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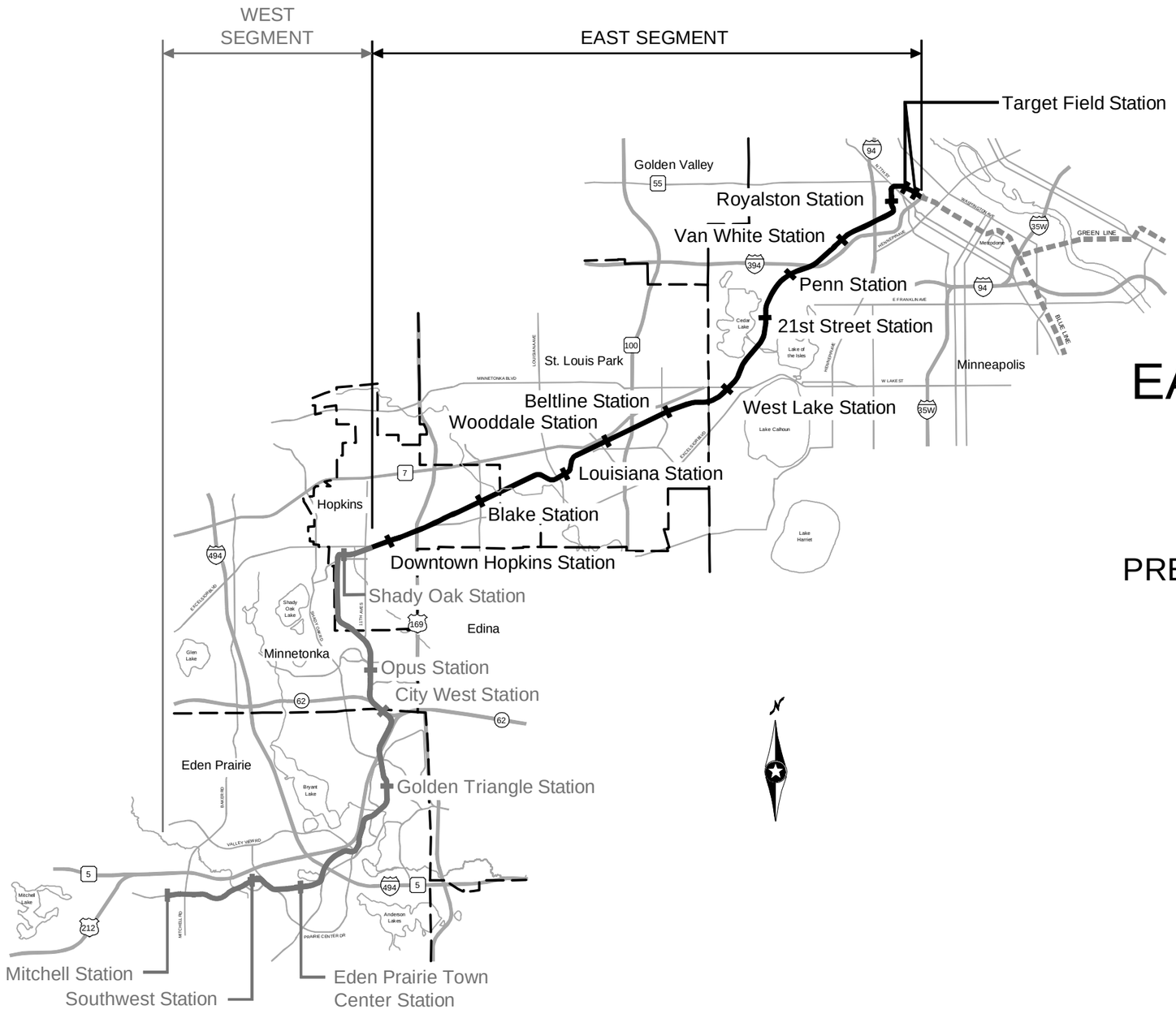

SOUTHWEST
Green Line LRT Extension

METROPOLITAN COUNCIL

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/ KENILWORTH CORRIDOR

PRELIMINARY ENGINEERING (SEPTEMBER 2014)

INDEX

FREIGHT (CP RAIL/TC&W)

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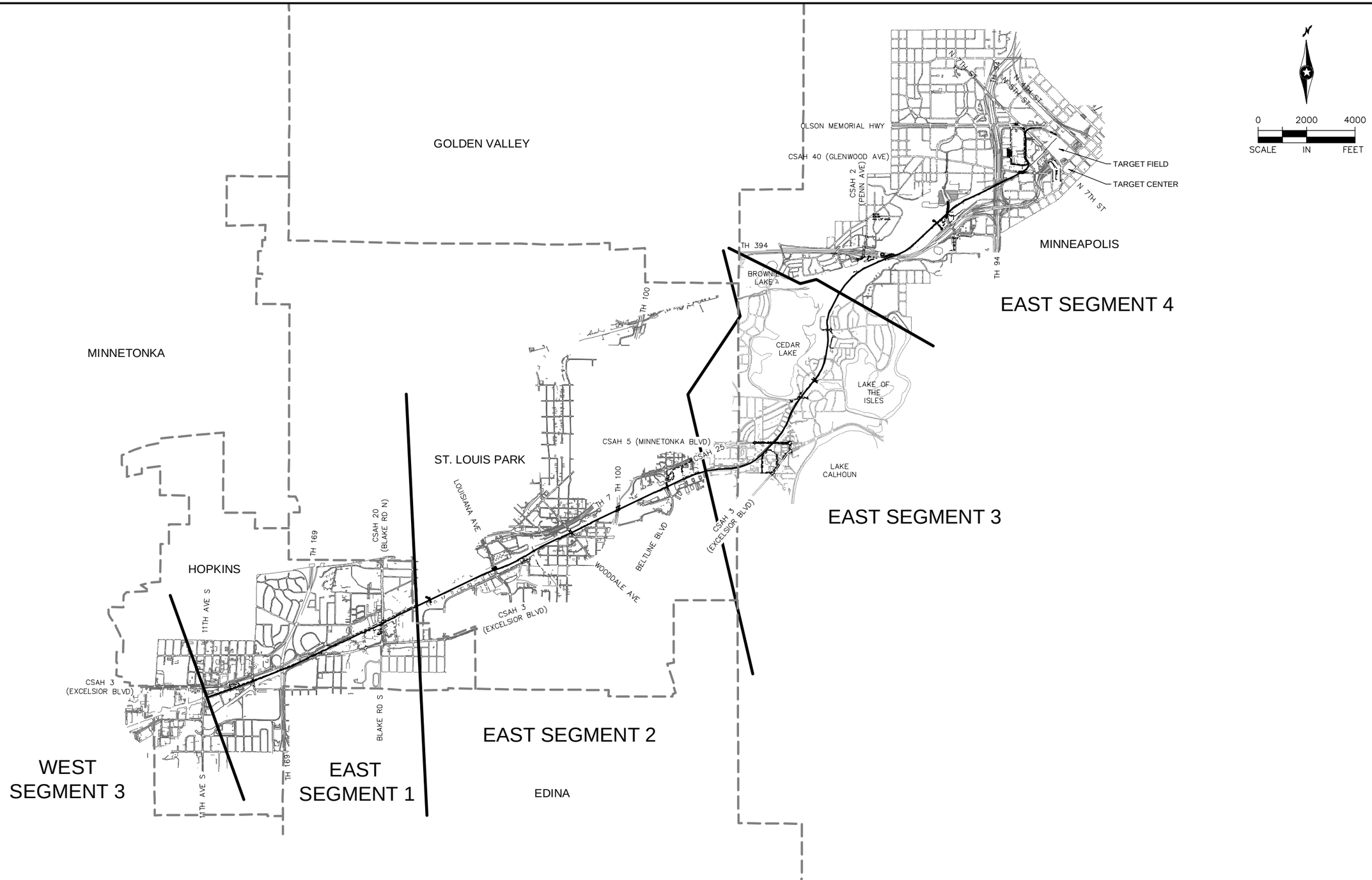
Kimley»Horn Gannett Fleming

PRELIMINARY - NOT FOR CONSTRUCTION

Aug, 29 2014 10:16 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-CVR.dwg By: chris.bunders



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SEGMENT KEY MAP

DISCIPLINE: VOLUME1a

SHEET NAME: E0-FRR-KEY - 001

SHEET 2 OF 61

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TRACK LINETYPES

- TRACK ℄
- RETAINING WALL
- TUNNEL WALL
- ROADWAY ℄
- FENCE
- BALLAST CURB

TRACK SYMBOLS

- SIGNALIZED INTERSECTION
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED DIRECTIONAL LANE USE
- EXISTING DIRECTIONAL LANE USE
- AUTOMATIC GATE
- RAIL TURNOUT
- POINT OF SWITCH (PS)
- 200 — RAILROAD CURVE NUMBER
- 12 — MILE POST

CIVIL LINETYPES

- ROADWAY ℄
- TRACK ℄
- CONCRETE CURB AND GUTTER
- TRAIL
- SIDEWALK
- DRIVEWAY
- BRIDGE
- RETAINING WALL
- TUNNEL WALL
- CROSSWALK
- STOP BAR
- MEDIAN NOSE
- SAWCUT
- FENCE
- LIMITS OF DISTURBANCE
- CONCRETE SIDEWALK JOINTING

CIVIL SYMBOLS

- ACCESSIBLE PEDESTRIAN CURB RAMP
- PROPOSED SIGNALIZED INTERSECTION
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED DIRECTIONAL LANE USE
- EXISTING DIRECTIONAL LANE USE
- AUTOMATIC GATE
- HANDICAP PARKING STALL
- TACTILE WARNING STRIP
- TPSS BUILDING
- SIGNAL OR INTERMEDIATE OR PLATFORM OR XING OR TUNNEL HOUSE OR ANY COMBINATION OF THESE

ABBREVIATIONS

AD	ALGEBRAIC DIFFERENCE	NO	NUMBER
AVE	AVENUE	OCS	OVERHEAD CONTACT SYSTEM
BGN	BEGIN	OH	OVERHEAD
BVCE	BEGINNING VERTICAL CURVE ELEVATION	PC	POINT OF CURVE
BVCS	BEGINNING VERTICAL CURVE STATION	PITO	POINT OF INTERSECTION OF TURNOUT
BLVD	BOULEVARD	PKWY	PARKWAY
BNSF	BURLINGTON NORTHERN SANTA FE RAILWAY	POT	POINT ON TANGENT
C&G	CURB AND GUTTER	PROP	PROPOSED
℄	CENTERLINE	PS	POINT OF SWITCH
CP	CANADIAN PACIFIC	PT	POINT OF TANGENT
CPRAIL	CANADIAN PACIFIC RAILWAY	PVI	POINT OF VERTICAL INTERSECTION
CS	CURVE TO SPIRAL	R	RADIUS (FEET)
CSAH	COUNTY STATE AID HIGHWAY	r	RATE OF CHANGE VERTICAL CURVE
DF	DIRECT FIXATION	RH	RIGHT HAND
DR	DRIVE	ROW	RIGHT OF WAY
Ea	ACTUAL SUPERELEVATION (INCHES)	S	SOUTH
EB	EAST BOUND	SB	SOUTH BOUND
ELEV	ELEVATION	SC	SPIRAL TO CURVE
Eu	UNBALANCED SUPERELEVATION (INCHES)	SIG-COMM	SIGNAL COMMUNICATION
EVCE	ENDING VERTICAL CURVE ELEVATION	ST	STREET
EVCS	ENDING VERTICAL CURVE STATION	ST	SPIRAL TO TANGENT
EX	EXISTING	STA	STATION
HCRRA	HENNEPIN COUNTY REGIONAL RAILROAD AUTHORITY	TOR	TOP OF RAIL
LH	LEFT HAND	TPSS	TRACTION POWER SUBSTATION
Ls	SPIRAL LENGTH (FEET)	TRK	TRACK
MPLS	CITY OF MINNEAPOLIS	TS	TANGENT TO SPIRAL
MPRB	MINNEAPOLIS PARK AND RECREATION BOARD	UG	UNDERGROUND
N	NORTH	V	DESIGN VELOCITY (MPH)
NB	NORTH BOUND	WB	WEST BOUND

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
LEGEND AND ABBREVIATIONS

DISCIPLINE: FREIGHT

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SHEET 3 OF 61

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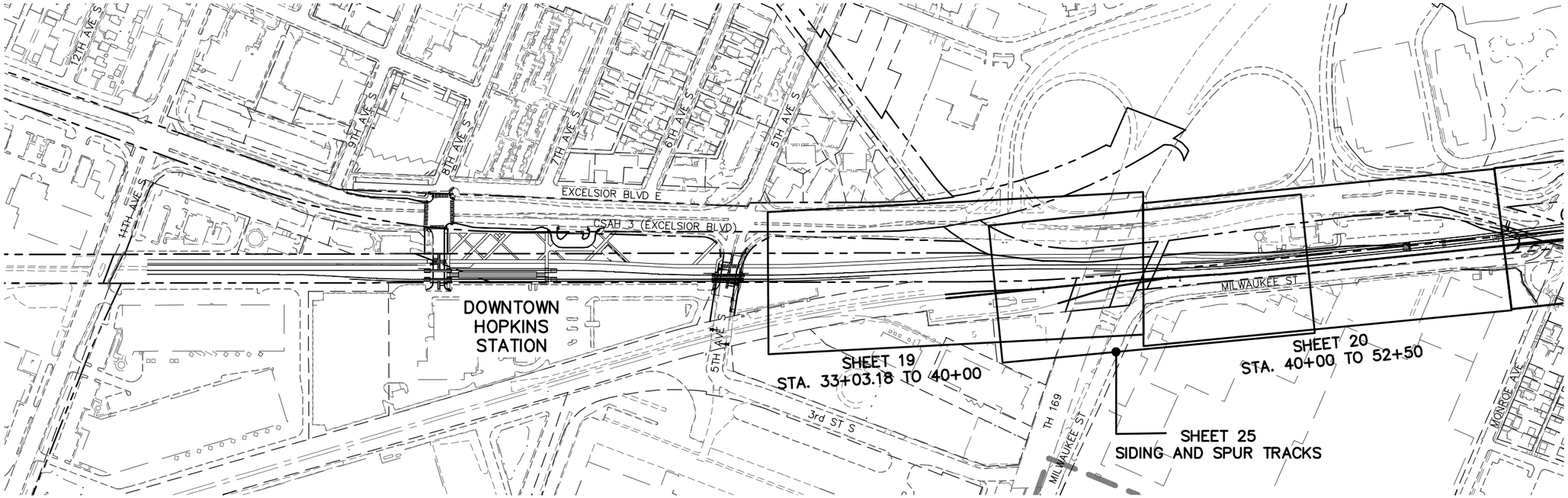

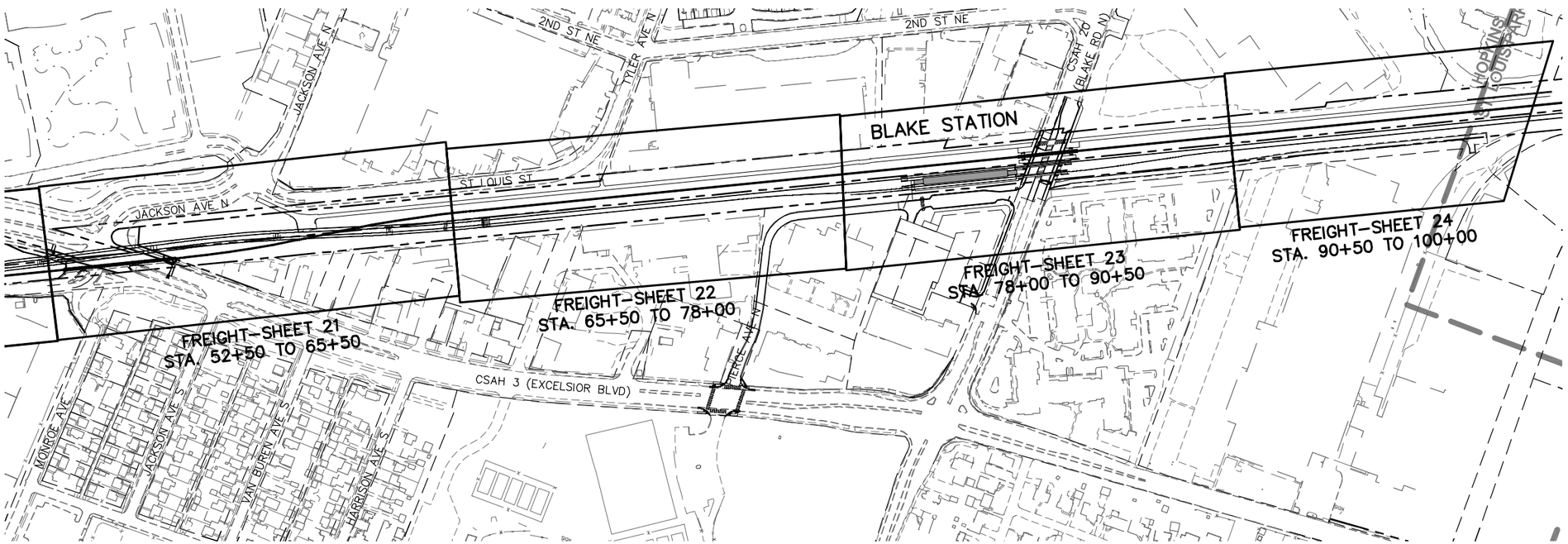

NOTE:
SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 1
SHEETS 7–14 FOR EXISTING CONDITIONS.

0 100 200 400
SCALE IN FEET

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SHEET INDEX

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-IDX - 001

SHEET 4 OF 61

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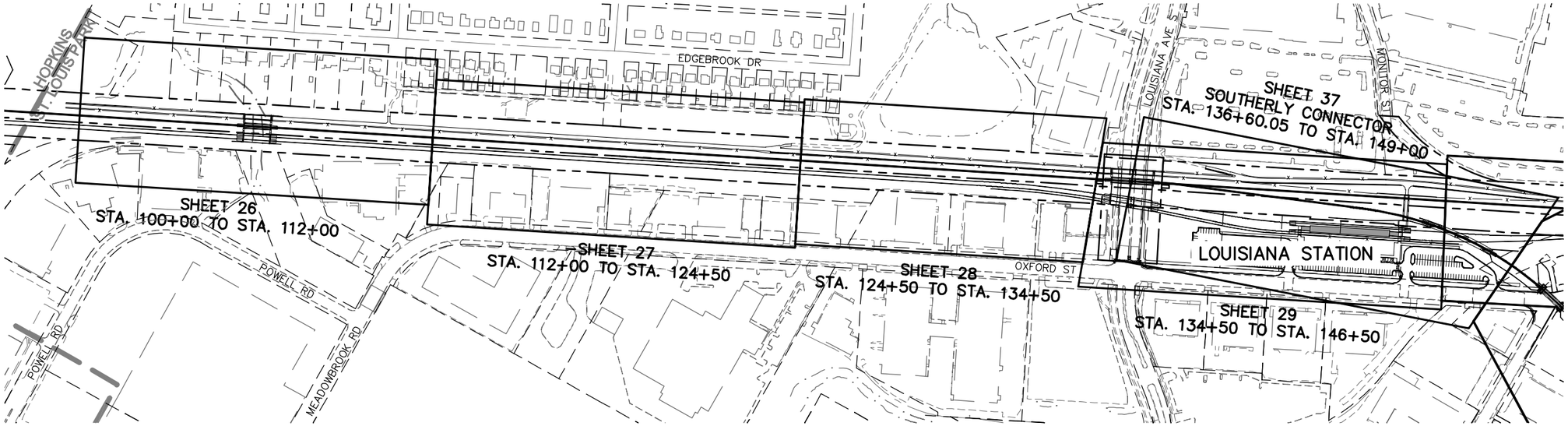
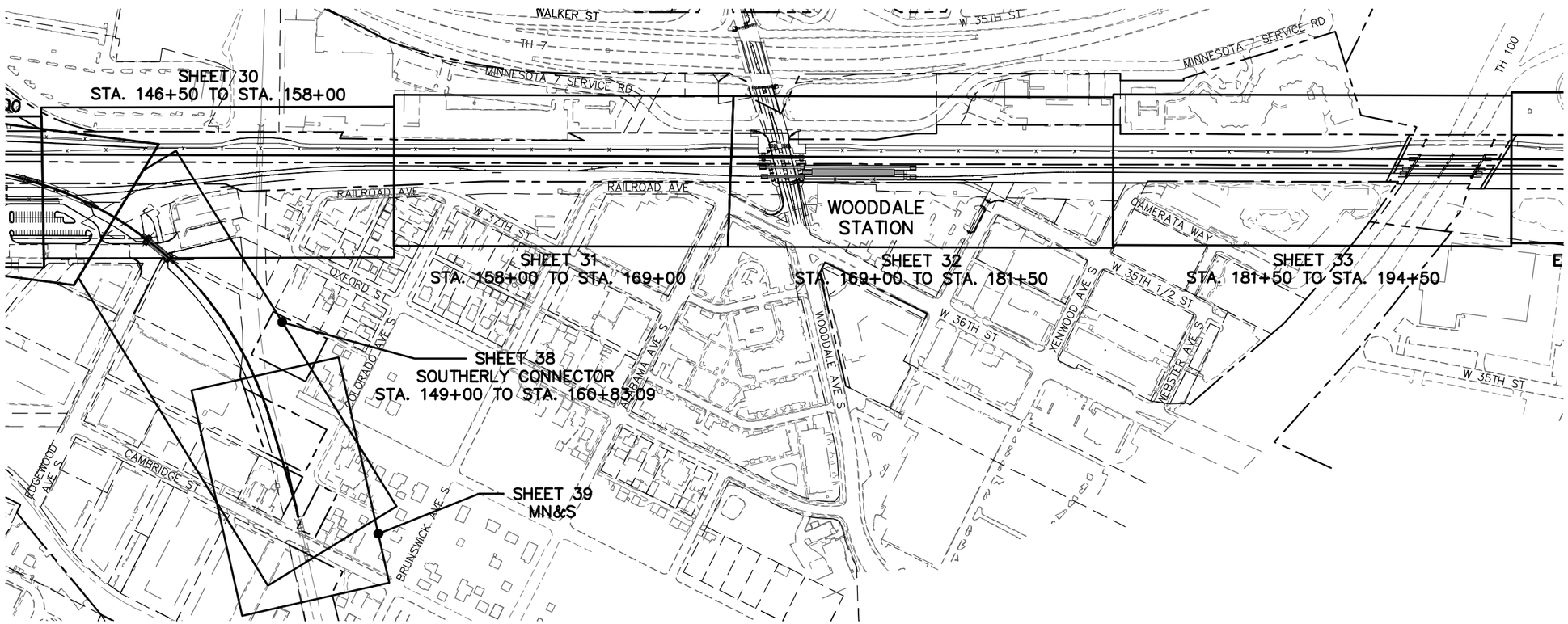
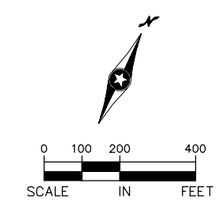




NOTE:
SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 2
SHEETS 9–19 FOR EXISTING CONDITIONS.



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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SHEET INDEX

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-IDX - 001

SHEET 5 OF 61

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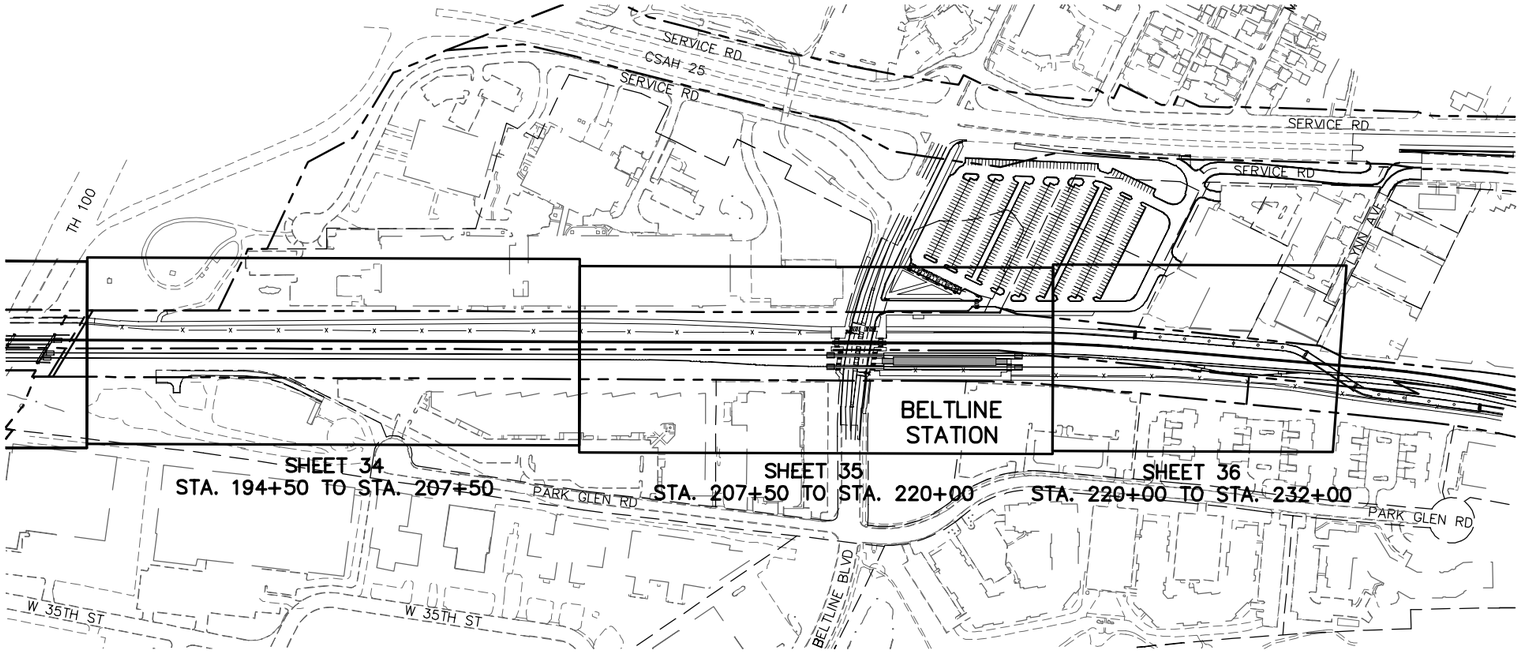

NOTE:
SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 2
SHEETS 9–19 FOR EXISTING CONDITIONS.

0 100 200 400
SCALE IN FEET

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SHEET INDEX

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-IDX - 002

SHEET 6 OF 61

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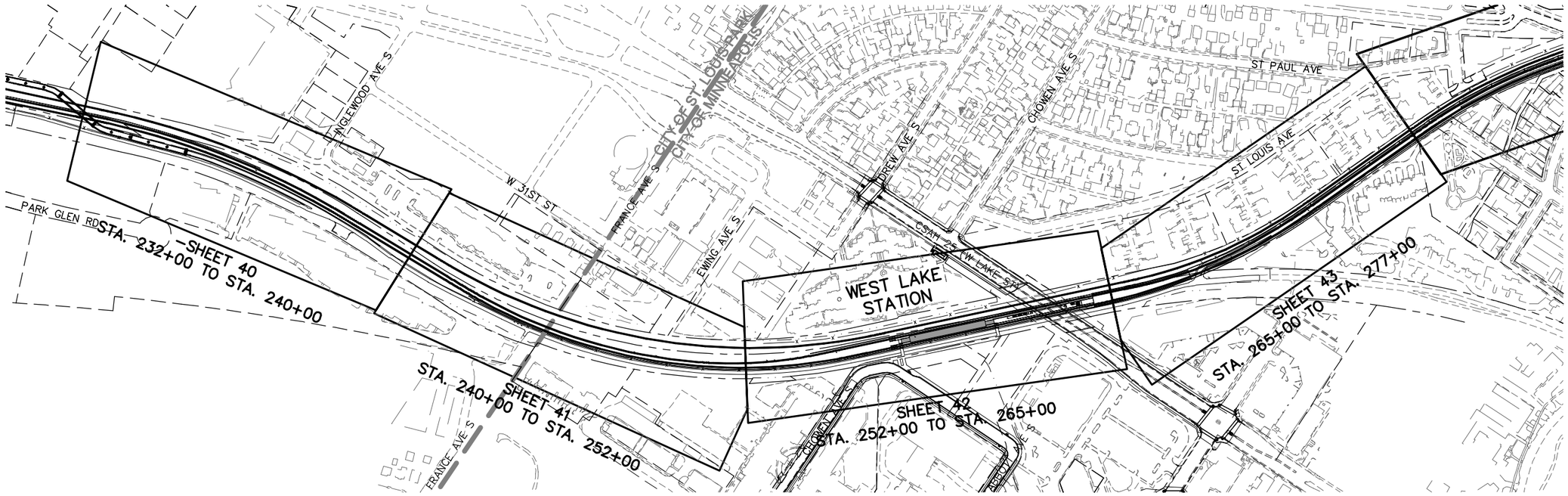

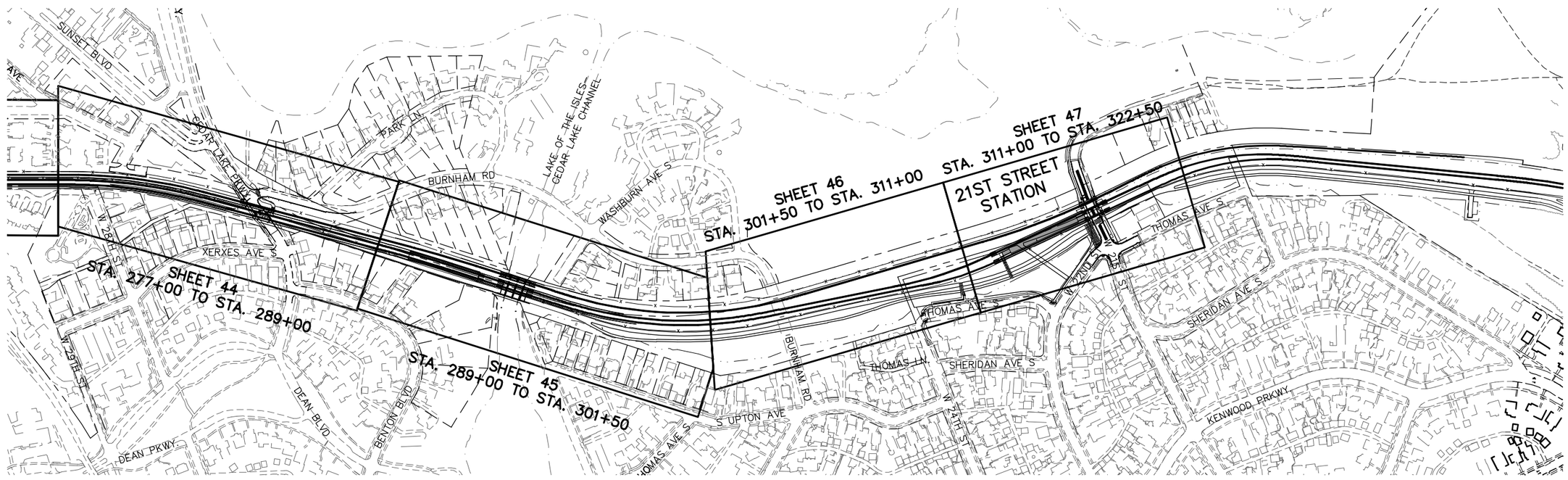

0 100 200 400
SCALE IN FEET

NOTE:
SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 3 SHEETS 7–17 FOR EXISTING CONDITIONS.

