02/03/98

PROJECT REFERENCE NO.	SHEET NO.
I-4411	E-1

LIGHTING

SEAL 022582
PAUL KI-BUN CHAN
Paul K. Chan
7/10/06

PLANS AND DETAILS FOR PROPOSED LIGHTING /ELECTRICAL CONSTRUCTION

△ NOTES

- △1 PROVIDE ELECTRICAL DUCT AT THESE NOTED LOCATIONS IN CONFORMANCE WITH NEC REQUIREMENTS FOR AN APPROVED RACEWAY FOR ELECTERICAL CIRCUITS. SEE TABLE C, THIS SHEET.
- △2 LOCATE ALL JUNCTION BOXES OUTSIDE CLEAR ZONE AND IN AN AREA UNLIKELY TO USED BY TRAFFIC.
- △3 LOCATE ALL BORE PITS OUTSIDE CLEAR ZONE AS DEFINED BY THE 2002 AASHTO ROADSIDE DESIGN GUIDE OR AS DIRECTED BY ENGINEER.
- △4 LOCATE PROPOSED CONTROL SYSTEM AND SERVICE POLE IN AN AREA ACCESSIBLE FOR MAINTENANCE VEHICLES AND OUTSIDE CLEAR ZONE AS DEFINED BY THE 2002 AASHTO ROADSIDE DESIGN GUIDE.

SCOPE OF WORK

PROVIDE ROADWAY LIGHTING BY PROVIDING AND INSTALLING HIGH PRESSURE SODIUM LUMINAIRES ON 120′ HIGH MOUNT STANDARDS IN ONE INTERCHANGE AND 100′ HIGH MOUNT STANDARDS IN ANOTHER INTERCHANGE, INCLUDING UNDERGROUND CIRCUITRY, CONTROL SYSTEM AND JUNCTION BOXES.

DESIGN CRITERIA

1984 AASHTO "AN INFORMATIONAL GUIDE FOR ROADWAY LIGHTING"

2001 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS

2005 NATIONAL ELECTRICAL CODE

2002 AASHTO ROADSIDE DESIGN GUIDE

ROADWAY STANDARDS

THE FOLLOWING DRAWINGS, AS APPEAR IN "NCDOT ROADWAY STANDARD DRAWINGS - ENGLISH", ROADWAY DESIGN UNIT-N.C. DEPARTMENT OF TRANSPORTATION RALEIGH, N.C., DATED JANUARY 2002 AND THE STANDARD DRAWINGS AS REVISED (NUMBER CONTAINING THE LETTER "D") AND ATTACHED HEREWITH, ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

DRAWING NO.	TITLE
1401.01	HIGH MOUNT STANDARD
1402D01	HIGH MOUNT FOUNDATION
1403.01	HIGH MOUNT LUMINAIRE
1407.01	ELECTRIC SERVICE POLE AND LATERAL
1408D01	LIGHT CONTROL SYSTEM
1408.01(SHEET 2 & 3)	LIGHT CONTROL SYSTEM
1409.01	ELECTRICAL DUCT
1410.01	FEEDER CIRCUITS
1411.01	ELECTRICAL JUNCTION BOXES

ALL WORK SHALL BE IN CONFORMANCE WITH DIVISION 14 OF THE STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, DATED JANUARY 2002 AND PROJECT SPECIAL PROVISIONS, LIGHTING.

LEGEND

8 120	PROPOSED 120′ HIGH MAST STANDARD WITH HM FOUNDATION & EIGHT (8) HM LUMINAIRES OF 750W HPS MEDIUM CUTOFF SYMETRICAL LIGHT DISTRIBUTION AT 90 MPH WIND SPEED
6	PROPOSED 100′ HIGH MAST STANDARD WITH HM FOUNDATION & SIX (6) HM LUMINAIRES OF 750W HPS MEDIUM CUTOFF SYMETRICAL LIGHT DISTRIBUTION AT 90 MPH WIND SPEED
◩	PROPOSED CONTROL SYSTEM. BREAKER SIZE SHOWN IN LOAD SCHEDULE AT LIGHTING CONSTRUCTION SHEET
⊠	PROPOSED ELECTRICAL JUNCTION BOX TYPE PC18 (18″ L X 12″ W X18″ H) LOCATION: SEE TABLE B, THIS SHEET
△1	REFERENCE TO CORRESPONDING NOTE AS NUMBERED
A1 2	PROPOSED FEEDER CIRCUIT CONTROL SYSTEM(A), CIRCUIT(1) PLAN SYMBOL (2) LOCATION: SEE TABLE A, THIS SHEET
3#1/0 USE 2″ C ⊗	PROPOSED 30′ CLASS 4 SERVICE POLE AND LATERAL, IF REQUIRED 3#1/0 USE CONDUCTORS 2″ CONDUIT
2″ ELEC. DUCT JA OR BD	PROPOSED ELECTRICAL DUCT, SIZE 2″ JACKED (JA) OR BURIED (BD) LOCATION: SEE TABLE C, THIS SHEET

