



# Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

June 3, 2010

SUBJECT: FAI Route 57 (I-57)  
Section 1414.2B  
Cook County  
Contract No. 60J27  
Item No. 325, June 11, 2010 Letting  
Addendum A

## NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

1. Revised the Schedule of Prices.
2. Revised the Table of Contents to the Special Provisions.
3. Revised pages 28 - 30, 56 - 59, 62 - 63, 70 - 71 & 108 of the Special Provisions.
4. Added pages 282 - 319 to the Special Provisions.
5. Revised sheets 1, 2, 6, 8 - 11, 28, 34 - 38, 91, 92, 96, 98, 101, 103, 108, 109, 113, 117, 191, 193, 197, 198, 201, 203 - 208, 315, 359 and 363 of the Plans.
6. Added page 11A, 209A - 209F, 210A - 210I, 212A & 212B to the Plans.

Prime contractors must utilize the enclosed material when preparing their bid and must include any Schedule of Prices changes in their bidding proposal.

Bidders using computer-generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Very truly yours,

Scott E. Stitt, P.E.  
Acting Engineer of Design and Environment

A handwritten signature in black ink, appearing to read 'Ted B. Walschleger', with a small 'P.E.' to the right.

By: Ted B. Walschleger, P. E.  
Engineer of Project Management

cc: Diane O'Keefe, Region 1, District 1; Mike Renner; Estimates

TBW:MS:jc

ILLINOIS DEPARTMENT OF TRANSPORTATION  
 SCHEDULE OF PRICES  
 CONTRACT  
 NUMBER - 60J27

State Job # - C-91-217-10  
 PPS NBR - 1-74987-1200  
 County Name - COOK - -  
 Code - 31 - -  
 District - 1 - -  
 Section Number - 1414.2B

Project Number

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\* REVISED : MAY 28, 2010

Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
J1213003	PAVT MARK TPE BLACK 6	FOOT	30,545.000				
J1213004	PAVT MARK TPE BLACK 8	FOOT	22,909.000				
JS813003	JNC BOX SS ES 20X12X8	EACH	2.000				
JS813007	UD 4#2#8GXLPUSE 2	FOOT	284.000				
JT213002	CONCRETE GUTTR TYP G3	FOOT	166.000				
JT637023	CONC MED BAR TRAN TVF	FOOT	137.000				
JT637027	CONC BAR S F TY F MOD	FOOT	210.000				
XX007994	FIBER OPTIC SPLICE	EACH	28.000				
X0300057	MAN TA 6D T1FCL R-PLT	EACH	4.000				
X0301576	COAXIAL CABLE IN CON	FOOT	1,899.000				
X0301892	MAN TA 8D T1FCL R-PLT	EACH	2.000				
X0320870	BRACED EXCAVATION	CU YD	1,196.000				
X0321750	REM TEMP CONC BAR SO	FOOT	940.000				
X0322247	MAIN EX TRAFFIC SURV	L SUM	1.000				
* X0322256	TEMP INFO SIGNING	SQ FT	126.000				

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* X0322434	LT TOWER SERV PAD SPL	EACH	8.000				
X0322441	DIG LOOP DET SEN U 4C	EACH	1.000				
X0322442	TONE EQ 3 FRE REC PRG	EACH	4.000				
X0322443	TONE EQ 3 FREQ TR PRG	EACH	4.000				
X0322671	STAB CONSTR ENTRANCE	SQ YD	2,000.000				
X0322916	PRO SS CONN TO EX SS	EACH	3.000				
X0322917	PRO SS CONN TO EX MAN	EACH	3.000				
X0322925	ELCBL C TRACER 14 1C	FOOT	318.000				
X0322936	REMOV EX FLAR END SEC	EACH	1.000				
X0323574	MAINTAIN LIGHTING SYS	CAL MO	26.000				
X0323651	REM & REIN EX LT UNIT	EACH	12.000				
X0323670	PREFORM DETECT LOOP	FOOT	387.000				
X0323830	DRAINAGE SCUPPR DS-11	EACH	24.000				
X0323988	TEMP SOIL RETEN SYSTM	SQ FT	11,082.000				
* DELETED							

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X0324752	STORM SEWER FILLED	CU YD	115.000				
X0324866	REM REIN SURV CAB	EACH	1.000				
* X0325132	SHAP & GRAD HM LT TWR	SQ YD	170.000				
* X0325775	WET RF TEM TAPE T3 4	FOOT	170,640.000				
X0325840	WET RF TEM TAPE T3 12	FOOT	534.000				
X0325876	WET RF TEM TAPE T3 8	FOOT	4,109.000				
* X0326107	WET RF TEM TAPE T3 5	FOOT	16,669.000				
X0326133	TEMP WD POLE 45FT CL5	EACH	44.000				
X0326382	CONC BARRIER BASE SPL	FOOT	8,133.000				
* X0326405	TEMPORARY FENCE PR	FOOT	6,220.000				
X0326520	T THRIE SPGR D REM SP	FOOT	60.000				
X0326527	TEMP THRIE SPGR D SP	FOOT	60.000				
X0326836	REM & RE VID CAM & EQ	EACH	2.000				
X0326965	ELCBL 19 25PR	FOOT	23,303.000				
X0326966	REM EX STR LUG SYSTEM	SQ YD	689.000				

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X0326967	REINF CONC DCT BK REM	FOOT	9,851.000				
X0326968	JUN BOX POLE/POST MTD	EACH	6.000				
X0326971	LT P FDN RDWY MED T1	EACH	1.000				
X0712400	TEMP PAVEMENT	SQ YD	2,995.000				
X2130010	EXPLOR TRENCH SPL	FOOT	220.000				
X3120500	STAB SUBBASE HMA 4.5	SQ YD	48,377.000				
X4400198	CONC BARRIER REM SPL	FOOT	772.000				
X5030225	CONC STRUCT SPL	CU YD	2,594.200				
X6020088	MAN TA 8 DIA T1F CL	EACH	3.000				
X6370150	C BAR VAR X-SEC 32HT	FOOT	8,073.000				
X6640210	TEMP CH LK FENCE PORT	FOOT	1,260.000				
X6700410	ENGR FLD OFF A SPL	CAL MO	23.000				
X7011015	TR C-PROT EXPRESSWAYS	L SUM	1.000				
X7013820	TR CONT SURVEIL EXPWY	CAL DA	399.000				
X7040010	TEMP CONC BARRIER SPL	FOOT	3,790.000				

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X8107510	CON T 1 CNC SPL	FOOT	99.000				
* DELETED							
* X8210015	TEMP LUM HPSV 400	EACH	8.000				
* X8360360	LP F M 15BC 10" X 8'	EACH	2.000				
X8710027	FIB OPT CBL 4F SM	FOOT	681.000				
X8710035	FIB OPT CBL 96F SM	FOOT	41,443.000				
Z0001050	AGG SUBGRADE 12	SQ YD	53,113.000				
Z0013798	CONSTRUCTION LAYOUT	L SUM	1.000				
Z0018400	DRAINAGE STR ADJ	EACH	10.000				
Z0018600	DRAINAGE STR RECONST	EACH	9.000				
Z0018800	DRAINAGE SYSTEM	L SUM	1.000				
Z0030240	IMP ATTN TEMP NRD TL2	EACH	6.000				
Z0030250	IMP ATTN TEMP NRD TL3	EACH	13.000				
Z0030350	IMP ATTN REL NRD TL3	EACH	14.000				
Z0034210	MECH ST EARTH RET WL	SQ FT	14,415.000				

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20100110	TREE REMOV 6-15	UNIT	147.000				
20100500	TREE REMOV ACRES	ACRE	0.500				
20200100	EARTH EXCAVATION	CU YD	40,940.000				
20201200	REM & DISP UNS MATL	CU YD	9,115.000				
20400800	FURNISHED EXCAVATION	CU YD	42,015.000				
20700220	POROUS GRAN EMBANK	CU YD	362.000				
20700400	POROUS GRAN EMB SPEC	CU YD	224.800				
20800150	TRENCH BACKFILL	CU YD	19,272.000				
21001000	GEOTECH FAB F/GR STAB	SQ YD	22,285.000				
21101615	TOPSOIL F & P 4	SQ YD	61,718.000				
25000210	SEEDING CL 2A	ACRE	13.000				
25000400	NITROGEN FERT NUTR	POUND	1,148.000				
25000500	PHOSPHORUS FERT NUTR	POUND	1,148.000				
25000600	POTASSIUM FERT NUTR	POUND	1,148.000				
25100115	MULCH METHOD 2	ACRE	4.250				

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25100125	MULCH METHOD 3	ACRE	8.250				
25100630	EROSION CONTR BLANKET	SQ YD	101,648.000				
28000250	TEMP EROS CONTR SEED	POUND	1,250.000				
28000305	TEMP DITCH CHECKS	FOOT	324.000				
28000400	PERIMETER EROS BAR	FOOT	9,046.000				
28000500	INLET & PIPE PROTECT	EACH	17.000				
28000510	INLET FILTERS	EACH	190.000				
28100105	STONE RIPRAP CL A3	SQ YD	130.000				
28100107	STONE RIPRAP CL A4	SQ YD	110.000				
28100109	STONE RIPRAP CL A5	SQ YD	145.000				
28100111	STONE RIPRAP CL A6	SQ YD	70.000				
28100500	BROKEN CONC RIPRAP	SQ YD	96.000				
28200200	FILTER FABRIC	SQ YD	455.000				
40600200	BIT MATLS PR CT	TON	51.300				
40600215	P BIT MATLS PR CT	TON	22.000				



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40600300	AGG PR CT	TON	28.000				
40600895	CONSTRUC TEST STRIP	EACH	7.000				
40600982	HMA SURF REM BUTT JT	SQ YD	158.000				
40603148	P HMA BC SMA N80	TON	1,890.000				
40603153	P HMA SC SMA N80	TON	5,801.000				
40603340	HMA SC "D" N70	TON	1,377.000				
42000521	PCC PVT 11 JOINTED	SQ YD	3,422.000				
42001300	PROTECTIVE COAT	SQ YD	18,878.000				
42100200	CONT REINF PCC PVT 9	SQ YD	13,997.000				
42100360	CONT REINF PCC PVT 13	SQ YD	2,826.000				
42100800	PAVT REINFORCEMENT 9	SQ YD	13,997.000				
42100960	PAVT REINFORCEMENT 13	SQ YD	2,826.000				
42101112	LUG SYSTEM COMPL 12	EACH	2.000				
42101448	LUG SYSTEM COMPL 48	EACH	2.000				
44000100	PAVEMENT REM	SQ YD	4,421.000				

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44000156	HMA SURF REM 1 3/4	SQ YD	16,384.000				
44000157	HMA SURF REM 2	SQ YD	28,325.000				
44000500	COMB CURB GUTTER REM	FOOT	208.000				
44000700	APPROACH SLAB REM	SQ YD	512.000				
44004250	PAVED SHLD REMOVAL	SQ YD	23,764.000				
44201807	CL D PATCH T3 13	SQ YD	83.000				
44201809	CL D PATCH T4 13	SQ YD	127.000				
44300200	STRIP REF CR CON TR	FOOT	10,954.000				
48101700	AGGREGATE SHLDS SPL	CU YD	27.000				
48203021	HMA SHOULDERS 6	SQ YD	921.000				
48203033	HMA SHOULDERS 9	SQ YD	874.000				
48203049	HMA SHOULDERS 13	SQ YD	20,567.000				
48300600	PCC SHOULDERS 11	SQ YD	1,064.000				
48300800	PCC SHOULDERS 13	SQ YD	6,019.000				
50100300	REM EXIST STRUCT N1	EACH	1.000				

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50100400	REM EXIST STRUCT N2	EACH	1.000				
50104400	CONC HDWL REM	EACH	3.000				
50157300	PROTECTIVE SHIELD	SQ YD	2,749.000				
50200100	STRUCTURE EXCAVATION	CU YD	18,681.000				
* 50200400	ROCK EXC STRUCT	CU YD	34.000				
50300225	CONC STRUCT	CU YD	2,216.400				
50300255	CONC SUP-STR	CU YD	3,179.800				
50300260	BR DECK GROOVING	SQ YD	8,977.000				
50300280	CONCRETE ENCASEMENT	CU YD	63.900				
50300300	PROTECTIVE COAT	SQ YD	10,667.000				
50500105	F & E STRUCT STEEL	L SUM	1.000				
50500505	STUD SHEAR CONNECTORS	EACH	42,966.000				
50800105	REINFORCEMENT BARS	POUND	386,550.000				
50800205	REINF BARS, EPOXY CTD	POUND	1,012,890.000				
50800515	BAR SPLICERS	EACH	938.000				

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51100100	SLOPE WALL 4	SQ YD	1,142.000				
* 51201600	FUR STL PILE HP12X53	FOOT	16,463.000				
51201800	FUR STL PILE HP14X73	FOOT	11,501.000				
* 51202305	DRIVING PILES	FOOT	27,964.000				
51203600	TEST PILE ST HP12X53	EACH	6.000				
51203800	TEST PILE ST HP14X73	EACH	2.000				
51204650	PILE SHOES	EACH	927.000				
51500100	NAME PLATES	EACH	2.000				
52000110	PREF JT STRIP SEAL	FOOT	816.000				
52100010	ELAST BEARING ASSY T1	EACH	93.000				
52100020	ELAST BEARING ASSY T2	EACH	31.000				
52100520	ANCHOR BOLTS 1	EACH	372.000				
54213663	PRC FLAR END SEC 18	EACH	1.000				
54213669	PRC FLAR END SEC 24	EACH	2.000				
54213681	PRC FLAR END SEC 36	EACH	2.000				

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Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
54213693	PRC FLAR END SEC 48	EACH	5.000				
54215547	MET END SEC 12	EACH	4.000				
550A0090	STORM SEW CL A 1 18	FOOT	17.000				
550A0120	STORM SEW CL A 1 24	FOOT	7.000				
550A0190	STORM SEW CL A 1 48	FOOT	2.000				
550A0380	STORM SEW CL A 2 18	FOOT	1,934.000				
550A0410	STORM SEW CL A 2 24	FOOT	2,727.000				
550A0430	STORM SEW CL A 2 30	FOOT	849.000				
550A0450	STORM SEW CL A 2 36	FOOT	2,426.000				
550A0480	STORM SEW CL A 2 48	FOOT	1,220.000				
550A0750	STORM SEW CL A 3 36	FOOT	828.000				
550A0780	STORM SEW CL A 3 48	FOOT	395.000				
550A5500	SS CL A 2 EQRS 42	FOOT	916.000				
550B0320	STORM SEW CL B 2 8	FOOT	105.000				
55100500	STORM SEWER REM 12	FOOT	640.000				

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55100700	STORM SEWER REM 15	FOOT	160.000				
55100900	STORM SEWER REM 18	FOOT	125.000				
55101200	STORM SEWER REM 24	FOOT	275.000				
552A0600	SS JKD CL A 18	FOOT	220.000				
552A0900	SS JKD CL A 24	FOOT	325.000				
552A1300	SS JKD CL A 36	FOOT	608.000				
552A1600	SS JKD CL A 48	FOOT	156.000				
58700300	CONCRETE SEALER	SQ FT	12,733.000				
59100100	GEOCOMPOSITE WALL DR	SQ YD	239.000				
60100945	PIPE DRAINS 12	FOOT	407.000				
60107700	PIPE UNDERDRAINS 6	FOOT	20,355.000				
60108200	PIPE UNDERDRAIN 6 SP	FOOT	700.000				
60109580	P UNDR FOR STRUCT 4	FOOT	420.000				
60200105	CB TA 4 DIA T1F OL	EACH	4.000				
60200805	CB TA 4 DIA T8G	EACH	2.000				

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60201310	CB TA 4 DIA T20F&G	EACH	2.000				
60201340	CB TA 4 DIA T24F&G	EACH	3.000				
60203805	CB TA 5 DIA T1F OL	EACH	1.000				
60204505	CB TA 5 DIA T8G	EACH	4.000				
60205010	CB TA 5 DIA T20F&G	EACH	2.000				
60218400	MAN TA 4 DIA T1F CL	EACH	2.000				
60221000	MAN TA 5 DIA T1F OL	EACH	1.000				
60221100	MAN TA 5 DIA T1F CL	EACH	27.000				
60223800	MAN TA 6 DIA T1F CL	EACH	13.000				
60224035	MAN TA 6 DIA T20F&G	EACH	2.000				
60224446	MAN TA 7 DIA T1F CL	EACH	3.000				
60224448	MAN TA 7 DIA T8G	EACH	1.000				
60247160	DR STR T1 W/2 T20F&G	EACH	28.000				
60247170	DR STR T2 W/2 T22F&G	EACH	25.000				
60500040	REMOV MANHOLES	EACH	3.000				