0 100 200 400
SCALE IN FEET

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SHEET INDEX

DISCIPLINE: FREIGHT
SHEET NAME: E3-FRR-IDX - 001

SHEET 7 OF 61

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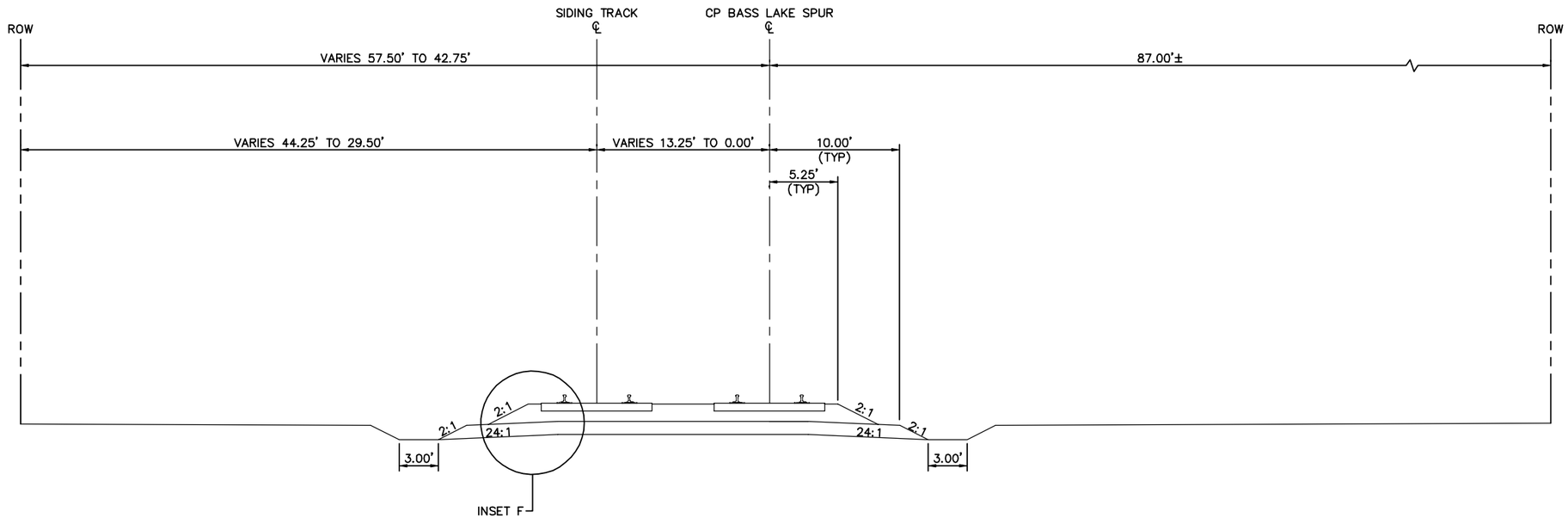

TYPICAL SECTION
STA. 33+03 TO STA. 36+40

NOTE:
FOR INSETS, SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 3 SHEET 34.

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TYPICAL SECTIONS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-TYP - 001

SHEET 8 OF 61

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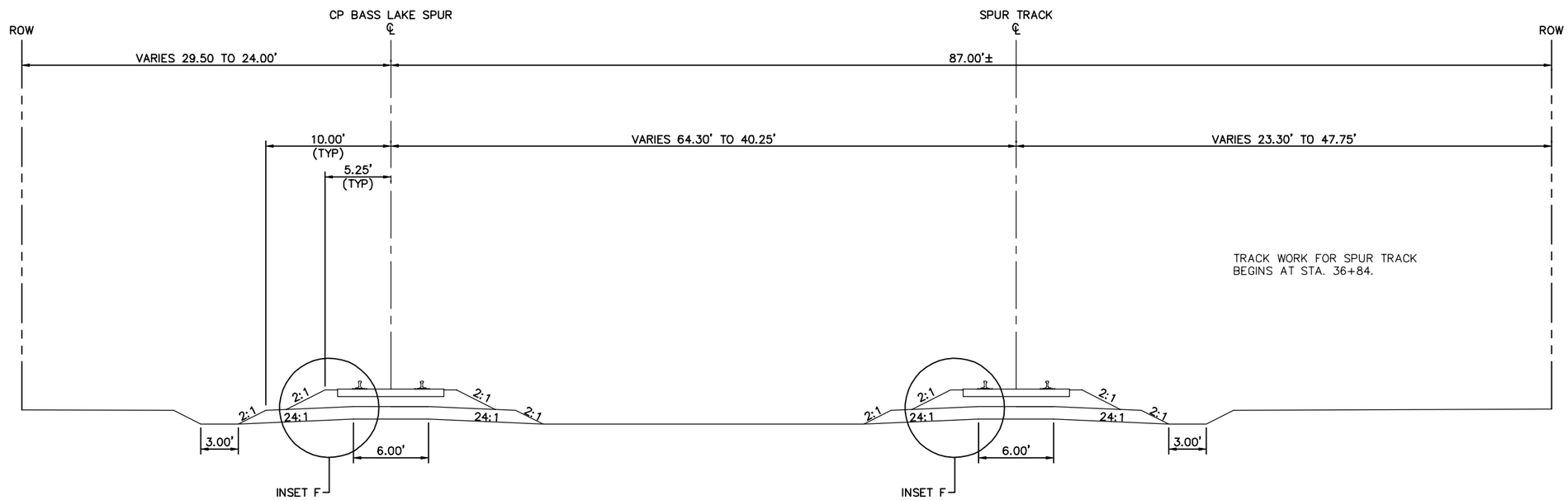

TYPICAL SECTION
STA. 36+40 TO STA. 37+72

NOTE:
FOR INSETS, SEE EAST – VOLUME 1
(CIVIL) – SEGMENT 3 SHEET 34.

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TYPICAL SECTIONS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-TYP - 002

SHEET 9 OF 61

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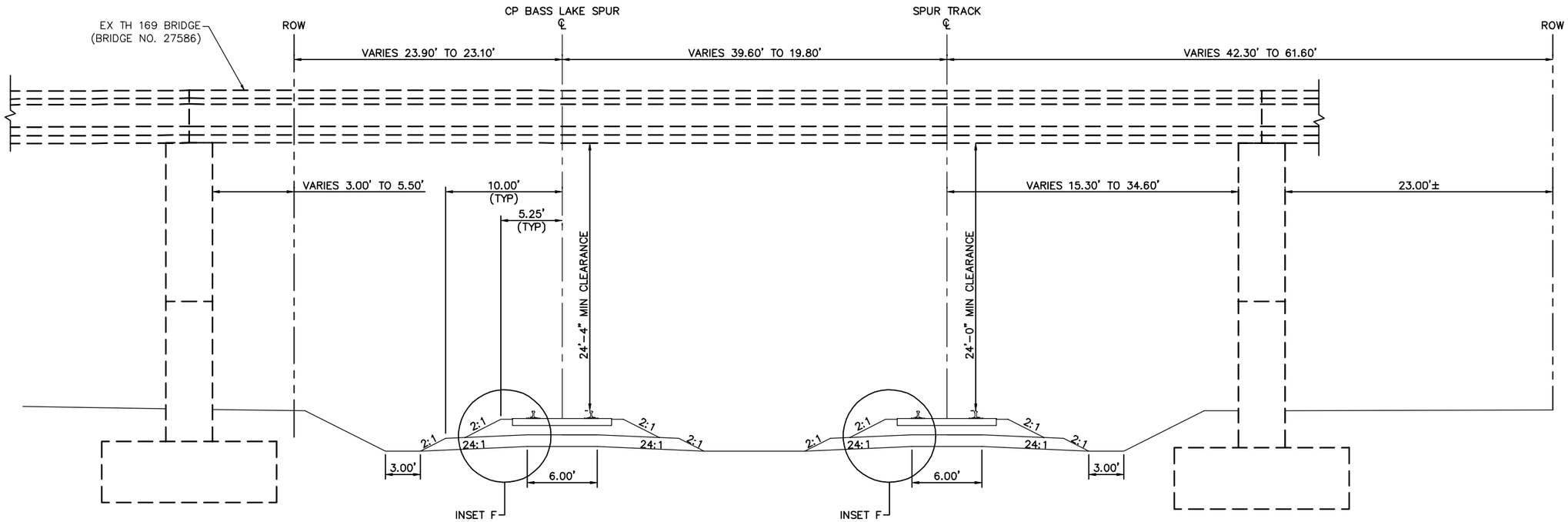

TYPICAL SECTION
STA. 37+72 TO STA. 38+79

NOTE:
FOR INSETS, SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 3 SHEET 34.

SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 3 FOR ADDITIONAL TYPICAL SECTIONS.

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TYPICAL SECTIONS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-TYP - 003

SHEET 10 OF 61

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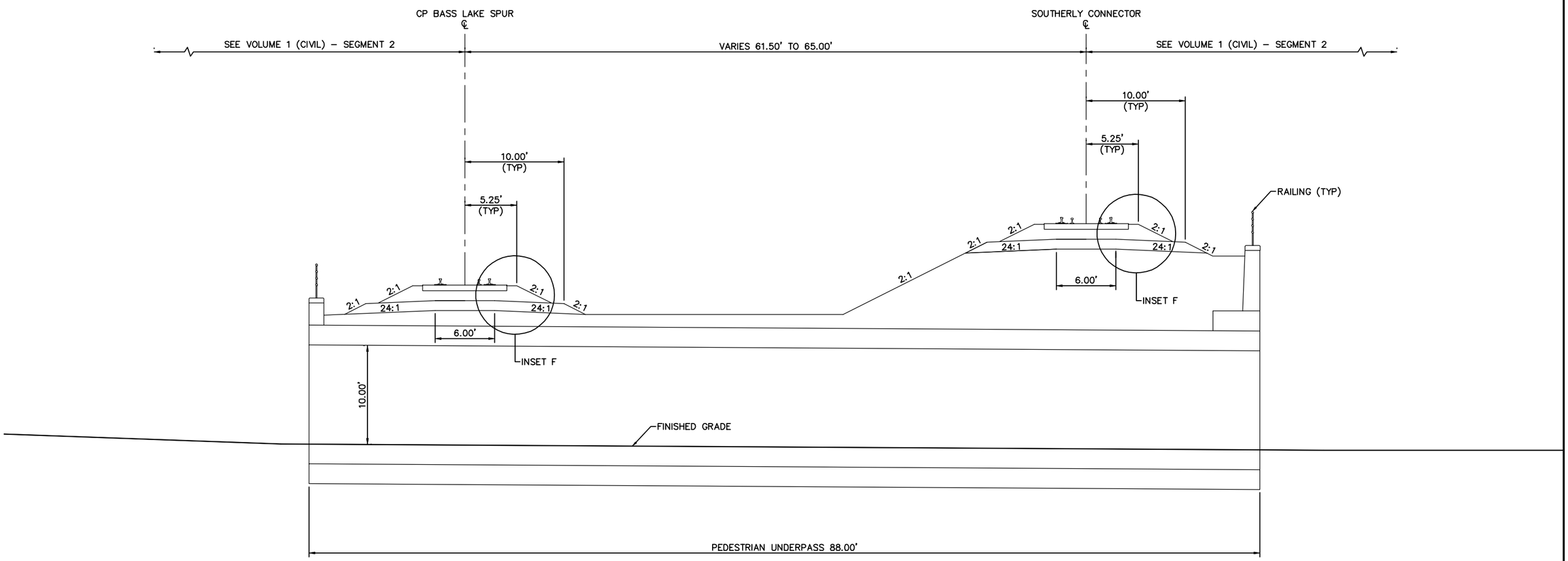

TYPICAL SECTION
STA. 144+90 TO STA. 145+08

NOTE:
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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TYPICAL SECTIONS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-TYP - 004

SHEET 11 OF 61

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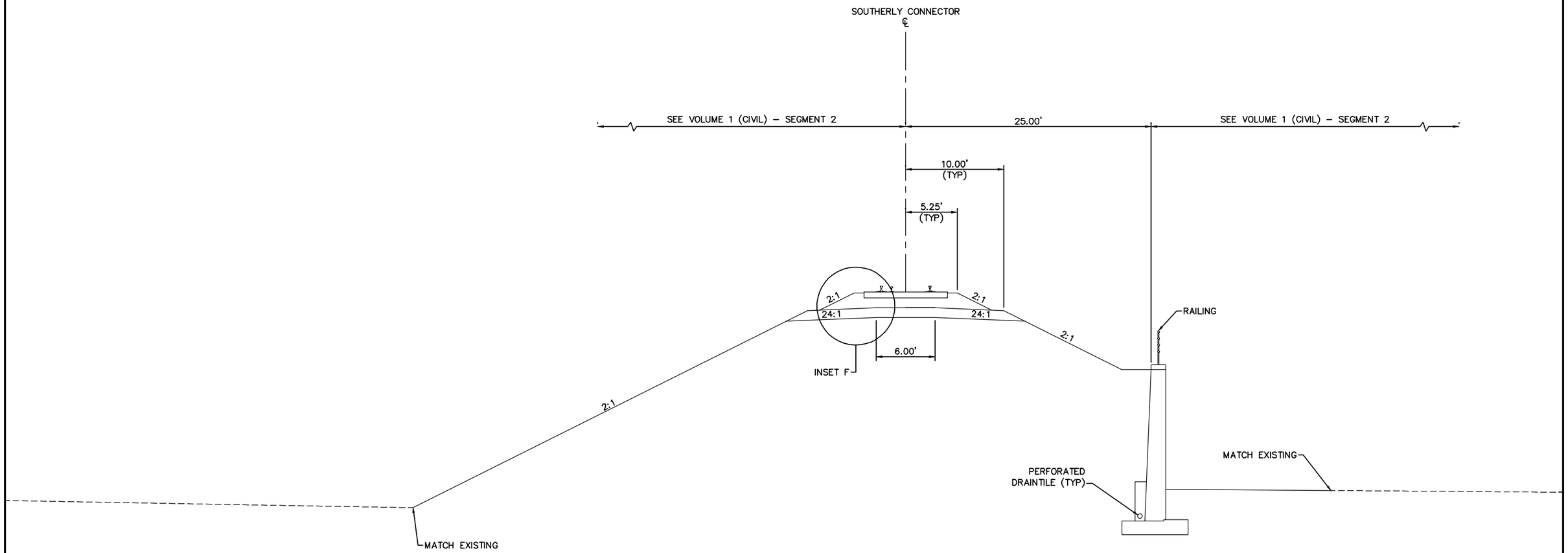

TYPICAL SECTION
STA. 148+02 TO STA. 150+27

TYPICAL SECTION
STA. 151+23 TO STA. 158+58

NOTE:
FOR INSETS, SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 2 SHEET 45.

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
SOUTHERLY CONNECTOR
TYPICAL SECTIONS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-TYP - 005

SHEET 12 OF 61

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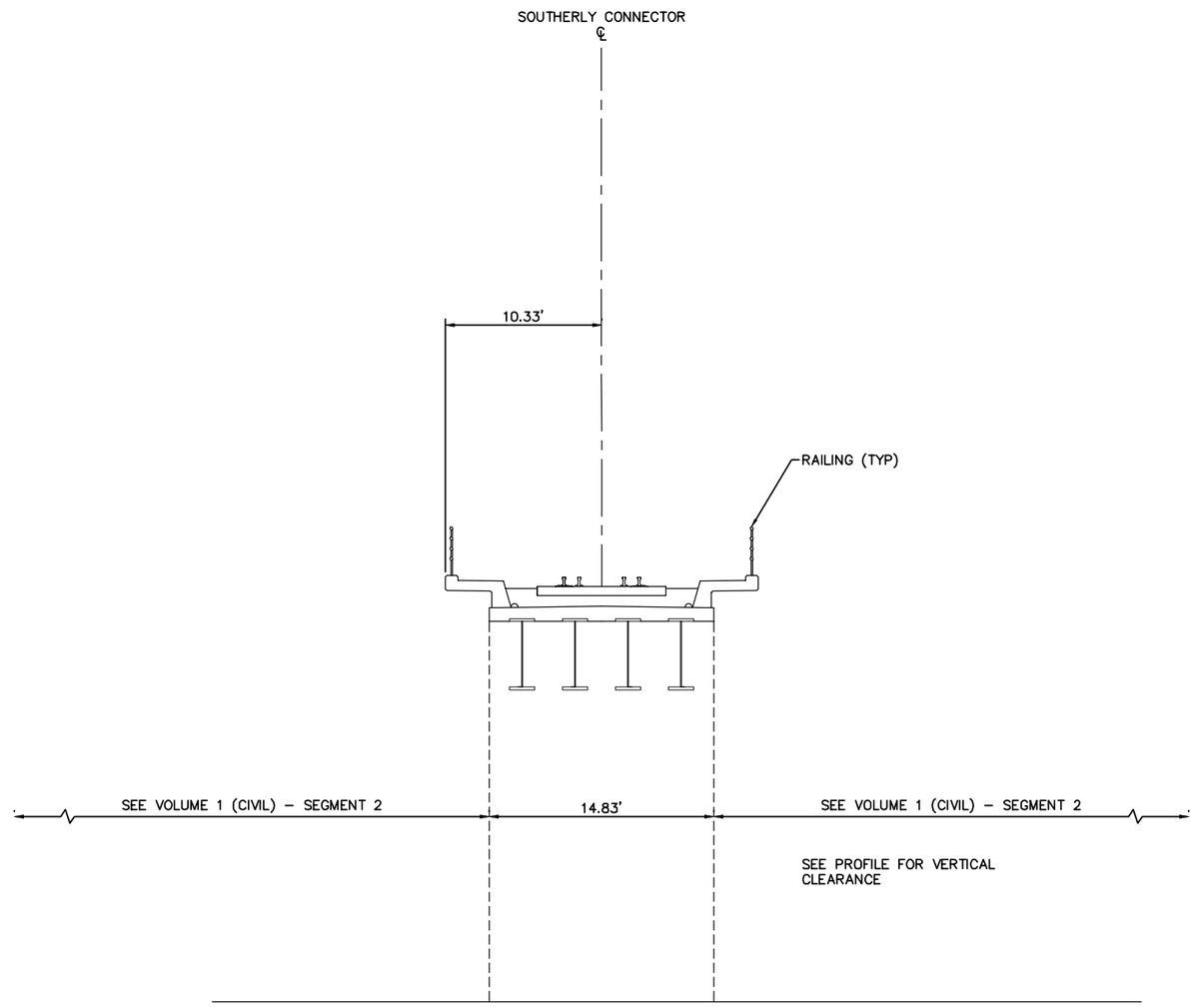

TYPICAL SECTION
STA. 146+04 TO STA. 148+02
TYPICAL SECTION
STA. 150+27 TO STA. 151+23

NOTE:
FOR INSETS, SEE EAST – VOLUME 1 (CIVIL) – SEGMENT 2 SHEET 45.

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
SOUTHERLY CONNECTOR
TYPICAL SECTIONS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-TYP - 006

SHEET 13 OF 61

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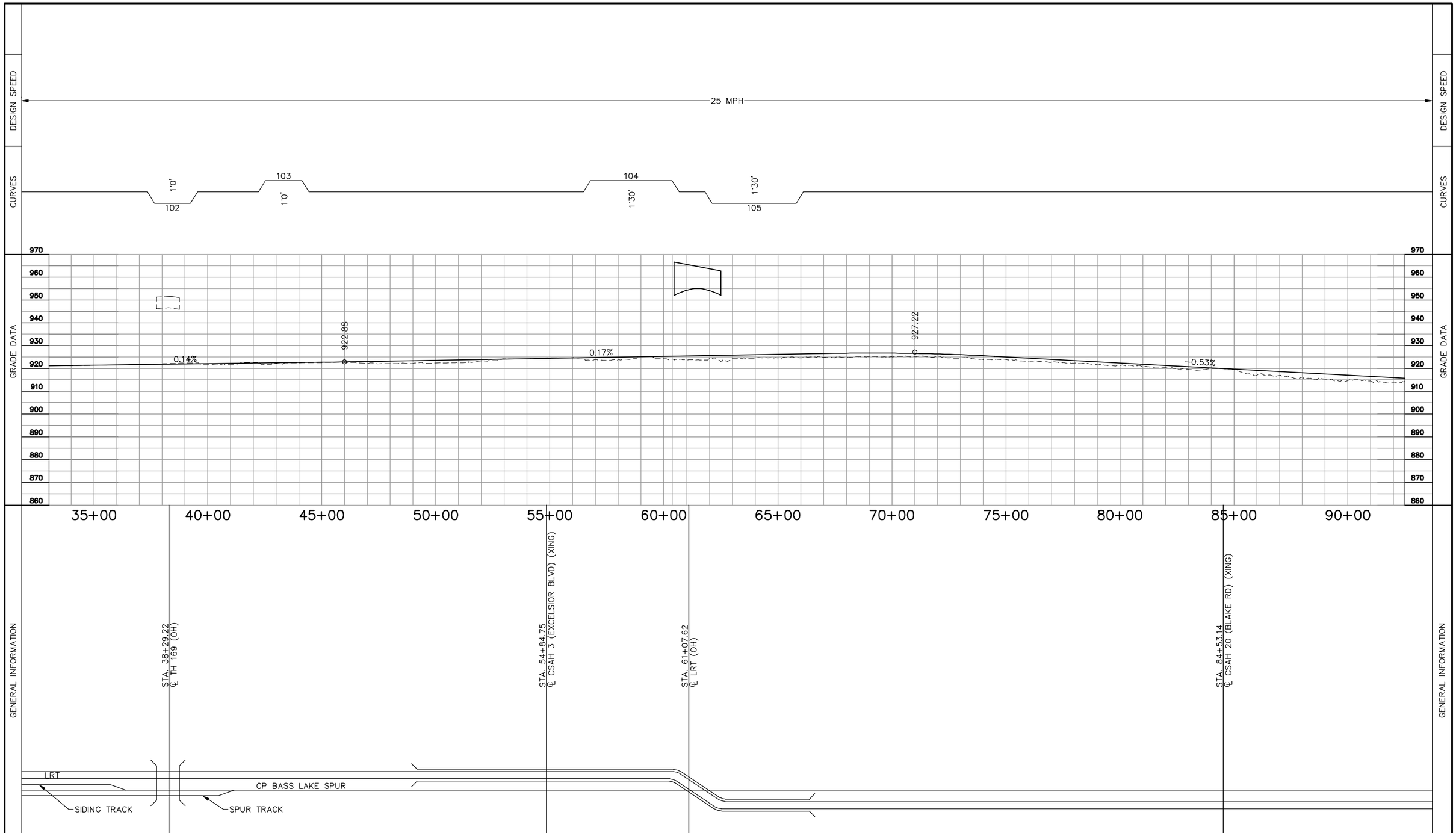

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SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TRACK CHARTS
STA. 33+03.18 TO STA. 92+50

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-CHART - 001

SHEET 14 OF 61

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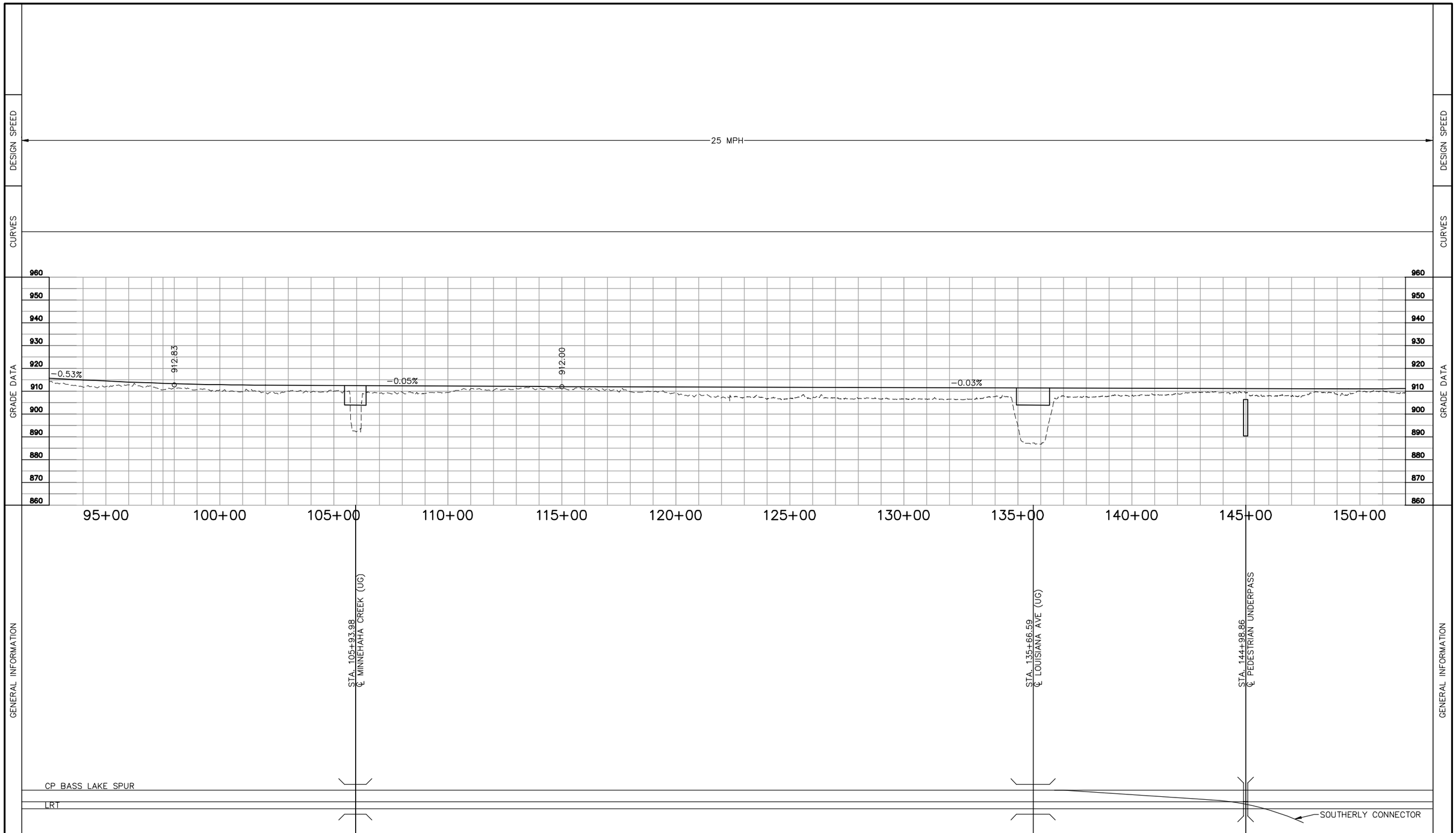

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TRACK CHARTS
STA. 92+50 TO STA. 152+00

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-CHART - 002

SHEET 15 OF 61

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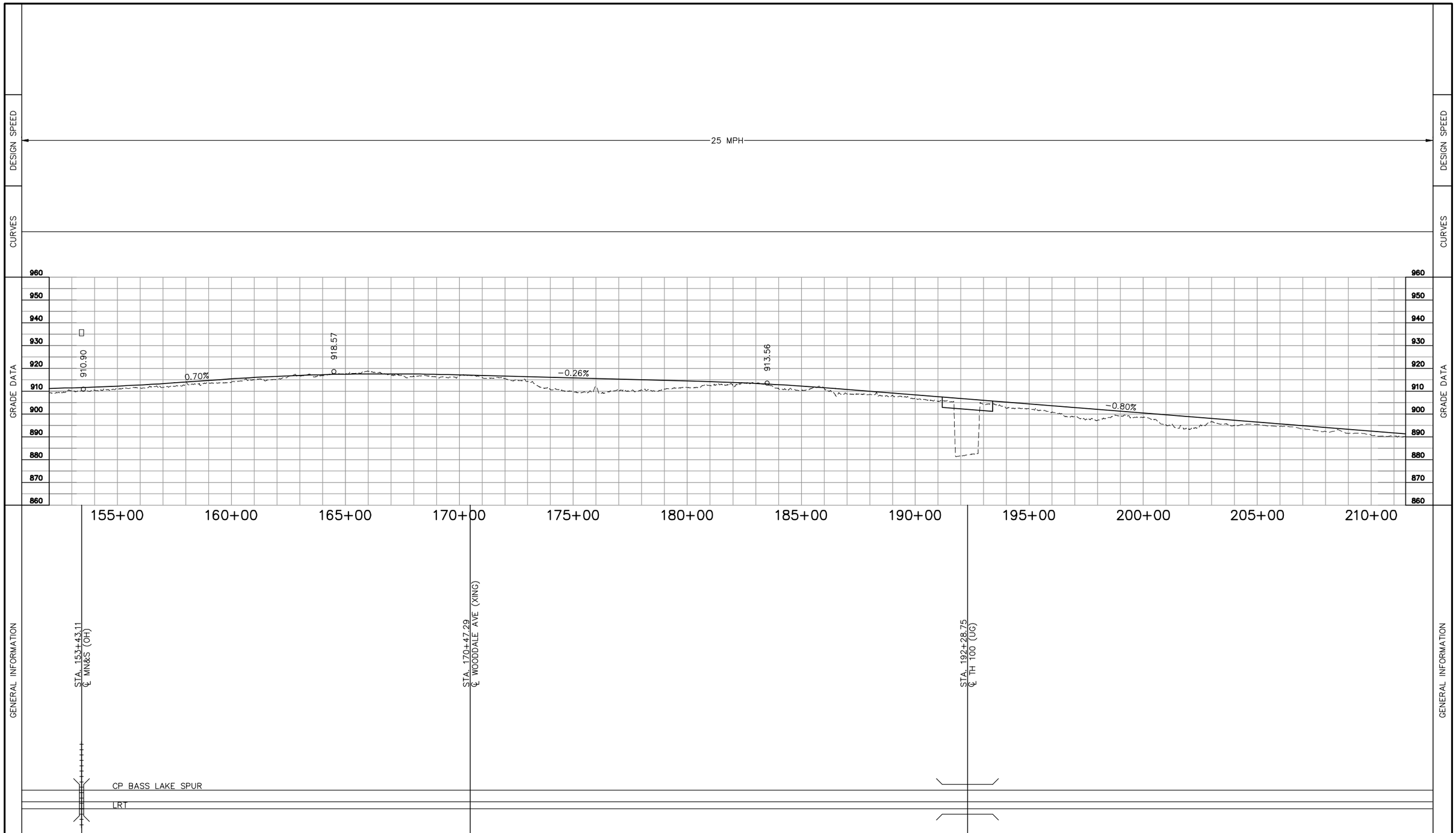

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TRACK CHARTS
STA. 152+00 TO STA. 211+50

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-CHART - 003

SHEET 16 OF 61

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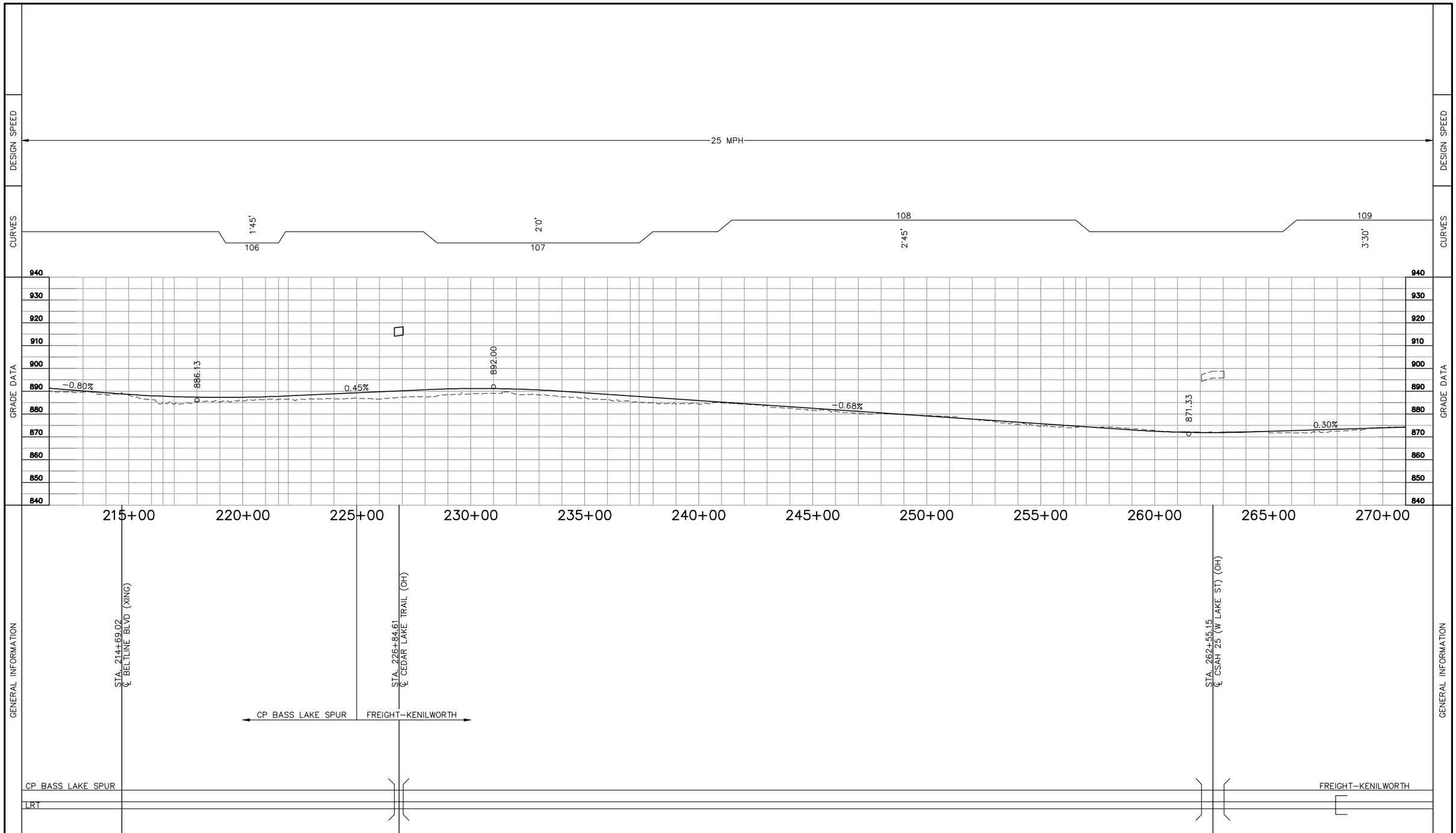

