

- (4) Combination Poles - where a combination lighting/signal pole is specified on the Plan, the combination pole shall conform to all requirements of the traffic signal pole specified in the previous sub-sections. Luminaire arm and signal arm shall be pointed in the same direction as specified in the Plan.
- (5) Arms - all signal pole arms shall include 1 inch rubber grommets at outlets for signal wiring, and removable end caps.
- (6) Foundations - before placing the concrete for the foundation, the Contractor shall make sure that the appropriate anchor bolts are placed in proper orientation, elevation and verticality. This may be accomplished by using positioning plates and/or tying the anchor bolt assembly to the reinforcing cage. "Stabbing" of anchor bolts is not permitted. The anchor bolt threads shall be protected from concrete fouling during concrete placement. Excavated areas shall be inspected by the City prior to placing concrete.

Concrete shall be "Structural Class" as noted in the City Standard Technical Specifications. The minimum 28 day compressive strength of concrete shall be 4,000 psi. Samples of fresh concrete will be obtained and handled by the City in accordance to the Specifications. At each intersection, concrete testing will be performed by the City.

The foundation can be one or two pours. If done in one pour, the top 6 inches of the pole and pedestal foundations shall be formed in a square and shall be level with the adjacent sidewalk or approximately 2 inches above the finished grade if no sidewalk is present. It may be necessary to wait for a new sidewalk to be placed prior to finishing 2nd pour to obtain proper grades.

Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcement. Chutes used shall be such that concrete slides in them and does not flow. Placement may be through elephant trunks or similar devices to prevent segregation. Chutes, troughs and pipes shall be made of aluminum.

Concrete shall be generally compacted with the aid of mechanical vibrating equipment. Vibration shall be transmitted directly to the concrete. The duration of vibration at any location shall be held to minimum necessary to produce thorough compaction.

The concrete shall be cured with an approved moisture barrier such as wet burlap or polyethylene for a period of 72 hours. Cold weather curing shall be such that the concrete temperature remains above freezing for the entire curing period. As a general practice, do not attach poles to the foundation until concrete has cured for 14 days. When necessary, the poles can be installed after 7 days, provided the compressive strength of concrete has reached at least 3,500 psi.

(7) Installation - the Contractor shall visually verify that the traffic signal poles are plumb after the mast arm and other loads have been applied. Adjustment shall be made using the leveling nuts on the anchor bolts. The final distance between the top of the foundation and the bottom of the leveling nuts shall not exceed 1 inch.

**B. Steel Traffic Signal Poles:**

- (1) General: Steel traffic signal poles shall conform to subsections 1607 and 1608 of the latest edition of the KDOT Standard Specifications and the requirements on the Plan. The poles and arms shall be tapered monotube made only of one length of structural steel sheet of not less than no. 5 & 7 manufacturing standard gauge meeting the requirements of the latest edition of the American Society for Testing and Materials (ASTM) specification A595 "Specification for steel tubes, low-carbon, tapered for structural use". As an acceptable alternative, the poles and arms shall have a minimum of 12 sides made only of one length of structural steel sheet of not less than no. 5 & 7 manufacturing standard gauge meeting the requirements of the latest edition of the ASTM specification A570 "specification for structural quality hot-rolled carbon steel sheet and strip" or A572 "specification for high-strength low-alloy Columbium-Vanadium steels of structural quality" with a minimum yield strength of 55 kilo pounds per square inch and a maximum silicone content of 0.06 percent. Only one longitudinal weld, and no traverse welds, shall be permitted in the fabrication of the shaft or arm. (Exception: multiple gauge arms designed for lengths of 40 feet or greater may have bolted telescopic field joints so as to develop full strength of the adjacent shaft sections to resist bending action.)
- (2) Galvanization: steel traffic signal poles shall be galvanized to the requirements of the latest edition of the American Society for Testing and Materials (ASTM) 123 "Specifications for zinc (hot dip galvanized) coatings on iron and steel products".
- (3) As noted in Section 9 of ASTM 123, it is the responsibility of the pole manufacturer to ensure compliance with this specification. This shall be achieved by an in-plant inspection program designed to maintain the coating thickness,

finish, and appearance within the requirements of this specification.

- (4) As noted in Section 6 of ASTM 123, renovations must be limited to no more than 36 square inches per piece. Renovations larger than this will be cause for rejection.
- (5) Renovations shall be made in accordance with ASTM 780 "repair of damaged and uncoated areas of hot-dip galvanized coatings". Renovations shall be completed with zinc based Solder paints containing zinc dust or sprayed zinc as described in this ASTM specification.

**C. Aluminum Traffic Signal Pedestals:**

- (1) General - traffic signal pedestals shall consist of an aluminum shaft of the length specified in the plans, a cast aluminum base, collar assembly, anchor bolts with nuts and washers, and be provided with a pole cap. The shaft shall be spun from one piece of seamlessness tubing, having a nominal outside diameter of 4.5 inches and 0.25 inch wall thickness, and meeting the requirements of section 1626 of the KDOT Standard Specifications. The shaft shall have no longitudinal welds nor circumferential welds. All pedestals shall have the shaft attached to the base with a round aluminum collar assembly with stainless steel hardware.
- (2) Finish - the shaft shall have a uniform polished finish. Each shaft shall be protected during shipment and installation. When specified to be painted black, pedestals shall be made of steel.

**D. Metallic Conduit and Fittings:**

- (1) General - conduit under existing road pavement shall be installed using an approved boring method. Open cut trenching through existing pavement will not be permitted unless approved by the Engineer. Conduit runs are typical only and may be adjusted during installation to clear obstructions and facilitate wiring as approved by the Engineer.
- (2) Conduit - metallic conduit shall be rigid steel conduit meeting the requirements of the latest edition of the American National Standards Institute (ANSI) Specification C80.1 "Specifications for Zinc-coated Rigid Steel Conduit".
- (3) Fittings - metallic conduit fittings shall be zinc coated and shall meet the requirements of the latest edition of the American National Standards Institute (ANSI) Specification C80.4 "Specification for Fittings for Rigid Metal Conduit and Electrical Metallic Tubing".
- (4) Bonding - all metallic conduits shall be electrically bonded by a grounding bushing and ground wire as detailed in the Plan.

**E. Non-metallic Conduit and Fittings:**

- (1) Conduit - non-metallic conduit shall be schedule 40 rigid polyvinyl chloride meeting the requirements of the latest edition of the National Electrical Manufacturers' Association (NEMA) Standard TC-2 and shall be listed by the Underwriters' Laboratory, Inc.
- (2) Fittings - non-metallic conduit fittings shall be fabricated from polyvinyl chloride having the same chemical and physical properties as the conduit with which it is to be used. Each shall bear the Underwriters' laboratory, Inc. label. The joints shall be made in accordance with the manufacturers' recommendations.
- (3) HDPE - high density polyethylene pipe (HDPE) conduit shall have an outside diameter as specified in the Plan. It shall be schedule 40 and orange in color.

