STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	456	1055

STATE OF KANSAS

DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE OF PROPOSED

STATE HIGHWAY

FEDERAL AID PROJECT

CITY OF WICHITA

SEDGWICK COUNTY

EAST KELLOGG (US-54/400) – WEBB/KTA INTERCHANGE

PAVING PROJ. NO. 472-85031 OCA NO. 705011
SEWER PROJ. NO. 468-84876 OCA NO. 624107
WATER PROJ. NO. 448-90591 OCA NO. 635815
SIGNALIZATION PROJ. NO. 472-84926 OCA NO. 766332

INDEX OF SHEETS

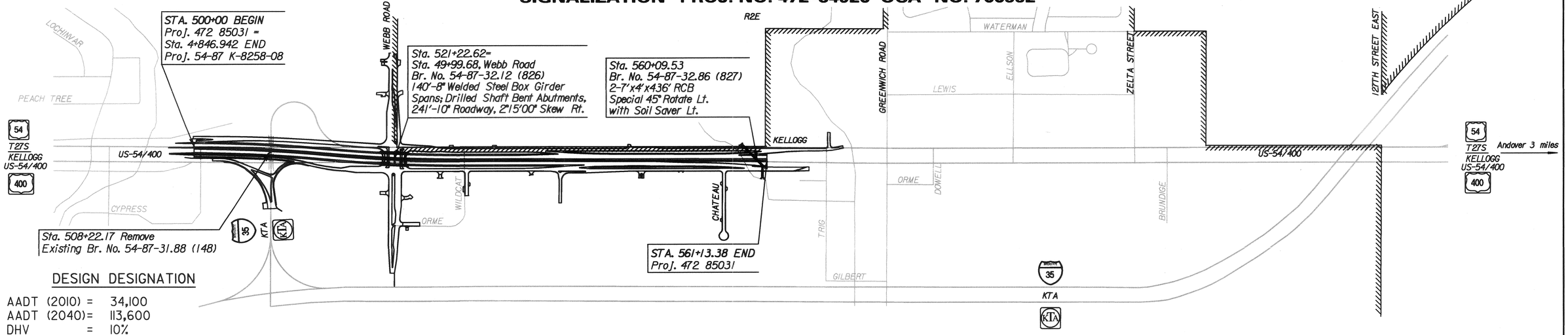
VOLUME 1 - ROADWAY
VOLUME 2 - DRAINAGE, SEWER, WATER
VOLUME 3 - RETAINING WALLS, BRIDGES
VOLUME 4 - SUMMARY OF QUANTITIES, POLLUTION CONTROL LANDSCAPING, LIGHTING, SIGNAL, ITS
VOLUME 5 - PAVEMENT MARKING, SIGNING, CONSTRUCTION SEQUENCE, TRAFFIC CONTROL, RIGHT-OF-WAY
VOLUME 6 - CROSS SECTIONS

SEE SHEET NO. 457 FOR INDEX SHEET

SCALE
500' 0 500' 1000'

PROJ. 54-87 KA-2382-01
NHPP-A238(201)

GRADING
SURFACING
CONCRETE PAVEMENT
STORM SEWER
SANITARY SEWER
WATERLINE
WALLS
BRIDGES
SEEDING
SODDING
ROADSIDE IMPROVEMENT
LIGHTING
TRAFFIC SIGNALIZATION
ITS
SIGNING
PAVEMENT MARKING

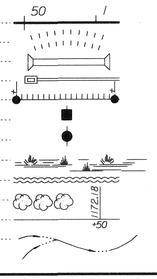


DESIGN DESIGNATION

AADT (2010)	=	34,100
AADT (2040)	=	113,600
DHV	=	10%
D	=	0.5 (EB)
T	=	7%
V	=	70 MPH (US54)
V	=	40 MPH (FR. RDS. & SIDEROADS)
C of A	=	FULL
Clear Zone	=	6' FROM BACK OF CURB (FR. RDS. & SIDEROADS)
Clear Zone	=	34' (US-54)

CONVENTIONAL SIGNS

COUNTY LINE		CENTER LINE OF PROJECT	
CITY LIMITS		TERRACE	
STATE OR NATIONAL LINE		CULVERTS	
TOWNSHIP, SECTION or GRANT LINE		DROP INLET & STORM SEWER	
PROPERTY LINE		ACCESS CONTROL	
HIGHWAY FENCE		POWER POLE	
EXISTING FENCE		TELEPHONE POLE	
GUARD FENCE		MARSH	
CONSTRUCTION LIMITS		HEDGE	
RIGHT OF WAY LINE		TREES	
TRAVELED WAY		PROFILE ELEVATION	
RAILROADS		STREAM or CREEK	



CITY OF WICHITA
POPULATION 366,046

GROSS LENGTH OF PROJECT	6,113.38 FT.	
EXCEPTIONS	0.00	
ADDITIONS	0.00	
NET LENGTH OF PROJECT	6,113.38 FT.	1.158 MILES
NET LENGTH OF BRIDGES	0.00 FT.	0.00 MILES
NET LENGTH OF ROAD	6,113.38 FT.	1.158 MILES

NOTE:
Traffic for US-54 to be carried through construction.
See Sheet No's. 724- 826 for Construction Sequence.

RONALD NUESSEN LICENSED 13738 04-16-15 KANSAS PROFESSIONAL ENGINEER

ABDEL HAMADA LICENSED 14148 04-16-2015 KANSAS PROFESSIONAL ENGINEER

PLANS PREPARED BY :
PARSONS BRINCKERHOFF
Baughman
TranSystems
SRF Consulting Group, Inc. Engineers Planners Designers
VS VICKI SCURI SITEWORKS

APPROVED - DATE
04/16/15
GARY JANZEN, P.E. CITY ENGINEER
CITY OF WICHITA, KANSAS

DATE | BY
SURVEY
CADD TECHNICIAN
DESIGNERS
SQUAD

Drawn By :
Plotted : 4/15/2015
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	457	1055

VOLUME 1

1	Title Sheet
2	Index Sheet
3	General Notes
4-21	Typical Sections
22	Foundation Treatment & Compaction of Earthwork
23-33	Plan & Profile (Mainline)
34-53	Plan & Profile (Frontage Road)
54-64	Plan & Profile (Sideroad)
65-75	Plan & Profile (Ramp)
76-77	Plan & Profile (Permanent Crossover)
78-87	Plan & Profile (Temporary Road)
88- 99	Benchmarks & Survey Coordinates
100-118	Intersection Details
119-140	Paving Details
141-158	Pavement Details

VOLUME 2

159	Title Sheet
160	Index Sheet
161-175	Inlet and Manhole Details
176-178	RCB Details
179-200	Storm Sewer Plan & Profile (Mainline)
201-227	Strom Sewer Plan & Profile (Frontage Road)
228-234	Storm Sewer Plan & Profile (Sideroad)
235-237	Storm Sewer Plan & Profile (Ramp)
238-242	Schedule of Storm Sewer Conduits
243-246	Schedule of Inlets and Manholes
247	Ditch Lining
248-250	Underdrains
251-252	Sanitary Sewer Manhole Details
253-256	Sanitary Sewer Plan & Profile
257	Sanitary Sewer Summary
258-262	Water Line Details
263- 271	Water Line Plan & Profile (Mainline)
272-274	Water Line Plan & Profile (Sideroad)
275	Water Line Summary
276-290	Concrete Safety Barrier
291	Impact Attenuator
292-294	End Sections
295	Miscellaneous Pipe Culvert Details
296	Summary of Pipe Culverts
297	Drainage Data Sheet

VOLUME 3

298	Title Sheet
299	Index Sheet
300-338	Retaining Walls
339-368	Pattern Mapping
369-375	Bridge No. 54-87-32.86 (827)
376-452	Bridge No. 54-87-32.12 (826)
453	Standard Pile Details
454	Bridge Excavation
455	Supports and Spacers for Reinforcing Steel

VOLUME 4

456	Title Sheet
457	Index Sheet
458-463	Summary of Quantities
464-481	Temporary Erosion and Pollution Control Plan
482-486	Erosion Control Details
487	Sidewalk Plan and Profile
488-490	Roadside Improvement
491- 516	Landscaping
517-537	Lighting
538	Traffic Volumes
539-558	Traffic Signal
559-565	Communication Duct Bank
566- 614	ITS

VOLUME 5

615	Title Sheet
616	Index Sheet
617-629	Pavement Marking
630- 721	Signing
723	Project Surfacing
724-826	Construction Sequence
827-848	Traffic Control
849-853	Concrete Safety Barrier (Temporary)
854	Impact Attenuator (Temporary)
855	Inertial Barrier
856	Type III Barricades
857-867	Right-of-Way
868	Drainage Map

VOLUME 6

869	Title Sheet
870	Index Sheet
871-872	Earthwork Computations
873- 910	Cross Sections (Mainline)
911- 972	Cross Sections (Frontage Road)
973-1001	Cross Sections (Sideroad)
1002-1035	Cross Sections (Ramp)
1036-1039	Cross Sections (Permanent Crossover)
1040-1055	Cross Sections (Temporary Road)

CITY OF WICHITA

INDEX SHEET

SURV. - | PLOT | CADD | DES. - | DR. | TR. | CKD. - | APP. -

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	458	1055

◔ REMOVAL OF EXISTING STRUCTURES (FOR INFORMATION ONLY)

STATION	SIDE	REMARKS
Mainline		
496+50 - 503+45	Lt.	Parking Lot Drainage & Lighting (8600 E. Kellogg)
500+75	Lt.	Curb Inlet
501+98 - 534+72	Lt. & Rt.	San. Sewer Line: 13 Manholes & 10" x 3,552' SS
503+54 - 573+84	Lt. & Rt.	Water Line: 10 Fire Hydrants, 12 Water Valves, 7 Water Meters, 4 Water Vaults, 8" x 1,682' WL, & 12" x 7,082' WL
501+28	Lt.	Drop Inlet & 18" x 98' RCP (NW)
501+49 - 505+35	Lt. & Rt.	Water Line: 2 Fire Hydrants, 2 Water Valves, Water Meter, & 8" x 704' WL
501+83	Lt.	Curb Inlet, Manhole, & 36" x 107' RCP (W)
502+22	Lt.	Curb Inlet, Manhole, & 36" x 39' RCP (W)
503+45	Lt.	Parking Lot Drainage (8930 E. Kellogg)
503+87	Rt.	Manhole, 24" x 112' RCP (W), & 24" x 46' RCP (SE) w/ End Section
504+32	Lt.	Manhole, Curb Inlet & 36" x 213' RCP (W)
506+42 - 535+00	Lt.	San. Sewer Line: 15 Manholes, 12" x 156' SS, & 15" x 2,903' SS
505+46	Rt.	24" x 80' RCP w/ End Section & Headwall
505+59	Lt.	Manhole & 24" x 161' RCP (NW)
505+96	Lt.	Manhole & 36" x 164' RCP (W)
507+03	Lt.	Curb Inlet, Manhole, 15" x 23' RCP (S), & 24" x 144' RCP (W)
507+36	Lt.	Manhole, 24" x 33' RCP (W), & 24" x 153 ' RCP (E) w/ End Section
508+22	Lt. & Rt.	Existing Bridge (K.D.O.T. No. 54-87-31.88(148)) (Category C)
509+82	Rt.	24" x 84' RCP w/ End Section & Headwall
510+23	Rt.	30" x 47' RCP w/ End Sections
510+41	Lt.	Catch Basin & 15" x 36' RCP (S) w/ End Section
512+10	Lt.	24" x 86' CMP w/ End Sections
512+64	Lt.	Catch Basin & 15" x 43' RCP (NE) w/ End Section
513+85	Rt.	Manhole
514+57	Lt.	18" x 73' RCP w/ End Sections
515+22	Lt.	Manhole
516+64	Lt.	Fire Hydrant
516+88	Lt.	Manhole, 8" x 44' SS (N), & 8" x 32' SS (S)
519+96	Lt.	Manhole & 8" x 28' SS (S)
520+59	Rt.	Manhole & 8" x 122' SS (N)
520+61	Lt.	Manhole & 18" x 210' RCP (E)
520+99	Rt.	Manhole, 8" x 51' SS (NW), & 8" x 127' SS (S)
521+50 - 561+00	Lt.	Existing Fence Posts (Beechcraft - 9600 E. Kellogg)
521+72	Lt.	Manhole, 24" x 210' RCP (E)
522+00 - 528+80	Rt.	Parking Lot Lighting (9609 E. Kellogg)
522+10	Rt.	Business Sign (9601 E. Kellogg)
522+77	Lt.	Catch Basin & 18" x 473' RCP (E)
523+87	Lt. & Rt.	2 Catch Basins & 24" x 12' RCP
524+97	Lt.	Manhole & 8" x 32' SS (S)
525+09	Rt.	Drop Inlet & 20" x 95' RCP (SW)
525+24	Lt.	Manhole, 8" x 30' SS (SW) & 8" x 21' SS (NE)
527+63	Lt.	Catch Basin & 18" x 228' RCP (E)
529+50 - 534+50	Rt.	Parking Lot Lighting & Business Sign (9901 E. Kellogg)
529+96	Lt.	Manhole, 10" x 20' PVC (N)
531+87	Rt.	Manhole
538+73	Rt.	46' Entrance Pipe w/ End Sections
538+73	Rt.	43' Entrance Pipe w/ End Sections
539+00	Rt.	29' CRP w/ End Sections
539+34	Lt.	Manhole, 18" x 49' RCP (W), 18" x 17' RCP (S) w/ End Sections & 24" x 38' RCP w/ End Section
539+40	Rt.	Existing Fence (10221 E. Kellogg)
539+81 - 544+62	Rt.	8" x 482' WL
540+39	Rt.	Manhole
543+05	Rt.	SWS Structure
547+06	Lt. & Rt.	18" x 51' RCP w/ End Sections
547+71	Lt.	24" x 76' RCP w/ End Sections
550+21	Lt.	24" x 50' RCP w/ End Sections
554+47	Lt.	18" x 74' RCP w/ End Sections
555+28	Lt.	18" x 26' RCP w/ End Sections
558+05	Rt.	103' Entrance Pipe w/ End Sections
558+08	Lt.	2 - 7' x 5' x 91' RCB
558+79	Lt.	2 - 7' x 4' x 96' RCB
559+09	Rt.	2 - 7' x 4' x 33' RCB
556+90 - 560+90	Rt.	Lighting & Fence (10727 E. Kellogg)
562+75 - 565+70	Rt.	Business Sign & Fence (10909 E. Kellogg)
560+96	Lt.	24" x 48' RCP w/ End Sections
565+75 - 567+25	Rt.	Parking Lot Lighting & Business Sign (10929 E. Kellogg)
566+96	Lt.	End Section
567+57	Rt.	24" x 50' RCP w/ End Sections
567+67	Lt.	Manhole, 21" x 35' SS (S) & 8" x 14' SS (W)
567+68	Lt.	24" x 54' RCP w/ End Sections
567+85 - 570+76	Rt.	Parking Lot Lighting & Business Sign (11051 E. Kellogg)
569+00	Rt.	Drop Inlet & 15" x 26' CMP w/ End Section
570+00	Lt.	San Sewer Manhole
570+35	Rt.	Ditch Inlet & 24" x 34' RCP w/ End Section
570+97	Rt.	Catch Basin & 15" x 6' RCP

◔ REMOVAL OF EXISTING STRUCTURES (FOR INFORMATION ONLY)

STATION	SIDE	REMARKS
Webb Road		
38+92 - 56+16	Lt. & Rt.	Water Line: 2 Fire Hydrants, 8 Water Valves, 3 Water Meters, 5 Water Vaults, 8" x 361' WL, & 20" x 1,735' WL
39+71	Lt.	Catch Basin, 21" x 63' RCP (N), 18" x 217' RCP (S) & 15" x 50' RCP (NE)
41+98	Lt. & Rt.	Catch Basin, Curb Inlet, Manhole, 12" x 83' RCP (W) & 15" x 36' RCP (SE)
43+35	Rt.	Catch Basin & 15" x 133' RCP (N)
45+35	Lt.	36' CRP w/ End Sections
45+60	Lt.	Catch Basin & 24" x 94' RCP (E)
45+63	Rt.	Catch Basin & 30" x 21' RCP (W)
45+66	Rt.	Manhole, Curb Inlet, & 18" x 347' RCP (S & W)
45+74	Rt.	Curb Inlet & 18" x 5' RCP (N)
49+89 - 54+16	Rt.	Water Line: 2 Water Valves, 1 Water Meter, 8" x 62' WL, & 12" x 449' WL
50+16 - 53+16	Rt.	Parking Lot Drainage & Lighting (515 S. Webb)
50+16 - 53+17	Rt.	Parking Lot Drainage & Lighting (527 S. Webb)
50+77	Lt.	Manhole & 30" x 80' RCP (N)
51+78	Lt. & Rt.	Curb Inlet, Catch Basin, & 18" x 104' RCP (E & SE)
51+90 - 53+20	Rt.	Parking Lot Lighting & Business Sign (511 S. Webb)
52+20	Rt.	Curb Inlet & 15" x 39' RCP (N)
52+23	Lt.	Catch Basin & 30" x 137' RCP (N)
53+72	Lt.	Manhole, 2 Catch Basins, 36" x 145' RCP (N), & 93' RCP (E) w/ End Section
56+27	Lt.	Manhole, Catch Basin, 18" x 7' RCP (E), 30" x 33' RCP (E), & 40" x 255' RCP (N)
56+43	Lt.	Catch Basin & 15" x 15' RCP (SW)
56+54	Lt. & Rt.	Waterline, 1 Fire Hydrant, Water Valve & 8" x 177' WL
56+59	Lt.	2 Catch Basins & 15" x 39' RCP (S)
57+08	Lt.	2 Catch Basins & 15" x 225' RCP (E & SW)
57+69	Lt. & Rt.	2 Catch Basins, 15" x 54' RCP (W), & 24" x 28' RCP (SE)
57+88	Lt.	48" x 160' RCP w/ Headwall
58+91	Lt. & Rt.	2 Catch Basins & 15" x 87' RCP (W & SE) w/ End Section

◔ *See Project Special Provisions for additional information.*

EARTHWORK

BALANCE	EXCAVATION						OVEREXCAVATION			COMPACTION			** PLACE SELECT SOIL	*** WASTE
	COMMON		HIGH WEATH. SHALE		* ROCK (EX. PVMT.)		COMMON	H.W. SHALE	TYPE AA MR-0-5	TYPE AA MR-0-5	TYPE A MR-5-5	TYPE B MR-90		
	CU. YDS.	VMF	CU. YDS.	VMF	CU. YDS.	VMF	CU. YDS.	CU. YDS.	CU. YDS.	CU. YDS.	CU. YDS.	CU. YDS.	CU. YDS.	CU. YDS.
/	†308,360		164,868		*		27,430	20,761	48,191	7,709	51,993	83,109	**	293,428
TOTALS	308,360	0.80	164,868	0.80	*		27,430	20,761	48,191	7,709	51,993	83,109	**	293,428

* *All Existing Pavement to be Wasted and shall be paid for as the Bid Item "Pavement Removed" measured in square yards.*

** *Strip and stockpile the top 6" of native topsoil from all excavation and embankment areas. This soil shall be used to complete the top 6" of embankments, and finish cut slopes and other areas to be permanently seeded. This work shall be SUBSIDIARY to the bid item "Common Excavation".*

*** *Does not include Pavement to be Wasted.*

† *All excavation for the construction of the drainage ditch at 10603 E Kellogg shall be stockpiled outside of the limits of the drainage easement on the adjacent property. The Contractor shall coordinate the stockpile location with the property owner prior to beginning excavation. All coordination, labor and materials to stockpile the excavation shall be SUBSIDIARY to the bid item "Common Excavation".*

ERADICATION OF TRAVELED WAY

STATION to STATION		SIDE		REMARKS
Mainline				
561+13.38	568+00	Lt.	6.9	
TOTAL			6.9	

GUARDRAIL, REMOVAL OF STEEL PLATE

STATION to STATION		SIDE	LIN. FT.	REMARKS
Mainline				
507+86	508+45	Rt.	220.60	
508+00	508+58	Lt.	221.60	
Webb Road				
43+59	44+84	Lt.	124.70	
46+68	47+46	Lt.	99.84	
TOTAL			666.74	

SIDEWALK, DRIVE &/OR PKGLOT REMOVED & REPLACED

STATION to STATION		SIDE	SQ. YDS.	REMARKS
Mainline				
522+42	528+78	Rt.	1614.9	Parking Lot - 9609 E. Kellogg
529+48	534+06	Rt.	726.9	Parking Lot - 9901 E. Kellogg
535+55	536+05	Rt.	480.9	Parking Lot - 10009 E. Kellogg
536+05	538+60	Rt.	1029.1	Parking Lot - 10011 E. Kellogg
567+78	568+05	Lt.	338.8	Drive - Golden Corral
568+05	568+18	Lt.	80.7	Parking Lot - Golden Corral
Webb Road				
39+92	42+74	Rt.	124.6	Parkig Lot - 9555 E. Corporate Hills
42+74	46+38	Rt.	270.8	Parking Lot - 411 S. Webb
57+18	57+58	Lt.	98.7	Parking Lot - 9707 E. Orme
TOTAL			4765.4	

PLUGGING WATER WELLS

STATION	SIDE	EACH	REMARKS
Mainline			
523+00	Lt.	1	
523+50	Rt.	1	
TOTAL		2	

RIP-RAP

STATION	SIDE	LIGHT STONE SQ. YDS.	REMARKS
Mainline			
495+83.92	Lt.	72.0	
South Frontage Road			
1510+27	Rt.	22.0	
Webb Road			
61+62.45	Lt.	74.0	
Chateau Street			
107+57.76	Rt.	18.0	
110+12.46	Rt.	41.0	
TOTAL		227.0	

CONCRETE DITCH LINING

STATION	SIDE	SQ. YDS.	REMARKS
Mainline			
560+64.27	Rt.	119.5	Br. No. 54-87-32.86 (827) outlet
TOTAL		119.5	

CITY OF WICHITA

SUMMARY OF QUANTITIES

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SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
-	-	-	-	-	-	-	-

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	459	1055

IMPACT ATTENUATOR (SEVERE DUTY)

STATION	SIDE	NARROW HAZARD	REMARKS
Mainline			
498+13.71	Rt.	1	
537+94.71	Lt.	1	
Ramp A			
20500+78.82	Lt.	1	
Ramp H			
10542+32.16	Rt.	1	
Ramp J			
20559+31.94	Lt.	1	
TOTAL		5	

INERTIAL BARRIER SYSTEM

STATION	SIDE	DESIGN SPEED 45 MPH	REPLACEMENT MODULES	REMARKS
Mainline				
544+83.66	Rt.	1	10	
TOTAL		1	10	

BARRICADE (TYPE III)(FIXED)

STATION	SIDE	EACH	REMARKS
Mainline			
561+13.38	Lt.	5	
South Frontage Road			
15+63.35	℄	3	
North Frontage Road			
2567+88.25	℄	2	
TOTAL		10	

CONCRETE SAFETY BARRIER NOSE

STATION	SIDE	ENTRANCE	EXIT	REMARKS
Mainline				
498+13.71	Rt.		1	
501+33.14	Lt.	1		
539+32.20	Rt.	1		
560+44.19	Lt.	1		
Ramp K				
10557+11.90	Rt.	1		
TOTALS		4	1	

CONCRETE SIDEWALK PROTECTION CURB

STATION to STATION		SIDE	LIN. FT.	REMARKS
South Frontage Road				
1521+53.71	1522+00.00	Rt.	46.3	
1526+20.00	1526+82.28	Rt.	62.3	
Webb Road				
40+32.00	40+75.00	Lt.	53.0	
52+81.03	53+76.30	Lt.	95.3	
54+33.70	55+55.49	Lt.	121.4	
TOTAL			378.3	

BRIDGE APPROACH SLAB FOOTING

BRIDGE LOCATION	LOCATION	CU. YDS.	REMARKS
Webb			
Mainline	North Approach Slab	82.5	
	South Approach Slab	87.7	
TOTAL		170.2	

BRICK PAVERS (CONCRETE), CROSSWALK

STATION to STATION		SIDE	SQ. YDS.	PATTERN
Webb Road				
39+25.96	40+15.78	Rt.	98.3	Herringbone
40+35.38	40+35.47	℄	97.8	Herringbone
48+14.03	48+23.97	℄	111.0	Herringbone
48+14.03	48+23.91	Lt.	38.5	Herringbone
48+30.70	48+73.57	Rt.	57.6	Herringbone
48+38.08	48+95.27	Lt.	62.8	Herringbone
50+92.70	51+54.94	Rt.	70.8	Herringbone
51+04.25	51+43.20	Lt.	43.4	Herringbone
51+63.23	51+73.16	Rt.	56.6	Herringbone
51+63.23	51+73.16	Lt.	76.1	Herringbone
TOTAL			712.9	

* *Do Not Anchor*

** *Quantities for "Concrete Masonry Surface Treatment" shown on this sheet are for Concrete Barriers only. See Bridge, Retaining Wall and Disc Wall Plans for remaining quantities.*

*** *Quantities for "Colored Stamped Concrete Pavement (4" Uniform) (Plain)" shown on this sheet are for South Frontage Road, Webb Road, & Carmax Entrance medians only. See Landscape Plans for remaining quantities.*

CONCRETE SAFETY BARRIER

STATION to STATION		SIDE	LINEAR FEET TYPE II (SPEC.)	LINEAR FEET TYPE IV (SPEC.)	LINEAR FEET TYPE F3	REMARKS
Mainline						
497+28.16	561+13.38	℄		6385.2		
498+13.71	539+32.20	Rt.	4,118.9			
501+33.14	537+94.71	Lt.	3,660.7			
533+23.70	561+13.34	Rt.			*2,792.4	
539+46.00	559+31.10	Lt.	1,985.9			
542+32.57	557+11.24	Rt.	1,479.4			
544+83.66	550+88.52	Rt.			* 605.4	
560+44.19	561+13.38	Lt.	68.9			
568+80.50	573+52.99	Lt.			475.0	
South Frontage Road						
1554+09.01	1555+13.24	Lt.	104.2			
1562+01.95	1563+34.81	Rt.			* 137.5	
Ramp A						
20500+26.92	20500+78.82	Lt.	51.9			
20501+33.20	20507+05.79	Rt.	571.5			
Ramp B						
10498+13.37	10512+26.06	Lt.	1,416.8			
10500+00.72	10507+06.99	Rt.	706.1			
Ramp C						
10499+02.62	10504+68.15	Lt.	576.2			
Ramp H						
10536+11.77	10539+33.06	Lt.	320.5			
Ramp J						
20560+43.13	20562+90.59	Rt.	247.6			
TOTALS			15,308.6	6,385.2	4,010.3	

**CONCRETE MASONRY SURFACE TREATMENT

STATION to STATION		SIDE	BARRIER	SQ. YDS.	REMARKS
Mainline					
498+13.71	539+32.20	Rt.	Type II (Spec.)	1,675.2	
501+33.14	537+94.71	Lt.	Type II (Spec.)	1,582.4	
539+46.00	559+31.10	Lt.	Type II (Spec.)	1,080.8	
542+32.57	557+11.24	Rt.	Type II (Spec.)	887.2	
560+44.19	561+13.38	Lt.	Type II (Spec.)	46.9	
South Frontage Road					
1554+09.01	1555+13.24	Lt.	Type II (Spec.)	70.6	Includes 1 Barrier Transition
Ramp A					
20500+26.92	20500+78.82	Lt.	Type II (Spec.)	35.2	
20501+33.20	20507+05.79	Rt.	Type II (Spec.)	388.1	Includes 1 Barrier Transition
Ramp B					
10498+13.37	10512+26.06	Lt.	Type II (Spec.)	957.5	
10500+00.72	10507+06.99	Rt.	Type II (Spec.)	420.3	Includes 1 Barrier Transition
Ramp C					
10499+02.62	10504+68.15	Lt.	Type II (Spec.)	295.4	Includes 1 Barrier Transition
Ramp H					
10536+11.77	10539+33.06	Lt.	Type II (Spec.)	217.8	Includes 1 Barrier Transition
Ramp J					
20560+43.13	20562+90.59	Rt.	Type II (Spec.)	167.7	Includes 1 Barrier Transition
TOTALS				7,825.1	

CONCRETE FLUME

STATION to STATION		SIDE	LIN. FT.	REMARKS
Mainline				
503+80.91	515+02.60	Lt.	1125.1	
510+00.00	515+03.01	Rt.	502.0	
TOTAL			1,627.1	

FLUME INLET AND SLOPE DRAIN (TEMP.)

STATION	SIDE	EACH	SLOPE DRAIN (CONCRETE) LIN. FT.	REMARKS
Ramp BB				
10+63.66	Rt.	1	20	Phase 2
TOTAL		1	20	

FG 300 CURB SYSTEM

STATION to STATION		SIDE	LIN. FT.	REMARKS
Mainline				
566+07	569+96	Lt.	131	
566+76	573+37	Lt.	221	
TOTAL			352	

FG 300 CURB END CAP

STATION	SIDE	EACH	REMARKS
Mainline			
566+76	Lt.	1	
569+96	Lt.	1	
TOTAL		2	

CONCRETE PAVEMENT (VALLEY GUTTER)

STATION	SIDE	REINF. CONC. PVMT. (VG) SQUARE YDS. 9"	REINF. CONC. PVMT. (VG) SQUARE YDS. 10"	CRUSHED ROCK BASE, REINFORCED SQUARE YDS. 6"	CRUSHED ROCK BASE, REINFORCED SQUARE YDS. 10"	REMARKS
North Frontage Road						
2526+03.59	Lt.		219.2		230.1	Costco West Entrance
2530+66.21	Lt.		205.1		215.4	Costco East Entrance
South Frontage Road						
1524+30.05	Rt.		171.5		181.8	Hoover Rd., LLC Entrance
1534+02.63	Rt.		164.3		174.6	Tractor Supply Entrance
1545+76.82	Rt.		236.1		254.0	Carmax Entrance
Webb Road						
39+72.60	Lt.	287.0		298.7		Costco North Entrance
43+03.69	Rt.	175.6		186.1		Maxwell Entrance
42+88.20	Lt.	291.2		307.2		Costco South Entrance
53+55.42	Rt.	171.5		181.8		KTA Drive
54+05.00	Lt.	171.5		181.8		Hoover Rd., LLC Entrance
TOTALS		1,096.8	996.2	1,155.6	1,055.9	

CONCRETE DRIVEWAY (8") (REINF.)

STATION	SIDE	WIDTH FT.	RADIUS FT.	SQ. FT.	REMARKS
South Frontage Road					
1549+97.25	Rt.	39.4	18	751.9	
Orme Street					
101+56.05	Rt.	25	25	1,120.2	
Wildcat Lane					
101+62.52	Lt.	27.7	25.5	545.4	
102+14.22	Rt.	45.2	18	1,068.7	
Chateau Street					
101+56.88	Rt.	25	17.5	568.9	
102+10.13	Lt.	30	25.5	630.8	
105+39.28	Rt.	25	17.5	568.9	
TOTAL				5,254.8	

CONCRETE PAVEMENT (8" UNIF)(AE)(PL)

STATION to STATION		SIDE	WIDTH FT.	SQ. YDS.	REMARKS
Ramp C					
10499+70.00	10499+81.00	Lt.	Var.	3.2	Vertical Walls at Sign Support
TOTAL				3.2	

CONCRETE PAVEMENT (8" UNIF)(AE)(REINF)

STATION to STATION		SIDE	WIDTH FT.	SQ. YDS.	REMARKS
Ramp C					
10499+03.00	10501+85.00	Lt.	Var.	174.6	
TOTAL				174.6	

*** COLORED STAMPED CONCRETE PAVEMENT (4" UNIF)(AE)(PL)

STATION to STATION		SIDE	COLORED STAMPED CONC. PAVMT. (4" UNIF)(AE)(PL) SQ. YDS.	FLOWABLE FILL (LOW STRENGTH) CU. YDS.	REMARKS
South Frontage Road					
1537+01.30	1539+79.08	Rt.	45.7	13.0	
Webb Road					
31+11.75	33+04.25	Rt.	95.8	34.6	
33+89.75	39+12.00	℄	125.7	45.4	
40+46.47	42+88.45	℄	61.9	22.4	
43+57.84	44+73.45	℄	218.6	115.4	
46+63.97	48+37.22	Lt.	422.7	223.1	
48+70.00	49+18.41	Lt./Rt.	126.1	66.6	
50+82.25	51+02.54	Lt./Rt.	52.4	27.7	
51+49.98	53+23.23	℄	427.9	225.8	
54+93.45	56+23.57	℄	394.1	208.0	
56+47.67	56+90.50	℄	64.8	34.2	
56+95.11	57+40.69	℄	62.6	33.0	
59+97.64	61+43.59	℄	149.4	78.9	
Carmax Entrance					
100+51.00	100+95.40	℄	51.4	24.3	
TOTAL			2,299.1	1,152.2	

COLORED STAMPED CONCRETE PAVEMENT (6" UNIF)(AE)(REINF)

STATION to STATION		SIDE	WIDTH FT.	SQ. YDS.	REMARKS
Mainline					
498+13.74	510+00.00	Rt.	Var.	904.8	
515+02.60	536+68.23	Lt.	Var.	1,105.4	
515+03.01	537+27.69	Rt.	Var.	1,135.9	
Ramp C					
10499+03.00	10499+70.00	Lt.	Var.	21.8	
Ramp B					
10499+82.59	10504+75.36	Rt.	Var.	447.8	
TOTAL				3,615.7	

CONCRETE SIDEWALK (4")

STATION to STATION		SIDE	WIDTH FT.	SQ. FT.
South Frontage Road				
1521+59.53	1524+08.51	Rt.	6	1,473.7
1524+51.51	1526+87.28	Rt.	6	1,383.5
1527+38.26	1533+74.28	Rt.	6	3,844.5
1534+30.56	1536+64.08	Rt.	6	1,401.9
1537+80.41	1545+36.12	Rt.	6	4,535.9
1546+16.60	1549+70.85	Rt.	6	2,125.5
1550+23.28	1554+26.34	Rt.	6	2,436.6
1554+87.52	1565+18.07	Rt.	6	6,192.5
1565+98.38	1568+45.00	Rt.	6	1,479.7
North Frontage Road				
2498+50.00	2517+75.38	Lt.	6	10,958.1
Webb Road				
38+70.00	39+13.19	Rt.	6	253.0
40+28.55	42+73.53	Rt.	6	1,469.9
40+32.47	42+73.53	Lt.	6	1,478.0
43+30.96	47+17.76	Rt.	6	2,365.6
43+34.47	47+50.62	Lt.	6	2,504.6
47+17.76	48+25.42	Rt.	6	1,352.6
47+50.62	48+26.05	Lt.	6	504.1
48+82.18	49+12.12	Rt.	6	185.2
49+05.16	49+17.73	Lt.	6	76.4
50+88.59	50+94.66	Lt.	6	32.6
51+55.47	52+36.80	Lt.	6	1,373.8
51+65.23	52+68.03	Rt.	6	696.5
52+36.80	53+76.30	Lt.	6	842.2
52+68.03	53+25.34	Rt.	6	351.4
54+33.70	56+47.57	Lt.	6	1,295.3
53+85.49	62+10.00	Rt.	6	4,943.8
57+17.12	63+48.84	Lt.	6	3,821.9
TOTAL				59,378.8

WHEELCHAIR RAMP WITH DETECTABLE WARNING PANELS

STATION		SIDE	WIDTH FT.	TYPE I EACH	WIDE MEDIAN EACH
South Frontage Road					
1524+08.51		Rt.	6	1	
1524+51.51		Rt.	6	1	
1526+87.28		Rt.	6	1	
1527+38.26		Rt.	6	1	
1533+74.28		Rt.	6	1	
1534+30.56		Rt.	6	1	
1536+64.40		Rt.	6	1	
1537+80.72		Rt.	6	1	
1545+36.12		Rt.	6	1	
1546+16.60		Rt.	6	1	
1549+70.85		Rt.	6	1	
1550+23.41		Rt.	6	1	
1554+26.34		Rt.	6	1	
1554+87.52		Rt.	6	1	
Webb Road					
39+13.19		Rt.	6	1	
40+28.55		Rt.	6	1	
40+35.47		Rt.	6	1	
40+35.47		Lt.	6	1	
42+73.53		Rt.	6	1	
42+73.29		Lt.	6	1	
43+30.96		Rt.	6	1	
43+34.47		Lt.	6	1	
48+15.97		Lt.	6		1
48+18.97		Lt.	6	1	
48+18.97		Rt.	6	1	
48+23.69		Rt.	6	1	
48+26.23		Lt.	6	1	
48+83.90		Rt.	6	1	
49+05.16		Lt.	6	1	
50+82.44		Rt.	6	1	
50+94.10		Lt.	6	1	
51+54.90		Lt.	6	1	
51+64.44		Rt.	6	1	
51+65.23		℄	6		1
51+68.23		Lt.	6	1	
51+68.23		Rt.	6	1	
53+25.34		Rt.	6	1	
53+85.49		Rt.	6	1	
53+76.30		Lt.	6	1	
54+33.70		Lt.	6	1	
56+47.58		Lt	6	1	
57+17.34		Lt	6	1	
TOTALS				40	2

CITY OF WICHITA

SUMMARY OF QUANTITIES

8:31:19 PM
4/16/2015
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SURV. | PLOT | CADD | DES. | DR. | TR. | CKD. | APP.

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	460	1055

*CONCRETE SIDEWALK (8") (REINFORCED)

STATION to STATION		SIDE	SQ. FT.	REMARKS
Webb Road				
49+12.06	49+25.32	Rt.	80.2	North Bridge Approach
49+17.92	49+31.30	Lt.	85.9	North Bridge Approach
50+69.72	50+83.22	Rt.	76.2	South Bridge Approach
50+75.43	50+88.64	Lt.	78.3	South Bridge Approach
TOTAL			320.6	

*COLORED STAMPED CONCRETE (8" UNIF)(AE)(REINF)

STATION to STATION		SIDE	SQ. YD.	REMARKS
Webb Road				
49+12.31	49+25.71	Rt.	14.2	North Bridge Approach
49+17.65	49+31.04	Lt.	15.0	North Bridge Approach
50+69.54	50+83.26	Rt.	21.9	South Bridge Approach
50+75.10	50+88.97	Lt.	18.4	South Bridge Approach
TOTAL			69.5	

*8" CURB

STATION to STATION		SIDE	LIN. FT.	REMARKS
Webb Road				
49+12.72	49+25.73	Rt.	13.0	North Bridge Approach
49+17.63	49+30.64	Lt.	13.0	North Bridge Approach
50+70.26	50+83.27	Rt.	13.0	South Bridge Approach
50+75.08	50+88.09	Lt.	13.0	South Bridge Approach
TOTAL			52.0	

*DRILLING AND GROUTING

STATION to STATION		SIDE	EACH	REMARKS
Webb Road				
49+12.72	49+25.73	Rt.	9	North Bridge Approach
49+17.63	49+30.64	Lt.	9	North Bridge Approach
50+70.26	50+83.27	Rt.	9	South Bridge Approach
50+75.08	50+88.09	Lt.	9	South Bridge Approach
TOTAL			36	

* Quantities for "Concrete Sidewalk (8") (Reinforced)", "8" Colored Stamped Concrete, "8" Curb", and Drilling and Grouting" shown on this sheet are for Bridge Approaches only. See Bridge Plans for remaining quantities.

COMBINED CURB & GUTTER (AE) - TABLE 1

STATION to STATION		SIDE	LINEAR FEET TYPE I	LINEAR FEET TYPE I (SPEC.)	LINEAR FEET TYPE II	LINEAR FEET TYPE III (8")	CONCRETE RAMP NOSE (MEDIAN) EACH	REMARKS
South Frontage Road								
1510+24.71	1514+55.00	Lt.		431.8				
1510+24.71	1517+62.18	Rt.	744.7					
1514+55.00	1514+84.00	Lt.			29.1			
1514+84.00	1517+62.18	Lt.		277.8				
1521+25.40	1533+05.26	Lt.		1,179.9				
1521+25.40	1523+84.55	Rt.	259.1					
1524+75.55	1526+93.28	Rt.	235.8					
1527+31.78	1533+57.92	Rt.	643.5					
1534+46.92	1536+98.02	Rt.	310.6					
1537+03.80	1539+78.58	Rt.	274.8					
1537+01.30	1539+79.08	Rt.		292.8				
1537+26.01	1545+20.50	Rt.	837.8					
1540+11.23	1540+34.97	Lt.			23.8			
1540+34.97	1554+09.01	Lt.		1,373.9				
1546+32.32	1554+39.93	Rt.	825.3					
1554+73.93	1563+63.35	Rt.	907.6					
1558+92.73	1559+15.13	Lt.			23.2			
North Frontage Road								
2498+50.00	2499+37.39	Rt.		87.4				
2498+50.00	2518+26.10	Lt.	1,977.6					
2499+37.39	2499+61.11	Rt.			23.8			
2506+24.39	2515+01.16	Rt.		876.4				
2515+01.16	2515+46.16	Rt.			45.0			
2515+46.16	2518+26.10	Rt.		280.0				
2521+88.01	2525+52.47	Lt.	365.5					
2526+55.45	2530+16.21	Lt.	360.4					
2531+16.21	2544+88.56	Lt.	1,402.3					
2521+88.01	2533+60.40	Rt.		1,174.1				
2538+04.90	2557+89.71	Rt.		1,984.6				
2545+17.56	2566+24.46	Lt.	2,141.5					
2557+89.71	2558+13.51	Rt.			23.9			
2564+61.94	2565+30.00	Rt.		68.1				
2566+55.25	2567+88.25	Lt.	148.4					
Webb Road								
31+11.75	33+04.25	Rt.				392.9		
33+89.75	39+12.00	℄				1,051.2		
39+12.00	39+18.00	Lt.					1	
38+70.00	38+88.54	Rt.	18.5					
38+70.00	39+16.09	Lt.	46.1					
40+29.11	42+86.07	Lt.	257.0					
40+53.20	42+56.74	Rt.	203.5					
40+40.47	40+46.47	Rt.					1	
40+46.47	47+67.30	℄				724.1		SB Median
40+46.47	47+67.30	℄				724.1		NB Median
43+47.75	47+67.30	Rt.	421.5					
43+61.88	47+67.30	Lt.	406.4					
47+67.30	52+18.26	℄	659.7	225.6		642.1		Intersection
52+18.26	53+09.92	Rt.	91.7					
52+18.26	53+59.50	Lt.	141.2					
54+50.50	56+31.31	Lt.	181.6					
52+18.26	56+89.90	℄				964.0		
56+95.43	61+43.59	℄				911.2		
54+00.92	62+10.00	Rt.	809.7					
57+31.84	63+48.84	Lt.	619.5					
61+43.59	61+49.59	℄					1	
TOTALS TABLE 1			15,291.3	8,252.4	168.8	5,409.6	3	

COMBINED CURB & GUTTER (AE) - TABLE 2

STATION to STATION		SIDE	LINEAR FEET TYPE I	LINEAR FEET TYPE I (SPEC.)	LINEAR FEET TYPE II	LINEAR FEET TYPE III (8")	CONCRETE RAMP NOSE (MEDIAN) EACH	REMARKS
Corporate Hills Drive								
201+68.77	202+56.54	Lt.	116.8					
201+68.77	202+33.88	℄				124.6		
201+78.57	202+56.45	Rt.	107.0					
Maxwell Entrance								
200+75.62	201+25.59	Lt.	50.0					
200+75.28	200+84.28	Rt.	24.7					
201+17.19	201+25.59	Rt.	17.8					
Hoover Rd, LLC - Webb Rd.			141.7					
Orme Street								
101+70.78	102+90.00	Rt.	234.6					
100+78.66	102+90.00	Lt.	231.4					
Hoover Rd, LLC - S. Fr. Rd.			145.1					
Wildcat Lane								
100+56.50	102+80.00	Rt.	223.5					
100+56.50	102+80.00	Lt.	224.1					
Tractor Supply Entrance								
100+56.33	100+62.71	Lt.	9.9					
100+56.67	100+68.48	Rt.	17.9					
Club Rodeo Entrance								
101+19.20	103+56.16	Lt.	237.0					
101+15.72	103+56.16	Rt.	240.5					
Carmax Entrance								
100+48.11	100+92.51	℄		104.5				
100+53.52	100+95.02	Lt.	41.7					
100+53.70	100+93.57	Rt.	41.6					
Chateau Street								
100+56.38	107+56.75	Lt.	738.4					
100+56.62	107+56.75	Rt.	738.1					
Golden Corral Entrance								
200+56.90	201+94.81	Lt.	139.0					
200+58.28	201+94.39	Rt.	135.0					
Ramp A								
20507+05.79	20507+65.57	Rt.		59.5				
Ramp C								
10501+80.00	10501+85.00	Lt.		5.0				
10502+42.10	10503+25.00	Rt.	82.7					
10506+27.29	10509+94.64	Lt.		386.1				
10510+00.00	10510+64.14	Rt.	100.9					
Ramp D								
10502+45.86	10503+12.77	Rt.	93.5					
10503+46.49	10503+52.49	Lt.					1	
10503+52.49	10505+81.87	Lt.		236.2				
Ramp E								
1501+74.75	1504+81.79	Lt.		307.0				
1503+32.74	1503+38.74	Rt.					1	
1503+38.74	1504+82.74	Rt.	144.2					
1504+82.74	1505+74.86	Rt.		97.9				
Ramp G								
20535+00.39	20537+96.67	Rt.			294.9			
Ramp H								
10535+01.97	10536+11.78	Lt.		109.3				
Ramp J								
20562+90.59	20566+04.63	Rt.		312.6				
TOTALS TABLE 2			4,277.1	1,618.1	294.9	124.6	2	
TOTALS TABLE 1			15,291.3	8,252.4	168.8	5,409.6	3	
GRAND TOTALS			19,568.4	9,870.5	463.7	5,534.2	5	

CONCRETE PAVEMENT AND LIME TREATED SUBGRADE - TABLE 1 (MINOR SIDEROADS)

SIDE ROAD / ENTRANCE	CONC. PVMT. (12"UNIF)(AE) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) (NRDJ) SQ. YDS.	CONC. PVMT. (10"VAR)(AE)(PL) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) (REINF) SQ. YDS.	CONC. PVMT. (10"VAR)(AE) (REINF) SQ. YDS.	CONC. PVMT. (10"VAR)(AE) (NRDJ) SQ. YDS.	COLORED STAMPED CONC. PVMT. (10"UNIF)(AE)(PL) SQ. YDS.	CONC. PVMT. (9"UNIF)(AE) (NRDJ) SQ. YDS.	CONC. PVMT. (9"UNIF)(AE) SQ. YDS.	4" CEMENT TREATED BASE SQ. YDS.	CRUSHED ROCK BASE, REINFORCED 6" SQ. YDS.	CRUSHED ROCK BASE, REINFORCED 10" SQ. YDS.	6" LIME TREATED SUBGRADE MANIPULATION SQ. YDS.	6" LIME TREATED SUBGRADE † LIME TONS	6" LIME TREATED SUBGRADE WATER MGAL (Set Price)
Corporate Hills Drive										454.6		534.6				
Orme Road										195.2		235.8				
Wildcat Lane				171.8									201.7			
Club Rodeo Entrance				605.3									753.8			
Chateau Street				157.3									187.2			
Hawker Beechcraft Entrance				116.3									143.5			
Goldern Corral Entrance				142.6									187.2			
TOTALS TABLE 1	0.0	0.0	0.0	1,193.3	0.0	0.0	0.0	0.0	0.0	649.8	0.0	770.4	1,473.4	0.0	0.0	

† Computed at 5% by weight of the top 6" of soil (soil @ 110 lbs./cu. ft.)

CITY OF WICHITA

SUMMARY OF QUANTITIES

460

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SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
-	-	-	-	-	-	-	-

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	461	1055

CONCRETE PAVEMENT AND LIME TREATED SUBGRADE - TABLE 2

STATION to STATION		SIDE	CONC. PVMT. (12"UNIF)(AE) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) (NRDJ) SQ. YDS.	CONC. PVMT. (10"VAR)(AE)(PL) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) (REINF) SQ. YDS.	CONC. PVMT. (10"VAR)(AE) (REINF) SQ. YDS.	CONC. PVMT. (10"VAR)(AE) (NRDJ) SQ. YDS.	COLORED STAMPED CONC. PVMT. (10"UNIF)(AE)(PL) SQ. YDS.	CONC. PVMT. (9"UNIF)(AE) (NRDJ) SQ. YDS.	CONC. PVMT. (9"UNIF)(AE) SQ. YDS.	4" CEMENT TREATED BASE SQ. YDS.	CRUSHED ROCK BASE, REINFORCED		6" LIME TREATED SUBGRADE		
														6" SQ. YDS.	10" SQ. YDS.	MANIPULATION SQ. YDS.	† LIME TONS	WATER MGAL (Set Price)
Mainline																		
497+37.77	500+00.00	Rt.			273.0								324.1			324.1	4.0	
498+03.00	500+00.00	Lt.			185.4								185.4			185.4	2.3	
500+00.00	501+33.14	Lt.		714.1	183.5								897.6			897.6	11.1	
500+00.00	502+05.00	Rt.		1,113.8	307.6								1,466.4			1,466.4	18.1	
501+33.14	514+95.00	Lt.		7,460.9	2,011.0								9,773.0			9,773.0	120.9	
502+05.00	514+95.00	Rt.		7,050.7	1,894.0								9,230.5			9,230.5	114.2	
514+95.00	528+90.00	Lt.		7,622.7	2,047.0								9,978.6			9,978.6	123.5	
514+95.00	528+90.00	Rt.		7,644.8	2,060.5								10,016.4			10,016.4	124.0	
528+90.00	535+48.06	Lt.		3,601.1	968.8								4,716.1			4,716.1	58.4	
528+90.00	537+27.69	Rt.		4,583.9	1,233.2								6,003.4			6,003.4	74.3	
535+48.06	537+27.69	Lt.		1,081.8	170.1								1,291.8			1,291.8	16.0	
537+27.69	537+95.96	Lt.		438.1	54.9								508.3			508.3	6.3	
537+29.69	539+32.20	Rt.		1,119.2	301.1								1,464.0			1,464.0	18.1	
537+95.96	539+86.03	Lt.		1,281.6									1,281.6			1,281.6	15.9	
539+32.20	541+38.16	Rt.		1,127.0	168.0								1,295.1			1,295.1	16.0	
539+86.03	545+10.00	Lt.		2,867.3									2,867.3			2,867.3	35.5	
541+38.16	545+30.00	Rt.		2,144.3									2,144.3			2,144.3	26.5	
545+10.00	554+45.00	Lt.		6,363.3	961.0								7,532.1			7,532.1	93.2	
545+30.00	552+65.00	Rt.		5,001.9	755.4								5,920.6			5,920.6	73.3	
552+65.00	557+55.36	Rt.		2,683.4									2,683.4			2,683.4	33.2	
554+45.00	558+42.79	Lt.		2,176.8									2,176.8			2,176.8	26.9	
557+55.36	559+58.24	Rt.		1,110.2	197.4								1,307.6			1,307.6	16.2	
558+42.79	560+44.19	Lt.		1,101.7	168.4								1,270.1			1,270.1	15.7	
559+58.24	561+13.38	Rt.		849.9	187.5					148.4			1,202.8			1,202.8	14.9	
560+44.19	561+13.38	Lt.		378.1	101.5								493.1			493.1	6.1	
South Frontage Road																		
1510+24.71	1513+70.00	Lt. & Rt.		926.3											1,196.5			
1513+70.00	1514+40.00	Lt. & Rt.		841.5											975.4			
1514+40.00	1517+62.18	Lt. & Rt.		1,481.2											1,654.0			
1521+25.40	1563+63.35	Lt. & Rt.		12,385.1											14,929.6			
North Frontage Road																		
2498+50.00	2499+37.39	Lt. & Rt.		233.0											301.0			
2499+37.39	2500+57.39	Lt. & Rt.		321.6											366.7			
2500+57.39	2502+46.13	Lt. & Rt.		503.4											576.9			
2502+46.13	2506+24.39	Lt. & Rt.		1,009.5											1,157.0			
2506+24.39	2514+26.16	Lt. & Rt.		3,207.8											3,831.3			
2514+26.16	2518+26.10	Lt. & Rt.		1,820.7											2,133.4			
2521+88.01	2567+88.25	Lt. & Rt.		14,959.6											18,005.9			
Webb Road																		
34+97.54	38+70.00	Lt. & Rt.									559.2			673.5				
38+70.00	40+53.20	Lt. & Rt.										1,491.3		1,679.3				
40+53.20	47+67.30	Lt. & Rt.									7,373.0			8,276.4				
47+67.30	49+24.41	Lt. & Rt.				3,222.5					143.7			170.9	3,904.0			
49+10.14	49+33.55	Lt. & Rt.	384.3												392.8			
50+67.09	50+90.70	Lt. & Rt.	406.0												414.6			
50+75.74	52+18.26	Lt. & Rt.				2,446.4					345.8			377.1	2,961.5			
52+18.26	62+10.00	Lt. & Rt.									8,825.4	93.3		10,165.6				
Ramp A																		
20500+26.92	20500+78.82	Lt. & Rt.		117.6	53.4								182.5			182.5	2.3	
20500+78.82	20501+98.46	Lt. & Rt.		309.1	140.7					33.6			505.7			505.7	6.3	
20501+98.46	20503+87.45	Lt. & Rt.		530.2	126.9								699.1			699.1	8.7	
20503+87.45	20505+56.45	Lt. & Rt.		434.7									472.1			472.1	5.8	
20505+56.45	20507+05.79	Rt.		282.6									315.6			315.6	3.9	
20507+05.79	20507+65.57	Rt.		80.2											103.2			
Ramp B																		
10498+19.38	10500+00.63	Lt.		101.6									136.7			136.7	1.7	
10500+00.63	10501+22.00	Lt. & Rt.		259.6				143.5					440.0			440.0	5.4	
10501+22.00	10504+37.00	Lt. & Rt.		674.1	323.7								1,137.8			1,137.8	14.1	
10504+37.00	10508+56.99	Lt. & Rt.		560.2	417.5		362.0						1,477.4			1,477.4	18.3	
10508+56.99	10510+23.81	Lt. & Rt.		223.1	148.0		144.8						573.1			573.1	7.1	
10510+23.81	10510+52.23	Lt. & Rt.		38.0	19.2		24.7						85.2			85.2	1.1	
10510+52.23	10510+92.36	Lt. & Rt.		53.7	4.8		33.5						97.5			97.5	1.2	
10510+92.36	10511+43.82	Lt. & Rt.		68.1			30.9						110.0			110.0	1.4	
10511+43.82	10512+26.06	Lt. & Rt.		249.7	72.7								359.0			359.0	4.4	
TOTALS TABLE 2			790.3	111,188.8	15,536.2	5,668.9	595.9	143.5	0.0	182.0	17,247.1	1,584.6	92,622.1	21,342.8	52,903.8	92,622.1	1,146.3	

† Computed at 5% by weight of the top 6" of soil (soil @ 110 lbs./cu. ft.)

CITY OF WICHITA

SUMMARY OF QUANTITIES

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4/16/2015
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SURV. - PLOT CADD DES. - DR. - TR. CKD. - APP. -

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	462	1055

CONCRETE PAVEMENT AND LIME TREATED SUBGRADE - TABLE 3

STATION to STATION		SIDE	CONC. PVMT. (12"UNIF)(AE) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) (NRDJ) SQ. YDS.	CONC. PVMT. (10"VAR)(AE)(PL) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) SQ. YDS.	CONC. PVMT. (10"UNIF)(AE) (REINF) SQ. YDS.	CONC. PVMT. (10"VAR)(AE) (REINF) SQ. YDS.	CONC. PVMT. (10"VAR)(AE) (NRDJ) SQ. YDS.	COLORED STAMPED CONC. PVMT. (10"UNIF)(AE)(PL) SQ. YDS.	CONC. PVMT. (9"UNIF)(AE) (NRDJ) SQ. YDS.	CONC. PVMT. (9"UNIF)(AE) SQ. YDS.	4" CEMENT TREATED BASE SQ. YDS.	CRUSHED ROCK BASE, REINFORCED		6" LIME TREATED SUBGRADE		
														6" SQ. YDS.	10" SQ. YDS.	MANIPULATION SQ. YDS.	† LIME TONS	WATER MGAL (Set Price)
Ramp C																		
10501+85.00	10502+42.14	Lt.		140.8									153.4			153.4	1.9	
10502+42.14	10503+25.00	Lt. & Rt.		254.9									304.2			304.2	3.8	
10503+25.00	10504+68.15	Lt. & Rt.		445.0	126.2								636.1			636.1	7.9	
10504+68.15	10506+21.92	Lt. & Rt.		279.0	135.6								448.2			448.2	5.5	
10506+21.92	10507+11.92	Lt. & Rt.		193.6	79.4								326.9			326.9	4.0	
10507+11.92	10507+90.00	Lt. & Rt.		141.0	68.9								258.3			258.3	3.2	
10507+90.00	10510+00.00	Lt. & Rt.		634.6	185.2								950.0			950.0	11.8	
10510+00.00	10510+65.77	Lt. & Rt.		270.8									270.8			270.8	3.4	
Ramp D																		
10502+76.98	10503+46.49	Lt. & Rt.		410.4	30.0								462.8			462.8	5.7	
10503+46.49	10505+81.87	Lt. & Rt.		659.7	211.3								1,024.0			1,024.0	12.7	
10505+81.87	10506+39.75	Lt. & Rt.		142.8	50.6								210.3			210.3	2.6	
10506+39.75	10508+69.03	Lt. & Rt.		573.7	200.5								868.9			868.9	10.8	
10508+69.03	10509+42.80	Lt. & Rt.		110.8	64.5								191.1			191.1	2.4	
Ramp E																		
1501+74.75	1502+75.37	Lt. & Rt.		136.9									176.1			176.1	2.2	
1502+75.37	1503+32.74	Lt. & Rt.		142.3									164.6			164.6	2.0	
1503+32.74	1504+81.79	Lt. & Rt.		295.0									412.1			412.1	5.1	
1504+81.79	1505+26.08	Lt. & Rt.		78.7	20.9								126.7			126.7	1.6	
1505+26.08	1505+71.09	Lt. & Rt.				154.4							184.1			184.1	2.3	
Ramp G																		
20535+00.39	20537+29.22	Lt. & Rt.		360.3									448.9			448.9	5.6	
20537+29.22	20537+81.58	Lt. & Rt.		97.7	24.2								142.2			142.2	1.8	
20537+81.58	20538+85.26	Lt. & Rt.		208.9	113.5					92.0			425.6			425.6	5.3	
20538+85.26	20539+45.05	Lt. & Rt.		138.8	105.6								244.4			244.4	3.0	
20539+45.05	20545+10.00	Lt. & Rt.		1,091.7	580.3								1,797.4			1,797.4	22.2	
Ramp H																		
10536+11.80	10538+89.42	Lt. & Rt.		361.0									422.4			422.4	5.2	
10538+89.42	10541+12.38	Lt. & Rt.		477.4	236.4								716.0			716.0	8.9	
10541+12.38	10542+32.16	Lt. & Rt.		254.3	91.7					138.1			494.6			494.6	6.1	
10542+32.16	10542+92.60	Lt. & Rt.		109.5	68.7								191.6			191.6	2.4	
10542+92.60	10545+30.00	Lt. & Rt.		345.6	244.0								642.4			642.4	7.9	
Ramp J																		
20554+45.00	20554+89.80	Lt. & Rt.		60.0	46.0								115.9			115.9	1.4	
20554+89.80	20559+33.19	Lt. & Rt.		801.8					462.5				1,362.2			1,362.2	16.9	
20559+33.19	20560+13.81	Lt. & Rt.		172.6	16.9				100.9	54.5			355.5			355.5	4.4	
20560+13.81	20561+41.81	Lt. & Rt.		274.1	87.9				111.8				487.6			487.6	6.0	
20561+41.81	20562+16.22	Lt. & Rt.		159.3					49.9				225.8			225.8	2.8	
20562+16.22	20564+69.82	Lt. & Rt.		285.7									371.5			371.5	4.6	
Ramp K																		
10552+65.00	10557+11.85	Lt. & Rt.		791.4	459.5								1,350.1			1,350.1	16.7	
10557+11.85	10557+54.13	Lt. & Rt.		117.3	59.7								176.9			176.9	2.2	
10557+54.13	10558+94.65	Lt. & Rt.		375.3	110.0								485.2			485.2	6.0	
10558+94.65	10561+02.41	Lt.		552.7									552.7			552.7	6.8	
10561+02.41	10562+33.00	Lt. & Rt.		357.5									357.5			357.5	4.4	
TOTALS TABLE 3			0.0	12,302.9	3,417.5	154.4	0.0	0.0	725.1	284.6	0.0	0.0	18,535.0	0.0	0.0	18,535.0	229.5	
TOTALS TABLE 1			0.0	0.0	0.0	1,193.3	0.0	0.0	0.0	0.0	0.0	649.8	0.0	770.4	1,473.4	0.0	0.0	
TOTALS TABLE 2			790.3	111,188.8	15,536.2	5,668.9	595.9	143.5	0.0	182.0	17,247.1	1,584.6	92,622.1	21,342.8	52,903.8	92,622.1	1,146.3	
GRAND TOTALS			790.3	123,491.7	18,953.7	7,016.6	595.9	143.5	725.1	466.6	17,247.1	2,234.4	111,157.1	22,113.2	54,377.2	111,157.1	1,375.8	1

† Computed at 5% by weight of the top 6" of soil (soil @ 110 lbs./cu. ft.)

CITY OF WICHITA

SUMMARY OF QUANTITIES

SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	463	1055

Revised Plans

RECAPITULATION OF ROAD QUANTITIES

	ITEM	QUANTITY	UNIT
	LUMP SUM BID ITEMS - ROAD		
*	Contractor Construction Staking	Lump Sum	Lump Sum
	Field Office and Laboratory (Type A)	1	Each
	Field Office (Special)	1	Each
*	Mobilization	Lump Sum	Lump Sum
*	Mobilization (DBE)	Lump Sum	Lump Sum
	Removal of Existing Structures	Lump Sum	Lump Sum
	Removal of Existing Buildings (Non-Participating)	Lump Sum	Lump Sum
	Transportation of Salvaged Material (Non-Participating)	Lump Sum	Lump Sum
	Site Clearing	Lump Sum	Lump Sum
	Site Restoration	Lump Sum	Lump Sum
	Common Excavation	335,790	Cu. Yds.
	Common Excavation (Highly Weathered Shale)	185,629	Cu. Yds.
	Eradication of Traveled Way	7	Sta.
	Pavement Removed	183,600	Sq. Yds.
	Compaction of Earthwork (Type AA) (MR-0-5)	55,900	Cu. Yds.
	Compaction of Earthwork (Type A) (MR-5-5)	51,993	Cu. Yds.
	Compaction of Earthwork (Type B) (MR-90)	83,109	Cu. Yds.
	Water (Grading)(Set Price)	1	M. Gal.
†	Concrete (Gr 4.0) (AE)	434	Cu. Yds.
†	Reinforcing Steel (Grade 60) (Epoxy Coated)	70,201	Lbs.
	Guardrail, Removal of Steel Plate	667	Lin. Ft.
	Curb and Gutter, Combined (AE) (Type I)	19,569	Lin. Ft.
	Curb and Gutter, Combined (AE) (Type I) (Spec.)	9,871	Lin. Ft.
	Curb and Gutter, Combined (AE) (Type II)	464	Lin. Ft.
	Curb and Gutter, Combined (AE) (Type III) (8")	5,535	Lin. Ft.
	8" Curb	52	Lin. Ft.
	Concrete Ramp Nose Section (Median)	5	Each
	Concrete Flume	1,627	Lin. Ft.
◔	Flume Inlet (Concrete) (Temp.)	1	Each
◔	Slope Drain (Concrete) (Temp.)	20	Lin. Ft.
	Drilling and Grouting	36	Each
	Flowable Fill (Low Strength)	1,152	Cu. Yds.
	Brick Pavers (Concrete), Crosswalk	713	Sq. Yds.
	Wheelchair Ramp w/ Detectable Warning Panels	42	Each
	Impact Attenuator (Severe Duty) (Narrow Hazard)	5	Each
	Inertial Barrier System	1	Each
	Replacement Modules	10	Each
	Barricade (Type III) (Fixed)	10	Each
	Concrete Safety Barrier (Type II) (Spec.)	15,309	Lin. Ft.
	Concrete Safety Barrier (Type IV) (Spec.)	6,385	Lin. Ft.
	Concrete Safety Barrier (Type F3)	4,011	Lin. Ft.
	Concrete Safety Barrier Nose (Entrance)	4	Each
	Concrete Safety Barrier Nose (Exit)	1	Each
	FG 300 Curb System	352	Each
	FG 300 Curb End Cap	2	Each
††	Retaining Wall (Modular Block)	508	Sq. Ft.
††	Retaining Wall (MSEW)	29,330	Sq. Ft.
††	Retaining Wall (Soldier Pile)	72,072	Sq. Ft.
	Concrete Masonry Surface Treatment	19,904	Sq. Yds.
††	Handrail (Metal) (3'-6")	1,503	Lin. Ft.
	Concrete Pavement (8" Uniform) (AE) (Plain)	4	Sq. Yds.
	Concrete Pavement (8" Uniform) (AE) (Reinf)	175	Sq. Yds.
	Concrete Pavement (9" Uniform) (AE) (NRDJ)	17,247	Sq. Yds.
	Concrete Pavement (9" Uniform) (AE)	2,234	Sq. Yds.
	Concrete Pavement (10" Uniform) (AE) (NRDJ)	123,492	Sq. Yds.
	Concrete Pavement (10" Uniform) (AE) (Reinf)	596	Sq. Yds.
	Concrete Pavement (10" Uniform) (AE)	7,017	Sq. Yds.
	Concrete Pavement (12" Uniform) (AE)	790	Sq. Yds.
	Concrete Pavement (10" Variable) (AE) (Plain)	18,954	Sq. Yds.
	Concrete Pavement (10" Variable) (AE) (NRDJ)	725	Sq. Yds.
	Concrete Pavement (10" Variable) (AE) (Reinf)	144	Sq. Yds.
	Concrete Pavement (VG) 9" (Reinf)	1,097	Sq. Yds.
	Concrete Pavement (VG) 10" (Reinf)	997	Sq. Yds.
****	Colored Stamped Concrete Pavement (4" Uniform) (AE) (Plain)	9,777	Sq. Yds.
	Colored Stamped Concrete Pavement (6" Uniform) (AE) (Reinf)	3,616	Sq. Yds.
	Colored Stamped Concrete Pavement (8" Uniform) (AE) (Reinf)	70	Sq. Yds.
	Colored Stamped Concrete Pavement (10" Uniform) (AE) (Plain)	467	Sq. Yds.
	Bridge Approach Slab Footing	170	Cu. Yds.
	Concrete Core (Set Price)	1	Each
	Curing Environment	Lump Sum	Lump Sum
	Concrete Pavement Smoothness	Lump Sum	Lump Sum
	Lime	1,376	Ton
	Water (Lime Treated Subgrade) (Set Price)	1	M. Gal.
	Manipulation (Lime Treated Subgrade)	111,157	Sq. Yds.
†††	Crushed Rock Base 5", Reinforced	2,820	Sq. Yds.
†††	Crushed Rock Base 6", Reinforced	23,006	Sq. Yds.
†††	Crushed Rock Base 8", Reinforced	5,723	Sq. Yds.
†††	Crushed Rock Base 9", Reinforced	3,935	Sq. Yds.
	Crushed Rock Base 10", Reinforced	54,377	Sq. Yds.
	Cement Treated Base (4")	111,157	Sq. Yds.
	MEASURED QUANTITY BID ITEMS - ROAD		
	Plugging Water Wells	2	Each
**	Sidewalk, Drive &/or Pkg Lot Removed & Replaced	4,765	Sq. Yds.
	Concrete Driveway (8") (Reinforced)	5,255	Sq. Ft.
	Concrete Sidewalk (4")	59,379	Sq. Ft.
	Concrete Sidewalk (8") (Reinforced)	321	Sq. Ft.
	Concrete Sidewalk Protection Curb	378	Lin. Ft.
***	Crushed Rock Base 9", Reinforced (Temporary)	32,870	Sq. Yds.

RECAPITULATION OF DRAINAGE QUANTITIES

	ITEM	QUANTITY	UNIT
	LUMP SUM BID ITEMS - DRAINAGE		
	Rip-Rap, Light Stone	227	Sq. Yds.
	Concrete Ditch Lining	120	Sq. Yds.
	Inlet, Retrofit	3	Each
	Inlet, Area (Type II) (Special)	97	Each
	Inlet, Curb (Type I)(L=10' W=3')	29	Each
	Inlet, Curb (Type I)(L=10' W=4')	36	Each
	Inlet, Curb (Type I)(L=10' W=5')	22	Each
	Inlet, Curb (Type I)(L=10' W=6')	4	Each
	Inlet, Curb (Type 12)	20	Each
	Inlet, Gutter (Special)	1	Each
	Inlet, Manhole (Spec.)	2	Each
	Inlet, Grated Driveway, Single	1	Each
	Inlet, Drop (Single)	11	Each
	Inlet, Drop (Double)	1	Each
	Inlet Adjusted	1	Each
	Inlet Hookup	113	Each
	MH Adjusted, SWS	2	Each
	MH, Reinforced Concrete	25	Each
	MH, Standard SWS (4')	4	Each
	MH, Standard SWS (5')	8	Each
	Manhole Stack (4')	3	Each
◔	Pipe, SWS 12" (Temp.)	76	Lin. Ft.
◔	Pipe, SWS 18" x 12" (15") (Temp.)	201	Lin. Ft.
	Pipe, SWS 15"	147	Lin. Ft.
	Pipe, SWS 15" (RCP)	166	Lin. Ft.
◔	Pipe, SWS 15" (Temp.)	19	Lin. Ft.
	Pipe, SWS 18"	2 213	Lin. Ft.
	Pipe, SWS 18" (RCP)	2 11,927	Lin. Ft.
◔	Pipe, SWS 18" (RCP) (Temp.)	167	Lin. Ft.
	Pipe, SWS 21" (RCP)	239	Lin. Ft.
	Pipe, SWS 24"	120	Lin. Ft.
◔	Pipe, SWS 24" (Temp.)	13	Lin. Ft.
	Pipe, SWS 24" (RCP)	2 3,433	Lin. Ft.
◔	Pipe, SWS 24" (RCP) (Temp.)	189	Lin. Ft.
◔	Pipe, SWS HERCP 30" x 19" (24") (Temp.)	82	Lin. Ft.
	Pipe, SWS 30" (RCP)	2 1,962	Lin. Ft.
	Pipe, SWS HERCP 38" x 24" (30")	426	Lin. Ft.
	Pipe, SWS 36"	58	Lin. Ft.
	Pipe, SWS 36" (RCP)	6,225	Lin. Ft.
	Pipe, SWS 42" (RCP)	218	Lin. Ft.
	Pipe, SWS 48" (RCP)	483	Lin. Ft.
	Pipe, SWS 54" (RCP)	1,293	Lin. Ft.
	Pipe, SWS 60" (RCP)	1,124	Lin. Ft.
	Pipe, SWS, RCBC (5'x5')	659	Lin. Ft.
	Pipe, 18" (RCP)	412	Lin. Ft.
◔	Pipe, 18" (RCP) (Temp.)	411	Lin. Ft.
◔	Pipe, 24" (RCP) (Temp.)	75	Lin. Ft.
	Pipe, HERCP 30" x 19" (24")	56	Lin. Ft.
◔	Pipe, CMMAC 71"x 47" (Temp.)	96	Lin. Ft.
	Fill, Sand (Flushed & Vibrated)	28,390	Lin. Ft.
	MEASURED QUANTITY BID ITEMS - DRAINAGE		
	4" Perforated Underdrain Pipe	1,130	Lin. Ft.
▷	4" Dia Pipe Underdrain (E)	1,498	Lin. Ft.

◔ *The bid price for Temporary items needed for construction shall include all materials and work to construct, install and remove these items. All materials and work to patch connecting structures shall be included in the bid price. When temporary pipes are constructed under permanent pavement, end sections shall be removed and the pipe abandoned as per City of Wichita Specifications.*

* *The same work for the tied Sanitary Sewer Project No. 468-83152 shall be SUBSIDIARY to these bid items for this Project.*

** *All existing pavement disturbed by the construction within temporary easement or as noted shall be replaced in kind to match the existing pavement type and depth. Removal and replacement of the disturbed pavement shall be paid for by the measured quantity of "Sidewalk, Drive &/or Pkg Lot Removed & Replaced" in Square Yards. The "Recapitulation of Road Quantities" shows the estimated Square Yards of disturbed pavement to be removed and replaced. The Engineer will identify any pavement to be removed but not replaced. All areas identified where existing pavement is removed but not to be replaced shall be restored with sod to match the adjacent turf type. Restoration of disturbed areas shall include, but not be limited to, embankment, top soil preparation, fertilizer, and sod installation. All sodding work shall be in accordance with City of Wichita Standard Specifications and City of Wichita Administrative Regulation No. AR6.5, which governs cleanup and restoration or replacement following construction. This work shall be SUBSIDIARY to the bid item "Sidewalk, Drive &/or Pkg Lot Removed & Replaced".*

*** *Temporary Crushed Rock base needed for construction shall include but not be limited to temporary ramps, pavement widening and utility relocations. Temporary Crushed Rock Base shall be paid for by the measured quantity in Square Yards. The "Recapitulation of Road Quantities" shows the estimated Square Yards of tempoary crushed rock base to be constructed and removed. For Surfacing Quantities, See Sheet No. 723*

**** *Includes quantity shown on Sheet No. 513*

RECAPITULATION OF BRIDGE QUANTITIES

BRIDGE NUMBER	STATION	SEE SHEET NO.
Webb Road		
54-87-32.12 (826)	49+99.47	376

RECAPITULATION OF BRIDGE NUMBER 54-87-32.86 (827) STA. 560+09.53

ITEM	QUANTITY	UNIT
LUMP SUM BID ITEMS - 54-87-32.86 (827)		
Pipe, SWS, RCBC (2-7'x4')	436	Lin. Ft.

RECAPITULATION OF TRAFFIC SIGNAL QUANTITIES

ITEM	QUANTITY	UNIT
LUMP SUM BID ITEMS - TRAFFIC SIGNAL		
Traffic Signalization (Webb Road)	Lump Sum	Lump Sum

RECAPITULATION OF TRAFFIC SIGNAL QUANTITIES (NON-PARTICIPATING)

ITEM	QUANTITY	UNIT
LUMP SUM BID ITEMS - TRAFFIC SIGNAL (NON-PARTICIPATING)		
Traffic Signalization (Corporate Hills)	Lump Sum	Lump Sum

RECAPITULATION OF SANITARY SEWER QUANTITIES (NON-PARTICIPATING)

ITEM	QUANTITY	UNIT
LUMP SUM BID ITEMS - SANITARY SEWER (NON-PARTICIPATING)		
Pipe, SS 8"	158	Lin. Ft.
Pipe, SS 10"	2,287	Lin. Ft.
Pipe, SS 15"	714	Lin. Ft.
Pipe Stub, 10"	2	Each
MH, Standard SS (4')	11	Each
MH, Standard SS (5')	2	Each
MH, Standard SS (4') w/Outside Drop	2	Each
MH, Standard SS (5') w/Outside Drop	1	Each
Pipe, Casing (18" ID min.) (Bored), Steel	140	Lin. Ft.
MH Invert, Reconstructed	4	Each
Air Testing, SS Pipe	3,157	Lin. Ft.
Fill, Flowable	1,707	Lin. Ft.
MH Adjustment	2	Each
MEASURED QUANTITY BID ITEMS - SANITARY SEWER (NON-PARTICIPATING)		
MH, Joint Wrap	184	Lin. Ft.

RECAPITULATION OF WATER QUANTITIES (NON-PARTICIPATING)

	ITEM	QUANTITY	UNIT
	LUMP SUM BID ITEMS - WATER (NON-PARTICIPATING)		
	Pipe, WL 8"	3 433	Lin. Ft.
	Pipe, WL 8", By Directional Boring	121	Lin. Ft.
	Pipe, WL 12"	2 0	Lin. Ft.
	Pipe, WL 12", By Directional Boring	167	Lin. Ft.
	Pipe, WL 16"	3 2 5,173	Lin. Ft.
	Pipe, WL 16", By Directional Boring	60	Lin. Ft.
	Pipe, WL 20"	3 4,982	Lin. Ft.
3	Pipe, WL 20", By Directional Boring	85	Lin. Ft.
	Pipe, WL DICL 8"	9	Lin. Ft.
2	Pipe, WL DICL 12"	8	Lin. Ft.
	Pipe, WL DICL 16"	3 2 149	Lin. Ft.
	Pipe, WL DICL 20"	3	Lin. Ft.
	Fire Hydrant Assembly	12	Each
	Valve Assembly, Anchored 8"	3 12	Each
	Valve Assembly, Anchored 12"	2	Each
	Valve Assembly, Anchored 16"	5	Each
	Valve Assembly, Anchored 20"	11	Each
	Valve Assembly, Air Release	2	Each
	Valve Vault, Adjustment (Special)	1	Each
	Pipe, Casing (24" ID min.) (Bored), HDPE	140	Lin. Ft.
	Pipe, Casing (24" ID min.), HDPE	80	Lin. Ft.
	Pipe, Casing (30" ID min.) (Bored), HDPE	568	Lin. Ft.
	Pipe, Casing (30" ID min.), HDPE	25	Lin. Ft.
	Tapping Sleeve & Valve 12"	1	Each
	20"x8" Tapping Sleeve & Valve	1	Each
	12" Connection, Temporary	1	Each
	1" Domestic Service	7	Each
	2" Domestic Service	3	Each
	4" Domestic Service	1	Each
	8" Fire Service	2	Each

RECAPITULATION OF PRIVATE UTILITIES QUANTITIES

ITEM	QUANTITY	UNIT
LUMP SUM BID ITEMS - PRIVATE UTILITIES		
Utility Relocation (Coordination & Survey) (Non-Participating)	Lump Sum	Lump Sum
Utility Relocation (Trench & Backfill) (Non-Participating)	Lump Sum	Lump Sum
Utility Relocation (AT&T Conduit System) (Non-Participating)	Lump Sum	Lump Sum
Utility Relocation (Westar Conduit System) (Non-Participating)	Lump Sum	Lump Sum
Electric Lighting System (Westar)	Lump Sum	Lump Sum

For RCB Summary, See Sheet No. 176
For Storm Sewer Summaries, See Sheet No's. 241 - 242
For Inlet and Manhole Summary, See Sheet No. 246
▷ *For Underdrains, See Sheet No's. 248- 250*
For Sanitary Sewer Summary, See Sheet No. 257
For Water Line Summary, See Sheet No. 275
† *For Bridge Approach Barrier Summaries, See Sheet No's. 276 - 280*
For Culvert Summary, See Sheet No. 296
†† *For Retaining Wall Summary, See Sheet No. 302*
For Erosion Control and Seeding Quantities, See Sheet No. 464
For Landscape Quantities, See Sheet No. 513
† *For Disc Walls, See Sheet No. 516*
For Lighting Quantities, See Sheet No. 537
For Traffic Signal Bill of Materials, See Sheet No's. 543 & 548
For Communication Duct Quantities, See Sheet No. 559
For ITS Quantities, See Sheet No. 570
For Pavement Marking Quantities, See Sheet No. 629
For Signing Quantities, See Sheet No. 657
For Surfacing Quantities, See Sheet No. 723
††† *For Traffic Control Quantities, See Sheet No. 848*

3 6/08/2015 Revised Quantities

2 6/02/2015 Revised Quantities

CITY OF WICHITA

SUMMARY OF QUANTITIES

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	464	1055

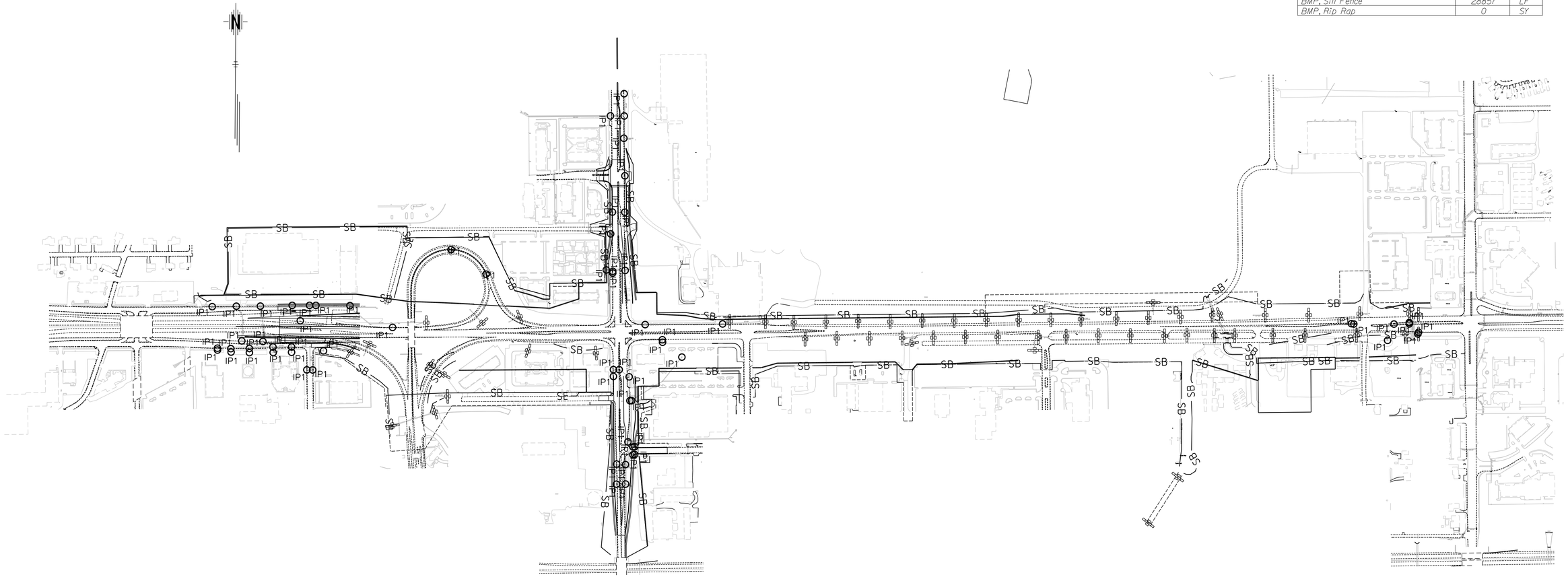
Revised Plans

RECAPITULATION OF EROSION CONTROL QUANTITIES		
LUMP SUM BID ITEMS	*QUANTITY*	*UNIT*
Seeding, Temporary	*56*	*AC*
Sod, Temporary	*0*	*AC*
MEASURED QUANTITY BID ITEMS		
BMP, Back of Curb Protection	*27592*	*LF*
BMP, Construction Entrance	*4*	*EA*
BMP, Curb Inlet Protection	*169*	*EA*
BMP, Drop Inlet Protection	*124*	*EA*
BMP, Ditch Check	*67*	*EA*
BMP, Erosion Control Mat	*1332*	*SY*
BMP, Silt Fence	*28857*	*LF*
BMP, Rip Rap	*0*	*SY*

4

SCALE

0 300' 600' 1200'



LEGEND

SB — *SILT FENCE BARRIER*

DITCH CHECK

IP1 *INLET PROTECTION FOR EXISTING INLETS*

4 *6/12/2015 Revised temporary sod quantity.*

CITY OF WICHITA

EAST KELLOGG

PHASE I POLLUTION CONTROL PLAN

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	465	1055

GENERAL NOTES:

1. *Contractor shall prepare and implement the Storm Water Pollution Prevention (SWP2) Plan compliant with the Kansas Department of Health and Environment (KDHE) Kansas Water Pollution Control and National Pollutant Discharge Elimination System (NPDES) Stormwater Runoff from Construction Activities General Permit No. S-MCST-0312-I, Federal Permit No. KSR 100000, or the more current version, if applicable. The Construction General Permit includes requirements for spill prevention, control and response; waste management; and locating portable toilets, concrete washout stations, equipment and material storage areas, fueling stations, and other potential surface and ground water pollutant sources away from streams, drainage courses, and low lying areas.*

2. *Contractor's SWP2 Plan shall be developed and prepared under the supervision of a Kansas professional engineer, geologist, architect or landscape architect, or a Certified Professional in Erosion and Sediment Control.*

3. *Contractor is responsible for construction means, methods, sequencing and scheduling. Any sequencing indicated in these plans is for illustration only, may at best only reflect brief moments in time, and is not intended to dictate Contractor's means, methods, sequencing or scheduling.*

4. *This erosion control plan is provided for information only, and is used primarily to establish pay items for bidding purposes. Before construction begins, the Contractor will have a much better view of the on-site situation and the planned construction means, methods, sequencing and scheduling than the designer, and shall review and modify the erosion/pollution control plan to comply with the SWP2 Plan, the NPDES General Permit, and the Notice of Intent (NOI).*

5. *Contractor shall conduct all construction operations such that less than ten (10) acres of soil are disturbed within a common drainage area, and remain unrestored at any one time. Alternately, Contractor may design a temporary sediment basin; obtain all necessary permits and temporary construction easements; construct and operate the basin; provide any necessary water treatment, maintenance, testing or reporting; and ultimately remove the basin and restore the area; all at its own expense. Disturbed soils may be considered restored when mulched, treated with soil stabilizing compound, or otherwise surfaced. Temporary sediment basins will not be permitted beneath permanent paving, retaining walls or other structures without approval of the Engineer, and unless all foundations are completely restored before construction proceeds.*

6. *In general this erosion control plan is intended to illustrate sediment controls only. Contractor is responsible for providing erosion controls such as mulching or surfacing to stabilize disturbed areas within the time frames required by the SWP2 Plan and the NPDES General Permit:*

   A. *Part 7.2.4 When construction activities on steep slopes (slopes of forty (40) percent or greater, see definitions) cannot be avoided, the SWP2 Plan must require the contractor to immediately initiate placement of appropriate erosion control BMPs in any exposed steep slope areas where construction activities have permanently or temporarily ceased, and will not resume for a period exceeding 7 calendar days.*

   B. *Part 7.2.5 Stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating, or other soil disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. The disturbed areas shall be protected from erosion by maintaining the erosion control BMPs, or establishing the area with mulch or other similarly effective soil stabilizing BMPs. Initial stabilization activities must be completed within 21 days.*

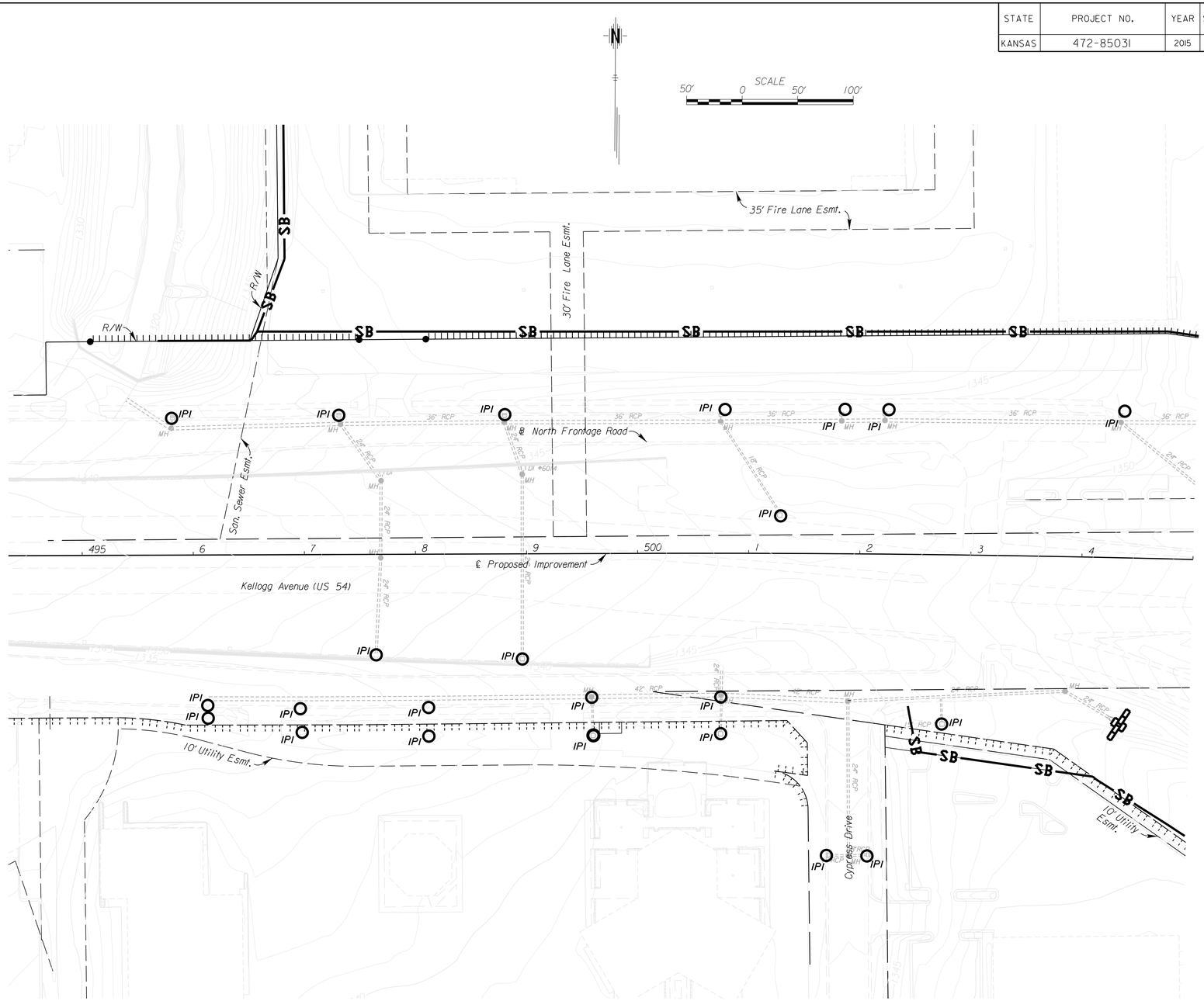
8. *Contractor is required by Part 7.2.3(11) of the NPDES General Permit to minimize off-site tracking of soils by utilizing wheel washing facilities or an appropriately designed construction entrance and exit. Off-site track out must be cleaned up at the end of each day. Part 7.2.9(1) requires that wash waters be free of detergents, soaps, or solvents and must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge. Site the construction entrances and exits with adequate site distance, temporary signage, and/or flaggers.*

9. *Contractor shall implement BMPs to maintain existing stream flow volumes through the project, and minimize sediment reaching them, in accordance with the Construction General Permit.*

10. *Strip and stockpile top 6" of existing topsoil. Over-cut excavations 6" and spread 6" of reclaimed topsoil over areas to be permanently seeded or sodded (subsidiary to Earthwork).*

11. *Phase I Pollution Control Plans include laying out perimeter controls for project, providing inlet protection for existing inlets in area of construction, and providing pollution control for temporary ramp construction.*

12. *Phase 2 Pollution Control Plans include back of curb protection for proposed curb and gutter areas, inlet protection for proposed inlets, and seeding of disturbed areas.*



LEGEND

BC	*BACK OF CURB PROTECTION*
SB	*SILT BARRIER FENCE*
	DITCH CHECK
IPI	*INLET PROTECTION FOR EXISTING INLETS*

CITY OF WICHITA

EAST KELLOGG

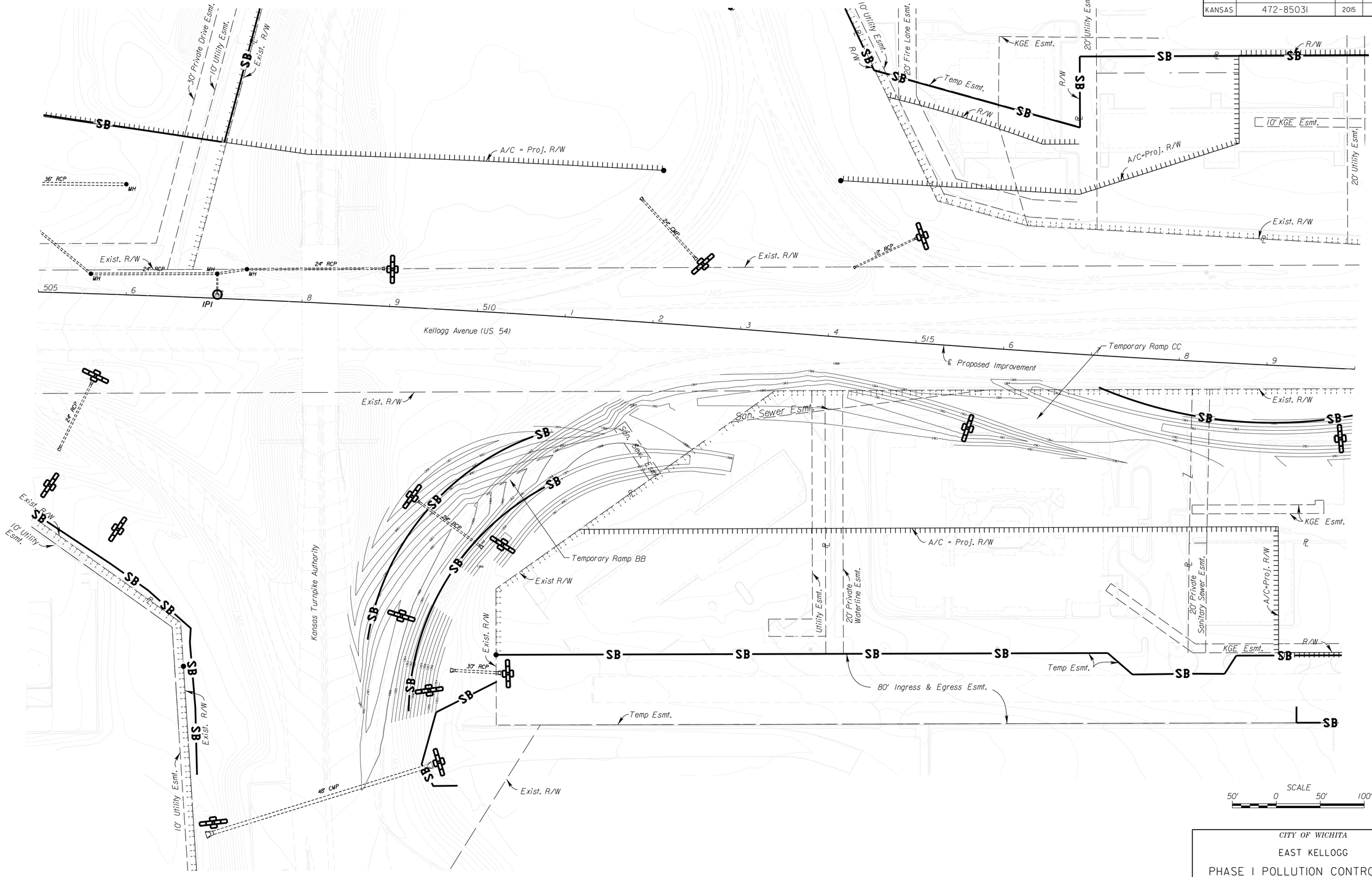
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	466	1055



CITY OF WICHITA

EAST KELLOGG

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	467	1055

SCALE
50' 0 50' 100'

Exist. R/W
66' Cities Service Gas Company Esmt.
Webb Road
Drainage Esmt.
Williams Natural Gas Co. Esmt.
City Service Gas Co. Esmt.
Gas Service Co. Esmt.
66' Williams Natural Gas Co. Esmt.
Temp. Esmt
R/W
SB
IPI
18" RCP
24" RCP
10' KGE Esmt.
Kellogg Avenue (US 54)
℄ Proposed Improvement
10' Gas Service Company Easement
20' Utility Esmt.
San. Sewer Esmt.
SWB Esmt.
5' Utility Esmt.
10' Utility Easement
30' Utility Easement
Wildcat Lane
KTA Drive
KGE Esmt.
66' Northwest Central Pipeline Corporation Esmt.
10520

CITY OF WICHITA

EAST KELLOGG

PHASE I POLLUTION CONTROL PLAN

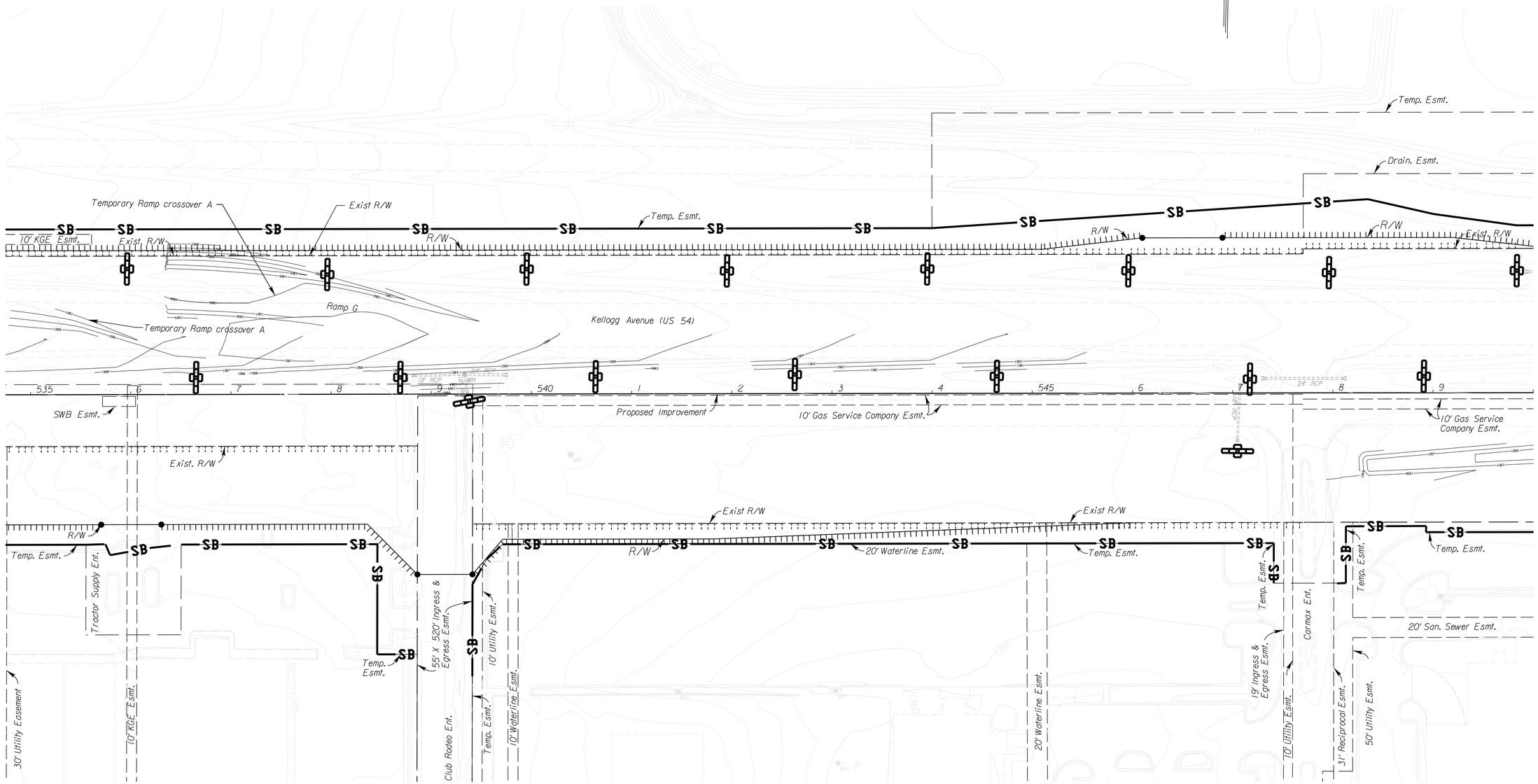
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	468	1055

SCALE
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CITY OF WICHITA

EAST KELLOGG

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	469	1055

SCALE
50' 0 50' 100'

N

Temp. Esmt.
Drain. Esmt.
R/W
Exist. R/W
24" RCP
Gas Service Esmt.
Kellogg Avenue (US 54)
Drain. Esmt.
Exist. R/W
℄ Proposed Improvement
18" RCP
10' Gas Service Company Esmt.
Kellogg Drive
Temporary Ramp DD
10' Gas Service Company Esmt.
Exist. R/W
Exist. R/W
Temp. Esmt.
20' Utility Esmt.
20' San. Sewer Esmt.
15" Waterline Esmt.
Exist. R/W
Chateau Street
R/W
Exist. R/W
20' Utility Esmt.
A/C
10' Utility Esmt.
R/W
R/W
8" Utility Esmt.
10' Utility Esmt.
R/W

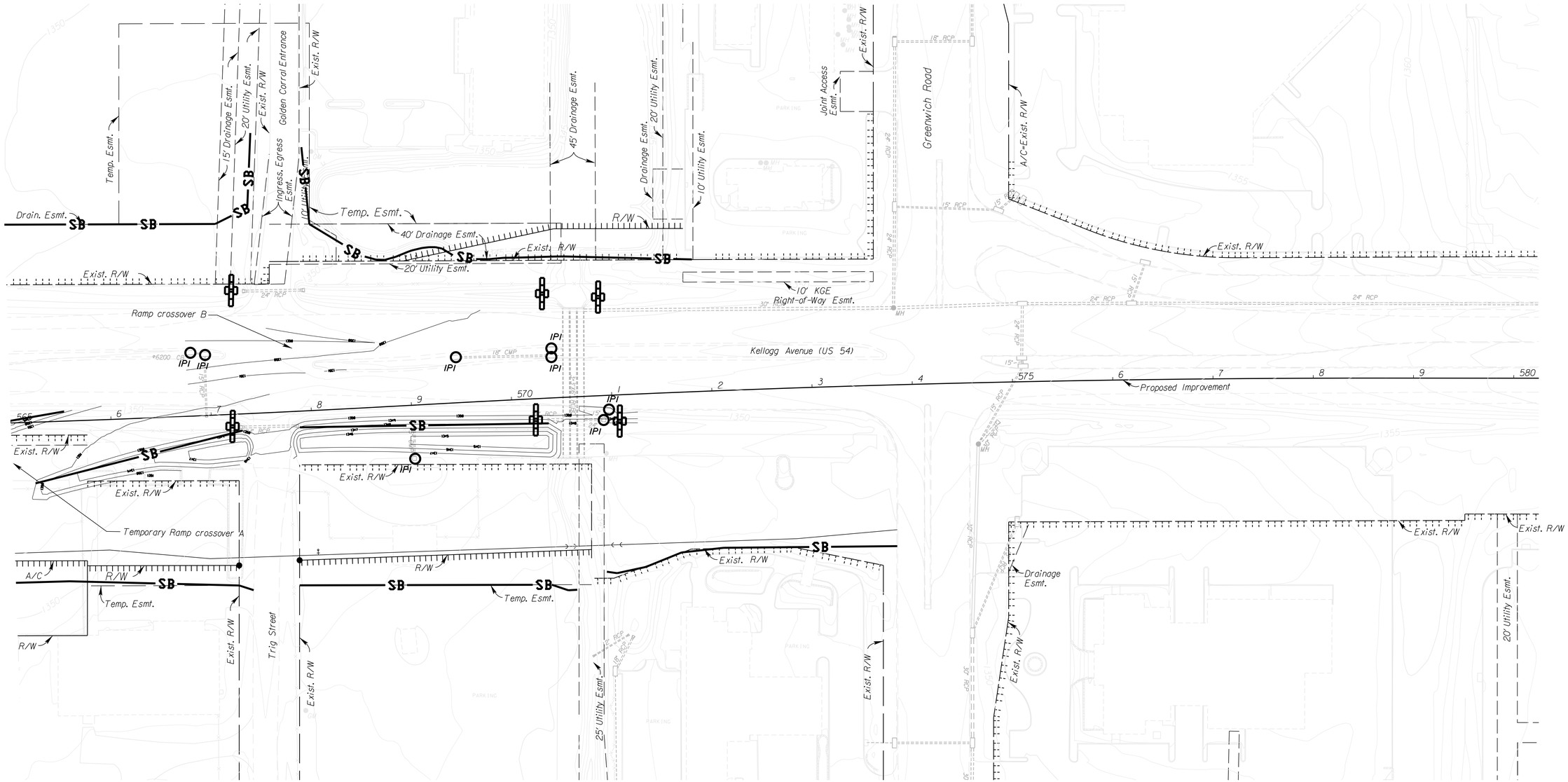
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	470	1055

SCALE 50' 0 50' 100'



CITY OF WICHITA

EAST KELLOGG

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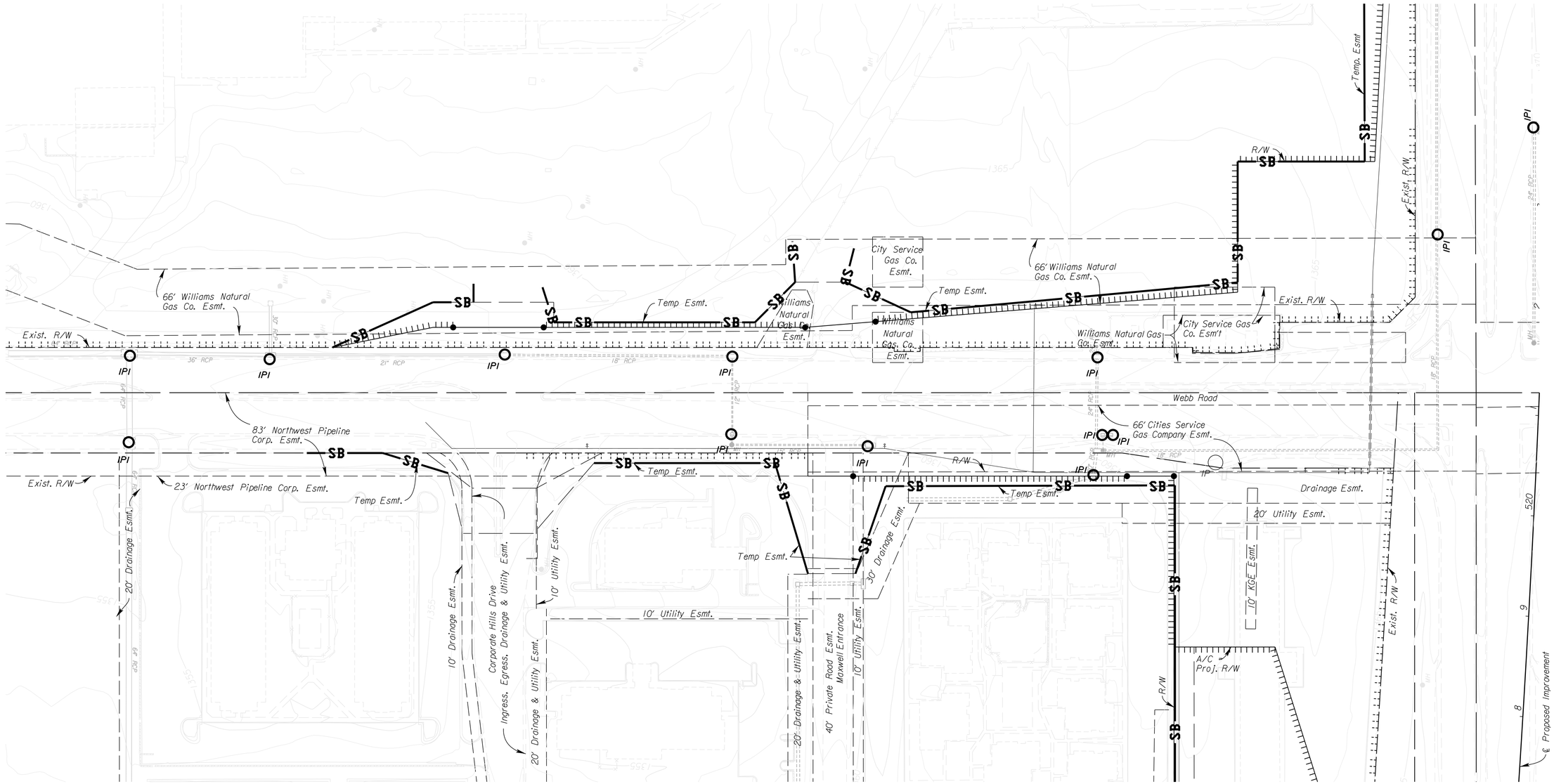
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	471	1055

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CITY OF WICHITA

WEBB ROAD

PHASE I POLLUTION CONTROL PLAN

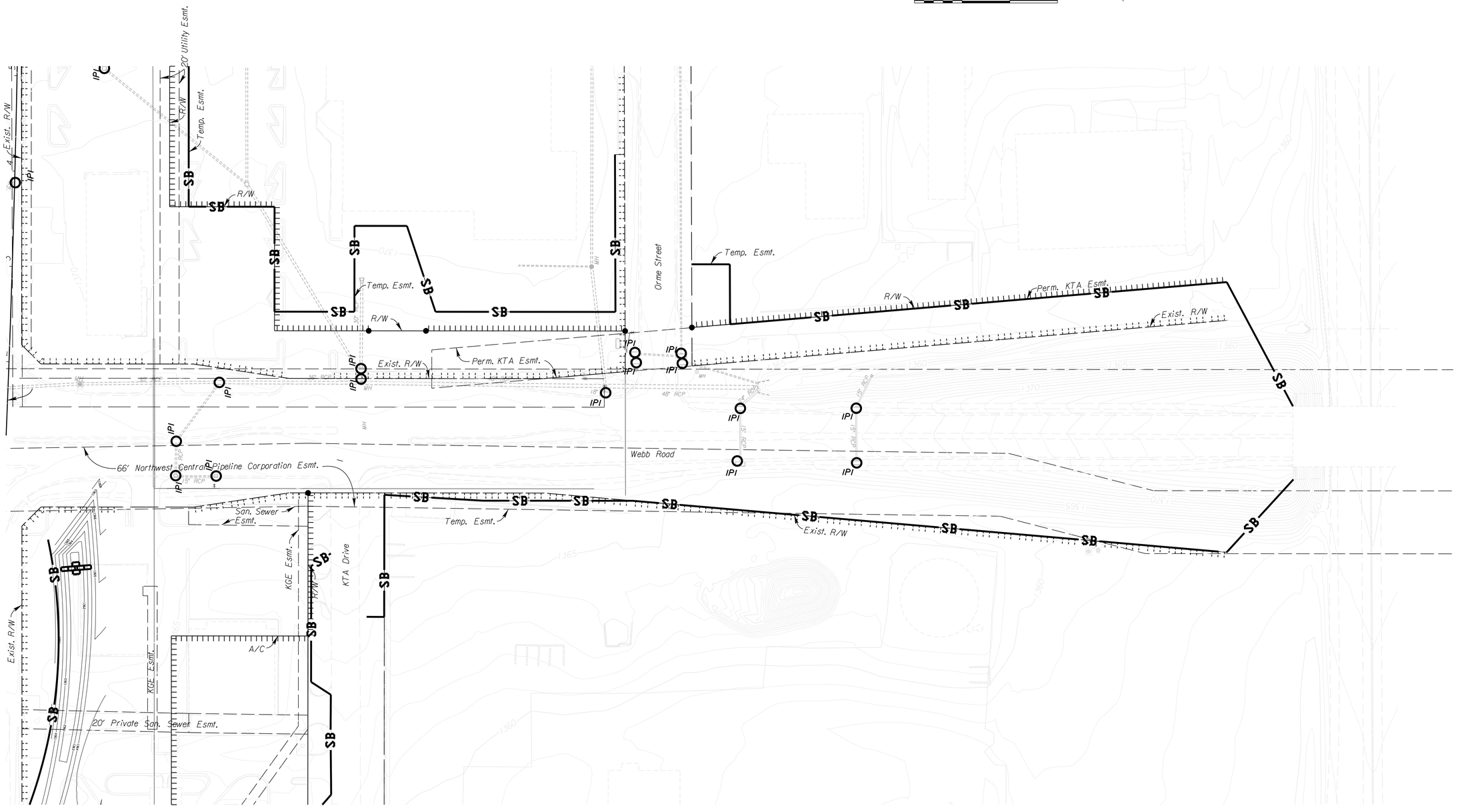
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	472	1055

SCALE
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CITY OF WICHITA
WEBB ROAD
PHASE I POLLUTION CONTROL PLAN
STA. 50+00 TO STA. 65+00

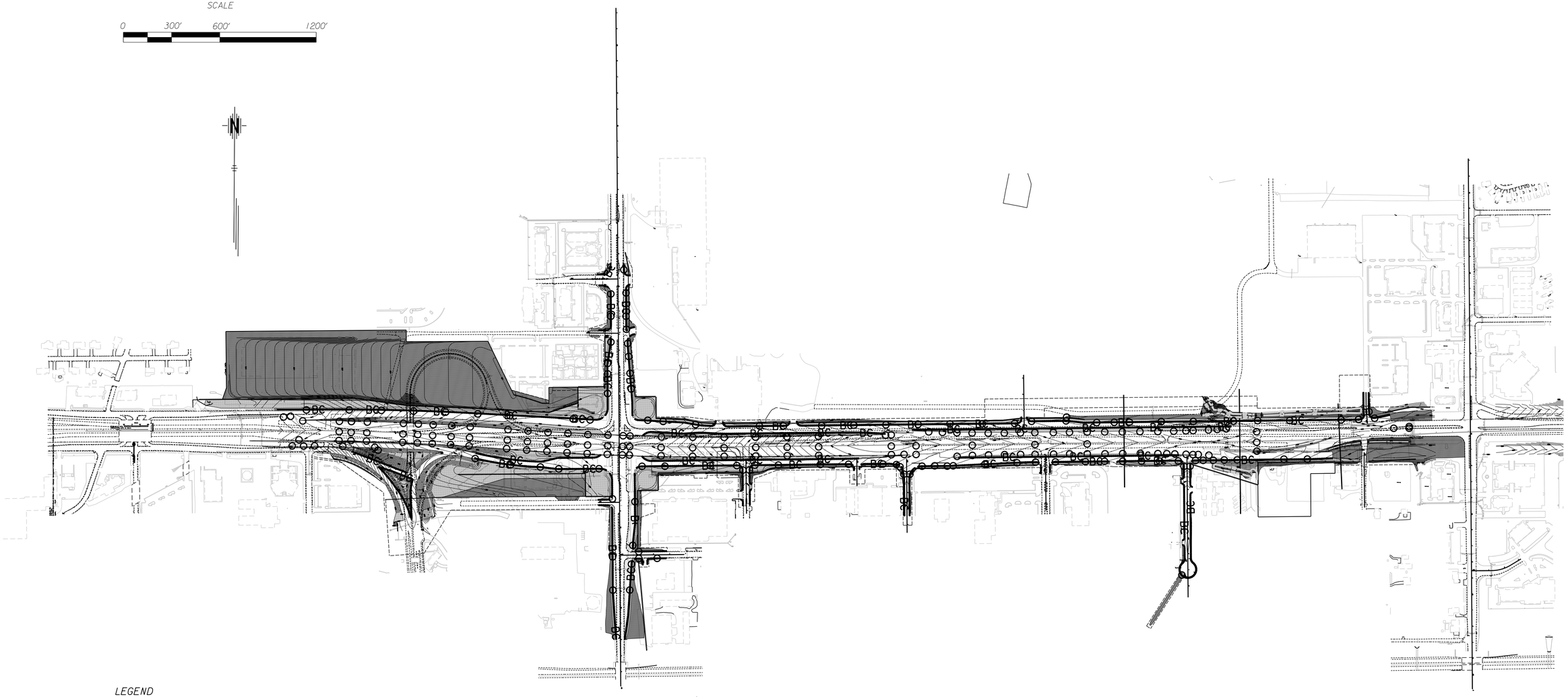
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	473	1055

SCALE

0 300' 600' 1200'



LEGEND

—— BC ——	BACK OF CURB PROTECTION
	DITCH CHECK
	INLET PROTECTION FOR PROPOSED INLETS
	EROSION CONTROL MAT
	TEMP. ANNUAL RYE MIX PERM. BUFFALO SEED
	TEMP. ANNUAL RYE MIX PERM. BUFFALO SOD

CITY OF WICHITA

EAST KELLOGG

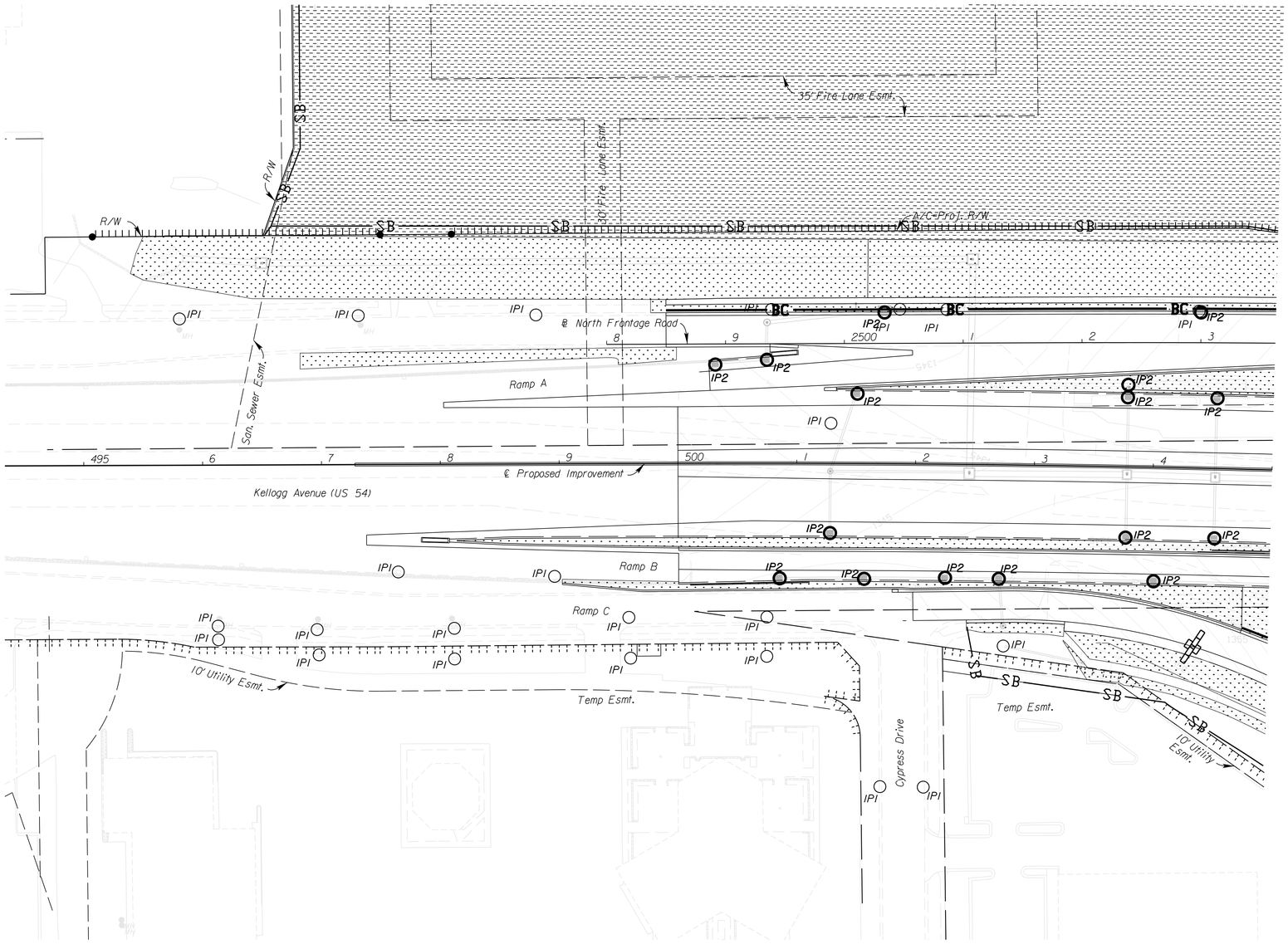
PHASE I POLLUTION CONTROL PLAN

STA. 495+00 TO STA. 580+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	474	1055



N

SCALE
50' 0 50' 100'

LEGEND

- BC — BACK OF CURB PROTECTION
- SB — SILT FENCE (INSTALLED IN PHASE 1)
- SB2 — SILT FENCE (INSTALLED IN PHASE 2)
- DITCH CHECK (INSTALLED IN PHASE 1)
- DITCH CHECK (INSTALLED IN PHASE 2)
- IP1 — INLET PROTECTION (FOR EXISTING INLETS)
- IP2 — INLET PROTECTION (FOR PROPOSED INLETS)
- TEMP. ANNUAL RYE MIX / PERM. BUFFALO SEED
- TEMP. ANNUAL RYE MIX / PERM. BUFFALO SOD
- TEMP. ANNUAL RYE MIX / PERM. SEE LANDSCAPE PLANS
- EROSION CONTROL MAT

CITY OF WICHITA

EAST KELLOGG

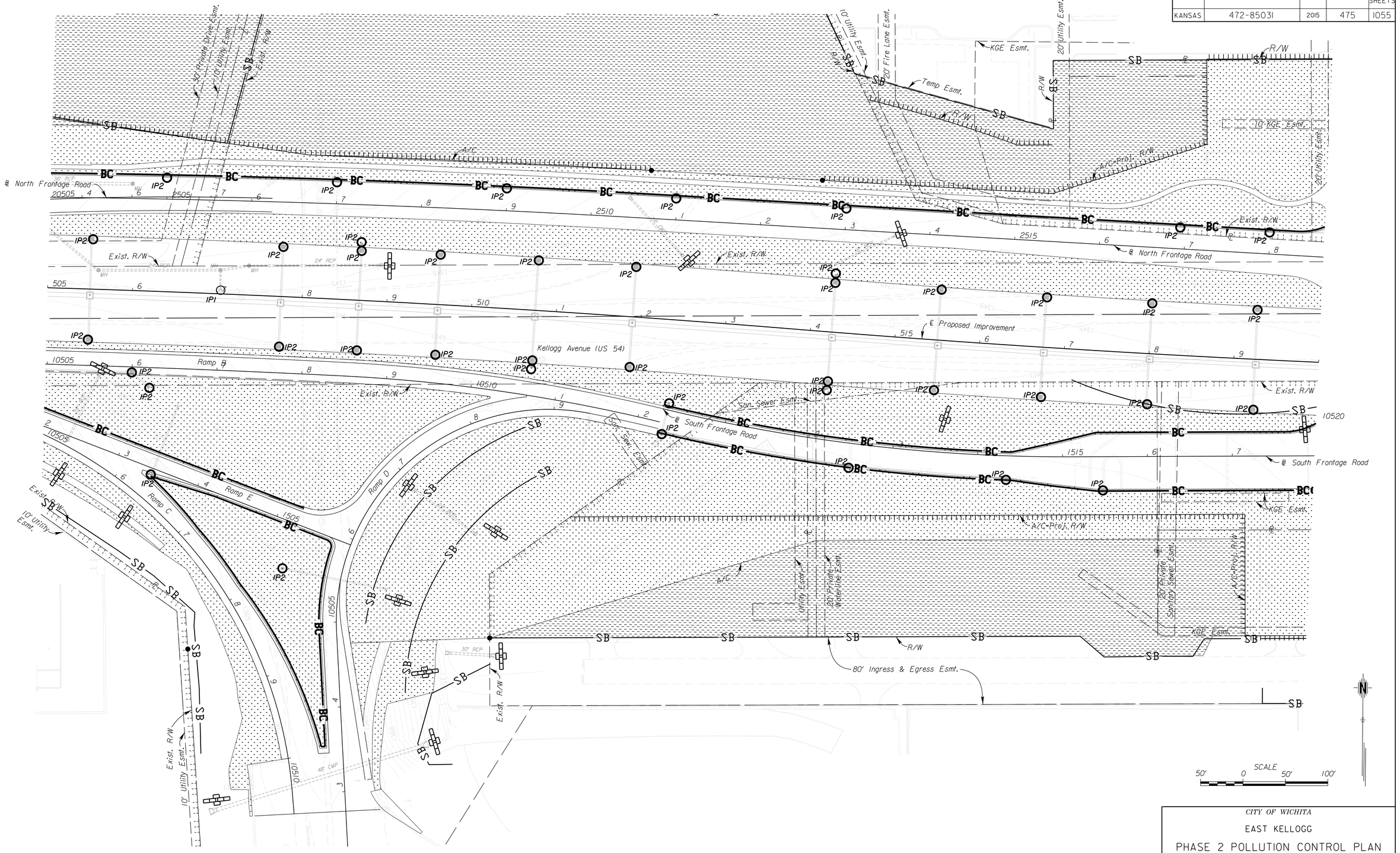
PHASE 2 POLLUTION CONTROL PLAN

STA. 495+00 TO STA. 505+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	475	1055



CITY OF WICHITA

EAST KELLOGG

PHASE 2 POLLUTION CONTROL PLAN

STA. 505+00 TO STA. 520+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	476	1055

SCALE
50' 0 50' 100'

N

Webb Road
66' Cities Service Gas Company Esmt.
20' Utility Esmt.
Drainage Esmt.
Exist. R/W
66' Williams Natural Gas Co. Esmt.
Williams Natural Gas Co. Esmt.
City Service Gas Co. Esmt.
Gas Service Co. Esmt.
Temp. Esmt.
@ North Frontage Road
Kellogg Avenue (US 54)
10' KGE Esmt.
@ Proposed Improvement
10' Gas Service Company Easement
@ Ramp E
@ South Frontage Road
SWB Esmt.
20' Utility Esmt.
Wildcat Lane
San. Sewer Esmt.
5' Utility Esmt.
Utility Easement
KGE Esmt.
66' Northwest Central Pipeline Corporation Esmt.
KTA Drive
R/W
SB
BC
IP1
IP2
P1
2520
2525
2530
1520
525
520

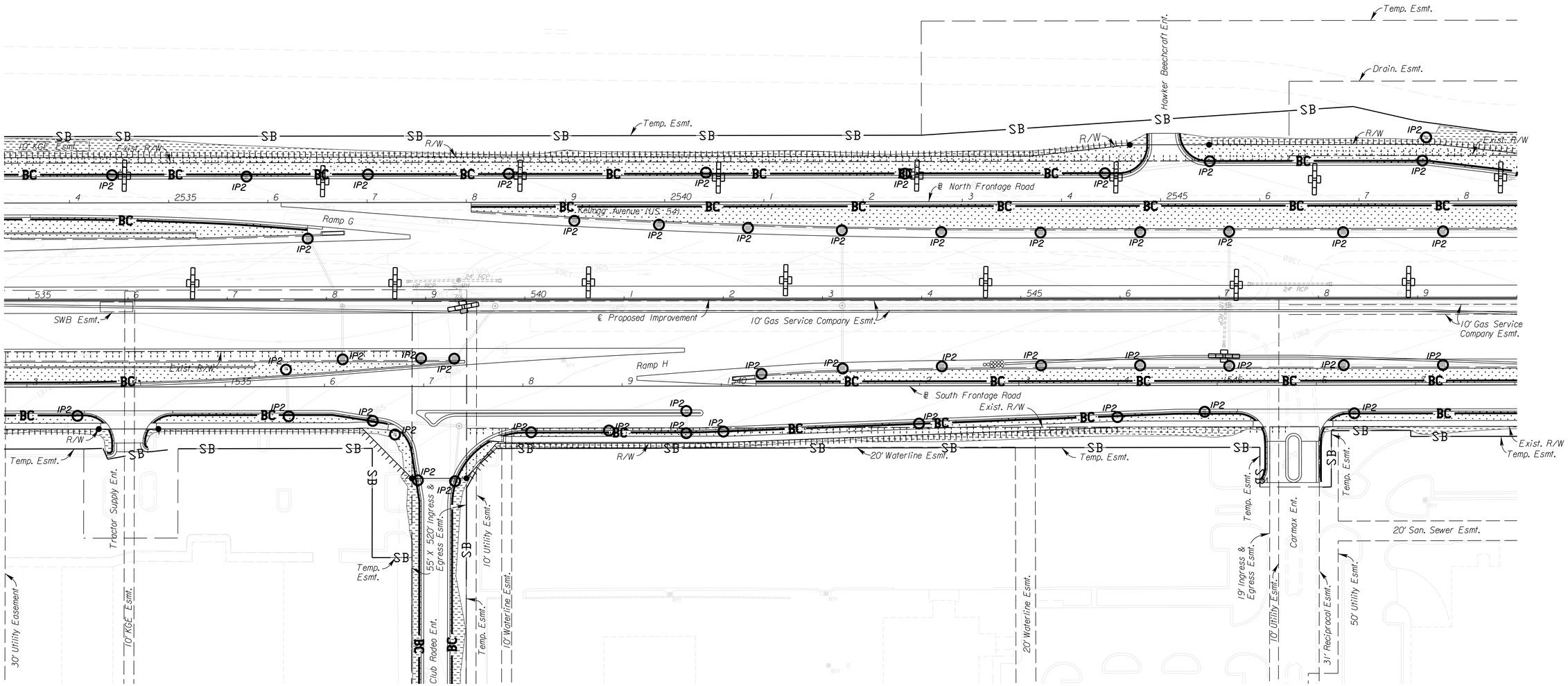
CITY OF WICHITA
EAST KELLOGG
PHASE 2 POLLUTION CONTROL PLAN
STA. 520+00 TO STA. 535+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	477	1055

SCALE
50' 0 50' 100'



CITY OF WICHITA

EAST KELLOGG

PHASE 2 POLLUTION CONTROL PLAN

STA. 535+00 TO STA. 550+00

477

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	478	1055

SCALE 50' 0 50' 100'

N

Temp. Esmt.
Drain. Esmt.
Drain. Esmt.
Const. Limits
R/W
Exist. R/W
Gas Service Esmt.
Exist. R/W
@ North Frontage Road
Kellogg Avenue (US-54)
Ramp J
℄ Proposed Improvement
Kellogg Drive
10' Gas Service Company Esmt.
10' Gas Service Company Esmt.
Exist. R/W
Exist. R/W
Ramp K
@ South Frontage Road
Exist. R/W
Temp. Esmt.
20' Utility Esmt.
20' San. Sewer Esmt.
15' Waterline Esmt.
Chateau Street
Exist. R/W
Exist. R/W
20' Utility Esmt.
A/C
10' Utility Esmt.
R/W
R/W
10' Utility Esmt.
8' Utility Esmt.
R/W

CITY OF WICHITA

EAST KELLOGG

PHASE 2 POLLUTION CONTROL PLAN

STA. 550+00 TO STA. 565+00

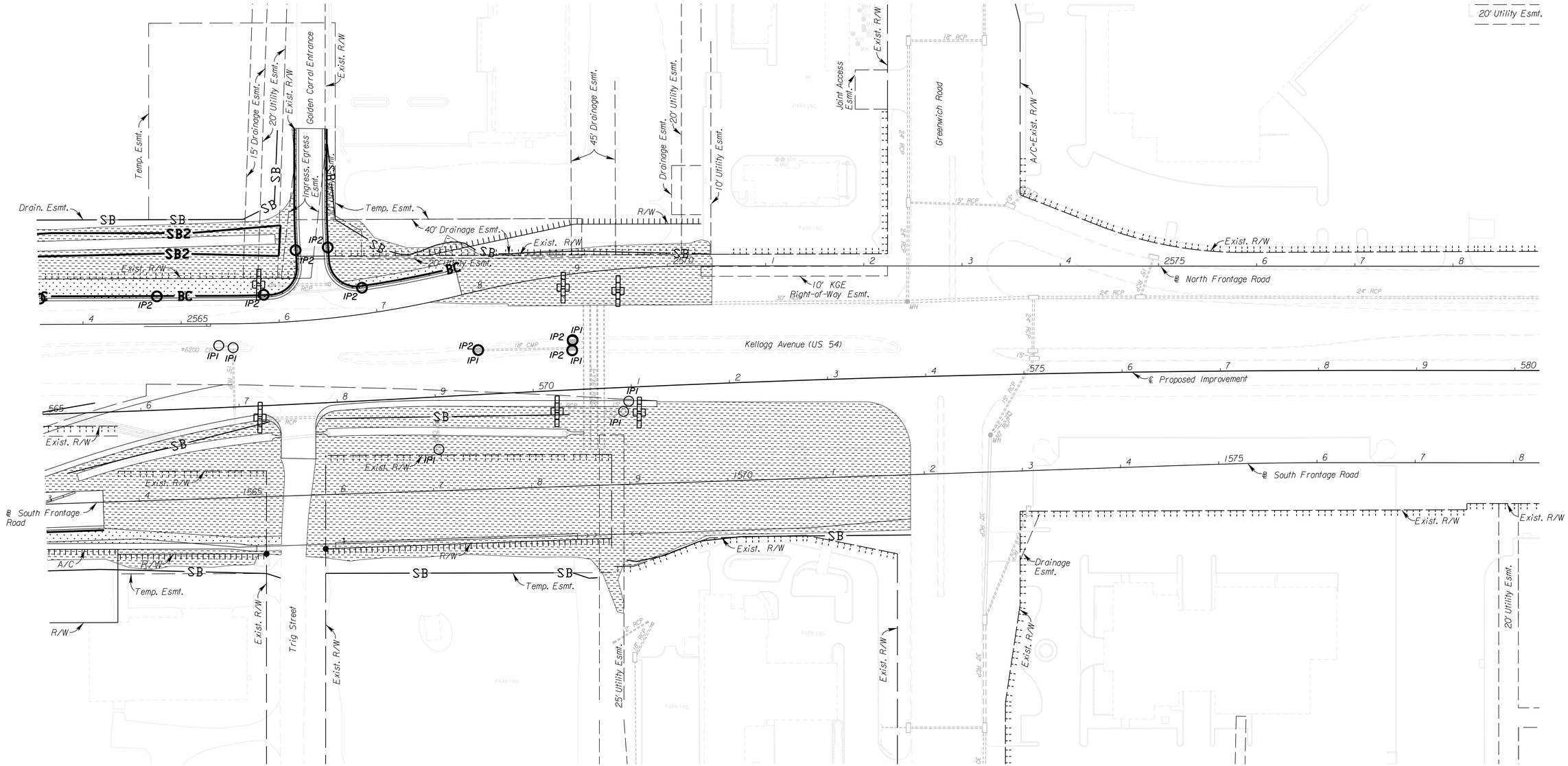
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	479	1055

SCALE 50' 0 50' 100'



CITY OF WICHITA

EAST KELLOGG

PHASE 2 POLLUTION CONTROL PLAN

STA. 565+00 TO STA. 580+00

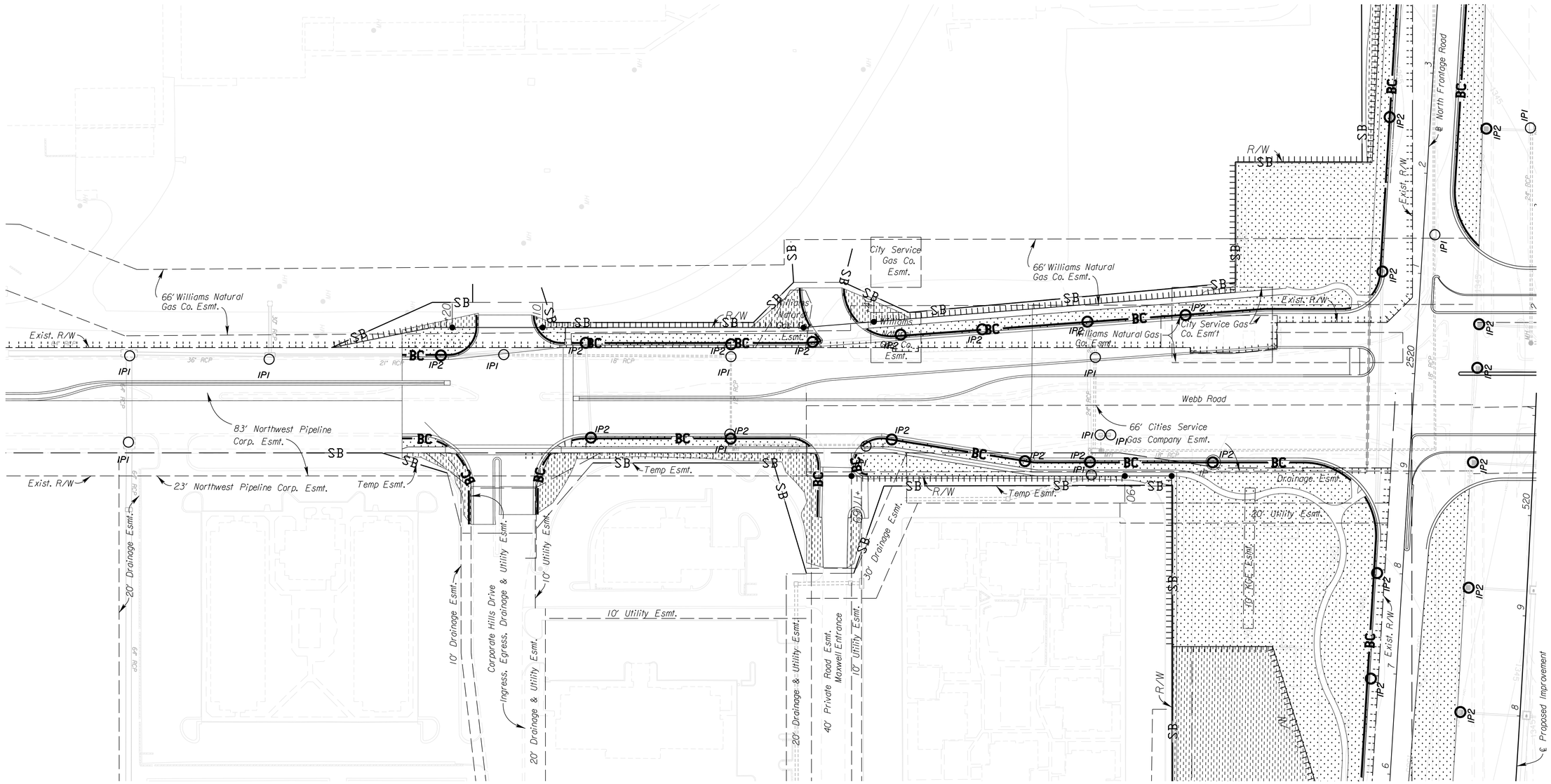
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	-			-	-	-	-

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	480	1055

SCALE 50' 0 50' 100'



CITY OF WICHITA

WEBB ROAD

PHASE 2 POLLUTION CONTROL PLAN

STA. 35+00 TO STA. 50+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	481	1055

SCALE
50' 0 50' 100'

N

Exist. R/W
@ South Frontage Road
20' Utility Esmt.
Temp. Esmt.
Proposed Improvement
Const. Limits
Orme Street
Perm. KTA Esmt.
Exist. R/W
Perm. KTA Esmt.
Exist. R/W
Const. Limits
66' Northwest Central Pipeline Corporation Esmt.
Webb Road
Temp. Esmt.
Exist. R/W
Exist. R/W
San. Sewer Esmt.
KG&E Esmt.
KTA Drive
KG&E Esmt.
20' Private San. Sewer Esmt.
Const. Limits

SB BC IP1 IP2

CITY OF WICHITA

WEBB ROAD

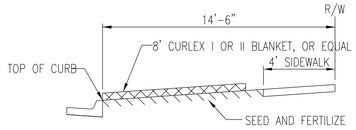
PHASE 2 POLLUTION CONTROL PLAN

STA. 50+00 TO STA. 65+00

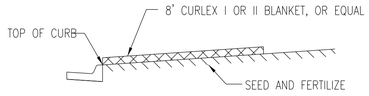
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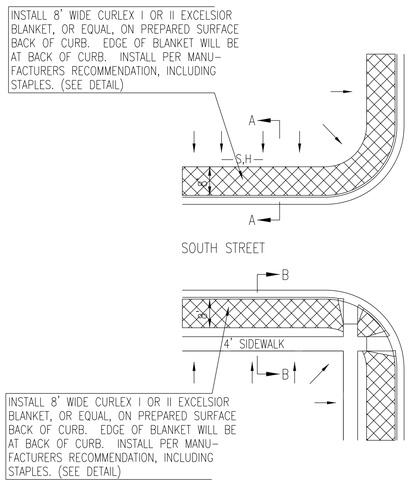
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SECTION B-B



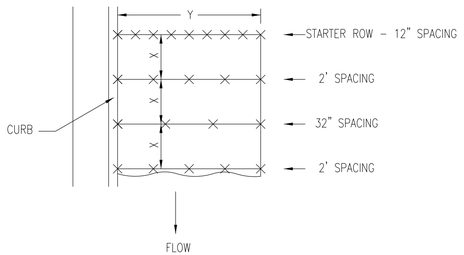
SECTION A-A



GENERAL NOTES

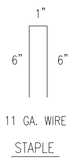
1. EXCELSIOR MAT TO BE INSTALLED WHEN SOD IS NOT SPECIFIED ON PROJECT.
2. EXCELSIOR BLANKET TO BE INSTALLED OVER SEED AND FERTILIZER, AS SPECIFIED IN THE PROJECT SPECIFICATIONS.
3. AFTER INSTALLATION OF EXCELSIOR BLANKET, AT LOCATIONS WHERE CONCENTRATED FLOW CARRIES SEDIMENT OVER THE CURB AND INTO THE GUTTER, SUPPLEMENTAL EROSION CONTROL DEVICES WILL BE INSTALLED BY THE CONTRACTOR AS NEEDED, TO FIX THE PROBLEM.