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

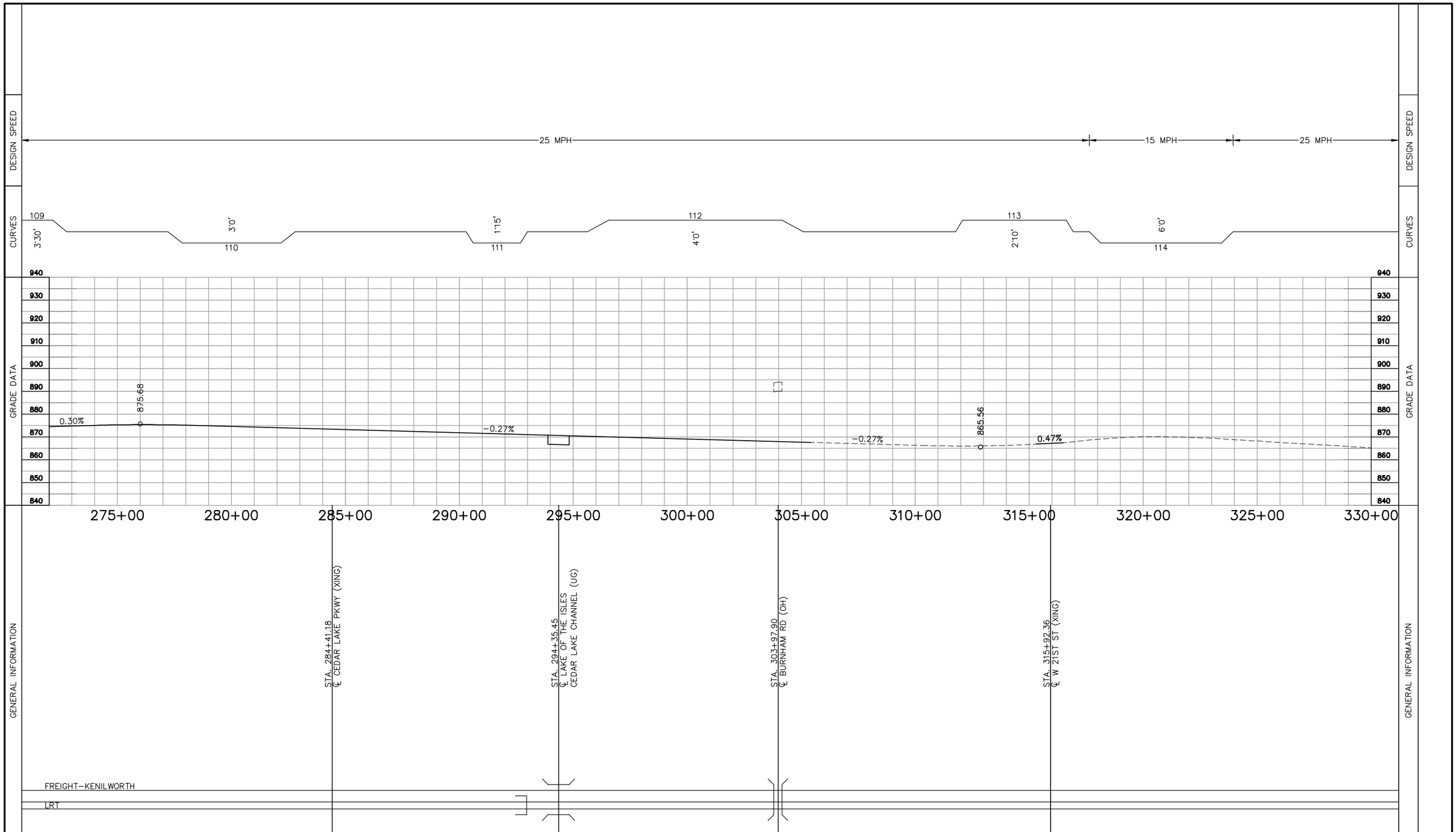
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TRACK CHARTS
STA. 211+50 TO STA. 271+00

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-CHART - 004

SHEET 17 OF 61

Aug, 29 2014 10:20 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-CHART.dwg By: chris.bunders



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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
TRACK CHARTS
STA. 272+00 TO STA. 330+00

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-CHART - 005

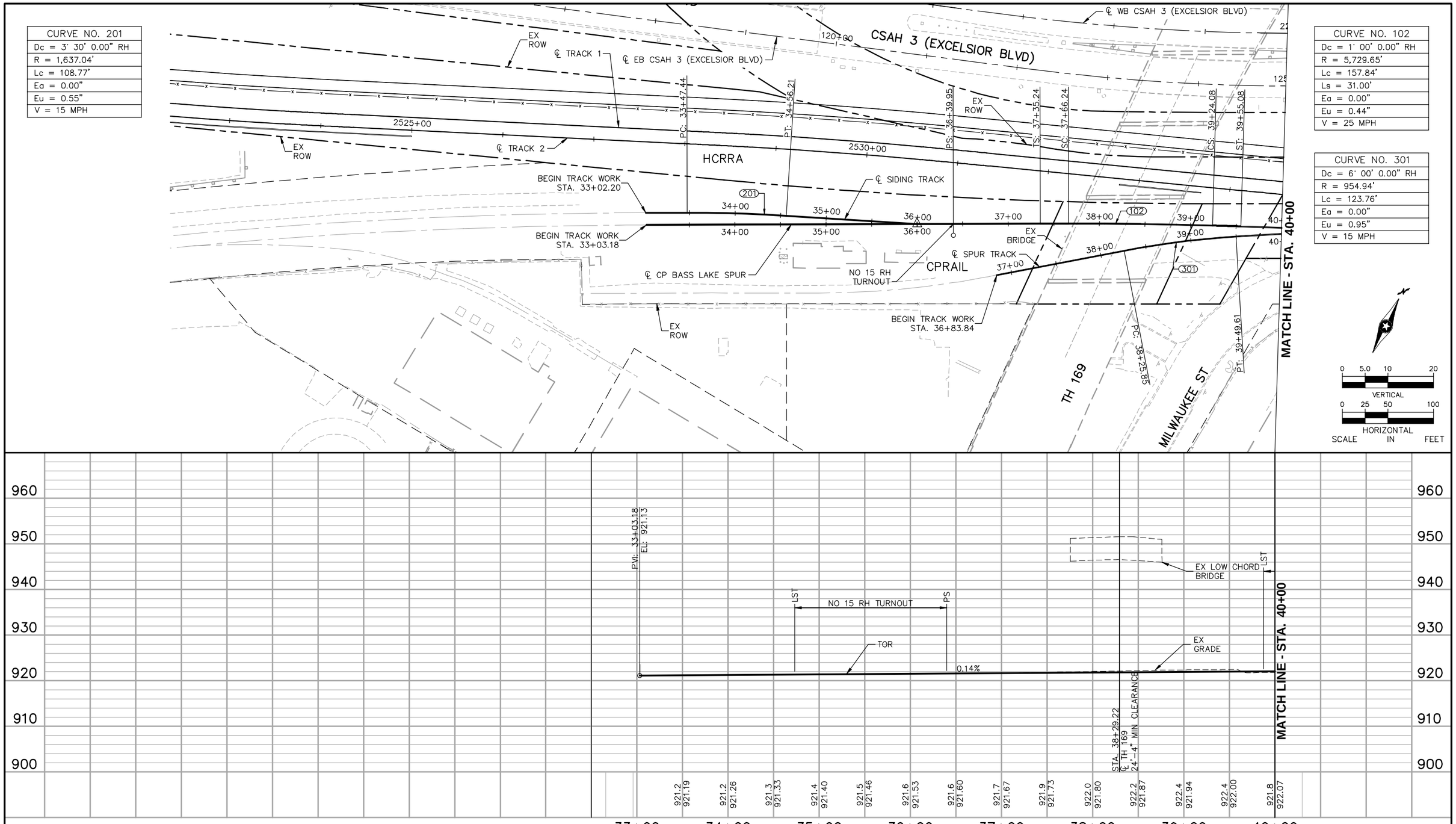
SHEET 18 OF 61

Aug. 29 2014 10:20 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-CHART.dwg By: chris.bunders

CURVE NO. 201
Dc = 3° 30' 0.00" RH
R = 1,637.04'
Lc = 108.77'
Ea = 0.00"
Eu = 0.55"
V = 15 MPH

CURVE NO. 102
Dc = 1° 00' 0.00" RH
R = 5,729.65'
Lc = 157.84'
Ls = 31.00'
Ea = 0.00"
Eu = 0.44"
V = 25 MPH

CURVE NO. 301
Dc = 6° 00' 0.00" RH
R = 954.94'
Lc = 123.76'
Ea = 0.00"
Eu = 0.95"
V = 15 MPH



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

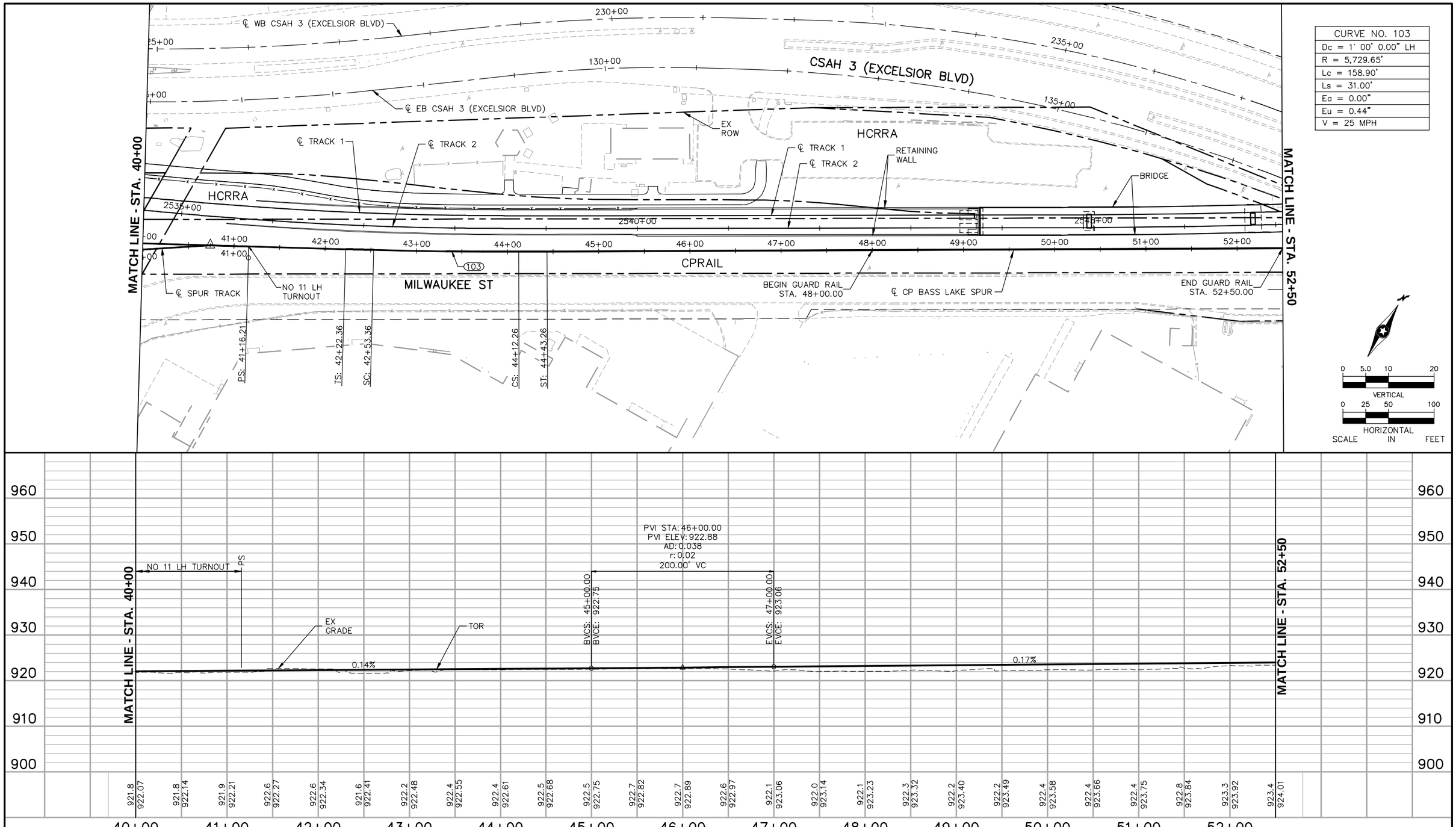
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 33+03.18 TO STA. 40+00

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-PPFL - 001

SHEET 19 OF 61

Aug, 29 2014 10:21 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

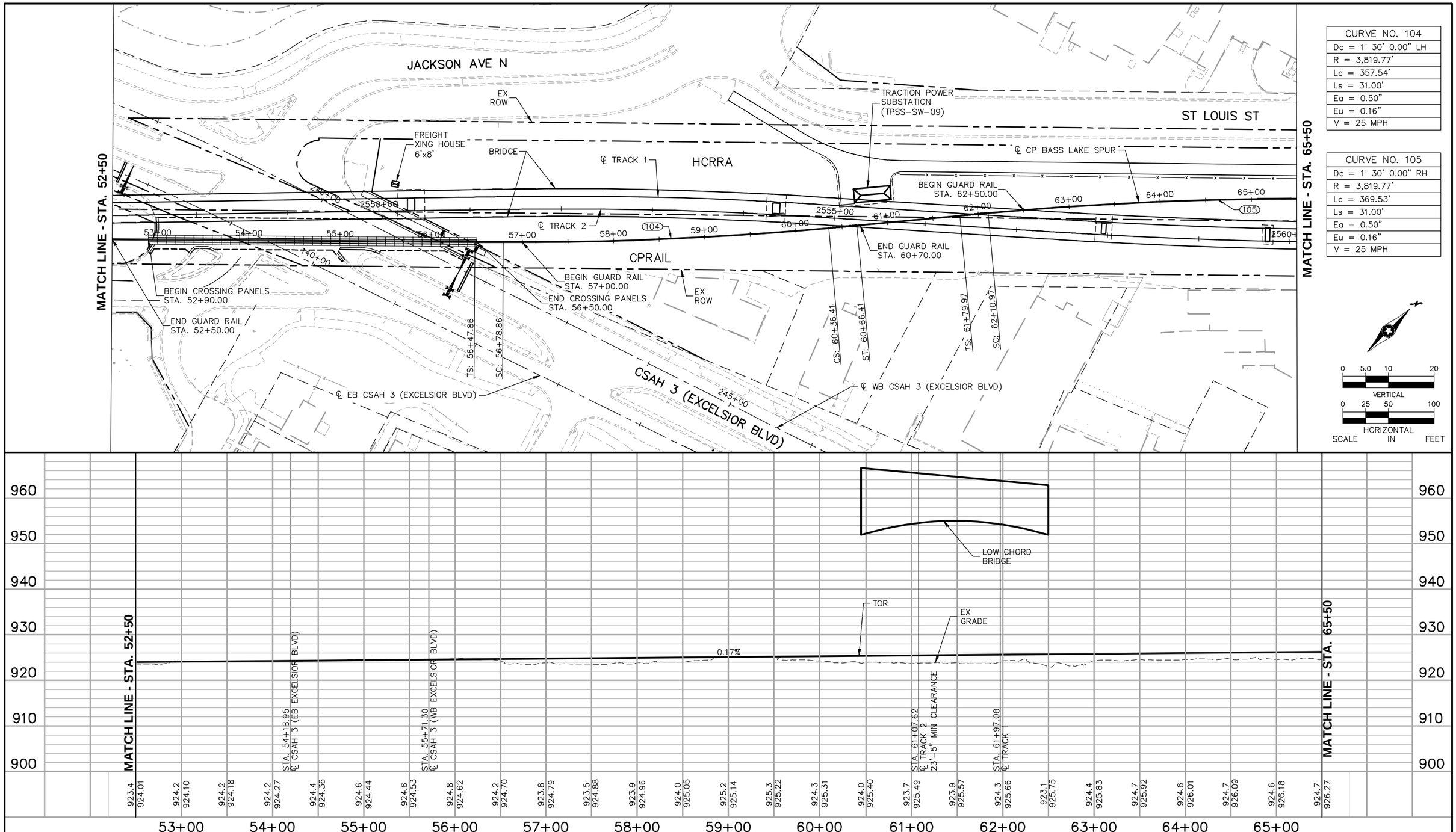
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 40+00 TO STA. 52+50

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-PPFL - 002

SHEET 20 OF 61

Aug, 29 2014 10:21 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



CURVE NO. 104
Dc = 1° 30' 0.00" LH
R = 3,819.77'
Lc = 357.54'
Ls = 31.00'
Ea = 0.50"
Eu = 0.16"
V = 25 MPH

CURVE NO. 105
Dc = 1° 30' 0.00" RH
R = 3,819.77'
Lc = 369.53'
Ls = 31.00'
Ea = 0.50"
Eu = 0.16"
V = 25 MPH

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

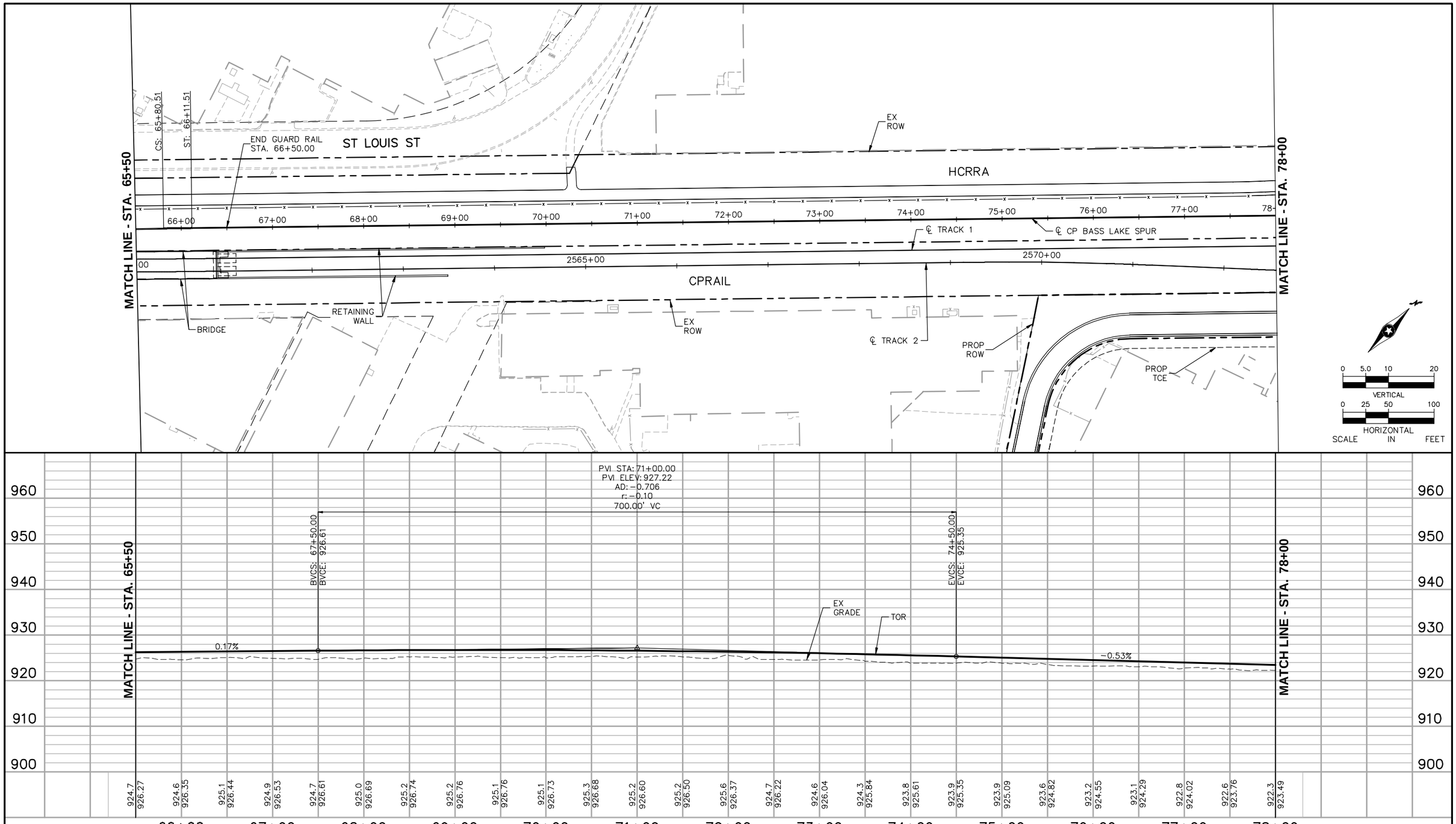
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 52+50 TO STA. 65+50

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-PPFL - 003

SHEET 21 OF 61

Aug, 29 2014 10:21 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

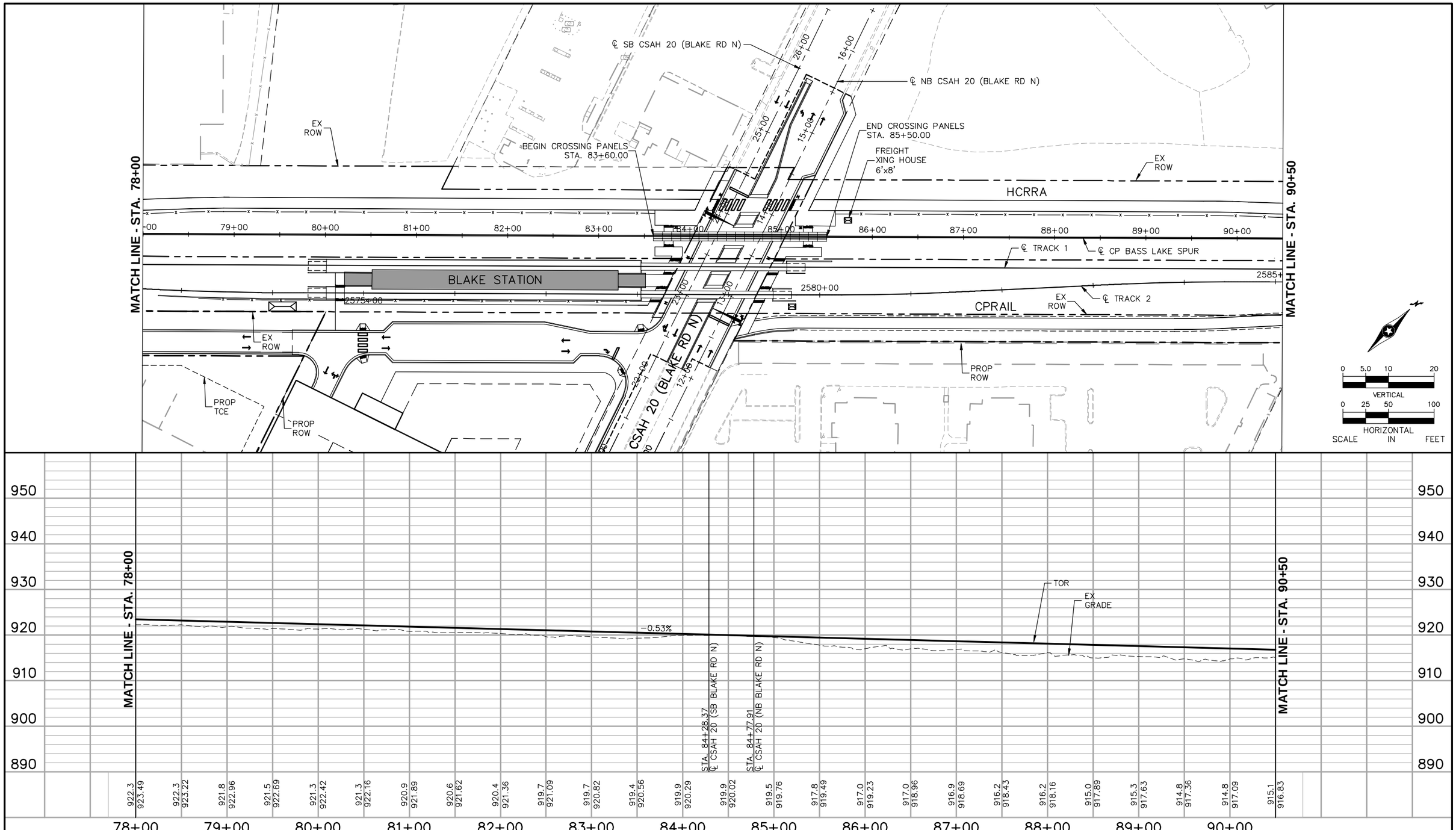
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 65+50 TO STA. 78+00

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-PPFL - 004

SHEET 22 OF 61

Aug, 29 2014 10:21 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

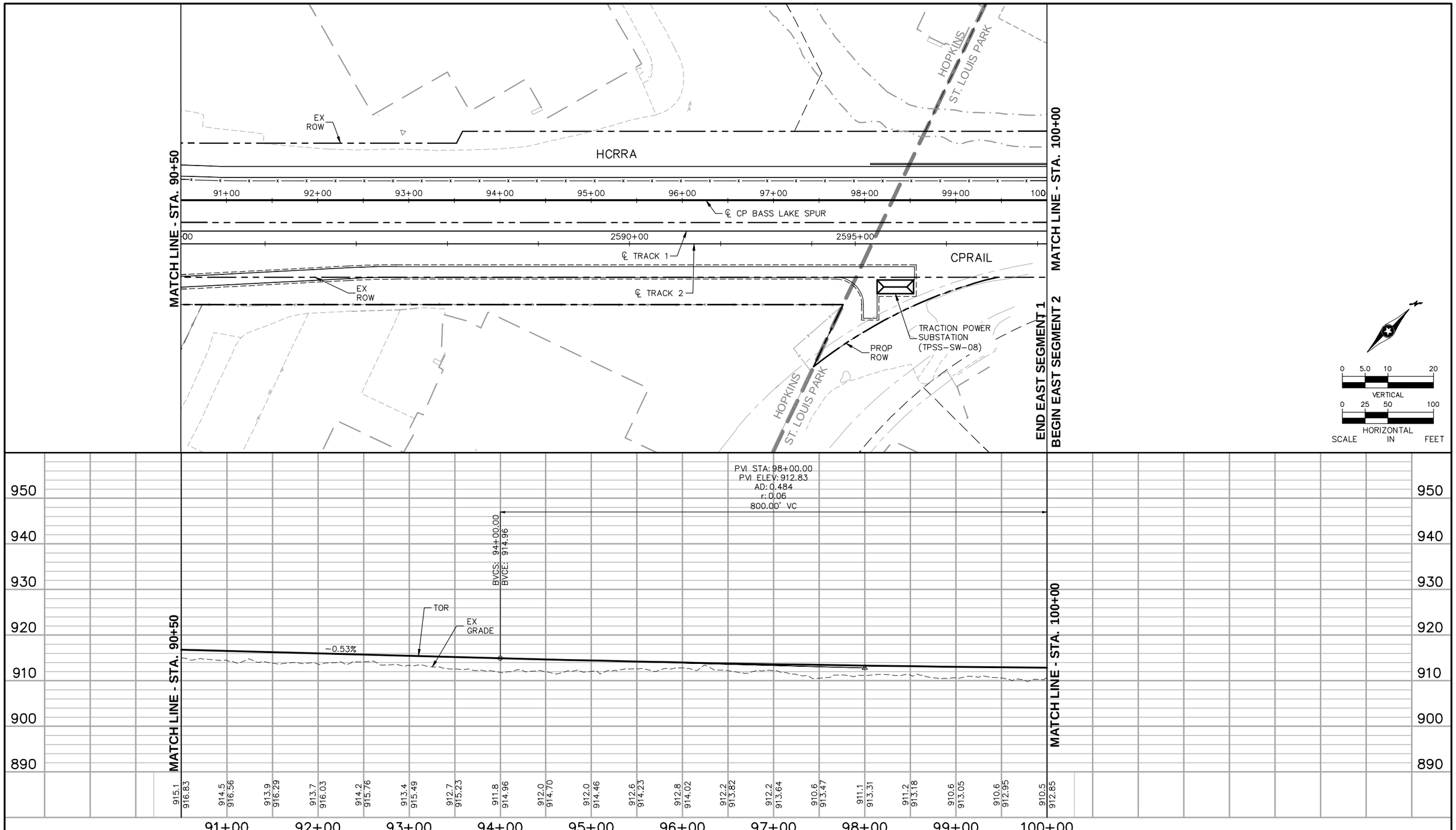
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 78+00 TO STA. 90+50

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-PPFL - 005

SHEET 23 OF 61

Aug, 29 2014 10:22 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

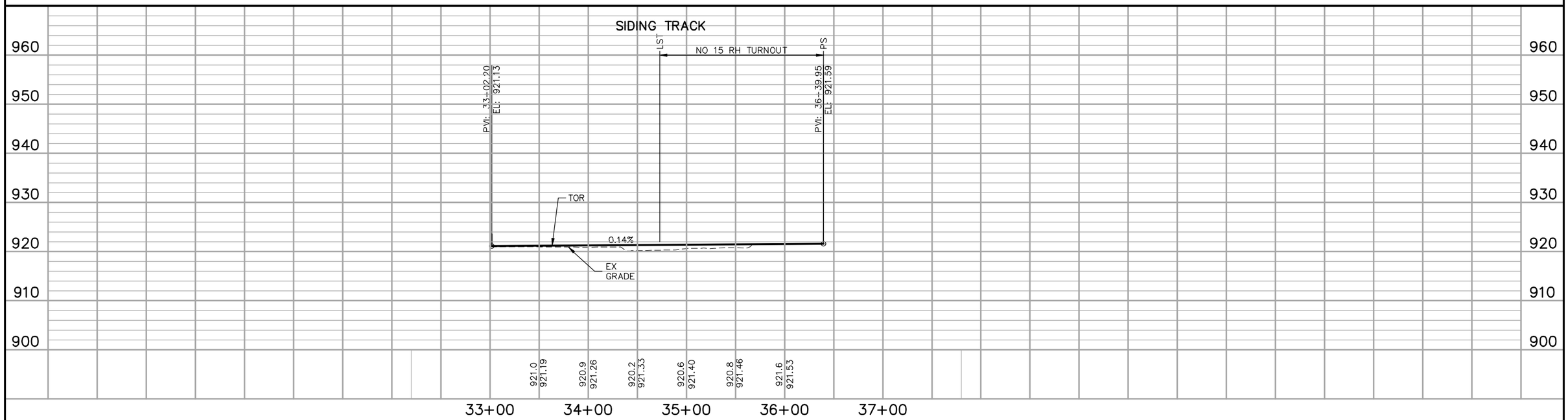
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 90+50 TO STA. 100+00

DISCIPLINE: FREIGHT

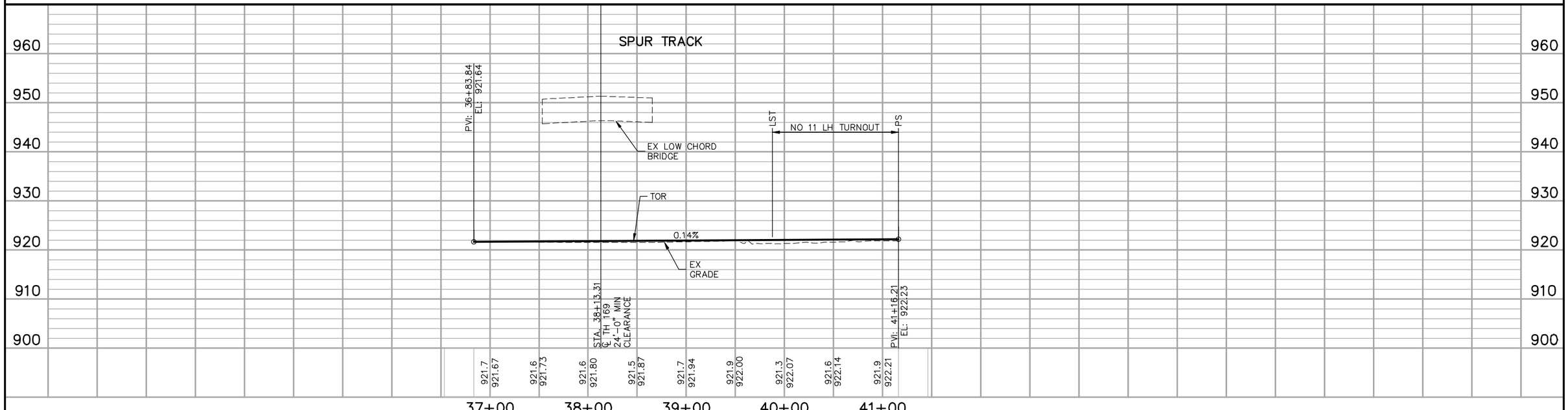
SHEET NAME: E1-FRR-PPFL - 006

SHEET 24 OF 61

Aug, 29 2014 10:22 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



NOTE:
SEE SHEETS 19 AND 20 FOR PLAN VIEW.



