Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm

Hydraulic Analysis Report for Goldenstar Creek

RICK Job No. 19427
December 29, 2022
Revised: May 8, 2024

RICK

HYDRAULIC ANALYSIS REPORT
FOR
GOLDENSTAR CREEK

RICK Job No. 19427

-DRAFT-

Brendan Hastie, PE
R.C.E #65809, Exp. 9/25

Prepared for:

TTLC Riverside Chicago, LLC
2942 Century Place, Suite 121
Costa Mesa, CA 92626
Telephone: 949-645-5370

Prepared by:

RICK
Water Resources Division
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

December 29, 2022
Revised: May 8, 2024

TABLE OF CONTENTS

INTRODUCTION 1

Topography 2

HYDROLOGIC DATA 2

HYDRAULIC ANALYSIS 2

Manning's n Values 3

Model Extents and Boundary Conditions 4

Existing Condition Model 5

Proposed Condition Models 6

HYDRAULIC RESULTS 7

Freeboard 7

Riprap Sizing 7

Downstream Impacts 8

Upstream Impacts 8

CONCLUSION 9

APPENDICES

Appendix 1: HEC-RAS Backup Information

Appendix 2: HEC-RAS Workmap

Appendix 3: HEC-RAS Output

HYDRAULIC ANALYSIS
FOR
GOLDENSTAR CREEK

REVISION PAGE

May 8, 2024

This report presents revisions to the December 29, 2022 report pursuant to the emailed response c comments received as part of the 1st plan check review by Riverside County Flood Control and Water Conservation District on the Hydraulic Analysis for Goldenstar Creek. Responses by Rick Engineering are shown below **in bold.**

1. Per the provided cross-sections in the hydraulic report, it looks like there are multiple areas where grading is proposed within or very near to the creek. Due to the project's proximity to the floodplain and per our erosion hazard setback requirements for minor watercourses, with a 100-year flowrate less than 500 cfs, the setback shall be a minimum of 25 feet from the limits of the 100-year water surface elevation. Should you wish to build within the erosion hazard setback area, adequate scour protection such as riprap revetment shall be provided and shown on future exhibits. If proposing to armor the watercourse or channel banks, they shall be publicly maintained. Any such facility shall meet District standards including required maintenance access roads.
   o An erosion hazard zone can be defined as an area where erosion may potentially result in damage to a resource. A "resource" may be inclusive of private or public houses, buildings, apartments, fences, utilities, infrastructure, or other feature of appreciable value**.**

   Noted. Grading is not proposed in the 100-yr flood extents and no "resources" are proposed to be put in the erosion hazard zone.

2. Although the Hydraulic Report was adequate to address some of our concerns regarding the basin location and floodplain limits. In order to provide appropriate future administration of County Ordinance No. 458, the following items shall be submitted to the District for review and approval: a. A floodplain analysis consisting of HEC-RAS calculations, cross sections, maps, reports, and other data prepared to the satisfaction of the District for the purpose of revising the effective SFHA limits. b. Exhibits showing the pre-development and post-development SFHA limits. All hydrologic and hydraulic models, maps and mapping data must be submitted electronically to the District for review and approval.

Noted. The proposed and existing SFHA limits have been included on the hydraulic workmap included in Appendix 2. Electronic copies of the hydraulic models have been included as attachments. Hydrologic backup information for offsite bypass and onsite systems in included in the Drainage Study and Hydrologic backup information for Goldenstar Creek is included in Appendix 4 of the Hydraulic Analysis.

3. The proposed basins on Lot C and D should be revised to meet our LID Handbook requirements (https://rcwatershed.org/permittees/riverside-county-lid-bmp-handbook/#93-98-1-lid-bmp-design-handbook). The embankment side slopes proposed for Lot C and D are both shown as 2:1 slopes which is not acceptable for embankments constructed from fill and should be no steeper than 4:1.

   Basins have been revised to meet LID handbook requirements with 4:1 side slopes. See Appendix 6 of the WQMP for additional information.

4. The inlet structures for both proposed culverts beneath Chicago Ave and Street "E" shall be redesigned to meet the width of the 100-year floodplain limits upstream of the culvert crossings. This will adequately collect and funnel all flows into the proposed culverts. This redesign may increase the disturbed area within the creek.

   Noted. Culvert inlet structure design has been revised to adequately collect and funnel all flows into the proposed culverts.

5. Maintenance access ramps down to the inlet and outlet structures of both culverts should also be shown on any future submittals. Please provide information regarding the operation and maintenance of any proposed flood control facilities including basins and culverts. Adding the maintenance access may also increase the disturbed area within the creek.

   Maintenance access has been provided and will be included in future submittals.

INTRODUCTION

This report presents the hydrologic and hydraulic analysis of the future single-family development Arroyo Vista project. The project site is located north of Van Buren Boulevard on Iris Avenue, west of Chicago Ave, and south of Gentian Avenue in the County of Riverside, California. The site is approximately 140.8 acres. This area incorporates all onsite areas, including the portions of the creek that run through the site. The total offsite tributary area to the outlet of the site is approximately 335 acres. The Vicinity Map shown below as Figure 1 displays the location of the Development.

The reach of the waterbody referred to as Goldenstar Creek by the Santa Ana Regional Water Quality Control Board included in this study extends from the eastern site boundary to the northwestern, where it confluences with a larger unnamed drainage from the north. The primary purpose of this preliminary hydraulic analysis is to assess potential impacts to the water surface elevations within the Goldenstar Creek as a result of the project improvements and to size drainage structures for road crossings. The project has prepared and compared the results of the pre-project and post-project hydraulic capacity ("capacity run") hydraulic models for the project-specific reach of the Goldenstar Creek.

This document includes a summary of the hydrologic information for the site and hydraulic analysis of the proposed improvements adjacent to and across the channel. The calculations included in this document demonstrate the performance of the channel under conditions reflective of the proposed changes in comparison to the existing channel condition.

Design History

It is understood that the Goldenstar Creek in the vicinity of the Chicago Ave project area has historically been agricultural use and has remained undeveloped. The creek drops approximately 125 vertical feet along approximately 3,400 linear feet of channel through the project. Large rock outcroppings are visible via aerial imagery along the side slopes and bottom of the existing creek.

Topography

The topographic information used to develop the hydraulic model within the Chicago Ave Improvements is based project specific topography on the NVD-29 vertical datum developed from an aerial survey conducted by Rick Engineering Company. Cross sections for this hydraulic analysis were created using this topography for existing conditions. Cross sections for proposed conditions were created using this topography combined with project improvement grading elevations.

HYDROLOGIC DATA

Existing and proposed hydrologic calculations for the pre-project and post-project conditions have been conducted in the separate report titled “Drainage Study for Arroyo Vista,” dated May 8, 2024 (and any subsequent versions thereafter) prepared by Rick Engineering Company (Job Number 19427). Contributing offsite flows were also analyzed, resulting in a total tributary area of 335 acres and a peak 100-year flow rate at the end of the downstream project boundary of approximately 534 cubic feet per second (cfs) in the proposed condition. This area includes three flow paths entering the site on the eastern boundary and one flow path entering from the southern boundary. Offsite tributary flows associated with the project location confluence with Goldenstar Creek in both the existing and proposed condition before draining to the northwest corner. The peak flow rate in the Goldenstar Creek used for hydraulic analysis is relatively unchanged between existing and proposed conditions. Post-project Hydrology Maps and hydrologic calculations utilized for the Goldenstar Creek hydraulic model have been provided in Appendix 4.

HYDRAULIC ANALYSIS

The GeoHECRAS computer modeling software was used as a supplemental tool to help build the hydraulic model and the HEC-RAS v.6.2 computer program was used (as the main engine) to execute the hydraulic calculations. The HEC-RAS program is intended for calculating water surface elevations (WSELs) and velocities for supercritical, subcritical,

and mixed flow regimes in natural or man-made channels. The effects of the various obstructions such as culverts may be considered in the computations.

Analyses have been performed to determine the hydraulic characteristics of the existing and proposed conditions within the project-specific reach of Goldenstar Creek.

Manning's n Values

Manning's n-values for the model were based on observations of the channel condition upstream supplemented with site visits performed by Rick Engineering staff. The overbanks consist of light vegetation with many boulder sections. The bottom of the channel contains heavy vegetation with a few marshy habitats. Supporting photos of the channel in the existing condition are included as Appendix 1. The Manning's n value assigned to the cross-sections for hydraulic analysis as specified in the table below are considered to be reflective of a heavily vegetated condition to determine a conservative water surface elevation to check the freeboard provided for the proposed infrastructure and structures.

At this point, it is not known if or where onsite environmental mitigation areas would be proposed in the channel. It is anticipated that if environmental mitigation areas were to be designated in the future, the hydraulic analyses would not need to be revised as the Manning's n value used for the analysis reflects a condition where vegetation would not be cleared or mowed, consistent with an unmaintained channel bottom and/or environmental mitigation area.

Table 1 - Modeled Manning's "n" Values

	"Capacity Condition" Manning's n
Location	
Channel banks and bottom	0.15
Overbanks	0.15

Model Extents and Boundary Conditions

In effort to determine the impacts of proposed improvements of the Arroyo Vista development, the HEC-RAS model extends approximately 200 linear feet upstream of the eastern boundary of the proposed development. To determine the upstream starting water surface elevation, the initial cross section water surface elevation is determined via a normal depth calculation based on a slope of 0.03.

The downstream limit of the model terminates just upstream of the confluence of Goldenstar Creek and a larger tributary from the northeast of the site. To determine the downstream water surface elevation, a normal depth calculation based on a slope of 0.01 is assigned as a boundary condition. The limit of the model is sufficiently downstream to establish the water surface elevation throughout the project. The extent of the analysis is considered to be sufficient to estimate the water surface elevation and velocity through the project area and determine if there are impacts to upstream properties.

Existing Condition Model

The existing condition model reflects the most recently surveyed channel configuration and is intended to study the existing configuration of the portion of Goldenstar Creek running through the project.

a. Existing ***Condition Model – Capacity***

HEC-RAS Files:

The following HEC-RAS files reflect the Existing Capacity Condition hydraulic model for Goldenstar Creek at Arroyo Vista. It includes roughness values that reflect a heavily vegetated and unmaintained state of the channel, as presented by Table 1:

	File:	Title:
Project:	19427_TTLC.prj	19427_TTLC
Plan:	19427_TTLC.p02	Existing_Capacity
Geometry:	19427_TTLC.g02	Existing_Capacity
Flow:	19427_TTLC.f02	Goldenstar - Flow

Proposed Condition Models

The following models were created for design purposes where the adjacent banks have been redefined at varying side slopes and includes the proposed road crossings via culverts.

b. Proposed Condition Model –Capacity

HEC-RAS Files:

The following HEC-RAS files reflect the Proposed Capacity Condition hydraulic model for Goldenstar Creek at Arroyo Vista. It includes roughness values that reflect a heavily vegetated and unmaintained state of the channel, as presented by Table 1. The results of this model may be used to check the capacity of the channel.:

	File:	Title:
Project:	19427_TTLC.prj	19427_TTLC
Plan:	19427_TTLC.p05	Proposed_Capacity_Box
Geometry:	19427_TTLC.g05	Proposed _Capacity_Box
Flow:	19427_TTLC.f01	Goldenstar - Flow_Proposed_Undetained

HYDRAULIC RESULTS

As previously discussed, hydraulic models were created in the GeoHECRAS modeling software and the HEC-RAS v.6.2 program was used to evaluate the hydraulic impacts to Goldenstar Creek of the proposed improvements. The resulting 100-year storm event model output may be found in Appendix 3.

Freeboard

For the channel span adjacent to the proposed development, the minimum amount of freeboard protecting the adjacent properties is approximately 6.5 feet at cross section 4284. The proposed culvert crossings at river stations 4215 and 2159 are not overtopped and have a minimum amount of freeboard of approximately 4 feet and 5 feet, respectively.

Riprap Sizing

Tractive forces and velocities should be considered to determine the minimum riprap size with final design of the culverts and proposed slopes within the floodplain.

Downstream Impacts

Upon comparison of the existing and proposed models, the average channel velocity and WSE downstream of the proposed project is unchanged during the 100 year storm event. Therefore no adverse effects due to the proposed channel improvements are anticipated to the downstream channel from a hydraulic standpoint.

Upstream Impacts

The results of the Proposed Capacity Condition Model indicate that there would be a maximum increase to the water surface elevation of approximately 3.5 feet to the existing water surface elevation at the cross-section 4284 during a 100-year storm event. The proposed condition flow regime matches with the existing condition flow regime at cross-section 4453. The resulting change in water surface elevation does not impact existing upstream structures. Therefore, no adverse effects due to the proposed channel improvements are anticipated to the upstream channel from a hydraulic standpoint.

CONCLUSION

This report presents a hydraulic analysis for a reach of the Goldenstar Creek in support of the proposed Arroyo Vista development project. The HEC-RAS v.6.2 computer program was used (as the main engine) to execute the hydraulic calculations. A maximum increase to water surface elevation of approximately 3.5 feet is indicated by this analysis located within the project reach due to the proposed improvements, specifically the upstream culvert crossing. No adverse effects due to the proposed channel improvements are anticipated to the upstream or downstream channel from a hydraulic standpoint. Freeboard along the banks adjacent to the channel is anticipated to be in excess of 5 feet, and no overtopping is anticipated of the proposed culverts or the proposed pads.

Appendix 1

HEC-RAS Backup Information

Image Date: 1/26/2022

Existing Channel Photos – Arroyo Vista
JN 19427

Image Date: 1/26/2022

Existing Channel Photos – Arroyo Vista
JN 19427

Image Date: 1/26/2022

Existing Channel Photos – Arroyo Vista
JN 19427

Image Date: 1/16/2015

Existing Channel Photos – Arroyo Vista
JN 19427

Image Date: 1/16/2015

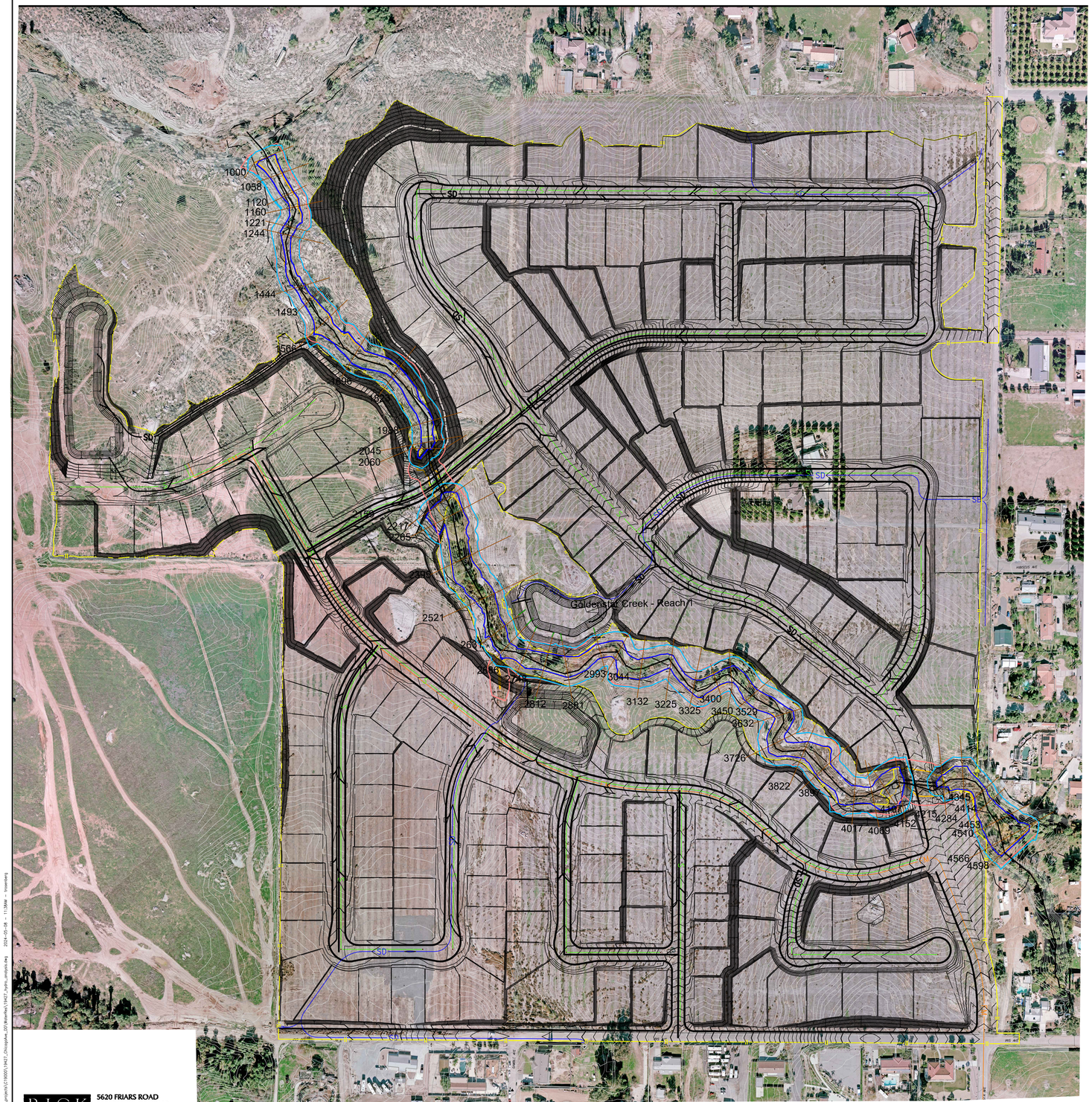
Existing Channel Photos – Arroyo Vista
JN 19427

Image Date: 1/16/2015

Existing Channel Photos – Arroyo Vista
JN 19427

Appendix 2

HEC-RAS Workmap



LEGEND:

- DWR AWARDNESS FLOODPLAIN
- APPROXIMATE HEC-RAS 100-YEAR FLOODPLAIN
- APPROXIMATE HEC-RAS 100-YEAR PRE-PROJECT FLOODPLAIN
- HEC-RAS CROSS SECTION
- CHANNEL BANK STATION
- APPROXIMATE PRE-PORJECT HEC-RAS100-YEAR FLOODPLAIN 25 FT OFFSET
- APPROXIMATE HEC-RAS 100-YEAR FLOODPLAIN 25 FT OFFSET
- PROPOSED GRADING DAYLIGHT LINE
- INEFFECTIVE FLOW AREA

N

150 75 0 150 300 450

GRAPHIC SCALE: 1"=150'

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX)619.291.4165

HYDRAULIC MAP FOR ARROYO VISTA PRELIMINARY ENGINEERING

(PRE & POST-PROJECT)

J-19427

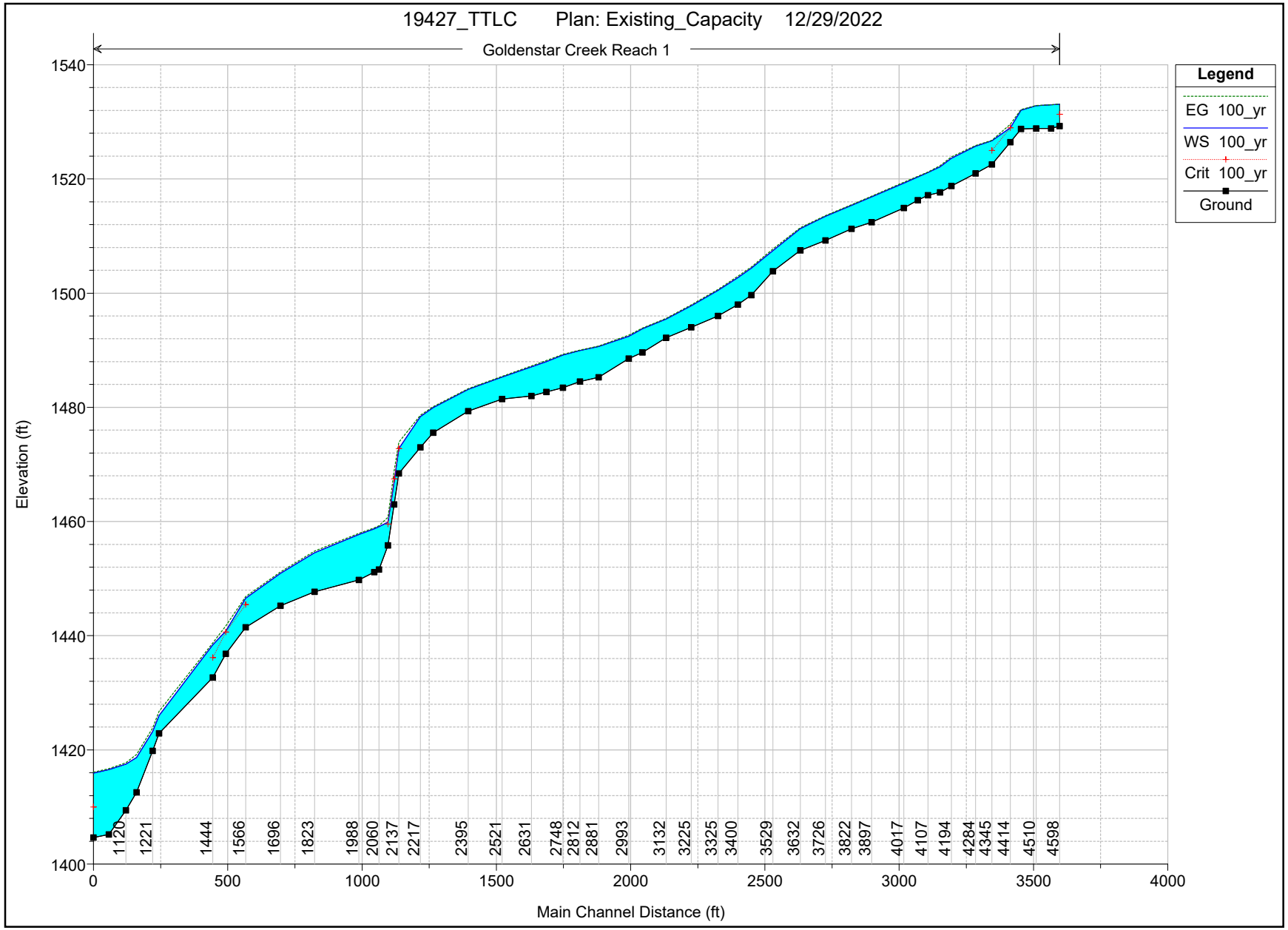
DATE: 02/12/2022
REVISED: 05/08/2024

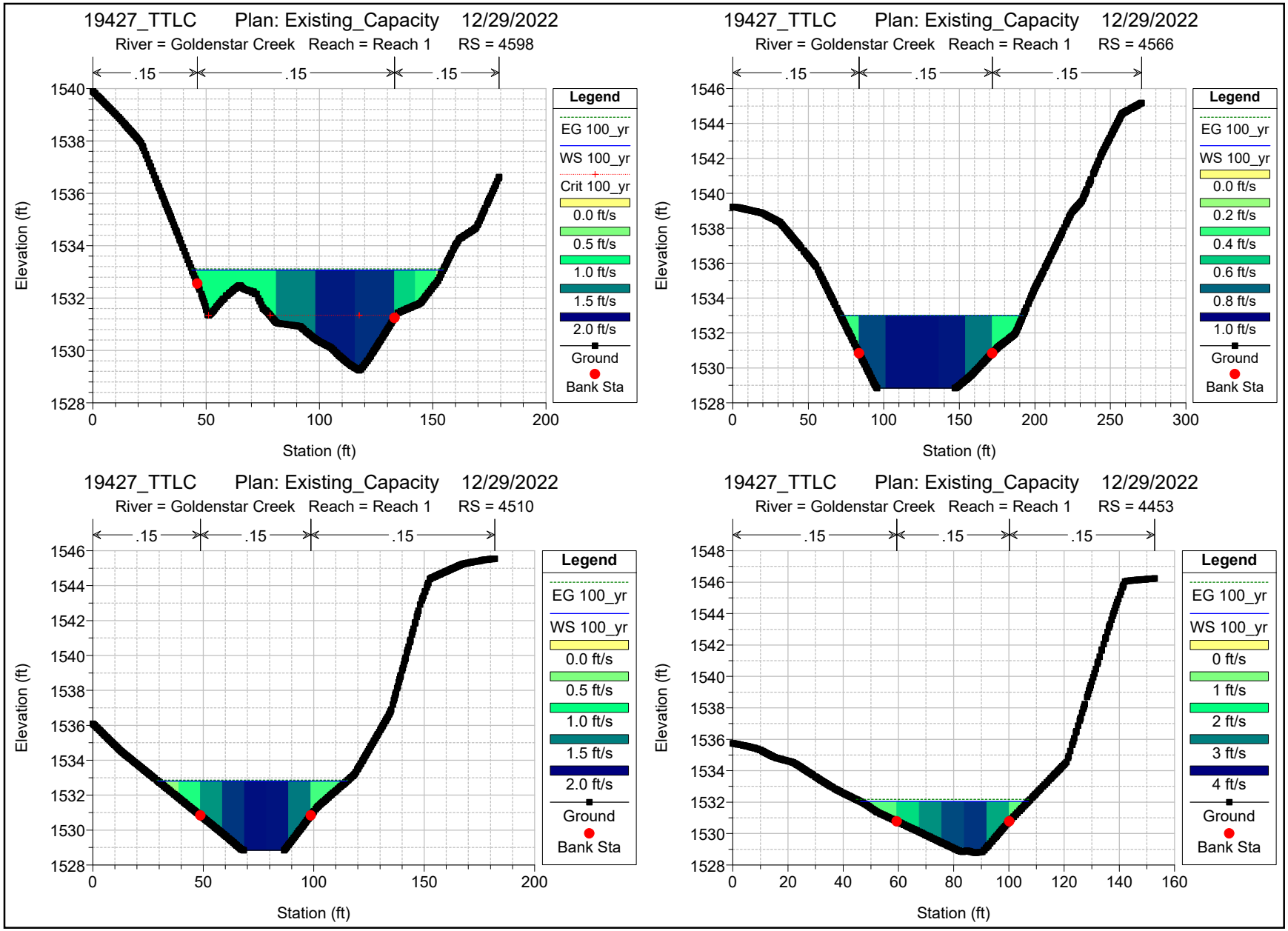
© 2024 Rick Engineering Company

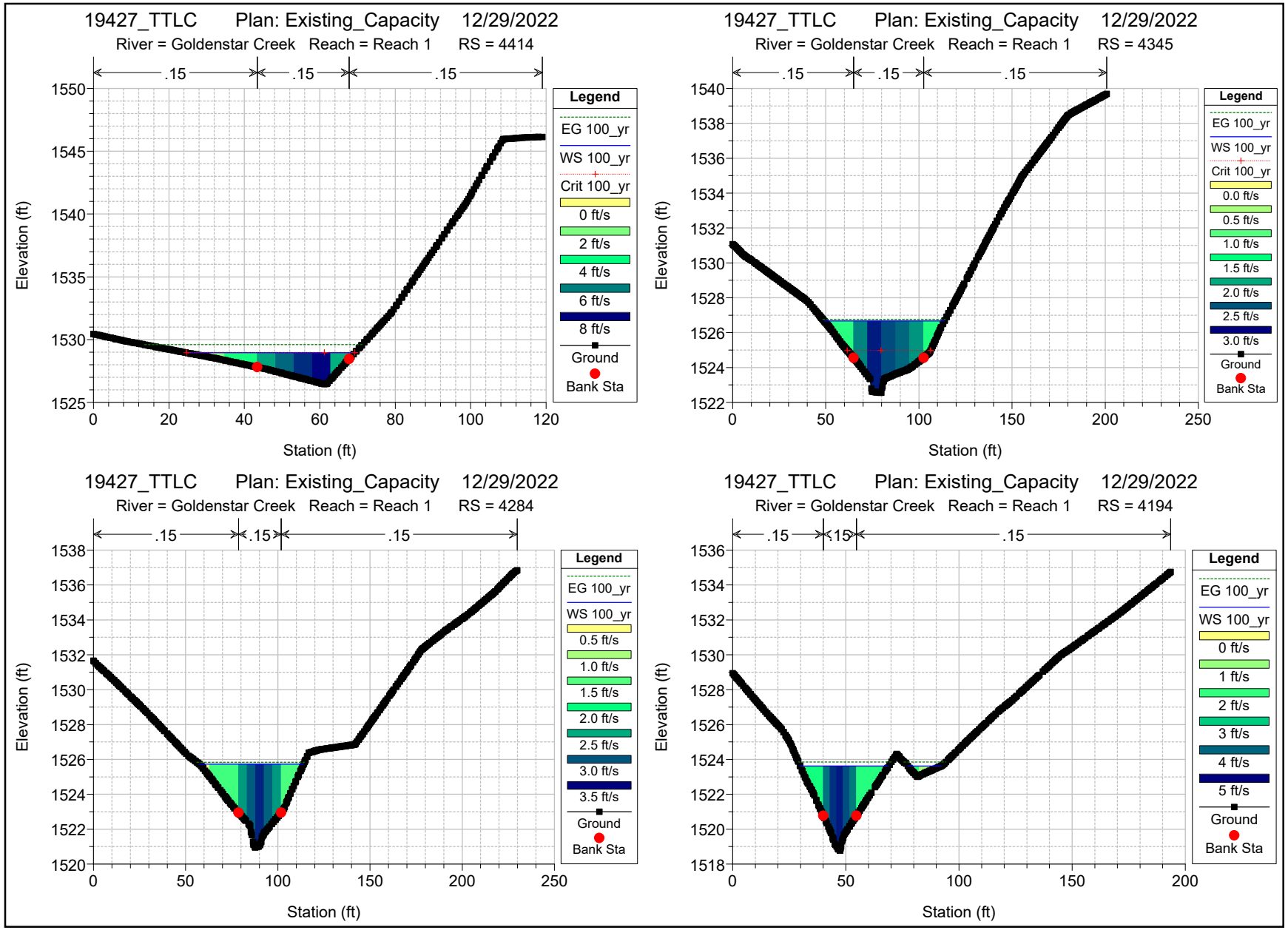
NOT FOR CONSTRUCTION – EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

