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Antelope Valley Line Study

Appendix 3
Tasks 5 and 6: Infrastructure Improvements and Cost Estimates for Modeled Service Scenarios

Metro

AVL

ANTELOPE VALLEY LINE STUDY

Contract No. PS-2415-3024-03

Appendix 3

Tasks 5 and 6: Infrastructure Improvements and Cost Estimates for Modeled Service Scenarios

Prepared for:

Metro

Los Angeles County
Metropolitan Transportation Authority

Tasks 5 6 Infrastructure and Costs Report		
	Date	**Initials**
Originator	12/18/2018	Tom L.
Checker	12/19/2018	Foster N.
Back Checker	12/19/2018	Tom L.
Format Checker	12/20/2018	Salvador M.
Approved by	12/21/2018	Foster N.

Prepared by:

444 South Flower Street
Suite 800
Los Angeles, California 90071

December 21, 2018

Tasks 5- 6 Appendix 1 - Civil Schematics Review Copy		
	Date	**Initials**
Originator	10/18 - 11/7/18	RSE Staff
Checker	11/2 - 11/13/18	Tom L., Michael H.
Back Checker	12/6/2018	RSE Staff
Format Checker	-	-
Approved by	12/21/2018	Foster N.

Tasks 5 6 Appendix 2 Alignment Drawings Review Copy		
	Date	**Initials**
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Checker	11/2 - 11/13/18	Tom L., Michael H.
Back Checker	12/6/2018	RSE Staff
Format Checker	-	-
Approved by	12/21/2018	Foster N.

Tasks 5 6 Appendix 3 Signal Drawings Review Copy		
	Date	**Initials**
Originator	11/16/2018	PRE Staff
Checker	12/19-12/20/18	Phil M.
Back Checker	12/20/2018	PRE Staff
Format Checker	-	-
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Tasks 5 - 6 Appendix 4 Cost Estimates Review Copy		
	Date	**Initials**
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Checker	12/3 - 12/19/18	Tom L., Salvador M.
Back Checker	12/3 - 12/6/18	RSE, PRE Staff
Format Checker	12/19/2018	Salvador M.
Approved by	12/21/2018	Foster N.

CONTENTS

Tables

ACRONYMS AND ABBREVIATIONS

AVL	Antelope Valley Line
AVTA	Antelope Valley Transportation Authority
Metro	Los Angeles County Metropolitan Transportation Authority
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CHSRA	California High-Speed Rail Authority
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
LAUS	Los Angeles Union Station
LINK US	Formerly known as Southern California Regional Interconnector Project
LRT	Light Rail Transit
MRP	Metrolink Rehabilitation Plan
NCTC	North County Transportation Coalition
NEPA	National Environmental Policy Act
PRE	Pacific Railway Enterprises
QA/QC	Quality Assurance/Quality Control
ROM	Rough-order-of-Magnitude
ROW	Right-of-Way
SCRRA	Southern California Rail Road Authority
SCORE	Southern California Optimized Rail Expansion
UPRR	Union Pacific Railroad

1 INTRODUCTION

Tasks 5 and 6 of the Antelope Valley Line (AVL) study require the development of drawings and cost estimates for each of the infrastructure improvement projects identified during the Modeling Task of the study which are needed to support the service scenarios. This submittal presents the results of these drawing development and cost estimation tasks. All estimated capital costs are in 2018 dollars. Please note that these cost estimates do not include rolling stock costs, or right-of-way acquisition costs for those projects where some property is needed

.

2 METHODOLOGY

During the Modeling Task of the AVL study, the study team developed five separate service scenarios for testing, with varying service assumptions. Those five scenarios were:

1. Hourly bi-directional service only
2. Semi-hourly bi-directional with intermediate turn-back
3. Semi-hourly bi-directional with intermediate turn-back, full-length express service, and bunched outer-zone trains
4. Semi-hourly bi-directional with intermediate turn-back, full-length express service, and spread-out outer-zone trains
5. Same as (4), with intermediate turns at Sylmar instead of Vista Canyon

Scenarios 3, 4, and 5 are consistent with levels and types of rail service included in the State Rail Plan.

These scenarios were then modeled using the Viriato train scheduling software, and stringlines were prepared which identified locations where double tracking would be needed for train meets or additional infrastructure (station improvements, train storage areas) would be needed to support each scenario. In the case of additional double tracking, the precise locations and estimated lengths of the passing track segments were identified, based on a goal to provide reliable service under the scenario. The required extent of double tracking was estimated conservatively, in recognition of the uncertainties that exist at this high level of preliminary planning, and to account for potential future rolling stock choices that could result in equipment with different performance characteristics operating on the AVL.

The WSP team and sub-consultants then developed schematics showing the areas of improvements, using the Metrolink 2018 Track Charts (1"=500') as the base. After review and concurrence of the team, the proposed improvements were then overlaid on alignment drawings using the Metrolink 2018 Track Chart Aerial Mapping (1"=200') to show the improvements in the context of the local areas. These drawings were reviewed and checked in accordance with the project's Quality Assurance/Quality Control (QA/QC) Plan.

The combination of the schematics and alignment drawings were then used to develop Rough-order-of-Magnitude (ROM) Cost Estimates for each element of each location's capital project. The Cost Estimate started with a cost template for standard capital elements and unit costs, and applied these unit costs to the take-offs from the schematics and drawings to arrive at a subtotal for estimated construction cost for each location's capital project. Where available, unit costs came from the *2018 Metrolink Rehabilitation Plan (MRP)*; if a unit cost for a specific element was not available in the MRP, a unit cost was derived from other recent capital projects with which the team is familiar.

Separate from the civil improvements, sub-consultant Pacific Railway Enterprises (PRE) evaluated each of the capital projects for signal-related required work, and developed separate signal drawings showing those improvements. PRE also provided cost estimates for those elements, which were consolidated with the civil improvements in the Construction Cost estimate.

A Contingency of 35% was added to this Construction Cost subtotal. A Soft Cost estimate of 60% was added on top of the combined Construction Cost plus Contingency, to arrive at a total ROM capital cost. This total capital cost estimate was cross-checked against the schematics/drawings for consistency, in accordance with the QA/QC Plan.

Note that this ROM capital cost does not include right-of-way acquisition costs or additional rolling stock costs.

3 RESULTS - CAPITAL PROJECTS AND COST ESTIMATES

Table 3-1 summarizes all of the capacity-related capital projects identified during the study, and indicates which capital projects would be needed to support each Service Scenario. A total of 15 separate capital projects were identified. Scenarios 3, 4, and 5 have three separate hourly patterns (hourly full corridor, hourly short-turn, and hourly express) and thus have the highest number of required capital projects and thus the highest estimated capital costs. Table 3-1also provides the estimated number of required track-feet of new construction. Following Table 3-1 is a discussion of key issues related to the improvements.

Table 3-1: Antelope Valley Line Total Estimated Capital Costs of the Scenarios

Capital Projects and Costs				Scenario					ROM Cost Est. for Project[1,2]
MP Location	Project	Track-feet	Description	Scenario 1 Hourly Only	Scenario 2 30-60 No Express	Scenario 3 3-Hourly Patterns	Scenario 4 3-Hourly Patterns	Scenario 5 3-Hourly Patterns	
-76.6	Lancaster Terminal -- 6 trainsets	3,440	New double track and second station platform face, plus two new 1,000' storage tracks		X			X	$ 27,300,000
-76.6	Lancaster Terminal -- 8 trainsets	4,300	New double track and second station platform face, plus three new 1,000' storage tracks			X	X		$ 30,100,000
68.5-72.0	Palmdale North	18,480	New double track and 2 platform tracks at station (integrated with HSR)				X	X	$ 127,300,000
55.0-57.5	Acton Siding	13,200	New siding			X			$ 40,200,000
50.0-52.5	Ravenna South	13,200	Extend existing siding (new double track)				X	X	$ 56,300,000
37.5-38.6	Via Princessa-Honby	5,808	Extend existing siding (new double track)			X			$ 26,400,000
33.4-35.0	Canyon-Sta. Clarita	8,448	Extend existing siding (new double track)		X	X	X	X	$ 48,800,000
30.2-32.4	Hood-Saugus	11,616	Connect sidings and convert to double track			X			$ 41,600,000
25.3-26.5	Balboa-Tunnel	6,336	Extend double track	X	X	X	X	X	$ 41,800,000
21.9-23.6	Sylmar-Roxford	8,976	New double track			X			$ 48,300,000
21.5-22.1	Sylmar Station	3,168	Second track at station (Costs included in Van Nuys - Sylmar)					X	$ -
19.5-21.9	Van Nuys Blvd-Sylmar	12,672	New double track						$ 56,400,000
17.0-19.5	Sheldon-Van Nuys Blvd	13,200	New double track				X	X	$ 67,000,000
12.7-15.6	Brighton-McGinley	15,312	Extend and connect double track sections		X	X	X	X	$ 57,300,000
Total ROM Capital Cost				**$ 41,800,000**	**$ 175,200,000**	**$ 334,500,000**	**$ 428,600,000**	**$ 425,800,000**	**$ 668,800,000**

Notes:
1. ROM Cost Estimate per RSE Antelope Valley CIP Project Cost Estimates, and PRE ROM Cost Estimates for Signal-Related work
2. All Costs include 35% Contingency on top of Base Construction Cost, and 60% Soft Cost rate added to Base Construction Costs AND Contingency.

3.1 Property Acquisition Estimates

In addition to the civil and signal system improvements and cost estimates, the team identified three locations where additional right-of-way (ROW) will be necessary to construct the improvements. The three projects with new ROW requirements are Lancaster South, Palmdale North, and Santa Clarita Station. Table 3-2 summarizes the ROW needs and estimated square feet and acreage for these three locations. Please note that these are very rough estimates based on examination of the 200-scale alignment drawings, and would need to be verified through further detailed engineering.

Table 3-2: Property Acquisition Estimates for AVL Capital Projects

Project	Property Purpose	Parcel No.	Total Est, SF	Acreage Equivalent
Lancaster South	Train Storage Area	1	73,442	1.69
Lancaster South	Access Track/Turnout	2	3,758	0.09
Lancaster South	Access Lead	3	12,919	0.30
Project Total			**90,119**	**2.07**
Palmdale North	Second Track	1	**56,650**	**1.30**
Santa Clarita Station	Second Platform	1	**6,167**	**0.14**

Source: Rail Surveyors and Engineers, Inc., estimates from Alignment Drawings

In addition to the property requirements in Table 3-2, expansion of Sylmar/San Fernando Station with a second track and platform is shown to fit just within the Metrolink ROW; however, with the other property needed for Metro's East San Fernando Valley Transit project and California High Speed Rail, more property at this location will be needed. Metro staff has indicated that property needs in this area have already been identified.

3.2 Train Consist and Storage Requirements

Each of the service scenarios evaluated for this study has specific rolling stock requirements. Metrolink interlines much of its service throughout the system, and taking such linkages into account is beyond the scope of this study. However, the train trips in the headway sheets developed for each of the scenarios were blocked in order to determine the minimum train consist requirements for each scenario, were it to be operated independently of other Metrolink service. These train consist requirements, and the locations where they would start and end their service days, were used to determine how much overnight train storage would be required at the Lancaster end of the line, and the costs of those storage tracks were included in the Lancaster South capital projects. Table 3-3 summarizes the results of that analysis, and shows that anywhere from four (4) to eight (8) trainsets would need to be stored overnight at Lancaster. Scenarios with six or more trainsets being stored at Lancaster would require additional storage capacity.

Table 3-3: Lancaster Station Overnight Layover Requirements

Scenario	Description	# Trainsets Stored Overnight	Consist #'s from Headway Sheets:
1	Hourly bi-directional service only	4	1, 2, 3, 4
2	Semi-hourly bi-directional with intermediate turn-back	6	1, 2, 3, 4, 6, 7
3	Semi-hourly bi-directional with intermediate turn-back, full-length express service, and bunched outer-zone trains	8	1, 2, 3, 4, 6, 7, 8, 9
4	Semi-hourly bi-directional with intermediate turn-back, full-length express service, and spread-out outer-zone trains	8	1, 2, 3, 4, 6, 7, 8, 9
5	Same as (4), with intermediate turns at Sylmar instead of Vista Canyon	6	1,2,3,4,8,9

3.3 Environmental Constraints and Issues

All the capacity expansion capital projects identified for this study would be constructed alongside existing tracks in areas that have already been disturbed, which would help to minimize environmental impacts. However, many of the double-track improvements would cross existing drainages or waterways and those projects would require hydrology analyses to ensure the improvements would be able to handle anticipated storm flows. Five of the track projects will also require retained cut or retained fill, which could trigger environmental analysis requirements.

In terms of noise and vibration impacts from operations on the additional track, many of the capital projects would occur in commercial, industrial, or rural areas with no residences nearby. However, based on examination of the alignment drawings, the following potential areas of noise and vibration impacts were identified:

- At Milepost 21.9, at Sylmar/San Fernando Station, there are homes near the Van Nuys Blvd./Sylmar project but they are separated by the station parking lot from the tracks.
- At Milepost 23.5, there is a mobile home park adjacent to the ROW near the Sylmar-Roxford project; the additional track would be constructed on the opposite side of the existing track from the mobile home park.
- At Mileposts 31.2 to 31.4, the Hood-Saugus project would add a second track near Via Princessa Street, adjacent to some high-density residential units.
- At Milepost 37.4, the Via Princessa-Honby project would begin a second track just to the east of a residential community. That project continues past a large mobile home park immediately north of the ROW at Milepost 38.0 to 38.4, and some high-density residential at Milepost 38.5.

3.4 Project Phasing

The phasing of the identified capital projects would depend on which service scenario, or variant, from those identified in Table 3-1, is pursued. Table 3-1indicates which capital projects would be required for each given scenario. Based on Table 3-1, the Balboa Tunnel double-track project supports all scenarios and therefore is a top priority project for funding. That project, by itself, would enable hourly bi-directional service at regular clock-face intervals. The Canyon-Santa Clarita and Brighton-McGinley

projects, which support four of the five scenarios, would be necessary for headway improvements beyond the hourly-only service, and would be strong contenders for early project phasing. Beyond those three projects, the phasing of the remaining identified capital projects would depend on which approach is chosen to provide express service in addition to the two local service patterns provided in Scenario 2, and on the extent of available funding.

4 ATTACHMENTS

In the attachments that accompany this Technical Memorandum, the following materials are presented:

- Attachment 1 - Civil Improvement Schematics
- Attachment 2 - Civil Improvement Alignment Drawings
- Attachment 3 - Signal Improvement Drawings
- Attachment 4 - Cost Estimates by Capital Project Location
- Attachment 5 – AVL Funding and Financing Opportunities Memorandum
- Attachment 6 – Lancaster Service and Inspection Facility

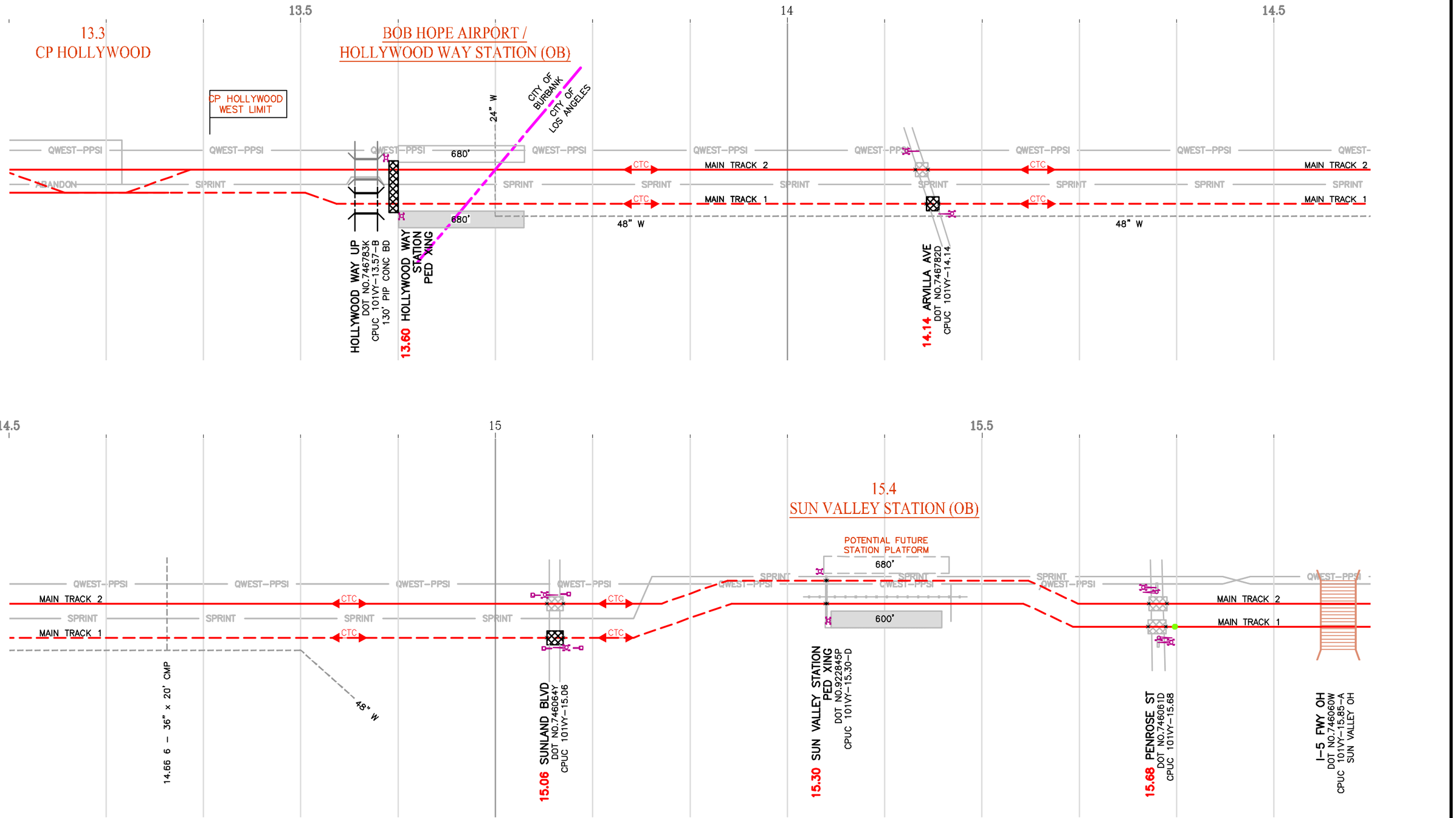
Table 4-1 provides an index of all drawings and cost estimate pages.

Table 4-1: Index of Drawings and Estimates

Project Name	Mileposts	Description	Appendix 1 Civil Improvement Schematics PDF Pages	Appendix 2 Civil Improvement Alignment Drawings PDF Pages	Appendix 3 Signal Improvement Drawings PDF Pages	Appendix 4 Cost Estimate
Hollywood - McGinley	13.4 - 15.6	Extend and connect double track sections	1	1 - 3	-	1
Sheldon - Van Nuys Blvd.	17.0 - 19.5	New double track	2	4 - 6	-	2
Van Nuys Blvd. - Sylmar	19.5 - 21.9	New double track	3	7 - 9	-	3
Sylmar Station	21.5 - 22.1	Second track and platform at station	3	10	-	3
Sylmar - Roxford	21.9 - 23.6	New double track	4	11 - 12	-	4
Balboa Tunnel	25.3 - 26.5	Extend double track	5	13 - 14	34 - 35	5
Hood - Saugus	30.2 - 32.4	Connect sidings and convert to double track	6	15 - 17	30 - 31	6
Canyon - Santa Clarita	33.4 - 35.0	Extend existing siding (new double track)	7	18 - 19	28 - 29	7
Via Princessa - Honby	37.5 - 38.6	Extend existing siding (new double track)	8	20 - 21	26 - 27	8
Ravenna South	50.0 - 52.5	Extend existing siding (new double track)	9	22 - 24	17 - 18	9
Acton Siding	55.0 - 57.5	New siding	10	25 - 27	14 - 15	10
Palmdale North	68.5 - 72.0	New double track and 2 platform tracks at station (integrated with HSR)	11 - 12	`	3 - 6	11
Lancaster South	76.6	New double track and second station platform face, plus two new 1,000' storage tracks	13	33	1	12
Lancaster South	76.6	New double track and second station platform face, plus three new 1,000' storage tracks	13	33	1	12

APPENDIX 3 – ATTACHMENT 1

CIVIL IMPROVEMENT SCHEMATICS



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APPROVED BY	XXX
DATE	12/06/2018

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BELMONT, CA 94002
www.RSEMAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 1 – TRACK SCHEMATIC
HOLLYWOOD – MCGINLEY
MP: 13.4 TO 15.6

CONTRACT NO. PS–2415–3024–01
DRAWING NO. DWG
REVISION 0
SHEET NO. 1 OF 1
SCALE 1"=500'

17 17.5 18

17.1
CP SHELDON

CP SHELDON
WEST LIMIT

WEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT SPRINT QWEST-PPSI

CTC

MAIN TRACK 2

MAIN TRACK 1

17.05 SHELDON ST
DOT NO.746057N
CPUC 101VY-17.05

17.46 TUJUNGA WASH
66' STG BD

17.50 108" x 200' CMP

17.53 2-60" x 74' CMP

17.87 BRANFORD ST
DOT NO.746055A
CPUC 101VY-17.87

17.98 LACFC
3-8' x 4' x 300' RCB

18.5 19 19.5

19.3
CP VAN NUYS

QWEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT QWEST-PPSI SPRINT

CTC

MAIN TRACK 2

MAIN TRACK 1

18.42 OSBORNE ST
DOT NO.746054T
CPUC 101VY-18.42

18.44 13" x 21" x 20' CMPA

18.95 24" x 20' CIP

19.24 PIERCE ST
DOT NO.746053L
CPUC 101VY-19.24

19.42 6' RT BD

19.51 VAN NUYS BLVD
DOT NO.746052E
CPUC 101VY-19.51

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ANTELOPE VALLEY LINE STUDY
SEGMENT 1 – TRACK SCHEMATIC
SHELDON – VAN NUYS BLVD
MP: 17.0 TO 19.5

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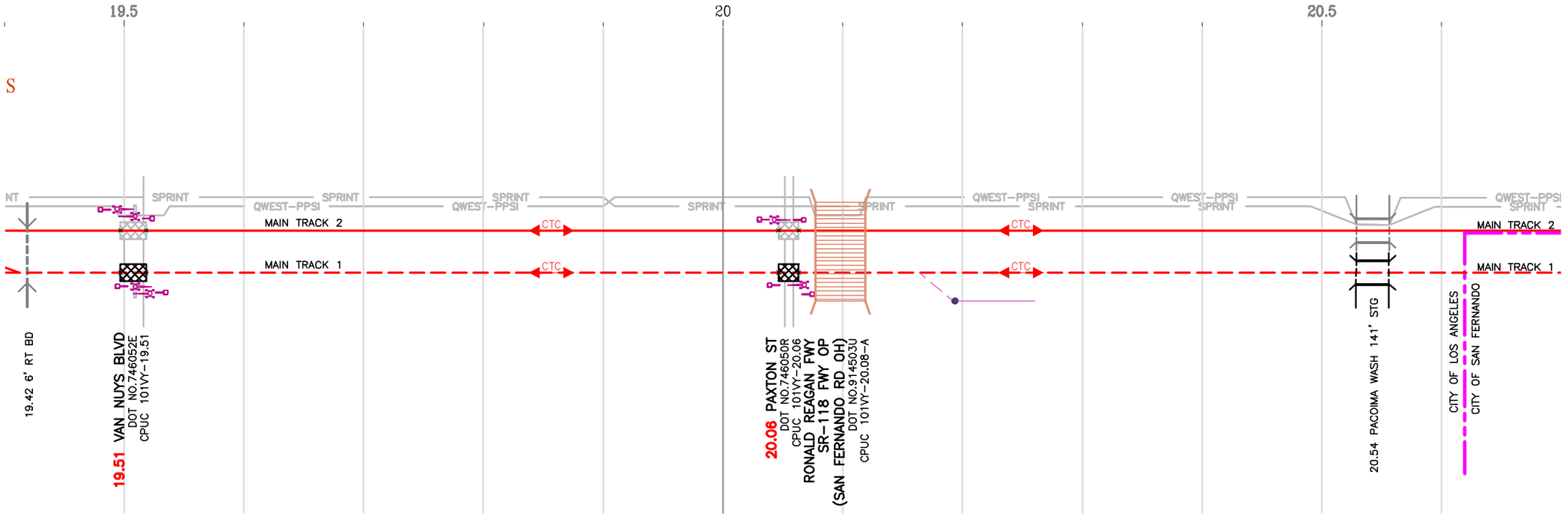

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ANTELOPE VALLEY LINE STUDY
SEGMENT 1 – TRACK SCHEMATIC
VAN NUYS BLVD – SYLMAR
MP: 19.5 TO 21.9

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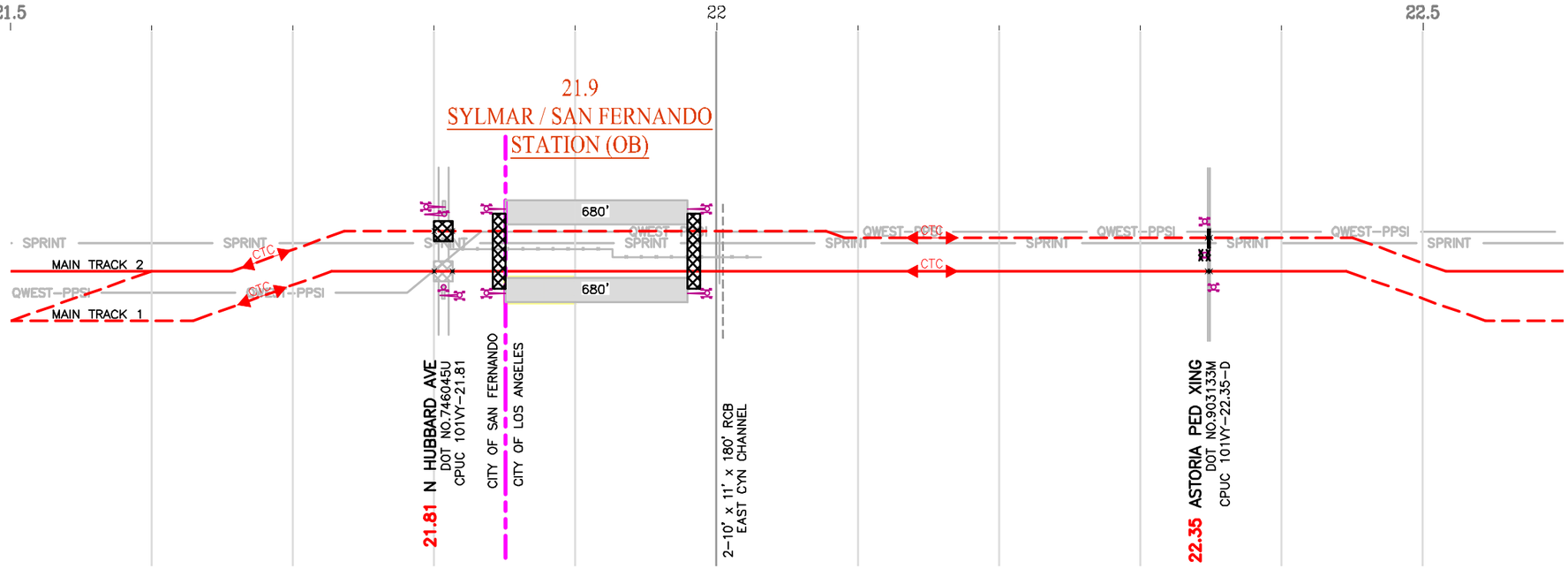

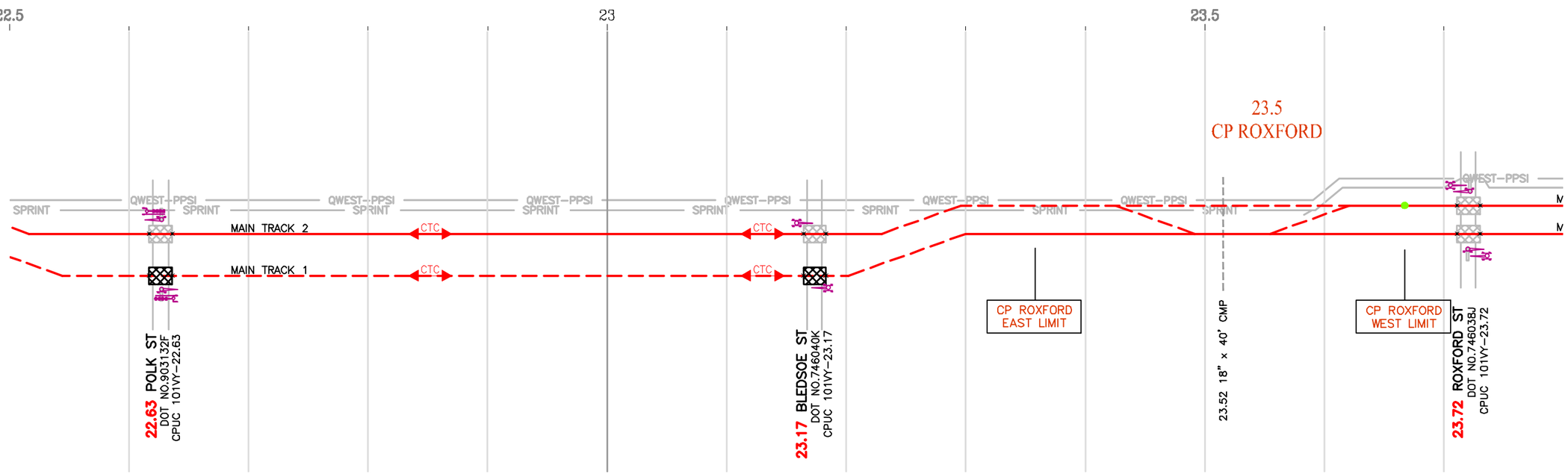

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SYLMAR – ROXFORD
MP: 21.9 TO 23.6

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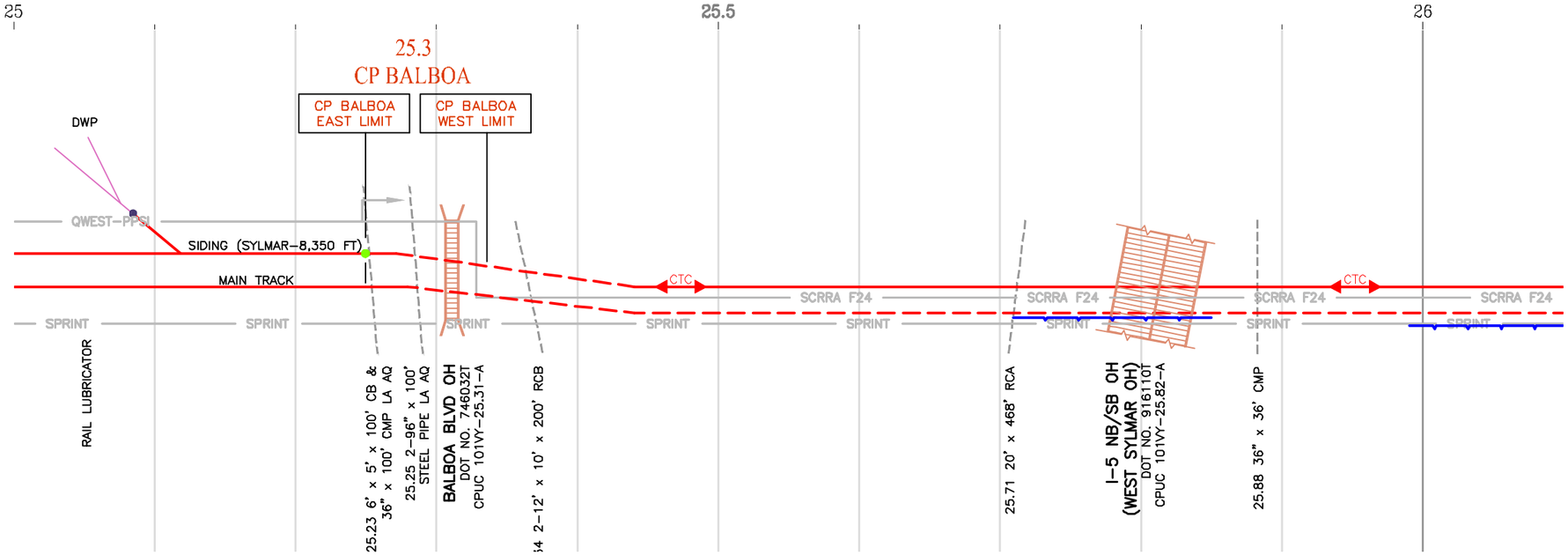

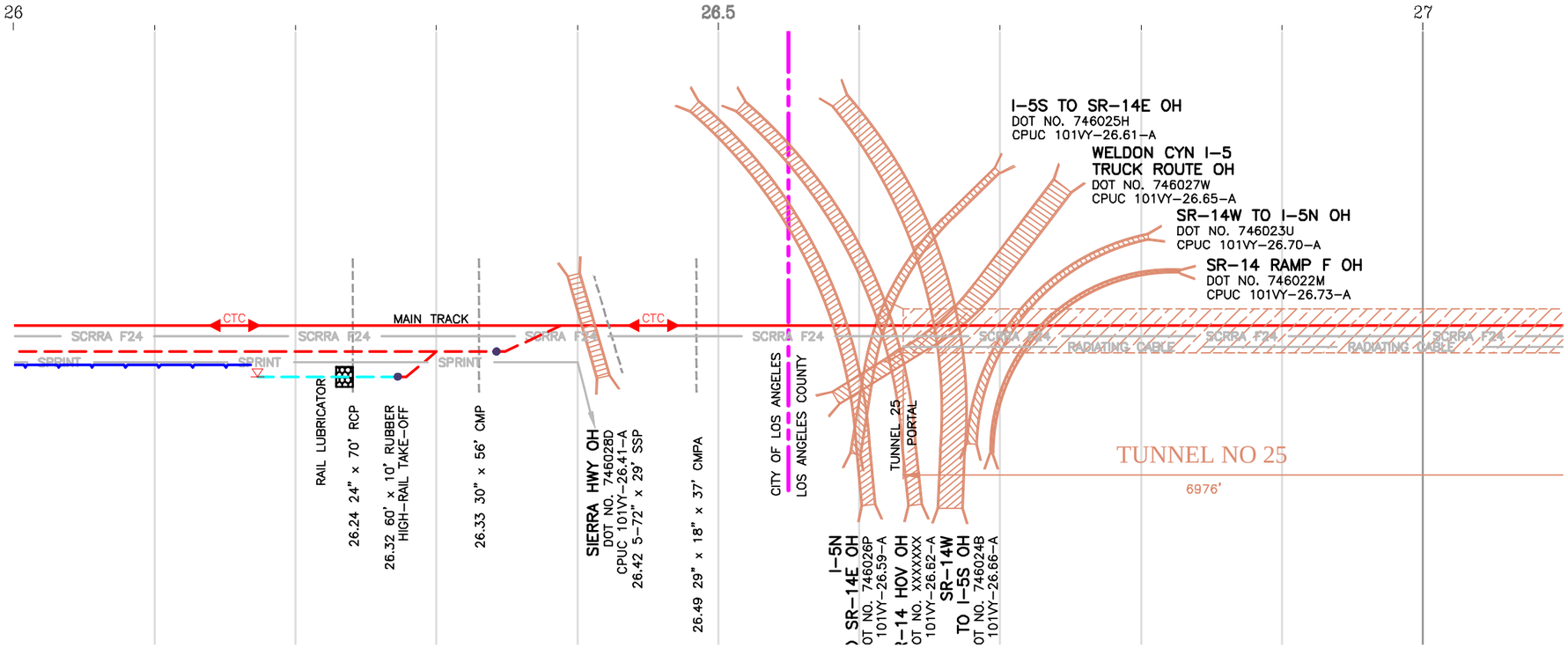

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WWW.RSERAIL.COM

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SEGMENT 2 – TRACK SCHEMATIC
BALBOA – TUNNEL
MP: 25.3 TO 26.5

CONTRACT NO. PS-2415-3024-01

DRAWING NO. DWG

REVISION	SHEET NO.
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SCALE 1"=500'

30

30.5

31

30.2
CP HOOD

CP HOOD EAST LIMIT

CP HOOD WEST LIMIT

30.0
NEWHALL STATION (OB)

510'

510'

CTC

CTC

SCRRA F24

SCRRA F24

MAIN TRACK 2

MAIN TRACK 1

CTC

CTC

29.92 MARKET ST
DOT NO. 746017R
CPUC 101VY-29.92

30.28 NEWHALL CK
126' PIP

30.39 13TH ST
DOT NO. 746016J
CPUC 101VY-30.39

30.88 2-48" x 36' CMP

30.94 PLACERITA CK
112' PCSG

31.18 24" x 24' CIP

VIA PRINCESSA OH
DOT NO. 921714H
CPUC 101VY-31.30-A

31.5

32

32.5

32.4
CP SAUGUS

CP SAUGUS EAST LIMIT

CP SAUGUS WEST LIMIT

LAYOVER 2560'

MAIN TRACK 2

MAIN TRACK 1

CTC

CTC

CTC

CTC

MAIN TRACK

SIDING (SAUGUS-4,880 FT)

TRACK CENTERS < 13'

31.58 4-60" x 250' RCP

31.60 OAK RIDGE DR
DOT NO. 746015C
CPUC 101VY-31.60

31.75 5-6' x 3.5' x 224' RCB

32.35 DRAYTON ST
DOT NO. 746014V
CPUC 101VY-32.35

jchung Dec 06, 2018 - 5:49pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_Schem.dwg

REV.	DATE		BY	SUB.	APP.

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DESIGNED BY: J CHUNG
DRAWN BY: J CHUNG
CHECKED BY: XXX
APPROVED BY: XXX
DATE: 12/06/2018

METROLINK

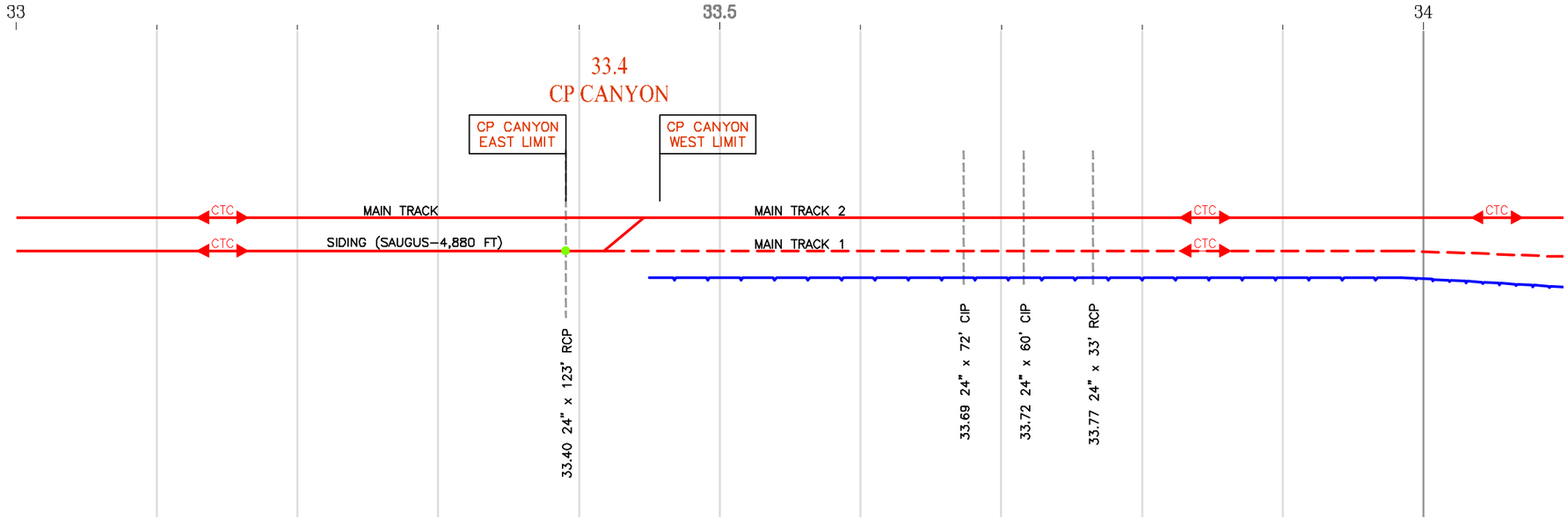
RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.rsemail.com

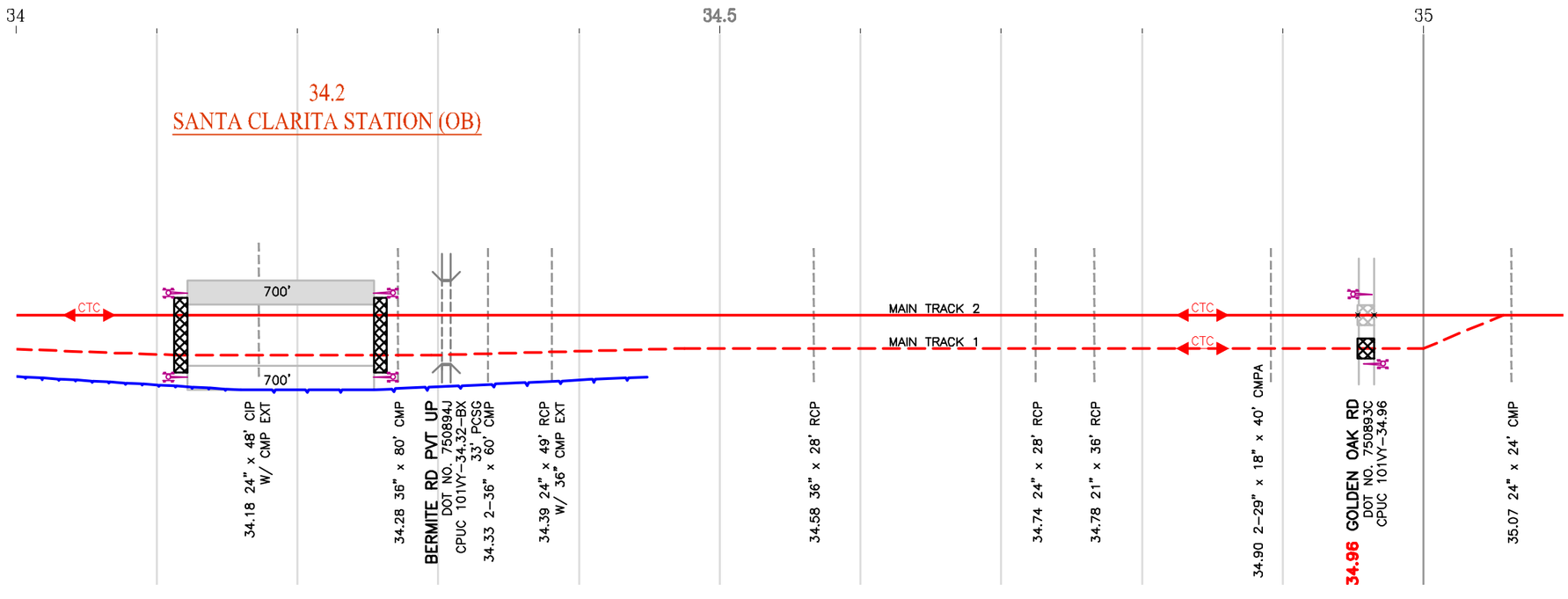
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 2 – TRACK SCHEMATIC
HOOD – SAUGUS
MP: 30.2 TO 32.4

CONTRACT NO. PS-2415-3024-0
DRAWING NO. DWG
REVISION 0
SHEET NO. 1 OF 1
SCALE 1"=500'





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DATE	12/06/2018

METROLINK.