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

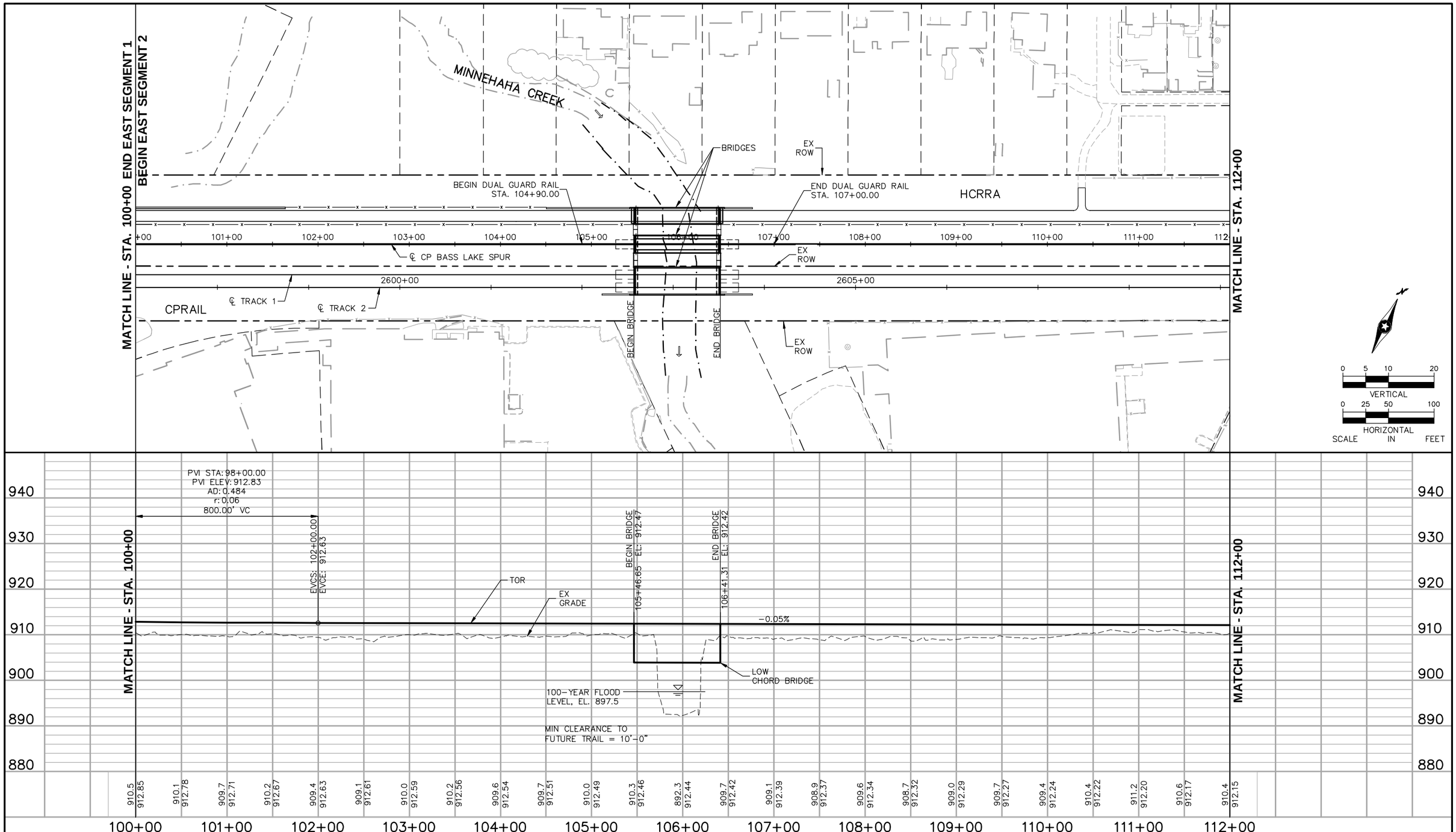
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PROFILE
SIDING AND SPUR TRACKS

DISCIPLINE: FREIGHT

SHEET NAME: E1-FRR-PPFL - 007

SHEET 25 OF 61

Aug, 29 2014 10:22 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E1-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

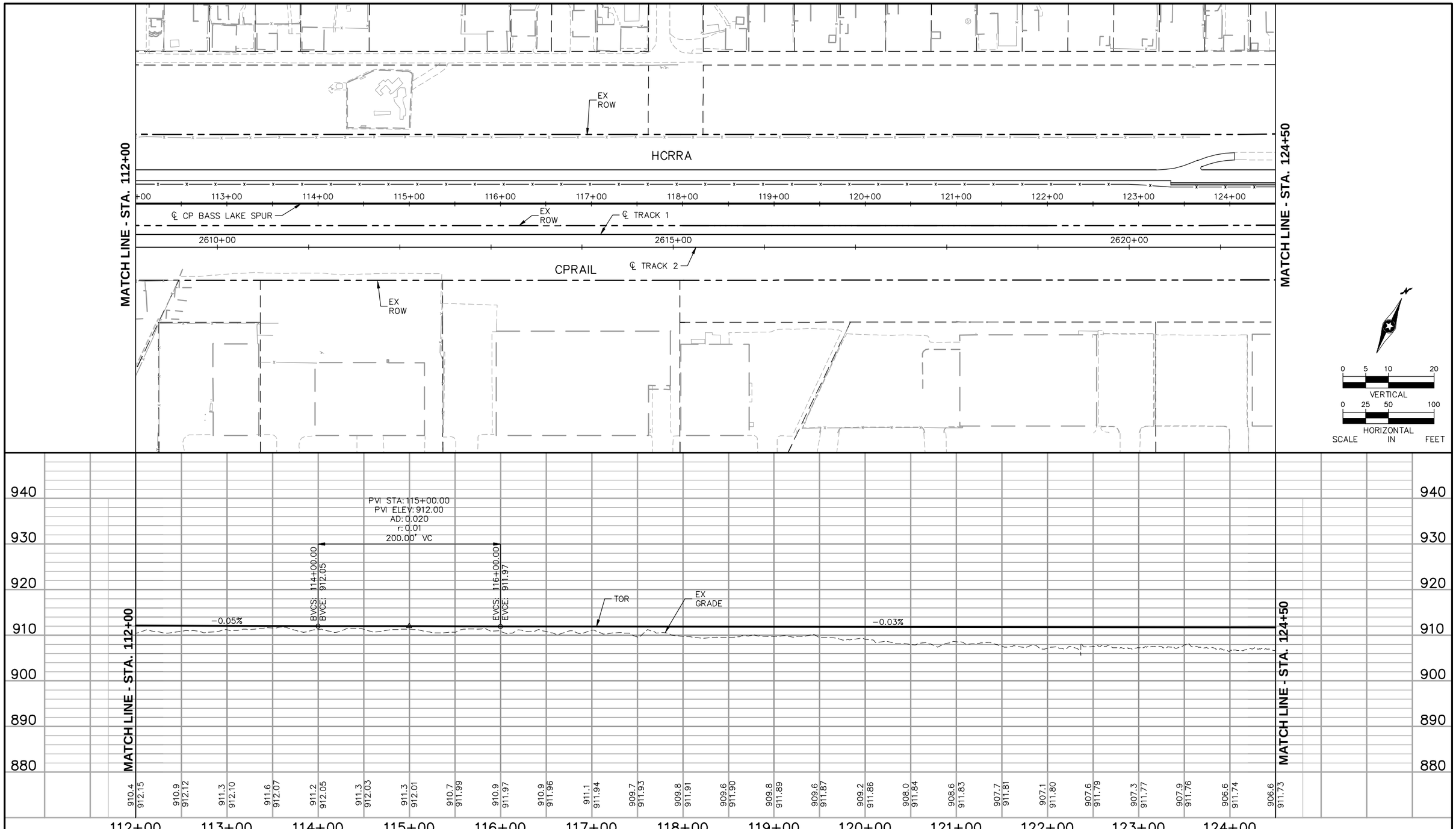
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 100+00 TO STA. 112+00

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 001

SHEET 26 OF 61

Aug, 29 2014 10:24 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

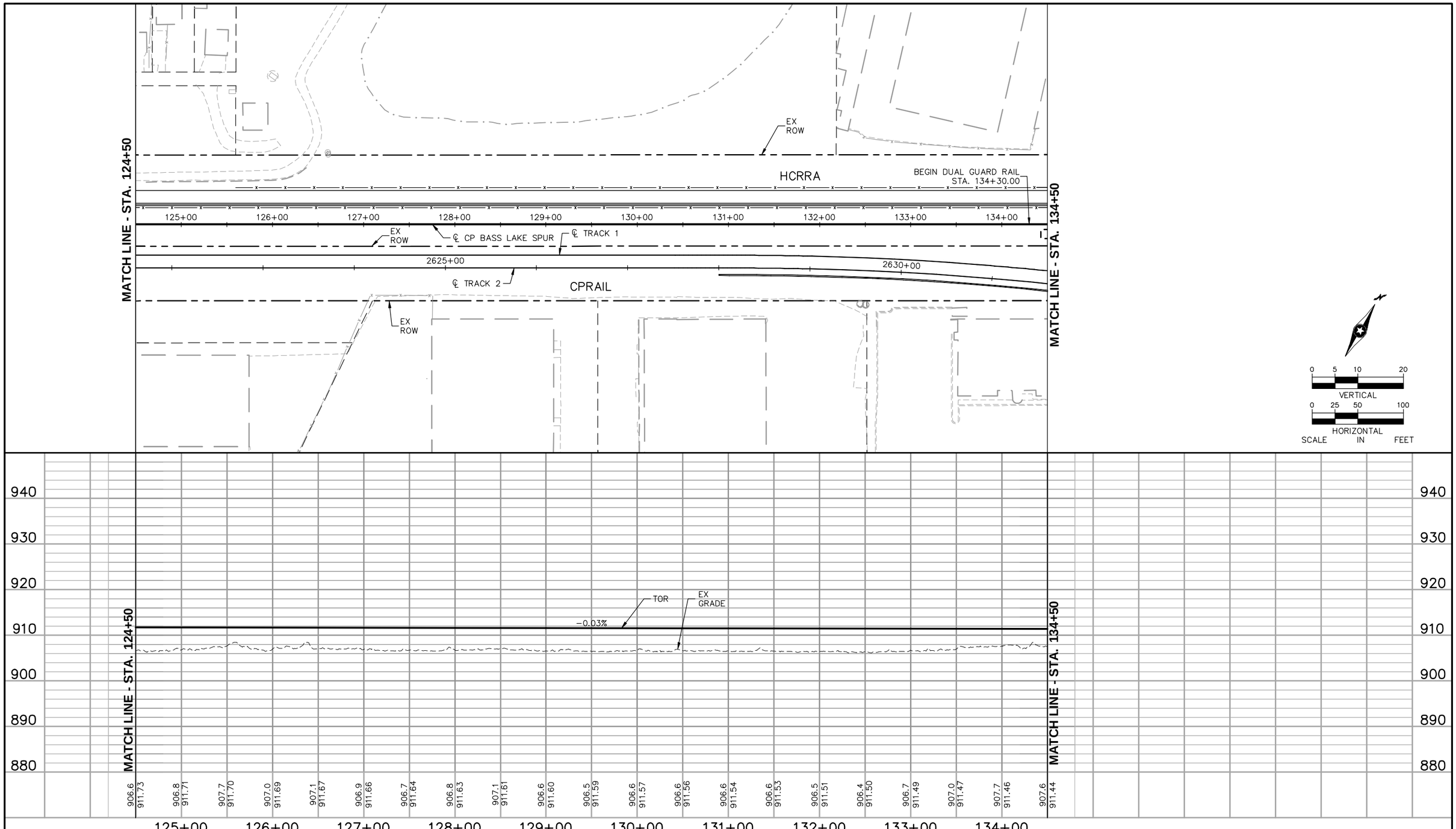
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 112+00 TO STA. 124+50

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 002

SHEET 27 OF 61

Aug. 29 2014 10:23 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

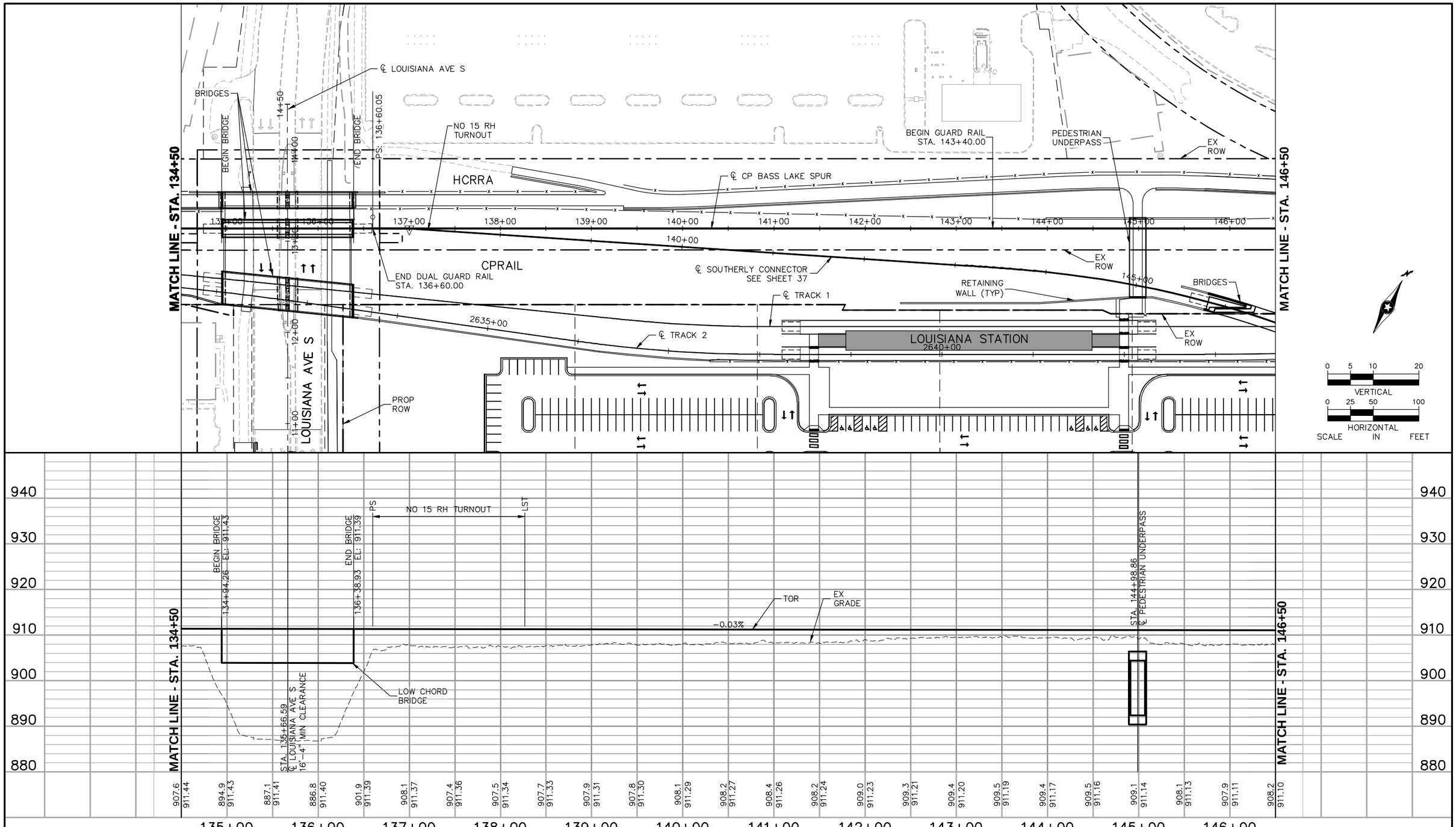
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 124+50 TO STA. 134+50

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 003

SHEET 28 OF 61

Aug, 29 2014 10:24 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

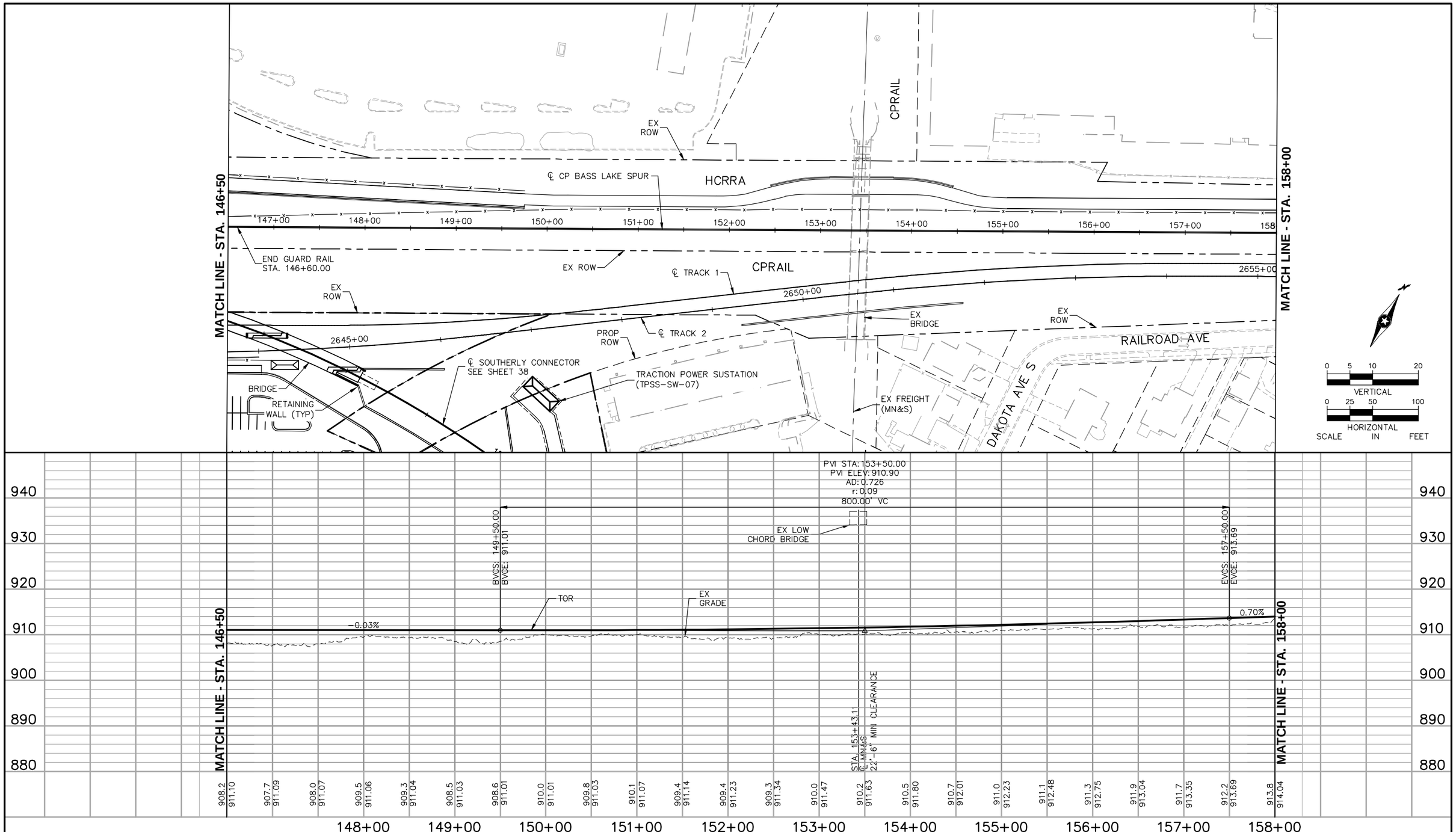
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 134+50 TO STA. 146+50

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 004

SHEET 29 OF 61

Aug, 29 2014 10:24 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

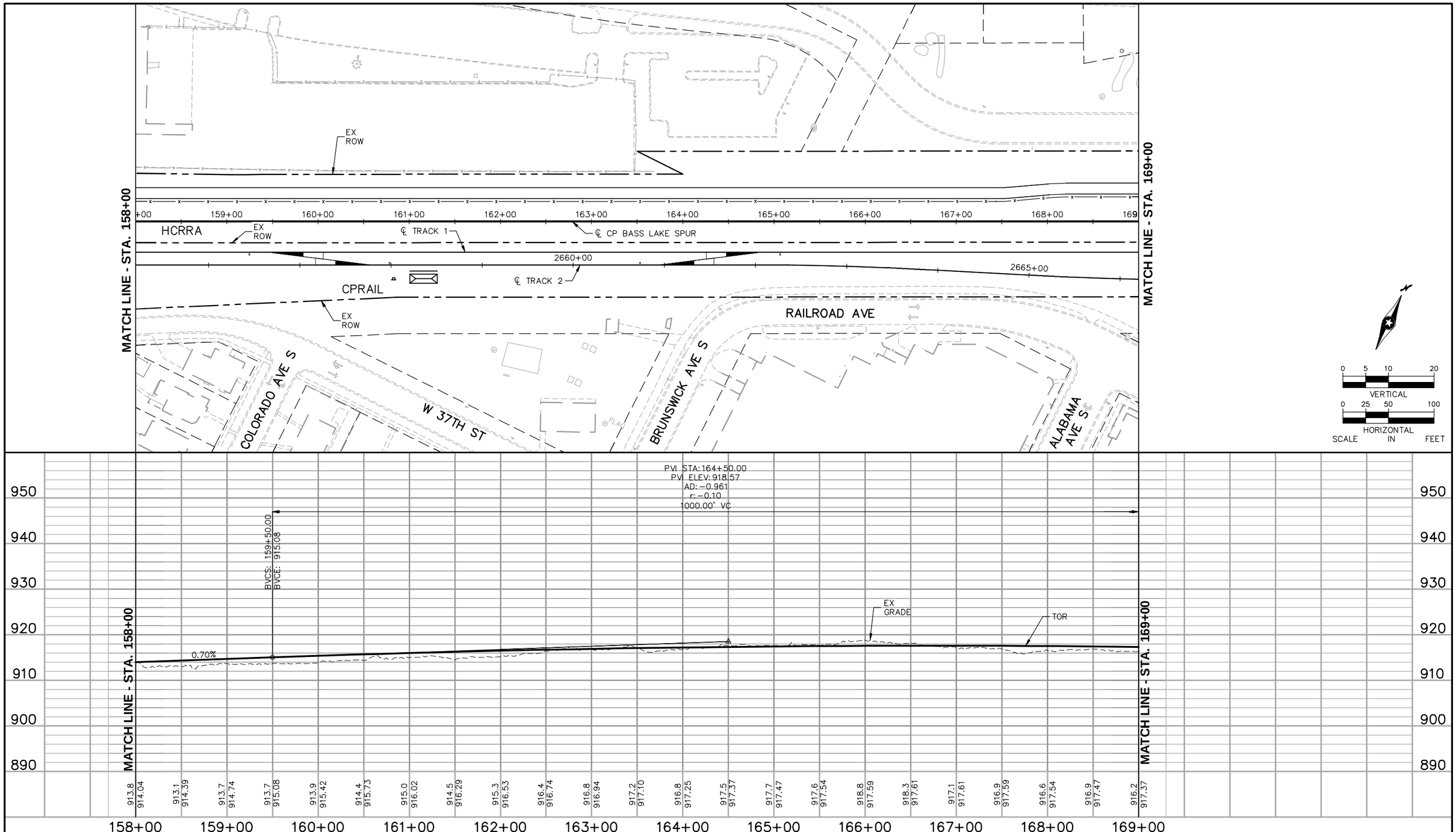
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 146+50 TO STA. 158+00

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 005

SHEET 30 OF 61

Aug, 29 2014 10:25 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

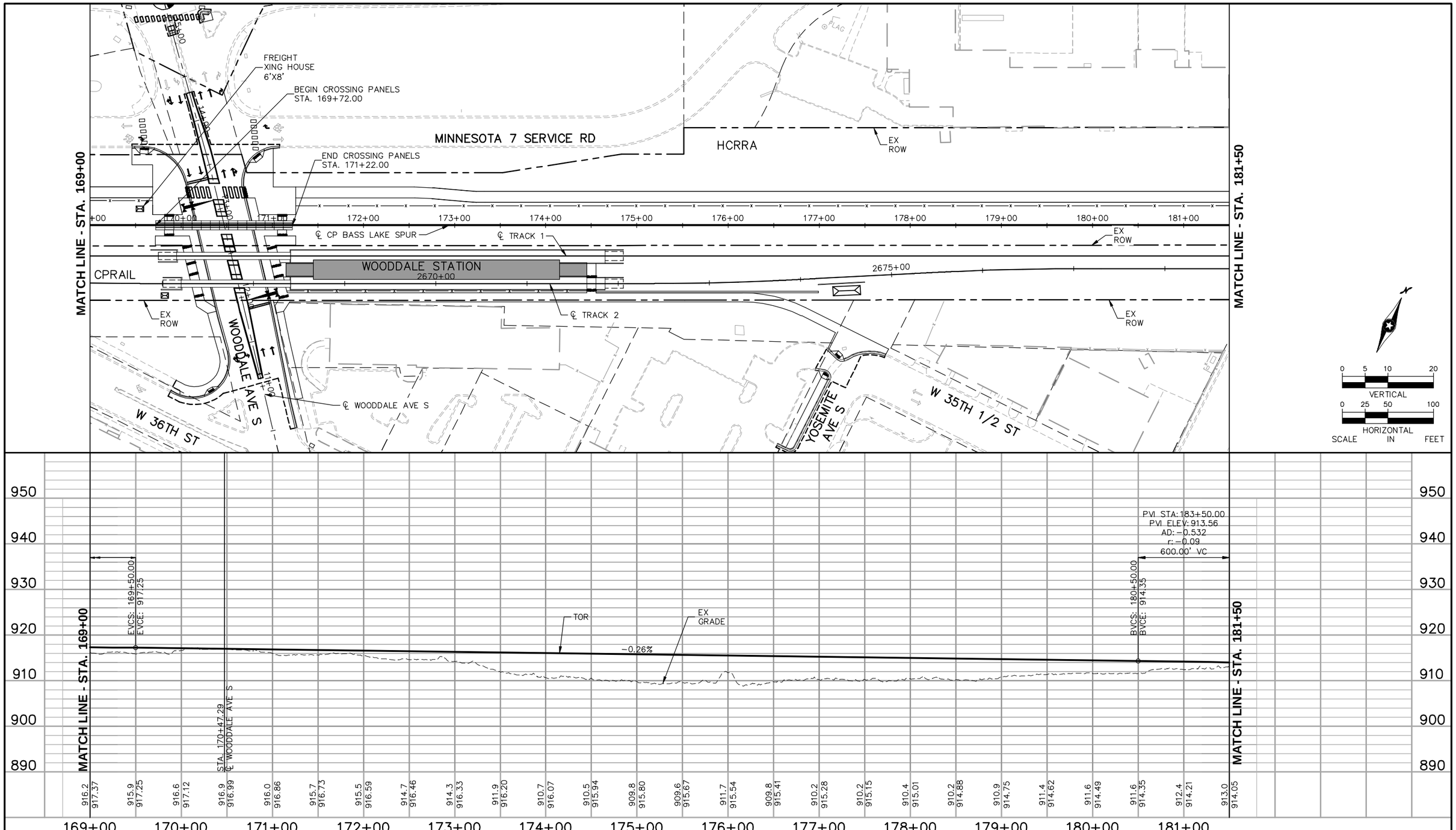
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 158+00 TO STA. 169+00

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 006

SHEET 31 OF 61

Aug, 29 2014 10:25 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

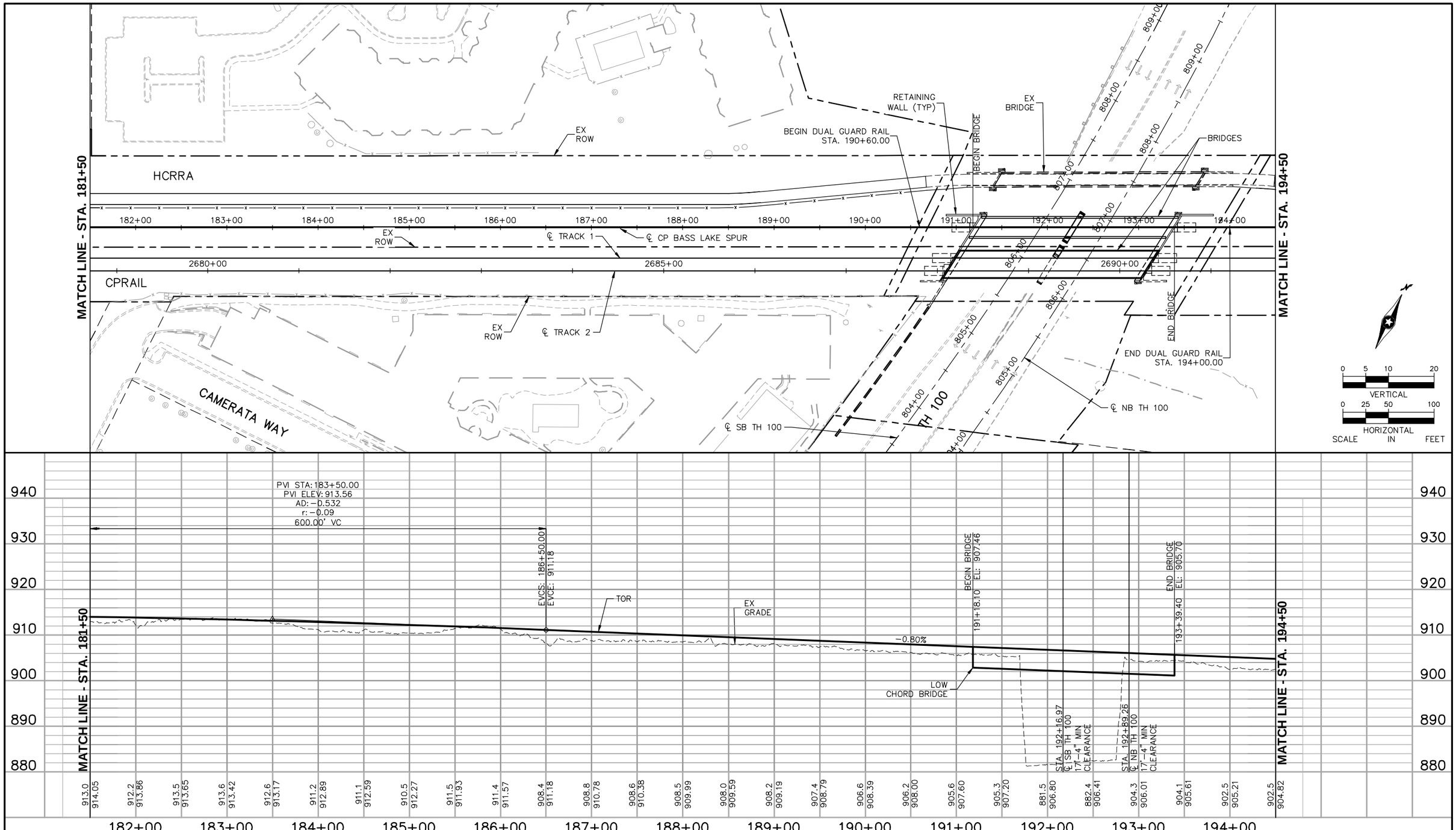
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 169+00 TO STA. 181+50