BACK OF CURB PROTECTION DETAIL



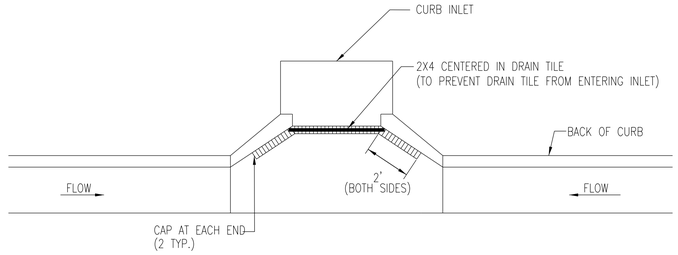
STAPLE PATTERN

NOTES: USE 6" SEAM OVERLAP
(X & Y = RECOMMENDED BY MANUFACTURE)



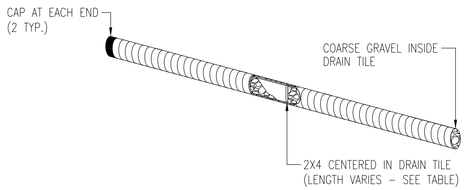
STAPLE

DETAILS FOR APPROVED EROSION CONTROL MAT



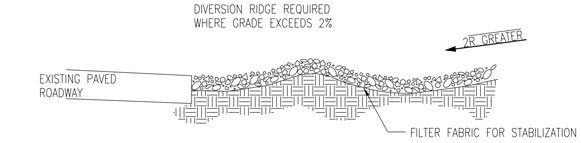
NOTE:
PLACE 4" PERFORATED PVC PIPE, FILLED WITH 1/2"-1" DIA. GRAVEL, IN FRONT OF CURB INLET AS SHOWN.

2X4 LENGTH	INLET TYPE	INLET OPENING
5'-6"	1-A	5'-0"
10'-6"	1-A	10'-0"
15'-6"	1-A	15'-0"

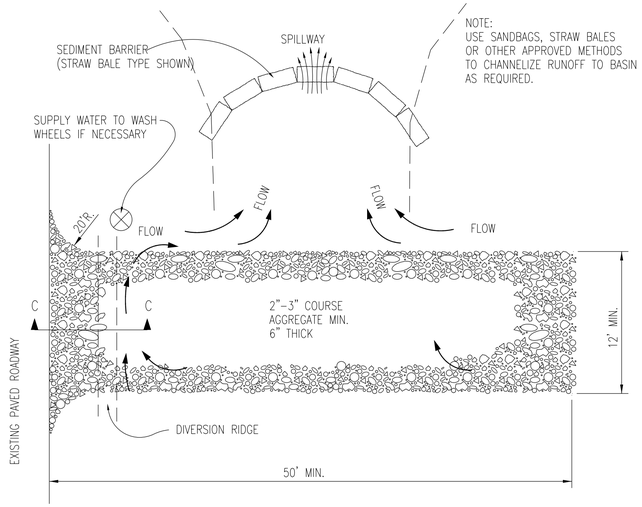


CURB INLET PROTECTION

4" PERFORATED PIPE W/ GRAVEL



SECTION C-C



STABILIZED CONSTRUCTION ENTRANCE

GENERAL NOTES

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN, AS SHOWN ABOVE.
4. DRIVE ENTRANCES ONTO RESIDENTIAL LOTS WILL NOT BE REQUIRED TO HAVE THE SEDIMENT BARRIER SHOWN, BUT WHEEL WASHING MAY BE REQUIRED IF STABILIZED ENTRANCE IS NOT SUFFICIENT TO KEEP MUD FROM BEING TRACKED ONTO ADJACENT STREET. ENTRANCE SHALL EXTEND FROM BACK OF CURB TO DWELLING.

REVISION DATE: MAY 2013

CITY OF WICHITA
PUBLIC WORKS & UTILITIES
ENGINEERING DIVISION

BACK OF CURB PROTECTION, CURB INLET PROTECTION AND CONSTRUCTION ENTRANCE

CITY ENGINEER
GARY JANZEN, P.E.

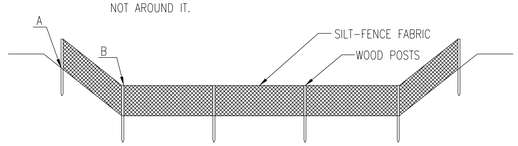
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	

CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

SHEET
482 of 1055

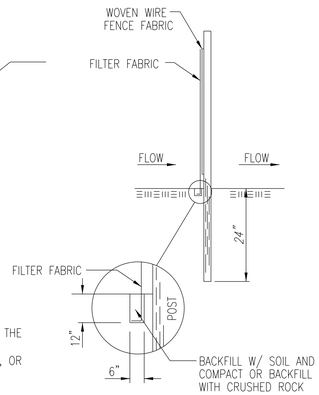
SW-501

NOTE: POINT A MUST BE HIGHER THAN POINT B SO THAT WATER FLOWS OVER THE SILT FENCE FABRIC AND NOT AROUND IT.



ELEVATION

SILT FENCE DITCH CHECKS
(STREAM PROTECTION)



ANCHOR TRENCH DETAIL

MATERIAL SPECIFICATION:

SILT FENCE FABRIC SHOULD CONFORM TO THE AASHTO M288 96 SILT FENCE SPECIFICATION.
THE POSTS USED TO SUPPORT THE SILT FENCE FABRIC SHOULD BE A HARDWOOD MATERIAL WITH THE FOLLOWING MINIMUM DIMENSIONS: 2" SQUARE (NOMINAL) BY 4' LONG.
SILT FENCE FABRIC SHOULD BE ATTACHED TO THE WOODEN POSTS WITH STAPLES, WIRE, ZIP TIES, OR NAILS.

PLACEMENT:

PLACE SILT FENCE IN DITCHES WHERE IT IS UNLIKELY THAT IT WILL BE OVERTOPPED.
WATER SHOULD FLOW THROUGH A SILT FENCE DITCH CHECK, NOT OVER IT. SILT FENCE DITCH CHECKS OFTEN FAIL WHEN OVERTOPPED.
SILT FENCE DITCH CHECKS SHOULD BE PLACED PERPENDICULAR TO THE FLOWLINE OF THE DITCH.
THE SILT FENCE SHOULD EXTEND FAR ENOUGH SO THAT THE GROUND LEVEL AT THE ENDS OF THE FENCE IS HIGHER THAN THE TOP OF THE LOW POINT OF THE FENCE. THIS PREVENTS WATER FROM FLOWING AROUND THE CHECK.
SILT FENCE DITCH CHECKS SHOULD NOT BE PLACED IN DITCHES WHERE HIGH FLOWS ARE EXPECTED. ROCK CHECKS SHOULD BE USED INSTEAD.
SILT FENCE SHOULD BE PLACED IN DITCHES WITH SLOPES OF 6% OR LESS. FOR SLOPES STEEPER THAN 6%, ROCK CHECKS SHOULD BE USED.

THE FOLLOWING TABLE PROVIDES CHECK SPACING FOR A GIVEN DITCH GRADE:

DITCH GRADE (%)	CHECK SPACING (FEET)
0.5	200
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	30

PROPER INSTALLATION METHOD:

EXCAVATE A TRENCH PERPENDICULAR TO THE DITCH FLOWLINE THAT IS AT LEAST 12" DEEP BY 6" WIDE.
EXTEND THE TRENCH IN A STRAIGHT LINE ALONG THE ENTIRE LENGTH OF THE PROPOSED DITCH CHECK.
PLACE THE SOIL ON THE UPSTREAM SIDE OF THE TRENCH FOR LATER USE.
ROLL OUT A CONTINUOUS LENGTH OF SILT FENCE FABRIC ON THE DOWNSTREAM SIDE OF THE TRENCH.
PLACE THE EDGE OF THE FABRIC IN THE TRENCH STARTING AT THE TOP UPSTREAM EDGE OF THE TRENCH.
LINE TWO SIDES OF THE TRENCH WITH THE FABRIC AS SHOWN ON DETAIL. BACKFILL OVER THE FABRIC IN THE TRENCH WITH THE EXCAVATED SOIL AND COMPACT. AFTER FILLING THE TRENCH, APPROXIMATELY 24" TO 36" OF SILT FENCE FABRIC SHOULD REMAIN EXPOSED.
LAY THE EXPOSED SILT FENCE ON THE UPSTREAM SIDE OF THE TRENCH TO CLEAR AN AREA FOR DRIVING IN THE POSTS. JUST DOWNSTREAM OF THE TRENCH, DRIVE POSTS INTO THE GROUND TO A DEPTH OF AT LEAST 24". PLACE POSTS NO MORE THAN 4' APART.
ATTACH THE SILT FENCE TO THE ANCHORED POST WITH STAPLES, WIRE, ZIP TIES, OR NAILS.

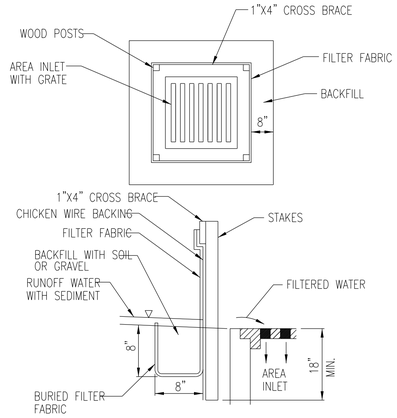
LIST OF COMMON PLACEMENT/INSTALLATION MISTAKES TO AVOID:

WATER SHOULD FLOW THROUGH A SILT FENCE DITCH CHECK-NOT OVER IT. PLACE SILT FENCE IN DITCHES WHERE IT IS UNLIKELY THAT IT WILL BE OVERTOPPED. SILT FENCE INSTALLATIONS QUICKLY DETERIORATE WHEN WATER OVERTOPS THEM.
DO NOT PLACE SILT FENCE POSTS ON THE UPSTREAM SIDE OF THE SILT FENCE FABRIC. IN THIS CONFIGURATION, THE FORCE OF THE WATER IS NOT RESTRICTED BY THE POSTS, BUT ONLY BY THE STAPLES (WIRE, ZIP TIES, NAILS, ETC.). THE SILT FENCE WILL RIP AND FAIL.
DO NOT PLACE A SILT FENCE DITCH CHECK DIRECTLY IN FRONT OF A CULVERT OUTLET. IT WILL NOT STAND UP TO THE CONCENTRATED FLOW.
DO NOT PLACE SILT FENCE DITCH CHECKS IN DITCHES THAT WILL LIKELY EXPERIENCE HIGH FLOWS. THEY WILL NOT STAND UP TO CONCENTRATED FLOW.
FOLLOW PRESCRIBED DITCH CHECK SPACING GUIDELINES. IF SPACING GUIDELINES ARE EXCEEDED, EROSION WILL OCCUR BETWEEN THE DITCH CHECKS.
DO NOT ALLOW WATER TO FLOW AROUND THE DITCH CHECK. MAKE SURE THAT THE DITCH CHECK IS LONG ENOUGH SO THAT THE GROUND LEVEL AT THE ENDS OF THE FENCE IS HIGHER THAN THE LOW POINT ON THE TOP OF THE FENCE.
DO NOT PLACE SILT FENCE DITCH CHECKS IN CHANNELS WITH SHALLOW SOILS UNDERLAIN BY ROCK. IF THE CHECK IS NOT ANCHORED SUFFICIENTLY, IT WILL WASH OUT.

INSPECTION AND MAINTENANCE:

SILT FENCE DITCH CHECKS SHOULD BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL OF 1/2" OR MORE. THE FOLLOWING IS A LIST OF QUESTIONS THAT SHOULD BE ADDRESSED DURING EACH INSPECTION:

DOES WATER FLOW AROUND THE DITCH CHECK?
DOES WATER FLOW UNDER THE DITCH CHECK?
DOES THE SILT FENCE SAG EXCESSIVELY?
HAS THE SILT FENCE TORN OR BECOME DETACHED FROM THE POSTS?
DOES SEDIMENT NEED TO BE REMOVED FROM BEHIND THE DITCH CHECK?



SILT FENCE BARRIERS FOR AREA INLETS
(INLET PROTECTION)

MATERIAL SPECIFICATION:

SILT FENCE FABRIC SHOULD CONFORM TO THE AASHTO M288 96 SILT FENCE SPECIFICATION.
THE WIRE OR POLYMERIC MESH BACKING USED TO HELP SUPPORT THE SILT FENCE FABRIC SHOULD CONFORM TO THE AASHTO M288 96 SILT FENCE SPECIFICATION.
THE POSTS USED TO SUPPORT THE SILT FENCE FABRIC SHOULD BE A HARDWOOD MATERIAL WITH THE FOLLOWING MINIMUM DIMENSIONS: 2" SQUARE (NOMINAL) BY 4' LONG.
THE MATERIAL USED TO FRAME THE TOPS OF THE POSTS SHOULD BE 1" BY 4" BOARDS.
SILT FENCE FABRIC AND SUPPORT BACKING SHOULD BE ATTACHED TO THE WOODEN POSTS AND FRAME WITH STAPLES, WIRE, ZIP TIES, OR NAILS.

PLACEMENT:

PLACE A SILT FENCE DROP INLET BARRIER IN A LOCATION WHERE IT IS UNLIKELY TO BE OVERTOPPED.
WATER SHOULD FLOW THROUGH SILT FENCE, NOT OVER IT. SILT FENCE BARRIERS FOR AREA INLETS OFTEN FAIL WHEN REPEATEDLY OVERTOPPED.
WHEN USED AS A BARRIER FOR AREA INLETS, SILT FENCE FABRIC AND POSTS MUST BE SUPPORTED AT THE TOP BY A WOODEN FRAME.
WHEN A SILT FENCE BARRIER FOR AREA INLETS IS LOCATED NEAR AN INLET THAT HAS STEEP APPROACH SLOPES, THE STORAGE CAPACITY BEHIND THE BARRIER IS DRASTICALLY REDUCED. TIMELY REMOVAL OF SEDIMENT MUST OCCUR FOR A BARRIER TO OPERATE PROPERLY IN THIS LOCATION.

PROPER INSTALLATION METHOD:

EXCAVATE A TRENCH AROUND THE PERIMETER OF THE AREA INLET THAT IS AT LEAST 8" DEEP BY 8" WIDE.
DRIVE POSTS TO A DEPTH OF AT LEAST 18" AROUND THE PERIMETER OF THE AREA INLET.
THE DISTANCE BETWEEN POSTS SHOULD BE 4' OR LESS. IF THE DISTANCE BETWEEN TWO ADJACENT CORNER POSTS IS MORE THAN 4', ADD ANOTHER POST(S) BETWEEN THEM.
CONNECT THE TOPS OF ALL THE POSTS WITH A WOODEN FRAME MADE OF 1" BY 4" BOARDS. USE NAILS OR SCREWS FOR FASTENING.
ATTACH THE WIRE OR POLYMERIC-MESH BACKING TO THE OUTSIDE OF THE POST/FRAME STRUCTURE WITH STAPLES, WIRE, ZIP TIES, OR NAILS.
ROLL OUT A CONTINUOUS LENGTH OF SILT FENCE FABRIC LONG ENOUGH TO WRAP AROUND THE PERIMETER OF THE AREA INLET. ADD MORE LENGTH FOR OVERLAPPING THE FABRIC JOINT. PLACE THE EDGE OF THE FABRIC IN THE TRENCH, STARTING AT THE OUTSIDE EDGE OF THE TRENCH. LINE ALL THREE SIDES OF THE TRENCH WITH THE FABRIC. BACKFILL OVER THE FABRIC IN THE TRENCH WITH THE EXCAVATED SOIL AND COMPACT. AFTER FILLING THE TRENCH, APPROXIMATELY 24" TO 36" OF SILT FENCE FABRIC SHOULD REMAIN EXPOSED.
ATTACH THE SILT FENCE TO THE OUTSIDE OF THE POST/FRAME STRUCTURE WITH STAPLES, WIRE, ZIP TIES, OR NAILS. THE JOINT SHOULD BE OVERLAPPED TO THE NEXT POST.

NOTE: WHEN A SILT FENCE BARRIER FOR AREA INLET IS PLACED IN A SHALLOW MEDIAN DITCH, MAKE SURE THAT THE TOP OF THE BARRIER IS NOT HIGHER THAN THE PAVED ROAD. IN THIS CONFIGURATION, WATER MAY SPREAD ONTO THE ROADWAY CAUSING A HAZARDOUS CONDITION.

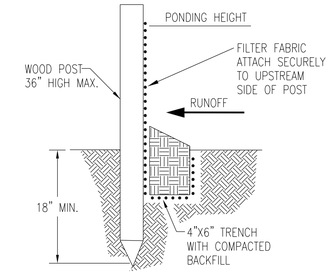
LIST OF COMMON PLACEMENT/INSTALLATION MISTAKES TO AVOID:

WATER SHOULD FLOW THROUGH A SILT FENCE BARRIER FOR AREA INLET-NOT OVER IT. PLACE A SILT FENCE BARRIER FOR AREA INLET IN A LOCATION WHERE IT IS UNLIKELY TO BE OVERTOPPED. SILT FENCE BARRIER FOR AREA INLETS OFTEN FAIL WHEN REPEATEDLY OVERTOPPED.
DO NOT PLACE POSTS ON THE OUTSIDE OF THE SILT FENCE BARRIER FOR AREA INLET. IN THIS CONFIGURATION, THE FORCE OF THE WATER IS NOT RESISTED BY THE POSTS, BUT ONLY BY THE STAPLES (WIRE, ZIP TIES, NAILS, ETC.). THE SILT FENCE WILL RIP AND FAIL.
DO NOT INSTALL SILT FENCE BARRIER FOR AREA INLETS WITHOUT FRAMING THE TOP OF THE POSTS.
THE CORNER POSTS AROUND AREA INLETS ARE STRESSED IN TWO DIRECTIONS WHEREAS A NORMAL SILT FENCE IS ONLY STRESSED IN ONE DIRECTION. THIS ADDED STRESS REQUIRES MORE SUPPORT.

INSPECTION AND MAINTENANCE:

SILT FENCE BARRIER FOR AREA INLETS SHOULD BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL OF 1/2" OR MORE. THE FOLLOWING IS A LIST OF QUESTIONS THAT SHOULD BE ADDRESSED DURING EACH INSPECTION:

DOES WATER FLOW UNDER THE SILT FENCE?
DOES THE SILT FENCE SAG EXCESSIVELY?
HAS THE SILT FENCE TORN OR BECOME DETACHED FROM THE POSTS?
DOES SEDIMENT NEED TO BE REMOVED FROM BEHIND THE AREA INLET BARRIER?



SILT FENCE BARRIERS

MATERIAL SPECIFICATION:

SILT FENCE FABRIC SHOULD CONFORM TO THE AASHTO M288 96 SILT FENCE SPECIFICATION.
THE POSTS USED TO SUPPORT THE SILT FENCE FABRIC SHOULD BE A HARDWOOD MATERIAL WITH THE FOLLOWING MINIMUM DIMENSIONS: 2" SQUARE (NOMINAL) BY 4' LONG.
SILT FENCE FABRIC SHOULD BE ATTACHED TO THE WOODEN POSTS WITH STAPLES, WIRE, ZIP TIES, OR NAILS.

PLACEMENT:

A SLOPE BARRIER SHOULD BE USED AT THE TOE OF A SLOPE WHEN A DITCH DOES NOT EXIST. THE SLOPE BARRIER SHOULD BE PLACED ON NEARLY LEVEL GROUND 5' TO 10' AWAY FROM THE TOE OF A SLOPE. THE BARRIER IS PLACED AWAY FROM THE TOE OF THE SLOPE TO PROVIDE ADEQUATE STORAGE FOR SETTLING OUT SEDIMENT.
WHEN PRACTICABLE, SILT FENCE SLOPE BARRIERS SHOULD BE PLACED ALONG CONTOURS TO AVOID A CONCENTRATION OF FLOW.
SILT FENCE SLOPE BARRIERS CAN ALSO BE PLACED ALONG RIGHT-OF-WAY FENCE LINES TO KEEP SEDIMENT FROM CROSSING ONTO ADJACENT PROPERTY. WHEN PLACED IN THIS MANNER, THE SLOPE BARRIER WILL NOT LIKELY FOLLOW CONTOURS.

PROPER INSTALLATION METHOD:

EXCAVATE A TRENCH THE LENGTH OF THE PLANNED SLOPE BARRIER THAT IS 6" DEEP BY 4" WIDE.
MAKE SURE THAT THE TRENCH IS EXCAVATED ALONG A SINGLE CONTOUR. WHEN PRACTICABLE, SLOPE BARRIERS SHOULD BE PLACED ALONG CONTOURS TO AVOID A CONCENTRATION OF FLOW. PLACE THE SOIL ON THE UPSLOPE SIDE OF THE TRENCH FOR LATER USE.
ROLL OUT A CONTINUOUS LENGTH OF SILT FENCE FABRIC ON THE DOWNSLOPE SIDE OF THE TRENCH.
PLACE THE EDGE OF THE FABRIC IN THE TRENCH STARTING AT THE TOP UPSLOPE EDGE. LINE ALL THREE SIDES OF THE TRENCH WITH THE FABRIC. BACKFILL OVER THE FABRIC IN THE TRENCH WITH THE EXCAVATED SOIL AND COMPACT. AFTER FILLING THE TRENCH, APPROXIMATELY 24" TO 36" OF SILT-FENCE FABRIC SHOULD REMAIN EXPOSED.
LAY THE EXPOSED SILT FENCE UPSLOPE OF THE TRENCH TO CLEAR AN AREA FOR DRIVING IN THE POSTS. JUST DOWNSLOPE OF THE TRENCH, DRIVE POSTS INTO THE GROUND TO A DEPTH OF AT LEAST 18".
PLACE POSTS NO MORE THAN 4' APART.
ATTACH THE SILT FENCE TO THE ANCHORED POST WITH STAPLES, WIRE, ZIP TIES, OR NAILS.

LIST OF COMMON PLACEMENT/INSTALLATION MISTAKES TO AVOID:

WHEN PRACTICABLE, DO NOT PLACE SILT FENCE SLOPE BARRIERS ACROSS CONTOURS. SLOPE BARRIERS SHOULD BE PLACED ALONG CONTOURS TO AVOID A CONCENTRATION OF FLOW. WHEN THE FLOW CONCENTRATES, IT OVERTOPS THE BARRIER AND THE SILT FENCE SLOPE BARRIER QUICKLY DETERIORATES.
DO NOT PLACE SILT-FENCE POSTS ON THE UPSLOPE SIDE OF THE SILT FENCE FABRIC. IN THIS CONFIGURATION, THE FORCE OF THE WATER IS NOT RESTRICTED BY THE POSTS, BUT ONLY BY THE STAPLES (WIRE, ZIP TIES, NAILS, ETC.). THE SILT FENCE WILL RIP AND FAIL.
DO NOT PLACE SILT FENCE SLOPE BARRIERS IN AREAS WITH SHALLOW SOILS UNDERLAIN BY ROCK. IF THE BARRIER IS NOT SUFFICIENTLY ANCHORED, IT WILL WASH OUT.
SILT FENCE SLOPE BARRIERS MUST BE DUG INTO THE GROUND-SILT FENCE AT GROUND LEVEL DOES NOT WORK BECAUSE WATER WILL FLOW UNDERNEATH.

INSPECTION AND MAINTENANCE:

SILT FENCE SLOPE BARRIERS SHOULD BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL OF 1/2" OR MORE. THE FOLLOWING IS A LIST OF QUESTIONS THAT SHOULD BE ADDRESSED DURING EACH INSPECTION:

ARE THERE ANY POINTS ALONG THE SLOPE BARRIER WHERE WATER IS CONCENTRATING?
DOES WATER FLOW UNDER THE SLOPE BARRIER?
DO THE SILT FENCES SAG EXCESSIVELY?
HAS THE SILT FENCE TORN OR BECOME DETACHED FROM THE POSTS?
DOES SEDIMENT NEED TO BE REMOVED FROM BEHIND THE SLOPE BARRIER?

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

SILT FENCE DITCH CHECK AND BARRIER DETAILS

CITY ENGINEER
GARY JANZEN, P.E.

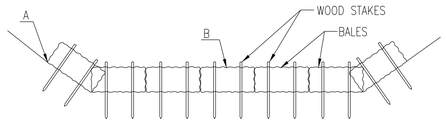
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	11/2010

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NOTE: POINT A MUST BE HIGHER THAN POINT B
SO THAT WATER FLOWS OVER THE BALES AND
NOT AROUND THEM.



STRAW BALE DITCH CHECKS

MATERIAL SPECIFICATION:

BALE DITCH CHECKS MAY BE CONSTRUCTED OF WHEAT STRAW, OAT STRAW, PRAIRIE HAY, OR BROMEGRASS HAY THAT IS FREE OF WEEDS DECLARED NOXIOUS BY THE KANSAS STATE BOARD OF AGRICULTURE.
THE STAKES USED TO ANCHOR THE BALES SHOULD BE A HARDWOOD MATERIAL WITH THE FOLLOWING MINIMUM DIMENSIONS: 2" SQUARE (NOMINAL) BY 4' LONG.
OPTIONAL: THE DOWNSTREAM SCOUR APRON SHOULD BE CONSTRUCTED OF A DOUBLE-NETTED STRAW EROSION-CONTROL BLANKET AT LEAST 6' WIDE.
OPTIONAL: THE METAL LANDSCAPE STAPLES USED TO ANCHOR THE EROSION-CONTROL BLANKET SHOULD BE AT LEAST 8" LONG.

PLACEMENT:

BALE DITCH CHECKS SHOULD BE PLACED PERPENDICULAR TO THE FLOWLINE OF THE DITCH.
THE DITCH CHECK SHOULD EXTEND FAR ENOUGH SO THAT THE GROUND LEVEL AT THE ENDS OF THE CHECK IS HIGHER THAN THE TOP OF THE LOWEST CENTER BALE. THIS PREVENTS WATER FROM FLOWING AROUND THE CHECK.
STRAW BALE DITCH CHECKS SHOULD NOT BE PLACED IN DITCHES WHERE HIGH FLOWS ARE EXPECTED. ROCK CHECKS SHOULD BE USED INSTEAD.
BALES SHOULD BE PLACED IN DITCHES WITH SLOPES OF 6% LESS. FOR SLOPES STEEPER THAN 6%, ROCK CHECKS SHOULD BE USED.
THE FOLLOWING TABLE PROVIDES CHECK SPACING FOR A GIVEN DITCH GRADE:

DITCH GRADE (%)	CHECK SPACING (FEET)
0.5	200
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	30

PROPER INSTALLATION METHOD:

EXCAVATE A TRENCH PERPENDICULAR TO THE DITCH FLOWLINE THAT IS 4" DEEP AND A BALE'S WIDTH WIDE. EXTEND THE TRENCH IN A STRAIGHT LINE ALONG THE ENTIRE LENGTH OF THE PROPOSED DITCH CHECK. PLACE THE SOIL ON THE UPSTREAM SIDE OF THE TRENCH-IT WILL BE USED LATER.
OPTIONAL: ON THE DOWNSTREAM SIDE OF THE TRENCH, ROLL OUT A LENGTH OF EROSION-CONTROL BLANKET (SCOUR APRON) EQUAL TO THE LENGTH OF THE TRENCH. PLACE THE UPSTREAM EDGE OF THE EROSION-CONTROL BLANKET ALONG THE BOTTOM UPSTREAM EDGE OF THE TRENCH. THE EROSION CONTROL BLANKET SHOULD BE ANCHORED IN THE TRENCH WITH ONE ROW OF 8" LANDSCAPE STAPLES PLACED ON 18" CENTERS. THE REMAINDER OF THE EROSION-CONTROL BLANKET (THE PORTION THAT IS NOT LYING IN THE TRENCH) WILL SERVE AS THE DOWNSTREAM SCOUR APRON. THIS SECTION OF THE BLANKET SHOULD BE ANCHORED TO THE GROUND WITH 8" LANDSCAPE STAPLES PLACED AROUND THE PERIMETER OF THE BLANKET ON 18" CENTERS. THE REMAINDER OF THE BLANKET SHOULD BE ANCHORED USING TWO EVENLY SPACED ROWS OF 8" LANDSCAPE STAPLES ON 18" CENTERS PLACED PERPENDICULAR TO THE FLOWLINE OF THE DITCH.
PLACE THE BALES IN THE TRENCH, MAKING SURE THAT THEY ARE BUTTED TIGHTLY. TWO STAKES SHOULD BE DRIVEN THROUGH EACH BALE ALONG THE CENTERLINE OF THE DITCH CHECK, APPROXIMATELY 6" TO 8" IN FROM THE BALE ENDS. STAKES SHOULD BE DRIVEN AT LEAST 12" INTO THE GROUND.
ONCE ALL THE BALES HAVE BEEN INSTALLED AND ANCHORED, PLACE THE EXCAVATED SOIL AGAINST THE UPSTREAM SIDE OF THE CHECK AND COMPACT IT. THE COMPACTED SOIL SHOULD BE NO MORE THAN 3" TO 4" DEEP AND EXTEND UPSTREAM NO MORE THAN 24".

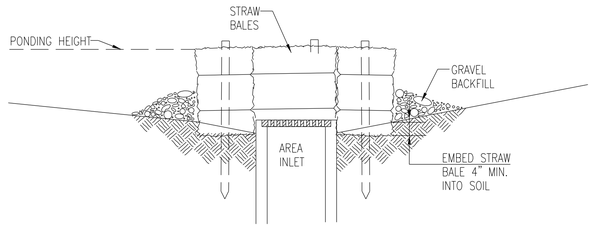
LIST OF COMMON PLACEMENT/INSTALLATION MISTAKES TO AVOID:

DO NOT PLACE A BALE DITCH CHECK DIRECTLY IN FRONT OF A CULVERT OUTLET. IT WILL NOT STAND UP TO THE CONCENTRATED FLOW.
DO NOT PLACE BALE DITCH CHECKS IN DITCHES THAT WILL LIKELY EXPERIENCE HIGH FLOWS. THEY WILL NOT STAND UP TO CONCENTRATED FLOW.
FOLLOW PRESCRIBED DITCH-CHECK SPACING GUIDELINES. IF SPACING GUIDELINES ARE EXCEEDED, EROSION WILL OCCUR BETWEEN THE DITCH CHECKS.
DO NOT ALLOW WATER TO FLOW AROUND THE DITCH CHECK. MAKE SURE THAT THE DITCH CHECK IS LONG ENOUGH SO THAT THE GROUND LEVEL AT THE ENDS OF THE CHECK IS HIGHER THAN THE TOP OF THE LOWEST CENTER BALE.
DO NOT PLACE BALE DITCH CHECKS IN CHANNELS WITH SHALLOW SOILS UNDERLAIN BY ROCK. IF THE CHECK IS NOT ANCHORED SUFFICIENTLY, IT WILL WASH OUT.
BALE DITCH CHECKS MUST BE DUG INTO THE GROUND. BALES AT GROUND LEVEL DO NOT WORK BECAUSE THEY ALLOW WATER TO FLOW UNDER THE CHECK.

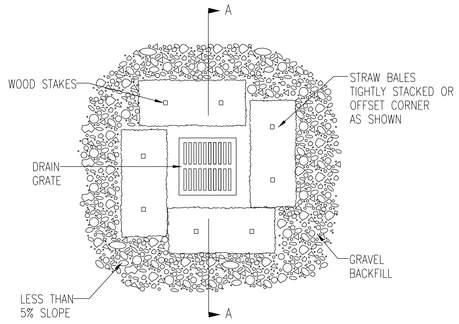
INSPECTION AND MAINTENANCE:

BALE DITCH CHECKS SHOULD BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL OF 1/2" OR MORE. THE FOLLOWING IS A LIST OF QUESTIONS THAT SHOULD BE ADDRESSED DURING EACH INSPECTION:

DOES WATER FLOW AROUND THE DITCH CHECK?
DOES WATER FLOW UNDER THE DITCH CHECK?
DOES WATER FLOW THROUGH SPACES BETWEEN ABUTTING BALES?
ARE ANY BALES AND/OR SCOUR APRONS (OPTIONAL) DISLODGED?
ARE BALES DECOMPOSING DUE TO AGE AND/OR WATER DAMAGE?
DOES SEDIMENT NEED TO BE REMOVED FROM BEHIND THE DITCH CHECK?



SECTION A-A



STRAW BALE BARRIERS FOR AREA INLETS
(INLET PROTECTION)

MATERIAL SPECIFICATION:

BALE AREA INLET BARRIERS SHOULD BE CONSTRUCTED OF WHEAT STRAW, OAT STRAW, PRAIRIE HAY, OR BROMEGRASS HAY THAT IS FREE OF WEEDS DECLARED NOXIOUS BY THE KANSAS STATE BOARD OF AGRICULTURE.
THE STAKES USED TO ANCHOR THE BALES SHOULD BE A HARDWOOD MATERIAL WITH THE FOLLOWING MINIMUM DIMENSIONS: 2" SQUARE (NOMINAL) BY 4' LONG.
TWINE SHOULD BE USED TO BIND BALES. THE USE OF WIRE BINDING IS PROHIBITED BECAUSE IT DOES NOT BIODEGRADE READILY.

PLACEMENT:

BALE AREA INLET BARRIERS SHOULD BE PLACED DIRECTLY AROUND THE PERIMETER OF A DROP INLET.
WHEN A BALE AREA INLET BARRIER IS LOCATED NEAR AN INLET THAT HAS STEEP APPROACH SLOPES, THE STORAGE CAPACITY BEHIND THE BARRIER IS DRASTICALLY REDUCED. TIMELY REMOVAL OF SEDIMENT MUST OCCUR FOR A BARRIER TO OPERATE PROPERLY IN THIS LOCATION.

PROPER INSTALLATION METHOD:

EXCAVATE A TRENCH AROUND THE PERIMETER OF THE AREA INLET THAT IS AT LEAST 4" DEEP BY A BALE'S WIDTH WIDE.
PLACE THE BALES IN THE TRENCH, MAKING SURE THAT THEY ARE BUTTED TIGHTLY. SOME BALES MAY NEED TO BE SHORTENED TO FIT INTO THE TRENCH AROUND THE AREA INLET. TWO STAKES SHOULD BE DRIVEN THROUGH EACH BALE, APPROXIMATELY 6" TO 8" IN FROM THE BALE ENDS.
STAKES SHOULD BE DRIVEN AT LEAST 12" INTO THE GROUND.
ONCE ALL THE BALES HAVE BEEN INSTALLED AND ANCHORED, PLACE THE EXCAVATED SOIL AGAINST THE RECEIVING SIDE OF THE BARRIER AND COMPACT IT. THE COMPACTED SOIL SHOULD BE NO MORE THAN 3" TO 4" DEEP.
NOTE: WHEN A BALE AREA INLET BARRIER IS PLACED IN A SHALLOW MEDIAN DITCH, MAKE SURE THAT THE TOP OF THE BARRIER IS NOT HIGHER THAN THE PAVED ROAD. IN THIS CONFIGURATION, WATER MAY SPREAD ONTO THE ROADWAY CAUSING A HAZARDOUS CONDITION.

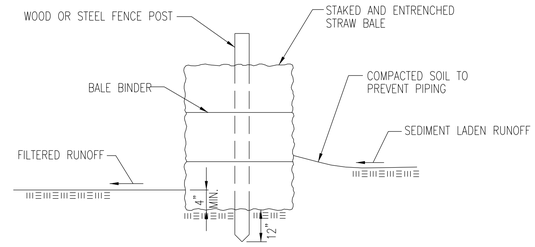
LIST OF COMMON PLACEMENT INSTALLATION MISTAKES TO AVOID:

BALES SHOULD BE PLACED DIRECTLY AGAINST THE PERIMETER OF THE AREA INLET. THIS ALLOWS OVERTOPPING WATER TO FLOW DIRECTLY INTO THE INLET INSTEAD OF ONTO NEARBY SOIL CAUSING SCOUR.
BALE AREA INLET BARRIERS MUST BE DUG INTO THE GROUND. BALES AT GROUND LEVEL DO NOT WORK BECAUSE THEY ALLOW WATER TO FLOW UNDER THE BARRIER.

INSPECTION AND MAINTENANCE:

BALE AREA INLET BARRIERS SHOULD BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL 1/2" OR MORE. THE FOLLOWING IS A LIST OF QUESTIONS THAT SHOULD BE ADDRESSED DURING EACH INSPECTION:

DOES WATER FLOW UNDER THE AREA INLET BARRIER?
DOES WATER FLOW THROUGH SPACES BETWEEN ABUTTING BALES?
ARE ANY BALES DISLODGED?
ARE BALES DECOMPOSING DUE TO AGE AND/OR WATER DAMAGE?
DOES SEDIMENT NEED TO BE REMOVED FROM BEHIND THE AREA INLET BARRIER?



STRAW BALE BARRIERS

MATERIAL SPECIFICATION:

BALE SLOPE BARRIERS MAY BE CONSTRUCTED OF WHEAT STRAW, OAT STRAW, PRAIRIE HAY, OR BROMEGRASS HAY THAT IS FREE OF WEEDS DECLARED NOXIOUS BY THE KANSAS STATE BOARD OF AGRICULTURE.
THE STAKES USED TO ANCHOR THE BALES SHOULD BE A HARDWOOD MATERIAL WITH THE FOLLOWING MINIMUM DIMENSIONS: 2" SQUARE (NOMINAL) BY 4' LONG.
TWINE SHOULD BE USED TO BIND BALES. THE USE OF WIRE BINDING IS PROHIBITED BECAUSE IT DOES NOT BIODEGRADE READILY.

PLACEMENT:

A SLOPE BARRIER SHOULD BE USED AT THE TOE OF A SLOPE WHEN A DITCH DOES NOT EXIST. THE SLOPE BARRIER SHOULD BE PLACED ON NEARLY LEVEL GROUND 5' TO 10' AWAY FROM THE TOE OF A SLOPE. THE BARRIER IS PLACED AWAY FROM THE TOE OF THE SLOPE TO PROVIDE ADEQUATE STORAGE FOR SETTLING OUT SEDIMENT.
WHEN PRACTICABLE, BALE SLOPE BARRIERS SHOULD BE PLACED ALONG CONTOURS TO AVOID A CONCENTRATION OF FLOW.
BALE SLOPE BARRIERS CAN ALSO BE PLACED ALONG RIGHT-OF-WAY FENCE LINES TO KEEP SEDIMENT FROM CROSSING ONTO ADJACENT PROPERTY. WHEN PLACED IN THIS MANNER, THE SLOPE BARRIER WILL NOT LIKELY FOLLOW CONTOURS.

PROPER INSTALLATION METHOD:

EXCAVATE A TRENCH THE LENGTH OF THE PLANNED SLOPE BARRIER THAT IS 4" DEEP AND A BALE'S WIDTH WIDE. MAKE SURE THAT THE TRENCH IS EXCAVATED ALONG A SINGLE CONTOUR. WHEN PRACTICABLE, SLOPE BARRIERS SHOULD BE PLACED ALONG CONTOURS TO AVOID A CONCENTRATION OF FLOW. PLACE THE SOIL ON THE UPSLOPE SIDE OF THE TRENCH FOR LATER USE.
PLACE THE BALES IN THE TRENCH, MAKING SURE THAT THEY ARE BUTTED TIGHTLY. TWO STAKES SHOULD BE DRIVEN THROUGH EACH BALE ALONG THE CENTERLINE OF THE DITCH CHECK, APPROXIMATELY 6" TO 8" IN FROM THE BALE ENDS. STAKES SHOULD BE DRIVEN AT LEAST 12" INTO THE GROUND.
ONCE ALL THE BALES HAVE BEEN INSTALLED AND ANCHORED, PLACE THE EXCAVATED SOIL AGAINST THE UPSLOPE SIDE OF THE CHECK AND COMPACT IT. THE COMPACTED SOIL SHOULD BE NO MORE THAN 3" TO 4" DEEP.

LIST OF COMMON PLACEMENT/INSTALLATION MISTAKES TO AVOID:

WHEN PRACTICAL, DO NOT PLACE BALE SLOPE BARRIERS ACROSS CONTOURS. SLOPE BARRIERS SHOULD BE PLACED ALONG CONTOURS TO AVOID A CONCENTRATION OF FLOW. CONCENTRATED FLOW OVER A SLOPE BARRIER CREATES A SCOUR HOLE ON THE DOWNSLOPE SIDE OF THE BARRIER. THE SCOUR HOLE EVENTUALLY UNDERMINES THE BALES AND THE BARRIER FAILS.
DO NOT PLACE BALE SLOPE BARRIERS IN AREAS WITH SHALLOW SOILS UNDERLAIN BY ROCK. IF THE BARRIER IS NOT ANCHORED SUFFICIENTLY, IT WILL WASH OUT.
BALE SLOPE BARRIERS MUST BE DUG INTO THE GROUND. BALES AT GROUND LEVEL DO NOT WORK BECAUSE THEY ALLOW WATER TO FLOW UNDER THE BARRIER.

INSPECTION AND MAINTENANCE:

BALE SLOPE BARRIERS SHOULD BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL OF 1/2" OR MORE. THE FOLLOWING IS A LIST OF QUESTIONS THAT SHOULD BE ADDRESSED DURING EACH INSPECTION:

ARE THERE ANY POINTS ALONG THE SLOPE BARRIER WHERE WATER IS CONCENTRATING?
DOES WATER FLOW UNDER THE SLOPE BARRIER?
DOES WATER FLOW THROUGH SPACES BETWEEN ABUTTING BALES?
ARE ANY BALES DISLODGED?
ARE BALES DECOMPOSING DUE TO AGE AND/OR WATER DAMAGE?
DOES SEDIMENT NEED TO BE REMOVED FROM BEHIND THE SLOPE BARRIER?

CITY OF WICHITA
PUBLIC WORKS & UTILITIES
ENGINEERING DIVISION

STRAW BALE DITCH CHECK AND BARRIER DETAILS

CITY ENGINEER
GARY JANZEN, P.E.

PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	11/2010

CITY ENGINEER'S OFFICE
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WICHITA, KANSAS 67202-1620
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SHEET
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GENERAL NOTES

1. THIS SHEET IS INTENDED TO PROVIDE GUIDELINES AS TO WHAT TYPES OF EROSION CONTROL DEVICES WILL BE INSTALLED DURING THE CONSTRUCTION PROCESS. CONTRACTORS ARE EXPECTED TO BID PROJECTS ACCORDINGLY.

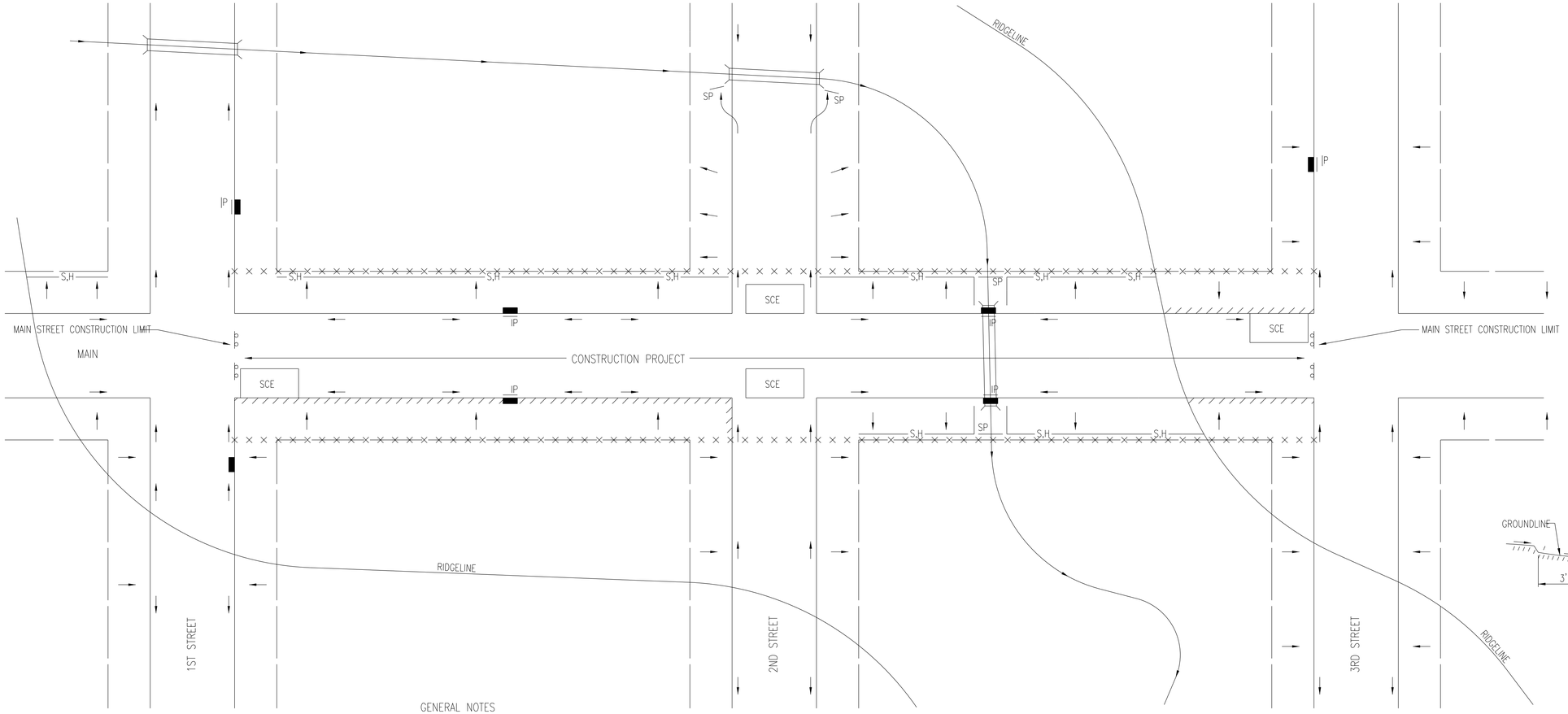
2. EROSION CONTROL DEVICES MUST BE MAINTAINED BY THE CONTRACTOR THROUGHOUT THE CONSTRUCTION PROCESS AND UNTIL THE DISTURBED EARTH IS RESTABILIZED.

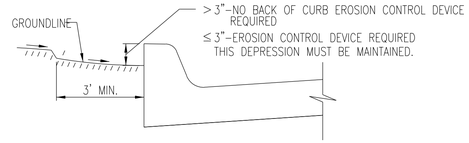
3. IF THE PROJECT WILL DISTURB 1 ACRE OR MORE, A FEDERAL/STATE NPDES STORMWATER PERMIT IS REQUIRED. A DETAILED STORMWATER POLLUTION PREVENTION PLAN, IS REQUIRED. THE EROSION CONTROL DEVICES SHOWN ON THIS SHEET ARE CONSIDERED TO BE THE MINIMUM TO BE SHOWN IN THE POLLUTION PREVENTION PLAN.

4. FOR PROJECTS DISTURBING LESS THAN 1 ACRE, CONTRACTORS ARE ENCOURAGED TO PREPARE STORMWATER POLLUTION PREVENTION PLANS PRIOR TO CONSTRUCTION. EROSION CONTROL DEVICES MUST BE USED ON ALL PROJECTS.

5. FAILURE TO USE AND MAINTAIN EROSION CONTROL DEVICES IS A VIOLATION OF SECTION 16.32 OF THE CITY CODE AND WILL SUBJECT THE CONTRACTOR TO THE PENALTIES PROVIDED FOR THEREIN.

6. THE APPLICATION OF EROSION CONTROL DEVICES SHOWN ON THIS SHEET IS FOR SITUATIONS NORMALLY ENCOUNTERED. FROM TIME TO TIME, SITUATIONS WILL ARISE THAT MAY REQUIRE A DIFFERENT DEVICE OTHER THAN THOSE SHOWN. EROSION CONTROL DEVICES, OTHER THAN THOSE SHOWN, MAY BE UTILIZED AS LONG AS THEY ARE EFFECTIVE AND MAINTAINED.





CURB BACKFILL DETAIL

THIS IS A TEMPORARY MEASURE ONLY, WHEN APPROVED BY THE PROJECT ENGINEER. THE DIRT GRADE BEHIND THE CURB SHALL BE BROUGHT TO THE TOP OF CURB, WITH TEMPORARY EROSION CONTROL MAT OR PERMANENT VEGETATION PLACED, PRIOR TO THE COMPLETION OF ALL PROJECTS.

LEGEND

R-O-W LIMITS	
DRAINAGE FLOW PATH	
R/W LIMIT WITHIN CONSTRUCTION LIMIT	
STORM WATER INLETS	
IP	INLET PROTECTION
S,H	SILT FENCE OR HAY BALE BARRIER
SP	STREAM PROTECTION
SCE	STABILIZED CONSTRUCTION ENTRANCE
	BACK OF CURB PROTECTION

GENERAL NOTES

1. THE INTENT OF ALL EROSION CONTROL DEVICES IS TO KEEP ALL SEDIMENT CONFINED TO THE CONSTRUCTION SITE, AND OUT OF ALL UNDERGROUND PIPES, DITCHES, LAKES, AND OTHER DRAINAGE FACILITIES, AND OFF OF STREETS.

2. THE POINT OF COMPLIANCE IS GENERALLY THE RIGHT-OF-WAY LINES WITHIN THE LIMITS OF CONSTRUCTION.

3. EROSION CONTROL DEVICES WILL BE REQUIRED AT ALL POINTS ALONG THE PROJECT WHERE DISTURBED EARTH CAN DRAIN ONTO PRIVATE PROPERTY.

4. INLET PROTECTION DEVICES WILL BE REQUIRED WHEREVER WATER CAN DRAIN OFF THE PROJECT SITE INTO AN INLET, INCLUDING ANY SIDE STREET INLETS.

5. EROSION CONTROL DEVICES SHALL BE INSTALLED AT CREEK CROSSINGS SO AS TO PREVENT SEDIMENT FROM ENTERING THEREIN.

6. STABILIZED CONSTRUCTION ENTRANCES SHALL BE PROVIDED, AS NEEDED, TO PREVENT MUD FROM TRACKING ONTO STREETS NOT UNDER CONSTRUCTION AND ON STREETS WITHIN THE PROJECT LIMITS IF TRAFFIC IS BEING MAINTAINED THROUGH THE PROJECT.

7. ANY MUD TRACKED ONTO STREETS MUST BE REMOVED AT THE END OF EACH WORK DAY.

8. THE CONTACTOR WILL BE REQUIRED TO PLACE EROSION CONTROL DEVICES BACK OF CURB, WHENEVER WATER CAN DRAIN OVER CURB, TO KEEP ERODED SOIL OUT OF THE GUTTERLINES, IN ACCORDANCE WITH THE FOLLOWING:
   A. THE DEVICE REQUIRED WILL BE APPROVED EROSION CONTROL MAT LISTED ON THE CITY'S APPROVED MATERIAL LIST. SAID BLANKET SHALL BE PLACED OVER THE APPROPRIATE SEED AND FERTILIZER, AS SPECIFIED IN THE PROJECT SPECIFICATIONS. (SEE SOIL EROSION BMPs – BACK OF CURB SEDIMENT BARRIER DETAILS)
   B. THIS DEVICE SHALL BE INSTALLED IMMEDIATELY WHENEVER THE CURB IS BACKFILLED TO WITHIN 3" OF THE TOP OF CURB. (SEE CURB BACKFILL DETAIL) OTHER BMP'S MAY BE REQUIRED AT LOCATIONS WHERE CONCENTRATED FLOW CARRIES SEDIMENT OVER THE CURB.
   C. ADDITIONALLY, OTHER EROSION CONTROL DEVICES (HAY BALES, SILT FENCE, ETC.) WILL BE INSTALLED AT LOCATIONS OF CONCENTRATED FLOW RESULTING IN SEDIMENT OVERRUNNING THE MAT.
   D. SHOULD THE PROJECT PLANS SPECIFY THAT THE RIGHT-OF-WAY IS TO BE SODDED, THE EXCELSIOR MAT WILL NOT BE REQUIRED SO LONG AS THE SOD IS PLACED WITHIN 48 HOURS AFTER CURB BACKFILL REACHES A HEIGHT OF 3" OR LESS FROM TOP OF CURB. (SEE CURB BACKFILL DETAIL)

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

STREET IMPROVEMENT PROJECTS

CITY ENGINEER
GARY JANZEN, P.E.

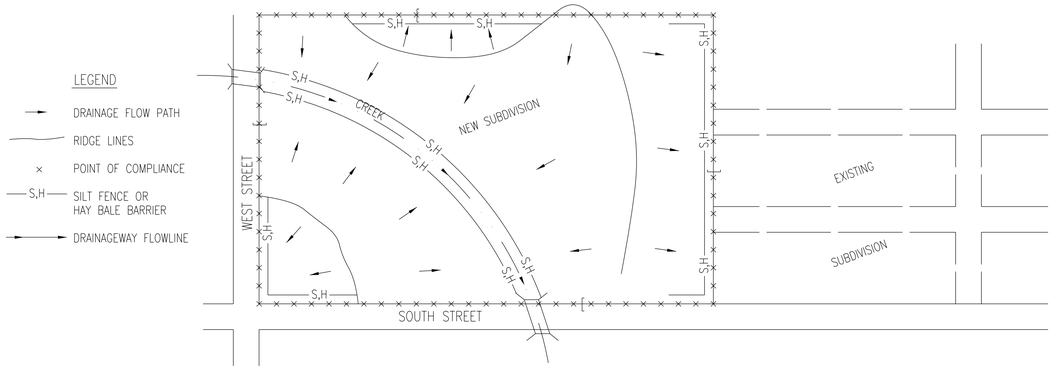
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	*08/2012*

CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

SHEET
485 of 1055

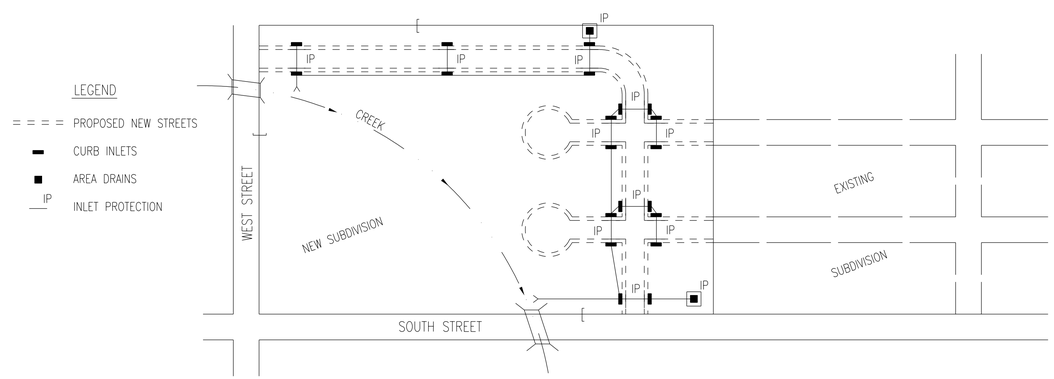
SW-504

PHASE 1 – INITIAL EARTHWORK AND UTILITIES (EXCEPT STORM SEWER)



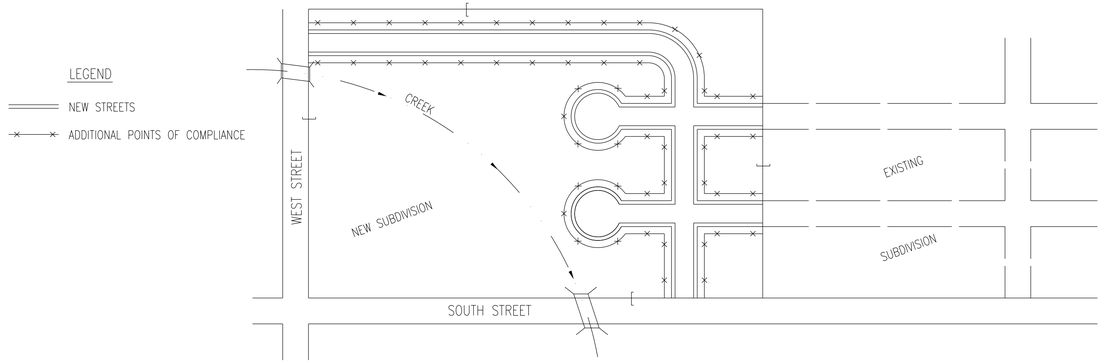
1. DURING THIS PHASE OF SUBDIVISION CONSTRUCTION, THE POINTS OF COMPLIANCE ARE THE PERIMETER BOUNDARIES AND ANY DRAINAGE WAYS OR STORM SEWERS DRAINING THROUGH OR FROM THE SITE. SHOULD LAKES BE CONSTRUCTED WITHIN THE SUBDIVISION THAT WILL DISCHARGE DURING STORMS, THEY ARE ALSO A POINT OF COMPLIANCE.
2. HAY BALES OR SILT FENCE MUST BE CONSTRUCTED ALONG THE PROPERTY LINE WHERE ON SITE WATER CAN DRAIN OFF THE PROPERTY. THESE EROSION CONTROL DEVICES WILL ALSO BE INSTALLED ALONG ANY DRAINAGE DITCH OR LAKE THAT CAN DISCHARGE.
3. SHOULD SILT OR SEDIMENT ENTER THE DITCHES OR STREETS ON THE ADJACENT BOUNDARY STREETS, APPROPRIATE EROSION CONTROL DEVICES WILL BE PLACED WITHIN THE SUBDIVISION TO PREVENT THIS.
4. ANY MUD TRACKED ONTO ADJACENT STREETS WILL BE REMOVED WITHIN 48 HOURS OR BY FRIDAY AT 6:00 PM, WHICHEVER IS EARLIER.
5. CONTRACTORS WORKING WITHIN THE SITE WILL NOT BE REQUIRED TO USE INDIVIDUAL EROSION CONTROL DEVICES AS LONG AS THOSE SPECIFIED ABOVE ARE IN PLACE AND EFFECTIVE. CONTRACTORS WORKING ON THE BOUNDARY LINE STREETS OR ON ADJACENT PROPERTIES TO EXTEND UTILITIES ARE EXPECTED TO USE EROSION CONTROL DEVICES AT THEIR WORK LOCATIONS, AS NEEDED.
6. UTILIZE STABILIZED CONSTRUCTION ENTRANCE AT ENTRANCE AND EXIT ONTO ANY EXISTING PUBLIC STREETS.
7. IF THE INITIAL EARTH WORK AND UTILITIES ARE DONE AS PART OF A PUBLIC IMPROVEMENT PROJECT, THESE EROSION CONTROL DEVICES WILL BE INSTALLED BY THE CONTRACTOR AS SPECIFIED IN THE INDIVIDUAL PROJECT CONTRACTS. THE CONTRACTOR WILL MAINTAIN THE DEVICES UNTIL COMPLETION OF THE CONTRACT, AT WHICH TIME THE DEVELOPER WILL ASSUME MAINTENANCE RESPONSIBILITIES. IF THESE CONTRACTS ARE NOT PUBLIC IMPROVEMENT PROJECTS, THE DEVELOPER WILL BE RESPONSIBLE FOR INSTALLING AND MAINTAINING THESE DEVICES.
8. WITHIN 14 DAYS OF COMPLETION OF EARTHWORK ACTIVITIES IN ANY GIVEN AREA, THAT AREA SHALL BE TEMPORARILY OR PERMANENTLY SEEDED AND MULCHED.

PHASE 2 – INSTALLATION OF STORM SEWER



1. DURING THIS PHASE OF SUBDIVISION DEVELOPMENT, ALL EROSION CONTROL DEVICES REQUIRED IN PHASE 1 SHALL REMAIN IN PLACE AND BE MAINTAINED.
2. AS NEW STORM SEWERS, WITH INLETS, ARE INSTALLED, THE STORM SEWERS MUST NOW BE PROTECTED SO ALL NEW INLETS BECOME POINTS OF COMPLIANCE.
3. AREA DRAINS – AS SOON AS WATER CAN FLOW INTO THESE DRAINS, HAY BALE OR SILT FENCE PROTECTION WILL BE INSTALLED AROUND THEM.
4. CURB OPENING INLETS – AS SOON AS WATER CAN FLOW INTO THESE DRAINS, INLET PROTECTION DEVICES MUST BE INSTALLED. IF WATER CANNOT FLOW INTO CURB INLETS UNTIL STREET CONSTRUCTION IS COMPLETE, THEN STREET CONTRACTOR WILL INSTALL INLET PROTECTION. SEE PHASE 3 – STREET CONSTRUCTION.
5. THE STORM SEWER CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING THESE DEVICES.
6. THE SUBDIVISION DEVELOPER WILL MAINTAIN THESE EROSION CONTROL DEVICES ONCE INSTALLED.
7. ALL DISTURBED GROUND WILL BE FINAL GRADED AND TEMPORARILY OR PERMANENTLY SEEDED WITHIN 14 DAYS IF COMPLETION OF WORK IN ANY GIVEN PART OF THE SUBDIVISION.
8. ONCE ALL DISTURBED GROUND DRAINING TO AN INLET HAS BEEN RESTABILIZED WITH GRASS OR SOD, THE SUBDIVISION DEVELOPER WILL BE RESPONSIBLE FOR PERMANENTLY REMOVING THE INLET PROTECTION.

PHASE 3 – STREET CONSTRUCTION

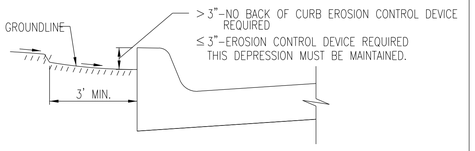


1. DURING THIS PHASE OF SUBDIVISION CONSTRUCTION, NEW STREETS ARE INSTALLED. ALL EROSION CONTROL DEVICES INSTALLED DURING PHASE 1 AND 2 MUST STILL BE MAINTAINED. THE POINT OF COMPLIANCE NOW SHIFTS TO THE BACK OF CURB ALONG EACH STREET.
2. CURB OPENING INLET PROTECTION:
   A. SUMP AREAS – INLET PROTECTION SHALL BE PROVIDED WHEN STREET SUBGRADE WORK IS COMPLETED.
   B. NON-SUMP LOCATIONS – PROVIDE INLET PROTECTION AS SOON AS BASE COURSE ASPHALT IS INSTALLED, BEFORE THE SURFACE COURSE LIFT.
3. EROSION CONTROL DEVICES WILL BE REQUIRED BACK OF CURB WHEREVER WATER CAN FLOW OVER THE CURB AND THE CURB HAS BEEN BACKFILLED TO WITHIN 3" OR LESS OF THE TOP OF CURB (SEE CURB BACKFILL DETAIL). FOR CURBS NOT YET ENTIRELY BACKFILLED (3" OR MORE BELOW TOP OF CURB), ADDITIONAL DEVICES WILL BE REQUIRED AT POINTS WHERE WATER BREAKS OVER CURB WHICH COULD RESULT IN THE PLACEMENT OF SEDIMENT IN THE GUTTER.
4. SEE DETAIL SHEET FOR BACK OF CURB PROTECTION.
5. THE BACK OF CURB PROTECTION SPECIFIED ON THIS PLAN MAY HAVE TO BE SUPPLEMENTED WITH HAY BALE OR SILT FENCE EROSION CONTROL DEVICES AT LOCATIONS WHERE CONCENTRATED FLOW RESULTS IN SEDIMENT BEING CARRIED OVER THE EXCELSIOR MATS.
6. THE STREET CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING BACK OF CURB EROSION CONTROL DEVICES.
7. THE INDIVIDUAL LOT OWNERS WILL BE RESPONSIBLE FOR MAINTAINING THE BACK OF CURB EROSION CONTROL DEVICES IN FRONT OF THEIR LOTS UNTIL SUCH TIME AS ADJACENT DISTURBED EARTH IS STABILIZED WITH GRASS OR SOD.

GENERAL NOTES

1. THE INTENT OF ALL EROSION CONTROL DEVICES IS TO PREVENT ERODED SOIL FROM ENTERING DITCHES, STORM SEWERS, LAKES, STREETS OR ANY OTHER OTHER DRAINAGE FEATURE.
2. THIS SHEET IS INTENDED TO PROVIDE GUIDELINES AS TO WHAT TYPE OF EROSION CONTROL DEVICES WILL BE INSTALLED DURING THE CONSTRUCTION PROCESS. CONTRACTORS ARE EXPECTED TO BID PROJECTS ACCORDINGLY.
3. EROSION CONTROL DEVICES SHALL BE MAINTAINED DURING THE CONSTRUCTION PROCESS TO REMAIN EFFECTIVE. MAINTENANCE SHALL BE AS INDICATED ON SOIL EROSION BMP'S DETAIL SHEETS.
4. PERSONS DESTROYING EROSION CONTROL DEVICES SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING THEM OR INSTALLING SUITABLE REPLACEMENT DEVICES.
5. THE DEVELOPMENT OF ANY SUBDIVISION THAT DISTURBS 1 ACRE OR MORE WILL REQUIRE A FEDERAL/STATE NPDES STORMWATER PERMIT. THE PREPARATION OF A STORMWATER POLLUTION PREVENTION PLAN IS REQUIRED. EROSION CONTROL DEVICES ARE REQUIRED. THE DETAILS SHOWN ON THIS SHEET ARE THE MINIMUM STANDARDS TO BE SHOWN ON POLLUTION PREVENTION PLANS.
6. FOR SUBDIVISIONS SMALLER THAN 1 ACRE, SOIL EROSION DEVICES ARE REQUIRED. ALSO, DEVELOPERS AND CONTRACTORS ARE ENCOURAGED TO DEVELOP POLLUTION PREVENTION PLANS FOR EACH PROJECT PRIOR TO CONSTRUCTION.
7. FAILURE TO USE AND MAINTAIN SOIL EROSION DEVICES IS A VIOLATION OF SECTION 16.32 OF THE CITY CODE AND WILL SUBJECT THE SUBDIVISION DEVELOPER AND CONTRACTORS TO THE PENALTIES PROVIDED THEREIN.
8. THE APPLICATION OF EROSION CONTROL DEVICES SHOWN ON THIS SHEET IS FOR SITUATIONS NORMALLY ENCOUNTERED. FROM TIME TO TIME, SITUATIONS WILL ARISE THAT MAY REQUIRE DEVICES OTHER THAN THAT SHOWN. EROSION CONTROL DEVICES, OTHER THAN THOSE SHOWN, MAY BE UTILIZED SO LONG AS THEY ARE EFFECTIVE AND MAINTAINED.
9. A STABILIZED EARTH SURFACE IS DEFINED AS ONE THAT IS HARD SURFACED WITH CONCRETE, ASPHALT, OR THE LIKE, OR ONE ON WHICH 70% OF THE GRASS HAS GERMINATED ON THE ENTIRE SURFACE.

SEE DETAIL SHEET FOR BACK OF CURB PROTECTION DETAIL



CURB BACKFILL DETAIL (STREET CONSTRUCTION ONLY)

THIS IS A TEMPORARY MEASURE ONLY, WHEN APPROVED BY THE PROJECT ENGINEER. THE DIRT GRADE BEHIND THE CURB SHALL BE BROUGHT TO THE TOP OF CURB, WITH TEMPORARY EROSION CONTROL MAT OR PERMANENT VEGETATION PLACED, PRIOR TO THE COMPLETION OF ALL PROJECTS.

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

SUBDIVISION DEVELOPMENT PROCESS

CITY ENGINEER
GARY JANZEN, P.E.

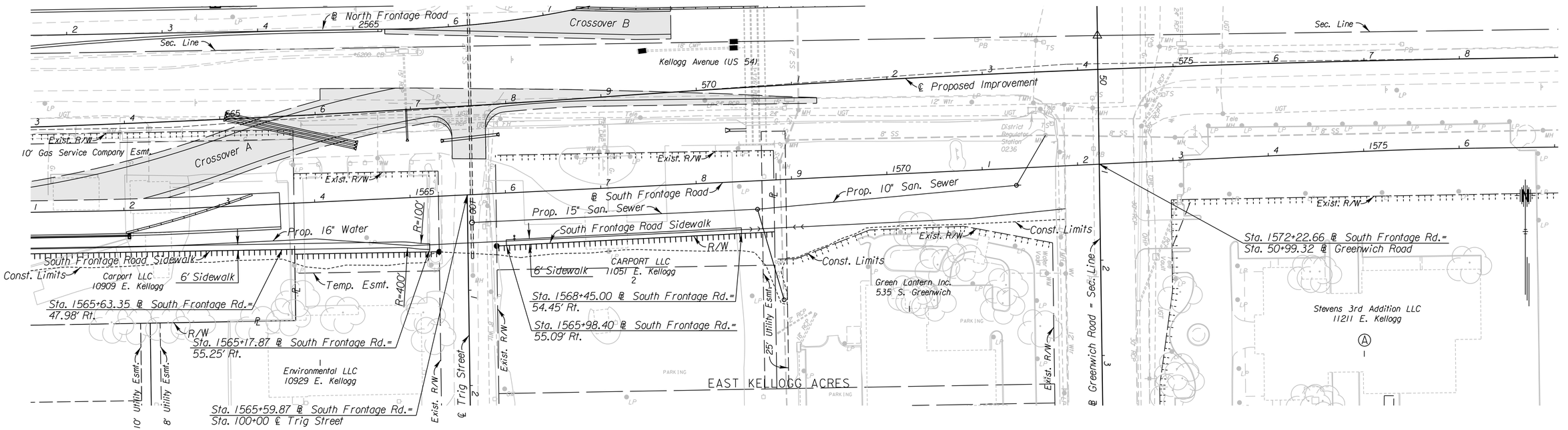
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	08/2012

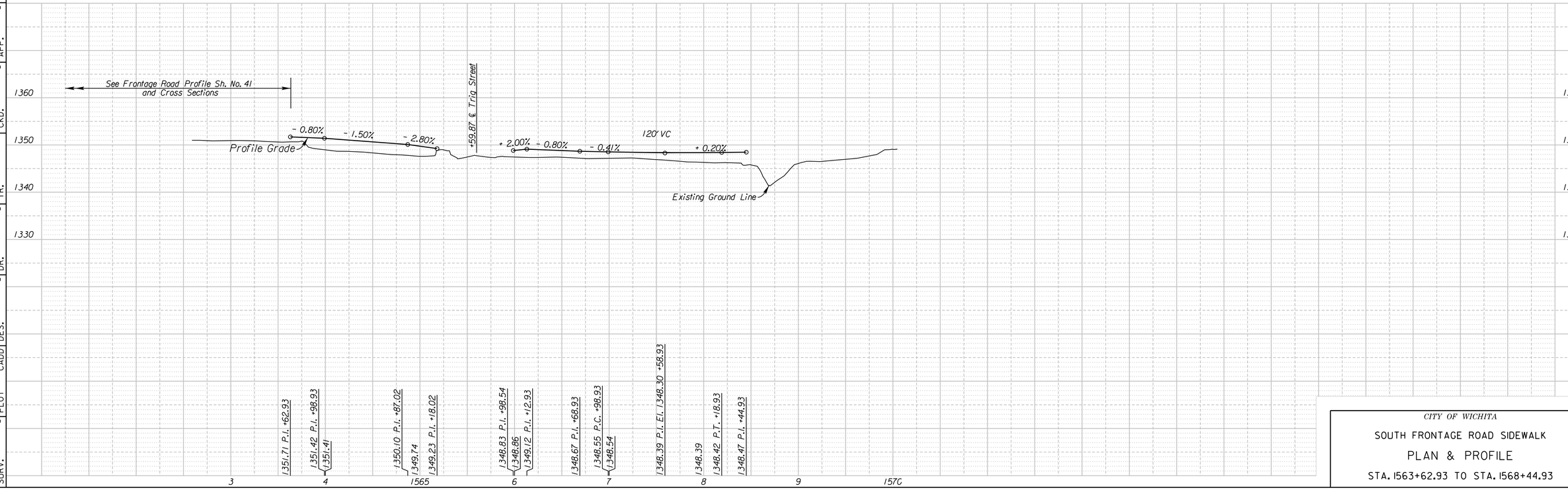
CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

SHEET
486 of 1055

SW-505

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	487	1055





CITY OF WICHITA

SOUTH FRONTAGE ROAD SIDEWALK

PLAN & PROFILE

STA. 1563+62.93 TO STA. 1568+44.93

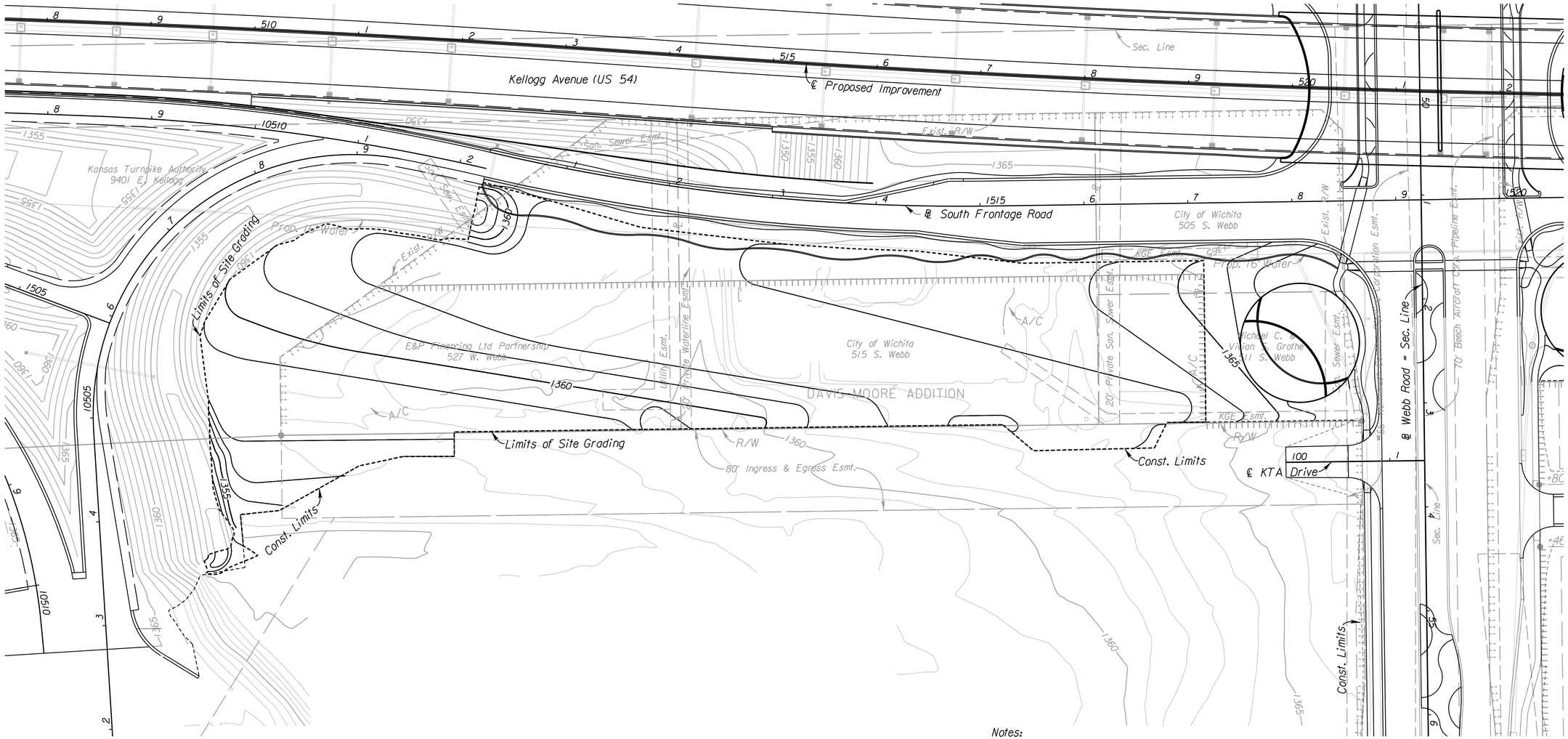
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SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
-	-	-	-	-	-	-	-

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	488	1055

N

SCALE
50' 0 50' 100'



Notes:
Intersection of all slope lines shall be softened and rounded for pleasing appearance.

All earthwork needed for site restoration shall be paid for as "Common Excavation" and "Compaction of Earthwork (Type B)(MR-90)". See Sh. No. 872

Fill material needed shall be hauled from within the project. No off-site material will be accepted.

Contractor shall maintain postive drainage within existing drainage basins.

See Sh. No's. 491-502 for Landscape Plans.

CITY OF WICHITA

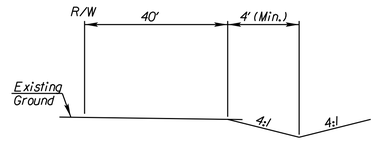
SOUTH FRONTAGE ROAD

ROADSIDE IMPROVEMENTS

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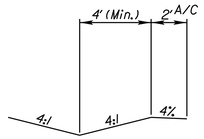
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	489	1055



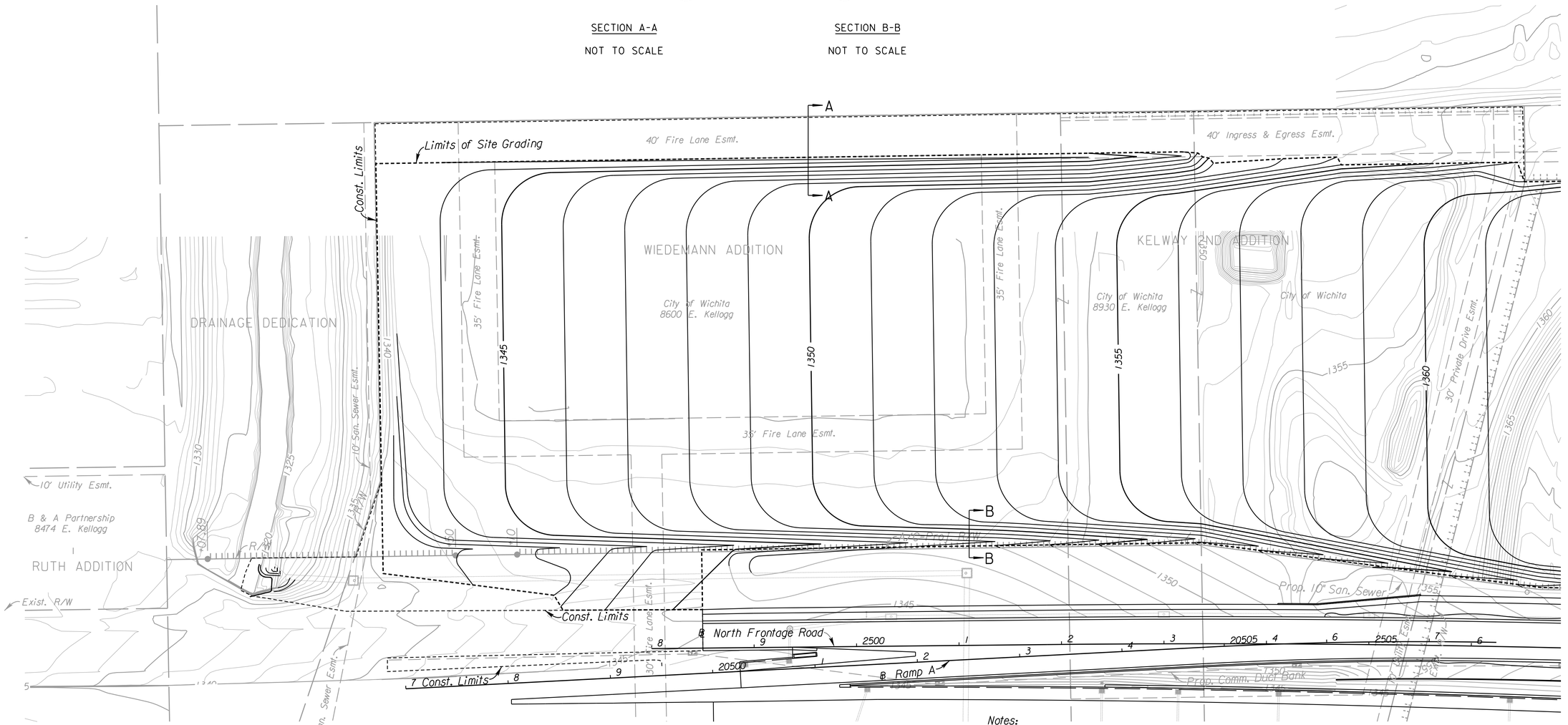
SECTION A-A

NOT TO SCALE



SECTION B-B

NOT TO SCALE



Notes:
Intersection of all slope lines shall be softened and rounded for pleasing appearance.

All earthwork needed for site restoration shall be paid for as "Common Excavation" and "Compaction of Earthwork (Type B)(MR-90)". See Sh. No. 872

Fill material needed shall be hauled from within the project. No off-site material will be accepted.

Contractor shall maintain postive drainage within existing drainage basins.

See Sh. No's. 491-502 for Landscape Plans.

CITY OF WICHITA

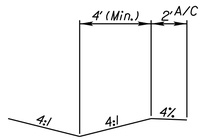
NORTH FRONTAGE ROAD

ROADSIDE IMPROVEMENTS

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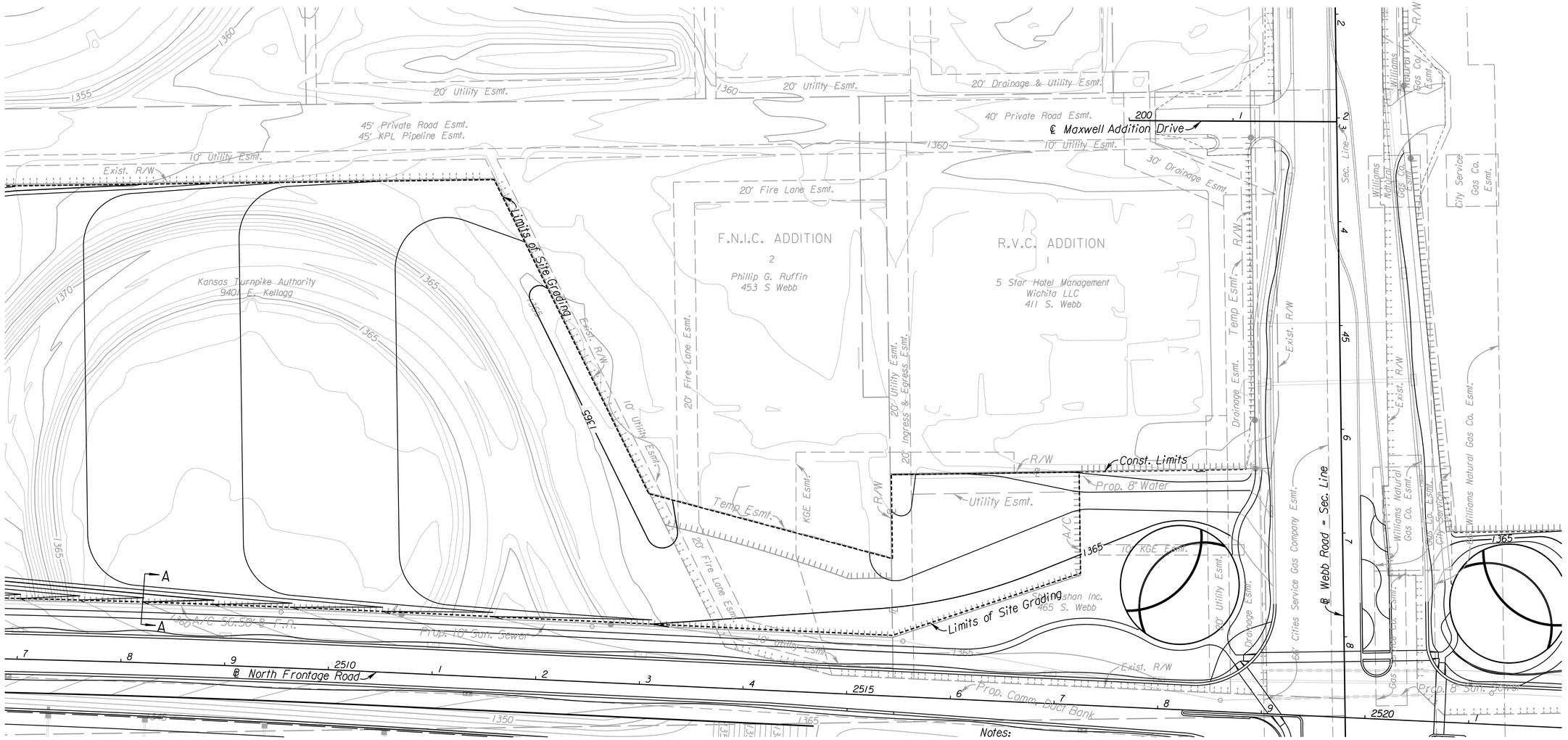
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	490	1055



SECTION A-A

NOT TO SCALE



Notes:
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See Sh. No's. 491-502 for Landscape Plans.

CITY OF WICHITA

NORTH FRONTAGE ROAD

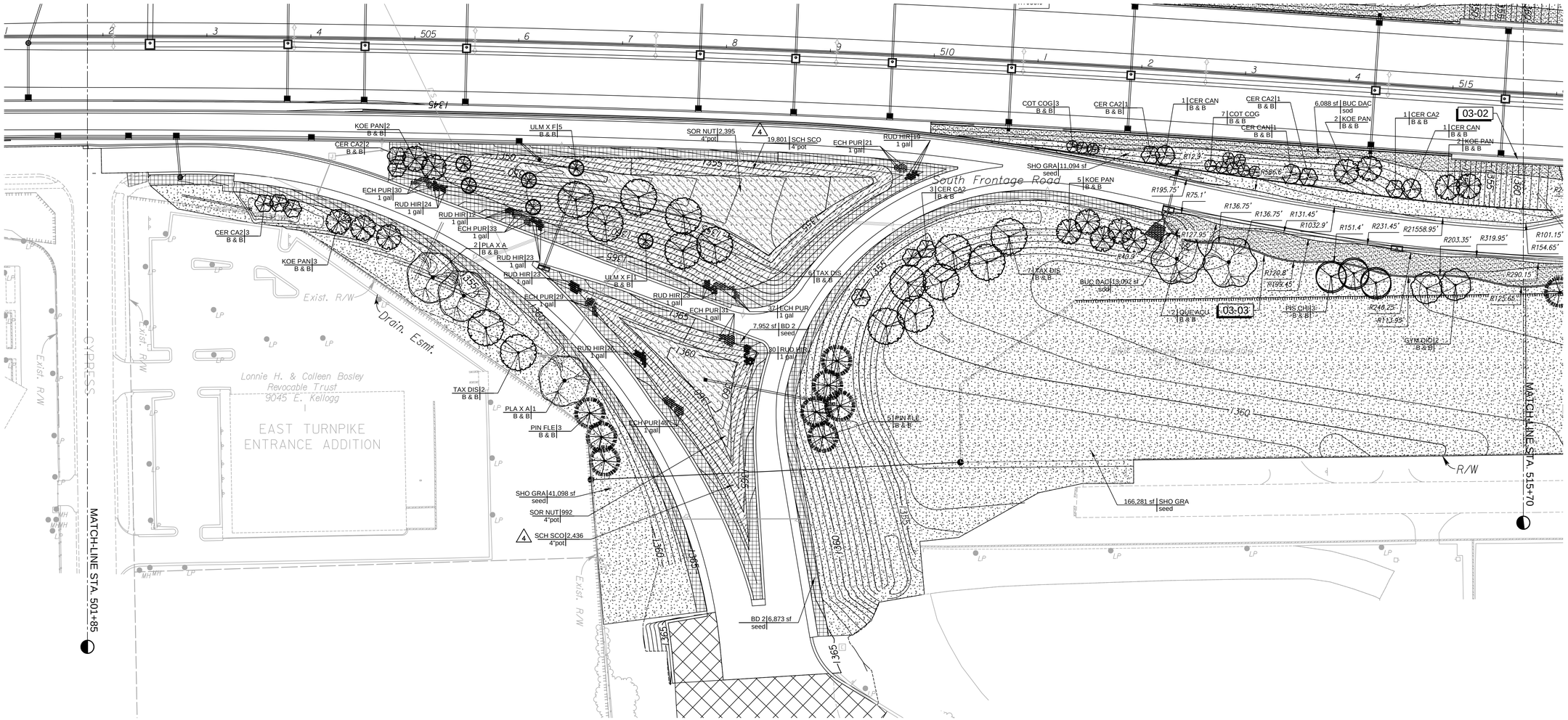
ROADSIDE IMPROVEMENTS

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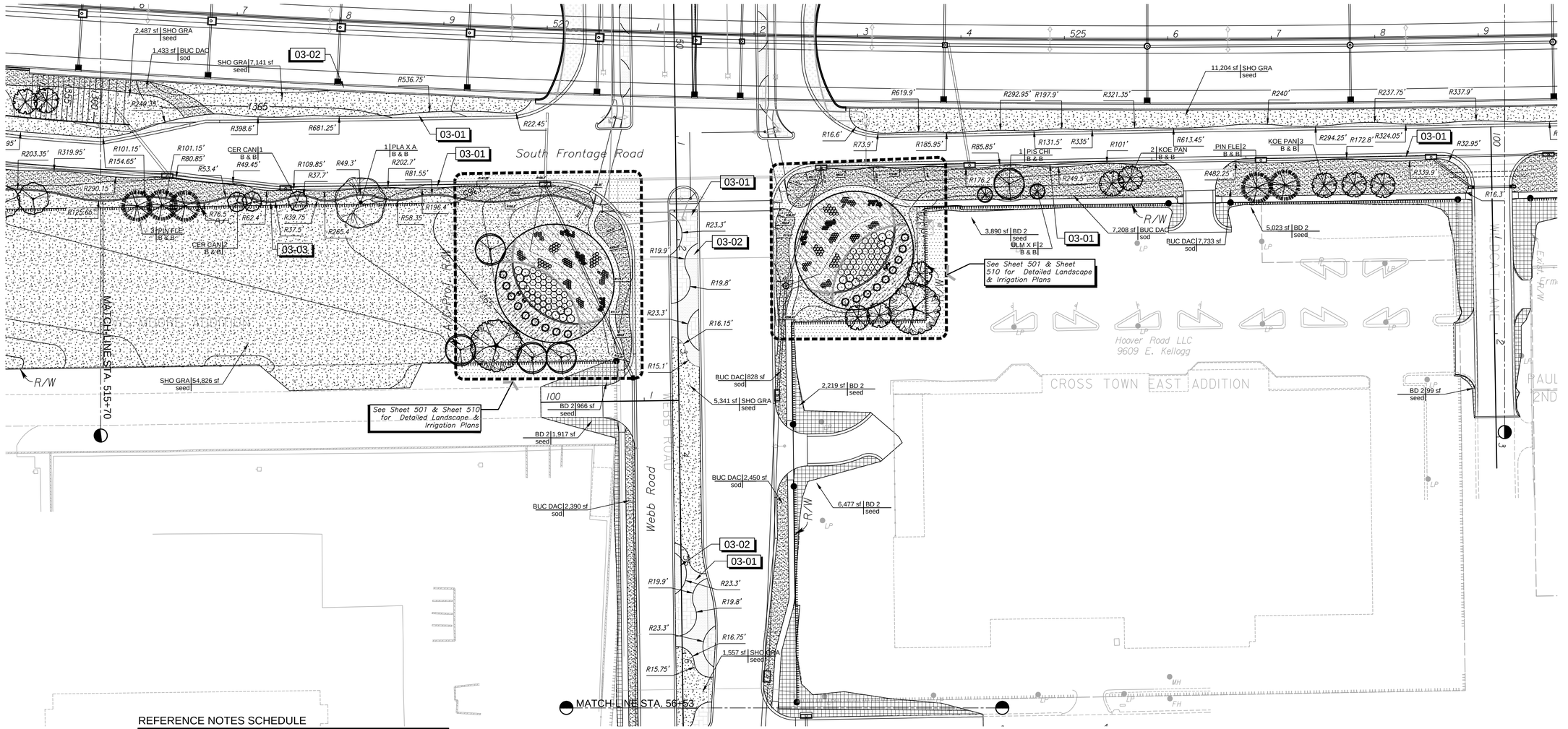
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	491	1055

Revised Plans


N
Scale 1" = 50'
South Frontage Road
EAST TURNPIKE ENTRANCE ADDITION
Lonnie H. & Colleen Bosley Revocable Trust
9045 E. Kellogg
Exist. R/W
Drain. Esmt.
CYPRESS
MATCHLINE STA. 501+85
MATCHLINE STA. 515+70
R/W
03-01
03-02
03-03
KOE PAN|2 B & B
CER CA2|2 B & B
ULM X F|5 B & B
SOR NUT|2,395 4"pot
19,801 | SCH SCO | 4 pot
ECH PUR|21 1 gal
RUD HIR|15 1 gal
COT COG|3 B & B
CER CA2|1 B & B
1|CER CAN B & B
CER CA2|1 B & B
6,088 sf|BUC DAC sod
7|COT COG B & B
2|KOE PAN B & B
CER CAN|1 B & B
1|CER CA2 B & B
1|CER CAN B & B
2|KOE PAN B & B
SHO GRA|11,094 sf seed
5|KOE PAN B & B
3|CER CA2 B & B
ECH PUR|30 1 gal
RUD HIR|24 1 gal
RUD HIR|12 1 gal
ECH PUR|33 1 gal
2|PLA X A B & B
RUD HIR|23 1 gal
RUD HIR|23 1 gal
ULM X F|1 B & B
ECH PUR|29 1 gal
RUD HIR|2 1 gal
ECH PUR|3 1 gal
32|ECH PUR 1 gal
7,952 sf|BD 2 seed
RUD HIR|26 1 gal
20|RUD HIR 1 gal
6|TAX DIS B & B
7|TAX DIS B & B
BUC DAC|13,052 sf sod
7|QUE ACU B & B
PIS CHI|3 B & B
GYM DIO|2 B & B
CER CA2|3 B & B
KOE PAN|3 B & B
TAX DIS|2 B & B
PLA X A|1 B & B
PIN FLE|3 B & B
ECH PUR|46 1 gal
5|PIN FLE B & B
SHO GRA|41,098 sf seed
SOR NUT|992 4"pot
4 SCH SCO|2,436 4"pot
166,281 sf|SHO GRA seed
BD 2|6,873 sf seed
R12.9'
R586.6'
R195.75'
R75.1'
R136.75'
R136.75'
R131.45'
R1032.9'
R151.4'
R231.45'
R21558.95'
R203.35'
R319.95'
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R127.95'
R720.8'
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	492	1055



REFERENCE NOTES SCHEDULE

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.
03-02	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 45 degree Herringbone "New Brick" Stamp. Direction of stamp to be 45 degrees to the 90 degree stamp pattern.
03-03	12" wide mow strip. Non Colored Concrete Pavement (12" Uniform)(AE)
03-05	Stamped Stained Concrete Part of Bridge Deck (see Bridge Details). Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.

PLANT SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
PIS CHI	1	Pistacia chinensis	Chinese Pistache	B & B	2"Cal	
PLA X A	1	Platanus x acerifolia	London Plane Tree	B & B	2"Cal	
ULM X F	2	Ulmus x 'Frontier'	Frontier Elm	B & B	2"Cal	
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
PIN FLE	5	Pinus flexilis 'Vanderwolf's Pyramid'	Vanderwolf's Pyramid Pine	B & B		6'-8' H
FLOWERING TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
CER CAN	3	Cercis canadensis texensis 'Oklahoma Whitebud' Multi-Trunk	Oklahoma Whitebud	B & B		8'-10' H
KOE PAN	5	Koelreuteria paniculata	Golden Rain Tree	B & B	2"Cal	
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BD 2	12,622 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed		
BUC DAC	22,042 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SHO GRA	85,664 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		

CITY OF WICHITA

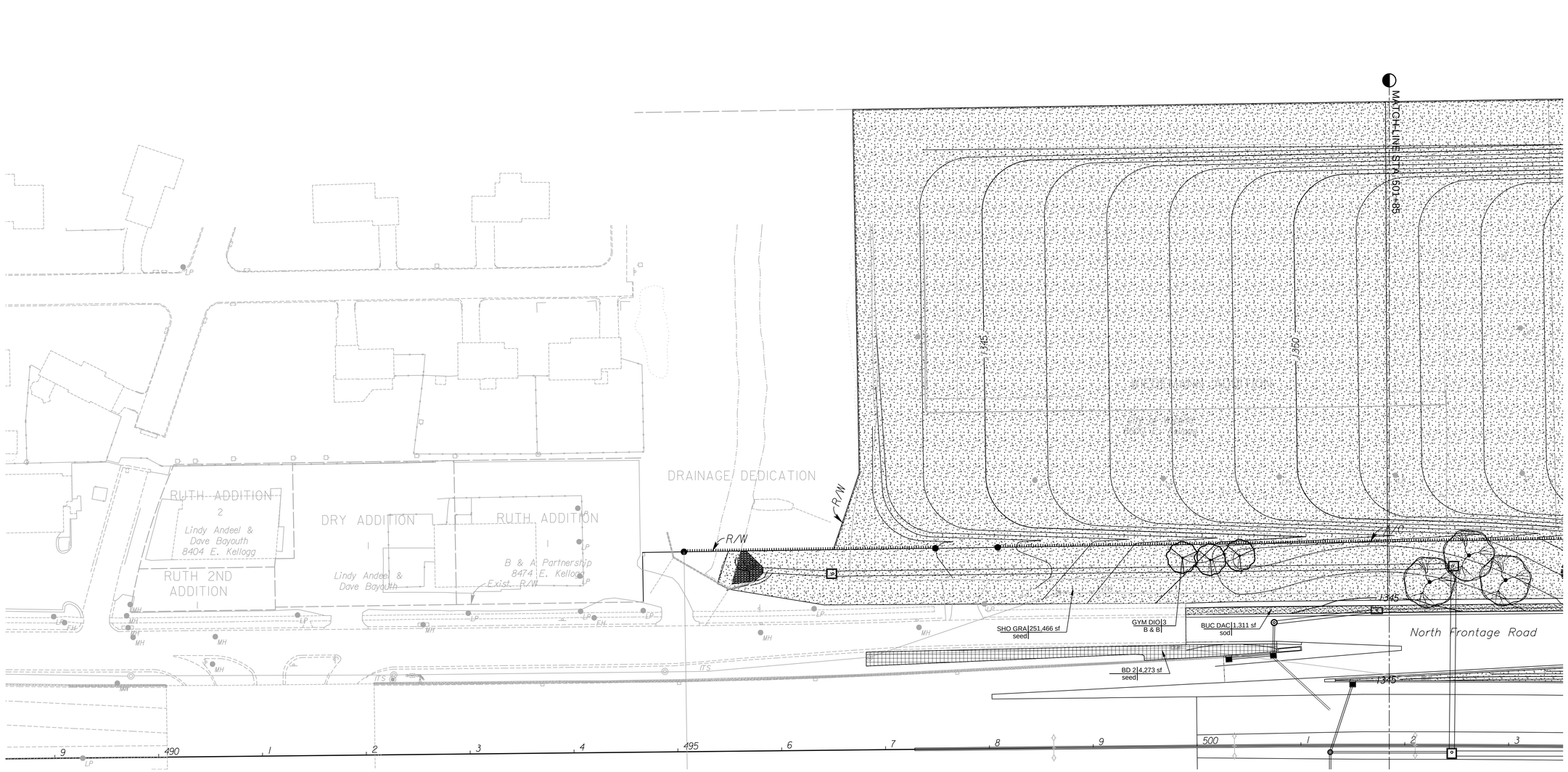
SOUTH FRONTAGE ROAD

LANDSCAPE PLAN

STA. 515+68 - STA. 529+25

$PRINTTIME$ $PRINTDATE$ $FILE$ | SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	493	1055



N

Scale
1" = 50'

PLANT SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
GYM DIO	3	Gymnocladus dioica	Kentucky Coffee Tree	B & B	2"Cal	

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	4,272 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	1,310 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SHO GRA	251,466 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	

CITY OF WICHITA

NORTH FRONTAGE ROAD

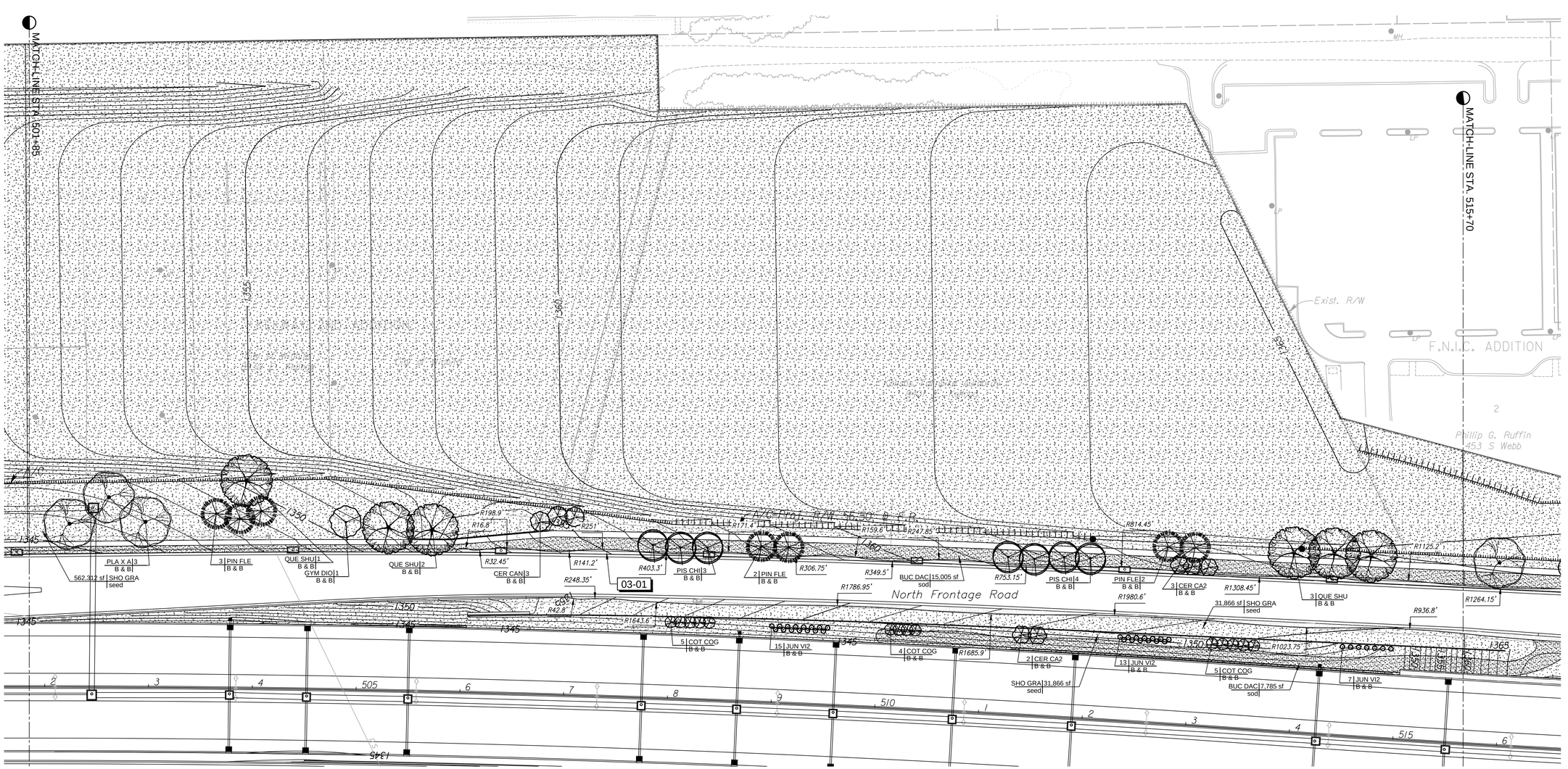
LANDSCAPE PLAN

STA. 495+00 - STA. 501+85

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

$PRINTTIME$
$PRINTDATE$
$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	494	1055



REFERENCE NOTES SCHEDULE

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.
03-02	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 45 degree Herringbone "New Brick" Stamp. Direction of stamp to be 45 degrees to the 90 degree stamp pattern.

PLANT SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
GYM DIO	1	Gymnocladus dioica	Kentucky Coffee Tree	B & B	2"Cal	
PIS CHI	7	Pistacia chinensis	Chinese Pistache	B & B	2"Cal	
PLA X A	3	Platanus x acerifolia	London Plane Tree	B & B	2"Cal	
QUE SHU	6	Quercus shumardii	Shumard Red Oak	B & B	2"Cal	
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
JUN VI2	35	Juniperus virginiana 'Taylor'	Taylor Eastern Redcedar	B & B		6'–8' H
PIN FLE	7	Pinus flexilis 'Vanderwolf's Pyramid'	Vanderwolf's Pyramid Pine	B & B		6'–8' H
FLOWERING TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
CER CAN	3	Cercis canadensis texensis 'Oklahoma Whitebud' Multi–Trunk	Oklahoma Whitebud	B & B		8'–10' H
CER CA2	5	Cercis canadensis 'Forest Pansy' TM Multi–Trunk	Forest Pansy Redbud	B & B		8'–10' H
COT COG	14	Cotinus coggygria 'Royal Purple' Multi–Trunk	Royal Purple Smoke Tree	B & B		6'–8' H
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BUC DAC	24,101 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SHO GRA	594,178 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		

CITY OF WICHITA

NORTH FRONTAGE ROAD

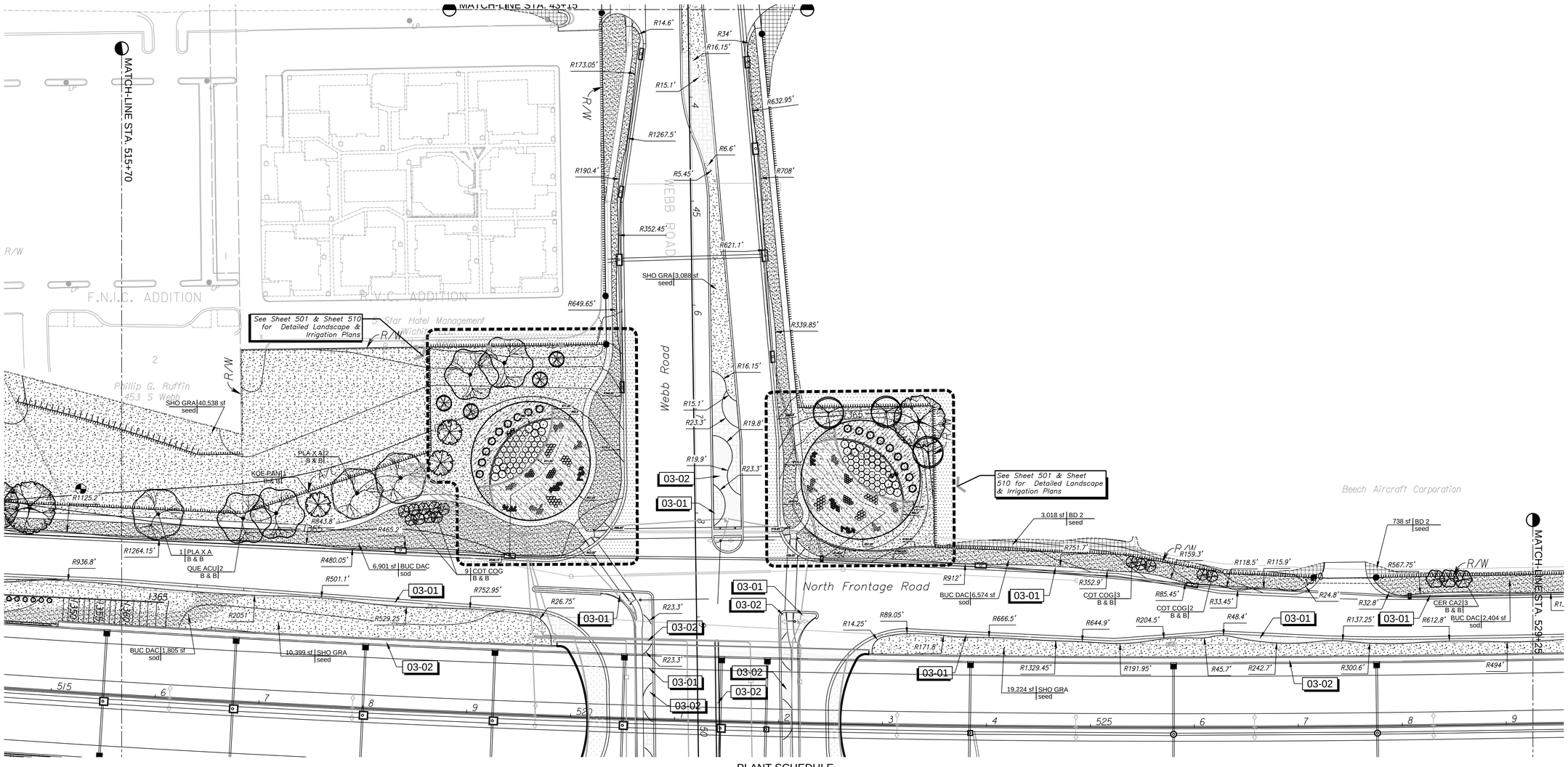
LANDSCAPE PLAN

STA. 501+85 - STA. 515+70

SURV. $SURV$ | PLOT | CADD | DES. $RODES$ | DR. | $RODR$ | TR. | CKD. $ROCKD$ | APP. $RDAPP$

$PRINTTIME$
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$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	495	1055



Scale
1" = 50'

REFERENCE NOTES SCHEDULE

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.
03-02	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 45 degree Herringbone "New Brick" Stamp. Direction of stamp to be 45 degrees to the 90 degree stamp pattern.
03-05	Stamped Stained Concrete Part of Bridge Deck (see Bridge Details). Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.

PLANT SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
PLA X A	3	Platanus x acerifolia	London Plane Tree	B & B	2"Cal	
QUE ACU	2	Quercus acutissima	Sawtooth Oak	B & B	2"Cal	
FLOWERING TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
CER CA2	3	Cercis canadensis 'Forest Pansy' TM Multi-Trunk	Forest Pansy Redbud	B & B		8'-10' H
COT COG	14	Cotinus coggygria 'Royal Purple' Multi-Trunk	Royal Purple Smoke Tree	B & B		6'-8' H
KOE PAN	1	Koelreuteria paniculata	Golden Rain Tree	B & B	2"Cal	
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BD 2	5,344 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed		
BUC DAC	23,510 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SHO GRA	34,108 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		

CITY OF WICHITA

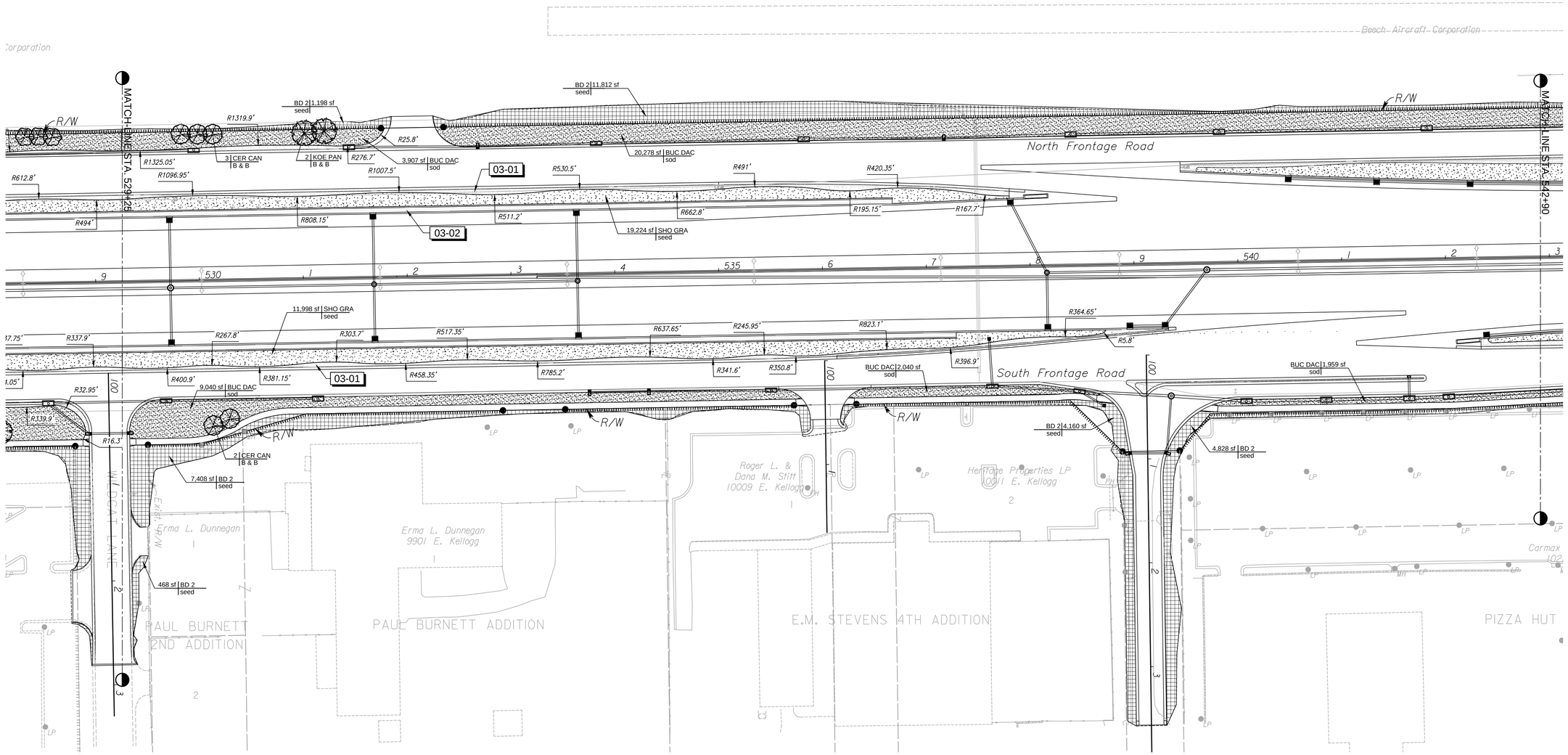
NORTH FRONTAGE ROAD

LANDSCAPE PLAN

STA. 515+70 - STA. 529+25

$PRINTTIME$ $PRINTDATE$ $FILE$ | SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	496	1055



Scale 1" = 50'

REFERENCE NOTES SCHEDULE

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.
03-02	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 45 degree Herringbone "New Brick" Stamp. Direction of stamp to be 45 degrees to the 90 degree stamp pattern.

PLANT SCHEDULE

FLOWERING TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
CER CAN	5	Cercis canadensis texensis 'Oklahoma Whitebud' Multi-Trunk	Oklahoma Whitebud	B & B		8'-10' H
KOE PAN	2	Koelreuteria paniculata	Golden Rain Tree	B & B	2"Cal	

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	29,718 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	37,224 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SHO GRA	11,997 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	

CITY OF WICHITA

NORTH & SOUTH FRONTAGE ROADS

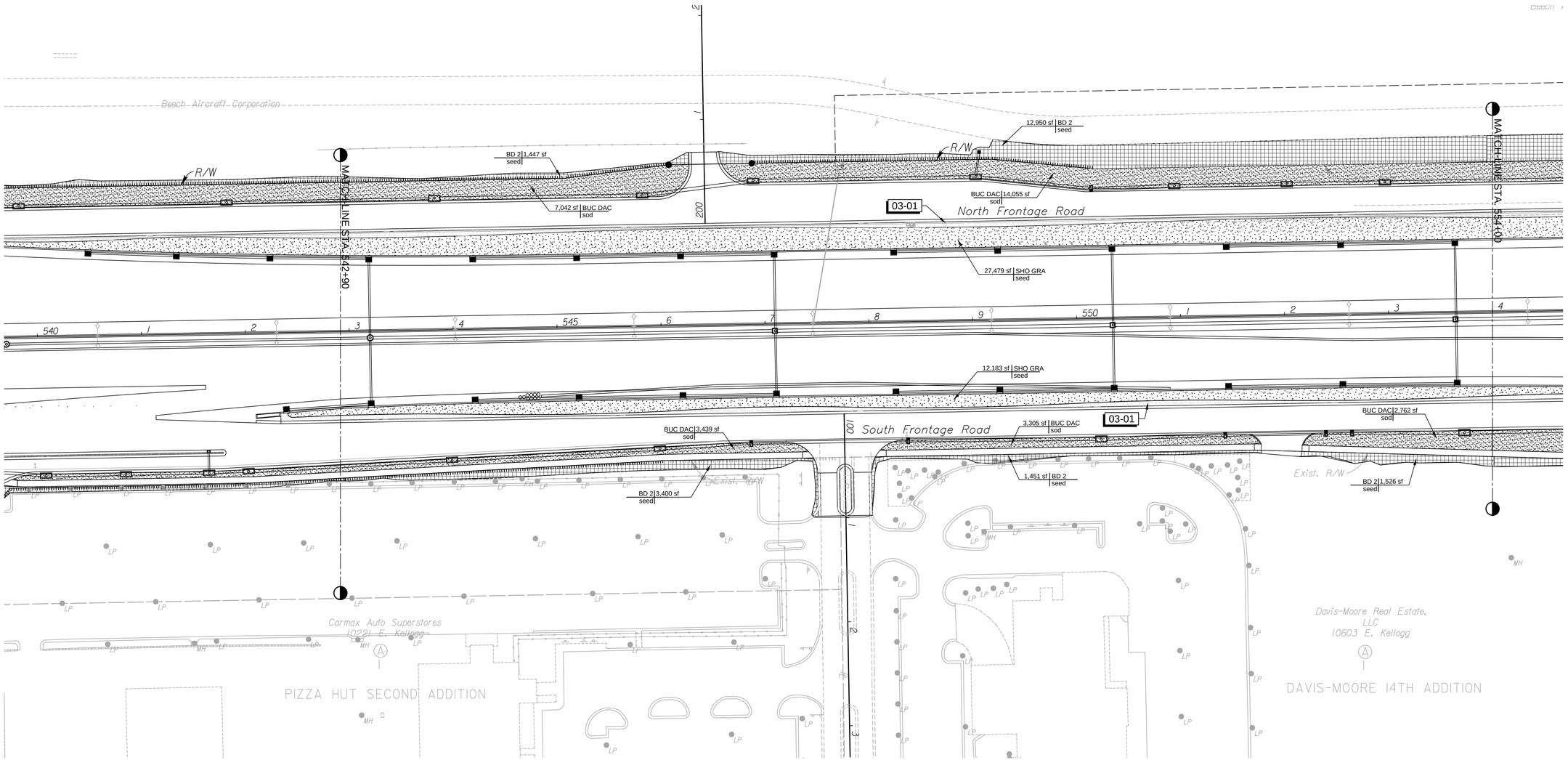
LANDSCAPE PLAN

STA. 529+25 - STA. 543+93

$PRINTTIME$ $PRINTDATE$ $FILE$

SURV. $SURV$ | PLOT | CADD | DES. $RODES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	497	1055



N

Scale
1" = 50'

REFERENCE NOTES SCHEDULE

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.

PLANT SCHEDULE

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	20,774 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	30,604 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SHO GRA	12,183 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	

CITY OF WICHITA

NORTH & SOUTH FRONTAGE ROADS

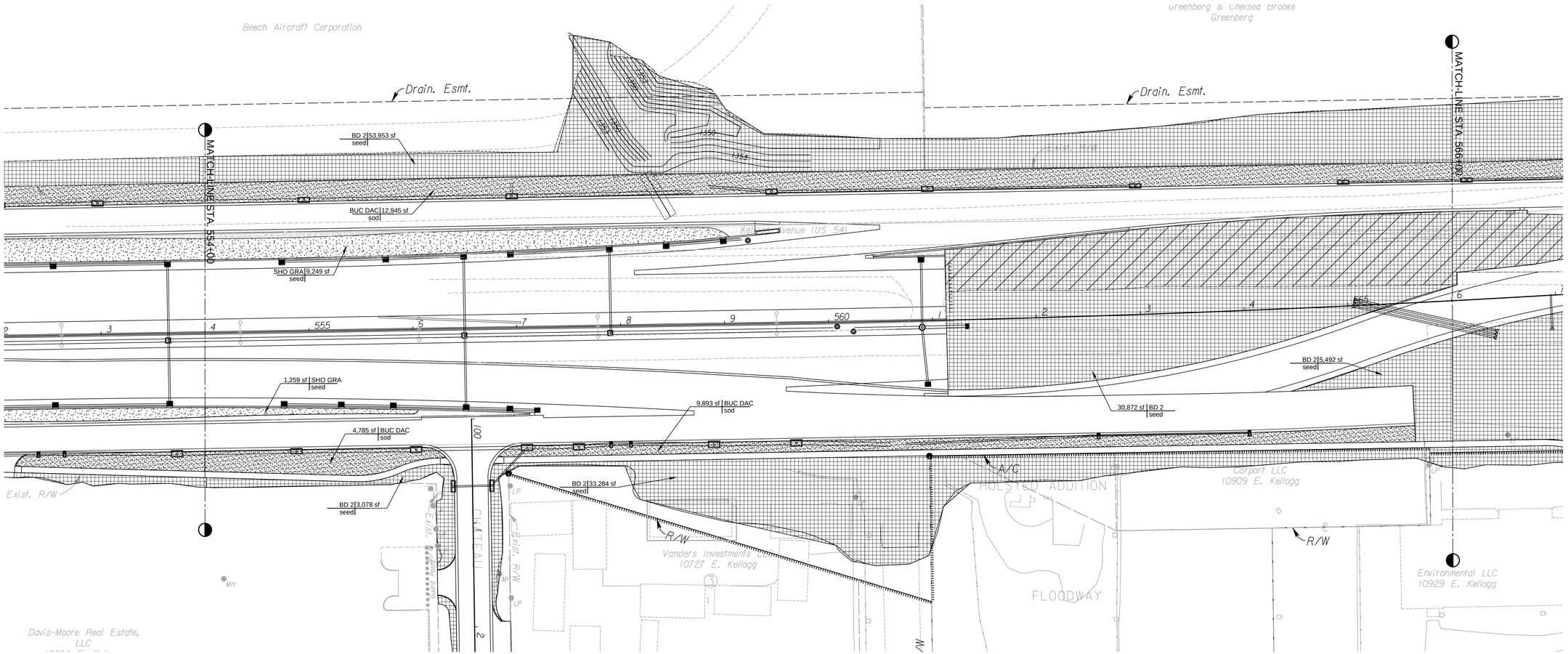
LANDSCAPE PLAN

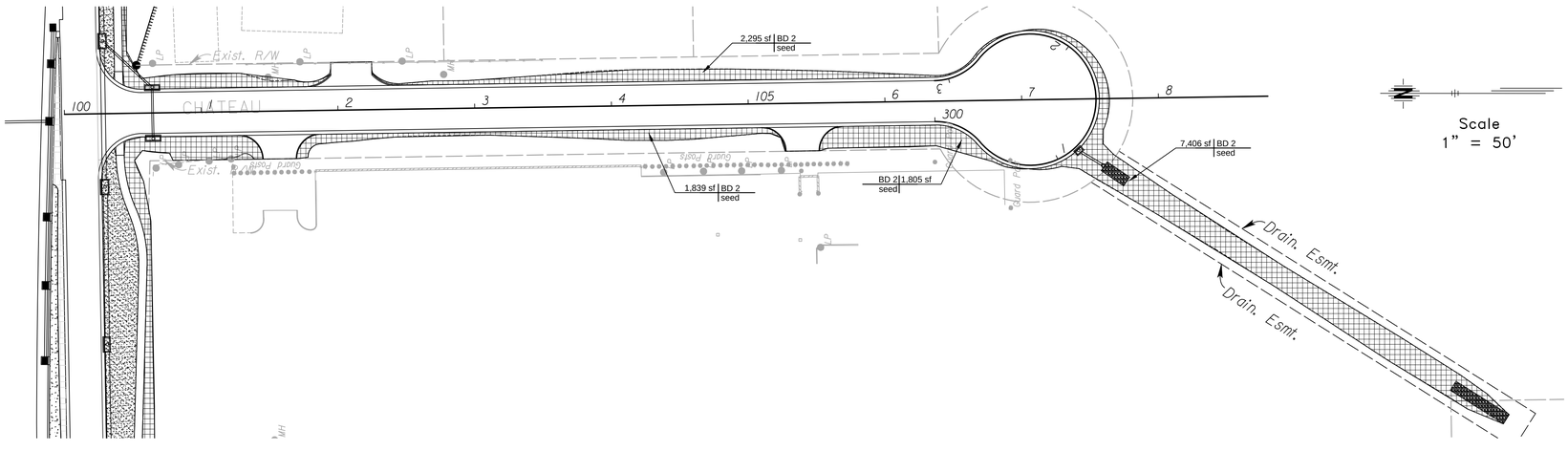
STA. 543+93 - STA. 554+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	498	1055





PLANT SCHEDULE

GROUND COVERS	QTY.	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	166,822 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	38,164 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SHO GRA	10,508 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	

CITY OF WICHITA

NORTH & SOUTH FRONTAGE ROADS

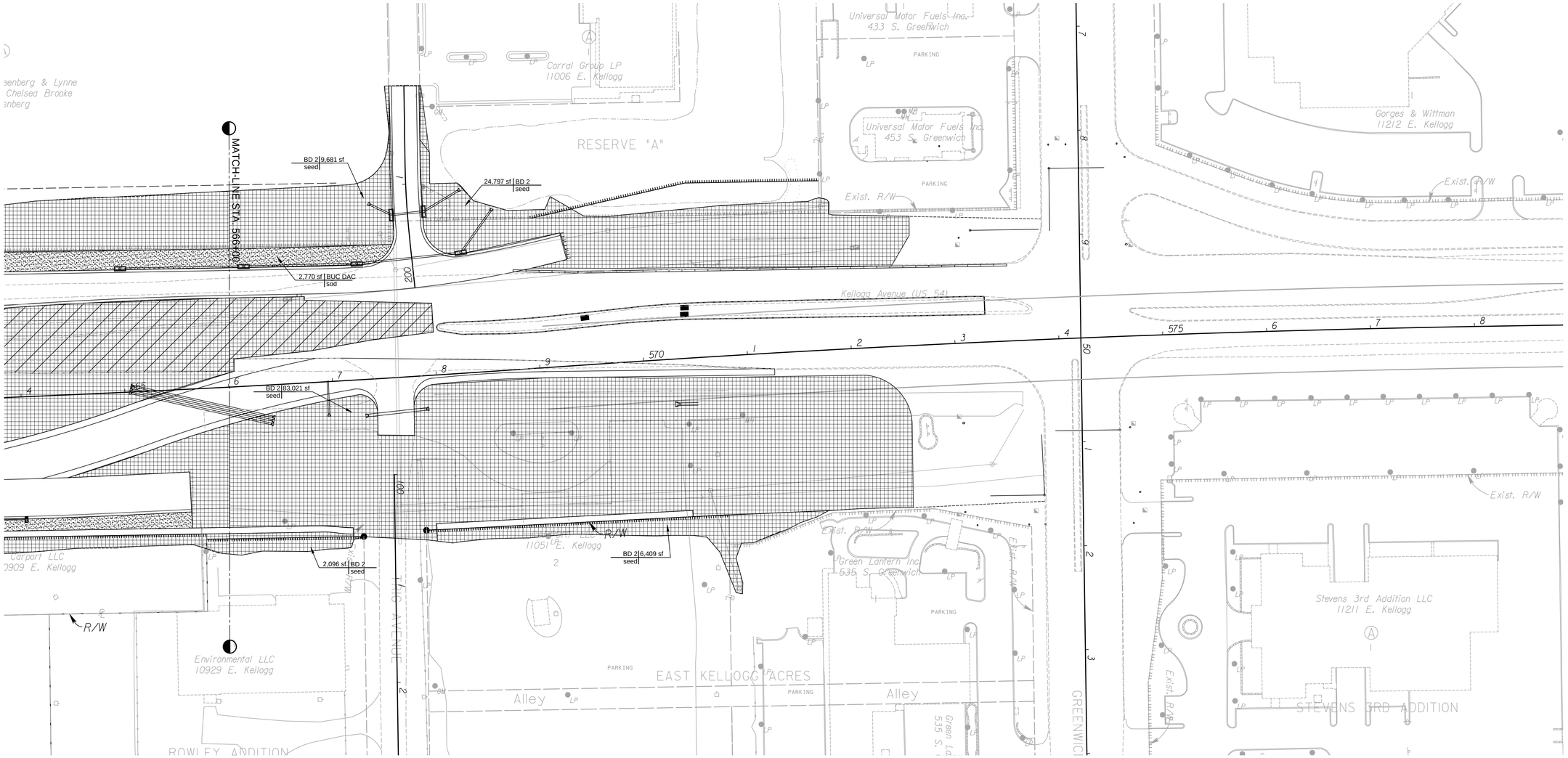
LANDSCAPE PLAN

STA. 554+00 - STA. 566+00

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SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	499	1055



PLANT SCHEDULE

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	134,773 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	2,770 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	

CITY OF WICHITA

NORTH & SOUTH FRONTAGE ROADS

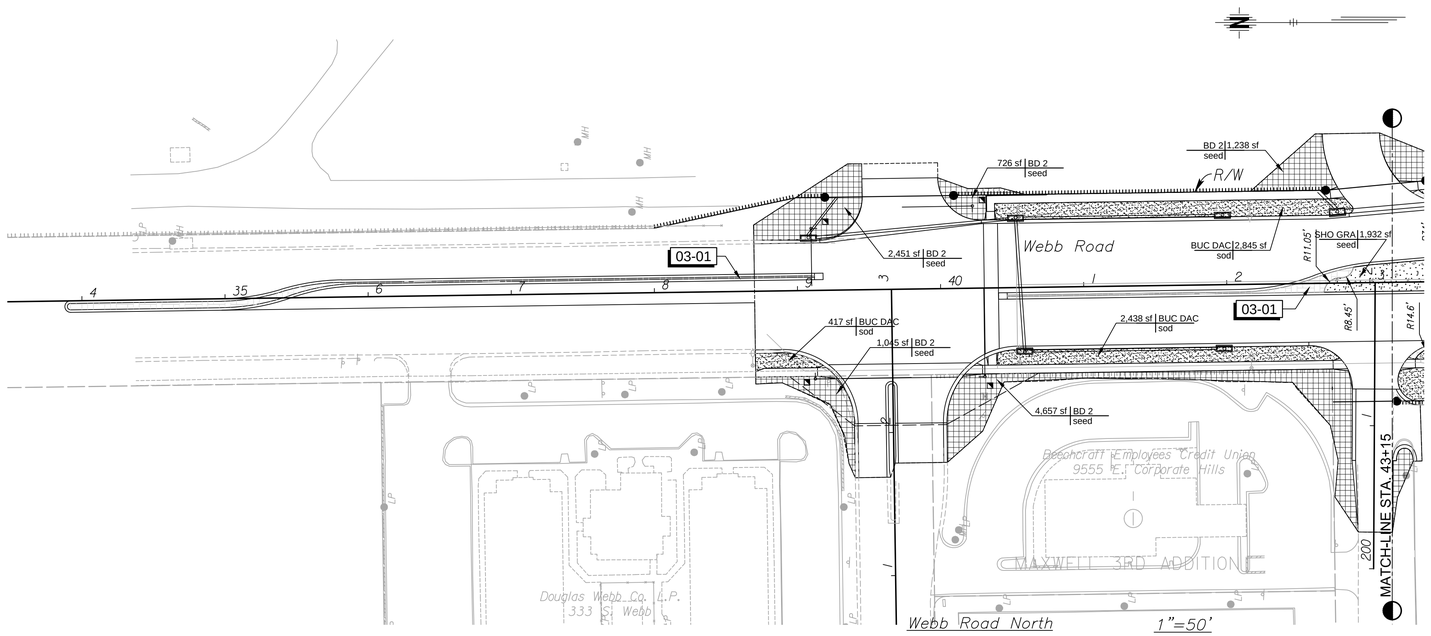
LANDSCAPE PLAN

STA 566+00 - STA 573+00

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SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	500	1055

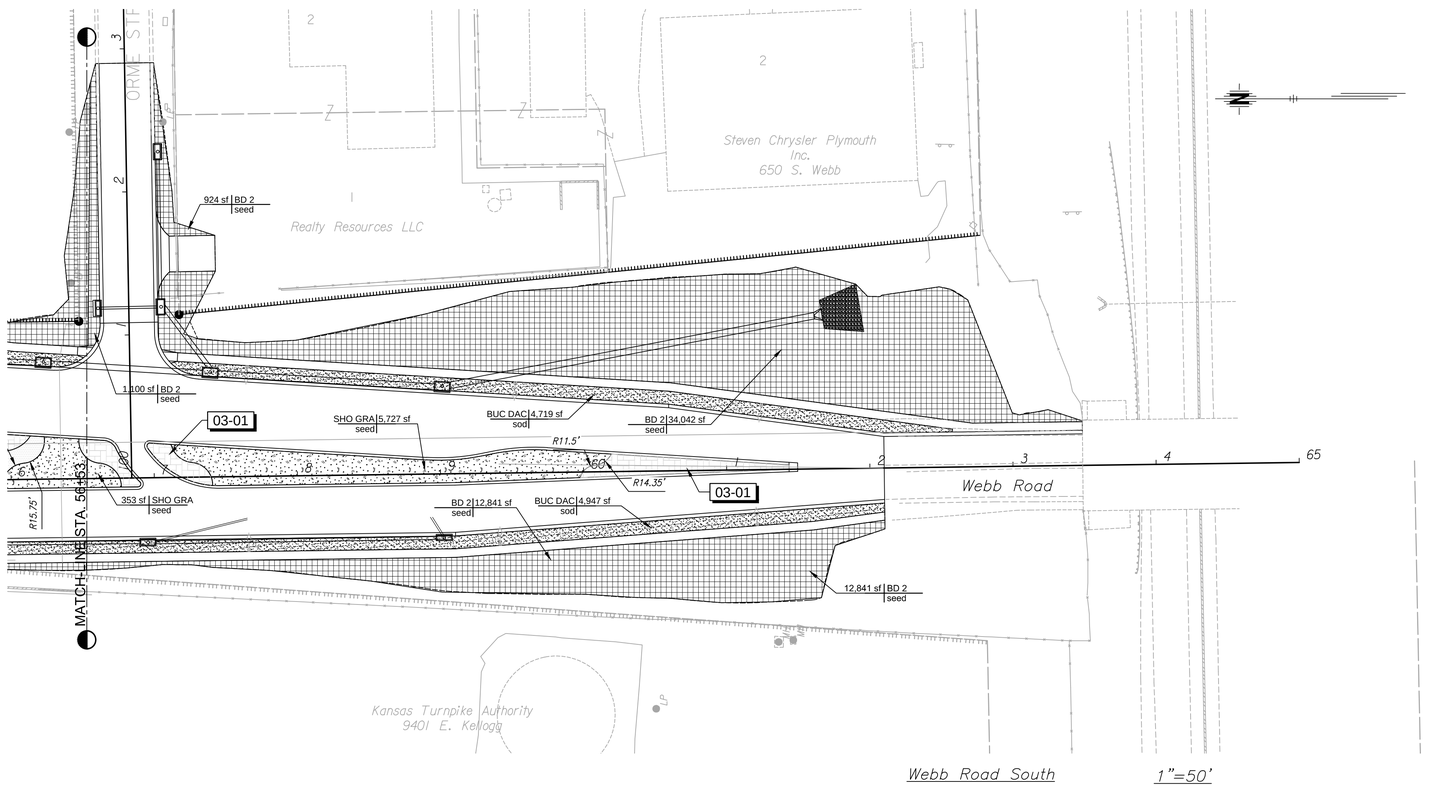


REFERENCE NOTES SCHEDULE S10

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.