TABLE "A"
CIRCUITRY CONDUCTOR CONDUIT TYPE & SIZE

PLAN SYMBOL	DESCRIPTION		CONTRACT ITEM
2	2#2 Ø 1 #4G 1.5″ P	2 AWG SIZE 2 CONDUCTOR (BK & RD) 1 AWG SIZE 4 GROUNDING CONDUCTOR 1.5″ PVC CONDUIT	2 #2 W/G FEEDER CIRCUIT IN 1.5″ CONDUIT
*2	2#2 Ø 1 #4G	2 AWG SIZE 2 CONDUCTOR (BK & RD) 1 AWG SIZE 4 GROUNDING CONDUCTOR	2 #2 W/G FEEDER CIRCUIT
6	2#6 Ø 1 #8G 1.5″ P	2 AWG SIZE 6 CONDUCTOR (BK & RD) 1 AWG SIZE 8 GROUNDING CONDUCTOR 1.5″ PVC CONDUIT	2 #6 W/G FEEDER CIRCUIT IN 1.5″ CONDUIT
*6	2#6 Ø 1 #8G	2 AWG SIZE 6 CONDUCTOR (BK & RD) 1 AWG SIZE 8 GROUNDING CONDUCTOR	2 #6 W/G FEEDER CIRCUIT
8	2#8 Ø 1 #10G 1.5″ P	2 AWG SIZE 8 CONDUCTOR (BK & RD) 1 AWG SIZE 10 GROUNDING CONDUCTOR 1.5″ PVC CONDUIT	2 #8 W/G FEEDER CIRCUIT IN 1.5″ CONDUIT
*8	2#8 Ø 1 #10G	2 AWG SIZE 8 CONDUCTOR (BK & RD) 1 AWG SIZE 10 GROUNDING CONDUCTOR	2 #8 W/G FEEDER CIRCUIT

TABLE "B"
JUNCTION BOX SUMMARY

NUMBER	LOCATION	TYPE		SHEET
JB1	20′ FROM HM#1	PC18		E2
JB2	20′ FROM HM#2	PC18		E2
JB3	20′ FROM HM#3	PC18		E2
JB4	50′ FROM HM#4	PC18		E2
JB5	BETWEEN JB1 AND JB6	PC18		E2
JB6	STA. 44+87 -L- 96′ LT	PC18		E2
JB7	STA. 44+87 -L- 96′ RT	PC18		E2
JB8	STA. 27+87 -RPC- 82′ LT	PC18		E2
JB9	20′ FROM HM#1	PC18		E3
JB10	STA. 41+41 -Y2- RT NEAR HM#2	PC18		E3
JB11	20′ FROM HM#3	PC18		E3
JB12	20′ FROM HM#4	PC18		E3
JB13	BETWEEN JB12 AND JB14	PC18		E3
JB14	STA. 41+41 -Y2- LT	PC18		E3
JB15	STA. 34+65 -L- 58′ LT	PC18		E3
JB16	STA. 34+65 -L- 64′ RT	PC18		E3
TOTALS		PC18	16	

TABLE "C"
ELECTRICAL DUCT SUMMARY

STATION	RACEWAY	SHEET	TYPICAL LENGTH IN FEET							
			BURIED (BD)				JACKED (JA)			
			SIZE 2″	SIZE 3″	SIZE 4″	SIZE 6″	SIZE** 2″	SIZE 3″	SIZE 4″	SIZE 6″
27+87 -RPC-		E2				56				
27+87 -RPC-		E2		170						
33+77 -Y-		E2						98		
44+87 -L-		E2							147	
44+87 -L-	JB6 - JB7	E2	196							
27+00 -Y-		E2						90		
7+10 -RPC-		E3								60
7+10 -RPC-	CS-B - JB16	E3		161						
34+65 -L-		E3							54	
34+65 -L-	JB15 - JB16	E3	129							
41+41 -Y2-		E3							126	
41+41 -Y2-	JB10 - JB14	E3	220							
2+24 -LPA-		E3						37		
TOTALS			545	331		56		225	327	60

ABBREVIATIONS

BD	BURIED
LT	LIGHT
JA	JACKED
MH	MOUNTING HEIGHT
Ø	PHASE
SER LAT	SERVICE LATERAL
PVC	PVC SCHEDULE 40 CONDUIT
RGC	RIGID GALVANIZED STEEL CONDUIT
C	CONDUIT
CKT	CIRCUIT
N	NEUTRAL
G	GROUND