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 007

SHEET 32 OF 61

Aug. 29 2014 10:25 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

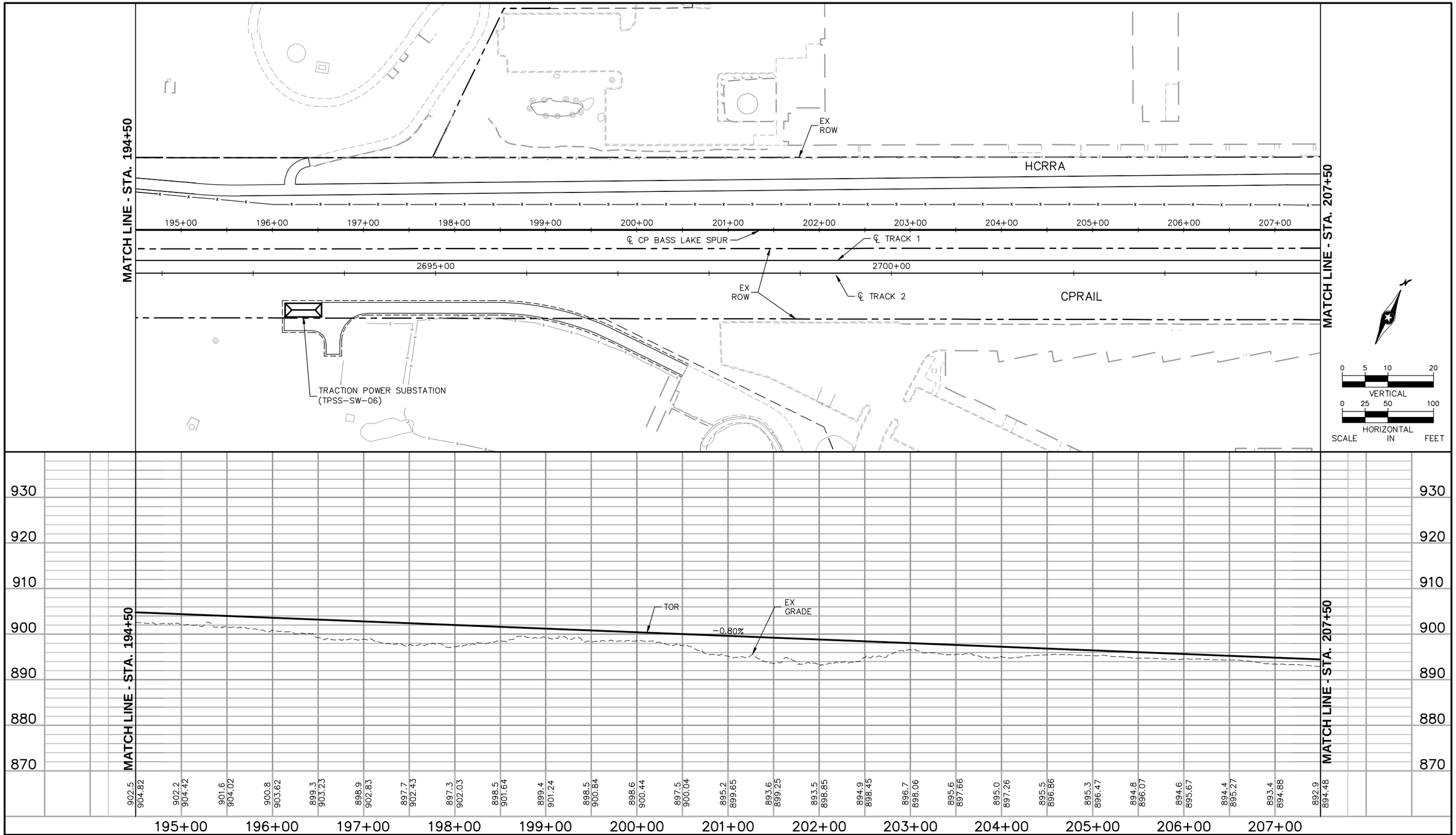
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 181+50 TO STA. 194+50

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 008

SHEET 33 OF 61

Aug. 29 2014 10:26 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

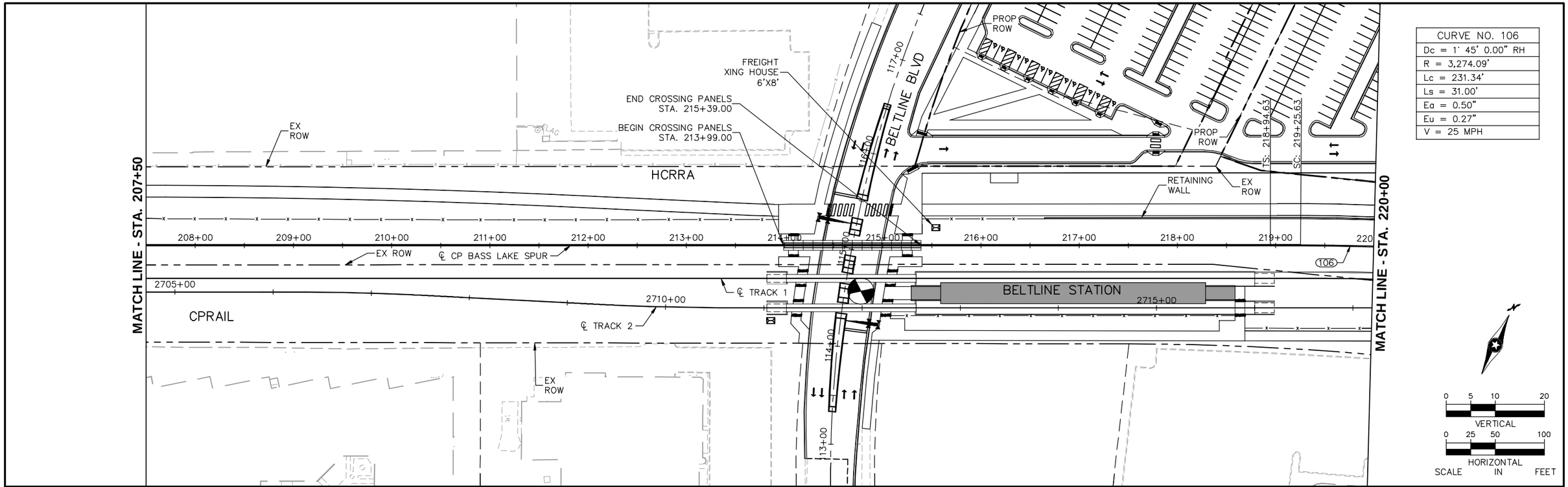
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 194+50 TO STA. 207+50

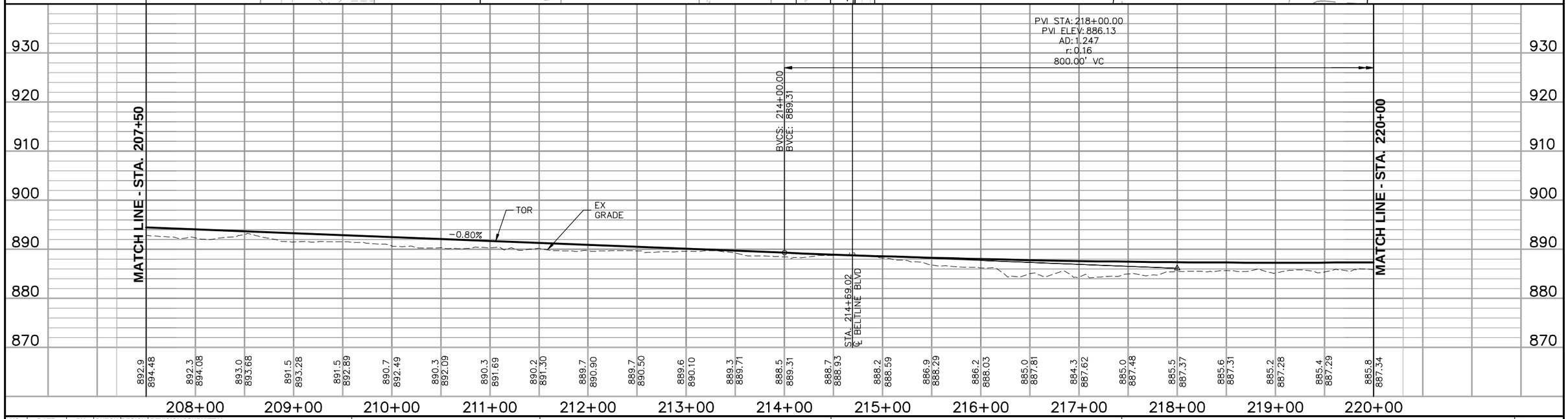
DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 009

SHEET 34 OF 61

Aug, 29 2014 10:26 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders





NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 207+50 TO STA. 220+00

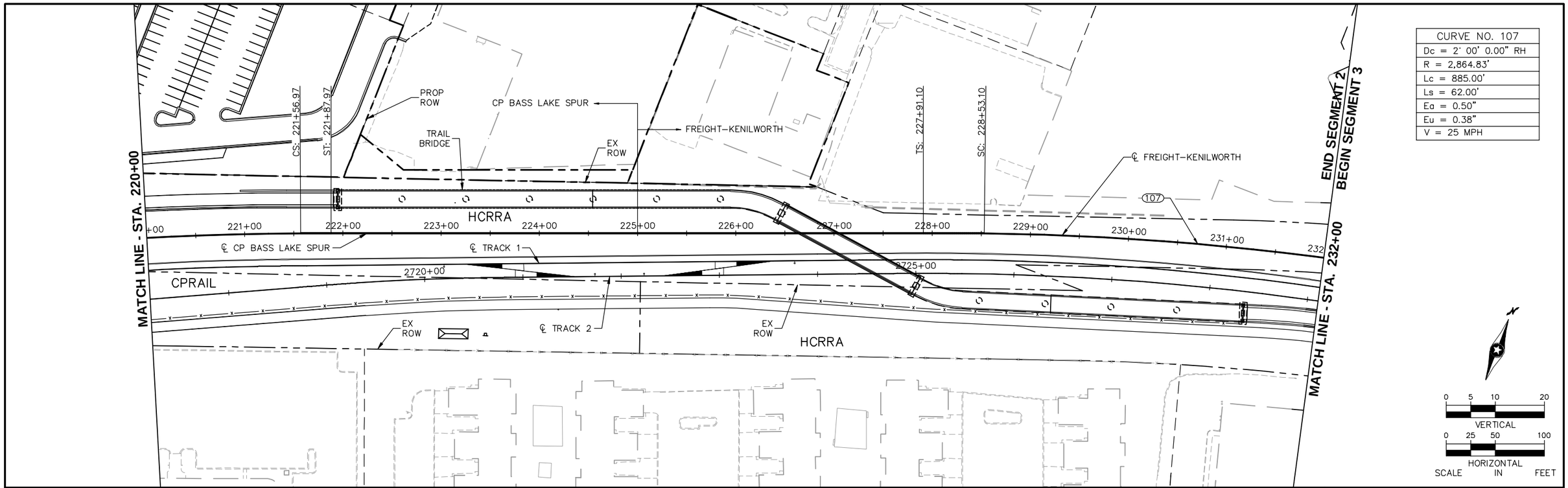
DISCIPLINE: FREIGHT

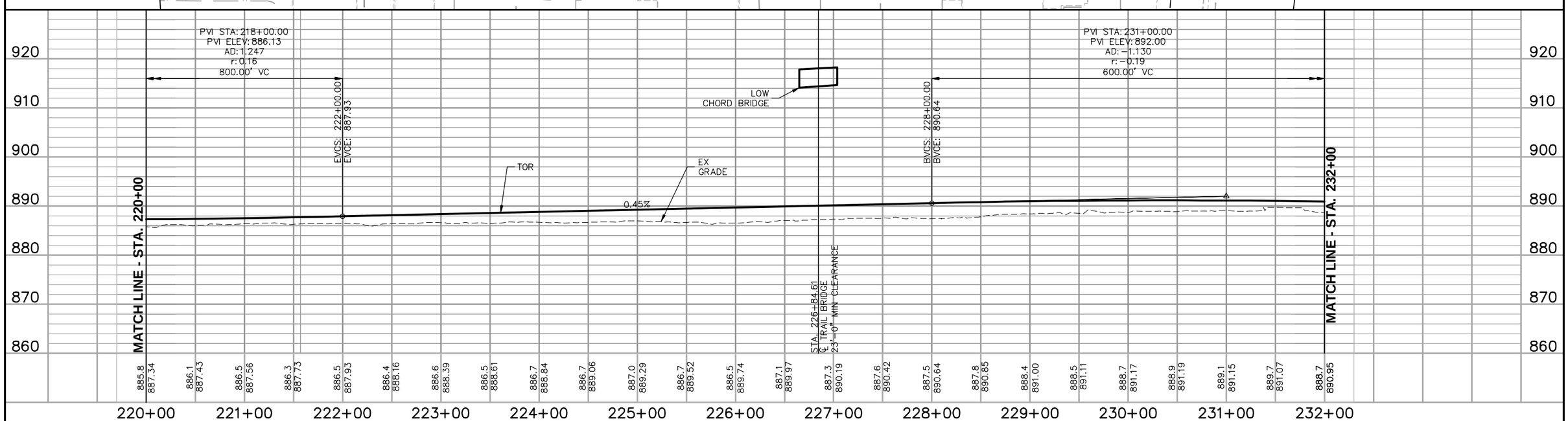
SHEET NAME: E2-FRR-PPFL - 010

SHEET 35 OF 61

Aug. 29 2014 10:26 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders

CURVE NO. 107
Dc = 2° 00' 0.00" RH
R = 2,864.83'
Lc = 885.00'
Ls = 62.00'
Ea = 0.50"
Eu = 0.38"
V = 25 MPH





NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

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PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

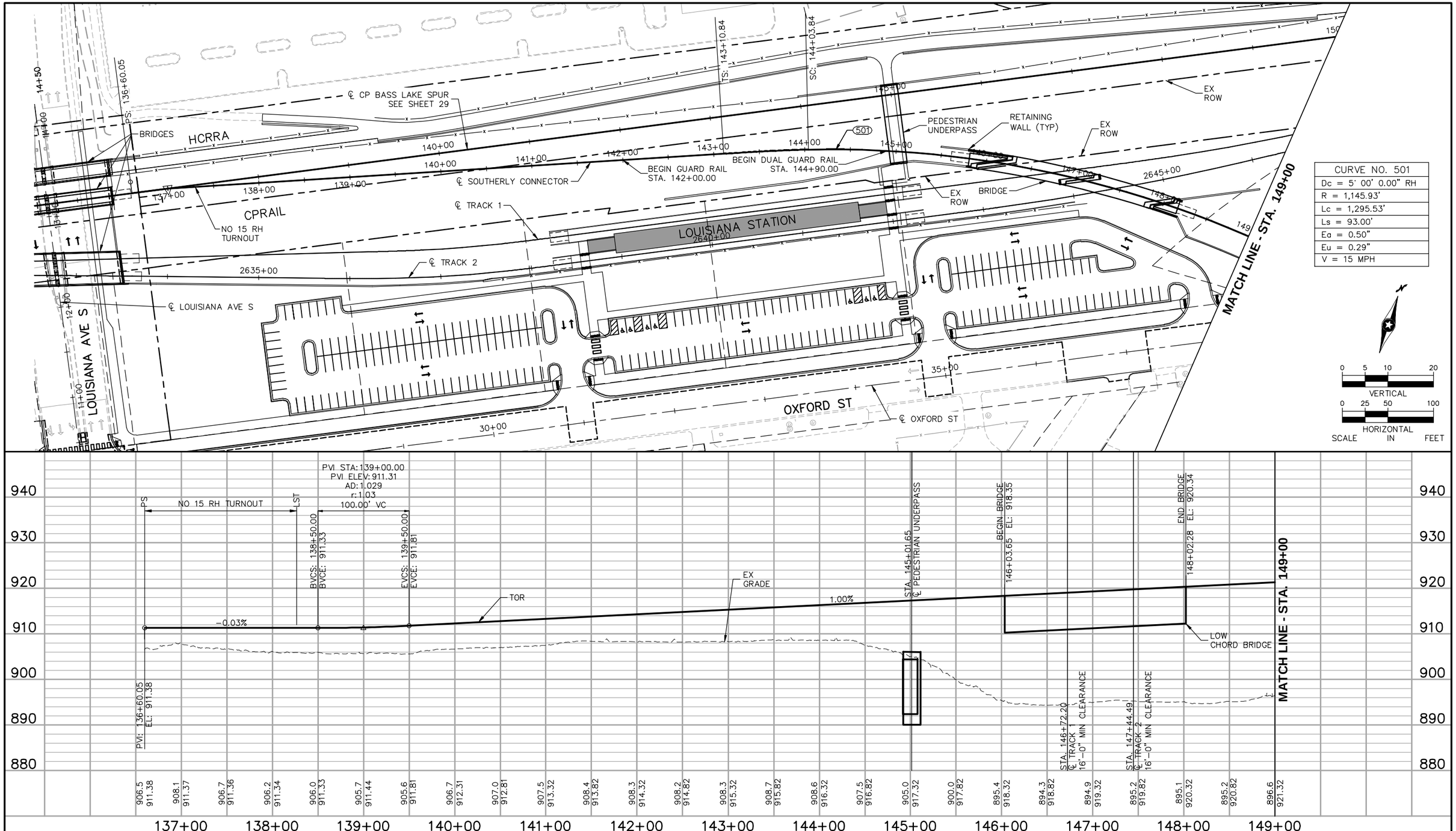
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 220+00 TO STA. 232+00

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL - 011

SHEET 36 OF 61

Aug, 29 2014 10:27 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

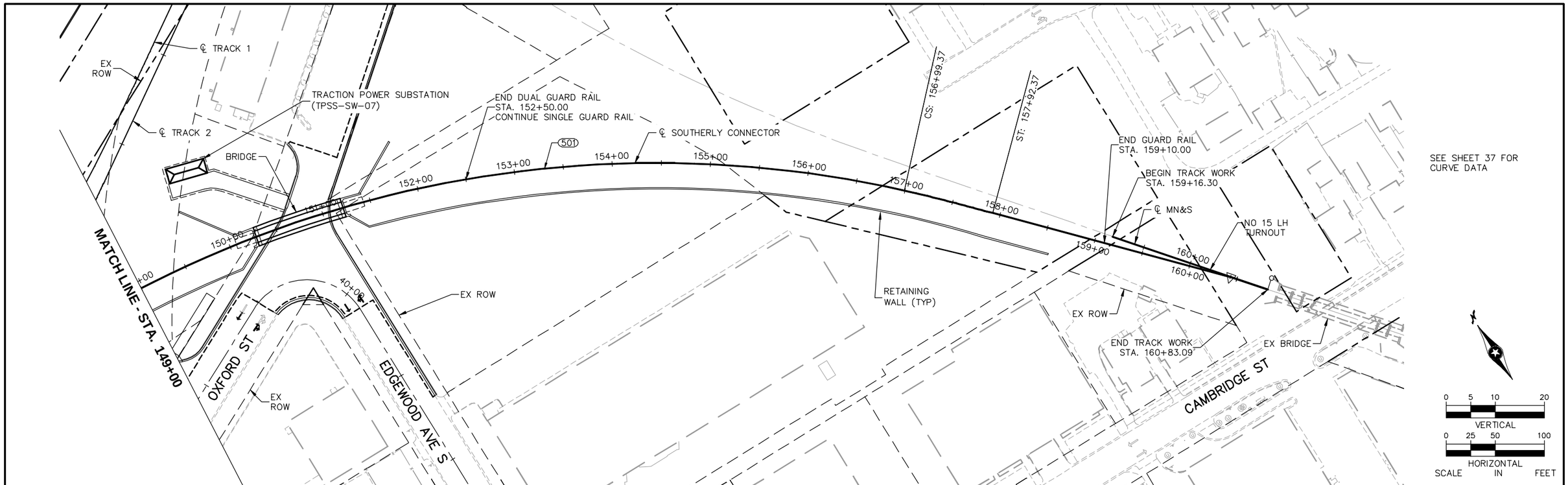
EAST - VOLUME 1a (FREIGHT)
SOUTHERLY CONNECTOR
PLAN AND PROFILE
STA. 136+60.05 TO STA. 149+00

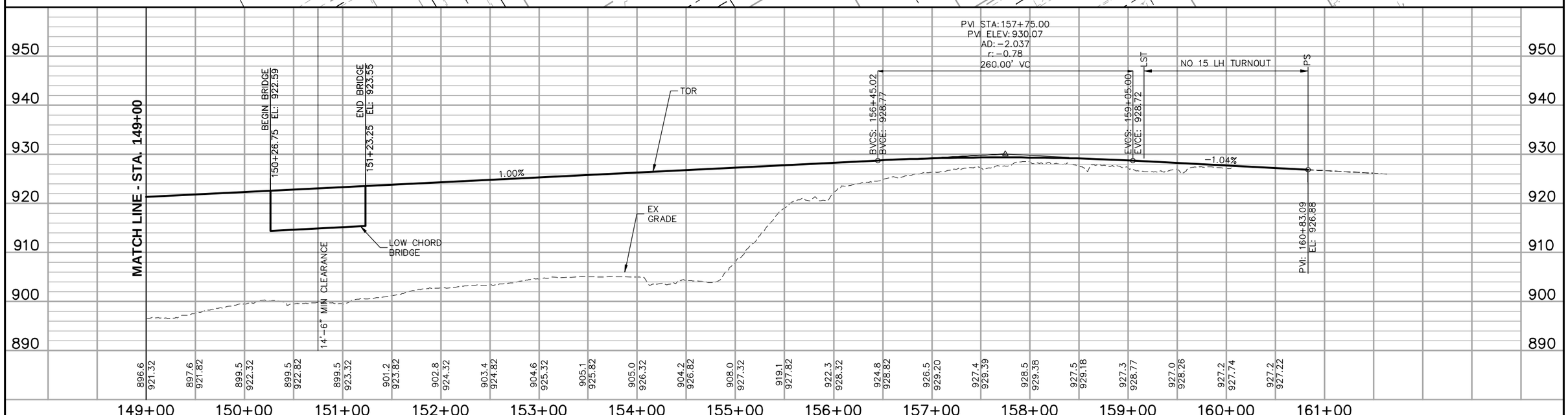
DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL-SC - 001

SHEET 37 OF 61

Aug, 29 2014 10:28 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL-SC.dwg By: chris.bunders





NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

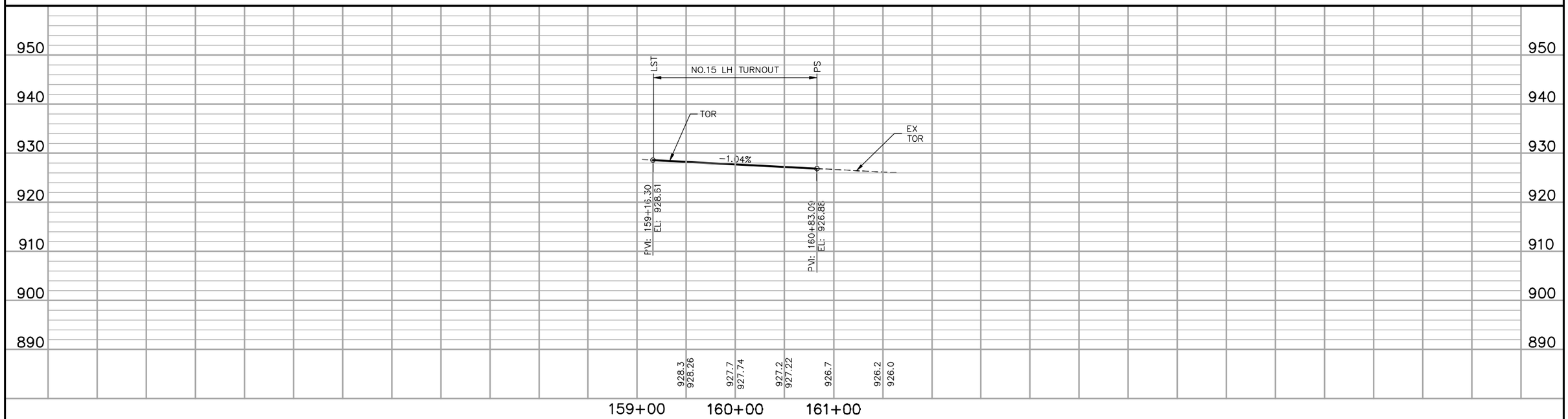
EAST - VOLUME 1a (FREIGHT)
SOUTHERLY CONNECTOR
PLAN AND PROFILE
STA. 149+00 TO STA. 160+83.09

DISCIPLINE: FREIGHT

SHEET NAME: E2-FRR-PPFL-SC - 002

SHEET 38 OF 61

Aug, 29 2014 10:28 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL-SC.dwg By: chris.bunders



NOTE:
SEE SHEET 38 FOR PLAN VIEW.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
MN&S
PROFILE
STA. 159+00 TO STA. 161+00

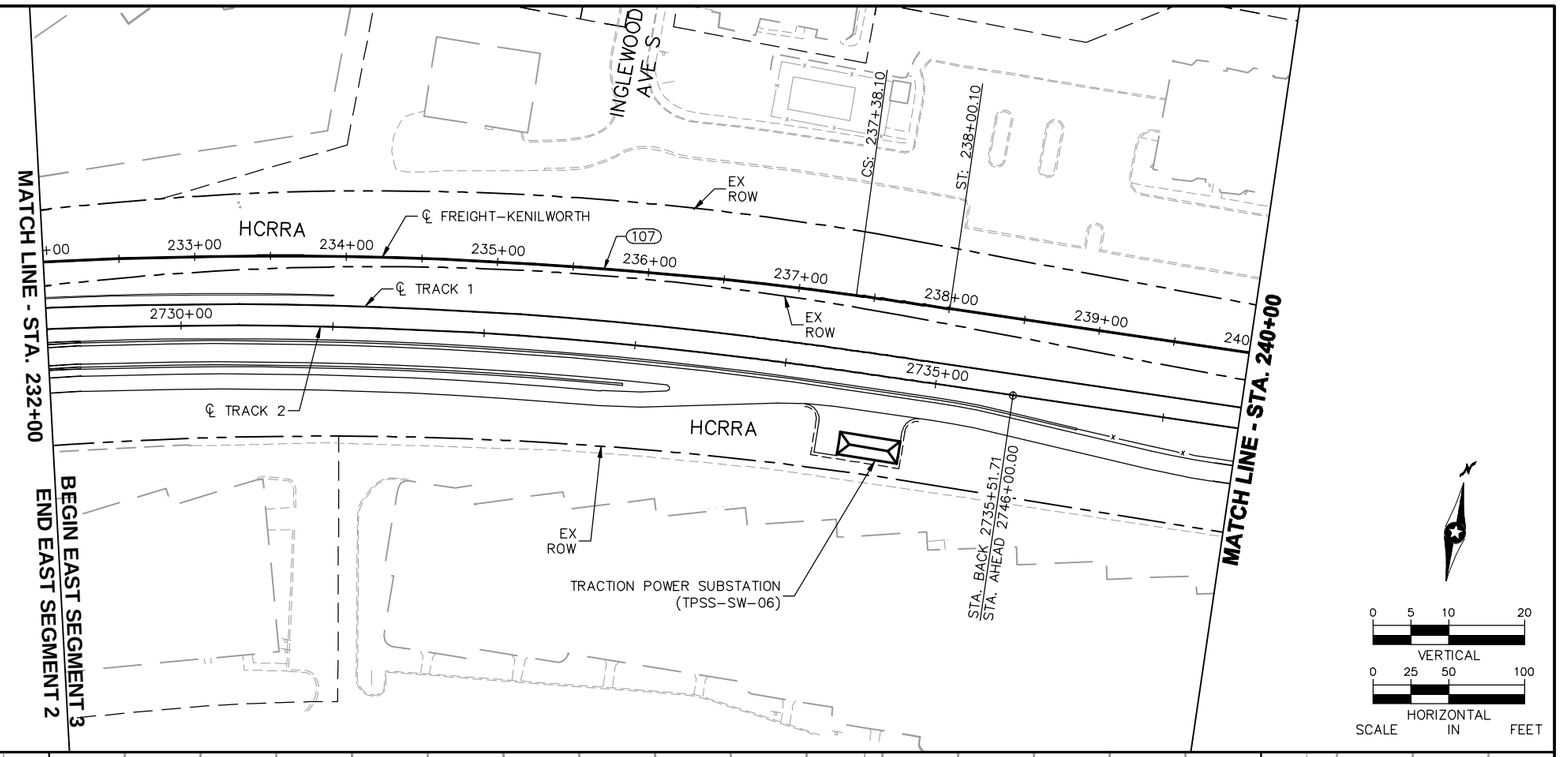
DISCIPLINE: FREIGHT

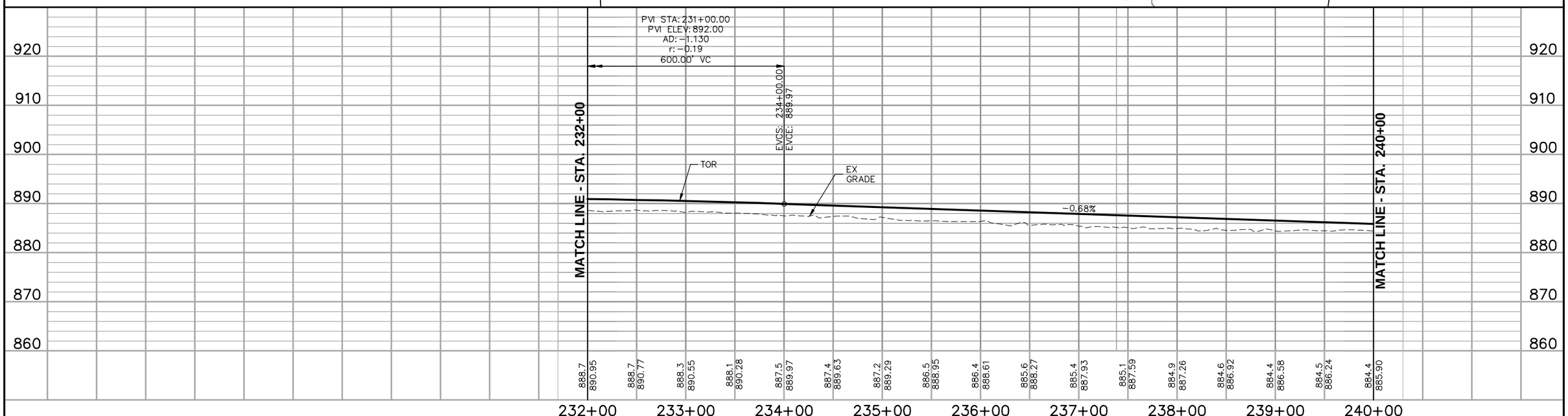
SHEET NAME: E2-FRR-PPFL-SC - 003

SHEET 39 OF 61

Aug, 29 2014 10:28 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E2-FRR-PPFL-SC.dwg By: chris.bunders