PLANT SCHEDULE S10

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	10,116 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	5,700 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SHO GRA	1,927 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	



PLANT SCHEDULE S9

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	48,907 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	9,665 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SHO GRA	6,079 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	

REFERENCE NOTES SCHEDULE S9

SYMBOL	03 CONCRETE DESCRIPTION
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.

CITY OF WICHITA

WEBB ROAD

LANDSCAPE PLAN

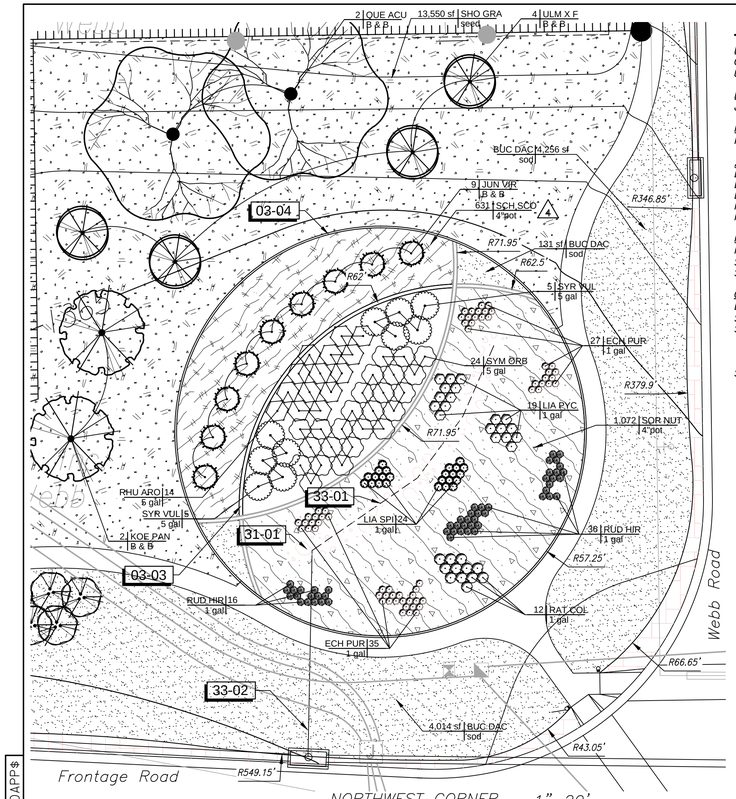
NORTH & SOUTH LIMITS OF WEBB ROAD

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

$PRINTTIME$
$PRINTDATE$
$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	501	1055

Revised Plans



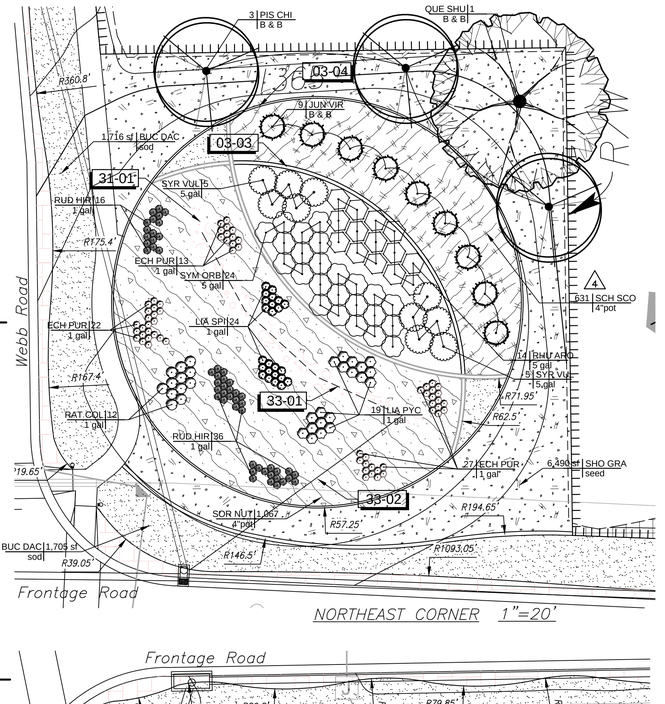
NORTHWEST CORNER 1"=20'

PLANT SCHEDULE NORTHWEST

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
QUE ACU	2	Quercus acutissima	Sawtooth Oak	B & B	2"Cal	
ULM X F	4	Ulmus x 'Frontier'	Frontier Elm	B & B	2"Cal	
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
JUN VIR	9	Juniperus virginiana 'Canaertii'	Canaerti Juniper	B & B		6'–8' H
FLOWERING TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
KOE PAN	2	Koelreuteria paniculata	Golden Rain Tree	B & B	2"Cal	
ANNUALS/PERENNIALS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
ECH PUR	62	Echinacea purpurea	Purple Coneflower	1 gal		
LIA PYC	19	Liatris pycnostachya	Gayfeather	1 gal		
LIA SPI	24	Liatris spicata	Spike Gayfeather	1 gal		
RAT COL	12	Ratibida columnifera	Yellow Praire Coneflower	1 gal		
RUD HIR	52	Rudbeckia hirta	Black–eyed Susan	1 gal		
NATIVE SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
RHU ARO	14	Rhus aromatica 'Gro–Low'	Gro–Low Fragrant Sumac	5 gal		
SYM ORB	24	Symphoricarpos orbiculatus 'Buckbrush'	Coralberry	5 gal		
SYR VUL	10	Syringa vulgaris	Common Lilac	5 gal		
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BUC DAC	8,533 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SCH SCO (4)	631	Schizachyrium scoparium	Little Bluestem Grass	4"pot		24" o.c.
SHO GRA	13,550 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		
SOR NUT	1,072	Sorghastrum nutans	Indian Grass	4"pot		24" o.c.

PLANT SCHEDULE NORTHEAST

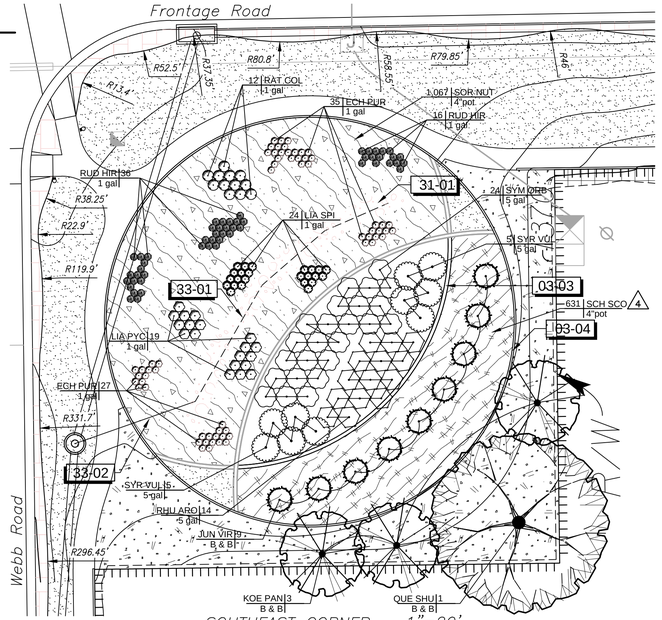
DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
PIS CHI	3	Pistacia chinensis	Chinese Pistache	B & B	2"Cal	
QUE SHU	1	Quercus shumardii	Shumard Red Oak	B & B	2"Cal	
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
JUN VIR	9	Juniperus virginiana 'Canaertii'	Canaerti Juniper	B & B		6'–8' H
ANNUALS/PERENNIALS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
ECH PUR	62	Echinacea purpurea	Purple Coneflower	1 gal		
LIA PYC	19	Liatris pycnostachya	Gayfeather	1 gal		
LIA SPI	24	Liatris spicata	Spike Gayfeather	1 gal		
RAT COL	12	Ratibida columnifera	Yellow Praire Coneflower	1 gal		
RUD HIR	52	Rudbeckia hirta	Black–eyed Susan	1 gal		
NATIVE SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
RHU ARO	14	Rhus aromatica 'Gro–Low'	Gro–Low Fragrant Sumac	5 gal		
SYM ORB	24	Symphoricarpos orbiculatus 'Buckbrush'	Coralberry	5 gal		
SYR VUL	10	Syringa vulgaris	Common Lilac	5 gal		
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BUC DAC	3,684 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SCH SCO (4)	631	Schizachyrium scoparium	Little Bluestem Grass	4"pot		24" o.c.
SHO GRA	6,490 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		
SOR NUT	1,067	Sorghastrum nutans	Indian Grass	4"pot		24" o.c.



NORTHEAST CORNER 1"=20'

PLANT SCHEDULE SOUTHEAST

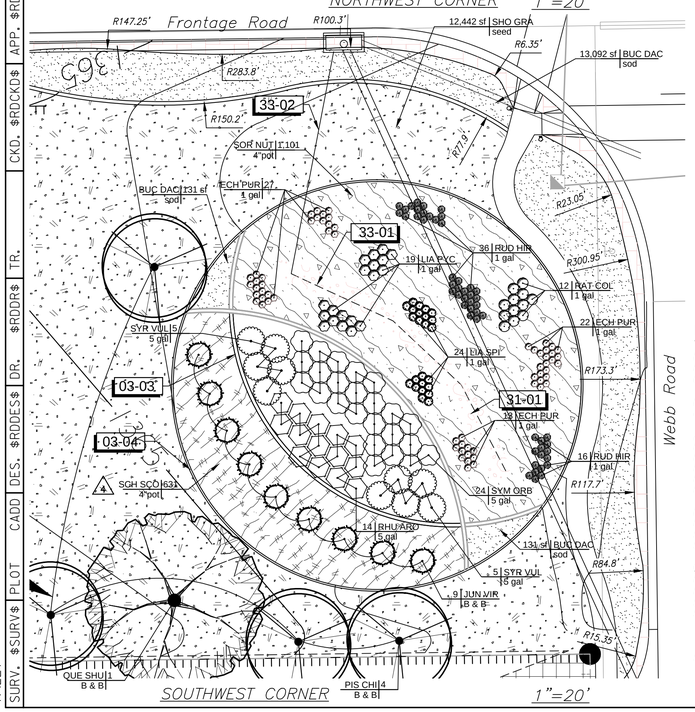
DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
QUE SHU	1	Quercus shumardii	Shumard Red Oak	B & B	2"Cal	
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
JUN VIR	9	Juniperus virginiana 'Canaertii'	Canaerti Juniper	B & B		6'–8' H
FLOWERING TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
KOE PAN	3	Koelreuteria paniculata	Golden Rain Tree	B & B	2"Cal	
ANNUALS/PERENNIALS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
ECH PUR	62	Echinacea purpurea	Purple Coneflower	1 gal		
LIA PYC	19	Liatris pycnostachya	Gayfeather	1 gal		
LIA SPI	24	Liatris spicata	Spike Gayfeather	1 gal		
RAT COL	12	Ratibida columnifera	Yellow Praire Coneflower	1 gal		
RUD HIR	52	Rudbeckia hirta	Black–eyed Susan	1 gal		
NATIVE SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
RHU ARO	14	Rhus aromatica 'Gro–Low'	Gro–Low Fragrant Sumac	5 gal		
SYM ORB	24	Symphoricarpos orbiculatus 'Buckbrush'	Coralberry	5 gal		
SYR VUL	10	Syringa vulgaris	Common Lilac	5 gal		
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BUC DAC	5,763 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SCH SCO (4)	631	Schizachyrium scoparium	Little Bluestem Grass	4"pot		24" o.c.
SHO GRA	4,132 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		24" o.c.
SOR NUT	1,067	Sorghastrum nutans	Indian Grass	4"pot		24" o.c.



SOUTHEAST CORNER 1"=20'

PLANT SCHEDULE SOUTHWEST

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
PIS CHI	4	Pistacia chinensis	Chinese Pistache	B & B	2"Cal	
QUE SHU	1	Quercus shumardii	Shumard Red Oak	B & B	2"Cal	
EVERGREEN TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**	**CAL**	**SIZE**
JUN VIR	9	Juniperus virginiana 'Canaertii'	Canaerti Juniper	B & B		6'–8' H
ANNUALS/PERENNIALS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
ECH PUR	62	Echinacea purpurea	Purple Coneflower	1 gal		
LIA PYC	19	Liatris pycnostachya	Gayfeather	1 gal		
LIA SPI	24	Liatris spicata	Spike Gayfeather	1 gal		
RAT COL	12	Ratibida columnifera	Yellow Praire Coneflower	1 gal		
RUD HIR	52	Rudbeckia hirta	Black–eyed Susan	1 gal		
NATIVE SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		
RHU ARO	14	Rhus aromatica 'Gro–Low'	Gro–Low Fragrant Sumac	5 gal		
SYM ORB	24	Symphoricarpos orbiculatus 'Buckbrush'	Coralberry	5 gal		
SYR VUL	10	Syringa vulgaris	Common Lilac	5 gal		
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**CONT**		**SPACING**
BD 2	966 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed		
BUC DAC	2,290 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod		
SCH SCO (4)	631	Schizachyrium scoparium	Little Bluestem Grass	4"pot		24" o.c.
SHO GRA	12,442 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed		
SOR NUT	1,101	Sorghastrum nutans	Indian Grass	4"pot		24" o.c.



SOUTHWEST CORNER 1"=20'

(4) 6/12/15 Changed Quantities for Bluestem

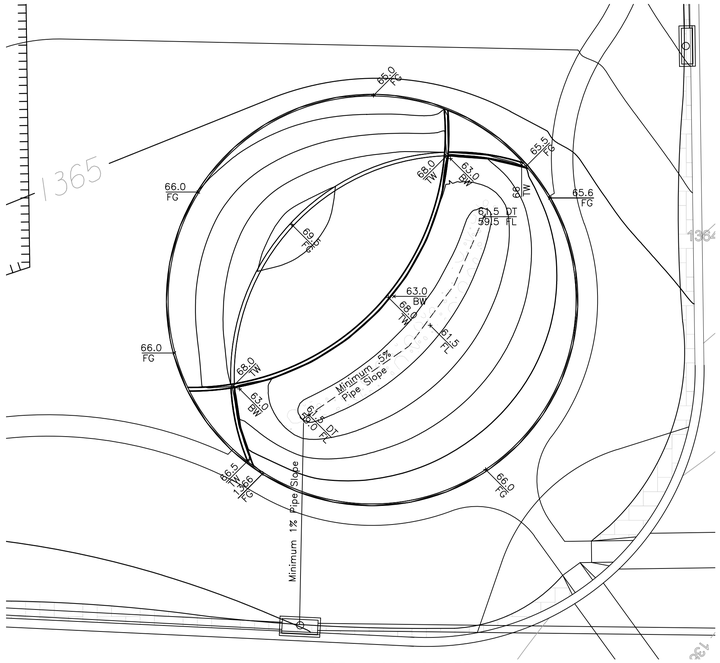
CITY OF WICHITA

LANDSCAPE PLAN

VALUE

$PRINTTIME$
$PRINTDATE$
$FILE$
SURV. $SURV$ PLOT CADD DES. $RODES$ DR. $RODR$ TR. CKD. $ROCKD$ APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	502	1055


66.0 FG
65.6 FG
63.0 BW
63.0 BW
63.0 BW

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	503	1055

Revised Plans

PLANT SCHEDULE

DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
GYM DIO	6	Gymnocladus dioica	Kentucky Coffee Tree	B & B	2"Cal	
PIS CHI	18	Pistacia chinensis	Chinese Pistache	B & B	2"Cal	
PLA X A	10	Platanus x acerifolia	London Plane Tree	B & B	2"Cal	
QUE ACU	6	Quercus acutissima	Sawtooth Oak	B & B	2"Cal	
QUE SHU	9	Quercus shumardii	Shumard Red Oak	B & B	2"Cal	
TAX DIS	15	Taxodium distichum 'Shawnee Brave' TM	Bald Cypress	B & B	2"Cal	
ULM X F	12	Ulmus x 'Frontier'	Frontier Elm	B & B	2"Cal	

EVERGREEN TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
JUN VIR	36	Juniperus virginiana 'Canaertii'	Canaerti Juniper	B & B		6'-8' H
JUN VI2	35	Juniperus virginiana 'Taylor'	Taylor Eastern Redcedar	B & B		6'-8' H
PIN FLE	20	Pinus flexilis 'Vanderwolf's Pyramid'	Vanderwolf's Pyramid Pine	B & B		6'-8' H

FLOWERING TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
CER CAN	14	Cercis canadensis texensis 'Oklahoma Whitebud' Multi-Trunk	Oklahoma Whitebud	B & B		8'-10' H
CER CA2	19	Cercis canadensis 'Forest Pansy' TM Multi-Trunk	Forest Pansy Redbud	B & B		8'-10' H
COT COG	38	Cotinus coggygria 'Royal Purple' Multi-Trunk	Royal Purple Smoke Tree	B & B		6'-8' H
KOE PAN	27	Koelreuteria paniculata	Golden Rain Tree	B & B	2"Cal	

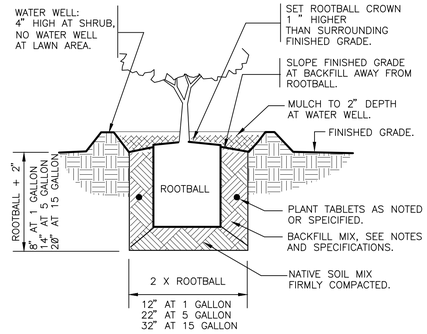
ANNUALS/PERENNIALS	QTY	BOTANICAL NAME	COMMON NAME	CONT
ECH PUR	469	Echinacea purpurea	Purple Coneflower	1 gal
LIA PYC	76	Liatris pycnostachya	Gayfeather	1 gal
LIA SPI	96	Liatris spicata	Spike Gayfeather	1 gal
RAT COL	48	Ratibida columnifera	Yellow Praire Coneflower	1 gal
RUD HIR	388	Rudbeckia hirta	Black-eyed Susan	1 gal

NATIVE SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	CONT
RHU ARO	56	Rhus aromatica 'Gro-Low'	Gro-Low Fragrant Sumac	5 gal
SYM ORB	96	Symphoricarpos orbiculatus 'Buckbrush'	Coralberry	5 gal
SYR VUL	40	Syringa vulgaris	Common Lilac	5 gal

GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	CONT	SPACING
BD 2	471,352 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	seed	
BUC DAC	233,233 sf	Buchloe dactyloides 'Cody'	Buffalo Grass	sod	
SCH SCO (4)	10,446	Schizachyrium scoparium	Little Bluestem Grass	4"pot	24" o.c.
SHO GRA	1,328,838 sf	Short Grass Prarie Mix 10% Little Bluestem, 15% El Reno Side Oats Grama, 60% Lovington Blue Grama, 15% Buffalograss		seed	
SOR NUT	8,532	Sorghastrum nutans	Indian Grass	4"pot	24" o.c.

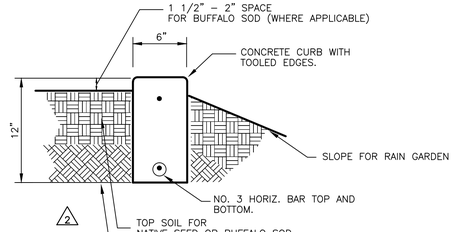
LANDSCAPE NOTES

1. All landscape work shall be done in accordance with industry standards.
2. Areas marked as Seed/Seed shall be installed as follows
   Cody Buffalo seed at a rate of 1.5 lbs/1000 SF and be Fertilized with 5 lbs/1000 SF of 10-20-10
   Cody Buffalo Sod shall be Fertilized with 1.5 lbs/1000 SF
   Short Grass Mix Seed shall be seeded at 8.5lbs/acre with NO Fertilizer.
3. Trees with broken leaders or no central leader will not be accepted.
4. All planting beds shall be prepared by killing all existing vegetation with Round-Up (or equal) according to label directions. A Pre-emergent herbicide such as Treflan (5%) (or equal) shall be applied per label directions. All planting beds to receive 2" organic matter (such as cotton bur mulch, compost, or humus) and shall be rototilled in to a depth of 6-8". (2)
5. Mulch all planting beds with min. 3" of mulch. Mulch all tree saucer wells with min. 3" of mulch. Mulch material to be shredded cypress mulch of uniform consistency. Cost of mulch to be incidental to trees.
6. Topsoil hauled onto site shall be fertile, friable, natural loam topsoil, of uniform quality characteristic of representative local soils which produce heavy growth of crops, grass, or other vegetation. It shall be free of trash, or other matter toxic to plant growth. Cost of topsoil to be incidental to shrub beds at four corners.
7. Topsoil shall be delivered in an unfrozen and non- muddy condition and shall be subject to approval by the Landscape Architect.
8. Prior to any excavation for landscaping purposes the location of underground utilities shall be determined by calling Kansas One Call at 687-2470/1-800-344-7233. Contractor shall be responsible for any damage done to existing utilities.
9. Report any discrepancies in the planting plan to the Landscape Architect, prior to starting construction.
10. The Landscape Contractor shall coordinate with the G.C. to gain site access to install the plants and maintain grounds, until final acceptance from owner. Upon final acceptance, the one (1) year guarantee period will begin.
11. The Landscape Contractor shall coordinate with the G.C. to install the plants and maintain grounds, until final acceptance from owner.
12. The Landscape Contractor is responsible for any damage done to sidewalks, curbs, pavement, utilities, existing trees to remain, or adjacent property not within project limits when installing or maintaining the plantings before final acceptance.
13. General Contractor to coordinate with appropriate Local City Official to Remove/Transplant existing trees.
14. Fall planting season shall be September 1 through October 31. Spring planting season shall be April 1 through June 30. For grass seeding, fall season shall be September 1 through mid October. Spring season for seeding shall be from March 15 through mid May.
15. Quantities listed on the plant palette are for informational purposes only. Landscape Contractor shall be responsible for calculating quantities necessary to complete the installation of theses plans.
16. Landscape Contractor shall provide maintenance until final project acceptance including landscape maintenance and watering.



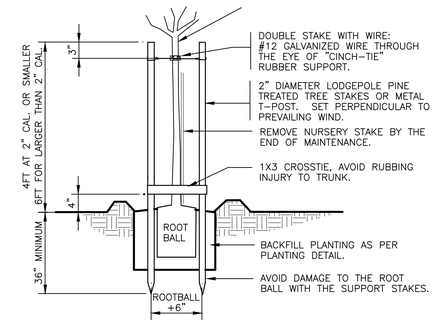
1 SHRUB PLANTING

1" = 1'-0" P-CI-01

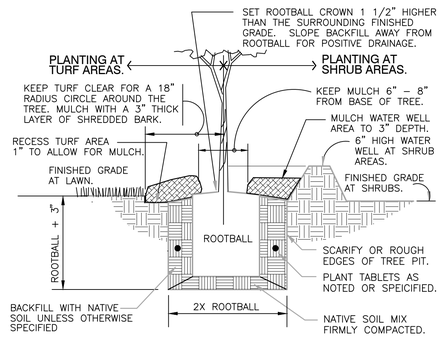


3 6" CONCRETE MOW STRIP

1 1/2" = 1'-0" P-CI-06



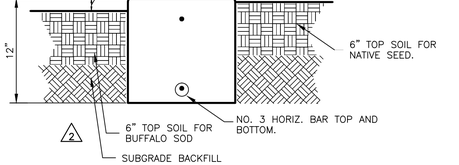
STAKING DETAIL



PLANT PIT DETAIL

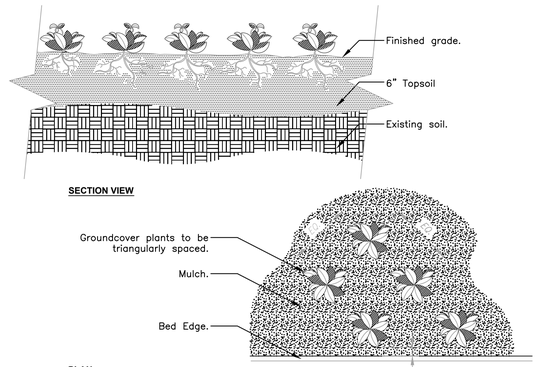
2 TREE PLANTING DOUBLE STAKE B&B

1" = 1'-0" P-CI-04



4 12" CONCRETE MOW STRIP

1 1/2" = 1'-0" P-CI-05



PLAN

Notes:
1- See planting legend for groundcover species, size, and spacing dimension.
2- Small roots (¼" or less) that grow around, up, or down the root ball periphery are considered a normal condition in container production and are acceptable however they should be eliminated at the time of planting. Roots on the periphery can be removed at the time of planting. (See root ball shaving container detail).
3- Settle soil around root ball of each groundcover prior to mulching.

5 GROUNDCOVER

3/4" = 1'-0" P-CI-10

URBAN TREE FOUNDATION © 2014
OPEN SOURCE FREE TO USE

REFERENCE NOTES SCHEDULE

SYMBOL	03 CONCRETE DESCRIPTION	QTY
03-01	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors # 5237 Sandstone or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.	61,930 sf
03-02	Stamped Colored Concrete Pavement (4" Uniform)(AE)(Plain). 4" Thick Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 45 degree Herringbone "New Brick" Stamp. Direction of stamp to be 45 degrees to the 90 degree stamp pattern.	27,866 sf
03-03	12" wide mow strip. Non Colored Concrete Pavement (12" Uniform)(AE)	1,371 lf
03-04	6" wide mow strip. Non Colored Concrete Pavement (12" Uniform)(AE)	1,439 lf
03-05	Stamped Stained Concrete Part of Bridge Deck (see Bridge Details). Concrete to be colored to match Davis Colors #160 Brick Red or approved equal and patterned with 90 degree Herringbone "New Brick" Stamp. Direction of stamp to be parallel to mainline roadway.	3,968 sf

SYMBOL	31 EARTHWORK DESCRIPTION	QTY
31-01	Loose rock placed in bottom of rain garden on top of underdrain system.	53.68 cy

SYMBOL	33 UTILITIES DESCRIPTION	QTY
33-01	6" Dia. PVC Underdrain (H). Perforated Drain Tile	322 lf
33-02	6" Dia. Pipe Underdrain (K). Non Perforated Pipe	230 lf

(4) 6/12/15 Changed Quantities for Bluestem

(2) 6/02/15 Revised details and notes to clarify top soil depth.

CITY OF WICHITA

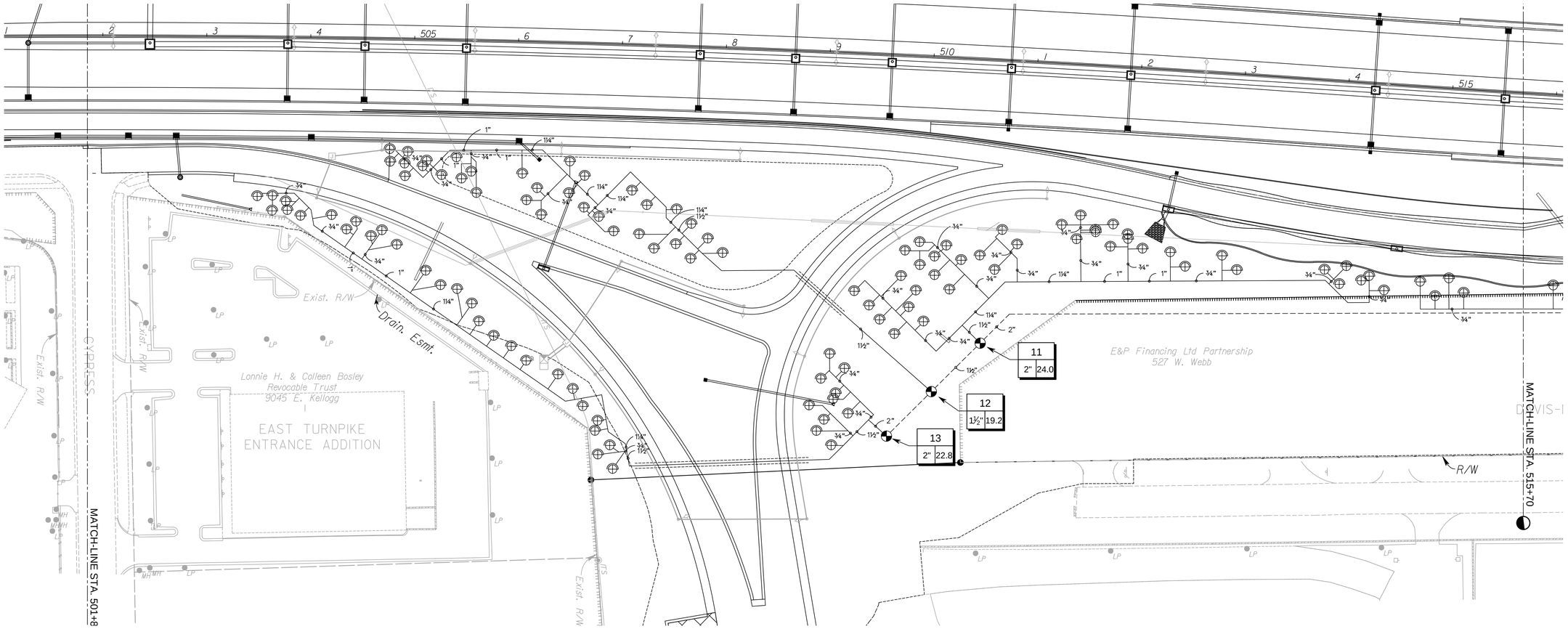
NOTES & DETAILS

LANDSCAPE NOTES

$PRINTTIME$
$PRINTDATE$
$FILE$

SURV. $SURV$ | PLOT | CADD | DES. $RODES$ | DR. $RODR$ | TR. | CKD. $ROCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	504	1055

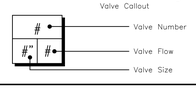


IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	114	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1-1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	3
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	4,300 l.f.
	Irrigation Mainline: PVC Schedule 40	1,027 l.f.
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall be a mininum of 6". Extend sleeves 18 inches beyond edges of paving or construction.	224.6 l.f.

Valve Callout



CITY OF WICHITA

SOUTH FRONTAGE ROAD

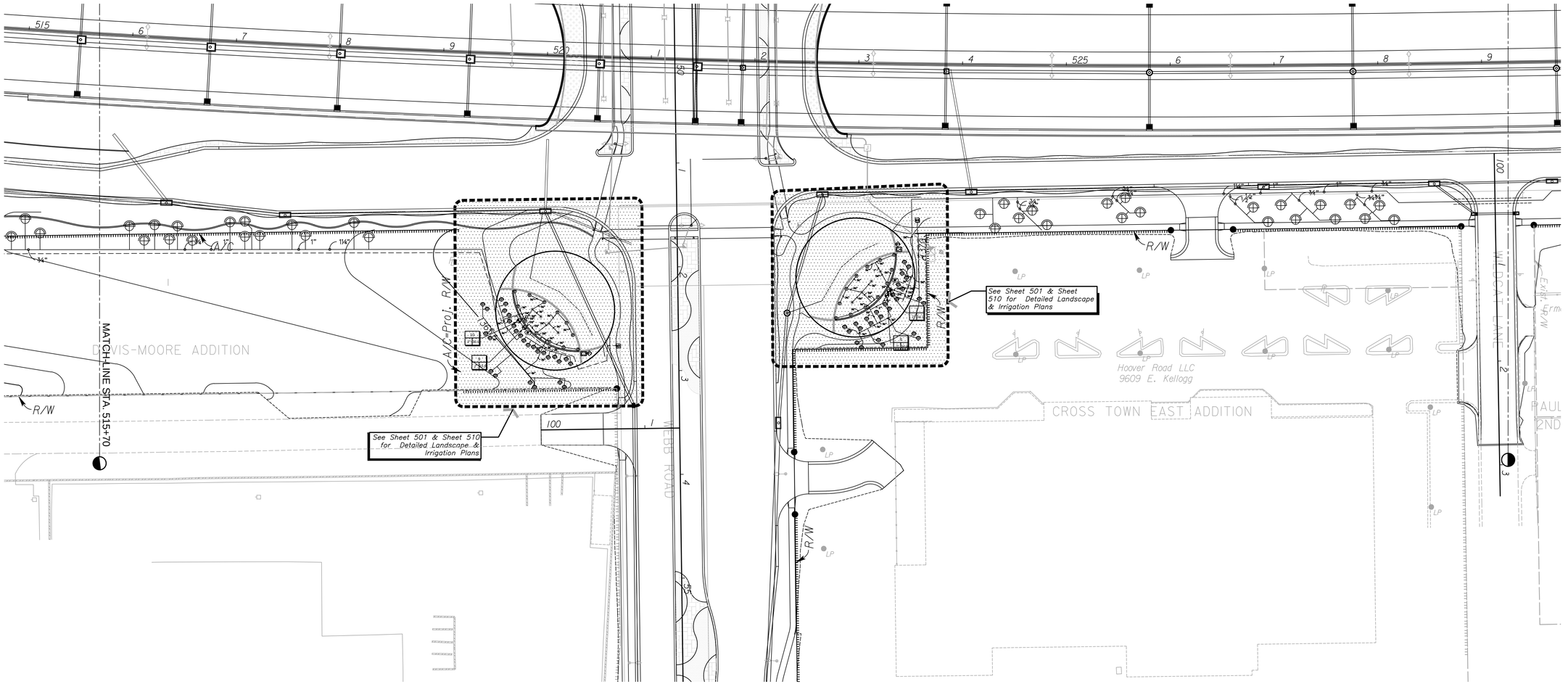
IRRIGATION PLAN

STA. 501+85 - STA. 515+70

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

$PRINTTIME$
$PRINTDATE$
$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	505	1055

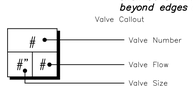


IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A S-16A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	34	30

SYMBOL	DESCRIPTION	QTY
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	1,707 l.f.
	Irrigation Mainline: PVC Schedule 40	860.5 l.f.
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall be a minimum of 6". Extend sleeves 18 inches beyond edges of paving or construction.	74.9 l.f.

Valve Callout



CITY OF WICHITA

SOUTH FRONTAGE ROAD

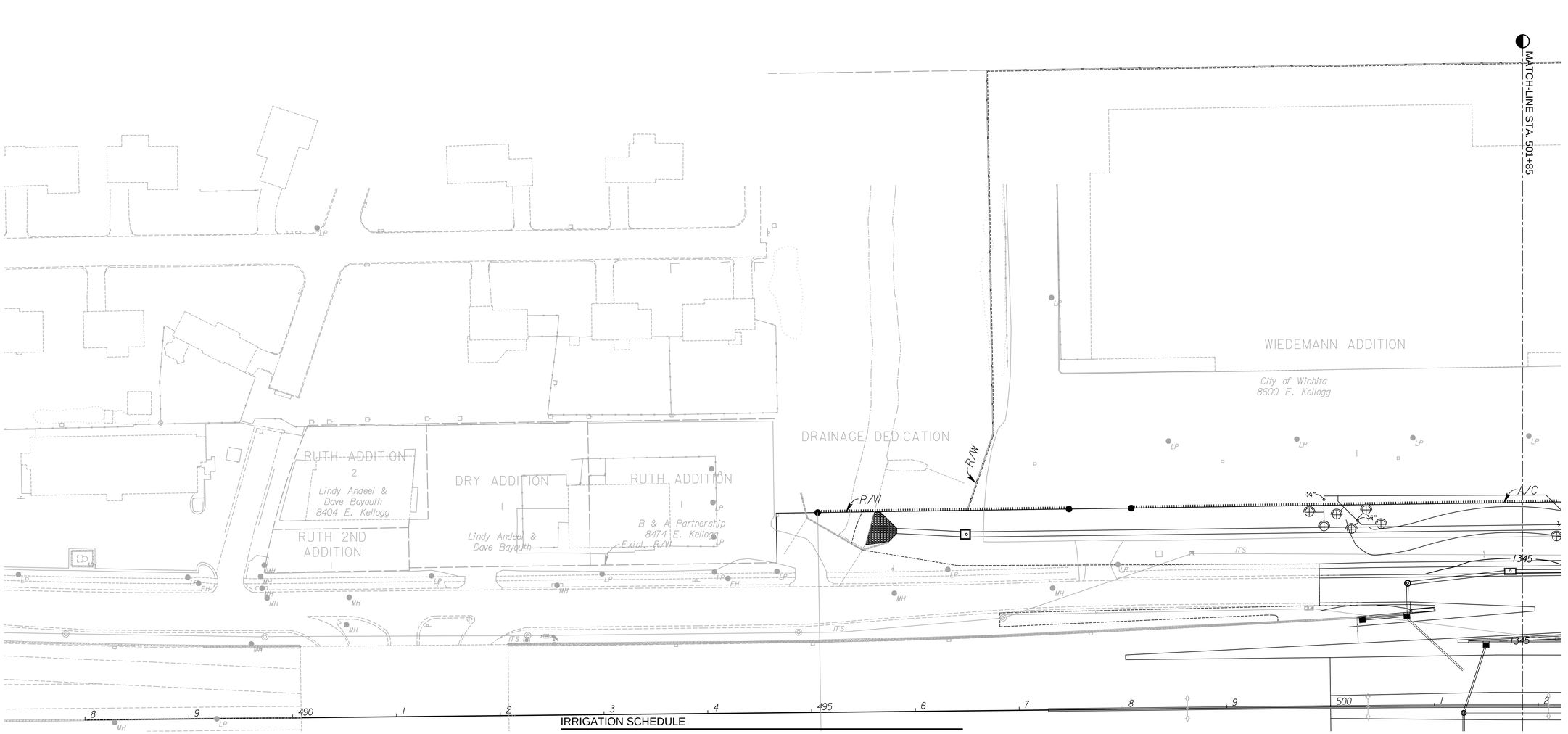
IRRIGATION PLAN

STA. 515+70 - STA. 529+25

$PRINTTIME$
$PRINTDATE$
$FILE$

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	506	1055

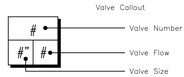


IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A	8 Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	6	30

SYMBOL	DESCRIPTION	QTY
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	340.2 l.f.

Valve Callout



CITY OF WICHITA

NORTH FRONTAGE ROAD

IRRIGATION PLAN

STA. 495+00 - STA. 501+85

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. | $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

$PRINTTIME$
$PRINTDATE$
$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	507	1055

MATCH-LINE STA. 501+85

MATCH-LINE STA. 515+70

IRRIGATION_SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	60	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1-1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	2
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	2,707 l.f.
	Irrigation Mainline: PVC Schedule 40	878.7 l.f.

Valve Callout

Valve Number

Valve Flow

Valve Size

KELWAY 2ND ADDITION

City of Wichita
8930 E. Kellogg

City of Wichita

Kansas Turnpike Authority
9401 E. Kellogg

Exist. R/W

F.N.I.C. ADDITION

Phillip G. Ruffin
453 S Webb

A/C

Exist. R/W

A/C=Proj. R/W-56.50' B.L.E.R.

1
2" 25.2

2
2" 32.4

Scale
1" = 50'

CITY OF WICHITA

NORTH FRONTAGE ROAD

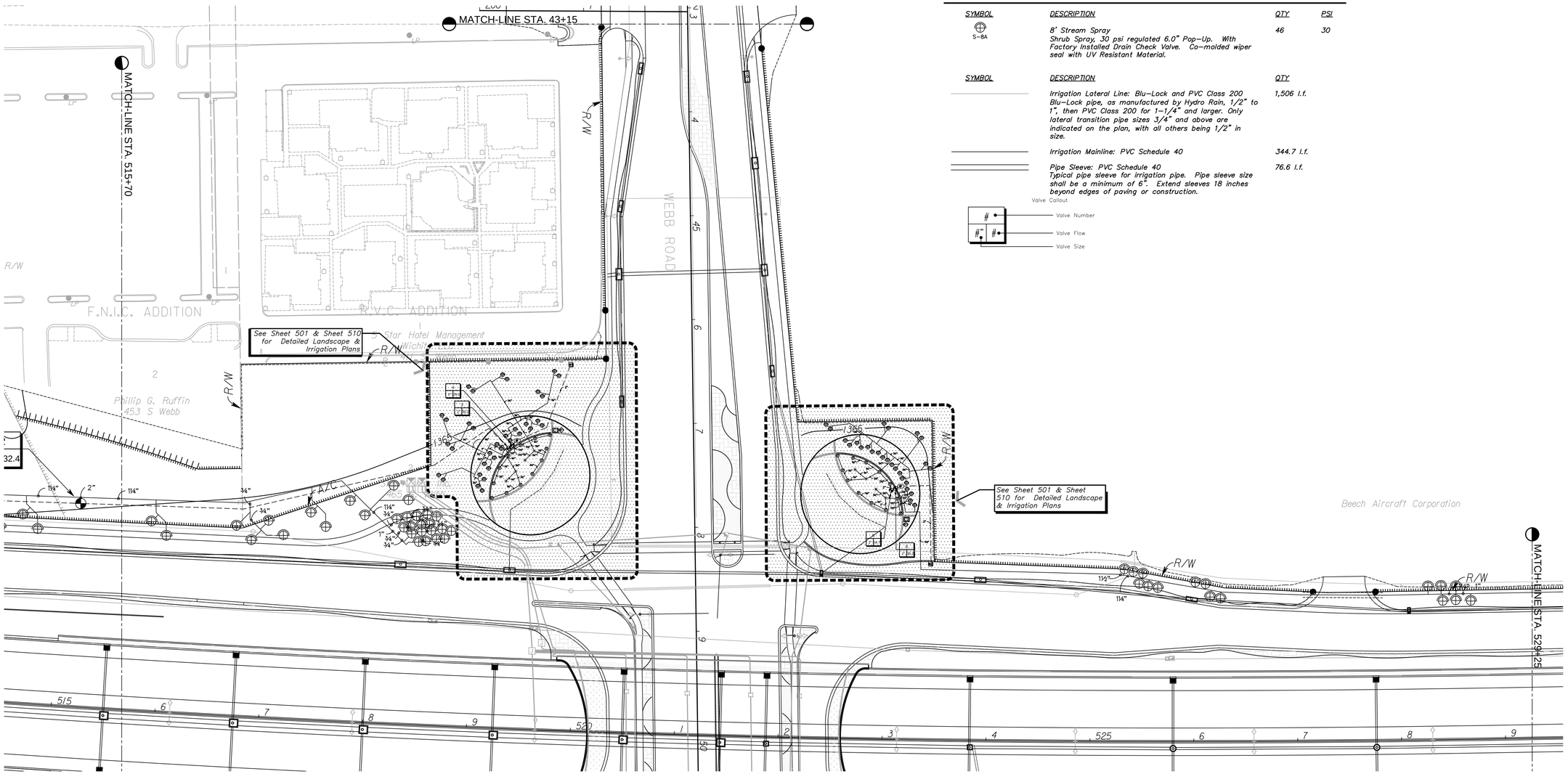
IRRIGATION PLAN

STA. 501+85 - STA. 515+70

$PRINTTIME$
$PRINTDATE$
$FILE$

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	508	1055



IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	46	30

SYMBOL	DESCRIPTION	QTY
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	1,506 l.f.
	Irrigation Mainline: PVC Schedule 40	344.7 l.f.
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall be a minimum of 6". Extend sleeves 18 inches beyond edges of paving or construction.	76.6 l.f.

Valve Callout

N

Scale
1" = 50'

CITY OF WICHITA

NORTH FRONTAGE ROAD

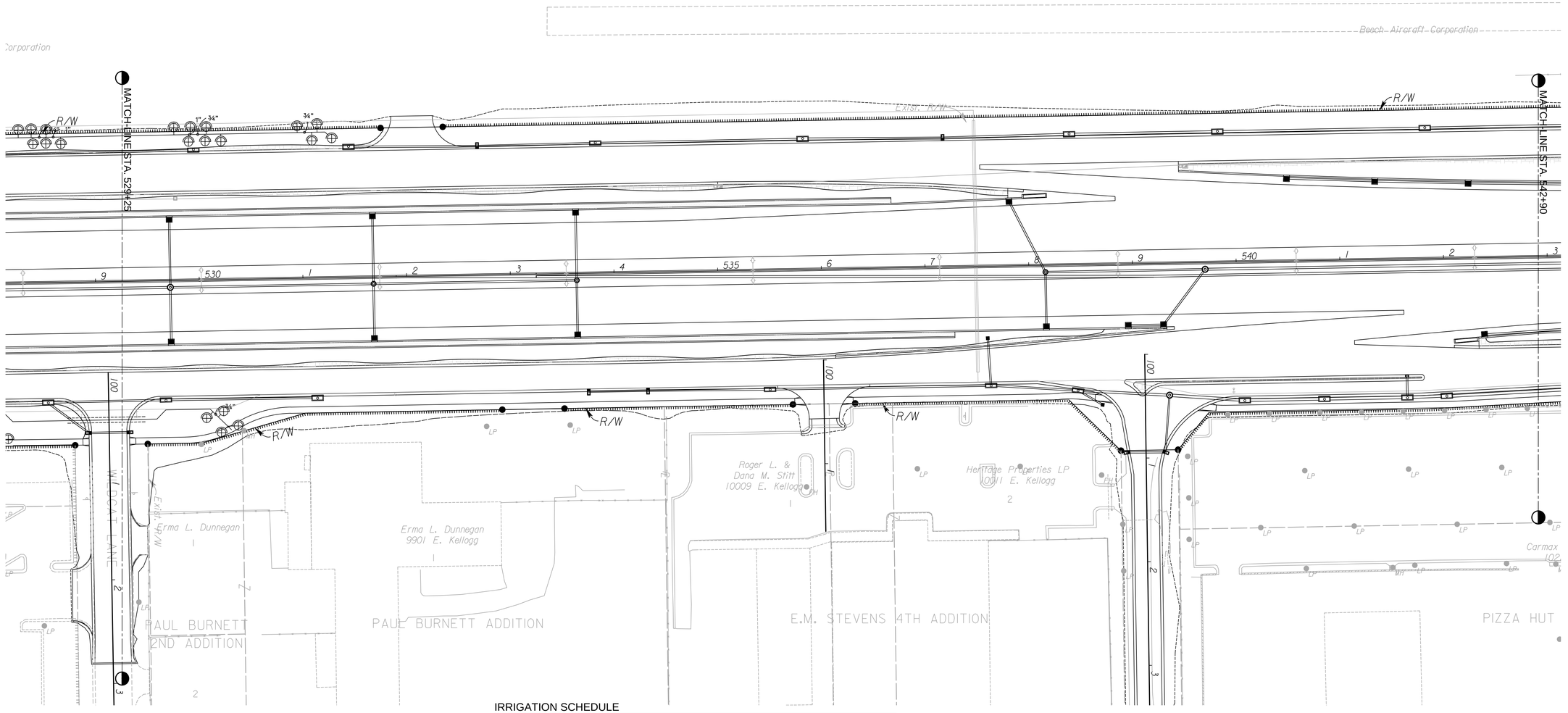
IRRIGATION PLAN

STA. 515+70 - STA. 529+25

SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

$PRINTTIME$
$PRINTDATE$
$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	509	1055

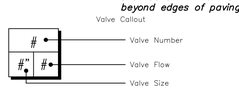


IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	14	30

SYMBOL	DESCRIPTION	QTY
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	563.5 l.f.
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall be a minimum of 6". Extend sleeves 18 inches beyond edges of paving or construction.	74.9 l.f.

Valve Callout



CITY OF WICHITA

MAIN LINE

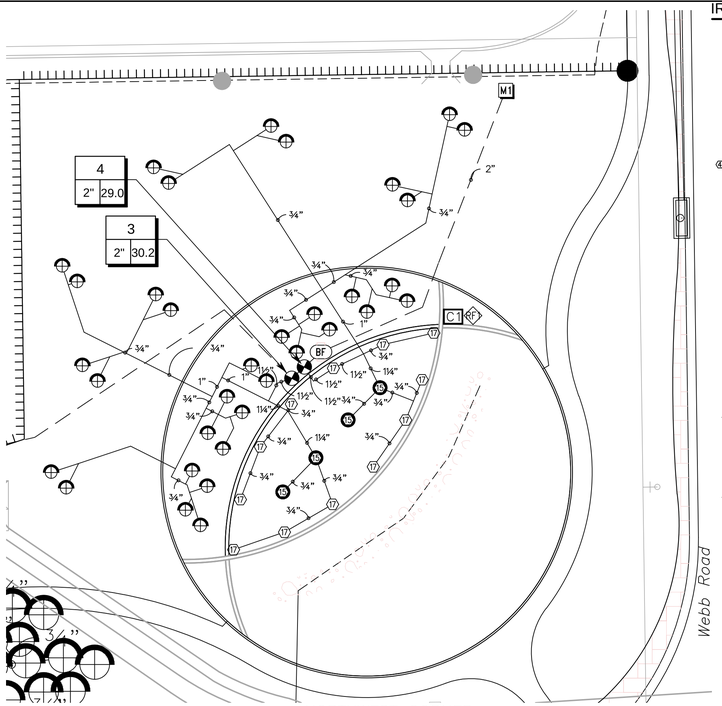
IRRIGATION PLAN

STA. 529+25 - STA. 542+90

$PRINTTIME$
$PRINTDATE$
$FILE$
SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	510	1055

Revised Plans



NORTHWEST CORNER

IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S–8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	34	30
Q T H TT TQ F	15' Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	4	30
④ ⑥ ⑧ ⑩ ⑫ ⑮ ⑰	Adjustable Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	12	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1–1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	2
BF	Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	1
M1	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
	Irrigation Lateral Line: Blu–Lock and PVC Class 200 Blu–Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1–1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	826.4 l.f.
	Irrigation Mainline: PVC Schedule 40	385.6 l.f.

Valve Callout
- # — Valve Number
- #" # — Valve Flow
- Valve Size

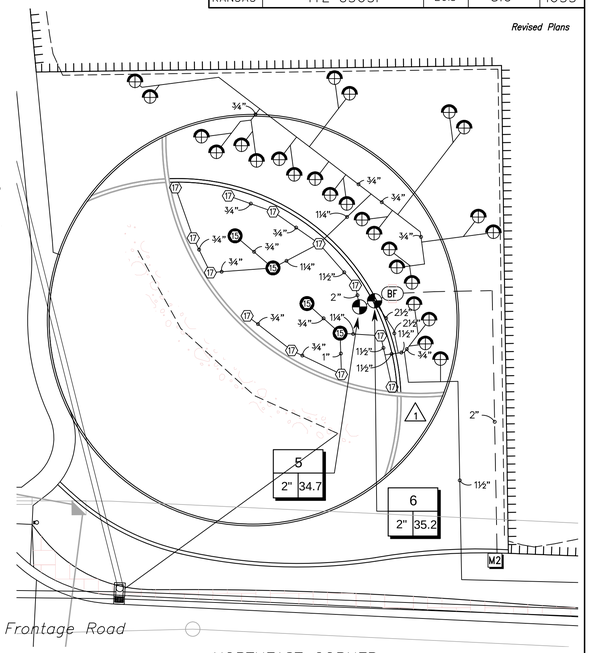
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Scale
1" = 20'

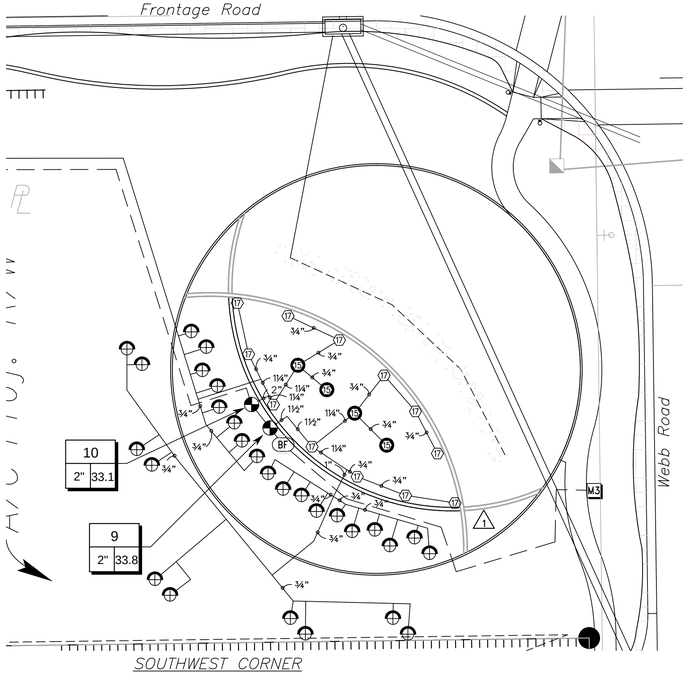
IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S–8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	26	30
Q T H TT TQ F	15' Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	4	30
④ ⑥ ⑧ ⑩ ⑫ ⑮ ⑰	Adjustable Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	12	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1–1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	2
BF	Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	1
M2	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
	Irrigation Lateral Line: Blu–Lock and PVC Class 200 Blu–Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1–1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	884.5 l.f.
	Irrigation Mainline: PVC Schedule 40	113.1 l.f.



NORTHEAST CORNER



SOUTHWEST CORNER

IRRIGATION SCHEDULE

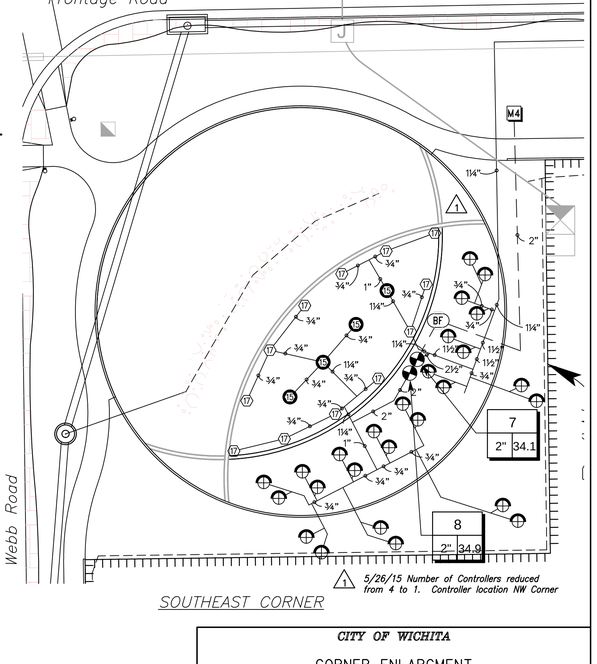
SYMBOL	DESCRIPTION	QTY	PSI
S–8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	28	30
Q T H TT TQ F	15' Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	4	30
④ ⑥ ⑧ ⑩ ⑫ ⑮ ⑰	Adjustable Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	12	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1–1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	2
BF	Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	1
M3	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
	Irrigation Lateral Line: Blu–Lock and PVC Class 200 Blu–Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1–1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	846.7 l.f.
	Irrigation Mainline: PVC Schedule 40	1,083 l.f.

IRRIGATION SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S–8A S–T6A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	26	30
Q T H TT TQ F	15' Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	4	30
④ ⑥ ⑧ ⑩ ⑫ ⑮ ⑰	Adjustable Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop–Up. With Factory Installed Drain Check Valve. Co–molded wiper seal with UV Resistant Material.	12	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1–1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	2
BF	Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	1
M4	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
	Irrigation Lateral Line: Blu–Lock and PVC Class 200 Blu–Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1–1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	751.4 l.f.
	Irrigation Mainline: PVC Schedule 40	107.7 l.f.



1 5/26/15 Number of Controllers reduced from 4 to 1. Controller location NW Corner

SOUTHEAST CORNER

CITY OF WICHITA

CORNER ENLARGMENT

IRRIGATION CORNERS

SURV. $SURV$ | PLOT | CADD | DES. $RODES$ | DR. $RODR$ | TR. | CKD. $ROCKD$ | APP. $RDAPP$

$PRINTTIME$
$PRINTDATE$
$FILE$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	511	1055

Revised Plans

VALVE SCHEDULE

NUMBER	MODEL	SIZE	TYPE	PSI	PSI @ POC	GPM	PRECIP
1	Valve	2"	Shrub Spray	39.36		25.23	0.82 in/h
2	Valve	2"	Shrub Spray	39.84		32.43	0.89 in/h
3	Valve	2"	Shrub Spray	36.39		30.18	1.21 in/h
4	Valve	2"	Shrub Spray	35.93		28.97	1.24 in/h

VALVE SCHEDULE

NUMBER	MODEL	SIZE	TYPE	PSI	PSI @ POC	GPM	PRECIP
5	Valve	2"	Shrub Spray	38.42		34.74	1.14 in/h
6	Valve	2"	Shrub Spray	41.34		35.19	1.04 in/h

VALVE SCHEDULE

NUMBER	MODEL	SIZE	TYPE	PSI	PSI @ POC	GPM	PRECIP
9	Valve	2"	Shrub Spray	34.37		33.79	1.19 in/h
10	Valve	2"	Shrub Spray	36.59		33.08	1.08 in/h
11	Valve	2"	Shrub Spray	37.67		24.02	0.82 in/h
12	Valve	1-1/2"	Shrub Spray	36.54		19.22	0.82 in/h
13	Valve	2"	Shrub Spray	37.09		22.82	0.82 in/h

VALVE SCHEDULE

NUMBER	MODEL	SIZE	TYPE	PSI	PSI @ POC	GPM	PRECIP
7	Valve	2"	Shrub Spray	36.86		34.11	1.01 in/h
8	Valve	2"	Shrub Spray	32.67		34.93	1.30 in/h

1. All irrigation work is to be installed in compliance with all local codes and regulations.
2. The Irrigation Contractor DOES NOT START irrigation construction until pressure and flows have been verified and all pipe alignments have been field located and approved by the Landscape Architect and/or Owner representative prior to construction.
3. Irrigation system to be built as shown in the plans with Hunter Industries equipment or approved equals. Any changes to the design caused by changing equipment shall be submitted prior to start of construction of irrigation system.
4. Prior to construction, Irrigation Contractor to locate all exist and proposed utilities and electrical wiring.
5. Contractor shall not install irrigation system when any obstructions in the field exist. Contact the Landscape Architect for clarification before proceeding around obstructions.
6. Heads to be adjusted to not spray on buildings, walks, or drives. Spray Heads will be located nearest to planting bed edge using funny pipe and fittings. Spray Heads to be located and sized so not to be susceptible to damage by automobile overhangs.
7. Irrigation Contractor shall coordinate with Paving Contractor to locate and install required irrigation lines sleeving prior to any paving. Combine piping when possible to save on sleeving material. Sleeves to be min. 20" below finish grade. Verify final depth w/ Paving Contractor for adequate coverage.
8. Automatic drainage valves to be located at the ends of lines and at the lowest points on the lines.
9. Irrigation Contractor to verify location of city water with GC prior to installation of system. Irrigation Contractor shall verify static pressure and volume of water supply prior to installation of system.
10. Locate Irrigation Controller in northwest corner of Webb and Kellogg as field approved by City of Wichita.
11. Irrigation water is to be supplied as shown.

IRRIGATION_SCHEDULE

SYMBOL	DESCRIPTION	QTY	PSI
S-8A	8' Stream Spray Shrub Spray, 30 psi regulated 6.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	388	30
15 Q, 15 T, 15 H, 15 TT, 15 TQ, 15 F	15' Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	16	30
4, 6, 8, 10, 12, 15, 17	Adjustable Shrub Spray Shrub Spray, 30 psi regulated 12.0" Pop-Up. With Factory Installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	48	30

SYMBOL	DESCRIPTION	QTY
	Valve 1", 1-1/2", 2", and 3" Plastic Electric Remote Control Valves, Globe Configuration, with NPT Threaded Inlet/Outlet, for Commercial/Municipal Use.	13
BF	1" Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	1
BF	1 1/2" Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	2
BF	1/2" Backflow Preventer Pressure Vacuum Breaker, brass with ball valve SOV. Install 12" (305MM) above highest downstream outlet and the highest point in the downstream piping.	1
C1	Calsense Model ET2000e Controller - Controller shall communicate with City of Wichita Central irrigation control system via GPRS radio modem installed at factory within controller. Controller system shall include Calsense flow sensor, Model FM of Appropriate size to be installed at points of connection. RRe-trans remote control unit to be provided with controller unit. City of Wichita to provide SIM card required for the GPRS communications	1 (1)
RF	Calsense Model RB-I-- Tipping Rain Bucket shall be provided with Controller Install per manufacturer's specifications.	1
M1	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
M2	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
M3	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
M4	Water Meter 1" Existing meter installed with water main. Verify with GC for installed location.	1
	Irrigation Lateral Line: Blu-Lock and PVC Class 200 Blu-Lock pipe, as manufactured by Hydro Rain, 1/2" to 1", then PVC Class 200 for 1-1/4" and larger. Only lateral transition pipe sizes 3/4" and above are indicated on the plan, with all others being 1/2" in size.	13,448 l.f.
	Irrigation Mainline: PVC Schedule 40	2,735 l.f.
	Pipe Sleeve: PVC Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall be a minimum of 6". Extend sleeves 18 inches beyond edges of paving or construction.	376.1 l.f.

WATERING SCHEDULE

NUMBER	MODEL	TYPE	PRECIP	SUN	MON	TUE	WED	THU	FRI	SAT	IN./WEEK	MIN./WEEK	GAL./WEEK	GAL./DAY
1	Valve	Shrub Spray	0.82 in/h		31 min		31 min		31 min		1.25	92	2,321	773.6
2	Valve	Shrub Spray	0.89 in/h		29 min		29 min		29 min		1.25	85	2,757	918.9
3	Valve	Shrub Spray	1.21 in/h		21 min		21 min		21 min		1.25	63	1,901	633.8
4	Valve	Shrub Spray	1.24 in/h		21 min		21 min		21 min		1.25	61	1,767	589.2
5	Valve	Shrub Spray	1.14 in/h		22 min		22 min		22 min		1.25	66	2,293	764.4
6	Valve	Shrub Spray	1.04 in/h		24 min		24 min		24 min		1.25	72	2,534	844.7
7	Valve	Shrub Spray	1.00 in/h		25 min		25 min		25 min		1.25	75	2,648	882.8
8	Valve	Shrub Spray	1.30 in/h		20 min		20 min		20 min		1.25	58	2,026	675.4
9	Valve	Shrub Spray	1.19 in/h		21 min		21 min		21 min		1.25	63	2,129	709.6
10	Valve	Shrub Spray	1.08 in/h		24 min		24 min		24 min		1.25	70	2,315	771.8
11	Valve	Shrub Spray	0.82 in/h		31 min		31 min		31 min		1.25	92	2,210	736.7
12	Valve	Shrub Spray	0.82 in/h		31 min		31 min		31 min		1.25	92	1,768	589.4
13	Valve	Shrub Spray	0.82 in/h		31 min		31 min		31 min		1.25	92	2,100	699.9

CRITICAL ANALYSIS

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P.O.C. NUMBER: 01
Water Source Information: Existing meter
Installed with water main. Verify with GC for installed location.

FLOW AVAILABLE
Water Meter Size: 1"
Flow Available: 37.50 gpm

PRESSURE AVAILABLE
Static Pressure at POC: 60.00 psi
Elevation Change: 5.00 ft
Service Line Size: 2"
Length of Service Line: 5.00 ft
Pressure Available: 58.00 psi

DESIGN ANALYSIS
Maximum Station Flow: 32.43 gpm
Flow Available at POC: 37.50 gpm
Residual Flow Available: 5.07 gpm

Pressure Req. at Critical Station: 39.82 psi
Loss for Fittings: 0.43 psi
Loss for Main Line: 4.26 psi
Loss for POC to Valve Elevation: 0.87 psi
Loss for Backflow: 4.95 psi
Loss for Water Meter: 6.30 psi
Critical Station Pressure at POC: 56.63 psi
Pressure Available: 58.00 psi
Residual Pressure Available: 1.37 psi

P.O.C. NUMBER: 02
Water Source Information: Existing meter
Installed with water main. Verify with GC for installed location.

FLOW AVAILABLE
Water Meter Size: 1"
Flow Available: 37.50 gpm

PRESSURE AVAILABLE
Static Pressure at POC: 60.00 psi
Elevation Change: 5.00 ft
Service Line Size: 2"
Length of Service Line: 5.00 ft
Pressure Available: 58.00 psi

DESIGN ANALYSIS
Maximum Station Flow: 35.19 gpm
Flow Available at POC: 37.50 gpm
Residual Flow Available: 2.31 gpm

Pressure Req. at Critical Station: 41.34 psi
Loss for Fittings: 0.10 psi
Loss for Main Line: 0.99 psi
Loss for POC to Valve Elevation: 1.30 psi
Loss for Backflow: 2.70 psi
Loss for Water Meter: 7.44 psi
Critical Station Pressure at POC: 53.87 psi
Pressure Available: 58.00 psi
Residual Pressure Available: 4.13 psi

P.O.C. NUMBER: 03
Water Source Information: Existing meter
Installed with water main. Verify with GC for installed location.

FLOW AVAILABLE
Water Meter Size: 1"
Flow Available: 37.50 gpm

PRESSURE AVAILABLE
Static Pressure at POC: 60.00 psi
Elevation Change: 5.00 ft
Service Line Size: 2"
Length of Service Line: 5.00 ft
Pressure Available: 58.00 psi

DESIGN ANALYSIS
Maximum Station Flow: 33.79 gpm
Flow Available at POC: 37.50 gpm
Residual Flow Available: 3.71 gpm

Pressure Req. at Critical Station: 40.71 psi
Loss for Fittings: 0.11 psi
Loss for Main Line: 1.07 psi
Loss for POC to Valve Elevation: 1.30 psi
Loss for Backflow: 6.00 psi
Loss for Water Meter: 6.56 psi
Critical Station Pressure at POC: 55.75 psi
Pressure Available: 58.00 psi
Residual Pressure Available: 2.25 psi

P.O.C. NUMBER: 04
Water Source Information: Existing meter
Installed with water main. Verify with GC for installed location.

FLOW AVAILABLE
Water Meter Size: 1"
Flow Available: 37.50 gpm

PRESSURE AVAILABLE
Static Pressure at POC: 60.00 psi
Elevation Change: 5.00 ft
Service Line Size: 2"
Length of Service Line: 5.00 ft
Pressure Available: 58.00 psi

DESIGN ANALYSIS
Maximum Station Flow: 35.31 gpm
Flow Available at POC: 37.50 gpm
Residual Flow Available: 2.19 gpm

Pressure Req. at Critical Station: 42.05 psi
Loss for Fittings: 0.10 psi
Loss for Main Line: 0.96 psi
Loss for POC to Valve Elevation: 1.30 psi
Loss for Backflow: 2.71 psi
Loss for Water Meter: 7.49 psi
Critical Station Pressure at POC: 54.61 psi
Pressure Available: 58.00 psi
Residual Pressure Available: 3.39 psi

(1) 5/26/15 Or Equal removed from controller note.

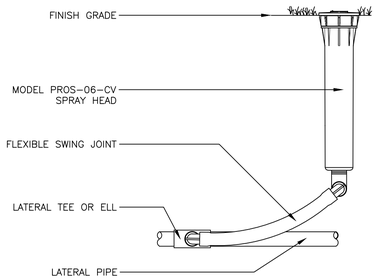
CITY OF WICHITA

IRRIGATION NOTES AND SCHEDULE

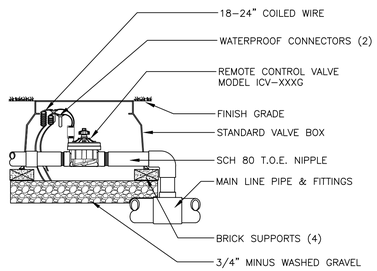
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	512	1055

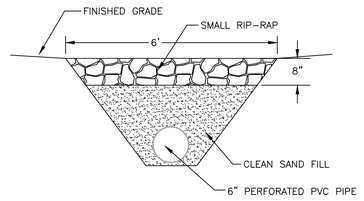
Revised Plans



1 6" SPRAY HEAD WITH SWING JOINT
3" = 1'-0" P-CI-40

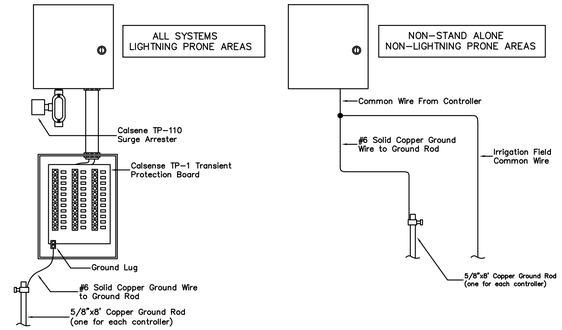


3 GLOBE VALVE
1" = 1'-0" P-CI-20

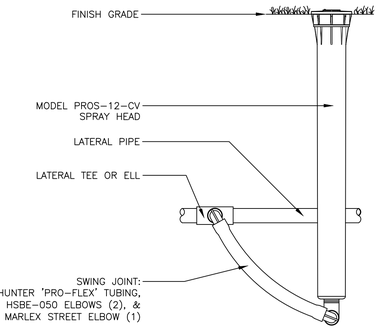


5 UNDERDRAIN
3/4" = 1'-0" P-CI-57

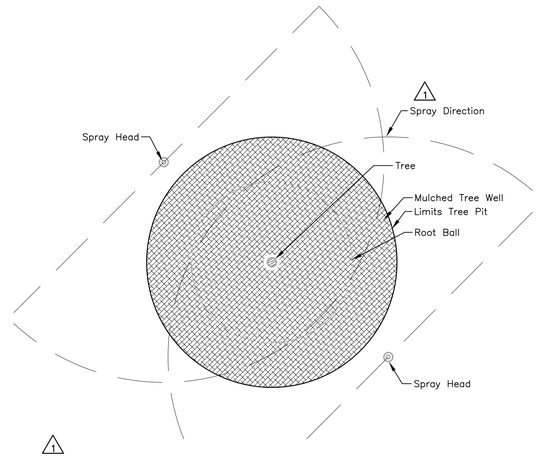
GROUNDING INSTRUCTIONS DETAIL



1 Calsense Controller Grounding
nts

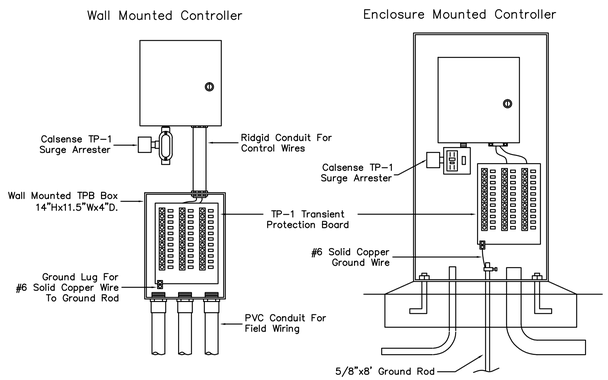


1 12" SPRAY HEAD WITH SWING JOINT
3" = 1'-0" P-CI-56

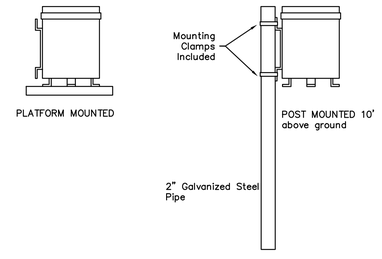


1 TREE SPRAY
3/4" = 1'-0" P-CI-58

TYPICAL TRANSIENT PROTECTION INSTALLATIONS



1 Calsense Controller
nts



1 Calsense Tipping Rain Bucket
nts

1 *5/26/15 Removed Hunter Sole Source Added details for Calsense Controller*

CITY OF WICHITA

IRRIGATION DETAILS

$PRINTTIME$
$PRINTDATE$
$FILE$
SURV. $SURV$ | PLOT | CADD | DES. $RDDES$ | DR. $RDDR$ | TR. | CKD. $RDCKD$ | APP. $RDAPP$

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	513	1055

Revised Plans

Recapitulation

Key	QTY	Item	Notes
		Lump Sum Bid Items – Landscape	
	9,777 SY	*Stamped colored concrete Pavement (4" Uniform)(AE)(Plain)*	
	1,371 LF	*12" Mow strip, Non Colored Concrete (12" Uniform)(AE)*	
	1,439 LF	*6" Mow Strip, Non Colored Concrete (12" Uniform)(AE)*	
	53.68 CY	*Large Egg Rock (4 "–6")*	
	18,978 EA ⚠4	*Groundcover*	*4" Pot*
	25,915 SY	*Buffalograss*	*Sod*
	52,372 SY	*Bffalograss*	*Seed*
	147,297 SY	*Short Grass Prairie*	*Seed*
	1 LS	*Irrigation System*	
	1 LS	*1 Year Maintenance Agreement*	*(Non–Participating)*
		Measured Quantity Items – Landscape	
	322 LF	*6" Dia. Pipe Underdrain (H)*	*Perforated Drain Tile*
	230 LF	*6" Dia. Pipe Underdrain (K)*	*Non–Perforated Pipe*
	103 EA	*Deciduous Tree*	*2" Cal. B&B*
	38 EA	*Deciduous Tree*	*6'–8' H, B&B*
	33 EA	*Deciduous Tree*	*8'–10' H, B&B*
	91 EA	*Evergreen Tree*	*6'–8' H, B&B*
	192 EA	*Shrubs*	*5 Gal.*
	1077 EA	*Perennials/Annuals*	*1 Gal.*

⚠4 *6/12/15 Changed Quantities for Bluestem*

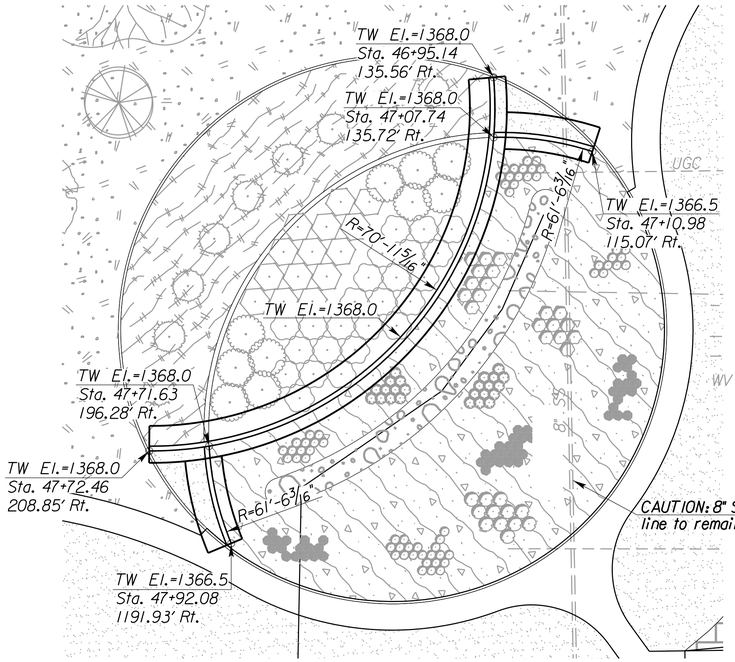
CITY OF WICHITA

LANDSCAPE AND IRRGATION RECAP

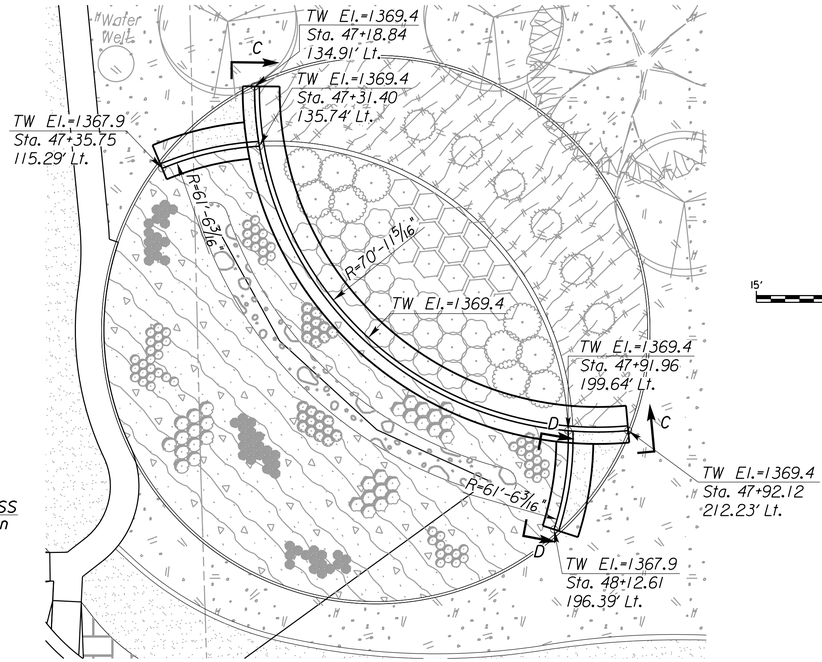
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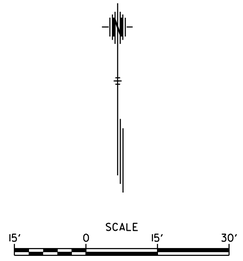
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	514	1055



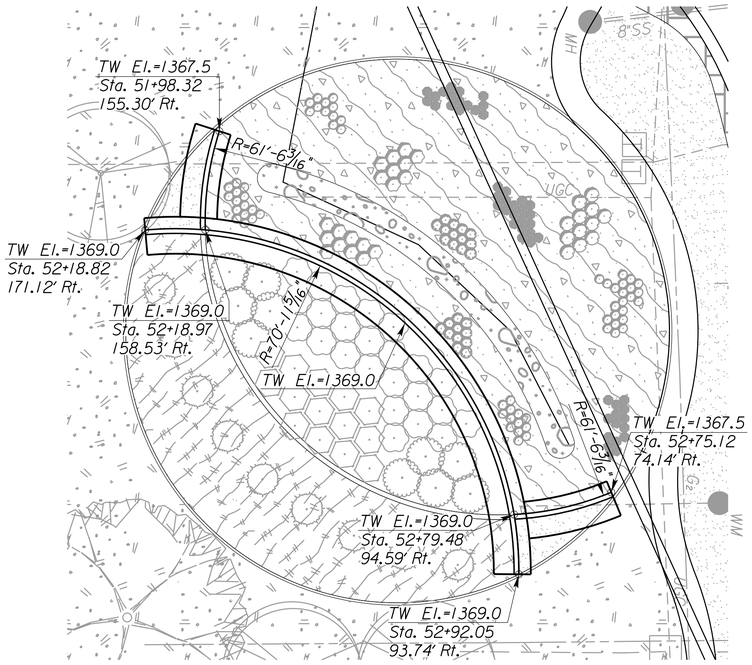
NORTHWEST DISC



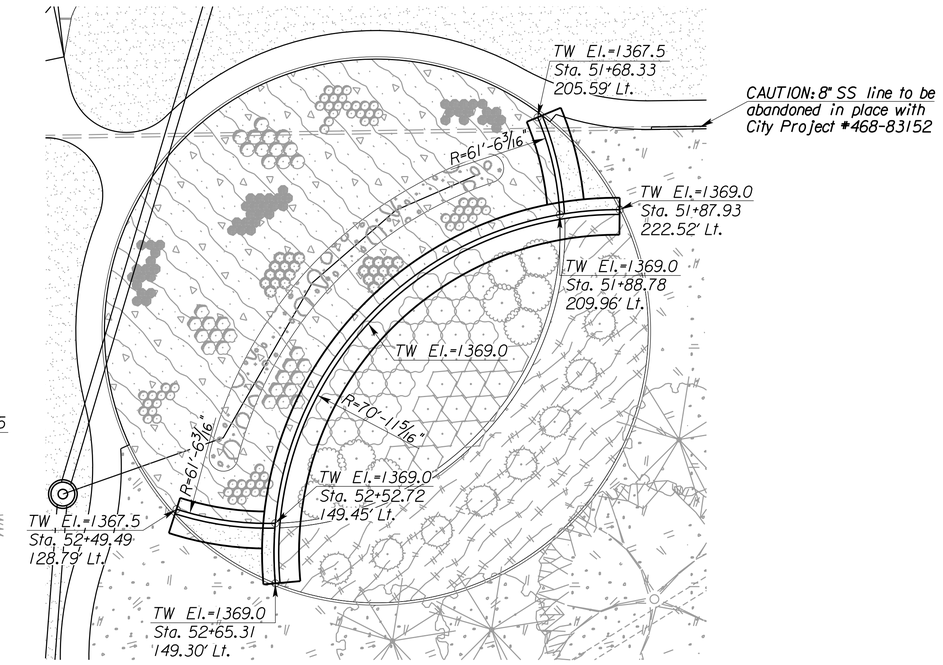
NORTHEAST DISC



CAUTION!!!
Locate all underground utilities prior to construction of footings. Maintain 4'-0" min. distance between edge of proposed footing and utility.



SOUTHWEST DISC



SOUTHEAST DISC

NOTE:
All stations and offsets are from ℄ Webb.

See Landscaping sheets for proposed ground elevations in front of walls.

LEGEND
TW = Top of Wall

See Sh. #502 for Landscaping Plans.
See Sh. #516 for Developed View C-C and D-D for formliner pattern.

CITY OF WICHITA

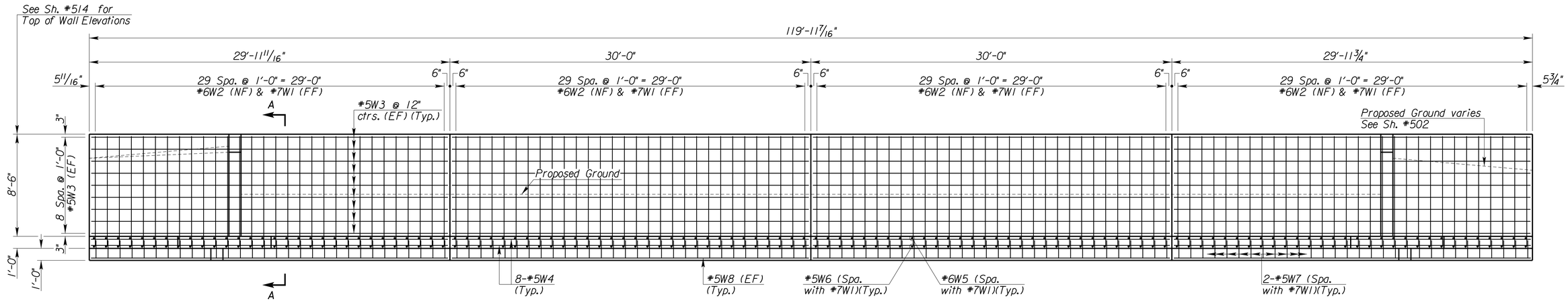
DISCS AT WEBB ROAD AND EAST KELLOGG

DISC WALL DETAILS I

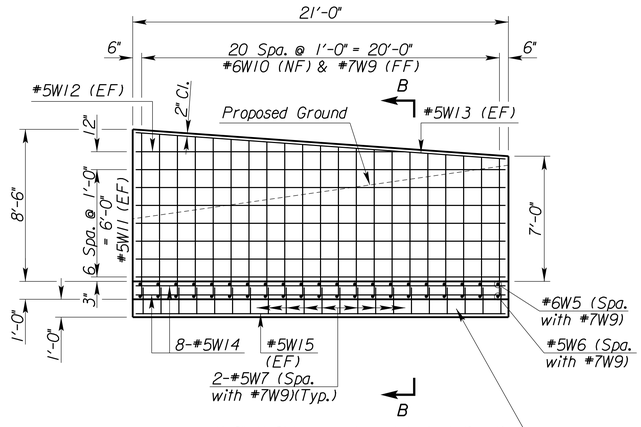
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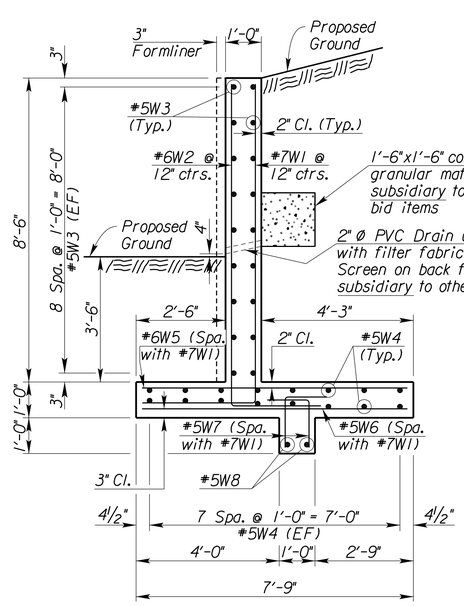
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	515	1055



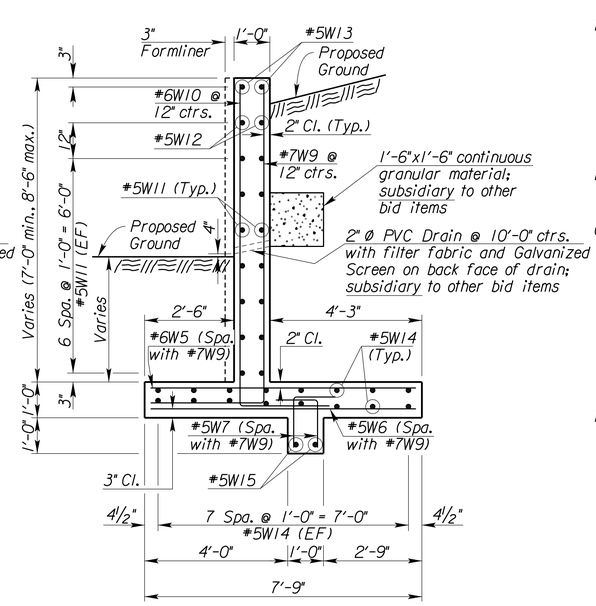
DEVELOPED ELEVATION OF LONG WALL
(Section C-C from Sh. #514)
(4 Required)



DEVELOPED ELEVATION OF SHORT WALL
(Section D-D from Sh. #514)
(8 Required)



SECTION A-A



SECTION B-B

GENERAL NOTES

See Sh. #303 for general notes pertaining to all walls.

CONCRETE: Concrete is bid as Concrete (Grade 4.0)(AE). Bevel all exposed edges of all concrete with a 3/4 inch triangular molding, except as otherwise noted on the plans.

REINFORCING STEEL: All reinforcing steel dimensions are to the centerline of bars unless otherwise noted. All reinforcing steel shall conform to the requirements of ASTM A615, Grade 60.

Field bend nearly horizontal reinforcing for plan curve in wall.

EXCAVATION: Excavation for disc walls is subsidiary to other bid items.

CONCRETE MASONRY SURFACE TREATMENT: Coat all exposed surfaces of the walls with an approved pigmented sealer (uniform color). All surfaces to be coated shall be prepared with a light brush sandblast prior to application. The form release agent used on concrete surfaces to be coated, shall be compatible with the color stain product to be applied to the surface. Use of curing compound on surfaces to be coated is prohibited. See Project Special Provisions for process for Color selection.

FOUNDATION TREATMENT: Compact Foundation material prior to wall construction & cut footing to neat lines.

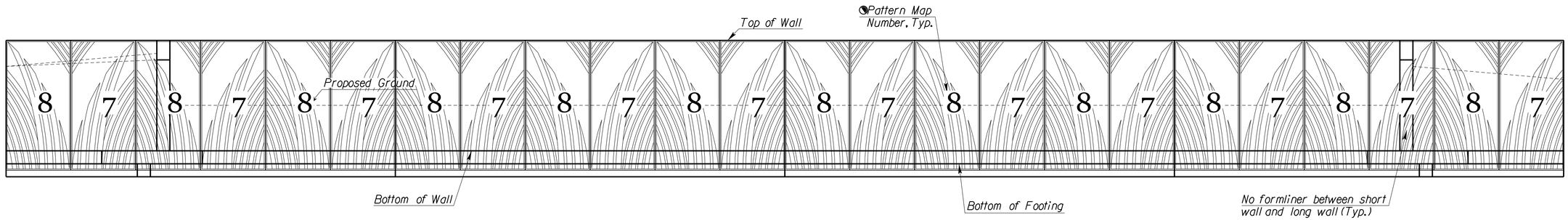
LEGEND
EF = Each Face
NF = Near Face
FF = Far Face

CITY OF WICHITA
DISCS AT WEBB ROAD AND EAST KELLOGG
DISC WALL DETAILS II

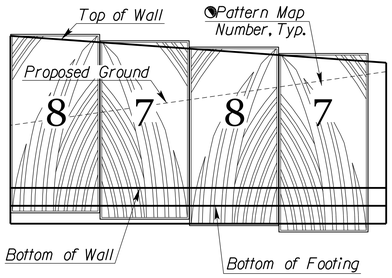
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	516	1055



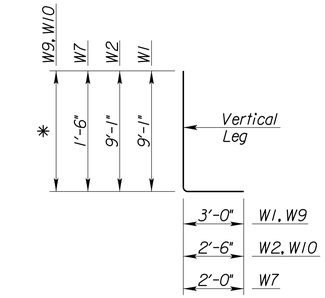
SECTION C-C
(4 Required)



SECTION D-D
(8 Required)

See Sh. #339 for Pattern Map Key.

Note:
Extend formliner to top of footing= bottom of wall, or 1'-6" below finished grade.



W1, W2, W7, W9 & W10

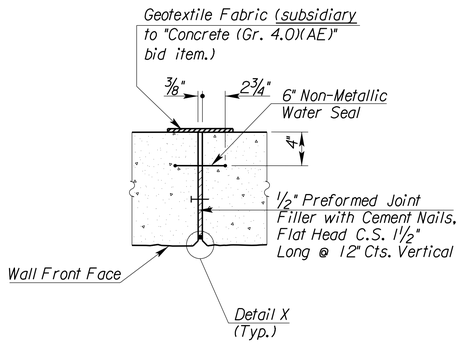
BENDING DIAGRAMS
(All dimensions are out to out of bars unless otherwise noted).

* Increase from 7'-5" to 9'-1" by 1" increments (cut 8 each length)

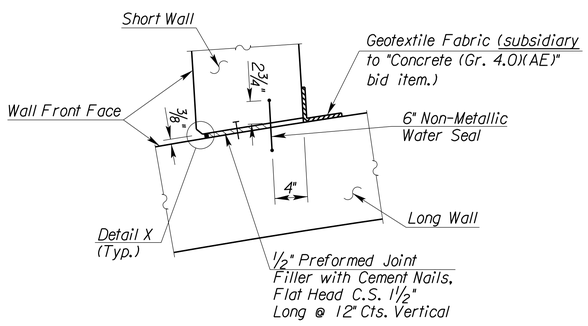
DISC WALLS (Listed for ALL Walls)
BILL OF REINFORCING STEEL
EPOXY COATED GRADE 60

	Straight Bars				Bent Bars			
	Mark	Size	Number	Length	Mark	Size	Number	Length
Walls	W5	#6	648	7'-5"	W1	#7	480	12'-1"
					W9	#7	168	⊗
	W3	#5	288	29'-7"				
	W4	#5	256	29'-7"	W2	#6	480	11'-7"
	W6	#5	648	7'-5"	W10	#6	168	⊗
	W8	#5	32	29'-7"				
	W11	#5	112	20'-8"	W7	#5	1,296	3'-6"
	W12	#5	16	15'-0"				
	W13	#5	16	20'-8"				
	W14	#5	128	20'-8"				
	W15	#5	16	20'-8"				

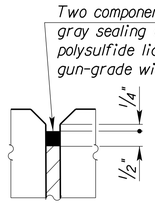
⊗ See Bending Diagrams



LONG WALL EXPANSION JOINT DETAIL
Provide 2" Cl. Min. to Horiz. Bars at Expansion Joint.



SHORT WALL TO LONG WALL EXPANSION JOINT DETAIL



DETAIL X
Applies to front face of retaining wall as shown.

SUMMARY OF QUANTITIES (Listed for ALL Walls)	
Reinforcing Steel (Gr. 60)(Epoxy Coated)	67,631 Lbs.
Concrete (Gr. 4.0)(AE)	425.0 C.Y.
Concrete Masonry Surface Treatment	382.2 S.Y.

See Sh. #339 for Wall Panel Key.

CITY OF WICHITA

DISCS AT WEBB ROAD AND EAST KELLOGG

DISC WALL DETAILS III

SURV.	PLOT	CADD	DES.	AH/BS	DR.	GB/CP	TR.	--	CKD.	SB/NW	APP.	--

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	517	1055

CONSTRUCTION NOTES:

W Contractor shall provide all labor, equipment and materials required to furnish and install Mainline lighting. All light pole assemblies on Mainline are barrier mounted poles. See detail on Sheet 531.

R Contractor shall provide all labor, equipment and materials required to furnish and install Ramp Lighting. See table on this sheet for pole offset location. See detail on Sheet 531.

GENERAL NOTES:

ALL WIRING AND WIRING METHODS SHALL COMPLY WITH THE MOST CURRENT NATIONAL ELECTRIC CODE STANDARDS. ANY CHANGES TO THESE STANDARDS SHALL BE APPROVED BY THE AUTHORITY HAVING JURISDICTION.

LOCATE ALL EXISTING UTILITES PRIOR TO BEGINNING WORK.

GROUND ALL METAL PARTS OF SWITCHES, CASES, POLES AND CONDUIT USED ABOVE GROUND WITH A NO. 6 BARE WIRE.

MAKE SPLICES IN THE INDUCT SECONDARY CABLE INSIDE OF POLE BASES AND JUNCTION BOXES. CONTACT THE ENGINEER IN CHARGE FOR APPROVAL OF OTHER SPLICE LOCATIONS.

OZ EXPANSION JOINTS SHALL BE INSTALLED IN THE CONDUIT RUNS AT ALL BRIDGE EXPANSION JOINTS.

FURNISH AND INSTALL LIGHTING EQUIPMENT, INCLUDING POLES, CONCRETE BASES FOR POLES, ANCHOR BOLTS, LUMINAIRES, LAMPS, WIRING, CONDUIT, CONDUIT FITTINGS, SUPPORTS, INTERCONNECTIONS, GROUND RODS, AND ALL INCIDENTIALS NECESSARY FOR THE COMPLETE INSTALLATION WITHIN THE LIMITS SHOWN ON THE PLANS. FURNISH AND INSTALL ALL EQUIPMENT NECESSARY FOR SATISFACTORY OPERATION, WHETHER SPECIFICALLY MENTIONED OR NOT.

PLOW OR TRENCH AND BACKFILL UNDERGROUND CONDUCTOR INDUCT APPROXIMATELY 3 FT. BELOW GROUNDLINE. BACKFILL IN ALL AREAS SHALL BE FREE OF RUBBLE AND ROCK.

FINAL LOCATION FOR ENCLOSURE INSTALLATIONS ARE TO BE DETERMINED BY THE ENGINEER IN CHARGE. POSITION THE ENCLOSURES SO THAT THE PHOTOCELLS ARE POINTED DUE NORTH.

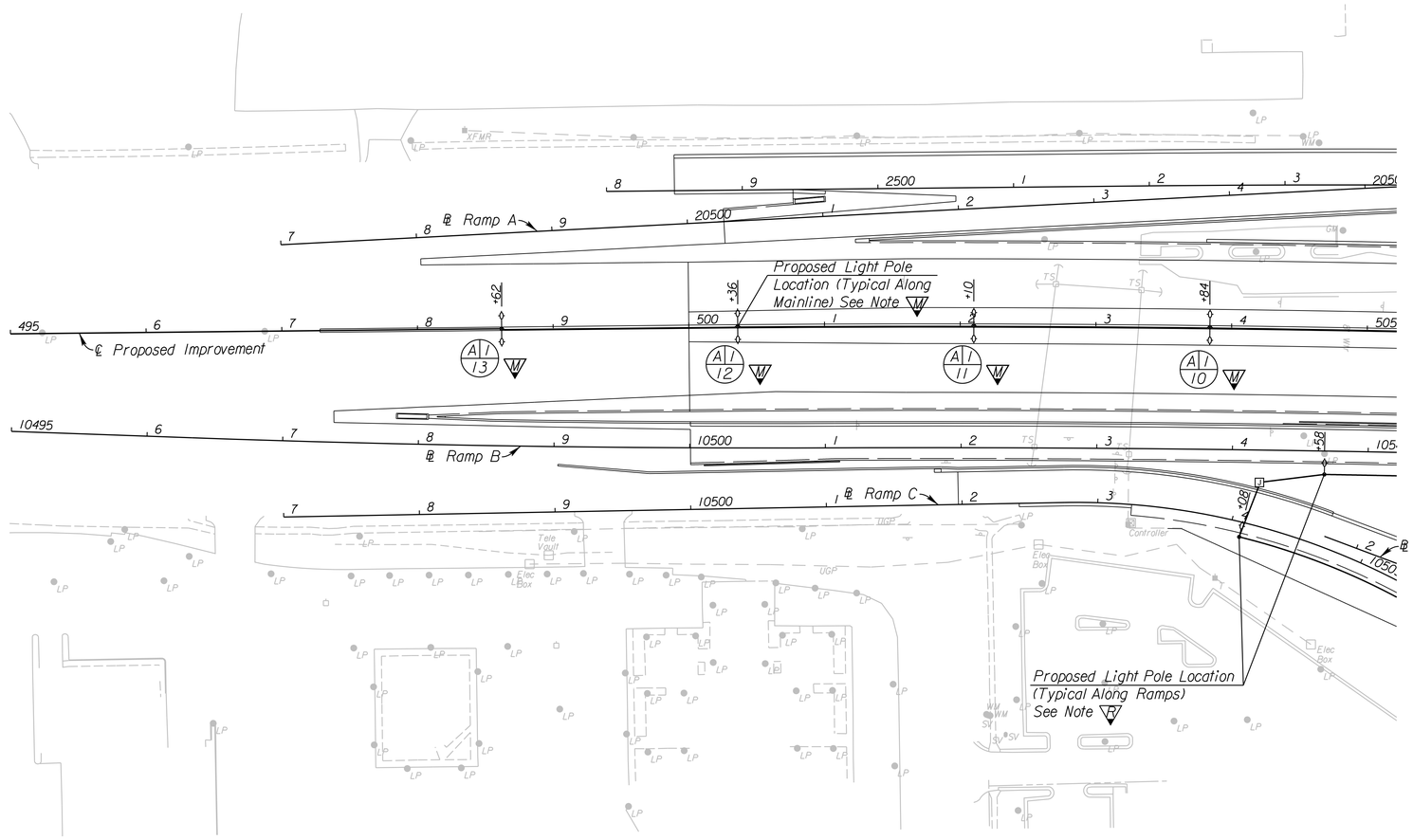
THE FOLLOWING COMPANIES HAVE SCREW-IN LIGHT POLE FOUNDATIONS THAT HAVE BEEN ACCEPTED BY THE KANSAS DEPARTMENT OF TRANSPORTATION: A.B. CHANCE COMPANY AND J.H. BOTTS, INC. ADDITIONAL COMPANIES DESIRING APPROVAL BY KDOT MUST SUBMIT DESIGN COMPUTATIONS AND CATALOG CUTS TO THE KANSAS DEPARTMENT OF TRANSPORTATION, BUREAU OF TRANSPORTATION SAFETY & TECHNOLOGY, EISENHOWER BUILDING, 700 SW HARRISON, 6TH FLOOR, TOPEKA, KS 66603-3754.

STREET LIGHT LEGEND

- 2 - 120 LED STREETLIGHT W/10 FT. BRACKET ARM, 40 FT. MTG. HT.
- 1 - 120 LED STREETLIGHT W/8 FT. BRACKET ARM, 40 FT. MTG. HT.
- SCHED 40 PVC CONDUIT (SIZE AS NOTED)
- SERVICE POINT
- TYPE II JUNCTION BOX
- PAD MOUNTED CONTROL CENTER (SHADED AREA INDICATES PHOTOCELL ORIENTATION)
- CONSTRUCTION NOTE NUMBER

CONTROLLER — CIRCUIT NO. / POLE NO.

Scale: 1"=50'



CITY OF WICHITA

EAST KELLOGG

LIGHTING PLAN

STA. 490+00 TO STA. 505+00

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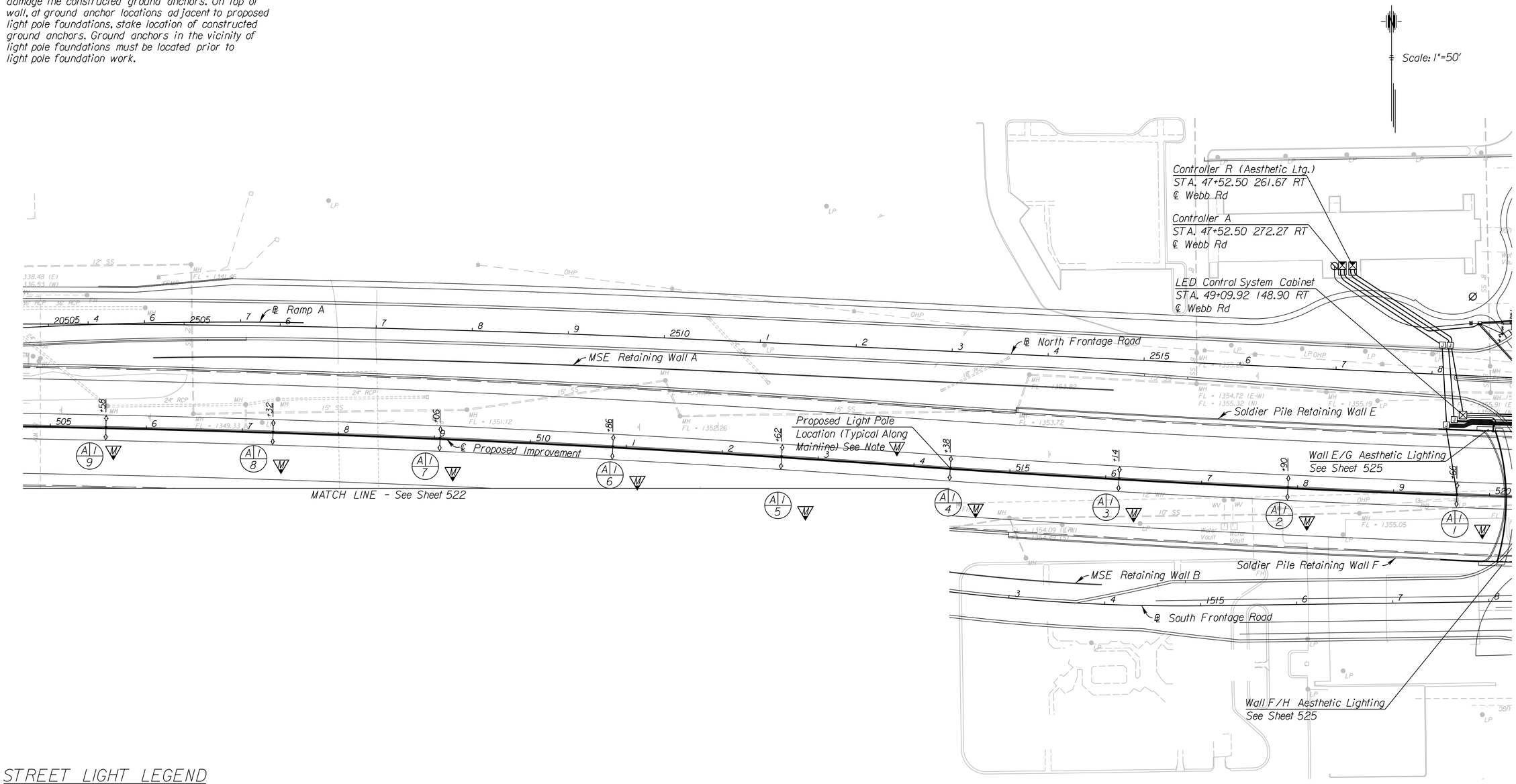
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	518	1055

CONSTRUCTION NOTES:

▽ CAUTION: Proposed light pole foundations must not damage the constructed ground anchors. On top of wall, at ground anchor locations adjacent to proposed light pole foundations, stake location of constructed ground anchors. Ground anchors in the vicinity of light pole foundations must be located prior to light pole foundation work.

▽W Contractor shall provide all labor, equipment and materials required to furnish and install Mainline lighting. All light pole assemblies on Mainline are barrier mounted poles. See detail on Sheet 531.



STREET LIGHT LEGEND

- 2 - 120 LED STREETLIGHT W/10 FT. BRACKET ARM, 40 FT. MTG. HT.
- 1 - 120 LED STREETLIGHT W/8 FT. BRACKET ARM, 40 FT. MTG. HT.
- SCHED 40 PVC CONDUIT (SIZE AS NOTED)
- Ø SERVICE POINT
- TYPE II JUNCTION BOX
- PAD MOUNTED CONTROL CENTER (SHADED AREA INDICATES PHOTOCELL ORIENTATION)
- ▽ CONSTRUCTION NOTE NUMBER

CONTROLLER — CIRCUIT NO. / POLE NO.

CITY OF WICHITA

EAST KELLOGG

LIGHTING PLAN

STA. 505+00 TO STA. 520+00

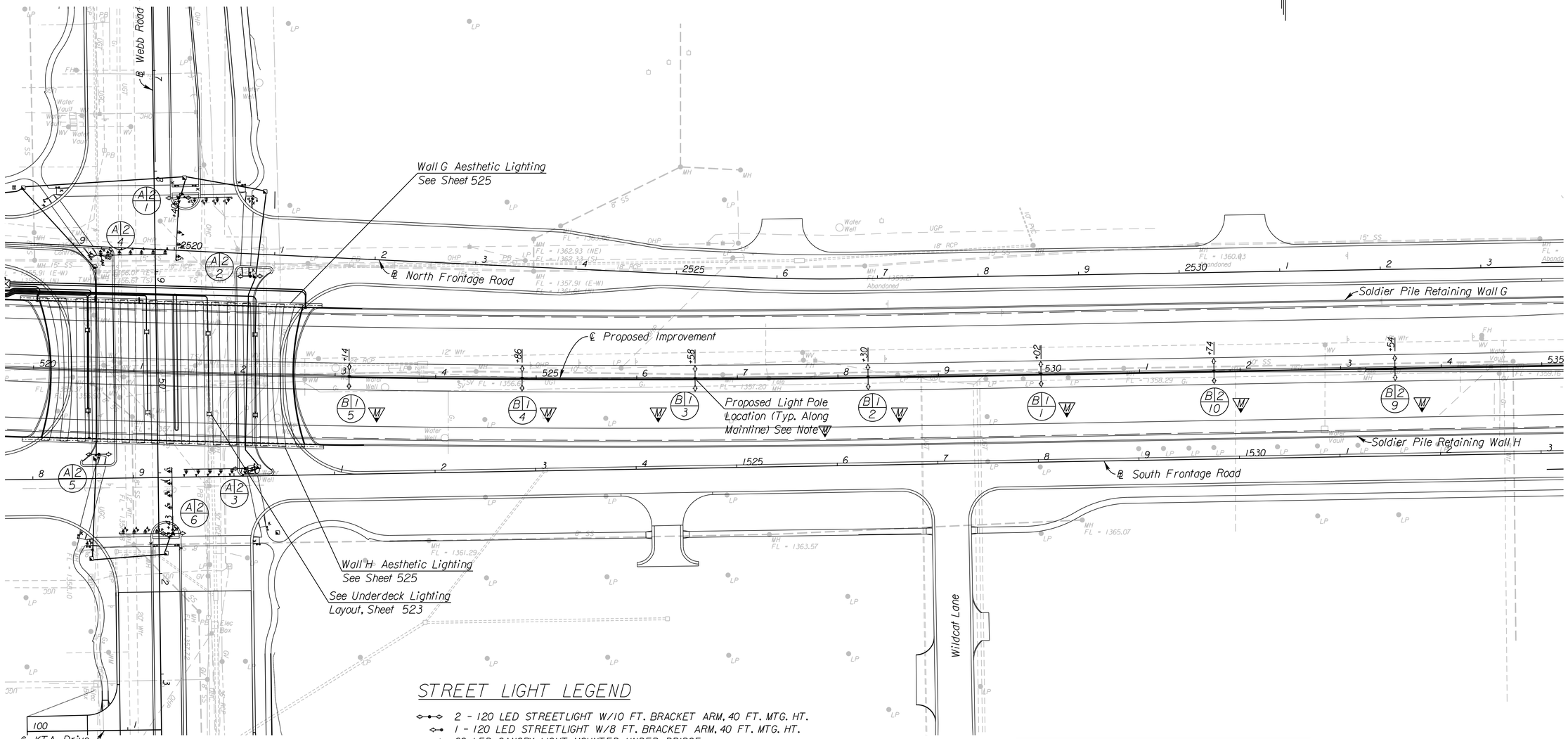
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SURV. - PLOT | CADD | DES. - DR. | TR. - CKD. | APP.

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	519	1055

CONSTRUCTION NOTES:

(W) Contractor shall provide all labor, equipment and materials required to furnish and install Mainline lighting. All light pole assemblies on Mainline are barrier mounted poles. See detail on Sheet 531.

Scale: 1"=50'



STREET LIGHT LEGEND

- 2 - 120 LED STREETLIGHT W/10 FT. BRACKET ARM, 40 FT. MTG. HT.
- 1 - 120 LED STREETLIGHT W/8 FT. BRACKET ARM, 40 FT. MTG. HT.
- 60 LED CANOPY LIGHT, MOUNTED UNDER BRIDGE
- SCHED 40 PVC CONDUIT (SIZE AS NOTED)
- SERVICE POINT
- TYPE II JUNCTION BOX
- PAD MOUNTED CONTROL CENTER (SHADED AREA INDICATES PHOTOCELL ORIENTATION)
- (W) CONSTRUCTION NOTE NUMBER

CONTROLLER — CIRCUIT NO. / POLE NO.

LIGHTING ON SIGNAL POLES *		
FIXTURE NO.	SIGNAL POLE NO.	FIXTURE TYPE
A-2-1	3.	2-120 LED W / 10' ARM
A-2-2	7.	2-120 LED W / 10' ARM
A-2-3	9.	2-120 LED W / 10' ARM
A-2-4	19.	2-120 LED W / 10' ARM
A-2-5	17.	2-120 LED W / 10' ARM
A-2-6	13.	2-120 LED W / 10' ARM

* See sheet 540 for pole number and location.

NOTE:

All luminaires and bracket arms on signal poles to be perpendicular to ℄ Webb Road.

CITY OF WICHITA

EAST KELLOGG

LIGHTING PLAN

STA. 520+00 TO STA. 535+00

SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
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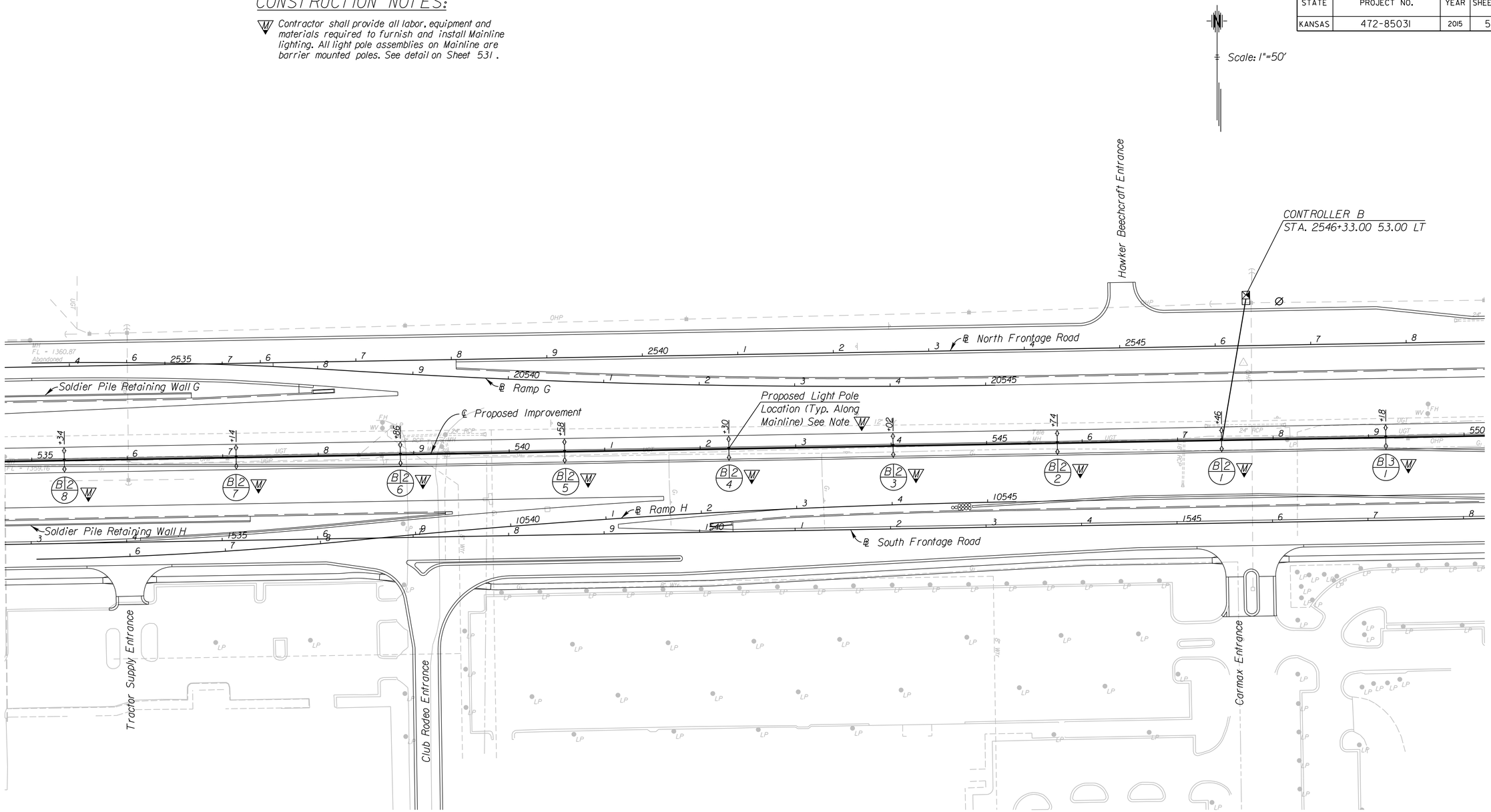
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	520	1055

CONSTRUCTION NOTES:

1. Contractor shall provide all labor, equipment and materials required to furnish and install Mainline lighting. All light pole assemblies on Mainline are barrier mounted poles. See detail on Sheet 531.

Scale: 1"=50'



STREET LIGHT LEGEND

- 2 - 120 LED STREETLIGHT W/10 FT. BRACKET ARM, 40 FT. MTG. HT.
- 1 - 120 LED STREETLIGHT W/8 FT. BRACKET ARM, 40 FT. MTG. HT.
- SCHED 40 PVC CONDUIT (SIZE AS NOTED)
- SERVICE POINT
- TYPE II JUNCTION BOX
- PAD MOUNTED CONTROL CENTER (SHADED AREA INDICATES PHOTOCELL ORIENTATION)
- CONSTRUCTION NOTE NUMBER
- CONTROLLER / CIRCUIT NO. / POLE NO.

CITY OF WICHITA

EAST KELLOGG

LIGHTING PLAN

STA. 535+00 TO STA. 550+00

520

SURV. | PLOT | CADD | DES. | DR. | TR. | CKD. | APP.

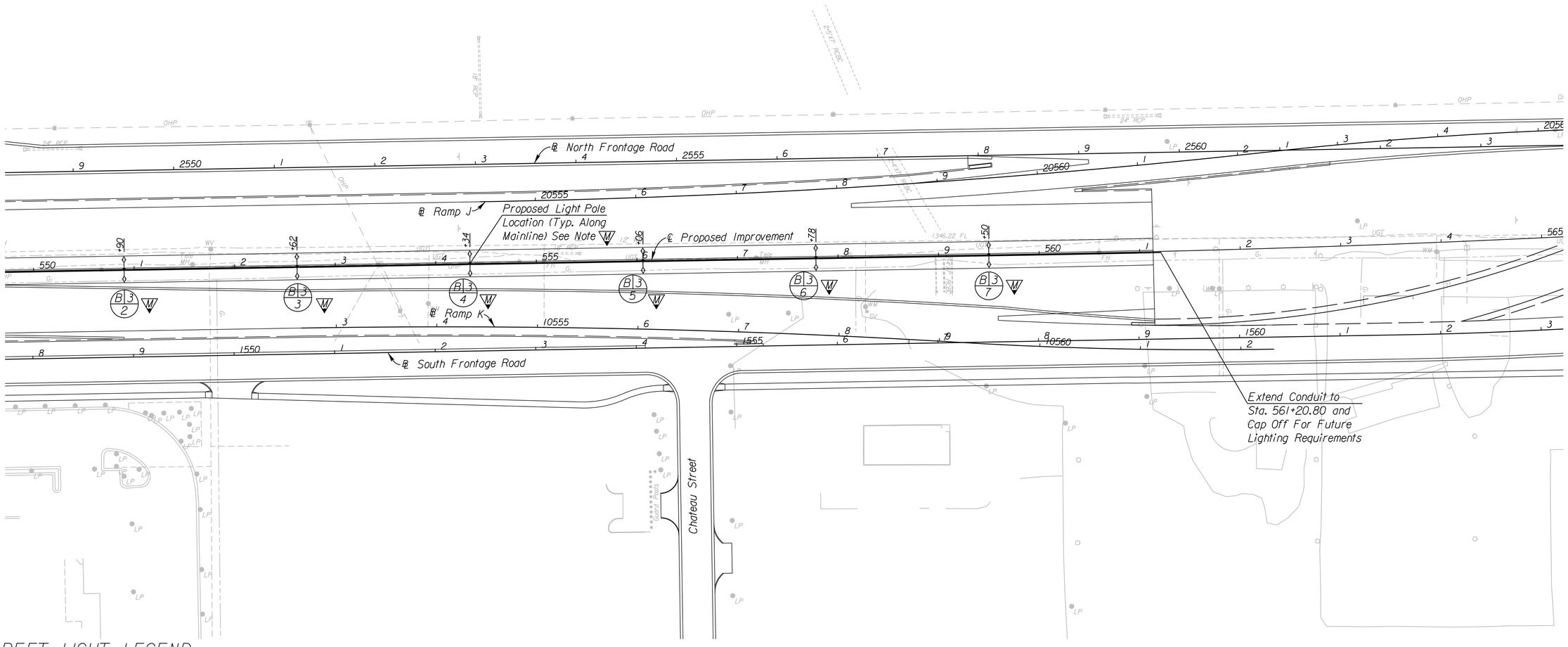
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	521	1055

CONSTRUCTION NOTES:

W Contractor shall provide all labor, equipment and materials required to furnish and install Mainline lighting. All light pole assemblies on Mainline are barrier mounted poles. See detail on Sheet 531.

Scale: 1"=50'



STREET LIGHT LEGEND

- 2 - 120 LED STREETLIGHT W/10 FT. BRACKET ARM, 40 FT. MTG. HT.
- 1 - 120 LED STREETLIGHT W/8 FT. BRACKET ARM, 40 FT. MTG. HT.
- SCHED 40 PVC CONDUIT (SIZE AS NOTED)
- SERVICE POINT
- TYPE II JUNCTION BOX
- PAD MOUNTED CONTROL CENTER (SHADED AREA INDICATES PHOTOCELL ORIENTATION)
- CONSTRUCTION NOTE NUMBER
- CONTROLLER / CIRCUIT NO. / POLE NO.

CITY OF WICHITA

EAST KELLOGG

LIGHTING PLAN

STA. 550+00 TO STA. 565+00

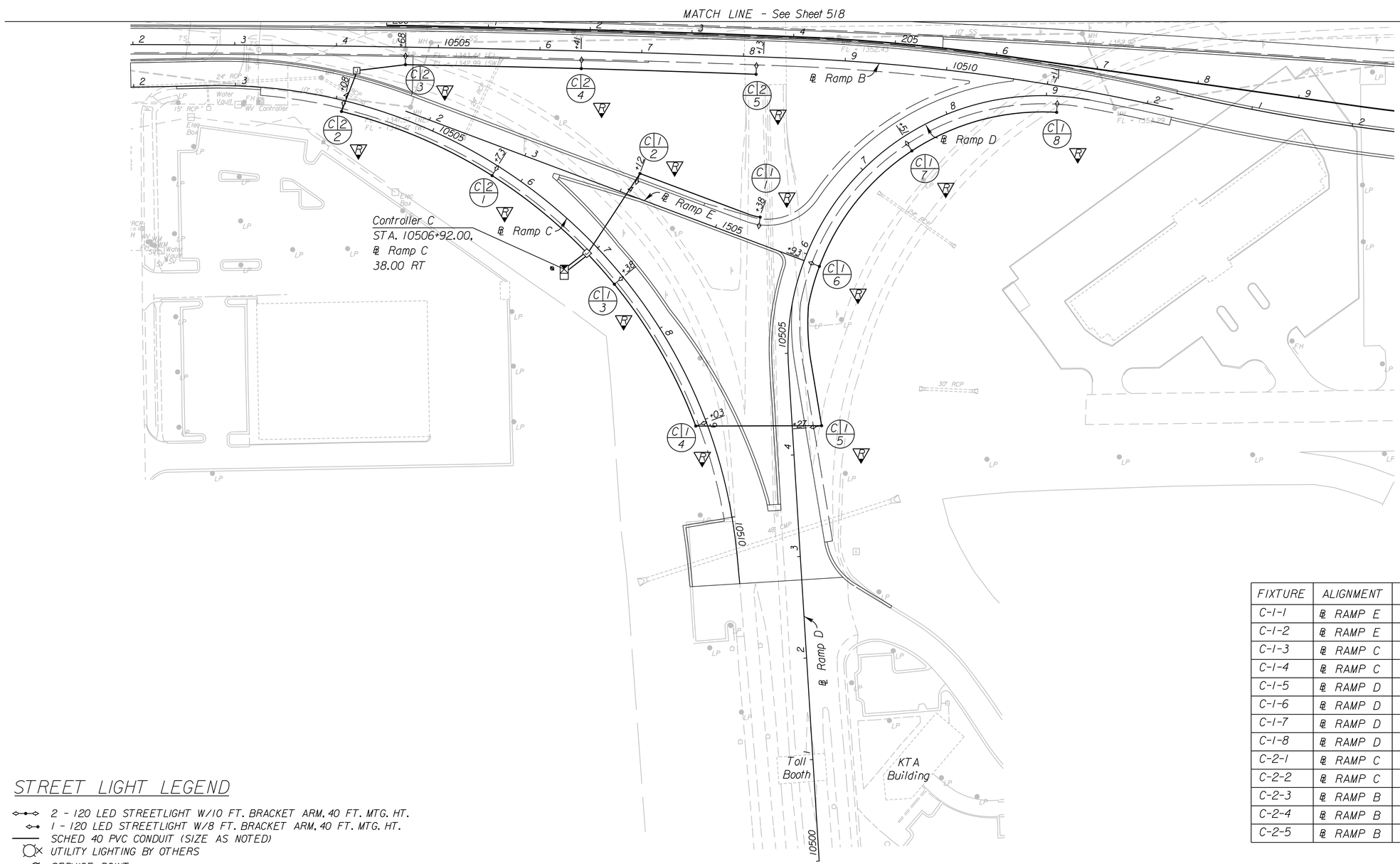
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	522	1055

Contractor shall provide all labor, equipment and materials required to furnish and install Ramp Lighting. See table on this sheet for pole offset location. See detail on Sheet 531.



Scale: 1"=50'

FIXTURE	ALIGNMENT	STATION	OFFSET	FND. TYPE †
C-1-1	℄ RAMP E	1505+37.61	24.78 LT	STD
C-1-2	℄ RAMP E	1504+12.00	23.50 LT	STD
C-1-3	℄ RAMP C	10507+38.00	11.00 RT	STD
C-1-4	℄ RAMP C	10509+03.00	11.00 RT	STD
C-1-5	℄ RAMP D	10504+27.00	28.86 RT	STD
C-1-6	℄ RAMP D	10505+93.00	16.00 RT	STD
C-1-7	℄ RAMP D	10507+51.00	16.00 RT	STD
C-1-8	℄ RAMP D	10509+11.00	16.00 RT	STD
C-2-1	℄ RAMP C	10505+73.00	11.00 RT	STD
C-2-2	℄ RAMP C	10504+08.00	11.00 RT	STD
C-2-3	℄ RAMP B	10504+68.00	17.25 RT	STD
C-2-4	℄ RAMP B	10506+41.00	17.25 RT	STD
C-2-5	℄ RAMP B	10508+13.00	17.25 RT	STD

STREET LIGHT LEGEND

- 2 - 120 LED STREETLIGHT W/10 FT. BRACKET ARM, 40 FT. MTG. HT.
- 1 - 120 LED STREETLIGHT W/8 FT. BRACKET ARM, 40 FT. MTG. HT.
- SCHED 40 PVC CONDUIT (SIZE AS NOTED)
- UTILITY LIGHTING BY OTHERS
- SERVICE POINT
- TYPE II JUNCTION BOX
- PAD MOUNTED CONTROL CENTER (SHADED AREA INDICATES PHOTOCELL ORIENTATION)
- CONSTRUCTION NOTE NUMBER
- CONTROLLER — CIRCUIT NO. / POLE NO.

FND. TYPE †

STD STANDARD GROUND MOUNT

CITY OF WICHITA

EAST KELLOGG

LIGHTING PLAN RAMPS B, C & D

STA. 10502+00 TO STA. 10510+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
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LED Control System Cabinet

1" RGS CONDUIT

1/2" RGS CONDUIT (DATA)

SLEEVE IN BRIDGE ABUTMENT, SEE BRIDGE PLAN FOR DETAILS

Scale: 1"=10'

JUNCTION BOX

TO WALLS E & G GRAZING FIXTURES SEE WIRING DIAGRAM SHT. 529

A-3-1
+52.54
40.00 LT

A-3-3
+11.50
40.00 LT

A-3-5
+72.71
40.00 LT

A-3-7
+19.50
40.00 LT

JUNCTION BOX

GIRDER LIGHTING, SEE SHT. 526

520

1

2

℄ Proposed Improvements

A-3-2
+55.56
40.00 RT

A-3-4
+14.87
40.00 RT

A-3-6
+75.69
40.00 RT

A-3-8
+21.56
40.00 RT

GIRDER LIGHTING, SEE SHT. 526

TO WALLS F & H GRAZING FIXTURES, SEE WIRING DIAGRAM SHT. 529

LEGEND

60 LED CANOPY LIGHT ON PENDANT

CONDUIT - SIZE AND TYPE AS NOTED

J — TYPE II JUNCTION BOX

Mount Junction Box (Above Ground) over sleeve through abutment wall

Install canopy light with pendant. Center fixture between box girders. Attach fixure and counduit per NEC requirements. Contractor shall provide all labor, equipment and materials required to complete installation. See Details, on Sheet 531 . See wiring details on Sheet 527.

CITY OF WICHITA

EAST KELLOGG

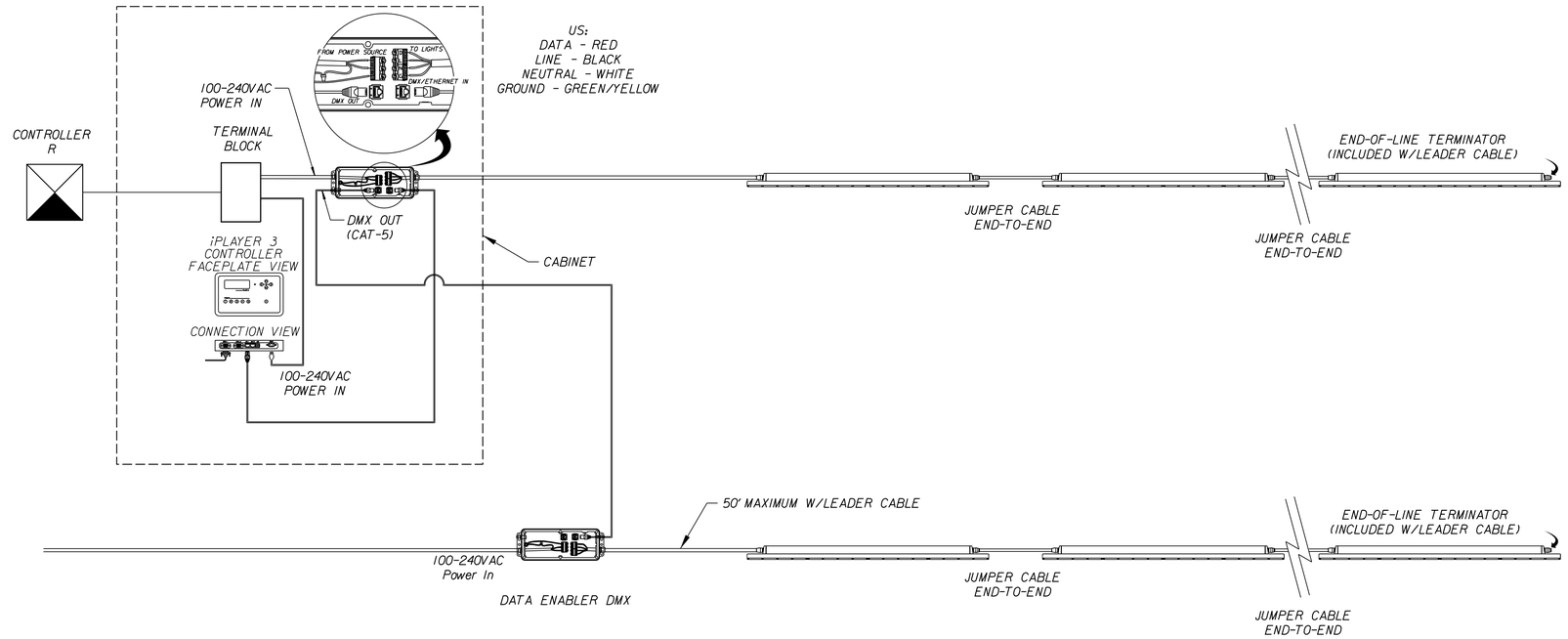
LIGHTING DETAILS

WEBB ROAD UNDERDECK LIGHTING LAYOUT

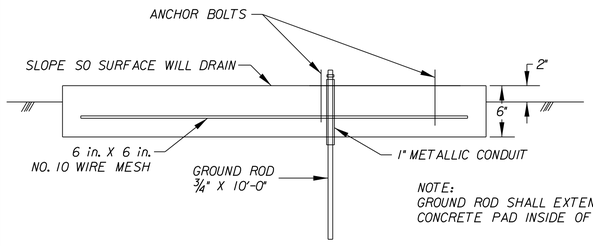
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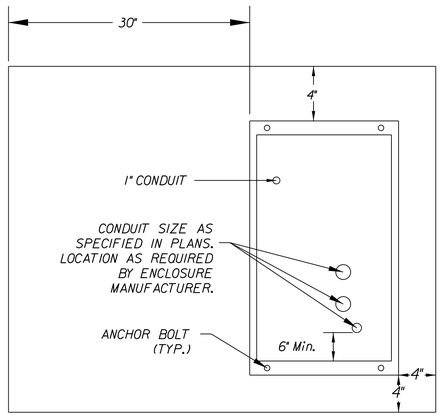
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	524	1055



LINEAR GIRDER GRAZING LED CONTROL SYSTEM DIAGRAM



NOTE:
GROUND ROD SHALL EXTEND 2 INCHES ABOVE THE CONCRETE PAD INSIDE OF ENCLOSURE BASE.



CONCRETE PAD DETAILS

CONCRETE PAD NOTES:

1. THE DUCT FOR SECONDARY CABLE SHALL EXTEND 1" PAST THE END OF THE CONDUIT BEND.
2. ALL CONDUIT TO EXTEND 1" MIN. ABOVE CONCRETE SURFACE.
3. PAD DIMENSIONS SHALL BE ADJUSTED ACCORDINGLY FOR THE SIZE OF THE ENCLOSURE TO BE INSTALLED.

CABINET NOTES:

1. CABINETS TO BE CORROSION-RESISTANT 0.125 ALUMINUM.
2. ALL FACTORY INSTALLED WIRE TO BE 600 VOLT RATED COPPER, THHN
3. ALL TERMINALS APPROVED FOR COPPER OR ALUM. WIRE.
4. COPPER BUSSED CIRCUIT BREAKER INTERIOR.
5. PADLOCK PROVISIONS.
6. ENCLOSURES MOUNT TO CONCRETE PAD WITH 5/8" DIA. ANCHOR BOLTS.
7. PROVIDE GROUND ROD(S) FOR EACH CABINET, AS REQUIRED FOR MAXIMUM OF 25 OHMS RESISTANCE TO GROUND.
8. FINISH: BRUSHED ALUMINUM.

(SPECIFICATIONS CONTINUED FROM COLUMN AT RIGHT)

PERIPHERAL EQUIPMENT SHALL MEET THE FOLLOWING SPECIFICATIONS:

A) CABINET: THE LED CONTROL SYSTEM AND OTHER EQUIPMENT AS NECESSARY SHALL BE HOUSED IN A STANDALONE, HINGED, NEMA 3R ENCLOSURE. THE CABINET SHALL BE LOCKABLE, EITHER INTEGRATED INTO THE DOOR HANDLE OR WITH A PADLOCK. THE CABINET SHALL BE DESIGNED TO BE FLUSH MOUNTED ON A CONCRETE PAD. PROVISIONS TO MAINTAIN COMPONENT TEMPERATURE IN THE PROPER OPERATING RANGE MAY BE INCLUDED IF REQUIRED; INCLUDING, BUT NOT LIMITED TO, VENTS, FANS, HEATERS, AND ELEVATED ROOFS. ALL VENTS SHALL INCLUDE FILTER PANELS.

B) INTEGRATED DATA AND POWER MODULES SHALL BE PROVIDED AS REQUIRED TO DELIVER POWER AND CONTROL TO THE LIGHTING FIXTURES. MODULES MOUNTED IN EXPOSED AREAS SHALL BE UL LISTED FOR WET ENVIRONMENTS AND SHALL BE CAPABLE OF OPERATING BETWEEN -15° AND 115°F. MODULES SHALL BE FROM THE SAME MANUFACTURER AS THE LIGHTING FIXTURES AND SHALL BE COMPATIBLE WITH THE CONTROLLER.

C) DATA CABLE SHALL BE CAT 5E OR BETTER. CONTROLLERS AND INTEGRATED DATA AND POWER MODULES SHALL BE LOCATED SO THAT THE MAXIMUM CABLE LENGTH TO MAINTAIN DATA INTEGRITY AS RECOMMENDED BY THE MANUFACTURER IS NOT EXCEEDED.

THE LIGHTING SYSTEM, INCLUDING ALL EQUIPMENT, WIRING, CONDUIT AND ANCILLARY ITEMS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS AND SHALL MEET ALL LOCAL CODES AND REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

4. MAPPING, AIMING LIGHTS & ON-SITE PROGRAMMING

LIGHTING INSTALLERS SHALL RECORD THE ADDRESSES AND MAP ALL OF THE FIXTURES, PROVIDING A COMPLETE LIGHTING DIAGRAM FOR USE IN PROGRAMMING.

INSTALLERS MUST AIM THE LIGHTS TO PROVIDE MAXIMUM, EVEN COVERAGE OF THE WALLS AND GIRDER FOR REVIEW AND APPROVAL BY THE ENGINEER AND ARTIST.

GENERAL CONTRACTOR TO PROVIDE A PROFESSIONAL LIGHTING PROGRAMMER TO ASSIST ARTIST WITH DEVELOPING LIGHTING SHOWS FOR WEBB ROAD BRIDGE. ALLOW THREE DAYS AND THREE NIGHTS OF PROGRAMMING TO ACHIEVE A NUMBER OF SHOWS AND CITY REVIEWS REQUIRED TO APPROVE THE WORK.

5. QUALIFICATIONS FOR LIGHTING PROGRAMMER

PERFORMANCE QUALIFICATION: LIGHTING PROGRAMMER MUST HAVE MINIMALLY FIVE YEARS OF EXPERIENCE PROGRAMMING AESTHETIC LIGHT SHOWS.

