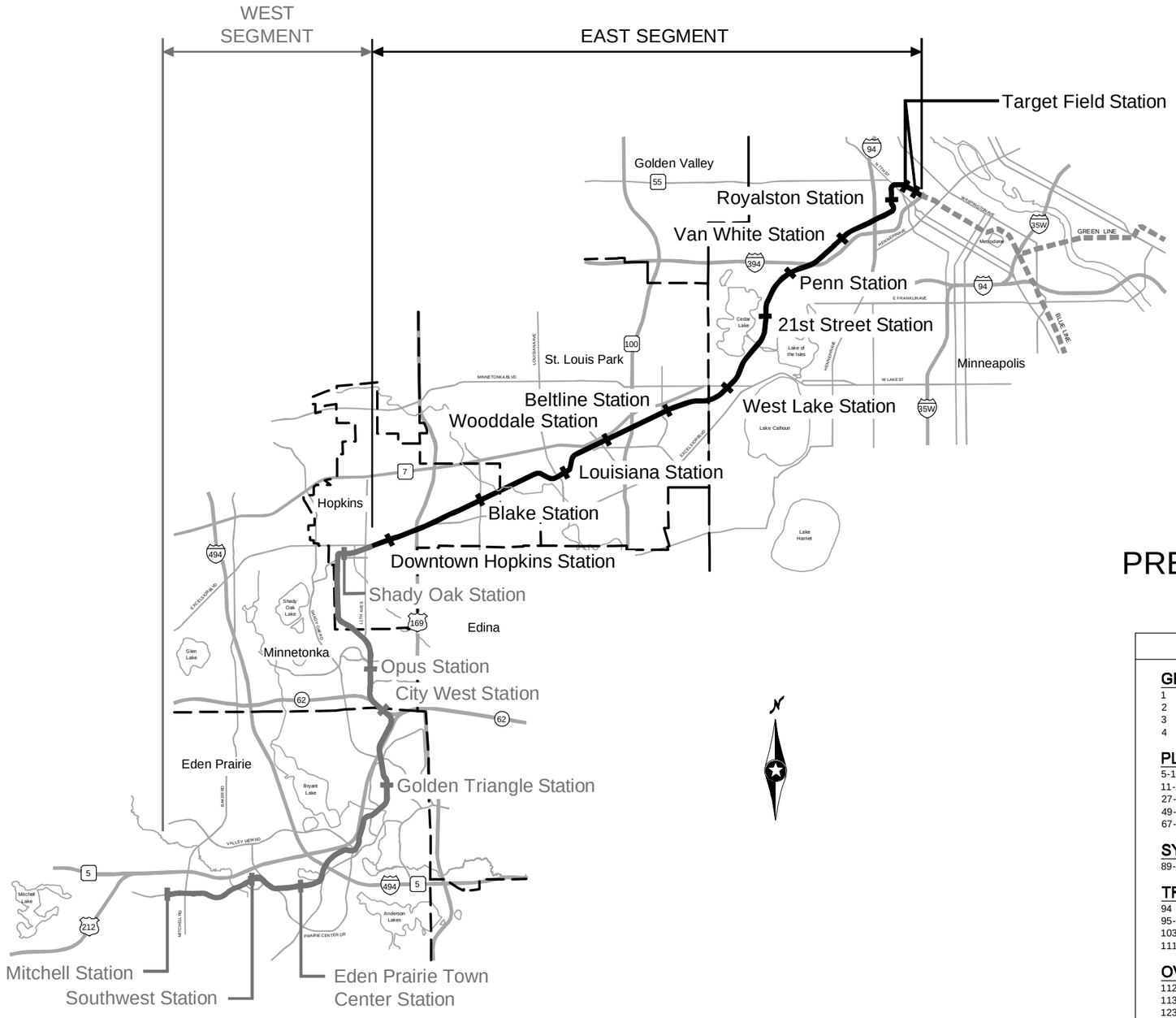


SOUTHWEST
Green Line LRT Extension

METROPOLITAN COUNCIL

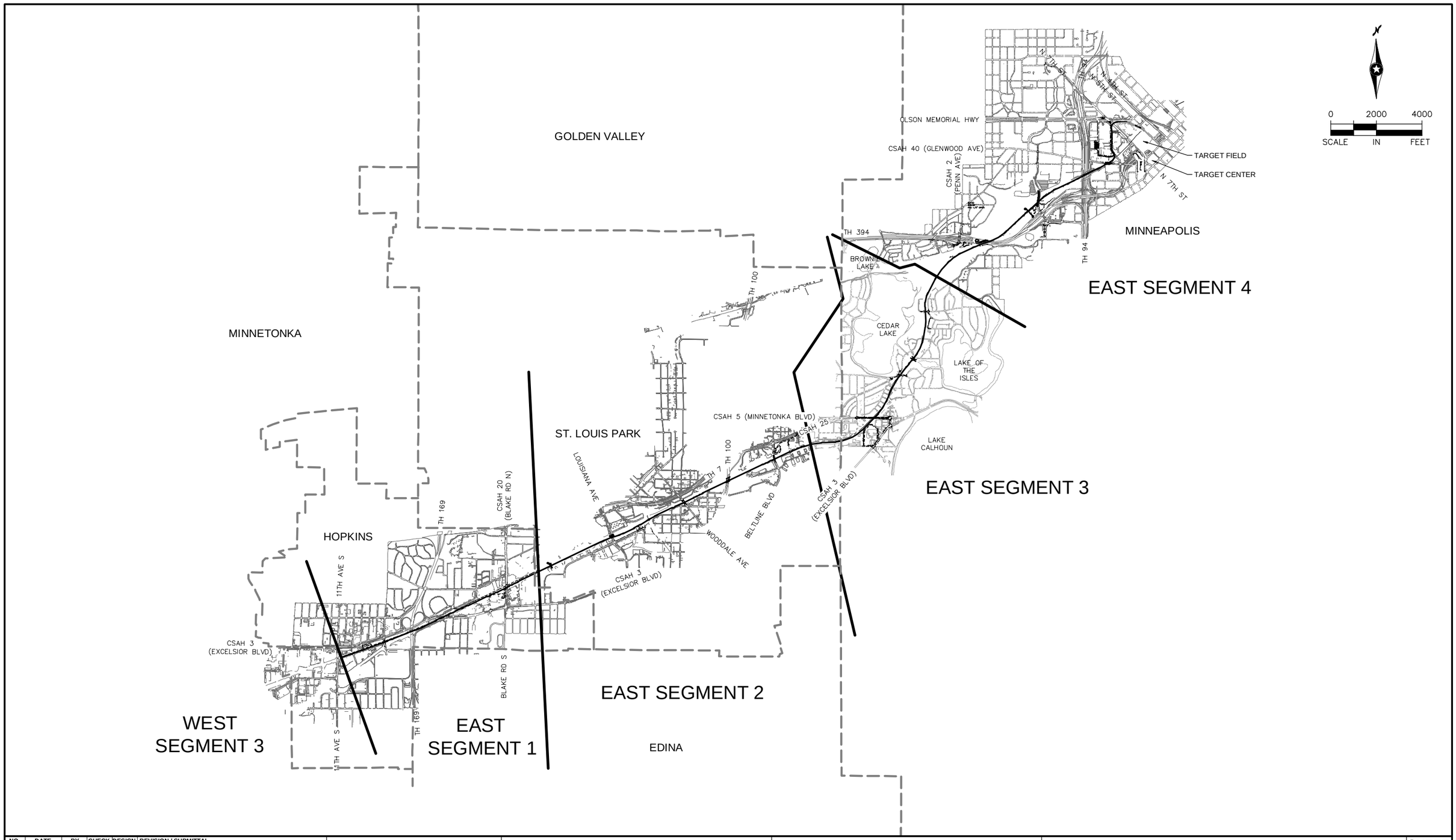
EAST - VOLUME 3 (SYSTEMS)

PRELIMINARY ENGINEERING (SEPTEMBER 2014)

INDEX

Kimley»Horn SYSTRA Gannett Fleming M-P Consultants CONSULTING ENGINEERING MINNEAPOLIS • MINNESOTA

PRELIMINARY - NOT FOR CONSTRUCTION



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
GENERAL
SEGMENT KEY MAP

DISCIPLINE: SYSTEMS

SHEET NAME: SYS-KEY-001

SHEET 2 OF 240

Aug, 27 2014 03:31 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-KEY.dwg By: curtis.neft

A

A	AMPERE
AB	ANCHOR BOLT
ABD	ABANDON, ABANDONED
ABUT	ABUTMENT
ABV	ABOVE
AC	ALTERNATING CURRENT
ACI	AMERICAN CONCRETE INSTITUTE
ACSR	ALUMINUM CONDUCTOR, STEEL REINFORCED
ADJ	ADJACENT
AF	AUDIO FREQUENCY
AFO	AUDIO FREQUENCY OVERLAY
A/G	AT GRADE
AH	AHEAD
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AL	ALUMINUM
AP	APPROACH
APPROX	APPROXIMATE
APT	AUXILIARY POWER TRANSFORMER
AREMA	AMERICAN RAILWAY ENGINEERING & MAINTENANCE OF WAY ASSOCIATION (FORMERLY AREA)
AS	AMMETER SWITCH
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY OF TESTING & MATERIALS
A/T	AUTO TENSION (A.T.)
ATM	ALONG TRACK MOVEMENT
ATR	ABOVE TOP OF RAIL
ATS	AUTOMATIC TRAIN STOP
AVG	AVERAGE
AWG	AMERICAN WIRE GAUGE
AWS	AMERICAN WELDING SOCIETY

B

BK	BACK
BARR	BARRIER
BAT	BATTERY
B/B	BACK TO BACK
BC	BOLT CIRCLE/BATTERY CHARGER
BFA	BY-PASS FEEDER ANCHOR
BIL	BASIC INSULATION LEVEL
BKR	BREAKER
BLDG	BUILDING
BL	BASELINE
BOBP	BOTTOM OF BASEPLATE
BOS	BOTTOM OF STEEL
BM	BEAM
BR	BRIDGE
BRKT	BRACKET
BSF	BAR SIGNAL FOUNDATION
B-SPAN	BODY SPAN
BTM	BOTTOM
BTWN	BETWEEN
B/W	BALANCE WEIGHT
BWA	BALANCE WEIGHT ANCHOR
BZ	BRONZE

C

C	CELSIUS
CAB	CABINET
CANT	CANTILEVER
CAT	CATENARY (CAT.)
CB	CIRCUIT BREAKER
CCLRT	CENTRAL CORRIDOR LRT
CCTV	CLOSED CIRCUIT TELEVISION
CF	CUBIC FEET
CHAM	CHAMFER
CHGR	CHARGER
CIP	CAST-IN-PLACE
CKT	CIRCUIT
℄	CENTERLINE
℄ TO ℄	CENTERLINE TO CENTERLINE
CISP	CAST IRON SEWER PIPE

C CONTINUED

CLF	CHAIN LINK FENCE
CLR	CLEARANCE, CLEAR
COMM	COMMUNICATIONS
COMPT	COMPARTMENT
CONC	CONCRETE
COND	CONDUCTOR
CONST	CONSTRUCTION
CONT	CONTINUATION, CONTINUOUS
CONTR	CONTRACTOR
CND	CONDUIT
CR	CONDUIT RISER
CT	CURRENT TRANSFORMER
CS	CURVE-TO-SPIRAL
CSO	CONDUIT STUB OUT
CSU	CONDUIT STUB UP
CT	CONDUIT TIES
CTR	CENTER
CU	COPPER
CW	CONTACT WIRE
CY	CUBIC YARD

D

D	DEPTH
DB	DIRECT BURIAL
DC	DIRECT CURRECT
DEG	DEGREE
DF	DIRECT FIXATION
DTL	DETAIL
DGA	DOWN GUY ANCHOR
DIA	DIAMETER, ø
DIM	DIMENSION (DIM)
DISC	DISCONNECT
DISC SW	DISCONNECT SWITCH
DIST	DISTRIBUTION
DLGT	DOME LIGHT
DOC	DEGREE OF CURVATURE
DS	DOOR SWITCH
DWG	DRAWING

E

E	EAST
EA	EACH
EB	EASTBOUND
Ea	SUPERELEVATION IN INCHES
EHS	EXTRA HIGH STRENGTH
ELEC	ELECTRICAL
ELEV	ELEVATION
EMI	ELECTROMAGNETIC INTERFERENCE
EPR	ETHYLENE PROPYLENE RUBBER
EQ	EQUAL
EQN	EQUATION
EQPT	EQUIPMENT (EQUIP)
ES	EXTRA STRENGTH
ET	ELEMENT OF TES DEVICES
ETC	ET CETERA
ETS	EMERGENCY TRIP STATION
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERNAL

F

F	FAHRENHEIT
FA	FIXED ANCHOR
FAC	FACILITY
FDN	FOUNDATION
FDR	FEEDER
FF	FOUNDATION TRAFFIC
FFJ	FULL FEEDING JUMPER
FJ	FEEDER JUMPER
FM	FRICTION MODIFIER
FOP	FACE OF POLE
FOS	FACTOR OF SAFETY
FP	FEEDER POLE
FREQ	FREQUENCY

F CONTINUED

FS	FAR SIDE
FT	FEET, FOOT
F TO F	FACE TO FACE
F/T	FIXED TERMINATION (F.T.)
FTG	FOOTING

G

GALV	GALVANIZED
GB	GROUND BUS
G/L	GROUND LINE
GND	GROUND
GRD	GROUNDING DEVICE
GRS	GALVANIZED RIGID STEEL
GRSC	GALVANIZED RIGID STEEL CONDUIT
GC	GRADE CROSSING
GTE	GENERAL TELEPHONE ELECTRIC

H

HD	HARD DRAWN
HDG	HOT DIPPED GALVANIZED AFTER FABRICATION
HDPE	HIGH DENSITY POLYETHYLENE
HEX	HEXAGONAL
HH	HANDHOLE
HIA	HIAWATHA LRT (HLRT)
HID	HIGH INTENSITY DISCHARGE
HO	HAND OPERATED
HORIZ	HORIZONTAL
HPS	HIGH PRESSURE SODUIM
HRL	HIGH RAIL LEVEL
H-SPAN	HEAD SPAN
HS	HANDHOLE SIGNAL
HSS	HIGH STRENGTH STEEL
HT	HEIGHT
HTR	HEATER
HV	HIGH VOLTAGE
HVAC	HEATING VENTILATION AIR CONDITIONING
HWY	HIGHWAY
Hz	HERTZ

I

I	INTERLOCK
IB	IMPEDENCE BONDS
IC	INSTRUMENT CASE
ID	INSIDE DIAMETER
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
IL	LINE CURRENT
IJ	INSULATED JOINT
IN	INCH, INCHES
INC	INCOMING
INCL	INCLUDE, INCLUDING
INSUL	INSULATION
IPT	INTERFACE PHASE TRANSFORMER
I/R	IN RUNNING (RIDING CONTACT WIRE)

J

J	JUMPER
JB	JUNCTION BOX
JCT	JUNCTION
JJ	(2) JUMPERS
JT	JUNCTION BOX TIES

K

K	KIP
KCMIL	THOUSAND CIRCULAR MILS
kA	KILOAMPERE
KN	KNUCKLE
kV	KILOVOLT
kVA	KILOVOLT AMPERE
KSF	KIPS PER SQUARE FOOT
KSI	KIPS PER SQUARE INCH
kW	KILOWATT

L

LA	LIGHTNING ARRESTOR
LB	POUND, POUNDS
LB/FT	POUNDS PER FOOT
LC	LINE CURRENT
LF	LINEAR FEET
LED	LIGHT EMITTING DIODE
LG	LONG, LENGTH
LTG	LIGHTING
LOC	LOCATION
LPT	LOW POINT
LRT	LIGHT RAIL TRANSIT
LS	LUMP SUM/LINE SECTION/LINE SEGMENT
LT	LIGHT OR LEFT
LTS	LIGHTS
LV	LOW VOLTAGE

M

M	METER (DISTANCE)
MAX	MAXIMUM
M/W	MESSENGER WIRE
MC	MOTOR CONTROL
MCM	THOUSAND CIRCULAR MIL
mH	MILLIHENRY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
M/L	MAIN LINE
MNDOT	MINNESOTA DEPARTMENT OF TRANSPORTATION
MOP	MOTOR OPERATED
MP	MILE POST - MORE PERMISSIVE SPEED
MPA	MID POINT ANCHOR
MPH	MILES PER HOUR
MS	MANHOLE SIGNAL
MTG	MOUNTING
MT	METRO TRANSIT
MVA	MEGAVOLT AMPERE
mV	MILLIVOLT
MW	MEGAWATT
MW	MESSENGER WIRE

N

N	NORTH, NEUTRAL
N/A	NOT APPLICABLE
NB	NORTH BOUND
NBR	NON-BRIDGING
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEG	NEGATIVE
NESC	NATIONAL ELECTRICAL SAFETY CODE
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
No.	NUMBER
NOM	NOMINAL
NR	NOT REGISTERED NEGATIVE RETURN
NS	NEAR SIDE
NS	NOT SUPPORTED
NSR	NOT SUPPORTED OR REGISTERED
NTS	NOT TO SCALE

O

OC	ON CENTER
OCS	OVERHEAD CONTACT SYSTEM
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OHB	OVERHEAD BRIDGE
O/L	OVERLAP
O/R	OUT OF RUNNING (NON-RIDING CONTACT WIRE)

P

PAN	PANTOGRAPH
PB	PULLBOX
PC	POINT OF CURVE
PD	POWER DISTRIBUTION PANEL
PE	PHOTOELECTRIC CELL

P CONTINUED

PED	PEDESTRIAN
PF	POINT OF FROG PEDESTRIAN FLASHER
PGRS	PVC COATED GRSC
PH	PHASE
PI	POINT OF INTERSECTION
PITO	POINT OF INTERSECTION OF TURNOUT
PL	PLATE
P/L	PROPERTY LINE
PLAT	PLATFORM
POS	POSITIVE
PRE-C	PRE-CAST CONCRETE
PROP	PROPOSED
PS	POINT OF SWITCH
PSF	POUNDS PER SQUARE FEET
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENT
P/T	POCKET TRACK
PUC	PUBLIC UTILITY COMMISSION
PVC	POLYVINYL CHLORIDE COUNDUIT (PVCC) OR POINT OF VERTICAL CURVE
PWR	POWER
PX	PEDESTRIAN CROSSING

Q

QTY	QUANTITY

R

R	RADIUS
RAB	RAIL ACCESS BOX
RE	RUNNING EDGE OF RAIL
RECT	RECTIFIER
REF	REFERENCE
REV	REVISE/REVISION
REQD	REQUIRED
RPZ	RUNWAY PROTECTION ZONE
RT	RIGHT
RTU	REMOTE TERMINAL UNIT
RR	RAILROAD
RRX	RAILROAD GRADE CROSSING
RW	RETAINING WALL
ROW	RIGHT OF WAY

S

S	SOUTH
SA	SURGE ARRESTOR
SAP	SUBSTATION ALARM PANEL
SB	SOUTHBOUND OR SPLICE BOX
SC	SPIRAL TO CURVE OR SIGNAL/ COMMUNICATION
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SCAT	SIMPLE CATENARY AUTO TENSION
SCFT	SIMPLE CATENARY FIXED TERMINATION
SECT	SECTION
SI	SECTION INSULATOR
SIG	SIGNAL
SOP	SET OUT POINT
SP	SURGE PROTECTION
SPEC	SPECIFICATION
SPS	SMALL PART STEELWORK
SPST	SINGLE POLE SINGLE THROW
SQ	SQUARE
Sq Ft	SQUARE FEET
Sq In	SQUARE INCHES
S-SPAN	STEADY SPAN
SST	STAINLESS STEEL
ST STA	SPIRAL TO TANGENT, STREET STATION, STATIONING
STD	STANDARD
STRUCT	STRUCTURE
SU	STUB-UP
SUSP	SUSPENDED
SW	SWITCH
SWA	SINGLE WIRE ANCHOR

S CONTINUED

SWAT	SINGLE WIRE AUTO TENSION
SWFT	SINGLE WIRE FIXED TERMINATION
SWH	SWITCH HEATER
SWHC	SWITCH HEATER CABINET
SWHT	SWITCH HEATER TRANSFORMER
S/E	SUPERELEVATION

T

T	TIE SWITCH
TB	TAP BOX, TERMINAL BLOCK
TBD	TO BE DETERMINED
TBR	TO BE REMOVED
TE	TRACTION ELECTRIFICATION
TEL	TELEPHONE
TEMP	TEMPERATURE
TEM	TEMPORARY
TERM	TERMINAL, TERMINATION
TF	AXEL COUNTER
THK	THICK
T/F	TOP OF FOUNDATION
T/G	TOP OF GROUND LINE
TL	TENSION LENGTH OR TRACK LIGHTING
T/LR	TOP OF LOW RAIL
TO	TURNOUT
TOC	TOP OF CONCRETE
TOLR	TOP OF LOW RAIL
TOR	TOP OF RAIL
TORW	TOP OF RETAINING WALL
TP	TRACTION POWER
TPSS	TRACTION POWER SUBSTATION
TPT	TRACTION POWER CONTROLLER
TRAC	TRACTION
TRANSF	TRANSFORMER, TRANSFER
TRK	TRACK
TS	TANGENT TO SPIRAL
TTC	TELEPHONE TERMINAL CABINET
TVM	TICKET VENDING MACHINE
TWA	TIE WIRE ANCHOR
TWC	TRAIN-TO-WAYSIDE COMMUNICATIONS, TWC LOOP
TYP	TYPICAL

U

UG	UNDERGRADE, UNDERGROUND
UGB	UNDERGRADE BRIDGE
U/S	UNDERSIDE
UTIL	UTILITY (UTIL)

V

V	VOLT
VA	VOLT AMPS
VERT	VERTICAL
V/S	VERSINE
VS	VOLTMETER SWITCH

W

W	WATT, WIDTH OR WIRE
W/	WITH
WB	WESTBOUND
WI	WEIGHT - WROUGHT IRON
W/O	WITHOUT
WF	WIDE FLANGE
WWF	WELDED WIRE FABRIC

X

XB	CROSS BOND.
XFMR	TRANSFORMER
X-ING	CROSSING
XOVER	CROSSOVER
XPASS	CROSS PASSAGE
X-SECT	CROSS SECTION
X-SPAN	CROSS SPAN

Y

Y	YARD
YL	YARD LEAD

Z

ZBOND	IMPEDANCE BOND

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS) GENERAL ABBREVIATIONS

DISCIPLINE: SYSTEMS

SHEET NAME: SYS-GEN-001

SHEET 3 OF 240

SYSTEMS LEGEND & GENERAL NOTES

LAYOUT PLAN SYMBOLS:

SC MANHOLE

TE MANHOLE

SC HANDHOLE

TPSS FENCE

MAINLINE SC DUCTBANK

MAINLINE TE DUCTBANK

INTRUSION DETECTION

MC DUCTBANK

TPSS BUILDING (TPSS–SW–##)

SIGNAL OR INTERMEDIATE OR PLATFORM OR XING OR TUNNEL HOUSE OR ANY COMBINATION OF THESE

FP OCS FEEDER POLE

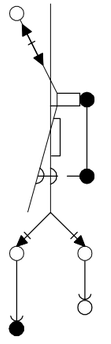
TP OCS TUBULAR POLE

OCS POLE/FOUNDATION

POLE WITH SINGLE CANTILEVER

DOWN GUY ANCHOR

SECTION INSULATOR, BRIDGING TYPE



BALANCE WEIGHT ANCHOR, SINGLE CONTACT WIRE

POLE WITH DOUBLE CANTILEVER

CROSSING CONTACT BRIDGE

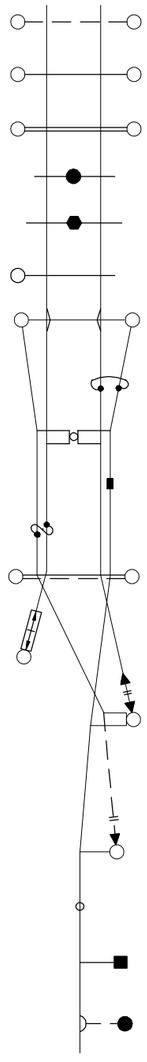
NEW POLE WITH WIRE PULL–OFF FOR TWO WIRES

FIXED TERMINATION – FISH TAIL STYLE SINGLE CONTACT WIRE

EXISTING DOWN GUY ANCHOR

NEW DOWN GUY ANCHOR

LAYOUT PLAN SYMBOLS CONT:



STEADY SPAN STRUCTURE (NO SUPPORT)

HEADSPAN SUPPORT STRUCTURE WITHOUT STEADY SPAN REGISTRATION

PORTAL STRUCTURE

NEW POLE WITH BACK–TO–BACK CANTILEVERS

POLE, JOINT USE WITH BACK–TO–BACK OCS CANTILEVERS AND STREET LIGHTS

TWO TRACK CANTILEVER – HINGED SUPPORT

SINGLE CONTACT WIRE BRIDLE SUPPORT AND REGISTRATION ASSEMBLY

POTENTIAL EQUALIZING JUMPER

POLE WITH BACK–TO–BACK DOUBLE CANTILEVERS

INSULATOR CUT INTO OUT–OF–RUNNING C/W

FULL CURRENT JUMPER

HEADSPAN SUPPORT STRUCTURE WITH STEADY SPAN REGISTRATION

SPRING TENSIONER – SINGLE CONTACT WIRE

BALANCE WEIGHT ANCHOR SIMPLE CATENARY SYSTEM

OUT OF RUNNING CONTACT WIRE

FIXED TERMINATION – SIMPLE CATENARY SYSTEM

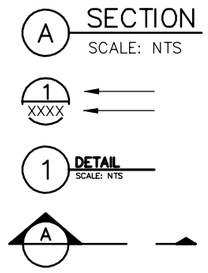
TUNNEL OR BRIDGE SUPPORT

TUNNEL OR BRIDGE SUPPORT AND REGISTRATION

POLE WITH WIRE PULL OFF FOR ONE WIRE

GENERAL NOTES:

1. ITEMS SHOWN SCREENED ARE EITHER NOT–IN–CONTRACT OR ARE PART OF ANOTHER DESIGN PACKAGE.
2. DEPTH OF CONDUITS MAY VARY SLIGHTLY IN ORDER TO ACHIEVE ADEQUATE DRAINAGE INTO MANHOLES, HANDHOLES AND PULLBOXES. SEE SPECIFICATIONS.
3. ALL HANDHOLES AND MANHOLES SHALL BE LOCATED WITH LONG SIDE PARALLEL TO TRACKS UNLESS OTHERWISE NOTED
4. COORDINATE INSTALLATION OF DUCTBANKS AT TRACK DRAINS AND BELOW TRACK SLABS.
5. LOCATION OF KNOWN EXISTING UNDERGROUND UTILITIES IS INDICATED ON UTILITY DRAWINGS. FIELD VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING INSTALLATION OF THIS WORK.



SECTION A

DETAIL No. 1 ON XXXX = SHEET NO.

DETAIL No. 1 (WHERE INDICATED OR SHOWN)

SECTION CROSS SECTION

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
GENERAL
SYMBOLS, LEGEND AND GENERAL NOTES

DISCIPLINE: SYSTEMS

SHEET NAME: SYS-GEN-002

SHEET 4 OF 240

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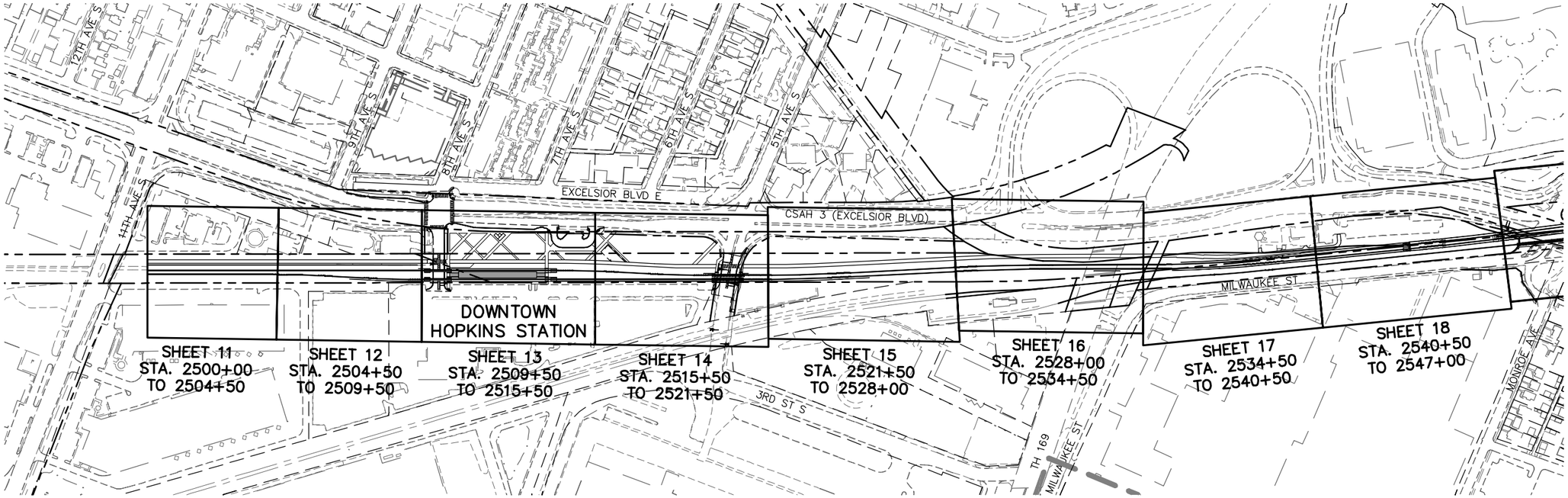

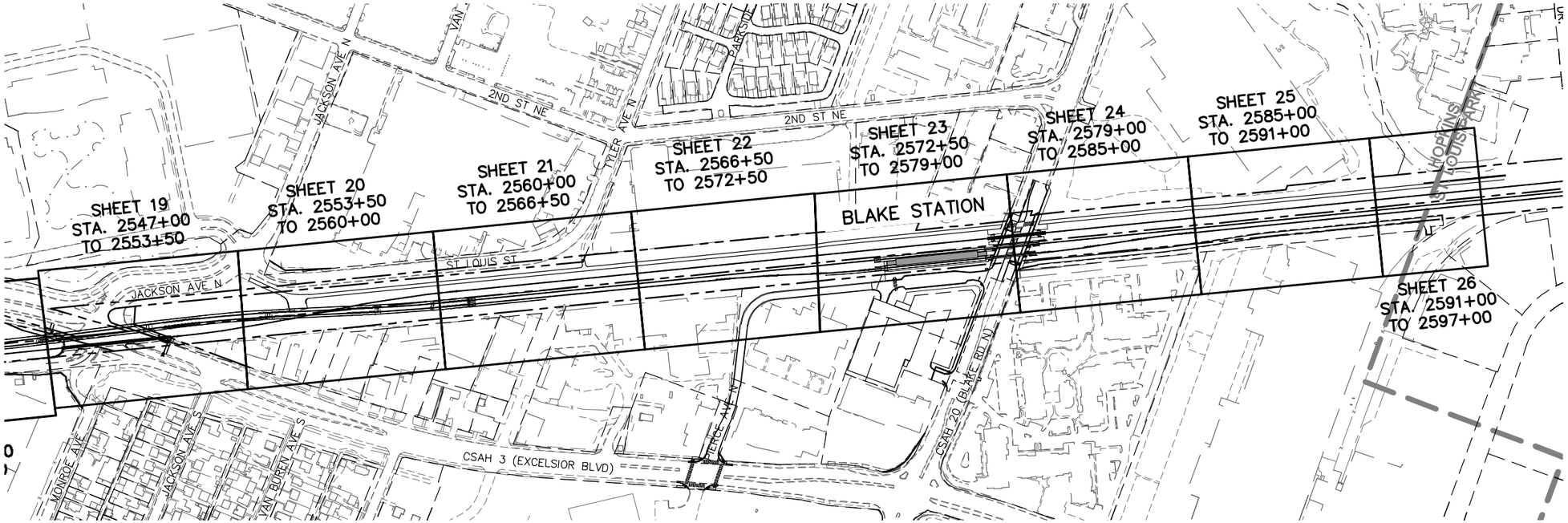

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
SHEET LAYOUT INDEX

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-IDX-001

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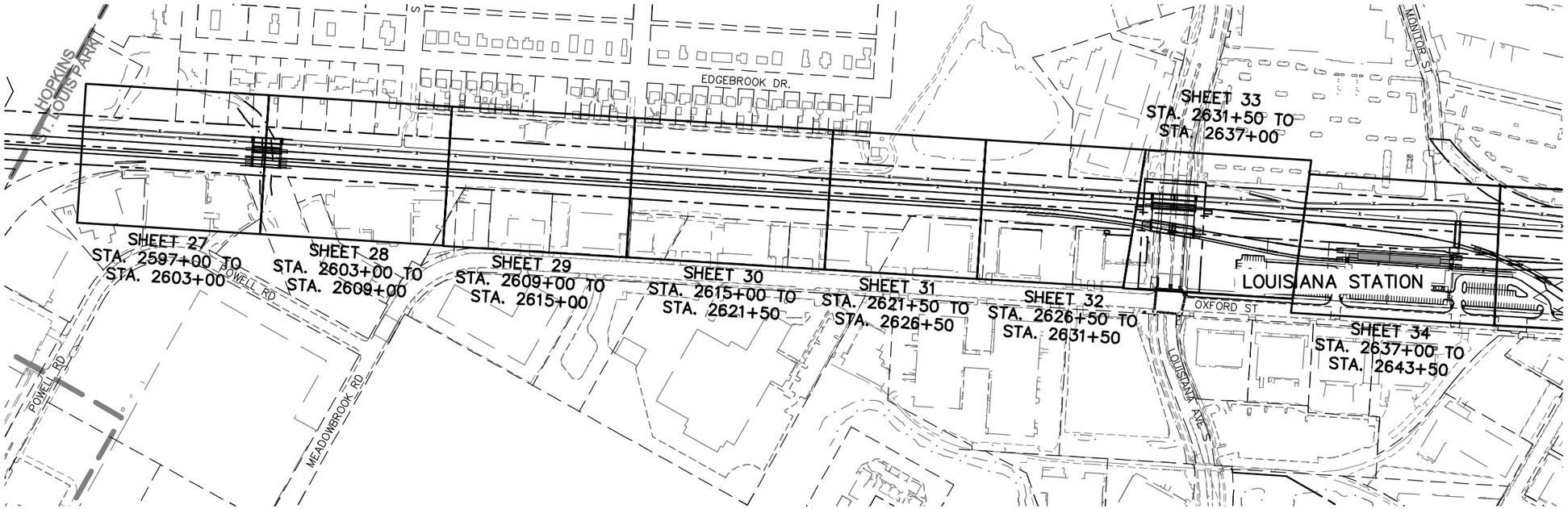

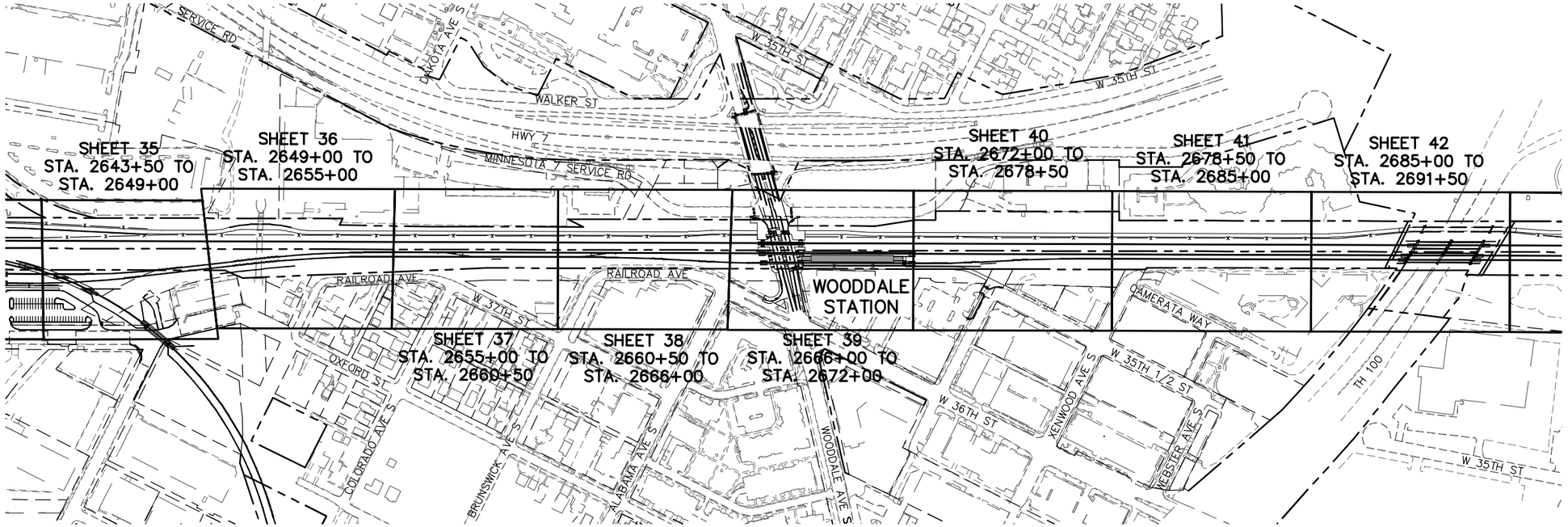

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
SHEET LAYOUT INDEX

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-IDX-001

SHEET 6 OF 240

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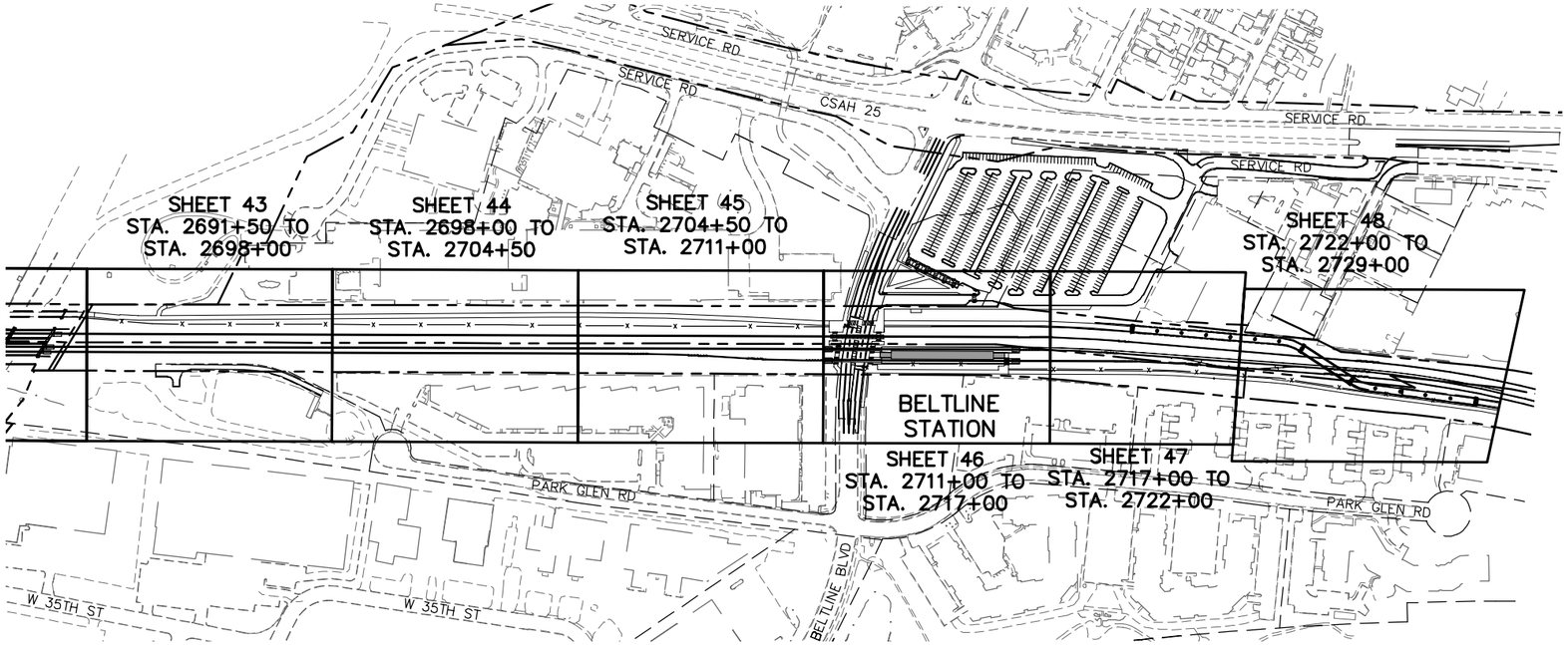

0 100 200 400
SCALE IN FEET

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
SHEET LAYOUT INDEX

DISCIPLINE: SYSTEMS

SHEET NAME: E2-SYS-IDX-002

SHEET 7 OF 240

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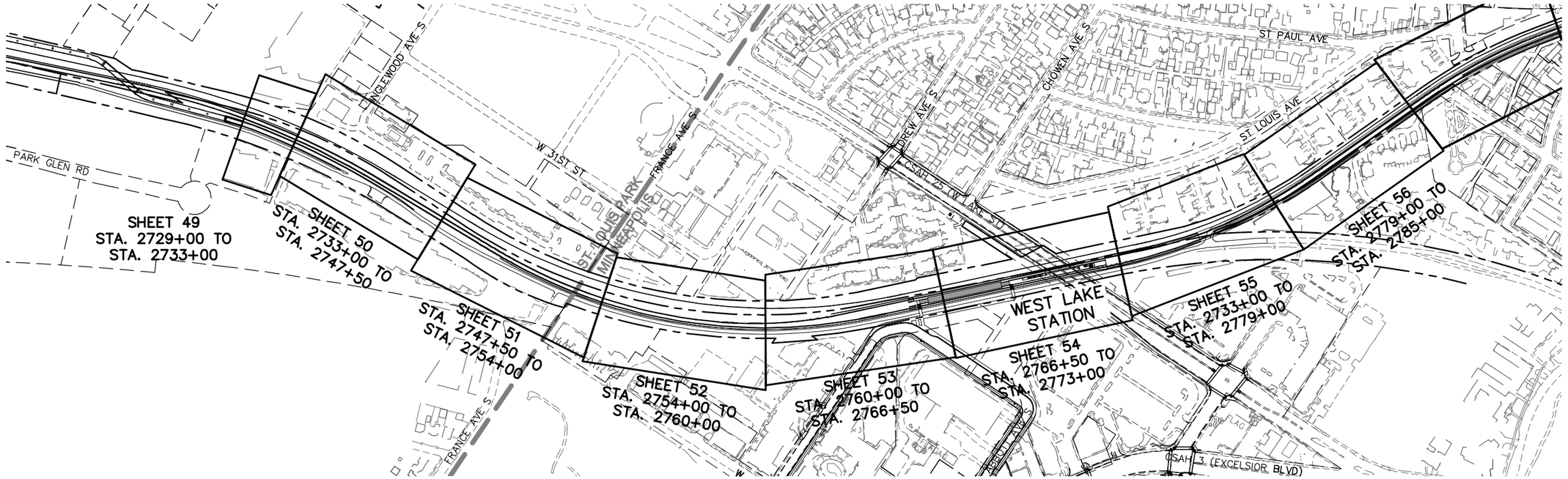

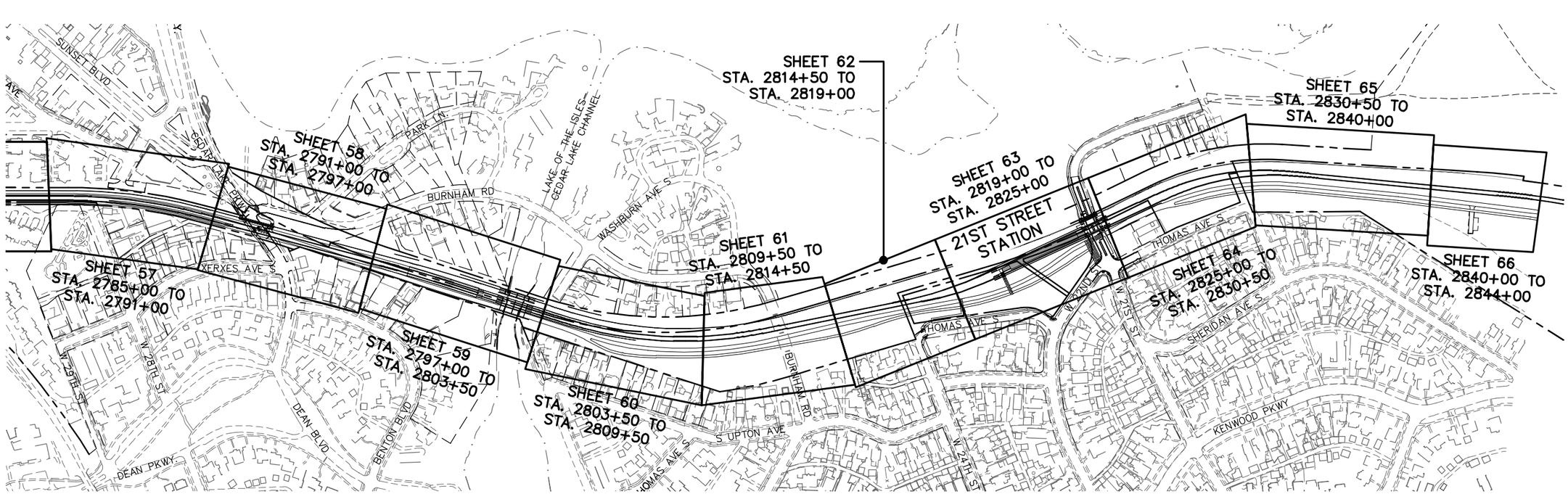

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
SHEET LAYOUT INDEX

DISCIPLINE: SYSTEMS

SHEET NAME: E3-SYS-IDX-001

SHEET 8 OF 240

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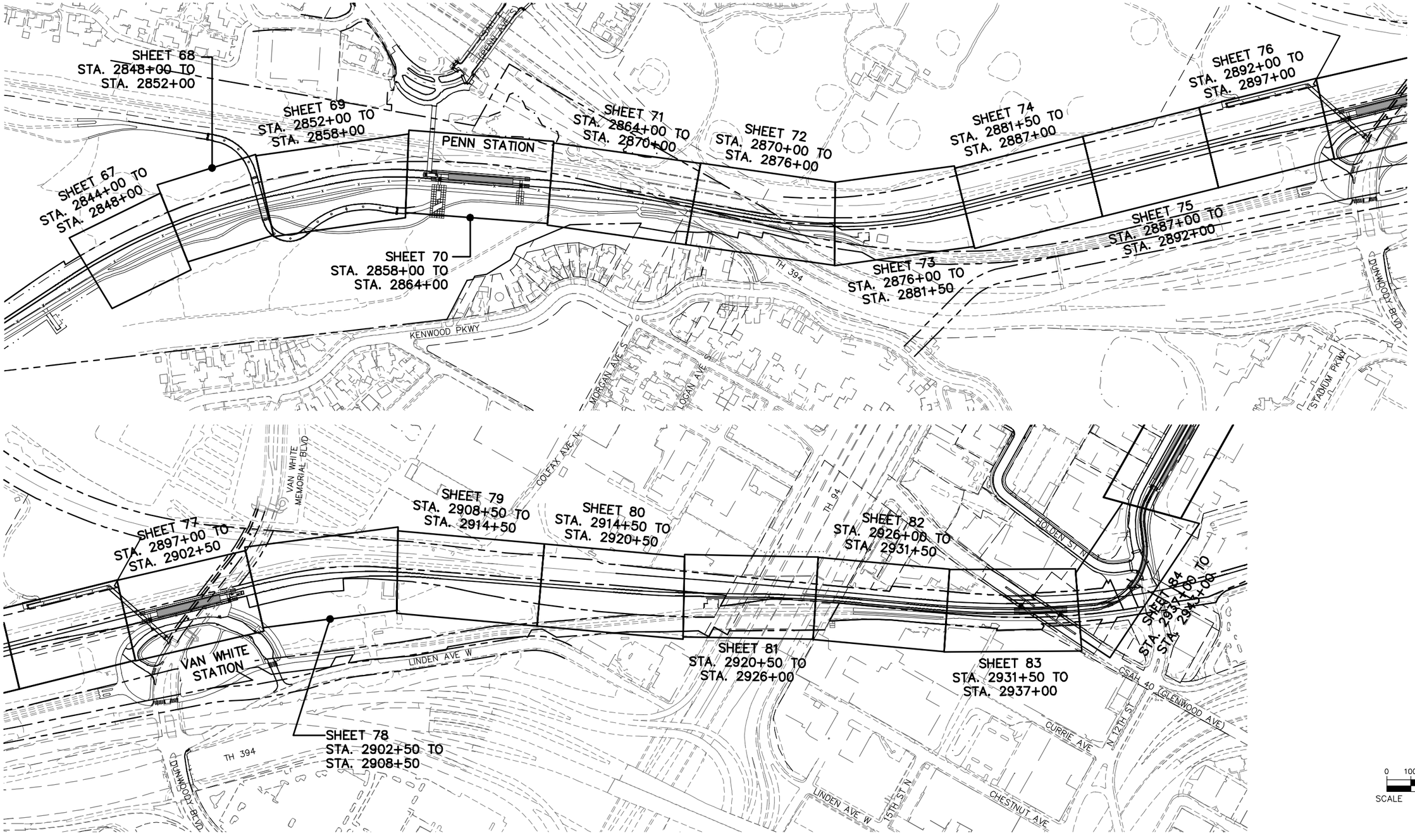

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

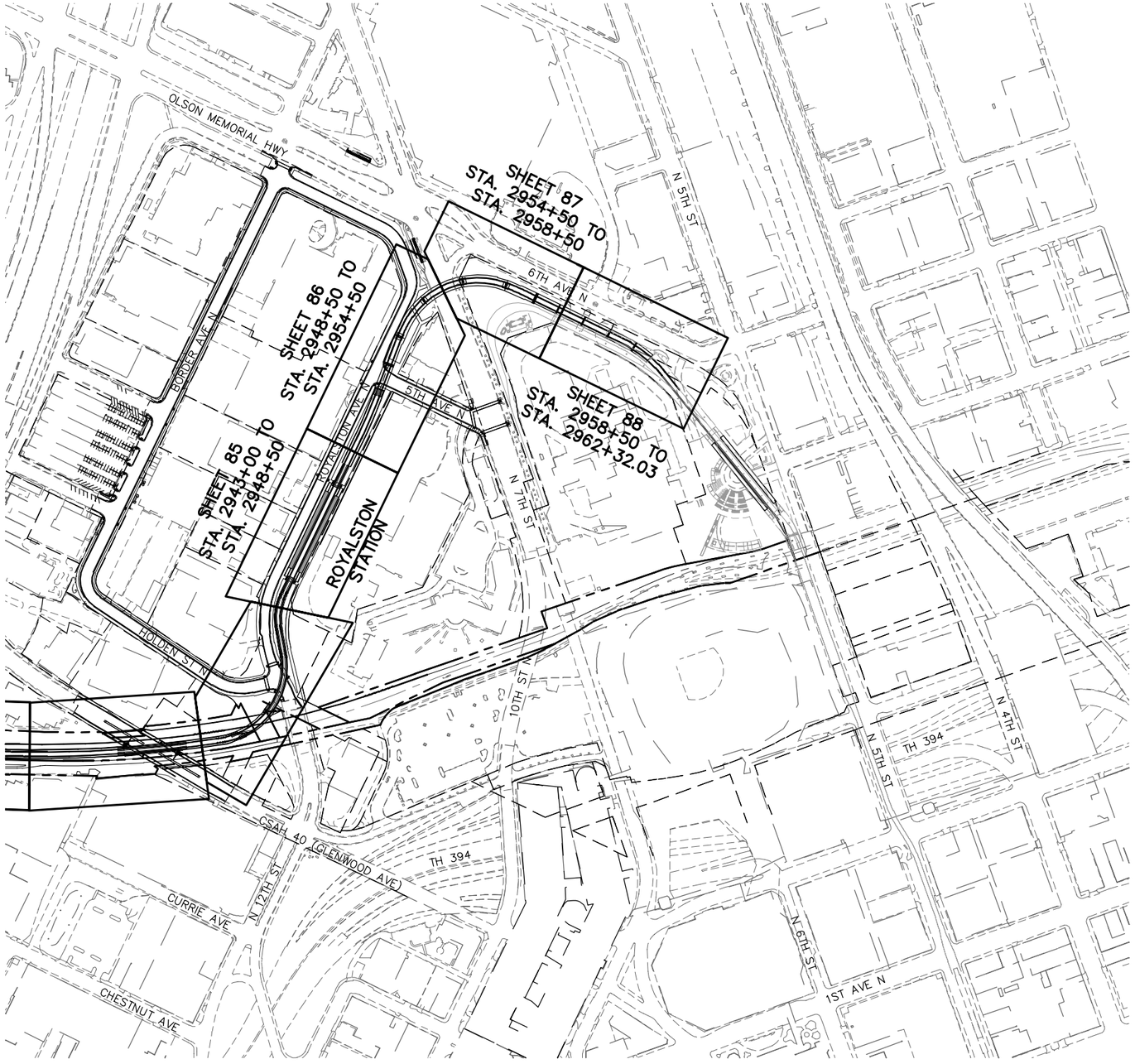
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
SHEET LAYOUT INDEX

DISCIPLINE: SYSTEMS

SHEET NAME: E4-SYS-IDX-001

SHEET 9 OF 240



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
SHEET LAYOUT INDEX

DISCIPLINE: SYSTEMS

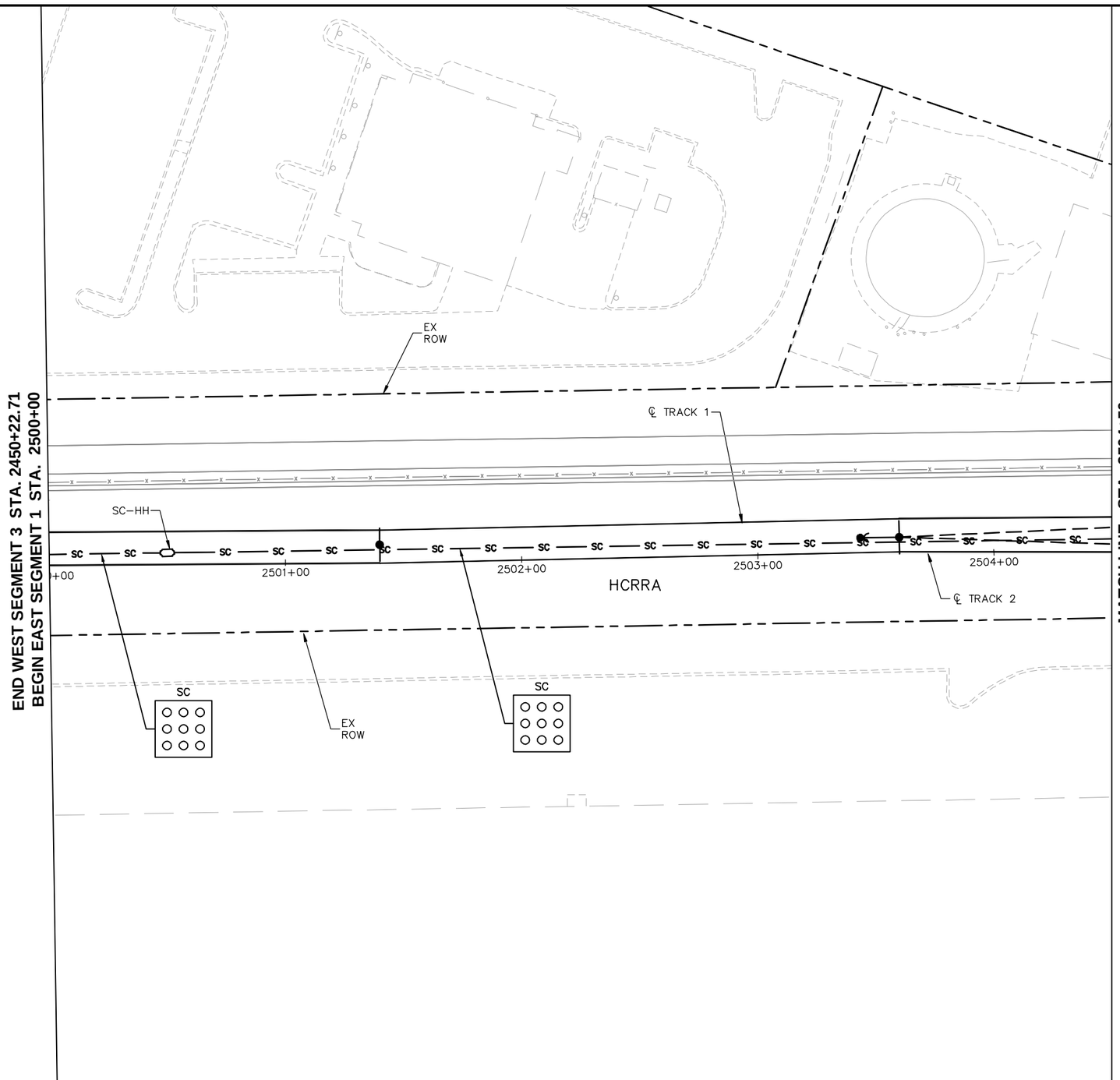
SHEET NAME: E4-SYS-IDX-002

SHEET 10 OF 240

Aug. 27 2014 05:32 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-IDX.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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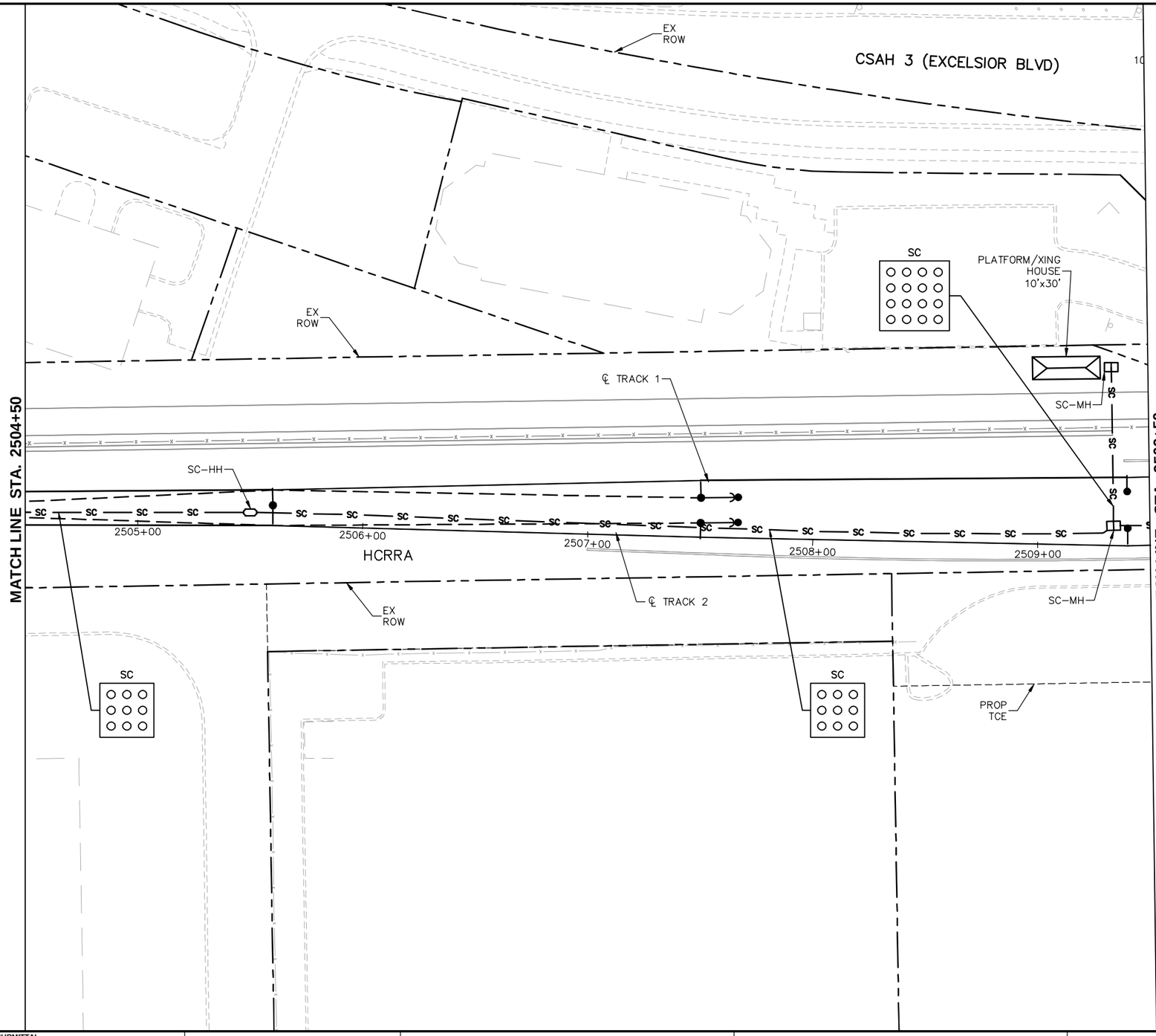
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2500+00 TO STA. 2504+50

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-001

SHEET 11 OF 240

Aug, 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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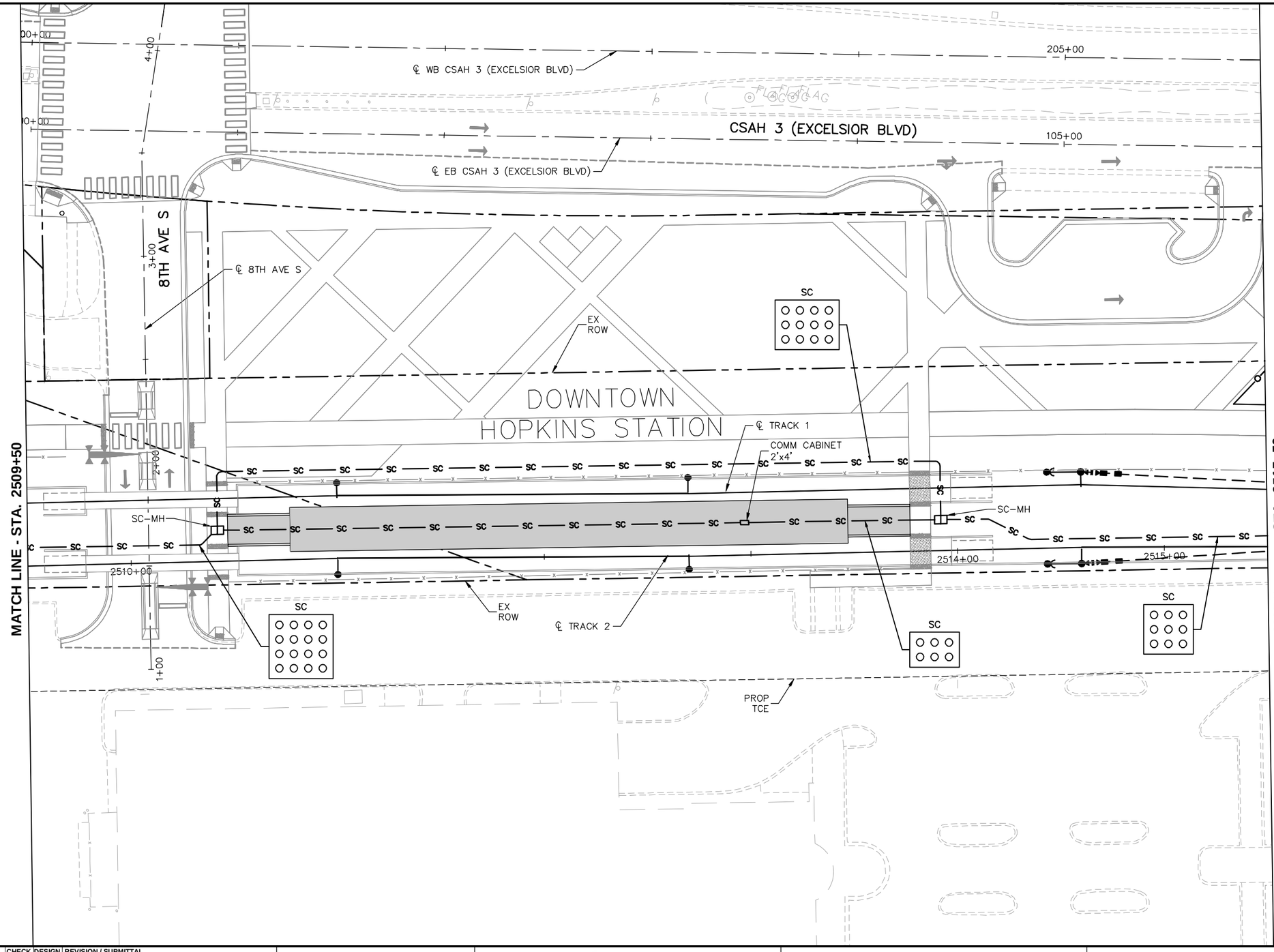
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2504+50 TO STA. 2509+50

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-002

SHEET 12 OF 240

Aug, 27 2014 05:35 pm V: \3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.
6. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE DETERMINED IN FINAL DESIGN.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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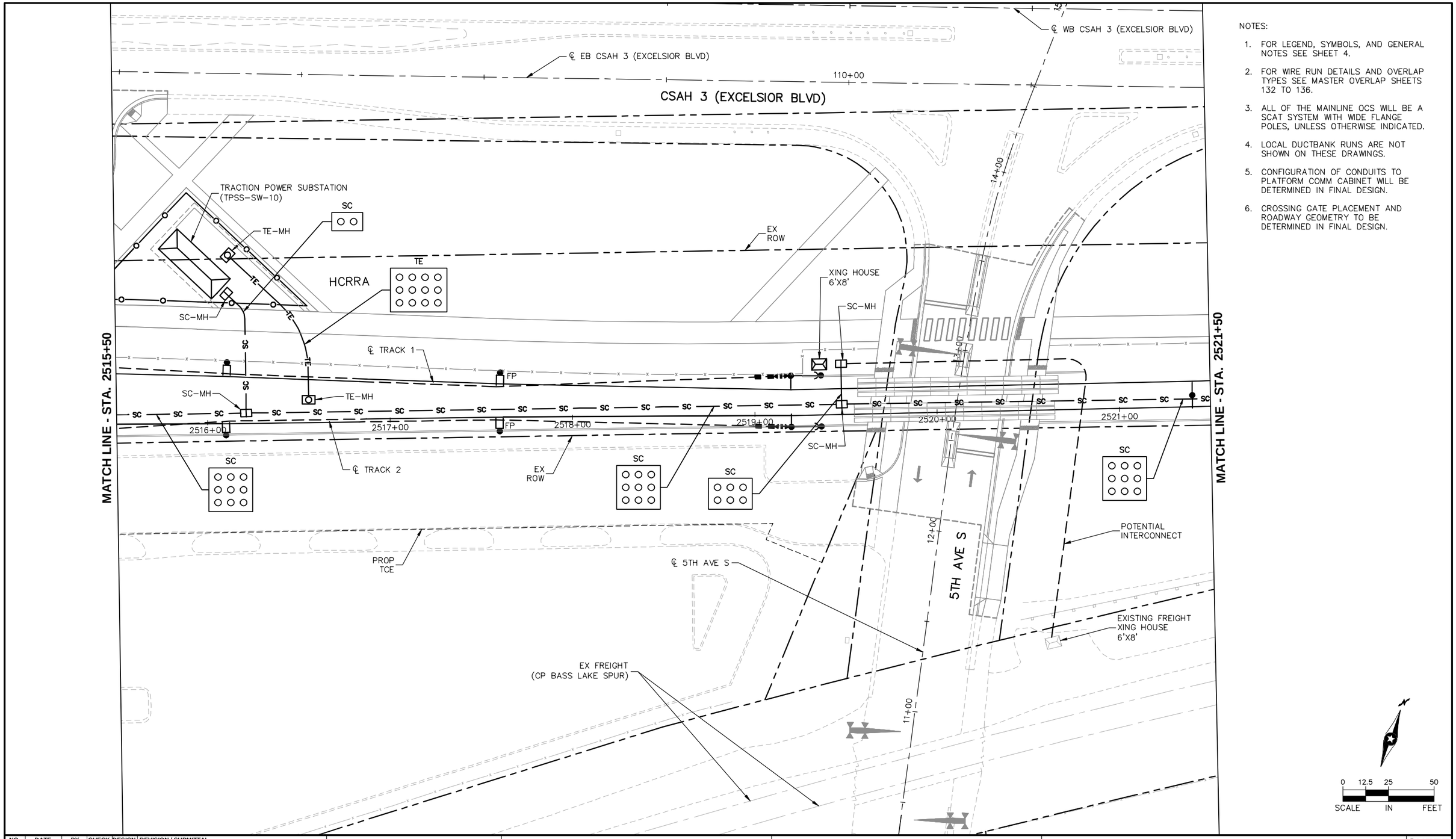
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2509+50 TO STA. 2515+50

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-003

SHEET 13 OF 240

Aug, 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
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5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.
6. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE DETERMINED IN FINAL DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2515+50 TO STA. 2521+50

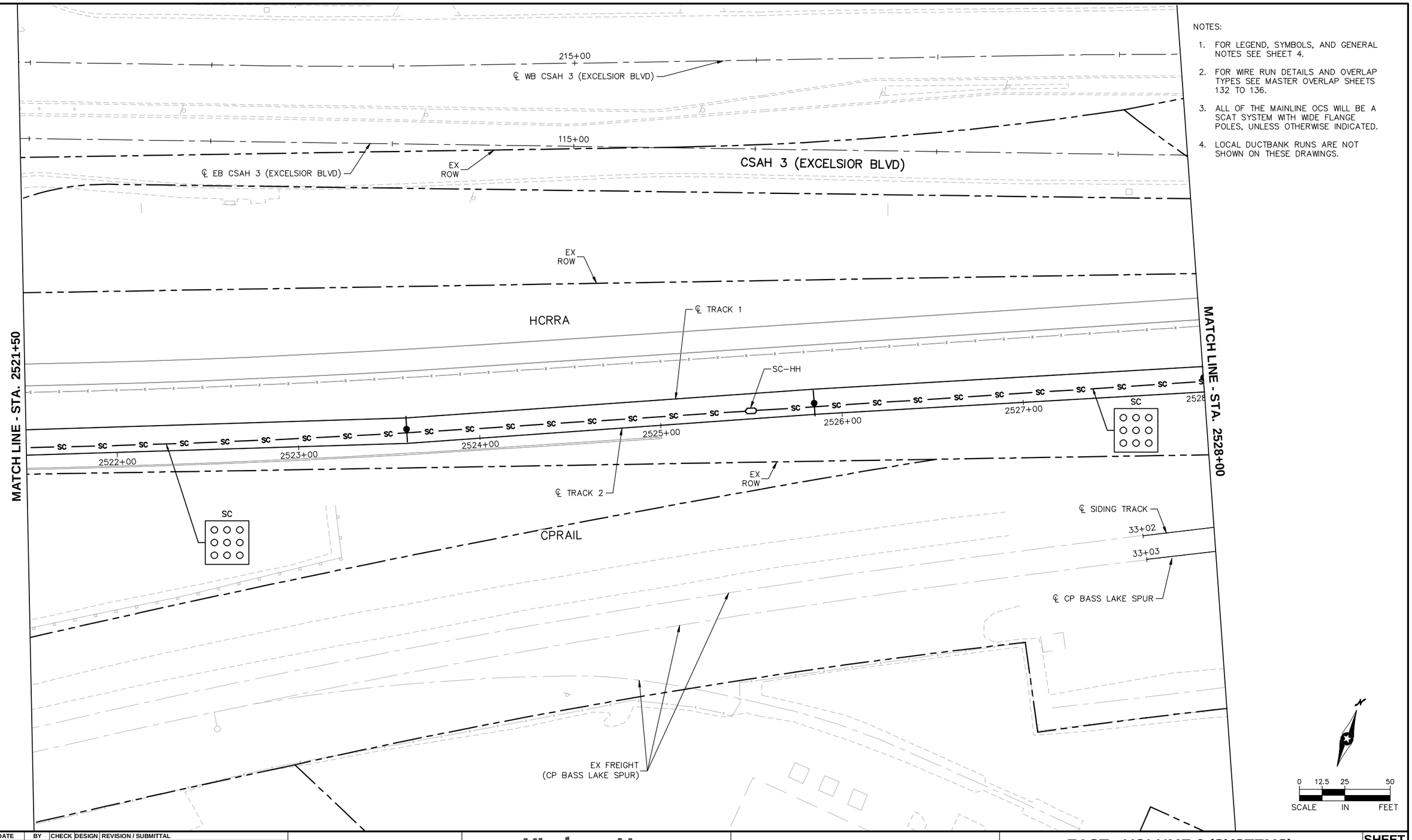
DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-004

SHEET 14 OF 240

Aug, 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2521+50 TO STA. 2528+00

DISCIPLINE: SYSTEMS

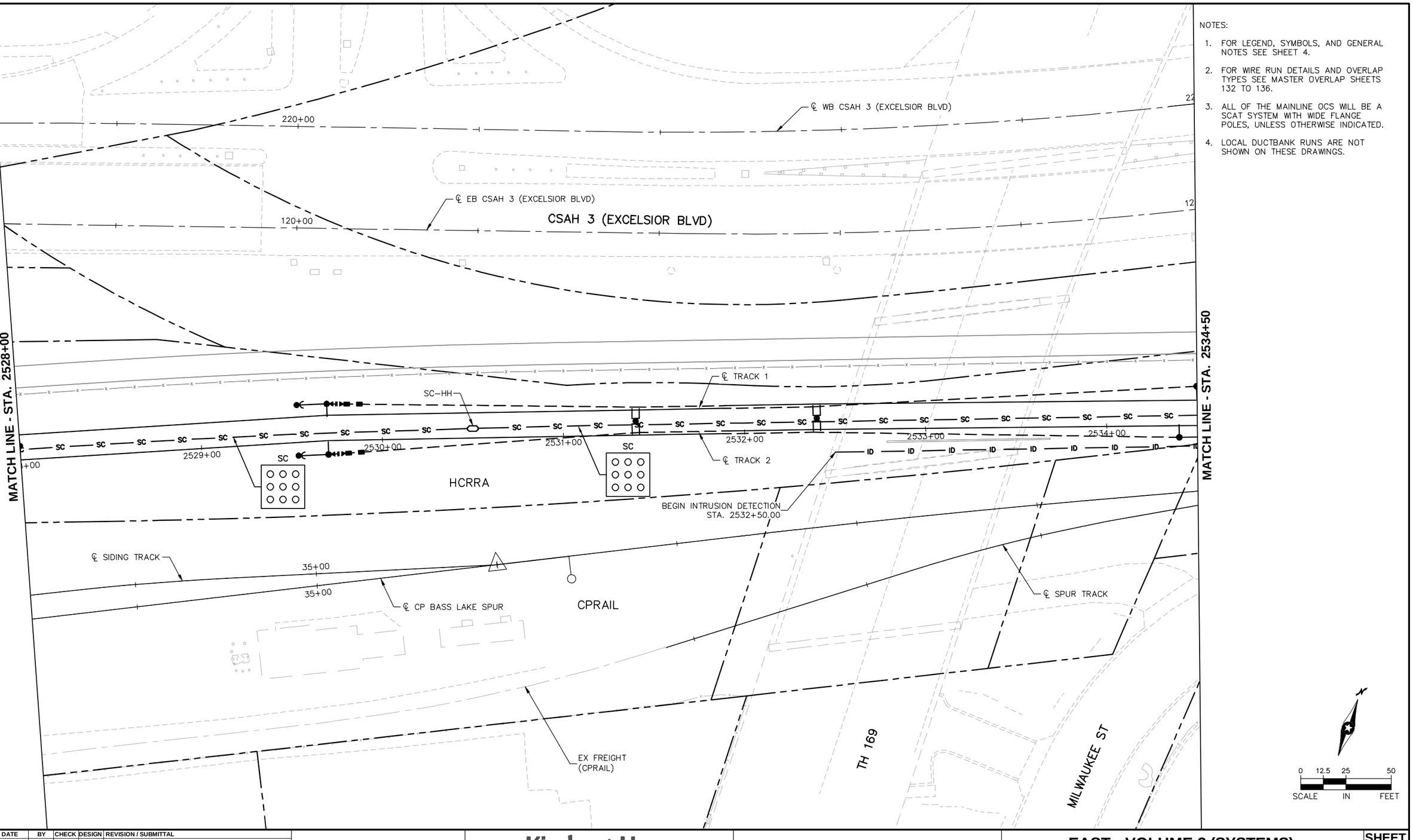
SHEET NAME: E1-SYS-PLN-005

SHEET 15 OF 240

Aug. 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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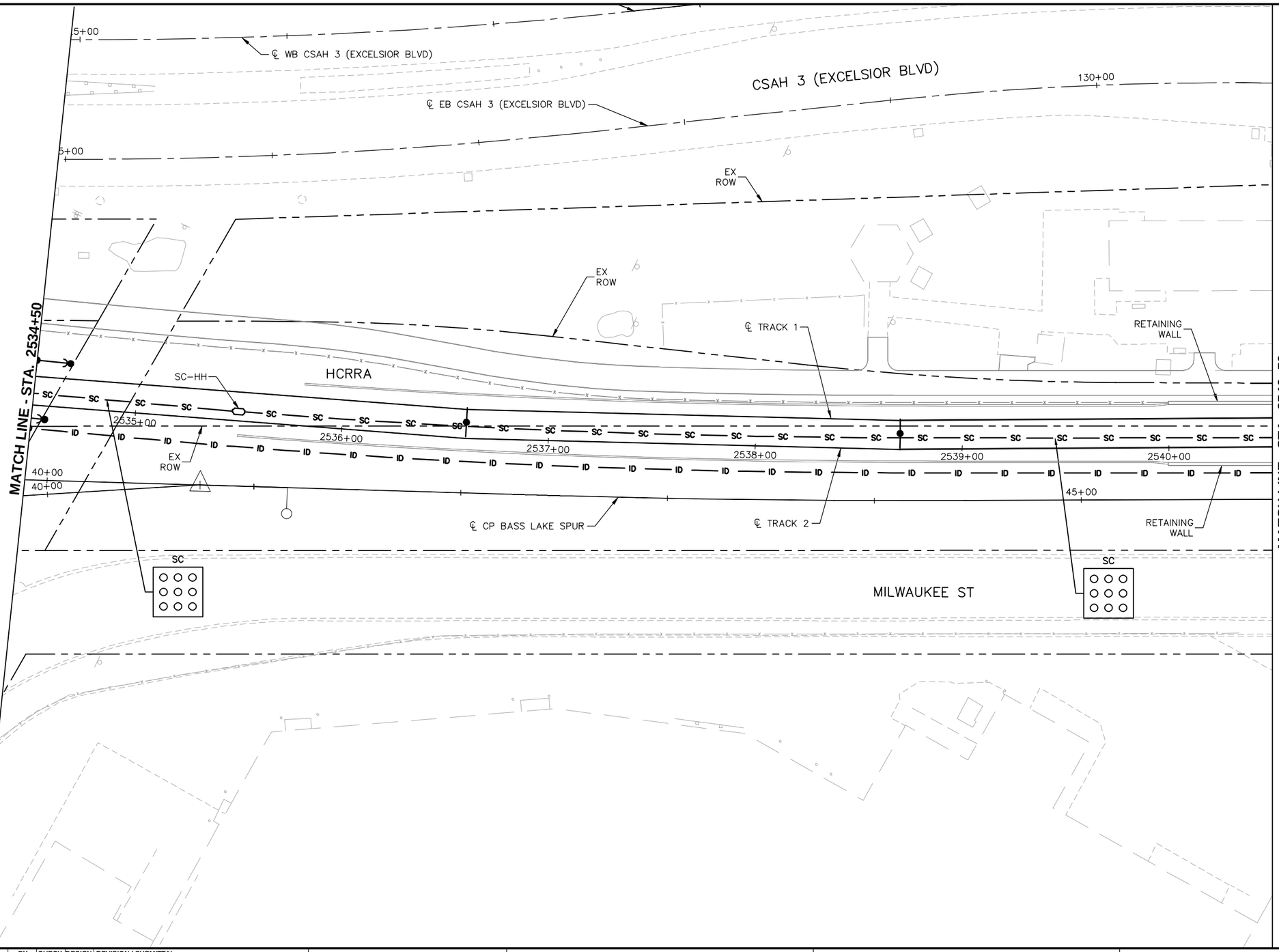
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2528+00 TO STA. 2534+50

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-006

SHEET 16 OF 240

Aug. 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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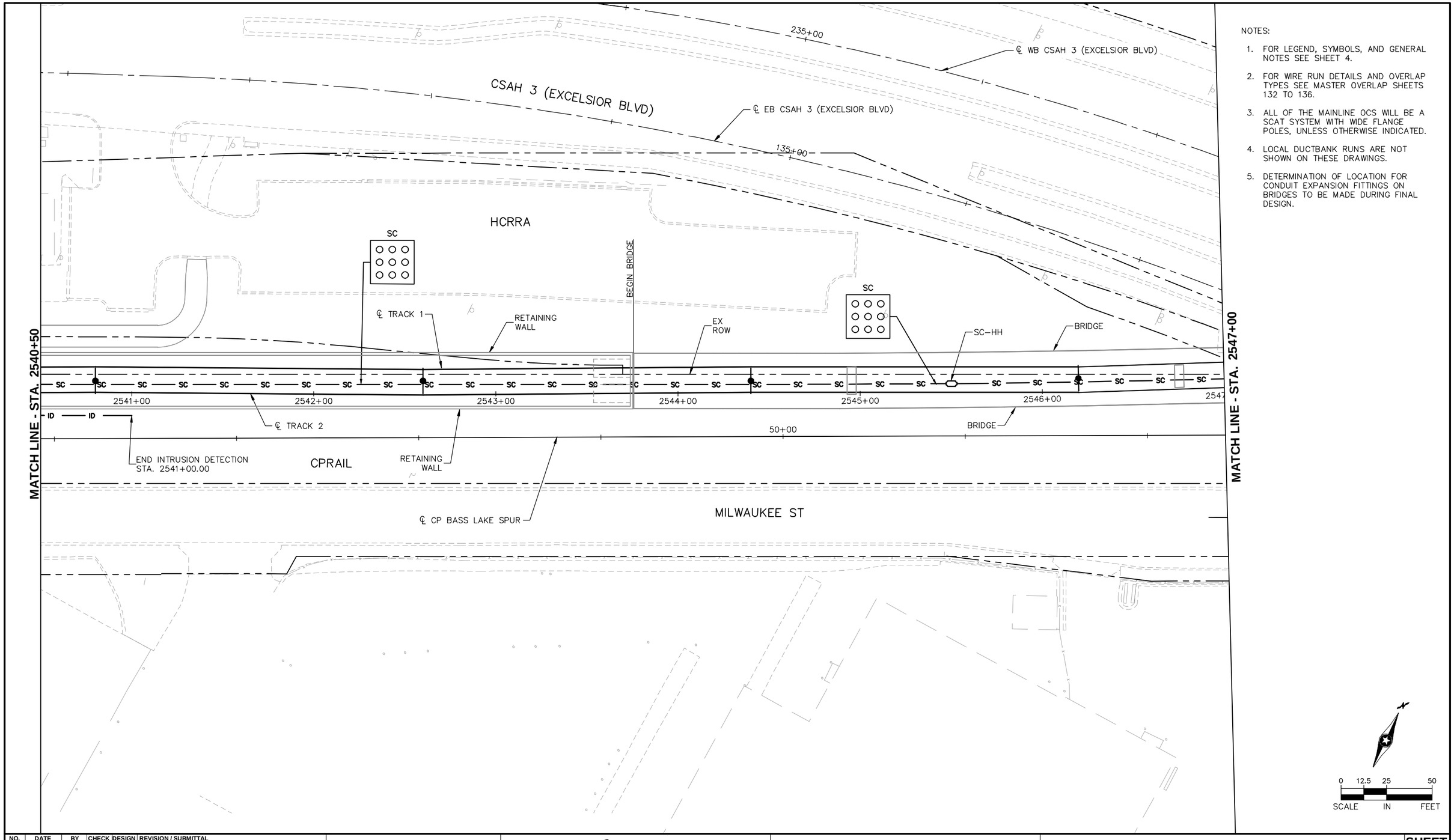
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2534+50 TO STA. 2540+50

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-007
SHEET 17 OF 240



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2540+50 TO STA. 2547+00

DISCIPLINE: SYSTEMS

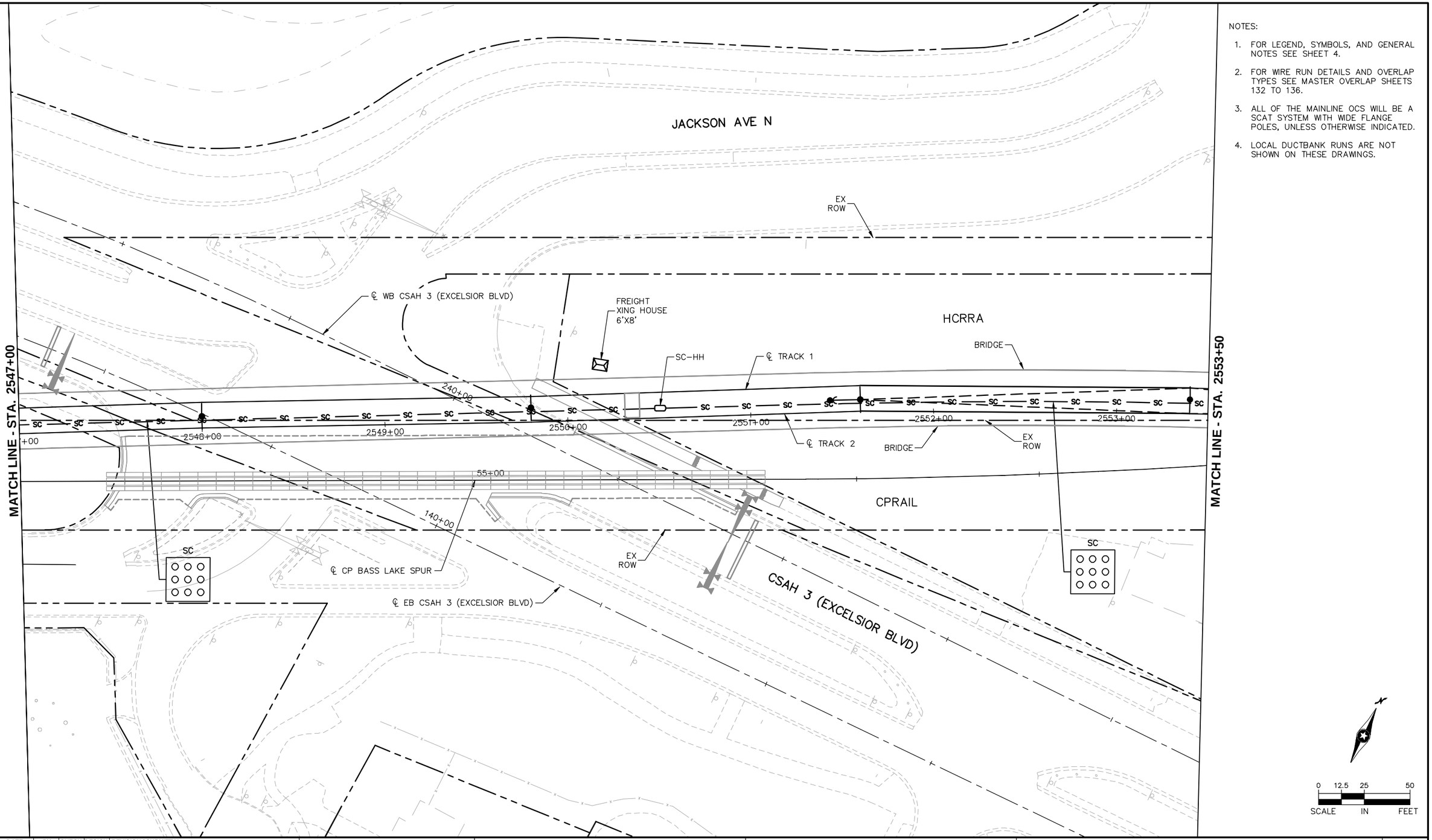
SHEET NAME: E1-SYS-PLN-008

SHEET 18 OF 240

Aug. 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2547+00 TO STA. 2553+50

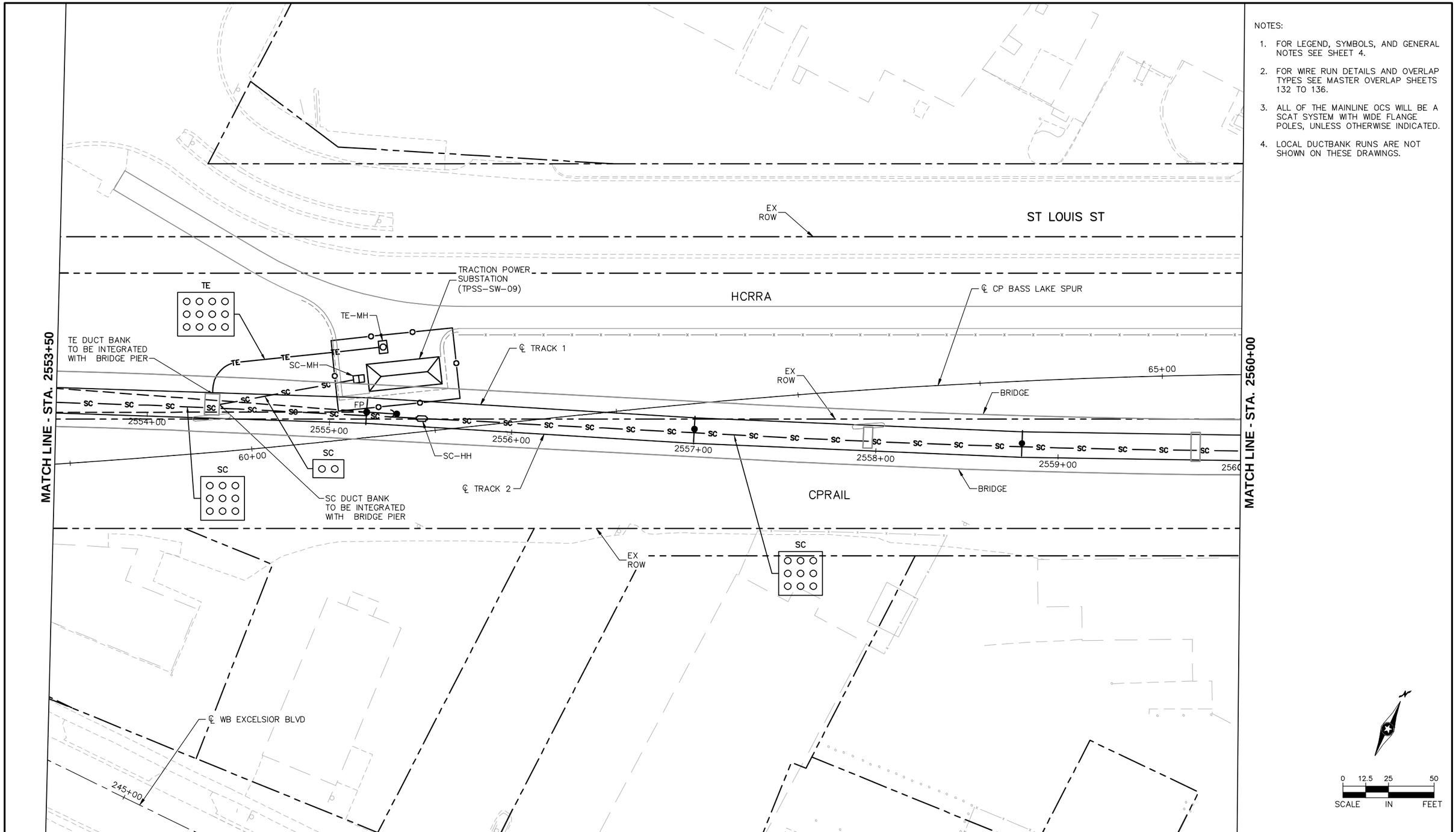
DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-009

SHEET 19 OF 240

Aug, 27 2014 05:35 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2553+50 TO STA. 2560+00

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-010

SHEET 20 OF 240

Aug, 27 2014 05:36 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.

MATCH LINE - STA. 2560+00

MATCH LINE - STA. 2566+50

ST LOUIS ST

EX ROW

HCRRA

℄ CP BASS LAKE SPUR

END BRIDGE

70+00

BRIDGE

RETAINING WALL

BEGIN INTRUSION DETECTION STA. 2563+50.00

℄ TRACK 1

EX ROW

SC–HH

SC

ID

2561+00

2562+00

2563+00

2564+00

2565+00

2566+00

BRIDGE

RETAINING WALL

CPRAIL

℄ TRACK 2

SC–HH

EX ROW

SC

SCALE 0 12.5 25 50 IN FEET

Aug. 27 2014 05:36 pm V:\3300_PEC–E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1–SYS–PLN.dwg By: curtis.neft

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2560+00 TO STA. 2566+50

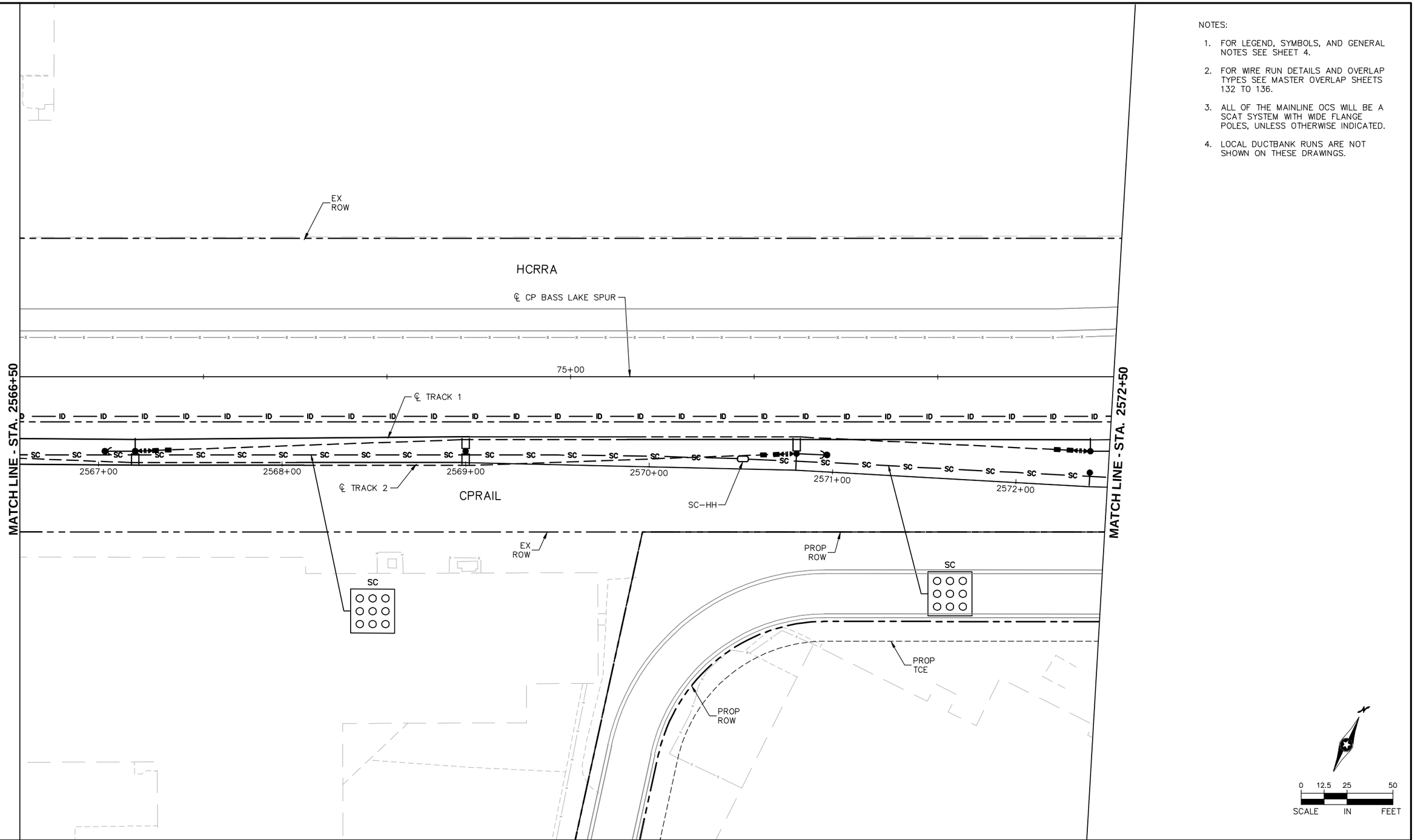
DISCIPLINE: SYSTEMS

SHEET NAME: E1-SYS-PLN-011

SHEET 21 OF 240

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2566+50 TO STA. 2572+50

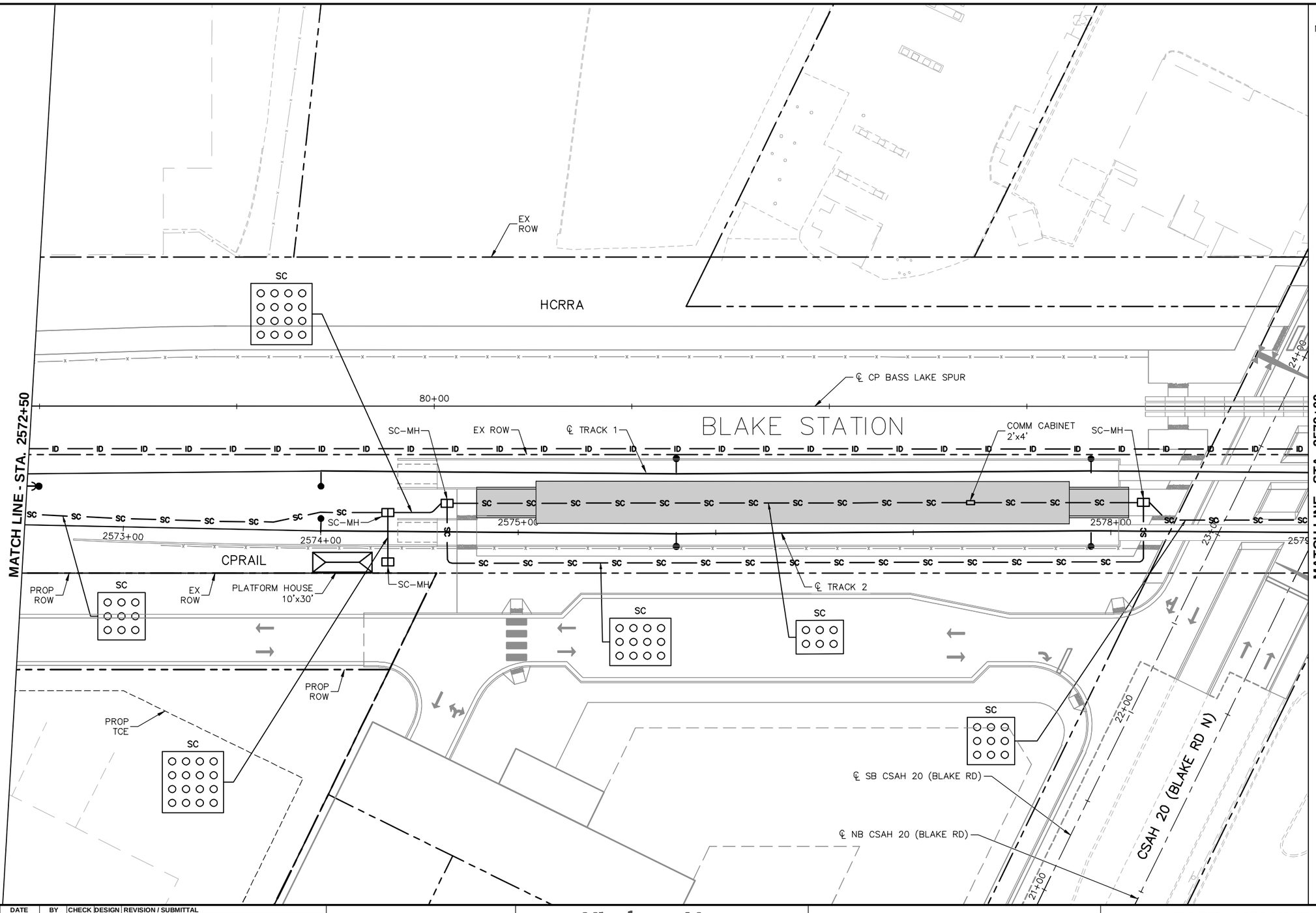
DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-012

SHEET 22 OF 240

Aug. 27 2014 05:36 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.
6. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE DETERMINED IN FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2572+50 TO STA. 2579+00

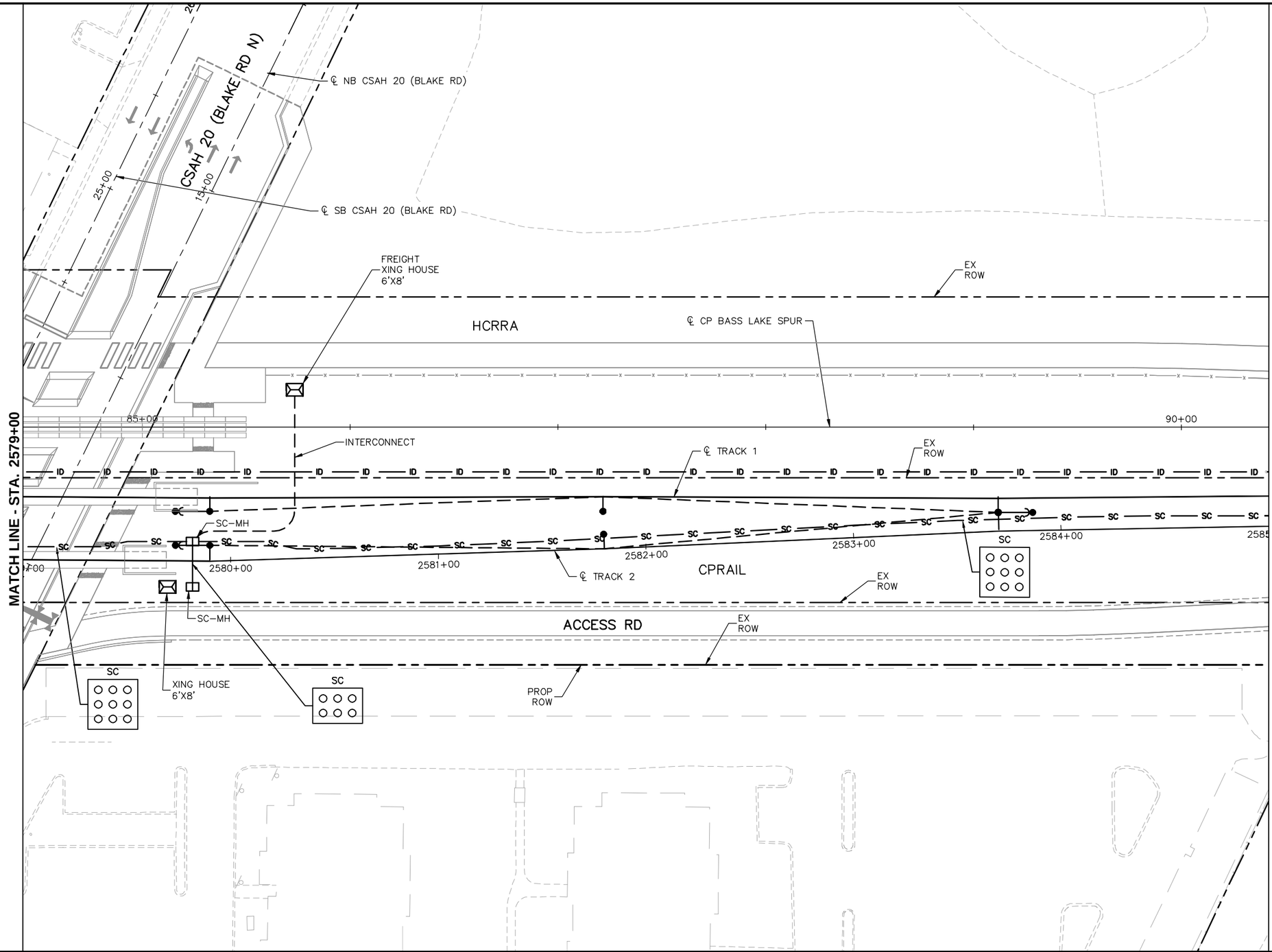
DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-013

SHEET 23 OF 240

Aug, 27 2014 05:36 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE FINALIZED IN FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2579+00 TO STA. 2585+00

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-014

SHEET 24 OF 240

Aug. 27 2014 05:36 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
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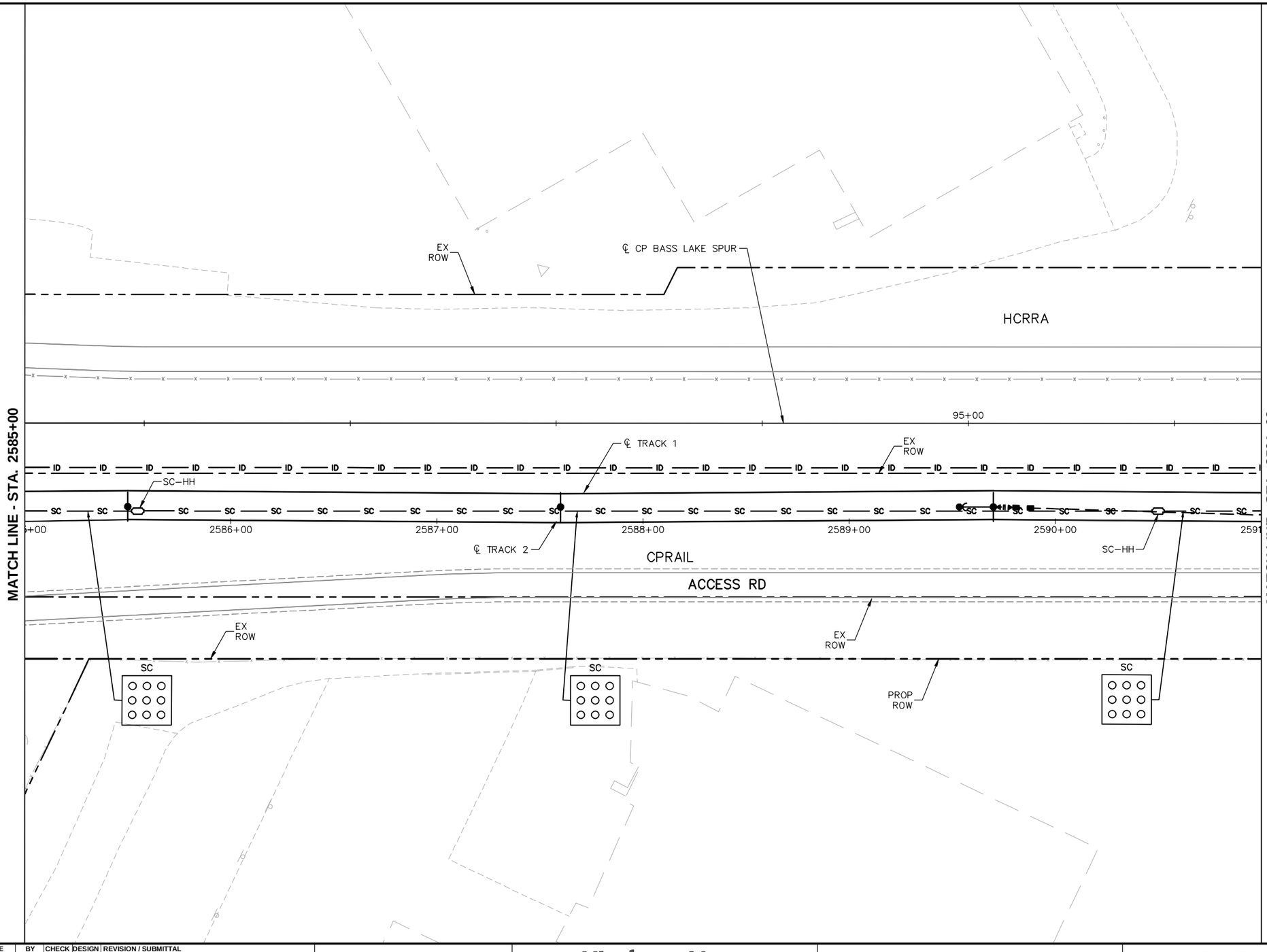
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

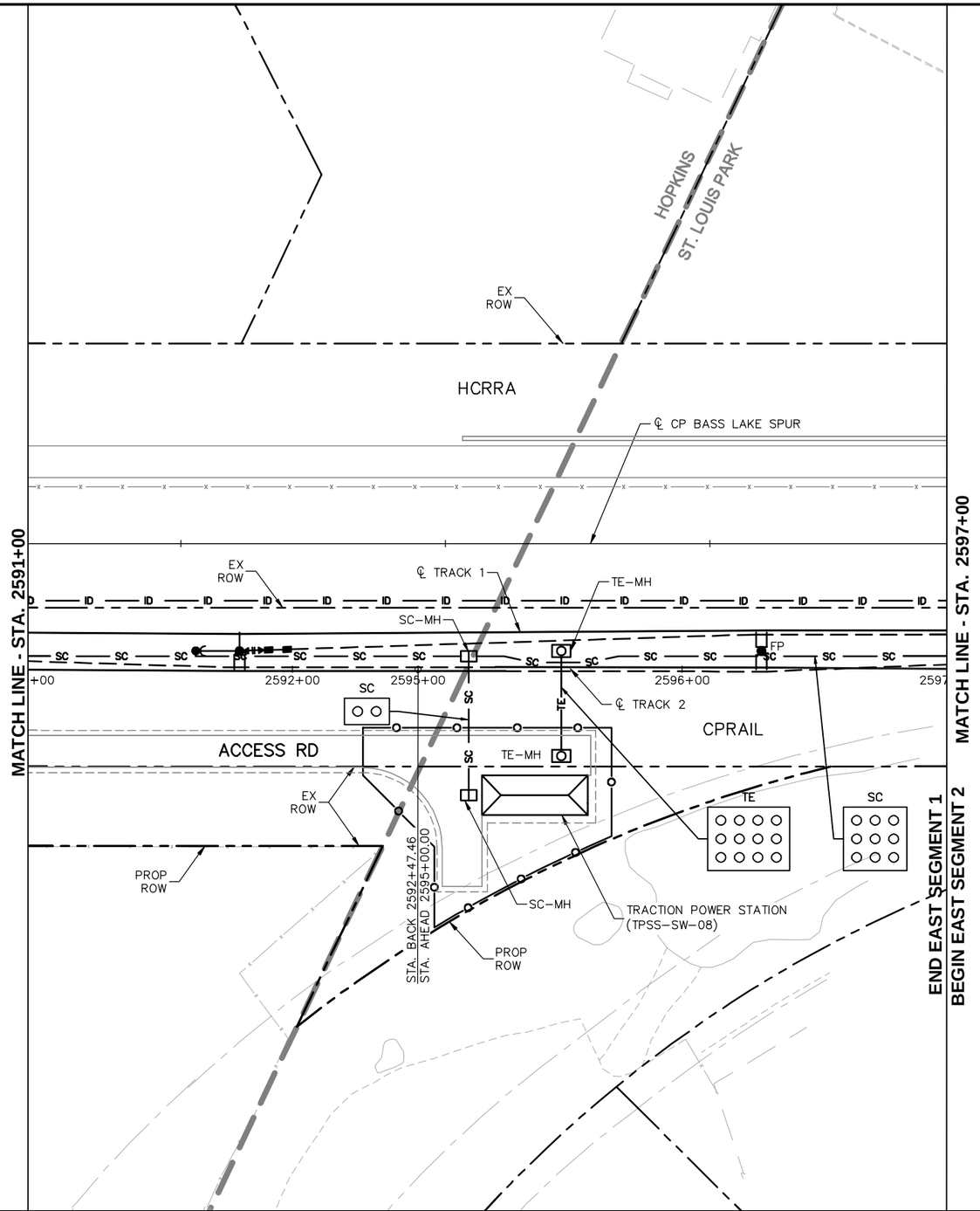
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2585+00 TO STA. 2591+00

DISCIPLINE: SYSTEMS

SHEET NAME: E1-SYS-PLN-015

SHEET 25 OF 240

Aug, 27 2014 05:36 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft



NOTES:

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0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E1
PLAN SHEET LAYOUTS
STA. 2591+00 TO STA. 2597+00

DISCIPLINE: SYSTEMS
SHEET NAME: E1-SYS-PLN-016

SHEET 26 OF 240

Aug. 27 2014 05:36 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E1-SYS-PLN.dwg By: curtis.neft

END EAST SEGMENT 1

BEGIN EAST SEGMENT 2

MINNEHAHA CREEK

EX ROW

℄ CP BASS LAKE SPUR

HCRRA

RETAINING WALL

BRIDGE

100+00

105+00

EX ROW

℄ TRACK 1

END INTRUSION DETECTION STA. 2602+50.00

SC–HH

2598+00

2599+00

2600+00

2601+00

2602+00

SC–HH

MATCH LINE - STA. 2597+00

MATCH LINE - STA. 2603+00

EX ROW

CPRAIL

RETAINING WALL

BRIDGE

BEGIN BRIDGE

℄ TRACK 2

SC

SC

SC

SC

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
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5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.

0 12.5 25 50

SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2597+00 TO STA. 2603+00

DISCIPLINE: SYSTEMS

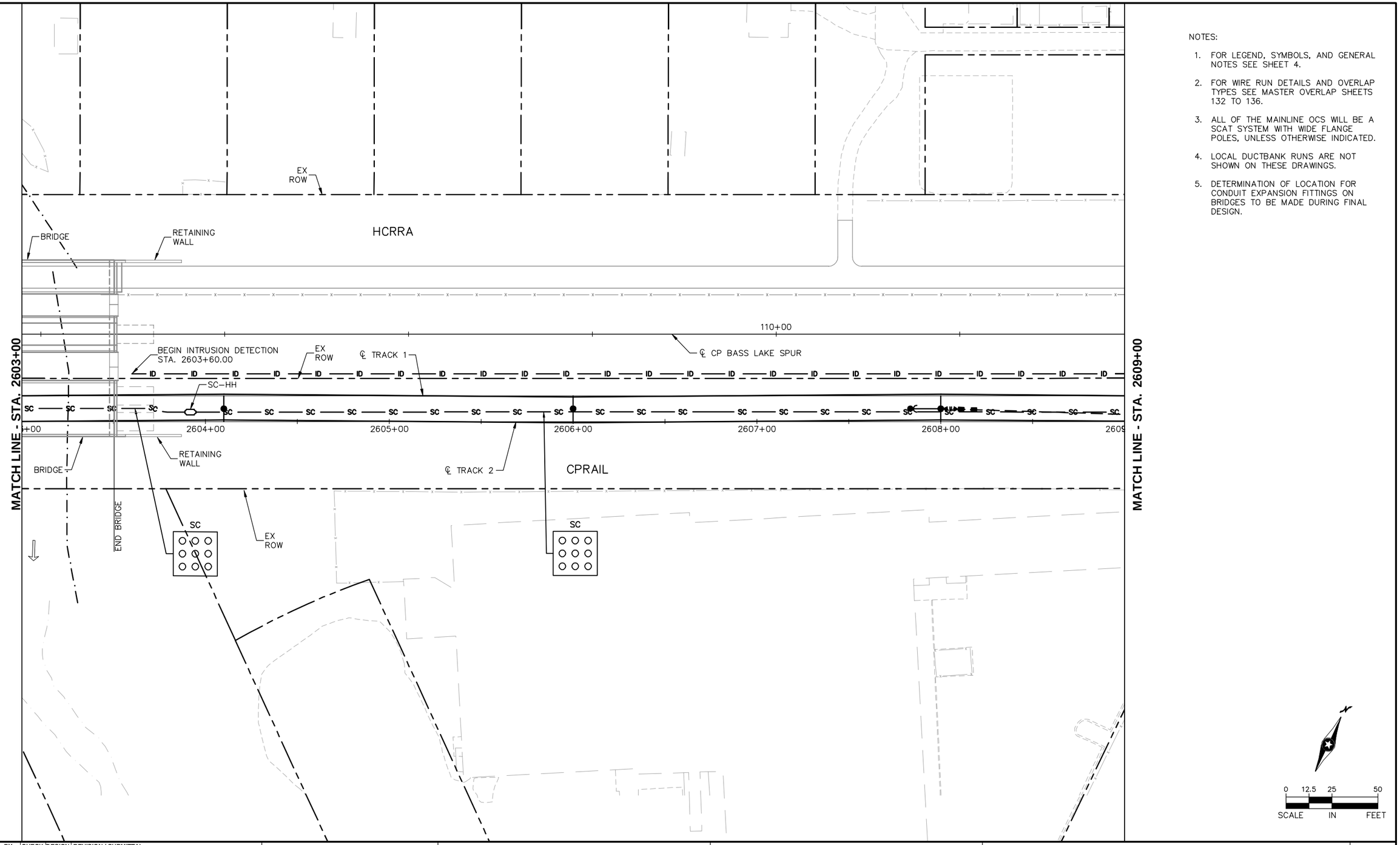
SHEET NAME: E2-SYS-PLN-001

SHEET 27 OF 240

Aug. 27 2014 05:40 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2603+00 TO STA. 2609+00

DISCIPLINE: SYSTEMS

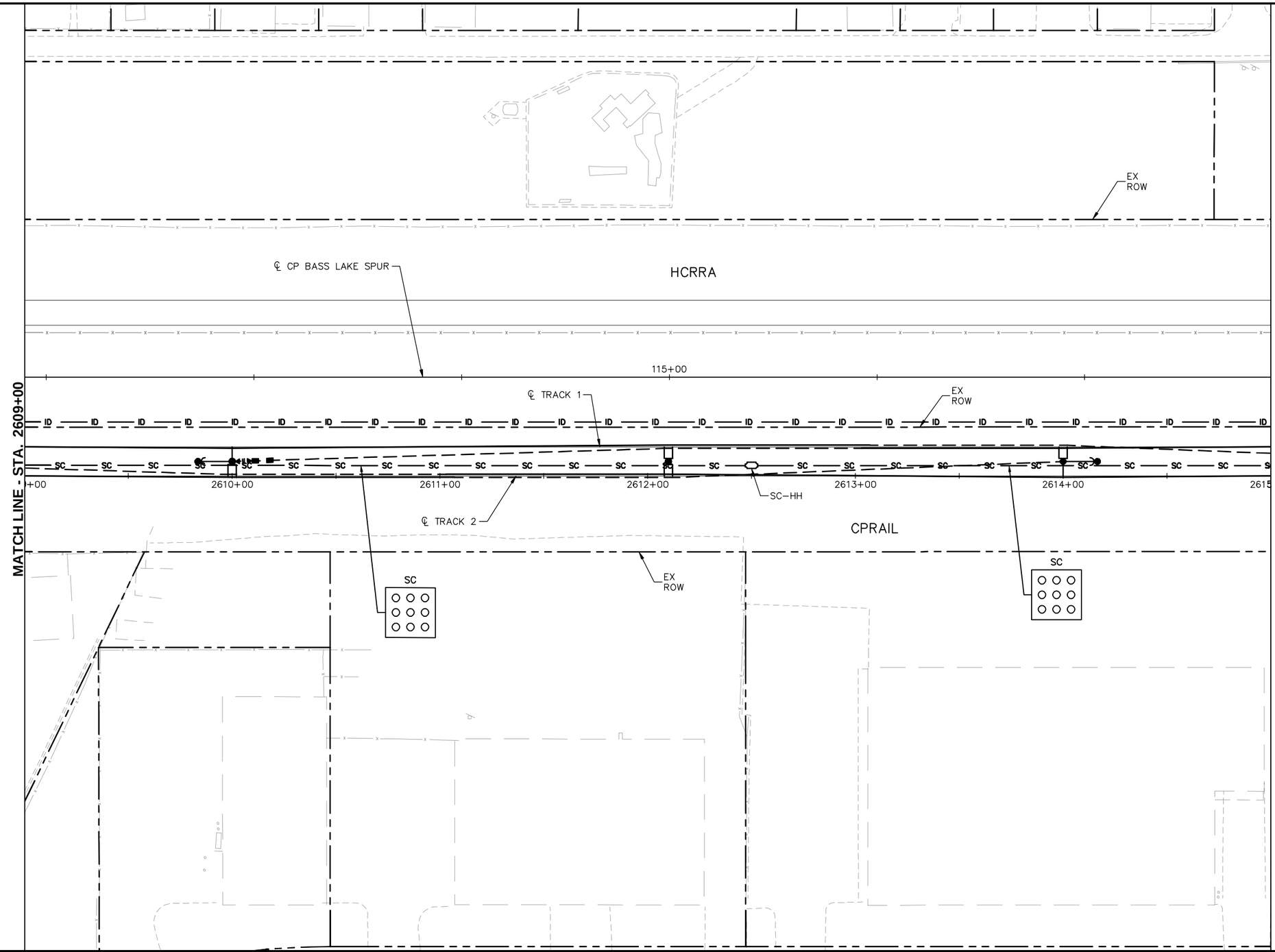
SHEET NAME: E2-SYS-PLN-002

SHEET 28 OF 240

Aug, 27 2014 05:40 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



0 12.5 25 50
SCALE IN FEET

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2609+00 TO STA. 2615+00

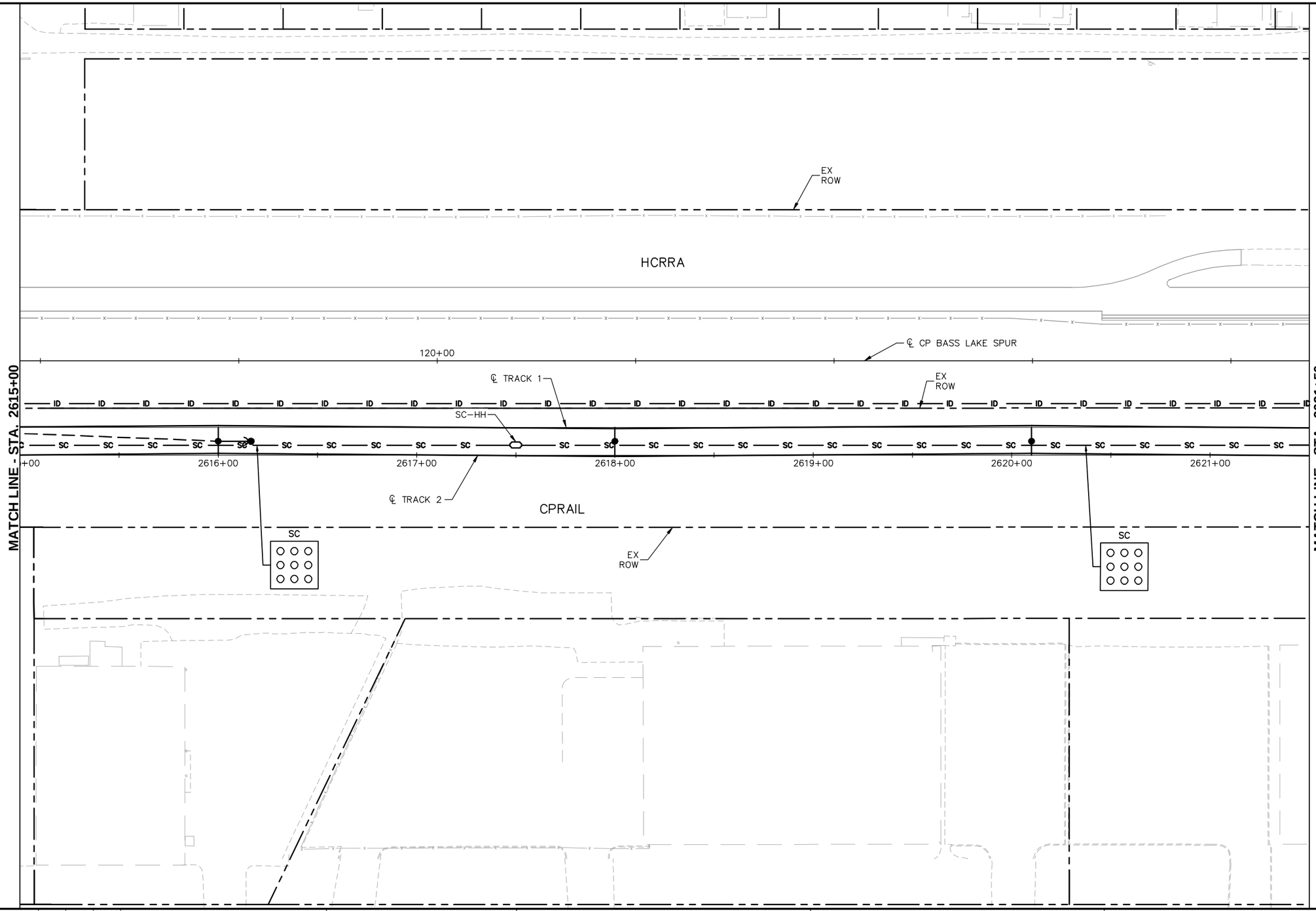
DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-003

SHEET 29 OF 240

Aug, 27 2014 05:40 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

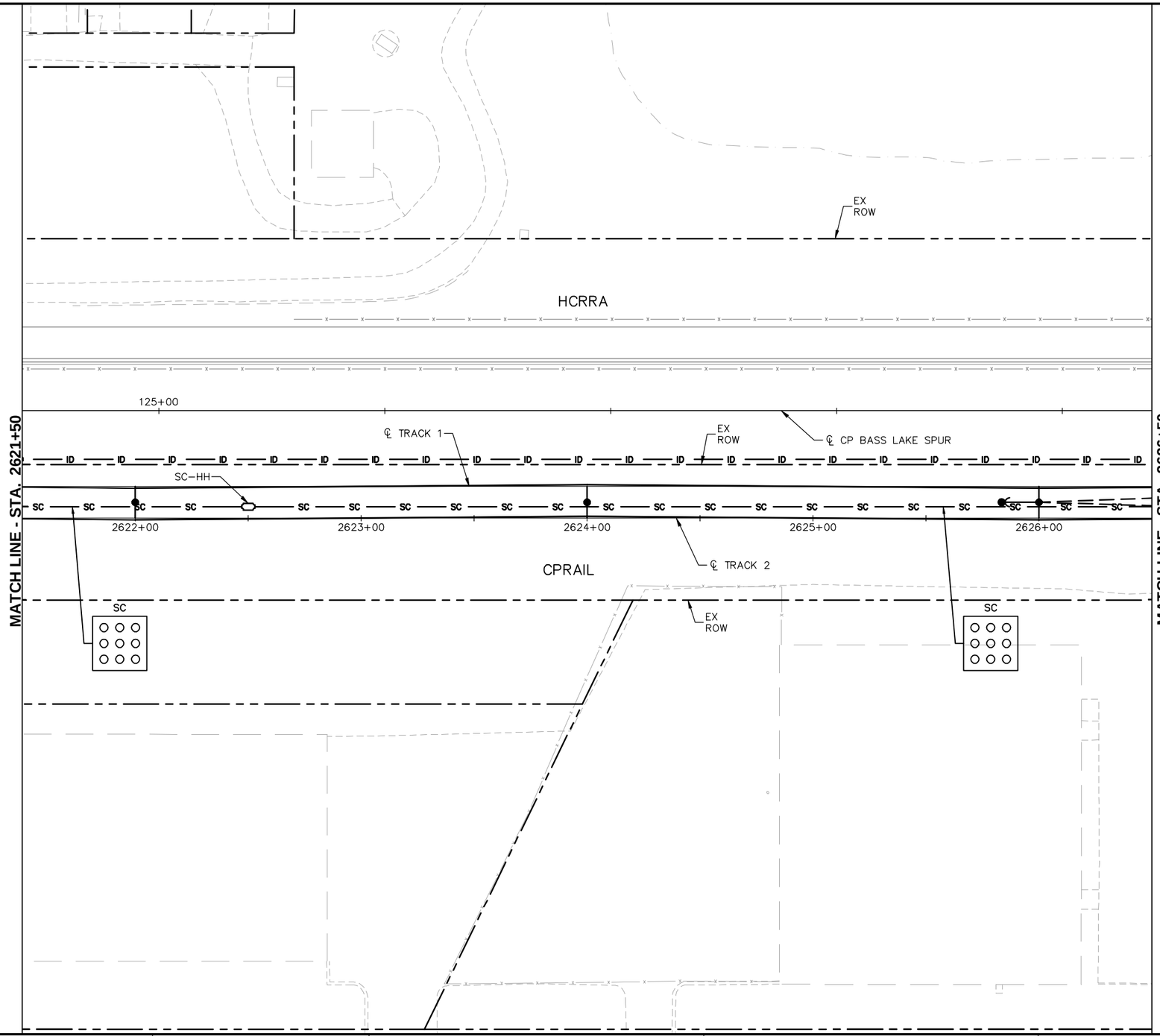
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2615+00 TO STA. 2621+50

DISCIPLINE: SYSTEMS

SHEET NAME: E2-SYS-PLN-004

SHEET 30 OF 240

Aug. 27 2014 05:40 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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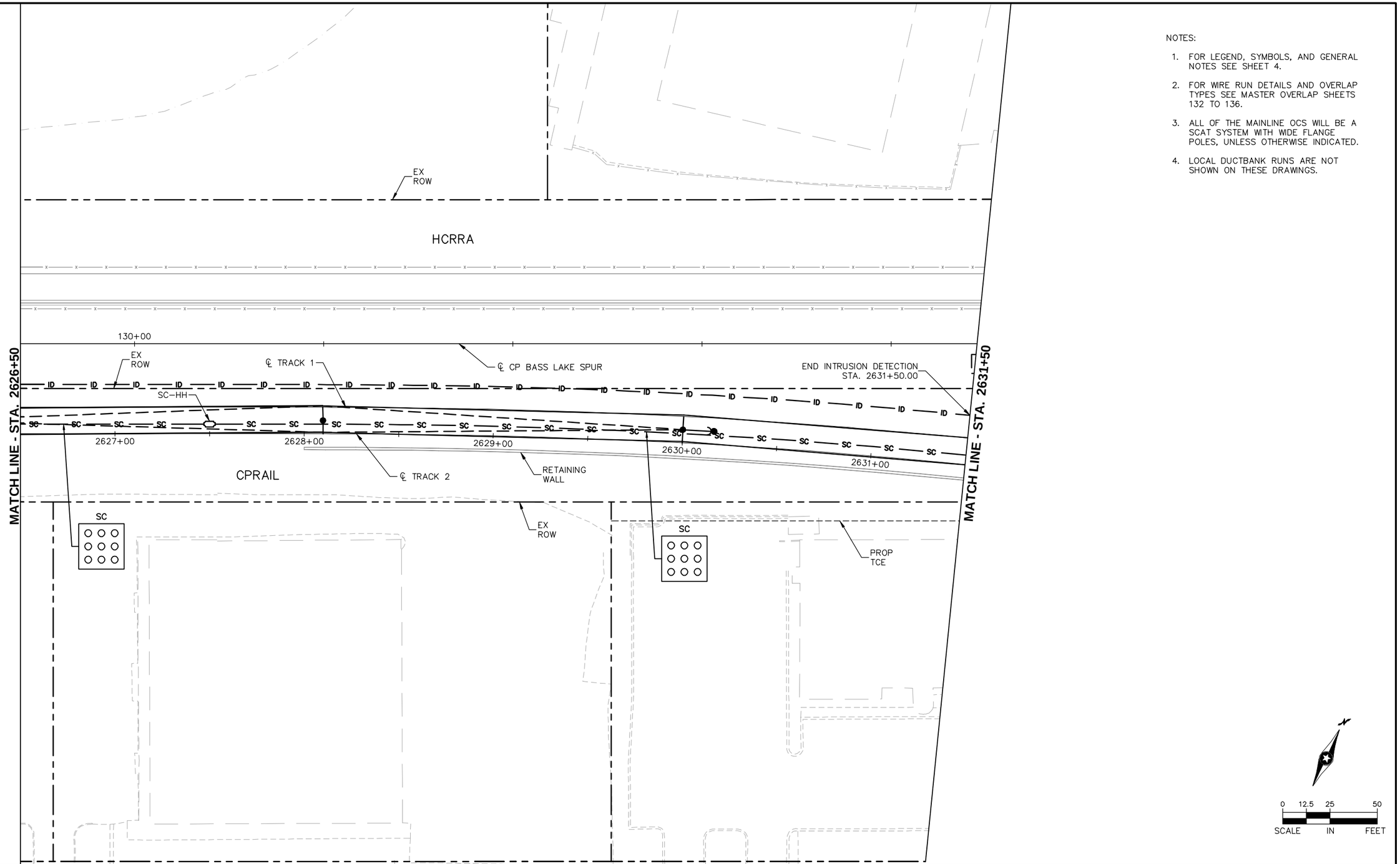
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2621+50 TO STA. 2626+50

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-005

SHEET 31 OF 240

Aug, 27 2014 05:40 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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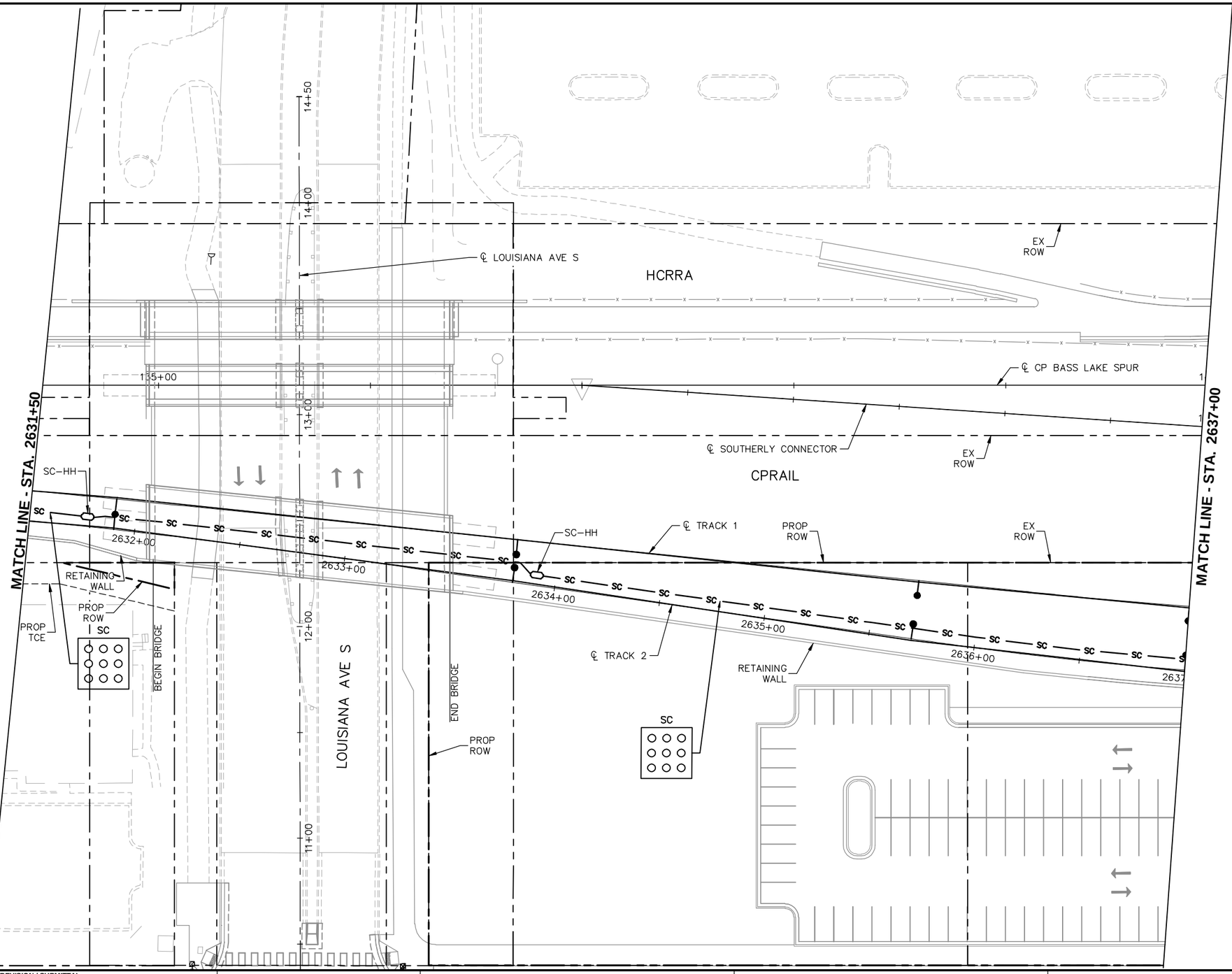
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2626+50 TO STA. 2631+50