SEE SHEET 36 FOR
CURVE DATA





NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

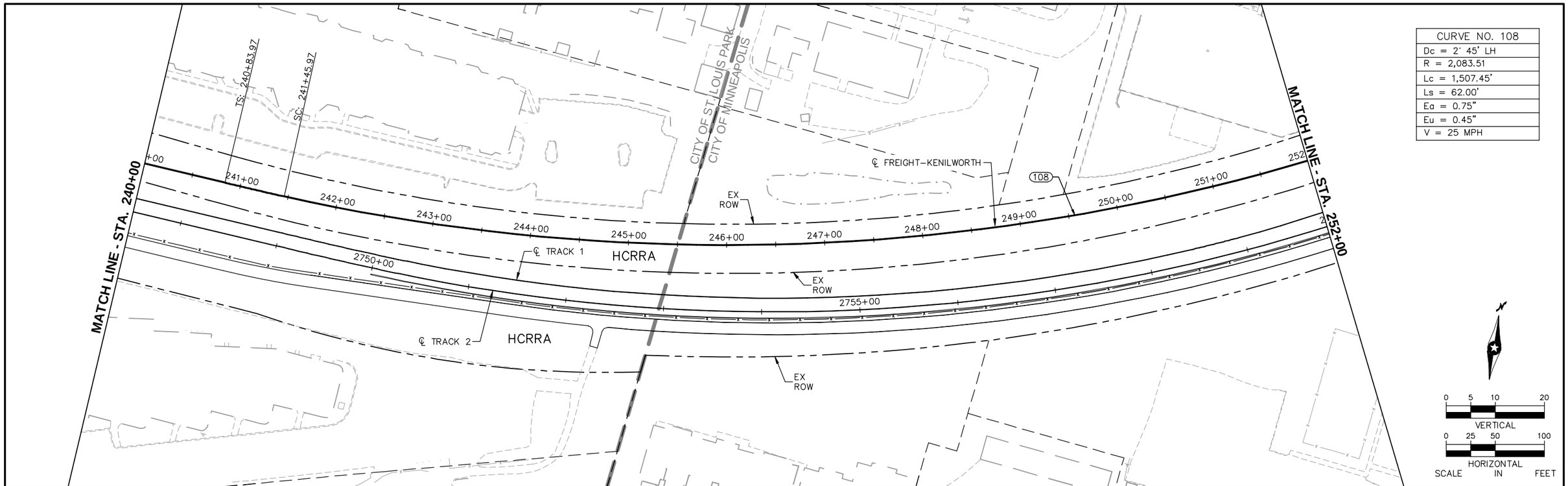
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 232+00 TO STA. 240+00

DISCIPLINE: FREIGHT

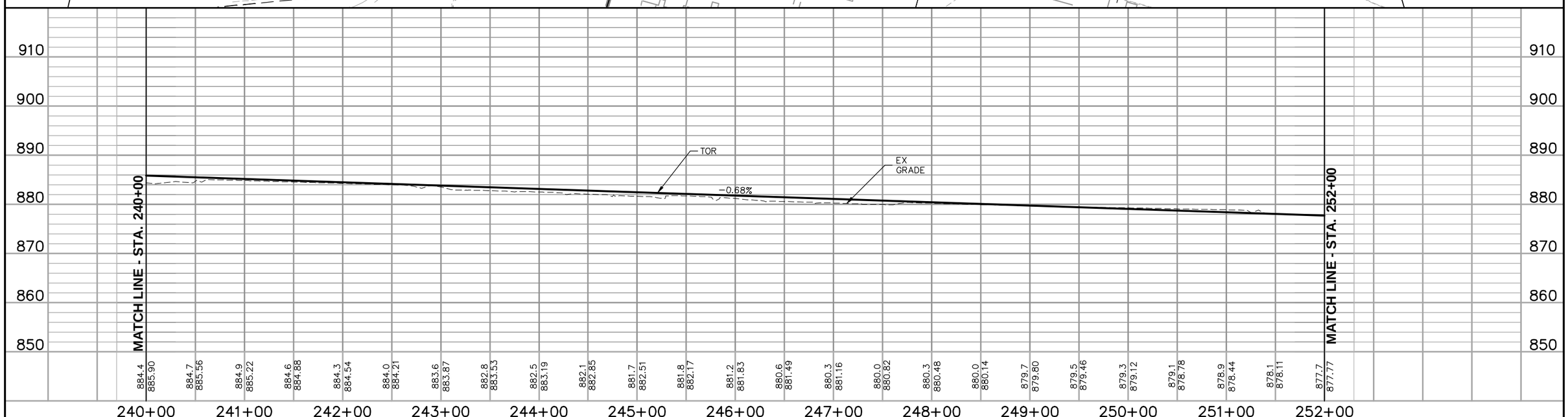
SHEET NAME: E3-FRR-PPFL - 001

SHEET 40 OF 61

Aug, 29 2014 10:29 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



CURVE NO. 108
Dc = 2° 45' LH
R = 2,083.51
Lc = 1,507.45'
Ls = 62.00'
Ea = 0.75"
Eu = 0.45"
V = 25 MPH



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

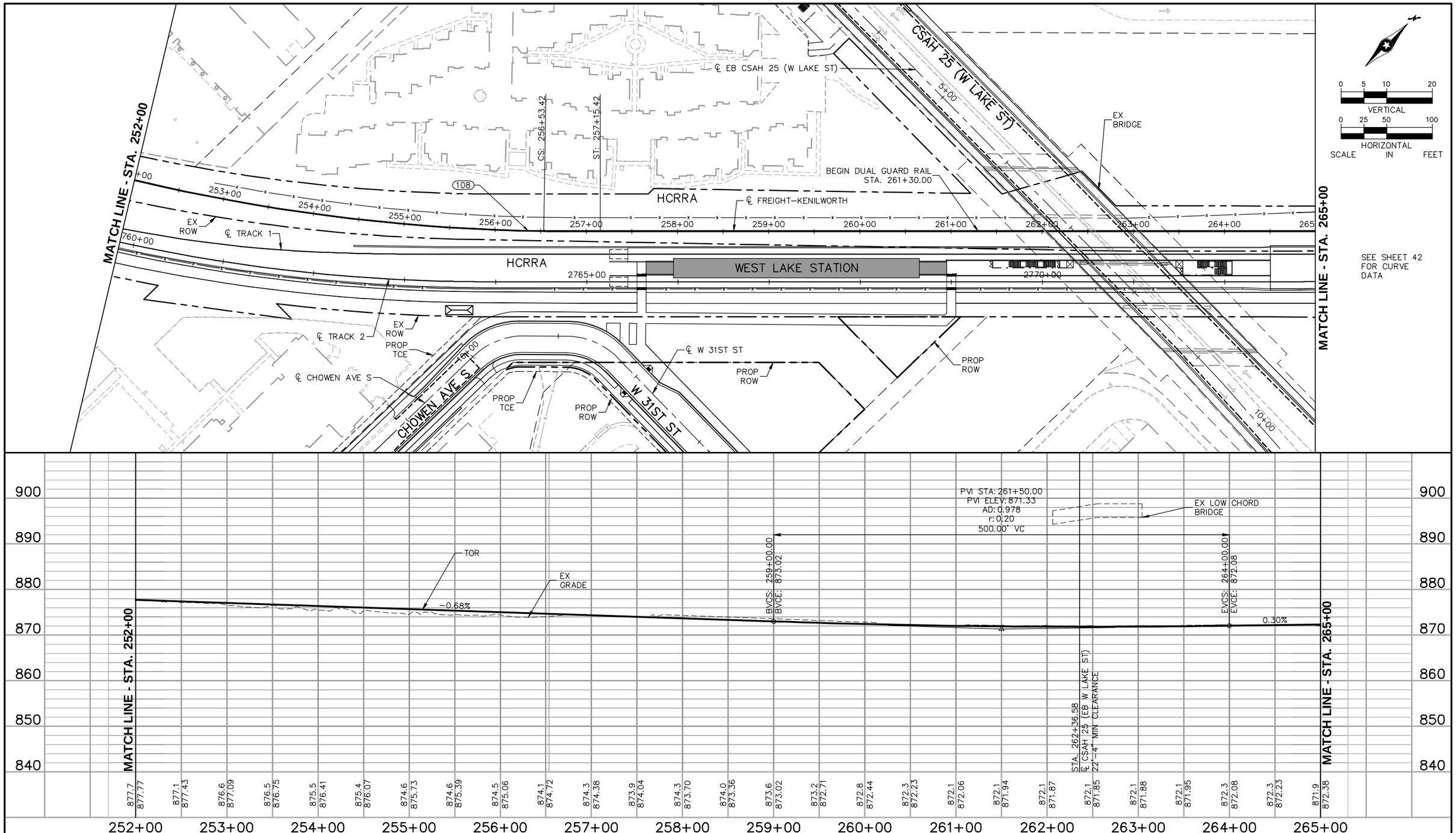
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 240+00 TO STA. 252+00

DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 002

SHEET 41 OF 61

Aug, 29 2014 10:29 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

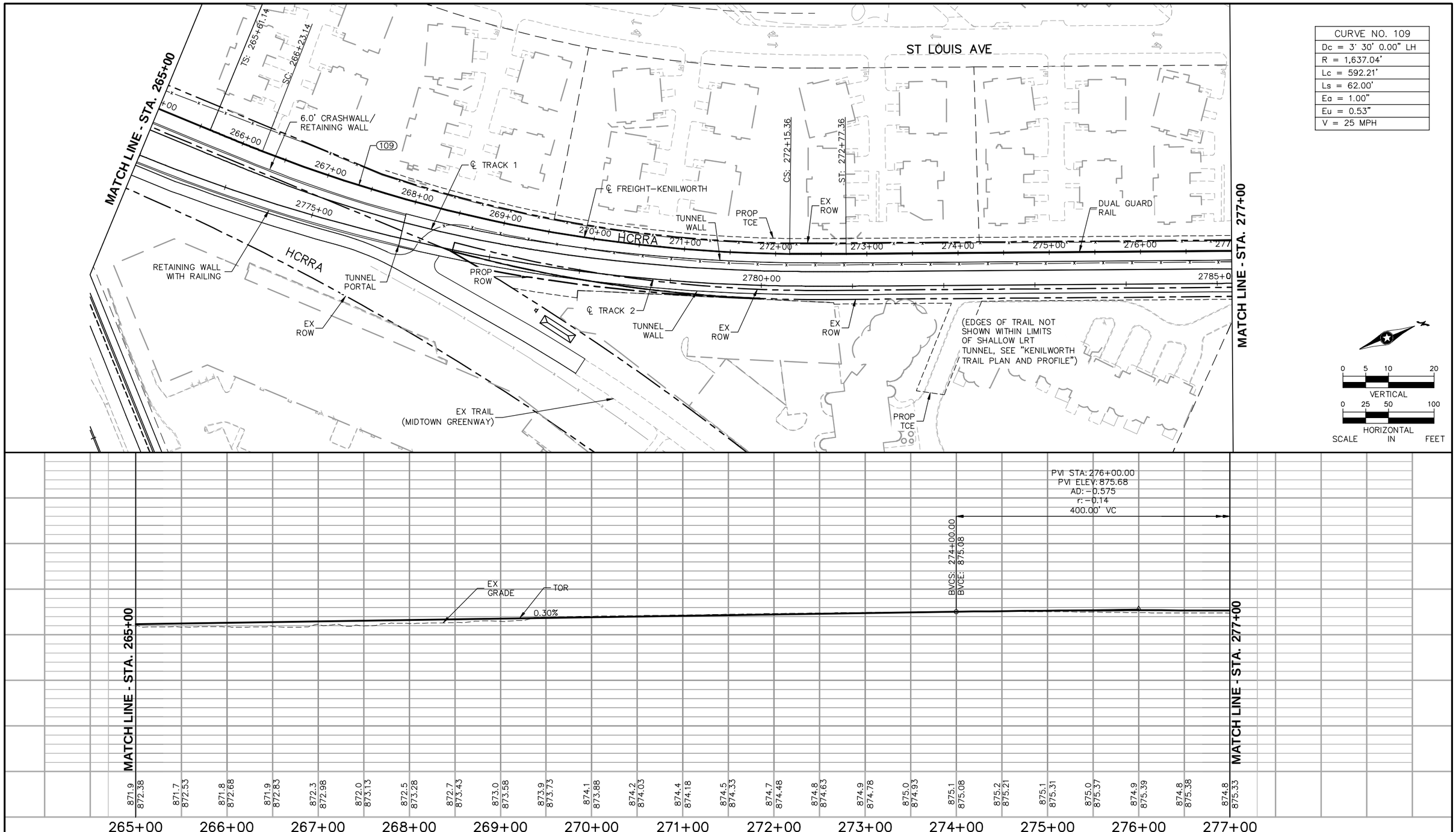
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 252+00 TO STA. 265+00

DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 003

SHEET 42 OF 61

Aug. 29 2014 10:29 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

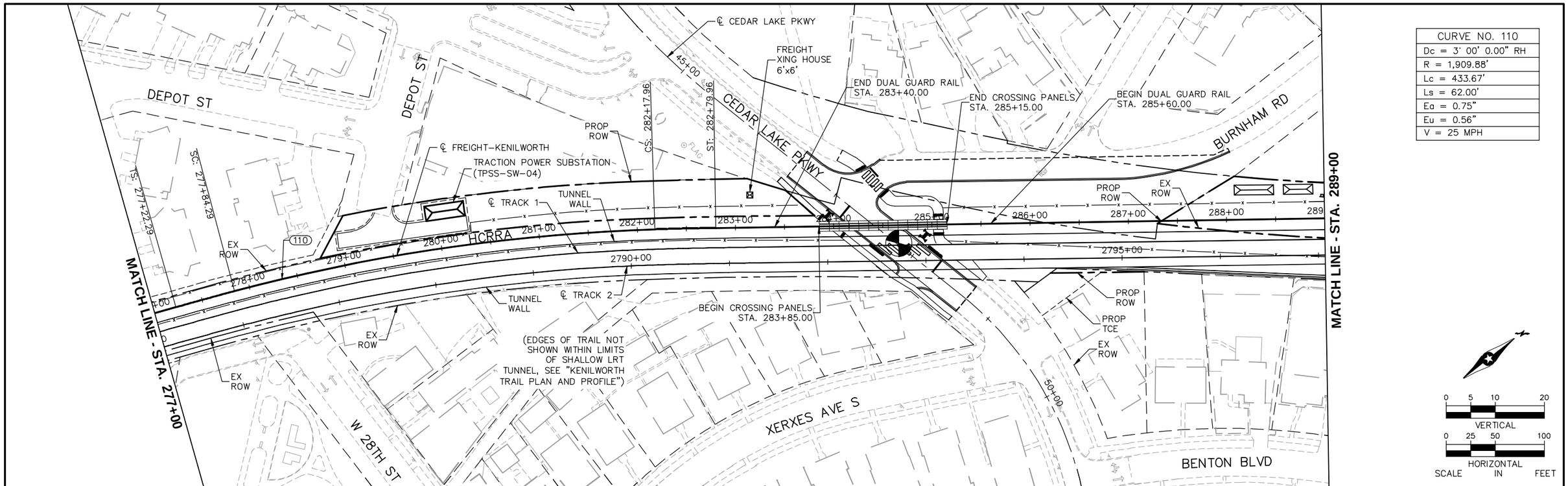
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 265+00 TO STA. 277+00

DISCIPLINE: FREIGHT

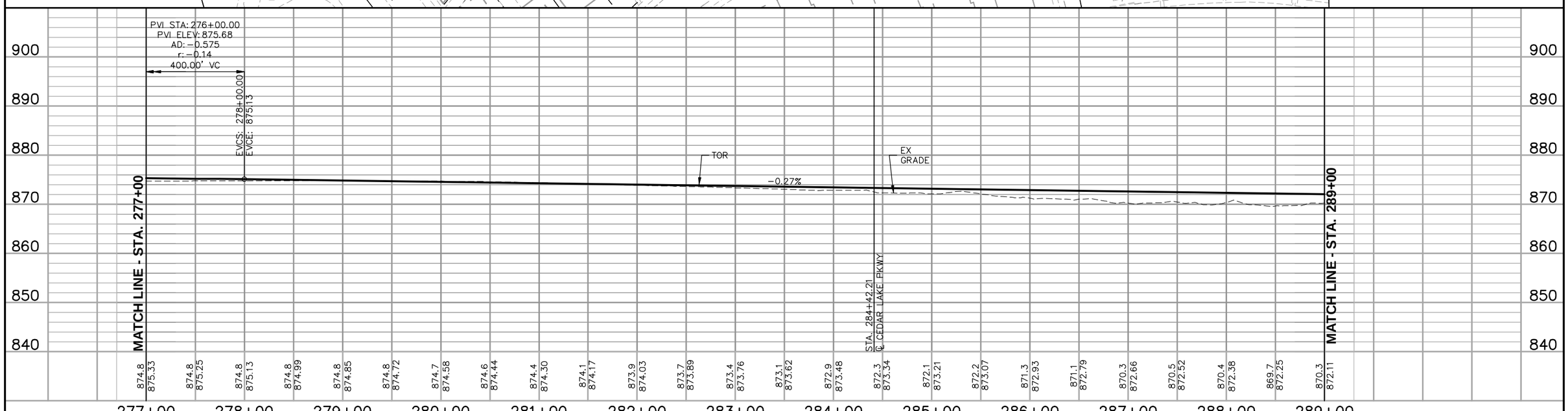
SHEET NAME: E3-FRR-PPFL - 004

SHEET 43 OF 61

Aug, 29 2014 10:29 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



CURVE NO. 110
Dc = 3° 00' 0.00" RH
R = 1,909.88'
Lc = 433.67'
Ls = 62.00'
Ea = 0.75"
Eu = 0.56"
V = 25 MPH



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

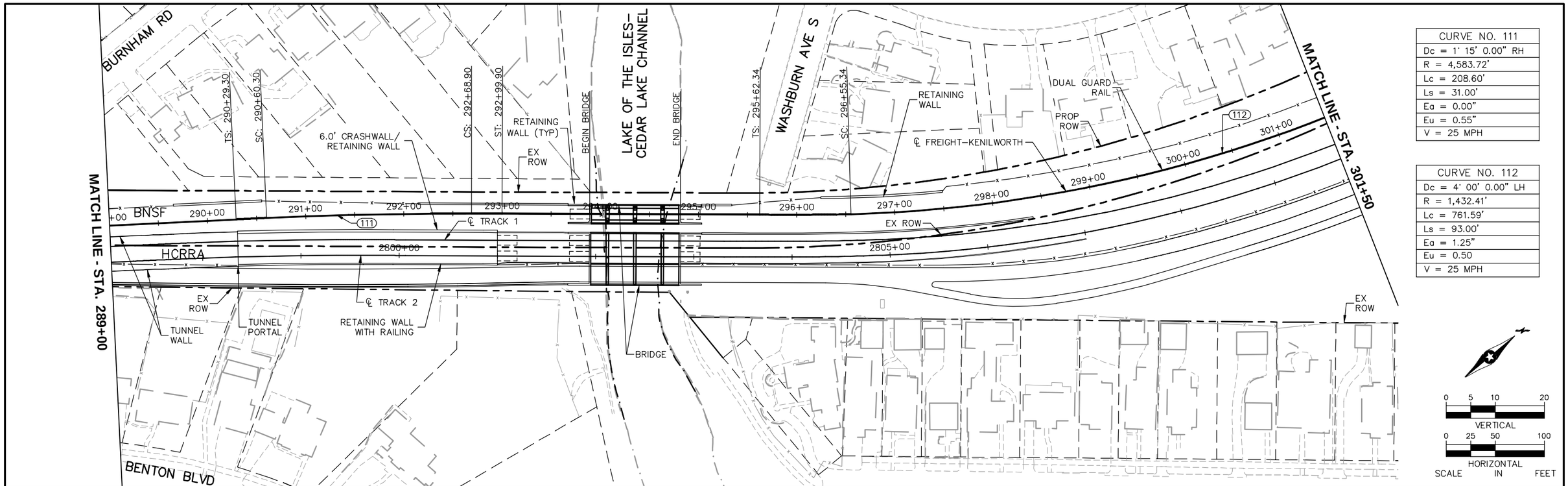
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 277+00 TO STA. 289+00

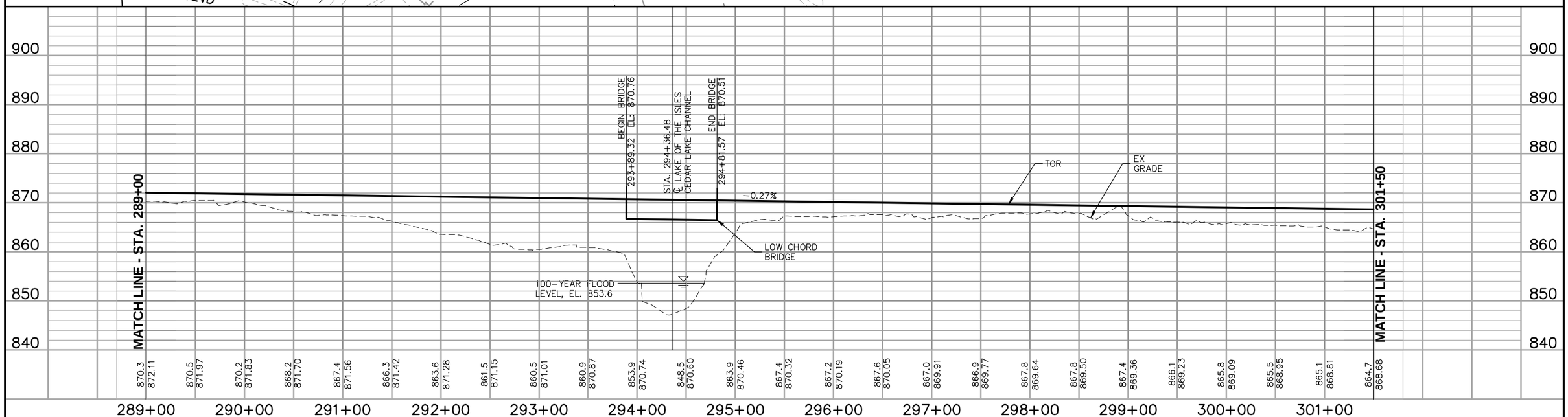
DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 005

SHEET 44 OF 61

Aug, 29 2014 10:29 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders





NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 289+00 TO STA. 301+50

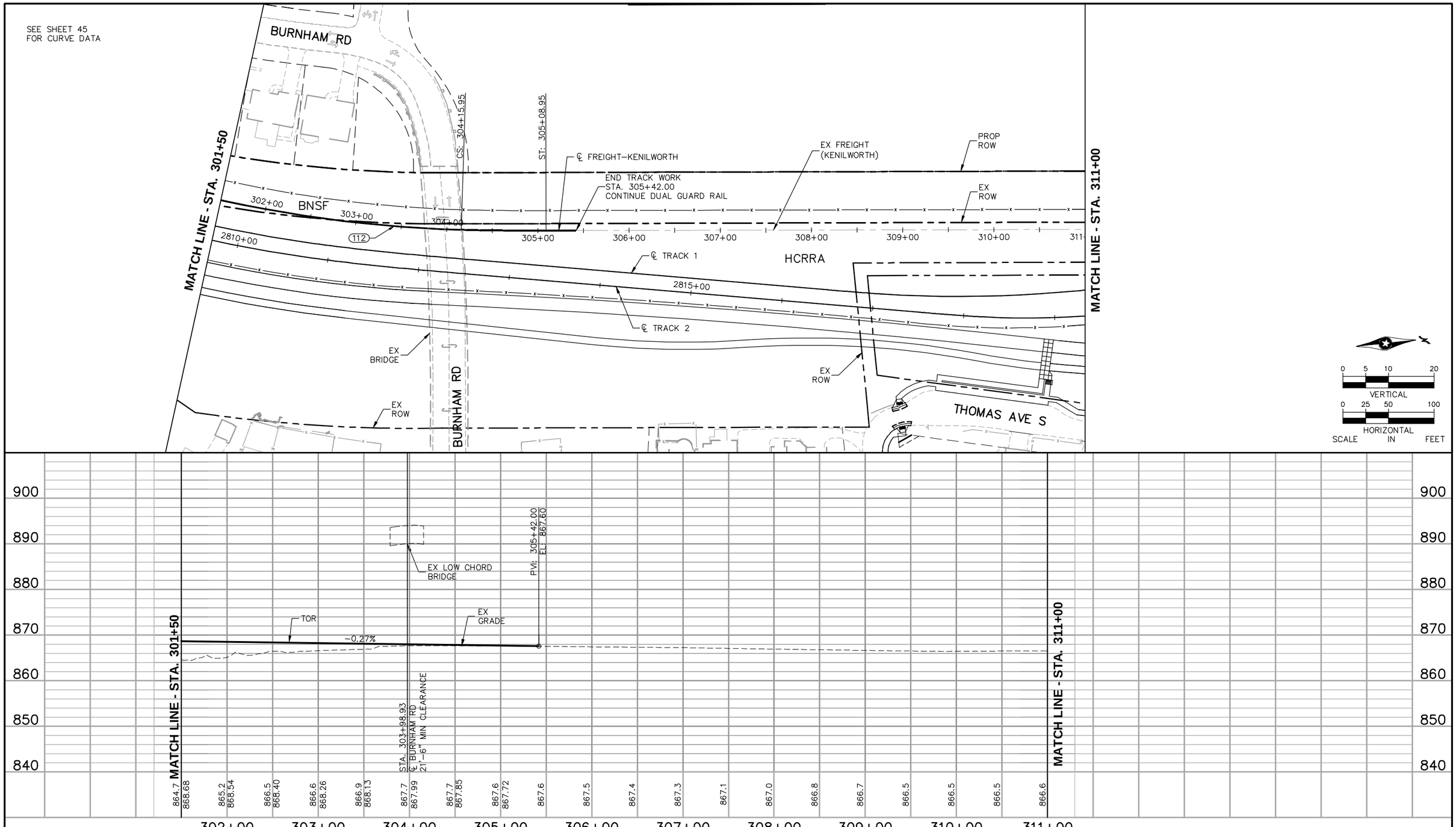
DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 006

SHEET 45 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders

SEE SHEET 45
FOR CURVE DATA



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

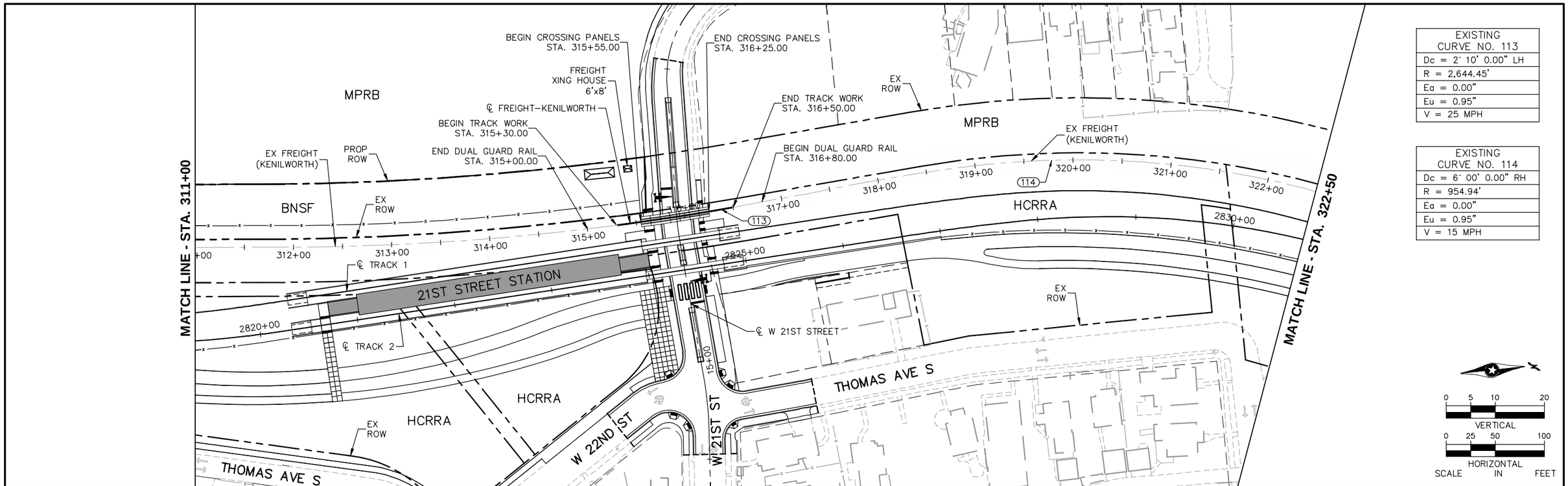
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 301+50 TO STA. 311+00

DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 007

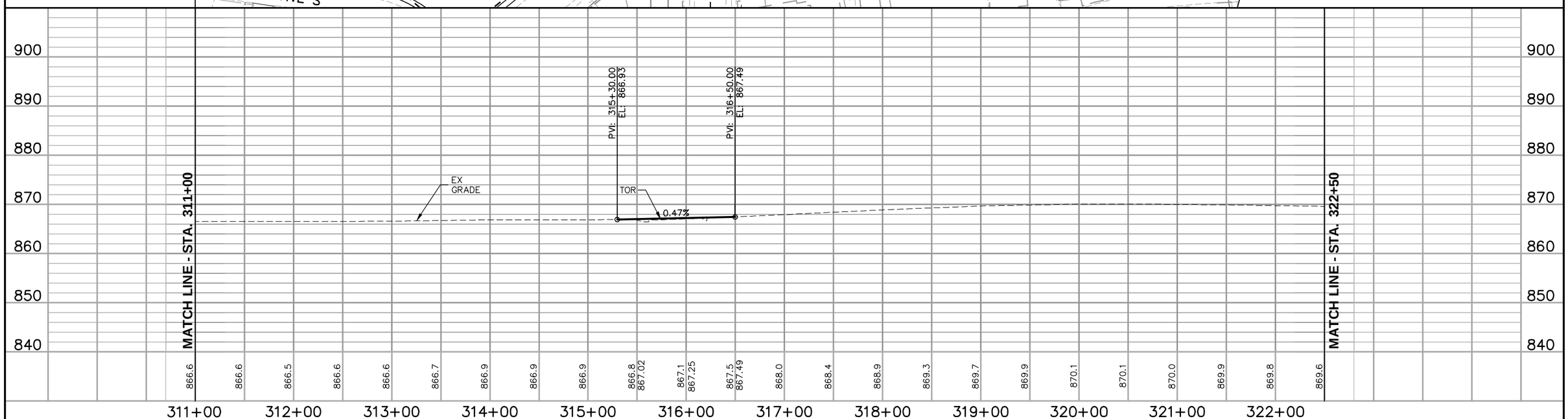
SHEET 46 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