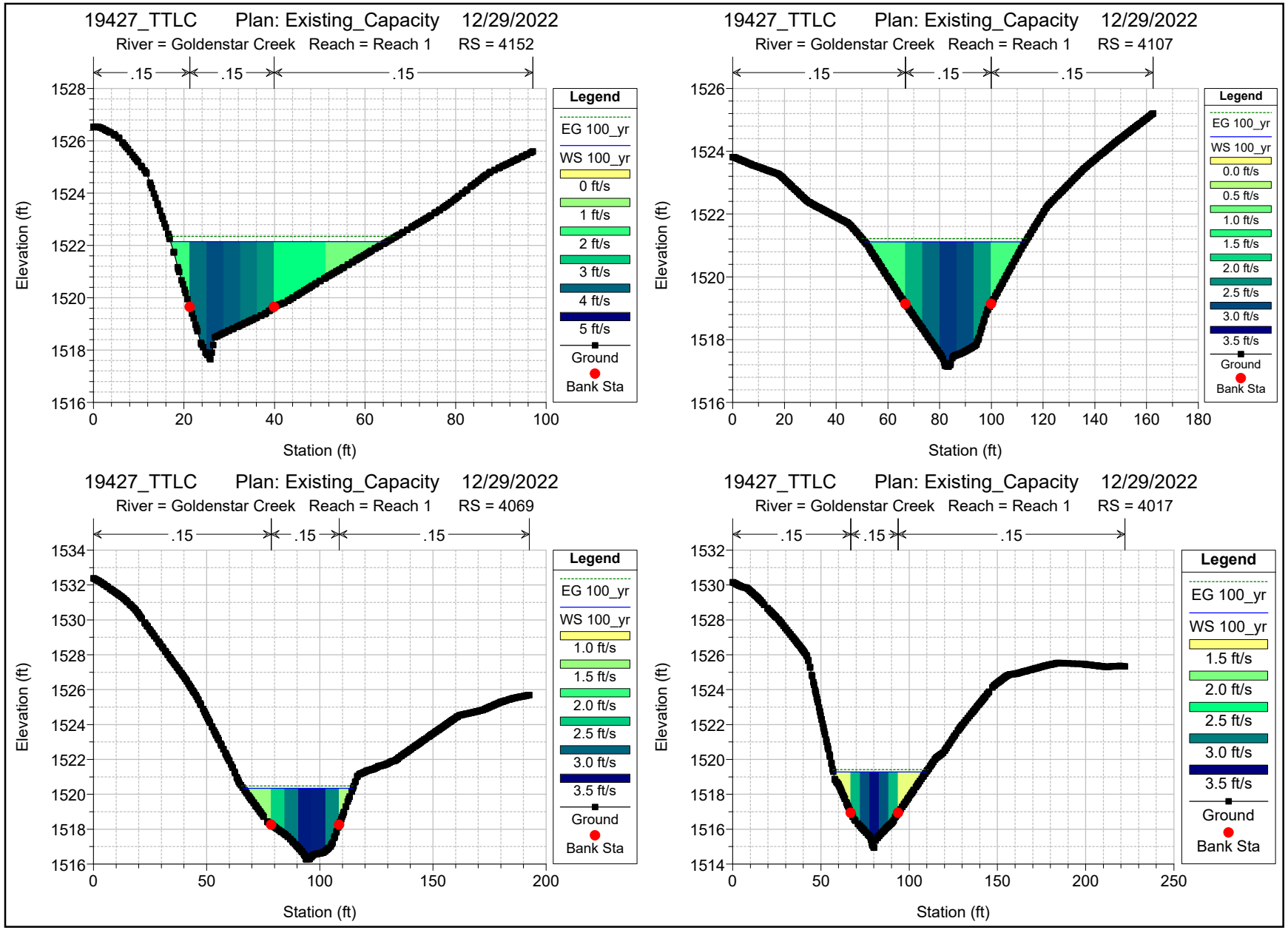
Appendix 3

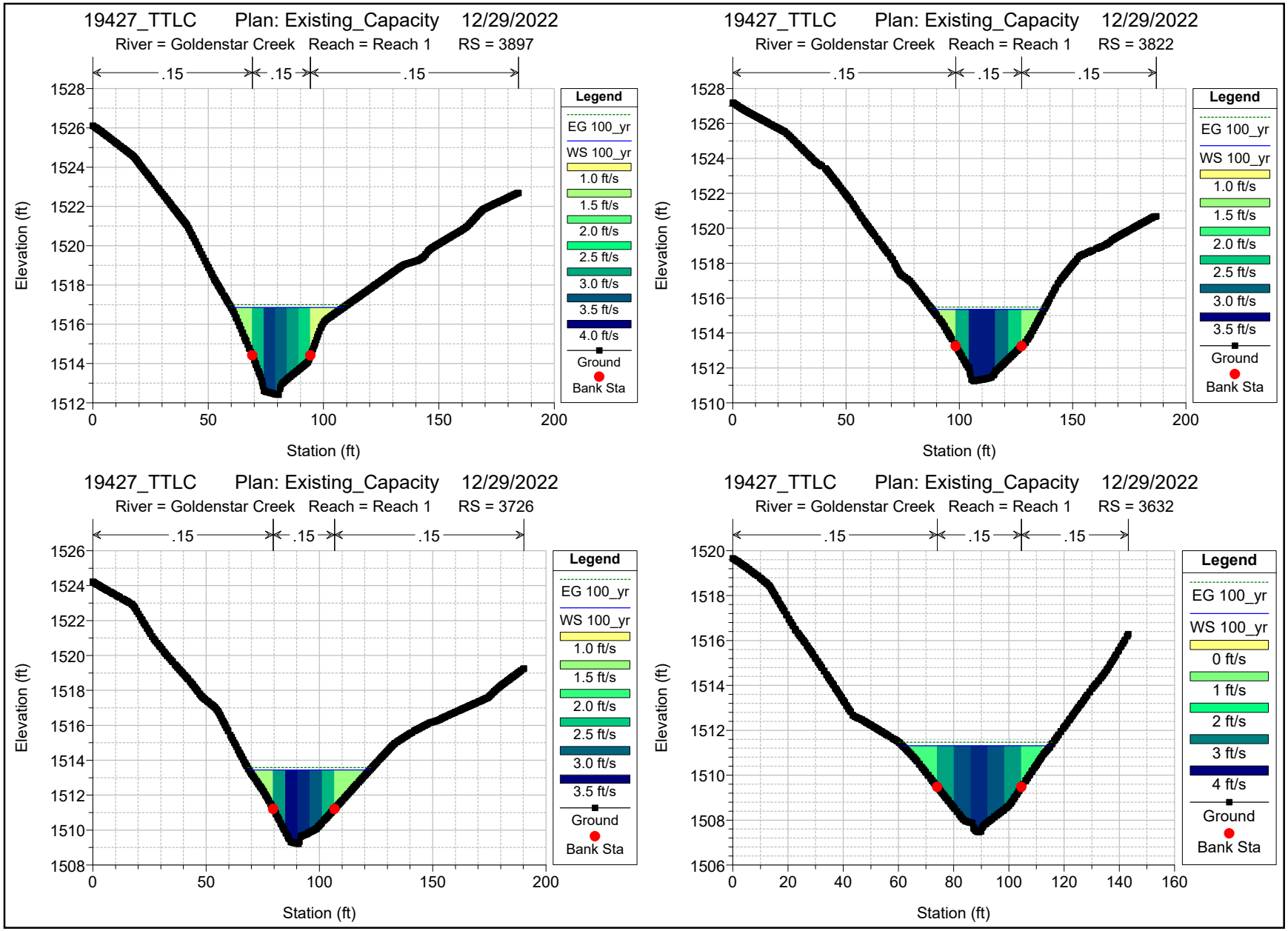
HEC-RAS Output

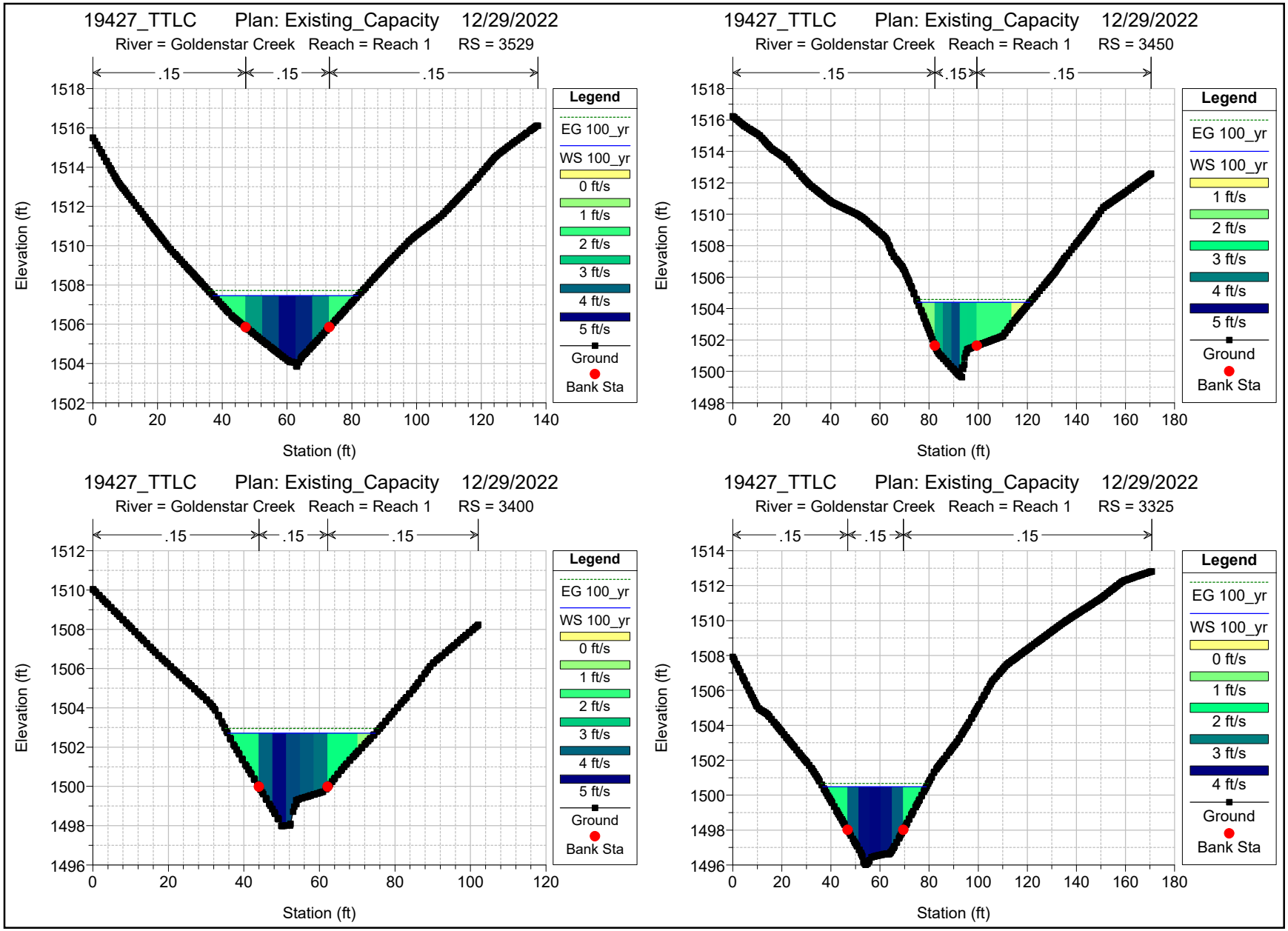

19427_TTLC Plan: Existing_Capacity 12/29/2022
Goldenstar Creek Reach 1
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
Ground
Elevation (ft)
Main Channel Distance (ft)
1540
1520
1500
1480
1460
1440
1420
1400
0
500
1000
1500
2000
2500
3000
3500
4000
1120
1221
1444
1566
1696
1823
1988
2060
2137
2217
2395
2521
2631
2748
2812
2881
2993
3132
3225
3325
3400
3529
3632
3726
3822
3897
4017
4107
4194
4284
4345
4414
4510
4598

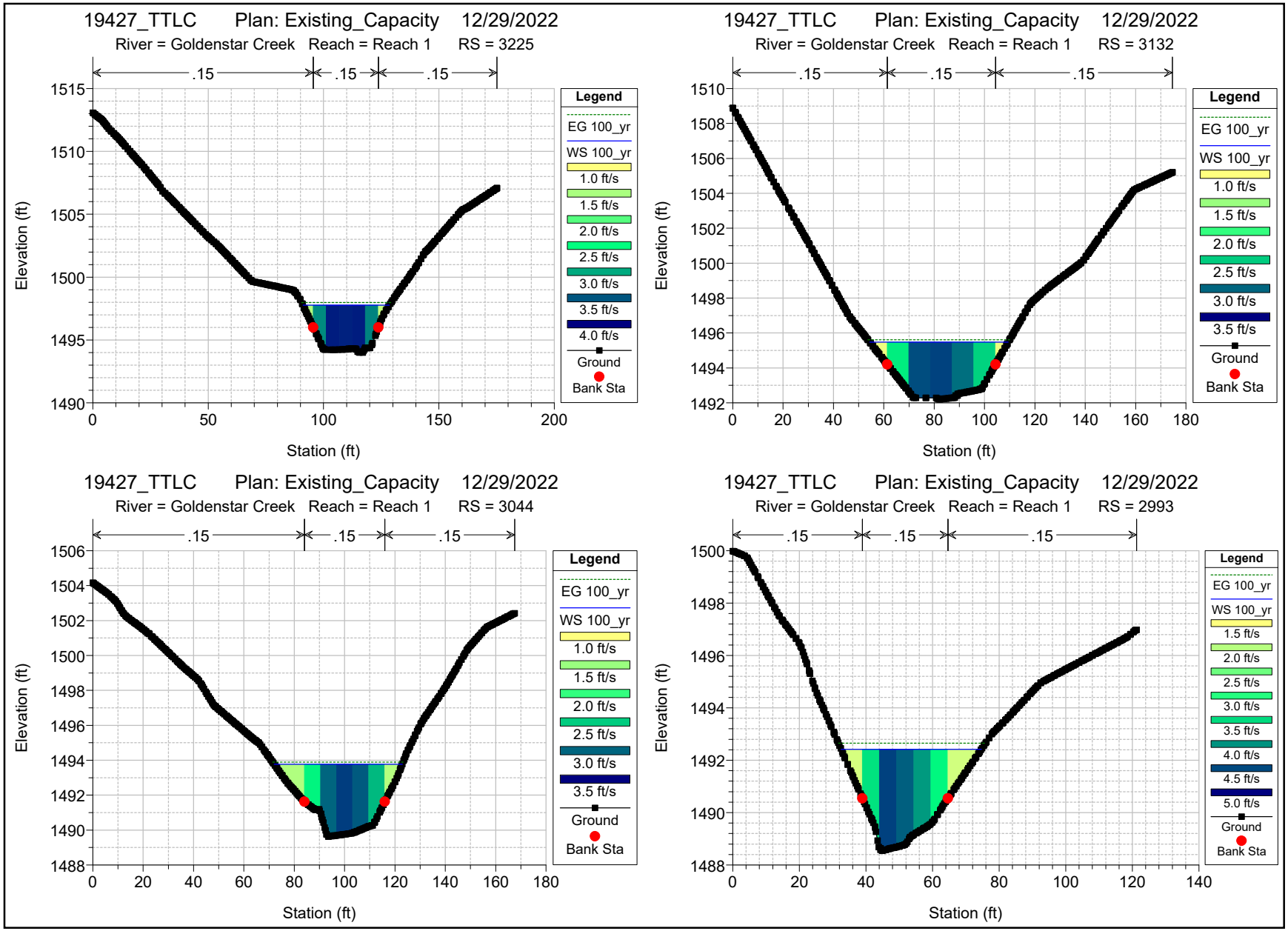

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4598
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4566
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4510
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4453
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

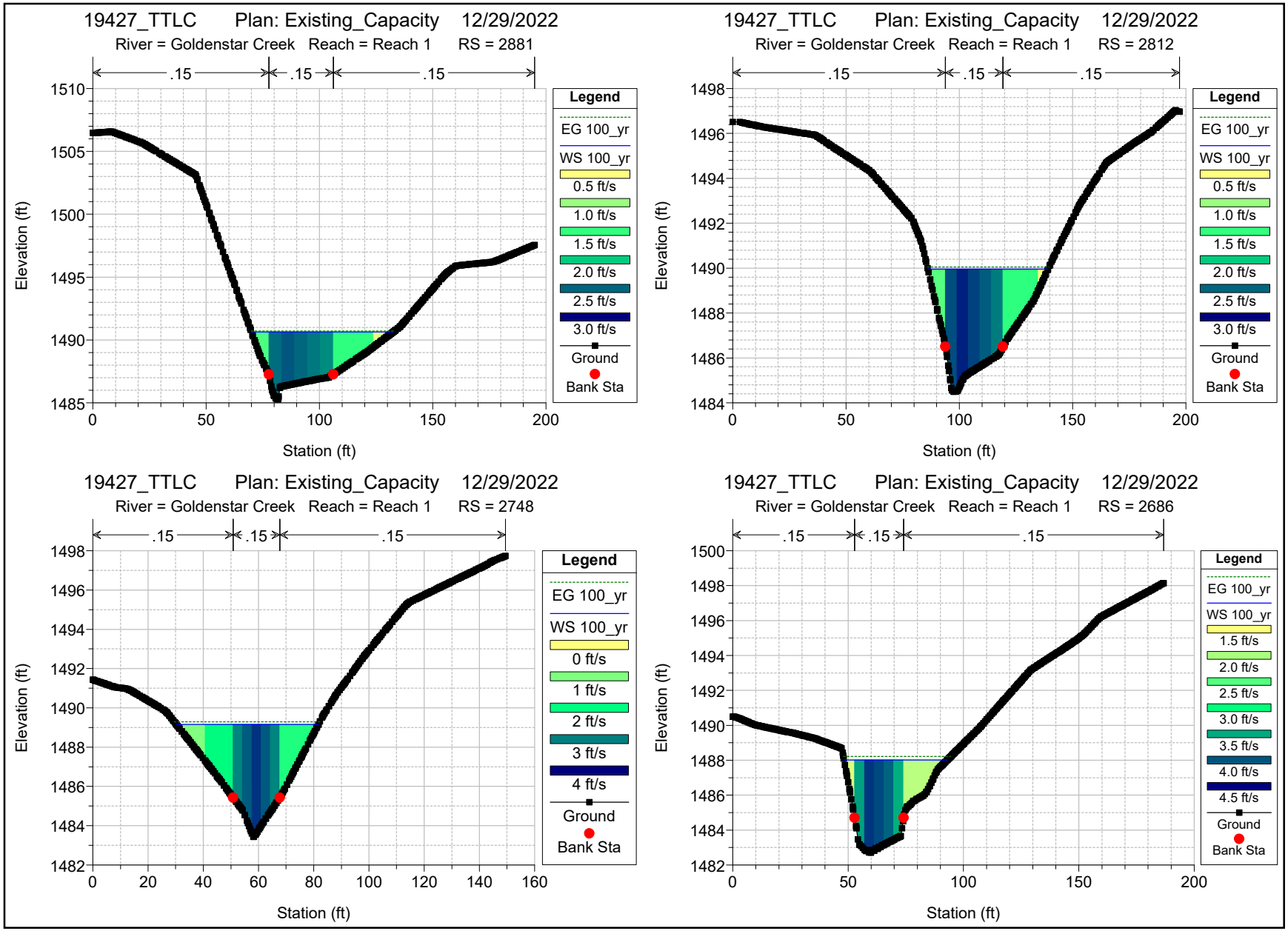

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4414
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4345
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4284
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4194
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

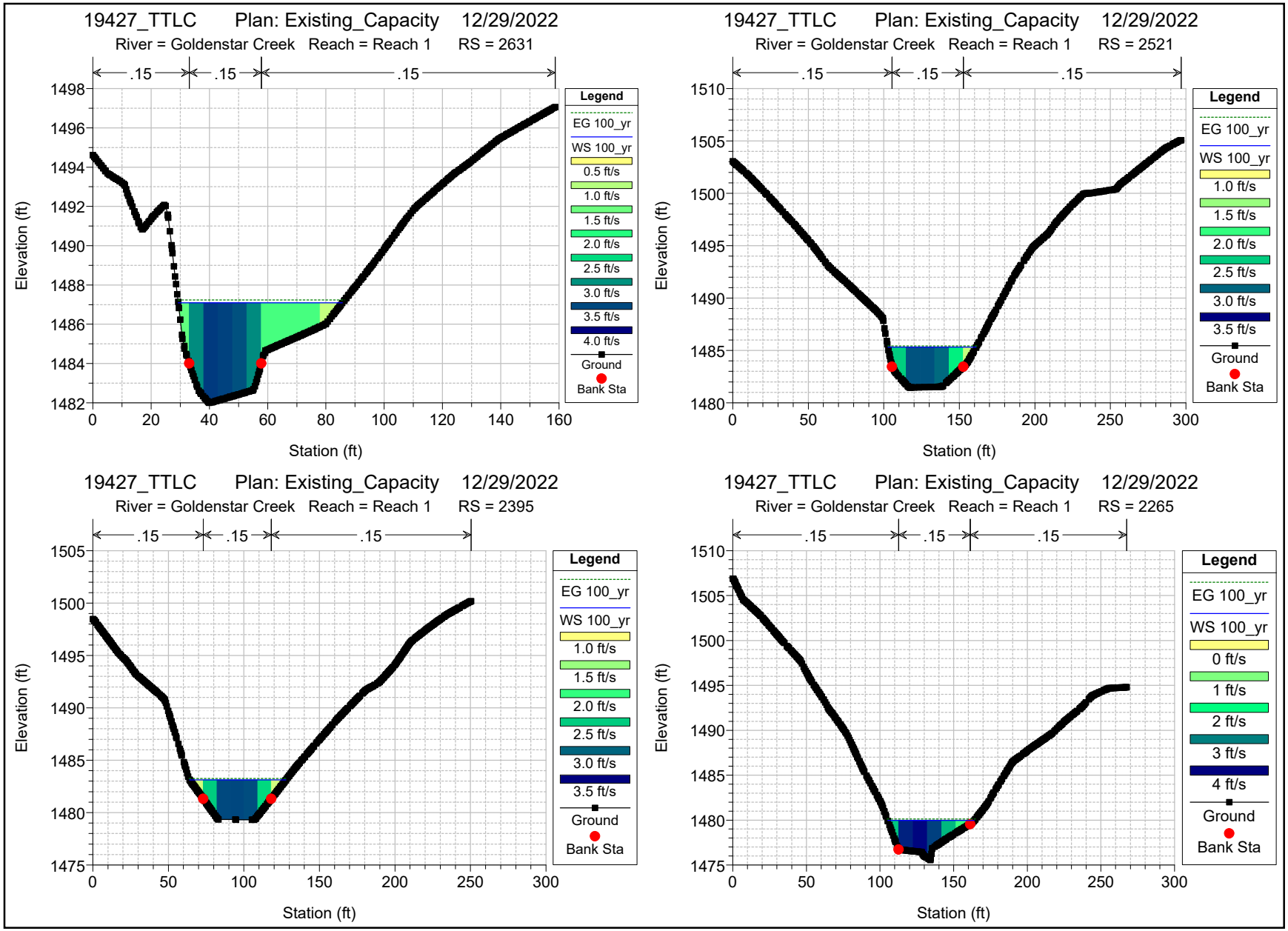

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4152
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4107
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4069
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 4017
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

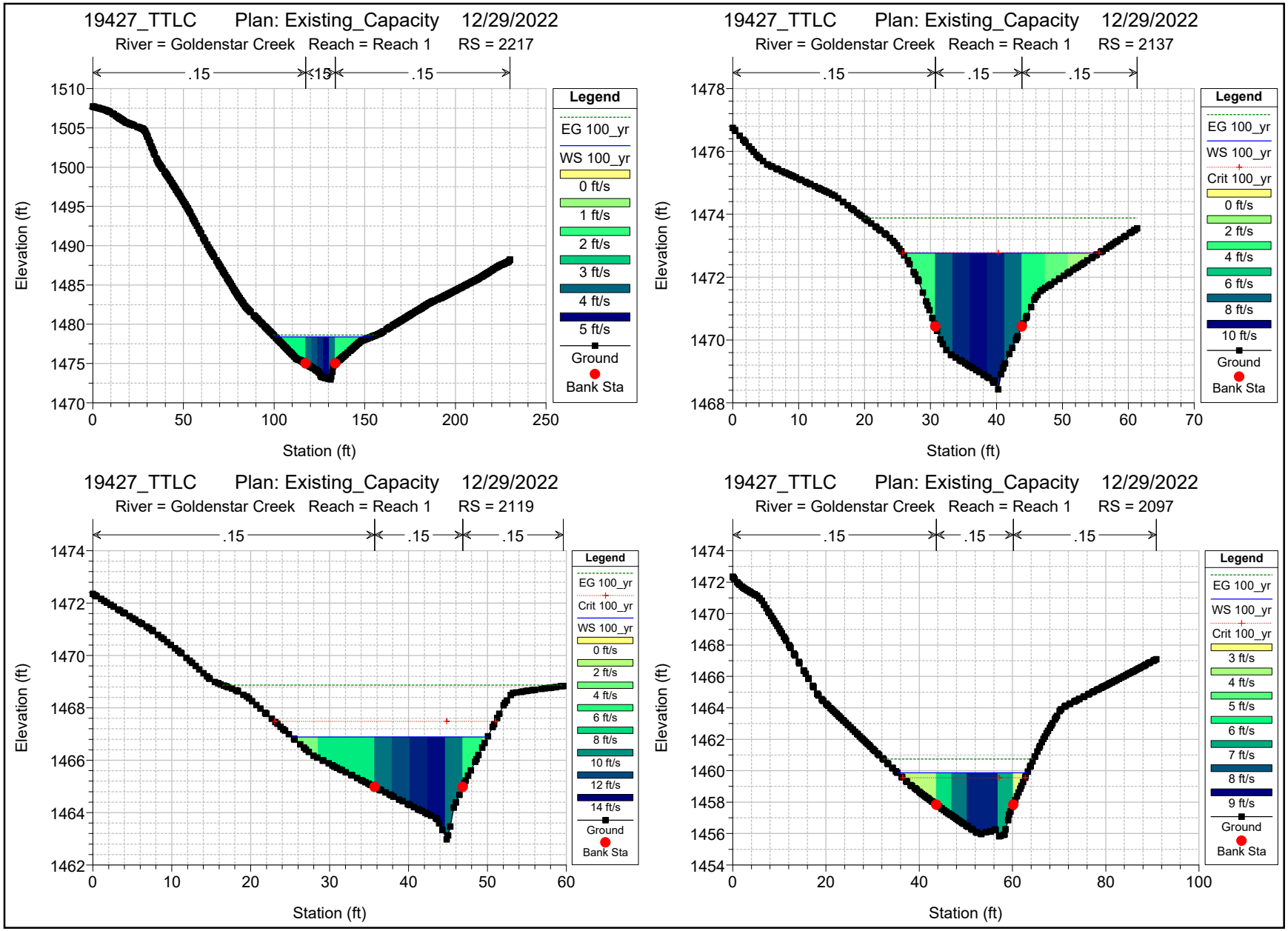

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3897
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3822
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3726
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3632
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