**VI. Pull Boxes:**

**A. General:**

Service and Junction Box locations are typical only and may be adjusted during installation to clear obstructions and facilitate wiring as approved by the engineer. The quantity of boxes as shown in the plans may not be reduced. However, additional boxes may be provided at the contractor's expense. Service and Junction Boxes shall not be located in sidewalk ramps. All Service and Junction Boxes shall be free of trash, wire scraps, etc.

**B. Bedding:**

An 8 inch layer of aggregate shall be provided under all Service and Junction Boxes. The aggregate under service and junction boxes shall be 0.50 inch clean gravel. This aggregate will be visually accepted by the Engineer.

**C. Conduit Entrances:**

The area around the conduit entrance shall be filled with a mortar grout or a silicone sealant. All conduits under a roadway shall enter thru bottom of service box.

**D. Service Boxes:**

All service boxes are to be either pre cast concrete with a cast iron cover or fiberglass reinforced polymer concrete with a fiberglass reinforced polymer concrete cover.

**E. Junction Boxes:**

The Contractor may furnish either pre cast concrete Junction Boxes with a cast iron cover or fiberglass reinforced polymer concrete Junction Boxes with a fiberglass reinforced polymer concrete cover.

**VII. Luminaires and Lamps:**

**A. Luminaires and Lamps:**

All Luminaires and Lamps shall be LED, and shall be approved by Evergy.

**B. Lighting Secondary Cable:**

The lighting distribution cable and pole and bracket cable shall be stranded, annealed, type U.S.E. - 2 copper wire.

**C. Photoelectric Control:**

Photoelectric control shall be solid state type, 1000 watt/1800 VA max., single pole, double throw, twist lock mounting, 120 volt operation. The operating levels shall be 3 FC on -1.8 FC off with an allowable 25 percent variance on or off. The photoelectric control shall have a minimum of a 30 second time delay off.

**D. Street Lights:**

All Street Lights shall be fused in pole base.

**E. Fused Connector:**

Fused connector kits shall be sized to the conductors specified in the plans and shall be supplied with molded rubber boots for waterproofing. The connector shall be capable of withstanding multiple disconnects without damage to the watertight seals or terminals. Each connector shall include all parts and materials necessary to complete it's installation such as fuses, lubricating compound, and assembly devices.

**D. Fuse:**

The fuse shall be a minimum of 5 amp cartridge type as recommended by the connector manufacturer.

**VIII. Signs:**

**A. General:**

The design details (color, letter height and letter series) for all regulatory and warning signs shall be as shown in the latest edition of the Standard Highway Signs manual unless shown otherwise in the Plan. Sign blanks for all regulatory and warning signs shall be 0.080 inch thick aluminum alloy unless otherwise noted in Plan. All signs shown in the bill of materials on the traffic signal quantities sheet shall be included in the lump sum cost for the bid item of "Traffic Signal Installation".

**B. Overhead Street Name Signs:**

Overhead street name signs shall be Type 5052-H38 Aluminum alloy and shall be 0.125 inch thick. The sign faces shall be direct applied white enclosed lens with high performance reflective sheeting background. The legend and border shall be formed using the cutable film process. The cutable film shall be 3M-1177C green Scotch Lite Electrocut film.

- Series "E" - 6 inch upper case for "SW", "ST", "AV", "BLVD" etc.
- Series "E" - 8 inch upper case with 6" lower case for names.

The border size shall be 0.75 inch wide. All corners on sign blanks shall be rounded.

**C. Layout:**

Before final fabrication and shipment, the manufacturer or supplier shall provide the Engineer with a layout of each sign showing the exact street name lettering to be placed on the sign.

**D. Mounting:**

- (1) Regulatory Signs - the RIO series signs shall be mounted on the mast arm to the right of the left signal head using an approved mounting bracket as shown in the Traffic Signal installation details. The mounting bracket shall be capable of withstanding a wind load in excess of 100 mph.
- (2) Overhead Street Name Signs - the overhead street name signs shall be mounted on the signal mast arm, between the signal pole and the first traffic signal head

assembly. The final location will be determined by the Engineer. Installation of signs on mast arms shall be accomplished with suitable stainless steel banding, clamps and brackets capable of withstanding 100 mph winds. Street name signs over 18 inches in height shall be installed using approved sign mounting brackets. All bolts inserted through sign faces shall have flat washers installed between the reflective sheeting and bolt heads. Bolt holes in signs shall be drilled in the field. Signs shall be mounted such that the legend is level.

- (3) Pedestrian Push-Button Signs - signs shall be mounted to the traffic signal pole above the appropriate pedestrian push-button. Mounting shall be accomplished using suitable stainless steel banding, clamps and brackets capable of withstanding 100 mph winds.

**E. Illuminated Overhead Street Name Signs:**

- (1) The letters of the illuminated street name signs shall meet the size, color, font and spacing requirements in accordance to the latest version of the MUTCD.
- (2) The illuminated street name signs shall be mounted on the mast arm between the vertical shaft of the signal pole and the first signal head on the mast arm, and shall be made level and plumb by using mounting brackets recommended by the manufacturer of the signal poles.
- (3) The lights for the illuminated overhead street signs shall be LED. The LED light shall be configured and mounted to ensure uniform illumination across the entire face of the sign.
- (4) The power source for the illuminated overhead street name signs shall be 120 VAC. The wire size for the power connection shall be a three conductor #14 AWG, stranded copper conductor cable. The illuminated street light fixtures shall be connected to the street lighting control circuit for the intersection so that the street name signs are synchronized (on/off) with the street lights.
- (5) All fixtures related to illuminated overhead street name signs shall have a minimum of 2 year manufacturer's warranty for materials and workmanship.

**F. Acceptance:**

All signs will be accepted on the basis of Catalog Cuts and visual inspection by the Engineer when delivered to the project site.

**IX. Pedestrian Push Button Station:**

Each pedestrian push button station shall consist of one or two parts. Part One consists of a one piece pushbutton assembly, speaker and directional sign. Part Two consists of a power supply and control unit for the pushbutton assembly located in the associated pedestrian head. The buttons, related hardware and audible signal shall be compliant with the Americans with Disabilities Act (ADA).

**Push Button Assembly:**

The pushbutton assembly shall include a vibrating arrow button and a speaker in one piece. A R10-14C sign shall be either part of or separate from assembly. The Push Button assembly shall be connected to the power supply and control unit located in the associated pedestrian head by a four wire cable. The pushbutton assembly shall have an ADA compliant vibrating weatherproof Push Button with an arrow indication molded into the button. The pushbutton assembly shall have a weatherproof speaker built into the back of the unit that can provide a locating tone, and a user selectable "walk sign is on for x street" voice message or percussive tone to repeat for the duration of the walk indication. The volume of the speaker can be set manually or can be set to automatically adjust the ambient noise level. Under automatic adjustment the volume of the audible sounds automatically adjust in relation to the ambient noise level for the cycle that follows. All operations of the pushbutton assembly shall be field selectable by means of a configuration unit.

