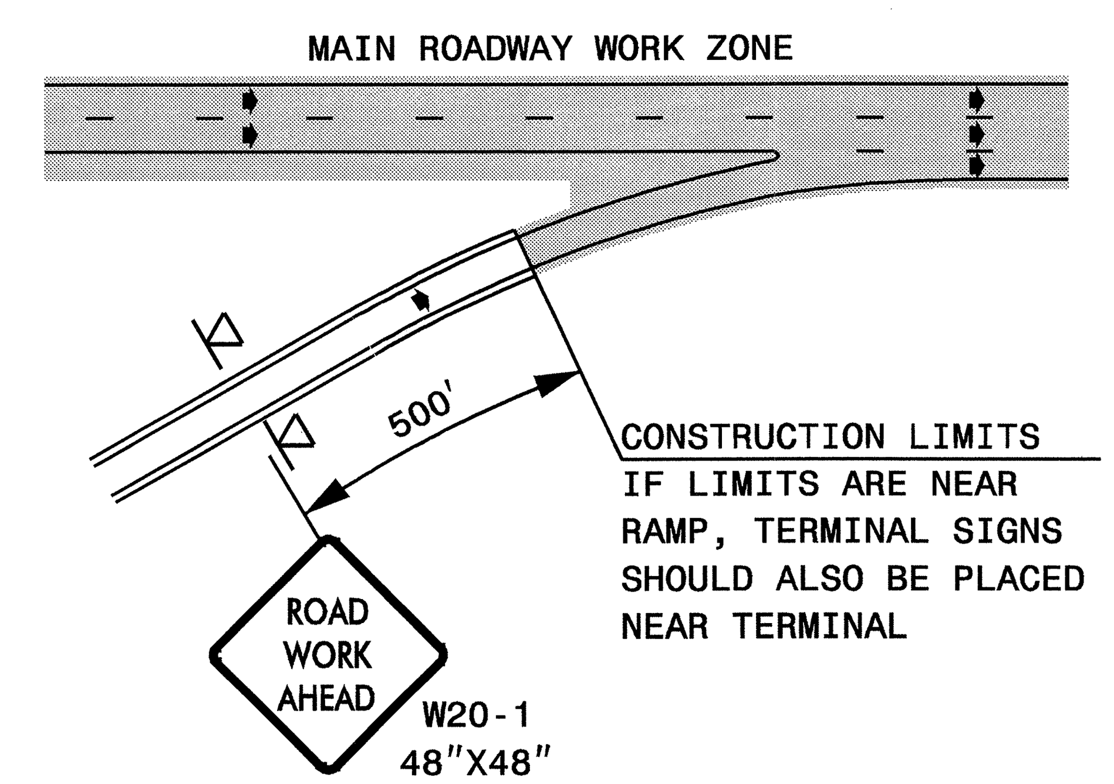
EXIT RAMPS



NOTE:
SIGN NOT REQUIRED IF ADVANCE WARNING SIGNS HAVE BEEN PLACED ALONG -Y- LINE THAT RAMP INTERSECTS. IF CONSTRUCTION LIMITS ARE AT END OF RAMP, PLACE SIGN AT END OF RAMP.