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-006

SHEET 32 OF 240

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2631+50 TO STA. 2637+00

DISCIPLINE: SYSTEMS

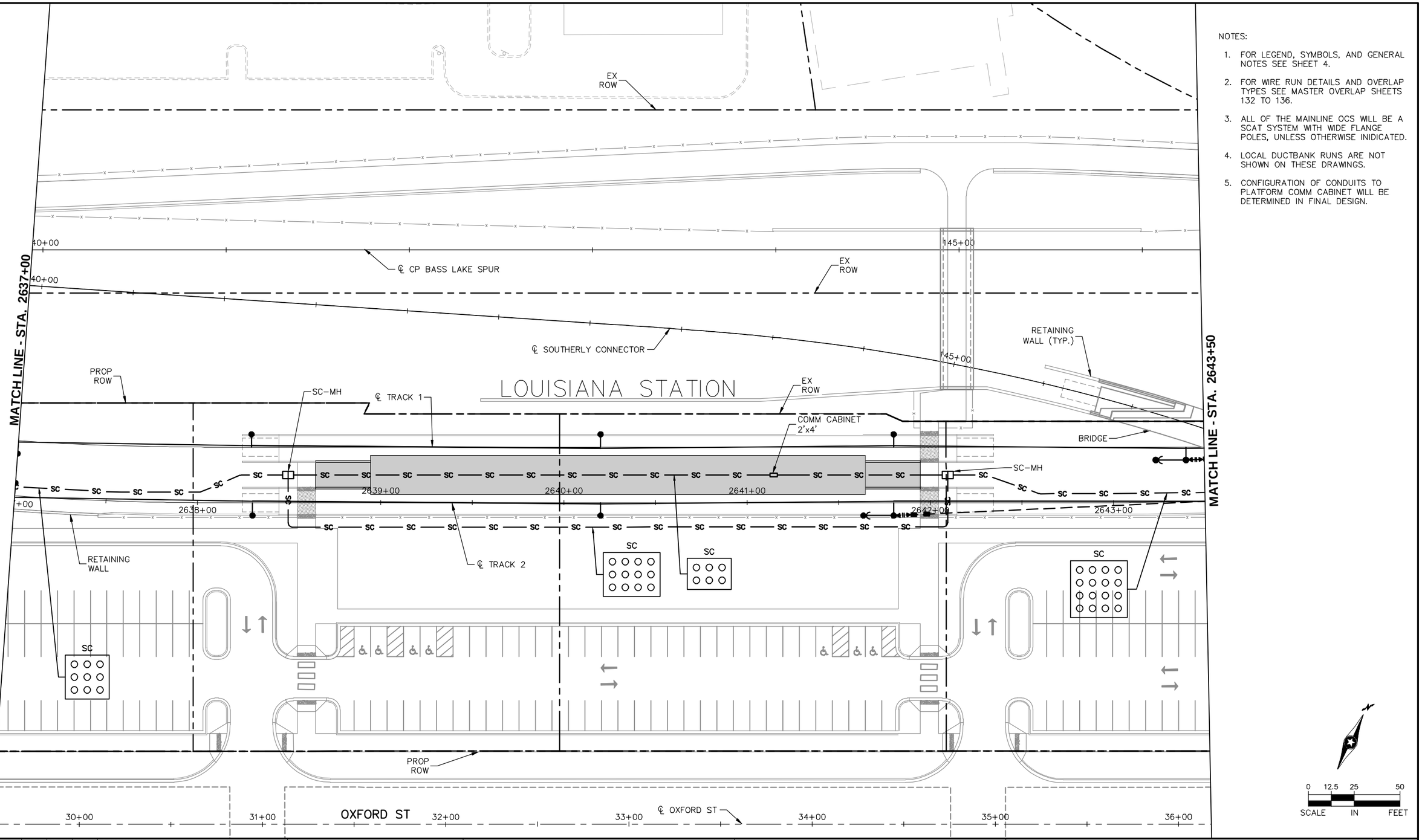
SHEET NAME: E2-SYS-PLN-007

SHEET 33 OF 240

Aug. 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2637+00 TO STA. 2643+50

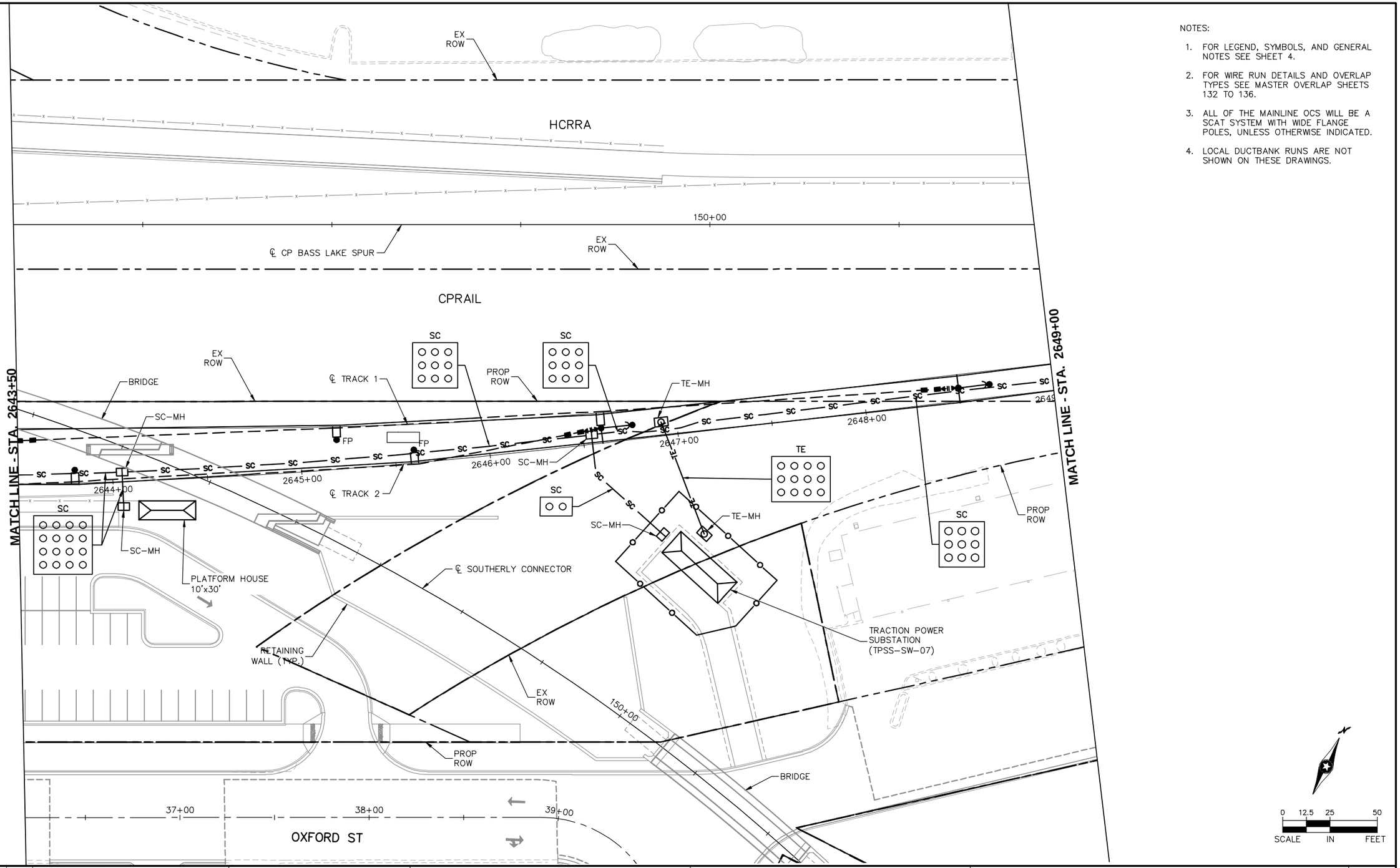
DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-008

SHEET 34 OF 240

Aug, 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2643+50 TO STA. 2649+00

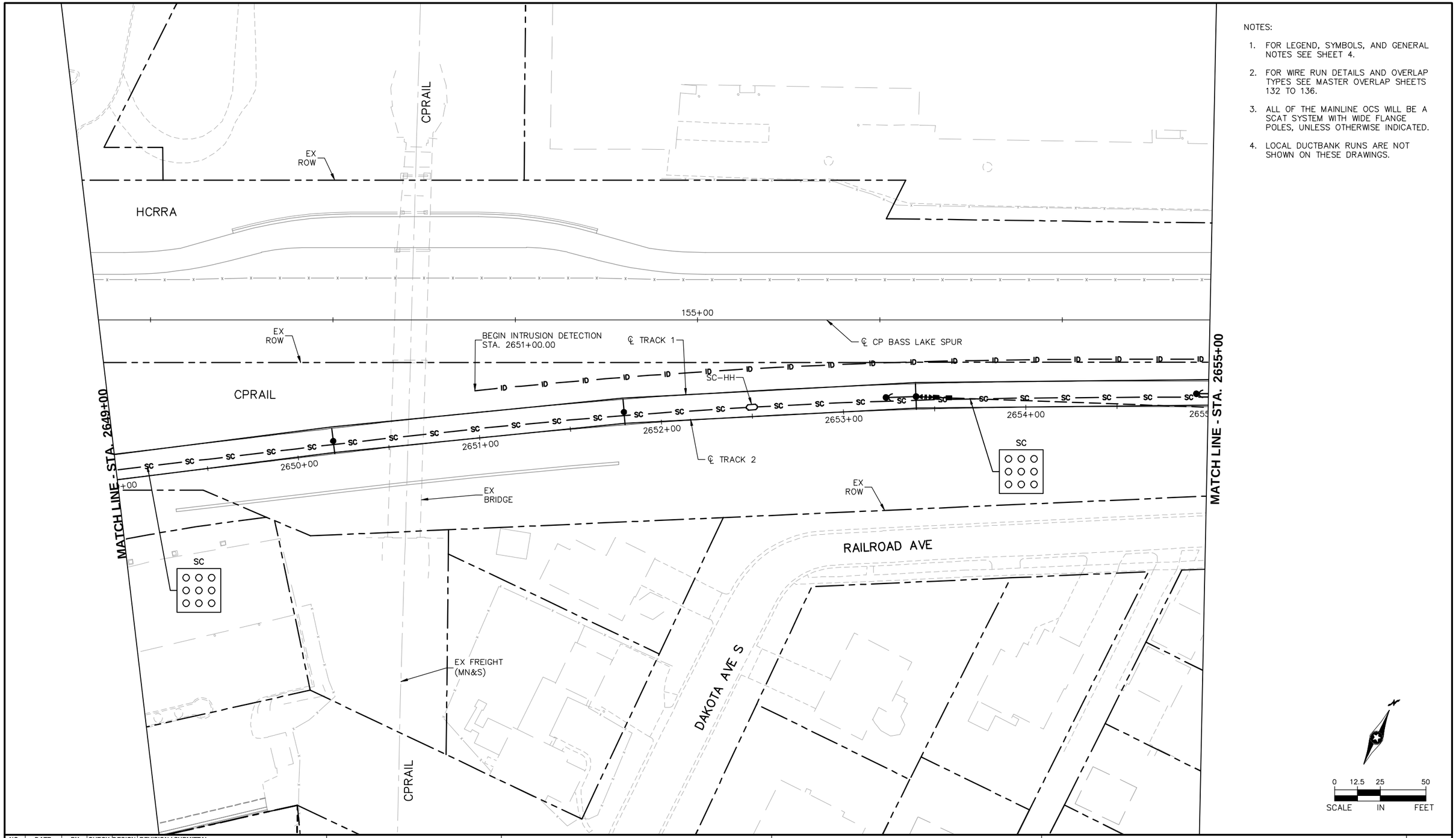
DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-009

SHEET 35 OF 240

Aug, 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2649+00 TO STA. 2655+00

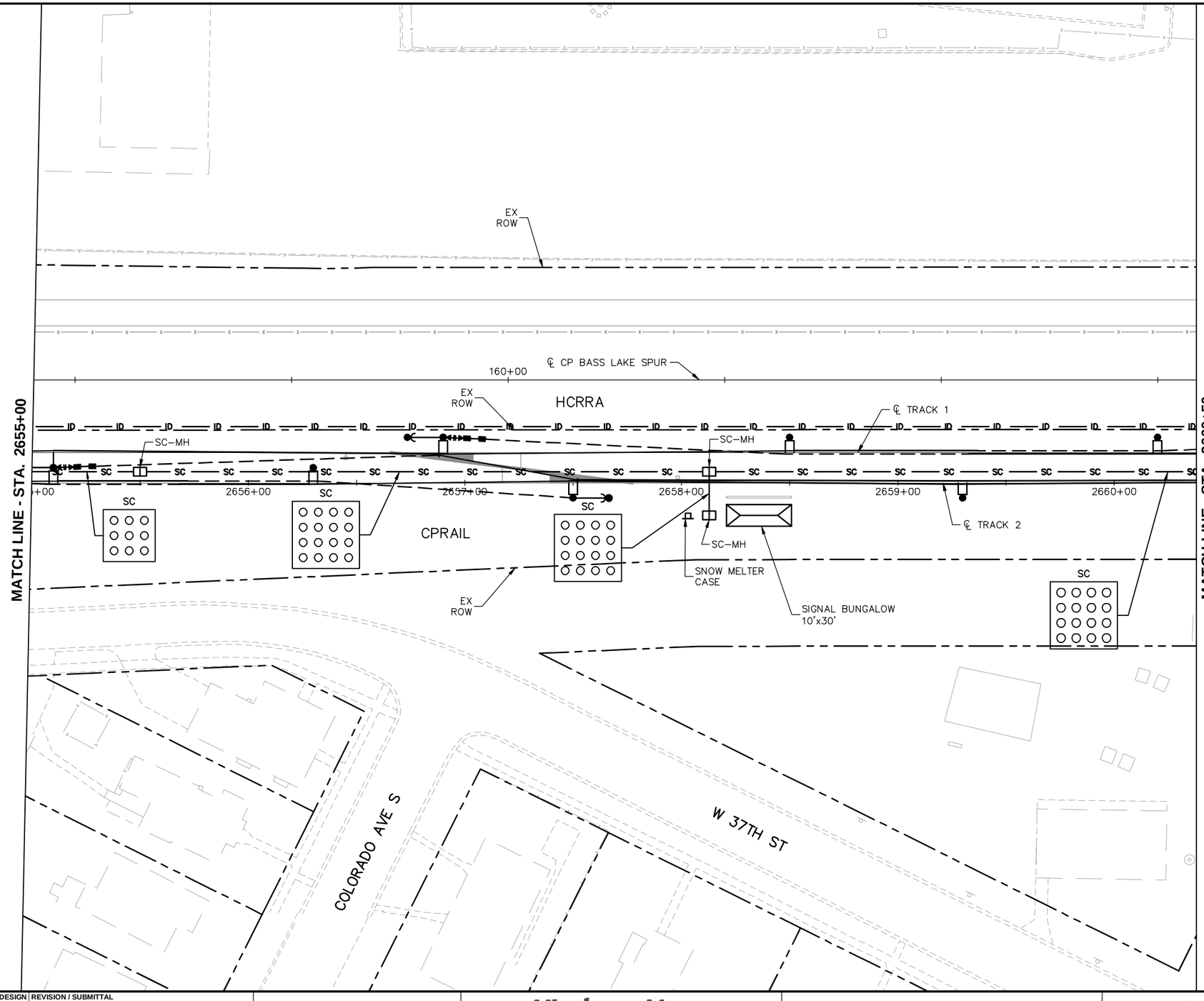
DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-010

SHEET 36 OF 240

Aug, 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. INTERLOCKING CONDUIT CONFIGURATION TO BE DETERMINED IN FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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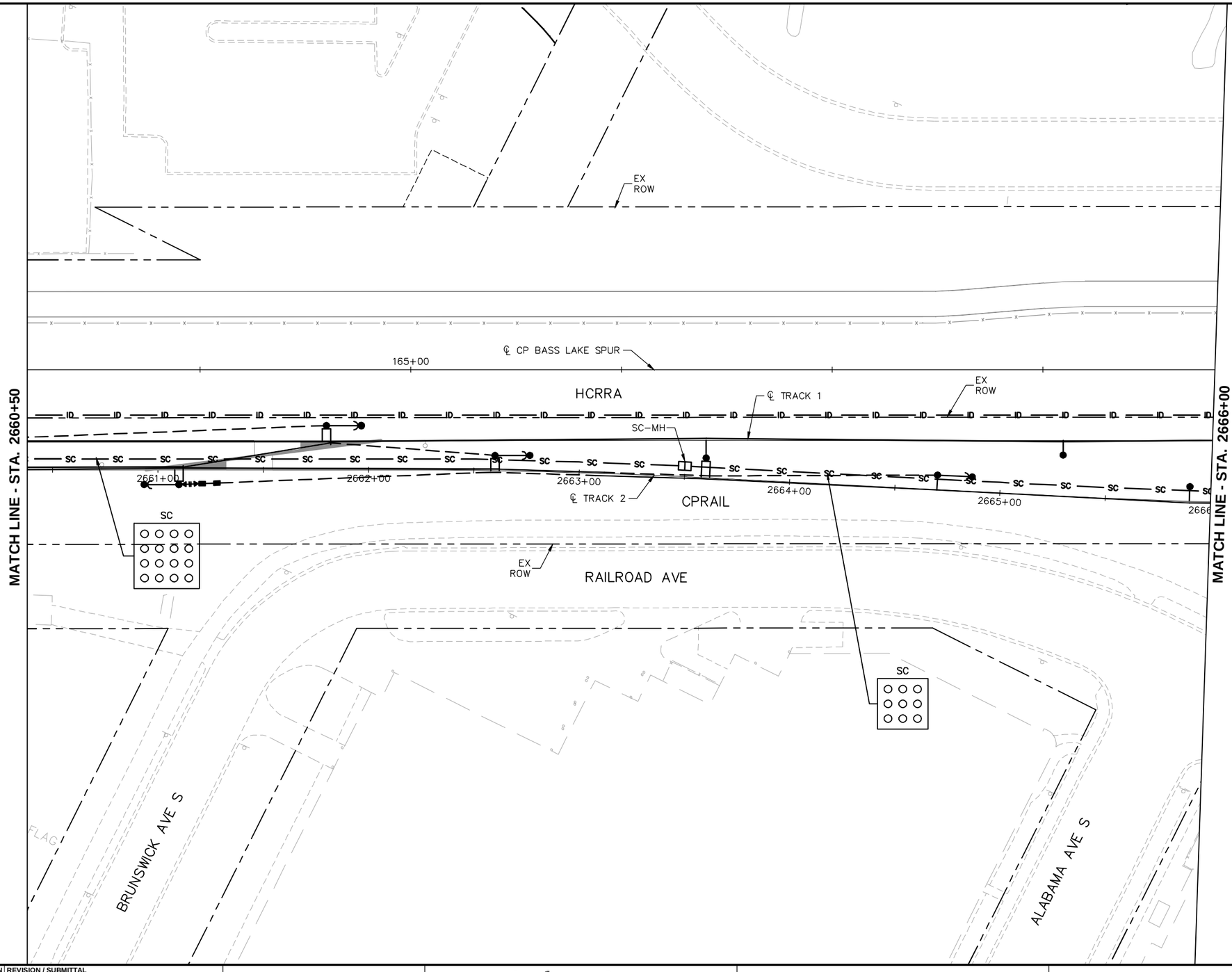
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2655+00 TO STA. 2660+50

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-011

SHEET 37 OF 240

Aug, 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
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NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2660+50 TO STA. 2666+00

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-012

SHEET 38 OF 240

Aug. 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.
6. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE DETERMINED IN FINAL DESIGN.

MINNESOTA 7 SERVICE RD

EX ROW

FREIGHT XING HOUSE 6'X8'

HCRRA

CPRAIL INTERCONNECT

℄ CP BASS LAKE SPUR

℄ TRACK 1

WOODDALE STATION

COMM CABINET 2'x4'

SC-MH

XING HOUSE 6'X8'

WOODDALE AVE S

℄ TRACK 2

℄ WOODDALE AVE S

W 36TH ST

MATCH LINE - STA. 2666+00

MATCH LINE - STA. 2672+00

14+00

13+00

12+00

11+00

10+00

170+00

2667+00

2668+00

2669+00

2670+00

2671+00

0 12.5 25 50

SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2666+00 TO STA. 2672+00

DISCIPLINE: SYSTEMS

SHEET NAME: E2-SYS-PLN-013

SHEET 39 OF 240

Aug, 27 2014 05:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
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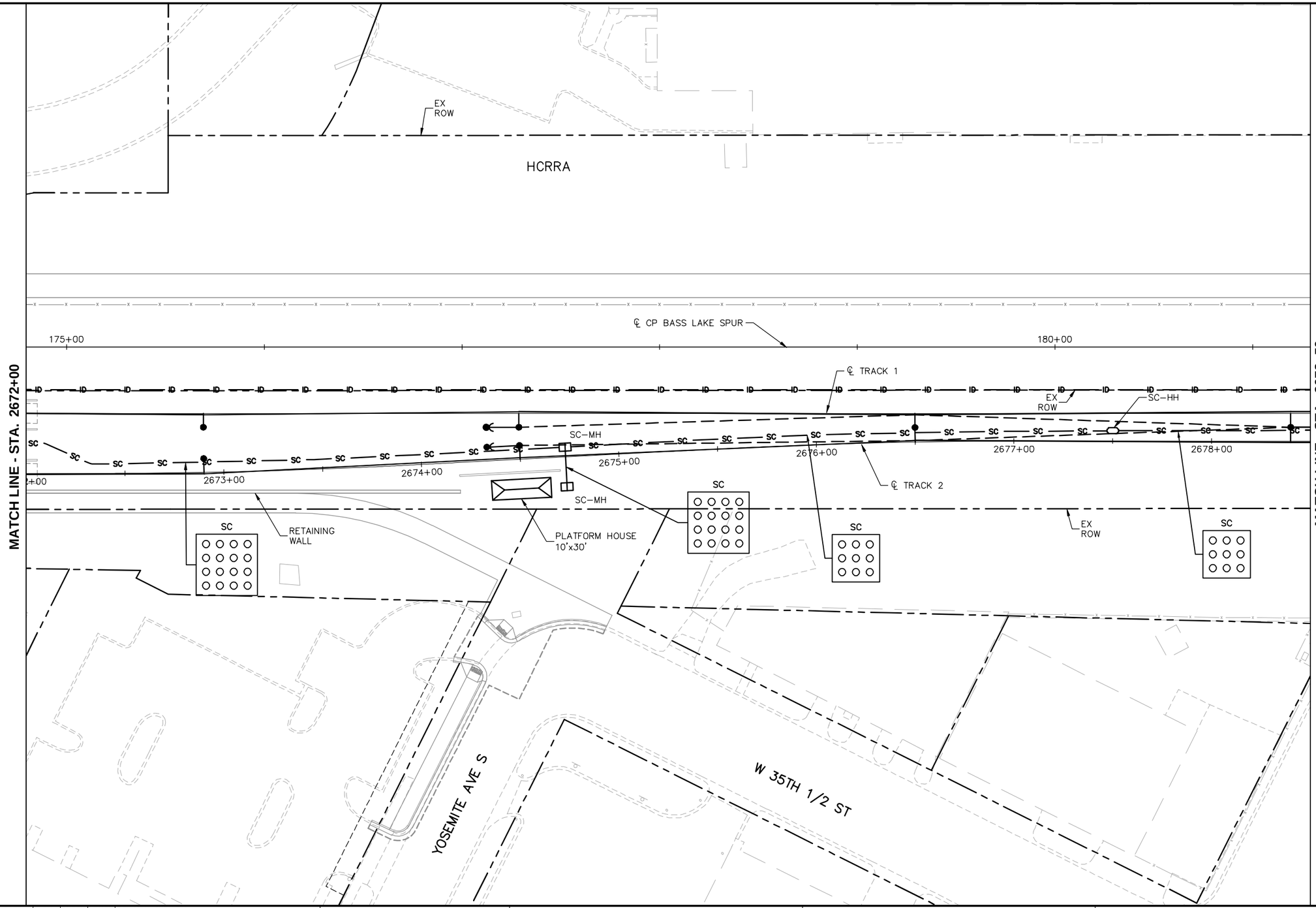

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA
PRELIMINARY ENGINEERING

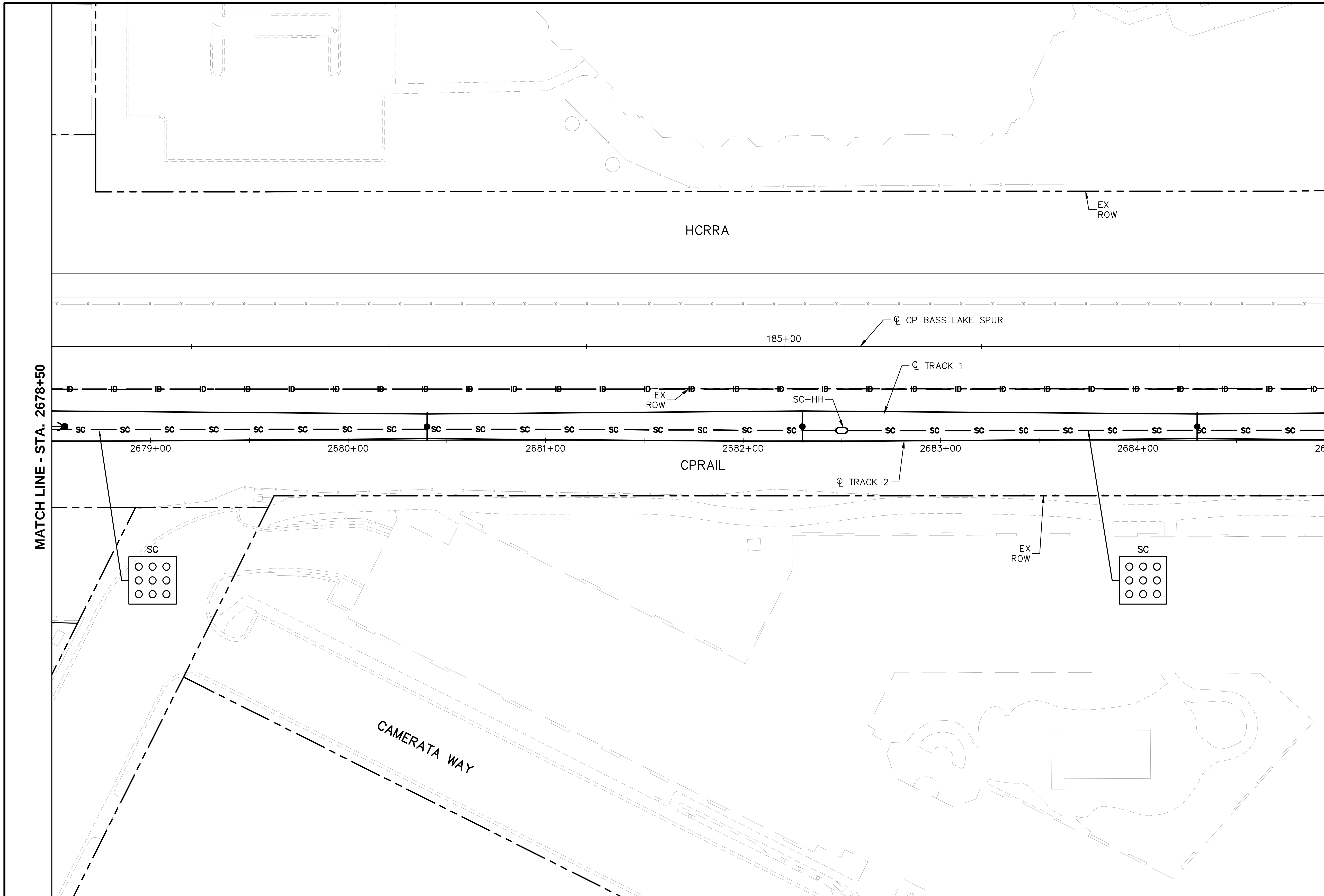
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2672+00 TO STA. 2678+50

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-014

SHEET 40 OF 240

Aug. 27 2014 05:41 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
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Aug. 27 2014 05:42 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2678+50 TO STA. 2685+00

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-015

SHEET 41 OF 240

MATCH LINE - STA. 2685+00

MATCH LINE - STA. 2691+50

HCRRA

EX ROW

℄ CP BASS LAKE SPUR

RETAINING WALL (TYP.)

BEGIN INTRUSION DETECTION STA. 2690+50.00

END INTRUSION DETECTION STA. 2688+00.00

℄ TRACK 1

SC–HH

CPRAIL

℄ TRACK 2

BRIDGE

EXISTING RETAINING WALL

BEGIN BRIDGE

END BRIDGE

SC

TH 100

℄ SB TH 100

℄ NB TH 100

190+00

2686+00

2687+00

2688+00

2689+00

2690+00

2691+00

803+00

804+00

805+00

806+00

807+00

808+00

NOTES:

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SCALE IN FEET 0 12.5 25 50

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

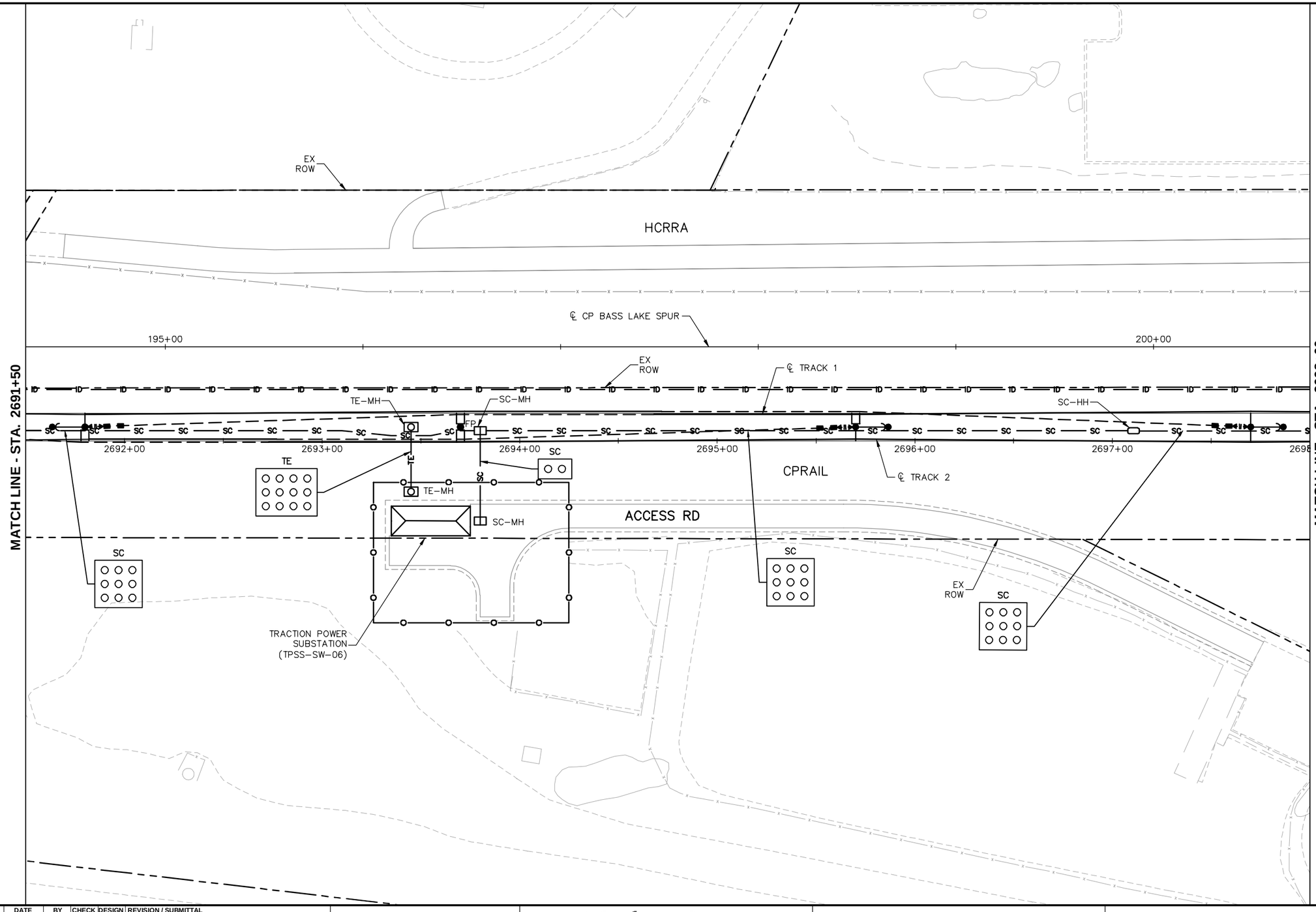
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2685+00 TO STA. 2691+50

DISCIPLINE: SYSTEMS

SHEET NAME: E2-SYS-PLN-016

SHEET 42 OF 240

Aug, 27 2014 05:42 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

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NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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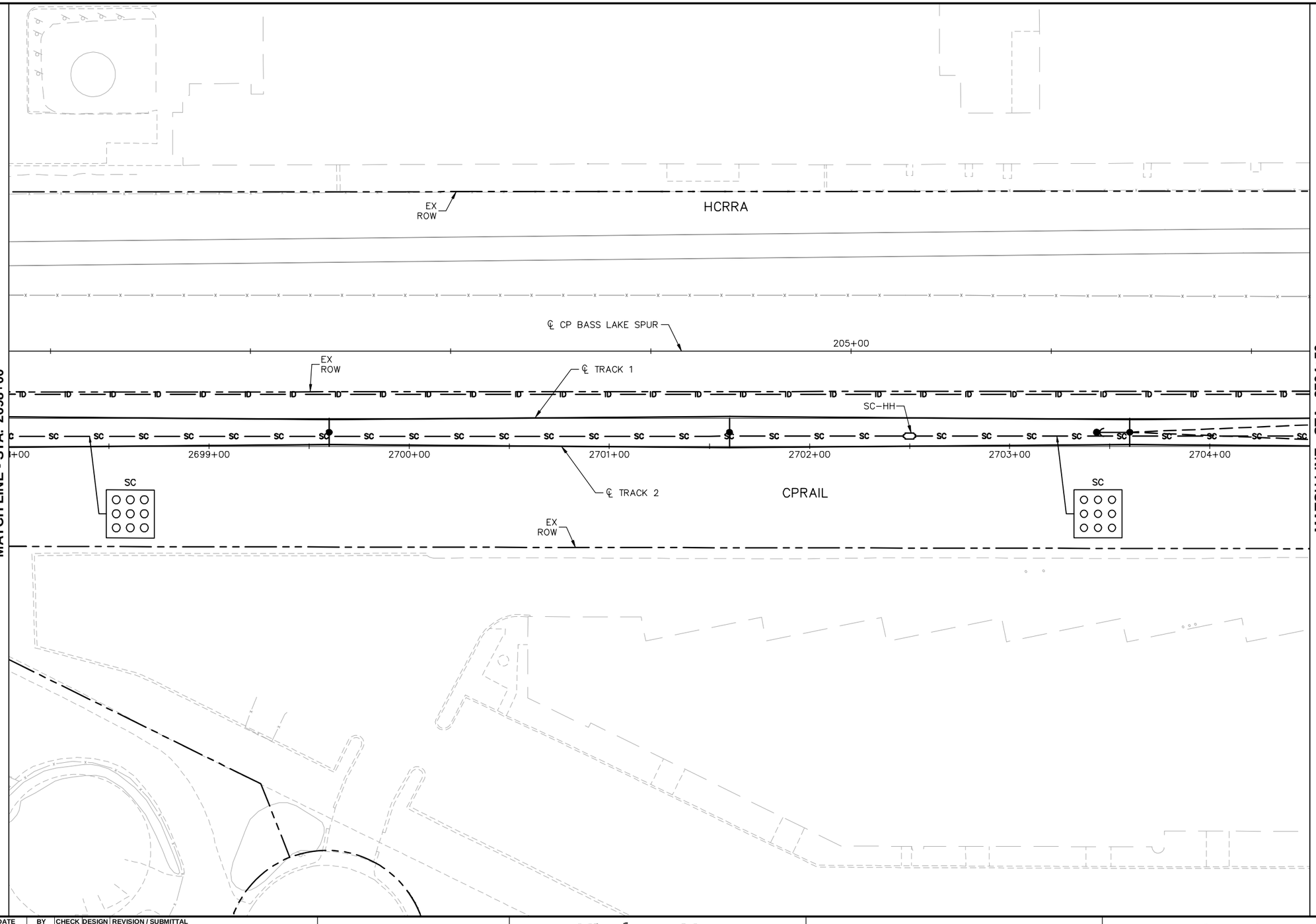
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2691+50 TO STA. 2698+00

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-017

SHEET 43 OF 240



NOTES:

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0 12.5 25 50
SCALE IN FEET

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2698+00 TO STA. 2704+50

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-018

SHEET 44 OF 240

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
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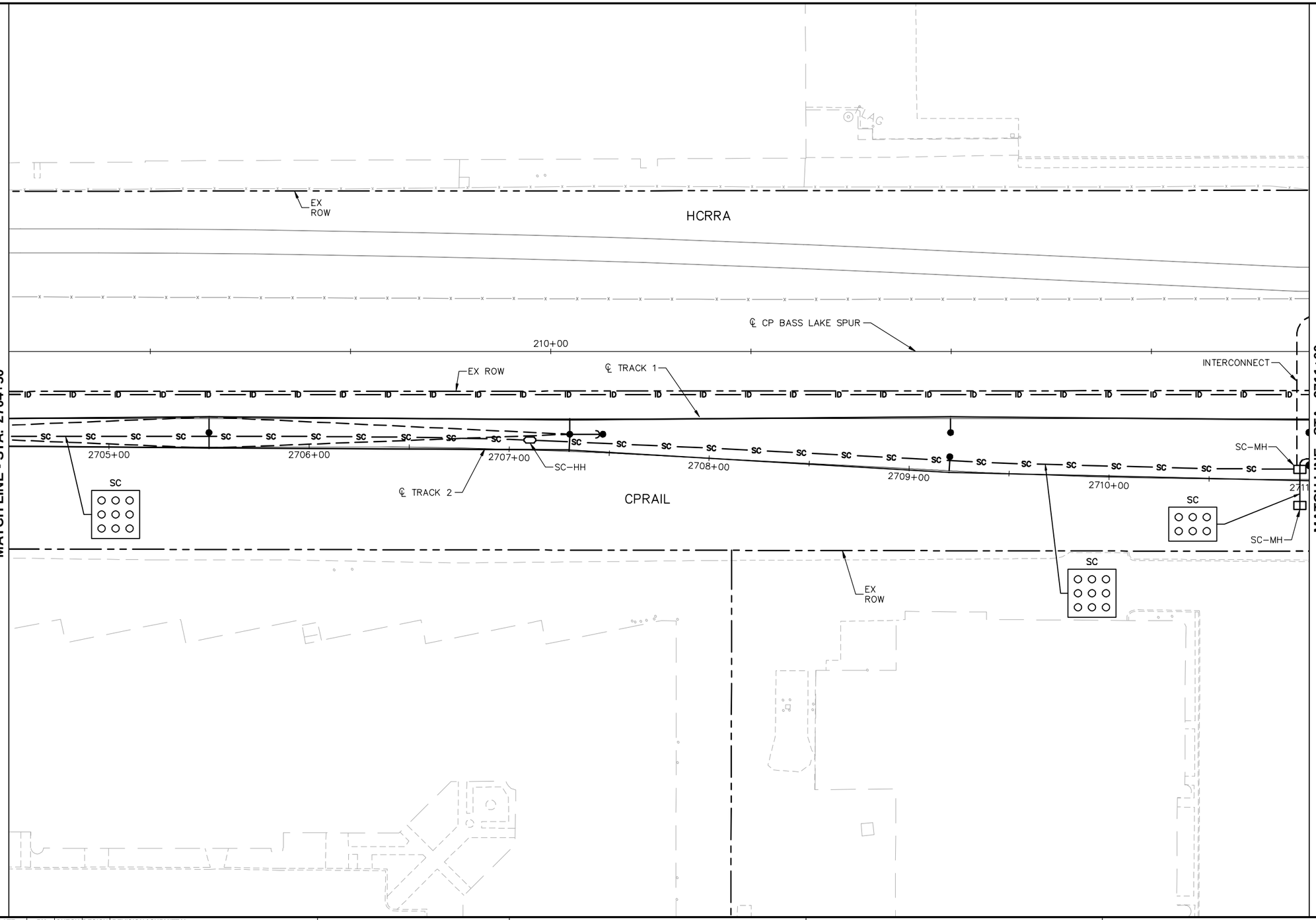


0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2704+50 TO STA. 2711+00

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-019

SHEET 45 OF 240

Aug, 27 2014 05:42 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.
6. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE DETERMINED IN FINAL DESIGN.

MATCH LINE - STA. 2711+00

MATCH LINE - STA. 2717+00

BELTLINE BLVD

PROP ROW

EX ROW

HCRRA

INTERCONNECT

FREIGHT XING HOUSE 6'X8'

℄ CP BASS LAKE SPUR

BELTLINE STATION

℄ TRACK 1

COMM CABINET 2'x4'

SC–MH

2711+00

2712+00

2713+00

2714+00

2715+00

2716+00

CPRAIL

℄ TRACK 2

XING HOUSE 6'X8'

℄ BELTLINE BLVD

SC

0 12.5 25 50

SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

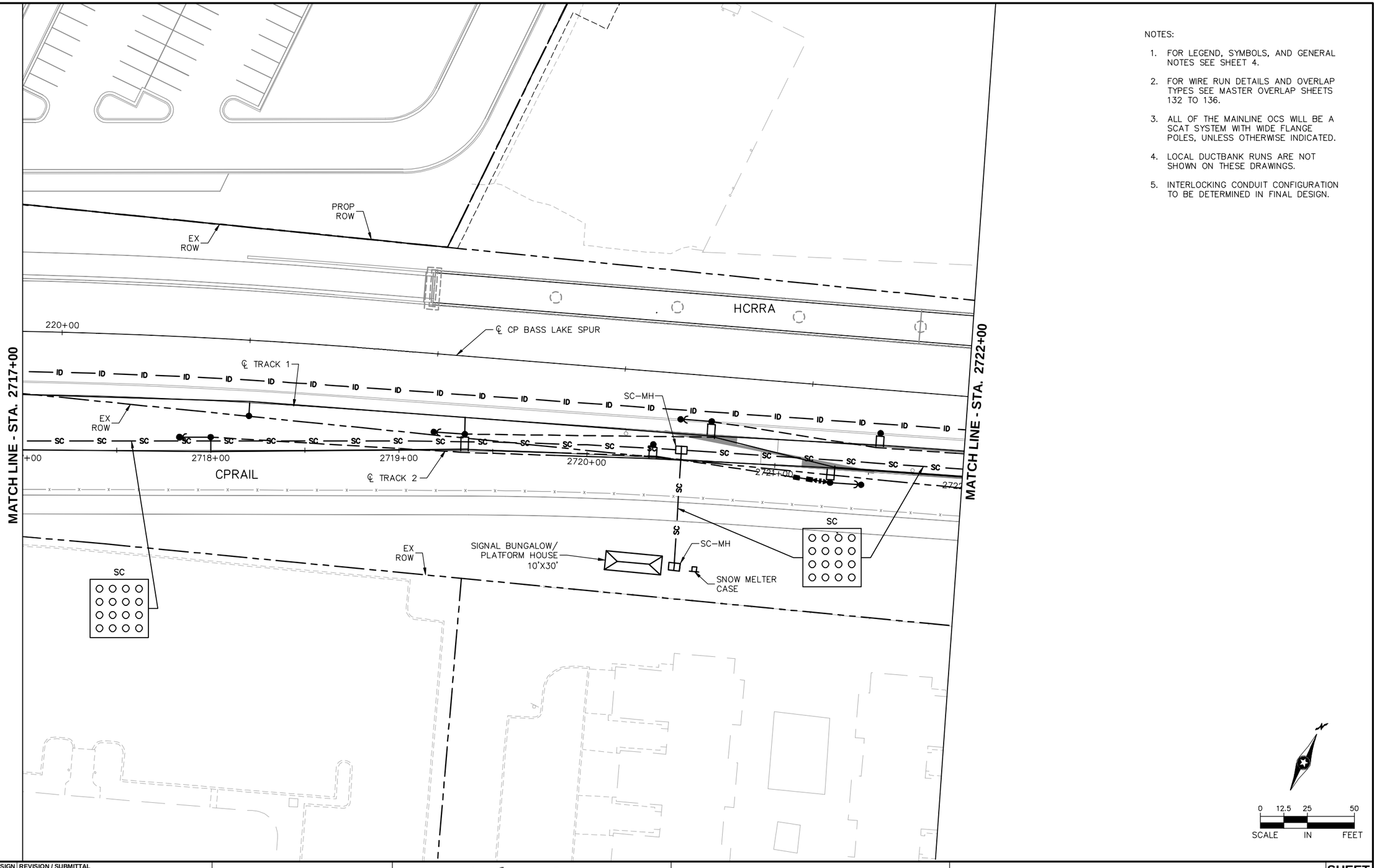
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2711+00 TO STA. 2717+00

DISCIPLINE: SYSTEMS

SHEET NAME: E2-SYS-PLN-020

SHEET 46 OF 240

Aug, 27 2014 05:42 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. INTERLOCKING CONDUIT CONFIGURATION TO BE DETERMINED IN FINAL DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2717+00 TO STA. 2722+00

DISCIPLINE: SYSTEMS
SHEET NAME: E2-SYS-PLN-021

SHEET 47 OF 240

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. INTERLOCKING CONDUIT CONFIGURATION TO BE DETERMINED IN FINAL DESIGN.

MATCH LINE - STA. 2722+00

END EAST SEGMENT 2
BEGIN EAST SEGMENT 3

MATCH LINE - STA. 2729+00

EX ROW

℄ FREIGHT–KENILWORTH

HCRRA

225+00

230+00

ID

SC

SC–MH

℄ TRACK 1

℄ TRACK 2

2723+00

2724+00

2725+00

2726+00

2727+00

2728+00

2729

SC

HCRRA

EX ROW

0 12.5 25 50

SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

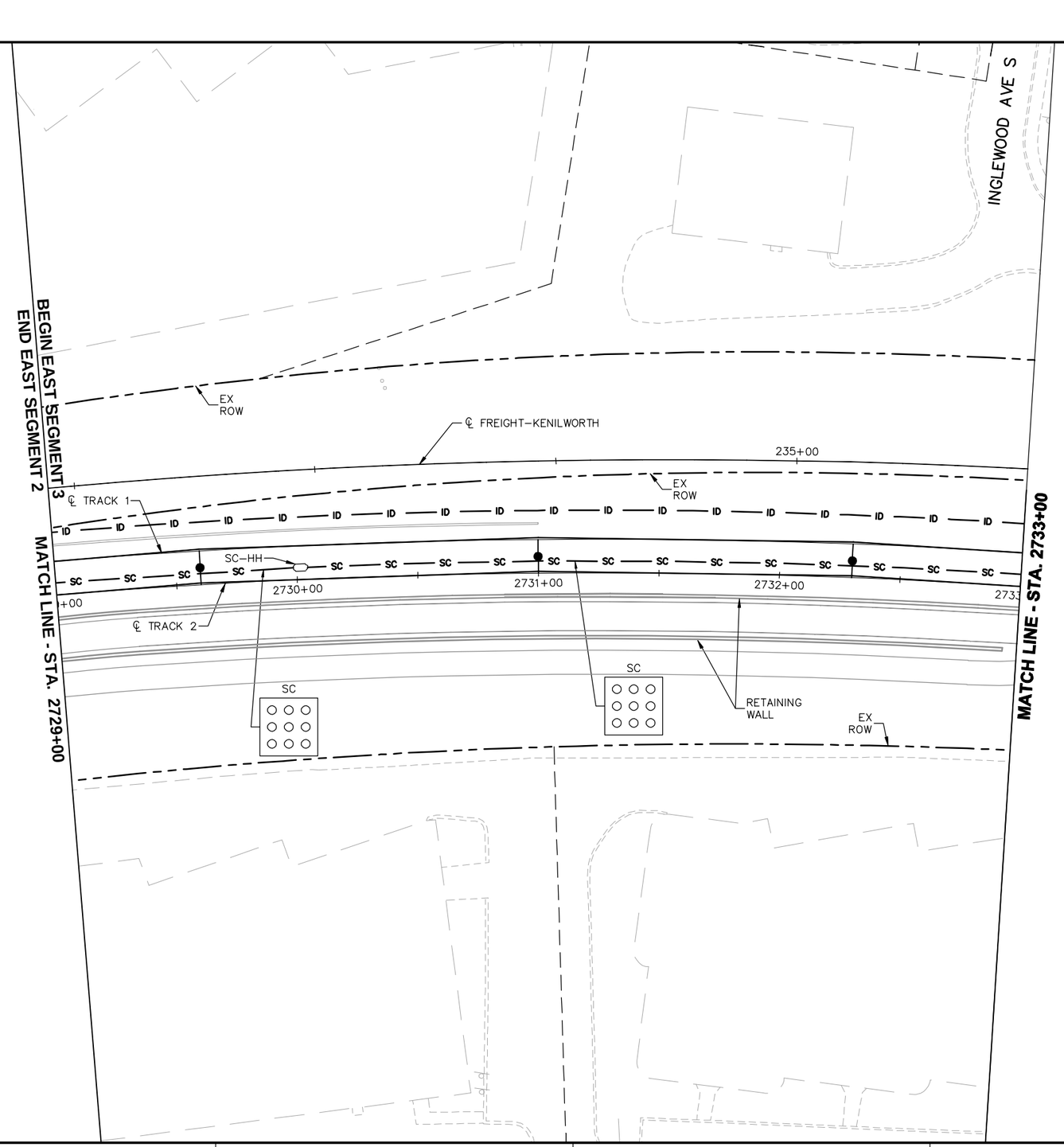
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E2
PLAN SHEET LAYOUTS
STA. 2722+00 TO STA. 2729+00

DISCIPLINE: SYSTEMS

SHEET NAME: E2-SYS-PLN-022

SHEET 48 OF 240

Aug, 27 2014 05:42 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E2-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

SCALE 0 12.5 25 50 IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2729+00 TO STA. 2733+00

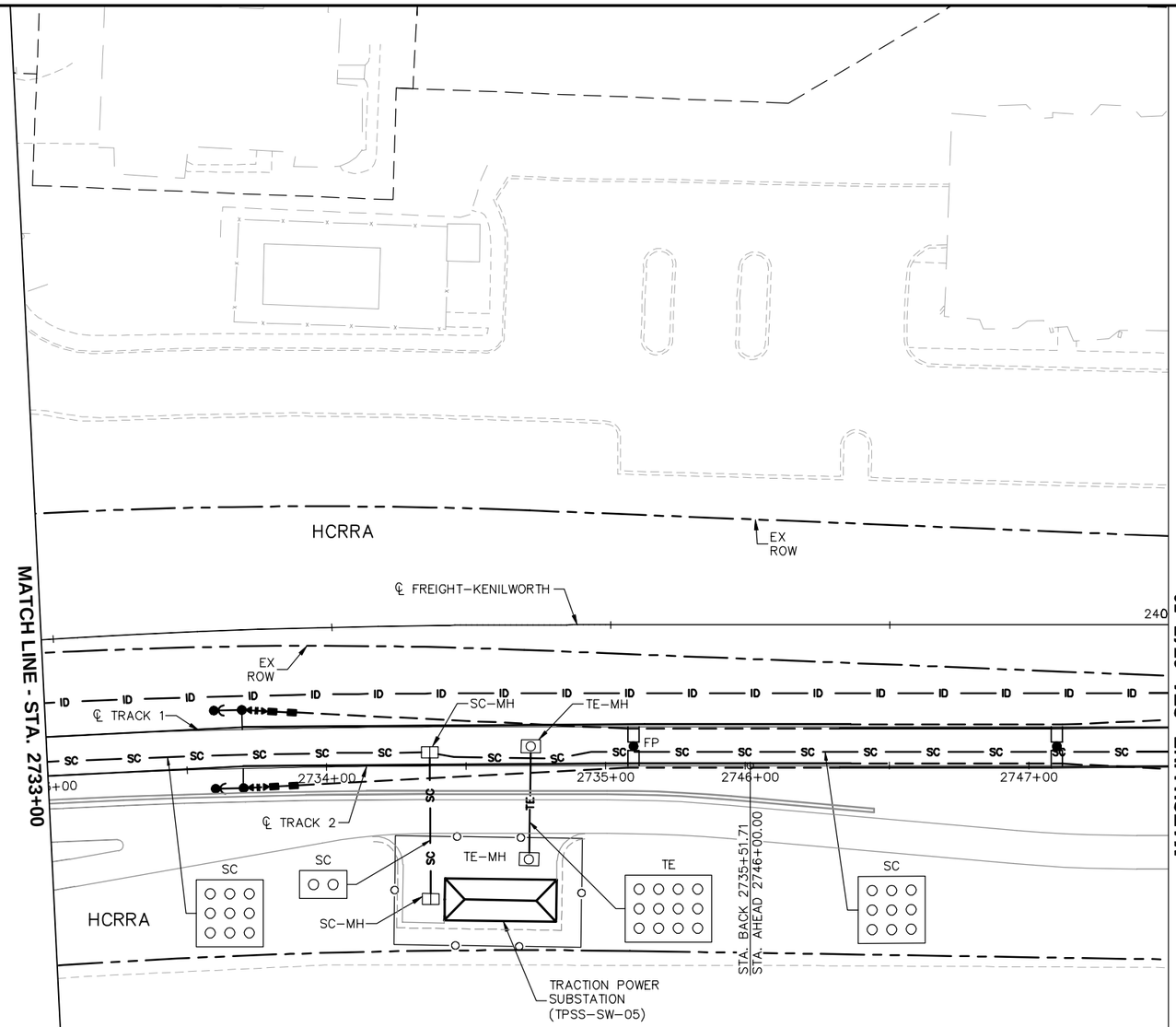
DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-001

SHEET 49 OF 240

Aug, 27 2014 05:45 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2733+00 TO STA. 2747+50

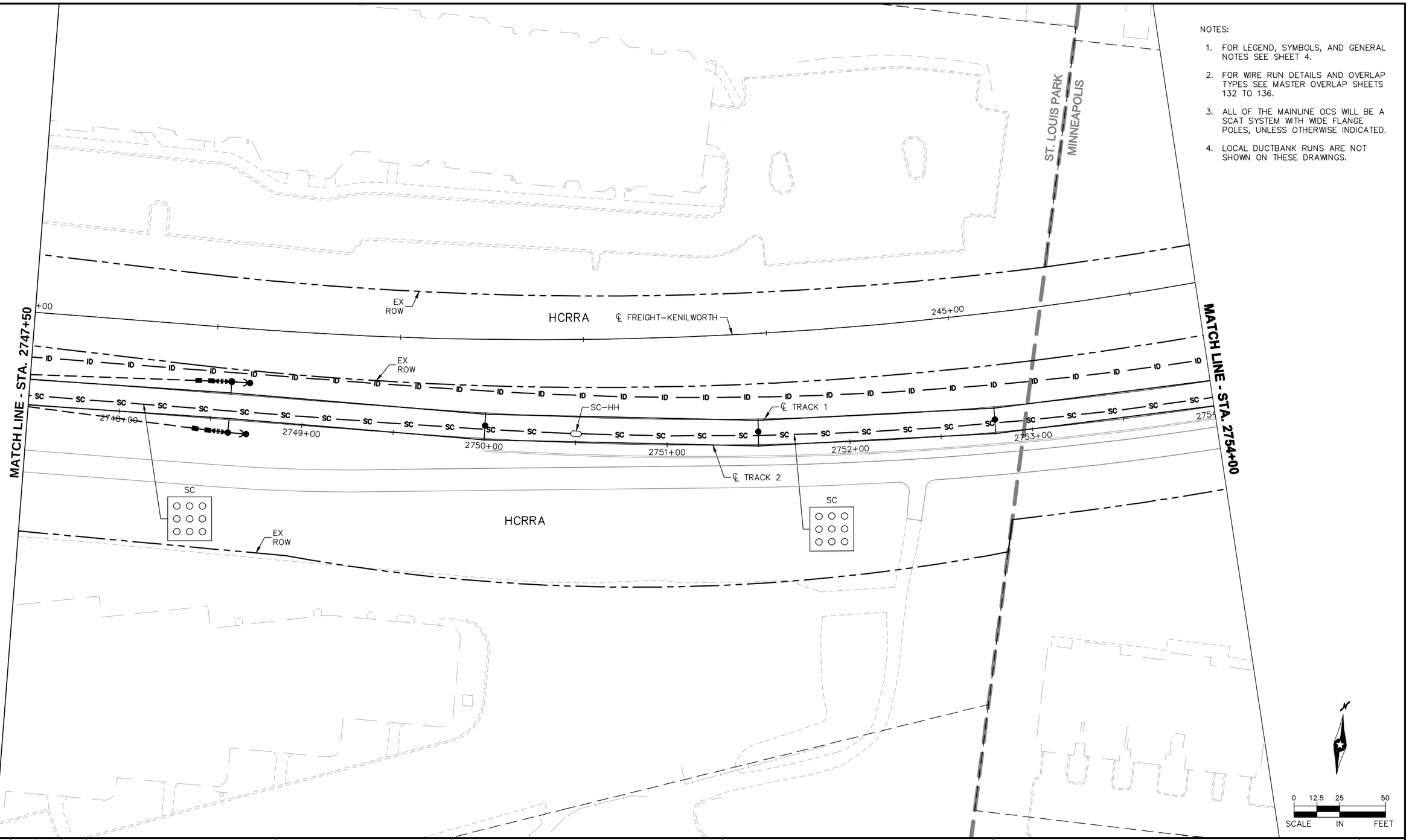
DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-002

SHEET 50 OF 240

Aug, 27 2014 05:45 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2747+50 TO STA. 2754+00

DISCIPLINE: SYSTEMS

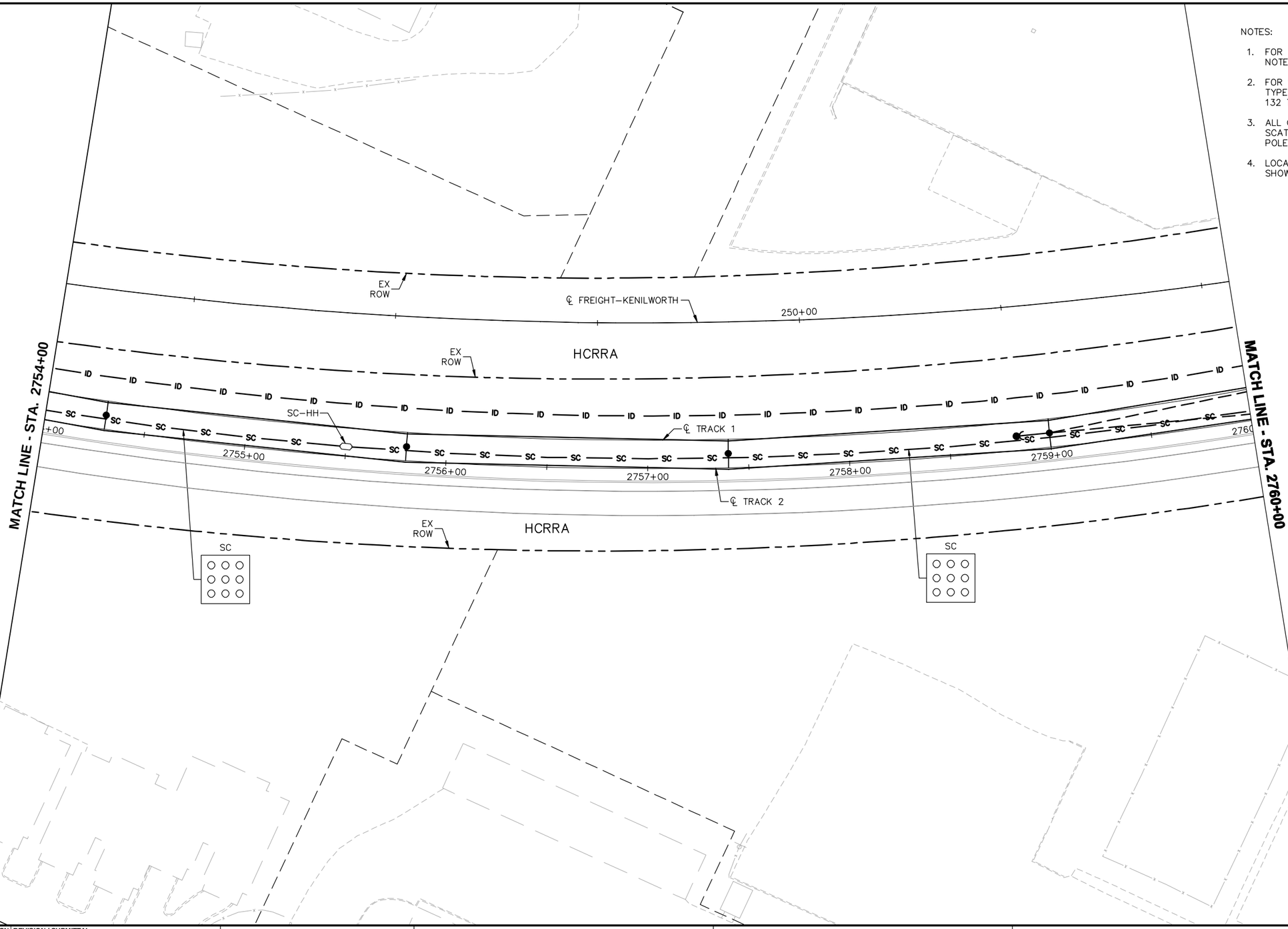
SHEET NAME: E3-SYS-PLN-003

SHEET 51 OF 240

Aug, 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2754+00 TO STA. 2760+00

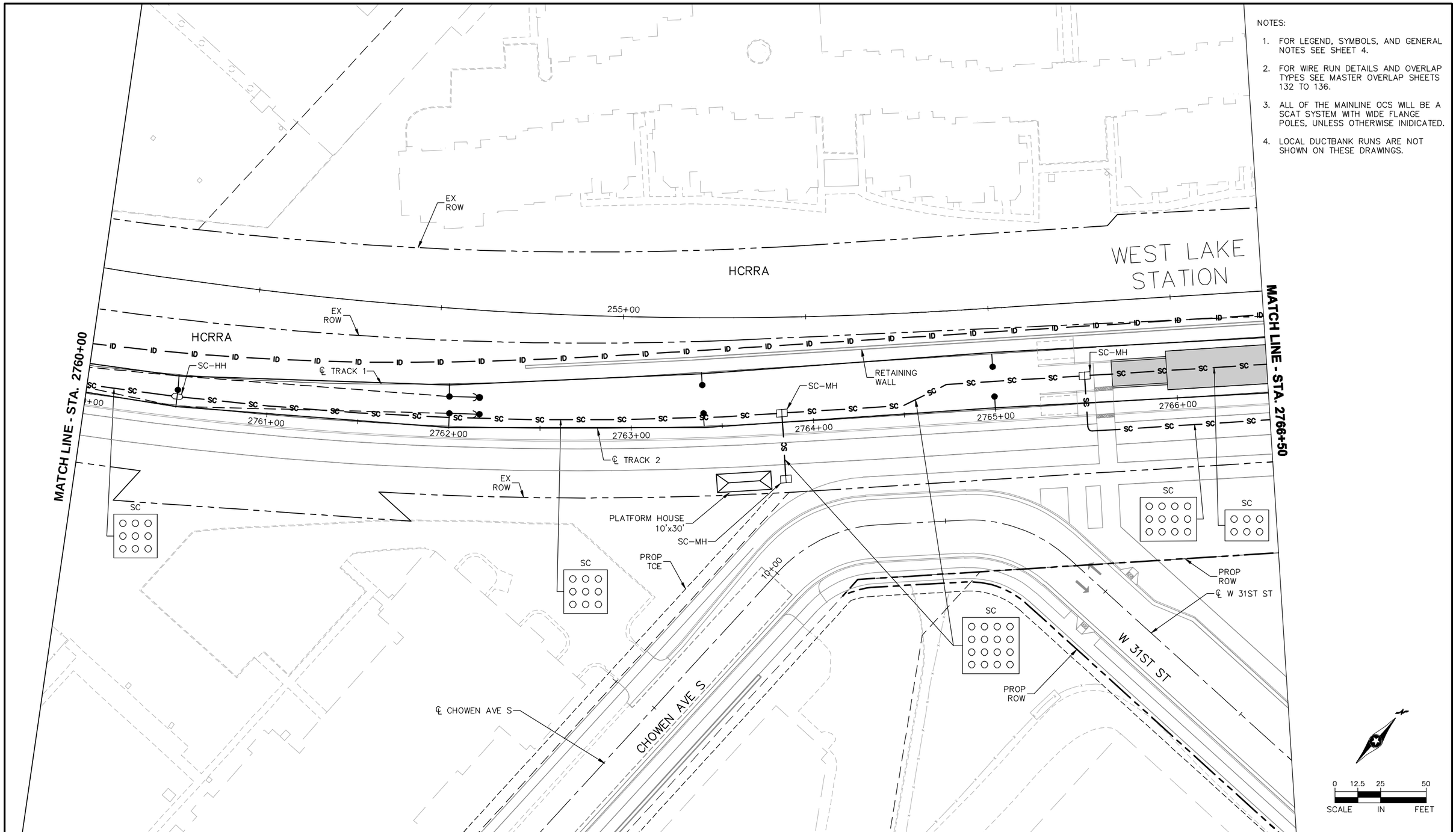
DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-004

SHEET 52 OF 240

Aug, 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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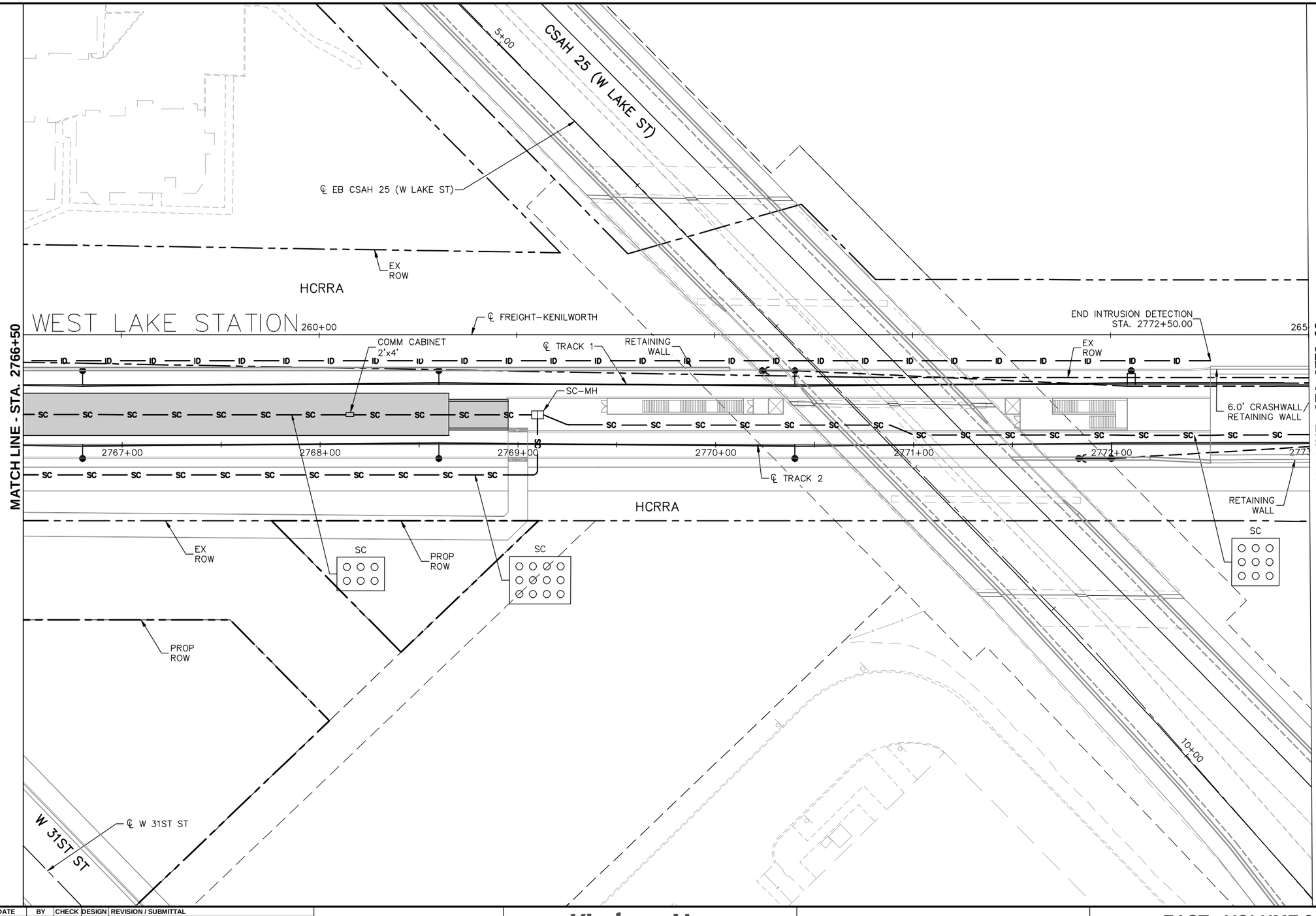
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2760+00 TO STA. 2766+50

DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-005

SHEET 53 OF 240

Aug, 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2766+50 TO STA. 2773+00

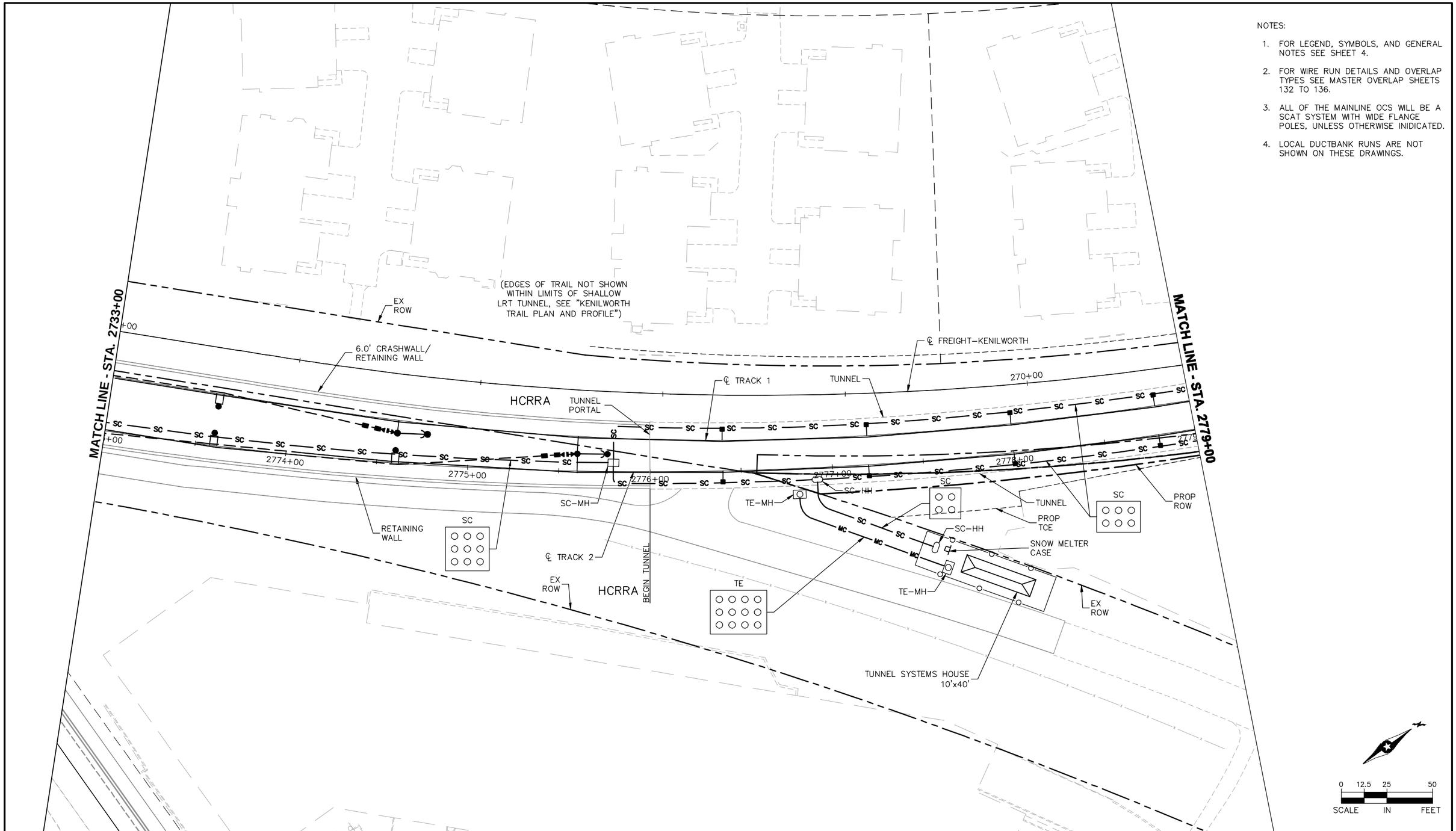
DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-006

SHEET 54 OF 240

Aug, 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neff

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2733+00 TO STA. 2779+00

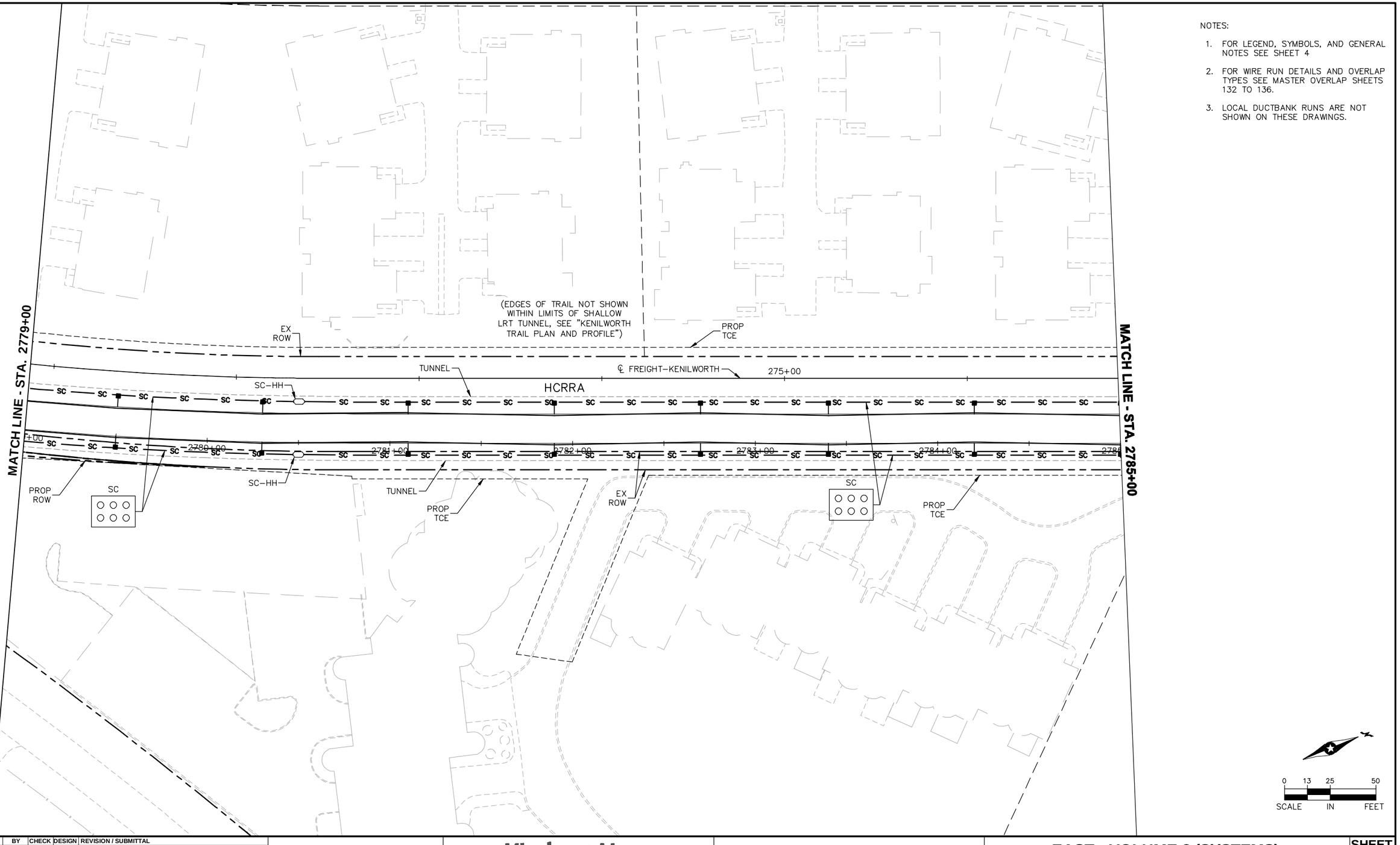
DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-007

SHEET 55 OF 240

Aug, 27 2014 05:46 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2779+00 TO STA. 2785+00

DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-008

SHEET 56 OF 240

Aug. 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

DEPOT ST

DEPOT ST

45+00

CEDAR LAKE PKWY

TRACTION POWER SUBSTATION (TPSS-SW-04)

TE

(EDGES OF TRAIL NOT SHOWN WITHIN LIMITS OF SHALLOW LRT TUNNEL, SEE "KENILWORTH TRAIL PLAN AND PROFILE")

SC-MH

PROP ROW

SC

PROP TCE

SC

TE-MH

SC

PROP ROW

℄ FREIGHT-KENILWORTH

2784+00

SC-HH

HCRRA

EX ROW

℄ TRACK 1

TUNNEL

SC-HH

MATCH LINE - STA. 2785+00

SC-HH

2786+00

2787+00

2788+00

2789+00

2790+00

EX ROW

SC

℄ TRACK 2

TUNNEL

SC-HH

SC

MATCH LINE - STA. 2791+00

PROP TCE

W 28TH ST

0 12.5 25 50

SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2785+00 TO STA. 2791+00

DISCIPLINE: SYSTEMS

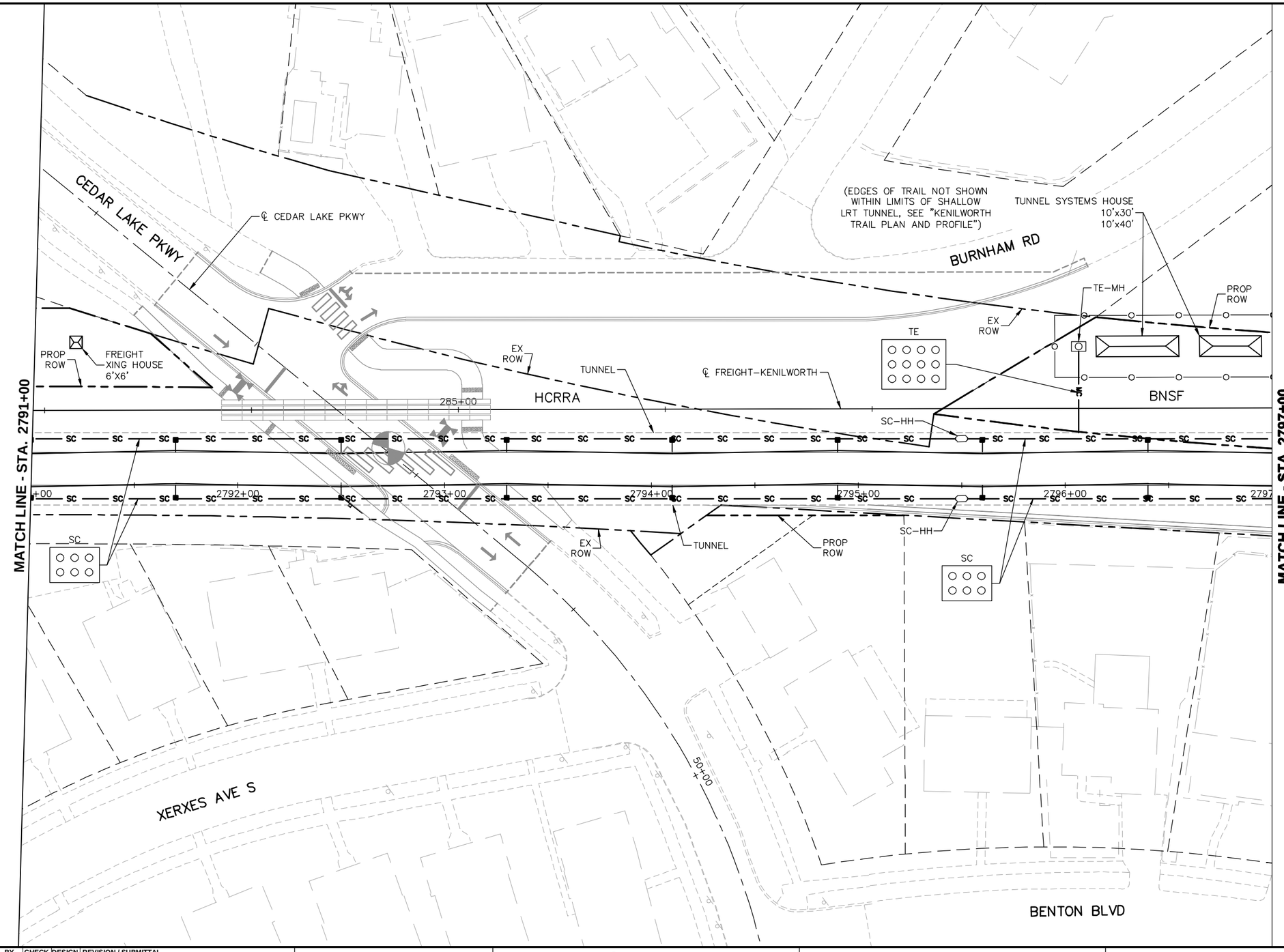
SHEET NAME: E3-SYS-PLN-009

SHEET 57 OF 240

Aug, 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

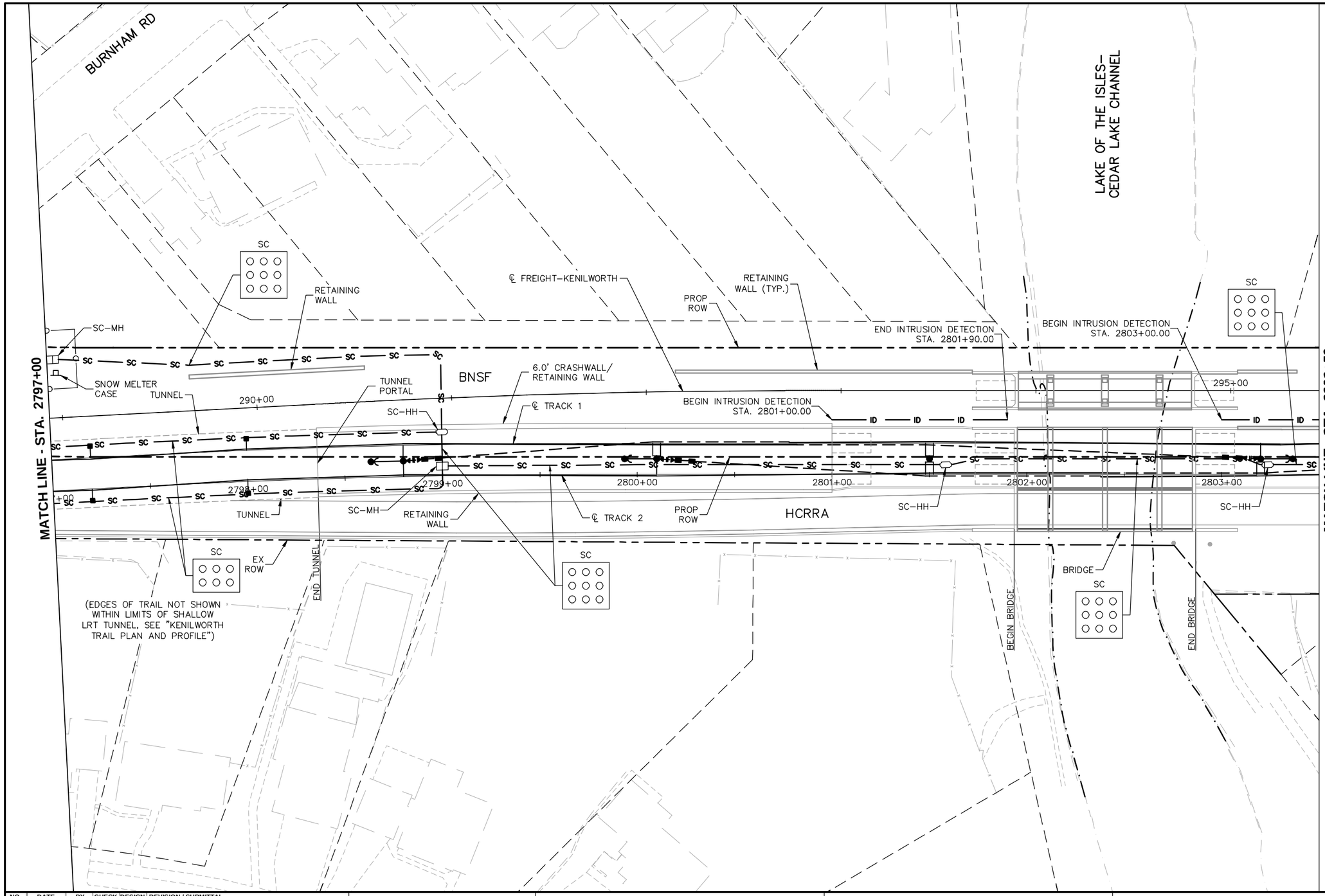
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2791+00 TO STA. 2797+00

DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-010

SHEET 58 OF 240

Aug, 27 2014 05:46 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

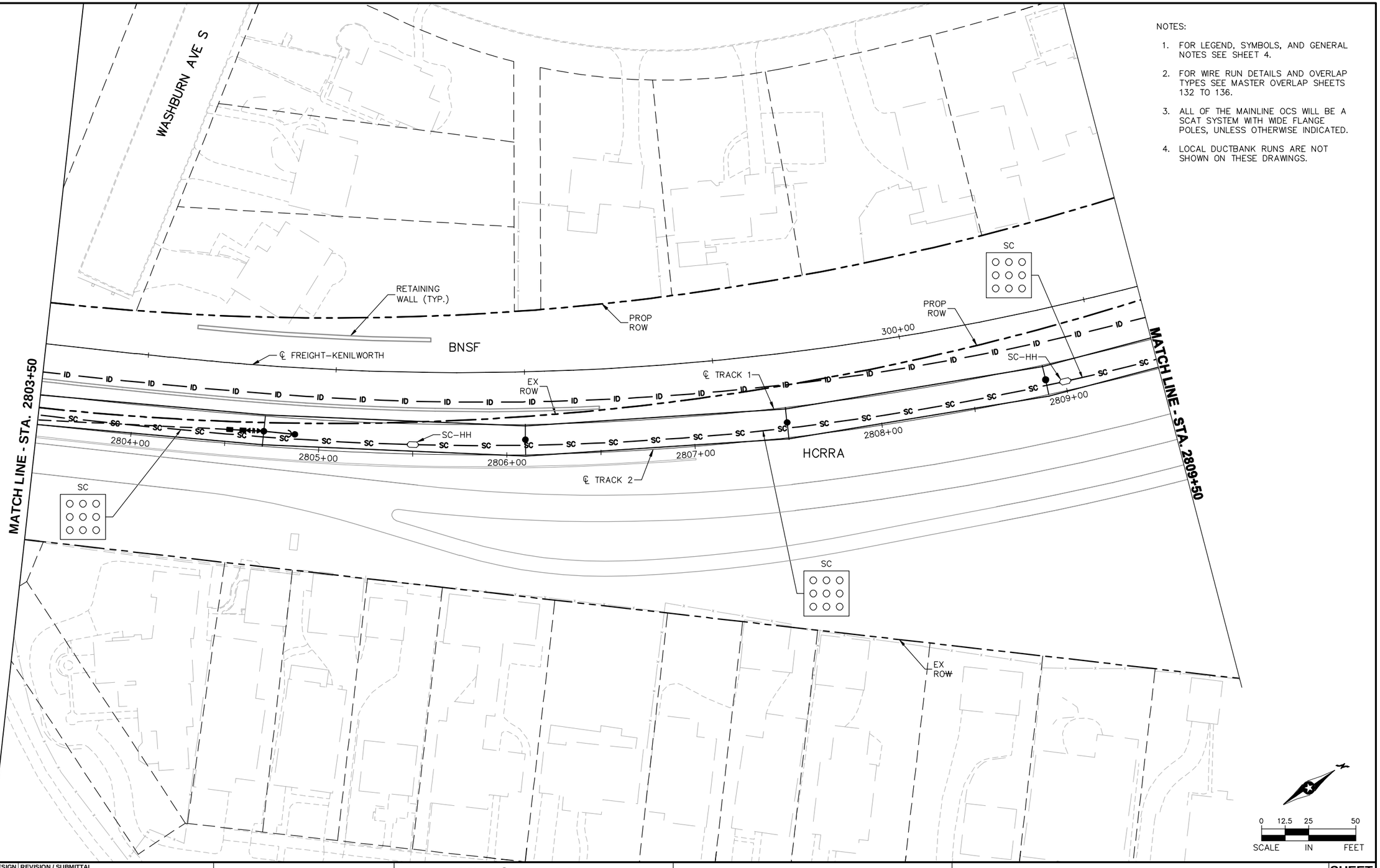
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2797+00 TO STA. 2803+50

DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-011

SHEET 59 OF 240

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

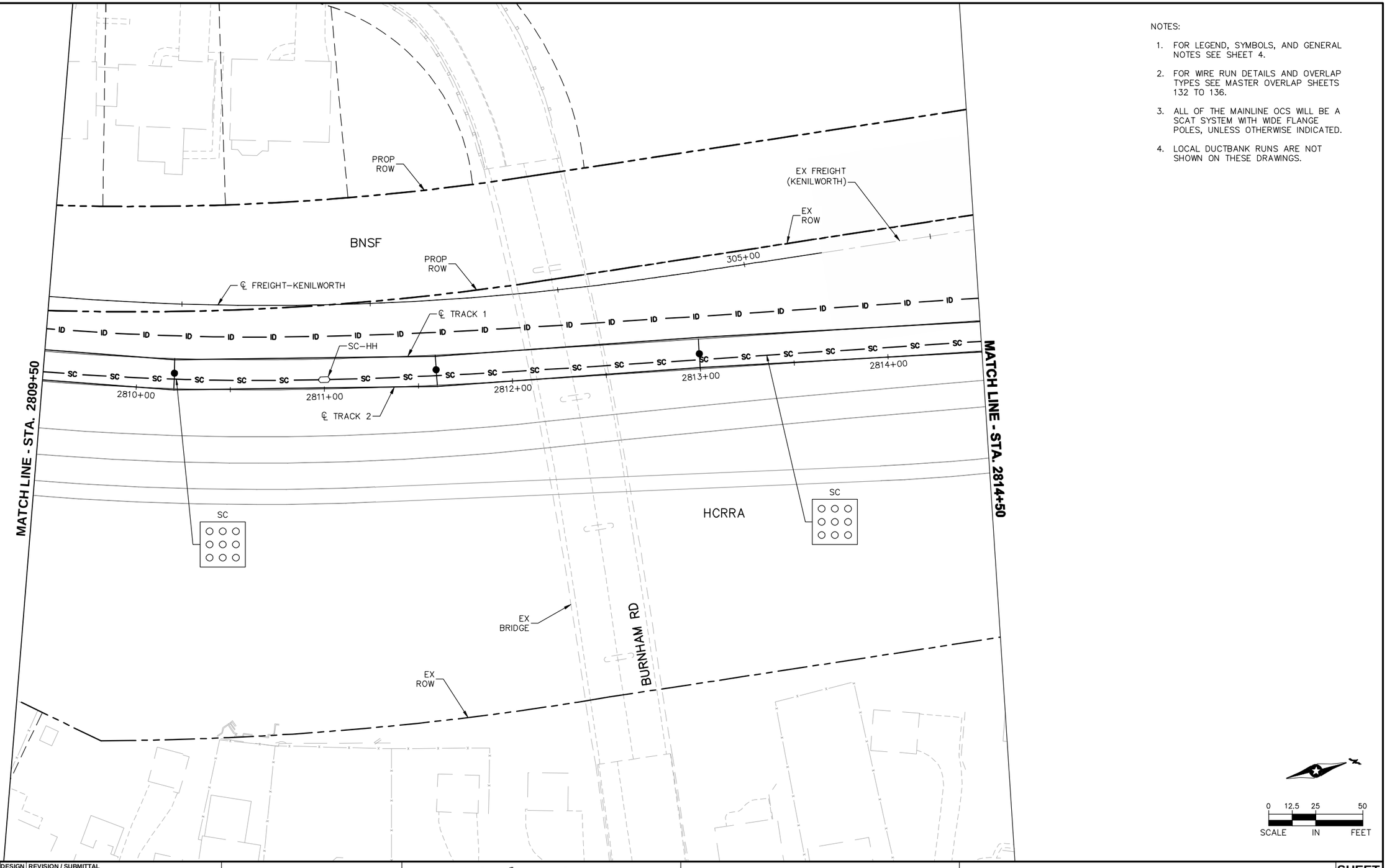
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2803+50 TO STA. 2809+50

DISCIPLINE: SYSTEMS

SHEET NAME: E3-SYS-PLN-012

SHEET 60 OF 240

Aug. 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft



NOTES:

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4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

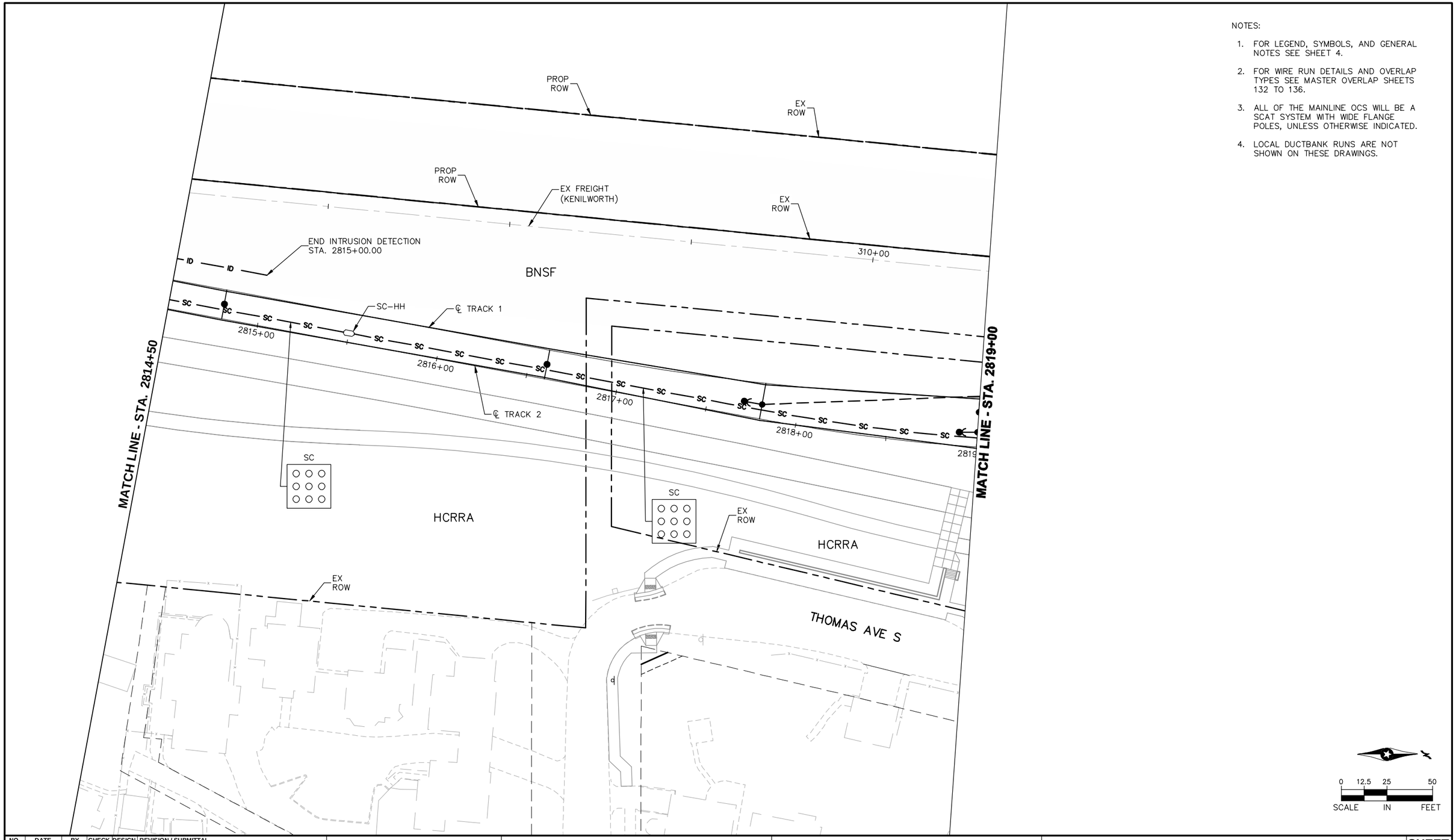
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2809+50 TO STA. 2814+50

DISCIPLINE: SYSTEMS

SHEET NAME: E3-SYS-PLN-013

SHEET 61 OF 240

Aug. 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft



NOTES:

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2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
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NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

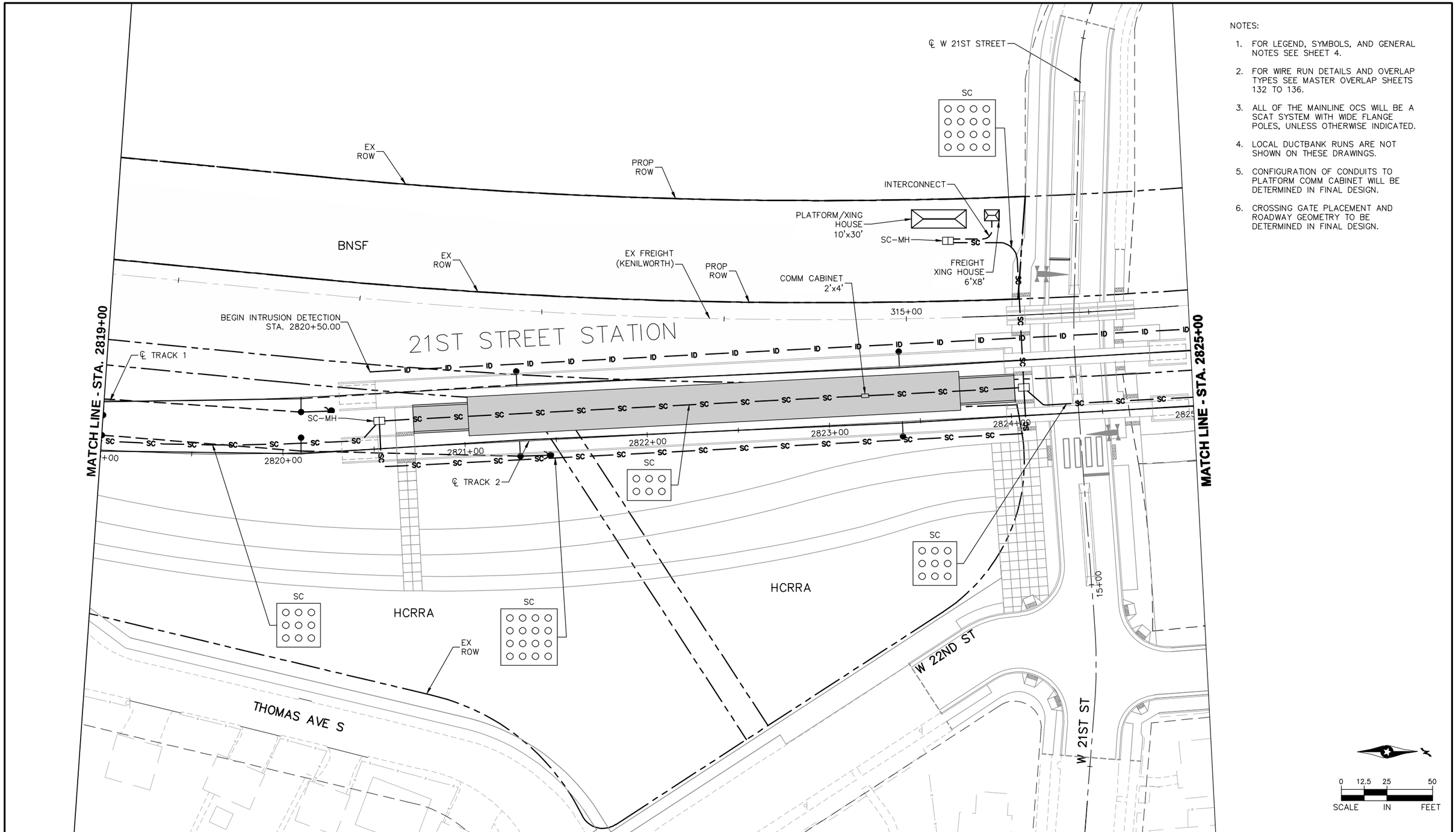
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2814+50 TO STA. 2819+00

DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-014

SHEET 62 OF 240

Aug, 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft



NOTES:

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2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
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4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.
6. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE DETERMINED IN FINAL DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2819+00 TO STA. 2825+00

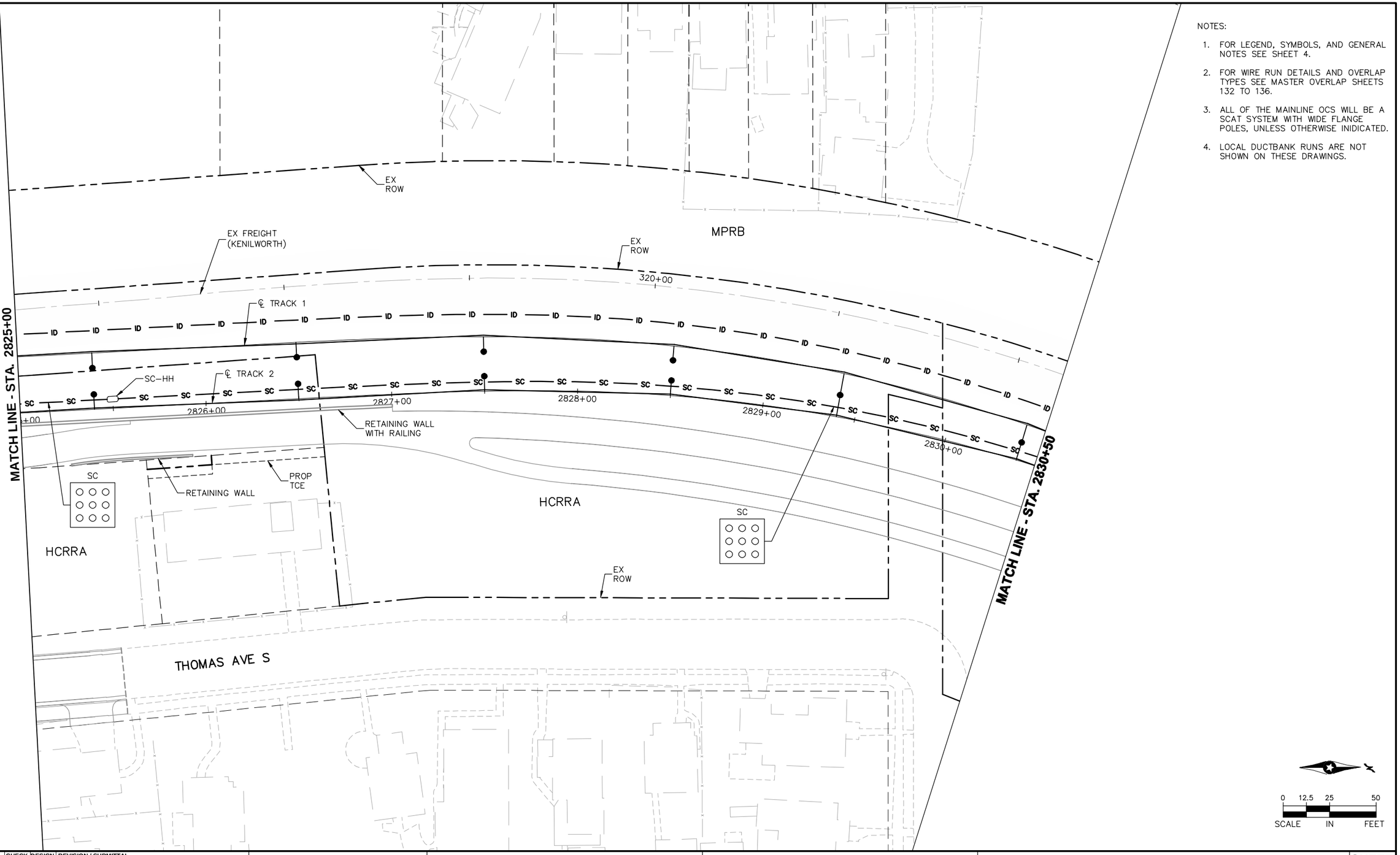
DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-015

SHEET 63 OF 240

Aug. 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2825+00 TO STA. 2830+50

DISCIPLINE: SYSTEMS

SHEET NAME: E3-SYS-PLN-016

SHEET 64 OF 240

Aug, 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

EX ROW

MPRB

EX FREIGHT (KENILWORTH)

325+00

MATCH LINE - STA. 2830+50

SC-HH

℄ TRACK 1

END INTRUSION DETECTION STA. 2836+50.00

2831+00

2832+00

2833+00

2834+00

2835+00

2836+00

℄ TRACK 2

STA. BACK 2836+99.74
STA. AHEAD 2840+00.00

MATCH LINE - STA. 2840+00

SC

HCRRA

EX ROW

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2830+50 TO STA. 2840+00

DISCIPLINE: SYSTEMS

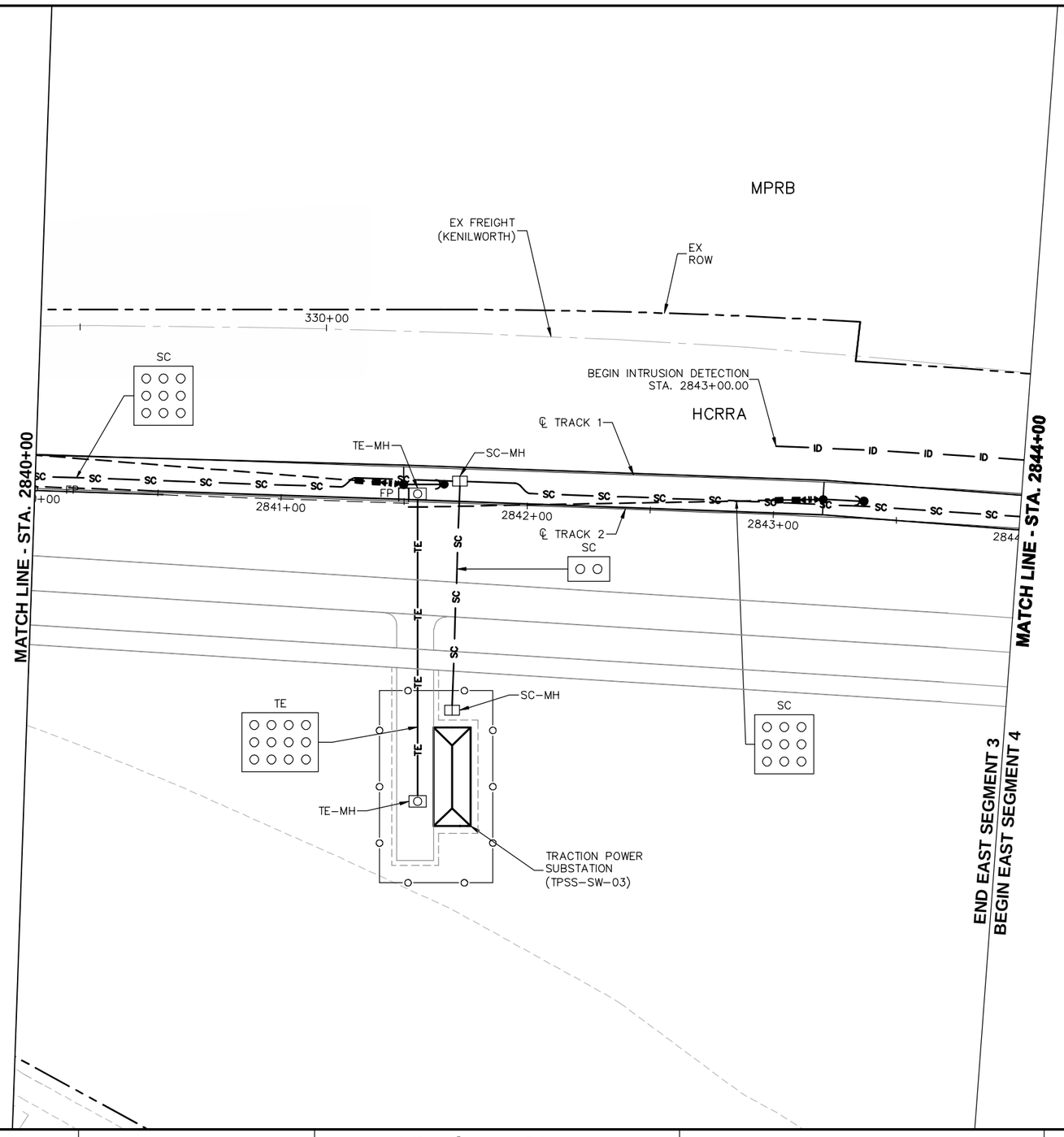
SHEET NAME: E3-SYS-PLN-017

SHEET 65 OF 240

Aug, 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

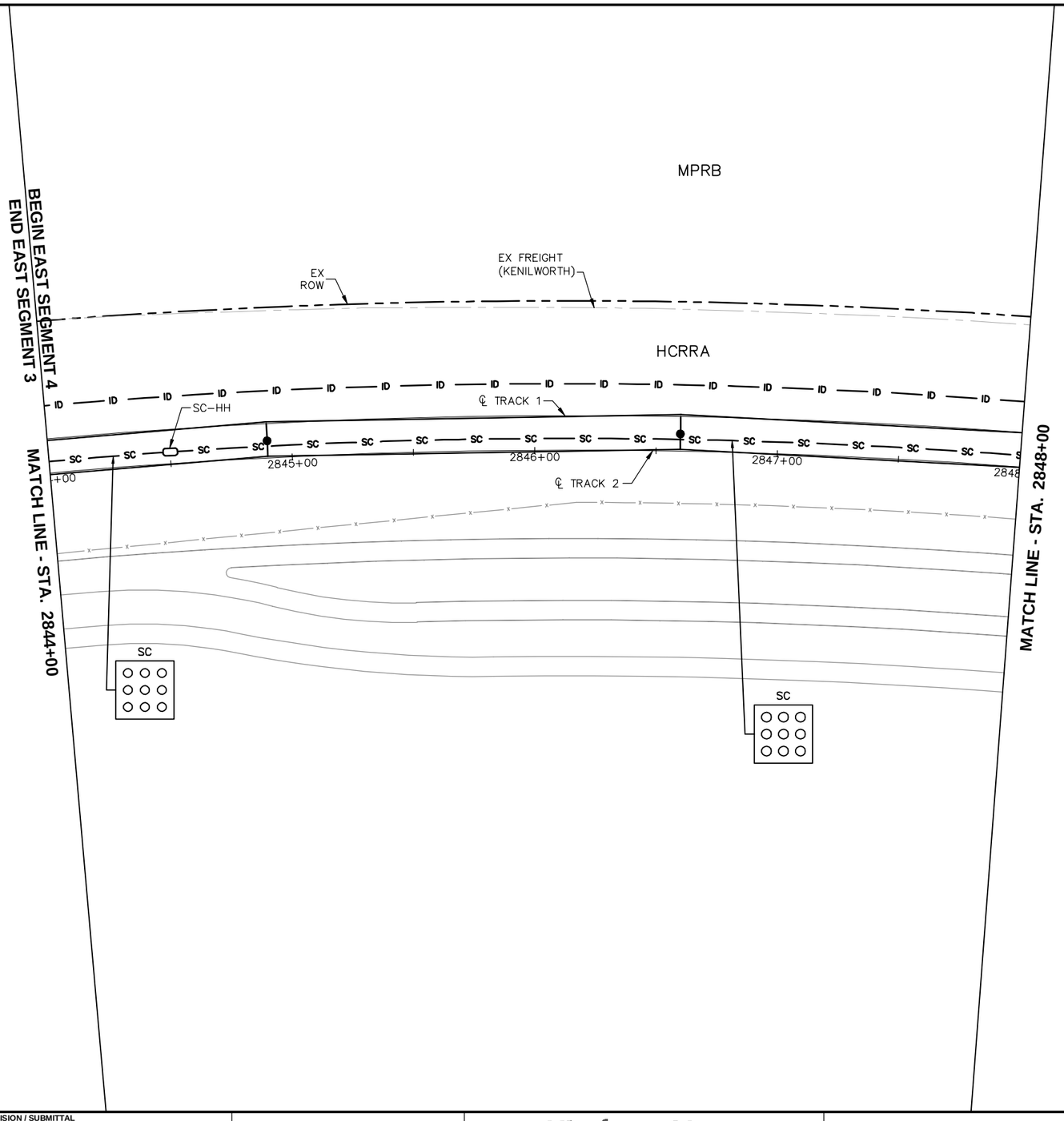
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E3
PLAN SHEET LAYOUTS
STA. 2840+00 TO STA. 2844+00

DISCIPLINE: SYSTEMS
SHEET NAME: E3-SYS-PLN-018

SHEET 66 OF 240

Aug. 27 2014 05:47 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E3-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

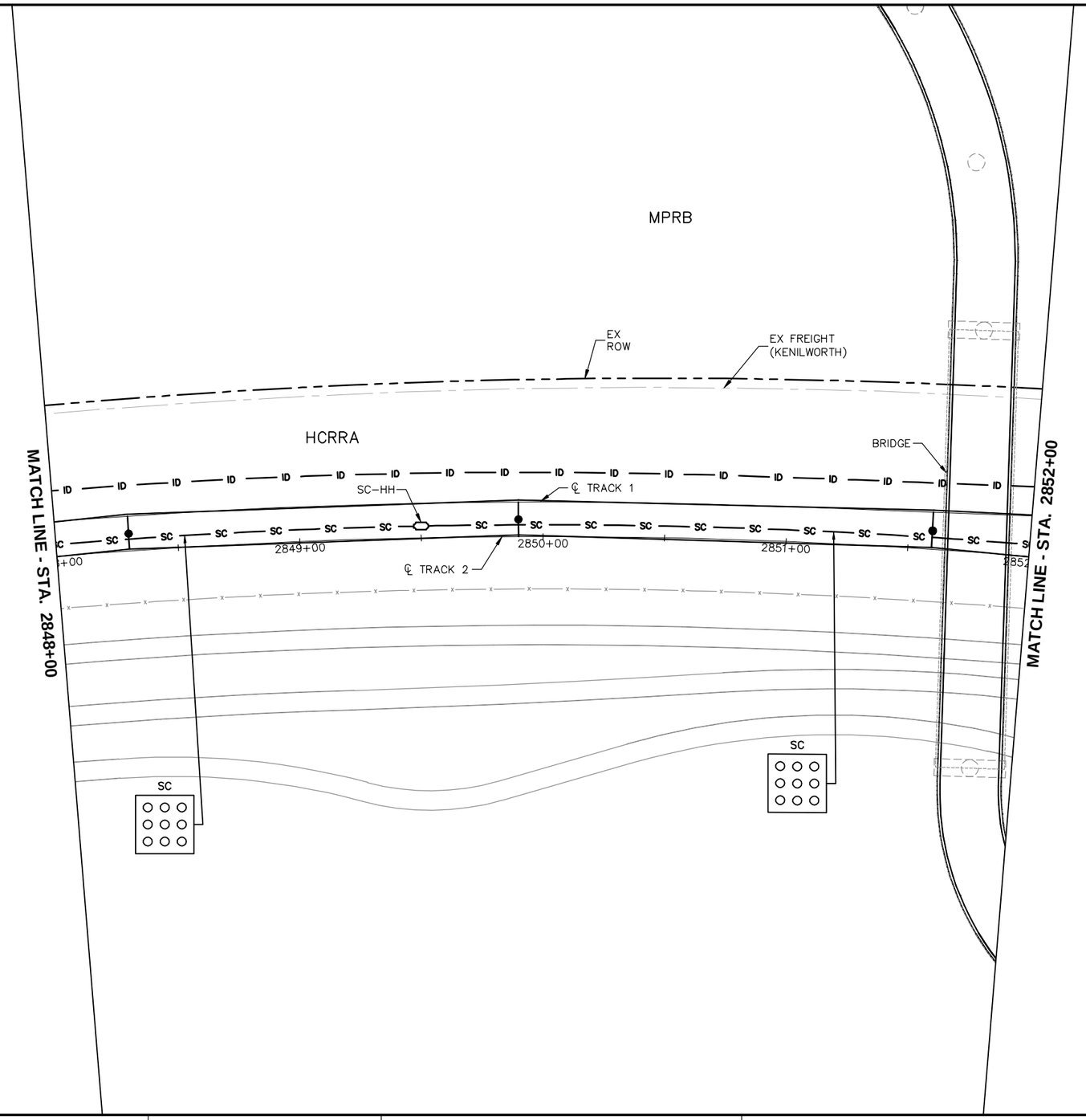
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2844+00 TO STA. 2848+00

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-001

SHEET 67 OF 240

Aug. 27 2014 05:49 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA
PRELIMINARY ENGINEERING

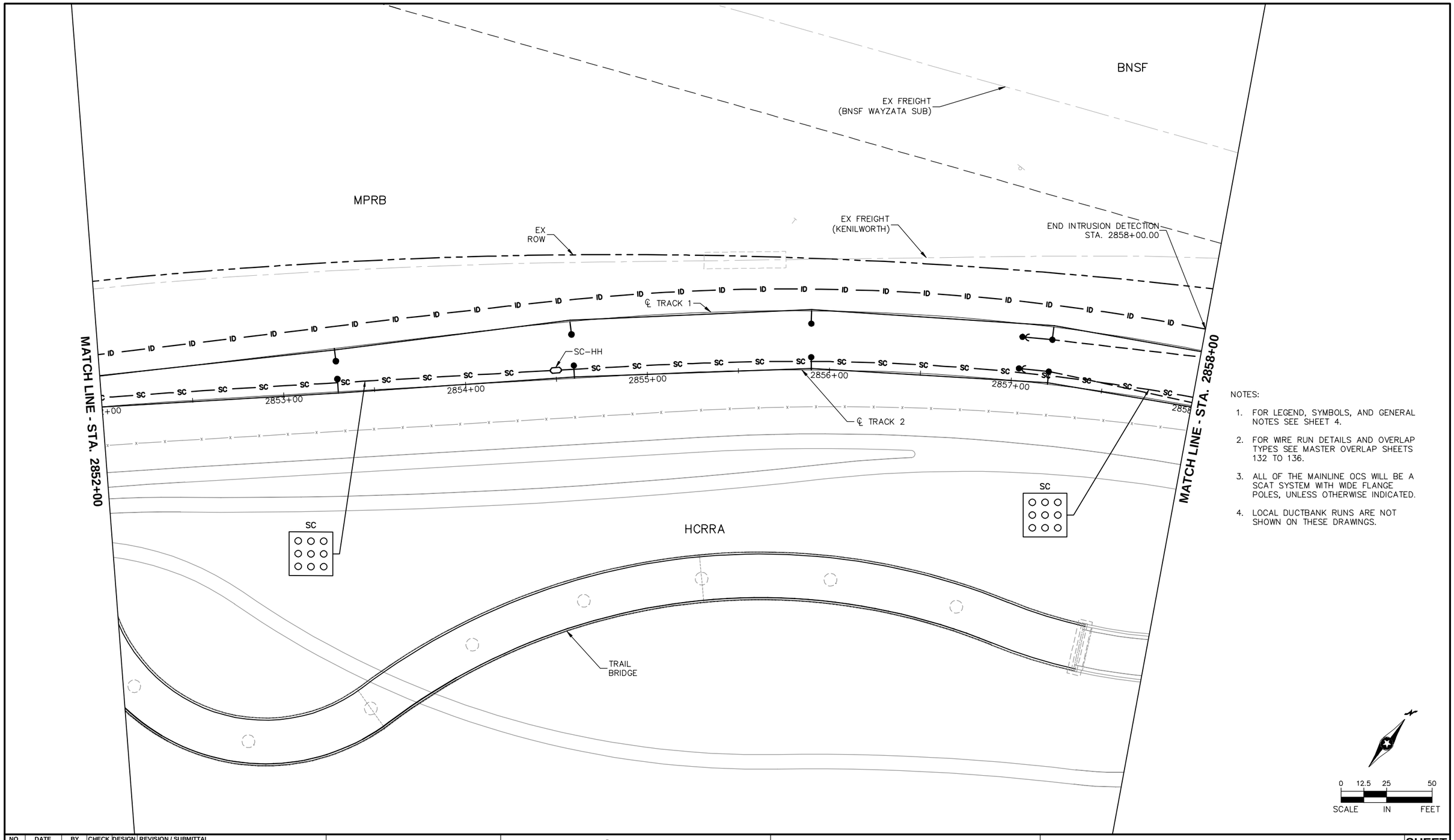
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2848+00 TO STA. 2852+00

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-002

SHEET 68 OF 240

Aug. 27 2014 05:49 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2852+00 TO STA. 2858+00

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-003

SHEET 69 OF 240

Aug, 27 2014 05:50 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.