Where two accessible pushbuttons on the same corner of the intersection are separated by a distance of at least ten (10) feet, the audible walk indication shall be a percussive tone. Where two accessible pedestrian pushbuttons on the same corner of the intersection are not separated by a distance of at least ten feet, the audible walk indication shall be a voice message. When there is only one accessible pedestrian pushbutton on the corner, the audible walk indication shall be a voice message. The pushbutton assembly shall have a sign indicating instructions to cross.

**Power Supply and Control Unit:**

The power supply and control unit shall consist of a unit approximately 7" x 4" and be located in the associated pedestrian head for the pushbutton assembly that it controls or built into pushbutton unit. The unit will have four inputs on a barrier divided terminal strip. These inputs will be for ground, walk, don't walk, and AC neutral. The unit will have four outputs on a barrier divided terminal strip. These outputs will be

4	10/30/20	MAJOR REVISIONS	SU	KRE	
3	02/26/18	Added Warranty note to sec. VIII.	KAP	TLC	
2	01/22/18	Added Push Button Warranty Note	DHS	TLC	
1	9/1/17	Updated Standard	DHS	TLC	
NO.	DATE:	REVISION	BY:	APP'D	

EDITED BY: Shoeb Uddin

APP'D BY: Kristi Erickson



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for DC+ and DC- or 12 VDC power, walk output, and don't walk output. The outputs shall be connected to the pushbutton assembly by a four wire cable. The unit shall be fused using two 0.5 amp fuses or mov 5 joules.

Warranty:

The manufacturer shall warrant the pedestrian pushbutton unit against defects and workmanship for a period of at least five years from the date of shipment. The warranty shall be assigned to the city of Topeka.

**X. Controller Cabinets:**

The Controller cabinet shall be of the Model specified in the major items of the equipment list shown on the Traffic Signal Quantities sheet. The cabinet shall, at a minimum, come equipped with the electronic equipment as shown in the same list. The Controller cabinet shall be natural aluminum, unless specified to be painted black in the Plan. All electronic equipment shall meet the requirements of the TSCES as modified below.

**XI. 333SD - ITS Type 3 Traffic Signal Cabinet:**

The Controller Cabinet shall be a Model 333SD-ITS Type 3. The 333SD-ITS Type 3 cabinet shall include a base extension assembly. Each cabinet shall have anchor bolts in accordance with FHWA-IP-78-16 Specification.

Quantity

- 4 EA - Internal (Front/Back) Fluorescent Lamps
- 2 EA - New York 330 Pull-out Drawer Assembly
- 4 EA - Fan Panel Assembly
- 1 EA - Transient Voltage Surge Suppression System ( SHA-1210)
- 2 EA - Split Input Files with Lead Edged Plastic Card Guides
- 1 EA - Output File with Lead Edged Plastic Card Guides (No Phoenix Connectors)
- 1 EA - Red Monitor Kit Assembly
- 1 EA - Traffic UPS (See Specifications)
- 2 EA - Cabinet Lifting Plates (Mounted on the sides of the cabinet)

Cabinet Dimensions: 54" x 44.5" x 26"  
Cabinet shall have 4 doors and Corbin #2 Locks and Keys

The left side of the 333SD-ITS Cabinet Assembly shall have shelves assembled to the EIA Rack Assembly to house additional equipment, such as, but not limited to, Video Detection, Standby Uninterrupted Power Supply and Communication Equipment. All Cabinets shall have a protective shield over the circuit breakers to prevent them from being accidentally turned off. The shield shall be mounted in such a way that the switches are still readily visible to the technician and can be turned on or off.

Input and Output Files

The input file shall be split (44 Pin) and contain upper and lower lead edged plastic card guides. The Output file shall have 8 "Flash programming jumper blocks", one for each of the 8 phases and shall contain upper and lower lead edged plastic card guides.

Traffic Uninterrupted Power Supply (UPS)

The 333SD-ITS shall have a UPS as specified below and shall be rack mounted in the left cabinet.

1. Performance Requirements:

- (a) The traffic UPS shall be capable of producing simultaneously-fully generated, conditioned and true Sine wave, standby and continuous AC outputs.
- (b) Suggested Operating mode for respective outputs during power failure - continuous output provided for signal controllers and modems; stand by output provided for signals in flash mode operation (optional delay timer available for short-term battery run under full cycling operation).
- (c) Up to the maximum rating, the traffic UPS shall be capable of running any combination of signal heads, whether incandescent, LED or neon, by any manufacturer, regardless of power factor, without overdriving the poorer power factor LED heads which may cause early degradation, low luminosity or early signal failure.
- (d) Upon loss of utility power, the traffic UPS shall insert battery power into the system via a supplied power interface module (PIM). In case of UPS failure and/or battery depletion, the PIM will ensure that the UPS will drop out and, upon return of utility power, the traffic control system will default to normal operating mode.
- (e) The Power Interface Module shall enable removal and replacement of the traffic UPS without shutting down the traffic control system ("Hot Swap" capability). Connectors shall be equipped with a "Safety Interlock" feature.

- (f) For 2070 or "California" style cabinets, upon loss of power, the traffic UPS shall actuate the existing Flash Transfer Relays (FTR) and Mercury contactor (MC) to force the traffic control system into flash mode operation.
- (g) Existing flasher modules and flash transfer relays shall be utilized.
- (h) To facilitate emergency crews and police activities, the traffic UPS shall be compatible with police panel functions ("signals off" switch must kill power to the field wiring even when UPS/Battery Power is on).
- (i) The traffic UPS shall not duplicate or take over flash operation or flash transfer relay functions.
- (j) The traffic UPS shall be capable of providing continuous, fully conditioned, regulated, sinusoidal (AC) power to selected devices such as signal controllers, modems, communication hubs, NTCIP adapters and video/radar equipment.

2. Major Components of UPS:

The traffic UPS shall consist of 3 major components - the Electronics Module, the Power Interface Module and the Battery System.