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60500050	REMOV CATCH BAS	EACH	41.000				
60500205	FILL CATCH BAS	EACH	5.000				
60900315	TY D INLET BOX 609006	EACH	2.000				
60900515	CONC THRUST BLOCKS	EACH	4.000				
61000225	TY F INLET BOX 610001	EACH	2.000				
63000005	SPBGR TY B	FOOT	500.000				
63100045	TRAF BAR TERM T2	EACH	1.000				
63100070	TRAF BAR TERM T5	EACH	1.000				
63100085	TRAF BAR TERM T6	EACH	2.000				
63100089	TRAF BAR TERM T6B	EACH	1.000				
63100105	TRAF BAR TERM T10	EACH	2.000				
63100169	TR BAR TRM T1 SPL FLR	EACH	1.000				
63200310	GUARDRAIL REMOV	FOOT	12,051.000				
63301210	REM RE-E SPBGR TY A	FOOT	75.000				
63301215	REM RE-E SPBGR TY B	FOOT	525.000				



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63700155	CONC BAR 1F 32HT	FOOT	201.000				
63700900	CONC BARRIER BASE	FOOT	524.000				
63801200	MOD GLARE SCRNSYS	FOOT	1,780.000				
64200105	SHOULDER RUMBLE STRIP	FOOT	39,594.000				
66400305	CH LK FENCE 6	FOOT	2,468.000				
66400510	CH LK FENCE 10	FOOT	122.000				
66410002	CH LK GATES 10X8 DBL	EACH	2.000				
66410300	CH LK FENCE REMOV	FOOT	1,872.000				
66410400	CH LK FENCE REM & RE	FOOT	389.000				
67100100	MOBILIZATION	L SUM	1.000				
70101800	TRAF CONT & PROT SPL	L SUM	1.000				
70106800	CHANGEABLE MESSAGE SN	CAL MO	80.000				
70300240	TEMP PVT MK LINE 6	FOOT	21,170.000				
* 70301000	WORK ZONE PAVT MK REM	SQ FT	80,432.000				
70400100	TEMP CONC BARRIER	FOOT	25,190.000				

ILLINOIS DEPARTMENT OF TRANSPORTATION  
 SCHEDULE OF PRICES  
 CONTRACT  
 NUMBER - 60J27

State Job # - C-91-217-10  
 PPS NBR - 1-74987-1200  
 County Name - COOK- -  
 Code - 31 - -  
 District - 1 - -  
 Section Number - 1414.2B

Project Number

Route  
 FAI 57

\* REVISED : MAY 28, 2010

Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
70400200	REL TEMP CONC BARRIER	FOOT	28,150.000				
72100100	SIGN PANEL OVERLAY	SQ FT	65.000				
72400600	RELOC SIN PAN ASSY TB	EACH	2.000				
72400720	RELOC SIGN PANEL T2	SQ FT	52.000				
72400730	RELOC SIGN PANEL T3	SQ FT	515.000				
72700100	STR STL SIN SUP BA	POUND	5,580.000				
73000100	WOOD SIN SUPPORT	FOOT	125.000				
* 73400100	CONC FOUNDATION	CU YD	11.000				
* DELETED							
73600100	REMOV OH SIN STR-SPAN	EACH	1.000				
* 73700100	REM GR-MT SIN SUPPORT	EACH	4.000				
* 73700200	REM CONC FDN-GR MT	EACH	4.000				
73700300	REM CONC FDN-OVHD	EACH	2.000				
* 78000200	THPL PVT MK LINE 4	FOOT	37,549.000				
* 78000300	THPL PVT MK LINE 5	FOOT	10,281.000				

ILLINOIS DEPARTMENT OF TRANSPORTATION  
 SCHEDULE OF PRICES  
 CONTRACT  
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State Job # - C-91-217-10  
 PPS NBR - 1-74987-1200  
 County Name - COOK - -  
 Code - 31 - -  
 District - 1 - -  
 Section Number - 1414.2B

Project Number

Route  
 FAI 57

\* REVISED : MAY 28, 2010

Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
* 78000500	THPL PVT MK LINE 8	FOOT	4,020.000				
* 78000600	THPL PVT MK LINE 12	FOOT	2,314.000				
* 78005110	EPOXY PVT MK LINE 4	FOOT	21,597.000				
* 78005120	EPOXY PVT MK LINE 5	FOOT	5,697.000				
78005140	EPOXY PVT MK LINE 8	FOOT	2,654.000				
78005150	EPOXY PVT MK LINE 12	FOOT	2,892.000				
* 78008210	POLYUREA PM T1 LN 4	FOOT	3,122.000				
* 78008220	POLYUREA PM T1 LN 5	FOOT	781.000				
* DELETED							
* 78008250	POLYUREA PM T1 LN 12	FOOT	1,122.000				
78100100	RAISED REFL PAVT MKR	EACH	540.000				
78100105	RAISED REF PVT MKR BR	EACH	46.000				
78100200	TEMP RAIS REF PVT MKR	EACH	378.000				
78100300	REPLACEMENT REFLECTOR	EACH	1,049.000				
78200100	MONODIR PRIS BAR REFL	EACH	2,520.000				

ILLINOIS DEPARTMENT OF TRANSPORTATION  
 SCHEDULE OF PRICES  
 CONTRACT  
 NUMBER -

60J27

State Job # - C-91-217-10  
 PPS NBR - 1-74987-1200  
 County Name - COOK- -  
 Code - 31 - -  
 District - 1 - -  
 Section Number - 1414.2B

Project Number

Route  
 FAI 57

\* REVISED : MAY 28, 2010

Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
78200410	GUARDRAIL MKR TYPE A	EACH	32.000				
* 78300100	PAVT MARKING REMOVAL	SQ FT	24,197.000				
81000600	CON T 2 GALVS	FOOT	242.000				
81000800	CON T 3 GALVS	FOOT	87.000				
81001000	CON T 4 GALVS	FOOT	1,620.000				
81013000	CON T 4 PVC	FOOT	870.000				
81025600	CON ENC RC 4 PVC 2X1	FOOT	7,764.000				
81025700	CON ENC RC 4 PVC 3X1	FOOT	1,577.000				
81100320	CON AT ST 1 PVC GS	FOOT	420.000				
81100605	CON AT ST 2 PVC GALVS	FOOT	20.000				
81101000	CON AT ST 4 GALVS	FOOT	878.000				
* 81101005	CON AT ST 4 PVC GALVS	FOOT	919.000				
81200230	CON EMB STR 2 PVC	FOOT	1,232.000				
81200270	CON EMB STR 4 PVC	FOOT	7,880.000				
81300220	JUN BX SS AS 6X6X4	EACH	14.000				

ILLINOIS DEPARTMENT OF TRANSPORTATION  
 SCHEDULE OF PRICES  
 CONTRACT  
 NUMBER - 60J27

State Job # - C-91-217-10  
 PPS NBR - 1-74987-1200  
 County Name - COOK - -  
 Code - 31 - -  
 District - 1 - -  
 Section Number - 1414.2B

Project Number

Route  
 FAI 57

\* REVISED : MAY 28, 2010

Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
81300530	JUN BX SS AS 12X10X6	EACH	1.000				
* 81300555	JUN BX SS AS 12X12X8	EACH	4.000				
81300810	JUN BX SS AS 18X12X8	EACH	3.000				
81304200	JUN BOX EM S 12X12X8	EACH	8.000				
81400200	HD HANDHOLE	EACH	29.000				
* 81603203	UD 3#2#4GEP RRHW 1 1/2	FOOT	3,637.000				
81700335	EC C EPR RHW 3-1C 6	FOOT	2,551.000				
81702110	EC C XLP USE 1C 10	FOOT	2,360.000				
81800330	A CBL 3-1C6 MESS WIRE	FOOT	1,116.000				
* 81800400	A CBL 4-1C2 MESS WIRE	FOOT	2,682.000				
* 81900200	TR & BK FIL F ELECT WK	FOOT	31,675.000				
* 82102400	LUM SV HOR MT 400W	EACH	2.000				
* 82105600	LUM SV HM HOR MT 400W	EACH	40.000				
82107300	UNDERPAS LUM 150W HPS	EACH	2.000				
* 83050810	LT P A 47.5MH 15MA	EACH	2.000				

ILLINOIS DEPARTMENT OF TRANSPORTATION  
 SCHEDULE OF PRICES  
 CONTRACT  
 NUMBER - 60J27

State Job # - C-91-217-10  
 PPS NBR - 1-74987-1200  
 County Name - COOK- -  
 Code - 31 - -  
 District - 1 - -  
 Section Number - 1414.2B

Project Number

Route  
 FAI 57

\* REVISED : MAY 28, 2010

Item Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
* 83057595	LT P WD 100 CL4 15MA	EACH	8.000				
* 83504700	LT TOWER 120MH LM 12	EACH	7.000				
* 83505700	LT TOWER 130MH LM 12	EACH	1.000				
* 83700250	LT TOWER FDN 44D	FOOT	170.000				
* 83700300	LT TOWER FDN 48D	FOOT	30.000				
* 83800205	BKWY DEV TR B 15BC	EACH	2.000				
* 84200500	REM LT UNIT SALV	EACH	12.000				
84200804	REM POLE FDN	EACH	22.000				
84400105	RELOC EX LT UNIT	EACH	12.000				
87200400	SPAN WIRE	FOOT	30,198.000				
87301305	ELCBL C LEAD 14 1PR	FOOT	1,697.000				
87800200	CONC FDN TY D	FOOT	6.000				
87900200	DRILL EX HANDHOLE	EACH	9.000				
89502380	REMOV EX HANDHOLE	EACH	17.000				

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**SPECIAL PROVISIONS**

- Maintenance of Traffic (I-294)
- Maintenance of Roadways
- Traffic Control and Protection (Special)
- Traffic Control and Protection (Expressways)
- Traffic Control Plan
- Traffic Control Surveillance (Expressways)
- Keeping the Expressway Open to Traffic
- Failure to Open Traffic Lanes to Traffic
- Personal Protective Equipment
- Pavement Marking Removal
- Traffic Control for Work Zone Areas
- Temporary Information Signing
- Temporary Type III Tape for Wet Conditions
- Impact Attenuators, Temporary
- Reflective Sheeting on Channelizing Devices

**KEEPING THE EXPRESSWAY OPEN TO TRAFFIC**

Effective: March 22, 1996

Revised: February 9, 2005

Whenever work is in progress on or adjacent to an expressway, the Contractor shall provide the necessary traffic control devices to warn the public and to delineate the work zone as required in these Special Provisions, the Standard Specifications, the State Standards and the District Freeway details. All Contractors' personnel shall be limited to these barricaded work zones and shall not cross the expressway.

The Contractor shall request and gain approval from the Illinois Department of Transportation's Expressway Traffic Operations Engineer (847-705-4151) twenty-four (24) hours in advance of all daily lane, ramp and shoulder closures and seventy-two (72) hours in advance of all permanent and weekend closures on all Freeways and/or Expressways in District One. This advance notification is calculated based on workweek of Monday through Friday and shall not include weekends or Holidays.

A Maintenance of Traffic coordination meeting must be scheduled with the Tollway at least 30 days prior to the implementation of any Maintenance of Traffic. Temporary lane closures on I-294 will be permitted only with the Tollway's approval. Lane closure requests require to be submitted to the Tollway before 9 a.m. the working day preceding the requested closure. Weekend closures require notice on Friday before 9 a.m.

**LOCATION: I-57 Mainline**

WEEK NIGHT	TYPE OF CLOSURE	ALLOWABLE CLOSURE HOURS	
		INBOUND (Northbound)	OUTBOUND (Southbound)
Sunday -	1-Lane	8:00 PM	to 5:00 AM
Thursday	2-Lane	11:00 PM	to 5:00 AM
Friday	1-Lane	9:00 PM (Fri)	to 10:00 AM (Sat)
	2-Lane	11:59 PM (Fri)	to 6:00 AM (Sat)
Saturday	1-Lane	9:00 PM (Sat)	to 10:00 AM (Sun)
	2-Lane	11:59 PM (Sat)	to 8:00 AM (Sun)

Revised 06/03/2010

**LOCATION: I-294 Mainline**

WEEK NIGHT	TYPE OF CLOSURE	ALLOWABLE CLOSURE HOURS	
		INBOUND (Northbound)	OUTBOUND (Southbound)
Monday thru Thursday	1 Lane Closure	9:00 a.m. -- 3:00 p.m. 8:00 p.m. 5:00 a.m.	9:00 a.m. -- 3:00 p.m. 8:00 p.m. 5:00 a.m.
Friday	1 Lane Closure	9:00 a.m. -- 2:00 p.m. 8:00 p.m. 5:00 a.m.	9:00 a.m. -- 2:00 p.m. No evening
Saturday	1 Lane Closure	All day	All day
Sunday	1 Lane Closure	12:00 a.m. -- Noon. 10:00 p.m. 5:00 a.m.	All Day

**LOCATION: I-57 Ramps**

WEEK NIGHT	TYPE OF CLOSURE	ALLOWABLE CLOSURE HOURS	
		INBOUND	OUTBOUND
Sunday thru Thursday	Temporary Partial	8:00 p.m. - 5:00 a.m.	9:00 p.m. - 6:00 a.m.
Friday	Ramp & Shoulder	8:00 p.m. (Fri) - 6:00 a.m. (Sat)	9:00 p.m. (Fri) - 7:00 a.m. (Sat)
Saturday	Closures	8:00 p.m. (Sat) - Noon. (Sun)	9:00 p.m. (Sat) - 10:00 a.m. (Sun)

In addition to the hours noted above, temporary shoulder and partial ramp closures are allowed weekdays between 9:00 A.M. and 3:00 P.M.

Narrow lanes and permanent shoulder closures will not be allowed between Dec. 1<sup>st</sup> and April 1<sup>st</sup>.

Full Expressway Closures will only be permitted for a maximum of 15 minutes at a time during the low traffic volume hours of 1:00 A.M. to 5:00 A.M. Monday thru Friday and from 1:00 A.M. to 7:00 A.M. on Sunday. During Full Expressway Closures, the Contractor will be required to close off all lanes except one, using Freeway Standard Closures. Police forces should be notified and requested to close off the remaining lane at which time the work item may be removed or set in place. The District One Traffic Operations Department **shall be** notified (847-705-4151) at least 3 working days (weekends and holidays DO NOT count into this 72 hours notification) in advance of the proposed road closure and will coordinate the closure operations with police forces.

All stage changes requiring the stopping and/or the pacing of traffic shall take place during the allowable hours for Full Expressway Closures and shall be approved by the Department.

All daily lane closures shall be removed during adverse weather conditions such as rain, snow, and/or fog and as determined by the Engineer.

Additional lane closure hour restrictions may have to be imposed to facilitate the flow of traffic to and from major sporting events and/or other events.

Revised 06/03/2010

All lane closure signs shall not be erected any earlier than one-half (1/2) hour before the starting hours listed above. Also, these signs should be taken down within one-half (1/2) hour after the closure is removed.

The Contractor will be required to cooperate with all other contractors when erecting lane closures on the expressway. All lane closures (includes the taper lengths) without a three (3) mile gap between each other, in one direction of the expressway, shall be on the same side of the pavement. Lane closures on the same side of the pavement with a half (1/2) mile or less gap between the end of one work zone and the start of taper of next work zone should be connected. The maximum length of any lane closure on the project and combined with any adjacent projects shall be three (3) miles. Gaps between successive permanent lane closures shall be no less than two (2) miles in length.

Private vehicles shall not be parked in the work zone. Contractor's equipment and/or vehicles shall not be parked on the shoulders or in the median during non-working hours. The parking of equipment and/or vehicles on State right-of-way will only be permitted at the locations approved by the Engineer.

#### **FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC**

Effective: March 22, 1996

Revised: February 9, 2005

Should the Contractor fail to completely open and keep open all the traffic lanes to traffic in accordance with the limitations specified under the Special Provisions for "Keeping the Expressway Open to Traffic", the Contractor shall be liable to the Department for the amount of:

One lane or ramp blocked = **\$3,000.00**

Two lanes blocked = **\$5,000.00**

Not as a penalty but as liquidated and ascertained damages for each and every 15 minute interval or a portion thereof that a lane is blocked outside the allowable time limitations. Such damages may be deducted by the Department from any monies due the Contractor. These damages shall apply during the contract time and during any extensions of the contract time.

#### **TRAFFIC CONTROL FOR WORK ZONE AREAS**

Effective: 9/14/95

Revised: 1/1/07

Work zone entry and exit openings shall be established daily by the Contractor with the approval of the Engineer. All vehicles including cars and pickup trucks shall exit the work zone at the exit openings. All trucks shall enter the work zone at the entry openings. These openings shall be signed in accordance with the details shown elsewhere in the plans and shall be under flagger control during working hours.

The Contractor shall plan his trucking operations into and out of the work zone as well as on to and off the expressway to maintain adequate merging distance. Merging distances to cross all lanes of traffic shall be no less than 1/2 mile.