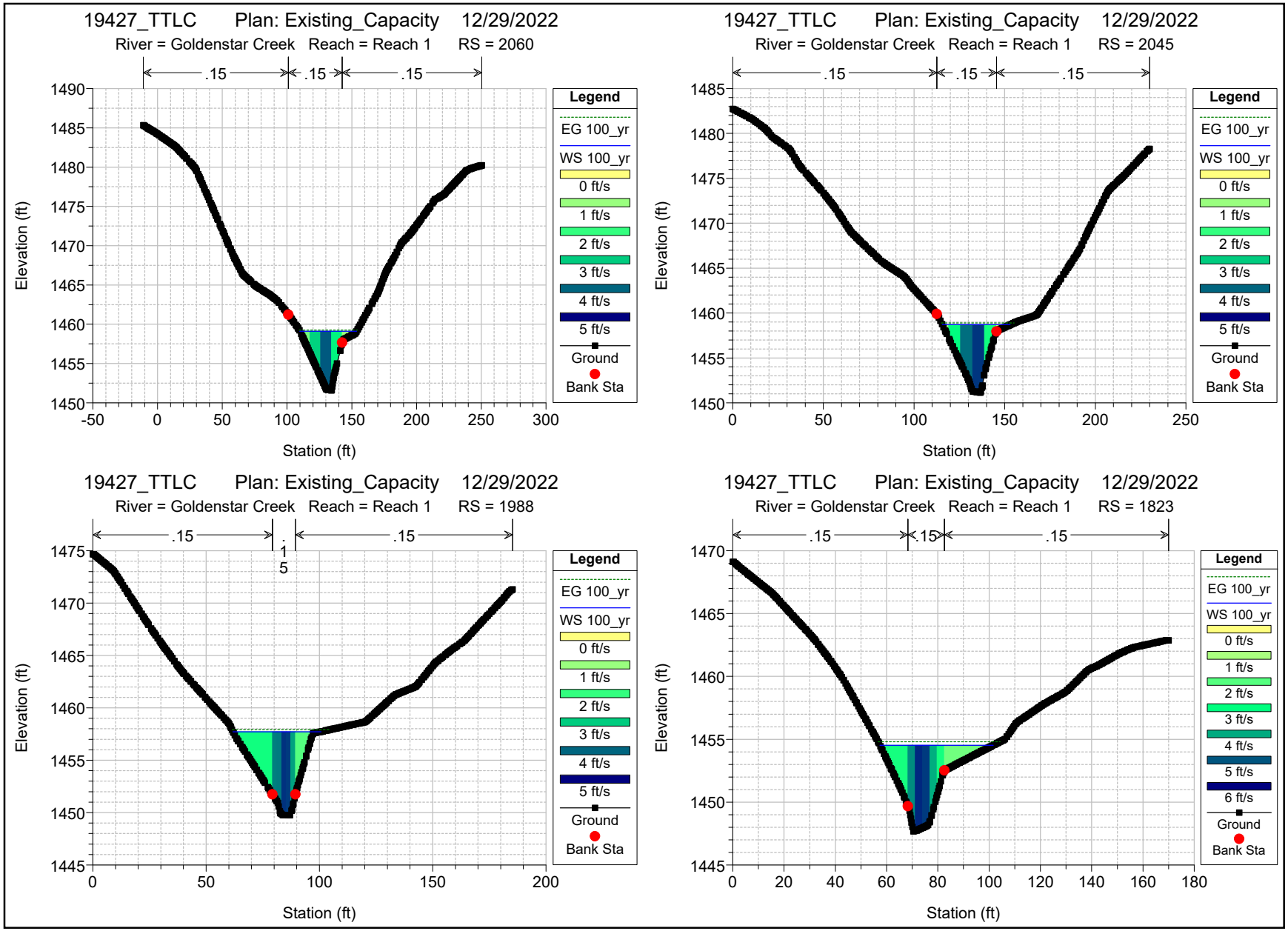

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3529
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3450
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3400
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3325
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

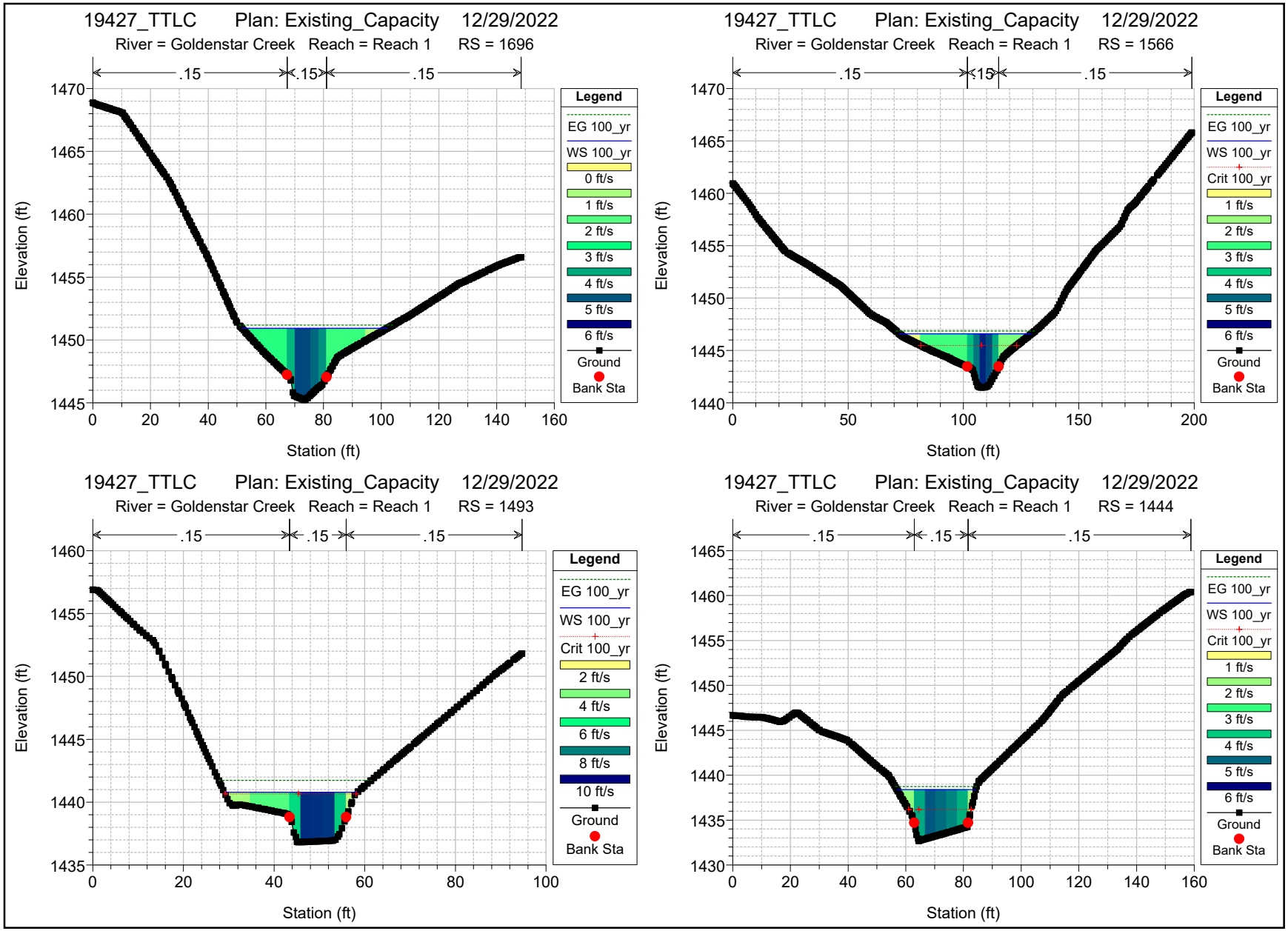

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3225
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3132
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 3044
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2993
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
5.0 ft/s
Ground
Bank Sta

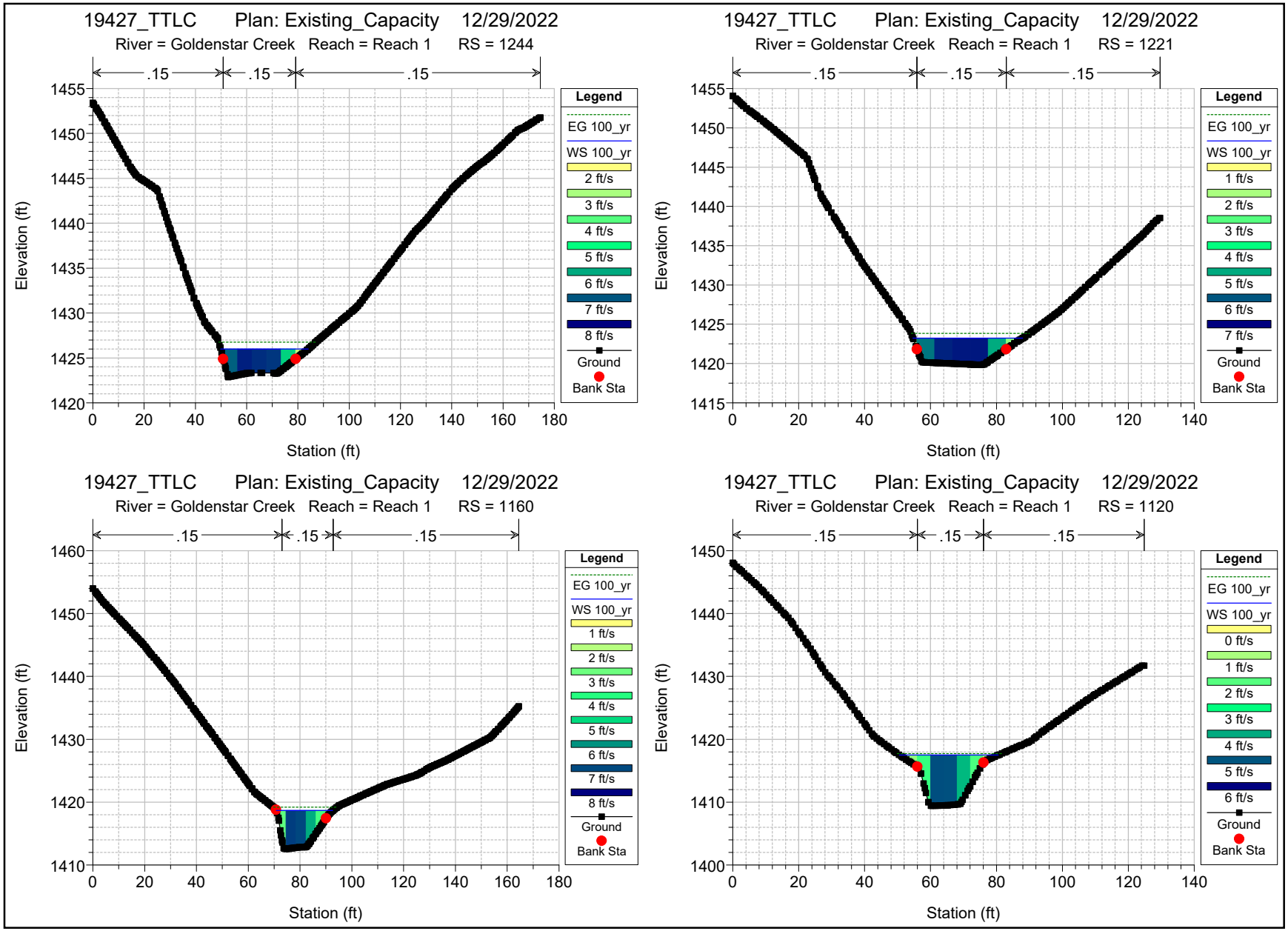

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2881
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2812
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2748
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2686
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Bank Sta

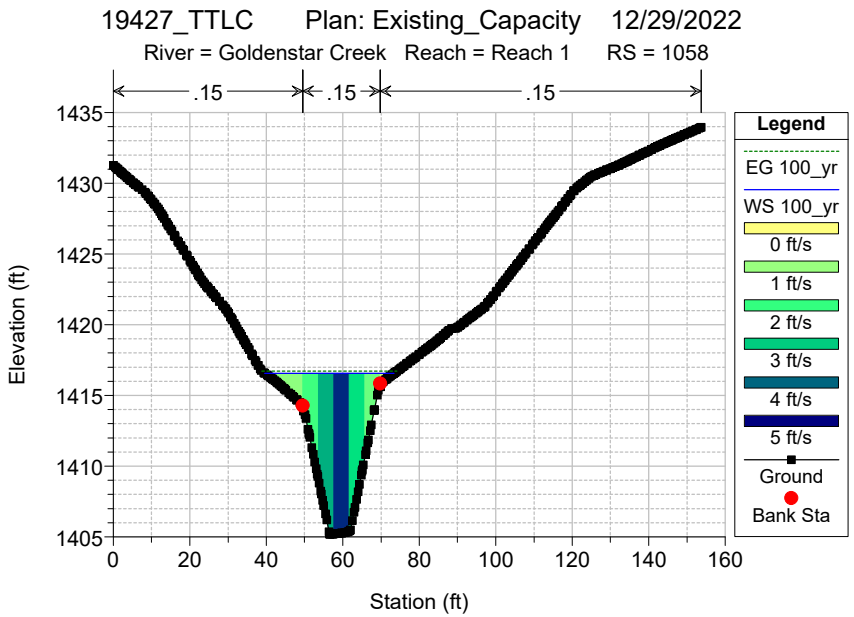

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2631
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2521
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2395
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2265
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

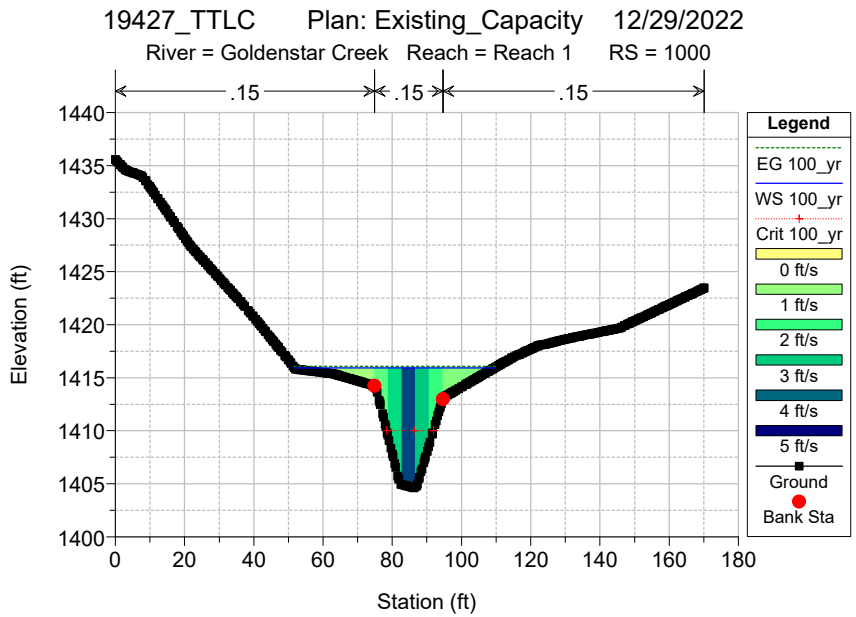

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2217
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2137
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2119
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
Crit 100_yr
WS 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2097
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2060
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 2045
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1988
.15
.1
5
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1823
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1696
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1566
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1493
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1444
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

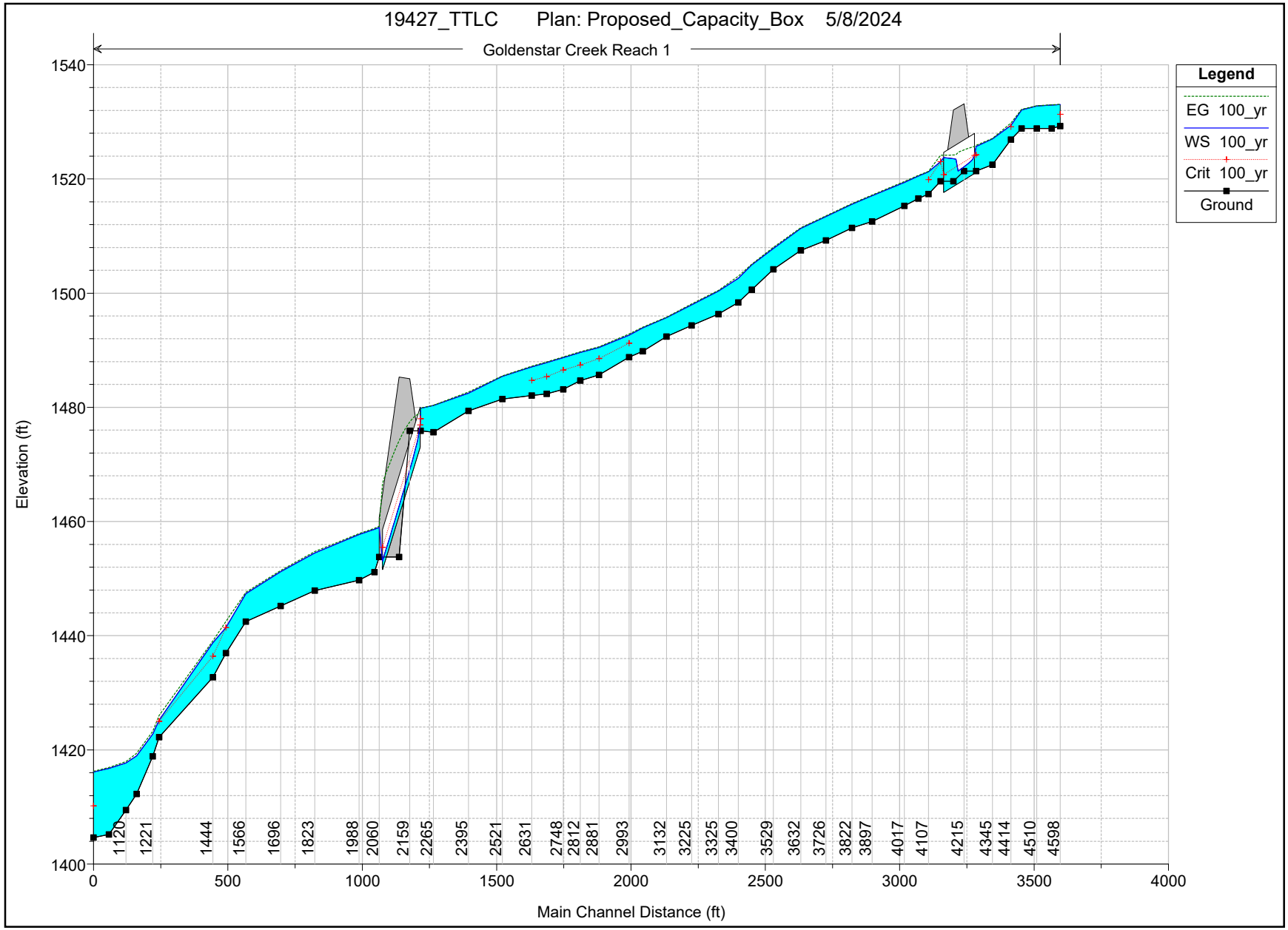

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1244
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1221
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1160
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta
19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1120
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

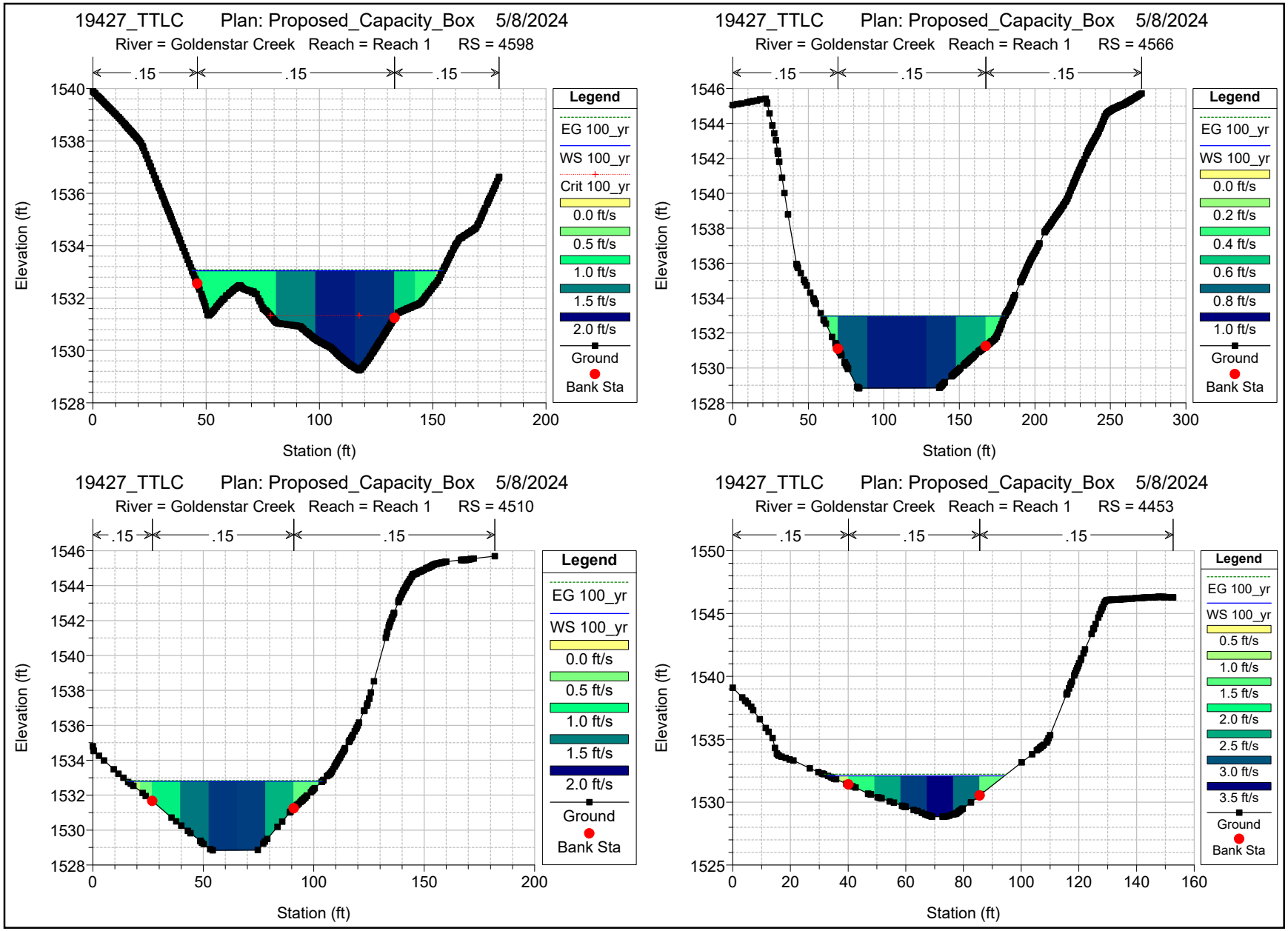

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1058
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

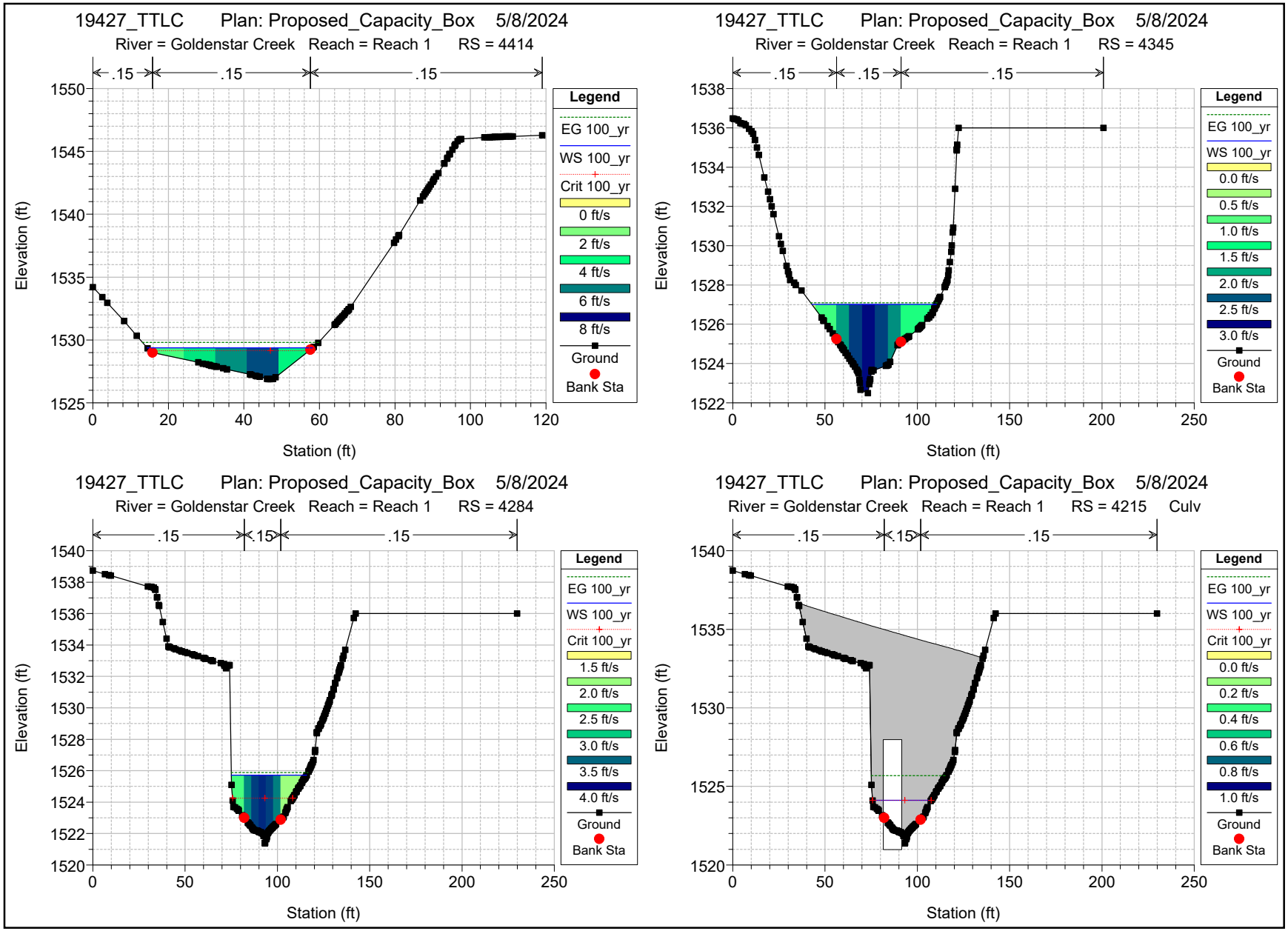

19427_TTLC Plan: Existing_Capacity 12/29/2022
River = Goldenstar Creek Reach = Reach 1 RS = 1000
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