A. The Electronics Module:

The Electronics Module shall consist of the following:

- (1) True Sine wave, high frequency inverter utilizing IGBT technology.
- (2) 3-stage, temperature compensated, battery charger
- (3) For connection from the Electronics Module to the Power Interface Module and the Battery System, dedicated harness shall be provided with quick release, keyed, circular connectors and braided nylon sleeves over all conductors.
- (4) Local and remote control of UPS functions.
- (5) Local and remote communications capabilities.
- (6) Be capable of accepting an NTCIP-ready adapter.
- (7) Separate Power Interface Module (PIM) for inserting power safely and reliably.
- (8) Physical Specifications:  
Rack Mount: Width = 19", Depth = 12", Height = 3.5" (2U)  
Shelf Mount: Width = 19", Depth = 12", Height = 3.5"  
Wall Mount/Unistrut Rail Mount: Width = 6.9", Depth = 9.5", Height = 16"  
Separate Power Interface Module: Width = 6", Depth = 2.8", Height = 9"

B. The Power Interface Module:

- (1) Input Specifications:  
Nominal Input Voltage: 120 VAC, Single Phase  
Input Voltage Range: 86 VAC to 140 VAC  
Input Frequency: 50 or 60 Hz (± 5%)  
Input Configuration: 3 Wire (Hot, Neutral and Ground)  
Input Current (Maximum Draw): 7.2 amps, Power-factor corrected  
Input Protection: Input Fuse (12 amps)
- (2) Output Specification:  
Nominal Output Voltage: 120 VAC, Single Phase  
Power Rating: 1 KVA (1000 VA/700W)  
Output Voltage Regulation: ± 2% for 100% Step Load Change and from high battery to low battery condition.  
Output Frequency: 50 or 60 Hz (± 5%)  
Output Configuration: Keyed, Circular Connectors and Duplex Receptacle  
Output Wave Form: True Sine wave  
Overload Capability: 110% for 10 minutes, 200% for half second.  
Fault Clearing: Current Limit and Automatic Shutdown  
Short Circuit Protection: Current Limit and Automatic Shutdown  
Efficiency: 85% at Full Load  
Load Power Factor: 0.7 Lagging Through Unity to 0.7 Leading

C. The Battery System:

- (1) The battery shall be comprised of extreme temperature, deep cycle, AGM/VRLA (absorbed glass mat/ valve regulated lead acid) batteries that have been field proven and tested by the U.S. Military.
- (2) The battery system shall consist of one or more strings (typically 4 or 6 batteries per string) of extreme temperature, deep cycle, AGM/VRLA batteries.
- (3) Batteries shall be certified to operate at extreme temperatures from -40° C to +74° C.
- (4) The batteries shall be provided with appropriate interconnect wiring and a corrosion-resistant mounting tray and/or brackets appropriate for the cabinet into which they will be installed.
- (5) The interconnect cable shall be protected with abrasion-resistant nylon sheathing.
- (6) The interconnect cable shall connect to the Base Module via a quick-release circular connector.

- (7) For purposes of safety and proper operation, the circular battery connector shall have interlocking pins to prevent turn-on if batteries are not connected, and to shut off the UPS should the batteries be disconnected.
- (8) Battery construction shall include heavy-duty, inter-cell connections for low-impedance between cells, and heavy-duty plates to withstand shock and vibration.
- (9) The top cover shall use tongue and groove construction and shall be epoxied to the battery case for maximum strength and durability.
- (10) An optional lifting handle shall be available on battery modules.
- (11) The Battery system shall meet the following requirements:
  - (a) shall be certified and field proven to meet or exceed NEMA temperature standards from -40° C to +74° C.
  - (b) Ampere: see Table 1 for Hour Ratings
  - (c) Hydrogen gas emissions must meet Mil-Spec #MIL-B-8565J
  - (d) Dimensions: see Table 1
  - (e) Weights: see Table 1

3. Mounting Configuration:

2070 Style - mounting method shall be 19" rack mount. Shelf angled or rails, typically supplied by others, are available as optional accessories.

4. Environmental Specifications

- (a) The UPS shall meet or exceed NEMA temperature standards from -40° C to +74° C.
- (b) The UPS shall be certified and field proven to meet or exceed NEMA temperature standards. A certificate of compliance shall be made available upon request.

5. Communications, Controls and Diagnostics

- (a) Communications to the UPS shall be provided by RJ-45 Ethernet connectors, connected to the Ethernet switch in the signal cabinet.
- (b) Front Panel Controls: Power On, Cold (DC) Start, Alarm Silence, Battery Test, Bypass Breaker, and DC/Battery Breaker.

6. Reliability

- (a) Calculated MTBF is 100,000 hours based on component ratings.
- (b) When Bypass and Power Interface Module are included, System MTBF increases to 150,000 hours.

7. Options

- (a) Battery tray to hold 6 OP72A batteries, up to 4 OP72B or OP72C batteries, and up to 3 OP72D batteries. Tray is 19" wide for use in 2070 type cabinets and mounts on standard Retma rails.
- (b) Swing-out battery box, mounts on right rail inside back door of 2070 type cabinets. Box is designed to hold 6 OP72A batteries, up to 4 OP72B or OP72C batteries and up to 3 OP72D batteries.
- (c) Service Pedestal - shall be available as a mounting option.
- (d) Adjustable delay-timer to provide up to 10 hours of full cycling while on battery before switching to flash mode (only available where 100% low-power/LED signals and PED heads are used). Batteries must be sized properly to fully utilize this feature.
- (e) One-shot ground pulse to trigger external start upon return of AC power.
- (f) Enhanced battery charger provides accelerated charging capacity (contact factory for details and proper application)

8. A light shall be mounted on top of the cabinet that will be on indicating when signal is operating in battery back-up.

9. Warranty:

Standard warranty terms for a period of minimum one-year shall cover all components of the UPS including the battery system, all parts and labor.

TABLE 1								
	ESTIMATED RUNTIME (assumes 77°F/25°C, to 1.75 volts per cell).			Unit Weight (Kg.)	Overall Dimensions Per Battery Inches (cm.)			
	Volts/ A-hrs.	200 Watts	400 Watts		800 Watts	Length L	Width W	Height H
12 VDC 16 A-h	3.5 Hrs	1.73 Hrs	52 Min.	14.7 (6.7)	7.27 (18.46)	3.11 (7.89)	6.67 (16.93)	
12 VDC 31 A-h	8.8 Hrs	3.8 Hrs	1.8 Hrs	23 (10.5)	7.68 (19.51)	5.15 (13.08)	7.22 (18.34)	
12 VDC 39 A-h	11.3 Hrs	5.5 Hrs	2.3 Hrs	29 (13.2)	7.68 (19.51)	5.15 (13.08)	8.50 (21.59)	
12 VDC 48 A-h	13.7 Hrs	6.7 Hrs	2.9 Hrs	32 (14.5)	9.41 (23.90)	5.22 (13.26)	9.35 (23.75)	

\*OP72X battery sets include six (6) batteries per set. Wired in series, each set provides 72 VDC.