RSE, INC.
1075 Old County Road
Suite 201 Los Angeles, CA 90402
www.rsecal.com

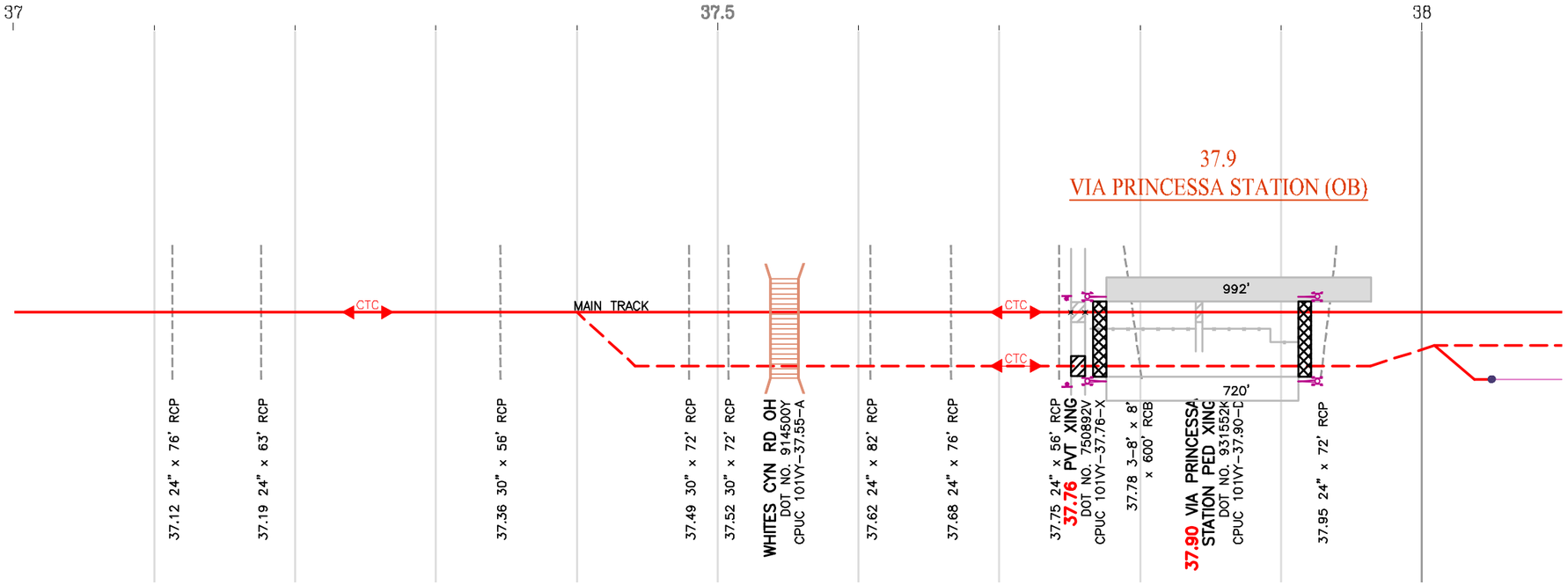
SUBMITTED: _____ PROJECT MANAGER

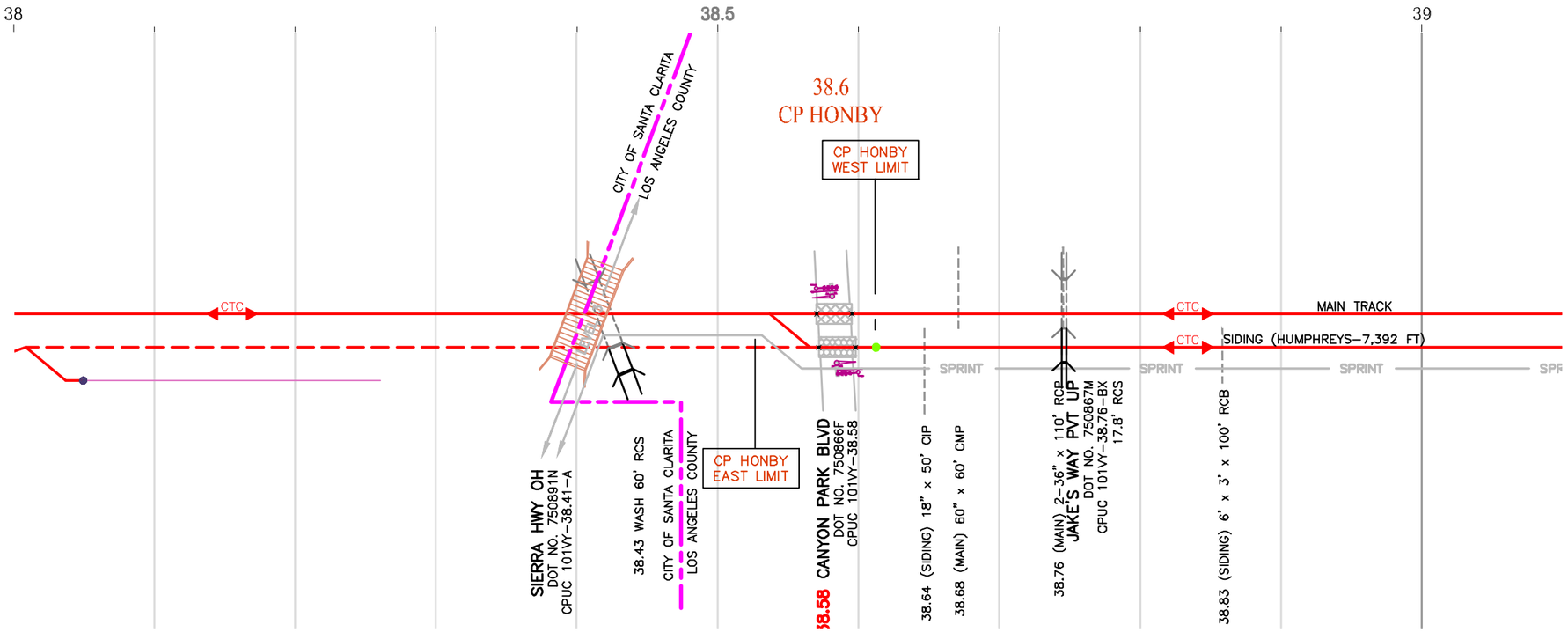
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 2 – TRACK SCHEMATIC
CANYON – STA. CLARITA
MP: 33.4 TO 35.0

CONTRACT NO. PS-2415-3024-0
DRAWING NO. DWG
REVISION 0
SHEET NO. 1 OF 1
SCALE 1"=500'

Dec 06, 2018 – 5:49pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_Schem.dwg
jchung





REV.	DATE	BY	APP.
		SJB	

INFORMATION CONFIDENTIAL:

DESIGNED BY	J CHUNG
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METROLINK.

RSE. INC.
1075 Old County Road
Belmont, CA 94002
www.rserail.com

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 2 – TRACK SCHEMATIC
VIA PRINCESSA – HONBY
MP: 37.5 TO 38.6

CONTRACT NO. PS-2415-3024-0

DRAWING NO. DWG

REVISION 0 | SHEET NO. 1 OF 1

SCALE 1"=500'

Dec 06, 2018 - 5:49pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_Schem.dwg
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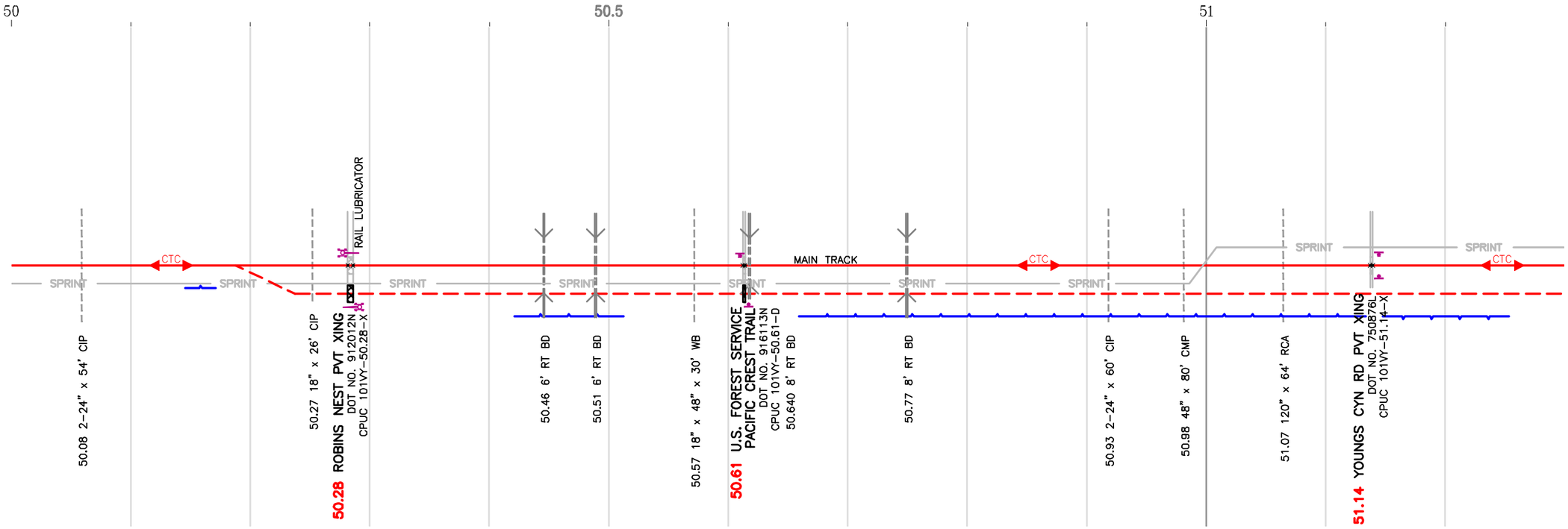

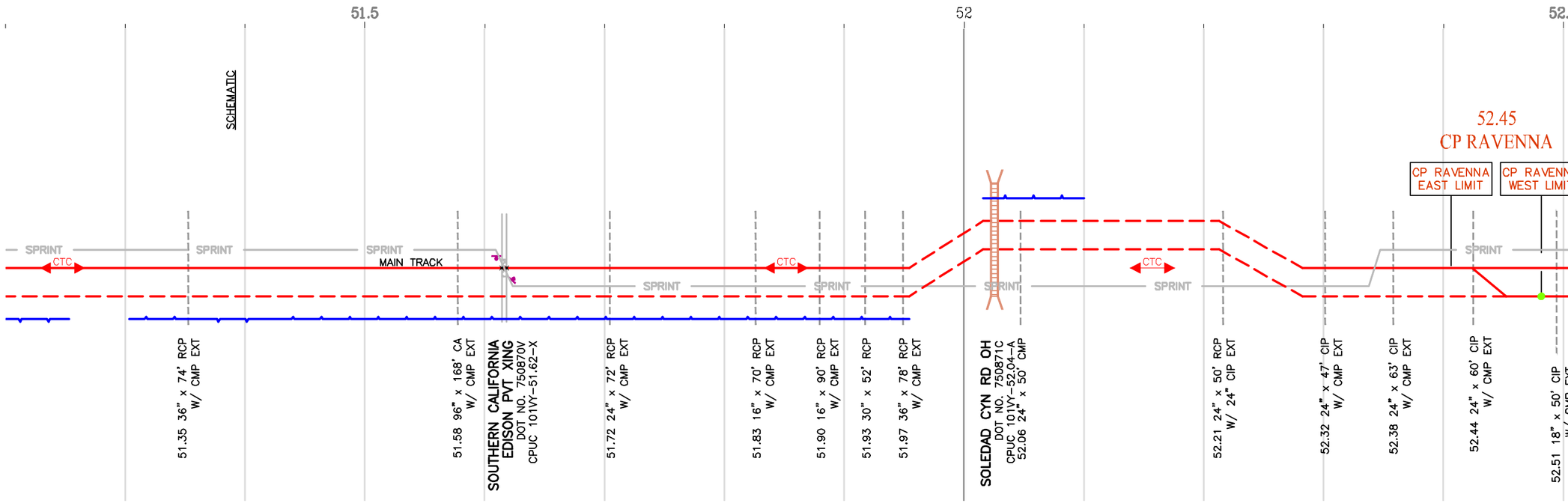

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METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 3 – TRACK SCHEMATIC
RAVENNA SOUTH
MP: 50.0 TO 52.5

CONTRACT NO. PS-2415-3024-0
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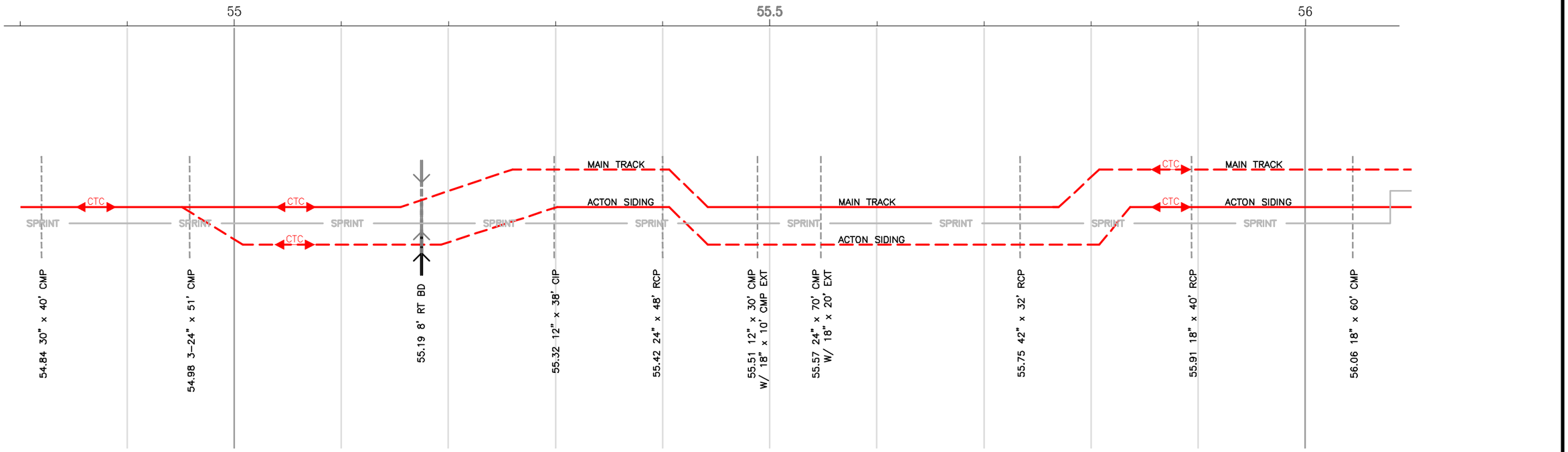
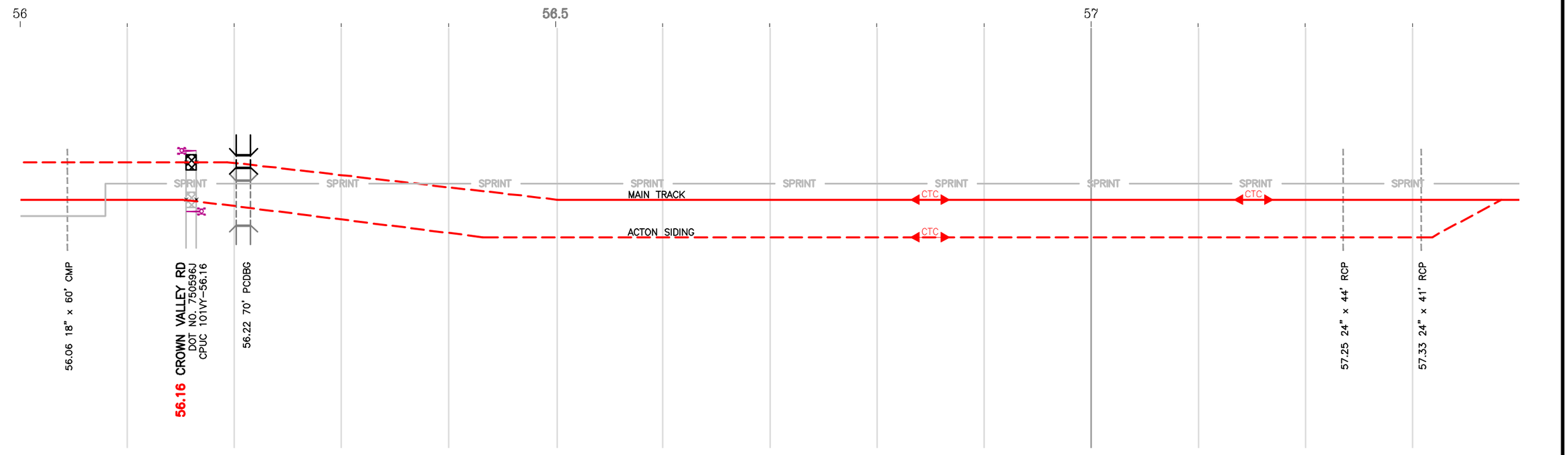
SHEET NO. 1 OF 1
SCALE 1"=500'





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1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 3 – TRACK SCHEMATIC
ACTON SIDING
MP: 55.0 TO 57.5

CONTRACT NO.	PS-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 1
SCALE	1"=500'

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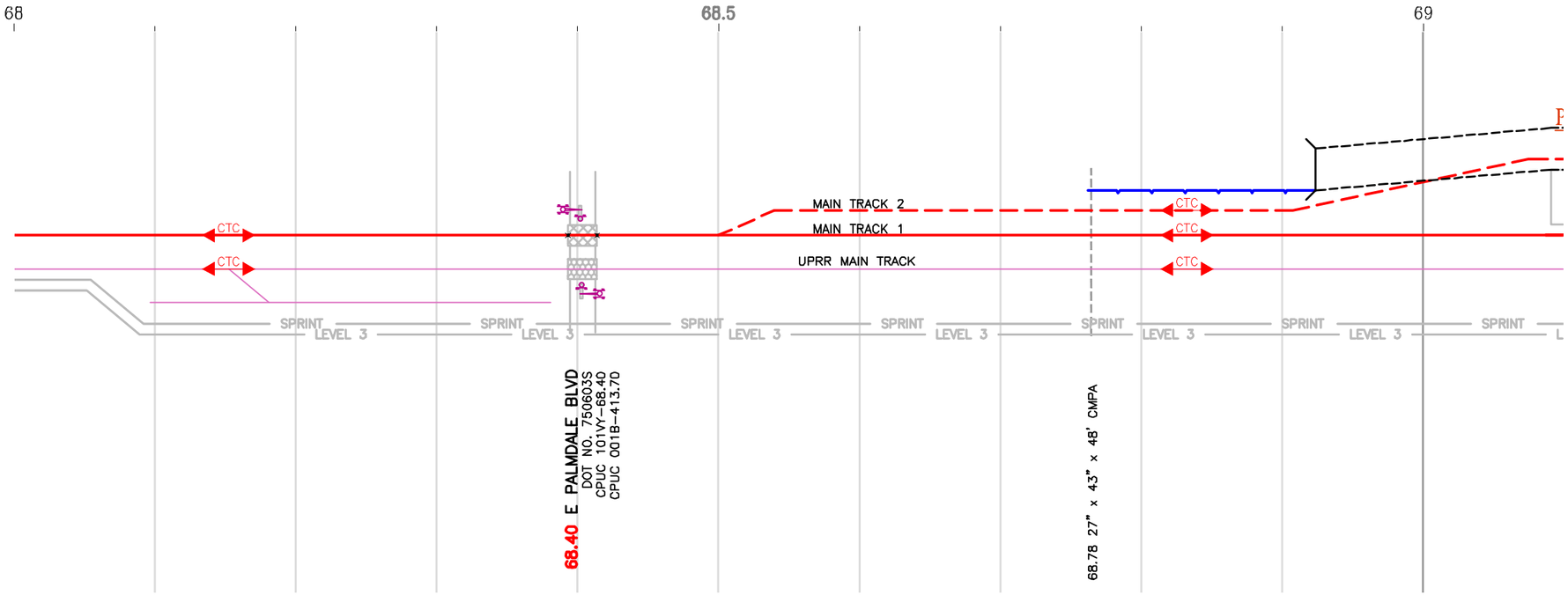

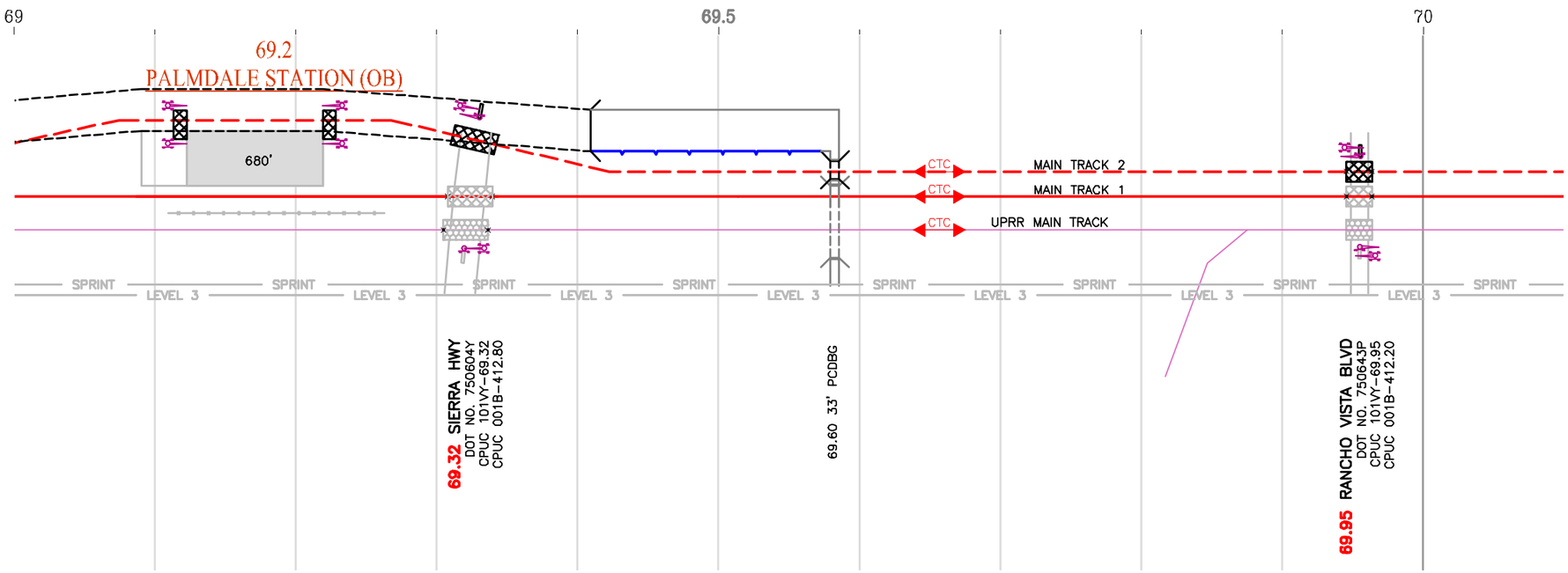

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK SCHEMATIC
PAMDALE NORTH
MP: 68.5 TO 72

CONTRACT NO. PS-2415-3024-0
DRAWING NO. DWG
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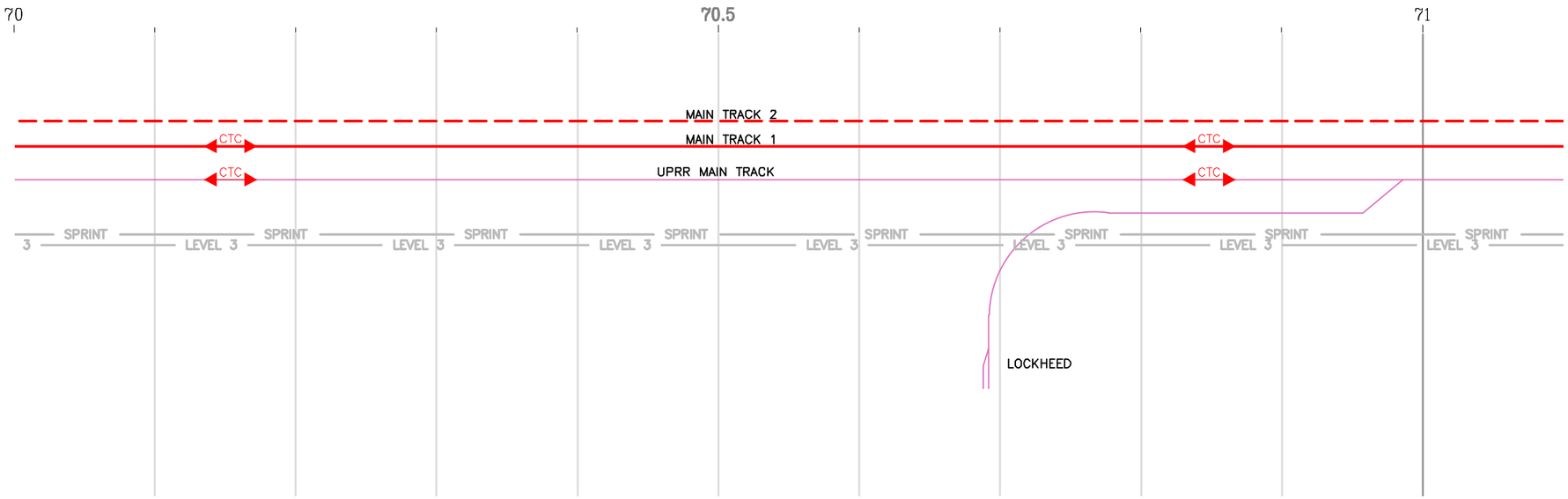
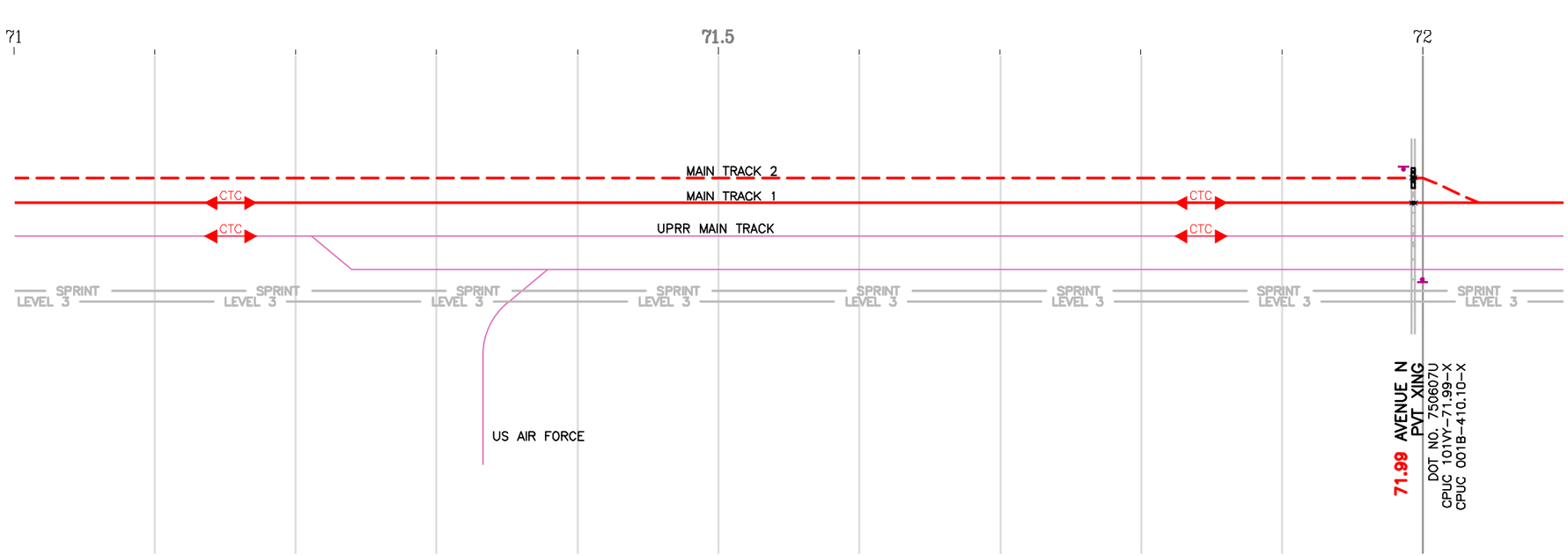
SHEET NO. 1 OF 2
SCALE 1"=500'





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www.rserail.com

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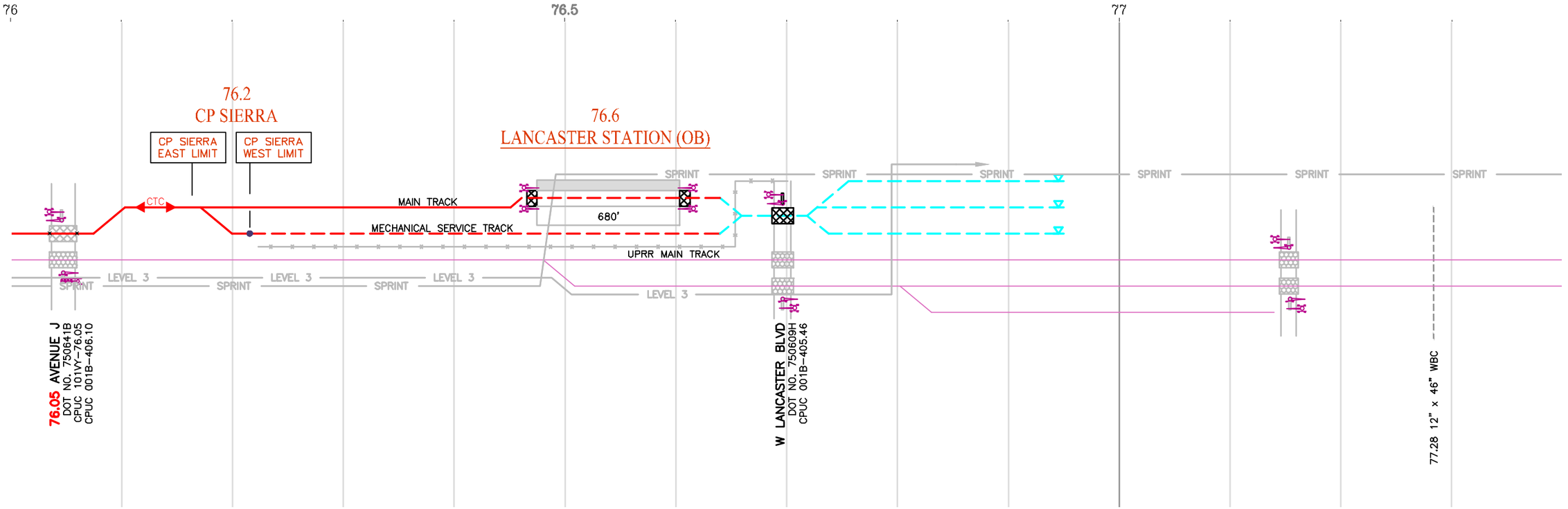
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK SCHEMATIC
PAMDALE NORTH
MP: 68.5 TO 72

CONTRACT NO. PS-2415-3024-0
DRAWING NO. DWG
REVISION 0
SHEET NO. 2 OF 2
SCALE 1"=500'



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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK SCHEMATIC
LANCASTER SOUTH
MP: –76.6

CONTRACT NO. PS–2415–3024–0

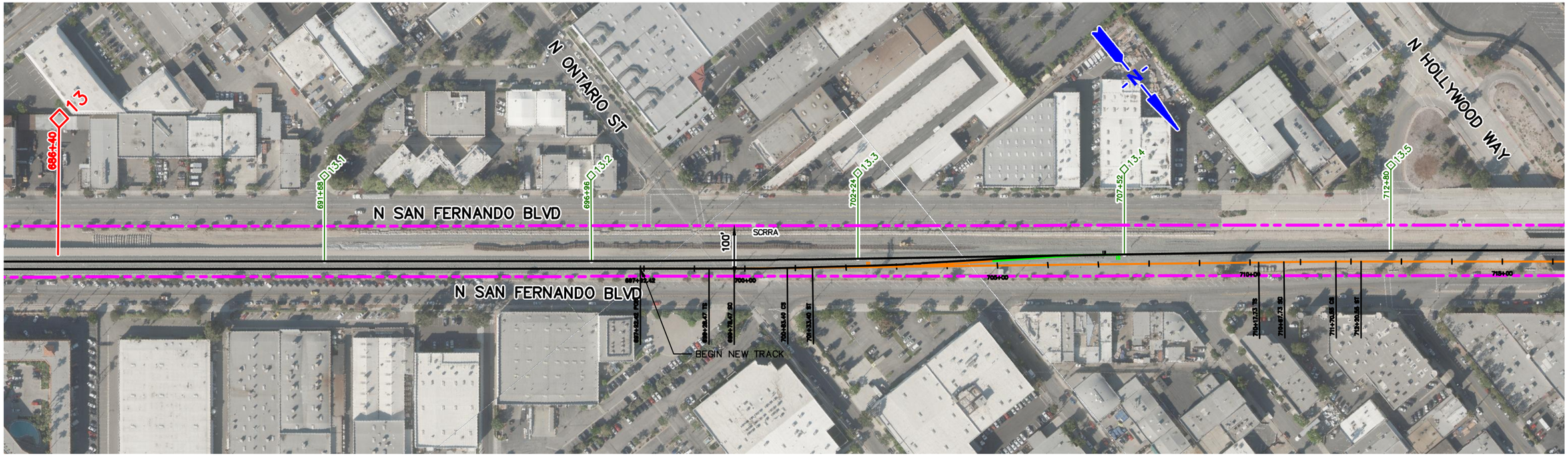
DRAWING NO. DWG

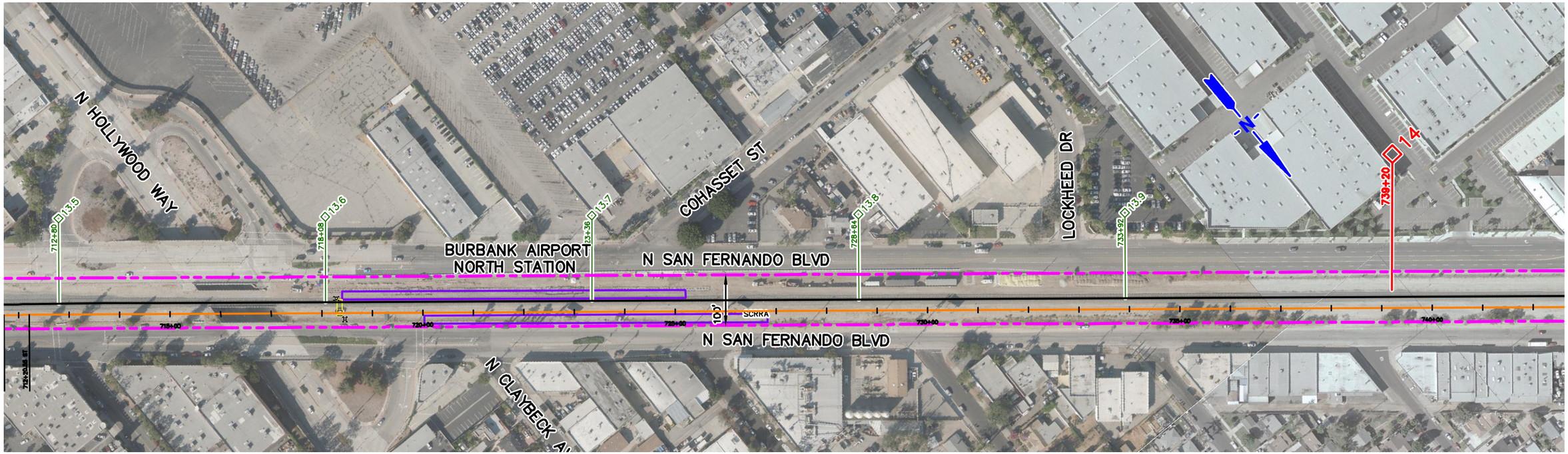
REVISION	SHEET NO.
0	1 OF 1

SCALE 1"=500'

APPENDIX 3 – ATTACHMENT 2

CIVIL IMPROVEMENT ALIGNMENT DRAWINGS





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METROLINK.

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSEREAL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
HOLLYWOOD – MCGINLEY
MP: 13.4 TO 15.6

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 3
SCALE	1"=200'

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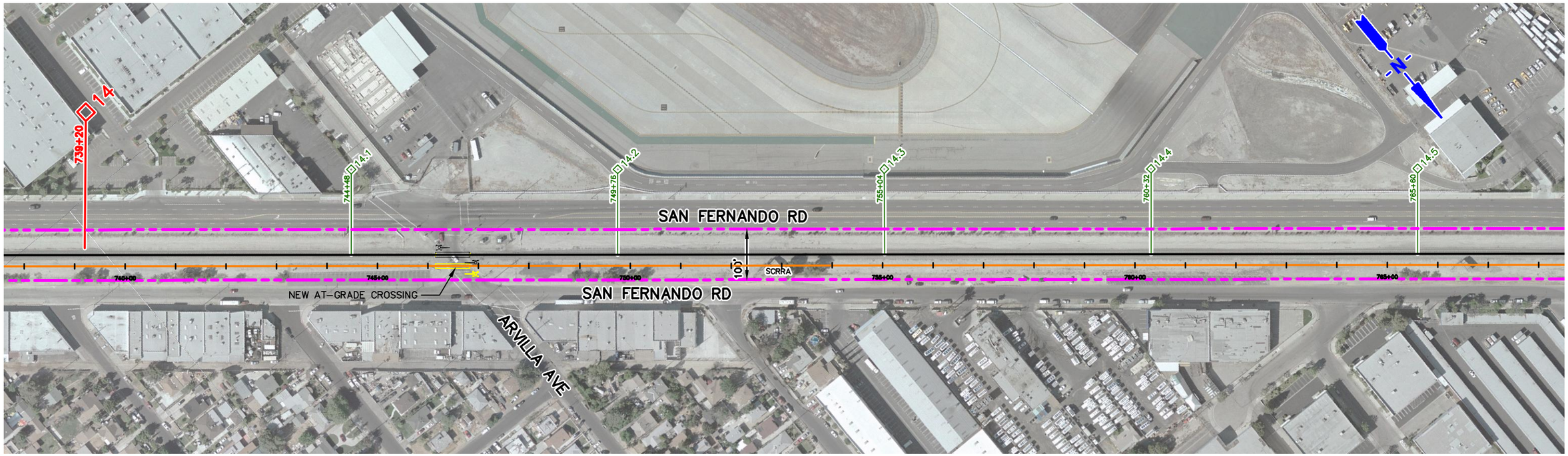

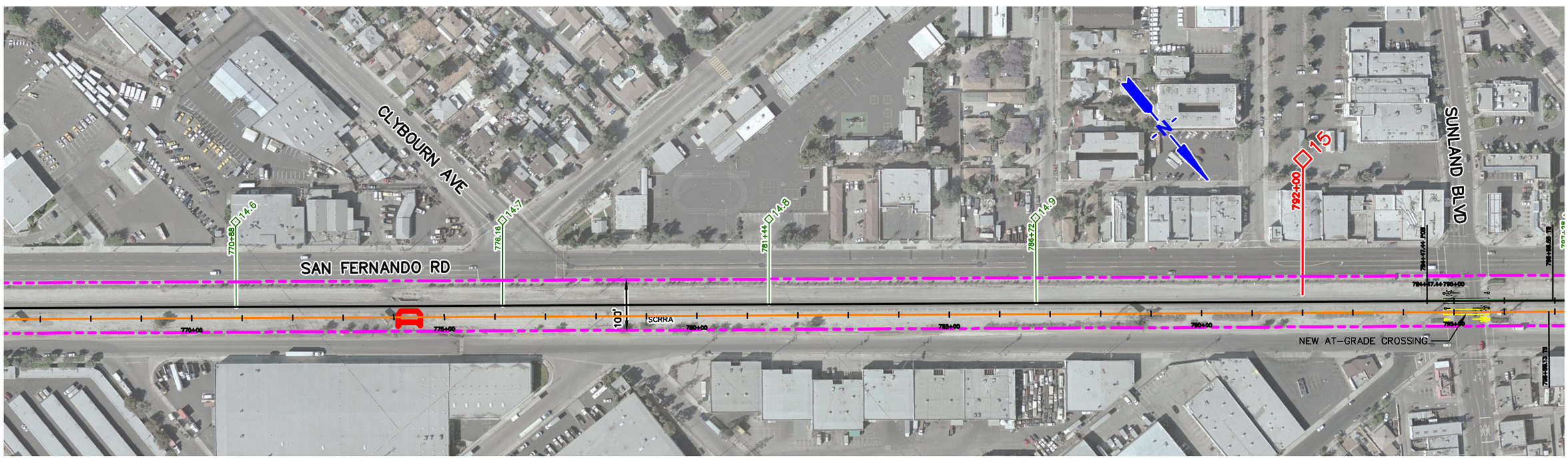

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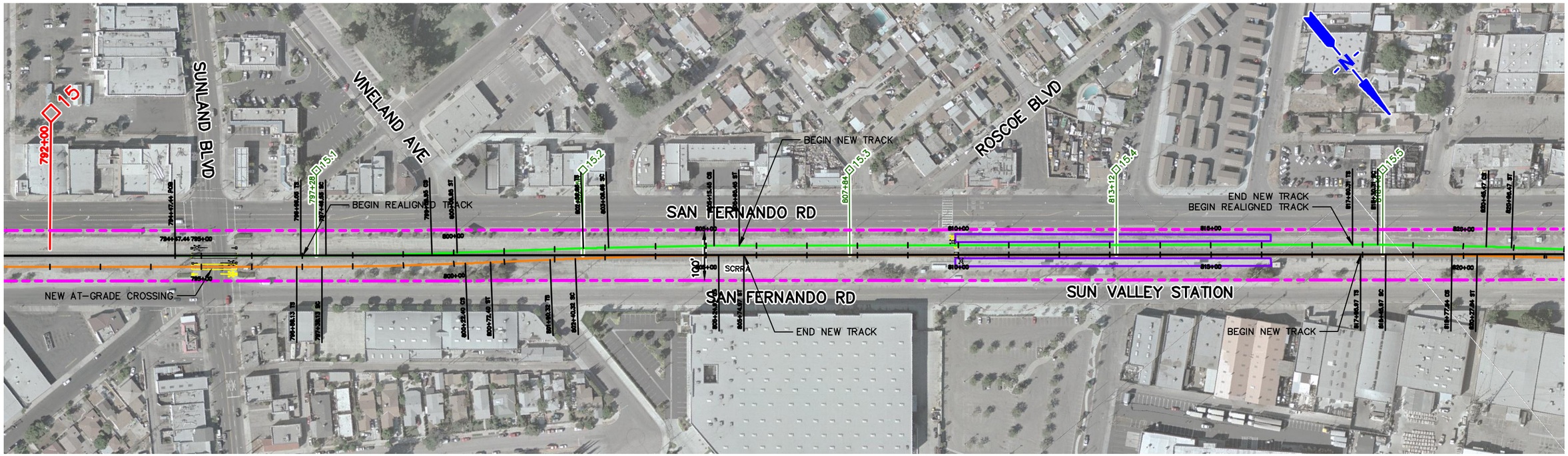
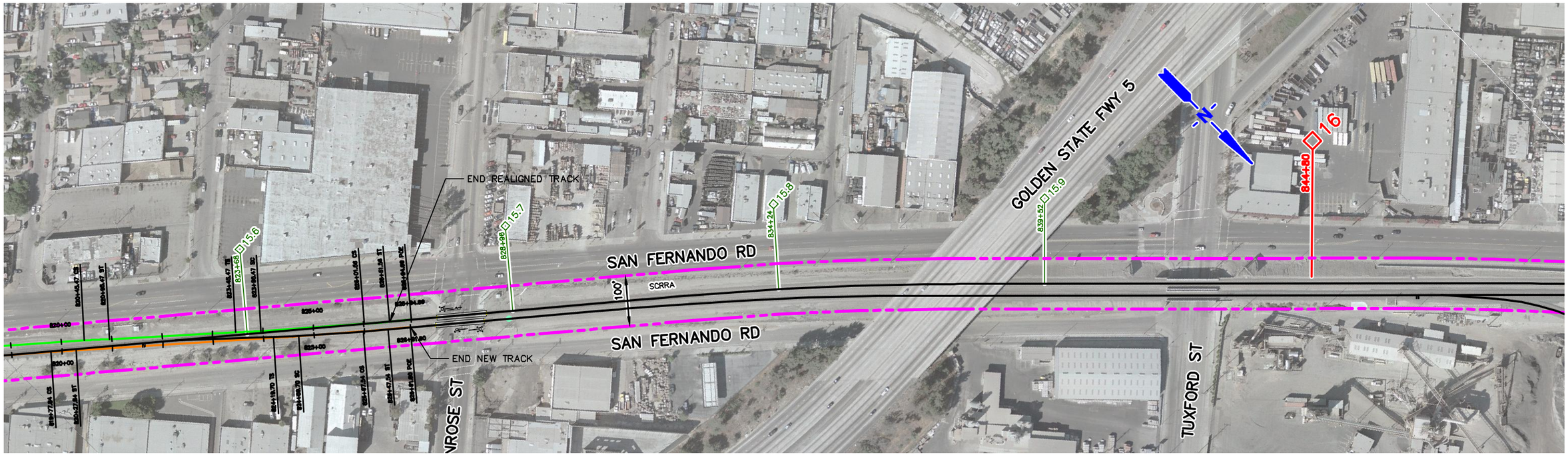
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
HOLLYWOOD – MCGINLEY
MP: 13.4 TO 15.6

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 3
SCALE	1"=200'





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Belmont, CA 94002
www.reserail.com

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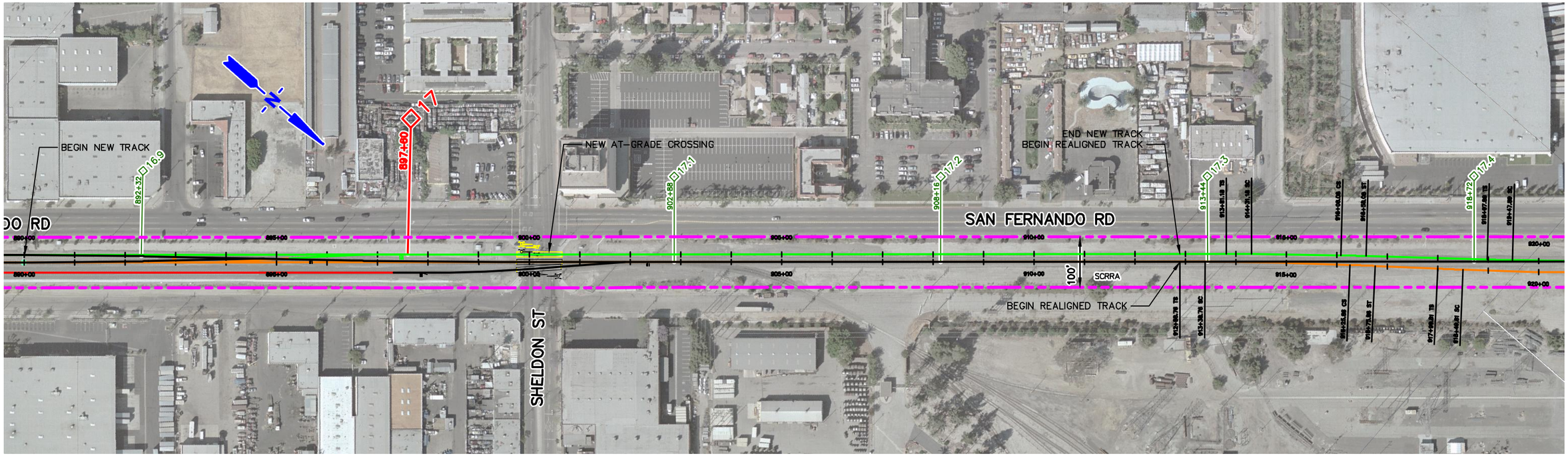
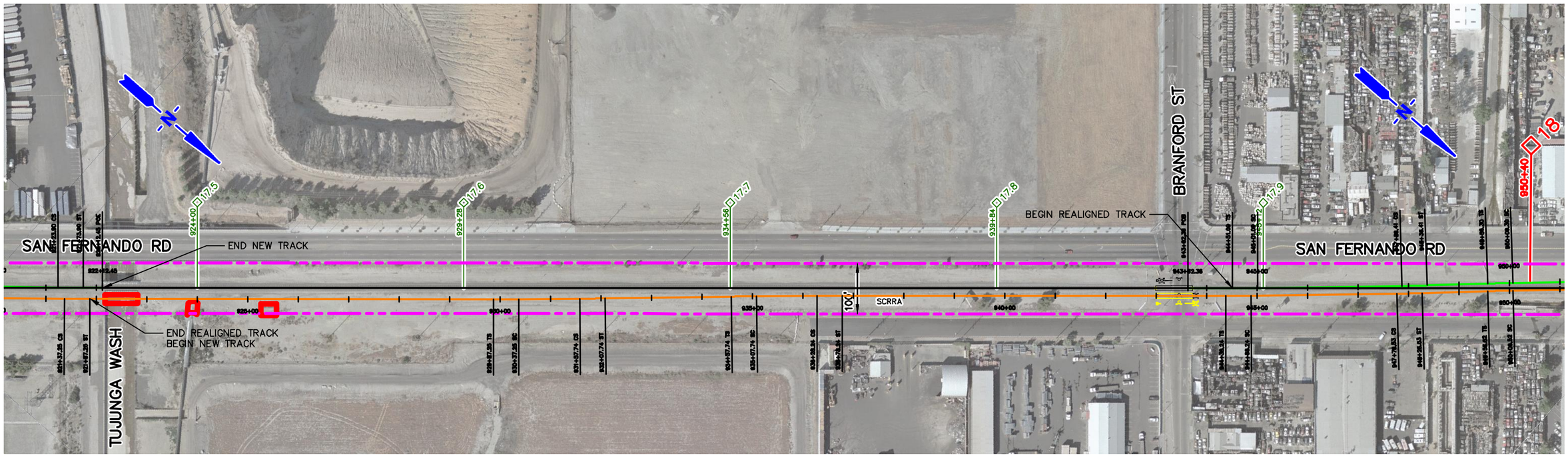
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
HOLLYWOOD – MCGINLEY
MP: 13.4 TO 15.6

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	3 OF 3
SCALE	1"=200'





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REV.	DATE	BY	SNB	APP.