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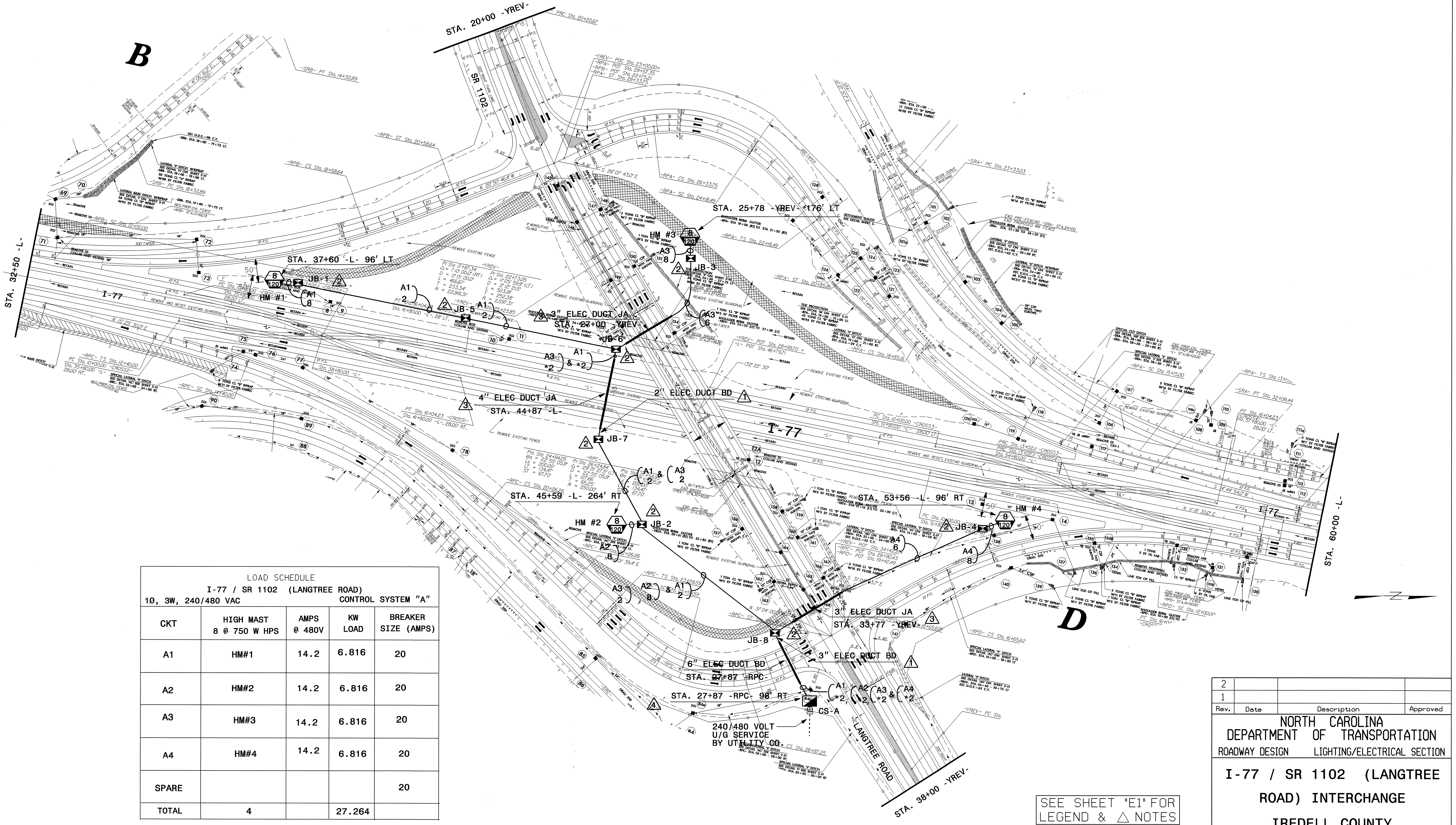
PROJECT REFERENCE NO.	SHEET NO.
I-4411	E-2

LIGHTING

SEAL 022582 PAUL KI-BUN CHAN 3-14-06

100′ 0′ 100′
Scale

USE FOR LIGHTING CONSTRUCTION ONLY



LOAD SCHEDULE I-77 / SR 1102 (LANGTREE ROAD) 1Ø, 3W, 240/480 VAC CONTROL SYSTEM "A"				
CKT	HIGH MAST 8 @ 750 W HPS	AMPS @ 480V	KW LOAD	BREAKER SIZE (AMPS)
A1	HM#1	14.2	6.816	20
A2	HM#2	14.2	6.816	20
A3	HM#3	14.2	6.816	20
A4	HM#4	14.2	6.816	20
SPARE				20
TOTAL	4		27.264	