NO.	DATE:	REVISION	BY:	APP'D
3	10/30/20	MAJOR REVISIONS	SU	KRE
2	07-06-10	ADD CONTROLLER SPEC UNDER IX	KAP	LGV
1	01-14-08	ADD 333SD-ITS CONTROLLER DETAIL	KAP	LGV

DRAWN BY: Shoeb Uddin  
APP'D BY: Kristi Ericksen

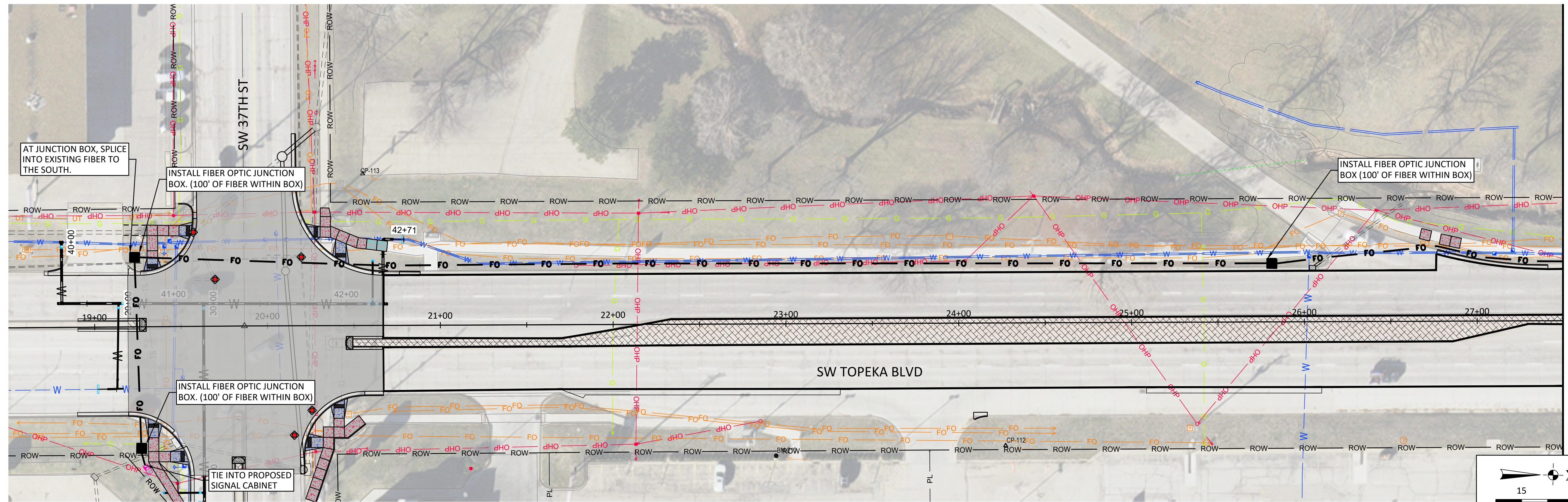


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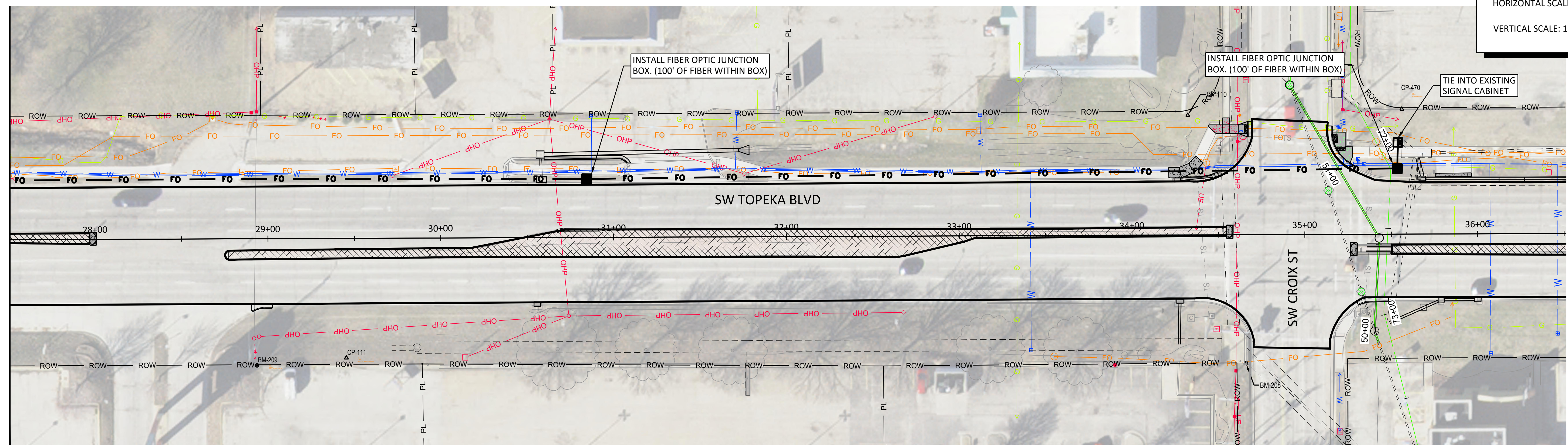
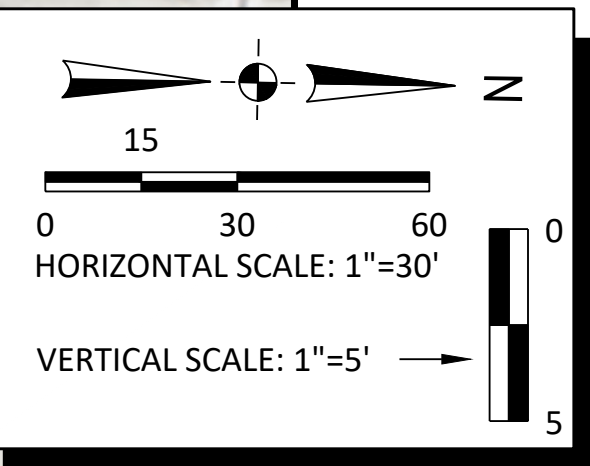
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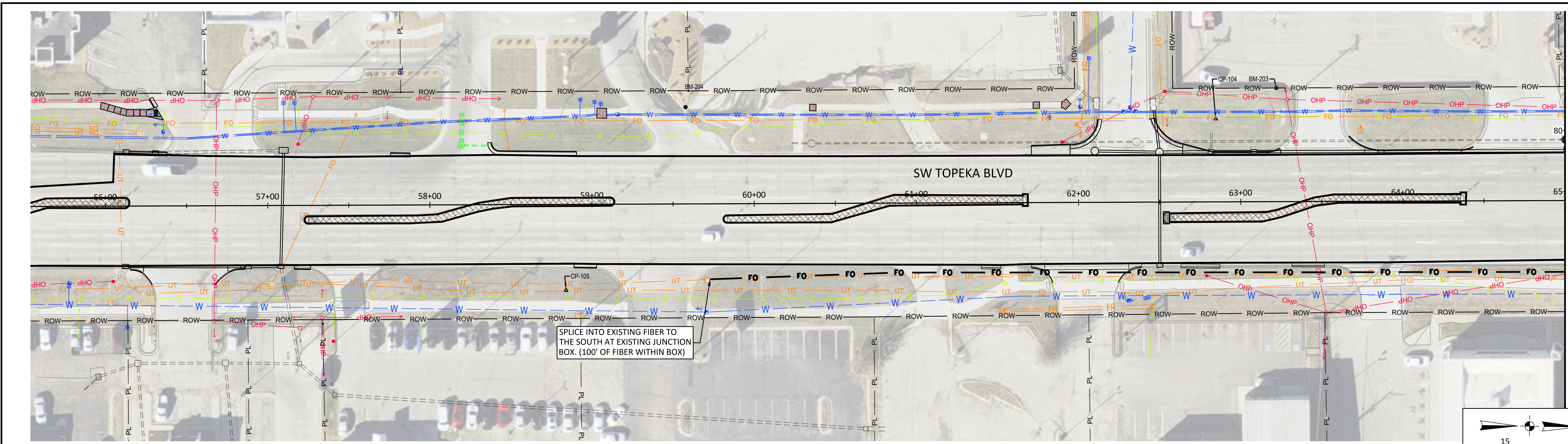
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TOPEKA BLVD  
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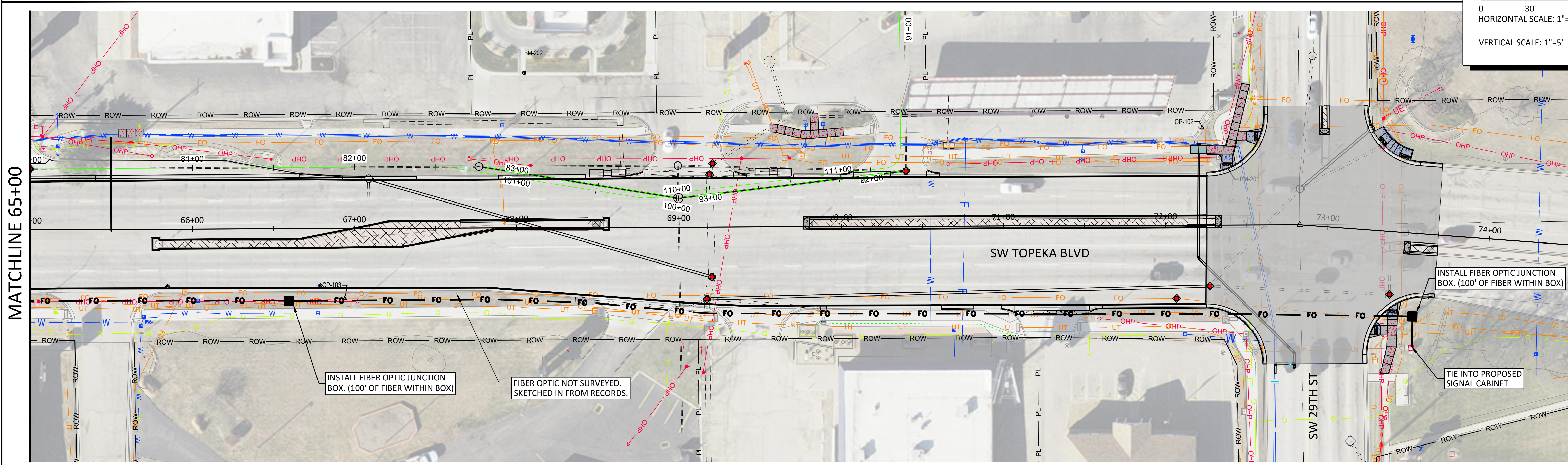
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MATCHLINE 65+00