MATT HAMILTON (OR EQUAL)
INITIATEENERGY LLC
PO BOX 3616
OLYMPIC VALLEY, CA 96146
530-412-0347 (CELL)
hamiltonmattm@gmail.com

DAVID EMPEY
RC LURIE
1002 E JEFFERSON
PHOENIX, AZ 85304
602-738-8018
dempey@rclurie.com

MANUFACTURER'S REPRESENTATIVE FOR PROGRAMMING SERVICES (OR EQUAL)

SPECIFICATION:

1. DESCRIPTION: LINEAR LED LIGHTING AT WEBB ROAD BRIDGE ON GIRDERS & WALLS

LINEAR GRAZING FIXTURE, RGB COLOR LED: LUMINAIRE FIXTURE SHALL BE A LINEAR FIXTURE THAT UTILIZES LIGHT EMITTING DIODES (LEDS) AS THE LIGHT SOURCE. THE FIXTURE SHALL CONSIST OF A HOUSING, LINEAR LED ARRAY, AND MOUNTING BRACKET, AND SHALL BE CAPABLE OF PLACEMENT END-TO-END TO CREATE A CONTINUOUS ROW OF LIGHT TO ILLUMINATE THE GIRDER UNIFORMLY. HOUSING SHALL BE OF HEAVY-DUTY ALUMINUM AND SHALL HAVE SUFFICIENT THERMAL MANAGEMENT CAPACITY TO ASSURE PROPER OPERATION OVER AN AVERAGE RATED LIFE OF 50,000 HOURS AT 70% OF LAMP LUMEN OUTPUT. HOUSING SHALL BE UL LISTED FOR WET LOCATIONS. EXTERIOR FINISH SHALL BE ANODIZED ALUMINUM; OTHER FINISHES MAY BE SUBMITTED FOR ENGINEER APPROVAL. THE BODY OF THE FIXTURE SHALL BE NO MORE THAN 3 IN. HIGH AND 3 IN. WIDE IN CROSS SECTION AND SHALL BE EQUIPPED WITH A FIELD ADJUSTABLE MOUNTING BRACKET TO ALLOW AIMING AFTER INSTALLATION WITH PROVISION TO SECURE FIXTURE AT FINAL ADJUSTMENT LOCATION. THE ENTIRE ASSEMBLY, INCLUDING LUMINAIRE HOUSING AND BRACKET SHALL BE CAPABLE OF INSTALLATION TO THE UNDERSIDE OF THE BRIDGE DECK AS SHOWN IN PLAN DETAILS WITHOUT PROTRUDING BEYOND THE EDGE OF THE BRIDGE DECK. THE LUMINAIRE SHALL CONSIST OF RED, GREEN AND BLUE LEDS CAPABLE OF PROVIDING CONTINUOUSLY VARIABLE COLORS, AND SHALL PROVIDE AN INITIAL LUMEN OUTPUT OF AT LEAST 400 LUMENS PER LINEAL FOOT (LUMEN OUTPUT MEASUREMENTS SHALL COMPLY WITH IES LM-79-08 TESTING PROCEDURES). THE LUMINAIRE SHALL BE CONFIGURED WITH A 60°X 60° BEAM ANGLE. ALL FIXTURES SHALL BE PRE-WIRED AND PRE-ASSEMBLED. POWER SUPPLY SHALL BE COMPATIBLE WITH FIXTURE AS RECOMMENDED BY THE LUMINAIRE MANUFACTURER AND APPROVED FOR WET LOCATIONS, OR INTEGRAL TO THE FIXTURE.

LED GIRDER LIGHTING: COLOR KINETICS POWERGRAZE QLX POWERCORE: 60X60 BEAM ANGLE OR APPROVED EQUAL
LED WALL LIGHTING: COLOR KINETICS POWERGRAZE QLX POWERCORE: 10X60 BEAM ANGLE OR APPROVED EQUAL

2. CONTROL SYSTEM PROGRAMS AND EFFECTS

COLOR LED LIGHTING CONTROL SYSTEM: PROVIDE A COMPLETE COLOR LED LIGHTING CONTROL SYSTEM CAPABLE OF PROVIDING MULTIPLE LIGHTING EFFECTS, WITH ALL FIXTURES INDIVIDUALLY ADDRESSED, CAPABLE OF RUNNING THE FOLLOWING PROGRAMS OR MORE:

- FIXED COLOR SELECT AND DISPLAY A SINGLE FIXED COLOR ACROSS ALL FIXTURES IN THE SYSTEM.
- CROSS FADE CREATE A SMOOTH TRANSITION FROM ONE SOLID COLOR TO A SECOND SOLID COLOR ON ALL FIXTURES SIMULTANEOUSLY
- COLOR WASH CREATE A SMOOTH TRANSITION THROUGH A SERIES OF SOLID COLORS ON ALL FIXTURES SIMULTANEOUSLY
- CHASING CREATES BARS OF REPEATED COLOR
- CHASING NODE CREATES BANDS OF REPEATED COLOR MOVING
- SWEEP DISPLAYS A PROGRESSIVE TRANSITION OF ONE ORE MORE FOREGROUND COLORS ACROSS A SOLID BACKGROUND COLOR
- SWEEP NODE DISPLAYS A PROGRESSIVE TRANSITION OF ONE OR MORE FOREGROUND COLOR TRANSITIONING FROM NODE TO NODE
- SPARKLE FLASHES ONE OR MORE FOREGROUND COLORS AT RANDOM INTERVALS OVER A SOLID COLOR
- STREAK ONE OR MORE BANDS OF COLOR MOVE ACROSS A SOLID BACKGROUND
- SPIRAL PRODUCES ARCS OF COLOR ORIGINATING FROM A CENTRAL POINT
- BURST PRODUCES CONCENTRIC RINGS OF COLORS
- RANDOM COLOR PRODUCES A SEQUENCE OF TWO OR MORE RANDOMLY GENERATED SOLID COLORS
- FADE ABILITY TO GRADUALLY FADE-IN OR FADE-OUT THE SATURATION OR BRIGHTNESS OF THE COLOR AND LIGHT LEVEL
- RIPPLE DISPLAYS RINGS OF COLOR MOVIN OVER A SOLID BACKGROUND COLOR
- PARTICLE PRODUCES ANIMATED CIRCULAR SHAPES OVER A SOLID BACKGROUND COLOR
- CONSTANT MODIFIER APPLIES A CONSTANT CHANGE TO A HUE, SATURATION AND/OR BRIGHTNESS
- WAVE MODIFIER USES DIFFERENT WAVE PATTERNS TO VARY THE APPEARANCE OF EFFECTS
- FADE IN FADE OUT MODIFIER SETS LIMITS ON RED, GREEN AND/OR BLUE CHANNELS OF ALL EFFECTS
- PERLIN NOISE MODIFER OVERLAYS A RANDOM SMOOTH FLOWING PATTERN OF NOISE OVER ALL EFFECTS UNDERNEATH IT IN A GROUP

CONTROLLER: COLOR KINETICS iPLAYER3 OR APPROVED EQUAL

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.philipscolorkinetics.com

3. COMPONENTS AND OPERATION

ALL COMPONENTS OF THE SYSTEM MUST BE CAPABLE OF OPERATING FROM -15°TO 115°F. IF ANY COMPONENTS ARE INCAPABLE OF OPERATING TO THESE EXTREMES; CLIMATE CONTROL EQUIPMENT SHALL BE INCLUDED TO MAINTAIN THE EQUIPMENT IN THE OPERATING TEMPERATURE RANGE OF EACH COMPONENT. ALL COMPONENTS SHALL ACCEPT AN INPUT VOLTAGE OF 240 VAC.

THE CONTROLLER MUST BE CAPABLE OF TURNING THE SYSTEM ON AND OFF BY AN ASTRONOMICAL TIMER THAT ACCOUNTS FOR VARIATION IN SUNRISE AND SUNSET TIMES THROUGHOUT THE YEAR, INCLUDING AUTOMATIC DAYLIGHT SAVING TIME ON/OFF ADJUSTMENT. THE CONTROLLER SHALL INCLUDE A MEANS TO DISPLAY THE CURRENT MODE AND CONFIGURATION MENUS, AND HAVE THE ABILITY TO STORE A MINUMUM OF THREE PRESET PROGRAMS.

(CONTINUED IN COLUMN TO LEFT)

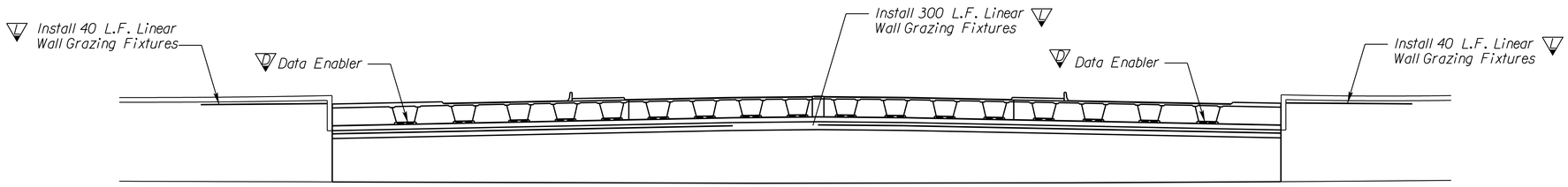
CITY OF WICHITA

EAST KELLOGG
AESTHETIC LIGHTING DETAILS
LED CONTROLLER

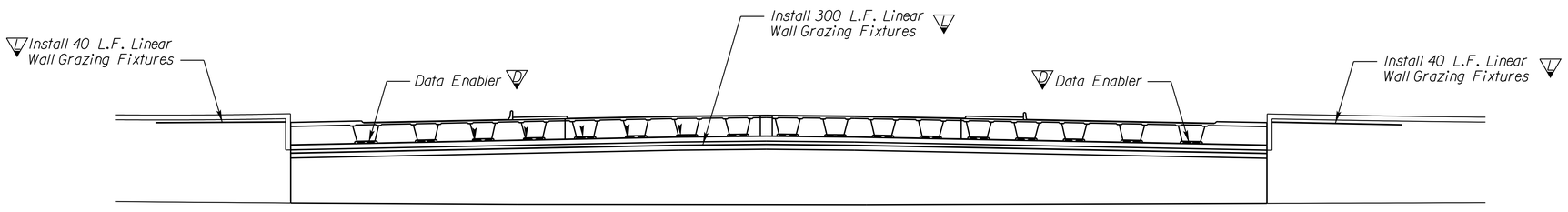
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	525	1055

Scale: 1"=20'



ELEVATION - WALL E & G & WEBB ABUTMENT
FRONT FACE



ELEVATION - WALL F & H & WEBB ABUTMENT
FRONT FACE

CONSTRUCTION NOTES:

LOCATE DATA ENABLER ON COPING IN VOID BELOW BOX GIRDER. SEE SHEET 534 FOR DETAILS.

INSTALL LUMINAIRE UNDER COPING. SEE SHEET 534 FOR DETAILS.

SEE SHEET 529 FOR WIRING DIAGRAM

LEGEND

WALL GRAZING FIXTURE, LED

(GI) DRIVER NUMBER

CITY OF WICHITA

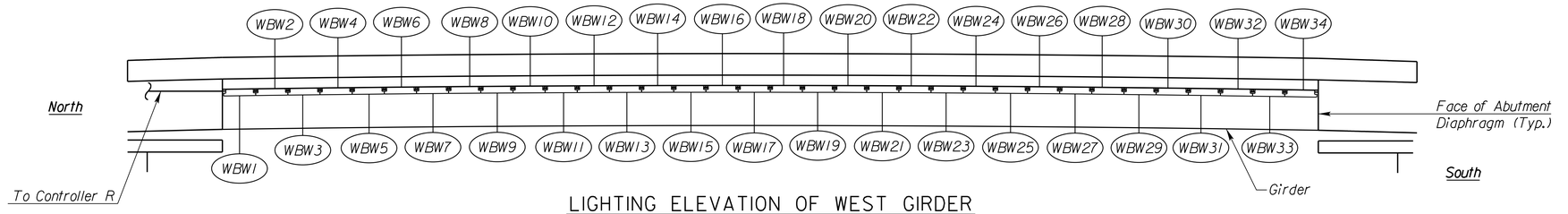
EAST KELLOGG
AESTHETIC LIGHTING LAYOUT
WALLS E, F, G & H

525

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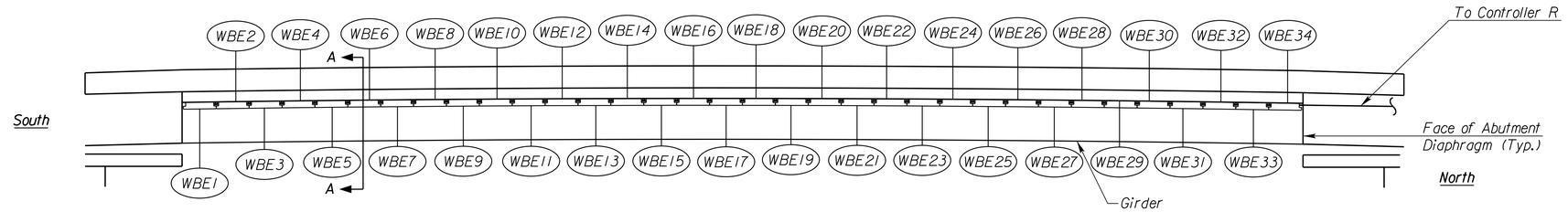
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	526	1055



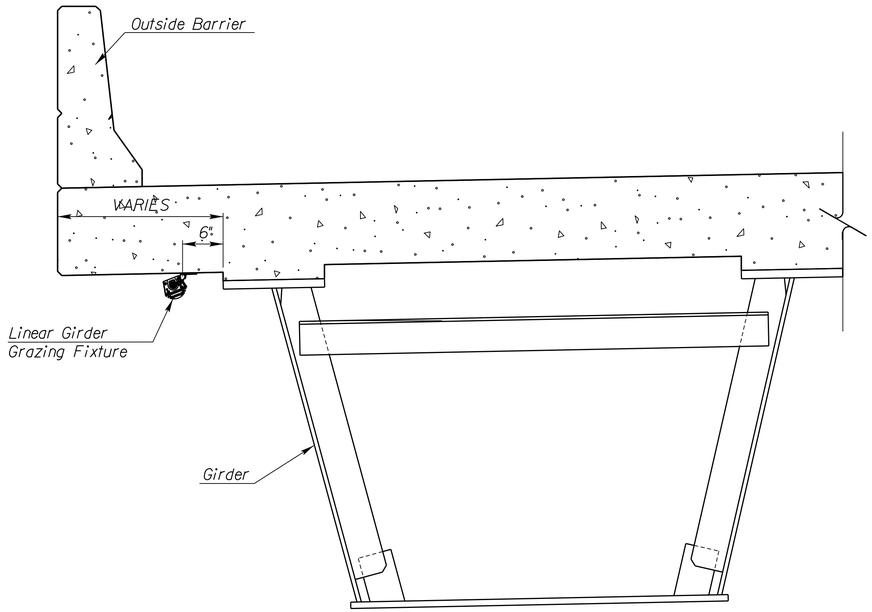
LIGHTING ELEVATION OF WEST GIRDER

(Showing profile of girder and rail)
SEE SHEET 529 FOR WIRING DIAGRAM

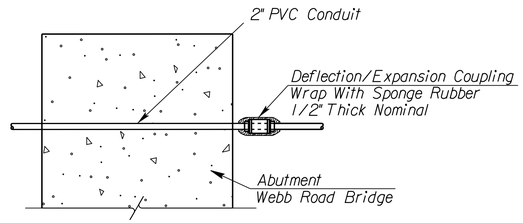


LIGHTING ELEVATION OF EAST GIRDER

(Showing profile of girder and rail)
SEE SHEET 529 FOR WIRING DIAGRAM



COPING DETAIL SECTION A-A THRU BARRIER



DEFLECTION/EXPANSION CONDUIT COUPLING DETAIL SECTION THRU ABUTMENT

LEGEND

WBW2 — Fixture Number

CITY OF WICHITA

WEBB ROAD OVER EAST KELLOGG
AESTHETIC LIGHTING LAYOUT
GIRDER LIGHTING

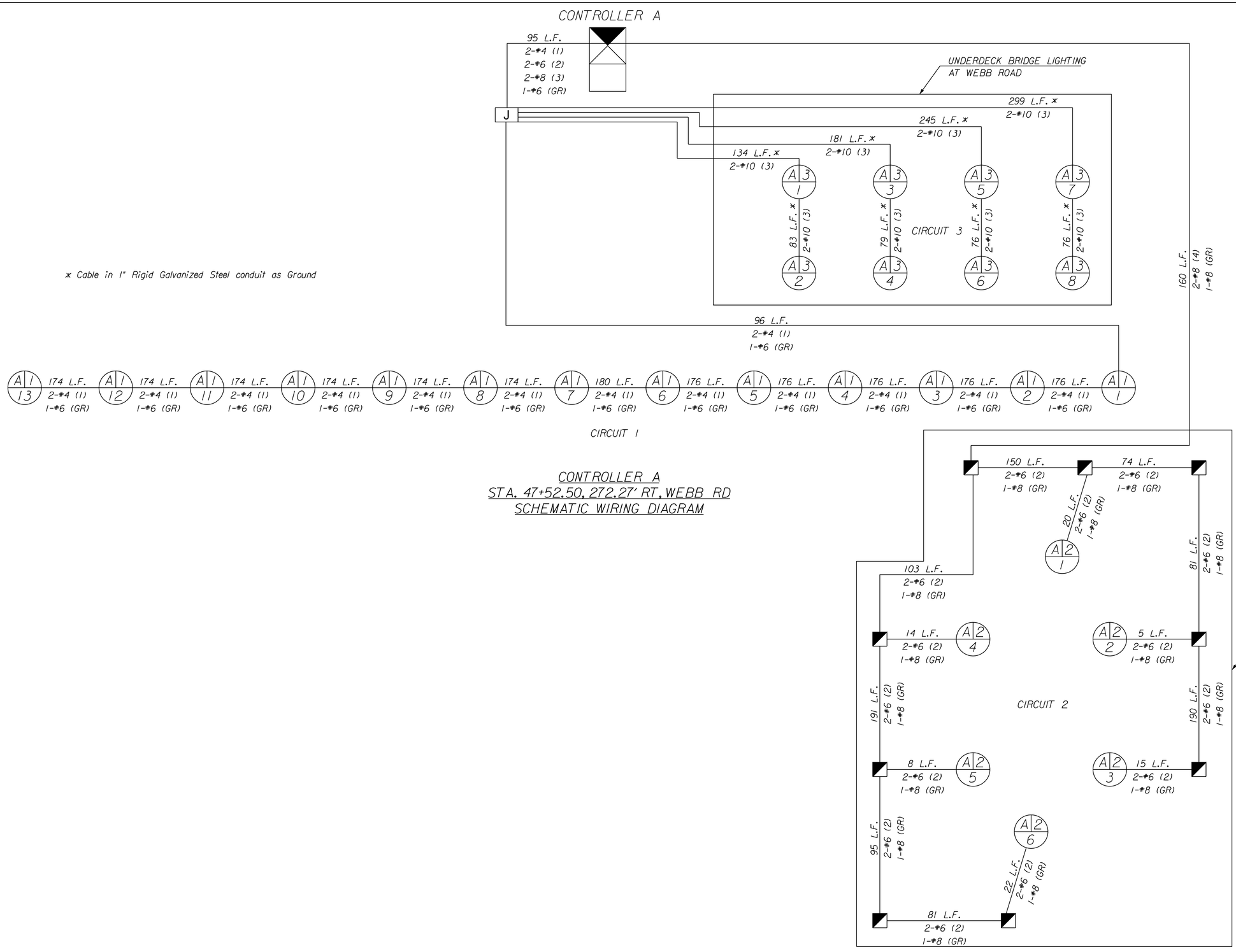
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	527	1055



CONTROLLER A
STA. 47+52.50, 272.27' RT, WEBB RD
SCHEMATIC WIRING DIAGRAM

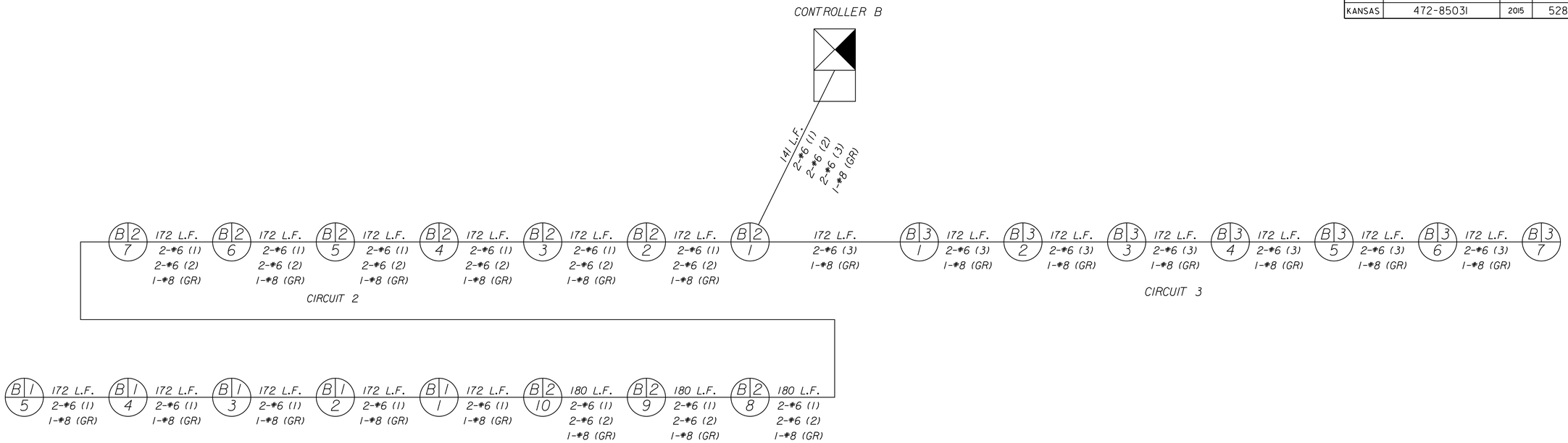
CITY OF WICHITA

EAST KELLOGG
LIGHTING WIRING DIAGRAM DETAILS
CONTROLLER A

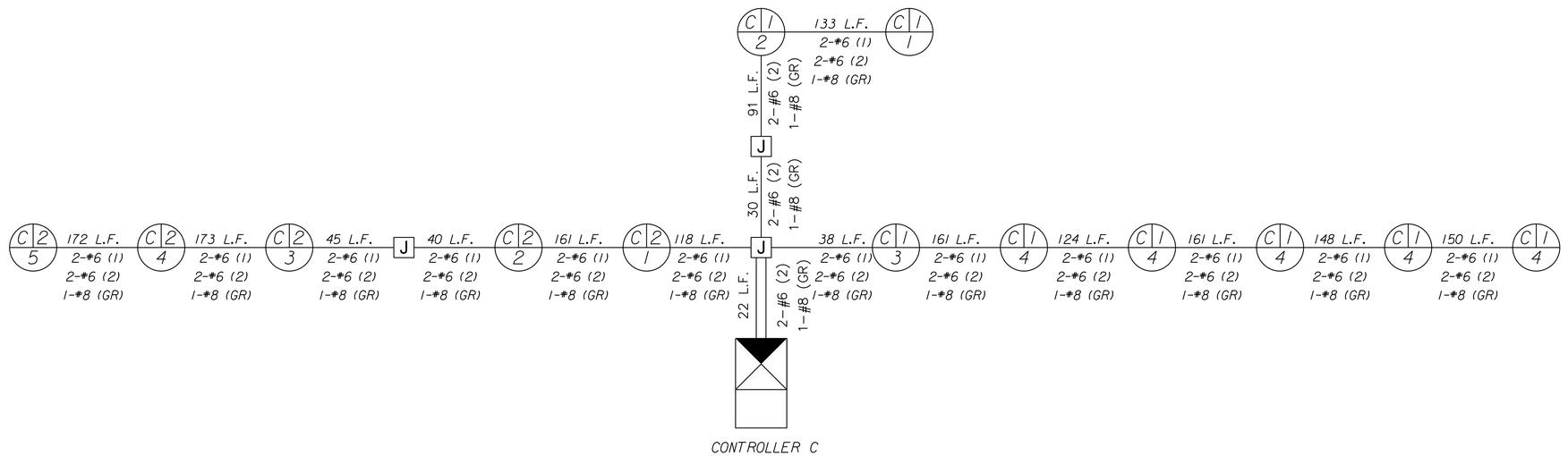
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	528	1055



CONTROLLER B
STA. 2546+33.00, 53.00' LT
SCHEMATIC WIRING DIAGRAM



CONTROLLER C
STA. 10506+92.00, 38.00' RT, ℄ RAMP C
SCHEMATIC WIRING DIAGRAM

CITY OF WICHITA

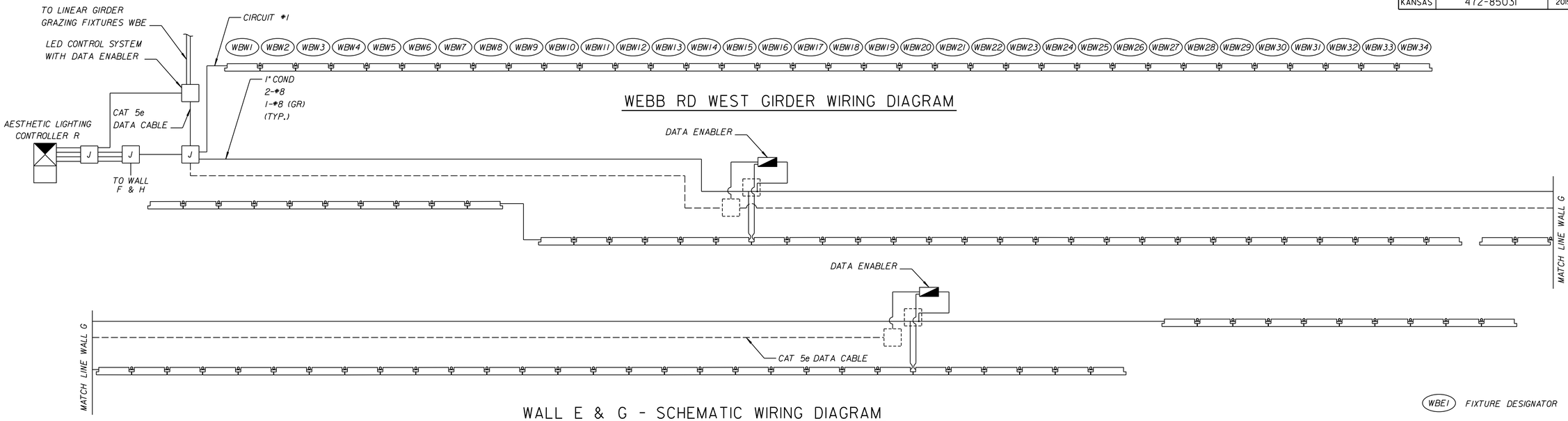
EAST KELLOGG
LIGHTING WIRING DIAGRAM DETAILS
CONTROLLER B & C

528

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	529	1055



WEBB RD WEST GIRDER WIRING DIAGRAM

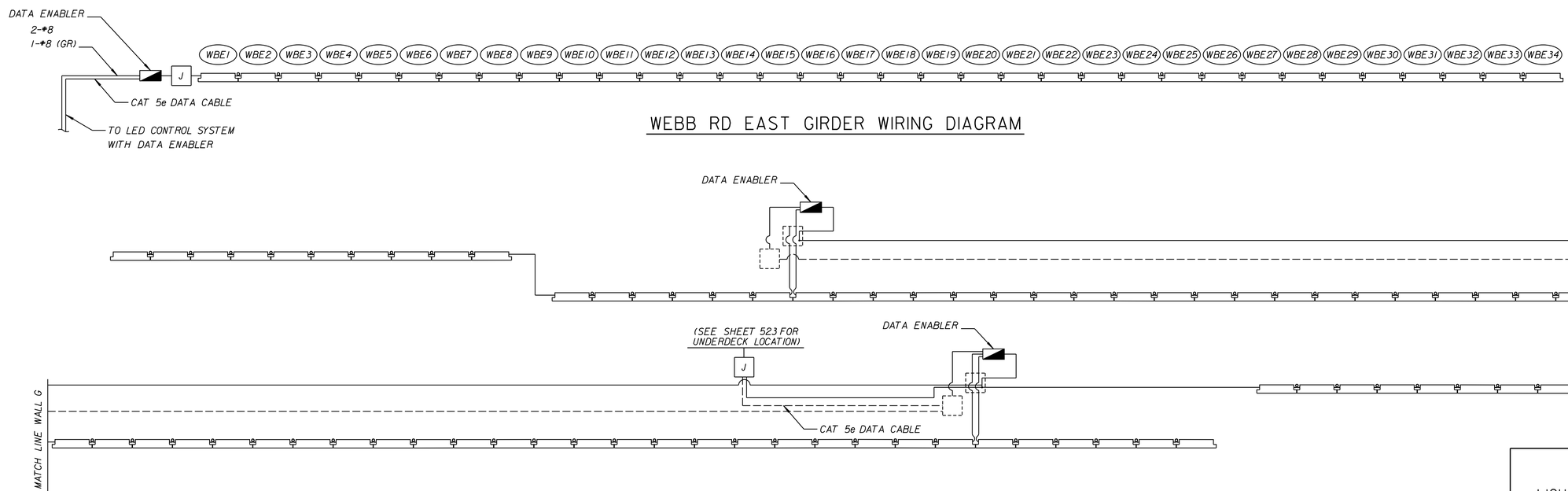
WALL E & G - SCHEMATIC WIRING DIAGRAM

WBE1 FIXTURE DESIGNATOR

48" LINEAR WALL FLOODLIGHT, LED RGB

ENT CONCRETE DEEP WALL BOX

J JUNCTION BOX



WEBB RD EAST GIRDER WIRING DIAGRAM

WALL F & H - SCHEMATIC WIRING DIAGRAM

CITY OF WICHITA

EAST KELLOGG

LIGHTING WIRING DIAGRAM DETAILS CONTROLLER R

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	530	1055

NOTE:
WHENEVER THE PLAN SPECIFICATIONS CONFLICT WITH THE STANDARD KANSAS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, LATEST EDITION, THE PLAN SPECIFICATIONS SHALL GOVERN.

CONSTRUCTION:
LIGHT STANDARDS SHALL BE DESIGNED TO COMPLY WITH THE 2009 EDITION OF THE A.A.S.H.T.O. PUBLICATION, STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR THE HIGHWAY SIGNS, LUMINAIRES, TRAFFIC SIGNALS, AND CURRENT INTERIMS. USE FATIGUE CATAGORY II. SEE STANDARD SPECIFICATIONS, LATEST EDITION, SECTION 801.

LIGHT STANDARDS:
(A) STEEL STANDARDS: THE LIGHT STANDARDS SHALL COMPLY WITH THE REQUIRMENTS OF A.S.T.M. 607 WITH THE EXCEPTIONS AND/OR ADDITIONS AS LISTED IN THE STANDARD KANSAS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, LATEST EDITION, SECTION 1608.2. THE LIGHT STANDARDS WITH 40' MOUNTING SHALL BE ONE (1) SECTION. THE DIAMETER OF THE STANDARDS SHALL BE SHOWN ON THE DETAIL SHEETS.

(a) BASE: THE BASE SHALL BE EITHER A ONE (1) PIECE STEEL BASE COMPLYING WITH THE REQUIRMENTS OF A.S.T.M. A-27, GRADE 65-35, A STEEL FORGED BASE COMPLYING WITH THE REQUIRMENTS OF A.S.T.M. A-668, CLASS C OR A PLATE BASE COMPLYING WITH THE REQUIREMENTS OF A.S.T.M. A 36-77A. THE BASE SHALL BE SECURED TO THE BOTTOM SECTION BY TWO (2) CONTINUOUS ELECTRIC ARC WELDS.

(b) MASTARMS: THE MASTARMS SHALL BE FABRICATED FROM 2" STANDARD PIPE MEETING THE REQUIRMENTS OF A.S.T.M. A-53 OR A.S.T.M. A-35.

(c) FINISH: THE BASE, MASTARMS, AND LIGHT STANDARDS SHALL BE GALVANIZED ACCORDING TO ASTM A-123.

(B) ALUMINUM STANDARDS: STANDARDS SHALL CONFORM TO THE PLAN DRAWINGS AND SPECIFICATIONS. THE SHAFT SHALL BE SPUN FROM ONE PIECE OF SEAMLESS TUBING (A.S.T.M. B-429) ALUMINUM ASSOCIATION ALLOY 6063-T6, WITH MINIMUM NOMINAL WALL THICKNESS OF 0.188 INCH FOR 40' MOUNTING HEIGHT. AFTER FABRICATION IT SHALL HAVE MECHANICAL STRENGTH OF NOT LESS THAN T6 TEMPER. THE SHAFT SHALL HAVE NO LONGITUDINAL NOR CIRCUMFERENTIAL WELDS EXCEPT AT THE LOWER END JOINING THE SHAFT TO THE BASE.

(a) BASE: A ONE-PIECE CAST ALUMINUM (A.S.T.M. B-108 ALLOY S.G. 70A-T6) ANCHOR BASE OF ADEQUATE STRENGTH, SHAPE AND SIZE BE SECURED TO THE LOWER END OF THE SHAFT BY TWO (2) CONTINUOUS WELDS. THE BASE SHALL TELESCOPE THE SHAFT AND THE ONE WELD SHALL BE ON THE INSIDE OF THE BASE AT THE END OF THE SHAFT WHILE THE OTHER WELD SHALL BE ON THE OUTSIDE AT THE TOP OF THE BASE. (THE TWO (2) WELDS SHALL DEVELOP THE DESIGN STRENGTH OF THE POLE ASSEMBLY.)

(b) MASTARMS: SINGLE MEMBER TYPE: THE BRACKET ARM ASSEMBLY SHALL CONSIST OF A TAPERED ALUMINUM ARM, OVALIPTIC IN SHAPE AT THE POLE END AND TAPPERING TO A MINIMUM OF 2¼" O.D. AT THE LUMINAIRE END, MADE OF (A.S.T.M. B-429) ALUMINUM ASSOCIATION ALLOY 6063-T6 TUBING.

TRUSS TYPE MEMBER: THE UPPER AND LOWER MEMBERS SHALL BE 2" IPS ALUMINUM PIPE, (A.S.T.M. B-429) ALUMINUM ASSOCIATION ALLOY 6063-T6.

(c) FINISH: ALL HARDWARE (BOLTS, NUTS, AND WASHERS - BUT NOT INCLUDING ANCHOR BOLTS) NOT OTHERWISE SPECIFICALLY DESIGNATED IN THE SPECIFICATIONS, SHALL BE ALUMINUM OR STAINLESS STEEL. ALL MATERIALS SHALL BE FURNISHED IN NATURAL ALUMINUM COLOR, POLE SHAFTS SHALL BE FURNISHED WITH A POLISHED SURFACE.

ELECTRICAL MATERIAL:

(A) PHOTO CELL : PHOTO-ELECTRIC CONTROLL SHALL BE SOLID STATE TYPE, 1000 W/1800 VA, SINGLE POLE, SINGLE THROW, TWIST LOCK MOUNTING, 105 TO 300 VOLT OPERATION. THE OPERATING LEVELS SHALL BE 1.6 FT. C. ON AND 0.4 FT. C. OFF, WITH AN ALLOWABLE 0.5 FT. C. VARIANCE ON OR OFF. THE PHOTO-ELECTRIC CONTROL SHALL HAVE A MINIMUM OF 30 SECOND TIME DELAY AND FAIL IN THE ON MODE.

(B) DUCT: THE DUCT FOR SECONDARY CABLE UNDERGROUND SHALL BE POLYETHYLENE DUCT WITH MINIMUM TENSILE STRENGTH OF 3100 P.S.I. DUCT TO PROVIDE FOR 40% MAXIMUM FILL. THE DUCT SIZED SHALL MEET A. S. T. M. D3485 (LATEST REVISION).

(C) CONDUCTOR: CONDUCTOR SHALL BE STRANDED ANNEALED COPPER MEETING THE REQUIREMENTS OF A.S.T.M. B-8 AND A.S.T.M. B-33.

(a) SECONDARY CABLE: SECONDARY CABLE SHALL BE COPPER SINGLE CONDUCTOR CABLE FOR OPERATION AT 600 VOLTS MAXIMUM. MATERIAL SHALL MEET THE APPLICABLE REQUIREMENTS OF I.C.E.A. STANDARD S-105-692, AND LISTED BY U.L. AS TYPE USE-2 FOR DIRECT BURIAL.

(a) SECONDARY CABLE (INDUCT): SECONDARY CABLE SHALL BE COPPER SINGLE CONDUCTOR CABLE FOR OPERATION AT 600 VOLTS MAXIMUM. MATERIAL SHALL MEET THE APPLICABLE REQUIREMENTS OF I.C.E.A. STANDARD S-19-81, WITH THERMOPLASTIC INSULATION OF GRS-RUBBER BASE MEETING APPENDIX K(A) OF I.C.E.A. AND LISTED BY U.L. AS TYPE USE-2 FOR DIRECT BURIAL; OR, MATERIAL SHALL MEET THE APPLICATION REQUIREMENTS OF I.C.E.A. STANDARD S-66-524, WITH THERMO-SETTING INSULATION OF CROSS LINK POLYETHYLENE MEETING REQUIREMENTS OF COLUMN "A" OF I.C.E.A. AND LISTED BY U.L. AS TYPE USE-2.

(D) ROADWAY LUMINAIRE, LED: ROADWAY LUMINAIRE FIXTURE SHALL CONSIST OF AN ASSEMBLY THAT UTILIZES LEDs AS THE LIGHT SOURCE. THE COMPLETE LUMINAIRE SHALL CONSIST OF A HOUSING, LED ARRAY, AND ELECTRONIC DRIVER. LUMINAIRES AS LOCATED ON THE PLANS MUST BE CAPABLE OF MAINTAINING AN AVERAGE ILLUMINANCE OF 0.9 FOOTCANDLES ON ALL THROUGH LANES OF THE EXPRESSWAY AND TRAVELED WAY OF RAMPS WITH AN AVERAGE/MINIMUM UNIFORMITY RATIO OF 3:1 OR BETTER. THE VEILING LUMINANCE RATIO SHALL BE 0.3:1 OR BETTER. ALL PHOTOMETRIC CALCULATIONS SHALL BE DETERMINED BASED ON IESNA RP-8-00 WITH A LIGHT LOSS FACTOR OF 0.72 APPLIED TO THE INITIAL DELIVERED LUMENS OF THE LEDs. NOMINAL LUMINAIRE MOUNTING HEIGHT SHALL BE 40 FT. ABOVE THE ROADWAY SURFACE. FIXTURE HOUSING SHALL BE ALL-ALUMINUM CONSTRUCTION WITH AN INTEGRAL SLIPFITTER FOR A 2 IN. BRACKET MOUNTING. HOUSING SHALL BE FINISHED IN BLACK WITH THE EXCEPTION OF LIGHT ENGINE, HEAT SINK OR COOLING FINS WHICH MAY REMAIN UNFINISHED ALUMINUM. LUMINAIRE SHALL OPERATE AT 4300K CCT +/- 300K AND ACCEPT AN INPUT VOLTAGE OF 480 VOLTS. EACH LUMINAIRE SHALL BE RATED FOR A MINIMUM OPERATIONAL LIFE OF 63,000 HOURS. LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS AND CERTIFIED TO ANSI C136.31-2001 BRIDGE AND OVERPASS VIBRATION STANDARDS. PRODUCT SUBMITTALS SHALL BE ACCOMPANIED BY IESNA LM-79-08 COMPLIANT TEST REPORTS PERFORMED BY AN INDEPENDENT LIGHT TESTING LABORATORY.

(E) NOT USED

(F) NOT USED

(G) ENCLOSURE: THE ENCLOSURE CABINET SHALL BE CONSTRUCTED OF 5052 ALLOY ALUMINUM 0.125" THICK. THE CABINET SHALL BE OF CLEAN CUT DESIGN HAVING NO SHARP EDGES, CORNERS OR PROJECTIONS. THE CIRCUITING SHALL BE SERVICEABLE BY MEANS OF A FULL LENGTH HINGED DOOR WITH PADLOCK PROVISIONS. THE ENCLOSURE SHALL HAVE 600 VOLT RATED MOLDED CASE MAIN AND SECONDARY BREAKERS, TWIST-LOCK PHOTO-CELL SOCKET, AND ELECTRICALLY HELD CONTACTORS. THE EQUIPMENT WITHIN THE ENCLOSURE SHALL BE WIRED PRIOR TO DELIVERY. THE ENCLOSURE SHALL HAVE A METER VIEW WINDOW AND A GLASS TO ALLOW LIGHT TO THE PHOTO-CELL.

(a) MAIN AND SECONDARY BREAKERS: THE MAIN AND SECONDARY BREAKERS SHALL HAVE A MOUNTING DIMENSIONS OF 1⅜" WIDE X 4½" HIGH MOUNTING HOLES SHALL BE POSITIONED TO ACCOMODATE A BREAKER 2¾" WIDE SIDE BY SIDE. SEE ENCLOSURE DETAIL SHEET.

GENERAL MATERIALS AND NOTES:

(A) MISCELLANEOUS HARDWARE: MISCELLANEOUS HARDWARE THAT REQUIRES GALVANIZING OR ELECTROPLATING SHALL CONFORM TO THE STANDARD KANSAS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, LATEST EDITION, SECTION 1703.2 (c).

(B) METALLIC CONDUIT: METALLIC CONDUIT SHALL BE RIGID STEEL CONDUIT MEETING THE REQUIREMENTS OF AMERICAN STANDARD SPECIFICATION C-80.1. TRENCHING FOR CONDUIT WILL NOT BE PERMITTED THROUGH EXISTING PAVEMENT. JACKING WILL NOT BE PERMITTED IN DISTRICT ONE UNLESS APPROVED BY THE ENGINEER IN CHARGE OF CONSTRUCTION.

(C) METALLIC CONDUIT FITTINGS: METALLIC CONDUIT FITTINGS SHALL BE ZINC COATED AND SHALL MEET THE REQUIREMENTS OF AMERICAN STANDARD SPECIFICATION C-80.1.

(D) NON-METALLIC CONDUIT:
D.1 RIGID POLYVINYL CHLORIDE MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATIONS NO. L.P. 1036A, TYPE II, ELECTRICAL CLASS 2, GRADE C. EACH LENGTH SHALL BEAR THE UNDERWRITERS, INC. LABEL. NON-METALLIC CONDUIT FITTINGS SHALL BE FABRICATED FROM POLYVINYL CHLORIDE HAVING THE SAME CHEMICAL AND PHYSICAL PROPERITIES AS THE CONDUIT WITH WHICH IT IS TO BE USED. EACH SHALL BEAR THE UNDERWRITERS, INC. LABEL. THE JOINTS SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTORS RECOMMENDATIONS.

D. 2 FIBERGLASS CONDUIT: CONDUIT SHALL BE FIBERGLASS REINFORCED EPOXY MANUFACTURED USING THE FILAMENT WINDING PROCESS. CONDUIT, ELBOWS AND FITTINGS SHALL BE MANUFACTURED FROM THE SAME RESIN/HARDNER/ GLASS SYSTEMS MANUFACTURED BY THE SAME FILAMENT WOUND SYSTEM. ALL CONDUIT AND FITTINGS SHALL MEET UL1684. ALL CONDUIT SHALL BE NON-TAPERED. THE JOINTS SHALL HAVE THREDDED BELL AND SPIGOT ENDS. THE CONDUIT WILL BE JOINED TOGETHER USING A TWO PART EPOXY ADHESIVE CREATING A TIGHT LOCK JOINT. THE CONDUIT WALL THICKNESS WILL BE 0.071" FOR 3"#4" - 4" AND 0.095" FOR 5" AND 6". ALL CONDUITS SHALL BE MANUFACTURED TO IPS PIPE SIZES. FOR UNDERGROUND USE ONLY.

D. 3 ELECTRICAL NON-METALLIC TUBING (ENT): CONDUIT SHALL BE HIGH IMPACT RESISTANT POLYVINYL CHLORIDE DESIGNED FOR CONCRETE ENCASEMENT. ENT CONDUIT SHALL BE UL LISTED AND SHALL BE MANUFACTURED IN ACCORDANCE WITH NEMA TC-13. ALL FITTINGS SHALL BE NON-CORRODING AND CONCRETE-TIGHT MADE IN ACCORDANCE WITH THE CONDUIT MANUFACTURER'S RECOMMENDATIONS. THE FITTINGS SHALL PROVIDE A CONDUIT PULL-OUT FORCE OF AT LEAST 175 FOOT-POUNDS. ALL ENT CONDUIT, FITTINGS, AND ACCESSORIES SHALL BE MANUFACTURED BY THE SAME COMPANY SO AS TO FORM A COMPLETE ENT SYSTEM.

D. 4 LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT (LFNC): CONDUIT SHALL HAVE A SMOOTH PVC INNER SURFACE AND AN INTEGRAL REINFORCING MEMBER WITHIN THE CONDUIT WALL. LFNC SHALL BE UL LISTED, AND BE IN COMPLAINCE WITH ARTICLE 356 OF THE NEC FOR LFNC-B.

(E) GROUND: GROUND WIRE SHALL BE A #6 AWG SOLID BARE COPPER WIRE AND ARRANGEMENT SHALL BE AS NOTED ON PLANS.

(F) ANCHOR BOLTS: ANCHOR BOLTS SHALL CONFORM TO THE STANDARD KANSAS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, LATEST EDITION, SECTION 1613, TYPE I FOR LIGHT STANDARDS, TYPE II FOR TOWERS.

(G) BREAK-AWAY CABLE CONNECTORS: THE CONNNECTORS SHALL PROVIDE A FUSED WATERPROOF WIRING CONNECTION THAT WHEN SUBJECTED TO STRAIN CONSISTANT WITH A KNOCKDOWN WILL SEPARATE WITHOUT DAMAGE TO WIRING. WHEN SEPARATION OCCURRS, THE CONNECTORS SHALL HAVE NO CONTACTS EXPOSED TO PRESENT A SHOCK HAZARD. THE CABLE CONNECTORS SHALL MEET AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS (LATEST EDITION), ARTICLE 12.5.3 (C). CONNECTOR INSTALLATION SHALL BE AS DIRECTED BY THE MANUFACTURER.

(H) FRANGIBLE BASE: FRANGIBLE BASE SHALL BE CAST ALUMINUM TO MEET THE STANDARDS OF THE LATEST A.A.S.H.T.O. STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, AND TRAFFIC SIGNALS. THE FRANGLIBLE BASE SHALL ACCOMODATE UP TO A 15" BOTTOM BOLT CIRCLE. THE FRANGIBLE BASE SHALL HAVE HIGH DENSITY PLASTIC DOORS. THE COLOR SHALL BE PIGMENTED THROUGHOUT TO GIVE THE APPEARENCE OF ALUMINUM. THE DOORS SHALL WITHSTAND TEMPERATURE EXTREMES OF -70°F TO 150°F. AND ARE COMPOUNDED WITH U.V. INHIBITORS.

(I) JUNCTION BOXES (IN-GROUND): THE JUNCTION BOX SHALL BE OF SUFFICIENT SIZE TO FACILITATE THE CONDUIT AND WIRING AS INDICATED IN THE PLANS. JUNCTION BOXES SHALL HAVE THE MINIMUM NOMINAL DIMENSIONS OF 12 INCHES DEEP WITH A MINIMUM PHYSICAL OPENING OF 130 SQUARE INCHES. IN-GROUND JUNCTION BOXES MAY BE CONSTRUCTED OF ONE OF THE FOLLOWING METHODS:

PRE-CAST CONCRETE WITH A CAST IRON COVER; POLYMER CONCRETE WITH A POLYMER CONCRETE COVER; FIBERGLASS REINFORCED POLYMER BODY WITH A POLYMER CONCRETE RING AND COVER; HIGH DENSITY POLYETHYLENE BODY WITH POLYMER CONCRETE RING AND COVER. THE RING SHALL BE SECURELY ATTACHED TO THE BODY.

ENCLOSURES, BOXES AND COVERS ARE REQUIRED TO CONFORM TO ALL TEST PROVISIONS OF ANSI/SCTE 77 2002 "SPECIFICATION FOR UNDERGROUND INTEGRITY" FOR TIER 15 APPLICATIONS.

THE COVER SHALL BEAR THE LOGO "LIGHTING" CLEARLY AND PERMANENTLY MOLDED OR ETCHED INTO THE COVER.

JUNCTION BOXES (ABOVE-GROUND): ABOVE GROUND JUNCTION BOXES SHALL HAVE THE NOMINAL DIMENSIONS OF 12 INCHES BY 12 INCHES BY 6 INCHES. THE JUNCTION BOX SHALL BE MADE OF 14 GAUGE SHEET METAL(STEEL) WITH WELDED SEAMS, KNOCKOUTS AND WEATHER PROOF SCREW COVER. BOXES SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A-123 AFTER FABRICATION.

(J) WEDGE TYPE STUD BOLT ANCHORS:
THE CONTRACTOR SHALL INSTALL TWO ⅜" X 3" WEDGE TYPE ANCHORS FOR CONDUIT CLAMPS. THE ANCHORS SHALL BE WEDGE TYPE MADE FROM CARBON STEEL MEETING AISI 12L14 STEEL. THE MINIMUM EMBEDDED DEPTH SHALL BE 1 ¾".

(K) CONDUIT CLAMPS WITH CLAMP BACKS:
THE CONTRACTOR SHALL INSTALL 2" CONDUIT CLAMPS WITH A COMPATIBLE CLAMP BACK. CLAMPS SHALL BE HEAVY DUTY STEEL TO SECURE THE 2" RIGID CONDUIT TO STRUCTURE. CONDUIT CLAMPS ARE TO BE SPACED AT 6' INTERVALS.

(L) CABLE GRIP SUPPORTS: THE CONTRACTOR SHALL INSTALL ONE (1) CABLE SUPPORT GRIP IN EACH ROADWAY LIGHTING POLE. THE CABLE SUPPORT GRIP SHALL BE MADE OF HIGH GRADE, NON-MAGNETIC TIN COATED BRONZE STRAND. THE CABLE SUPPORT GRIP SHALL BE CAPABLE OF SECURING TWO (2) #10 AWG TYPE USE-2 CABLES IN A VERTICAL POSITION HOLDING THE WEIGHT OF THE CABLES AND CABLE CONNECTORS OFF THE LUMINAIRE ASSEMBLY. SEE ROADWAY LIGHTING DETAILS SHEET.

(M) ALL WELDS SHALL BE SMOOTH CLEAN DENSE DEPOSIT THAT WILL EXCLUDE MOISTURE AND CONFORM TO A.W.S. SPECIFICATION D1.1 (LATEST REVISION). FIELD WELDS WILL NOT BE ALLOWED.

(N) GROUND RODS SHALL BE COPPERCLAD STEEL, ¾" DIAMETER BY 10' LONG.

PAINTING OF LIGHTING EQUIPMENT:

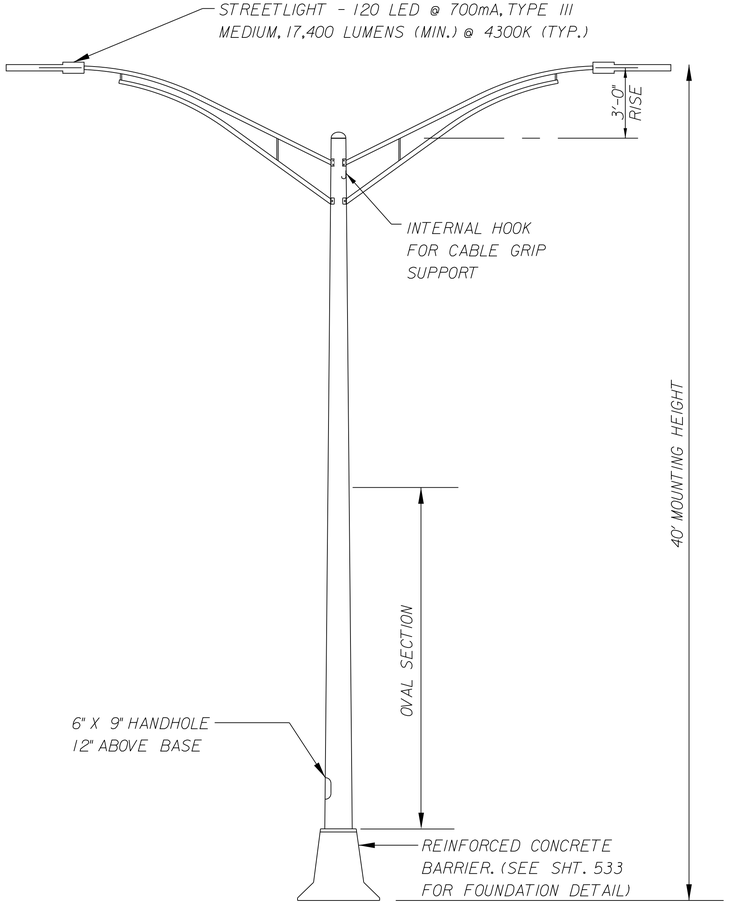
ALL LIGHTING POLES, AND LIGHTING MAST ARMS SHALL HAVE A FACTORY APPLIED FINISH OF TGIC THERMOSET POLYESTER POWDER COAT PAINT. THE PAINT SHALL BE BLACK IN COLOR, AS APPROVED TO MEET THE CITY OF WICHITA STANDARD AND SHALL BE APPLIED AFTER ALL COMPONENTS ARE THOROUGHLY CLEANED AND PRIMED WITH A CHROMATE PRETREATMENT. THE COST OF PAINTING SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICES FOR "ELECTRIC LIGHTING SYSTEMS."

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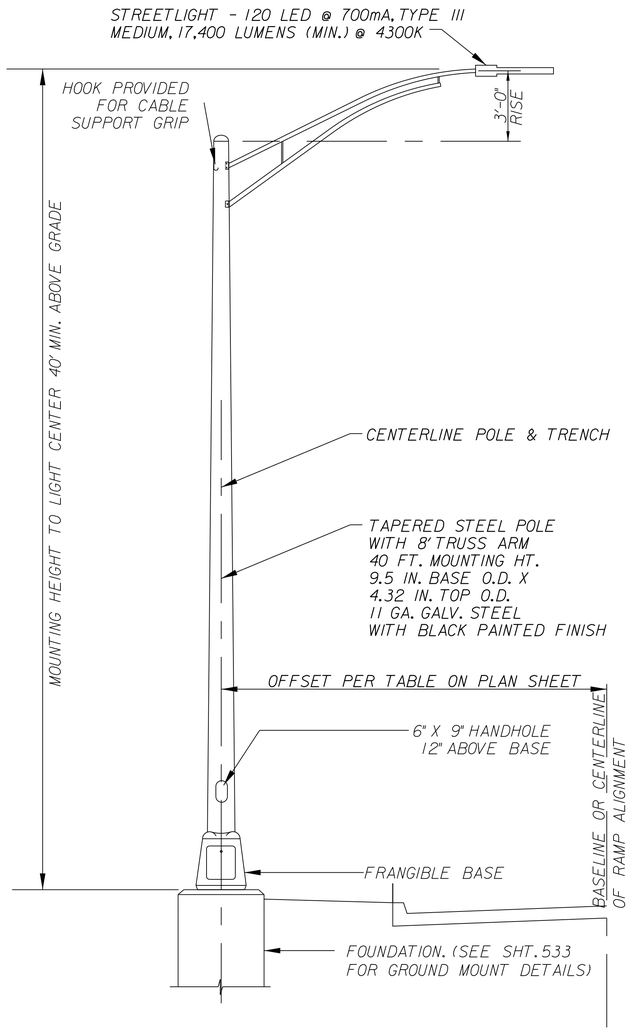
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CITY OF WICHITA
EAST KELLOGG
ROADWAY LIGHTING SPECIFICATIONS

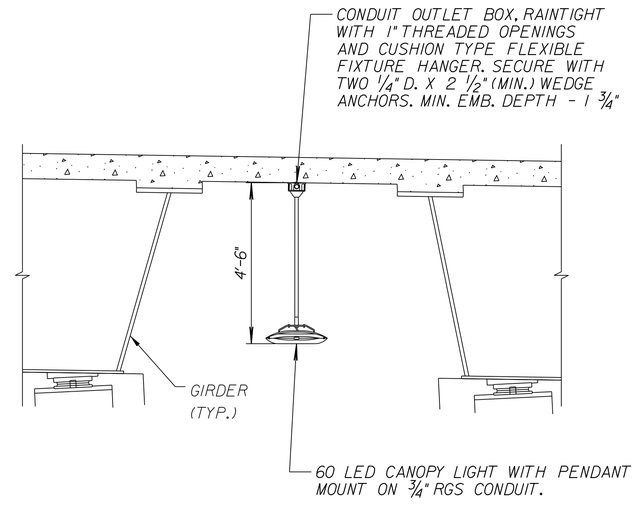
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	531	1055



BARRIER MOUNTED LIGHT POLE



RAMP ALIGNMENTS
GROUND MOUNTED LIGHT POLE



WEBB ROAD
ELEVATION - UNDERDECK LIGHTING

NOTES:

LIGHT STANDARDS SHALL BE GROUNDED BY MEANS OF A NO.6 AWG SOLID BARE COPPER GROUND WIRE BOLTED TO THE INSIDE OF THE LIGHT STANDARD SHAFT WITH A 1½" GROUNDING NUT. GROUND WIRE SHALL BE CONNECTED TO THE COPPERCLAD GROUND ROD BY MEANS OF A GROUND ROD CLAMP WITH AN EXOTHERMIC CONNECTION.

POLES SHALL BE CAREFULLY SET AND RAKED TO PROVIDE A VERTICAL ALIGNMENT. THE ALIGNMENT OF THE POLES IS AN ESSENTIAL FEATURE OF THE INSTALLATION. THE WORK SHALL BE AS NEARLY PERFECT AS PRACTICAL AND NO PERCEPTIBLE TOLERANCE WILL BE PERMITTED.

SINGLE ARM RAMP LIGHTS TO MATCH MAINLINE IN STYLE AND MANUFACTURER.

UNDERDECK CANOPY LUMINAIRE: LUMINAIRE FIXTURE SHALL CONSIST OF AN ASSEMBLY THAT UTILIZES LEDs AS THE LIGHT SOURCE. THE COMPLETE LUMINAIRE SHALL CONSIST OF A HOUSING, LED ARRAY, AND ELECTRONIC DRIVER. LUMINAIRES AS LOCATED ON THE PLANS MUST BE CAPABLE OF MAINTAINING AN AVERAGE ILLUMINANCE OF 0.9 FOOT CANDLES ON ALL THROUGH LANES OF STREET PAVEMENT UNDER BRIDGE STRUCTURES WITH AN AVERAGE/MINIMUM UNIFORMITY RATIO OF 3:1 OR BETTER. ALL PHOTOMETRIC CALCULATIONS SHALL BE DETERMINED BASED ON IESNA RP-8-00 WITH A LIGHT LOSS FACTOR OF 0.72 APPLIED TO THE INITIAL DELIVERED LUMENS OF THE LEDs. LUMINAIRES SHALL BE CAPABLE OF BEING MOUNTED DIRECTLY TO THE BRIDGE STRUCTURE OR MOUNTING PLATES INDICATED IN THE PLANS. FIXTURE SHALL BE ALL-ALUMINUM CONSTRUCTION WITH AN INTEGRAL JUNCTION BOX FOR WIRING CONNECTIONS. HOUSING SHALL BE FINISHED IN WHITE. LUMINAIRE SHALL OPERATE AT 4300K (+/- 300K) AND ACCEPT AN INPUT VOLTAGE OF 480 VOLTS. EACH LUMINAIRE SHALL BE RATED FOR A MINIMUM OPERATIONAL LIFE OF 63,000 HOURS. LUMINAIRE SHALL BE UL LISTED FOR WET LOCATIONS, IP 66 RATED, AND CERTIFIED TO ANSI C136.31-2001 BRIDGE AND OVERPASS VIBRATION STANDARDS. PRODUCT SUBMITTALS SHALL BE ACCOMPANIED BY IESNA LM-79-08 COMPLIANT EST REPORTS PERFORM BY AN INDEPENDENT LIGHT TESTING LABORATORY.

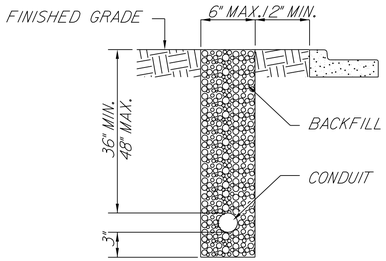
CITY OF WICHITA

EAST KELLOGG
LIGHTING DETAILS
ROADWAY LIGHTING

SURV.	-	PLOT	CADD	DES.	-	DR.	-	TR.	-	CKD.	-	APP.

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KANSAS	472-85031	2015	532	1055

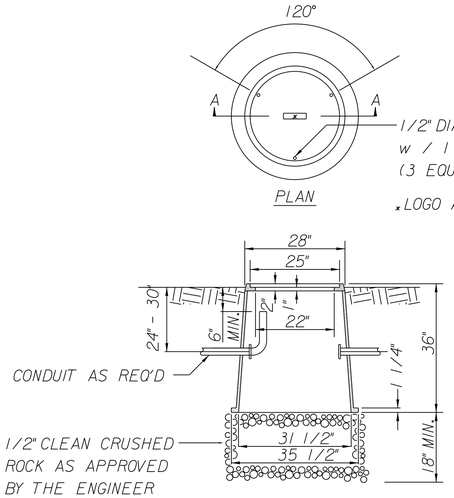


TRENCHING IN UNPAVED AREAS

NOTES:

1. BACKFILL IN UNPAVED AREAS SHALL BE FREE OF RUBBLE AND ROCK. CONDUITS SHALL BE PITCHED TO DRAIN.
2. ALL PIPES SHALL BE INSPECTED PRIOR TO BACKFILL. ALL PIPE COVERED PRIOR TO INSPECTION SHALL BE UNCOVERED AT THE CONTRACTOR'S EXPENSE.
3. UNLESS OTHERWISE AUTHORIZED BY THE CITY ENGINEER, ALL TRENCHES IN AREAS OF FUTURE STREET CONSTRUCTION SHALL BE BACKFILLED WITH CLEAN ½" ROCK BACKFILL (CA-5). ROCK BACKFILL SHALL EXTEND TO THE TOP OF THE TRENCH AND 3 FT. BACK OF ALL CURBS.

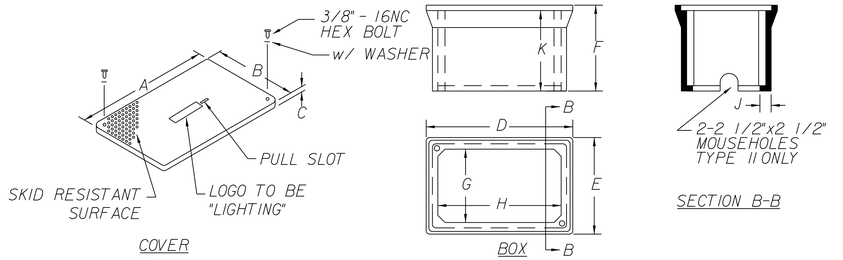
TRENCHING DETAILS



NOTE:
1. SERVICE BOX MATERIAL TO BE AN AGGREGATE CONSISTING OF SAND AND GRAVEL BOUND TOGETHER WITH A POLYMER AND REINFORCED WITH A CONTINUOUS WOVEN GLASS STRANDS. THE MATERIAL MUST HAVE THE FOLLOWING MECHANICAL PROPERTIES:
   COMPRESSIVE STRENGTH - 20,000 PSI
   TENSILE STRENGTH - 1700 PSI
   FLEXURAL STRENGTH - 7500 PSI
2. SERVICE BOX WITH ADJUSTABLE TOP RING SHALL NOT BE PERMITTED.

FIBERGLASS REINFORCED POLYMER CONCRETE SERVICE BOX

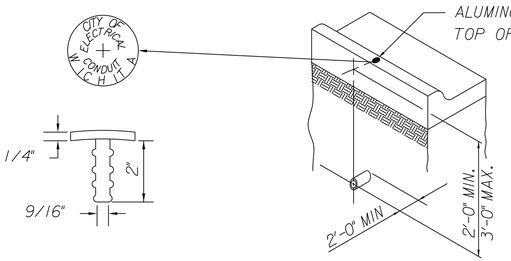
NOT TO SCALE



* TOLERANCE ±1/4" IN ANY DIMENSION

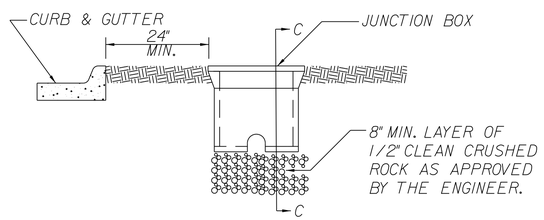
TYPE	DIMENSIONS (IN.) *									
	A	B	C	D	E	F	G	H	J	K
I	12 7/8	12 7/8	1 1/2	14	14	12 3/4	10 1/2	10 1/2	1	12
II	18 1/2	11 1/2	1 1/2	20 1/2	13 1/2	12	10 1/4	17 1/4	3/8	11 1/4
III	30 1/2	17 1/2	1 3/4-2			30	15 1/2	28 1/2		

FIBERGLASS REINFORCED POLYMER CONCRETE JUNCTION BOX DETAILS
NOT TO SCALE



CONDUIT SHALL BE PLACED 2'-0" TO 3'-0" BELOW THE TOP OF CURB ELEVATION AND SHALL EXTEND 2'-0" MINIMUM BEYOND THE BACK OF CURB. CONDUIT SHALL BE INSTALLED TO DRAIN, AND ALL ENDS SHALL BE THREADED AND CAPPED. AN ALUMINUM MARKER SHALL BE PLACED IN THE TOP OF THE CURB DIRECTLY OVER THE CONDUIT. ALUMINUM MARKERS WILL BE FURNISHED BY THE CONTRACTOR.

CONDUIT MARKING DETAIL



JUNCTION BOX INSTALLATION DETAIL

CITY OF WICHITA

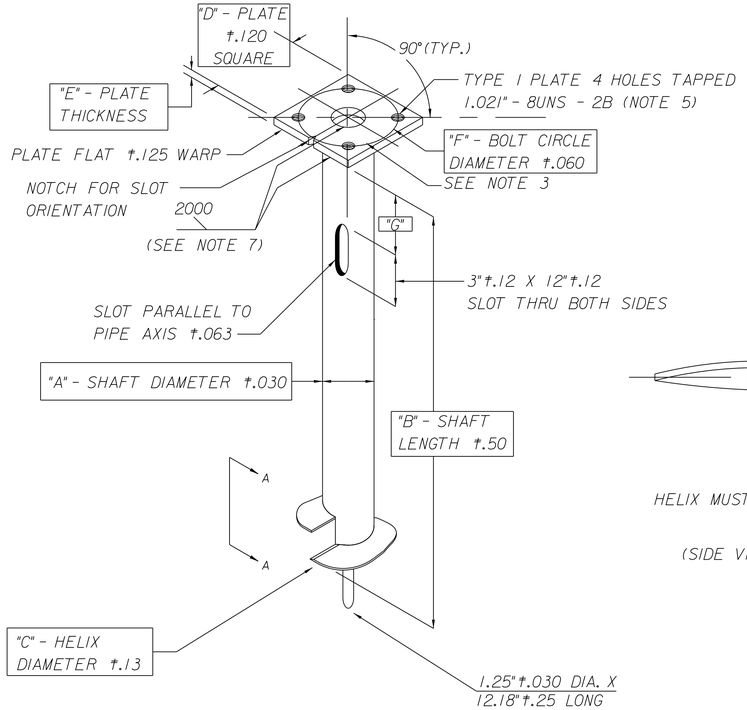
EAST KELLOGG

DETAILS FOR JCT. BOXES, TRENCHES & CONDUIT MRKRS.

SURV.	-	PLOT	CADD	DES.	-	DR.	-	TR.	CKD.	-	APP.	-

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	533	1055

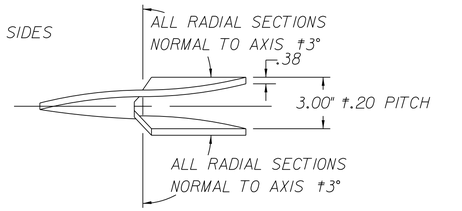


SCREW-IN FOUNDATION

TYPE	MOUNTING HEIGHT	ARM SPECIFICATION	MAXIMUM TORQUE RATING (lbs ft)	A SHAFT DIA.	B SHAFT LENGTH	C HELIX DIA.	D PLATE SIZE	E PLATE THICKNESS	F BOLT CIRCLE	G SLOT LOCATION
F1	40'	SINGLE	20,000	8"	60"	14"	14.5"	1.0"	11.5"	18"
F2	40'	TWIN	20,000	8"	60"	14"	18"	1.25"	14.5"	18"

NOTES:

1. FINISH: HOT DIP GALVANIZE PER ASTM-A153 (LATEST REVISION).
2. BASEPLATE TO BE PERPENDICULAR TO SHAFT AXIS (±1) AND HOLE AND CONCENTRIC (±.188 I.D. FIM) TO SHAFT AXIS
3. ALL BASES SHALL BE IDENTIFIED BY THE MANUFACTURER'S INITIALS AND THE ANCHOR TYPE (1,2 & 3) PERMANENTLY STAMP INTO THE TOP PLATE WITH 1/2" LETTERS. THE JULIAN DATE OF MANUFACTURE SHALL BE PERMANENTLY STAMPED IN 1/4" NUMERALS.
4. PILOT POINT AND SHAFT AXES TO BE CONCENTRIC (±.125 FIM) AND IN LINE (±2°).
5. TAP 1" HOLES ON THE SPECIFIED BOLT CIRCLE PERPENDICULAR TO THE BASEPLATE. CLEAN AND CHASE THE THREADS AFTER HOT-DIP GALVANIZING SO THAT A BOLT MAY BE HAND INSTALLED.
6. PREHEAT (ROOM TEMPERATURE 70°F). TUMBLEBLAST, HANDGRIND, AND CLEAN BASEPLATE, HELIX, AND CORE ON ALL WELD AREAS.
7. FLAMECUT IRREGULARITIES PERMISSIBLE:
   (1) VALLEYS NOT TO EXCEED 3/32 IN. BELOW NOMINAL SURFACE LEVEL.
   (2) PEAKS OR POSITIVE IRREGULARITIES NOT TO EXCEED 1/32 IN. ABOVE NOMINAL SURFACE LEVEL OR INTERSECTIONS OF NOMINAL SURFACES.
8. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
9. ALL MATERIAL IS TO BE NEW, UNUSED AND MILL TRACEABLE MEETING THE FOLLOWING SPECIFICATIONS:
   - BASEPLATE: ASTM A36-(LATEST REVISION) HOT ROLLED STEEL PLATE
   - SHAFT: STEEL PIPE PILES, SEAMLESS OR STRAIGHT WELDED, GRADE 2 PER ASTM A252. ALTERNATE MATERIAL PIPE TYPE E OR S, GRADE B PER ASTM A53.
   - HELIX: ASTM A635-(LATEST REVISION) HOT ROLLED STEEL PLATE
   - PILOT POINT: ASTM A575-(LATEST REVISION) HOT ROLLED STEEL
10. ALL 30' AND 40' ALUMINUM LIGHT POLES SHALL BE FURNISHED WITH BREAKAWAY BASES.
11. THE DESIGN AND PERFORMANCE INTEGRITY OF THE FOUNDATION SHALL BE VERIFIED BY FULL-SCALE TESTS BY QUALIFIED ENGINEERS INDEPENDENT OF THE MANUFACTURER. CERTIFIED TEST REPORTS SHALL BE PROVIDED UPON REQUEST.
12. FLAME CUT NOTCH OR PROJECTION WILL BE ON BASE PLATE TO INDICATE SLOT ORIENTATION.

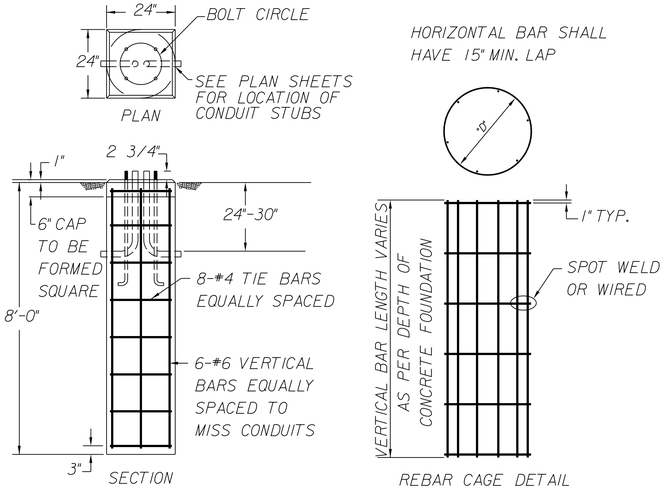


HELIX MUST BE FORMED BY MATCHING METAL DIE

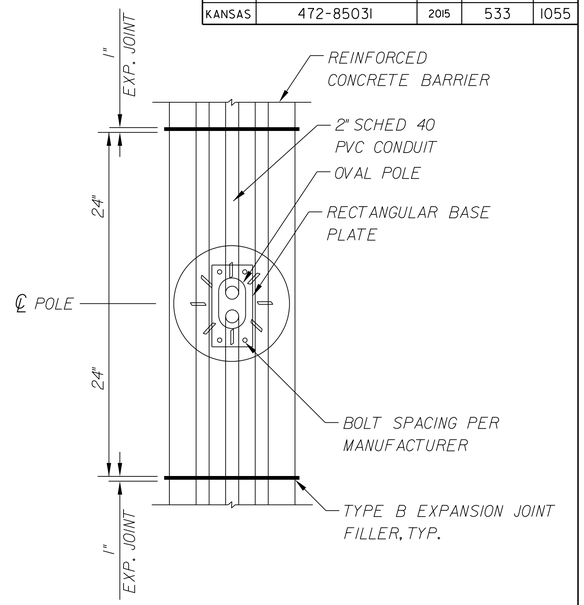
VIEW A-A

(SIDE VIEW OF TRUE HELICAL FORM)

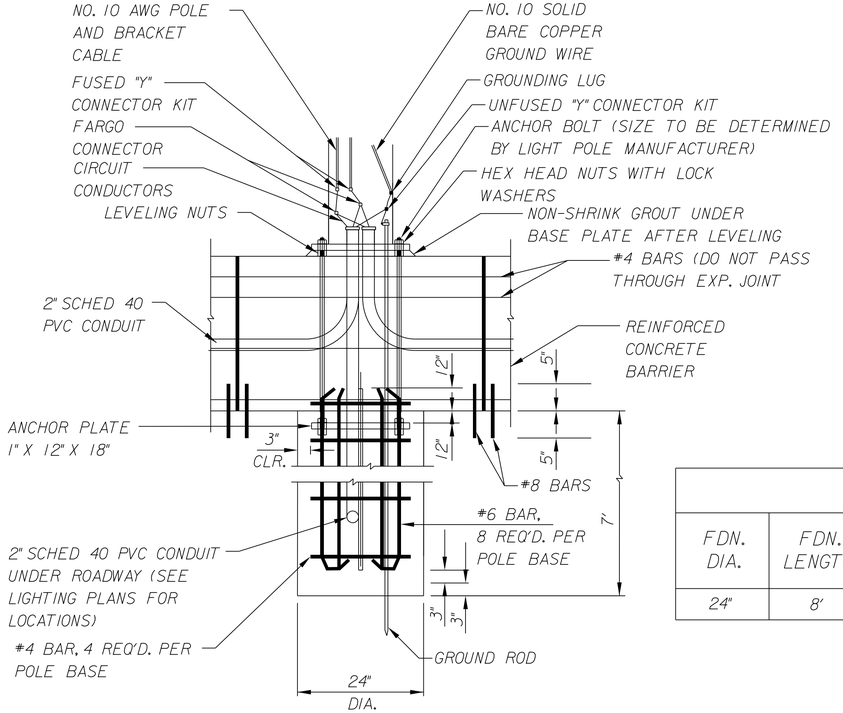
THREADED STUD



CONCRETE FOUNDATION DETAILS
40 FOOT POLE



BARRIER MOUNTING DETAIL



CONCRETE FOUNDATION FOR BARRIER MOUNTED LIGHT POLE

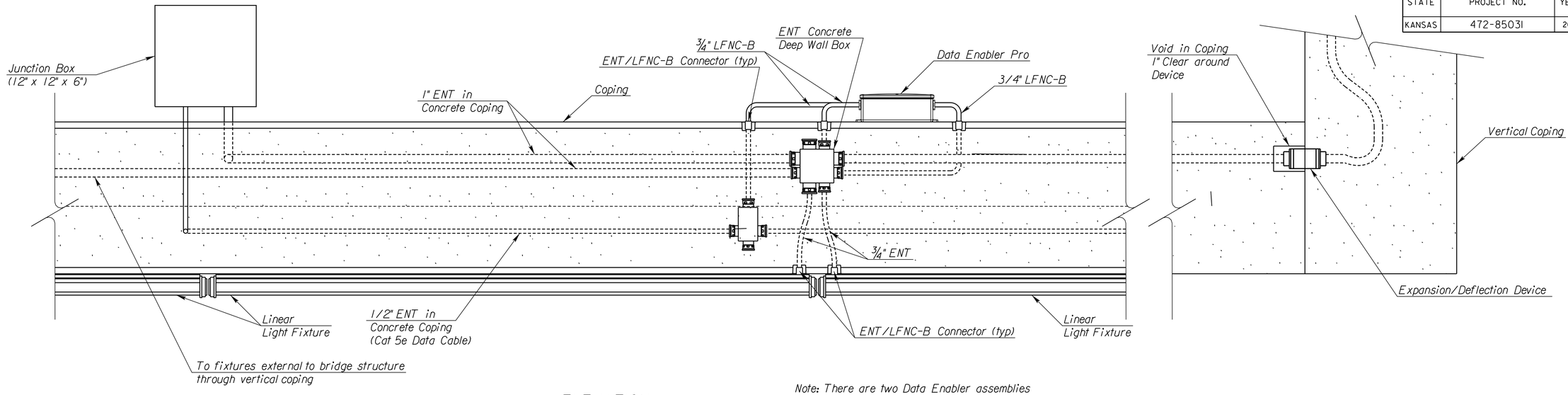
REBAR SCHEDULE				
FDN. DIA.	FDN. LENGTH	REBAR CIRCLE "D"	VERTICAL REBAR LENGTH	HORIZONTAL REBAR SPACING
24"	8'	20"	7'-6"	14" MAX.

CITY OF WICHITA

EAST KELLOGG
LIGHTING DETAILS
POLE FOUNDATION DETAILS

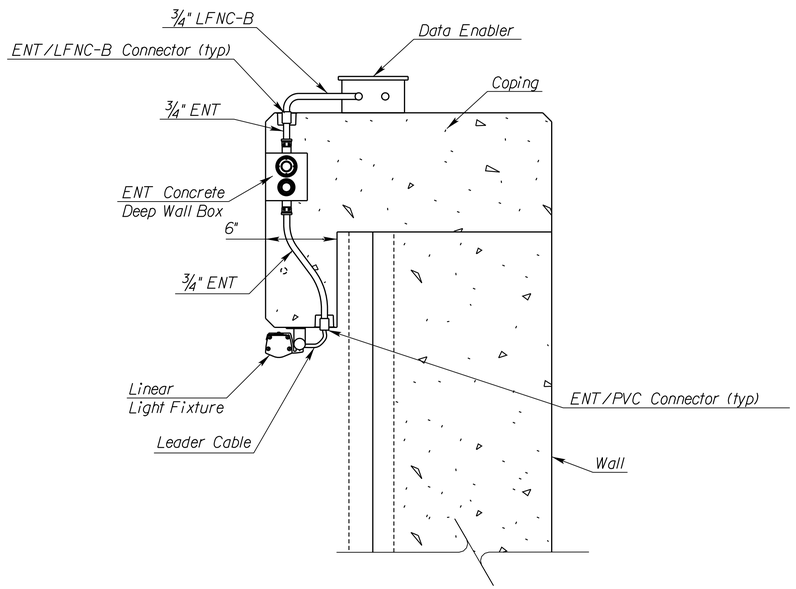
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	534	1055

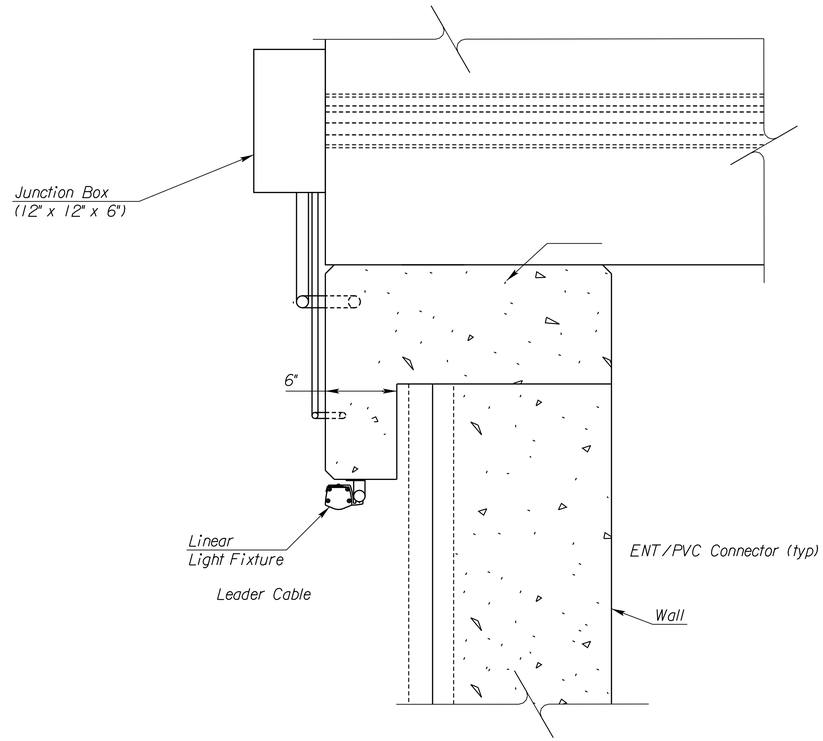


ELEVATION

Note: There are two Data Enabler assemblies per this detail on each wall



SECTION THRU COPING
@ Data Enabler



SECTION THRU COPING
@ Junction Box

CITY OF WICHITA

WEBB ROAD & RAMP D OVER EAST KELLOGG

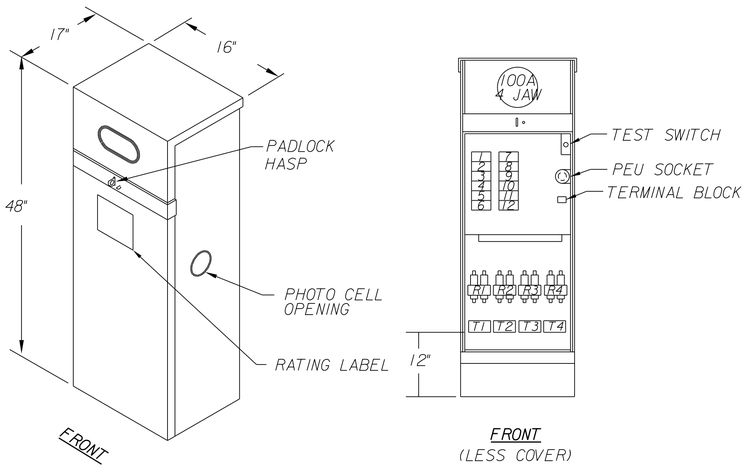
WALL COPING LIGHTING DETAILS

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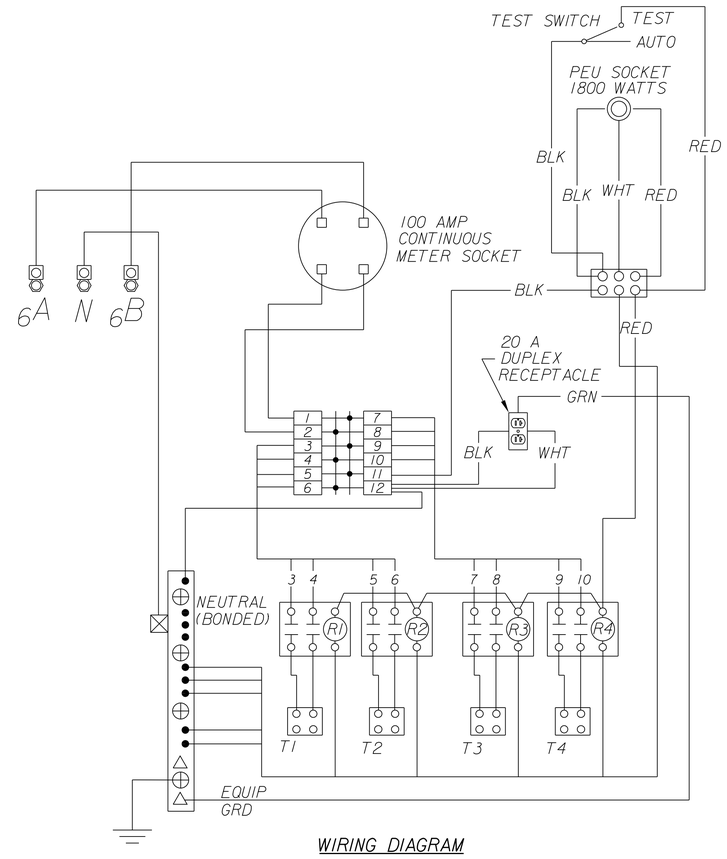
SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	535	1055

CIRCUIT DIRECTORY				
NO.	DESCRIPTION	QTY	AMP	POLE
1,2	MAIN	1	100	2
3,4	BRKR. 1	1	30	2
5,6	BRKR. 2	1	30	2
7,8	BRKR. 3	1	30	2
9,10	BRKR. 4	1	30	2
11	BRKR. 5	1	15	1
12	BRKR. 6	1	20	1
	RELAY 1	1	30	2
	RELAY 2	1	30	2
	RELAY 3	1	30	2
	RELAY 4	1	30	2



PAD-MOUNTED CONTROL CENTER

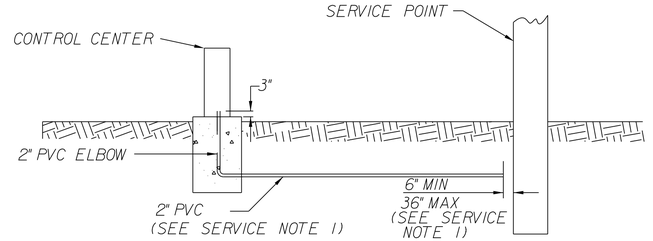


WIRING DIAGRAM

SERVICE NOTES:

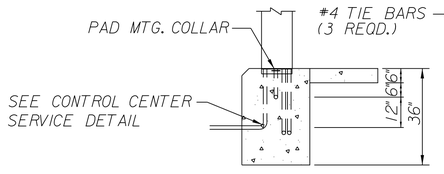
1.) CONTRACTOR SHALL INSTALL 2" PVC CONDUIT (30" DEEP) WITH PULL STRING TO WITHIN 6" MIN. - 36" MAX. OF THE BASE OF THE SERVICE POINT. PULL STRING TO BE PROVIDED BY CONTRACTOR FOR WESTAR INSTALLED SERVICE CABLE.

2.) IN THE EVENT THAT WESTAR DETERMINES THAT SERVICE CABLE MUST BE PROVIDED AND INSTALLED BY THE CONTRACTOR. THE CABLE SHALL HAVE AN AMPACITY RATING NOT LESS THAN 80 PERCENT OF THE MAXIMUM RATING OF THE CONTROL CENTER.

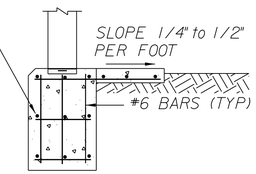


CONTROL CENTER SERVICE

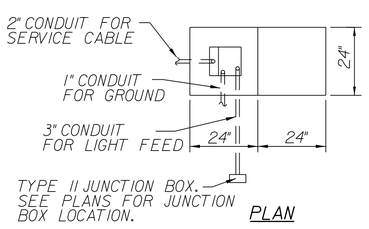
CONTROL CENTER NOTES:
1) PROVIDE GROUND ROD(S) AS REQUIRED FOR MAXIMUM OF 25 OHMS RESISTANCE TO GROUND.
2) CONCRETE SLAB TO PROVIDE SEMI-DRY WORKING AREA IN FRONT OF CONTROLLER CABINET.



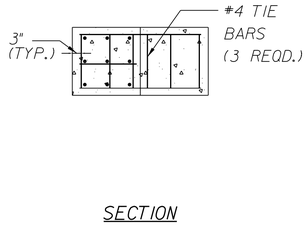
SECTION



SECTION

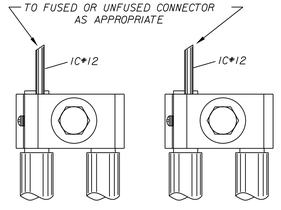


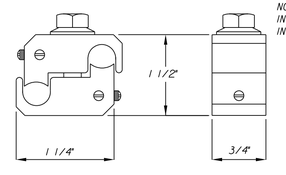
PLAN



SECTION

CONCRETE FOUNDATION FOR CONTROL CENTER





MULTI-TAP CONNECTOR

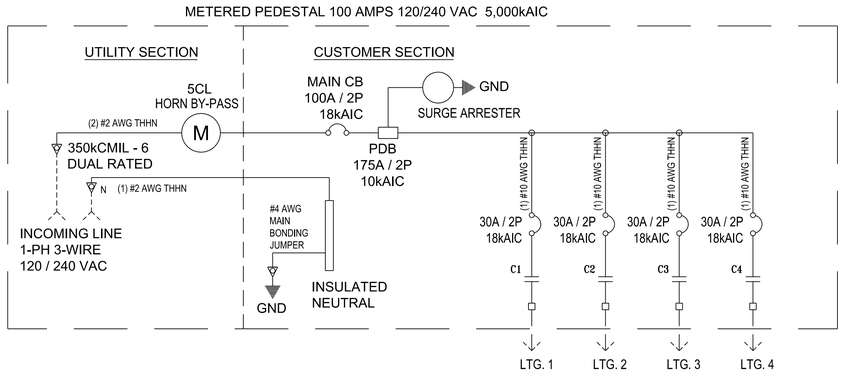
CITY OF WICHITA

EAST KELLOGG
LIGHTING DETAILS
CONTROL CENTER AND CONNECTIONS
ROADWAY LIGHTING

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	536	1055

Revised Plans



SINGLE LINE DIAGRAM

△2 *SPECIFICATIONS:*

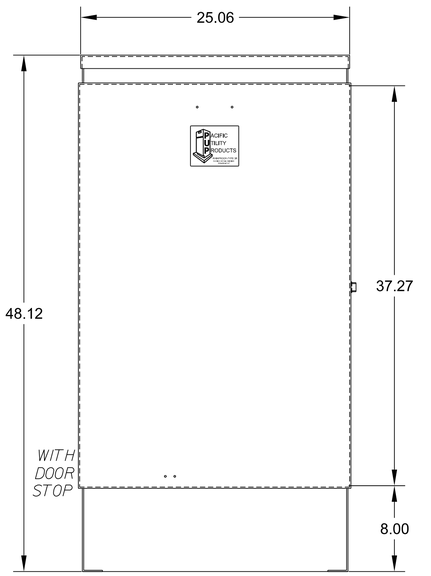
- *NEMA 3R CONSTRUCTION*
- *FABRICATED FROM .125 IN. THICK NATURAL 5052-H32 ALUMINUM*
- *FACTORY WIRING 600 VOLT RATED COPPER*
- *ALL COMPONENTS U.L. LISTED*
- *PADLOCK PROVISIONS*
- *PROVIDE GROUND ROD(S) AS REQUIRED FOR MAXIMUM OF 25 OHMS RESISTANCE TO GROUND*

COMPONENT DIRECTORY:

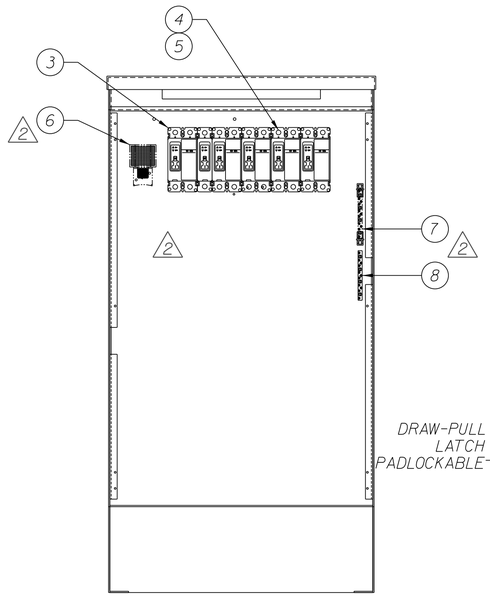
1. *LANDING LUGS 350kCMIL-6 PER PH*
2. *MTR SOCKET 200A 4J WITH 5th CLIP*
3. *(1) MAIN CB 100a 2P 120/240VAC 18kAIC*
4. *(1) CB 15A 1P 120/240VAC 18kAIC*
5. *(4) CB 30A 2P 120/240VAC 18kAIC*
6. △2 *(1) LIGHTNING ARRESTER 2P 650VAC*
7. *INSULATED NEUTRAL BUS*
8. *GROUND BUS*

NOTES:

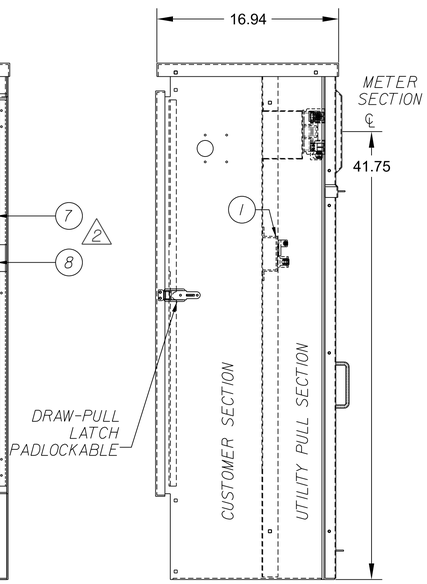
△2 *ON-OFF SWITCHING CONTROL OF CIRCUITS TO BE ACCOMPLISHED AT COLOR LED DMX CONTROLLER.*



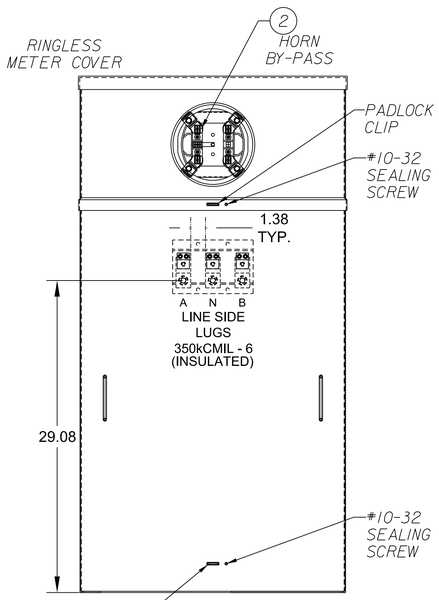
FRONT VIEW



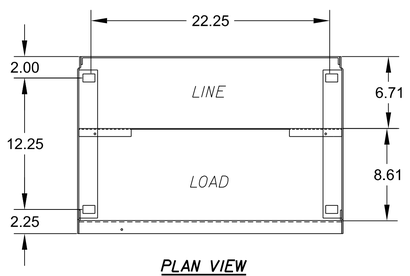
FRONT VIEW
SHOWN LESS DOOR & COVERS



SIDE VIEW



REAR VIEW



PLAN VIEW

CONTROLLER R

△2 *6/2/2015 Removed mercury relays, updated component directory, added specifications, revised note.*

CITY OF WICHITA
EAST KELLOGG
LIGHTING DETAILS
CONTROL CENTER AND CONNECTIONS
AESTHETIC LIGHTING

SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	537	1055

Revised Plans

SUMMARY OF ELECTRIC LIGHTING QUANTITIES *

ITEM	UNIT	QUANTITY	
8' BRACKET ARM	EACH	13	
10' BRACKET ARM	EACH	70	
40' MTG HT POLES, GROUND MOUNTED	EACH	13	
40' MTG HT POLES, BARRIER MOUNTED	EACH	35	
COBRAHEAD LED LUMINAIRE	EACH	83	
UNDERPASS CANOPY LED LUMINAIRE	EACH	8	
SCREW-IN FOUNDATION (40 FOOT POLE)	EACH	13	
BARRIER MOUNT FOUNDATION (40 FOOT POLE)	EACH	35	
FOUR-CIRCUIT CONTROLLER WITH PHOTO CELL	EACH	3	2
2" SCHEDULE 40 PVC CONDUIT (TRENCHED)	LIN FT	2,922	
2" SCHEDULE 40 PVC CONDUIT (BARRIER)	LIN FT	5,738	
2" SCHEDULE 40 PVC CONDUIT (IN STRUCTURE)	LIN FT	351	
3" SCHEDULE 40 PVC CONDUIT (PUSHED)	LIN FT	313	
1" RIGID GALV. STEEL (RGS) CONDUIT (ON STRUCTURE)	LIN FT	1,221	
CABLE (3-1c #4 AWG TYPE RHH/RHW/USE)	LIN FT	2,632	
CABLE (3-1c #6 AWG TYPE RHH/RHW/USE)	LIN FT	8,173	
CABLE (3-1c #8 AWG TYPE RHH/RHW/USE)	LIN FT	1,518	
CABLE (3-1c #10 AWG TYPE RHH/RHW/USE)	LIN FT	1,343	
POLE AND BRACKET CABLE (1c #10 AWG TYPE RHW / USE)	LIN FT	13,617	
TYPE II JUNCTION BOX	EACH	5	
CONNECTOR KIT	EACH	273	
GROUND ROD	EACH	38	2

2 SUMMARY OF AESTHETIC LIGHTING (WALLS) QUANTITIES *

ITEM	UNIT	QUANTITY
48" LINEAR GRAZING FIXTURE, LED RGB, 10 X 60 BEAM ANGLE	EACH	190
CONDUIT, 2" SCHEDULE 40 PVC (TRENCHED)	LIN FT	201
CONDUIT, 1" RIGID GALVANIZED STEEL	LIN FT	284
CONDUIT, 1" ENT	LIN FT	812
CONDUIT, 1/2" RIGID GALVANIZED STEEL (DATA)	LIN FT	944
CONDUIT, 3/4" (LFNC-B)	LIN FT	8
CONDUIT, 3/4" (ENT, PVC SCHED 40)	LIN FT	32
CONDUIT, 1/2" ENT / RGS (Data) *	LIN FT	944
CABLE (3-1c #8 AWG TYPE RHH / RHW / USE)	LIN FT	710
CABLE (3-1c #10 AWG TYPE RHH / RHW / USE)	LIN FT	738
CABLE (4c #10 AWG TYPE RHH / RHW / USE) (POWER & DATA)	LIN FT	232
CABLE (CATEGORY 5e DATA CABLE)	LIN FT	1,000
JUMPER CABLE (BETWEEN FIXTURES)	EACH	178
DATA ENABLER PRO	EACH	4
TYPE II JUNCTION BOX	EACH	2
JUNCTION BOX (12" x 12" x 6", ABOVE GRADE)	EACH	2
ENT CONCRETE DEEP WALL BOX	EACH	8
ENCLOSURE (AT POWER SUPPLY / FOR GIRDER & WALL LIGHTING)	EACH	1
ADDRESS MAPPING AND AIMING OF LIGHTS	L.S.	1

2 SUMMARY OF AESTHETIC LIGHTING (BRIDGE GIRDER) QUANTITIES *

ITEM	UNIT	QUANTITY
48" LINEAR GRAZING FIXTURE, LED RGB, 60 X 60 BEAM ANGLE	EACH	68
CONDUIT, 2" SCHEDULE 40 PVC (TRENCHED)	LIN FT	444
CONDUIT, 1" RIGID GALVANIZED STEEL	LIN FT	322
CONDUIT, 1/2" RIGID GALVANIZED STEEL (DATA)	LIN FT	316
CABLE (3-1c #8 AWG TYPE RHH / RHW / USE)	LIN FT	742
CABLE (4c #10 AWG TYPE RHH / RHW / USE) (POWER & DATA)	LIN FT	66
CABLE, CATEGORY 5e DATA	LIN FT	324
JUMPER CABLE (BETWEEN FIXTURES)	EACH	66
DATA ENABLER PRO	EACH	2
IPLAYER 3 CONTROLLER (BRIDGE GIRDER & WALL GRAZE LIGHTING)	EACH	1
EQUIPMENT CABINET (CLIMATE CONTROLLED)	EACH	1
JUNCTION BOX, ABOVE GRADE (12"x12"x6")	EACH	1
ADDRESS MAPPING AND AIMING OF LIGHTS	L.S.	1
ON-SITE PROGRAMMING (BRIDGE GIRDER & WALL GRAZE LIGHTING)	L.S.	1

RECAPITULATION OF LIGHTING QUANTITIES

ITEM	UNIT	QUANTITY
ELECTRIC LIGHTING SYSTEM (ROADWAY)	L.S.	Lump Sum
AESTHETIC LIGHTING (BRIDGE RAIL)	L.S.	Lump Sum
AESTHETIC LIGHTING (WALLS)	L.S.	Lump Sum

* THESE APPROXIMATE QUANTITIES WERE PREPARED SOLELY FOR THE CONTRACTOR'S CONVENIENCE AND ARE NOT GUARANTEED TO BE A COMPLETE LIST OF MATERIALS FOR THIS PROJECT.

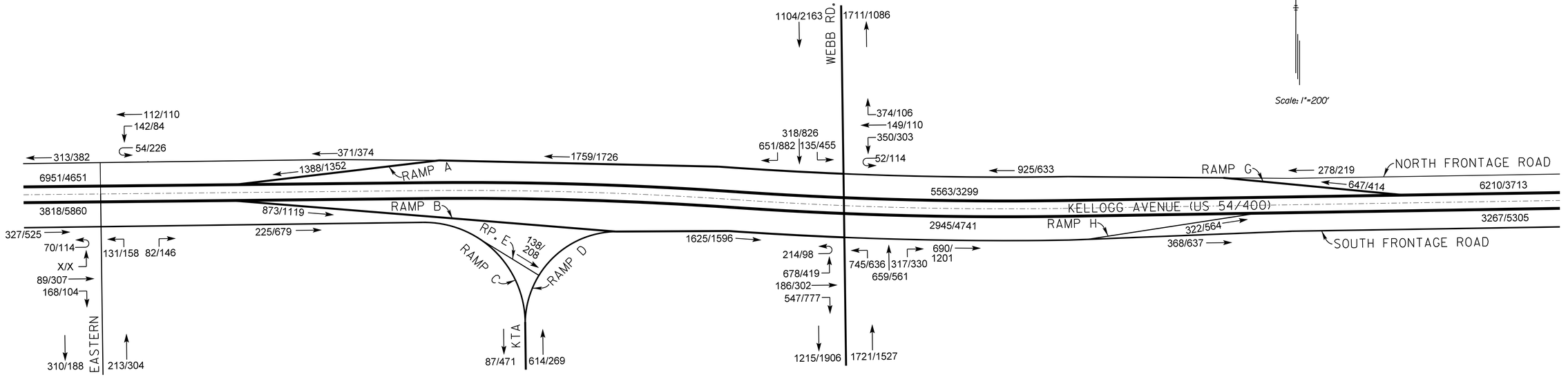
2 6/2/2015 Revised quantities.

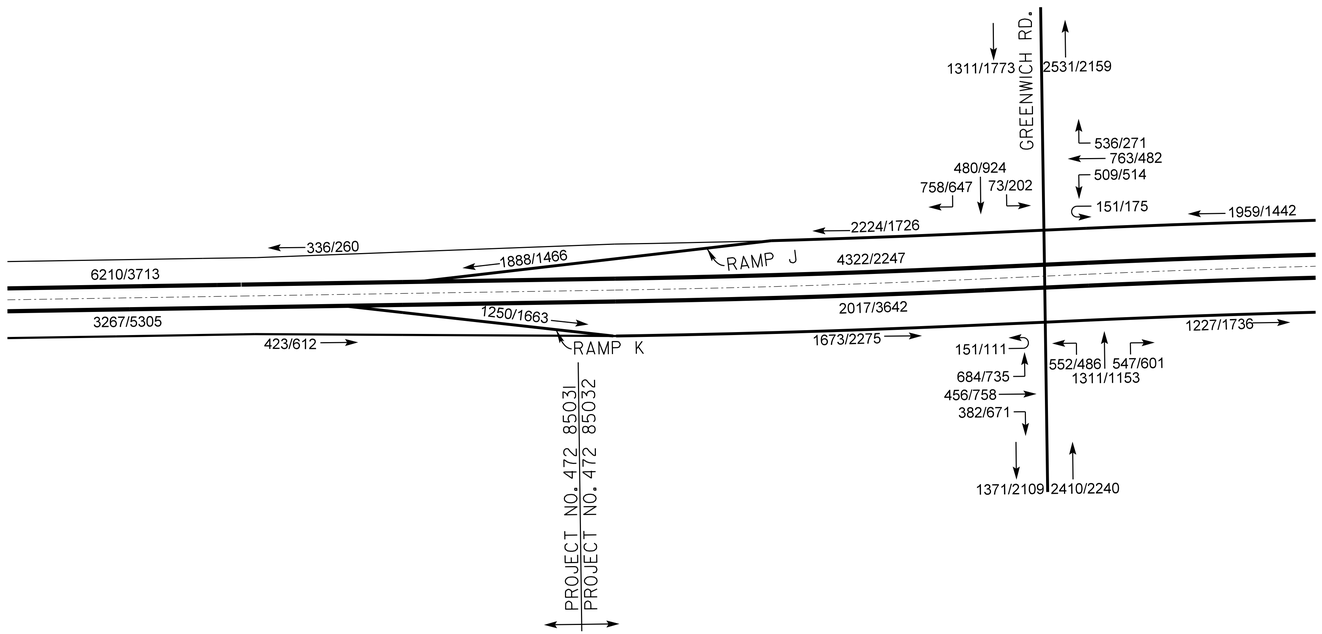
CITY OF WICHITA

EAST KELLOGG
SUMMARY OF QUANTITIES
LIGHTING

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	538	1055





PROJECTED 2040 PEAK HOUR (AM/PM) TRAFFIC VOLUMES

CITY OF WICHITA

EAST KELLOGG

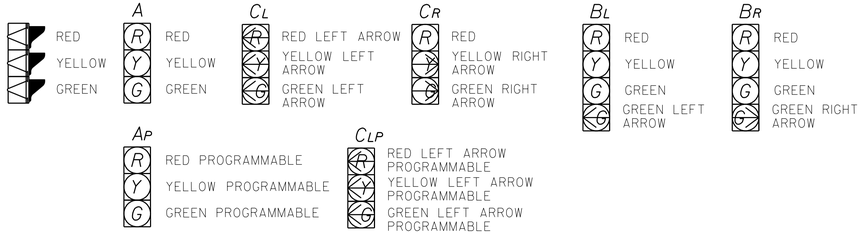
TRAFFIC VOLUMES

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	539	1055

TYPICAL SIGNAL HEADS

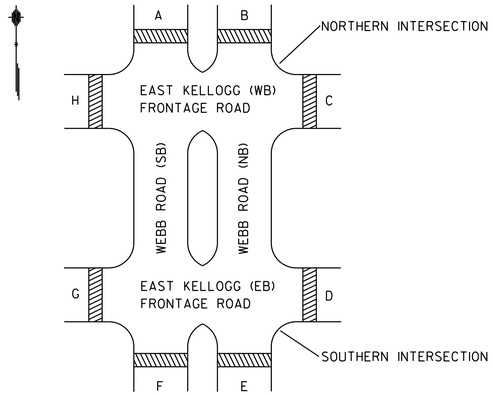


PEDESTRIAN WITH COUNTDOWN



PEDESTRIAN CROSSING INFORMATION

CROSSWALK LABELS



CROSSWALKS AND VALID SIGNAL PHASES

PED CROSSING	PHASE NUMBER	NOTES	WALK TIME (SEC.)	FDW TIME (SEC.)
A	N 2		4	30
B	N 2		4	12
C	N 4		4	19
D	S 4		4	13
E	S 6		4	20
F	PREEMPT	PREEMPTS BOTH NORTH AND SOUTH SIGNALS. PED CROSSINGS B AND D ALSO DISPLAY WALK IF ACTIVATED.	4	16
G	S 8		4	20
H	PREEMPT	PREEMPTS BOTH NORTH AND SOUTH SIGNALS. PED CROSSINGS B, D AND F ALSO DISPLAY WALK IF ACTIVATED.	4	18

NORTHERN INTERSECTION (N)
SOUTHERN INTERSECTION (S)

GENERAL NOTES

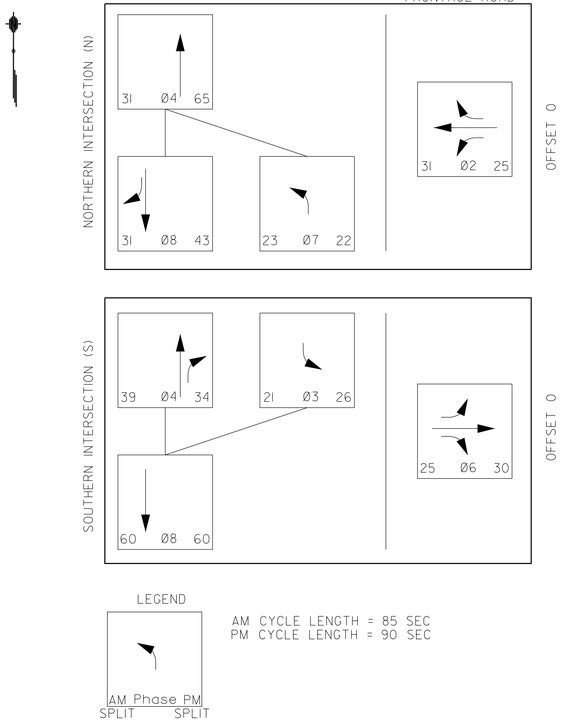
THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS OF ALL EXISTING UTILITIES BEFORE BEGINNING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. COMPANIES, OR AGENCIES THAT HAVE IDENTIFIED UTILITIES IN THIS VICINITY ARE LISTED ON SHEET 23

POLES AND BOXES SHALL BE STAKED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION OF EACH ITEM.

SERVICE AND JUNCTION BOX LOCATIONS AND CONDUIT RUNS ARE TYPICAL ONLY AND MAY BE ADJUSTED DURING INSTALLATION TO CLEAR OBSTRUCTIONS AND FACILITATE WIRING AS APPROVED BY THE ENGINEER.

THE RADAR EQUIPMENT MANUFACTURER SHALL PROVIDE TRAINING ON THE INSTALLATION, OPERATION AND MAINTENENCE OF THE RADAR DETECTION SYSTEM (1 DAY MINIMUM).

PHASE DIAGRAM



AM CYCLE LENGTH = 85 SEC
PM CYCLE LENGTH = 90 SEC

NOTE: LINES CONNECTING PHASES INDICATE PHASES THAT CAN OCCUR CONCURRENTLY.

LEGEND

- (40') — MAST ARM POLE (LENGTH)
- 3" RIGID CONDUIT
- 1.5" RIGID CONDUIT
- VEHICLE DETECTION RADAR
- XX — RADAR VEHICLE DETECTION ZONE
- STREET NAME SIGN D3-1
- LEFT TURN YIELD ON GREEN (R10-12)
- LEFT TURN SIGNAL (R10-10L)
- SERVICE BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL HEAD WITH BACKPLATE
- PEDESTRIAN PUSH BUTTON
- PEDESTRIAN SIGNAL HEAD
- WIND DAMPER
- PP — POWER POLE
- LUMINAIRE
- RADAR DETECTION CONE
- JUNCTION BOX (ABOVE GROUND)
- SU — WIRELESS COMMUNICATIONS SUBSCRIBER UNIT ALVARION SU-A-5.8-3-BD-VL

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CITY OF WICHITA

EAST KELLOGG (US-54) & WEBB ROAD

GENERAL NOTES

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	540	1055

Scale: 1"=20'

Sta. 48+21.95, 110.19' Lt. Install
New Service Box
See Service Box Detail Sheet

POLE 6
Sta. 48+25.90, 98.38' Lt. Install
New Signal Pedestal with Signal Head
and Ped. Signal and Pushbutton

POLE 5
Sta. 48+14.68, 90.51' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

Install Radar Presence Detection for
Westbound Approach

POLE 4
Sta. 48+14.70, 38.24' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

POLE 2
Sta. 48+14.71, 23.87' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

Sta. 48+07.07, 30.09' Lt. Install
New Service Box
See Service Box Detail Sheet

Sta. 49+05.71, 98.81' Lt. Install
New Service Box
See Service Box Detail Sheet

POLE 7
Sta. 49+05.76, 94.28' Lt. Install
New Signal Pole with
Ped. Signal and Pushbutton

Install Radar Presence Detection for
Northbound Approach

Install Radar Presence Detection for
Southbound Approach

POLE 8
Sta. 50+92.54, 96.03' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

Sta. 50+95.42, 100.05' Lt. Install
New Service Box
See Service Box Detail Sheet

POLE 9
Sta. 50+96.77, 86.52' Lt. Install
New Signal Pole with
61.0' Mastarm and signs

Sta. 51+61, 118' Lt. Install
New Service Box
See Service Box Detail Sheet

POLE 10
Sta. 51+58.03, 108.48' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

POLE 11
Sta. 51+72.49, 100.23' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

POLE 12
Sta. 51+72.48, 15.92' Lt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

Install Radar Presence Detection for
Northbound Approach

Sta. 51+80.03, 5.06' Lt. Install
New Service Box
See Service Box Detail Sheet

POLE 14
Sta. 51+72.48, 1.96' Rt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

POLE 13
Sta. 51+60.31, 13.88' Lt. Install
New Signal Pole with
64.0' Mastarm and Signs for
Eastbound and 52.0' Mastarm
and signs for Southbound

Sta. 51+84.48, 67.31' Rt. Install
New Service Box
See Service Box Detail Sheet

POLE 15
Sta. 51+72.53, 71.85' Rt. Install
New Signal Pedestal with Signal Head
and Ped. Signal and Pushbutton

POLE 16
Sta. 51+63.72, 80.69' Rt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

Install Radar Presence Detection for
Eastbound Approach

Sta. 50+84.41, 62.42' Rt. Install
New Service Box
See Service Box Detail Sheet

POLE 17
Sta. 50+80.74, 58.60' Rt. Install
New Signal Pole with
Ped. Signal and Pushbutton

POLE 18
Sta. 48+86.84, 63.60' Rt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

POLE 19
Sta. 48+82.89, 53.99' Rt. Install
New Signal Pole with
66.0' Mastarm and signs

Sta. 48+94.18, 60.15' Rt. Install
New Service Box
See Service Box Detail Sheet

POLE 20
Sta. 48+25.84, 106.54' Rt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

Sta. 48+14.74, 130.27' Rt. Install
New Service Box
See Service Box Detail Sheet

Sta. 48+14.73, 139.27' Rt. Install
Type 2070 Traffic Controller with
Concrete Pad

POLE 1
Sta. 48+14.72, 97.58' Rt. Install
New Signal Pedestal with
Ped. Signal and Pushbutton

POLE 3
Sta. 48+26.92, 24.19' Lt. Install
New Signal Pole with
52.0' Mastarm and Signs for
Northbound and 61.0' Mastarm
and signs for Westbound

Install Radar Presence Detection for
Southbound Approach

160'
1.5" RGC Trenched
(To Power)

See Signing Plans
for details.

See Signing Plans
for details.

Prop. 20" Water
Prop. Comm. Duct Bank
Prop. 10" San. Sewer
Prop. 16" Water
Prop. 20" Water
Prop. 20" Water

@ Webb Road = Sec. Line
@ South Frontage Road
@ North Frontage Road

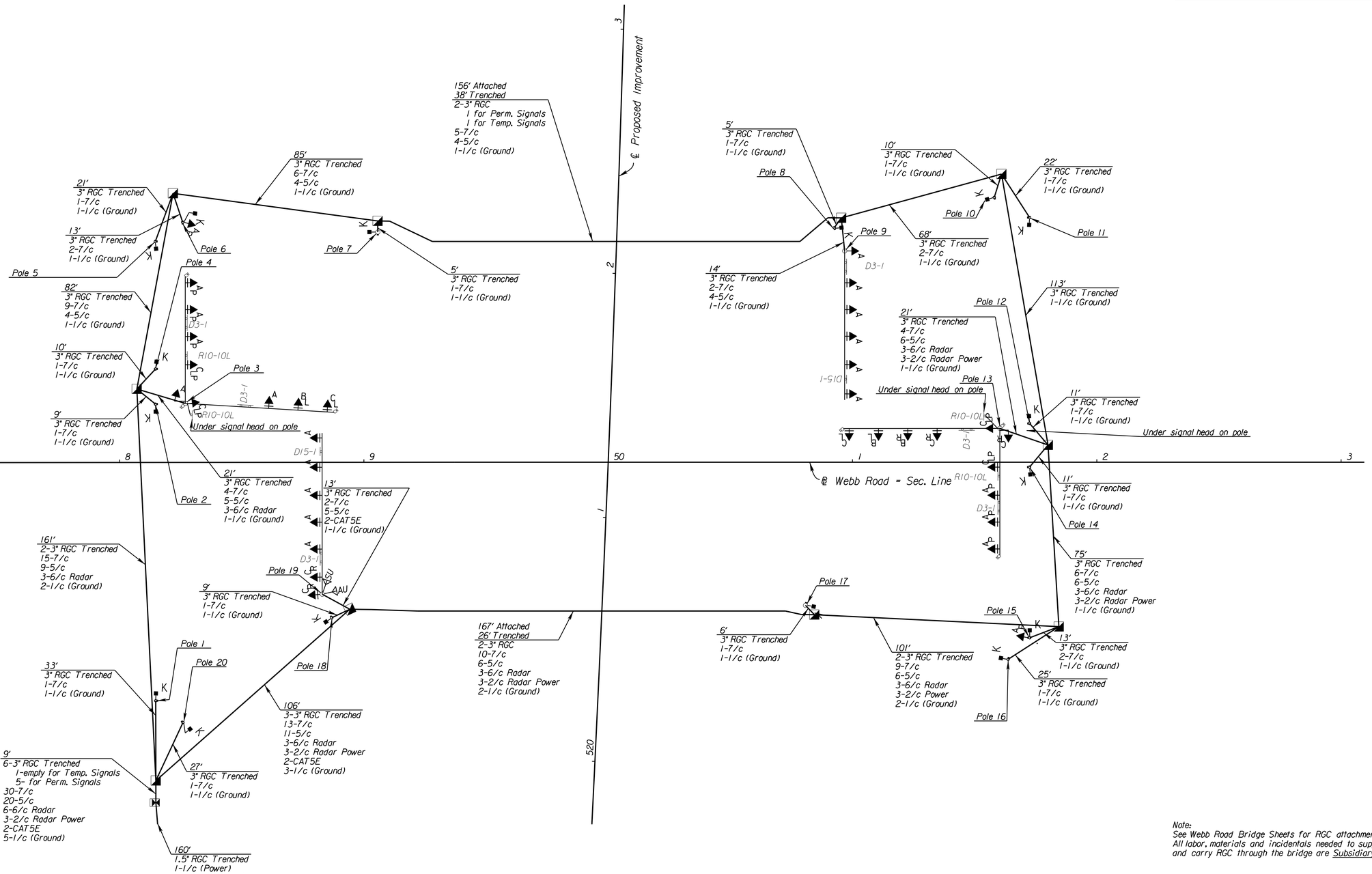
EAST 54
WEST 54

CITY OF WICHITA
EAST KELLOGG (US-54) & WEBB ROAD
SIGNALIZATION PLAN

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	541	1055



Note:
See Webb Road Bridge Sheets for RGC attachment details.
All labor, materials and incidentals needed to support and carry RGC through the bridge are Subsidiary.

CITY OF WICHITA

EAST KELLOGG (US-54) & WEBB ROAD

CONDUIT AND WIRING PLAN

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	542	1055

POLE 1, 2, 4, 5, 7, 8, 10, 11, 12, 14, 16, 17, 18 & 20

POLE 6 & 15

POLE 9

POLE 19

WESTBOUND

NORTHBOUND

POLE 3

EASTBOUND

SOUTHBOUND

POLE 13

CITY OF WICHITA

EAST KELLOGG (US-54) & WEBB ROAD

POLE WIRING DIAGRAM

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	543	1055

BILL OF MATERIALS (FOR INFORMATION ONLY)

LEGEND	UNITS	QTY.
PAD MOUNTED CABINET	EACH	1
TRAFFIC SIGNAL HEAD (see chart A) WITH MOUNTING HARDWARE	EACH	34
TRAFFIC SIGNAL POLE (see chart B) STEEL	EACH	20
2070 CONTROLLER		CITY PROVIDE
CONCRETE CONTROLLER PAD	EACH	1
CONCRETE FOOTING - POLE	EACH	20
CONDUIT ELBOW 90° 1.5"	EACH	XX
CONDUIT ELBOW 90° 3"	EACH	XX
BACKPLATE 5" 3 SECTION	EACH	23
BACKPLATE 5" 4 SECTION	EACH	2
SERVICE BOX	EACH	10
GROUND ROD & CLAMP (5/8" x 8')	EACH	1
GROUND ROD & CLAMP (3/4" x 10')	EACH	20
CONDUIT CLAMP	EACH	XX
TRAFFIC SIGNAL LAMP RED LED KIT	EACH	26
TRAFFIC SIGNAL LAMP YELLOW LED KIT	EACH	24
TRAFFIC SIGNAL LAMP GREEN LED KIT	EACH	26
TRAFFIC SIGNAL LAMP GREEN ARROW LED KIT	EACH	11
TRAFFIC SIGNAL LAMP YELLOW ARROW LED KIT	EACH	8
TRAFFIC SIGNAL LAMP RED ARROW LED KIT	EACH	8
MULTI-CONDUCTOR CABLE NO. 14 A.W.G. 7/c	LIN. FT.	13256
MULTI-CONDUCTOR CABLE NO. 14 A.W.G. 5/c	LIN. FT.	9900
COMMON GROUND WIRE NO. 8 A.W.G. 1/c	LIN. FT.	5401
POWER LEAD-IN WIRE NO. 6 A.W.G. 1/c (TYPE THHN)	LIN. FT.	320
RADAR 6/c	LIN. FT.	2980
MULTI-CONDUCTOR CABLE NO. 14 A.W.G. 2/C RADAR POWER	LIN. FT.	1903
CONDUIT 3" (RGC) (SEE CHART C)	LIN. FT.	2392
RADAR DETECTION ADVANCE UNIT	EACH	0
RADAR DETECTION PRESENCE UNIT	EACH	6
RADAR DETECTION MOUNTING HARDWARE	EACH	6
CONDUIT 1.5" (RGC) (SEE CHART C)	LIN. FT.	160
STREET NAME SIGNS WITH MOUNTING HARDWARE (D3-1) (SEE CHART D)	EACH	6
LEFT TURN SIGNAL (R10-10L)	EACH	4
ACCESSIBLE PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON UNIT (4-WIRE)	EACH	16
PEDESTRIAN CROSSING SIGN (R10-3bL)	EACH	6
PEDESTRIAN CROSSING SIGN (R10-3bR)	EACH	6
PEDESTRIAN CROSSING SIGN TO MEDIAN (R10-3dL)	EACH	2
PEDESTRIAN CROSSING SIGN TO MEDIAN (R10-3dR)	EACH	2
WIRELESS COMMUNICATIONS SUBSCRIBER UNIT ALVARION SU-A-5.8-3-BD-VL	EACH	1

"XX" Quantity to be determined in the field.

TYPE 2070 CONTROLLER SETTINGS

INTERVAL		WAPITI PROGRAM PHASE Northern 2 WB	4* NBT	7 NBL	8* SB	Southern 3 SBL	4* NBT	6 EB	8* SBT	NOMINAL DISPLAY TIME CLOCK		FEATURES	PHASE Northern 2	4	7	8	Southern 3	4	6	8
Max	0									0	Year	Veh Recall								
Max 2	1									1	Month	Ped Recall								
Walk	2									2	Day Month	Red Lock								
Fl. Dw.	3									3	Day Week	Yel Lock								
Max Init.	4									4	Hour	0 Permit								
Min. Green	5	10	10	7	10	7	10	10	10	5	Minute	Ped Phases								
TBR	6									6	Second	Lead Phases								
TTR	7									7		Dbl Entry								
	8									8		Sequential								
Passage	9									9		Start Up Yel								
Min. Gap	a									a		Overlap A								
Add Act	b									b		Overlap B								
Yellow	c	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	c		Overlap C								
Red Clr	d	2.5	1.9	1.9	3.9	1.9	3.9	2.5	1.9	d		Overlap D								
Red Rev.	e									e		Exclusive								
Walk II	f									f		Sm Gap								

*Note: Phase 4 and Phase 8 are Normal Dwell.

CHART "B" - TRAFFIC SIGNAL POLES

POLE #	STATION	POLE HEIGHT	ARM HEIGHT	DISTANCE	SIDE	ARM LENGTH	# OF SIGNAL ON ARM	SIGNAL SPACING	TYPE
5	48+14.68	15		90.51'	LT.				
4	48+14.70	15		38.24'	LT.				
2	48+14.71	15		23.87'	LT.				
1	48+14.72	15		97.58'	RT.				
20	48+25.84	15		106.54'	RT.				
6	48+25.90	15		98.38'	LT.				
3	48+26.92	35	19	24.19'	LT.	52.0' N. BD.	4	12-11.5-11-11	J.U.
			19			61.0' W. BD.	3	34-12-12	
19	48+82.89	35	19	53.99'	RT.	66.0'	6	7-11.5-11-11-11.5-12	J.U.
18	48+86.84	15		63.60'	RT.				
7	49+05.76	35		94.28'	LT.				J.U.
17	50+80.74	35		58.60'	RT.				J.U.
8	50+92.54	15		96.03'	LT.				
9	50+96.77	35	19	86.52'	LT.	61.0'	5	13-11-11-11.5-12	J.U.
10	51+58.03	15		108.48'	LT.				
13	51+60.31	35	19	13.88'	LT.	64.0' E. BD.	4	25-12-12-12	J.U.
			19			52.0' S. BD.	4	16-11.5-11-11	
16	51+63.72	15		80.69'	RT.				
14	51+72.48	15		1.96'	RT.				
12	51+72.48	15		15.94'	LT.				
11	51+72.49	15		100.23'	LT.				
15	51+72.53	15		71.85'	RT.				

DETECTION ZONE SUMMARY

ZONE NO.	ZONE SIZE W x L	PHASE CALLED	PHASE EXTENDED	DELAY	STRETCH	INITIAL SETTING (SEC.)
121	8 x 40	N 2	N 2			
122	8 x 40	N 2	N 2			
123	8 x 40	N 2	N 2			
124	8 x 40	N 2	N 2	5		
141	8 x 40	N 4	N 4			
142	8 x 40	N 4	N 4			
143	8 x 40	N 4	N 4			
171	8 x 40	N 7	N 7	3		
172	8 x 40	N 7	N 7	3		
181	8 x 40	N 8	N 8			
182	8 x 40	N 8	N 8			
183	8 x 40	N 8	N 8			
184	8 x 40	N 8	N 8			
185	8 x 40	N 8	N 8			
186	8 x 40	N 8	N 8	5		
187	8 x 40	N 8	N 8	5		
231	8 x 40	S 3	S 3	3		
232	8 x 40	S 3	S 3	3		
241	8 x 40	S 4	S 4			
242	8 x 40	S 4	S 4			
243	8 x 40	S 4	S 4			
244	8 x 40	S 4	S 4			
245	8 x 40	S 4	S 4			
246	8 x 40	S 4	S 4	5		
261	8 x 40	S 6	S 6			
262	8 x 40	S 6	S 6			
263	8 x 40	S 6	S 6			
264	8 x 40	S 6	S 6	5		
281	8 x 40	S 8	S 8			
282	8 x 40	S 8	S 8			
283	8 x 40	S 8	S 8			

N for North intersection, S for South intersection

JUNCTION BOX (ABOVE GROUND)

STATION	DISTANCE	SIDE
49+15.02	23.23'	RT.
49+22.17	56.76'	LT.
50+81.17	23.25'	RT.
50+82.67	56.75'	LT.

CHART "D" - STREET NAME SIGN SUMMARY

LEGEND	TYPE	QTY.	UNITS	SIZE
Webb 400 S	D3-1	1	EA.	48" x 18"
Webb 500 S	D3-1	1	EA.	48" x 18"
Kellogg Dr 9500 E	D3-1	2	EA.	72" x 18"
Kellogg Dr 9600 E	D3-1	2	EA.	72 x 18"

CHART "C" - CONDUIT

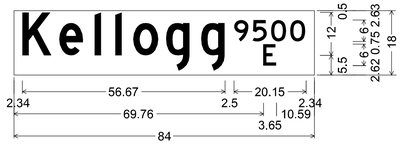
CONDUIT SIZE	TRENCHED	BORED	ATTACHED
3 INCH	1746	0	646
1.5 INCH	160	0	0

SERVICE BOX SUMMARY

STATION	DISTANCE	SIDE
48+07.07	30.09'	LT.
48+14.74	130.27'	RT.
48+21.95	110.19'	LT.
48+94.18	60.15'	RT.
49+05.71	98.81'	LT.
50+84.41	62.42'	RT.
50+95.42	100.05'	LT.
51+61.00	118.00'	LT.
51+80.03	5.06'	LT.
51+84.48	67.31'	RT.

CHART "A" - SIGNAL INVENTORY

NO. WAYS	NO. SECTION (Per Face)	SIGNAL FACE ARRANGEMENT	MOUNTING TYPE	QTY.
1	3	A	MAST ARM WITH BACKPLATE	11
1	3	A	SIDE OF POLE	2
1	3	AP	MAST ARM WITH BACKPLATE PROGRAMMABLE	6
1	4	BL	MAST ARM WITH BACKPLATE	2
1	4	BR	MAST ARM WITH BACKPLATE	1
1	3	CL	MAST ARM WITH BACKPLATE	2
1	3	CLP	SIDE OF POLE PROGRAMMABLE	2
1	3	CR	MAST ARM WITH BACKPLATE	2
1	3	CR	SIDE OF POLE	2
1	3	CLP	MAST ARM WITH BACKPLATE PROGRAMMABLE	2
1	3	AP	SIDE OF POLE PROGRAMMABLE	2



D3-1; No border, White on Green;
[Kellogg] D; [9500] D; [E] D;
Table of distances between letter and object lefts.

	K	e	l	l	o	g	g
2.34	10.31	9.89	5.79	5.00	9.17	9.82	

	9	5	0	0		
9.19	5.44	5.15	5.35	4.21	2.34	

	E	
69.76	3.65	10.59

Sign details shown for Kellogg, which has decending strokes in the legend. Same dimensions for Kellogg 9600 E.

GENERAL NOTES

1. The Contractor shall be responsible for furnishing or obtaining from the City and installing the controller, cabinet concrete base, and for all equipment necessary for the complete and satisfactory operation of the traffic signal whether said equipment is specifically mentioned or not. The City will supply the 2070 Controller only. The Contractor shall supply all other equipment including a 2010 ECLip conflict monitor with ethernet port.
2. Lengths given are to the centerline of pole/box and do not include lengths for elbows and risers.
3. Signal heads, traffic signs, etc. shall include all brackets, hardware, & other incidentals necessary for installation.
4. See City of Wichita Standard Specifications for additional wiring notes.
5. Quantities are for information only.
6. The Contractor shall install a 1.5 inch RGC from the controller to the power pole and continue up the power pole per the "Power Pole and Span Pole Assembly Details" sheet. The Contractor shall furnish and install the appropriate power cable in the 1.5 inch RGC per the plans. The Contractor will obtain the meter box from Westar and install the meter box to the power pole.
7. See lighting plans for luminaries.

SPECIAL FINISH FOR TRAFFIC SIGNAL EQUIPMENT

The traffic signal controller cabinet, bracket, sign blank backs, signal backs and other exposed surfaces shall be shop painted with an aerosol lacquer cellulose color to match the traffic signal pole color. The contractor shall submit two copies of the proposed coating system to the City for approval prior to application.

TRAFFIC SIGNAL POLE & PEDESTAL EXTERIOR COATING

In addition to being galvanized, all exterior surfaces shall be coated with a zinc rich epoxy powder to a minimum dry film thickness of 2.0 mils. The coating shall be electrostatically applied and partially cured in a gas fired convection oven by heating the steel substrate to a minimum of 250 degrees Fahrenheit.

The powder primed surface shall be coated with an intermediate coat of polyester powder to a minimum dry film thickness of 2.0 mils. The coating shall be electrostatically applied and cured by heating the steel substrate in a convection oven to minimum of 350 degrees and a maximum of 400 degrees Fahrenheit.

The intermediate coat shall be top coated with one coat of high-build acrylic polyurethane enamel to a minimum dry film thickness of 2.0 mils. The coating shall be electrostatically applied and cured by heating the substrate in a convection oven to minimum of 225 degrees Fahrenheit. The final top coating color shall be BLACK.

CITY OF WICHITA

EAST KELLOGG (US-54) & WEBB ROAD

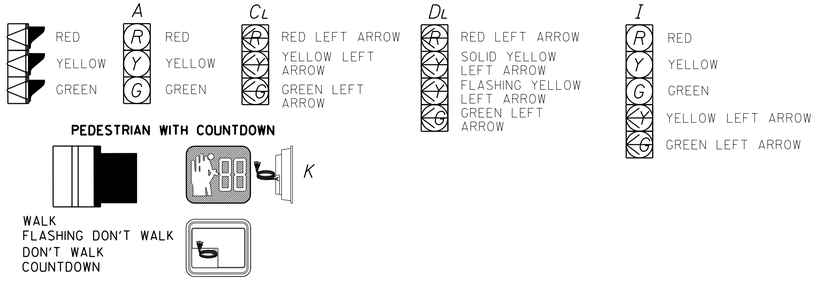
SIGNALIZATION PLAN NOTES AND TABLES

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	544	1055

TYPICAL SIGNAL HEADS



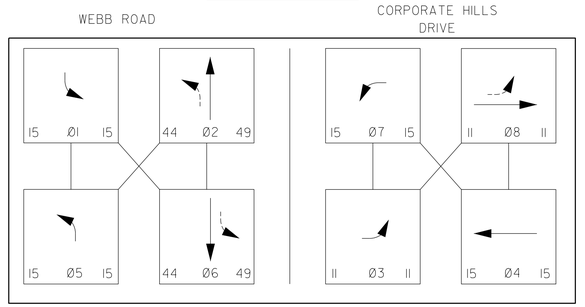
GENERAL NOTES

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS OF ALL EXISTING UTILITIES BEFORE BEGINNING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. COMPANIES, OR AGENCIES THAT HAVE IDENTIFIED UTILITIES IN THIS VICINITY ARE LISTED ON SHEET 23
2. POLES AND BOXES SHALL BE STAKED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION OF EACH ITEM.
3. SERVICE AND JUNCTION BOX LOCATIONS AND CONDUIT RUNS ARE TYPICAL ONLY AND MAY BE ADJUSTED DURING INSTALLATION TO CLEAR OBSTRUCTIONS AND FACILITATE WIRING AS APPROVED BY THE ENGINEER.
4. CONDUIT SHALL INCLUDE ALL BRACKETS, HARDWARE, & OTHER INCIDENTALS NECESSARY FOR INSTALLATION.
5. THE RADAR EQUIPMENT MANUFACTURER SHALL PROVIDE TRAINING ON THE INSTALLATION, OPERATION, AND MAINTENANCE OF THE RADAR DETECTION SYSTEM (1 DAY MINIMUM).
6. SIGNAL SHALL BE PLACED IN OPERATION ONLY AFTER COMMUNICATIONS WITH WEBB AND KELLOGG SIGNAL IS ESTABLISHED.

LEGEND

- (40') — MAST ARM POLE (Length)
- 3" RIGID CONDUIT
- 1.5" RIGID CONDUIT
- VEHICLE DETECTION RADAR
- XX — RADAR VEHICLE DETECTION ZONE
- STREET NAME SIGN D3-1
- LEFT TURN YIELD ON GREEN (R10-12)
- LEFT TURN SIGNAL (R10-10L)
- SERVICE BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL HEAD WITH BACKPLATE
- PEDESTRIAN PUSH BUTTON
- PEDESTRIAN SIGNAL HEAD
- WIND DAMPER
- PP — POWER POLE
- LUMINAIRE
- RADAR DETECTION CONE
- SU — WIRELESS COMMUNICATIONS SUBSCRIBER UNIT ALVARION SU-A-5.8-3-BD-VL

PHASE DIAGRAM



LEGEND

AM Phase PM
SPLIT SPLIT

AM CYCLE LENGTH = 85 SEC
PM CYCLE LENGTH = 90 SEC

NOTES: 1. LINES CONNECTING PHASES INDICATE PHASE THAT CAN OCCUR CONCURRENTLY.
2. DOTTED ARROWS INDICATE PERMISSIVE MOVEMENTS.