BNSF

EX FREIGHT
(BNSF WAYZATA SUB)

EX FREIGHT
(KENILWORTH)

PENN STATION

CONT BOX

SC

℄ TRACK 1

COMM CABINET
2'x4'

SC-MH

SC

2859+00

2860+00

2861+00

2862+00

2863+00

℄ TRACK 2

MATCH LINE - STA. 2858+00

MATCH LINE - STA. 2864+00

HCRRA

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

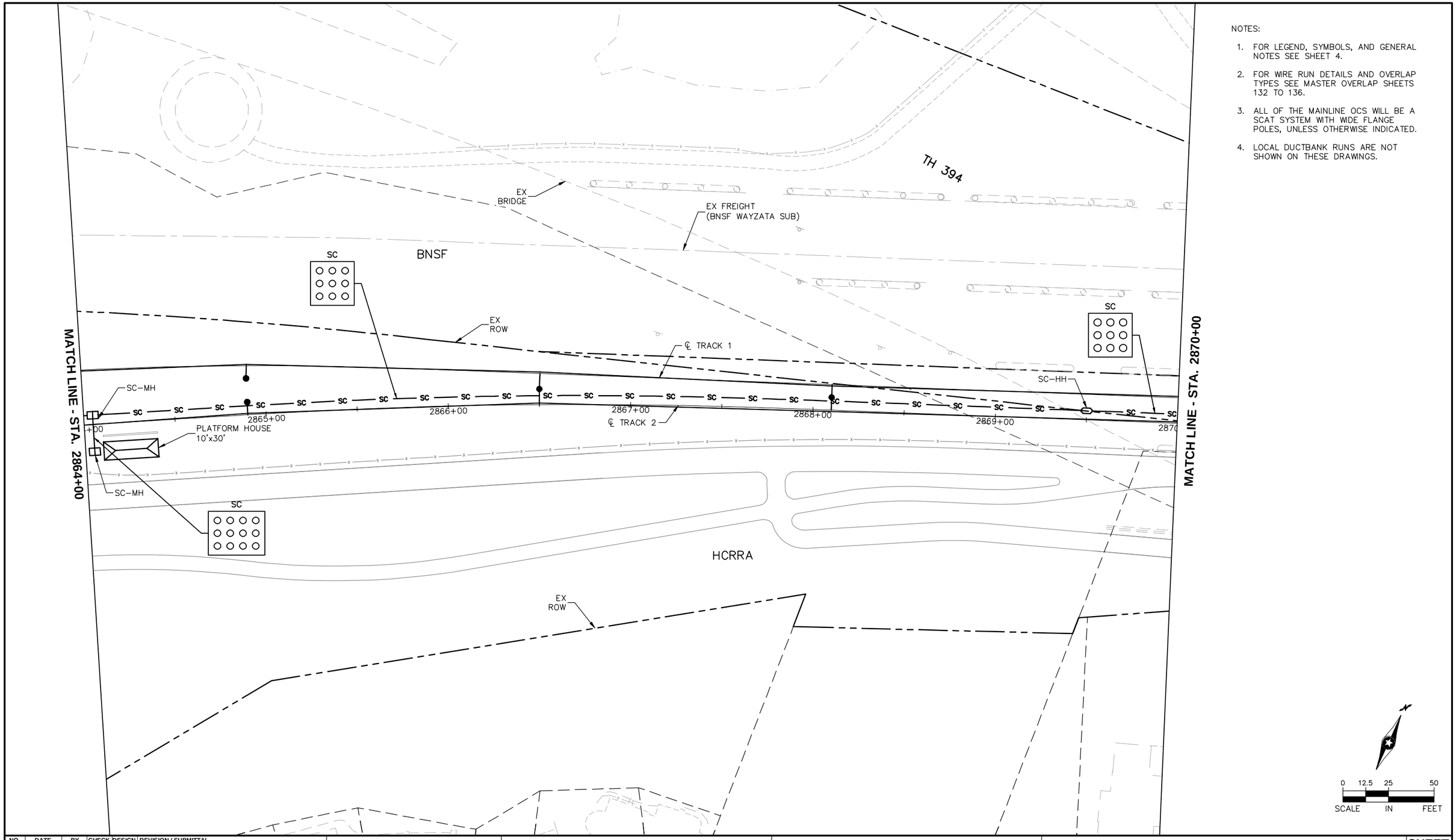
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2858+00 TO STA. 2864+00

DISCIPLINE: SYSTEMS

SHEET NAME: E4-SYS-PLN-004

SHEET 70 OF 240

Aug. 27 2014 05:50 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2864+00 TO STA. 2870+00

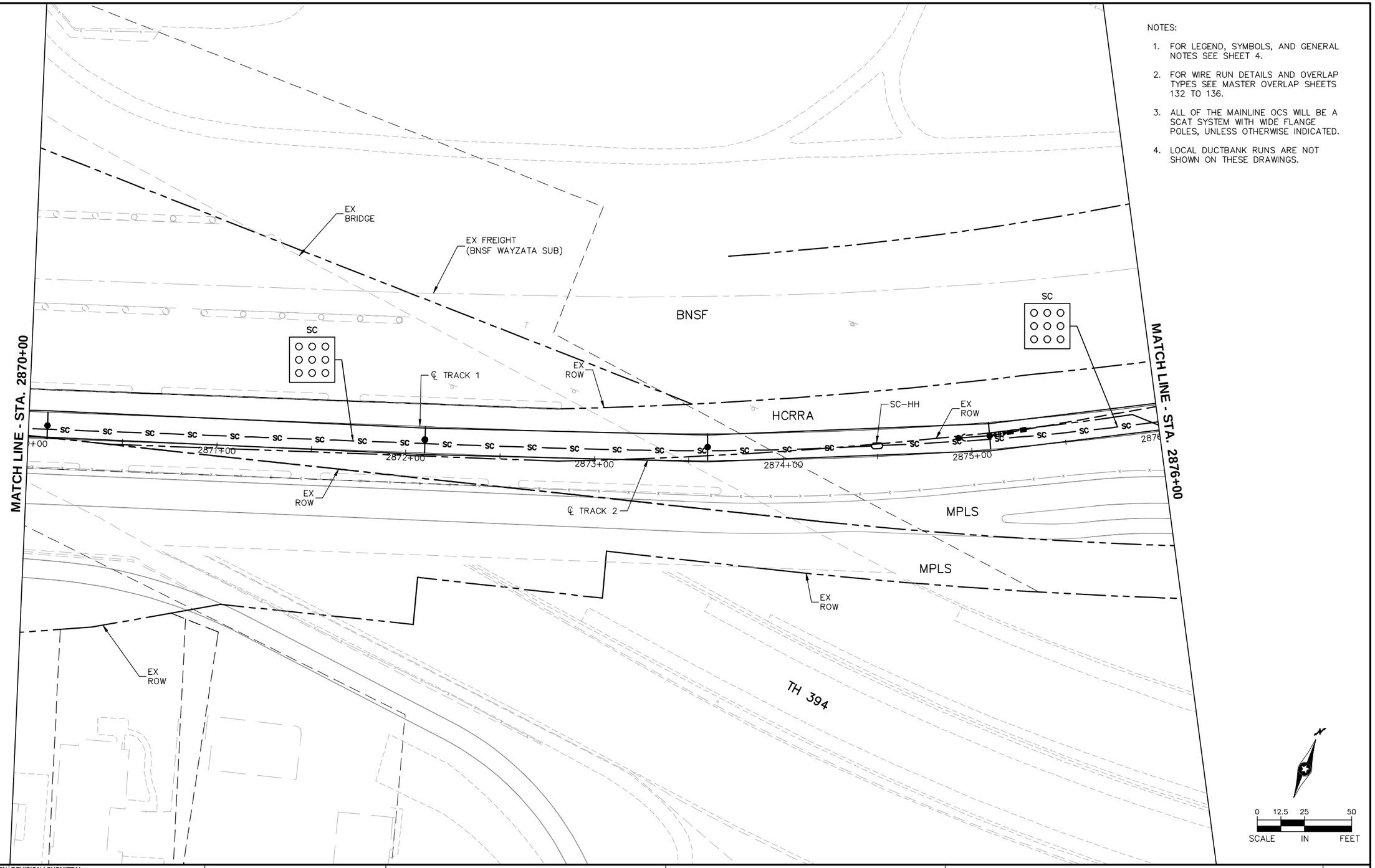
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-005

SHEET 71 OF 240

Aug, 27 2014 05:50 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

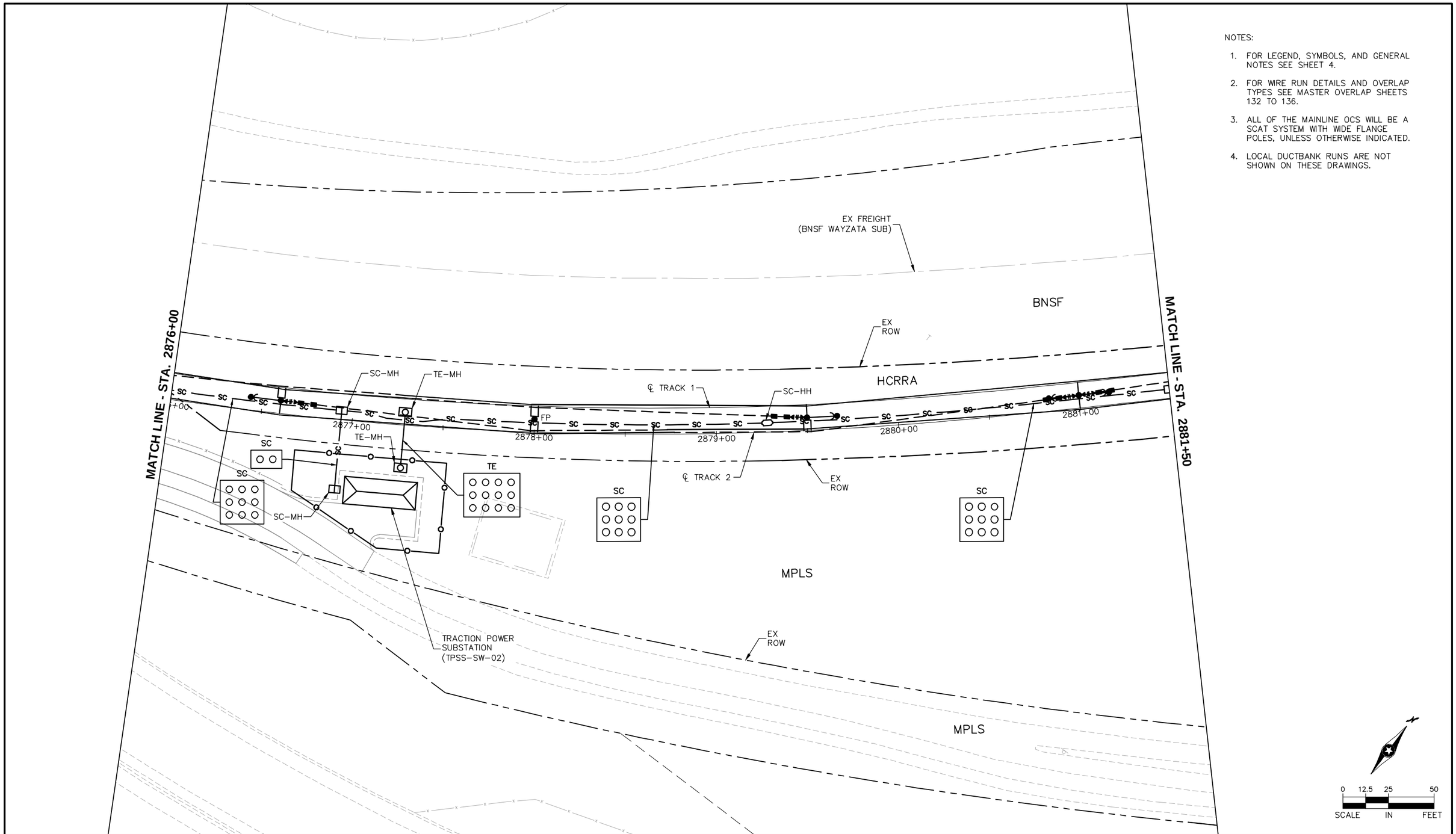
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2870+00 TO STA. 2876+00

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-006

SHEET 72 OF 240

Aug, 27 2014 05:50 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

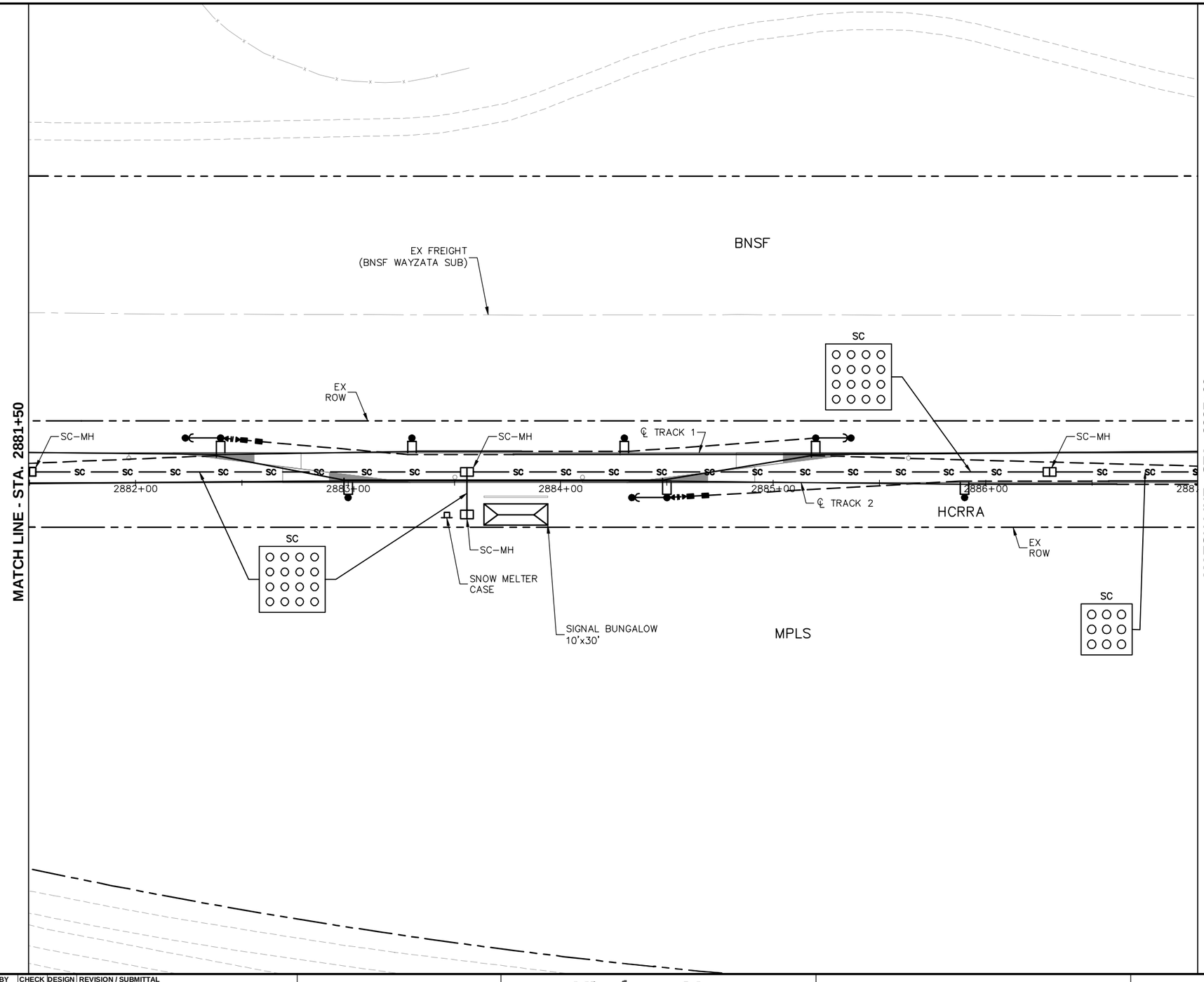
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2876+00 TO STA. 2881+50

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-007

SHEET 73 OF 240

Aug. 27 2014 05:50 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neff



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. INTERLOCKING CONDUIT CONFIGURATION TO BE DETERMINED IN FINAL DESIGN.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

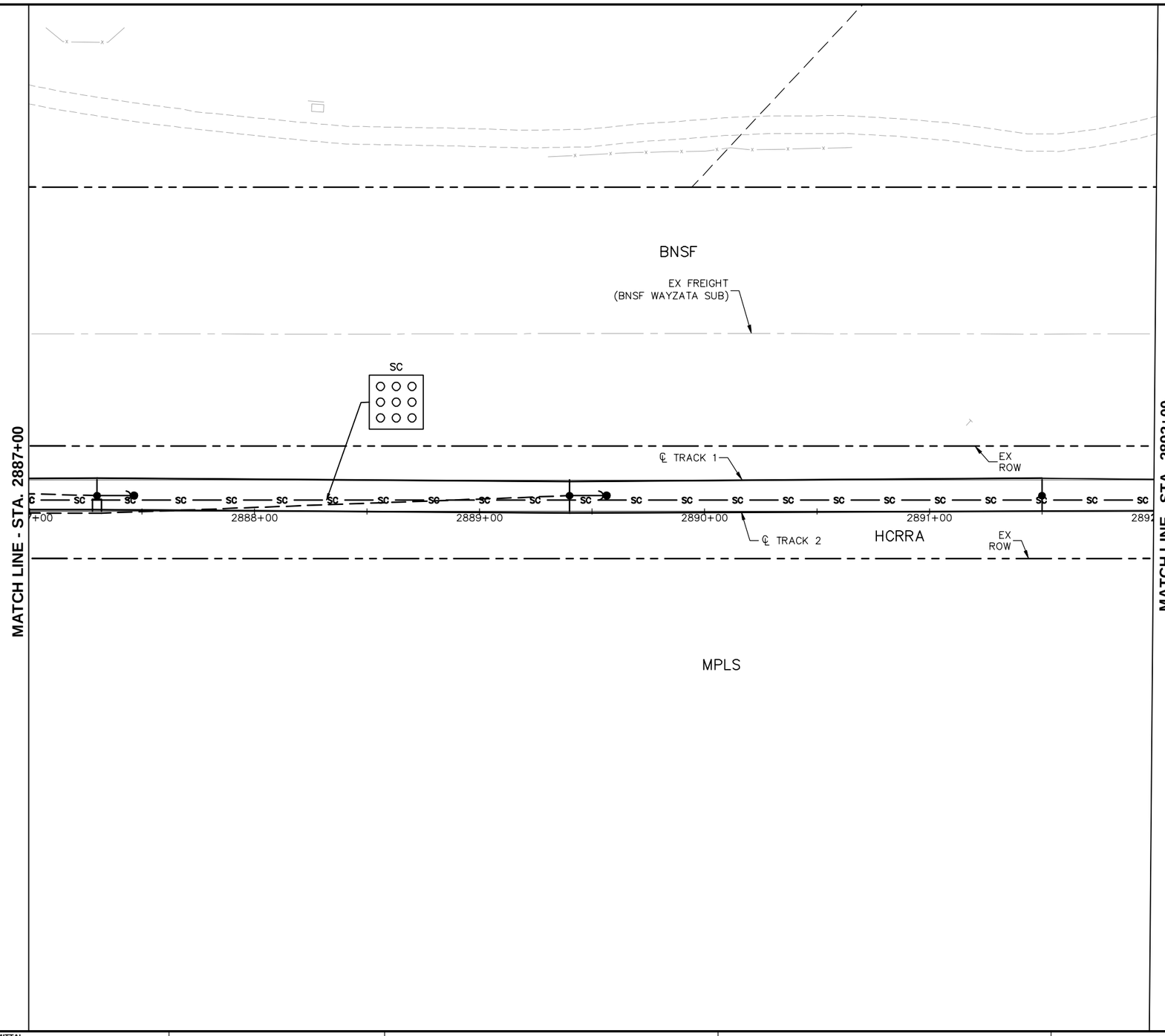
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2881+50 TO STA. 2887+00

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-008

SHEET 74 OF 240

Aug, 27 2014 05:50 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2887+00 TO STA. 2892+00

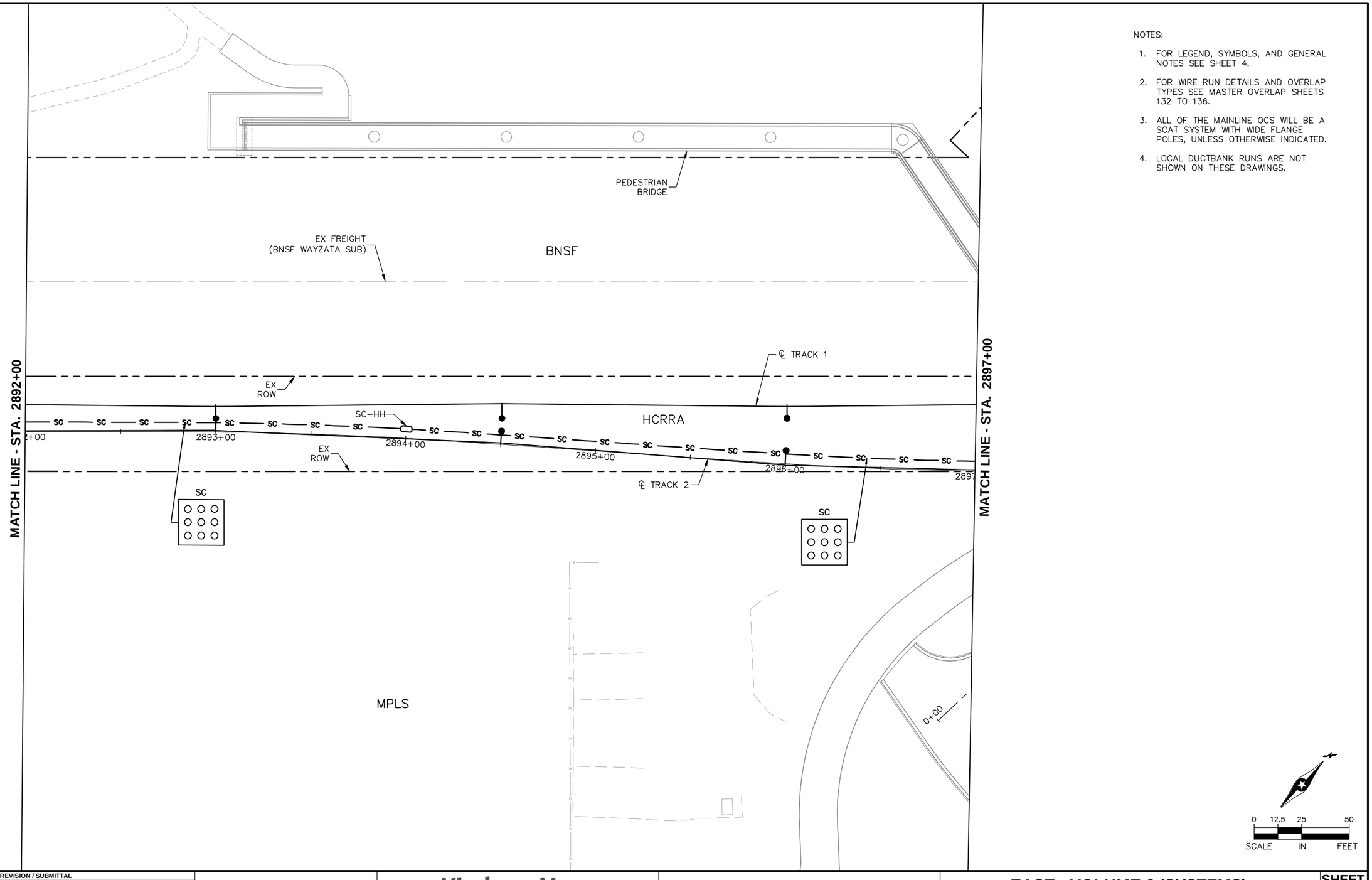
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-009

SHEET 75 OF 240

Aug. 27 2014 05:50 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

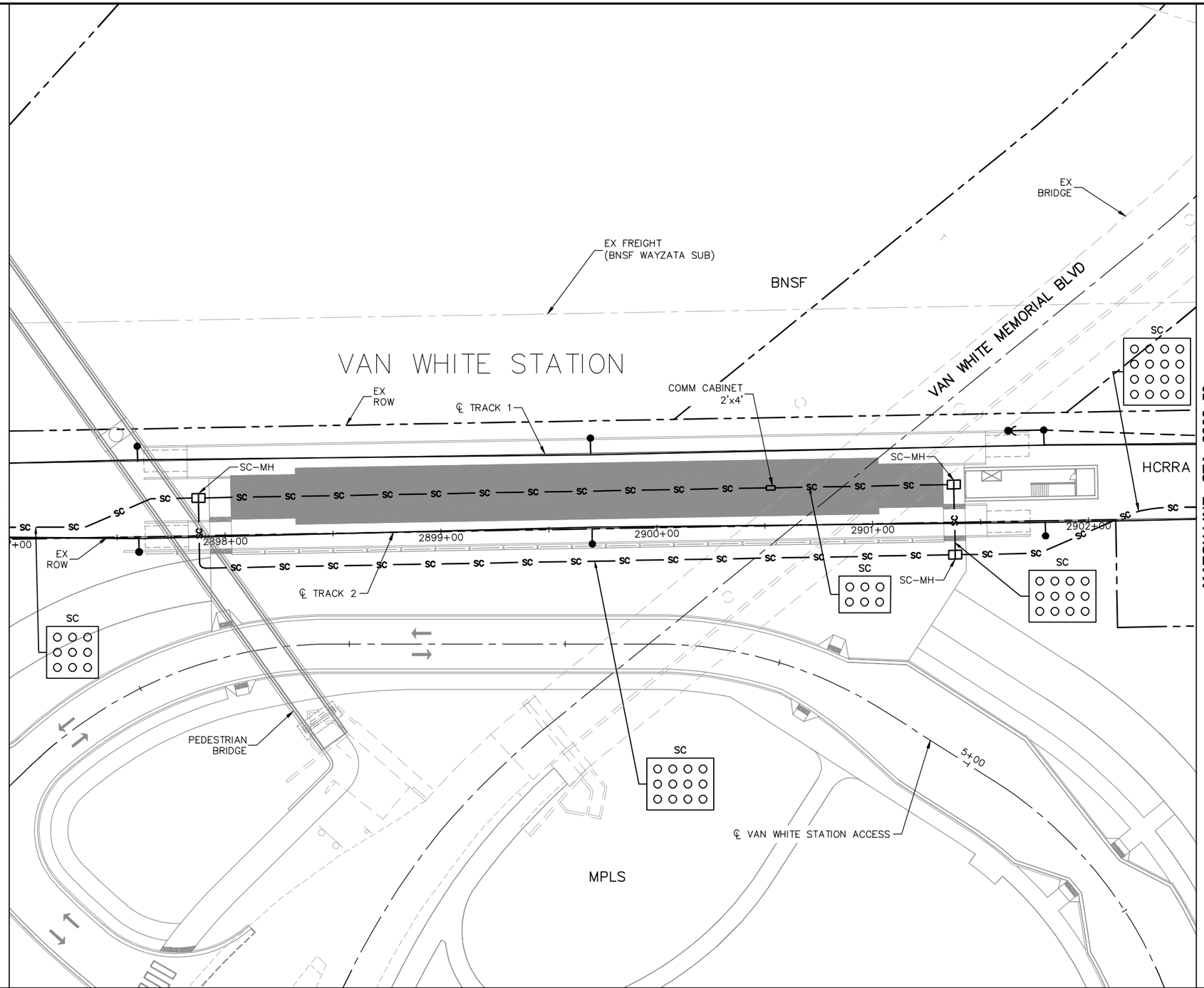
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2892+00 TO STA. 2897+00

DISCIPLINE: SYSTEMS

SHEET NAME: E4-SYS-PLN-010

SHEET 76 OF 240

Aug. 27 2014 05:50 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neff



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.

SCALE 0 12.5 25 50 IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2897+00 TO STA. 2902+50

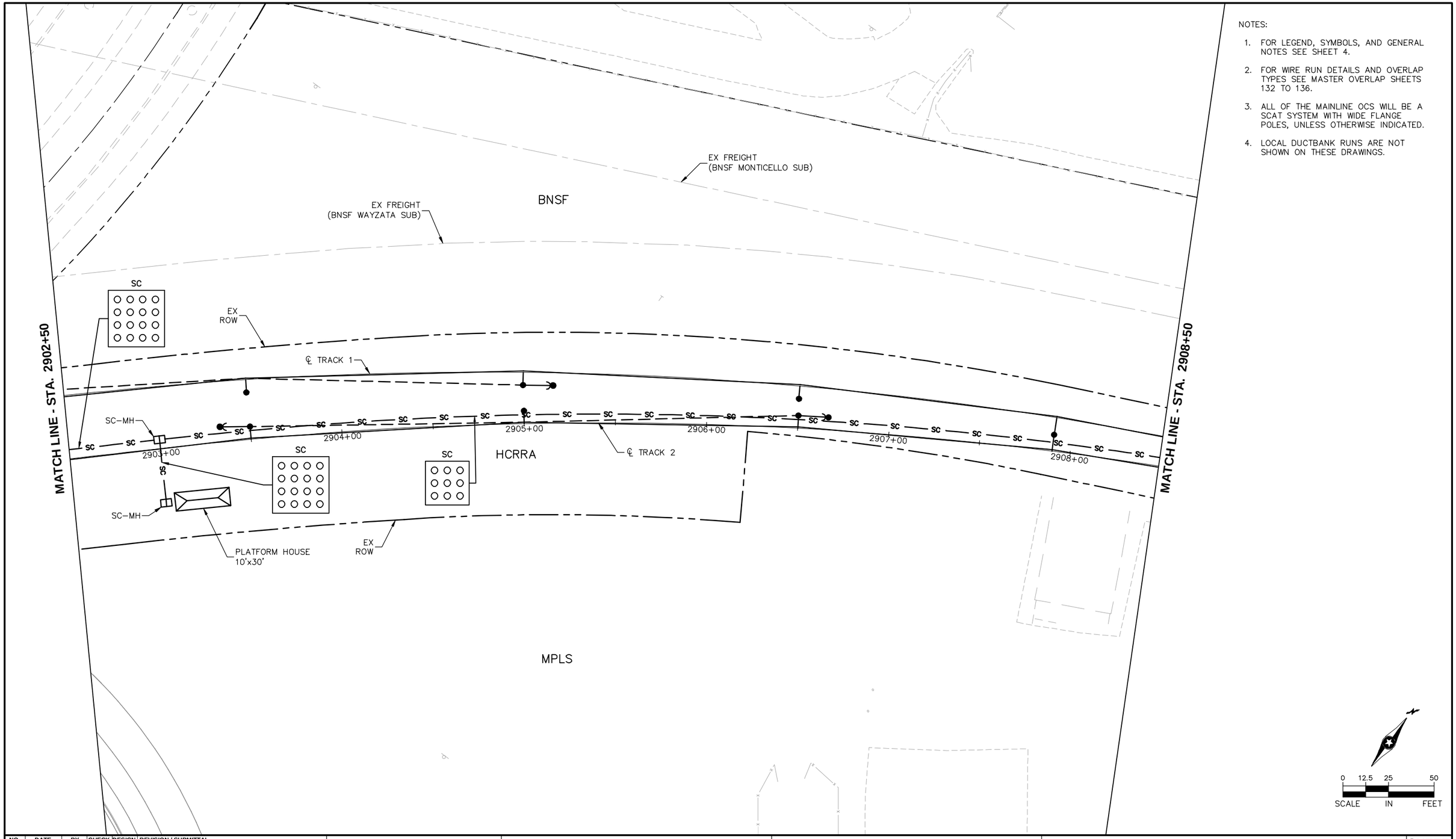
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-011

SHEET 77 OF 240

Aug, 27 2014 05:51 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neff

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2902+50 TO STA. 2908+50

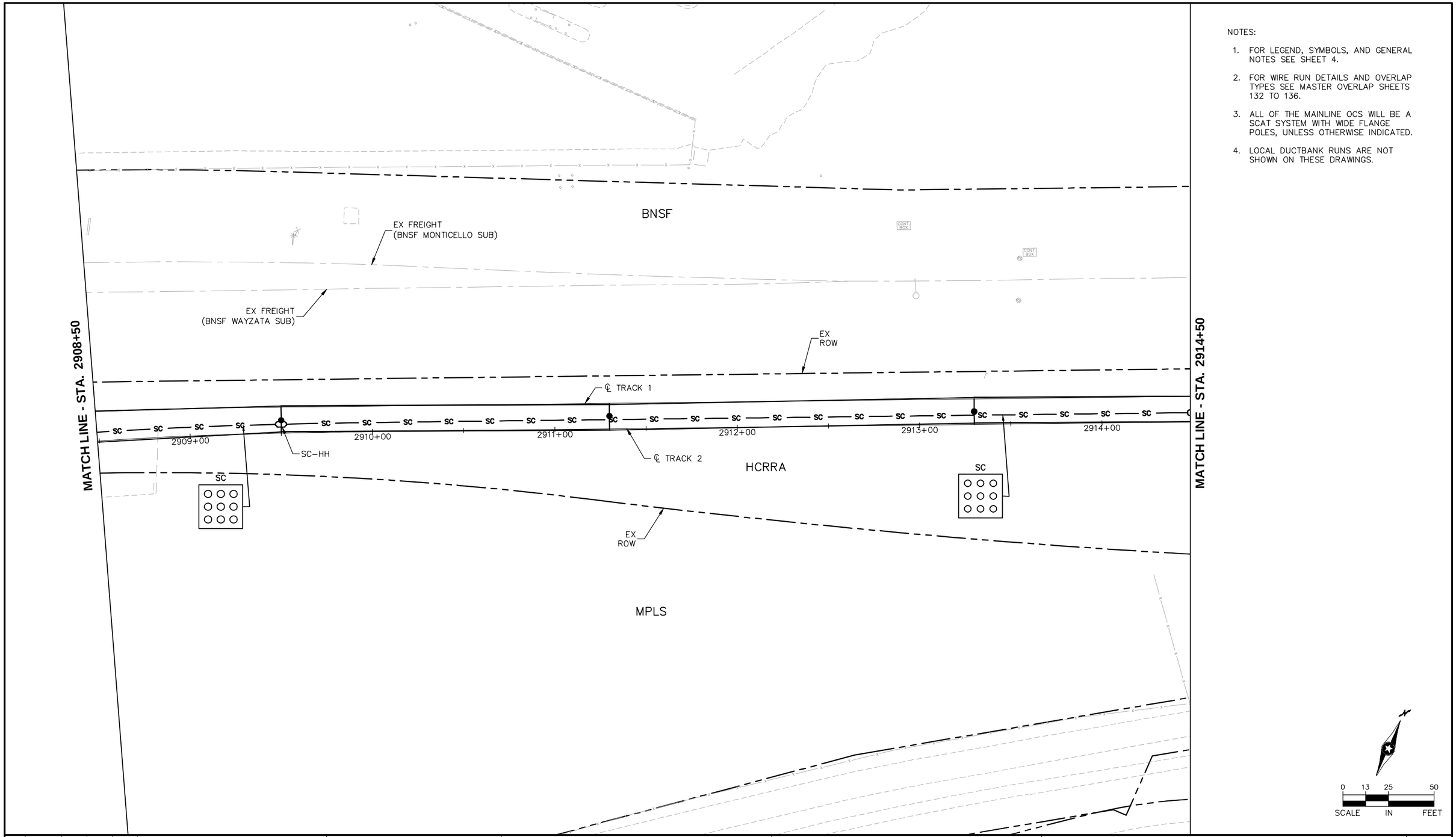
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-012

SHEET 78 OF 240

Aug, 27 2014 05:51 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2908+50 TO STA. 2914+50

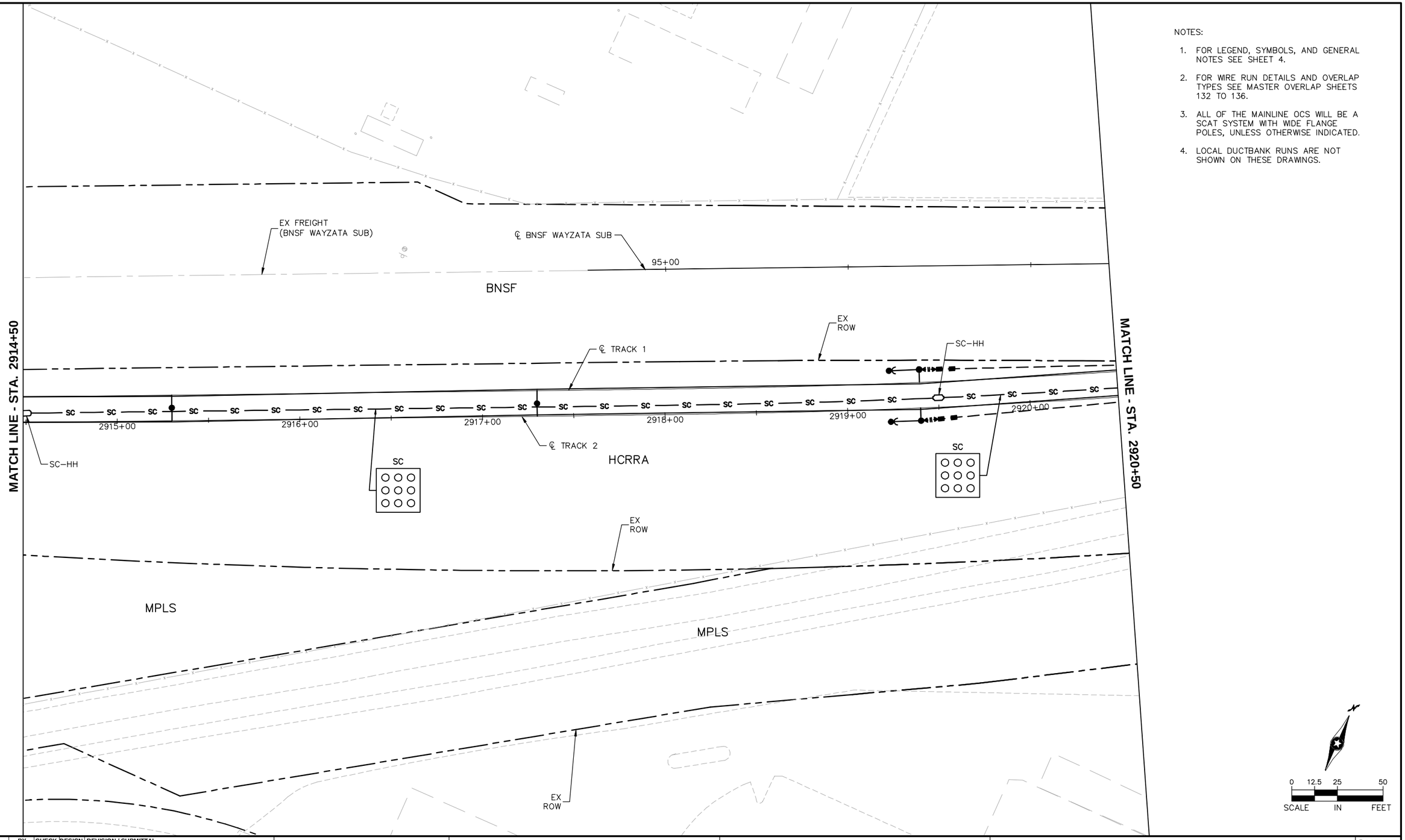
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-013

SHEET 79 OF 240

Aug. 27 2014 05:51 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2914+50 TO STA. 2920+50

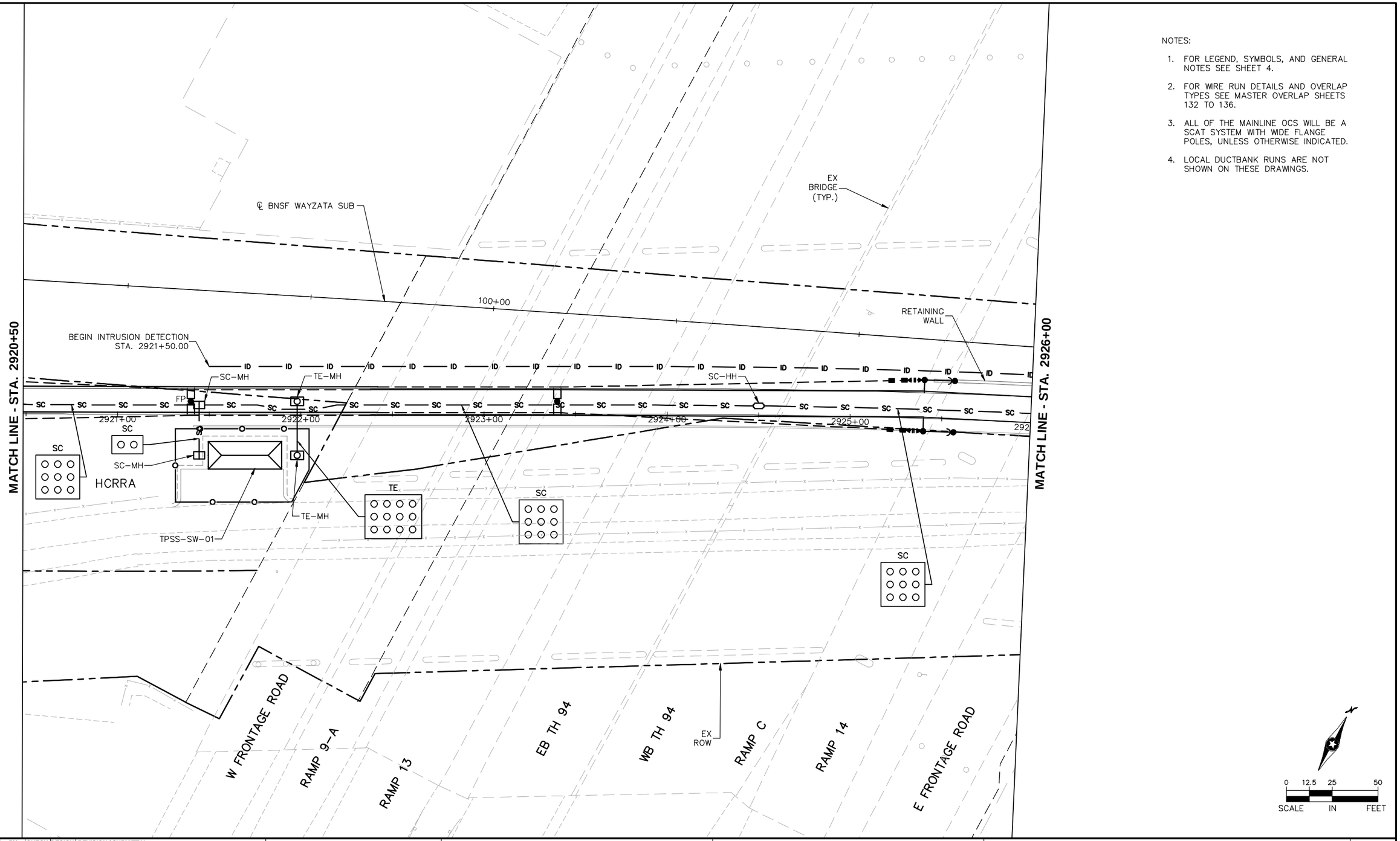
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-014

SHEET 80 OF 240

Aug, 27 2014 05:51 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2920+50 TO STA. 2926+00

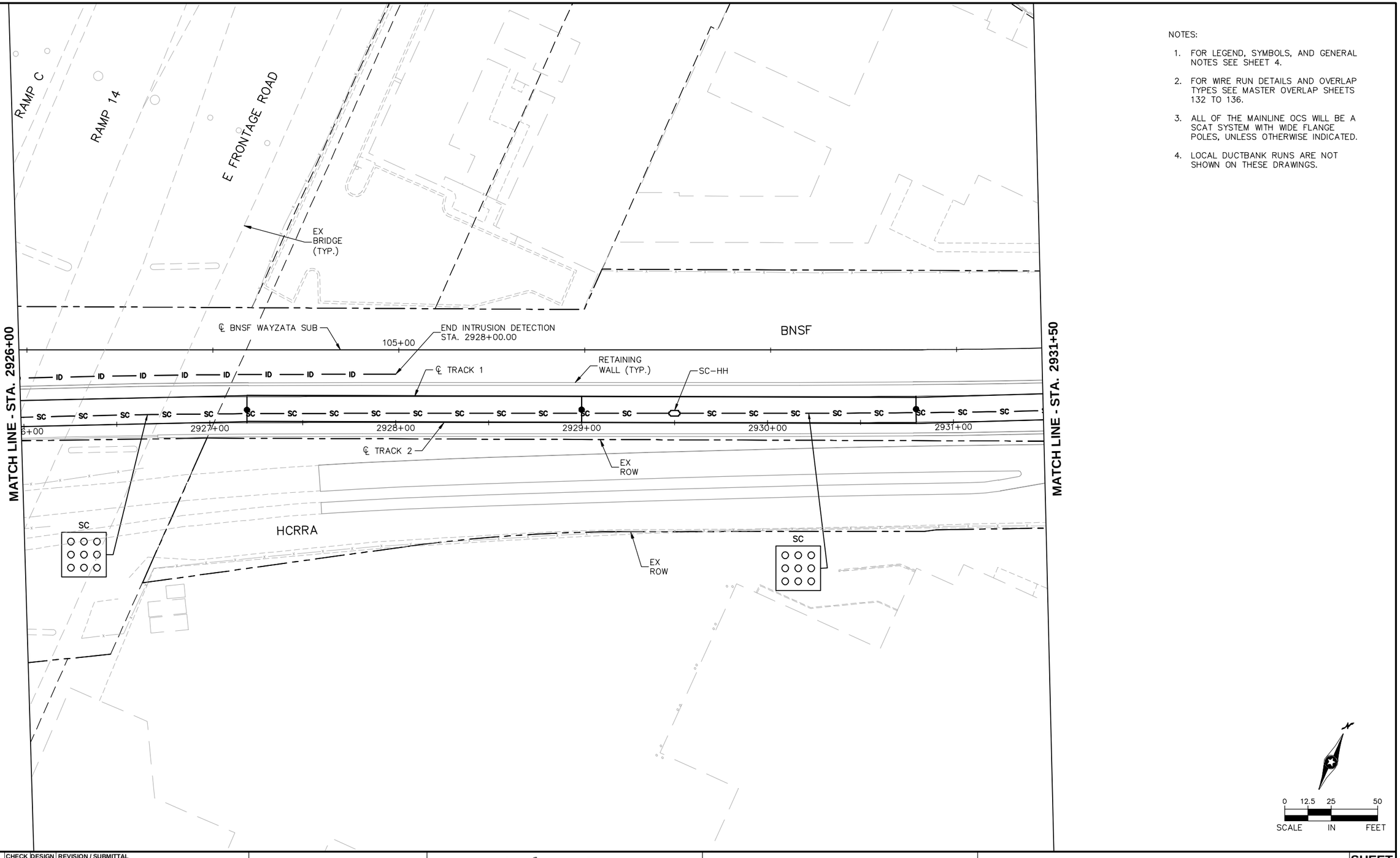
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-015

SHEET 81 OF 240

Aug, 27 2014 05:51 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2926+00 TO STA. 2931+50

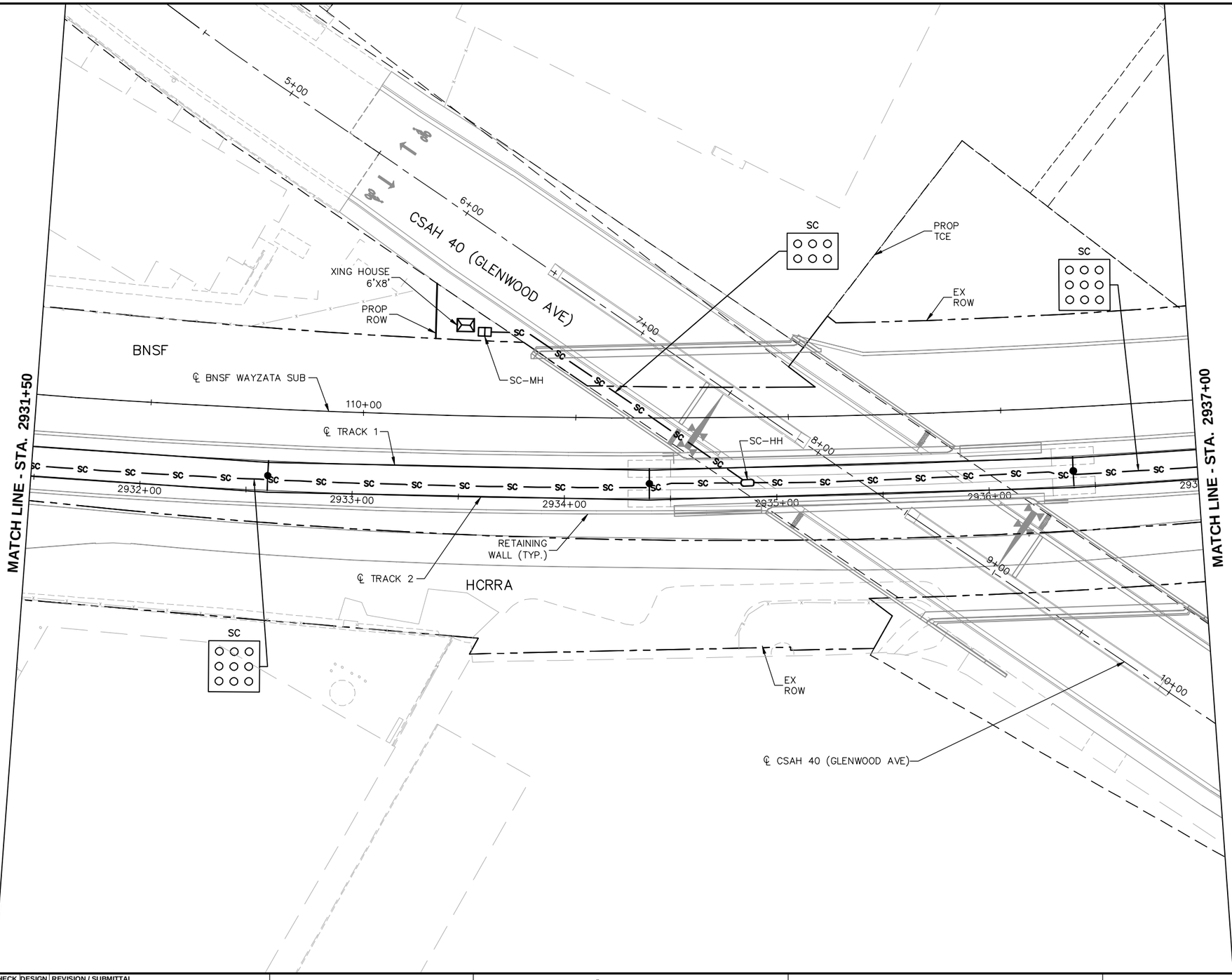
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-016

SHEET 82 OF 240

Aug. 27 2014 05:51 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CROSSING GATE PLACEMENT AND ROADWAY GEOMETRY TO BE FINALIZED IN FINAL DESIGN.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2931+50 TO STA. 2937+00

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-017

SHEET 83 OF 240

Aug. 27 2014 05:51 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.

MATCH LINE - STA. 2937+00

MATCH LINE - STA. 2943+00

℄ BNSF WAYZATA SUB

RETAINING WALL (TYP.)

℄ HOLDEN ST N

HOLDEN ST N

55+00

54+00

53+00

115+00

11+00

12+00

0+00

ROYALSTON AVE N

℄ TRACK 1

℄ TRACK 2

℄ ROYALSTON AVE N

SC

SC-MH

TP

XING HOUSE 6'X8'

PLATFORM HOUSE 10'x30'

2938+00

2939+00

2940+00

2941+00

2942+00

294

BRIDGE

BNSF

TUBULAR POLE (TYP)

HCRRA

0 12.5 25 50

SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2937+00 TO STA. 2943+00

DISCIPLINE: SYSTEMS

SHEET NAME: E4-SYS-PLN-018

SHEET 84 OF 240

Aug. 27 2014 05:51 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INIDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. CONFIGURATION OF CONDUITS TO PLATFORM COMM CABINET WILL BE DETERMINED IN FINAL DESIGN.

ROYALSTON STATION

ROYALSTON AVE N

℄ TRACK 1

℄ TRACK 2

℄ ROYALSTON AVE N

EX ROW

COMM CABINET 2'x4'

RETAINING WALL

TUBULAR POLE (TYP)

SC-MH

TP

SC

FLAG

5+00

2944+00

2945+00

2946+00

2947+00

2948+00

MATCH LINE - STA. 2943+00

MATCH LINE - STA. 2948+50

0 12.5 25 50

SCALE IN FEET

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

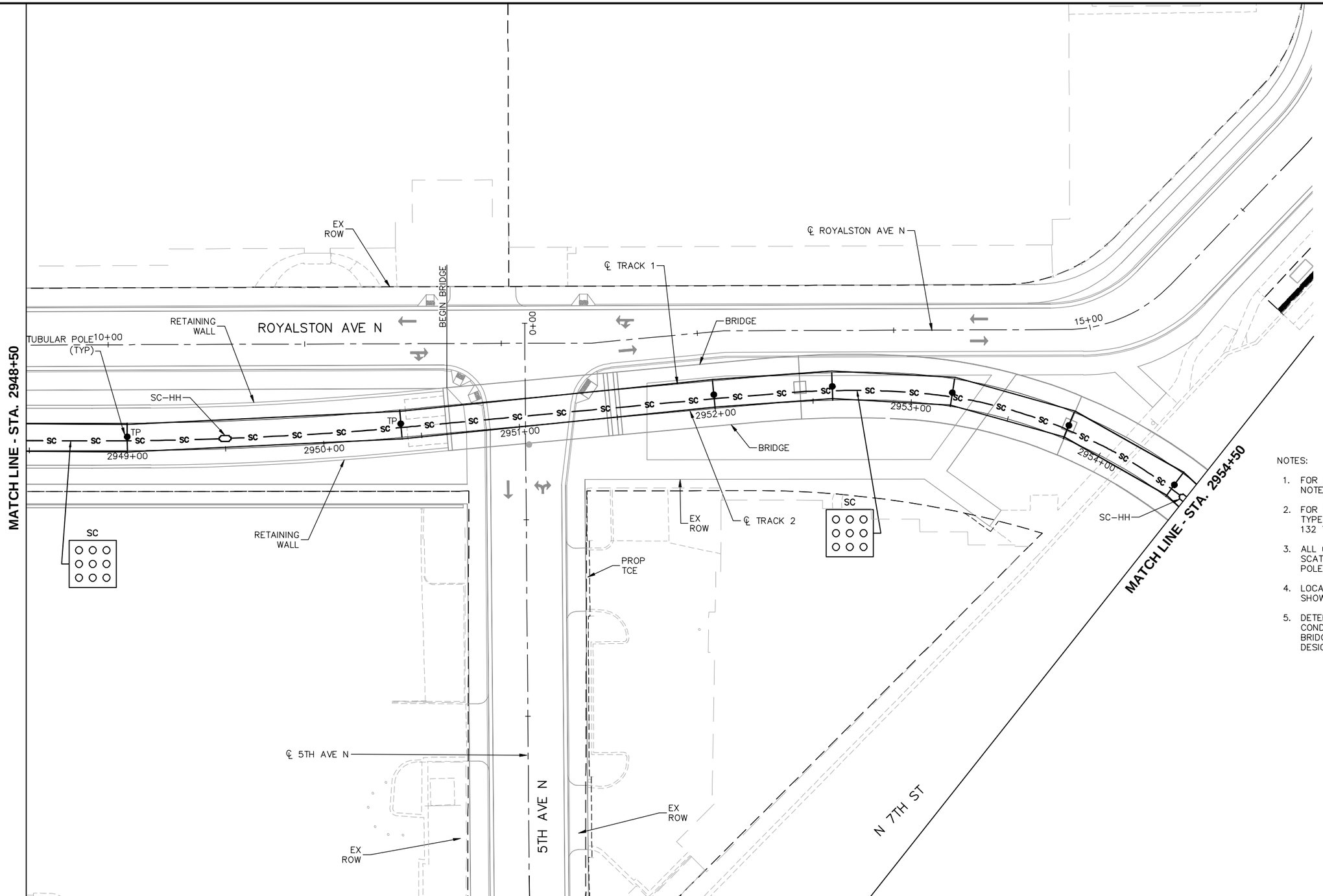
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2943+00 TO STA. 2948+50

DISCIPLINE: SYSTEMS

SHEET NAME: E4-SYS-PLN-019

SHEET 85 OF 240

Aug. 27 2014 05:51 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.
5. DETERMINATION OF LOCATION FOR CONDUIT EXPANSION FITTINGS ON BRIDGES TO BE MADE DURING FINAL DESIGN.

0 12.5 25 50
SCALE IN FEET

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

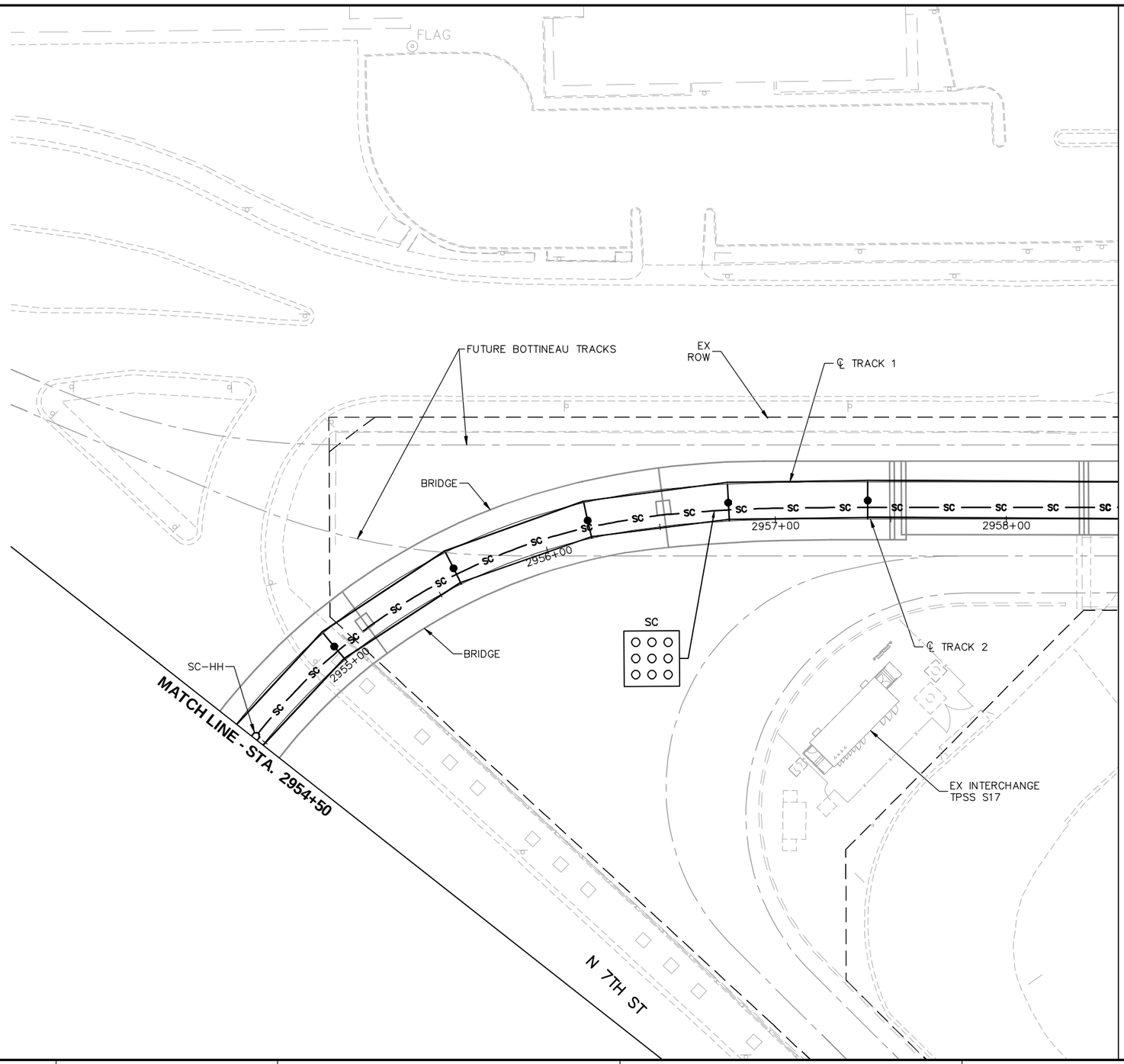
EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2948+50 TO STA. 2954+50

DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-020
SHEET 86 OF 240

Aug. 27 2014 05:52 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2954+50 TO STA. 2958+50

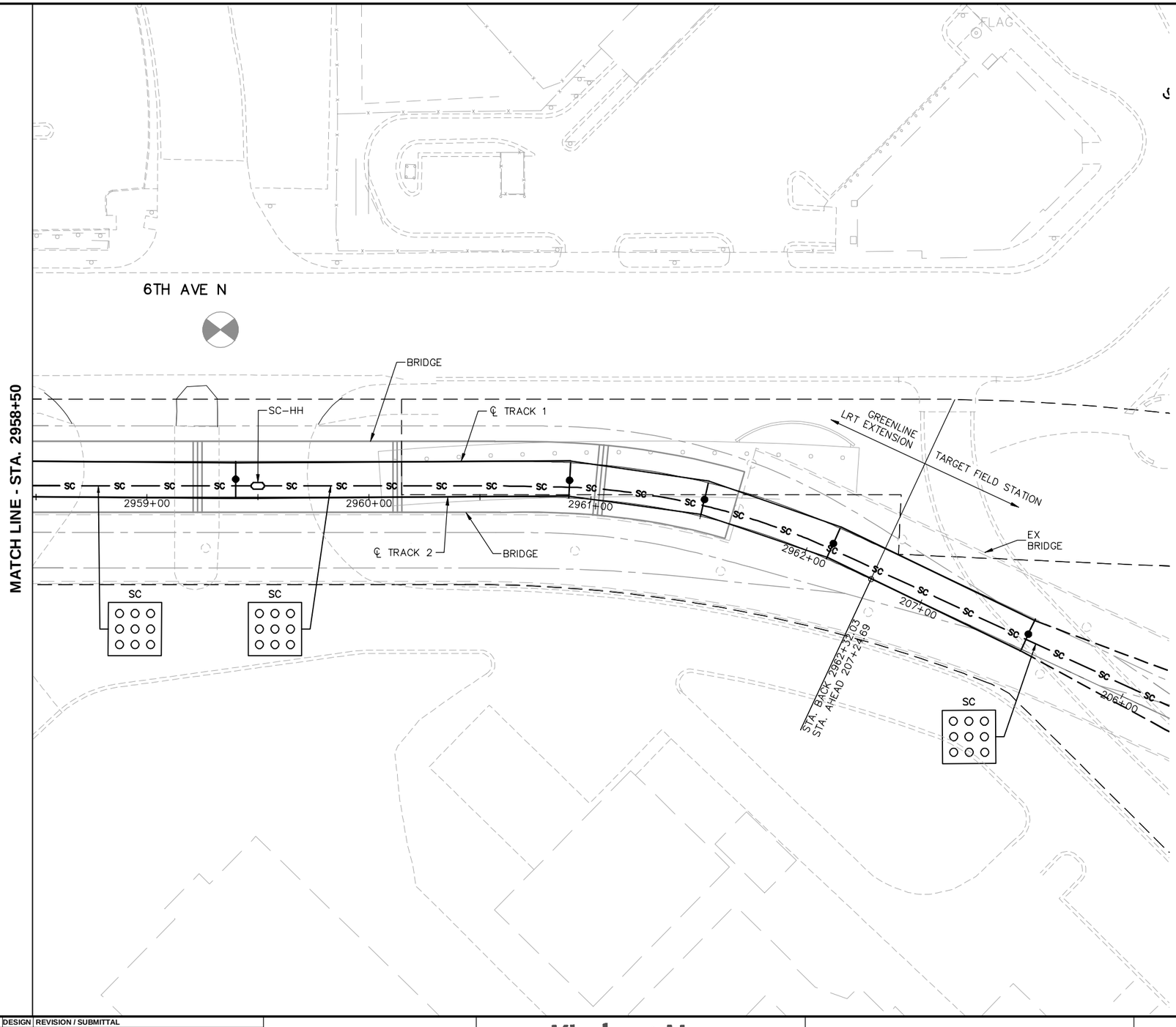
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-021

SHEET 87 OF 240

Aug, 27 2014 05:52 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft

NOTES:

1. FOR LEGEND, SYMBOLS, AND GENERAL NOTES SEE SHEET 4.
2. FOR WIRE RUN DETAILS AND OVERLAP TYPES SEE MASTER OVERLAP SHEETS 132 TO 136.
3. ALL OF THE MAINLINE OCS WILL BE A SCAT SYSTEM WITH WIDE FLANGE POLES, UNLESS OTHERWISE INDICATED.
4. LOCAL DUCTBANK RUNS ARE NOT SHOWN ON THESE DRAWINGS.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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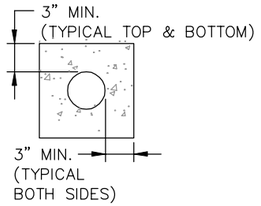
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SEGMENT E4
PLAN SHEET LAYOUTS
STA. 2958+50 TO STA. 2962+32.03

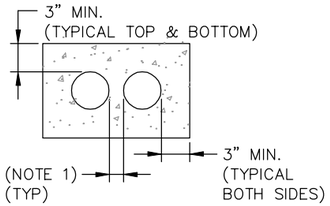
DISCIPLINE: SYSTEMS
SHEET NAME: E4-SYS-PLN-022

SHEET 88 OF 240

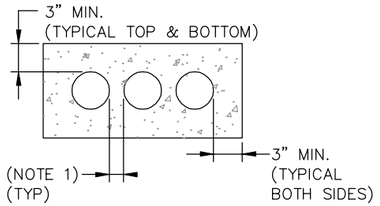
Aug. 27 2014 05:52 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E4-SYS-PLN.dwg By: curtis.neft



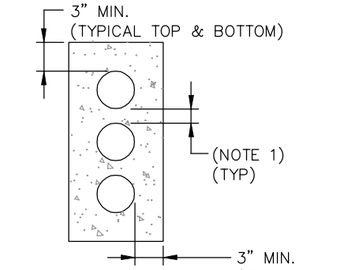
1 TYPE 1
(NOTE 2)



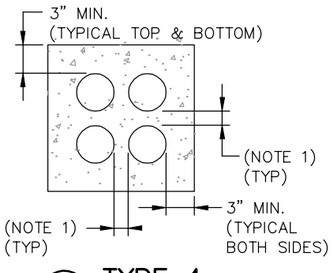
2 TYPE 2
(NOTE 2)



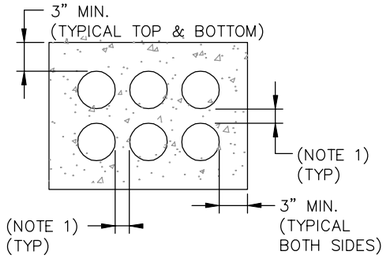
3 TYPE 3
(NOTE 2)



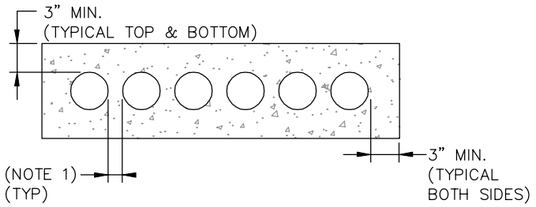
3V TYPE 3V
(NOTE 2)



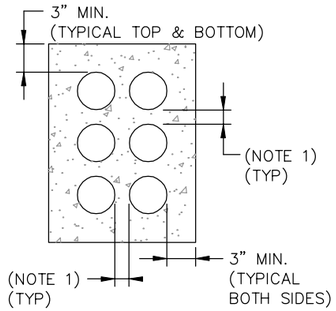
4 TYPE 4
(NOTE 2)



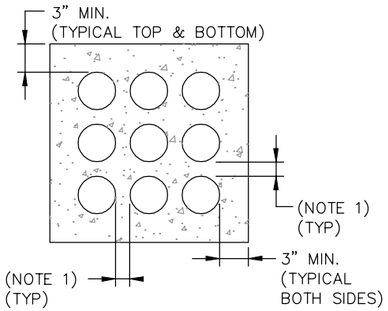
6 TYPE 6
(NOTE 2)



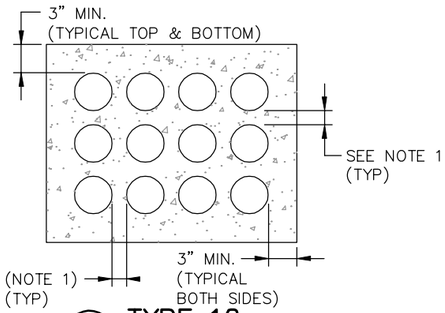
3 TYPE 6H
(NOTE 2)



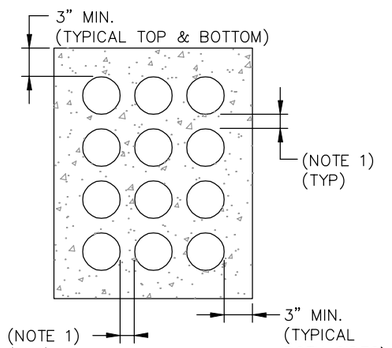
6V TYPE 6V
(NOTE 2)



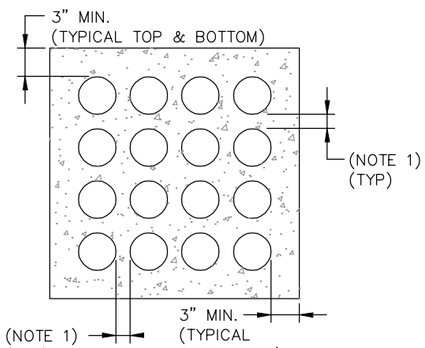
9 TYPE 9
(NOTE 2)



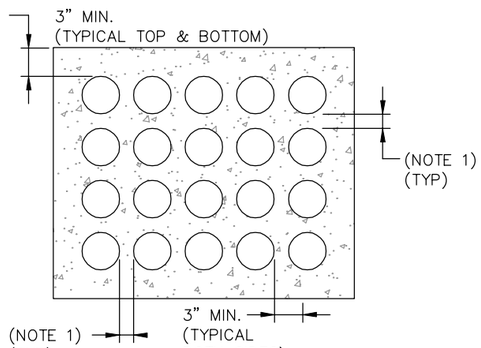
12 TYPE 12
(NOTE 2)



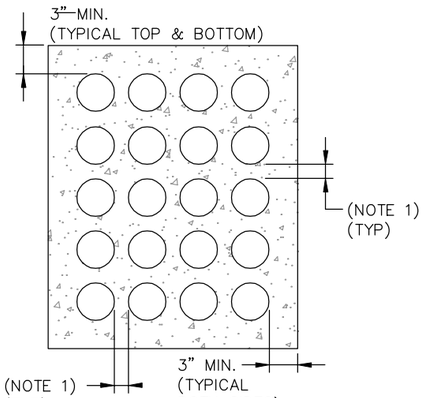
12V TYPE 12V
(NOTE 2)



16 TYPE 16
(NOTE 2)



20 TYPE 20
(NOTE 2)



20 TYPE 20V
(NOTE 2)

NOTES:

1. USE PVC ELECTRICAL CONDUIT SPACERS TO MAINTAIN A SPACING OF 1 1/2" CLEAR BETWEEN CONDUITS FOR SIGNAL/ COMMUNICATION AND LV DUCTBANKS. FOR TRACTION ELECTRIFICATION AND HV DUCTBANKS MAINTAIN A SPACING OF 3" CLEAR BETWEEN CONDUITS

2. DUCTBANK EXAMPLE:

   TYPE (2), INDICATES NUMBER OF CONDUITS AND THE CONDUIT SIZES VARY

   (V) INDICATES VERTICAL CONFIGURATION

TYPICAL DUCTBANK SECTIONS

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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Gannett Fleming
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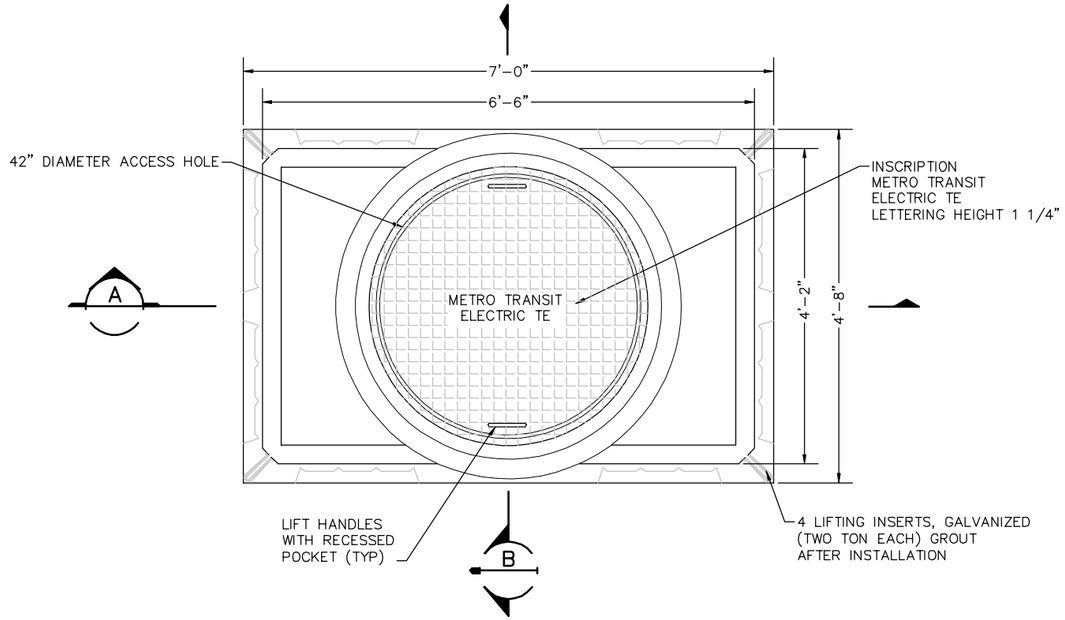
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SYSTEMWIDE ELECTRICAL
DETAILS & TECHNICAL SHEETS
DUCTBANK SECTIONS

DISCIPLINE: SYSTEMS
SHEET NAME: SWE-DTL-001

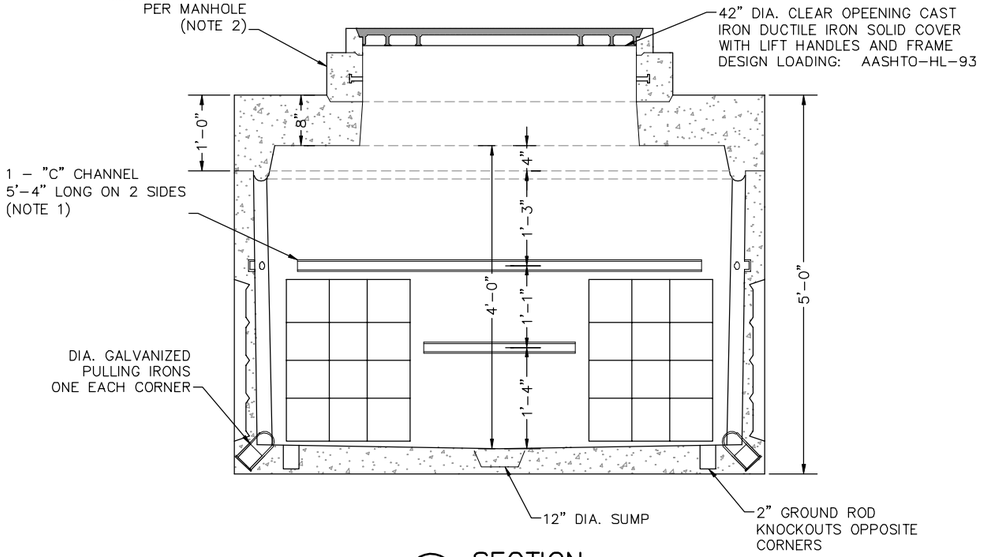
SHEET 89 OF 240



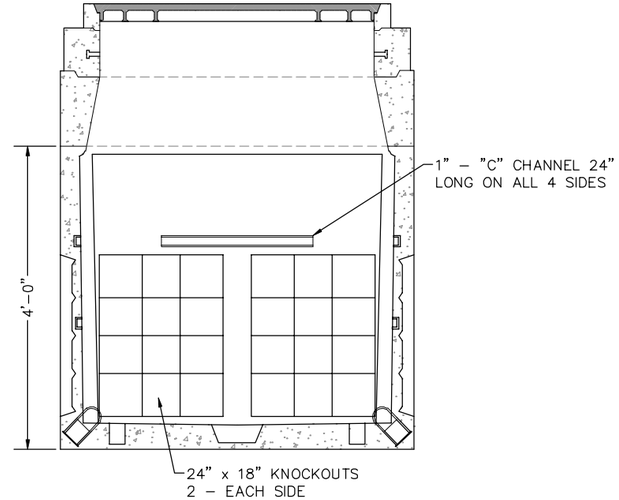
1 TE MANHOLE PLAN
NTS

NOTES:

1. INSTALL SIX CABLE RACKS WITH TWELVE INSULATORS PER MANHOLE.
2. USE ROUND ACCESS RISERS (30" MAX) TO ACHIEVE FINAL ELEVATION.



A SECTION
SCALE: NTS



B SECTION
SCALE: NTS

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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Gannett Fleming
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SYSTEMWIDE ELECTRICAL
DETAILS & TECHNICAL SHEETS
MANHOLE DETAILS - TE

DISCIPLINE: SYSTEMS
SHEET NAME: SWE-DTL-002

SHEET 90 OF 240

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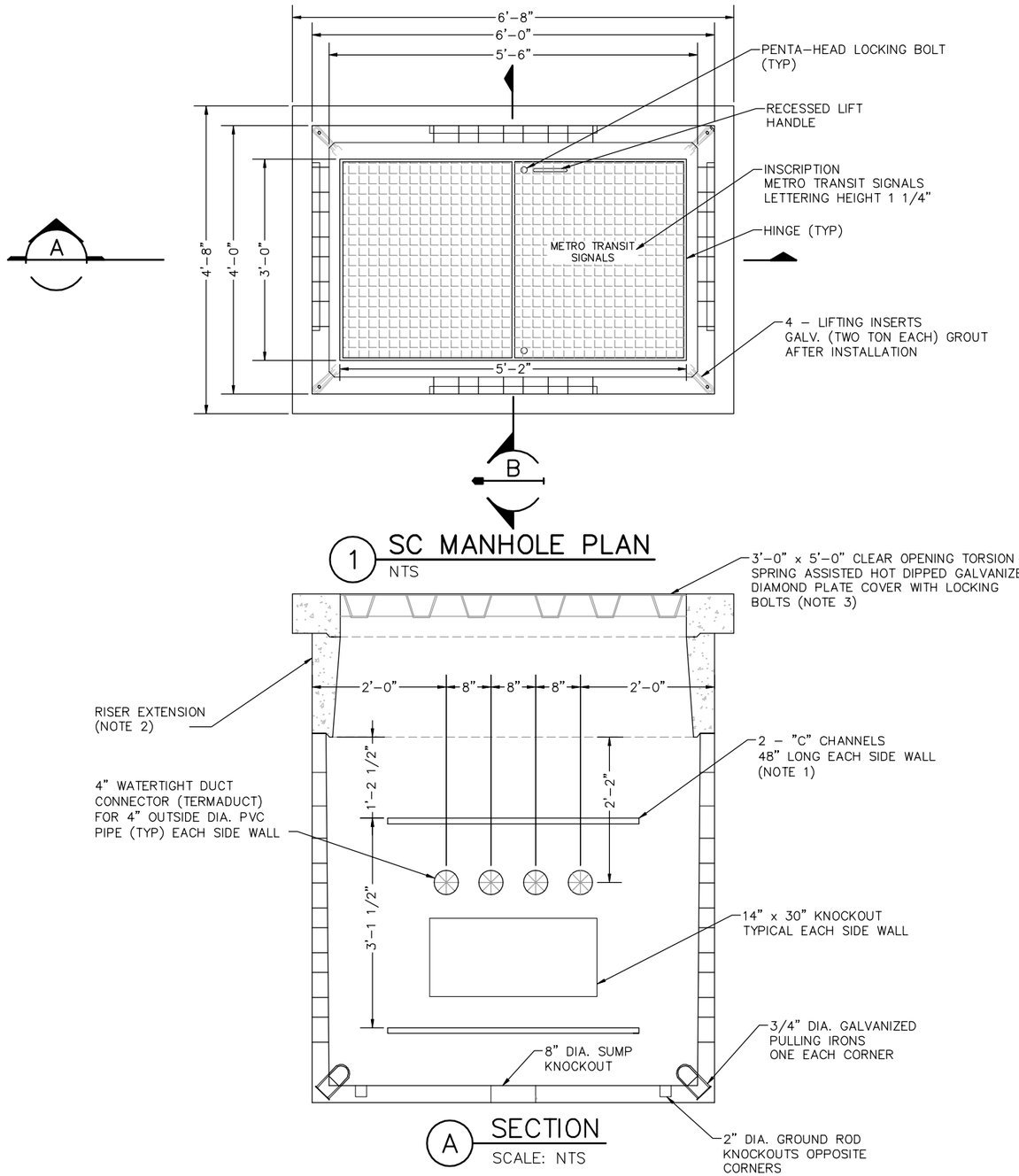
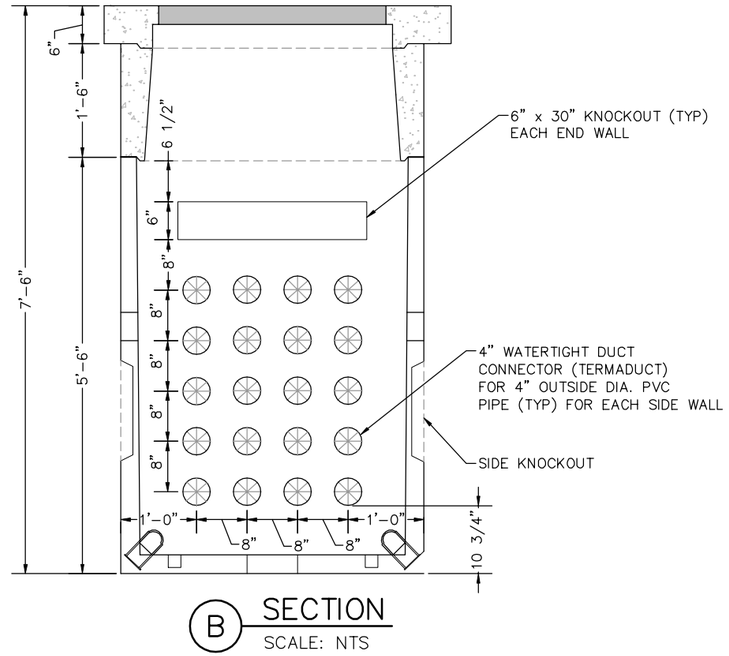


1 SC MANHOLE PLAN
NTS

A SECTION
SCALE: NTS

NOTES:

1. INSTALL EIGHT CABLE RACKS WITH SIXTEEN INSULATORS PER MANHOLE.
2. USE RISER EXTENSIONS TO ACHIEVE FINAL ELEVATION.
3. COVERS SHALL BE DESIGNED TO WITHSTAND AASHTO HL-93 WHEEL LOADINGS, SUITABLE FOR USE IN OFF STREET LOCATIONS.



B SECTION
SCALE: NTS

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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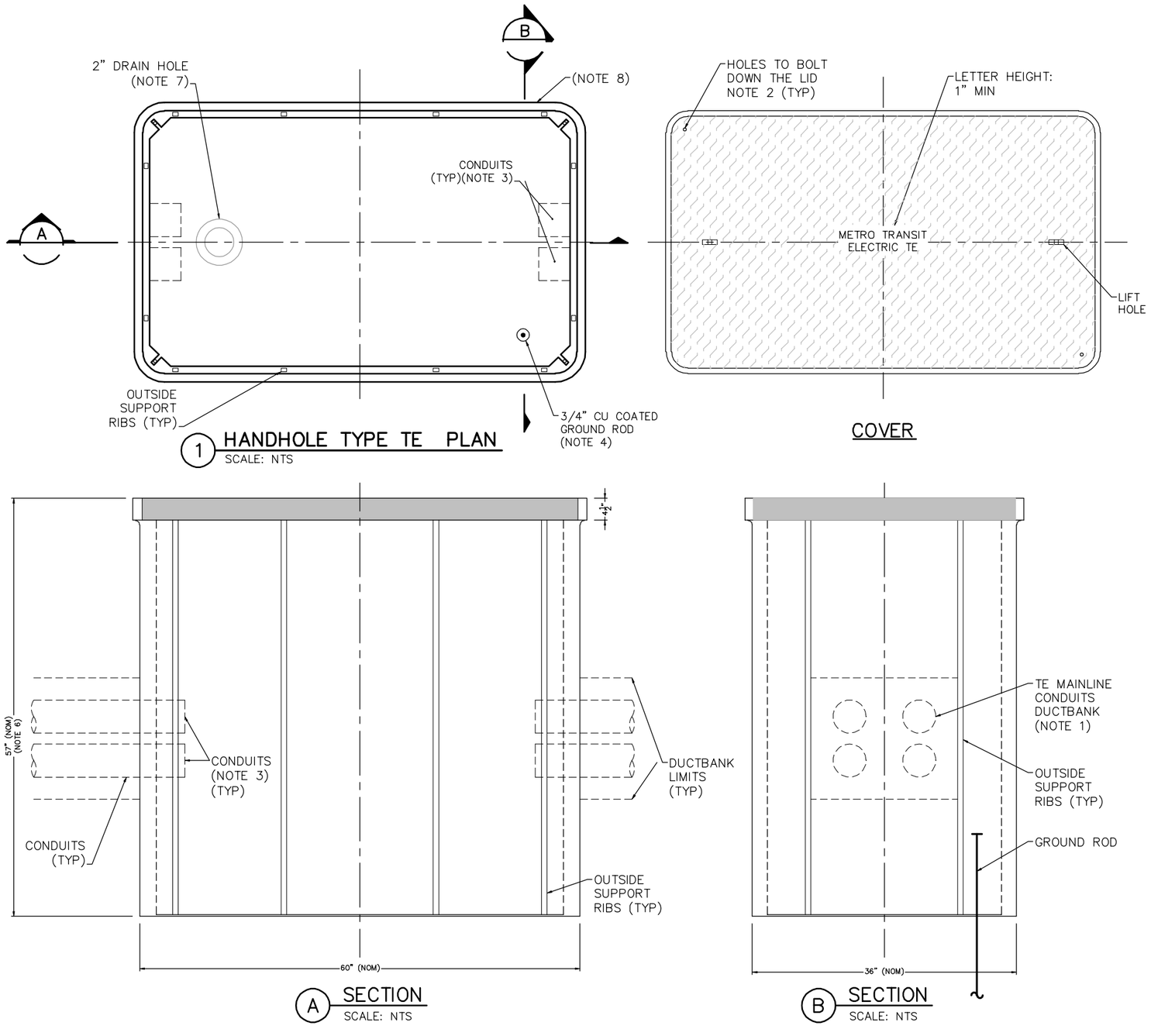
Gannett Fleming
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SYSTEMWIDE ELECTRICAL
DETAILS & TECHNICAL SHEETS
MANHOLE DETAILS - SC

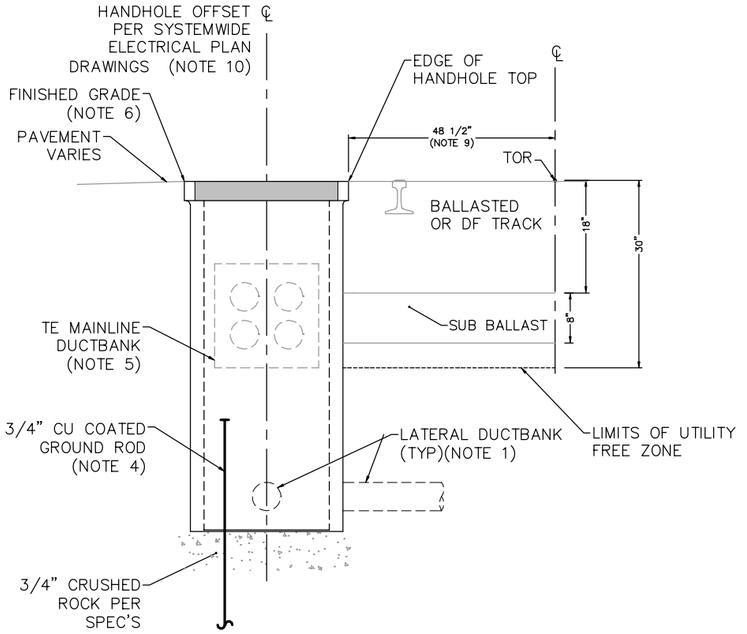
DISCIPLINE: SYSTEMS
SHEET NAME: SWE-DTL-003

SHEET 91 OF 240



1 HANDHOLE TYPE TE PLAN
SCALE: NTS

COVER



2 HANDHOLE TYPE TE TYPICAL INSTALLATION
SCALE: NTS

A SECTION
SCALE: NTS

B SECTION
SCALE: NTS

NOTES:

1. CONDUITS SHOWN ARE FOR EXAMPLE ONLY. ADDITIONAL CONDUITS MAY BE REQUIRED AS SHOWN ON THE PLAN SHEETS.
2. SEE SPECIFICATIONS REGARDING HOLD–DOWN BOLTS FOR COVERS.
3. CONDUITS SHALL EXTEND INTO THE HANDHOLE A MAXIMUM OF 1" FROM THE INSIDE WALL.
4. INSTALL GROUND ROD CAUTIOUSLY TO AVOID DAMAGE TO POSSIBLE UTILITY INSTALLATIONS.
5. ADJUST CONDUIT ENTRY INTO THE HANDHOLE TO CREATE POSITIVE CONDUIT DRAINAGE AND TO ENTER CENTER OF HANDHOLE.
6. ADJUST DEPTH OF HANDHOLE TO ASSURE THAT COVER IS FLUSH WITH FINISHED GRADE. FOR LOCATIONS ON BRIDGES AND LAND BRIDGES TOP OF HANDHOLE IS TO BE AT THE SAME ELEVATION AS TOP OF RAIL.
7. LOCATE DRAIN HOLE ON LOWER END OF HANDHOLE AND PROVIDE STAINLESS STEEL SNAP–IN TYPE GRATE.
8. HANDHOLE MANUFACTURER IS SYNERTECH, MODEL NO. S3660C60FA OR APPROVED EQUAL.
9. SPECIAL HANDHOLE TYPES MAY BE REQUIRED AT SOME LOCATIONS.
10. HANDHOLE OFFSET DIMENSION IS APPROXIMATE. FINAL PLACEMENT OF HANDHOLE SHALL ASSURE THAT HANDHOLE TOP DOES NOT CONFLICT WITH TRACK CONSTRUCTION.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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Gannett Fleming
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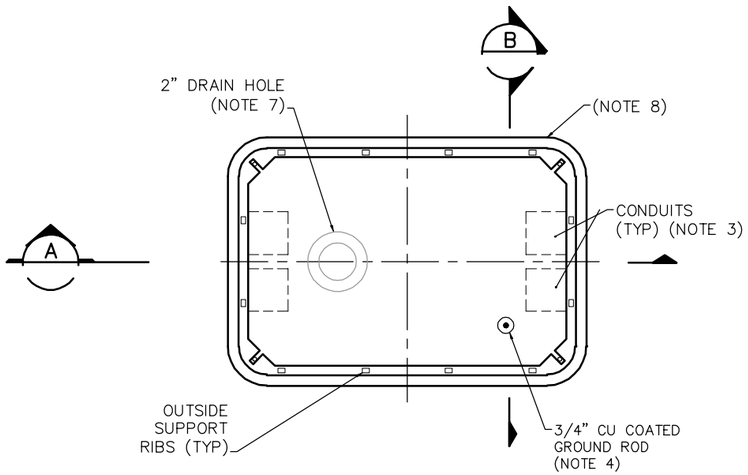
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SYSTEMWIDE ELECTRICAL
DETAILS & TECHNICAL SHEETS
HANDHOLE DETAILS - TE

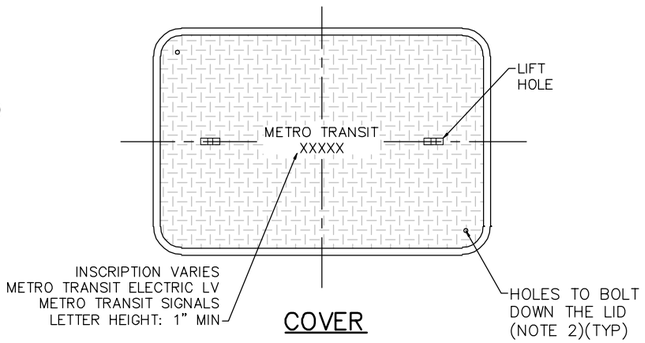
DISCIPLINE: SYSTEMS
SHEET NAME: SWE-DTL-004

SHEET 92 OF 240

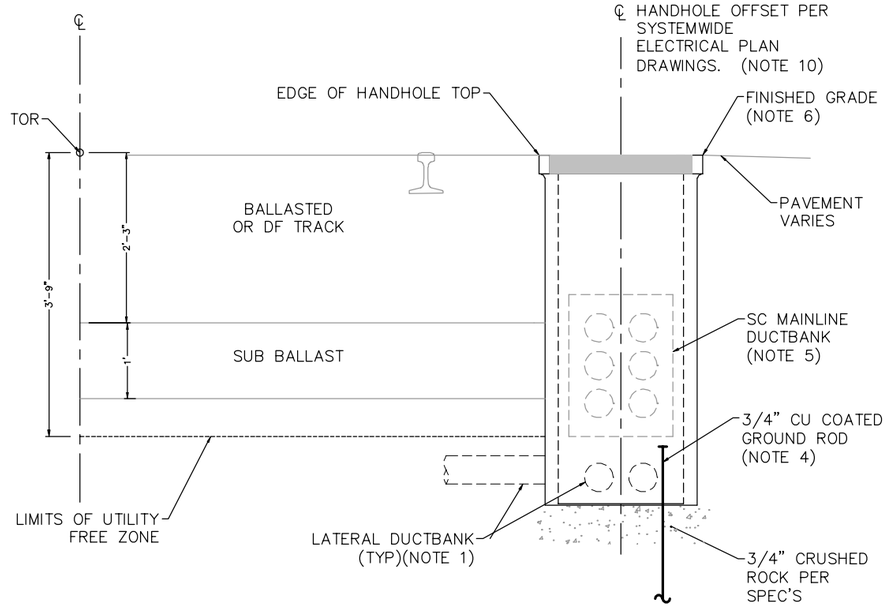
Aug. 27 2014 05:02 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-SWE-DTL.dwg By: curtis.neft



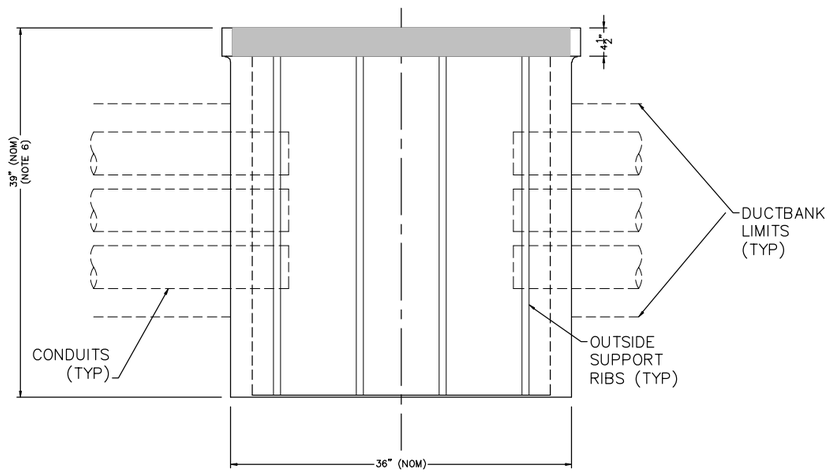
1 HANDHOLE TYPE SC PLAN
SCALE: NTS



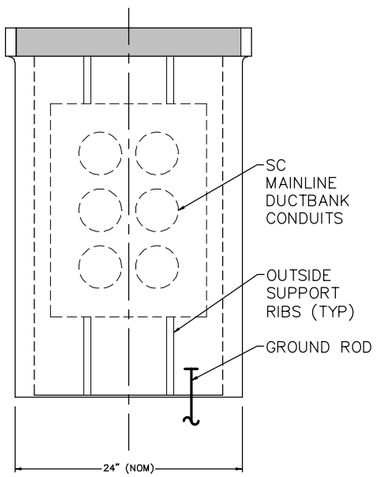
COVER



2 HANDHOLE TYPE SC INSTALLATION
SCALE: NTS



A SECTION
SCALE: NTS



B SECTION
SCALE: NTS

NOTES:

1. CONDUITS SHOWN ARE FOR EXAMPLE ONLY. ADDITIONAL CONDUITS MAY BE REQUIRED AS SHOWN ON THE PLAN SHEETS.
2. SEE SPECIFICATIONS REGARDING HOLD–DOWN BOLTS FOR COVERS.
3. CONDUITS SHALL EXTEND INTO THE HANDHOLE A MAXIMUM OF 1" FROM THE INSIDE WALL AND TERMINATE WITH BELL END FITTINGS.
4. INSTALL GROUND ROD CAUTIOUSLY TO AVOID DAMAGE TO POSSIBLE UTILITY INSTALLATIONS.
5. ADJUST CONDUIT ENTRY INTO THE HANDHOLE TO CREATE POSITIVE CONDUIT DRAINAGE AND TO ENTER CENTER OF HANDHOLE.
6. ADJUST DEPTH OF HANDHOLE TO ASSURE THAT COVER IS FLUSH WITH FINISHED GRADE. FOR LOCATIONS ON BRIDGES AND LAND BRIDGES TOP OF HANDHOLE IS TO BE AT THE SAME ELEVATION AS TOP OF RAIL.
7. LOCATE DRAIN HOLE ON LOWER END OF HANDHOLE AND PROVIDE STAINLESS STEEL SNAP–IN TYPE GRATE.
8. HANDHOLE MANUFACTURER IS SYNERTECH, MODEL NO. S2436C42FA OR APPROVED EQUAL.
9. SPECIAL HANDHOLE TYPES MAY BE REQUIRED FOR SOME LAYOUTS.
10. HANDHOLE OFFSET DIMENSION IS APPROXIMATE. FINAL PLACEMENT OF HANDHOLE SHALL ASSURE THAT HANDHOLE TOP DOES NOT CONFLICT WITH TRACK CONSTRUCTION.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SYSTEMWIDE ELECTRICAL
DETAILS & TECHNICAL SHEETS
HANDHOLE DETAILS - SC

DISCIPLINE: SYSTEMS

SHEET NAME: SWE-DTL-005

SHEET 93 OF 240

RECTIFIER TRANSFORMER

POWER TRANSFORMER

SECONDARY GROUNDED NEUTRAL (Y)

VOLTAGE TRANSFORMER

100/5
3
CURRENT TRANSFORMER
CURRENT RATIO
QUANTITY OF TRANSFORMERS

DELTA TRANSFORMER CONNECTION

WYE TRANSFORMER CONNECTION

TEST SWITCH

OR
RECTIFIER

FUSE

INDICATING FUSE

REMOVABLE FUSE

OR
CIRCUIT BREAKER, DRAWOUT

CIRCUIT BREAKER, FIXED MOUNTED

76
DC CIRCUIT BREAKER, WITH DIRECT ACTING OVERCURRENT TRIP

LIMIT DEVICE – NORMALLY OPEN CONTACT

MOMENTARY NORMALLY OPEN
PUSH BUTTON CONTACT

MOMENTARY NORMALLY CLOSED PUSH BUTTON
CONTACT WITH LOCK–OUT DEVICE

C
CONTACTOR COIL

INDICATING LIGHT

ELECTRO–MECHANICAL SOLENOID INTERLOCK

NORMALLY OPEN CONTACT

NORMALLY CLOSED CONTACT

SHUNT

REMOVABLE LINK

or
SA
SURGE ARRESTER

DIRECTION OF CONTROL OR
RELAY INFLUENCE LINE

CONCEALED/BURIED CONDUIT OR DUCTBANK

FUTURE OMF TRACKS

4–4"
INDICATES DUCTBANK OF (4) 4" CONDUITS

A
AUXILIARY POWER SUPPLY

POWER DISTRIBUTION BLOCK

KWHR
KILOWATT HOUR METER

VT
VOLTAGE TRANSDUCER

VS
VOLTAGE SWITCH

AS
AMMETER SWITCH

MS
MICROSWITCH

M
MOTORIZED

V
VOLTMETER

A
AMMETER

PM
POWER METER

I
INTERLOCK

K#
KIRK KEY INTERLOCK

E
ELECTRICAL INTERLOCK

SC
SCADA

R2G
RAIL TO GROUND

ETS PUSH BUTTON

Z
IMPEDANCE BOND

INSULATED RAIL JOINT

OCS SECTION INSULATOR

OCS INSULATED OVERLAP

PASSENGER STATION

A
ANNUNCIATOR

NO
NORMALLY OPEN
DISCONNECT SWITCH

NC
NORMALLY CLOSED
DISCONNECT SWITCH

OCS
OMF OCS DISCONNECT SWITCH
AND CONTACTOR

OCS
OMF GROUNDING OCS
DISCONNECT SWITCH
AND CONTACTOR

APS
OMF APS DISCONNECT SWITCH,
PLUG, AND CONTACTOR

SH
OMF SWITCH HEATER PANEL

OMF CONTACT WIRE ALIVE
INDICATOR LIGHT

F
OMF FALL GATE
PROXIMITY DETECTOR

GROUNDING:

GROUND ROD

LYNCOLE XIT GROUND ROD

COILED PIGTAIL FOR CONNECTION

GROUND

BARE COPPER CABLE

GROUND MAT OR EARTH

GROUND CABLE "SPLICE" CONNECTION (EXOTHERMIC)

GROUND CABLE "CROSS" CONNECTION (EXOTHERMIC)

GROUND CABLE CONNECTION TO REBAR IN FOUNDATION

GROUND CABLE "TEE" CONNECTION (EXOTHERMIC)

52 3
DEVICE WITH ANSI FUNCTION/NUMBER
QUANTITY SHOWN OUTSIDE DEVICE CIRCLE

5	EMERGENCY TRIP STATION
26R1	RECTIFIER OVERTEMP ALARM (1ST. STAGE)
26R2	RECTIFIER OVERTEMP ALARM (2ND. STAGE)
27	AC UNDERVOLTAGE RELAY
32	REVERSE POWER RELAY
33A	AC EQUIPMENT REAR DOOR OPEN
33D	DC EQUIPMENT REAR DOOR OPEN
33N	NEGATIVE CUBICLE DOOR SWITCH
33R	RECTIFIER DOOR SWITCH
33T	TRANSFORMER DOOR SWITCH
47	PHASE SEQUENCE RELAY
49T1	TRANSFORMER OVERTEMP ALARM (1ST STAGE)
49T2	TRANSFORMER OVERTEMP TRIP (2ND STAGE)
50	PHASE INSTANTANEOUS TIME OVER CURRENT RELAY
50N	GROUND INSTANTANEOUS TIME OVER CURRENT RELAY
51	PHASE TIME DELAY OVER CURRENT RELAY
51N	GROUND TIME DELAY OVER CURRENT RELAY
52	AC CIRCUIT BREAKER
59	AC OVER VOLTAGE RELAY
64HS	FRAME FAULT HOT STRUCTURE MONITORING RELAY
64GS	FRAME FAULT GROUNDED STRUCTURE MONITORING RELAY
64V	RAIL TO GROUND VOLTAGE RELAY
72/172	DC CIRCUIT BREAKERS
76/176	DC DIRECT ACTING OVERCURRENT TRIP DEVICE
85	TRANSFER TRIP RELAY
85L	TRANSFER TRIP RELAY(LOCKOUT)
86	AC LOCKOUT RELAY
89N	NEGATIVE DISCONNECT SWITCH
98R1	RECTIFIER DIODE FAILURE ALARM (1ST STAGE)
98R2	RECTIFIER DIODE FAILURE ALARM (2ND STAGE)
127	DC FEEDER UNDERVOLTAGE RELAY
127A	LOSS OF AC CONTROL VOLTAGE
127B	LOSS OF DC CONTROL VOLTAGE
127C	BATTERY UNDERVOLTAGE
150	DC RATE OF RISE AND OVERCURRENT RELAY
159	DC OVER VOLTAGE RELAY
159A	125 VDC CONTROL VOLTAGE SHORTED WITH 750VDC
182	DC LOAD MEASUREMENT AND RECLOSING RELAY
186	DC LOCKOUT RELAY
SDR	SMOKE DETECTOR RELAY

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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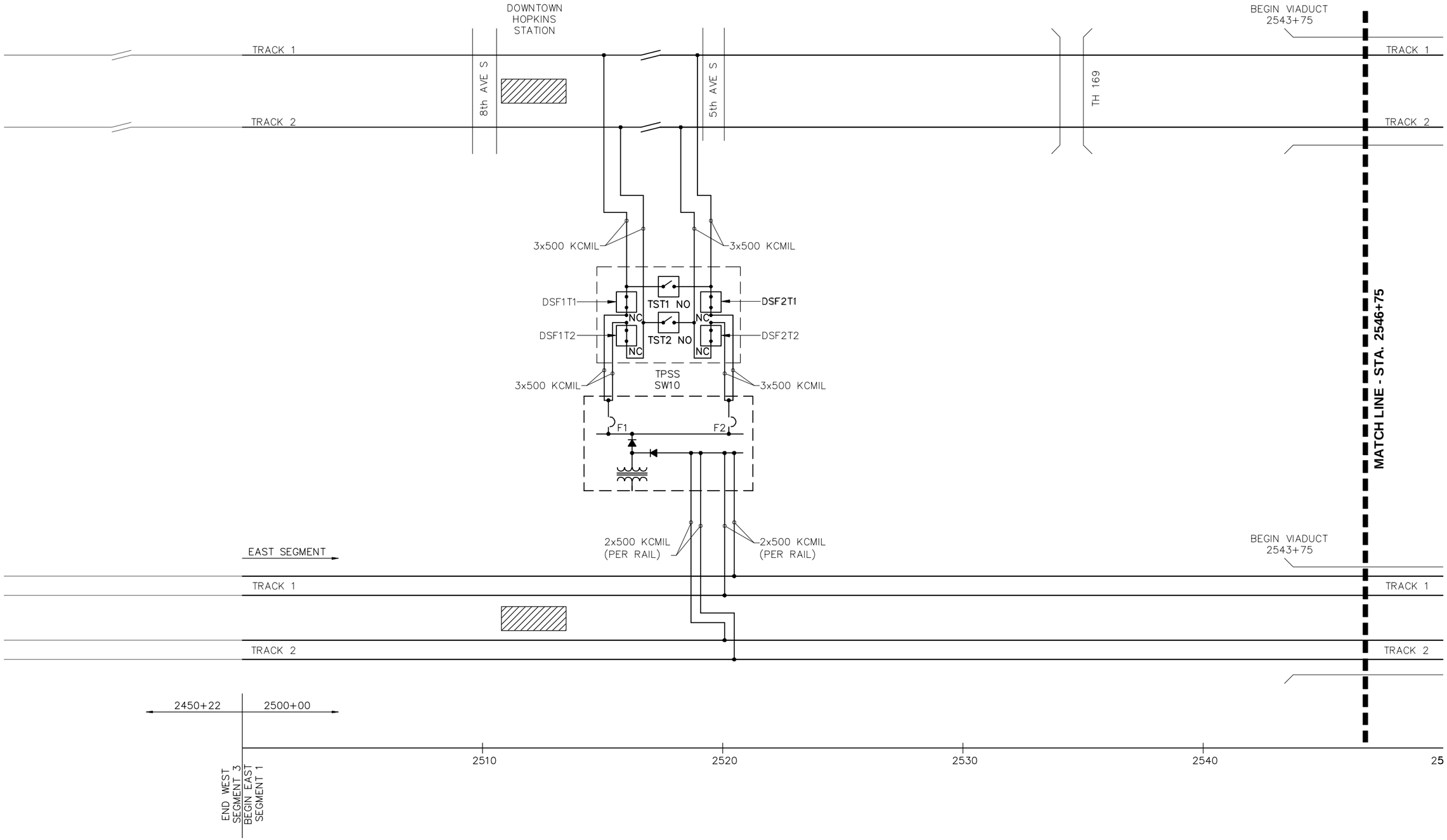
Gannett Fleming
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
GENERAL
SYMBOLS, LEGEND AND GENERAL NOTES

DISCIPLINE: SYSTEMS
SHEET NAME: TPS-GEN-001

SHEET 94 OF 240



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SECTIONALIZING DIAGRAM
STA. 2500+00 TO STA. 2546+75

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-001

SHEET 95 OF 240

Aug. 27 2014 05:04 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft

END VIADUCT
2560+95

BLAKE
STATION

BLAKE RD

CREEK

TRACK 1

TRACK 2

MATCH LINE - STA. 2546+75

3x500 KCMIL

3x500 KCMIL

DSF1T1

TST1 NO

DSF2T1

NC

NC

DSF1T2

TST2 NO

DSF2T2

NC

NC

3x500
KCMIL

TPSS
SW09

3x500 KCMIL

F1

F2

2x500 KCMIL
(PER RAIL)

2x500 KCMIL
(PER RAIL)

END VIADUCT
2560+95

TRACK 1

TRACK 2

2550

2560

2570

2580

2590

2600

2592+47.46

2595+00.00

STATION
EQUATION

2597
SEGMENT 1
SEGMENT 2

3x500 KCMIL

3x500 KCMIL

DSF1T1

TST1 NO

DSF2T1

NC

NC

DSF1T2

TST2 NO

DSF2T2

NC

NC

3x500 KCMIL

TPSS
SW08

3x500 KCMIL

F1

F2

2x500 KCMIL
(PER RAIL)

2x500 KCMIL
(PER RAIL)

MATCH LINE - STA. 2609+25

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METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

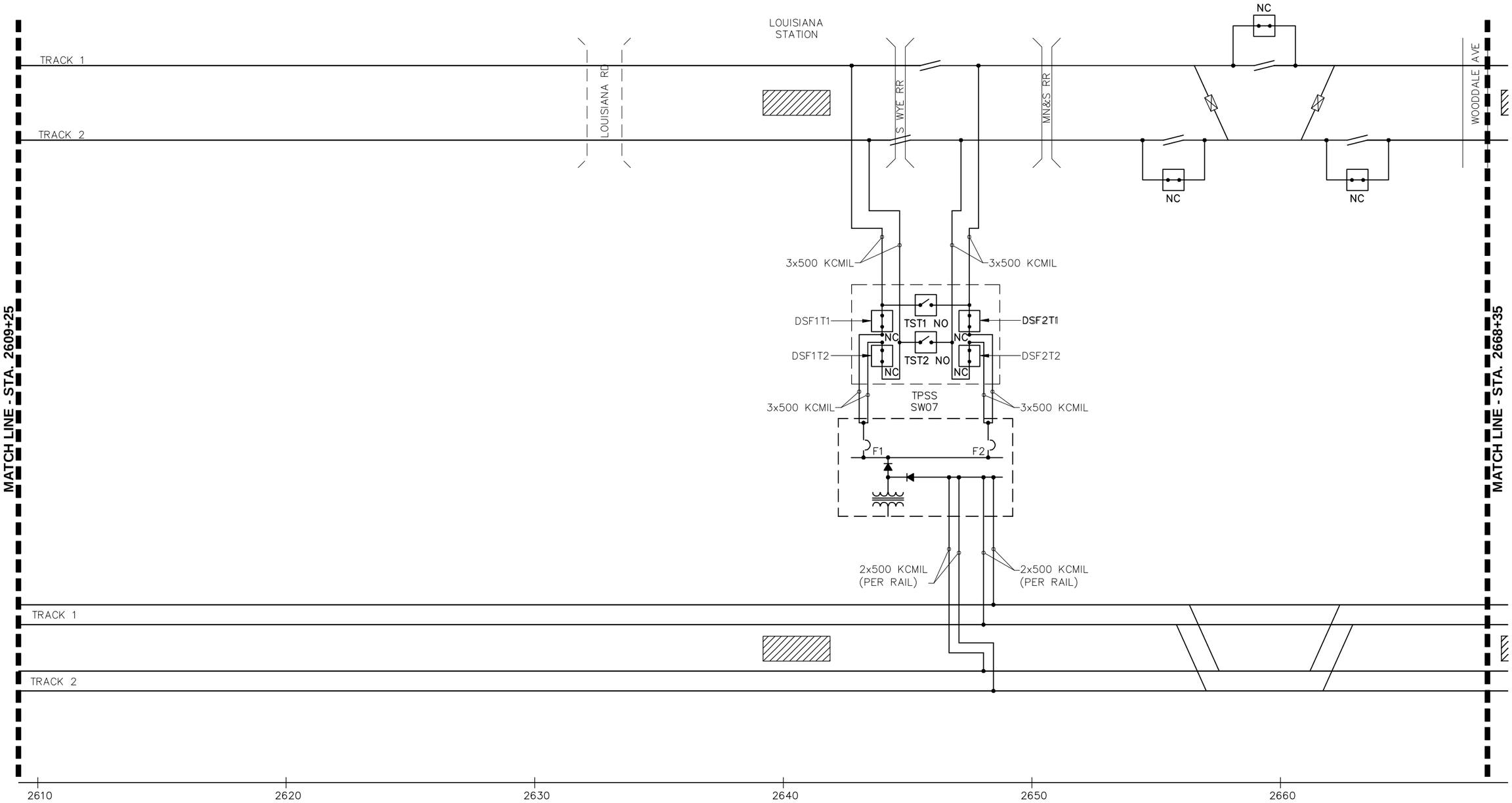
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SECTIONALIZING DIAGRAM
STA. 2546+75 TO STA. 2609+25

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-002

SHEET 96 OF 240

Aug, 27 2014 05:04 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-TPS-SCD.dwg By: curtis.neft



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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

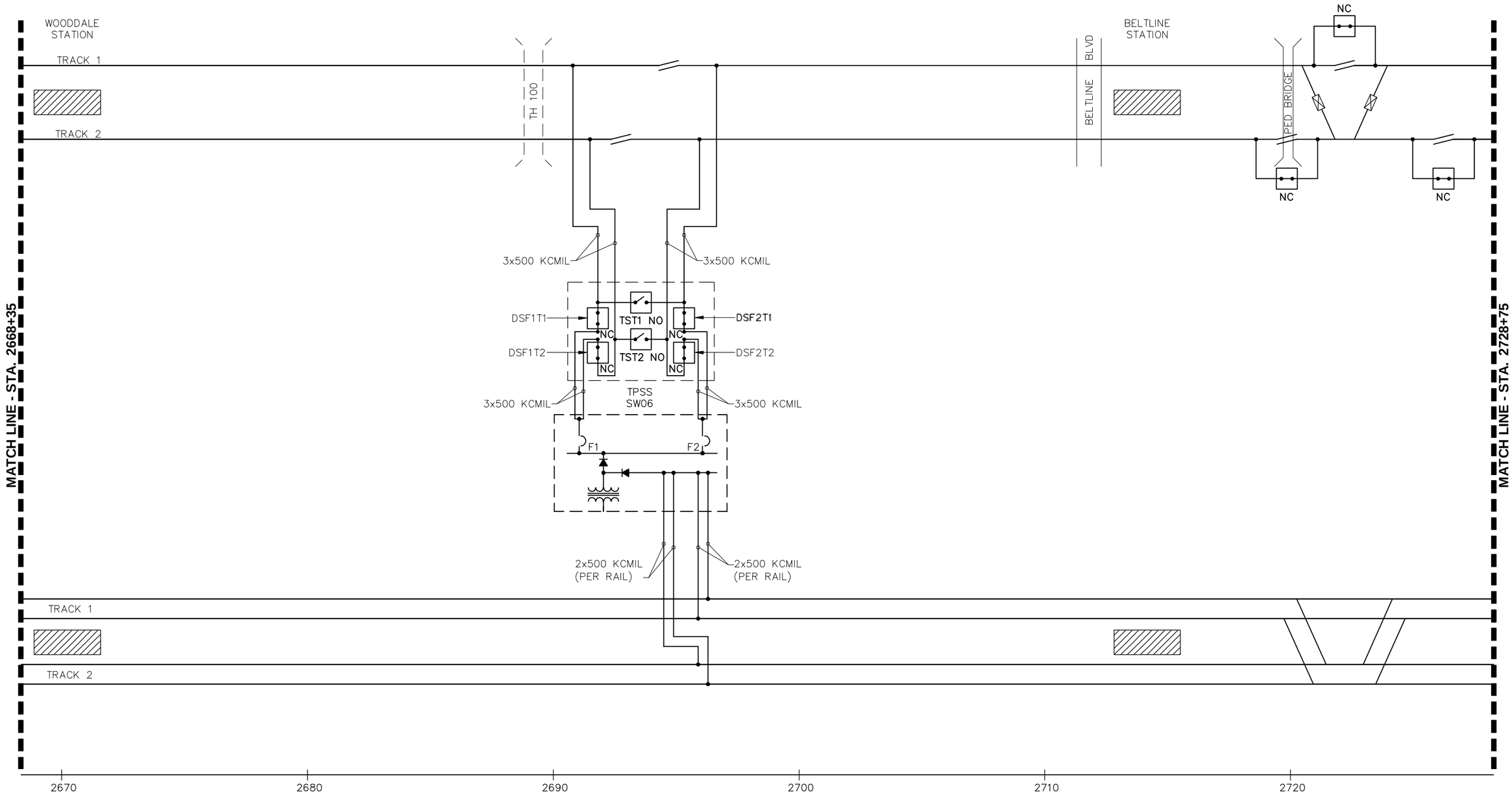
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SECTIONALIZING DIAGRAM
STA. 2609+25 TO STA. 2668+35

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-003

SHEET 97 OF 240

Aug, 27 2014 05:04 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft



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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM SECTIONALIZING DIAGRAM
STA. 2668+35 TO STA. 2728+75

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-004

SHEET 98 OF 240

Aug, 27 2014 05:04 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft

MATCH LINE - STA. 2728+75

MATCH LINE - STA. 2798+70

WEST LAKE STATION

W LAKE ST

TRACK 1

TRACK 2

NC

NC

3x500 KCMIL

3x500 KCMIL

DSF1T1

DSF1T2

TST1 NO

TST2 NO

DSF2T1

DSF2T2

NC

TPSS SW05

F1

F2

2x500 KCMIL (PER RAIL)

2x500 KCMIL (PER RAIL)

TPSS SW04

2735+51.71 BACK

2746+00.00 AHEAD

2729 SEGMENT 2 SEGMENT 3

2730

2750

2760

2770

2780

2790

END OF WALL 2772+50

BOAT SECTION

PORTAL 2776+00

TUNNEL

PORTAL 2798+36

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

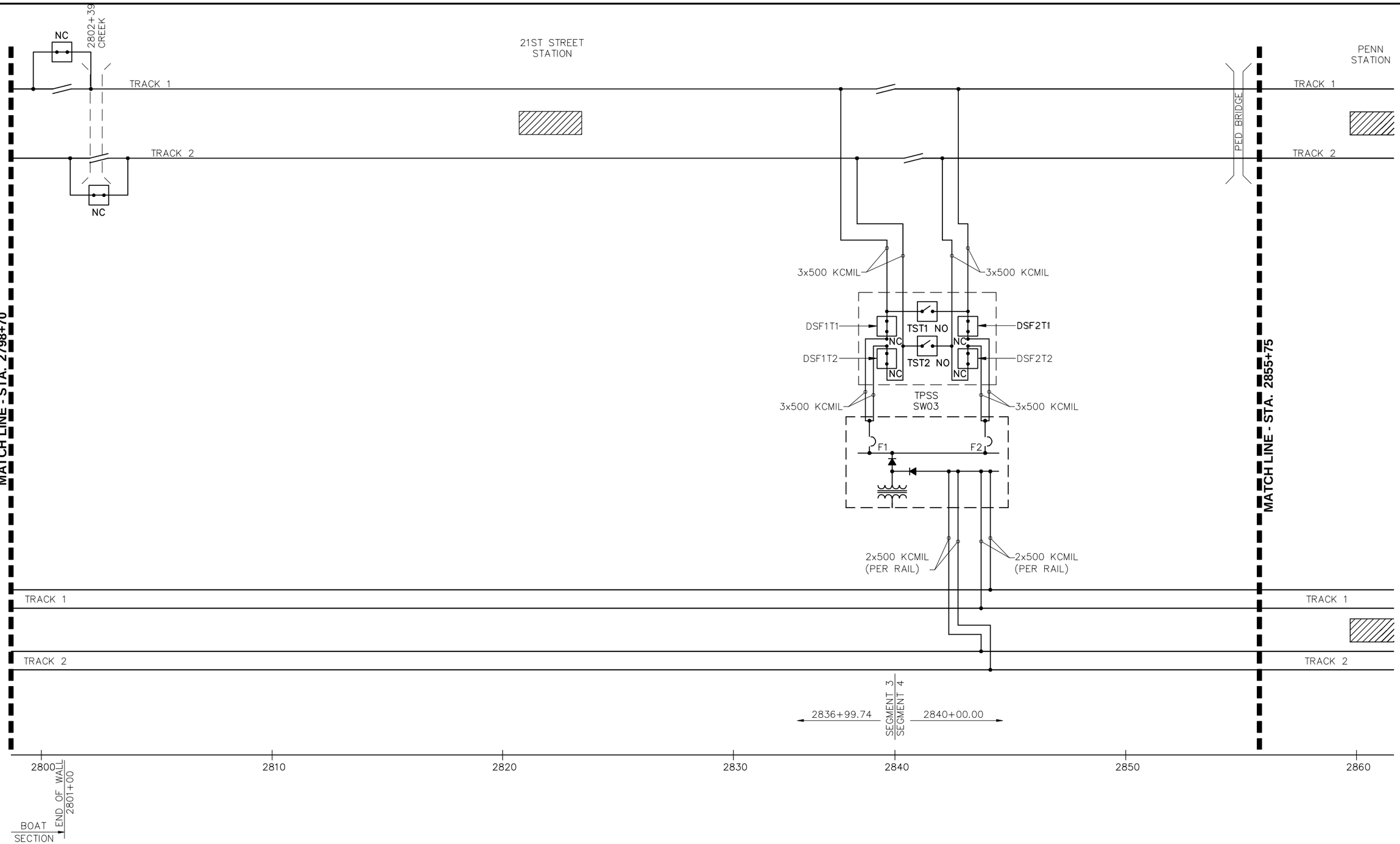
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SECTIONALIZING DIAGRAM
STA. 2728+75 TO STA. 2798+70

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-005

SHEET 99 OF 240

Aug. 27 2014 05:04 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

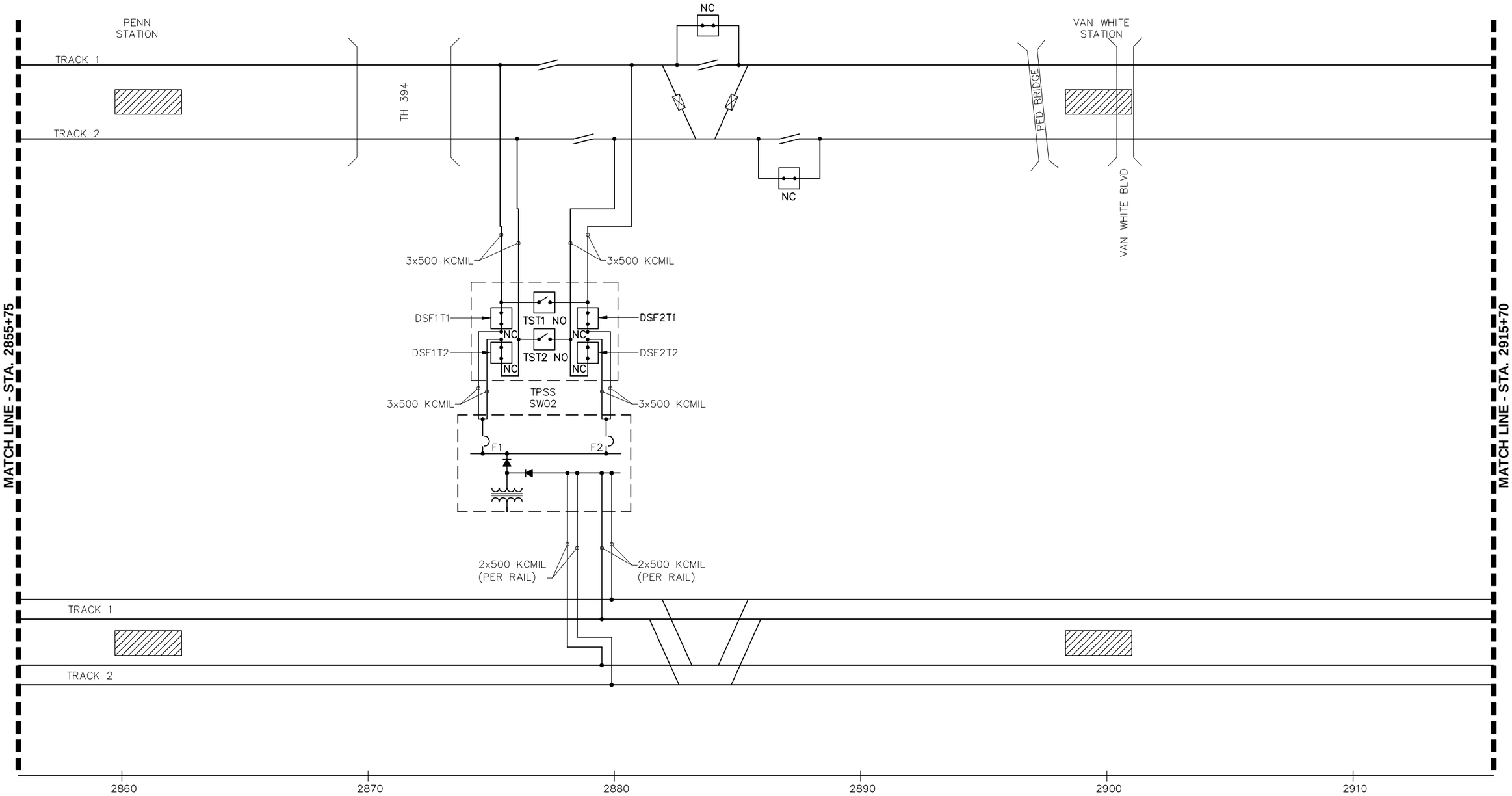
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM SECTIONALIZING DIAGRAM
STA. 2798+70 TO STA. 2855+75

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-006

SHEET 100 OF 240

Aug, 27 2014 05:04 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

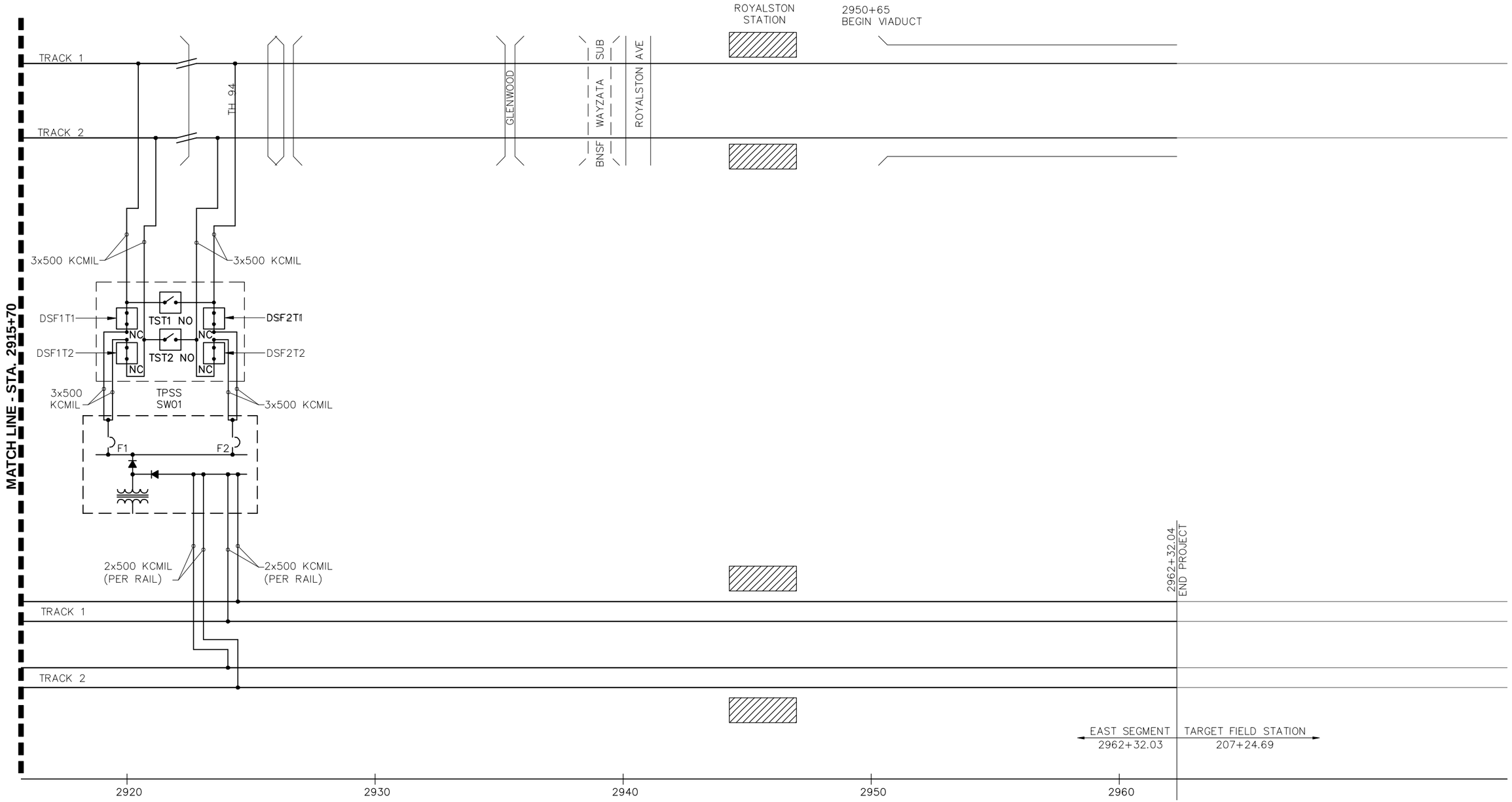
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SECTIONALIZING DIAGRAM
STA. 2855+75 TO STA. 2915+70

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-007

SHEET 101 OF 240

Aug, 27 2014 05:04 pm v:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

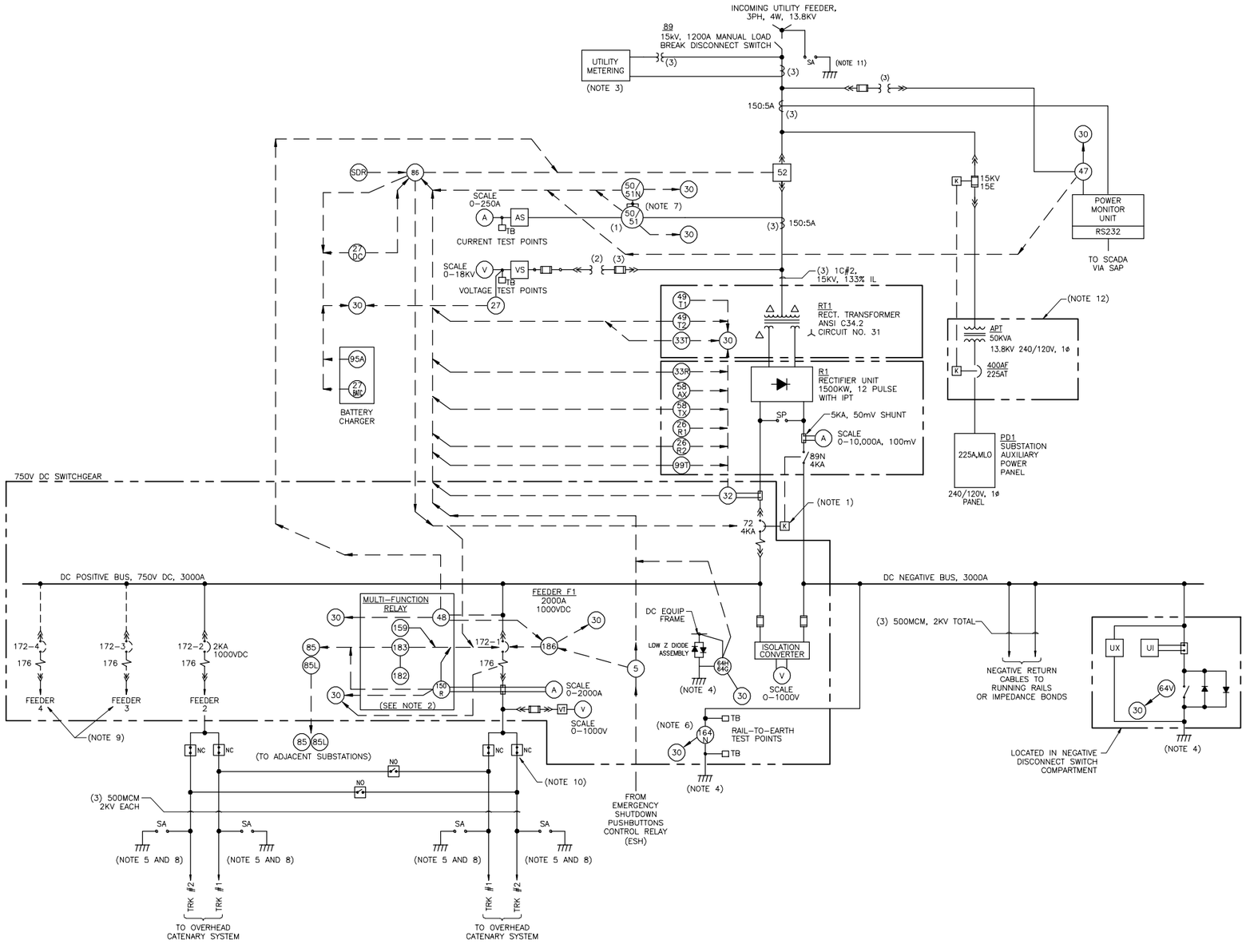
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SECTIONALIZING DIAGRAM
STA. 2915+70 TO STA. 2962+32.03

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SCD-008

SHEET 102 OF 240

Aug. 27 2014 05:04 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-TPS-SCD.dwg By: curtis.neft



ANSI DEVICE LEGEND:

5	EMERGENCY STOP PUSHBUTTON
26R1	RECTIFIER DIODE OVERTEMPERATURE, 1ST STEP
26R2	RECTIFIER DIODE OVERTEMPERATURE, 2ND STEP
27	AC SUPPLY UNDERVOLTAGE
27 BATC	BATTERY CHARGER UNDERVOLTAGE
30	ANNUNCIATOR/SUPERVISORY
32	REVERSE CURRENT INSTANTANEOUS RELAY
33R	RECTIFIER DOOR POSITION SWITCH
33T	RECTIFIER TRANSFORMER DOOR POSITION SWITCH
47	PHASE SEQUENCE AND UNDERVOLTAGE RELAY
48	INCOMPLETE SEQUENCE RELAY
49T1	TRANSFORMER WINDING OVERTEMPERATURE, 1ST STEP
49T2	TRANSFORMER WINDING OVERTEMPERATURE, 2ND STEP
50/51	PHASE FAULT TIME OVERCURRENT RELAY W/INSTANTANEOUS ELEMENT
50/51N	GROUND FAULT TIME OVERCURRENT RELAY W/INSTANTANEOUS ELEMENT
52	AC CIRCUIT BREAKER
58AX	DIODE FUSE MONITOR, 1ST STAGE ALARM
58TX	DIODE FUSE MONITOR, 2ND STAGE TRIP
64,164	FRAME FAULT RELAY
64V	DC NEGATIVE TO GROUND VOLTAGE MONITOR
72	DC MAIN BREAKER
85	TRANSFER TRIP
85L	TRANSFER TRIP, LOCKOUT
86	AC LOCKOUT RELAY, HAND RESET
89	AC POWER DISCONNECT SWITCH
89N	NEGATIVE DISCONNECT SWITCH
95A	BATTERY CHARGER FAILURE ALARM
99T	RECTIFIER DC SURGE SUPPRESSION FUSE FAILURE
150R	DC FEEDER RATE OF RISE RELAY
159	DC OVER VOLTAGE RELAY
164N	NEGATIVE TO EARTH POTENTIAL RELAY
172	DC FEEDER BREAKER
176	DC FEEDER DIRECT ACTING TRIP DEVICE
182	DC FEEDER LOAD MEASURING AND VOLTAGE SENSING
183	RECLOSING RELAY
186	DC LOCKOUT RELAY, HAND RESET
SDR	SMOKE DETECTOR ALARM

NOTES:

1. KEY INTERLOCK SHALL PREVENT OPENING OF 89N DEVICE UNLESS 72 DEVICE IS OPEN.
2. PROTECTIVE DEVICES AND INSTRUMENTS FOR FEEDER 2 IS IDENTICAL TO FEEDER 1.
3. CURRENT AND POTENTIAL TRANSFORMERS AND UTILITY METER ARE PROVIDED BY THE UTILITY.
4. CONNECT TO SUBSTATION GROUND GRID.
5. SEPARATE DRIVEN RODS LOCATED AT CATENARY FEEDER POLE.
6. 164N RELAY SHALL HAVE AN ADJUSTABLE TIME RELAY.
7. ONE 3–PHASE SOLID STATE OVERCURRENT RELAY PROGRAMMED TO FOLLOW NEMA RI–9 EXTRA HEAVY DUTY TRACTION OVERLOAD PROFILE.
8. SURGE ARRESTER AND GROUND CONNECTION LOCATED AT CATENARY FEEDER POLE (TYPICAL).
9. FUTURE FEEDERS.
10. GROUND–MOUNTED DC FEEDER DISCONNECT SWITCHES RATED AT 2KA, 1000VDC LOCATED ADJACENT TO TRACTION POWER SUBSTATION.
11. CONNECT TO AC GROUND GRID.
12. IF NECESSARY, FINAL DESIGN SHALL DETERMINE IF OTHER FACILITIES ARE TO BE POWERED FROM THIS SOURCE AND INCREASE CAPACITY AS REQUIRED.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

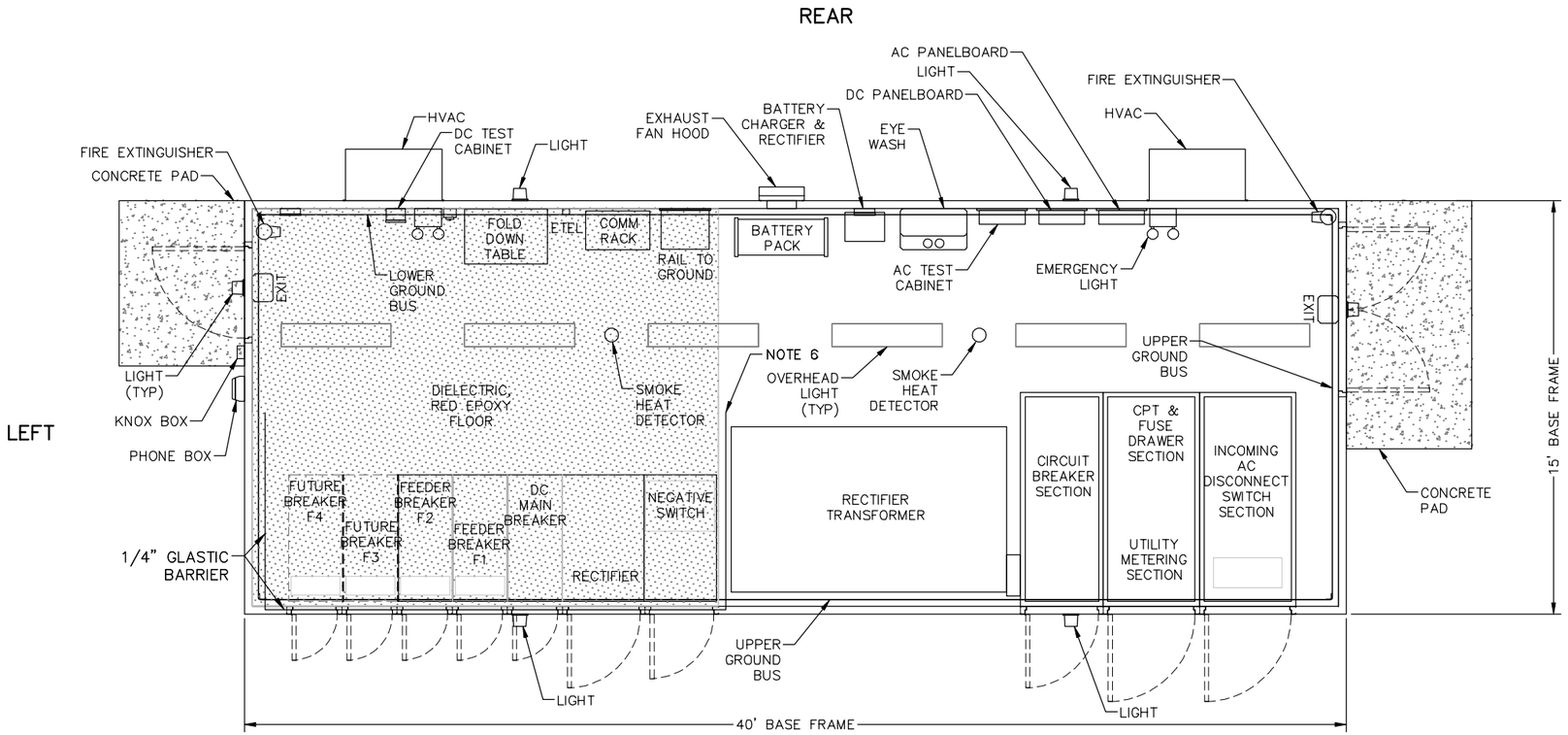
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
MAINLINE TPSS ONE LINE DIAGRAM

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-OLD-001

SHEET 103 OF 240



NOTES:

1. PROVIDE PREFABRICATED BUILDING AND EQUIPMENT UNDER THIS CONTRACT
2. EQUIPMENT DIMENSIONS ARE APPROXIMATE. SUBMIT FINAL DIMENSIONS TO THE C.A.R. FOR APPROVAL
3. SIZE AND LOCATION OF DC CABLE ENTRANCES TO BE DETERMINED BY CONTRACTOR
4. PROVIDE ELECTRICAL INSULATION ON WALLS AND FLOOR IN AREAS SHOWN
5. PROVIDE GLASTIC BARRIER BETWEEN RECTIFIER TRANSFORMER AND RECTIFIER. EXTEND GLASTIC 1'-6" BEYOND RECTIFIER TRANSFORMER AS SHOWN. PROVIDE AN INSULATED FINISHED EDGE ON EXPOSED GLASTIC EDGE. ALSO, INSTALL GLASTIC BARRIER BETWEEN EACH DC FEEDER BREAKER, AND DC MAIN BREAKER AND NEGATIVE DISCONNECT SWITCH
6. SPACE DC SWITCHGEAR AND RECTIFIER 2 INCHES OFF REAR WALL
7. PROVIDE WALL MOUNTED HINGED WORK TABLE WITH SUPPORTS.
8. PROVIDE DRAW OUT FUSE TRUNNION WITH MECHANICAL INTERLOCK TO L.V. MAIN AC C.B. PANELS
9. BLUE LIGHT, ETEL, CARD READER, KNOX BOX, CAMERA, AND ACCESS CONTROLLER PANEL ONLY LOCATED ON ONE END OF TPSS. CONSULT WITH C.A.R. REGARDING LOCATION OF THIS EQUIPMENT ON PER SITE BASIS.
10. FRONT OF COMMUNICATION RACK TO FACE WORK BENCH
11. GROUND BUS BAR MUST BE SILVER PLATED. REFER TO SPECIFICATIONS FOR DETAILED REQUIREMENTS. EQUIPMENT GROUNDS MUST ALSO BE SILVER PLATED BUS BAR.
12. INSULATED COVERS MUST BE FURNISHED WITHIN THE FLOOR.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
MAINLINE TPSS EQUIPMENT LAYOUT PLAN

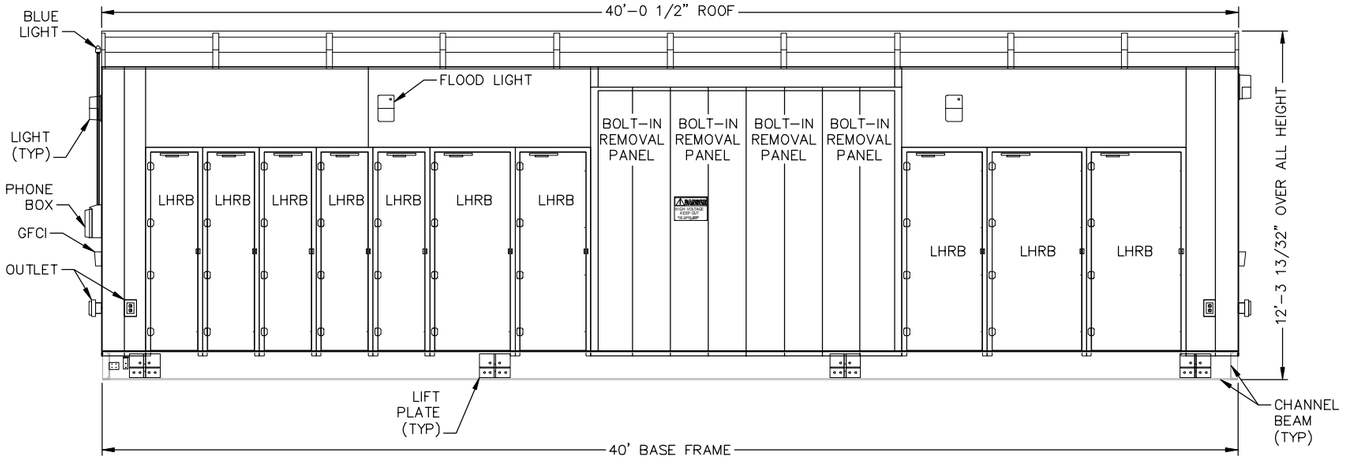
DISCIPLINE: SYSTEMS

SHEET NAME: TPS-DTL-101

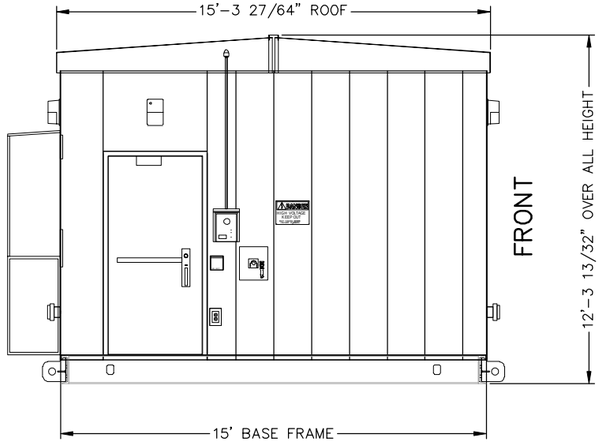
SHEET 104 OF 240

NOTES:

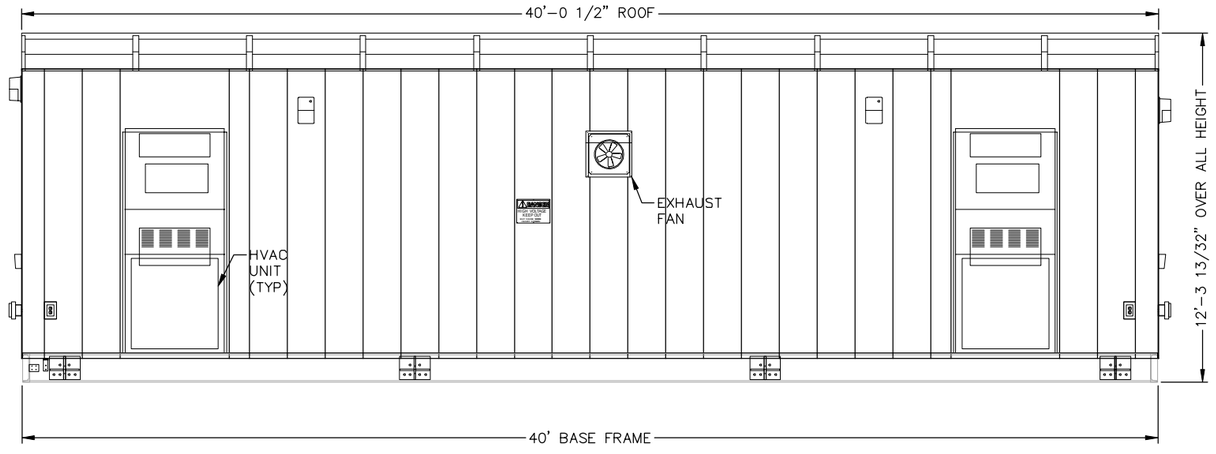
1. ALL DIMENSIONS ARE APPROXIMATE. SUBMIT THE FINAL DIMENSIONS TO THE C.A.R. FOR APPROVAL
2. CONSULT WITH C.A.R. REGARDING LOCATION OF BLUE LIGHT, ETEL, CARD READER, AND KNOX BOX
3. INSTALL 1'-4" REMOVABLE TRANSOM ABOVE DOUBLE DOORS TO ALLOW FOR TOTAL OPENING OF 8'-0
4. NUMBER OF RISERS FOR CONCRETE PAD WILL VARY FROM ONE SITE TO THE NEXT. CONTRACTOR TO CONSTRUCT CONCRETE PAD WITH EQUAL VERTICAL RISERS SUCH THAT NO RISER EXCEEDS 9 INCHES IN HEIGHT.
5. MOUNT NEGATIVE SURGE ARRESTER ON THE EXTERIOR ABOVE DOOR FOR NEGATIVE CUBICLE.