SEE SHEET "E1" FOR LEGEND & △ NOTES

Rev.	Date	Description	Approved
2			
1			

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN LIGHTING/ELECTRICAL SECTION

I-77 / SR 1102 (LANGTREE ROAD) INTERCHANGE
IREDELL COUNTY

Drawn By:	Approved By:	Dwg No.:
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02/03/98

02/03/98

PROJECT REFERENCE NO.	SHEET NO.
I-4411	E-3

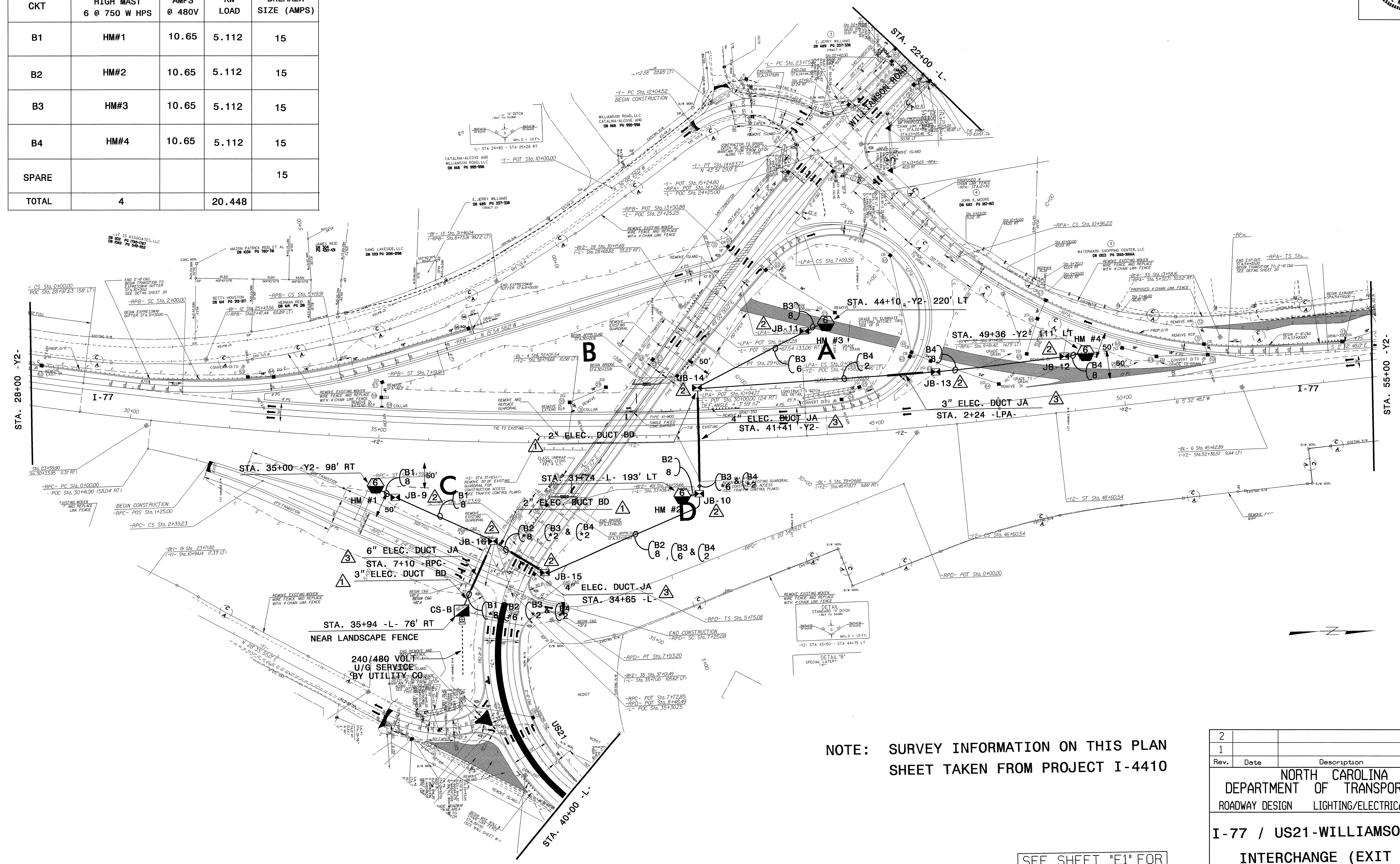
LIGHTING

SEAL 022582
PAUL KI-BUN CHAN
Paul K. Chan
2-9-06

USE FOR LIGHTING CONSTRUCTION ONLY

LOAD SCHEDULE
I-77 / US21- WILLIAMSON ROAD
1Ø, 3W, 240/480 VAC CONTROL SYSTEM "B"