CITY OF WICHITA

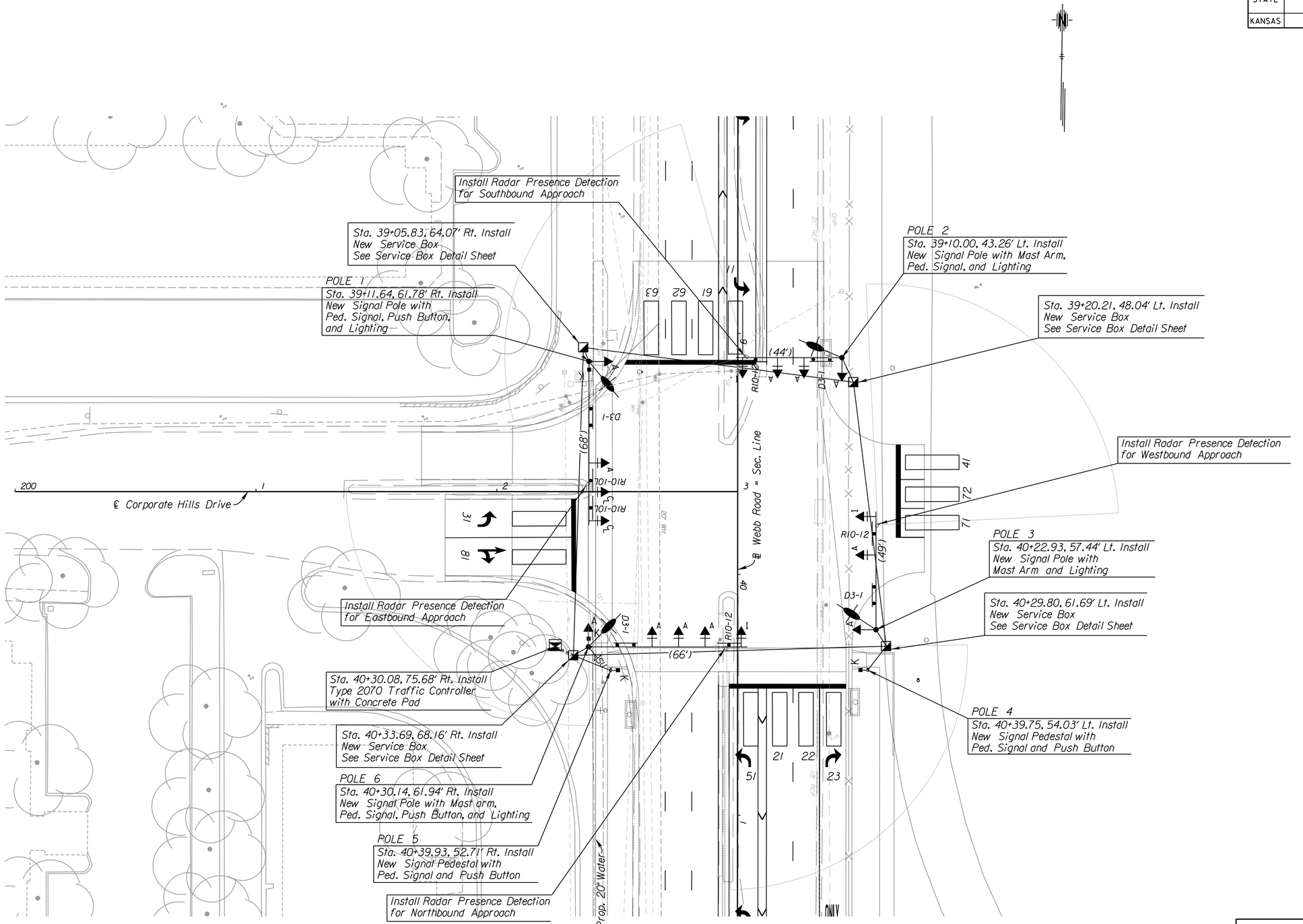
WEBB ROAD & CORPORATE HILLS DRIVE

GENERAL NOTES

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KANSAS	472-85031	2015	545	1055



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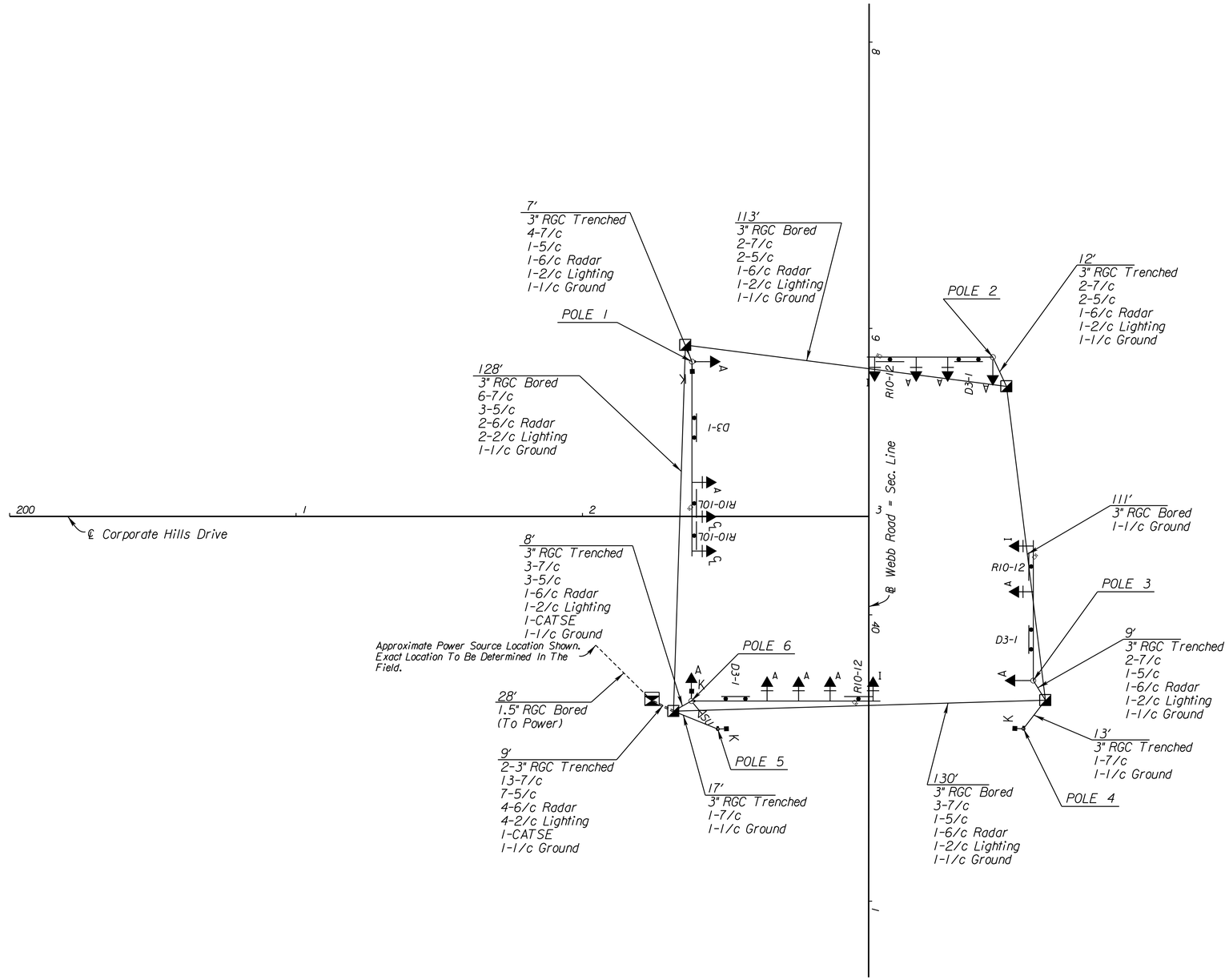
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CITY OF WICHITA

CORPORATE HILLS DRIVE & WEBB ROAD

SIGNALIZATION PLAN

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	546	1055



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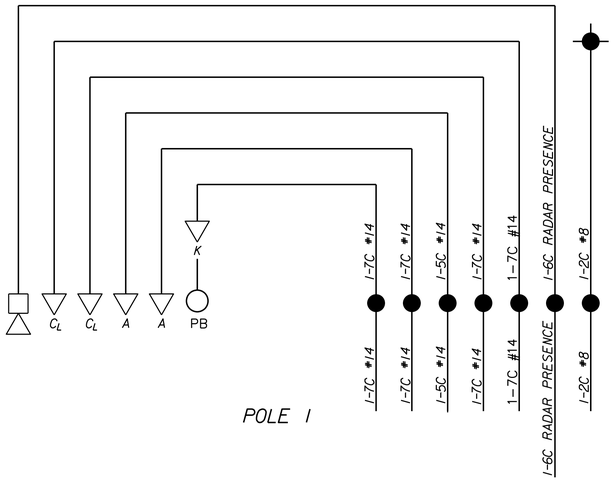
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CITY OF WICHITA

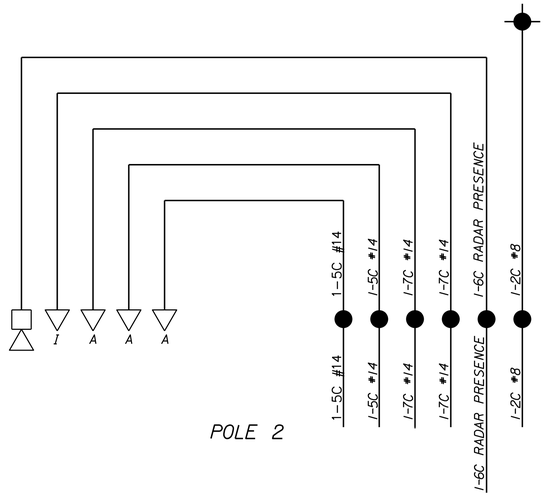
CORPORATE HILLS DRIVE & WEBB ROAD

CONDUIT AND WIRING PLAN

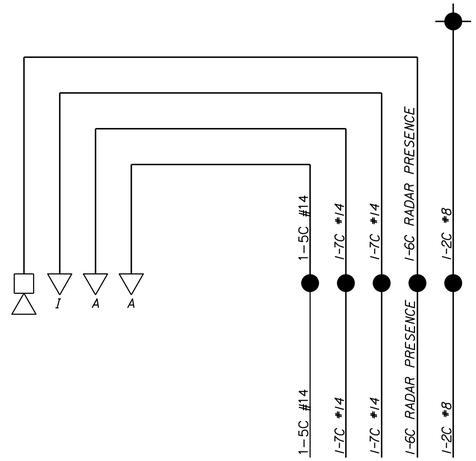
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	547	1055



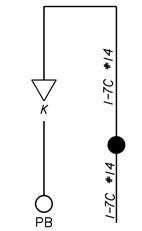
POLE 1



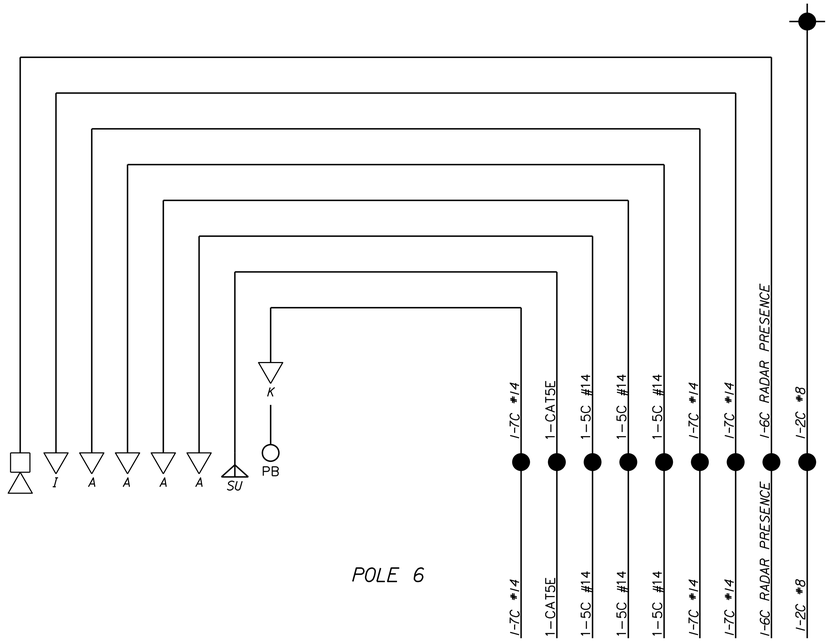
POLE 2



POLE 3



POLE 4 & 5



POLE 6

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CITY OF WICHITA

WEBB ROAD & CORPORATE HILLS DRIVE

POLE WIRING PLAN

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	548	1055

BILL OF MATERIALS (FOR INFORMATION ONLY)

LEGEND	UNITS	QTY.
PAD MOUNTED CABINET	EACH	1
TRAFFIC SIGNAL HEAD (see chart A) WITH MOUNTING HARDWARE	EACH	15
TRAFFIC SIGNAL POLE (see chart B) STEEL	EACH	6
2070 CONTROLLER		CITY PROVIDE
CONCRETE CONTROLLER PAD	EACH	1
CONCRETE FOOTING - POLE	EACH	6
CONDUIT ELBOW 90° 1.5"	EACH	XX
CONDUIT ELBOW 90° 3"	EACH	XX
BACKPLATE 5" 3 SECTION	EACH	9
BACKPLATE 5" 4 SECTION	EACH	0
BACKPLATE 5" 5 SECTION	EACH	3
SERVICE BOX	EACH	4
GROUND ROD & CLAMP (5/8" x 8')	EACH	1
GROUND ROD & CLAMP (3/4" x 10')	EACH	6
CONDUIT CLAMP	EACH	XX
TRAFFIC SIGNAL LAMP RED ARROW LED KIT	EACH	2
TRAFFIC SIGNAL LAMP RED LED KIT	EACH	14
TRAFFIC SIGNAL LAMP YELLOW LED KIT	EACH	14
PRAFFIC SIGNAL LAMP GREEN LED KIT	EACH	14
TRAFFIC SIGNAL LAMP GREEN ARROW LED KIT	EACH	5
TRAFFIC SIGNAL LAMP YELLOW ARROW LED KIT	EACH	5
MULTI-CONDUCTOR CABLE NO. 14 A.W.G. 5/c	LIN. FT.	1343
MULTI-CONDUCTOR CABLE NO. 14 A.W.G. 7/c	LIN. FT.	3246
COMMON GROUND WIRE NO. 8 A.W.G. 1/c	LIN. FT.	2423
POWER LEAD-IN WIRE NO. 6 A.W.G. 1/c (TYPE THHN)	LIN. FT.	68
MULTI-CONDUCTOR CABLE NO. 8 A.W.G. 2/c	LIN. FT.	856
RADAR 6/c	LIN. FT.	1001
MULTI-CONDUCTOR CABLE NO. 14 A.W.G. 2/C RADAR POWER	LIN. FT.	0
CONDUIT 3" (RGC)	LIN. FT.	566
RADAR DETECTION ADVANCE UNIT	EACH	0
RADAR DETECTION PRESENCE UNIT	EACH	4
RADAR DETECTION MOUNTING HARDWARE	EACH	4
CONDUIT 1.5" (RGC)	LIN. FT.	28
STREET NAME SIGNS WITH MOUNTING HARDWARE (D3-1) (SEE CHART D)	EACH	4
LEFT TURN YIELD ON GREEN BALL (R10-12)	EACH	3
LEFT TURN SIGNAL (R10-10L)	EACH	2
ACCESSIBLE PEDESTRIAN SIGNAL HEAD & PUSH BUTTON UNIT (4-WIRE)	EACH	4
PEDESTRIAN CROSSING SIGN R10-3bL	EACH	2
PEDESTRIAN CROSSING SIGN R10-3bR	EACH	2
	EACH	
LUMINAIRES	EACH	4
WIRELESS COMMUNICATIONS SUBSCRIBER UNIT ALVARION SU-A-5.8-3-BD-VL	EACH	1

"XX" Quantity to be determined in the field.

SERVICE BOX SUMMARY (EXISTING)

STATION	DISTANCE	SIDE
39+05.83	64.07'	RT.
39+20.21	48.04'	LT.
40+29.80	61.69'	LT.
40+33.69	68.16'	RT.

CHART "D" - STREET NAME SIGN SUMMARY

LEGEND	TYPE	QTY.	UNITS	SIZE
Corporate Hills 9500 E	D3-1	1	EA.	96" x 18"
Corporate Hills 9600 E	D3-1	1	EA.	96" x 18"
Webb 300 S	D3-1	1	EA.	48" x 18"
Webb 400 S	D3-1	1	EA.	48" x 18"

CHART "C" - CONDUIT

CONDUIT SIZE	TRENCHED	BORED	ATTACHED
3 INCH	84	482	0
1.5 INCH	0	28	0

CHART "A" - SIGNAL INVENTORY

NO. WAYS	NO. SECTION (Per Face)	SIGNAL FACE ARRANGEMENT	MOUNTING TYPE	QTY.
1	3	A	Mast Arm with Backplate	7
1	3	A	Side of Pole	4
1	3	C_L	Mast Arm with Backplate	2
1	5	I	Mast Arm with Backplate	3

TYPE 2070 CONTROLLER SETTINGS

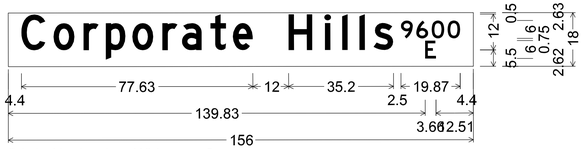
INTERVAL		WAPITI PROGRAM PHASE 1 SBL	2* NBT	3 EBL	4 WBT	5 NBL	6* SBT	7 WBL	8 EBT
Max	0								
Max 2	1								
Walk	2						4		4
Fl. Dw.	3						28		28
Max Init.	4								
Min. Green	5	7	10	7	10	7	10	7	10
TBR	6								
TTR	7								
	8								
Passage	9	3	3	3	3	3	3	3	3
Min. Gap	a								
Add Act	b								
Yellow	c	3.9	3.9	3.0	3.0	3.9	3.9	3.0	3.0
Red Clr	d	2.1	2.1	2.5	2.5	2.1	2.1	2.5	2.5
Red Rev.	e								
Walk II	f								

NOMINAL DISPLAY TIME CLOCK		FEATURES	PHASE 1	2	3	4	5	6	7	8
0	Year	Veh Recall								
1	Month	Ped Recall								
2	Day Month	Red Lock								
3	Day Week	Yel Lock								
4	Hour	0 Permit								
5	Minute	Ped Phases								
6	Second	Lead Phases	X		X		X		X	
7		Dbl Entry								
8		Sequential								
9		Start Up Yel		X				X		
a		Overlap A								
b		Overlap B								
c		Overlap C								
d		Overlap D								
e		Exclusive								
f		Sm Gap								

*Note: Phase 2 and Phase 6 are Normal Dwell.

CHART "B" - TRAFFIC SIGNAL POLES

POLE #	STATION	POLE HEIGHT	ARM HEIGHT	DISTANCE	SIDE	ARM LENGTH	# OF SIGNAL ON ARM	SIGNAL SPACING	TYPE
1	39+11.64	35	19	61.78'	Rt.	68	2	42-12-12	J.U.
2	39+10.00	35	19	43.26'	Lt.	44	3	16-11-14.5	J.U.
3	40+22.93	35	19	57.44'	Lt.	49	2	31-16	J.U.
4	40+39.75			54.03'	Lt.				
5	40+39.93			52.71'	Rt.				
6	40+30.14	35	19	61.94'	Rt.	66	4	27-11-11-15	J.U.



D3-1; No border, White on Green;
[Corporate Hills] D; [9600] D; [E] D;
Table of distances between letter and object lefts.

4.40	C 10.77	o 10.08	r 7.46	p 8.90	o 10.09	r 6.58	a 9.55	t 7.51	e		
	18.69	H 12.20	i 5.79	l 5.78	l 4.74	s 9.19	9 5.15	6 5.16	0 5.34	0 4.22	4.40

139.83	E 3.66	12.51

DETECTION ZONE SUMMARY

ZONE NO.	ZONE SIZE W x L	PHASE CALLED	PHASE EXTENDED	DELAY	STRETCH	INITIAL SETTING (SEC.)
11	8x40	1	1			
21	8x40	2	2			
22	8x40	2	2			
23	8x40	2	2			
31	8x40	3	8			
41	8x40	4	4			
51	8x40	5	5			
61	8x40	6	6			
62	8x40	6	6			
63	8x40	6	6			
71	8x40	7	7	5		
72	8x40	7	7	5		
81	8x40	8	8	5		

GENERAL NOTES

1. The Contractor shall be responsible for furnishing or obtaining from the City and installing the controller, cabinet concrete base, and for all equipment necessary for the complete and satisfactory operation of the traffic signal whether said equipment is specifically mentioned or not. The City will supply the 2070 controller only. The Contractor shall supply all other equipment including a 2010 ECLip conflict monitor with ethernet port.
2. Lengths given are to the centerline of pole/box and do not include lengths for elbows and risers.
3. Signal heads, traffic signs, etc. shall include all brackets, hardware, & other incidentals necessary for installation.
4. See City of Wichita Standard Specifications for additional wiring notes.
5. Quantities are for information only.
6. The Contractor shall install a 1.5 inch RGC from the controller to the power pole and continue up the power pole per the "Power Pole and Span Pole Assembly Details" sheet. The Contractor shall furnish and install the appropriate power cable in the 1.5 inch RGC per the plans. The Contractor will obtain the meter box from Westar and install the meter box to the power pole.
7. Luminaires shall be 120 LED @ 700 mA, Type III Medium, 17,400 Lumens (Min.) @ 4300 K (Typ.).
8. Phases 2 and 6 (NBT & SBT) shall be placed in soft recall.

SPECIAL FINISH FOR TRAFFIC SIGNAL EQUIPMENT

The traffic signal controller cabinet, bracket, sign blank backs, signal backs and other exposed surfaces shall be shop painted with an aerosol lacquer cellulose color to match the traffic signal pole color. The contractor shall submit two copies of the proposed coating system to the City for approval prior to application.

TRAFFIC SIGNAL POLE & PEDESTAL EXTERIOR COATING

In addition to being galvanized, all exterior surfaces shall be coated with a zinc rich epoxy powder to a minimum dry film thickness of 2.0 mils. The coating shall be electrostatically applied and partially cured in a gas fired convection oven by heating the steel substrate to a minimum of 250 degrees Fahrenheit.

The powder primed surface shall be coated with an intermediate coat of polyester powder to a minimum dry film thickness of 2.0 mils. The coating shall be electrostatically applied and cured by heating the steel substrate in a convection oven to minimum of 350 degrees and a maximum of 400 degrees Fahrenheit.

The intermediate coat shall be top coated with one coat of high-build acrylic polyurethane enamel to a minimum dry film thickness of 2.0 mils. The coating shall be electrostatically applied and cured by heating the substrate in a convection oven to minimum of 225 degrees Fahrenheit. The final top coating color shall be BLACK.

CITY OF WICHITA

WEBB ROAD & CORPORATE HILLS DRIVE

SIGNALIZATION PLAN NOTES AND TABLES

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
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CITY OF WICHITA, KANSAS
SPECIFICATIONS

TRAFFIC SIGNAL INSTALLATION

01. GENERAL

The contractor shall have a licensed journeyman electrician on site while traffic installation work is performed.

The contractor shall notify the appropriate power company prior to any service connection or attachment to determine the proper type and method of hook-up or installation. The cost of any initial hook-up charge shall be borne by the contractor. This shall include, but not be limited to, the cost of power supplied for all testing until the signal installation is accepted.

02. CONDUIT

All conductors shall be run between bases, junction boxes pull boxes, and services boxes in rigid conduit conforming to the provisions of Section 2 of these specifications. The size of the conduit used shall be of the size as shown on the plans.

The ends of all conduit shall be well reamed to removes burrs and rough edges. Field cuts shall be made square and true so that the ends will butt or come together for the full diameter thereof. Slip joints or running threads will not be permitted for coupling conduit. When a standard coupling cannot be used, an approved threaded union shall be used. The threads on all conduit shall be painted with a good quality of lead or rust preventative paint before couplings are made. All couplings shall be fitted and tightened until the end of the conduits are brought together. Where coating on conduit has been injured in handling, or installing, such injured places shall be thoroughly painted with rust preventative paint.

All conduit ends shall be threaded and capped with standard pipe caps until wiring is started. When caps are removed, the threaded ends shall be provided with approved conduit bushings.

Conduit bends, except factory bends, shall have a radius of not less than six (6) times the inside diameter of the conduit. Where factory bends are not used, conduit bends shall be made without crimping or flattening, using the longest radius practicable.

Conduit set in bases shall extend 2"to 3" vertically from the top of the base. A plastic or metal conduit bushing shall be installed on the end of all conduit terminating within a base. Conduit shall enter through the sides of a pull box and shall leave the major portion of the box clear. Conduit entering concrete service and junction boxes shall not extend more than 5" inside of service or junction box as measured along the longitudinal axis of the conduit. Conduit entering service boxes shall be at least 8" above the crushed rock bottom of the service hole. Conduit should be sloped to drain as directed by the Engineer. At all outlets, conduits shall enter from the direction of the run.

Wherever possible, the conduit shall be installed by trenching. Trenches shall run in straight lines between pull boxes and bases. The location of the conduit shall be as shown on the plans, except that where physical obstructions dictate, the location shall be determined by the Engineer. Conduit shall be installed to a depth of at least 600 mm below finish grade. This requirement may be waived by the Engineer where physical conditions or obstructions warrant.

Trenches shall be backfilled with material free of rock and compacted in lifts by hand tamping or with mechanical tampers to the density noted on the plans. If a density is not specified on the plans, trench backfill shall be compacted until, in the opinion of the Engineer, no significant future settlement will occur.

Existing underground conduit to be incorporated into a new system shall be cleaned with a mandrel and blown out with compressor air.

Conduit runs shown on the plans are for bidding purposes only, and may be changed with permission of the Engineer to avoid underground obstructions.

Conduit placed under existing pavement or sidewalk shall be installed by an approved jacking or drilling method. The existing pavement shall not be disturbed unless otherwise noted on the plans or approved by the Engineer. Excessive use of water such that the pavement might be undermined, or the subgrade softened, will not be permitted.

03. CONCRETE BASE FOR POLES AND CONTROLLER CABINET

Bases for poles and cabinets shall be reinforced concrete as detailed on the plans. The reinforcing bars shall be free of rust and dirt and shall be of the size, number and dimensions shown on the plans.

Anchor bolts shall extend uniformly above the finish grade of the concrete base a height equal to the manufacturer's recommendations (leaving at least three threads exposed when secured).

The anchor bolt sizes for the pole bases are to be standardized as follows:

1. Mast arm lengths 16' through 36'
   4 each, 1 1/2" Dia. x 54" long x 6" hook
   Bolt Circle = 16"
2. Mast arm lengths 40' through 56'
   4 each, 1 3/4" Dia. x 84" long x 6" hook
   Bolt Circle = 20"

The contractor shall design an anchor bolt assembly which shall be welded to the rebar cage and the resulting unit inserted in the form for the concrete base. The unit shall be designed and constructed such that, after insertion in the form, it can be checked for proper orientation, elevation and verticality. "Stabbing" of anchor bolts or ground rods will not be permitted.

The location of the bases shall be as shown on the plans. Any variation from the plan location shall be only with the approval of the Engineer.

Steel traffic signal pole bases shall be constructed in two pours. The initial concrete placement shall end 6" below finish grade. A 6" thick, 36" square concrete cap shall be poured when the pole has been erected, plumbed, and approved by the Engineer. The top of the base shall be slightly (15/64" to 15/32") higher than the adjacent curb and gutter, or finish grade if no curb and gutter. Aluminum pedestal bases shall be constructed in one pour as detailed on the plans.

04. WIRING

Wiring shall conform to the appropriate articles of the National Electric Code or subsequent revisions. The conductors from the terminal block in the controller to the signal base shall be a continuous run. No splices of cable will be permitted in conduit or outside of junction boxes, service boxes or pole bases unless otherwise specified in the supplemental specifications, special provisions, or on the plans for an overhead wiring system. All signal cable splices shall be made above ground in pole or pedestal bases.

When conductors and cables are pulled into the conduit, all ends shall be taped to exclude moisture, and shall be so kept until the splices are made or terminal appliances attached. Ends of spare conductors shall remain taped.

When pulling conductors through conduits, a powdered soapstone, talc or other approved lubricant shall be used. Cable shall not be taped or bundled together to be to be pulled or left in conduit.

80" of slack or excess cable, as applicable, shall be left in each service box for traffic signal cable, and detector lead-in wire.

40" of slack or excess cable shall be left in each junction box and at each termination point.

Excess cable to be uniformly bundled and secured with threaded stud, as close as possible to top of service boxes and junction boxes.

A. Splices

1. Signal conductor cable – Conductors shall be joined by twisting the conductors. Conductor insulation shall be penciled, trimmed to conical shape, before applying splice insulation. Splice insulation shall consist of layers of thermoplastic or neoprene insulation electrical tape bearing the label of the Underwriters Laboratories, Inc., applied to a thickness equal to and well lapped over the original insulation, except that on high voltage splices two layers of rubber tape conforming to the requirements at A.S.T.M. designation: D 119 shall be applied over the conductor before placing the thermoplastic tape. The splice shall then be well covered with two layers of friction or other approved tape. At least 40" of slack shall be left for each cable splice in pedestal and pole bases.

2. When terminating ends of cable at all terminal blocks an approved #14 insulated spade terminal shall be properly crimped on end of each conductor to provide a secure connection.

3. Locking spade terminals shall not be used.

B. Wiring Notes

1. The Contractor shall furnish and install all loop wire, shielded loop lead-in wire, power supply cable and traffic signal cable for the complete operation of the traffic signal.

2. One seven conductor cable shall be run from the controller to each signal pole for pedestrian movement. The following color codes shall be used:

Red	Don't Walk (Phase 2 or 6)
Green	Walk (Phase 2 or 6)
Orange	Push Button (Phase 2 or 6)
White w/Black	Don't Walk (Phase 4 or 8)
Blue	Walk (Phase 4 or 8)
Black	Push Button (Phase 4 or 8)
White	Common

3. One five conductor cable shall be run from the pole base to each 3-section signal head. The following color codes shall be used:

Black	Not Used
White	Common
Red	Red Ball
Green	Green Ball
Orange	Yellow Ball

4. One seven conductor cable per conflicting movement shall be run from the controller to each signal pole. The following color codes shall be used:

White	Common
Red	Red Ball
Green	Green Ball
Orange	Yellow Ball
Blue	Green Arrow
Black	Yellow Arrow
White w/Black	Street Name Sign (where applicable)

5. Each signal head mounted on a signal pole or mast arm shall have one continuous multi-conductor cable run from the pole base to the signal head. A five-section signal head (left turn signal) shall have a seven conductor cable. A three-section signal head (through movement) shall have a five conductor cable; Pedestrian signal heads shall have a five conductor cable; Each push-button shall have a two conductor cable.

6. A single conductor stranded No. 8 green wire shall carry the equipment ground from the grounding lug of all signal poles to the controller cabinet and the power disconnect box.

7. One five conductor cable shall be run from the pole base to pedestrian signal head. The following color codes shall be used:

White	Common (All Phases)
Red	Don't Walk (Phase 2 or 6)
Green	Walk (Phase 2 or 6)
Orange	Don't Walk (Phase 4 or 8)
Black	Walk (Phase 4 or 8)

8. Identify cable runs in cabinet.

05. 332 CABINET WIRING AND CABLE IDENTIFICATION

The following is the standard City of Wichita specifications for wiring and labeling cables in a 332 cabinet and shall be closely followed, any deviation from these specifications must be approved by the Engineer or his representative:

A. Cabinet Wiring

1. All cables shall have adequate excess cable at their termintions so there is no tension on the conductors.

   (a) Traffic signal cables shall be 60" in length and stripped back 40".

   (b) Pedestrian signal cables shall be the same as the signal cables except the push button conductors shall be 100" in length to reach the proper terminal point without the use of a butt splice.

   (c) Detector feeder cable shall be 100" in length and stripped back 8".

2. The cables shall be formed in such a manner so that any access panels can be lowered without interference.

3. There shall not be any use of tape on the stripped out conductors.

4. Nylon-cable ties shall not be used on any field cables except those used for identification.

5. The drain wire of each detector feeder shall be covered with a tube type covering (i.e., shrink tube) not more than three (3) times the diameter of the wire.

6. All cable fillers shall be removed from stripped back cable.

7. Each conductor shall be separately terminated with a non-locking, insulated block fork terminal of the appropriate size.

8. All conduits entering the cabinet base shall be closed with an approved duct seal.

9. All excess cable shall be neatly formed in the bottom of the cabinet.

10. All cables terminating at the input files shall be run in the provided pan ducts.

11. All traffic and pedestrian signal cables, also detector feeders, shall be permanently and legibly identified by the use of Nylon Identification Cable Ties. Traffic signal and pedestrian signal cables shall have a marking pad size of 1/2" x 3/4" (i.e., TY-RAP #TY546M). Detector feeders shall have a marking pad size of 1" x 5/16" (i.e., TYP-RAP #TY551M). The legends shall be made with a permanent type marking pen.

    The following legends shall be used:

    (a) Traffic signal and pedestrian signal cables

    "NW Sigs." = Traffic signal cable to NW corner
    "NW Peds." = Pedestrian signal cable to NW corner

    "NE Sigs." = Traffic signal cable to NE corner
    "NE Peds." = Pedestrian signal cable to NE corner

    "SW Sigs." = Traffic signal cable to SW corner
    "SW Peds." = Pedestrian signal cable to SW corner

    "SE Sigs." = Traffic signal cable to SE corner
    "SE Peds." = Pedestrian signal cable to SE corner

    (b) Detector Feeders

    "WBLT" = Phase 1 Westbound Left Turn Loop
    "EB FAR" = Phase 2 Eastbound Far Advance Loop
    "EB MID" = Phase 2 Eastbound Middle Advance Loop
    "EB CLOSE" = Phase 2 Eastbound Close Loop
    "EB RT. LN." = Phase 2 Eastbound Right Lane Loop (If Applicable)
    "EB LT. LN." = Phase 2 Eastbound Left Lane Loop (If Applicable)
    "SBLT" = Phase 3 Southbound Left Turn Loop
    "NB FAR" = Phase 4 Northbound Far Advance Loop
    "NB MID" = Phase 4 Northbound Middle Advance Loop
    "NB CLOSE" = Phase 4 Northbound Close Loop
    "NB RT. LN." = Phase 4 Northbound Right Lane Loop (If Applicable)
    "NB LT. LN." = Phase 4 Nothbound Left Lane Loop (If Applicable)
    "EBLT" = Phase 5 Eastbound Left Turn
    "WB FAR" = Phase 6 Westbound Far Advance Loop
    "WB MID" = Phase 6 Westbound Middle Advance Loop
    "WB CLOSE" = Phase 6 Westbound Close Loop
    "WB RT. LN." = Phase 6 Westbound Right Lane Loop (If Applicable)
    "WB LT. LN." = Phase 6 Westbound Left Lane Loop (If Applicable)
    "NBLT" = Phase 7 Northbound Left Turn Loop
    "SB FAR" = Phase 8 Southbound Far Advance Loop
    "SB MID" = Phase 8 Southbound Middle Advance Loop
    "SB CLOSE" = Phase 8 Southbound Close Loop
    "SB RT. LN." = Phase 8 Southbound Right Lane Loop (If Applicable)
    "SB LT. LN." = Phase 8 Southbound Left Lane Loop (If Applicable)

12. The traffic signal and pedestrian signal field wires shall terminate at the following locations in all 332 cabinets:

    WBLT – RED 125, YELLOW 126, GREEN 127
    EB SIGS. – RED 128, YELLOW 129, GREEN 130
    EB PEDS. – DW 113, WALK 115
    SBLT – RED 116, YELLOW 117, GREEN 118
    NB SIGS. – RED 101, YELLOW 102, GREEN 103
    NB PEDS. – DW 104, WALK 106
    EBLT – RED 131, YELLOW 132, GREEN 133
    WB SIGS. – RED 134, YELLOW 135, GREEN 136
    WB PEDS. – DW 119, WALK 121
    NBLT – RED 122, YELLOW 123, GREEN 124
    SB SIGS. – RED 107, YELLOW 108, GREEN 109
    SB PEDS. – DW 110, WALK 112

13. The detector feeders and the pedestrian pushbutton field wires shall terminate at the following locations in all 332 cabinets:

    a. Detector Feeders

    WBLT – I-1-DE
    EB FAR ADV – I-2-DE
    EB MID ADV – I-2-JK
    EB CLOSE – I-3-DE
    SBLT – I-5-DE
    NB FAR – I-6-DE
    NB MID – I-6-JK
    NB CLOSE – I-7-DE
    EBLT – J-1-DE
    WB FAR – J-2-DE
    WB MID – J-2-JK
    WB CLOSE – J-3-DE
    NBLT – J-5-DE
    SB FAR – J-6-DE
    SB MID – J-6-JK
    SB CLOSE – J-7-DE

    All drain wires to terminate at terminal L of the corresponding slot.

    b. Pedestrian Pushbuttons

    EB PEDS. – I-12-D
    NB PEDS. – I-12-J
    WB PEDS. – I-13-D
    SB PEDS. – I-13-J

14. If any additional loop or field wire terminations are necessary, their location will be determined by the Engineer or his representative.

06. MAST ARM AND POLE BASE CABLE IDENTIFICATION

The following is the specification for identifying all cables used in the complete operation of the traffic signals which are located in mast arms and pole bases.

The through traffic and pedestrian signal cables shall be legibly identified with the use of Nylon Identification Cable Ties. The marking pad size shall be 15/32" x 7/8" (i.e., TY-RAP #TY546M). The legend shall be made with a permanent-type marking pen.

The pushbutton cables shall be legibly identified with the use of Nylon Identification Cable Ties. The marking pad size shall be 1" x 5/16" (i.e., TY-RAP #TY551M). The legends shall be made with a permanent-type marking pen.

A. Mast Arm Traffic and Pedestrian Signal Cable Legends

1. Mast Arm Signal Cables

   "Lt. Turn Sig." – Left Turn Signal
   "Out Bd. Sig." – Farthest Through Traffic Signal from Pole
   "Center Sig." – Next Farthest Through Traffic Signal from Pole (If Applicable)
   "In Bd. Sig." – Closest Thru Traffic Signal to Pole
   "SOP Sig." – Side of Pole Through Traffic Signal

2. Pole Mounted Pedestrian Signals and Pushbuttons

   "Ped. Sig." – Pedestrian Signal
   "Ph.2 P.B." – All Phase 2 Pushbuttons
   "Ph.4 P.B." – All Phase 4 Pushbuttons
   "Ph.6 P.B." – All Phase 6 Pushbuttons
   "Ph.8 P.B." – All Phase 8 Pushbuttons

07. TRAFFIC SIGNAL HEADS

Traffic signal heads mounted on the side of poles or on pedestals shall be 10' from the ground to the bottom of the signal head.

Type II side-of-pole pedestrian signal bracket to be mounted on back side of pole 135° clockwise from mast arm.

Traffic signal heads mounted on mast arms or span wire shall be no less than 15' and no more than 19' from the pavement to the bottom of the signal head. In some instances the Engineer may require the signal to be mounted above 15' for better visibility. Under no circumstances shall the bottom of the signal be more than 7/32" above the pavement.

The Engineer shall direct the final positioning of the signal heads. Signal heads shall not be installed at any intersection until all other signal equipment, including the controller, is in place and ready for operation at that intersection, except that the signal heads may be mounted if the faces are not directed toward traffic or if the faces are covered.

08. POLE INSTALLATION

When installed, the traffic signal poles shall be back raked according to the manufacturer's recommendation to allow for deflection, such that the pole will be plumb when loaded.

09. LOOP DETECTOR INSTALLATION

The field loop conductor installed in the pavement shall run continuously from the terminating service box, junction box, or base with no splices permitted. The field loop conductors shall be spliced to the lead-in cable and the lead-in cable shall run continuously from the terminating service box, junction box, or base to the sensing unit, except on multiple loop installations where additional loop conductors may be spliced to the lead-in cable as directed by the Engineer.

All lengths of loop wires that are not embedded in the pavement shall be twisted with at least six (6) turns per meter, including lengths in conduits and handholes.

The electrical splice between the loop lead-in cable to the controller and the loop wire shall be made by the following method:

1. Remove all lead-in cable coverings and ground wire, leaving 4" of insulated wire exposed.
2. Remove the insulation from each conductor of the lead-in cable and scrape both copper conductors with knife until bright.
3. Remove appropriate length of insulation from the ends of the loop wires and scrape both copper conductors with knife until bright.
4. Conductors shall be joined by using a #14 butt splice. The two splices shall be staggered to provide adequate insulation. Each splice shall be insulated with layers of thermoplastic or neoprene insulation electrical tape bearing the label of the Underwriters Laboratories, Inc., applied to a thickness equal to and well looped over the original insulation.

The two splices shall then be over-wrapped with layers of thermoplastic or neoprene insulation as above and then coated thoroughly with a water proof electrical coating.

The location of each loop shall be marked on the pavement with crayon or spray paint. The contractor shall obtain the approval of the Engineer prior to cutting the saw slots.

The saw shall be equipped with a depth gauge and horizontal guide to assure proper depth and alignment of the slot. The blade used for the saw cut shall provide a clean, straight, well-defined 1/4" wide saw cut without damage to adjacent areas. The depth of the saw cut shall be 3 1/2" deep. Where the loop changes direction, the saw cuts shall be overlapped to provide full depth at all corners. Right angle or corners less than 90° shall not be used.

Before installing the loop wire, the saw cuts shall be checked for the presence of jagged edges or protrusions. Should these exist, they must be removed. The slots must be cleaned and dried to remove cutting dust, grit, oil, moisture or other contaminants. Cleaning shall be achieved by flushing clean with a stream of water, and following this, the slots should be cleared of water and dried using oil-free compressed air.

Loop detector conductor shall be installed using a 1/8" to 3/16"-thick wood paddle.

Each loop shall be coiled clockwise (or per manufacturer's recommended practice) and the beginning conductor banded in the terminating handhole or base with a symbol "S" to denote start of conductor. Each loop shall be further identified by phase or function as shown on the project plans, with durable tags, or as directed by the Engineer.

Each loop spliced to lead-in cable, checked at control cabinet, shall not measure less than 100 megohms to ground.

Contractor to supply City of Wichita with a typed record of loop inductance and resistance to ground of each loop measured at cabinet. Provide the date each loop was checked.

10. COMMUNICATIONS CABLE

A. Cable

Cable used for intersection communication shall be six pair #19 AWG shielded cable conforming to the requirements of Specification 20-2 of the IMSA. Shielding shall also conform to IMSA Specifications.

B. Splices General

Communications cable splices shall be made at the communications terminal block within the signal controller cabinet whenever possible. Other necessary cable splices shall be made only with approval of the project engineer in the manner dictated below.

C. Underground Splices

Underground communications cable splices shall be made only within service boxes or utility manholes using an approved waterproof, re-enterable splice kit with multiple port and caps if necessary. The splices shall be staggered heat shrinkable insulated butt splices. The splice kits shall be filled with an approved non-hardening, waterproof encapsulant The enclosure shall be transparent and capable of being racked in the service box or manhole immediately after filling with encapsulant. The contractor shall rack all splice kits after filling with encapsulant.

D. Aerial Splices

Aerial splices shall be made using a terminal block.

CITY OF WICHITA

TRAFFIC SIGNAL SPECIFICATION
AMERICAN STANDARD

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E. Shield Grounding

Communications cable shielding shall be grounded at one point only – at the control center in City Hall for CBD zones and at the on-street master cabinet for non-CBD zones. Shielding at all splice points (aerial, underground or at the controller cabinet) shall be connected together using shield connectors and a #14 THNN stranded, white insulated wire with a ring tongue connector on each end as a bonding jumper between the shield connectors. Proper insulation shall be used on all bare parts of the bonding system to prevent contact with the messenger cable or other metal parts in the closure.

F. Testing

A continuity test and an insulation resistance test of each communications pair (including spares) will be conducted in the presence of the project engineer or his representative. During the tests, all transient suppression devices shall be disconnected. If any test fails, repairs shall be made by the contractor and the entire test for that cable circuit shall be repeated.

G. Continuity Test

The continuity test shall be made between a point upstream of where the new communications cable is spliced to the existing cable and each new field termination point. Each conductor in a pair shall show a resistance of not more than 10 ohms per 300 m of AWG #19 conductors. The resistance shall be measured with a meter having a minimum resistance of 20,000 ohms/volt. Contractor to supply City of Wichita with a typed record of the resistance of each paired conductor.

H. Insulation Resistance Test

The insulation resistance test shall be measured with all other connections to the conductor under test removed, and all other conductors in the cable and the shield grounded. The measurement shall be made with a direct current potential of not less than 360 volts nor more than 550 volts applied for one minute. Insulation resistance shall exceed 3,000 megohm–km. The contractor to supply City of Wichita with typed record of the resistance of each conductor.

11. MESSENGER CABLE

Where shown in the plans, the messenger cable shall be used to support all overhead communications and detector lead–in cable. The messenger cable shall be 5/16" in diameter and shall include devices such as rings or spiral slashing used to attach the cable, and shall run from struture to structure without splicing. Prior to erecting messenger cable, the contractor shall determine the length of the strand required to span the distance between the poles indicated on the drawings, allowing a sufficient additional length of span wire to compensate for sag.

No messenger cables shall be erected which would lie on, or are liable to run on, a utility company wire or cable, tree limb, etc. If a messenger cable is erected within 12" of any other cable, wire or structure, it shall be protected with plastic wire guards. The height of the messenger cable on the pole shall conform to requirements of the serving utility and the National Electrical Code, and the National Electric Safety Code.

TRAFFIC SIGNAL EQUIPMENT

01. TYPE 170 TRAFFIC SIGNAL CONTROLLER SYSTEM

Each Type 170 Traffic Signal Controller System shall meet the applicable specifications detailed in *TSCES, published by the California Business, Transportation and Housing Agency, Department of Transportation (Caltrans), Jan. 1989 edition. AS modified by TSCES, Addendem 8, Nov. 1993, as well as the additional requirements noted below.

A. Controller Unit

The Model 170 controller unit shall contain a single MPU with at least 2K of RAM memory on a separate board apart from the Input/Output logic board.

Output interface – The output interface shall consist of a minimum of 80 bits of buffered storage. Output data shall be latched at the time of writing from the MPU. This interface shall provide an NPN open collector output capable of driving up to 40 volts DC and sinking up to 100 milliamperes. A logic state one from the MPU shall be presented as a grounded collector (0 to 2 volts), and a logic state zero presented as an open circuit. Once a port is written into, the data will remain present and stable until either another port is written into it, or until the power is turned off. The state of these output ports at the time of power up or power down shall be an open circuit.

Provide adjustable AC threshold voltage indicator on power supply.

All IC's integral to controller unit shall be socket mounted.

The Model 170 controller shall include a Model 412B2 System memory module of same manufacturer as specified in Traffic Signal Control Equipment Specifications published by the California Business, Transportation and Housing Agency, Department of Transportation (Caltrans), January, 1989 edition. The specifications are available from the Caltrans Publication Unit, telephone (916) 445–3520. The Model 412 System Memory Module shall include lithium cell for backup power to retain data in the volatile RAM devices. The lithium cell shall be replaceable and switched to disconnect cell while module is not in use. Switch to be accessible without removing system memory module. The Model 412 System Memory Module to be provided with WAPITI Micro Systems W41KS Program (latest revision) on 27256 EPROM.

B. Conflict Monitor

The Model 210 conflict monitor(s) supplied shall meet requirements outlined in Chapter 3 of the Traffic Signal Control Hardware Specifications detailed in FHWA–IP–78–16 published by the Federal Highway Administration and dated December, 1978, and the following requirements:

1. Any dark signal head (that is, loss of signal output to field terminals) shall cause the monitor to trip.

2. Any yellow time less than 2.8 seconds shall cause the monitor to trip.

3. The green, yellow and red indications for each phase shall be brought into the monitor individually and shall be monitored separately with respect to a loss of signal on any of the three inputs per channel.

4. The monitor shall have the required circuitry to allow the early detection of a conflict caused by a green or yellow signal "hang up" (that is, any green or yellow output which shall remain on when the controller has transferred to a yellow or all red output) by starting the fault timers as soon as yellow appears with the corresponding green still energized. The monitor shall not wait until a conflicting green is displayed to time the conflict. This shall preclude the presentation of a conflicting signal display at the intersection.

5. During the "all red" clearance period (if used), the monitor shall check all inputs for faulty signal display and shall react to these faulty indications during the all red clearance period. Since during this period the only inputs that should be active would be the reds, the monitor shall detect any faults such as red/green, red/yellow, green/yellow and green/red/yellow.

6. The monitor shall be capable of monitoring for incorrect signals applied at the field terminals of each vehicular movement (green, yellow, red). Should a voltage be present on more than one, or none, of the inputs (green, yellow, red) of a channel, the unit shall begin timing the duration of this condition. If this condition exists for less than 700 milliseconds, the unit shall not trigger. If this condition exists for 700 milliseconds or more, but less than 1,000 milliseconds, the unit may or may not trigger.

7. When the unit triggers, it shall cause the output relay contacts to transfer. These contacts shall remain in this state until the unit is reset by the activation of the panel control, or the activation of the external reset input. Power interruption shall not reset the conflict monitor when it has been triggered by detection of a faulty load switch output.

8. The minimum indicators shall be as follows:

a. Power – shall be illuminated when the 24VDC input from the controller is present and the AC+ is applied to the monitor.

b. Watch Dog Error – shall illuminate when the monitor detects a watch dog error.

c. Conflict – shall illuminate when a conflict has been detected by the monitor.

d. Red Failure – shall illuminate when a red failure has been detected by the monitor.

e. Switch Fail – shall illuminate when a faulty load switch has been detected by the monitor.

f. PCA – shall illuminate when the program board if not installed or is not installed properly.

g. PIAF – shall illuminate when the unit has detected a failure and then experiences a power interruption.

h. The monitor shall include signal status indicators. These indications (one per channel) shall illuminate when a proceed signal is present on the corresponding channel during normal operation. If the unit trips due to a conflict, the signal status shall lock up, displaying the status of each channel at the time the conflict occurred. Should the monitor trip due to the absence of red or a faulty load switch output, the signal status indicators shall display the channel (channels) which is (are) at fault.

i. Yellow or Sequence – shall illuminate when a short yellow time has been detected.

9. If the monitor detects a load switch fault condition, the switch failure indicator shall be illuminated and the signal status indicators will display the exact channel of the load switch that failed.

10. The red inputs shall be brought into the monitor via a front panel connector.

11. The Red Enable shall be brought into the monitor via the same front panel connector as the red inputs.

12. A Red Interface Adapter shall be wired in and tested. Red interface block to be programmable without the use of tools or the lowering of any access panels.

13. Conflict monitor to be capable of monitoring four (4) red, yellow and green outputs from the Model 420 auxiliary output file.

14. Communications software shall be compatible with W41KS software.

C. Detectors

The Model 222 Two–Channel Loop Detector as specified in Chapter 4 FHWA–IP–78–16 shall provide for a "failsafe" continuous output in response to an open loop or open lead–in wire.

Each detector unit shall provide interface capability with 22 and 44 pin, 170–type input file.

Each detector unit shall provide sixteen sensitivity settings via thumbwheel switches.

Each detector unit shall be provided with a test switch position to verify loop system integrity. The open loop test position shall indicate a previous fault via the front panel indicator. The memory shall remain intact and can be queried repeatedly. Existing detections shall not be reset and the memory shall only be reset by removing and reinserting the detector unit.

Each detector unit shall provide for selection of delay time of 0 to 30 seconds in 2.0 second increments and/or extension time of 0 to 7 1/2 seconds in 0.5 second increments or off if no timing is desired.

Each timer (delay and extension) shall be provided with buffer circuitry to enable or disable the timer based on an external signal output. Each channel shall include an external input to gate the timing. Provide for cross–talk elimination with only one channel on at a time while scanning.

D. Controller Cabinet

The Model 332B Cabinet and Model 336A Cabinet cabinets shall meet the applicable specifications detailed in the Caltrans Specifications* as well as additional requirements that follow. The cabinets shall be unpainted natural aluminum. The output file must be capable of flashing all 8 phases red or yellow. The three–point locking mechanism shall be fabricated so that it may be actuated by rotating a removable 15 mm hex key. The hex socket and locking cam shall rotate on a 19 mm minimum diameter shaft.

The socket and shaft shall be field–replaceable with common tools. The socket head shall be protected from being rotated with a pipe wrench or similar tool. One aluminum hex wrench shall be provided with each cabinet.

The cabinet assembly shall be provided with a Power Distribution Assembly (PDA) number 2 and the circuit option (Section 6.4.3.9 of the Caltrans Specifications*).

All #8 conductors from service panel (TBS) and mercury contactor to signal bus and main equipment bus shall be 133 strand #29 AWG electronic hook–up wire.

A hybrid power line surge protection device such as the EDCO Surrestor SHA–1210 or equal shall be furnished in each controller cabinet. The protector shall be installed between the applied line voltage and earth ground. The surge protector shall be capable of reducing the effects of transient voltages apllied to the AC line. The protector shall be mounted inside the PDA#2. The Equipment Line Out shall provide filtered power to the controller, 24 VDC power supply, input file and conflict monitor through shielded cable or twisted pair to the units AC plus and AC minus inputs.

The protector shall include the following features and functions:

Maximum AC line voltage: 140 VAC.

Twenty pulses of peak current, each of which will rise in 8 microseconds and fall in 20 microseconds to one–half the peak: 20,000 Amperes.

The protector shall be provided with the following terminals:

Main line (AC Line first stage terminal).

Main Neutral (AC Neutral input terminals).

Equipment Line Out (AC Line second stage output terminal, 10 Amps.).

Equipment Neutral Out (Neutral terminal to protected equipment).

GND (Earth connection).

The Main AC line in and the Equipment Line out terminals shall be separated by a 200 Microhenry (minimum) inductor rated to handle 10 Amp AC Service.

The first stage clamp shall be between Main Line and Ground terminals.

The second stage clamp shall be between Equipment Line Out and Equipment Neutral.

Each cabinet shall be furnished with a communications terminal block, C2P harness and connector, voice jack harness, and voice jack, conforming to the requirements detailed in the Caltrans Specifications*.

TBO/Communications Termination Block – This terminal block will serve as the termination block for the communication conductors, overvoltage protection devices, and the termination points for the C2P harness and conductors. Install over voltage protection ground bus and hard wire to eqipment ground bus with #8AWG wire.

C2P Harness and Connector – A four–conductor, jacketed cable shall be attached to the terminal block with locking spade lugs. The cable shall terminate in a standard C2P connector and shall be routed through the cabinet and be of sufficient length to reach the C2S connector on the back of the 170 controller unit when the unit is installed in the equipment rack.

Voice Jack Harness – A two–conductor twisted, jacketed cable shall be attached to the terminal block with locking spade lugs. The cable shall be routed to the voice jack.

Voice Jack – A voice communications jack shall be installed with solder lugs extending out of the side of the jack housing and shall have a cover.

Each terminal on output terminal blocks to be marked as per phase function.

Jumper I 13–K to I 13–E to I 12–E to I 12–K to I 16–2.

Provide Fiberglas disposable filters in lieu of metal filters.

The input file printed circuit board must be accessible without removing or lowering panel.

The lifting eyes shall be removable.

Interchangeability of the Isolation Relay and Logic Relay shall not be possible.

Flash blocks to be accessible without lowering or opening any service panels and marked as per phase.

Red interface adapter to be programmable without tools.

Red interface adapter to be accessible without lowering or opening access panels.

Provide cable tie down (Richo #CFC C–8) or equivalent to secure red interface adapter cable to the bottom of the output file.

Anchor bolts to be provided with 332B Cabinet.

Additional Model 336A Cabinet Specifications:

The cabinet shall be a weatherproof, outdoor, pole–mounted or pedestal–mounted type with overall dimensions not to exceed 36" high by 22" wide by 20" deep. The cabinet will utilize all the standard plug–in modules that are utilized by the Type 336 Caltrans cabinets.

The bottom of all 336A cabinets shall be solid plate and be reinforced with a 22" wide by 20" deep, 3/8" aluminum base plate, continuously welded to the inside bottom of the cabinet.

Cabinets shall be attached to the pole using two aluminum mounting brackets, mounted top and bottom, for each cabinet. The brackets shall be secured to the cabinets using appropriate stainless steel mounting bolts and washers. The brackets shall be secured to the pole by appropriate banding buckles and couplings.

Door opening flange around the door opening shall be 7 1/2" wide.

Steel rails shall be provided in lieu of the rack cage for mounting of the controller and cabinet assemblies. The rail assembly shall consist of 4 EIA threaded rails bolted to the two sides at the front and rear of the cabinet. The rails shall be threaded in the same manner and pattern as the Model 332 cabinet cage. The rails shall be plated as specified in Caltrans Specifications*, Section 1.2.8.3.2.

The cabinet, if used for school signal control, shall be modified to operate flashing beacons by time–of–day, day–of–week through controller output.

E. Switch Pack

The components of the three solid state switches, enclosed in the load switch, shall be of interchangeable, modular cube design.

Cube to be mounted separate from circuit board for ease of replacement.

Housing and handle to be constructed of metal, suitably protected against corrosion.

F. Flasher Unit

Each of the two load circuits contained in the Flasher Unit shall be of interchangeable cube design.

Cube to be mounted separate from circuit board for ease of replacement.

Housing and handle to be constructed of metal, suitably protected against corrosion.

G. Zonal Master Controllers

The zonal master controller shall conform to the Type 170 specifications.

Insofar as possible, the boards from the master shall be interchangeable with those in the local 170's.

1. The zonal master 170's shall be configured with a second serial port. The second serial port shall be the same type as the primary serial port and address mapped to location 6002 (Hex) for control functions and location 6003 (Hex) for data functions. The second serial port shall be capable of operating at a clock rate of 300, 600, 1200, 2400, 4800, or 9600 baud. This selection shall be independent of the primary ACIA.

The signals from the second ACIA shall be routed to the rear panel of the 170 chassis and terminated in a 14–position connector identical to the C2 connector. This connector shall be marked C20S.

A 3' (three–foot) cable shall be provided to interconnect from the C20S connector to a standard DB25S connector on an auto dial modem.

2. All controllers shall be provided with a Model 400 Modem Module as detailed in Chapter 7 of the Caltrans Specifications*.

3. Each zonal master 170 controller unit shall be supplied with one (1) Model 412B2 System Memory Module. The module shall be provided with WAPITI Micro Systems W70SM, latest revision, software package, on 27256 EPROM.

02. AC SERVICE INPUT

Each service disconnect must be furnished with an installed lightning arrestor on the AC service input which meets or exceeds the following requirements:

A. The unit must be capable of withstanding repeated 20,000 ampere surges (minimum of 20).

B. The unit must have internal follow – current limiters (resistive elements).

C. The unit must contain three active clamping stages minimum.

D. The unit must self–extinguish within 8.3 milliseconds after the trailing edge of the surge.

E. The parallel impedance of limiters must be less than 0.15 OHMS.

F. The unit shall be UL approved.

Each service disconnect to have 70 AMP main lugs with no more than 4 circuits.

03. VEHICLE DETECTOR LOOP WIRE SEALANT

A. The saw slot filler and encapsulant shall be a one–part polyurethane, moisture curing, elastomeric compound requiring no mixing, measuring or application of heat prior to or during its installation and designed specifically for sealing and protecting vehicle detector loop wires.

B. The encapsulant is intended to provide compressive yield strength to withstand normal vehicular traffic as well as sufficient flexibility to withstand normal movement in asphaltic and concrete pavements, while protecting the loop wire from moisture penetration, fracture and shear.

C. The encapsulant shall be designed for roadway installation when surface temperature is between 5°C and 60°C and enable vehicular traffic to pass over the sawcut immediately after installation without tracking or stringing of the material. The encapsulant shall form a surface skin allowing exposure to vehicular traffic within 30 minutes at 24°C and completely cure to a tough, rubber–like consistency in two (2) to seven (7) days after installation.

D. Cured encapsulant shall exhibit resistance to effects of weather, vehicular abrasion, motor oils, gasoline, antifreeze solution, brake fluid, deicing chemicals and salt normally encountered, in such a manner that the performance of the vehicle detector loop wire is not adversely affected.

E. Filling of the sawcut shall be in accordance with the directions of the manufacturer.

04. PEDESTRIAN PUSHBUTTON ASSEMBLY

This specification is intended to provide minimum requirements for pedestrian pushbuttons that will be acceptable:

1. A one–piece cast aluminum raised sign legend with pushbutton housing.

2. Weatherproof and dustproof pedestrian pushbutton with silver contacts rated a minimum of 35 amps at 12 volts.

3. The legend "Push Button – Wait For Walk Signal" shall be cast into the face of the assembly.

4. Assembly to have 4" radius bracket mount for banding to pole.

05. AERIAL SPLICE BOX

The contractor shall furnish and install aerial enclosures for splicing overhead interconnect cable. Spliced enclosures shall be of polyethylene construction and be capable of accommodating up to a 12–pair cable. The enclosure shall provide easy access to aerial cable, while providing weather protection for the splice. No aerial splice boxes shall be installed at locations that cannot be accessed by a maintenance truck, or that require the climbing of a pole for service.

The enclosure shall have the following overall maximum exterior dimensions: 30" long, 10" high, and 4" wide. Minimum dimensions of 16" long 6" high, and 3 1/2" wide shall be provided for the interior compartment.

The enclosure cover shall be capable of easy removal for splicing the interconnect cable and easily stored for typical maintenance activity, such as replacement of interior termination blocks or cable diagnostics.

All communication cable conductors shall be accommodated on termination blocks provided within the enclosure. The aerial enclosure shall be capable of being installed while enclosing the overhead supporting messenger strand. Once installed, the enclosed messenger strand and interconnect cable shall appear as one unit under the splice cover.

06. TRAFFIC SIGNAL LAMPS

Lamps for vehicular and pedestrian signals shall meet the following requirements:

A. 300 mm Signals

A nominal 135 watt, 120 volt, A21 clear traffic signal lamp of 6,000 hour life rating guaranteed by the manufacturer, is to be used in all 12" vehicular and pedestrian indications. Lamps shall be 80% Krypton filled with heat reflection.

B. Candlepower

All traffic signal lamps must meet beam candlepower specification of ITE–1110(1970).

C. Mass Spectrometry Analysis

Mass Spectrometry Analysis to verify percent Krypton shall be provided with catalog cut sheets.

D. Signal backplates shall be aluminum.

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TRAFFIC SIGNAL EQUIPMENT

A. Detectors

* The detector shall provide for a "fail safe" continuous output in response to a detector failure.

Each detector unit shall provide interface capability with 22 and 44 pin, 170-type input file.

Each detector unit shall provide for selection of delay time of 0 to 30 seconds in 2.0 second increments and/or extension time of 0 to 7 1/2 seconds in 0.5 second increments or off if no timing is desired.

* Each timer (delay and extension) shall be provided with buffer circuitry to enable or disable the timer based on an external signal output.

Presence Radar Detection Specification

1.0 General. This item shall govern the purchase of aboveground radar presence detector (RPD) equivalent to the Wavetronix SmartSensor Matrix.
An RPD detects vehicles by transmitting electromagnetic radar signals through the air. The signals bounce off vehicles in their paths and part of the signal is returned to the RPD. The returned signals are then processed to determine traffic parameters.
RPDs are not affected by normal weather and environmental conditions such as rain, wind, snow, dust, etc. They also do not require cleaning and can maintain performance over a wide range of ambient temperatures.
RPDs provide a non-intrusive means of detecting traffic. This property not only makes them safer to install but also more cost effective than sensors that require roadway modifications or placement.

2.0 Sensor Outputs. The RPD shall present real-time presence data in 10 lanes.
The RPD shall support a minimum of eight zones.
The RPD shall support a minimum of four channels.
The RPD shall support user-selectable zone to channel mapping.
The RPD shall use AND logic to trigger channels when all selected zones are active.
The RPD shall use OR logic to combine multiple zones to a channel output, and shall have channel output extend and delay functionality.
The RPD algorithms shall mitigate detections from wrong way or cross traffic.
The RPD system shall have fail-safe mode capabilities for contact closure outputs if communication is lost.

3.0 Detectable Area.
3.1 Detection Range. The RPD shall be able to detect and report presence in lanes with boundaries as close as 6 ft. (1.8 m) from the base of the pole on which the RPD is mounted.
The RPD shall be able to detect and report presence in lanes located within the 100 ft. (30.5 m) arc from the base of the pole on which the RPD is mounted.
3.2 Field of View. The RPD shall be able to detect and report presence for vehicles within a 90 degree field of view.
3.3 Lane Configuration. The RPD shall be able to detect and report presence in up to 10 lanes.
The RPD shall be able to detect and report presence in curved lanes and areas with islands and medians.

4.0 System Hardware. For each approach to be detected, one RPD corner radar shall be used.
4.1 Preassembled Backplate. Each RPD shall have a traffic cabinet preassembled backplate with the following:
- AC/DC power conversion
- Surge protection
- Terminal blocks for cable landing
- Communication connection points

The preassembled backplate for the RPD shall be a cabinet side mount or rack mount.
4.2 Contact Closure Input File Cards. The RPD shall use contact closure input file cards with 2 or 4 channel capabilities.
The contact closure input file cards for the RPD shall be compatible with industry standard detector racks.

5.0 Maintenance. The RPD shall not require cleaning or adjustment to maintain performance.
The RPD shall not rely on battery backup to store configuration information, thus eliminating any need for battery replacement.
Once the RPD is calibrated, it shall not require recalibration to maintain performance unless the roadway configuration changes.
The mean time between failures shall be 10 years, which is estimated based on manufacturing techniques.

6.0 Physical Properties. The RPD shall not exceed 4.2 lbs. (1.9 kg) in weight.
The RPD shall not exceed 13.2 in. by 10.6 in. by 3.3 in. (33.5 cm x 26.9 cm x 8.4 cm) in its physical dimensions.
All external parts of the RPD shall be ultraviolet-resistant, corrosion-resistant, and protected from fungus growth and moisture deterioration.
6.1 Enclosure. The RPD shall be enclosed in a Lexan EXL polycarbonate.
The enclosure shall be classified "11" outdoor weatherability in accordance with UL 746C.
The RPD shall be classified as watertight according to the NEMA 250 standard.
The RPD enclosure shall conform to test criteria set forth in the NEMA 250 standard for type 4X enclosures. Test results shall be provided for each of the following type 4X criteria:
- External icing (NEMA 250 clause 5.6)
- Hose-down (NEMA 250 clause 5.7)
- 4X corrosion protection (NEMA 250 clause 5.10)
- Gasket (NEMA 250 clause 5.14)

The RPD shall be able to withstand a drop of up to 5 ft. (1.5 m) without compromising its functional and structural integrity.
The RPD enclosure shall include a connector that meets the MIL-C-26482 specification. The MIL-C-26482 connector shall provide contacts for all data and power connections.

7.0 Electrical. The RPD shall consume less than 10 W.
The RPD shall operate with a DC input between 9 VDC and 28 VDC.
The RPD shall have onboard surge protection.

8.0 Communication Ports. The RPD shall have two communication ports, and both ports shall communicate independently and simultaneously.
Two independent communication ports allow one port to be used for configuration, verification and traffic monitoring without interrupting communications on the dedicated data port.
The RPD shall support the upload of new firmware into the RPD's non-volatile memory over either communication port.
The RPD shall support the user configuration of the following:
- Response delay
- Push port

The communication ports shall support a 9600 bps baud rate.

9.0 Radar Design. The RPD shall be designed with a matrix of radars.
The matrix of radars enables the sensor to provide detection over a large area and to discriminate lanes.
9.1 Frequency Stability. The circuitry shall be void of any manual tuning elements that could lead to human error and degraded performance over time.
All transmit modulated signals shall be generated by means of digital circuitry, such as a direct digital synthesizer, that is referenced to a frequency source that is at least 50 parts per million (ppm) stable over the specified temperature range, and ages less than 6 ppm per year. Any upconversion of a digitally generated modulated signal shall preserve the phase stability and frequency stability inherent in the digitally generated signal.
This specification ensures that, during operation, the RPD strictly conforms to FCC requirements and that the radar signal quality is maintained for precise algorithmic quality. Analog and microwave components within an RPD have characteristics that change with temperature variations and age. If the output transmit signal is not referenced to a stable frequency source, then the RPD is likely to experience unacceptable frequency variations which may cause it to transmit out of its FCC allocated band and thus will be non-compliant with FCC regulations.
The RPD shall not rely on temperature compensation circuitry to maintain transmit frequency stability.
Temperature-based compensation techniques have been shown to be insufficient to ensure transmit frequency stability.
One reason this type of technique is not sufficient is that it does not compensate for frequency variations due to component aging.
The bandwidth of the transmit signal of the RPD shall not vary by more than 1% under all specified operating conditions and over the expected life of the RPD.
The bandwidth of an RPD directly affects the measured range of a vehicle. A change in bandwidth causes a direct error in the measured range, i.e., a 5% change in bandwidth would cause a range error of 10 ft. (3 m) for a vehicle at 200 ft. (61 m).
If the bandwidth changes by more than 1% due to seasonal temperature variations and component aging, then the RPD will need to be frequently reconfigured to maintain the specified accuracy.

9.2 Antenna Design. The RPD antennas shall be designed on printed circuit boards.
Printed circuit board antennas eliminate the need for RF connectors and cabling that result in decreased reliability. Printed circuit antennas are less prone to physical damage due to their extremely low mass.
The vertical beam width of the RPD at the 6 dB points of the two-way pattern shall be 65 degrees or greater.
The antennas shall cover a 90 degree horizontal field of view.
The sidelobes in the RPD two-way antenna pattern shall be -40 dB or less.
Low sidelobes ensure that the performance from the antenna beam widths is fully achieved.
9.3 Resolution. The RPD shall transmit a signal with a bandwidth of at least 245 MHz.
The bandwidth of the transmit signal translates directly into radar resolution, which contributes directly to detection performance. For example, an RPD that transmits at a low bandwidth will have low radar resolution, which could cause it to count a single vehicle as two vehicles in adjacent lanes. As another example of the adverse effects of low radar resolution, the response from a sign or other radar target in the roadway may spill over into the lanes of travel and desensitize the radar. In order to achieve the specified detection accuracy in a variety of conditions, the unwindowed radar resolution cannot be larger than 2 ft. (0.6 m) at the half-power level, which requires a bandwidth of 240 MHz. The high radar resolution reduces the problem of vehicle responses getting drowned out by brighter vehicles in adjacent lanes and improves performance for moving and stopped vehicles near roadway targets.
9.4 RF Channels. The RPD shall provide at least 8 RF channels so that multiple units can be mounted in the same vicinity without causing interference between them.
9.5 Verification. The RPD shall have a self-test that is used to verify correct hardware functionality.
The RPD shall have a diagnostics mode to verify correct system functionality.

10.0 Configuration.
10.1 Auto-configuration. The RPD shall have a method for automatically defining traffic lanes, stop bars and zones with-out requiring user intervention. This auto-configuration process shall execute on a processor internal to the RPD and shall not require an external PC or other processor.
The auto-configuration process shall work under normal intersection operation and may require several cycles to complete.
10.2 Manual Configuration. The auto-configuration method shall not prohibit the ability of the user to manually adjust the RPD configuration.
The RPD shall support the configuring of lanes, stop bars and detection zones in 1-ft. (0.3-m) increments.
When lanes have variable widths or have variable spacing (e.g. gore between lanes), precise resolution is necessary.
10.3 Windows? Mobile-based Software. The RPD shall include graphical user interface software that displays all configured lanes and the current traffic pattern using a graphical traffic representation.
A visual representation of traffic patterns allows an installer to quickly associate specific detections with corresponding vehicles, and it facilitates verification of RPD performance.
The graphical interface shall operate on Windows Mobile, Windows XP, Windows Vista and Windows 7 in the .NET framework.
The software shall support the following functionality:
- Operate over a TCP/IP connection
- Give the operator the ability to save/back up the RPD configuration to a file or load/restore the RPD configuration from a file
- Allow the backed-up sensor configurations to be viewed and edited
- Provide zone and channel actuation display
- Provide a virtual connection option so that the software can be used without connecting to an actual sensor
- Local or remote sensor firmware upgradability

11.0 Operating Conditions. The RPD shall maintain accurate performance in all weather conditions, including rain, freezing rain, snow, wind, dust, fog and changes in temperature and light, including direct light on sensor at dawn and dusk.
RPD operation shall continue in rain up to 1 in. (2.5 cm) per hour.
The RPD shall be capable of continuous operation over an ambient temperature range of -40°F to 165.2°F (-40°C to 74°C).
The RPD shall be capable of continuous operation over a relative humidity range of 5% to 95% (non-condensing).

12.0 Testing.
12.1 FCC. Each RPD shall be certified by the Federal Communications Commission (FCC) under CFR 47, part 15, section 15.249 as an intentional radiator.
The FCC certification shall be displayed on an external label on each RPD according to the rules set forth by the FCC.
The RPD shall comply with FCC regulations under all specified operating conditions and over the expected life of the RPD.
12.2 NEMA TS 2-2003 Testing. The RPD shall comply with the applicable standards stated in the NEMA TS 2-2003 standard. Third party test results shall be made available for each of the following tests:
- Shock pulses of 10 g, 11 ms half sine wave
- Vibration of 0.5 g up to 30 Hz
- 300 V positive/negative pulses applied at one pulse per second at minimum and maximum DC supply voltage
- Cold temperature storage at -49°F (-45°C) for 24 hours
- High temperature storage at 185°F (85°C) for 24 hours
- Low temp, low DC supply voltage at -29.2°F (-34°C) and 10.8 VDC
- Low temp, high DC supply voltage at -29.2°F (-34°C) and 26.5 VDC
- High temp, high DC supply voltage at 165.2°F (74°C) and 26.5 VDC
- High temp, low DC supply voltage at 165.2°F (74°C) and 10.8 VDC

13.0 Manufacturing. The RPD shall be manufactured and assembled in the USA.
The internal electronics of the RPD shall utilize automation for surface mount assembly, and shall comply with the requirements set forth in IPC-A-610C Class 2, Acceptability of Electronic Assemblies.
The RPD shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include the following:
- Functionality testing of all internal sub-assemblies
- Unit level burn-in testing of 48 hours duration or greater
- Final unit functionality testing prior to shipment

Test results and all associated data for the above testing shall be provided for each purchased RPD by serial number, upon request.

14.0 Support. The RPD manufacturer shall provide both training and technical support services.
14.1 Training. The manufacturer-provided training shall be sufficient to fully train installers and operators in the installation, configuration, and use of the RPD to ensure accurate RPD performance.
The manufacturer-provided training shall consist of comprehensive classroom labs and hands-on, in-the-field, installation and configuration training.
Classroom lab training shall involve presentations outlining and defining the RPD, its functions, and the procedures for proper operation. These presentations shall be followed by hands-on labs in which trainees shall practice using the equipment to calibrate and configure a virtual RPD. To facilitate the classroom presentation and handson labs, the manufacturer-provided training shall include the following items:
- Knowledgeable trainer or trainers thoroughly familiar with the RPD and its processes
- Presentation materials, including visual aids, printed manuals and other handout materials for each student
- Computer files, including video and raw data, to facilitate the virtual configuration of the RPD
- Laptop computers or Windows CE handheld devices with the necessary software, and all necessary cables, connectors, etc.
- All other equipment necessary to facilitate the virtual configuration of the RPD

Field training shall provide each trainee with the hands-on opportunity to install and configure the RPD at roadside.
Training shall be such that each trainee will mount and align the RPD correctly.

* Edits to the standard specifications were made.

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14.2 Technical Assistance. Manufacturer-provided technical support shall be available according to contractual agreements, and a technical representative shall be available to assist with the physical installation, alignment, and auto-configuration of each supplied RPD. Technical support shall be provided thereafter to assist with troubleshooting, maintenance, or replacement of RPDs should such services be required.

15.0 Documentation. RPD documentation shall include an instructional training guide and a comprehensive user guide as well as an installer quick-reference guide and a user quick-reference guide.
The RPD manufacturer shall supply the following documentation and test results at the time of the bid submittal:
- FCC CFR 47 certification (frequency compliance)
- IED 6100-4-5 class 4 test report (surge)

16.0 Warranty. The RPD shall be warranted free from material and workmanship defects for a period of two years from date of shipment.

Presence Radar Detection Specification
1.0 General. This item shall govern the purchase of aboveground continuous tracking advance detector (CTAD) equivalent to the Wavetronix SmartSensor Advance.
A CTAD detects vehicles by transmitting electromagnetic radar signals through the air. The signals bounce off vehicles in their paths and part of the signal is returned to the CTAD.
The returned signals are then processed to determine traffic parameters. CTADs are not affected by normal weather and environmental conditions such as rain, wind, snow, dust, etc. They also do not require cleaning and can maintain performance over a wide range of ambient temperatures.
CTADs provide a non-intrusive means of detecting traffic because they can be installed at the side of a roadway. This property not only makes them safer to install but also more cost-effective than sensors that require roadway modifications or placement.

2.0 Measured Quantities and Outputs. The CTAD shall detect range, speed, vehicle estimated time of arrival (ETA) to the stop bar for vehicles or clusters of vehicles moving in the user-selected direction of travel. The CTAD shall also detect instantaneous roadway efficiency.
The CTAD shall be able to simultaneously detect and report information from up to 25 vehicles on the roadway when they are serially sequenced between the near and far boundaries.
The CTAD shall turn on a zone output when the range, speed, ETA, and qualified count or instantaneous roadway efficiency requirements for that zone are satisfied.
The CTAD shall turn on an alert output on when the userdefined zone output combinational logical is satisfied.
The CTAD shall turn on a normal channel output when any of the channel's alerts is on and the channel's delay and extend time constraints are satisfied.
The CTAD shall turn on a latched channel output when the on alert is turned on and the delay time is satisfied. The CTAD shall turn off a latched channel output when the off alert is turned on or the max timer expires and the extension time is satisfied.
Channel outputs are used to create contact closures which can be used as inputs into a traffic controller.
The CTAD shall provide vehicle call and extend data on up to eight channels that can be connected to contact closure modules compliant with NEMA TS 1, NEMA TS 2, 170, and 2070 controller cabinets.
The CTAD shall be capable of providing data for each tracked detection over the serial ports.

3.0 Detectable Area.
3.1 Mounting Location. The CTAD shall be able to detect and report vehicle information when mounted within 50 ft. (15.2 m) of the center of the lanes of interest.
The CTAD shall be able to detect and report vehicle information when mounted at heights up to 40 ft. (12.2 m) above the road surface.
3.2 Detection Range. The CTAD shall be able to detect and report information on the roadway located with the near boundary at 50 ft. (15.2 m) from the base of the pole on which the CTAD is mounted.
The CTAD shall be able to detect and report information on the roadway located with the far boundary at 500 ft. (152.4 m) from the base of the pole on which the CTAD is mounted.
For incoming traffic, 95 percent of large vehicles within the line-of-site of the CTAD shall be detected and reported before they arrive 400 ft. (121.9 m) from the sensor. For incoming traffic, 90 percent of all motor vehicles within the line-of-site of the CTAD shall be detected and reported before they arrive 400 ft. (121.9 m) from the sensor.

4.0 Performance.
4.1 Detection Accuracy. The CTAD shall detect at least 98 percent of large vehicles like truck-trailer combinations and at least 95 percent of all motor vehicles within the line-of-sight of the CTAD sensor where multiple detections of multiunit vehicles are not considered false detections and merged detections of adjacent lane vehicles are not considered missed detections.
4.2 Range Accuracy. The CTAD shall provide range measurements in which 90% of the measurements are accurate within 10 ft. (3 m) when the vehicle is tracked independently.
4.3 Speed Accuracy. The CTAD shall provide per vehicle speed measurements in which 90% of the measurements are accurate within 5 mph (8 kph) when tracked independently.
4.4 ETA Accuracy. The CTAD shall provide estimated time-of-arrival (ETA) measurements in which 85% of the measurements are accurate within one second, when the detected vehicles are tracked independently at a constant speed above 40 mph (64 kph) and are within 2.5 and 5.5 seconds of the stop bar.

5.0 Performance Maintenance. The CTAD shall not require cleaning or adjustment to maintain performance.
The CTAD shall not rely on battery backup to store configuration information, thus eliminating any need for battery replacement.
Once the CTAD is calibrated, it shall not require recalibration to maintain performance unless the roadway configuration changes.
The mean time between failures shall be 10 years, which is estimated based on manufacturing techniques.

6.0 Physical Properties. The CTAD shall not exceed 4 lbs. (1.8 kg) in weight.
The CTAD shall not exceed 14 in. x 11 in. x 4 in. (35.6 cm x 27.9 cm x 10.2 cm) in its physical dimensions.
All external parts of the CTAD shall be ultraviolet-resistant, corrosion-resistant, and protected from fungus growth and moisture deterioration.
6.1 Enclosure. The CTAD shall be enclosed in a Lexan polycarbonate.
The enclosure shall be classified "f1" outdoor weatherability in accordance with UL 746C.
The CTAD shall be classified as watertight according to the NEMA 250 standard.
The CTAD enclosure shall conform to test criteria set forth in the NEMA 250 standard for type 4X enclosures. Test results shall be provided for each of the following type 4X criteria:
- External icing (NEMA 250 clause 5.6)
- Hose-down (NEMA 250 clause 5.7)
- 4X corrosion protection (NEMA 250 clause 5.10)
- Gasket (NEMA 250 clause 5.14)

The CTAD shall be able to withstand a drop of up to 5 ft. (1.5 m) without compromising its functional and structural integrity.
The CTAD enclosure shall include a connector that meets the MIL-C-26482 specification. The MIL-C-26482 connector shall provide contacts for all data and power connections.

7.0 Electrical. The CTAD shall consume less than 4 W @ 12 VDC.
The CTAD shall operate with a DC input between 12 VDC and 28 VDC.
The CTAD shall have onboard surge protection.

8.0 Communication Ports. The CTAD shall have two communication ports, and both ports shall communicate independently and simultaneously.
Two independent communication ports allow one port to be used for configuration, verification and traffic monitoring without interrupting communications on the dedicated data port.
The CTAD shall support the upload of new firmware into the CTAD?s non-volatile memory over either communication port.
The CTAD shall support the user configuration of the following:
- Baud rate
- Communication port response delay
- Contact closure output frequency

Both communication ports shall support all of the following baud rates: 9600, 19200, 38400, 57600 and 115200 bps.
The contact closure output frequency shall be user configurable as short as 10 ms, with a default near 130 ms for compatibility.
Contact closure data shall be reliably communicated over homerun cable connections as long as 600 ft. (182.9 m) with latency from the time of channel requirement satisfaction to the eventual reporting of the detections on the back edge of the contact closure card in 15 ms or less.

9.0 Radar Design.
9.1 Frequency Stability. The circuitry shall be void of any manual tuning elements that could lead to human error and degraded performance over time.
All transmit modulated signals shall be generated by means of digital circuitry, such as a direct digital synthesizer, that is referenced to a frequency source that is at least 50 parts per million (ppm) stable over the specified temperature range, and ages less than 6 ppm per year. Any upconversion of a digitally generated modulated signal shall preserve the phase stability and frequency stability inherent in the digitally generated signal.
This specification ensures that, during operation, the CTAD strictly conforms to FCC requirements and that the radar signal quality is maintained for precise algorithmic quality. Analog and microwave components within a CTAD have characteristics that change with temperature variations and age. If the output transmit signal is not referenced to a stable frequency source, then the CTAD is likely to experience unacceptable frequency variations which may cause it to transmit out of its FCC allocated band and thus will be non-compliant with FCC regulations.
The CTAD shall not rely on temperature compensation circuitry to maintain transmit frequency stability.
Temperature-based compensation techniques have been shown to be insufficient to ensure transmit frequency stability. One reason this type of technique is not sufficient is that it does not compensate for frequency variations due to component aging.
The bandwidth of the transmit signal of the CTAD shall not vary by more than 1% under all specified operating conditions and over the expected life of the CTAD.
9.2 Antenna Design. The CTAD antennas shall be designed on printed circuit boards. Printed circuit board antennas eliminate the need for RF connectors and cabling that result in decreased reliability. Printed circuit antennas are less prone to physical damage due to their extremely low mass.
The vertical beam width of the CTAD at the 6 dB points of the two-way pattern shall be 65 degrees or greater.
This enables the CTAD to provide simultaneous detection from the nearest to the farthest ranges. The vertical beam width of a CTAD determines the field of view in which it can detect traffic.
The horizontal beam width of the CTAD at the 6 dB points of the two-way pattern shall be 11 degrees or less.
A narrow horizontal beam width narrows the field of view of the CTAD to the lanes of interest and helps to exclude the traffic traveling in the opposite direction.
The sidelobes in the CTAD two-way antenna pattern shall be -40 dB or less.
Low sidelobes ensure that the performance from the antenna beam widths is fully achieved.
9.3 RF Channels. The CTAD shall provide at least four RF channels so that multiple units can be mounted in the same vicinity without causing interference between them.

10.0 Configuration.
10.1 Auto-configuration. The CTAD shall have a method for automatically configuring the sensitivity of detection in at least 5-ft. (1.5-m) increments.
This allows the sensor to quickly and accurately record the intensity of roadside clutter and set appropriate rejection thresholds to avoid false detections at different ranges.
The auto-configuration method shall not prohibit the ability of the user to manually adjust the CTAD configuration.
The CTAD shall support the configuration of up to eight channel outputs with up to four alerts per channel and up to four zones per alert, resulting in 32 configurable alerts and 128 configurable zones.
10.2 Zone Configuration. The CTAD shall support the configuring of zones in 5-ft. (1.5-m) increments.
The CTAD shall support detection zones as long as 450 ft. (137.2 m).
The ability to define one large zone simplifies and enhances configuration when compared to point detection schemes.
The CTAD shall support user configurable high-speed and low-speed detection filters for each zone.
The CTAD shall support the configuring of speed filters in 1-mph (1.6-kph) increments.
The speed thresholds can be used to provide superior gap management for green extension applications at signalized intersections, especially when a high-speed traffic stream presents a limited number of opportunities to gap out. For example, when the operational objective is to increase safety by extending the green light for law-abiding high-speed drivers, reporting of low-speed vehicles is not desirable. On the other hand, when the operational objective is to increase efficiency by extending the green light for clearance of a low-speed traffic queue, reporting of high-speed vehicles is not desirable.
In addition, these speed filters can be configured to screen out reporting of detections that may adversely impact operational objectives.
For example, low speed filters can also be used to screen out detection of low-speed clutter like unwanted detection of turn-only boys, pedestrians, swaying trees, and vibrating signs.
The CTAD shall support user configurable upper and lower estimated time-of-arrival (ETA) filters for each zone.
The CTAD shall support the configuring of ETA filters in increments of 0.1 seconds.
The ETA thresholds can be used to provide superior gap management for green extension applications at signalized intersections, especially when a high-speed traffic stream presents a limited number of opportunities to gap out. For example, when the operational objective is to increase safety by extending the green light for law-abiding high-speed drivers, reporting of vehicles upstream of 5.5 seconds and downstream of 2.5 seconds may not be desirable. Vehicles with 2.5 to 5.5 seconds are commonly considered to be in the driver dilemma zone when the light turns yellow. However, motorists closer than 2.5 seconds can easily clear the intersection and those beyond 5.5 seconds can be expected to stop. Dilemma zone protection has been shown to reduce red-light running and rearend collisions.
ETA filtering provides a dynamic form of dilemma zone protection that adapts when traffic speeds rise above or fall below design assumptions used with traditional methods of fixed-point detection. ETA filtering also constrains reporting of detections to provide more gap out opportunities, avoid the likelihood of reaching maximum green, and maximize the effective use of green by timing clearance of the last vehicle. Therefore, ETA filtering also provides practical efficiency benefits.
The CTAD shall provide configurable upper and lower count filters that help determine if a required number of qualified detections are present.
The CTAD shall support the configuring of qualified count filters in increments of one.
These filters can be to provide superior gap management for green extension applications at signalized intersections, especially when a high-speed traffic stream presents a limited number of opportunities to gap out.
Qualified count is tied to the number of vehicles that meet the range, speed and ETA requirements of a zone. For example, for green extension it may be required that there are two vehicles detected within 2.5 to 5.5 seconds of the stop bar traveling above 35 mph (56 kph), instead of just one. The logic is that if only one vehicle is in the dilemma zone, this is not as threatening as if there are two vehicles (one following the other). The following vehicle may incorrectly assume that the lead vehicle will try to clear the intersection and cause a rear-end collision. Rear-end collisions are the most common form of collision at a signalized intersection.
10.3 Windows?-based Software. The CTAD shall include graphical user interface software that displays the current traffic pattern using a graphical traffic representation.
A visual representation of traffic patterns allows an installer to quickly associate specific detections with corresponding vehicles, and it facilitates verification of CTAD performance.
The graphical user interface shall also display all configured alerts and provide visual representation of their actuation.
The graphical user interface shall provide a means of logging the vehicular track files with an update rate of greater than five times per second.
The user configured baud rate will effect the rate at which log files are logged. This requirement must be met at higher baud rates.
The graphical interface shall operate on Windows Mobile, Windows XP, Windows Vista, and Windows 7 in the .NET framework.
The software shall support the following functionality:
- Automatically find the correct baud rate
- Automatically find the correct serial communication port
- Operate over a TCP/IP connection
- Provide a virtual sensor connection for software usability without a sensor
- Give the operator the ability to save/back up the CTAD configuration to a file or load/restore the CTAD configuration from a file

11.0 Operating Conditions. The CTAD shall maintain accurate performance in all weather conditions, including rain, freezing rain, snow, wind, dust, fog and changes in temperature and light, including direct light on sensor at dawn and dusk.
CTAD operation shall continue in rain up to 4 in. (10.2 cm) per hour.
The CTAD shall be capable of continuous operation over an ambient temperature range of -40?F to 165?F (-40?C to 74?C).
The CTAD shall be capable of continuous operation over a relative humidity range of 5% to 95% (non-condensing).

12.0 Testing.
12.1 FCC. Each CTAD shall be Federal Communications Commission (FCC) certified under CFR 47, part 15, section 15.245 or 15.249 as an intentional radiator.
The FCC certification shall be displayed on an external label on each CTAD according to the rules set forth by the FCC.
The CTAD shall comply with FCC regulations under all specified operating conditions and over the expected life of the CTAD.
12.2 NEMA TS 2-1998 Testing. The CTAD shall comply with the applicable standards stated in the NEMA TS 2-1998 Standard. Third party test results shall be made available for each of the following tests:
- Shock pulses of 10 g, 11 ms half sine wave
- Vibration of 0.5 g up to 30 Hz
- 300 V positive/negative pulses applied at one pulse per second at minimum and maximum DC supply voltage
- Cold temperature storage at -49?F (-45?C) for 24 hours
- High temperature storage at 185?F (85?C) for 24 hours
- Low temp, low DC supply voltage at -29.2?F (-34?C) and 10.8 VDC
- Low temp, high DC supply voltage at -29.2?F (-34?C) and 26.5 VDC
- High temp, high DC supply voltage at 165.2?F (74?C) and 26.5 VDC
- High temp, low DC supply voltage at 165.2?F (74?C) and 10.8 VDC

13.0 Manufacturing. The CTAD shall be manufactured and assembled in the USA.
The internal electronics of the CTAD shall utilize automation for surface mount and wave solder assembly, and shall comply with the requirements set forth in IPC-A-610C Class 2, Acceptability of Electronic Assemblies.
The CTAD shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include the following:
- Functionality testing of all internal sub-assemblies
- Unit level burn-in testing of 48 hours? duration or greater
- Final unit functionality testing prior to shipment

Test results and all associated data for the above testing shall be provided for each purchased CTAD by serial number, upon request.

14.0 Support. The CTAD manufacturer shall provide both training and technical support services.
14.1 Training. The manufacturer-provided training shall be sufficient to fully train installers and operators in the installtaion, auto-configuration, and use of the CTAD to ensure accurate CTAD performance.
The manufacturer-provided training shall consist of comprehensive classroom labs and hands-on, in-the-field, installation and configuration training.
Classroom lab training shall involve presentations outlining and defining the CTAD, its functions, and the procedures for proper operation. These presentations shall be followed by hands-on labs in which trainees shall practice using the equip-ment to calibrate and configure a virtual CTAD. To facilitate the classroom presentation and hands-on labs, the manufac-turer-provided training shall include the following items:
- Knowledgeable trainer or trainers thoroughly familiar with the CTAD and its processes
- Presentation materials, including visual aids, printed manuals and other handout materials for each student
- Computer files, including video and raw data, to facilitate the virtual configuration of the CTAD
- Laptop computers or Windows CE handheld devices with the necessary software, and all necessary cables, connec-tors, etc.
- All other equipment necessary to facilitate the virtual configuration of the CTAD

Field training shall provide each trainee with the hands-on opportunity to install and configure the CTAD at the roadside.
Training shall be such that each trainee will mount and align the CTAD correctly.
14.2 Technical Assistance. The manufacturer-provided technical support shall be available according to contractual agree-ments and a technical representative available to assist with the physical installation, alignment, and configuration of each supplied CTAD. Technical support shall be provided thereafter to assist with troubleshooting, maintenance, or replacement of CTADs should such services be required.

15.0 Documentation. CTAD documentation shall include a comprehensive user guide as well as an installer quick-reference guide and a user quick-reference guide.
The CTAD manufacturer shall supply the following documentation and specification test results at the time of the bid submittal:
- Detection accuracy
- Range accuracy
- Earliest range of detection
- Speed accuracy
- ETA accuracy
- FCC CFR 47 certification
- NEMA 250 standard for Type 4X Enclosure third-party test data
- NEMA TS 2-1998 standard third-party test data

16.0 Warranty. The CTAD shall be warranted free from material and workmanship defects for a period of two years from date of shipment.

Radar 6-conductor Cable
1.0 General. This item shall govern the purchase of a traffic sensor-to-traffic cabinet cable equivalent to the Wavetronix SmartSensor 6-conductor cable.
2.0 Cable. The cable shall be the Orion Wire Combo-2204-2002-PVCGY or an equivalent cable that conforms to the following specifications:
- The RS-485 conductors shall be 2 twisted pairs.
- The RS-485 conductors shall have nominal capacitance conductor to conductor of less than 40 pF/ft at 1 kHz.
- The RS-485 conductors shall have nominal conductor DC resistance of less than 16.7 ohms/1000 ft. at 20?C.
- The power conductors shall be a twisted pair.
- The power conductors shall have nominal conductor DC resistance of less than 11 ohms/1000 ft. at 20?C.
- The entire cable shall be shielded with an aluminum/polyester shield with a drain wire.
- The cable jacket shall be made of gray PVC that is 0.053 in. (1.3 mm) thick.
- The cable shall have a diameter of 0.41 in. (1.04 cm).
- The power wires in the cable shall be 20 AWG; the communications wires shall be 22 AWG.
- The cable shall be RoHS compliant.
- The cable shall have a UL/cUL type CMG safety approval.
- The cable shall be cable of operating at temperatures up to 221?F (105?C) while dry and 167?F (75?C) while wet.
- The cable shall have an FT4 flammability rating.
- The cable shall be UV resistant, as per the UL 720 Hour Sunlight Resistance Test.

3.0 Connector. The cable end connector shall meet the MIL-C-26482 specification and shall be designed to interface with the appropriate MIL-C-26482 connector. The connector backshell shall be an environmentally sealed shell that offers excellent immersion capability. All conductors that interface with the connector shall be encased in a single jacket, and the outer diameter of this jacket shall be within the backshell's cable O.D. range to ensure proper sealing. The backshell shall have a strain relief with enough strength to support the cable slack under extreme weather conditions. Recommended connectors are Cannon's KPT series, and recommended backshells are Glenair Series 37 cable sealing backshells.

Radar Cable Junction Box
1.0 General. This item shall govern the purchase of a junction box (JB) equivalent to the Wavetronix SmartSensor 6-conductor cable junction box.
2.0 Physical. The JB shall not exceed 6.3 in. x 3.6 in. x 2.4 in. (16 cm x 9 cm x 6 cm) in its dimensions.
The JB's cable grip shall allow for a cable with a diameter of 0.2 in.-0.5 in. (5 mm-12.7 mm).
The JB shall be designed to meet IP 66 & NEMA 250 type 1, 3R, 4X, 6P and 12 ratings.
The JB shall be made of fiberglass and include an aluminum backplate.
3.0 Connector Block. The JB shall have nine terminal blocks;
these blocks' connections shall employ insulation displacement technology. The JB shall have a nominal current of 17.5 A and a nominal voltage of 500 V. Its maximum load current shall be 17.5 A. The JB shall accept wire ranging in size from 24-16 AWG.

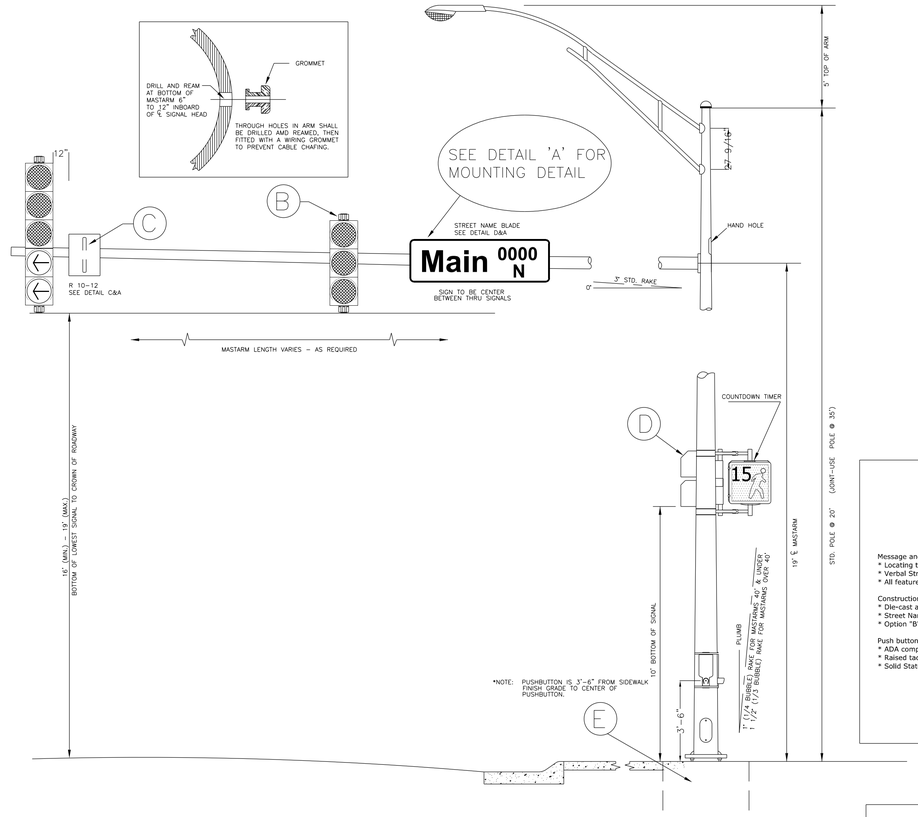
Intersection Radar Preassembled 19-inch Rack
1.0 General. This item shall govern the purchase of a preassembled 19-inch rack (PR) equivalent to the Wavetronix Intersection Preassembled 19-inch Rack, as part of a system involving a radar presence detector (RPD) system or a continuous tracker advance detector (CTAD) system.
2.0 Product Description. The PR shall be a preassembled 19-inch rack to be installed in a server rack. The PR shall include the following elements (where multiple models of the same device are listed, their use depends on whether the PR is meant to support two or four sensors): a DC power supply equivalent to the Click! 202/204; a circuit breaker equivalent to the Click! 210/210-02; an AC surge suppresion device equivalent to the Click! 230; a system surge protection device equivalent ot the Click! 222; T-bus connectors and end blocks; terminal blocks for sensor cable termination; terminal blocks for AC line input; end blocks for stabilization and spacing; and a 19-inch rack as a mounting platform.

Radar Mount
1.0 General. This item shall govern the purchase of a traffic sensor mounting assembly equivalent to the Wavetronix SmartSensor mount.
2.0 Mounting. The mounting assembly shall provide at least two axes of rotation to ensure proper installation.
The mounting assembly shall be able to support at least a 15-lb. (6.8-kg) load.
The mounting assembly shall feature a symmetric hole pattern that mates with fixed and rotational SmartSensor backplates.
The mounting assembly shall have two contact points with the pole.
The mounting assembly shall be slotted for 3/4-in. (1.9-cm) banding.
3.0 Construction. The mounting assembly be constructed of 0.1875 in. (0.48 cm) thick or thicker aluminum with 316 stainless steel hardware.
The mounting assembly shall be powder coated for oxidation resistance.

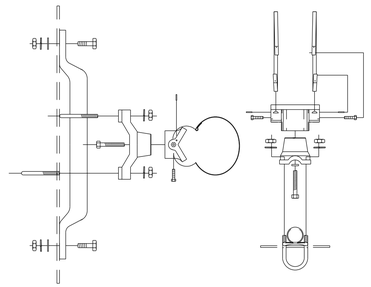
CITY OF WICHITA

TRAFFIC SIGNAL SPECIFICATION
AMERICAN STANDARD

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4/15/2015
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SURV. - PLOT CADD DES. - DR. - TR. CKD. - APP. -

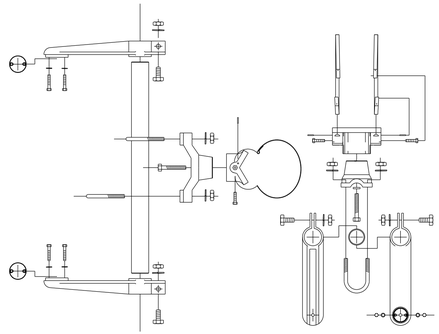


BANDED SIGN MOUNTING BRACKET DETAIL



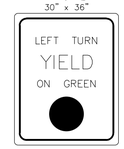
A

TYPE I SIGNAL MOUNTING BRACKET ASSEMBLY DETAIL



B

STANDARD SIGNING



C

DWG. NO.
N45AN0-X

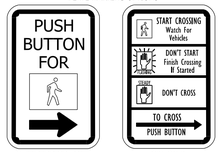
PUSH BUTTON STATION

Message and Sound options include:
* Locating tone
* Verbal Street Name (Example: Crossing Main at Central)
* All features field selectable using a Configurator.

Construction :
* Die-cast aluminum, powder coated Black in color.
* Street Name In Braille In the directional arrow of the sign.
* Option "B" signing option.

Push button :
* ADA compliant
* Raised tactile arrow on the button
* Solid State switch rated at a Minimum of 20 million actuations

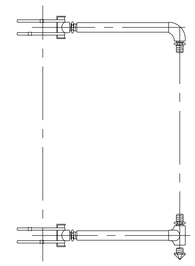
PLATE MARKING OPTIONS



STANDARD OPTION A

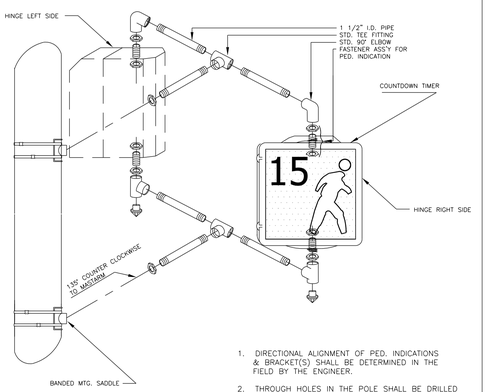
OPTION B

TYPE III SIDE-OF-POLE MOUNTING BRACKET ASSEMBLY



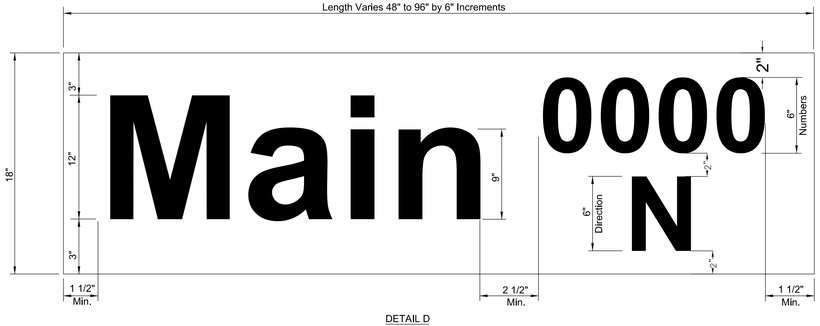
F

TYPE II SIGNAL MOUNTING BRACKET ASSEMBLY (SIDE-OF-POLE)

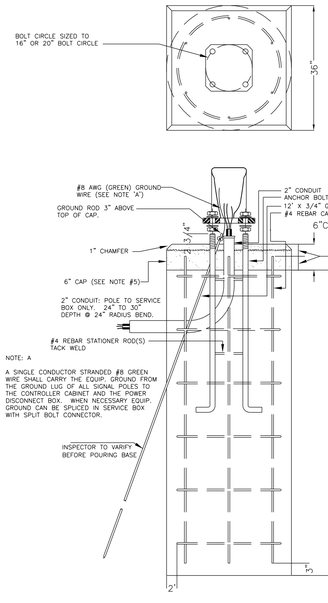


1. DIRECTIONAL ALIGNMENT OF PED. INDICATIONS & BRACKET(S) SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. THROUGH HOLES IN THE POLE SHALL BE DRILLED AND WELL REAMED TO PREVENT CABLE CHAFING.
3. HINGE PEDESTRIAN SIGNAL DOORS AWAY FROM POLE.
4. CLAM SHELL BRACKETS ARE NOT ACCEPTABLE.

D



DETAIL D
METRO



NOTE: A

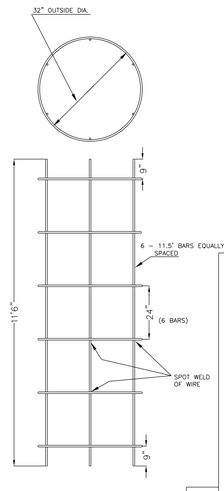
A SINGLE CONDUCTOR STRANDED #8 GREEN WIRE SHALL CARRY THE EQUIP. GROUND FROM THE GROUND LUG OF ALL SIGNAL POLES TO THE CONTROLLER CABINET AND THE POWER DISCONNECT BOX. WHEN NECESSARY EQUIP. GROUND CAN BE SPLICED IN SERVICE BOX WITH SPLIT BOLT CONNECTOR.

INSPECTOR TO VARIFY BEFORE POURING BASE

NOTE:

1. THE ANCHOR BOLTS FOR THE SIGNAL POLE SHALL BE TACK WELDED TOGETHER IN A 16" OR 20" DIA. BOLT PATTERN (ON CENTERS AS SHOWN) TO MAINTAIN REQUIRED BOLT CONFIGURATION PATTERN AND TO AID IN VERTICAL POSITIONING WHILE CONCRETE BASE IS POURED.
2. USE ANTI-SEIZE COMPOUND ON ALL THREADS.
3. 12' x 3/4" GROUND ROD TO BE POSITIONED BEFORE POURING BASE.
4. CLASS 'A' CONCRETE SHALL BE USED TO CONSTRUCT BASE.
5. CONSTRUCT A 6" THICK x 36" SQUARE CONCRETE CAP AFTER POLE HAS BEEN ERECTED & PLUMBED. CHAMFER EDGE 1". MUST BE APPROVED BY ENG. BEFORE POURED.
6. CONDUIT SHALL HAVE PLASTIC (OR METAL) BUSHING (ABOVE BASE) TO PREVENT CABLE CHAFING.
7. USE #6 BARE COPPER GROUND CONDUCTOR FROM CLAMP TO GROUND BOLT IN ACCESS HOLE.

REBAR CAGE



E

REVISED: AUGUST 2014

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

STEEL SIGNAL POLE ASSEMBLY DETAILS

TRAFFIC ENGINEER
BRIAN A. COON, P.E.

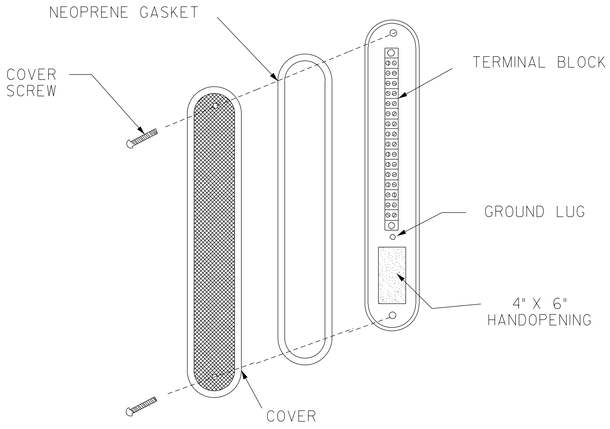
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	

CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

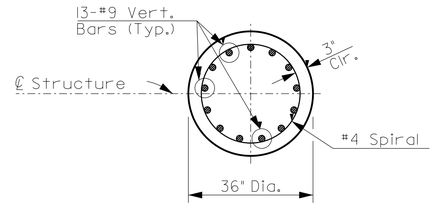
SHEET
553

TR-101

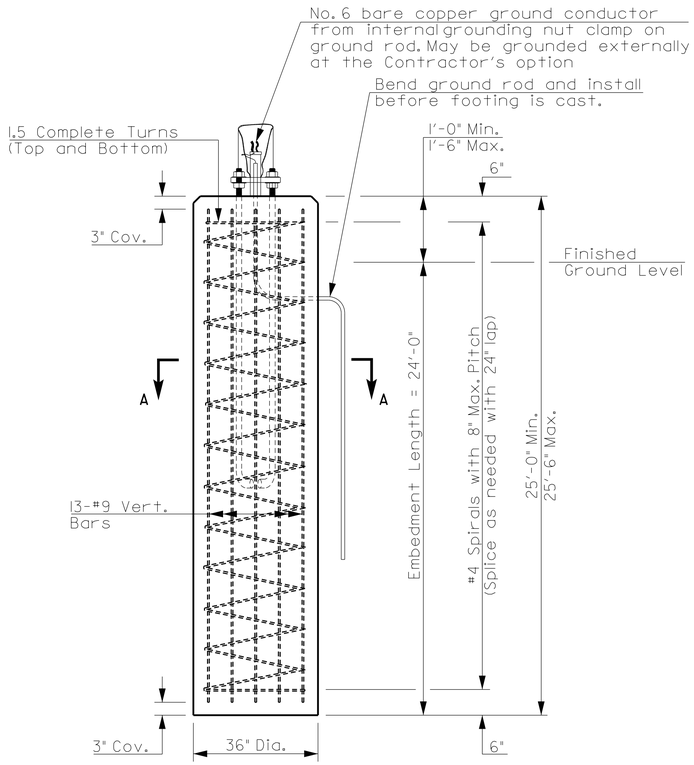
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	554	1055



WIRING TERMINAL HAND HOLE

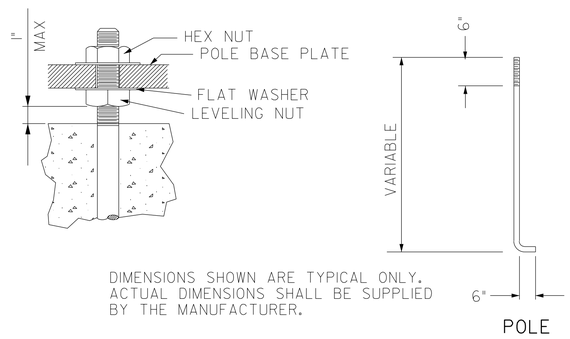


SECTION A-A



ELEVATION OF FOOTING

(Footing for mast arm spans greater than 54')
(See Sh. No. 553 for mast arm spans of 54' and less)



MAST ARM POLE ANCHOR BOLT DETAIL

NON-STANDARD FOUNDATION NOTES

Pole Manufacturer is responsible, at a minimum, for mast arm, pole, anchor bolt, and base plate design.

The bid item "Traffic Signal (Lump Sum)" shall include all material for construction of mast arm assembly including anchor bolts, reinforcing steel, concrete, & base plates.

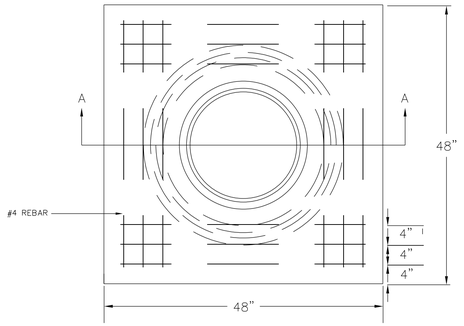
CITY OF WICHITA

TRAFFIC SIGNAL INSTALLATION DETAIL SHEET

SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.

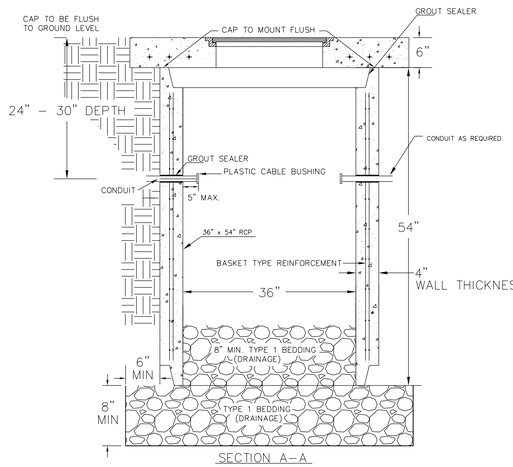
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SERVICE BOX CONSTRUCTION/INSTALLATION DETAILS

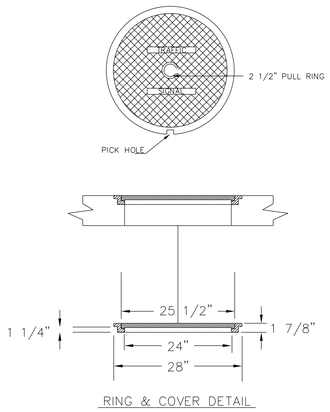


PRE-CAST CONCRETE
SERVICE BOX

(36" I.D. X 54" RCP)
with 6" CAP

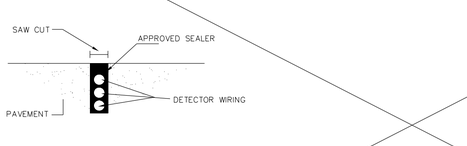


SECTION A-A

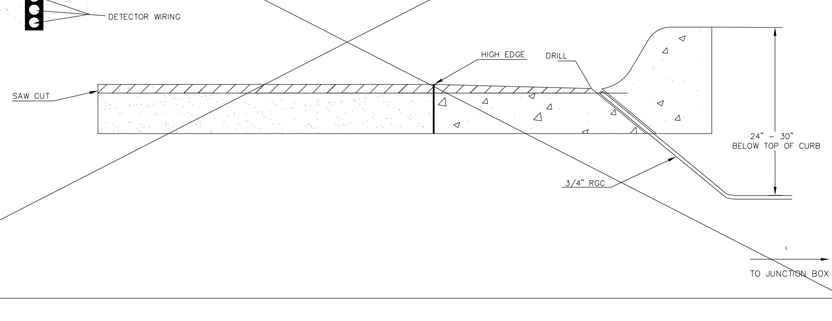


RING & COVER DETAIL

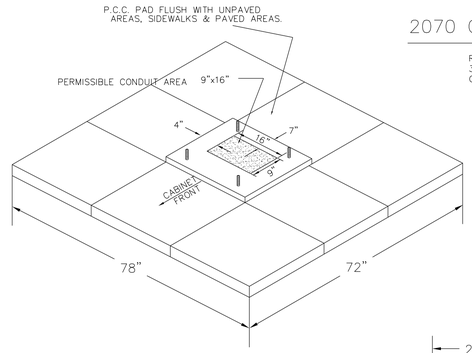
CONDUIT/DETECTOR WIRE INSTALLATION DETAILS



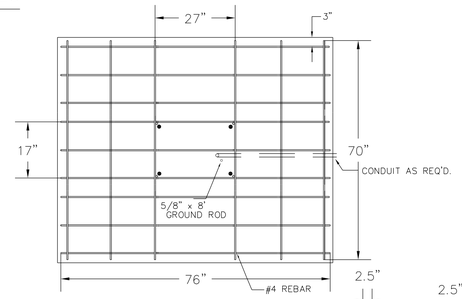
STD. CURB & GUTTER

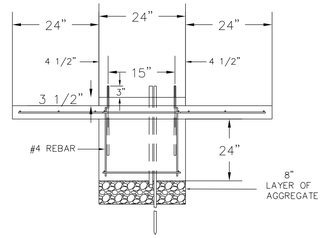


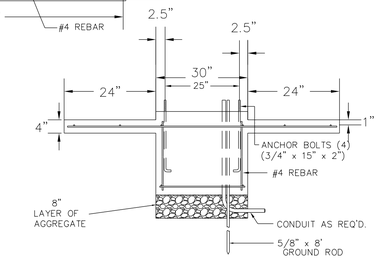
2070 CONTROLLER PAD DETAILS



REBAR SHALL BE ASTM A615M GRADE 300 MEETING THE REQUIREMENTS OF SUBSECTION SPECIFICATIONS.

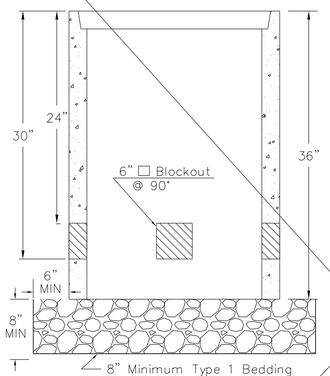




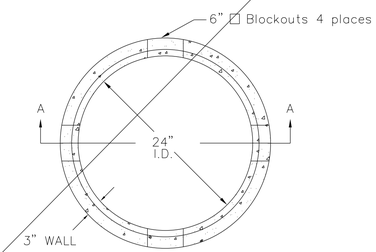


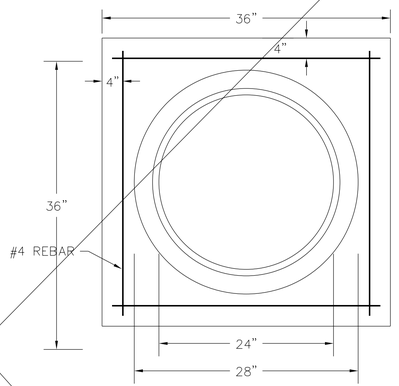
JUNCTION BOX DETAILS

PRE-FAB Junction Box
(24" I.D. X 36" R.C.P.)



SECTION A-A





JUNCTION BOX CAP

36" x 36" x 6"
TOP OF CAP TO BE FLUSH WITH GROUND LEVEL.

** SEE SERVICE BOX INSTALLATION FOR RING & COVER DETAILS.

NOTES:

SERVICE & JUNCTION BOX:

1. CONDUIT CONNECTION TO BE FLUSH TO WITHIN 5" OF INSIDE FACE OF SIDE WALL, CONDUIT TO DRAIN INTO SERVICE BOX.
2. CONDUIT CONNECTIONS TO SERVICE BOX SHALL BE TERMINATED WITH PLASTIC CABLE BUSHING.
3. CONDUIT SHALL BE SEALED WITH APPROVED SEALER AT INSIDE WALL FACE.
4. ALL SERVICE & JUNCTION BOXES TO HAVE 8" OF CRUSHED ROCK.

No 90 degree elbows unless approved by Traffic Maintenance

TRENCHING:

1. DEPTH TO BE 30" MINIMUM WITH ROCK & STUBBLE FREE BACKFILL TO SERVE AS BEDDING MATERIAL. MAINTAIN MINIMUM CONDUIT DEPTH IN TRENCH.
2. BACKFILL TO BE COMPACTED IN 6" LOOSE LIFTS BY HAND OR MECHANICAL TAMPING TO A 95% STANDARD DENSITY.

CONDUIT:

1. SLOPE CONDUIT TO DRAIN AS DIRECTED BY THE ENGINEER.
2. 3" RIGID STEEL CONDUIT BTWN. SERVICE BOXES.
   2" " " " BTWN. SERVICE BOX AND POLE.
   1 1/4" " " BTWN. SERVICE & JUNCTION BOXES.
   3/4" " " BTWN. JUNCTION BOXES.
   3/4" " " BTWN. JUNCTION BOX & DETECTOR LOOP SAW CUT.

No 90 degree elbows unless approved by Traffic Maintenance

REVISED AUGUST 2014

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

SERVICE/JUNCTION BOX, CONTOLLER PAD CONSTRUCTION/INSTALLATION

TRAFFIC ENGINEER
BRIAN COON, P.E.

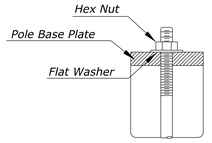
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	

CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

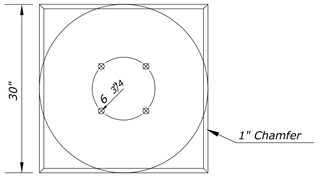
SHEET
555 of 1055

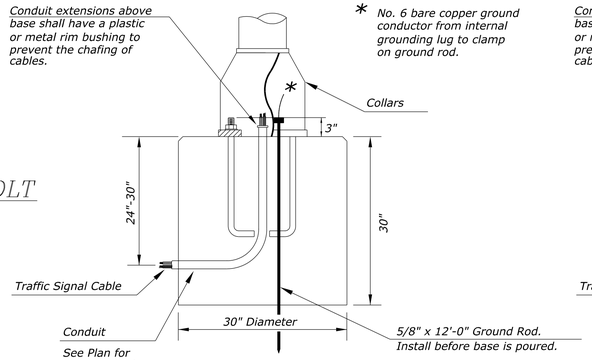
TR-109

Use Keystone "No-Weld Number 1 Anti-Seize Compound" on all bolts & nuts.



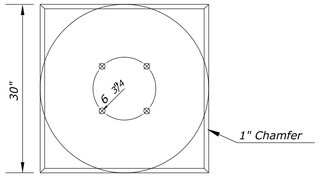
ANCHOR BOLT DETAIL

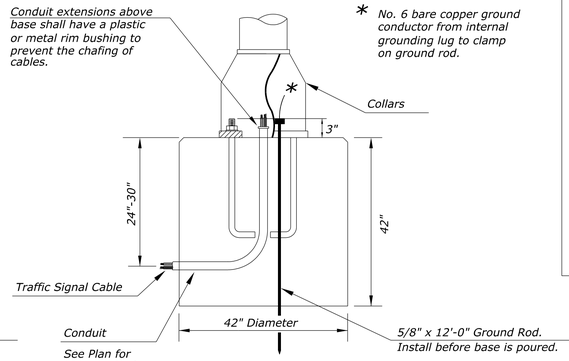




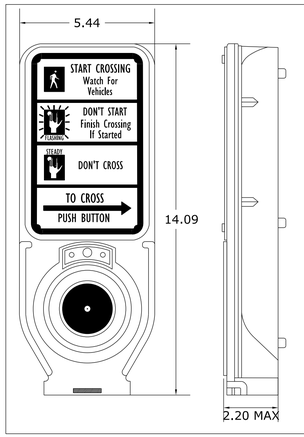
Pedestal bases shall have collars on them to provide additional support to the pole.

CONCRETE BASE-A DETAIL





CONCRETE BASE-B DETAIL FOR TRAFFIC SIGNAL PEDESTAL WITH CONTROLLER CABINET



DWG. NO. N45AN0-X

PUSH BUTTON STATION

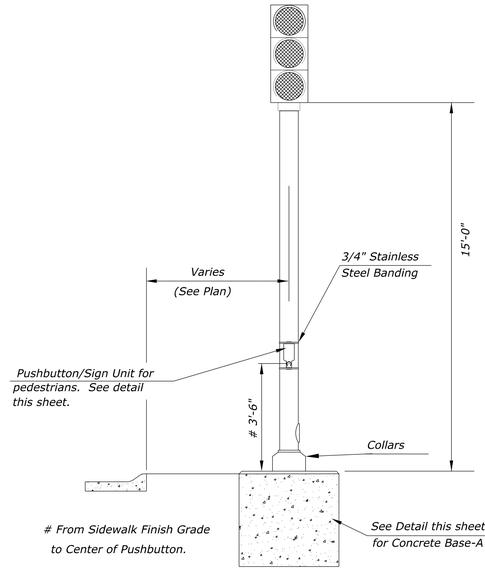
The 4 Wire Navigator PBS is the pedestrian interface to the Navigator Accessible Pedestrian Signal. All sounds emanate from the back of the unit via a weather-proof speaker that is protected by a vandal resistant screen. A sunlight visible LED latches "ON" to confirm the button has been pushed.Each PBS connects to a Control Unit located inside its associated ped sign housing. A four wire cable connects the PBS to the power unit.

PBS includes the Frame with Option "B" sign, ADA compliant push button, and mounting hardware.

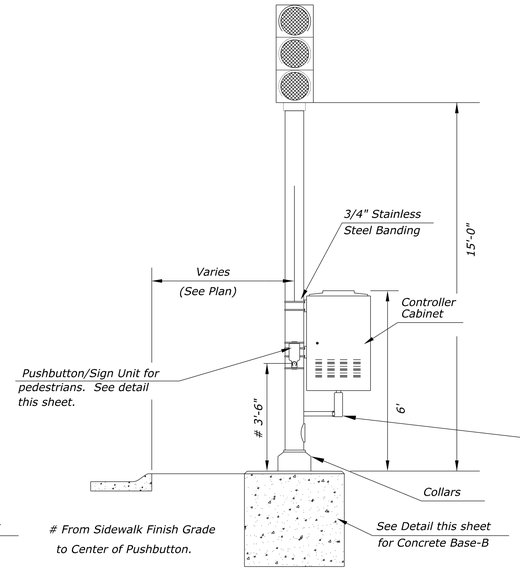
By interfacing with the Control Unit that installs in the Pedestrian Walk Sign, the PBS shall provide the following standard features.

* Conformation of the button push via latching LED, sound, and vibrotactile bounce.
* Direction of travel (with extended button push).
* Standard locating tone during Don't Walk (and clearance if desired).
* Standard voice message during Walk.
* Vibrating button during Walk.
* Standard verbal countdown during PED clearance.
* All sounds automatically adjust to ambient over 60db range.

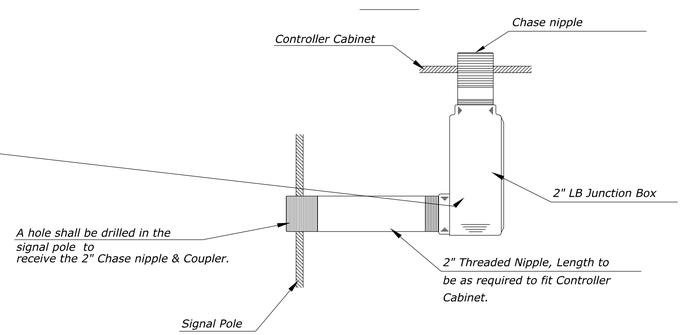
PEDESTRIAN PUSHBUTTON/SIGN UNIT DETAIL



TRAFFIC SIGNAL PEDESTAL



TRAFFIC SIGNAL PEDESTAL WITH CONTROLLER CABINET



DWG. NO. N45AN0-X

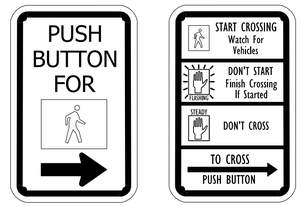
PUSH BUTTON STATION

Message and Sound options include:
* Locating tone
* Verbal Street Name (Example: Crossing Main at Central)
* All features field selectable using a Configurator.

Construction :
* Die-cast aluminum, powder coated Black in color.
* Street Name in Braille in the directional arrow of the sign.
* Option "B" signing option.

Push button :
* ADA compliant
* Raised tactile arrow on the button
* Solid State switch rated at a Minimum of 20 million actuations

PLATE MARKING OPTIONS



STANDARD OPTION A

OPTION B

REVISED: AUGUST 2014

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

SIGNAL PEDESTAL & BASE WITH ADA PUSH BUTTON

TRAFFIC ENGINEER
BRIAN A. COON P.E.

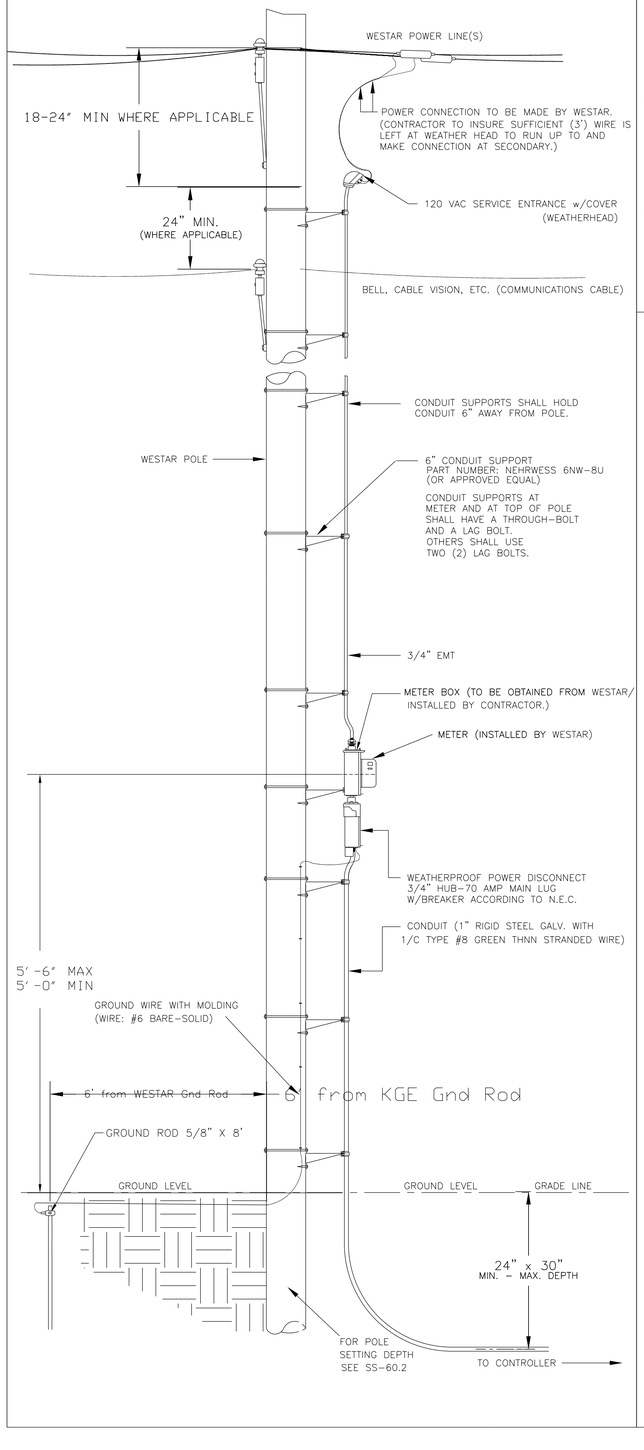
PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	

CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

SHEET 556 of 1055

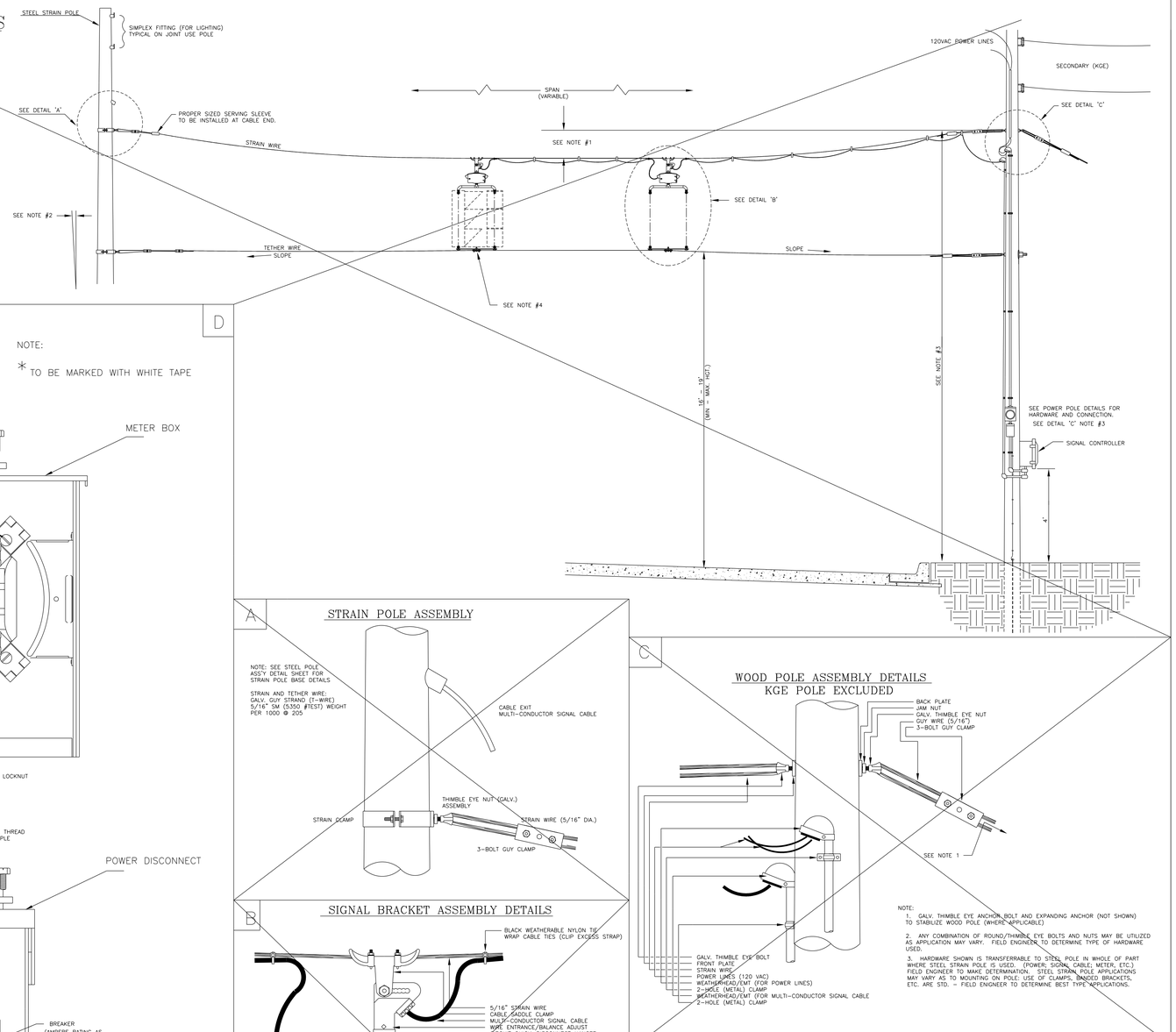
TR-112

POWER POLE DETAILS



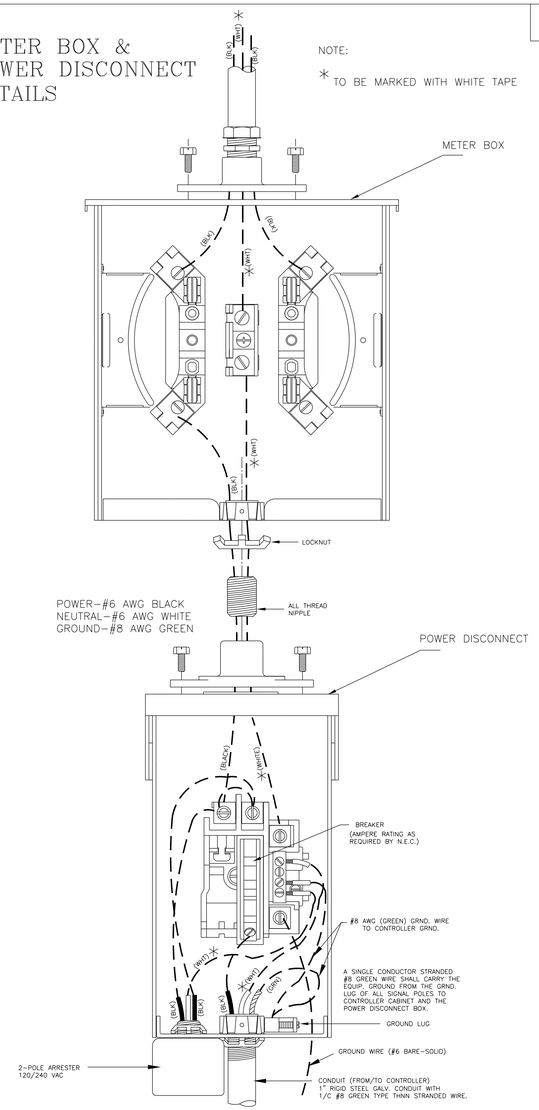
SPANWIRE ASSEMBLY DETAILS

1. MAX. SAG = 5F SPAN.
2. STANDARD BACKRAKE = 1.5"
3. HEIGHT OF STRAIN WIRE HOOK-UP TO BE DETERMINED BY FIELD ENGINEER. TRAFFIC SIGNAL CABLE TO BE SECURED TO STRAIN (SPAN) WIRE WEATHERABLE NYLON CABLE HANGERS (12" CTR.) DETAIL 'B'
4. TETHER CLAMP TO BE DESIGNED TO RELEASE UNDER 'HIGH WIND LOAD' TO PERMINT SIGNAL 'FREE SWING'.



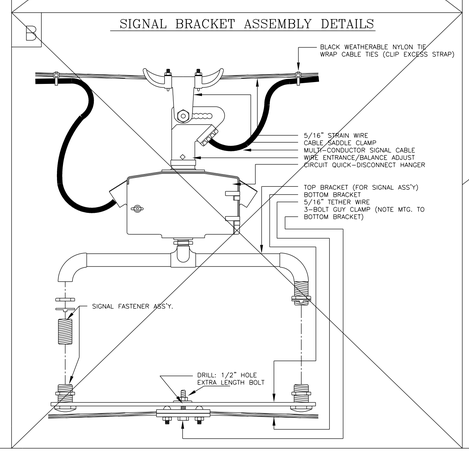
METER BOX & POWER DISCONNECT DETAILS

NOTE:
* TO BE MARKED WITH WHITE TAPE



A STRAIN POLE ASSEMBLY

SIGNAL BRACKET ASSEMBLY DETAILS



WOOD POLE ASSEMBLY DETAILS
KGE POLE EXCLUDED

NOTE:
1. GALV. THIMBLE EYE ANCHOR BOLT AND EXPANDING ANCHOR (NOT SHOWN) TO STABILIZE WOOD POLE (WHERE APPLICABLE)
2. ANY COMBINATION OF ROUND/THIMBLE EYE BOLTS AND NUTS MAY BE UTILIZED AS APPLICATION MAY VARY. FIELD ENGINEER TO DETERMINE TYPE OF HARDWARE USED.
3. HARDWARE SHOWN IS TRANSFERRABLE TO STEEL POLE IN WHOLE OF PART WHERE STEEL STRAIN POLE IS USED. (POWER; SIGNAL CABLE; METER, ETC.) FIELD ENGINEER TO MAKE DETERMINATION. STEEL STRAIN POLE APPLICATIONS MAY VARY AS TO MOUNTING ON POLE; USE OF CLAMPS, BANDED BRACKETS, ETC. ARE STD. - FIELD ENGINEER TO DETERMINE BEST TYPE APPLICATIONS.