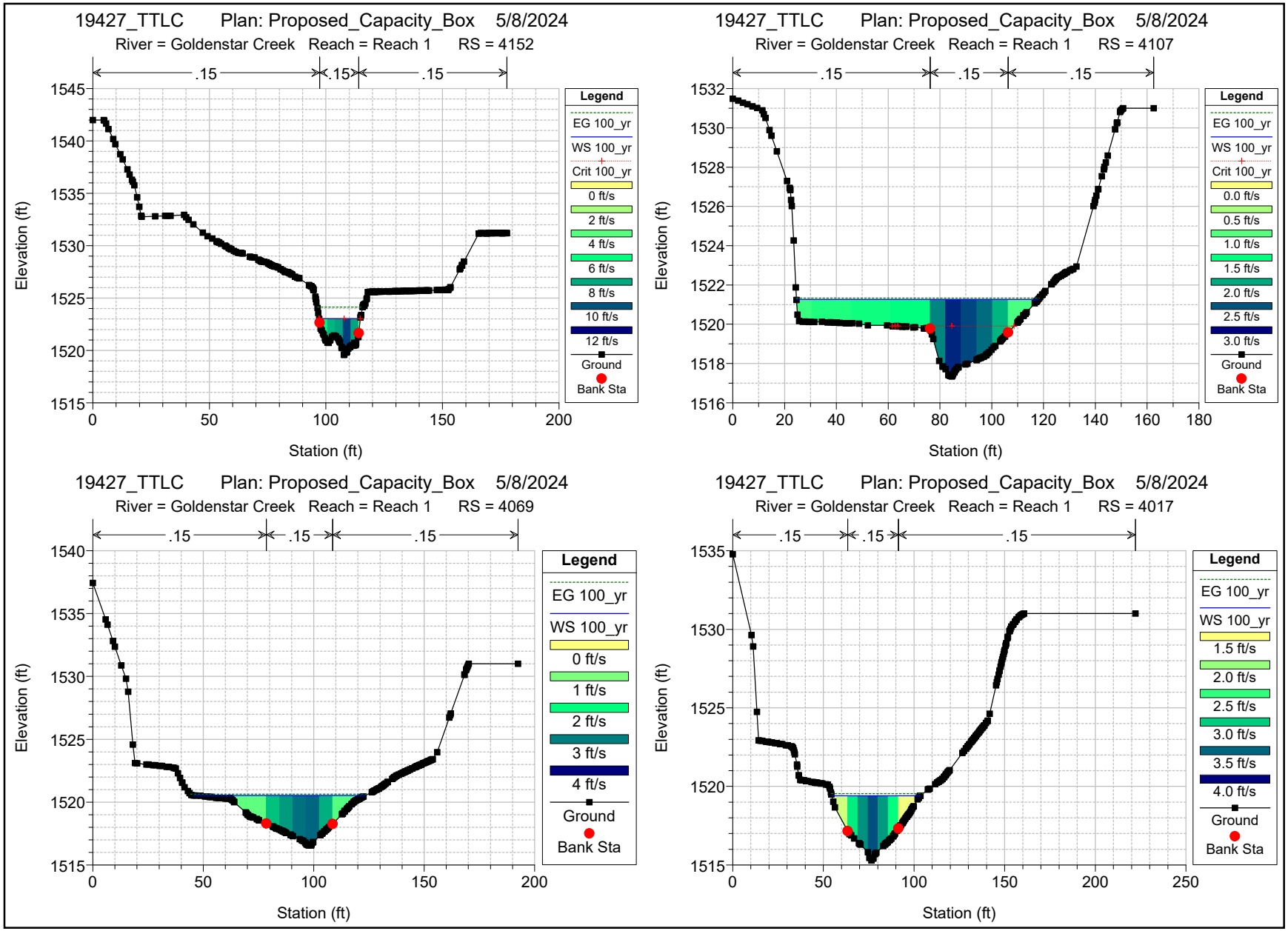
HEC-RAS Plan: Exist_Capacity River: Goldenstar Creek Reach: Reach 1 Profile: 100_yr

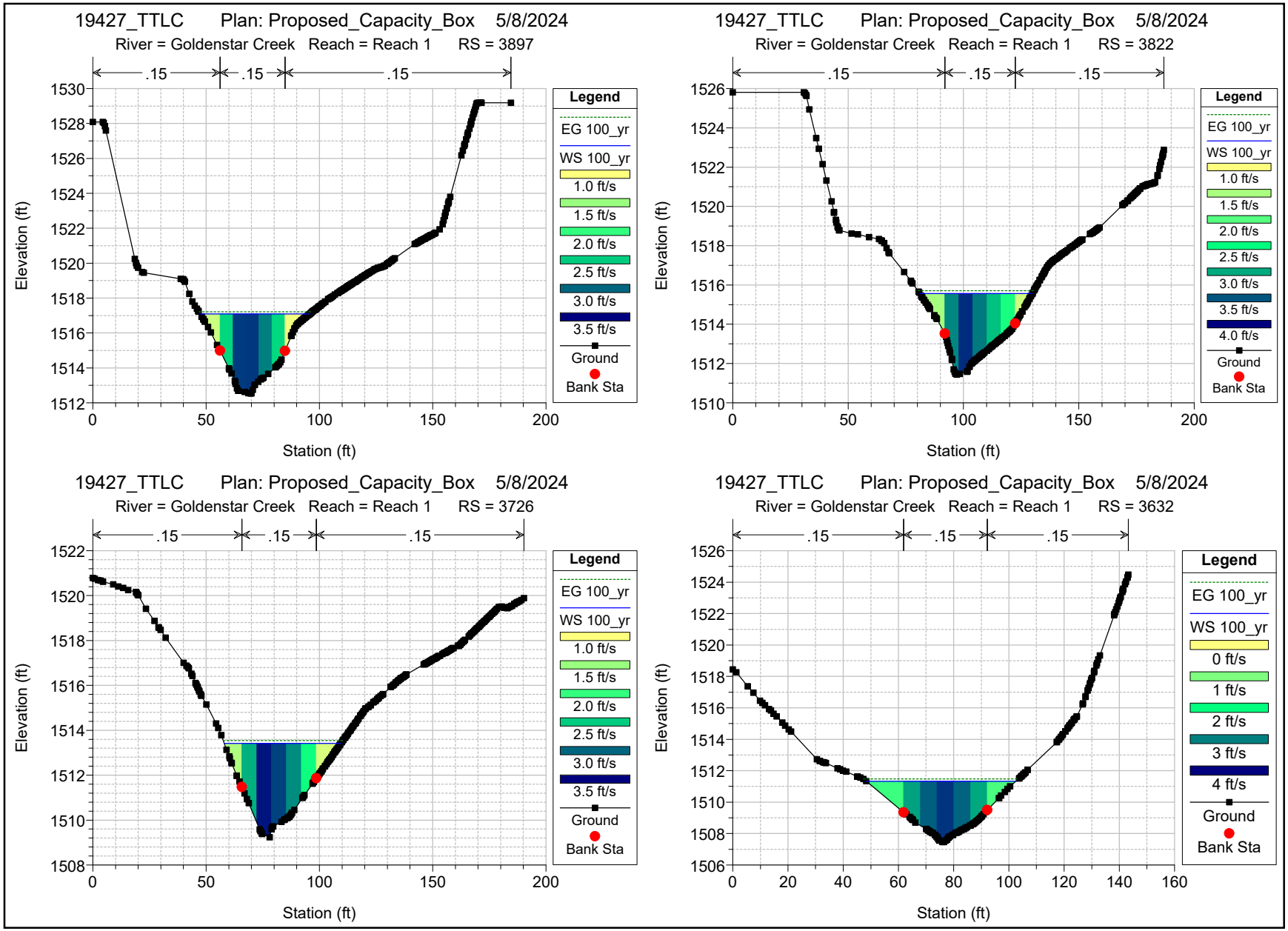
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	4598	100_yr	315.00	1529.24	1533.05	1531.33	1533.09	0.009531	1.58	207.54	110.63	0.19
Reach 1	4566	100_yr	315.00	1528.84	1532.97		1532.98	0.001444	0.91	368.66	120.59	0.08
Reach 1	4510	100_yr	315.00	1528.84	1532.79		1532.83	0.006296	1.74	199.51	85.32	0.17
Reach 1	4453	100_yr	315.00	1528.78	1532.02		1532.16	0.029950	3.06	110.47	60.51	0.35
Reach 1	4414	100_yr	315.00	1526.45	1528.93	1528.93	1529.58	0.227288	6.73	52.43	44.18	0.90
Reach 1	4345	100_yr	345.00	1522.55	1526.81	1525.05	1526.90	0.014362	2.53	152.80	66.39	0.25
Reach 1	4284	100_yr	345.00	1520.95	1525.86		1525.98	0.016007	2.99	139.49	58.75	0.27
Reach 1	4194	100_yr	345.00	1518.77	1523.75		1523.98	0.033528	4.38	101.74	56.80	0.39
Reach 1	4152	100_yr	345.00	1517.65	1522.27		1522.47	0.033833	4.02	104.61	49.29	0.38
Reach 1	4107	100_yr	345.00	1517.14	1521.24		1521.36	0.017378	2.83	139.10	64.37	0.28
Reach 1	4069	100_yr	345.00	1516.26	1520.48		1520.62	0.020321	3.11	122.27	49.62	0.30
Reach 1	4017	100_yr	345.00	1514.93	1519.42		1519.56	0.020551	3.18	125.30	53.96	0.30
Reach 1	3897	100_yr	345.00	1512.41	1516.98		1517.14	0.019858	3.30	119.60	50.90	0.30
Reach 1	3822	100_yr	345.00	1511.25	1515.48		1515.62	0.019986	3.13	123.02	50.74	0.30
Reach 1	3726	100_yr	345.00	1509.21	1513.56		1513.70	0.020026	3.17	125.35	54.73	0.30
Reach 1	3632	100_yr	345.00	1507.47	1511.44		1511.60	0.025661	3.32	116.82	55.50	0.33
Reach 1	3529	100_yr	345.00	1503.85	1507.53		1507.82	0.056318	4.48	86.12	45.61	0.48
Reach 1	3450	100_yr	345.00	1499.63	1504.40		1504.58	0.028951	3.79	109.27	45.72	0.35
Reach 1	3400	100_yr	345.00	1497.98	1502.70		1502.95	0.036722	4.30	93.60	39.11	0.40
Reach 1	3325	100_yr	345.00	1496.01	1500.48		1500.67	0.026028	3.69	105.88	42.19	0.34
Reach 1	3225	100_yr	345.00	1494.00	1497.77		1497.97	0.028295	3.61	100.23	37.47	0.35
Reach 1	3132	100_yr	345.00	1492.20	1495.48		1495.61	0.022364	2.87	125.01	55.04	0.31
Reach 1	3044	100_yr	345.00	1489.63	1493.77		1493.89	0.017057	2.89	130.37	50.84	0.28
Reach 1	2993	100_yr	345.00	1488.54	1492.36		1492.61	0.039898	4.09	92.42	41.59	0.41
Reach 1	2881	100_yr	345.00	1485.26	1490.48		1490.56	0.010131	2.42	166.23	61.11	0.22
Reach 1	2812	100_yr	345.00	1484.50	1489.79		1489.88	0.010071	2.58	154.76	51.95	0.22
Reach 1	2748	100_yr	370.00	1483.43	1488.82		1488.98	0.019891	3.64	126.24	48.28	0.31
Reach 1	2686	100_yr	370.00	1482.70	1487.66		1487.82	0.017734	3.43	123.55	41.62	0.29
Reach 1	2631	100_yr	370.00	1482.00	1486.91		1487.02	0.012081	2.86	153.08	55.28	0.24
Reach 1	2521	100_yr	460.00	1481.45	1485.31		1485.44	0.016951	2.85	167.66	58.40	0.28
Reach 1	2395	100_yr	460.00	1479.32	1483.13		1483.25	0.017651	2.92	167.29	63.77	0.28
Reach 1	2265	100_yr	460.00	1475.56	1479.95		1480.13	0.034485	3.42	138.49	58.73	0.38
Reach 1	2217	100_yr	460.00	1473.00	1478.39		1478.62	0.028566	4.35	134.00	53.12	0.36
Reach 1	2137	100_yr	460.00	1468.43	1472.76	1472.76	1473.89	0.174250	8.97	60.14	29.82	0.86
Reach 1	2119	100_yr	460.00	1462.98	1466.89	1467.48	1468.87	0.467064	12.20	44.02	24.77	1.31
Reach 1	2097	100_yr	460.00	1455.83	1459.88	1459.55	1460.74	0.139128	7.75	65.70	27.90	0.76
Reach 1	2060	100_yr	460.00	1451.59	1459.11		1459.27	0.017323	3.22	147.96	43.84	0.27
Reach 1	2045	100_yr	460.00	1451.14	1458.70		1458.90	0.023041	3.62	129.22	37.44	0.31
Reach 1	1988	100_yr	460.00	1449.75	1457.73		1457.91	0.013521	4.01	150.50	38.87	0.26
Reach 1	1823	100_yr	460.00	1447.67	1454.52		1454.80	0.028158	4.64	121.63	44.08	0.35
Reach 1	1696	100_yr	460.00	1445.23	1450.94		1451.20	0.028307	4.66	129.58	50.49	0.37
Reach 1	1566	100_yr	470.00	1441.46	1446.60	1445.50	1446.88	0.039471	5.00	126.11	57.38	0.42
Reach 1	1493	100_yr	470.00	1436.81	1440.88		1441.78	0.141018	8.20	67.74	29.75	0.75
Reach 1	1444	100_yr	470.00	1432.69	1438.35	1436.22	1438.70	0.032046	4.85	105.35	27.24	0.39
Reach 1	1244	100_yr	470.00	1422.88	1425.88		1426.60	0.157198	6.85	70.34	33.64	0.78
Reach 1	1221	100_yr	470.00	1419.83	1423.08		1423.64	0.099821	6.08	79.49	32.55	0.64
Reach 1	1160	100_yr	470.00	1412.55	1418.41		1418.91	0.063399	5.68	83.42	20.93	0.48
Reach 1	1120	100_yr	470.00	1409.41	1417.20		1417.44	0.022005	3.98	121.67	27.82	0.29
Reach 1	1058	100_yr	470.00	1405.18	1416.28		1416.43	0.011688	3.11	157.10	30.96	0.20
Reach 1	1000	100_yr	470.00	1404.63	1415.67	1409.79	1415.80	0.010006	3.01	175.63	52.39	0.19

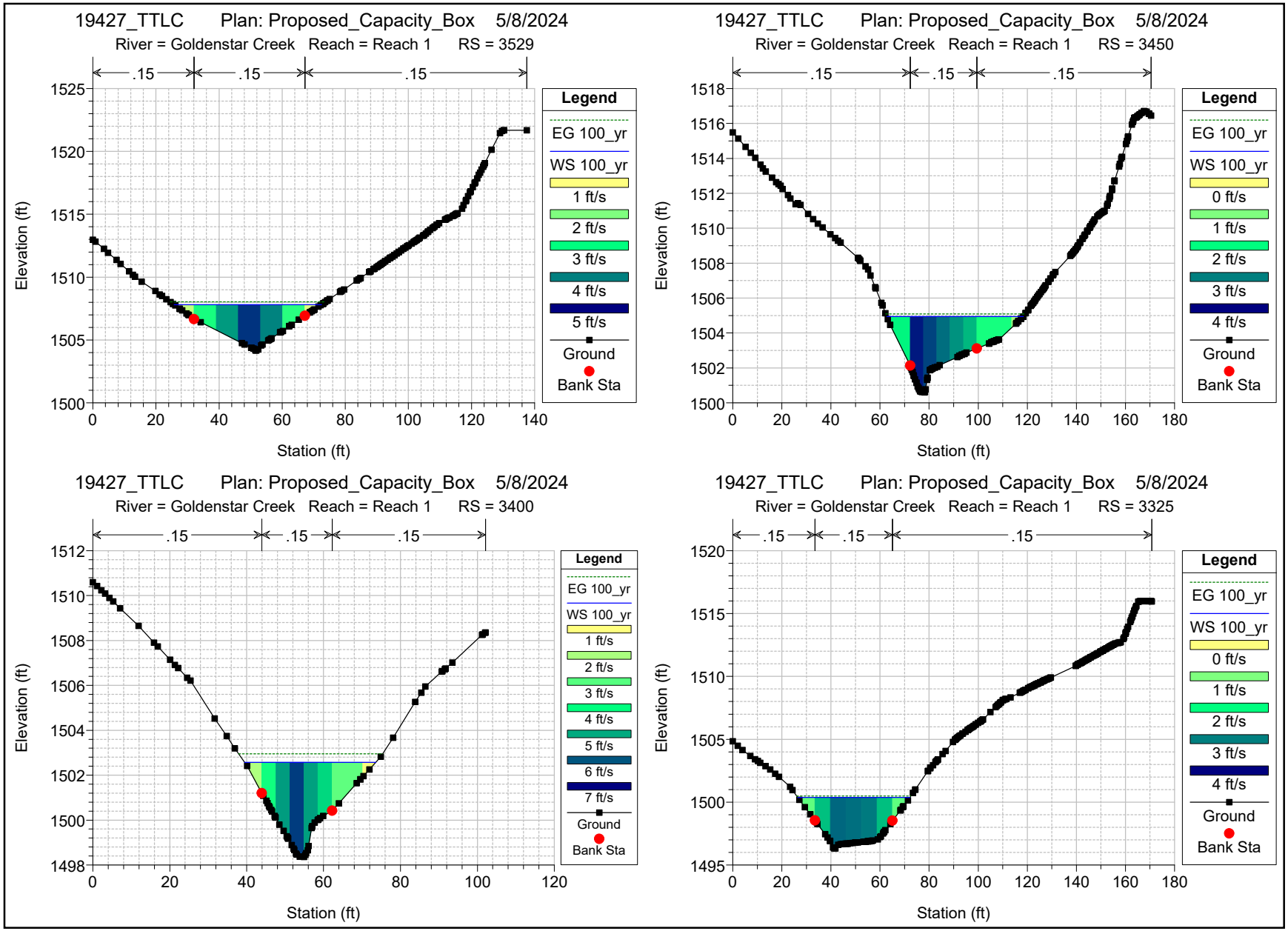

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
Goldenstar Creek Reach 1
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
Ground
Elevation (ft)
Main Channel Distance (ft)
1540
1520
1500
1480
1460
1440
1420
1400
0
500
1000
1500
2000
2500
3000
3500
4000
1120
1221
1444
1566
1696
1823
1988
2060
2159
2265
2395
2521
2631
2748
2812
2881
2993
3132
3225
3325
3400
3529
3632
3726
3822
3897
4017
4107
4215
4345
4414
4510
4598

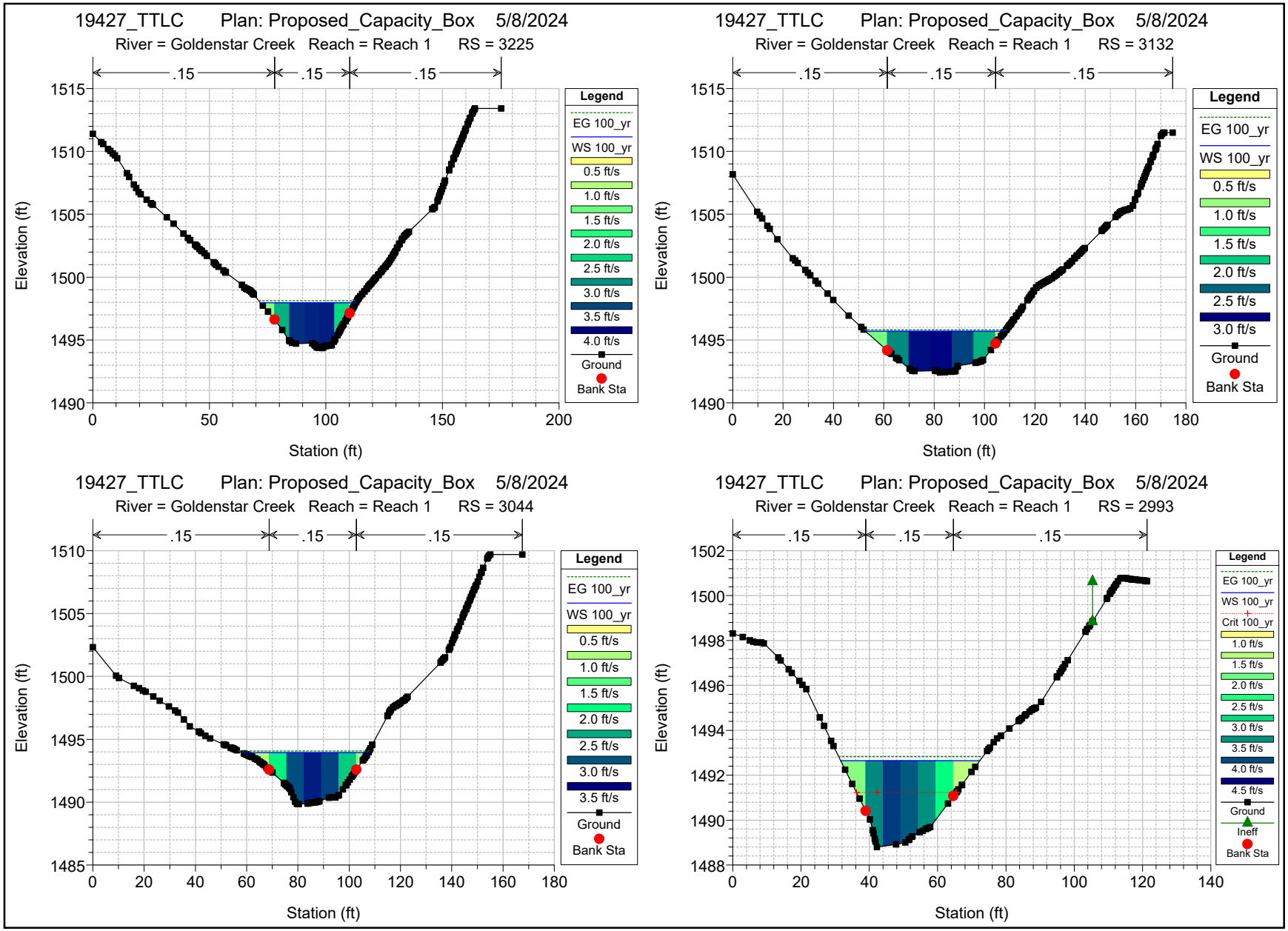

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4598
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4566
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4510
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4453
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta

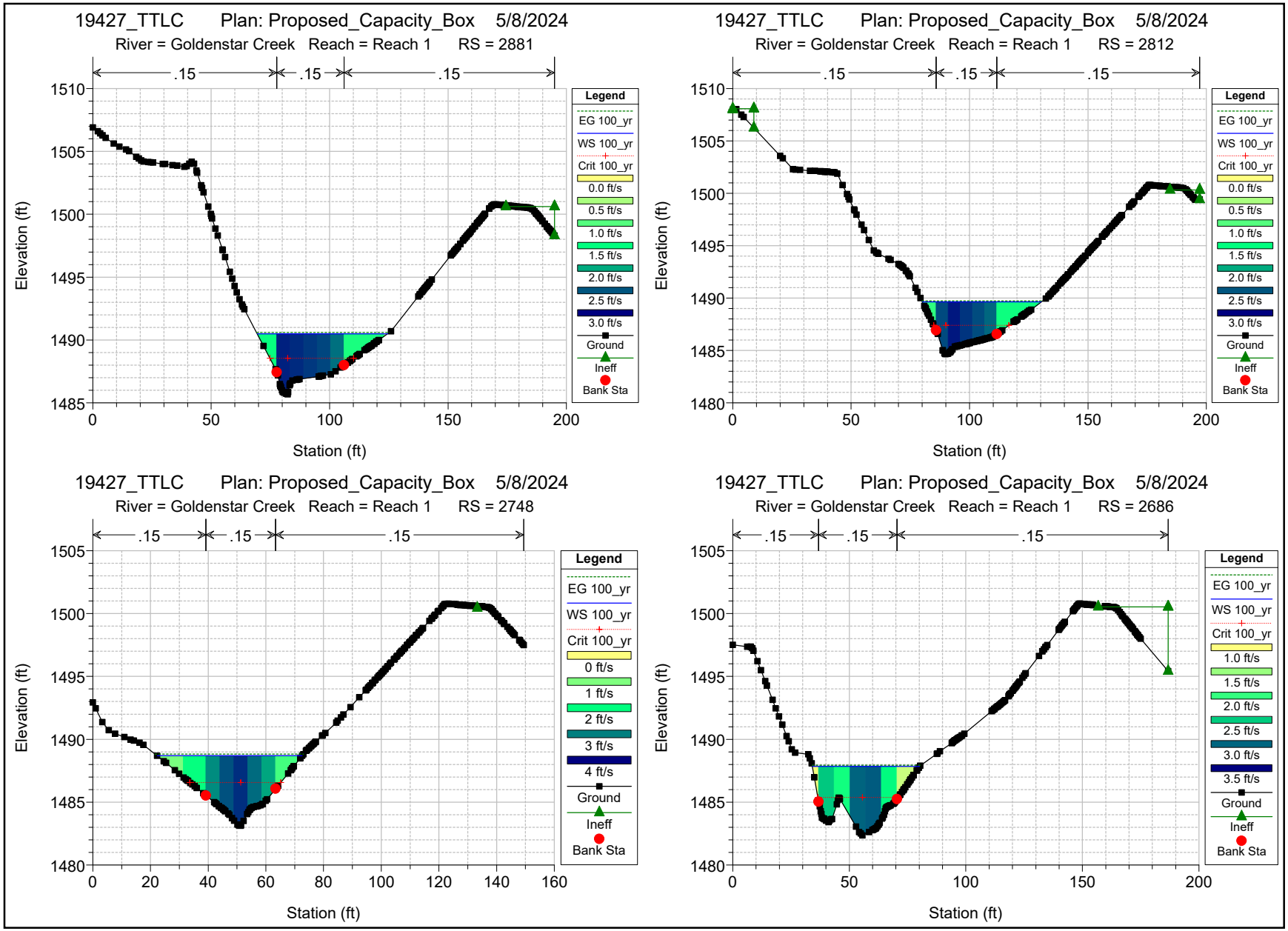

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4414
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4345
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4284
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4215 Culv
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