MATCHLINE 65+00

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**TOPEKA**  
*Public Works*  
**ENGINEERING**  
 620 SE MADISON St. • 2nd Floor • TOPEKA, KS 66607  
 Phone: (785) 368-3842 • Fax: (785) 368-3881

TOPEKA BLVD  
 IMPROVEMENTS:  
 PROJECT #701038.00

FIBER OPTIC INTERCONNECT PLANS

DATE: APR 2026  
 SHEET: 79 OF 122  
 PROJ.: 701038.00

File Location: Y:\Kansas\1325-6005\1325-600005-PR00-TOPEKA BLVD FIBER OPTIC.dwg [Plot Date: 4/17/2026 2:18:12 PM] [Last Saved: 4/8/2026 2:22:13 PM, Blue]

### SUMMARY OF QUANTITIES

BID ITEMS	TOTAL	UNITS
2" HDPE CONDUIT	3126	LF
JUNCTION BOXES	7	EA
FIBER OPTIC CABLE	3826	LF

### GENERAL NOTES

- FIBER OPTIC LINE SHALL BE AT-3CE12YT-024 AND HAVE MINIMUM 100' IN EACH BOX.
- CONDUIT SHALL INCLUDE MATERIALS, LABOR, EQUIPMENT, AND INCIDENTALS NECESSARY TO INSTALL CONDUIT AS SHOWN. INSTALLATION OF CONDUIT SHALL BE BY HDD. CONDUIT SHALL BE 2" DIAMETER HDPE, ORANGE IN COLOR. LOCATION SHOWN ON PLANS IS APPROXIMATE, INSTALL TO AVOID EXISTING UTILITIES, AND PROPOSED WORK. CONDUIT SHOULD NOT BE INSTALLED UNDER MAINLINE PAVEMENT, EXCEPT AS REQUIRED AT CROSSINGS. MINIMUM INSTALLATION DEPTH SHALL BE 30" TO THE TOP OF THE CONDUIT. CONDUIT SHALL BE INSTALLED AFTER THE BRIDGE IS COMPLETE AND BACKFILLED, AS CONDUIT WILL RUN OVER THE TOP OF THE NEW BOX. AN EXCEPTION TO MINIMUM DEPTH WILL BE ALLOWED AT THE BOX LOCATION.
- INSTALL JUNCTION BOXES PER DT-102.