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

POWER POLE AND SPAN POLE ASSEMBLEY DETAILS

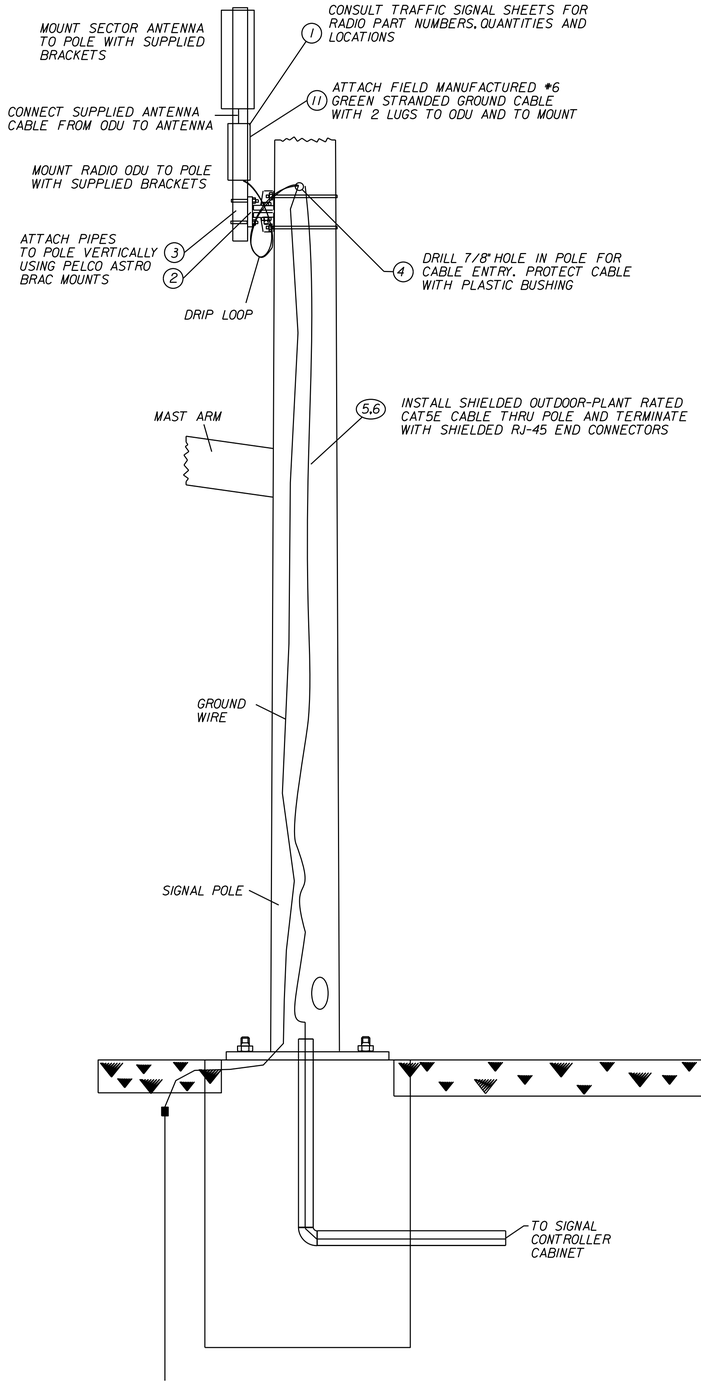
TRAFFIC ENGINEER
PAUL GUNZELMAN, P.E.

PROJECT NUMBER	OCA NUMBER	DATE
472-85031	705011	11/2003

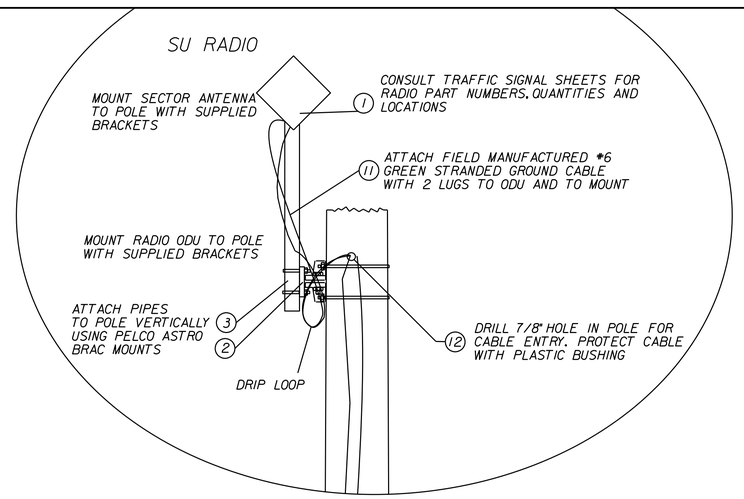
CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	558	1055

AU RADIO



SU RADIO



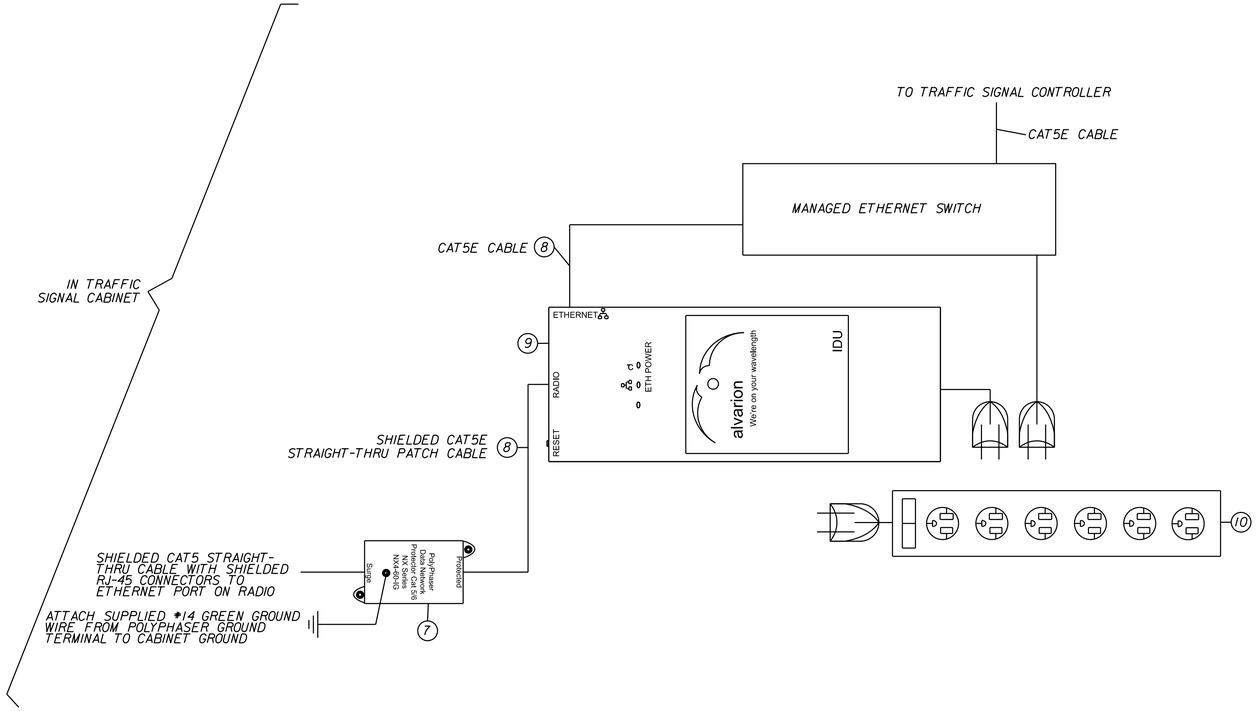
TYPICAL SUBSCRIBER UNIT PARTS LIST (FOR INFORMATION ONLY)

ITEM	QTY	PART NO.	DESCRIPTION
1	1		ALVARION SU-A-5.8-3-BD-VL *
2	1		PELCO ASTRO-BRAC, 96 INCHES
3	1		ALUMINUM PIPE, MINIMUM 1½ I.D., MINIMUM 40' LONG
4	1		ARLINGTON INDUSTRY SNAP IN BUSING FOR KNOWCKOUT
5	1		CAT5E CABLE, 200 FEET
6	2		DIGI-KEY SHIELDED RJ-45 END CONNECTORS
7	1		POLYPHASER NETGUARD W/GROUND CABELE
8	3		CAT5E CABLE, 3 FEET
9	1		ALVARION UNIVERSAL INDOOR UNIT AC POWER ADAPTER
10	1		BELKIN 6-OUTLET SURGE STRIP, 3 FEET
11	1		THHN #6 STRANDED GROUND CABLE, 120 FEET

TYPICAL ACCESS UNIT PARTS LIST (FOR INFORMATION ONLY)

ITEM	QTY	PART NO.	DESCRIPTION
1	1		ALVARION AU-D-SA-5.8-90-VL *
2	1		PELCO ASTRO-BRAC, 96 INCHES
3	1		ALUMINUM PIPE, MINIMUM 1½ I.D., MINIMUM 40' LONG
4	1		ARLINGTON INDUSTRY SNAP IN BUSING FOR KNOWCKOUT
5	1		CAT5E CABLE, 200 FEET
6	2		DIGI-KEY SHIELDED RJ-45 END CONNECTORS
7	1		POLYPHASER NETGUARD W/GROUND CABELE
8	3		CAT5E CABLE, 3 FEET
9	1		ALVARION UNIVERSAL INDOOR UNIT AC POWER ADAPTER
10	1		BELKIN 6-OUTLET SURGE STRIP, 3 FEET
11	1		THHN #6 STRANDED GROUND CABLE, 120 FEET

* ALVARON EQUIPMENT, OR APPROVED EQUIVALENT WHICH IS COMPATIBLE WITH THE CITY OF WICHITA COMMUNICATIONS SYSTEM.



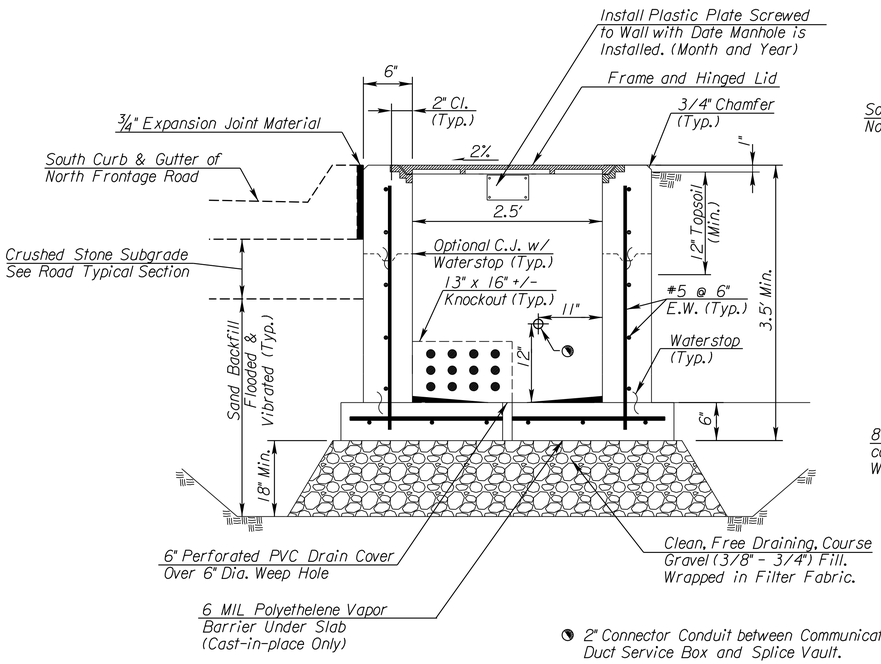
CITY OF WICHITA

WIRELESS ACCESS UNIT INSTALLATION DETAIL SHEET

SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
-	-	-	-	-	-	-	-

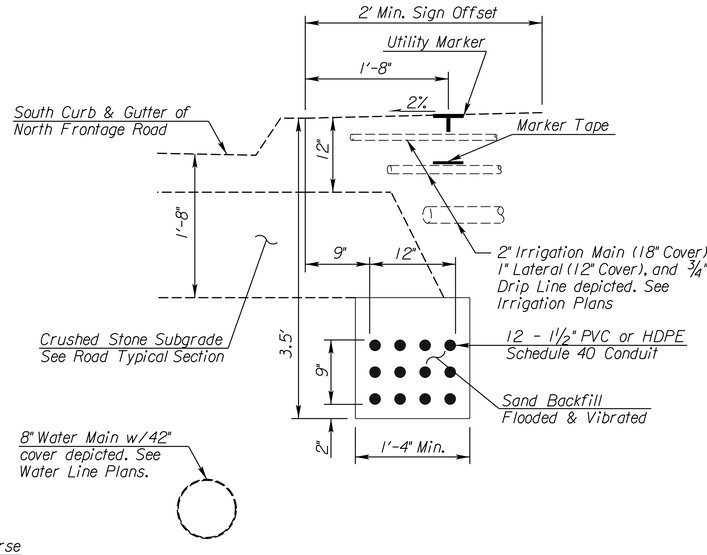
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	559	1055



COMMUNICATION DUCT BANK SERVICE BOX SECTION "A-A"

No Scale



COMMUNICATION DUCT BANK DETAIL

No Scale

Contractor shall construct the 12 conduit duct bank at the locations shown on the plans. The vertical elevation of the duct bank shall be adjusted by the Contractor as approved by the Engineer to clear utilities. This work shall be SUBSIDIARY to the bid item "Communication Duct" and shall include all materials, tools, labor equipment, pull boxes and incidentals necessary to complete the work.

GENERAL NOTES

For precast communication duct service box, submit drawings stamped by a structural engineer licensed in Kansas.

On a wall near lid, fasten a 2" x 4" plastic label plate. Show month and year installed.

Concrete- 4,000 PSI Min. at 28 days, with 4% to 6% air.
Reinforcing- A615, Grade 60 (Fy= 60 ksi).

Lid security bolts shall be 1/2" dia. S.S. Provide (1) wrench to owner for lid security bolts.

City electrical code requires 24" minimum cover over conduit in paved areas and 30" minimum cover in unpaved areas. Where crossing obstructions, warp duct bank as required, also providing 2" clearance around all conduits.

See Standard Specifications for compaction requirements. Compaction around Communication Duct Service Box shall meet the same standard compaction requirements as a storm sewer inlet.

Communication Duct Bank Service Boxes shall be paid for as "Communication Duct Service Box" and include all work and materials required to construct the service box as detailed.

Communication Duct shall be paid for as Lin. Ft. of "Communication Duct" and includes all work and materials required to construct the duct as detailed.

Communication Duct will be routed around sign truss footings a minimum of 5'.

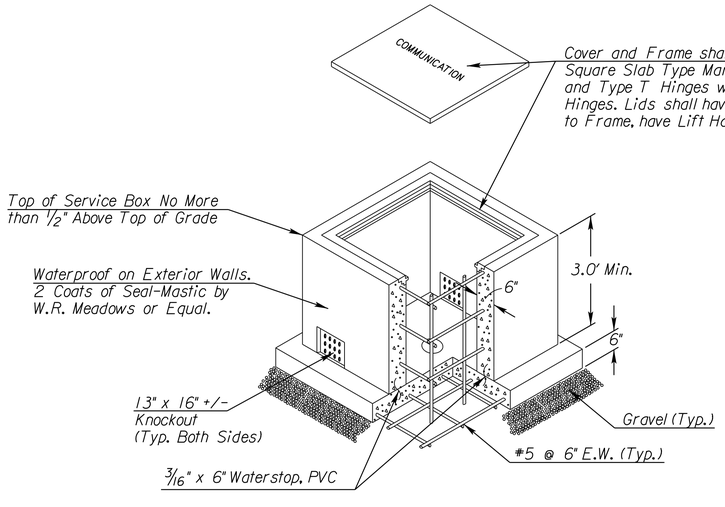
SUMMARY OF COMMUNICATION DUCT QUANTITIES

STATION TO STATION		QUANTITY (Lin. Ft.)	COMM. DUCT SERVICE VAULT (EACH)	ITS FIBER OPTIC SPLICE VAULT (EACH)
496+83.80	499+79.37	300.1	-	-
2498+39.00	2500+80.00	238.8	1	1
2500+80.00	2504+29.00	349.0	1	1
2504+29.00	2506+89.00	260.0	1	1
2506+89.00	2511+34.00	444.6	1	1
2511+34.00	2517+28.00	593.8	1	1
2517+28.00	2518+25.00	98.3	1	1
2518+25.00	2521+86.47	360.8	1	1
2521+86.47	2524+38.00	245.8	1	-
2524+38.00	2528+37.15	405.8	1	1
2528+37.15	2533+60.00	531.3	1	-
2533+60.00	2538+08.75	434.9	1	1
2538+08.75	2547+00.00	898.1	1	1
2547+00.00	2555+90.00	894.3	1	1
2555+90.00	2565+65.00	924.2	1	1
2565+65.00	2570+67.00	541.4	1	1
2570+67.00			1	1
	TOTALS	7521.2	16	14

RECAPITULATION OF COMMUNICATION DUCT QUANTITIES

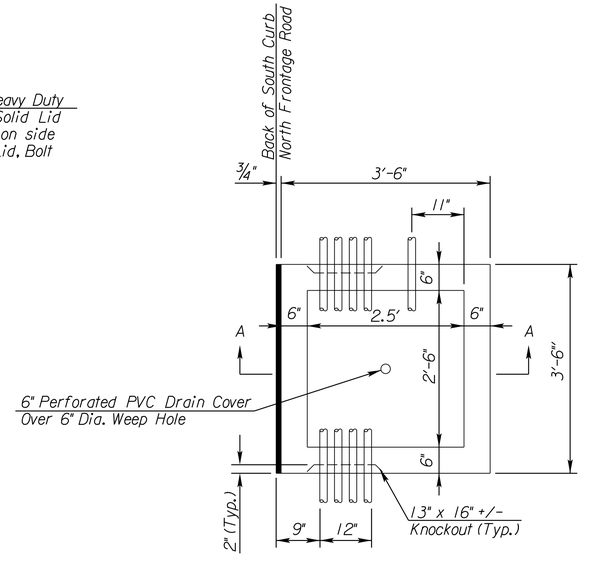
ITEM	QUANTITY	UNIT
Communication Duct	7521.2	Lin. Ft.
Communication Duct Service Box	16	Each
ITS Fiber Optic Splice Vault	14	Each

For Fiber Optic Splice Vault Details See Sh. Nos. 591 & 592



COMMUNICATION DUCT BANK SERVICE BOX ISOMETRIC VIEW

No Scale



COMMUNICATION DUCT BANK SERVICE BOX PLAN VIEW

No Scale

CITY OF WICHITA

NORTH FRONTAGE ROAD

COMMUNICATION DUCT BANK DETAILS

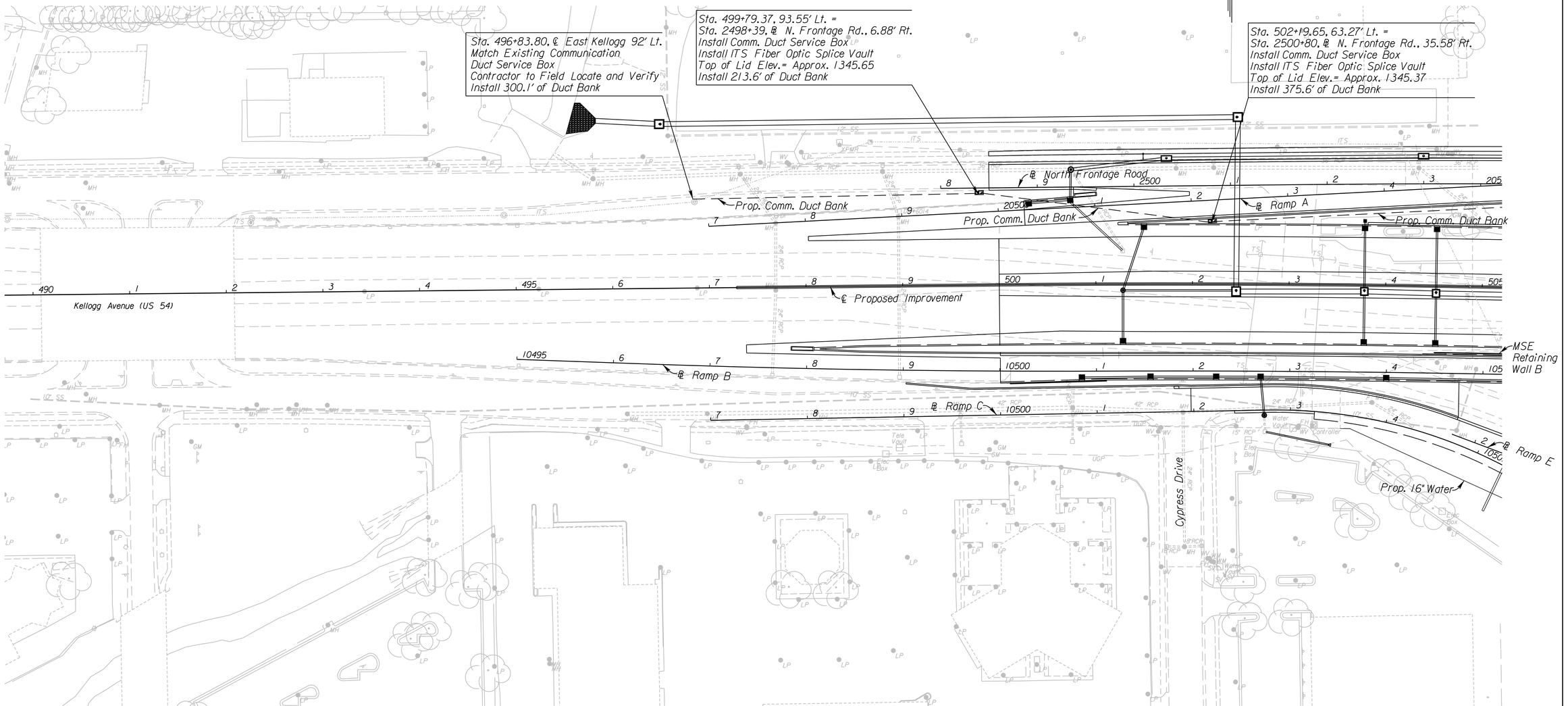
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SURV.	-	PLOT	CADD	DES.	-	DR.	-	TR.		CKD.	-	APP.	-

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	560	1055

NOTE:
From Sta. 496+83.80 to Sta. 572+07.46, Install 96-Count Single Mode Fiber Optic Cable inside Conduit 1 of 12 of Conduit Duct Bank. Coil 100' in each Splice Vault along entire route.



KDOT has fiber optic cable located at the western terminal of this project that provides communication to several ITS devices including cameras and dynamic message signs. The Contractor is responsible for relocating this fiber optic cable as part of the utility relocation, including installation of new fiber optic cable and splices if necessary. Disruption to this communication link during relocation needs to be minimized and should be no longer than 6 hours. A temporary fiber link will be installed if needed to meet this deadline. The Contractor is to provide OTDR tests on the relocated fiber according to ITS specifications. The Contractor shall contact KDOT for location of the ITS device power and communication cables prior to beginning work in the area.

LEGEND

- Comm. Duct Service Box
- ITS Fiber Optic Splice Vault

UTILITIES

Gas	Kansas Gas Service
Power	Westar
ITS	KDOT
Sanitary Sewer	Wichita Water & Sewer
Storm Water Sewer	Wichita Water & Sewer
Telephone	AT&T
Traffic Signal	City of Wichita
Water	Wichita Water & Sewer

See Sh. No's. 179-237 for SWS Plans.
See Sh. No's. 253-256 for San. Sewer Plans.
See Sh. No's. 263-274 for Water Plans.
See Sh. No's. 300-338 for Retaining Wall Plans.

CITY OF WICHITA

EAST KELLOGG

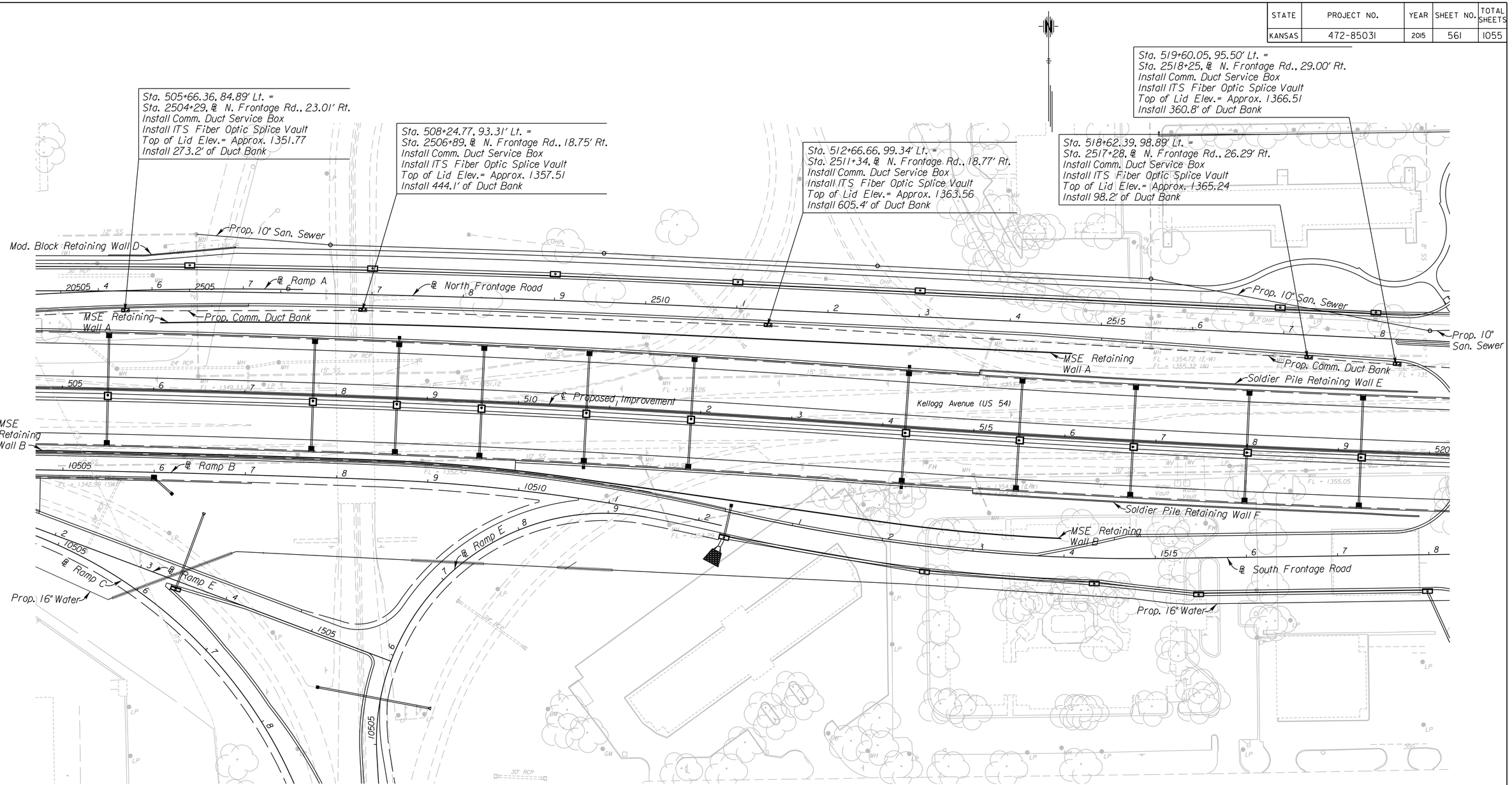
COMMUNICATION DUCT BANK

STA. 490+00 TO STA. 505+00

SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	561	1055



UTILITIES	
Cable	Cox Communications
Gas	Kansas Gas Service
Power	Westar
ITS	KDOT
Sanitary Sewer	Wichita Water & Sewer
Storm Water Sewer	Wichita Water & Sewer
Telephone	AT&T
Traffic Signal	City of Wichita
Water	Wichita Water & Sewer

See Sh. No's. 179-237 for SWS Plans.
See Sh. No's. 253-256 for San. Sewer Plans.
See Sh. No's. 263-274 for Water Plans.
See Sh. No's. 300-338 for Retaining Wall Plans.

CITY OF WICHITA

EAST KELLOGG

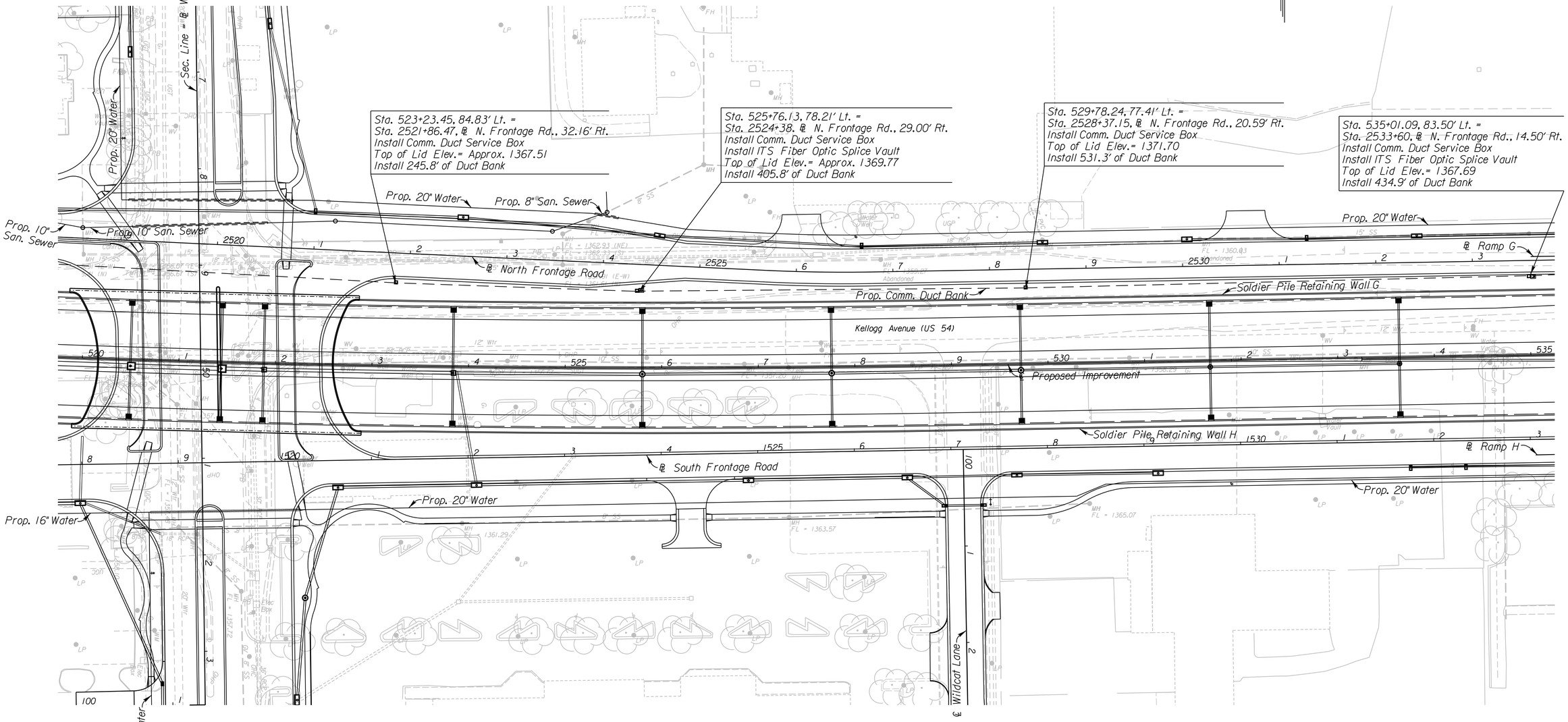
COMMUNICATION DUCT BANK

STA. 505+00 TO STA. 520+00

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SURV.	-	PLOT	CADD	DES.	-	DR.	-	TR.	CKD.	-	APP.

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	562	1055



UTILITIES

Cable	Cox Communications
Gas1	Kansas Gas Service
Gas2	Southern Star Pipeline
Gas3	Hawker Beechcraft
Power	Westar
Sanitary Sewer	Wichita Water & Sewer
Storm Water Sewer	Wichita Water & Sewer
Telephone	AT&T
Traffic Signal	City of Wichita
Water	Wichita Water & Sewer

See Sh. No's. 179-237 for SWS Plans.
See Sh. No's. 253-256 for San. Sewer Plans.
See Sh. No's. 263-274 for Water Plans.
See Sh. No's. 300-338 for Retaining Wall Plans.

CITY OF WICHITA

EAST KELLOGG

COMMUNICATION DUCT BANK

STA. 520+00 TO STA. 535+00

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SURV.	PLOT	CADD	DES.	DR.	TR.	CKD.	APP.
-	-	-	-	-	-	-	-

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	563	1055

Sta. 539+49.84, 95.50' Lt. =
Sta. 2538+08.75, ℄ N. Frontage Rd., 2.50' Rt.
Install Comm. Duct Service Box
Install ITS Fiber Optic Splice Vault
Top of Lid Elev.= 1364.35
Install 898.1' of Duct Bank

Sta. 548+41.03, 95.55' Lt. =
Sta. 2547+00, ℄ N. Frontage Rd., 2.50' Rt.
Install Comm. Duct Service Box
Install ITS Fiber Optic Splice Vault
Top of Lid Elev.= 1358.48
Install 894.3' of Duct Bank

Prop. 20" Water
Soldier Pile Retaining Wall G
Prop. 20" Water
℄ Ramp G
Prop. Comm. Duct Bank
℄ North Frontage Road
Prop. Comm. Duct Bank
℄ Hawker Beechcraft Entrance
Kellogg Avenue (US 54)
℄ Proposed Improvement
Soldier Pile Retaining Wall H
℄ Ramp H
℄ South Frontage Road
Prop. 20" Water
Prop. 16" Water
Prop. 16" Water
Prop. 16" Water
℄ Tractor Supply Entrance
℄ Club Rodeo Entrance
℄ Carmax Entrance

See Sh. No's. 179-237 for SWS Plans.
See Sh. No's. 253-256 for San. Sewer Plans.
See Sh. No's. 263-274 for Water Plans.
See Sh. No's. 300-338 for Retaining Wall Plans.

UTILITIES

Gas,	Kansas Gas Service
Power	Westar
Sanitary Sewer	Wichita Water & Sewer
Storm Water Sewer	Wichita Water & Sewer
Telephone	AT&T
Water	Wichita Water & Sewer

CITY OF WICHITA

EAST KELLOGG

COMMUNICATION DUCT BANK

STA. 535+00 TO STA. 550+00

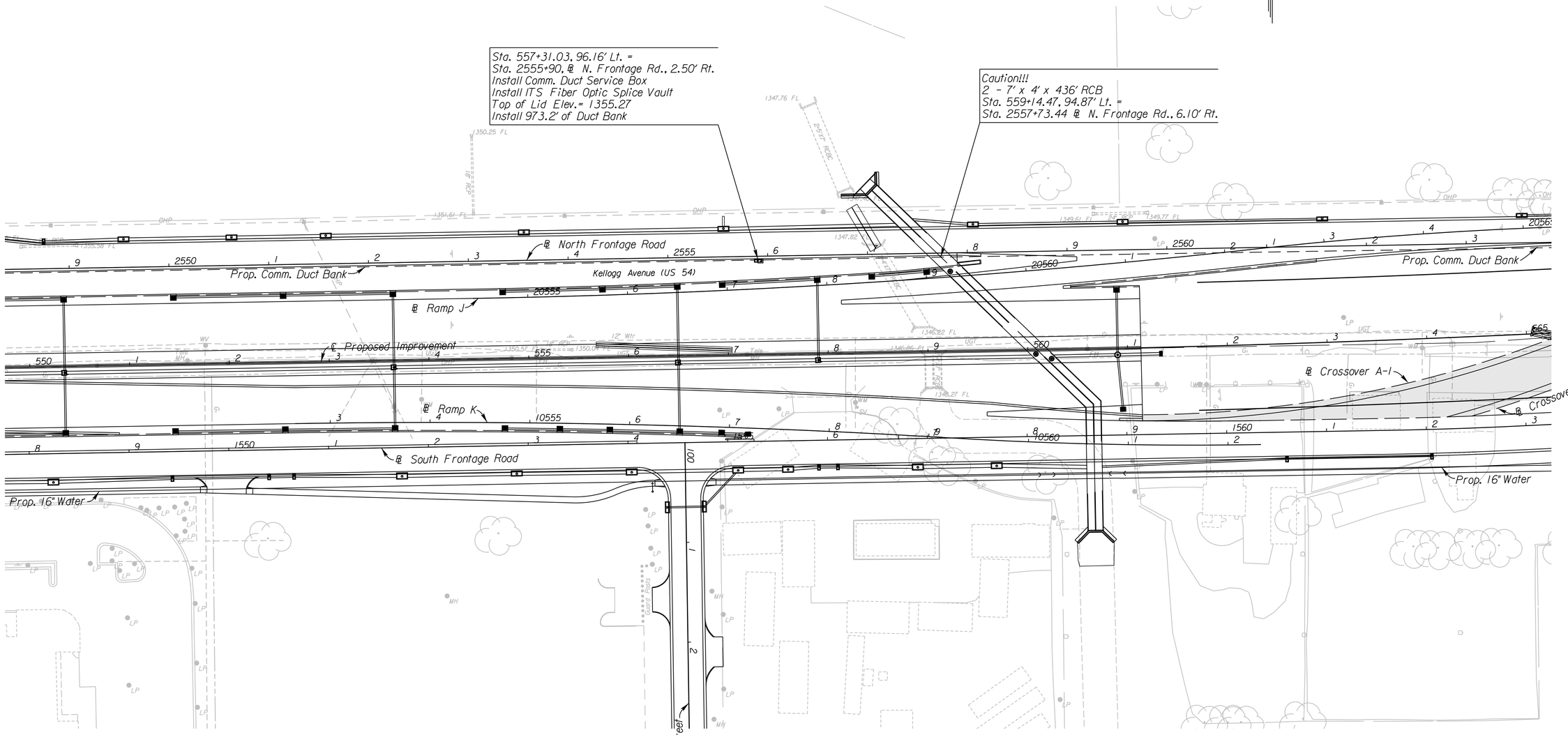
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	564	1055

Sta. 557+31.03, 96.16' Lt. =
Sta. 2555+90, ℄ N. Frontage Rd., 2.50' Rt.
Install Comm. Duct Service Box
Install ITS Fiber Optic Splice Vault
Top of Lid Elev.= 1355.27
Install 973.2' of Duct Bank

Caution!!!
2 - 7' x 4' x 4.36' RCB
Sta. 559+14.47, 94.87' Lt. =
Sta. 2557+73.44 ℄ N. Frontage Rd., 6.10' Rt.



LEGEND

Crossover A Pavement.
See Sh. No's. 76 - 77

UTILITIES

Gas	Kansas Gas Service
Power	Westar
Storm Water Sewer	Wichita Water & Sewer
Telephone	AT&T
Water	Wichita Water & Sewer

See Sh. No's. 179-237 for SWS Plans.
See Sh. No's. 253-256 for San. Sewer Plans.
See Sh. No's. 263-274 for Water Plans.
See Sh. No's. 300-338 for Retaining Wall Plans.

CITY OF WICHITA

EAST KELLOGG

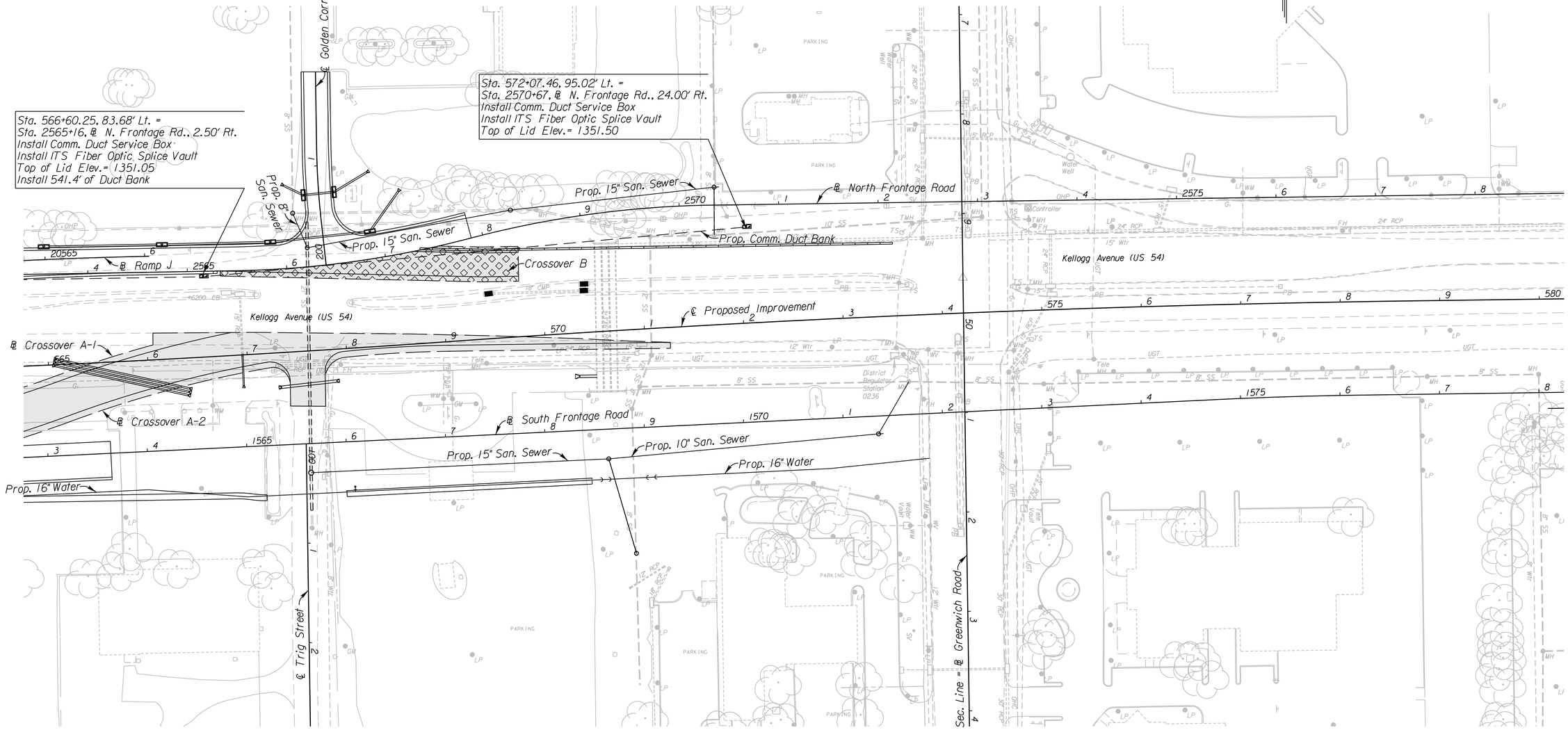
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STA. 550+00 TO STA. 565+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	565	1055



LEGEND

Crossover A Pavement. See Sh. No's. 76 - 77

Crossover B Pavement See Sh. No. 52

UTILITIES

Cable	Cox Communications
Gas	Kansas Gas Service
Power	Westar
Sanitary Sewer	Wichita Water & Sewer
Storm Water Sewer	Wichita Water & Sewer
Telephone	AT&T
Traffic Signal	City of Wichita
Water	Wichita Water & Sewer

See Sh. No's. 179-237 for SWS Plans.
See Sh. No's. 253-256 for San. Sewer Plans.
See Sh. No's. 263-274 for Water Plans.
See Sh. No's. 300-338 for Retaining Wall Plans.

CITY OF WICHITA

EAST KELLOGG

COMMUNICATION DUCT BANK

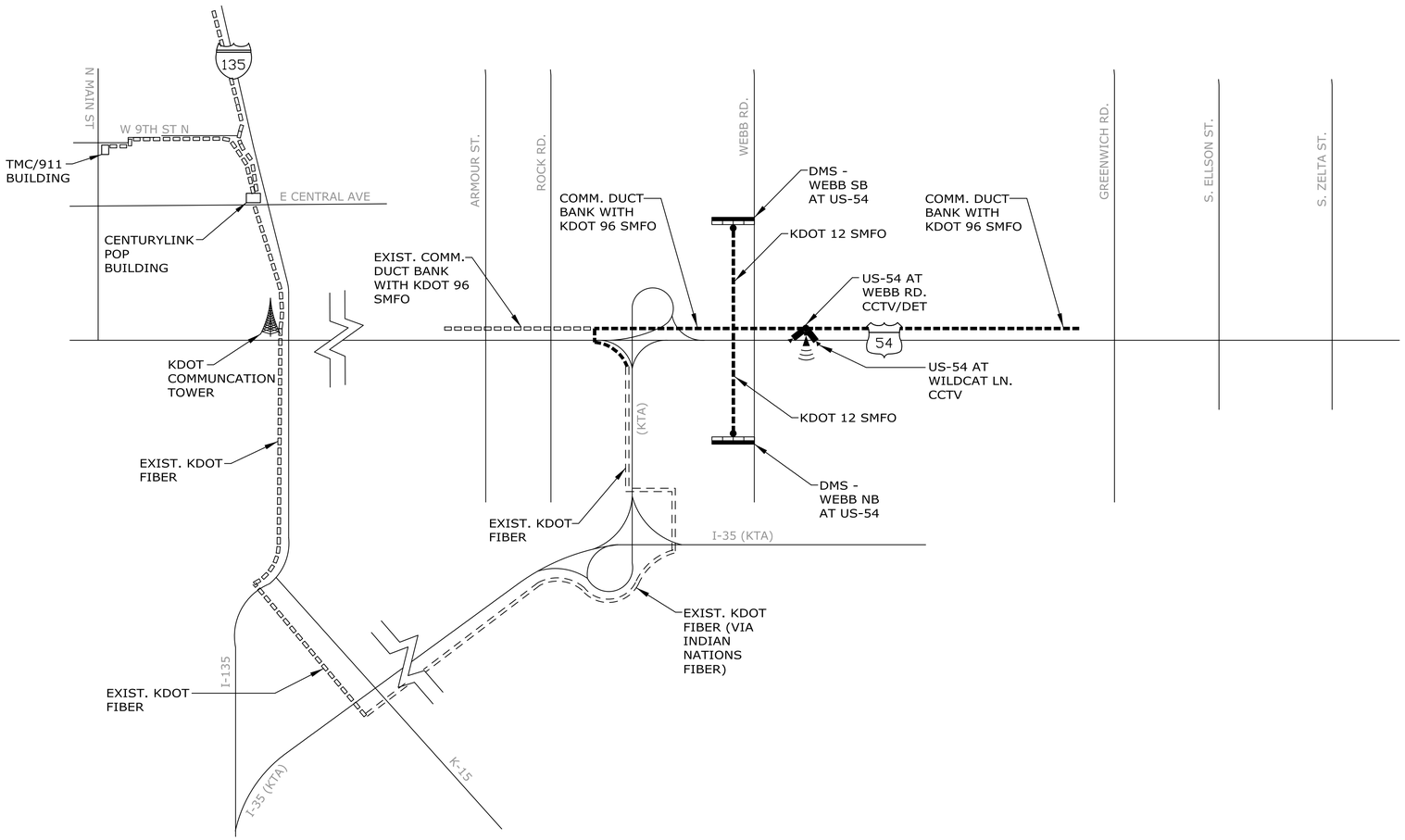
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	566	1055

NOT TO SCALE



LEGEND (FOR THIS SHEET ONLY)

- SINGLE-SIDED DMS
- CCTV / DETECTOR
- EXISTING WIRELESS-TO-FIBER (WTF) TOWER
- EXISTING FIBER (LEASE FROM KTA/INDIAN NATIONS)
- EXISTING FIBER AND CONDUIT (KDOT)
- NEW FIBER AND CONDUIT

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CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

ITS DEVICE OVERVIEW

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	567	1055

LEGEND

- Dynamic Message Sign, Ground Mounted, Proposed (Butterfly)
- Dynamic Message Sign, Ground Mounted, Proposed (Dual Post)
- Dynamic Message Sign, Ground Mounted, Proposed (Butterfly, Dual Face)
- Dynamic Message Sign, Truss Mounted, Proposed
- CCTV Camera, Proposed
- Radar Vehicle Detector, Proposed
- Radar Vehicle Detection Area, Proposed
- ITS Cabinet, Proposed, with Proposed Foundation
- Pole Mounted ITS Cabinet, Proposed
- Fiber Optic Cable Splice Vault without Splice, Proposed
- Fiber Optic Cable Splice Vault with Splice, Proposed
- Fiber Optic Cable Splice Vault without Splice, By Others (CL, KTA, Etc)
- Fiber Optic Cable Splice Vault with Splice, By Others (CL, KTA, Etc)
- Pull Box, Proposed
- Wireless Communication Tower/Pole
- XXX-XXX — New ITS Field Component

- L.P. — Light Pole
- Mile Marker
- Power Pole
- Power Supply Assembly
- T — Power Transformer
- OP — Power Overhead Source
- UP — Power Underground Source
- (R) — Removal
- Sign, Existing
- Guy Wire, Proposed
- Telephone Pole
- Trees, Existing
- Truss Sign
- City Limits
- Conduit, Existing
- Conduit, Bored, Proposed
- Conduit, On Structure, Proposed
- Conduit, Trenched, Proposed
- Construction Limits

- FIBER OPTIC CABLE — Fiber Optic Cable, Existing
- GAS LINE — Gas, Existing
- TELEPHONE CABLE — Telephone, Existing
- Guard Rail, Existing
- Guard Rail, Proposed
- Hedge, Existing
- Marsh
- Power, Existing
- Property Line
- Railroad, Existing
- Exist R/W — R/W, Existing
- R/W, Existing Access Control
- R/W, Access Control
- Township, Section or Grant Line
- State/County Line
- Culverts, Existing
- Drop Inlet & Storm Sewer, Existing
- Perm. Esmt. — Easement, Permanent
- Temp. Esmt. — Easement, Temporary
- Fence, Existing

ABBREVIATIONS

AG	Above Ground
Approx.	Approximate
Ave.	Avenue
Blvd.	Boulevard
BOC	Back of Curb
BPU	Board of Public Utilities
BWM	Bandwidth Manager
C	Conductor
CA	ITS Cabinet Assembly
CCR	Camera Control Receiver
CCTV	Closed Circuit Television Camera
CL	CenturyLink (Lightcore)
Coax.	Coaxial
Comm.	Communications
Conc.	Concrete
Ctr.	Center
DET	Detector
DIO	Digital Input/Output
Dist.	Distribution
DMS	Dynamic Message Sign
DTI	Digital Teleport, Inc. (Lightcore)
Dr.	Drive
Ea.	Each
EB	Eastbound
EOP	Edge of Pavement
EOS	Edge of Shoulder
EOTW	Edge of Travel Way
Exist.	Existing
FDU	Fiber Distribution Unit
F&I	Furnish And Install
Flex.	Flexible
FO	Fiber Optic
FT	Feet
FTC	Field Traffic Controller
HAR	Highway Advisory Radio
HDPE	High Density Polyethylene
HH	Handhole (Splice Vault)
Hwy.	Highway
IN	Inch
I/O	Input/Output
ITS	Intelligent Transportation System
KCP&L	Kansas City Power & Light
KDOT	Kansas Department of Transportation
KTA	Kansas Turnpike Authority
Ln.	Lane
LC	Lightcore (Century Link)
LS	Lump Sum
LT	Left
Min.	Minimum
MMFO	Multimode Fiber Optic
MM	Mile Marker
MP	Milepost
MPH	Miles per Hour
NB	Northbound
No.	Number
Nom.	Nominal
PB	Pull Box
Pkwy.	Parkway
POP	Point of Presence
PP	Power Pole
PS	Power Supply/Assembly
PVC	Polyvinyl Chloride
Rd.	Road
Req'd.	Required
RMC	Rigid Metal Conduit
RT	Right
Rte.	Route
R/W	Right-of-Way
SB	Southbound
SMFO	Single-mode Fiber Optic
St.	Street
Sta.	Station
SV	Splice Vault
SW	Sidewalk
TB	Transition Box
TMC	Traffic Management Center
Trfwy.	Trafficway
Typ.	Typical
Truck	Truckline
UIP	Use In Place
UP	Undergrownd Power
SOP	Source Of Power
VDS	Vehicle Detection Station
WB	Westbound
XFMR	Transformer

CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

ITS LEGEND AND ABBREVIATIONS

ITS-D01 VERSION DATE: 06-07-12

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	568	1055

GENERAL NOTES

1. ALL WORK WILL BE CONFINED WITHIN THE EXISTING ROADWAY RIGHT-OF-WAY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY AND KEEP INSTALLATION OF ALL EQUIPMENT AND DEVICES WITHIN THE EXISTING ROADWAY RIGHT-OF-WAY.

2. CONTRACTOR SHALL MAINTAIN 2 FT CONDUIT CLEARANCE FROM ALL LANDSCAPED FEATURES EXISTING WITHIN THE RIGHT-OF-WAY. ANY LANDSCAPING DISTURBED DURING CONSTRUCTION ACTIVITIES SHALL BE RESTORED TO ORIGINAL CONDITION. NO ADDITIONAL PAYMENT WILL BE MADE.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING ALL DISTURBED WORK AREAS. RESTORATION INCLUDES SEEDING, FERTILIZING, MULCHING, AND THE REMOVAL OF ALL UNUSED MATERIAL AND DEBRIS FROM THE WORK AREA ACCORDING TO THE KDOT STANDARD SPECIFICATIONS AND AS REQUIRED BY THE ENGINEER. ALL GRADING WORK SHALL SLOPE AWAY FROM FOUNDATIONS TO PREVENT PONDING. ADEQUATE TEMPORARY ROTECTION AGAINST EROSION SHALL BE PROVIDED ACCORDING TO THE KDOT UTILITY ACCOMMODATION POLICY.

4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ANY CONFLICTS WITH EXISTING UTILITIES INCLUDING KDOT LIGHTING AND FIBER IN THE FIELD PRIOR TO INITIATION OF CONSTRUCTION PER SITE. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE ENGINEER UPON DETERMINATION OF ANY UTILITY CONFLICTS. THE CONTRACTOR SHALL ADHERE TO KDOT'S UTILITIES ACCOMMODATION POLICY UNLESS OTHERWISE NOTED.

5. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CALL DIG SAFE AT 811 OR 1-800-344-7233 (1-800-DIG SAFE) TO REQUEST THE UTILITIES BE MARKED IN THAT AREA. THE CONTRACTOR SHALL CALL THE KDOT FIELD ENGINEER TO REQUEST THAT KDOT LIGHTING AND ITS (FIBER, OTHER) BE MARKED IN THAT AREA. THE CONTRACTOR SHALL ALSO CONTACT ANY AND ALL UTILITIES AND LOCAL GOVERNMENT AGENCIES NOT PARTICIPATING IN LOCATION SERVICES. WHEN DIGGING IN THE KANSAS CITY AREA, JOHNSON COUNTY, OR WYANDOTTE COUNTY, CALL KC SCOUT AT (816) 622-6500. WHEN IN JOHNSON COUNTY, ALSO CALL WATER ONE LOCATE REQUEST SERVICES AT (913) 895-1806.

6. SURVEY AND STAKE ALL ITS DEVICE LOCATIONS INCLUDING BUT NOT LIMITED TO: POLES, FOUNDATIONS, CABINETS, POWER SERVICE, PULL BOXES, AND SPLICE VAULTS.

7. PLACEMENT OF ALL DMS AND CCTV FOUNDATIONS, CABINETS, TRANSFORMERS AND PULL BOXES MUST BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION AND BEFORE SURVEYORS LEAVE EACH SITE. ORIENTATION OF ALL CABINETS SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACEMENT. ANY RESTAKING NECESSITATED BY ADJUSTMENT IS CONSIDERED INCIDENTAL TO THE PROJECT AND NO ADDITIONAL PAYMENT WILL BE MADE.

8. THE PLANS DEPICT CONDUIT ROUTING IN SCHEMATIC FORM ONLY. THE CONTRACTOR SHALL DETERMINE FINAL ROUTING BASED ON ACTUAL FIELD CONDITIONS PRIOR TO CONSTRUCTION AT EACH SITE, INCLUDING UTILITY LOCATOR SERVICE MARKINGS, TO PREVENT CONFLICTS WITH EXISTING UTILITIES. WHERE POSSIBLE CONTRACTOR TO ROUTE CONDUIT ADJACENT TO RIGHT-OF-WAY LINE AND PERPENDICULAR TO RIGHT-OF-WAY LINE FOR LATERALS.

9. THE CONTRACTOR SHALL FIELD REVIEW CONDUIT ON STRUCTURE FOR NECESSARY ROUTING, MOUNTING HARDWARE (INCLUDING BRIDGE HANGERS, FITTINGS, EXPANSION JOINTS AND JUNCTION BOXES) FOR ALL EXTERNALLY MOUNTED CONDUITS PRIOR TO SUBMITTAL OF BID TO DETERMINE THE TYPES AND EXTENT OF INCIDENTAL ITEMS TO BE INCLUDED IN THE UNIT PRICE OF CONDUIT.

10. BRIDGE ATTACHMENTS REQUIRE A SEPARATE PERMIT FROM KDOT THAT SHALL BE OBTAINED BY THE CONTRACTOR PER KDOT'S UTILITY ACCOMMODATION POLICY.

11. ALL TRAFFIC CONTROL PLANS AND LANE CLOSURES SHALL BE PRE-APPROVED BY THE ENGINEER.

12. PROPOSED ITS EQUIPMENT LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED TO AVOID CONFLICTS WITH UNDERGROUND UTILITIES OR OTHER OBSTRUCTIONS. DMS, CCTV CAMERA, DETECTOR AND WIRELESS EQUIPMENT LOCATIONS ARE LOCATION SENSITIVE. THE CONTRACTOR AND ENGINEER SHALL RECEIVE APPROVAL FROM THE KDOT ITS ENGINEER PRIOR TO REVISING THE PLAN LOCATION OR ORIENTATION OF ANY OF THE ITS EQUIPMENT.

13. KDOT WILL FURNISH HARDWARE AS DESCRIBED IN THE PLANS AND SPECIFICATIONS. CONTRACTOR SHALL CAREFULLY REVIEW PLANS AND SPECIFICATIONS FOR DETAILS ON KDOT FURNISHED ITEMS.

14. ALL ITS EQUIPMENT CALLED OUT BY PLANS AND SPECIFICATIONS AS "INSTALL" OR KDOT FURNISHED, INCLUDING DMS, CCTV ASSEMBLIES, DETECTORS AND COMMUNICATIONS EQUIPMENT, SHALL INCLUDE ALL TRANSPORTATION FROM A DESIGNATED KDOT FACILITY, INSTALLATION, AND TESTING IN ACCORDANCE WITH THE SPECIFICATIONS. CONTRACTOR SHALL COORDINATE WITH ENGINEER AND MANUFACTURER FOR A STORAGE LOCATION AT A DESIGNATED KDOT FACILITY.

15. INSTALLATION, TESTING AND INTEGRATION OF ALL ITS DEVICES INCLUDING KDOT FURNISHED ITEMS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

16. ITS EQUIPMENT POLE LOCATIONS AS SHOWN HAVE APPROPRIATE CLEAR ZONE PROTECTION. WHERE APPLICABLE, AND WHEN ITS POLES ARE TO BE PLACED NEAR EXISTING GUARDRAIL, ITS EQUIPMENT POLES SHALL BE LOCATED SUCH THAT THERE IS A MINIMUM OF 7 FT OF CLEARANCE FROM BACK OF GUARD RAIL TO FACE OF EQUIPMENT POLE. VARIATION FROM PLAN LOCATION MUST BE APPROVED BY ENGINEER.

17. TRANSFORMER LOCATIONS AS SHOWN HAVE APPROPRIATE CLEAR ZONE PROTECTION. VARIATION FROM PLAN LOCATION MUST BE APPROVED BY ENGINEER. LOCATE TRANSFORMERS AND POWER SUPPLY POLES AT THE RIGHT-OF-WAY LINE/FENCE WHEN POSSIBLE.

18. CONTRACTOR SHALL NOTIFY CENTURYLINK AND/OR KTA WHEN APPLICABLE TWO WEEKS AND AGAIN AT 72 HOURS PRIOR TO PERFORMING ANY WORK WITHIN 5 FT OF A CENTURYLINK OR KTA BACKBONE FIBER. A CENTURYLINK, KTA WHEN APPLICABLE, AND KDOT INSPECTOR MUST BE PRESENT FOR WORK WITHIN 5 FT OF FIBER OPTIC FACILITIES.

19. AT NO TIME SHALL THE CONTRACTOR ACCESS A CENTURYLINK AND/OR KTA PULLBOX OR SPLICE VAULT FOR ANY REASON WITHOUT A CENTURYLINK AND/OR KTA INSPECTOR PRESENT.

20. ALL WORK WITHIN 10 FT OF CENTURYLINK AND/OR KTA FIBER BACKBONE SHALL BE CARRIED OUT WITH HAND TOOLS ONLY. NO MECHANIZED EQUIPMENT SHALL BE ALLOWED IN THE ACCESS OF THE KDOT CONDUIT FROM THE CENTURYLINK AND / OR KTA CONDUIT ARRAY. HYDRO EXCAVATION IS ALLOWED.

21. CONTRACTOR TO MAINTAIN AT LEAST 20 FT OF CLEARANCE FROM ALL EXISTING GAS FACILITIES AND 5 FT OF CLEARANCE FROM CENTURYLINK AND / OR KTA FIBER. EXCEPTION ALLOWED WHEN PERFORMING WORK WITH CENTURYLINK WHILE KDOT AND CENTURYLINK INSPECTOR PRESENT.

22. WHEN WITHIN 5 FT OF KDOT LIGHTING FACILITIES, CONDUIT SHALL BE HAND DUG.

23. HIGH VOLTAGE POWER LINES MAY BE WITHIN THE PROJECT LIMITS. ALL WORK IS TO BE PERFORMED IN CONFORMANCE WITH ALL STATE, LOCAL, FEDERAL, UTILITY AND CONTRACT REQUIREMENTS. KDOT HAS NO CONTROL OVER THE MEANS, METHODS, CHOICE OF EQUIPMENT, SEQUENCING OF WORK, AND SAFETY PRACTICES USED WHEN WORKING IN, ON, OR AROUND HIGH VOLTAGE LINES OR OTHER UTILITY STRUCTURES AS THESE ITEMS ARE THE RESPONSIBILITY OF THE PARTIES CONTROLLING THE PHYSICAL PERFORMANCE OF THE WORK.

24. ALL GROUNDING SYSTEMS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND MANUFACTURER SPECIFICATIONS. FOLLOW APPLICABLE NEC REQUIREMENTS FOR INSTALLATION OF ALL PROJECT MATERIALS. THE CONTRACTOR SHALL PROPERLY GROUND ALL EQUIPMENT, CABINET AND GROUND RODS PER APPLICABLE STANDARDS OR AS DIRECTED BY ENGINEER.

25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ORDERING AND PAYING FOR THE ELECTRICAL SERVICE IN KDOT'S NAME WHEN IN KDOT AREA OR KC SCOUT'S NAME WHEN IN KC SCOUT AREA AT THE LOCATIONS SHOWN ON THE PLANS. CONTRACTOR SHALL MAKE PAYMENT OF ALL POWER COMPANY FEES UNTIL KDOT OR KC SCOUT ASSUMES OWNERSHIP. UTILITY COMPANIES, CONTACT NAME, AND PHONE NUMBER FOR EACH SITE IS LISTED ON THE ELECTRICAL SERVICE LOCATION SUMMARY SHEET.

26. WARNING TAPE IS REQUIRED IN ALL TRENCHES CONTAINING CONDUIT. MULTIPLE CONDUITS IN PARALLEL SHALL SHARE THE SAME TRENCH.

27. CONTRACTOR TO INSPECT AND REPAIR EXISTING CONDUIT. SEE CONDUIT SPECIFICATIONS FOR ADDITIONAL DETAILS. REPAIRS PAID FOR UNDER ITS UNIT COST ITEM "CONDUIT REPAIR".

28. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR ANY EXISTING CONDUIT, REPLACE ANY EXISTING CONDUCTORS OR OTHER FACILITIES DAMAGED DURING CONSTRUCTION. ALL EXISTING IMPROVEMENTS REMOVED OR DAMAGED BY THE CONTRACTOR SHALL BE REPLACED IN KIND BY THE CONTRACTOR, WITH NO ADDITIONAL PAYMENT.

29. PRIOR TO INSTALLING DMS SUPPORT STRUCTURES, THE CONTRACTOR SHALL VERIFY FINAL ELEVATIONS OF DMS FOUNDATIONS TO ENSURE THAT THEY WILL PROVIDE FOR THE CORRECT HEIGHT OF THE OVERALL DMS STRUCTURE WHEN INSTALLED.

30. DMS SHALL NOT BE ATTACHED TO THE SUPPORT POSTS UNTIL THE SUPPORTING SYSTEMS OF CONDUIT, PULL BOXES, CONTROLLER ASSEMBLIES, POWER SUPPLY ASSEMBLIES AND ALL OTHER ITEMS NECESSARY ARE IN PLACE TO PROVIDE A FULLY FUNCTIONING DMS SYSTEM.

31. CCTV POLES SHOULD BE ORIENTED SO THAT POLE HANDHOLE USED FOR CAMERA LOWERING OPERATIONS IS: NOT ON THE DOWNHILL SIDE OF A SLOPE, NOT DIRECTLY BENEATH THE CAMERA AND WOULD NOT EXPOSE WORKERS TO TRAFFIC. POLE MOUNTED CABINETS SHALL BE INSTALLED SO THAT THEY ARE NOT DIRECTLY BENEATH THE CAMERA. THE AREA ENGINEER SHALL APPROVE PLACEMENT OF CAMERA POLES.

32. CCTV CAMERAS AND DMS SHALL BE ORIENTED ACCORDING TO THE CCTV ORIENTATION DETAIL AND THE DMS ORIENTATION DETAIL.

33. THE CONTRACTOR SHALL INSTALL DETECTORS AND ANTENNAS SO AS TO NOT INTERFERE WITH THE CCTV LOWERING DEVICE.

34. THE CONTRACTOR SHALL PROVIDE KDOT AN ELECTRONIC LIST OF GPS READINGS (EXCEL FORMAT) FOR ALL INSTALLED DEVICES (DMS, CCTV, DET), PULL BOXES, SPLICE VAULTS, CABINETS, POWER METERS, TRANSFORMERS AND WIRELESS TOWERS. THE ACCURACY OF THE GPS READINGS SHALL BE WITHIN 3 FT. OBTAIN GPS AND THREE TIE-POINT MEASUREMENTS FOR EACH BURIED ELECTRICAL PULL BOX PRIOR TO PLACING BACKFILL MATERIAL.

35. CONTROLLED DEMOLITION: THE REMOVAL OF EXISTING STATIC SIGN STRUCTURES, CANTILEVER AND BUTTERFLY STRUCTURES IS A CONTROLLED DEMOLITION. CONTRACTOR SHALL SUBMIT DEMOLITION PLANS TO THE FIELD ENGINEER PER KDOT SPECIFICATIONS AND PER KDOT CONTROLLED DEMOLITION SPECIAL PROVISIONS. CONTROLLED DEMOLITION, DEMOLITION PLANS AND CONTIGENCY PLANS ARE SUBSIDIARY TO THE SITE BID AND NO ADDITIONAL PAYMENT WILL BE MADE.

36. IN ADDITION TO THESE GENERAL NOTES, CONTRACTOR SHALL CAREFULLY REVIEW EQUIPMENT DETAILS AND SPECIFICATIONS FOR ADDITIONAL NOTES AND REQUIREMENTS.

37. THE CONTRACTOR SHALL PROVIDE 24 WEEKS NOTICE TO KDOT WHEN KDOT SUPPLIED MATERIALS OR ITEMS ARE NEEDED FOR INSTALLATION.

38. KDOT HAS FIBER OPTIC CABLE LOCATED AT THE WESTERN TERMINAL OF THIS PROJECT THAT PROVIDES COMMUNICATION TO SEVERAL ITS DEVICES - INCLUDING CAMERA AND DYNAMIC MESSAGE SIGNS. CONTRACTOR IS RESPONSIBLE FOR RELOCATING THIS FIBER OPTIC CABLE AS PART OF THE UTILITY RELOCATION, INCLUDING INSTALLATION OF NEW FIBER OPTIC CABLE AND SPLICES IF NECESSARY. DISRUPTION TO THIS COMMUNICATION LINK DURING RELOCATION SHALL BE NO LONGER THAN 6 HOURS. THE CONTRACTOR SHALL FURNISH AND INSTALL A TEMPORARY FIBER LINK IF NEEDED TO MEET THIS DEADLINE. THE CONTRACTOR IS TO PROVIDE OTDR TESTS ON THE RELOCATED FIBER ACCORDING TO ITS SPECIFICATIONS. THE CONTRACTOR SHALL CONTACT KDOT FOR LOCATION OF THE ITS DEVICE POWER AND COMMUNICATION CABLES PRIOR TO BEGINNING WORK IN THIS AREA.

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CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

ITS GENERAL NOTES

ITS-D02 VERSION DATE: 02-11-14

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	569	1055

From Device No. — To Device No. — Device Center to Center Distance — Size, Color, and Number of Conduits in Trench — Size, Color and Number of Conduits in Bore — Size and Number of Conduits on Structure — Power Cable Size — Fiber Optic Cable Fiber Count — Total Length of Category 5E Cable — CCTV/DMS/VDS Device-Specific Cables

CONDUIT AND CABLE ROUTING TABLE

CONDUIT (FT)																CABLE (FT)													
			TRENCHED									BORED			ON STRUCTURE	POWER					COMM.		DETECTOR		DEVICE				
			1		2		3		4	S	6	7	8	1	2	3	4	5	FIBER OPTIC		#		1	2	3	4
FROM	TO	CTR TO CTR DISTANCE (FT)	1 IN RED	1 IN GREEN	2 IN RED	2 IN GREEN	3 IN RED	3 IN GREEN	4 IN RED	4 IN GREEN	SPARE 2 IN BLACK	2 IN RED	2 IN GREEN	3 IN RED	3 IN GREEN	2 IN RMC	3-#X/0	3-#6	3-#X	2-#X	2-#X	(12) 12 SMFO	(XX) XX SMFO	CAT 5E CABLE		CCTV	DMS	VDS**	
TOTAL																													

∗ CONDUIT AND / OR CABLE RUN CARRIES OVER TO ADJACENT SHEETS

∗∗ MAX. HEIGHT OF DETECTOR ON POLE ASSUMED AT 25 FT FOR CABLE QUANTITIES

NOTES:

1. ALL LENGTHS IN TABLES ARE MEASURED IN FEET.
2. TRENCHED CONDUIT SHALL BE HDPE, AND CONDUIT ON STRUCTURES SHALL BE RIGID METAL (RMC), UNLESS OTHERWISE NOTED.
3. CTR TO CTR HORIZONTAL DISTANCES ARE ROUNDED UP TO THE NEAREST WHOLE FOOT. GRADE ELEVATION CHANGES ARE NOT ACCOMMODATED IN CABLE QUANTITIES AND ARE INCIDENTAL.
4. TOTAL LENGTHS OF CONDUIT AND CABLE INCLUDE ADDITIONAL QUANTITIES AS GIVEN ON THIS SHEET, AND ARE ROUNDED UP TO THE NEAREST WHOLE FOOT.
5. AFTER PULLING FIBER OPTIC CABLE THROUGH THE BOXES, THE CONTRACTOR SHALL CUT OFF AND DISCARD THE FIRST 10 FT OF THE CABLE. THIS 10 FT IS CONSIDERED INCIDENTAL TO THE PROJECT AND NO ADDITIONAL PAYMENT WILL BE MADE.
6. ALL CONDUIT SIZES ARE INDUSTRY STANDARD ENGLISH SIZE CONDUIT DESIGNATED BY THEIR ROUNDED NOMINAL INCH (IN) DIAMETER EQUIVALENT.
7. GROUND WIRE IS REQUIRED TO BE INSTALLED. THE NUMBER OF CONDUCTORS LISTED IN THE TABLE DOES NOT INCLUDE THE REQUIRED GROUND WIRE. GROUND WIRE IS CONSIDERED INCIDENTAL TO THE PROJECT AND NO ADDITIONAL PAYMENT WILL BE MADE.

ADDITIONAL CONDUIT QUANTITIES INCLUDED IN TABLE

3 FT AT EACH POWER SUPPLY ASSEMBLY (LOAD AND SERVICE SIDE)
3 FT AT EACH ITS CABINET ASSEMBLY
3 FT AT EACH CCTV
3 FT AT EACH DMS
3 FT AT EACH POWER POLE OR POWER PEDESTAL FOR POWER CO. SERVICE

CONDUIT SYMBOL LEGEND

- 1 — 1 IN (HDPE)
- 2 — 2 IN (HDPE)
- 3 — 3 IN (HDPE)
- 4 — 4 IN (HDPE)
- S — 2 IN SPARE (HDPE)

} TRENCHED

- 6 — 2 IN (HDPE)
- 7 — 3 IN (HDPE)

} BORED

- 8 — 2 IN RMC

} ON STRUCTURE

ADDITIONAL CABLE QUANTITIES INCLUDED IN TABLE

POWER CABLES

36 FT AT EACH TYPE 1 POWER SUPPLY ASSEMBLY
8 FT AT EACH TYPE 2 POWER SUPPLY ASSEMBLY (LOAD SIDE)
8 FT AT EACH TYPE 2 POWER SUPPLY ASSEMBLY (SERVICE SIDE) PLUS DISTANCE TO POWER CO. SERVICE PLUS 36 FT IF SERVICE POLE, OR 8 FT IF SERVICE PEDESTAL
8 FT AT EACH TRANSFORMER
8 FT COIL AT EACH ITS CABINET ASSEMBLY
6 FT COIL AT EACH PULL BOX
50 FT AT EACH OVERHEAD DMS
25 FT AT EACH ROADSIDE DMS

FIBER OPTIC TRUNKLINE CABLES (XX SMFO)

50 FT FROM EACH DIRECTION AT EACH - SPLICE VAULT WHEN SPLICING
100 FT AT EACH SPLICE VAULT WHEN NOT SPLICING
25 FT AT EACH PULL BOX (WHEN NOT SPLICING)

FIBER OPTIC BRANCH CABLES (XX SMFO)

50 FT AT EACH ITS CABINET LOCATION
- STORE 40 FT AT THE PULL BOX OR SPLICE VAULT NEAREST ITS CABINET
- STORE 10 FT AT ITS CABINET

100 FT FROM EACH DIRECTION AT EACH KDOT SPLICE VAULT WHEN SPLICING
25 FT AT EACH PULL BOX OR SPLICE VAULT WHEN NOT SPLICING

CATEGORY 5E CABLE

8 FT COIL AT EACH ITS CABINET
3 FT COIL AT PULL BOX WHERE SPLICED TO LOOP WIRE
6 FT COIL AT EACH MID-RUN PULL BOX

CCTV/DMS/VDS CABLES

8 FT COIL AT EACH ITS CABINET
3 FT AT DEVICE
6 FT COIL AT EACH PULL BOX
POLE HEIGHT (VARIES) AT EACH POLE

DEVICE ID CODE LEGEND

K075NBC-05-151.41 — K 075 NB C - 05 XXX.XX

- XXX.XX — Mile Post
- 05 — Device Number
- C — Device: C - Camera (CCTV); CA - ITS Cabinet; S - Sign (DMS); V - Vehicle Detection Station
- NB — Direction: NB - Northbound, SB - Southbound; EB - Eastbound, WB - Westbound
- 075 — Route: US 75
- K — State: K-Kansas

PB075-02 — PB 075 - 02

- 02 — Device Number
- 075 — Route: US 75
- PB — Device: PB - Pull Box; PP - Power Pole; PS - Power Supply / Assembly; T - Transformer

SV075-01 — SV 075 - 01

- 01 — KDOT Splice Vault No.
- 075 — Route: US 75
- SV — KDOT Splice Vault

CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

CABLE, CONDUIT, AND DEVICE LEGEND

ITS-D03A VERSION DATE: 04-28-14

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	570	1055

ITS SUMMARY OF QUANTITIES (FOR INFORMATION ONLY)

ITEM DESCRIPTION	UNITS	SITE 1	QUANTITY
2" HDPE Conduit - Trenched (Green, Communications)	L.F.	1462	1462
2" HDPE Conduit - Bored (Green, Communications)	L.F.	1400	1400
2" HDPE Conduit - Trenched (Red, Power)	L.F.	2796	2796
2" HDPE Conduit - Trenched (Black, Spare)	L.F.	38	38
2" RMC Conduit - Structure Attachment	L.F.	465	465
3-1/C #2 Power Conductor	L.F.	1341	1341
3-1/C #4 Power Conductor	L.F.	2260	2260
ITS Pull Box (KDOT ELECTRIC)	Each	13	13
ITS Pull Box (KDOT ITS)	Each	9	9
Remove, Salvage and Reinstall Pull Box (KDOT ITS)	Each	2	2
Power Supply Assembly Type 2	Each	1	1
Surge Protection Device (Power Supply Assembly)	Each	1	1
Splice Vault	Each	3	3
FO Splice	Each	20	20
FO Splice Closure, Large	Each	3	3
12 Ct. SMFO Cable	L.F.	2415	2415
96 Ct. SMFO Cable	L.F.	9100	9100
Pull Back and Reroute 96 Ct. SMFO Cable	L.F.	1600	1600
DMS System (Arterial DMS and DMS Cabinet)	Each	2	2
DMS Communication Cable (Signal cable)	L.F.	80	80
DMS Structure	Each	2	2
DMS Structure Foundation	Each	2	2
Steel CCTV Pole and Foundation, 35' Above Ground	Each	1	1
Camera Lowering Device (IP)	Each	2	2
Camera Lowering Device Composite Cable (IP)	L.F.	104	104
IP CCTV Assembly	Each	2	2
Surge Protection Device for IP CCTV (Power over Ethernet)	Each	2	2
Radar Vehicle Detector Cable	L.F.	57	57
Radar Vehicle Detector Mounting Brackets	Each	1	1
Radar Vehicle Detector	Each	1	1
Radar Vehicle Detector Serial to Ethernet Converter	Each	1	1
Radar Vehicle Detector Power Supply	Each	1	1
Radar Vehicle Detector Surge Suppressor	Each	1	1
DIN Rack Adapter	Each	1	1
Pad Mounted ITS 334C Cabinet	Each	1	1
Category 5 UTP patch cables 1.8 meter	Each	7	7
Fiber Optic Simplex Patch Cords LC-LC Connector, 2 meter	Each	12	12
Fiber Optic Patch Panel	Each	3	3

KDOT SUPPLIED ITS ITEMS (FOR INFORMATION ONLY) - TO BE INSTALLED BY CONTRACTOR

ITEM DESCRIPTION	UNITS	SITE 1	QUANTITY
Cisco IE-3000 Network Switch	Each	3	3
Cisco IEM-3000-4SM	Each	1	1
Cisco Power Supply	Each	3	3
Small Form Pluggable Fiber Modules GLC-LX-SM	Each	6	6

RECAPITULATION OF ITS QUANTITIES

ITEM	UNIT	QUANTITY
INTELLIGENT TRANSPORTATION SYSTEM, SITE 1	L.S.	1

** NOTE: THE 96 CT SMFO CABLE INCLUDED IN THESE QUANTITIES SHALL BE INSTALLED IN THE COMMUNICATION DUCT BANKS ALONG THE LENGTH OF THE PROJECT. SEE NOTE ON SHEET 560

* NOTE: PROJECT WIDE QUANTITIES ARE TO BE INCLUDED IN "INTELLIGENT TRANSPORTATION SYSTEMS, SITE 1", BID ITEM. ANY ASSOCIATED WORK AT THE TMC, POP BUILDING, OR EXISTING ITS SITES TO COMPLETE THE BID ITEM ABOVE IS TO BE CONSIDERED PART OF THE BID ITEM FOR THE SITE.

CITY OF WICHITA
EAST KELLOGG & WEBB ROAD
ITS SUMMARY OF QUANTITIES

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	571	1055

Existing Communication Duct Bank with KDOT 96 SMFO

Cut and Pull Back Existing Fiber Optic Cable from SV054-03. Re-Install Fiber Optic Cable into new conduit through SV054-02 and re-splice back into SV054-03.

This is a Temporary Link During Construction. Splice Existing Fiber into the New 96 Ct. SMFO Running East Along the Length of the Project in City Conduit - See Communication Duct Bank Plans Beginning on Sheet 560

Pull Back Existing 96 SMFO Fiber Optic Cable Remove Existing Conduit

EXISTING SV054-01

STA. 498+80 Remove and Salvage Pull Box Install Salvaged Pull Box at PB054-09

Pull Back Existing 96 SMFO Fiber Optic Cable Remove Existing Conduit

Proposed Communication Duct Bank

Re-install Existing 96 SMFO Fiber Optic Cable into New Conduit

6 96* 235'

6 96* 1165'

SV054-02

Existing Water Main Below Existing Sidewalk Place Proposed Splice Vault in Boulevard Between Frontage Road and Right-of-Way Line. Concrete Pad not required for Splice Vault at this location due to limited Boulevard.

MATCHLINE STA. 503+00

Mansfield

Eastern

NOTE: KDOT HAS FIBER OPTIC CABLE LOCATED AT THE WESTERN TERMINAL OF THIS PROJECT THAT PROVIDES COMMUNICATION TO SEVERAL ITS DEVICES - INCLUDING CAMERAS AND DYNAMIC MESSAGE SIGNS. CONTRACTOR IS RESPONSIBLE FOR RELOCATING THIS FIBER OPTIC CABLE AS PART OF THE UTILITY RELOCATION, INCLUDING INSTALLATION OF NEW FIBER OPTIC CABLE AND SPLICES IF NECESSARY. DISRUPTION TO THIS COMMUNICATION LINK DURING RELOCATION SHALL BE NO LONGER THAN 6 HOURS. THE CONTRACTOR SHALL FURNISH AND INSTALL A TEMPORARY FIBER LINK IF NEEDED TO MEET THIS DEADLINE. THE CONTRACTOR IS TO PROVIDE OTDR TESTS ON THE RELOCATED FIBER ACCORDING TO ITS SPECIFICATIONS. THE CONTRACTOR SHALL CONTACT KDOT FOR LOCATION OF THE ITS DEVICE POWER AND COMMUNICATION CABLES PRIOR TO BEGINNING WORK IN THIS AREA.

SCALE 1" = 50'

NOTE: DEVICE AND CONDUIT SYMBOLOGY ON PLAN SHEET IS NOT SHOWN TO SCALE FOR PLAN CLARITY. DO NOT SCALE LOCATIONS FROM PLAN SHEETS.

NOTE: * INDICATES THE RE-INSTALLATION OF EXISTING FIBER OPTIC CABLE

CITY OF WICHITA

EAST KELLOGG

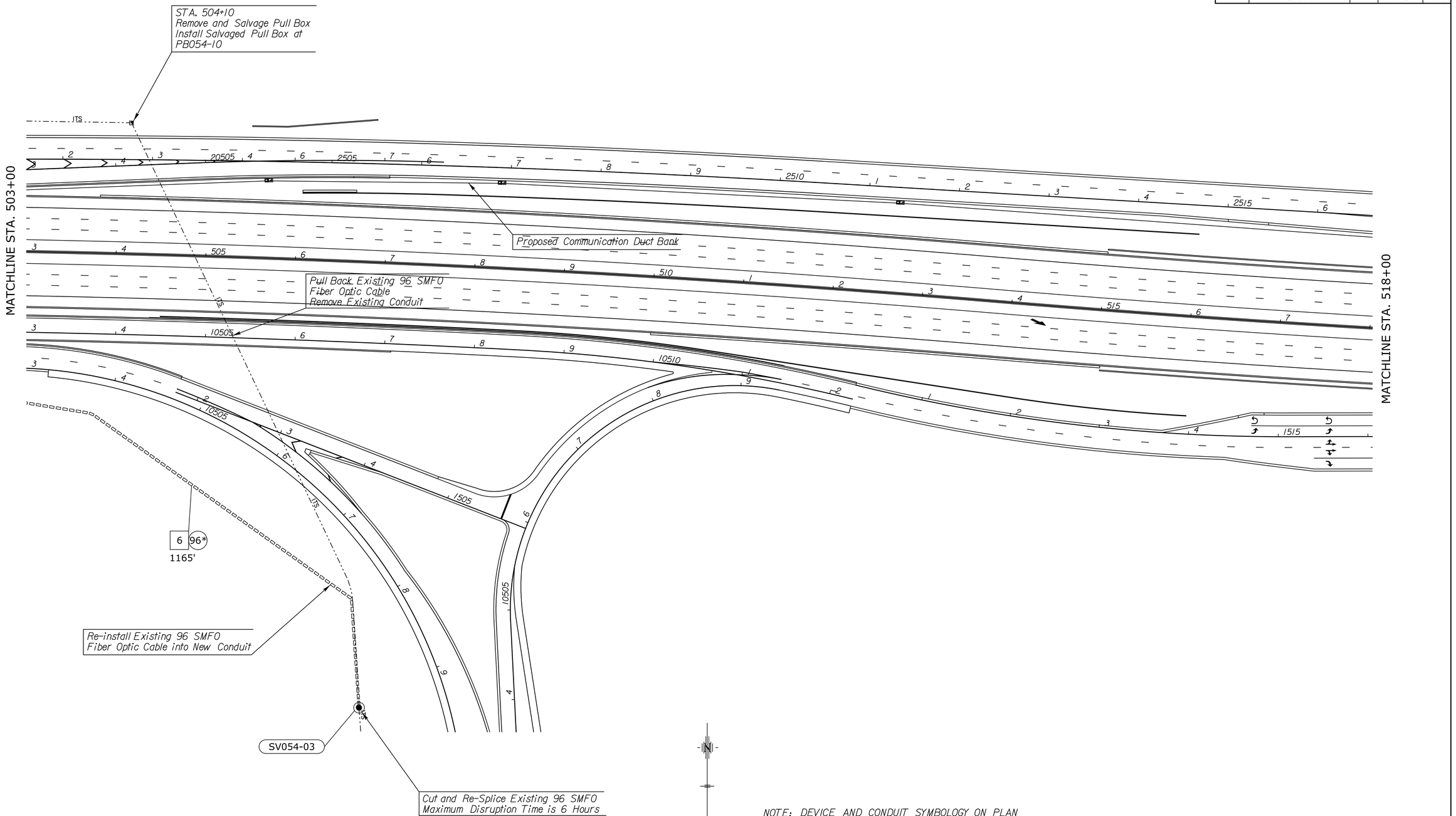
ITS PLAN

STA. 488+00 TO STA. 503+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	572	1055



NOTE: DEVICE AND CONDUIT SYMBOLOGY ON PLAN SHEET IS NOT SHOWN TO SCALE FOR PLAN CLARITY. DO NOT SCALE LOCATIONS FROM PLAN SHEETS.

SCALE 1" = 50'

NOTE: * INDICATES THE RE-INSTALLATION OF EXISTING FIBER OPTIC CABLE

CITY OF WICHITA

EAST KELLOGG

ITS PLAN

STA. 503+00 TO STA. 518+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	573	1055

MATCHLINE STA. 47+00

PS054-01 TYPE 2

WESTAR POWER SOURCE

PB054-07

PB054-08

PB054-10

PB054-06

PB054-09

PB054-05

PB054-04

PB054-03

PB054-01

PB054-02

PB054-11

PB054-12

SV054-04

SV054-05

205'

250'

250'

225'

185'

110'

225'

245'

5'

125'

155'

115'

350'

345'

75'

Sta. 523+23.45 Communication Duct Bank Service Box

ITS Splice Vault: Splice 12 SMFO to 96 SMFO Coil 100' 12 SMFO

Sta. 529+51.27, 69'Lt. Sta. Install ITS Cabinet On Conc. Pad

Sta. 529+61.27', 64.83' Lt. Install 35' steel CCTV Pole, Two CCTV, and Veh. Detector Mount Pole on Retaining wall See Sh. No's. 325 & 326

Sta. 529+78.24 Communication Duct Bank Service Box

ITS Splice Vault: Splice 12 SMFO to 96 SMFO Coil 100' 12 SMFO

Webb Road Bridge Conduit Utility Hanger Junction North

Proposed Communications Duct Bank

Webb Road Bridge Conduit Utility Hanger Junction South

MATCHLINE STA. 518+00

MATCHLINE STA. 533+00

MATCHLINE STA. 53+00

Kellogg Avenue (US-54)

K054WBCA-01-222.00

K054WBC-01A-222.00

K054WBC-01B-222.00

K054WBV-01-222.00

SPARE

5'

10'

5'

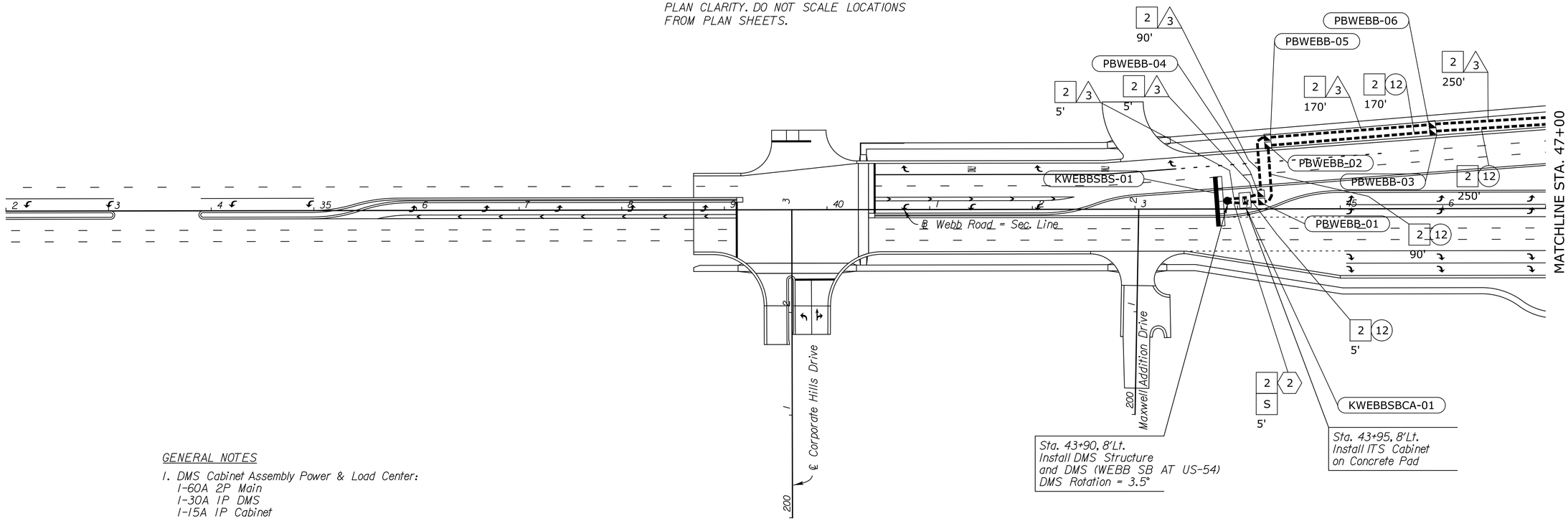
5'

5

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	574	1055

SCALE 1" = 50'

NOTE: DEVICE AND CONDUIT SYMBOLOGY ON PLAN SHEET IS NOT SHOWN TO SCALE FOR PLAN CLARITY. DO NOT SCALE LOCATIONS FROM PLAN SHEETS.



GENERAL NOTES

1. DMS Cabinet Assembly Power & Load Center:
   1-60A 2P Main
   1-30A 1P DMS
   1-15A 1P Cabinet

CITY OF WICHITA

WEBB ROAD

ITS PLAN

STA. 35+00 TO STA. 47+00

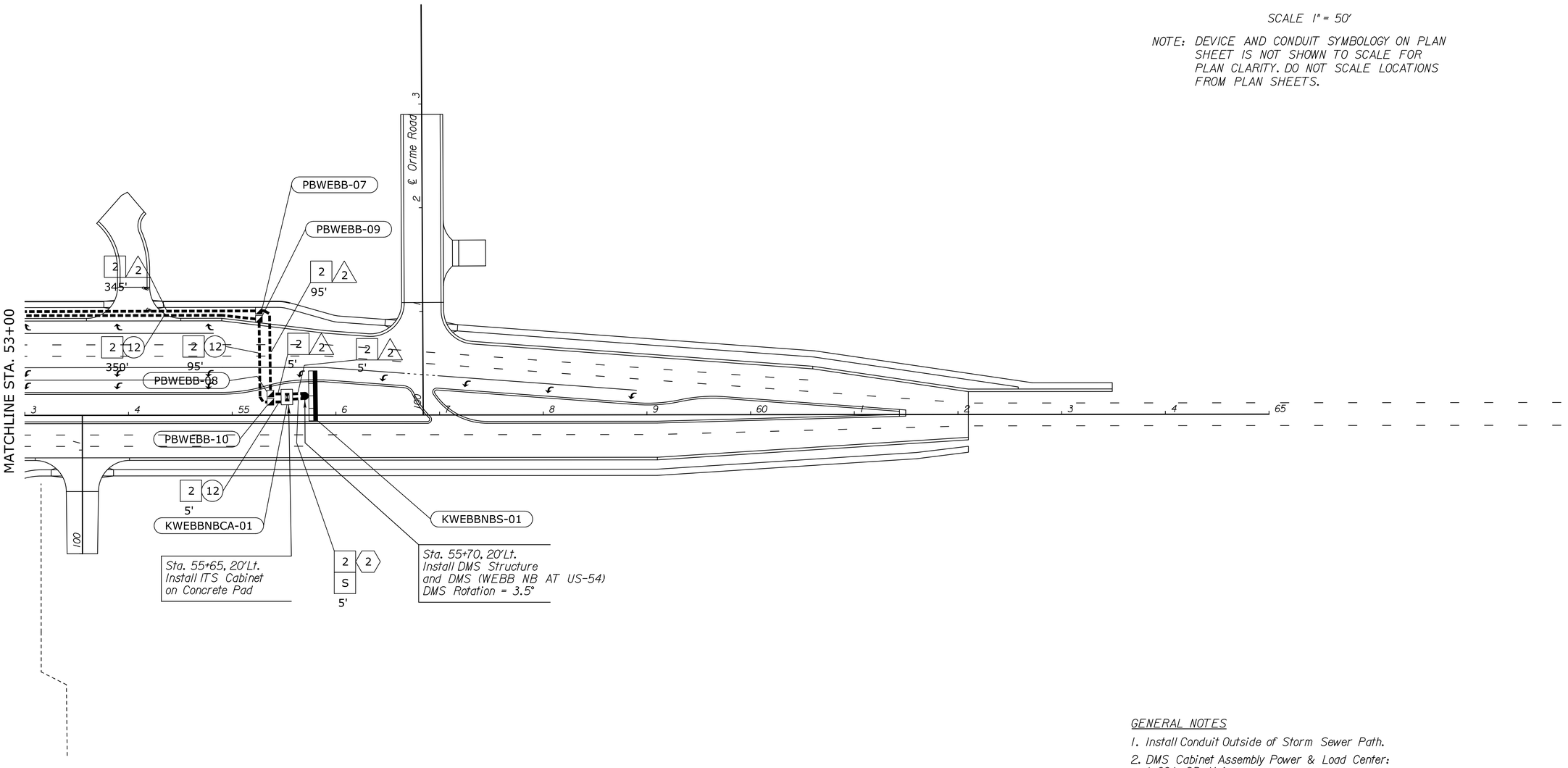
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	575	1055

SCALE 1" = 50'

NOTE: DEVICE AND CONDUIT SYMBOLOGY ON PLAN SHEET IS NOT SHOWN TO SCALE FOR PLAN CLARITY. DO NOT SCALE LOCATIONS FROM PLAN SHEETS.



GENERAL NOTES

1. Install Conduit Outside of Storm Sewer Path.
2. DMS Cabinet Assembly Power & Load Center:
   1-60A 2P Main
   1-30A 1P DMS
   1-15A 1P Cabinet

CITY OF WICHITA

WEBB ROAD

ITS PLAN

STA. 53+00 TO STA. 65+00

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	576	1055

CONDUIT AND CABLE ROUTING TABLE

CONDUIT (FT)

CABLE (FT)

FROM	TO	CTR TO CTR DISTANCE (FT)	TRENCHED 1 IN RED	TRENCHED 1 IN GREEN	TRENCHED 2 IN RED	TRENCHED 2 IN GREEN	TRENCHED 3 IN RED	TRENCHED 3 IN GREEN	TRENCHED 4 IN RED	TRENCHED 4 IN GREEN	TRENCHED SPARE 2 IN BLACK	BORED 2 IN RED	BORED 2 IN GREEN	BORED 3 IN RED	BORED 3 IN GREEN	ON STRUCTURE 2 IN RMC	POWER 3-#X/0	POWER 3-#2	POWER 3-#4	POWER 2-#X	POWER 2-#X	COMM. FIBER OPTIC 12 SMFO	COMM. FIBER OPTIC 96 SMFO	DETECTOR CAT 5E CABLE	DETECTOR #	DEVICE 1 CCTV	DEVICE 2 DMS	DEVICE 3 VDS**	DEVICE 4
SV054-01	SV054-02	235											235										# 335						
SV054-02	SV054-03	1165											1165										#1265						
K054WBC-01A-222.00	PB054-01	5				8					8															49			
K054WBC-01B-222.00	PB054-01	5																								29			
K054WBV-01-222.00	PB054-01	5																										44	
PB054-01	K054WBCA-01-222.00	5				8					8															26		13	
K054WBCA-01-222.00	PB054-01	5				8																55							
PB054-01	SV054-05	10				10																110							
K054WBCA-01-222.00	PB054-02	5			8														19										
PB054-02	PB054-03	75			75														81										
PB054-03	PB054-04	245			245														251										
PB054-04	PB054-05	225			225														231										
PB054-05	PB054-06	225			225														231										
PB054-06	PB054-07	205			205														422										
PB054-07	PB054-08	185			185														382										
PB054-08	PS054-01	5			8														58										
KWEBBSBS-01	KWEBBSBCA-01	5			8														38										
KWEBBSBS-01	KWEBBSBCA-01	5				11					11																40		
KWEBBSBCA-01	PBWEBB-01	5				8																55							
PBWEBB-01	PBWEBB-02	90				90																115							
PBWEBB-02	PBWEBB-03	170				170																195							
PBWEBB-03	PB054-10	250				250																275							
PB054-10	PB054-09	110				110																270							
PB054-09	SV054-04	85				85																370							
KWEBBSBCA-01	PBWEBB-04	5			8														19										
PBWEBB-04	PBWEBB-05	90			90														96										
PBWEBB-05	PBWEBB-06	170			170														176										
PBWEBB-06	PB054-06	250			250														256										
PB054-06	PB054-07	205			205													211											
PB054-07	PB054-08	185			185													191											
PB054-08	PS054-01	5			8													29											
KWEBBNBS-01	KWEBBNBCA-01	5			8													38											
KWEBBNBS-01	KWEBBNBCA-01	5				11					11																40		
KWEBBNBCA-01	PBWEBB-10	5				8																55							
PBWEBB-10	PBWEBB-09	95				95																120							
PBWEBB-09	PB054-12	350				350																375							
PB054-12	PB054-10	395				240										310						420							
KWEBBNBCA-01	PBWEBB-08	5			8													19											
PBWEBB-08	PBWEBB-07	95			95													101											
PBWEBB-07	PB054-11	345			345													351											
PBWEBB-11	PB054-06	395			240											155		401											
TOTAL					2796	1462					38		1400			465		1341	2260			2415	#1600			104	80	57	

∗ CONDUIT AND / OR CABLE RUN CARRIES OVER TO ADJACENT SHEETS

∗∗ MAX. HEIGHT OF DETECTOR ON POLE ASSUMED AT 25 FT FOR CABLE QUANTITIES

REINSTALL EXISTING FIBER OPTIC CABLE INTO NEW CONDUIT

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CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

ITS PLAN

CABLE & CONDUIT TABLE

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	577	1055

I. GENERAL DESIGN CRITERIA

1. APPLICABLE CODES

   A. AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION 2009 WITH 2011 INTERIM.
   B. AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES, 17TH EDITION

2. WIND LOADS

   A. BASIC WIND SPEED (3-SECOND GUST) = 90 MPH
   B. DRAG COEFFICIENTS PER AASHTO SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION WITH 2011 INTERIM.

3. ICE LOADS

   A. ALL SUPPORT STRUCTURE SURFACES AND DMS TOP, FRONT, AND BACK SURFACES: 3 psf

4. ASSUMED SOIL PARAMETERS FOR CAISSON DESIGN:
   DENSITY = 100 PCF AND C = 0
   Ø = 20

   A. CONTRACTOR SHALL CONFIRM SOIL PARAMETERS WITH ENGINEER PRIOR TO FABRICATION OF STRUCTURE AND DRILLED SHAFT FOUNDATION. IF SITE-SPECIFIC SOIL PARAMETERS DIFFER FROM THOSE LISTED ABOVE, CONTRACTOR SHALL PROVIDE FOUNDATION DESIGN BASED ON SITE-SPECIFIC SOIL PARAMETERS.

   B. CONTRACTOR SHALL COORDINATE WITH KDOT BUREAU OF STRUCTURES AND GEOTECHNICAL SERVICES FOR CONFIRMATION OF SOIL PARAMETERS PRIOR TO FABRICATION OF STRUCTURE AND DRILLED SHAFT FOUNDATION. IF SITE-SPECIFIC SOIL PARAMETERS DIFFER FROM THOSE LISTED ABOVE, CONTRACTOR SHALL PROVIDE FOUNDATION DESIGN BASED ON SITE-SPECIFIC SOIL PARAMETERS.

5. DMS DESIGN ASSUMPTIONS

   A. DMS - KWEBBSBS-01 AND KWEBBNBS-01
      1. DMS WEIGHT OF 2340 POUNDS
      2. DMS L x H = 20'-10" x 5'-6"

II. GENERAL CONCRETE NOTES

1. MATERIALS

   A. UNLESS OTHERWISE NOTED, ALL CAST IN PLACE CONCRETE SHALL CONFORM TO THE FOLLOWING:

      COMPRESSIVE STRENGTH F'C = 4000 PSI AT 28 DAYS
      SLUMP = 5" MAX
      ENTRAINED AIR = 5% +/- 1%
      MAX WATER CEMENT RATIO = 0.45
      AGGREGATE SIZE = #57 (1 1/2 " MAX.) AS DEFINED BY ASTM C33

   B. ADMIXTURES SHALL BE AS REQUIRED FOR HOT/COLD WEATHER CONCRETING.

   C. REINFORCEMENT: UNLESS OTHERWISE NOTED, REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.

2. CAISSONS SHALL BE PLACED AS INDICATED ON THE DRAWINGS.

3. FOR SPECIAL WEATHER CONCRETING (HOT AND COLD WEATHER CONCRETING) SEE ACI 305, "HOT WEATHER CONCRETING" AND ACI 306 "COLD WEATHER CONCRETING," RESPECTIVELY.

4. CLEAR COVER TO REINFORCING SHALL CONFORM TO ACI 318, UNLESS NOTED OTHERWISE. DETAILS OF REINFORCEMENT SHALL CONFORM TO ACI 315.

5. WELDING OF REINFORCEMENT IS PROHIBITED.

6. FIELD WELDING TO ANCHOR BOLTS IS PROHIBITED.

7. OBSERVE ALL OWNER RULES WITH RESPECT TO SAFETY, BADGES, CONDUCT, PERMITS, CUTTING AND WELDING, ETC.

8. ANCHOR BOLTS

   A. ANCHOR BOLTS CAST INTO CONCRETE SHALL CONFORM TO ASTM F1554, GRADE 55 U.N.O.

   B. ANCHOR BOLTS SHALL HAVE ROLLED THREADS IN ACCORDANCE WITH KDOT STANDARDS.

III. FOUNDATION REQUIREMENTS

1. PROVIDE DRILLED CAISSONS OF DIAMETER AND EMBEDMENT INDICATED ON THESE DRAWINGS.

IV. STRUCTURAL STEEL NOTES

1. QUALITY ASSURANCE:

   A. MATERIALS, FABRICATION, AND ERECTION ARE SUBJECT TO INSPECTION AND TESTS IN THE MILL, SHOP AND FIELD.
   B. ALL WELDERS MUST BE QUALIFIED IN ACCORDANCE WITH THE AWS CODE BY AN INDEPENDENT AGENCY WITHIN ONE YEAR PRIOR TO THEIR EMPLOYMENT FOR THIS WORK. WELDING CERTIFICATE FOR EACH WELDER SHALL BE ON FILE AND AVAILABLE FOR INSPECTION BY KDOT.
   C. MILL TEST REPORTS OF THE MATERIAL USED SHALL BE AVAILABLE FOR REVIEW AT KDOT'S REQUEST.
   D. NOTIFY KDOT SEVEN DAYS IN ADVANCE OF COMMENCING TO FABRICATE STEEL SO OWNER MAY INSPECT SHOP FABRICATION IF SO DESIRED.
   E. PROVIDE ACCESS FOR THE TESTING AGENCIES AND INSPECTORS TO PLACES WHERE STRUCTURAL STEEL WORK IS BEING FABRICATED OR PRODUCED, SO THAT REQUIRED TESTING AND INSPECTING MAY BE ACCOMPLISHED.
   F. FULL PENETRATION WELDS AT COLUMN BASES SHALL RECEIVE EITHER "RT" OR "UT" EXAMINATION IN ADDITION TO VISUAL EXAMINATION IN ACCORDANCE WITH AWS D1.1 CHAPTER 6. ALL OTHER WELDS SHALL RECEIVE DOCUMENTED VISUAL EXAMINATION.

2. SHOP DRAWINGS:

   A. SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH KDOT STANDARD SPECIFICATIONS.

3. MATERIALS:

   A. HSS MEMBERS FOR DMS TRUSSES: ASTM A500 gr B, Fy=42 KSI.
   B. PIPE FOR DMS POLES AND RAILINGS: ASTM A53 gr B.
   C. PLATES AND MISCELLANEOUS SHAPES: ASTM A36.
   D. STRUCTURAL BOLTS IF REQUIRED: ASTM A325.

4. SHOP FABRICATION AND ASSEMBLY:

   A. FABRICATE ITEMS OF STRUCTURAL STEEL IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS.
   B. PROPERLY MARK AND MATCH-MARK MATERIALS FOR FIELD ASSEMBLY AND FOR IDENTIFICATION AS TO LOCATION FOR WHICH INTENDED.
   C. FABRICATE FOR DELIVERY SEQUENCE WHICH WILL EXPEDITE ERECTION AND MINIMIZE FIELD HANDLING OF MATERIALS.
   D. PROVIDE FINISH SURFACES OF MEMBERS EXPOSED IN THE FINAL STRUCTURE FREE FROM MARKINGS, BURRS, AND OTHER DEFECTS.
   E. ALL STRUCTURAL MEMBERS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M 111 (ASTM A123) AFTER FABRICATION.
   F. STRUCTURAL BOLTS, ANCHOR BOLTS AND MISCELLANEOUS HARDWARE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M 232 (ASTM A 153).

5. CONNECTIONS:

   A. USE WELDED OR BOLTED CONNECTIONS AS INDICATED.

6. ERECTION:

   A. ERECT STRUCTURAL STEEL IN ACCORDANCE WITH THE DRAWINGS.
   B. DO NOT ERECT STEEL UNTIL FOUNDATIONS HAVE DEVELOPED SUFFICIENT STRENGTH TO CARRY THE IMPOSED LOADS. A MINIMUM CURING PERIOD SHALL BE SEVEN DAYS, UNLESS OTHERWISE AUTHORIZED BY THE OWNER'S REPRESENTATIVE.

7. MISCELLANEOUS STEEL:

   A. GRATING: ALL CARBON STEEL GRATING SHALL BE 1-1/4"X3/16" WELDED STEEL BAR GRATING (BEARING BARS AT 1-3/16" O.C., CROSS BARS AT 4" O.C.) WHERE INDICATED ON THE DRAWINGS. HOT DIP GALVANIZE AFTER FABRICATION. PROVIDE SERRATED BAR GRATING FOR ALL LOCATIONS, TYPICAL.

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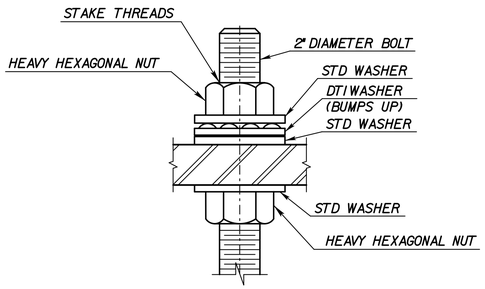
CITY OF WICHITA
WEBB ROAD
ITS PLANS
STRUCTURAL GENERAL NOTES

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	578	1055

POST BASE PLATE ASSEMBLY													
POST OUTER DIAMETER × THICKNESS	BASE PLATE						BRACKET PLATES				ANCHOR BOLTS		
	F	H	S	R	T	FILLET WELD	I	G	W	FILLET WELD	P	SIZE DIA. × LENGTH	E
18″ × 3/8″	18″	2 9/16″	2′-1″	3 1/2″	2″	1/2″	11″	4″	3/4″	1/2″	8″	2 1/4″ × 10′-0″	1′-0″

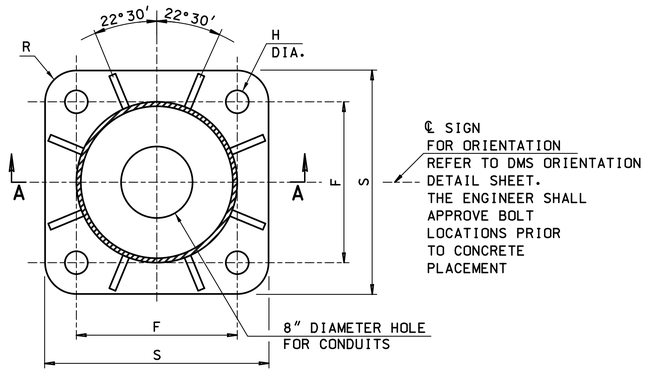
SCHEDULE OF CAISSON FOUNDATIONS													
BUTTERFLY SIGN DESIGNATION	LOCATION	TOP OF CAISSON EL. A	CAISSON DIA. D	CAISSON LENGTH	CAISSON ROCK SOCKET LENGTH	CAISSON REINFORCEMENT							
						TYPE "C-1"		TYPE "C-2"			TYPE "C-3"		
						NO.& SIZE	LENGTH	NO.& SIZE	RD	LENGTH	NO.& SIZE	RD	LENGTH *
KWEBBSBS-01	STA. 43+90 WEBB RD. SB	4′-6″	42″	20′-0″	N/A	19-#8	19′-6″	2-#4	3′-0″	11′-0″	1-#4	3′-0″	196′-0″
KWEBBNBS-01	STA. 55+70 WEBB RD. NB	4′-6″	42″	20′-0″	N/A	19-#8	19′-6″	2-#4	3′-0″	11′-0″	1-#4	3′-0″	196′-0″

* LENGTH INCLUDES ONE 18″ SPLICE FOR EACH 40′ OF SPIRAL LENGTH.

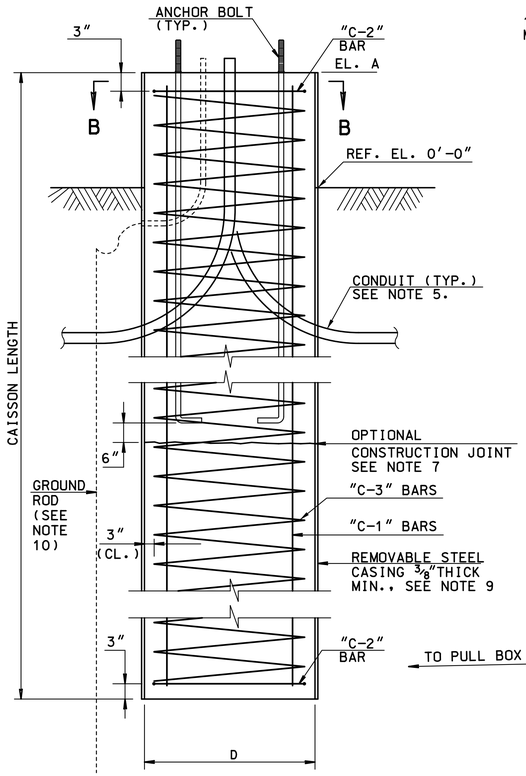


ANCHOR BOLT WASHER DETAIL

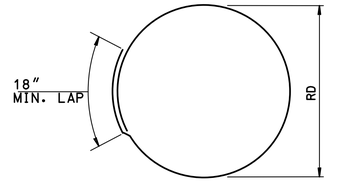
SEE NOTE 6.



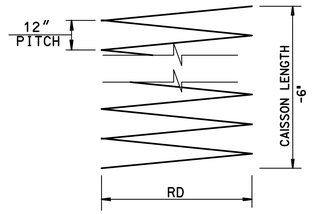
18″ POST BASE PLATE PLAN



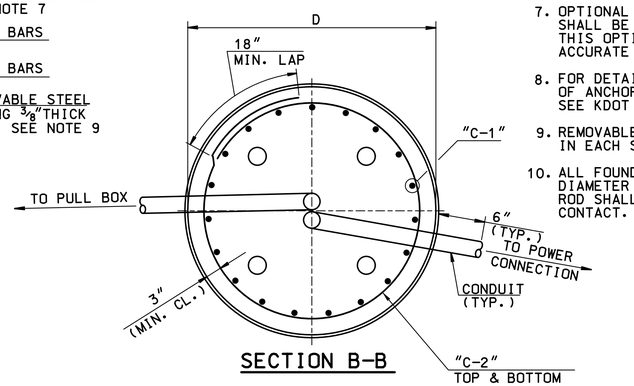
TYPICAL CAISSON DETAIL



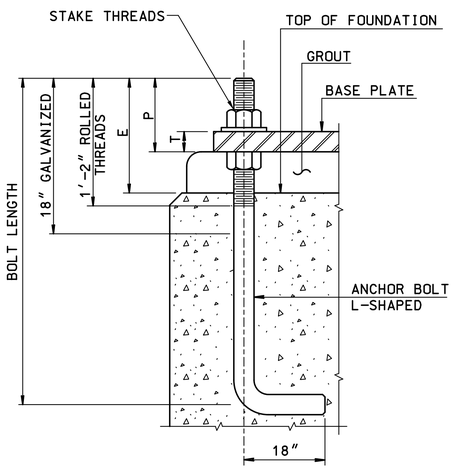
TYPE "C-2" TIE DETAIL



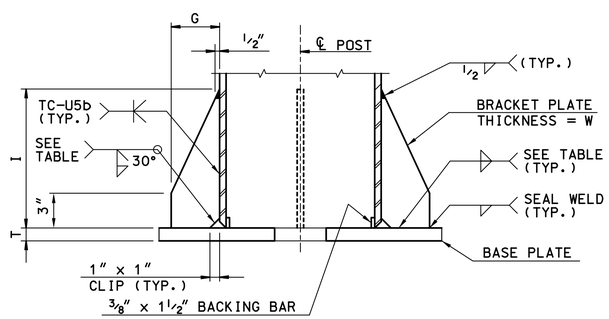
TYPE "C-3" TIE DETAIL



SECTION B-B



ANCHOR BOLT DETAIL



SECTION A-A

NOTES:

1. FOR DESIGN CRITERIA SEE STRUCTURAL GENERAL NOTES SHEET.
2. EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 3/4″ × 3/4″ EXCEPT AS NOTED.
3. REINFORCEMENT BARS SHALL CONFORM TO THE DIMENSIONS SHOWN ON THIS DRAWING.
4. BARS SHALL NOT BE SPLICED EXCEPT AS PROVIDED ON THIS DRAWING OR AUTHORIZED BY THE ENGINEER. WHEN SPLICING IS APPROVED, THE REINFORCEMENT BARS SHALL BE LAPPED FOR A LENGTH OF AT LEAST 36 DIAMETERS AND SHALL BE SECURELY WIRED TOGETHER.
5. FOR LOCATION AND DIRECTION OF CONDUIT SEE INDIVIDUAL SITE PLAN SHEETS.
6. ANCHOR BOLTS SHALL BE PROVIDED WITH TWO HEAVY HEXAGON NUTS AND DIMENSIONED AS PER ANSI B18.2.2 AND WASHERS DIMENSIONED AS PER ASTM F436 TABLE 2. THE INSIDE NUT DIAMETER AND THREADS SHALL BE COORDINATED WITH ROLLED THREADS. THE THREADED LENGTH OF ANCHOR BOLT IS AS SHOWN IN THE ANCHOR BOLT DETAIL. PROVIDE DIRECT TENSION INDICATORS (ASTM F2437-06 GRADE 55) SANDWICHED BETWEEN STANDARD WASHERS AT EACH ANCHOR BOLT.
7. OPTIONAL CONSTRUCTION JOINT IN CAISSONS SHALL BE 6″ BELOW BOTTOM OF ANCHOR BOLTS. THIS OPTIONAL JOINT WILL FACILITATE ACCURATE PLACEMENT OF ANCHOR BOLTS.
8. FOR DETAILED INSTALLATION PROCEDURES OF ANCHOR BOLTS AND OF BASE PLATES, SEE KDOT STANDARD SPECIFICATIONS.
9. REMOVABLE STEEL CASING SHALL BE INSTALLED IN EACH SHAFT TO PREVENT CAVE-IN OF SOILS.
10. ALL FOUNDATIONS SHALL CONTAIN A 3/4″ DIAMETER COPPER CLAD GROUND ROD. GROUND ROD SHALL HAVE A MINIMUM OF 5′ OF EARTH CONTACT.

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CITY OF WICHITA

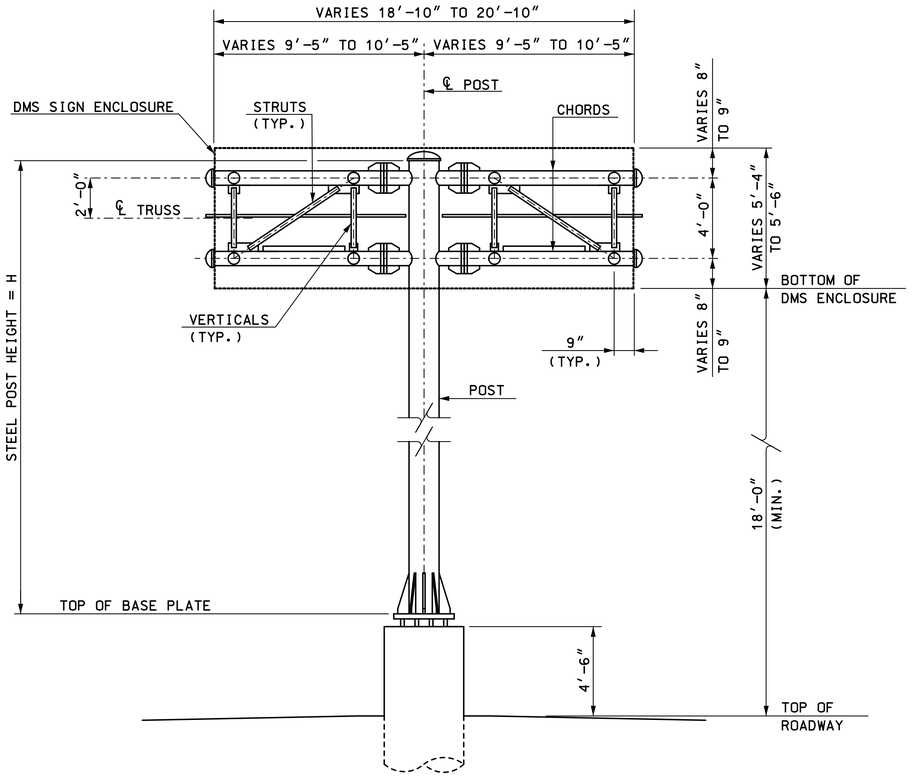
WEBB ROAD

ITS PLANS

BUTTERFLY SIGN STRUCTURE POST BASE PLATE & CAISSON DETAILS

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	579	1055

BUTTERFLY SIGN SUPPORT STRUCTURES						
SIGN SUPPORT		SINGLE OR DOUBLE SIDED	ELEVATION ABOVE REF. EL. 0′–0″		STEEL POST	
STRUCTURE DESIGNATION	LOCATION		℄ TRUSS	BOTTOM OF BASE PLATE	H (FT)	SIZE OD x THICK (IN)
KWEBBSBS–01	STA. 43+90 WEBB RD. SB	SINGLE	21′–0″	4′–10″	19′–6″	18 x 3/8
KWEBBNBS–01	STA. 55+70 WEBB RD. NB	SINGLE	21′–0″	4′–10″	19′–6″	18 x 3/8



TYPICAL BUTTERFLY SIGN SUPPORT ELEVATION (ARTERIAL DMS)

NOTES:

1. ALL ELEVATIONS SHALL BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO FABRICATION AND INSTALLATION.
2. MANUFACTURER MUST VERIFY DIMENSIONS AND SUBMIT SHOP DRAWINGS TO THE ENGINEER PRIOR TO FABRICATION.

CITY OF WICHITA

WEBB ROAD

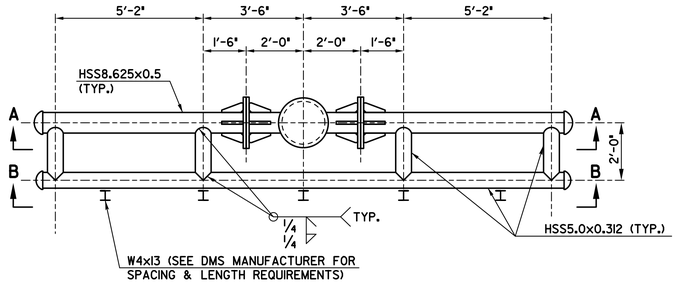
ITS PLANS

BUTTERFLY SIGN STRUCTURE

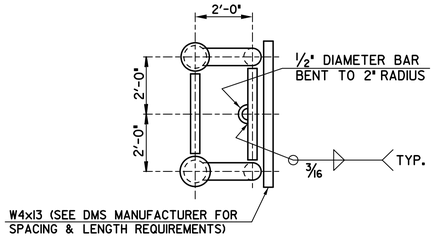
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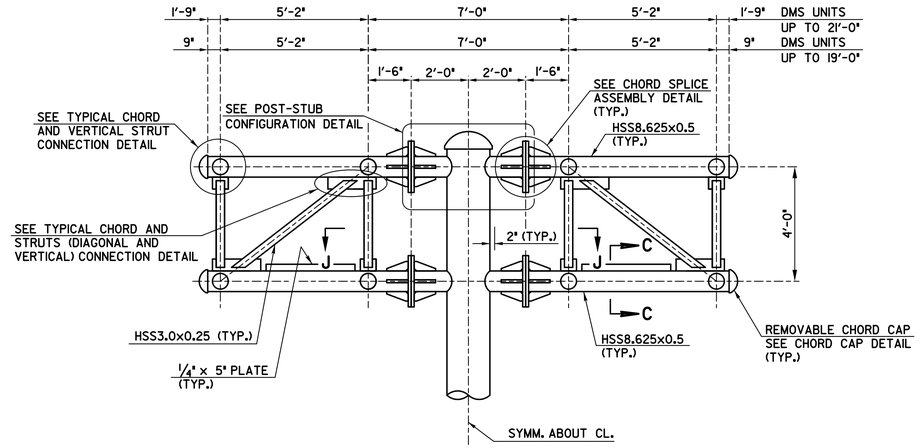
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KANSAS	472-85031	2015	580	1055



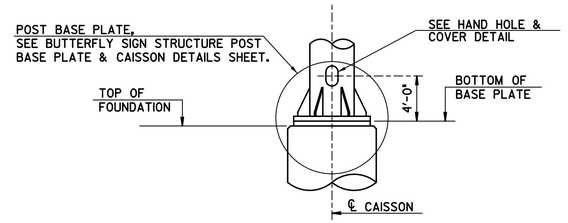
SINGLE-SIDED SIGN STRUCTURE PLAN



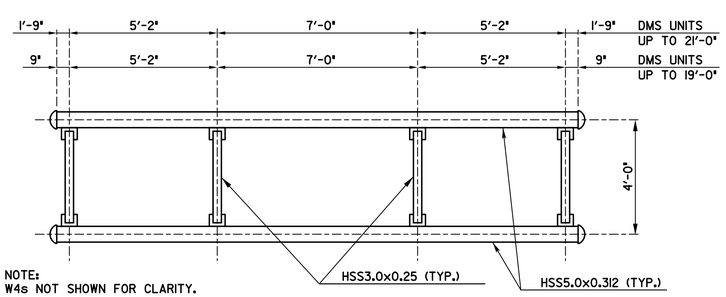
END ELEVATION



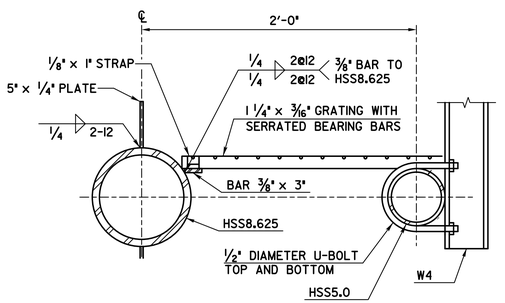
SECTION A-A
SINGLE-SIDED SIGN STRUCTURE



TYPICAL POST BASE ELEVATION FOR SIGN STRUCTURES



ELEVATION B-B



SECTION THRU SINGLE SIDED SIGN STRUCTURE
SECTION C-C

CITY OF WICHITA

WEBB ROAD

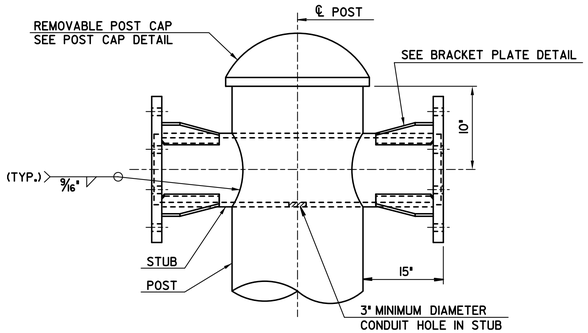
ITS PLANS

BUTTERFLY SIGN STRUCTURE
TRUSS AND POST DETAILS - 1

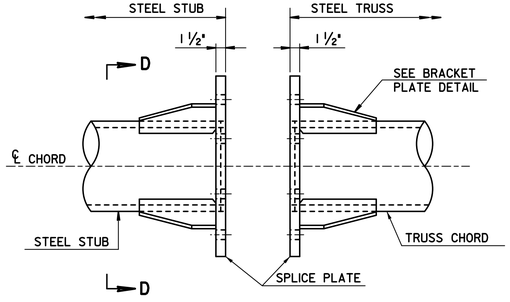
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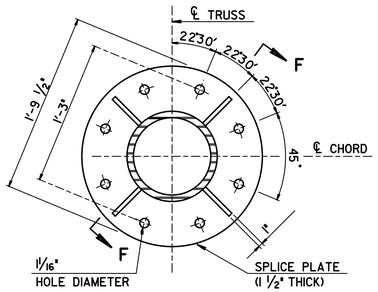
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	581	1055



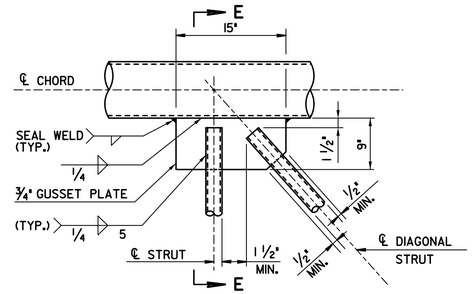
POST-STUB CONFIGURATION DETAIL



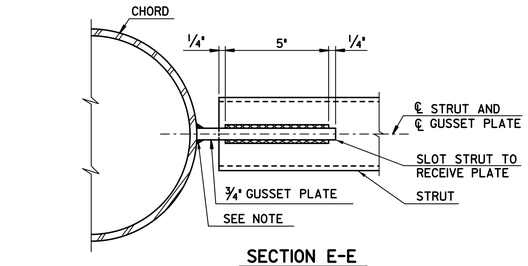
CHORD SPLICE ASSEMBLY DETAIL



SECTION D-D (MAINLINE DMS)

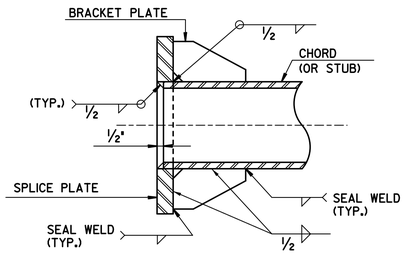


TYPICAL CHORD AND STRUTS (DIAGONAL & VERTICAL) CONNECTION DETAIL (MAINLINE DMS)



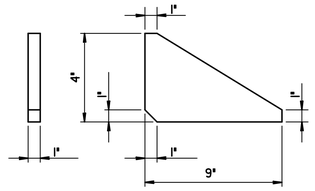
SECTION E-E

TYPICAL STRUT/DIAGONAL TO GUSSET PLATE WELD DETAIL

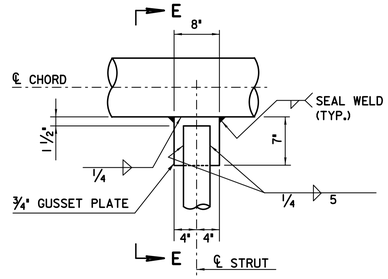


SECTION F-F

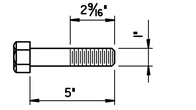
SPLICE AND BRACKET PLATE ASSEMBLY



BRACKET PLATE DETAIL

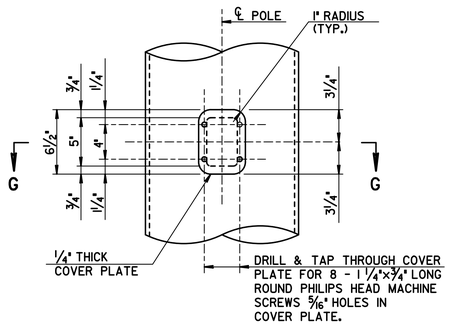


TYPICAL CHORD AND VERTICAL STRUT CONNECTION DETAIL

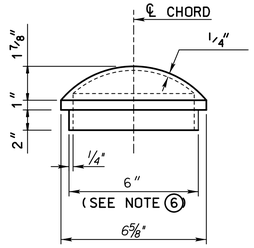


SPLICE BOLT DETAIL (A325)

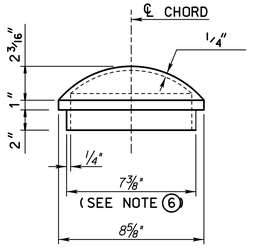
NOTE:
GUSSET PLATES TO BE ROUNDED TO THE RADIUS OF THE CHORD FOR PROPER FIT UP PRIOR TO WELDING.



HAND HOLE & COVER DETAIL



CHORD CAP DETAIL (MAINLINE DMS)
DRIVE FIT TYPE - CAST

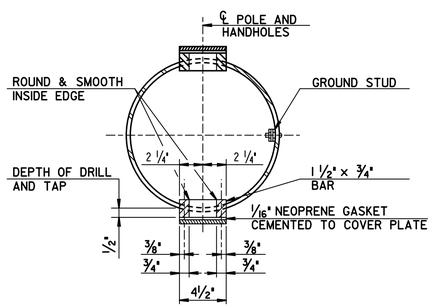


CHORD CAP DETAIL (MAINLINE DMS)
DRIVE FIT TYPE - CAST

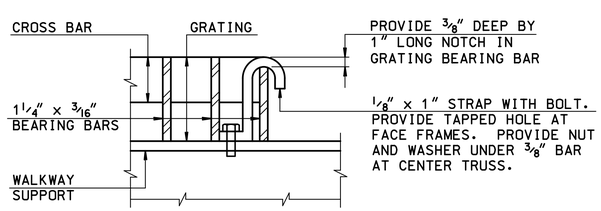
NOTES:

1. HOLE DIAMETER INDICATED IS DRILLED FULL, AS PER AASHTO 11.4.8 (DIVISION II).
2. TRUSS SPLICE PLATE BOLTS SHALL BE THREADED AS PER ANSI B1.1.
3. SPLICE BOLTS SHALL BE ASTM A325 HEAVY HEXAGON TYPE AS PER ANSI B18.2.1 AND SHALL BE FURNISHED WITH TWO HEAVY HEXAGON NUTS AS PER ANSI B18.2.2 AND WASHERS . SECOND NUT SHALL BE ADDED AFTER TORQUING OF FIRST NUT IS COMPLETE AND ACCEPTED BY THE ENGINEER.
4. SPLICE BOLTS SHALL BE TENSIONED AS SPECIFIED IN TABLE 11.5A OF DIVISION II AASHTO.
5. ALTERNATE CAP DESIGNS MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

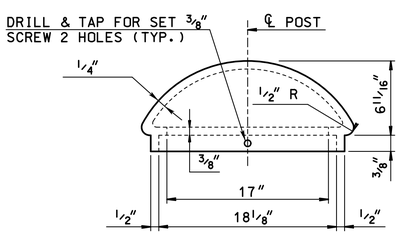
(6) MACHINE TO FORCE FIT ON CHORD.



SECTION G-G



TYP. CONNECTION DETAIL AT HANGER & GRATING



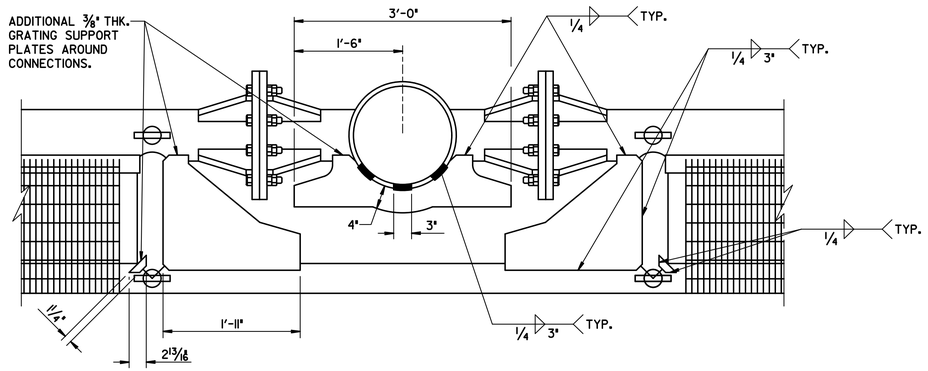
POST CAP DETAIL
DRIVE FIT TYPE - CAST

CITY OF WICHITA
WEBB ROAD
ITS PLANS
BUTTERFLY SIGN STRUCTURE
TRUSS AND POST DETAILS - 2

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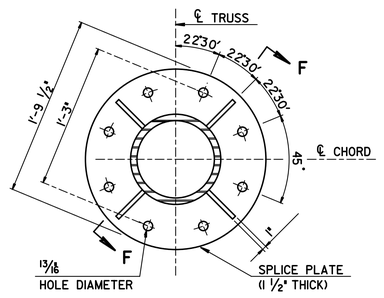
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	582	1055



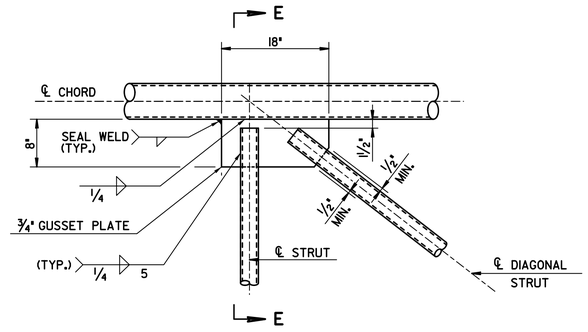
SECTION J-J (MAINLINE AND ARTERIAL DMS)

GRATING NOT SHOWN FOR CLARITY

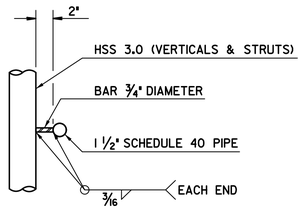
• GRATING ATTACHMENT DETAILS SHOWN FOR SINGLE SIDED DMS. DOUBLE SIDED DMS TO BE SYMMETRICAL.