Revised 06/03/2010

IDOT testing of the RAP material will be used in determining the percent of steel slag RAP or Expansive Material. When the contract specifies that an aggregate subbase is to be placed on the Aggregate Subgrade, the 3 inches (75 mm) of capping aggregate will be eliminated. A vibratory roller meeting the requirements of Article 1101.01(g) of the Standard Specifications shall be used to roll each lift of material to obtain the desired keying or interlock and necessary compaction. The Engineer will verify that adequate keying has been obtained.

When a recommended remedial treatment for unstable subgrades is included in the contract, the lower lift of Aggregate Subgrade may be placed simultaneously with the material for Porous Granular Embankment, Subgrade when the total thickness to be placed is 2 feet (600 mm) or less.

Method of Measurement.

Contract Quantities. Contract quantities shall be in accordance with Article 202.07 of the Standard Specifications.

Measured Quantities. Aggregate subgrade will be measured in place and the area computed in square yards (square meters).

Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for AGGREGATE SUBGRADE, 12" (AGGREGATE SUBGRADE, 300 mm).

## **SURFACE ROUGHENING**

This Special Provision revises Section 250 (Seeding) of the Standard Specifications for Road and Bridge Construction, creating a requirement that steep slopes be surface roughened as part of the seed bed preparation.

After the first paragraph of Article 250.05 add the following paragraph:

All slopes 1:3 (vertical to horizontal) and steeper shall be surface roughened by tracking with tracked machinery. The machinery shall be operated up and down the slope to leave horizontal depressions in the prepared seed bed. Back-blading shall not be permitted during the final grading operation. The number of machinery passes shall be limited to minimize soil compaction.

After the third paragraph of Article 250.10 add the following paragraph:

Surface roughening will not be paid separately, but is included in the cost of Seeding, of the type specified.

## **GENERAL ELECTRICAL REQUIREMENTS**

Effective: June 1, 2009

Add the following to Article 801 of the Standard Specifications:

"Maintenance transfer and Preconstruction Inspection:

General. Before performing any excavation, removal, or installation work (electrical or otherwise) at the site, the Contractor shall request a maintenance transfer and preconstruction site inspection, to be held in the presence of the Engineer and a representative of the party or parties responsible for maintenance of any lighting and/or traffic control systems which may be affected by the work. The request for the maintenance transfer and preconstruction inspection shall be made no less than seven (7) calendar days prior to the desired inspection date. The maintenance transfer and preconstruction inspection shall:

Establish the procedures for formal transfer of maintenance responsibility required for the construction period.

Revised 06/03/2010



Establish the approximate location and operating condition of lighting and/or traffic control systems which may be affected by the work

Marking of Existing Cable Systems. The party responsible for maintenance of any existing lighting and/or traffic control systems at the project site will, at the Contractor's request, mark and/or stake, once per location, all underground cable routes owned or maintained by the State. A project may involve multiple "locations" where separated electrical systems are involved (i.e. different controllers). The markings shall be taken to have a horizontal tolerance of at least 304.8 mm (one (1) foot) to either side.. The request for the cable locations and marking shall be made at the same time the request for the maintenance transfer and preconstruction inspection is made. The Contractor shall exercise extreme caution where existing buried cable runs are involved. The markings of existing systems are made strictly for assistance to the Contractor and this does not relieve the Contractor of responsibility for the repair or replacement of any cable run damaged in the course of his work, as specified elsewhere herein. Note that the contractor shall be entitled to only one request for location marking of existing systems and that multiple requests may only be honored at the contractor's expense. No locates will be made after maintenance is transferred, unless it is at the contractor's expense.

Condition of Existing Systems. The Contractor shall conduct an inventory of all existing electrical system equipment within the project limits, which may be affected by the work, making note of any parts which are found broken or missing, defective or malfunctioning. Megger and load readings shall be taken for all existing circuits which will remain in place or be modified. If a circuit is to be taken out in its entirety, then readings do not have to be taken. The inventory and test data shall be reviewed with and approved by the Engineer and a record of the inventory shall be submitted to the Engineer for the record. Without such a record, all systems transferred to the Contractor for maintenance during construction shall be returned at the end of construction in complete, fully operating condition."

Revise the 6<sup>th</sup> paragraph of Article 801.05(a) of the Standard Specifications to read:

"Resubmittals. All submitted items reviewed and marked 'APPROVED AS NOTED', or 'DISAPPROVED' are to be resubmitted in their entirety with a disposition of previous comments to verify contract compliance at no additional cost to the state unless otherwise indicated within the submittal comments."

Revise Article 801.11(a) of the Standard Specifications to read:

"Lighting Operation and Maintenance Responsibility. The scope of work shall include the assumption of responsibility for the continuing operation and maintenance the of existing, proposed, temporary, sign and navigation lighting, or other lighting systems and all appurtenances affected by the work as specified elsewhere herein. Maintenance of lighting systems will be paid for separately"

Add the following to Section 801.11(a) of the Standard Specifications:

"Energy and Demand Charges. The payment of basic energy and demand charges by the electric utility for existing lighting which remains in service will continue as a responsibility of the Owner, unless otherwise indicated. Unless otherwise indicated or required by the Engineer duplicate lighting systems (such as temporary lighting and proposed new lighting) shall not be operated simultaneously at the Owner's expense and lighting systems shall not be kept in operation during long daytime periods at the Owner's expense. Upon written authorization from the Engineer to place a proposed new lighting system in service, whether the system has passed final acceptance or not, (such as to allow temporary lighting to be removed), the Owner will accept responsibility for energy and demand charges for such lighting, effective the date of authorization. All other energy and demand payments to the utility shall be the responsibility of the Contractor until final acceptance."

Add the following to Section 801 of the Standard Specifications:

"Lighting Cable Identification. Each wire installed shall be identified with its complete circuit number at each termination, splice, junction box or other location where the wire is accessible."

"Lighting Cable Fuse Installation. Standard fuse holders shall be used on non-frangible (non-breakaway) light pole installations and quick-disconnect fuse holders shall be used on frangible (breakaway) light pole installations. Wires shall be carefully stripped only as far as needed for connection to the device. Over-stripping shall be avoided.

Revised 06/03/2010

An oxide inhibiting lubricant shall be applied to the wire for minimum connection resistance before the terminals are crimped-on. Crimping shall be performed in accordance with the fuse holder manufacturer's recommendations. The exposed metal connecting portion of the assembly shall be taped with two half-lapped wraps of electrical tape and then covered by the specified insulating boot. The fuse holder shall be installed such that the fuse side is connected to the pole wire (load side) and the receptacle side of the holder is connected to the line side."

Revise the 2<sup>nd</sup> and 3<sup>rd</sup> sentences of the second paragraph of Article 801.02 of the Standard Specifications to read:

"Unless otherwise indicated, materials and equipment shall bear the UL label, or an approved equivalent, whenever such labeling is available for the type of material or equipment being furnished."

Revise the 2<sup>nd</sup> paragraph of Article 801.16 of the Standard Specifications to read:

"When the work is complete, and seven days before the request for a final inspection, the full-size set of contract drawings. Stamped "RECORD DRAWINGS", shall be submitted to the Engineer for review and approval and shall be stamped with the date and the signature of the Contractor's supervising Engineer or electrician.

The record drawings shall be submitted in PDF format on CDROM as well as hardcopy for review and approval. In addition to the record drawings, copies of the final catalog cuts which have been Approved or Approved as Noted shall be submitted in PDF format along with the record drawings. The PDF files shall clearly indicate either by filename or PDF table of contents the respective pay item number. Specific part or model numbers of items which have been selected shall be clearly visible."

Add the following to Article 801.16 of the Standard Specifications:

"In addition to the specified record drawings, the Contactor shall record GPS coordinates of the following electrical components being installed, modified or being affected in other ways by this contract:

- Last light pole on each circuit
- Handholes
- Conduit roadway crossings
- Controllers
- Control Buildings
- Structures with electrical connections, i.e. DMS, lighted signs.
- Electric Service locations
- CCTV Camera installations
- Fiber Optic Splice Locations

Datum to be used shall be North American 1983.

Data shall be provided electronically and in print form. The electronic format shall be compatible with MS Excel. Latitude and Longitude shall be in decimal degrees with a minimum of 6 decimal places. Each coordinate shall have the following information:

1. Description of item
2. Designation or approximate station if the item is undesignated
3. Latitude
4. Longitude

Examples:

Description	Designation	Latitude	Longitude
CCTV Camera pole	ST42	41.580493	-87.793378
FO mainline splice handhole	HHL-ST31	41.558532	-87.792571
Handhole	HH at STA 234+35	41.765532	-87.543571
Electric Service	Elec Srv	41.602248	-87.794053
Conduit crossing	SB IL83 to EB I290 ramp	41.584593	-87.793378
Light Pole	DA03	41.558532	-87.792571
Lighting Controller	X	41.651848	-87.762053
Sign Structure	FGD	41.580493	-87.793378
Video Collection Point	VCP-IK	41.558532	-87.789771
Fiber splice connection	Toll Plaza34	41.606928	-87.794053

Revised 06/03/2010

Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 100 feet. Upon verification, data collection can begin. Data collection can be made as construction progresses, or can be collected after all items are installed. If the data is unacceptable the contractor shall make corrections to the data collection equipment and or process and submit the data for review and approval as specified.

Accuracy. Data collected is to be mapping grade. A handheld mapping grade GPS device shall be used for the data collection. The receiver shall support differential correction and data shall have a minimum 5 meter accuracy after post processing.

GPS receivers integrated into cellular communication devices, recreational and automotive GPS devices are not acceptable.

The GPS shall be the product of an established major GPS manufacturer having been in the business for a minimum of 6 years.”

## **EXPOSED RACEWAYS**

Effective: January 1, 2007

Revise the first paragraph of Article 811.03(a) of the Standard Specifications to read:

“General. Rigid metal conduit installation shall be according to Article 810.03(a). Conduits terminating in junction and pull boxes shall be terminated with insulated and gasketed watertight threaded NEMA 4X conduit hubs. The hubs shall be Listed under UL 514B. The insulated throat shall be rated up to 105° C. When PVC coated conduit is utilized, the aforementioned hubs shall also be PVC coated.”

Add the following to Article 811.03(b) of the Standard Specifications:

“Where PVC coated conduit is utilized, all conduit fittings, couplings and clamps shall be PVC coated. All other mounting hardware and appurtenances shall be stainless steel.”

“The personnel installing the PVC coated conduit must be trained and certified by the PVC coated conduit Manufacturer or Manufacturer’s representative to install PVC coated conduit. Documentation demonstrating this requirement must be submitted for review and approval.”

Revise Article 1088.01(a) of the Standard Specifications to read:

“Couplings and fittings shall meet ANSI Standard C80.5 and U.L. Standard 6. Elbows and nipples shall conform to the specifications for conduit. All fittings and couplings for rigid conduit shall be of the threaded type. All conduit hubs shall be gasketed and watertight with an integral O-ring seal.

All iron and steel products, which are to be incorporated into the work, including conduit and all conduit fittings, shall be domestically manufactured or produced and fabricated as specified in Article 106.”

Revise Article 1088.01(a)(3) of the Standard Specifications to read:

“a. PVC Coated Steel Conduit. The PVC coated rigid metal conduit shall be UL Listed (UL 6). The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid metal conduit. Ferrous fittings for general service locations shall be UL Listed with PVC as the primary corrosion protection. Hazardous location fittings, prior to plastic coating shall be UL listed.

b. The PVC coating shall have the following characteristics:

Revised 06/03/2010

Add the following to Article 1088.01(a)(4) of the Standard Specifications:

“All liquid tight flexible metal conduit fittings shall have an insulated throat to prevent abrasion of the conductors and shall have a captive sealing O-ring gasket. The fittings shall be Listed under UL 514B. The insulated throat shall be rated up to 105° C.”

Revise Article 811.05 of the Standard Specifications to read:

“811.05 Basis of Payment. This work will be paid for at the contract unit price per meter (foot) for CONDUIT ATTACHED TO STRUCTURE, of the diameter specified, GALVANIZED STEEL or CONDUIT ATTACHED TO STRUCTURE, of the diameter specified, PVC COATED GALVANIZED STEEL,.”

## GROUND ROD

Effective: January 1, 2007

Modified: May 24, 2010

Description. This item shall consist of furnishing, installing and connecting ground rods **and/or grounding arrays** for the grounding of service neutral conductors and for supplementing the equipment grounding system via connection at poles or other equipment throughout the system. All materials and work shall be in accordance with Article 250 of the NEC.

Materials. Materials shall be according to the following Articles of Section 1000 - Materials

Item	Article/Section
(a) Grounding Electrodes.....	1087.01(b)
(b) Grounding Electrode Conductors.....	1087.01(a)
(c) Access Well.....	1087.01(c)

## CONSTRUCTION REQUIREMENTS

General. All connections to ground rods, structural steel or fencing shall be made with exothermic welds. Where such connections are made to insulated conductors, the connection shall be wrapped with at least 4 layers of electrical tape extended 152.4 mm (six inches) onto the conductor insulation.

Ground rods shall be driven so that the tops of the rod are 609.6 mm (24 inches) below finished grade. Where indicated, ground wells shall be included to permit access to the rod connections.

Where indicated, ground rods shall be installed through concrete foundations.

Where ground conditions, such as rock, preclude the installation of the ground rod, the ground rod may be deleted with the approval of the Engineer.

Where a ground field of "made" electrodes is provided, such as at control cabinets, the exact locations of the rods shall be documented by dimensioned drawings as part of the Record Drawings.

Revised 06/03/2010

Ground rod connection shall be made by exothermic welds. Ground wire for connection to foundation steel or as otherwise indicated shall be stranded uncoated bare copper in accordance the applicable requirements of ASTM Designation B-3 and ASTM Designation B-8 and shall be included in this item. Unless otherwise indicated, the wire shall not be less than No. 2 AWG.

Where connections are made to epoxy coated reinforcing steel, the epoxy coating shall be sufficiently removed to facilitate the exothermic weld.

Ground wires and connection of ground rods at poles shall be included in this item.

**Measurement and Payment.** GROUND ROD will not be measured for payment separately but will be included as part of LIGHT POLE FOUNDATION (SPECIAL), REMOVE AND REINSTALL SURVEILLANCE CABINET, LIGHT TOWER FOUNDATION (OF THE SIZE SPECIFIED) or REMOVE AND REINSTALL VIDEO CAMERA AND EQUIPMENT.

## **UNDERGROUND RACEWAYS**

Effective: January 1, 2007

Revise Article 810.03 of the Standard Specifications to read:

“Installation. All underground conduit shall have a minimum depth of 30-inches (700 mm) below the finished grade.”

Add the following to Article 810.03 of the Standard Specifications:

“All metal conduit installed underground shall be Rigid Steel Conduit unless otherwise indicated on the plans.”

Add the following to Article 810.03 of the Standard Specifications:

“All raceways which extend outside of a structure or duct bank but are not terminated in a cabinet, junction box, pull box, handhole, post, pole, or pedestal shall extend a minimum of 300 mm (12”) or the length shown on the plans beyond the structure or duct bank. The end of this extension shall be capped and sealed with a cap designed for the conduit to be capped. The ends of rigid metal conduit to be capped shall be threaded, the threads protected with full galvanizing, and capped with a threaded galvanized steel cap. The ends of rigid nonmetallic conduit and coilable nonmetallic conduit shall be capped with a rigid PVC cap of not less than 3 mm (0.125”) thick. The cap shall be sealed to the conduit using a room-temperature-vulcanizing (RTV) sealant compatible with the material of both the cap and the conduit. A washer or similar metal ring shall be glued to the inside center of the cap with epoxy, and the pull cord shall be tied to this ring.”

Add the following to Article 810.03(c) of the Standard Specifications:

Revised 06/03/2010

Replace Article 836.04 with the following:

**836.04 Method of Measurement.** Pole foundations will be measured per each complete and in place.

Relocation of a foundation due to an obstruction and any shaft excavation to that point will not be measured for payment.

Ground rod shall not be measured for separately but will be included with the foundation.

Excavation in rock will be measured for payment according to Article 502.12.

Replace Article 836.05 with the following:

Basis of Payment. This work will be paid for at the contract unit price each for LIGHT POLE FOUNDATION (SPECIAL) which price shall be payment in full for all labor, equipment and materials and ground rod necessary to complete the work as specified herein.

**LIGHT POLE FOUNDATION, METAL, 15" BOLT CIRCLE, 10" X 8'**

Description. This item shall consist of constructing and installing a metal light pole foundation of the bolt circle and dimensions shown and detailed on the plans and in accordance with the applicable portions of Sections 836 of the Standard Specification.