CKT	HIGH MAST 6 @ 750 W HPS	AMPS @ 480V	KW LOAD	BREAKER SIZE (AMPS)
B1	HM#1	10.65	5.112	15
B2	HM#2	10.65	5.112	15
B3	HM#3	10.65	5.112	15
B4	HM#4	10.65	5.112	15
SPARE				15
TOTAL	4		20.448	



NOTE: SURVEY INFORMATION ON THIS PLAN SHEET TAKEN FROM PROJECT I-4410

SEE SHEET "E1" FOR LEGEND & △ NOTES

Rev.	Date	Description	Approved
2			
1			

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN LIGHTING/ELECTRICAL SECTION

I-77 / US21-WILLIAMSON ROAD
INTERCHANGE (EXIT 33)
(ROADWAY WORK COMPLETED UNDER TIP I-4410)
IREDELL COUNTY

Drawn By:	Approved By:	Dwg No.:
SKS		

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STATE OF
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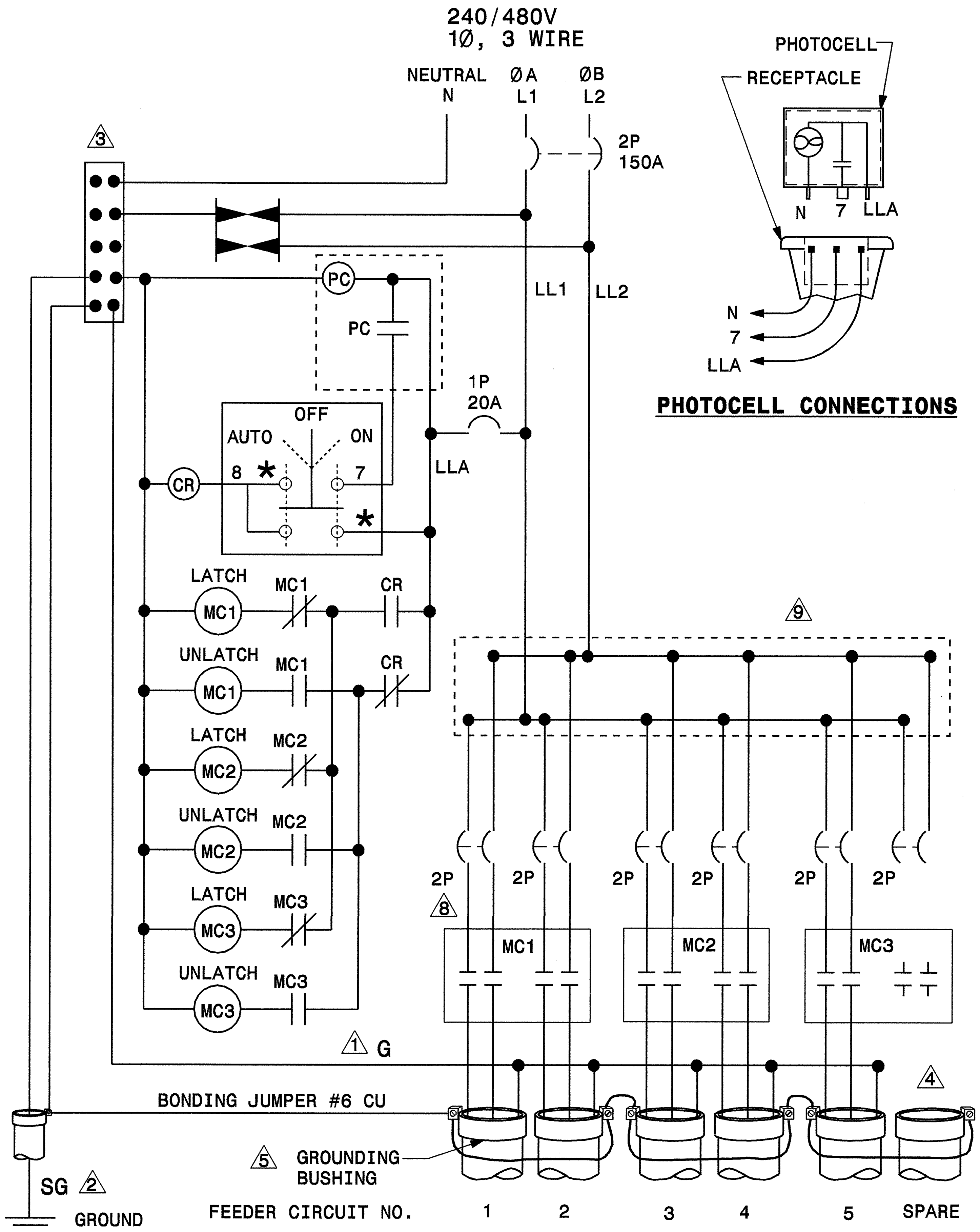
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.
7-06