INFORMATION CONFIDENTIAL:

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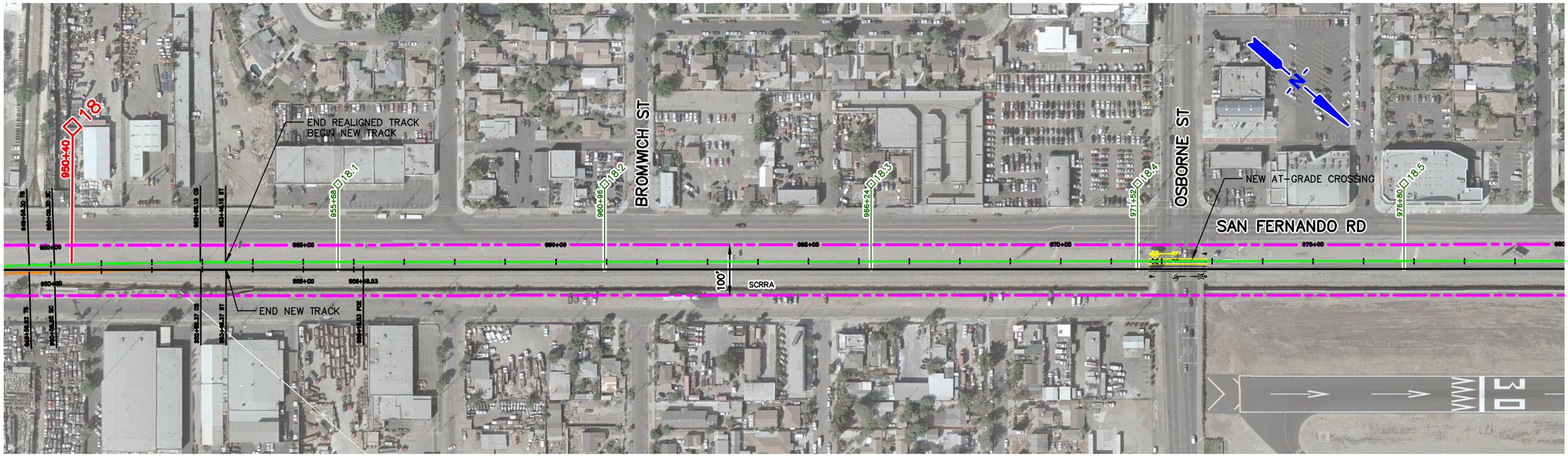
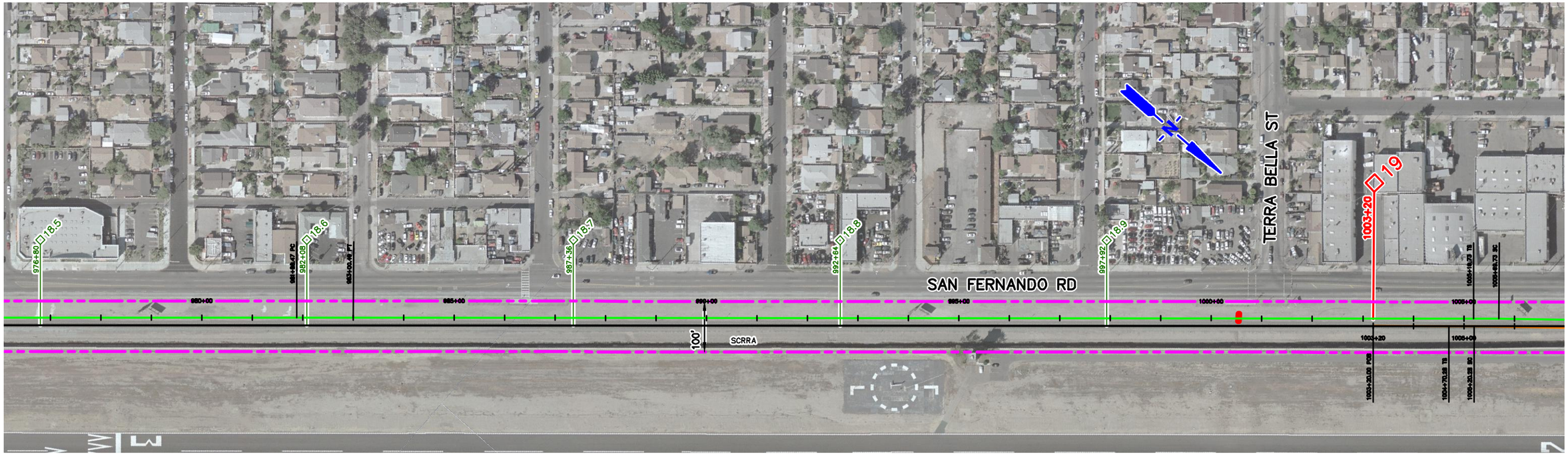
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
SHELDON – VAN NUYS BLVD
MP: 17.0 TO 19.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 3
SCALE	1"=200'





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www.RSEcal.com

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APPROVED: _____

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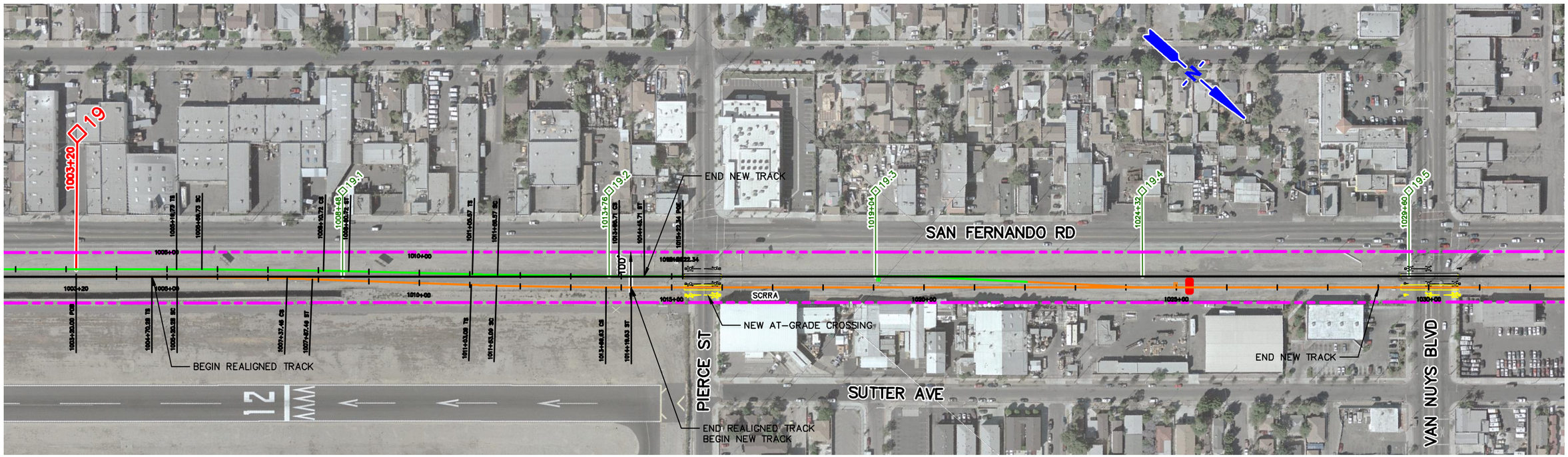
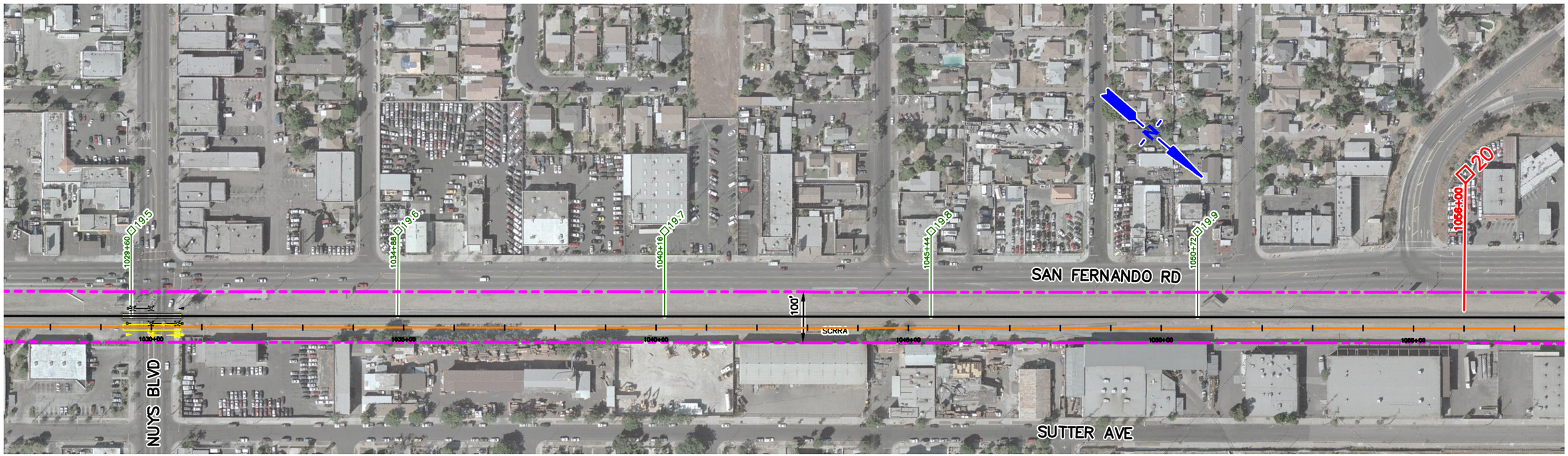
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
SHELDON – VAN NUYS BLVD
MP: 17.0 TO 19.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 3
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:16pm J:\Project1A\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg





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CHECKED BY: XXX
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BELMONT, CA 94002
WWW.RSERAIL.COM

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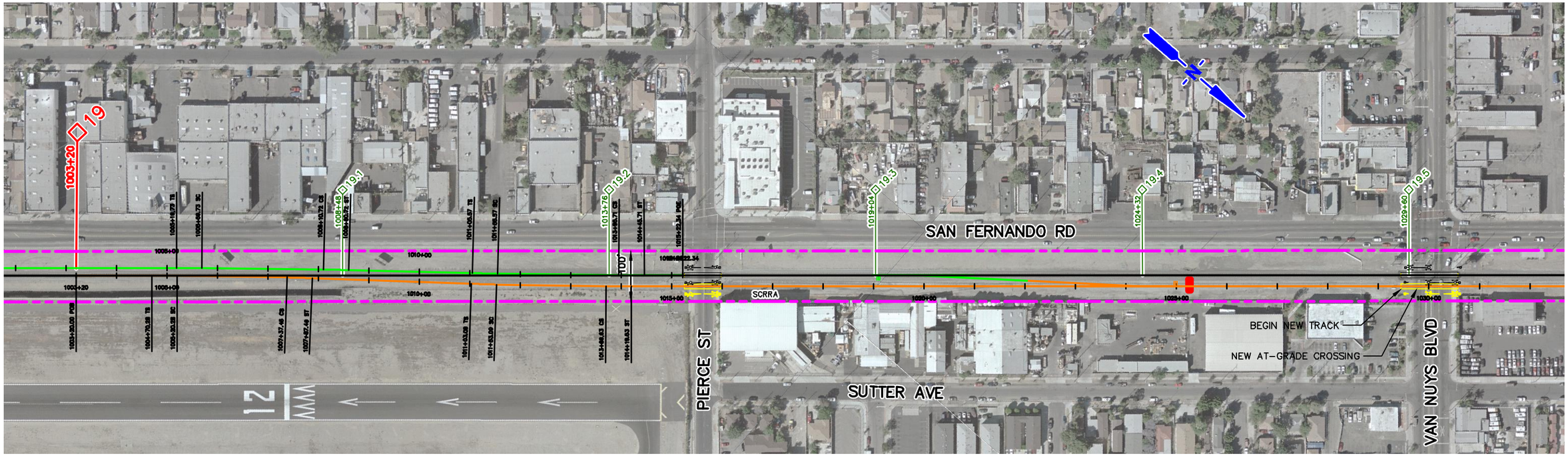
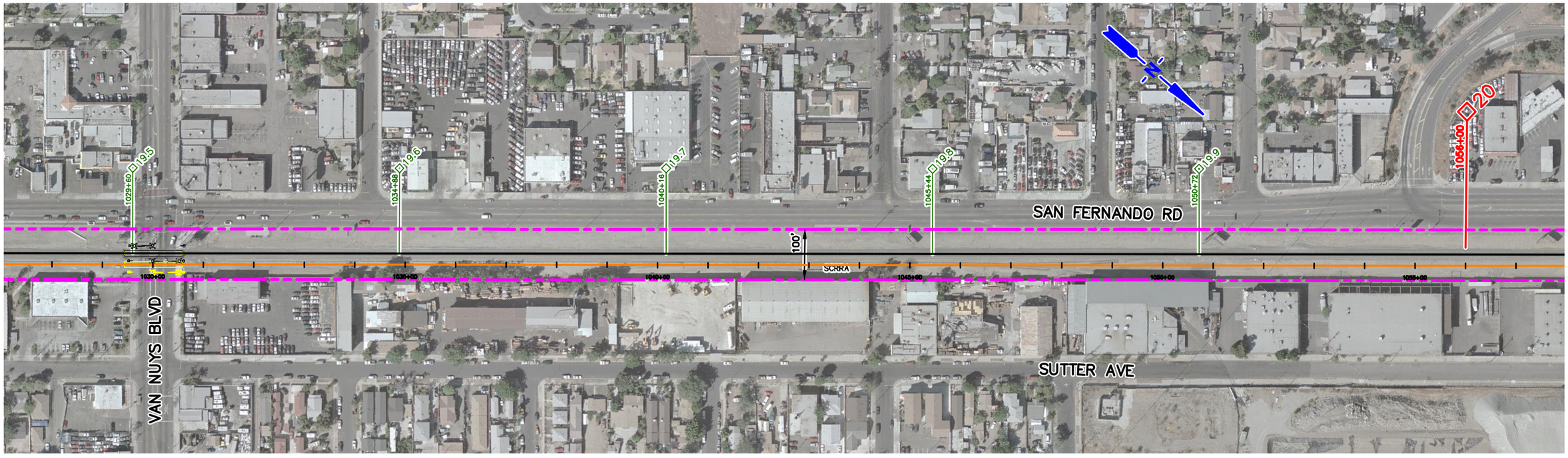
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
SHELDON – VAN NUYS BLVD
MP: 17.0 TO 19.5

CONTRACT NO. OS-2415-3024-03
DRAWING NO. DWG
REVISION 0
SHEET NO. 3 OF 3
SCALE 1"=200'

cdnguk Dec 06, 2018 - 6:16pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg





REV.	DATE		BY	CHK'D	APP.

INFORMATION CONFIDENTIAL:

All plans, drawings, specifications, and or information furnished herewith shall remain the property of the the Southern California Regional Rail Authority and shall be held confidential; and shall not be used for any purpose not provided for in agreements with the Southern California Regional Rail Authority.

DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
www.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

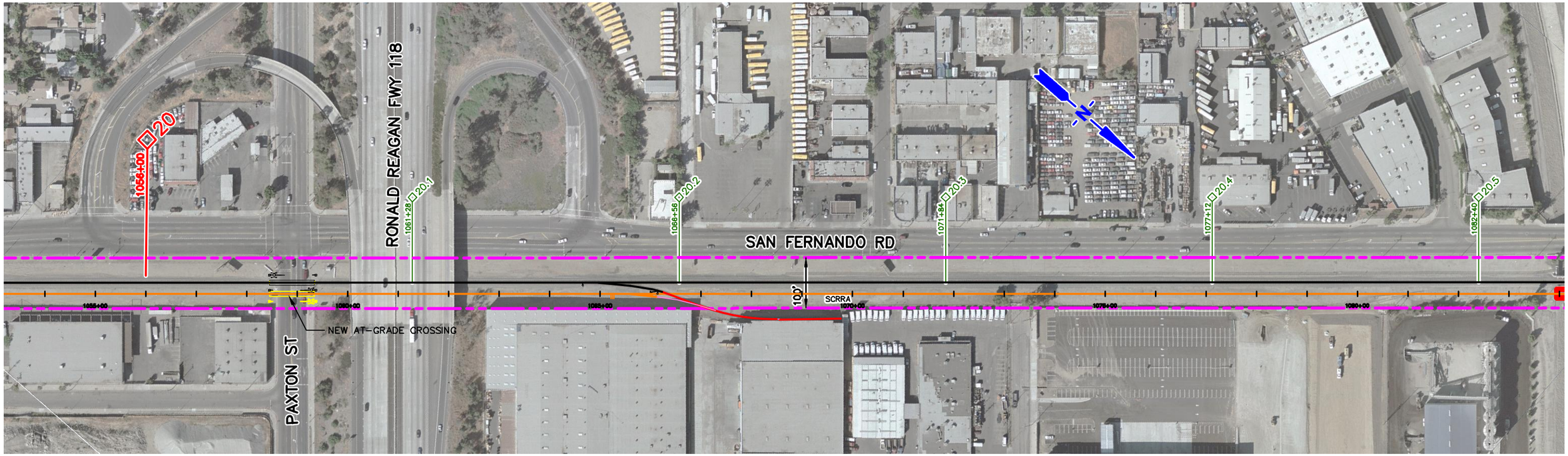
APPROVED: _____

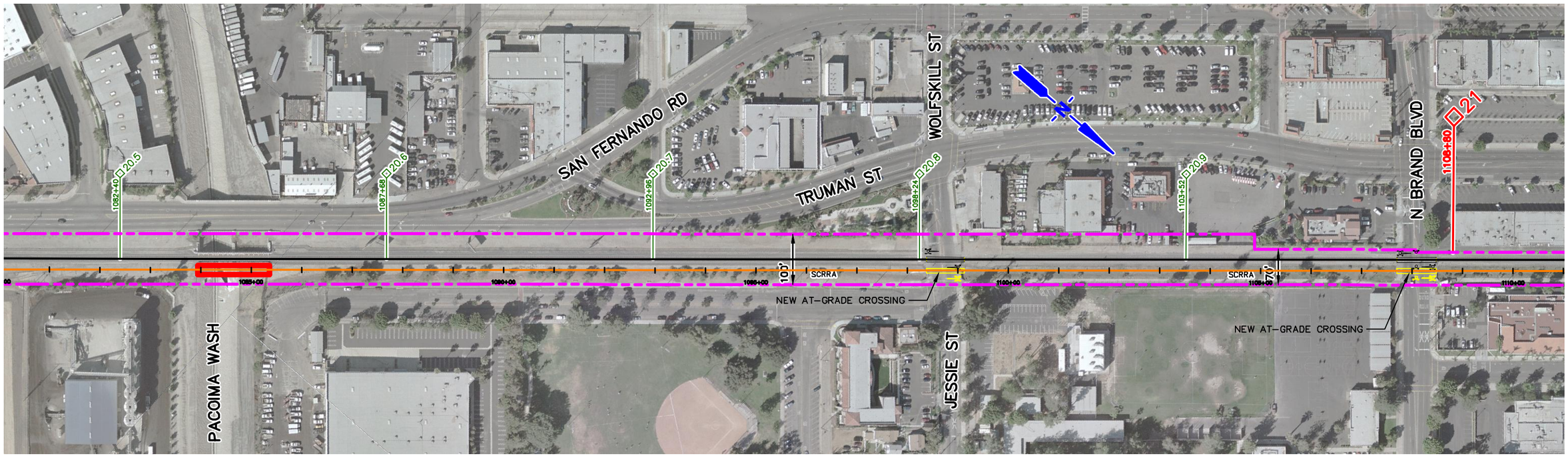
METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
VAN NUYS BLVD – SYLMAR
MP: 19.5 TO 21.9

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 3
SCALE	1"=200'

cchauk Dec 06, 2018 – 6:16pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





cdheuk Dec 06, 2018 - 6:16pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg

REV.	DATE		BY	SUB.	APP.

INFORMATION CONFIDENTIAL:

DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.rserail.com

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
VAN NUYS BLVD – SYLMAR
MP: 19.5 TO 21.9

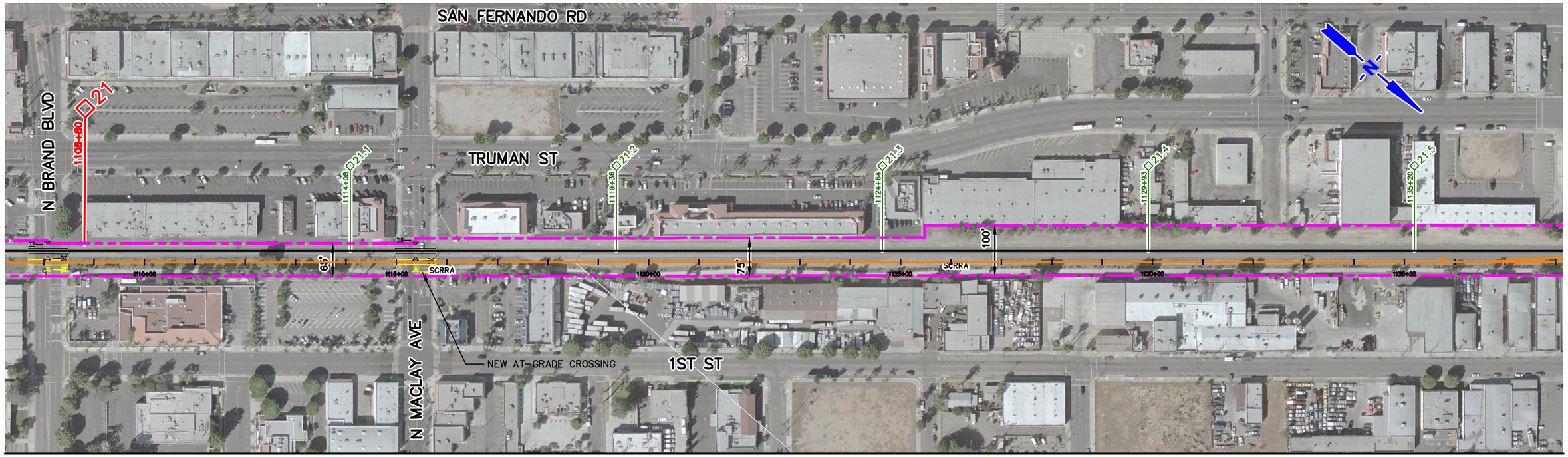
CONTRACT NO. PS-2415-3024-03

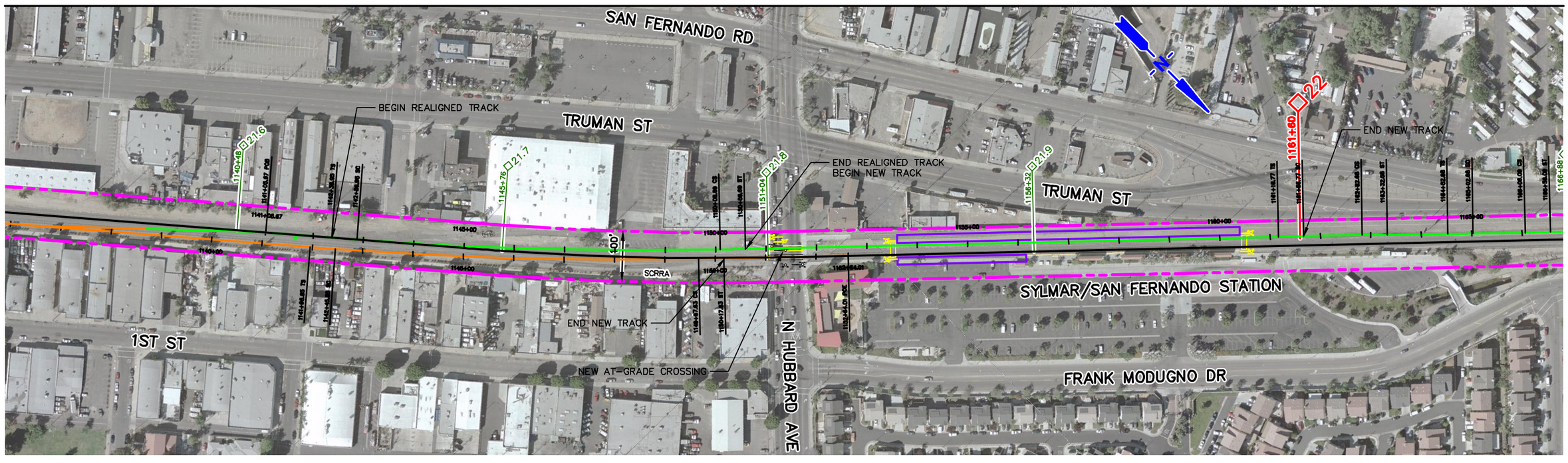
DRAWING NO. DWG

REVISION 0

SHEET NO. 2 OF 3

SCALE 1"=200'





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REV.	DATE		BY	SNB	APP.

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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.RSERail.com

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
VAN NUYS BLVD – SYLMAR
MP: 19.5 TO 21.9

CONTRACT NO.	PS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	3 OF 3
SCALE	1"=200'

SAN FERNANDO RD

N BRAND BLVD

TRUMAN ST

N MACLAY AVE

1ST ST

SCRRA

65'

75'

100'

1108+80 □21

1114+08 □21.1

1119+36 □21.2

1124+64 □21.3

1129+93 □21.4

1135+20 □21.5

1110+00

1115+00

1120+00

1125+00

1130+00

1135+00

SAN FERNANDO RD

NEW AT-GRADE CROSSING

EXIST BIKE PATH
TO BE MODIFIED

TRUMAN ST

1161+60 □22

1140+48 □21.6

1145+76 □21.7

1151+04 □21.8

1156+32 □21.9

1166+88 □22.1

1140+00

1145+00

1150+00

1155+00

1160+00

1165+00

1500'

SCRRA

1ST ST

N HUBBARD AVE

SYLMAR/SAN FERNANDO STATION

FRANK MODUGNO DR

REV.	DATE		BY	SUB.	APP.

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DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

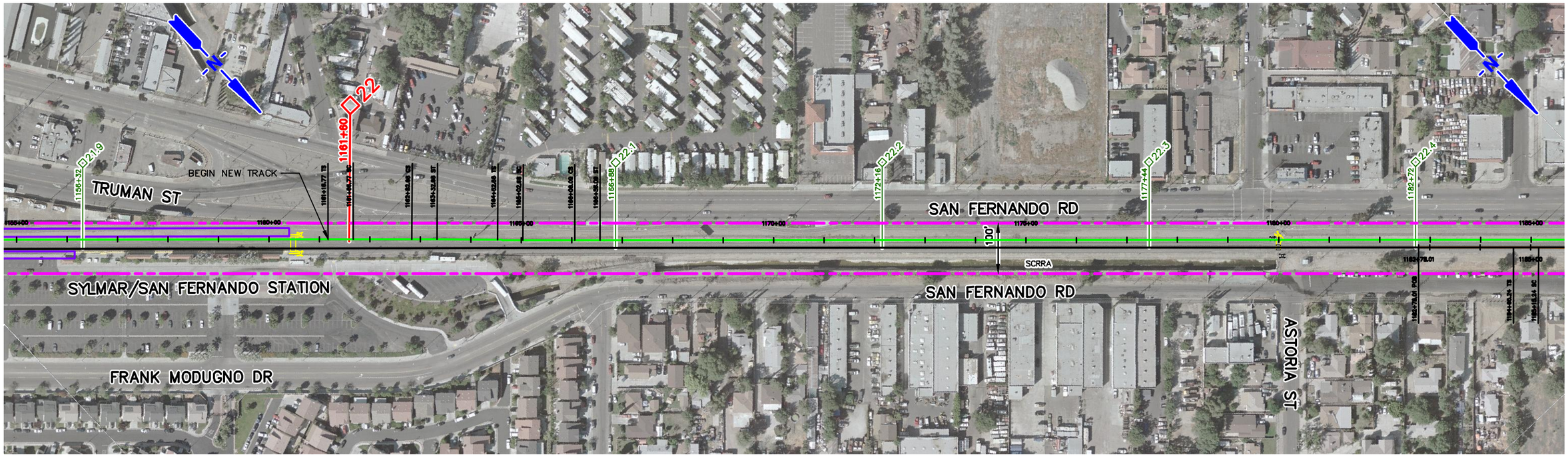
APPROVED: _____

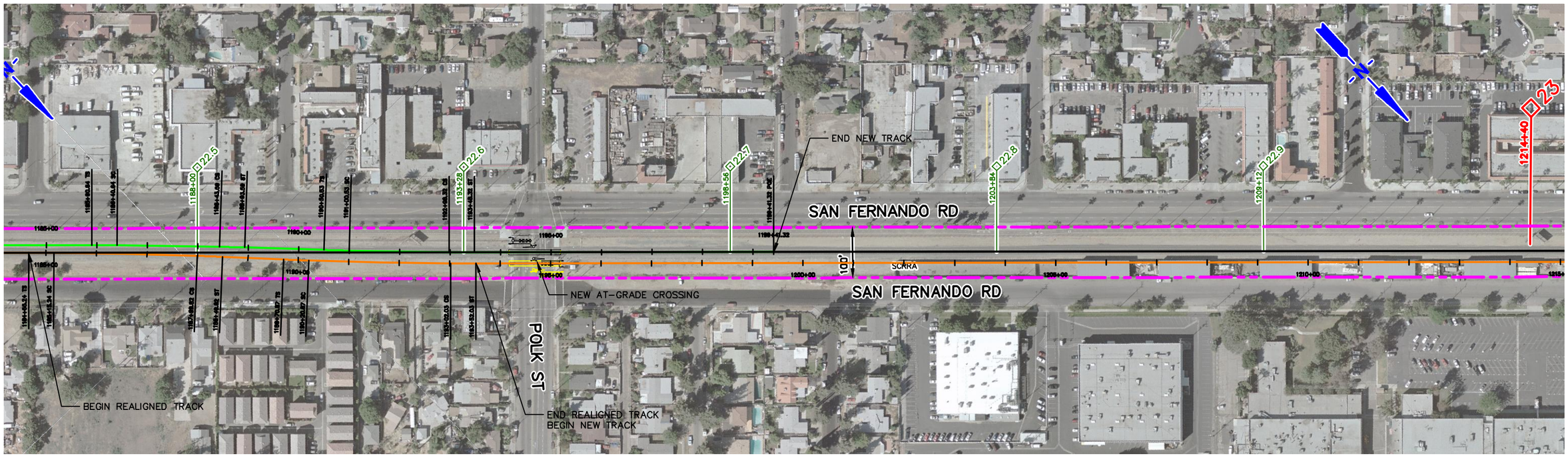
METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
SYLMAR STATION
MP: 21.5 TO 22.1

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 1
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:16pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





cdreuk Dec 06, 2018 - 6:17pm J:\Project1\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg

REV.	DATE	BY	APP.

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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1875 Old County Road
Belmont, CA 94002
www.reseal.com

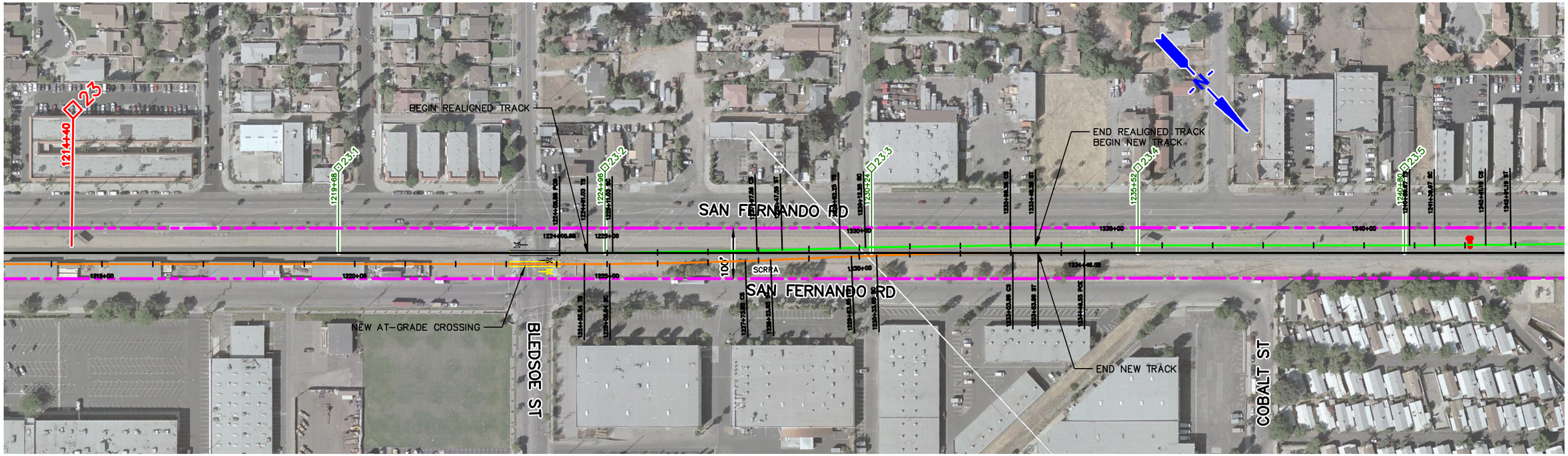
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
SYLMAR – ROXFORD
MP: 21.9 TO 23.6

CONTRACT NO. PS-2415-3024-03
DRAWING NO. DWG
REVISION 0
SHEET NO. 1 OF 2
SCALE 1"=200'



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CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1875 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

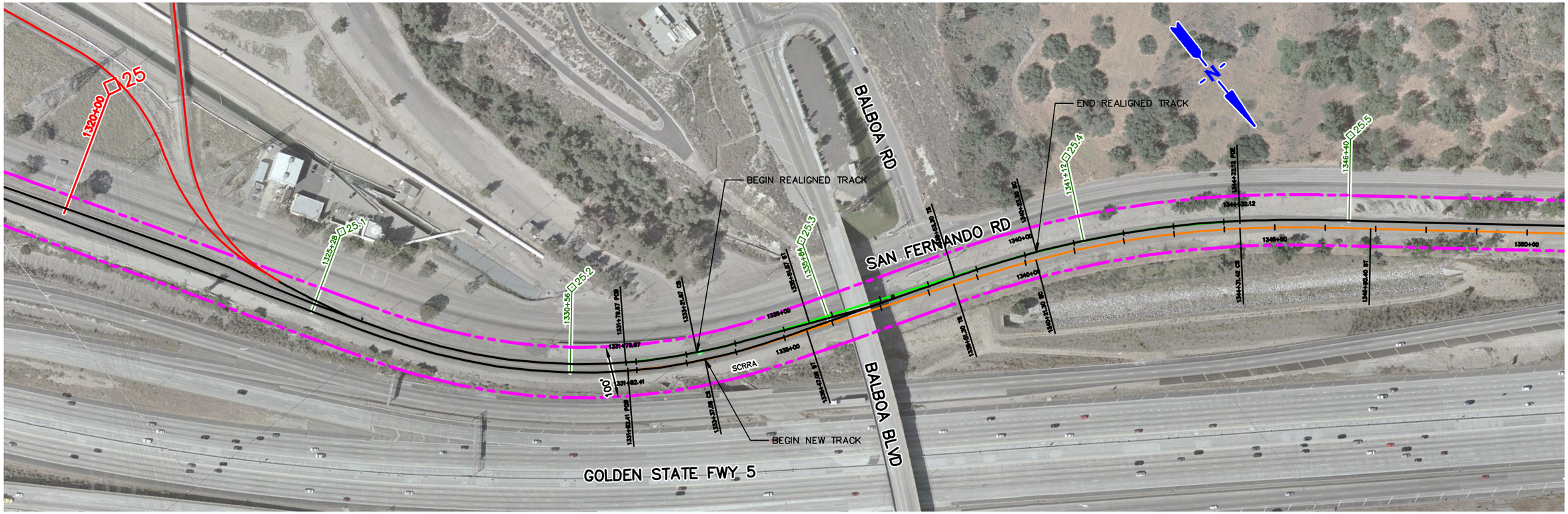
SUBMITTED: _____ PROJECT MANAGER

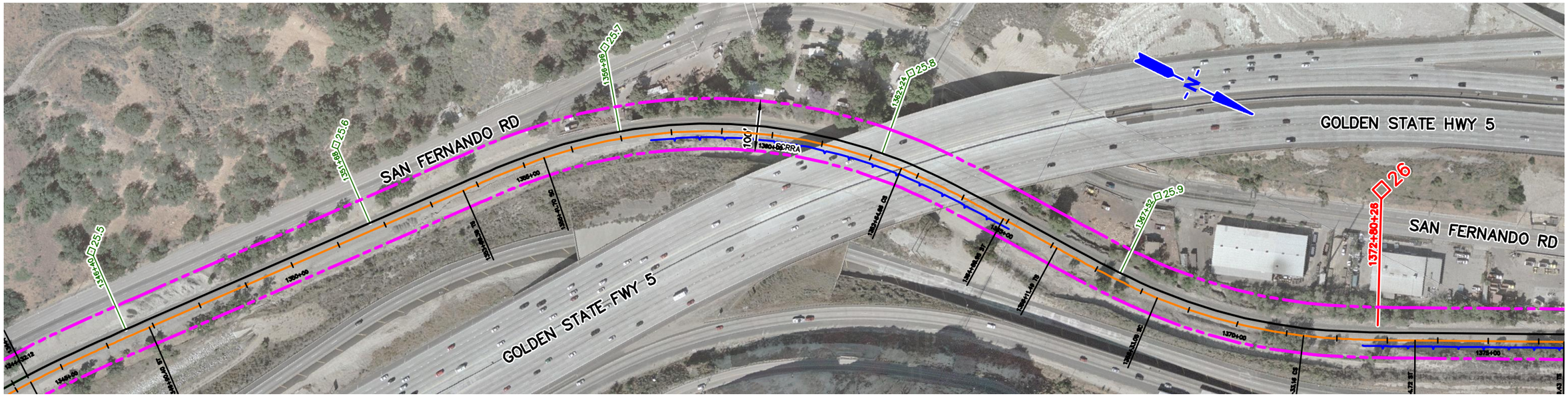
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
SYLMAR – ROXFORD
MP: 21.9 TO 23.6

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 2
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:17pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





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CHECKED BY	XXX
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DATE	11/30/2018

METROLINK.

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
BALBOA – TUNNEL
MP: 25.3 TO 26.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 2
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:17pm J:\Project\4\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg

GOLDEN STATE HWY 5

SAN FERNANDO RD

GOLDEN STATE HWY 5

SAN FERNANDO RD

GOLDEN STATE HWY 5 TRUCK ROUTE

FOOTHILL BLVD

SIERRA HWY

END NEW TRACK

SCRRA

100'

THE OLD RD

PORTAL TUNNEL 25
MP 26.63

TUNNEL 25

200'

100'

SCRRA

GOLDEN STATE HWY

ANTELOPE

N

cchauk Dec 06, 2018 - 6:17pm J:\Project4\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg

REV.	DATE		BY	SUB.	APP.