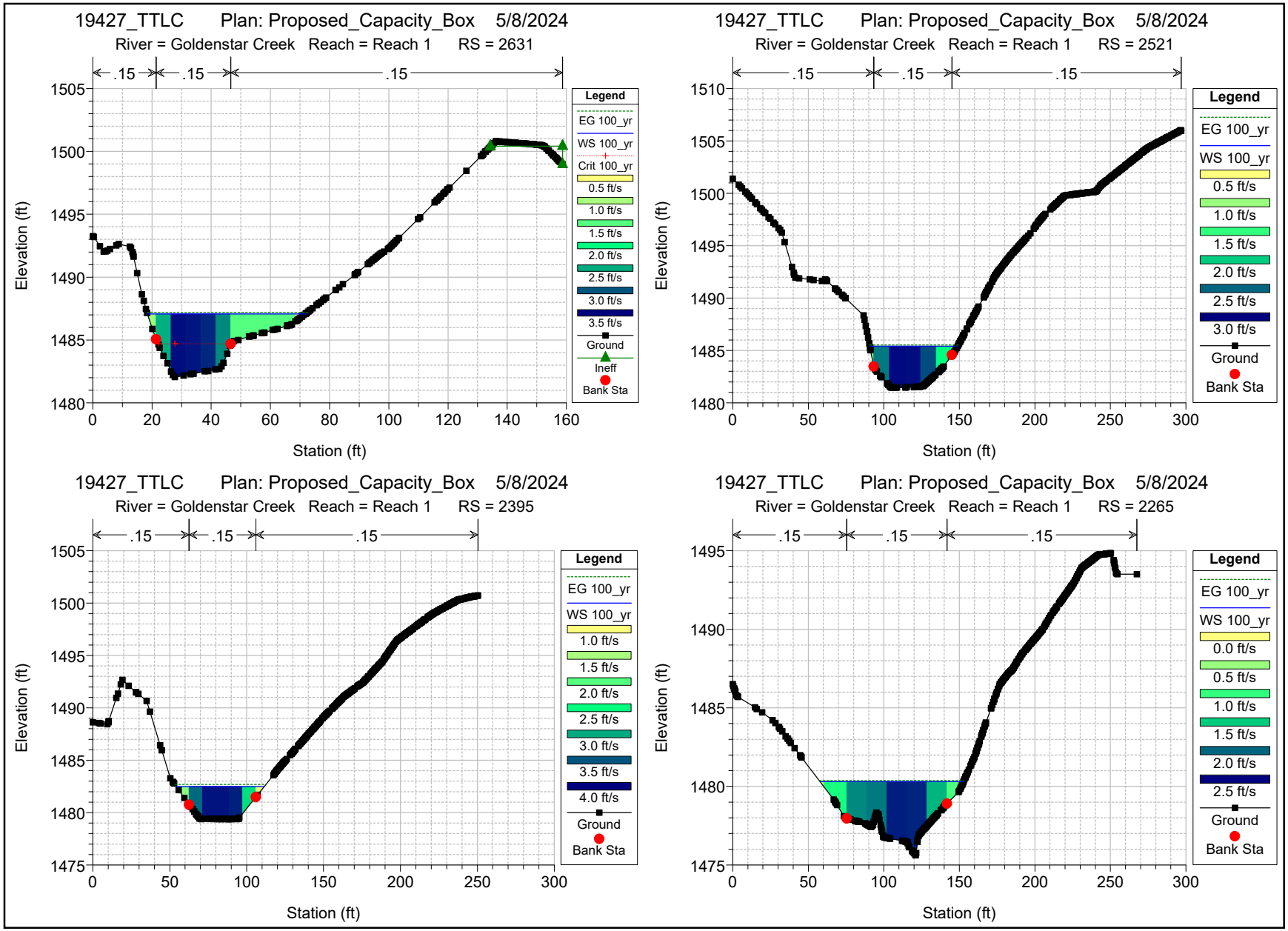

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4152
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4107
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4069
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 4017
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta

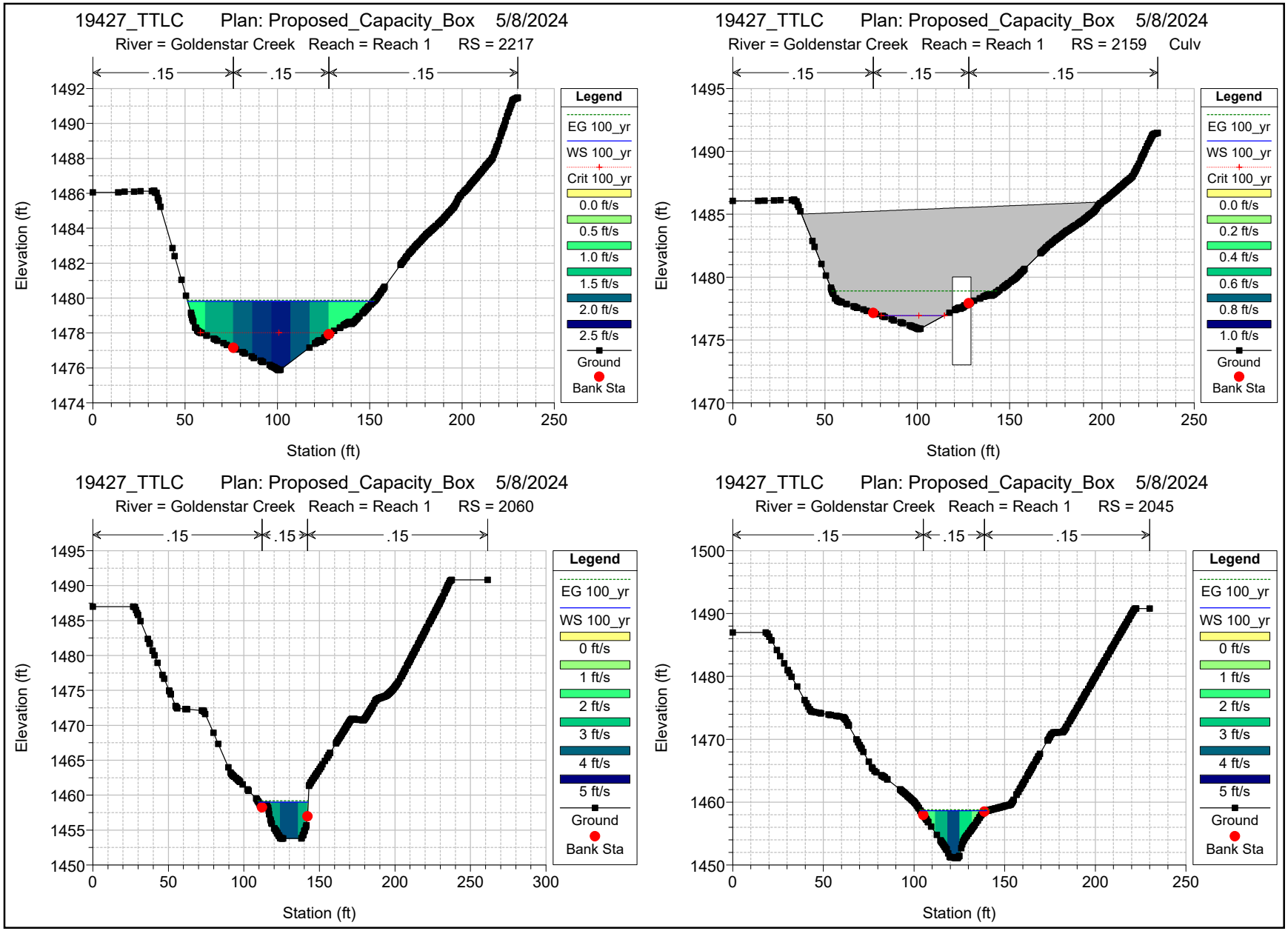

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3897
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3822
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3726
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3632
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

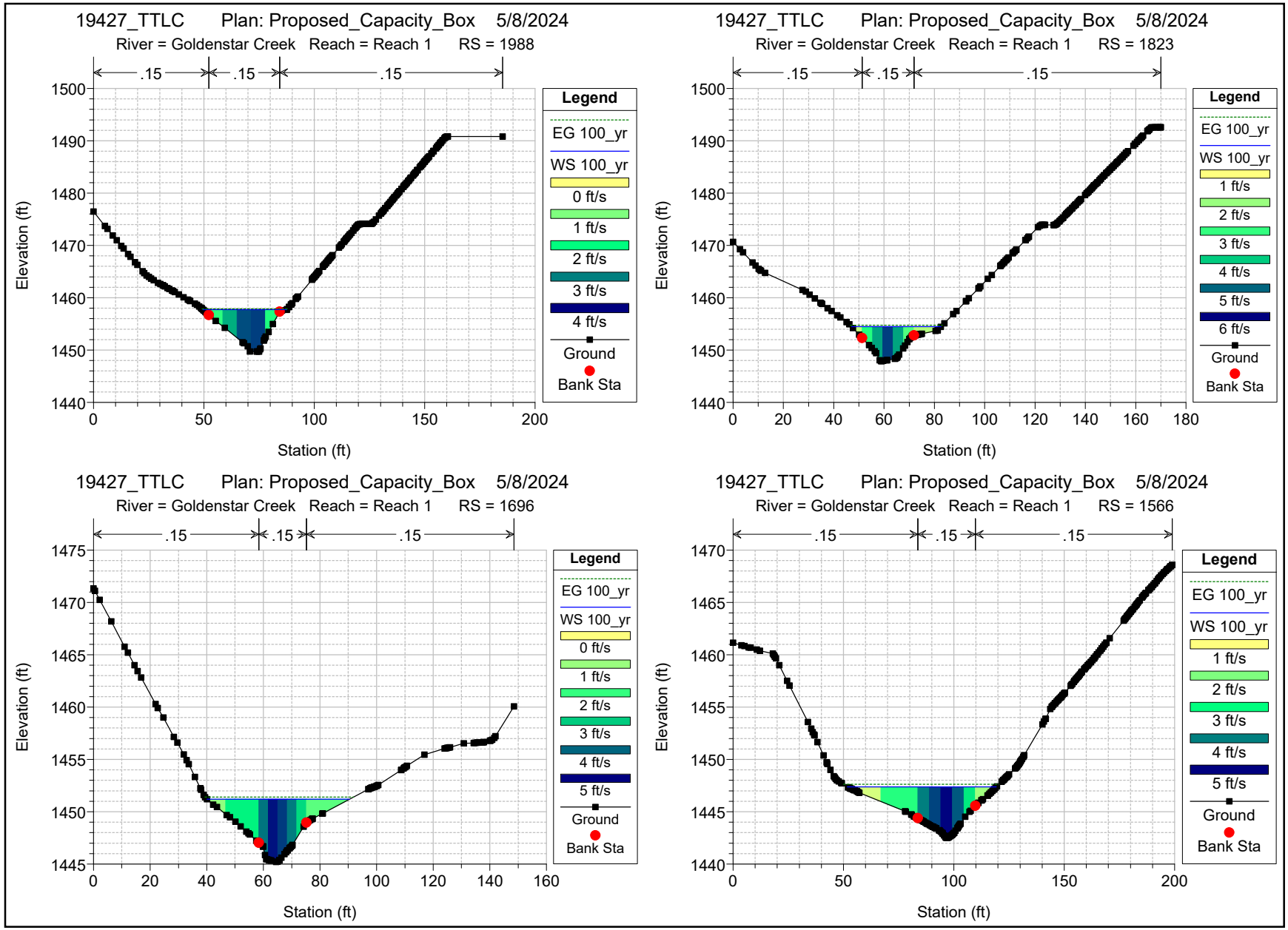

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3529
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3450
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3400
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3325
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta

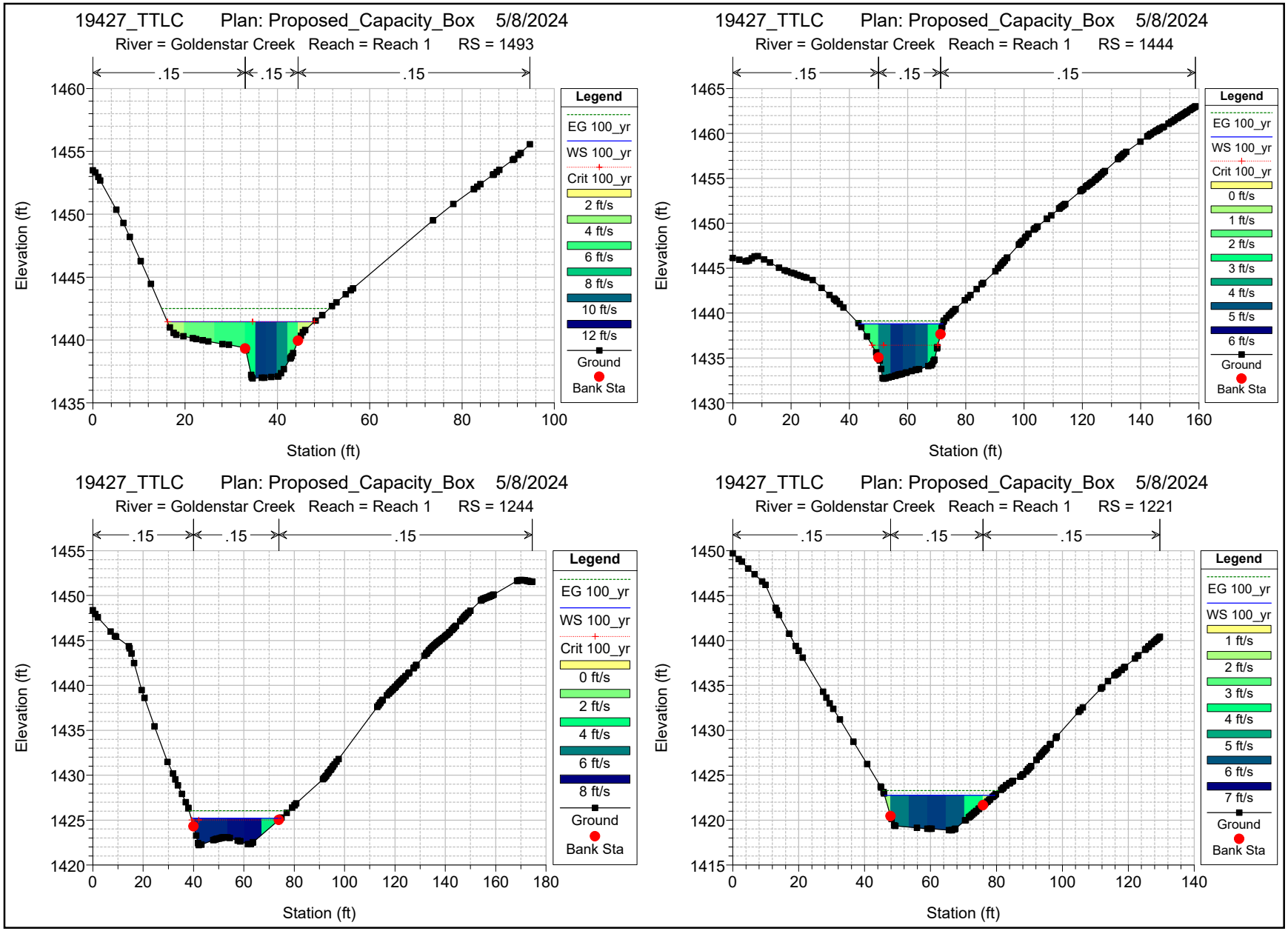

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3225
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3132
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 3044
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2993
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
4.5 ft/s
Ground
Ineff
Bank Sta

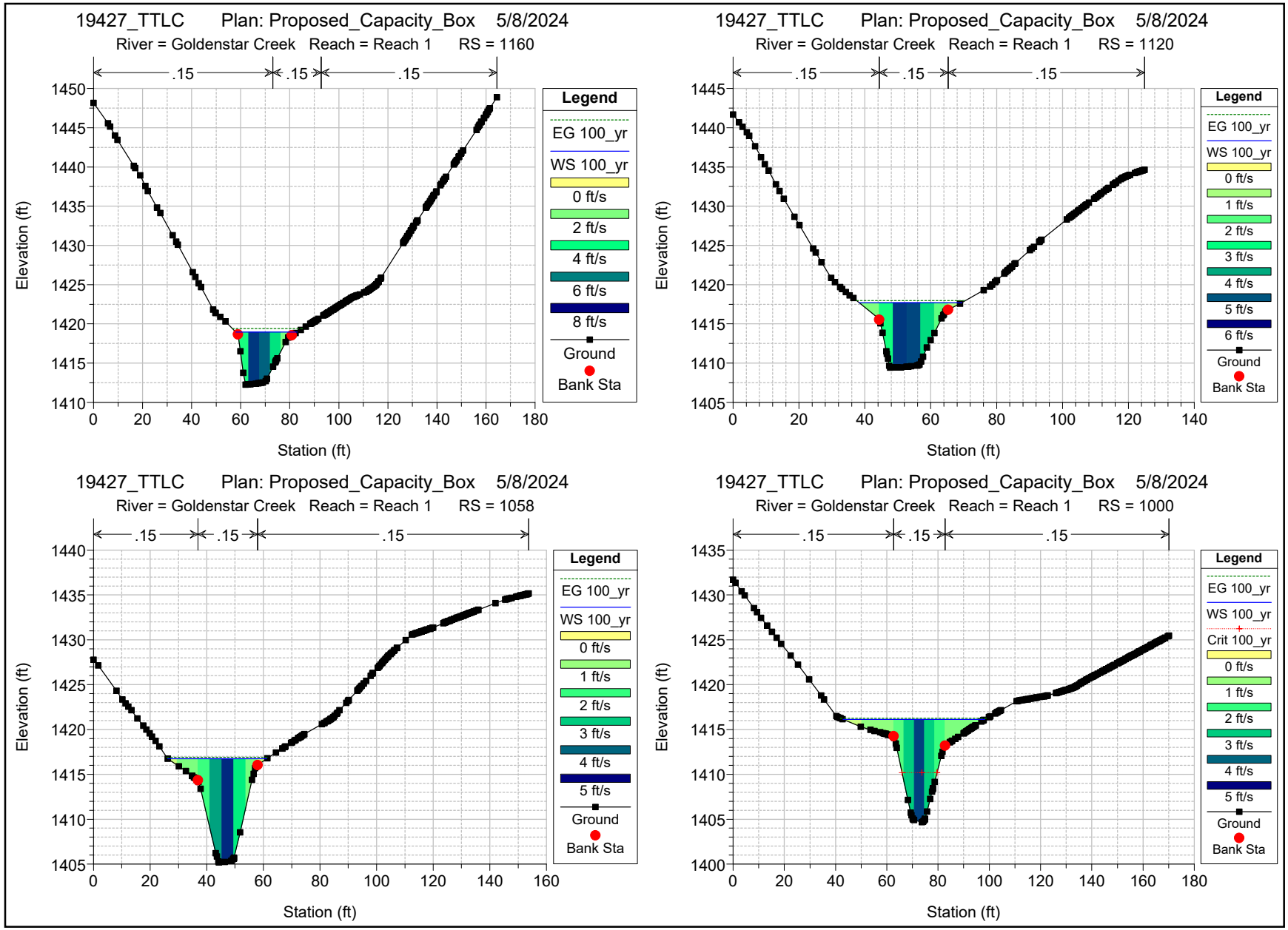

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2881
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2812
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Ineff
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2748
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Ineff
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2686
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Ineff
Bank Sta


19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2631
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Ineff
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2521
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2395
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
4.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2265
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta


19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2217
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2159 Culv
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2060
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 2045
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta


19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1988
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1823
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1696
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1566
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta


19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1493
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1444
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1244
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1221
.15 .15 .15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

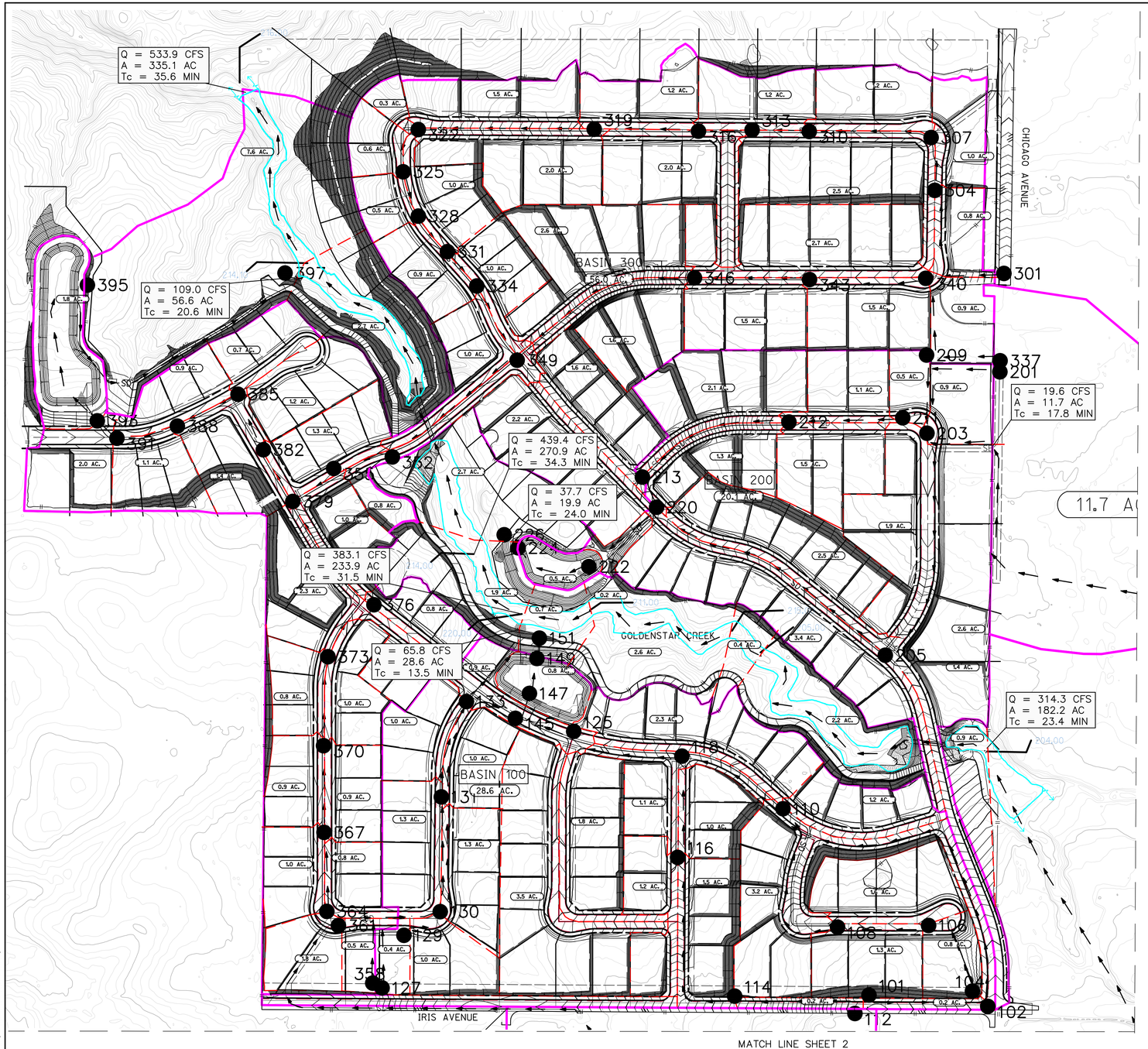

19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1160
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1120
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1058
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
19427_TTLC Plan: Proposed_Capacity_Box 5/8/2024
River = Goldenstar Creek Reach = Reach 1 RS = 1000
.15
.15
.15
Elevation (ft)
Station (ft)
Legend
EG 100_yr
WS 100_yr
Crit 100_yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

HEC-RAS Plan: Cap_Box River: Goldenstar Creek Reach: Reach 1 Profile: 100_yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	4598	100_yr	315.00	1529.24	1533.04	1531.33	1533.08	0.009621	1.59	206.92	110.57	0.19
Reach 1	4566	100_yr	315.00	1528.84	1532.97		1532.98	0.001427	0.87	373.95	121.07	0.08
Reach 1	4510	100_yr	315.00	1528.84	1532.80		1532.84	0.005616	1.56	212.36	88.35	0.16
Reach 1	4453	100_yr	315.00	1528.84	1532.08		1532.21	0.029398	2.93	112.71	61.24	0.34
Reach 1	4414	100_yr	315.00	1526.88	1529.37	1529.15	1529.81	0.187073	5.35	59.11	43.79	0.80
Reach 1	4345	100_yr	315.00	1522.50	1527.00		1527.10	0.015539	2.56	140.01	67.42	0.26
Reach 1	4284	100_yr	315.00	1521.37	1525.71	1524.26	1525.88	0.026600	3.60	101.45	40.85	0.34
Reach 1	4215		Culvert									
Reach 1	4152	100_yr	315.00	1519.59	1523.03	1523.03	1524.14	0.298815	8.48	37.50	17.66	1.01
Reach 1	4107	100_yr	315.00	1517.34	1521.26	1519.91	1521.33	0.014781	2.43	163.02	93.36	0.25
Reach 1	4069	100_yr	315.00	1516.56	1520.53		1520.64	0.019138	2.88	132.01	76.79	0.29
Reach 1	4017	100_yr	315.00	1515.28	1519.40		1519.54	0.023505	3.19	110.22	48.80	0.32
Reach 1	3897	100_yr	315.00	1512.54	1517.09		1517.21	0.016314	2.90	119.07	48.42	0.27
Reach 1	3822	100_yr	315.00	1511.43	1515.56		1515.71	0.024832	3.19	107.59	48.81	0.33
Reach 1	3726	100_yr	315.00	1509.24	1513.41		1513.54	0.020240	2.94	116.49	51.46	0.30
Reach 1	3632	100_yr	315.00	1507.47	1511.33		1511.47	0.024371	3.16	111.84	54.15	0.32
Reach 1	3529	100_yr	315.00	1504.17	1507.81		1508.03	0.048959	3.79	86.79	46.73	0.44
Reach 1	3450	100_yr	315.00	1500.60	1504.94		1505.09	0.028222	3.27	111.04	55.65	0.34
Reach 1	3400	100_yr	315.00	1498.36	1502.58		1502.95	0.069834	5.17	68.66	34.20	0.53
Reach 1	3325	100_yr	315.00	1496.32	1500.37		1500.49	0.018549	2.92	115.37	45.71	0.29
Reach 1	3225	100_yr	315.00	1494.36	1497.95		1498.13	0.031345	3.43	95.08	40.92	0.36
Reach 1	3132	100_yr	315.00	1492.41	1495.69		1495.80	0.019976	2.67	122.96	55.47	0.29
Reach 1	3044	100_yr	315.00	1489.84	1493.94		1494.07	0.019347	2.89	114.96	49.17	0.29
Reach 1	2993	100_yr	315.00	1488.80	1492.65	1491.23	1492.84	0.030686	3.64	94.24	40.75	0.36
Reach 1	2881	100_yr	315.00	1485.68	1490.50	1488.55	1490.59	0.013910	2.65	135.57	55.06	0.25
Reach 1	2812	100_yr	315.00	1484.67	1489.63	1487.40	1489.72	0.011837	2.63	137.30	50.16	0.23
Reach 1	2748	100_yr	385.00	1483.13	1488.68	1486.56	1488.82	0.016329	3.21	139.05	50.23	0.28
Reach 1	2686	100_yr	385.00	1482.35	1487.83	1485.37	1487.94	0.012136	2.67	152.75	45.99	0.23
Reach 1	2631	100_yr	385.00	1482.06	1487.07	1484.70	1487.20	0.015180	3.10	143.79	53.38	0.27
Reach 1	2521	100_yr	440.00	1481.44	1485.41		1485.52	0.015371	2.64	169.23	58.11	0.26
Reach 1	2395	100_yr	440.00	1479.39	1482.49		1482.69	0.035652	3.62	127.43	57.20	0.39
Reach 1	2265	100_yr	440.00	1475.62	1480.31		1480.37	0.010392	2.07	227.55	95.05	0.21
Reach 1	2217	100_yr	440.00	1475.88	1479.82	1478.02	1479.88	0.010118	2.11	234.70	100.99	0.21
Reach 1	2159		Culvert									
Reach 1	2060	100_yr	440.00	1453.79	1458.98		1459.20	0.024939	3.69	120.32	32.84	0.33
Reach 1	2045	100_yr	440.00	1451.12	1458.62		1458.79	0.019131	3.24	136.31	36.62	0.28
Reach 1	1988	100_yr	440.00	1449.72	1457.74		1457.88	0.013273	2.94	151.35	38.07	0.24
Reach 1	1823	100_yr	440.00	1447.89	1454.48		1454.76	0.028761	4.31	111.89	35.61	0.35
Reach 1	1696	100_yr	440.00	1445.20	1451.20		1451.41	0.023834	4.09	132.89	50.32	0.33
Reach 1	1566	100_yr	535.00	1442.48	1447.38		1447.62	0.034956	4.31	150.38	67.52	0.40
Reach 1	1493	100_yr	535.00	1436.94	1441.45	1441.45	1442.51	0.180497	9.09	70.48	31.82	0.82
Reach 1	1444	100_yr	535.00	1432.70	1438.78	1436.41	1439.12	0.031970	4.75	118.98	28.81	0.37
Reach 1	1244	100_yr	535.00	1422.23	1425.21	1425.02	1426.04	0.203158	7.29	73.80	35.63	0.87
Reach 1	1221	100_yr	535.00	1418.87	1422.77		1423.28	0.072029	5.75	95.84	33.43	0.56
Reach 1	1160	100_yr	535.00	1412.26	1418.95		1419.42	0.057196	5.50	97.88	25.03	0.46
Reach 1	1120	100_yr	535.00	1409.44	1417.71		1417.97	0.023286	4.19	133.42	31.20	0.30
Reach 1	1058	100_yr	535.00	1405.19	1416.75		1416.91	0.012105	3.26	172.85	34.99	0.21
Reach 1	1000	100_yr	535.00	1404.66	1416.13	1410.18	1416.27	0.010015	3.11	199.33	55.30	0.20

Appendix 4

Hydrologic Backup Information



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- FLOWPATH
- ACREAGE — 2.5 AC.
- NODE
- ONSITE DRAINAGE NODE ID — 301
- BASIN ID — BASIN 300
- PROPOSED 100-YEAR WSE OF GOLDENSTAR CREEK — 204.00
- GOLDENSTAR CREEK DRAINAGE NODE/ID

150 75 0 150 300 450

GRAPHIC SCALE: 1"=150'

NOTES

1. SEE PRE-PROJECT DRAINAGE EXHIBIT FOR OFFSITE HYDROLOGY.
2. SEE POST-PROJECT DRAINAGE EXHIBIT FOR ONSITE HYDROLOGY.

RICK ENGINEERING COMPANY
1770 IOWA AVE, SUITE 100
RIVERSIDE, CA 92507
951.782.0707
rickengineering.com

DRAINAGE STUDY MAP FOR
GOLDENSTAR CREEK

PRELIMINARY ENGINEERING
POST-PROJECT

SHEET 1 OF 2 DATE: 05/08/2024
J-19427

© 2024 Rick Engineering Company

NOT FOR CONSTRUCTION – EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

Q100 = 533.9 CFS
A = 335.1 AC
Tc = 35.6 MIN

Q100 = 109.0 CFS
A = 56.6 AC
Tc = 20.6 MIN

Q100 = 439.4 CFS
A = 270.9 AC
Tc = 34.3 MIN

Q100 = 37.7 CFS
A = 19.9 AC
Tc = 24.0 MIN

Q100 = 383.1 CFS
A = 233.9 AC
Tc = 31.5 MIN

Q100 = 65.8 CFS
A = 28.6 AC
Tc = 13.5 MIN

BASIN 300
56.6 AC.