Basis of Payment. This work will be paid for at the contract unit price each for LIGHT POLE FOUNDATION METAL, 15" BOLT CIRCLE, 10"x 8' which price shall be payment in full for all labor, equipment and materials necessary to complete the work as specified herein

Revised 06/03/2010

## **MAINTENANCE OF LIGHTING SYSTEMS**

Effective: January 1, 2007

Replace Article 801.11 and 801.12 of the Standard Specifications with the following:

Effective the date the Contractor's activities (electrical or otherwise) at the job site begin, the Contractor shall be responsible for the proper operation and maintenance of all existing and proposed lighting systems which are part of, or which may be affected by the work until final acceptance or as otherwise determined by the Engineer.

Before performing any excavation, removal, or installation work (electrical or otherwise) at the site, the Contractor shall initiate a request for a maintenance transfer and preconstruction inspection, as specified elsewhere herein, to be held in the presence of the Engineer and a representative of the party or parties responsible for maintenance of any lighting systems which may be affected by the work. The request for the maintenance preconstruction inspection shall be made no less than seven (7) calendar days prior to the desired inspection date.

Existing lighting systems, when depicted on the plans, are intended only to indicate the general equipment installation of the systems involved and shall not be construed as an exact representation of the field conditions. It remains the Contractor's responsibility to visit the site to confirm and ascertain the exact condition of the electrical equipment and systems to be maintained.

### **Maintenance of Existing Lighting Systems**

**Existing lighting systems.** Existing lighting systems shall be defined as any lighting system or part of a lighting system in service prior to this contract. The contract drawings indicate the general extent of any existing lighting, but whether indicated or not, it remains the Contractor's responsibility to ascertain the extent of effort required for compliance with these specifications and failure to do so will not be justification for extra payment or reduced responsibilities.

Revised 06/03/2010

- 1.7 The transmitter shall have a floating type gold plate connector to insure good connection.
- 1.8 The transmitter shall be capable of holding any of its assigned frequencies (mark, space) continuously without degradation in life of performance.
- 1.9 Each transmitter shall be capable of test operation of at least 30 pulses per second.
- 1.10 No transmitter plugs shall be required for tone output. A toggle switch thru the face plate shall put the transmitter "on line" and "off line".
- 1.11 Transmitter shall have L.E.D. indicators for Mark-Red, Space-Yellow and Carrier-Green visible thru the face panel.
- 1.12 Test points through front face plate shall be provided to test for DC voltage levels.

#### BASIS OF PAYMENT

This item will be paid for at the contract unit price each for TONE EQUIPMENT - 3 FREQUENCY PROGRAMMABLE TRANSMITTER, installed, operating and completely in place.

Terminal boards, wiring, and miscellaneous hardware will not be paid for separately, but shall be considered as incidental to the cost of this item.

#### **TEMPORARY WOOD POLE, 45 FT., CLASS 5**

Description. This item will consist of furnishing, **installing and removing** a temporary wood pole **used for the temporary surveillance system** of the size and description as shown on the plans.

Material. The wood pole and mast arm must meet the requirements of IDOT Material Specification 1069.

Installation. The wood pole must be installed as indicated in the IDOT Standard Specifications section 830.03, in the plans and/or as directed by the engineer.

#### Removal.

**The work shall be performed in accordance with Article 841.02 of the Standard Specifications with the exception that no luminaires must be salvaged.**

Method of Measurement. The item will be measured per each pole installed, complete.

Basis of Payment. This work will be paid for at the contract unit price each for WOOD POLE, SIZE AND CLASS AS SPECIFIED which shall be payment in full for furnishing, **installing and removing** the equipment as shown on the plans.

#### **REMOVE AND REINSTALL SURVEILLANCE CABINET**

Description This work consists of furnishing all necessary equipment, materials, labor, and coordination to relocate (remove, store and permanently reinstall) the existing Surveillance Cabinet J32.

Revised 06/03/2010



**THERMOPLASTIC PAVEMENT MARKINGS (BDE)**

Effective: January 1, 2007

Revise Article 1095.01(a)(2) of the Standard Specifications to read:

“(2) Pigment. The pigment used for the white thermoplastic compound shall be a high-grade pure (minimum 93 percent) titanium dioxide (TiO<sub>2</sub>). The white pigment content shall be a minimum of ten percent by weight and shall be uniformly distributed throughout the thermoplastic compound.

The pigments used for the yellow thermoplastic compound shall not contain any hazardous materials listed in the Environmental Protection Agency Code of Federal Regulations (CFR) 40, Section 261.24, Table 1. The combined total of RCRA listed heavy metals shall not exceed 100 ppm when tested by X-ray fluorescence spectroscopy. The pigments shall also be heat resistant, UV stable and color-fast yellows, golds, and oranges, which shall produce a compound which shall match Federal Standard 595 Color No. 33538. The pigment shall be uniformly distributed throughout the thermoplastic compound.”

Revise Article 1095.01(b)(1)e. of the Standard Specifications to read:

“e. Daylight Reflectance and Color. The thermoplastic compound after heating for four hours ± five minutes at 425 ± 3 °F (218.3 ± 2 °C) and cooled at 77 °F (25 °C) shall meet the following requirements for daylight reflectance and color, when tested, using a color spectrophotometer with 45 degree circumferential/zero degree geometry, illuminant C, and two degree observer angle. The color instrument shall measure the visible spectrum from 380 to 720 nm with a wavelength measurement interval and spectral bandpass of 10 nm.

White: Daylight Reflectance .....75 percent min.

\*Yellow: Daylight Reflectance .....45 percent min.

\*Shall meet the coordinates of the following color tolerance chart.

x	0.490	0.475	0.485	0.530
y	0.470	0.438	0.425	0.456”

Revise Article 1095.01(b)(1)k. of the Standard Specifications to read:

“k. Accelerated Weathering. After heating the thermoplastic for four hours ± five minutes at 425 ± 3 °F (218.3 ± 2 °C) the thermoplastic shall be applied to a steel wool abraded aluminum alloy panel (Federal Test Std. No. 141, Method 2013) at a film thickness of 30 mils (0.70 mm) and allowed to cool for 24 hours at room temperature. The coated panel shall be subjected to accelerated weathering using the light and water exposure apparatus (fluorescent UV - condensation type) for 75 hours according to ASTM G 53 (equipped with UVB-313 lamps).

Added 06/03/2010

The cycle shall consist of four hours UV exposure at 122 °F (50 °C) followed by four hours of condensation at 104 °F (40 °C). UVB 313 bulbs shall be used. At the end of the exposure period, the panel shall not exceed 10 Hunter Lab Delta E units from the original material.”

### **LIGHT TOWER SERVICE PAD, SPECIAL**

#### Description:

This work shall consist of the construction of light tower service pads with a 5'-0" high concrete retaining wall. The service pads shall be built to the lines and grades and dimensions shown on the plans. The work shall include the structure excavation, porous granular embankment, concrete structures, reinforcement bars, welded wire fabric, rustication finish, protective coat, sub-base granular material, Type B 6", and preformed joint filler required for the installation of the service pads. The concrete pad shall be thickened near the retaining wall as shown on the detail in the plans.

This work shall be constructed in accordance with Sections 424 and 503 of the Standard Specifications except as herein modified:

Subgrade preparation will be paid for under SHAPING AND GRADING AT HIGH MAST LIGHT TOWER.

Welded wire fabric shall meet the requirements of Section 1006.

#### Basis of Payment:

Light tower service pads integral with retaining walls will be paid for at the Contract unit price per each for LIGHT TOWER SERVICE PAD, SPECIAL, which shall be payment in full for the material and work described herein.

### **SHAPING AND GRADING AT HIGH MAST LIGHT TOWER**

#### Description:

This work shall consist of preparing the completed subgrade. It shall include shaping and final compaction of the earth for the construction of service pads. This include:, filling all depressions and smoothing the surface.

Densities will be determined as provided in Article 205.05. All holes, ruts, soft places and other defects shall be corrected. In no case shall the service pads be placed on soft or unstable material, or over areas that are not drained in a manner satisfactory to the Engineer. If the subgrade is dusty or muddy, operations shall be delayed until it is in a condition satisfactory to the Engineer.

Surplus excavated material resulting from grading and shaping the subgrade shall be disposed of as directed by the Engineer. If additional material is required, it shall be obtained from the right of way if possible and approved by the Engineer. Where rolling of the subgrade is required, any areas, which are inaccessible to a roller, shall be compacted by either a mechanical or hand tamper meeting the approval of the Engineer.

Added 06/03/2010

When Portland cement concrete is being placed directly on the subgrade, the subgrade shall be moist, but not muddy, at the time of placing the concrete. If required by the Engineer, the prepared subgrade shall be saturated with water the previous night, or not less than six nor more than 20 hours prior to the placing of the concrete. If the subgrade subsequently becomes too dry, it shall be sprinkled again ahead of placing the concrete, in such a manner as not to form mud or puddles of water.

The subgrade will be checked and approved by the Engineer before construction of the service pads is started. The Engineer may stop construction work at any time the subgrade is not in proper condition for the placing of the service pads.

Maintenance:

The finished subgrade shall be maintained in a smooth and compacted condition until the service pads and curb are placed.

Method of Measurement:

All subgrade preparation will be measured for payment in square yards.

Basis of Payment:

All subgrade preparation will be paid for at the Contract unit price per square yard for SHAPING AND GRADING AT HIGH MAST LIGHT TOWER, which shall include the excavation for removal or placement of all material within 6 in. of the grade and cross section shown on the plans or established by the Engineer. Excavation for the removal or placement of material outside this 6 in. tolerance will be paid for according to Excavation or Embankment items.

**TEMPORARY WOOD POLE, INSTALL ONLY**

Effective: January 1, 2008

**Description.** This item shall consist of retrieving from storage, transporting, and installing a temporary wood pole, and mast as applicable, as specified herein and as indicated on the plans.

**Materials.** Materials shall be according to the following Articles of Section 1000 - Materials

Item	Article/Section
(a) Light Pole Identification.....	1069.06

**CONSTRUCTION REQUIREMENTS**

**Inspection And Acceptance.** The Contractor shall examine the wood pole, and mast as applicable, in the presence of the Engineer and after accepting the pole(s) shall be held responsible for preservation of the condition of each pole, as it was at the time of acceptance, until the Final Acceptance Inspection.

**Transportation.** The Contractor shall transport, handle the wood pole in complete conformance with industry standard recommendations. The Contractor shall make arrangements to transfer the light poles from the State's storage facility located within District 1 on weekdays between the hours of 8:00 a.m. and 4:00 p.m., excluding State holidays applicable to the Department.

Added 06/03/2010

**Installation.** Installation shall be as described in Article 830.03(c). Unless otherwise indicated, the Contractor shall provide all hardware to install the pole and mast arm as specified herein and indicated on the plans.

Unless otherwise indicated, the wood pole and mast arm, as applicable, shall remain the property of the owner and shall be removed as specified elsewhere herein.

**Method Of Measurement.** Wood poles shall be counted as, each installed.

**Basis Of Payment.** This item shall be paid at the contract unit price each for **TEMPORARY WOOD POLE**, of the mounting height, mast arm quantity and length indicated, **(INSTALL ONLY)**.

## LUMINAIRE

Effective: January 1, 2007

Add the following to first paragraph of Article 1067(c) of the Standard Specifications:

“The reflector shall not be altered by paint or other opaque coatings which would cover or coat the reflecting surface. Control of the light distribution by any method other than the reflecting material and the aforementioned clear protective coating that will alter the reflective properties of the reflecting surface is unacceptable”

Add the following to Article 1067(e) of the Standard Specifications:

“The ballast shall be a High Pressure Sodium, high power factor, constant wattage auto-regulator, lead type (CWA) for operation on a nominal 240 volt system.”

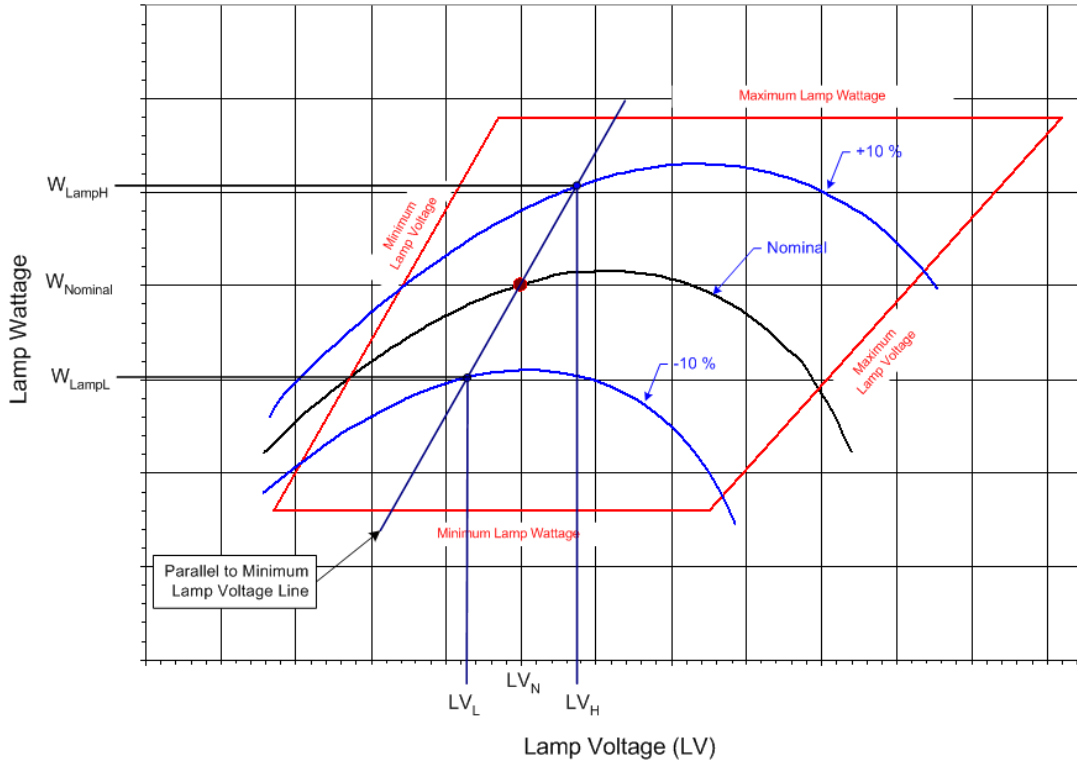
Revise Article 1067(e)(1) of the Standard Specifications to read:

“The high pressure sodium, auto-regulator, lead type (CWA) ballast shall be designed to ANSI Standards and shall be designed and rated for operation on a nominal 240 volt system. The ballast shall provide positive lamp ignition at the input voltage of 216 volts. It shall operate the lamp over a range of input voltages from 216 to 264 volts without damage to the ballast. It shall provide lamp operation within lamp specifications for rated lamp life at input design voltage range. Operating characteristics shall produce output regulation not exceeding the following values:

Nominal Ballast Wattage	Maximum Ballast Regulation
750	25%
400	26%
310	26%
250	26%
150	24%
70	18%

Added 06/03/2010

For this measure, regulation shall be defined as the ratio of the lamp watt difference between the upper and lower operating curves to the nominal lamp watts; with the lamp watt difference taken within the ANSI trapezoid at the nominal lamp operating voltage point parallel to the minimum lamp volt line:



$$\text{Ballast Regulation} = \frac{W_{LampH} - W_{LampL}}{W_{LampN}} \times 100$$

where:

$W_{LampH}$  = lamp watts at +10% line voltage when Lamp voltage =  $LV_H$

$W_{LampL}$  = lamp watts at - 10% line voltage when lamp voltage =  $LV_L$

$W_{LampN}$  = lamp watts at nominal lamp operating voltage =  $LV_N$

Wattage	Nominal Lamp Voltage, $LV_N$	$LV_L$	$LV_H$
750	120v	115v	125v
400	100v	95v	105v
310	100v	95v	105v
250	100v	95v	105v
150	55v	50v	60v
70	52v	47v	57v

Added 06/03/2010

Ballast losses, based on cold bench tests, shall not exceed the following values:

Nominal Ballast Wattage	Maximum Ballast Losses
750	14.0%
400	17.0%
310	19.0%
250	19.0%
150	26.0%
70	34.0%

Ballast losses shall be calculated based on input watts and lamp watts at nominal system voltage as indicated in the following equation:

$$\text{Ballast Losses} = \frac{W_{Line} - W_{Lamp}}{W_{Lamp}} \times 100$$

where:

$W_{line}$  = line watts at nominal system voltage

$W_{lamp}$  = lamp watts at nominal system voltage

Ballast output to lamp. At nominal system voltage and nominal lamp voltage, the ballast shall deliver lamp wattage with the variation specified in the following table. Example: *For a 400w luminaire, the ballast shall deliver 400 watts ±2.5% at a lamp voltage of 100v for the nominal system voltage of 240v which is the range of 390w to 410w.*

Nominal Ballast Wattage	Output to lamp variation
750	± 2.0%
400	± 2.5%
310	± 2.5%
250	± 4.0%
150	± 4.0%
70	± 4.0%

Ballast output over lamp life. Over the life of the lamp the ballast shall produce average output wattage of the nominal lamp rating as specified in the following table. Lamp wattage readings shall be taken at 5-volt increments throughout the ballast trapezoid. Reading shall begin at the lamp voltage ( $L_v$ ) specified in the table and continue at 5 volt increments until the right side of the trapezoid is reached. The lamp wattage values shall then be averaged and shall be within the specified value of the nominal ballast rating. Submittal documents shall include a tabulation of the lamp wattage vs. lamp voltage readings. Example: *For a 400w luminaire, the averaged lamp wattage reading shall not exceed the range of ±3% which is 388 to 412 watts"*

Added 06/03/2010

Nominal Ballast Wattage	LV Readings begin at	Maximum Wattage Variation
750	110v	± 3%
400	90v	± 3%
310	90v	± 3%
250	90v	± 4%
150	50v	± 4%
70	45v	± 5%

Add the following to Article 1067(f) of the Standard Specifications:

“Independent Testing. Independent testing of luminaires shall be required whenever the quantity of luminaires of a given wattage and distribution, as indicated on the plans, is 50 or more. For each luminaire type to be so tested, one luminaire plus one luminaire for each 50 luminaires shall be tested. Example: *A plan quantity of 75 luminaires would dictate that 2 to be tested; 135 luminaires would dictate that three be tested.*” If the luminaire performance table is missing from the contract documents, the luminaire(s) shall be tested and the test results shall be evaluated against the manufacturer’s published data. The test luminaire(s) results shall be equal to or better than the published data. If the test results indicated performance not meeting the published data, the test luminaire will be designated as failed and corrective action as described herein shall be performed.