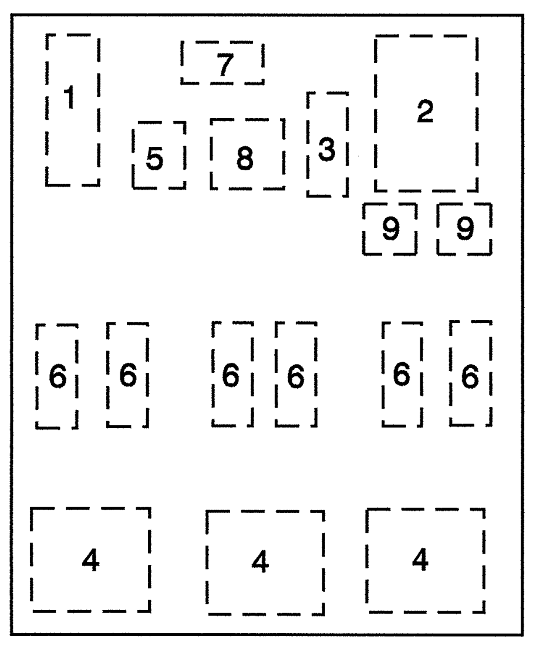
ENGLISH STANDARD DRAWING FOR
LIGHT CONTROL SYSTEM
SCHEMATIC

SHEET 1 OF 3
1408D01



SCHEMATIC

PHOTOCELL CONNECTIONS



INTERIOR PANEL
COMPONENT LAYOUT
△6 △7 △10

△ NOTES

- △1 EQUIPMENT GROUNDS (G) SHALL BE SIZED ACCORDING TO CIRCUIT DESCRIPTION. SEE PLANS.
- △2 SYSTEM GROUND (SG) SHALL BE CONTINUOUS FROM THE NEUTRAL BAR TO THE GROUNDING ELECTRODE (GROUND ROD).
- △3 THE NEUTRAL BAR SHALL BE BONDED TO THE PANEL.
- △4 FEEDER CIRCUITS NOT SHOWN ON THE PLANS SHALL NOT BE INSTALLED, BUT CONDUIT SHALL BE INSTALLED AND CAPPED.
- △5 INSTALL A GROUNDING BUSHING ON EACH CONDUIT. CONNECT BONDING JUMPER AS REQUIRED BY NEC.
- △6 SEE SHEET 3 OF 3 FOR ENCLOSURE.
- △7 THE CONTROL SYSTEM MUST BE LABELED "SUITABLE FOR USE AS SERVICE EQUIPMENT." REFER TO STANDARD SPECIFICATION 1408-2 FOR OTHER REQUIREMENTS.
- △8 SEE PLANS FOR BREAKER SIZES.
- △9 PROVIDE MULTI-TAP LOAD LUGS OR POWER DISTRIBUTION BLOCKS.
- △10 PROVIDE MANUFACTURER SUPPLIED MOUNTING BRACKETS OR SCREW STUDS PERMANENTLY ATTACHED TO THE BACK PANEL, FOR MOUNTING COMPONENTS.

COMPONENT LIST

#	QTY	DESCRIPTION	SPECIFICATIONS
1	1	NEUTRAL BAR	
2	1	SERVICE CIRCUIT BREAKER	2P, 480V, 150A
3	1	CONTROL CIRCUIT BREAKER	1P, 240V, 20A
4	3	MECHANICALLY HELD CONTACTORS	4P, 480V, 60A W/240V COIL
5	1	CONTROL RELAY W/NC & NO CONTACT	240V, 10A, W/240V COIL
6	6	FEEDER CIRCUIT BREAKERS	2P, 480V, 50A MAX
7	1	LIGHTNING ARRESTER	
8	1	SELECTOR SWITCH (ON-OFF-AUTO)	240V, 10A
9	2	POWER DISTRIBUTION LUGS OR BLOCKS	
		MOUNTING BRACKETS OR SCREW STUDS	

STATE OF
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DIVISION OF HIGHWAYS
RALEIGH, N.C.
7-06
ENGLISH STANDARD DRAWING FOR
LIGHT CONTROL SYSTEM
SCHEMATIC
SHEET 1 OF 3
1408D01