INFORMATION CONFIDENTIAL:

DESIGNED BY	J CHUNG
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CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

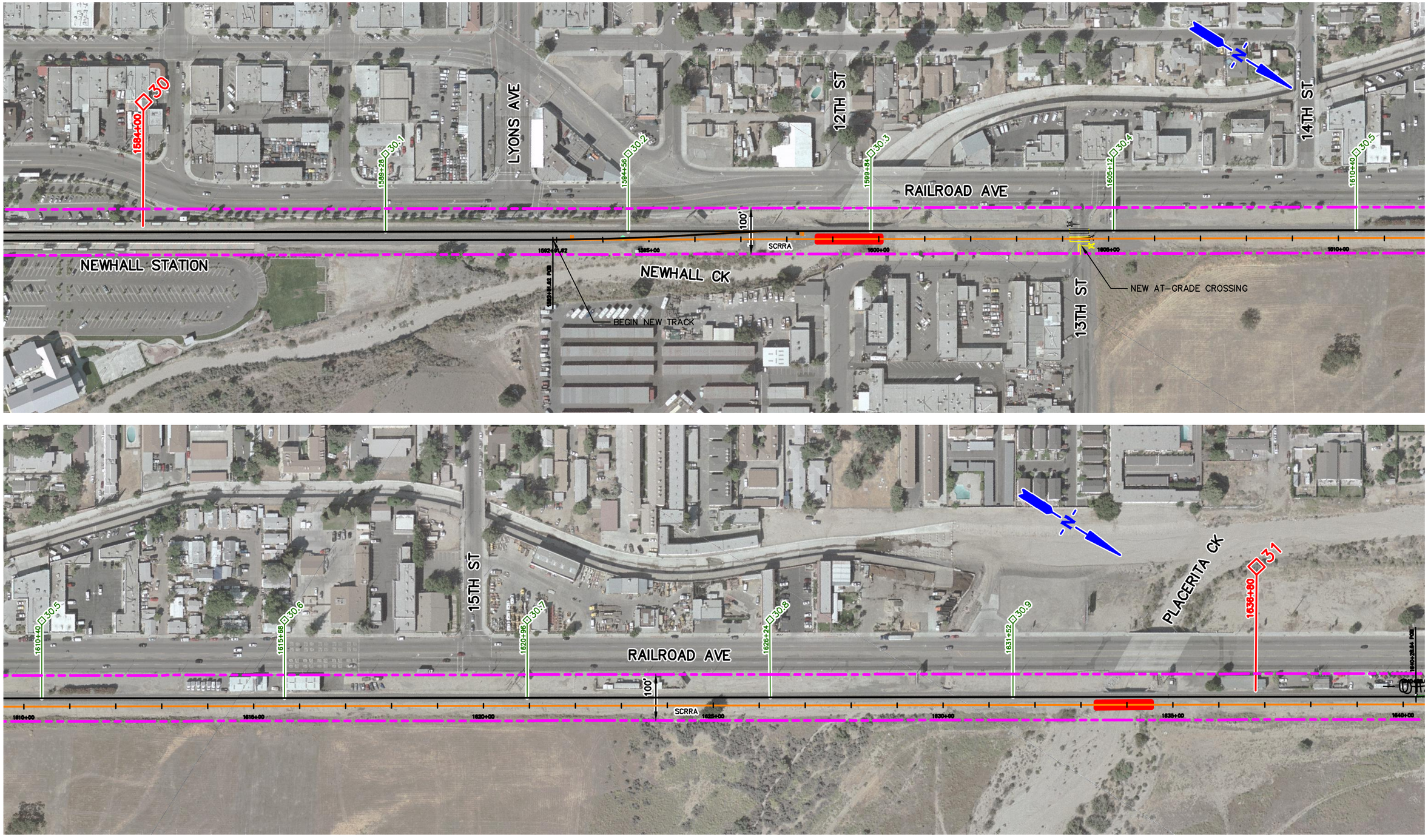
RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
BALBOA – TUNNEL
MP: 25.3 TO 26.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 2
SCALE	1"=200'



cdrauk Dec 06, 2018 - 6:18pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg

REV.	DATE	BY	SUB.	APP.

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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.reerail.com

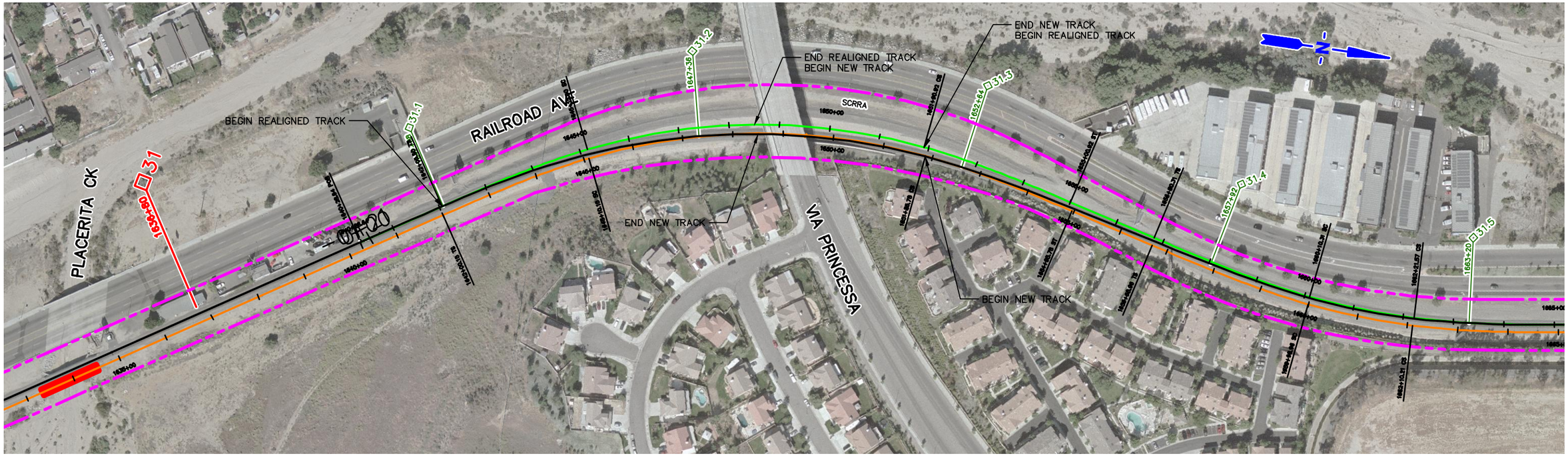
SUBMITTED: _____ PROJECT MANAGER

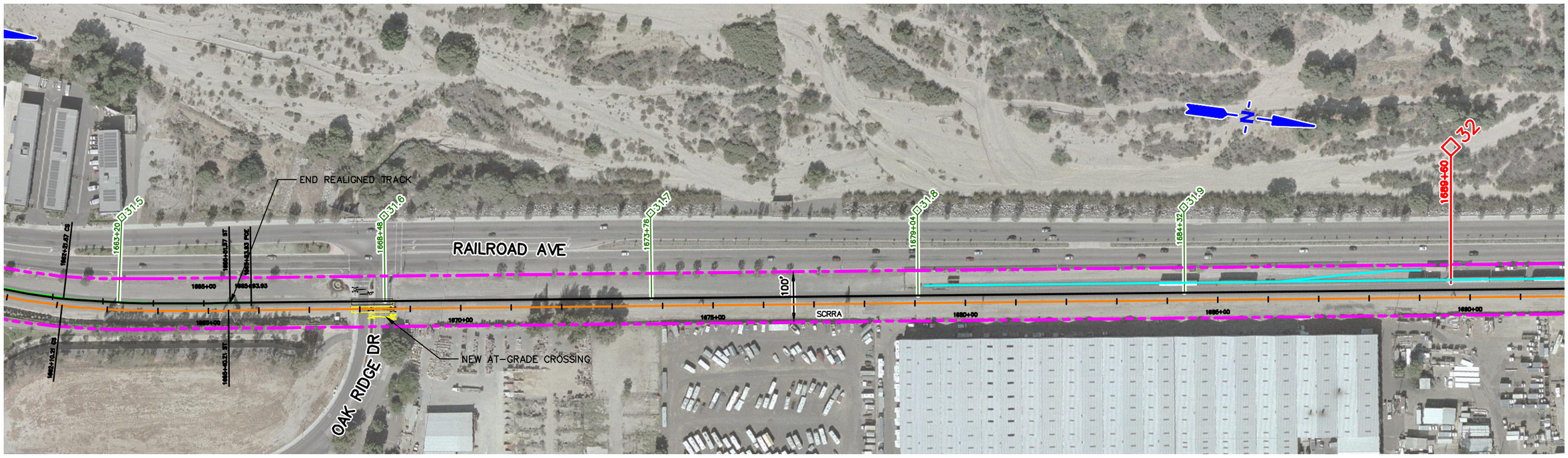
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
HOOD – SAUGUS
MP: 30.2 TO 32.4

CONTRACT NO. OS-2415-3024-03
DRAWING NO. DWG
REVISION 0
SHEET NO. 1 OF 3
SCALE 1"=200'





cchauk Dec 06, 2018 - 6:18pm J:\Project1A\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg

REV.	DATE	BY	SUB	APP.

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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
(650) RSERAIL-204

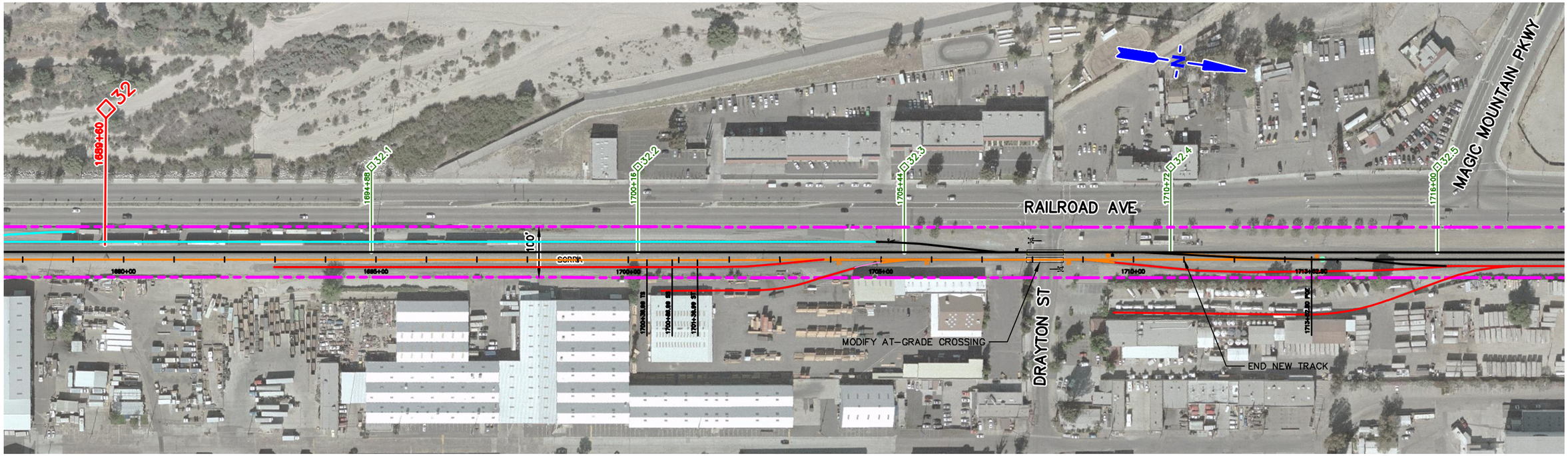
SUBMITTED: _____ PROJECT MANAGER

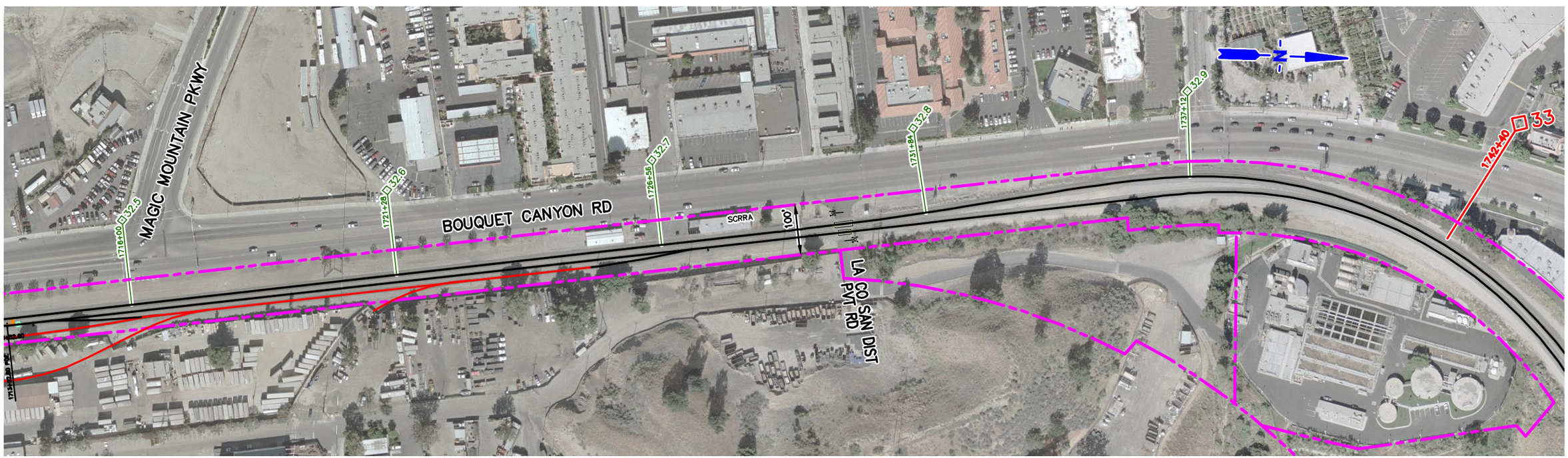
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
HOOD – SAUGUS
MP: 30.2 TO 32.4

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 3
SCALE	1"=200'





REV.	DATE		BY	SNB.	APP.

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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.reerail.com

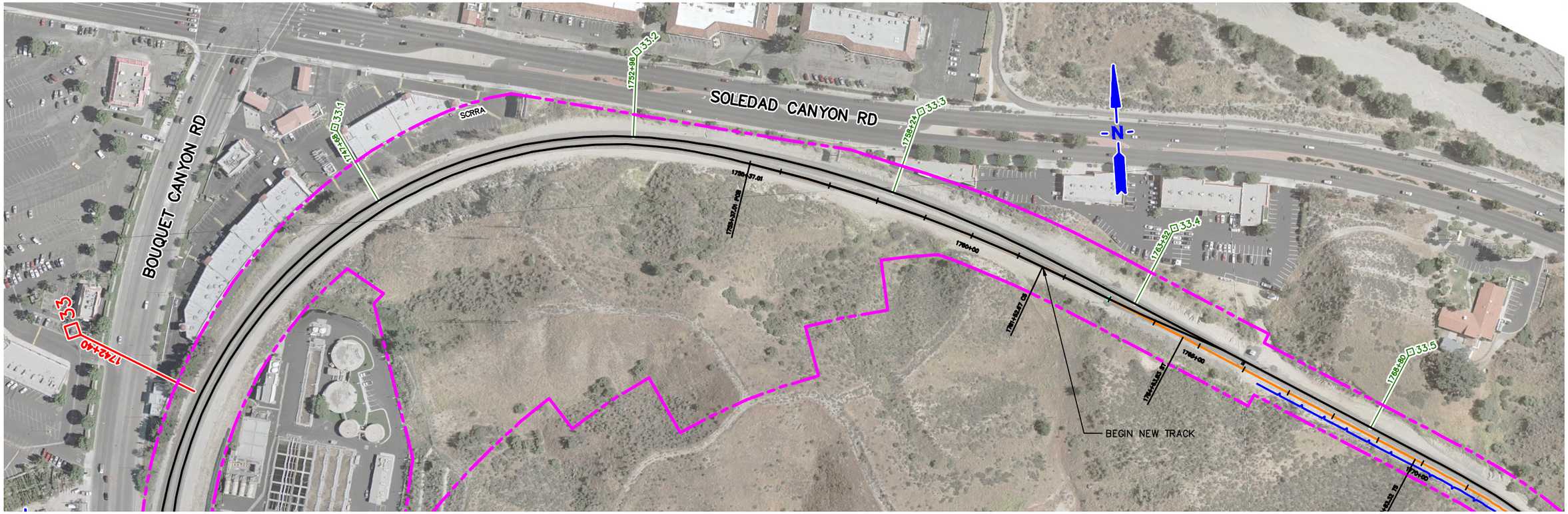
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
HOOD – SAUGUS
MP: 30.2 TO 32.4

CONTRACT NO	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	3 OF 3
SCALE	1"=200'

cchauk Dec 06, 2018 – 6:18pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg



REV.	DATE		BY	SUB	APP.

DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1079 Old County Road
Belmont, CA 94002
www.rserail.com

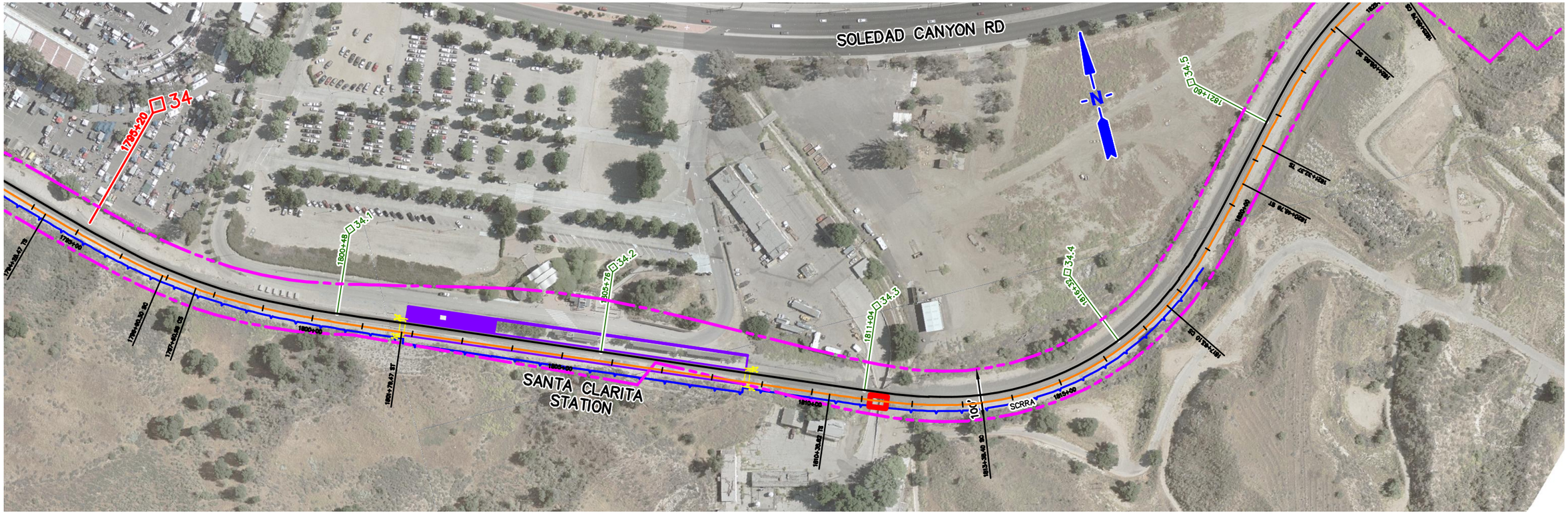
SUBMITTED: _____ PROJECT MANAGER

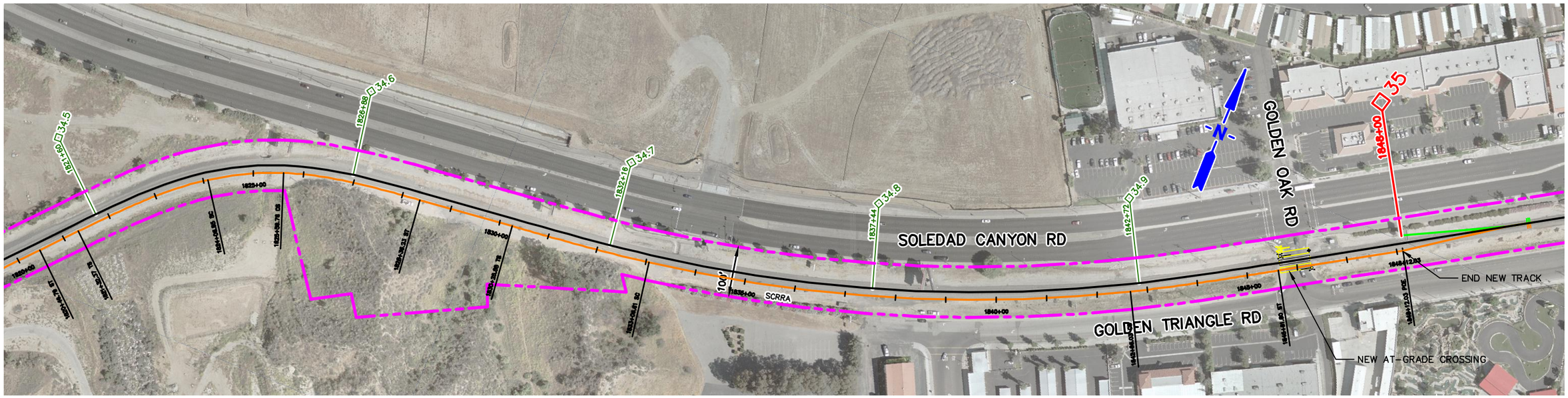
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
CANYON – STA. CLARITA
MP: 33.4 TO 35

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 2
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:18pm J:\Project\4\WSP\180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg





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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.rserail.com

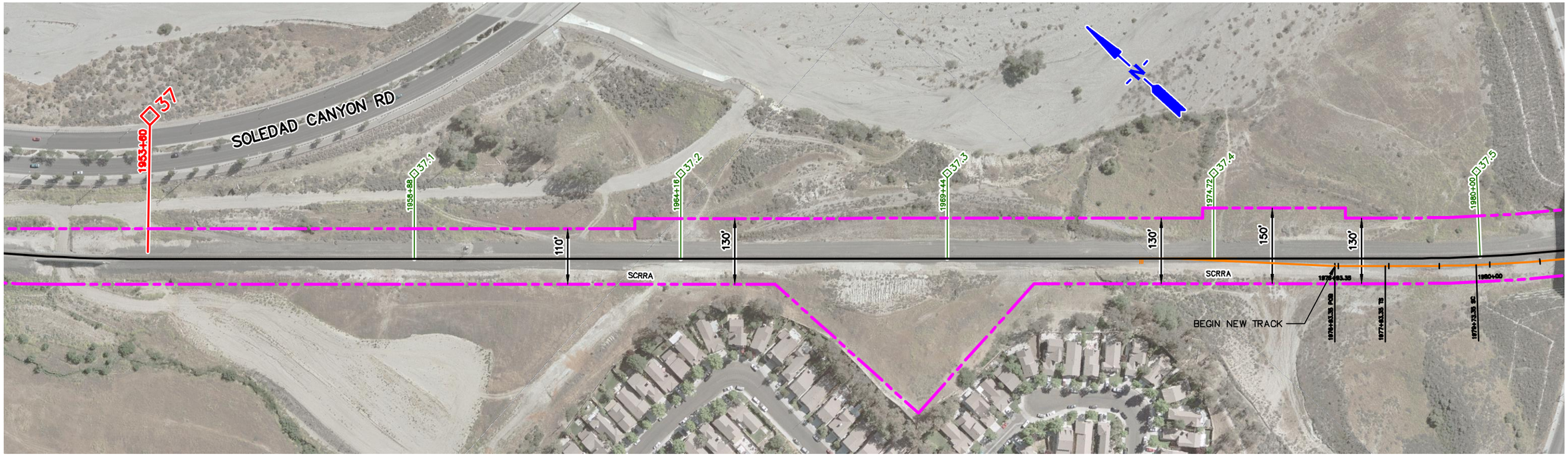
SUBMITTED: _____ PROJECT MANAGER

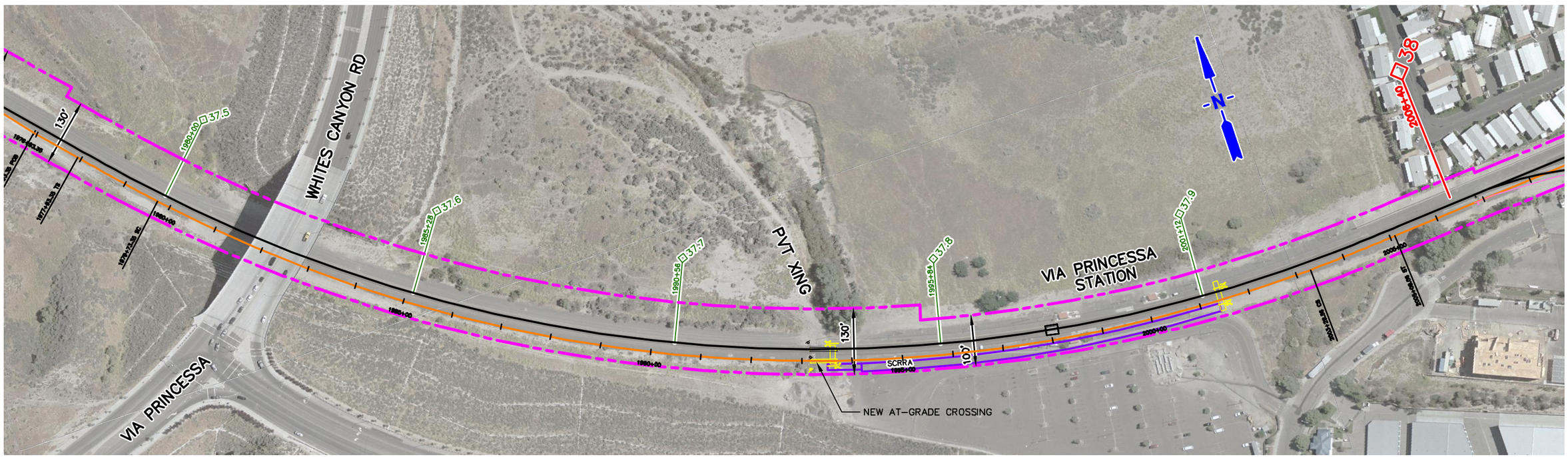
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
CANYON – STA. CLARITA
MP: 33.4 TO 35

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 2
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:19pm J:\Project\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1975 Old County Road
Belmont, CA 94002
www.reerail.com

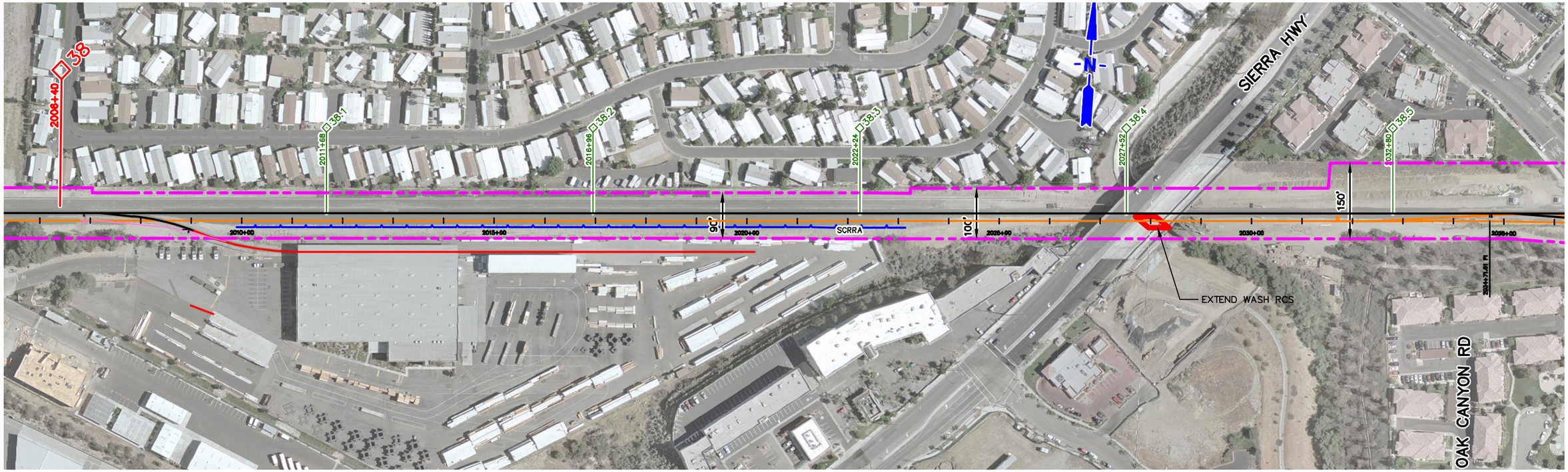
SUBMITTED: _____ PROJECT MANAGER

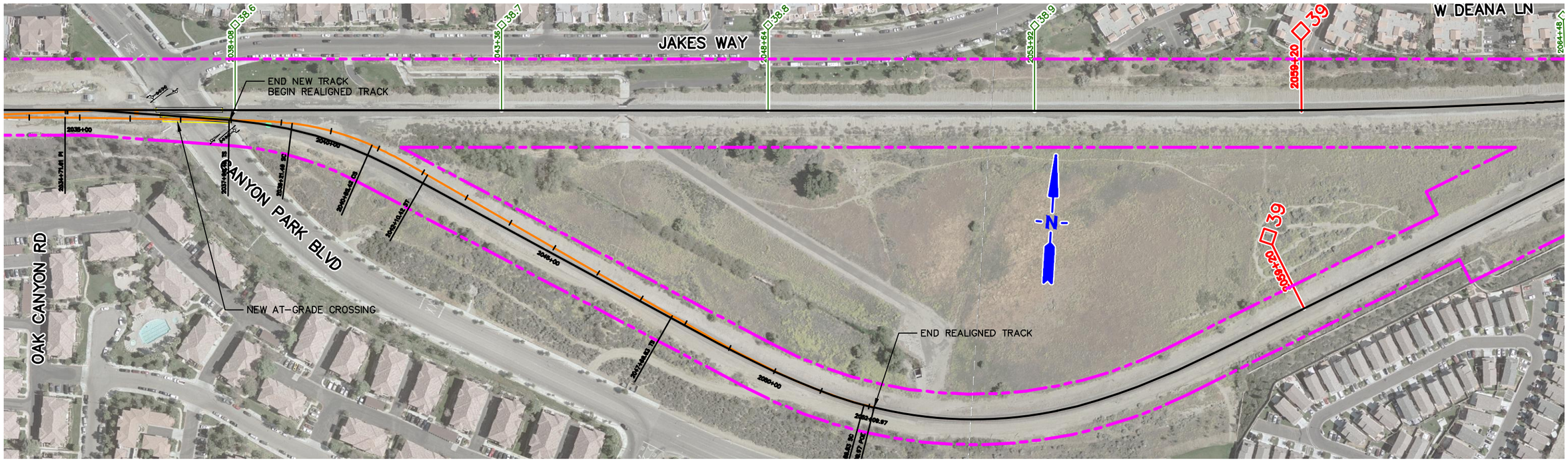
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
VIA PRINCESSA – HONBY
MP: 37.5 TO 38.6

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 2
SCALE	1"=200'

cchauk Dec 06, 2018 – 6:19pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.rserail.com

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
VIA PRINCESSA – HONBY
MP: 37.5 TO 38.6

CONTRACT NO.	PS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 2
SCALE	1"=200'

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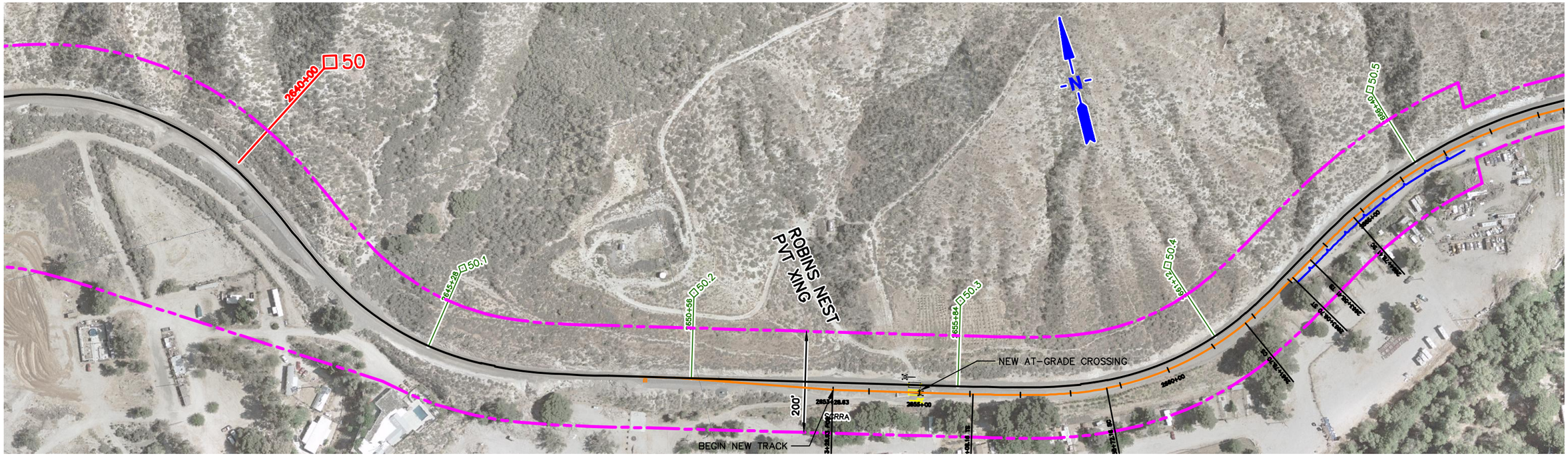

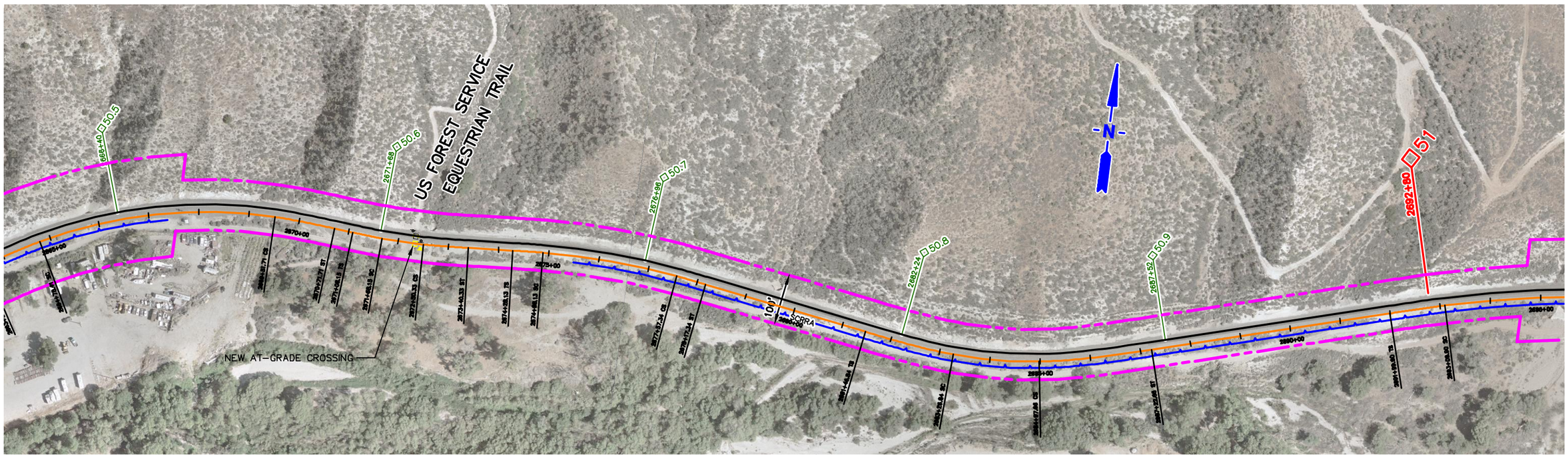

REV.	DATE	BY	SUB.	APP.

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
RAVENNA SOUTH
MP: 50.0 TO 52.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 3
SCALE	1"=200'

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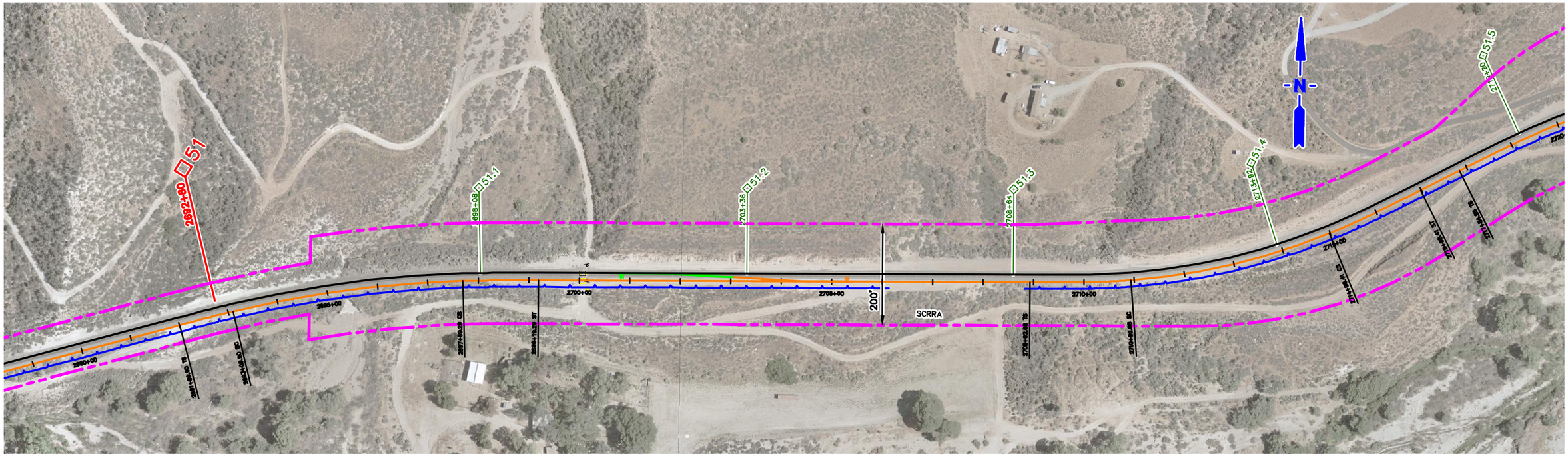

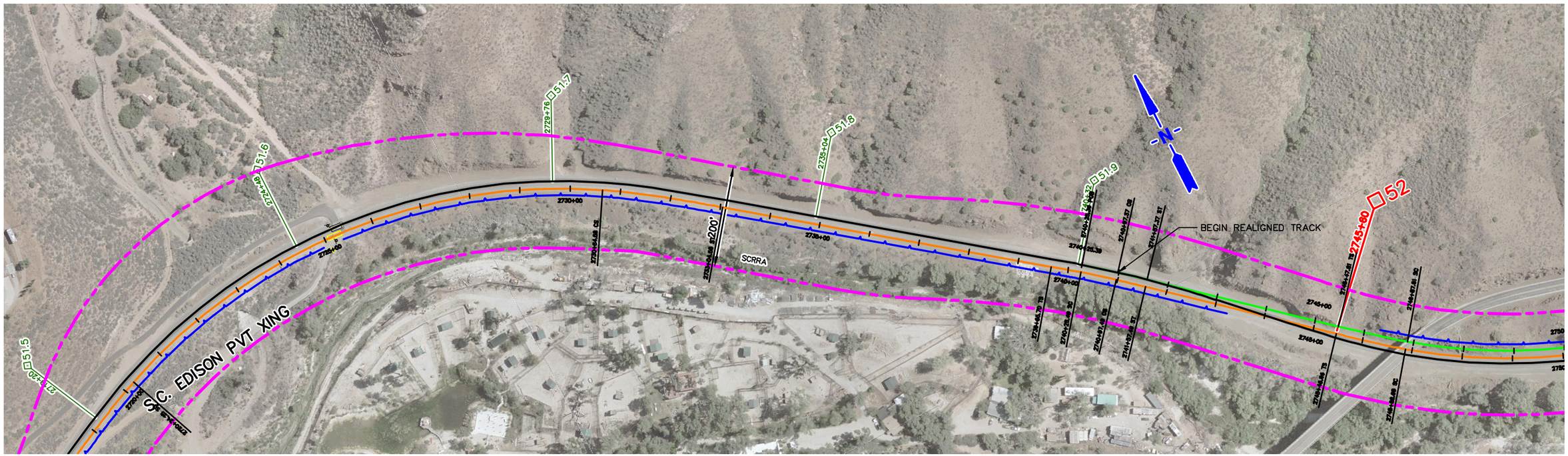

cchauk Dec 06, 2018 - 6:19pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg

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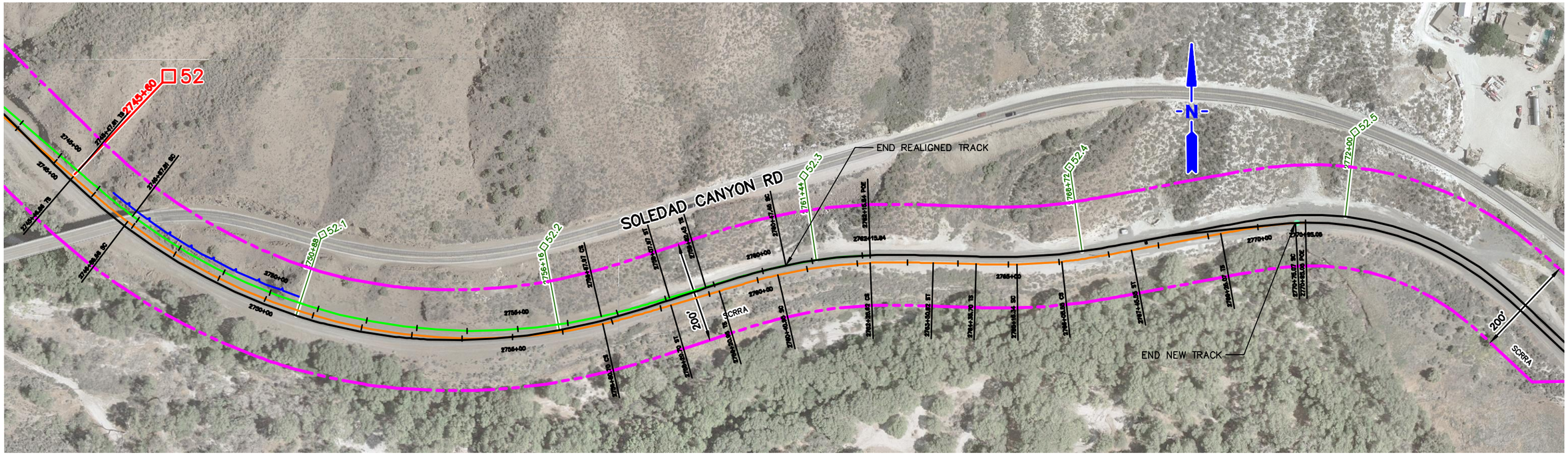
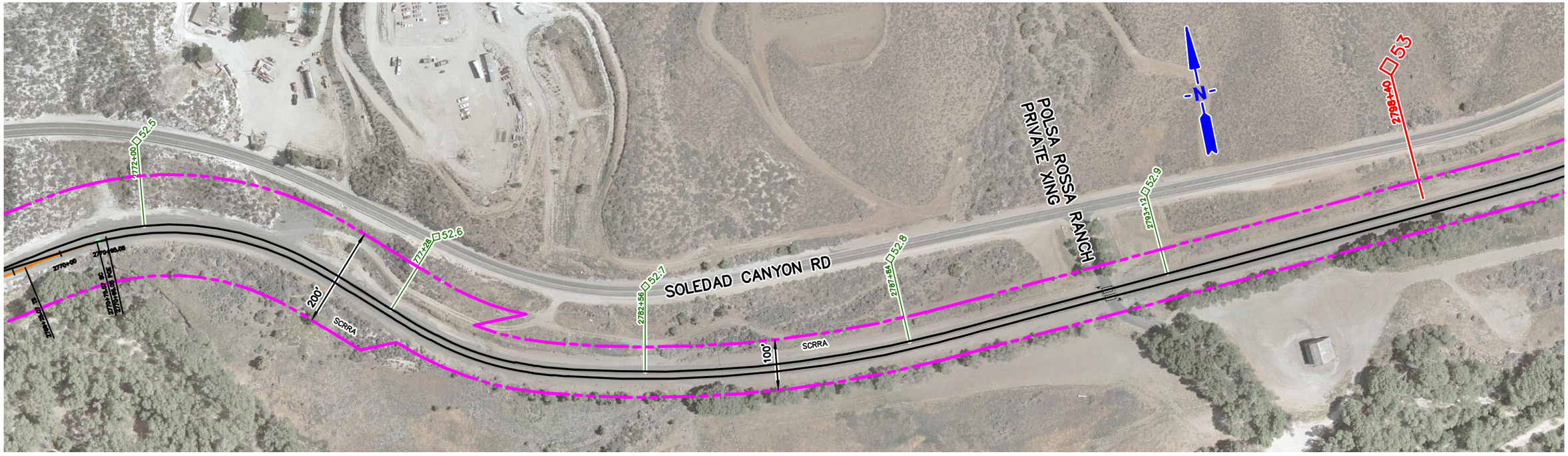
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
RAVENNA SOUTH
MP: 50.0 TO 52.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 3
SCALE	1"=200'





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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
www.RSERAIL.COM

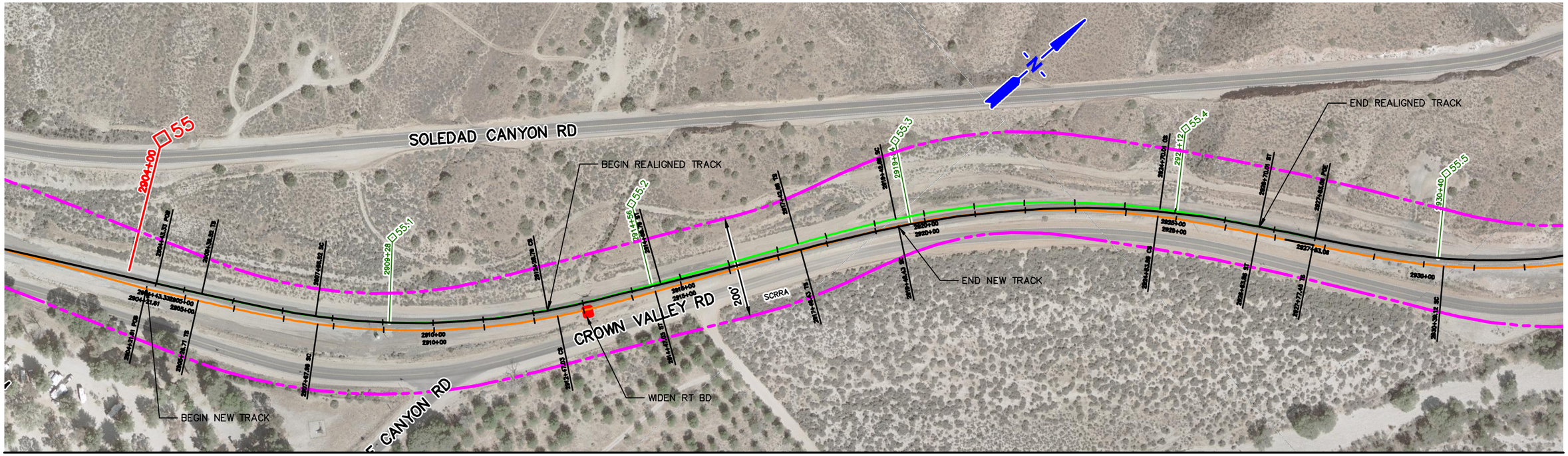
SUBMITTED: _____ PROJECT MANAGER

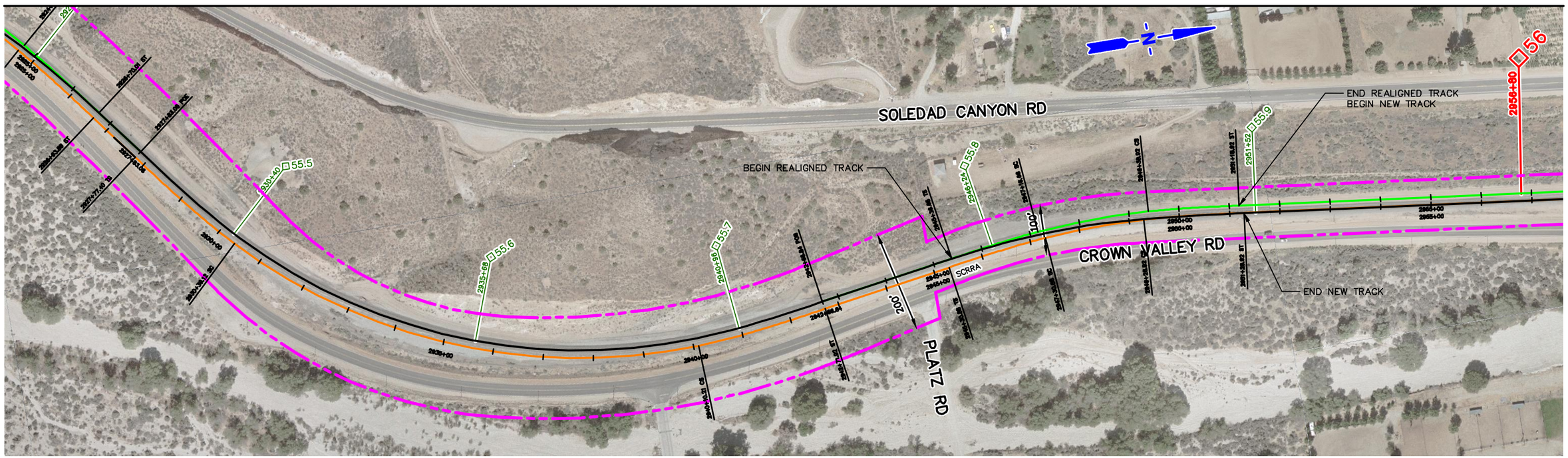
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
RAVENNA SOUTH
MP: 50.0 TO 52.5

CONTRACT NO.	PS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	3 OF 3
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:20pm J:\Project\4\WSP\80700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg





REV.	DATE		BY	SUB	APP.

DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

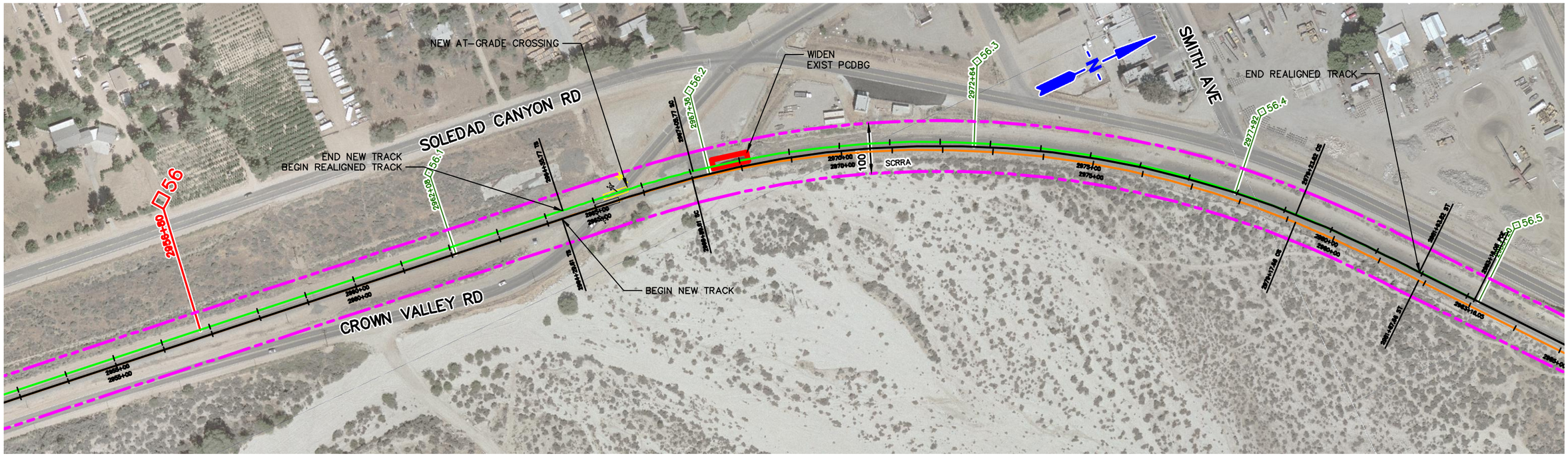
APPROVED: _____

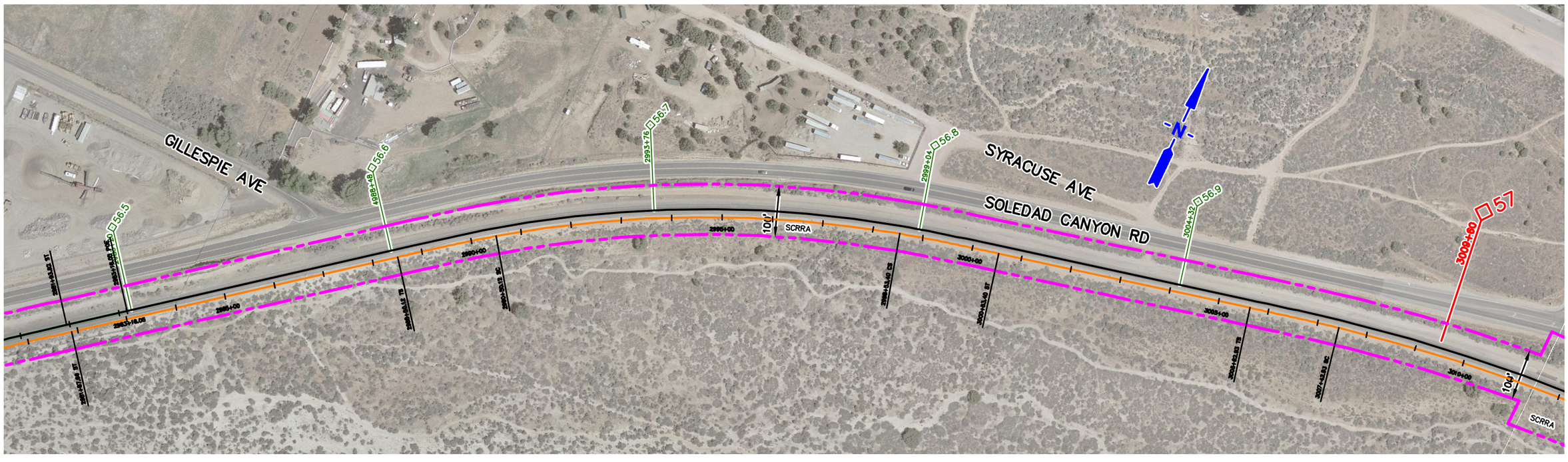
METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
ACTON SIDING
MP: 55.0 TO 57.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 3
SCALE	1"=200'

cbnguk Dec 06, 2018 - 6:20pm J:\Project14\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg





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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

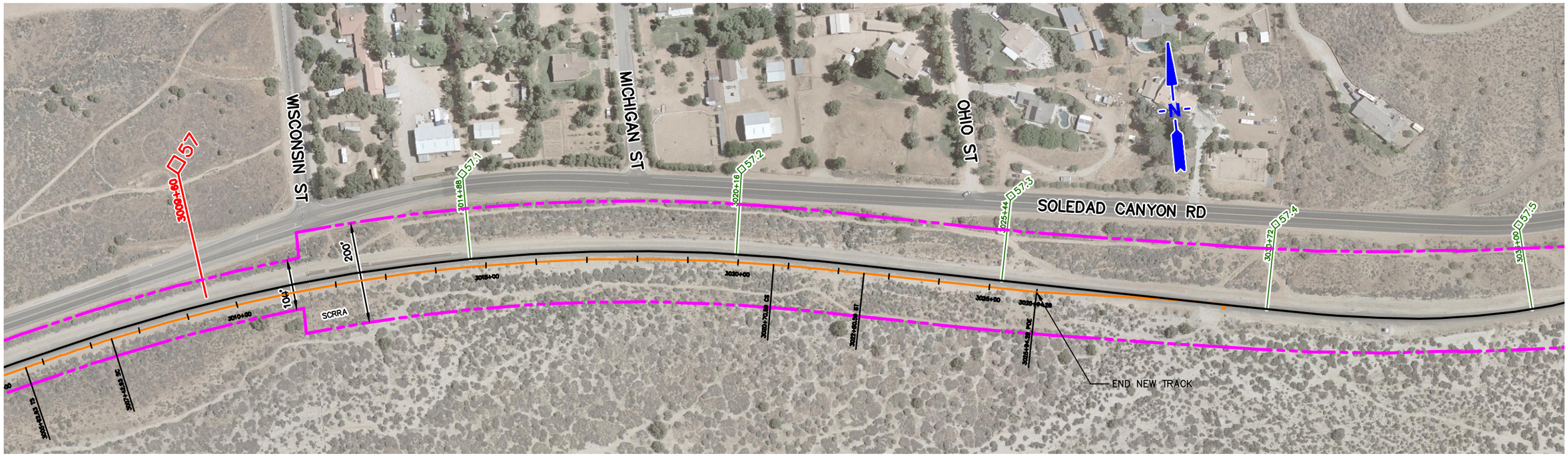
RSE, INC.
1075 Old County Road
Belmont, CA 94002
www.rserail.com

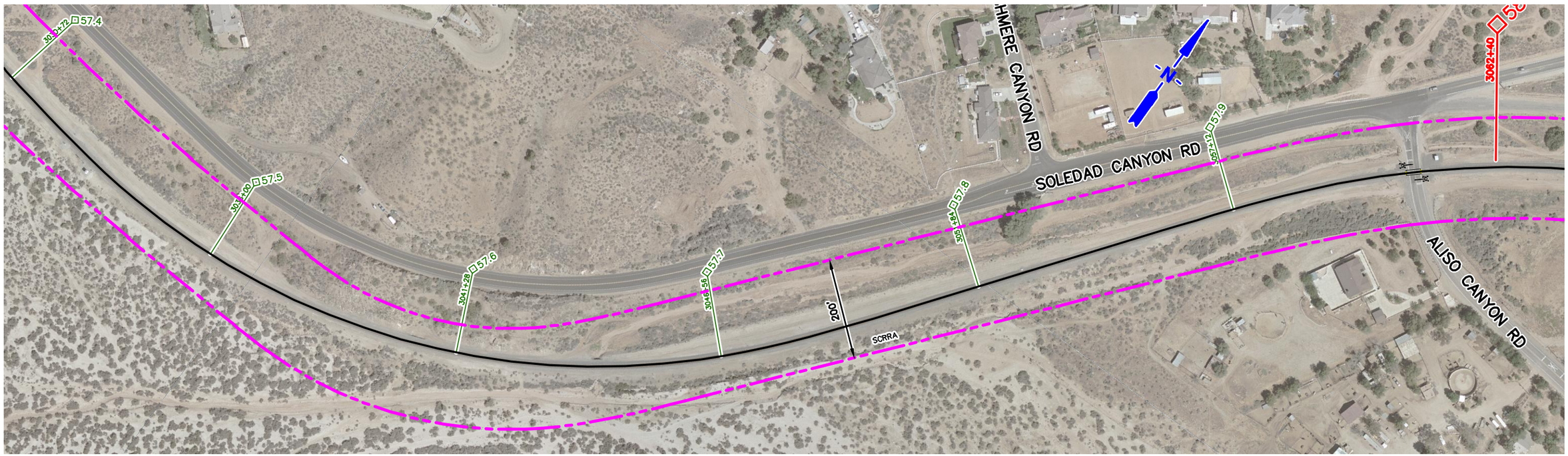
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
ACTON SIDING
MP: 55.0 TO 57.5

CONTRACT NO. PS-2415-3024-03
DRAWING NO. DWG
REVISION 0
SHEET NO. 2 OF 3
SCALE 1"=200'





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DESIGNED BY	J CHUNG
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1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
ACTON SIDING
MP: 55.0 TO 57.5

CONTRACT NO.	OS-2415-3024-03
DRAWING NO.	DWG
REVISION	0
SHEET NO.	3 OF 3
SCALE	1"=200'

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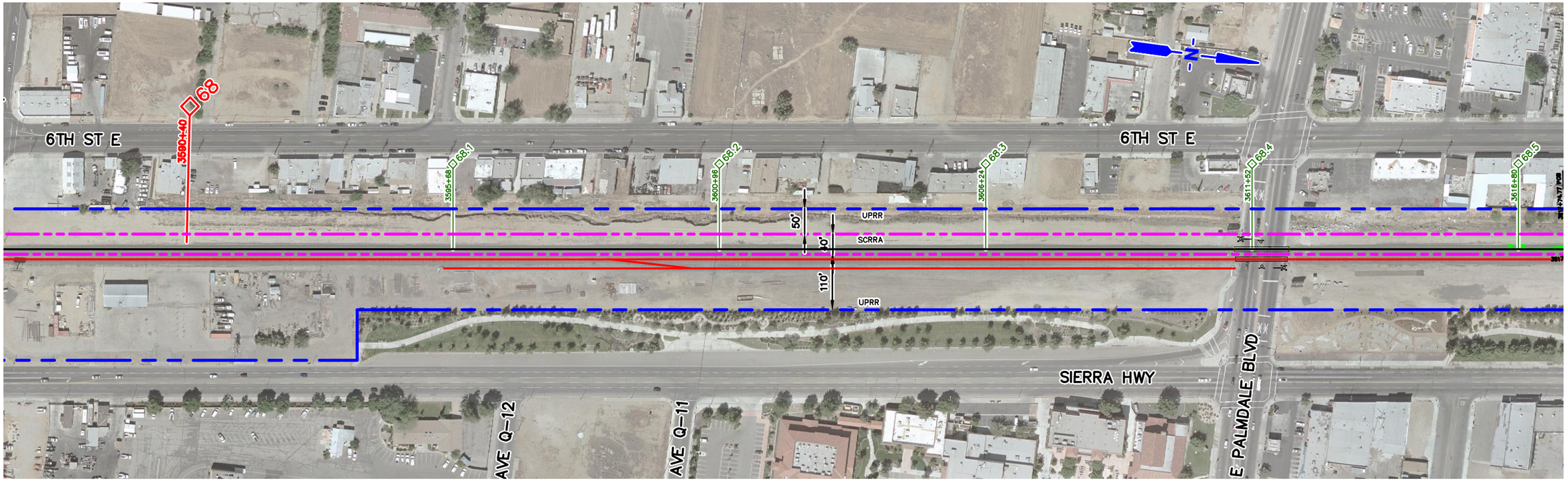

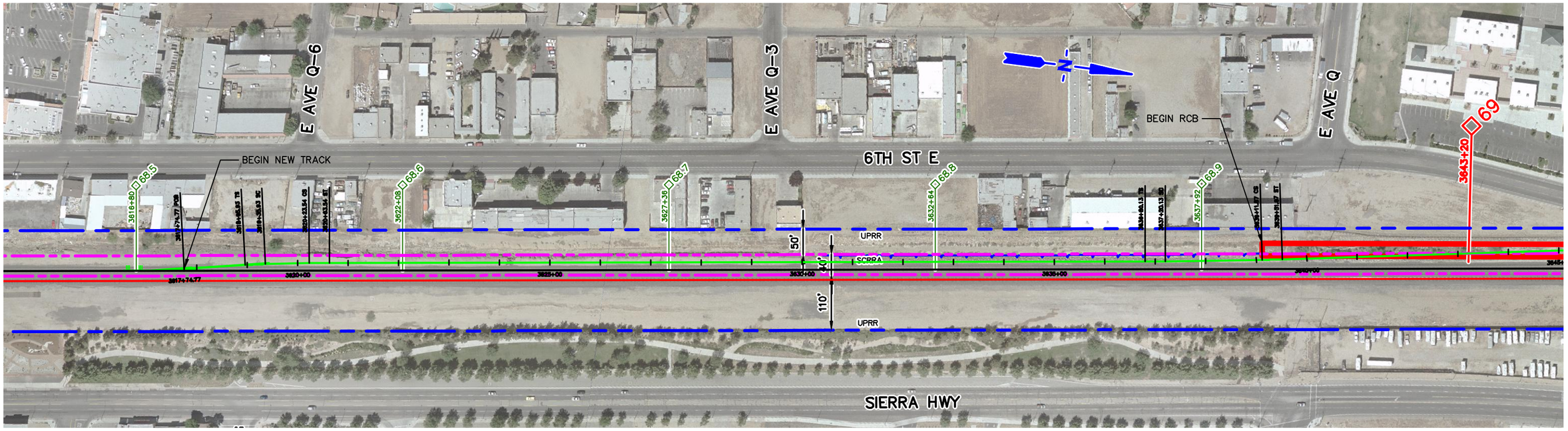

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METROLINK.

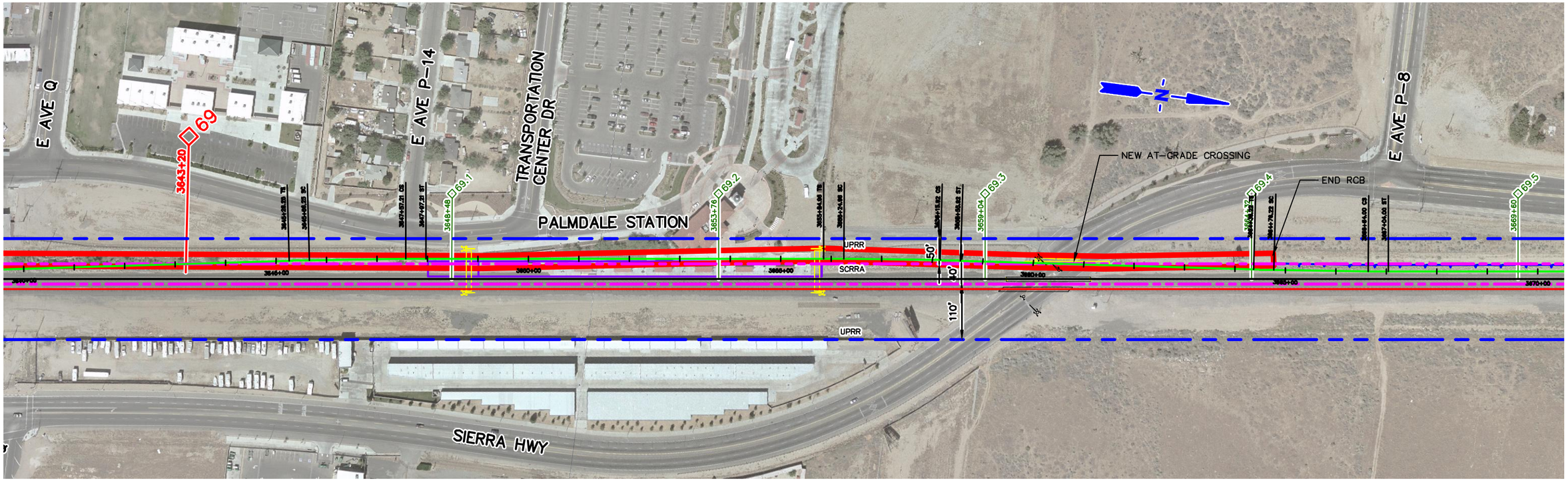
RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANETELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENT
PALMDALE NORTH
MP: 68.5 TO 72.0

CONTRACT NO.	PD-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 5
SCALE	1"=200'



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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK.

RSE, INC.
1075 OLD COUNTY ROAD
BELMONT, CA 94002
WWW.RSEREAL.COM

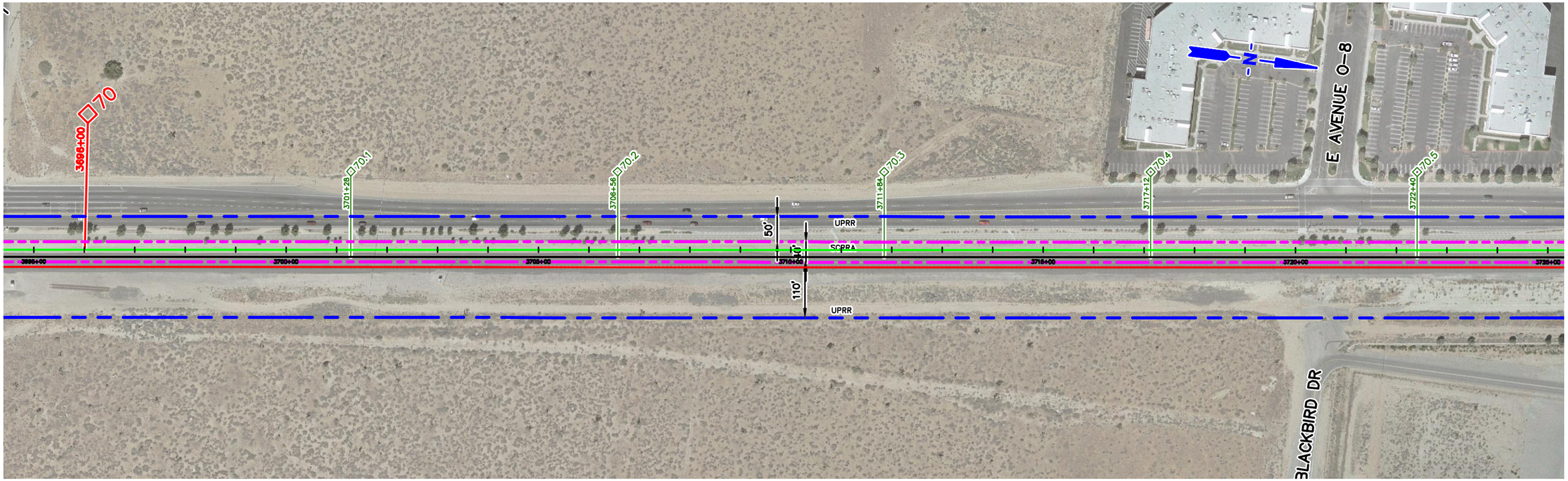
SUBMITTED: _____ PROJECT MANAGER

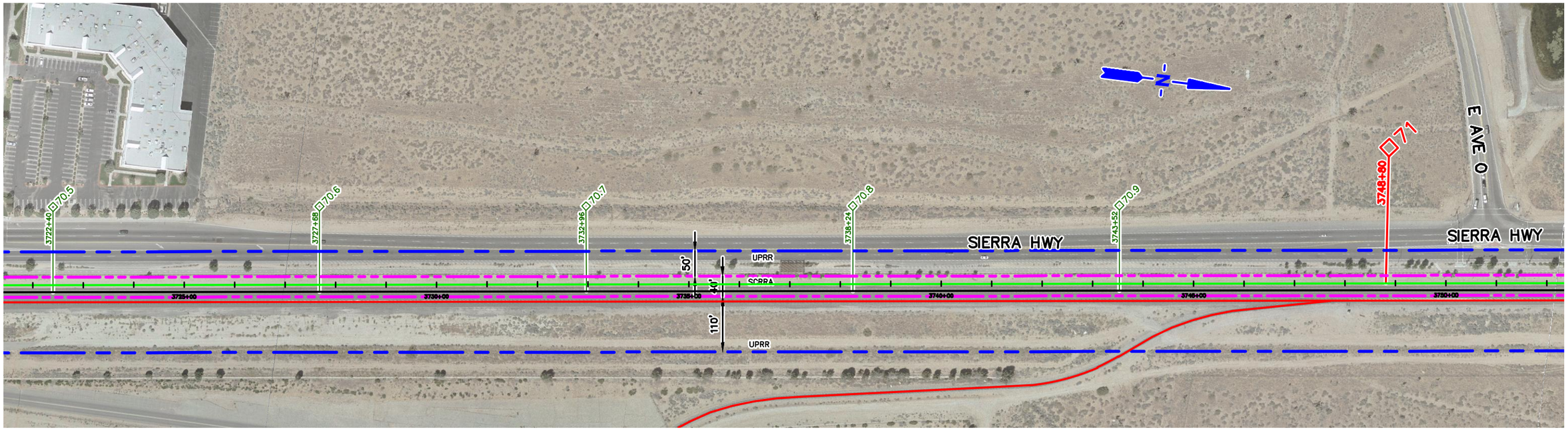
APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
PALMDALE NORTH
MP: 68.5 TO 72.0

CONTRACT NO.	PS-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	2 OF 5
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:21pm J:\Project\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





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DATE	11/30/2018

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BELMONT, CA 94002
WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
PALMDALE NORTH
MP: 68.5 TO 72.0

CONTRACT NO.	PS-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	3 OF 5
SCALE	1"=200'

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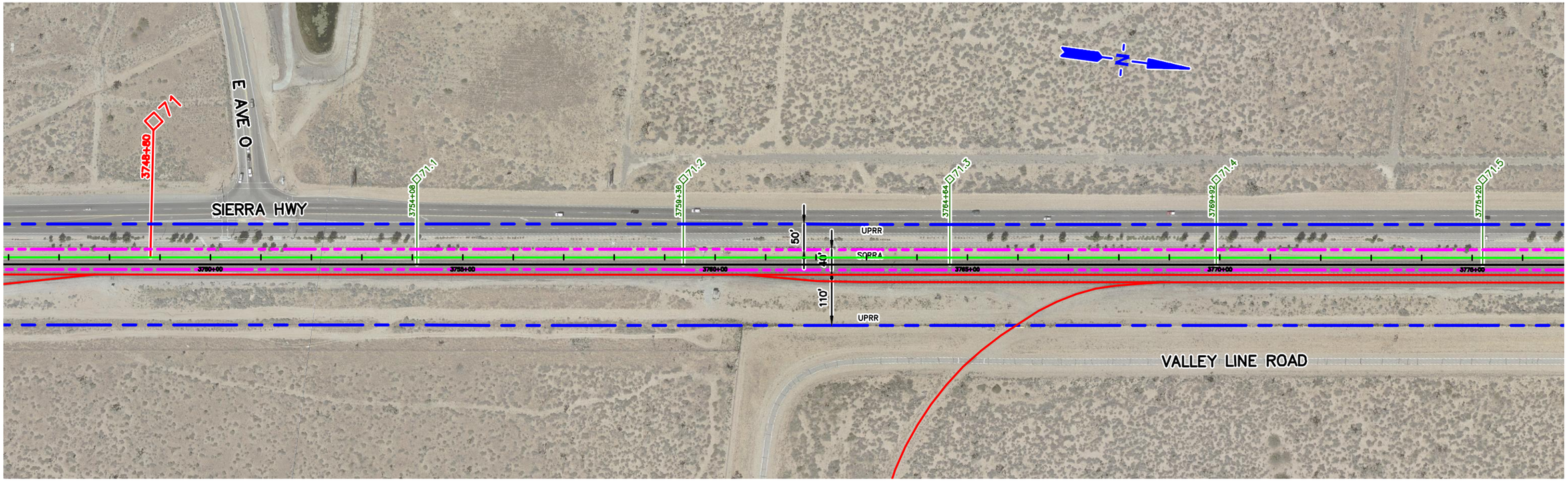

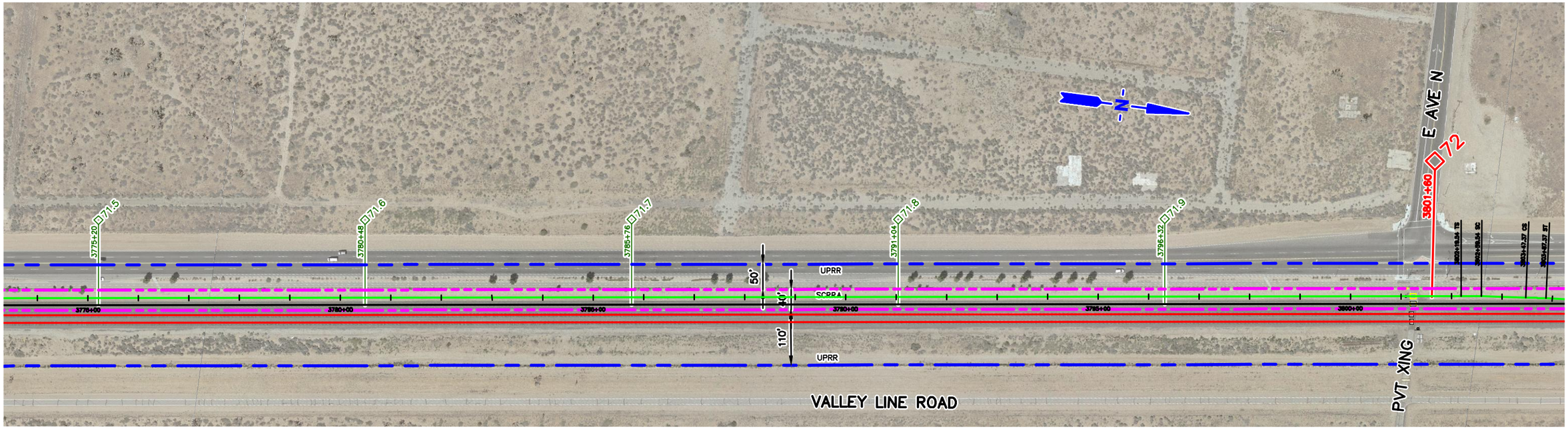

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CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

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WWW.RSERAIL.COM

SUBMITTED: _____ PROJECT MANAGER

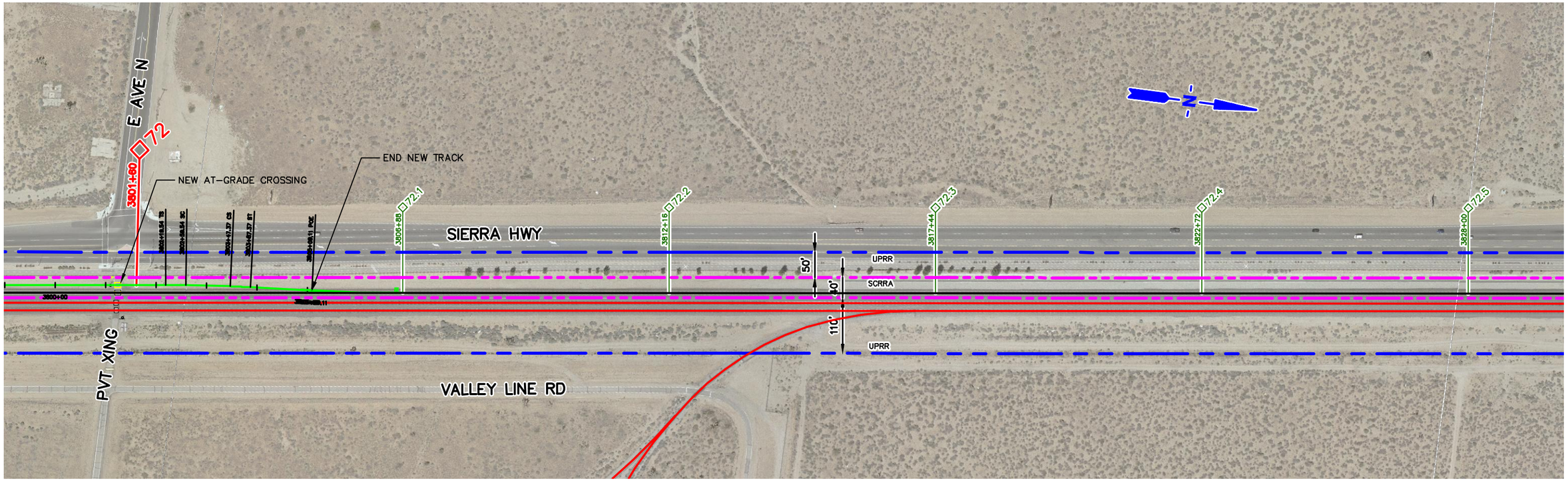
APPROVED: _____

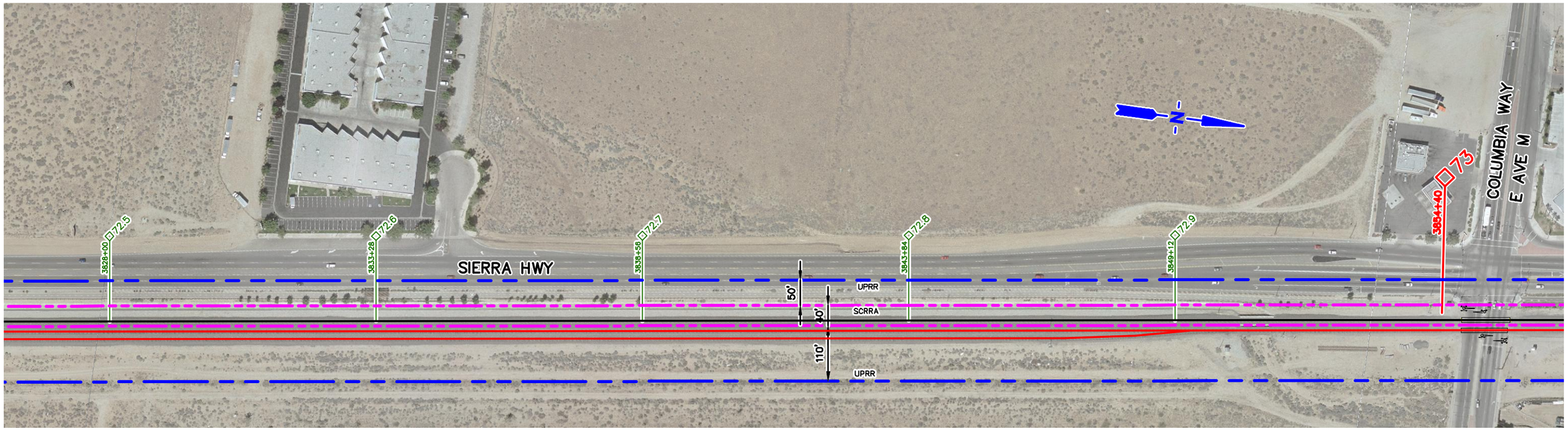
METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY

SEGMENT 4 – TRACK ALIGNMENTS
PALMDALE NORTH
MP: 68.5 TO 72.0

CONTRACT NO.	PS-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	4 OF 5
SCALE	1"=200'

cchauk Dec 06, 2018 - 6:21pm J:\Project4\WSP180700\04-CAD\Sheets\WSP_AVL_GP_ALIGNMENT.dwg





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APPROVED BY	XXX
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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
PALMDALE NORTH
MP: 68.5 TO 72.0

CONTRACT NO.	PS-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	5 OF 5
SCALE	1"=200'

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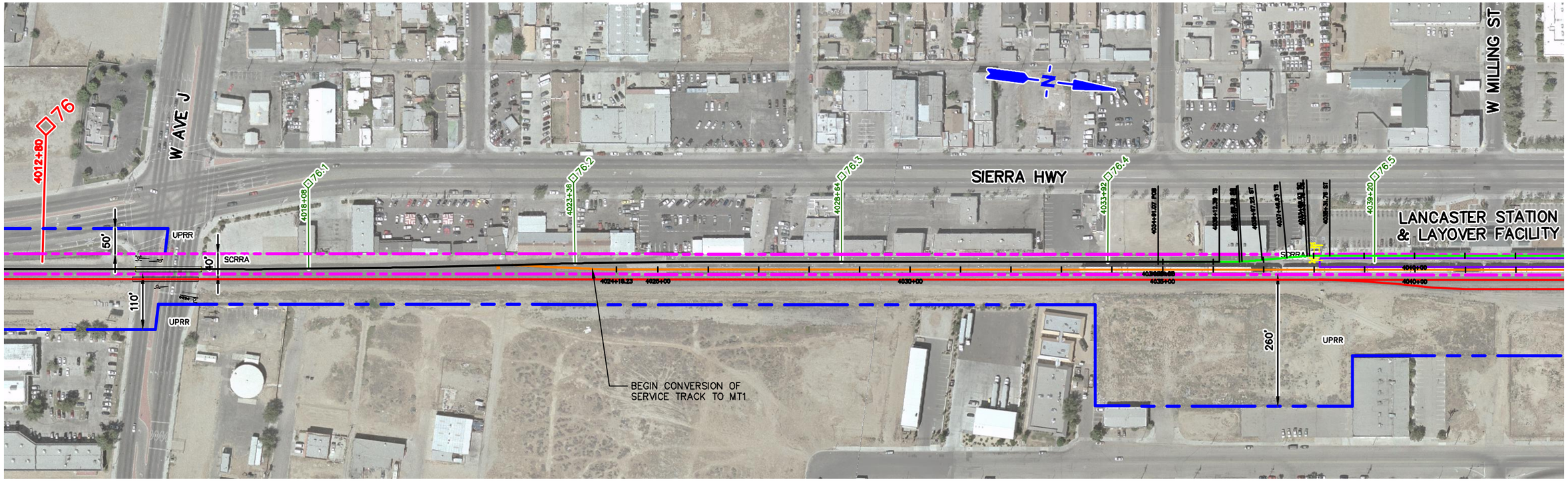

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DESIGNED BY	J CHUNG
DRAWN BY	J CHUNG
CHECKED BY	XXX
APPROVED BY	XXX
DATE	11/30/2018

METROLINK

RSE, INC.
1875 Old County Road
Belmont, CA 94002
www.reerail.com

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

METROLINK COMMUTER RAIL SYSTEM
ANTELOPE VALLEY LINE STUDY
SEGMENT 4 – TRACK ALIGNMENTS
LANCASTER SOUTH
MP: 76.2 TO 76.2

CONTRACT NO.	PS-2415-3024-0
DRAWING NO.	DWG
REVISION	0
SHEET NO.	1 OF 1
SCALE	1"=200'

cchauk Dec 06, 2018 – 6:22pm J:\Project1\WSP180700\04-CAD\Sheets\WSP_AVL_CIP_ALIGNMENT.dwg

APPENDIX 3 – ATTACHMENT 3

SIGNAL IMPROVEMENT DRAWINGS

4070 4060 4050 4040 4030 4020 4010 4000 3990

WEST

EAST

4065+60

77

4046+29 IJ

4024+18 IJ

4021+83 PS
4021+44 IJ

4015+30

℄

4012+80

76

LANCASTER STATION (OB)

CP SIERRA

U.P.R.R. MAIN TRACK

WB

EB

EC

WA

REMOVE INTERMEDIATES

E

761

150 FT

REMOVE CASE

10°

DWBS

EC

W

EA

8x8

6x8

2000'

4000'

40 MPH/10 MPH

LANCASTER STATION
VY-76.6

40 MPH/10 MPH | 79 MPH/60 MPH

"J" AVENUE
VY-76.07
DOT 750641B

0 500

SCALE IN FEET

12/21/2018 11:00:38 AM $USER$
$LEVELS$
$PENTBL$
$PLTDRVL$

NOT FOR CONSTRUCTION

REV.	DATE	BY	SUB.	APP.

INFORMATION CONFIDENTIAL:
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DESIGNED BY M. ALDERMAN
DRAWN BY A. PENA
CHECKED BY
APPROVED BY
DATE 10-29-18

SUBMITTED: _____ PROJECT MANAGER

Metro

PRE PACIFIC RAILWAY ENTERPRISES, INC.
3560 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4635/FAX 951-784-4635

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 76-77
SHEET 1 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3990 3980 3970 3960 3950 3940 3930 3920 3910

WEST

EAST

3962+13 AHEAD
3961+09 IJ
3960+00
℄
75

CP BONITA

U.P.R.R. MAIN TRACK

EC EC

W E

GB

4000'

4000'

'K' AVENUE
VY-75.04
DOT 750608B

0 500
SCALE IN FEET

12/21/2018 11:00:39 AM $USER$
$FILL$
$PENTBL$
$PLTDRVL$

NOT FOR CONSTRUCTION

REV.	DATE		BY SUB.	APP.

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DESIGNED BY M. ALDERMAN
DRAWN BY A. PENA
CHECKED BY
APPROVED BY
DATE 10-29-18

Metro

PRE PACIFIC RAILWAY ENTERPRISES, INC.
3580 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 74-75
SHEET 2 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3910 3900 3890 3880 3870 3860 3850 3840 3830

WEST

EAST

3907+20

74

3879+00 SIG

3855+28 3854+40 3854+14 IJ

℄ 73

* GATES CONTROLLED BY U.P.R.R.

REMOVE INTERMEDIATES

U.P.R.R. MAIN TRACK

EC 731 EC EC EC

EC 733 732 EC

734

721 722

REMOVE INTERMEDIATES

PTC

GRS

4000'

AVENUE L
VY-74.05
DOT 921715P

79 MPH | 60 MPH

COLUMBIA WAY
(FORMERLY 'M' AVENUE)
VY-73.02
DOT 750642H

0 500
SCALE IN FEET

12/21/2018 11:00:40 AM
$FILE$
$PENTBL$
$PLTDRVL$
$USER$

NOT FOR CONSTRUCTION

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DESIGNED BY	M. ALDERMAN
DRAWN BY	A. PENA
CHECKED BY	
APPROVED BY	
DATE	10-29-18

Metro

PRE PACIFIC RAILWAY ENTERPRISES, INC.
3560 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 73-74
SHEET 3 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

3830 3820 3810 3800 3790 3780 3770 3760 3750

WEST

EAST

3801+60
3801+24
3799+95 SIG
3799+45 PS
3797+75 PS
3797+25 SIG
3759+77 IJ

72 ℄

CP RUNWAY

2W
2E
EC EC
EC EC
4E
4W
PTC

REMOVE INTERMEDIATES

EC EC
711 712
6S
W

4000'

AVENUE N
VY-72.00
DOT 750607U

79 MPH | 60 MPH

0 500
SCALE IN FEET

12/21/2018 11:00:41 AM $USER$
$FILL$
$PENTBL$
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DESIGNED BY M. ALDERMAN
DRAWN BY A. PENA
CHECKED BY
APPROVED BY
DATE 10-29-18

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 72-73
SHEET 4 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3750 3740 3730 3720 3710 3700 3690 3680 3670

WEST

EAST

3748+80

71

3696+00

70

3693+60

3692+50 SIG

℄

U.P.R.R. MAIN TRACK

EC 691 EC

693 692

EC EC

694

PTC

19C*14 U.G.