The Contractor shall be responsible for all costs associated with the specified testing, including but not limited to shipping, travel and lodging costs as well as the costs of the tests themselves, all as part of the bid unit price for this item. Travel, lodging and other associated costs for travel by the Engineer shall be direct-billed to or shall be pre-paid by the Contractor, requiring no direct reimbursement to the Engineer or the independent witness, as applicable”

The Contractor shall select one of the following options for the required testing with the Engineer's approval:

- a. Engineer Factory Selection for Independent Lab: The Contractor may select this option if the luminaire manufacturing facility is within the state of Illinois. The Contractor shall propose an independent test laboratory for approval by the Engineer. The selected luminaires shall be marked by the Engineer and shipped to the independent laboratory for tests.
- b. Engineer Witness of Independent Lab Test: The Contractor may select this option if the independent testing laboratory is within the state of Illinois. The Engineer shall select, from the project luminaires at the manufacturer’s facility or at the Contractor's storage facility, luminaires for testing by the independent laboratory.
- c. Independent Witness of Manufacturer Testing: The independent witness shall select from the project luminaires at the manufacturers facility or at the Contractor's storage facility, the luminaires for testing.

Added 06/03/2010

The Contractor shall propose a qualified independent agent, familiar with the luminaire requirements and test procedures, for approval by the Engineer, to witness the required tests as performed by the luminaire manufacturer.

The independent witness shall as a minimum meet the following requirements:

- ▶ Have been involved with roadway lighting design for at least 15 years.
- ▶ Not have been the employee of a luminaire or ballast manufacturer within the last 5 years.
- ▶ Not associated in any way (plan preparation, construction or supply) with the particular project being tested.
- ▶ Be a member of IESNA in good standing.
- ▶ Provide a list of professional references.

This list is not an all inclusive list and the Engineer will make the final determination as to the acceptability of the proposed independent witness.

- d. Engineer Factory Selection and Witness of Manufacturer Testing: The Contractor may select this option if the luminaire manufacturing facility is within the state of Illinois. At the Manufacturer's facility, the Engineer shall select the luminaires to be tested and shall be present during the testing process. The Contractor shall schedule travel by the Engineer to and from the Manufacturer's laboratory to witness the performance of the required tests."

Add the following to Article 1067.02(a)(1) of the Standard Specifications:

"The beam of maximum candlepower for luminaires specified or shown to have a 'medium' distribution shall be at 70 degrees from the horizontal  $\pm$  2.5 degrees. Submittal information shall identify the angle."

Revise Article 1067.06(a)(1) of the Standard Specifications to read:

"The lamps shall be of the clear type and shall have a color of 1900° to 2200° Kelvin."

Revise Article 1067.06(a)(4) of the Standard Specifications to read:

Lamp Wattage	Initial Lumens	Mean Lumens	Rated Life (Hours)	Lamp Voltage
50	4,000	3,600	24,000	52
70	6,300	5,450	24,000	52
100	9,400	8,000	24,000	55
150	15,800	13,800	24,000	55
200	21,400	19,260	24,000	100
250	27,000	24,300	24,000	100
310	37,000	33,300	24,000	100
400	50,000	45,000	24,000	100
750	105,000	94,500	24,000	120

Added 06/03/2010



Add the following table(s) to Article 1067 of the Standard Specifications:

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE  
 (400W on Light Tower)**

**Locations: 1247+15, 1251+27, 1255+62 1255+63, 1259+79, 1260+39, 1264+00 and 1264+31**

GIVEN CONDITIONS		
<b>ROADWAY DATA</b>	Pavement Width	84 (ft)
	Number of Lanes	7
	Median Width	25
	I.E.S. Surface Classification	R3
<b>LIGHT POLE DATA</b>	Q-Zero Value	.07
	Mounting Height	110, 120, 130 (ft)
	Luminaire Count on the Ring	5
	Pole Set-Back From Edge of Pavement	50 (ft)
<b>LUMINAIRE DATA</b>	Lamp Type	HPS
	Lamp Lumens	50000
	I.E.S. Vertical Distribution	Medium
	I.E.S. Control Of Distribution	Cutoff
	I.E.S. Lateral Distribution	Type III
	Total Light Loss Factor	0.7
<b>LAYOUT DATA</b>	Spacing	500 (ft)
	Configuration	Opposite
	Luminaire Aiming Patten	All 1 direction

**NOTE:** Variations from the above specified I.E.S. distribution pattern may be requested and acceptance of variations will be subject to review by the Engineer based on how well the performance requirements are met.

PERFORMANCE REQUIREMENTS		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ILLUMINATION</b>	Ave. Horizontal Illumination, $E_{AVE}$	9 Lux
	Uniformity Ratio, $E_{AVE}/E_{MIN}$	3.0 (Max)
<b>LUMINANCE</b>	Average Luminance, $L_{AVE}$	0.6 Cd/m <sup>2</sup>
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3.5 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	6.0 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.3 (Max)

Added 06/03/2010

Add the following table(s) to Article 1067 of the Standard Specifications:

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE  
 (400W)**

**Locations: 1266+50, 1269+00**

GIVEN CONDITIONS		
<b>ROADWAY DATA</b>	Pavement Width	72 (ft), 40 (ft) Median
	Number of Lanes	3 NB, 3 SB
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>LIGHT POLE DATA</b>	Mounting Height	47.5 (ft)
	Mast Arm Length	15 (ft)
	Pole Set-Back From Edge of Pavement	20 (ft)
<b>LUMINAIRE DATA</b>	Lamp Type	HPS
	Lamp Lumens	50000
	I.E.S. Vertical Distribution	Medium
	I.E.S. Control Of Distribution	Full-Cutoff
	I.E.S. Lateral Distribution	Type III
	Total Light Loss Factor	0.7
<b>LAYOUT DATA</b>	Spacing	260 (ft)
	Configuration	Single
	Luminaire Overhang over edge of pavement	-5 (ft)

**NOTE:** Variations from the above specified I.E.S. distribution pattern may be requested and acceptance of variations will be subject to review by the Engineer based on how well the performance requirements are met.

PERFORMANCE REQUIREMENTS		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ILLUMINATION</b>	Ave. Horizontal Illumination, $E_{AVE}$	9 Lux
	Uniformity Ratio, $E_{AVE}/E_{MIN}$	3.0 (Max)
<b>LUMINANCE</b>	Average Luminance, $L_{AVE}$	0.6 Cd/m <sup>2</sup>
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3.5 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	6.0 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.3 (Max)

Added 06/03/2010

Add the following table(s) to Article 1067 of the Standard Specifications:

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE  
 (750W Temporary on Wood Pole)**

**Locations: 1247+56, 1250+36, 1253+06, 1255+96, 1259+61, 1262+61, 1265+61 and 1268+61**

GIVEN CONDITIONS		
<b>ROADWAY DATA</b>	Pavement Width	72 (ft), 40 (ft) Median
	Number of Lanes	3 NB, 3 SB
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>LIGHT POLE DATA</b>	Mounting Height	70 (ft)
	Mast Arm Length	15 (ft)
	Pole Set-Back From Edge of Pavement	20 (ft)
<b>LUMINAIRE DATA</b>	Lamp Type	HPS
	Lamp Lumens	110000
	I.E.S. Vertical Distribution	Medium
	I.E.S. Control Of Distribution	Cutoff
	I.E.S. Lateral Distribution	Type III
	Total Light Loss Factor	0.7
<b>LAYOUT DATA</b>	Spacing	365 (ft)
	Configuration	Single
	Luminaire Overhang over edge of pavement	-5 (ft)

**NOTE:** Variations from the above specified I.E.S. distribution pattern may be requested and acceptance of variations will be subject to review by the Engineer based on how well the performance requirements are met.

PERFORMANCE REQUIREMENTS		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ILLUMINATION</b>	Ave. Horizontal Illumination, $E_{AVE}$	9 Lux
	Uniformity Ratio, $E_{AVE}/E_{MIN}$	3.0 (Max)
<b>LUMINANCE</b>	Average Luminance, $L_{AVE}$	0.6 Cd/m <sup>2</sup>
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3.5 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	6.0 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.3 (Max)

Added 06/03/2010

## LIGHT TOWER

Effective: June 1, 2009

1. Description. This work shall consist of furnishing and delivering a light tower complete with lowering device, and all appurtenances required for a complete operating unit.
2. Definitions.

**Light Tower:** The complete light tower shaft and lowering device as one integral working system.

**Shaft:** The light tower shaft.

**Lowering Device:** The components involved with the mounting, operation, and raising and lowering of the luminaire ring, luminaires, and CCTV camera if so equipped.

**Tower Height:** The height of the tower shall be measured from the bottom of the base plate to the center-line of the luminaire tenon arm. This dimension is also referred to as Mounting Height.

3. Materials. Materials shall be as specified elsewhere herein.
4. Submittals and Certifications. Shop drawings, product data and certifications shall be submitted. The submitted information shall be complete and shall include information relative to all specified requirements suitable for verification of compliance.

**THE SUBMITTALS SHALL BE ARRANGED AND CROSS-REFERENCED TO THE SPECIAL PROVISIONS. FAILURE TO CROSS-REFERENCE THE SUBMITTAL INFORMATION WITH THE SPECIAL PROVISIONS WILL RESULT IN THE SUBMITTAL BEING RETURNED WITHOUT REVIEW.**

The submittal information shall be dated, current, project specific, identified as to the project, and shall also include the following calculations and certifications:

- Shaft design calculations, including Registered Engineer Certification.
- Lowering device seating force calculations.
- Certification of intent to provide domestic steel in accordance with Article 106.01 of the Standard Specifications.
- Welding details and procedures.
- Letter of intent to provide specified weld inspection reports.
- Confirmation of coordination between anchor rod supplier and tower manufacturer for adequacy of anchor rod assembly.
- Manufacturer's recommended installation procedures.
- Letter of intent to provide manufacturer's representative during installation and to provide specified installation certification.

All certifications shall be notarized.

5. Deleted

Added 06/03/2010

6. Light Tower

- 6.1 General. Light towers (high mast poles) shall consist of any poles 24 m (80 ft) or more in length.

Each light tower shall be complete with internal, integral motorized lowering mechanism, luminaire ring, pole top hood, internal electric power cables, luminaire counter-weight (when applicable), and all appurtenances required for a complete operating unit.

The design shall be based upon AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" current at the time the project is advertised. The calculated loading shall incorporate a total combined luminaire weight of 720 lbs and a total projected area of 7.3 m<sup>2</sup> (24 ft<sup>2</sup>). The towers shall also comply with AASHTO fatigue Category I.

Light towers shall be designed and constructed so no structural member or other component is applied in excess of the manufacturer's recommended rating (when applicable) or the published rating, whichever is lower.

The light towers shall be of a height and luminaire capacity as indicated and shall be of the non-latching ring support design. A latching-type ring support will not be acceptable.

The tower shall be provided as a single coordinated assembly, with one entity responsible as manufacturer of the whole. One entity must be the manufacturer of the lowering device or the tower shaft, or both, shall warrant the entire coordinated assembly.

- 6.2 Deflection. The design of the tower shaft shall achieve a maximum, fully loaded deflection at the top of the pole, which is not greater than the following percentage of the tower height:

<b>Light Tower Maximum Deflection</b>		
Tower Height		Maximum Deflection as % of Tower Height
Meters	Feet	
49	160	13.70
46	150	10.04
43	140	7.80
40	130	6.02
36	120	10.75
33	110	7.80
30	100	5.30
27	90	4.50
24	80	3.50

Added 06/03/2010

6.3 Shaft.

- 6.3.1 The tower shaft shall be a low deflection tapered shaft having polysided, circular, or elliptical cross sections. The shaft cross section at the top shall be not less than 190 mm (7.5 in.) in length across the major axis. The shaft cross section at the bottom shall not be greater than that which is compatible with the base plate bolt circle specified, and shall not be less than 600 mm (24 in.) in length across the minor axis for new installations.
- 6.3.2 All tower shaft components, including, but not limited to the shaft sections, tower sections, base plates, handhole door, handhole reinforcing, rain gutter, and base plate shall be fabricated from high strength, low alloy steel with minimum yield strength of 345,000 kPa (50,000 psi) according to AASHTO M 223 (ASTM A 572 GR 50).
- 6.3.3 Each tower shaft shall be constructed of not more than the following welded or slip fitted sections:

<b>Maximum Light Tower Sections</b>		
Tower Height		Maximum Number of Sections
Meters	Feet	
49	160	4
46	150	4
43	140	4
40	130	4
36	120	3
33	110	3
30	100	3
27	90	3
24	80	2

- 6.3.4 Sections which are slip fitted shall have slip joints with a minimum overlap of 1.5 times the diameter of the bottom of the upper section at the slip joint. Towers having slip joint construction shall be pre-fitted and match marked at the factory and shall be shipped disassembled for assembly at the job site. Slip joints shall be marked with a scribe to allow verification that 1.5 times diameter insertion is provided. A copper bonding jumper, included with the tower, shall bond slip fit pole sections together with a flat copper mesh and UL Listed ground lugs.

6.4 Handhole.

- 6.4.1 Each tower shaft shall be constructed with a handhole/access door for access to power connections and lowering mechanism equipment. The handhole shall be large enough to make the following items visible from an extended operating position and accessible for maintenance: cable drum, transition plate, and the drive train oil level indicator.

Added 06/03/2010

The handhole shall be sized and arranged to permit removal of the lowering mechanism without excessive dismantling of the equipment. The handhole may be a reinforced opening in the pole shaft as detailed on the plans or may be a part of a flared shaft base assembly as approved by the Engineer. The flared base shall not be considered a separate section of the tower shaft. Minimum opening dimension for the handhole shall be 300 mm x 900 mm (12 in. x 36 in.) and it shall have a lockable door. The handhole shall be located so as to not interfere with the operation of the door clamps, and it shall be positioned on the tower shaft to align on center with one of the anchor bolt (rod) positions and at a minimum height, as detailed on the plans, to facilitate access to mounting nuts with tools required for installation.

- 6.4.2 The handholes in the pole shafts shall have rounded corners and shall be reinforced to maintain the original strength of the tower shaft. Flared base assemblies shall maintain the strength of the shaft and have no nonround protrusions.
- 6.4.3 Handhole Door. The handhole shall have a door with a full-height stainless steel piano hinge, or with not less than two stainless steel hinges. A bolt through a door and frame eyelet shall not constitute an acceptable hinge. Hinges shall be heavy duty, suitable for the weight of the handhole door. The handhole door shall not be warped in any direction. The door hinge shall be attached with stainless steel nuts and bolts.
- 6.4.4 Handhole door gasket. The door/opening shall be gasketed in a manner which will prevent the entry of water into the tower and the door shall have a tight compressive seal employing a tubular gasket to assure compressibility. The gasket shall be a one piece design and shall be jointed by chemical fusion at the bottom of the opening.
- 6.4.5 Handhole door clamps. The door shall be held closed with a 12 gauge captive adjustable, spring loaded, stainless steel clamp assembly. The clamps shall have a depth stop feature to insure uniform sealing pressure at all clamp points. A minimum of four clamps shall be used around the nonhinged sides of the door assembly. The door clamp locations and handhole shall be coordinated with the tower so that the clamps can operate over their full range of movement without any interference from other tower components including anchor bolts which may protrude up to 6" above the top surface of the base plate. The door clamps shall be attached with stainless steel nuts and bolts.
- 6.4.6 Padlock provision. A stainless steel padlock hasp and staple shall be provided for locking the door. Door hardware shall be stainless steel. The door shall be equipped with an integral door stop/hold-open mechanism.