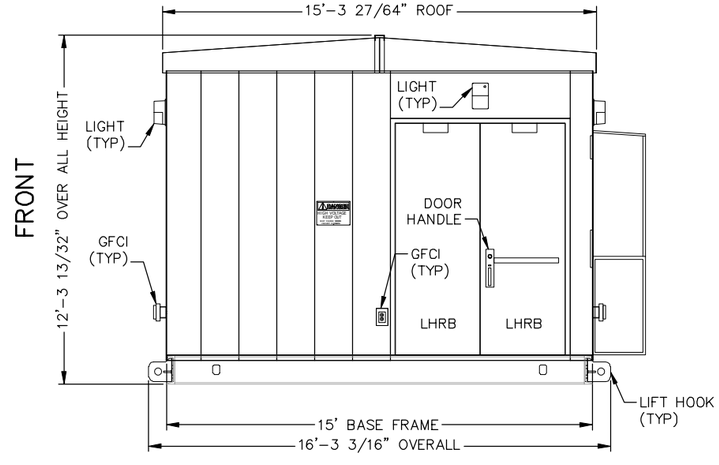
FRONT EXTERIOR ELEVATION



LEFT EXTERIOR ELEVATION



REAR EXTERIOR ELEVATION



LEFT EXTERIOR ELEVATION

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METROPOLITAN COUNCIL

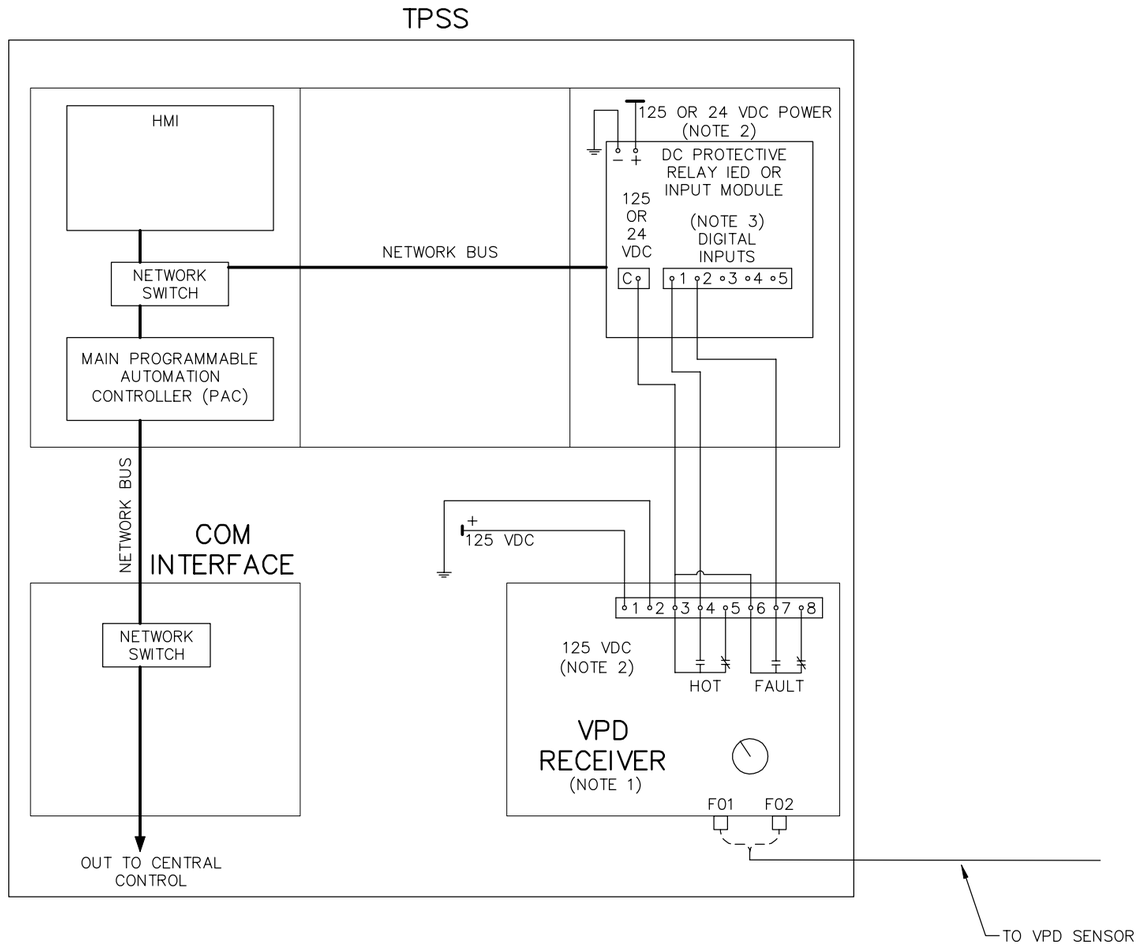
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
MAINLINE TPSS BUILDING ELEVATIONS

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-DTL-102

SHEET 105 OF 240



NOTES:

1. PROVIDE A SEPARATE NEMA 4 ENCLOSURE FOR VPD INSTALLATION.
2. REFER TO MANUFACTURERS REQUIREMENTS FOR CONTROL POWER VOLTAGE.
3. VPD HOT AND FAULT STATUS TO BE MONITORED AND INDICATED BY LCMS HMI AND CENTRAL CONTROL SYSTEM.

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
MAINLINE VOLTAGE PRESENCE DETECTOR

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-DTL-103

SHEET 106 OF 240

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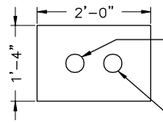
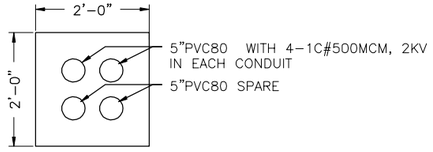
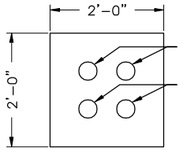


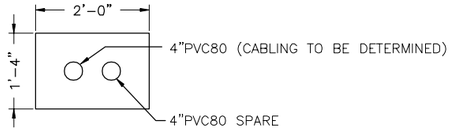
SECTION A
MEDIUM VOLTAGE CABLES



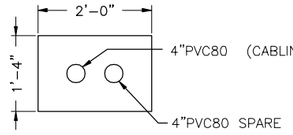
SECTION B
NEGATIVE TRACTION POWER CABLES



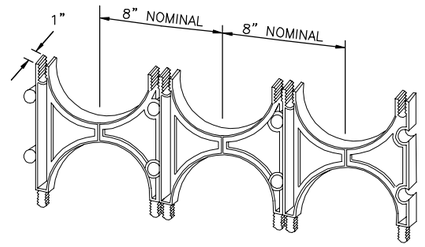
SECTION C
POSITIVE TRACTION POWER CABLES



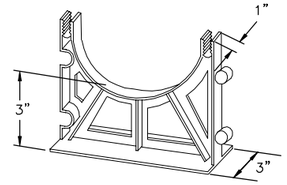
SECTION D
COMMUNICATION CABLES



SECTION E
LOW VOLTAGE (UNDER 600VAC)
DISTRIBUTION CABLES

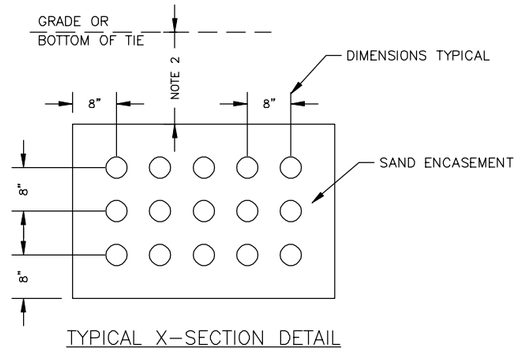


INTERMEDIATE SPACER

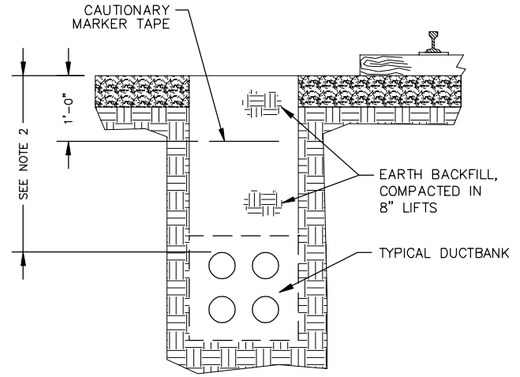


BASE SPACER
(BASE SPACER PROVIDES 3" SEPERATION BETWEEN THE BOTTOM ROW OF DUCTS AND THE TRENCH FLOOR)

PVC80 CONDUIT SPACERS
(GS INDUSTRIES OF BASSETT,INC.)
OR APPROVED EQUAL



TYPICAL X-SECTION DETAIL
NOT TO SCALE



TYPICAL TRENCH DETAIL
NOT TO SCALE

NOTES:

1. DUCTBANK SECTION VIEWS ARE INDICATED ON TYPICAL SUBSTATION LAYOUT PLAN.
2. DEPTH OF DUCTBANKS SHALL BE AS FOLLOW:
   * GENERAL: 30 INCHES BELOW GRADE
   * UNDER TRACKS: 50 INCHES BELOW BOTTOM OF TIE
3. SPARE CONDUITS SHALL BE TERMINATED AT RESPECTIVE MANHOLES WHEN INDICATED ON SITE PLAN. IF NO MANHOLE IS INDICATED, SPARE CONDUITS SHALL BE CAPPED 5 FEET BEYOND THE SUBSTATION FOUNDATION.

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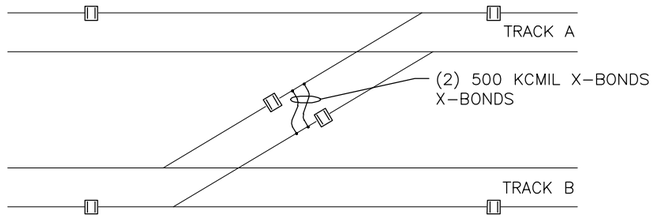
SOUTHWEST

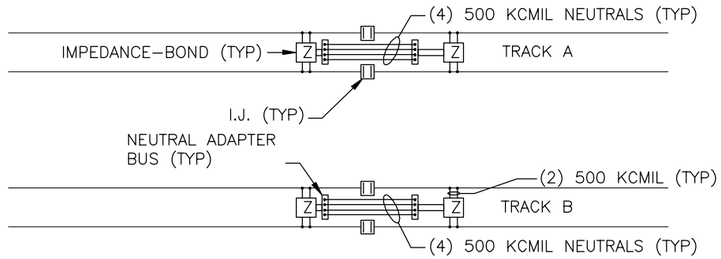
EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
TYPICAL DUCT BANK CONFIGURATION

DISCIPLINE: SYSTEMS
SHEET NAME: TPS-DTL-104

SHEET 107 OF 240

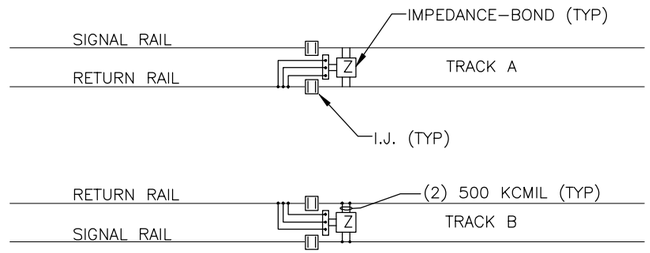


"TYPE 1" TYPICAL POWER BONDING CONNECTION
SINGLE RETURN RAIL IN CROSSOVER



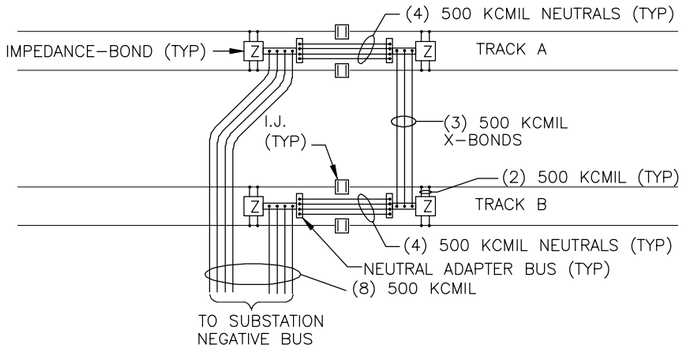
TYPICAL NEGATIVE RETURN CONNECTION
AC TRACK CIRCUIT TERRITORY WITH DOUBLE
IMPEDANCE BONDS AND I.J.'S ON BOTH TRACKS

"TYPE 4"



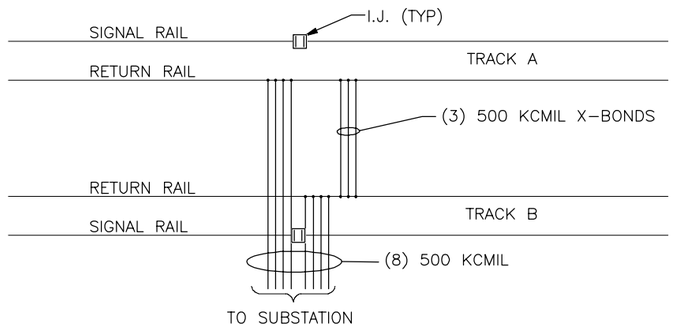
TYPICAL NEGATIVE RETURN CONNECTION
SINGLE RETURN RAIL TO DOUBLE
RETURN RAIL TRANSITION

"TYPE 7"



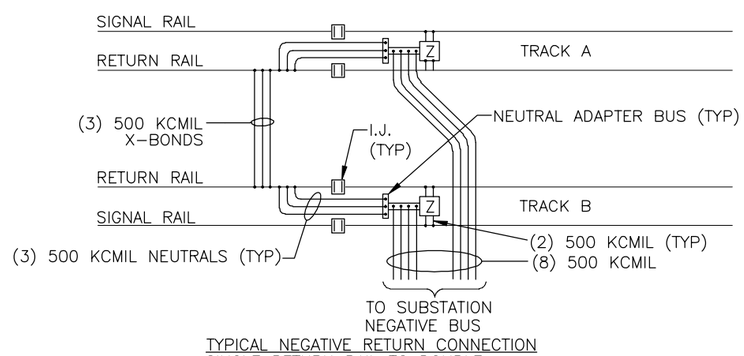
TYPICAL NEGATIVE RETURN CONNECTION
AC TRACK CIRCUIT TERRITORY WITH DOUBLE
IMPEDANCE BONDS AND I.J.'S ON BOTH TRACKS

"TYPE 2"



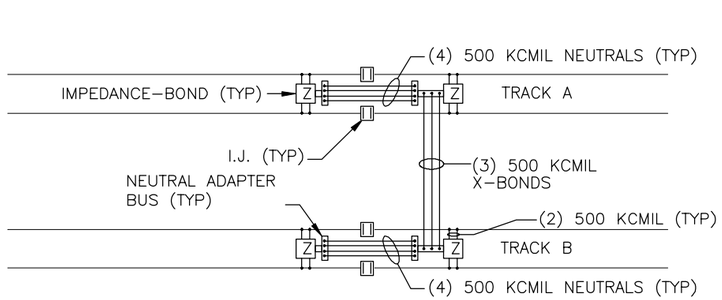
TYPICAL NEGATIVE RETURN CONNECTION
SINGLE RETURN RAIL TERRITORY

"TYPE 5"



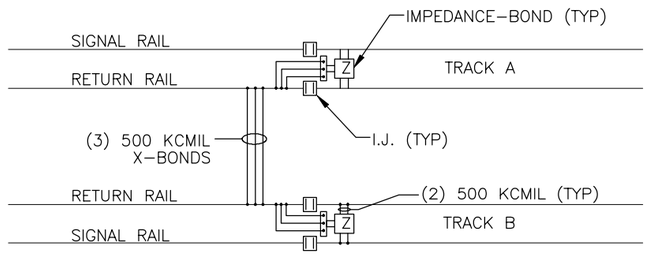
TYPICAL NEGATIVE RETURN CONNECTION
SINGLE RETURN RAIL TO DOUBLE
RETURN RAIL TRANSITION

"TYPE 8"



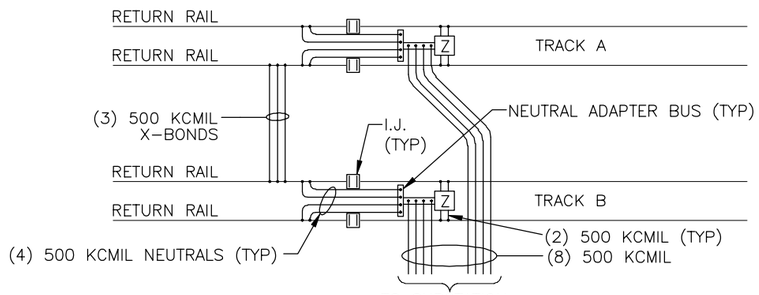
TYPICAL CROSSBONDING CONNECTION
AC TRACK CIRCUIT TERRITORY WITH DOUBLE
IMPEDANCE BONDS AND I.J.'S ON BOTH TRACKS

"TYPE 3"



TYPICAL CROSSBONDING CONNECTION
SINGLE RETURN RAIL TO DOUBLE
RETURN RAIL TRANSITION

"TYPE 6"



TYPICAL NEGATIVE RETURN CONNECTION
UNSIGNALED RETURN RAIL TO DOUBLE
RETURN RAIL TRANSITION

"TYPE 9"

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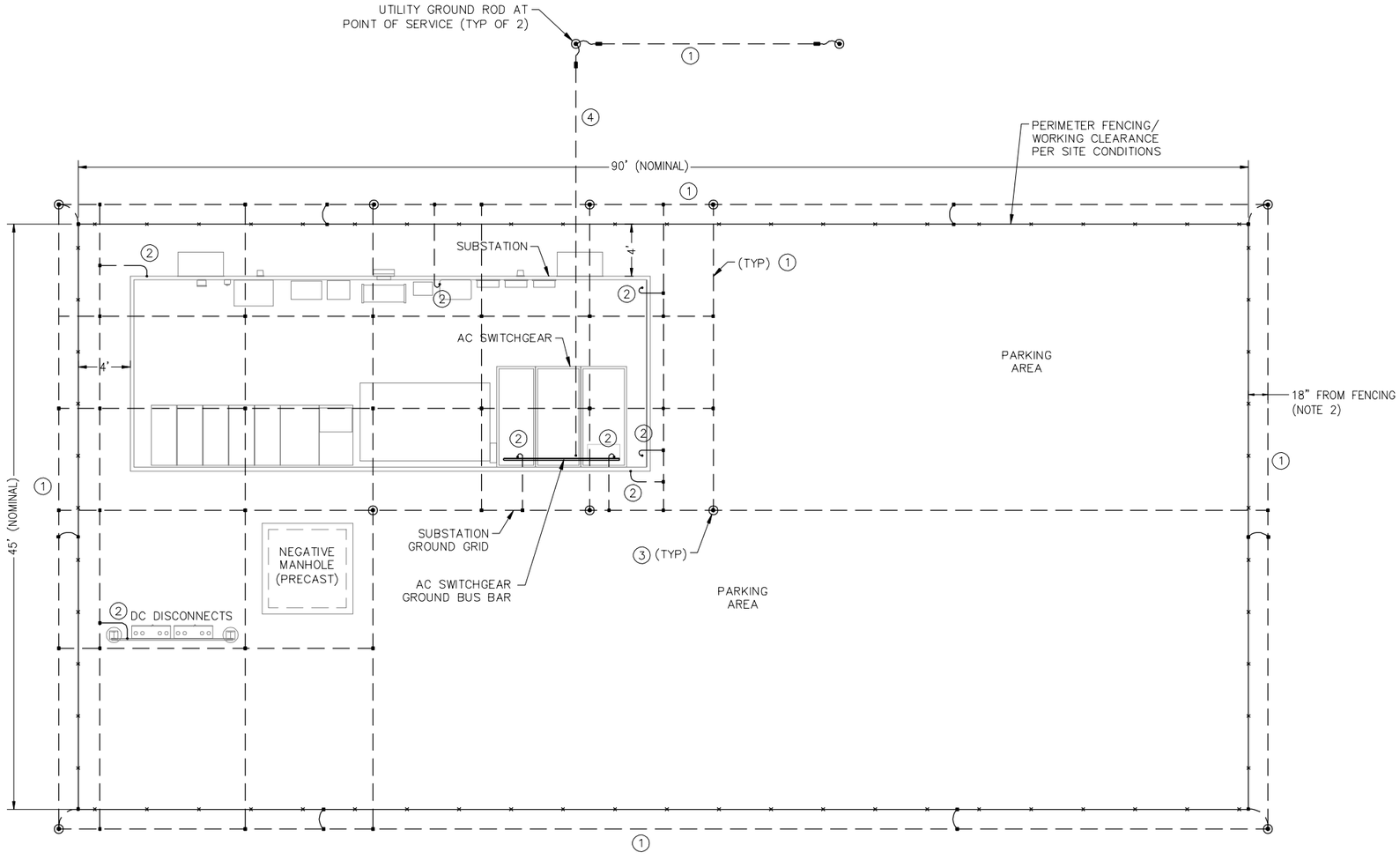
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
TYPICAL RAIL RETURN BONDING DETAIL

DISCIPLINE: SYSTEMS
SHEET NAME: TPS-DTL-105

SHEET 108 OF 240



LEGEND:

1. #4/0 BARE COPPER GROUND CONDUCTOR
2. #4/0 BARE COPPER PIGTAIL
3. GROUND ROD, 3/4" DIA. X 10' LONG WITH TEST INSPECTION WELL
4. UTILITY GROUND, #4/0 INSULATED, IN 2" PVC80 DIRECT BURIED FOR CONNECTION AT SWITCHGEAR GROUND BUS BAR

TYPICAL GROUND GRID DETAILS

2 1 0 2 4 6
SCALE IN FEET

NOTES:

1. FOR SUBSTATION GENERAL ARRANGEMENT SEE DRAWING TPS-XXX-015.
2. DESIGN GRID SHALL MEET IEEE 80 REQUIREMENTS.

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METROPOLITAN COUNCIL

SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
TYPICAL GROUND GRID DETAILS

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-DTL-106

SHEET 109 OF 240

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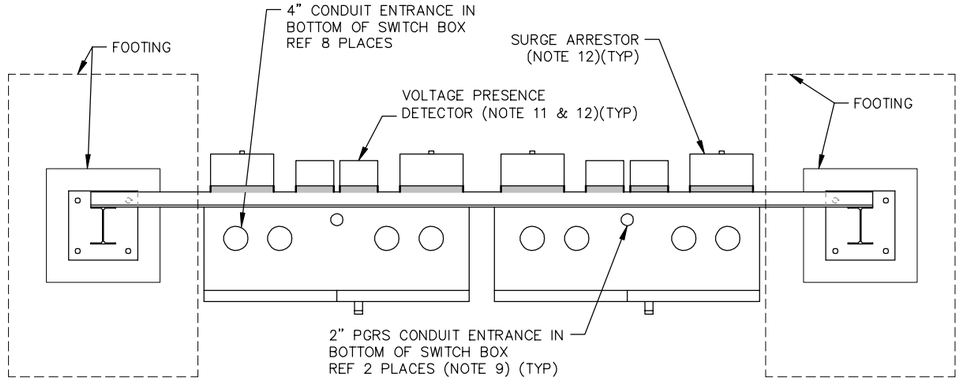
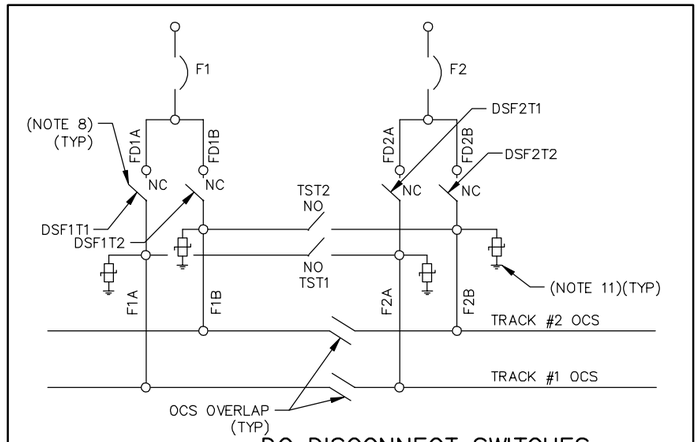
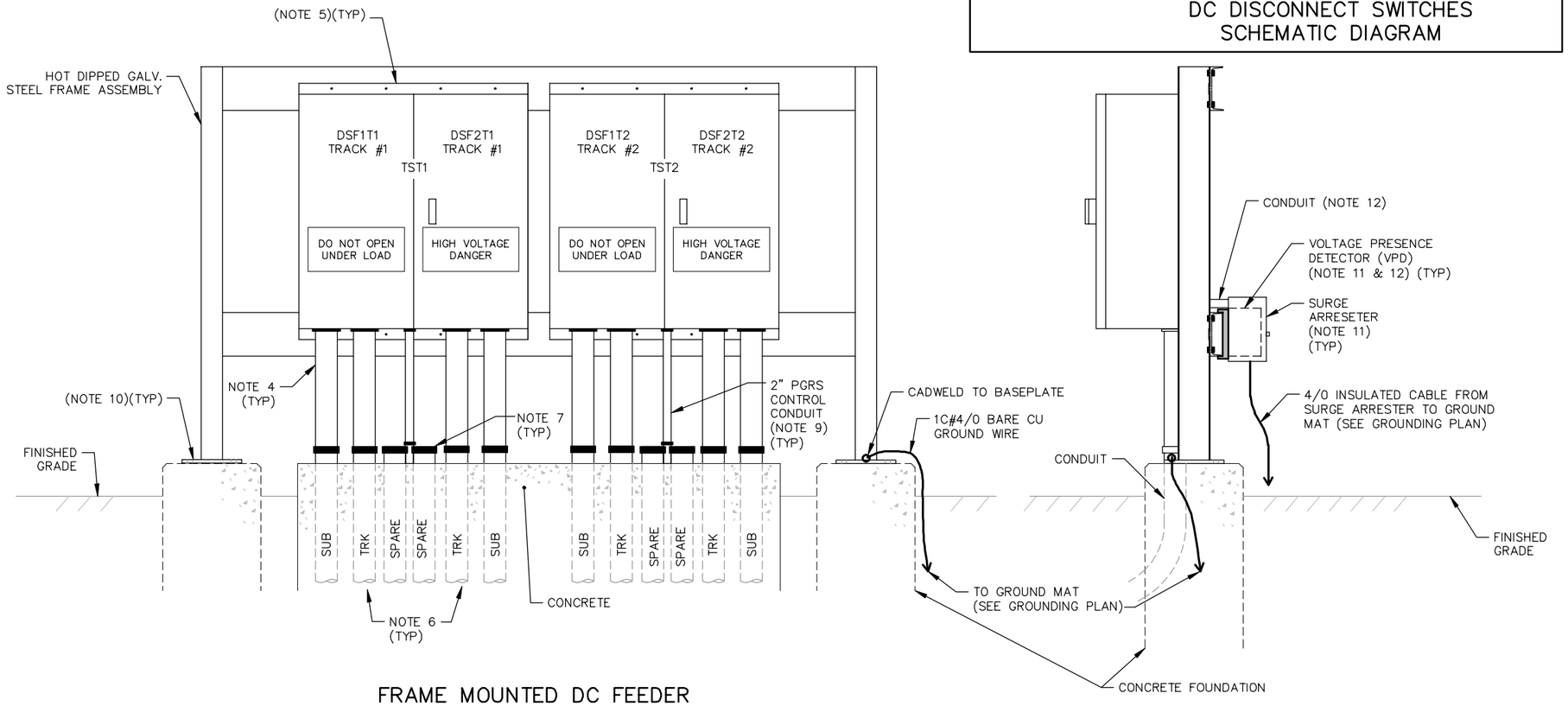




DC DISCONNECT SWITCHES
SCHEMATIC DIAGRAM

NOTES:

1. ALL STEEL TO CONFORM TO ASTM A36
2. ALL WELDING TO CONFORM TO AWS D1.1
3. HOT DIP GALVANIZED PER ASTM A123/A123–97A AFTER MACHINING AND WELDING
4. 4" PVC CONDUIT EXPOSED FROM BOTTOM OF SWITCH BOX TO PVC CONDUIT COUPLING PROJECTING 3" ABOVE CONCRETE ENCASEMENT
5. ALL SWITCHES ARE RATED 2KA, 1000VDC
6. ALL CONDUITS TO TRACK ARE 4" PVC–80, CONCRETE ENCASED.
7. STUB AND CAP SPARE CONDUITS 6" ABOVE TOP OF DUCTBANK
8. PROVIDE SWITCH STATUS DEVICE AND HARDWARE IN CABINET FOR EACH SWITCH TO INDICATE SWITCH POSITION.
9. PROVIDE CONTROL CABLE FROM SWITCH STATUS DEVICE TO TPS FOR INDICATION TO LCMS AND CCS. ALSO, PROVIDE VPD FIBER OPTIC CABLE AND NEGATIVE REFERENCE CABLE BACK TO TPSS.
10. SS #10 – SHIMS PLACED UNDER BASEPLATE TO LEVEL FRAME
11. PROVIDE CONDUIT TO SWITCH ENCLOSURE USING INSULATED HARDWARE. SEAL AROUND PENETRATIONS. SURGE ARRESTER TO BE CONNECTED ON LOAD SIDE OF DISCONNECT SWITCH.
12. VOLTAGE PRESENCE DETECTOR IS MOUNTED BESIDE THE SURGE ARRESTER, AS SHOWN IN THE PLAN VIEW. WELD CHANNEL BRACKET OR PLATE ACROSS CHANNEL FOR MOUNTING ENCLOSURES.



FRAME MOUNTED DC FEEDER
DISCONNECT SWITCHES

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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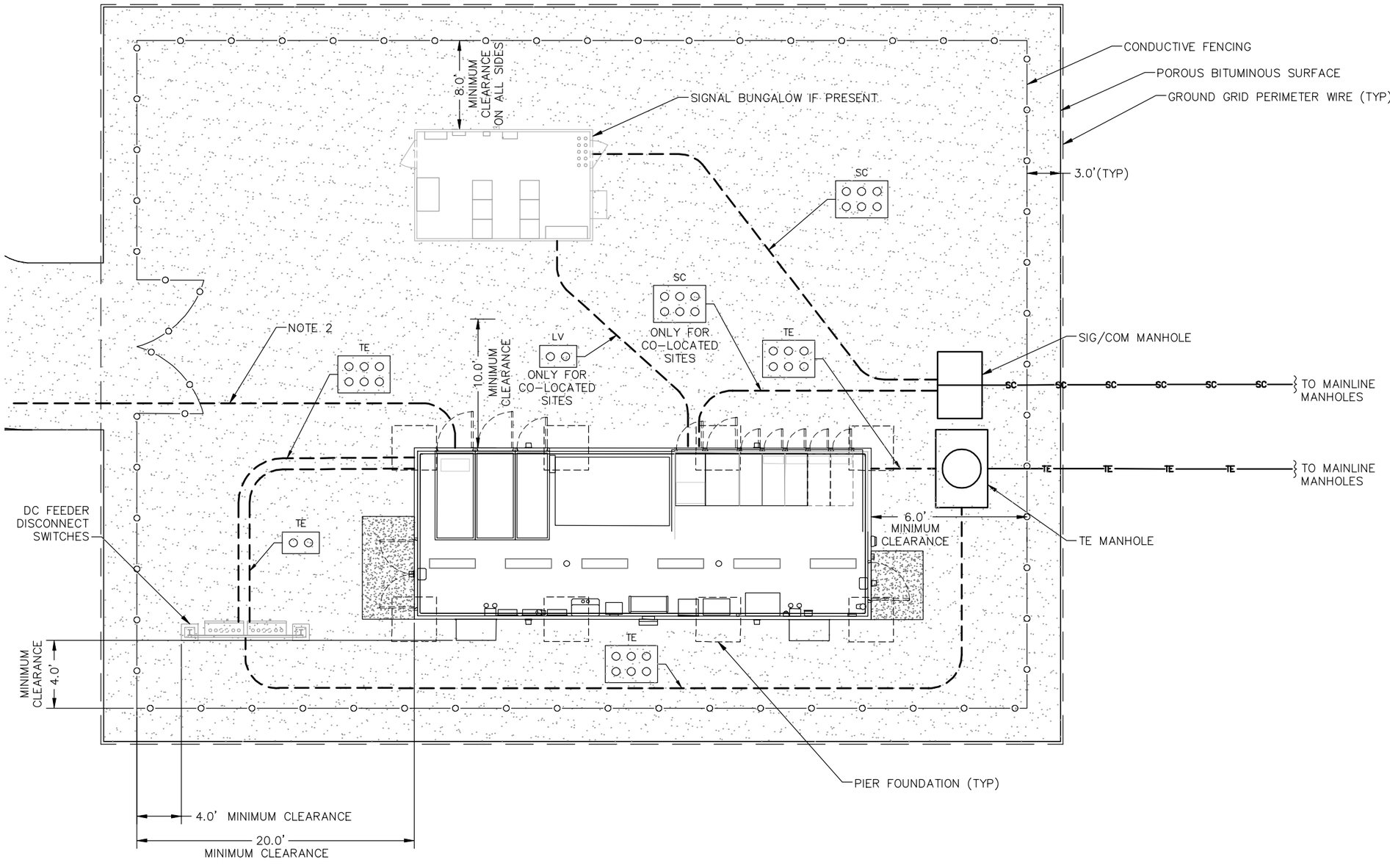
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION DETAILS
TPSS FEEDER DISCONNECT SWITCHES

DISCIPLINE: SYSTEMS
SHEET NAME: TPS-DTL-401

SHEET 110 OF 240



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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
TRACTION POWER SYSTEM
SUBSTATION SITE PLANS
TYPICAL SUBSTATION SITE PLAN

DISCIPLINE: SYSTEMS

SHEET NAME: TPS-SW11-GSP

SHEET 111 OF 240

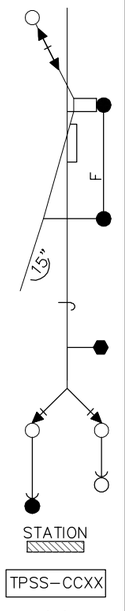
MASTER OVERLAP CHART SYMBOLS

BWA XXX	BALANCE WEIGHT ANCHOR LABEL XXX–LENGTH IN FEET FROM BALANCE WEIGHT ANCHOR TO FIXED ANCHOR OR TO MID–POINT TERMINATION
FT XXX	FIXED TERMINATION LABEL XXX–LENGTH IN FEET FROM FIXED ANCHOR TO BALANCE WEIGHT ANCHOR
MPA XXXXXX	MID POINT ANCHOR LABEL XXX–HALF TENSION LENGTH IN FEET FROM MID–POINT TERMINATION TO BALANCE WEIGHT ANCHOR
246 6	TENSION LENGTH IDENTIFICATION NUMBER
S	SPRING TENSIONER
	FIXED ANCHOR
	BALANCE WEIGHT ANCHOR
	NON–INSULATED OVERLAP
	INSULATED OVERLAP
	SECTION INSULATOR

LAYOUT PLAN SYMBOLS

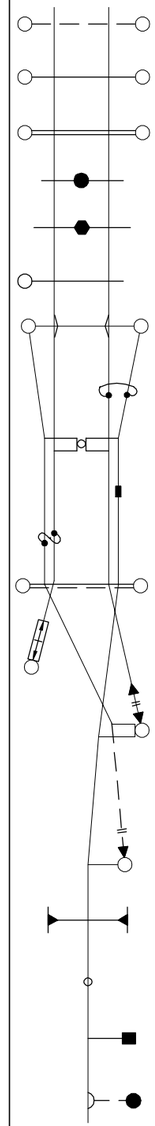
	OCS POLE, NEW
FP	OCS POLE WITH DC FEEDER
TP	OCS TUBULAR POLE
	POLE WITH SINGLE CANTILEVER
	DOWN GUY ANCHOR
	SECTION INSULATOR, BRIDGING TYPE
NB	SECTION INSULATOR, NON–BRIDGING TYPE

LAYOUT PLAN SYMBOLS CONT.



	BALANCE WEIGHT ANCHOR, SINGLE CONTACT WIRE
	POLE WITH DOUBLE CANTILEVER
	CROSSING CONTACT BRIDGE
	AERIAL FEEDER WIRE PARALLEL TO TRACK
	NEW POLE WITH WIRE PULL–OFF FOR TWO WIRES
	STRING LINE OFFSET OF RAIL AT MIDSPAN
	IN SPAN JUMPER
	POLE, JOINT USE WITH SINGLE CANTILEVER AND STREET LIGHT
	FIXED TERMINATION – FISH TAIL STYLE SINGLE CONTACT WIRE
	EXISTING DOWN GUY ANCHOR
	NEW DOWN GUY ANCHOR
	PASSENGER STATION
	TRACTION POWER SUBSTATION
	TURNBUCKLE
	SURGE ARRESTOR
	POLE MOUNTED SINGLE DISCONNECT SWITCH
	POLE MOUNTED DOUBLE DISCONNECT SWITCHES
	BALANCE WEIGHT ANCHOR LABEL XXX–LENGTH IN FEET FROM BALANCE WEIGHT ANCHOR TO FIXED ANCHOR OR TO MID–POINT TERMINATION
	FIXED ANCHOR LABEL XXX–LENGTH IN FEET FROM FIXED ANCHOR TO BALANCE WEIGHT ANCHOR
	MID POINT ANCHOR LABEL XXX–HALF TENSION LENGTH IN FEET FROM MID–POINT TERMINATION TO BALANCE WEIGHT ANCHOR
	TENSION LENGTH IDENTIFICATION NUMBER

LAYOUT PLAN SYMBOLS CONT.



	STEADY SPAN STRUCTURE (NO SUPPORT)
	HEADSPAN SUPPORT STRUCTURE WITHOUT STEADY SPAN REGISTRATION
	PORTAL STRUCTURE
	NEW POLE WITH BACK–TO–BACK CANTILEVERS
	POLE, JOINT USE WITH BACK–TO–BACK OCS CANTILEVERS AND STREET LIGHTS
	TWO TRACK CANTILEVER – HINGED SUPPORT
	SINGLE CONTACT WIRE BRIDLE SUPPORT AND REGISTRATION ASSEMBLY
	POTENTIAL EQUALIZING JUMPER
	POLE WITH BACK–TO–BACK DOUBLE CANTILEVERS
	INSULATOR CUT INTO OUT–OF–RUNNING C/W
	FULL CURRENT JUMPER
	HEADSPAN SUPPORT STRUCTURE WITH STEADY SPAN REGISTRATION
	SPRING TENSIONER – SINGLE CONTACT WIRE
	BALANCE WEIGHT ANCHOR SIMPLE CATENARY SYSTEM
	OUT OF RUNNING CONTACT WIRE
	FIXED TERMINATION – SIMPLE CATENARY SYSTEM
	HEADSPAN STRUCTURE ATTACHED TO BUILDING ANCHORS
	TUNNEL OR BRIDGE SUPPORT
	TUNNEL OR BRIDGE SUPPORT AND REGISTRATION
	POLE WITH WIRE PULL OFF FOR ONE WIRE

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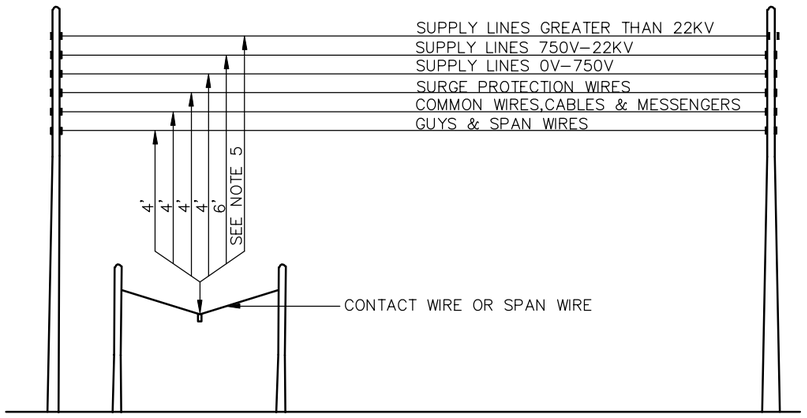
EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
GENERAL
SYMBOLS, LEGEND AND GENERAL NOTES

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-GEN-001

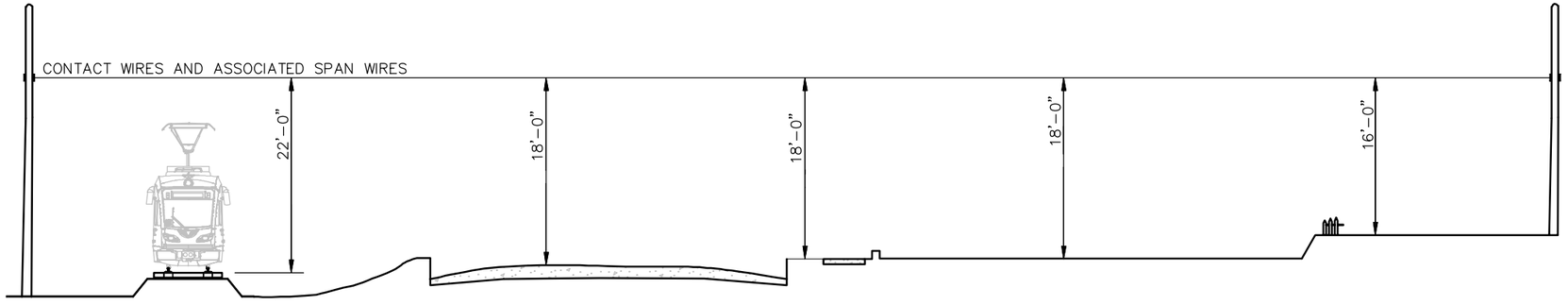
SHEET 112 OF 240

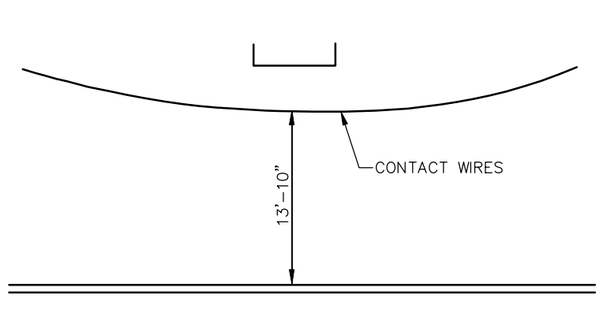


NON O.C.S. CONDUCTOR CLEARANCES ABOVE CONTACT OR MESSENGER WIRE

NOTES:

1. ALL CLEARANCES SHALL COMPLY WITH NATIONAL ELECTRIC SAFETY CODE
2. ALL CLEARANCES ARE MINIMUM VALUES
3. VERTICAL CLEARANCES APPLY TO CONTACT WIRES UNDER THE FOLLOWING CONDITIONS:
   A. CONDUCTOR TEMPERATURE OF 60˚ F, NO ICE, NO WIND, WITH FINAL SAG IN THE WIRE. OR CONDUCTOR TEMPERATURE OF 32˚ F, ICE (OPERATING CONDITIONS) NO WIND, WITH FINAL SAG IN THE WIRE, WHICHEVER IS GREATER
   B. SPAN LENGTHS NOT GREATER THAN THE FOLLOWING:
      AUTO TENSIONED SIMPLE CATENARY – 220 FT
      SINGLE CONTACT WIRE CATENARY – 110 FT
4. VERTICAL CLEARANCES APPLY TO NON–OCS CONDUCTORS ABOVE OCS CONTACT WIRES OR SPAN WIRE WITH NO ICE OR UNDER THE FOLLOWING CONDITIONS:
   A. CONDUCTOR SAG AT 120˚ F
   B. OR MAXIMUM CONDUCTOR TEMPERATURE IS GREATER THAN 120˚ F
   C. OR 32˚ F WITH RADIAL ICE OF 0.25 INCHES WHICHEVER PRODUCES THE LARGEST SAG AND O.C.S. CONTACT WIRES, AND SPAN WIRE WITH NO ICE
5. FOR VOLTAGES EXCEEDING 22KV (UP TO 470KV) THE CLEARANCE SHALL BE INCREASED BY 0.4 INCHES FOR EACH 1KV, OR FRACTION THEREOF, IN EXCESS OF 22KV





OCS WIRE CLEARANCES ABOVE GROUND OR RAILS

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
VERTICAL ELECTRICAL CLEARANCE REQUIREMENTS

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-101

SHEET 113 OF 240

DESIGN CRITERIA

1. CLIMATIC PARAMETERS

TEMPERATURE	OPEN ROUTE
NORMAL AMBIENT	60°F
MINIMUM AMBIENT	−40°F
MAXIMUM CONTACT WIRE	120°F

ICE	CONTACT	MESSENGER
OPERATING	1/4" RADIAL	1/2" RADIAL
NON−OPERATING	1/2" RADIAL	1/2" RADIAL

WIND	OPEN ROUTE
OPERATING (ICE)	40mph
OPERATING (NO ICE)	55mph
NON OPERATING (NO ICE)	90mph

2. ELECTRICAL CLEARANCES

	NORMAL
STATIC	4 INCHES
PASSING	3 INCHES

3. CATENARY SYSTEM PARAMETERS

ITEM	UNITS	SCAT MAINLINE	SWFT YARD
WIRE SIZE:			
CONTACT	KCMIL	350	350
MESSENGER	KCMIL	500	–
TENSION AT DESIGN TEMP (60°F)			
CONTACT WIRE	LB	3000	1750
MESSENGER WIRE	LB	5000	–
NORMAL CONTACT WIRE HEIGHT	FEET	18.5	18.5
MAXIMUM WIRE HEIGHT	FEET	22.3	22.3
NORMAL SYSTEM HEIGHT	FEET	4.0	–
MAXIMUM SPAN	FEET	220	80
MAXIMUM STAGGER	INCHES	9	9
MAXIMUM TENSION LENGTH	FEET	5300	–
CONTACT WIRE MAXIMUM WEAR	PERCENT	30	30
POLE DEFLECTION (MAXIMUM)	INCHES	2	2
MAX LIVE LOAD POLE DEFLECTION AT CONTACT WIRE HEIGHT	INCHES	1	1
FOUNDATION ROTATION (MAXIMUM)	DEGREES	0.50	0.50
MAX CONTACT WIRE GRADIENT			
(30mph) CONSTANT GRADIENT	RATIO	1 in 150	1 in 150
(30mph) CHANGE OF GRADIENT	RATIO	1 in 300	1 in 300

4. TOLERANCES AND RELATED INFORMATION:

A. TRACK

	EMBEDDED/DF	OPEN ROUTE	YARD
	DIRECT FIXATION	BALLASTED	BALLASTED
VERTICAL	0.125 INCHES	0.50 INCHES	1.00 INCHES
HORIZONTAL	0.50 INCHES	0.50 INCHES	0.50 INCHES
GROSS LEVEL	0.125 INCHES/GAUGE	0.125 INCHES/GAUGE	0.25 INCHES/GAUGE
GUAGE	0.125 INCHES	0.125 INCHES	−0.125 TO +0.25 INCHES

B. VEHICLE (ARTICULATED)

LATERAL DISPLACEMENT (EACH SIDE)	1.81 INCHES
ROLL TO EACH SIDE − MAXIMUM	3.00 DEGREES
BOUNCE − MAXIMUM	2.00 INCHES
TRUCK CENTER	32.43 FEET
WIDTH (OVER SIDE SHEETS)	8.7 − 8.8 FEET
LENGTH (OVER COUPLERS)	90 − 94 FEET
TRUCK WHEELBASE	5.91 TO 6.23 FEET
TRUCK CENTER TO COUPLER FACE	11.56 FEET

C. PANTOGRAPH

OVERALL WIDTH	6.50 FEET
CARBON WIDTH	3.50 FEET
MAXIMUM CARBON WEAR	0.75 INCHES
MAX LOCKDOWN HEIGHT	12.75 FEET ABOVE RAIL
MINIMUM PANTOGRAPH HEIGHT	13.00 FEET
MAXIMUM DEFLECTION RELATIVE TO CAR	1.50 INCHES TO EACH SIDE

D. OVERHEAD CONTACT SYSTEM INSTALLATION TOLERANCES	UNITS	
STRUCTURE FOUNDATION LOCATION ALONG TRACK: TANGENT & CURVE > 500 FT RADIUS	FEET	±5.0
TRACK CURVE LESS THAN 500 FT RADIUS	FEET	±2.00
ADJACENT TO SPECIAL TRACKWORK	FEET	±2.00
MAX SPAN CHANGE BETWEEN TWO ADJACENT STRUCTURES	FEET	±5.00
STRUCTURE FOUNDATION LOCATION − ACROSS TRACK		
− OUTSIDE POLES	INCHES	−0 +1.0
− CENTER POLES	INCHES	±1.00
FOUNDATION ELEVATION	INCHES	±1.00
POLE BASEPLATE ELEVATION	INCHES	±1.00
HANGER SPACING	INCHES	±3.00
CONDUCTOR HEIGHT AT SUPPORTS (SEE NOTE 1)		
− OPEN ROUTE	INCHES	±1.00
− TUNNEL UNDER & BRIDGES	INCHES	±0.50
STAGGER AT SUPPORTS	INCHES	±1.00
MESSENGER & CONTACT WIRE STAGGER DIFFERENCE AT SUPPORTS	INCHES	±2.00
WIRE TENSION	POUNDS	±50

5. MINIMUM CONTACT WIRE HEIGHT	FT	IN
TRACK VERTICAL TOLERANCE	0	0.5
VEHICLE HEIGHT ABOVE RAIL LEVEL	12	5
PANTOGRAPH LOCKDOWN ABOVE VEHICLE HEIGHT	0	3.5
PANTOGRAPH LOCKDOWN TO MINIMUM OPERATING HEIGHT	0	8
CONTACT WIRE ERECTION TOLERANCE	0	0.5
VEHICLE VERTICAL BOUNCE	0	1
MINIMUM CONTACT WIRE HEIGHT	13	6.5

6. DESIGN MINIMUM CONTACT WIRE HEIGHT	FT	IN
EXCLUSIVE R.O.W.	13	10
ROAD GRADE CROSSING	18	0
"HIGH & WIDE" GRADE CROSSING	22	0
IN STREET (NOT DOWNTOWN)	18	0
DOWNTOWN	16	0
TUNNEL SECTIONS	13	10
YARD	18	6

NOTES:

1. THE TOLERANCE GIVEN AT THE SUPPORTS FOR THE CONDUCTOR HEIGHT IS ONLY APPLICABLE PROVIDED THE CONDUCTOR GRADIENT IS ACCEPTABLE

2. FOR PANTOGRAPH CLEARANCE ENVELOPE SEE SHEET 115

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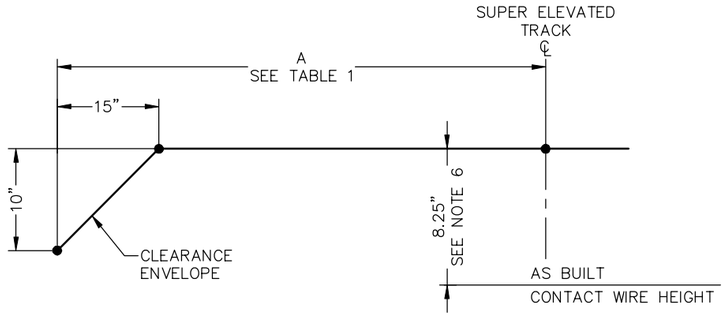
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
TOLERANCES AND WIRE HEIGHTS

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-DTL-102

SHEET 114 OF 240

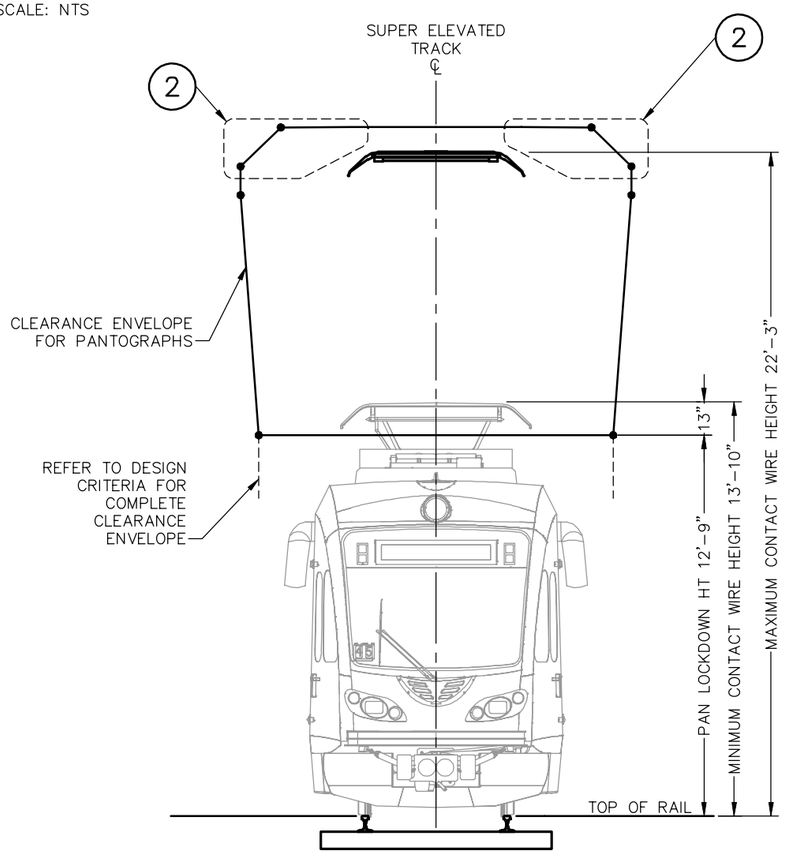


2 DETAIL
SCALE: NTS

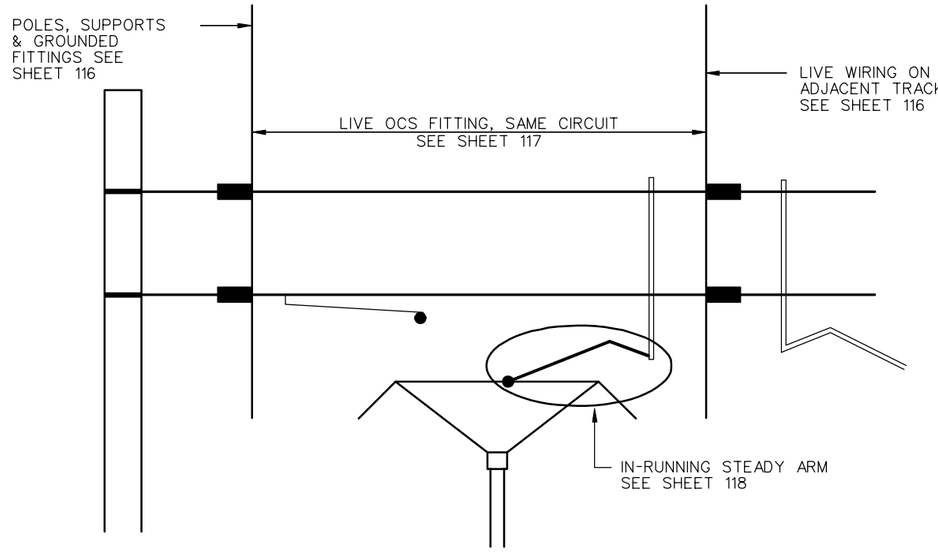
TABLE 1: DIMENSION TABLE		
AS–BUILT CW HT	DIMENSION A INCHES	
	EMBEDDED TRACK	BALLASTED TRACK
22'–0"	65.6	69.3
18'–6"	62.4	65.7
16'–0"	60.0	63.1
13'–10"	58.0	60.8

NOTES:

1. THIS DRAWING PROVIDES A SIMPLIFIED PANTOGRAPH CLEARANCE ENVELOPE FOR USE WITH AS BUILT OCS EQUIPMENT. TRACK AND POLES, MASONRY WALLS AND STRUCTURES. THE DIMENSIONS ARE TO BE MEASURED RELATIVE TO THE SUPERELEVATED TRACK.
2. OBSTRUCTIONS NOT CLEARING THIS OUTLINE MAY BE FURTHER EXAMINED AGAINST THE CONDITIONS AND MINIMUM CLEARANCES OF SHEETS 116, 117 & 118. SEE DETAIL 3.
3. FOR VALUES OF CONTACT WIRE HEIGHT BETWEEN THOSE LISTED IN TABLE 1, USE LINEAR INTERPOLATION TO DETERMINE A VALUE FOR DIMENSION A.
4. MINIMUM CLEARANCES FOR USE PRIOR TO CONSTRUCTION ARE TO BE CALCULATED USING ALLOWANCES SHOWN ON SHEETS 116, 117 & 118.
5. MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRIC SAFETY CODE (N.E.S.C) AND SHEET 113.
6. FOR STRUCTURAL MEMBERS THE VERTICAL CLEARANCE IS TO BE INCREASED TO 11.25".



SIMPLIFIED PANTOGRAPH CLEARANCE ENVELOPE FOR AS–BUILT CONDITIONS
SEE NOTE 1



3 RELATED MINIMUM CLEARANCE DETAIL
SCALE: NTS

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EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
SIMPLIFIED PANTOGRAPH CLEARANCE ENVELOPE

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-103

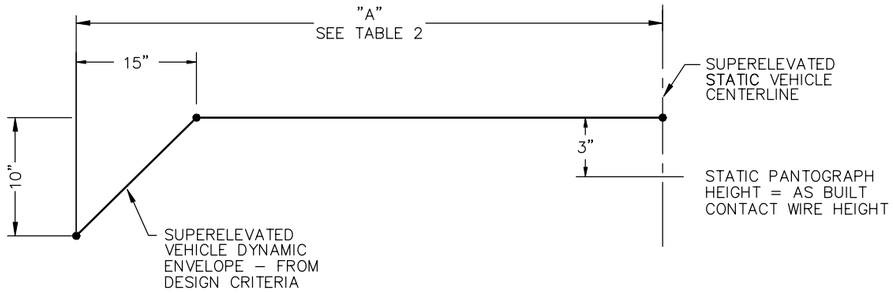
SHEET 115 OF 240

TABLE 1: HORIZONTAL OFFSET DUE TO TRACK SUPERELEVATION (OS)

AS–BUILT CW HEIGHT ABOVE RAIL	SUPERELEVATION (INCHES)					
	1	2	3	4	5	6
22'–0"	4.7	9.5	14.2	18.9	23.7	28.4
18'–6"	4.0	8.0	12.0	16.0	20.0	24.0
16'–0"	3.5	6.9	10.4	13.8	17.3	20.8
13'–10"	3.0	6.0	9.0	12.0	15.0	18.0

TABLE 2: VEHICLE DIMENSIONS
SEE NOTE 5

AS–BUILT CW HT	DIMENSION A INCHES	
	EMBEDDED TRACK	BALLASTED TRACK
22'–0"	62.1	64.3
18'–6"	58.9	60.7
16'–0"	56.5	58.1
13'–10"	54.5	55.8



EXTRACT FROM VEHICLE DYNAMIC ENVELOPE

SEE NOTE 5

NOTES:

1. THIS DRAWING PROVIDES DETAILED RELATIONSHIPS AND DIMENSIONS FOR DETERMINATION OF MINIMUM CLEARANCES BETWEEN A PANTOGRAPH AND ADJACENT FIXED INFRASTRUCTURE. THESE CLEARANCES MAY BE FURTHER REDUCED ONLY FOR THOSE CASES LISTED IN NOTE 2

2. FOR THE PURPOSE OF DETERMINATION OF CLEARANCES TO A PANTOGRAPH, AN OCS FITTING SHALL BE CONSIDERED LIVE WHERE IT IS SEPARATED FROM GROUNDED POLES OR LIVE WIRING OF ADJACENT TRACKS, BY AT LEAST ONE LEVEL OF SYSTEM RATED INSULATION

   – FOR IN–RUNNING LIVE STEADY ARMS, SEE SHEET 118
   – FOR OTHER LIVE OCS EQUIPMENT, SEE SHEET 117
   – ALL OTHER STRUCTURES, POLES OR EQUIPMENT REQUIRE PANTOGRAPH CLEARANCES DETERMINED FROM THIS DRAWING

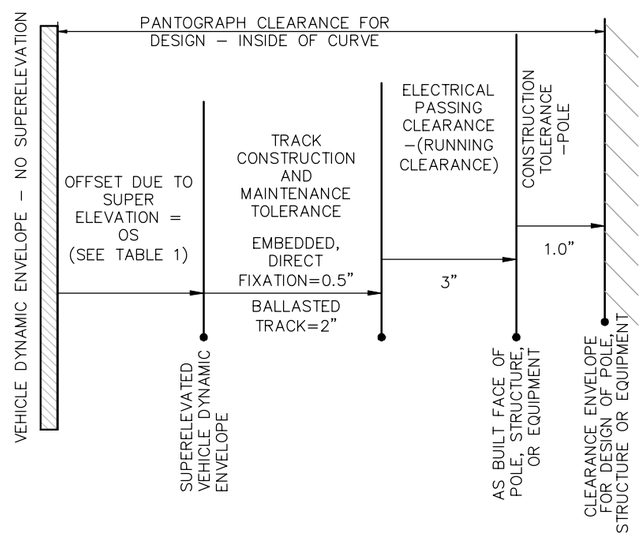
3. FOR OBJECTS DIAGONALLY SEPARATED, BOTH HORIZONTAL AND VERTICAL CLEARANCES ARE TO BE APPLIED. RUNNING CLEARANCES COMPONENTS MAY BE MEASURE RADIALLY

4. MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRIC SAFETY CODE (N.E.S.C.) AND SHEET 113

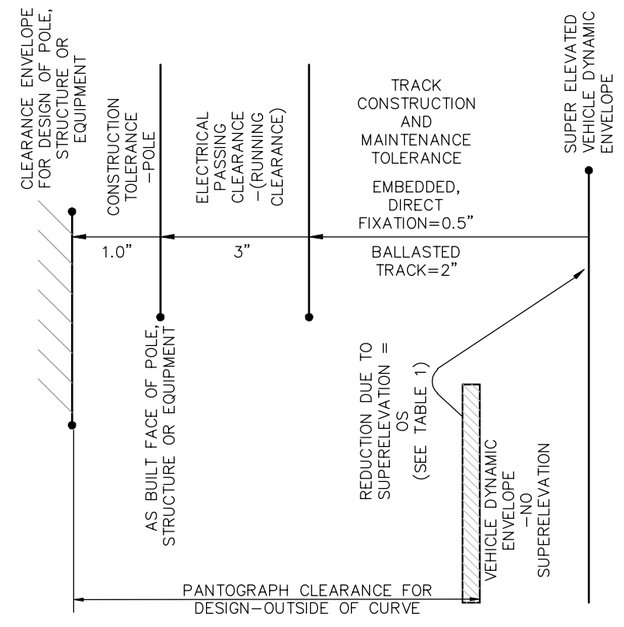
5. VEHICLE DYNAMIC ENVELOPE DETERMINED FOR SUPERELEVATION = 0" FROM CLEARANCE REQUIREMENTS OF DESIGN CRITERIA

6. SUPERELEVATION OFFSET (OS) IS TO BE CONSIDERED WHEN MEASUREMENTS ARE TAKEN FROM VERTICAL TRACK CENTERLINE

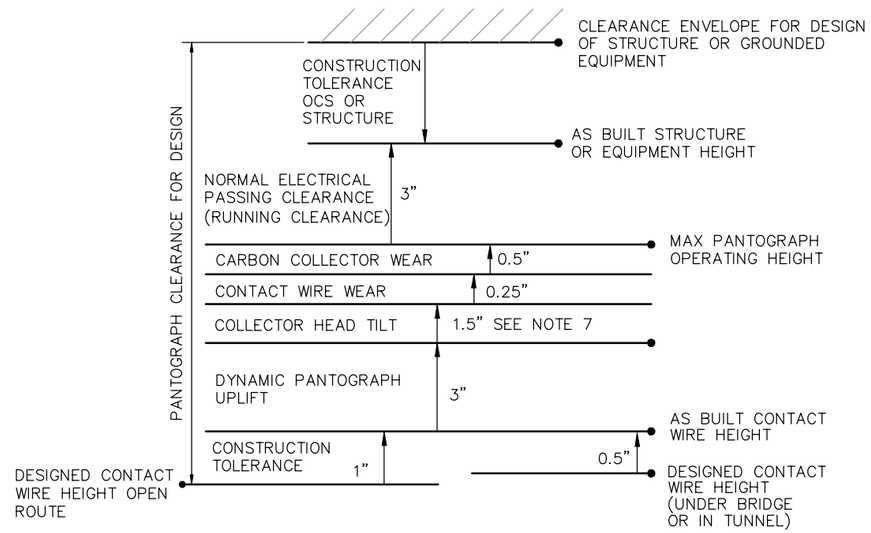
7. COLLECTOR HEAD TILT TO BE CONSIDERED ONLY WHERE ALL IN–RUNNING CONTACT WIRES ARE STAGGERED TO THE FAR SIDE OF THE SUPERELEVATED VEHICLE CENTERLINE



MINIMUM HORIZONTAL CLEARANCE TO OBJECTS ON THE INSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM HORIZONTAL CLEARANCE TO OBJECTS ON THE OUTSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM VERTICAL CLEARANCE TO OBJECTS ABOVE THE TRACK FROM A PANTOGRAPH

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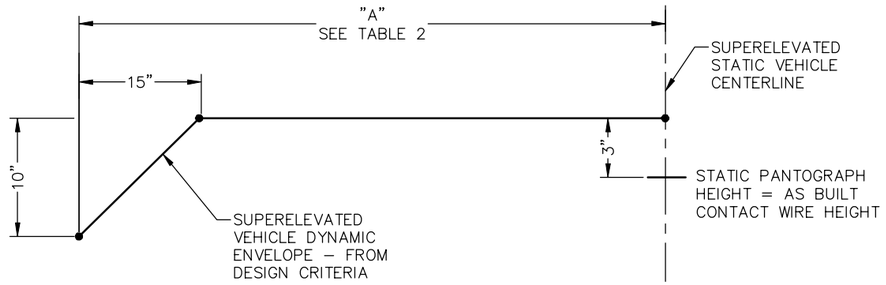
EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
PANTOGRAPH CLEARANCE TO GROUNDED ITEMS

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-104

SHEET 116 OF 240

TABLE 1: HORIZONTAL OFFSET DUE TO TRACK SUPERELEVATION (OS)						
AS–BUILT CW HEIGHT ABOVE RAIL	SUPERELEVATION (INCHES)					
	1	2	3	4	5	6
22'–0"	4.7	9.5	14.2	18.9	23.7	28.4
18'–6"	4.0	8.0	12.0	16.0	20.0	24.0
16'–0"	3.5	6.9	10.4	13.8	17.3	20.8
13'–10"	3.0	6.0	9.0	12.0	15.0	18.0

TABLE 2: VEHICLE DIMENSIONS SEE NOTE 5		
AS–BUILT CW HT	DIMENSION A INCHES	
	EMBEDDED TRACK	BALLASTED TRACK
22'–0"	62.1	64.3
18'–6"	58.9	60.7
16'–0"	56.5	58.0
13'–10"	54.5	55.8

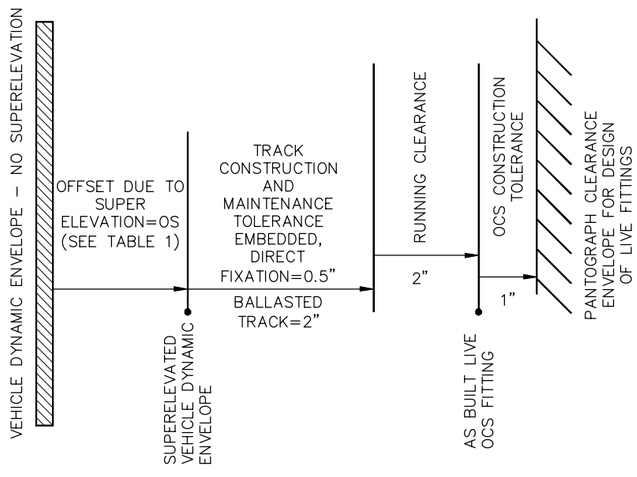


EXTRACT FROM VEHICLE DYNAMIC ENVELOPE

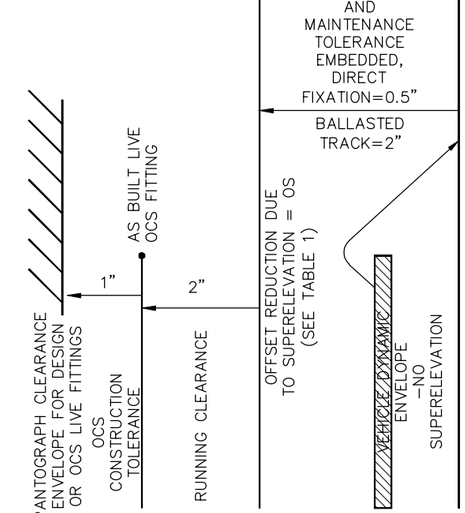
SEE NOTE 5

NOTES:

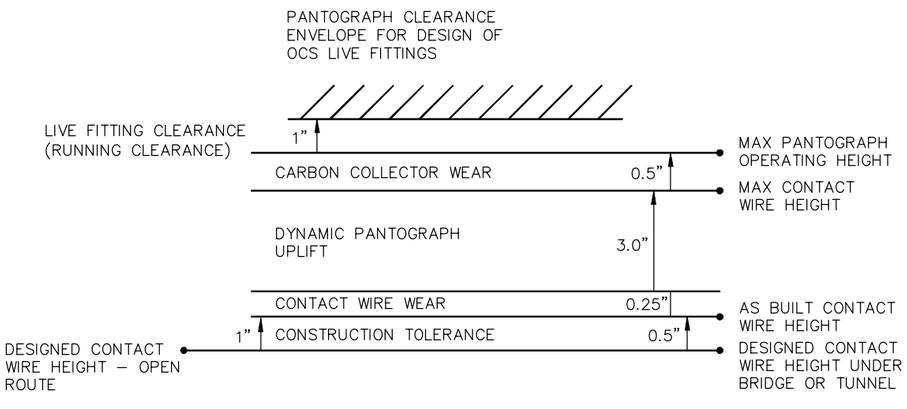
1. THE DRAWING PROVIDES RELATIONSHIPS AND DIMENSIONS FOR DETERMINATION OF MINIMUM CLEARANCES BETWEEN A PANTOGRAPH AND ADJACENT LIVE OCS, FITTINGS, EXCEPTING FOR IN–RUNNING STEADY ARMS.
2. FOR THE PURPOSE OF DETERMINATION OF CLEARANCES TO A PANTOGRAPH, AN OCS FITTING SHALL BE CONSIDERED LIVE ONLY WHERE IT IS SEPARATED FROM GROUNDED POLES OR LIVE WIRING OF ADJACENT TRACKS, BY AT LEAST ONE LEVEL OF SYSTEM RATED INSULATION.
   - FOR IN–RUNNING STEADY ARM, SEE SHEET 118
   - CLEARANCES FOR OTHER LIVE OCS FITTINGS TO BE DETERMINED FROM THIS DRAWING
   - ALL OTHER STRUCTURES, POLES OR EQUIPMENT REQUIRE CLEARANCES DETERMINED FROM SHEET 116
3. FOR OBJECTS DIAGONALLY SEPARATED, BOTH HORIZONTAL AND VERTICAL CLEARANCES ARE TO BE APPLIED. RUNNING CLEARANCE COMPONENTS MAY BE MEASURE RADIALLY.
4. MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRIC SAFETY CODE (N.E.S.C.) AND SHEET 113
5. VEHICLE DYNAMIC ENVELOPE DETERMINED FROM CLEARANCE REQUIREMENTS OF DESIGN CRITERIA.
6. SUPERELEVATION OFFSET (OS) IS TO BE CONSIDERED WHEN MEASUREMENTS ARE TAKEN FROM VERTICAL TRACK CENTERLINE.
7. CURVED TRACK ALLOWANCES Th AND Tc ARE TO BE CONSIDERED FOR INSIDE OF CURVE CLEARANCES.
8. COLLECTOR HEAD TILT TO BE CONSIDERED ONLY WHERE ALL IN–RUNNING CONTACT WIRES ARE STAGGERED TO THE FAR SIDE OF THE SUPERELEVATED VEHICLE CENTERLINE.



MINIMUM HORIZONTAL CLEARANCE TO LIVE FITTINGS ON THE INSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM HORIZONTAL CLEARANCE TO LIVE FITTINGS ON THE OUTSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM VERTICAL CLEARANCE FROM A PANTOGRAPH TO LIVE FITTINGS

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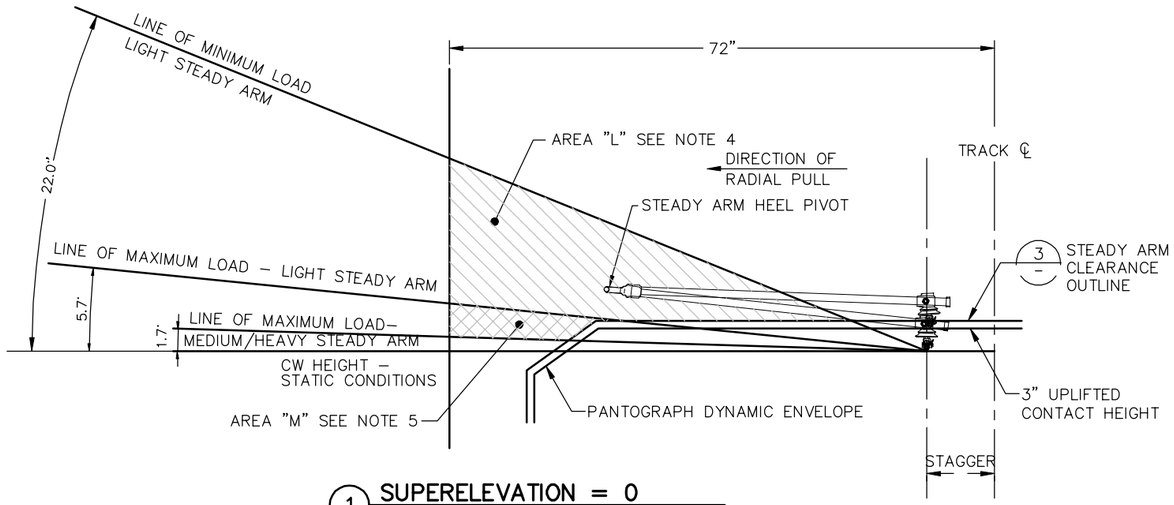
EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEMS - DETAILS
PANTOGRAPH CLEARANCE TO LIVE OCS FITTINGS

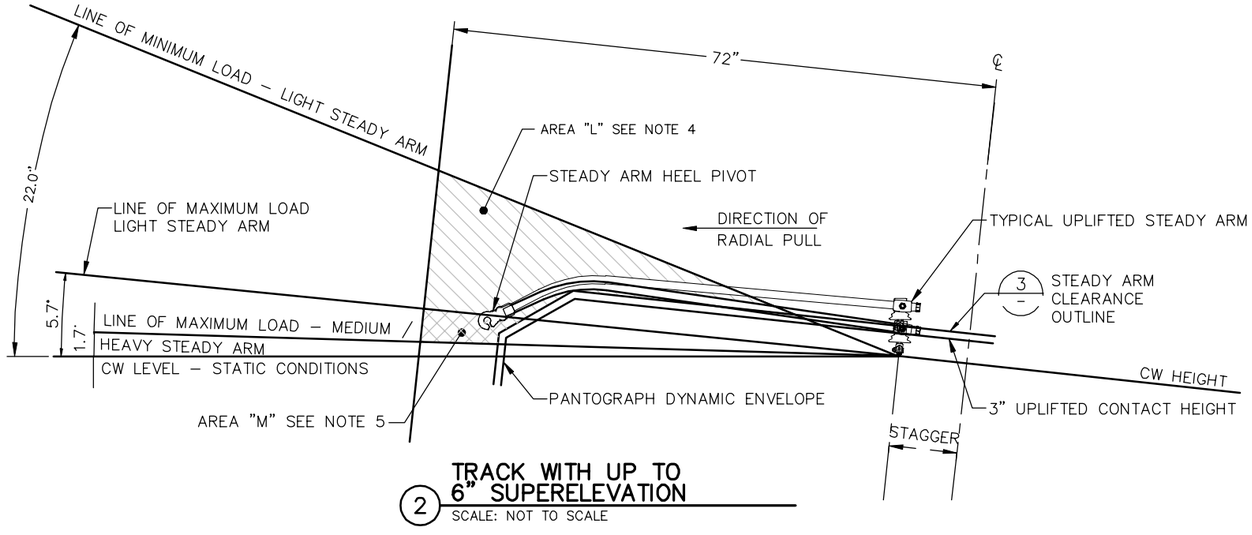
DISCIPLINE: SYSTEMS

SHEET NAME: OCS-DTL-105

SHEET 117 OF 240



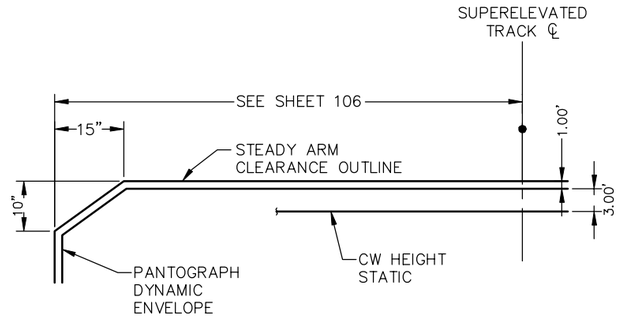
1 **SUPERELEVATION = 0**
SCALE: NOT TO SCALE



2 **TRACK WITH UP TO 6" SUPERELEVATION**
SCALE: NOT TO SCALE

NOTES:

1. THIS DRAWING IS TO BE USED FOR THE DESIGN AND APPLICATION OF STEADY ARMS REGISTERING IN–RUNNING CONTACT WIRES. IT DOES NOT APPLY TO UPLIFT RESTRICTING STEADY ARMS SPECIFIED FOR USE IN TUNNELS
2. ALL STEADY ARMS SHALL BE SHAPED SO AS NOT TO ENCROACH INSIDE THE STEADY ARM CLEARANCE OUTLINE OR WITHIN 1" RUNNING CLEARANCE OF THE PANTOGRAPH DYNAMIC ENVELOPE EXCEPTING FOR CONTACT WIRE CLAMP COMPONENTS
3. THE DIRECTION OF LOAD PULL IS TO BE MEASURED FROM THE STATIC CONTACT WIRE HEIGHT, WITH THE ANGLE RELATIVE TO LEVEL
4. LIGHT LOAD STEADY ARMS ARE TO BE SUITABLE FOR RADIAL LOADS UP TO 200 POUNDS. THE STEADY ARM HEEL PIVOT POINT IS TO FALL WITHIN AREA "L" SHOWN
5. MEDIUM LOAD STEADY ARMS ARE TO BE SUITABLE FOR RADIAL LOADS UP TO 500 POUNDS. THE STEADY ARM HEEL PIVOT POINT IS TO FALL WITHIN AREA "M" SHOWN
6. HEAVY RADIAL LOADS OF UP TO 1000 POUNDS SHALL BE SERVICED BY USING TWO MEDIUM LOAD STEADY ARMS ARRANGED TO SHARE LOAD EQUALLY
7. FOR AUTO–TENSIONED CONTACT WIRE THE MINIMUM DISTANCE FROM CONTACT WIRE TO HEEL PIVOT SHALL BE 36"



3 **STEADY ARM CLEARANCE FROM UPLIFTED PANTOGRAPH**
SCALE: NOT TO SCALE

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
STEADY ARM CLEARANCE SHAPES AND DIMENSIONS

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-106

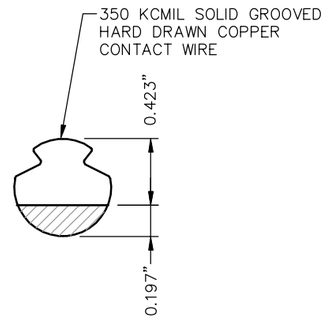
SHEET 118 OF 240

SIMPLE CATENARY AUTO–TENSIONED (SCAT)			
CONDUCTOR PARTICULARS (UNWORN CONDITION)	UNITS	CONDUCTOR	
		CONTACT	MESSENGER
CONDUCTOR TYPE	–	350 KCMIL SOLID GROOVED	500 KCMIL 19 STRAND
MATERIAL	–	HARD DRAWN COPPER	HARD DRAWN COPPER
DIAMETER	IN	0.620	0.811
CROSS SECTIONAL AREA	SQ IN	0.2758	0.3926
WEIGHT OF CONDUCTOR	LB/FT	1.063	1.544
WEIGHT OF SYSTEM	LB/FT	2.654	
RADIAL THICKNESS OF ICE (O)	IN.	0.25	0.50
WEIGHT OF ICE (O)	LB/FT	0.270	0.815
WEIGHT OF SYSTEM WITH ICE (O)	LB/FT	3.739	
RADIAL THICKNESS OF ICE (NO)	IN	0.50	0.50
WEIGHT OF ICE (NO)	LB/FT	0.696	0.815
WEIGHT OF SYSTEM WITH ICE (NO)	LB/FT	4.165	
CONDUCTOR BREAKING LOAD	LB	11810	21590
MAXIMUM SPAN	FT	220	
CONDUCTOR TENSIONS AT:			
60°F NO WIND	LB	3000	5000
120°F NO WIND	LB	3000	5000
–40°F WIND & ICE (O)	LB	3962	6707
–40°F WIND & ICE (NO)	LB	4038	7052
CONDUCTOR SAG ON MAXIMUM SPAN AT:			
60°F NO WIND	FT	0	3.211
120°F NO WIND	FT	0	3.211
–40° NO WIND ICE (O)	FT	0.162	3.373
–40°F NO WIND ICE (NO)	FT	0.362	3.573
SYSTEM HEIGHT	FT	4.0 (NORMAL)	
CONTACT WIRE HEIGHT AT 60°F	FT	18.50 (NORMAL)	
LOWER LIMIT OF AUTO TENSIONING	°F	–20	
UPPER LIMIT OF AUTO TENSIONING	°F	120	
MODULUS OF ELASTICITY	PSI	$16x10^{6}$	$16x10^{6}$
COEFFICIENT OF THERMAL EXPANSION	–/°F	$9.4x10^{-6}$	$9.4x10^{-6}$
MINIMUM FACTOR OF SAFETY	–	2.92	3.06

SIMPLE CATENARY AUTO–TENSIONED (SCAT)			
CONDUCTOR PARTICULARS (WORN CONDITION)	UNITS	CONDUCTOR	
		CONTACT	MESSENGER
PERMISSIBLE WEAR	% OF AREA	30.00	–
WEIGHT OF SYSTEM	LB/FT	2.335	
WEIGHT OF SYSTEM WITH ICE (O)	LB/FT	3.383	
WEIGHT OF SYSTEM WITH ICE (NO)	LB/FT	3.772	
CONDUCTOR TENSION AT:	–		
–40°F WIND & ICE (NO)	LB	3727	–
CONDUCTOR BREAKING LOAD	LB	8267	–
MINIMUM SAFETY FACTOR	–	2.22	–

NOTES:

1. ICE (O) OPERATING CONDITION IS WITH 1/2" RADIAL ICE ON THE MESSENGER WIRE AND 1/4" RADIAL ICE ON THE CONTACT WIRE
2. ICE (NO) NON OPERATING CONDITION IS WITH 1/2" RADIAL ICE ON BOTH MESSENGER & CONTACT WIRES
3. SYSTEM WEIGHTS SHOWN ARE FOR DESIGN PURPOSES AND CONSIST OF CONDUCTOR WEIGHTS PER FOOT, WHICH WERE TAKEN FROM MANUFACTURERS INFORMATION TABLES



PERMISSIBLE WEAR 30% OF THE ORIGINAL CROSS SECTIONAL AREA

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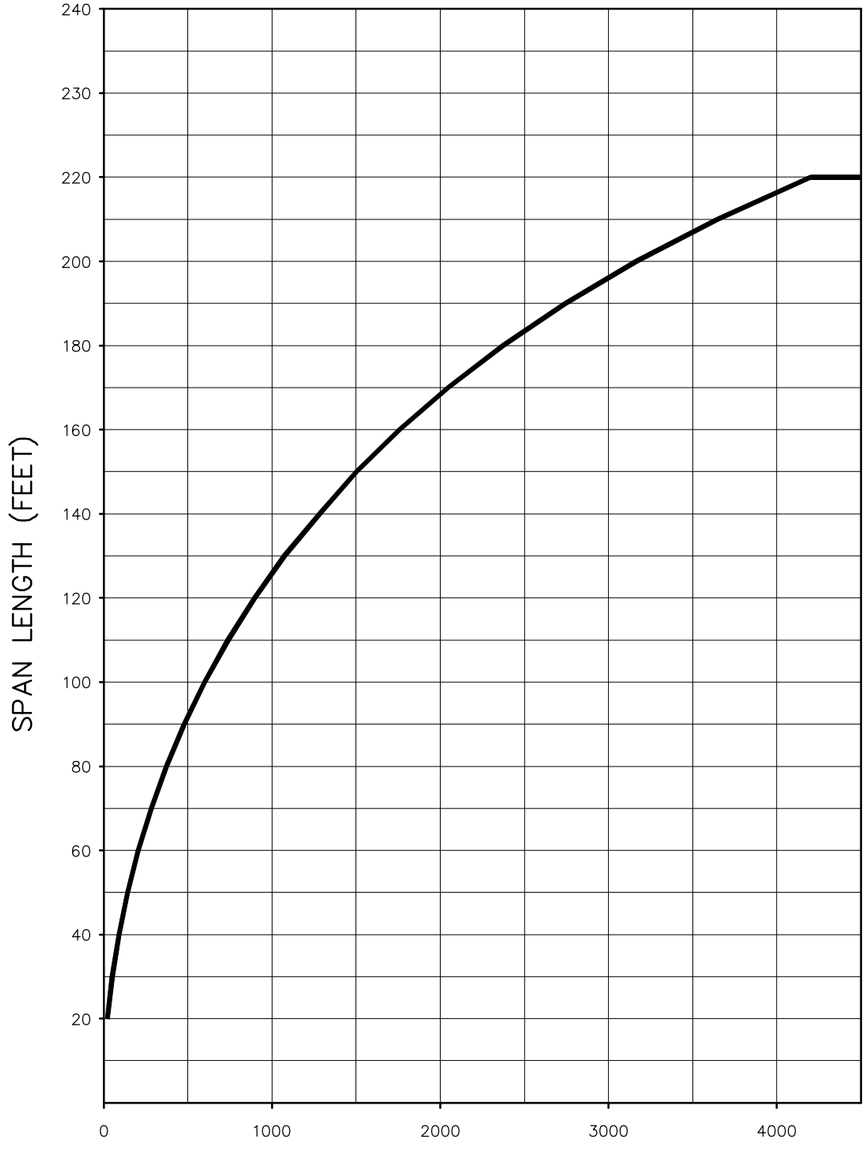
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
SCAT - CONDUCTOR PARTICULARS

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-DTL-107

SHEET 119 OF 240



MAXIMUM STRUCTURE SPACING
SEE NOTE 4

MAXIMUM CONSTRUCTED SPAN – CURVED TRACK				
18'–6" CONTACT WIRE HEIGHT				
SPAN [FT]	MAX VERSINE [IN]	STATIC OFFSET [IN]	BLOW–OFF [FT]	MIN. CURVE RADIUS [FT]
20	26.880	14.880	0.007	22
30	26.780	14.780	0.015	50
40	26.640	14.640	0.027	90
50	26.460	14.460	0.042	142
60	26.240	14.240	0.060	206
70	25.980	13.980	0.082	283
80	25.680	13.680	0.107	374
90	25.340	13.340	0.135	479
100	24.960	12.960	0.167	601
110	24.540	12.540	0.202	740
120	24.080	12.080	0.240	897
130	23.580	11.580	0.282	1075
140	23.040	11.040	0.327	1276
150	22.460	10.460	0.375	1503
160	21.840	9.840	0.427	1758
170	21.180	9.180	0.482	2047
180	20.480	8.480	0.540	2373
190	19.740	7.740	0.602	2743
200	18.960	6.960	0.667	3165
210	18.140	6.140	0.735	3647
220	17.280	5.280	0.807	4201

TABLE 1: MAXIMUM MID–SPAN STATIC OFFSET
SEE NOTE 6

NOTES:

1. MAXIMUM STRUCTURE SPACINGS FOR SPANS WHOLLY OVER CONSTANT RADIUS TRACK CURVE, ARE TO BE DETERMINED FROM THE GRAPHS AND RELATED NOTES. FOR ALL OTHER HORIZONTAL ALIGNMENT COMBINATIONS, SPACING MUST SATISFY MAXIMUM STATIC MIDSPAN OFFSET CRITERIA APPLIED TO STAGGERED CONTACT WIRE.
2. THE MAXIMUM STATIC MIDSPAN OFFSET IS THE VALUE THE CONTACT WIRE CAN BE FROM THE CENTER LINE OF A STATIC PANTOGRAPH UNDER STILL AIR CONDITIONS MEASURED AT MID–SPAN.
3. WHERE AS–BUILT STATIC MIDSPAN OFFSET EXCEEDS THE MAXIMUM VALUE LISTED IN TABLE 1, FURTHER CONSTRUCTION MAY ONLY CONTINUE AFTER SITE SPECIFIC APPROVAL BY THE CAR.
4. THE SPACINGS SHOWN ARE THE ABSOLUTE MAXIMUM FOR EACH CONTACT WIRE HEIGHT AND TRACK TYPE CONDITION. FOR DESIGN PURPOSES THE MAXIMUM SPAN SHALL BE REDUCED BY 5 FEET TO CATER FOR SITE ADJUSTMENTS IF OBSTRUCTIONS ARE ENCOUNTERED.
5. MAXIMUM CONTACT WIRE STAGGER = 9".
6. INSTALLED CONTACT WIRE SPANS MAY BE ACCEPTED WITH 1 INCH OF ADDITIONAL MIDSPAN OFFSET CONSTRUCTION TOLERANCE ABOVE THE MAXIMUM VALUES LISTED.
7. THE CONDITIONS FOR THE STRUCTURE SPACING CHART AND THE TABLES ARE 60° F WITH A WIND SPEED OF 55 MPH.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
SCAT -- STRUCTURE SPACING

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-108

SHEET 120 OF 240

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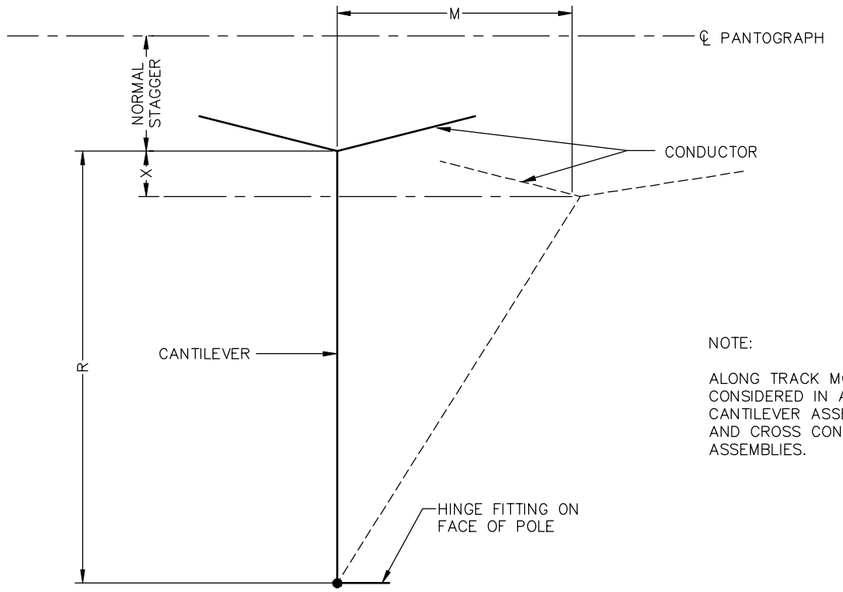
ALONG TRACK MOVEMENT [IN]															
		DISTANCE FROM MID POINT OR FIXED TERMINATION [FT]													
		200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2640
TEMPERATURE	−20	−1.80	−3.61	−5.41	−7.22	−9.02	−10.83	−12.63	−14.44	−16.24	−18.05	−19.85	−21.66	−23.46	−23.82
	−10	−1.58	−3.16	−4.74	−6.32	−7.90	−9.48	−11.05	−12.63	−14.21	−15.79	−17.37	−18.95	−20.53	−20.85
	0	−1.35	−2.71	−4.06	−5.41	−6.77	−8.12	−9.48	−10.83	−12.18	−13.54	−14.89	−16.24	−17.60	−17.87
	10	−1.13	−2.26	−3.38	−4.51	−5.64	−6.77	−7.90	−9.02	−10.15	−11.28	−12.41	−13.54	−14.66	−14.89
	20	−0.90	−1.80	−2.71	−3.61	−4.51	−5.41	−6.32	−7.22	−8.12	−9.02	−9.93	−10.83	−11.73	−11.91
	30	−0.68	−1.35	−2.03	−2.71	−3.38	−4.06	−4.74	−5.41	−6.09	−6.77	−7.44	−8.12	−8.80	−8.93
	40	−0.45	−0.90	−1.35	−1.80	−2.26	−2.71	−3.16	−3.61	−4.06	−4.51	−4.96	−5.41	−5.87	−5.96
	50	−0.23	−0.45	−0.68	−0.90	−1.13	−1.35	−1.58	−1.80	−2.03	−2.26	−2.48	−2.71	−2.93	−2.98
	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	0.23	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.26	2.48	2.71	2.93	2.98
	80	0.45	0.90	1.35	1.80	2.26	2.71	3.16	3.61	4.06	4.51	4.96	5.41	5.87	5.96
	90	0.68	1.35	2.03	2.71	3.38	4.06	4.74	5.41	6.09	6.77	7.44	8.12	8.80	8.93
	100	0.90	1.80	2.71	3.61	4.51	5.41	6.32	7.22	8.12	9.02	9.93	10.83	11.73	11.91
	110	1.13	2.26	3.38	4.51	5.64	6.77	7.90	9.02	10.15	11.28	12.41	13.54	14.66	14.89
	120	1.35	2.71	4.06	5.41	6.77	8.12	9.48	10.83	12.18	13.54	14.89	16.24	17.60	17.87

− (VE) INDICATES MOVEMENT TOWARD MID POINT ANCHOR
+ (VE) INDICATES MOVEMENT AWAY FROM MID POINT ANCHOR
ALONG TRACK MOVEMENT IS IN INCHES

ALONG TRACK MOVEMENT − AUTO−TENSIONED O.C.S.



NOTE:

ALONG TRACK MOVEMENT IS TO BE CONSIDERED IN ADJUSTMENT OF CANTILEVER ASSEMBLIES, STEADY ARMS, AND CROSS CONTACT BRIDGE ASSEMBLIES.

M=ALONG TRACK MOVEMENT
X=STAGGER CHANGE
R=DISTANCE FROM FACE OF POLE TO CONDUCTOR

$M = \alpha L T$

WHERE α =COEFFICIENT OF EXPANSION OF CONDUCTOR
L =DISTANCE FROM MID POINT ANCHOR
T =TEMPERATURE RANGE

$X = R - \sqrt{R^2 - M^2}$

WHERE R=CANTILEVER REACH
M=ALONG TRACK MOVEMENT

ALONG TRACK MOVEMENT [IN]	CANTILEVER REACH (DIMENSION R FEET−INCHES)													
	6'−0"	6'−6"	7'−0"	7'−6"	8'−0"	8'−6"	9'−0"	9'−6"	10'−0"	10'−6"	11'−0"	11'−6"	12'−0"	12'−6"
2	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
4	0.11	0.10	0.10	0.09	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05
6	0.25	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.14	0.13	0.13	0.12
8	0.45	0.41	0.38	0.36	0.33	0.31	0.30	0.28	0.27	0.25	0.24	0.23	0.22	0.21
10	0.70	0.64	0.60	0.56	0.52	0.49	0.46	0.44	0.42	0.40	0.38	0.36	0.35	0.33
12	1.01	0.93	0.86	0.80	0.75	0.71	0.67	0.63	0.60	0.57	0.55	0.52	0.50	0.48
14	1.37	1.27	1.17	1.10	1.03	0.97	0.91	0.86	0.82	0.78	0.74	0.71	0.68	0.65
16	1.80	1.66	1.54	1.43	1.34	1.26	1.19	1.13	1.07	1.02	0.97	0.93	0.89	0.86
18	2.29	2.11	1.95	1.82	1.70	1.60	1.51	1.43	1.36	1.29	1.23	1.18	1.13	1.08
20	2.83	2.61	2.42	2.25	2.11	1.98	1.87	1.77	1.68	1.60	1.52	1.46	1.40	1.34
22	3.44	3.17	2.93	2.73	2.55	2.40	2.26	2.14	2.03	1.94	1.85	1.76	1.69	1.62
24	4.12	3.78	3.50	3.26	3.05	2.86	2.70	2.55	2.42	2.31	2.20	2.10	2.01	1.93

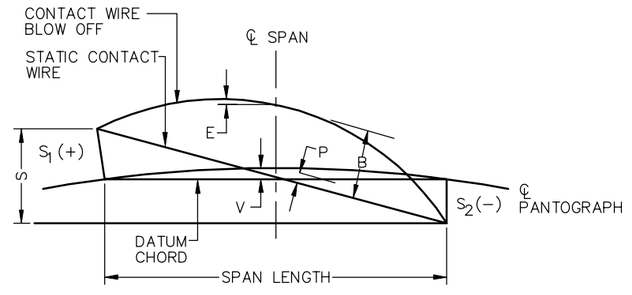
STAGGER CHANGE − AUTO−TENSIONED O.C.S.

STAGGER CHANGE VALUES IN INCHES

B−V [IN]	STAGGER DIFFERENCE(S) [IN]								
	2	4	6	8	10	12	14	16	18
2	0.13	0.50	1.13	2.00	3.13	4.50	6.13	8.00	10.13
4	0.06	0.25	0.56	1.00	1.56	2.25	3.06	4.00	5.06
6	0.04	0.17	0.38	0.67	1.04	1.50	2.04	2.67	3.38
8	0.03	0.13	0.28	0.50	0.78	1.13	1.53	2.00	2.53
10	0.03	0.10	0.23	0.40	0.63	0.90	1.23	1.60	2.03
12	0.02	0.08	0.19	0.33	0.52	0.75	1.02	1.33	1.69
14	0.02	0.07	0.16	0.29	0.45	0.64	0.88	1.14	1.45
16	0.02	0.06	0.14	0.25	0.39	0.56	0.77	1.00	1.27
18	0.01	0.06	0.13	0.22	0.35	0.50	0.68	0.89	1.13
20	0.01	0.05	0.11	0.20	0.31	0.45	0.61	0.80	1.01

STAGGER EFFECT − ALL O.C.S. STYLES

STAGGER EFFECT VALUES IN INCHES



S = STAGGER DIFFERENCE
S1 & S2 = STAGGER AT EACH SUPPORT
V = VERSINE OF CURVE BETWEEN SUPPORTS
P = CONTACT WIRE MIDSPAN OFFSET
B = CONTACT WIRE BLOW OFF
E = STAGGER EFFECT
STAGGER DIFFERENCE (S) = S1−S2

$$\text{STAGGER EFFECT (E)} = \frac{(S)^2}{16(B-V)}$$

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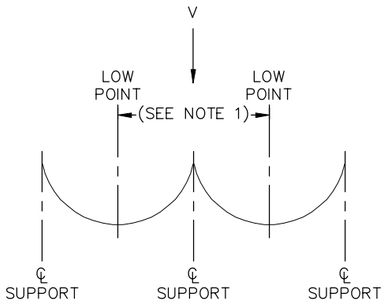
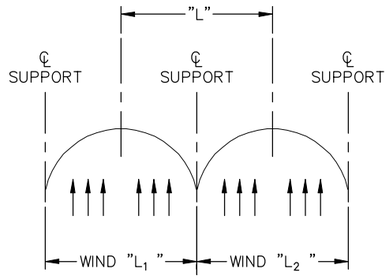
EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
SCAT - RISE & FALL
AND ALONG TRACK MOVEMENT

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-109

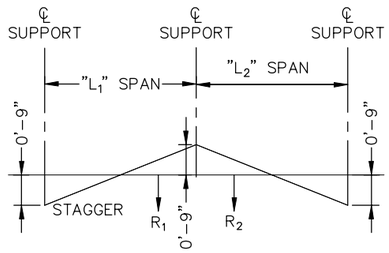
SHEET 121 OF 240



V = VERTICAL LOAD



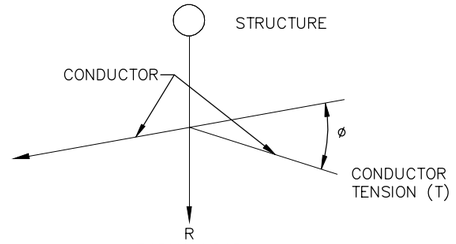
$$L = \frac{L_1 + L_2}{2}$$



RADIAL LOAD (R) AT SUPPORT
$R = R_1 + R_2$
RADIAL LOAD IS BASED ON 9" STAGGER AT SUPPORTS

NOTE:

L = SUM OF THE DISTANCE TO THE LOW POINT OF THE MESSENGER WIRE ON BOTH SIDES OF THE SUPPORT



RADIAL LOAD
$R = 2T \sin (1/2\ \theta)$

TO DETERMINE RADIAL LOAD, MEASURE TO DETERMINE RADIAL LOAD, MEASURE ANGLE θ AND USE TABLE TO DETERMINE LOAD FOR CONDITION REQUIRED. LOAD FOR CONDITION REQUIRED.

VERTICAL LOADING

SPAN (FEET)	CONDITION AND LOAD VALUE (V) (LB)		
	BARE	ICE (NO)	ICE (O)
40	106.16	166.60	149.56
50	132.70	208.25	186.95
60	159.24	249.90	224.34
70	185.78	291.55	261.73
80	212.32	333.20	299.12
90	238.86	374.85	336.51
100	265.40	416.50	373.90
110	291.94	458.15	411.29
120	318.48	499.80	448.68
130	345.02	541.45	486.07
140	371.56	583.10	523.46
150	398.10	624.75	560.85
160	424.64	666.40	598.24
170	451.18	708.05	635.63
180	477.72	749.70	673.02
190	504.26	791.35	710.41
200	530.80	833.00	747.80
210	557.34	841.64	785.19
220	583.88	916.30	822.58

WIND LOADING

SPAN (FEET)	CONDITION AND FORCE (WIND LOADING) (LB)							
	BARE WIRE 90 MPH WIND (N/O)		BARE WIRE 55 MPH WIND (O)		1/2" ICE MW & CW 40 MPH WIND (N/O)		1/2" ICE MW 1/4" ICE CW 40 MPH WIND (O)	
	CW	MW	CW	MW	CW	MW	CW	MW
40	42.8	56.0	16.0	20.8	22.0	24.8	15.2	24.8
50	553.5	70.0	20.0	26.0	27.5	31.0	19.0	31.0
60	64.2	84.0	24.0	31.2	33.0	37.2	22.8	37.2
70	74.9	98.0	28.0	36.4	38.5	43.4	26.6	43.4
80	85.6	112.0	32.0	41.6	44.0	49.6	30.4	49.6
90	96.3	126.0	36.0	46.8	49.5	55.8	34.2	55.8
100	107.0	140.0	40.0	52.0	55.0	62.0	38.0	62.0
110	117.7	154.0	44.0	57.2	60.5	68.2	41.8	68.2
120	128.4	168.0	48.0	62.4	66.0	74.4	45.6	74.4
130	139.1	182.0	52.0	67.6	71.5	80.6	49.4	80.6
140	149.8	196.0	56.0	72.8	77.0	86.8	53.2	86.8
150	160.5	210.0	60.0	78.0	82.5	93.0	57.0	93.0
160	171.2	224.0	64.0	83.2	88.0	99.2	60.8	99.2
170	181.9	238.0	68.0	88.4	93.5	105.4	64.6	105.4
180	192.6	252.0	72.0	93.6	99.0	111.6	68.4	111.6
190	203.3	266.0	76.0	98.8	104.5	117.8	72.2	117.8
200	214.0	280.0	80.0	104.0	110.0	124.0	76.0	124.0
210	224.7	294.0	84.0	109.2	115.5	130.2	79.8	130.2
220	235.4	308.0	88.0	114.4	121.0	136.4	83.6	136.4

RADIAL LOAD TANGENT TRACK

SPAN (FEET)	CONDITION AND RADIAL LOAD (LB) (R1 AND R2)					
	60°F NO WIND		OPERATING 40°F 40 MPH		NON-OPERATING -40°F, 40 MPH	
	NO ICE	NO ICE	1/4" ICE	1/2" ICE	1/2" ICE	1/2" ICE
	CW	MW	CW	MW	CW	MW
40	224.84	374.74	296.94	502.67	302.64	528.53
50	179.92	299.87	237.61	402.24	242.17	422.93
60	149.95	249.92	198.04	335.25	201.84	352.49
70	128.54	214.24	169.76	287.38	173.02	302.16
80	112.48	187.47	148.55	251.47	151.40	264.40
90	99.99	166.64	132.05	223.54	134.58	235.03
100	89.99	149.98	118.85	201.19	121.13	211.54
110	81.81	136.35	108.04	182.90	110.12	192.31
120	74.99	124.99	99.04	167.66	100.94	176.29
130	69.23	115.38	91.42	154.77	93.18	162.73
140	64.28	107.14	84.90	143.71	86.52	151.11
150	60.00	100.00	79.24	134.13	80.76	141.03
160	56.25	93.75	74.28	125.75	75.71	132.22
170	52.94	88.23	69.91	118.35	71.26	124.44
180	50.00	83.33	66.03	111.78	67.30	117.53
190	47.37	78.94	62.56	105.90	63.76	111.34
200	45.00	75.00	59.43	100.60	60.57	105.78
210	42.86	71.43	56.60	95.81	57.68	100.74
220	40.91	68.18	54.03	91.46	55.06	96.16

RADIAL LOAD BY ANGLE

ANGLE (DEGREES) θ	CONDITION AND RADIAL LOAD (LB)					
	60°F NO WIND		OPERATING 40°F 40 MPH		NON-OPERATING -40°F, 40 MPH	
	NO ICE	NO ICE	1/4" ICE	1/2" ICE	1/2" ICE	1/2" ICE
	CW	MW	CW	MW	CW	MW
0.5	26.18	43.63	34.57	58.53	35.24	61.54
1	52.36	87.27	69.14	117.06	70.48	123.08
1.5	78.54	130.90	103.72	175.58	105.71	184.62
2	104.71	174.52	138.29	234.11	140.95	246.15
2.5	130.89	218.15	172.86	292.62	176.18	307.68
3	157.06	261.77	207.43	351.14	211.41	369.20
4	209.40	348.99	276.54	468.14	281.85	492.22
5	261.72	436.19	345.64	585.11	352.27	615.21
6	314.02	523.36	414.71	702.03	422.67	738.15
7	366.29	610.49	483.75	818.91	493.03	861.03
8	418.54	697.56	552.75	935.71	563.35	983.85
9	470.75	784.59	621.71	1052.45	633.64	1106.59
10	522.93	871.56	690.62	1169.11	703.87	1229.24
11	575.07	958.46	759.48	1285.67	774.05	1351.81
12	627.17	1045.28	828.28	1402.14	844.17	1474.27
13	679.22	1132.03	897.02	1518.51	914.23	1596.62
14	731.22	1218.69	965.69	1634.76	984.22	1718.85
15	783.16	1305.26	1034.29	1750.88	1054.13	1840.94

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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Gannett Fleming
PRELIMINARY ENGINEERING

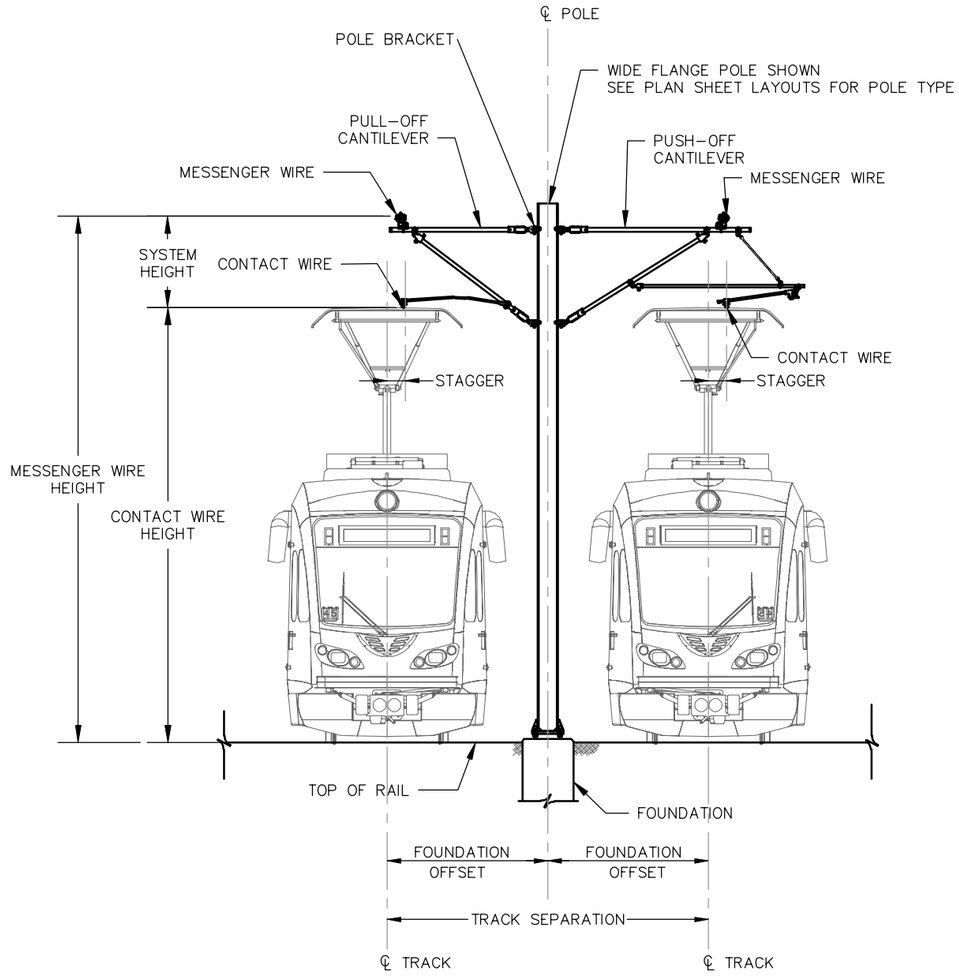
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM - DETAILS
SCAT - VERTICAL WIND & RADIAL LOADS

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-110

SHEET 122 OF 240

Aug. 27 2014 05:09 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-OCS-DTL.dwg By: curtis.neff



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

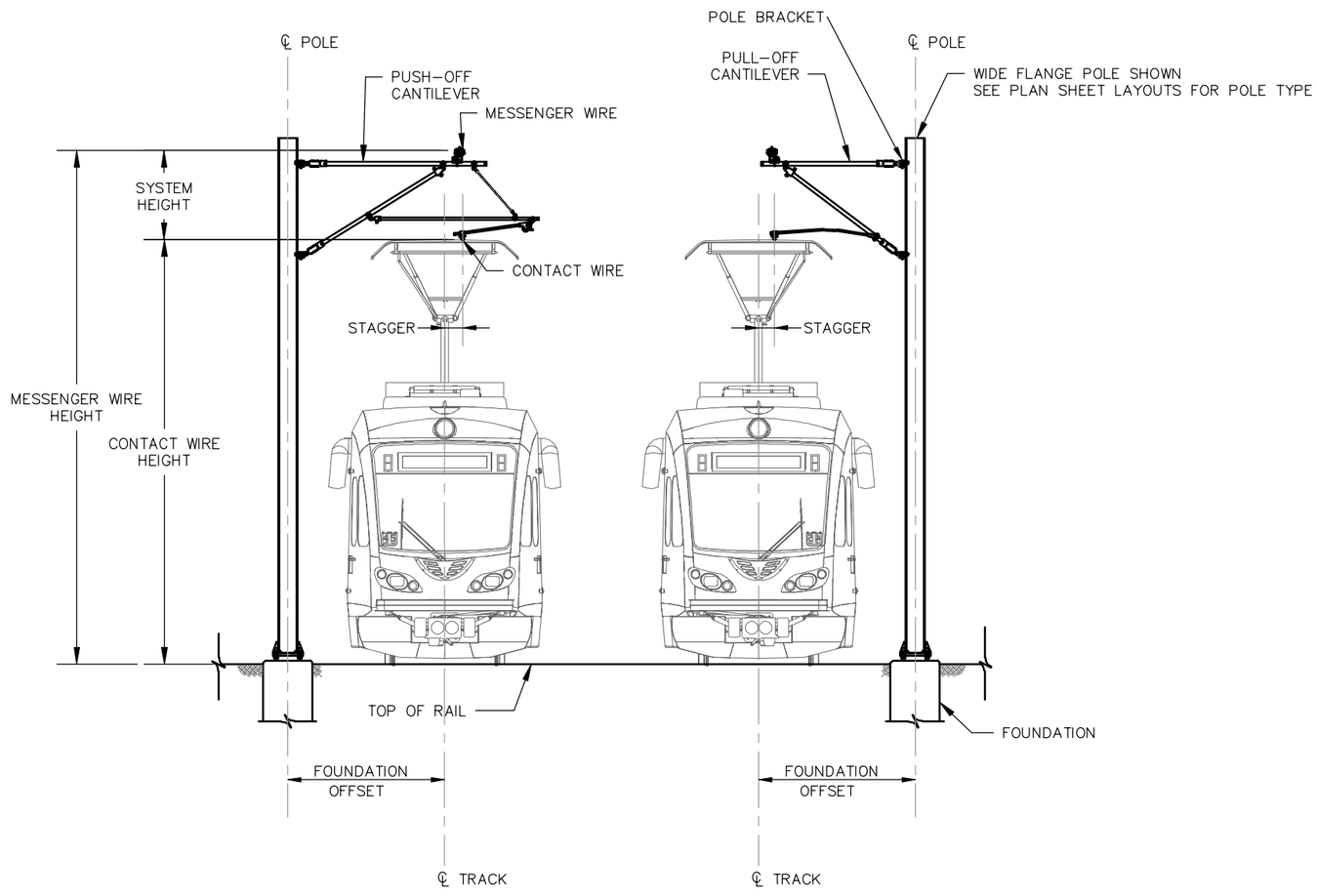
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT STRUCTURE - CENTER POLE

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-TAA-003

SHEET 123 OF 240



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

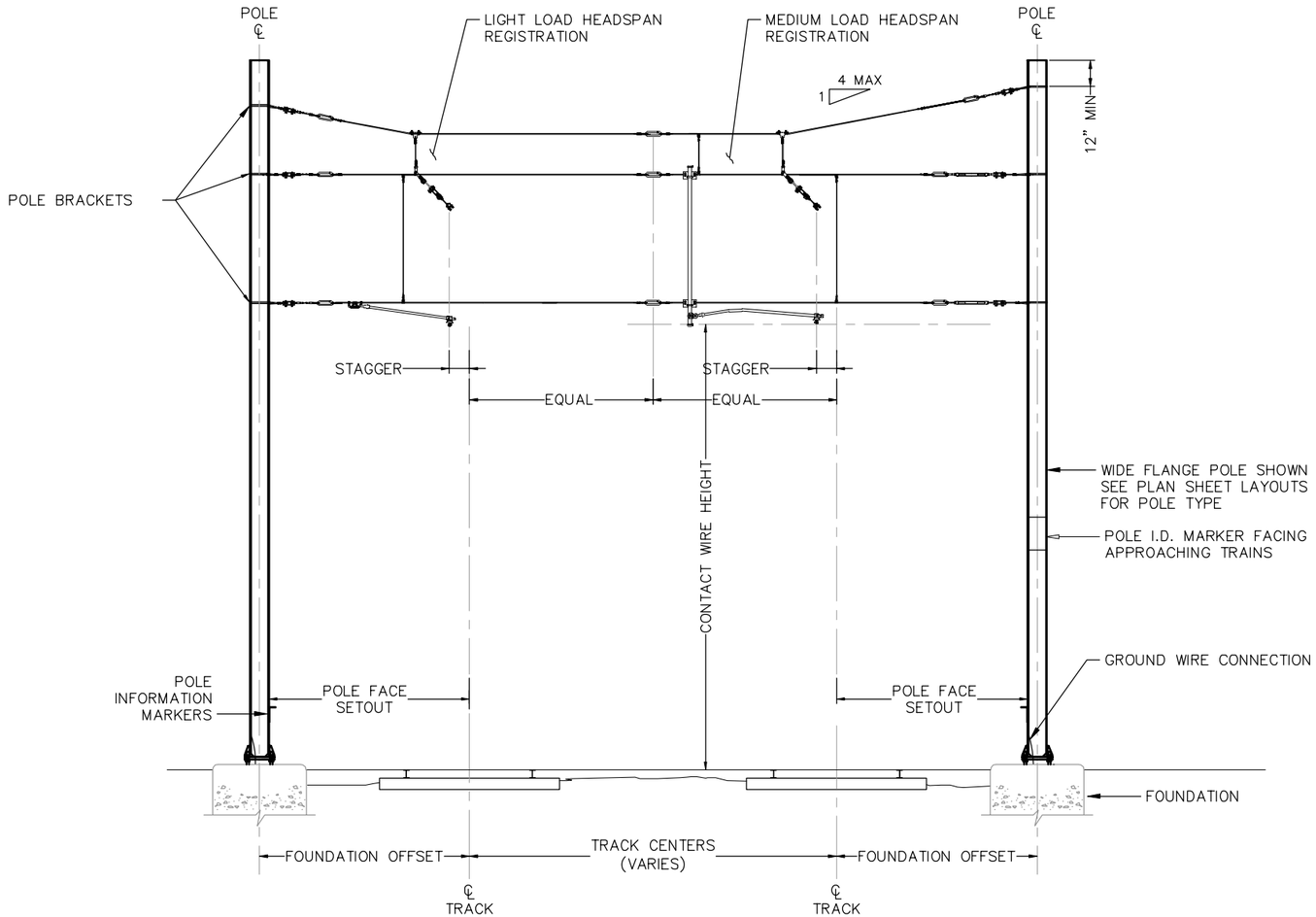
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT STRUCTURE - SIDE POLE

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-TAA-004

SHEET 124 OF 240



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METROPOLITAN COUNCIL

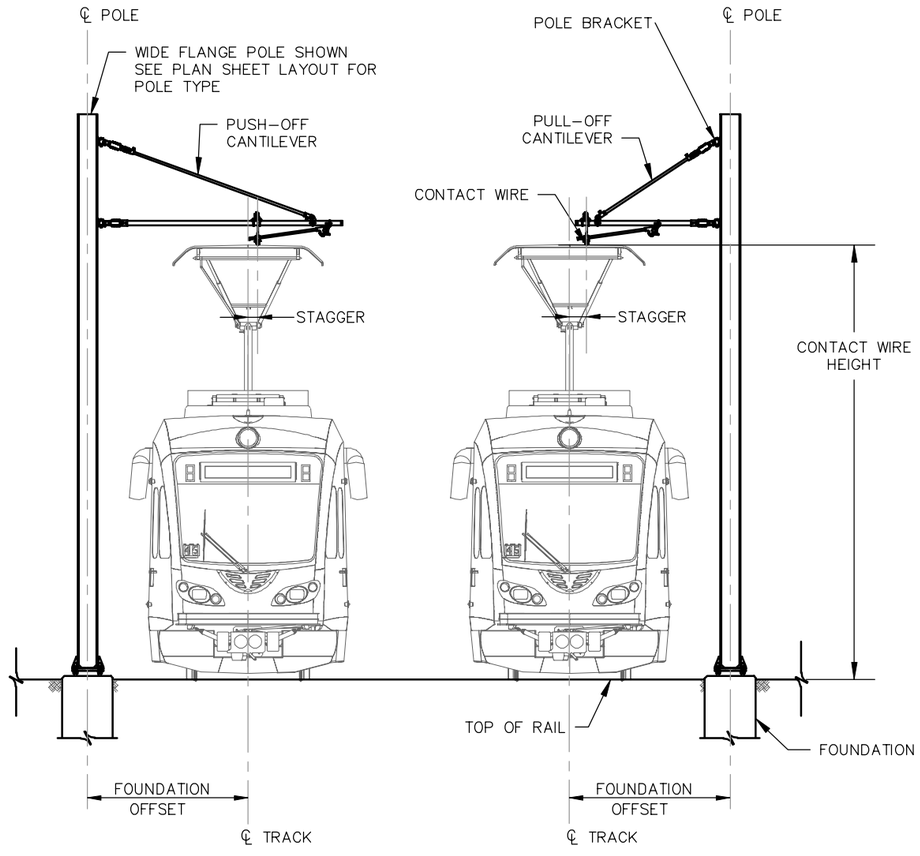
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT CROSS SPAN

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-TAA-005

SHEET 125 OF 240



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

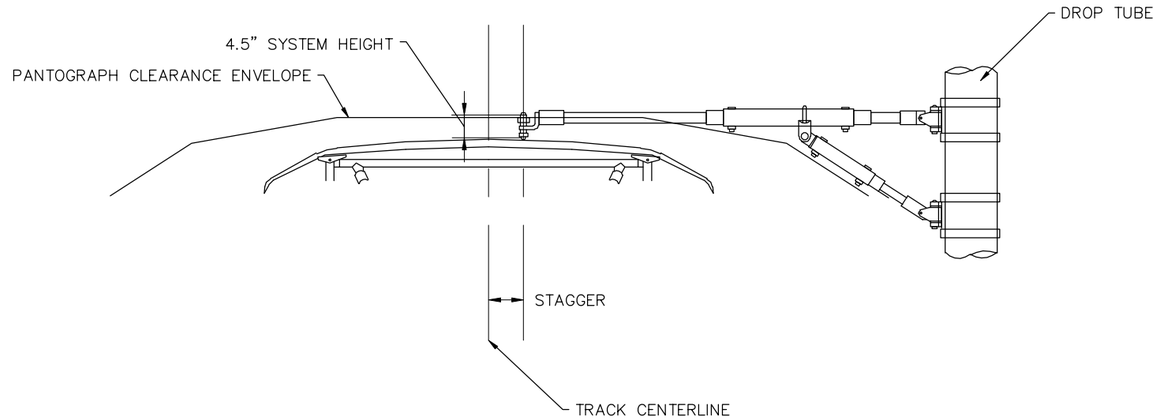
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SWFT PULL-OFF & PUSH-OFF STRUCTURE

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-TAA-006

SHEET 126 OF 240



TUNNEL SUPPORT ASSEMBLY

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

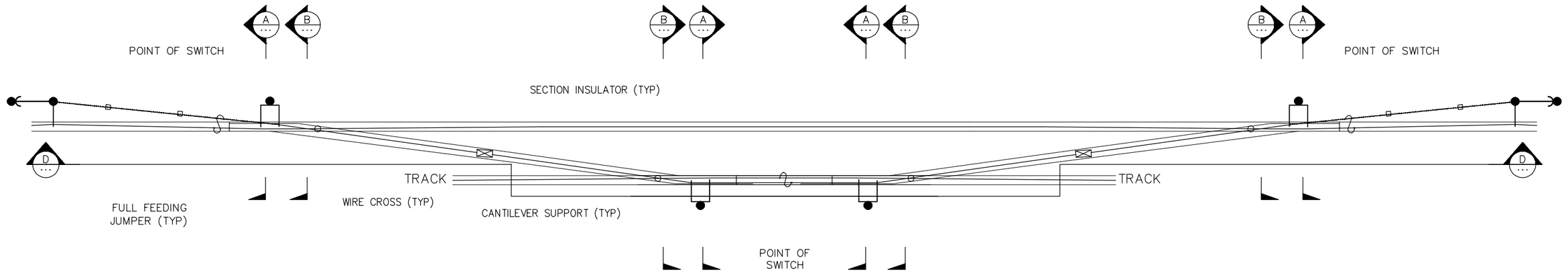
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT BRIDGE AND TUNNEL ATTACHMENT

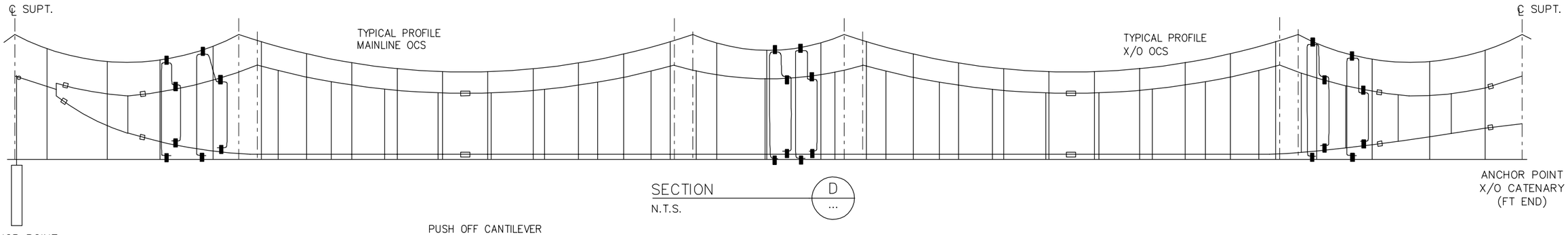
DISCIPLINE: SYSTEMS

SHEET NAME: OCS-TAA-007

SHEET 127 OF 240

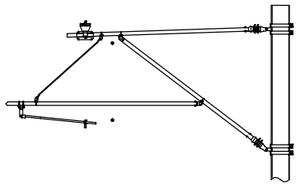


PLAN – TYPICAL CROSSOVER PLAN
N.T.S.



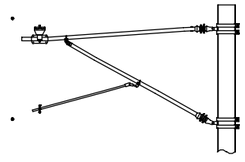
SECTION D
N.T.S.

PUSH OFF CANTILEVER FOR TANGENT TRACK



SECTION A
N.T.S.

MAINLINE CANTILEVER



SECTION B
N.T.S.

CROSSOVER CANTILEVER

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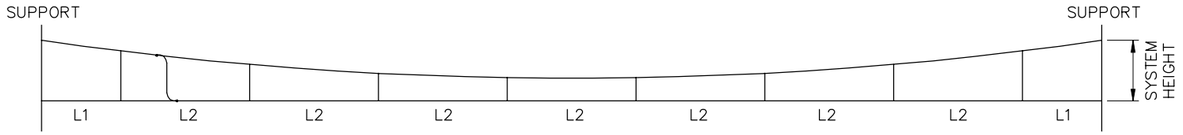
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

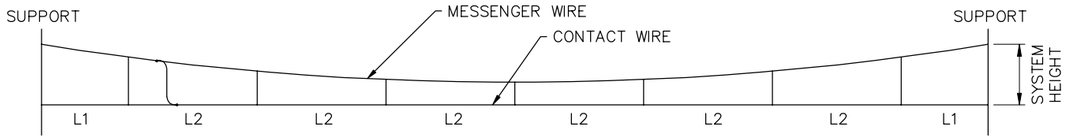
EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT UNIVERSAL CROSSOVER

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-TAA-010

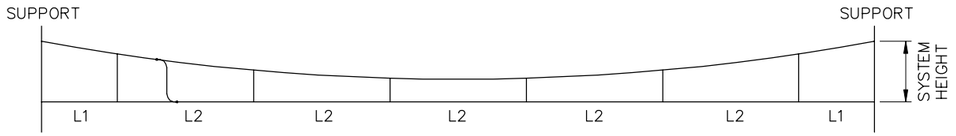
SHEET 128 OF 240



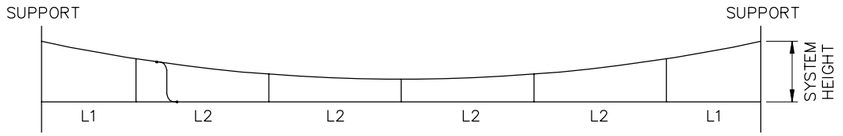
SPANS 211'–220'



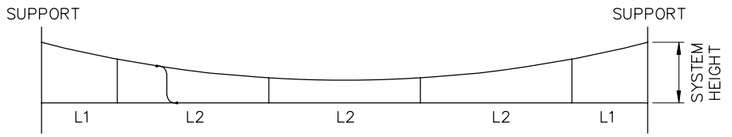
SPANS 181'–210'



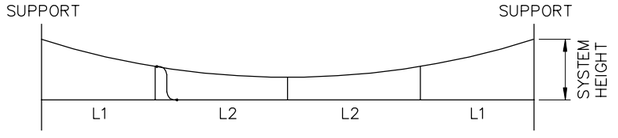
SPANS 151'–180'



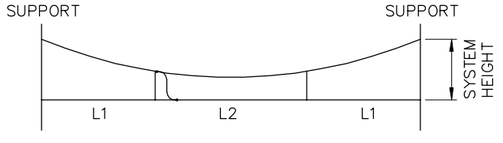
SPANS 121'–150'



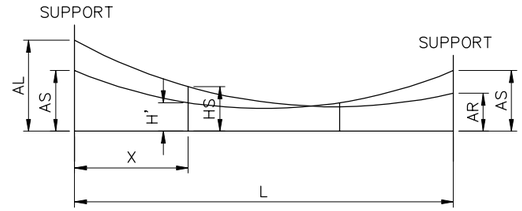
SPANS 91'–120'



SPANS 61'–90'



SPANS 30'–60'



H' = ADJUSTED HANGER LENGTH (IN)
HS = NORMAL HANGER LENGTH (IN)
AS = STANDARD SYSTEM HEIGHT (IN)
AL, AR = ADJUSTED SYSTEM HEIGHT (IN)
X = DISTANCE TO HANGER (FT)
L = SPAN LENGTH (FT)

ADJUSTMENTS FOR NON–STANDARD SYSTEM HEIGHTS

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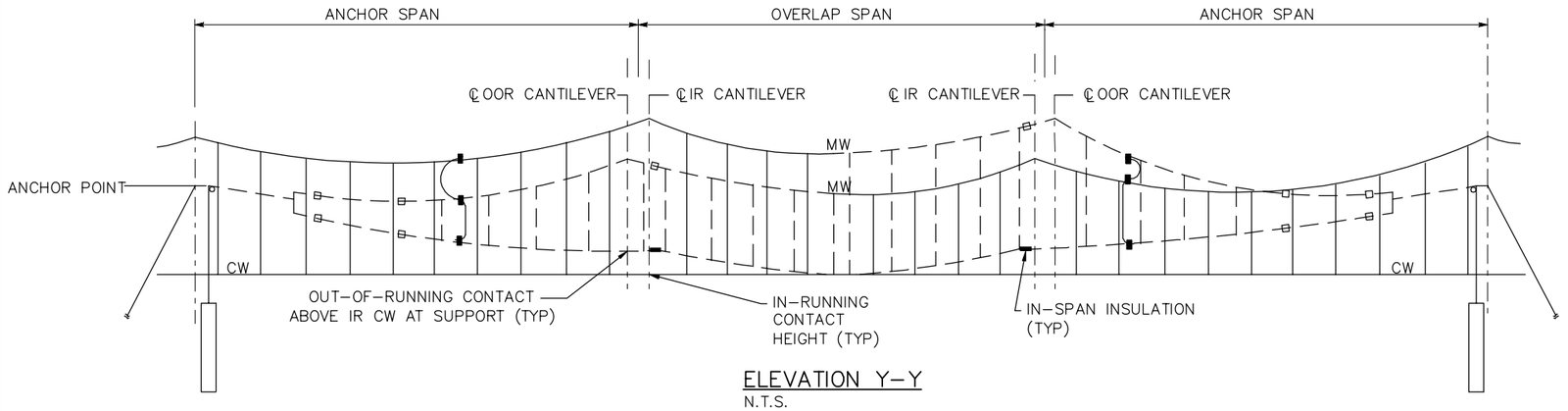
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SIMPLE CATENARY SPAN

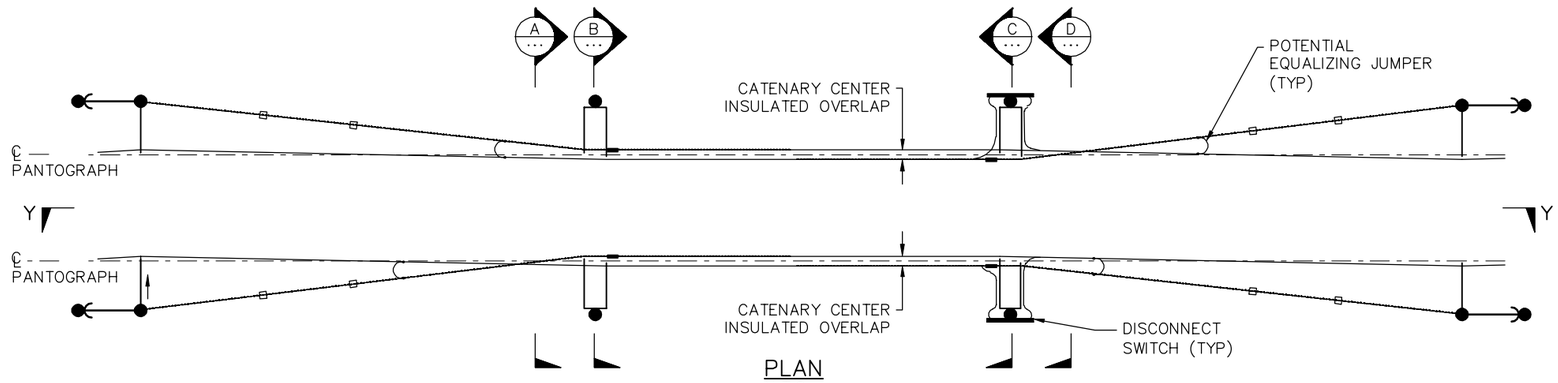
DISCIPLINE: SYSTEMS
SHEET NAME: OCS-TAA-011

SHEET 129 OF 240

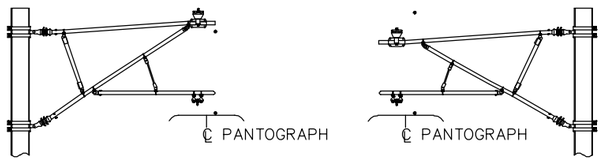
Aug. 27 2014 05:09 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-OCS-TTA.dwg By: curtis.neft



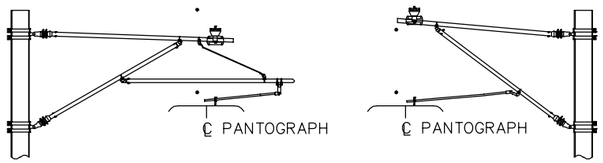
ELEVATION Y–Y
N.T.S.