4000'

4000'

RANCHO VISTA BLVD
(FORMERLY 'P' AVENUE)
VY-69.93
DOT 750643P

0 500
SCALE IN FEET

12/21/2018 11:00:42 AM $USER$
$FILL2$
$PENTBL$
$PLTDRVL$

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DRAWN BY A. PENA
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3560 University Avenue, Suite F
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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 70-71
SHEET 5 OF 35

CONTRACT NO.
DRAWING NO.
REVISION SHEET NO.
SCALE 1"=500'

3670 3660 3650 3640 3630 3620 3610 3600 3590

WEST

EAST

3661+51 IJ
3660+30
3659+09 IJ
℄

3643+20
69

3618+70 SIG
3616+80 PS
3616+30 SIG
3611+71
℄

3590+40
68

PALMDALE STATION

CP PALMDALE

* GATES CONTROLLED BY U.P.R.R.

REMOVE INTERMEDIATES

EC EC

691 692

REMOVE INTERMEDIATES

EC EA EC

EC

W EC

PTC

4000'

4000'

4000'

4000'

SIERRA HWY.
VY-69.33
DOT 750604Y

PALMDALE STATION
VY-69.2

79 MPH | 60 MPH

PALMDALE BLVD.
VY-68.42
DOT 750603S

0 500
SCALE IN FEET

12/21/2018 11:00:43 AM $USER$
$FILE$
$PENTBL$
$PLTDRVL$

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 68-69
SHEET 6 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3590 3580 3570 3560 3550 3540 3530 3520 3510

WEST EAST

3586+34 ℄

3569+02 IJ

3565+67 PS

3565+36 IJ

3537+60

67

3532+71 ℄

CP HAROLD

TO UPPR

19C*14 U.G.

EB

BEGIN U.P.R.R. MAIN TRACK

DWBS DWBS

W

*20

EC EC

EA

7C*14 U.G.

BXB

BXB BXB

7C*14 U.G., 3C*6 U.G. 19C*14 U.G., 7C*14 U.G. 7C*14 U.G.

6-9

4000′ 4000′ 4000′ 4000′

'R' AVENUE
VY-67.93
DOT 750602K

AVE. 'S'
VY-66.92
DOT 750601D

79 MPH/60 MPH 55 MPH/50 MPH

0 500
SCALE IN FEET

12/21/2018 11:00:44 AM $USER$
$FILES$
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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 66-67
SHEET 7 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3510 3500 3490 3480 3470 3460 3450 3440 3430

WEST

EAST

3484+80
66

3472+16 IJ
3471+39
℄

3461+34
℄

3444+61
℄

3432+00
65

EC

EC

651 652

6-9

BXB

BXB

12C#14 U.G.

4000'

4000'

4000'

BARREL SPRINGS RD.
VY-65.72
DOT 750644W

SIERRA HWY.
VY-65.58
DOT 750600W

CAL AQ BIKE TRAIL
VY-65.26
DOT 750599E

55 MPH/50 MPH | 79 MPH/50 MPH

0 500
SCALE IN FEET

12/21/2018 11:00:45 AM $USER$
$FILL$
$PENTBL$
$PLTDRVL$

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 65-66
SHEET 8 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3430 3420 3410 3400 3390 3380 3370 3360 3350

WEST

EAST

3379+20

64

3366+71

EC EC

631 632

4000'

79 MPH/50 MPH 49 MPH/35 MPH

PEARLBLOSSOM HWY
VY-64.35
DOT 750645D

0 500

SCALE IN FEET

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$FILL$
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APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 63-64
SHEET 9 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3350 3340 3330 3320 3310 3300 3290 3280 3270

WEST

EAST

3326+40

63

3282+32 IJ
3281+99 PS

3278+00 IJ

3273+60

62

CP CREST

12C*14 U.G.

WB EC

EC *20 WA EC

E

ANGELS FOREST HWY
VY-62,36
DOT 750598X

0 500

SCALE IN FEET

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$PENTBL$
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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 62-63
SHEET 10 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

3270 3260 3250 3240 3230 3220 3210 3200 3190

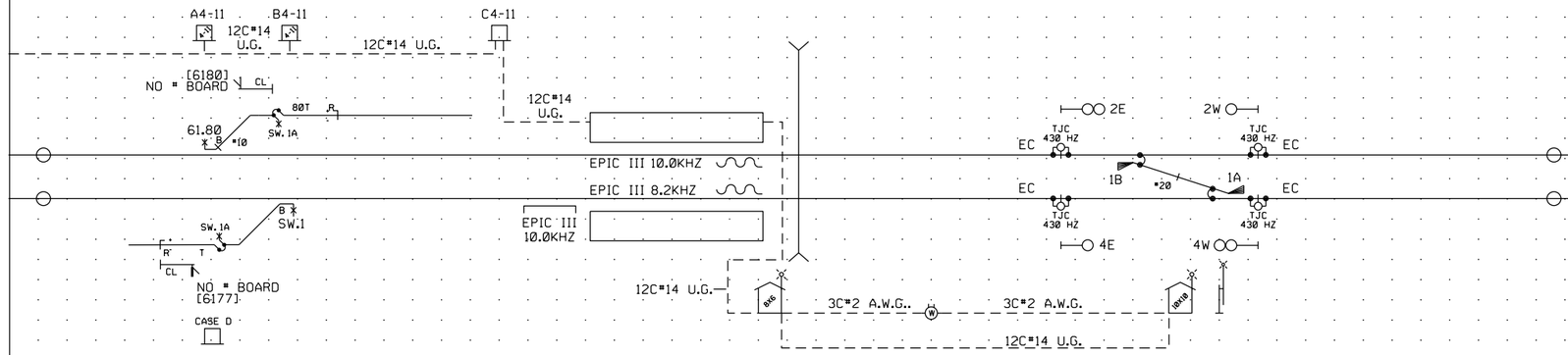
WEST EAST

3268+82
3263+22 HB
3260+87 SIG
3260+14 HB
3249+84 STN
3243+84 STN
3243+60 HSE
3242+60 CL
3238+00 PWR
3233+50 IJ
3231+52 PS
3229+34 HSE
3227+15 PS
3226+65 IJ
3220+80
3216+38

61

VINCENT GRADE/ ACTON STATION

C.P. QUARTZ



2567' 2567'

VINCENT GRADE/ACTON STATION (OB)
VY-61.4
VY STATION PED XING.
VY-61.40
DOT 932896C

49 MPH/35 MPH | 75 MPH/45 MPH

0 500
SCALE IN FEET

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TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER
APPROVED: _____

ANTELOPE VALLEY LINE STUDY
SCALED LAYOUTS
VY 60-61
SHEET 11 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

12/21/2018 11:00:48 AM $USER$
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$PLTDRVL$

3190 3180 3170 3160 3150 3140 3130 3120 3110

WEST

EAST

3168+66 IJ
3168+00

3164+83 PS
3164+33 IJ

3163+25 PWR

3115+20

60

59

C.P. SANTIAGO

EC
EC
W
EC
EC
EA
20

75 MPH/45 MPH | 54 MPH/45 MPH

0 500

SCALE IN FEET

12/21/2018 11:00:49 AM $USER$
$FILEL$
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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 59-60
SHEET 12 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3110 3100 3090 3080 3070 3060 3050 3040 3030

WEST

EAST

3088+50 SIG

3062+40

3060+76

58 ℄

3032+93 IJ

REMOVE INTERMEDIATES

581 582

571 572

EC EC

EC EC

AFTAC
430 HZ

REMOVE INTERMEDIATES

PTC

2720'

2720'

ALISO CANYON RD.
VY-57.99
DOT 750597R

0 500
SCALE IN FEET

54 MPH/45 MPH 59 MPH/45

12/21/2018 11:00:50 AM $USER$
$FILL$
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TEL 951-784-4535/FAX 951-784-4535

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 57-58
SHEET 13 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

3030 3020 3010 3000 2990 2980 2970 2960 2950

WEST

EAST

3025+96 SIG
3025+46 PS

3023+11 SIG

3009+60

57

2965+24 ℄

2956+80

56

CP OHIO

PTC

WC

EC

EC

EC

E

WA

7C#9 U.G.

4-11

AFTAC
430 HZ

3940'

ALISO CANYON RD.
VY-57.99
DOT 750597R

CROWN VALLEY RD.
VY-56.18
DOT 750596J

0 500
SCALE IN FEET

59 MPH/45 MPH | 47 MPH/35 MP

$USER$
11:00:51 AM
12/21/2018
$FILE$
$SPENTBLL$
$PLTDRVL$

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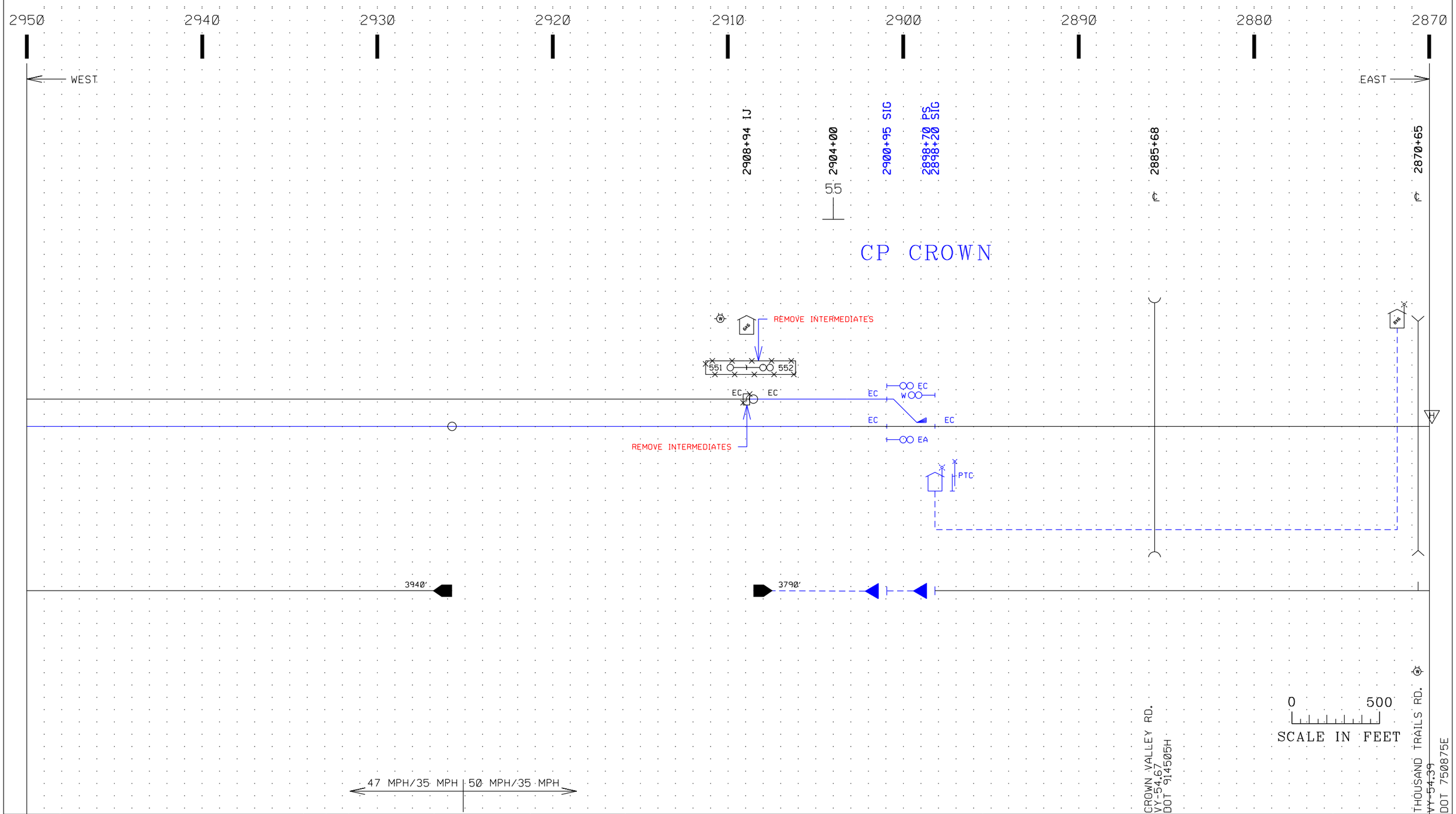
ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 56-57
SHEET 14 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'



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SUBMITTED: _____ PROJECT MANAGER

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ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 54-55
SHEET 15 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

2870 2860 2850 2840 2830 2820 2810 2800 2790

WEST

EAST

2851+20 2850+50 IJ

2844+77 PS

2841+25 IJ

2825+12 2824+83 HB

2798+40

2791+89

54

53

℄

℄

CP KOCIAN

7C#14 U.G.

WB

EC

EC

#14

EC

WA

TJC

E

53.52

#10

3790'

3790'

50 MPH/35 MPH | 39 MPH/25 MPH EWD ONLY

50 MPH/35 MPH | 39 MPH/25 MPH WWD ONLY

BOOTLEGGER CYN RD.
VY-53.52
DOT 750874X

POLSA ROSSA RANCH
PVT XING
VY-52.89
DOT 750873R

0 500

SCALE IN FEET

12/21/2018 11:00:53 AM $USER$
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APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 53-54
SHEET 16 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

2790 2780 2770 2760 2750 2740 2730 2720 2710

WEST

EAST

2771+03 IJ

2767+99 PS

2767+06 IJ

2765+00 SIG

2745+60

52

2725+34

℄

CP RAVENNA

REMOVE TURNOUT AND SIGNALS

EB

EA

EC

EC

EC

EC

EC

531

533

532

534

#14

REMOVE TURNOUT AND SIGNALS

40 MPH/30 MPH | 45 MPH/30 MPH

SOLEDAD CYN ROAD
VY-52.04
DOT 750871C

30 MPH/25 MPH | 35 MPH/30 MPH

40 MPH/25 MPH | 30 MPH/25 MPH

35 MPH/30 MPH | 40 MPH/30 MPH

SC EDISON PVT XING
VY-51.63
DOT 750870V

0 500

SCALE IN FEET

12/21/2018 11:00:54 AM $USER$
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APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 51-52
SHEET 17 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

2710 2700 2690 2680 2670 2660 2650 2640 2630

WEST

EAST

2706+23 SIG
2705+73 PS

2701+33 PS
2700+83 SIG
2700+10 ℄

2692+80
51

2672+38 ℄

2667+78 IJ

2654+98 ℄

2641+90 SIG

2640+00 SIG
2639+50
50

CP WASH

CP ANTELOPE

PTC

EC 4E 4W EC
EC EC
2E 2E

REMOVE INTERMEDIATES

501 502
EC EC
TJC

REMOVE INTERMEDIATES

*HBD & DED

4-11

EC
EC W EC
EA

* NOTE:
GRADE CROSSING HAS NOT BEEN BUILT, ACCESS IS BLOCKED.

1750'

1750'

YOUNG CYN PVT XING
VY-51.16
DOT 750876L

45 MPH/30 MPH | 35 MPH/30 MPH

US FOREST SERVICE XING
VY-50.63
DOT 916113N

35 MPH/30 MPH | 29 MPH/25 MPH

ROBINS NEST PVT XING
VY-50.30
DOT 912012N

0 500
SCALE IN FEET

12/21/2018 11:00:55 AM $USER$
$FILL$
$PENTBL$
$PLTDRVL$

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DESIGNED BY M. ALDERMAN
DRAWN BY A. PENA
CHECKED BY
APPROVED BY
DATE 10-29-18

Metro

PRE PACIFIC RAILWAY ENTERPRISES, INC.
3500 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 50-51
SHEET 18 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

2630 2620 2610 2600 2590 2580 2570 2560 2550

WEST

EAST

2587+20

49

2569+91

2559+76 IJ

481 482

EC EC

BURKE RD. PVT XING
VY-48.70
DOT 750878A

0 500

SCALE IN FEET

29 MPH/25 MPH

12/21/2018 11:00:56 AM $USER$
$FILL$
$PENTBL$
$PLTDRVL$

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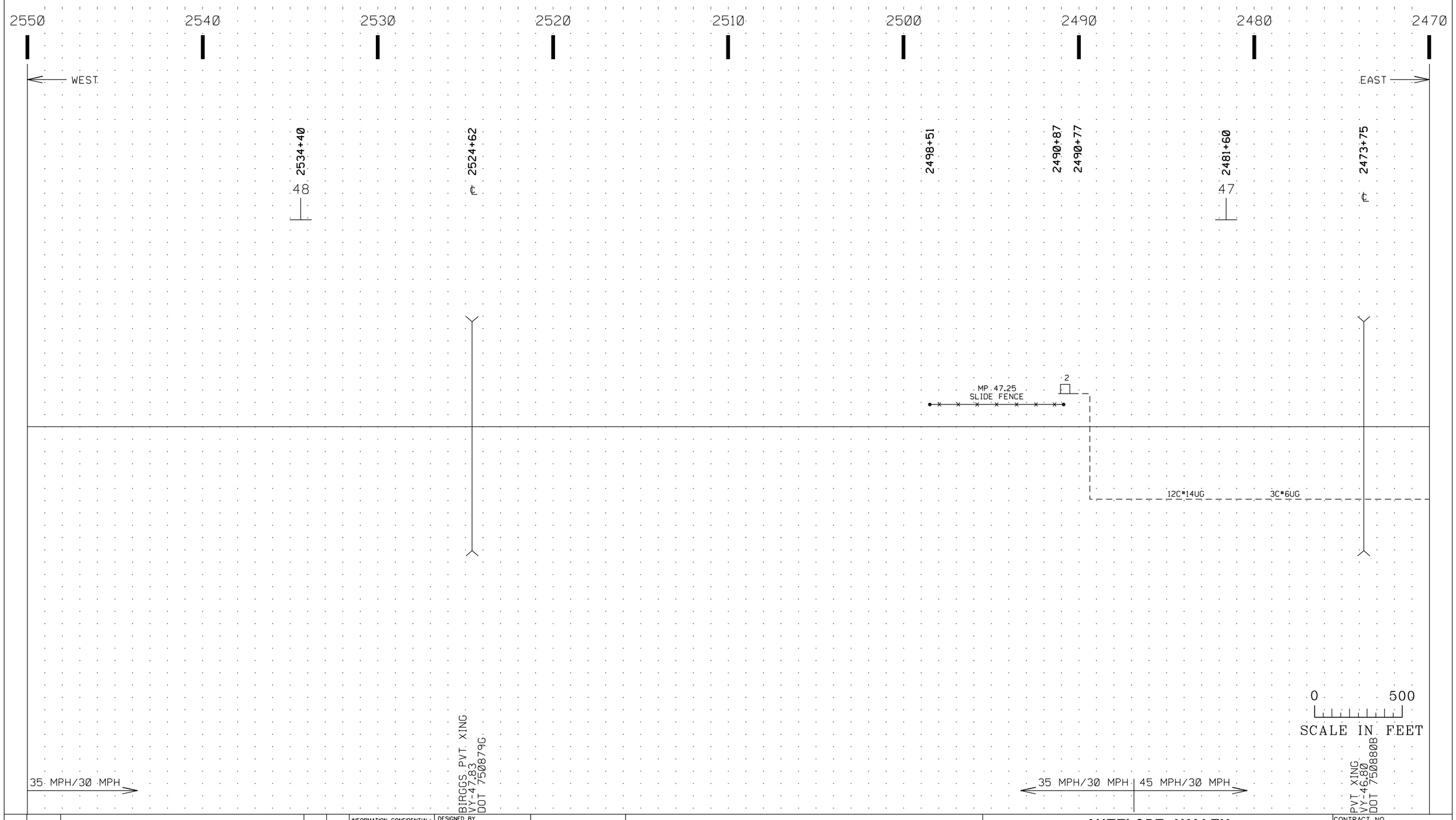
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 48-49
SHEET 19 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'



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DRAWN BY	A. PENA
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SUBMITTED: _____ PROJECT MANAGER

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ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 47-48
SHEET 20 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

2470 2460 2450 2440 2430 2420 2410 2400 2390

WEST

EAST

2466+75 IJ

2428+80

46

2411+83

℄

EC EC

461 462

SOLEDAD CYN RD.
VY-46.55
DOT 750881H

45 MPH/30 MPH | 34 MPH/30 MPH

RASMUSSEN
PVT XING
VY-45.69
DOT 750882P

0 500

SCALE IN FEET

12/21/2018 11:00:58 AM $USER$
$FILE2$
$PENTBL$
$PLTDRVL$

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DRAWN BY	A. PENA
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3560 University Avenue, Suite F
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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 45-46
SHEET 21 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

2390 2380 2370 2360 2350 2340 2330 2320 2310

WEST EAST

2383+16 ℄

2376+00
45

2336+58 IJ
2336+28 PS

2332+43 IJ

2323+20
44

2320+03 HB

CP SOLEDAD

1532'

7C#14 U.G.

43.96 #10

WB EC

EC #14 EC

WA E

10.0HZ

10.0HZ R

4-11

2033'

CAPRA RD.
VY-45.15
DOT 750883W

HIGH WATER DETECTOR
VY-44.94

34 MPH/30 MPH | 39 MPH/30 MPH

0 500
SCALE IN FEET

12/21/2018 11:00:59 AM $USER$
$FILE$
$PENTBL$
$PLTDRVL$

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 44-45
SHEET 22 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

2310 2300 2290 2280 2270 2260 2250 2240 2230

WEST

EAST

2303+13 ℄

2284+66 IJ

2270+40

43

1532'

431 432

TJC

433 434

946

946

3C*6U.G.

2033'

LANG STATION RD.
VY-43.63
DOT 750886S

39 MPH/30 MPH | 55 MPH/45 MPH

0 500

SCALE IN FEET

$USER$
11:01:00 AM
12/21/2018
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$PLTDRVL$

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APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 43-44
SHEET 23 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

2230 2220 2210 2200 2190 2180 2170 2160 2150

WEST

EAST

2217+60
42

2201+86 IJ
2198+70 PS
2197+97 IJ

2193+69
℄

2164+80
41

2154+24

CP LANG

W
EC
EC
*20
EA

18HP8

A STREET PVT XING
VY-41.56
DOT 750885K

OAK SPRG. CYN RD PVT
VY-41.26
DOT 750887Y

55 MPH/45 MPH

DRAGGING EQUIPMENT DETECTOR
VY-40.80

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

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ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 41-42
SHEET 24 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

12/21/2018 11:01:01 AM $USER$
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$PENTBL$
$PLTDRVL$

2150 2140 2130 2120 2110 2100 2090 2080 2070

WEST

EAST

2134+09 IJ
2129+24 PS
2126+67 HSE
2124+00 IJ
2113+83 ATS
2112+00
2111+30 STN
2104+53 STN
2098+97 SIG
2098+87 HSE

40

CP HUMPHREYS

EQUIPPED WITH ETHERNET
RADIO BACKHAUL

SIGNALS 39.75

EQUIPPED WITH STICK
BREAK LOGIC

VISTA CANYON
STATION

WC
WA
EC
E
*20
EPIC 10.0 KHZ
EPIC 11.5 KHZ
402
404
HUMPHREYS SIDING 8531'

EXISTING ATS
PROTECT IN PLACE

NEW INSTRUMENT
ENCLOSURE
SCRRA P/N 03-3248611

NEW INSTRUMENT
ENCLOSURE
SCRRA P/N 03-3246150

NEW INSTRUMENT
ENCLOSURE
SCRRA P/N 03-3246100

3940'
3940'

75 MPH/45 MPH

75 MPH/45 MPH | 79 MPH/45 MPH

SAND CYN CREEK & RD.
VY-40.66
DOT 750889M

J. SMITH STABLES PVT.
VY-40.15
DOT 750890G

LOST CANYON ROAD
VY-39.52
DOT 921720L

0 500
SCALE IN FEET

12/21/2018 11:01:02 AM $USER$
$FILL2
$PENTBLL$
$PLTORVL$

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 39-40
SHEET 25 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

2070 2060 2050 2040 2030 2020 2010 2000 1990

WEST

EAST

2059+20
39

2038+69 IJ
2037+17
2034+74 PS
2034+21 IJ
2034+02 PS
2030+22 PS
2029+72 SIG

2009+07 IJ
2006+87 HB
2006+40
38

1998+06

CP HONBY

INSTALL STICK BREAK LOGIC
INTO EXISTING CONTROLLER
AT CP HONBY

VIA PRINCESSA

4-11

REMOVE TURNOUT
AND SIGNALS

12C*14 U.G.

4E
4W
2E
2W
EB
EA
EC
EC
EC

REMOVE TURNOUT AND SIGNALS

REMOVE SWITCH
AND SIGNAL

4-11
382
510

3940'
3940'

79 MPH/45 MPH | 55 MPH/45 MPH

0 500
SCALE IN FEET

SR 14 FWY
VY-39.18
DOT 750868U

CANYON PARK BLVD.
VY-38.59
DOT 750866F

SIERRA HWY WEST
VY-38.41
DOT 750891N
SIERRA HWY EAST
VY-38.40

VIA PRINCESSA STATION
VY-37.9

PVT XING
VY-37.78
DOT 750892V

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TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 38-39
SHEET 26 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

1990 1980 1970 1960 1950 1940 1930 1920 1910

WEST

EAST

1978+74 SIG

1975+74 PS
1975+24 SIG

1959+89 IJ

1953+60

37

1918+29

℄

CP LEAHY

EC
EC
W
EC
EC
EA

PTC

REMOVED INTERMEDIATES

371
372
EC
EC

REMOVE INTERMEDIATES

4582'

3700'

WHITES CYN RD.
VY-37.55
DOT 914500Y

55 MPH/45 MPH
70 MPH/45 MPH

PENLON COURT
VY-36.98
DOT 922852A

RAINBOW GLEN DR.
VY-36.34
DOT 914504B

0 500
SCALE IN FEET

12/21/2018 11:01:04 AM $USER$
$FILES$
$PENTBLL$
$PLTDRVL$

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TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 36-37
SHEET 27 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

1910 1900 1890 1880 1870 1860 1850 1840 1830

WEST

EAST

1900+80
36
℄

1893+27
℄

1848+50 SIG
1848+00
1846+66 IJ
1845+86
1844+80 SIG
35
℄

CP GOLDEN

REMOVE INTERMEDIATES

EC

WA

341

342

EC

E

WC

EC

6-9

4582'

3700'

3700'

RUETHER AVE.
VY-35.87
DOT 750865Y

GOLDEN VALLEY RD.
VY-35.62
DOT 921722A

GOLDEN OAK RD.
VY-34.97
DOT 750893C

0 500
SCALE IN FEET

30 MPH/
70 MPH/45 MPH | 25 MPH

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$PENTBL$
$PLTDRVL$

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ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 35-36
SHEET 28 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

1830 1820 1810 1800 1790 1780 1770 1760 1750

WEST

EAST

1795+20

34

1766+54 IJ

1765+96 PS

1763+01 IJ

SANTA CLARITA

CP CANYON

331 332

REMOVE TURNOUT AND SIGNALS

EC

EC

EC

REMOVE TURNOUT AND SIGNALS

333 334

WB

EB

WA

SIG

3700'

BERMITE PVT RD.
VY-34.32
DOT 750894J

SANTA CLARITA
PASSENGER STA.
VY-34.2

30 MPH/25 MPH

40 MPH/35 MPH

3000'

0 500

SCALE IN FEET

12/21/2018 11:01:06 AM $USER$
$FILL$
$PENTBL$
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APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 34-35
SHEET 29 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

1750 1740 1730 1720 1710 1700 1690 1680 1670

WEST

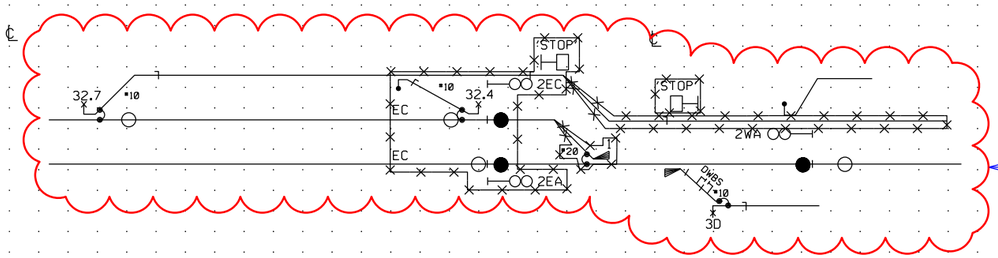
EAST

1742+40

33

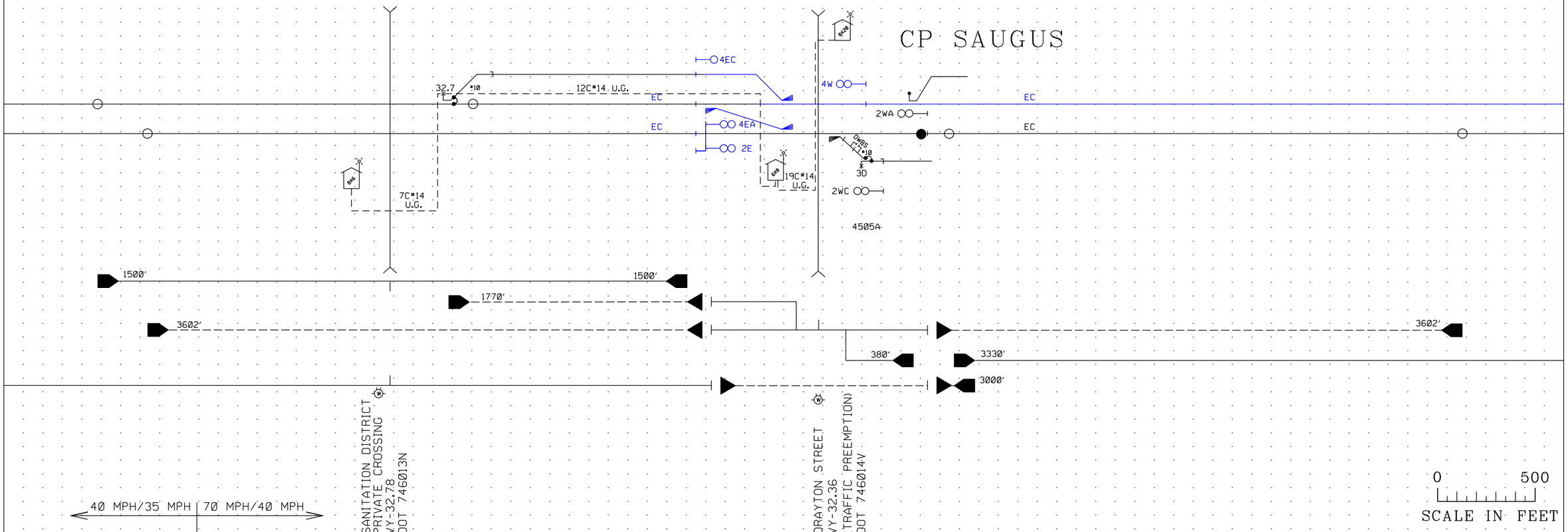
1730+19 1727+46 HB 1714+51 SIG 1714+01 HB 1713+71 IJ 1709+56 PS 1708+23 1707+66 PS 1704+89 IJ 1702+63 IJ 1689+60

32



EXISTING CONSITIONS SHOWN HERE DUE TO PROPOSED DESIGN TAKES PLACE IN SAME LOCATION. REPLACE EXISTING TURNOUT

CP SAUGUS



40 MPH/35 MPH | 70 MPH/40 MPH

SANITATION DISTRICT
PRIVATE CROSSING
VY-32.78
DOT 746013N

DRAYTON STREET
VY-32.36
(TRAFFIC PREEMPTION)
DOT 746014V

0 500
SCALE IN FEET

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APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 32-33
SHEET 30 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

12/21/2018 11:01:07 AM
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$PLTDRVL$

1670 1660 1650 1640 1630 1620 1610 1600 1590

WEST

EAST

1668+22 ℄

1636+80 ℄ 31

1604+37 ℄

1603+40 IJ

1598+24 PS

1594+45 IJ

CP HOOD

2574'

EXISTING CONDITIONS SHOWN HERE DUE TO PROPOSED DESIGN TAKES PLACE IN SAME LOCATIONS. REMOVE EXISTING TURNOUT

TS

DTT

#20

DT

TM

19C#14 U.G.

6-9

BNS

H

W

1180HZ

EC EC

1180HZ R EC

EC

WC

EC

EA

WA

E&S

12C#14 U.G.

4519'

4519'

3330'

5099'

2905'

OAK RIDGE DRIVE
VY-31.61
(TRAFFIC PREEMPTION)
DOT 746015C

70 MPH/40 MPH | 50 MPH/40 MPH

VIA PRINCESSA
VY-31.30
DOT 921714H

50 MPH/40 MPH | 70 MPH/40 MPH

13TH ST VY-30.39
SHOWN IN PTC SURVEY
BUT DOES NOT INCLUDE
STATION DATA.

13TH STREET
VY-30.39
(TRAFFIC PREEMPTION)
DOT 746016J

0 500
SCALE IN FEET

12/21/2018 11:01:08 AM $USER$
$FILL$
$PENTBL$
$PLTDRVL$

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 30-31
SHEET 31 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

1590 1580 1570 1560 1550 1540 1530 1520 1510

WEST

EAST

1584+00 1580+03 1563+33 1548+48 HB 1546+20 IJ 1539+08 IJ 1537+22 HB 1531+20 1527+00

30 ℄ ℄ 29 ℄

NEWHALL STATION (OB)

2574'

2112'

6-9

19C#14 U.G.

1180HZ R 1770HZ

[293] 29.27

1180HZ T R 1770HZ

29.30 *10'

[294] T 29.10 *10'

6-9

12C#14 U.G.

2554'

3244'

4519'

4519'

5099'

2905'

NEWHALL STATION (OB)
VY-30.0

MARKET STREET
VY-29.93
(TRAFFIC PREEMPTION)
DOT 746017R

SAN FERNANDO ROAD
VY-29.61
(TRAFFIC PREEMPTION)
DOT 746018X

70 MPH/40 MPH | 45 MPH/40 MPH

CALEX PRIVATE ROAD
VY-28.92
DOT 746021F

0 500
SCALE IN FEET

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$FILE2$
$PENTBL$
$PLTDRVL$

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REV.	DATE		BY SUB.	APP.

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DESIGNED BY M. ALDERMAN
DRAWN BY A. PENA
CHECKED BY
APPROVED BY
DATE 10-29-18

Metro

PRE PACIFIC RAILWAY ENTERPRISES, INC.
3560 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4535/FAX 951-784-4535

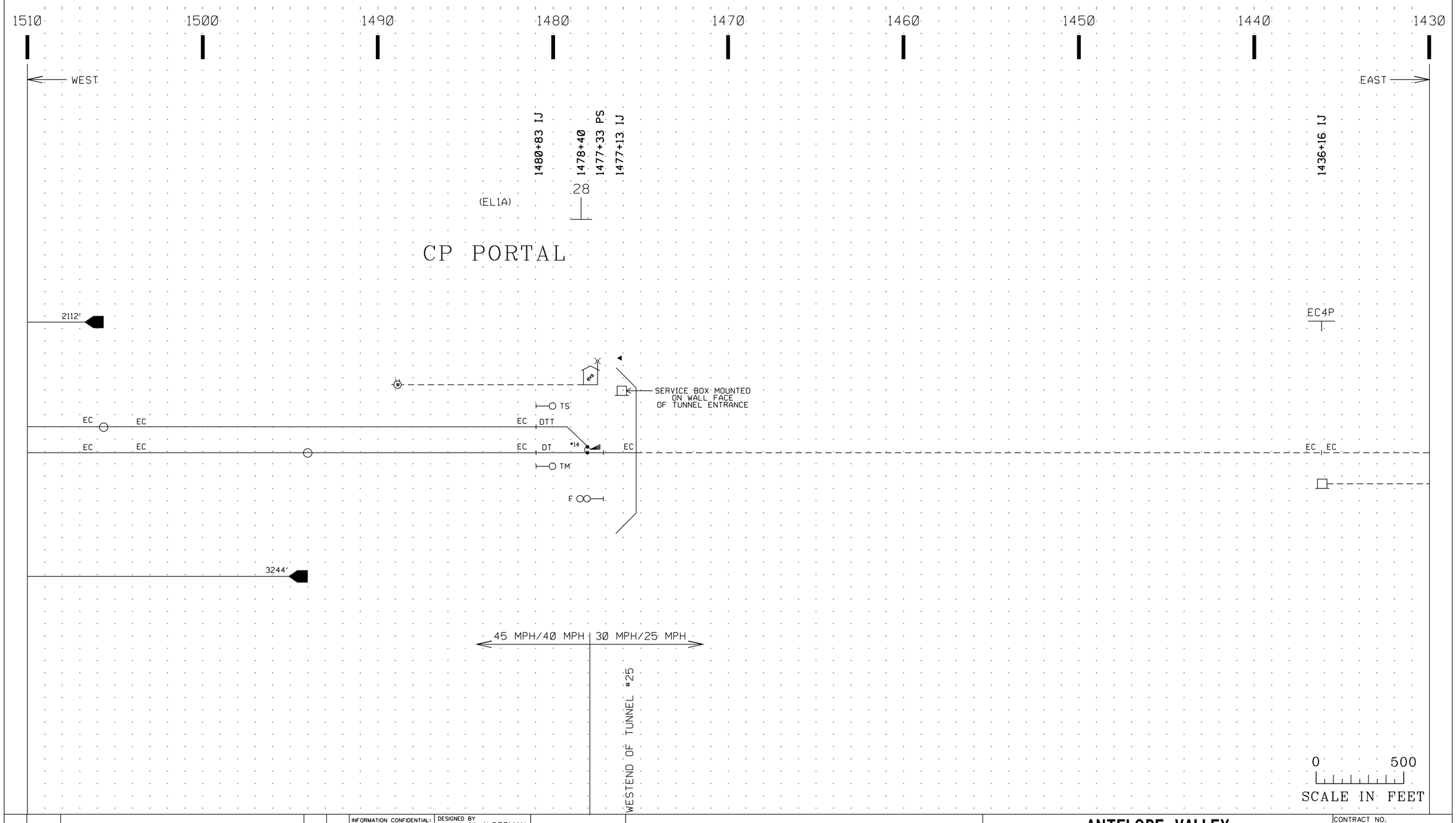
SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 29-30
SHEET 32 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'



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APPROVED BY	
DATE	10-29-18

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TEL 951-784-4535/FAX 951-784-4535

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 28-29
SHEET 33 OF 35

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	1"=500'

1430 1420 1410 1400 1390 1380 1370 1360 1350

WEST

EAST

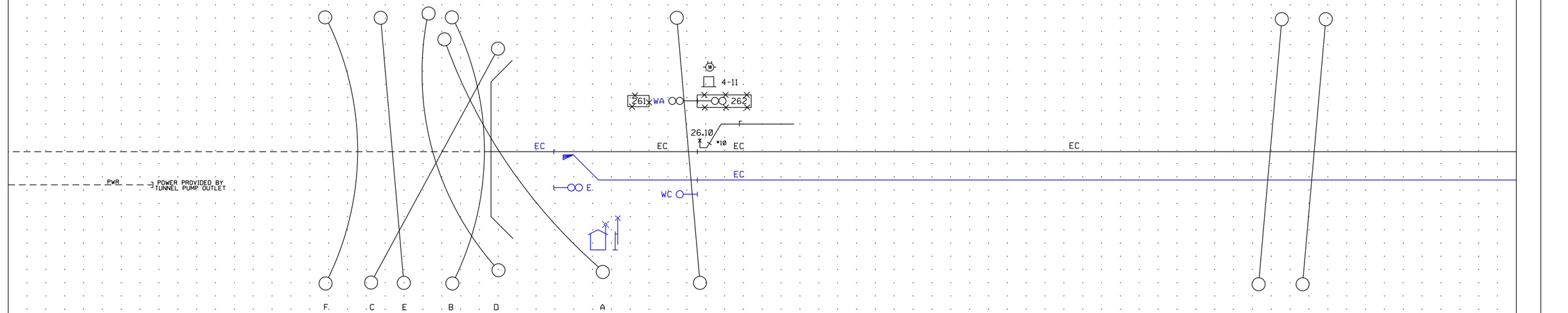
1425+60
27

1401+06 SJC
1400+56 PS

1393+44 IJ
1393+31 HB

1372+80
26

CP INTERCHANGE



30 MPH/25 MPH | 35 MPH/30 MPH

SR 14 RAMP (F)
VY-26.73
DOT 746022M

SR 14W TO I-5N (E)
VY-26.70
DOT 746023U

SR 14W TO I-5S (D)
VY-26.66
DOT 746024B

WELDON CYN I-5 (C)
VY-26.65
DOT 746027W

I-5S TO SR 14E (B)
VY-26.61
DOT 746025H

EAST END OF TUNNEL #25

I-5N TO SR 14E (A)
VY-26.59
DOT 746026P

SIERRA HWY
VY-26.41
DOT 746028D

I-5N FWY
VY-25.82
DOT 916110T

I-5S FWY
VY-25.78
DOT 916110T

35 MPH/30 MPH | 45 MPH/40 MPH

0 500
SCALE IN FEET

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REV.	DATE	BY	SUB.	APP.

DESIGNED BY M. ALDERMAN
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DATE 10-29-18

Metro

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

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3560 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4535/FAX 951-784-4535

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 26-27
SHEET 34 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

1350 1340 1330 1320 1310 1300 1290 1280 1270

WEST

EAST

1337+73 IJ
1337+18 PS
1333+17 IJ
1326+26 HB
1320+00
1277+65 HB
1274+49 HB

25

CP BALBOA

REMOVE CONTROL POINT

7069'

REMOVE CONTROL POINT

251 252

WA

EC

EC

EC

253 254

WB

REMOVE CONTROL POINT

SWA

*10

24.20

24.28

*10

4-11

7069'

45 MPH/40 MPH | 60 MPH/40 MPH

I-210W - I-5S CONNECTOR
VY-24.80
DOT 746034G

I-5 FWY
VY-24.74
DOT 746036V

I-5N - I210E CONNECTOR
VY-24.67
DOT 746037C

BALBOA BL
VY-25.31
DOT 746032T

0 500

SCALE IN FEET

60 MPH/40 MPH | 45 MPH/40 MPH

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$PENTBL$
$PLTDRVL$

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3580 University Avenue, Suite F
Riverside, CA 92501
TEL 951-784-4630/FAX 951-784-4635

SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SCALED LAYOUTS
VY 24-25
SHEET 35 OF 35

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

LEGEND

= METER SERVICE

= GCP 4000 BI-DIRECTIONAL

= GCP 4000 UNI-DIRECTIONAL

= PREDICTION LIMITS

= DAX FEED FROM THIS LOCATION

= POWER SWITCH

= POWER DERAIL

= SLIDING DERAIL WITH WHEEL CROWDER & SWITCH CIRCUIT CONTROLLER

= ELECTRIC LOCK

= SWITCH CIRCUIT CONTROLLER

PASSENGER SPEED
FREIGHT SPEED

= NARROW BAND SHUNT

EC = ELECTROCODE TRACK CIRCUIT

B = TRACK BATTERY

R = TRACK RELAY

B/R = STYLE "C" TRACK CIRCUIT

= SIGNAL SHELTER

= SIGNAL CASE (DOUBLE WIDE)

= SIGNAL CASE (SINGLE WIDE)

= WAYSIDE SIGNAL

= REMOVED FOR DESIGN

= PROPOSED FOR DESIGN

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NOT FOR CONSTRUCTION

REV.	DATE		BY	SUB.	APP.