BASIN 200
20.1 AC.

BASIN 100
28.6 AC.

OFFSITE BY-PASS
TO NODE 220
Q100 = 19.6 CFS
A = 11.7 AC
Tc = 17.8 MIN

11.7 A

GOLDENSTAR CREEK
UPSTREAM BOUNDARY
CONDITION
Q100 = 314.3 CFS
A = 182.2 AC
Tc = 23.4 MIN

CHICAGO AVENUE

GOLDENSTAR CREEK

IRIS AVENUE

MATCH LINE SHEET 2

MATCH LINE SHEET 2

LEGEND

MAJOR DRAINAGE BOUNDARY	
MINOR DRAINAGE BOUNDARY	
FLOWPATH	
ACREAGE	2.5 AC.
NODE	
ONSITE DRAINAGE NODE ID	301
BASIN ID	BASIN 300
PROPOSED 100-YEAR WSE OF GOLDENSTAR CREEK	
GOLDENSTAR CREEK DRAINAGE NODE/ID	204.00

150 75 0 150 300 450
GRAPHIC SCALE: 1"=150'

NOTES

1. SEE PRE-PROJECT DRAINAGE EXHIBIT FOR OFFSITE HYDROLOGY.
2. SEE POST-PROJECT DRAINAGE EXHIBIT FOR ONSITE HYDROLOGY.

RICK ENGINEERING COMPANY
1770 IOWA AVE, SUITE 100
RIVERSIDE, CA 92507
951.782.0707
rickengineering.com