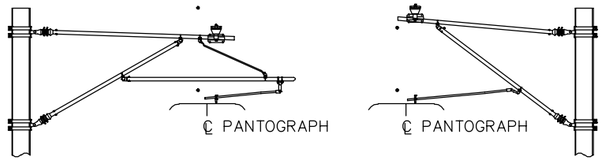
PLAN
N.T.S.



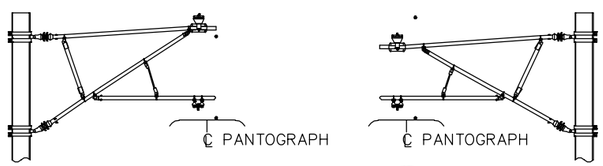
SECTION A
N.T.S.



SECTION B
N.T.S.



SECTION C
N.T.S.



SECTION D
N.T.S.

NOTES:

1. STAGGERS ON CURVES MAY VARY DEPENDING ON CURVE RADIUS.
2. A.T. OVERLAPS SHOWN, F.T. ARRANGEMENTS ARE SIMILAR.
3. TRACKS NOT SHOWN FOR CLARITY.
4. DISCONNECT SWITCH SHOWN IS REPRESENTATIVE. REFER TO DETAIL DRAWINGS FOR SWITCH CONFIGURATION.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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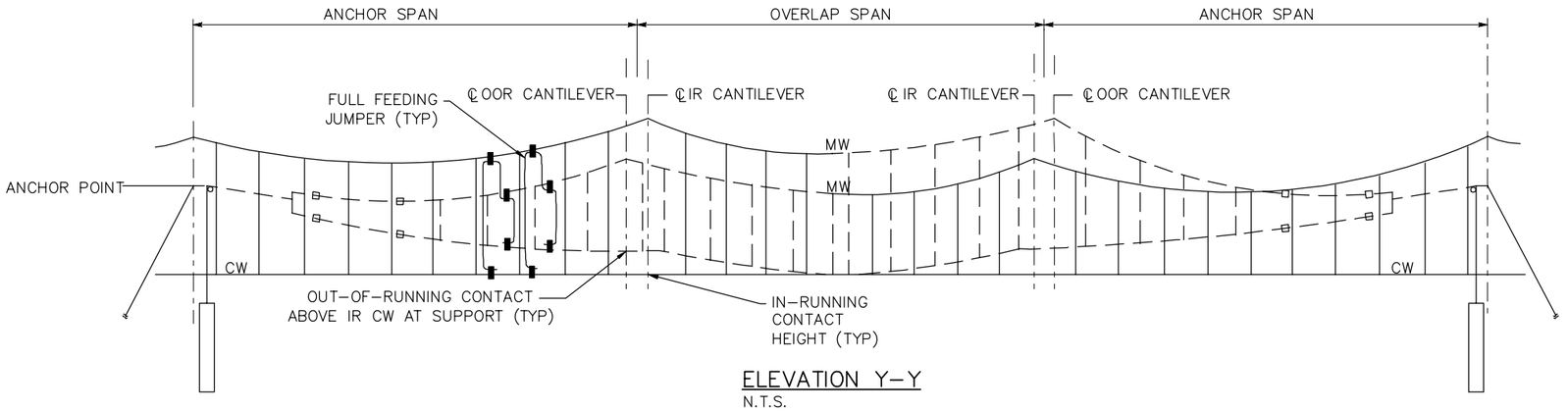
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT INSULATED OVERLAP

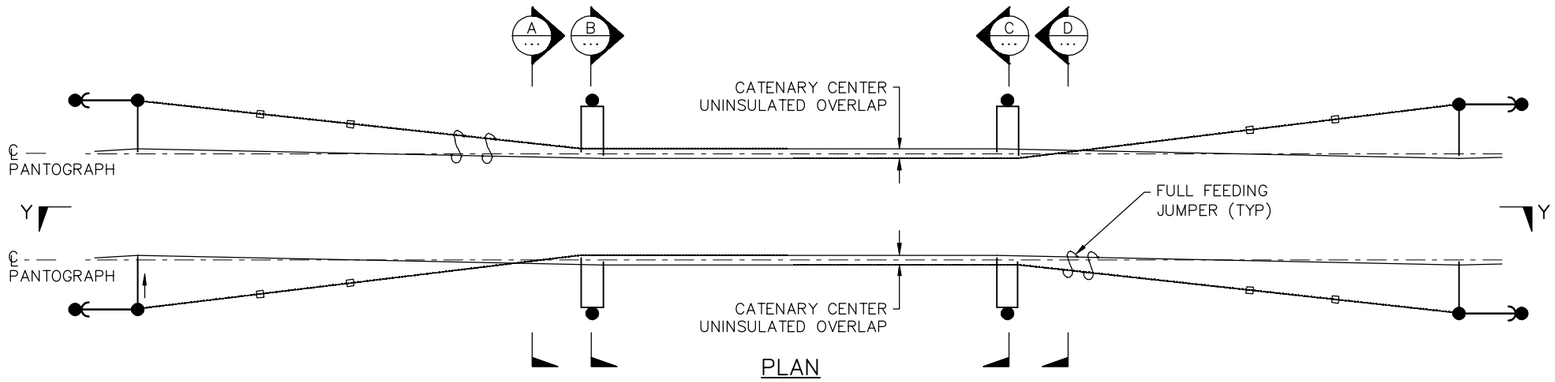
DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-001

SHEET 130 OF 240

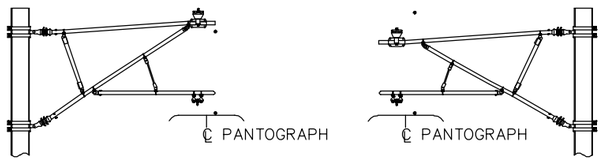
Aug. 27 2014 05:09 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-OCS-TTA.dwg By: curtis.neff



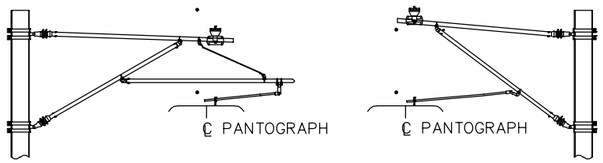
ELEVATION Y–Y
N.T.S.



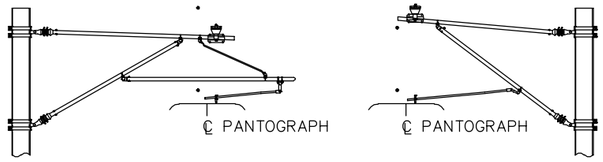
PLAN
N.T.S.



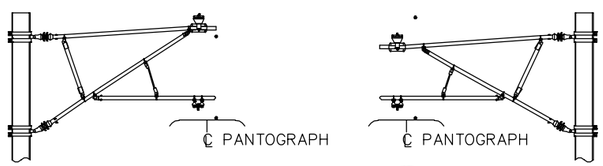
SECTION A
N.T.S.



SECTION B
N.T.S.



SECTION C
N.T.S.



SECTION D
N.T.S.

NOTES:

1. STAGGERS ON CURVES MAY VARY DEPENDING ON CURVE RADIUS.
2. A.T. OVERLAPS SHOWN, F.T. ARRANGEMENTS ARE SIMILAR.
3. TRACKS NOT SHOWN FOR CLARITY.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
TYPICAL ARRANGEMENTS AND ASSEMBLIES
SCAT UNINSULATED OVERLAP

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-DTL-002

SHEET 131 OF 240

Aug. 27 2014 05:09 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-OCS-TTA.dwg By: curtis.neff

BWA
XXX
BALANCE WEIGHT ANCHOR LABEL
XXX–LENGTH IN FEET FROM BALANCE WEIGHT ANCHOR TO FIXED ANCHOR OR TO MID–POINT TERMINATION

FT
XXX
FIXED TERMINATION LABEL
XXX–LENGTH IN FEET FROM FIXED ANCHOR TO BALANCE WEIGHT ANCHOR

MPA
XXX | XXX
MID POINT ANCHOR LABEL
XXX–HALF TENSION LENGTH IN FEET FROM MID–POINT TERMINATION TO BALANCE WEIGHT ANCHOR

FIXED ANCHOR AND DOWN GUY

BALANCE WEIGHT ASSEMBLY AND DOWN GUY

TRACTION POWER SUBSTATION (TPSS)

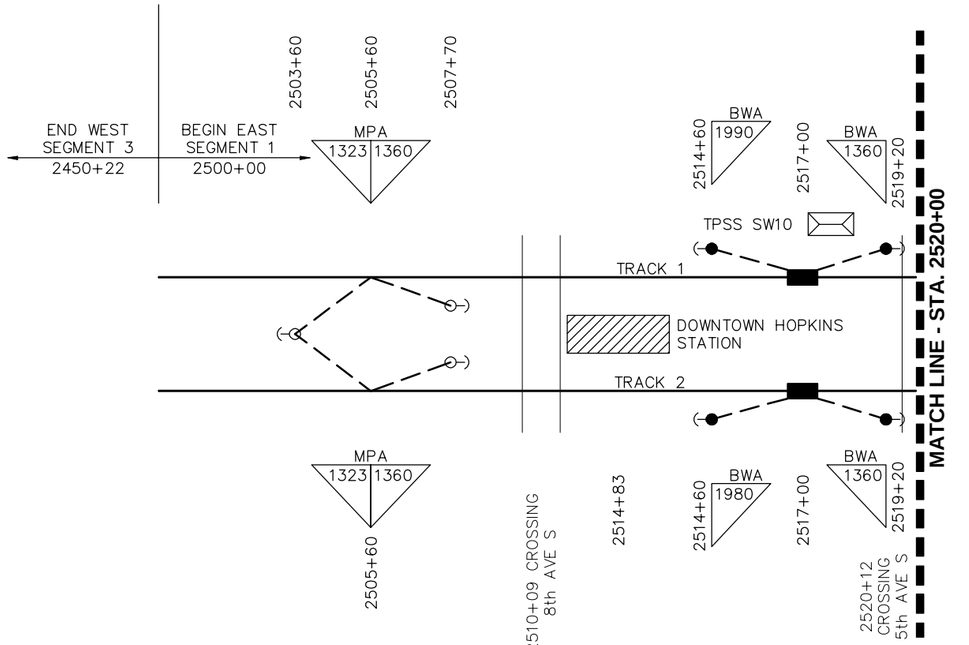
INSULATED OVERLAP

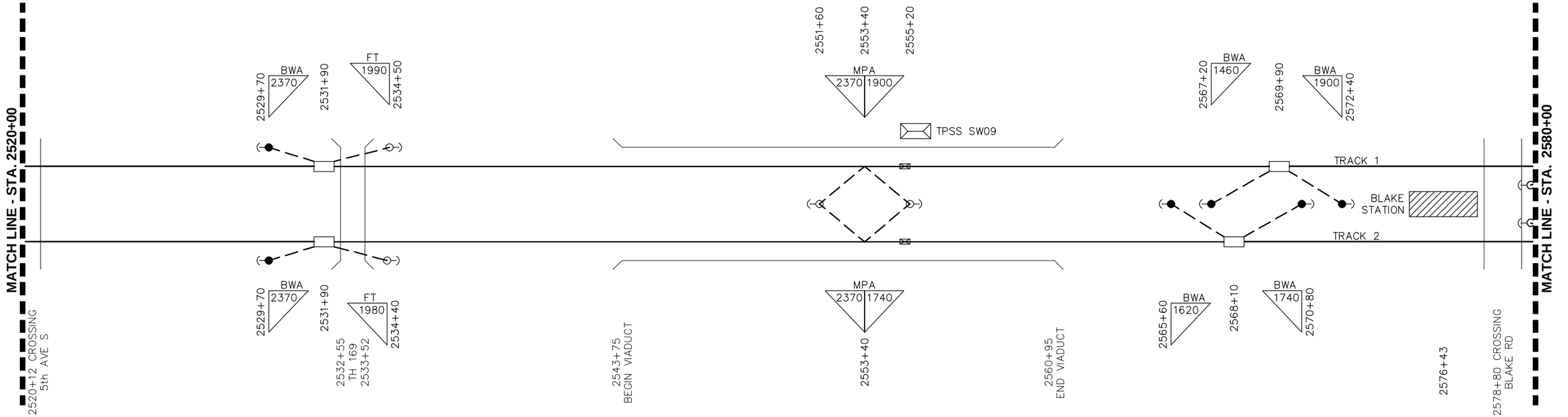
UNINSULATED OVERLAP

SECTION INSULATOR

OCS WIRE (IN RUNNING)

OCS WIRE (OUT OF RUNNING)





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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
MASTER OVERLAP CHART
STA. 2500+00 TO STA. 2580+00

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-MOC-001

SHEET 132 OF 240

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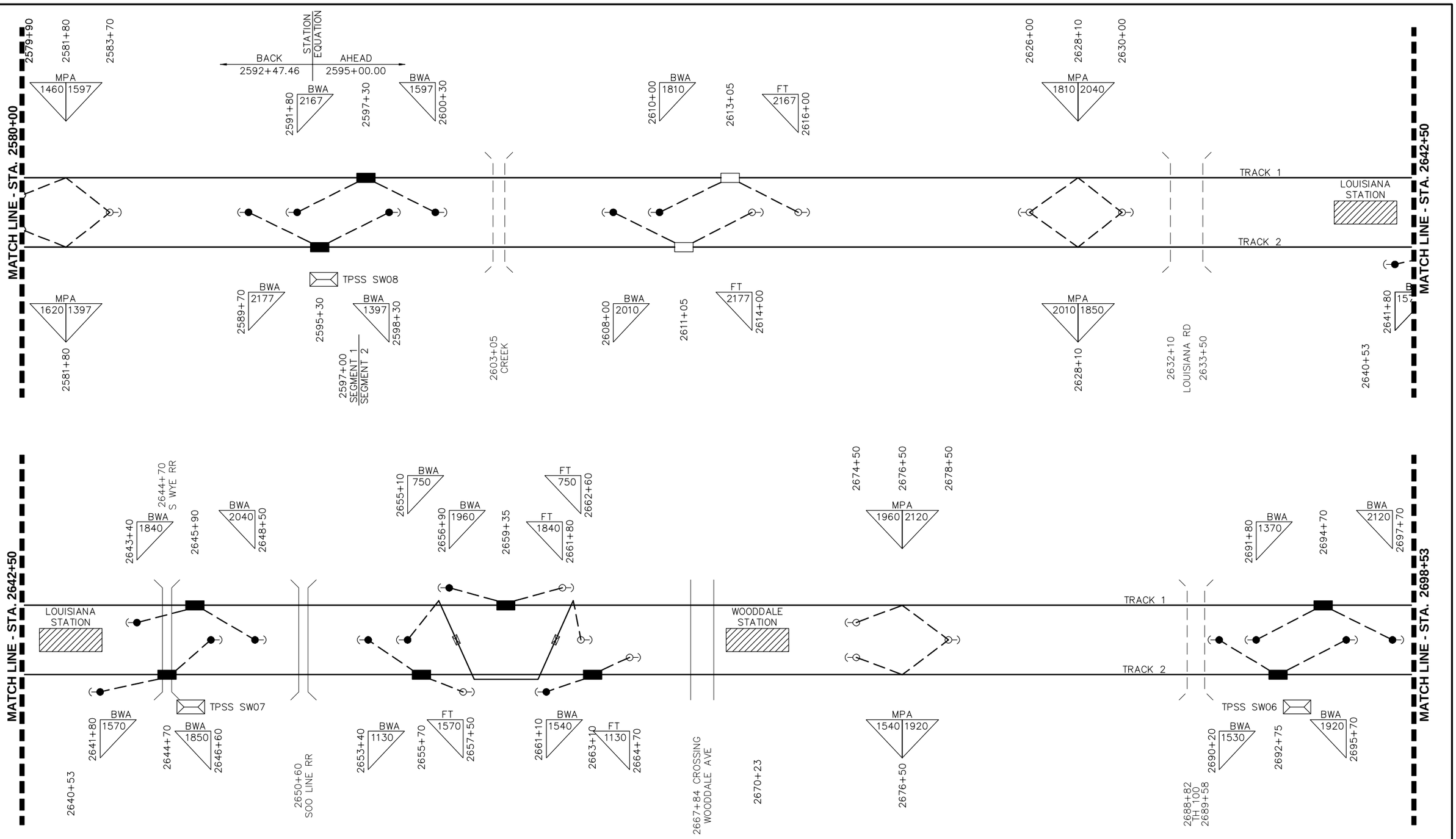

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
MASTER OVERLAP CHART
STA. 2580+00 TO STA. 2698+53

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-MOC-002

SHEET 133 OF 240

MATCH LINE - STA. 2698+53

2703+60 | 2705+50 | 2707+30
MPA 1370 | 1780
MPA 1530 | 1580
2705+50

BELTLINE STATION

2711+80 CROSSING BELTLINE BLVD

2714+17

2719+90 PED BRIDGE
2720+65 FT 1747 | BWA 1780 2723+30
2721+95
BWA 485 2724+20
2718+00 FT 1020 | BWA 1580 2721+30
2719+85
2719+35 FT 485
2724+20 FT 1392
2726+20
BWA 1020 2728+20
2729+00 SEGMENT 2 SEGMENT 3

STATION EQUATION
BACK 2735+51.71 | AHEAD 2746+00.00
2733+70 BWA 1632 | 2746+34 BWA 1747 2748+60
TPSS SW05
2733+70 BWA 1632 | 2746+34 BWA 1392 2748+60

2759+00 | 2760+50 | 2762+00
MPA 1632 | 1410
MPA 1632 | 1510
2760+50

TRACK 1
TRACK 2
WEST LAKE STATION

2767+29

MATCH LINE - STA. 2769+00

BOAT SECTION
END OF WALL 2772+50
2770+40 BWA 1680
2772+85 BWA 1410 2774+60
PORTAL 2776+00

TUNNEL
2786+60 | 2787+20 | 2789+80
MPA 1680 | 1600
2787+20

TPSS SW04

2772+00 BWA 1520 | 2774+10 BWA 1510 2775+60
2770+66 W LAKE ST 2771+60
MPA 1520 | 1750

BOAT SECTION
PORTAL 2798+36
2798+80 BWA 1830
END OF WALL 2801+00
BWA 1600 2803+20
2800+80
2800+10 BWA 2000 | 2802+40 BWA 1750 2804+70
2802+39 CREEK

2817+80 | 2819+00 | 2820+10
MPA 2020 | 1950
MPA 2000 | 2010
2819+00 | 2820+10 | 2821+30

TRACK 1
TRACK 2
21ST STREET STATION

MATCH LINE - STA. 2829+01

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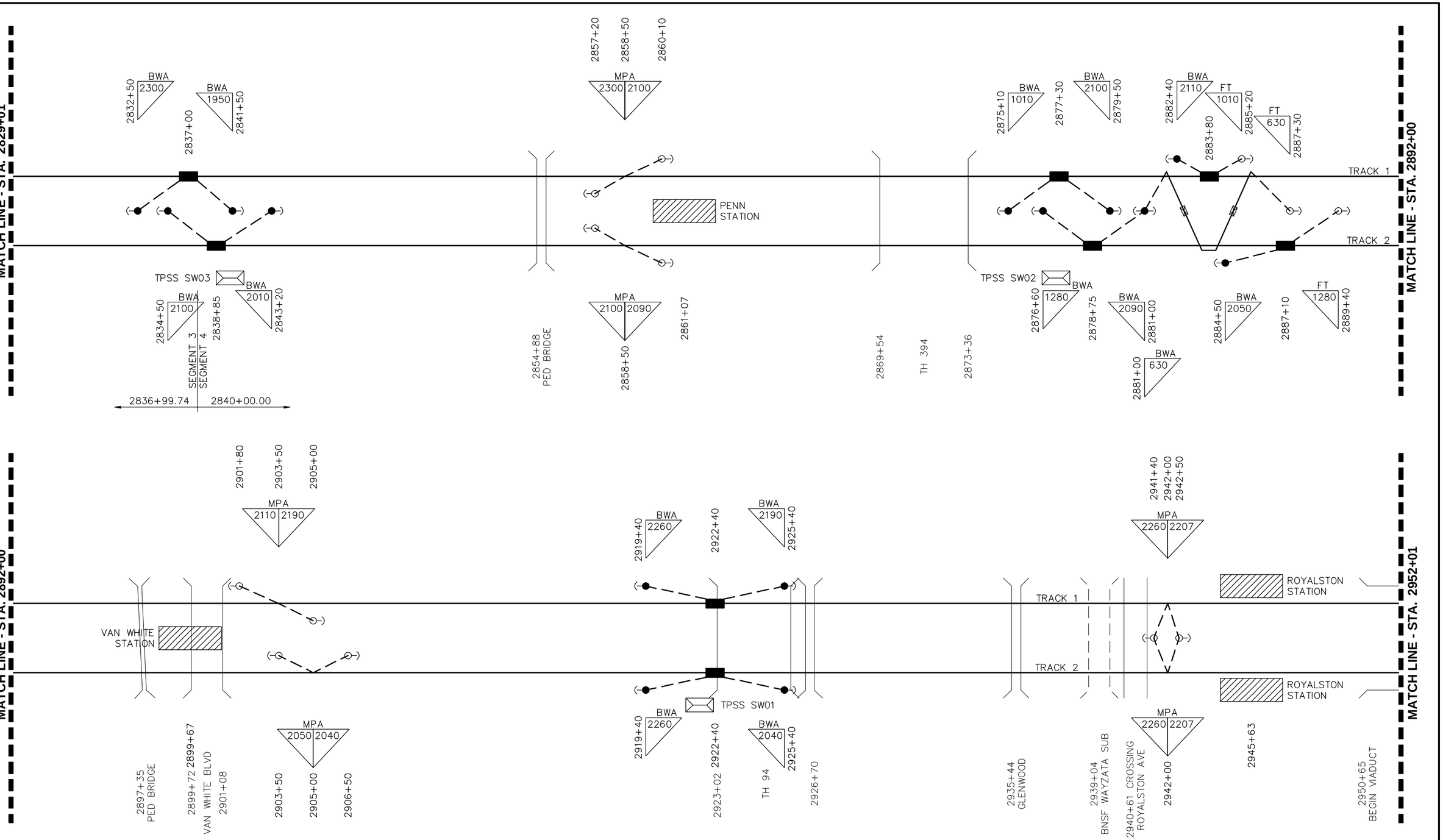
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
MASTER OVERLAP CHART
STA. 2698+53 TO STA. 2829+01

DISCIPLINE: SYSTEMS
SHEET NAME: OCS-MOC-003

SHEET 134 OF 240

Aug. 27 2014 05:10 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-OCS-MOC.dwg By: curtis.neff



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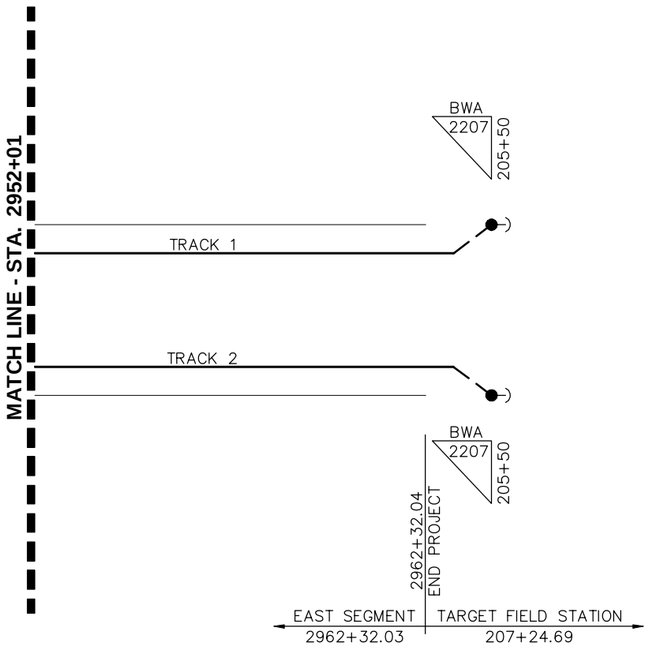
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
MASTER OVERLAP CHART
STA. 2829+01 TO STA. 2952+01

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-MOC-004

SHEET 135 OF 240



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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
OVERHEAD CONTACT SYSTEM
MASTER OVERLAP CHART
STA. 2952+01 TO STA. 205+50

DISCIPLINE: SYSTEMS

SHEET NAME: OCS-MOC-005

SHEET 136 OF 240

NAME	ASPECT	ASPECT	INDICATION
STOP	RED		STOP
APPROACH	YELLOW		PROCEED PREPARED TO STOP AT NEXT SIGNAL / ENTERING DARK TERRITORY
APPROACH DIVERGING	FLASHING YELLOW		PROCEED TO NEXT SIGNAL, PREPARED TO ENTER DIVERGING ROUTE AT PRESCRIBED SPEED
CLEAR	GREEN		PROCEED. (NEXT SIGNAL IS PERMISSIVE)
DIVERGING CLEAR	RED OVER FLASHING GREEN		PROCEED ON DIVERGING ROUTE AT PRESCRIBED SPEED THROUGH TURNOUT. (THE NEXT SIGNAL IS PERMISSIVE.) (SEE NOTE 1)

NAME	ASPECT	ASPECT	INDICATION
DIVERGING APPROACH	RED OVER FLASHING YELLOW		PROCEED ON DIVERGING ROUTE AT PRESCRIBED SPEED THROUGH TURNOUT. BE PREPARED TO STOP AT NEXT SIGNAL / ENTER DARK TERRITORY. (SEE NOTE 1)
DIVERGING RESTRICTING	RED OVER FLASHING LUNAR		PROCEED ON DIVERGING ROUTE AT RESTRICTED SPEED THROUGH TURNOUT, ENTER EITHER AN OCCUPIED BLOCK OR YARD LIMITS (SEE NOTE 1)
RESTRICTING	LUNAR		PROCEED AT RESTRICTED SPEED INTO AN OCCUPIED BLOCK, OR WITHIN YARD LIMITS
VERTICAL BAR	LUNAR VERTICAL BAR		PROCEED THROUGH ROADWAY INTERSECTION.
FLASHING VERTICAL BAR	LUNAR FLASHING VERTICAL BAR		CAUTION. BAR SIGNAL IS CHANGING TO STOP.
HORIZONTAL BAR	LUNAR HORIZONTAL BAR		STOP. DO NOT PROCEED THROUGH ROADWAY INTERSECTION.
FLASHING HORIZONTAL BAR	LUNAR FLASHING HORIZONTAL BAR		STOP. THE OPERATOR WILL SOUND TWO SHORT BLASTS OF HORN PRIOR TO MOVING, REGARDLESS OF ANY HORN PROHIBITION. WHEN IT IS TRAINS TURN, PROCEED SLOWLY INTO THE INTERSECTION UNTIL THE TRAIN FULLY OCCUPIES THE CROSSING, RINGING BELL CONTINUOUSLY THROUGH THE ENTIRE CROSSING. INDICATES FOUR-WAY STOP. THE FIRST TRAIN TO ENCOUNTER SHOULD NOTIFY THE RCC.

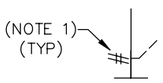
GREEN
(SHOWN ON A HEAD)
(NOTE 2 & 4)

YELLOW
(SHOWN ON A HEAD)
(NOTE 2 & 4)

RED
(SHOWN ON A HEAD)
(NOTE 2 & 4)

LUNAR
(SHOWN ON A HEAD)
(NOTE 2 & 4)

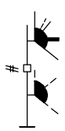
FLASHING
GREEN
(SHOWN ON B HEAD)
(NOTE 3)



FLASHING
YELLOW
(SHOWN ON B HEAD)
(NOTE 3)

FLASHING
YELLOW
(SHOWN ON A HEAD)
(NOTE 3)

FLASHING
LUNAR WHITE
(SHOWN ON B HEAD)
(NOTE 3)



CONTROLLED SIGNAL

NOTES:

1. WHERE PROVIDED, SIGNALS WITH MULTIPLE ASPECTS AND MULTIPLE DIVERGING DESTINATIONS WILL HAVE AN LED NUMBER INDICATOR ATTACHED TO PROVIDE ADDITIONAL DESTINATION INFORMATION.
2. HEAVY LINE INDICATES DISPLAY WITH SYSTEM AT REST.
3. FLASHING SIGNAL DISPLAY SHOWN BY DASHED LINE.
4. STEADY SIGNAL DISPLAY SHOWN BY SOLID LINE.

LEGEND:

- TRAIN TO WAYSIDE LOOP (TWC)
- XING BELL (DC)
- IMPEDANCE BOND (SINGLE)
- TRACK CIRCUIT LEADS
- TRACK CIRCUIT JUMPER
- NEGATIVE RETURN JUMPER
- POWER OPERATED SWITCH MACHINE (DUAL CONTROLLED)
- SNOW MELTER CASE (HS)
- SIGNAL BUNGALOW/PLATFORM/INTERMEDIATE HOUSE
- XING HOUSE
- STATION — STATION PLATFORM
- INSULATED JOINT
- SIGNAL RAIL (DOUBLE LINE TRACK PLAN)
- NEGATIVE RETURN RAIL (DOUBLE LINE TRACK PLAN)
- GRADE CROSSING GATE AND FLASHERS
- 1E — TRACK 1 EASTBOUND INTERLOCKING SIGNAL (COLOR LIGHT)
- 1W — TRACK 1 WESTBOUND INTERLOCKING SIGNAL (COLOR LIGHT)
- 2541E — TRACK 1 EASTBOUND AUTOMATIC SIGNAL (COLOR LIGHT) STATIONING 2540+XX (TRK 1 – ODD NUMBER)
- 2540W — TRACK 2 WESTBOUND AUTOMATIC SIGNAL (COLOR LIGHT) STATIONING 2540+XX (TRK 2 – EVEN NUMBER)
- BAR SIGNAL
- HIGHWAY GRADE CROSSING
- OVERLAY TRACK CIRCUIT
- PF– — PEDESTRIAN FLASHERS

ABBREVIATIONS:

MAS	MAXIMUM ALLOWABLE SPEED
MPH	MILES PER HOUR
E1–201	EAST SEGMENT 1, TRACK 2 CURVE #1 (PER CIVIL PLAN)
VC	VERTICAL CURVE
↗	UPGRADE GOING EAST
↘	DOWNGRADE GOING EAST
0.6%	GRADE PERCENTAGE
AVG	AVERAGE
TBD	TO BE DETERMINED
XING	CROSSING

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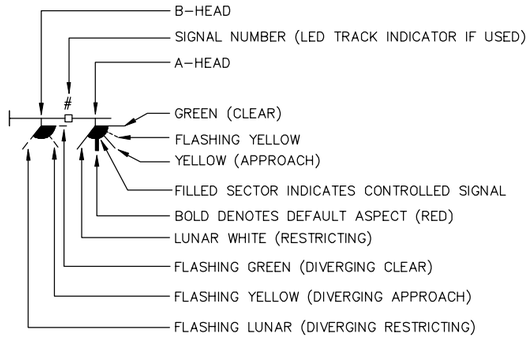
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
GENERAL
SYMBOLS, LEGEND AND GENERAL NOTES

SHEET 137 OF 240

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-GEN-001

INTERLOCKING SIGNAL (COLOR LIGHT)



SYMBOLS:

	TRAIN TO WAYSIDE LOOP (TWC)
	TRAIN
STATION	STATION PLATFORM
	INSULATED JOINT
	HIGHWAY GRADE CROSSING

SIGNAL ASPECTS:

G	GREEN (CLEAR)
FY	FLASHING YELLOW (APPROACH DIVERGING)
Y	YELLOW (APPROACH)
R	RED (STOP)
L	LUNAR (RESTRICTING)
R/FG	RED OVER FLASHING GREEN (DIVERGING CLEAR)
R/FY	RED OVER FLASHING YELLOW (DIVERGING APPROACH)
R/FL	RED OVER FLASHING LUNAR (DIVERGING RESTRICTING)

TRACK CODE ASSIGNMENT OF ELECTRONIC TRACK CIRCUITS	
TRACK CODE	ASSIGNMENT
C1	TRACK CIRCUIT – DETECTION CODE
C2	APPROACH ASPECT CONTROL CODE
C3	APPROACH DIVERGING CONTROL CODE
C4	NOT USED
C5	NON VITAL MULTIPURPOSE CODE
C6	TRAFFIC TUMBLE DOWN CODE INITIATED WHEN ROUTE ESTABLISHED AT INTERLOCKING
C7	CLEAR ASPECT CONTROL CODE
C8	NOT USED
C9	RESTRICTING CODE

AUTOMATIC SIGNAL (COLOR LIGHT)

ABBREVIATIONS:

2500+00	STATIONING
XXXX E	EASTWARD SIGNAL NUMBER
XXXX W	WESTWARD SIGNAL NUMBER
XXXX T	TRACK CIRCUIT NAME
EQ→	EQUATED DISTANCE EAST
←EQ	EQUATED DISTANCE WEST
VC	VERTICAL CURVE
↗	UPGRADE GOING EAST
↘	DOWNGRADE GOING EAST
.5%	PERCENTAGE OF GRADE
TBD	TO BE DETERMINED
MAS	MAXIMUM ALLOWABLE SPEED
MPHS	MILES PER HOUR PER SECOND
MPH	MILES PER HOUR
XING	CROSING

EQUATED DISTANCE FORMULA:

(1) EQUATED DISTANCE (ASCENDING) = ACTUAL DISTANCE x $\frac{(4+G)}{4}$

(2) EQUATED DISTANCE (DESCENDING) = ACTUAL DISTANCE x $\frac{(4-G)}{4}$

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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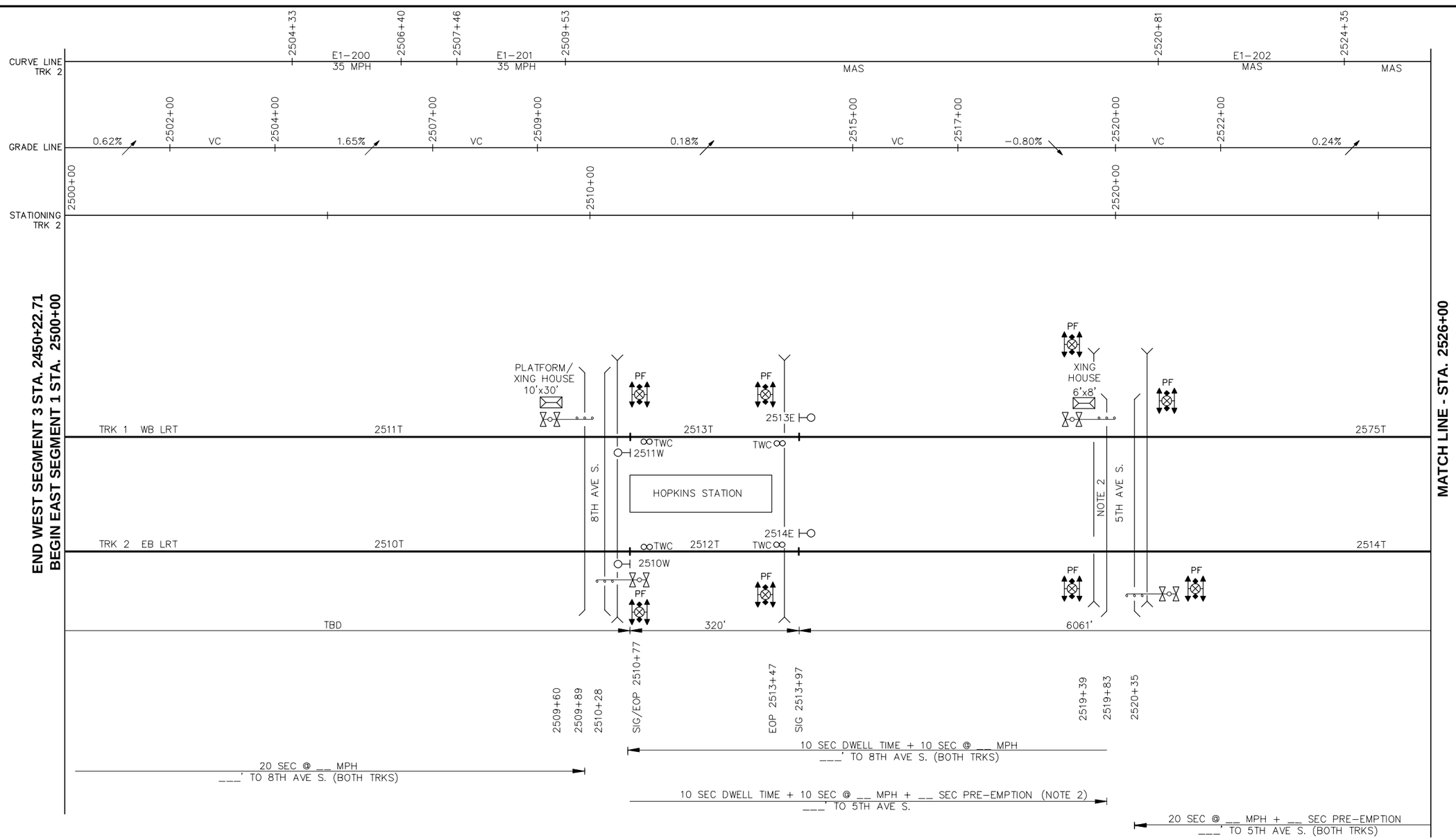
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
GENERAL
SYMBOLS & LEGEND - ROUTE & ASPECT

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-GEN-002

SHEET 138 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. IF EASTBOUND SIGNAL AT HOPKINS STATION IS CANCELED & THEN CALLED BY TWC, TWC REQUEST WILL ACTIVATE XING, SIGNAL CLEARING WILL BE DELAYED BY __ SEC.
3. DISTANCE, SPEED, PRE-EMPTION AND XING APPROACH LENGTHS WILL BE DETERMINED DURING ADVANCED DESIGN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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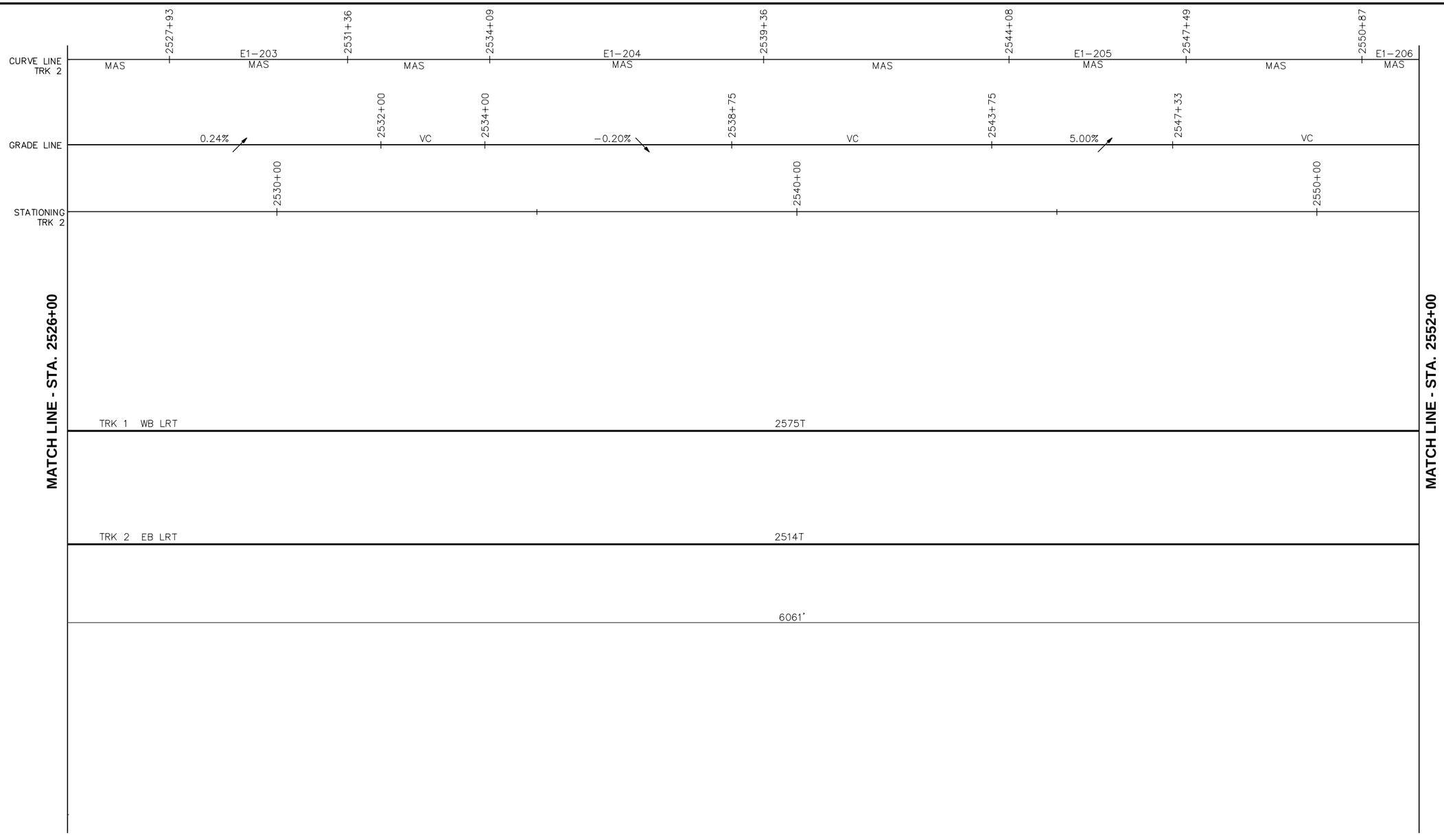
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2500+00 TO STA. 2526+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-001

SHEET 139 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

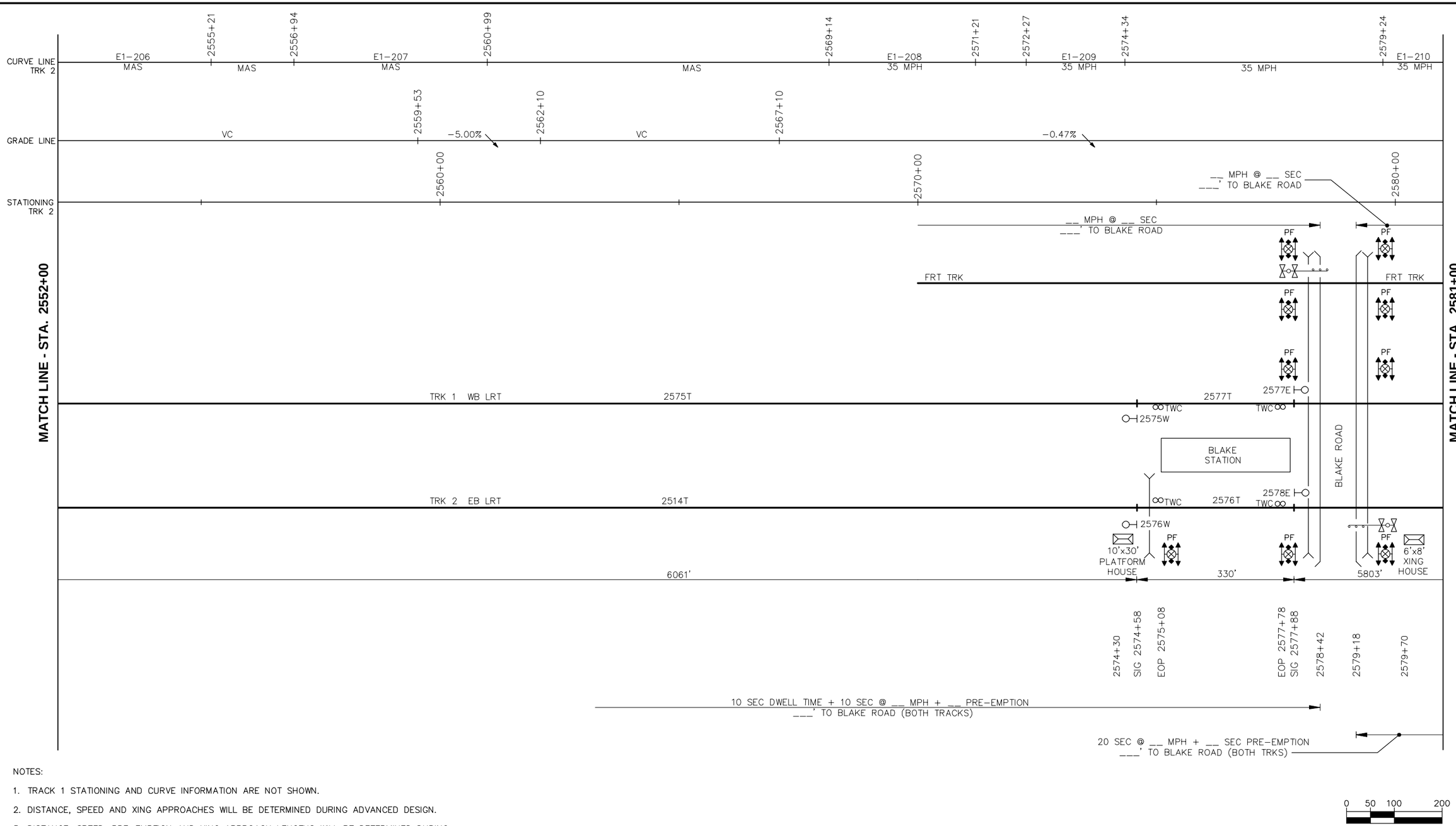
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2526+00 TO STA. 2552+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-002

SHEET 140 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. DISTANCE, SPEED AND XING APPROACHES WILL BE DETERMINED DURING ADVANCED DESIGN.
3. DISTANCE, SPEED, PRE–EMPTION AND XING APPROACH LENGTHS WILL BE DETERMINED DURING ADVANCED DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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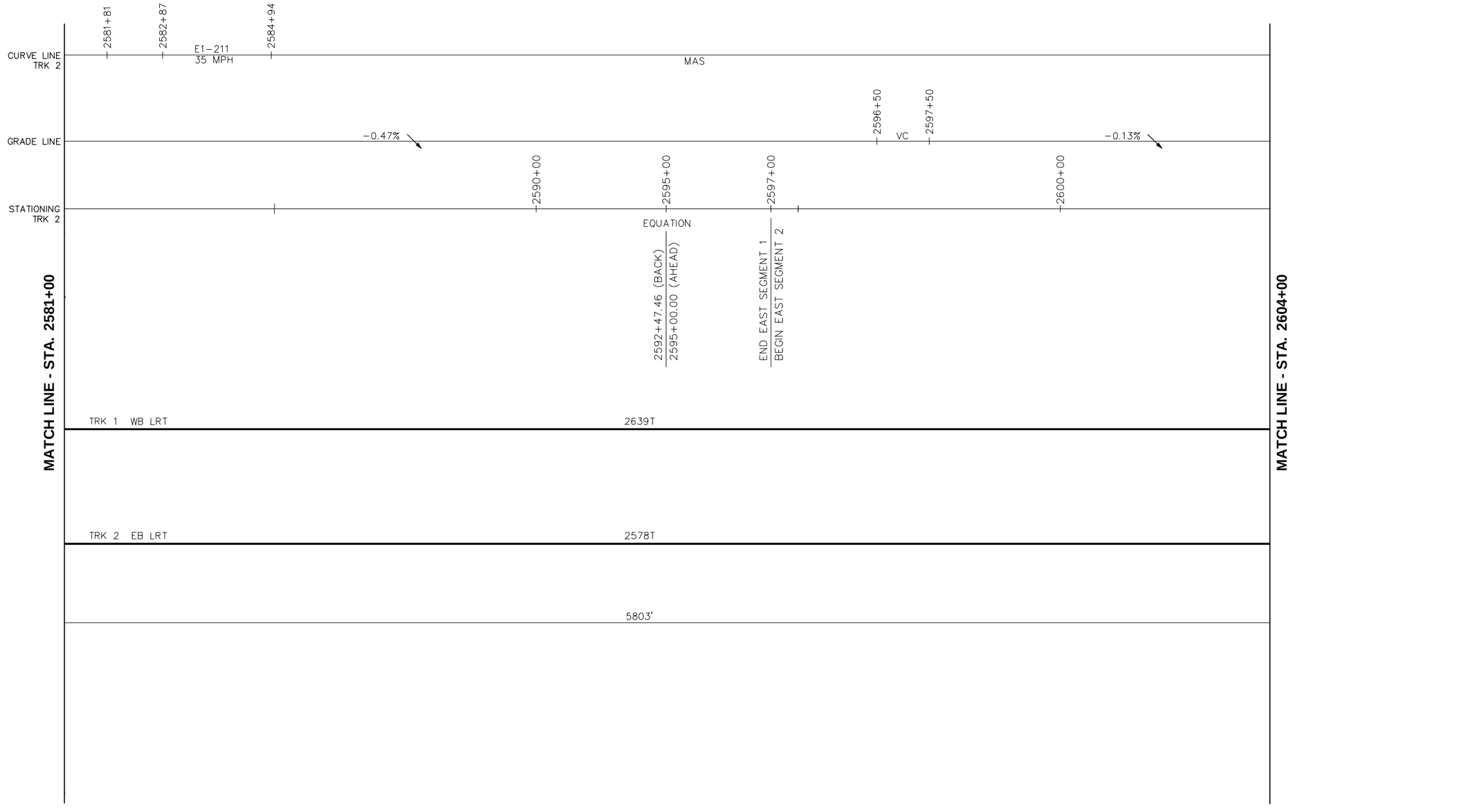
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2552+00 TO STA. 2581+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-003

SHEET 141 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2581+00 TO STA. 2604+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-004

SHEET 142 OF 240

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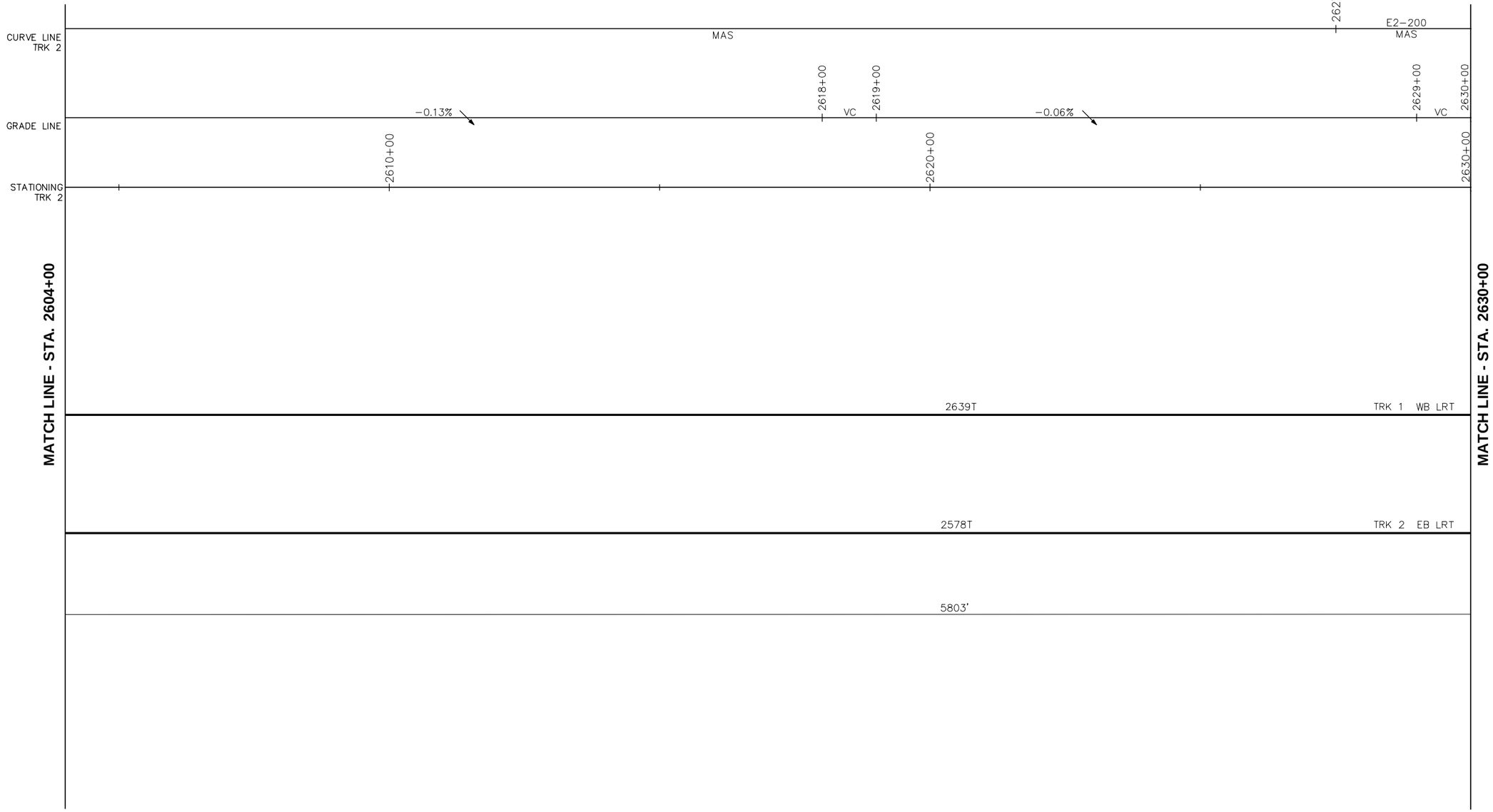

NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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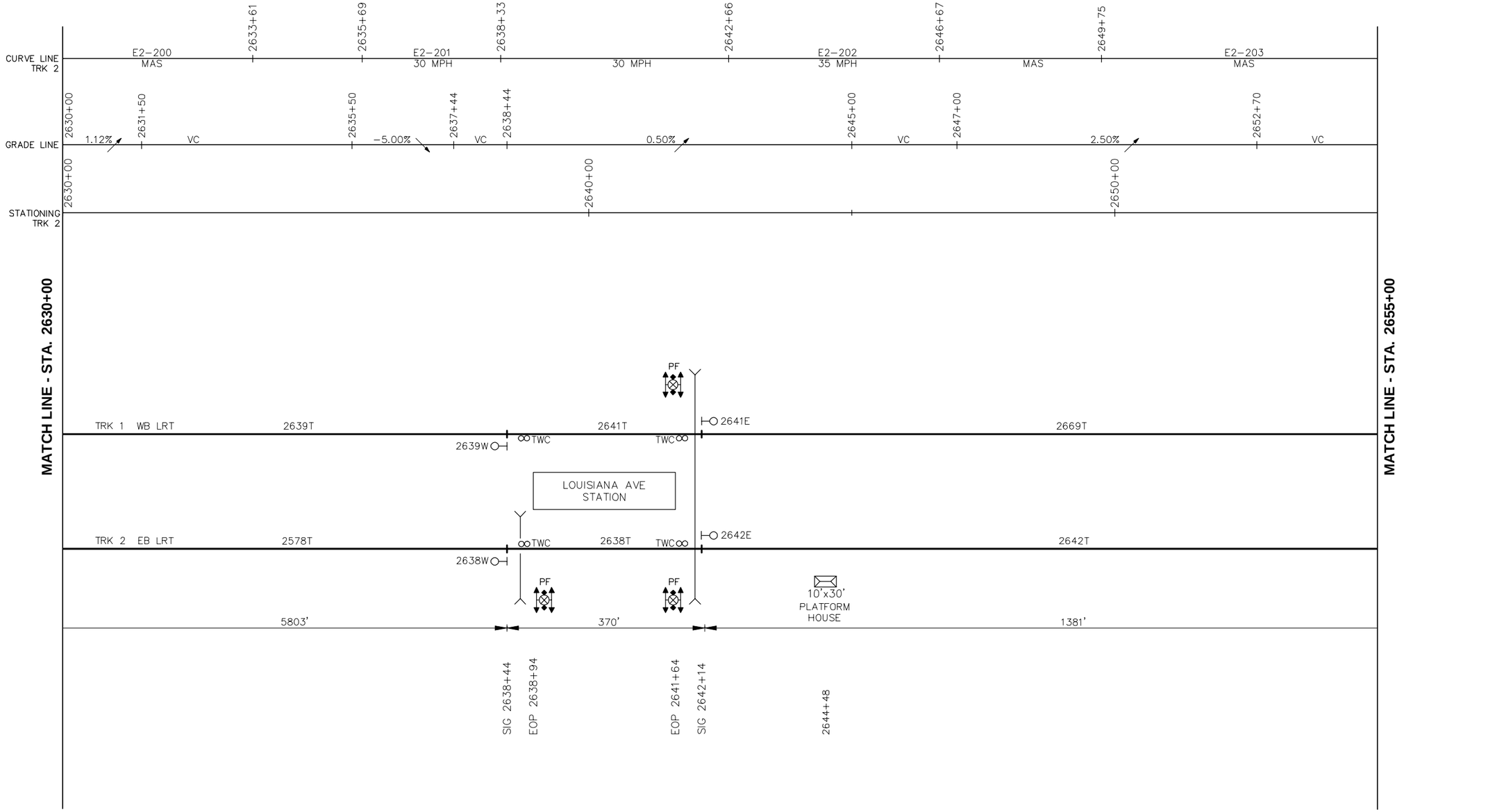
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2604+00 TO STA. 2630+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-005

SHEET 143 OF 240

Aug. 27 2014 04:17 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-SIG-CLD.dwg By: curtis.neft



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

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NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2630+00 TO STA. 2655+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-006

SHEET 144 OF 240

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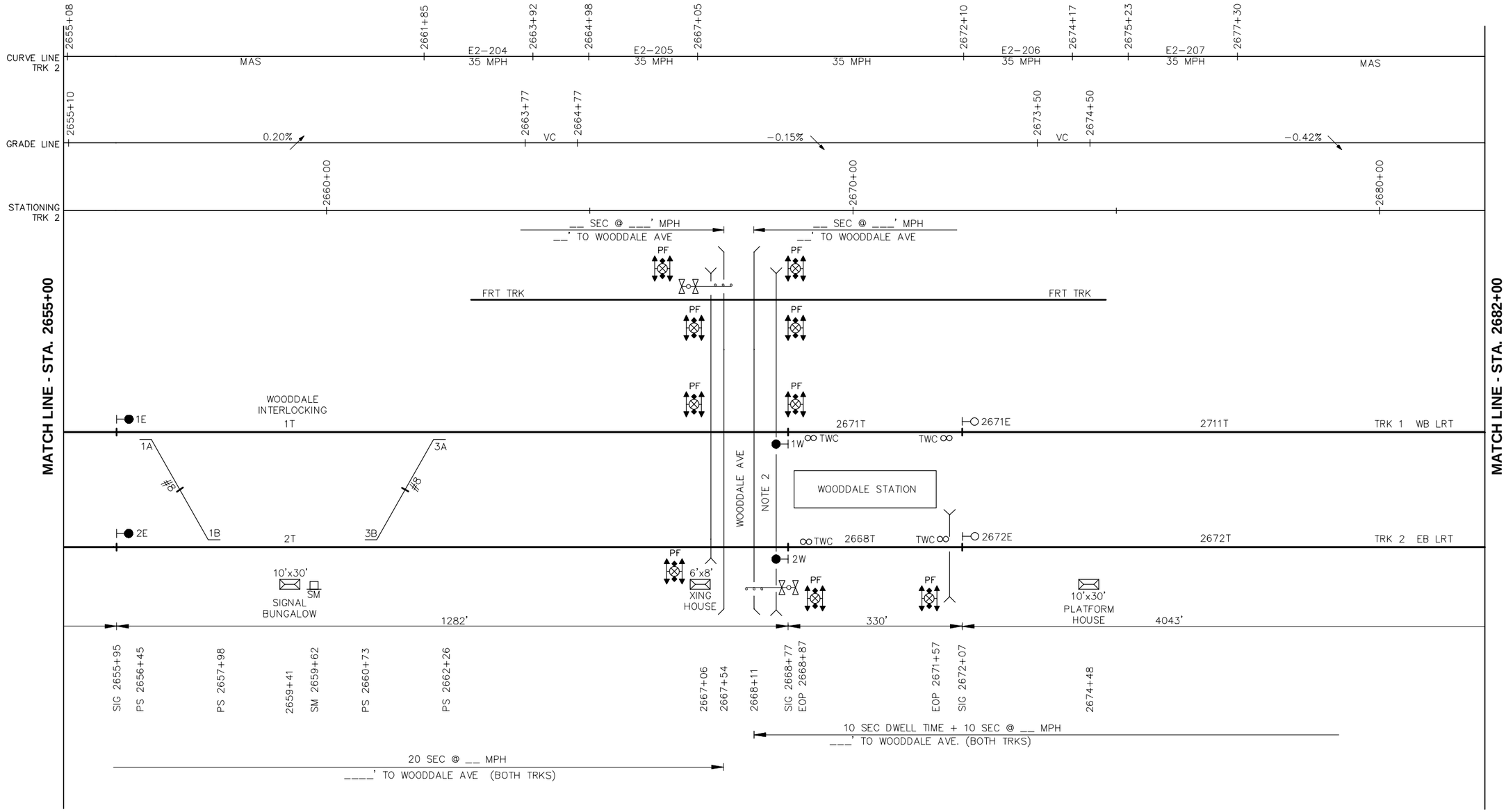

NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. INTERLOCKING CONTROL SIGNALS AT STATION ARE TO BE FLEETED FOR NORMAL OPERATIONS.
3. DISTANCE, SPEED, PRE-EMPTION AND XING APPROACH LENGTHS WILL BE DETERMINED DURING ADVANCED DESIGN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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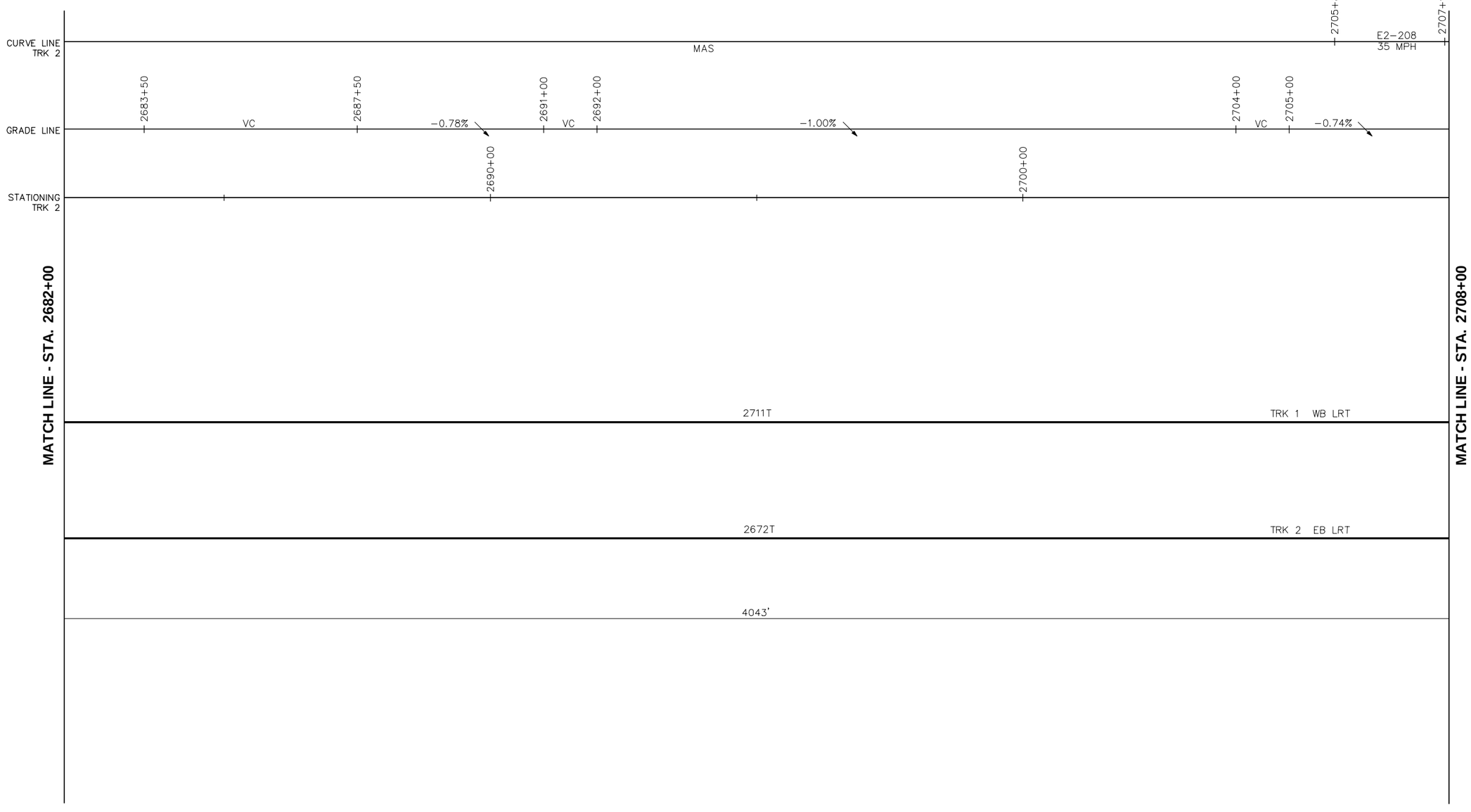
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2655+00 TO STA. 2682+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-007

SHEET 145 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

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NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

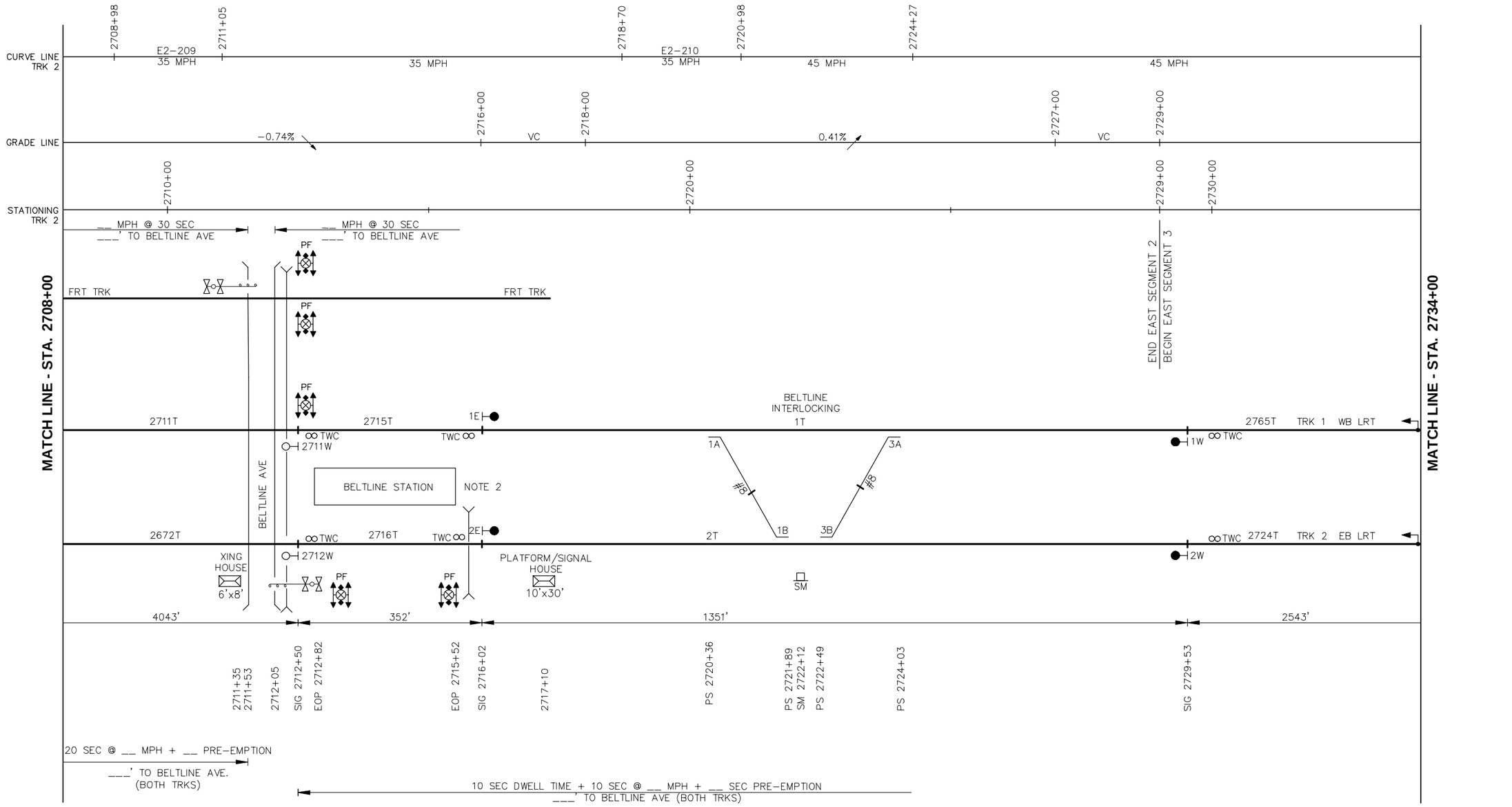
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2682+00 TO STA. 2708+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-008

SHEET 146 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. INTERLOCKING CONTROL SIGNALS AT STATION ARE TO BE FLEETED FOR NORMAL OPERATIONS.
3. DISTANCE, SPEED, PRE-EMPTION AND XING APPROACH LENGTHS WILL BE DETERMINED DURING ADVANCED DESIGN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

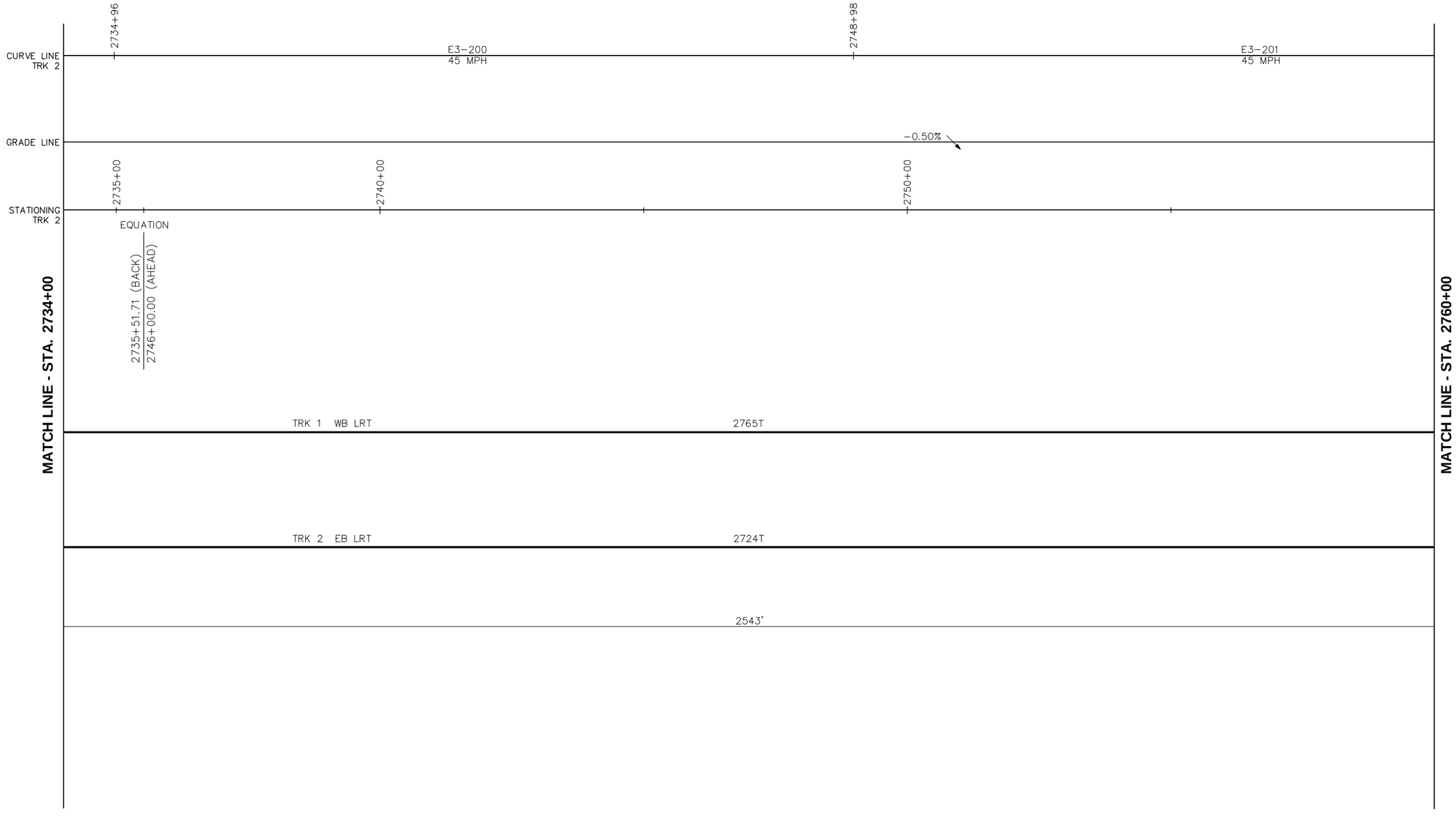
Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2708+00 TO STA. 2734+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-009

SHEET 147 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

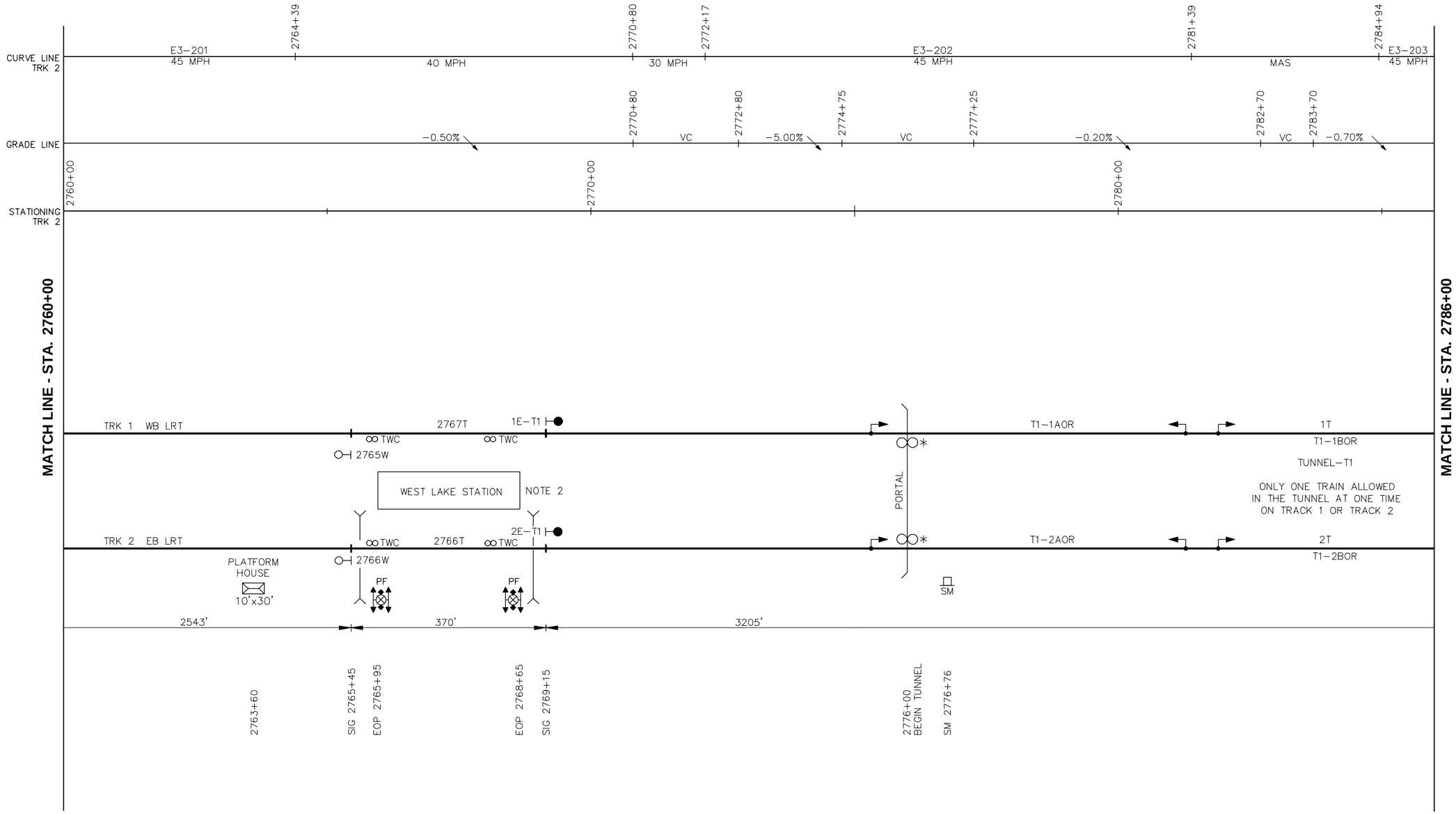
SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2734+00 TO STA. 2760+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-010

SHEET 148 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. INTERLOCKING CONTROL SIGNALS AT STATION ARE TO BE FLEETED FOR NORMAL OPERATIONS.

* PORTAL INTRUSION DEACTIVATION LOOP

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
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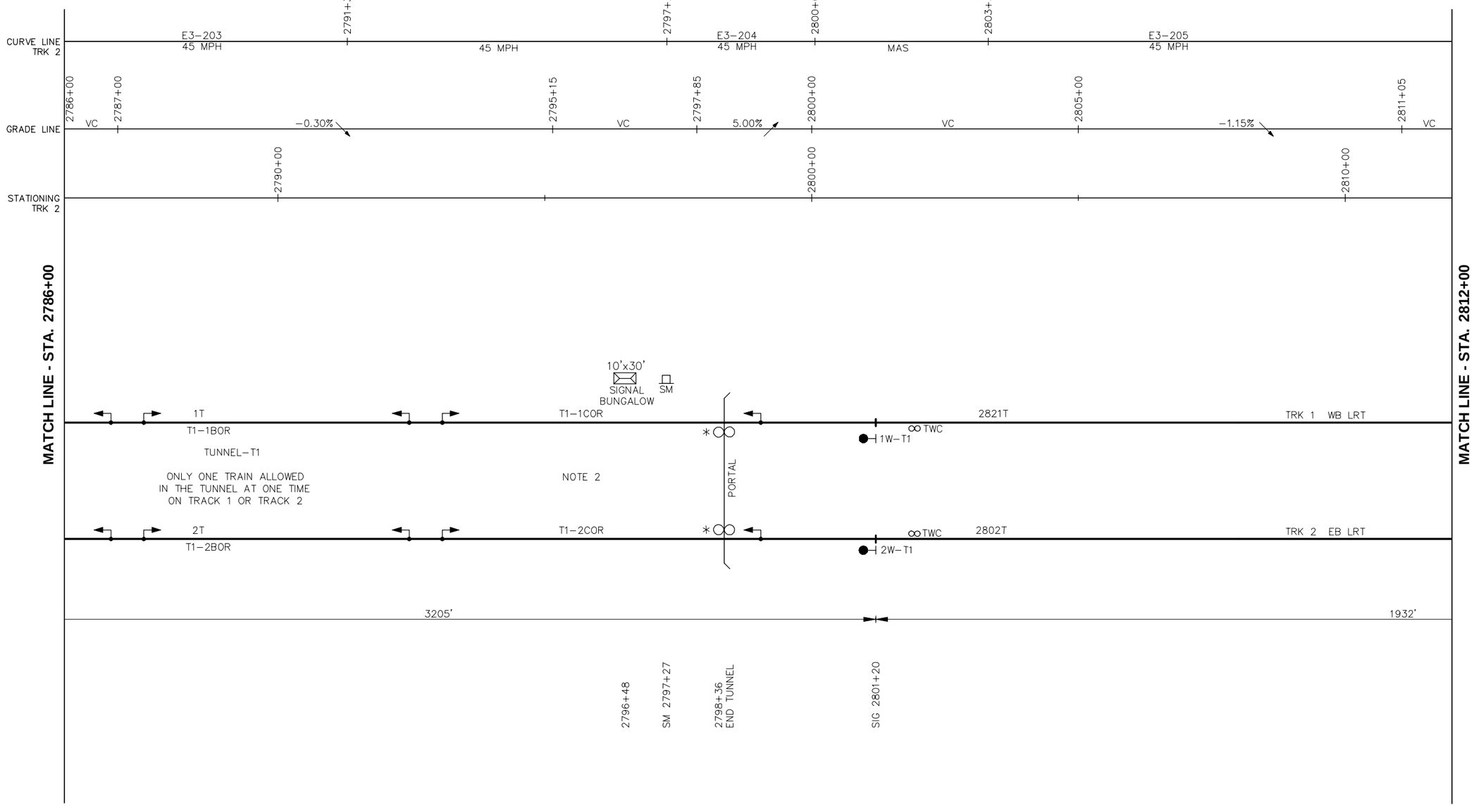
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2760+00 TO STA. 2786+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-011

SHEET 149 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. PROVIDE INPUT TO FAN CONTROL SYSTEM AT TUNNEL SYSTEMS HOUSE.

* PORTAL INTRUSION DEACTIVATION LOOP

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

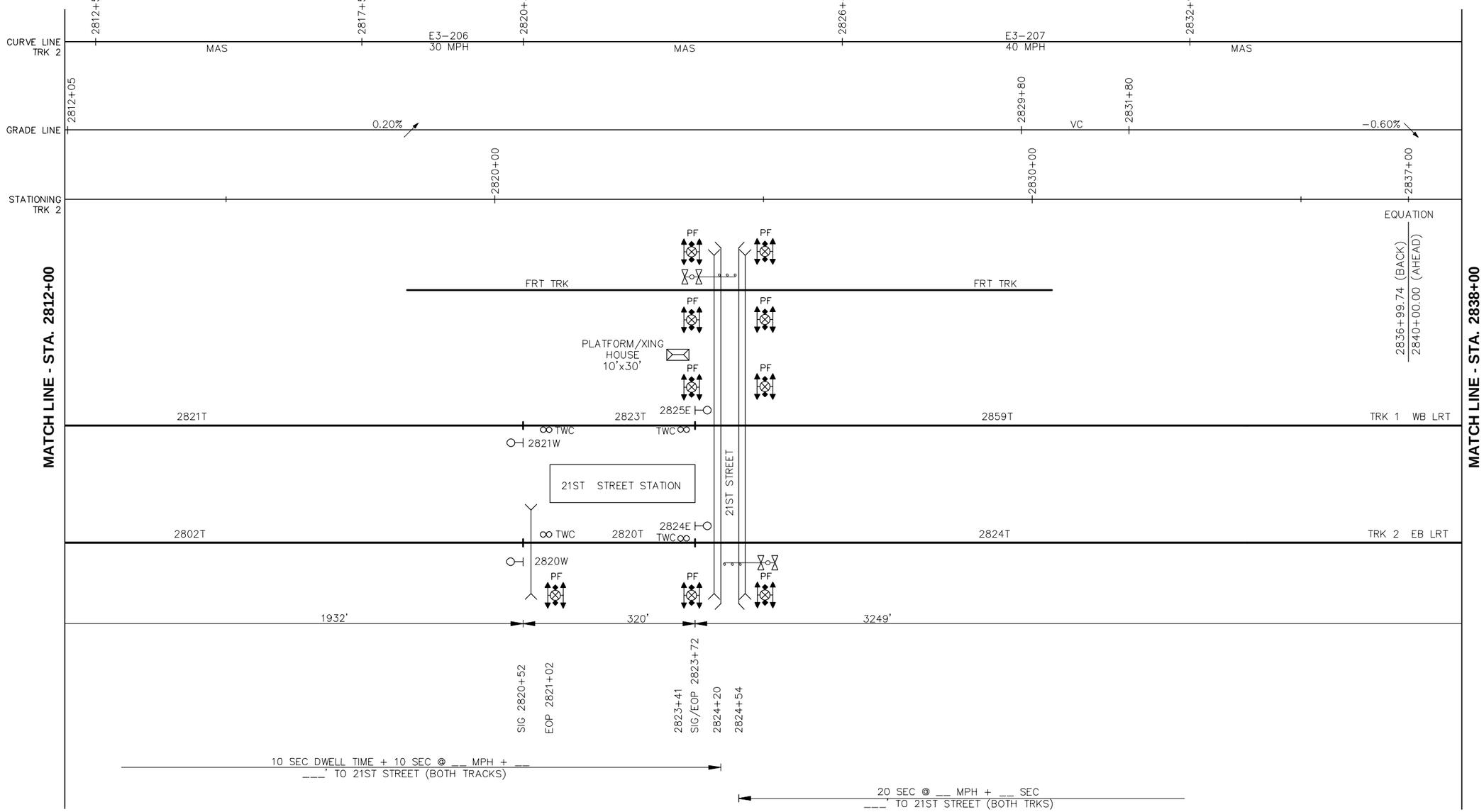
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2786+00 TO STA. 2812+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-012

SHEET 150 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

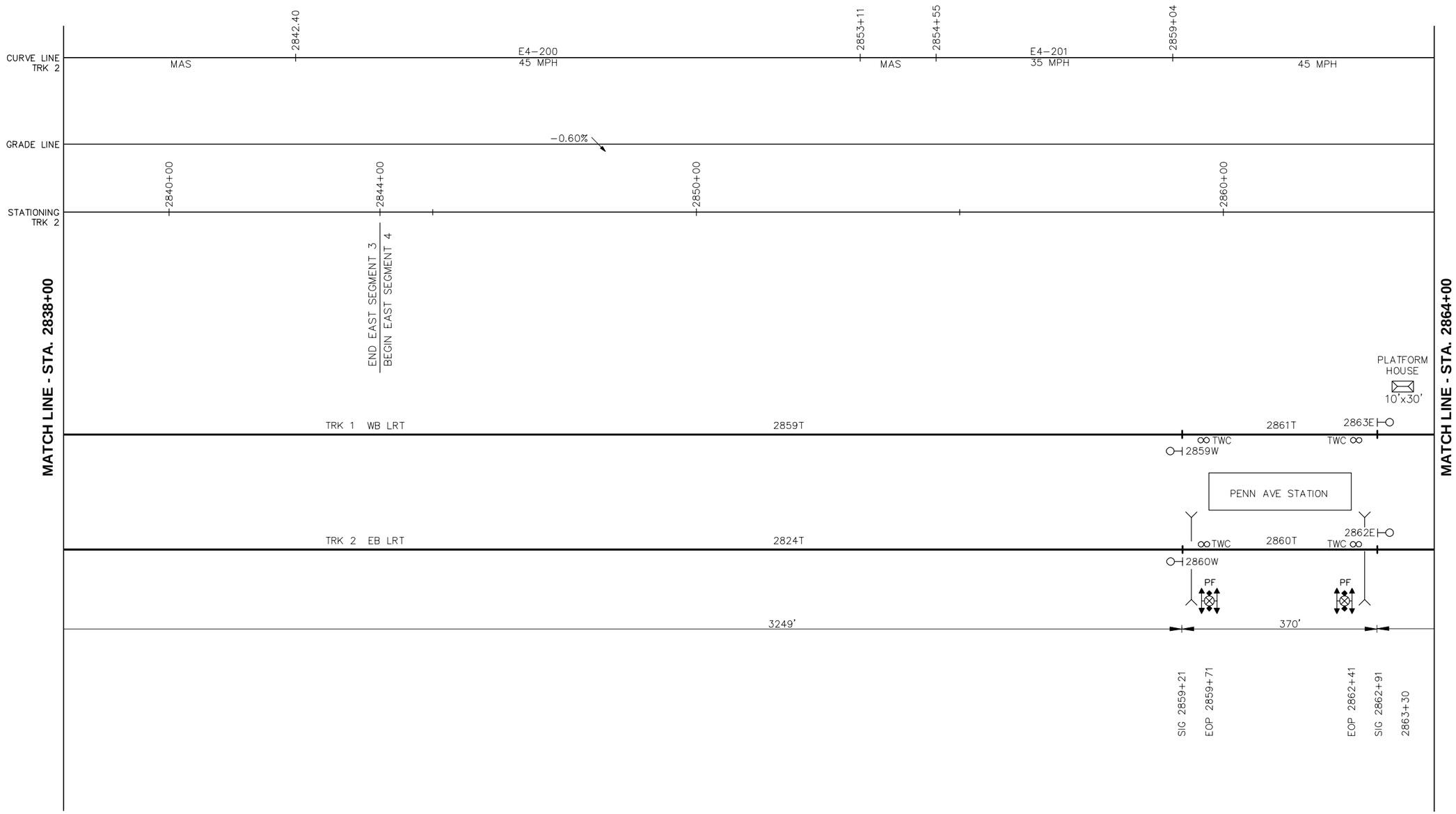
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2812+00 TO STA. 2838+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-013

SHEET 151 OF 240

Aug, 27 2014 04:18 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-SIG-CLD.dwg By: curtis.neff



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

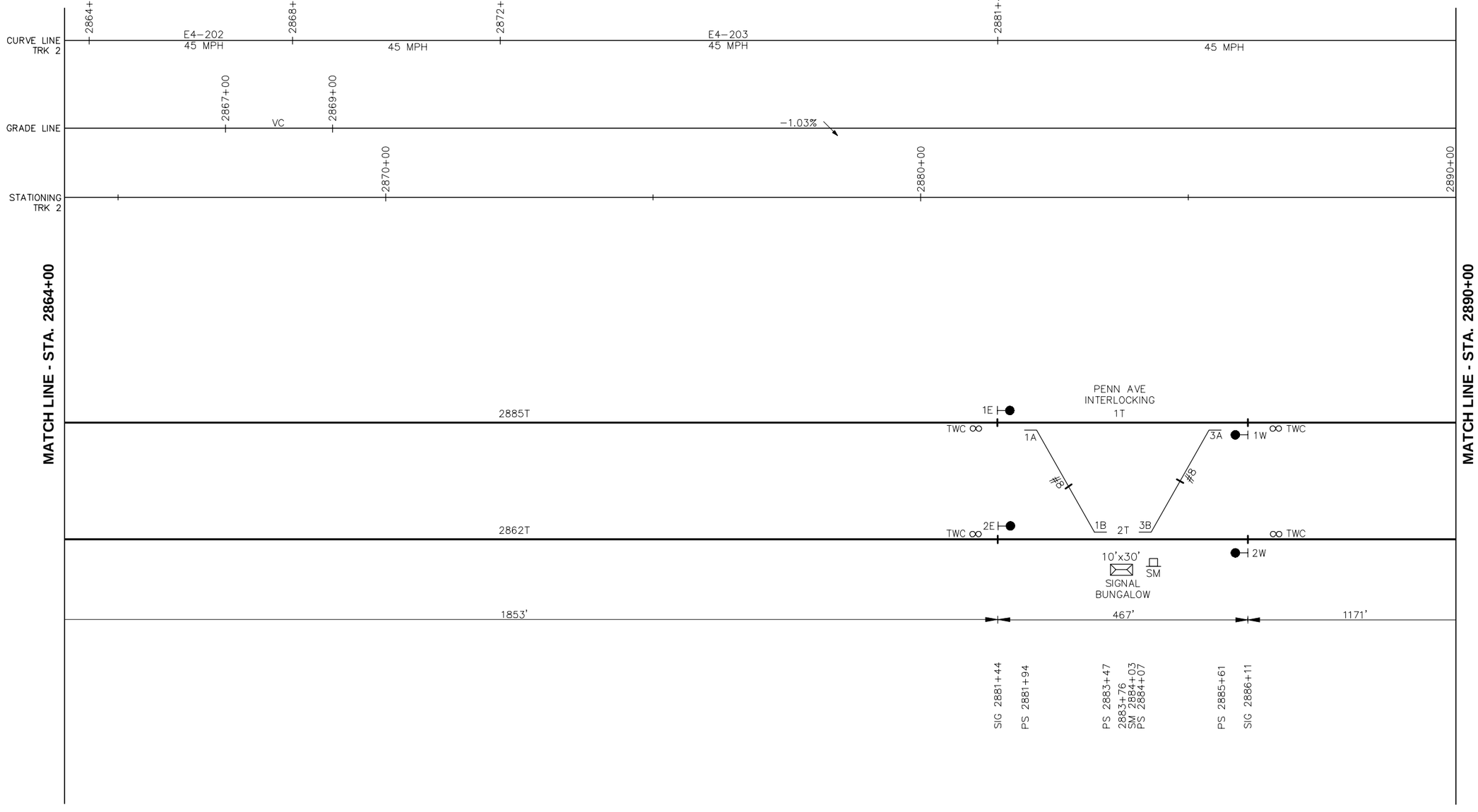
EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2838+00 TO STA. 2864+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-014

SHEET 152 OF 240

Aug. 27 2014 04:18 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-SIG-CLD.dwg By: curtis.neff



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. INTERLOCKING CONTROL SIGNALS AT STATION ARE TO BE FLEETED FOR NORMAL OPERATIONS.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
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PRELIMINARY ENGINEERING

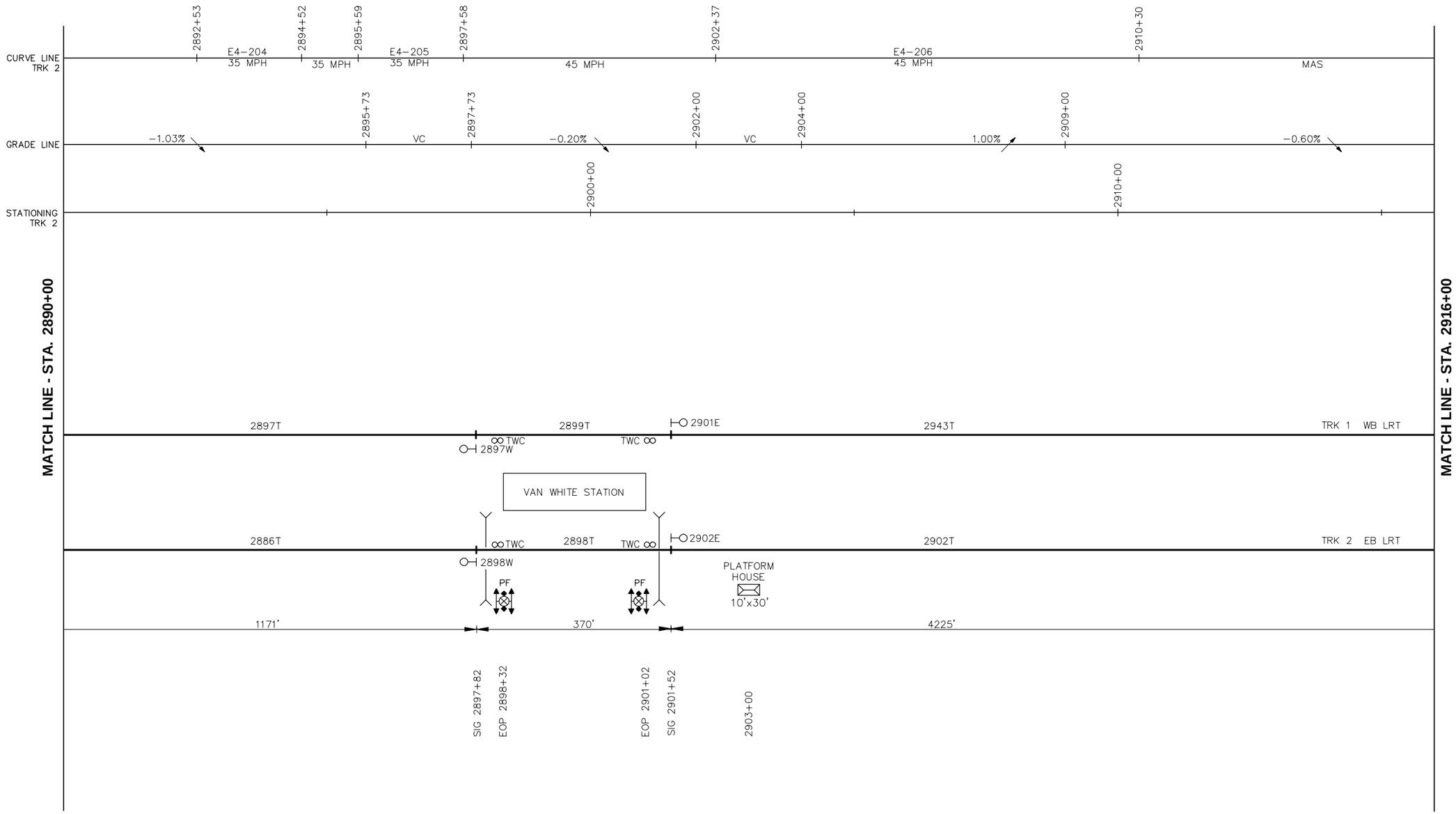
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2864+00 TO STA. 2890+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-015

SHEET 153 OF 240

Aug. 27 2014 04:18 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-SIG-CLD.dwg By: curtis.neft



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

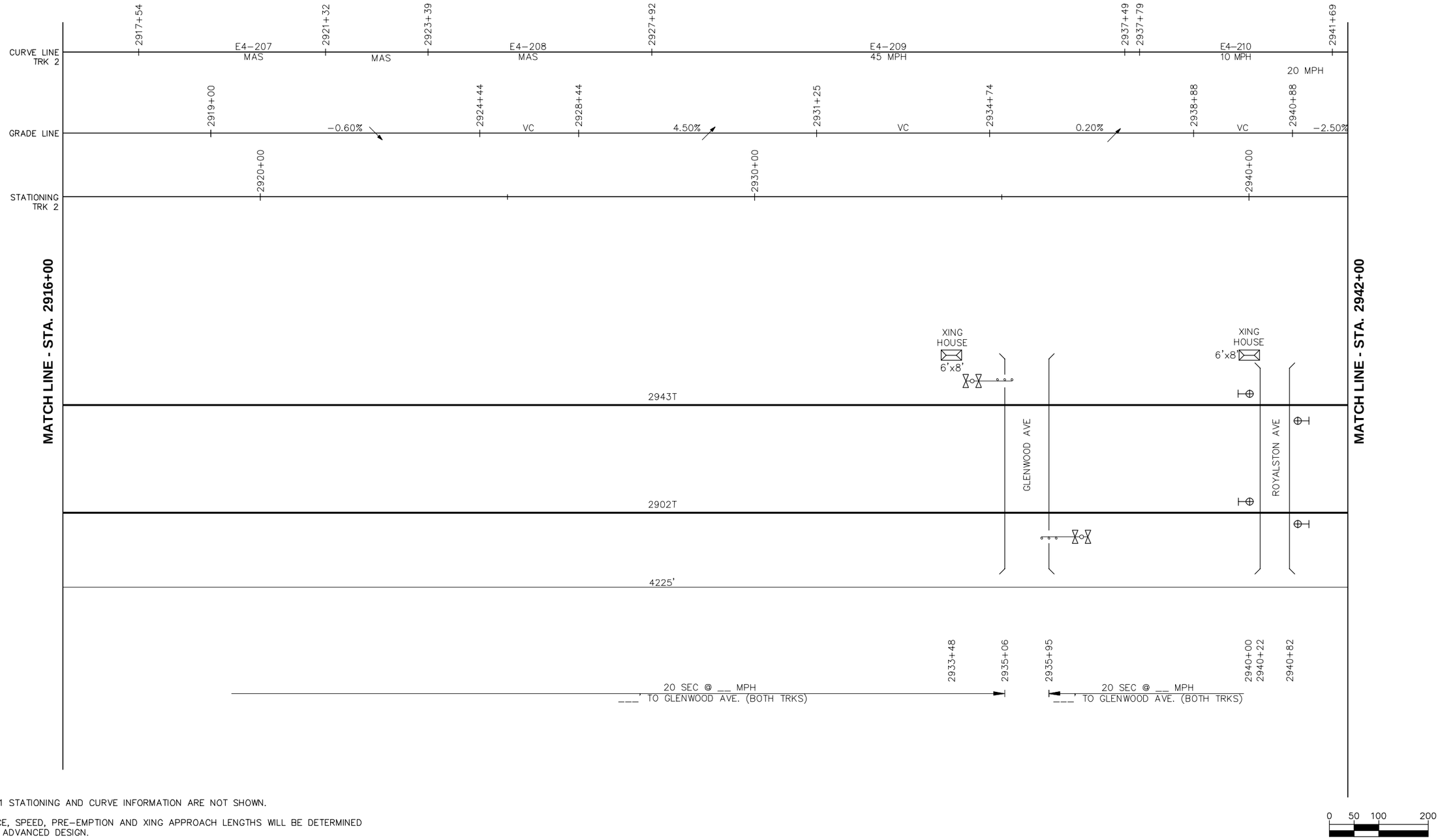
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2890+00 TO STA. 2916+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-016

SHEET 154 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.
2. DISTANCE, SPEED, PRE-EMPTION AND XING APPROACH LENGTHS WILL BE DETERMINED DURING ADVANCED DESIGN.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
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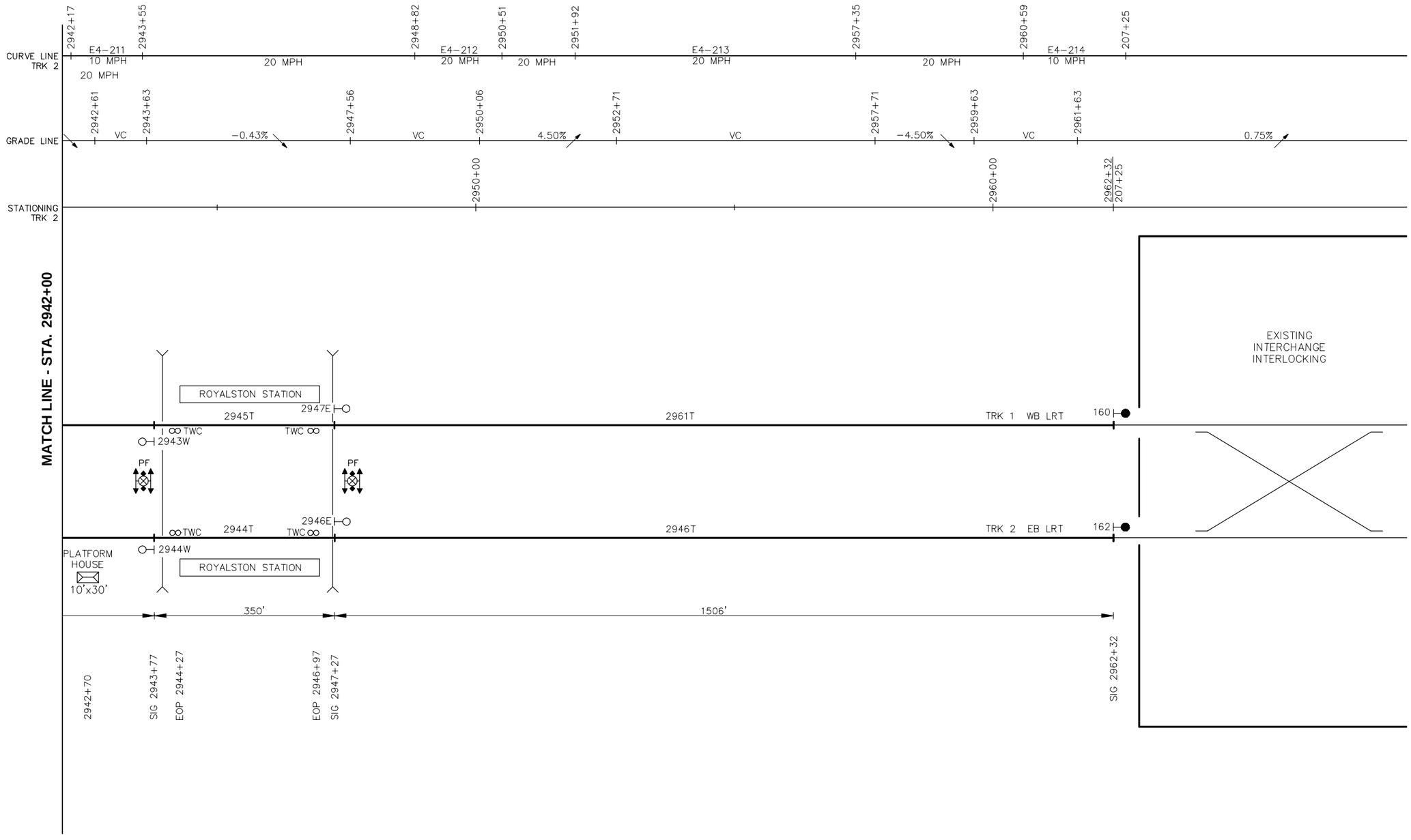
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2916+00 TO STA. 2942+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-CLD-017

SHEET 155 OF 240



NOTES:

1. TRACK 1 STATIONING AND CURVE INFORMATION ARE NOT SHOWN.

0 50 100 200

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
CONTROL LINE DIAGRAM
STA. 2942+00 TO STA. 2962+32

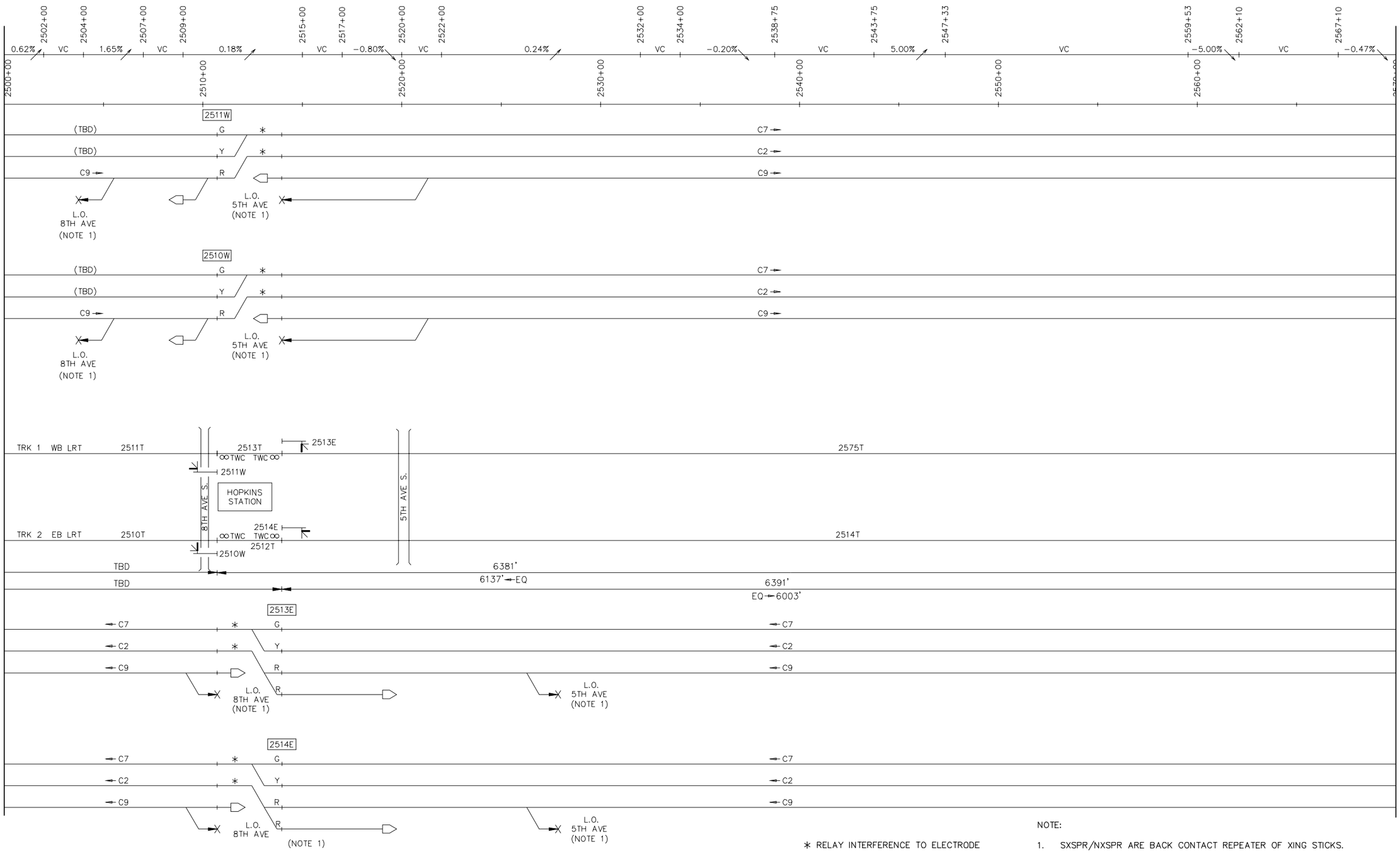
DISCIPLINE: SYSTEMS

SHEET NAME: SIG-CLD-018

SHEET 156 OF 240

Aug. 27 2014 04:18 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-SIG-CLD.dwg By: curtis.neft

END WEST SEGMENT 3 STA. 2450+22.71
MATCH LINE - STA. 2500+00



* RELAY INTERFERENCE TO ELECTRODE

NOTE:
1. SXSPR/NXSPR ARE BACK CONTACT REPEATER OF XING STICKS.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
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PRELIMINARY ENGINEERING

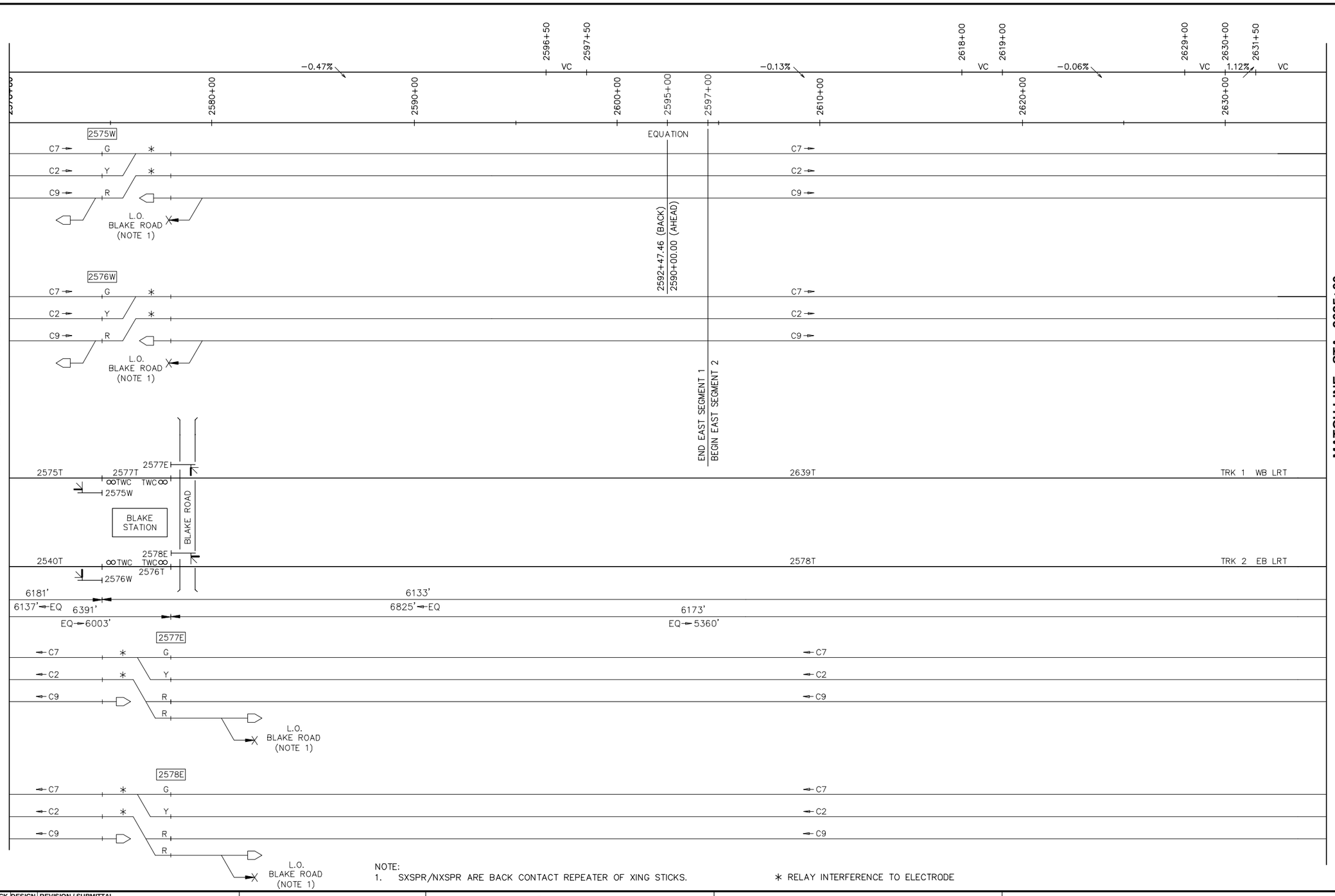
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2500+00 TO STA. 2570+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-RAC-001

SHEET 157 OF 240

Aug, 27 2014 04:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-SIG-RAC.dwg By: curtis.neft



NOTE:
1. SXSPR/NXSPR ARE BACK CONTACT REPEATER OF XING STICKS.

∗ RELAY INTERFERENCE TO ELECTRODE

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

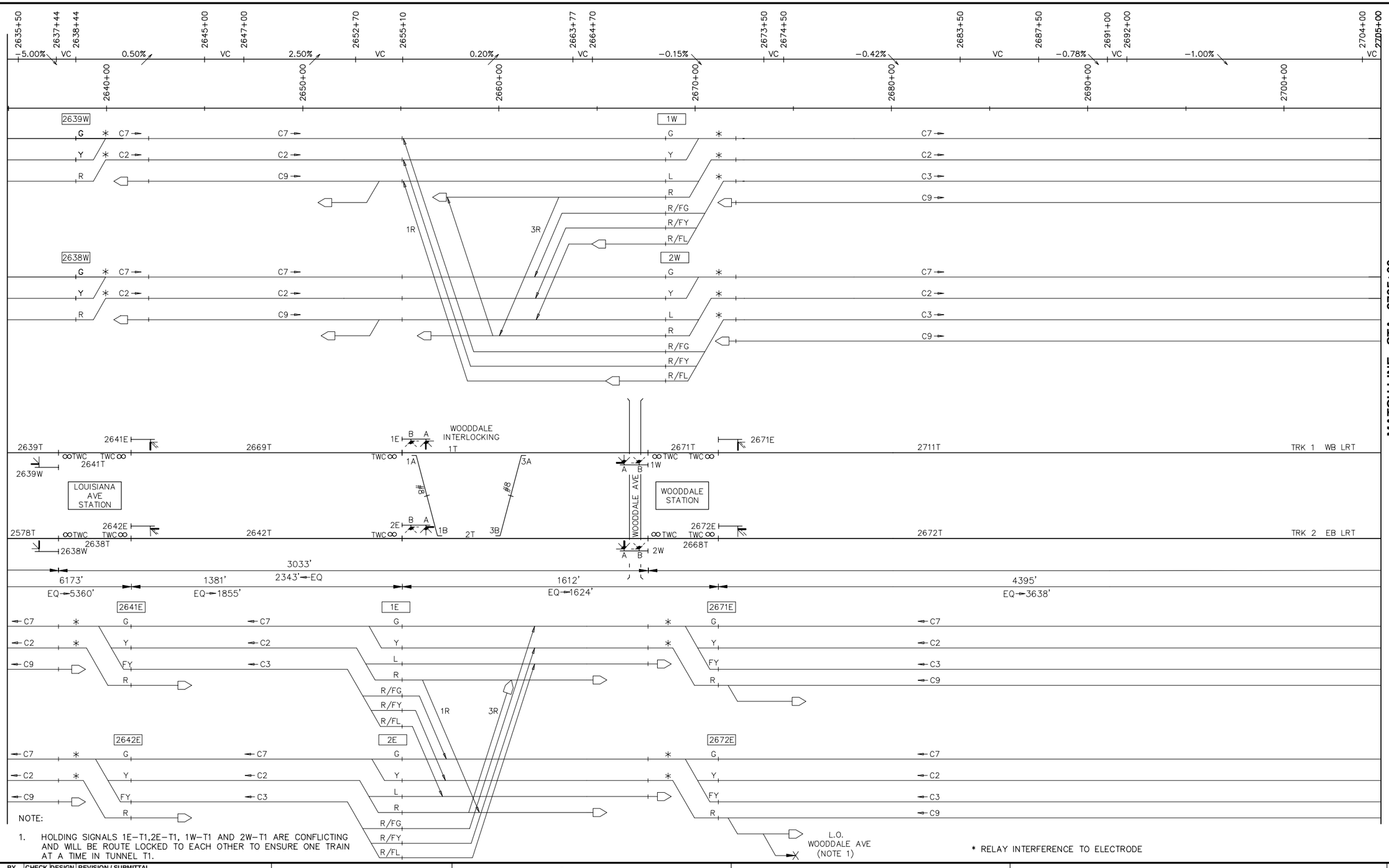
EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2570+00 TO STA. 2635+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-RAC-002

SHEET 158 OF 240

Aug. 27 2014 04:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-SIG-RAC.dwg By: curtis.neft



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2635+00 TO STA. 2705+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-RAC-003

SHEET 159 OF 240

Aug. 27 2014 04:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\EO-SYS-SIG-RAC.dwg By: curtis.neft

GRADE LINE

−0.74% | VC | 0.41% | VC | −0.50% | VC | −5.00%

2710+00 | 2716+00 | 2718+00 | 2720+00 | 2727+00 | 2729+00 | 2729+00 | 2730+00 | 2735+00 | 2740+00 | 2750+00 | 2760+00 | 2770+00 | 2770+80 | 2772+80 | 2774+75

MATCH LINE - STA. 2705+00

MATCH LINE - STA. 2775+00

2711W: C7 G, C2 Y, C3 FY, C9 R — L.O. BELTLINE AVE (NOTE 1)

1W: G, Y, L, R, R/FG, R/FY, R/FL

EQUATION

2735+51.71 (BACK)
2746+00.00 (AHEAD)

2765W: G, Y, FY, R

1R | 3R

2712W: C7 G, C2 Y, C3 FY, C9 R — L.O. BELTLINE AVE (NOTE 1)

2W: G, Y, L, R, R/FG, R/FY, R/FL

2766W: G, Y, FY, R

END EAST SEGMENT 2
BEGIN EAST SEGMENT 3

2711T | 2715T | 1E | B A | TWC | TWC | 2711W

BELTLINE INTERLOCKING

1T | TWC | 1A | 3A | #8 | #8 | A B 1W

TRK 1 WB LRT

2765T | 2767T | 1E−T1 | TWC | TWC | 2765W

BELTLINE STATION

BELTLINE AVE

WEST LAKE STATION

2692T | 2716T | 2E | B A | TWC | TWC | 2712W

2T | 1B 3B | TWC | A B 2W

TRK 2 EB LRT

2724T | TWC | TWC | 2766W | 2766T | 2E−T1

4373' | 1703' | 2543' | 3575'

5077'−EQ | 4395' | 1687'−EQ | 2962'−EQ | 3883'−EQ

EQ−3638' | 4264' | EQ−3873'

1E: C7 G, C2 Y, C3 L, C9 R, R/FG, R/FY, R/FL — L.O. BELTLINE AVE (NOTE 1)

1E−T1: G, Y, R — C7, C2, C9

1R | 3R

2E: C7 G, C2 Y, C3 L, C9 R, R/FG, R/FY, R/FL — L.O. BELTLINE AVE (NOTE 1)

2E−T1: G, Y, R — C7, C2, C9

NOTE:

1. SXSPR/NXSPR ARE BACK CONTACT REPEATER OF XING STICKS.

∗ RELAY INTERFERENCE TO ELECTRODE

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

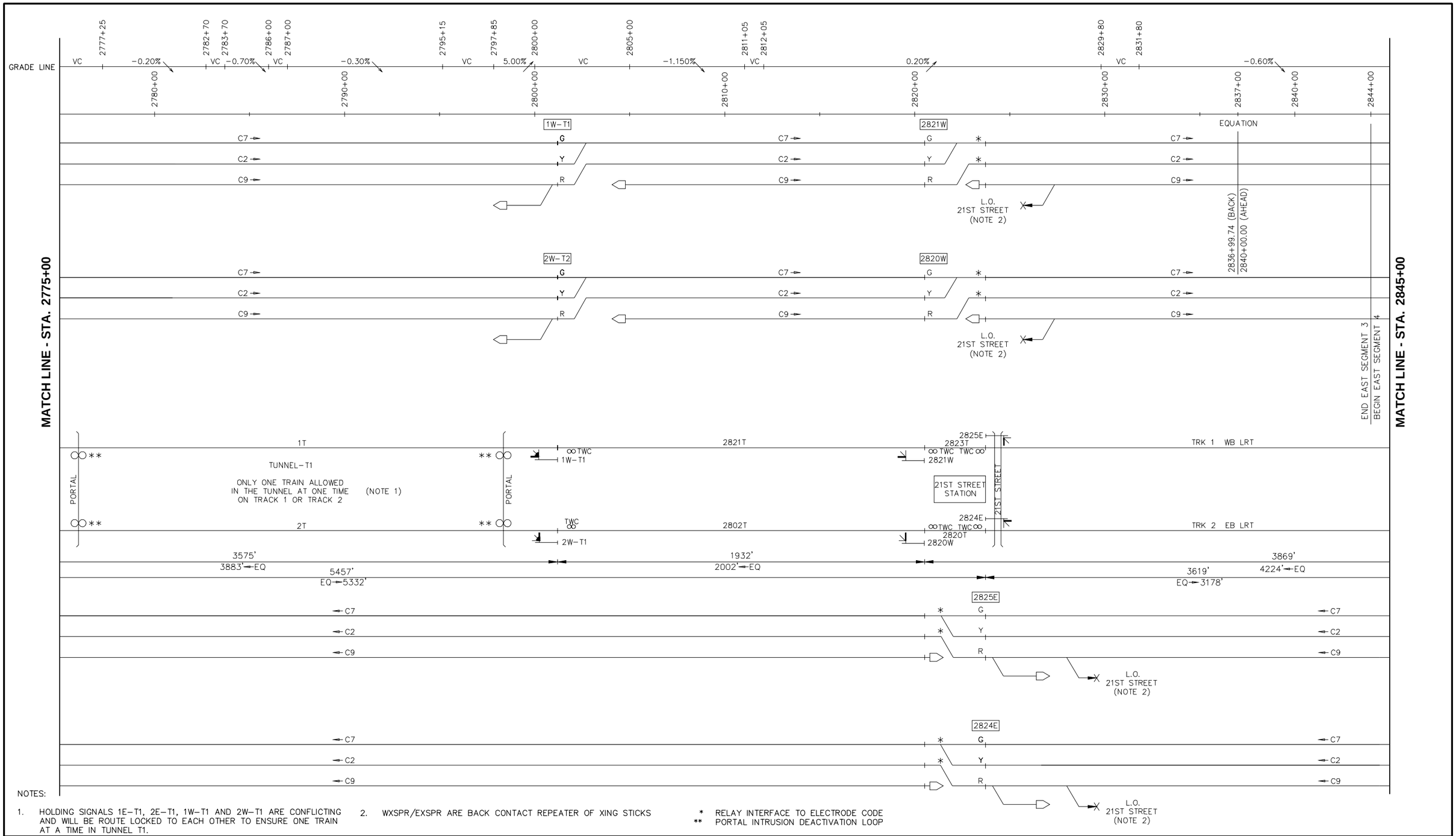
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2705+00 TO STA. 2775+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-RAC-004

SHEET 160 OF 240

Aug, 27 2014 04:41 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SYS-SIG-RAC.dwg By: curtis.neft



NOTES:

1. HOLDING SIGNALS 1E−T1, 2E−T1, 1W−T1 AND 2W−T1 ARE CONFLICTING AND WILL BE ROUTE LOCKED TO EACH OTHER TO ENSURE ONE TRAIN AT A TIME IN TUNNEL T1.
2. WXSPR/EXSPR ARE BACK CONTACT REPEATER OF XING STICKS

* RELAY INTERFACE TO ELECTRODE CODE
** PORTAL INTRUSION DEACTIVATION LOOP

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

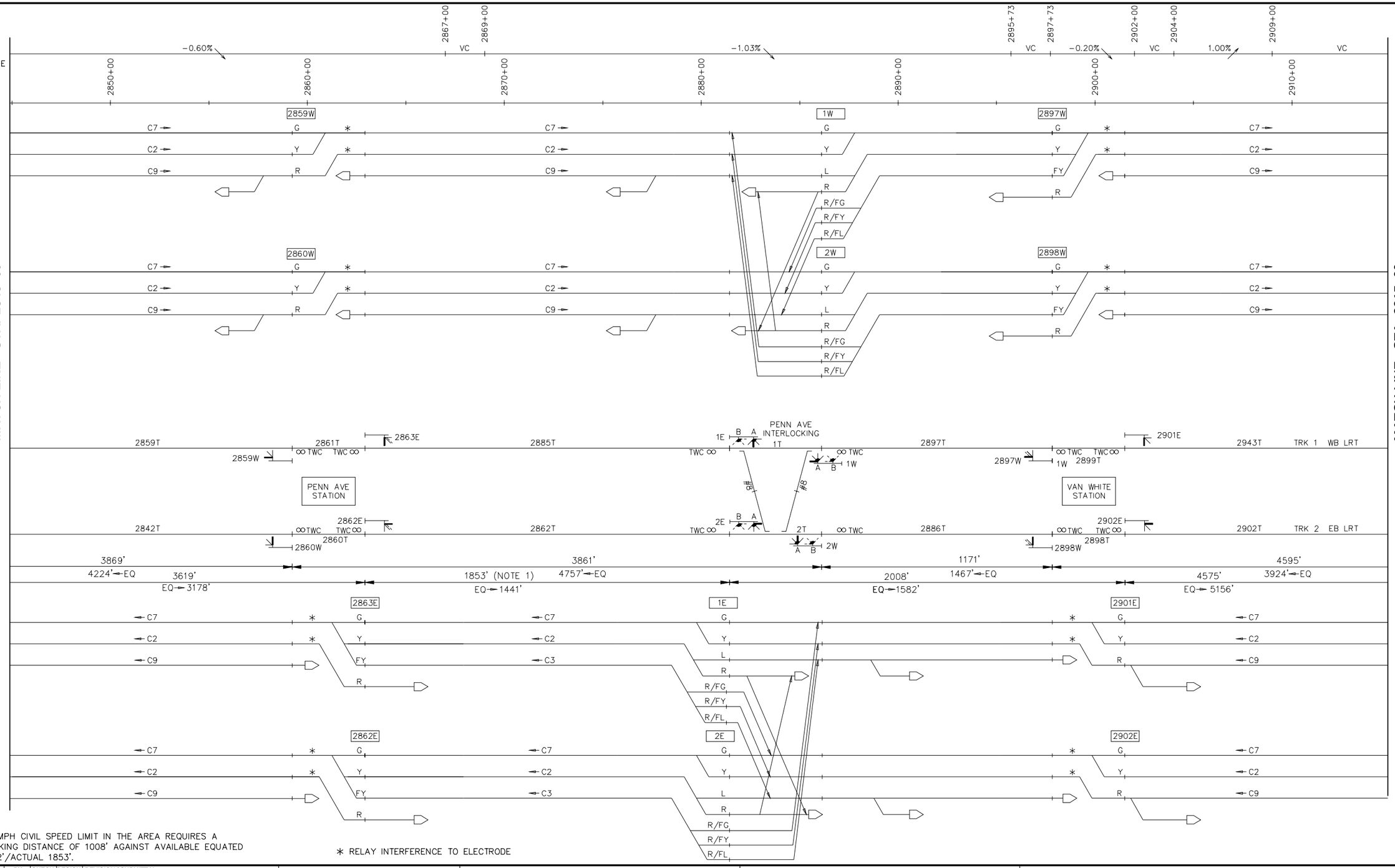
Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2775+00 TO STA. 2845+00

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-RAC-005

SHEET 161 OF 240



NOTES:

1. 45 MPH CIVIL SPEED LIMIT IN THE AREA REQUIRES A BRAKING DISTANCE OF 1008' AGAINST AVAILABLE EQUATED 1432'/ACTUAL 1853'.

* RELAY INTERFERENCE TO ELECTRODE

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn
SYSTRA

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

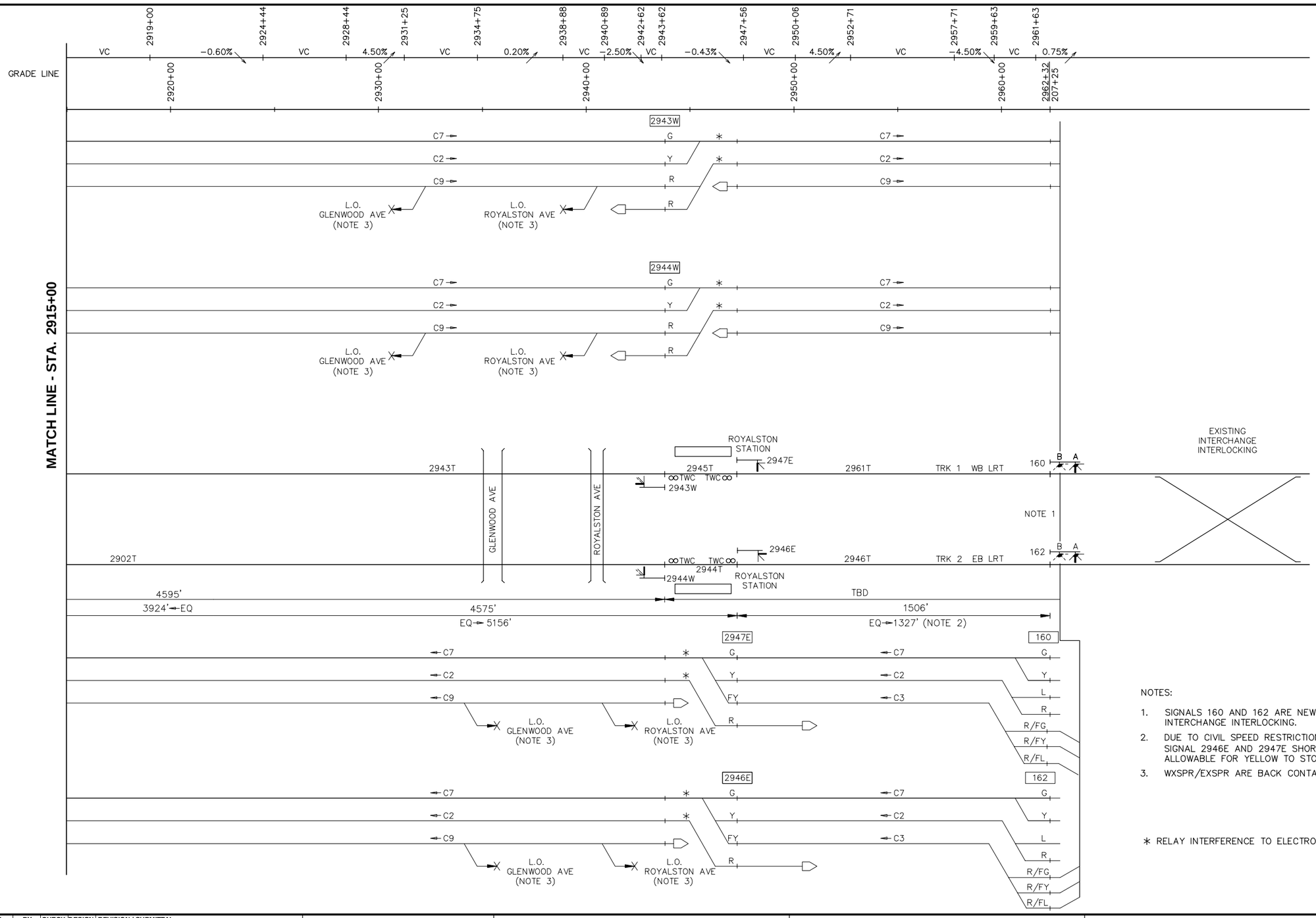
SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2845+00 TO STA. 2915+00

DISCIPLINE: SYSTEMS

SHEET NAME: SIG-RAC-006

SHEET 162 OF 240



NOTES:

1. SIGNALS 160 AND 162 ARE NEW SIGNALS OF EXISTING INTERCHANGE INTERLOCKING.
2. DUE TO CIVIL SPEED RESTRICTION OF 10 MPH APPROACHING SIGNAL 2946E AND 2947E SHORTER BLOCK 1327' EQ IS ALLOWABLE FOR YELLOW TO STOP.
3. WXSPR/EXSPR ARE BACK CONTACT REPEATER OF XING STICKS.