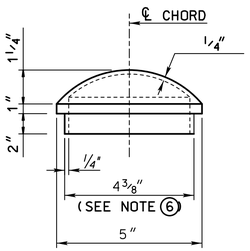
SECTION D-D (ARTERIAL DMS)



TYPICAL CHORD AND STRUTS (DIAGONAL & VERTICAL) CONNECTION DETAIL (ARTERIAL DMS)

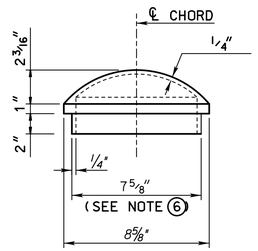


SECTION H-H (ARTERIAL DMS)



CHORD CAP DETAIL (ARTERIAL DMS)

DRIVE FIT TYPE – CAST



CHORD CAP DETAIL (ARTERIAL DMS)

DRIVE FIT TYPE – CAST

NOTES:

1. HOLE DIAMETER INDICATED IS DRILLED FULL, AS PER AASHTO II.4.8 (DIVISION II).
2. BOLTS SHALL BE THREADED AS PER ANSI B1.1.
3. SPLICE BOLTS SHALL BE ASTM A325 HEAVY HEXAGON TYPE AS PER ANSI B18.2.1 AND SHALL BE FURNISHED WITH TWO HEAVY HEXAGON NUTS AS PER ANSI B18.2.2 AND WASHERS . SECOND NUT SHALL BE ADDED AFTER TORQUING OF FIRST NUT IS COMPLETE AND ACCEPTED BY THE ENGINEER.
4. SPLICE BOLTS SHALL BE TENSIONED AS SPECIFIED IN TABLE II.5A OF DIVISION II AASHTO.
5. ALTERNATE CAP DESIGNS MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

(6) MACHINE TO FORCE FIT ON CHORD.

CITY OF WICHITA

WEBB ROAD

ITS PLANS

BUTTERFLY SIGN STRUCTURE
TRUSS AND POST DETAILS - 3

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	583	1055

11.0 DYNAMIC MESSAGE SIGN SYSTEM

11.1 DESCRIPTION
Furnish and install an arterial dynamic message sign (DMS) system and support structure for the purpose of disseminating information to the traveling public. Furnish and install at the locations as shown on the Plans.

11.2 MATERIALS

11.2.1 GENERAL
Furnish and install the arterial dynamic message sign system. Each furnish and install arterial DMS system consists of the DMS case including contents, display modules, all mounting hardware, sign controller unit, communication unit, software, equipment cabinet and contents, outdoor rated communications cabling between the DMS case and the equipment cabinet, grounding and surge protection, lightning protection, power supplies, storage and delivery, manufacturer training, manufacturer on-site installation support, manufacturer commissioning, testing and final acceptance, maintenance and operations manuals, and transfer of guarantees and warranties.

Do not attach the DMS to the support structure until the supporting systems of conduits, pull boxes, controller assemblies, power supply assemblies and all other items necessary are in place to provide a fully operational DMS system.

11.2.2 DMS
Furnish and install a Daktronics Vanguard VF-2420-27x120-46-RGB or approved equal meeting the following minimum requirements below. Ensure the DMS is fully compatible and mountable with the designed structure as shown in the Plans.

1. Full matrix, front access, full color (red, green, blue LED's), pixel pitch capable of producing a 12-inch Character with a 5x7 font, 30° viewing cones and high intensity LED display with minimum of 27 pixel rows and 120 pixel columns.
2. DMS Weight = Maximum weight of 2,340 pounds.
3. DMS Length = 18'10" to 20'10" DMS Height = 5'4" to 5'6" DMS Depth = 1'2"±.
4. Meets all mandatory NEMA TS 4 requirements.
5. DMS cabinet enclosure rated NEMA 3R.
6. Able to display three rows of 12-inch characters and message composed of any combination of alphanumeric text, punctuation symbols, and graphic images across multiple frames.
7. Power requirements 120/240 VAC, 60 Hz, single phase power, 3 wire plus ground with maximum AC power of 23 Amps per leg.
8. DMS UL 48 and UL 1433 compliant.
9. NTCIP compliant and supports NTCIP 1201, 1203, 2101, and 2103.
10. FCC Part 15, Subpart B as a "Class A"digital device.
11. Capable of Cellular, Fiber, Ethernet, Direct and radio communication options.
12. If required, install factory mounted Z-bar brackets attached to DMS structural frame members. Install using mechanically galvanized A325 high-strength steel bolts, direct tension indicators to verify that mounting hardware is tightened with proper amount of force, sealed and water tight.
13. Factory installed galvanized steel removable lifting eyebolts.
14. Legible within a distance range up to 600 feet under normal operating conditions.
15. Signed and Sealed copy of manufacturer's structural P.E. certification in the State of Kansas, including supporting calculations, shall be submitted within 60 days of submittal approval.

DMS shall include an environmental monitoring system that monitors and reports ambient light levels and temperature. DMS shall contain an over temperature safety shutdown. DMS will have connection for incoming power and incoming communication. Signal (communication) cable between the DMS and equipment cabinet shall be supplied from the same manufacturer as the DMS and shall be rated for indoor and outdoor use and UL rated. DMS shall include a complete surge protection system.

11.2.3 DMS SIGN CONTROLLER AND SOFTWARE
Controller shall be included with the DMS system and installed inside a ground mounted cabinet as shown in the Plans. Controller shall include NTCIP compliant RS232 port(s) and one NTCIP compliant Ethernet port with RJ45 connector, communicates directly with DMS board and includes firmware. Ensure sign controller includes a user interface with graphical LCD and keypad, memory, NTCIP protocol, internal clock and integrated surge protection.

Manufacturer shall provide NTCIP compliant software for stand-alone and remote acceptance testing. Manufacturer shall provide the latest version of the sign control software with documentation that the software is compatible with the current KDOT central software.

11.2.4 DMS EQUIPMENT CABINET
Ensure that the cabinet is a NEMA 3R Type 334 two-door, ground mounted, aluminum traffic rated as specified in the Plans and is supplied fully equipped from the same manufacturer as the DMS and is part of the DMS system. Cabinet shall include hinged doors, equipment rack, sign controller, surge protection devices, air filter, fan and heater with thermostat, pull out drawer, lights with door activated switch, pushbutton door switch, 9 position outlet strip, GFCI outlet single gang, load center with circuit breakers capable of accepting and landing a 120/240V power circuit, earth ground lug. Provide cabinet with BEST 3L Series Deadbolt Cabinet Lock with construction core that allows KDOT to install their own lock core. KDOT will replace the construction core with a KDOT keyed core upon cabinet acceptance.

11.2.5 DMS FUNCTIONALITY
Demonstrate that the DMS system functions with the KDOT central software, the MIST management software in Wichita, Kansas and TransSuite. Minimum functionality to be demonstrated shall include the ability to post and display messages. Provide documentation stating that the submitted DMS system is compatible with the latest version of the existing KDOT software drivers

11.2.6 DIAGNOSIS AND STATUS MONITORING
Diagnosis and status monitoring shall be available from the controller and from a remote computer of a local laptop with automatic warning events included. Diagnosis and status monitoring includes message display status, LED pixel testing, power supply operation, door states, fan operation, environmental conditions, over temperature shutdown, controller restart, power loss, power system failure, door open and communication loss.

11.2.7 LIGHTNING PROTECTION AND EQUIPMENT GROUNDING
Ensure that the DMS is equipped with earth ground lug electrically bonded to the housing. Each DMS shall include the installation of a grounding rod, ¾ inch by 10 feet and installation of a minimum No. 4 grounding conductor. Install grounding conductor from DMS ground lug to the ground rod. Ground rod connection shall be exothermically welded.

Furnish and install an air terminal lightning protection system for each DMS designed according to the 150 foot radius rolling sphere zone of protection. Submit 150 foot radius rolling sphere zone of protection drawing with air terminal equipment. Use system materials that are copper and high copper-content bronze castings. For all fittings, except cable holders, use heavy-duty type made from bronze castings. For all terminal rods, bolts, screws, and related type hardware use copper clad steel, bronze, or brass to prevent galvanic corrosion. The system consists of all necessary equipment as required to provide a complete and coordinated system. Ensure that all cables and all air terminals bear the UL label. Do not mix materials unless using a UL approved transition. All components of the lightning protection system shall conform to the current edition requirements of UL 96A and NFPA 780.

11.2.8 DMS SUBMITTALS, TESTING AND COMMISSIONING
DMS manufacturer shall provide a complete pre-build submittal within 60 calendar days of contract award and shall not proceed with DMS manufacture until the Engineer has approved the submittal. Pre-build submittal shall include but not be limited to: qualifications, DMS and cabinet shop drawings, DMS schematic block diagram, sign controller, component drawings, signal cable, cabinet drawings, catalog cut sheets, site power requirements, product testing reports and certifications. Manufacturer shall submit documentation and references of a minimum of 10 installations of the NTCIP approved model within the United States for Intelligent Transportation Systems.

Commissioning shall occur on-site in the presence of the manufacturer, Contractor, and KDOT system integrator. Contractor is responsible to coordinate with the manufacturer to perform complete field testing and to commission the DMS. Field testing shall conform to the manufacturer's specifications and the contract documents and shall be approved by KDOT. Field testing shall include test procedures, test reports and test results. Commissioning shall include confirming transmission with KDOT central software. Commissioning may require two on-site occurrences.

11.2.9 DELIVERY AND STORAGE
Manufacturer shall be able to manufacture and ship the DMS system within 120 calendar days of notification of approved submittal documentation. The DMS unit, including associated equipment, controllers, cabinets, and cabling shall be delivered complete, fully operational, and without defect.

Upon delivery, complete a pre-installation test of the DMS to verify that the DMS is fully functional and operating properly prior to transportation of the DMS to the site. This test shall include but not be limited to: a check for damage, an electrical check to verify all electrical connections are correct and verification that the DMS units are properly configured and fully functional. Provide a signed copy of the pre-installation test to the Engineer prior to delivery to the site. The pre-installation test may be waived with the approval of the Contractor, manufacturer and Engineer. If the test is waived, include documentation to this effect as a test result in the Technical Reference Manual.

Take ownership for any damage to the DMS system after acceptance of the DMS system from the manufacturer. Document, in writing and detailed photographs any visible damage or non-functioning portion of the DMS system prior to accepting the DMS. Store the DMS system in a safe and secure location prior to installation. Do not store the DMS at the field site for more than 24 hours prior to installation.

11.3 CONSTRUCTION REQUIREMENTS

11.3.1 GENERAL
Furnish any and all additional tools, equipment, mounting hardware, beam clips, cabling, materials, supplies, manufactured articles and perform all operations necessary to install the DMS as shown on the Plans and as specified herein. The hardware, construction services, and support services specified are intended to describe the minimum configuration that would be acceptable for this DMS system. Furnish and install the DMS support structure as detailed on the Plans.

11.3.2 ERECTION
This is a category A structure. Contractor shall submit detailed erection plans to the field engineer per KDOT specifications and per KDOT Field Erection special provisions. The seal of a licensed professional engineer is not required. Field erection and field erection plans are subsidiary to the site bid and no additional payment will be made.

11.3.3 DMS EQUIPMENT CABINET
Install the DMS equipment cabinet; this includes providing anchor bolts for ground mounted cabinets and furnish and install the cabinet foundation. Connect the DMS controller to the communication switch using a CAT 5 UTP patch cable as shown in the plans.

11.3.4 DMS MOUNTING
Mount the DMS to the structure as herein specified, shown on the Plans, or as directed by the Engineer.

11.3.5 DMS ORIENTATION
Orient the DMS such that the face of the sign is towards the roadway. Follow the DMS orientation detail located in the construction drawings for the orientation and exact position of the DMS. Receive approval by the Engineer prior to placement of the foundations.

11.3.6 SECURITY
Change the manufacturer default password to a unique password (KDOT supplied) upon taking possession of and commissioning the controller.

11.3.7 LIGHTNING PROTECTION
Furnish and install lightning protection at every DMS to reduce electrical differential potential. Install all equipment in accordance with the requirements of current editions of UL 96A, NFPA 780, and LPI 175.

11.3.8 TESTING AND COMMISSIONING
Test the DMS system in accordance with the ITS Equipment Specifications and the following supplemental requirements. The DMS manufacturer shall provide factory acceptance test results. Manufacturer is required to be on site to perform sign commissioning including testing for full communication integration with KDOT central software. Stand-alone testing may be completed concurrently with sign commissioning based on manufacturer recommendations for connection of electrical power. Perform acceptance testing and re-testing as necessary in the presence of a KDOT representative or system integrator. Manufacturer shall have a customer service department and be able to provide technical product support.

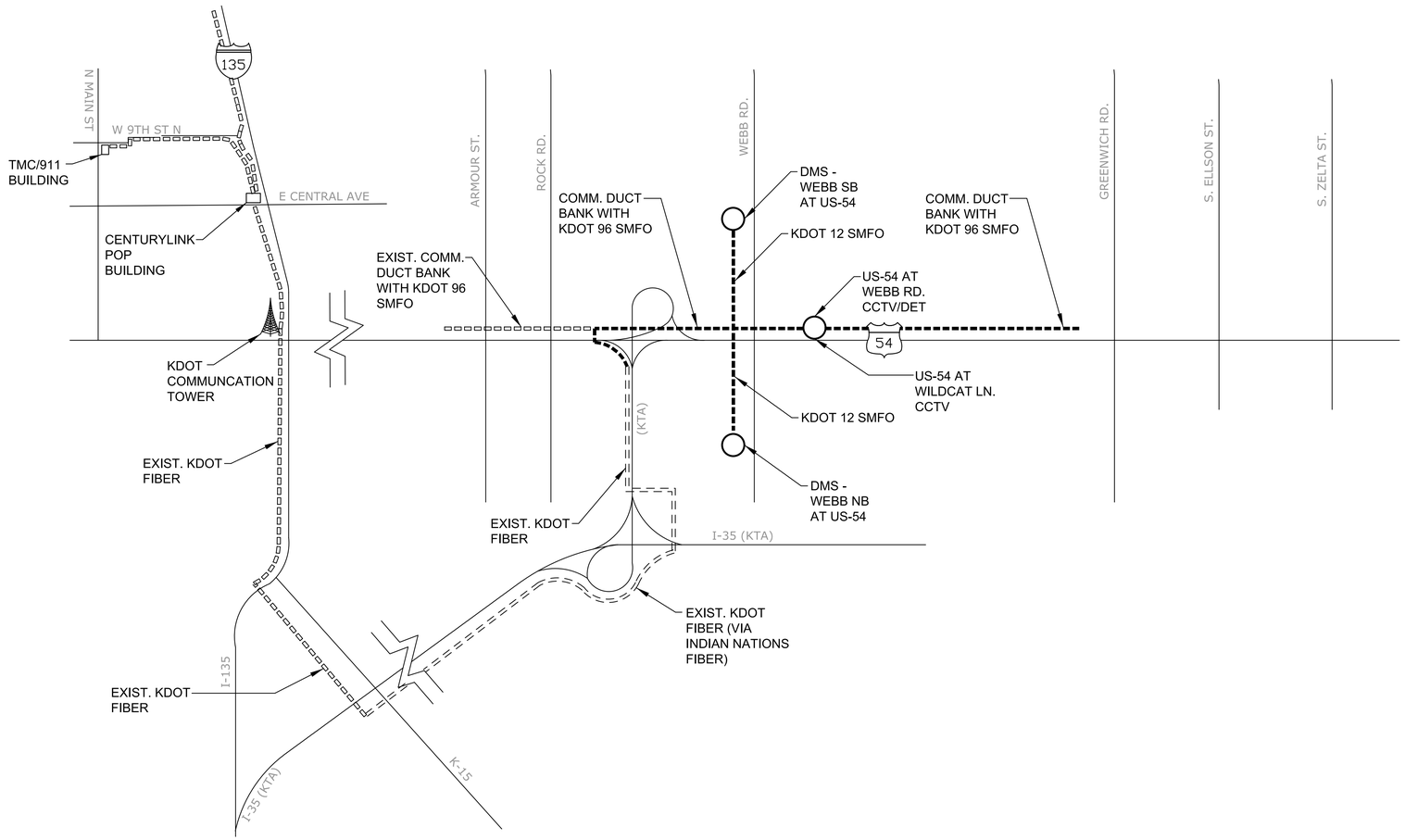
11.3.9 DOCUMENTATION
Ensure that the DMS manufacturer provides operation, maintenance, and vendor software manuals prior to final payment. Provide 2 hard copies and 3 electronic copies of the operation, maintenance, and vendor software manual and 1 copy for each equipment cabinet. The maintenance manual shall include parts specifications and wiring diagrams that cover all components of a unit. The DMS Manufacturer's NTCIP Management Information Base shall be provided for KDOT use or any 3rd party designated by KDOT. The Profile Implementation and Conformance Statement of Profile Requirements List shall also be provided.

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CITY OF WICHITA
WEBB ROAD
ARTERIAL DMS
PRODUCT SPECIFICATIONS

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	584	1055

NOT TO SCALE



LEGEND (FOR THIS SHEET ONLY)

- ITS DEVICE LOCATION
- EXISTING WIRELESS-TO-FIBER (WTF) TOWER
- EXISTING FIBER (LEASE FROM KTA/INDIAN NATIONS)
- EXISTING FIBER AND CONDUIT (KDOT)
- NEW FIBER AND CONDUIT

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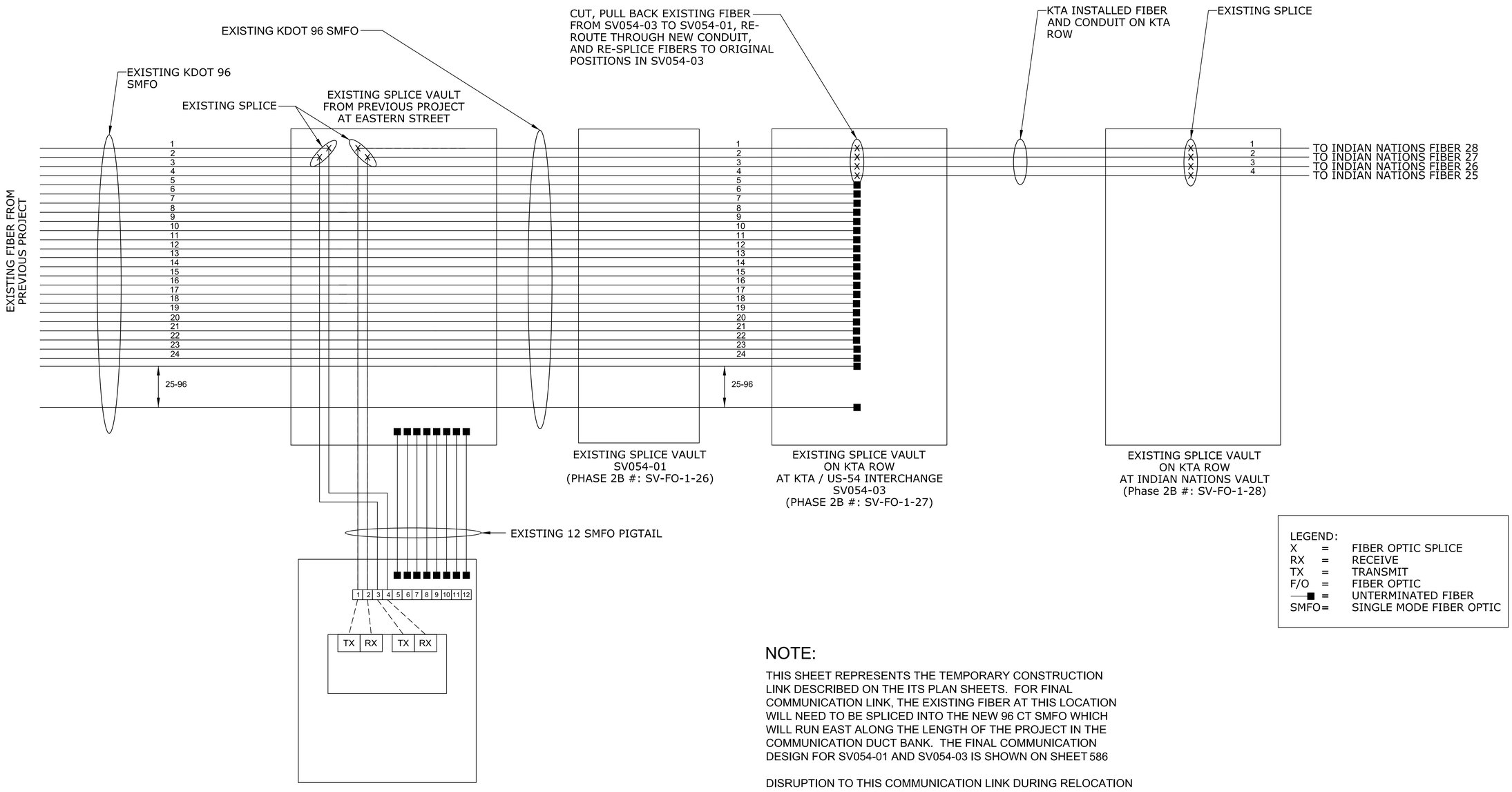
CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

COMMUNICATIONS OVERVIEW LAYOUT

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	585	1055

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LEGEND:

X	=	FIBER OPTIC SPLICE
RX	=	RECEIVE
TX	=	TRANSMIT
F/O	=	FIBER OPTIC
—■	=	UNTERMINATED FIBER
SMFO	=	SINGLE MODE FIBER OPTIC

NOTE:

THIS SHEET REPRESENTS THE TEMPORARY CONSTRUCTION LINK DESCRIBED ON THE ITS PLAN SHEETS. FOR FINAL COMMUNICATION LINK, THE EXISTING FIBER AT THIS LOCATION WILL NEED TO BE SPLICED INTO THE NEW 96 CT SMFO WHICH WILL RUN EAST ALONG THE LENGTH OF THE PROJECT IN THE COMMUNICATION DUCT BANK. THE FINAL COMMUNICATION DESIGN FOR SV054-01 AND SV054-03 IS SHOWN ON SHEET 586

DISRUPTION TO THIS COMMUNICATION LINK DURING RELOCATION SHALL NOT EXCEED 6 HOURS. THE CONTRACTOR SHALL FURNISH AND INSTALL A TEMPORARY FIBER LINK, IF NEEDED, TO MEET THE 6-HOUR DEADLINE.

CITY OF WICHITA

EAST KELLOGG & KTA

FIBER OPTIC SCHEMATIC

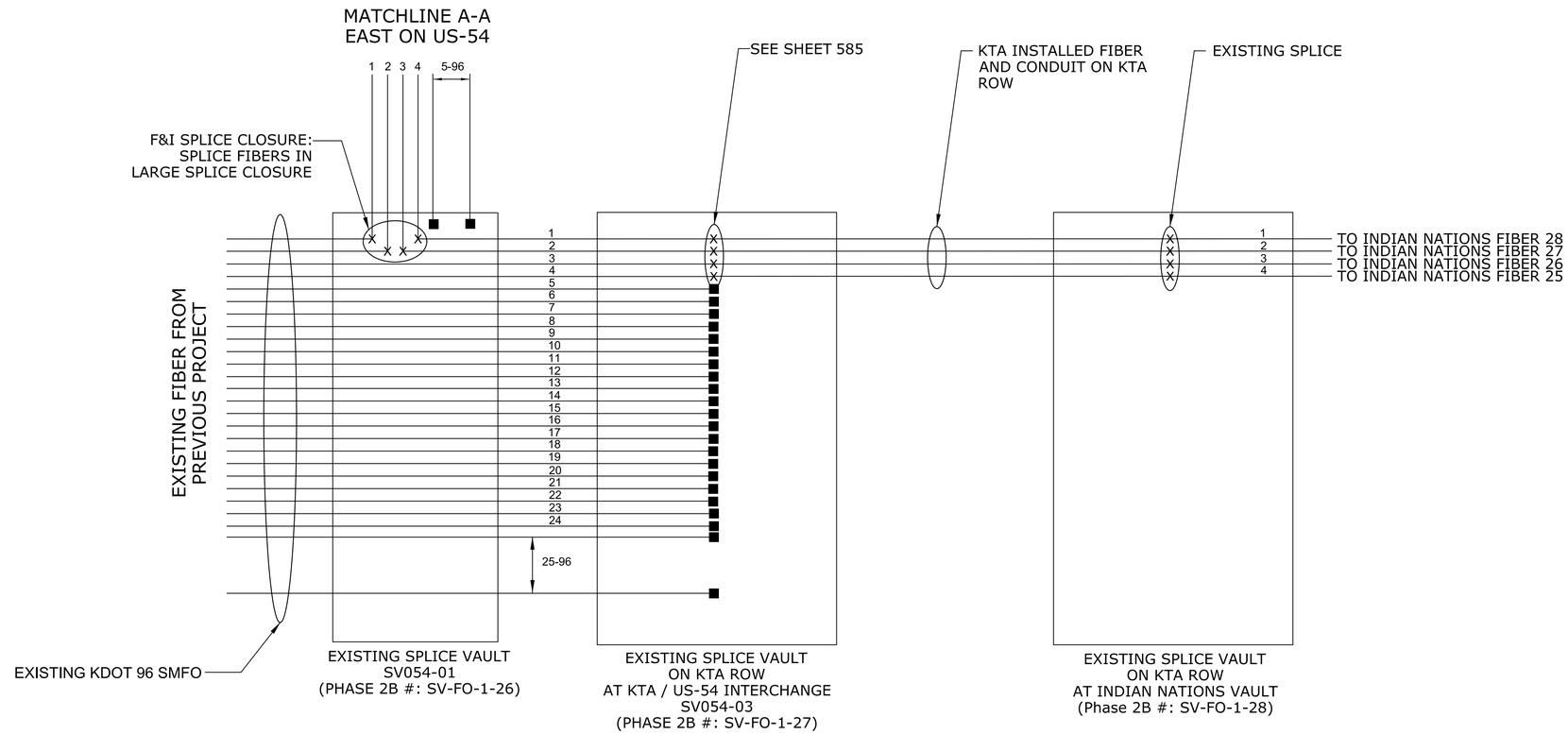
TEMPORARY CONSTRUCTION LINK

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	586	1055

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LEGEND:

X	=	FIBER OPTIC SPLICE
RX	=	RECEIVE
TX	=	TRANSMIT
F/O	=	FIBER OPTIC
——■	=	UNTERMINATED FIBER
SMFO	=	SINGLE MODE FIBER OPTIC

NOTE:

THIS SHEET REPRESENTS THE FINAL COMMUNICATION DESIGN FOR SV054-01 AND SV054-03. THE TEMPORARY COMMUNICATION DESIGN IS SHOWN ON SHEET 585

CITY OF WICHITA

EAST KELLOGG & KTA

FIBER OPTIC SCHEMATIC

FINAL COMMUNICATION LINK

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	587	1055

F&I DMS CABINET
KWEBBNBCA-01
WEBB NB AT US-54

TO DMS
DMS CONTROLLER
F&I CAT 5 UTP
CISCO SWITCH
TX RX TX RX
INSTALL SWITCH
F&I LC F/O PATCH CORD, SIMPLEX
LC PATCH PANEL
F&I 12 POSITION LC PATCH PANEL
F&I 12 SMFO PIGTAIL

F&I DMS CABINET
KWEBBSBCA-01
WEBB SB AT US-54

TO DMS
DMS CONTROLLER
F&I CAT 5 UTP
CISCO SWITCH
TX RX TX RX
INSTALL SWITCH
F&I LC F/O PATCH CORD, SIMPLEX
LC PATCH PANEL
F&I 12 POSITION LC PATCH PANEL
F&I 12 SMFO PIGTAIL

F&I ITS FIELD CABINET
K054WBCA-01-222.00
CCTV01A/CCTV01B/DET01

F&I CAT 5 UTP
TO CCTV
CCTV POE
TO CCTV
CCTV POE
CLI-CK!
TO DETECTOR
CISCO SWITCH
TX RX TX RX
EXPANSION
TX RX TX RX
INSTALL SWITCH AND IEM-3000-4SM EXPANSION MODULE
F&I LC F/O PATCH CORD, SIMPLEX
LC PATCH PANEL
F&I 12 POSITION LC PATCH PANEL
F&I 12 SMFO PIGTAIL

F&I SPLICE CLOSURE:
SPLICE FIBERS IN
LARGE SPLICE CLOSURE

F&I ITS SPLICE VAULT
SV054-04
WEBB ROAD

F&I ITS SPLICE VAULT
SV054-05
WILDCAT LANE

F&I SPLICE CLOSURE:
SPLICE FIBERS IN
LARGE SPLICE CLOSURE

MATCHLINE A-A
WEST ON US-54

F&I KDOT 96 SMFO

COMMUNICATION DUCT BANK
SERVICE BOX

F&I KDOT 96 SMFO

COMMUNICATION DUCT BANK
SERVICE BOX

F&I KDOT 96 SMFO

COMMUNICATION DUCT BANK
SERVICE BOX

W < US-54 > E

LEGEND:
X = FIBER OPTIC SPLICE
RX = RECEIVE
TX = TRANSMIT
F/O = FIBER OPTIC
—■ = UNTERMINATED FIBER
SMFO= SINGLE MODE FIBER OPTIC

NOTE:
ACTUAL FIBER CONNECTIONS, SWITCH CONFIGURATION, AND PORT ASSIGNMENT SUBJECT TO CHANGE. KDOT NETWORK ENGINEER TO APPROVE FINAL FIBER CONNECTION PLANS

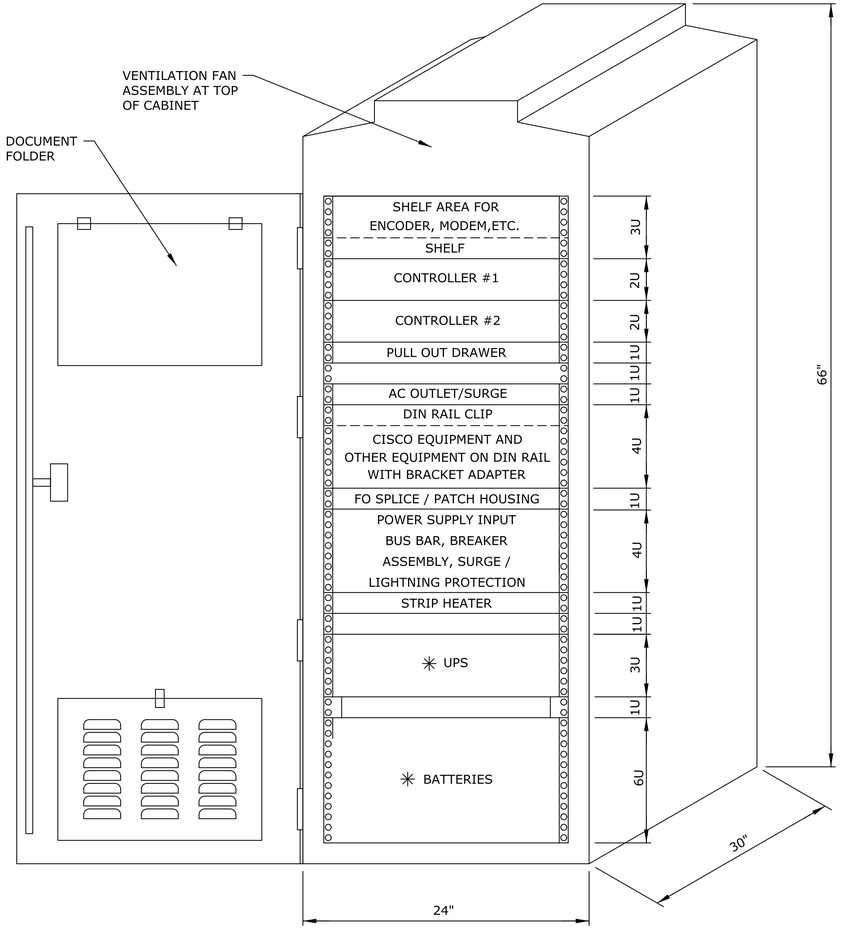
CITY OF WICHITA
EAST KELLOGG & WEBB ROAD
FIBER OPTIC SCHEMATIC

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	588	1055

GENERAL NOTES:

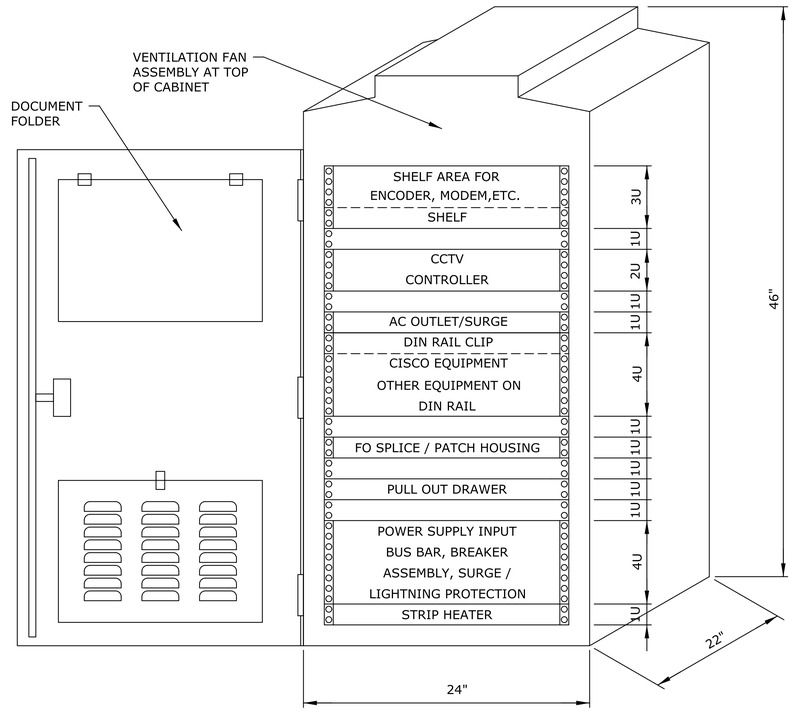
1. POWER SUPPLY ASSEMBLIES AND CONNECTIONS SHALL BE MOUNTED A MINIMUM OF 12 IN ABOVE THE BOTTOM OF GROUND MOUNTED CABINETS.
2. CONTRACTOR SHALL SUBMIT ACTUAL CABINET ELEVATIONS TO ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
3. SEE ITS PLANS AND SPECIFICATIONS FOR EQUIPMENT TO BE INCLUDED IN CABINETS.
4. DOOR FILTERS SHALL HAVE FULL BACK PLATES ENCLOSING FILTER AND HOLDING FILTER IN PLACE.



TYPICAL TYPE 334C CABINET

NOTE: 1U = 1.75 INCHES

✳ UPS + BATTERIES INCLUDED ONLY WHERE NOTED



TYPICAL TYPE 336S CABINET

NOTE: 1U = 1.75 INCHES

CITY OF WICHITA

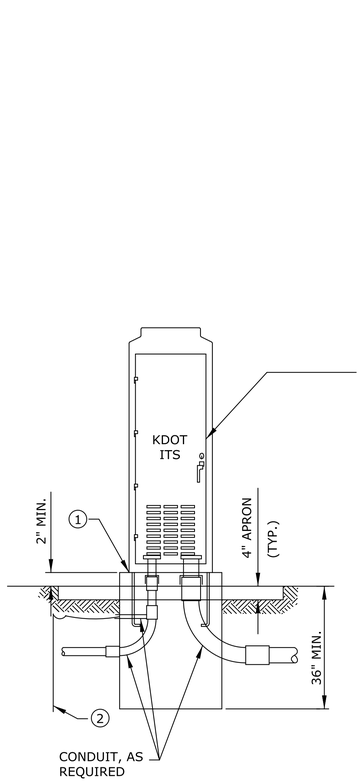
EAST KELLOGG & WEBB ROAD
TYPICAL 334C AND 336S
CABINET DETAILS

ITS-D04 VERSION DATE: 02-11-14

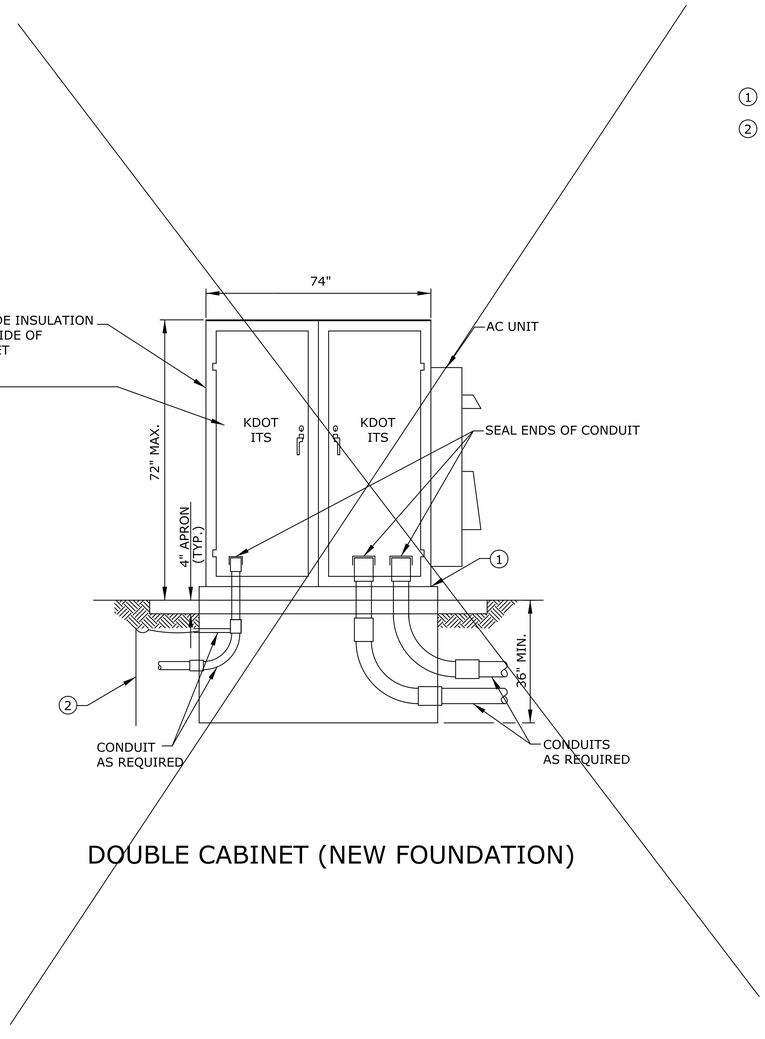
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	589	1055



SINGLE CABINET (NEW FOUNDATION)



DOUBLE CABINET (NEW FOUNDATION)

NOTES:

1. 100 YEAR SILICONE CAULK BETWEEN CABINET AND BASE.
2. GROUNDING ROD, ¾ IN X 10 FT MIN. IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSTION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 2.5 FT DEEP. CONNECTION TO GROUND ROD SHALL BE EXOTHERMICALLY WELDED.

GENERAL NOTES:

1. SLACK FOR FIBER OPTIC CABLE SHALL BE PLACED IN PULL BOXES AND SPLICE VAULTS ADJACENT TO CABINET. 10 FT OF SLACK SHALL BE PLACED WITHIN CONTROLLER CABINET.

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CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

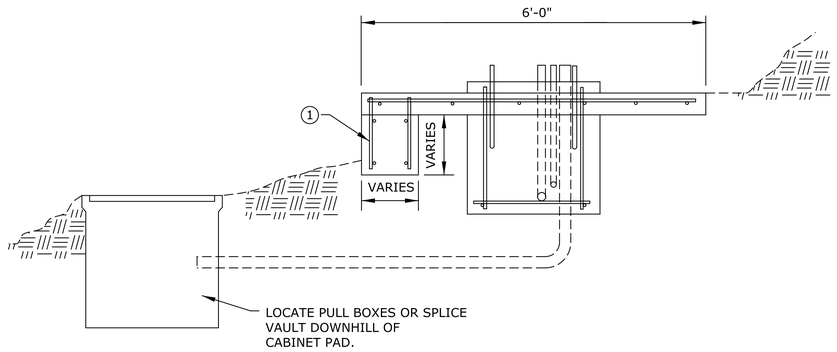
ITS CABINET DETAILS

ITS-D05 VERSION DATE: 06-07-12

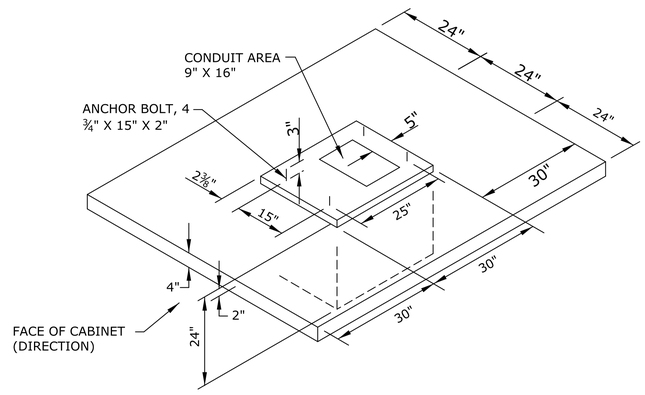
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	590	1055

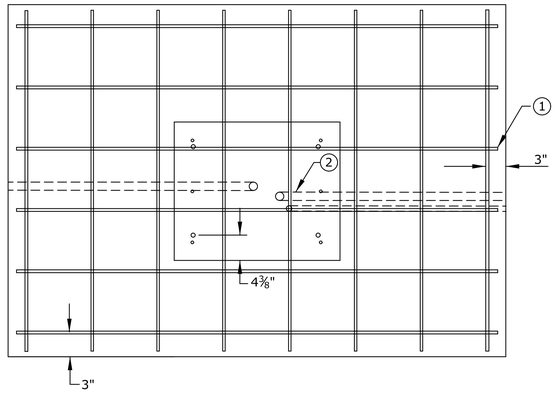
CABINET FOUNDATION NOTES:

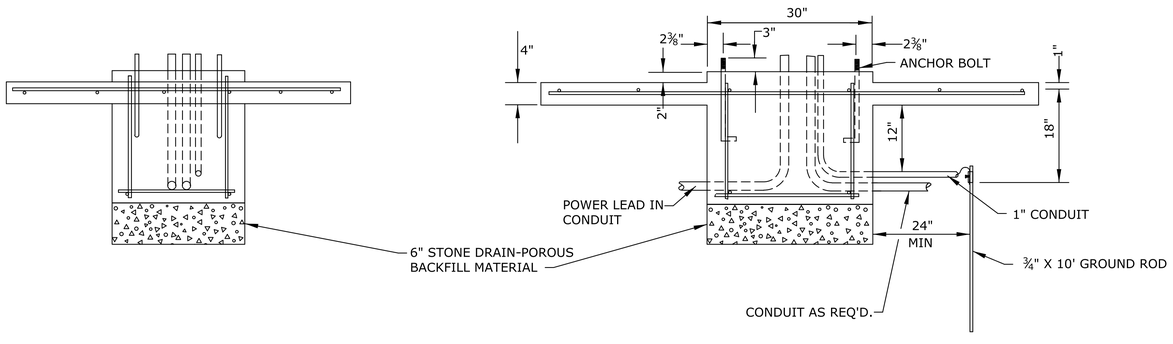
1. ALL REINFORCING BAR USED IN THE CONSTRUCTION OF THE CABINET FOUNDATION SHALL BE NO. 4 BARS, EVENLY SPACED AT 12 IN SPACING, +/- 1.5 IN.
2. REBAR SHALL BE ADJUSTED TO ACCOMMODATE CONDUIT.
3. STONE DRAIN MATERIAL SHALL CONFORM TO THE STANDARD SPECIFICATION.



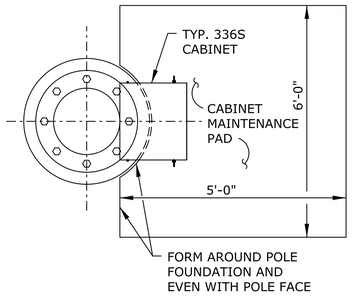
ITS CABINET FOUNDATION ON SLOPE DETAILS

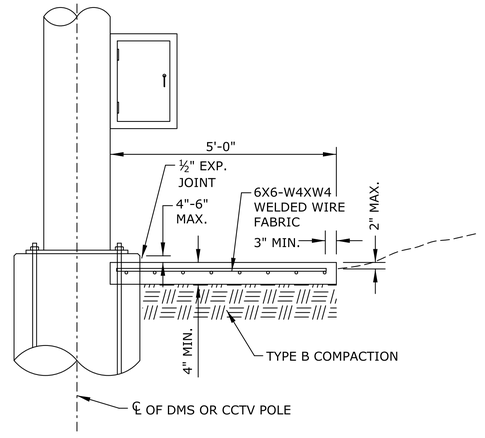






ITS CABINET FOUNDATION DETAILS





POLE MOUNTED ITS CABINET MAINTENANCE PAD

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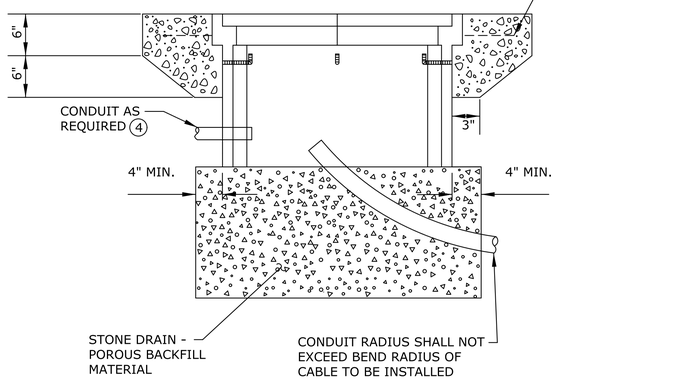
CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

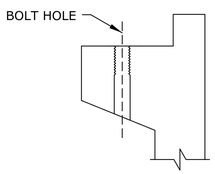
ITS CABINET FOUNDATION DETAILS

ITS-D06 VERSION DATE: 02-11-14

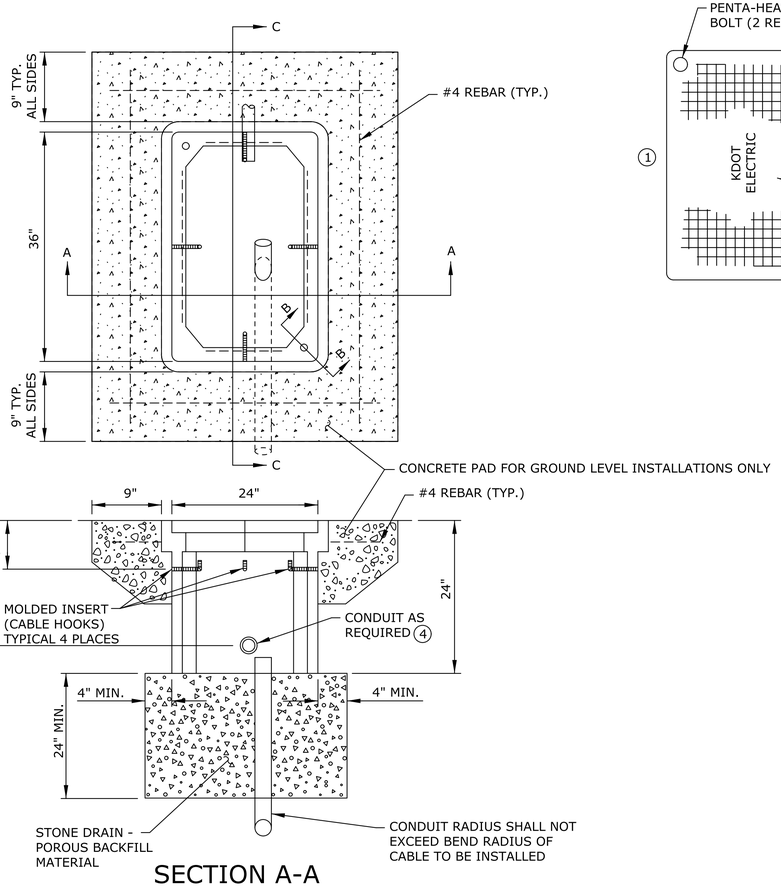
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KANSAS	472-85031	2015	591	1055



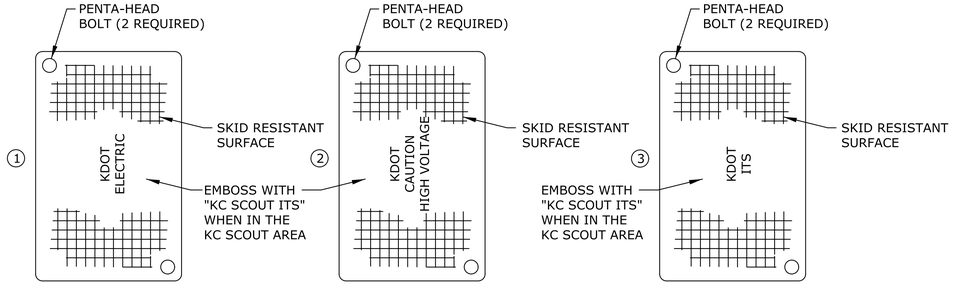
SECTION C-C



SECTION B-B
TYPICAL BOLT CLEANOUT



SECTION A-A



PREFORMED PULL BOX COVER (5)

NOTES:

(1) PULL BOXES WITH 120/240V CONDUCTORS SHALL BE EMBOSSED WITH "KDOT/ELECTRIC". TEXT SHALL BE 2 IN HIGH AND CENTERED

(2) PULL BOXES WITH 480V CONDUCTORS SHALL BE EMBOSSED "KDOT/CAUTION/HIGH VOLTAGE". TEXT SHALL BE 2 IN HIGH AND CENTERED.

(3) PULL BOXES WITH LOOP LEAD-IN CABLES, DETECTOR CABLES, COMMUNICATION CABLES OR DMS CABLES SHALL BE EMBOSSED "KDOT/ITS". TEXT SHALL BE 2 IN HIGH AND CENTERED.

(4) ALL METAL CONDUITS SHALL BE ELECTRICALLY BONDED BY A GROUND BUSHING AND NO. 4 BARE COPPER WIRE.

(5) SUBSTITUTE "KC SCOUT" FOR "KDOT" WHEN INSTALLATIONS ARE IN KC SCOUT AREA.

GENERAL NOTES:

1. ALL DIMENSIONS SHOWN ARE IN INCHES UNLESS OTHERWISE NOTED.
2. PREFORMED BOX WALLS MAY BE EITHER FLARED OR VERTICAL.
3. BURY ALL ELECTRICAL PULL BOXES SIX INCHES BELOW GRADE. CONCRETE PAD IS NOT REQUIRED WHEN ELECTRICAL PULL BOX IS BURIED. ENGINEER MAY REQUEST TOP OF ELECTRIAL PULL BOX TO BE INSTALLED FLUSH WITH GRADE WITH CONCRETE PAD.
4. IF AN EXTENSION IS USED WITH A PREFORMED BOX, THE LIP OF THE EXTENSION MAY BE INTERIOR OR EXTERIOR. THE EXTENSION SHALL BE COMPATIBLE AND FROM THE SAME MANUFACTURER.
5. CONDUIT SHALL ENTER THE PULL BOX FROM THE SIDE OF THE BOX OR FROM THE BOTTOM. IF USING SIDE ENTRY CONDUIT, ENSURE BEND RADIUS OF CABLE IS NOT EXCEEDED WHEN PULLING CABLE.
6. SIDE ENTRY CONDUIT SHALL ONLY BE USED FOR RMC, BRIDGE CONDUIT TRANSITION, OR SHORT SPLICE VAULT / PULL BOX CONNECTIONS.
7. COVER SHALL BE RATED FOR A MINIMUM OF 20,000 LB LOADING.
8. STONE DRAIN MATERIAL SHALL CONFORM TO THE STANDARD SPECIFICATIONS AND SHALL BE CLEAN AGGREGATE.

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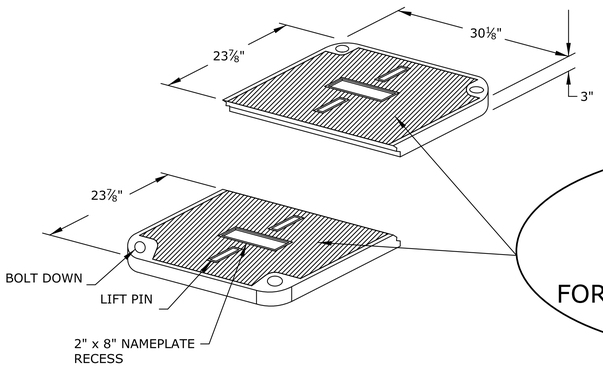
CITY OF WICHITA

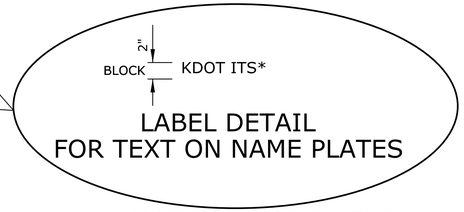
EAST KELLOGG & WEBB ROAD

ITS PULL BOX DETAILS

ITS-D07 VERSION DATE: 10-29-14

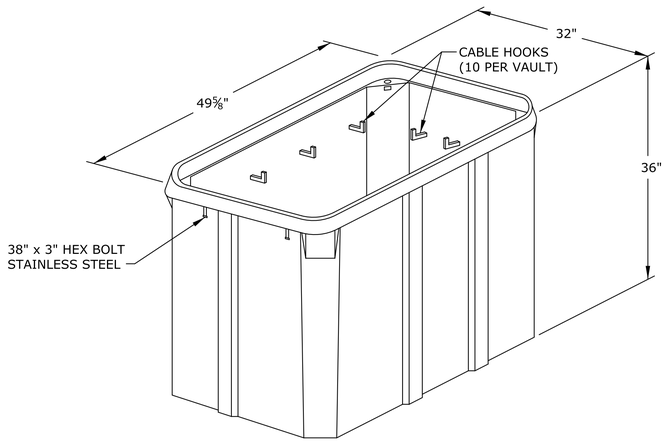
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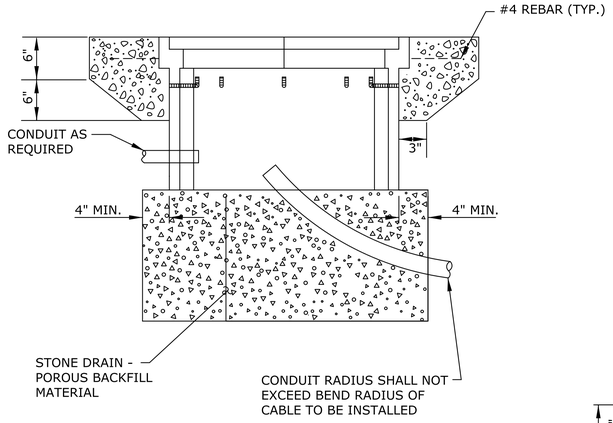


LABEL DETAIL
FOR TEXT ON NAME PLATES

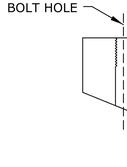
* NOT FOR USE IN THE KC SCOUT AREA



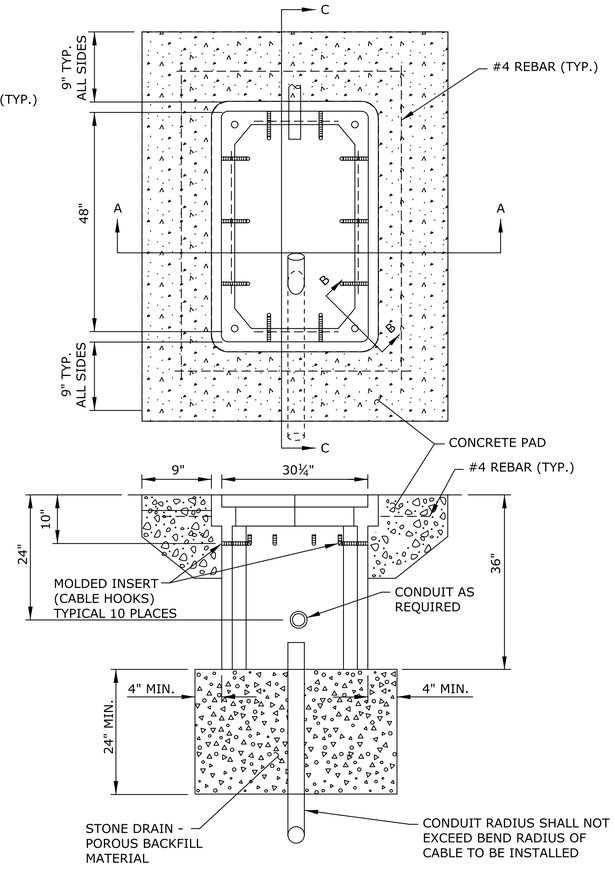
SPLICE VAULT



SECTION C-C



SECTION B-B
TYPICAL BOLT CLEANOUT



SECTION A-A

GENERAL NOTES:

1. ALL DIMENSIONS SHOWN ARE IN INCHES UNLESS OTHERWISE NOTED.
2. PREFORMED BOX WALLS MAY BE EITHER FLARED OR VERTICAL.
3. IF AN EXTENSION IS USED WITH A PREFORMED BOX, THE LIP OF THE EXTENSION MAY BE INTERIOR OR EXTERIOR. THE EXTENSION SHALL BE COMPATIBLE AND FROM THE SAME MANUFACTURER.
4. CONDUIT SHALL ENTER THE PULL BOX FROM THE SIDE OF THE BOX OR FROM THE BOTTOM. IF USING SIDE ENTRY CONDUIT, ENSURE BEND RADIUS OF CABLE IS NOT EXCEEDED WHEN PULLING CABLE.
5. SIDE ENTRY CONDUIT SHALL ONLY BE USED FOR RMC, BRIDGE CONDUIT TRANSITION, OR SHORT SPLICE VAULT / PULL BOX CONNECTIONS.
6. COVER SHALL BE RATED FOR A MINIMUM OF 20,000 LB LOADING.
7. STONE DRAIN MATERIAL SHALL CONFORM TO THE STANDARD SPECIFICATION AND SHALL BE CLEAN AGGREGATE.
8. RECTANGULAR SPLICE VAULT WITH SPLIT LID NOT FOR USE IN THE KC SCOUT AREA.

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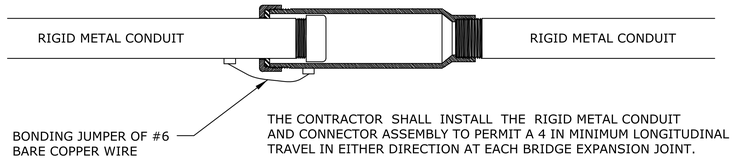
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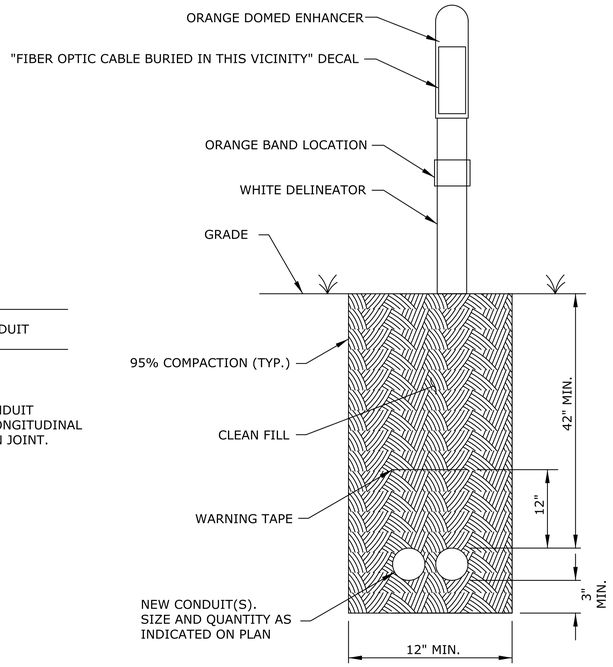
EAST KELLOGG & WEBB ROAD
RECTANGULAR FIBER OPTIC
SPLICE VAULT DETAIL

ITS-D08 VERSION DATE: 10-29-14

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	593	1055



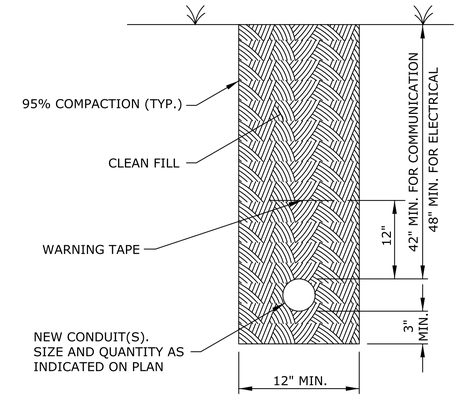
EXPANSION FITTING



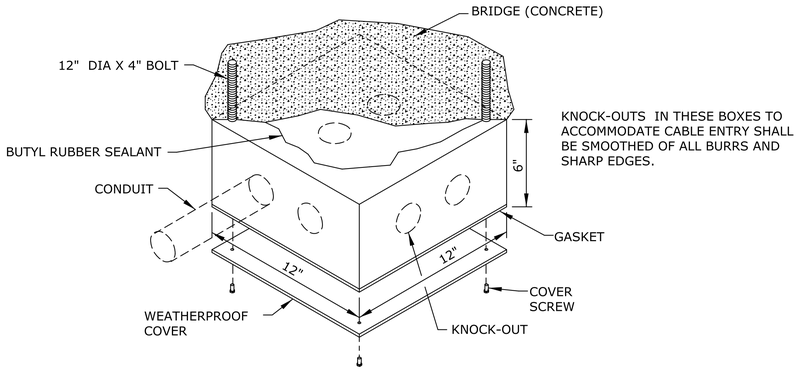
FIBER OPTIC TRENCH DETAIL

FIBER OPTIC CONDUIT MARKERS TO BE PLACED AT:

1. BEGIN AND END OF CONDUIT RUNS OVER 100 FT
2. EVERY 500 FT FOR CONDUIT RUNS ADJACENT TO R/W
3. BEGIN AND END OF CONDUIT RUNS ON STRUCTURE
4. AT SPLICE VAULTS (IF NOT A TERMINATION POINT ALREADY)
   a. ADD 1 ORANGE BAND TO MARKER IF A SPLICE VAULT WITH SLACK COIL
   b. ADD 2 ORANGE BANDS TO MARKER IF A SPICE VAULT WITH SLACK COIL AND A SPLICE ENCLOSURE
   c. ORANGE BAND SHALL BE 3" INDUSTRIAL TAPE OR APPROVED EQUAL

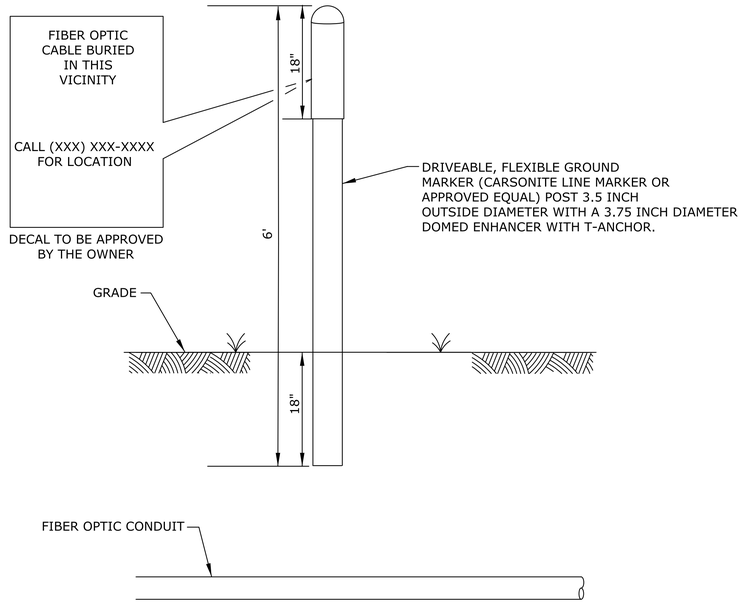


TRENCH DETAIL (NON FIBER)



THE JUNCTION BOX IS TO BE ATTACHED TO THE BRIDGE. THE CONTRACTOR SHALL DRILL TWO HOLES IN THE BOTTOM OF THE BOX AND BOLT THE JUNCTION BOX TO THE BRIDGE AT THE INSERTS PROVIDED. BOLTS SHALL BE 12 IN DIA. BY 4 IN LONG AND SHALL CONFORM TO ASTM A325. A WASHER SHALL BE INSTALLED BETWEEN THE BOLT HEAD AND BOTTOM OF THE BOX.

ABOVE GROUND JUNCTION BOX



FIBER OPTIC CONDUIT ABOVE GROUND DELINEATOR DETAIL

GENERAL NOTES:

1. ALL UTILITY CROSSINGS UNDER ROADWAY SHOULD HAVE A MINIMUM OF 5 FT OF COVER BELOW CROWN GRADE OR 3 FT COVER BELOW DITCH GRADE.
2. REFER TO THE KDOT UTILITY ACCOMMODATION POLICY FOR BRIDGE ATTACHMENT DETAILS.

CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

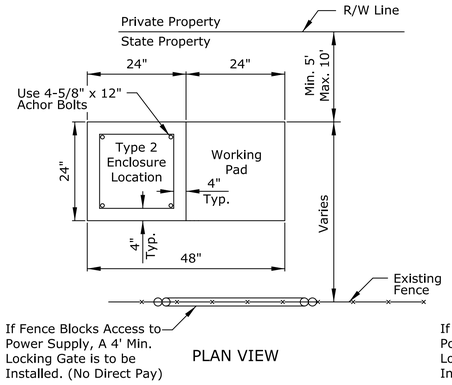
CONDUIT STRUCTURAL ATTACHMENT AND TRENCH DETAILS

ITS-D10 VERSION DATE: 02-11-14

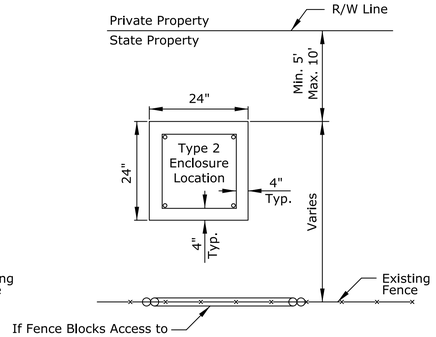
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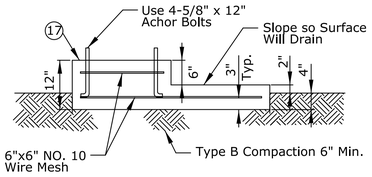
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	594	1055



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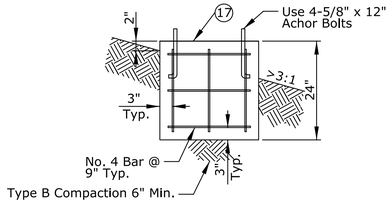


PLAN VIEW



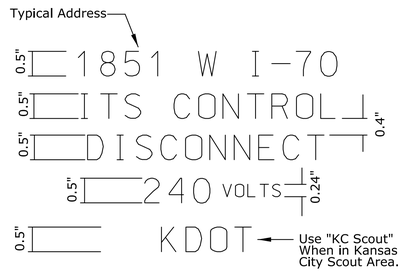
SIDE VIEW

TYPE 2 ENCLOSURE PAD



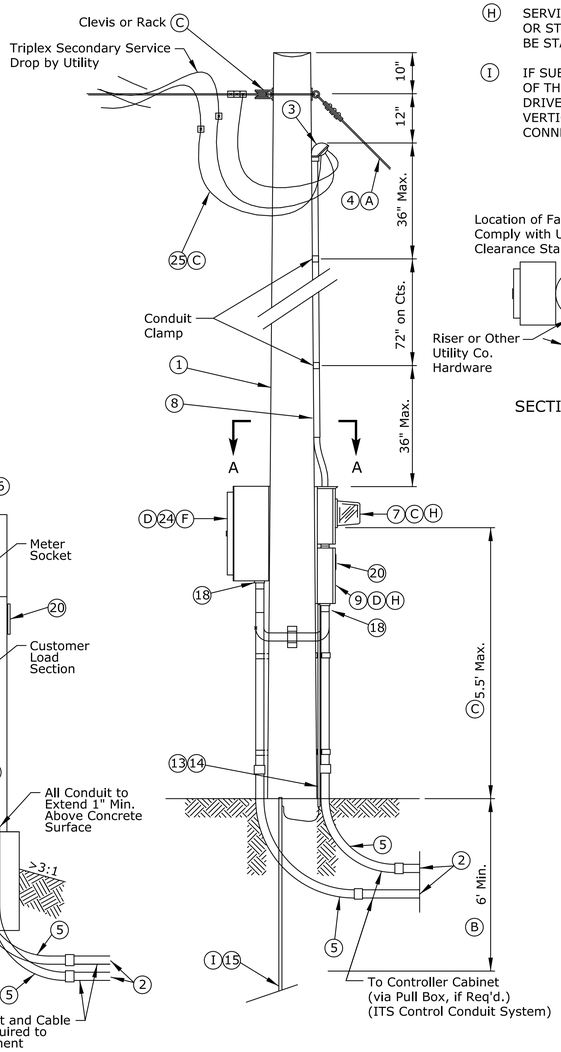
SIDE VIEW

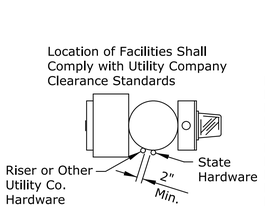
TYPE 2 ENCLOSURE PAD
WITH SLOPED GRADE



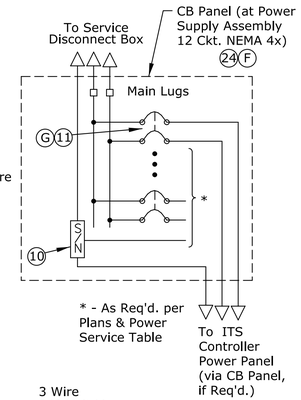
LABEL DETAIL

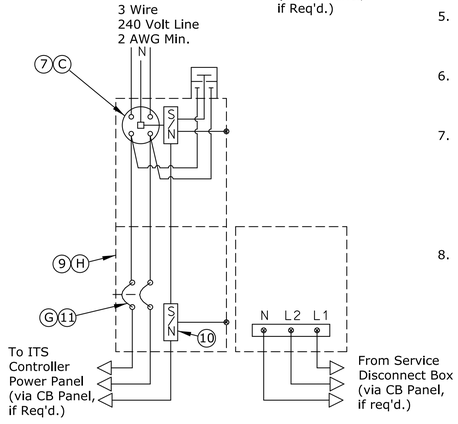
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SECTION A-A





POWER SUPPLY
(-PS)

CONTROLLER ENCLOSURE
POWER PANEL (-CA)

WIRING DIAGRAM - ITS CONTROL

DETAIL NOTES:

Ⓐ SERVICE POLE SHALL BE GUYED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 49 FT.

Ⓑ INCREASE 1 FT FOR EACH 5 FT ABOVE 30 FT.

Ⓒ METER SOCKET AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED, AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.

Ⓓ SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF CABINET DOOR.

Ⓔ (NOT USED)

Ⓕ IF MULTIPLE CIRCUITS ARE SPECIFIED, INSTALL CB PANEL ON POWER SUPPLY.

Ⓖ CIRCUIT BREAKERS IN THE CIRCUIT BREAKER PANEL SHALL BE PLUG-IN TYPE.

Ⓗ SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAINLESS STEEL.

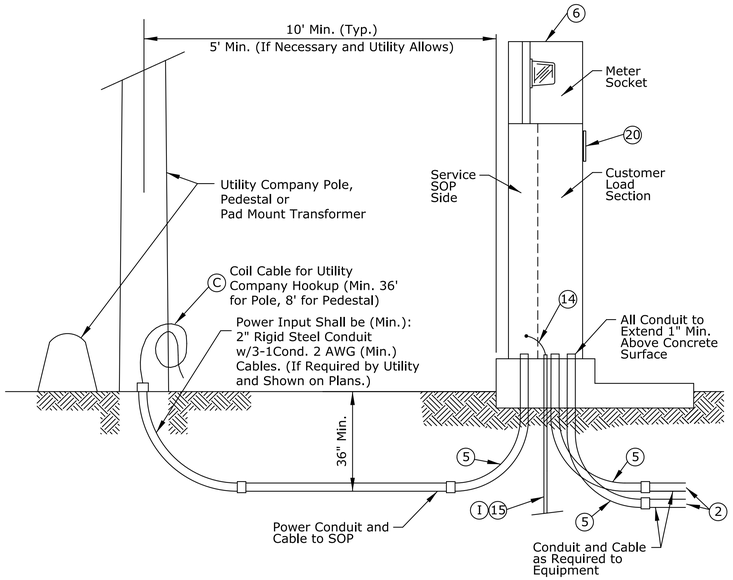
Ⓘ IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 2.5 FT DEEP. CONNECTION TO GROUND ROD SHALL BE WELDED.

LIST OF MATERIALS

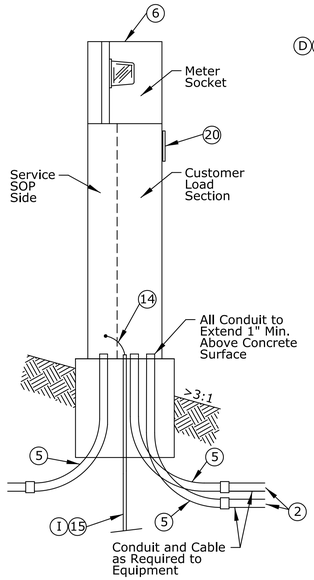
ITEM	DESCRIPTION
1	Service Pole 32.8' Min., Class 4 or 5 wood, Contractor Provided, State Owned *
2	Cable, Power *
3	Service Entrance Cap, for Conduit
4	Guy Cable, as Required Ⓐ
5	Conduit, Rigid, 2" * Min., with Preformed Elbows
6	Type 2 Enclosure, See TE 202
7	Meter Socket, 200 Amp, for ITS Controls ⒸⒽ
8	Conduit, Rigid, 2" * Min.
9	Service Disconnect Box, Lockable, Raintight, NEMA 4 ⒹⒽ
10	Insulated, Groundable Neutral, 200 Amp Min.
11	Breaker, Size and Pole, per Power Service Table Ⓖ
12	(Not Used)
13	Metal Conduit, 0.5" *
14	Ground Wire, 2 AWG Min.
15	Ground Rod, ¾" x 10' Min.
16	(Not Used)
17	Concrete, Grade 4.0
18	Conduit Hub, Threaded with Sealing Washers
19	(Not Used)
20	Phenolic Plate, White with Black Lettering
21	(Not Used)
22	(Not Used)
23	(Not Used)
24	NEMA 4, 12 Ckt, Main Lugs, Lockable, SS Enclosure Ⓕ
25	Cable, 2 AWG Min., 600 Volt Ⓒ
	* - See Plans

GENERAL NOTES:

1. FOR CABLE TYPES AND INSTALLATION, SEE STANDARD SPECIFICATIONS.
2. THE TYPE OF POWER SUPPLY ASSEMBLY IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.
3. ALL WORK AND ITEMS SHALL MEET NATIONAL ELECTRICAL CODE, NATIONAL ELECTRICAL SAFETY CODE AND NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION STANDARDS.
4. WHERE CB PANEL IS NOT DESIGNATED, OMIT ITEMS NOT REQUIRED.
5. ALL OPENINGS IN ANY SERVICE BOX OR METER BOX SHALL BE COVERED THEN SEALED WITH 100 YEAR SILICONE CAULK.
6. ALL MATERIALS REQUIRED EXCLUDING REFERENCE ITEMS AS SHOWN ON DRAWING SHALL BE INCLUDED IN PRICE BID FOR POWER SUPPLY ASSEMBLY.
7. UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET. IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE DISCONNECT CABINET.
8. FOR SINGLE CIRCUIT CONTROLLER ASSEMBLY FEED, ROUTE CONDUIT FROM DISCONNECT BOX; MULTIPLE CIRCUITS FROM FEEDER BREAKER PANEL ENCLOSURE.



TYPE 2 (PEDESTAL)
USE WITH TE 202 TYPICAL ENCLOSURE DETAILS



TYPE 2 (PEDESTAL) WITH SLOPED GRADE
USE WITH TE 202 TYPICAL ENCLOSURE DETAILS

TYPE 1 (POLE) OVERHEAD SERVICE

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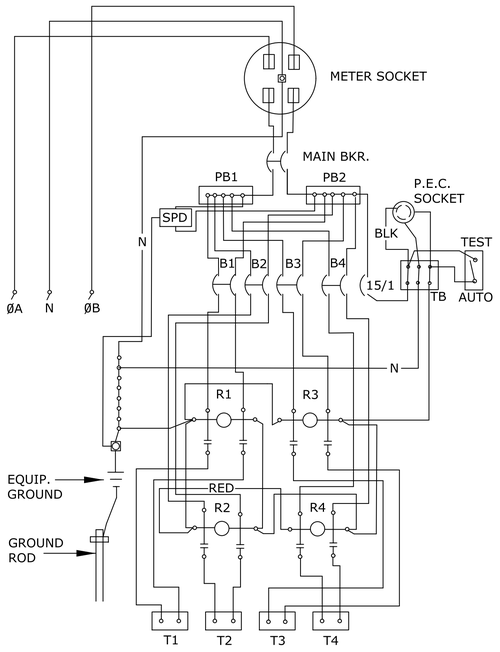
EAST KELLOGG & WEBB ROAD
ITS FIELD POWER SUPPLY
ASSEMBLY DETAILS

ITS-DII VERSION DATE: 02-11-14

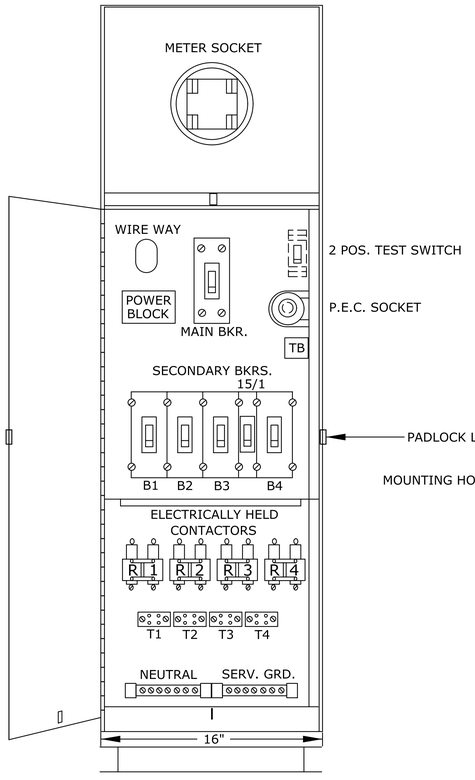
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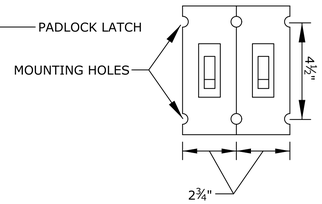


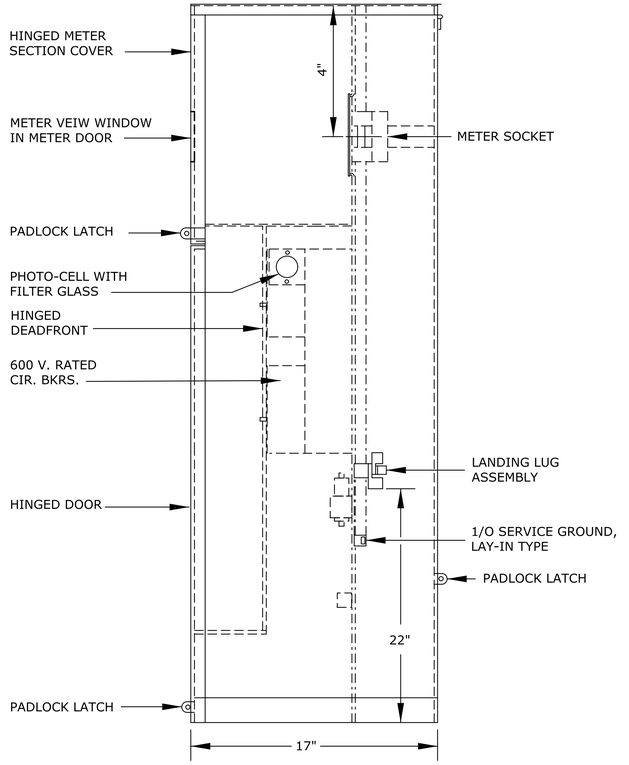
WIRING DIAGRAM

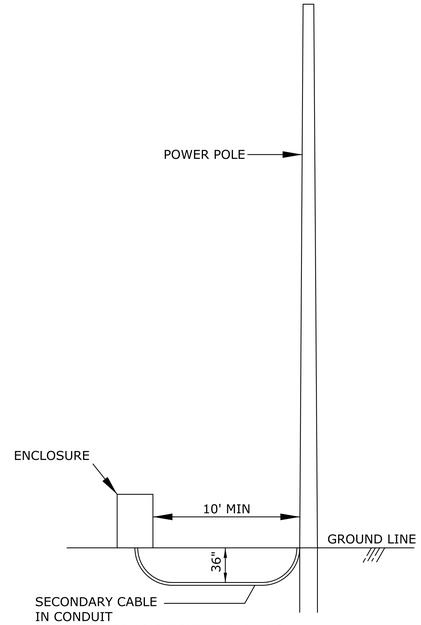


FRONT VIEW

TYPICAL BREAKER DETAILS (2 POLE)



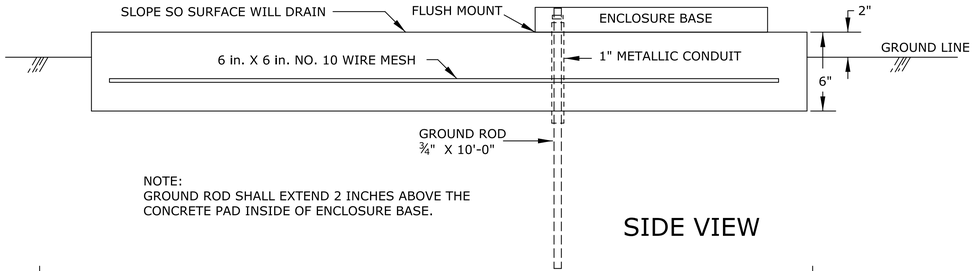




CONDUIT SIZE AS SPECIFIED IN PLANS.

POWER ARRANGEMENT

NOTE: POWER ARRANGEMENT SHALL MEET THE LOCAL UTILITY COMPANY SPECIFICATIONS.



NOTE:
GROUND ROD SHALL EXTEND 2 INCHES ABOVE THE CONCRETE PAD INSIDE OF ENCLOSURE BASE.

SIDE VIEW

NOTES:

THE ENCLOSURE CABINET SHALL BE CONSTRUCTED OF 5052 ALLOY ALUMINUM 0.125" THICK. THE CABINET SHALL BE OF CLEAN CUT DESIGN HAVING NO SHARP EDGES, CORNERS OR PROJECTIONS AND NEMA 3R CONSTRUCTION.

THE ENCLOSURE SHALL INCREASE IN SIZE WITH THE NUMBER OF CIRCUITS.

THE CUSTOMER DOOR SHALL BE HINGED THE FULL LENGTH OF THE DOOR AND HAVE SUITABLE MEANS OF HOLDING THE DOOR IN THE FULLY OPEN POSITION. PADLOCK BRACKET SHALL EXTEND THROUGH DOOR FOR SECURITY.

THE DEAD FRONT DOOR SHALL BE HINGED AND HAVE 3/4 TURN CLIPS OR OTHER SUITABLE MEANS OF LOCKING.

SERVICE ENTRANCE IN BACK OF ENCLOSURE SHALL HAVE A HINGED OR A LIFT OFF COVER WITH PAD LOCK PROVISIONS.

THE SECONDARY BREAKER FOR THE PHOTO-CELL CIRCUIT SHALL BE 277 VOLT, 15 AMP SINGLE POLE.

THE WIRING FROM PB1 AND PB2 TO T1 THROUGH T4 SHALL BE NO. 6 A.W.G. THW.

THE WIRING FOR THE LOAD AND LINE SIDE OF THE MAIN BREAKER SHALL BE THE SAME SIZE WITH THE WIRE.

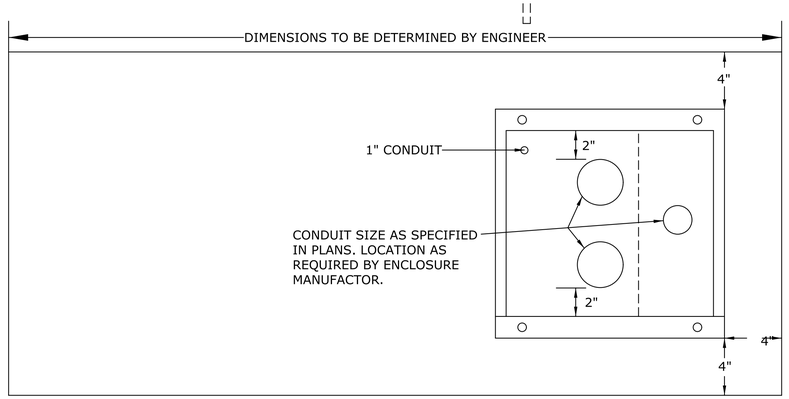
THE WIRING FOR THE PHOTO ELECTRIC CONTROL CIRCUIT SHALL BE NO. 12 A.W.G. THW.

ALL WIRING AND WIRING METHODS SHALL COMPLY WITH THE MOST CURRENT NATIONAL ELECTRIC CODE STANDARDS. ANY CHANGES TO THESE STANDARDS SHALL BE APPROVED BY THE AUTHORITY HAVING JURISDICTION.

PROVIDE NATURAL ALUMINUM FINISH.

SEE PLAN SHEET

MAIN BREAKER	2P - 100 AMP
SECONDARY BREAKER	
CIRCUIT NO. 1 (DMS)	2P - 60 AMP
CIRCUIT NO. 2 (DMS)	2P - 60 AMP
CIRCUIT NO. 3 (CCTV)	2P - 30 AMP
CIRCUIT NO. 4 (SPARE)	1P - 15 AMP
ELECTRICALLY HELD CONTACTORS	
CIRCUIT NO. 1	AMP
CIRCUIT NO. 2	AMP
CIRCUIT NO. 3	AMP
CIRCUIT NO. 4	AMP



TOP VIEW

NOTE: THE DUCT FOR SECONDARY CABLE SHALL EXTEND 1" PAST THE END OF THE CONDUIT BEND.

NOTE: ALL CONDUIT TO EXTEND 1" MIN. ABOVE CONCRETE SURFACE.

PAD DIMENSIONS SHALL BE ADJUSTED ACCORDINGLY FOR THE WIDTH OF THE ENCLOSURE TO BE INSTALLED.

10/29/2014 ADDED PADLOCK AND NEMA 3R REQUIREMENTS
2/28/2014 SPD ADDED TO PROTECT LOAD SIDE CONDUCTORS

CITY OF WICHITA

EAST KELLOGG & WEBB ROAD

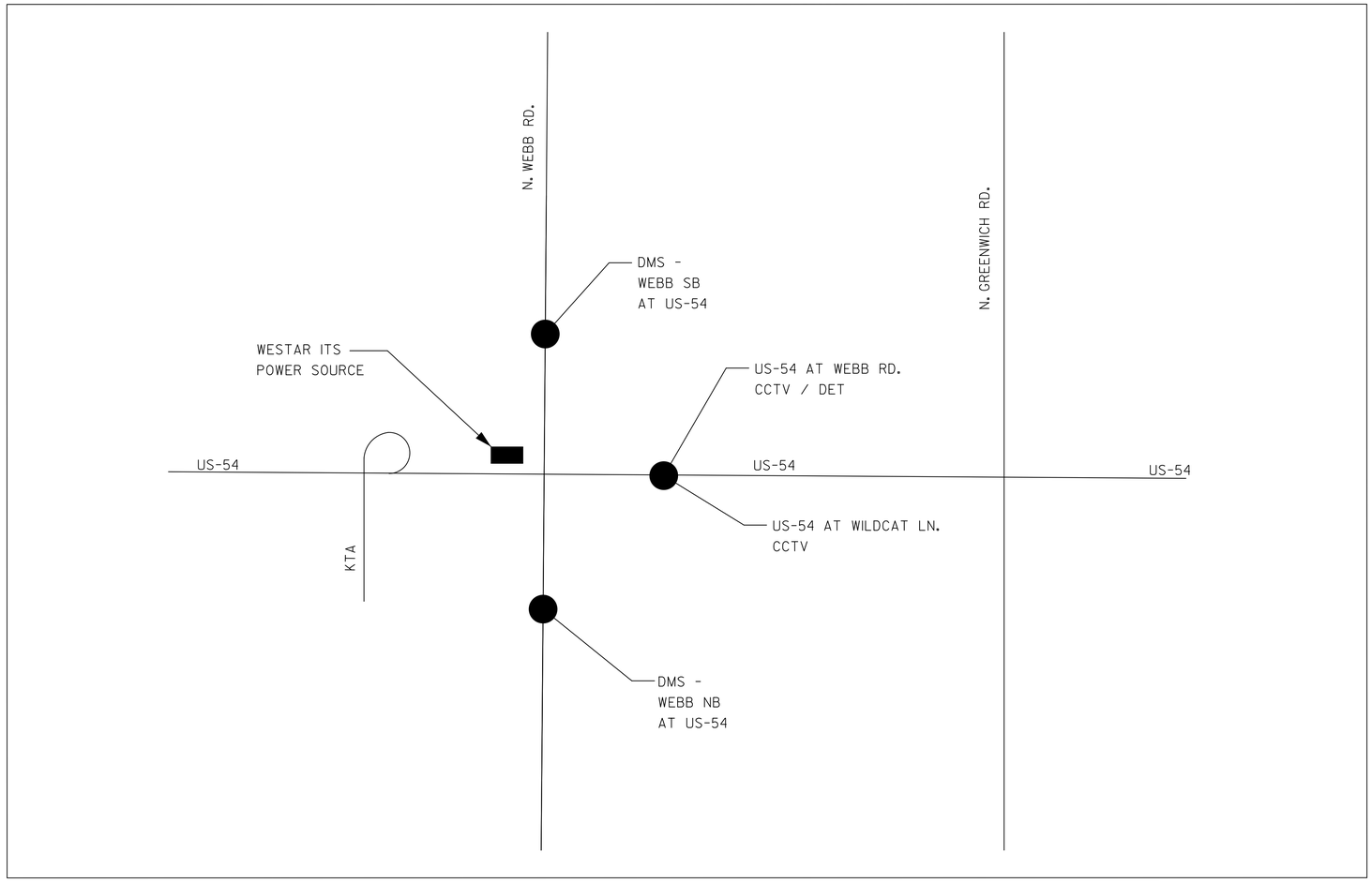
ITS TYPICAL ENCLOSURE DETAILS

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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	596	1055



NOT TO SCALE

LOCATION MAP HERE

UTILITY CONTACTS:

KDOT WITCHITA METRO UTILITY ENGINEER
BEN KOERNER
W - 316-744-1271
C - 316-250-9863
BENKO@KSDOT.ORG

WESTAR
BRANDON CHADD
W - 316-261-6251
C - 316-807-6346
BRANDON.CHADD@WESTARENERGY.COM

KDOT TMC ACCESS
DALE HOLSEY
W - 316-660-4970
C - 316-259-4172
HOLSEY@KSDOT.ORG

CENTURYLINK
JUSTIN SPORE
C - 316-210-2547

NOTE:

THE ENGINEER HAS CONDUCTED A FIELD REVIEW OF ALL EXISTING POWER SERVICE LOCATIONS. THESE LOCATIONS HAVE NOT BEEN VANDALIZED. CONTRACTOR SHALL VERIFY THAT NO DAMAGE HAS OCCURRED SINCE THE ENGINEER'S FIELD REVIEW. IF DAMAGE HAS OCCURRED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER WITHIN FIVE WORKING DAYS OF THE BEGINNING OF THE CONTRACT.

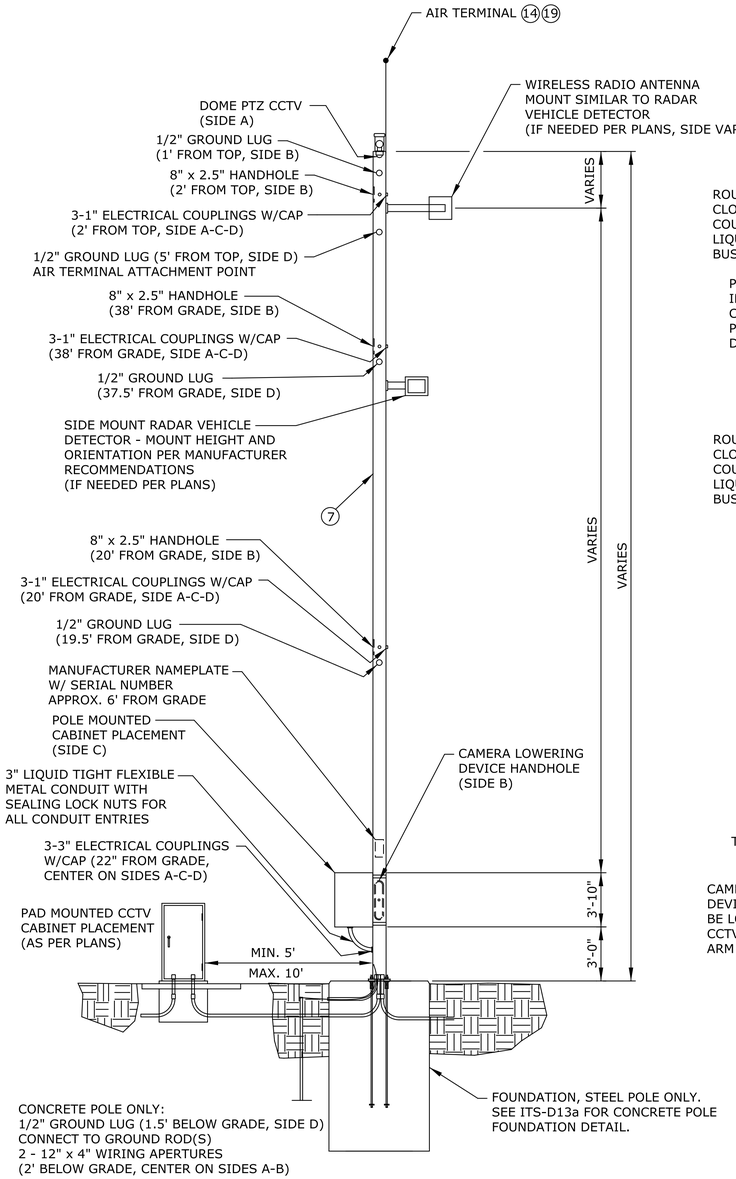
ELECTRICAL SERVICE TABLE

LOCATION NO.	ADDRESS/CITY/STATE LOCATION DESC.	POWER SERVICE ID	POWER SUPPLY TYPE	SERVICE VOLTAGE	STEP-UP TRANSFORMER VOLTAGE	STEP-DOWN TRANSFORMER VOLTAGE	CABINET NAME	LOAD (WATTS)	LOAD (AMPS)	METER SIZE (AMPS)	METER BASE (AMPS)	NEW BRANCH BREAKERS (POLE-AMPS)	COMMENTS/NOTES	SERVICE UTILITY	CONTACT NAME NUMBER
1	NW. QUADRANT US-54/WEBB RD.	PS054-01	TYPE 2	120/240	_	_	K054WBCA-01 (CCTV)	1800	15	100	100	2P - 30A	USE SAME METER PEDESTAL	WESTAR	SEE ABOVE
							K054SBCA-01 (DMS)	4500	19	100	100	2P - 60A	USE SAME METER PEDESTAL	WESTAR	SEE ABOVE
							K054NBCA-01 (DMS)	4500	19	100	100	2P - 60A	USE SAME METER PEDESTAL	WESTAR	SEE ABOVE

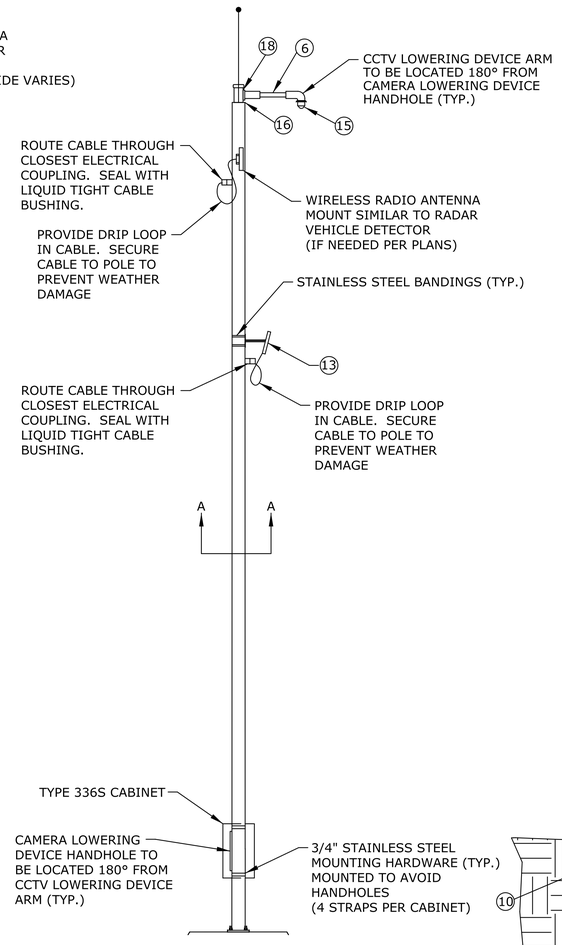
CITY OF WICHITA
EAST KELLOGG & WEBB ROAD
ITS ELECTRICAL SERVICE
LOCATION SUMMARY
ITS-DI2 VERSION DATE: 02-11-14

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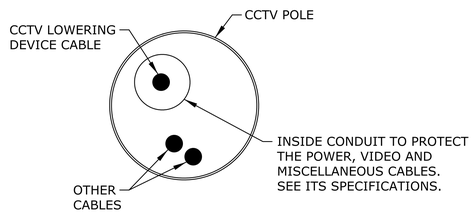
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KANSAS	472-85031	2015	597	1055



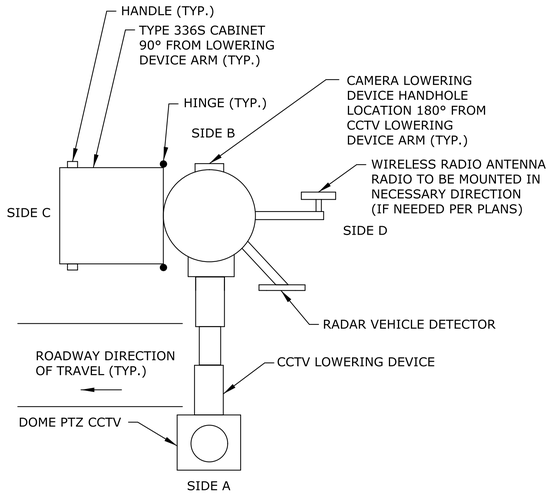
CABINET/CCTV/ANTENNA MOUNTING DETAIL



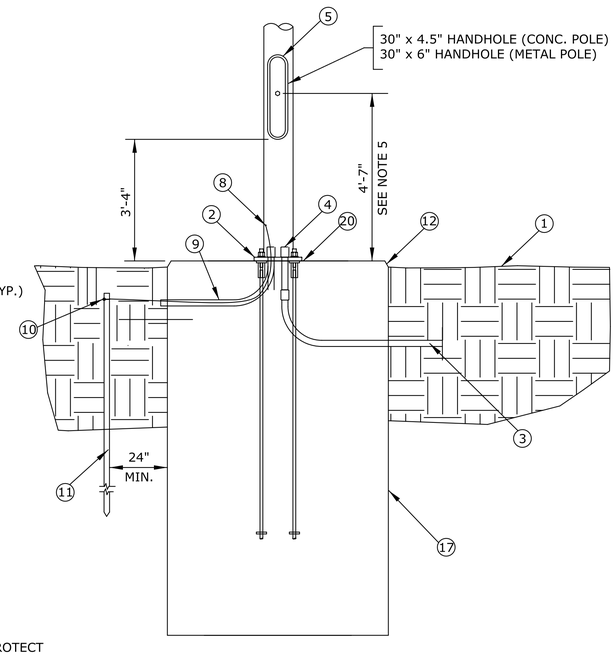
CABINET/CCTV/ANTENNA DETAIL (SIDE VIEW)



CCTV POLE SECTION A-A



CABINET/CCTV/ANTENNA DETAIL (TOP VIEW)



CABINET/CCTV POLE GROUNDING DETAIL

NOTES:

1. FINISHED GRADE - SLOPE AWAY FROM POLE OR FOUNDATION.
2. STEEL POLE: CONCRETE FOUNDATION, BASE PLATE LAYOUT AND BOLT CIRCLE TO BE AS SHOWN ON STRUCTURAL DETAILS.
3. SEE PLANS FOR CONDUIT SIZE AND QUANTITY.
4. STEEL POLE: CONDUIT END BELL. CONDUIT SHALL PROJECT A MINIMUM OF 2 IN AND A MAXIMUM OF 4 IN ABOVE BOTTOM OF BASE PLATE.
5. HAND HOLES SHALL HAVE A HINGED COVER. DIMENSIONS ARE AS NOTED.
6. PROVIDE AND INSTALL CCTV DOME CAMERA HOUSING AND LOWERING DEVICE AS CALLED FOR ON PLANS AND THE EQUIPMENT SPECIFICATIONS.
7. CCTV POLE. HEIGHT AS INDICATED ON PLANS.
8. STEEL POLE: GROUNDING LUG, CONNECT GROUNDING CONDUCTOR TO POLE AND BUSHINGS. CLEAN GALVANIZATION FROM GROUND LUG AREA.
9. PROVIDE A MINIMUM NO. 4 COPPER GROUNDING CONDUCTOR FROM POLE TO GROUNDING ROD(S).
10. CONNECTION TO GROUNDING ROD(S) SHALL BE EXOTHERMIC.
11. PROVIDE 3/4 IN X 10 FT SOLID COPPER GROUNDING ROD(S). REFER TO EQUIPMENT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
12. STEEL POLE: FOUNDATION HEIGHT ABOVE FINISHED GRADE SHOULD BE 6 TO 8 IN.
13. PROVIDE AND INSTALL RADAR VEHICLE DETECTOR UNIT AS CALLED FOR IN THE PLANS. THE DETECTOR UNIT SHALL BE BANDED TO THE STRUCTURE.
14. PROVIDE AND INSTALL ANTI-STREAMING AIR TERMINAL AND ATTACH TO POLE GROUND WIRE (IF REQUIRED). AIR TERMINAL SHALL BE A MINIMUM OF 5 FT LENGTH ABOVE TOP OF POLE AND 5 FT LENGTH ATTACHED TO POLE (TOTAL LENGTH OF 10 FT) AND SHALL BE LOCATED AND SIZED TO ADHERE TO THE 150 FT RADIUS ROLLING SPHERE MODEL AS DESCRIBED IN NFPA 780.
15. PROVIDE AND INSTALL DRIP SHIELD ACCORDING TO THE SPECIFICATIONS.
16. REMOVABLE POLE CAP SECURED WITH STAINLESS STEEL BOLTS. BOND METAL POLE CAP AND CCTV MOUNTING FRAME TO THE LIGHTNING PROTECTION SYSTEM USING A NO. 6 COPPER BONDING CONDUCTOR.
17. STEEL POLE: SEE STRUCTURAL DETAILS FOR FOUNDATION DIMENSIONS.
18. CONTRACTOR TO PROVIDE CABLE STRAIN RELIEF DEVICE IF NOT PROVIDED BY LOWERING DEVICE SUPPLIER.
19. PROVIDE A NO. 2 COPPER GROUNDING CONDUCTOR FROM AIR TERMINAL TO GROUNDING LUG AT BASE OF POLE IF POLE THICKNESS IS LESS THAN 3/16 IN OR NOT METAL PER NFPA 780.
20. STEEL POLE: INSTALL WIRE MESH (1/4 IN) AROUND POLE BASE, IF GAP EXISTS BETWEEN POLE AND BASE. SECURELY ATTACH TO POLE AND EMBED IN CONCRETE.

GENERAL NOTES:

1. PROVIDE ALL WORK IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
2. CCTV CAMERA DETAIL APPLIES TO BOTH CONCRETE AND METAL POLES.
3. THE EXACT LOCATION OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD WITH THE ENGINEER PRIOR TO INSTALLATION.
4. POLE DIMENSIONS NOT SHOWN SHALL BE AS DETERMINED BY THE MANUFACTURER. CONTRACTOR SHALL OBTAIN APPROVED SUBMITTALS PRIOR TO PURCHASE OR FABRICATION. SHOP DRAWINGS SHALL BE SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF KANSAS, AND SHALL BE APPROVED IN WRITING BY THE ENGINEER PRIOR TO ORDERING MATERIALS.
5. WHERE APPLICABLE, CCTV CAMERA POLE FOUNDATION SHALL BE LOCATED AT LEAST 7 FT AWAY FROM AND BEHIND GUARDRAIL.
6. CAMERA LOWERING DEVICE HANDHOLE IS TO BE INSTALLED 180° FROM THE CCTV LOWERING DEVICE ARM. POLE MOUNTED CABINET IS TO BE INSTALLED 90° FROM THE CCTV LOWERING DEVICE ARM (TYP.).

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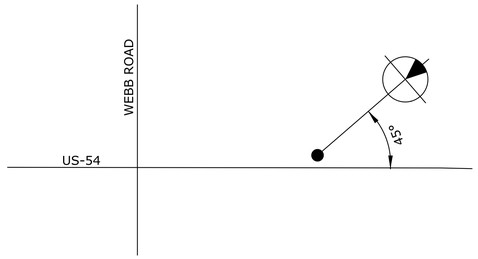
CITY OF WICHITA

EAST KELLOGG & WEBB ROAD
CCTV CAMERA POLE DETAIL
CONCRETE AND STEEL

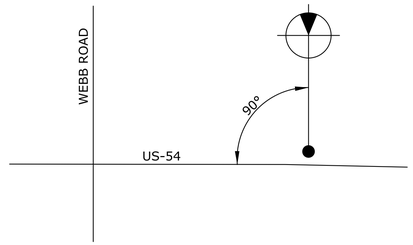
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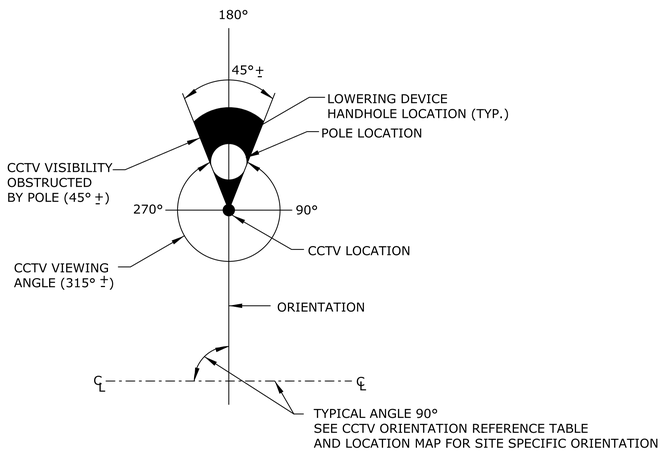
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K054WBC-01A
US-54 AT WEBB RD.
SITE 1 (UPPER CCTV - 35')



K054WBC-01B
US-54 AT WILDCAT LN.
SITE 1 (LOWER CCTV - 15')



CCTV ORIENTATION LEGEND

CCTV ORIENTATION REFERENCE TABLE		
CCTV NUMBER	ORIENTATION ANGLE	ORIENTATION ANGLE REFERENCE CENTERLINE
K054WBC-01A	45°	℄ US-54
K054WBC-01B	90°	℄ US-54

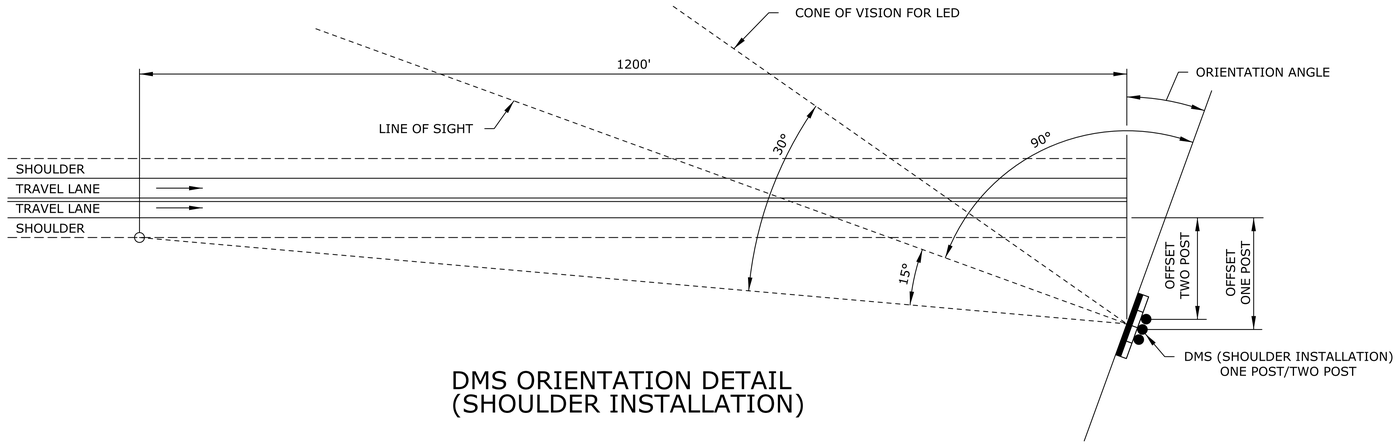
HANDHOLE ORIENTATION: CAMERA LOWERING DEVICE ARM TO BE INSTALLED 180 DEGREES FROM THE LOWERING DEVICE HANDHOLE (TYP.). SET POLE IN FIELD TO MAINTAIN THE PROPER CAMERA ORIENTATION ANGLE AND HANDHOLE ORIENTATION.

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CITY OF WICHITA
EAST KELLOGG & WEBB ROAD
CCTV ORIENTATION DETAIL
ITS-D14 VERSION DATE: 03-05-14

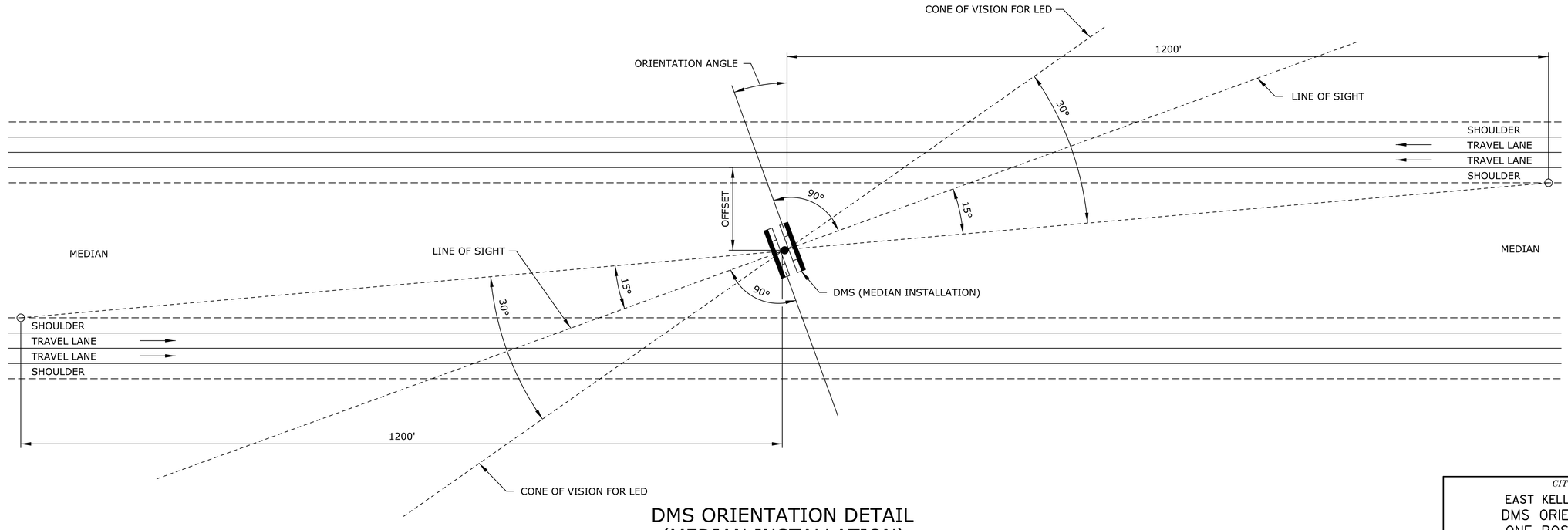
STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
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DMS ORIENTATION DETAIL (SHOULDER INSTALLATION)

DMS SITE DATA (UNIT:FT) (SHOULDER INSTALLATION)			
SITE	DMS	OFFSET	ORIENTATION ANGLE

DMS SITE DATA (UNIT:FT) (MEDIAN INSTALLATION)			
SITE	DMS	OFFSET	ORIENTATION ANGLE
1	KWEBBSBS-01	SEE PLAN SHEET	3.5°
1	KWEBBNBS-01	SEE PLAN SHEET	3.5°



DMS ORIENTATION DETAIL (MEDIAN INSTALLATION)

CITY OF WICHITA

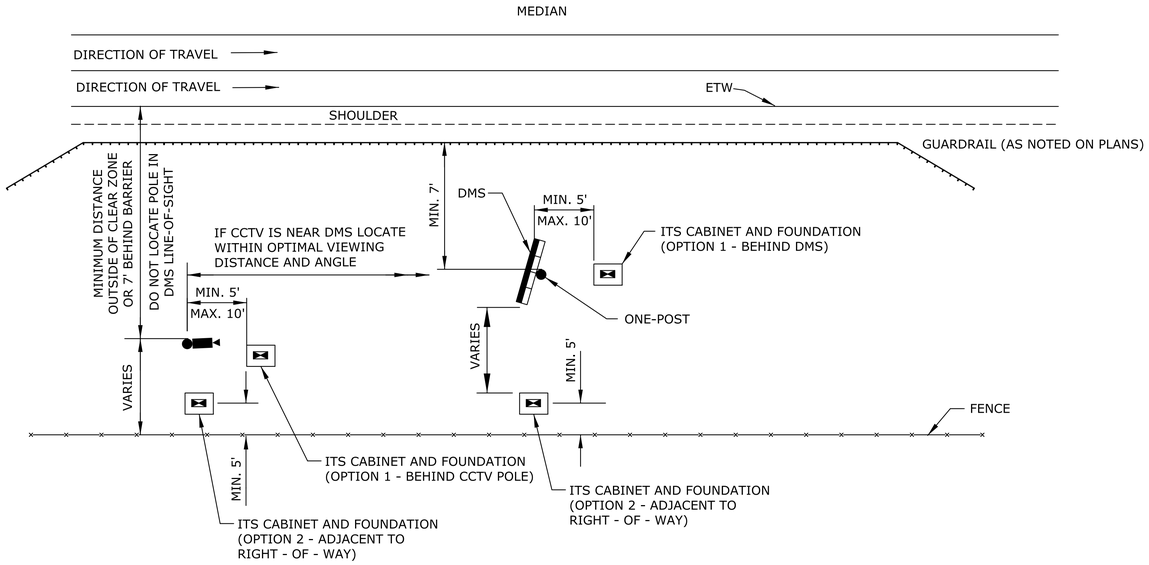
EAST KELLOGG & WEBB ROAD
DMS ORIENTATION DETAIL
ONE POST / TWO POST

ITS-DI5 VERSION DATE: 06-07-12

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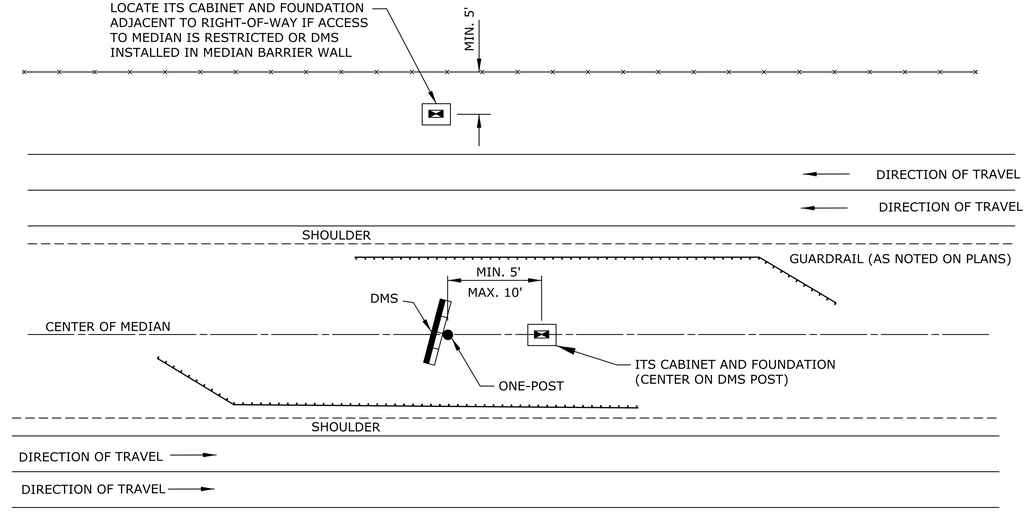
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STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	600	1055



TYPICAL DMS, CCTV, AND ITS CABINET SHOULDER PLACEMENT

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TYPICAL DMS AND ITS CABINET MEDIAN PLACEMENT

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CITY OF WICHITA

EAST KELLOGG & WEBB ROAD
DMS, CCTV, ITS CABINET
PLACEMENT DETAIL

ITS-DI6 VERSION DATE: 02-11-14

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85031	2015	601	1055

CONSTRUCTION AND MATERIAL REQUIREMENTS FOR INTELLIGENT TRANSPORTATION SYSTEM (ITS) INSTALLATIONS

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4.0	SUBMITTALS	SHEET S01
5.0	CONDUITS	SHEET S02
6.0	PULL BOXES, SPLICE VAULTS, AND JUNCTION BOXES	SHEET S03
7.0	WIRING	SHEET S03
8.0	GROUNDING, POWER SUPPLY ASSEMBLY, AND POWER	SHEET S04
9.0	CONCRETE FOUNDATIONS	SHEET S04
10.0	ITS FIELD ELEMENTS	SHEET S05
11.0	DYNAMIC MESSAGE SIGN SYSTEM	SHEET S06
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13.0	VEHICLE DETECTION SYSTEM	SHEET S08
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16.0	CELLULAR MODEMS	SHEET S11
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18.0	POINT-TO-MULTIPOINT (P2M) ETHERNET RADIO	SHEET S12
19.0	ITS COMMUNICATIONS INTEGRATION	SHEET S12
20.0	ITS COMPONENT TESTING	SHEET S13
21.0	TRAINING	SHEET S14
22.0	BASIS OF ACCEPTANCE FOR ITS SYSTEM	SHEET S14
23.0	MAINTENANCE AND WARRANTY	SHEET S14

1.0 DESCRIPTION

These specifications describe the equipment, material, and construction requirements to complete the lump sum Intelligent Transportation System (ITS) bid item. Compliance by the Contractor with the Specifications, ITS special provision 07-08041, latest revision, and Plans does not relieve the Contractor of the responsibilities of furnishing equipment and materials of proper design and installation to meet operating warranties for all ITS related components.

2.0 BID PREPARATION

Confirm the existing conditions before preparing the bid. Topography as shown on the plans is derived from existing roadway plans. Visit the site of the work and make a determination of the amount of rock, unclassified, or other materials that might be encountered. No additional pay will be made for differences in material encountered. Review the locations of devices and conduits throughout the project area prior to submittal of bid to determine the types and extent of incidental installation, removal, relocation, and replacement items to include in the price.

3.0 MATERIALS

All materials shall conform to the requirements for individual components of the ITS identified in these Specifications and the ITS Special Provision 07-08041, latest revision. All materials shall be as specified in the Summary of Quantities on the Plans.

3.1 BASIS OF ACCPTANCE

Acceptance of material furnished under these specifications will be based on satisfactory submittals that meet the requirements of section 4.0 and on the Engineer's approval of submittals where "no exceptions taken" or "exceptions as noted" is indicated.

3.2 KDOT SUPPLIED MATERIALS

KDOT may provide equipment such as Cisco equipment, VDS, DMS, DMS cabinet, and analog CCTV cameras for installation by the Contractor, as noted in the plans. Refer to the Summary of Quantities in the plans for specific KDOT supplied items. When using KDOT furnished equipment, the KDOT furnished equipment shall become the Contractor's responsibility upon delivery of this equipment to the Contractor.

4.0 SUBMITTALS

Submit one electronic copy of each submittal group to the Engineer for review and approval. At the same time, submit an electronic version to the KDOT ITS unit and others as directed by the KDOT ITS unit. Include in each submittal sufficient information and details to permit full evaluation of each item. Submittals, which in the judgment of the Engineer are insufficient to permit proper evaluation, will not be reviewed. Take care to address all the requirements of the Contract Documents in the submittal data. Leave nothing to assumption. Address the functional and technical interrelationships among the various items in detail.

In each submittal group, state all relevant information regarding materials and equipment in order to procure exact replacements of any or all items on the project. To be acceptable, provide a material list for each submittal group containing all items supplied by the Contractor for the group. The Engineer reserves the right to reject an incomplete or unclear submittal. Identify the materials on the list by the contract project number, item description, catalog part numbers, catalog cuts, shop drawings, trade names, and schedules or other pertinent information. Clearly indicate the materials from any catalog cuts. Note any material designation used in the Contract Documents on the materials list. Submit all manufacturer product sheets for review and approval.

For each item, include in the documents all information necessary to determine product specification compliance. Clearly indicate, on the documentation, the exact model number, accessories, and options that are being proposed for use. If standard manufacturer documentation does not specifically address all the product requirements, then obtain a letter from the manufacturer certifying compliance with each referenced requirement that is not indicated on the standard documentation. If reprinted literature, such as catalog cut sheets, is used to satisfy some or all of the submittal data requirements, do not include any statements on the literature which conflict with the requirements of the Contract Documents. Cross off and initial any such statements. Give an explanation of how specifications shall be met pertaining to items changed from the literature.

4.1 SUBMITTAL SCHEDULE AND REVIEW PERIODS

Submit product data submittals and shop drawings in a timely manner to allow for job completion within the contract working days. Submit testing and training procedures a minimum of thirty (30) calendar days prior to performing the test and training. Submit all owner's manuals, installation guides, parts list and other informational literature available from the manufacturer for the provided equipment a minimum of thirty (30) calendar days prior to system acceptance.

For each submittal, plan for any given package of submittal information to be in the hands of the Engineer for up to 15 business days. Obtain final approval, in writing from the Engineer, on all items within the submitted documentation. No time extensions will be granted as a result of having to resubmit items for review or having to make any modifications necessary to any submitted documentation. Review of the submittal data by the Engineer will not relieve the Contractor from obligation to furnish and install the work in accordance with Contract Documents.

4.2 SUBMITTAL REQUIREMENTS

Certify, by stamp or letter, that the material has been reviewed and approved and that it conforms to the requirements of the Contract Documents. If this certification is not included, the submittal will be returned without action.

Submit shop drawing submittals for structural items in Group 6 such as CCTV poles and DMS structures as 11" x 17" created documents or larger. The intent of this requirement is to provide a legible set of shop drawing submittals to allow for a thorough shop drawing review.

At the time of each submittal, define and delineate in writing, separate from the certification, any deviations from the Contract Documents. If the Engineer accepts this deviation, the deviation will be authorized by issuing a change order or if the deviation is minor, by endorsement to the letter.

The Engineer review will be only for conformance with the design concept of the work and for compliance with the information contained in the Contract Documents. The review of a specified item, as such, will not indicate review of the assembly in which the item functions. Review by the Engineer will not relieve the Contractor from responsibility for any errors or omissions in the submittals nor from his responsibility for complying with the Contract Documents.

4.3 SUBMITTAL GROUPS

Submit the data for the items in each group together. In general, no items in any group will be accepted until all items in the group are accepted; however, the Engineer may accept some items in a group, at his discretion, prior to all items being approved. Submit all additional devices that are not specifically listed below with the appropriate group. For submittal purposes, submit the data for the following items in groups defined as follows:

Group 1 - Conduit, Pull Boxes, Wiring, and Electrical
HDPE conduit
Rigid metallic conduit
Conduit couplings and/or reducers
Pull boxes
Splice vaults
Electrical conductors
Power service equipment
Fittings
Surge Protection Device
Grounding equipment
Air terminal equipment
Warning tape
Tracer wire
Pull rope
Duct plugs

Group 2 - Cabinet Assembly
Cabinet
Field traffic controller
Cabinet heater strip
Fluorescent cabinet lights and fixture
Fan and thermostat assembly
Power supply
Power strip
Detector card
Surge Protection Device
All other cabinet equipment except CCTV and communications equipment
Load center
Locking system
Filter
Door plate label
Alarm

Group 3 - Communications Equipment
Encoder
Cat 5E cable
Communication Switch
Co-Ax cable
Cellular equipment
Communication Surge Protection Device
Ethernet transceiver
Data transceiver
Media converter
PoE Injector
Wireless point to multi-point IDU radio, ODU antenna, power supply, mounting equipment, and radio cabling
Wireless point to point IDU radio, ODU antenna, power supply, mounting equipment, and radio cabling
Other communications equipment or accessories

Group 4 - Fiber Optics
Fiber optic cable
Fiber optic patch cable
Fiber optic splice enclosure and trays
Fiber distribution assembly
Fiber optic patch panels
Fiber connectors
Cable labels
Closet connector housing assembly

Group 5 - ITS Device Equipment
Pavement sensor
Vehicle detector
Sensor mount
Detector cable
Bluetooth detection system
CCTV camera and power supply
CCTV cable
CCTV mounting equipment

Group 6 - CCTV, Detector, and DMS Support Structures (Send electronic submittal).
Structural shop drawings to be reviewed by design Engineer (or consultant of record) with final approval by KDOT.
Shop drawings for DMS structures, foundations, and DMS mounting details
Shop drawings for CCTV pole and foundation
Shop drawings for Detector pole and foundation
Shop drawings for CCTV camera lowering device, including composite cable for CCTV
Shop drawings and specification for IP CCTV cameras including EPA and weight
Orientation drawing for CCTV pole to include camera, handhole and antenna placement

Group 7 - Testing
Test equipment
Test procedures

Group 8 - Other
Cisco certifications
Fiber optic cable installation and splicing resume
Cabinet wiring diagram
Cabinet rack elevation drawings
Miscellaneous items that did not fall in any of the previous groups

To aid in control of the submittal data process, transmit each group of submittal data to the Engineer using a transmittal sheet. The Engineer will date-stamp these transmittal sheets with the date received and will return a copy of the stamped transmittal sheet when returning the submittal data. List on the transmittal sheet specifically each item or element included in the transmittal. An element is one part of several parts of information related to the same item. Each drawing shall be listed separately. Furthermore, each drawing shall have a unique drawing number that can be referenced. The same drawing number shall not be used on more than one sheet.

4.4 STRUCTURAL AND FOUNDATION SHOP DRAWINGS

For all non-catalog or custom made items including the support structures and foundations for VDS, CCTV and DMS, submit shop drawings for approval along with other data necessary to permit full evaluation of the proposed product and/or material. Obtain approved submittals prior to purchase or fabrication of any support structures for use on this project.

Structural and foundation shop drawings and calculations shall be sealed and signed by a Professional Engineer licensed in the State of Kansas.

No additional payment will be made for Contractor geotechnical work. Historical boring log data may be provided by the Engineer.

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ITS EQUIPMENT SPECIFICATIONS
ITS-S01 VERSION DATE: 10-29-14

Submit one (1) set of submittal documentation electronically (PDF) to the Engineer for review. If the Engineer requires modifications to the submitted documentation make the necessary modifications and resubmit the revised submittal sets. Structural shop drawings will be reviewed and approved by the Engineer.

4.5 APPROVALS
Any work done prior to the Engineer's review and approval will be at the Contractor's risk and expense. Following review of the submittal data, the Engineer will mark the items in one of five ways:
1. "No Exceptions Taken";
2. "Exceptions As Noted";
3. "No Exceptions Taken, Resubmit With Complete Group Submittal";
4. "Corrections Required - Resubmit"; Or
5. "Rejected - Resubmit".

Proceed with any items marked "no exceptions taken" since the Engineer has taken no exception to the submittal. Proceed with any items marked "exceptions as noted", provided that the Contractor concurs with the notations. Items that are marked "corrections required - resubmit" are judged to be basically acceptable, they will have notations made on them about additional information required or corrections which are necessary before the items are acceptable. In such case, proceed immediately to correct said items and resubmit them for review. Items that are marked "rejected - resubmit" are judged to be unacceptable. Proceed immediately to identify new items or redesign said items and resubmit them for review.

Substitutions for any of the materials on the list are not acceptable without prior written approval by the Engineer. Submit in writing to the Engineer any changes to the approved materials list.

4.6 ORDER OF WORK
Provide a construction schedule (in MS Project or similar format) outlining the proposed order of work that shows a timely progression of ITS related construction. The Contractor will be allowed to construct footings and place concrete, install conduit and cables, and return at a later date to install the poles, controller assembly, or closed circuit television systems. The construction schedule shall provide a detailed plan for connection to the existing KDOT traffic management system.

5.0 CONDUITS

5.1 DESCRIPTION
Construct and install conduits as per the KDOT Utility Accommodation Policy, ITS Special Provision 07-08041, latest revision, as detailed on the Plans, as noted below, or as directed by the Engineer. Provide conduits of the type and size as shown on the Plans. Provide all incidental items necessary to provide a complete and fully functional conduit system. If approved by Engineer, conduit may be installed by trenching, plowing, or directional bore; however, payment will be made by the method specified in the Plans for that conduit.

5.2 MATERIALS

5.2.1 RIGID METALLIC CONDUIT
Rigid metallic conduit (RMC) is a threaded metal raceway of circular cross section with a coupling, which can be either a standard straight tapped conduit coupling or the integral type. Cover threads on the uncoupled end by thread protectors prior to installation. Adhere to UL 6 standards and outdoor ratings for all RMC and fittings. Provide a primary coating of zinc, a combination of zinc and organic coatings, or a nonmetallic coating, such as PVC. You may apply supplementary coatings where additional corrosion protection is needed. Where RMC is installed underground, wrap with an approved PVC tape. For RMC conduits that transition from above ground to underground, the PVC tape shall be extended 6-inches above ground level. Provide a bushing to all metallic conduit ends to protect the electrical conductors or fiber optic cable from abrasion.

5.2.2 NON METALLIC CONDUIT/HDPE CONDUIT
Provide HDPE conduit that is Schedule 80 and UL listed. Provide color-coded conduit as required for installation location. KDOT installation area: Provide red conduit for electrical cables, green conduit for communication and fiber optic cables, and black conduit for spare. KC Scout installation area: Provide yellow conduit for electrical cables, blue conduit for communication and fiber optic cables, and black conduit for spare. Install HDPE conduit according to manufacturer's instruction.

5.2.3 CONDUIT REPAIR SPLICES
When conduit is used to repair a section of existing conduit to provide the required conduit pathway, provide the same grade and size HDPE conduit as the existing conduit. Approval by the Engineer is required for mechanical conduit splices.

5.2.4 TRACER WIRE
Provide orange No. 12 AWG THHN stranded copper wire.

5.2.5 WARNING TAPE
Provide color durable and chemically resistant red reinforced 3 inch minimum wide, 4 mil thickness warning tape imprinted with "CAUTION BURIED CONDUIT BELOW" for conduits. Provide color durable and chemically resistant orange reinforced 3 inch wide warning tape imprinted with "CAUTION - FIBER OPTIC CABLE BURIED BELOW" for fiber optics.

5.2.6 PULL ROPES
Provide polypropylene pull ropes with a minimum tensile strength of 1,125 lbs.

5.2.7 CONCRETE ANCHORS
The following requirements apply: federal specification FF-S-325, Group II, Type 4, Class I and galvanized in accordance with ASTM A 153, B 695-91 Class 50 or constructed of stainless steel. Furnish a manufacturer's certification that the concrete anchors meet the required material and galvanizing specifications.

5.3 PROOF AND REPAIR OF EXISTING CONDUIT
Proof and repair as needed existing conduits to allow fiber optic backbone cable to be pulled or blown through existing conduit as shown on the Plans. In some instances the existing conduits are collocated with CenturyLink conduits. When accessing the KDOT conduits to repair or install a splice vault, care must be taken not to impact the CenturyLink conduits.

5.3.1 CONDUIT PROOFING
Provide a continuous conduit path for pulling or blowing of fiber backbone and fiber branch cables as shown in the Plans. The continuous path must be demonstrated through the conduit between existing pullboxes or newly installed splice vaults by passing a mandrel through the conduit.

5.3.2 CONDUIT REPAIR
Repair conduit where needed and as approved by the Engineer by installing a new conduit section connected to the existing conduits using a mechanical conduit splice. Request and receive approval from Engineer prior to any repair work. Conduit repair is defined based on a section. A section is considered a continuous length of conduit that is removed and replaced in order to provide a continuous conduit path. For purposes of bidding, each section shall be a maximum length of 50 feet. If a section is greater than 50 feet but less than 100 feet it shall be considered as two (2) sections.

The Contractor shall include five (5) sections of conduit repair in their ITS lump sum bid and shall provide a unit price per section in the Unit Cost List shown in the Required Contract Provision Furnishing Individual Components Necessary for the ITS System. KDOT makes no guarantee that this quantity will be utilized in the contract. The unit price quoted in this contract provision will be used to decrease the ITS lump sum bid through a change order for any sections of conduit repair that are not needed or to increase it if more than five sections are needed.

Seek approval from Engineer prior to use of discretionary splice vaults or pullboxes for conduit repair. Maintain detailed conduit repair records (including, but not limited to the date, time, exact location, quantity in feet, approval/authorization), then submit these records to the Engineer on a weekly basis. Conduit damaged by the Contractor during work performed by the Contractor under this contract shall be repaired at the Contractor's expense. The Engineer shall determine if the damaged conduit is a result of the Contractor's negligence.

5.4 CONSTRUCTION REQUIREMENTS

5.4.1 LOCATION OF CONDUIT
Prior to construction, field check the existing conditions at each site, including utility locator service markings, to assure no conflicts with existing utilities, including state-owned underground lighting, traffic signals, cathodic protection facilities, and drainage features. Upon written approval by the Engineer, you may alter the route of the conduit to avoid conflicts. Where possible, install trunk line conduit adjacent to the edge of the ROW or in the backslope of the ditch. Install conduit branch lines perpendicular to trunk line conduits. Slope conduit to a pull box at a minimum rate of 0.5 percent.

Unless otherwise shown on the Plans, accomplish a change in direction of conduit by bending the conduit uniformly to a radius that will fit the location or by the use of standard bends. The minimum bending radius of all conduits is the greater of the following: twenty (20) times the diameter of the fiber optic cable; six (6) times the internal diameter of a 2-inch conduit or smaller; ten (10) times the internal diameter of a 3-inch conduit or larger.

5.4.2 NOTIFICATION
Notify CenturyLink and/or KTA when applicable a minimum of two weeks in advance and again at 72 hours in advance to have an inspector on site prior to any planned work adjacent to their conduits. A CenturyLink and/or KTA inspector along with a KDOT representative must be present for work that is within five feet of CenturyLink conduit. Any adjacent work located within ten feet of any CenturyLink and/or KTA conduit, fiber optic pullbox or vault will all be done by hand trenching and digging. No mechanical equipment will be allowed.

5.4.3 THREADING
Use nipples to eliminate cutting and threading where short lengths of conduit are required. If it is necessary to cut and thread steel conduit, no exposed threads will be permitted.

5.4.4 CLEANING
Blow air through each conduit to remove debris and water. Clean and swab all conduits before cables are installed. Install expandable type dust plugs after cleaning on each end of individual conduits.

5.4.5 MANDREL TEST
Test conduit path by pulling a mandrel through the conduit. The mandrel shall have a diameter no less than 70% of the inside diameter of the conduit and a length of 2 inches. If the conduit does not allow the mandrel to be pulled through, clean and/or repair conduit to permit passage of the mandrel. When conduit run is an extended distance the Contractor may seek alternative methods as approved by the Engineer for this test.

5.4.6 END TREATMENT
Cut HDPE conduit inside pull boxes and splice vaults at a 90 degree angle with 8 inches to 12 inches exposed inside of the box. Be aware that long conduit pulls (installation) may stretch the HDPE conduit a given amount. If the conduit is slightly stretched during installation and placed among several adjacent boxes during the same conduit pull, then the conduit is cut to place the 10 to 12 inches of exposed conduit inside the box, the conduit may pull back into the soil and not leave any conduit exposed in the box. This problem can be avoided by pulling from one box to the adjacent box (minimize stretching), not pulling through several boxes at the same time (minimize stretching), and anticipating some conduit pullback therefore compensating for it by installing a small amount of extra conduit. Conduit installation may be rejected if conduit pullback occurs resulting in less than 10 to 12 inches of exposed conduit.

Sand all conduit ends smooth in order to eliminate any burrs on the inside or outside diameter of the HDPE conduit.

5.4.7 SPLICING
Use mechanical splices made in accordance with conduit and splice manufacturer's recommendations. Fusion conduit splices are not allowed. Submit materials to be used for conduit splices to the Engineer for review and approval along with the manufacturer's recommendations and installation procedures.

5.4.8 EMPTY CONDUITS
Cap or plug open ends of conduits placed for future use with water tight mechanical plugs. Do not cap or plug with tape. After cleaning and testing have been completed, place a pull rope in all empty conduits. KC Scout installations: Water tight duct seal may be used with approval by the Engineer.