Added 06/03/2010

- 6.4.7 Rain Shield. A rain shield shall be placed above the handhole to direct water away from the handhole. The shield shall be fabricated of the same material as the pole shaft, shall have rounded corners, and shall be permanently welded to the shaft. The rain shield cannot interfere with operation of the handhole door or door clamps. Details of the configuration and welding shall be submitted for the Engineer's approval.
- 6.4.8 Cable Hook. A cable hook/cradle, readily accessible from the front of the tower, shall be provided to hang the control operator cable assembly when not in use. The hook or cradle shall be made from steel rod no less than ½-inch in diameter and shall be painted as the pole is. This hook or cradle shall be large enough to hold 25 ft. (7.5m) of power cable and positioned for practical in-field use. The hook shall not have sharp edges or protrusions that could damage the cable, and it shall not interfere with the operation of the lowering mechanism.
- 6.4.9 Ground Lug. Each tower shaft shall have a handhole accessible ground lug welded to the shaft for connection of ground conductors. The lug shall be UL Listed and accessible with the lowering device installed.
- 6.4.10 Interior Bolt Exposure. Bolts attaching the various components to the tower, handhole, and handhole door shall be properly sized and coordinated with the matching nuts so that no more than 0.25" of thread is exposed past the nut when properly tightened.
- 6.5 CCTV component box mounting provision. The tower shaft shall include four (4) mounting standoffs welded to the tower shaft prior to finishing. The standoffs shall be configured as indicated on the drawings and shall be arranged to facilitate the installation of a standard 20" x 16" x 10" NEMA 4X stainless steel junction box as manufactured by Hoffman Enclosures (A-20H1610SSLP) or Electromate Enclosures (E-20H1610SS). The standoffs shall be drilled and tapped to accept a 7/16" diameter bolt.

Two 1" diameter holes shall be drilled and tapped at the upper third of the mounting area to facilitate the installation of conduits from the back of the box to the tower. The locations of these holes may be modified during the submittal process and must be approved by the Engineer. The holes shall be sealed with threaded steel plugs. The junction box mounting holes shall be sealed with threaded stainless steel bolts. The bolt and plug threads shall be coated with a generous amount of anti-seize compound prior to installation.

The manufacturer shall demonstrate that the specified junction box will fit by test fitting an actual junction box and documenting the results with photographs submitted to the Engineer for approval.

## 6.6 Base Plate.

- 6.6.1 The base plate shall be factory predrilled (slotted) for the number and configuration of anchor rods as provided in the following table:

Added 06/03/2010



Base Plate Configuration				
Tower Height		Min, number anchor rods	Rod Circle	
Meters	Feet		mm	inches
49	160	8	914	36
46	150	8	914	36
43	140	8	914	36
40	130	8	914	36
36	120	8	762	30
33	110	8	762	30
30	100	8	762	30
27	90	8	762	30
24	80	6	762	30

The base plate shall have a round (disk) shape of the specified outer diameter or as otherwise approved by the Engineer. The minimum thickness of the base plate shall be 50 mm (2.0 in.). The base plate shall be circumferentially welded to the tower shaft and, as noted above, the plate shall be oriented such that one anchor rod is aligned with the vertical center line of the handhole.

## 7. Welding.

### 7.1 Manufacturer Welding Requirements.

- 7.1.1 Circumferential welds. Circumferential welds, including top flange welds, shall be full penetration welds.
- 7.1.2 Longitudinal welds. Longitudinal welds shall have a minimum of 60 percent penetration, except the longitudinal welds on both the male and female shaft sections shall be full penetration welds within a distance of two diameters of overlap joints.

Minimum preheats for welds shall be 40° C (100° F) for fillets, 65° C (150° F) for seams, and 110° C (225° F) for circumferential welds.

Weld procedure specifications for seams and circumferential welds must be qualified according to Section 4, Part B of AWS D1.1. Charpy V-Notch (CVN) impact specimens shall be tested according to Table III-1 (note 2) of Appendix III for minimum values of 34 J (25 ft lb) at 4° C (40° F). Fillet weld procedures shall be tested according to Table 4.4 of AWS D1.1.

The welds shall be smooth and thoroughly cleaned of flux and spatter and be according to the AWS.

All full penetration welds shall be inspected for soundness by the ultrasonic method and all partial penetration welds shall be inspected by the magnetic particle method.

Added 06/03/2010

Welding inspection reports shall be submitted to the Engineer for approval. The welding symbols and complete information regarding location, type, size, welding sequence, and WPSs shall be shown on all shop drawings. The Contractor shall submit the manufacturer's welding procedures, including inspection procedures, to the Engineer for approval.

- 7.2 Independent Welding Inspection. In addition to manufacturer's own welding inspection, the Contractor shall have welding inspected by an independent Certified Welding Inspector (CWI). The selected inspector shall be approved by the Engineer before any inspecting is performed. The NDE inspector(s) shall be independent nondestructive testing inspector(s), certified as level II in RT, UT, and/or MT as applicable. The methods for testing full penetration and partial penetration welds by the independent welding inspector(s) shall be the same as specified above in section 7.1

The independent welding inspector shall send the test results directly to the Engineers, as follows: Illinois Department of Transportation, Attn: Engineer of Structural Services, 2300 S. Dirksen Parkway, Bureau of Bridges & Structures, Springfield, Illinois 62764 and to: Illinois Department of Transportation, District 1, Attn: Electrical Design Section Chief, Bureau of Traffic Operations, 201 West Center Court, Schaumburg, Illinois 60196. All welds must pass inspection. Any deficient welds must be brought to the attention of the Engineer and corrective measures must be outlined.

## 8. Light Tower Finish.

### 8.1 General.

The light tower shall be finished with a duplex finishing system. Towers shall be hot dipped galvanized and then the exterior of the tower shall be painted with an intermediate coat of polyamide epoxy paint and a finish coat of aliphatic polyurethane paint.

Components receiving this duplex coating are the tower shaft, handhole, handhole door, base plate, mounting plate and all other elements attached to the exterior of the shaft.

The luminaire ring shall be painted with a three part paint system consisting of a organic zinc rich aromatic urethane primer, a polyamidoamine epoxy intermediate coat, and an aliphatic acrylic polyurethane finish coat.

The color of the finish coat shall be according to Federal Standard Color Number 6307, Hanford Gray. A color sample shall be included in the submittal information for review and approval.

All cleaning, preparation for painting, and painting shall be done in the same shop to ensure single source responsibility of the entire coating system. Also, all paint materials shall be from a single source to ensure compatibility.

Added 06/03/2010

In addition, sequence of operation shall be submitted describing the procedure used in preparing the galvanized surface, the brand names of the paint to be used, and certification that the paint that is used is compatible with galvanized surfaces.

The paint manufacturer shall also submit a detailed field touch-up procedure for the paint system. The procedure shall be specific to the various degrees of damage and shall include, but not limited to, the specific type of touch paint to be used, surface preparation, and application requirements including temperature and humidity ranges.

8.2 Galvanizing. Hot-Dip galvanizing shall be in accordance with the applicable portions of ASTM A 123/123M or A 153/A 153M. Water quenching or chromate conversion coating of the galvanized steel is not allowed.

8.3 Shop conditions, General. The surfaces to be painted after surface preparation must remain free of moisture and other contaminants. The Contractor shall control the operations to insure that dust, dirt, or moisture does not come in contact with surfaces prepared or painted that day. In addition to the manufacturer's written instructions for surface preparation and painting, the following conditions shall apply (when in conflict, the most restrictive conditions shall govern):

The minimum steel and air temperatures shall be 40° F (4° C). Painting shall not be applied to steel that is at a temperature that will cause blistering, porosity, or be otherwise detrimental to the life of the painted surfaces. Painting shall not be applied when the steel surface temperature is less than 5° F (3° C) above the dew point. Painting shall not be applied to wet, damp, or frosted surfaces. Paint shall not be applied when the relative humidity is above 85%. Work accomplished under unfavorable weather conditions will be considered unacceptable and complete re-cleaning and painting of these areas will be required at no additional cost to the State.

All material must be applied under conditions within the following tolerances and permanent records must be kept of the processing conditions during the complete finishing process:

- Air temperature 50° F (10° C) minimum and 90° F (32° C) maximum.
- Steel surface temperature 50° F (10° C) minimum and 100° F (37° C) maximum.
- Humidity 85% maximum.
- Steel temperature at least 5° F (3° C) above the dew point.

8.4 Galvanized Steel Preparation.

The galvanized steel surfaces shall be prepared and primed as soon after galvanizing as possible but the surfaces shall be primed within 24 hours of the galvanizing operations. There should be no visible signs of zinc oxide or zinc hydroxide, which first appear as a fine white powder.

Added 06/03/2010

- 8.4.1 Surface smoothing. Zinc high spots shall be removed by cleaning with hand or power tools as describe in SSPC SP2 or SP3. The zinc should be removed until it is level with the surrounding area, taking care that the basecoating is not removed by the cleaning methods. After cleaning, the surface shall be inspected for conformance to the required zinc thickness in accordance with ASTM A 123 utilizing a magnetic or eddy current type thickness instrument in accordance with ASTM E 376. Any item falling below the required zinc thickness, before or after removal of any high spots, shall be repaired in accordance with practice ASTM A 780.
- 8.4.2 Surface cleaning. Hot dip galvanized surfaces must be clean and free of oil and grease before they are painted. Absolutely no water quenching or chromate conversion coating is allowed of the galvanized surface that is to be painted, as they will interfere with the adhesion of the paint coatings to the zinc surface. Any of the following methods as deemed necessary by the paint manufacturer shall be used for surface cleaning of the galvanized surfaces. The paint submittal shall indicate the proposed method of surface cleaning.
- Aqueous Alkaline Cleaning. An alkaline solution, with a pH of 11 to 13 may be used to remove traces of oil, grease, or dirt. Alkaline cleaner may not be used for removal of heavy build-up of zinc oxide or wet storage stain. The solution can be applied through immersion in a tank filled with the solution, sprayed, or brushed with a soft bristle brush. After cleaning, rinse thoroughly in hot water or water under pressure. Heated drying to accelerate the complete removal of water from the surface should be used.
  - Solvent Cleaning. Typical cleaning solvents, such as mineral spirits or high-flash naphtha, can be used to remove oil and grease. The procedure to be used is as specified in SSPC SP1. Proper rags or brushes should be used to wipe the galvanized parts. These rags or brushes should be cleaned or recycled often since oil can accumulate on their surfaces and be transferred back to the galvanized part. After cleaning, rinse thoroughly in hot water or water under pressure. Allow to dry completely before proceeding.
- 8.4.3 Surface preparation. Any of the following methods as per the written recommendation of the paint manufacturer may be used to prepare the galvanized surface for painting. The paint submittal shall indicate the proposed method of surface preparation.
- Sweep Blasting. Abrasive sweep or brush blasting which uses a rapid nozzle movement will roughen the galvanized surface profile. The abrasive material shall provide a stripping action without removing excess zinc layers. Particle size should be in the 8 mils to 20 mils (200  $\mu\text{m}$  to 500  $\mu\text{m}$ ) range. Materials that can be used are aluminum/magnesium silicate, soft mineral sands with a mohs hardness of 5 or less, corundum, limestone, and organic media such as corncobs or walnut shells.

Added 06/03/2010

Nozzle pressure shall not exceed 50 psi (350 kPa). The blasting angle to surface shall be 45° at a distance of 16" – 18" (406 – 457 mm). The purpose of the sweep blasting is to deform not to remove the galvanized metal. Any area falling below the required zinc thickness, before or after the sweep blasting should be repaired in accordance with ASTM A 780. The procedure for this process can be found in SSPC SP7. Sweep blasting of zinc shall not be less than 130 yds<sup>2</sup>/h (110 m<sup>2</sup> /h) using these types of abrasives. Substrate should be maintained at a temperature greater than 5° F (3° C) above the dew point temperature. Following abrasive blast cleaning, surfaces should be blown down with clean, compressed air. The formation of zinc oxide on the blasted surface will begin very quickly so the paint coating should be applied immediately, within 60 minutes, after sweep blasting.

- Wash Primer Treatment. This process involves the use of a metal conditioner to neutralize surface oxides and hydroxides along with etching the surface. One example of a wash primer is SSPC-Paint Specification No. 27. The process is based on three primary components: a hydroxyl-containing resin; a pigment capable of reacting with resin and acid; and an acid capable of making the resin insoluble by reacting with the resin, the pigment, and the zinc surface. The result is a film of approximately 0.3 mils to 0.5 mils (8 µm to 13 µm). Failures can occur if the film exceeds 0.5 mils (13 µm). The film is usually applied by spray, but may be applied by soft bristle brush, dip, or roller coater. For drying time prior to top coating, follow the manufacturer's instructions.
- Acrylic Passivation/Pretreatment. The passivation/pretreatment process consists of applying an acidic acrylic solution to the newly galvanized surface and then allowing it to dry, forming a thin film coating. The application methods for these water-based treatments are dipping, flow coating, spraying, or other appropriate means. Following application the coating is dried in an oven or in air. In some instances the coating is applied to hot galvanized articles in which case separate drying is not necessary. Rinsing is not required. The coating is approximately 0.04 mils (1 µm) thick. Painting is possible any time during a period of four months after application as long as the surface is free of visible zinc oxides or zinc hydroxides. However, if harmful contaminants such as dust, dirt, oils, grease, or deposits are present, they must be removed with a mild alkaline degreasing solution, pH 11.5 maximum, followed by a thorough rinse with hot water (140° F (60° C) maximum temperature) or a pressure wash, and then, thoroughly dried. This treatment applied in the galvanizing plant or later in the paint shop. When applied in the paint shop, the surface must first be appropriately cleaned as described above to remove contaminants picked up after galvanizing.

Added 06/03/2010

8.5 Bare Metal Preparation.

Bare metal shall be prepared in accordance with SSPC-SP6 (Commercial Blast Cleaning) with a 1.0 – 3.0 mil (25 –75 micron) surface profile.

8.6 General Paint Requirements.

- 8.6.1 Compatibility. Each coating in the system shall be supplied by the same paint manufacturer.
- 8.6.2 Toxicity. Each coating shall contain less than 0.01 percent lead in the dry film and no more than trace amounts of hexavalent chromium, cadmium, mercury or other toxic heavy metals.
- 8.6.3 Volatile Organics. The volatile organic compounds of each coating shall not exceed 420 g/L (3.5 lb/gal) as applied.
- 8.6.4 The paint system shall be manufactured by the following paint manufacturers or approved equal as determined by the Engineer.

<b>Manufacturer</b>	<b>Primer Coat</b>	<b>Intermediate Coat</b>	<b>Finish Coat</b>
Carboline	Carbozinc 859	Cabogaurd 888	Carboline 133 HB
Sherwin Williams	Zinc Clad III HS	Macropoxy 646	Acrolon 218

8.7 Zinc-Rich Primer Requirements.

- 8.7.1 Generic Type. This material shall be an organic zinc-rich epoxy or urethane primer. It shall be suitable for topcoating with epoxies, urethanes, and acrylics.
- 8.7.2 Zinc Dust. The zinc dust pigment shall comply with ASTM D 520, Type II.
- 8.7.3 Slip Coefficient. The organic zinc coating shall meet a Class B AASHTO slip coefficient (0.50 or greater) for structural steel joints using ASTM A 325M (A 325) or A 490M (A 490) bolts.
- 8.7.4 Salt Fog. There shall be no delamination, blistering, rust creepage at the scribe, or rusting at the scribe edges after 5,000 hours of salt fog exposure when tested according to ASTM B 117 and evaluated according to AASHTO R 31.
- 8.7.5 Cyclic Exposure. There shall be no delamination, blistering, rust creepage at the scribe, or rusting at the scribe edges after 5,000 hours of cyclic exposure when tested according to ASTM D 5894 and evaluated according to AASHTO R 31.
- 8.7.6 Humidity Exposure. There shall be no delamination, blistering, rust creepage at the scribe, or rusting at the scribe edges after 4,000 hours of humidity exposure when tested according to ASTM D 2247 and evaluated according to AASHTO R 31.