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SUBMITTED: _____ PROJECT MANAGER

APPROVED: _____

ANTELOPE VALLEY LINE STUDY

SYMBOL LEGEND

CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE 1"=500'

APPENDIX 3 – ATTACHMENT 4

COST ESTIMATES BY CAPITAL PROJECT LOCATION

AVL STUDY CIP COST ESTIMATE
Hollywood - McGinley
MP: 13.4 to 15.6

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				12,894	TF	$ 582	**$7,504,308**
	MT1		697+92	805+75	10783			
	MT1		817+96	826+92	896			
	MT2		805+65	817+80	1215			
	Realigned Track				1,740	TF	$ 700	**$1,218,000**
	MT2 Realign		796+97	805+65	868			
	MT2 Realign		817+80	826+52	872			
	TO#10				-	EA	$ 125,000	**$0**
	TO#20				-	EA	$ 300,000	**$0**
	TO#20 Crossover				1	EA	$ 1,500,000	**$1,500,000**
	CP Hollywood LH Xover	MP 13.35			1			
	At-Grade Signalized Crossing Modification				160	TF	$ 1,520	**$243,200**
	Arvilla Ave @GX w 1 new crossing panel	MP 14.14			70			
	Sunland Blvd @GX w 1 new crossing panel	MP 15.06			90			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				1	EA	$ 8,000	**$8,000**
	Sun Valley Station	MP 15.30			1			
	New At-Grade Ped Crossing				1	EA	$ 15,000	**$15,000**
	Bob Hope Airport Station	MP 13.60			1			
EARTHWORK								
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				130	TF	$ 10,000	**$1,300,000**
	Hollywood Way UP	MP 13.57			130			
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" CMP				135	LF	$ 2,400	**$324,000**
	6- 36" CMP @ MP 14.66 ext 22.5'	MP 14.66			135			
	60" CMP				-	LF	$ 2,600	**$0**
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				-	LF	$ 1,500	**$0**
UTILITIES								
	FO Relocation				12,960	LF	$ 700	**$9,072,000**
	SPRINT	MP 13.3-15.2	699+00	797+00	9800			
	QWEST-PPSI	MP15.1-15.6	797+00	828+50	3150			
MISC								
	Remove Billboard				5	EA	$ 14,700	**$73,500**
		MP 13.83			1			
		MP 14.26			1			
		MP 14.52			1			
		MP 14.66			1			
		MP 14.74			1			
STATION								
	At-Grade Platform				2	EA	$ 1,000,000	**$2,000,000**
	Bob Hope Airport Station MT1 Side Platform				1			
	Sun Valley Station MT2 side Platforms				1			
SIGNALS								
	Grade Crossing Warning Devices							**$2,603,000**
	Arvilla Avenue	MP 14.14			1	LS	$1,017,000	$1,017,000
	Sunland Blvd	MP 15.06			1	LS	$1,203,000	$1,203,000
	Sun Valley Station Ped X-ing	MP 15.34			1	LS	$383,000	$383,000
	Wayside C&S							**$1,665,000**
	Universal cross-over, switch machines, wayside signals, intermediate enclosure and signal, testing	13.4 & 14.14			1	LS	$1,665,000	$1,665,000

Construction Subtotal	$27,526,008
Contigency (35%)	$8,257,802
Soft Cost (60%)	$21,470,286
Total (W/O System & ROW)	**$57,254,097**
Say	**$57,300,000**

AVL STUDY CIP COST ESTIMATE
Sheldon - Van Nuys Blvd
MP: 17.0 to 19.5

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								$13,571,000
	New Ballast Track				13,950	TF	$ 582	**$8,118,900**
	MT2		890+00	922+12	3,212			
	MT1		921+87	953+46	3,159			
	MT2		953+46	1014+45	6,099			
	MT1		1014+20	1029+00	1,480			
	Realigned Track				2,743	TF	$ 700	**$1,920,100**
	MT1 Realign		912+89	921+87	898			
	MT2 Realign		944+51	953+46	895			
	MT1 Realign		1004+70	1014+20	950			
	TO#10				-	EA	$ 125,000	**$0**
	TO#20				-	EA	$ 300,000	**$0**
	TO#20 Crossover				2	EA	$ 1,500,000	**$3,000,000**
	CP Sheldon Xover	MP 17.22			1			
	CP Van Nuys Xover	MP 19.38			1			
	At-Grade Signalized Crossing Modification				350	TF	$ 1,520	**$532,000**
	Sheldon ST @GX- 1(N) Trk X	MP 17.05			90			
	Branford St @GX-1(N) Trk X	MP 17.87			73			
	Osborne ST @GX- 1(N) Trk X	MP 18.42			114			
	Pierce St @GX- 1(N) Trk X	MP 19.24			73			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				-	EA	$ 15,000	**$0**
EARTHWORK								$0
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								$1,050,000
	Ballast Deck Widening				6	TF	$ 10,000	**$60,000**
	6' RT BD@MP 19.42	MP 19.42			6			
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 10,000	**$0**
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				66	TF	$ 15,000	**$990,000**
	66' STG BD @Tujunga Wash	MP 17.46			66			
DRAINAGE								$310,000
	36" CMP				-	LF	$ 2,400	**$0**
					-			
	60" CMP				50	LF	$ 2,600	**$130,000**
	2-60" CMP @ MP 17.53	MP 17.53			50			
	84" CMP				35	LF	$ 3,000	**$105,000**
	108" CMP @ MP 17.50	MP 17.50			35			
	RCB 8'x8'				-	LF	$ 10,000	**$0**
					-			
	Other Cross Drain				50	LF	$ 1,500	**$75,000**
	13"x21" CMPA @ MP 18.44	MP 18.44			15			
	24" CIP @ MP 18.95	MP 18.95			35			
UTILITIES								$11,027,100
	FO Relocation				15,753	LF	$ 700	**$11,027,100**
	SPRINT	MP17.0-17.35	897+60	915+72	1812			
	SPRINT	MP17.95-19.05	948+12	1009+05	6093			
	QWEST-PPSI	MP17.0-17.35	897+60	915+72	1812			
	QWEST-PPSI	MP17.95-19.1	948+12	1008+48	6036			
MISC								$44,100
	Remove Billboard				3	EA	$ 14,700	**$44,100**
		MP 18.54			1			
		MP 18.83			1			
		MP 19.06			1			
STATION								$0
	At-Grade Platform				-	EA	$ 1,000,000	**$0**
SIGNALS								$6,189,000
	Grade Crossing Warning Devices				4	EA		**$3,282,000**
	Sheldon Street	MP 17.05			1	LS	$840,000	$840,000
	Branford Street	MP 17.87			1	LS	$852,000	$852,000
	Osborne Street	MP 18.42			1	LS	$864,000	$864,000
	Pierce Street	MP 19.24			1	LS	$726,000	$726,000
	Wayside C&S				1	EA		**$2,907,000**
	Cross-over signals and enclosure, testing, cabling	MP 19.25			1	LS	$2,907,000	$2,907,000

Construction Subtotal	$32,191,200
Contigency (35%)	$9,657,360
Soft Cost (60%)	$25,109,136
Total (W/O System & ROW)	**$66,957,696**
Say	**$67,000,000**

AVL STUDY CIP COST ESTIMATE
Van Nuys Blvd. - Sylmar
MP: 19.5 to 21.9

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								$10,667,250
	New Ballast Track				13,175	TF	$ 582	**$7,667,850**
	MT1		1029+00	1150+18	12,118			
	MT2		1150+60	1161+17	1,057			
	Realigned Track				824	TF	$ 700	**$576,800**
	MT2 Realign		1142+36	1150+60	824			
	TO#10				1	EA	$ 125,000	**$125,000**
	To UPRR Sdidng	MP 20.20			1			
	TO#20				-	EA	$ 300,000	**$0**
	TO#20 Crossover				1	EA	$ 1,500,000	**$1,500,000**
	CP Hubard Xover	MP 21.52			1			
	At-Grade Signalized Crossing Modification				505	TF	$ 1,520	**$767,600**
	Van Nuys Blvd @GX	MP 19.51			114			
	Paxton St @GX	MP 20.06			90			
	Jessie @GX	MP 20.81			75			
	N Brand St @GX	MP 20.99			78			
	N McClay Ave @GX	MP 21.12			80			
	N Hubard AVe @GX	MP 21.81			68			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				2	EA	$ 15,000	**$30,000**
	For Sylmar Platofrm access	MP 21.85			1			
	For Sylmar Platofrm access	MP 21.98			1			
EARTHWORK								$0
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								$2,115,000
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 10,000	**$0**
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				141	TF	$ 15,000	**$2,115,000**
	141' STG @Pacoima Wash	MP 20.54			141			
DRAINAGE								$0
	36" CMP				-	LF	$ 2,400	**$0**
	60" CMP				-	LF	$ 2,600	**$0**
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				-	LF	$ 1,500	**$0**
UTILITIES								$5,882,800
	FO Relocation				8,404	LF	$ 700	**$5,882,800**
	QWEST-PPSI	MP20.75-22	1096+00	1161+17	6,517			
	SPRINT	MP21.63-22	1142+30	1161+17	1,887			
MISC								$102,900
	Remove Billboard				7	EA	$ 14,700	**$102,900**
		MP 20.60			1			
		MP 22.05			1			
		MP 22.14			1			
		MP 22.59			1			
		MP 23.00			1			
		MP 23.41			1			
		MP 23.44			1			
STATION								$1,500,000
	At-Grade Platform				1.5	LF	$ 1,000,000	**$1,500,000**
	Sylamr Sta MT2 Side Platform				1.0			
	Extend Sylamr Sta MT1 Side Platform to 680'				0.5			
SIGNALS								
	Grade Crossing Warning Devices							**$4,240,000**
	Van Nuys Blvd	MP 19.51			1	LS	$864,000	$864,000
	Paxton Street	MP 20.06			1	LS	$1,002,000	$1,002,000
	Jessie Street	MP 20.81			1	LS	$702,000	$702,000
	North Brand Blvd	MP 20.99			1	LS	$836,000	$836,000
	North Maclay Avenue	MP 21.12			1	LS	$836,000	$836,000
	Wayside C&S							**$2,573,000**
	Turnout enclosure, intermediate signals, cabling, testing	MP 19.50			1	LS	$2,573,000	$2,573,000

Construction Subtotal	$27,080,950
Contigency (35%)	$8,124,285
Soft Cost (60%)	$21,123,141
Total (W/O System & ROW)	**$56,328,376**
Say	**$56,400,000**

AVL STUDY CIP COST ESTIMATE
Sylmar - Roxford
MP: 21.9 to 23.6

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				9,083	TF	$ 582	**$5,286,306**
	MT1		1193+52	1233+54	4,002			
	MT2		1161+17	1193+48	3,231			
	MT2		1233+40	1251+90	1,850			
	Realigned Track				1,766	TF	$ 700	**$1,236,200**
	MT1 Realign		1184+65	1193+52	887			
	MT2 Realign		1224+61	1233+40	879			
	TO#10				-	EA	$ 125,000	**$0**
	TO#20				-	EA	$ 300,000	**$0**
	TO#20 Crossover				2	EA	$ 1,500,000	**$3,000,000**
	CP Roxford RH Xover	MP 23.45			1			
	CP Roxford LH Xover	MP 23.55			1			
	At-Grade Signalized Crossing Modification				200	TF	$ 1,520	**$304,000**
	Polk St @GX	MP 22.63			102			
	Bledsoe St @GX	MP 23.17			98			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				1	EA	$ 15,000	**$15,000**
	Astoria Ped X	MP 22.35			1			
EARTHWORK								
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 10,000	**$0**
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" CMP				-	LF	$ 2,400	**$0**
	60" CMP				-	LF	$ 2,600	**$0**
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				15	LF	$ 1,500	**$22,500**
	18" CMP	MP 23.52			15			
UTILITIES								
	FO Relocation				12,000	LF	$ 700	**$8,400,000**
	QWEST-PPSI	MP22-22.6	1161+00	1193+50	3,250			
	QWEST-PPSI	MP22.3-23.7	1224+50	1252+00	2,750			
	SPRINT	MP22-22.6	1161+00	1193+50	3,250			
	SPRINT	MP22.3-23.7	1224+50	1252+00	2,750			
STATION								
	At-Grade Platform				-	EA	$ 1,000,000	**$0**
SIGNALS								
	Grade Crossing Warning Devices							**$3,069,000**
	Hubbard Avenue	MP 21.81			1	LS	$836,000	$836,000
	Astoria (Ped x-ing only)	MP 22.35			1	LS	$383,000	$383,000
	Polk Street	MP 22.63			1	LS	$1,024,000	$1,024,000
	Bledsoe Street	MP 23.17			1	LS	$826,000	$826,000
	Wayside C&S							**$1,872,000**
	Cross-over signals, enclosure, cabling, testing, ATCS/PTS	MP 21.90			1	LS	$1,872,000	$1,872,000

Construction Subtotal	$23,205,006
Contigency (35%)	$6,961,502
Soft Cost (60%)	$18,099,905
Total (W/O System & ROW)	**$48,266,412**
Say	**$48,300,000**

AVL STUDY CIP COST ESTIMATE
Balboa - Tunnel
MP: 25.3 to 26.5

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				5,843	TF	$ 582	**$3,400,626**
	MT1		1333+37	1391+80	5843			
	Realigned Track				1,283	TF	$ 700	**$898,100**
	MT2 Realign		1334+00	1340+23	623			
	Service Siding				660			
	TO#10				1	EA	$ 125,000	**$125,000**
	MT1-Siding LH	MP 25.30	1388+00		1			
	TO#20				1	EA	$ 300,000	**$300,000**
	MT2-MT1 LH	MP 25.34	1391+80		1			
	TO#20 Crossover				-	EA	$ 1,500,000	**$0**
	At-Grade Signalized Crossing Modification				-	TF	$ 1,520	**$0**
	At-Grade Non-Sig Crossing Modification				60	TF	$ 800	**$48,000**
	Service Siding High Rail Take Off	MP 26.32			60			
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				-	EA	$ 15,000	**$0**
EARTHWORK								
	Retainied Cut				1,670	LF	$ 3,000	**$5,010,000**
		MP 25.71 - 25.85			740			
		MP25.99-26.16			930			
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 10,000	**$0**
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" CMP				-	LF	$ 2,400	**$0**
	60" CMP				-	LF	$ 2,600	**$0**
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				-	LF	$ 1,500	**$0**
UTILITIES								
	FO Relocation				12,000	LF	$ 700	**$8,400,000**
	SCRRA F24	MP25.3-26.4			6000			
	SPRINT	MP25.3-26.4			6000			
STATION								
	At-Grade Platform				-	EA	$ 1,000,000	**$0**
SIGNALS								
	Grade Crossing Warning Devices							**$840,000**
	Roxford Street	MP 23.72			1	LS	$840,000	$840,000
	Wayside C&S							**$1,060,000**
	End of siding signals, switch machines, cantelevers, enclosure, testing, cabling				1	LS	$1,060,000	$1,060,000
							Construction Subtotal	$20,081,726
							Contigency (35%)	$6,024,518
							Soft Cost (60%)	$15,663,746
							Total (W/O System & ROW)	**$41,769,990**
							Say	**$41,800,000**

AVL STUDY CIP COST ESTIMATE
Hood - Saugus
MP: 30.2 to 32.4

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				11,801	TF	$ 582	**$6,868,182**
	New MT1 for Double Tracks		1593+00	1648+48	5,548			
	New MT1 for Double Tracks		1651+85	1711+00	5,915			
	New MT2 for Double Tracks		1648+53	1651+91	338			
	Realigned Track				2,008	TF	$ 700	**$1,405,600**
	Realign Exist MT1 as New MT2		1642+06	1648+53	647			
	Realign Exist MT1 as New MT2		1651+91	1665+52	1,361			
	TO#10				2	EA	$ 125,000	**$250,000**
	MT1-Siding LH	MP 32.30	1705+00		1			
	MT1-Siding RH	MP 32.37	1709+00		1			
	TO#20				1	EA	$ 300,000	**$300,000**
	MT1-Siding LH	MP 32.27	1704+00		1			
	TO#20 Crossover				2	EA	$ 1,500,000	**$3,000,000**
	CP Hood LH Xover	MP 30.25			1			
	CP Suagus RH Xover	MP 32.38			1			
	At-Grade Signalized Crossing Modification				204	TF	$ 1,520	**$310,080**
	13th St @GX	MP 30.39			50			
	Oak Ridge Dr @GX	MP 31.60			81			
	Drayton St	MP 32.35			73			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				-	EA	$ 15,000	**$0**
EARTHWORK								
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 10,000	**$0**
	Single Track Bridge (RC Box)				238	TF	$ 15,000	**$3,570,000**
	126' PIP @ Newhall Crk	MP 30.28			126			
	112' PCSG @ Placerita Crk	MP 30.94			112			
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" CMP				-	LF	$ 2,400	**$0**
	60" CMP				36	LF	$ 2,600	**$93,600**
	2-48" CMP @ MP30.88	MP 30.88			36			
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
					-			
	Other Cross Drain				15	LF	$ 1,500	**$22,500**
	24" CIP @ MP 31.18	MP 31.18			15			
UTILITIES								
	FO Relocation				-	LF	$ 700	**$0**
STATION								
	At-Grade Platform				-	EA	$ 1,000,000	**$0**
SIGNALS								
	Grade Crossing Warning Devices							**$2,244,000**
	13th Street	MP 30.39			1	LS	$702,000	$702,000
	Oakridge Drive	MP 31.60			1	LS	$840,000	$840,000
	Drayton Steet	MP 32.35			1	LS	$702,000	$702,000
	Wayside C&S							**$1,923,000**
	End of siding signals and enclosure, switch machines, cantilevers, cabling, testing	MP 32.40			1	LS	$1,923,000	$1,923,000
							Construction Subtotal	$19,986,962
							Contigency (35%)	$5,996,089
							Soft Cost (60%)	$15,589,830
							Total (W/O System & ROW)	**$41,572,881**
							Say	**$41,600,000**

AVL STUDY CIP COST ESTIMATE
Canyon - Santa Clarita
MP: 33.4 to 35.0

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				8,659	TF	$ 582	**$5,039,538**
	MT1		1761+53	1848+12	8,659			
	Realigned Track				-	TF	$ 700	**$0**
	TO#10				-	EA	$ 125,000	**$0**
	TO#20				1	EA	$ 300,000	**$300,000**
	MT2-MT1 LH	MP 35.00	1848+12		1			
	TO#20 Crossover				-	EA	$ 1,500,000	**$0**
	At-Grade Signalized Crossing Modification				61	TF	$ 1,520	**$92,720**
	Golden Oak Road @GX	MP 34.96			61			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				2	EA	$ 15,000	**$30,000**
	For access to new MT1 Side Platform	MP 34.14			1			
	For access to new MT1 Side Platform	MP 34.26			1			
EARTHWORK								
	Retainied Cut				4,615	LF	$ 3,000	**$13,845,000**
		MP 33.49 -34.45			4,615			
	Retained Fill				425	LF	$ 1,000	**$425,000**
		MP33.45-33.5			350			
		MP 33.68			75			
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 10,000	**$0**
	Single Track Bridge (RC Box)				33	TF	$ 15,000	**$495,000**
	Widening Bermite Rd PVT UP	MP 34.32			33			
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" CMP				105	LF	$ 2,400	**$252,000**
	Ext 36" CMP @ MP 34.28	MP 34.28			15			
	Ext 2-36" CMP @ MP 34.33	MP 34.33			30			
	Ext 36" CMP EXT@ MP 34.39	MP 34.39			15			
	Ext 36" CMP @ MP 34.58	MP 34.58			15			
	Ext DBL 2-29"x18" CMPA @ MP 34.90	MP 34.90			30			
	60" CMP				-	LF	$ 2,600	**$0**
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				90	LF	$ 1,500	**$135,000**
	Ext 24" CIP @ MP 33.69	MP 33.69			15			
	Ext 24" CIP @ MP 33.72	MP 33.72			15			
	Ext 24" RCP @ MP 33.77	MP 33.77			15			
	Ext 24" CIP @MP 34.18	MP 34.18			15			
	Ext 24" RCP @ MP 34.74	MP 34.74			15			
	Ext 21" RCP @ MP 34.78	MP 34.78			15			
UTILITIES								
	FO Relocation				-	LF	$ 700	**$0**
STATION								
	At-Grade Platform				1.25	EA	$ 1,000,000	**$1,250,000**
	New MT1 Side Platform				1			
	Extend Exist (MT2) Platform				0.25			
SIGNALS								
	Grade Crossing Warning Devices							**$702,000**
	Golden Oak Road	MP 34.96			1	LS	$702,000	$702,000
	Wayside C&S							**$877,000**
	CP Golden	MP 35.00			1	LS	$877,000	$877,000

Construction Subtotal	$23,443,258
Contigency (35%)	$7,032,977
Soft Cost (60%)	$18,285,741
Total (W/O System & ROW)	**$48,761,977**
Say	**$48,800,000**

AVL STUDY CIP COST ESTIMATE
Via Princessa - Honby
MP: 37.5 to 38.6

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				6,103	TF	$ 582	**$3,551,946**
	New MT1 for Double tracks		1976+93	2037+96	6,103			
	Realigned Track				1,394	TF	$ 700	**$975,800**
	Realign Exist MT1 beyond Canyon Park Blvd		2037+96	2051+90	1,394			
	TO#10				1	EA	$ 125,000	**$125,000**
	New MT1- Exist UPRR Siding	MP 38.01			1			
	TO#20				1	EA	$ 300,000	**$300,000**
	MT2-MT1 LH	MP 37.44	1976+93		1			
	TO#20 Crossover				1	EA	$ 1,500,000	**$1,500,000**
	CP Honby LH Xover	MP 38.60	2037+96		1			
	At-Grade Signalized Crossing Modification				131	TF	$ 1,520	**$199,120**
	Canyon Park Blvd @GX	MP 38.60			131			
	At-Grade Non-Sig Crossing Modification				54	TF	$ 800	**$43,200**
	PVT Crossing	MP 37.76			54			
	At-Grade Ped Crossing Modification				1	EA	$ 8,000	**$8,000**
	Existing Ped X at Platform	MP 37.90			1			
	New At-Grade Ped Crossing				2	EA	$ 15,000	**$30,000**
	For access to new MT1 Side Platform	MP 37.75			1			
	For access to new MT1 Side Platform	MP 37.91			1			
EARTHWORK								
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				1,325	LF	$ 1,000	**$1,325,000**
	Adjacent to UPRR Siding	MP 38.06-38.32			1,325			
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				40	TF	$ 10,000	**$400,000**
	Wash RCS @ MP 38.43	MP 38.43			40			
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" CMP				-	LF	$ 2,400	**$0**
	60" CMP				-	LF	$ 2,600	**$0**
	84" CMP				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				105	LF	$ 1,500	**$157,500**
	Ext 30" RCP @ MP 37.49	MP 37.49			15			
	Ext 30" RCP @ MP 37.52	MP 37.52			15			
	Ext 24" RCP @ MP 37.62	MP 37.62			15			
	Ext 24" RCP @ MP 37.68	MP 37.68			15			
	Ext 24" RCP @ MP 37.75	MP 37.75			15			
	Ext 24" RCP @MP 37.95	MP 37.95			15			
	Ext 18" CIP @ MP 38.64	MP 38.64			15			
UTILITIES								
	FO Relocation				700	LF	$ 700	**$490,000**
	SPRINT	MP 38.4-38.54	2028+00	2035+00	700			
STATION								
	At-Grade Platform				1	EA	$ 1,000,000	**$1,000,000**
	New MT1 Side Platform				1			
SIGNALS								
	Grade Crossing Warning Devices							**$872,000**
	Canyon Park Blvd	MP 38.58			1	LS	$872,000	$872,000
	Wayside C&S							**$1,697,000**
	End of siding and crossover signals, enclosures, switch machines, testing, cabling	MP 37.50			1	LS	$1,697,000	$1,697,000
							Construction Subtotal	$12,674,566
							Contigency (35%)	$3,802,370
							Soft Cost (60%)	$9,886,161
							Total (W/O System & ROW)	**$26,363,097**
							Say	**$26,400,000**

AVL STUDY CIP COST ESTIMATE
Ravenna South
MP: 50.0 to 52.5

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				11,746	TF	$ 582	**$6,836,172**
	New MT1 for Double tracks	MP 50.25-52.48	2653+29	2770+75	11746.00			
	Realigned Track				1,950	TF	$ 700	**$1,365,000**
	Realign Exist MT1 (new MT2) beneath Soledad Cyn Rd OH	MP 51.91-52.28	2740+97	2760+47	1950.00			
	TO#10				-	EA	$ 125,000	**$0**
	TO#20				1	EA	$ 300,000	**$300,000**
	MT2-MT1 RH	MP 50.25	2653+29		1.00			
	TO#20 Crossover				1	EA	$ 1,500,000	**$1,500,000**
	CP Wash RH Xover	MP 51.15	2701+00		1.00			
	At-Grade Signalized Crossing Modification				24	TF	$ 1,520	**$36,480**
	Robsins Nest PVT Crossing	MP 50.28			24.00			
	At-Grade Non-Sig Crossing Modification				42	TF	$ 800	**$33,600**
	Southern Cal Edison PVT Crossing	MP 51.62			30.00			
	Young Cyn Rd PVT Crossing	MP 51.14			12.00			
	At-Grade Ped Crossing Modification				1	EA	$ 8,000	**$8,000**
	US Forest Service Pacific Crest Trail	MP 50.61			1.00			
	New At-Grade Ped Crossing				-	EA	$ 15,000	**$0**
EARTHWORK								
	Retainied Cut				445	LF	$ 3,000	**$1,335,000**
		MP 52.01-52.10			445.00			
	Retained Fill				6,930	LF	$ 1,000	**$6,930,000**
		MP 50.44-50.52			440.00			
		MP 50.67-51.25			3060.00			
		MP 51.3-51.6			1610.00			
		MP 51.61-51.96			1820.00			
STRUCTURE								
	Ballast Deck Widening				28	TF	$ 10,000	**$280,000**
	RT BD@ MP 50.46	MP 50.46			6.00			
	RT BD@ MP 50.51	MP 50.51			6.00			
	RT BD@ MP 50.64	MP 50.64			8.00			
	RT BD @MP 50.77	MP 50.77			8.00			
	RC Box Culvert (As Bridge or Viaduct)				40	TF	$ 10,000	**$400,000**
	120" RCA @ MP 51.07	MP 51.07			40.00			
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
DRAINAGE								
	36" Pipe				56	LF	$ 2,400	**$134,400**
	36" RCP @ MP 51.35	MP 51.35			28.00			
	36" RCP @ MP 51.97	MP 51.97			28.00			
	60" Pipe				28	LF	$ 2,600	**$72,800**
	48" CMP @ MP 50.98	MP 50.98			28.00			
	84" Pipe				-	LF	$ 3,000	**$0**
	RCB 8'x8'				28	LF	$ 10,000	**$280,000**
	96" CA @ MP 51.58	MP 51.58			28.00			
	Other Cross Drain				298	LF	$ 1,500	**$447,000**
	Ext 18" CIP @ MP 50.27	MP 50.27			15.00			
	Ext 18" WB @ MP 50.57	MP 50.57			15.00			
	Ext 2-24" CIP @ MP 50.93	MP 50.93			56.00			
	Ext 24" RCP @ MP 51.72	MP 51.72			28.00			
	Ext 16" RCP @ MP 51.83	MP 51.83			28.00			
	Ext 16" RCP @ MP 51.90	MP 51.90			28.00			
	Ext 30" RCP @MP 51.93	MP 51.93			28.00			
	Ext 24" CMPP @MP 52.06	MP 52.06			27.00			
	Ext 24" RCP @ MP 52.21	MP 52.21			28.00			
	Ext 24" CIP @ MP 52.32	MP 52.32			15.00			
	Ext 24" CIP @ MP 52.38	MP 52.38			15.00			
	Ext 24" CIP @ MP 52.44	MP 52.44			15.00			
UTILITIES								
	FO Relocation				6,470	LF	$ 700	**$4,529,000**
	SPRINT	MP 50.2-51			4200.00			
	SPRINT	MP 51.6-52.33			2270.00			
STATION								
	At-Grade Platform				-	EA	$ 1,000,000	**$0**
SIGNALS								
	Grade Crossing Warning Devices							**$877,000**
	New Crossing	MP 50.28			1	LS	$877,000	$877,000
	Wayside C&S							**$1,694,500**
	Intermediate Signals	MP 52.40			1.00	LS	$1,694,500	$1,694,500

Construction Subtotal	$27,058,952
Contigency (35%)	$8,117,686
Soft Cost (60%)	$21,105,983
Total (W/O System & ROW)	**$56,282,620**
Say	**$56,300,000**

AVL STUDY CIP COST ESTIMATE
Acton Siding
MP: 55.0 to 57.5

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
New Ballast Track					11,938	TF	$ 582	**$6,947,916**
	New MT1 for Double tracks		2904+22	2919+46	1524.00			
	New MT1 for Double tracks		2922+00	2951+29	2929.00			
	New MT1 for Double tracks		2964+29	3025+94	6165.00			
	New MT2 for Double tracks		2951+16	2964+36	1320.00			
Realigned Track					3,778	TF	$ 700	**$2,644,600**
	Realign Exist MT1 to MT2		2912+29	2926+70	1441.00			
	Realign Exist MT1 to MT2		2945+37	2951+16	579.00			
	Realign Exist MT1 to MT2		2964+36	2981+94	1758.00			
TO#10					-	EA	$ 125,000	**$0**
TO#20					2	EA	$ 300,000	**$600,000**
	MT2-MT1 RH	MP 55.00	2904+22		1.00			
	MT1-MT2 LH	MP 57.31	3025+94		1.00			
TO#20 Crossover					-	EA	$ 1,500,000	**$0**
At-Grade Signalized Crossing Modification					50	TF	$ 1,520	**$76,000**
	Crown Valley Rd @GX	MP 56.16			50.00			
At-Grade Non-Sig Crossing Modification					-	TF	$ 800	**$0**
At-Grade Ped Crossing Modification					-	EA	$ 8,000	**$0**
New At-Grade Ped Crossing					-	EA	$ 15,000	**$0**
EARTHWORK								
Retainied Cut					-	LF	$ 3,000	**$0**
Retained Fill					-	LF	$ 1,000	**$0**
STRUCTURE								
Ballast Deck Widening					8	TF	$ 10,000	**$80,000**
	RT BD@ MP 55.19	MP 55.19			8.00			
RC Box Culvert (As Bridge or Viaduct)					-	TF	$ 10,000	**$0**
Single Track Bridge (RC Box)					70	TF	$ 15,000	**$1,050,000**
	Widening Bridge @ 56.22	MP 56.22			70.00			
Single Track Bridge (Steel Beam)					-	TF	$ 15,000	**$0**
DRAINAGE								
36" Pipe					-	LF	$ 2,400	**$0**
60" Pipe					15	LF	$ 2,600	**$39,000**
	42" RCP @ MP 55.75	MP 55.75			15.00			
84" Pie					-	LF	$ 3,000	**$0**
RCB 8'x8'					-	LF	$ 10,000	**$0**
Other Cross Drain					120	LF	$ 1,500	**$180,000**
	Ext 12" CIP @ MP 55.32	MP 55.32			15.00			
	Ext 24" RCP @ MP 55.42	MP 55.42			15.00			
	Ext 12" RCP @ MP 55.51	MP 55.51			15.00			
	Ext 24" CMP @MP 55.57	MP 55.57			15.00			
	Ext 18" RCP @ MP 55.91	MP 55.91			15.00			
	Ext 18" CMP @ MP 56.06	MP 56.06			15.00			
	Ext 24" RCP @ MP 57.25	MP 57.25			15.00			
	Ext 24" RCP @ MP 57.33	MP 57.33			15.00			
UTILITIES								
FO Relocation					6,550	LF	$ 700	**$4,585,000**
	SPRINT	MP 55-55.9	2904+00	2951+50	4750.00			
	SPRINT	MP 56.14-56.48	2964+00	2982+00	1800.00			
STATION								
At-Grade Platform					-	EA	$ 1,000,000	**$0**
SIGNALS								
Grade Crossing Warning Devices								**$530,000**
	Crown Valley Road	MP 56.16			1	LS	$530,000	$530,000
Wayside C&S								**$2,567,000**
	End of siding signals, enclosure, testing, cabling	MP 54.90			1	LS	$2,567,000	$2,567,000

Construction Subtotal	$19,299,516
Contigency (35%)	$5,789,855
Soft Cost (60%)	$15,053,622
Total (W/O System & ROW)	**$40,142,993**
Say	**$40,200,000**

AVL STUDY CIP COST ESTIMATE
Palmdale North
MP: 68.5 to 72.0

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				18,735	TF	$ 582	**$10,903,770**
	New MT2 for Double tracks		3617+75	3805+10	18,735			
	Realigned Track				-	TF	$ 700	**$0**
	TO#10				-	EA	$ 125,000	**$0**
	TO#20				2	EA	$ 300,000	**$600,000**
	MT2-MT1 RH	MP 72.07	3805+10		1			
	MT1-MT2 LH	MP 68.52	3617+75		1			
	TO#20 Crossover				-	EA	$ 1,500,000	**$0**
	At-Grade Signalized Crossing Modification				262	TF	$ 1,520	**$398,240**
	Sierra Hwy @GX	MP 69.32			166			
	Rancho Vista Blvd @GX	MP 69.95			96			
	At-Grade Non-Sig Crossing Modification				12	TF	$ 800	**$9,600**
	Ave N PVT @GX	MP 71.99			12			
	At-Grade Ped Crossing Modification				0	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				1	EA	$ 15,000	**$15,000**
	For Palmdale Sta Center Platform emergency access	MP 69.19			1			
EARTHWORK								
	Retainied Cut				0	LF	$ 3,000	**$0**
	Retained Fill				1770	LF	$ 1,000	**$1,770,000**
	Drainage Channel Bank N to station	MP68.76-68.92			870			
	Drainage Channel Bank S to Station	MP69.41-69.58			900			
STRUCTURE								
	Ballast Deck Widening				0	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				2,564	TF	$ 15,000	**$38,460,000**
	Beneath MT2 via Station	MP68.96-69.41	3639+12	3664+76	2,564			
	Single Track Bridge (RC Box)				42	TF	$ 15,000	**$630,000**
	MT2 Crossing Drainage Channel @ 69.60	MP 69.60			42			
	Single Track Bridge (Steel Beam)				0	TF	$ 15,000	**$0**
	Grade Sep Ped Crossing				1	EA	$ 1,000,000	**$1,000,000**
	For Palmdale Sta Center Platform access	MP 69.21			1			
DRAINAGE								
	36" Pipe				0	LF	$ 2,400	**$0**
	60" Pipe				0	LF	$ 2,600	**$0**
	84" Pie				0	LF	$ 3,000	**$0**
	RCB 8'x8'				15	LF	$ 10,000	**$150,000**
	27"x43" CMPA	MP 68.78			15			
	Other Cross Drain				0	LF	$ 1,500	**$0**
UTILITIES								
	FO Relocation				0	LF	$ 700	**$0**
STATION								
	At-Grade Platform				2	EA	$ 1,000,000	**$2,000,000**
	Center Platofrm at Palmdale Station (counted as 2 side platform for cost estimating)				2			
SIGNALS								
	Grade Crossing Warning Devices							**$1,660,000**
	Sierra Highway	MP 69.32			1		$668,000	$668,000
	Rancho Vista Blvd	MP 69.95			1		$992,000	$992,000
	Wayside C&S							**$3,572,000**
	Meter service, end of siding signals, enclosure, switch machines, crossover, cabling, testing	MP 68.50			1	LS	$3,572,000	$3,572,000

Construction Subtotal	$61,168,610
Contigency (35%)	$18,350,583
Soft Cost (60%)	$47,711,516
Total (W/O System & ROW)	**$127,230,709**
Say	**$127,300,000**

AVL STUDY CIP COST ESTIMATE
Lancaster Station
MP: 76.2 to 79.5

Guideway, Station & Site Costruction

Catogory	Item	MP	Beg Sta	End Sta	Quantity	Unit	Unit Price	Item Cost
TRACKWORK								
	New Ballast Track				3,624	TF	$ 582	**$2,109,168**
	New storage track (crossing W Lancaster Blvd)	MP 76.66-76.72			260.00			
	New storage track 1	MP 76.75-76.95			1045.00			
	New storage track 2	MP 76.73-76.95			1172.00			
	New storage track 3	MP 76.734-76.95			1147.00			
	Realigned Track				3,068	TF	$ 700	**$2,147,600**
	Realing Exist MT1 to MT2 in Station		4036+12	4045+40	928.00			
	Convert Exist Service Track to MT1 in Station		4024+10	4045+50	2140.00			
	TO#10				1	EA	$ 125,000	**$125,000**
	For storage Tracks	MP 76.73			1			
	TO#20				1	EA	$ 300,000	**$300,000**
	MT2-MT1 RH	MP 76.20	4023+36		1			
	TO#20 Crossover				2	EA	$ 1,500,000	**$3,000,000**
	Equalateral TO#20	MP 76.66			1			
	Equalateral TO#20	MP 76.72			1			
	At-Grade Signalized Crossing Modification				102	TF	$ 1,520	**$155,040**
	W Lancaster Blvd @GX	MP 76.70			102			
	At-Grade Non-Sig Crossing Modification				-	TF	$ 800	**$0**
	At-Grade Ped Crossing Modification				-	EA	$ 8,000	**$0**
	New At-Grade Ped Crossing				2	EA	$ 15,000	**$30,000**
	For Center Platform access	MP 76.47 & 76.61			2			
EARTHWORK								
	Retainied Cut				-	LF	$ 3,000	**$0**
	Retained Fill				-	LF	$ 1,000	**$0**
STRUCTURE								
	Ballast Deck Widening				-	TF	$ 10,000	**$0**
	RC Box Culvert (As Bridge or Viaduct)				-	TF	$ 15,000	**$0**
	Single Track Bridge (RC Box)				-	TF	$ 15,000	**$0**
	Single Track Bridge (Steel Beam)				-	TF	$ 15,000	**$0**
	Grade Sep Ped Crossing				-	EA	$ 1,000,000	**$0**
DRAINAGE								
	36" Pipe				-	LF	$ 2,400	**$0**
	60" Pipe				-	LF	$ 2,600	**$0**
	84" Pie				-	LF	$ 3,000	**$0**
	RCB 8'x8'				-	LF	$ 10,000	**$0**
	Other Cross Drain				-	LF	$ 1,500	**$0**
UTILITIES								
	FO Relocation				-	LF	$ 700	**$0**
STATION								
	At-Grade Platform				2	EA	$ 1,000,000	**$2,000,000**
	Center Platofrm at Lancaster Station				1			
	Modify existing side platform at Lancaster Station				1			
SIGNALS								
	Grade Crossing Warning Devices							**$3,710,000**
	East Avenue M	MP 73.02			1	LS	$992,000	$992,000
	West Avenue K	MP 75.04			1	LS	$992,000	$992,000
	West Avenue J	MP 76.05			1	LS	$1,010,000	$1,010,000
	West Lancaster Blvd.	MP 76.68			1	LS	$716,000	$716,000
	Wayside C&S							**$863,000**
	Crossover signals, switch machines, testing, cabling	MP 76.20			1	LS	$863,000	$863,000

Construction Subtotal	$14,439,808
Contigency (35%)	$4,331,942
Soft Cost (60%)	$11,263,050
Total (W/O System & ROW)	**$30,034,801**
Say	**$30,100,000**

APPENDIX 3 – ATTACHMENT 5

AVL FUNDING AND FINANCING OPPORTUNITIES MEMORANDUM

FUNDING AND FINANCING OPPORTUNITIES

There are numerous local, state, and federal funding and financing sources that could be sought to cover pre-construction and construction costs for projects identified and prioritized as part of the Los Angeles County Transportation Authority's (Metro) Antelope Valley Line Study (AVL Study). Such projects will be identified at a later date, so the following presents funding and financing sources that may be available to fund the types of commuter rail projects likely to come out of the AVL Study that will enhance Metrolink service between the Burbank and Lancaster stations along the AVL by mitigating existing operational constraints. These projects will be needed to improve overall travel time, ridership experience, regional rail services, safety, reliability and community connectivity. Below are summaries of the funding and finance opportunities, as well as more innovative arrangements that Metro could pursue, that could assist in the project identification and prioritization processes.

FEDERAL PROGRAMS: USDOT

U.S. DEPARTMENT OF TRANSPORTATION BETTER UTILIZING INVESTMENTS TO LEVERAGING DEVELOPMENT (BUILD; FORMERLY TIGER)

DESCRIPTION:

Congress has not completed its FY 2019 appropriations for the next round of discretionary grant funding for transportation projects across the country in the 11th round of the highly competitive BUILD (formerly TIGER) grant program. However, the program is likely to include between $750 million to $1 billion in federal funds intended to leverage money from private sector partners, states, local governments, metropolitan planning organizations and transit agencies. The Senate's legislation would mandate that USDOT use the merit criteria laid out in the Obama Administration's 2016 TIGER Notice of Funding Opportunity (NOFO), and not use the Federal share or an applicant's ability to generate non-Federal revenue as a selection criteria in awarding projects. The House's bill would mandate that BUILD project selections be evenly divided between urban and rural locations and calls for $250 million to be used for port projects.

Last year, Congress appropriated $1.5 billion for the FY 2018 round of BUILD. This is the highest total amount for the program since its creation as part of the 2009 American Recovery and Reinvestment Act. FY 2018 BUILD applications were due on July 19, 2018. Of the $1.5 billion available, at least $450 million must be awarded to rural projects and up to $15 million may be awarded for planning and design activities. Applicants were to match BUILD funds with a minimum of 20 percent non-federal funds (no local match in rural areas). USDOT has not announced awards yet, but will provide a maximum of $25 million and a minimum of $5 million to a single project ($1 million in rural areas).

The purpose of the BUILD grant program remains the same as TIGER – to support surface transportation projects that are difficult to fund through traditional federal programs and have a significant local or regional impact. To reflect the current Administration's Infrastructure Initiative, USDOT plans to award a greater share of BUILD funding to projects in rural areas that align well with the merit criteria than to than to those in urban areas. USDOT is also prioritizing local government action to raise new sources of revenue with a new criterion to evaluate local activities to generate additional non-Federal revenue for transportation infrastructure. BUILD applications will be evaluated based on eight equally-weighted merit criteria: safety,

WSP USA
Suite 800
444 South Flower Street
Los Angeles, CA 90071

Tel.: +1 213 362-9470
Fax: +1 213 362-9480
wsp.com

economic competitiveness, quality of life, environmental protection, state of good repair, innovation, partnership, and additional non-Federal revenue for infrastructure investments.

PROS & CONS:

- While the BUILD grant program is a unique potential funding opportunity for the AVL Study projects, the likelihood of its continued availability and an application's success in attaining grant funds from a future BUILD round is very limited.
- The capital costs of the projects identified and prioritized as part of the Metro AVL Study are suitable candidates for the BUILD program. However, demand for the grants has historically far exceeded available funds. During the previous eight rounds, the Department received nearly 8,000 applications requesting nearly $146 billion for transportation projects across the country.
- The projects would have to be highly competitive under the program's criteria to be awarded BUILD funds given the current focus on rural highway projects.
- Because the BUILD program was not authorized under the FAST Act, further rounds cannot be administered without specific Congressional appropriations for the program, which the current Administration has omitted in its budget recommendations. Despite this, the program will return in FY 2019.

TIMING OF NEXT ROUND:

The timing of the FY 2019 BUILD round will depend on when Congress passes and the President signs the THUD minibus appropriations bill for FY 2019. USDOT is currently operating under a continuing resolution (CR) that will fund its programs at FY 18 levels through December 7, 2018. The Senate-passed FY 19 Appropriations bill requires USDOT to issue the BUILD NOFO within 60 days of enactment of the Appropriations legislation, have an application deadline within 90 days after the publishing of the BUILD NOFO, and award grants no later than 270 days after enactment of the Appropriations legislation. If this provision remains in an enacted bill and it passes in December, we can expect a NOFO by February 2019, with an application deadline by end of May 2019, and grant awards next summer.

NATIONALLY SIGNIFICANT FREIGHT AND HIGHWAY PROJECTS (INFRA; FORMERLY FASTLANE)

DESCRIPTION:

USDOT's Infrastructure for Rebuilding America (INFRA) competitive grant program, administered by USDOT's Build America Bureau, is authorized at $4.5 billion from Fiscal Year (FY) 2016 through FY 2020. USDOT awarded $759 million to 18 projects in the initial FY 2016 FASTLANE round, $1.5 billion for the FY 2017-2018 INFRA round, and will have $900 million for the FY 2019 round.

INFRA funds are available for projects and programs that leverage federal funds with private and toll revenues, improve safety, and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements. INFRA grants will support the Administration's commitment to fixing our nation's crumbling infrastructure by creating opportunities for all levels of government and the private sector to fund infrastructure, using innovative approaches to improve the necessary processes for building significant projects, and increasing accountability for the projects that are built.

Though primarily a highway and bridge-focused program, INFRA includes a freight project set aside that could potentially support rail projects identified and prioritized as part of Metro's AVL Study. A total of $500 million has been set aside for non-highway freight projects for the 5 year authorization period. After accounting for FY 17-18 awards, approximately $250 million of the multimodal cap remains available.

PROS & CONS:

- AVL projects may be suitable candidates for the INFRA program to the extent that they support national or regional economic vitality by providing freight safety, mobility, and economic benefits, leverages federal funds with non-federal and private funds, demonstrates innovation in environmental review and permitting, project delivery, or safety and technology, and proposes an approach to measure project performance and hold SamTrans accountable for expenditure of funds.