* RELAY INTERFERENCE TO ELECTRODE

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

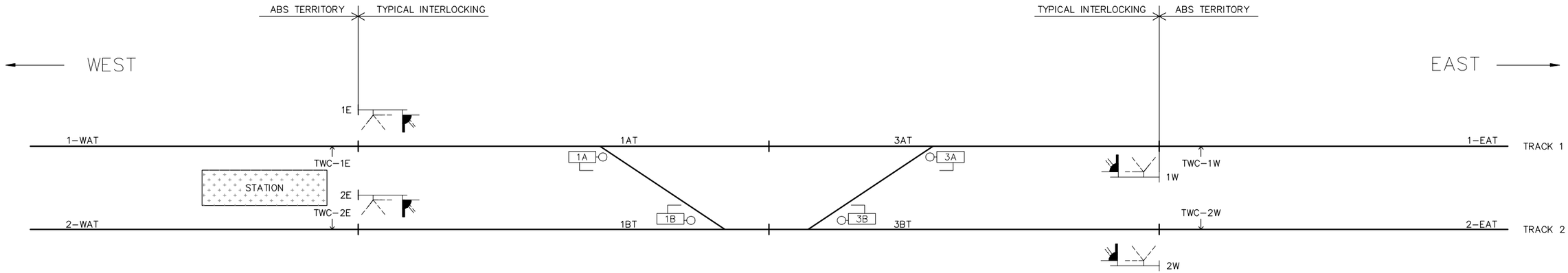
Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
ROUTE AND ASPECT CHARTS
STA. 2915+00 TO STA. 2962+32

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-RAC-007

SHEET 163 OF 240



SIGNAL ROUTES	ENTRANCE SIGNAL	EXIT SIGNAL	ASPECTS	OPPOSING/ CONFLICTING ROUTES	SWITCHES LOCKED (⬭ = REV.)			TRACKS UNOCCUPIED	CONTROL MODE			TIME LOCKING	OPERATIONAL NOTES
									AUTO	TWC	MANUAL	TIME SETTINGS	
1EA	1E	1W	G, FY, Y	2EB, 1WA, 1WB, 2WB	1A		3A	1AT, 3AT, 1–EAT	–	X	X	TBD	1
1EB		2W	R/FG, R/FY, R/FL	2EA, 2EB, 1WA, 1WB, 2WA, 2WB	(1A)	(1B)	3B	1AT, 1BT, 3BT, 2–EAT	–	X	X	TBD	1
2EA	2E	2W	G, FY, Y	1EB, 1WB, 2WA, 2WB	1B		3B	1BT, 3BT, 2–EAT	X	X	X	TBD	1
2EB		1W	R/FG, R/FY, R/FL	1EA, 1EB, 1WA, 1WB, 2WA, 2WB	1B	(3B)	(3A)	1BT, 3BT, 3AT, 1–EAT	–	X	X	TBD	1
1WA	1W	1E	G, FY, Y	2WB, 1EA, 1EB, 2EB	3A		1A	3AT, 1AT, 1–WAT	X	X	X	TBD	1
1WB		2E	R/FG, R/FY, R/FL	2WA, 2WB, 1EA, 1EB, 2EA, 2EB	(3A)	(3B)	1B	3AT, 3BT, 1BT, 2–WAT	–	X	X	TBD	1
2WA	2W	2E	G, FY, Y	1WB, 1EB, 2EA, 2EB	3B		1B	3BT, 1BT, 2–WAT	–	X	X	TBD	1
2WB		1E	R/FG, R/FY, R/FL	1WA, 1WB, 1EA, 1EB, 2EA, 2EB	3B	(1B)	(1A)	3BT, 1BT, 1AT, 1–WAT	–	X	X	TBD	1

NOTE 2

LAMP OUT DOWNGRADES			
SIGNALS	ASPECT	LAMP OUT	DOWNGRADE
1E, 2E, 1W, 2W	G	TOP G	Y
1E, 2E, 1W, 2W	Y	TOP Y	R
1E, 2E, 1W, 2W	FY	TOP Y	R
1E, 2E, 1W, 2W	R/FG	BOTTOM G	R/FY
1E, 2E, 1W, 2W	R/FY	BOTTOM Y	R
1E, 2E, 1W, 2W	R/FL	BOTTOM L	R
1E, 2E, 1W, 2W	R/FG, R/FY, R/FL	TOP R	D/D
1E, 2E, 1W, 2W	R	TOP R	D

NOTE: ALL SIGNAL LIGHT ASPECTS (E.G. G,Y,R) DISPLAY ON "A" HEAD WITH "B" HEAD DARK.

NOTES:

1. SIGNALS CAN BE CONTROLLED VIA RCC, TWC OR LOCAL CONTROL PANEL
2. TWC ROUTING CODES TO BE ASSIGNED IN FINAL DESIGN

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

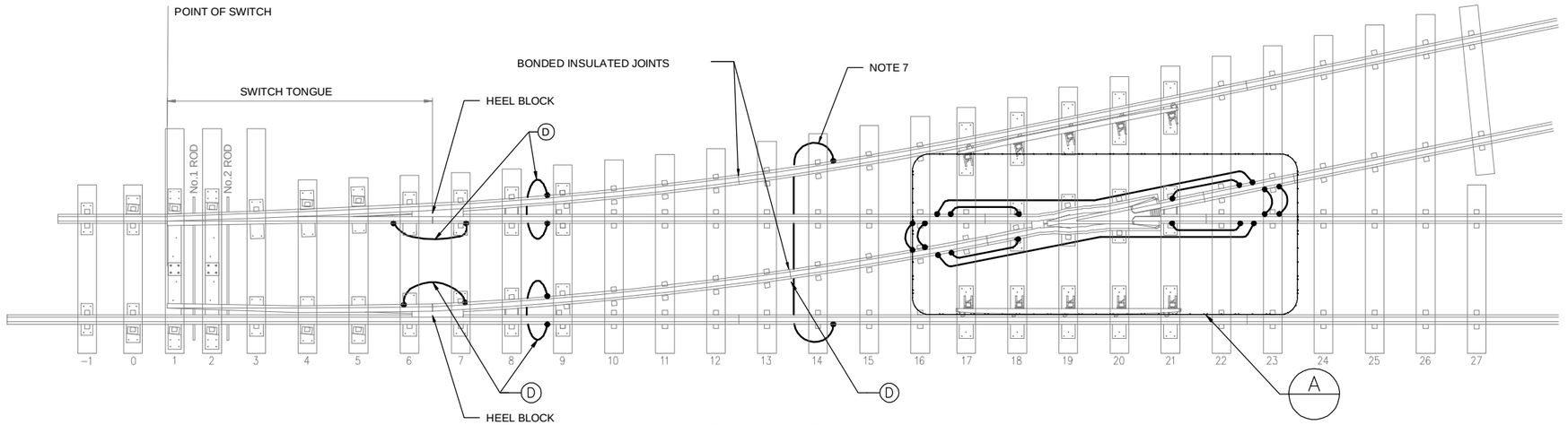
Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
TYPICAL ROUTE AND LOCKING TABLE

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-RLT-001

SHEET 164 OF 240



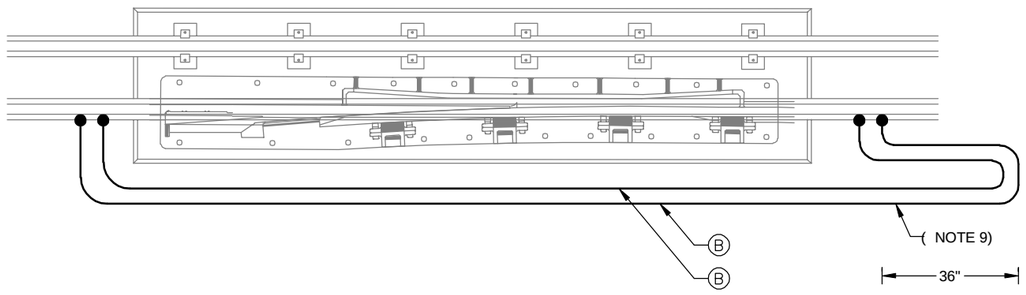
1 TURNOUT PLAN
SCALE: NTS

NOTES:

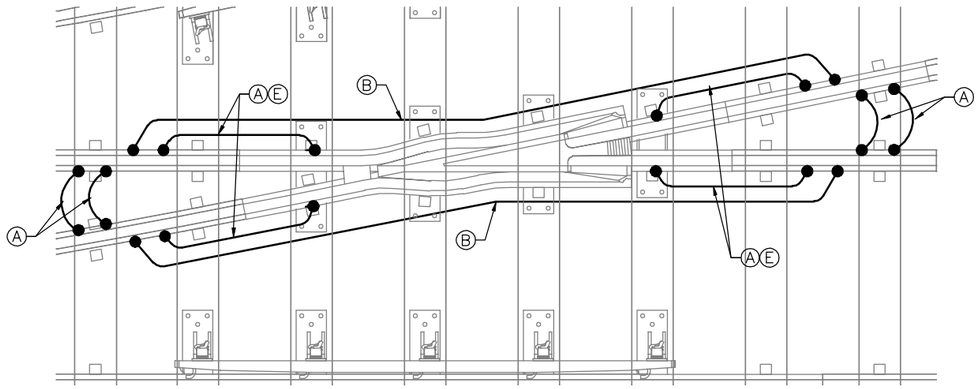
1. CROSS BONDING SHALL NOT BE COMBINED WITH NEGATIVE RETURN AT SUBSTATION.
2. ALL RAIL CONNECTIONS WILL BE MADE WITH MECHANICAL FASTENERS SUCH AS CEMBRE AR60 OR APPROVED EQUAL.
3. ACTUAL RAIL COMPONENT LENGTH AND TIE SPACING MAY VARY FROM THOSE SHOWN ON THIS DRAWING.
4. RIGHT HAND TURNOUT DETAILS SHALL BE OPPOSITE TO THAT SHOWN.
5. DRESS CABLES CLOSE TO RAIL WITHIN GAGE.
6. 250 KCMIL BOND CABLE AND 500 KCMIL BOND CABLE SHALL BE TYPE "EXTRA FLEX", "ROPELAY" TYPE OR APPROVED EQUAL.
7. RAIL CONNECTION SHALL BE PLACED AS CLOSE AS POSSIBLE TO THE INSULATED JOINT BAR, TYPICALLY NO MORE THAN 24 INCHES AWAY FROM THE ACTUAL JOINT, TO PROVIDE BROKEN RAIL PROTECTION
8. TRACK INSTALLATION SHOWN SCREENED FOR CLARITY.
9. JOINT IS DESIGNED TO ACCOMMODATE 30" OF EXPANSION / CONTRACTION. DESIGN CABLE LENGTH FOR BONDS ACCORDINGLY.

POWER BONDING KEY

- (A) 1-250 KCM - MECHANICAL RAIL CONNECTION
- (B) 1-500 KCM - MECHANICAL RAIL CONNECTION
- (C) 2-500 KCM - MECHANICAL RAIL CONNECTION
- (D) 2-250 KCM - MECHANICAL RAIL CONNECTION
- (E) NOT REQUIRED FOR WELDED JOINTS



2 RAIL EXPANSION JOINT RETURN POWER BONDING
SCALE: NTS



A FROG BONDING
SCALE: NTS

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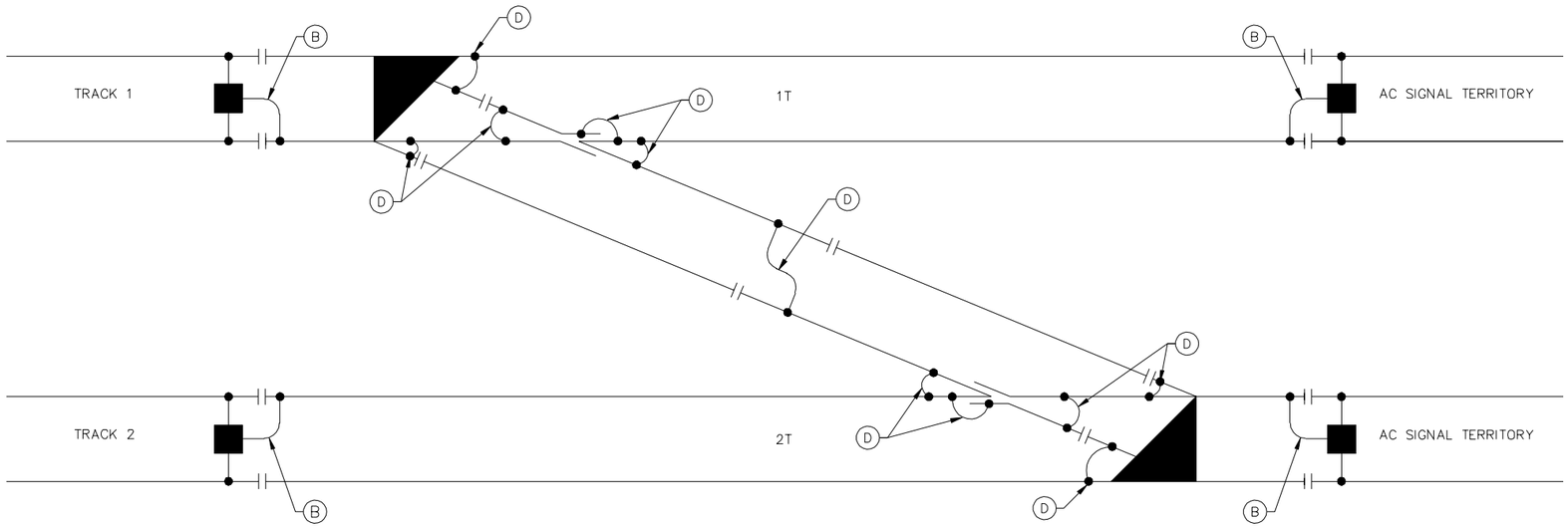
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
TYPICAL RAIL BONDING DETAIL - JOINTED

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-001

SHEET 165 OF 240

Aug. 27 2014 04:43 pm V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\SYSTEMS\E0-SIG-DTL-001.dwg By: curtis.neft

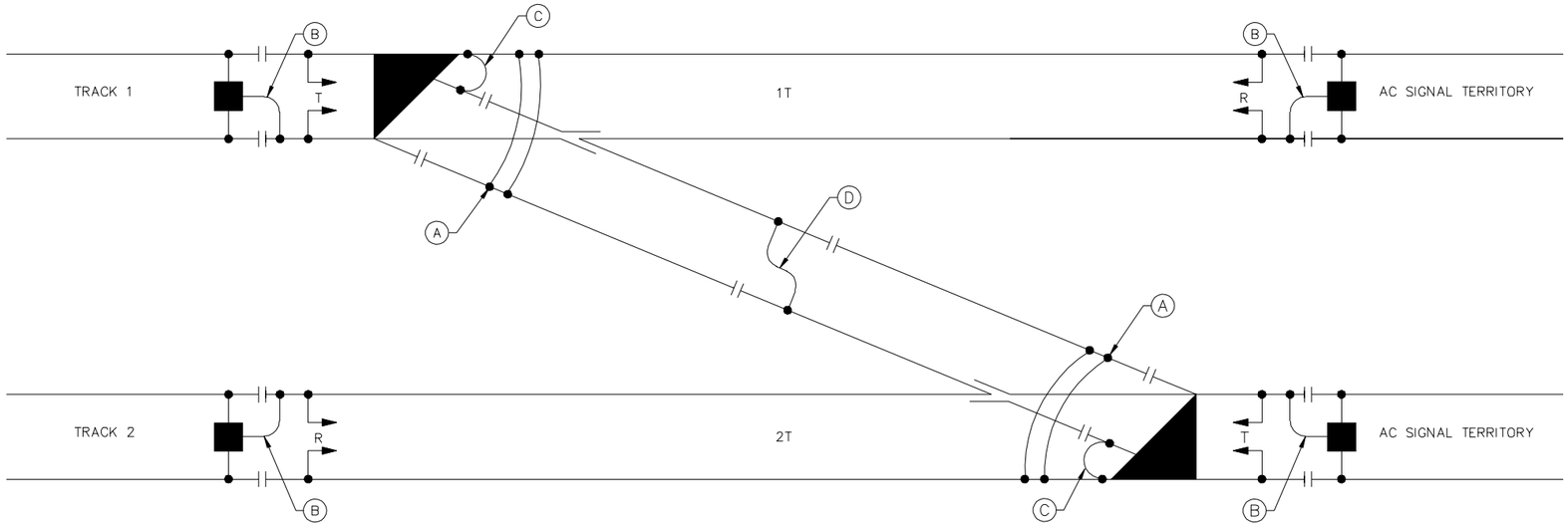


1 INTERLOCKING NEGATIVE RETURN RAIL BONDING

SCALE: NTS

NOTES:

1. RAIL BONDING SHALL BE ACCOMPLISHED WITH MECHANICAL CONNECTORS, SUCH AS CEMBRE AR60D OR APPROVED EQUAL.
2. THE CONTRACTOR SHALL PROVIDE BONDING PLANS FOR EACH SWITCH POINT LOCATION FOR APPROVAL BY THE CAR.
3. ARRANGEMENT SHOWN IS GENERAL AND IS PROVIDED TO SHOW TYPICAL ARRANGEMENTS OF TRACK CIRCUITS, BONDS AND RETURN RAIL CONFIGURATIONS.
4. ALL 500 KCM CABLES ARE ROPELAY
5. CROSS BONDING SHALL NOT BE COMBINED WITH NEGATIVE RETURN AT SUBSTATION.



2 INTERLOCKING SIGNAL RAIL BONDING

SCALE: NTS

SIGNAL AND POWER BONDING KEY

- (A) 1–#6 BOND STRAND (TRACK CIRCUIT JUMPER)
- (B) 3–500 KCM – MECHANICAL RAIL CONNECTION
- (C) 2–250 KCM – MECHANICAL RAIL CONNECTION
- (D) 2–500 KCM – MECHANICAL RAIL CONNECTION

INSULATED JOINT
NEGATIVE RETURN RAIL
SIGNAL RAIL

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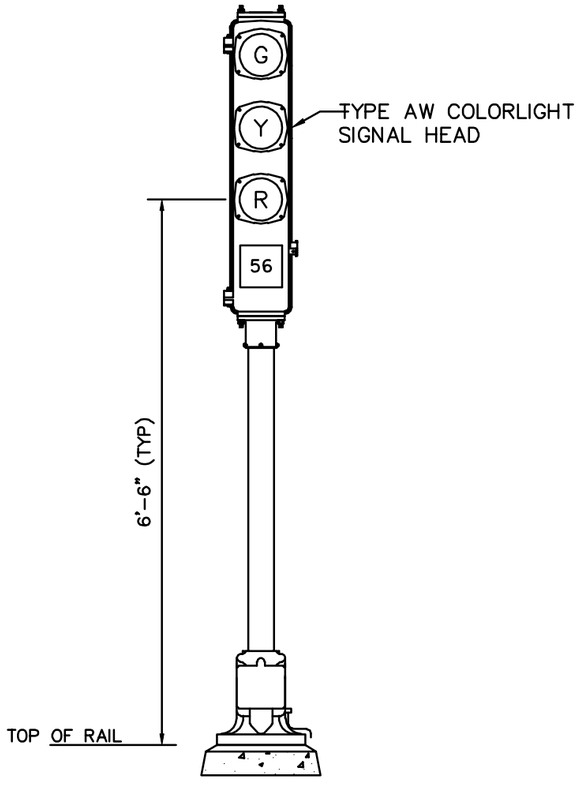
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
SINGLE RAIL TRACK CIRCUIT RAIL BONDING

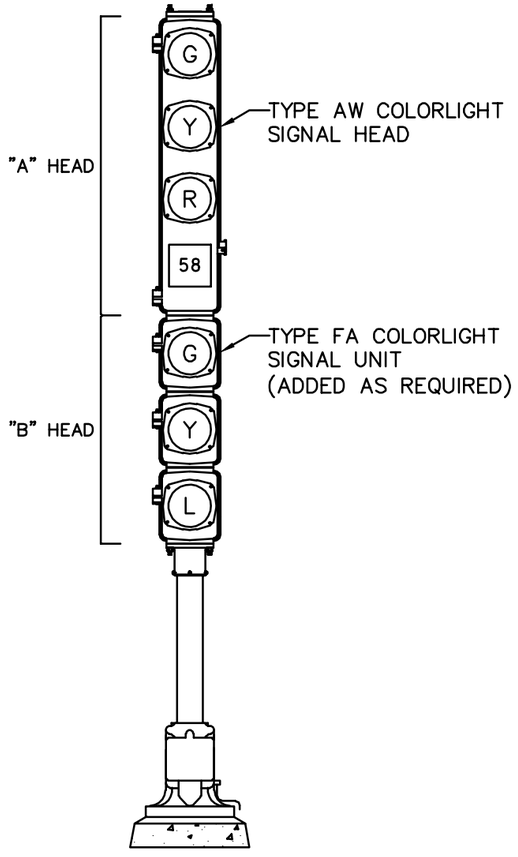
DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-003

SHEET 166 OF 240

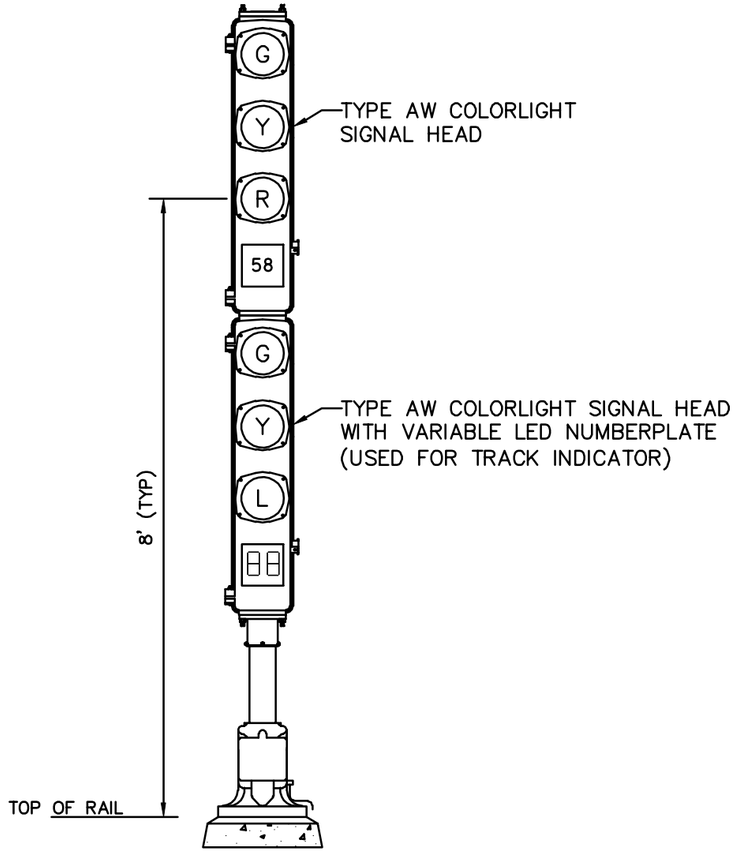
BLOCK SIGNAL



INTERLOCKING SIGNAL



INTERLOCKING SIGNAL WITH TRACK NUMBER INDICATOR



NOTES:

1. TRANSIT SIGNALS – TO BE USED ONLY IN YARDS, TUNNELS, AT STATION PLATFORMS, AND IN URBAN EMBEDDED TRACK ENVIRONMENTS WHERE MOUNTING SPACE IS A CONCERN. ALL OTHER SIGNALS TO BE HIGH SIGNALS.
2. DOUBLET SIGNAL LENSES, 6–3/8" CLEAR OUTER, 5–1/2" COLORED INNER, UNLESS LEDs SPECIFIED.
3. METAL HOODS TO BE 4" LONG.
4. HEADS TO BE PAINTED FLAT BLACK.
5. MAST AND JB TO BE ALUMINUM (NOT PAINTED).
6. LAMPS TO BE 10V/18W, SINGLE FILAMENT, UNLESS LEDs SPECIFIED.
7. PRE–CAST CONCRETE FOUNDATION.
8. SIGNAL NUMBER PLATES SHALL MEET AREMA
9. ALL SIGNALS TO BE MIN. 76" FROM CENTERLINE OF TANGENT TRACK, EXCEPT WHERE SIGNAL IS LOCATED AT END OF PLATFORM.
10. TRANSIT SIGNALS SHALL USE 4" ALUMINUM MAST.
11. DRAWING NOT TO SCALE.

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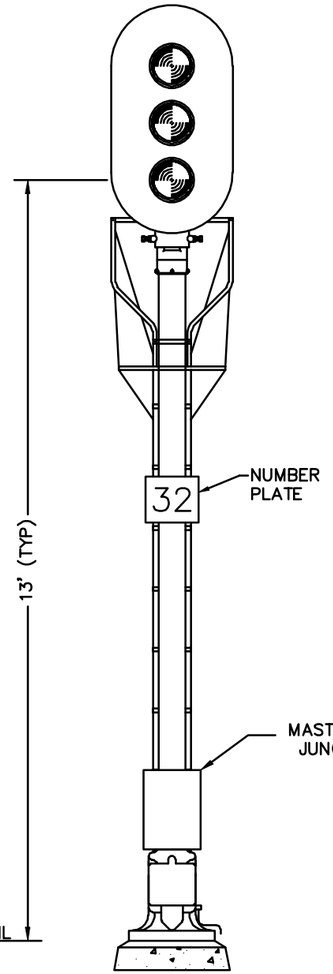
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
TRANSIT SIGNALS

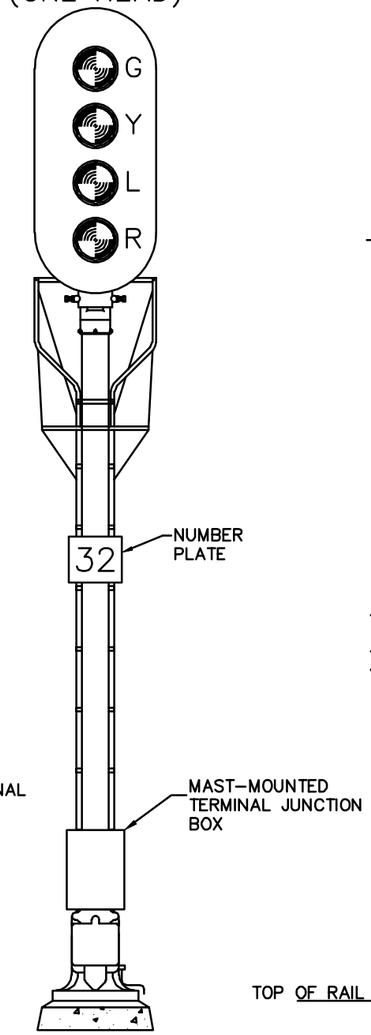
DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-004

SHEET 167 OF 240

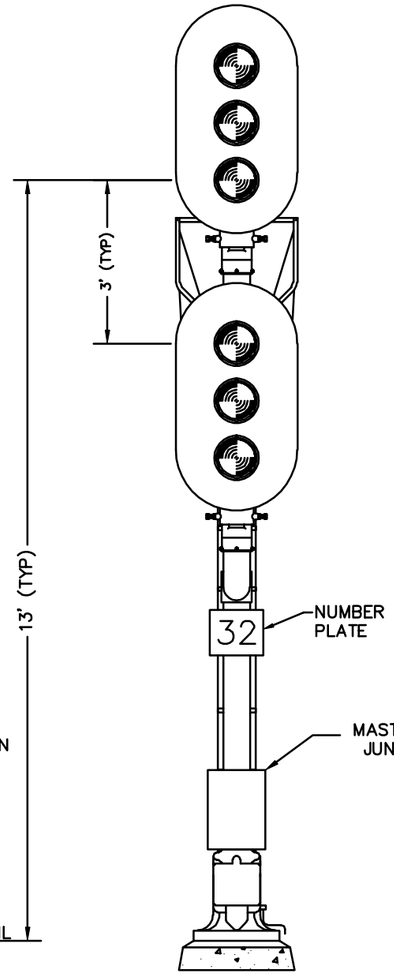
BLOCK SIGNAL



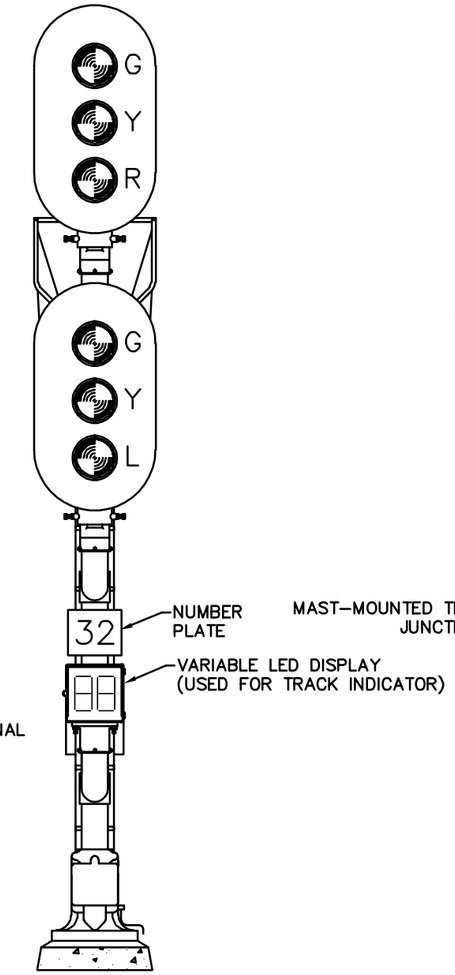
INTERLOCKING SIGNAL (ONE HEAD)

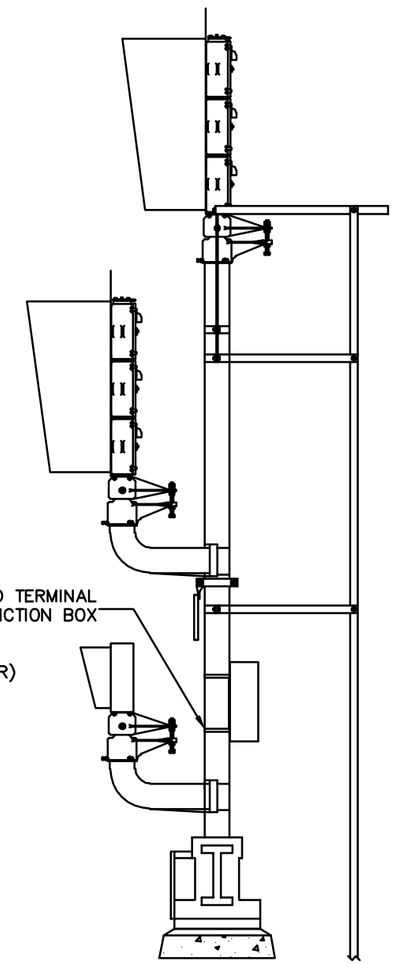


INTERLOCKING SIGNAL (TWO HEADS)



INTERLOCKING SIGNAL (TWO HEADS) WITH TRACK NUMBER INDICATOR





NOTES:

1. HIGH SIGNALS – TO BE USED AS BLOCK AND INTERLOCKING SIGNALS ON MAINLINE TRACKAGE WHERE HIGHER SPEEDS AND VISIBILITY ARE A CONCERN. TO BE USED AT ALL LOCATIONS OTHER THAN THOSE FOR WHICH TRANSIT SIGNALS ARE SPECIFIED.
2. DOUBLET SIGNAL LENSES, 8–3/8" CLEAR OUTER, 5–1/2" COLORED INNER, UNLESS LEDs SPECIFIED.
3. SNOW HOODS, BACKGROUNDS, LADDERS, AND PLATFORMS SHALL BE PROVIDED.
4. HEADS TO BE PAINTED FLAT BLACK.
5. MAST AND JB TO BE ALUMINUM (NOT PAINTED).
6. LAMPS TO BE 10V/18W, SINGLE FILAMENT, UNLESS LEDs SPECIFIED.
7. PRE–CAST CONCRETE FOUNDATION.
8. SIGNAL NUMBER PLATES SHALL MEET AREMA
9. ALL SIGNALS TO BE MIN. 76" FROM CENTERLINE OF TANGENT TRACK, EXCEPT WHERE SIGNAL IS LOCATED AT END OF PLATFORM.
10. HIGH SIGNALS SHALL USE 5" ALUMINUM MAST.
11. DRAWING NOT TO SCALE.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
WAYSIDE HIGH SIGNALS

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-005

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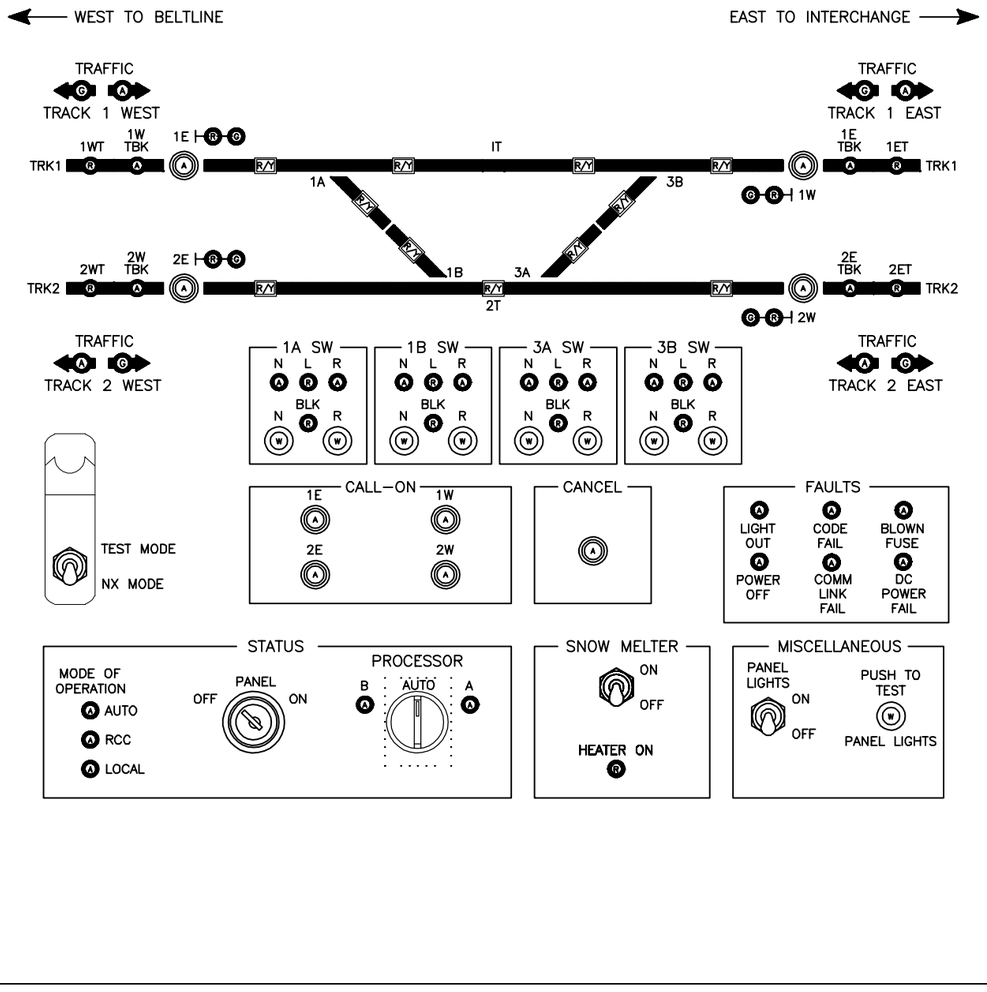
TYPICAL INTERLOCKING



MATERIAL:
BLACK POWDER COAT ALUMINUM WITH
LASER ENGRAVED TRACK AND LETTERING

TRACK: 5/16" WIDE
LINES: 1/32" WIDE
LETTERING: SMALL – .15" LARGE – .18"
LOCATION NAME – .31"

ROUND LEDS:
DIALIGHT 607 SERIES
= RED 607–2112–130F
= AMBER 607–2312–130F
= GREEN 607–2212–130F

2 COLOR LED:
LUMEX SSI–LXH0721YW35649

PUSHBUTTON:
EAO SERIES 11

PUSHBUTTON WITHOUT LAMP:
PUSHBUTTON: EAO 11–271.825
W = WHITE LENS: EAO 11–931.9

PUSHBUTTON WITH LAMP:
PUSHBUTTON: EAO 11–131.825
A = AMBER LENS: EAO 11–931.4

KNURLED CONICAL MOUNTING NUT: EAO 11–937

TOGGLE SWITCH: C&K 7101TZQE

KEY SWITCH:
ACTUATOR: EAO 704.121
CONTACT MODULE: EAO 704.901.3
SHALL MATCH EXISTING METRO TRANSIT STND

3 POSITION SWITCH:
ACTUATOR: EAO 704–403.0
CONTACT MODULE: EAO 704.901.5

SWITCH GUARD: HONEYWELL
19PA184–NT

NOTE:
1. LAYOUT IS TYPICAL. CONTRACTOR SHALL PROVIDE A DETAILED LOCAL CONTROL PANEL LAYOUT FOR EACH LOCATION AND SUBMIT TO THE ENGINEER FOR APPROVAL.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
TYP LOCAL CONTROL PANEL FACEPLATE

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-006

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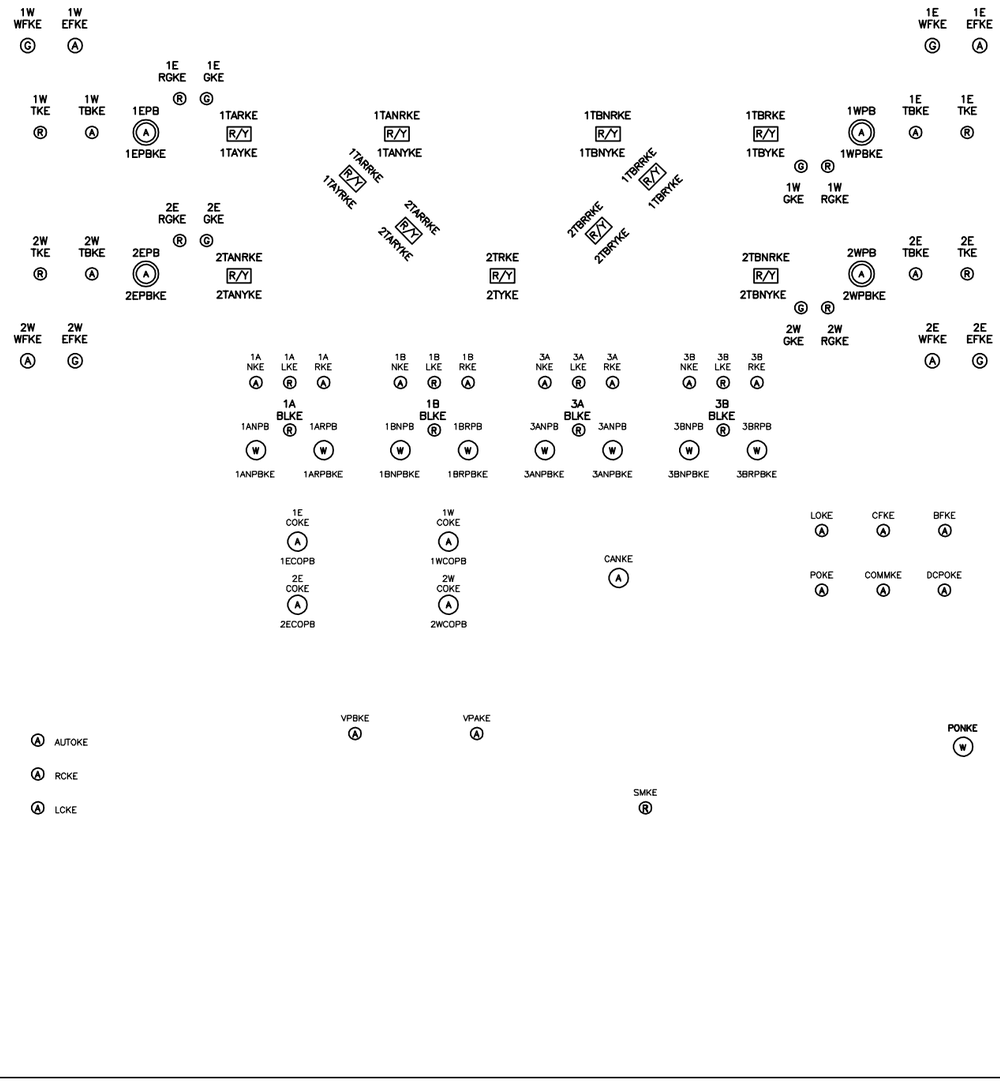
TYPICAL INTERLOCKING



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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
TYP INTERLOCKING LCP NOMENCLATURE

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-007

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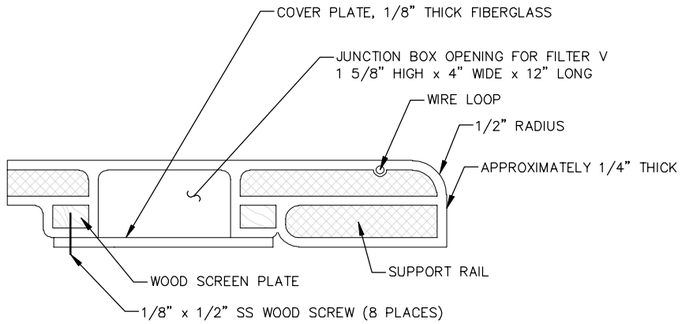
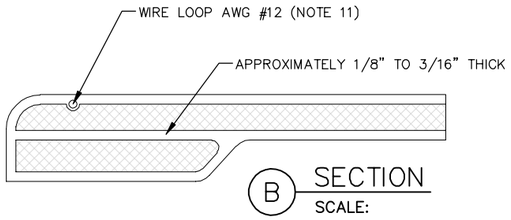
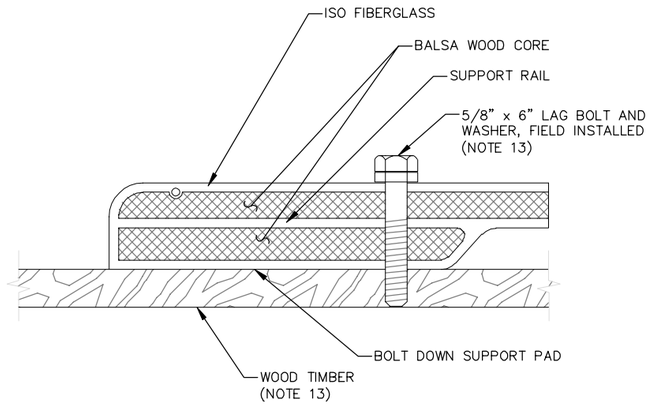


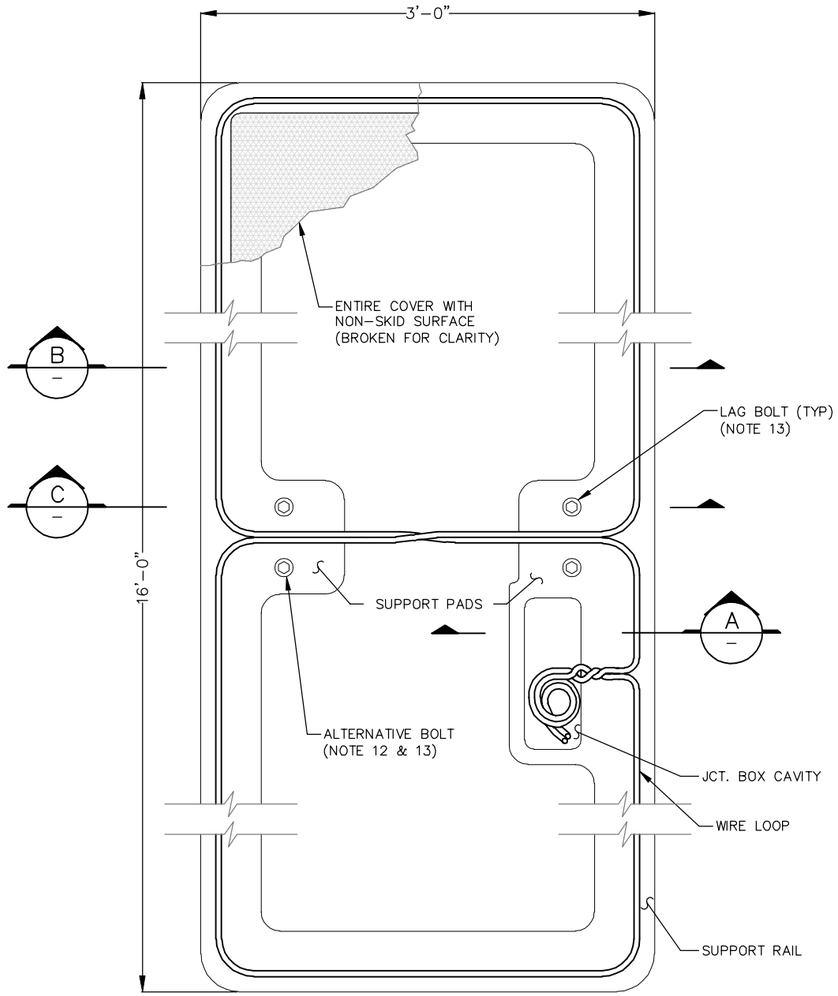
A SECTION
SCALE:



B SECTION
SCALE:



C SECTION
SCALE:



PLAN VIEW

1 TWC LOOP
SCALE: NTS

NOTE:

1. TWC LOOP ANTENNAS SHALL BE 3'x16' FOR MAINLINE INSTALLATIONS.
2. LOOP ANTENNA CONSTRUCTION SHALL BE OF FIBERGLASS AND WOOD
3. METAL COMPONENTS ARE NOT PERMITTED. OTHER THAN TWC CLIPS & LAG BOLTS
4. TOTAL WEIGHT SHALL NOT EXCEED 200 LBS FOR THE 3' X 16' LOOP
5. THE LOOP ANTENNA ASSEMBLY SHALL BE ABLE TO SUPPORT 1000 LBS IN A 3' X 16' OUTSIDE SUPPORTED SPAN
6. TOP SHALL BE MOLDED WITH AN AGGRESSIVE NON-SKID TEXTURE, AS APPROVED BY ENGINEER
7. TOP TO INCLUDE 1/4" CROWN ALONG THE LONG AXIS OF THE LOOP
8. OUTSIDE FINISH SHALL BE GRAY GELCOAT OR EQUIVALENT, AS APPROVED BY ENGINEER. FINISH THICKNESS SHALL BE 20 THOUSANDS OF ONE INCH MINIMUM
9. A JUNCTION BOX CAVITY TO BE MOLDED INTO LOOP ASSEMBLY. A 1/8" THICK COVER PLATE SHALL COVER JUNCTION BOX CAVITY ATTACHED BY EIGHT (8) SS SCREWS. COVER PLATE SHALL HAVE KNOCKOUT TO ALLOW 3/4" LIQUID-TITE FLEX CONDUIT ATTACHMENT
10. LOOP WIRE TO BE PLACED 2" OFFSET FROM OUTSIDE EDGE OF ASSEMBLY. LOOP WIRE TO CROSS AT CENTER AND TERMINATE AT JUNCTION BOX CAVITY WITH 120" OF EXTRA LEAD. LEADS TO BE TWISTED FROM LOOP CLOSING TO JUNCTION BOX
11. LOOP WIRE SHALL BE AWG #12 XHHW POLYETHYLENE JACKETED TRAFFIC SIGNAL LOOP WIRE
12. SUPPORT RAILS SHALL BE MOLDED INTO ASSEMBLY OUTER EDGES. SUPPORT PADS TO ALLOW FOR FIELD INSTALLATION OF TWO 5/8" LAG BOLTS PLACED A MINIMUM OF 2" EITHER SIDE OF WIDTH CENTERLINE AND 6" FROM OUTSIDE EDGE
13. CURRENTLY THE USE OF LAG BOLTS AND WOOD TIMBER IS NOT ALLOWED WITHOUT PRIOR APPROVAL FROM THE RESIDENT ENGINEER

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
TWC LOOP ANTENNA

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-008

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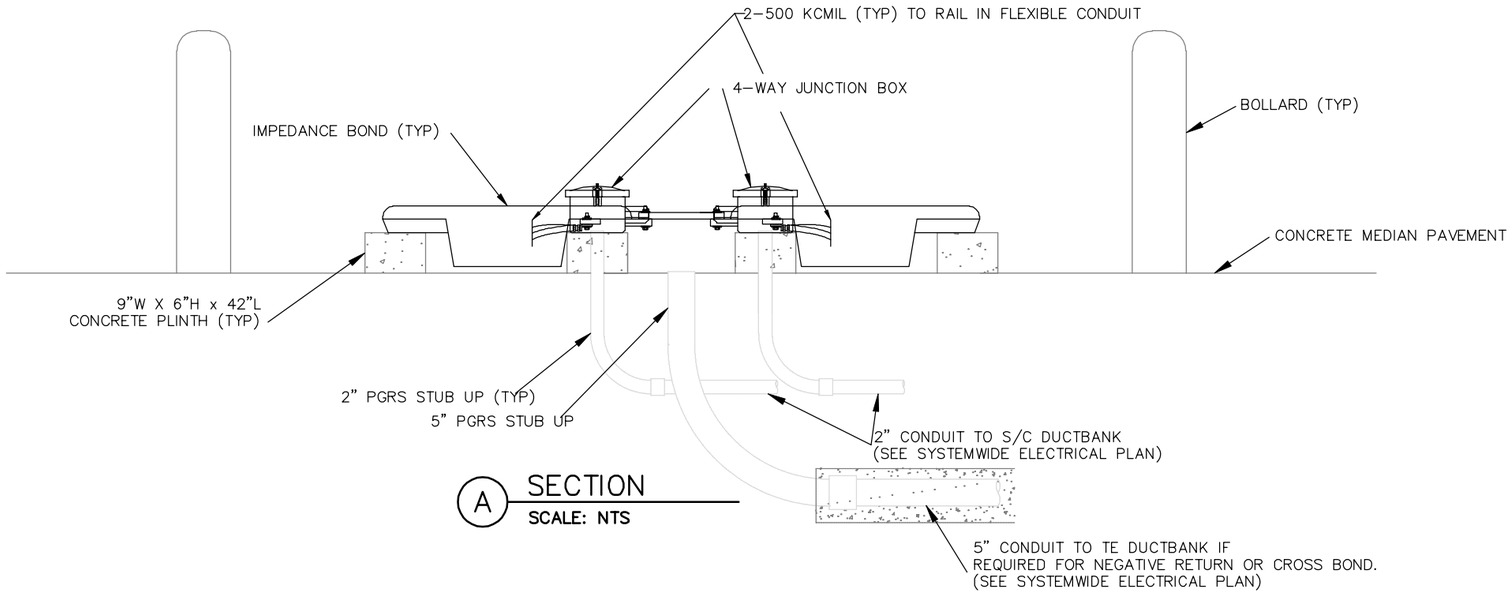
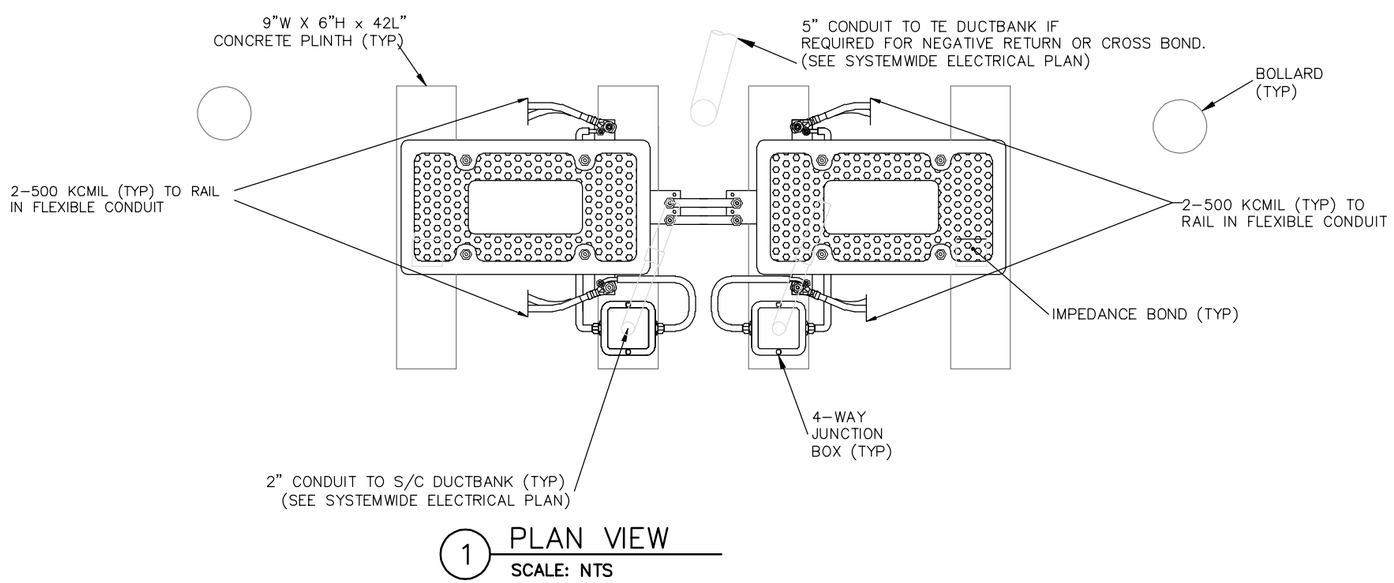


A SECTION
SCALE: NTS



1 PLAN VIEW
SCALE: NTS

NOTES:

1. CONCRETE PLINTHS ARE ARRANGED TO ALLOW THE MOUNTING OF STANDARD RAIL IMPEDANCE BONDS SIMILAR TO STANDARD TIE MOUNTED INSTALLATIONS.
2. THE 6" PLINTH HEIGHT ACCOMMODATES A TYPICAL IMPEDANCE BOND DEPTH AND AN ADDITIONAL 2" OF CLEARANCE BELOW.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
IMPEDANCE BOND MOUNTING - PLINTH

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-009

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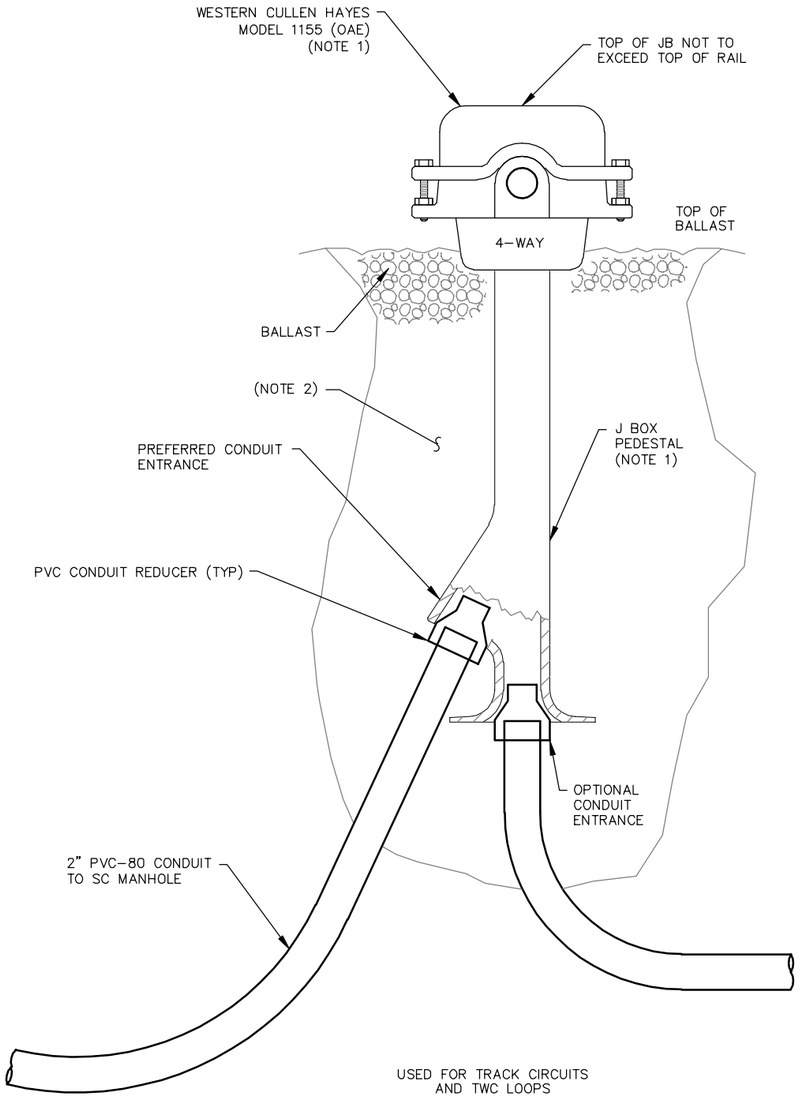
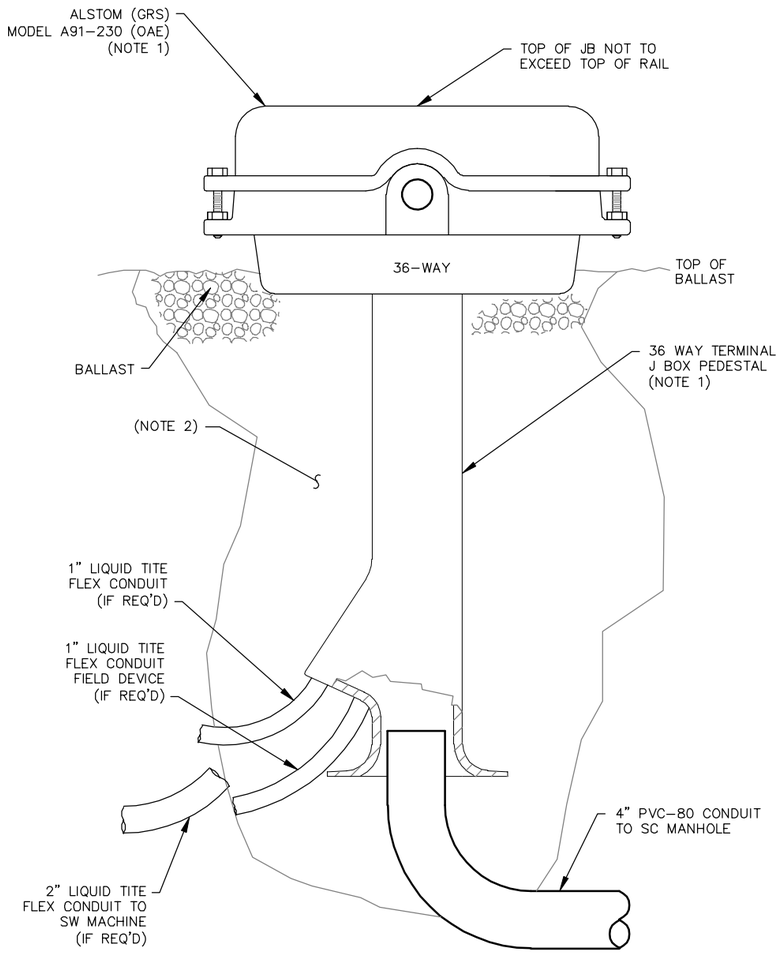


USED FOR TRACK CIRCUITS
AND TWC LOOPS

1 4-WAY BOOTLEG JUNCTION BOX DETAIL

SCALE: NTS



USED FOR MAINLINE SWITCH MACHINES

2 36-WAY BOOTLEG JUNCTION BOX DETAIL

SCALE: NTS

NOTES:

1. EQUIPMENT DETAILS SHALL BE SUBMITTED FOR APPROVAL
2. EXCAVATION FOR BOOTLEG AND JUNCTION BOX INSTALLATION WILL REQUIRE REMOVAL OF BALLAST, SUB-BALLAST AND NATIVE SOIL OR BACKFILL MATERIALS. THESE MATERIALS MUST BE KEPT SEPARATED AND NOT MIXED TOGETHER WHEN BACKFILLING
3. THE CONTRACTOR SHALL EQUIP EACH JUNCTION BOX PROVIDED WITH A COMPLETE SET OF GOLD NUT TEST LINKS AND APPROPRIATE STRAPS FOR ALL TERMINALS.

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METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
EQUIPMENT DETAILS
BOOTLEG JUCTION BOX INSTALLATION

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-010

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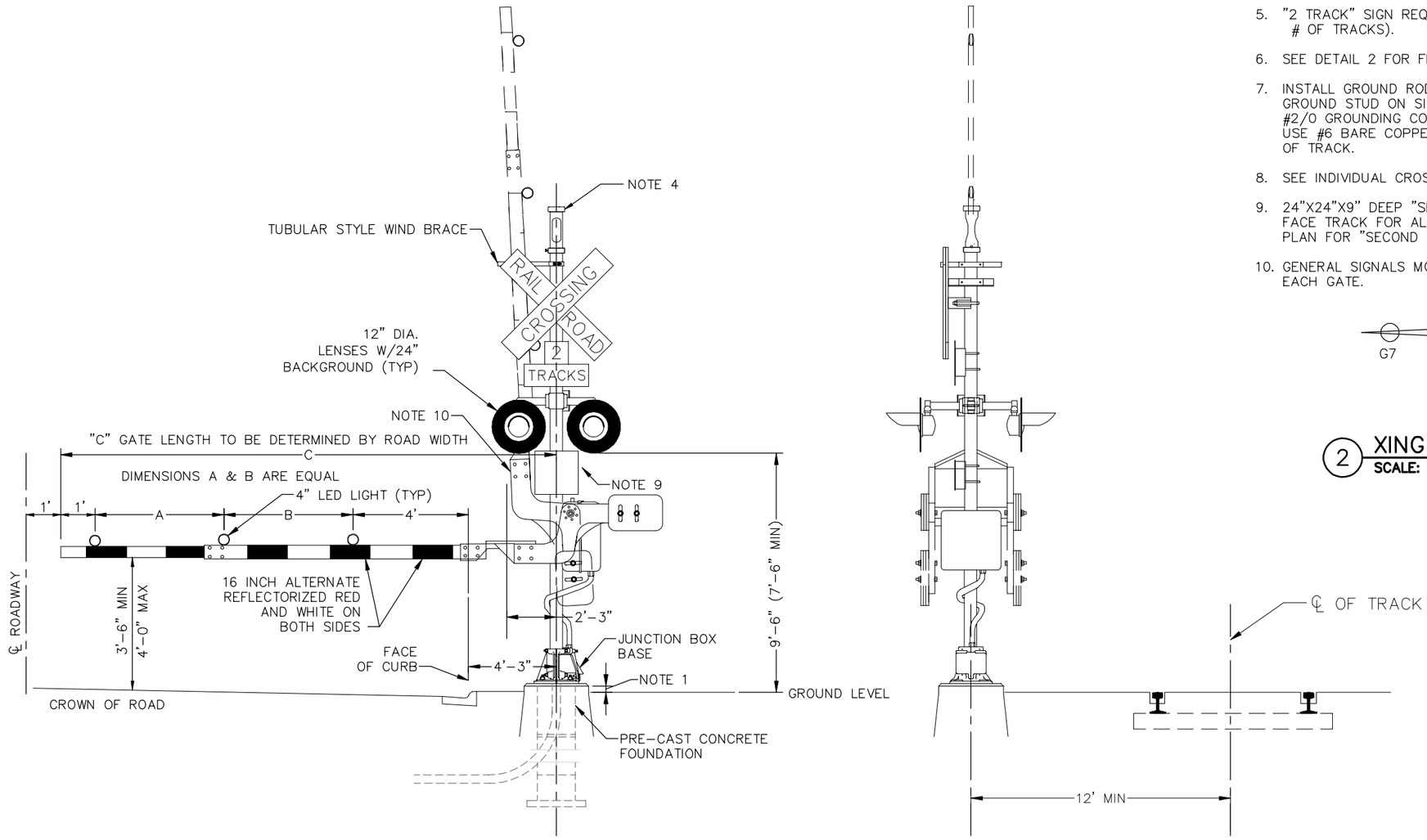
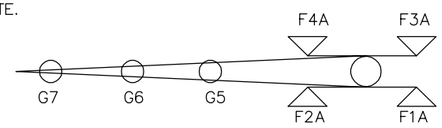


1 TYPICAL CROSSING GATE INSTALLATION DETAIL

SCALE: NTS

NOTE:

1. TOP OF FOUNDATION TO BE NO HIGHER THAN 4" ABOVE GROUND LEVEL ADJACENT TO FOUNDATION.
2. PROVIDE CABLE ENTRANCES TO FOUNDATIONS AS REQUIRED.
3. PRE-CAST FOUNDATIONS ARE PREFERRED WHERE POSSIBLE.
4. WESTERN CULLEN HAYES MODEL WCH0777 ELECTRONIC BELL.
5. "2 TRACK" SIGN REQUIRED FOR ALL CROSSINGS. (IF MORE THAN 2 TRACKS STATE # OF TRACKS).
6. SEE DETAIL 2 FOR FLASHING LIGHT NUMBERING.
7. INSTALL GROUND ROD ADJACENT TO FOUNDATION AND CONNECT GROUND WIRE TO GROUND STUD ON SIGNAL BASE. ATTACH GROUND ROD TO INTERNAL GROUND LUG WITH #2/0 GROUNDING CONDUCTOR FOR FOUNDATIONS LESS THAN 15' FROM ℄ OF TRACK. USE #6 BARE COPPER GROUNDING CONDUCTOR FOR FOUNDATIONS BEYOND 15' FROM ℄ OF TRACK.
8. SEE INDIVIDUAL CROSSING DRAWINGS FOR UNIQUE SITE INFORMATION.
9. 24"X24"X9" DEEP "SECOND TRAIN" SIGN ON GATE MAST SHALL BE INSTALLED AND MUST FACE TRACK FOR ALL CROSSINGS WHERE PEDESTRIANS ARE PRESENT. (SEE FREIGHT PLAN FOR "SECOND TRAIN" SIGN INFORMATION).
10. GENERAL SIGNALS MODEL SK-1000-KW BI-DIRECTIONAL GATE KEEPER REQUIRED FOR EACH GATE.



2 XING LIGHTING FLASHER NAMES

SCALE: NTS

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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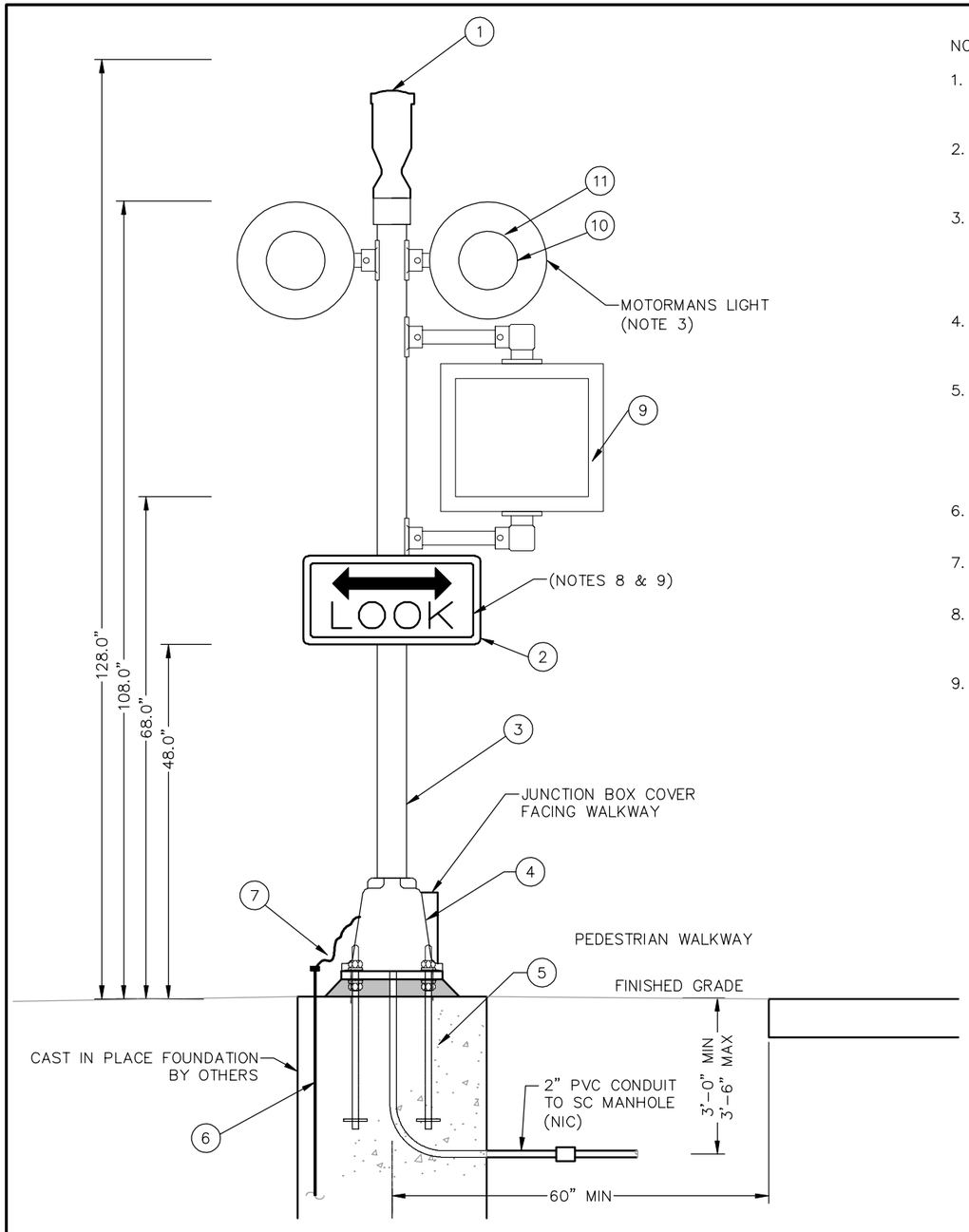
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
GRADE CROSSING EQUIPMENT
ARRANGEMENT & INSTALLATION DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-101

SHEET 174 OF 240

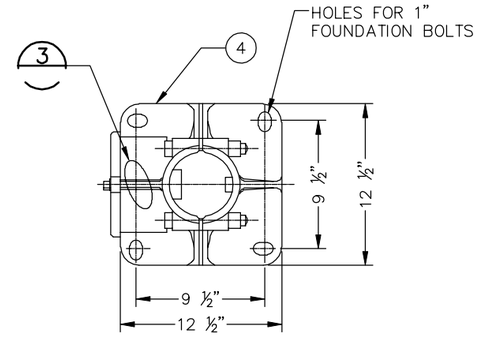


1 PEDESTRIAN FLASHER DETAIL
SCALE: NTS

NOTE:

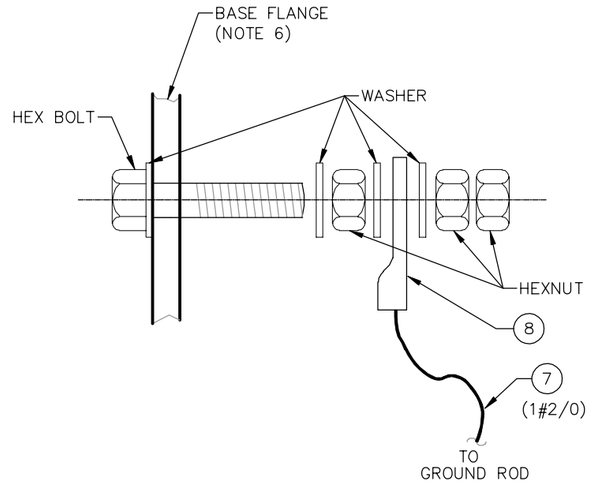
1. THE BILL OF MATERIALS ONLY INCLUDES THE MAJOR ITEMS AND DOES NOT INCLUDE ALL REQUIRED ITEMS FOR A COMPLETE INSTALLATION.
2. THIS CROSSING WARNING SIGNAL ASSEMBLY SHALL BE DOUBLE–SIDED, WITH EACH ACTIVE AND PASSIVE SIGNAL VIEWABLE FOR EACH DIRECTION.
3. EACH FLASHING UNIT SHALL INCLUDE A "MOTORMANS" SIDELIGHT BUILT INTO THE SIGNAL HOUSING UNIT. THE "MOTORMAN" SIDELIGHTS SHALL BE LOCATED TO PROVIDE A VISUAL INDICATION TO THE LRV OPERATOR THAT THE CROSSING WARNING DEVICE IS ACTIVE.
4. THE 2–SIDED LED SECOND TRAIN SIGN SHALL BE MANUFACTURED IN ACCORDANCE WITH ALL APPLICABLE SYSTEMS SPECIFICATIONS.
5. THE 2–SIDED LED SECOND TRAIN SIGN SHALL BE CONFIGURED SO THAT EACH LED PANEL CAN BE REPLACED WITHOUT REPLACING THE ENTIRE DEVICE, USING A DISCRETE POWER SUPPLY AND CABLING TO ENSURE THAT A SINGLE FAILURE WILL NOT DISABLE BOTH SIDES OF THE ACTIVE WARNING SIGN.
6. DRILL FLANGE FOR CONNECTION OF GROUND STUD TO BASE.
7. MANUFACTURERS SHALL BE SUBMITTED FOR APPROVAL BY THE CAR.
8. THE SIZE FOR THE STANDARD R15–8 SHALL BE REDUCED TO 12" X 24", SCALED FOR THE PEDESTRIAN SPECIFIC CROSSING DEVICE.
9. THE SIGN SHALL BE CONSTRUCTED TO MEET THE REQURIEMENTS OF MNDOT SPECIFICATIONS FOR MATERIALS AND REFLECTIVITY.

BILL OF MATERIALS		
ITEM	QTY	DESCRIPTION
1	1	WESTERN CULLEN HAYES MODEL WCHO777 ELECTRONIC BELL
2	2	12" X 24" "LOOK" STATIC REFLECTIVE SIGN, MUTCD R15–8
3	1	SIGNAL MAST, ALUMINUM, 4"
4	1	SPLIT JUNCTION BOX BASE (NOTE 7)
5	1	CAST IN PLACE FOUNDATION BY OTHERS (NOTE 7
6	1	10' COPPER CLAD GROUND ROD BY OTHERS
7	AS REQ'D	#2/0 BARE STRANDED COPPER WIRE
8	1	GROUND LUG AMP #33467
9	1	18" X 16" LED 2nd TRAIN APPROACHING SIGN– 2 SIDED, (NOTES 4 & 5)
10	2	16" ALUMINUM BACKGROUND, FLAT BLACK, WITH 9" VISOR
11	2	8" LED SIGNAL ROUNDEL, RAIL OR TRANSIT APPLICATION



PLAN VIEW

2 PEDESTRIAN FLASHER BASE PLATE DETAIL
SCALE: NTS



3 PEDESTRIAN FLASHER POLE GROUNDING DETAIL
SCALE: NTS

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
PEDESTRIAN CROSSING EQUIPMENT
PEDESTRIAN CROSSING BELL & FLASHER

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-201

SHEET 175 OF 240

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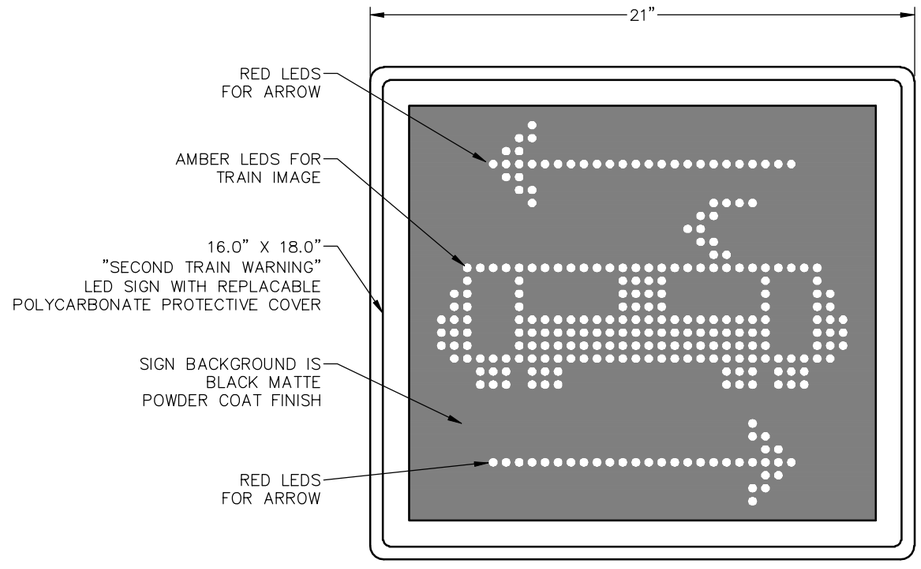
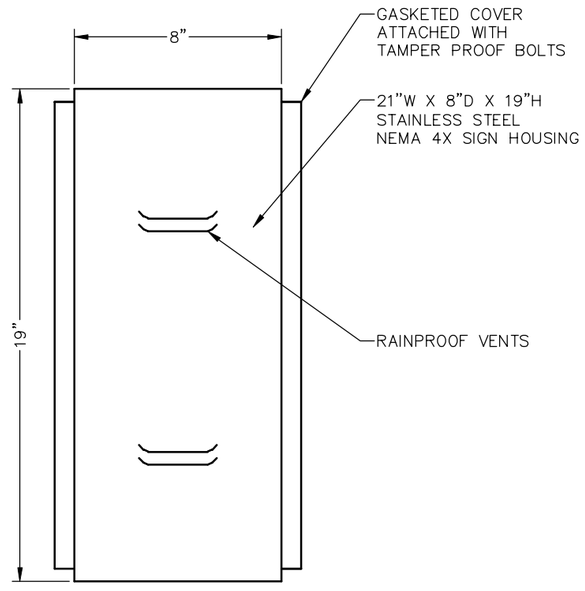


1 FRONT VIEW
SECOND TRAIN WARNING SIGN
SCALE: NTS



2 SIDE VIEW
SECOND TRAIN WARNING SIGN
SCALE: NTS

NOTES:

1. THE 16" X 18" "SECOND TRAIN WARNING" PEDESTRIAN SIGN SHOWN IS TO BE USED FOR PEDESTRIAN CROSSINGS AND IS NOT DESIGNED FOR ROADWAY TRAFFIC.
2. THIS "SECOND TRAIN WARNING" PEDESTRIAN SIGN SHALL BE DOUBLE SIDED, HOUSED IN A RUGGED STAINLESS STEEL NEMA 4X CASE WITH A HINGED AND GASKETED FACE FOR ACCESS AND SERVICE. THE POLYCARBONATE PROTECTIVE COVER AND THE LED UNIT ITSELF SHALL BE EASILY SERVICED, CLEANED, REMOVED OR REPLACED AS NECESSARY FOR STANDARD MAINTENANCE THE SIGN COMPONENTS SHALL BE EASILY REMOVED FOR SERVICE OR REPLACEMENT WITH PLUG COUPLED CABLES AND EASILY ACCESSED SCREWS AND RETAINING CLIPS.
3. THE "SECOND TRAIN WARNING" PEDESTRIAN SIGN SHALL BE AN LED SIGN MANUFACTURED ACCORDING TO THE REQUIREMENTS OF THE FEDERAL HIGHWAY STANDARD HIGHWAY SIGN HANDBOOK. THE MANUFACTURER SHALL PROVIDE A RUGGED AND RELIABLE DEVICE DESIGNED FOR THE LOCAL ENVIRONMENT.
4. THE CONTRACTOR SHALL ATTACH EACH "SECOND TRAIN WARNING" PEDESTRIAN ACTIVE SIGN TO THE CROSSING EQUIPMENT ASSEMBLY SHOWN ON SIG-DTL-008. THIS INSTALLATION SHALL BE RUGGED AND WILL BE COORDINATED WITH THE NECESSARY DEVICES AND SIGNS REQUIRED ON THAT ASSEMBLY.
5. THE EQUIPMENT SHOWN IS FOR INFORMATION ONLY. THE ACTUAL EQUIPMENT INSTALLED SHALL BE CHOSEN BY THE CONTRACTOR TO MEET THE FUNCTIONAL NEEDS OF THE PEDESTRIAN CROSSING AND WILL BE SUBMITTED TO THE CAR FOR APPROVAL PRIOR TO FABRICATION.
6. THE DIMENSIONS OF THE CASE SHOWN ARE PROPOSED DIMENSIONS, ACTUAL DIMENSIONS SHALL BE SHOWN ON THE SHOP DRAWINGS AND FOR THE DESIGN SUBMITTED TO THE CAR FOR APPROVAL.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
PEDESTRIAN CROSSING EQUIPMENT
SECOND TRAIN WARNING SIGNAL

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-202

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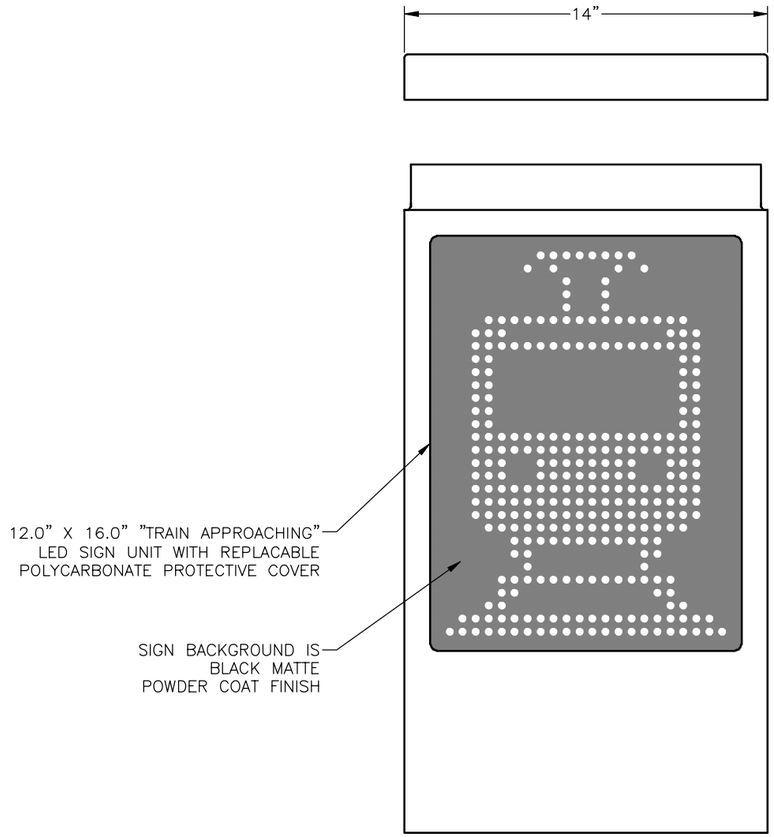
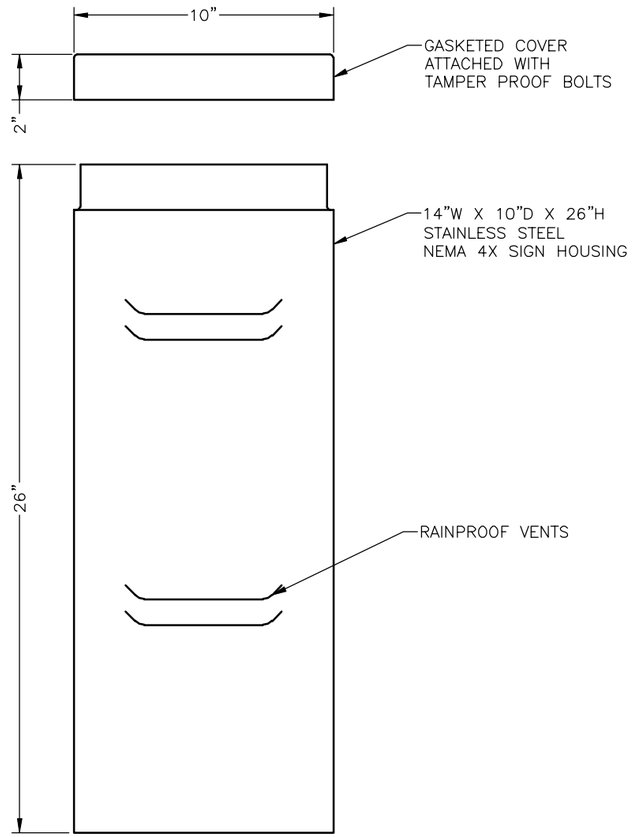


1 FRONT VIEW PEDESTRIAN WARNING SIGN
SCALE: NTS



2 SIDE VIEW PEDESTRIAN WARNING SIGN
SCALE: NTS

NOTES:

1. THIS "TRAIN APPROACHING" PEDESTRIAN SIGN SHALL BE SINGLE SIDED, HOUSED IN A RUGGED STAINLESS STEEL NEMA 4X CABINET WITH A GASKETED TOP ACCESS LID. THE CABINET SHALL BE NO WIDER THAN 14 INCHES TO ACCOMODATE THE AVAILABLE MOUNTING AREA.
2. THE FUNCTIONAL OPERATION OF THE "TRAIN APPROACHING" PEDESTRIAN SIGN SHALL BE AS DESCRIBED ON THE PEDESTRIAN CROSSING TYPICAL SITE CONFIGURATION PLAN PLAN.
3. THE "TRAIN APPROACHING" PEDESTRIAN SIGN SHALL BE AN LED SIGN MANUFACTURED ACCORDING TO THE REQUIREMENTS OF THE FEDERAL HIGHWAY STANDARD HIGHWAY SIGN HANDBOOK. THE MANUFACTURER SHALL PROVIDE A RUGGED AND RELIABLE DEVICE DESIGNED FOR THE LOCAL ENVIRONMENT.
4. THE POLYCARBONATE PROTECTIVE COVER AND THE LED UNIT ITSELF SHALL BE EASILY SERVICED, CLEANED, REMOVED OR REPLACED AS NECESSARY FOR STANDARD MAINTENANCE BY REMOVING THE TOP COVER TO ACCESS THE SIGN COMPONENTS. THE SIGN COMPONENTS SHALL BE EASILY REMOVED FOR SERVICE OR REPLACEMENT WITH PLUG COUPLED CABLES AND EASILY ACCESSED SCREWS AND RETAINING CLIPS.
5. THE CONTRACTOR SHALL ATTACH EACH "TRAIN APPROACHING" PEDESTRIAN ACTIVE SIGN TO THE PEDESTRIAN CROSSING STEM WALLS WITH POST DRILLED ANCHOR BOLTS FOR THE CABINET, USING A CHEMICAL TYPE ANCHOR DESIGNED FOR EACH SPECIFIC INSTALLATION. THIS INSTALLATION WILL BE COORDINATED WITH THE CONDUIT INSTALLED FOR THE OPERATION OF THE SIGN.
6. THE EQUIPMENT SHOWN IS FOR INFORMATION ONLY. THE ACTUAL EQUIPMENT INSTALLED SHALL BE CHOSEN BY THE CONTRACTOR TO MEET THE FUNCTIONAL NEEDS OF THE PEDESTRIAN CROSSING AND WILL BE SUBMITTED TO THE CAR FOR APPROVAL PRIOR TO FABRICATION.
7. THE DIMENSIONS OF THE CABINET SHOWN ARE MAXIMUM DIMENSIONS, THE CABINET SHALL NOT BE HIGHER THAN 42 INCHES ABOVE THE SITE PAVING LEVEL. THE CONTRACTOR SHALL CHOOSE A DESIGN THAT IS COORDINATED WITH THE ARCHITECTURAL STEM WALL THAT WILL BE INSTALLED AS PART OF A SEPARATE CONTRACT. ACTUAL DIMENSIONS SHALL BE SHOWN ON THE PEDESTRIAN CABINET DESIGN SUBMITTED TO THE CAR FOR APPROVAL.
8. THE CONTRACTOR SHALL PROVIDE ALL CABLES AND TERMINATIONS REQUIRED FOR UP TO 4 DEVICES AT EACH PED CROSSING LOCATION. ALL CABLES SHALL BE CONTINOUS, WITHOUT SPLICES, FROM EACH DEVICE TO THE CROSSING CONTROLLER CABINET.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
PEDESTRIAN CROSSING EQUIPMENT
PEDESTRIAN WARNING SIGN DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-203

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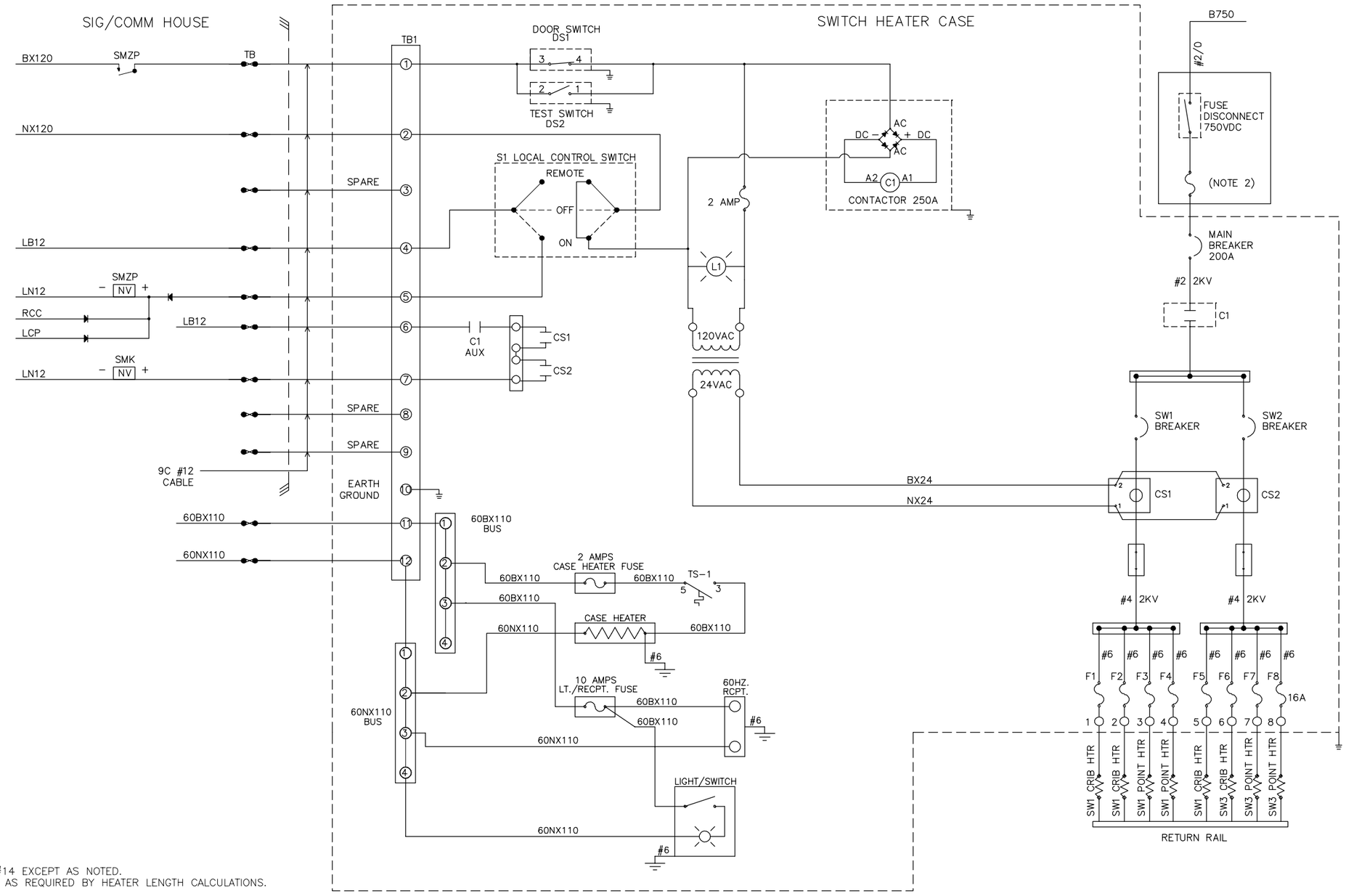

NOTES:

1. ALL WIRING #14 EXCEPT AS NOTED.
2. FUSE RATING AS REQUIRED BY HEATER LENGTH CALCULATIONS.

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

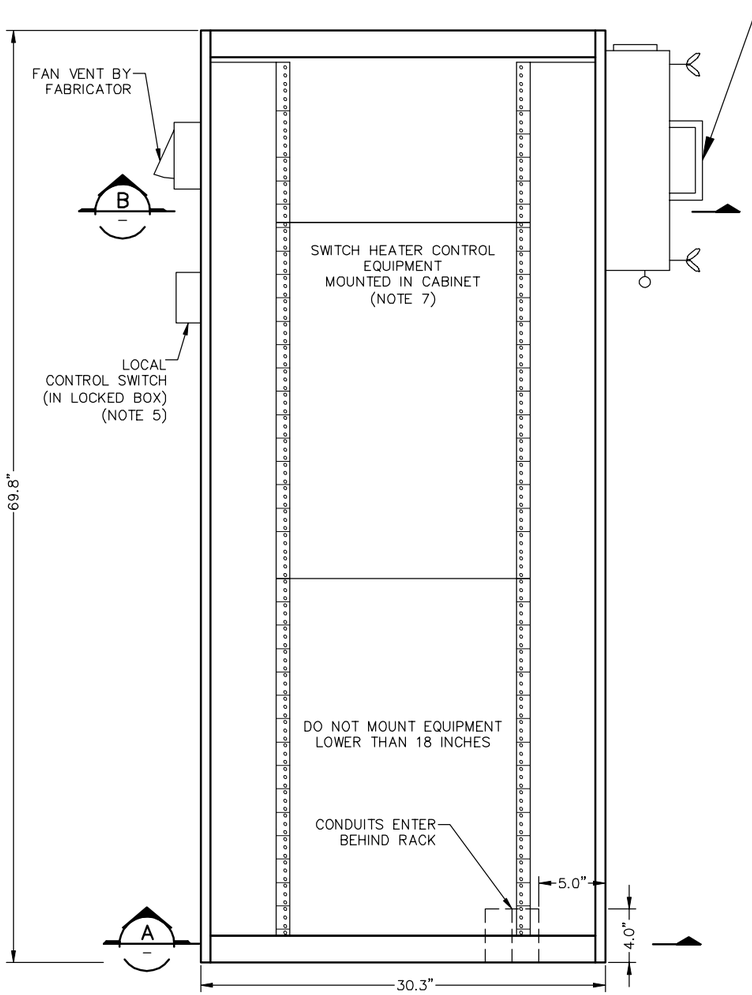
SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
750VCD SWITCH HEATER DETAILS
TYPICAL CONTROLLER CIRCUIT

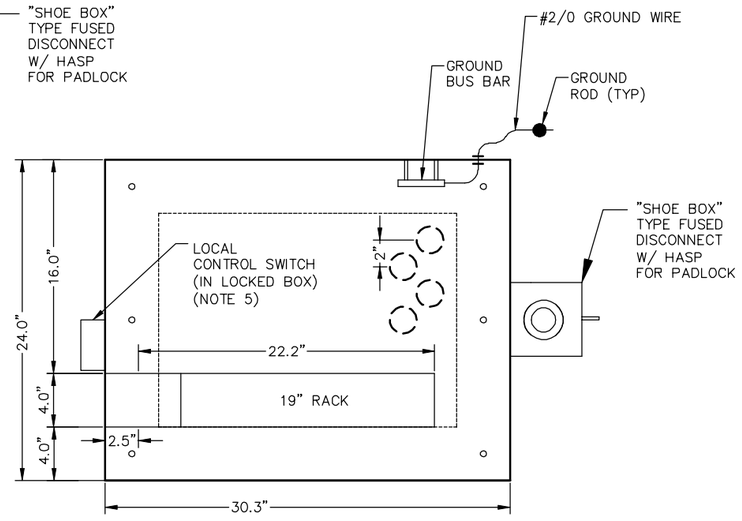
DISCIPLINE: SYSTEMS

SHEET NAME: SIG-DTL-301

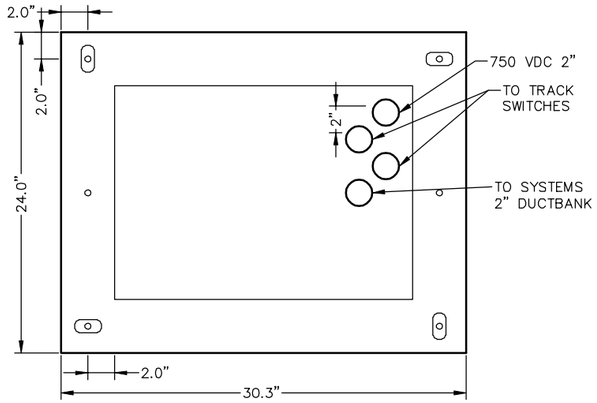
SHEET 178 OF 240



1 SWITCH HEAT CONTROLLER CABINET
SCALE: NTS



B CABINET PLAN DIMENSIONS
SCALE: NTS



A BASE DIMENSIONS
SCALE: NTS

NOTES:

1. THE CABINET WILL BE NEMA 4X AND WILL BE STAINLESS STEEL FINISH WITH FIBERGLASS PROTECTIVE LINING PROVIDED FOR THE 750V DC SWITCHING CONTROLLER AND WIRING.
2. THE CASE AND LOCAL CONTROL SWITCH WILL BE SECURED WITH HIGH-SECURITY PADLOCKS AND KEYED FOR METRO TRANSIT STANDARD TRACTION POWER MAINTENANCE PERSONNEL.
3. ALL 750V DC CIRCUIT WIRING TO BE 2000 VOLT INSULATION.
4. HEATER CASES AND ALL CONTROL CIRCUITS ARE SHOWN AS EXAMPLES ONLY. THE NUMBER OF CONTACTORS AND/OR FUSED BRANCH CIRCUITS PER CASE MAY VARY. THE CONTRACTOR SHALL SUBMIT A COMPLETE SWITCH HEAT CONTROLLER CABINET DESIGN AND PRODUCT SUBMITTAL TO THE CAR FOR APPROVAL.
5. CONTRACTOR TO VERIFY SIZE AND SUITABILITY FOR ALL WIRING.
6. LOW VOLTAGE WIRING TO BE 14 GAUGE, 1000V, BLACK UNLESS OTHERWISE NOTED.
7. HEATER CASES AND ALL CONTROL CIRCUITS ARE SHOWN AS EXAMPLES ONLY. THE NUMBER OF CONTACTORS AND/OR FUSED BRANCH CIRCUITS PER CASE MAY VARY. THE CONTRACTOR SHALL SUBMIT A COMPLETE SWITCH HEAT CONTROLLER CABINET DESIGN AND PRODUCT SUBMITTAL TO THE CAR FOR APPROVAL.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
750VCD SWITCH HEATER DETAILS
WAYSIDE CONTROL CABINET

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-302

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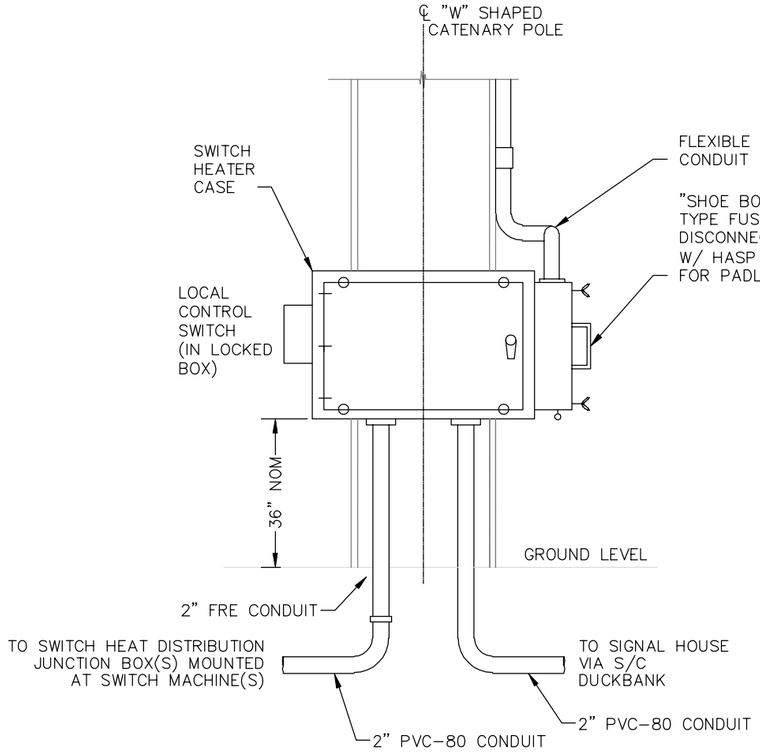
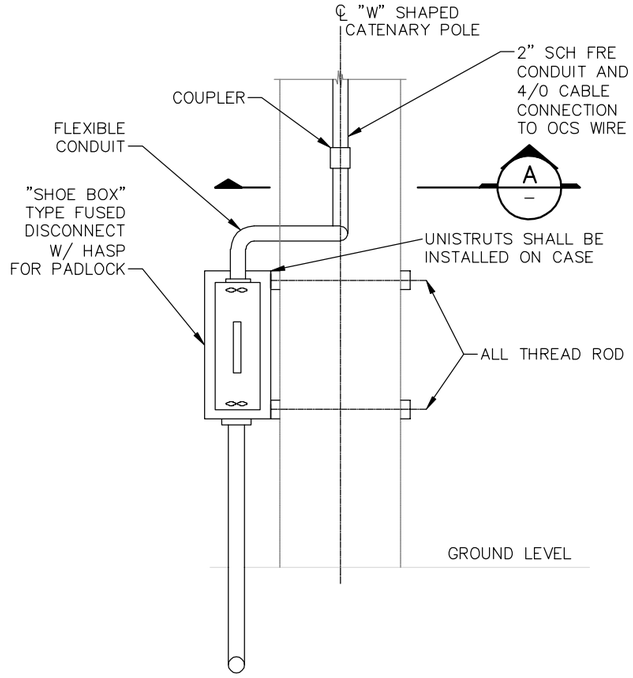
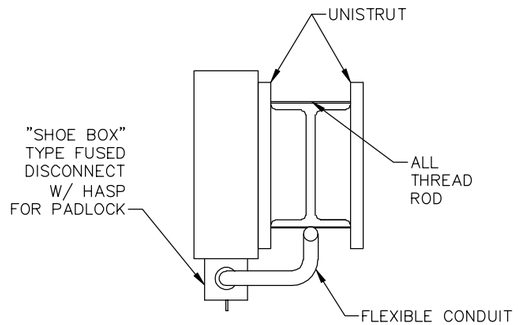


1 ELEVATION
SCALE: NTS



2 SIDE VIEW
SCALE: NTS



A SECTION
SCALE:

NOTES:

1. THE CONTRACTOR SHALL SUPPLY AND INSTALL AN OCS POLE MOUNTED SWITCH HEATER CONTROL CASE AND EQUIPMENT IF GEOGRAPHIC CONSTRAINTS PRECLUDE MOUNTING CONTROL CABINET OUTSIDE OF THE GUIDEWAY.
2. CABINET MOUNTED SWITCH HEATER CONTROL EQUIPMENT WILL RECEIVE 750VDC FROM THE 750V DC OVERHEAD CONTACT WIRE ROUTED THROUGH THE "SHOE BOX" TYPE FUSED DISCONNECT.
3. THE CASE WILL BE SECURED WITH HIGH-SECURITY PADLOCKS AND KEYED FOR METRO TRANSIT STANDARD TRACTION POWER MAINTENANCE PERSONNEL.
4. ALL 750V DC CIRCUIT WIRING TO BE 2000 VOLT INSULATION.
5. HEATER CASES AND ALL CONTROL CIRCUITS ARE SHOWN AS EXAMPLES ONLY. THE NUMBER OF CONTACTORS AND/OR FUSED BRANCH CIRCUITS PER CASE MAY VARY. THE CONTRACTOR SHALL SUBMIT A COMPLETE SWITCH HEAT CONTROLLER CASE DESIGN FOR EACH INSTALLATION WITH A DESIGN AND PRODUCT SUBMITTAL TO THE CAR FOR APPROVAL.
6. CONTRACTOR TO VERIFY SIZE AND SUITABILITY FOR ALL WIRING.
7. LOW VOLTAGE WIRING TO BE 14 GAUGE, 1000V, BLACK UNLESS OTHERWISE NOTED.
8. GROUND WIRING TO BE 14 GA., 600V, GREEN, UNLESS OTHERWISE NOTED.
9. CASE TO BE MOUNTED PARALLEL TO TRACK, NOT PERPENDICULAR.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
750DVC SWITCH HEATER DETAILS
TYPICAL POLE MOUNTED CASE LAYOUT

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-303

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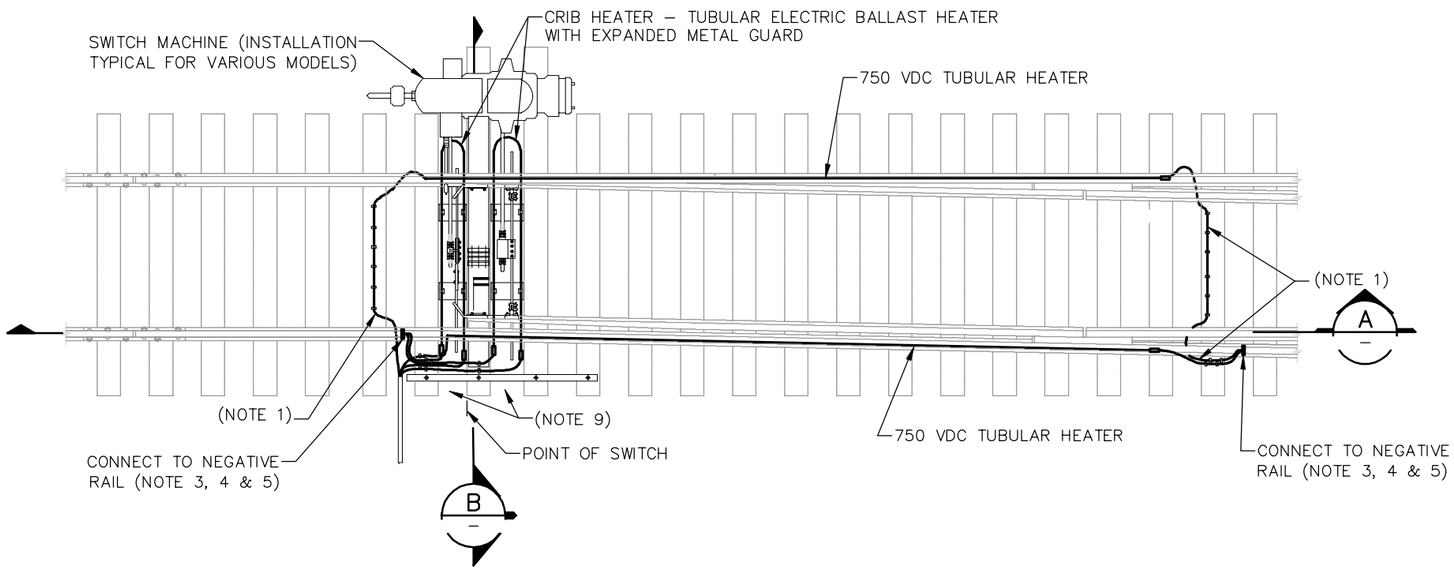
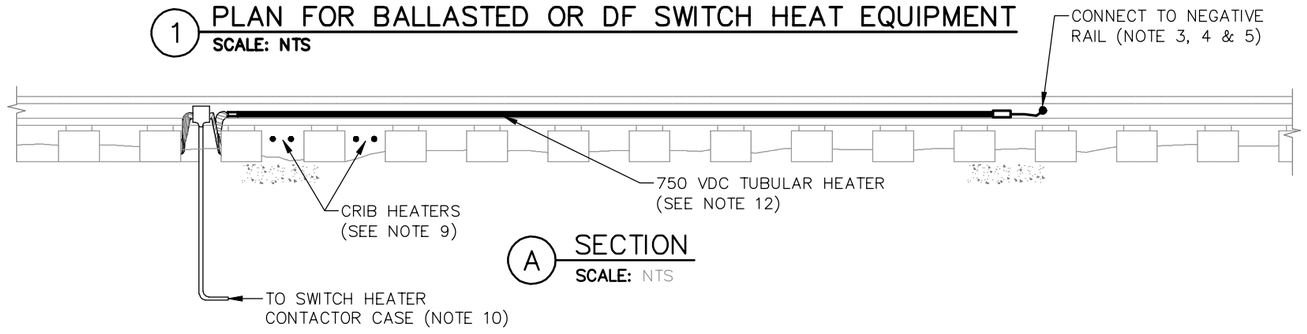


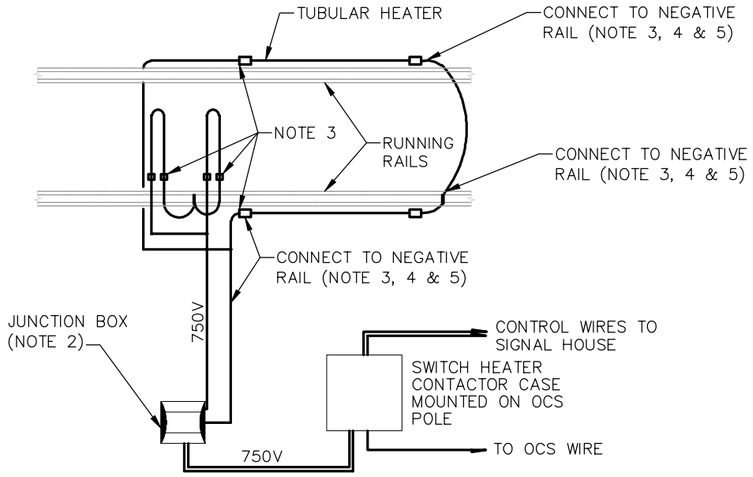
1 PLAN FOR BALLASTED OR DF SWITCH HEAT EQUIPMENT

SCALE: NTS



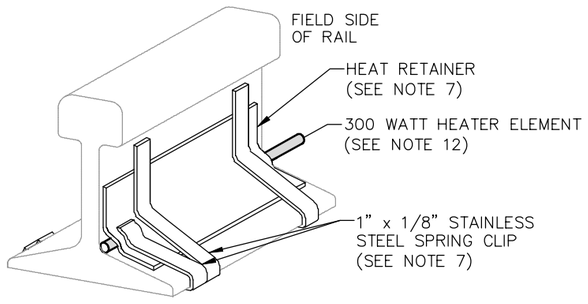
A SECTION

SCALE: NTS



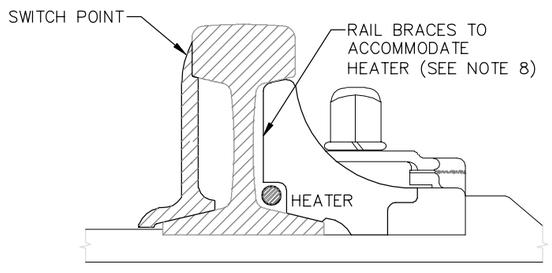
2 LAYOUT DETAIL

SCALE: NTS



3 HEATER DETAIL

SCALE: NTS



B SECTION

SCALE:

NOTES:

1. NO.6 AWG, 2KV INSULATED COPPER WIRE IN ORANGE LIQUID TIGHT CONDUIT.
2. JUNCTION BOX SHALL BE NON-METALLIC, U.V RESISTANT, MOUNTED SOLIDLY TO AN ADJUSTABLE PEDESTAL OR MOUNTED TO THE CONCRETE IN DIRECT FIXATION INSTALLATIONS.
3. CONNECT EACH HEATER LEAD TO #6, 2KV FEED WIRE WITH COMPRESSION SLEEVES AND INSULATE WITH RUBBER TAPE, THEN COMPLETE WITH A 2KV HEAT SHRINK SLEEVE FOR ADDITIONAL PROTECTION.
4. MAKE EACH CONNECTION FOR NEGATIVE SIDE OF SWITCH HEATERS TO NEGATIVE RETURN RAIL ONLY IN SINGLE RAIL TRACK CIRCUITS.
5. CONNECT NEGATIVE ELEMENT LEAD TO THE RAIL WEB WITH A CEMBRE MODEL AR60D OR APPROVED EQUAL.
6. ORANGE LIQUID-TIGHT OR PVC-40 CONDUIT TO HOUSE HEATER LEAD WIRES FOR THE ENTIRE RUN.
7. INSTALL STAINLESS STEEL SPRING CLIPS BETWEEN RAIL BRACES, TO HOLD HEATER AND RETAINER.
8. SLIDE HEATER ELEMENT THROUGH MILLED PORTION OF RAIL BRACES .
9. CRIB HEATERS SHALL BE INSTALLED TO EXTEND 4" PAST THE THE ENDS OF THE OPERATING RODS IN NUMBER 1 + 2 TIE SPACES TO FULLY HEAT THE ENTIRE CRIB AND ALL ASSOCIATED HARDWARE. INSTALL FULL LENGTH STAINLESS STEEL CRIB HEATER MOUNTING PANELS TO PROTECT THE TIES FOR EACH CRIB WITH A CRIB HEATER. EACH CRIB WITH AN OEPRATING SWITCH ROD SHALL HAVE A CRIB HEATING ELEMENT AND A MOUNTING PANEL INSTALLED.
10. PROTECT CABLES FOR SWITCH HEAT FEEDS WITH A FLEXIBLE ORANGE LIQUID TIGHT CONDUIT AND ATTACHED TO THE JUNCTION BOX WITH STRAIN RELIEF FITTINGS.
11. STAINLESS STEEL HEAT RETAINERS MOUNTED ON FIELD SIDE BETWEEN RAIL BRACES. ALL RETAINING CLIPS, PANELS AND RAIL MOUNTED SWITCH HEAT EQUIPMENT SHALL BE STAINLESS STEEL UNLESS OTHERWISE SPECIFIED.
12. HEATING ELEMENT TO BE 300 WATT/FOOT, WITH THE CAPACITY OF THE SYSTEM TO SUPPORT 400 WATT/FOOT AS AN OPTION.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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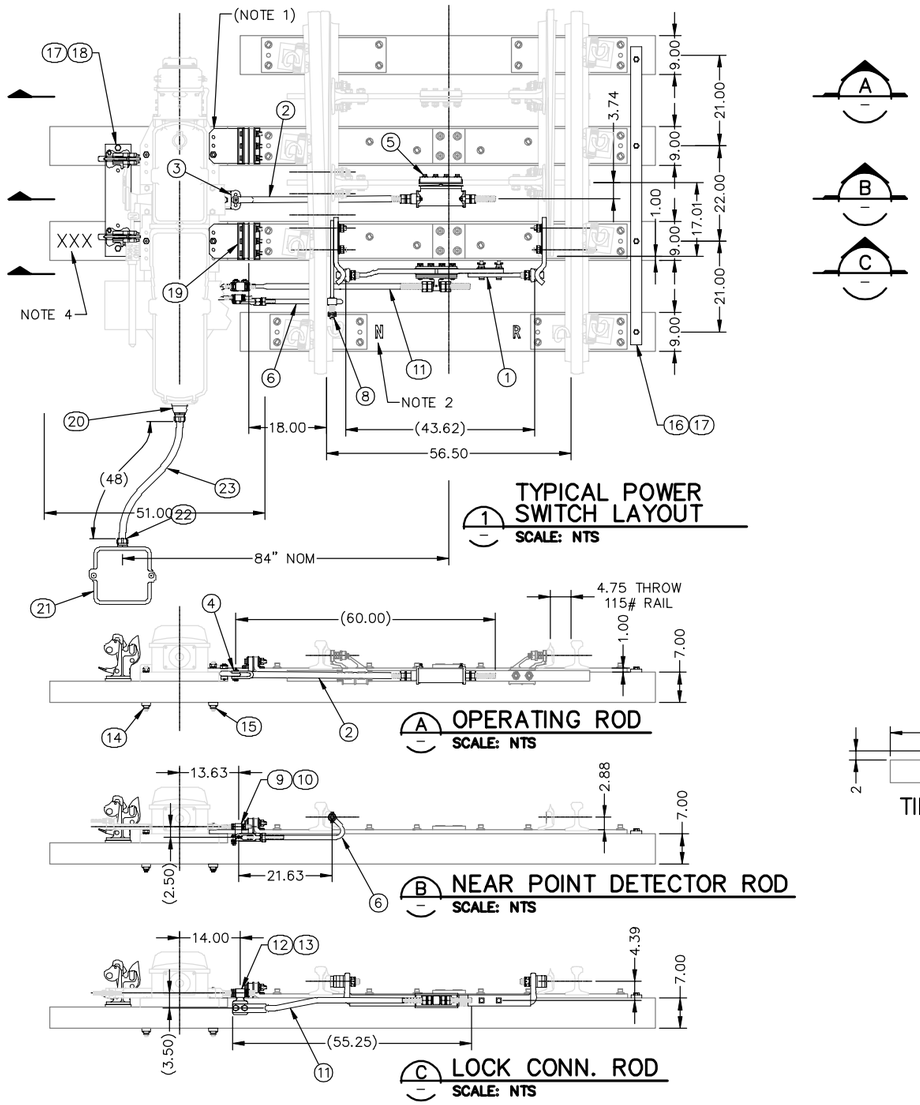
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
750VDC SWITCH HEATER DETAILS
BALLASTED AND DIRECT FIXATION DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-304

SHEET 181 OF 240



1 TYPICAL POWER SWITCH LAYOUT
SCALE: NTS

A OPERATING ROD
SCALE: NTS

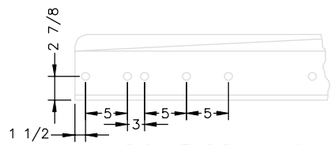
B NEAR POINT DETECTOR ROD
SCALE: NTS

C LOCK CONN. ROD
SCALE: NTS

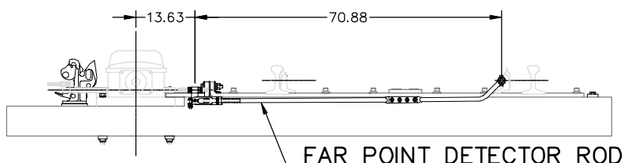
ITEM#	PART NUMBER	DESCRIPTION	999550X QTY	999550-001X QTY
1	802005-001X	FRONT ROD ASSY, SWIVEL	1	1
2	840120-050-01	ROD ASSY, OPERATING	1	1
3	941153-000-01	COUPLING ASSY, GRS MODEL-5	1	1
4	890590-005X	PIN ASSEMBLY, JAW	1	1
5	950143-001-11	BASKET ASSEMBLY	1	1
6	830570-006-01X	ROD ASSY, POINT DET. NEAR POINT	1	0
7	931130-050-01	ROD ASSY, POINT DET. FAR POINT	0	1
8	920560-007X	LUG, POINT DETECTOR POINT	1	1
9	920400-001X	LUG ASSY, DROP BALL STUD	1	1
10	990330-075-02	NUT, 0.750 HVY HEX JAM Z/Y	4	4
11	910109-082-01	ROD ASSY, LOCK CONNECTING	1	1
12	920530-002-01	LUG ASSY	1	1
13	990330-100-02	NUT, 1.000 HVY HEX JAM Z/Y	4	4
14	910922-037-02	STUD ASSY, 0.750 X 10.000	2	2
15	910922-036-01	STUD ASSY, 0.750 X 11.000	2	2
16	860004-007	TIE STRAP	1	1
17	990130-500-02	SCREW, LAG 0.750 X 5.000 Z/Y	6	6
18	950794-000-01X	LATCH STAND ASSY	1	1
19	860105-008-01	PLATE ASSEMBLY, GAGE EXTENSION	2	2
20	998192	COUPLING	1	1
21	998918-003-07	BOX ASSY, JUNCTION W/PEDESTAL 36 TER.	1	1
22	998687-034	CONNECTOR, 1.500 STRAIGHT	2	2
23	998231-048	CONDUIT, 1 1/2" LIQUIDTITE	1	1

NOTES:
1. CORNERS ON PLATES TO BE CUT TO SUIT ON SITE PER MODEL 5 CASTING CLEARANCES
2. 6" CAST LETTERS PAINTED WHITE, N AND R, TO BE APPLIED. G&B PART NOs 998760-002 AND 998760-004
3. ALL PART NUMBERS LISTED REFERENCE G & B CATALOGUE NUMBERS
4. SWITCH LETTERING AND IDENTIFICATION TO BE COMPLIANT WITH CONTRACT SPECIFICATION

TIE DAPPING DETAIL



POINT DRILLING



FAR POINT DETECTOR ROD

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
SWITCH MACHINE DETAILS
5F PWER SWITCH MACHINE

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-401

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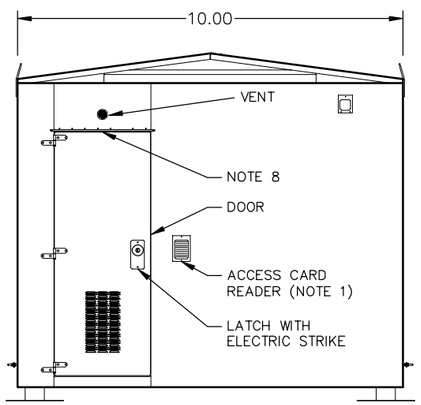
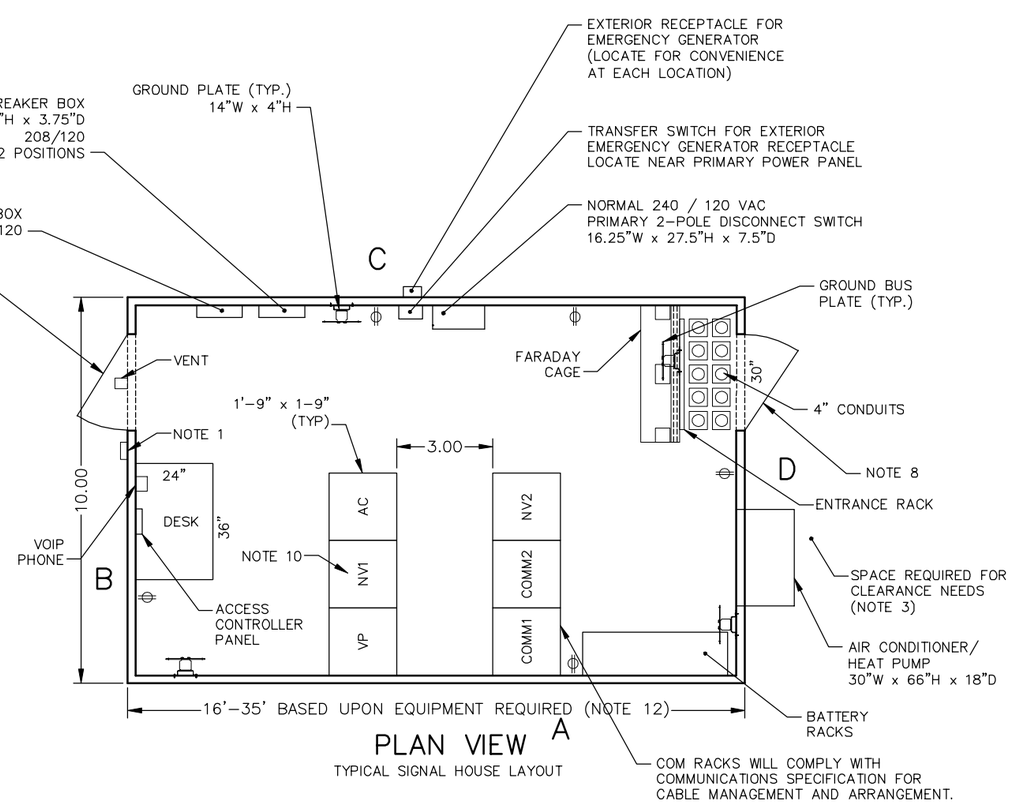
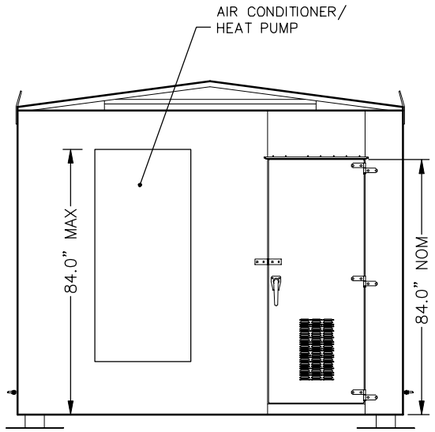


B – WALL ELEVATION

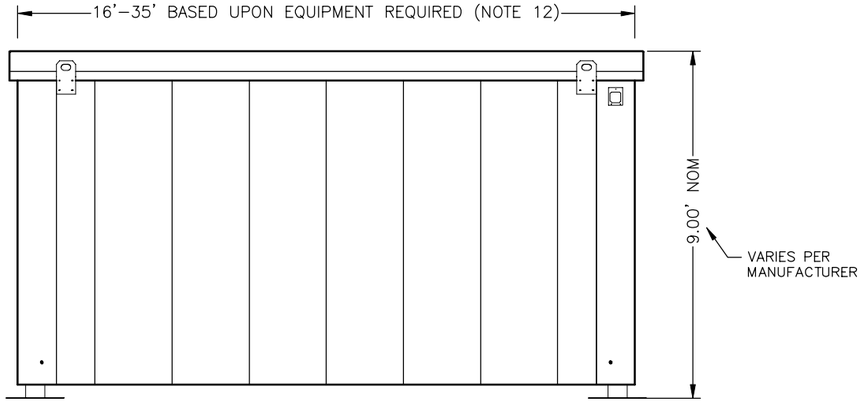


PLAN VIEW

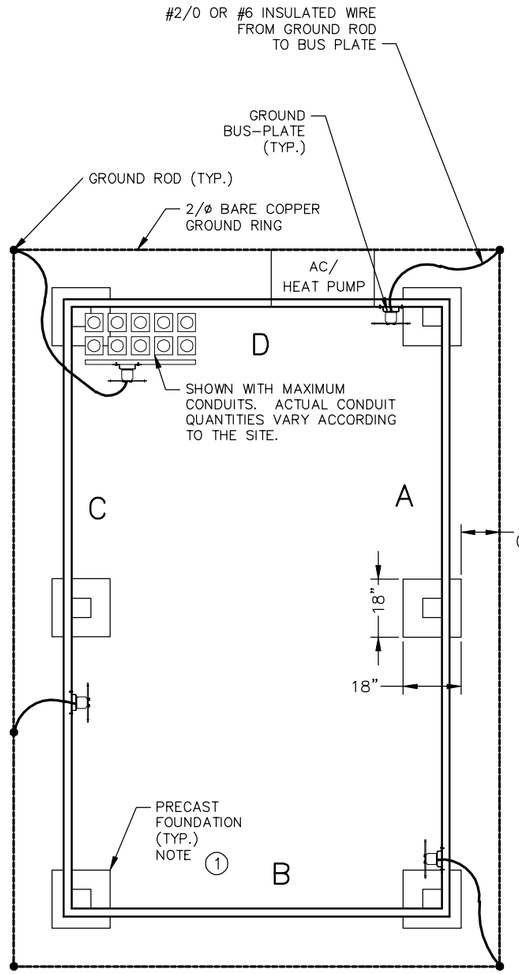
TYPICAL SIGNAL HOUSE LAYOUT



D – WALL ELEVATION



A – WALL ELEVATION



GROUNDING
SCHEME

LEGEND:

ϕ	=	DUPLEX OUTLET
VP	=	VITAL MICROPROCESSOR RACK
COM	=	FIBER COMM EQUIPMENT
NV	=	NON–VITAL MICROPROCESSOR RACK

1. ACCESS CARD READER WILL BE COMPATIBLE WITH METRO TRANSIT SECURITY PROTOCOL AND STANDARD EQUIPMENT, SEE TECHNICAL SPECIFICATION.
2. LOCATE HOUSE ON A CONCRETE PIERS TO ACCOMMODATE FINAL HOUSE SIZE AND ARRANGEMENT.
3. ARRANGE HOUSE ON EACH SITE TO MINIMIZE NOISE AND AIR ON SURROUNDING ENVIRONMENT AND TO CONSIDER HEAT PUMP LOCATION, IF POSSIBLE
4. ALL HOUSES TO BE MAXIMUM 10FT. WIDE. LENGTH SHALL BE AS REQUIRED (30FT MINIMUM).
5. ALL WIRING TO OUTLETS, LIGHT SWITCH, LIGHTS, THERMOSTAT, FAN, HEATER, AIR CONDITIONER AND CIRCUIT BREAKER PANEL SHALL BE IN CONDUIT
6. GROUND MAT TO PROVIDE MAXIMUM RESISTANCE TO GROUND OF 15 OHMS
7. HOUSE LAYOUT IS TYPICAL, FINAL DESIGNER TO PROVIDE DETAILED LAYOUT FOR EACH LOCATION
8. EACH DOOR WILL HAVE A LIMIT SWITCH DOOR POSITION SCADA DETECTOR MICROSWITCH LSA1A OR APPROVED EQUAL
9. HOUSE DOOR, STRIKE PLATE AND CASEMENT WITH EQUIPMENT COMPATIBLE WITH TECHNICAL SPECIFICATION.
10. FOR COMPLEX LOCATIONS, WALL MOUNT THE LCP NEAR THE DOOR. FOR ALL OTHER LOCATIONS, LOCATE THE LCP ON THE NV1 RACK NO LOWER THAN 48" TO TOP OF LCP.
11. CONTRACTOR SHALL DETERMINE AMOUNT AND SIZE OF RELAY RACKS AND CABLE TERMINATION UPON FINAL DETAILED DESIGN.
12. LENGTH OF SIGNAL HOUSE SHALL BE AS INDICATED ON LAYOUT PLANS.
13. CONTRACTOR SHALL SUBMIT FINAL DETAIL OF THE SIGNAL HOUSE DESIGN TO ENGINEER FOR APPROVAL

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EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
SIGNAL HOUSE DETAIL
TYPICAL SIGNAL HOUSE

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-501

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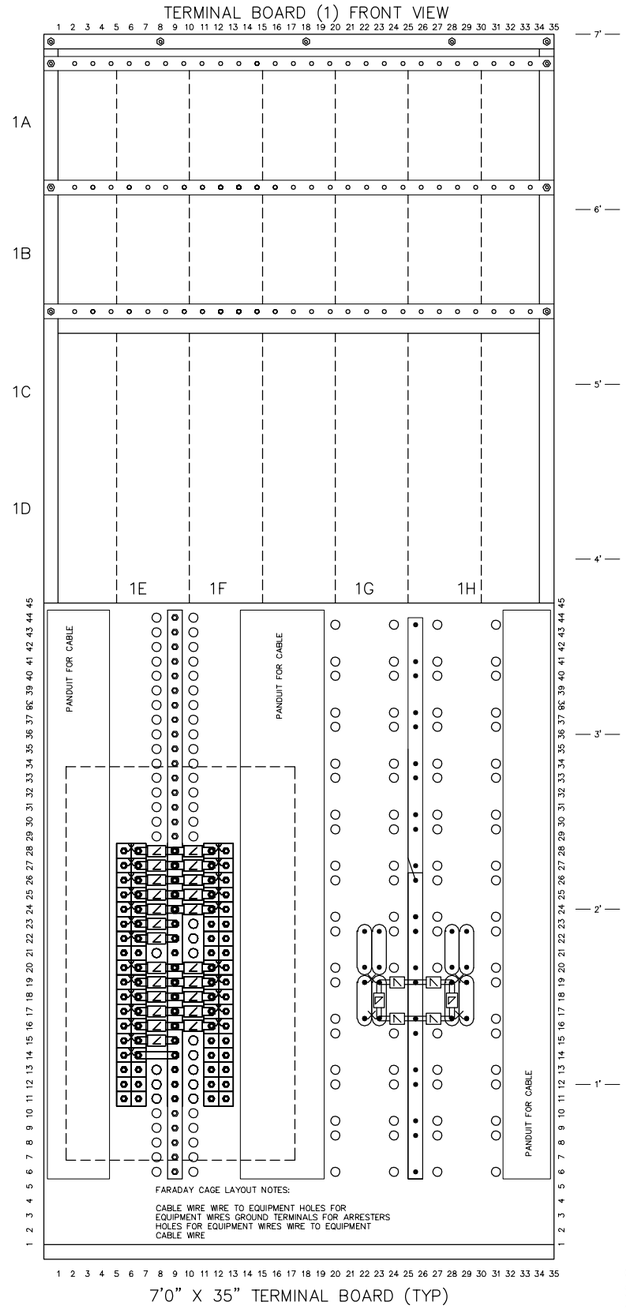
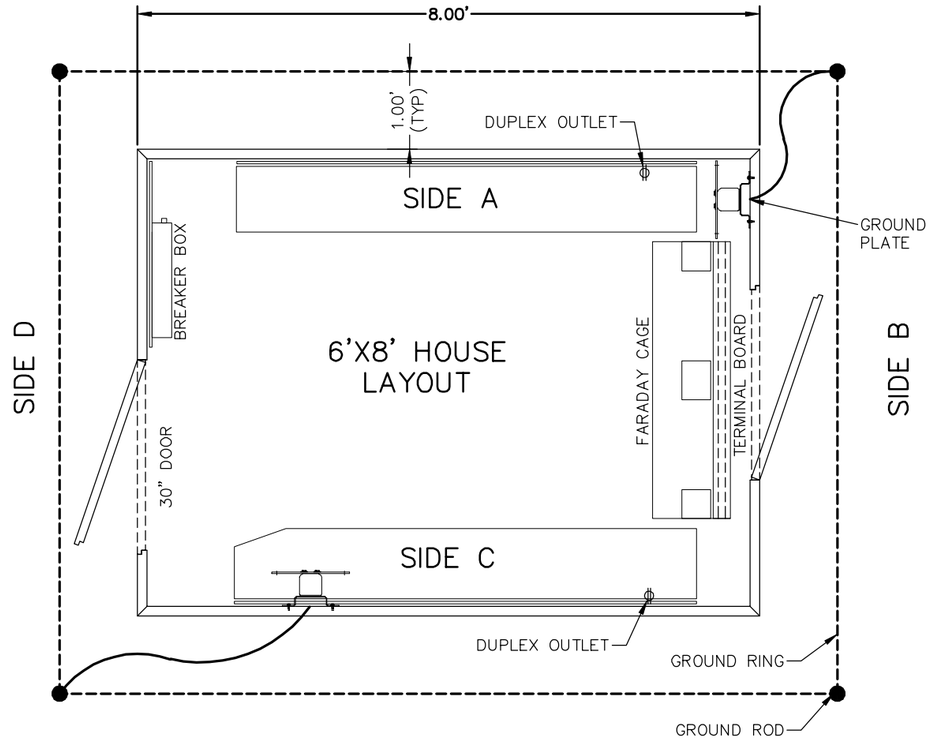


NOTES:

1. AN IP MAINTENANCE PHONE WILL BE MOUNTED ON SIDE "A". THIS PHONE WILL BE COMPLIANT WITH THE COMMUNICATION SYSTEM USED BY THE RCC FOR METRO TRANSIT MAINTENANCE.
2. THE ENTRANCE RACK SHALL BE CONFIGURED IN A FARADAY CAGE DESIGN TO PROVIDE LIGHTNING PROTECTION. THE DESIGN FOR THIS FARADAY CAGE WILL BE SUBMITTED TO THE CAR FOR APPROVAL PRIOR TO PROCUREMENT OR INSTALLATION.
3. THE CONTRACTOR SHALL PROVIDE A VENTILATION FAN AND RESISTIVE HEATER SIZED SPECIFICALLY FOR THE NEEDS OF THIS EQUIPMENT HOUSING AND FOR THIS CLIMATE. THE CLIMATE CONTROL SYSTEM WILL BE OPERATED BY A SINGLE THERMOSTAT. "OVERTEMP" AND "UNDERTEMP" ALARMS WILL BE GENERATED AND TRANSMITTED TO THE RCC VIA SCADA.