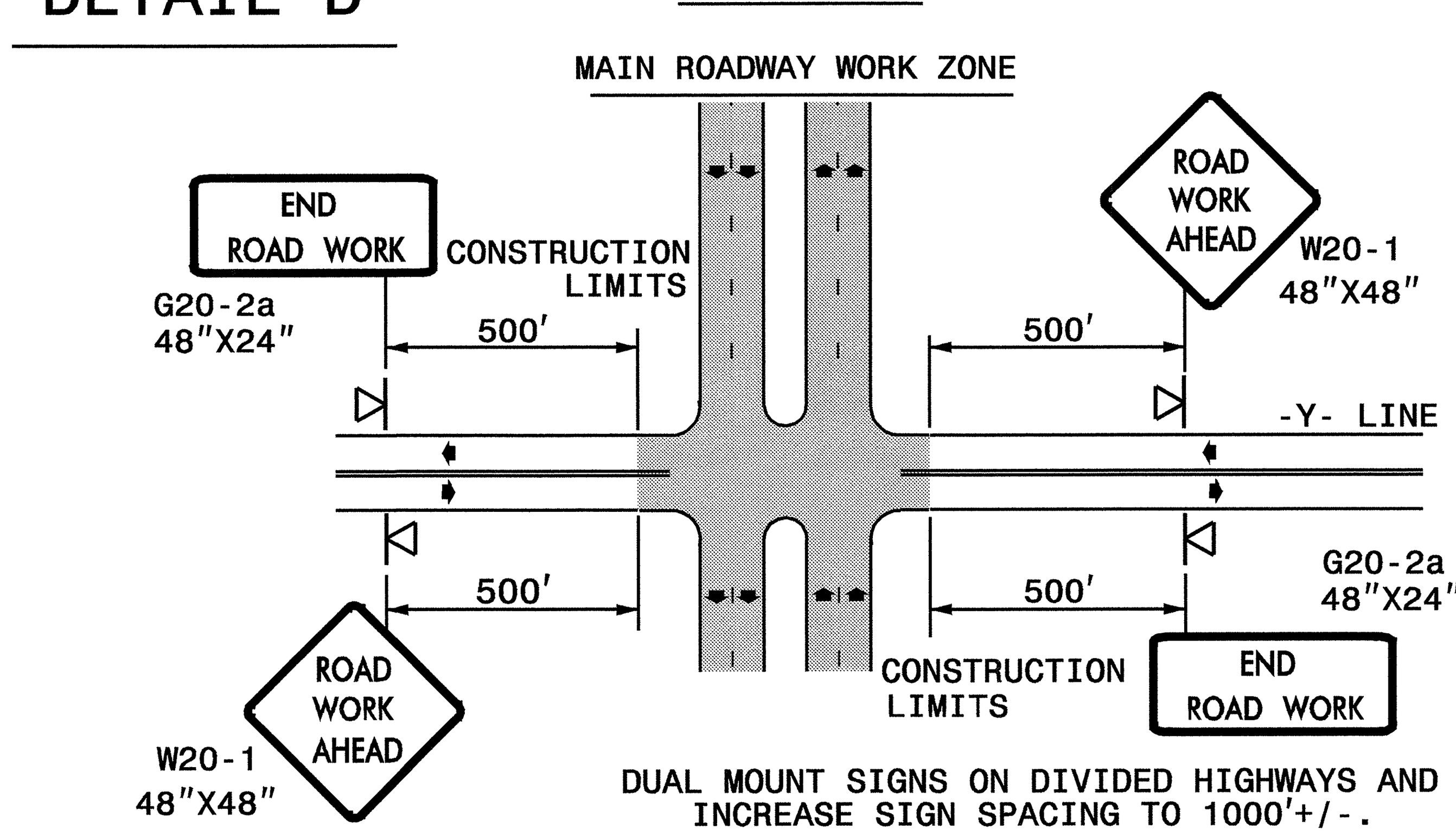
DETAIL C

ENTRANCE RAMPS



DETAIL D

-Y- LINES



DUAL MOUNT SIGNS ON DIVIDED HIGHWAYS AND INCREASE SIGN SPACING TO 1000'+/-.

GENERAL NOTES

- USE FLUORESCENT ORANGE SHEETING (TYPE VII OR HIGHER) ON ALL ADVANCED WORK ZONE SIGNS.
- DO NOT INSTALL ADVANCE WARNING SIGNS MORE THAN 3 DAYS PRIOR TO BEGINNING OF WORK.
- ALL SIGN SPACING DIMENSIONS ARE APPROXIMATE, FIELD ADJUST AS NECESSARY OR AS DIRECTED.
- USE PORTABLE WORK ZONE SIGNS ONLY WITH PORTABLE WORK ZONE SIGN STANDS SPECIFICALLY DESIGNED FOR ONE ANOTHER. PORTABLE WORK ZONE SIGNS MAY BE ROLL UP OR APPROVED COMPOSITE.
- PROVIDE PORTABLE WORK ZONE SIGN STANDS, PORTABLE SIGNS AND SIGN SHEETING WHICH ARE LISTED ON THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION'S APPROVED PRODUCT LIST OR ACCEPTED AS TRAFFIC QUALIFIED BY THE TRAFFIC CONTROL UNIT.
- ** TWO-WAY UNDIVIDED ADVANCE WARNING SIGN CONFIGURATION MAY BE USED ON MULTI-LANE FACILITIES WHERE CONDITIONS LIMIT THE USE OF DUAL MOUNTED SIGNS AS DETERMINED BY THE ENGINEER.

LEGEND

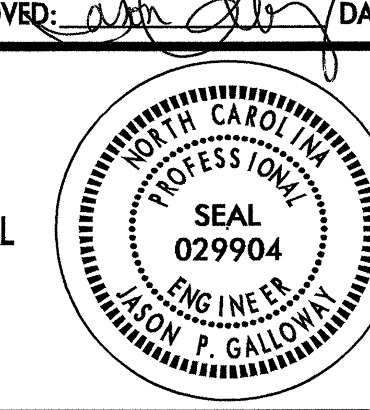
- PORTABLE SIGN
- DIRECTION OF TRAFFIC FLOW

DETAIL DRAWING
FOR FREEWAYS
WORK ZONE WARNING SIGNS
(SHORT-DURATION LANE CLOSURES)

SHEET 1 OF 1

APPROVED: DATE: 4/20/06

SEAL



DETAIL DRAWING
FOR FREEWAYS
WORK ZONE WARNING SIGNS

SCALE:	NONE
DATE:	
DWG. BY:	
DESIGN BY:	
REVIEWED BY:	

REVISIONS	
7-98	10/01
10-98	03/04
01/01	11/04

SP 03353

SIGN NUMBER: SP-03353
TYPE: A
QUANTITY: 1

SIGN WIDTH: 4'-0"
HEIGHT: 4'-0"
TOTAL AREA: 16.0 Sq.Ft.