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.
1-06

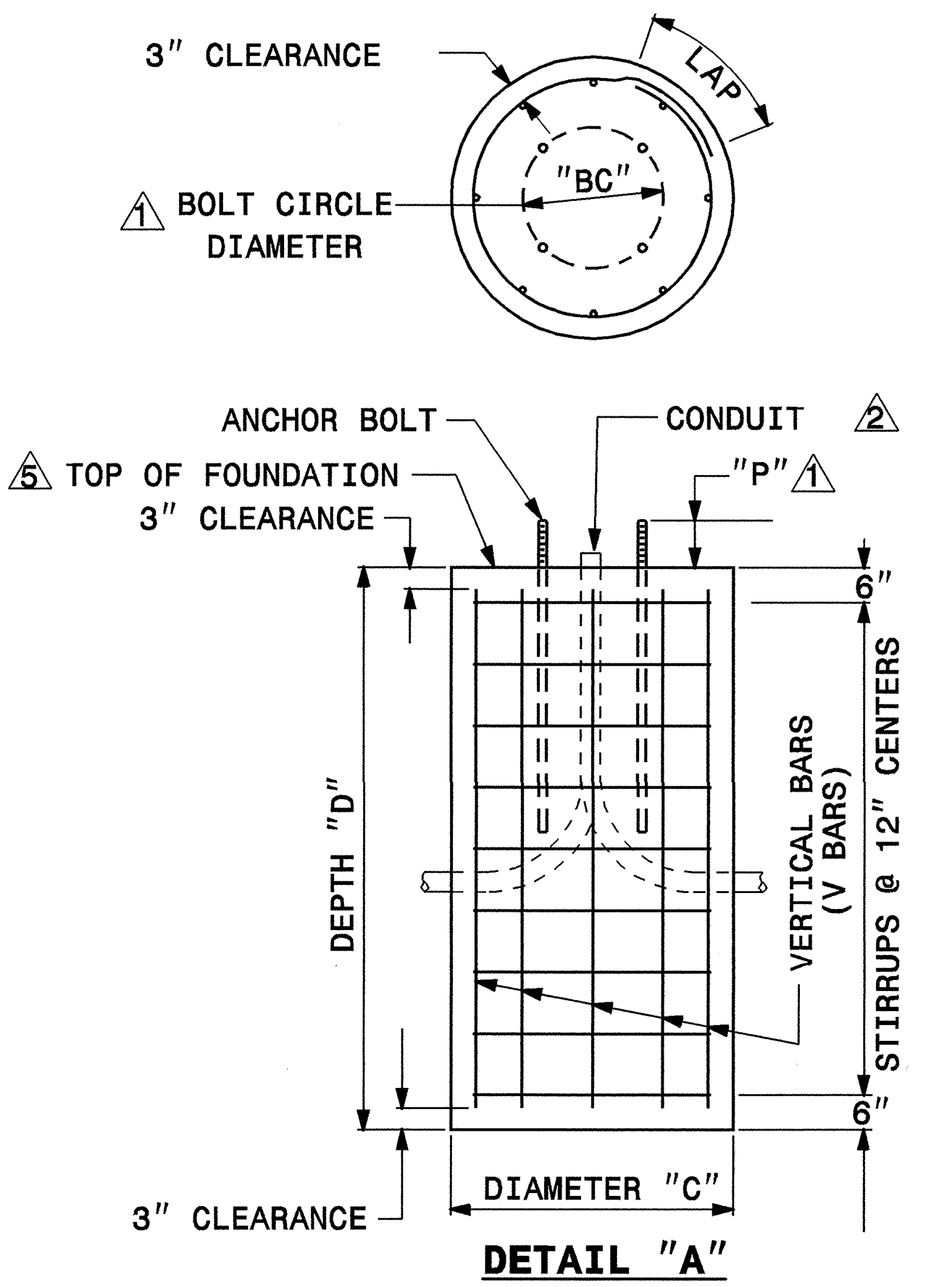
ENGLISH STANDARD DRAWING FOR
HIGH MOUNT FOUNDATION

SHEET 1 OF 1
1402D01

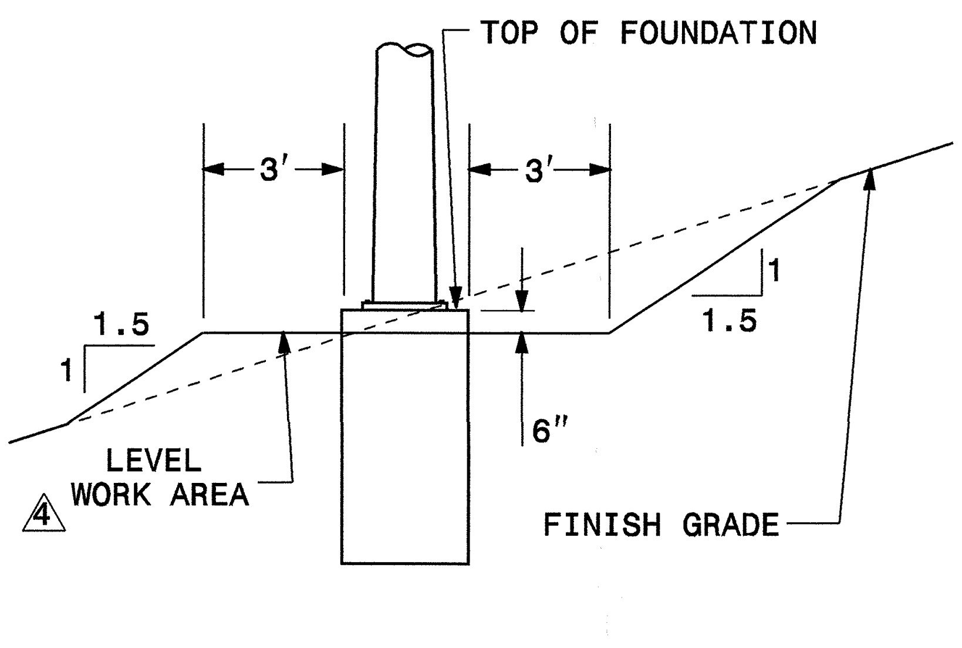
TABLE OF FOUNDATION DIMENSIONS AND QUANTITIES △3

HEIGHT OF HIGH MOUNT FT	DIAMETER "C" FT	STIRRUPS		WIND VELOCITY MPH														
				90					110					130				
				DEPTH "D" FT	V BARS		REINF.* STEEL LBS	CONCRETE CY	DEPTH "D" FT	V BARS		REINF.* STEEL LBS	CONCRETE CY	DEPTH "D" FT	V BARS		REINF.* STEEL LBS	CONCRETE CY
		SIZE	LAP-FT		QTY	SIZE				QTY	SIZE				QTY	SIZE		
80	3.5	#3	1.0	12	8	#8	306	4.3	13	8	#8	331	4.6	15	8	#8	382	5.3
100	4.0	#3	1.0	13	8	#9	413	6.1	15	8	#9	477	7.0	16	8	#9	509	7.4
120	4.5	#3	1.0	15	8	#10	557	8.2	16	8	#10	636	9.4	18	8	#10	716	10.6

* INCLUDES STIRRUPS AND VERTICAL BARS (V BARS)



DETAIL "A"



DETAIL "B"

NOTES

△1 ANCHOR BOLTS

CONFORM NUMBER, SIZE, AND LENGTH OF ANCHOR BOLTS, BOLT CIRCLE DIAMETER "BC", AND ANCHOR BOLT PROJECTION "P" TO APPROVED HIGH MOUNT STANDARD DRAWINGS.

△2 CONDUITS