DRAINAGE STUDY MAP FOR
GOLDENSTAR CREEK

PRELIMINARY ENGINEERING
POST-PROJECT

SHEET 1 OF 2 DATE: 05/08/2024
J-19427

© 2024 Rick Engineering Company

NOT FOR CONSTRUCTION – EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

\\cp.rickeng.com\projects\J-19000\19427_Chinatown_SD\Workfiles\19427_dm_post_OSC.dwg 2024-05-08 - 2:37PM - hovenberg

```
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2014 Advanced Engineering Software (aes)
                    (Rational Tabling Version 21.0)
                Release Date: 06/01/2014  License ID 1261

                          Analysis prepared by:

                         RICK ENGINEERING COMPANY
                             5620 Friars Road
                          San Diego, California 92110
                        619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* CHICAGO AVENUE                                                        *
* PROPOSED CONDITION RATIONAL METHOD FOR  GOLDENSTAR CREEK 100 YEAR EVENT  *
* JN# 19427 05/08/2024                                                  *
 ************************************************************************

  FILE NAME: CAGSCP00.RAT
  TIME/DATE OF STUDY: 09:10 05/08/2024
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.630
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.704
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.840
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.240
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4685655
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4625021
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.240
  SLOPE OF INTENSITY DURATION CURVE = 0.4625
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   25.0     18.5    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  23.40   RAIN INTENSITY(INCH/HOUR) =  1.92
  TOTAL AREA(ACRES) =   182.20   TOTAL RUNOFF(CFS) =    314.30

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1529.00  DOWNSTREAM(FEET) =   1509.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   803.00   CHANNEL SLOPE =  0.0249
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   4.300
  MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.798
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7216
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     316.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.85
  AVERAGE FLOW DEPTH(FEET) =   3.63   TRAVEL TIME(MIN.) =   3.48
  Tc(MIN.) =   26.88
  SUBAREA AREA(ACRES) =     3.10       SUBAREA RUNOFF(CFS) =    4.02
  TOTAL AREA(ACRES) =      185.3         PEAK FLOW RATE(CFS) =     318.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.64   FLOW VELOCITY(FEET/SEC.) =   3.86
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    205.00 =     803.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    215.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1509.00  DOWNSTREAM(FEET) =   1503.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0545
  CHANNEL BASE(FEET) =    4.50   "Z" FACTOR =   5.400
  MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.786
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7207
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     318.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.92
 AVERAGE FLOW DEPTH(FEET) =   3.07   TRAVEL TIME(MIN.) =   0.37
 Tc(MIN.) =   27.25
 SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.51
 TOTAL AREA(ACRES) =      185.7         PEAK FLOW RATE(CFS) =     318.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.07   FLOW VELOCITY(FEET/SEC.) =   4.93
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    215.00 =     913.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    211.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1503.00  DOWNSTREAM(FEET) =   1492.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   447.00   CHANNEL SLOPE =  0.0246
 CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   4.200
 MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.731
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7161
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     320.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.87
 AVERAGE FLOW DEPTH(FEET) =   3.78   TRAVEL TIME(MIN.) =   1.92
 Tc(MIN.) =   29.18
 SUBAREA AREA(ACRES) =     2.60       SUBAREA RUNOFF(CFS) =    3.22
 TOTAL AREA(ACRES) =      188.3         PEAK FLOW RATE(CFS) =     322.06

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.79   FLOW VELOCITY(FEET/SEC.) =   3.88
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    211.00 =    1360.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    211.00 TO NODE    220.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1492.00  DOWNSTREAM(FEET) =   1488.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE =  0.0211
 CHANNEL BASE(FEET) =    3.20   "Z" FACTOR =   5.300
 MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.706
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7140
```

```
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     322.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.48
  AVERAGE FLOW DEPTH(FEET) =   3.89   TRAVEL TIME(MIN.) =   0.91
  Tc(MIN.) =   30.08
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    0.85
  TOTAL AREA(ACRES) =      189.0         PEAK FLOW RATE(CFS) =     322.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.89   FLOW VELOCITY(FEET/SEC.) =   3.48
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    220.00 =    1550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   30.08
  RAINFALL INTENSITY(INCH/HR) =   1.71
  TOTAL STREAM AREA(ACRES) =   189.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    322.91

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.50   RAIN INTENSITY(INCH/HOUR) =  2.47
  TOTAL AREA(ACRES) =    28.60   TOTAL RUNOFF(CFS) =     56.80

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.50
  RAINFALL INTENSITY(INCH/HR) =   2.47
  TOTAL STREAM AREA(ACRES) =    28.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     56.80

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  19.00   RAIN INTENSITY(INCH/HOUR) =  2.11
  TOTAL AREA(ACRES) =    14.40   TOTAL RUNOFF(CFS) =     23.20

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.00
  RAINFALL INTENSITY(INCH/HR) =   2.11
  TOTAL STREAM AREA(ACRES) =    14.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      322.91    30.08        1.706        189.00
      2       56.80    13.50        2.472         28.60
      3       23.20    19.00        2.111         14.40

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      218.19    13.50       2.472
      2      275.63    19.00       2.111
      3      380.88    30.08       1.706

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     380.88   Tc(MIN.) =   30.08
  TOTAL AREA(ACRES) =      232.0
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    220.00 =    1550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    214.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1488.00  DOWNSTREAM(FEET) =   1484.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   273.00   CHANNEL SLOPE =  0.0147
  CHANNEL BASE(FEET) =    3.20   "Z" FACTOR =   5.300
  MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.670
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7108
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     382.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.17
  AVERAGE FLOW DEPTH(FEET) =   4.48   TRAVEL TIME(MIN.) =   1.44
  Tc(MIN.) =   31.52
  SUBAREA AREA(ACRES) =     1.90       SUBAREA RUNOFF(CFS) =    2.26
  TOTAL AREA(ACRES) =      233.9         PEAK FLOW RATE(CFS) =     383.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  4.48   FLOW VELOCITY(FEET/SEC.) =   3.17
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    214.00 =    1823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.52
  RAINFALL INTENSITY(INCH/HR) =   1.67
  TOTAL STREAM AREA(ACRES) =   233.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    383.13

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  24.00   RAIN INTENSITY(INCH/HOUR) =  1.89
  TOTAL AREA(ACRES) =    19.90   TOTAL RUNOFF(CFS) =     37.70

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.00
  RAINFALL INTENSITY(INCH/HR) =   1.89
  TOTAL STREAM AREA(ACRES) =    19.90
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.70

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  22.80   RAIN INTENSITY(INCH/HOUR) =  1.94
  TOTAL AREA(ACRES) =    11.70   TOTAL RUNOFF(CFS) =     19.60

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.80
  RAINFALL INTENSITY(INCH/HR) =   1.94
  TOTAL STREAM AREA(ACRES) =    11.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.60

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      383.13    31.52        1.670        233.90
      2       37.70    24.00        1.894         19.90
      3       19.60    22.80        1.940         11.70

 **********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      332.56    22.80       1.940
      2      348.57    24.00       1.894
      3      433.24    31.52       1.670

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     433.24   Tc(MIN.) =   31.52
  TOTAL AREA(ACRES) =      265.5
```

```
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    214.00 =    1823.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    214.00 TO NODE    214.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1484.00  DOWNSTREAM(FEET) =   1448.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   913.00   CHANNEL SLOPE =  0.0394
 CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   2.800
 MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.606
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7049
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     436.30
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.43
 AVERAGE FLOW DEPTH(FEET) =   4.39   TRAVEL TIME(MIN.) =   2.80
 Tc(MIN.) =   34.32
 SUBAREA AREA(ACRES) =     5.40       SUBAREA RUNOFF(CFS) =    6.11
 TOTAL AREA(ACRES) =      270.9         PEAK FLOW RATE(CFS) =     439.35

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  4.41   FLOW VELOCITY(FEET/SEC.) =   5.44
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    214.10 =    2736.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    214.10 TO NODE    214.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   34.32
 RAINFALL INTENSITY(INCH/HR) =   1.61
 TOTAL STREAM AREA(ACRES) =   270.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    439.35

****************************************************************************
 FLOW PROCESS FROM NODE    214.10 TO NODE    214.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  20.60   RAIN INTENSITY(INCH/HOUR) =  2.03
 TOTAL AREA(ACRES) =    56.60   TOTAL RUNOFF(CFS) =    109.00

****************************************************************************
 FLOW PROCESS FROM NODE    214.10 TO NODE    214.10 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.60
  RAINFALL INTENSITY(INCH/HR) =   2.03
  TOTAL STREAM AREA(ACRES) =    56.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    109.00

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      439.35    34.32        1.606        270.90
      2      109.00    20.60        2.033         56.60

 **********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      372.71    20.60       2.033
      2      525.43    34.32       1.606

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     525.43   Tc(MIN.) =   34.32
  TOTAL AREA(ACRES) =      327.5
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    214.10 =    2736.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    214.10 TO NODE    216.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1448.00  DOWNSTREAM(FEET) =   1402.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   556.00   CHANNEL SLOPE =  0.0827
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   2.800
  MANNING'S FACTOR = 0.100   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.580
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7024
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     529.65
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.53
  AVERAGE FLOW DEPTH(FEET) =   4.05   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   35.55
  SUBAREA AREA(ACRES) =     7.60       SUBAREA RUNOFF(CFS) =    8.43
  TOTAL AREA(ACRES) =      335.1         PEAK FLOW RATE(CFS) =     533.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  4.07   FLOW VELOCITY(FEET/SEC.) =   7.54
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    216.00 =    3292.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      335.1  TC(MIN.) =     35.55
  PEAK FLOW RATE(CFS)   =     533.87
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Arroyo Vista

NOISE IMPACT ANALYSIS

COUNTY OF RIVERSIDE

PREPARED BY:

William Maddux, INCE
bmaddux@urbanxroads.com
(619) 778-1971

JUNE 23, 2025

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **I**
APPENDICES ..... **III**
LIST OF EXHIBITS ..... **III**
LIST OF TABLES ..... **III**
LIST OF ABBREVIATED TERMS ..... **IV**
EXECUTIVE SUMMARY **1**
Off-Site Traffic Noise Analysis 1
Operational Noise Analysis 2
Construction and Rock Crushing Noise Analysis 3
Construction and Rock Crushing Vibration 3
Blasting Noise Analysis 3
Blasting Vibration Analysis 4
Construction Blasting Noise and Vibration Abatement Measures 4
Summary of CEQA Significance Findings 6
1 INTRODUCTION **7**
1.1 Site Location 7
1.2 Project Description 7
2 FUNDAMENTALS **11**
2.1 Range of Noise 11
2.2 Noise Descriptors 12
2.3 Sound Propagation 12
2.4 Noise Control 13
2.5 Noise Barrier Attenuation 14
2.6 Land Use Compatibility With Noise 14
2.8 Community Response to Noise 14
2.9 Vibration 15
3 REGULATORY SETTING **19**
3.1 California Noise Requirements 19
3.2 California Building Code 19
3.3 County of Riverside General Plan Noise Element 19
3.3 Construction Noise Standards 23
3.4 Construction Vibration Standards 24
3.7 Construction Blasting Standards 24
4 SIGNIFICANCE CRITERIA **25**
4.1 Noise Level Increases (Threshold A) 25
4.2 Vibration (Threshold B) 26
4.3 CEQA Guidelines Not Further Analyzed (Threshold C) 26
4.4 Significance Criteria Summary 26
5 EXISTING NOISE LEVEL MEASUREMENTS **29**
5.1 Measurement Procedure and Criteria 29
5.2 Noise Measurement Locations 29
5.3 Noise Measurement Results 31

6 METHODS AND PROCEDURES 33
6.1 FHWA Traffic Noise Prediction Model 33
6.2 On-Site Traffic Noise Prediction Model Inputs 33
6.3 Off-Site Traffic Noise Prediction Model Inputs 35
7 ON-SITE TRAFFIC NOISE IMPACTS 39
7.1 On-Site Exterior Noise Analysis 39
7.2 On-Site Interior Noise Analysis 39
8 OFF-SITE TRANSPORTATION NOISE IMPACTS 43
8.1 TRAFFIC NOISE CONTOURS 43
8.2 EXISTING TRAFFIC NOISE LEVEL INCREASES 50
8.3 EAPC (2030) TRAFFIC NOISE LEVEL INCREASES 50
8.4 HORIZON (2045) TRAFFIC NOISE LEVEL INCREASES 51
9 SENSITIVE RECEIVER LOCATIONS 57
10 OPERATIONAL NOISE IMPACTS 59
10.1 Operational Noise Sources 59
10.2 Reference Noise Levels 61
10.3 CadnaA Noise Prediction Model 61
10.4 Project Operational Noise Levels 62
10.5 Project Operational Noise Level Compliance 62
10.6 Project Operational Noise Level Increases 63
11 CONSTRUCTION IMPACTS 65
11.1 Construction Noise Levels 65
11.2 Construction Reference Noise Levels 65
11.3 Construction Noise Analysis 69
11.4 Construction Noise Level Compliance 70
11.5 Construction Vibration Impacts 71
11.6 Rock Crushing Construction Reference Noise Levels 71
11.6 Rock Crushing Construction Reference Noise Levels 72
11.7 Rock Crushing Construction Noise Analysis and Compliance 73
11.8 Rock Crushing Construction Vibration Analysis and Compliance 73
11.9 Blasting Noise Analysis 74
11.10 Blasting Vibration Impacts 76
12 REFERENCES 79
13 CERTIFICATION 81

APPENDICES

APPENDIX 3.1: COUNTY OF RIVERSIDE OFFICE OF INDUSTRIAL HYGIENE NOISE STUDY REQUIREMENTS
APPENDIX 5.1: STUDY AREA PHOTOS
APPENDIX 5.2: NOISE LEVEL MEASUREMENT WORKSHEETS
APPENDIX 7.1: ON-SITE TRAFFIC NOISE CALCULATIONS
APPENDIX 8.1: OFF-SITE TRAFFIC NOISE LEVEL CALCULATIONS
APPENDIX 10.1: OPERATIONS NOISE CALCULATIONS
APPENDIX 11.1: CONSTRUCTION NOISE CALCULATIONS
APPENDIX 11.2: ROCK CRUSHING NOISE CALCULATIONS
APPENDIX 11.3: BLASTING NOISE CALCULATIONS

LIST OF EXHIBITS

EXHIBIT 1-A: LOCATION MAP 8
EXHIBIT 1-B: SITE PLAN 9
EXHIBIT 2-A: TYPICAL NOISE LEVELS 11
EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION 15
EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION 17
EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE EXPOSURE 22
EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS 30
EXHIBIT 9-A: RECEIVER LOCATIONS 58
EXHIBIT 10-A: STATIONARY NOISE SOURCE LOCATIONS 60
EXHIBIT 11-A: CONSTRUCTION NOISE SOURCE AND RECEIVER LOCATIONS 66
EXHIBIT 11-B: ROCK CRUSHING ACTIVITY AND RECEIVER LOCATIONS 67
EXHIBIT 11-C: BLASTING ACTIVITY AND RECEIVER LOCATIONS 68

LIST OF TABLES

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS 6
TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY 27
TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS 31
TABLE 6-1: ON-SITE ROADWAY PARAMETERS 34
TABLE 6-2: TIME OF DAY VEHICLE SPLITS (SECONDARY, COLLECTOR) 34
TABLE 6-3: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX) 34
TABLE 6-4: OFF-SITE ROADWAY PARAMETERS 36
TABLE 6-5: AVERAGE DAILY TRAFFIC VOLUMES 37
TABLE 7-1: FUTURE EXTERIOR NOISE LEVELS (CNEL) 39
TABLE 7-2: FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL) 40
TABLE 7-3: SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL) 41
TABLE 8-1: EXISTING WITHOUT PROJECT NOISE CONTOURS 44
TABLE 8-2: EXISTING WITH PROJECT NOISE CONTOURS 45
TABLE 8-3: EAPC (2030) WITHOUT PROJECT NOISE CONTOURS 46
TABLE 8-4: EAPC (2030) WITH PROJECT NOISE CONTOURS 47
TABLE 8-5: HORIZON (2045) WITHOUT PROJECT NOISE CONTOURS 48
TABLE 8-6: HORIZON (2045) WITH PROJECT NOISE CONTOURS 49
TABLE 8-7: EXISTING WITH PROJECT TRAFFIC NOISE INCREASES 53

TABLE 8-8: EAPC 2030 WITH PROJECT TRAFFIC NOISE INCREASES 54
TABLE 8-9: HORIZON 2045 WITH PROJECT TRAFFIC NOISE INCREASES 55
TABLE 10-1: REFERENCE NOISE LEVELS 61
TABLE 10-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS 62
TABLE 10-3: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS 62
TABLE 10-4: OPERATIONAL NOISE LEVEL COMPLIANCE 63
TABLE 10-5: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES 64
TABLE 10-6: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES 64
TABLE 11-1: CONSTRUCTION REFERENCE NOISE LEVELS 69
TABLE 11-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY 70
TABLE 11-3: CONSTRUCTION NOISE LEVEL COMPLIANCE 70
TABLE 11-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT 71
TABLE 11-5: PROJECT GENERAL CONSTRUCTION VIBRATION LEVELS 72
TABLE 11-6: ROCK CRUSHING EQUIPMENT NOISE LEVEL SUMMARY 73
TABLE 11-7: ROCK CRUSHING EQUIPMENT VIBRATION LEVELS 74
TABLE 11-8: BLASTING CONSTRUCTION NOISE LEVELS 76

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
NR	Noise Reduction
Project	Arroyo Vista
REMEL	Reference Energy Mean Emission Level
STC	Sound Transmission Class

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise abatement measures for the proposed residential development Arroyo Vista ("Project"). The Project site is located on the northwest corner of Chicago Avenue and Iris Avenue in the Woodcrest area of unincorporated County of Riverside. This analysis conservatively assesses the development of 233 single-family residential dwelling units, while the Project proposes a slightly smaller development of 231 single-family dwelling units. This noise impact analysis was prepared to satisfy the County of Riverside noise level standards and ensure that adequate noise abatement measures are incorporated into the Project's development. In addition, recommendations for exterior and interior noise abatement are identified based on the latest Project site and grading plans.

EXTERIOR NOISE ABATEMENT

According to the County of Riverside 65 dBA CNEL exterior noise level standard for residential land uses, the on-site unmitigated exterior noise levels are considered normally acceptable for the proposed dwelling units. The on-site traffic noise level impacts indicate that the outdoor living areas adjacent to Chicago Avenue and Iris Avenue will experience unshielded exterior noise levels ranging from 61.3 to 64.2 dBA CNEL. Therefore, no mitigation would be required, and exterior noise impacts would be *less than significant.*

INTERIOR NOISE ABATEMENT

The interior noise level analysis shows that this interior areas would require a 16.3 to 19.2 dBA CNEL reduction to comply with the County of Riverside 45 dBA CNEL standard, which is greater than the minimum 12 dBA reduction with windows open and will require a windows-closed condition and mechanical ventilation (e.g., air conditioning). The Project intends to provide each unit in the development with mechanical ventilation, thus the windows can be kept in a closed position as required. Based on standard construction techniques, interior noise standards can be satisfied using standard windows and construction techniques. Therefore, no mitigation would be required to satisfy the County of Riverside 45 dBA CNEL interior noise level standards, and interior noise impacts would be *less than significant.*

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the operation of the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on twenty-three roadway segments surrounding the Project site were calculated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in *Arroyo Vista Traffic Impact Analysis*. (1) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing, Existing Plus Project, Existing plus Ambient Growth plus Project plus Cumulative (EAPC) (2030) Project Buildout, and Horizon Year (2045) traffic conditions.

The Existing exterior traffic noise levels are expected to range from 41.0 to 76.6 dBA CNEL. The Existing plus Project conditions will range from 41.0 to 76.6 dBA CNEL. The Project off-site traffic noise level increases will range from less than 0.1 to 8.2 dBA CNEL. Based on the traffic noise level increases, land uses adjacent to Gamble Avenue, south of Iris Avenue (segment #8), are predicted to experience a significant (8.2 dBA CNEL) noise level increase due to unmitigated Project-related traffic noise levels. However, the overall traffic noise levels along this segment are predicted to be 52.6 dBA CNEL. Based on the existing measured noise levels in the vicinity of Gamble Avenue, the ambient noise level is 56.7 dBA CNEL. Accounting for the measured existing ambient noise level, the Project would result in a traffic noise level increase of less than 2.0 dBA. Therefore, the Project-related traffic noise level increases along all segments would be *less than significant*.

The EAC Year 2030 without Project exterior noise levels are expected to range from 41.0 to 77.8 dBA CNEL. The EAPC Year 2030 with Project conditions will range from 41.0 to 77.8 dBA CNEL. Under this scenario, the Project off-site traffic noise level increases will range from less than 0.1 to 6.4 dBA CNEL. Similar to the existing condition, the traffic noise level increases at land uses adjacent to Gamble Avenue, south of Iris Avenue (segment #8), are predicted to be *significant* (6.4 dBA CNEL). However, similar to Existing plus Project traffic noise levels, the overall traffic noise level along this segment is predicted to be 53.0 dBA CNEL. Based on the existing measured noise levels in the vicinity of Gamble Avenue, the ambient noise level is 56.7 dBA CNEL. Accounting for the measured existing ambient noise level, the Project would result in a traffic noise level increase of less than 2.0 dBA. Therefore, Project-related traffic noise level increases would be *less than significant*.

The Horizon Year 2045 without Project exterior noise levels are expected to range from 41.0 to 78.4 dBA CNEL. The Horizon Year 2045 with Project conditions will range from 41.0 to 78.6 dBA CNEL. The Project off-site traffic noise level increases will range from less than 0.1 to 6.1 dBA CNEL. Similar to the existing and EAPC 2030 conditions, the traffic noise level increases at land uses adjacent to Gamble Avenue, s/o Iris Avenue (segment 8), are predicted to be *significant* (6.1 dBA CNEL). However, similar to Existing plus Project traffic noise levels, the overall traffic noise level along this segment is predicted to be 53.1 dBA CNEL. Based on the existing measured noise levels in the vicinity of Gamble Avenue, the ambient noise level is 56.7 dBA CNEL. Accounting for the measured existing ambient noise level, the Project would result in a traffic noise level increase of less than 2.0 dBA. Therefore, Project-related traffic noise level increases would be *less than significant*.

Therefore, the analysis shows that the Project-related traffic noise level increases would be less than significant.

OPERATIONAL NOISE ANALYSIS

The Arroyo Vista residential development is not expected to include any specific type of operational noise levels beyond the typical noise sources associated with similar residential land uses in the Project study area, such as people and children, parking lot activity, garage doors, small air conditioners, and trash collection, and is considered a noise-sensitive receiving land use.

However, there is the potential for operational noise impacts due to ground mounted air conditioners (HVAC) at adjacent residential land uses.

To assess the noise impacts of potential air conditioners, Urban Crossroads modeled typical 1- to 5-ton air conditioners on each lot at the approximate location of the units. Based on modeling, the daytime hourly noise levels at the off-site receiver locations are expected to range from 29.6 to 35.5 dBA $L_{eq.}$ The nighttime hourly noise levels at the off-site receiver locations are expected to range from 26.8 to 32.8 dBA L_{eq}. The operational noise levels associated with Arroyo Vista Project will not exceed the County of Riverside 55 dBA L_{ed} daytime and 45 dBA L_{eq} nighttime exterior noise level standards at all nearby receiver locations. Additionally, the Project will generate a daytime and nighttime operational noise level increases ranging from 0.0 to 04 dBA L_{eq} at the nearest receiver locations. Therefore, operational noise impacts of the Project are considered *less than significant*.

CONSTRUCTION AND ROCK CRUSHING NOISE ANALYSIS

Using sample reference noise levels to represent the planned construction and rock crushing activities at the Arroyo Vista site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. Since the County of Riverside General Plan and County Code of Ordinances do not identify specific construction noise level thresholds, an hourly average L_{eq} threshold is identified based on the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* for noise sensitive residential use. The Project-related construction and rock crushing activities noise levels are expected to range from 56.4 to 61.3 dBA L_{eq} and will satisfy the 80 dBA L_{eq} construction noise level threshold at all receiver locations. Additionally, construction activities are planned to typically occur between 7:00 a.m. and 5:00 p.m. and would comply with the County of Riverside limitation on allowable hours of construction per Section 9.52.020. Therefore, based on the results of this analysis, all nearby sensitive receiver locations will experience *less than significant* impacts due to Project construction noise levels.

CONSTRUCTION AND ROCK CRUSHING VIBRATION

Construction and rock crushing activities can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. Ground-borne vibration levels resulting from typical construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). At the nearest receivers Project construction vibration velocity levels are estimated to reach up to 0.02 in/sec PPV. Based on maximum acceptable continuous vibration threshold of 0.30 PPV (in/sec), the typical Project construction vibration levels will not exceed the County of Riverside thresholds at properties located adjacent to the Project site and vibration impacts would be *less than significant*.

BLASTING NOISE ANALYSIS

Blasting associated with Project construction would occur on-site and near residential homes. While some blasting noise will be noticeable by nearby residents, the recommended construction

noise and vibration recommendations identified in this report will reduce the worst-case noise levels calculated using RCNM. RCNM reference noise level for explosive blasting equipment is 94 dBA L_{max} at a distance of 50 feet. (2) Since the County of Riverside General Plan and County Code of Ordinances do not identify specific construction noise level limits for blasting activities, the Office of Surface Mining Reclamation and Enforcement (OSMRE) and the Code of Federal Regulations (CFR) Airblast Limits (30 CFR 816.67(b)) (3) are used to represents an appropriate threshold for determining potential impacts due to blasting-related noise levels. The noise levels at the individual receiver locations, will approach 70.2 dBA L_{max} and will not exceed the CFR maximum noise level of 129 dBA L_{max} noise level threshold and blasting noise impacts would be *less than significant*.

BLASTING VIBRATION ANALYSIS

Blasting operations can have unacceptable noise and vibration impacts if not conducted correctly. Excessive levels of structural vibration due to ground vibration from blasting can cause substantial damage to structures. Therefore, Noise-1 is required to mitigate potential vibration impacts. With the implementation of the identified controls vibration levels from blasting activities at sensitive receivers would be *less than significant*.

CONSTRUCTION BLASTING NOISE AND VIBRATION ABATEMENT MEASURES

Though blasting noise and vibration is temporary, intermittent and of short duration, and will not present any long-term impacts, the following practices would reduce any noise and vibration level increases produced by blasting activities to the nearby noise-sensitive residential land uses:

The following practices would reduce any noise and vibration level impacts produced by the proposed blasting activities at the nearby noise-sensitive residential land uses:

MM Noise-1: Blasting Limitations.

Prior to approval of any grading permits that require blasting activities and a blasting permit, the Project Applicant shall prepare and submit for County review and approval of a Blasting Noise and Vibration Monitoring and Abatement Plan ("Noise and Vibration Abatement Plan"). The required Noise and Vibration Abatement Plan shall include the name and qualifications of the person(s) responsible for monitoring and reporting blast vibrations. In addition, the Noise and Vibration Abatement Plan shall require a minimum of three seismographs for monitoring peak ground vibration and air-overpressure. The Noise and Vibration Abatement Plan also shall require that equipment and its use shall conform fully to the standards developed by the Vibration Section of the International Society of Explosive Engineers (ISEE). For all blasts, the Noise and Vibration Abatement Plan shall require monitoring of ground motion and air-overpressure at the nearest residential properties or other structure of concern. The Noise and Vibration Abatement Plan also shall specify a minimum trigger level for monitoring of 0.05 in/s for ground motion and 120 dB for air-overpressure. Additionally, the Noise and Vibration Abatement Plan shall require regular reporting of blasting and measurements to Riverside County, and shall include a copy of the instrument/software-generated blast monitoring report at each instrument location that includes measured peak particle velocity in inches per second, peak air-overpressure in linear-

scale decibels, and vibration and air-overpressure event plots, with date and time of event recording. In addition, the Noise and Vibration Abatement Plan shall include the following requirements:

- Prior to commencement of any blasting, a pre-blast survey of the conditions of all existing property and aboveground utilities located within 300 feet of any potential blasting areas shall be conducted. The pre-blast survey shall include a photographic record of all visible and accessible structures, facilities, utilities, or other improvements. The survey shall document the interior and exterior conditions of all residential property and associated structures located within 500 feet of blasting areas. If property owners refuse surveys, provide copies of certified-mail letters documenting attempts to provide the survey by a third-party professional survey company. The required surveys shall include a description of the interior and exterior condition of the various structures examined. Descriptions shall include the locations of any cracks, damage, or other existing defects and shall include information needed to identify and describe the defect, if any, and to evaluate the construction operations on the defect. Survey records shall include photos of all cracks and other damaged, weathered, or otherwise deteriorated structural conditions. If necessary, macro lenses and flash illumination shall be used to ensure defects are shown clearly in the photographs. Photos shall contain an accurate date stamp. No blasting shall occur prior to completion of surveys of surrounding residential properties. Surveys also shall be repeated at facilities or properties where damage concerns have been expressed by individual residents, property owners, or other concerned parties. Details of any observed changes to surveyed structures and documenting photos shall be reported and submitted to Riverside County.
- Blasting only shall be allowed Monday through Friday only between the hours of 8:00 a.m. and 5:00 p.m.
- No blasting shall occur closer than 100 feet from residential structures. In the event that non-rippable materials are encountered within 100 feet from any residential structure, alternative methods shall be employed to reduce blasting-related noise and vibration impacts. Alternative rock blasting within 100 feet of residential homes may include methods such as the drilling of holes in the largest area of rock, inserting expansive grout or small charges into each whole to fragment the rock into smaller pieces, and then crushing the pieces for transport or other use.
- No more than a total of 2,000 pounds of explosive shall be detonated each day, excluding detonators.
- All blasts located within 500 feet of any structures or above ground utilities shall be covered with woven steel cable or steel-cable and rubber-tire blasting mats with a minimum weight of 30 pounds per square foot. Woven polypropylene or similar weed-barrier fabric, covered with at least 6 inches of soil or sand shall be placed over blast areas to protect initiators before mats are placed. Mats shall be overlapped at least 3 feet and shall completely cover the blast area and extend at least three feet beyond the blast area in all directions. If any flyrock or blasted material is thrown more than 10 feet or half the distance to the nearest structure, whichever is less, blasting shall be suspended until the County's has approved a revised blasting plan showing revisions to assure adequate ground movement control.
- Before blasts are covered, all loose soils above the blast shall be removed where feasible. Remaining ground located within 20 feet of the blast shall be thoroughly wetted with water to suppress airborne dust. Sand or soils placed over weed-barrier fabric shall be similarly wetted before placing blast mats.

- If specified vibration limits are exceeded, blasting operations shall cease immediately and a revised blasting plan shall be submitted to the County. Blasting shall not resume until a revised blasting plan has been reviewed and the Contractor has expressed in writing the conditions that will be applied to further blasting work.

Project grading and blasting contractors shall be required to ensure compliance with the Noise and Vibration Abatement Plan requirements and shall permit periodic inspection of the construction site by County of Riverside staff or its designee to confirm compliance. The requirements of the Noise and Vibration Abatement Plan also shall be specified in bid documents issued to prospective construction contractors. Riverside County shall review all monitoring reports to ensure compliance with the Noise and Vibration Abatement Plan and shall have the authority to stop all blasting activities on site if it is determined that blasting activities are not being conducted in conformance with Noise and Vibration Abatement Plan and/or the above-listed requirements.

SUMMARY OF CEQA SIGNIFICANCE FINDINGS

The results of this Arroyo Vista Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (4). Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
On-Site Traffic Noise	7	*Less Than Significant*	-
Off-Site Traffic Noise	8	*Less Than Significant*	-
Operational Noise	10	*Less Than Significant*	-
Construction & Rock Crushing Noise	11	*Less Than Significant*	-
Construction & Rock Crushing Vibration		*Less Than Significant*	-
Blasting Noise		*Less Than Significant*	-
Blasting Vibration		*Significant*	*Less Than Significant*

1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Arroyo Vista ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures noise analysis, evaluates the potential noise impacts from operation and construction of the Project, and as necessary, identifies mitigation measures to reduce impacts.

1.1 SITE LOCATION

The Project site is located on the northwest corner of Chicago Avenue and Iris Avenue in the Woodcrest area of unincorporated County of Riverside, as shown on Exhibit 1-A. The closest major airport is the Riverside Municipal Airport located roughly 9.8 miles northwest of the Project site.