BORDER TYPE: FLUSH
RECESS: 0.59"
WIDTH: 0.75"
RADII: 1.38"

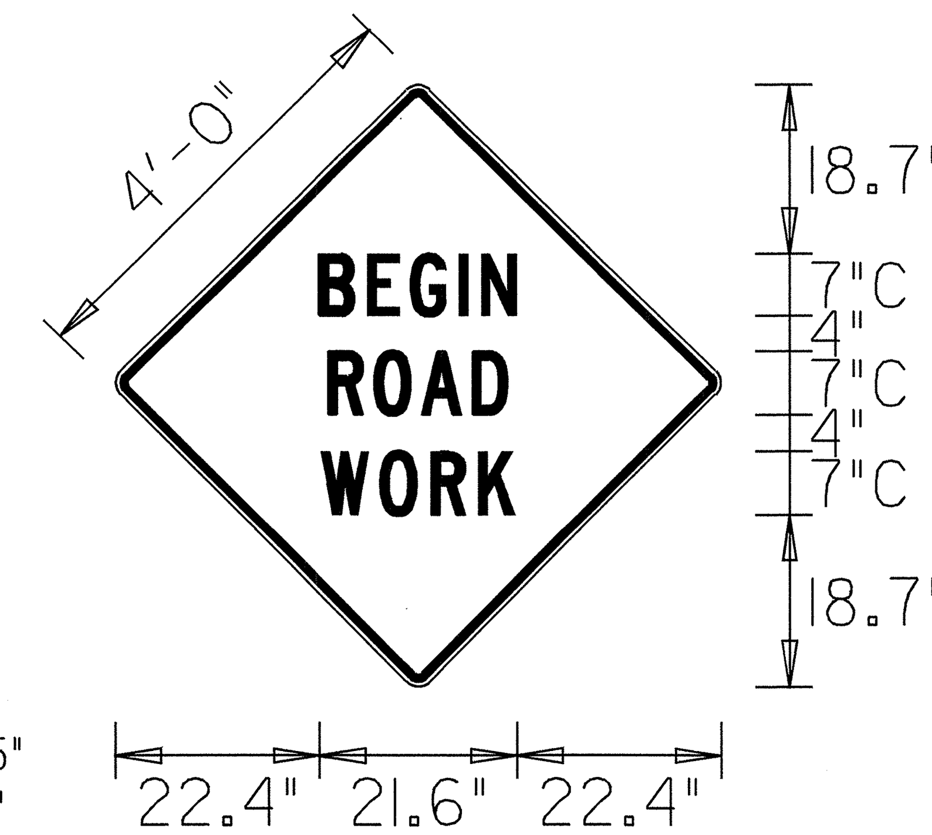
NO. Z BARS: N/A
LENGTH: N/A

BACKG COLOR: Fluorescent Orange
COPY COLOR: Black

SYMBOL	X	Y	WID	HT

MAT'L:

DESIGN BY: CL DOWNEY
PROJECT ID: ALL PROJECTS
CHECKED BY: CHECKED
DIV: DIV
STD #: W20-1
DATE: Aug 20,2003



BORDER
R=1.38"
TH=0.75"
IN=0.59"

USE NOTES: 2, 4

1. Legend and border shall be direct applied Type VII reflective sheeting.
2. Legend and border shall be direct applied non-reflective sheeting.
3. Shields shall be Type VII reflective sheeting on 0.032" (0.8mm) aluminum and demountable.
4. Background shall be Type VII reflective sheeting.
5. Background shall be Type I reflective sheeting.
6. Center arrow(s) vertically on sign.
7. Bottom panel shall be yellow Type III sheeting. Legend shall be direct applied black non-reflective sheeting. Yellow panel is:

LETTER POSITIONS

Letter spacings are to start of next letter

							Series/Size Text Length
	B	E	G	I	N		C7
22.4	5.3	4.6	5.4	2.5	3.8	22.4	21.6
	R	O	A	D			C7
23.4	5	5.2	5.6	3.8	23.4		19.6
	W	O	R	K			C7
22.6	6.4	5.6	5.2	4	22.6		21.2

Spacing Factor is 1 unless specified otherwise

FILENAME: SPEC1SHAK

NORTH CAROLINA D.O.T. SIGN DETAIL

GENERAL NOTES FOR SIGN SP-03353 "BEGIN ROAD WORK"

-SIGN SP-03353 "BEGIN ROAD WORK" ONLY APPLIES TO FULL CONTROL AND PARTIAL CONTROL OF ACCESS ROADWAYS
-WHEN USED, INSTALL SIGN SP-03353 "BEGIN ROAD WORK" ACCORDING TO DETAIL FOR FREEWAY WORK ZONE SIGNS

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

DETAIL DRAWING FOR
WORK ZONE SIGNS
BEGIN ROAD WORK

SHEET 1 OF 1

APPROVED: DATE:

SEAL

DETAIL DRAWING FOR
ADVANCED WORK ZONE WARNING
SIGN DESIGNS

SCALE: NONE
DATE: 08/03
DWG. BY:
DESIGN BY:
REVIEWED BY:

REVISIONS
04/04
11/04

19-APR-2006 10:39
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pseymore AT WZTC206427