MATCH ORIENTATION, QUANTITY, TYPE, AND SIZE OF CONDUITS TO THE LAYOUT SHEETS. STUB AND CAP ONE SPARE CONDUIT AT EACH FOUNDATION. PROJECT CONDUIT A MAXIMUM OF 2" ABOVE TOP OF FOUNDATION. PLACE CONDUIT 30" BENEATH FINISH GRADE.

△3 DIMENSIONS & QUANTITIES

DIMENSIONS AND QUANTITIES OF CONCRETE AND REINFORCING STEEL ARE GIVEN FOR THE PURPOSE OF OBTAINING BID PRICES ONLY. SEE STANDARD SPECIFICATIONS SECTION 1402, FOR OTHER STRUCTURAL REQUIREMENTS.

△4 WORK AREA

PROVIDE A LEVEL WORK AREA AROUND EACH FOUNDATION. CUT/FILL SLOPES MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER.

△5 ELEVATION

SET TOP OF FOUNDATION AT 6" ABOVE LEVEL WORK AREA. SEE DETAIL "B".

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED BY ANUPAM SHAH, P.E., 029979, ON OCTOBER 12, 2005.

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.
1-06
ENGLISH STANDARD DRAWING FOR
HIGH MOUNT FOUNDATION
SHEET 1 OF 1
1402D01

Rev.	Date	Description	Approved
2			
1			

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DESIGN SERVICES LIGHTING/ELECTRICAL SECTION

LIGHTING DETAILS
LIGHT CONTROL SYSTEM
SCHEMATIC
HIGH MOUNT FOUNDATION

Drawn By: PKC 12-14-05
Approved By:
Dwg No.:

PROJECT REFERENCE NO.	SHEET NO.
I-4411	E4

LIGHTING

KI-BUN CHAN
022582
3-20-06