EXISTING CURVE NO. 113
Dc = 2° 10' 0.00" LH
R = 2,644.45'
Ea = 0.00"
Eu = 0.95"
V = 25 MPH

EXISTING CURVE NO. 114
Dc = 6° 00' 0.00" RH
R = 954.94'
Ea = 0.00"
Eu = 0.95"
V = 15 MPH



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

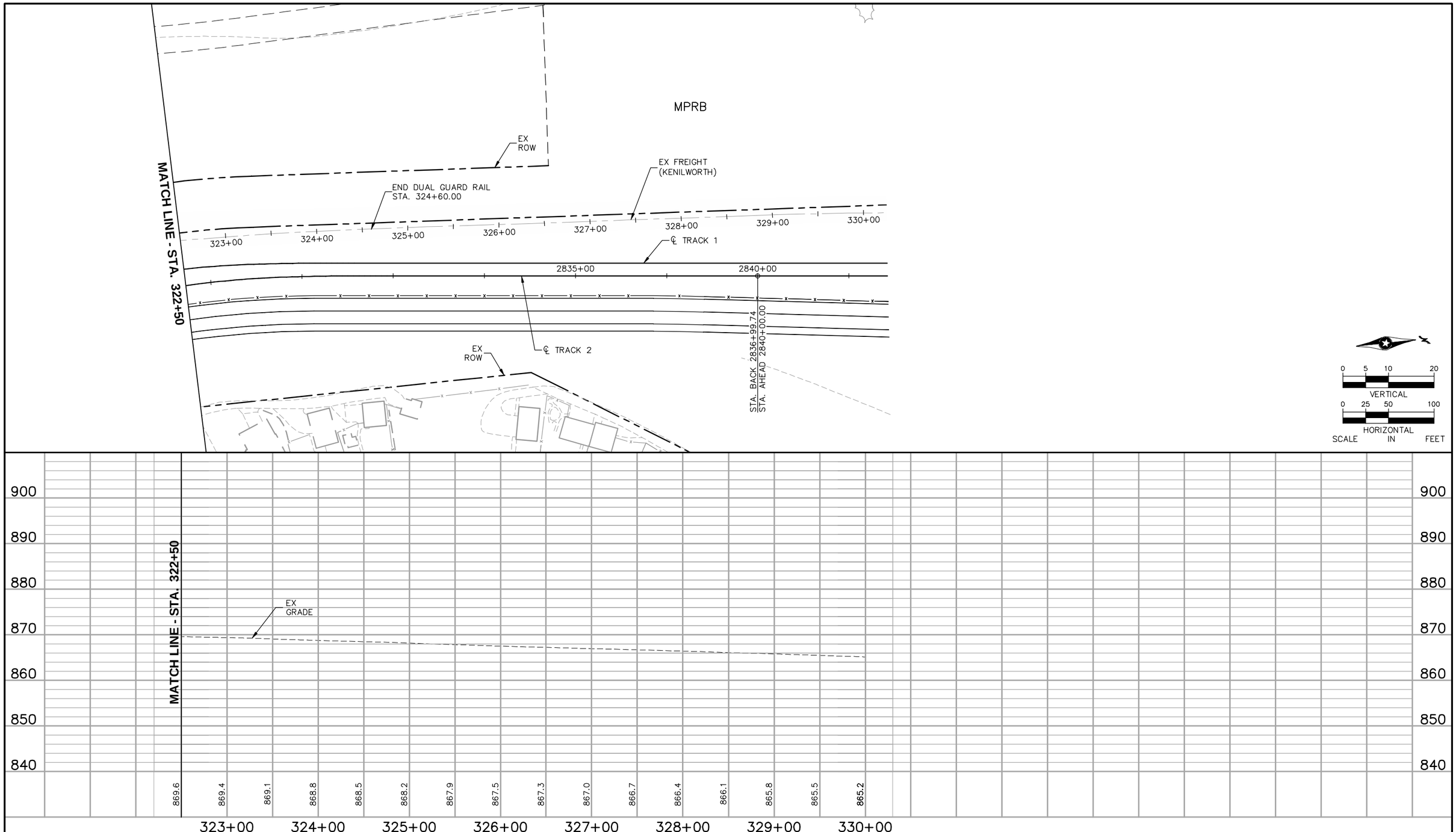
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 311+00 TO STA. 322+50

DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 008

SHEET 47 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

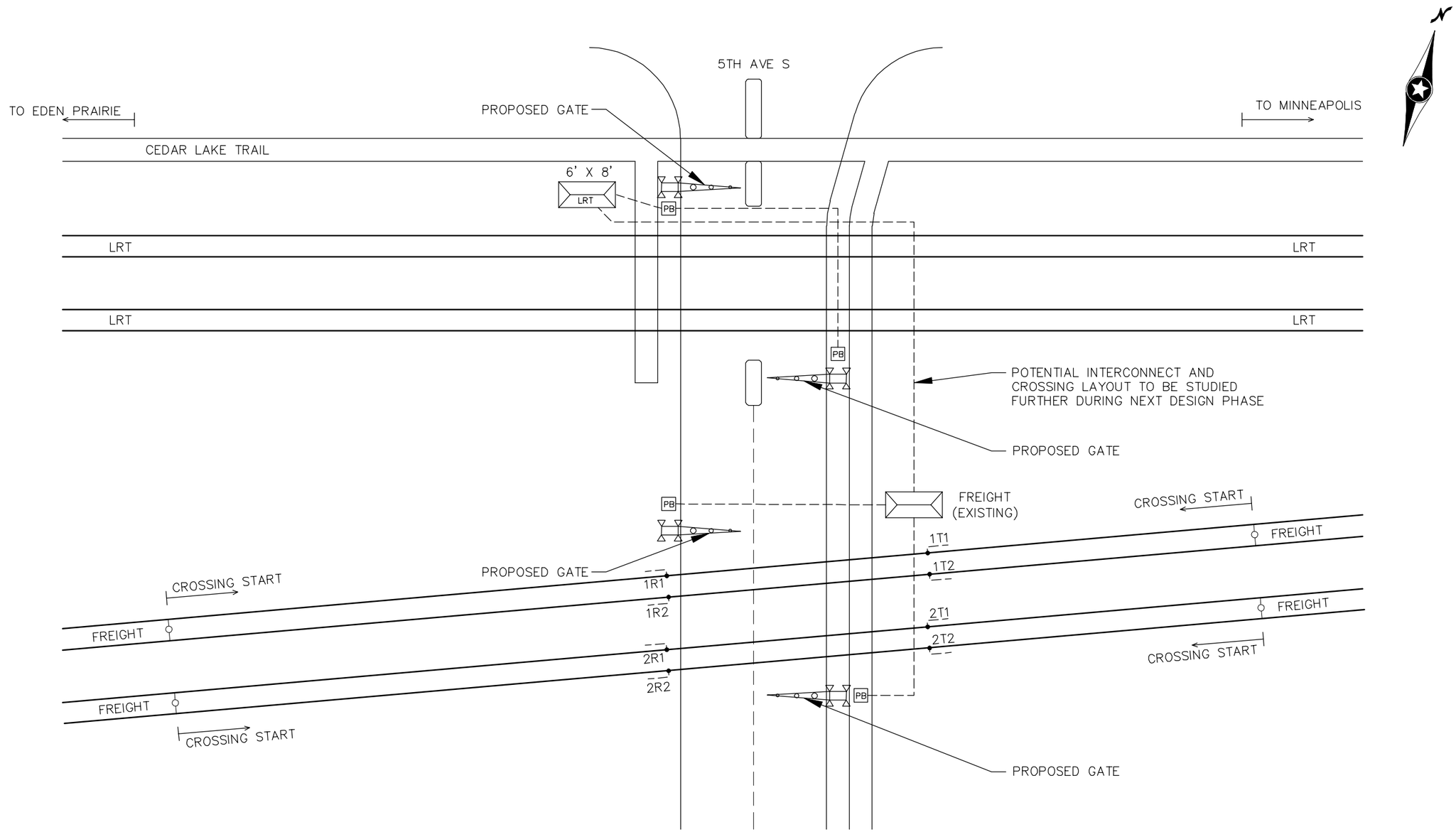
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
PLAN AND PROFILE
STA. 322+50 TO STA. 330+00

DISCIPLINE: FREIGHT

SHEET NAME: E3-FRR-PPFL - 009

SHEET 48 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E3-FRR-PPFL.dwg By: chris.bunders



NOTES:

1. UNLESS OTHERWISE NOTED ALL EQUIPMENT SHOWN IN EXISTING CONFIGURATION.
2. FURTHER MODIFICATIONS TO BE PROVIDED AS CIVIL DESIGN DICTATES.
3. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

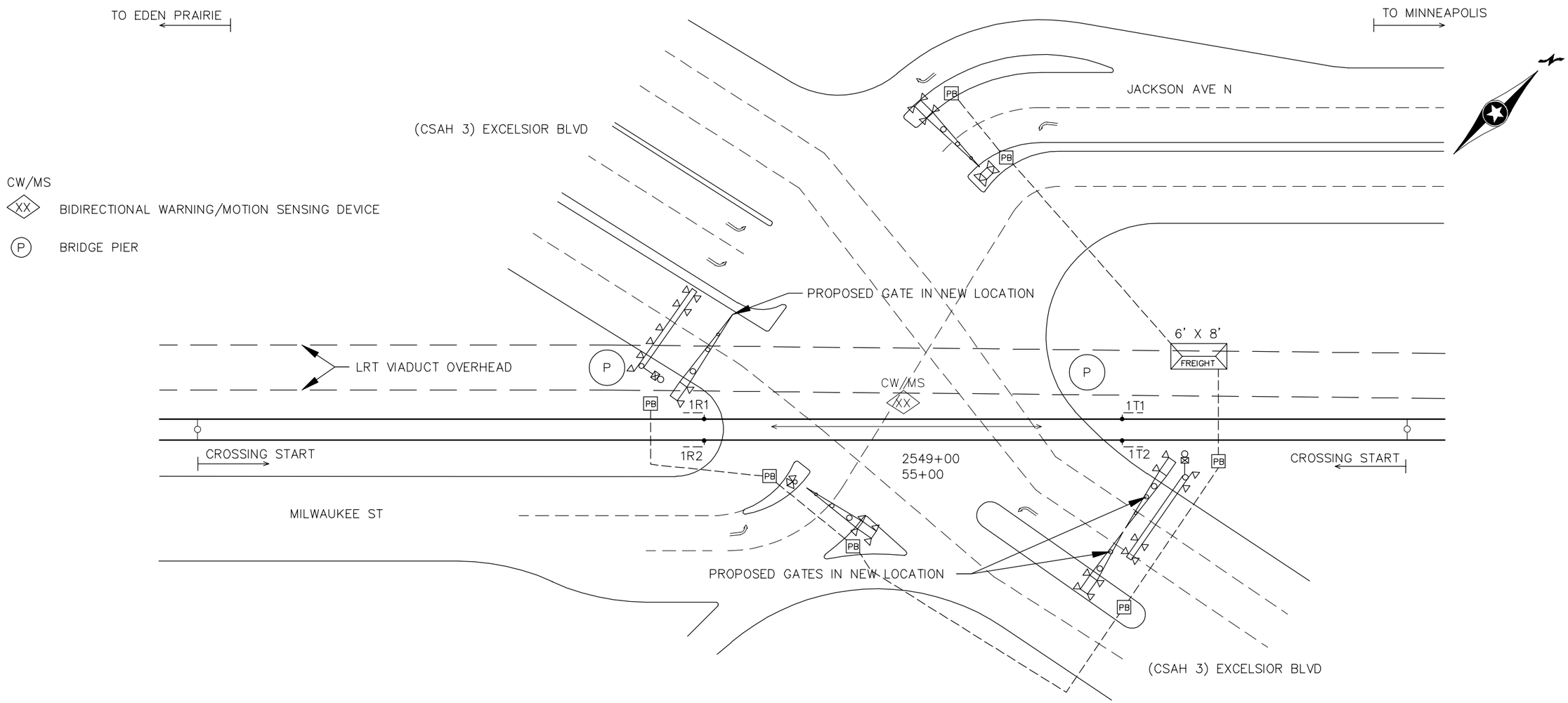
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
DETAILS
5TH AVE S

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 001

SHEET 49 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders



NOTES:

1. LRT IS GRADE SEPARATED FROM AT-GRADE CROSSING (ON VIADUCT).
2. UNLESS OTHERWISE NOTED ALL EQUIPMENT SHOWN IN EXISTING CONFIGURATION.
3. USE PREDICTORS (ADJUSTS CROSSING TIME DUE TO SPEED), MODIFY DOCUMENTATION AS NECESSARY.
4. PROVIDE ALL NEW FIELD WIRING.
5. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

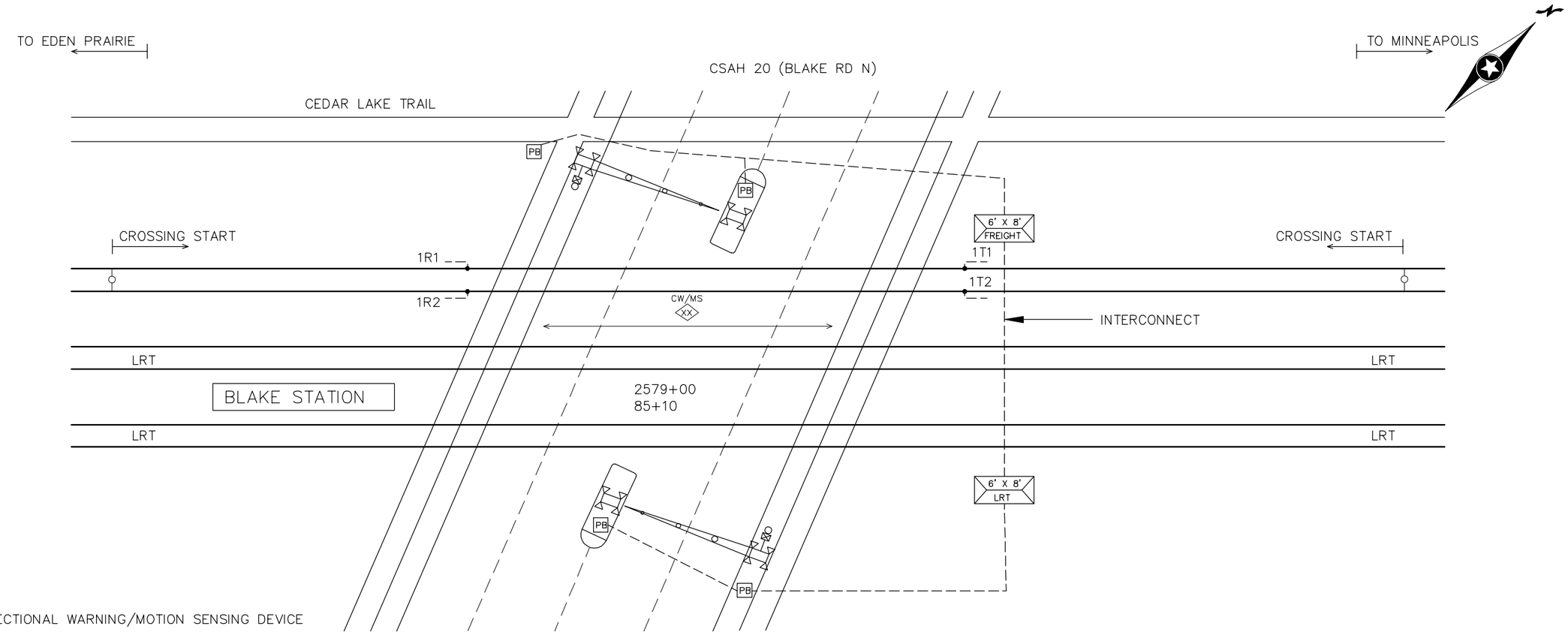
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SYSTEMS PLAN
CSAH 3 (EXCELSIOR BLVD)

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 002

SHEET 50 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders



CW/MS

XX BIDIRECTIONAL WARNING/MOTION SENSING DEVICE

NOTES:

1. USE PREDICTORS (ADJUSTS CROSSING TIME DUE TO SPEED), MODIFY DOCUMENTATION AS NECESSARY.
2. PROVIDE ALL NEW EQUIPMENT.
3. FREIGHT RAILROAD MAINTAINS HOUSE, GATE, AND CANTILEVER ON NORTH SIDE OF RIGHT-OF-WAY.
4. LRT MAINTAINS HOUSE, GATE, AND CANTILEVER ON SOUTH SIDE OF RIGHT-OF-WAY.
5. PROVIDE COMMUNICATIONS LINK TO LIGHT RAIL CROSSING HOUSE.
6. FREIGHT RAILROAD CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON NORTH SIDE OF CROSSING.
7. LRT CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON SOUTH SIDE OF CROSSING.
8. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

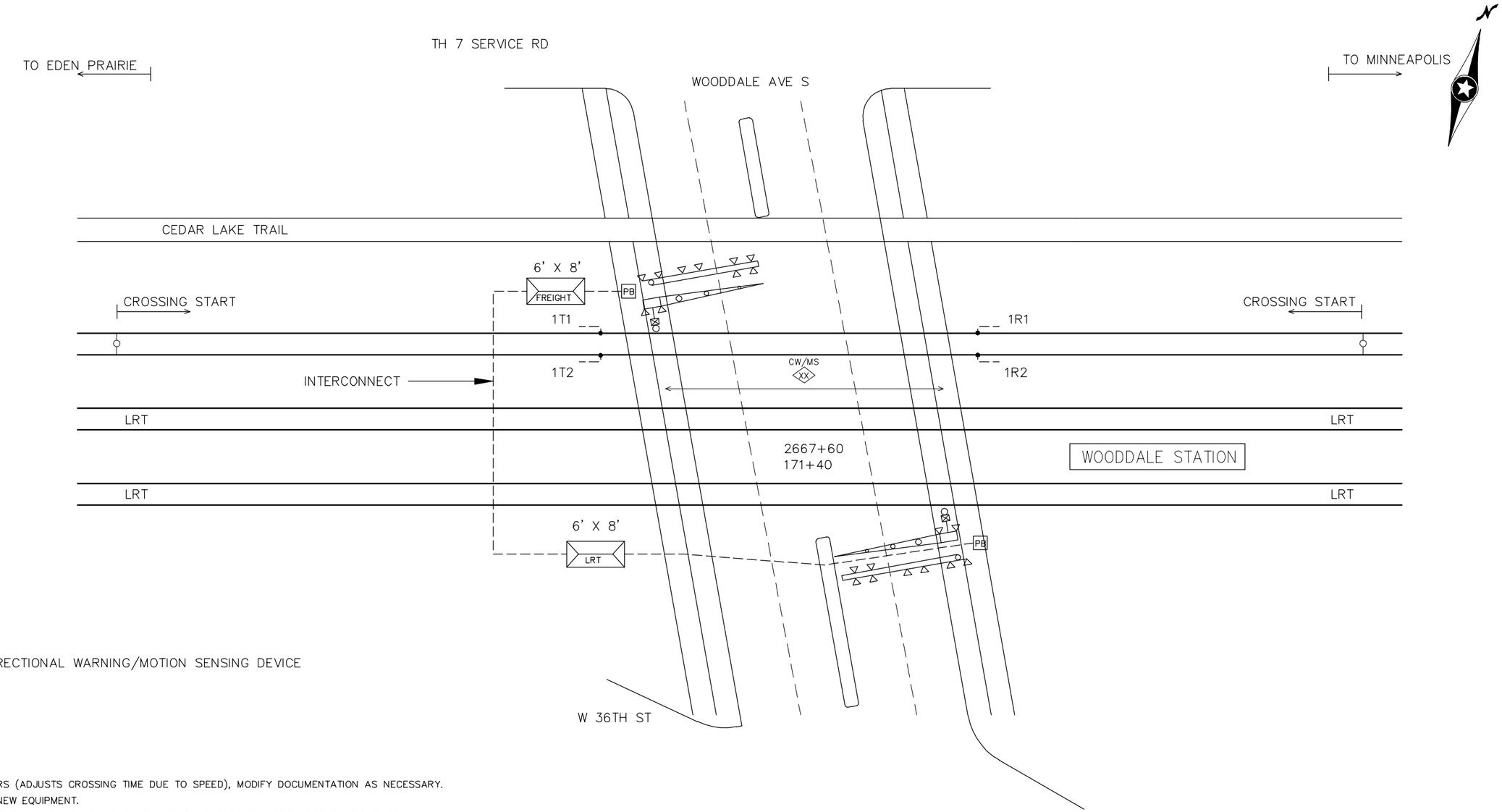
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SYSTEMS PLAN
CSAH 20 (BLAKE RD)

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 003

SHEET 51 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders



CW/MS

XX BIDIRECTIONAL WARNING/MOTION SENSING DEVICE

NOTES:

1. USE PREDICTORS (ADJUSTS CROSSING TIME DUE TO SPEED), MODIFY DOCUMENTATION AS NECESSARY.
2. PROVIDE ALL NEW EQUIPMENT.
3. FREIGHT RAILROAD MAINTAINS HOUSE, GATE, AND CANTILEVER ON NORTH SIDE OF RIGHT-OF-WAY.
4. LRT MAINTAINS HOUSE, GATE, AND CANTILEVER ON SOUTH SIDE OF RIGHT-OF-WAY.
5. PROVIDE COMMUNICATIONS LINK TO LIGHT RAIL CROSSING HOUSE.
6. FREIGHT RAILROAD CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON NORTH SIDE OF CROSSING.
7. LRT CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON SOUTH SIDE OF CROSSING.
8. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

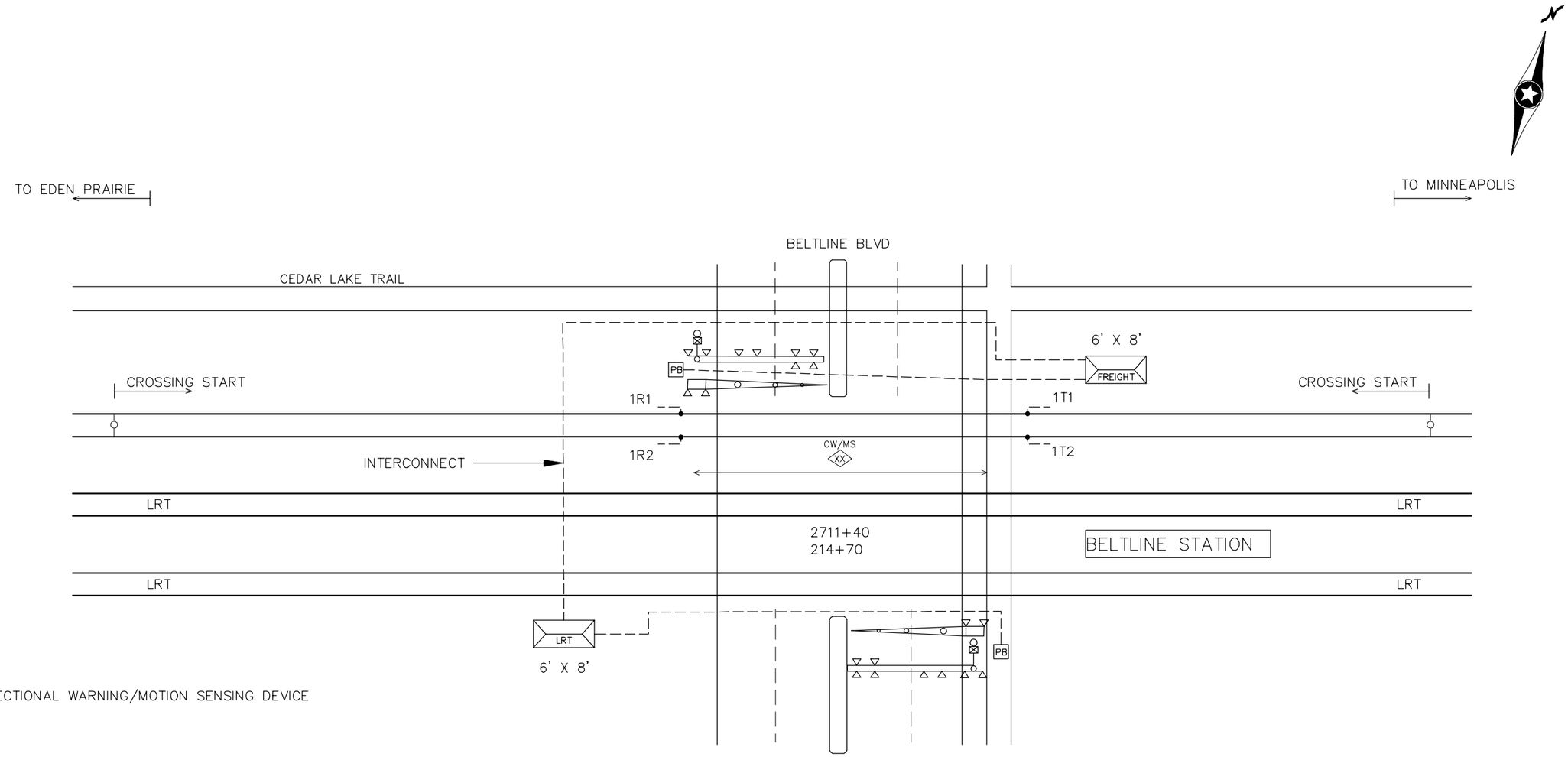
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SYSTEMS PLAN
WOODDALE AVE S

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 004

SHEET 52 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders



CW/MS

XX BIDIRECTIONAL WARNING/MOTION SENSING DEVICE

NOTES:

1. USE PREDICTORS (ADJUSTS CROSSING TIME DUE TO SPEED), MODIFY DOCUMENTATION AS NECESSARY.
2. PROVIDE ALL NEW EQUIPMENT.
3. FREIGHT RAILROAD MAINTAINS HOUSE, GATE, AND CANTILEVER ON NORTH SIDE OF RIGHT-OF-WAY.
4. LRT MAINTAINS HOUSE, GATE, AND CANTILEVER ON SOUTH SIDE OF RIGHT-OF-WAY.
5. PROVIDE COMMUNICATIONS LINK TO LIGHT RAIL CROSSING HOUSE.
6. FREIGHT RAILROAD CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON NORTH SIDE OF CROSSING.
7. LRT CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON SOUTH SIDE OF CROSSING.
8. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

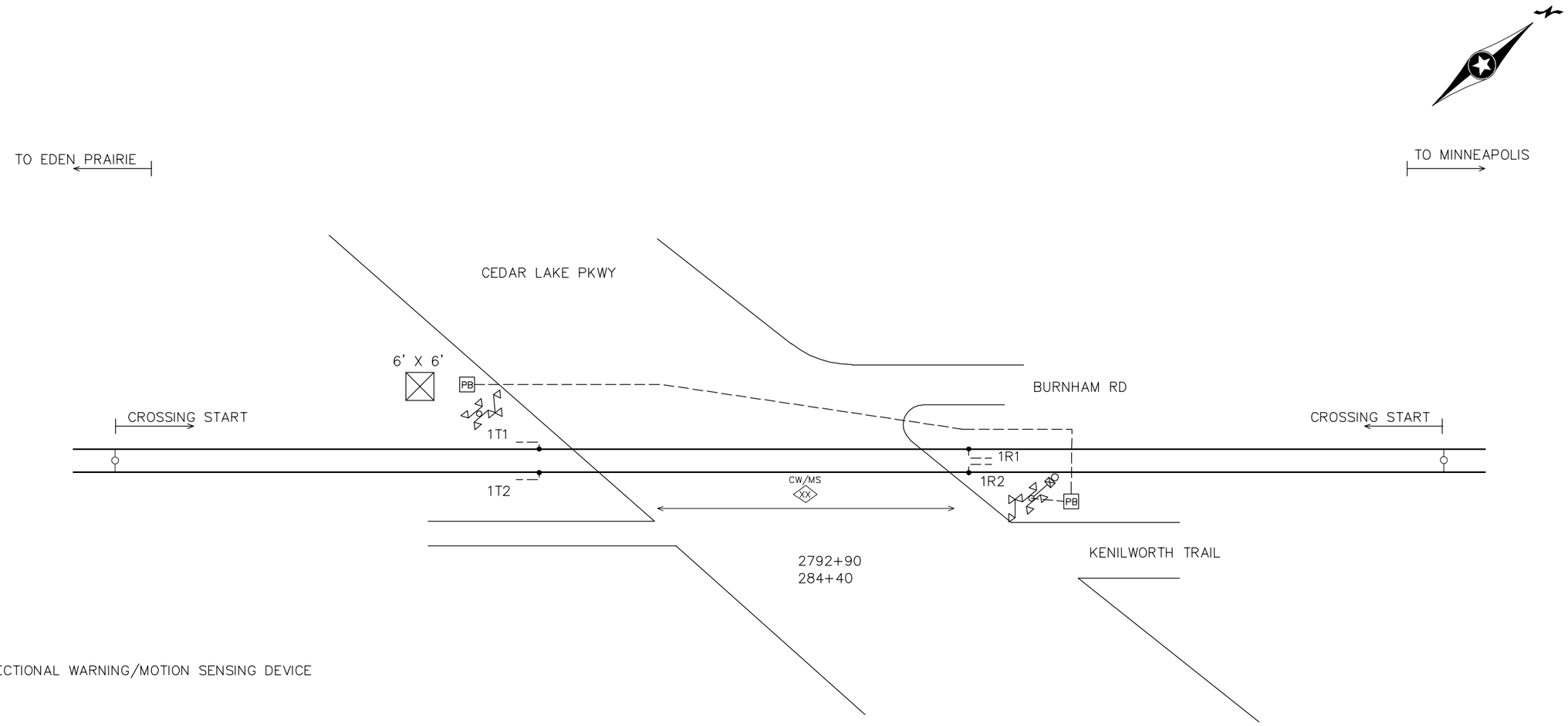
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SYSTEMS PLAN
BELTLINE BLVD

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 005

SHEET 53 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders



CW/MS

XX BIDIRECTIONAL WARNING/MOTION SENSING DEVICE

NOTES:

1. USE PREDICTORS (ADJUSTS CROSSING TIME DUE TO SPEED), MODIFY DOCUMENTATION AS NECESSARY.
2. PROVIDE ALL NEW FIELD WIRE AND CONDUIT.
3. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

Kimley»Horn

Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

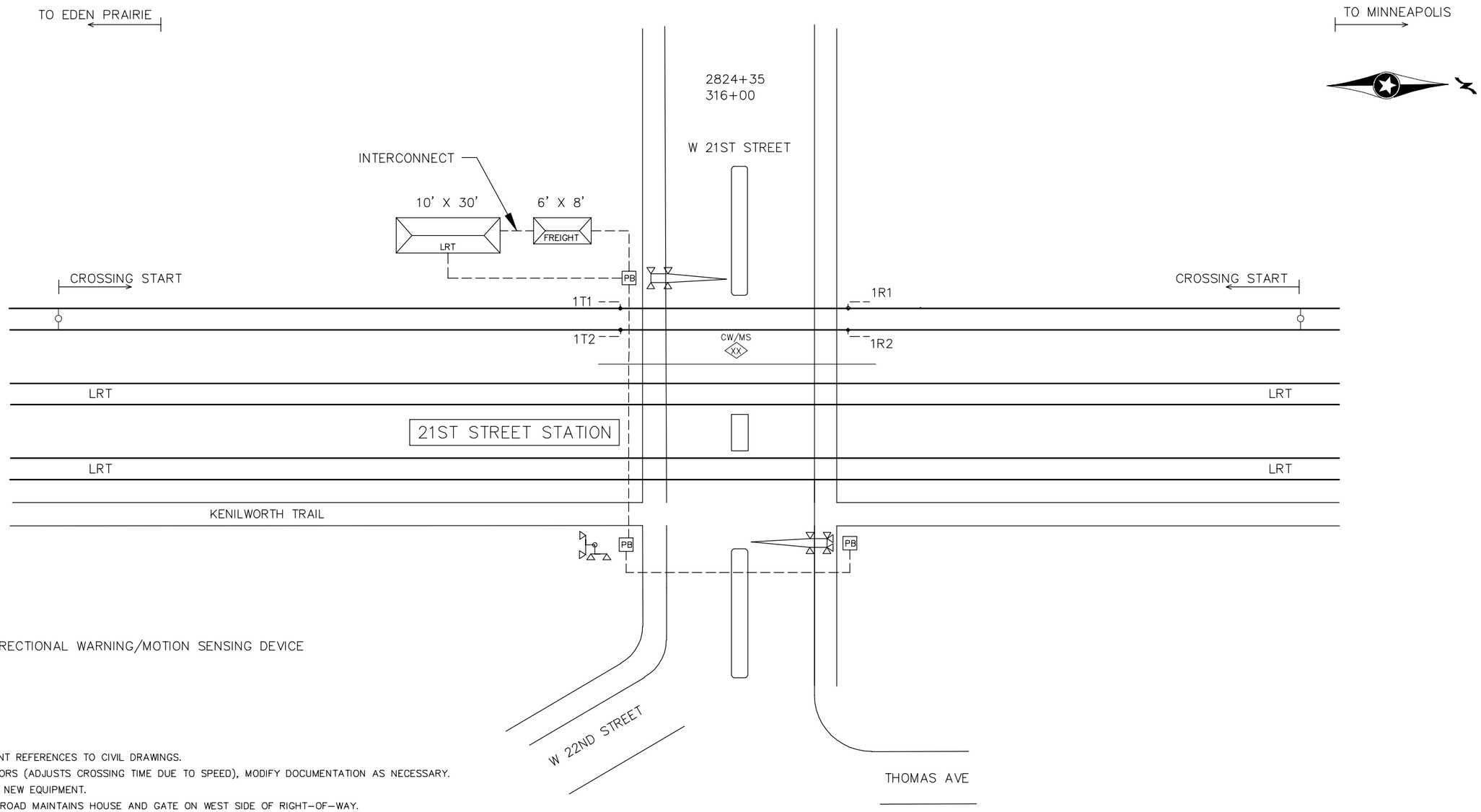
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SYSTEMS PLAN
CEDAR LAKE PKWY

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 006

SHEET 54 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders



CW/MS

XX BIDIRECTIONAL WARNING/MOTION SENSING DEVICE

NOTES:

1. ALL EQUIPMENT REFERENCES TO CIVIL DRAWINGS.
2. USE PREDICTORS (ADJUSTS CROSSING TIME DUE TO SPEED), MODIFY DOCUMENTATION AS NECESSARY.
3. PROVIDE ALL NEW EQUIPMENT.
4. FREIGHT RAILROAD MAINTAINS HOUSE AND GATE ON WEST SIDE OF RIGHT-OF-WAY.
5. LRT MAINTAINS HOUSE, AND GATE ON EAST SIDE OF RIGHT-OF-WAY.
6. PROVIDE COMMUNICATIONS LINK TO LIGHT RAIL CROSSING HOUSE.
7. FREIGHT RAILROAD CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON WEST SIDE OF CROSSING.
8. LRT CROSSING HOUSE TO CONTROL GATE AND FLASHERS ON EAST SIDE OF CROSSING.
9. FURTHER MODIFICATIONS MAY BE REQUIRED AS NECESSITATED BY RAILROAD.