NO.	DATE:	REVISION	BY:	APP'D

DRAWN BY: \_\_\_\_\_  
 APP'D BY: \_\_\_\_\_

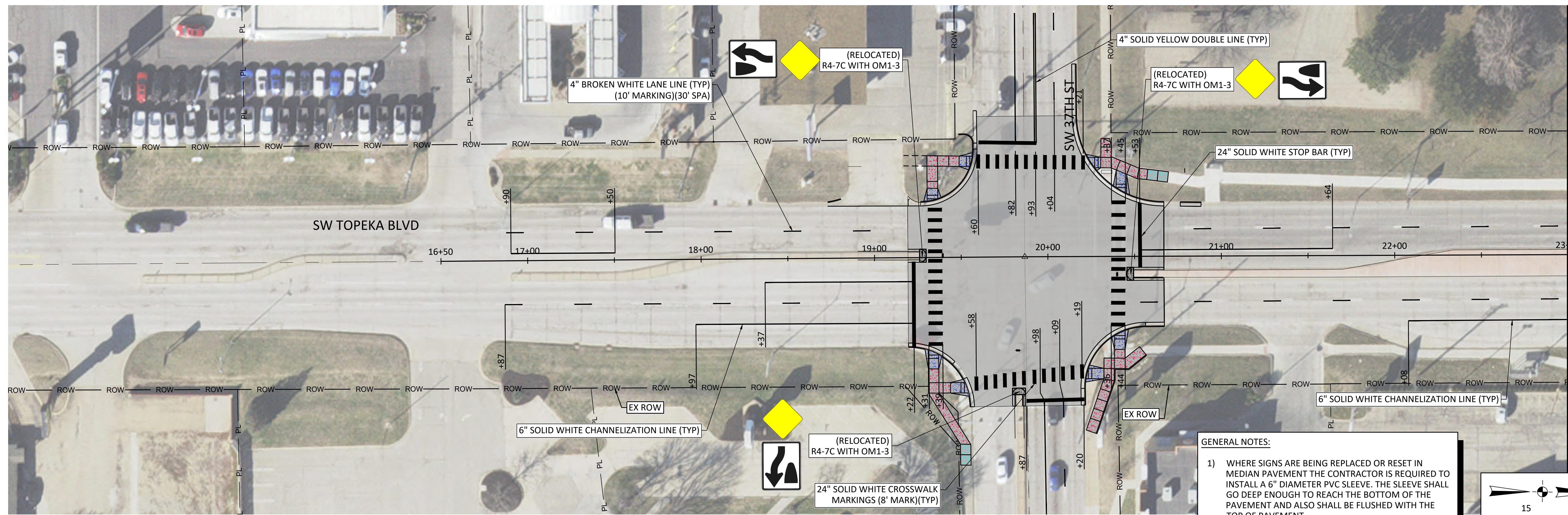


TOPEKA BLVD  
 IMPROVEMENTS:  
 PROJECT #701038.00

FIBER OPTIC NOTES

DATE: APR 2026  
 SHEET: 80 OF 122  
 PROJ.: 701038.00

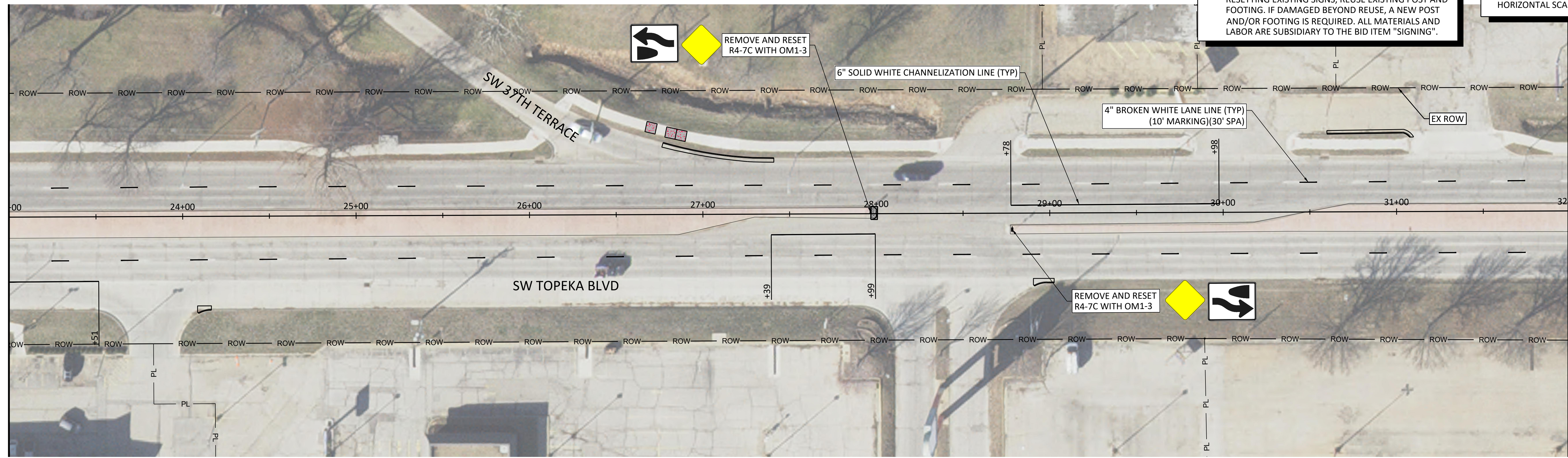
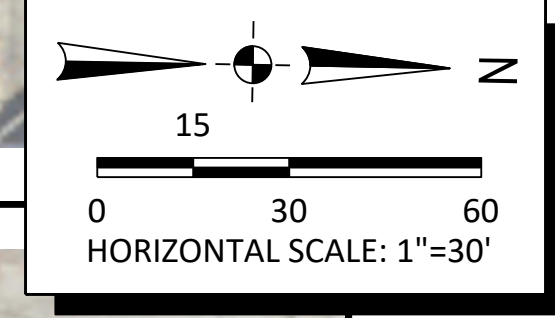
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MATCHLINE 23+00

**GENERAL NOTES:**

- WHERE SIGNS ARE BEING REPLACED OR RESET IN MEDIAN PAVEMENT THE CONTRACTOR IS REQUIRED TO INSTALL A 6" DIAMETER PVC SLEEVE. THE SLEEVE SHALL GO DEEP ENOUGH TO REACH THE BOTTOM OF THE PAVEMENT AND ALSO SHALL BE FLUSHED WITH THE TOP OF PAVEMENT.
- UNLESS OTHERWISE NOTED, WHEN REMOVING AND RESET EXISTING SIGNS, REUSE EXISTING POST AND FOOTING. IF DAMAGED BEYOND REUSE, A NEW POST AND/OR FOOTING IS REQUIRED. ALL MATERIALS AND LABOR ARE SUBSIDIARY TO THE BID ITEM "SIGNING".