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- 8.7.7 Adhesion. The adhesion to an abrasively blasted steel substrate shall not be less than 6200 kPa (900 psi) when tested according to ASTM D 4541 Annex A4.
- 8.7.8 Freeze Thaw Stability. There shall be no reduction of adhesion, which exceeds the test precision, after 30 days of freeze/thaw/immersion testing. One 24-hour cycle shall consist of 16 hours of approximately -30 C (-22° F) followed by 4 hours of thawing at 50 C (122° F) and 4 hours tap water immersion at 25° C (77° F). The test panels shall remain in the freezer on weekends and holidays.
- 8.7.9 Application. The primer shall be applied in accordance with manufacturer's instructions to a dry fill thickness of 2.5 – 3.5 mils.

#### 8.8 Intermediate Coat Requirements.

- 8.8.1 Generic Type. This material shall be an epoxy or urethane. It shall be suitable as an intermediate coat over inorganic and organic zinc primers and compatible with acrylic, epoxy, and polyurethane topcoats.
- 8.8.2 Color. The color of the intermediate coat shall be white or off-white.
- 8.8.3 Application. The primer shall be applied in accordance with manufacturer's instructions to a dry fill thickness of 3.0 – 4.0 mils.

#### 8.9 Urethane Finish Coat Requirements.

- 8.9.1 Generic Type. This material shall be an aliphatic urethane. It shall be suitable as a topcoat over epoxies and urethanes. The finish shall be semi-gloss
- 8.9.2 Color. The color of the finish coat shall be according to Federal Standard Color Number 6307, Hanford Gray. A color sample shall be included in the submittal information for review and approval.
- 8.9.4 Application. The finish coat shall be applied in accordance with manufacturer's instructions to a dry fill thickness of 2.5 – 3.5 mils.

#### 8.10 Three Coat System Requirements.

The paint manufacturer shall certify that the paint system complies with the following requirements. The certification shall be signed by an officer of the manufacturer and shall be notarized.

- 8.10.1 Finish Coat Color. For testing purposes, the color of the finish coat shall be according to Federal Standard Color Number 6307, Hanford Gray.

Added 06/03/2010

8.10.2 Salt Fog. When tested according to ASTM B 117 and evaluated according to AASHTO R 31, the paint system shall exhibit no spontaneous delamination and not exceed the following acceptance levels after 5,000 hours of salt fog exposure:

<b>Salt Fog Acceptance Criteria (max)</b>			
Blister Criteria	Rust Criteria		
Size/Frequency	Maximum Creep	Average Creep	% Rusting at Scribed Edges
#8 Few	4mm	1mm	1

8.10.3 Cyclic Exposure. When tested according to ASTM D 5894 and evaluated according to AASHTO R 31, the paint system shall exhibit no spontaneous delamination and not exceed the following acceptance levels after 5,000 hours of cyclic exposure:

<b>Cyclic Exposure Acceptance Criteria (max)</b>			
Blister Criteria	Rust Criteria		
Size/Frequency	Maximum Creep	Average Creep	% Rusting at Scribed Edges
#8 Few	2mm	1mm	1

8.10.4 Humidity Exposure. There shall be no delamination, blistering, rust creepage at the scribe, or rusting at the scribe edges after 4,000 hours of humidity exposure when tested according to ASTM D 2247 and evaluated according to AASHTO R 31.

8.10.5 Adhesion. The adhesion to an abrasively blasted steel substrate shall not be less than 6200 kPa (900 psi) when tested according to ASTM D 4541 Annex A4.

8.10.6 Freeze Thaw Stability. There shall be no reduction of adhesion, which exceeds the test precision, after 30 days of freeze/thaw/immersion testing. One 24 hour cycle shall consist of 16 hours of approximately -30 C (-22° F) followed by 4 hours of thawing at 50° C (122° F) and 4 hours tap water immersion at 25° C (77° F).

#### 8.11 Quality Control.

The Contractor shall conduct a quality control program that ensures that the work accomplished complies with these specifications. The quality control program shall consist of:

- Qualified personnel to manage the program and conduct quality control tests.
- Proper quality measuring instruments.
- Quality Control Plan.
- Condition and quality recording procedures.

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The personnel managing the quality control program shall have experience and knowledge of industrial coatings and the measurements needed to assure quality work. The personnel performing the quality control tests shall be trained in the use of the quality control instruments. These personnel shall not perform surface preparation and painting. Painters shall perform wet film thickness measurements. The Contractor shall supply all necessary equipment to perform quality control testing of shop conditions, equipment, surface preparation, and profile and paint film thickness. The Contractor's personnel in accordance with the equipment manufacturer's recommendations shall calibrate these instruments.

The Contractor shall implement a Quality Control Plan approved by the Engineer including a schedule of required measurements and tests as outlined herein, procedures for correcting unacceptable work, and procedures for improving surface preparation and painting quality as a result of quality control findings. The Contractor shall supply and use forms approved by the Engineer to record the results of quality control tests. These reports shall be available at the work site for review by the Engineer. The purpose of the quality control program is to assist the Contractor in the proper performance of the work. Quality control tests performed by the Contractor will not be used as the sole basis for acceptance of the work.

8.12 Warranty. Before the painted surfaces, described herein, are accepted as a finished product, the light tower manufacturer shall have the paint manufacturer certify that the paint system was applied correctly in accordance with the paint manufacturer's procedures and these special provisions. The Contractor shall then furnish to the State, the tower manufacturer's, or paint manufacturer's normal paint warranty for a minimum of six months after final tower installation under a separate contract. It is anticipated that the towers will be installed by the end of 2005.

8.13 The paint thickness will be checked at the time of tower installation. If it is determined that the paint dry film thicknesses does not comply with the specified values, the Contractor shall apply another coat of finish paint, at no additional cost to the State, on the installed tower with surface preparation as required by the paint manufacturer. The dry film thickness will then be re-measured and if the thickness is not compliant, the procedure will be repeated again until the dry film thickness complies with all requirements at no additional cost to the State.

## 9. Head Frame.

9.1 Each tower shall be equipped with a head frame assembly to support and guide the luminaire ring assembly.

9.2 The head frame and luminaire ring shall have a positive mating/alignment interface at which the seating force is applied at each support cable. The interface shall be designed to operate with not less than 1.3 kN (300 lbs.) of total seating force distributed among the interface points. Manufacturer calculations shall be submitted to confirm this requirement. The stop used at the top of the tower shall not deform with the full force applied.

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- 9.3 All head frame members and components, including support arms, shall be fabricated of steel of the same type as specified for the tower shafts or stainless steel of appropriate strength. The head frame shall have a head plate, a support, and 2 pulleys for each support cable. All openings in the head frame assembly shall be machined smooth and free from any burrs and sharp edges which could damage the support cables and power cable.
  - 9.4 The head frame shall have a power cable pulley placed between and roughly equidistant from 2 support arms, with a pulley diameter around the groove of not less than 350 mm (14 inches).
  - 9.5 The power cable shall pass through the head frame assembly utilizing a four-way roller guide assembly sized to accommodate the outside diameter of the power cable.
  - 9.6 Pulleys shall be constructed to allow associated cables to ride freely within pulley grooves and cable guides shall be incorporated to prevent cables from riding out of pulleys.
  - 9.7 Pulleys, attachment hardware, latches, hinges and the like shall be stainless steel. Pulleys shall be made of Unified Numbering System type 300 stainless steel and have permanently lubricated sealed bearings except the power cable pulleys may be cast aluminum or high-strength nylon.
  - 9.8 The head frame assembly shall be equipped with a metal hood. The hood shall protect the operating head frame components from damage or deterioration from weather but shall permit pole ventilation while preventing the entry of birds. The hood shall have a strong secure mechanical means to open/raise the hood for the future maintenance of the head frame such as a spin screw mount, and shall have a double-secured latching system to assure closure. The Design shall be such as to minimize the risk that the hood will be displaced from gusts of wind. The head frame assembly shall be match-marked to its tower shaft and shall be attached to the shaft by stainless steel hardware.
10. Luminaire Ring.
- 10.1 Each tower shall be provided with a luminaire ring suitable for twelve (12) luminaires of the type, and orientation specified. The ring shall mate/align with the head frame and shall be coordinated relative to seating force.
  - 10.2 The ring shall be designed for lowering to a position with the center line of luminaire arms 1.4 m (54 inches) or less above the top of the tower base plate. The exact fully-lowered position shall be adjustable in the field. Wiring shall be fully enclosed in a metal raceway.
  - 10.3 The ring shall be equipped with spring loaded bumpers, spring loaded rollers, spring-loaded outriggers or other shock-absorbing mechanism to guide the ring during the raising/lowering operations. The guide mechanism shall be spring loaded and shall be designed to minimize shock to the luminaire during raising and lowering.

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These devices shall be attached in a secure manner. The mechanism does not have to maintain constant contact with the tower shaft.

- 10.4 Arms for the attachment of luminaires shall be standard 50 mm (2-inch) diameter tenon arms. The arms shall be attached to the ring in a secure manner either by welding or by means of stainless steel bolts, nuts, lock washers and hardware such that a permanent rigid attachment is achieved. Arms shall be approximately 325 mm (13 inches) in length, coordinated with luminaire size and configuration and shall be arranged so that the overall diameter of the ring, including the luminaire, does not exceed 3.4 m (11 ft.). A "T" arm configuration shall be used as indicated in the plans and described elsewhere herein. Tenon arm ends shall be threaded to accept a PVC pipe cap. All tenon arms shall be capped. The tenon arms shall be level when the ring is in the raised position.
- 10.5 The ring raceway shall be arranged with screened weep holes of not less than ½-inch diameter at no less than 90 degree intervals around the ring.
- 10.6 The ring shall be equipped with an enclosed wire raceway and a stainless steel NEMA 4X terminal box for wiring of the luminaires and CCTV camera.

10.6.1 Junction Box. The box shall be made of Type 304 stainless steel, not less than 2.03 mm (14 gauge), with all seams continuously welded with stainless steel weld wire and ground smooth. Exterior surfaces shall have a smooth polished finish. The box shall be UL 50 "Junction and Pull Box", "Junction Box", or "Pull Box".

A grounding lug shall be provided for the connection of the equipment grounding conductors as required by NEC Article 250-114.

The box shall have an overlapping stainless steel cover and shall be secured to the box with a continuous stainless steel hinge and a minimum of 4 captive stainless steel clamps utilizing captive stainless steel hex-head bolts or deep slotted stainless steel screws.

Be suitable for surface mounting, complete with external stainless steel mounting lugs or brackets welded to the enclosure.

The box cover shall have a continuous formed, seamless, urethane, oil-resistant gasket. The gasket shall be extruded directly onto the junction box cover. The gasket shall adhere to the cover without the use of adhesives. A neoprene strip gasket, or urethane strip gasket cut out of a larger sheet and glued to the junction box will not be acceptable.

10.6.2 The box shall be arranged and connected to the top of the ring from the top of the box in a manner that precludes moisture draining from the ring into the box. All fittings penetrating the box shall be watertight hubs with an integral O-ring. The hubs shall be watertight and corrosion resistant NEMA 4X and have an insulated polycarbonate throat. The insulated throat shall be rated up to 105° C. The hubs shall be UL Listed and comply with UL Standard 514B.

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- 10.6.3 The box shall be equipped with a hinged door and a latch or with captive stainless steel closure hardware acceptable to the Engineer and an external special fixed-mount plug with a retained cap as specified elsewhere herein to accept a test power connection when the ring is in the lowered position.
- 10.6.4 The box shall be divided into two (2) compartments by a non-conductive barrier, minimum thickness of 0.04". One side of the box shall, on the top, have the main tower cable entry and the entry for the luminaire wires; it shall also contain a terminal strip with identified terminals for connection of the main power cord, luminaires, and the test power receptacle. The terminal strip shall have terminals sized to accommodate the cables to be connected and shall have luminaire connection terminals to accommodate the usage of all luminaire positions. The other side of the box shall, have on the top, a 3/4" inch conduit entry, capped, for extension of CCTV wiring, as applicable and shall contain an appropriate terminal strip for CCTV camera power and control connections as well as provisions for video output connections.
- 10.7 The ring shall facilitate ease of wiring to the arms by the use of removable gasketed covers, physical arrangement, or other means acceptable to the Engineer. Arms shall be factory or field wired according to NEC Article 410-31 using No. 10 wire having ethylene propylene rubber (EPR) insulation or bonded composite EPR insulation with a chlorosulfanated polyethylene jacket, rated 600 V not less than 90° C (194 ° F.), RHH-RHW, U.L. listed with solid color coding.

<b>Luminaire wire</b>		
<b>Insulation Type</b>	<b>Average EPR Insulation Thickness</b>	<b>Average Jacket Thickness</b>
Single Material EPR	1.1 mm (45 mils)	n/a
Bonded Composite Insulation Thickness	0.8 mm (30 mils)	0.4 mm (15 mils)

Wiring shall be color coded (black, red, white, and green, as applicable) with coloring via outer material color or by painting with a process approved by the Engineer. Wire rating information shall be visible in a contrasting color. Wires shall be installed to all luminaire arms. Luminaire wires shall extend 600 mm (24 inches) longer than their respective tenon arm and shall be trained back into the arm which shall then be closed with a protective cap for shipment of the jobsite. All wires shall be capped and crimped with sealant and heat-shrink insulating sleeves (wire nuts, tape, crimps, etc. will not be acceptable.). All ring wires shall be tagged with wire markers at both ends. The tenon arms shall also be tagged corresponding to the wiring contained within.

- 10.8 The luminaire ring shall be factory checked and marked for proper positioning and luminaire orientation. Catalog cuts and shop drawings shall indicate the orientation of the luminaire ring, handhole, and bolt circle in relation to each other on a single drawing.

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- 10.9 The ring shall be complete with a counterweight for each unused luminaire position plus one additional counterweight. Counterweights shall be based upon the luminaires to be installed on each respective tower.
- 10.10 All luminaire rings shall be arranged to accommodate the complete indicated compliment of luminaires, regardless of the number actually to be installed, to facilitate luminaire positioning and orientation. For rings of 6 positions or less, each position shall have a tenon arm. For rings of more than 6 luminaire positions, the arrangement shall be accomplished by a "T" type of tenon arm to produce two luminaire mounting positions from a single extension arm, or by other means approved by the Engineer.
11. Lowering and Support Mechanism.
- 11.1 The support shall be of the non-latching design.
- 11.2 The mechanism shall operate to raise the luminaire ring to its fully raised position and to lower the ring to a position with the centerline of the luminaire tenon arms 1.4 m (54 inches) or less above the top of the tower base plate. The exact fully-lowered position shall be adjustable in the field.
- 11.3 The lowering and support mechanism shall include, but not be limited to the support cables, power cable, pulleys, winch, gear reducer, mechanical clutch, electric motor, control and all accessories and appurtenances for a coordinated operating system.
- 11.4 The lowering and support scheme shall be of the 2-cable or 3-cable type as specified.
- 11.5 Three-cable mechanisms shall incorporate 3 support cables joined via an appropriate proven transition design to a single hoist cable wound around a single hoist winch. The transition design shall be such to prevent twisting of the support cables, to assure smooth winding of the cables on the winch and to prevent binding on the inside of the tower shaft.
- 11.6 Two-cable mechanisms shall incorporate 2 support/hoist cables wound around a dual winch assembly. The design shall be such to prevent twisting of the cables and to assure smooth winding of the cables on their respective winches and to prevent binding on the inside of the tower shaft.
- 11.7 The hoisting system shall be securely mounted and the lower assembly, i.e. motor, winch, mechanical clutch, gear reducer, etc., shall be designed to allow ease in removal of the equipment via the tower handhole without dismantling the system. Individual components shall be accessible and removable without the removal of other components. Mounting plates and other mounting templates and provisions shall have standardized dimensions to facilitate removal and interchangeability from unit to unit. Mounting hardware shall have an abundant strength safety factor and shall be positioned for even distribution of load.

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- 11.8 The lowering device shall tightly position the luminaire mounting ring against the head assembly frame by applying a holding force evenly distributed among the seating/interfacepoints. The total force required by the system must not be less than 1.3 kN (300 lbs.) greater than the weight of the luminaire mounting ring with all luminaire positions occupied by luminaires. There shall be a positive indication at the handhole that the required force has been applied, visible from the extended operating position away from the handhole and not under the ring. Submittal information shall include load and seating force calculations to demonstrate compliance with specified requirements.
- 11.9 The mechanism shall be equipped with a multi-point safety chain and hook assembly to maintain the tension on the support system, allowing the motorized winch assembly to be disengaged. Chain and all hardware shall be stainless steel.
- 11.10 The system shall be designed so that unbroken power cable, suspension and/or hoist cable can be replaced from ground level.
- 11.11 Support and Hoist Cables.
- 11.11.1 Cables (wire rope) shall be manufactured from Type 302 stainless steel having a carbon content of 0.09 to 0.15 and shall be a stranded assembly coated with a friction-limiting non-corrosive lubricant.
- 11.11.2 Cables shall be 7x19 wire strand and have no strand joints or strand splices.
- 11.11.3 Cables shall be manufactured and listed for compliance with military specification MIL-W-83420B, Type 1, Composition B.
- 11.11.4 Cable terminals shall be stainless steel compatible with the cable and as recommended by the cable manufacturer. The terminals, swaging, etc. shall meet the requirements of military specification MIL-T-781 and shall be so listed. Care shall be exercised to assure a match of connector sizes to the wire rope size(s), and, to the extent possible, connectors shall have visible size markings.
- 11.11.5 For 3-cable systems, the support cables shall each be not less than 5 mm (3/16 inch) in diameter and the hoist cable shall not be less than 8 mm (5/16 inch) in diameter.
- 11.11.6 For 2-cable systems, the support/hoist cables shall each be not less than 6 mm (1/4 inch) in diameter.
- 11.11.7 As part of the tower shop drawings and product data submitted for approval, support and hoist cable information shall be provided. Submittals without such information will be incomplete and will be rejected. The information shall include, but not limited to:

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- Catalog information to confirm sizing, stranding and other specified requirements.
- Evidence of listing as military specification cable as specified.
- Certification of compliance with all specification requirements made by the cable manufacturer.