N.T.S.

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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Gannett Fleming

PRELIMINARY ENGINEERING

METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

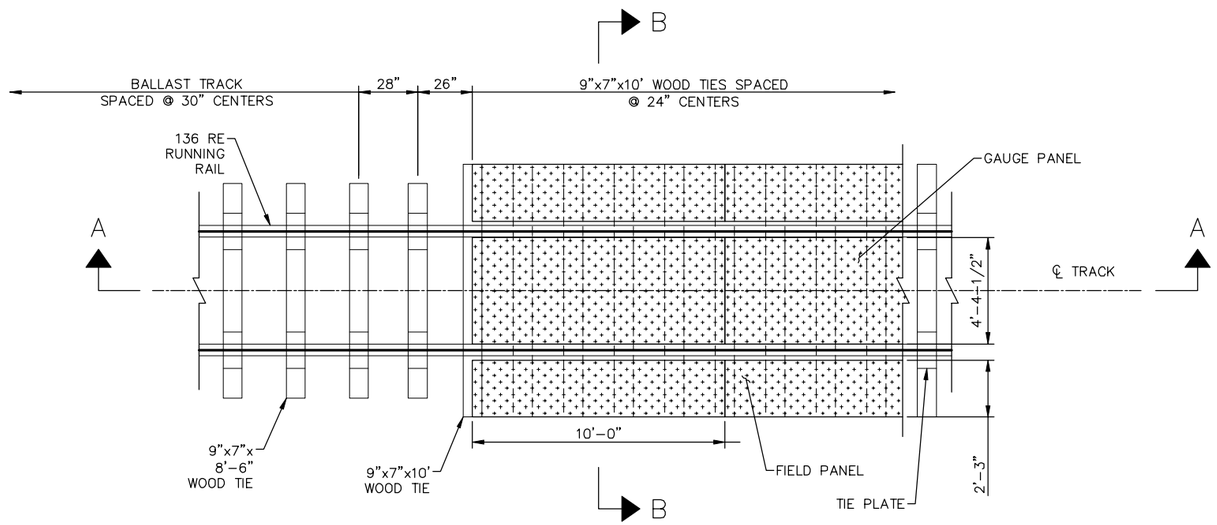
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
SYSTEMS PLAN
W 21ST STREET

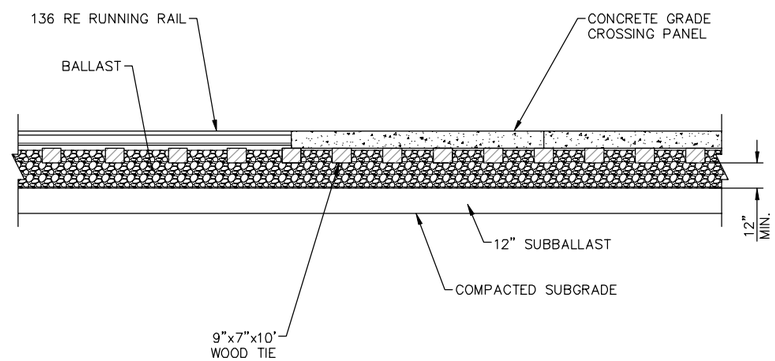
DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-SYS - 007

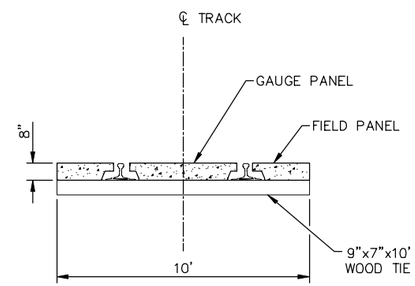
SHEET 55 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-SYS.dwg By: chris.bunders





SECTION A–A



SECTION B–B

ROAD CROSSING WITH CONCRETE PANEL ON 10' WOOD TIES

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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SOUTHWEST Green Line LRT Extension

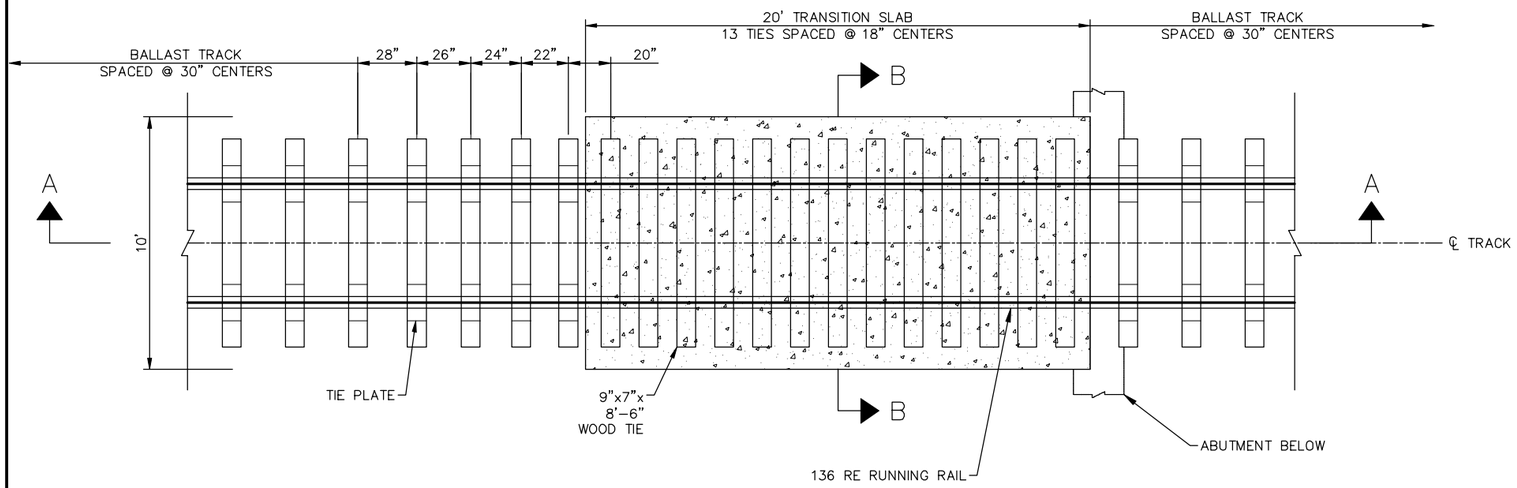
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
DETAILS

DISCIPLINE: FREIGHT

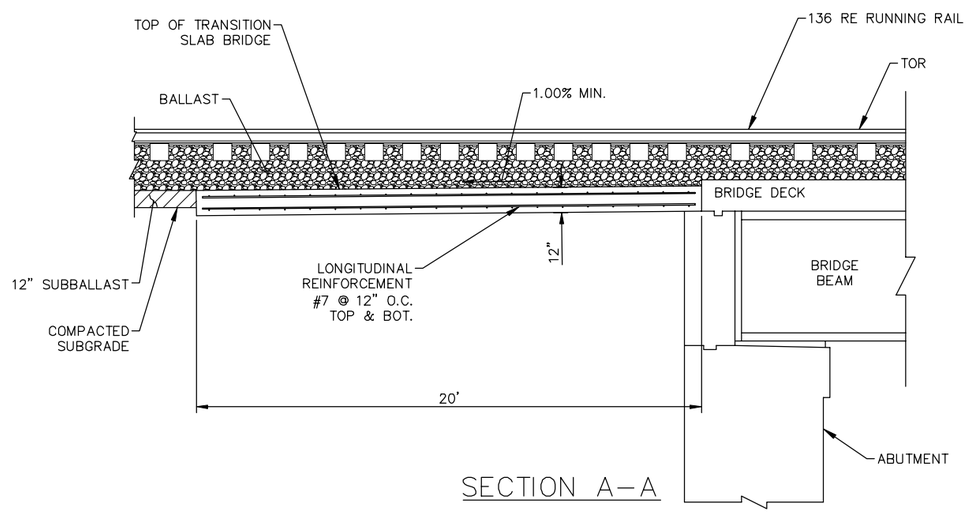
SHEET NAME: E0-FRR-DTL - 001

SHEET 56 OF 61

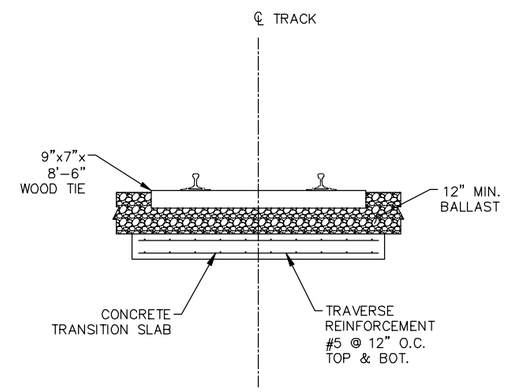
Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-DTL.dwg By: chris.bunders



PLAN VIEW



SECTION A-A



SECTION B-B

BALLAST TRACK TRANSITION SLAB AT BALLASTED BRIDGE

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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METROPOLITAN COUNCIL

SOUTHWEST Green Line LRT Extension

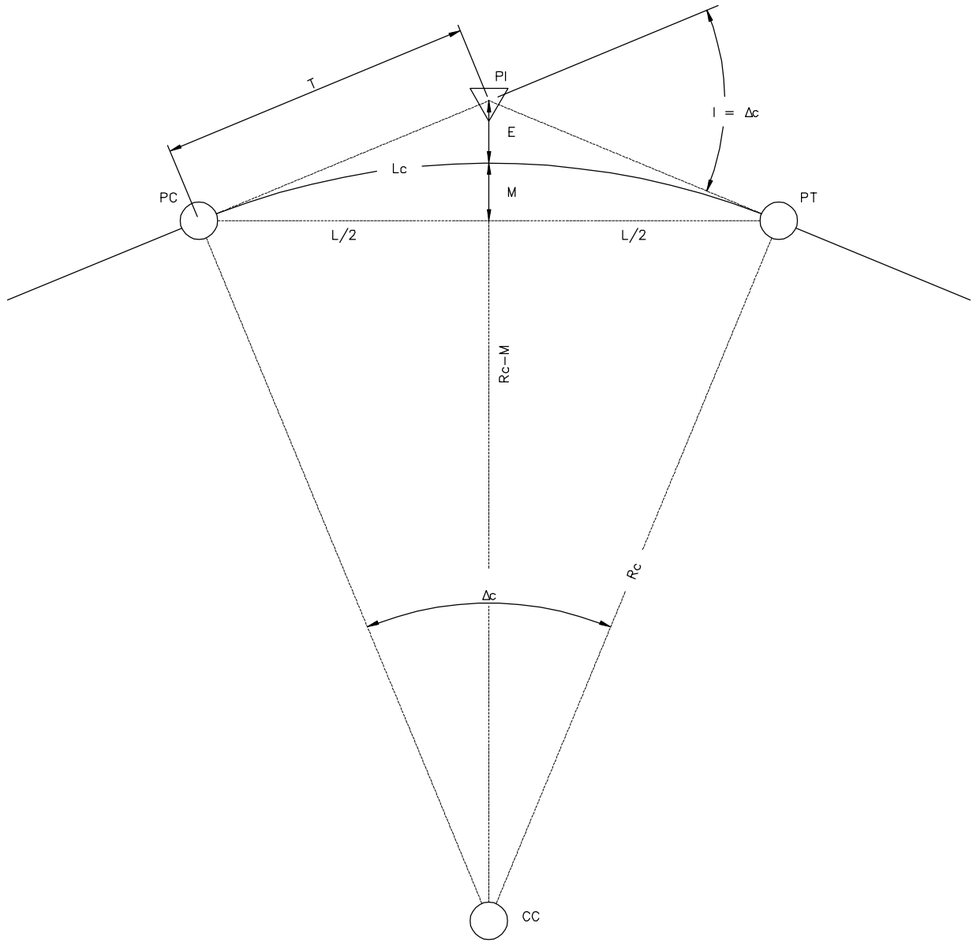
EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
DETAILS

DISCIPLINE: FREIGHT

SHEET NAME: E0-FRR-DTL - 002

SHEET 57 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-DTL.dwg By: chris.bunders



SIMPLE CURVE DIAGRAM

DEFINITIONS

Dc = DEGREE OF CURVE IN CHORD DEFINITION (DECIMAL DEGREES)
Rc = RADIUS OF CURVE (FEET)
Lc = LENGTH OF CURVE IN 100' CHORDS (FEET)
Δc = CENTRAL ANGLE OF CURVE (DECIMAL DEGREES)
E = EXTERNAL DISTANCE (FEET)
T = TANGENT DISTANCE (FEET)
M = MIDDLE ORDINATE (FEET)
L = CHORD LENGTH (FEET)
I = DEFLECTION ANGLE (DECIMAL DEGREES)
PC = POINT OF CURVE
PT = POINT OF TANGENT
PI = POINT OF INTERSECTION
CC = CENTER OF CURVE

SIMPLE CURVE FORMULAS

$$\frac{\text{SIN } Dc}{2} = \frac{50}{Rc}$$

$$Dc = \frac{5729.65'}{Rc}$$

$$Lc = \frac{\Delta c}{Dc}$$

$$T = Rc \text{ TAN } \tfrac{1}{2}$$

$$E = Rc \text{ SEC}\tfrac{1}{2} - Rc$$

$$M = Rc - Rc \text{ COS}\tfrac{1}{2}$$

$$L = 2 \text{ Rc SIN}\tfrac{1}{2}$$

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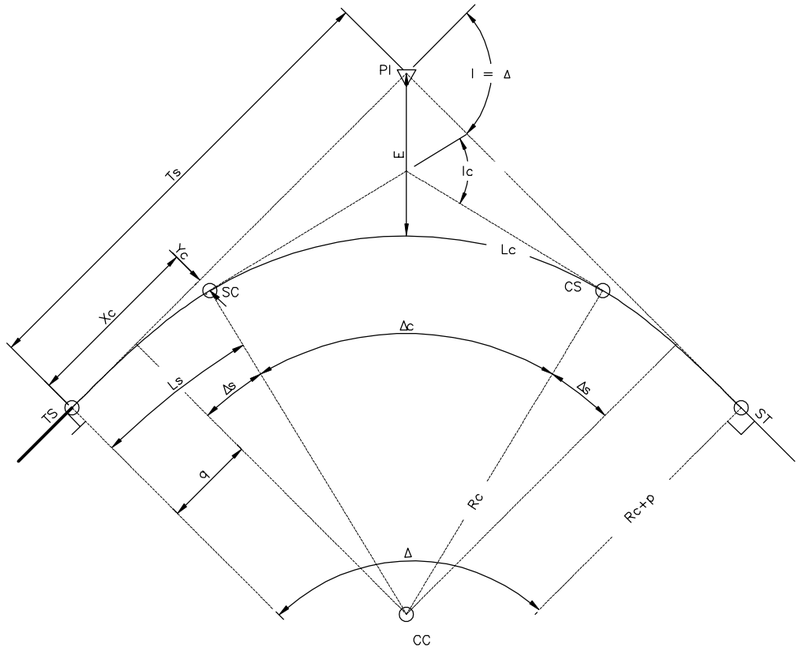
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
DETAILS

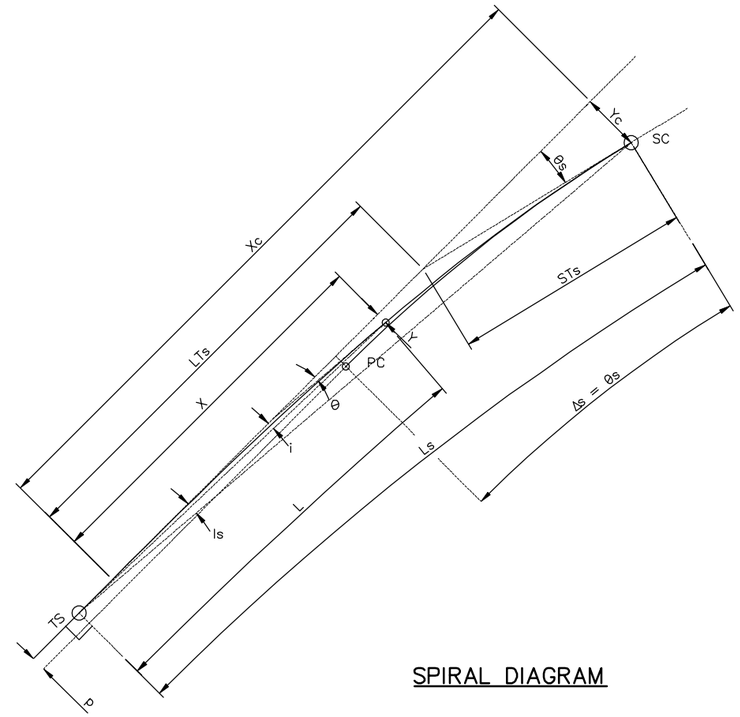
DISCIPLINE: FREIGHT
SHEET NAME: E0-FRR-DTL - 003

SHEET 58 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-DTL.dwg By: chris.bunders



SPIRAL CURVE DIAGRAM



SPIRAL DIAGRAM

DEFINITIONS

Dc = DEGREE OF SIMPLE CURVE IN CHORD DEFINITION (DEGREES)
d = DEGREE OF CURVATURE OF THE SPIRAL AT ANY POINT
Rc = RADIUS OF CURVE (FEET)
Δ = TOTAL CENTRAL ANGLE OF CURVE (DEGREES)
Δc = CENTRAL ANGLE OF SIMPLE CURVE (DEGREES)
Δs = CENTRAL ANGLE OF SPIRAL (DEGREES)
E = EXTERNAL DISTANCE OF THE SIMPLE CURVE (FEET)
Ts = TOTAL TANGENT DISTANCE (FEET)
Ls = LENGTH OF SPIRAL (FEET)
Lc = LENGTH OF THE SIMPLE CURVE IN CHORD DEFINITION (FEET)
L = LENGTH FROM TS TO ANY POINT ALONG THE SPIRAL (FEET)
I = TOTAL DEFLECTION ANGLE (DEGREES)
Ic = DEFLECTION ANGLE OF THE SIMPLE CURVE (DEGREES)
Is = DEFLECTION ANGLE OF THE SPIRAL (DEGREES)
i = DEFLECTION ANGLE FROM TS TO ANY POINT ON THE SPIRAL
p = LENGTH OF THROW, OFFSET DISTANCE FROM TANGENT TO PC/PT
q = DISTANCE FROM TS/ST TO THE OFFSET TC/CT
Xc = DISTANCE ALONG TANGENT FROM TS/ST TO THE SC/CS (FEET)
Yc = OFFSET DISTANCE FROM TANGENT TO SC/CS (FEET)
X = DISTANCE ALONG TANGENT FROM TS/ST TO ANY POINT ON THE SPIRAL
Y = OFFSET DISTANCE FROM TANGENT TO ANY POINT ON THE SPIRAL
θs = SPIRAL ANGLE FROM TANGENT TO SC
θ = SPIRAL ANGLE FROM TANGENT TO ANY POINT ON THE SPIRAL
LTs = LONG TANGENT OF SPIRAL (FEET)
STs = SHORT TANGENT OF SPIRAL (FEET)
TS = POINT OF TANGENT TO SPIRAL CURVE
SC = POINT OF SPIRAL CURVE TO SIMPLE CURVE
CS = POINT OF SIMPLE CURVE TO SPIRAL CURVE
ST = POINT OF SPIRAL CURVE TO TANGENT
PC = POINT OF CURVE
PT = POINT OF TANGENT
PI = POINT OF INTERSECTION
CC = CENTER OF CURVE

FORMULAS

$\Delta = \Delta c + 2\Delta s$

$\Delta s = \frac{Ls}{2Rc}$

$i = \frac{\theta}{3}$

$X = L - \frac{L^5}{40Rc^2 Ls^2}$

$Xc = Ls - \frac{Ls^3}{40Rc^2}$

$Y = \frac{L^3}{6RcLs}$

$Yc = \frac{Ls^2}{6Rc}$

$q = Xc - Rc \ SIN\Delta s$

$p = \frac{1}{4}Yc = \frac{Ls^2}{24Rc}$

$Ts = (Rc + p) \ TAN\frac{I}{2} + q$

$E = \frac{Rc + p}{COS \frac{I}{2}} - Rc$

$LTs = Xc - \frac{Yc}{TAN\Delta s}$

$STs = \frac{Yc}{SIN\Delta s}$

$\frac{SIN \ Dc}{2} = \frac{50}{Rc}$

$Dc = \frac{5729.65'}{Rc}$

$Lc = \frac{\Delta c}{Dc}$

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Gannett Fleming
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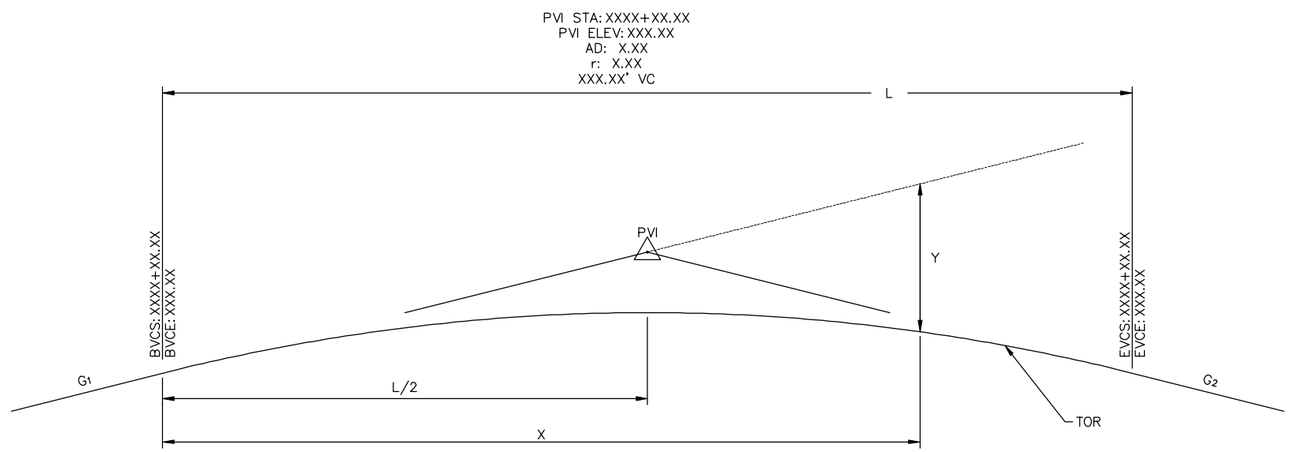
METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
DETAILS

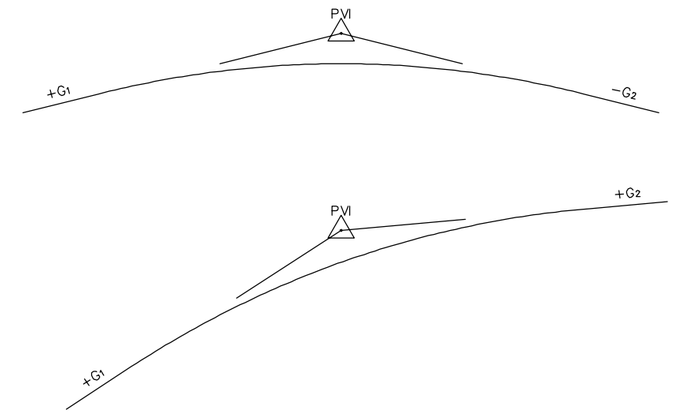
DISCIPLINE: FREIGHT
SHEET NAME: E0-FRR-DTL - 004

SHEET 59 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-DTL.dwg By: chris.bunders



STANDARD VERTICAL CURVE



CREST TYPE VERTICAL CURVES

DEFINITIONS

G_1 = ENTRY GRADE %
G_2 = DEPARTING GRADE %
PVI = POINT OF VERTICAL INTERSECTION
AD = ALGEBRAIC DIFFERENCE
r = RATE OF CHANGE OF GRADE
L = LENGTH OF VERTICAL CURVE
Vd = DESIGN VELOCITY (MPH)
BVCS = BEGIN VERTICAL CURVE STATION
BVCE = BEGIN VERTICAL CURVE ELEVATION
EVCS = END VERTICAL CURVE STATION
EVCE = END VERTICAL CURVE ELEVATION
X = HORIZONTAL DISTANCE FROM BVC
Y = ELEVATION OF PARABOLA BELOW G_1
Rv = EQUIVALENT RADIUS OF VERTICAL CURVE

FORMULAS

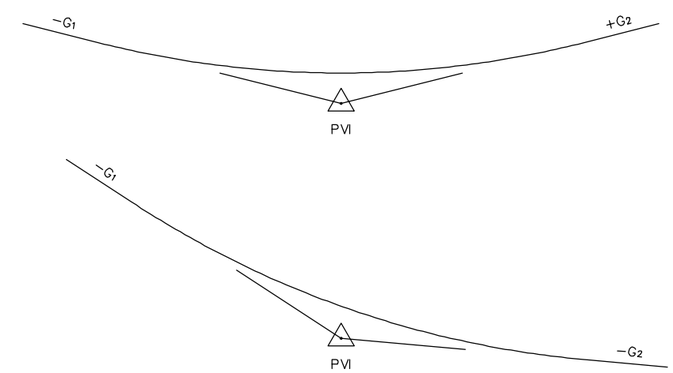
$$a = \frac{G_2 - G_1}{2L}$$

$$Y = BVCE + G_1X + aX^2$$

$$AD = G_2 - G_1$$

$$r = \frac{100\ AD}{L}$$

$$Rv = \frac{L}{0.01\ AD}$$



SAG TYPE VERTICAL CURVES

NO.	DATE	BY	CHECK	DESIGN	REVISION / SUBMITTAL

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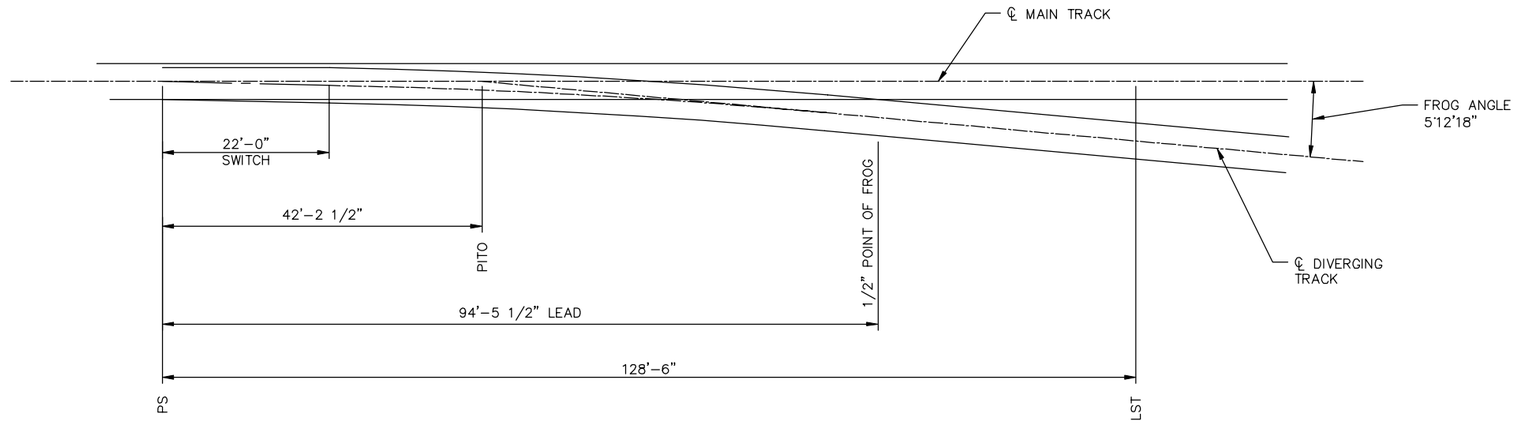
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR
DETAILS

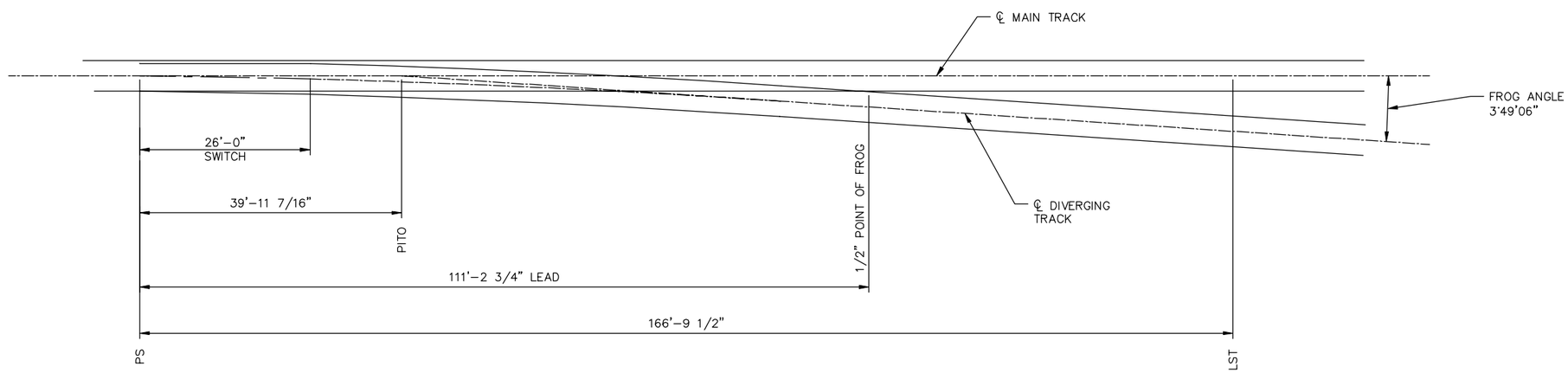
DISCIPLINE: FREIGHT
SHEET NAME: E0-FRR-DTL - 005

SHEET 60 OF 61

Aug, 29 2014 10:30 am V:\3300_PEC-E\CAD\OVERALL\PLAN SHEETS\FREIGHT\E0-FRR-DTL.dwg By: chris.bunders



NO 11 TURNOUT GEOMETRY DETAIL



NO 15 TURNOUT GEOMETRY DETAIL

NOTE
RIGHT HAND TURNOUT ILLUSTRATED. MIRROR FOR LEFT HAND TURNOUT.

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METROPOLITAN COUNCIL
SOUTHWEST Green Line LRT Extension

EAST - VOLUME 1a (FREIGHT)
BASS LAKE SPUR/KENILWORTH CORRIDOR DETAILS

DISCIPLINE: FREIGHT
SHEET NAME: E0-FRR-DTL - 006

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