CABLE SHIELDS ARE TO BE WIRED TO GROUND
SPARE CABLE CONDUCTORS ARE TO BE CONNECTED TO GROUND

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EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
SIGNAL HOUSE DETAILS
TYPICAL 6'X8' GRADE CROSSING HOUSE

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-502

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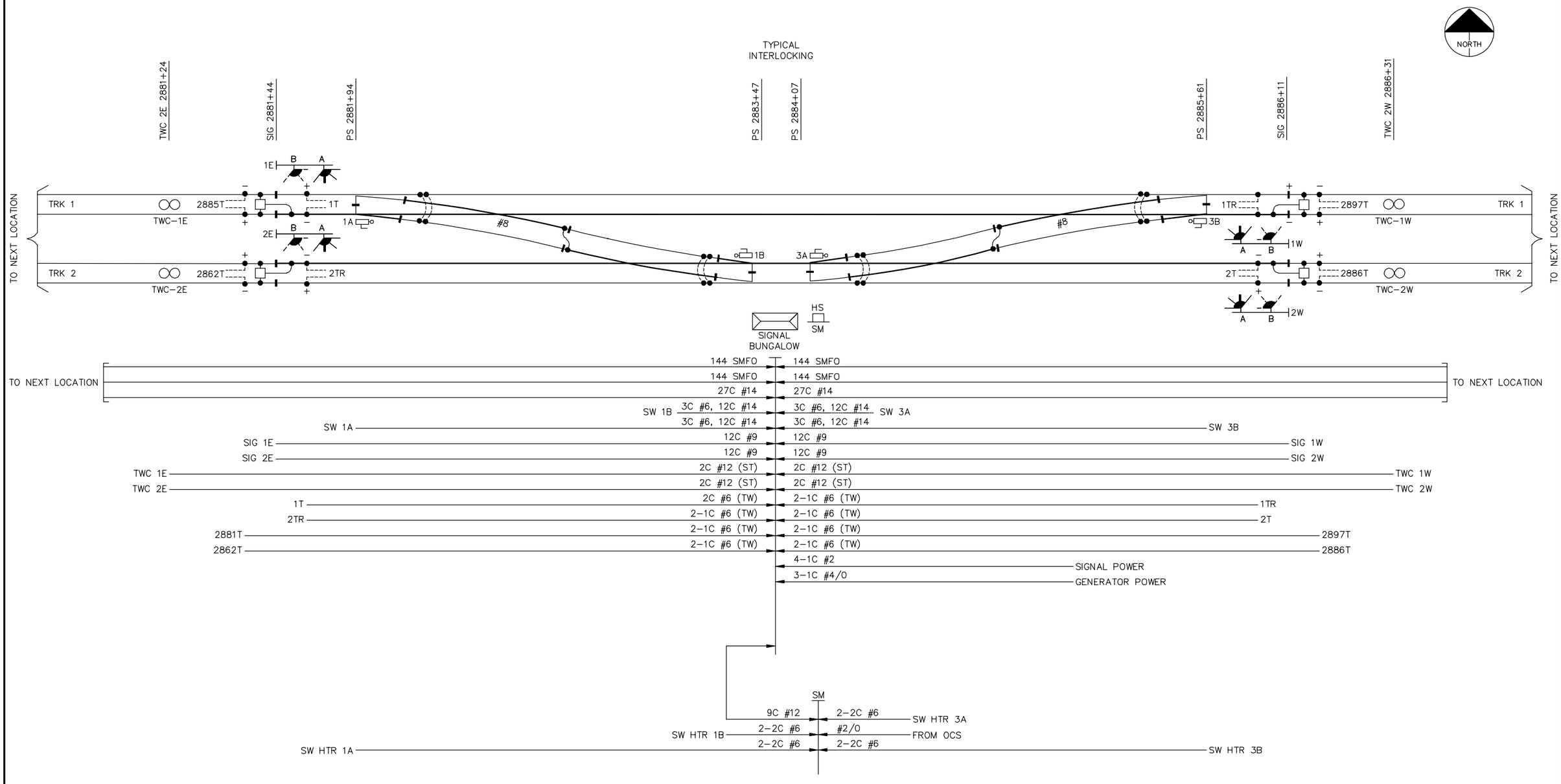

1. THIS DRAWING SHOWS PROPOSED TRACK LAYOUT AND IS INCLUDED FOR DESIGN DEVELOPEMENT PURPOSES. CONTRACTOR SHALL DETERMINE MID I.J. AT INTERLOCKING UPON FINAL DESIGN.

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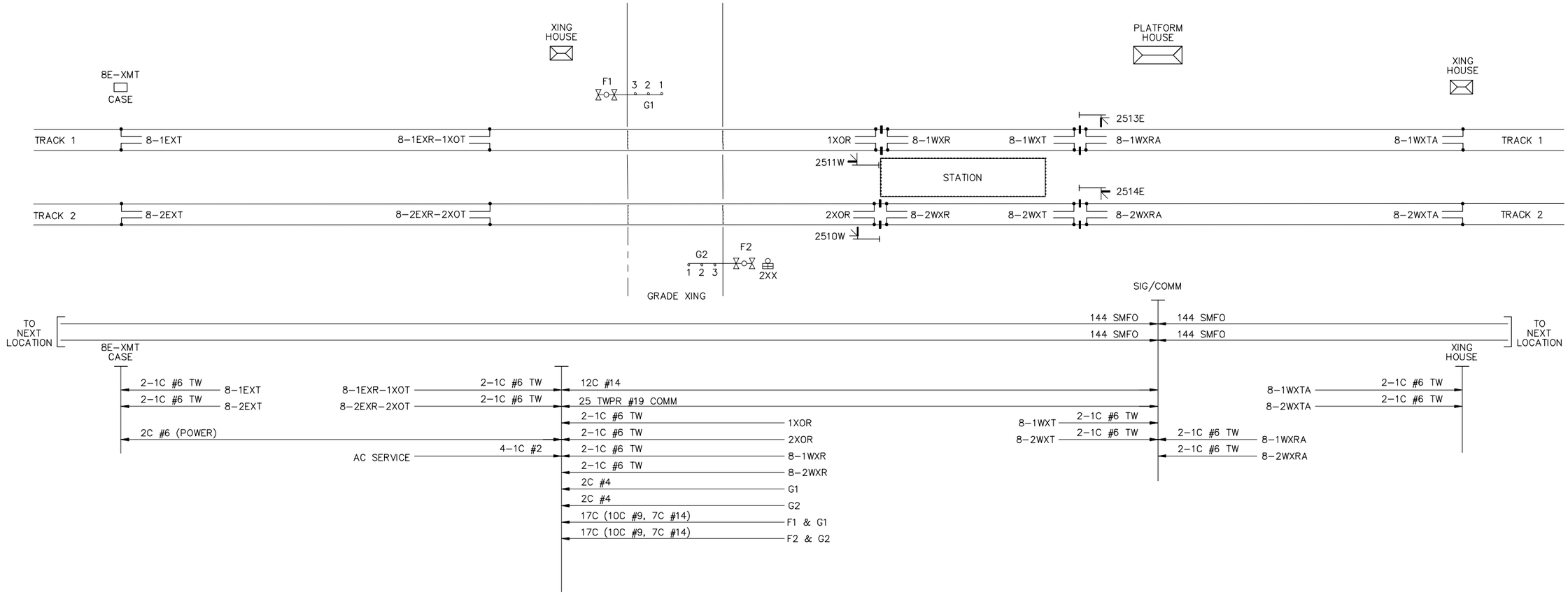
EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
TYPICAL CABLE PLAN INTERLOCKING

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-601

SHEET 185 OF 240



NOTE:
THIS DRAWING SHOWS PROPOSED CABLE LAYOUT AND IS INCLUDED FOR DESIGN DEVELOPMENT PURPOSES. FINAL CABLE DESIGN SELECTION WILL BE DETERMINED BY CONTRACTOR AND WILL BE IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.

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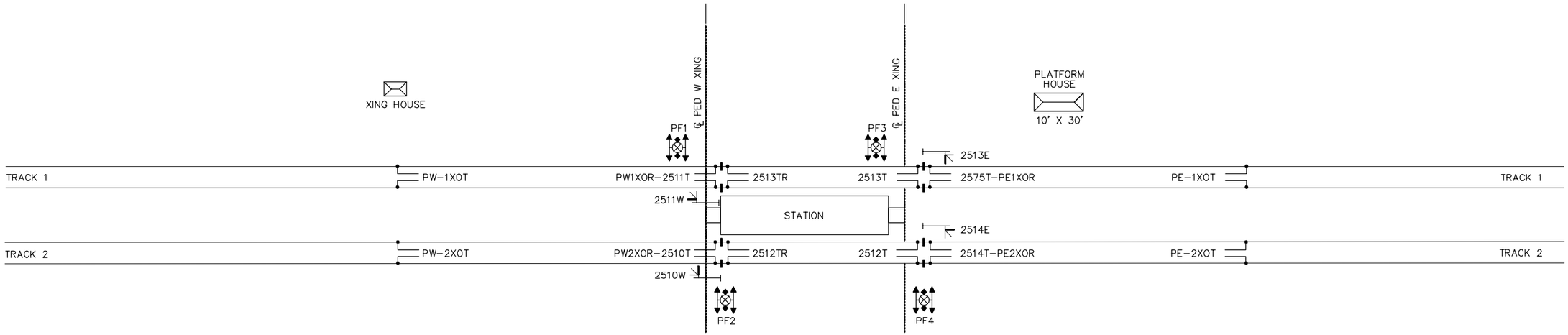
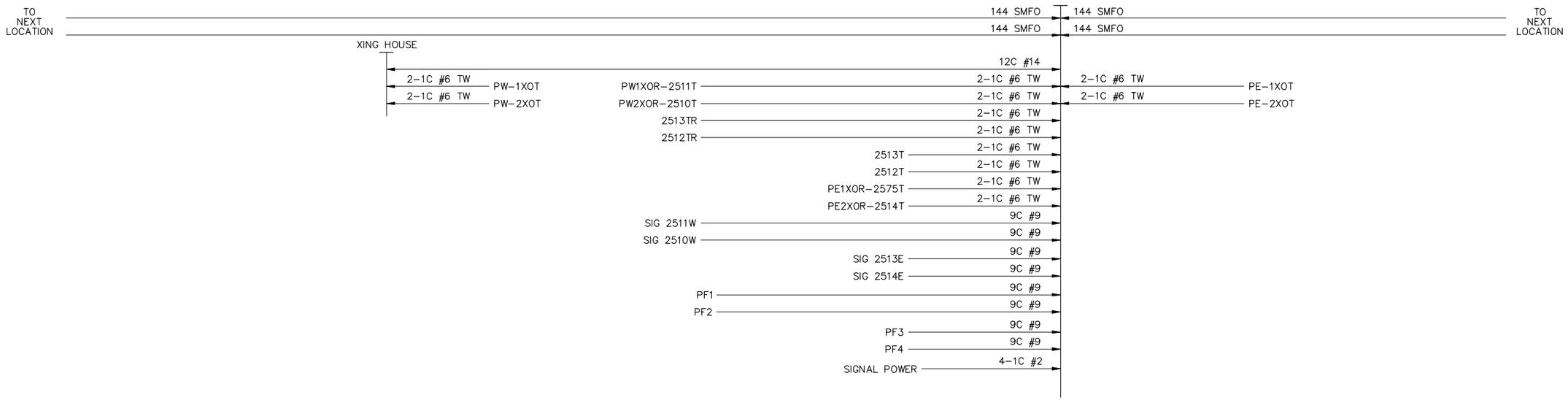
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
TYPICAL CABLE PLAN
GRADE CROSSING

DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-602

SHEET 186 OF 240





NOTE:
THIS DRAWING SHOWS PROPOSED CABLE LAYOUT AND IS INCLUDED FOR DESIGN DEVELOPMENT PURPOSES. FINAL CABLE DESIGN SELECTION WILL BE DETERMINED BY CONTRACTOR AND WILL BE IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
SIGNAL SYSTEM
TYPICAL CABLE PLAN
STATION PLATFORM

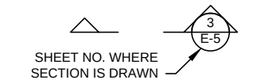
DISCIPLINE: SYSTEMS
SHEET NAME: SIG-DTL-603

SHEET 187 OF 240

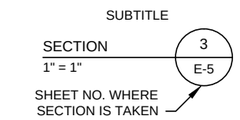
ABBREVIATIONS

AC	ALTERNATING CURRENT	MIN	MINIMUM
ACR	ACCESS CARD READER	MTG	MOUNTING
AFF	ABOVE FINISHED FLOOR	MTD	MOUNTED
AFG	ABOVE FINISHED GRADE	NC	NORMALLY CLOSED
A, AMP	AMPERE	NO	NORMALLY OPEN OR NUMBER
AUTO	AUTOMATIC	NTS	NOT TO SCALE
AUX	AUXILIARY	OB	OUTBOUND
AWG	AMERICAN WIRE GAUGE	OC	ON CENTER
C	CONDUIT	ODU	OUTDOOR UNIT
CAT6	CATEGORY 6 CABLE	OL	OVERLOAD
CCTV	CLOSED CIRCUIT TELEVISION	PA	PUBLIC ADDRESS
CKT	CIRCUIT	PCC	PLATFORM COMMUNICATION CABINET
COMM	COMMUNICATION(S)	PH	PHASE
CPT	CONTROL POWER TRANSFORMER	PLC	PROGRAMMABLE LOGICAL CONTROLLER
CR	CONTROL RELAY	PP	POWER PANEL
CS	CONTROL SWITCH	PR	PAIR
CT	CURRENT TRANSFORMER	PT	POTENTIAL TRANSFORMER
CU	COPPER	PTT	PUSH-TO-TALK
DN	DOWN	PTZ	PAN-TILT-ZOOM CAMERA
DSP	DIGITAL SIGNAL PROCESSOR	PVC	POLYVINYL CHLORIDE
ELEC	ELECTRICAL	QTY	QUANTITY
ELEV	ELEVATION	SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
EM	EMERGENCY		
ETEL	EMERGENCY TELEPHONE	SCU	STATION CONTROL UNIT
FBO	FURNISHED BY OTHERS	SEC	SECONDS OR SECONDARY
FDP	FIBER DISTRIBUTION PANEL	SH	SHIELDED OR SHEET
FO	FIBER OPTIC	SMFO	SINGLE MODE FIBER OPTIC
FRP	FIBERGLASS REINFORCED POLYESTER	SN	SOLID NEUTRAL
FU	FUSE	SPKR	SPEAKER
FUT	FUTURE	SS	STAINLESS STEEL
G, GRD	GROUND	SVV	STORED VALUE VALIDATOR
GF	GROUND FAULT INTERRUPTER	SW	SWITCH
GRS	GALVANIZED RIGID STEEL	TC	TIME DELAY ON CLOSING
HH	HANDHOLE	TCC	TRANSIT CONTROL CENTER
HT	HEIGHT	TEL	TELEPHONE
HZ	HERTZ	TO	TIME DELAY ON OPENING
IB	INBOUND	TVM	TICKET VENDING MACHINE
INST	INSTANTANEOUS	TWP	TWISTED PAIR
INSTR	INSTRUMENT	TYP	TYPICAL
ITC	INTERFACE TERMINAL CABINET	UG	UNDERGROUND
KAIC	KILO AMPERE INTERRUPTING CAPACITY	UPS	UNINTERRUPTABLE POWER SUPPLY
KVA	KILOVOLT AMPERE	V	VOLTS
LA	LIGHTNING ARRESTER	VOIP	VOICE OVER IP
LP	LIGHTING PANEL	VMS	VARIABLE MESSAGE SIGN
MCC	MAIN COMMUNCATION CABINET	W	WIRE
MFR	MANUFACTURER	WP	WEATHERPROOF
MH	MANHOLE	XFMR	TRANSFORMER
MIC	MICROPHONE		

SYMBOL	DESCRIPTION
	COMMUNICATION SYSTEMS
R	SECURITY SYSTEM CARD ACCESS READER
CCTV	CLOSED CIRCUIT TV CAMERA
DS	SECURITY ALARM DOOR SWITCH
SA	SECURITY ALARM PANEL
E	EMERGENCY TELEPHONE HANDSET
H S	PAGING SPEAKER, POLE MOUNTED, BI-DIRECTIONAL
S	PA SPEAKER, SURFACE MOUNTED CEILING TYPE
	MICROPHONE
	ADA DOOR OPERATOR
HH	HANDHOLE
MH	MANHOLE



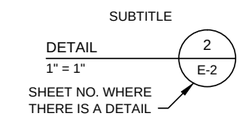
SYMBOL WHERE THERE IS A SECTION



SYMBOL WHERE SECTION IS DRAWN

SECTION SYMBOL

SYMBOL WHERE THERE IS A DETAIL



SYMBOL WHERE DETAIL IS DRAWN

DETAIL SYMBOL

NOTES:

1. THE BLOCK DIAGRAMS, QUANTITY AND SIZE OF DEVICES REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF COMMUNICATIONS EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE FUNCTION AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.

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METROPOLITAN COUNCIL

SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
SYMBOLS AND ABBREVIATIONS

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SYM-000

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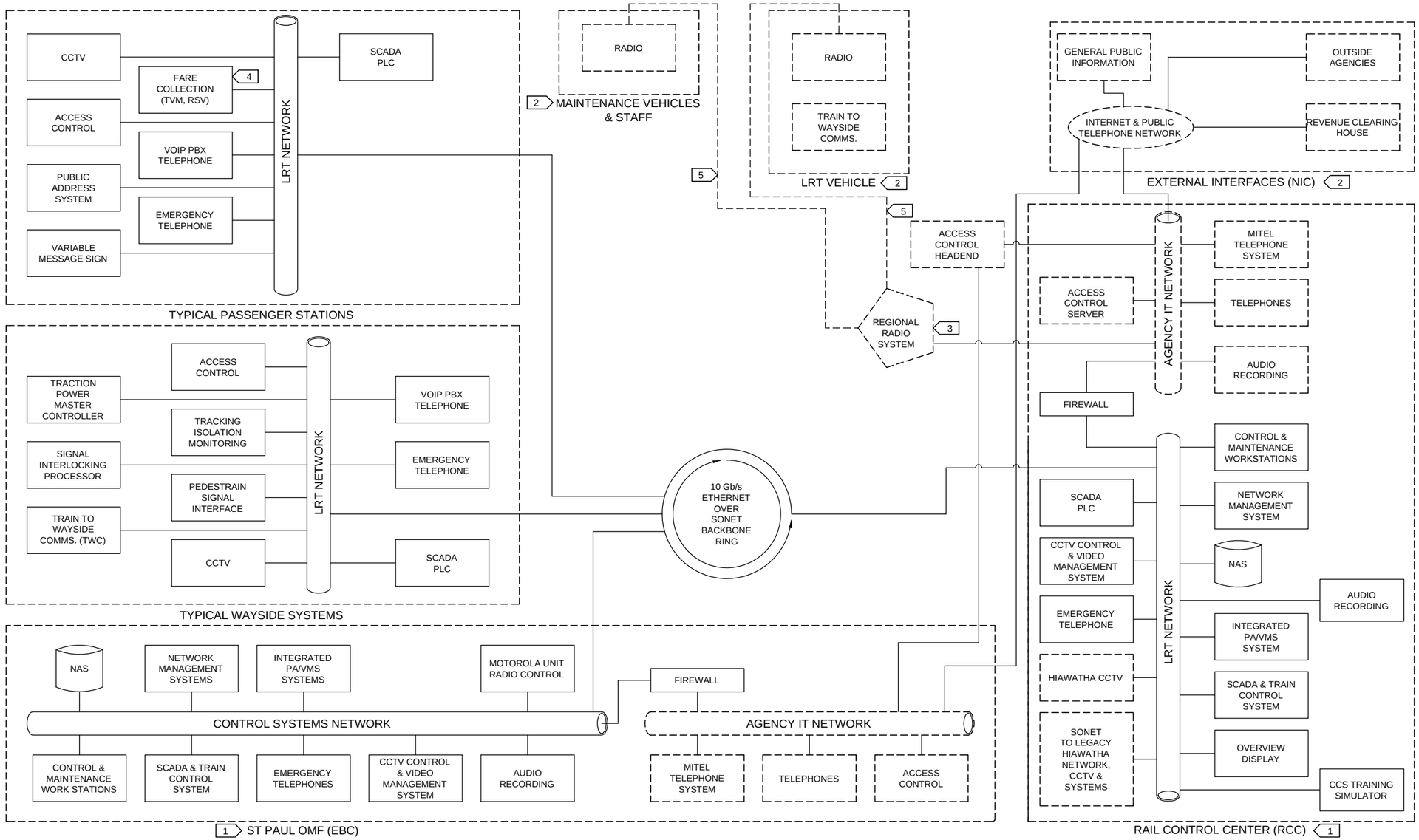

1 COMMUNICATIONS OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF GREEN LINE COMMUNICATION SYSTEMS AS TYPICALLY INSTALLED AND IN CURRENT OPERATION; INDIVIDUAL SITES MAY VARY SOMEWHAT.
2. THIS DRAWING IS A LOGICAL SCHEMATIC DIAGRAM AND IS NOT INTENDED TO SHOW INDIVIDUAL COMPONENTS, CABLE RUNS, ETC.
3. SEE TUNNEL COMMUNICATIONS SHEET FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES: ⬠

1. SITE AND ALL COMPONENTS WITHIN ARE EXISTING; CONTRACTOR SHALL EXPAND AND/OR PROVIDE LICENSES, PROGRAMMING, ETC. NECESSARY TO INCORPORATE ALL NEW FIELD SUBSYSTEMS AND DEVICES.
2. EXISTING FACILITIES AND SUBSYSTEMS.
3. RADIO SYSTEM CONSISTS OF EXISTING 800-MHz REGIONAL RADIO (ARMER) SYSTEM, ON WHICH METRO TRANSIT HAS TALK GROUPS FOR OPERATIONAL SERVICE.
4. NEW ITEMS TO BE PROVIDED BY OTHERS.
5. WIRELESS 800-MHz RADIO LINKS.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
CTS NETWORK
COMMUNICATIONS OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SWB-001

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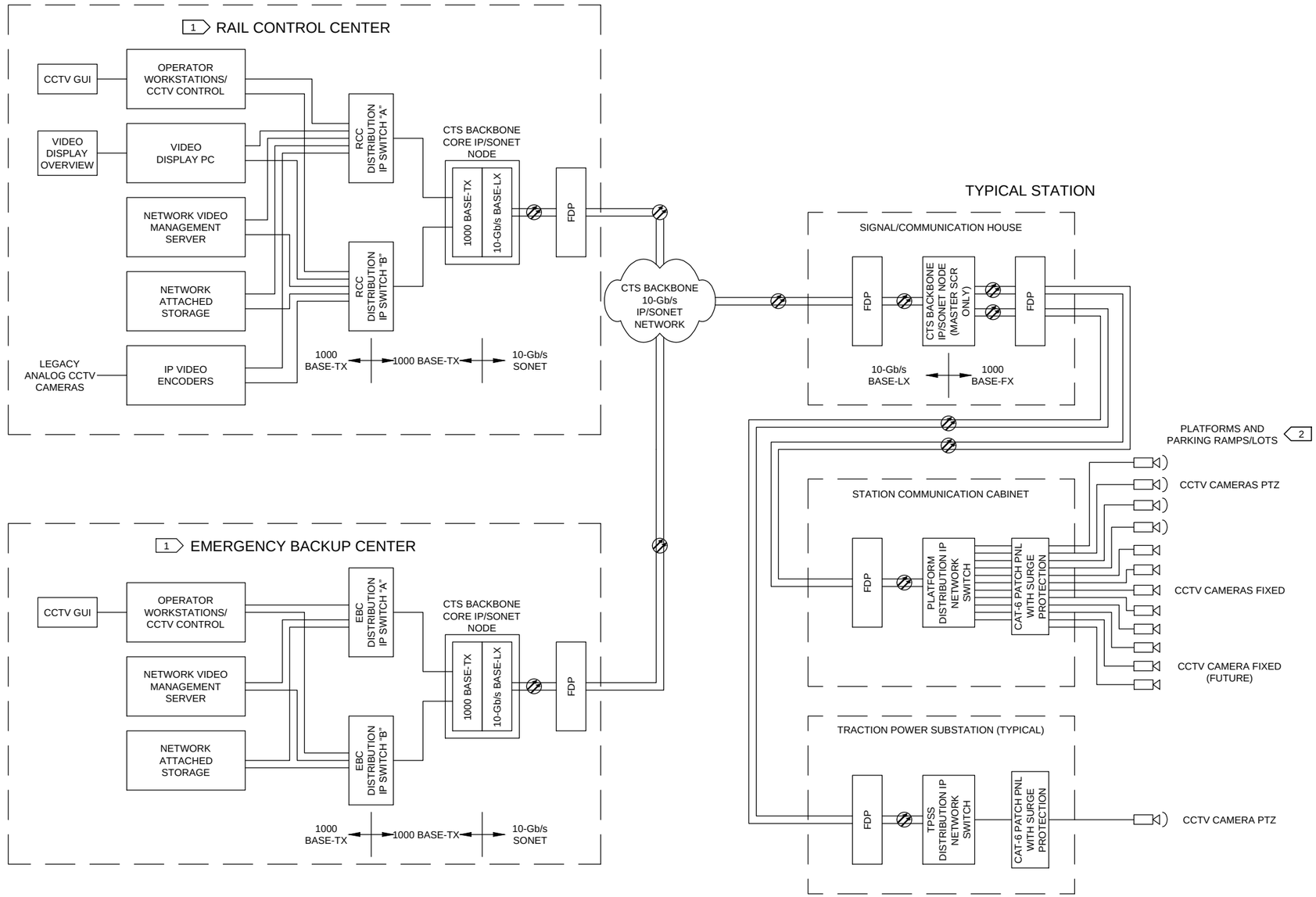

1 CCTV SYSTEM OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHOULD NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE CCTV SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. NOT ALL LOCATIONS WHERE CCTV CAMERAS WILL BE INSTALLED ARE SHOWN IN THIS DIAGRAM.
5. SEE TUNNEL COMMUNICATION SHEETS FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL EXPAND HEAD END SYSTEMS TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT CAMERAS ON CCTV HEADEND SYSTEM, AND FURNISH ADDITIONAL NVR STORAGE TO ACCOMMODATE ALL NEW SWLRT CAMERAS.
2. PARKING RAMPS AND LOTS MAY REQUIRE A SEPARATE CABINET AND NETWORK SWITCH TO ACCOMMODATE MINIMUM CABLE LENGTHS; THESE CABINETS ARE NOT SHOWN ON THIS DRAWING.

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EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
CTS NETWORK
CCTV OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SWB-002

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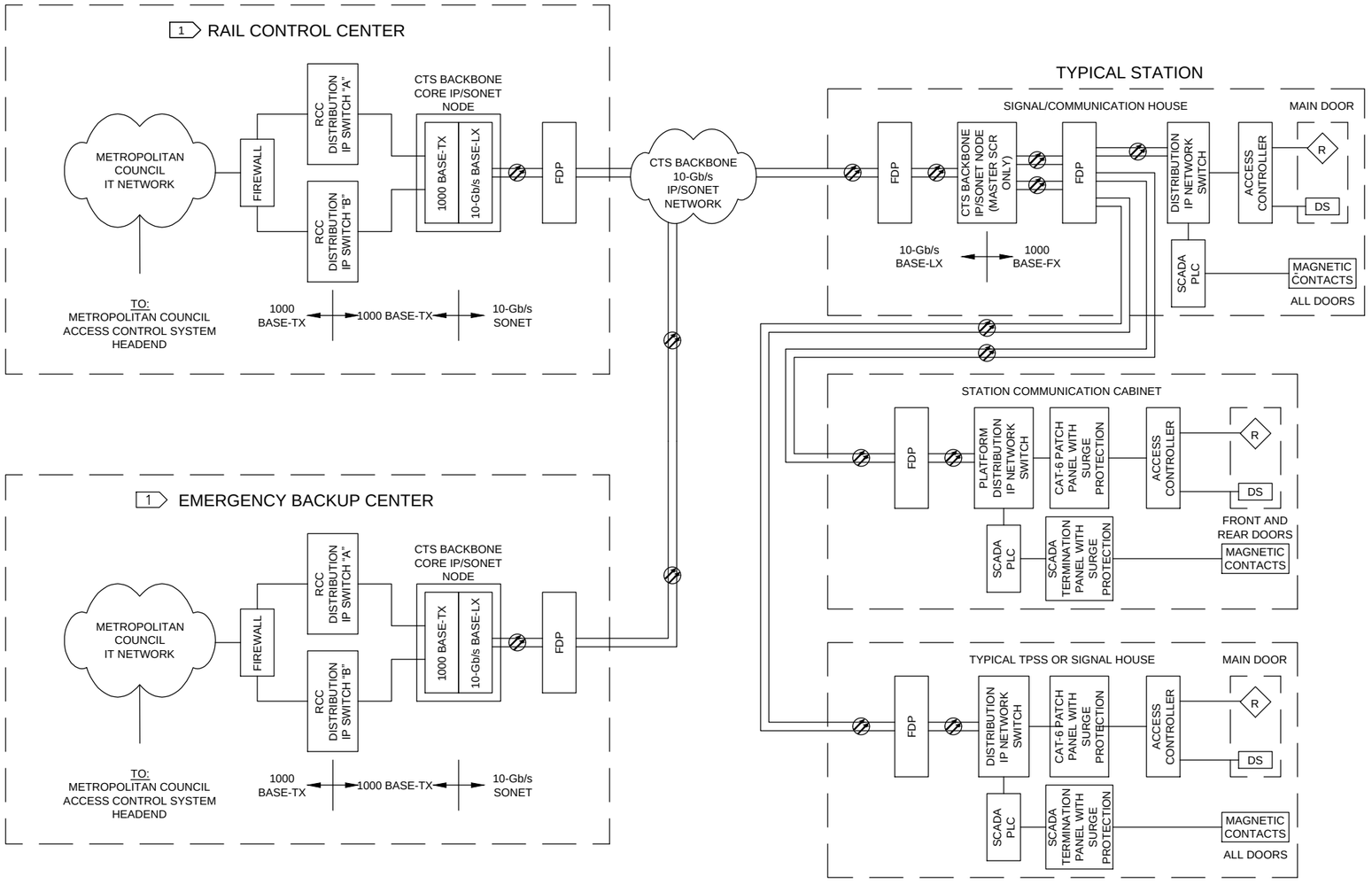

1 ACCESS CONTROL SYSTEM OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE ACCESS CONTROL SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. SEE TUNNEL COMMUNICATIONS SHEET FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL PROVIDE PROGRAMMING FOR ALL NEW ACCESS CONTROLLERS AND ACCESS CARD READERS, AND WORK WITH MET COUNCIL TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT STATION ACCESS CARD READERS ON EXISTING GE FACILITY COMMANDER SYSTEM.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
CTS NETWORK
ACCESS CONTROL SYSTEM OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SWB-003

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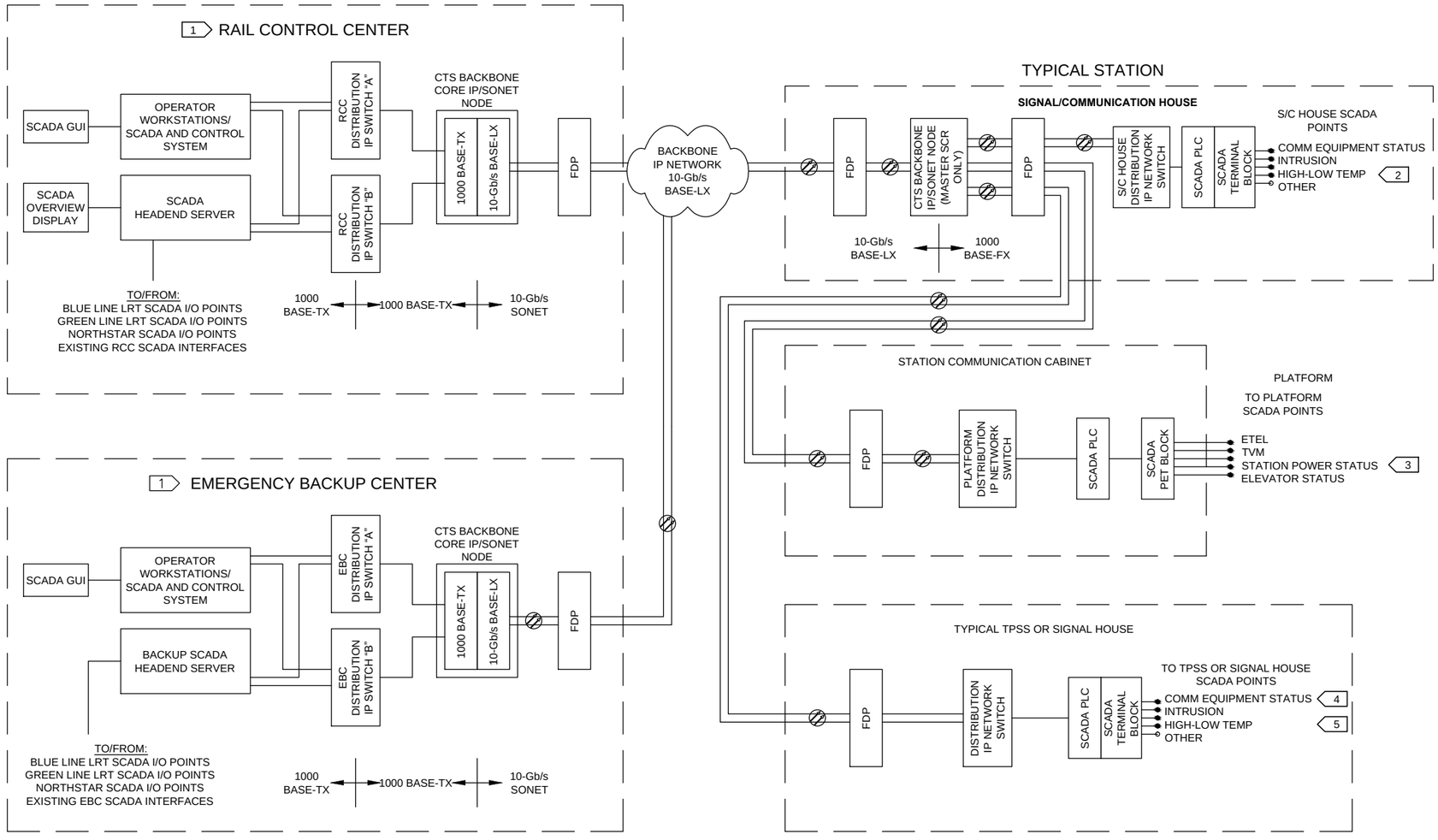

1 SCADA SYSTEM OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE FARE COLLECTION SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. SCADA POINTS SHOWN ON THIS DRAWING ARE AN ARBITRARY SAMPLE OF POINTS; SEE SPECIFCATION DOCUMENTS FOR ACTUAL REQUIRED LIST OF SCADA POINTS.
5. SEE TUNNEL COMMUNICATION SHEETS FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL EXPAND HEAD END SYSTEMS AND PROVIDE SCADA PROGRAMMING TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT SCADA POINTS, ALARMS AND CONTROLS ON SCS CENTRAL CONTROL SYSTEM.
2. TYPICAL SIGNAL-COMMUNICATION HOUSE CONTAINS 15-20 DISCREET AND 3 ANALOG I/O SCADA POINTS.
3. TYPICAL STATION COMMUNICATION CABINET CONTAINS 25-30 DISCREET AND 1-2 ANALOG I/O SCADA POINTS.
4. TYPICAL SIGNAL HOUSE CONTAINS 10-15 DISCREET AND 1-2 ANALOG SCADA POINTS.
5. TYPICAL TPSS CONTAINS 140 DISCREET SCADA I/O POINTS, (10 OF WHICH ARE CONTROLS, THE REST ARE INDICATIONS) AND 10 ANALOG SCADA INDICATIONS.

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Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS CTS NETWORK SCADA SYSTEM OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SWB-004

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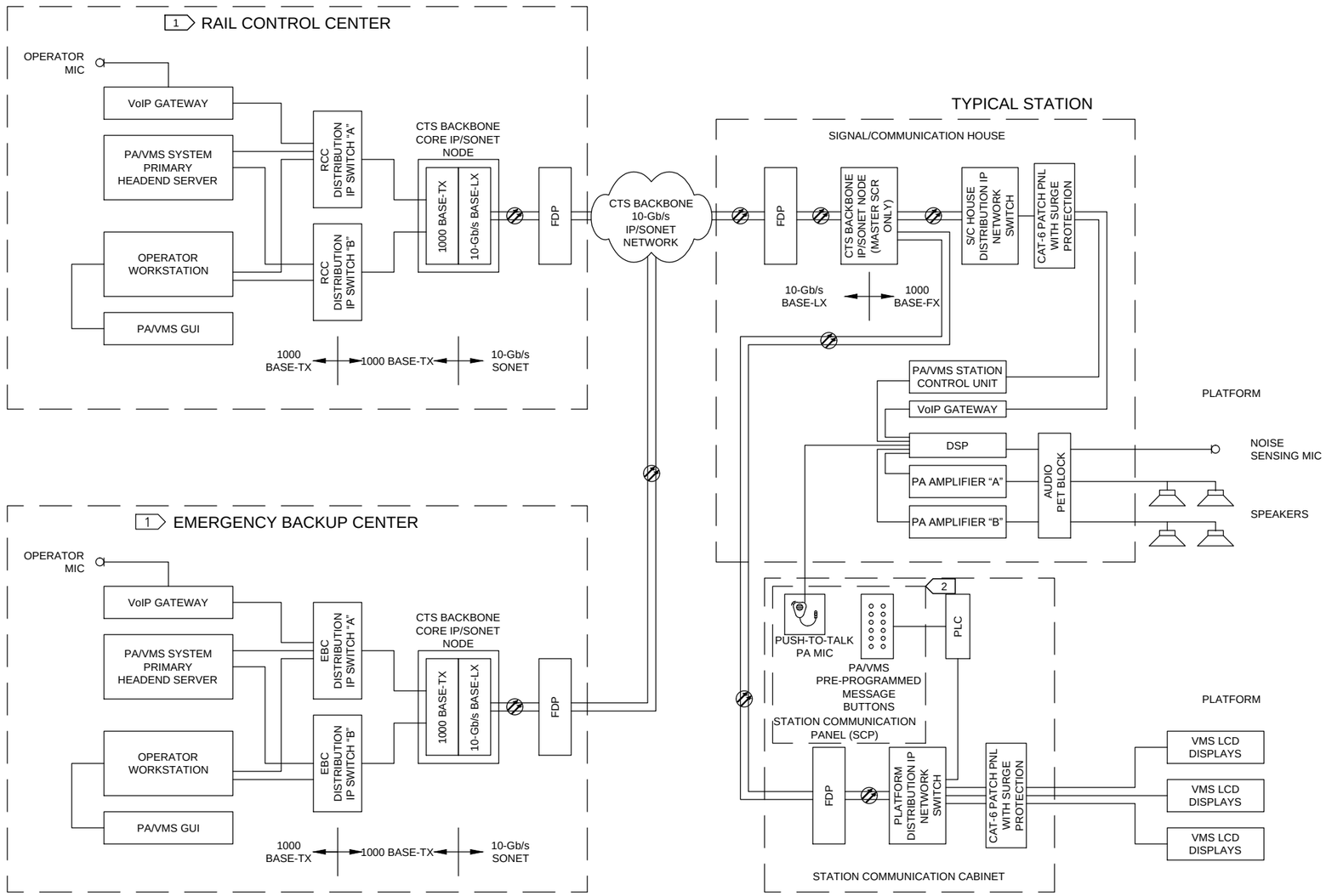

1 PA/VMS SYSTEM OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE PA/VMS SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. SEE TUNNEL COMMUNICATION SHEETS FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL EXPAND HEAD END SYSTEMS AND PROVIDE PROGRAMMING TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT STATION PA/VMS SYSTEMS ON PA/VMS HEADEND SYSTEM.
2. STATION CONTROL PANEL SHALL BE PROVIDED WITH LOCKABLE DOOR SET INTO COMMUNICATION CABINET ON PLATFORMS; KEYING SHALL MATCH EXISTING METRO TRANSIT LRT SCP LOCKS.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
CTS NETWORK
PA/VMS SYSTEM OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SWB-005

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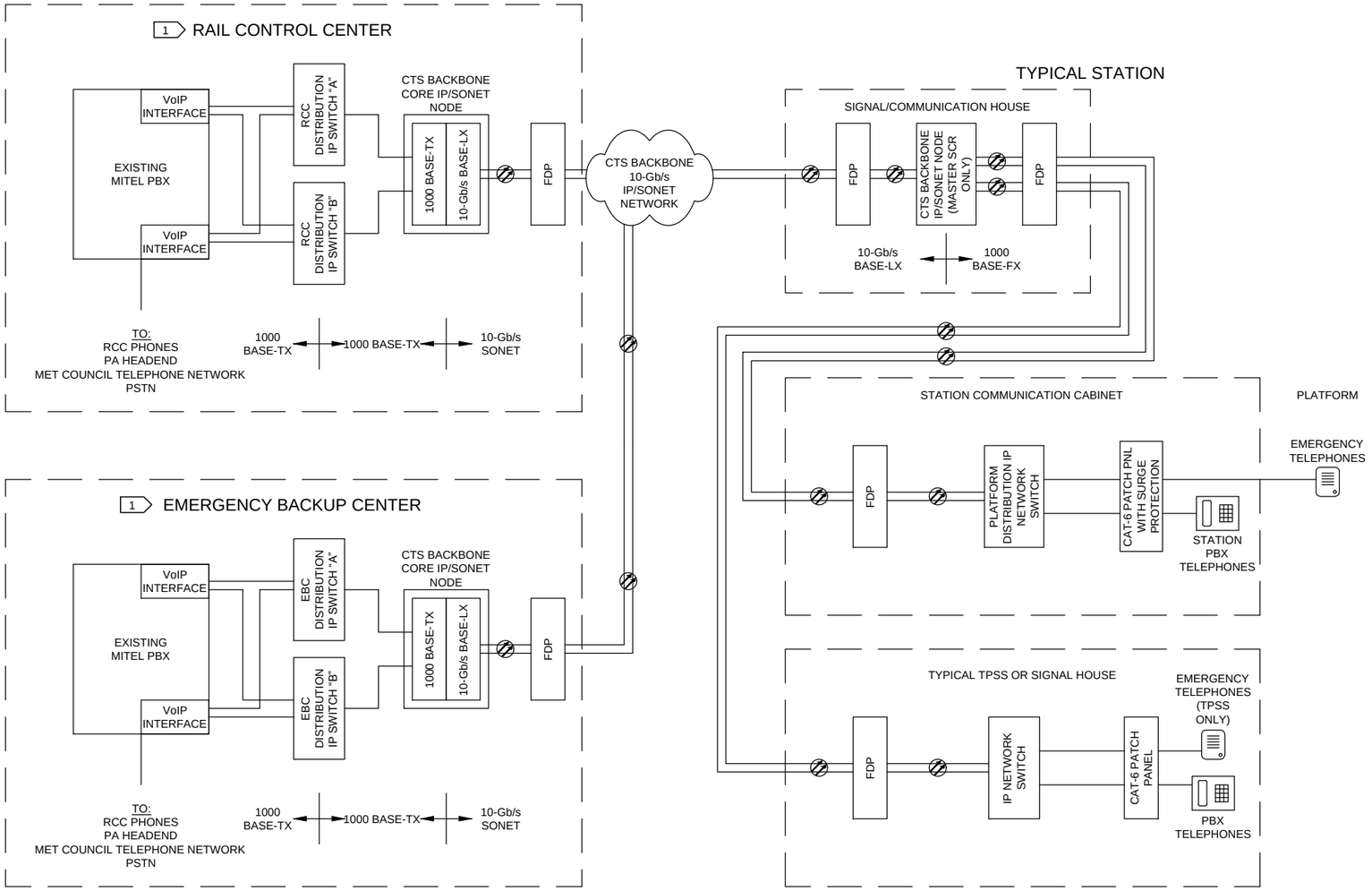

1 TELEPHONE SYSTEM OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE TELEPHONE SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. SEE TUNNEL COMMUNICATION SHEETS FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL PROVIDE LICENSES FOR ALL NEW PHONES, AND WORK WITH MET COUNCIL TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT STATION TELEPHONES ON EXISTING MITEL PHONE SYSTEM.

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EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
CTS NETWORK
TELEPHONE SYSTEM OVERVIEW

DISCIPLINE: SYSTEMS
SHEET NAME: E0-SYS-COM-SWB-006

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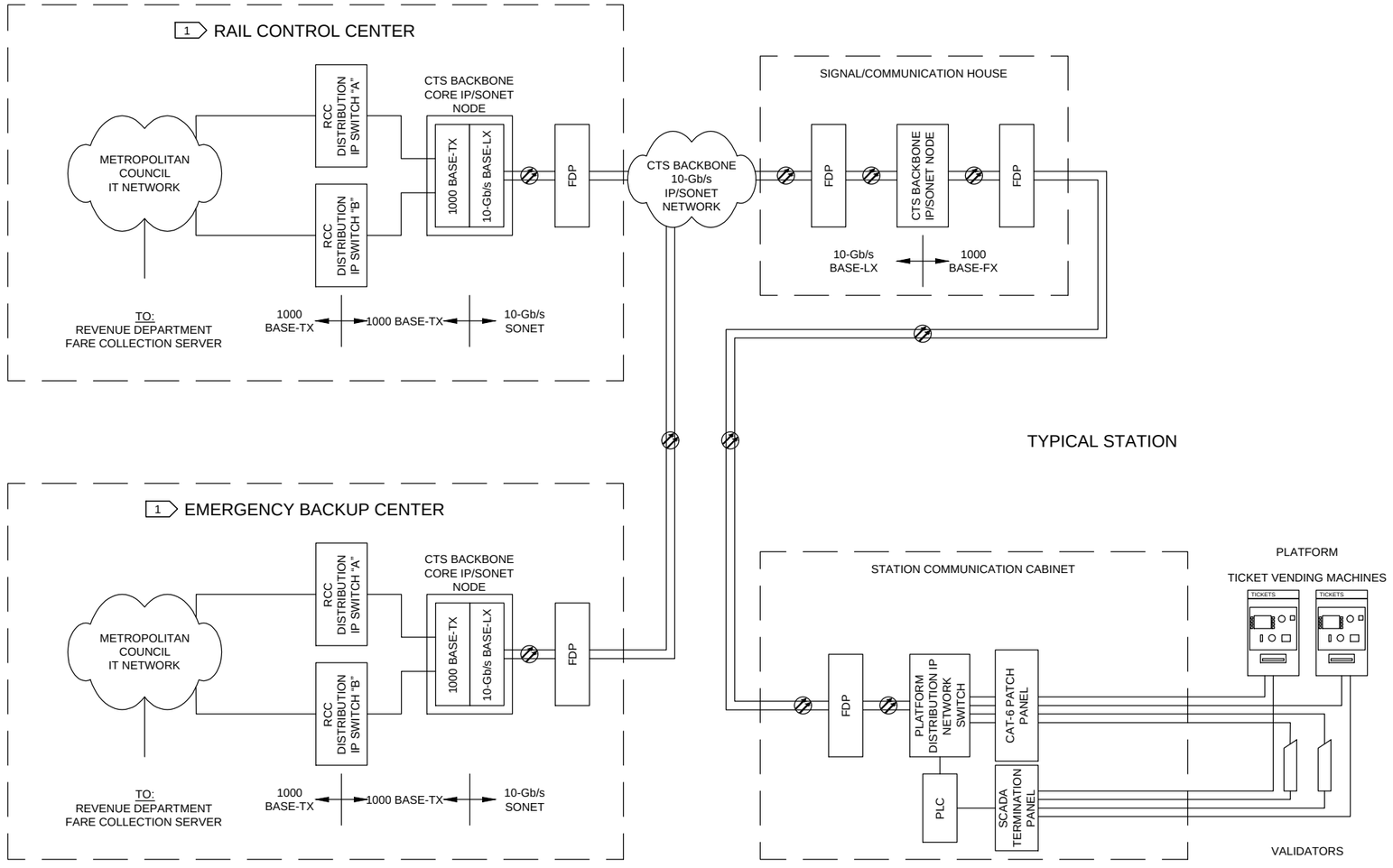

1 FARE COLLECTION SYSTEM OVERVIEW

SCALE: NTS

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE FARE COLLECTION SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. SEE TUNNEL COMMUNICATION SHEETS FOR ANY ITEMS OR SUBSYSTEMS IN TUNNEL.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL EXPAND HEAD END SYSTEMS AND PROVIDE SCADA PROGRAMMING TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT FARE COLLECTION POINTS ON SCADA HEADEND SYSTEM.

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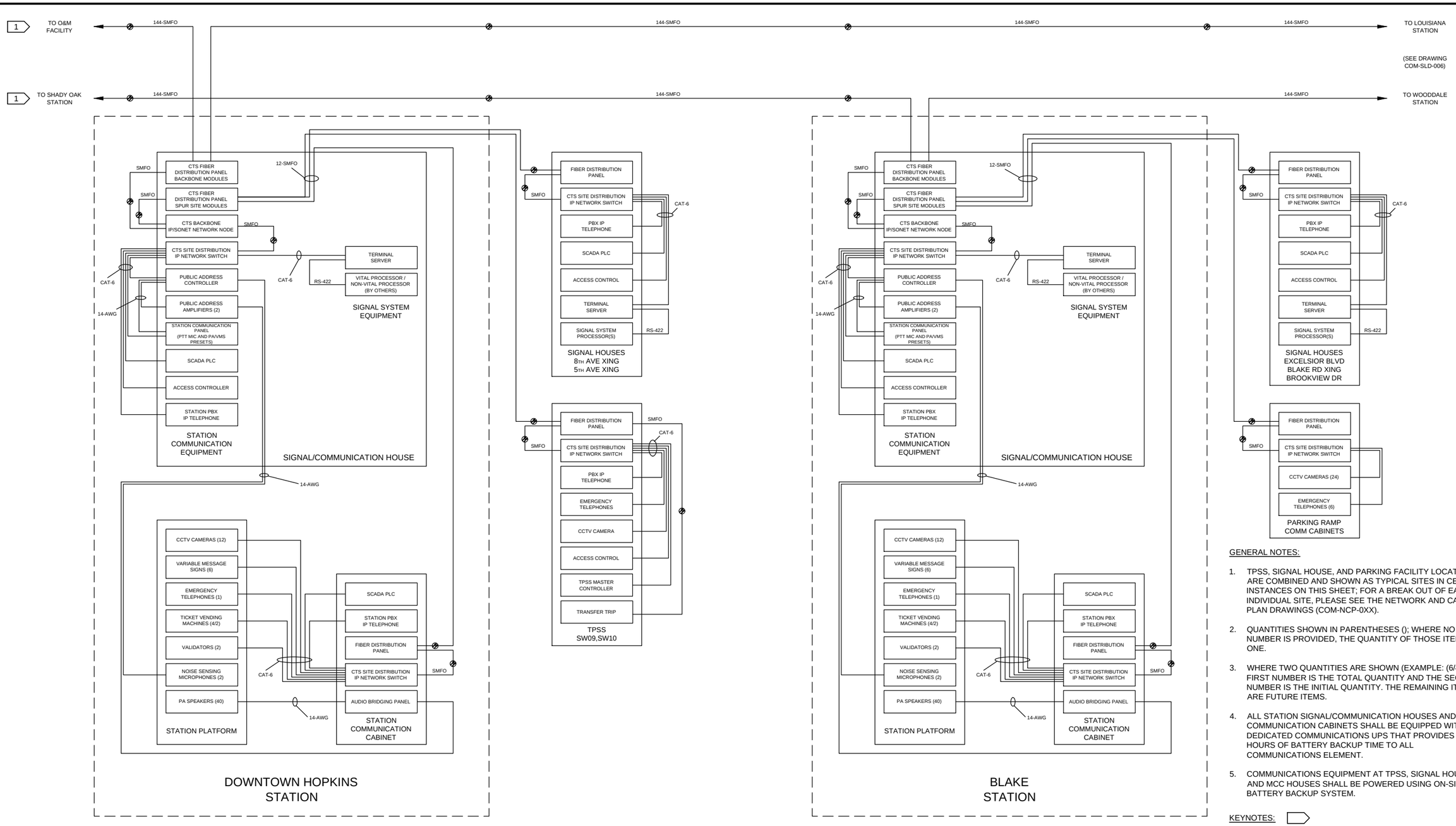
EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
CTS NETWORK
FARE COLLECTION SYSTEM OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SWB-007

SHEET 195 OF 240



GENERAL NOTES:

1. TPSS, SIGNAL HOUSE, AND PARKING FACILITY LOCATIONS ARE COMBINED AND SHOWN AS TYPICAL SITES IN CERTAIN INSTANCES ON THIS SHEET; FOR A BREAK OUT OF EACH INDIVIDUAL SITE, PLEASE SEE THE NETWORK AND CABLE PLAN DRAWINGS (COM-NCP-0XX).
2. QUANTITIES SHOWN IN PARENTHESES (); WHERE NO NUMBER IS PROVIDED, THE QUANTITY OF THOSE ITEMS IS ONE.
3. WHERE TWO QUANTITIES ARE SHOWN (EXAMPLE: (6/4)), THE FIRST NUMBER IS THE TOTAL QUANTITY AND THE SECOND NUMBER IS THE INITIAL QUANTITY. THE REMAINING ITEMS ARE FUTURE ITEMS.
4. ALL STATION SIGNAL/COMMUNICATION HOUSES AND COMMUNICATION CABINETS SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS UPS THAT PROVIDES 4 HOURS OF BATTERY BACKUP TIME TO ALL COMMUNICATIONS ELEMENT.
5. COMMUNICATIONS EQUIPMENT AT TPSS, SIGNAL HOUSES, AND MCC HOUSES SHALL BE POWERED USING ON-SITE BATTERY BACKUP SYSTEM.

KEYNOTES:

1. O&M FACILITY AND SHADY OAK STATION ARE PART OF WEST SEGMENT DESIGN AND ARE NOT SHOWN IN THIS PLAN SET.

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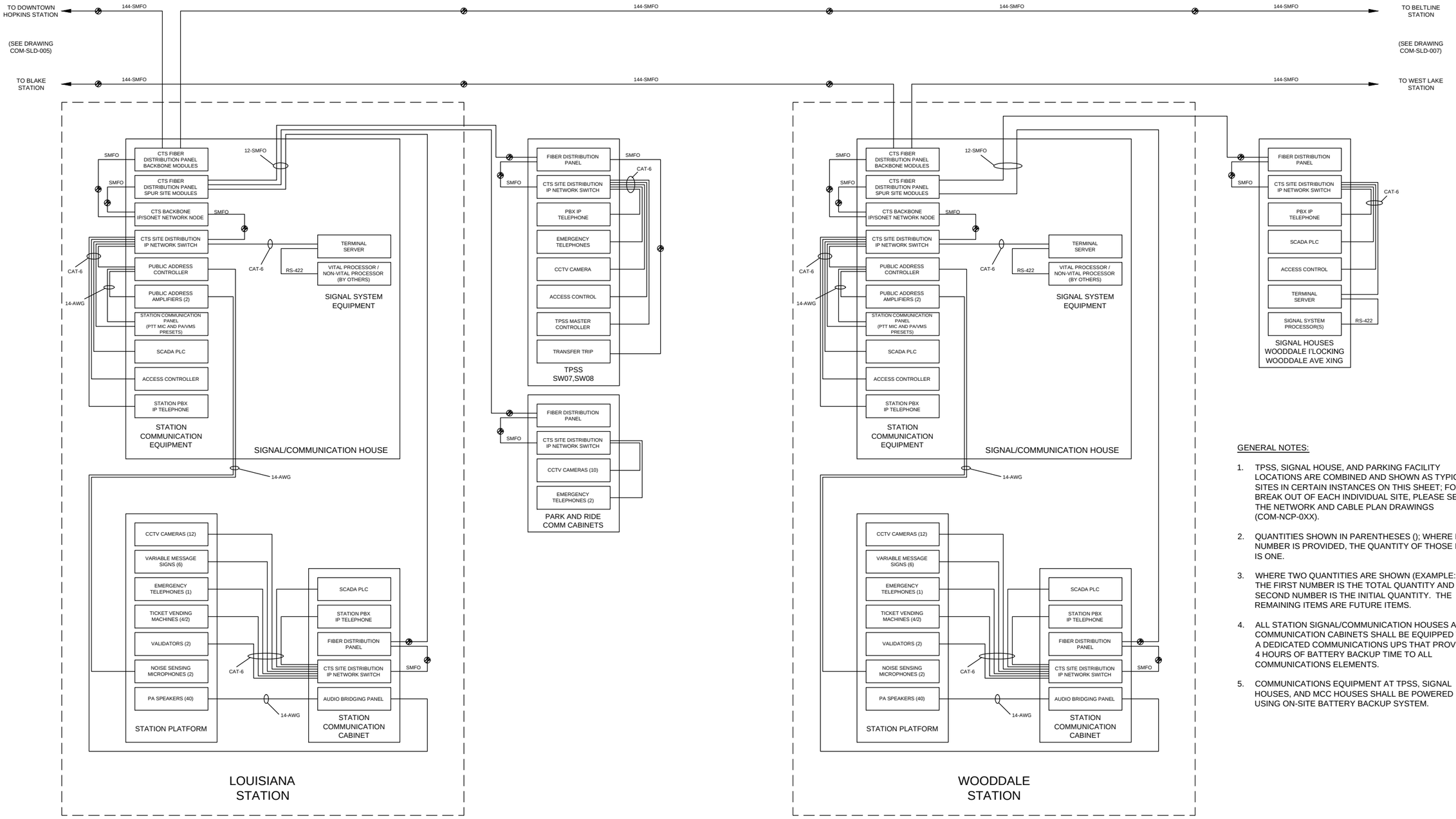
EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS SINGLE LINE DIAGRAM 1 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SLD-005

SHEET 196 OF 240



GENERAL NOTES:

1. TPSS, SIGNAL HOUSE, AND PARKING FACILITY LOCATIONS ARE COMBINED AND SHOWN AS TYPICAL SITES IN CERTAIN INSTANCES ON THIS SHEET; FOR A BREAK OUT OF EACH INDIVIDUAL SITE, PLEASE SEE THE NETWORK AND CABLE PLAN DRAWINGS (COM-NCP-0XX).
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3. WHERE TWO QUANTITIES ARE SHOWN (EXAMPLE: (6/4)), THE FIRST NUMBER IS THE TOTAL QUANTITY AND THE SECOND NUMBER IS THE INITIAL QUANTITY. THE REMAINING ITEMS ARE FUTURE ITEMS.
4. ALL STATION SIGNAL/COMMUNICATION HOUSES AND COMMUNICATION CABINETS SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS UPS THAT PROVIDES 4 HOURS OF BATTERY BACKUP TIME TO ALL COMMUNICATIONS ELEMENTS.
5. COMMUNICATIONS EQUIPMENT AT TPSS, SIGNAL HOUSES, AND MCC HOUSES SHALL BE POWERED USING ON-SITE BATTERY BACKUP SYSTEM.

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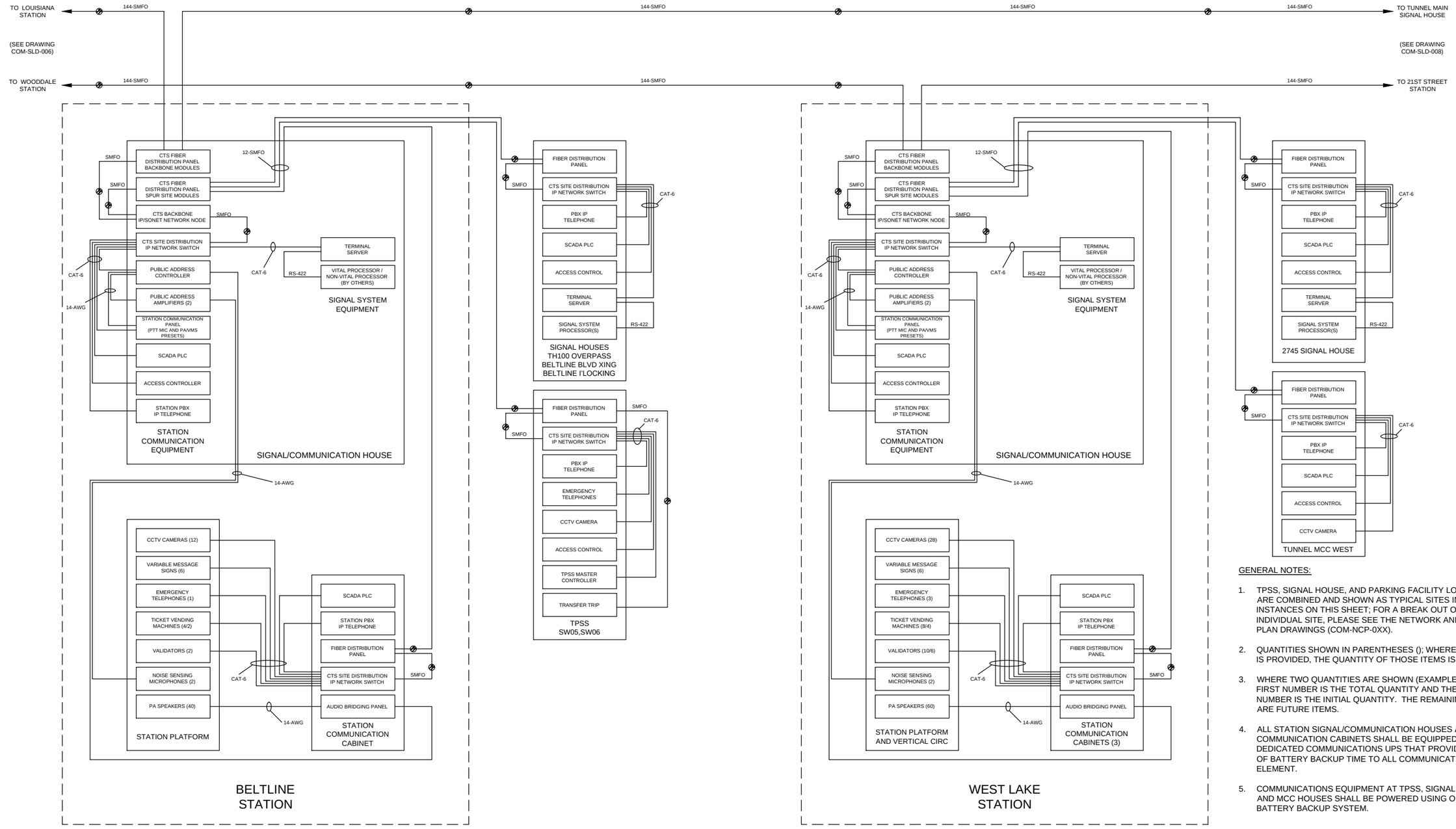
EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS SINGLE LINE DIAGRAM 2 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SLD-006

SHEET 197 OF 240



GENERAL NOTES:

1. TPSS, SIGNAL HOUSE, AND PARKING FACILITY LOCATIONS ARE COMBINED AND SHOWN AS TYPICAL SITES IN CERTAIN INSTANCES ON THIS SHEET; FOR A BREAK OUT OF EACH INDIVIDUAL SITE, PLEASE SEE THE NETWORK AND CABLE PLAN DRAWINGS (COM-NCP-0XX).
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4. ALL STATION SIGNAL/COMMUNICATION HOUSES AND COMMUNICATION CABINETS SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS UPS THAT PROVIDES 4 HOURS OF BATTERY BACKUP TIME TO ALL COMMUNICATIONS ELEMENT.
5. COMMUNICATIONS EQUIPMENT AT TPSS, SIGNAL HOUSES, AND MCC HOUSES SHALL BE POWERED USING ON-SITE BATTERY BACKUP SYSTEM.

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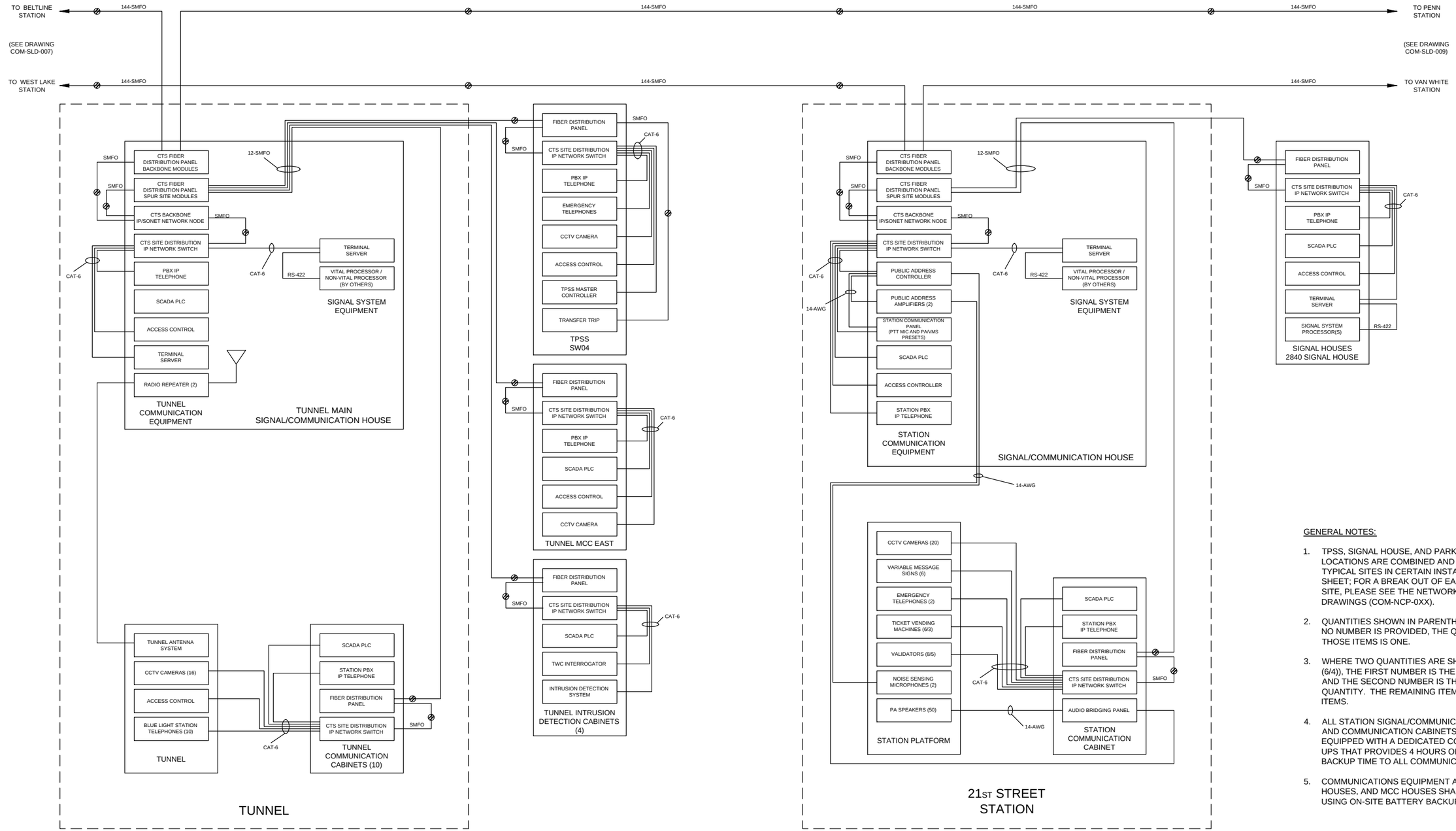
EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS SINGLE LINE DIAGRAM 3 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SLD-007

SHEET 198 OF 240



GENERAL NOTES:

1. TPSS, SIGNAL HOUSE, AND PARKING FACILITY LOCATIONS ARE COMBINED AND SHOWN AS TYPICAL SITES IN CERTAIN INSTANCES ON THIS SHEET; FOR A BREAK OUT OF EACH INDIVIDUAL SITE, PLEASE SEE THE NETWORK AND CABLE PLAN DRAWINGS (COM-NCP-0XX).
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4. ALL STATION SIGNAL/COMMUNICATION HOUSES AND COMMUNICATION CABINETS SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS UPS THAT PROVIDES 4 HOURS OF BATTERY BACKUP TIME TO ALL COMMUNICATIONS ELEMENT.
5. COMMUNICATIONS EQUIPMENT AT TPSS, SIGNAL HOUSES, AND MCC HOUSES SHALL BE POWERED USING ON-SITE BATTERY BACKUP SYSTEM.

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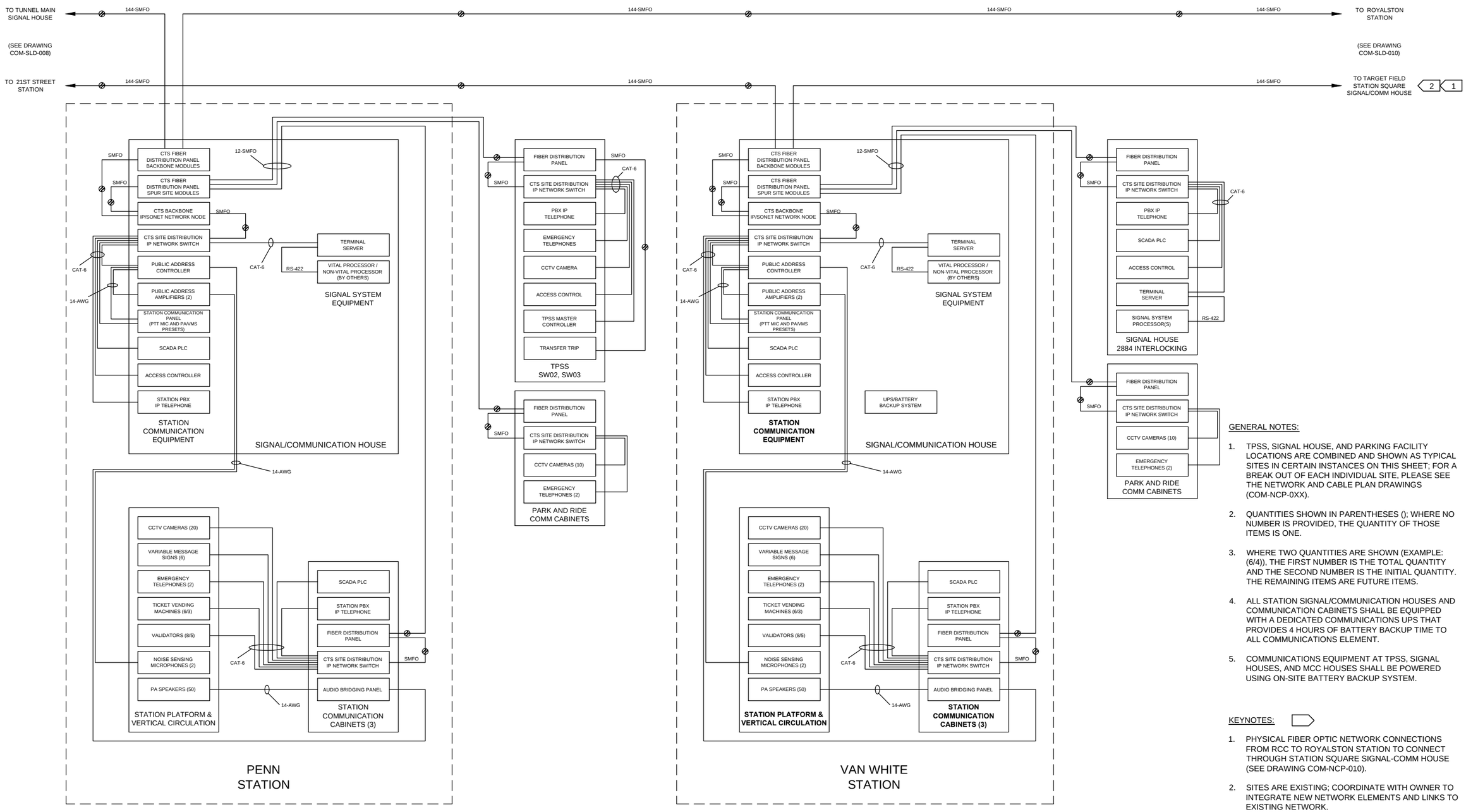
EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
SINGLE LINE DIAGRAM
4 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-SLD-008

SHEET 199 OF 240



GENERAL NOTES:

1. TPSS, SIGNAL HOUSE, AND PARKING FACILITY LOCATIONS ARE COMBINED AND SHOWN AS TYPICAL SITES IN CERTAIN INSTANCES ON THIS SHEET; FOR A BREAK OUT OF EACH INDIVIDUAL SITE, PLEASE SEE THE NETWORK AND CABLE PLAN DRAWINGS (COM-NCP-0XX).
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4. ALL STATION SIGNAL/COMMUNICATION HOUSES AND COMMUNICATION CABINETS SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS UPS THAT PROVIDES 4 HOURS OF BATTERY BACKUP TIME TO ALL COMMUNICATIONS ELEMENT.
5. COMMUNICATIONS EQUIPMENT AT TPSS, SIGNAL HOUSES, AND MCC HOUSES SHALL BE POWERED USING ON-SITE BATTERY BACKUP SYSTEM.

KEYNOTES:

1. PHYSICAL FIBER OPTIC NETWORK CONNECTIONS FROM RCC TO ROYALSTON STATION TO CONNECT THROUGH STATION SQUARE SIGNAL-COMM HOUSE (SEE DRAWING COM-NCP-010).
2. SITES ARE EXISTING; COORDINATE WITH OWNER TO INTEGRATE NEW NETWORK ELEMENTS AND LINKS TO EXISTING NETWORK.

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EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS SINGLE LINE DIAGRAM 5 OF 6

DISCIPLINE: SYSTEMS
SHEET NAME: E0-SYS-COM-SLD-009

SHEET 200 OF 240

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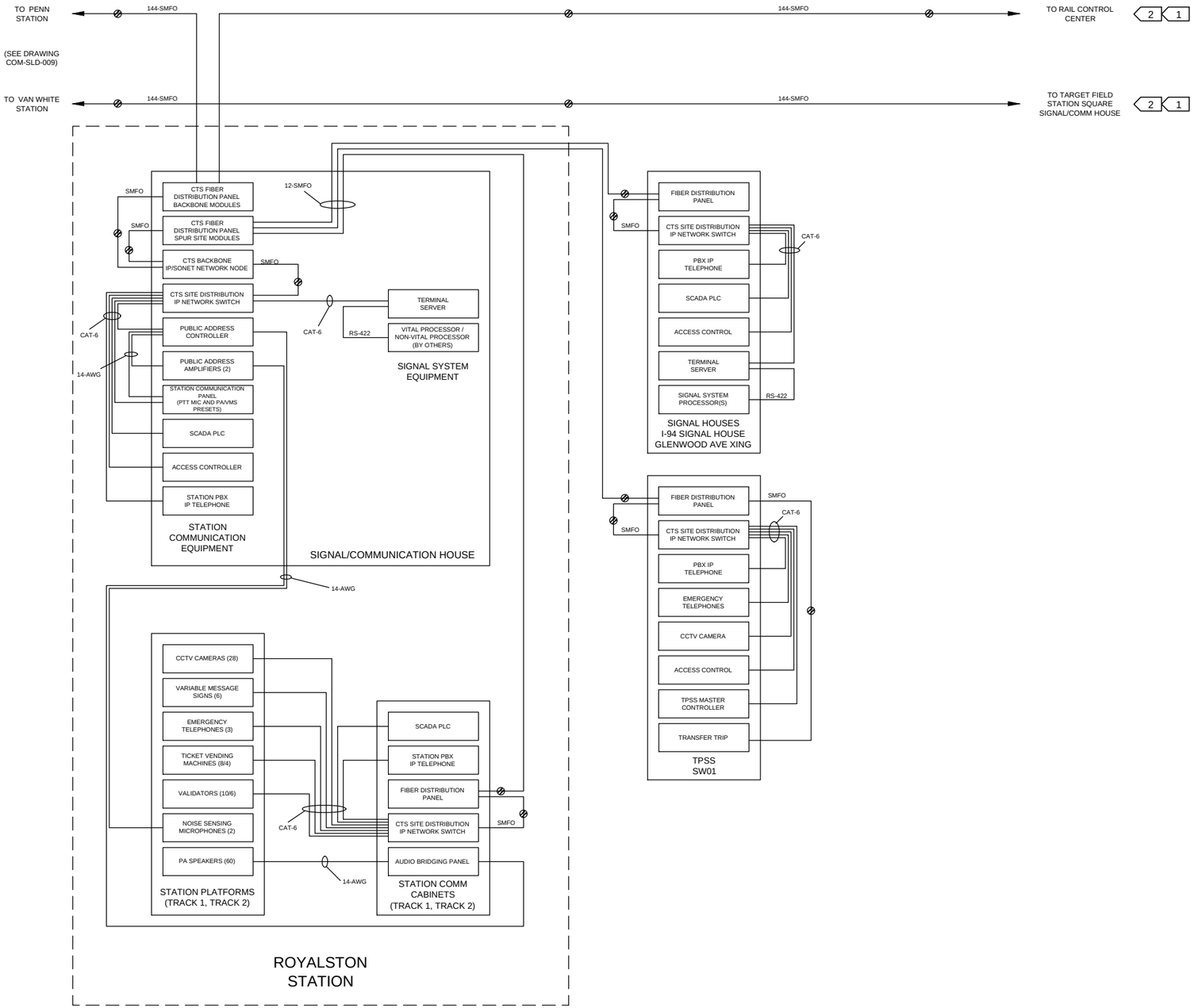

GENERAL NOTES:

1. TPSS, SIGNAL HOUSE, AND PARKING FACILITY LOCATIONS ARE COMBINED AND SHOWN AS TYPICAL SITES IN CERTAIN INSTANCES ON THIS SHEET; FOR A BREAK OUT OF EACH INDIVIDUAL SITE, PLEASE SEE THE NETWORK AND CABLE PLAN DRAWINGS (COM-NCP-0XX).
2. QUANTITIES SHOWN IN PARENTHESES (); WHERE NO NUMBER IS PROVIDED, THE QUANTITY OF THOSE ITEMS IS ONE.
3. WHERE TWO QUANTITIES ARE SHOWN (EXAMPLE: (6/4)), THE FIRST NUMBER IS THE TOTAL QUANTITY AND THE SECOND NUMBER IS THE INITIAL QUANTITY. THE REMAINING ITEMS ARE FUTURE ITEMS.
4. ALL STATION SIGNAL/COMMUNICATION HOUSES AND COMMUNICATION CABINETS SHALL BE EQUIPPED WITH A DEDICATED COMMUNICATIONS UPS THAT PROVIDES 4 HOURS OF BATTERY BACKUP TIME TO ALL COMMUNICATIONS ELEMENT.
5. COMMUNICATIONS EQUIPMENT AT TPSS, SIGNAL HOUSES, AND MCC HOUSES SHALL BE POWERED USING ON-SITE BATTERY BACKUP SYSTEM.

KEYNOTES:

1. PHYSICAL FIBER OPTIC NETWORK CONNECTIONS FROM RCC TO ROYALSTON STATION TO CONNECT THROUGH STATION SQUARE SIGNAL-COMM HOUSE.
2. SITES ARE EXISTING; COORDINATE WITH OWNER TO INTEGRATE NEW NETWORK ELEMENTS AND LINKS TO EXISTING NETWORK.

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EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
SINGLE LINE DIAGRAM
6 OF 6

DISCIPLINE: SYSTEMS

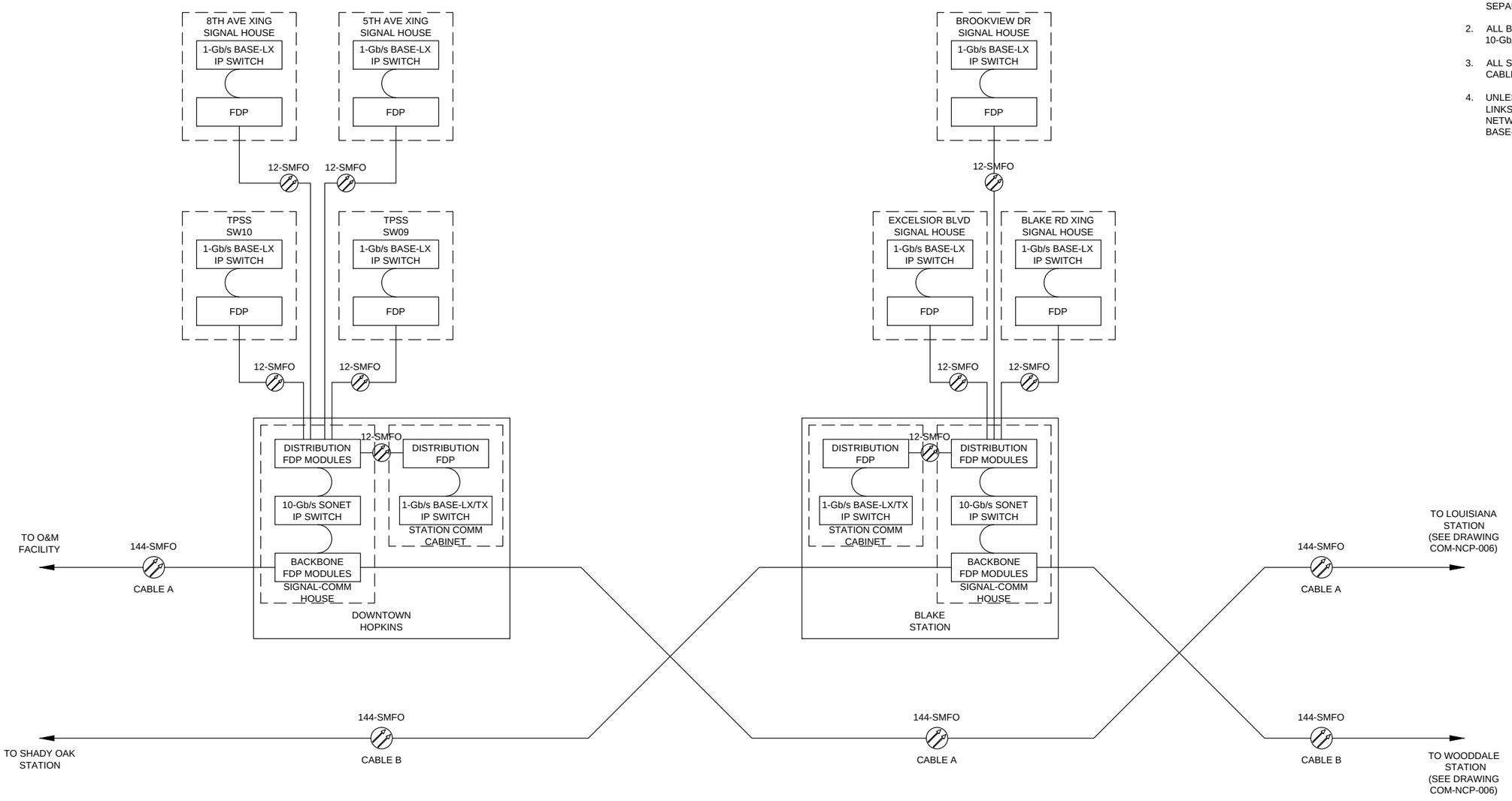
SHEET NAME: E0-SYS-COM-SLD-010

SHEET 201 OF 240

Aug, 27 2014 08:00 am V:\3300_pec-e\CAD\OVERALL\plan sheets\ELEC\E0-SYS-COM-SLD-010.dwg By: Fergtk

GENERAL NOTES:

1. 144-SMFO BACKBONE CABLE SHALL BE ROUTED DIVERSELY IN ALL INSTANCES; ROUTE 'A' AND 'B' CABLES IN SEPARATE DUCTS OF S/C DUCTBANK, AND PROVIDE ENTRANCES/EXITS OF 'A' AND 'B' CABLES INTO HOUSES AND ENCLOSURES VIA SEPARATE CONDUITS.
2. ALL BACKBONE NETWORK LINKS SHALL BE 10-Gb/s.
3. ALL SPUR NETWORK LINKS OVER 12-SMFO CABLE SHALL BE 1-Gb/s.
4. UNLESS OTHERWISE NOTED, COPPER NETWORK LINKS FROM SITE ACCESS SWITCHES TO NETWORK DEVICES SHALL BE 1000/100/10 BASE-T LINKS.



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EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS NETWORK AND CABLE PLAN 1 OF 6

DISCIPLINE: SYSTEMS

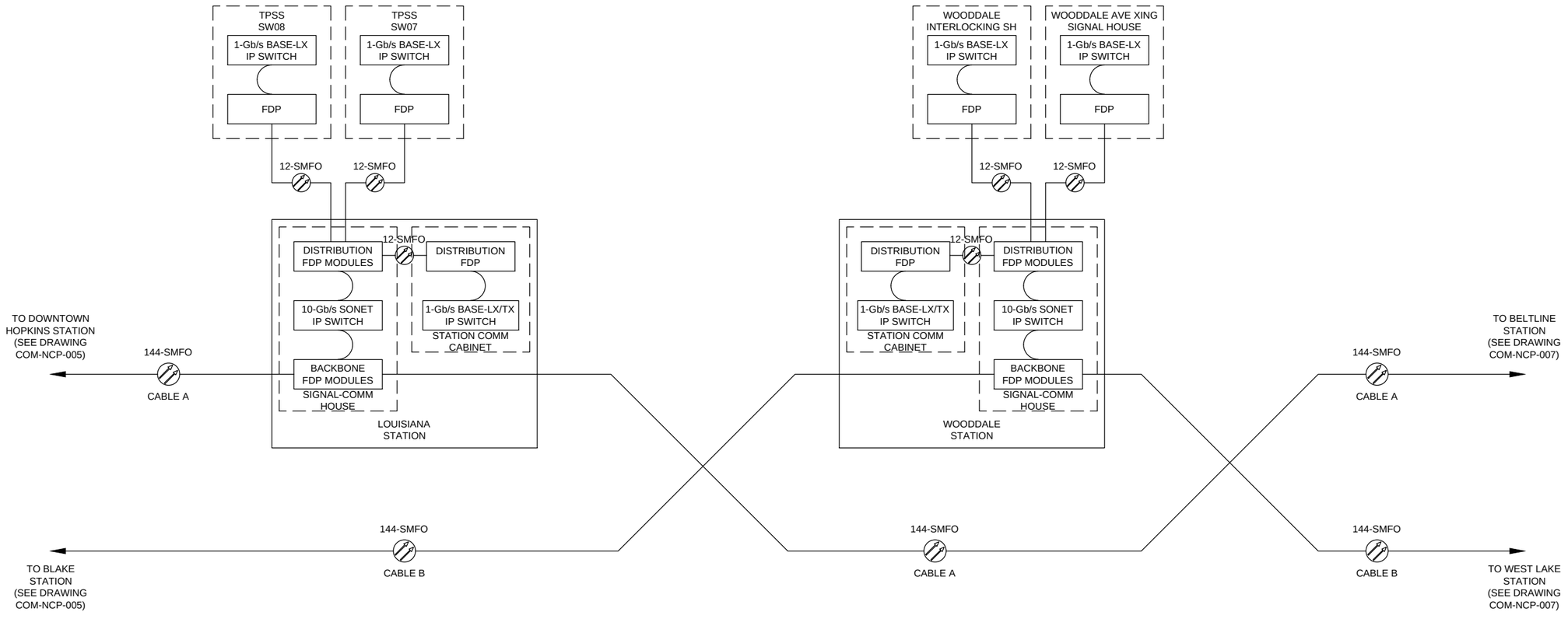
SHEET NAME: E0-SYS-COM-NCP-005

SHEET 202 OF 240

Aug. 27 2014 08:01 am V:\3300_pec-e\CAD\OVERALL\plan sheets\ELEC\E0-SYS-COM-NCP-005.dwg By: Fergtk

GENERAL NOTES:

1. 144-SMFO BACKBONE CABLE SHALL BE ROUTED DIVERSELY IN ALL INSTANCES; ROUTE 'A' AND 'B' CABLES IN SEPARATE DUCTS OF S/C DUCTBANK, AND PROVIDE ENTRANCES/EXITS OF 'A' AND 'B' CABLES INTO HOUSES AND ENCLOSURES VIA SEPARATE CONDUITS.
2. ALL BACKBONE NETWORK LINKS SHALL BE 10-Gb/s.
3. ALL SPUR NETWORK LINKS OVER 12-SMFO CABLE SHALL BE 1-Gb/s.
4. UNLESS OTHERWISE NOTED, COPPER NETWORK LINKS FROM SITE ACCESS SWITCHES TO NETWORK DEVICES SHALL BE 1000/100/10 BASE-T LINKS.



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EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS NETWORK AND CABLE PLAN 2 OF 6

DISCIPLINE: SYSTEMS

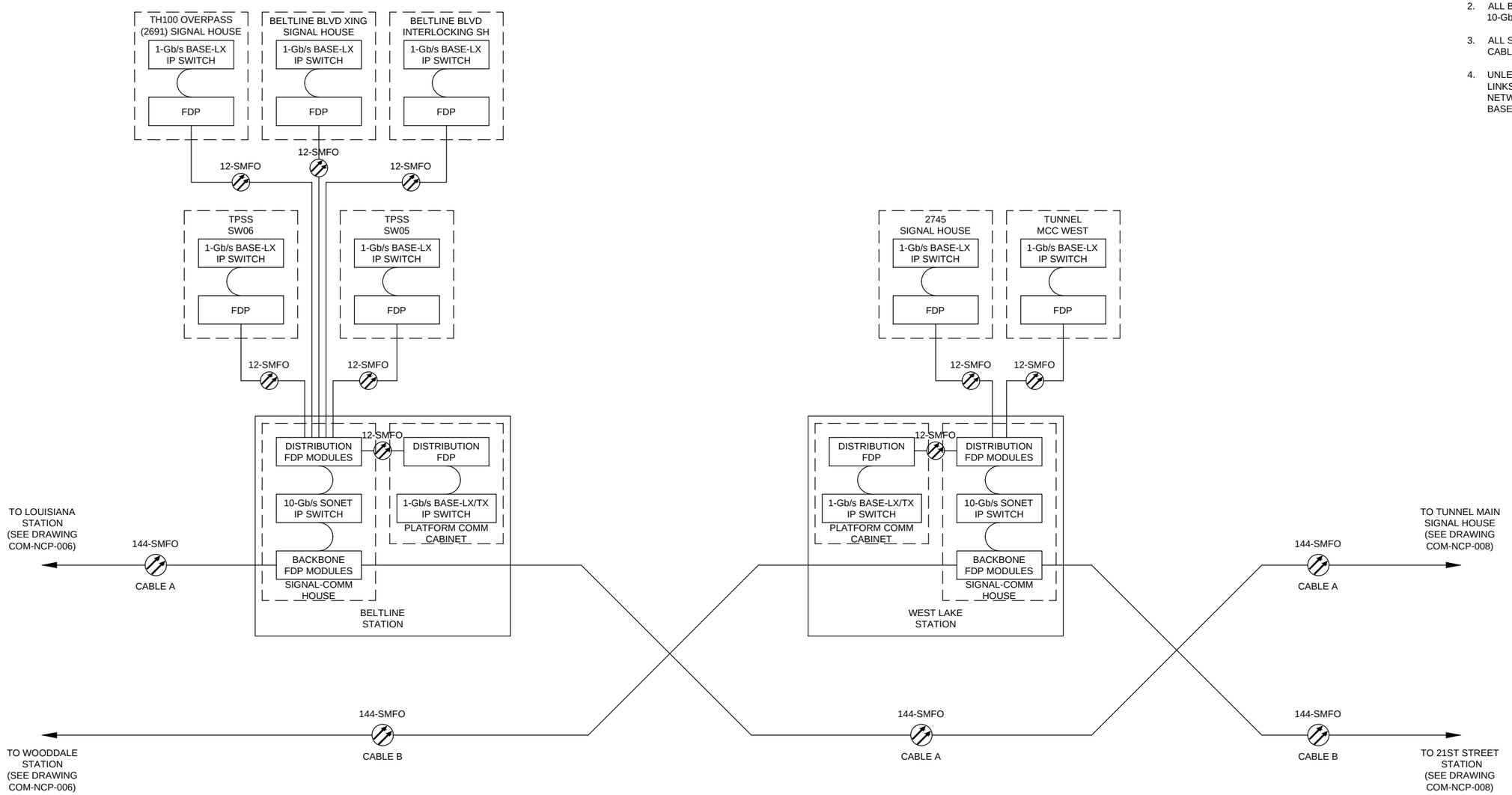
SHEET NAME: E0-SYS-COM-NCP-006

SHEET 203 OF 240

Aug. 27 2014 08:01 am V:\3300_pec-e\CAD\OVERALL\plan sheets\ELEC\E0-SYS-COM-NCP-006.dwg By: Fergtk

GENERAL NOTES:

1. 144-SMFO BACKBONE CABLE SHALL BE ROUTED DIVERSELY IN ALL INSTANCES; ROUTE 'A' AND 'B' CABLES IN SEPARATE DUCTS OF S/C DUCTBANK, AND PROVIDE ENTRANCES/EXITS OF 'A' AND 'B' CABLES INTO HOUSES AND ENCLOSURES VIA SEPARATE CONDUITS.
2. ALL BACKBONE NETWORK LINKS SHALL BE 10-Gb/s.
3. ALL SPUR NETWORK LINKS OVER 12-SMFO CABLE SHALL BE 1-Gb/s.
4. UNLESS OTHERWISE NOTED, COPPER NETWORK LINKS FROM SITE ACCESS SWITCHES TO NETWORK DEVICES SHALL BE 1000/100/10 BASE-T LINKS.



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EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS NETWORK AND CABLE PLAN 3 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-NCP-007

SHEET 204 OF 240

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GENERAL NOTES:

1. 144-SMFO BACKBONE CABLE SHALL BE ROUTED DIVERSELY IN ALL INSTANCES; ROUTE 'A' AND 'B' CABLES IN SEPARATE DUCTS OF S/C DUCTBANK, AND PROVIDE ENTRANCES/EXITS OF 'A' AND 'B' CABLES INTO HOUSES AND ENCLOSURES VIA SEPARATE CONDUITS.
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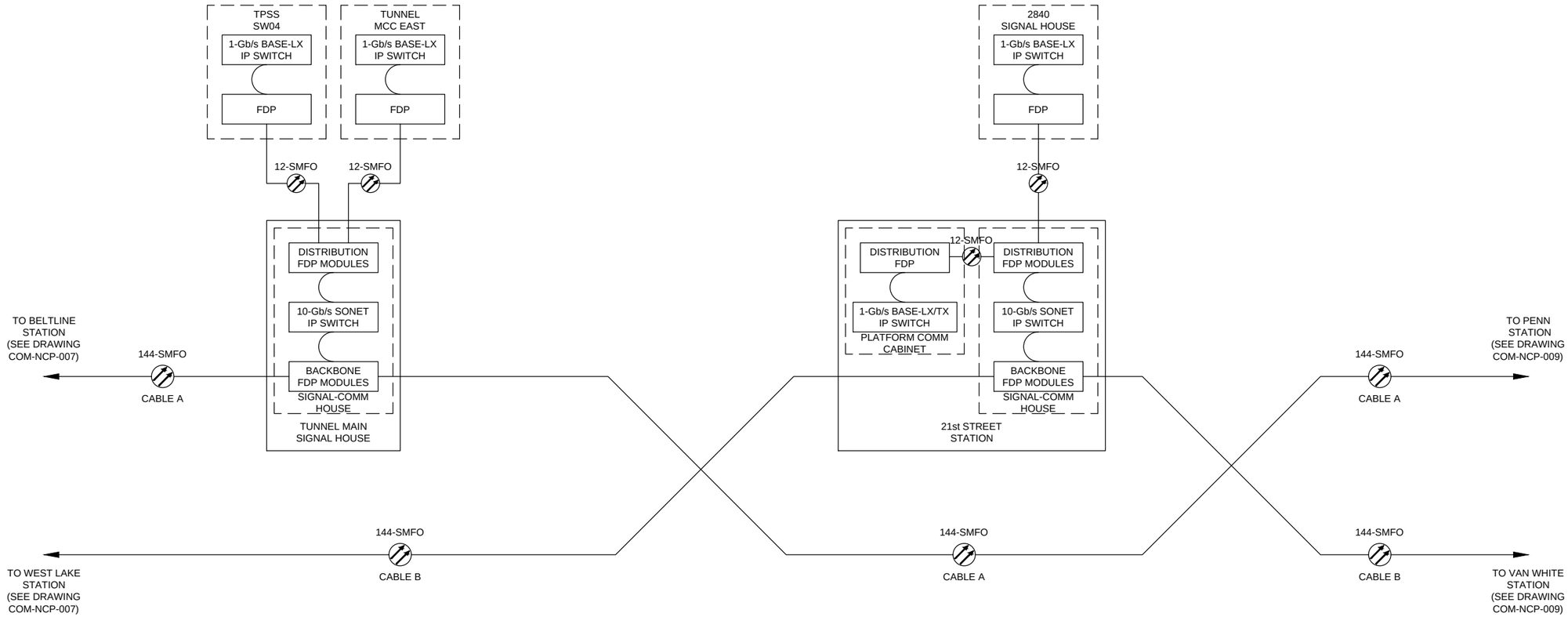
4. UNLESS OTHERWISE NOTED, COPPER NETWORK LINKS FROM SITE ACCESS SWITCHES TO NETWORK DEVICES SHALL BE 1000/100/10 BASE-T LINKS.



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EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS NETWORK AND CABLE PLAN 4 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-NCP-008

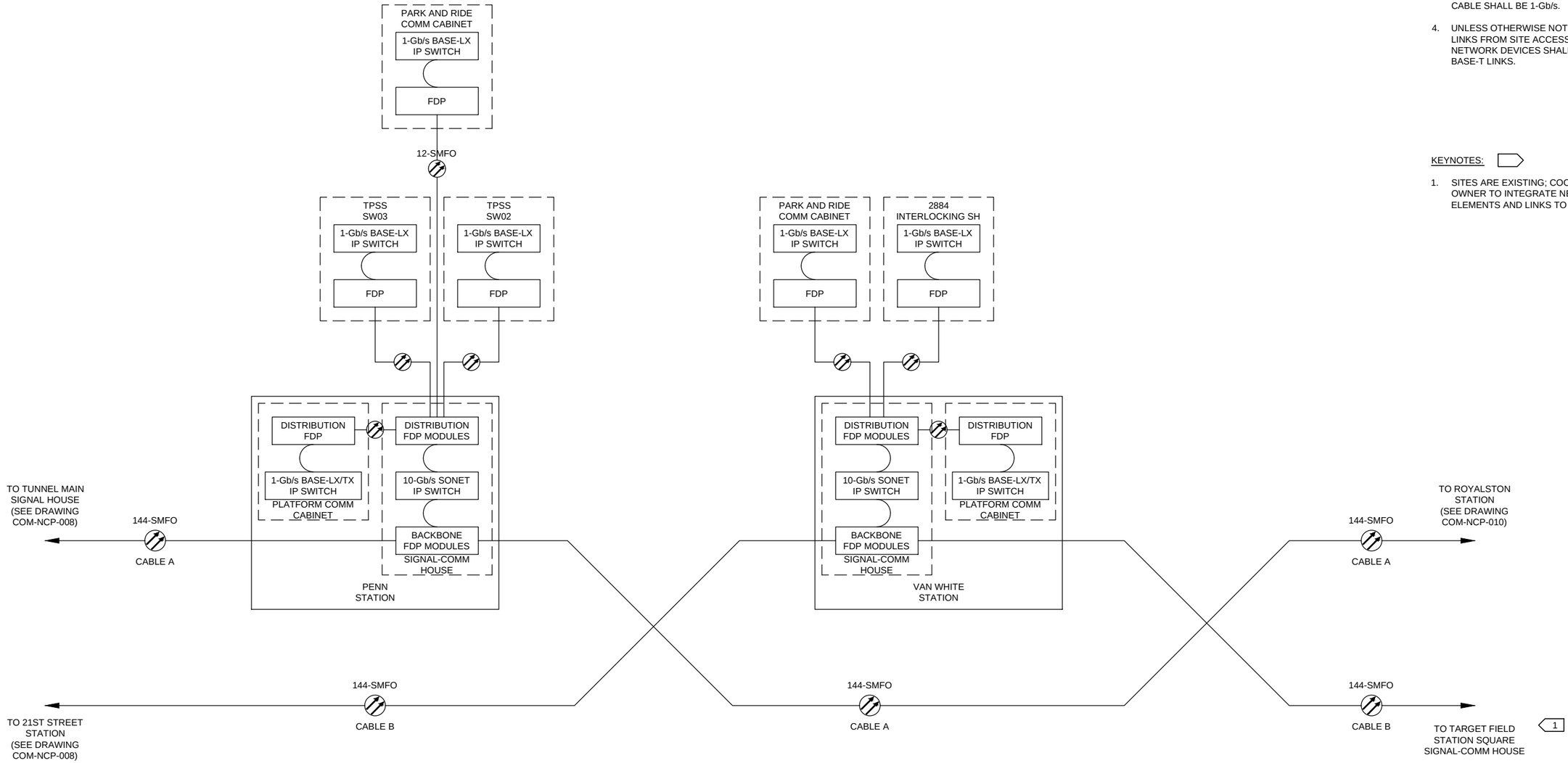
SHEET 205 OF 240

GENERAL NOTES:

1. 144-SMFO BACKBONE CABLE SHALL BE ROUTED DIVERSELY IN ALL INSTANCES; ROUTE 'A' AND 'B' CABLES IN SEPARATE DUCTS OF S/C DUCTBANK, AND PROVIDE ENTRANCES/EXITS OF 'A' AND 'B' CABLES INTO HOUSES AND ENCLOSURES VIA SEPARATE CONDUITS.
2. ALL BACKBONE NETWORK LINKS SHALL BE 10-Gb/s.
3. ALL SPUR NETWORK LINKS OVER 12-SMFO CABLE SHALL BE 1-Gb/s.
4. UNLESS OTHERWISE NOTED, COPPER NETWORK LINKS FROM SITE ACCESS SWITCHES TO NETWORK DEVICES SHALL BE 1000/100/10 BASE-T LINKS.

KEYNOTES:

1. SITES ARE EXISTING; COORDINATE WITH OWNER TO INTEGRATE NEW NETWORK ELEMENTS AND LINKS TO EXISTING NETWORK.



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METROPOLITAN COUNCIL

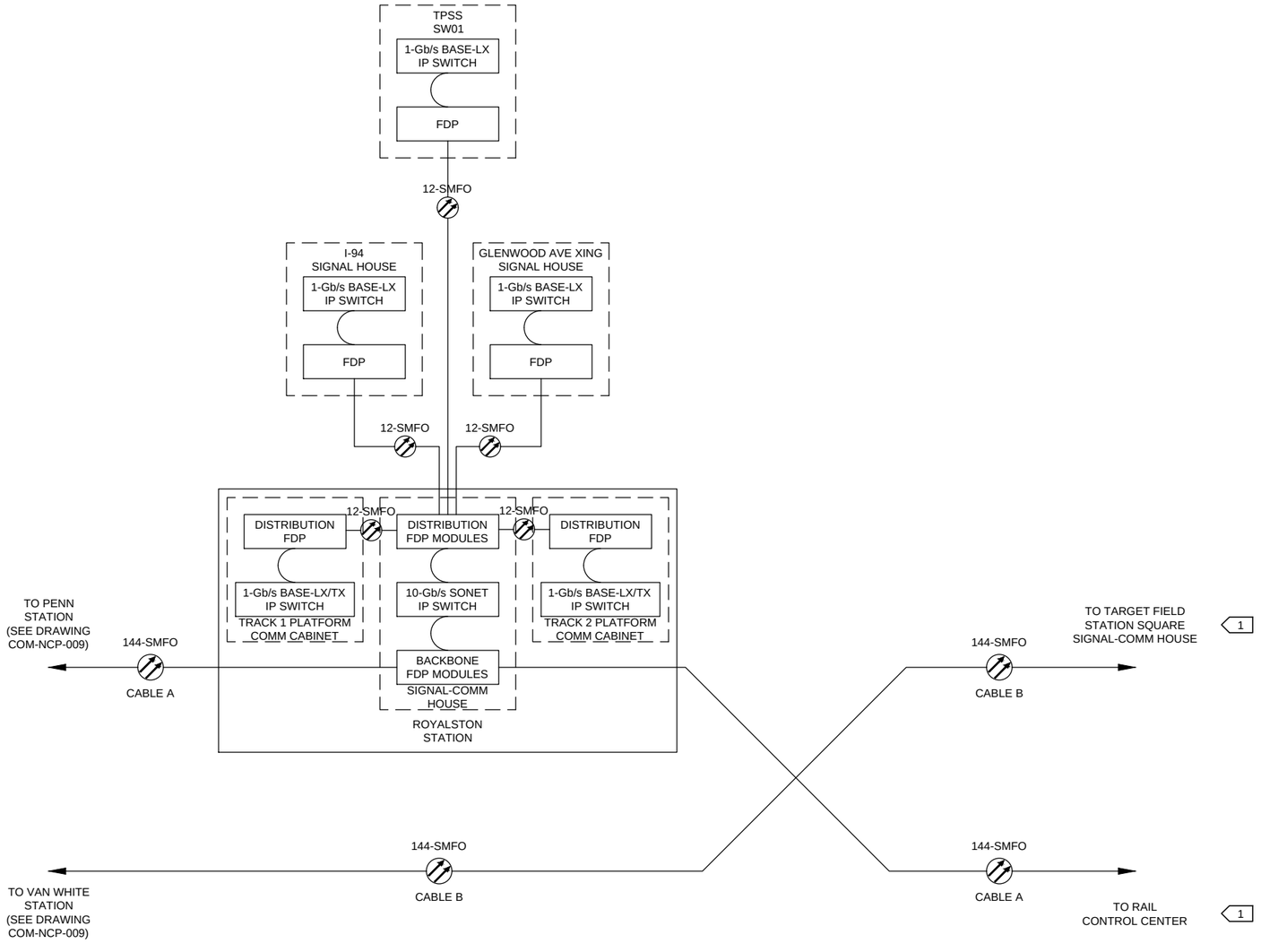
SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS NETWORK AND CABLE PLAN 5 OF 6

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-NCP-009

SHEET 206 OF 240



GENERAL NOTES:

1. 144-SMFO BACKBONE CABLE SHALL BE ROUTED DIVERSELY IN ALL INSTANCES; ROUTE 'A' AND 'B' CABLES IN SEPARATE DUCTS OF S/C DUCTBANK, AND PROVIDE ENTRANCES/EXITS OF 'A' AND 'B' CABLES INTO HOUSES AND ENCLOSURES VIA SEPARATE CONDUITS.
2. ALL BACKBONE NETWORK LINKS SHALL BE 10-Gb/s.
3. ALL SPUR NETWORK LINKS OVER 12-SMFO CABLE SHALL BE 1-Gb/s.
4. UNLESS OTHERWISE NOTED, COPPER NETWORK LINKS FROM SITE ACCESS SWITCHES TO NETWORK DEVICES SHALL BE 1000/100/10 BASE-T LINKS.

KEYNOTES:

1. SITES ARE EXISTING; COORDINATE WITH OWNER TO INTEGRATE NEW NETWORK ELEMENTS AND LINKS TO EXISTING NETWORK.

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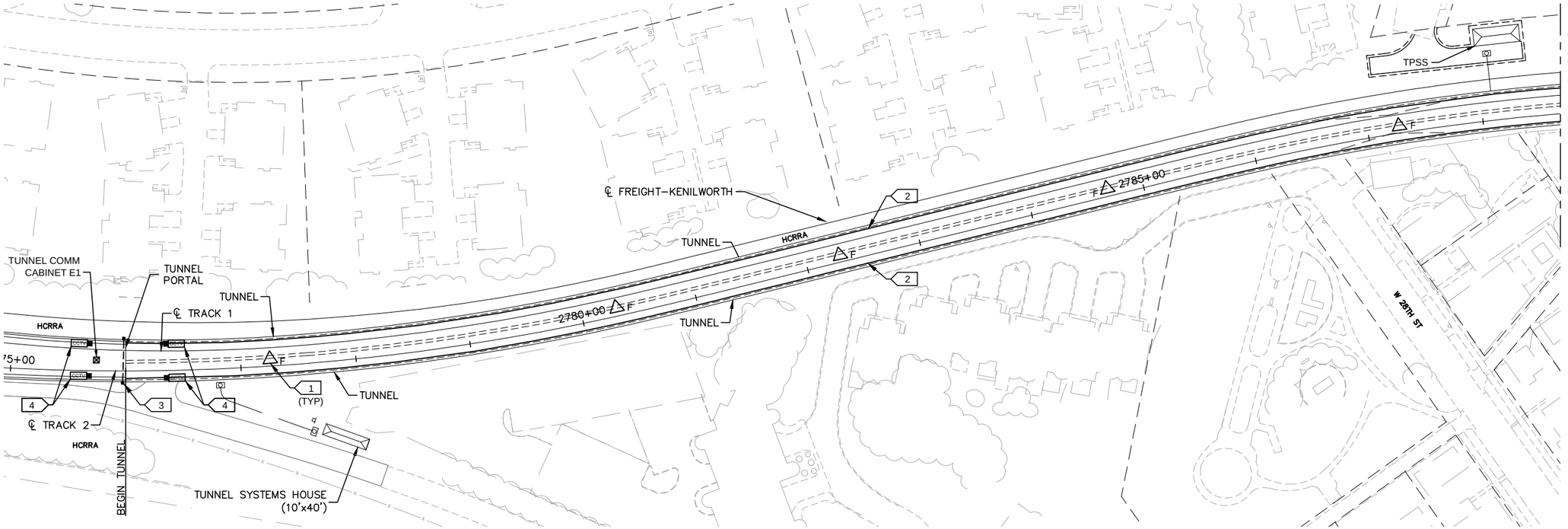
SOUTHWEST
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS NETWORK AND CABLE PLAN 6 OF 6

DISCIPLINE: SYSTEMS

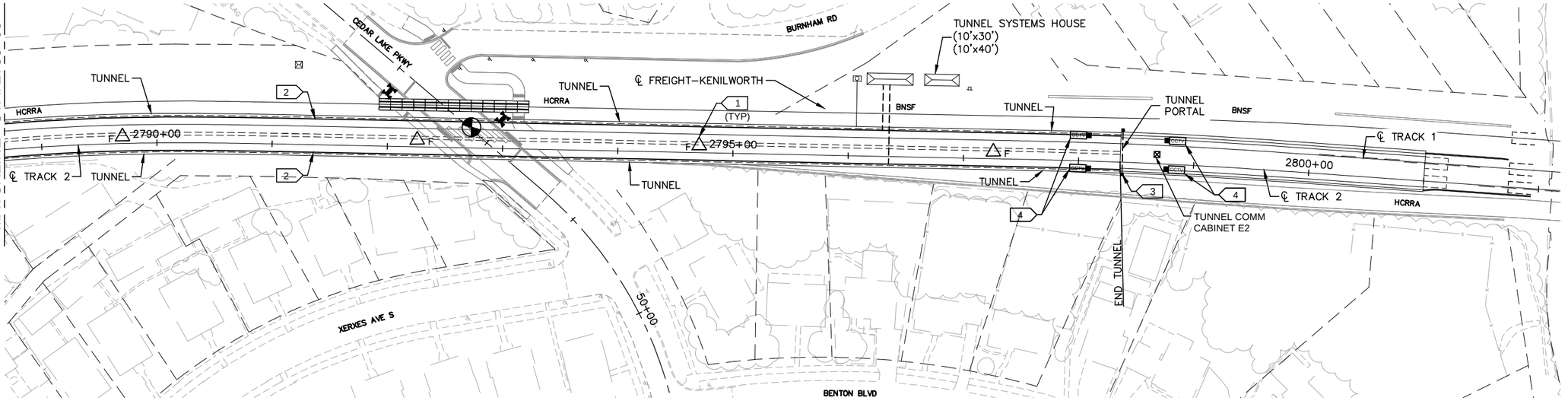
SHEET NAME: E0-SYS-COM-NCP-010

SHEET 207 OF 240



1 TUNNEL SITE PLAN (W PORTAL TO STA. 2788+65)

SCALE: 1"=50'



2 TUNNEL SITE PLAN (STA. 2788+65 TO E PORTAL)

SCALE: 1"=50'

GENERAL NOTES:

1. REFER TO TUNNEL BLOCK DIAGRAMS FOR SYSTEMS COMPONENTS AND SCHEMATICS.
2. SURGE PROTECTION SHALL BE PROVIDED FOR ALL CABLING ENTERING CABINETS, S-C HOUSES, TPSS, OR OTHER ENCLOSURES FROM OUTSIDE.
3. ALL CONDUIT IN TUNNELS SHALL BE SURFACE MOUNTED.

KEYNOTES:

1. INSTALL FIREMAN'S PHONE AT EACH 4" STAND PIPE DROP; COORDINATE WITH FIRE LIFE SAFETY DESIGN SHEETS.
2. MOUNT RADIATING COAXIAL CABLE TO TUNNEL CEILING CENTERED ABOVE WALKWAY.
3. INTRUSION DETECTION BEAM WALL.
4. PORTAL CCTV CAMERAS; MOUNT TO PROVIDE FULL VIEW OF TUNNEL PORTAL.

0 25 50 100
SCALE

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS TUNNEL SYSTEMS SITE PLAN

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-TUNL-SITE - 001

SHEET 208 OF 240

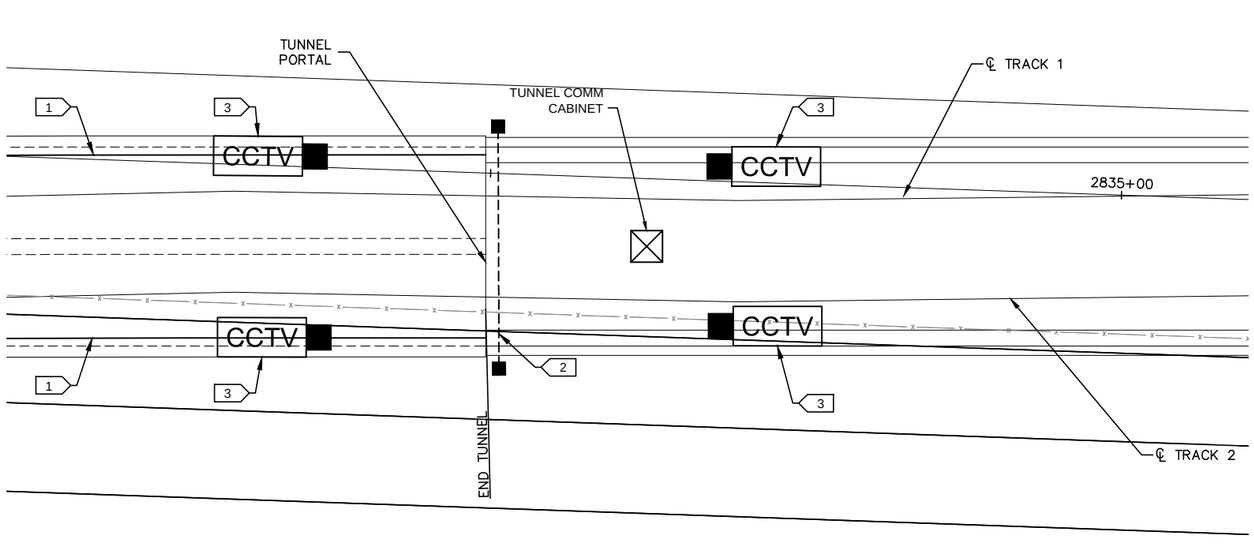
Aug. 27 2014 08:03 am V:\3300_pec-e\CAD\OVERALL\plan sheets\ELEC\E0-SYS-COM-TUNL-SITE.dwg By: Fergtk

GENERAL NOTES:

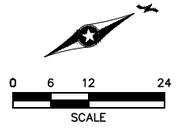
1. REFER TO TUNNEL BLOCK DIAGRAMS FOR SYSTEMS COMPONENTS AND SCHEMATICS.
2. SURGE PROTECTION SHALL BE PROVIDED FOR ALL CABLING ENTERING CABINETS, S-C HOUSES, TPSS, OR OTHER ENCLOSURES FROM OUTSIDE.
3. ALL CONDUIT IN TUNNELS SHALL BE SURFACE MOUNTED.

KEYNOTES:

1. MOUNT RADIATING COAXIAL CABLE TO TUNNEL CEILING CENTERED ABOVE WALKWAY.
2. INTRUSION DETECTION BEAM WALL.
3. PORTAL CCTV CAMERAS; MOUNT TO PROVIDE FULL VIEW OF TUNNEL PORTAL.



1 TUNNEL INTRUSION DETECTION PLAN (TYP.)
SCALE: 1"=1'



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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
TUNNEL SYSTEMS
INTRUSION DETECTION PLAN

DISCIPLINE: SYSTEMS
SHEET NAME: E0-SYS-COM-TUNL-SITE - 002

SHEET 209 OF 240

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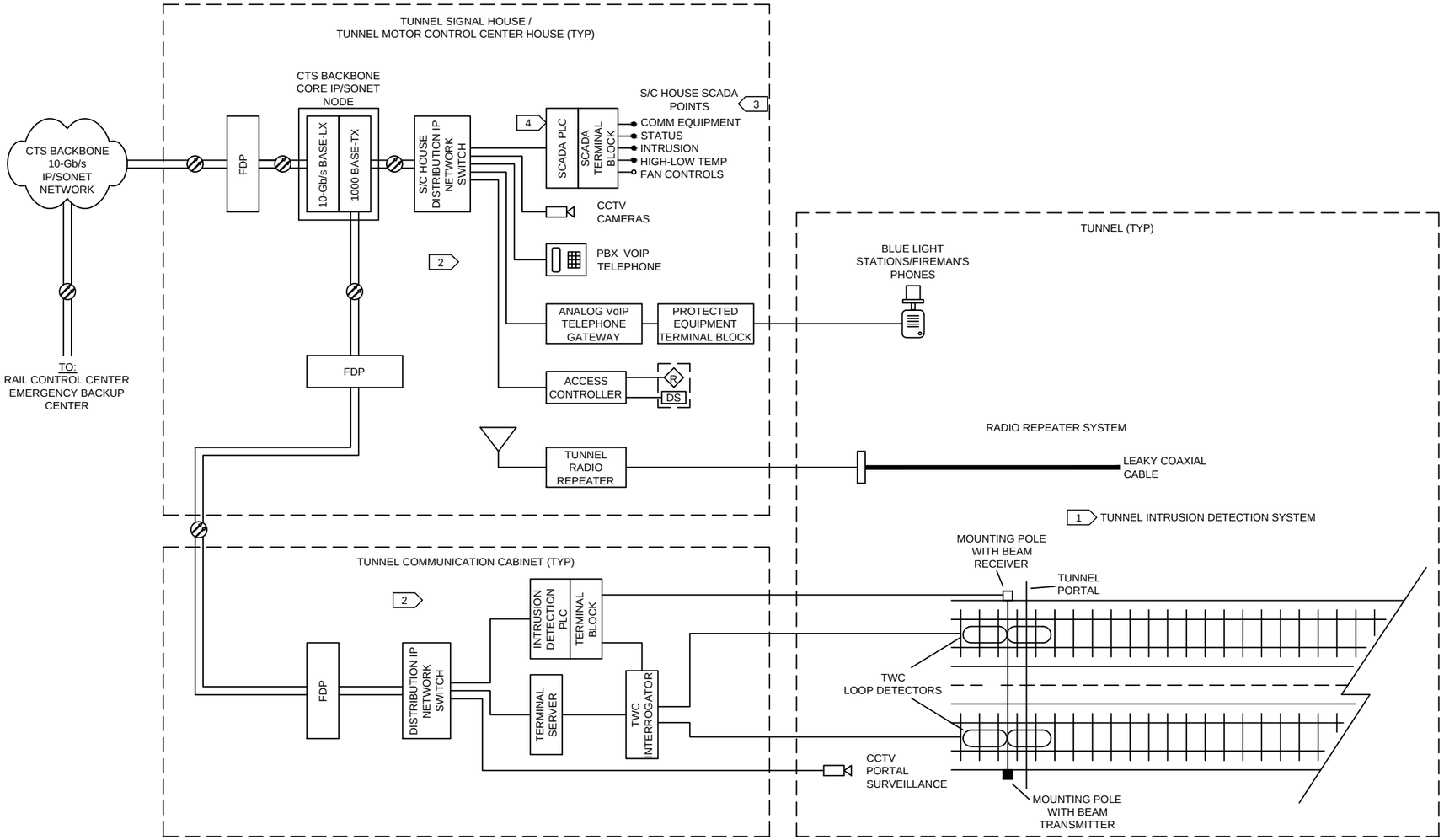

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON STATION PLATFORM AND CANOPY PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE TUNNEL COMMUNICATION SYSTEMS WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION.

KEYNOTES:

1. A HORN AND STROBE SHALL BE INSTALLED AT TUNNEL PORTALS FOR INTRUSION DETECTION. STROBE SHALL BE MOUNTED IN LOCATION VISIBLE TO TRAIN OPERATOR; HORN SHALL BE MOUNTED IN LOCATION AUDIBLE TO INTRUDERS.
2. UPS/BATTERY BACKUP SHALL BE PROVIDED FOR EACH LOCATION NOTED; BATTERY RUNTIME SHALL BE 8 HOURS MINIMUM.
3. TYPICAL TUNNEL MCC HOUSE WILL CONTAIN 50-75 DISCREET (10-15 CONTROLS, THE REST INDICATIONS) AND 5-10 ANALOG SCADA I/O POINTS.
4. SCADA SYSTEM SHALL INTERFACE WITH FIRE MANAGEMENT INFORMATION SYSTEM.

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Green Line LRT Extension

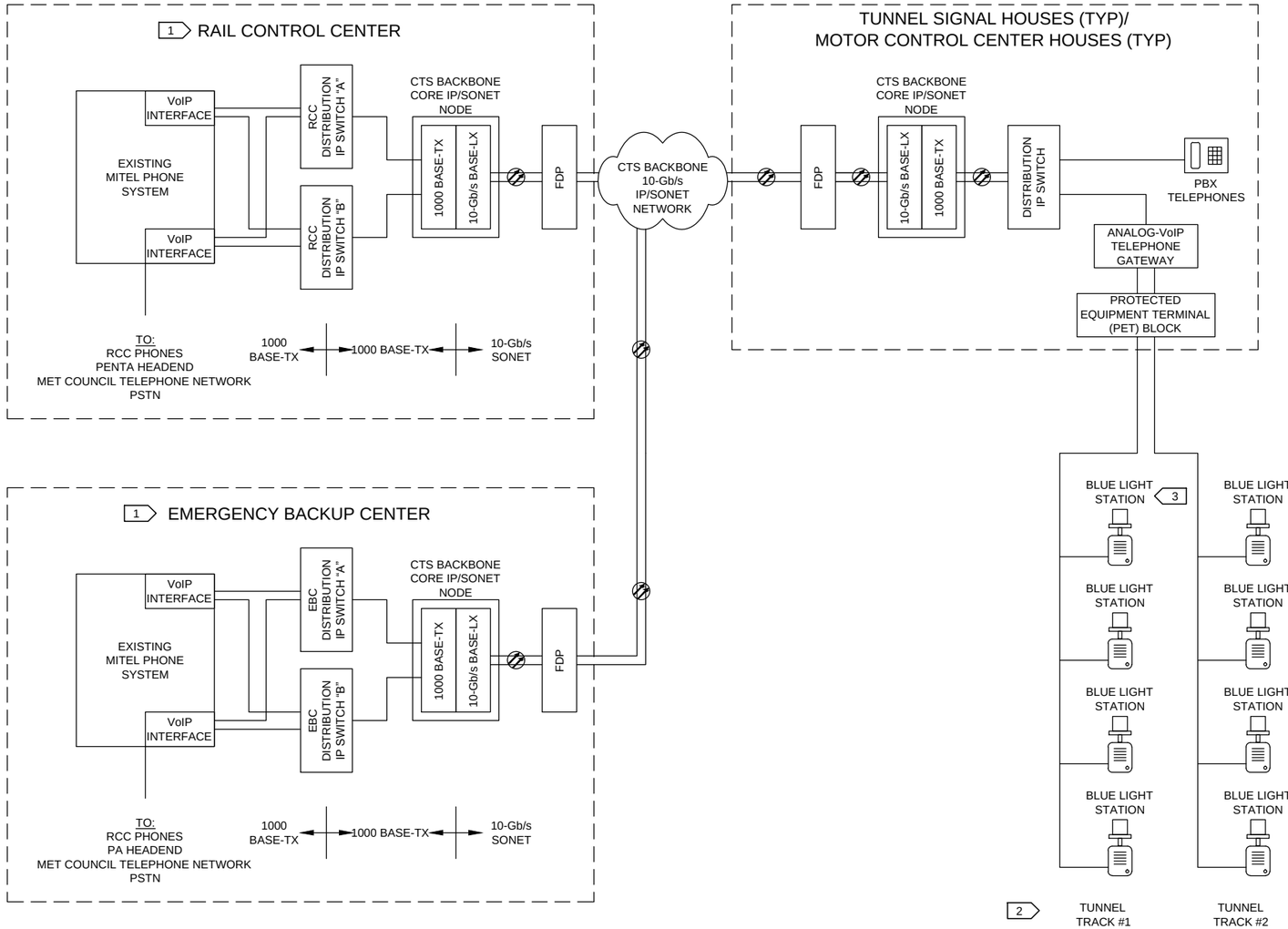
EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
TUNNEL SYSTEMS DIAGRAM
COMMUNICATIONS SYSTEMS OVERVIEW

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-TUN-005

SHEET 210 OF 240

Aug. 27 2014 08:03 am V:\3300_pec-e\CAD\OVERALL\plan sheets\ELEC\E0-SYS-COM-TUN-005.dwg By: Fergtk



TUNNEL FIREMAN'S PHONES

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON TUNNEL COMMUNICATIONS SITE PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE TELEPHONE SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE INDIVIDUAL STATION DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION AND CONFIGURATION INFORMATION.
4. CONTRACTOR SHALL PROVIDE ANY ADDITIONAL COMPONENTS NECESSARY TO MEET NFPA-130 REQUIREMENTS REGARDING FIREMAN PHONES/BLUE LIGHT STATIONS.

KEYNOTES:

1. ALL ITEMS AT RCC AND EBC ARE EXISTING. CONTRACTOR SHALL PROVIDE LICENSES FOR ALL NEW PHONES, AND WORK WITH MET COUNCIL TO THE EXTENT NECESSARY TO PROVISION ALL NEW SWLRT STATION TELEPHONES ON EXISTING MITEL PHONE SYSTEM.
2. THIS DRAWING SHOWS A SAMPLING OF THE ITEMS THAT SHALL BE PROVIDED FOR SCHEMATIC PURPOSES; FOR ACTUAL QUANTITIES, SEE TUNNEL PLAN VIEW SHEET.
3. BLUE LIGHT STATIONS CONSIST OF A FIREMAN'S TELEPHONE AND A BLUE LIGHT BEACON. PHONES SHALL BE ANALOG; ALL PHONES SHALL BE BRIDGED TOGETHER WITH A PHONE AT THE FIRE ALARM CONTROL PANEL.

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EAST - VOLUME 3 (SYSTEMS)
COMMUNICATIONS SYSTEMS
TUNNEL SYSTEMS DIAGRAM
TELEPHONE BLOCK DIAGRAM

DISCIPLINE: SYSTEMS

SHEET NAME: E0-SYS-COM-TUN-006

SHEET 211 OF 240

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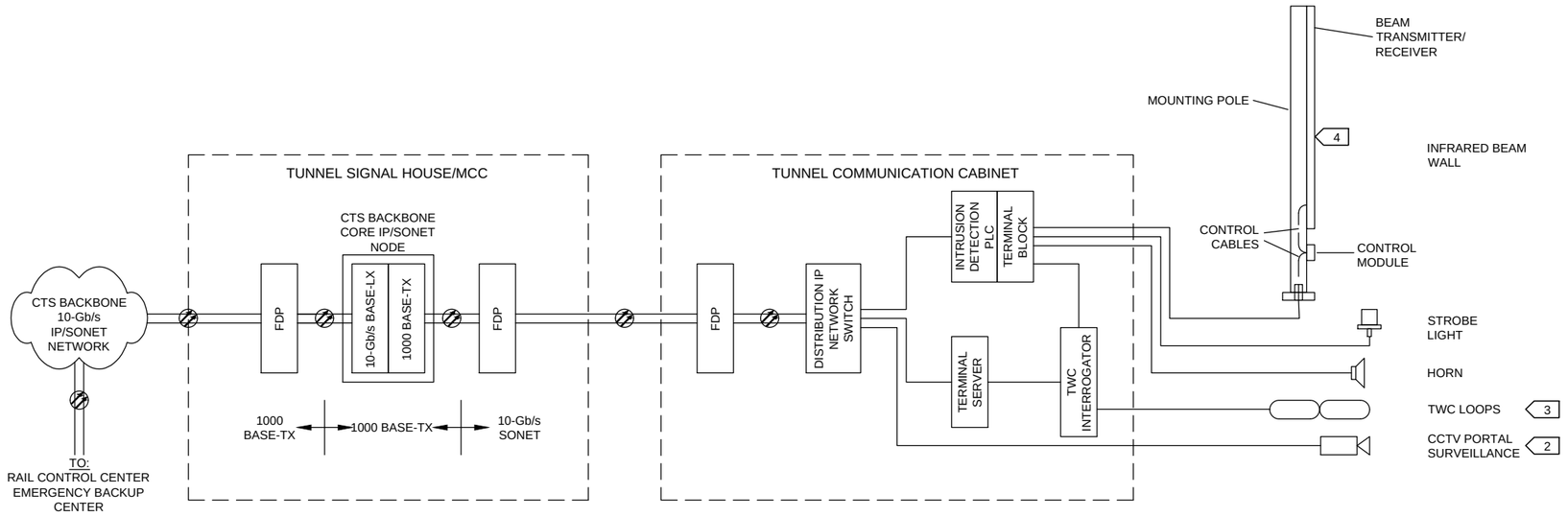

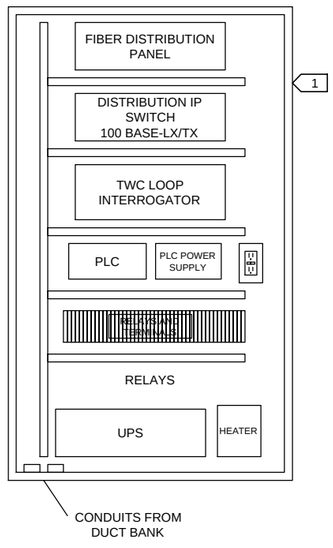

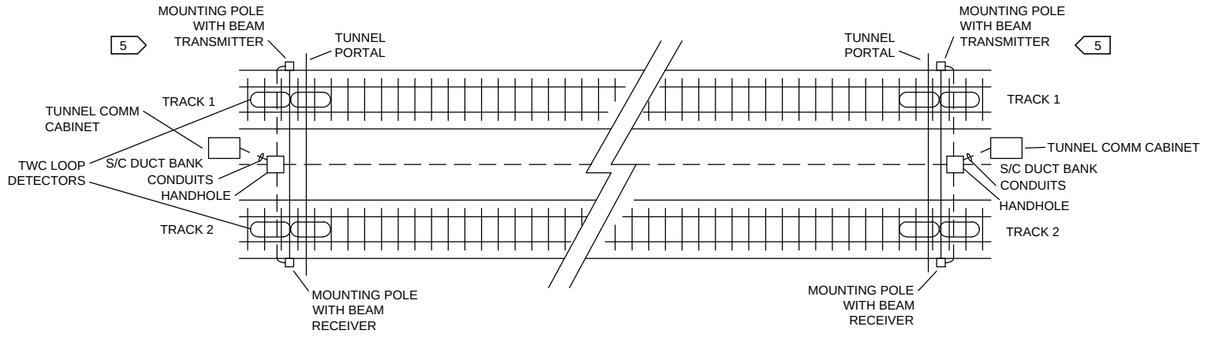

GENERAL NOTES:

1. DRAWING IS MEANT AS A GUIDELINE FOR CONTRACTOR'S DESIGN, WHICH SHALL BE SUBMITTED THROUGH SHOP DRAWING REVIEW PROCESS; SYSTEM AND COMPONENTS SHALL NOT BE CONSTRUCTED DIRECTLY FROM THIS DRAWING.
2. DRAWING NOT TO SCALE; EXACT QUANTITIES AND LOCATIONS OF DEVICES SHOWN ON TUNNEL COMMUNICATIONS SITE PLAN DRAWINGS.
3. THIS DIAGRAM PROVIDES A GENERAL OVERVIEW OF THE TUNNEL INTRUSION DETECTION SYSTEM WITH FIELD SITES SHOWN IN TYPICAL CONFIGURATION; REFERENCE TUNNEL SITE PLAN DRAWINGS AND DETAIL SHEETS FOR MORE DETAILED INSTALLATION INFORMATION.
4. SURGE PROTECTION SHALL BE PROVIDED FOR ALL CABLING ENTERING CABINETS, S-C HOUSES, TPSS, OR OTHER ENCLOSURES FROM OUTSIDE.

KEY NOTES:

1. TYPICAL CABINET ELEVATION FOR INTRUSION DETECTION SYSTEM.
2. CAMERAS SHALL BE INSTALLED IN LOCATIONS AS SHOWN ON TUNNEL SITE PLAN, AND SHALL PROVIDE VIEW OF TRACKWAY AND PORTALS AT BEAM WALL LOCATIONS.
3. TWC LOOPS SHALL BE PROGRAMMED TO SUPPRESS INTRUSION ALARMS WHEN TRAIN LRV BREAKS BEAM WALL; LOOPS SHALL BE CENTERED ON BEAM WALL.
4. TYPICAL INSTALLATION OF BEAM WALL TRANSMITTER RECEIVER; CONFIGURE BEAM WALL PER MANUFACTURER SPECIFICATIONS AT LOCATIONS SHOWN ON TUNNEL SITE PLAN DRAWING.
5. INFRARED BEAM TX AND RX TOWERS SHALL BE MOUNTED SUCH THAT 2'-6" WALKWAY IS NOT OBSTRUCTED.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS) COMMUNICATIONS SYSTEMS TUNNEL SYSTEMS DIAGRAM PORTAL INTRUSION DETECTION

DISCIPLINE: SYSTEMS
SHEET NAME: E0-SYS-COM-TUN-007

SHEET 212 OF 240

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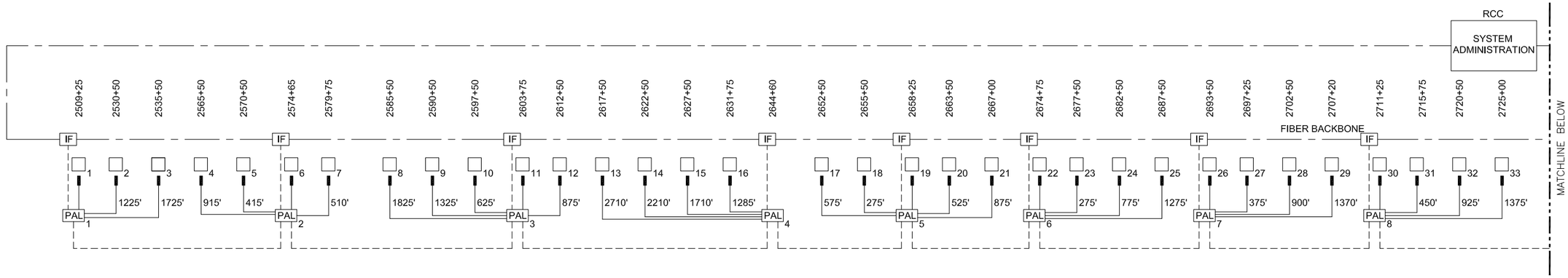

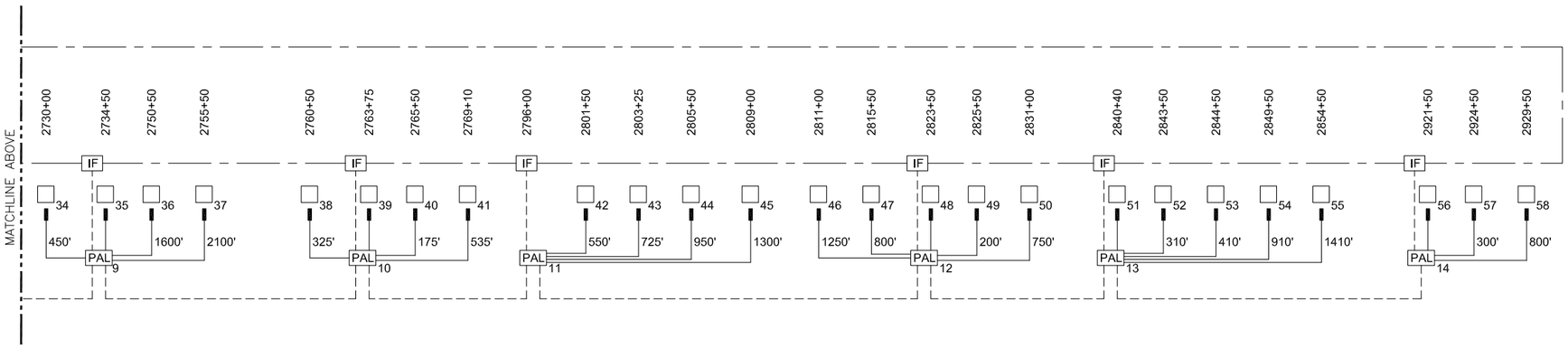

MANHOLE/HANDHOLE

PAL — SINGLE PALADIN JUNCTION BOX LOCATED IN COMMUNICATIONS HUT

IF — FIBER INTERFACE

SENSOR

SENSOR COPPER CABLING (ITW SHOWN)

DIRECT IN-GROUND 6-STRAND SINGLE-MODE FIBER

FIBER OPTIC BACKBONE

NOTES:

1. AVERAGE DISTANCE OF 500FT BETWEEN SENSORS CONNECTED TO COMMON PALADIN.
2. AVERAGE DISTANCE OF 4200FT BETWEEN PALADINS CONNECTED BY 6-STRAND SMF.