Documentation of arrangement to provide a sample of the support cable to an independent laboratory as selected by the Engineer for testing to the military specifications listed herein, with results to be sent directly to the Engineer, all included incidental to this item. Copies of recent test reports made on identical cable indicating compliance with military specification requirements shall be submitted. The test reports shall include as a minimum, the following:

- Breaking Strength test.
- Endurance test.
- Stretch test.
- Test load.
- Chemical Composition.

#### 11.12 Winch.

- 11.12.1 Drum. The winch/gear reducer assembly shall have a drum suitable for the hoist of support/hoist cables, arranged to provide smooth winding of the cable and to prevent slippage. The drum shall be stainless steel or cast/ductile iron and shall have a diameter not less than 18 times the diameter of its respective cable (wire rope). The winch drum shall be designed with cable guides for a smooth cable take-up of level lays and to prevent the cable from riding over the drum flange. The drum shall have the end of the cable attached by means of a swaged connection and one full layer of cable shall be wound on the drum even when the ring is in the fully lowered position. The drum flange axle shall be supported at both ends.
- 11.12.2 Gear Reducer. Each assembly shall incorporate a gear reducer having a reduction ratio which will prevent free fall of the luminaire ring upon failure or disengagement of the drive unit and which will produce a travel rate of 3 m (10 ft.) to 4.6 m (15 ft.) per minute under normal operation.
- 11.12.3 The unit shall have a worm gear which is totally enclosed in a lubricating reservoir. The lubricant shall have a viscosity range suitable for proper operation in ambient temperatures from -40° C to 49° C (-40° F. to 120° F.)
- 11.12.4 The worm shall be manufactured of case hardened ground alloy steel or cast iron.

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- 11.12.5 The gear shall be of bronze alloy or of a proven alternate material and design acceptable to the Engineer with and the gear shall be keyed to the output shaft. The output shaft shall be high quality medium carbon steel ground to close tolerances. The worm and output shaft shall be mounted on anti-friction bearings. All shaft extensions shall be equipped with a lip-type synthetic element and oil seals.
- 11.12.6 The unit shall have provisions to verify oil levels in all gear boxes, and oil level indication shall be visible from the handhole when the unit is installed.
- 11.13 Clutch. The mechanism shall incorporate a mechanical clutch, installed between the winch/gear reducer and the cable winch assembly. The clutch shall be of mechanical type, in a sealed cast metal housing. The clutch torque shall be factory calibrated and coordinated with the electric motor. The clutch shall act to limit the seating force of the raised ring to a pre-established value. The clutch shall be suitable for the application and torque limitation and shall not deteriorate with use.
- 11.14 Motor.
- 11.14.1 The electric motor shall be matched to the load and torque characteristics required for a fully loaded luminaire ring and shall not be less than 746 watts (1 horsepower).
- 11.14.2 The motor shall be capable of producing torque in excess of the clutch maximum torque rating. The motor shall be totally enclosed fan cooled (TEFC), shall be reversible to operate the lowering mechanism in both directions, and shall be suitable for operation on the power supply characteristics shown on the drawings. Submittal information shall include complete motor data, including, but not limited to:
- Manufacturer
  - Nameplate Rated Watts (Horsepower)
  - Rated Voltage
  - Full Load RPM
  - Full Load Current
  - Locked Rotor Current
  - NEMA Design Letter
  - Insulation Class
  - Torque Data
  - Dimensional Data
- 11.15 Lowering Device Control.
- 11.15.1 The lowering device control shall consist of motor short circuit and motor running overcurrent protection and motor control complete with all appurtenances and interconnecting wiring. The control may incorporate a reversing motor starter or a suitably-rated reversing control station.

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- 11.15.2 The lowering device control may be provided in a separate NEMA 4X stainless steel enclosure or in the enclosure with the tower main Electrical breaker, provided the remote control station is a separate remote device.
- 11.15.3 The lowering device motor shall have a motor disconnecting means circuit and running overload protection according to N.E.C. requirements. The motor disconnect and short circuit protection shall be achieved by a molded case thermal magnetic bolt-on circuit breaker rated at 600 volts, of an ampere rating suitable for the motor and having a UL-listed interrupting rating of not less than 14,000 rms symmetrical amperes at 480 volts and 10,000 rms symmetrical amperes at 240 volts.
- 11.15.4 Running overcurrent protection shall be according to N.E.C. requirements. Motor overload protection shall be achieved by an appropriate dual element fuse in a spring-loaded screw-in type small-dimension fuse holder mounted within the enclosure in a suitable box or other arrangement approved by the Engineer.
- 11.15.5 The motor starter, if incorporated, shall not be smaller than NEMA size 1, shall be rated 600 volts and shall be full voltage, reversing type, with arc-extinguishing characteristics and renewable silver-to-silver contacts. A reversing control switch, if incorporated, shall be rated well in excess of the duty required and in no case less than 2,240 watts (3 horsepower) at 230 volts single phase. The control shall be momentary contact, raise-stop-lower with a neutral stop condition, requiring positive action by the person operating the device to keep the motor energized. The control shall have auxiliary contacts as indicated and as required for the control.
- 11.15.6 The enclosure shall have an exterior position-indicating trip-free operating handle for the motor circuit breaker. The enclosure(s) shall have exterior nameplates to read "LOWERING DEVICE CONTROL" and "MOTOR CIRCUIT BREAKER" as well as an interior nameplate "MOTOR OVERLOAD FUSE" which shall also be inscribed with the applicable fuse type and ratings. Nameplates shall be engraved, 2-color, attached with screws.
- 11.15.7 The line side power to the lowering device control shall be obtained via a plug extended connection to the power distribution cord/receptacle.
- 11.15.8 The control shall be complete with a cable-connected remote control station. The control station shall incorporate heavy duty control devices in a non-metallic impact-resistant NEMA 4X enclosure. The control shall be "dead man" type with "RAISE" and "LOWER" controls, requiring the operator to hold the respective control depressed in position for movement of the ring in either direction and with release of the control to stop the mechanism.

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The cord shall incorporate a No. 12 ground wire and the number of conductors required for a control, with control conductors not less than No. 14. The cord shall be weatherproof with watertight connections at either end and it shall be long enough to allow the operator to stand 7.5 m (25 ft.) away from the lowered luminaire ring. Provisions for storage of the control station and cord such as a suitable hanger cradle, shall be provided in a manner easily accessible at the handhole and in a location which precludes interference with the internal components of the lowering mechanism.

11.15.9 Cables extended from the enclosure shall be passed through a watertight sealing bushing and the cable shall be supported and arranged to preclude interference with the lowering mechanism. Wiring shall be in compliance with NEC requirements. Motor wires shall not be less than No. 12 and motor wiring shall be extended in UL-listed extra-flexible, weatherproof cord or other cord approved by the Engineer with suitable fittings, bushings and supports. All equipment shall be grounded and bonded via an appropriately sized equipment ground wire.

#### 11.16 Electric Power Distribution.

11.16.1 Electric power for motorized operation of the lowering mechanism and for the power supply to the lighting shall be taken from the lighting circuitry feeding the tower. The distribution shall provide termination of the supply feeder, extension to a tower main breaker and distribution to lighting and the lowering device.

11.16.2 The tower shall be equipped with a main circuit breaker. The circuit breaker shall be molded case, 2-pole, 40-ampere thermal magnetic, bolt-on type having a UL-listed interrupting rating of not less than 14,000 rms symmetrical amperes at 480 volts. The breaker shall indicate "ON", "OFF" and "TRIPPED" conditions and the handle shall be trip-free.

11.16.3 The main breaker shall be housed in NEMA 4X stainless steel enclosure with an external, position-indicating operating handle with padlock provisions. The enclosure shall have a 2-color engraved nameplate to read "MAIN BREAKER", attached with screws. The box shall have openings and suitable bushings for cable extensions.

11.16.4 The main breaker shall be arranged for line-side connection to incoming feeder conductors entering the base of the tower via an extension of multi-conductor cable. The load side of the main breaker shall be connected to a cord and receptacle which shall be arranged for connection to either the luminaire ring main power, the lowered luminaire ring test power or the lowering device control.

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- 11.16.5 Each connection to the main breaker shall be made with the specified electric power cable, extended from the enclosure through a watertight sealing/support bushing. The cables shall be arranged and secured to preclude any interference with the lowering device operation.

11.17 Electric Power Cable.

- 11.17.1 The electric power cable shall consist of a 4-conductor jacketed extra flexible cable, (2 phase conductors, neutral conductor and a ground conductor) Type W industrial grade portable power cable, as listed in NEC Table 400-4. The cable shall meet ICEA S-68-516, WC-3 and shall be approved by the Pennsylvania Bureau of Mines.
- 11.17.2 Each conductor shall be stranded assembly of 133 flexible annealed copper wires according to ASTM B 33. Each of the 4 conductors shall be sized No. 6. Each conductor shall be individually insulated with ethylene propylene rubber insulation, all in compliance with ICEA S-68-516. Insulation shall be rated not less than 600/2000 volts, 90° C (194° F.) and insulation thickness shall not be less than 1.5 mm (60 mils).
- 11.17.3 Each individual conductor's insulation shall be color coded; one black, one red, one white and one green.
- 11.17.4 The individual conductors shall be assembled in a cable, with non-hydroscopic reinforced rubber fillers to maintain a smooth round outer surface, with a jacket applied overall. The jacket shall be a heavy duty jacket manufactured according to ASTM D 752 and shall be imprinted with the manufacturer, conductor size number of conductors, type of cable, voltage rating, and Pennsylvania Bureau of Mines designation P-XXX-MSHA.

12. Ground Continuity.

- 12.1 A flexible copper braid connector of #2 copper equivalent shall be attached with studs and exothermic welds at tower shaft sections or the shafts shall be electrically joined by other means approved by the Engineer. Towers shall include all materials to achieve this bond.

13. Power Receptacles and Plugs.

- 13.1 Power receptacles and plugs shall be circuit-breaking devices which shall mate with each other. The plugs and receptacles shall be 4-wire 4-pole, 600 volt, 60 ampere weatherproof devices according to UL Standard 498 and International Electrical Commission Standard 309. The devices shall be listed by the manufacturer as suitable for make and break operation at rated current.

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- 13.2 Components and insert assemblies shall be interchangeable to accept either pin or socket inserts to allow either plug or receptacle to be configured in an energized or deenergized condition, i.e. reverse-contact configurations shall be available. Locations of reverse-contact devices shall be as indicated.
  - 13.3 Each plug or receptacle connection to a power cord shall be complete with a suitable non-metallic sealing connector body with a wire mesh strain relief. Other plugs and receptacles shall be complete with suitable sealing angle-adapter panel of box mounting bodies, as applicable and shall be complete with back-boxes if so dictated by the power distribution configuration.
  - 13.4 Each plug and each receptacle shall be complete with a retained flap-type or retained screw-on cover.
  - 13.5 Plugs and receptacles shall be water-tight, dust-tight, and chemical resistant and be suitable for use when exposed to the weather and shall be applicable for safe use in harsh, wet weather conditions. The Engineer shall be the judge of applicability.
14. Shipment and Installation.
- 14.1 The light tower, luminaire ring, etc., and hardware shall be packaged during shipment to protect all surfaces from being scratched, marred, chipped, or damaged in any way. Prior to installation, the tower and all its components will be inspected by the Engineer and any parts found to be damaged or defective shall be replaced. Any minor damage to a completely painted light tower surface shall be touched up in a professional manner as approved by the paint manufacturer.
  - 14.2 The tower shall be set plumb on the foundation and fastened to the anchor rods with double nuts and washers. Flat washers shall be installed below and above the base plate of the pole. Locknuts with nylon or steel inserts shall be installed on top of the top nut. The nuts shall be tightened in compliance with torque specifications recommended by the manufacturer of the lighting unit.
  - 14.3 The space between the finished top of the foundation and the bottom of the base plate of the pole shall be enclosed with an expanded metal screen made of stainless steel. The size of the mesh of the screen shall be 1/4 in. (6 mm) or less and #18 gauge (1.22 mm) thick, or heavier as approved by the Engineer. The screen shall be held in place with a stainless steel band installed around the tower base plate. The band shall be held tight by a ratchet-type device. Grouting shall not be used to enclose the above described space.
  - 14.4 The light tower shall be straight and centered on its longitudinal axis, under no-wind conditions, so, when examined with a transit from any direction, the deviation from the normal shall not exceed 1/8 in. in 3 ft (3 mm in 1 m) within any 5 ft (1.5 m) of height, with total deviation not to exceed 3 in. (75 mm) from the vertical axis through the center of the pole base.

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15. Method of Measurement. Each light tower which is delivered shall be counted as a unit for payment.
16. Basis of Payment. This work will be paid for at the contract unit price each for **LIGHT TOWER** of the mounting height, luminaire mounting positions specified.

### **TEMPORARY FENCE (PRAIRIE PROTECTION)**

Work under this item must be performed in accordance with the applicable portions of Articles 201.01 (c) and 201.05 and Section 664 of the Standard Specifications and in accordance with the Standard details and at locations identified on the plans, except as herein modified.

Description: This work must consist of constructing a temporary fence as shown on the plans or as directed by the Engineer. The temporary fence (Prairie Protection) is intended to be used for both the protection of sensitive and/or endangered trees, shrubs, flowers and plant material from intrusions of work equipment and to ensure that adjacent silt fence is protected from damage..

Temporary fence must be chain link fencing. The temporary fence must be a minimum of 4 ft. high with stakes or posts placed a maximum of 10 ft apart. This item also includes the removal and disposal of the temporary fencing and posts when no longer required.

The protection of 'sensitive' plant material is important on this project. When the Engineer is notified or determines a deficiency exists, he/she will be the sole judge as to the prairie protection deficiency. Temporary Fence (Prairie Protection) deficiencies may include but are not limited to:

- Temporary Fence (Prairie Protection) not in place at the start of construction.
- Temporary Fence (Prairie Protection) damaged or down.
- Unauthorized removal of Temporary Fence (Prairie Protection).

The Contractor must dispatch sufficient resources within 2 hours of notification to make needed corrections of deficiencies. If the Contractor fails to restore the required Temporary Fence (Prairie Protection) within the time limits specified above, the Engineer will impose a monetary deduction for each incident. This time period will begin with the time of notification to the Contractor and end with the Resident Engineer's acceptance of the corrections. For this project, the monetary deduction will be \$500 per occurrence. In addition, if the Contractor fails to respond, the Engineer may correct the deficiencies and the cost thereof will be deducted from monies due or which may become due the Contractor. This corrective action will in no way relieve the Contractor of his/her contractual requirements or responsibilities.

If any material and/or equipment is found to be over or outside of the Temporary Fence (Prairie Protection) or if the Contractor's operations are found to be encroaching upon the sensitive areas, the Engineer will immediately impose a monetary deduction for each occurrence found. An additional \$500 deduction will be imposed for each hour that said encroachment is not addressed.

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In the event that landscape or landscape elements outside of the Temporary Fence (Prairie Protection) are damaged by the Contractor's operation or personnel, the Contractor must be responsible for repair or remediation of the damage as determined by the Engineer, the appropriate Agency, Municipality, County or Township and/or the property owner. In the event that the damage to any trees are beyond repair and requires removal or trees was mistakenly removed by the Contractor, the trees must be replaced on a unit size for unit size basis, with the minimum acceptable size replacement trees of 5 units or greater. The quality of the replacement tree must be equivalent to the standards of the Illinois Department of Transportation. The cost of this work will be the responsibility of the Contractor.

Method of Measurement: TEMPORARY FENCE (PRAIRIE PROTECTION) will be measured for payment in feet in place.

Basis of Payment: The work must be paid for at the contract unit price per foot of TEMPORARY FENCE (PRAIRIE PROTECTION). The contract unit prices must include all labor, material, and equipment required to complete the work as shown on the plans, standard details, and as specified.

Added 06/03/2010