5.4.9 DEPTH
The following requirements apply: a minimum of 42 inches of cover for all underground conduit containing communication service; a minimum of 48 inches of cover for all underground conduit containing electrical service; a minimum of 5 feet of cover below crown grade or 3 feet below ditch grade for all utilities crossing under roadways. Encase conduit in concrete or other appropriate means as approved by the Engineer if this minimum conduit depth cannot be achieved at site-specific locations. The Engineer will determine if exceptions to meeting the depth requirements are necessary.

5.4.10 TRACER WIRE
Install tracer wire for locating purposes in all KDOT conduit containing fiber optic cable and spare conduits intended for future fiber optic cables installed as part of this project. When multiple conduits share the same trench or bore, only one conduit will be required to contain a tracer wire. Pull tracer wire into all cabinets and device bases. Terminate tracer wire inside cabinets or device bases. Terminate tracer wire on a protected terminal that is isolated from the cabinet or base ground and labeled "TRACER". Continuously connect tracer wire along the fiber backbone. Do not continuously connect the tracer wire in conduit containing fiber spurs that branch out to the individual controller cabinets. For all conduit carrying fiber spurs, the central point in which all tracer wires are electrically bonded to each other at an isolated terminal is the controller cabinet. Do not electrically bond tracer wires to any ground wire. Use connectors approved by the Engineer in a splice vault to electrically bond the tracer wires when continuous runs of tracer wire cannot be installed.
Insulate these connectors. Label all tracer wires ending in a splice vault "TRACER".

5.4.11 WARNING TAPE
Install warning tape at approximately 1/3 to 1/2 of the depth of cover over electrical conduits, fiber optic conduits and communications conduit.

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5.4.12 CONDUIT IN TRENCH
Excavate trenches to the width and depth necessary for conduit installation as shown in the Plans. Do not use material which might cause mechanical damage to the conduit for backfilling below an elevation 6 inches above the conduit. Clean the bottom of the trench of such material before the conduit is placed. Obtain approval by the Engineer of the trench prior to conduit placement. Backfill all trenches according to the ITS Special Provision 07-08041, latest revision.

5.4.13 BORED CONDUIT
Install bored conduit without disturbing the existing surface. Place bored conduit by boring or other approved means. Locate all bore pits and spoil piles a minimum of 4 feet from the edge of the paved roadway or shoulder surface and barricade, fence, or protect the pits by some other acceptable method from errant vehicles or pedestrians.

5.4.14 PLOWED CONDUIT
Conduits may be installed by plowing upon approval of the Engineer. Use a vibratory type plow which will place conduits at the minimum depths indicated above when installation is accomplished by plowing. Compact the soil over the installation to the original in-place density. Do not plow conduits in rocky areas.

5.4.15 EXTERNAL CONDUIT ON STRUCTURE
Obtain all permits and approval of all external conduits on structure according to the KDOT Utility Accommodation Policy. All permitting for attachments will go through the KDOT Bridge section for review.

Use RMC for all above ground external conduit. When HDPE conduit is installed inside a RMC raceway, install the HPDE conduit such that there are no splices. Use an approved expansion/contraction joint if a splice is necessary.

Use external conduit on structure for existing structures, or if provisions are not made in the Plans for providing a conduit raceway in new structures. Conduit on structure includes conduit on bridges, retaining walls or other structures. Adhere to the requirements in the KDOT Utility Accommodation Policy (latest edition) for all bridge/structure attachments, except as noted herein. Install conduit based on the bridge type. Do not attach conduit to prestressed concrete girders or prestressed-precast concrete deck panels.

Securely fasten conduit within 3 feet of each transition box or other conduit termination. You may increase fastening to a distance of 5 feet where secured to the concrete with clamps or supported by openings through framing members at intervals no greater than 10 feet.

Install concrete anchors in concrete to a minimum embedment of 1.8 inches.

Do not use drilling, grinding or welding if it is necessary to anchor the conduit to steel bridge members. The Engineer shall approve attachment method to steel members. Install junction boxes as shown on the Plans or as directed by the Engineer. Surface mount junction boxes and install such that covers are easily accessible.

Use a conduit expansion fitting when the conduit crosses a bridge expansion joint. Ensure that minimum movement in either direction is provided in the expansion fitting as shown on the Plans or as specified by the Engineer.

Following installation of the cable in conduit, seal all conduit entrances in controller assemblies, pull boxes, and splice vaults with a duct seal putty or a mechanical duct plug to prevent the ingress of moisture, foreign materials, and rodents.

5.4.16 GROUNDING AND BONDING
In all conduits for electrical cables, except spare conduit, install a bare, solid copper wire of a gauge equal to the largest current carrying conductor in the conduit. Use a No. 6 AWG ground wire when the largest current carrying conductor is smaller than a No. 6 AWG. Bond the wire to the ground lugs in poles and cabinets and bond the wires to each other to form electrically continuous conductors over the full length of the conduit system.

6.0 PULL BOXES, SPLICE VAULTS, AND JUNCTION BOXES

6.1 DESCRIPTION
Construct and install all pull boxes and fiber optic splice vaults provided for in this contract according to the ITS Special Provision 07-08041, latest revision, as noted below and as detailed in the plans, or as directed by the Engineer.

Install pull boxes and splice vaults according to the locations, lines, grades, and details shown on the Plans. Locations may be adjusted during installation to clear obstructions and to facilitate wiring as approved by the Engineer. The quantity of pull boxes, and splice vaults as shown in the Plans may not be reduced without the Engineer's approval. Install additional pull boxes and splice vaults at Contractor's expense and with Engineer's approval to facilitate the ease of construction and pulling of electrical conductors and fiber optic cables.

6.2 MATERIALS

6.2.1 PREFORMED PULL BOX AND SPLICE VAULT
Pull box and splice vault dimensions are shown on the Plans. Preformed pull boxes and splice vaults are composed of mortar consisting of sand, gravel and polyester resin reinforced by a woven glass fiber mat or of resin mortar and fiberglass. The pull box, or splice vault lid shall be rated for a minimum loading of 20,000 pounds. Equip each pull box and splice vault with a bolt down cover of the same material unless a locking lid is specified. Electrically bond metal conduits to one another when used in preformed pull boxes.

Rectangular fiber optic splice vault with split lid is for KDOT installations. Round fiber optic splice vault is for KC Scout installations.

6.2.2 PREFORMED PULL BOX AND SPLICE VAULT COVER
Covers on pull boxes shown on the Plans that contain 480 volt or greater circuits shall be embossed with "KDOT CAUTION-HIGH VOLTAGE". Covers on pull boxes that contain electric cable (120V/240V) shall be embossed with "KDOT ELECTRIC". Covers on pull boxes that contain communication cable shall be embossed with "KDOT ITS". Covers on all other pull boxes or splice vaults shall be embossed with "KDOT ITS" unless otherwise directed by the Engineer. Substitute "KC SCOUT" for "KDOT" for installations in the KC Scout area.

Each pull box and splice vault shall be equipped with a bolt down cover. The threaded hole which receives the cover hold-down bolt shall be open at the bottom to allow cleanout of sand, dirt and other debris. Lock down bolts shall be stainless steel or brass with a penta-head.

6.2.3 STONE DRAIN
Comply with Section 1107.2 (e), use crushed stone.

6.3 CONSTRUCTION REQUIREMENTS

6.3.1 PREFORMED PULL BOXES AND SPLICE VAULTS
Install conduit to enter the pull box or splice vault in the side or from the bottom of the box and to extend a minimum of 8 inches and a maximum of 12 inches into the box as shown on the Plans. If it is necessary to increase the excavation depth and extend the pull box, no direct payment will be made. Excavate the opening outside the pull box wide enough to allow compaction of the backfill material. Do not use cinders, broken concrete, broken rock or other hard or undesirable material for backfilling. Backfill ITS pull boxes and splice vaults according to the ITS special provision 07-08041, latest revision.

Drill the holes for the conduit as recommended by the manufacturer. Drill round holes that are no more than 1/2 inch larger than the conduit. Seal all conduit entrances into pull boxes or splice vaults with an expandable foam sealer around the conduits to prevent the entering of foreign material into the pull boxes. Seal all conduits entering pull boxes or splice vaults with an approved mechanical duct plug. KC Scout installations: Water tight duct seal may be used with approval by the Engineer. Clean all pull boxes and splice vaults so they are free of trash, conduit and wire scraps, etc.

Do not construct pull boxes and splice vaults in or near sidewalk handicap ramps or approaches.

When installing ITS communication pull boxes, construct a concrete pad around the perimeter of the pull box placed in a sod area or shoulder as shown on the Plans. Use Grade 4.0 concrete for the pad, or a commercial mixture approved by KDOT and in accordance with Section 401 of the KDOT Standard Specifications. Construct ITS communication pull boxes so the top surface is flush with surfaced areas and approximately 1 inch above earth or sod areas.

Install ITS electrical pull boxes 6 inches below existing grade and cover with backfill material. Receive approval from the Engineer for backfill type and compaction. Obtain GPS coordinates and 3 tie-point measurements for each buried electrical pull box prior to placing backfill material. Engineer may request top of surface of ITS electrical pull box to be flush with surface areas and approximately 1 inch above earth or sod areas with a concrete pad.

Construct all pull boxes and splice vaults with a stone drain that is 2 feet deeper than the bottom of the pull box. Pull boxes or splice vaults located in rock will require a 6 inch concrete floor with a 2 inch rigid conduit drain.

Install separate pull boxes for all power service cables and communications cables. No sharing of the pull boxes will be allowed.

6.3.2 JUNCTION BOXES
Mount junction boxes to bridges with wedge anchor bolts of sufficient size and strength to safely secure the box to the structure. Cover the surface of the junction box which comes in contact with concrete with aluminum colored butyl rubber sealant (caulking compound).

6.3.3 SPLICE VAULT
Install discretionary splice vaults, at Contractor's expense, with approval by the Engineer, along the existing conduit to provide a conduit pathway along the existing conduit or to facilitate pulling or blowing of fiber optic cable. When installing a splice vault, both as shown on the Plans and discretionary, to intercept the KDOT conduits, offset the splice vault from the CenturyLink conduit by at least 36 inches. Excavate a new trench adjacent to the CenturyLink conduits to allow the KDOT conduits to be re-aligned to intercept the new splice vault offset from the CenturyLink conduits. Maintain minimum bending radius for the conduit. Contact CenturyLink two weeks in advance of excavation adjacent to CenturyLink conduits. Do not enter (open, cut into) CenturyLink's conduit at any time. Only a designated CenturyLink representative has access to a CenturyLink vault.

When rerouting an existing empty KDOT conduit into a new splice vault, propose a method to positively identify the empty KDOT and seek approved by the Engineer. Demonstrate this method of positively identifying the empty KDOT conduit demonstrated in the field while witnessed by the Engineer. Perform this demonstration prior to the Contractor performing field work on the existing conduit.

7.0 WIRING

7.1 DESCRIPTION
Comply with the requirements of ITS special provision 07-08041, latest revision, as detailed in the Plans and as described below. Provide wiring of the type and size as shown on the Plans. This section specifically does not include fiber optic cable.

7.2 MATERIALS

7.2.1 ELECTRICAL CONDUCTORS
Use electrical conductors and associated equipment that meet the requirements of ICEA, IMSA, NEMA, RETMA, NEC and the regulations of the national board of fire underwriters, as applicable, and meet the approval of the Engineer. Use soft drawn copper for all conductors except as noted. Solid conductors may be used only for grounding where connected to a ground rod.

Use copper cablings that conform to ASTM B 3 and B 8 with flame-retardant, moisture, and heat resistant cross-linked polyethylene or thermoplastic insulation rated 90ºC in wet locations and listed by UL as Type XHHW-2 or USE-2. Use solid wire for No. 10 AWG and smaller and stranded wire for sizes No. 8 AWG and larger.

For all current carrying electrical conductor runs, use ground wire in run that matches AWG size of the largest conductor in a specified run.

Furnish all low voltage, control, and communications cables on reels. Use reels with continuous cable of sufficient length to permit the associated cable runs to be made without splices in between specified locations shown on the Plans. Utilize the appropriate sheath for the particular application. Comply with the requirements of ANSI/EIA/TIA-568 B or latest approved version of that standard.

7.2.2 CAT 5E CABLE
Use outdoor rated Cat 5E cable with UV resistant outer jacket.
Furnish plenum rated cable for installations inside of buildings or shelters including POP buildings.

7.2.3 COMMUNICATION (CCTV) CABLE
Comply with manufacturers requirements for Communication CCTV cable. Use communication (CCTV) cable for analog cameras that are 75 ohm co-axial construction with copper center conductors and polyethylene dielectric material. Use co-axial shields that are braided with a 95% minimum coverage. Use outer jackets for cables that are UV resistant and flame retardant. Install CCTV cable connectors that are of the type appropriate for devices specified in the Plans (BNC, F, etc.). For IP based cameras, use communications CCTV cable that is a 10/100 Base-T Ethernet cable with RJ-45 connectors, gold plated and allow for power over Ethernet.

7.2.4 COMMUNICATION (RF) CABLE
Use communication (RF) cables that are 75 ohm co-axial construction with polyethylene dielectric material. Use co-axial shields that have 100% coverage. Use outer jackets for RF cables that are UV resistant and flame retardant. Use RF cables (excluding jumpers with lengths less than three feet) that have an attenuation of less than 6 dB per 100 feet at 1800 MHz. When using RF cables for jumpers of less than three feet, an attenuation of less than 18 dB per 100 feet is required. Install RF cable connectors or provide manufacture pre-installed RF cable connectors that are appropriate for the type of device as specified in the Plans.

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7.3 CONSTRUCTION REQUIREMENTS
Install all wiring as described in the ITS special provision 07-08041, latest revision and as noted below.

7.3.1 PULLING
Use insulating types of pulling compounds containing no mineral oil. Follow the pulling tension limits recommended by the wire and cable manufacturer. Use a dynamometer where mechanical means are used. Cut off section subject to mechanical means.

7.3.2 BENDING RADIUS
Use a minimum bending radius for all cable, except fiber optic cable, that is greater than the manufacturer's minimum bending radius and greater than six times the overall cable diameter.

7.3.3 SPLICES
Use continuous low voltage power conductors from the power supply to the control cabinet and not spliced in pull boxes or junction boxes unless indicted on plan. Install all other cables continuous, without splices, from termination to termination. Where required, splice where shown on the Plans or as approved by the Engineer where required for cable installation. Receive pre-approved by the Engineer for all splices and locations.

If splicing in power supply circuits where the voltage does not exceed 600 Volts AC, utilize splices made with approved spring-type wire connectors. Soldered connections will not be permitted. The insulation for the splice shall consist of two layers of electrical rubber tape, four layers of plastic electrical tape, and two layers of friction tape. Securely apply the tapes over the bare wire splice area and back onto the original insulation a minimum of one inch. Apply a minimum of three coats of approved liquid waterproof compound to the splice. The finished splices electrical and mechanical characteristics and insulation quality are required to be equal to those of the original cable.

Splice conductors only in pull boxes, terminal compartments, pedestals, or cabinets. Splices are not allowed in conduits. Where possible, install cable continuous, without splices, from termination to termination.

7.3.4 INSTALLATION
Install low voltage control and communications cables in conduit separate from power cables, unless otherwise noted on the Plans. Ground the shield of shielded cables at one end only and as recommended by equipment manufacturer. Install and terminate vendor furnished cable in accordance with vendor equipment requirements.

Seal all conduit at cabinet entrances with a duct seal putty or a mechanical duct plug as approved by the Engineer to prevent ingress of water, dust or other foreign materials.

8.0 GROUNDING, POWER SUPPLY ASSEMBLY, AND POWER

8.1 GROUNDING
Ensure that all equipment, devices, wiring, power supplies and service, antennas are protected from external and internal sources, including power surges, lightning, induced voltages, and static discharge. Ensure that ground rods are listed according to UL requirements as detailed in the standard UL 467, Grounding and Bonding Equipment, and meet the requirements of NEC 250. Use electrodes that are copper clad or solid copper. Use grounding rod attachments that are minimum #4 tin-plated bare copper wires. All components of the lightning protection system shall conform to the current edition requirements of UL 96A and NFPA 780.

Exothermically weld all grounding rod attachments at all connection points. Bond all metal components of the ITS device subsystem, such as the cabinets and steel poles, to the grounding system with a grounding cable that uses a mechanical connection on the equipment side and an exothermically welded connection at the down cable.

8.2 GROUND RESISTANCE TESTING AND CERTIFICATION
Achieve a resistance to ground measurement of 5 ohms or less in dry conditions between the grounding electrode and the soil (using multiple electrodes, if necessary). Make all connections to the grounding electrode using exothermic welds.

Connect all grounding electrodes related to the ITS device and its subsystems, and any grounded electrical system within a 100 foot radius (but not beyond the right of way) of the ITS cabinet base, to a single point main grounding electrode, sometimes referred to as the ground window, which shall be driven a maximum of 3 feet from the base of the ITS cabinet. Provide for each grounding electrode an interfacing hemisphere, which is an imaginary cylinder with a radius and depth equal to the length of the electrode, so each additional electrode must be spaced two times the electrode length away from other electrodes. Bury the bonding wires a minimum of 2 feet below the grade.

Measure the ground resistance with an instrument designed specifically to measure and document earth/ground resistance, soil resistance, and current flow. Conduct the test by using the fall-of-potential method as described in the IEEE Standard 142-2007. Provide the Engineer with written test results for each testing location prior to backfilling the grounding electrode. Include in the test results the instrument model and date of calibration for the device used in the testing, the local environmental conditions at the time of testing, and a full fall-of-potential graph. Certify and sign the test results.

8.3 DESCRIPTION
Provide a complete interface between the project electrical distribution system and the utility company providing power service. New service points will be established as indicated on the Plans. As necessary, provide a service pole or pedestal, meter socket, circuit breakers, weatherproof enclosure for the breakers, risers, grounding materials, fittings, and adapters. Circuit breakers and disconnect switches required as indicated on the Plans. Any work to bring the power from outside of the right-of-way to the right-of-way will be completed by utility company providing power service. Comply with the National Electrical Code (NEC) for all work.

Perform the following: Process an application for electrical service for each location, coordinate with the Utility to ensure the proper location of electrical services provided by the utility, provide the Utility with the construction schedule so that power is available when needed. Coordinate with the Utility for installation of the power meter. Assume all fees until KDOT or KC Scout assumes ownership. Notify and coordinate with the Engineer when KDOT or KC Scout is to assume ownership of the proposed sources of power.

Utility companies, contact name and phone number for each site is listed on the Plans. Power coordination will be reviewed at the pre-construction meeting. All utility hookups are subsidiary.

8.4 MATERIALS
Comply with the details shown in the Plans. Consult the utility company providing power service regarding their service installation requirements and furnish the service equipment in compliance with codes and regulations, and their requirements.

8.4.1 POWER SUPPLY ASSEMBLY, TYPE 1.
Supply and install new type 1 power supply assemblies in accordance with the details shown on the Plans. Include meter socket and disconnect on a new Type 1 overhead service pole. Use conductor and disconnect size as indicated on the Plans.

8.4.2 POWER SUPPLY ASSEMBLY, TYPE 2.
Supply and install new Type 2 power supply assemblies in accordance with the details shown on the Plans. Provide power supply assemblies that contain a main circuit breaker frame and trip rating as indicated on the Plans. When breaker lugs are not large enough for the conductor size, provide and install a power distribution block in a NEMA 4 enclosure on the secondary side of the disconnect.

The customer door shall have a latching handle with provision for padlocking in the closed position. Provide a temporary padlock. KDOT will replace the padlock with a KDOT-supplied padlock at final acceptance.

8.4.3 SERVICE POLE
Where service poles are required; either new, modification to existing or replacement of existing, use a service pole that is 35 feet minimum height made of Class 4 or 5 wood. Ground the pole with a ground rod per the utility company's requirements. Where conduit is attached to the pole include a service entrance cap on the top of the conduit run. Design this cap to prevent ingress of water into conduit. Include guy wires where requested by the utility company.

8.4.4 TRANSFORMERS
Provide and install step-down transformers (480 VAC to 120/240 VAC) and step-up transformers (120/240 VAC to 480 VAC) where indicated on the Plans. Use a transformer assembly in all instances where the control cabinet location requires a transformer to ensure that proper voltage is provided to the control cabinet being serviced by the transformer assembly. Use Jefferson Electric phase encapsulated transformers or approved equal that meet these following minimum requirements.

Step-down transformer: The transformer assembly shall consist of a NEMA 3R rated cabinet/enclosure and an appropriate 480 VAC to 120/240 VAC transformer, service disconnect (480 Volt side), and distribution panel (120/240 volt side). The transformer primary voltage shall be 480 VAC and the secondary voltage shall be 120/240 VAC single phase 0.5Hz, grounded neutral. The volt-ampere rating shall be as shown in the Plans.

Step-up transformer: The transformer assembly shall consist of a NEMA 3R rated cabinet/enclosure and an appropriate 120/240 VAC to 480 VAC transformer, service disconnect (120/240 volt side), and secondary over-current protection, via circuit breaker or fuse (480 volt side). The transformer primary voltage shall be 120/240 VAC and the secondary voltage shall be 480 VAC single phase 0.5Hz, grounded neutral. The volt-ampere rating shall be as shown in the Plans.

Construct the cabinet and door from 5052-H32 sheet aluminum alloy with a thickness of 0.125 inches. Form all welds neatly and free of cracks, blow holes, and other irregularities. Ensure that there are no burrs on all inside and outside edges of the cabinets/enclosures. Provide a sloped top on the cabinets/enclosures to prevent the accumulation of water on its top surface. Construct signs that are riveted to the access doors to the transformer and service disconnect stating "DANGER HIGH VOLTAGE". The latching handle is to have a provision for padlocking in the closed position. Provide temporary padlock. KDOT will replace the padlock with a KDOT supplied padlock at final acceptance.

Where required by the plans, mount the step-down transformer to the side of the ITS cabinet facing away from traffic. Ensure all cabling runs from the transformer to the cabinet panel board are tied tightly to the rack to prevent excess slack in the cable.

Provide all transformer assembly equipment and accessories furnished on the project that is new and of prime quality, and has not have been used previously on other projects or in other locations. All items of the same type shall be identical and totally interchangeable.

Use transformers that include a fused service disconnect appropriately sized for the intended load and to safely clear a fault. Submit the size of the service disconnect for approval.

Use transformers that are single phase, dry type units with two 5% augmentation taps.

The mass of the transformer shall not exceed 250 pounds. Label the transformer (i.e. step-down or step-up) and identify on the exterior all incoming and outgoing voltages. Use transformers that are the quiet type. Do not use sound levels in excess of 45dB.

8.4.5 FITTINGS AND ADAPTERS
Where large conductor sizes of 1/0 or greater are shown on the plans, Provide shop drawings that show the type of fitting/adapter being proposed and the locations in which these fittings/adapters are being proposed to accommodate proper termination (lugs/splices) within panels, pull boxes, and cabinets for a complete system assembly that can be installed in a tidy, professional manner. Utilize fitting/adapter with a set screw to secure the conductors. Do not use a crimp style fitting/adapter.

8.4.6 SURGE PROTECTION
Provide each power supply assembly with devices listed to UL 1449, current edition, to protect the load side conductors from power surges and over voltages. Supply all power supply assemblies with 120/240 volt AC heavy-duty parallel surge protector on the AC service input. Provide surge protection for all power supply assemblies that meets the following minimum specifications:

1. Voltage Protection Rating (VPR) of 700V, L-N, L-G, N-G
2. Surge current 100 kA per phase
3. Total peak surge current 80 kA (8x20 US)
4. SCCR of 200k AIC available short circuit current.
5. Failure indicator
6. Operating temperature range from 40ºC to 85ºC

8.5 CONSTRUCTION REQUIREMENTS

8.5.1 POWER SUPPLY
The power service locations, as indicated on the drawings, are initial service points coordinated between KDOT and the utility company providing power service. Coordinate with the utility to verify the final point of service. Consult the utility company providing power service regarding their service installation requirements and furnish the service equipment in compliance with codes and regulations, and their requirements.

Notify the utility company providing power service for the need for service and coordinate the schedule for that service from the utility. Any power supply requiring modifications from what is shown on the Plans will require an additional service request form to be submitted by the Contractor.

Measure the resistance between the ground electrode and earth using the testing procedures as outlined in these Specifications.

Verify the power service voltage at the power service locations prior to installation of circuits at all locations indicated on the drawings. Label all circuits in all pull boxes, junction boxes and ITS cabinets by means of round aluminum identification tags with a minimum thickness of 2.5 micrometers attached to the cables with copper wire. Provide lightning arrestors of the rated voltage as shown on the Plans. Provide each constructed service drop with a phenolic nameplate indicating the following:
Project "KDOT ITS"
Service address: "_____"
Service voltage: "_____"
Coordinate with local City government to determine the appropriate service address for power supply if not otherwise shown on plans.

9.0 CONCRETE FOUNDATIONS

9.1 DESCRIPTION
Construct and install all foundations for ITS Field Equipment provided for in this contract per Division 400 and 700 of the KDOT Standard Specifications, as modified below, and as detailed in the plans.

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9.2 MATERIALS

9.2.1 REINFORCING STEEL
Use reinforcing steel that meets the requirements of the KDOT Standard Specifications. Use reinforcing steel that is free of rust and dirt. Provide reinforcing steel of the size, number, shape and dimensions as shown in the Plans.

9.2.2 ANCHOR BOLTS
Provide anchor bolts of the size, number, and materials as shown in the Plans and meet the requirements of Section 1615 of the KDOT Standard Specifications, as described below, and as detailed in the plans.

9.3 CONSTRUCTION REQUIREMENTS

9.3.1 CONCRETE FOUNDATIONS
Before placement of the concrete for the foundation, ensure that the appropriate anchor bolts are placed in the proper orientation, in both the horizontal and vertical direction. This may be accomplished by using preformed bolt templates, positioning plates, and/or tying the anchor bolt assembly to the reinforcing steel cage. Do not use "Stabbing" of anchor bolts. Protect all anchor bolt threads from concrete fouling when the foundation is poured.

9.3.2 ANCHOR BOLT INSTALLATION
Install anchor bolt installation in accordance with the most current version of the FHWA Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaries, and Traffic Signals and the following:

Ship the anchor bolts, nuts, and washers pre-assembled and protected from dirt and moisture. Threads must be protected from damage during installation. Anchor bolts shall not be subjected to erection or service loads until the concrete has reached 75% of the design strength or as approved by the Engineer. Installation includes the following:

1. Installation torque. Use the torque wrench tightening the nuts for final torque verification that has a torque indicator that is calibrated annually. Provide a certification of such calibration to the Engineer. The Engineer will specify the verification torque for the diameter and grade of anchor bolt.

2. Anchor bolt rotation capacity test. Prior to use, run an anchor bolt rotation capacity test with at least one anchor bolt from each lot. The test consists of two parts: Using the base plate or plate of equivalent grade, thickness, and finish; install anchor bolt and nuts as specified below to verify its adequacy to achieve the verification torque. The plate must be restrained to resist the torque during the test. Following completion of tightening, remove the anchor bolt and nuts and inspect for thread damage. The anchor bolt is restrained while the nuts are turned onto the bolts at least one bolt diameter past the location of the leveling nut, then backed off by one worker using an ordinary wrench (without a cheater bar). The threads are considered damaged if unusual effort is required to turn the nut. If the threads are damaged or the verification torque is not attained, the Engineer will reject the lot of anchor bolts. If there is no damage to the anchor bolt or nuts during this test, they may be used in the foundation.

3. Templates. Use templates as shown on the Plans to maintain the spacing and alignment of anchor bolts during placing and curing of the concrete. Bottom template shall be located as shown on the Plans. Top template shall be located above top of concrete. The template hole pattern shall match the base plate hole pattern. Receive approval by the Engineer for use of additional templates prior to use.

Install and tighten anchor bolts according to the following procedure:

1. Prior to and during concrete placement, adequately secured anchor bolts with templates in place.
2. After concrete placement, the misalignment from vertical shall not exceed 1:40.
3. After concrete placement, clean the exposed part of the anchor bolts with a wire brush and lubricated.
4. Turn the nuts onto the bolts well past the elevation of the leveling nut and backed off by one worker using an ordinary wrench without a cheater bar. Report thread damage requiring unusual effort to the Engineer.
5. Lubricate the exposed threads of the anchor bolts immediately prior to placing leveling nuts.
6. Clean leveling nuts and lubricate threads and bearing surfaces. Place on the anchor bolts.
7. Place leveling washers on the anchor bolts and brought to their proper elevation.
8. Place column or pole on foundation.
9. Place top washers.
10. Clean top nuts and lubricate threads and bearing surfaces. Place and tighten nuts to between 20 and 30 percent of the verification torque using tightening sequence shown on Plans. This is termed snug-tight.
11. Tighten leveling nuts to between 20 and 30 percent of the verification torque using tightening sequence shown on Plans. This is termed snug-tight.
12. Appropriately mark the position of the snug-tight top nuts on the base plate and nut at each bolt. Turn top nuts 1/6 turn for 1.5 inch diameter grade 36 anchor bolts beyond snug tight using tightening sequence shown on Plans and using at least two full tightening cycles. Verify proper nut rotation. Tolerance is plus 20 degrees.
13. Use a torque wrench to verify that a torque at least equal to the verification torque is required to additionally tighten the leveling nuts and the top nuts. Report to the Engineer any inability to achieve this torque.
14. Use the torque wrench again after at least 48 hours to verify that a torque at least equal to 110 percent of the verification torque is required to additionally tighten the leveling nuts and the top nuts. This verification is required at least 48 hours after erection of the remainder of the structure and after any heavy attachments to the structure.
15. Jam nuts shall be placed and installed to snug tight.
16. Rodent screens are required around the base of each pole.
17. Adjust anchor bolt nuts to plumb with the pole under load.

10.0 ITS FIELD ELEMENTS

10.1 DESCRIPTION
This work consists of furnishing equipment and material for, and installing ITS field elements in conformity with the locations and details shown on the Plans or established by the Engineer. ITS field elements include the controller assemblies, cabinets, communication equipment, closed circuit television (CCTV) systems, vehicle detection systems (VDS), and dynamic message sign (DMS) systems.

10.2 MATERIALS
Furnish all tools, labor, equipment, materials, supplies and manufactured articles and perform all operations necessary to construct the ITS field element installations as shown on the Plans and as specified herein. The hardware, construction services, and support services specified are intended to describe the minimum configuration that would be acceptable for these installations.

10.2.1 LABELING EQUIPMENT
Apply permanent external labeling on all communication equipment; including any required cross connects to communications equipment, according to these contract documents and information provided by the Engineer. Use self-laminating vinyl labels at least 1-inch wide and long enough that the translucent portion of the label completely covers the white area bearing the legend. Use vinyl with a layer of pressure sensitive acrylic adhesive. Use labels that resist oil, water, and solvents and are self-extinguishing. Use a machine to print the legend in letters at least 1/8 inch high.

10.2.2 INCIDENTALS
Furnish and install all incidental accessories necessary to make the system complete in all respects and ready for operation, even if not particularly specified; furnished, deliver and install all incidentals without additional expense. Include in the work and in the bid all minor details not usually shown or specified, but necessary for the proper installation and operation.

10.2.3 CABLES AND CONDUCTORS
Incidental items include all cables and conductors including but not limited to, serial cables, alarm ribbon cables, Cisco equipment power cables, DC power cables, AC power cables, power service conductors, fiber optic jumpers, signal cables, interface cables, and other cables and connectors located at the field element sites. No separate payment shall be made for incidental items.

10.2.4 MEDIA CONVERTER
Furnish and install a GE Security IFS Ethernet Optical Transceiver DE7200 or approved equal if specified in the plans with the following minimum requirements:
1. 10/100 Mbps Ethernet, auto-negotiating, full duplex or half duplex data. IEEE 802.3 compliant.
2. Auto network detection.
3. NTCIP Compatible
4. Optical: 1310/1550 nm, Single-mode fiber optic cabling support. LC optical connectors.
5. Minimum optical range of 10 miles.
6. Data: RJ-45 connector
7. Power: 12VDC @ 200mA
8. Power, Transmit, and Received LED indicators.
9. Physical Properties: 4.0in x 3.0in x 1.0in, 2.0 lbs maximum

10.3 CONSTRUCTION REQUIREMENTS

10.3.1 LABELING EQUIPMENT AND CABLES
Label all communication equipment and every cable immediately upon installation. Label all communication equipment and all cables at every point of access, including pull boxes, and termination points. Consult with the Engineer concerning the desired method of identifying each cable.

10.3.1.1 FIBER OPTIC CABLES OUTER JACKETS
1. Label each cable with permanent cable tags, with two integrated holes on each end for connecting tag to cable with cable ties.
2. Label each cable where it enters a cabinet, pull box, splice vault, splice closure, and termination points.
3. All cables shall be labeled within 12 inches of the conduit or other entry point. Label both ends as it comes in and out of a pull box or vault.
4. Label FO trunk cables with the following information:
a. The number of fiber strands in the cable by mode
b. Cable type (single mode "SM", Multi-mode "MM" or hybrid "SM/MM")
c. Owner
d. The item to which the cable travels (e.g. "TO PB 18-2", "To P.O.P.", etc.)
e. Example: "96 SM FIBER KDOT" "TO PB 18-2"
5. Label branch cables with same plus what device it is connecting to. Example: "12 SM FIBER KDOT" "TO CCTV10/DET 12"

10.3.1.2 SPLICE ENCLOSURE
1. Label splice closures indicating what fibers inside are spliced
2. Label splice trays within closures with cable and fiber strand numbers.
3. Example: "KDOT 96 SMFO Fibers 23-24 TO KDOT 12 SMFO BRANCH FIBERS 3-4 or CenturyLink-KDOT 12 SMFO Fibers 11-12 TO KDOT 12 SMFO BRANCH FIBERS 3-4".

10.3.1.3 POWER CABLES
1. Label each cable within 12 inches of where it enters a cabinet, pull box, meter pedestal, transformer or other termination point.
2. Label it "POWER XXX VOLTS" with a RED label
3. Label where it is coming from/going to (e.g. "POWER 120 VOLTS" "TO CA CCTV I-135/Central")
4. Label taps inside meter pedestals or transformers with "ITS POWER" tag.

10.3.1.4 ITS CABINETS
1. Inside cabinets, place a patch panel key/diagram of patch panel with port numbers.
2. On each diagram/key include the following:
a. Cable number for mainline fiber
b. What cabinet/shelter and device to which the fiber connects
c. The port on the IE 3000 to which a jumper/patch cable connects.
3. Label each port on the fiber optic patch panel with the designated port number.
4. Jumper cables need not be labeled in ITS cabinets as long as they are less than three meters in length.
5. Label each network device (CCTV encoders, DMS controllers, Vehicle Detectors, Media Converters, Power Distribution Devices and Uninterruptable Power Supplies) with IP addresses.
6. Label Cellular Modems with IP addresses and assigned phone numbers.
7. Label Cisco switches with IP address and site number. Label switch ports with Tx1, Rx1, Tx2, Rx2 and what port they connect to on the fiber optic patch panel. Label each port with its corresponding VLAN address.
8. Wireless network devices shall be labeled with the following items:
a. IP address
b. Programmed radio frequency/channel
c. Other wireless devices that link to the unit
d. e.g.: "AU, 10.8.32.25, 4.97 GHz, TO SU@CCTV 03, TO SU@DET 01, TO SU@DET 02" or "SU, 10.8.34.24, 4.95 GHz, TO AU@SG CO COURTHOUSE"

10.3.1.5 POP BUILDINGS
1. Label patch panels ports to indicate the origin of the fiber optic cable terminated.
2. Label jumper cables at each end with a tag that includes the destination patch panel and port number(s) (e.g. "TO Panel 1 Ports 11-12" and "TO Panel 2 Ports 3-4").
3. Label outer jackets of fiber cables entering patch panels/distribution frames as in section 1-d.
4. Label individual fibers entering back of patch panel with the corresponding strand number and origin.

10.3.1.6 TMC COMMUNICATION ROOM (IF UTILIZED)
1. Label patch panels to indicate the origin of the fiber optic cable terminated.
2. Label individual fibers entering back of patch panel with the corresponding strand number and origin.
3. Label jumper cables at each end with a tag that includes the destination patch panel and port number(s) (e.g. "TO: Panel 1 Ports 11-12" and "TO Panel 2 Ports 3-4").
4. Label jumpers from patch panel to Cisco SFPs with the fiber strand numbers, and origin to which they connect (e.g. Fiber #3, P.O.P. Building)
5. Provide Cisco switch port diagram denoting what fiber and Ring they are connected to.

10.3.1.7 CONDUITS
1. Label empty conduits noting to where they connect (e.g. "TO PB2-2 TO PB2-3").
2. If a conduit color is not per plans (Red for Power, Green for Communications), label it so it is clear what it is being used for, even if there are cables inside conduit.

10.3.2 MEDIA CONVERTER
Install in accordance with the manufacturer's recommended procedure.

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11.0 DYNAMIC MESSAGE SIGN SYSTEM

11.1 DESCRIPTION
The purpose of this section is to provide general information for the installation of KDOT furnished dynamic message sign (DMS) systems as shown on the Plans and specified herein.

11.2 MATERIALS

11.2.1 GENERAL
KDOT will supply the dynamic message sign systems. The equipment supplied by KDOT consists of a DMS case including contents, sign controller unit (SCU) and communication unit; cabling for between the DMS case and the sign controller unit, display modules, equipment cabinet; and DMS software and power supplies. Do not attach the DMS to the support posts until the supporting systems of conduits, pull boxes, controller assemblies, power supply assemblies and all other items necessary are in place to provide a fully functioning DMS system.

11.2.2 DELIVERY
Complete a pre-installation test of the DMS to verify that the DMS is fully functional and operating properly prior to transportation of the DMS to the site. This test shall include: a check for damage, an electrical check to verify all electrical connections are correct and verification that the DMS units are properly configured and fully functional.

The pre-installation test may be waived with the approval of the Contractor, Manufacturer and Engineer. If the test is waived include documentation to this effect as a test result in the Technical Reference Manual.

Take ownership for any damage to the DMS system after acceptance of the DMS system from KDOT. Document, in writing and detailed photographs any visible damage or non-functioning portion of the KDOT provided DMS system prior to accepting the DMS and leaving the KDOT storage facility. Schedule 72 hours in advanced with KDOT for date and time to pick-up the DMS from the KDOT facility. Do not store the DMS at the field site for more than 24 hours prior to installation.

11.2.3 LIGHTNING PROTECTION
Use system materials that are copper and high copper-content bronze castings. For all fittings, except cable holders, use heavy-duty type made from bronze castings. For all terminal rods, bolts, screws, and related type hardware use copper clad steel, bronze, or brass to prevent galvanic corrosion. The system consists of all necessary equipment as required to provide a complete and coordinated system. Ensure that all cable and all air terminals bear the UL label. Do not mix materials unless using a UL approved transition. All components of the lightning protection system shall conform to the current edition requirements of UL 96A and NFPA 780. Submit 150 foot radius rolling sphere zone of protection drawing with air terminal equipment.

11.3 CONSTRUCTION REQUIREMENTS

11.3.1 GENERAL
Furnish any and all additional tools, equipment, mounting hardware, beam clips, cabling, materials, supplies, manufactured articles and perform all operations necessary to install the DMS as shown on the Plans and as specified herein. The hardware, construction services, and support services specified are intended to describe the minimum configuration that would be acceptable for this DMS system. Furnish and install the DMS support structure as detailed on the Plans.

11.3.2 ERECTION
This is a category A structure. Contractor shall submit detailed erection plans to the field engineer per KDOT specifications and per KDOT Field Erection special provisions. The seal of a licensed professional engineer is not required. Field erection and field erection plans are subsidiary to the site bid and no additional payment will be made.

11.3.3 DMS CONTROLLER CABINET
Install the DMS controller cabinet; this includes providing anchor bolts for pad mounted cabinets as shown on the Plans. Connect the DMS controller to the appropriate communication equipment specified in the plans to access the network as shown on the Plans and as directed by the Engineer. If a modem is used, install and configure the cellular modem into the DMS cabinet as specified in the Plans. Attach the cellular modem antennae and associated cables to poles, structures, or antenna mounting conduit as indicated in the Plans. Align the antenna toward the appropriate cellular communications tower.

11.3.4 MOUNTING
Mount the DMS to the support posts or structure as herein specified, shown on the Plans, or as directed by the Engineer.

11.3.5 DMS ORIENTATION
Orientate the DMS such that the face of the sign is towards the roadway. Follow the DMS orientation detail located in the construction drawings for the orientation and exact position of the DMS. Receive approval by the Engineer prior to placement of the foundations.

11.3.6 SECURITY
Change the manufacturer default password to a unique password (KDOT supplied) upon taking possession of and commissioning the controller.

11.3.7 LIGHTNING PROTECTION
Furnish and install lightning protection at every DMS to reduce electrical differential potential. Install all equipment in accordance with the requirements of current editions of UL 96A, NFPA 780, and LPI 175.

12.0 CLOSED CIRCUIT TELEVISION SYSTEM (CCTV)

12.1 DESCRIPTION
Install the closed circuit television (CCTV) camera and equipment cabinet as specified in the plans. Orient all equipment as shown on the construction drawings. Pay attention to the specific orientation of the pole and the specific mounting orientation of all equipment on the pole.

Provide and install a pole, pole foundation, anchor bolts, equipment cabinet, connection hardware, camera lowering device, composite cable, camera lowering tool, surge protection and grounding, air terminal, CCTV communication equipment and cables as specified in the plans.

Install the new CCTV cameras adjacent to and have their operating and communication equipment located in the pole mounted controller cabinets or in ground mounted cabinet assemblies as indicated on the Plans, or as directed by the Engineer.

12.2 MATERIALS

12.2.1 CCTV CAMERA ASSEMBLY
The CCTV camera assembly consists of a high performance color CCTV camera, zoom lens, pan and tilt drive unit, domed enclosure, mounting brackets, connectors and cabling all assembled together into one operational unit. Ensure that the CCTV camera assembly weighs less than 100 lbs and has a center of gravity of less than 24” from the center of the pole.

If an IP camera is required, provide an Axis model Q6042-E IP series dome camera or an approved equal. Ensure an IP video encoder is integrated inside the camera dome assembly. Ensure the encoded video is H.264 (MPEG-4 Part 10/AVC) compliant using the baseline profile. Provide a 100Base-TX network interface that facilitates the transmission of camera control commands and video over an Ethernet based IP network.

The following electrical and environmental requirements are applicable for all CCTV equipment:

(1.1) Power: 120VAC @ 60Hz;
(1.2) Environmental: Operating Temperature: -50° to 50°C; and
(1.3) Operating Humidity: Up to 95% RH non-condensing.

Ensure that the camera operates with a motorized-iris lens and be designed for day and night functionality. Ensure that the shutter speeds are remotely adjustable from 1/60 to 1/10,000 seconds. Ensure that the camera incorporates Digital Signal Processing (DSP) circuitry to provide advanced features such as automatic electronic shutter control, backlight compensation, digital zoom and image stabilization. Ensure that the camera supports closing of the iris when pointed directly at the sun. Ensure the camera has a minimum horizontal resolution of 470 lines. Ensure the system to noise ratio is no less than 48 db. Ensure that the camera is equipped with Automatic Gain Control (AGC) so that the camera will be capable of remotely controlling the white balance in response to changes in environmental lighting conditions. If the AGC is switchable, set the AGC to the “on” position. Ensure that the camera supports on-screen title generation that will allow the user to define the camera with character specific information.

Ensure the camera is supplied with mechanical and digital zoom capabilities. Ensure the mechanical zoom lens is remotely controlled through the camera unit and have a magnification factor of at least 35x. Ensure the zoom lens has an automatic and manual iris and focus controls. In addition, ensure the camera has at least a 12x digital zoom capabilities. Ensure the lens aperture range is F1.6 to F2.8 minimum. If camera is HD, mechanical zoom shall be at least 18x.

Provide camera housing that is pressurized when possible, non-pressurized dome enclosure is acceptable when a pressurized option is not available. Provide camera housing that contains the CCTV camera, lens and pan/tilt drive unit. Securely mount and wire the domed enclosure to the camera-lowering device. Supply all hardware required to mount the domed camera enclosure to the camera lowering device. Provide the domed camera enclosure that is water tight and constructed so that the enclosed equipment will not be affected by rainfall, blowing dust, salt, fungus, and other debris. Supply the unit with a heater to keep the camera and lens within the acceptable operating temperature range.

Ensure that the pan and tilt drive unit allows the remote position of the CCTV camera to view freeway traffic conditions. Fit the units to mount to the CCTV camera and domed enclosure and supply with all of the necessary mounting plates, connectors, brackets and wiring for operation. Ensure the unit allows 360° of continuous panning which is variable from 1 to 40°/second. Ensure the unit allows a minimum of 10 preset positions accurate to within 0.5° accuracy.

Demonstrate that the camera assembly functions with the following video management software packages:
1. For systems integrating with the KC SCOUT, the Genetec Omnicast video distribution system, TransSuite, and Wowza systems.
2. For systems integrating with KDOT ATMS, the MIST CCTV management software and BARCO video wall display in Wichita, KS.

Minimum functionality to be demonstrated shall include the ability to decode and display a video stream using the codes, resolution and frame rate specified and all pan-tilt-zoom, iris, focus and present functions.

Connection Type	Frame Rate Specified	Resolution
Cell Modem	5	CIF 352x240
Broadband Wireless	30	CIF 352x240
Fiber Optic (100 Base FX or Greater)	30	D1 720x480 or 352x240

12.2.2 CCTV CAMERA LOWERING SYSTEM
Ensure that the camera lowering system is designed to support and lower the CCTV camera assembly without damage or causing degradation of camera operations. The camera lowering system device and the pole are interdependent and thus, must be considered a single unit or system. Provide a lowering system that consists of a suspension contact unit, divided channel support arm, pole top adjustable tenon, pole top junction box, conduit mount adapter and camera connection box. Provide a cable strain relief device/wire mesh grip if not provided by the lowering device supplier.

Ensure that the divided support arm and receiver brackets are designed to self-align the contact unit with the pole center line during installation and ensure the contact unit cannot twist under high wind conditions. Provide a camera-lowering device that withstands 100 mile per hour winds with a 30 percent gust factor using a 1.65 safety factor. Deliver to the Engineer the lowering device manufacturer independent laboratory testing documents certifying adherence to the stated wind force criteria utilizing, as a minimum effective projected area (EPA), the actual EPA or an EPA greater than that of the camera system to be attached.

Provide a camera-lowering device product from a manufacturer with a minimum of 2 years of experience in the successful manufacturing of such systems. Provide documentation by the lowering device provider identifying a minimum of 3 previous projects where the purposed system has been installed successfully.

As part of this contract, the lowering device manufacturer is required to furnish a factory representative to assist with the assembly and testing of the first installation of the lowering system onto the pole assembly. Receive approval by the Engineer for this installation to ensure that it is working properly prior to a second installation. As part of this contact, the lowering device manufacturer is required to be available to assist in a second installation or possibly a third installation until the manufacture and KDOT are satisfied with proper installation. Furnish from the manufacturer the applicable documentation certifying instruction on the installation, operation and safety features of the lowering device. Provide operational instructions to the Engineer.

Provide the suspension contact unit with a load capacity of 600 pounds with a 4 to 1 safety factor. Use a locking mechanism between the fixed and moveable components of the lowering device. Use a movable assembly with a minimum of 2 latches. Use a latching mechanism that securely holds the device and its mounted equipment. Use a latching mechanism that operates by alternately raising and lowering the assembly using the winch and lowering cable. When latched, ensure that all weight is removed from the lowering cable. Use a fixed unit that has a heavy duty cast tracking guide and means to allow latching in the same position each time. Use a contact unit housing that is weatherproof with a replaceable neoprene gasket provided to seal the interior from dust and moisture. Ensure that the entire unit has a minimum temperature rating of -40 degrees Fahrenheit to +190 degrees Fahrenheit.

Ensure that the prefabricated components of the lift unit support system are designed to preclude the lifting cable from contacting the power or video cabling. Supply an internal 1.25 inch PVC conduit in the pole for the lifting/lowering cable. Ensure that a conduit mount adapter for housing the lowering cable, with an interface to allow the connection of a 1.25 inch PVC conduit is located just below the cable stop block at the back of the lowering device. Ensure that the only cable permitted to move within the pole or lowering device during lowering or raising is the stainless steel lowering cable. Ensure that all other cables remain stable and secure during lowering and raising operations.

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ITS EQUIPMENT SPECIFICATIONS
ITS-S06 VERSION DATE: 10-29-14

Provide two hand-operated lowering tools for up to 10 lowering devices, and one additional tool for each 10 additional devices. Ensure that the camera-lowering device is operated by use of a portable lowering tool. Ensure that the tool consists of a lightweight metal frame and winch assembly with a quick release cable connector and an adjustable safety clutch (socket). Ensure that this tool is compatible with accessing the support cable through the handhole of the pole. When attached to the handhole, the tool will support itself and the load assuring lowering operations and provide a means to prevent freewheeling when loaded. Ensure that the lowering tool has a reduction gear to reduce the manual effort required to operate the lifting handle to raise and lower a capacity load. Provide the lowering tool with an adapter (socket) for operating the lowering device by a portable drill using a clutch mechanism.

Ensure that the lowering tool is equipped with a positive locking mechanism to secure the cable reel during raising and lowering operations and prevent freewheeling. Ensure that the lowering tool is made of durable and corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry accepted coatings to withstand exposure to a corrosive environment. The lowering tools are incidental to other items of work.

Provide a camera junction box that is of two piece clamshell design with one hinge side and one latch side to facilitate easy opening. Ensure that the general shape of the box is cylindrical to minimize the EPA. Ensure that the Camera Junction Box is cast aluminum with stabilizing weights on the outside of the box to increase room on the interior. Ensure that the box is capable of having up to 40 pounds of stabilizing weights. Ensure that the bottom of the Camera Junction Box is drilled and tapped with a 1-1/2" NPT thread to accept industry standard dome housings and be able to be modified to accept a wide variety of other camera mountings. Install gaskets with the junction box to prevent water intrusion. Ensure that the bottom of the box has a screened and vented hole to allow airflow and reduce internal condensation.

Ensure that all pulleys for the camera lowering device and portable lowering tool have sealed, self lubricated bearings, oil tight bronze bearings, or sintered-oil impregnated bronze bushings. Ensure that the lowering cable is a minimum 1/8 inch diameter stainless steel aircraft cable with a minimum breaking strength of 1740 pounds with (7) strands of 19 AWG wire each.

Ensure that all electrical and communications connections between the fixed and movable lowering device components are protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. Ensure that the electrical connections between the fixed and movable lowering device components are designed and tested to conduct video signals as well as the power for operation of dome environmental controls.

Ensure that the female and male socket contact halves of the connector block are made of a UL94, V0 rated thermosetting synthetic rubber. Ensure that the female barrel or brass socket contacts and the male high conductivity brass pin contacts are permanently encased in this material.

Ensure that the interface and locking components are made of stainless steel or aluminum. Ensure that all external components of the lowering device are made of corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry accepted coatings to withstand exposure to a corrosive environment.

The lowering unit shall have sufficient weight to disengage the camera and its control components in order that it can be lowered properly. Provide counterweights as necessary to assure that the alignment of pins and connectors are proper for camera support to be raised into position without binding. Ensure that the pole top and/or camera junction boxes have the power and signal connectors for attachment to the bare leads in the pole top and/or junction boxes.

Install a drip shield above the lowering device connection to prevent moisture from infiltrating the camera assembly.

Submit camera pole shop drawings to the Engineer for approval prior to pole and lowering device fabrication.

12.2.2.1 IP CAMERAS-LOWERING DEVICE
Provide a camera lowering system for IP cameras that is equipped with a contact block specifically designed for use with IP cameras in an outdoor environment and includes an outdoor rated Cat 5e cable for the operations of video power, data and control molded directly to contact block.

Ensure that the current carrying male contacts are gold plated, beryllium and 0.09 inch in diameter at the contact area. Ensure that all current carrying female barrel contacts are also gold-plated, beryllium copper and at least 0.09 inches I.D. at the contact area. Ensure that each individual female barrel contact has a stainless steel sleeve which prevents foreign matter from entering the contact area as well as preclude the possibility of the leaves of the female contact from opening beyond allowable limits and ensure a snug fit around the respective male pins. Ensure that there is at least one female contact that is positioned closer to the face of the female connector body than all the others, which will allow it to make first contact and break last contact to provide optimum grounding performance.

Ensure that each IP male/female connector includes (8) contacts mechanically crimped to CAT5e Wire and (5) contacts mechanically crimped to #18/1 UL lead wire, which may be used for additional camera requirements including but not limited to power, alarms or grounds. Connect these wire ends to the contractor provided power/signal cable in the pole and CCTV accordingly in a manner acceptable to Engineer. Ensure that each male pin is self wiping. During production, the contacts must be successfully tested and verified for Ethernet data speeds up to a minimum of 1000 Base T requirements.

Ensure that each male contact and female barrel contact is individually encased in their respective male and female molded rubber blocks to provide protection from moisture.

Ensure that the contacts are self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. Ensure that the facility manufacturing the electrical contact connector complies with Mil Spec Q-9858 and Mil Spec I-45208.

12.2.2.2 ANALOG CAMERAS-LOWERING DEVICE
Provide a camera lowering system that includes a factory installed 13-conductor plus coax composite cable for the operations of video power, data and control. Provide a composite cable that is compatible with the manufacturer of the camera as well as the lowering system and includes a factory pre-wired Circular AMP connector and TNC for quick connections to the lowering device leads in the pole top. Provide this composite cable to include: One 75 ohm co-axial cable (RG59/U) with copper center and braid shield conductors, and polyethylene dielectric material; Two #22 AWG shielded twisted pair cable, orange-yellow and red-brown color codes; One #16 AWG twisted pair cable, black-white color code; One #14 AWG twisted pair, brown-red color code; Two #22 AWG twisted pair, violet-gray and blue-green color codes. Ensure that all cables are cabled together and the cable bundle is wrapped with an overall clear polyester tape, and PVC jacket of nominal 0.035" thickness, fillers may be used. Ensure that the overall outside diameter of cable is approximately 0.60".

Ensure that the current carrying male contacts are 1/8 inch in diameter. Ensure that two male contacts are longer than the rest which will make first contact and break last contact to provide optimum grounding performance. Ensure that the number of contacts is a minimum of 14, and the camera mounted thereto, is capable of performing all of its necessary functions on 14 contacts or less.

Ensure that the current carrying female contacts are 1/8 inch I.D. Ensure that all of the contacts are recessed 1/8 inch from the face of the connector. Cored holes in the rubber measuring 1/4 inch diameter and 1/8 inch deep molded into the connector body are centered on each contact on the face of the connector to create rain-tight seals when mated with the male connector.

Ensure that the wire leads from both the male and female contacts are permanently and integrally molded in a UL94, V0 rated thermosetting synthetic rubber. Ensure that the current carrying and signal wires are constructed of #18/1 AWG synthetic rubber jacketed wire.

Ensure that the contacts are self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. The electrical contact connector must meet Mil spec Q-9858 and Mil spec I-45208.

12.2.3 CAMERA POLE
Provide poles in accordance with the latest edition of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals including all addendums. Furnish and install camera poles as shown on the Plans and details. Submit shop drawings of the poles to the Engineer and receive approved in writing prior to fabrication as described elsewhere in these Specifications. It is at the Contractors discretion to use Steel or Concrete camera poles with written approval by the Engineer.

12.2.3.1 CONCRETE POLE
Design poles considering application of wind load and deal load. The moment at any point along the length of the pole is the sum of the moments resulting from dead load and forces from wind loads. The wind force is equal to the wind pressure multiplied by the effective projected area of the objects involved. Design poles to have a minimum pole top deflection not greater than 1 inch in a 30 mph non gust wind based upon the mounting of a single lowering device and camera.

Ensure that the pole achieves a minimum 28-day compressive strength of 8,000 psi. Use cement that conforms to the latest requirements of Type I Portland Cement in accordance with ASTM-C150. Maximum size aggregate may be ¾ inch (19mm) or ¾ of the clear spacing between reinforcing steel and surface of pole. Ensure that any water reducers, retarders, or accelerating admixtures conform to ASTM-C494. Use water that is free from foreign materials in amounts harmful to concrete and embedded steel.

Use deformed steel reinforcement that conforms to requirements of ASTM-A615 for Grade 60 Rebar. Use Prestressing steel reinforcement that conforms to uncoated 7-wire, stress relieved strand; ASTM-A416. Use steel spiral reinforcement that conforms to the requirements of ASTM-A82 and is not less than .148-inch diameter. Ensure that all structural steel conforms to ASTM-A36 and zinc alloy AC41A conforms to ASTM-B240. Provide a finish that is hot dipped galvanized in accordance with ASTM-A153. Provide all poles with a #2 stranded copper ground wire cast into the wall of the pole at the handhole box location.

If colored or tinted concrete poles are required per the Plans, follow the procedures in this paragraph. Ensure that the pole is etched and finished with two coats of high performance urethane enamel. It is stated on the project drawings if a color other than gray is required, all pigments used shall be non-fade iron or chromium oxides. Color to be approved by the Engineer. Any deviation from the aggregate finish, color, and composition requires approval from Engineer.

Follow all manufacturing tolerance, details of reinforcement, and finishes in accordance with the Guide Specification for Prestressed Concrete Poles as published in the May-June, 1982, issue of the Journal of the Prestressed Concrete Institute.

Perform a concrete cylinder test for each 100 cubic yards of concrete poured. Perform a final quality control check on each pole after manufacturing is complete. Ensure that all quality control procedures are mandated in a written manual and are available for inspection.

Provide poles that are prestressed and the concrete placed by the centrifugal spinning process. The centrifugal spinning is to insure both a minimum 28-day compressive strength of 8,000 psi and a minimum of ¾ inch cover over the prestressing strand.

Provide poles that have a smooth natural form finish, soft gray in color unless an alternate color and finish is specified. Provide poles that are designed and constructed so that all wiring and grounding facilities are concealed within the pole. Cast all handholes, couplings, thru-bolt holes and ground wire into the pole during the manufacturing process.

Provide poles that are round in cross section and provide a continuous taper of 0.18 inch per foot of length and provide a minimum 3#4 inch of concrete coverage over the prestressing strands. Provide all cable entry holes in accordance with the location shown on the standard detail drawings, and sizes as required, and are free from sharp edges for passages of electrical wiring.
1. Two 4" x 12" conduit entrance openings centered 24 inch below grade.
2. Handhole and pole top tenon as shown on the plans & per lowering device provider.

Mount camera lowering device to a special designed tenon bolted to the top of pole. Provide poles with a fish wire to facilitate cable installation. Provide poles with a minimum inside raceway dimension of 5 inch at tip of pole.

Ensure that prestressed concrete poles are lifted and supported during manufacturing, stockpiling, transporting and erection operations only at the points shown on the shop drawings. Ensure that transportation, site handling, and erection are performed with acceptable equipment and methods, and by qualified personnel.

12.2.3.2 STEEL POLE
Steel poles with other gages and dimensions that meet or exceed the requirements shown on the Plans may be used. Only round or hex decagonal (16 sided) shapes will be allowed for this option. To invoke this option, submit shop drawings and detailed calculations signed and sealed by a Professional Engineer registered in the State of Kansas. Demonstrate compliance with the requirements shown on the Plans and herein. Submit calculations for poles with other gages and dimensions that include analysis of the pole, base plate, and anchor bolts. For all pole heights, do not exceed 32,084 lb-ft for the maximum moment from group I, II or III load combinations at top of foundation. Submit pole calculations that are analyzed at six inch (6") intervals from the base plate to the pole top. At each of these locations, give the following information:

1. The pole diameter, thickness, section modulus, moment of inertia, and cross sectional area.
2. The centroid, weight, projected area, drag coefficient, velocity pressure, and wind force of each trapezoidal pole segment.
3. The axial force, shear force, primary moment, total moment, axial stress, bending stress, allowable axial stress, allowable bending stress, and combined stress ratio (CSR) at each elevation.
4. The pole angular and linear deflection at each elevation.

Ensure that the pole is designed such that the deflection does not exceed one inch (1") at the top of the pole in a sustained 30 mile per hour wind condition. Provide a pole shaft that is one piece construction up to 50' in length, and shall conform to ASTM A595 Grade A with minimum yield strength of 55 ksi or ASTM A572 with minimum yield strength of 55 ksi. Provide a pole with a constant linear taper of greater than or equal to 0.14 in/ft, and contain only one longitudinal seam weld. Ensure that hexadecagonal poles have a 4 in. corner radius. Circumferential welded tube butt splices and laminated tubes are not permitted.

Ensure that welding and fabrication of the assemblies' is in accordance with the ANSI/AWS D1.1 Structural Welding Code-Steel.

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Ensure that longitudinal seam welds within 6in. of complete penetration pole to base plate welds are complete penetration welds. Ensure that tube longitudinal seam welds are free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Ensure that longitudinal welds suspected to contain defects are magnetic particle inspected. Ensure that all circumferential butt-welded pole and arm splices are ultrasonically or radiographically inspected.

Provide a single, large, bottom handhole opening that is reinforced with a minimum 2 inch wide hot rolled steel rim. Ensure that the nominal outside dimension is approximately 6 inches x 27 inches. Ensure that the handhole has a tapped hole for mounting the portable winch thereto as shown on the drawings. Ensure that a tenon is welded or bolted to the pole top with mounting holes and slot as required for the mounting of the camera-lowering system. Ensure that the tenon is of dimensions necessary to facilitate camera lowering device component installation. Ensure that each slot is parallel to the pole centerline for mounting the lowering device.

Provide a pole with a custom plate mounted tenon that allows the field modification of the arm/camera orientation up to 360 degrees. Ensure that the tenon has mounting holes and slot as required for the mounting of the camera-lowering system. Ensure that the tenon is of dimensions necessary to facilitate camera lowering device component installation. Ensure that each slot shall be parallel to the pole centerline for mounting the lowering device.

Ensure that top and bottom electrical cable guides are located within the pole aligned with each other. Position one cable guide 2 inches below the handhole and position the other 1 inch directly below the top of tenon. Position a parking stand 1.5 inches below the top of the handhole on the inner portion of the handhole frame and located at 90, 180, and 270 degrees.

Provide base plates that conform to ASTM A36 or A572 Grade 50. Ensure plates are integrally welded to the tubes with a telescopic welded joint or a full penetration butt weld with backup bar. Ensure that the plates are hot dip galvanized per the requirements of the contract documents.

Provide anchor bolts that conform to the requirements of AASHTO 314 Grade 55. Ensure that the upper 12 inches of the bolts are hot dip galvanized per ASTM A153. Supply each anchor bolt with two hex nuts and two flat washers. Ensure that the strength of the nuts is equal or exceed the proof load of the bolts.

Construct CCTV pole foundations as indicated on the Plans.

12.2.4 CABLES AND CONNECTORS
Furnish and install camera control cables. Furnish and install all necessary connectors to make the CCTV system operational. Determine the proper cable lengths. Splices in the control cables are not allowed.

12.2.5 ASSOCIATED CONTROL EQUIPMENT
Furnish and install equipment in the cabinet as specified in the construction Plans including associated patch cables and incidental items.

12.2.6 VIDEO ENCODER
Provide video encoders that are an Impath i-Volution i5110-ET ruggedized multi-protocol standalone encoder with Vicon protocol or approved equal as shown on the construction Plans. Encoders submitted as an approved equal must be capable of all i5110-ET protocols and have been tested and proven to be compatible with KDOT's ATMS software.
The following requirements apply:
1. Temperature hardened NEMA 4 for outdoor applications (-34°C to +74°C)
2. Concurrent H.264, MPEG 2, MPEG 4 video streaming
3. Up to full D-1 resolution
4. Unicast and Multicast Video
5. Auto-Start video streaming
6. 1 Video input and 2 serial data ports (RS232 and RS422/485)
7. Network Interface IEEE 802.3 Ethernet RJ-45
8. Embedded Web-based manager
9. Embedded Web-based video viewing utility that can display live video and provide control of pan-tilt-zoom, focus, and preset functioning.

12.2.7 POWER SUPPLY
Furnish and install power supply that meets the following minimum requirements.
1. To be used with outdoor dome PTZ cameras
2. Input Voltage: 120V, 50/60 Hz
3. Output Voltage: 24V
4. Output Current: 2A to 4A
5. Output Power: 50VA 100VA
6. Compliant to NEMA TS2
7. Operating Temperature: -10˚C to 45˚C
8. Humidity: Up to 90% relative, non-condensing

12.2.8 SURGE PROTECTION
Furnish and install a surge protection system that consists of the following components:
1. Surge protection on power conductors. Ensure that the conductors carrying power to the camera assembly are protected by surge protectors in the cabinet.
2. Surge protection on communication conductors. Ensure that the conductors carrying control signals from the cabinet to the camera are protected by surge protectors in the cabinet.
3. Surge protection for coaxial cable, when applicable. Ensure that the coaxial cable carrying the video signal from the camera assembly to the cabinet is protected by a surge protector in the cabinet.

Provide surge protector products that meet the following minimum requirements:
1. UL listed and labeled to current editions of UL 497B and UL 497C
2. Operating Temperature: -40°F to 185°F
3. Operating Humidity: 95% RH non-condensing
4. Wall, DIN rail or 19" rack mountable
5. Three stage protection
6. 10 year product warranty
7. The minimum requirements listed on the following table:

Circuit	Maximum Continuous Operating Voltage	Frequency/ Bandwidth/ Data Rate	Surge Capacity	Max. Let-Through Voltage
12 VDC	15-20 V	N/A	5kA per mode (8x20 µs)	<150Vpk
24 VAC	30-55 V	N/A	5kA per mode (8x20 µs)	<175Vpk
48 VDC	60-85 V	N/A	5kA per mode (8x20 µs)	<200Vpk
Coaxial Composite Video	4-8 V	Up to 1.5 GHz	10kA per mode (8x20 µs)	<100Vpk
RS422/ RS485	8-15 V	Up to 10 Mbps	10kA per mode (8x20 µs)	<30Vpk
Ethernet Data	7-12 V	> 100 Mbps/ 125 MHz	3kA per mode (10x1000 µs)	<30Vpk
Power over Ethernet	44-52 V	> 100 Mbps/ 125 MHz	10kA per mode (8x20 µs)	<90Vpk

12.2.9 AIR TERMINAL
Furnish and install a solid or tubular aluminum, copper or stainless steel at least 5/8 inch in diameter air terminal. Use air terminals that are UL listed.

12.2.10 POLE GROUNDING
Provide pole grounding that meets the requirements of the Power Supply Assembly, Power, and Grounding section of these specifications.

12.2.11 TRANSPORTATION
Obtain the correct transportation guidelines from the manufacture and implement these guidelines. Take precautions to ensure no damage to the lowering system.

12.3 CONSTRUCTION REQUIREMENTS

12.3.1 CAMERA ASSEMBLIES
Install the dome so that the pole does not block the camera's view of traffic. Refer to the Plans for guidance on where the allowable blind spot is located.

12.3.2 POLE AND FOUNDATION
Contact the Engineer a minimum of two weeks prior to final placement of the CCTV foundation to schedule the final location review.

12.3.3 NETWORK SWITCH CONNECTIONS
Request port assignments from the Engineer/owner at least 4 weeks prior to making the physical connections to the network switch. Supply technicians with at least one year of experience installing and configuring Cisco network switches. Submit experience resume to the Engineer for approval prior to performing any work.

12.3.4 SURGE PROTECTION
Terminate all the cables on surge protectors.

12.3.5 AIR TERMINAL
Install the air terminal on the opposite side of the pole from the dome. Position the rod to project a minimum of 5 feet in length above the top of pole (not including the lowering device cap) with an equal length to be mounted to the pole. Provide and install an air terminal mounting bracket. Locate and size the air terminal to adhere to the 150 foot radius rolling sphere model as described in NFPA 780 and as shown on the Plans. Seek approval from Engineer for adjustment of 5 foot height requirement.

Apply a copper-based conductive sealant between the rod and the pole before tightening the bolts. Perform all work related to the installation of the air terminal in accordance with NFPA 780.

12.3.6 POLE GROUNDING
Connect the bottom of the pole to one or more ground rods using a minimum #4 stranded or solid copper grounding conductor from pole to grounding rod. Construct the ground conductor to travel through the foundation in a schedule 40, non-metallic, U.L. listed conduit as shown in the plans. If the steel pole thickness is 3/16 inch or less, use a copper down grounding conductor. Clean galvanized ground lug at bottom connection point prior to exothermic welding. Use exothermic welding for all ground wire connections, except the connection to the pole, which shall use the pole's grounding lug.

Use a device that measures resistance to ground using the three-point fall-of-potential method to ensure that the resistance from the air terminal to ground does not exceed 5 ohms in dry conditions. Add more ground rods if necessary to achieve this requirement. Bond multiple grounding rod electrode assemblies to each other with No. 2 AWG solid bare tinned copper wire that is exothermically welded at all connection points.

12.3.7 CCTV CAMERA LOWERING SYSTEM
Ensure that the lowering device manufacturer furnishes a factory representative to assist with the assembly and testing of the first installation of the lowering system onto the pole assembly. Ensure that this installation is working properly and is approved by the Engineer prior to a second installation. Ensure that the lowering device manufacturer is available to assist in a second installation or possibly a third installation until the manufacture and KDOT are satisfied with proper installation. Provide from the manufacturer the applicable documentation certifying that the Contractor has been instructed on the installation, operation and safety features of the lowering device. Provide the Engineer with operational instructions.

13.0 VEHICLE DETECTION SYSTEM

13.1 DESCRIPTION
Install a Vehicle Detection System (VDS) including lightning surge protection, AC/DC power converter and a media converter for Ethernet communications for the purposes of detecting vehicular speed, volume counts, and lane occupancies. Install in the locations shown on the Plans.

13.2 MATERIALS

13.2.1 RADAR VEHICLE DETECTORS (DETECTORS)
Include all the cables, connectors, and mounting hardware recommended by the manufacturer for proper operation of the system. If required, provide a Wavetronix Smartsensor HD (model SS126) unit or approved equal including lightning surge protection, AC/DC power converter and a media converter for Ethernet communications that meets the following minimum requirements.

13.2.1.1 PERFORMANCE
The following requirements apply:
1. Able to measure volume, occupancy (including slow moving or stationary vehicles), classification counts, and speed, when in a sidefire configuration and mounted as shown on the Plans.
2. Suitable for polled operation using multipoint RS-232 communication at 9600 bits per second.
3. Detection range: 6.0 to 250.0 feet.
4. Detection Zone: Up to 22 traffic lanes simultaneously
5. Operating Frequency: 24.0-24.25 GHz
6. Transmit bandwidth: 245 MHz.
7. Transmitter power: up to 10 W.
8. Operating temperature range: -40°C to +74°C.
9. Operating humidity range from 5 to 95% RH.
10. Meets FCC rules Part 15 for interference.
11. Occupies no more than 0.6 cubic feet
12. Weighs no more than 15 lbs.
13. Housing sealed to withstand rain (or snow) up to a rate of 2 inches per hour or wind loads up to 90mph.
14. Includes a mounting assembly for each radar detector with the following requirements: stainless steel or all aluminum construction, capable of supporting a load of 20 lb., capable of being mounted on the side of the pole approved by the manufacturer of the microwave detector.
15. Includes a twisted-pair cable between the cabinet and each microwave detector with the following requirements: provides both power and serial communication, UV-resistant and rated for 300 volts, terminate on a single MS connector.

13.2.2 LAPTOP SOFTWARE
Provide vendor software that enables a technician to test all features and functions of the detector, and perform all set-up procedures with a web based interface. Deliver this software on a CD so that it can be installed on other computers. Ensure that the Engineer has the right to make and use an unlimited number of copies of this software.

13.2.3 COMMUNICATION PROTOCOL
Demonstrated that the radar vehicle detector can communicate with KDOT ATMS software or is compliant with the National Transportation Communications for ITS Protocol (NTCIP). To be NTCIP compliant, ensure that the detector adheres to the version of the following standards that is current at the time of bidding:
1. Information level: NTCIP Standard 1209, including implementation of the TSS Data Collection conformance group.
2. Application level: NTCIP Standard 1101, Compliance Level 2.
3. Transport level: Null protocol
4. Subnetwork level: NTCIP Standard 2101

13.2.4 DOCUMENTATION
Supply full documentation of all manufacturer-specific objects supported by the detector. Submit this in the form of a CD containing ASCII versions of a MIB in ASN.1 format. Ensure that the MIB contains accurate and meaningful description fields and supported ranges indicated in the syntax field of the object-type macros. Ensure that the manufacturer will allow the use of any and all of the documentation described above by the Engineer for system integration purposes at any time, regardless of what parties are involved in the system integration effort.

13.2.5 DEVICE SERVER
Provide a Wavetronix Click 301 device server or approved equal if specified in the plans and will allow the detector to communicate over the Ethernet IP network when the detector is connected to an Ethernet network device. Provide a device server that meets the following minimum requirements:
1. Able to convert half-duplex serial communication to Ethernet and vice versa
2. Include multiple communication ports: Ethernet, RS-485, RS-232 DTE
3. Use either Ethernet or serial interfaces to configure baud rates
4. Operating temperature range: -34°C to +74°C
5. Operating humidity range from 5 to 95% RH
6. Input voltage range between 10 to 30 VDC

13.2.6 SURGE PROTECTION/POWER CONVERTER
Provide a Wavetronix Click 200 surge protector or approved equal that meets the following minimum requirements:
1. Three-stage surge suppression design over DC, RS-232 and RS-485 lines
2. Meets NEMA TS2-1998 environmental testing and IEC 61000-4-5 electrical surge test
Use this inside the cabinet in order to protect both the power and the communication lines.

Provide a Wavetronix Click 201 AC/DC power converter or approved equal that meets the following minimum requirements:
1. Provide 24 VDC at currents of 1-Amp
2. Provide a mains buffering greater than 20ms under full load

13.2.7 POLE
For standalone detector locations, conform and construct in accordance with details shown on the Plans. Provide frangible detector poles unless otherwise noted. For locations where detectors are mounted to another ITS device pole or structure, mount as shown in the plans. Design the poles for the standalone detectors to comply with the latest edition of the AASHTO publication "Standard Specifications for Structural Supports for Highway Signs, Luminaires, Traffic Signals and Interims". Use fatigue Category II. Also, see the KDOT Standard Specifications.

Provide all hardware (bolts, nuts, and washers, but not including anchor bolts) not otherwise specifically designated in the specifications that is aluminum or stainless steel. Furnish all materials in natural aluminum color. Finish pole shafts with a polished surface.

Conform to the standard KDOT specifications, latest edition, Section 1703.2(c) for miscellaneous hardware that requires galvanizing or electroplating.

Use ground wire that is a #6 AWG solid bare copper wire, unless otherwise shown on the Plans. Use ground rods that are solid copper.

Conform to the KDOT Standard Specifications, latest edition, Section 1615 for anchor bolts.

Provide break-away cable connectors that provide a fused waterproof wiring connection that when subjected to strain consistent with a knockdown, will separate without damage to the wiring. When separation occurs, ensure the connectors shall have no contacts exposed to present a shock hazard. Meet requirements as listed in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (Latest Edition), Article 12.5.3 (C). Install the connectors as directed by the manufacturer.

If wedge type stud bolt anchors are used, install 3/8 inch by 3 inch wedge type anchors for conduit clamps. Use wedge type anchors made from carbon steel meeting AISI 12L14 Steel. Provide a minimum embedded depth of 1-3/4 inches.

If conduit clamps with clamp backs are used, Install 2 inch conduit clamps with a compatible clamp back. Use heavy duty steel clamps to secure the rigid conduit to the structure. Space conduit clamps at 6 foot intervals.

Install one cable support grip in each detector pole. Provide a cable support grip made of high grade, non-magnetic tin coated bronze strand. Provide a cable support grip that is capable of securing two #10 AWG type USE-2 cables in a vertical position holding the weight of the cables and cable connectors off the detector assembly.

13.2.8 STEEL DETECTOR POLE
Comply with the requirements of the ASTM 607 with the exceptions and/or additions as listed in the KDOT standards.

Provide detector poles in one section and conform to the height and diameter on the Plans. Provide a base that is either a one piece steel base complying with the requirements of ASTM A-27, Grade 65-35, a steel forged base complying with the requirements of ASTM A-668, Class C or A, or a plate base complying with the requirements of ASTM A 36-77A. Secure the base to the bottom section by two continuous electric arc welds. Galvanize the base and detectors pole according to ASTM A-123.

13.2.9 ALUMINUM DETECTOR POLE
Provide aluminum detector poles that are spun from one piece of seamless tubing (ASTM B-29) Aluminum Association Alloy 6063-T6, with a minimum nominal wall thickness of 0.188 inches for a 40 ft long pole.

After fabrication, provide a mechanical strength of not less than T6 Temper. Provide a shaft with no longitudinal or circumferential welds, except at the lower end joining the shaft to the base.

Provide a base that is one piece cast aluminum (ASTM B-108 Alloy SG 70A-T6) anchor base of adequate strength, shave and size to secure to the lower end of the shaft by two continuous welds. Ensure that the base will telescope the shaft and the one weld shall be on the inside of the base at the end of the shaft. Ensure the other weld will be on the outside at the top of the base. The two welds shall develop the design strength of the pole assembly.

Use a cast aluminum frangible base that meets the standards of the latest AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (Latest Edition). Ensure the frangible base accommodates a 12-1/2 inch bolt circle top and bottom. Ensure the frangible base has high density plastic doors. Pigment the color throughout to give the appearance of aluminum. Ensure the doors withstand temperature extremes of -70 degrees Fahrenheit to 150 degrees Fahrenheit and are compounded with UV inhibitors.

13.3 FOUNDATION
Construct as indicated on the Plans and Specifications.

13.4 CONSTRUCTION REQUIREMENTS

13.4.1 RADAR VEHICLE DETECTORS
Install in accordance with the manufacturer's recommended procedure for side-fired installation. Determine proper mounting height of the detector being supplied based on offset, height, and lanes to be detected. Note that the recommended mounting height is relative to the road surface, not the base of the pole. Aim the detector to detect vehicles in the lanes indicated at the particular location.

Specify the length of control cable/harness required to the detector supplier. Include the vehicle detector control cable/harness in the detector ITS unit cost.

Provide a separate entry point for each VDS.

Installation may be done by the Contractor's forces, but each installation must be checked by the manufacturer or manufacturer's representative, and adjusted as recommended by the manufacturer. Installation includes connecting the detector to the device server and power supply in the associated ITS cabinet, as shown on the Plans.

The set up includes speed calibration using measured (not estimated) reference speeds with a LIDAR gun. When the setup is complete and the detector is ready for operation, deliver the values of all parameters that were set during the process to the Engineer in printed or computer-readable form. Provide all equipment, such as a LIDAR gun, software, laptop computer, tools and cables, needed for the set up work.

14.0 ITS CABINET ASSEMBLY

14.1 DESCRIPTION
ITS cabinet are defined as the complete assembly of all required equipment and components for the control of ITS field elements at each location as detailed in the Plans and the collection and communication to the Traffic Management Center of data gathered from the ITS Field Elements. Install Type 334C and Type 336S in the quantities and numbers at the locations as detailed in the Plans or as directed by the Engineer. Provide all necessary incidental items necessary for a complete fully functioning cabinet installation including DIN rails, wiring, and all equipment mounting hardware.

14.2 MATERIALS

14.2.1 GENERAL
Include necessary back panels, interface for CCTV, VDS or DMS as shown on the Plans, all required communication equipment, all required wiring, switches and connectors, and all other equipment as required by these specifications and as shown on the Plans, or as directed by the Engineer, to provide a fully functioning and operational ITS system.

14.2.2 ITS CABINETS
Use either model 334C for pad mounted cabinets or 336S for pole mounted cabinets as shown and indicated in the Plans and exhibit a bare aluminum finish. Provide cabinets with two full size doors for front or rear entry. Ensure that all cabinets are designed to NEMA 3R specification. Provide each door with a raised designation `KDOT ITS' as indicated in the Plans. Provide handles for each main door that open outwards. Supply all cabinets with a removable self-standing rack assembly, an AC buss, a ground bus, and a strip heater. Do not provide any power distribution assemblies unless specified.

Provide all KDOT main cabinet doors with a BEST 3L Series Deadbolt Cabinet Lock with construction core that will allow KDOT to install their own lock core. KDOT will replace the construction core with a KDOT keyed core upon cabinet acceptance. Dispose of the construction core after cabinets are accepted.

Provide all main cabinet doors with a Corbin Number 2 Lock for KC Scout installations.

14.2.3 CABINET SIZE
Standard 336S cabinet dimensions are approximately 46" x 24" x 22". Standard 334C cabinet dimensions are approximately 66" x 24" x 30". Size each controller cabinet based on the equipment as identified on the Plans and described herein.

14.2.4 LIGHTS
Include 2 fluorescent lighting fixtures mounted inside the front and back portion of the cabinet. Install a door-activated switch to turn on the cabinet lights when the door is open. Install each switch to work each individual light.

14.2.5 ALARM
Install an additional door actuated switch for each main door. Wire this switch such that an alarm can be sent to the TMC when both or either door is opened.

14.2.6 POWER AND LOAD CENTER
The cabinet will be capable of accepting/landing a 120V/240V power circuit. Land all incoming power in a Load Center provided with the cabinet, including circuit breakers. Power will be distributed to the cabinet through a Load Center (Square D Model QO612L100S or equivalent) that will be installed in the cabinet. Ground bars and distribution bars are to be installed adjacent to the Load Center for internal cabinet power distribution. Provide the main power to have its own 2-pole circuit breaker (amperage as defined in the plans) in the load center that will shut off power to the entire cabinet. The load center will be provided with a minimum of two single pole 120V-15A circuit breakers. Distribute cabinet loads across both circuits to balance loads. The heater should be on one circuit and the camera on another circuit. Mount all power terminals and the Load Center a minimum of 12" above the bottom of ground mounted cabinets.

14.2.7 FILTER
Install and house a removable and replaceable furnace type fiberglass filter behind door vents. Ensure the filtration area covers the vent openings. Ensure the filter is held firmly in place with a vented back plate shell that fits over the entire filter providing full support. Ensure the shell is louvered to direct the incoming air downward. Where air-conditioning is required, do not use door vents on the main doors and block the top vents of the cabinet with aluminum panels welded in place.

14.2.8 DIN RACK ADAPTER
Provide each ITS cabinet with a 19 inch recessed DIN rail adapter with DIN rail for placement of Cisco equipment and other equipment. The following minimum requirements apply: rail adapter is a 4U or 5U adapter with a minimum depth of 7.5 inches, 19 inch rack mountable with four mounting holes, aluminum or steel, supports a minimum of 20 lbs of equipment.

14.2.9 FAN
Attach a fan and thermostat assembly to the top of the cabinet.

14.2.10 DRAWER
Supply a pull out drawer for all 334C and 336S type cabinets for placement of laptops or tools.

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14.2.11 SHELF
Supply a shelf for all 334C and 336S type cabinets for placement of laptops or tools.

14.2.12 SURGE PROTECTION
Provide each cabinet with devices listed to UL 1449, current edition, to protect the control equipment from power surges and over voltages. This includes incoming power lines, the power supply, and outgoing lines when applicable. Supply all cabinets with 120/240 volt AC heavy-duty parallel surge protector on the AC service input. Provide surge protection for all cabinets except DMS only cabinets that have the following minimum specifications:
1. Voltage Protection Rating (VPR) of 700V, L-N, L-G, N-G
2. Surge current 100 kA per phase
3. Total peak surge current 80 kA (8x20 US)
4. SCCR of 42k AIC or available short circuit current, whichever is greater.
5. Failure indicator
6. Operating temperature range from -40ºC to 85ºC

If required to supply a DMS only cabinet, the following minimum specifications apply:
1. Voltage Protection Rating (VPR) of 700V, L-N, L-G, N-G
2. Surge current 80,000 amps per phase
3. Total peak surge current 80 kA (8x20 US)
4. SCCR of 200k AIC or available short circuit current, whichever is greater.
5. Failure indicator
6. Operating temperature range from -40ºC to 85ºC

14.2.13 POWER STRIP
Provide a rack mounted power strip receptacle in cabinets. Include a minimum of 8 receptacles on this unit with a minimum of 2 receptacles on front and 6 receptacles on rear. Use UL 1449 rated for 330V surge suppression. Provide power strip to protect from over voltages up to 40,000 amps per phase.

If required to supply a remote controlled IP addressable power strip, use a power strip Dataprobe iBootBar NEMA model or approved equal and that meets the following minimum requirements:
1. Web controlled 8 outlet power strip
2. Multi-outlet, multi-user remote reboot
3. Outlet grouping for simultaneous switching
4. AutoPing for automatic failure detect and reboot

When iBootBar is specified, use iBootBar in lieu of power strip.

14.2.14 HEATER
Provide a Berko PHT500 electric utility heater or approved equal that meets the following minimum requirements. Rack mount the heater or attach to cabinet as approved by Engineer. Ensure the heater provides 500 watt output at 240V or 120V and is of rugged construction. Operate the heater by the use of a non-programmable, mechanical thermostat capable of being set to 40°F or lower. Do not use standard home heating range thermostats.

14.3 CONSTRUCTION REQUIREMENTS

14.3.1 GENERAL
Stake the proposed location of all Type 334C ground mounted cabinets, indicating the direction that the doors will open for approval by the Engineer prior to excavating and pouring of the cabinet foundation. Place pole mounted cabinets so that the top of cabinet shall not exceed 6 feet above ground and cabinet orientation shall not expose workers to traffic. Receive approval by the Engineer for orientation of all cabinets prior to placement. Install all equipment in all ITS cabinets as shown in the Plans and allowing sufficient space between equipment for ease of maintenance and trouble-shooting. Do not locate any devices in the bottom 10 inches of the cabinet except the strip heater. Submit to the Engineer for approval all ITS cabinet layouts including wiring diagram, dimensional plans and cabinet population drawings. Size and space the ITS equipment racks to accommodate any future communications equipment shown on the Communication Routing Schematics shown on the Project Plans.

14.3.2 WIRING
Use insulated, stranded copper wire. Neatly bundle and secure wiring with plastic cable ties. Route incoming field circuits horizontally from the conduit to the back of the cabinet, then vertically to the terminal block. Label all terminals and ensure they are not visibly obstructed. Identify all field leads by means of round aluminum identification tags with a minimum thickness of 0.1 mils attached to the cables with a copper wire to correspond with the Plans. Use outgoing circuits of the same polarity as the line side of the power supply, and the common return of the circuits of the same polarity as the ground side of the power supply. Provide the power supply through three single conductor cables. Carry the ground side of the power supply throughout the cabinet in a continuous circuit, and secured to a ground bus bar in an approved manner. Terminate all field conductors in the ITS cabinet.

14.3.3 CABINET PANEL WIRING
Neatly bundle and secure all wiring on the cabinet panel with plastic cable ties. Use an expandable braided sleeve for any multi-conductor cable between the controller or auxiliary equipment and the back panel. Use discrete insulated wires and solder directly to lugs on the back of terminal blocks and sockets. Do not use printed circuit boards.

14.3.4 CABLES
Locate and secure all cables such that they do not interfere with the removal of the rack mounted equipment or opening access panels on the equipment.

4.3.5 CONDUIT ARRANGEMENT
Install the conduits placed in the controller base such that the appropriate conduit is placed at the location where wire running through it will be attached in the cabinet. Each cabinet may require different conduit placement. Carefully design conduit placement to prevent crossing of cables within the cabinet.

14.3.6 HEATER
Install strip heater in all ITS cabinets and set to maintain a minimum temperature of 40°F at all times. Locate strip heater in the bottom portion of all ITS cabinets.

14.3.7 DOCUMENT POCKET
Install a document pocket on the inside of the front door of the cabinet for storage of wiring diagrams, maintenance logs, cabinet elevation drawings, communication schematic drawings, and test results.

14.3.8 CABINET RACK ELEVATIONS
Submit rack elevation drawings for each ITS cabinet and all racks modified in the KDOT designated facility. Provide rack elevation drawings that are drawn to scale, include both front and back elevations. Label each rack elevation with a summary title stating the location, type of cabinet, cabinet outside dimensions, and rack dimensions (19" rack with XXU slots). Indicate the placement of each rack-mounted piece of equipment, blank panels, and blank spaces. Show vertical dimensions in both inches and rack units (multiples of 1.75 inches). Conform to Documentation section of these specifications.

15.0 FIBER OPTIC CABLE, INSTALLATION, AND HARDWARE

15.1 DESCRIPTION
Provide, install, terminate and test fiber optic cable.

15.2 MATERIALS
Provide fiber optic components that are compatible, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. Provide all cable, components, or assemblies that are best quality, non-corroding, with a design life of at least 20 years. Provide all components or assemblies of the same from the same manufacturer. Provide all components that are the size and type required for the specified fiber.

15.3 FIBER OPTIC CABLE
Provide fiber optic cables in compliance with Corning ALTOS All-Dielectric gel free cables for fiber counts of 2-288 fibers or approved equal and that comply with the following minimum requirements.

Provide all fiber optic cable required for this project that are all dielectric, duct type, with loose buffer tubes and conform to these Specifications. Ensure that the Single Mode Fiber Optic (SMFO) cables contain single mode (SM) dual-window (1310 nm and 1550 nm) fibers. Ensure the multi-mode fiber optic (MMFO) cables contain graded index fiber at 850 nm and 1300mm with 62.5 micron core diameters.

Ensure the optical fibers are contained within loose buffer tubes. Ensure the loose buffer tubes are stranded around an all dielectric central member. Ensure that Aramid yarn and/or fiberglass is used as a primary strength member, and a polyethylene outside jacket is provided for overall protection. Provide and install fiber optic cables as shown in the Plans and specifications. Provide single mode fibers within the finished cable that comply with the requirements in the following table:

Parameters	Value
Mode	Single
Type	Step Index
Core diameter	8.3µm (nominal)
Cladding diameter	125µm±1.0µm
Core to Cladding Offset	≤ 0.6µm
Coating Diameter	245 µm±10µm
Cladding Non-circularity defined as: [1-(min. cladding dia ÷max. cladding dia.)]x100	≤ 1.0%
Proof/Tensile Test	690 Mpa, min.
Attenuation @ 1,310nm	≤0.40 dB/km
Attenuation @ 1,550 nm	≤0.35 dB/km
Attenuation at the Water Peak	≤ 2.1 dB/km @ 1383±3nm
Chromatic Dispersion:	
Zero Dispersion Wavelength	1301.5 to 1321.5 nm
Zero Dispersion Slope at zero dispersion wavelength	≤0.092 ps/(nm2*km)
Maximum Dispersion:	3.3 ps/(nm*km) for 1285 - 1330nm <18 ps/(nm*km) for 1550 nm
Cut-Off Wavelength	<1260 nm
Mode Field Diameter (Petermann II)	9.3±0.5µm at 1310 nm 10.5±1.0µm at 1550 nm

15.4 COLOR CODING
Comply with EIA/TIA-598a "color coding of fiber optic cables."

15.5 GENERAL CABLE PERFORMANCE SPECIFICATIONS
As part of the material submittal for the cable, include evidence that the cable meets the ANSI/ICEA S-87-640 design and test criteria.

15.6 PACKAGING AND SHIPPING REQUIREMENTS
Provide documentation of compliance to the required specifications to the Engineer prior to ordering the material. Attention is directed to "fiber optic testing" elsewhere in these Specifications. Ensure the completed cable is packaged for shipment on reels. Ensure the cable is wrapped in weather and temperature resistant covering. Ensure both ends of the cable are sealed to prevent the ingress of moisture.

Securely fasten each end of the cable to the reel to prevent the cable from coming loose during transit. Provide six feet of accessible cable length on each end of the cable for testing. Ensure that the complete outer jacket marking is visible on these six feet of cable length.

Provide each cable reel with a durable weatherproof label or tag showing the Manufacturer's name, the cable type, the actual length of cable on the reel, the Contractor's name, the contract number, and the reel number. Include a shipping record in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, Etc.), factory test results, cable identification number and any other pertinent information. Ensure that the minimum hub diameter of the reel is at least 30 times the diameter of the Cable. Provide the cable in one continuous length per reel with no factory splices in the fiber. Ensure that each reel is marked to indicate the direction the reel should be rolled to prevent loosening of the cable. Include all installation procedures and technical support information in the Technical Reference Manual.

15.7 FIBER OPTIC SPLICE CLOSURE
Provide all fiber optic splices closure that are a Corning Lanscape Solution Advanced Splice Closure, Splice Closure Family (SCF) Product, or approved equal that meets the following minimum requirements. Provide the end cap of the canister splice closure with two express ports for uncut backbone cables and a minimum of four quick-seal TM mechanical seal cable ports for branch cables or additional backbone cables. Provide fiber optic splice closures with splice trays from the same manufacturer as the splice closure and with sufficient quantity of trays to account for all proposed splices required on the Plans at each splice point plus an additional two trays for future splicing capacity. Suspend all splice closures off floor of vault.

Do not use pressurized splice closures.

For end of reel splicing, use an approved fiber optic splice enclosure sized to accommodate full cable splice in one enclosure.

15.8 FIBER OPTIC CABLE ASSEMBLIES
Provide cable assemblies (jumpers and pigtails) that are Corning Lanscape Solution cable assemblies or approved equal that meets the following minimum requirements. Provide the cable used for cable assemblies that is made of fiber meeting the performance requirements of these Specifications for the fiber optic cable being connected. Provide Manufacturer's attenuation test results for all cable assemblies. Provide breakout cables that comply with the specifications for pigtails.

15.8.1 PIGTAILS
Provide pigtails that are of simplex (one fiber) construction, in 900 micrometer tight buffer form, surrounded by aramid yarn for strength, with a connector on one end. Provide an outer jacket that is yellow PVC with a nominal diameter of 3 mm, marked with the Manufacturer's identification information. Provide all pigtails a minimum of one meter in length. Provide pigtail connectors that are factory terminated. Field terminations are not permitted. Follow the installation procedures outlined for fiber optic cables for pigtails installed in conduit, except that the pulling tension shall not exceed 200 pounds.

15.8.2 JUMPERS
Jumpers may be of simplex or duplex design. Provide all jumpers to be at least six feet in length, sufficient to avoid stress and allow orderly routing. Provide jumpers that have connectors on both ends. Ensure that the outer jacket of duplex jumpers is yellow for all single mode; orange for 62.5µm multimode; aqua for 50µm multimode jumpers. Ensure that the two inner simplex jackets have contrasting colors to provide easy visual identification for polarity. Ensure that all jumper connectors are factory terminated. Do not use field terminations.

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15.8.3 CONNECTORS
Use LC connectors for all new connectors. Many existing connectors are SC. Use SC to LC jumpers to mate with equipment when required to assure all new connectors are type LC. Do not apply index-matching fluids, gels, or anti-reflection coating to the end of the fiber. Ensure that the connector operating temperature range is -40ºC to +75ºC. Ensure that typical insertion loss is 0.2 dB (or better) and the return reflection loss is 50 dB (or better). Ensure that connection durability is less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). Provide connectors with a blue color body or boot.

15.8.4 FACTORY TESTING
Provide all pigtail and jumper connectors that are factory-installed and tested. Document and submit factory test results to the Engineer prior to use. Do not install connectors in the field.

15.9 FIBER DISTRIBUTION UNIT (FDU)
Use the fiber distribution unit (FDU), also referred to as patch panels, to terminate fibers in all cabinets containing fiber terminations. Provide units that are capable of terminating the required number of fibers, as is indicated on the Plans. Use terminations that are SC or LC (as indicated on the plans), -bulkhead connectors which match the fiber optic jumper cables used for connection to the optical termination equipment in the controller assembly. Do not allow fiber optic splicing to occur outside of splice trays housed within the fiber distribution units. Provide all units located in POP buildings to be rack mountable in an EIA 23-inch rack. Provide all units located in roadside devices to be rack mountable in an EIA 19-inch rack. Use units that are of the minimum necessary dimensions to terminate the quantity of fibers indicated on the Plans as to maximize the total amount of available rack space. Provide units which terminate 6 or 12 fibers that occupy no more than one rack unit of space within the cabinet. Comply with the requirements of ANSI/TIA/EIA-568-A and ANSI/TIA/EIA-606.

15.10 CONSTRUCTION REQUIREMENTS
Install all equipment per the manufactures instructions and industry standards. Do not exceed equipment and material ratings. When cable is delivered to the site, conduct optical time domain reflectometer (OTDR) tests on-the-spool. See testing section of these specifications.

15.10.1 INSTALLATION AND SPLICING QUALIFICATIONS
Submit resumes and references detailing fiber splicing and installation experience for on-site personnel to the Engineer for approval. The subcontractors used on this project are considered part of the contractor's team and are also required to submit resumes and references. Submit to the Engineer references including client project manager, phone number and project experience. Failure to comply may result in a declaration of noncompliance. Provide necessary documentation of subcontractor qualifications to the Engineer upon request.

Minimum requirements for on-site personal involved in the installation and testing of fiber optic cable and fiber optic splicing equipment are: two years experience in the installation, testing, use and maintenance of fiber optic cable and fiber optic splicing equipment.

In addition, ensure that a member of the contractor's team, that meets the above qualifications and has been approved by the Engineer, is on-site at all times during the fiber optic cable installation and fiber optic splicing work until successful completion of the work. Receive approval from the Engineer for any substitution of this individual. The Engineer may stop activity on this project as a result of the absence of this on-site personal from the project and the Engineer will continue to charge time to the contractor and will not grant a time extension.

Ensure that installations provide ease of maintenance, with all component parts being readily accessible for inspection and maintenance.

15.10.2 CABLE INSTALLATION
Submit the manufacturer's recommenced procedures for pulling and for blowing of the fiber optic cable to the Engineer for review and approval at least 2 weeks prior to installing cables. Contractor is required to have the equipment and experience to install cable by either method: pulling or blowing. KDOT reserves the right to choose the method of installation. Use mechanical aids to assist cable installation. Use a breakaway swivel to ensure that the tension does not exceed 80 percent of the manufacturer's recommended tension. Ensure that the cable grips for installing fiber optic cable have a ball bearing swivel to prevent the cable from twisting during installation. Ensure pulling of cable is with even tension. Properly seal cable ends during installation.

Use cable pulling lubricant recommended by the cable manufacturer and a non-abrasive pull tape conforming to the provisions described under "Conduit" elsewhere in these Specifications. When blowing cable, use cable blowing lubricant specifically designed for installation of cable by blowing. Ensure that the lubricant will cover the fiber optic cable for the entire pull. Provide cable slack as indicate on the Plans. Record sequential markings (the number of feet printed on the cable) at all splice vaults; organize and submit this information to the Engineer.

During cable installation, keep the bend radius at a minimum of twenty times the outside diameter of the cable. Install cable with no splices except those indicated on the Plans. After installation, cut off and discard the first 10 feet of the cable. These 10 feet have not been included in the conduit and cable table and are considered incidental to other items of work. Following installation of the cable in conduit, seal all fiber optic conduit entrances in controller assemblies, pull boxes and splice vaults with mechanical duct plugs and sealing compound to prevent the ingress of moisture, foreign materials and rodents. Ensure that no residual tension remains on the cable after installation, except the weight of the cable.

Do not perform any "end of day" or "end of shift" cable cuts on any fiber optic cables. For all cable used as a trunkline cable, use full, uncut, virgin reels or spools.

15.10.3 CABLE DAMAGE DURING INSTALLATION
If the cable becomes damaged during installation, stop operations and notify the Engineer immediately. There will be no extra payment or revisions to contract completion time for the replacement of the damaged cable.

15.10.4 SPLICING
When a buffer tube is required to be opened in order to perform fusion splicing, cut only the fibers to be terminated/spliced at a location according to the Plans. Unused fibers or fibers that are continuous through a splice location (expressed fibers) are to be coiled, and neatly routed around the inside edges of the splice tray. Splice optical fibers using the fusion splice method. Ensure alignment is via fiber cores and splicing equipment has fully automated X, Y, and Z axis (3-axis) alignment using a light injection/detection system. Use splicing equipment that has an auto fusion time control to monitor the power level through the splice to complete the fusing process when splice loss is a minimum.

At splice locations where branch cables intersect with trunkline cables, so not open the buffer tubes of the trunkline cable unless a splice is required within that particular buffer tube. Ensure that these "straight through" buffer tubes remain unopened and simply be "expressed" through the splice enclosure; stowed in the bottom of the splice closure beneath the splice tray/s.

Provide splice losses that average less than or equal to 0.05 dB/splice between any two optical ports and do not exceed 0.05 dB for any splice. Protect all splices with a thermal shrink sleeve, 60 millimeters long. Place the completed splices in a splice tray. Place the splice tray in the splice closure or housing. Refer to the "Fiber Optic Cable Segment Diagram" in the Plan Set concerning the required labeling text for each cable segment.

An "end of reel/spool" trunkline splice is allowed every 10,000 cable feet minimum. Contain full cable splice in a single splice enclosure of adequate size. Redline the location of the trunkline splice enclosure/s onto the plan set and formally submit along with the fiber optic cable system test report.

15.10.5 SPLICE ENCLOSURES
Use a fiber optic splice enclosure contained inside a splice vault for underground splicing. Contain all fibers that require splicing within one enclosure. Upon completion of the splices, secure the splice trays to the inner enclosure. Seal the enclosure using a procedure recommended by the manufacturer that will provide a waterproof environment for the splices. Ensure a tight salt-resistant and waterproof seal is made which will not leak upon aging.

Fasten the enclosure securely to the wall of the pull box in a manner that allows the cables to enter at the end of the closure without violating the minimum bending radius for the cables, while maximizing the clearance from the bottom of the pull box.

15.10.6 FIBER DISTRIBUTION UNIT (FDU)
Secure the main cable into the FDU in a workman like manner. No bends to exceed a 2.0 inch minimum bend radius. Sparingly and carefully use wire pulls as to not pinch the fiber.

15.10.6.1 SLACK CABLE
Leave sufficient amount of fiber optic cable in the FDU to facilitate removal of splice trays to allow splicing to occur on a splice table.

15.10.6.2 TERMINATION SPLICES
Termination splices are splices in an equipment cabinet that join fibers in a cable to pigtails or connector modules. Place the termination splices in a splice tray and place the splice trays in the fiber distribution unit (FDU). Loop the individual fibers at least one full turn within the splice tray to avoid micro bending. Maintain a 2.0 inch minimum bend radius during installation and after placing fibers in the tray. Individually restrain each fiber in a splice tray. Place the optical fibers in the splice tray to provide no discernible tensile force on the optical fiber. Label every Closet Connector Housing Module by placing appropriate labels with pin/port numbers 1 through 12 on the Module; Label the fiber optic SFP Ports on every Ethernet Switch with the text (TX1, RX1, TX2, RX2).

15.10.7 CONNECTIONS
Install protective caps on all unmated connectors.

15.10.8 FIBER OPTIC CABLE TESTING
Perform Fiber Optic Cable Testing in accordance with the requirements set forth in the testing section of these Specifications.

16.0 CELLULAR MODEMS

16.1 GENERAL
Furnish all tools, equipment, materials, supplies and manufactured articles and perform all operations necessary to install cellular modems as shown on the Plans and as specified herein.

16.2 MATERIALS

16.2.1 CELLULAR MODEM
Provide a modem that is a Sierra Wireless Raven X, Raven XT, or approved equal, as indicated on the Plans. The following minimum requirements apply: Support automatic scheduled over the air Preferred Roaming List (PRL) updates and be supported on Verizon network, ALEOS embedded intelligence, high speed processor, embedded machine protocols, class 1 division 2 certified, serial and Ethernet interface. Provide associated antennas, antenna cables, and power supplies with the modem at no additional charge. KDOT will activate all cellular modems.

16.2.2 ANTENNA
Use antenna assemblies with cellular modems that are of the dual-band (800~960/1710~2500 MHz) Yagi style, have a working temperature of -40°C to 60°C and an OMNI direction whip style antenna that uses a metal ground plane. Provide an antenna that is a Wilson 304411 or approved equal to meet the following minimum requirements. Provide a vandal resistant type antenna base. Mount antenna to the top of the ITS device pole or structure with mounting hardware that is approved by the Engineer.

16.2.3 ANTENNA CABLE
Provide riser cables that are of a low-loss co-axial design. Ensure loss per 100 feet does not exceed 5 dB at 1800 MHz. Jumper cables may be used inside cabinets between cellular modems and lightning protection devices. Jumper cables may not exceed three feet in length and may not have losses greater than 18 dB per 100 feet. Provide outer jackets of all RF cables that are flame retardant and UV (sunlight) resistant.

16.3 CONSTRUCTION REQUIREMENTS

16.3.1 GENERAL
Incidental items include all connectors, adaptors and cables, including but not limited to RF co-axial cables, DC power cables, AC power cables, Ethernet cables, or any other interface cables, . There will be no separate payment for incidental items. KDOT will provide IP addressing. Construct and make all necessary network configurations. Coordinate with KDOT and receive approval for any downtime necessary to connect the cellular modems.

16.3.2 ANTENNA INSTALLATION
Install antennas as per manufacturer's instruction and in accordance with any applicable electrical or construction codes. Align antennas to optimize signal quality (received signal strength indication (RSSI) and signal to noise ratio (S/N). Determine the appropriate antenna azimuth and align the antenna toward the appropriate cellular communication tower. Supply the necessary test equipment for antenna alignment to achieve the maximum signal transfer.

17.0 POINT-TO-POINT (P2P) ETHERNET RADIO (LICENSED BAND)

17.1 DESCRIPTION
Furnish, install, configure and test an Ethernet radio. If required to supply a radio, provide a Ceragon Ethernet radio or approved equal that meets these specifications. Ensure that the radio provides an acceptable wireless Ethernet communication link when combined with another radio.

17.2 SPECIFICATIONS AND REQUIREMENTS
Provide wireless equipment that meets the following specifications and requirements:

1. Point-to-Point (P2P).
2. Operate in 11 GHz FCC licensed frequency band.
3. Use Time Division Multiplexing (TDM) wireless modulation.
4. Allow Quality of Service (QoS) management.
5. Support 802.1Q headers to carry VLAN tags and priority markings shall support VLAN tagging per port.
6. Use a native Ethernet technology for Payload Interface. Mapping of Ethernet over TDM will not be accepted. Equipment will support FE and GE autosensing interfaces.
7. Frame Length Support: Support for "Baby Jumbo"frames up to 1632 Bytes.
8. Buffer Size: overall buffer size (used to manage traffic queues) of at least 1 Mb. Usable by a single service, if required by traffic profile.
9. RF Bandwidth: 10 MHz, 30 MHz capable.
10. Receive sensitivity (BER 10-6): With 10MHz channel spacing, range between -90.5 dBm at QPSK to -73.0 dBm at 256 QAM.
11. Support forward error correction.
12. Fade and Intermodulation Countermeasures: Support for adaptive equalization, adaptive modulation and space diversity
13. Minimum supplied bandwidth 100Mbps. Software expandable to 200Mbps without hardware changes. During testing, actual bandwidth to be verified with RFC2544 throughput and latency tests.
14. FCC Part 15 compliant and certified for EMC.
15. Type of emission: Licensed only (compliant with FCC Part 101).
16. Provide 10/100 BaseT RJ-45 Ethernet port.
17. Minimum operating temperature range for P2P radio Outdoor Unit (ODU): -40 to 55 degrees C. Minimum operating temperature range for P2P radio Indoor Unit (IDU): -5 to 55 degrees C.
18. Security: Provide user-controlled levels and privileges and user access control.
19. Management: Ethernet SNMP remotely, ASCII RS-232 locally or equivalent. Fully managed remotely, allowing downloading of system configuration, equipment software or system operation firmware changes.
20. Rack mounted
21. Warranty: In-warranty product repairs are covered up to 5 years.
22. Advance replacement: Replacement product is shipped express overnight (in most cases) in case of a verified product issue.

17.3 CONSTRUCTION
Provide all radio channel planning, communication path analysis, power level settings, antenna positioning (X, Y and Z axis including tilt), and Radio Frequency Interference (RFI) and Electro-Magnetic Interference (EMI) resolution so that fully functional, operational and secure communication links are provided. A preliminary design plan has been provided in the plan set, but it is understood that the design may need to change based on field conditions encountered. Take into consideration existing licensed radio networks operated by others. Install, orient and align the P2P radios in order to optimize performance. Reference and follow installation guidelines provided by the radio manufacturer. Provide all antennas, pipes, mounts, cabling, lightning protection, grounding, configuration, testing and other subsidiary items and include in this individual bid item.

Furnish all tools equipment, materials, supplies and manufactured articles and all operations necessary to install wireless equipment and construct, configure and test the wireless communications facilities as shown on the plans and as specified herein. Use stainless steel for all hardware and fasteners.

Lightning Protection: For protection of the P2P radio equipment, Provide and install bi-directional replaceable gas tube lightning arrestors (Polyphaser Model RGT or equivalent).

Mount the ground level network interface, power supply and grounding block in the cabinet or data closet at the site. Contact Engineer to coordinate FCC required prior coordination notice and FCC License Application. Contact Engineer to obtain network configuration information including: IP addresses, VLAN tags and security key info for equipment installed.

Connect the P2P Ethernet radio to the Ethernet switch or other Ethernet-enabled device at the site.

17.4 TESTING/SUBMITTALS
Develop a test plan to demonstrate that each P2P Ethernet Radio is providing a wireless link capable of a continuous data rate of 100 Mbps. Complete a minimum 15-day test period before final acceptance. Submit test plan to the engineer for approval. Incorporate any changes requested by the engineer into the test plan and test each link. Document all test results and submit these to the engineer for approval. Provide an Excel spreadsheet (electronically) that details all equipment received and installed as well as all configuration settings, including VLAN's.

18.0 POINT TO MULTIPOINT (P2M) ETHERNET RADIO

18.1 DESCRIPTION
Furnish, install, configure and test a P2M Ethernet Radio. Ensure that the P2M radio provides an acceptable wireless Ethernet communication link when combined with another P2M radio.

18.2 SPECIFICATIONS AND REQUIREMENTS
Provide wireless equipment that meets the following specifications and requirements:

1. Operates in unlicensed frequency band, 5.15-5.35 GHz, 5.47-5.725 GHz, 5.725-5.850 GHz or in the 4.94-4.99 GHz band
2. Radio Access Method: Time Division Duplex (TDD)
3. Channel: 10 MHz, 20 MHz
4. Central Frequency Resolution: 5 MHz, 10 MHz
5. Typical Sensitivity (dBm at antenna port):

Modulation	1	2	3	4	5	6	7	8
Level* 20 MHz	-89	-88	-86	-84	-81	-77	-73	-71
Level* 10 MHz	-92	-91	-89	-87	-84	-80	-76	-74

*Modulation Level combines modulation scheme and coding gain.

6. Modulation Scheme (Adaptive): OFDM: BPSK, QPSK, QAM16, QAM64
7. VLAN Support: Based on IEEE 802.1q, QinQ 802.3ad
8. Layer-2 Traffic Prioritization: Based on IEEE 802.1p
9. Layer-3 Traffic Prioritization: IP ToS according to RFC791 and DSCP according to RFC2474
10. Layer-4 Traffic Prioritization: UDP/TCP port range
11. Security: WEP 128-bit authentication, AES128, WEP 128, and certified FIPS-197 mode built-in encryption.
12. Remote Management Access: From wired LAN or wireless link
13. Management Access Protection: Multilevel password; configuration of remote direction (from Ethernet only, wireless only, or both sides); configuration of IP addresses of authorized stations
14. Software Upgrade: via TFTP and FTP
15. SNMP Agents: SNMP v1 client, MIB II, Bridge MIB
16. Allows Quality of Service (QoS) management
17. Ethernet Interface: 10/100 BaseT RJ-45 port
18. Operating Temperature, SU/AU Outdoor Units: -40o C to 55o C
19. Power over Ethernet (POE)
20. Point-to-Multipoint (P2M)
21. Minimum rated/actual bandwidth of 54/24 Mbps
22. EMC and Radio: FCC Part 15 compliant

18.3 CONSTRUCTION
Install P2M Ethernet Radios at locations as shown on the plans.

Provide for all radio channel planning, communication path work, power level settings, antenna positioning (X, Y and Z axis including tilt), Radio Frequency Interference (RFI) and Electro-Magnetic Interference (EMI) resolution so that fully functional, operational and secure communication links are provided. A design plan has been provided in the plan set but it is understood that that design may need to change based on field conditions encountered. Take into consideration existing unlicensed radio networks operated by others. Install the radios and orient to maximize the Signal-to-Noise Ratio (SNR) levels. Reference and follow installation guidelines provided by the radio manufacturer. Provide all antennas, pipes, mounts, cabling, lightning protection, grounding, configuration, testing to provide a fully functional system.

Furnish all tools, equipment, materials, supplies and manufactured articles and all operations necessary to install wireless equipment and construct, configure and test the wireless communications facilities as shown on the plans and as specified herein. Use stainless steel for all hardware and fasteners.

Provide surge protection (Transtector Model TSJ GbE PoE or equivalent) on all P2M radio cables entering a cabinet or data closet.

Mount the P2M Radio Outdoor Unit/Antenna as high on the supporting structure as practical, while remaining within the 30 degree protected radius beneath the air terminal (if installed). Do not allow the mounting of the radio to interfere with the camera lowering device or with the lightning air terminal.

Use outdoor-plant rated industrial Cat5E cable (Commscope 2003 Black or approved equivalent) with shielded RJ-45 end connectors (Digi-Key A9115-ND or approved equivalent) between the radio outdoor unit and the cabinet or data closet surge protector.

Mount the network interface, power supply, surge suppression, and grounding block neatly in the cabinet or data closet at the site.
Contact Engineer to obtain network configuration information including; IP addresses, VLAN tags and security key info for equipment installed.
Connect the P2M Ethernet radio to the Ethernet switch or other Ethernet-enabled device at the site.

Apply permanent external labeling on radio equipment in the cabinet according to information to be provided by the engineer.

19.0 ITS COMMUNICATIONS INTEGRATION

19.1 DESCRIPTION
This work consists of the installation of communication equipment and configuration of hardware settings and software parameters (both wireless and fiber optic), such as IP addressing and serial port definitions, VLAN definitions and network management parameters of KDOT furnished and Contractor furnished communications equipment as defined herein, in KDOT designated facilities, or ITS cabinets as shown on the Plans, or directed by the Engineer.

Configure all communication equipment based on a template provided by the Engineer for each type of ITS component such as Ethernet switches, modems, CCTV cameras, and DMS.

Provide a complete, functional, wireless, fiber optic and electronic communications system, including all necessary cables, connections, surge suppressors, antenna alignments and configurations in accordance with the KDOT and equipment manufacturers' specifications and as specified on the Plans and Specifications. Provide equipment as specified on the Plans and Specifications, integrate, test, demonstrate and receive KDOT's approval of the complete system.

Provide troubleshooting, reinstallation, and reconfiguration of all KDOT furnished and Contractor furnished communication equipment in the event of communication equipment failure. Receive approval by the Engineer for any reconfiguration.

19.1.1 CERTICIATION OF CONTRACTOR PERSONNEL
Use a CISCO certified technician, or in the presence of and under the responsible charge of an employee or subcontractor who is a CISCO certified technician for all configuration of Cisco switches. Before starting work, provide the Engineer with the names of the personnel assigned to perform switch configuration and a copy of their certification card.

19.2 MATERIALS

19.2.1 GENERAL
Supply all tools, equipment, materials, supplies and manufactured articles and perform all operations necessary to install KDOT furnished equipment and construct the communications facilities as shown on the Plans and as specified herein, or as directed by the Engineer.

19.2.2 CONNECTORS, CABLES AND ADAPTERS
Incidental items include all connectors, adaptors and cables, including but not limited to serial cables, alarm cables, all power cables for Cisco equipment, DC power cables, AC power cables, fiber optic jumpers, DS-1 cables, Ethernet cables, interface cables, located within and between all ITS cabinets and KDOT designated facilities. There will be no separate payment for incidental items. Use outdoor rated for cables exposed to weather conditions or installed in field cabinets.

19.3 CONSTRUCTION REQUIREMENTS

19.3.1 GENERAL
Furnish all tools, equipment, materials, supplies, and manufactured articles and perform all operations necessary to install KDOT furnished equipment and Contractor furnished equipment and construct the communications facilities as shown on the Plans and as specified herein.

19.3.2 KDOT FURNISHED EQUIPMENT
Receive and review the installation wiring diagrams from the KDOT furnished communication equipment suppliers. Use these drawings to make necessary terminations to all KDOT furnished and Contractor furnished communication equipment.

19.3.3 COMMUNICATION SCHEMATIC DRAWINGS
Submit as-built communication schematic drawings to the Engineer based on the actual connections made in the field and in the KDOT designated facility. Include in the as-built communication schematic drawings all equipment, both KDOT furnished and Contractor furnished. Leave a copy of these approved drawings in each respective ITS cabinet or KDOT designated facility. Use documentation format as specified in these specifications.

19.3.4 NETWORK CONFIGURATIONS
KDOT will provide IP addressing and configuration files for each KDOT furnished communication equipment type. Make all necessary network configurations. Coordinate with KDOT and receive approval for any downtime necessary to connect the new network components.

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19.3.5 COORDINATION
Provide a skilled staff member to attend a coordination meeting prior to installation of communication equipment.

19.4 INTEGRATION WITH CENTRAL SOFTWARE
Ensure proper integration and functionality with systems as identified by KDOT or KC Scout. Ensure continuity of functions currently in place, and prevent disruption of service for any sites not included in the plans. Coordinate with KDOT or KC Scout to identify affected systems and devise methods to prevent service interruptions. Ensure proper integration and functionality with:

1. For systems integrating with KC Scout, the Genetec Omnicast video distribution system, TransSuite, and Wowza systems.
2. For systems integrating with KDOT ATMS, the MIST CCTV management software and BARCO video wall display in Wichita, KS.

Perform software integration testing in coordination with KDOT or KC Scout on ATMS and video distribution systems. Configure both KDOT furnished and Contractor furnished equipment as needed in order to achieve functionality prescribed by KDOT. Travel to site locations as many times as required to test and configure equipment to provide a working communication system with KDOT or KC Scout central software. Complete integration prior to final acceptance.

20.0 ITS COMPONENT TESTING

20.1 DESCRIPTION
Test all ITS devices and communication links installed in this project. Demonstrate functionality of each device using a test plan provided by KDOT. Test plans will include a list of items to be tested, a test method (observation, calculation or demonstration) an expected result and an obtained result. Seek KDOT approval for input or specific procedures or for modifications to the test plan.

First, test each unit with its vendor software, then coordinate with KDOT to test with KDOT ATMS software, finally check transmission at site and at the KDOT designated facility. Demonstrate through testing that the equipment associated with each cabinet works as required. The tests described below are in addition to any other tests required herein.

20.2 MATERIALS
Provide all testing equipment, labor, materials and incidentals required to carry out the KDOT provided test plan and all tests described in this section.

20.3 CABINET LEVEL FUNCTIONAL TESTS
Perform testing on each of the field components installed. Ensure that this testing verifies the proper functioning of the field components after installation. Perform the tests identified under this type of testing on each installed component and ensure the results are signed off by the Engineer or designated KDOT representative.

Provide copies of the test results for each component to KDOT and if requested, the test hardware and software.

20.3.1 CCTV PAN-TILT-ZOOM (PTZ) CAMERA CONTROL TEST
Ensure that the PTZ camera control test verifies the functionality of the installed camera controller as well as the serial communication to the camera controller. This test will use vendor test software to the CCTV camera to be commanded to turn on; turn off; send a message to the controller to pan right and left; send a message to the controller to tilt up and down; and send a message to the camera controller to zoom-in and zoom-out.

20.3.2 CCTV VIDEO CAMERA THROUGHPUT TEST
Ensure that this test demonstrates that video data from the CCTV camera can be manually selected on the IP network switch and be displayed on a workstation monitor at a KDOT designated facility.

20.3.3 CCTV STAND-ALONE TEST
Following the installation, conduct an approved stand-alone test for each CCTV to verify that the units operate as specified. If a unit fails to pass the stand-alone test, correct or replace the unit, and repeat the test until proven successful.

For each unit of equipment, conduct approved stand-alone tests that exercise all stand-alone functional operations of the equipment including the following: control of focus, iris, and power on/off; range of pan, tilt, zoom and digital zoom; presence and quality of video signal; camera ID and preset text generation; and pan and tilt limit stops are set to the Engineer's specification.

Stand-alone test the CCTV camera assembly for no-less-than 24 hours as a complete unit to include the CCTV camera, all cabling, all surge suppression, video encoder and/or IP network switch (if applicable) as required per project plans and specifications. This testing will require that each CCTV location be connected to a laptop to exercise the CCTV camera functionality.

20.3.4 CCTV SUBSYSTEM TEST
Verify the video transmission quality; response to all central software commands identified under functional requirements; horizontal and vertical resolution; and verify the video transmission quality to the KDOT designated facility. Conduct the subsystem test in the following order: Test with vendor software at site, test with KDOT ATMS software, verify video transmission at site, and verify video transmission at KDOT designated facility. Test video for smooth frame transmission, good color and overall image quality. Ensure no video locking.

20.3.5 CCTV TEST PERIOD AND FINAL ACCEPTANCE
The test period for each CCTV will be 60 days, to commence when all work has been completed, materials have been furnished and completely installed, and copies of the CCTV test results have been received and accepted by the Engineer. Final system acceptance for each CCTV camera will be defined as when the CCTV camera assembly has been operated continuously and successfully for 60 calendar days with no more than 2 calendar day's downtime due to mechanical, electrical and/or other malfunctions.

20.4 DYNAMIC MESSAGE SIGN TEST
Perform the DMS test to evaluate the functionality of the installed DMS signs as well as the communication links between the controller and the KDOT central software. Use vendor software and KDOT's current NTCIP compliant central software for this test. Contact and coordinate with the DMS manufacturer to perform sign commissioning. Provide all equipment required to complete testing.

20.4.1 DMS STAND-ALONE TEST
Following the installation, conduct an approved stand-alone test for each DMS assembly to verify that the unit operates as specified. Complete the stand-alone test for each DMS within two weeks following the installation of the DMS case, cabinet, power and communication links. If a unit fails to pass the stand-alone test, correct or replace, and repeat the test until proven successful.

Perform the stand-alone test for the DMS system using both the controller front display panel and a notebook PC. Provide the notebook PC. The DMS manufacturer shall provide the vendor software for the test.

20.4.2 DMS COMMISSIONING
Manufacturer shall perform on-site DMS commissioning including communication testing with KDOT central software. DMS commissioning includes the following items: DMS system is installed correctly, DMS system is functioning correctly, DMS is ready for normal operations without the need for an additional site visit, record of all tests and setup tests performed. Manufacturer shall provide procedures. DMS commissioning shall include the following tests in this order: test with vendor software at site, test with KDOT central software, verify transmission at site, verify transmission at KDOT facility.

20.4.3 DMS TEST PERIOD AND FINAL ACCEPTANCE
Test each DMS for a 60 day test period, to commence when all work has been completed, materials have been furnished and completely installed, and copies of the DMS stand-alone and commissioning test results have been received and accepted by the Engineer. Final system acceptance for each DMS will be defined as when the DMS assembly has been operated continuously and successfully for 60 calendar days with no more than 2 calendar day downtime due to mechanical, electrical and/or other malfunctions.

20.5 VEHICLE DETECTOR TEST
Test each radar vehicle detector to confirm the accuracy of the data reported to the KDOT designated facility staff.

20.5.1 VOLUME
Use human observers to count the vehicles in each lane during a 15 minute interval. The total for each lane shall be compared with the lane total for the same period reported by the central computer. The totals from the computer and from the observers must not differ by more than 10 percent for every lane.

20.5.2 SPEED
Conduct this test one lane at a time. Use a trained, experienced operator with a LIDAR gun to measure the speeds of individual vehicles, excluding large trucks, in the lane. Measure as many vehicles as possible in a 10 minute period and the results averaged. Calculate a weighted average speed for the same period based on data from the central computer. Weight the speed for each reporting period by the number of vehicles in that reporting period. The speeds from the computer must be within fifteen percent of the observed speed for every lane. If vehicles in the closest lane interfere with speed measurements in other lanes, provide a means of elevating the observer enough to provide a clear line of sight to the vehicles being observed.

20.5.3 VEHICLE DETECTOR TEST PERIOD AND FINAL ACCEPTANCE
Test each Vehicle Detector for a 60 day test period, to commence when all work has been completed, materials have been furnished and completely installed, and copies of the test results have been received and accepted by the Engineer. Final system acceptance for each Vehicle Detector will be defined as when the detector has been operated continuously and successfully for 60 calendar days with no more than 2 calendar days downtime due to mechanical, electrical and/or other malfunctions.

20.6 WIRELESS DATA COMMUNICATIONS LINK TEST
Prior to testing an installed link, calculate expected signal strengths for each link and expected throughput. Include the following in the test plans installation documentation for each site: Transmit power setting, antenna type and gain, antenna azimuth, transmit frequencies (or channel/band for broadband equipment), antenna height, and minimum receive power for the applicable modulation scheme/throughput as provided by the manufacturer. Include in the test reports: signal quality, modulation scheme selected (or selected by device if automatic), link throughput for TCP and UDP protocols using a tool such as Iperf over a period of no less than 60 seconds and packet loss over a period of no less than 60 seconds. Include in the test report comparisons of observed and expected throughput for each link. Provide test results to the Engineer.

20.7 FIBER OPTIC CABLE INSTALLATION TEST
After all the splices and terminations have been completed, test each fiber, including spares, with a power meter/stable laser source and OTDR between termination points. Test fiber optic cables bi-directionally. Provide launch cable when testing. Model this test after FOTP-171 insertion loss.

Conduct power meter tests for each fiber to demonstrate connectivity and attenuation from origin to destination. Demonstrate that the attenuation for each fiber path including connectors, and splices as a whole, comply with the loss budgets required by these documents and the optical equipment being installed. Submit a test result summary sheet of each fiber to the Engineer for review and approval. Test between termination and ITS Cabinets as designated by the Engineer.

In addition to the above, conduct bidirectional OTDR and power meter tests end to end. End to end is defined as KDOT designated facility to field device. This includes tests for each fiber from the designated KDOT facility to the field device.

Conduct the tests at test wavelengths of 1310 nm and 1550 nm. Request from the Engineer an electronic copy of the blank testing worksheet. Use this worksheet as a template for recording OTDR and power meter test data as well as physical characteristics of the fiber optic cable and the cable run. Provide OTDR trace results in a graphical form acceptable to the Engineer.

Provide sample OTDR results to the Engineer for approval before testing begins. As indicated on the form, the actual link loss must be less than the calculated maximum for each fiber and no unexplained events shall exist. If any fiber fails to satisfy the specified performance requirements in the 1310 nm or 1550 nm wavelength tests, determine the cause and correct the failure to the satisfaction of the Engineer. Provide electronic copies of all test results to the Engineer. Provide test results with a summary table indicating fiber data, 1310 nm results, 1550 nm results, and fiber identification.

Coordinate with CenturyLink to verify testing and confirm results. If issues are identified that require additional site visits caused by CenturyLink splicing or other factors out of the Contractor's control, Contractor shall document the issues and notify KDOT to determine if change order is needed. All additional expenses resulting in additional site visits shall be approved by KDOT in advance. Any additional Contractor work performed without approval from KDOT will not be paid.

20.8 DOCUMENTATION
TECHNICAL REFERENCE MANUAL (TRM)
Compile all vendor-supplied component information required by these Specifications into a Technical Reference Manual (TRM). Provide final documentation to the Engineer for review prior to production of the TRM. Deliver two (2) copies of the final TRM to the Engineer before final acceptance of the project. Provide the copies on 8 1/2 " X 11" paper and bound in three-ring hard covered binders complete with dividers and identifying cover. Provide the TRM to the Engineer and the KDOT ITS unit on a CD or flash drive that contains viewable PDF documents. Include in the TRM all specifications, manuals, and publications provided by the vendor of each ITS component, communication elements, and other pieces of equipment and cable to the lowest module or component level. Include in the TRM cabinet diagrams and test results for all equipment as described elsewhere in the Specifications.

Include in the TRM, as a minimum, the following subsections:
1.Master Items Index
2.ITS Component/Equipment Description and Technical Data
3.Vendor Software Documentation
4.Component Operations
5.Corrective Maintenance
6.Preventative Maintenance
7.Parts List
8.Test Results
9.Configuration Files
10.Warranties
11.Cable and Conductors Certifications
12.Lowering Device Installation Certifications from Manufacturer
13.Cabinet Rack Elevations
14.As-Built Plan Set and Shop Drawing
15.GPS Documentation and Tie-Point Measurements
16.In-Cabinet Documentation

20.8.1 MASTER ITEMS INDEX
Provide a master items index as the first section of the TRM. Provide in this section a component index into the TRM for easy reference of data relating to that component.

20.8.2 ITS COMPONENT/EQUIPMENT DESCRIPTION AND TECHNICAL DATA
Contain in this section an overall description of the ITS component or equipment and associated equipment cables with illustrative block diagrams. Identify in this section all equipment and cables in the system stating the exact module and option number that are employed in the system. Provide technical data specifications and configuration settings for every type of equipment or cable. Clearly describe any modification that is made to the equipment. Clearly identify in these "as-built" configuration listings the specific piece of equipment in the system that they belong to, not just the type of equipment. Print and include any software executable configuration files in this document. Also deliver these software executable files in a computer readable format stored on CD-ROM. Provide this document to cross-reference the printed file listing with the stored files file-name.

Contain in this section all wiring and termination diagrams for each ITS component and all communications and other support equipment. Provide system-wide schematic and wiring drawings to identify the type of equipment at each location and the function of all equipment. Show on the drawings how the system is interconnected. Provide a comprehensive list of cabling and wiring s to clearly identify the interconnection and labeling of all equipment in the field.

20.8.3 VENDOR SOFTWARE DOCUMENTATION
Provide user manuals for all vendor-supplied software.

20.8.4 COMPONENT OPERATIONS
Ensure that the TRM describes how to operate each component of the system and each particular type of equipment and software. Provide equipment layout, layout of controls, displays, software operating procedures and all other information required to correctly operate each component of the system and each functional unit. Provide procedures for initial tune-up of each piece of each system and adjustment and checkout required to ensure that the systems are functioning within the performance requirements. Clearly document any special procedures. Explain the functions and settings of all parameters.

20.8.5 CORRECTIVE MAINTENANCE
Include in the manual fault diagnostic and repair procedures to permit the location and correction of faults to the level of each replaceable module. Procedures shall include alignment and testing of the equipment following repair, the test equipment, tools, diagnostic software required and the test set up.

20.8.6 PREVENTATIVE MAINTENANCE
Include in the manual procedures for preventative maintenance in order to maintain the performance parameters of each component of the various systems, equipment and cables within the requirements of the specifications.

20.8.7 PARTS LIST
Include in the manual a list of all replaceable parts with exact parts description and number and a directory of recommended suppliers with correspondence address, telephone and fax numbers. Include what date the warranty started and how long it is in effect.

20.8.8 TEST RESULTS
Include in this section a copy of the results for all the tests that have been conducted for the contract including but not limited to ITS component test results. Include in this section as applicable to the Plans:
1. Mandrel test results
2. Ground resistance testing and certifications
3. CCTV test results
4. DMS test results
5. Vehicle detector test results
6. Wireless data communications test results
7. Fiber optic cable installation test results
8. Integration test results

20.8.9 CONFIGURATION FILES
Save all configuration files for Contractor and KDOT supplied electronic equipment and maintain an up-to-date detailed component inventory. Maintain both hard copy and electronic files (Word or Excel) s and deliver up-to-date copies of these files to the Engineer periodically as work progresses, or as directed by the Engineer.

20.8.10 WARRANTIES
Include in this section a complete copy of all warranty information for Contractor supplied equipment as specified in these specifications. Provide effective dates for all warranties. Warranty information will be verified by KDOT prior to final project acceptance.

20.8.11 CABLE AND CONDUCTOR CERTIFICATIONS
Include in this section all cable and conductor certifications from the supplier indicating that the materials meet the requirements of these specifications; and that the cable furnished was from a lot manufactured by (manufacturer's name) whose test results indicate compliance with the specifications. Include packaging and shipping labels showing the manufacturer's name, the cable type, and actual length of cable on reel, contractor's name, contract number, and reel number. Also include the date of manufacture, cable characteristics (size, attenuation, bandwidth), factory test results, cable identification number and other pertinent information.

20.8.12 LOWERING DEVICE INSTALLATION CERTIFICATIONS FROM MANUFACTURER
Include in this section all lowering device installation certifications from the manufacturer indicating that the lowering device was installed correctly and that a factory representative was on site to assist with the assembly and testing of the installation. Include the installation instructions and the operational specifications of the lowering device.

20.8.13 CABINET RACK ELEVATIONS
Include in this section all cabinet rack elevation drawings for each field cabinet assembly and all racks modified in a KDOT facility. Provide elevations that are drawn to scale, including both the front and back elevations. Label each drawing with a title stating field cabinet name, location and mile post along with a summary stating type of cabinet, cabinet outside dimensions, and rack dimensions (19" rack with XXU slots). Indicate on the drawings the placement of each piece of equipment, blank panels, and blank spaces. Show vertical dimensions in both inches and rack units (multiples of 1.75 inches). Indicate in the drawings blank space reserved for KDOT provided equipment.

20.8.14 AS-BUILT PLAN SET AND SHOP DRAWING
Keep and maintain at the job site half size contract Plans with shop drawings and submittals. Legibly mark these Plans in a contrasting, reproducible color to depict any changes or other deviations that have been made to the Plans or approved shop drawings including buried or concealed construction and utility features that are revealed during the course of construction. Record the locations of all buried utilities that differ from the location indicated or that were not indicated on the contract Plans. Record the tie-point measurements for each buried electrical pull box. Supplement the as-built documents by any detailed sketches as necessary or directed to indicate fully existing conditions and the work as actually constructed. Prior to final acceptance of the project, provide the Engineer with the original as-built plan set with shop drawings, two half-size copies of the complete as-built plan set and record drawings, and one electronic PDF copy.

Include in this section an electronic PDF of as-built plan set and shop drawings.

20.8.14.1 SPLICE VAULT DOCUMENTATION
Clearly record on the communications layout/plan sheets of the as-built plan set, the sequential fiber cable markings at all splice vaults, for each cable run entering into the splice vault.

20.8.15 GPS DOCUMENTATION AND TIE-POINT MEASUREMENTS
Include in this section an electronic list of GPS readings in excel format for all installed devices including but not limited to DMS foundations, CCTV foundations, detection, cabinets, pullboxes, splices vaults, wireless towers and power supplies. Coordinate with KDOT on the current GPS format for coordinates. The accuracy of the GPS reading shall be within 3 feet. Also include in this section a sketch including the 3 tie-point measurements for each buried electrical pull box.

20.8.16 IN-CABINET DOCUMENTATION
Provide to the Engineer final in-cabinet documentations for review and acceptance. Provide documentation that is computer generated and use 8 1/2"by 11"paper size. Place approved documentation in each cabinet folder. Include at a minimum the following documentation in the cabinet: the maintenance log, cabinet elevation drawings, communication schematic drawings, and test results. If changes occur during construction provide to the cabinets the revised documentation.

Include in this section an electronic PDF of in-cabinet documentation.

21.0 TRAINING

21.1 DESCRIPTION
Conduct training courses for KDOT operations and maintenance staff on operating components of the ITS system if requested by KDOT. Design training courses to ensure that KDOT staff achieves a full knowledge and appreciation of the design, operation and maintenance of equipment. Training may consist of field device operations and maintenance training, field communications operations and maintenance training, and system (outside plant) operations and maintenance training.

21.2 MATERIALS
Provide all training documentation, and coordination with vendors to provide teaching staff. Provide the training to consist of lectures and demonstrations and shall provide practical (hands-on) training and experience.

Provide 5 hard copies of the training manuals and 1 electronic copy of the training manuals.

Provide a detailed training plan and a syllabus for each course for the approval of the Engineer. Include in the information tentative dates for courses, locations, and an outline of topics and names of instructors. Provide this information to the Engineer at least 30 days in advance of the training course.

21.3 CONSTRUCTION REQUIREMENTS
Provide up to a 2-day training class to train operations and field maintenance personnel at KDOT's request. Include with the training in-the-field demonstrations.

22.0 BASIS OF ACCEPTANCE FOR ITS SYSTEM

The ITS system will be accepted when all test results, documentation including but not limited to the TRM, and as-built plans are received and approved by the Engineer, all test periods are successfully completed, and all training is completed.

23.0 MAINTENANCE AND WARRANTY

23.1 MAINTENANCE
Maintain all equipment and cables installed in this project until the ITS system has passed all testing requirements specified here in and has been accepted by KDOT. Once the operational test period has successfully been completed, turn over the maintenance of the ITS system to KDOT.

23.2 WARRANTY
Equipment Warranty: Obtain, assign and furnish to the Engineer written manufacturer's warranties for all Contractor provided products and electronic equipment consistent with those provided as customary trade practice. Provide warranties to cover defect in assembly, fabrication, and materials for a minimum date of one year from the date of final acceptance. Provide warranties that require the manufacture to furnish replacements for any part or equipment found to be defective during the warranty period at no cost to KDOT. Provide warranties that are fully transferable from the Contractor to KDOT and transfer all warranties to KDOT's name at the time of final acceptance of the work.

Contractor Warranty: Provide a Contractor's warranty providing for satisfactory in-service operation of the ITS during the 60 day test period for each ITS component. Comply with the following for Contractor provided equipment: If defects develop during this period, replace or repair the provided equipment, at the expense of the Contractor, including all labor, material and associated costs, as necessary to restore required performance. Comply with the following for KDOT provided equipment: If defects develop in KDOT provided equipment, KDOT will provide a replacement and Contractor shall replace equipment, at the expense of the Contractor, including all labor, material and associated costs, as necessary to restore required performance. KDOT labor costs resulting from equipment replacement will not be charged to the manufacturer or the Contractor.

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