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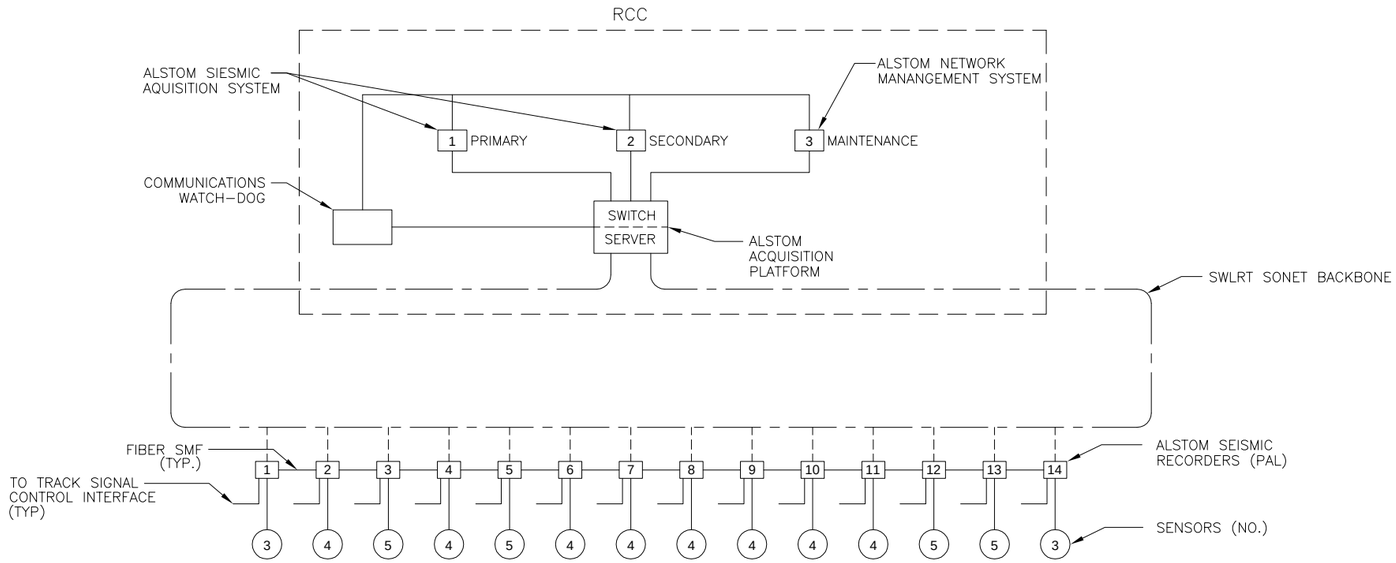
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
INTRUSION DETECTION SYSTEM
IDS SENSOR AND RECORDER LOCATIONS

DISCIPLINE: SYSTEMS
SHEET NAME: FLS-DTL-323

SHEET 213 OF 240



SENSOR ZONE	SENSOR ID (*Indicates Seismic Recorder Site)
1	1*, 2, 3
2	4, 5, 6*, 7
3	8, 9, 10, 11*, 12
4	13, 14, 15, 16
5	17, 18, 19*, 20, 21
6	22*, 23, 24, 25
7	26*, 27, 28, 29
8	30*, 31, 32, 33
9	34, 35*, 36, 37
10	38, 39*, 40, 41
11	42, 43, 44, 45
12	46, 47, 48*, 49, 50
13	51*, 52, 53, 54, 55
14	56*, 57, 58

NOTE: AVERAGE DISTANCE BETWEEN SENSORS = 500 FEET.
*NETWORK NODE INTERFACE

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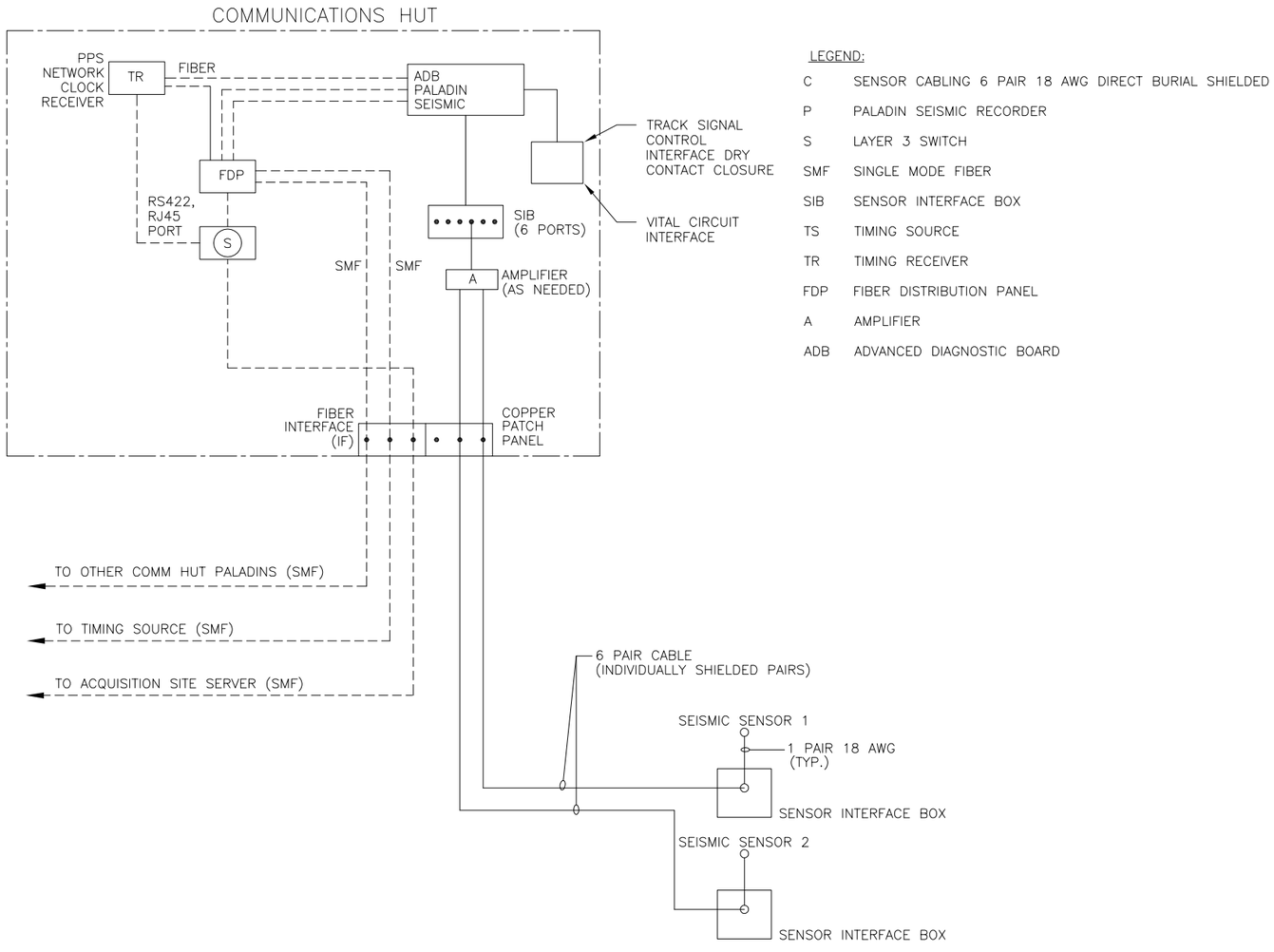
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
INTRUSION DETECTION SYSTEM
IDS SYSTEM CONFIGURATION AND IDS RCC SYSTEM EQUIPMENT

DISCIPLINE: SYSTEMS
SHEET NAME: FLS-DTL-324

SHEET 214 OF 240



LEGEND:

C	SENSOR CABLING 6 PAIR 18 AWG DIRECT BURIAL SHIELDED
P	PALADIN SEISMIC RECORDER
S	LAYER 3 SWITCH
SMF	SINGLE MODE FIBER
SIB	SENSOR INTERFACE BOX
TS	TIMING SOURCE
TR	TIMING RECEIVER
FDP	FIBER DISTRIBUTION PANEL
A	AMPLIFIER
ADB	ADVANCED DIAGNOSTIC BOARD

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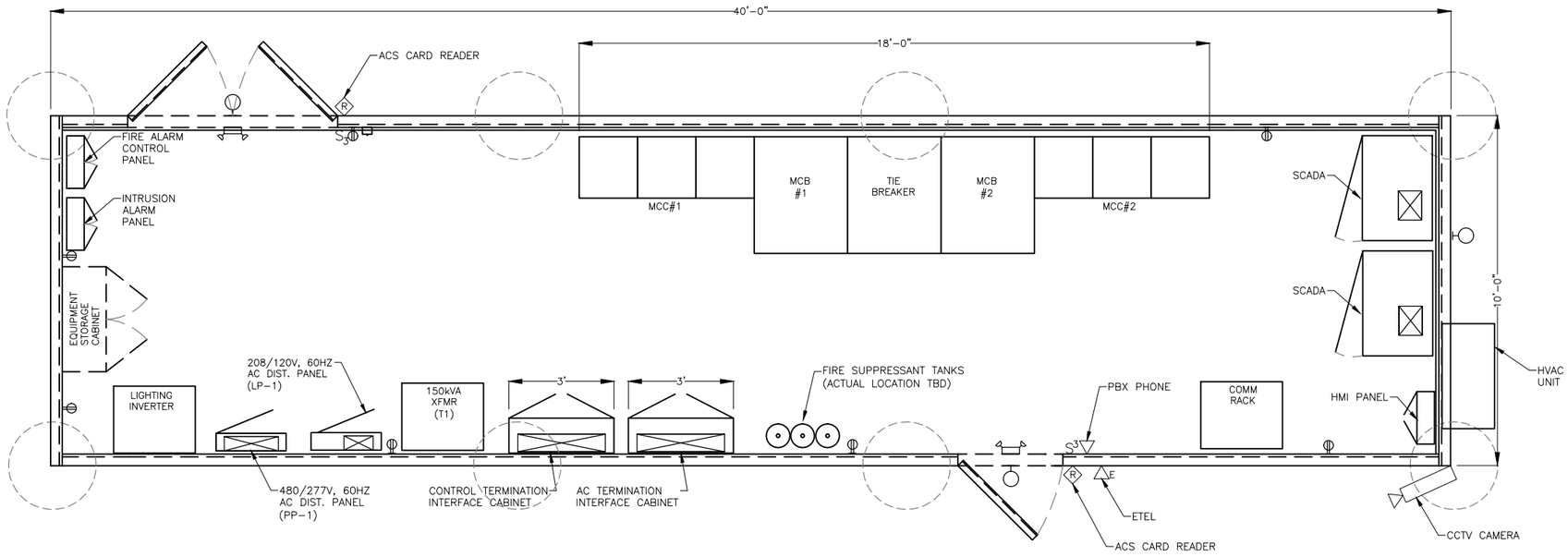
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
INTRUSION DETECTION SYSTEM
IDS COMMUNICATIONS HUT
TYPICAL EQUIPMENT AND COMMUNICATIONS

DISCIPLINE: SYSTEMS
SHEET NAME: FLS-DTL-325

SHEET 215 OF 240



NOTES:

1. PERFORM ALL WORK IN ACCORDANCE WITH THE DESIGN CRITERIA, THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), AND THE REGULATIONS OF THE AUTHORITY HAVING JURISDICTION.
2. PERMANENTLY AND EFFECTIVELY GROUND PANELS, MOTORS AND OTHER EQUIPMENT.
3. PRE-MANUFACTURED MCC ROOM SHALL INCLUDE LIGHTING SYSTEM TO MEET THE DESIGN CRITERIA ILLUMINATION LEVELS.
4. MCC EQUIPMENT BASED ON EATON 2100 SERIES.

0 1 2 4 6 FT.

1/2" = 1'-0"

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (FAN MOTOR CONTROL)
TYPICAL MOTOR CONTROL CENTER ROOM LAYOUT

DISCIPLINE: SYSTEMS

SHEET NAME: E3-FLS-DTL-202

SHEET 216 OF 240

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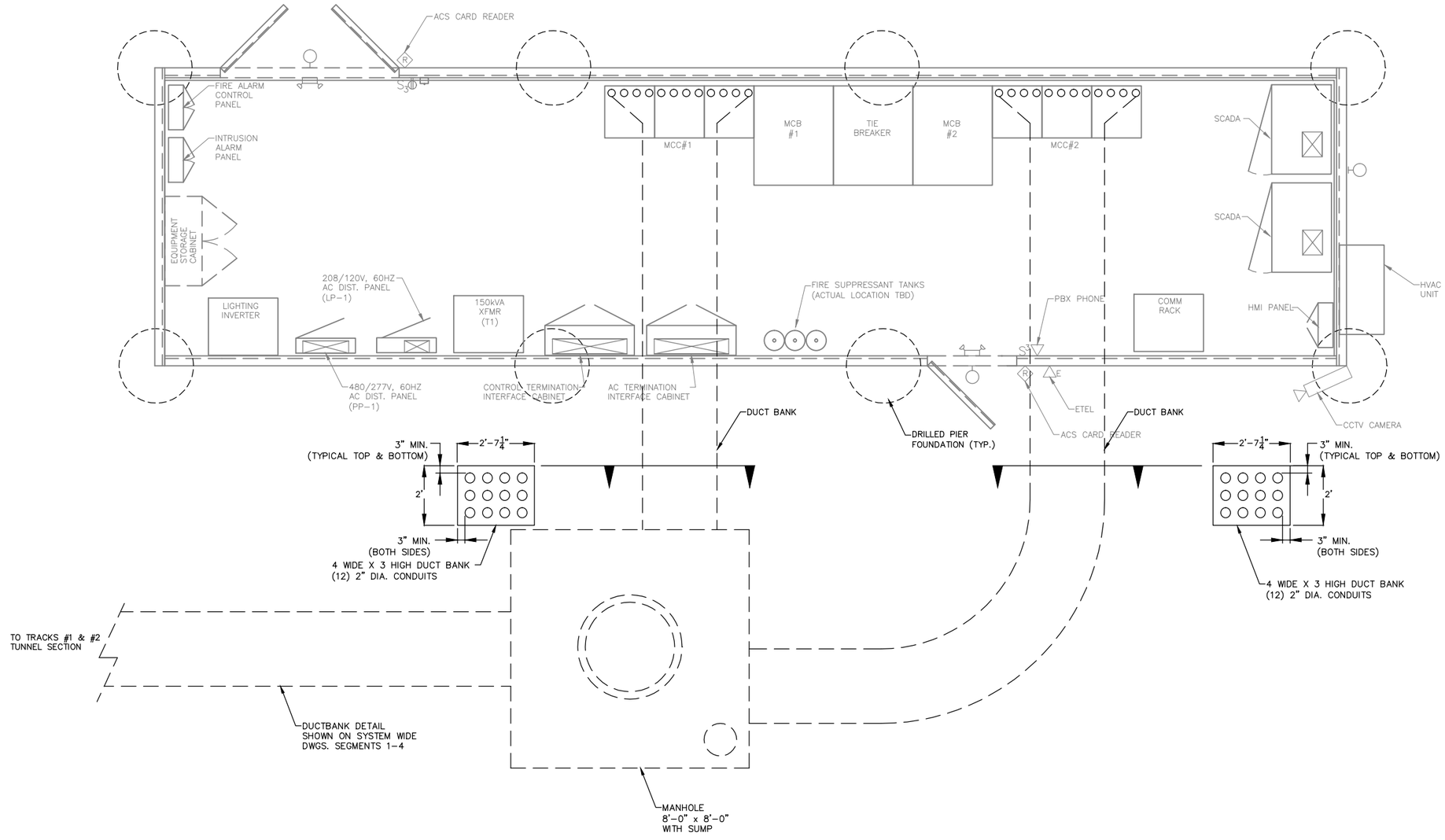

NOTES:

1. PERFORM ALL WORK IN ACCORDANCE WITH THE DESIGN CRITERIA, THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), AND THE REGULATIONS OF THE AUTHORITY HAVING JURISDICTION.

0 1 2 4 6 FT.

1/2" = 1'-0"

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METROPOLITAN COUNCIL

SOUTHWEST

EAST - VOLUME 3 (SYSTEMS) FIRE LIFE SAFETY (FAN MOTOR CONTROL) MOTOR CONTROL CENTER DUCT BANK AND FOUNDATION PLAN

DISCIPLINE: SYSTEMS

SHEET NAME: E3-FLS-DTL-204

SHEET 217 OF 240

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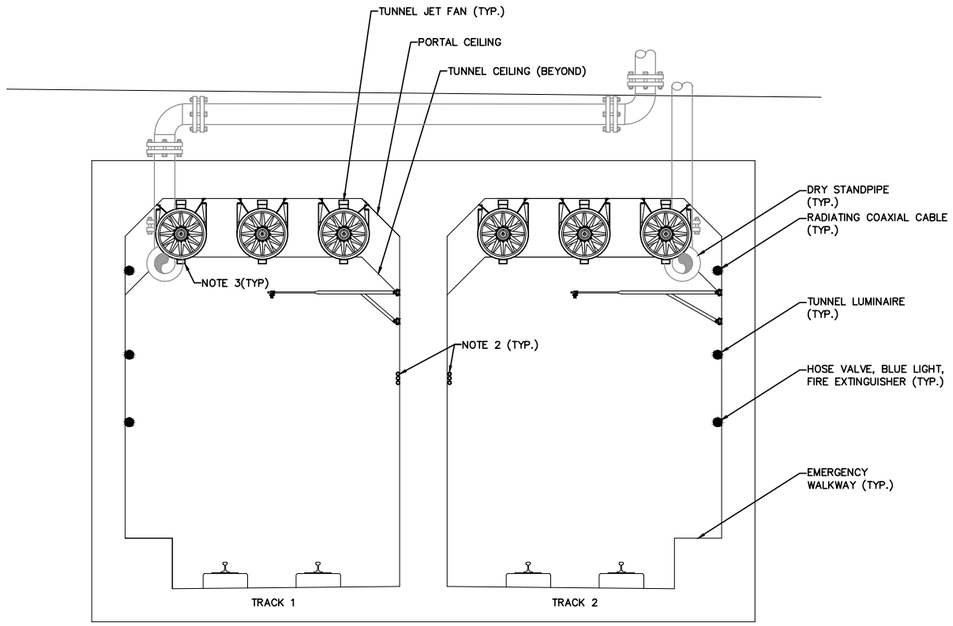

TYPICAL FAN PLACEMENT SECTION LOOKING EAST (1/–)
SCALE: 3"=1'-0"

NOTES:

1. PERFORM ALL WORK IN ACCORDANCE WITH THE DESIGN CRITERIA, THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), AND THE REGULATIONS OF THE AUTHORITY HAVING JURISDICTION.
2. ROUTE FIRE RATED CABLE ALONG THE TUNNEL WALLS. ALL WIRING TO THE TUNNEL JET FANS SHALL BE PROTECTED BY A LISTED FIRE-RATED ASSEMBLY WITH A MINIMUM FIRE RATING OF 1 HOUR.

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SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (FAN MOTOR CONTROL)
CABLE ROUTING/ ATTACHMENT DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-205

SHEET 218 OF 240

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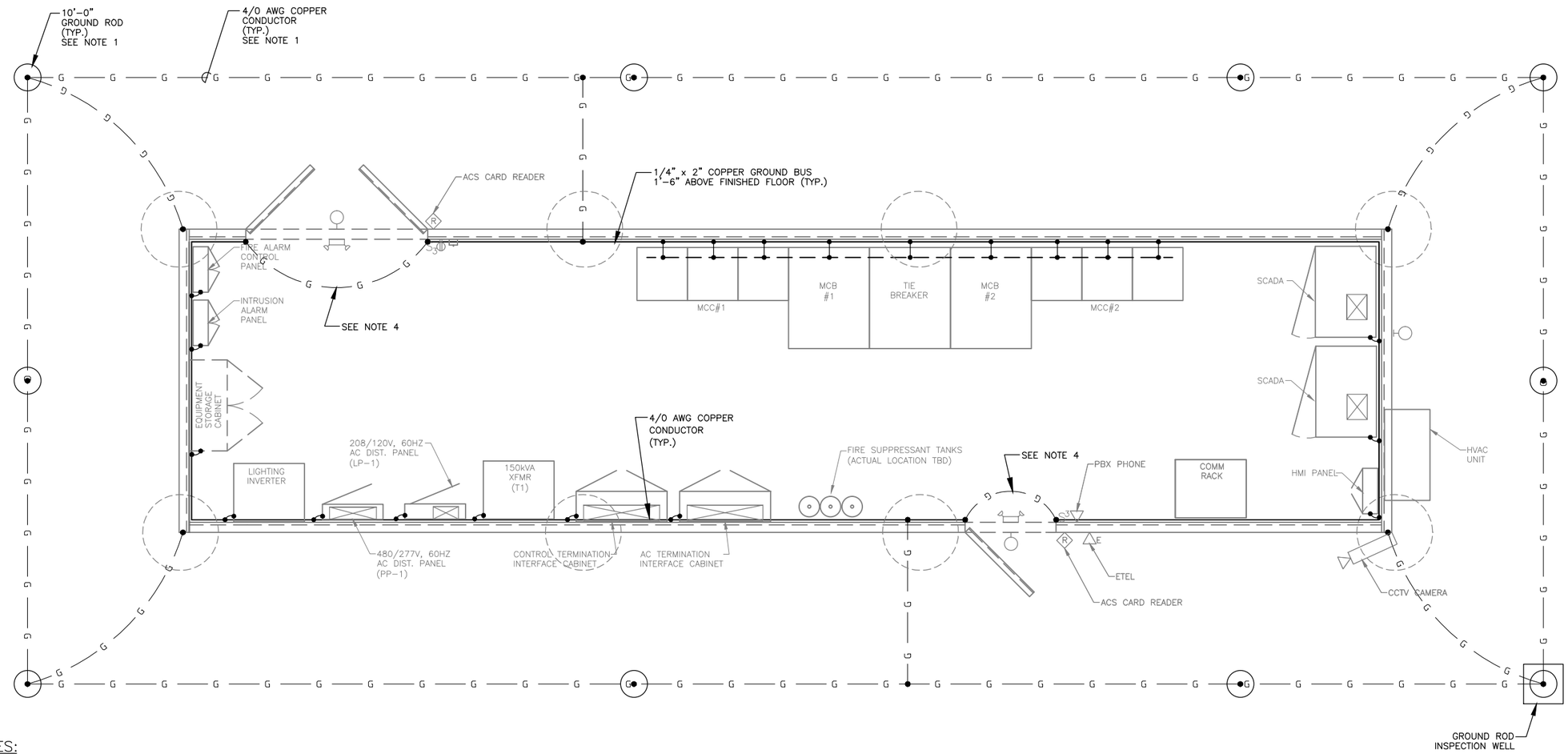

NOTES:

1. GROUND RING CABLES SHALL BE 4/0 AWG BARE STRANDED COPPER ALL GROUND RODS SHALL BE 10' LONG BY ⅝" DIAMETER COPPER-CLAD STEEL.
2. GROUND RING SHALL BE BURIED A MINIMUM OF 2'-0" BELOW FINISHED GRADE AND 5'-0" OFF THE EDGE OF MCC BUILDING.
3. WHERE METAL SECURITY FENCES ARE INSTALLED, CONNECT THE NEAREST FENCE POSTS AND ACCESS GATE FENCE POSTS TO THE GROUND RING. THE GROUND RING TO EXTEND 5'-0" BEYOND FENCE LINE OR NOT LESS THAN 10'-0" INSIDE TO BE UNGROUNDED.
4. GROUND BUS SHALL BE ELECTRICALLY CONTINUOUS AND VISIBLE AROUND DOOR OPENINGS.
5. SEE GROUNDING DETAILS ON DRAWING FLS-DTL-206.

0 1 2 4 6 FT.
1/2" = 1'-0"

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Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (FAN MOTOR CONTROL)
TYPICAL GROUNDING PLAN

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-206

SHEET 219 OF 240

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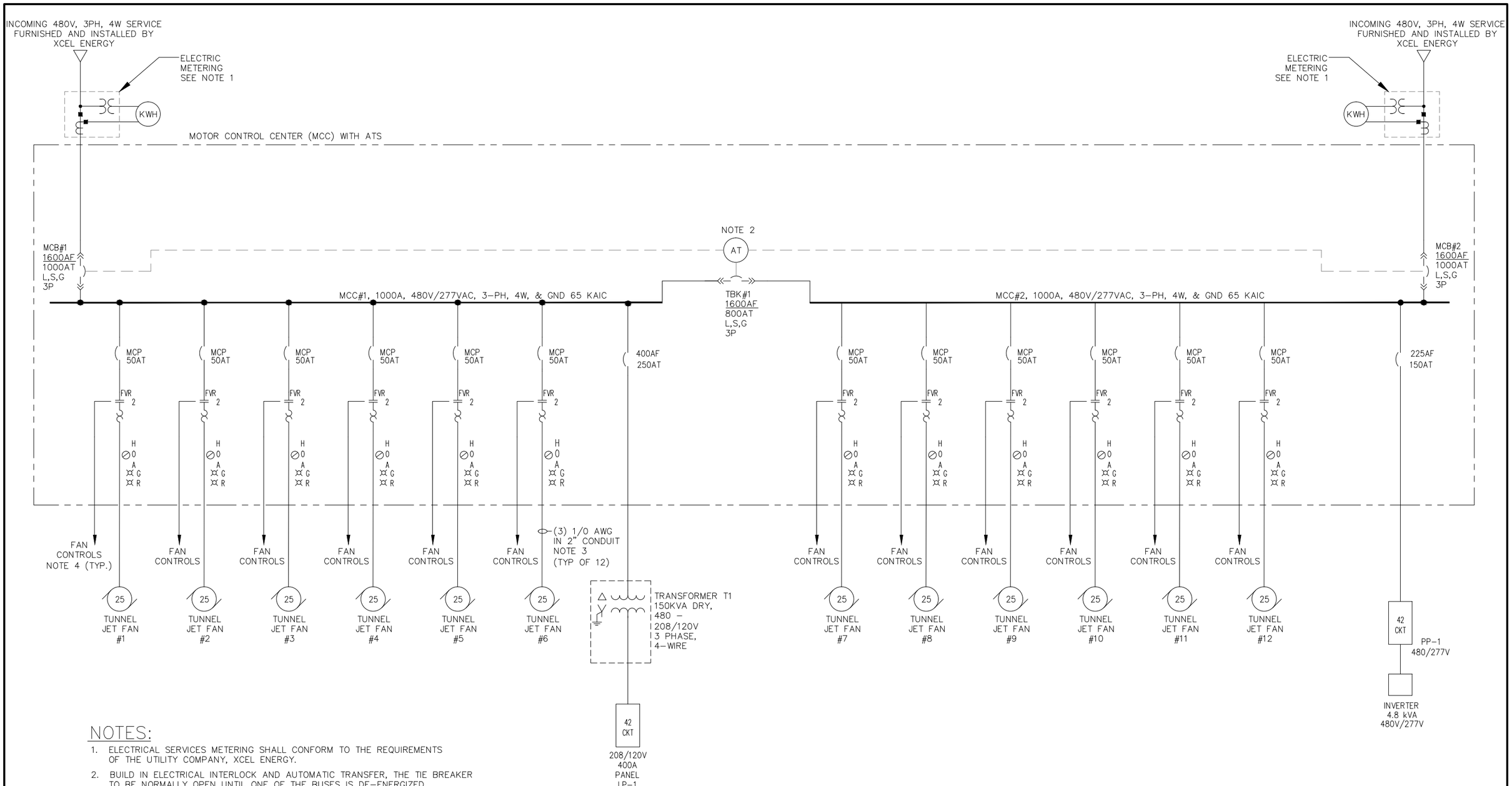

NOTES:

1. ELECTRICAL SERVICES METERING SHALL CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY, XCEL ENERGY.
2. BUILD IN ELECTRICAL INTERLOCK AND AUTOMATIC TRANSFER, THE TIE BREAKER TO BE NORMALLY OPEN UNTIL ONE OF THE BUSES IS DE-ENERGIZED.
3. ALL WIRES TO TUNNEL JET FANS SHALL BE 1-HR FIRE RATED.
4. REFER TO DRAWING FLS-DTL-307 AND FLS-DTL-308 FOR TUNNEL JET FAN CONTROL DIAGRAM.
5. MCC EQUIPMENT BASED ON EATON 2100 SERIES.

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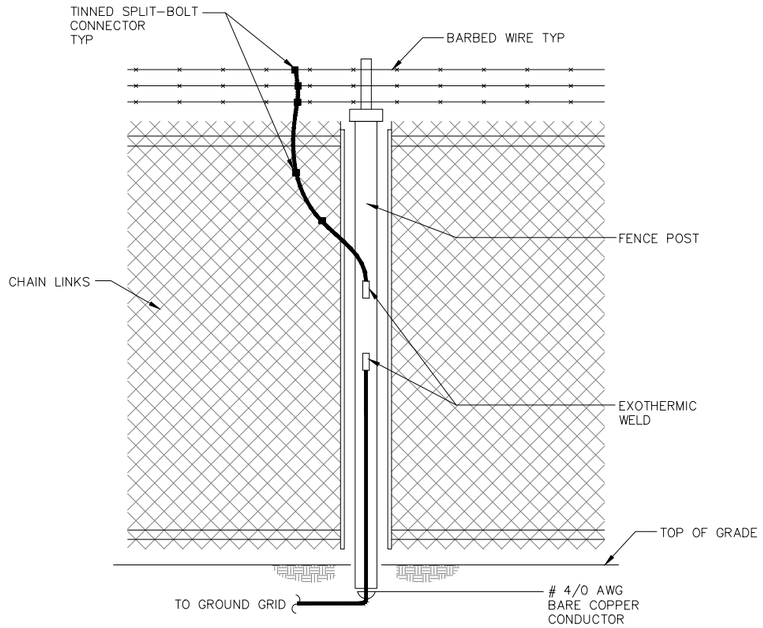
METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (FAN MOTOR CONTROL)
OVERALL POWER
SINGLE LINE DIAGRAM

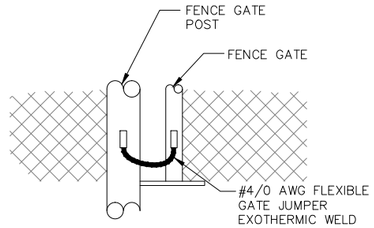
DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-207

SHEET 220 OF 240



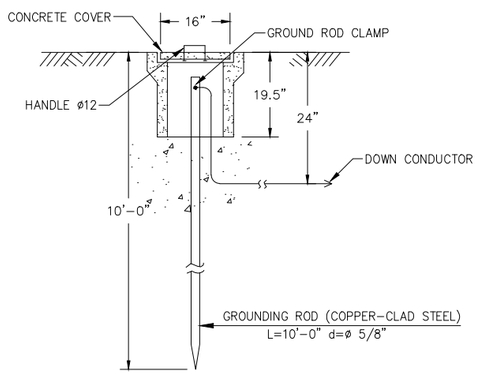
1 SUBSTATION FENCE POST GROUNDING

NOT TO SCALE



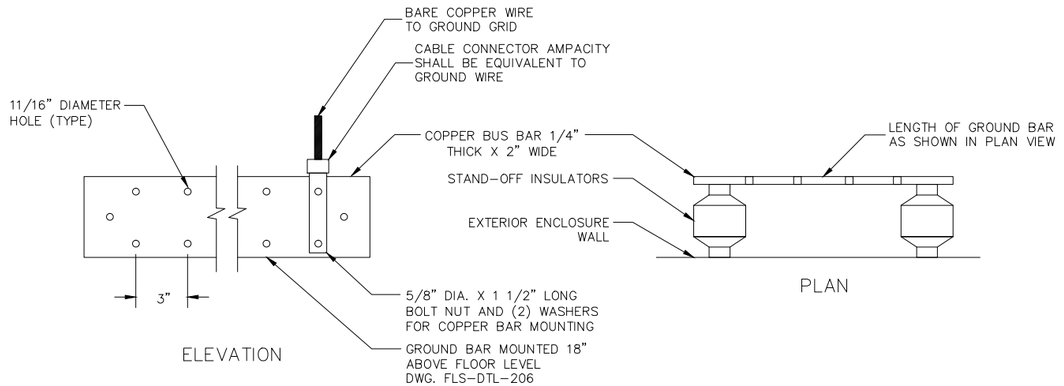
2 SUBSTATION GATE POST GROUNDING

NOT TO SCALE



3 INSPECTION WELL GROUND ROD

NOT TO SCALE



4 MCC ROOM GROUND BUS DETAIL

NOT TO SCALE

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METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (FAN MOTOR CONTROL)
TYPICAL GROUNDING DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-208

SHEET 221 OF 240

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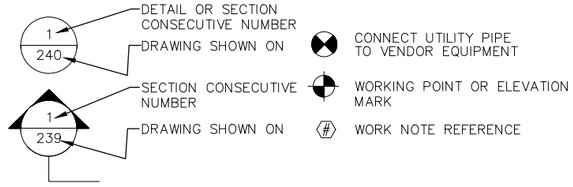
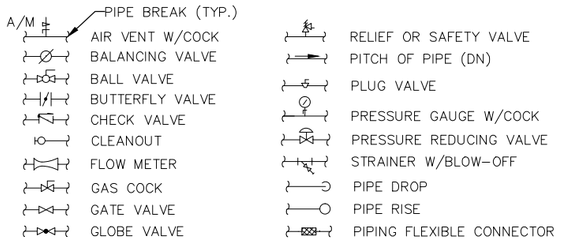
GENERAL SYMBOLS



PIPING SYMBOLS



PIPING LEGEND

SP — DRY STANDPIPE

TYPICAL ABBREVIATIONS

ADA	AMERICANS WITH DISABILITY ACT (MEETING REQUIREMENTS OF)
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
AVG	AVERAGE
BIV	BUTTERFLY INDICATING VALVE
BOP	BOTTOM OF PIPE
BOS	BOTTOM OF STEEL
C	CONTROL PANEL
CENT	CENTRIFUGAL
CISP	CAST IRON STEEL PIPE
CLDIP	CEMENT-LINED DUCTILE IRON PIPE
CONC	CONCRETE
CONN	CONNECTION
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DN	DOWN
DR	DRAIN
DWG	DRAWING
EA	EACH
EL.	ELEVATION
ELEC	ELECTRICAL
EXH	EXHAUST
EXIST	EXISTING
EQ	EQUAL
FLEX	FLEXIBLE
FLR	FLOOR
FM	FACTORY MUTUAL
FT	FOOT OR FEET
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
Hz	HERTZ
HP	HORSEPOWER
IBBM	IRON BODY, BRONZE MOUNTED
ID	INSIDE DIAMETER
IN	INCH
INV	INVERT ELEVATION
kW	KILOWATTS
LVG	LEAVING
MIN	MINIMUM
MAX	MAXIMUM
NC	NORMALLY CLOSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NO	NORMALLY OPEN
NPS	NOMINAL PIPE SIZE
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OSY	OUTSIDE STEM AND YOKE
OH	OVERHEAD
PE	PLAIN END
P.E.	PROFESSIONAL ENGINEER
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH (GAUGE)
RM	ROOM
RPM	REVOLUTION PER MINUTE
SQ	SQUARE
TEMP	TEMPERATURE
TYP.	TYPICAL
UON	UNLESS OTHERWISE NOTED
UP	UP OR UPWARD
V/PH/Hz	VOLTS/PHASE HERTZ
VERT	VERTICAL
W/	WITH
W/O	WITHOUT

GENERAL NOTES

1. LEGENDS, SYMBOLS NOTES AND ABBREVIATIONS SHOWN ON THIS DRAWING PERTAIN TO FLS – TUNNEL VENTILATION AND FIRE PROTECTION DRAWINGS ONLY.
2. ALL LEGENDS, SYMBOLS AND ABBREVIATIONS SHOWN ON THIS DRAWING DO NOT NECESSARILY APPEAR IN THESE CONTRACT DOCUMENTS.
3. PROVIDE ALL NECESSARY AND SHOWN MATERIAL, EQUIPMENT OR WORK SHOWN ON DOCUMENTS, UNLESS SPECIFICALLY INVOKED TO BE BY OTHERS.
4. COORDINATE INSTALLATION OF PIPING AND EQUIPMENT WITH ALL OTHER TRADES PRIOR TO THE FABRICATION AND INSTALLATION OF ALL SYSTEMS.
5. THE CONTRACT DOCUMENTS ARE DIAGRAMMATIC IN THE NATURE AND, DUE TO THE SCALE OF DRAWINGS IT IS NOT FEASIBLE TO SHOW ALL OFFSETS, FITTINGS ND OTHER APPURTENANCES NECESSARY TO MEET THE ACTUAL FIELD CONDITIONS. PROVIDE ALL OFFSETS, FITTINGS, VALVES, TRAPS AND OTHER MATERIAL AS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM.
6. COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR ALL ELECTRICAL EQUIPMENT REQUIREMENTS, INCLUDING STARTERS, DISCONNECTS, FUSES, TRANSFORMERS, ETC.
7. ALL OPENINGS (FLOOR, WALLS AND ROOF), EQUIPMENT PADS, LOCATIONS OF EQUIPMENT, PIPING, ETC. ARE SIZED IN ACCORDANCE WITH SCHEDULED EQUIPMENT. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR THE REVISION OF LOCATION FOR ANY EQUIPMENT AS REQUIRED TO SUIT PROJECT CONDITIONS. THE EQUIPMENT LISTS FORM THE BASIS OF DESIGN.
8. REFER TO DRAWINGS AND BUILDING CODES FOR REQUIREMENTS AND METHODS OF INSTALLATION, PRODUCTS AND GENERAL PROVISIONS PERTAINING TO THE CONTRACT REQUIREMENTS.
9. ALL CONTRACTOR FURNISHED EQUIPMENT SHOWN ON THESE DRAWINGS ARE BASED ON A SPECIFIED MANUFACTURER. ANY MODIFICATIONS AND/OR SUBSTITUTION OF SAID EQUIPMENT IS SUBJECT TO COMPLETE COORDINATION BY THE CONTRACTOR OF ALL CONNECTIONS, SERVICES, OPENINGS SIZES, AND OTHER CONSTRUCTION RELATED REQUIREMENTS.
10. CONTRACTOR TO VERIFY AND COORDINATE ALL STRUCTURAL, MECHANICAL. ELECTRICAL, AND PLUMBING REQUIREMENTS OF EQUIPMENT WITH MANUFACTURER'S APPROVED SHOP DRAWINGS PRIOR TO INSTALLATION.
11. THIS LAYOUT IS PROVIDED FOR GENERAL LOCATION OF EQUIPMENT. UNLESS SPECIFICALLY LOCATED BY DIMENSIONS ON THE DRAWINGS THE EQUIPMENT SHALL BE LOCATED NEAR LOCATION ON THE DRAWINGS BUT IN THE MOST OPERATIONALLY EFFICIENT POSITION AND ORIENTATION.

SEISMIC DESIGN NOTES

1. ALL EQUIPMENT, PIPING, ETC. SHALL BE INSTALLED IN COMPLIANCE WITH MINNESOTA BUILDING CODE (2006 INTERNATIONAL BUILDING CODE) AND MINNESOTA AMENDMENTS – CHAPTER 1305.
2. ALL VIBRATION AND SEISMIC PROTECTION DEVICES SHALL BE THE PRODUCTS OF A SINGLE MANUFACTURER.
3. SUBMIT FOR APPROVAL SHOP DRAWINGS AND CALCULATIONS AND/OR CERTIFICATIONS MEETING THE REQUIREMENTS OF APPLICABLE CODES AND DESIGN STANDARDS. SHOP DRAWINGS AND CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN STATE OF MINNESOTA.
4. SEISMIC PROTECTION DEVICES SHALL MEET PROJECT SPECIFICATIONS, CODE REQUIREMENTS AND SHALL BE BASED ON THE FOLLOWING CRITERIA:
   - OCCUPANCY CATEGORY OF THE BUILDING (TUNNEL): III
   - COMPONENT IMPORTANCE FACTOR: 1.5
   - SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD: CONSULT STRUCTURAL DRAWINGS
   - SEISMIC DESIGN CATEGORY BASED ON 1-SEC PERIOD: CONSULT STRUCTURAL DRAWINGS

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SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
LEGEND, SYMBOLS AND GENERAL NOTES

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL- 301

SHEET 222 OF 240

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JET FAN SCHEDULE – TRACK 1

JET FAN NO.	LOCATION	PERFORMANCE				ELECTRICAL		CONSTRUCTION DATA			WEIGHT	BASIS–OF–DESIGN		NOTES
		VELOCITY	RPM	THRUST	REVERSE	HP	V–PH–HZ	DRIVE	FAN DIA.	TEMP. RATING	LBS.	MANUFACTURER	MODEL No.	
JF–T1–01	STA. 2776+49.00 TO 2776+60.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–02	STA. 2776+49.00 TO 2776+60.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–03	STA. 2776+49.00 TO 2776+60.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–04	STA. 2778+32.22 TO 2778+43.44	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–05	STA. 2778+32.22 TO 2778+43.44	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–06	STA. 2778+32.22 TO 2778+43.44	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–07	STA. 2794+92.78 TO 2795+04.00	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–08	STA. 2794+92.78 TO 2795+04.00	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–09	STA. 2794+92.78 TO 2795+04.00	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–10	STA. 2796+67.60 TO 2796+78.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–11	STA. 2796+67.60 TO 2796+78.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T1–12	STA. 2796+67.60 TO 2796+78.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11

JET FAN NOTES:

1. PROVIDE HANGING VIBRATION ISOLATION KIT, INLET SCREENS, HEATERS, 2D SILENCERS, MOTOR WINDING RTDS, CURRENT SENSORS, PHASE DETECTORS, VIBRATION SENSOR AND AIR FLOW SWITCHES.
2. SILENCERS SHALL BE 12 GAUGE CASING AND 16 GAUGE PERFORATED PLATE, ASTM A–36.
3. ALL STEEL SHALL BE HOT–DIP GALVANIZED.
4. FAN CASING SHALL BE 1/4" THICK, HOT–DIP GALVANIZED STEEL PLATE, ASTM A–36.
5. DISCONNECT SWITCH AND DUAL, REVERSIBLE POWER SOURCE BY DIV. 16000.
6. M/S = METERS PER SECOND
7. N = NEWTONS
8. °C = DEGREES CENTIGRADE (CELSIUS)
9. MM = MILLIMETERS
10. FANS SHALL MEET OR EXCEED REQUIREMENTS OF NFPA–130, CURRENT EDITION.
11. LOCATION STATION VALUES BASED ON TRACK 2.

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
JET FAN SCHEDULE
TRACK 1

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-302

SHEET 223 OF 240

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JET FAN SCHEDULE – TRACK 2

JET FAN NO.	LOCATION	PERFORMANCE				ELECTRICAL		CONSTRUCTION DATA			WEIGHT	BASIS–OF–DESIGN		NOTES
		VELOCITY	RPM	THRUST	REVERSE	HP	V–PH–HZ	DRIVE	FAN DIA.	TEMP. RATING	LBS.	MANUFACTURER	MODEL No.	
JF–T2–01	STA. 2776+49.00 TO 2776+60.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–02	STA. 2776+49.00 TO 2776+60.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–03	STA. 2776+49.00 TO 2776+60.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–04	STA. 2778+32.22 TO 2778+43.44	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–05	STA. 2778+32.22 TO 2778+43.44	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–06	STA. 2778+32.22 TO 2778+43.44	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–07	STA. 2794+92.78 TO 2795+04.00	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–08	STA. 2794+92.78 TO 2795+04.00	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–09	STA. 2794+92.78 TO 2795+04.00	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–10	STA. 2796+67.60 TO 2796+78.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–11	STA. 2796+67.60 TO 2796+78.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11
JF–T2–12	STA. 2796+67.60 TO 2796+78.22	33 M/S	3,540	408N	408N	25	460–3–60	DIRECT	630 MM	400°C/2 HOURS	1,200	FLAKT WOODS	63JMTS/31/2/9/28/–/2.0D N	1 THRU 11

JET FAN NOTES:

1. PROVIDE HANGING VIBRATION ISOLATION KIT, INLET SCREENS, HEATERS, 2D SILENCERS, MOTOR WINDING RTDS, CURRENT SENSORS, PHASE DETECTORS, VIBRATION SENSOR AND AIR FLOW SWITCHES.
2. SILENCERS SHALL BE 12 GAUGE CASING AND 16 GAUGE PERFORATED PLATE, ASTM A–36.
3. ALL STEEL SHALL BE HOT–DIP GALVANIZED.
4. FAN CASING SHALL BE 1/4" THICK, HOT–DIP GALVANIZED STEEL PLATE, ASTM A–36.
5. DISCONNECT SWITCH AND DUAL, REVERSIBLE POWER SOURCE BY DIV. 16000.
6. M/S = METERS PER SECOND
7. N = NEWTONS
8. °C = DEGREES CENTIGRADE (CELSIUS)
9. MM = MILLIMETERS
10. FANS SHALL MEET OR EXCEED REQUIREMENTS OF NFPA–130, CURRENT EDITION.
11. LOCATION STATION VALUES BASED ON TRACK 2.

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Kimley»Horn
SYSTRA
PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
JET FAN SCHEDULE
TRACK 2

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-303

SHEET 224 OF 240

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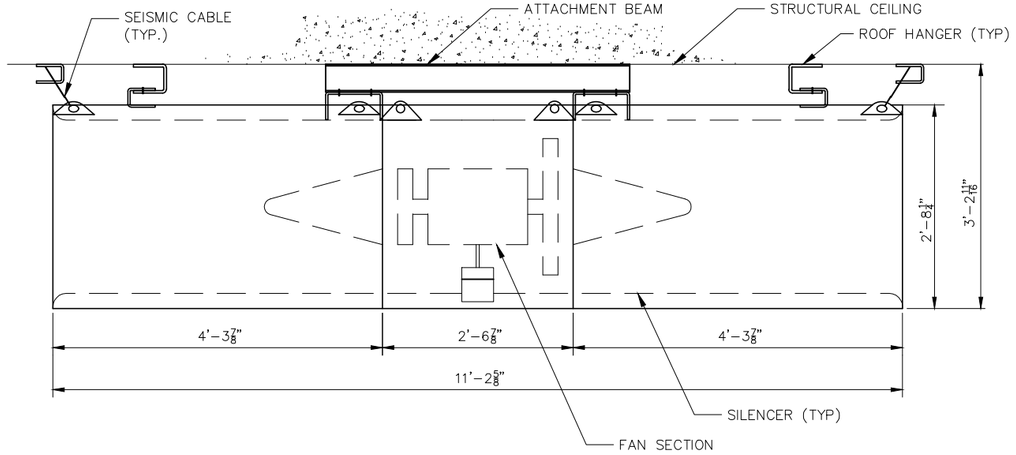
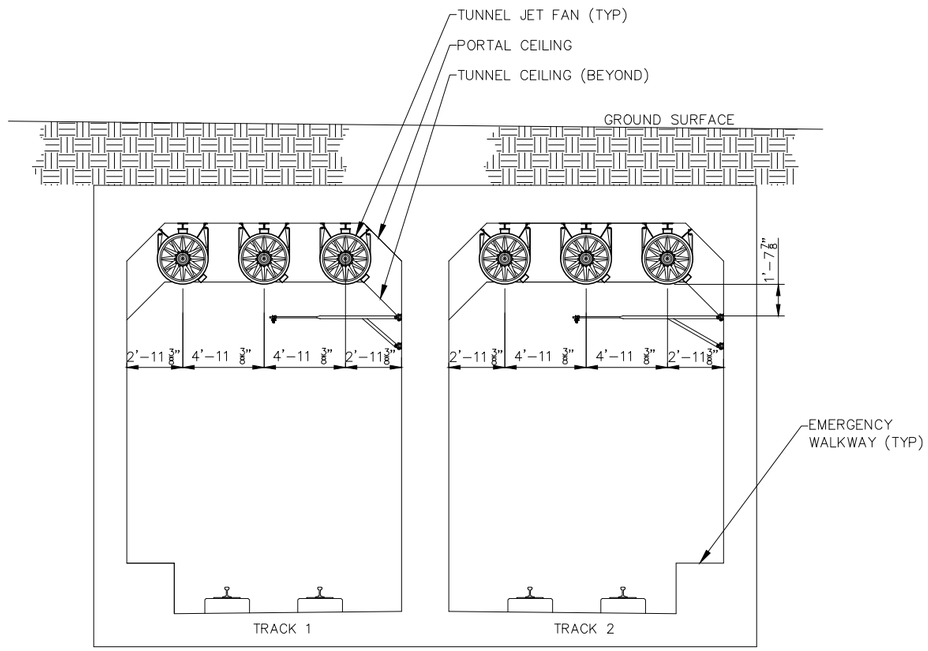
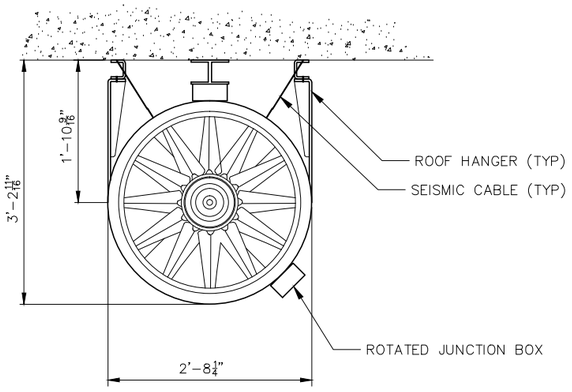


TYPICAL FAN – SIDE VIEW (1/225)
SCALE: 1" = 1'-0"





TYPICAL FAN – CROSS SECTION (2/225)
SCALE: 1" = 1'-0"

TYPICAL FAN LOCATIONS – PORTAL CROSS SECTION (3/225)
SCALE: 1/4" = 1'-0"

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METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
TYPICAL JET FAN DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-306

SHEET 225 OF 240

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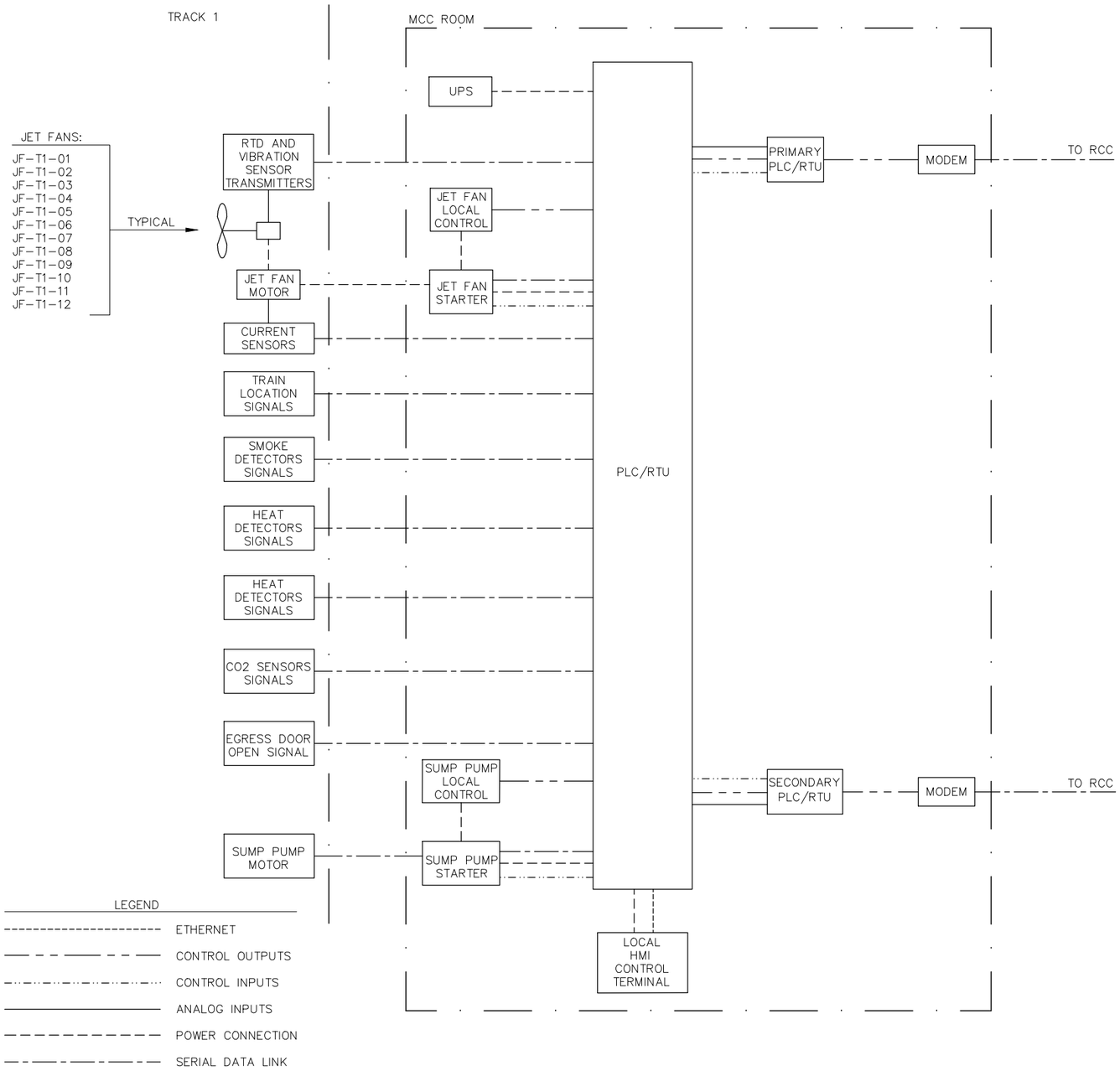

JET FAN CONTROL SEQUENCE

GENERAL

1. THE CONTROL SOFTWARE SHALL HAVE AVAILABLE THE FOLLOWING INPUTS:
   - TRAIN LOCATION INSIDE TUNNEL. TRACK SEGMENTATION NOT TO EXCEED 600' IS SUGGESTED.
   - ADDRESSABLE SMOKE DETECTOR ACTIVATION SIGNAL. MINIMUM OF FOUR (4) SMOKE DETECTORS INSIDE EACH HALF-TUNNEL SHALL BE PROVIDED.
   - HEAT DETECTOR (TEMPERATURE SENSOR) SIGNAL WHENEVER AMBIENT TEMPERATURE EXCEEDS SETPOINT VALUE. MINIMUM OF TWO (2) HEAT DETECTION SENSORS SHALL BE PROVIDED INSIDE EACH HALF-TUNNEL.
   - CO2 SENSORS, MINIMUM OF TWO (2) PER HALF-TUNNEL SHALL BE PROVIDED. WHENEVER THE CO2 LEVEL RISES ABOVE THRESHOLD VALUE (ADJUSTABLE) ALARM SEQUENCE SHALL COMMENCE AND JET FANS SHALL OPERATE AS IN TEMPERATURE CONTROL MODE.
   - EGRESS DOOR LOCATED MIDWAY OF TUNNEL, BETWEEN HALF-TUNNELS, SHALL HAVE LIMIT SWITCHES TO INDICATE FULLY-CLOSED AND OPEN POSITION. THE EGRESS DOOR SHALL BE 1 1/2 HR.-FIRE RATED AND MANUALLY OPERABLE FROM EACH ADJOINING HALF TUNNEL.
   - ALARM OUTPUTS TO OTHER CONTROL SYSTEMS SUCH AS SCADA.
2. EACH JET FAN SHALL HAVE PROOF-OF-OPERATION CURRENT SENSORS, AND SOUTH AND NORTH AIR FLOW SENSORS.
3. EACH JET FAN SHALL HAVE MOTOR WINDING TEMPERATURE DETECTORS (RTD), TWO (2) PER PHASE AND ONE (1) RTD PER BEARING.
4. EACH JET FAN SHALL HAVE VIBRATION SENSOR.
5. PLC/RTU TO BE CONFIGURED AS PRIMARY AND SECONDARY UNITS. SYSTEM CONFIGURATION SHALL BE I HOT STANDBY MODE.
6. HMI PANEL AT EACH MCC AND RCC SHALL BE CONNECTED VIA ETHERNET RING TO ALLOW ANY JET FAN TO BE CONTROLLED AND MONITORED FROM ANY CONTROLLED LOCATION.

TEST MODE

1. ANNUAL TESTING OF THE JET FANS SHALL BE PERFORMED USING LOCAL CONTROLS OR REMOTE CONTROLS. AUTOMATIC TESTING IS NOT ENCOURAGED BUT IT SHOULD BE AN OPTION.
2. TESTING MAY EXTEND OVER A PERIOD OF DAYS AT OPERATOR'S DISCRETION. SOFTWARE LOGIC SHALL TRACK TESTING DATES, TESTING INTERVAL AND AIR FLOW DIRECTION FOR EACH FAN, AND GENERATE REMINDERS 30 DAYS IN ADVANCE.

TEMPERATURE CONTROL OR CO2 CONTROL MODE

1. WHENEVER TUNNEL AMBIENT TEMPERATURE OR CO2 LEVEL EXCEEDS THRESHOLD VALUE (ADJUSTABLE) JET FANS WILL BE ENERGIZED IN STAGED GROUPS OF 2 FANS AT A TIME UNTIL THE THRESHOLD VALUE STABILIZES.
2. WHEN THRESHOLD VALUE STABILIZES OR REDUCES FOR A PERIOD OF 10 MINUTES (ADJUSTABLE) THE NUMBER OF OPERATING FANS SHALL DECREASE 1 FAN AT A TIME. SHOULD TEMPERATURE OR CO2 LEVEL BEGIN TO RISE AGAIN THE SEQUENCE SHALL REVERSE.
3. FANS SHALL OPERATE UNTIL THE TEMPERATURE DROPS 10 DEGREES F BELOW SETPOINT, OR 10% BELOW CRITICAL CO2 LEVEL EXPRESSED IN PPM.

GENERAL NOTES:

1. ONLY FLS TUNNEL VENTILATION CONTROL FEATURES ARE SHOWN.
2. SEE SHEET NAME ES-FLS-DTL-308 FOR REMAINING CONTROL SEQUENCE NOTES.

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METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
JET FANS BLOCK CONTROL DIAGRAM TRACK 1

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-307

SHEET 226 OF 240

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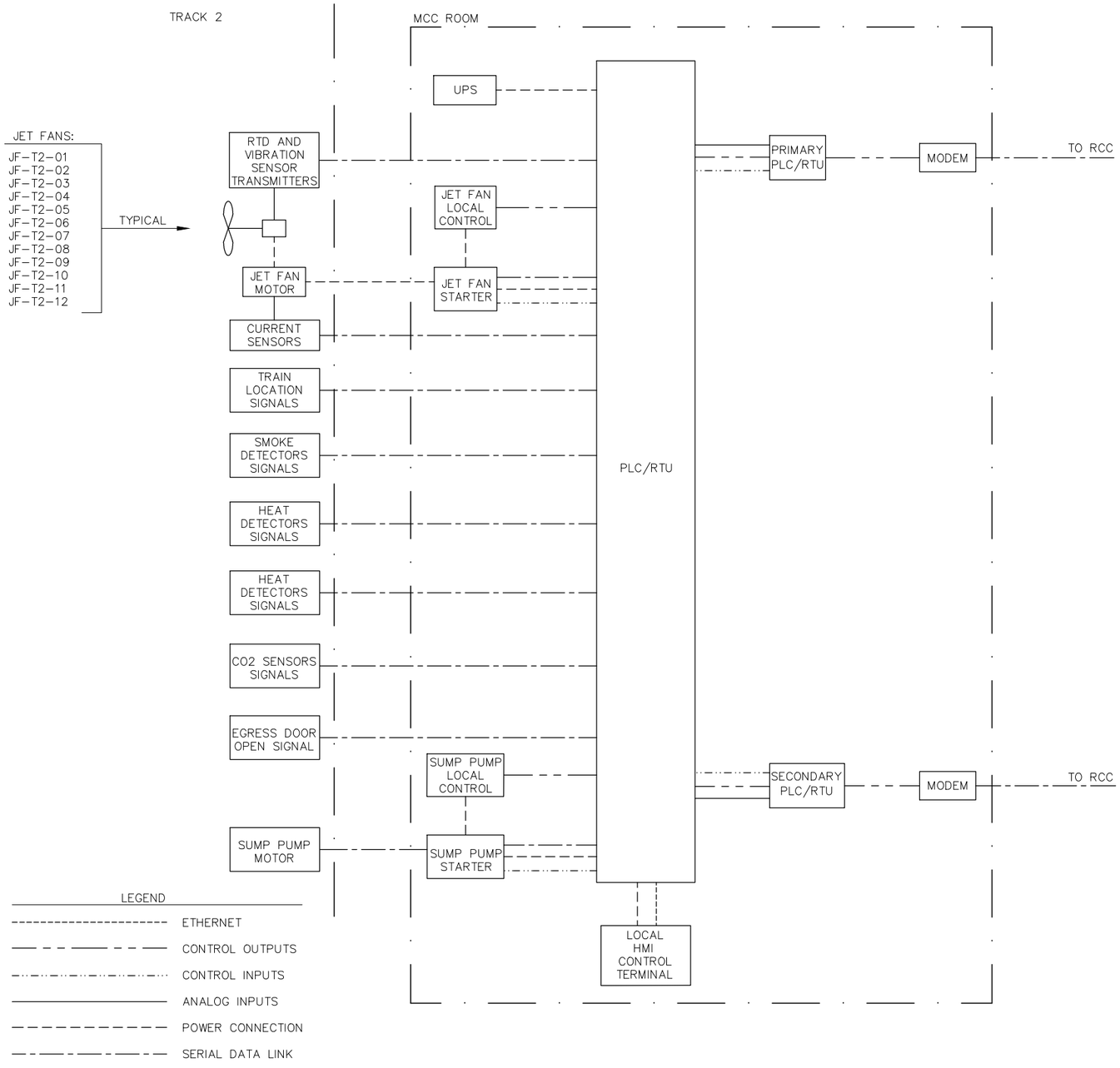

JET FAN CONTROL SEQUENCE (CONTINUED)

EMERGENCY MODE

1. EMERGENCY MODE JET FAN OPERATION MAY BE MANUAL OR IT MAY BE FULLY AUTOMATIC BASED ON THE SIGNAL FROM HEAT DETECTORS AND/OR SMOKE DETECTORS. SELECTED THRESHOLD VALUES SHALL BE ADJUSTABLE.
2. ONCE EMERGENCY FAN MODE IS ACTIVATED ALL 12 JET FANS SHALL BE ACTIVATED IN THE NORTH OR SOUTH AIR FLOW DIRECTION.
3. SELECTED AIR MOVEMENT DIRECTIONS WILL BE BASED ON THE FOLLOWING INPUTS:
   - TRAIN LOCATION INSIDE TUNNEL (FOR A STATIONARY LOCATION)
   - TRAIN TRAVEL DIRECTION (FOR A MOVING TRAIN)
   - LOCATION OF THE HEAT DETECTOR AND/OR SMOKE DETECTOR TRIGGERING EMERGENCY MODE
4. THE SELECTED AIR MOVEMENT (SMOKE EXHAUST) DIRECTION GENERALLY WILL BE TOWARD THE CLOSEST PORTAL. PASSENGER EGRESS DIRECTION WILL BE TOWARD THE CLOSEST PORTAL (AS LONG AS THE CRITICAL VELOCITY IS MAINTAINED) OR TOWARD EGRESS DOOR LOCATED MIDWAY INSIDE TUNNEL OR TOWARD THE OTHER PORTAL AS LONG AS THE TRAVEL DISTANCE IS LESS THAN 1,250 FEET.
5. TRAIN CONDUCTORS SHALL BE FULLY TRAINED IN THE TUNNEL VENTILATION ASPECTS ESPECIALLY THE EMERGENCY MODE FAN OPERATIONS. TRAIN CONDUCTORS SHALL HAVE THE FULL AUTHORITY TO EVACUATE PASSENGERS ALONG THE MOST FEASIBLE ROUTE. ONCE FIREFIGHTERS ARRIVE ON THE SCENE ALL EVACUATION AND OVERALL CONTROL SHALL BE WITH THE FIRE DEPARTMENT.
6. WHENEVER FANS OPERATE IN EMERGENCY MODE ALL TRAIN TRAFFIC WILL HALT IN THE ADJOINING NON-AFFECTED HALF-TUNNEL. ANY MOVING TRAIN PRESENT IN THE ADJOINING HALF-TUNNEL WILL CONTINUE ON ITS PATH BUT NO OTHER TRAINS WILL BE ALLOWED TO ENTER THE TUNNEL.
7. TRAIN EXPERIENCING FIRE EMERGENCY MAY CONTINUE TOWARD PORTAL BUT IT MUST STOP AS SOON AS IT EXITS THE TUNNEL TO ENABLE FIREFIGHTING. THE DECISION TO CONTINUE TRAVEL WILL REMAIN WITH THE CONDUCTORS AND TRAIN ENGINEER.
8. JET FANS WILL OPERATE CONTINUOUSLY UNTIL THE FIREFIGHTERS ON THE SCENE DECIDE THAT FAN OPERATION IS NO LONGER REQUIRED. ONLY THEN JET FANS WILL BE SHUT DOWN.

ALARMS

THE FOLLOWING ALARMS SHALL BE GENERATED AND SIGNALED AT LOCAL MCC, PORTAL BASED CONTROL PANELS OR RCC, AS APPROPRIATE:

- EGRESS DOOR LOCATED MIDWAY INSIDE TUNNEL IS NOT FULLY CLOSED
- AMBIENT TEMPERATURE INSIDE TUNNEL ABOVE 105 DEGREES F (ADJUSTABLE)
- AMBIENT LEVEL OF CO2 INSIDE TUNNEL ABOVE 10,000 PPM (ADJUSTABLE)
- SMOKE DETECTION
- ANY JET FAN OPERATION IN ANY MODE. OPERATION MODE SHALL BE DISPLAYED.
- FAILURE OF ANY FAN TO OPERATE UPON COMMAND TO ENERGIZE.
- HIGH WINDING TEMPERATURE IN ANY JET FAN. THE THRESHOLD VALUE WILL BE DEVELOPED IN CONSULTATION WITH THE FAN VENDOR.
- HIGH TEMPERATURE READOUT OF FAN MOTOR BEARINGS. THE THRESHOLD VALUE WILL BE DEVELOPED IN CONSULTATION WITH THE FAN VENDOR.
- ABNORMAL VIBRATION IN ANY JET FAN. THE THRESHOLD VALUE WILL BE DEVELOPED IN CONSULTATION WITH THE FAN VENDOR.

GENERAL NOTES:

1. ONLY FLS TUNNEL VENTILATION CONTROL FEATURES ARE SHOWN.
2. SEE SHEET NAME E3-FLS-DTL-307 FOR CONTROL SEQUENCE NOTES.

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METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
JET FANS BLOCK CONTROL DIAGRAM TRACK 2

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-308

SHEET 227 OF 240

DESCRIPTION			NOTES	TRACK 1 JET FANS												TRACK 2 JET FANS											
VENTILATION MODE NO.	OPERATION TYPE	LOCATION DESCRIPTION	VENTILATION METHODOLOGY	JF-T1-01	JF-T1-02	JF-T1-03	JF-T1-04	JF-T1-05	JF-T1-06	JF-T1-07	JF-T1-08	JF-T1-09	JF-T1-10	JF-T1-11	JF-T1-12	JF-T2-01	JF-T2-02	JF-T2-03	JF-T2-04	JF-T2-05	JF-T2-06	JF-T2-07	JF-T2-08	JF-T2-09	JF-T2-10	JF-T2-11	JF-T2-12
1	NORMAL	BOTH PORTALS	NONE	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	TEST	BOTH PORTALS	VENTILATE NORTH	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
3	TEST	BOTH PORTALS	VENTILATE SOUTH	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
4	TEMPERATURE CONTROL	BOTH PORTALS	VENTILATE IN DIRECTION OF TRAIN TRAVEL – NORTH	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
5	TEMPERATURE CONTROL	BOTH PORTALS	VENTILATE IN DIRECTION OF TRAIN TRAVEL – SOUTH	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
6	EMERGENCY	BOTH PORTALS	SMOKE VENTILATION NORTH	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
7	EMERGENCY	BOTH PORTALS	SMOKE VENTILATION SOUTH	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

NOTES

1. THIS MODE TABLE SHALL BE IMPLEMENTED WITH CONTROL SEQUENCE STATEMENT.

2. JET FANS MAY OPERATE IN FORWARD OR REVERSE PENDING DESIRED VENTILATION AIR MOVEMENT STATED AS SOUTH OR NORTH DIRECTION. FOR EXAMPLE, SOUTH DIRECTION MEANS TUNNEL AIR WILL EXHAUST IN THE SOUTH PORTAL AND NORTH PORTAL WILL BE THE AIR INTAKE. ONCE JET FANS ARE ENERGIZED THEY ALL SHALL OPERATE IN THE SAME INDICATED DIRECTION.

3. EACH HALF–TUNNEL HAS TWELVE (12) JET FANS AVAILABLE. EIGHT (8) OPERATING FANS ARE THE MINIMUM REQUIREMENT FOR EMERGENCY OPERATION. IN EMERGENCY MODE OF OPERATION ALL AVAILABLE (UP TO 12) JET FANS WILL BE ENERGIZED.

4. IN TEMPERATURE CONTROL MODE OF OPERATION FANS WILL BE ENERGIZED TWO (2) FANS AT A TIME UNTIL THE TEMPERATURE IS BROUGHT BACK TO THE SETPOINT. ONCE THE SETPOINT IS ACHIEVED JET FANS WILL BE DE–ENERGIZED ONE (1) FAN AT A TIME. ON A TEMPERATURE RISE THE SEQUENCE SHALL REVERSE. FAN(S) SHALL OPERATE UNTIL THE TEMPERATURE INSIDE TUNNEL SHOWS CONTINOUS DECREASE BELOW SETPOINT. WHEN THE TEMPERATURE DROPS 10 DEGREES F BELOW SETPOINT THE JET FAN(S) SHALL BE DE–ENERGIZED.

5. THE MODE TABLE DOES NOT ADDRESS MANUAL OVERRIDES COMMANDS. WHEN THE MANUAL OPERATION IS OVER THE FANS SHALL RESET TO THIS MODE TABLE. WHEN THE FANS ARE IN THE MANUAL OVERRIDE MODE ALARM LIGHT(S) SHALL BE ACTIVATED AT LOCAL MCC, CONTROL PANELS AT THE END OF PORTALS AND RCC, AS APPLICABLE.

6. TEST MODES ARE DESIGNED TO MITIGATE NOISE POLLUTION AND YET TEST EACH FAN OPERATING IN FORWARD AND REVERSE ONCE A YEAR. IN THE TEST MODE ONLY ONE (1) FAN WILL BE ENERGIZED AT A TIME, FOR A 10 MINUTE DURATION. THOSE TESTS MAY BE STAGGERED OVER A PERIOD OF DAYS.

7. T1 = TRACK 1

8. T2 = TRACK 2

9. JF = JET FAN

10. "ON" INDICATES OPERATION OF FAN PER THIS MODE TABLE AND CONTROL SEQUENCE.

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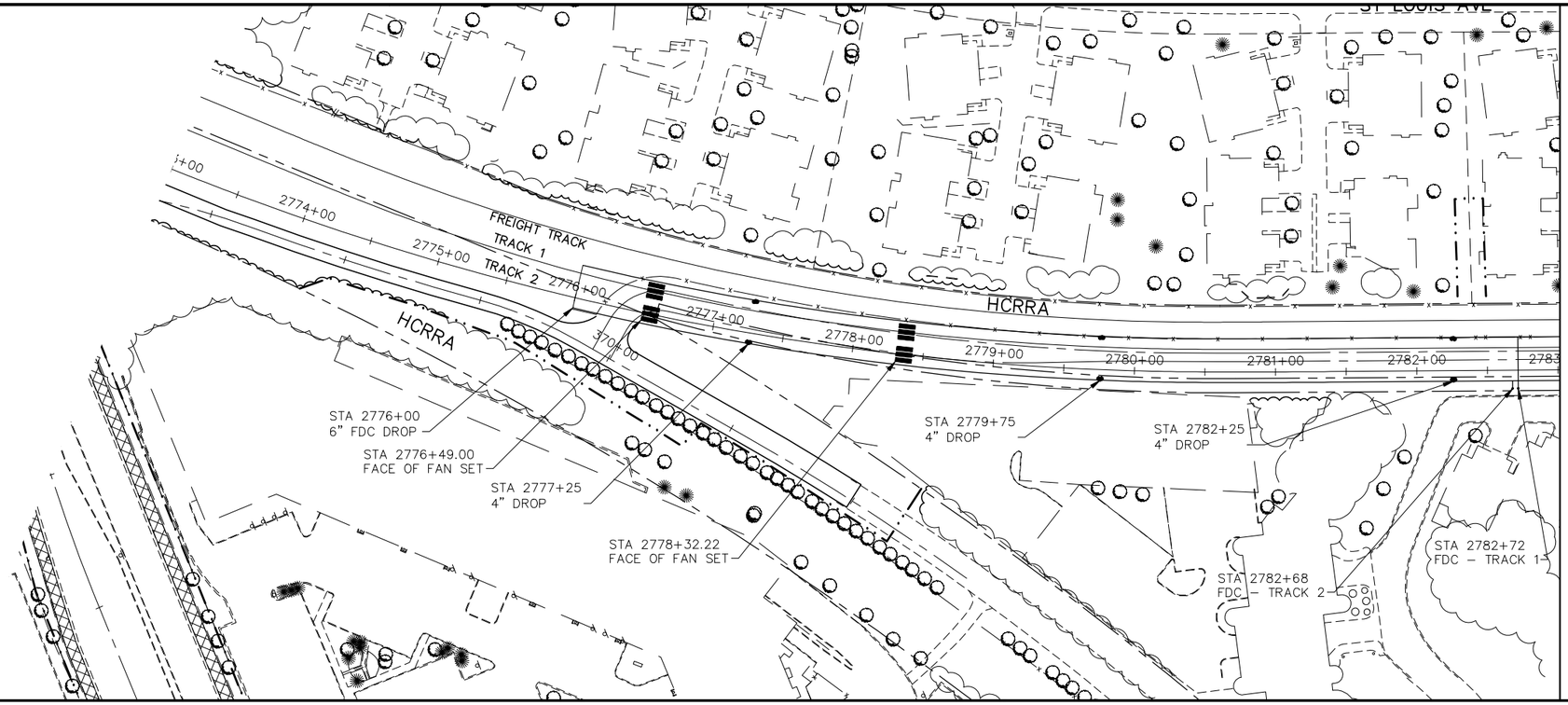
METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
MODE TABLE
TUNNEL JET FANS

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-311



MATCH LINE - STA. 2783+00

0 50 100 150 FT.
1" = 50'-0"

NOTES:
1. STANDPIPE SYSTEM HAS 6" VERTICAL DROPS AT EACH END OF THE TUNNEL. THE SYSTEM ALSO HAS 4" DROPS SPACED NO MORE THAN 260 FEET APART. EACH 4" DROP MUST BE RECESSED INTO THE STRUCTURAL WALLS OF THE TUNNEL TO MEET ACCESSIBLE REQUIREMENTS OF THE PEDESTRIAN WALKWAY. COORDINATE DESIGN WITH LOCATION OF CONSTRUCTION CELLS, OTHER SYSTEMS AND PROJECT REQUIREMENTS.
2. TRAIL NOT SHOWN FOR CLARITY OF TRACK AND FIRE LIFE SAFETY SYSTEM LAYOUT.

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EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
LOCATIONS OF JET FANS & STANDPIPE
STA. 2773+00 TO STA. 2783+00

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-313

SHEET 229 OF 240

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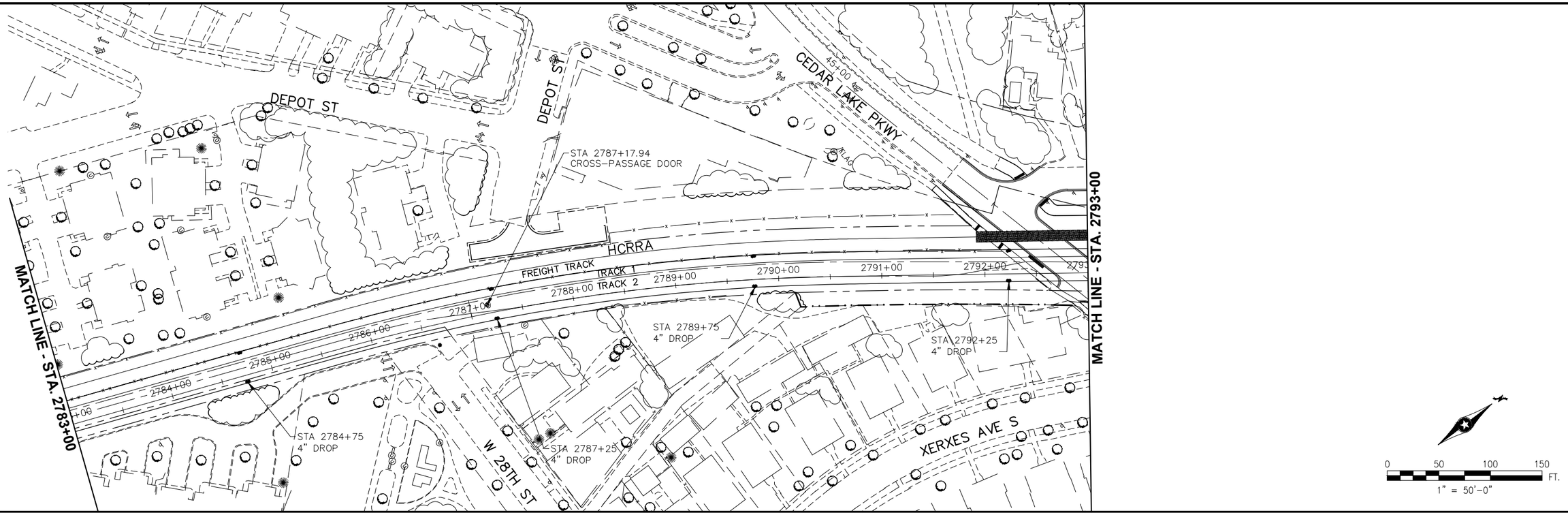

NOTES:

1. STANDPIPE SYSTEM HAS 6" VERTICAL DROPS AT EACH END OF THE TUNNEL. THE SYSTEM ALSO HAS 4" DROPS SPACED NO MORE THAN 260 FEET APART. EACH 4" DROP MUST BE RECESSED INTO THE STRUCTURAL WALLS OF THE TUNNEL TO MEET ACCESSIBLE REQUIREMENTS OF THE PEDESTRIAN WALKWAY. COORDINATE DESIGN WITH LOCATION OF CONSTRUCTION CELLS, OTHER SYSTEMS AND PROJECT REQUIREMENTS.
2. TRAIL NOT SHOWN FOR CLARITY OF TRACK AND FIRE LIFE SAFETY SYSTEM LAYOUT.

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METROPOLITAN COUNCIL

SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
LOCATIONS OF JET FANS & STANDPIPE
STA. 2783+00 TO STA. 2793+00

DISCIPLINE: SYSTEMS

SHEET NAME: E3-FLS-DTL-314

SHEET 230 OF 240

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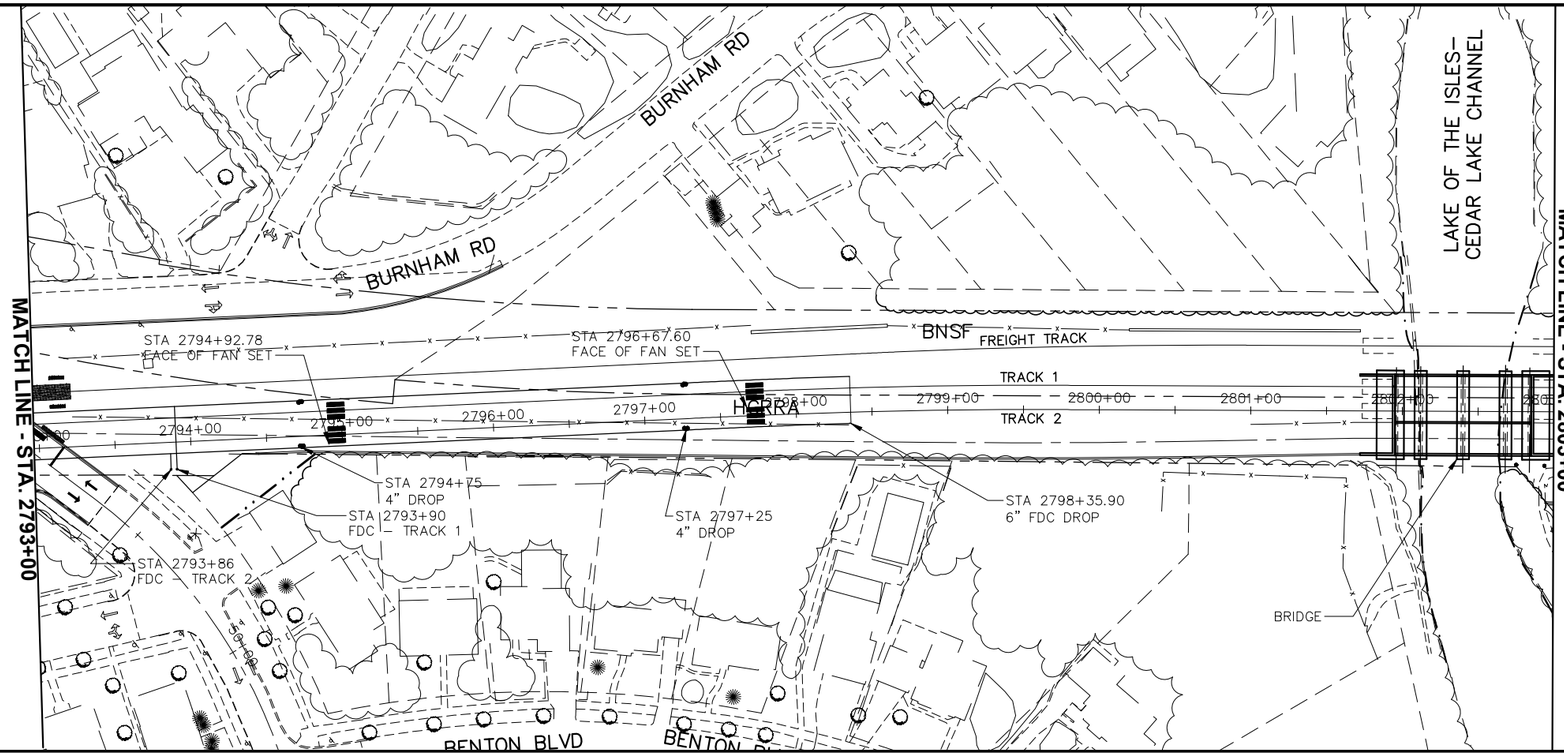

NOTES:

1. STANDPIPE SYSTEM HAS 6" VERTICAL DROPS AT EACH END OF THE TUNNEL. THE SYSTEM ALSO HAS 4" DROPS SPACED NO MORE THAN 260 FEET APART. EACH 4" DROP MUST BE RECESSED INTO THE STRUCTURAL WALLS OF THE TUNNEL TO MEET ACCESSIBLE REQUIREMENTS OF THE PEDESTRIAN WALKWAY. COORDINATE DESIGN WITH LOCATION OF CONSTRUCTION CELLS, OTHER SYSTEMS AND PROJECT REQUIREMENTS.
2. TRAIL NOT SHOWN FOR CLARITY OF TRACK AND FIRE LIFE SAFETY SYSTEM LAYOUT.

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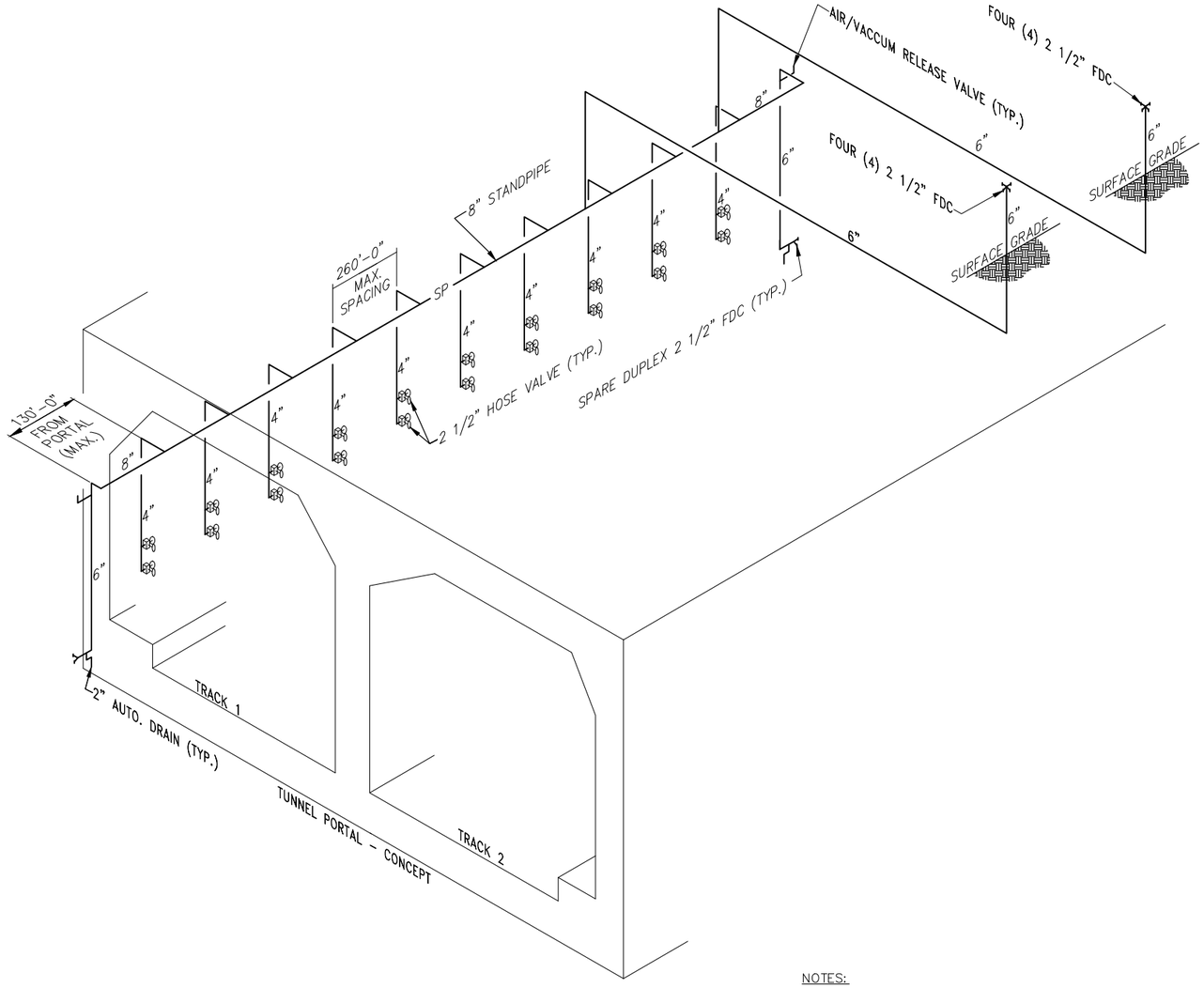
METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
LOCATIONS OF JET FANS & STANDPIPE
STA. 2793+00 TO STA. 2803+00

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-315

SHEET 231 OF 240



DRY STANDPIPE DESIGN CRITERIA

1. THE TUNNEL FIRE PROTECTION SYSTEM SHALL BE HYDRAULICALLY DESIGNED AS FOLLOWS:
   - NFPA-14, LATEST EDITION.
   - CLASS I – MANUAL DRY STANDPIPE SYSTEM.
   - 500 GPM FLOWING THRU THE MOST REMOTE HOSE VALVE.
   - 250 GPM AT EACH OF TWO (2) OTHER STANDPIPE HOSE VALVES.
   - MAXIMUM DESIGN FLOW RATE SHALL BE 1,250 GPM.
   - MINIMUM RESIDUAL PRESSURE AT ANY HOSE VALVE SHALL BE 100 PSIG.
   - HOSE VALVES SHALL BE LOCATED TO PROVIDE 100% HOSE STREAM COVERAGE USING 100' OF HOSE AND 30' OF WATER SPRAY.
   - ALL STANDPIPE HOSE VALVES SHALL BE EQUIPPED WITH 2 ½" CAP AND CHAIN. HOSE VALVE OUTLETS CONNECTION SHALL MEET LOCAL FIRE DEPARTMENT STANDARDS.
   - ALL ZONE VALVES SHALL HAVE LOCKING CAPABILITY AND MONITORING. ALL ZONE VALVES SHALL BE NORMALLY OPEN.
2. THE INSTALLATION AND MAINTENANCE OF STANDPIPE SYSTEMS SHALL BE IN ACCORDANCE WITH NFPA-14 AND NFP-25, AND AHJ.
3. STANDPIPE DESIGN SHALL HAVE MEANS OF PREVENTING VACUUM, ALLOW RELEASE OF AIR AND DRAINAGE.
4. STANDPIPE DESIGN SHALL HAVE FEATURES TO ACCOMMODATE THERMAL EXPANSION.
5. USE OF APPROVED CHECK VALVE(S) ON FDC TO BE VERIFIED WITH AHJ.

DRY STANDPIPE SYSTEM COMPONENTS

1. ALL STANDPIPES SHALL BE SCHEDULE 30 MINIMUM FULLY GALVANIZED STEEL PIPE, DUCTILE IRON PIPE OR EQUIVALENT.
2. ALL FITTINGS SHALL BE DUCTILE IRON FOR GROOVED PIPING, MALLEABLE IRON FOR SCREWED JOINTS OR STEEL FLANGED.
3. ALL VALVES SHALL BE DUCTILE IRON OR BRASS.
4. ALL PIPE HANGERS, MATERIALS, PIPE SUPPORTS, DEVICES AND INSTALLATION SHALL BE IN ACCORDANCE WITH NFPA-13 AND AHJ.
5. ALL PIPING SHALL HAVE SWAY BRACES PER NFPA-13, LATEST EDITION.
6. ALL HANGERS, SUPPORTS, MATERIALS, SWAY BRACES AND FERROUS COMPONENTS SHALL BE HOT DIP GALVANIZED.
7. ALL ELECTRICAL DEVICES REQUIRING POWER SHALL BE WIRED BY OTHERS.
8. INSTALLED SYSTEMS SHALL BE HYDRAULICALLY TESTED AT 200 PSIG FOR 2 HOURS OR AT 50 PSIG OVER WORKING PRESSURE ABOVE 150 PSIG.
9. ALL STANDPIPES SYSTEMS SHALL BE PROVIDED WITH MEANS FOR FLUSHING AND SHALL HAVE A TEST CONNECTION AT APPROVED LOCATION.
10. ALL UNDERGROUND (UNDER SOIL COVER) PIPING AND FITTINGS SHALL BE INSTALLED PER NFPA-24 AND AHJ.

NOTES:

1. REFER TO DESIGN CRITERIA NOTES AND DETAILS ON SHEET NAMES E3-FLS-DTL-321 AND E3-FLS-DTL-322.
2. FIRE EXTINGUISHERS ARE NOT SHOWN FOR CLARITY.

TRACK 1
MANUAL CLASS I DRY STANDPIPE DIAGRAM
NTS

1
232

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METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
DRY STANDPIPE CONCEPTUAL DIAGRAM
TRACK 1

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-319

SHEET 232 OF 240

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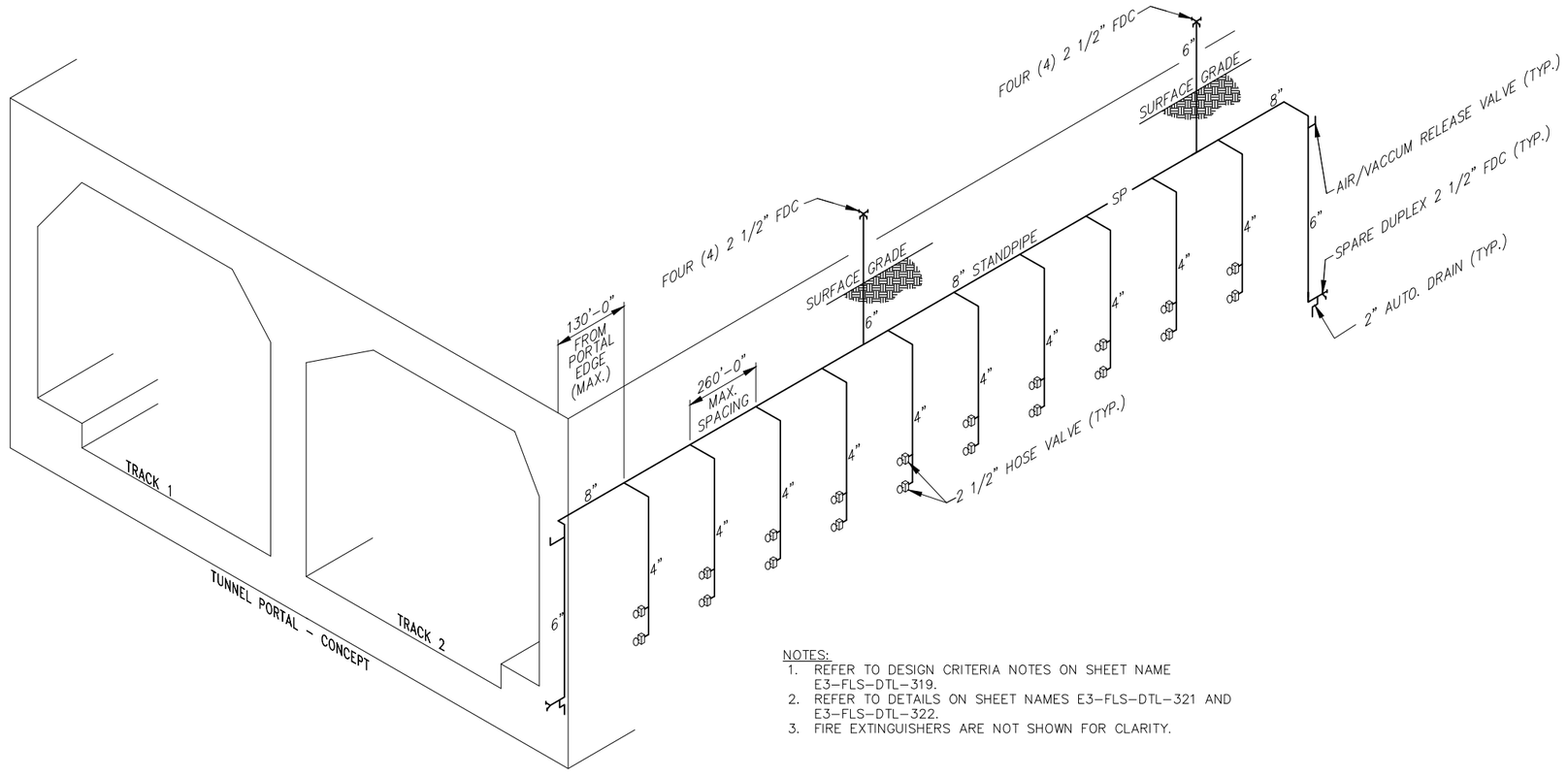

NOTES:
1. REFER TO DESIGN CRITERIA NOTES ON SHEET NAME E3-FLS-DTL-319.
2. REFER TO DETAILS ON SHEET NAMES E3-FLS-DTL-321 AND E3-FLS-DTL-322.
3. FIRE EXTINGUISHERS ARE NOT SHOWN FOR CLARITY.

TRACK 2
MANUAL CLASS I DRY STANDPIPE DIAGRAM — 1/233
NTS

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SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
DRY STANDPIPE CONCEPTUAL DIAGRAM
TRACK 2

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-320

SHEET 233 OF 240

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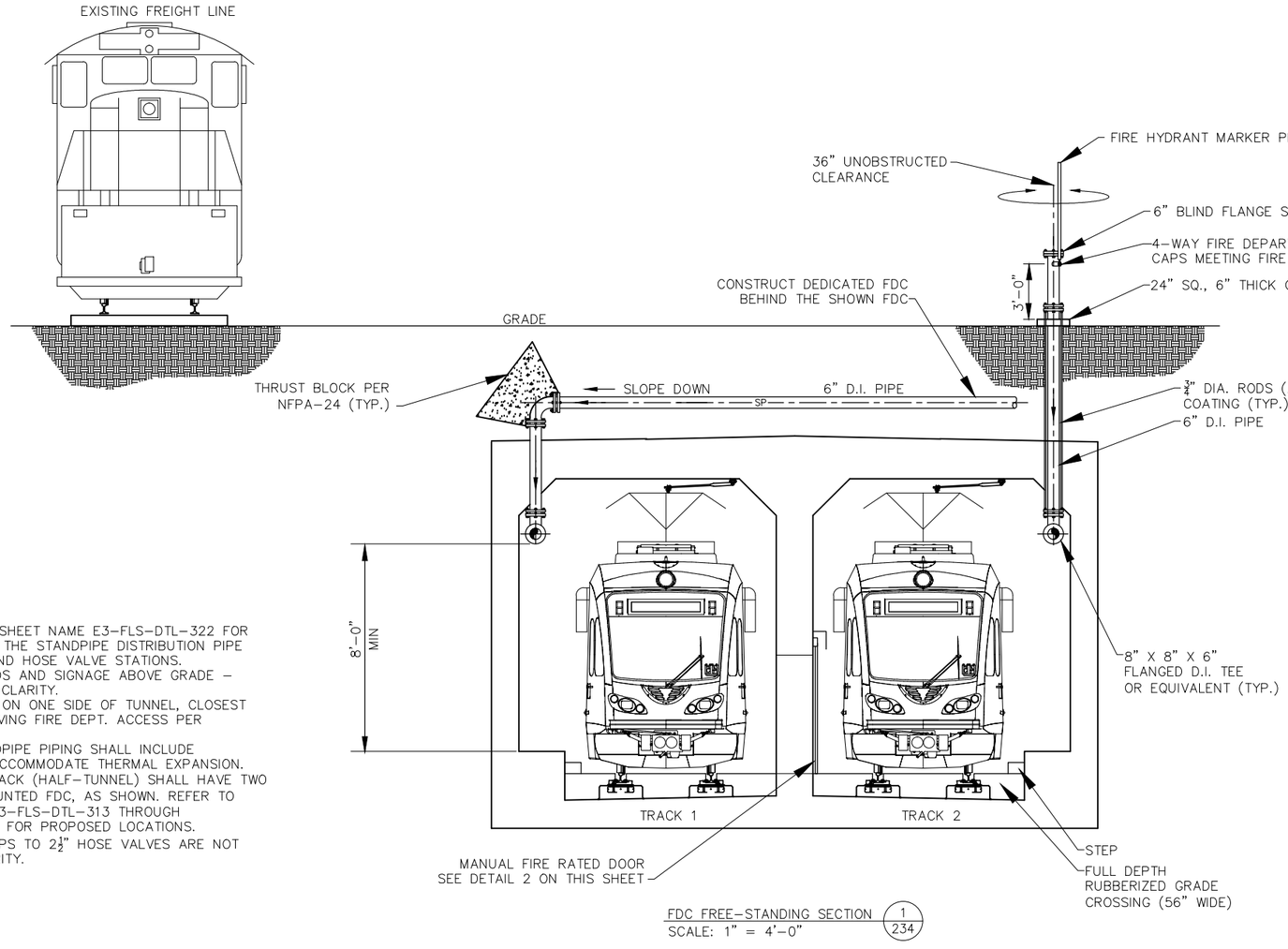
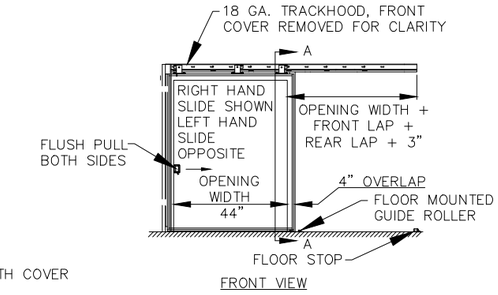
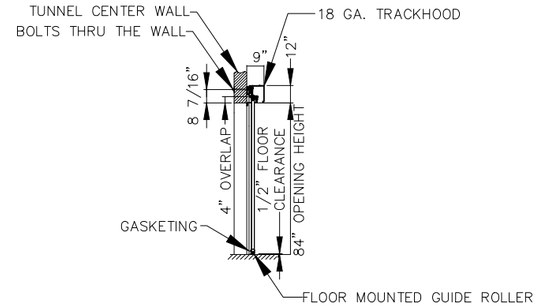


FDC FREE-STANDING SECTION (1/234)
SCALE: 1" = 4'-0"

NOTES:
1. SEE DETAILS ON SHEET NAME E3-FLS-DTL-322 FOR CONNECTIONS TO THE STANDPIPE DISTRIBUTION PIPE INSIDE TUNNEL AND HOSE VALVE STATIONS.
2. PROVIDE BOLLARDS AND SIGNAGE ABOVE GRADE – NOT SHOWN FOR CLARITY.
3. LOCATE ALL FDC ON ONE SIDE OF TUNNEL, CLOSEST TO ROADWAYS GIVING FIRE DEPT. ACCESS PER NFPA-130.
4. DESIGN OF STANDPIPE PIPING SHALL INCLUDE PROVISIONS TO ACCOMMODATE THERMAL EXPANSION.
5. EACH TUNNEL TRACK (HALF-TUNNEL) SHALL HAVE TWO (2) SURFACE MOUNTED FDC, AS SHOWN. REFER TO SHEETS NAMES E3-FLS-DTL-313 THROUGH E3-FLS-DTL-315 FOR PROPOSED LOCATIONS.
6. 4" VERTICAL DROPS TO 2½" HOSE VALVES ARE NOT SHOWN FOR CLARITY.



FRONT VIEW



SECTION "A-A"

NOTES:
1. MANUAL OPEN/MANUAL CLOSE OPERATION
2. TYPE 304 SS CONSTRUCTION
3. PROVIDE LIMIT SWITCHES TO SIGNAL DOOR OPEN AND DOOR CLOSED.

MANUAL SLIDING FIRE RATED DOOR (2/234)
"B" LABEL 1 1/2 HR. UL RATED
SCALE: NTS

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METROPOLITAN COUNCIL
SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
DRY STANDPIPE
TYPICAL SECTION

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-321

SHEET 234 OF 240

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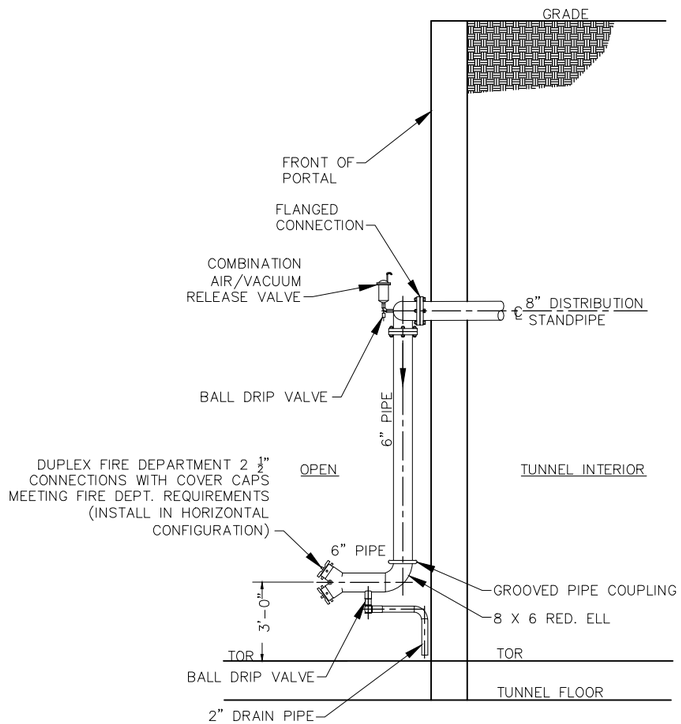
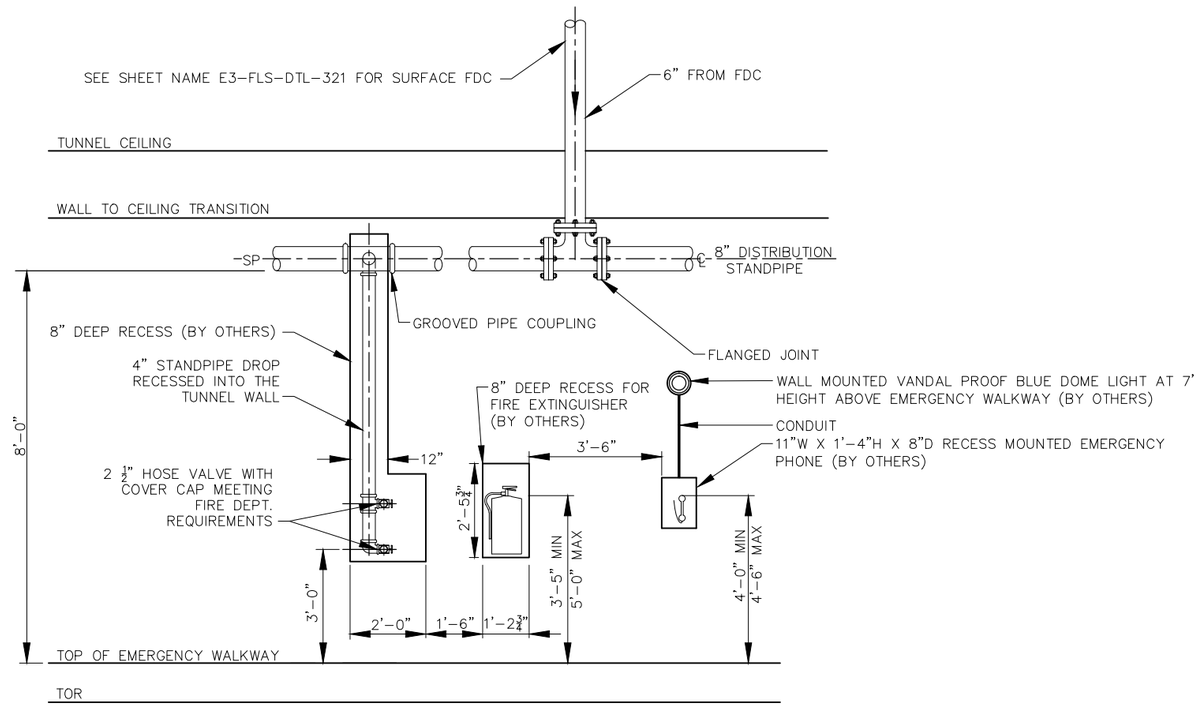


NOTES:

1. TOTAL OF FOUR (4) SPARE FDC, AUTOMATIC DRAINS AND AIR/VACUUM VALVES ARE REQUIRED.
2. TYPE OF PIPE JOINTS ARE DEPENDENT ON THE PIPING USED. SHOWN CONNECTIONS ARE FOR ILLUSTRATION ONLY.
3. LOCATE FDC OUTSIDE PORTAL, OUT OF THE TUNNEL CROSS-SECTION.

SPARE FDC/HOSE VALVES AT EDGE OF PORTAL DETAIL — 1/235
NTS



NOTES:

1. INSTALL 2 1/2" HOSE VALVE STATIONS AT MAXIMUM DISTANCE OF 260', ON CENTER.
2. PROVIDE FIRE EXTINGUISHERS AT MAXIMUM DISTANCE OF OF 300', ON CENTER.
3. FIRE EXTINGUISHERS SHALL BE TYPE 2A:20-B:C, 20 LBS.
4. DIMENSIONS OF THE FIRE EXTINGUISHER RECESS ARE BASED ON POTTER ROEMER NO. 1706 CABINET.
5. EACH TUNNEL TRACK (HALF-TUNNEL) SHALL HAVE TWO (2) SURFACE MOUNTED FDC, AS SHOWN. REFER TO SHEET NAMES E3-FLS-DTL-313 THROUGH E3-FLS-DTL-315 FOR PROPOSED LOCATIONS.
6. HOSE VALVES RECESSED CABINET DIMENSIONS ARE BASED ON CROWNLINE NO. 6015.

2 1/2" HOSE VALVES INSIDE TUNNEL DETAIL — 2/235
NTS

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SOUTHWEST

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY (TUNNEL VENTILATION)
DRY STANDPIPE TYPICAL DETAILS

DISCIPLINE: SYSTEMS
SHEET NAME: E3-FLS-DTL-322

SHEET 235 OF 240

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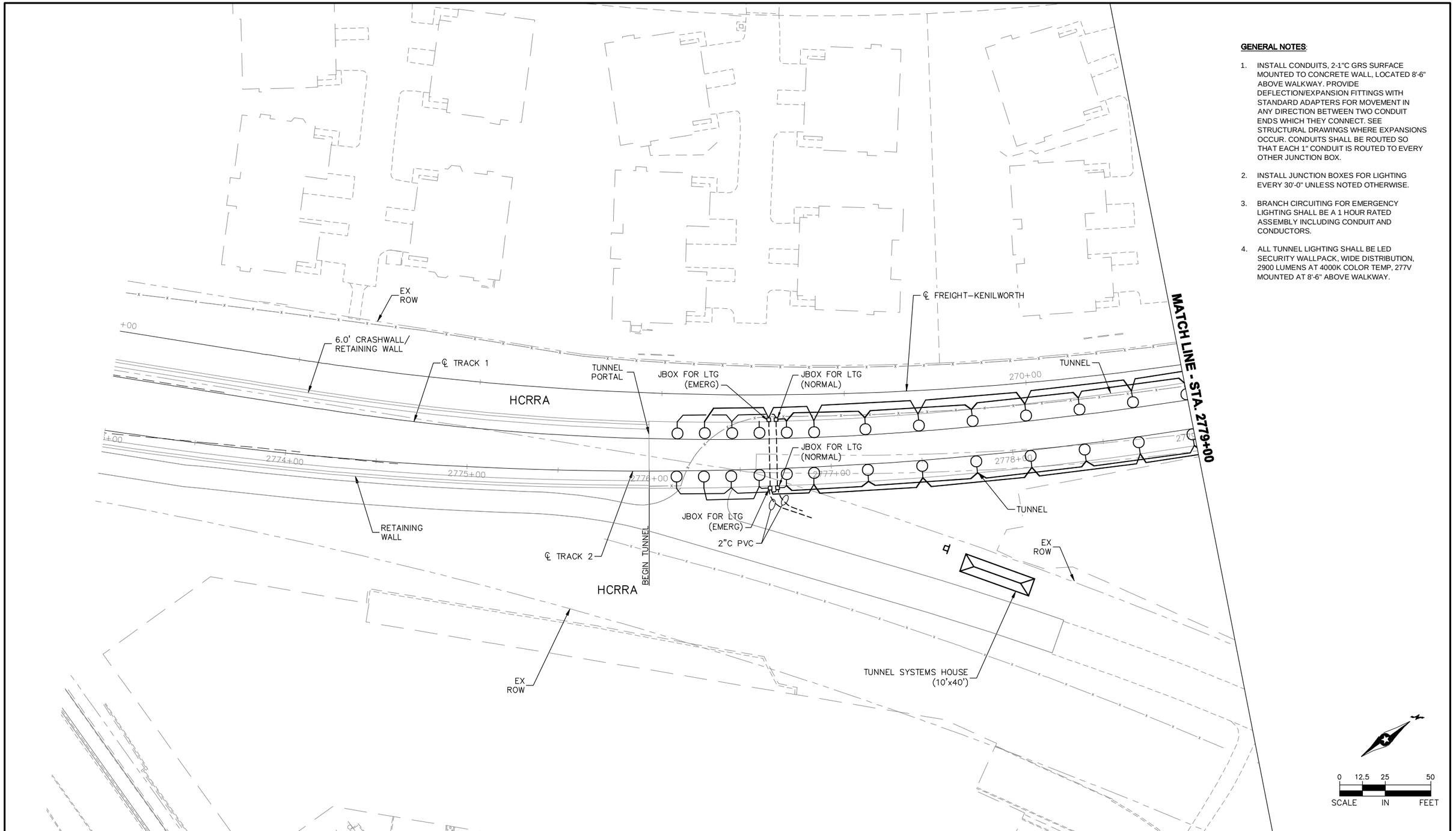

GENERAL NOTES:

1. INSTALL CONDUITS, 2-1"C GRS SURFACE MOUNTED TO CONCRETE WALL, LOCATED 8'-6" ABOVE WALKWAY. PROVIDE DEFLECTION/EXPANSION FITTINGS WITH STANDARD ADAPTERS FOR MOVEMENT IN ANY DIRECTION BETWEEN TWO CONDUIT ENDS WHICH THEY CONNECT. SEE STRUCTURAL DRAWINGS WHERE EXPANSIONS OCCUR. CONDUITS SHALL BE ROUTED SO THAT EACH 1" CONDUIT IS ROUTED TO EVERY OTHER JUNCTION BOX.
2. INSTALL JUNCTION BOXES FOR LIGHTING EVERY 30'-0" UNLESS NOTED OTHERWISE.
3. BRANCH CIRCUITING FOR EMERGENCY LIGHTING SHALL BE A 1 HOUR RATED ASSEMBLY INCLUDING CONDUIT AND CONDUCTORS.
4. ALL TUNNEL LIGHTING SHALL BE LED SECURITY WALLPACK, WIDE DISTRIBUTION, 2900 LUMENS AT 4000K COLOR TEMP, 277V MOUNTED AT 8'-6" ABOVE WALKWAY.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY SYSTEMS
TUNNEL LIGHTING
STA. 2773+00 TO STA. 2779+00

DISCIPLINE: SYSTEMS

SHEET NAME: FLS-ELE-TUNL-001

SHEET 236 OF 240

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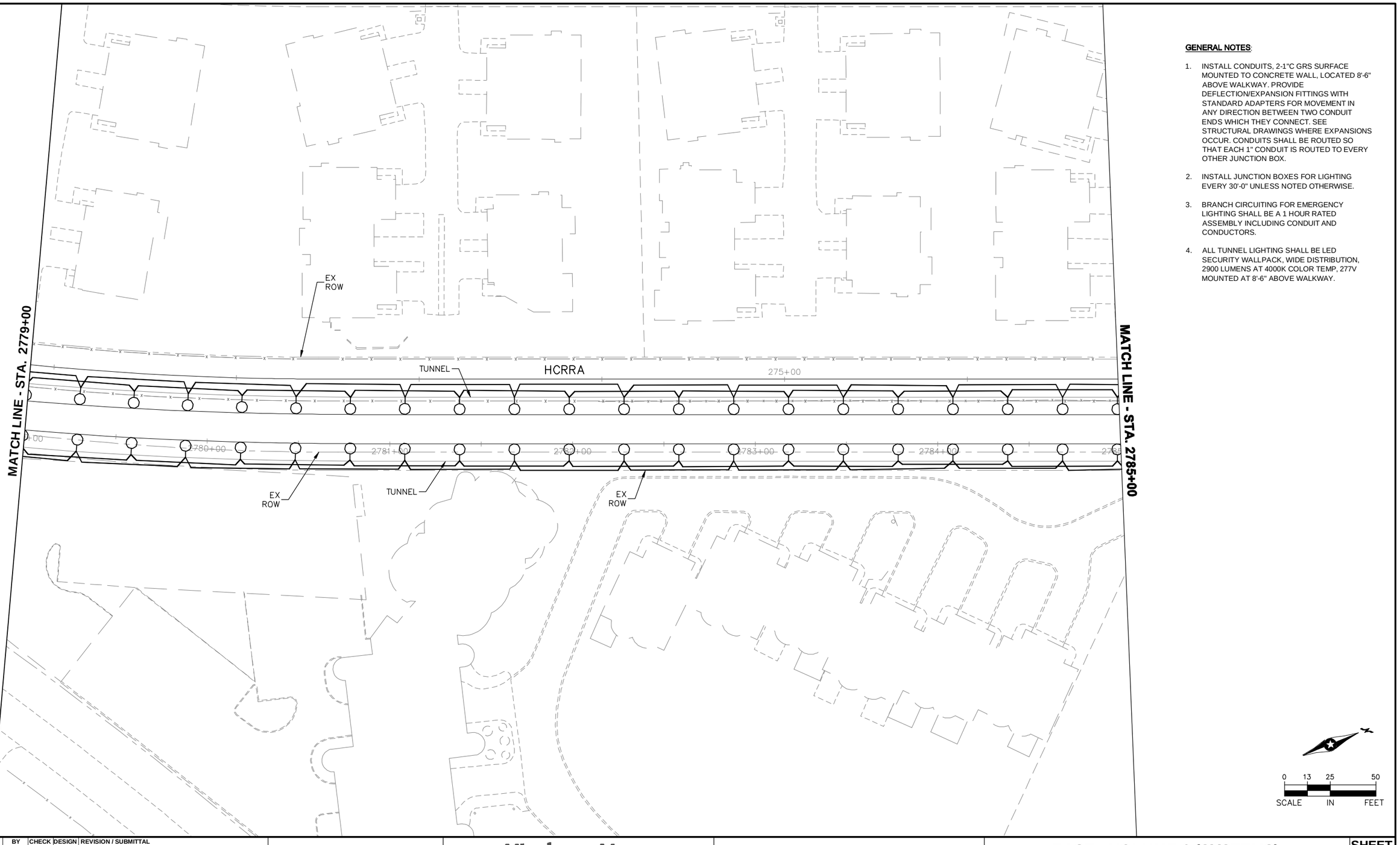

GENERAL NOTES:

1. INSTALL CONDUITS, 2-1"C GRS SURFACE MOUNTED TO CONCRETE WALL, LOCATED 8'-6" ABOVE WALKWAY. PROVIDE DEFLECTION/EXPANSION FITTINGS WITH STANDARD ADAPTERS FOR MOVEMENT IN ANY DIRECTION BETWEEN TWO CONDUIT ENDS WHICH THEY CONNECT. SEE STRUCTURAL DRAWINGS WHERE EXPANSIONS OCCUR. CONDUITS SHALL BE ROUTED SO THAT EACH 1" CONDUIT IS ROUTED TO EVERY OTHER JUNCTION BOX.
2. INSTALL JUNCTION BOXES FOR LIGHTING EVERY 30'-0" UNLESS NOTED OTHERWISE.
3. BRANCH CIRCUITING FOR EMERGENCY LIGHTING SHALL BE A 1 HOUR RATED ASSEMBLY INCLUDING CONDUIT AND CONDUCTORS.
4. ALL TUNNEL LIGHTING SHALL BE LED SECURITY WALLPACK, WIDE DISTRIBUTION, 2900 LUMENS AT 4000K COLOR TEMP, 277V MOUNTED AT 8'-6" ABOVE WALKWAY.

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SCALE IN FEET

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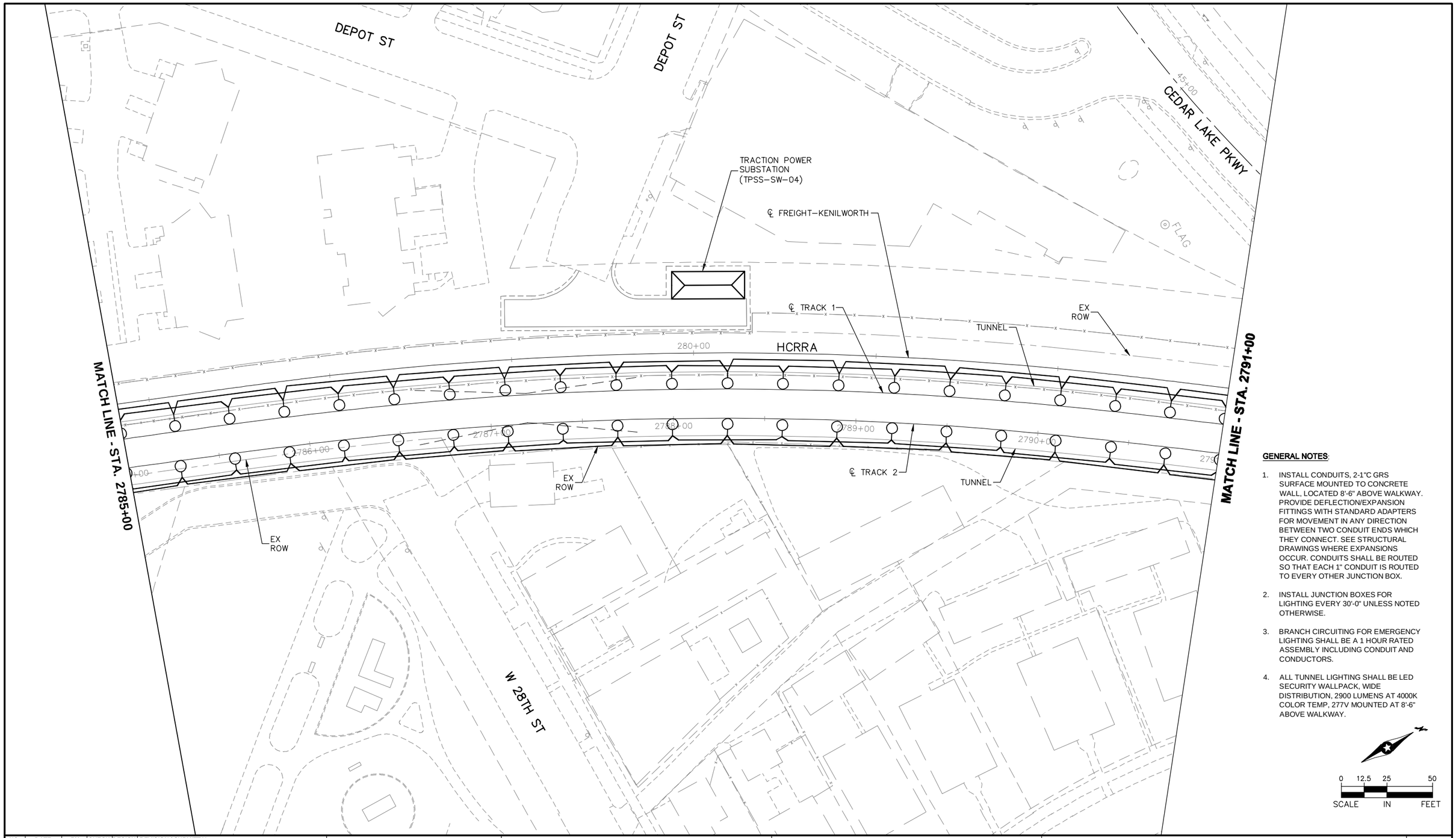
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY SYSTEMS
TUNNEL LIGHTING
STA. 2779+00 TO STA. 2785+00

DISCIPLINE: SYSTEMS
SHEET NAME: FLS-ELE-TUNL-002

SHEET 237 OF 240



GENERAL NOTES:

1. INSTALL CONDUITS, 2-1"C GRS SURFACE MOUNTED TO CONCRETE WALL, LOCATED 8'-6" ABOVE WALKWAY. PROVIDE DEFLECTION/EXPANSION FITTINGS WITH STANDARD ADAPTERS FOR MOVEMENT IN ANY DIRECTION BETWEEN TWO CONDUIT ENDS WHICH THEY CONNECT. SEE STRUCTURAL DRAWINGS WHERE EXPANSIONS OCCUR. CONDUITS SHALL BE ROUTED SO THAT EACH 1" CONDUIT IS ROUTED TO EVERY OTHER JUNCTION BOX.
2. INSTALL JUNCTION BOXES FOR LIGHTING EVERY 30'-0" UNLESS NOTED OTHERWISE.
3. BRANCH CIRCUITING FOR EMERGENCY LIGHTING SHALL BE A 1 HOUR RATED ASSEMBLY INCLUDING CONDUIT AND CONDUCTORS.
4. ALL TUNNEL LIGHTING SHALL BE LED SECURITY WALLPACK, WIDE DISTRIBUTION, 2900 LUMENS AT 4000K COLOR TEMP, 277V MOUNTED AT 8'-6" ABOVE WALKWAY.

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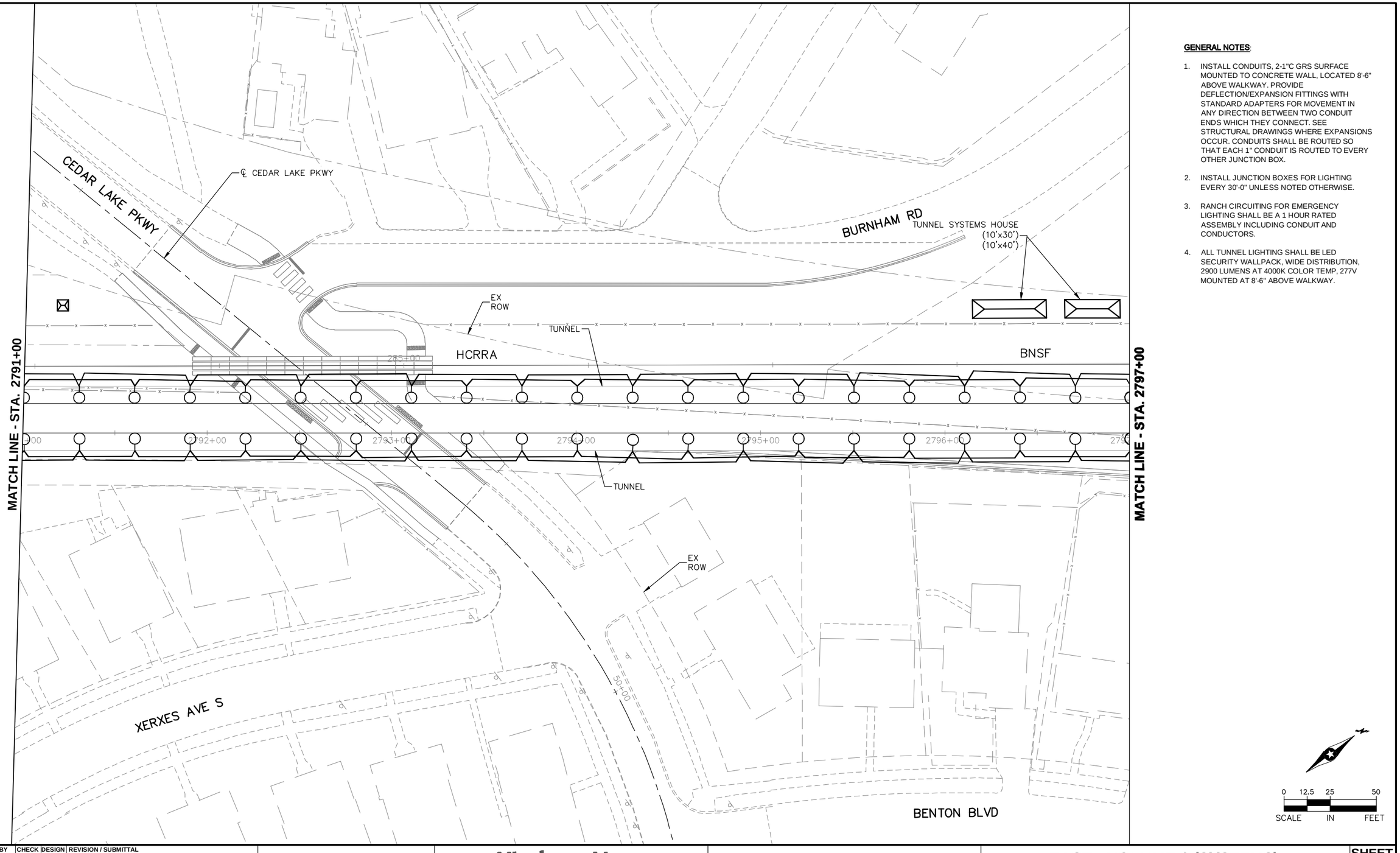
Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY SYSTEMS
TUNNEL LIGHTING
STA. 2785+00 TO STA. 2791+00

DISCIPLINE: SYSTEMS

SHEET NAME: FLS-ELE-TUNL-003

SHEET 238 OF 240



GENERAL NOTES:

1. INSTALL CONDUITS, 2-1"C GRS SURFACE MOUNTED TO CONCRETE WALL, LOCATED 8'-6" ABOVE WALKWAY. PROVIDE DEFLECTION/EXPANSION FITTINGS WITH STANDARD ADAPTERS FOR MOVEMENT IN ANY DIRECTION BETWEEN TWO CONDUIT ENDS WHICH THEY CONNECT. SEE STRUCTURAL DRAWINGS WHERE EXPANSIONS OCCUR. CONDUITS SHALL BE ROUTED SO THAT EACH 1" CONDUIT IS ROUTED TO EVERY OTHER JUNCTION BOX.
2. INSTALL JUNCTION BOXES FOR LIGHTING EVERY 30'-0" UNLESS NOTED OTHERWISE.
3. RANCH CIRCUITING FOR EMERGENCY LIGHTING SHALL BE A 1 HOUR RATED ASSEMBLY INCLUDING CONDUIT AND CONDUCTORS.
4. ALL TUNNEL LIGHTING SHALL BE LED SECURITY WALLPACK, WIDE DISTRIBUTION, 2900 LUMENS AT 4000K COLOR TEMP, 277V MOUNTED AT 8'-6" ABOVE WALKWAY.

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SCALE IN FEET

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EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY SYSTEMS
TUNNEL LIGHTING
STA. 2791+00 TO STA. 2797+00

DISCIPLINE: SYSTEMS
SHEET NAME: FLS-ELE-TUNL-004

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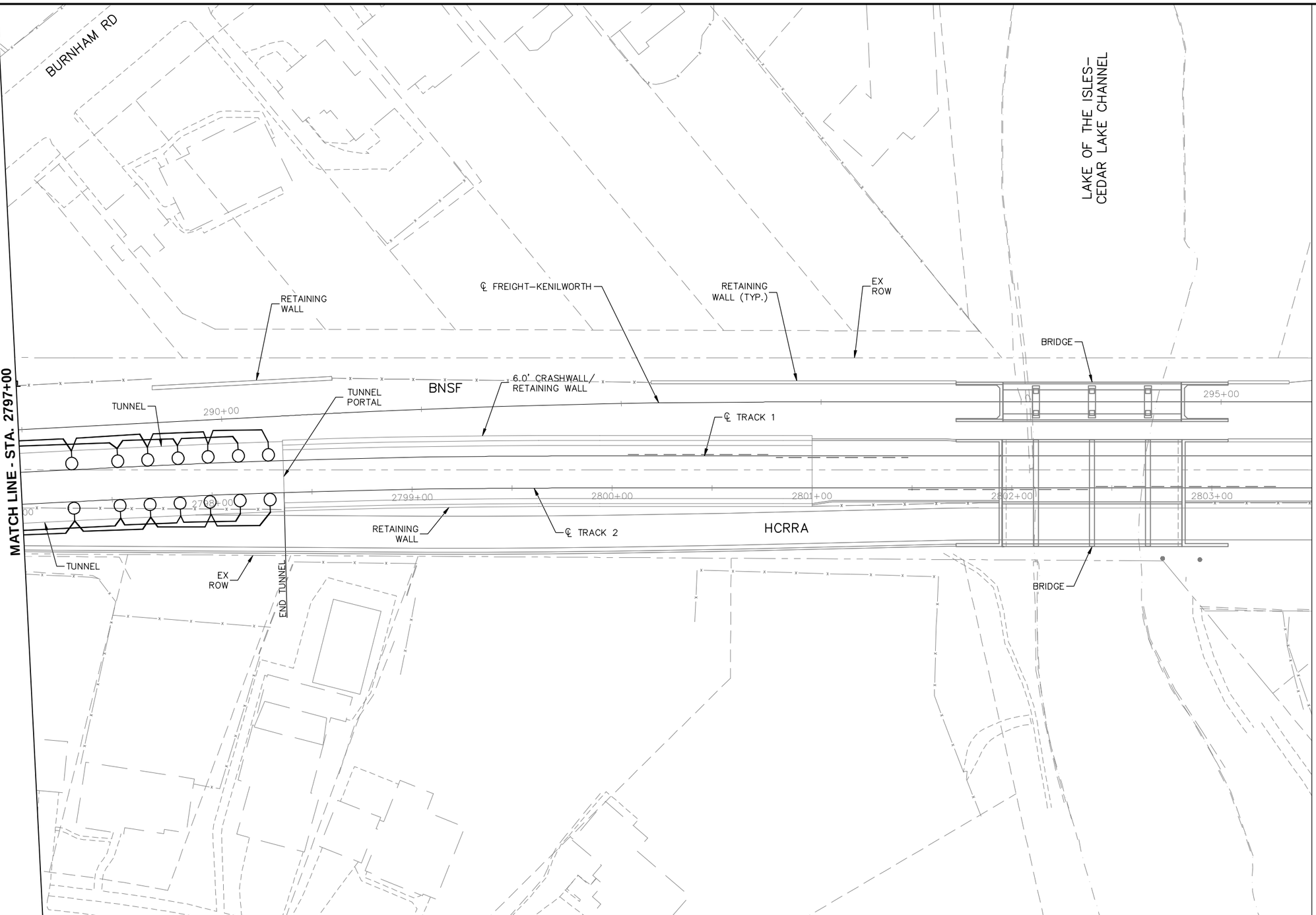

GENERAL NOTES:

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4. ALL TUNNEL LIGHTING SHALL BE LED SECURITY WALLPACK, WIDE DISTRIBUTION, 2900 LUMENS AT 4000K COLOR TEMP, 277V MOUNTED AT 8'-6" ABOVE WALKWAY.

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 3 (SYSTEMS)
FIRE LIFE SAFETY SYSTEMS
TUNNEL LIGHTING
STA. 2797+00 TO STA. 2803+50

DISCIPLINE: SYSTEMS

SHEET NAME: FLS-ELE-TUNL-005

SHEET 240 OF 240