- Unlike BUILD, the Administration is fully supportive of this program, which "provides dedicated, discretionary funding for projects that address critical issues facing our nation's highways and bridges." In addition, it is authorized under the FAST Act and tied to federal highway appropriations, which is not at risk of cuts or elimination. Thus, it can be viewed as a reliable potential source of project funding.
- INFRA awards are bigger than BUILD awards. The last BUILD round capped awards at $25 million, while INFRA has no such cap. In fact, the largest grant during the prior INFRA round was $184.1 million for Georgia's SR 400 Express Lanes project.
- Like BUILD, INFRA is highly competitive. In the last FY 17-18 round, USDOT received 234 applications and awarded 26. Thus, it would compete with many rail, intermodal and port projects for the $250 million remaining in the non-highway freight project set-aside. Rail grade-separation projects are not included in this set-aside, and would compete against the larger pot for highway and bridge projects.

TIMING OF NEXT ROUND:

Applications for the next (FY 2019) round are likely to be due in late 2018.

FEDERAL PROGRAMS: FEDERAL TRANSIT ADMINISTRATION

CAPITAL INVESTMENT GRANTS

DESCRIPTION:

As FTA's primary grant program for funding heavy rail, commuter rail, light rail, streetcars, and bus rapid transit, this discretionary grant program (Section 5309) requires projects seeking FTA Capital Investment Grant (CIG) funding to complete a series of steps over several years to be eligible for funding. There are three categories of projects under CIG: New Starts, Small Starts, and Core Capacity. For New Starts and Core Capacity projects, the law requires completion of Project Development and Engineering in advance of receipt of a construction grant agreement. For Small Starts projects, the law requires completion of Project Development in advance of receipt of a construction grant agreement. The law also requires projects to be rated by FTA at various points in the process according to statutory criteria evaluating project justification and local funding commitment. CIG funds have historically been awarded for construction activities, following the completion of a Full Funding Grant Agreement (FFGA).

The Expedited Project Delivery for Capital Investment Grants Pilot program has also been authorized to allow up to eight projects over the life of the program to be selected for expedited grant awards. Projects must be supported through a public-private partnership and demonstrate local financial commitment, technical capacity, and a certification that the existing transit system is in a state of good repair (SOGR). Certification that a transit system is in a SOGR would entail FTA certification of its Transit Asset Management Plan. An exception is provided to the state of good repair requirement if the proposed project is a core capacity project that will allow the project sponsor to make substantial progress toward achieving a state of good repair.

PROS & CONS:

- Certain large expansion or capacity projects resulting from the AVL Study would likely be suitable candidates for the CIG program.
- Metro and Metrolink are currently pursuing and will continue to pursue further CIG grants for SCORE and "28 by '28" program projects. Once the projects are completed and the federal investment has shown success, Metro and/or Metrolink could pursue Section 5309 grant funding for other priority projects related to the AVL.
- Current uncertainty related to the federal transit program limits the likelihood of success of attaining such federal funds. Though authorized, the program is likely to be funded at lower levels than in the recent past and limited to meet current FFGA commitments.

TIMING OF NEXT ROUND:

Requests to enter into CIG are accepted on a rolling basis and not subject to a NOFO. Requests for expressions of interest to enter into the Expedited Project Delivery for Capital Investment Grants Pilot program are currently being solicited by FTA with a due date of November 13, 2018.

STATE OF GOOD REPAIR GRANTS

DESCRIPTION:

This formula program (Section 5337) replaces the fixed guideway modernization program (Section 5309). The federal share of eligible capital costs is 80 percent of the net capital project cost, unless the grant recipient requests a lower percentage.

PROS & CONS:

- This program would be applicable to maintenance and rehabilitation projects that may be identified through the AVL Study, potentially including maintenance of the AVL tracks, rolling stock, and upgrade of existing bridges and tunnels.
- Funding is limited to fixed guideway systems (including rail, bus rapid transit, and passenger ferries) and high intensity bus (buses operating in high occupancy vehicle (HOV) lanes).
- Projects are limited to replacement and rehabilitation (rolling stock, track, line equipment and structures, signals and communications, power equipment and substations, passenger stations and terminals, security equipment and systems, maintenance facilities and equipment, operational support equipment), or capital projects required to maintain public transportation systems in a state of good repair, as well as development and implementation of transit asset management plans.

FEDERAL PROGRAMS: FEDERAL RAILROAD ADMINISTRATION

FAST ACT PROGRAMS

The FAST Act authorizes $2.2 billion over five years for three new competitive rail development grant programs that have not been appropriated by Congress nor had funding availability announced by USDOT:

RESTORATION AND ENHANCEMENT GRANT PROGRAM

- This program provides operating assistance to initiate, restore, or enhance intercity passenger rail transportation. Grants are limited to three years of operating assistance per route and may not be renewed. A NOFO has not been issued to award funds under this program.

CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENTS (CRISI) PROGRAM

Description:

- This program seeks to improve the safety, efficiency, and reliability of passenger and freight rail systems. Eligible activities include a wide range of capital, regional and corridor planning, environmental analyses, research, workforce development, and training projects.
- So far, two rounds of CRISI grants have been awarded. The latest FY 2018 round includes more than $318 million in grant funding from the Consolidated Appropriations Act of 2018 for capital projects that improve intercity passenger and freight rail transportation safety, efficiency, and reliability. $250 million in CRISI funding for positive train control (PTC) systems deployment was provided under a separate NOFO published in May 2018.

Pros and Cons:

- The CRISI grant program directs at least 25 percent of available funds towards rural communities, thereby limiting the amount of funds available to AVL Study-identified projects.
- Selection preference will be given to projects with a 50-percent non-federal funding match from any combination of private, state, or local funds.

- Criteria include: supporting economic vitality; leveraging federal funding; preparing for life-cycle costs; using innovative approaches to improve safety and expedite project delivery; and holding grant recipients accountable for achieving specific, measurable outcomes.

Timing of Next Round:

- Applications for the current FY 18 round are due on October 12, 2018. Another round is likely to occur following enactment of the FY 2019 THUD Appropriations bill with a NOFO anticipated by mid-2019.

FEDERAL PROGRAMS: FINANCING

TRANSPORTATION INFRASTRUCTURE FINANCE AND INNOVATION ACT (TIFIA) LOANS

DESCRIPTION:

Administered by the Build America Bureau, the TIFIA program provides important financing debt options (direct loans, loan guarantees, and standby lines of credit) for large projects and public-private partnerships. Broadly speaking, TIFIA provides credit assistance for qualified projects of regional and national significance. The FAST Act authorized TIFIA at $285 million for FY 2018 and $300 million for FY 2019 and FY 2020, representing a cut to the TIFIA program from prior levels ($750 million in FY 2013 and $1 billion in FY 2014) that could constrain growth in the program's lending capacity over the course of time.

Any highway and transit capital project eligible for federal aid is eligible for the TIFIA program. Major requirements include a capital cost of at least $50 million (or 33.3 percent of a state's annual apportionment of Federal-aid funds, whichever is less). TIFIA is limited to a maximum of 33 percent of the total eligible project costs, unless the sponsor provides compelling justification for up to 49 percent. Senior debt must be rated investment grade. The project also must be supported in whole or in part from user charges or other non-federal dedicated funding sources and be included in the state's transportation plan.

Qualified projects are evaluated by the US Transportation Secretary against eight statutory criteria, including, among others, impact on the environment, significance to the national transportation system, and the extent to which they generate economic benefits, leverage private capital, and promote innovative technologies. Eligible candidates for the TIFIA program must meet the following requirements:

- Creditworthiness:
- Ability to satisfy applicable creditworthiness standards
- Rate covenant, if applicable
- Adequate coverage requirements to ensure repayment
- Ability to obtain investment grade ratings on senior debt;
- Foster partnerships that attract public and private investment for the project;
- Ability to proceed at an earlier date or reduced lifecycle costs (including debt service costs);
- Reduce contribution of federal grant assistance for the project; and
- Construction contracting process can commence no more than 90 days from execution of a TIFIA credit instrument.

PROS & CONS:

- TIFIA credit assistance could be suitable for construction activities related to the railcar purchase, station improvements, grade separation projects, guideways, and parking components of the AVL Study-identified projects.
- The process to apply and be approved for TIFIA is quite extensive, requiring dedication of user charges or other non-federal funding sources to the project and a positive creditworthiness rating.

TIMING OF NEXT ROUND:

TIFIA applications are accepted on a rolling basis and not subject to a NOFO.

RAILROAD REHABILITATION & IMPROVEMENT FINANCING (RRIF) PROGRAM

DESCRIPTION:

RRIF provides direct loans and loan guarantees to acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, bridges, yards, buildings and shops; refinance outstanding debt incurred for the purposes listed above; and develop or establish new intermodal or railroad facilities. The Build America Bureau administers the program, providing direct loans and loan guarantees up to $35 billion to finance development of railroad infrastructure. Up to $7.0 billion is reserved for projects benefiting freight railroads other than Class I carriers.

PROS & CONS:

- This program would be applicable to construction of the projects identified and prioritized through the AVL Study.
- The financing may be used to acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops; refinance outstanding debt incurred for the purposes listed above; and develop or establish new intermodal or railroad facilities.
- Direct loans can fund up to 100 percent of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing to the government.

TIMING OF NEXT ROUND:

RRIF loan applications are accepted on a rolling basis and not subject to a NOFO.

REVENUE BONDS

DESCRIPTION:

There are two types of revenue bonds that are generally used for transit projects in the United States.

1. **Farebox revenue bonds** use farebox revenues and anticipated grant receipts as collateral for revenue bonds, which can only be backed by fare box revenues if the level of state and local funding committed to transit for the three years following the bond issue are higher than the funds that were committed in the three years prior to the bond issue. Transit agencies must identify another source of funds for the agency's operating expenses before issuing a farebox revenue bond.
2. Similar to GARVEEs, transit agencies can also borrow against future federal-aid funds (FTA Title 49 grants) that are allocated by formula (Section 5307) or by project (Section 5309). These transit debt mechanisms are known as **Grant Anticipation Notes (GANs)**, and do not include debt-related financing costs such as interest and issuance costs. A transit agency issues GANs secured with a pledge of federal-aid assistance, thus amassing up-front capital, and pays down the bonds over a period of time as the Federal funds are received. GANs are available to transit agencies receiving federal transit aid.

PROS & CONS:

- Both farebox revenue and GANs may have wide-ranging applicability to the projects developed through the AVL Study.
- While not a federal funding source, revenue bonds are a source of project financing that may be applicable to the Project. Revenue bonds do not provide new funding; rather, as capital markets debt (i.e., bonds supported by fares, FTA grants, sales taxes, and other revenues sold on the public markets), they accelerate the availability of resources to meet construction needs through leveraging.
- Revenue bonds are distinct from federal loans (e.g., TIFIA and RRIF), which are supported by the same revenue sources, but comprise loans between the borrowers and USDOT.

TIMING OF NEXT ROUND:

Bond financing is at the discretion of the transit agency.

STATE PROGRAMS

SENATE BILL 1 (SB 1)

DESCRIPTION:

SB 1, the Transportation Infrastructure and Economic Investment Act, enacted in April 2017, is a $6 billion funding package to improve the State's roads and transportation infrastructure. The revenues come from the elimination of the Board of Equalization's annual adjustment of the gas excise tax, restoration of the price-based gas excise tax rate to 17.3 cents, increasing and indexing the base gas excise tax by an additional 12 cents over three years, increasing the diesel excise tax by 20 cents and sales tax by 4 percent, an annual $100 fee for zero-emission vehicles, a vehicle registration adjustment of $38 per vehicle, restoration of existing weight fees, increasing the Cap and Trade allocation for transit, CalTrans efficiency improvements, and acceleration of General Fund loan repayment obligations.

SB 1 created the following programs administered by the CTC that may benefit the projects identified and prioritized through the AVL Study:

1. LOCAL PARTNERSHIP PROGRAM (LPP) FORMULAIC PROGRAM

SB 1 made $200 million available annually to reward local or regional transportation agencies that have sought and received voter approval of taxes or that have imposed fees, which taxes or fees are dedicated solely for transportation improvements. Eligible projects include improvements to transit facilities, including guideways, that expand transit services, increase transit ridership, improve transit safety, enhance access or convenience of the traveling public, or otherwise provide or facilitate a viable alternative to driving. For the two-year cycle covering FY 2017-18 and 2018-19, 50 percent of LPP funds will be distributed by formula to match voter-approved transportation taxes, tolls and fees. Metro is receiving $29.1 million in FY 2017-18 (Cycle 1) and $29.97 million in FY 2019 (Cycle 2) under this formulaic distribution. Cycle 2 funds will be directed to the West Santa Ana Branch transit corridor project, as well as the Green Line extension and Transit Access Pass (TAP) Bus Farebox Upgrade - Municipal Transit Operators projects.

2. LPP COMPETITIVE PROGRAM

For the three-year cycle covering Fiscal Years 2017-18, 2018-19 and 2019-20, 50 percent of the remaining LPP funds were made available for a competitive grant program for which applications were due in January 2018. CTC received 90 applications seeking over $900 million, reflecting the high demand for LPP funds. Staff recommendations for funding were issued in April 2018, including $75 million for Metro's Orange Line Bus Rapid Transit Improvements project.

3. TRADE CORRIDORS ENHANCEMENT PROGRAM (TCEP)

TCEP funds infrastructure improvements on federally-designated Trade Corridors of National and Regional Significance, the Primary Freight Network, as identified in the California Freight Mobility Plan, and along other corridors that have a high volume of freight movement. The Program builds on the 2007 Proposition 1B Trade Corridors Improvement Fund program, as well as the 2014 California Freight Mobility Plan and the 2015 California Sustainable Freight Action Plan. In January 2018, the California Transportation Commission (CTC) received 42 project nominations consisting of 55 individual projects seeking over $1.96 billion. In May 2018, it awarded $1.39 billion in federal and state freight funds for the initial 2018 TCEP round to 28 projects valued at more than $4 billion. This included Metro's Southern California Rail Projects bundle, SR 605 / 91 Interchange Improvement: Gateway Cities Freight Crossroads Project, I-5 Golden State Chokepoint Relief, SR 71 Freeway Conversion, and SR 57 / 60 Confluence: Chokepoint Relief Program.

4. SOLUTIONS FOR CONGESTED CORRIDORS PROGRAM (SCCP)

The primary objective of the SCCP is to achieve a balanced set of transportation, environmental, and community access improvements within highly congested travel corridors throughout the state. Funding is available to projects that make specific performance improvements and are a part of a comprehensive corridor plan designed to reduce congestion in highly traveled corridors by providing more transportation choices for residents, commuters, and visitors to the area of the corridor while preserving the character of the local community and creating opportunities for neighborhood enhancement projects. Eligible projects include: new or existing transit infrastructure improvements (such as adding rail capacity, operational and/or safety improvements that allow for faster transit speeds, more reliable service, or more frequent service, improvements at transit stations that allow for improved safety, operational efficiency, or additional capacity); new or existing rail infrastructure (such as construction of track siding to allow for trains to pass; adding railroad capacity by expanding the number of tracks serving the rail corridor; operational and/or safety improvements that allow for faster train speeds; improvements at rail stations that allow for improved safety, operational efficiency, or additional capacity); acquisition of rail cars, locomotives, or other rolling stock; and operational improvements (such as railroad at-grade crossings improvements or separations). CTC established an initial funding cycle for SCCP as a 4-year (FY 2017-18 to FY 2020-21), $1 billion program from the $250 million available annually. 32 project applications were received by CTC in February 2018 for over $2.5 billion in requested funding, reflecting the demand for SCCP funds. Staff recommendations for SCCP funding released in April 2018 include $150 million for Metro's Airport Metro Connector 96th Street Transit Station project. Following this initial program, CTC intends to program three years of funding in subsequent cycles (2020, 2022, etc.) by November 1 of each even-numbered year with two new years of programming capacity added to the program. Projects require at least a 30 percent match of local, state, federal or private funds.

PROS & CONS:

- Competitive grant funding under SB 1 is a viable option to cover the capital costs of the Project (e.g., planning, design, transit stations, rolling stock, grade crossings and separations, extra track).
- However, demand for the grants has exceeded available funds.
- In addition, future rounds may be jeopardized should Proposition 6, the statewide referenda on the 2018 ballot to repeal SB 1, prove successful and be approved.

TIMING OF NEXT ROUND:

If the SB 1 repeal effort fails, the CTC would likely adopt subsequent LPP Competitive Program, TCEP, and SCCP programs in 2020 with calls for projects shortly thereafter (i.e., within three years from today), which may be sufficient to develop the Project to be competitive under the programs' criteria.

CALTRANS FY 2019 TRANSPORTATION PLANNING GRANTS (SUSTAINABLE COMMUNITIES, STRATEGIC PARTNERSHIPS, AND ADAPTATION PLANNING)

DESCRIPTION:

Caltrans will soon be issuing a Call for Projects for these Senate Bill (SB) 1 planning grant funds:

- **$17 million for Sustainable Communities Grants** to encourage local and regional planning that further state and regional goals with a grant minimum of $50,000 for Disadvantaged Communities and $100,000 for all others and grant maximum of $1 million. The Program funds local and regional multimodal transportation and land use planning projects that further the region's Regional Transportation Plan / Sustainable Communities Strategy, contribute to the State's greenhouse gas reduction targets, and assist in achieving the Caltrans Mission and Grant Program Overarching Objectives (sustainability, preservation, mobility, safety, innovation, economy, health, social equity). An 11.47% minimum match is required and may be in the form of an eligible in-kind contribution (e.g., staff time from the primary applicant counts as cash match).

- **Strategic Partnerships**: $3 million in federal funds are available for multimodal planning studies with a focus on transit, in partnership with Caltrans, of regional, interregional and statewide significance.
- **$6 million for Adaptation Planning Grants** to local and regional agencies for climate change adaptation planning with a grant minimum of $100,000 and maximum of $1 million. Program funds support planning actions at local and regional levels that advance climate change adaptation efforts on the transportation system, especially efforts that serve the communities most vulnerable to climate change impacts. An 11.47% minimum match is required and may be in the form of an eligible in-kind contribution (e.g., staff time from the primary applicant counts as cash match).

It is envisioned that these planning grants will provide much needed funding to support regional sustainable communities strategies and ultimately achieve the State's greenhouse gas reductions targets of 40 and 80 percent below 1990 levels by 2030 and 2050, respectively.

TIMING OF NEXT ROUND:

Final Grant Application Guides are anticipated for release in early October, and applications will be due November 2, 2018.

CAP-AND-TRADE PROGRAM

DESCRIPTION:

AB 32 (2006) requires the reduction of greenhouse gas (GHG) emissions to 1990 levels by 2020. In order to meet this goal, the California Air Resources Board (CARB) adopted a "cap-and-trade" program, which places a "cap" on entities responsible for 85 percent of the state's GHG emissions. As part of the program, CARB conducts quarterly auctions and sells emission allowances. Proceeds from the state's cap-and-trade program auctions are deposited into the Greenhouse Gas Reduction Fund (GGRF) and are appropriated by the Legislature. The GGRF supports a number of programs that provide funding for low carbon transportation projects, including:

1 **Transit and Intercity Rail Capital Program (TIRCP)**

Administered by the California State Transportation Agency (CalSTA), TIRCP funds transformative capital improvements that will modernize California's intercity, commuter, and urban rail systems, and bus and ferry transit systems to reduce emissions of greenhouse gases by reducing congestion and vehicle miles traveled throughout California. SB 9 required the program's second grant cycle to approve a five-year program of projects starting with State FY 2018-19 and ending with 2022-23. In April 2018, CalSTA awarded $2.65 billion ($1 billion from the existing continuous appropriation based on 10 percent of the Cap-and-Trade auction proceeds during the programming period plus SB 1 revenues) to 28 projects. This includes nearly $1.1 billion for Metro's Los Angeles Region Transit System Integration and Modernization Program, which supports six key "20 by 2028" projects – the Gold Line Light Rail Transit Extension to Montclair, the East San Fernando Valley Transit Corridor, the West Santa Ana Branch Light Rail Transit Corridor, the Green Line Light Rail Extension to Torrance, the Orange/Red Line to Gold Line Bus Rapid Transit Connector, and the Vermont Transit Corridor project. It also includes $13.2 million for the Antelope Valley Transit Authority (AVTA) and Long Beach Transit (LBT) "From the Desert to the Sea: AVTA and LBT Zero Emission Bus Initiative" and $875.7 million for Metrolink's Southern California Optimized Rail Expansion (SCORE) program.

2 **Low Carbon Transit Operations Program (LCTOP)**

Administered by Caltrans in coordination with Air Resource Board (ARB) and the State Controller's Office (SCO), the LCTOP supports transit projects and operations that reduce GHG emissions. LCTOP provides funds on a formula basis to transit agencies and MPOs for new or expanded bus service, expanded intermodal transit facilities, and may include equipment acquisition, fueling, maintenance and other costs to operate these services or facilities. The amount of funds available is dependent on state-wide auctions of emissions credits. Funds are distributed based on prior use of State Transportation Act funds and is divided in two equal parts: 50 percent is available for regional entities and is distributed based on the ratio of

population of the area under its jurisdiction to the total population of the state; and the other 50 percent is available to transit operators and is distributed based on the ratio of total revenue of each operator during the prior fiscal year to the total revenue (fare) of all operators of the state.

PROS & CONS

- For FY 2017-18, Metro is receiving $29.3 million in LCTOP funding. A portion of this and future LCTOP allocations may cover capital costs of the projects identified by the AVL Study if they are not accounted for already.
- Metro and Metrolink have been successful in competing for TIRCP discretionary grant funds and are leveraging these state dollars to receive FTA CIG funding and potentially private financing for certain projects within the programs they have won TIRCP funds for. Both agencies may pursue TIRCP for future phases of these programs, so AVL Study projects proposed for TIRCP funds may compete with other Metro and Metrolink priorities and should demonstrate reductions in greenhouse gas emissions, improved transit ridership, integration with other rail and transit systems, including high-speed rail, improved rail safety, and benefits to disadvantaged communities. Alternatively, local jurisdictions or transit agencies could sponsor a future TIRCP application for AVL Study project funding.

TIMING OF NEXT ROUND:

The next TIRCP call for projects is not likely to occur for another five years and the LCTOP provides low amounts of funding dependent on Cap-and-Trade revenues. Thus, TIRCP and LCTOP dollars could be used to fund longer-term projects identified through the AVL Study.

LOCAL PROGRAMS

Local governments can fund transportation projects through a range of revenue options, such as sales taxes, special assessments, parking and car rental fees, tax increment financing, and property taxes. These revenues can be applied directly to project costs or used as a repayment stream either for bonds or private investment. Innovative financing is one way to assemble a complete funding package, especially when a region can generate revenue through a local option sales tax or other revenue source.

MEASURE R

Measure R, also known as the *Traffic Relief and Rail Expansion Ordinance*, is a special revenue fund used to account for the proceeds of the voter-approved one-half percent sales tax that became effective on July 1, 2009 and continues for the next 30 years. Measure R is expected to generate $40 billion over its duration. Revenues collected are required to be allocated in the following manner:

3 **2 percent** for rail capital improvements;
4 **3 percent** for Metrolink capital improvement projects within Los Angeles County;
5 **5 percent** for rail operations for new transit project operations and maintenance;
6 **15 percent** for local return;
7 **20 percent** for county-wide bus service operations, maintenance, and expansion;
8 **20 percent** for highway capital projects; and
9 **35 percent** for transit capital specific projects.

MEASURE M

Measure M is a $120 billion voter-approved plan that adds new transit projects and accelerates others previously approved under Measure R. It is paid for by an additional permanent half-cent sales tax increase as well as the continuation of the existing Measure R half-cent sales tax for eternity or until voters decide to terminate the taxes. Revenues collected are required to be allocated in the following way:

1 **2 percent** for walking and biking projects under the Metro Active Transportation Program;

- **5 percent** for Metro rail operations;
- **20 percent** for transit operations with Metro and municipal providers;
- **2 percent** for ADA paratransit for the disabled and Metro discounts for seniors and students;
- **35 percent** for transit construction which includes system connectivity projects like airports, Union Station, and the Countywide bus rapid transit (BRT) program;
- **2 percent** for Metro State of Good Repair;
- **17 percent** for highway construction which includes system connectivity projects like ports, highway congestion programs, and investment in improved goods movement;
- **16 percent** for local return — base where funding will be funneled back to local projects and transit services; and
- **1 percent** to regional rail like Metrolink.

VALUE CAPTURE

Description:

Local government revenues, such as sales taxes, special assessments, parking and car rental fees, tax increment financing, and property taxes, can be applied directly to project costs or used as a repayment stream either for bonds or private investment. Some of these options are value capture methods, or funding mechanisms where landowners who benefit from a transportation project contribute to the pool of funding for the project. Value capture funding approaches aim to link the beneficiaries of a public infrastructure investment to the project by allowing them to pay for portions of the capital or operations and maintenance cost. Value capture includes many types of revenue generating mechanisms, including special assessment district financing, tax increment financing, and development impact fees. As opposed to real estate developments, regional transportation improvements are more difficult to associate value generated by it directly to individuals and businesses. However, value capture is more applicable to rail transit projects than to bus transit projects, and value capture tools can still play a very important part in Metro and Metrolink project funding. Below are common examples of value capture financing mechanisms available to the projects identified as priorities through the AVL Study.

Special Assessment District

A special assessment district is an officially designated area from which additional property taxes are collected for a specific use. The properties (or subset of properties) located within the district boundary would be assessed with a higher tax rate or at a fee expressly to fund the AVL Study project. The benefit of a special assessment district – in addition to the revenue raised from the new tax – is that the revenue stream would exist outside of Metro's or other government entities' existing budget structures, allowing for greater flexibility and independence in decisions about how the funds are used for the AVL Study project.

Special assessment districts can be organized in a variety of ways, depending on the intent of the revenue raised from the district. A special assessment district may levy the additional taxes or fees based on distance from the project, type of land use, total acreage, or frontage. Special assessment districts are typically structured to generate either a specified level of revenue or to last a set number of years. Since special assessment districts are a distinct legal entity, such districts can serve as a vehicle to accept more state and federal funds for transportation needs. Some examples of special assessment districts are: (1) public transit assessment districts (governed by SB 142, enables assessments within a half-mile of transit stations); (2) community facilities or Mello-Roos districts (self-imposed taxes on property owners to finance public services and improvements surrounding a particular development or development area); (3) business-based improvement districts (which levy a tax on participating businesses within a geographic area); and (4) property-based business improvement districts (a self-governed district to augment services).

A shared business tax scheme could be an efficient solution for the AVL corridor. In this instance, businesses across several jurisdictions would be taxed as part of one district or assessment area. Given the geographic scope of the AVL corridor, a shared business special assessment district may raise additional revenue from private parties most likely to benefit from corridor improvements.

Tax Increment Financing (TIF)

Tax increment financing (TIF) is a way of applying the additional property tax revenue generated by the surrounding land after a project is completed. TIF is commonly used in real estate redevelopment projects where the assessed value of a parcel will increase substantially and a portion of that increase is diverted to associated infrastructure or project uses. TIF typically involves local governments financing infrastructure projects within a discrete, defined TIF district through debt that is serviced by the additional property tax revenue generated by surrounding land after a project is completed. Unlike special tax assessment districts, TIF does not involve a tax rate increase. Instead, the rise in property values resulting from the transportation project generates additional revenues that are dedicated to making payments on bonds that finance the projects. Local governments are typically cautious about TIF financing because it obligates bonding capacity and future property taxes, but are more willing to approve TIF financing if the new development will stimulate economic growth in the near-term that would not materialize without it.

In California, concerns over the State's budgetary obligation to backfill diverted property tax funds for local school districts led to the dissolution of Redevelopment Agencies in 2011. As a result, cities and counties were left without a means of utilizing TIF. However, new forms of TIF have emerged to give local jurisdictions options to finance infrastructure and economic development projects:

- *Enhanced Infrastructure Financing Districts* (EIFDs) provide broad authority for local agencies to use tax increment to finance a wide variety of projects, including road Infrastructure. No public vote is required to establish an authority, and though a 55 percent vote is required to issue bonds, other financing alternatives exist. Unlike former redevelopment, this tool imposes no geographic limitations on where it can be used, and no blight findings are required. An EIFD can be used on a single street, in a neighborhood or throughout an entire city. It can also cross jurisdictional boundaries and involve multiple cities and a county. While an individual city can form an EIFD without participation from other local governments, the flexibility of this tool and the enhanced financial capacity created by partnerships will require creative discussions between local agencies on how the tool can be used to fund common priorities.
- *Community Revitalization and Investment Authorities* (CRIAs) focus on assisting with the revitalization of poorer neighborhoods and former military bases. While similar to redevelopment, a CRIA is more streamlined. Accountability measures are included to ensure that the use of the CRIA remains consistent with community priorities, and a 25 percent set-aside is included for affordable housing. Although an initial protest opportunity exists, no public vote is required to establish an authority, and bonds and other debt can be issued after a CRIA is established.
- *Annexation Development Plans* (ADP) allow TIF to be adopted by consenting local agencies to improve or upgrade infrastructure as part of annexing a disadvantaged unincorporated community. An ADP can be implemented by a special district either formed for this purpose or incorporated into the duties of an existing special district. After the Local Agency Formation Commission (LAFCO) approves the annexation, the special district can issue debt without an additional vote.

Of these new tools, EIFDs and CRIAs authorize the broadest uses of TIF allowed in California since Redevelopment. However, EIFDs and CRIAs are more limited than their Redevelopment Agency predecessors. Effective use of these tools will require integrated and innovative financing approaches and cooperation among local government agencies, which poses a large challenge for using TIF as a potential revenue stream for the AVL Study projects.

Developer Contributions

Development impact fees can be collected by a city or county to fund capital infrastructure costs. Direct developer contributions may result from a negotiation between a large developer and the project sponsor during the planning stages of development review or under an Adequate Public Facilities Ordinance. A developer may propose an extension to the new system, additional stops, or a change in alignment that will provide direct benefit to their property (as well as generate additional ridership). In exchange, the project sponsor may request a financial contribution to balance the larger public benefits resulting from greater ridership with the private benefits to the developer.

Public and Private Contributions

Metro may have access to contributions from public and private partners, including the cities along the AVL that will benefit from the AVL Study projects and large institutions and businesses. Contributions from a few key partners have the ability to build

momentum with other governments, institutions and companies with an interest in providing enhanced mobility and access for employees. This effort could replicate the current example of Amazon buying transit assets (rail sets) for the City of Seattle and Sound Transit, in exchange for service improvements and advertising space (train cars).

Pros & Cons

Value capture methods could finance specific AVL Study projects, such as first/last mile bicycle and pedestrian improvements, station access, and park-and-ride facilities, similar to how the City of Alexandria, Virgina financed the Potomac Yard Metrorail Station through a planned mixed-use, transit oriented district. The new station is being entirely self-financed from new development surrounding the station, with $240 million in revenue from a combination of tax-increment financing, two different special tax districts, and developer contributions.

Possibly the largest challenge for using value capture is securing uniform political support for the revenue stream, particularly for the project area given that the impacts are spread over many cities. A private-sector champion or partnership for using this funding approach is critical since they are influential in selling the value that these corridor improvements will provide to industry peers, who together can help generate the political will to support what is essentially a new tax.

ALTERNATE PROJECT DELIVERY METHODS

PUBLIC-PRIVATE PARTNERSHIP (P3)

Public-Private Partnership (P3) is a strategy for procurement which involves a long-term contractual agreement between the government and a private firm targeted towards financing, designing, constructing, maintaining and operating infrastructure facilities and services that were traditionally provided by the public sector. P3 addresses limited funding resources for infrastructure or development projects of the public sector, thereby allowing the allocation of public funds for other local priorities.

Two general forms of P3 structures are common: availability payment- and concession-based P3s.

In availability payment-based P3s, the public authority contracts with a private sector entity to provide a public good, service or product at a constant capacity for a given payment (capacity fee) and a separate charge for usage of the public good, product or service (usage fee). In concession-based P3s, the government grants the private sector the right to build, operate and charge public users of the public good, infrastructure or service, a fee or tariff which is regulated by public regulators and the concession contract.

There are a number of P3 contractual arrangements, such as Design-Build-Operate-and-Maintain, Design-Build-Finance, and Design-Build-Finance-Operate-and-Maintain (DBFOM), which reflect the different appetites for risk and the role of the project proponent (see figure below). A concession-based P3, for instance, such as a tolled highway would likely be a Design-Build-Finance-Operate-and-Maintain contract.

Public Responsibility — Private Responsibility

P3 Options					
New Build Facilities	Private Contract Fee Services	Design Build	Design Build Operate Maintain	Design Build Finance	Design Build Finance Operate Maintain Concession
Existing Facilities	O & M Concession				Long Term Lease Concession

The benefit of private sector engagement through P3 delivery of capital projects is that P3 projects deliver enhanced capital and operating performance through a whole-lifecycle management approach to project execution, mitigating for public sector risks such as lack of up-front, near-term capital funds and technical expertise to deliver the projects. P3 delivery also provides schedule and cost certainty through appropriate transfer of such risks from the public to the private sectors.

P3 is a mechanism to finance a project and transfer risk. Under a P3 contractual arrangement, some of the risks typically assumed by the agency would be transferred to the private partner. For instance, Metro and/or its project partners could lease the rail right-of-way and/or stations to a private entity to design, build, finance, operate and maintain the AVL projects and operations in return for the right to collect fares and other fees. Such revenues could be kept by the private partner, meaning they would be accepting the demand / revenue risk, or demand / revenue risk could be accepted by Metro and/or its partners and the private entity would receive an "availability payment" in exchange. In the availability payment scenario, the payments to the private partner would be linked to performance metrics and a payment schedule, with the contract dictating the facility standards that must be maintained for the private partner to receive the full availability payment in a given period.

P3 projects are best suited for large, complex efforts that harness the power of project finance and risk transfer. As a result, the P3 delivery method requires a different approach to program management, planning and procurement processes to ensure project success.

APPENDIX 3 – ATTACHMENT 6

LANCASTER SERVICE AND INSPECTION FACILITY

Contents

Tables

Figures

Background

Stakeholder Meeting Input on Lancaster Facility

During the February 11, 2019 Antelope Valley Line (AVL) Stakeholder Meeting, SCRRA's representative to the meeting pointed out an additional capital project cost that must be considered. It was pointed out that most of the proposed service scenarios for the AVL assumed that assigned train consists would operate back and forth between Lancaster and/or a short-turn location and Los Angeles Union Station throughout the day. This operating plan differs from current operations where most trains are interlined with other Metrolink service and are serviced during the day at the Central Maintenance Facility (CMF). With assigned trainsets to the AVL service, additional "turn-around servicing" facilities would be needed at Lancaster, since there would be no opportunity to service them mid-day at the CMF.

Approach and Assumptions

The capital projects and cost estimates previously developed for the AVL study already accounted for a second platform track and increased storage tracks at Lancaster, with up to three new 1,000' tracks to be constructed north of the existing station. Thus, to develop a rough-order-of-magnitude (ROM) cost estimate for the additional facility improvements, guidance from SCRRA staff was obtained and the following assumptions were made to address the additional facilities/equipment required for service and inspection:

- Currently the Lancaster layover facility is at capacity - including parking two trainsets on the platform overnight. The facility can't support any more trains overnight, or even any more cars (all trains capped at 4 cars today). Such a facility could not sit on the mainline (i.e. passengers could not ride through it). Based on this guidance, our ROM estimate assumes either one or two service and inspection tracks would be constructed on the added storage tracks already included in our capital project list.
- Currently, trains only receive cleaning/toilet/water service at Lancaster - none of these trains are fueled, sanded, or DEFed at Lancaster and these trains must go into CMF during the day to receive their complete daily servicing. Based on this, our ROM estimate provides for sanding, cleaning, consumables storage, toilet, and water service at Lancaster. The estimate assumes trackside fueling by truck rather than invest in fuel storage tanks and dispensers for this small fleet.
- The ROM estimate assumes one service and inspection facility/track can handle up to six train consists. Accordingly, our ROM estimate includes costing for one service track and for two service tracks, which will cover Service Scenarios 1 through 3.
- Much of the costing was based on the recent Perris Valley Line layover facility in Perris.

Lancaster Facility Service and Inspection Track Facility - Results

Facility Improvements and Cost Estimates

A WSP Senior Supervising Engineer who specializes in rail vehicles and facilities used the above information and the Alignment Drawing from AVL Task 5 (Figure 1) to develop a ROM cost estimate for the two facility sizes. The results are summarized in Table 1 and detailed in Tables 2 and 3.

Revised Total Cost Estimate for Lancaster Single and Double Service Track Projects

The cost of service and inspection improvements for a single service and inspection track improvement, including construction contingency (35%) and soft costs allowance (60%), consistent with the other capital costing conducted for this study, totaled $8.8 million. The cost for a double-service and inspection track improvement totaled $11.8 million.

When these estimates are added to the previously-prepared estimates for the Lancaster platform and storage track improvements, the resulting revised totals for those projects are as follows:

Table 1 – Estimated Capital Cost for Lancaster Station and Terminal Improvements

Lancaster Station Improvements	Original Capital Cost Estimate	Addendum Cost for Service and Inspection Improvements	Revised Total Project Cost
Lancaster Terminal -- 6 trainsets	$27,300,000	$8,815,000	$36,115,000
Lancaster Terminal -- 8 trainsets	$30,100,000	$11,776,000	$41,876,000

Figure 1: Track Alignments - Lancaster Station Improvements

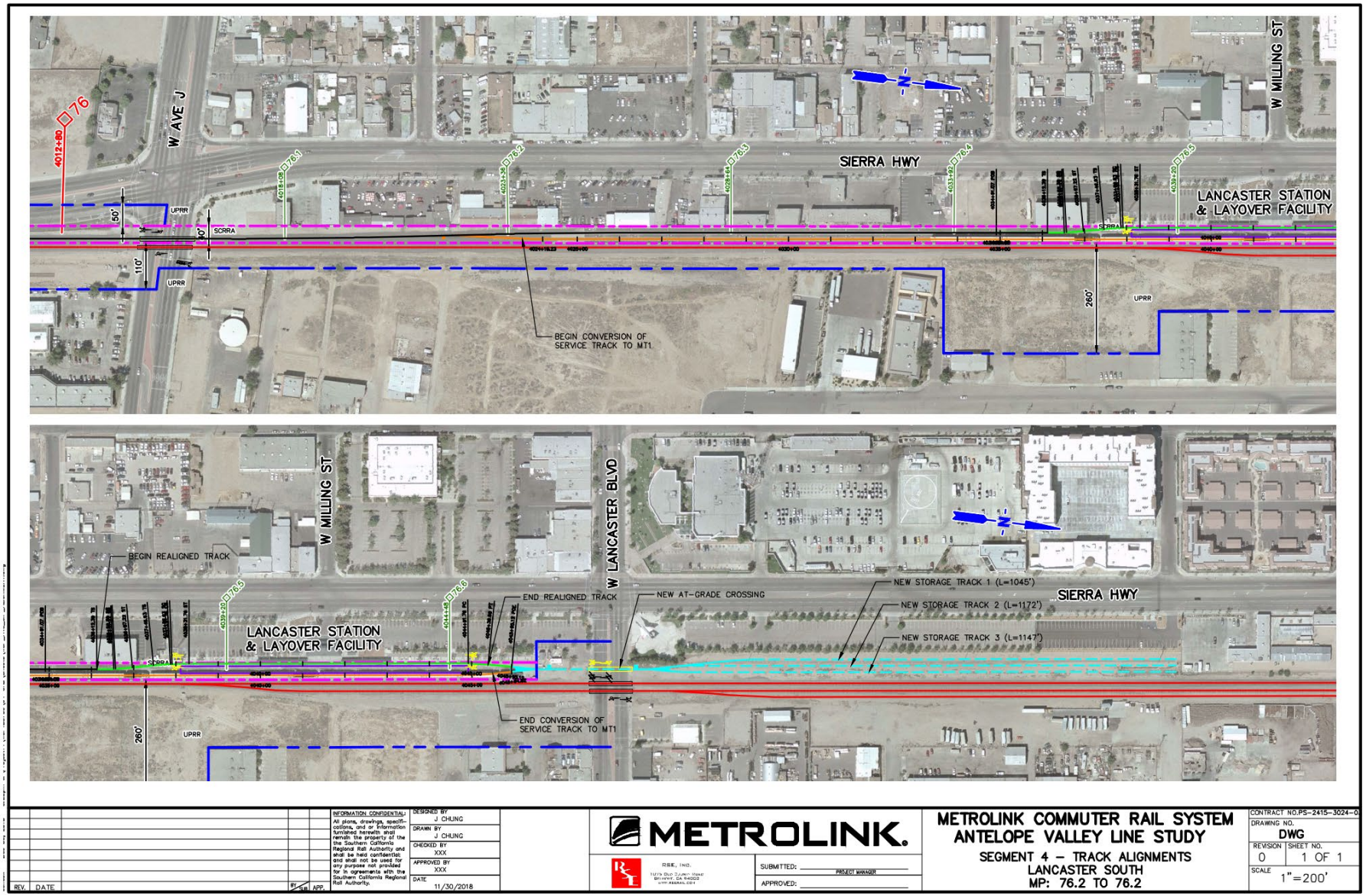

Table 2: Lancaster Station – ROM Cost Estimate for Service and Inspection Improvements – Single Storage Track

METROLINK.

AVL LAYOVER FACILITY - LANCASTER
Project Cost Estimate

Date: 3/10/19

Single Storage Track

Item	Description	Qty	UOM	Cost/unit	Cost
1	Site preparation	120000	sqft	$3	$360,000
2	Porous asphalt - Driveway	20,000	sqft	$2	$40,000
3	Concrete	300	cuyd	$600	$180,000
4	Fencing	2500	ft	$100	$250,000
5	Access Gate	1	ea	$30,000	$30,000
6	CONNEX Box for Consumables Storage (20')	2	ea	$5,000	$10,000
7	Utilities	1	ea	$300,000	$300,000
8	Sanitary Sewer	1	ea	$100,000	$100,000
9	Electrical	1	ea	$300,000	$300,000
10	Plumbing	1	ea	$300,000	$300,000
11	Track pans	4	ea	$10,000	$40,000
12	Sand Tower/system (one sander)	1	ea	$1,400,000	$1,400,000
13	Sanding platform	1	ea	$250,000	$250,000
14	Auxiliary Power Stations	2	ea	$25,000	$50,000
15	Yard Lighting	12	ea	$8,000	$96,000
16	Air Compressor and piping	1	ea	$175,000	$175,000
17	Oil/Water Separator	1	ea	$200,000	$200,000
	Construction Sub-Total				**$4,081,000**
	Construction Contingency (35%)				**$1,428,350**
	Construction Total with Contingency				**$5,509,350**
	Soft Cost (60%)				**$3,305,610**
	GRAND TOTAL COST ESTIMATE				**$8,814,960**
	Say				**$8,815,000**

Table 3: Lancaster Station – ROM Cost Estimate for Service and Inspection Improvements – Double Storage Track

AVL LAYOVER FACILITY - LANCASTER
Project Cost Estimate

Date: 3/10/19

Double Storage Track

Item	Description	Qty	UOM	Cost/unit	Cost
1	Site preparation	120000	sqft	$3	$360,000
2	Porous asphalt - Driveway	40,000	sqft	$2	$80,000
3	Concrete	500	cuyd	$600	$300,000
4	Fencing	2500	ft	$100	$250,000
5	Access Gate	1	ea	$30,000	$30,000
6	CONNEX Box for Consumables Storage (20')	2	ea	$5,000	$10,000
7	Utilities	1	ea	$500,000	$500,000
8	Sanitary Sewer	1	ea	$200,000	$200,000
9	Electrical	1	ea	$500,000	$500,000
10	Plumbing	1	ea	$500,000	$500,000
11	Track pans	8	ea	$10,000	$80,000
12	Sand Tower/system (two sanders)	1	ea	$1,700,000	$1,700,000
13	Sanding platform	1	ea	$250,000	$250,000
14	Auxiliary Power Stations	4	ea	$25,000	$100,000
15	Yard Lighting	24	ea	$8,000	$192,000
16	Air Compressor	1	ea	$200,000	$200,000
17	Oil/Water Separator	1	ea	$200,000	$200,000
	Construction Sub-Total				**$5,452,000**
	Construction Contingency (35%)				**$1,908,200**
	Construction Total with Contingency				**$7,360,200**
	Soft Cost (60%)				**$4,416,120**
	GRAND TOTAL COST ESTIMATE				**$11,776,320**
	Say				**$11,776,000**

ASSUMPTIONS
Yard track are 1200' long
Fueling by truck
Track work not included
Inspection pit not included