MATCHLINE 23+00

MATCHLINE 32+00

NO.	DATE:	REVISION	BY:	APPD

DRAWN BY: \_\_\_\_\_  
 APPD BY: \_\_\_\_\_

  
 Alfred Benesch & Company  
 123 SE 6th, Suite 200  
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 Ph 785.409.6507      Job No. - 1325-600005.00

  
 620 SE MADISON St. • 2nd Floor • TOPEKA, KS 66607  
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TOPEKA BLVD  
 IMPROVEMENTS:  
 PROJECT #701038.00

PAVEMENT MARKING  
 AND SIGNING PLAN

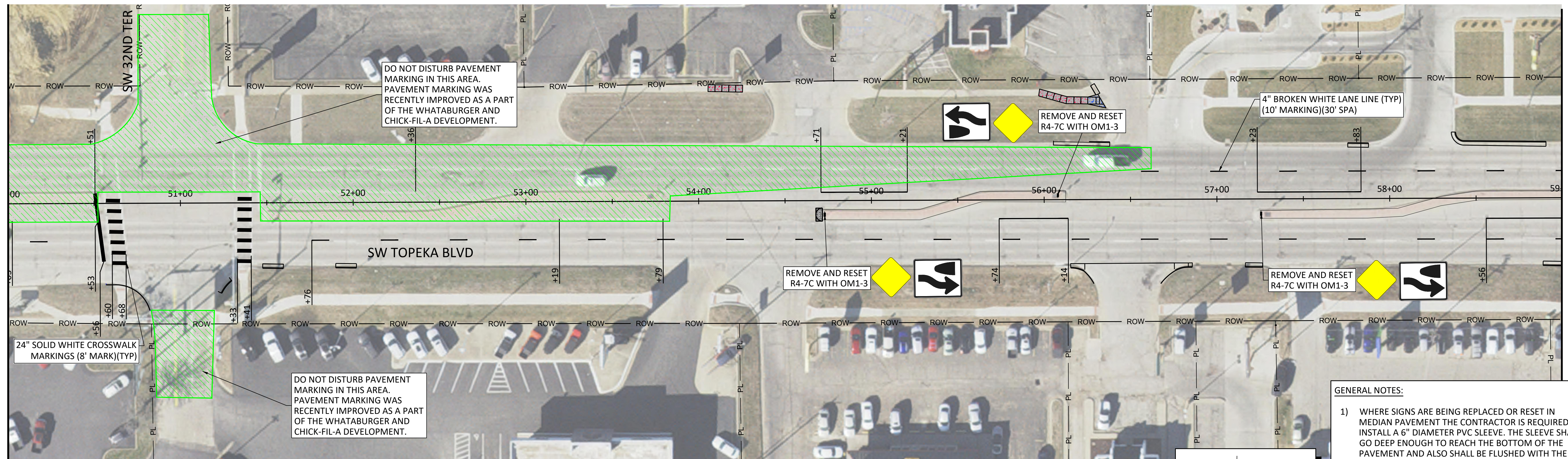
DATE: APR 2026  
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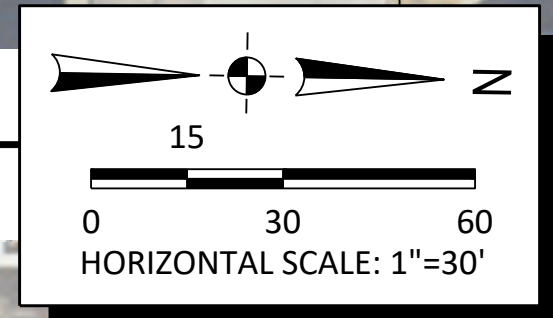
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MATCHLINE 50+00

MATCHLINE 59+00

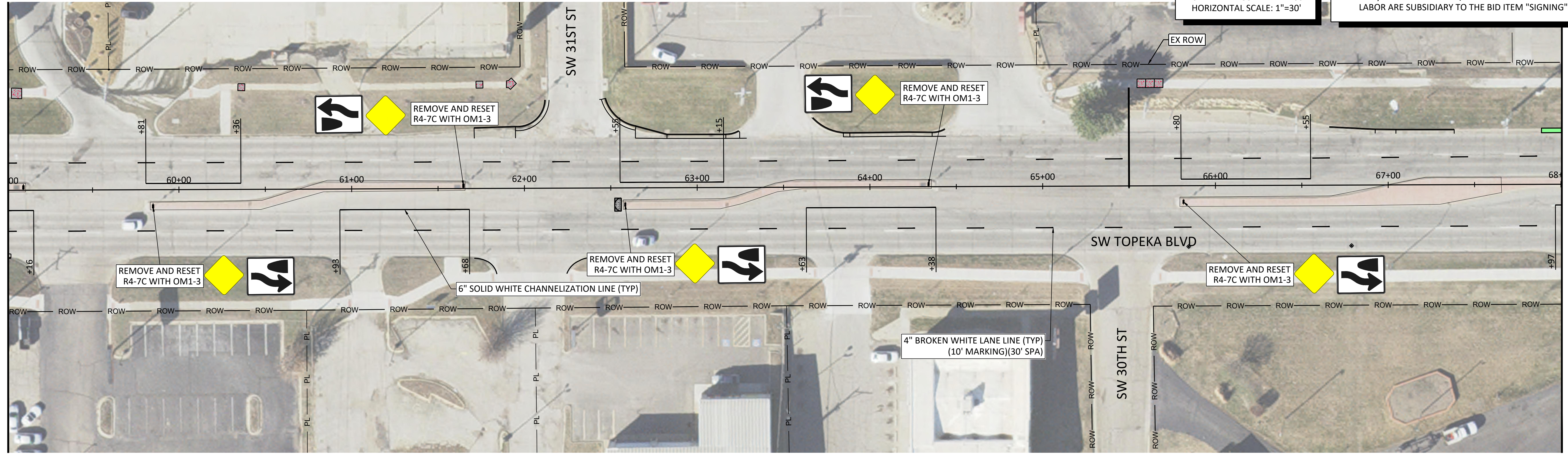


- GENERAL NOTES:**
- 1) WHERE SIGNS ARE BEING REPLACED OR RESET IN MEDIAN PAVEMENT THE CONTRACTOR IS REQUIRED TO INSTALL A 6" DIAMETER PVC SLEEVE. THE SLEEVE SHALL GO DEEP ENOUGH TO REACH THE BOTTOM OF THE PAVEMENT AND ALSO SHALL BE FLUSH WITH THE TOP OF PAVEMENT.
  - 2) UNLESS OTHERWISE NOTED, WHEN REMOVING AND RESET EXISTING SIGNS, REUSE EXISTING POST AND FOOTING. IF DAMAGED BEYOND REUSE, A NEW POST AND/OR FOOTING IS REQUIRED. ALL MATERIALS AND LABOR ARE SUBSIDIARY TO THE BID ITEM "SIGNING".



MATCHLINE 59+00

MATCHLINE 68+00



NO.	DATE:	REVISION	BY:	APPD

DRAWN BY: \_\_\_\_\_  
 APPD BY: \_\_\_\_\_

**benesch**  
 Alfred Benesch & Company  
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TOPEKA BLVD  
 IMPROVEMENTS:  
 PROJECT #701038.00

PAVEMENT MARKING  
 AND SIGNING PLAN

DATE: APR 2026  
 SHEET: 83 OF 122  
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