1.2 PROJECT DESCRIPTION

The Project consists of the development of 231 single family detached residential dwelling units and associated improvements. The Project is anticipated to be developed in two phases with a Project buildout in 2030, as shown on Exhibit 1-B. This analysis conservatively assesses the development of 233 single-family residential dwelling units.

EXHIBIT 1-A: LOCATION MAP

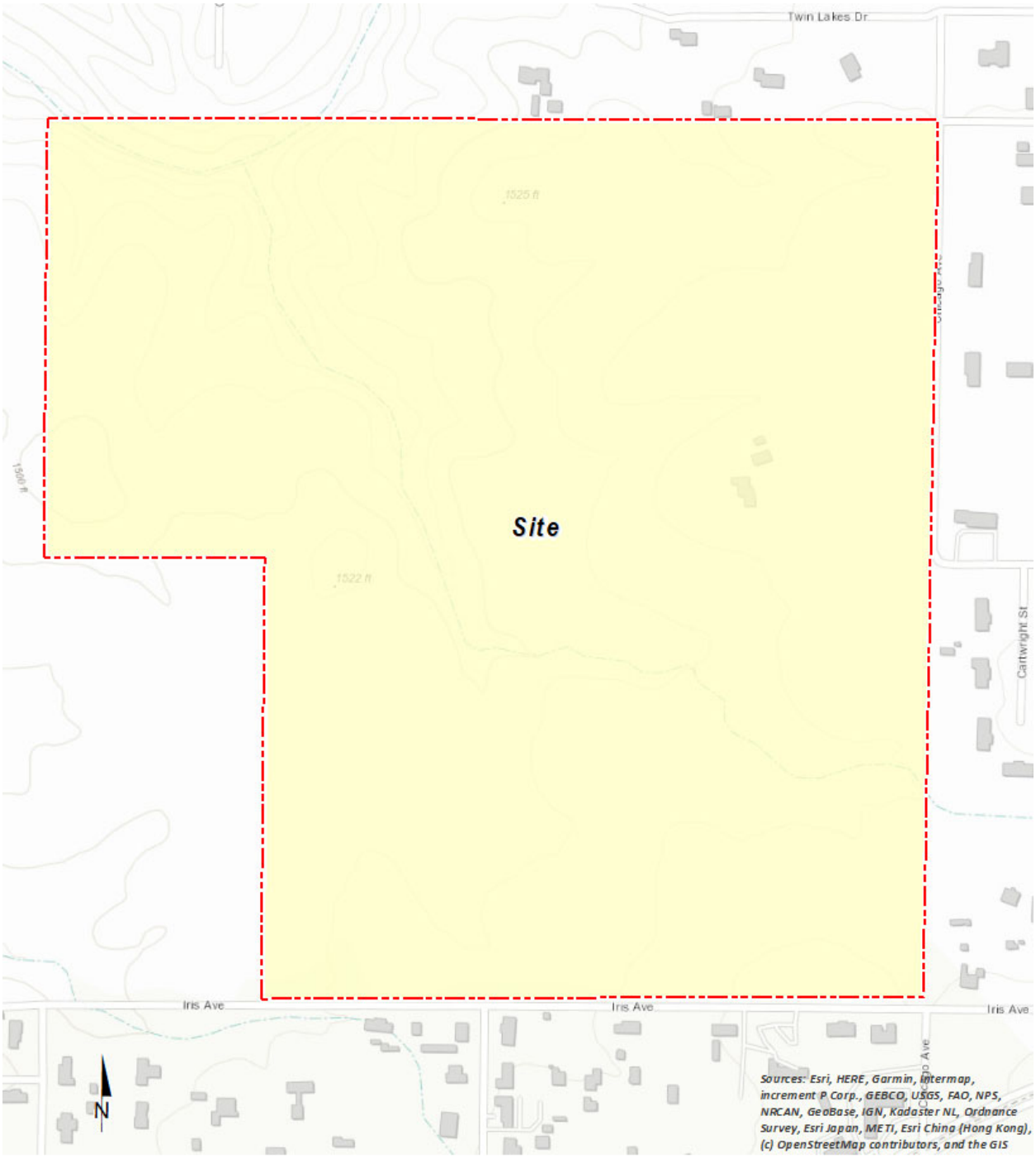
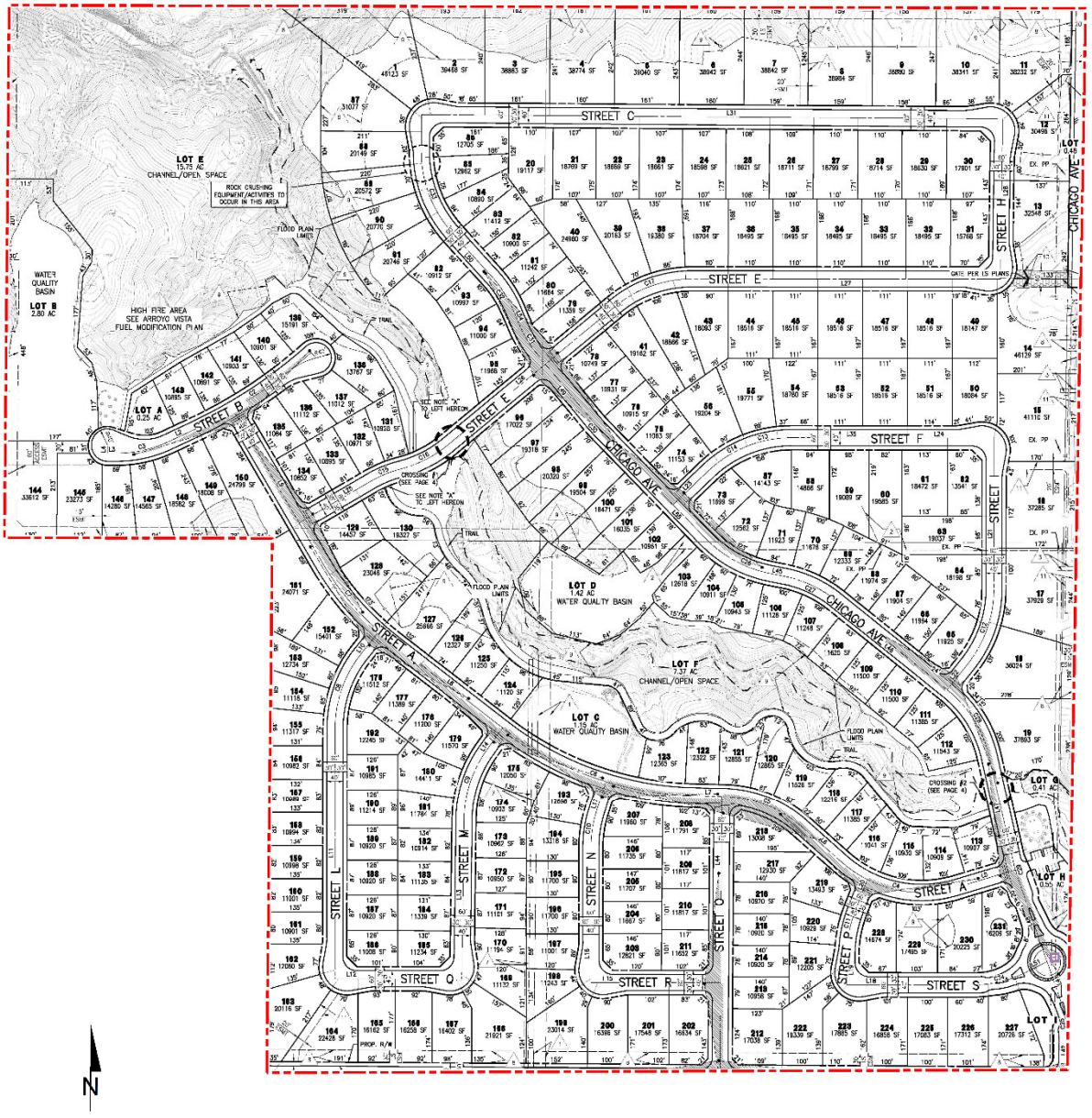


EXHIBIT 1-B: SITE PLAN



This page was intentionally left blank.

2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health (5). Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (6) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (7) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{50}, L_{25}, L_8 and L_2, are commonly used. The percentile noise descriptors are the noise levels equaled or exceeded during 50 percent, 25 percent, 8 percent, and 2 percent of a stated time. Sound levels associated with the L_2 and L_8 typically describe transient or short-term events, while levels associated with the L_{50} describe the steady state (or median) noise conditions. While the L_{50} describes the median noise levels occurring 50 percent of the time, the L_{eq} accounts for the total energy (average) observed for the entire hour. Therefore, the L_{eq} noise descriptor is generally 1-2 dBA higher than the L_{50} noise level.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The County of Riverside relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to

as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (6)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (8)

2.3.3 ATMOSPHERIC EFFECTS

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (6)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure. (8)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receptor by controlling the noise source, transmission path, receptor, or all three. This concept is known as the source-path-receptor concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (8)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (9)

2.8 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

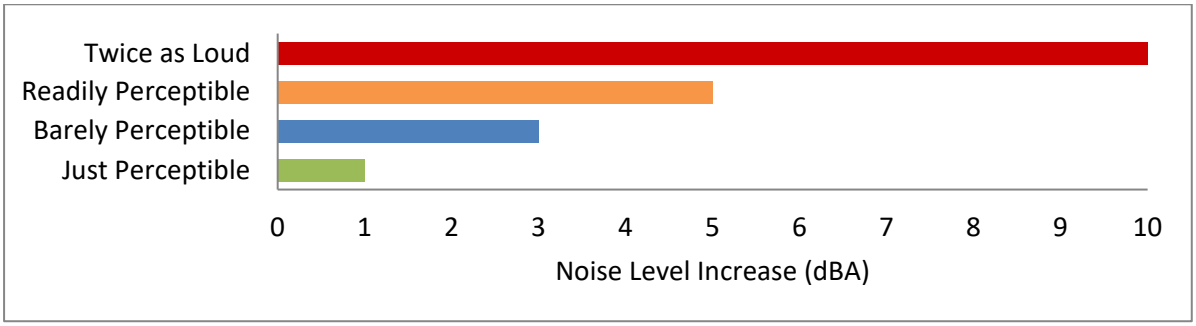
- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (10) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (10)

Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments,

a change of 3 dBA is considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (11)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



2.9 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual*, vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

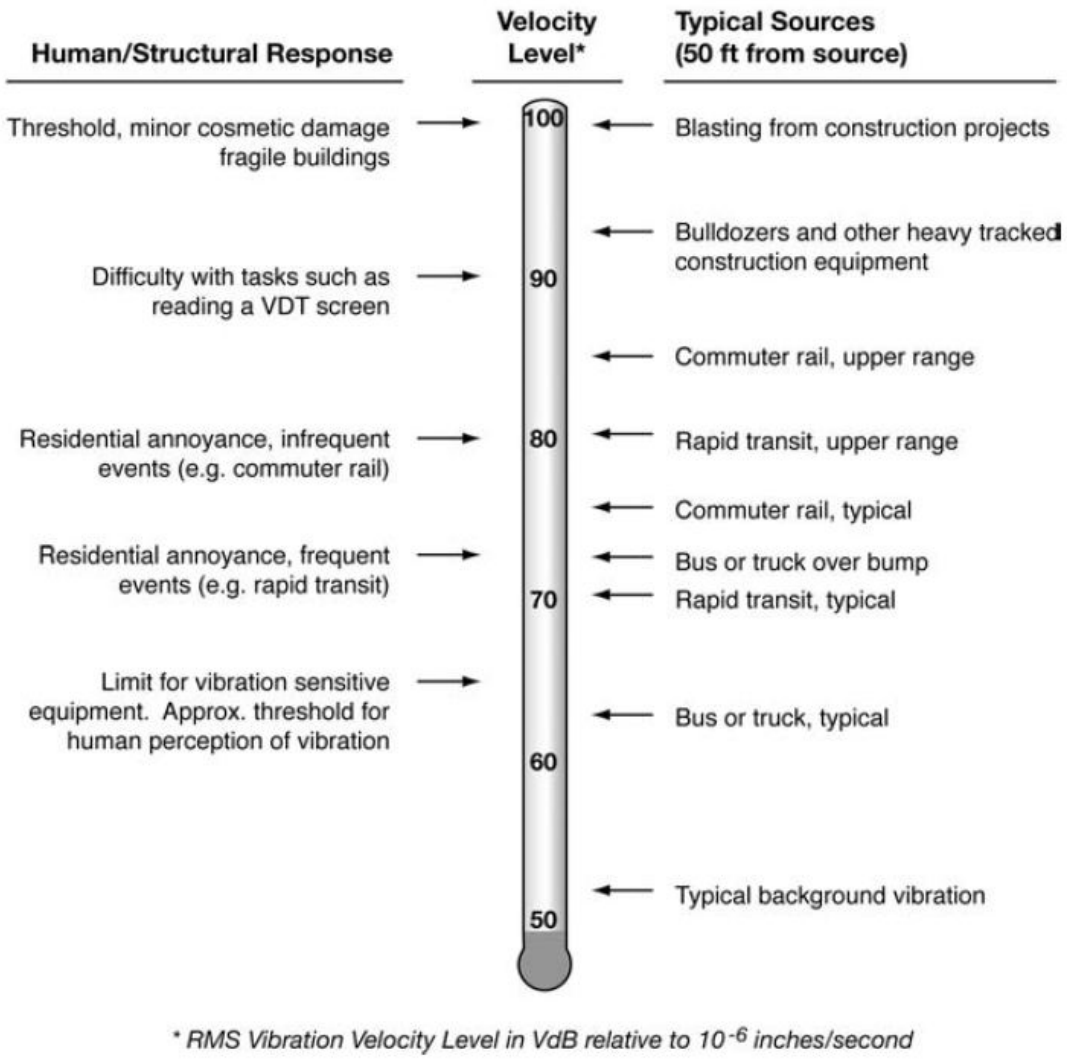
Additionally, in contrast to airborne noise, ground-borne vibration outdoors is not a common environmental problem and annoyance from ground-borne vibration is almost exclusively an indoor phenomenon (4). Therefore, the effects of vibrations should only be evaluated at a structure and the effects of the building structure on the vibration should be considered. Wood-frame buildings, such as typical residential structures, are more easily excited by ground vibration than heavier buildings. In contrast, large masonry buildings with spread footings have a low response to ground vibration (4). In general, the heavier a building is, the lower the response will be to the incident vibration energy. However, all structurers reduce vibration levels due to the coupling of the building to the soil.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal (4). The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body (4). However, the RMS amplitude and PPV are related mathematically, and the RMS amplitude of equipment is typically calculated from the PPV reference level. The RMS amplitude is approximately 70% of the PPV (12). Thus, either can be used on the description of vibration impacts.

While not universally accepted, vibration decibel notation (VdB) is another vibration notation developed and used by the FTA in their guidance manual to describe vibration levels and provide a background of common vibration levels and set vibration limits (13). Decibel notation (VdB) serves to reduce the range of numbers used to describe vibration levels and is used in this report to describe vibration levels.

As stated in the FTA guidance manual, the background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual*.

This page was intentionally left blank.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 CALIFORNIA NOISE REQUIREMENTS

California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (14) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 CALIFORNIA BUILDING CODE

California's noise insulation standards for all residential units are codified in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Chapter 12, Section 1206. These noise standards are applied to new construction that contains dwelling units or sleeping units, such as residential and hotel or motel uses, in California for controlling interior noise levels resulting from exterior noise sources. For new buildings, the acceptable interior noise limit is 45 dBA CNEL in habitable rooms (15).

3.3 COUNTY OF RIVERSIDE GENERAL PLAN NOISE ELEMENT

The County of Riverside has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the County of Riverside from excessive exposure to noise. (16) The Noise Element specifies the maximum allowable exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies several polices to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To protect County of Riverside residents from excessive noise, the Noise Element contains the following policies related to the Project:

N 1.1 Protect noise-sensitive land uses from high levels of noise by restricting noise-producing land uses from these areas. If the noise-producing land use cannot be relocated, then noise buffers such as setbacks, landscaping, or block walls shall be used.

N 1.3 Consider the following uses noise-sensitive and discourage these uses in areas in excess of 65 CNEL:

- *Schools*
- *Hospitals*
- *Rest Homes*
- *Long Term Care Facilities*
- *Mental Care Facilities*
- *Residential Uses*
- *Libraries*
- *Passive Recreation Uses*
- *Places of Worship*

N 1.5 Prevent and mitigate the adverse impacts of excessive noise exposure on the residents, employees, visitors, and noise-sensitive uses of Riverside County.

N 4.1 Prohibit facility-related noise, received by any sensitive use, from exceeding the following worst-case noise levels:

a. 45 dBA 10-minute L_{eq} between 10:00 p.m. and 7:00 a.m.;

b. 65 dBA 10-minute L_{eq} between 7:00 a.m. and 10:00 p.m.

N 13.1 Minimize the impacts of construction noise on adjacent uses within acceptable standards.

N 13.2 Ensure that construction activities are regulated to establish hours of operation in order to prevent and/or mitigate the generation of excessive or adverse impacts on surrounding areas.

N 13.3 Condition subdivision approval adjacent to developed/occupied noise-sensitive land uses (see policy N 1.3) by requiring the developer to submit a construction-related noise mitigation plan to the [County] for review and approval prior to issuance of a grading permit. The plan must depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of this project, through the use of such methods as:

i. Temporary noise attenuation fences;

ii. Preferential location and equipment; and

iii. Use of current noise suppression technology and equipment.

N 14.1 Enforce the California Building Standards that sets standards for building construction to mitigate interior noise levels to the tolerable 45 CNEL limit. These standards are utilized in conjunction with the Uniform Building Code by the County's Building Department to ensure that noise protection is provided to the public. Some design features may include extra-dense insulation, double-paned windows, and dense construction materials.

N 16.3 Prohibit exposure of residential dwellings to perceptible ground vibration from passing trains as perceived at the ground or second floor. Perceptible motion shall be presumed to be a motion velocity of 0.01 inches/second over a range of 1 to 100 Hz.

To ensure noise-sensitive land uses are protected from high levels of noise (N 1.1), Table N-1 of the Noise Element identifies guidelines to evaluate proposed developments based on exterior and interior noise level limits for land uses and requires a noise analysis to determine needed mitigation measures if necessary. The Noise Element identifies residential use as a noise-sensitive land use (N 1.3) and discourages new development in areas with transportation related levels of 65 dBA CNEL or greater existing ambient noise levels. To prevent and mitigate noise impacts for its residents (N 1.5), County of Riverside requires exterior noise attenuation measures

for sensitive land use exposed to transportation related noise levels higher than 65 dBA CNEL. In addition, the County of Riverside had adopted an interior noise level limit of 45 dBA CNEL (N 14.1).

Policy N 4.1 of the Noise Element sets a stationary-source exterior noise limit to not to be exceeded for a cumulative period of more than ten minutes in any hour of 65 dBA L_{eq} for daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. To prevent high levels of construction noise from impacting noise-sensitive land uses, policies N 13.1 through 13.3 identify construction noise mitigation requirements for new development located near existing noise-sensitive land uses. Policy 16.3 establishes the vibration perception threshold for rail-related vibration levels, used in this analysis as a threshold for determining potential vibration impacts due to Project construction. (16)

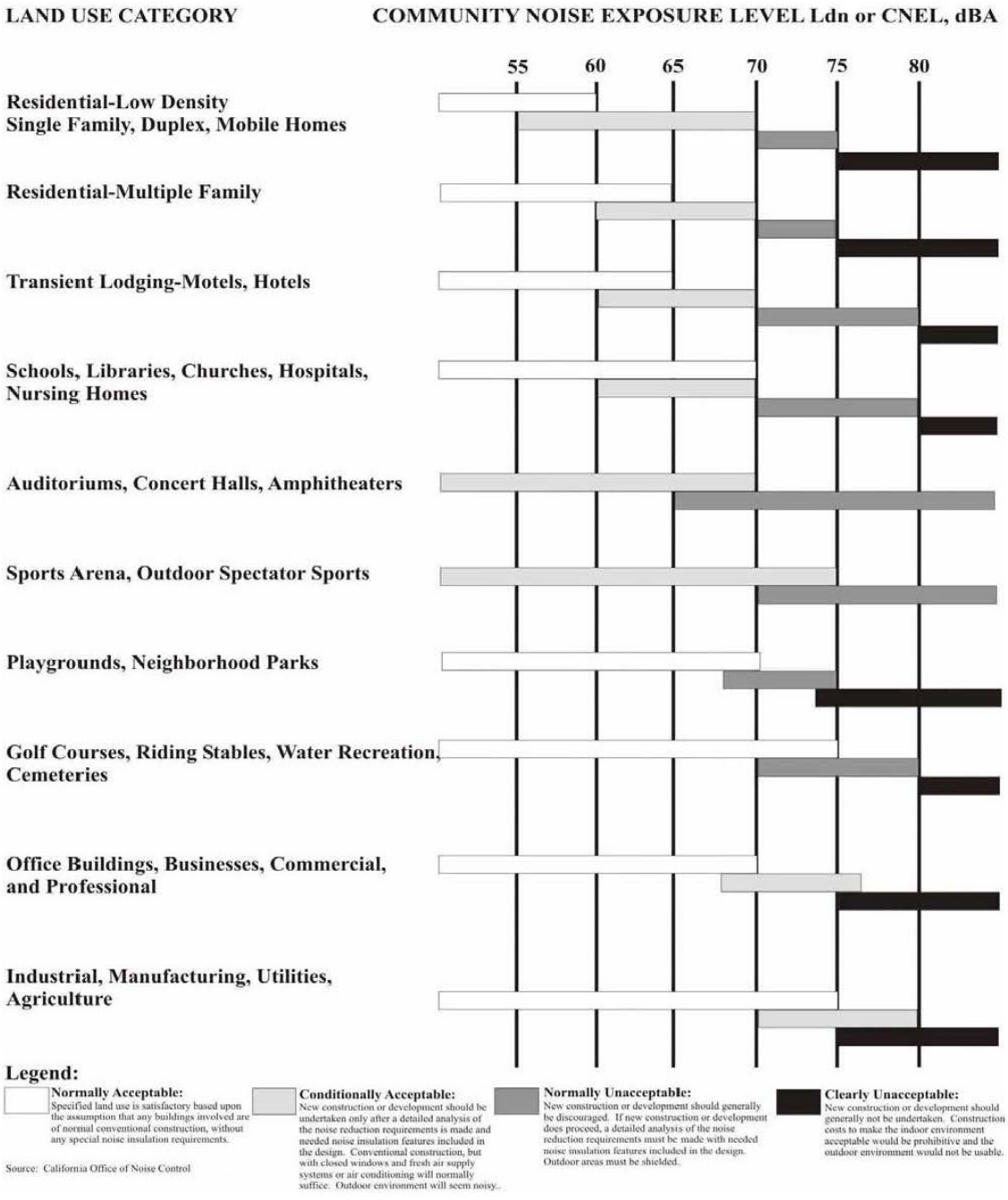
3.2.1 LAND USE COMPATIBILITY GUIDELINES

The noise criteria identified in the County of Riverside Noise Element (Table N-1) are guidelines to evaluate the land use compatibility of transportation related noise. The compatibility criteria, shown on Exhibit 3-A, provides the County with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels. The *Land Use Compatibility for Community Noise Exposure* matrix describes categories of compatibility and not specific noise standards. The Arroyo Vista land use is considered *normally acceptable* with unmitigated exterior noise levels of less than 60 dBA CNEL. For *conditionally acceptable* exterior noise levels, approaching 70 dBA CNEL for residential land uses, *new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice*. (16)

3.2.2 COUNTY OF RIVERSIDE STATIONARY NOISE STANDARDS

The County of Riverside has set hourly average L_{eq} exterior noise limits to control the stationary-source noise associated with the development of the proposed Arroyo Vista. The County considers noise generated using motor vehicles to be a stationary noise source when operated on private property such as at a loading dock. These facility-related noises, as projected to any portion of any surrounding property containing a *habitable dwelling, hospital, school, library or nursing home*, must not exceed the following worst-case noise levels. Policy N 4.1 of the County of Riverside General Plan Noise Element sets a stationary-source average L_{eq} exterior noise limit not to be exceeded for a cumulative period of more than ten minutes in any hour of 65 dBA L_{eq} for daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. (16)

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE EXPOSURE



Source: County of Riverside General Plan Noise Element, Table N-1.

The County of Riverside County Code of Ordinances Section 9.52.040 *General sound level standards* identify lower, more restrictive exterior noise level standards, which for the purpose of this report, are used to evaluate potential Project-related operational noise level limits instead of the higher General Plan exterior noise level standards previously identified. The County of Riverside County Code of Ordinances identifies exterior noise level limits of 55 dBA L_{eq} during the daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. for noise-sensitive uses. (17) The County of Riverside County Code of Ordinances Noise Ordinance is included in Appendix 3.1.

Based on several discussions with the County of Riverside Department of Environmental Health (DEH), Office of Industrial Hygiene (OIH), it is important to recognize that the County of Riverside County Code of Ordinances noise level standards, incorrectly identify maximum noise level (L_{max}) standards that should instead reflect the maximum hourly average noise levels (L_{eq}). Moreover, the County of Riverside DEH OIH's April 15th, 2015 *Requirements for determining and mitigating, non-transportation noise source impacts to residential properties* also identifies operational (stationary-source) noise level limits using the L_{eq} metric, consistent with the direction of the County of Riverside General Plan guidelines and standards provided in the Noise Element. Therefore, this report has been prepared consistent with direction of the County of Riverside DEH OIH guidelines and standards using the average L_{eq} noise level metric for stationary-source (operational) noise level evaluation.

3.3 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project, the County of Riverside has established limits to the hours of operation. Section 9.52.020 of the County's Noise Regulation ordinance indicates that noise associated with any private construction activity located within one-quarter of a mile from an inhabited dwelling is considered exempt between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May. (17) Neither the County's General Plan nor County Code of Ordinances establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (18 p. 179)

3.4 CONSTRUCTION VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. (4) To analyze vibration impacts originating from the operation and construction of the Arroyo Vista, vibration-generating activities are appropriately evaluated against standards established under the Municipal Code if such standards exist. However, the County of Riverside does not identify specific construction vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (12 p. 38) Table 19, vibration damage are used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

3.7 CONSTRUCTION BLASTING STANDARDS

The construction of the proposed Project will include blasting of hard rock areas, which is a major source of potential noise and vibration impacts to nearby residential receivers. Since the County of Riverside General Plan and County Code of Ordinances do not identify specific construction noise level limits for blasting activities, the Office of Surface Mining Reclamation and Enforcement (OSMRE) and the Code of Federal Regulations (CFR) Airblast Limits (30 CFR 816.67(b)) are used. Section 816.2 of Title 30 of the CFR indicates that the blasting regulations are intended to ensure that all surface mining activities are conducted in a manner which preserves and enhances environmental and other values in accordance with the Act. (2) While the OSMRE regulates mining activities, the blasting activities at the Project site represent surface mining activities which, to satisfy California Environmental Quality Act (CEQA) guidelines, must demonstrate that they do not adversely affect the existing environment. Therefore, the OSMRE blasting regulations are applied to the blasting activities anticipated at the Project site. For mining operations, which require larger blasts than that of the Project, the lowest noise level threshold identified in the CFR is a maximum noise level 129 dBA L_{max} for blasting activity measured at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area. (3) The L_{max} threshold used in the noise analysis is suitable for single-event noise levels, such as blasting activities, since other noise regulations in L_{eq} (energy average), for example, average out a reference noise level over a given time period which reduces the single-event noise level over a longer period of time. The L_{max}, therefore, allows for the shorter-duration single-event noise levels to be evaluated against an appropriate threshold.

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (19) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines. Under CEQA, consideration must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes that there is no single noise increase that renders the noise impact significant. (20) This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called ambient environment.

The Federal Interagency Committee on Noise (FICON) (21) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (Leq). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will typically be judged.

As previously stated, the approach used in this noise study recognizes that there is no single noise increase that renders a noise impact significant, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (20) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a readily perceptible 5 dBA or greater project-related noise level increase is considered a significant impact when the without project noise levels are below 60 dBA. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA barely perceptible noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any

increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance.

The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project (baseline) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or readily perceptible, 3 dBA or barely perceptible, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses. These levels of increases and their perceived acceptance are consistent with guidance provided by both the Federal Highway Administration (22 p. 9) and Caltrans (11 p. 2_48).

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.4, the vibration impacts originating from the construction of the Arroyo Vista, vibration-generating activities are appropriately evaluated using standards established by the Caltrans *Transportation and Construction Vibration Guidance Manual*, Table 19. The Caltrans' vibration thresholds for building damage are used in this noise study to assess potential operational and temporary construction-related impacts at adjacent building locations. A maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec) is used to describe the nearest residential buildings adjacent to the Project site.

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

CEQA Noise Threshold C applies when there are nearby public and private airports and/or air strips and focuses on land use compatibility of the Project to nearby airports and airstrips. The Project site is not located within two miles of an airport or airstrip. The closest major airport is March Air Force Base located roughly 4.2 miles east of the Project site. The noise level contours of March Airforce Base are shown in Exhibit 4-1. As shown, the Project site would be outside the 60 dBA CNEL noise level contour and thus would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant,* and no further noise analysis is conducted in relation to Appendix G to the CEQA Guidelines, Noise Threshold C.

4.4 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix that includes the allowable criteria used to identify potentially significant incremental noise level increases.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	**Nighttime**
On-Site Traffic[1]	Exterior Noise Level Criteria	65 dBA CNEL	
	Interior Noise Level Standard	45 dBA CNEL	
Off-Site Traffic[2]	If ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
	If ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
	If ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
Operational	Exterior Noise Level Standards[3]	55 dBA L_{eq}	45 dBA L_{eq}
	If ambient is < 60 dBA Leq[1]	≥ 5 dBA L_{eq} Project increase	
	If ambient is 60 - 65 dBA Leq[1]	≥ 3 dBA L_{eq} Project increase	
	If ambient is > 65 dBA Leq[1]	≥ 1.5 dBA L_{eq} Project increase	
Construction	Noise Level Threshold[4]	80 dBA L_{eq}	
	Vibration Level Threshold[5]	0.30 in/sec PPV	

[1] County of Riverside General Plan Noise Element.
[2] FICON, 1992.
[3] County of Riverside County Code of Ordinances, Section 9.52.040.
[4] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[5] Fdowudqv#Wudqvsruwdwrq#Ddg#Frqvwuxfwrq#Ylevudwrq#P dqxdo/#Dsuld#5353#Wdedn#<.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

This page was intentionally left blank.

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at five locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A shows the Project site and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, March 23, 2022. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

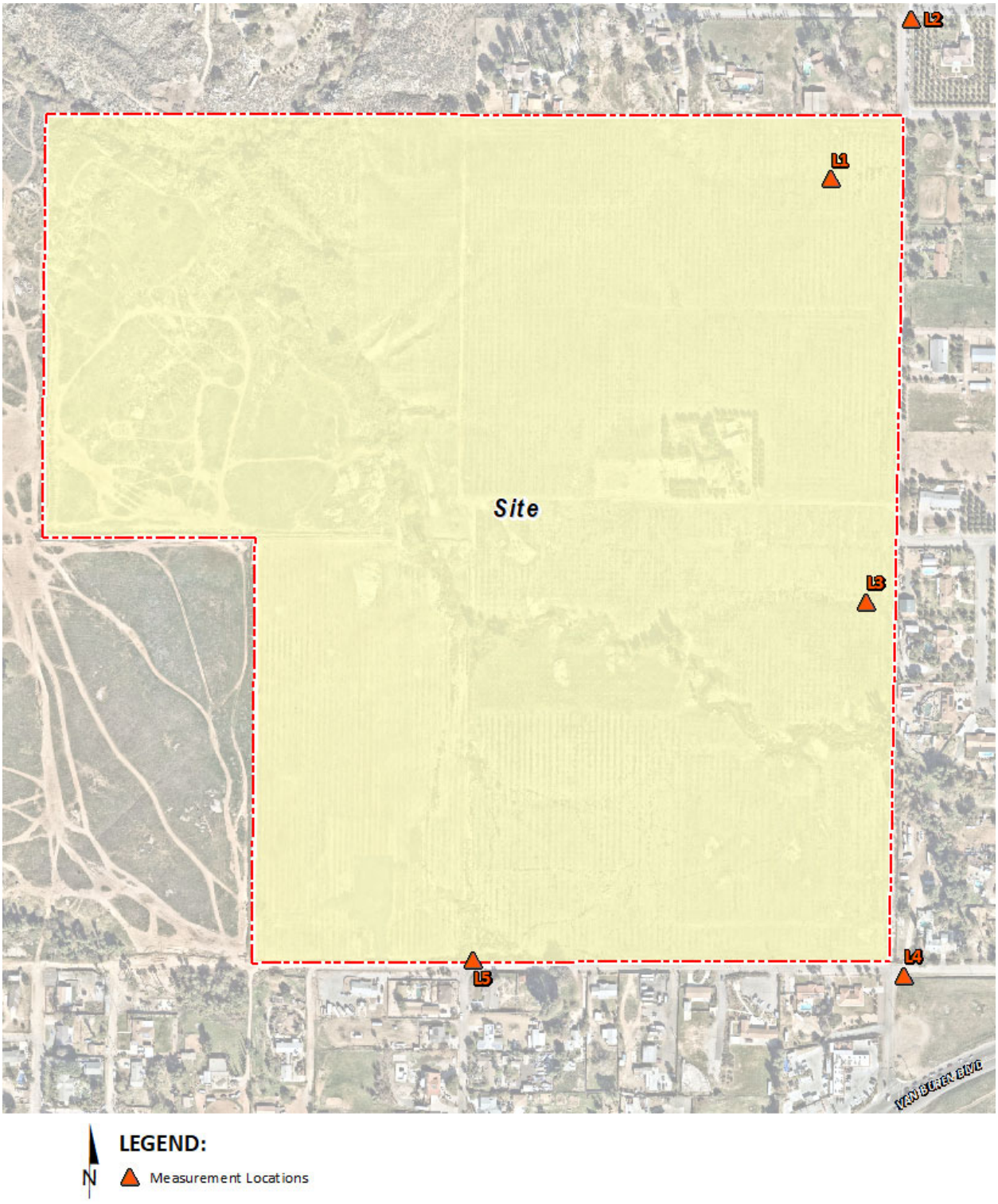
To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (23)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (6) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (18)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (18) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA Leq)[2]		CNEL
		Daytime	Nighttime	
L1	Located northeast on the Project site near the existing residence at 17975 Twin Lakes Drive.	46.3	42.4	50.0
L2	Located northeast of the Project site near an existing residence at 18019 Twin Lakes Drive.	51.0	46.8	54.2
L3	Located east of the Project site near the existing residence at 15795 Cartwright Street.	44.6	42.3	49.4
L4	Located in the southeast corner of the Project site near an existing residence at 18010 Iris Avenue	55.0	53.0	60.0
L5	Located south of the Project site near an existing residence at 16016 Gamble Avenue	55.0	48.2	56.7

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods. The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with nearby surface streets. This includes the auto and heavy truck activities on study area roadway segments near the noise level measurement locations.

This page was intentionally left blank.

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (24) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (25) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the average daily traffic (ADT) volumes used for this study are presented on Table 6-1. Based on the County of Riverside General Plan Circulation Element Map, Chicago Avenue and Iris Avenue are classified as one (1) lane Collectors. Future average daily traffic volumes, shown on Table 6-1, were obtained from the Arroyo Vista Traffic Analysis prepared by Urban Crossroads on June 18, 2025. (26) Consistent with the County of Riverside Office of Industrial Hygiene noise study requirements, (27) soft site conditions were used to analyze the potential on-site traffic noise impacts for the Project study area.

Table 6-2 presents the time-of-day vehicle splits by vehicle type and roadway classification, and Table 6-3 presents the total traffic flow distributions (vehicle mixes) used for this analysis which were obtained from the County of Riverside Office of Industrial Hygiene noise study requirements. The vehicle mix provides the hourly distribution percentages of automobiles for input into the FHWA Model based on roadway types. The vehicle splits are shown on Tables 6-2 are reported as a percentage of the overall percentage.

TABLE 6-1: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification[1]	Maximum Daily Traffic Volume[2]	Posted Speed Limit (mph)[3]	Site Conditions
Chicago Av.	2	Collector	8,000	25	Soft
Iris Av.	2	Collector	8,000	30	Soft

[1] County of Riverside Circulation Element Table C-1 July 2020
[2] County of Riverside Circulation Element Figure C-3, 2013
[3] Posted speed limit.

TABLE 6-2: TIME OF DAY VEHICLE SPLITS (SECONDARY, COLLECTOR)

Time Period	Vehicle Type		
	Autos	Medium Trucks	Heavy Trucks
Daytime (7am-7pm)	77.5%	84.8%	86.5%
Evening (7pm-10pm)	12.9%	4.9%	2.7%
Nighttime (10pm-7am)	9.6%	10.3%	10.8%
Total:	100.0%	100.0%	100.0%

Source: County of Riverside Office of Industrial Hygiene - Secondary, Collector

TABLE 6-3: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Roadway Classification	Total % Traffic Flow[1]			Total
	Autos	Medium Trucks	Heavy Trucks	
All Roadways	97.42%	1.84%	0.74%	100.00%

[1] Source: County of Riverside Office of Industrial Hygiene - Secondary, Collector

To predict the future noise environment at each lot within the Project site, coordinate information was collected to identify the noise transmission path between the noise source and receiver. The coordinate information is based on the Project site plan showing the plotting of each lot, as shown in Exhibit 1-B. The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to the noise barrier, and the building façade. The first-floor exterior noise level receivers were placed five feet above the pad elevation, or three feet above the pad elevation when the barrier height exceeds six feet per County of Riverside Office of Industrial Hygiene noise study guidelines. Second-floor receivers were placed 14 feet above the pad elevation.

6.3 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-4 identifies the eighteen off-site study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the County of Riverside General Plan Circulation Element, and the posted vehicle speeds. Consistent with the Traffic Analysis prepared by Urban Crossroads, Inc. for the Project, (1) the off-site traffic noise analysis includes the following traffic scenarios.

- Existing Conditions Without Project: This scenario refers to the existing present-day noise conditions (as of April 2025) without the proposed Project.
- Existing plus Project Conditions – Project Buildout: This scenario refers to the existing present-day noise conditions with the proposed Project. It should be noted that this scenario would not actually occur, as full occupancy of Phase 1 of the proposed Project is not expected to occur until 2028 while the "Existing" conditions evaluated in the NIA reflects existing traffic as of April 2025, when traffic count data was collected.
- Existing plus Ambient Growth plus Cumulative (EAC) 2030 Conditions Without Project: This scenario includes near-term noise conditions from ambient growth and cumulative developments without traffic from the proposed Project.
- Existing plus Ambient Growth plus Project plus Cumulative (EAPC) (2030) Conditions – Project Buildout: This scenario includes Project-related traffic, ambient growth, and all cumulative projects identified in the Project's traffic analysis.
- Horizon Year (2045) Conditions Without Project: This scenario refers to cumulative horizon year noise conditions without traffic from the proposed Project.
- Horizon Year (2045) Conditions With Project: This scenario includes all horizon year noise conditions including traffic from the proposed Project.

The average daily traffic (ADT) volumes used for this study are presented on Table 6-5. Table 6-2 and Table 6-3 provide the time of day (daytime, evening, and nighttime) vehicle splits used for calculating CNEL values.

TABLE 6-4: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Receiving Land Use[1]	Classification[2]	Right Of Way	Vehicle Speed (mph)
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	Urban Arterial	152'	45
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	Urban Arterial	152'	55
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	Secondary	100'	55
4	Washington St.	n/o Van Buren Bl.	Sensitive	Arterial	88'	45
5	Washington St.	s/o Van Buren Bl.	Sensitive	Arterial	88'	35
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	Local	60'	25
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	Local	60'	25
8	Gamble Av.	s/o Iris Av.	Sensitive	Local	60'	25
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	Secondary	100'	40
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	Secondary	100'	40
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	Secondary	100'	50
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	Secondary	100'	50
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	Collector	74'	45
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	Collector	74'	40
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	Urban Arterial	152'	50
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	Urban Arterial	152'	50
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	Urban Arterial	152'	50
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	Urban Arterial	152'	50
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	Urban Arterial	152'	50
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	Urban Arterial	152'	50
21	Iris Av.	w/o Gamble Av.	Sensitive	Local	60'	30
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	Local	60'	30
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	Local	60'	30

[1] Based on a review of existing aerial imagery.

TABLE 6-5: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]					
			Existing		EACP (2030)		Horizon (2045)	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Van Buren Bl.	n/o Victoria Av.	30,281	30,787	33,838	34,344	41,126	41,632
2	Van Buren Bl.	s/o Victoria Av.	39,758	40,484	47,454	48,180	51,843	52,569
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	26,488	27,236	32,803	33,551	35,727	36,475
4	Washington St.	n/o Van Buren Bl.	15,725	15,879	20,811	20,965	24,184	25,338
5	Washington St.	s/o Van Buren Bl.	9,192	9,280	11,032	11,120	12,047	12,135
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	1,122	2,662	1,122	2,662	1,363	2,903
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	2,835	2,945	3,131	3,241	3,444	3,554
8	Gamble Av.	s/o Iris Av.	117	777	196	856	215	875
9	Wood Rd.	n/o Van Buren Bl.	9,239	9,349	9,239	9,349	12,618	12,728
10	Wood Rd.	s/o Van Buren Bl.	12,370	12,590	13,657	13,877	17,833	18,053
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	19,588	19,764	19,588	19,764	28,156	28,332
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	12,051	12,117	13,305	13,371	17,456	17,522
13	Victoria Av.	w/o Van Buren Bl.	10,090	10,200	10,090	10,200	12,254	12,364
14	Victoria Av.	e/o Van Buren Bl.	5,757	5,867	5,757	5,867	6,992	7,102
15	Van Buren Bl.	w/o Washington St.	28,697	29,445	32,255	33,003	38,410	39,158
16	Van Buren Bl.	e/o Washington St.	35,562	36,552	40,485	41,475	48,133	49,103
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	35,550	35,880	35,550	35,880	43,175	43,505
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	33,813	34,913	33,813	34,913	41,066	42,166
19	Van Buren Bl.	e/o Wood Rd.	31,982	32,752	31,982	32,752	40,274	41,044
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	29,513	30,041	29,513	30,041	35,843	36,371
21	Iris Av.	w/o Gamble Av.	35	35	35	35	43	43
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	177	397	177	397	215	435
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	154	154	154	154	187	187

[1] Arroyo Vista Traffic Analysis, Urban Crossroads, Inc.

This page was intentionally left blank.

7 ON-SITE TRAFFIC NOISE IMPACTS

This on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potential necessary noise abatement measures for the Project. The primary source of noise impacts to the Project site will be traffic noise from Chicago Avenue and Iris Avenue. The Project will also experience some background traffic noise from the Project's internal local streets, however, due to low traffic volume/speed, traffic noise from these roads will not make a significant contribution to the noise environment.

7.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the parameters outlined in Tables 6-1 to 6-4, the expected future exterior noise levels for individual lots were calculated. Table 7-1 presents a summary of future exterior noise levels in the outdoor living areas (backyards) within the Project site. The on-site traffic noise level impacts indicate that the outdoor living areas adjacent to Chicago Avenue and Iris Avenue will experience unshielded exterior noise levels ranging from 61.3 to 64.2 dBA CNEL. This noise analysis shows that the Project will satisfy the County of Riverside 65 dBA CNEL exterior noise level standards for residential land uses. The on-site traffic noise analysis calculations are provided in Appendix 7.1.

TABLE 7-1: FUTURE EXTERIOR NOISE LEVELS (CNEL)

Lot	Roadway	Unmitigated Exterior Noise Level (dBA CNEL)[1]			
		1st Floor	2nd Floor	3rd Floor	4th Floor
11	Chicago Av.	61.3	62.3	61.9	61.3
227	Iris Av.	64.2	64.0	63.6	63.0
200		64.2	64.1	63.7	63.2
165		62.9	62.7	62.3	61.9

[1] Exterior noise level calculations are included Appendix 5.1.

7.2 ON-SITE INTERIOR NOISE ANALYSIS

Since exterior noise levels will exceed 60 dBA CNEL, the Project is considered "conditionally acceptable", which requires new construction or development to conduct a detailed analysis of the noise reduction requirements and include the needed noise insulation features in the Project design. According to the County of Riverside, conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally provide 25 dBA; thus, noise levels up to 70 dBA CNEL will typically comply with the 45 dBA CNEL interior standard. Therefore, to verify that the future interior noise levels will comply, the exterior noise levels were calculated at the first -and second-floor building façades, and the interior noise levels were calculated based on standard construction techniques with windows closed.

7.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." (28) (29) However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: [1] weather-stripped solid core exterior doors; [2] upgraded dual glazed windows; [3] mechanical ventilation/air conditioning; and [4] exterior wall/roof assemblies free of cutouts or openings.

7.2.2 INTERIOR NOISE LEVEL ASSESSMENT

Tables 7-2 and 7-3 show that the lots facing Chicago Avenue and Iris Avenue will experience future unmitigated noise levels ranging from 61.3 to 64.2 dBA CNEL at the first-floor building façade, and 62.3 to 64.1 dBA CNEL at the second-floor building façade. The interior noise level analysis shows that the interior noise areas would require a 16.3 to 19.2 dBA CNEL reduction to comply with the County of Riverside 45 dBA CNEL interior noise level standard, which is greater than the minimum 12 dBA reduction with windows open and will require a windows-closed condition and mechanical ventilation (e.g., air conditioning). The Project Applicant intends to provide each unit in the development with mechanical ventilation, thus the windows can be kept in a closed position. Based on standard construction techniques, interior noise standards can be satisfied using standard windows and construction techniques. Therefore, the Project will satisfy the County of Riverside 45 dBA CNEL interior noise level standards for residential development.

TABLE 7-2: FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot	Noise Level at Façade[1]	Required Interior NR[2]	Estimated Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold	Threshold Exceeded?
11	61.3	16.3	25.0	No	36.3	45	No
227	64.2	19.2	25.0	No	39.2	45	No
200	64.2	19.2	25.0	No	39.2	45	No
165	62.9	17.9	25.0	No	37.9	45	No

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] Estimated minimum interior noise reduction in first-floor bedrooms.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise reduction

TABLE 7-3: SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot	Noise Level at Façade[1]	Required Interior NR[2]	Calculated Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold	Threshold Exceeded?
11	62.3	17.3	25.0	No	37.3	45	No
227	64.0	19.0	25.0	No	39.0	45	No
200	64.1	19.1	25.0	No	39.1	45	No
165	62.7	17.7	25.0	No	37.7	45	No

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] Estimated minimum interior noise reduction in second floor bedrooms.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise reduction

This page was intentionally left blank.

8 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with the proposed Project, noise contours were developed based on the *Arroyo Vista Traffic Analysis* (1). Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Conditions Without Project: This scenario refers to the existing present-day noise conditions (as of April 2025) without the proposed Project.
- Existing plus Project Conditions – Project Buildout: This scenario refers to the existing present-day noise conditions with the proposed Project. It should be noted that this scenario would not actually occur, as full occupancy of Phase 1 of the proposed Project is not expected to occur until 2028 while the "Existing" conditions evaluated in the NIA reflects existing traffic as of April 2025, when traffic count data was collected.
- Existing plus Ambient Growth plus Cumulative (EAC) 2030 Conditions Without Project: This scenario includes near-term noise conditions from ambient growth and cumulative developments without traffic from the proposed Project.
- Existing plus Ambient Growth plus Project plus Cumulative (EAPC) (2030) Conditions – Project Buildout: This scenario includes Project-related traffic, ambient growth, and all cumulative projects identified in the Project's traffic analysis.
- Horizon Year (2045) Conditions Without Project: This scenario refers to cumulative horizon year noise conditions without traffic from the proposed Project.
- Horizon Year (2045) Conditions With Project: This scenario includes all horizon year noise conditions including traffic from the proposed Project.

8.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental 24-hour dBA CNEL traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA CNEL noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area.

Tables 8-1 through 8-4 present a summary of the exterior dBA CNEL traffic noise levels. Roadway segments are analyzed in each of the following timeframes: Existing without and with Project conditions, Cumulative 2030 without and with Project conditions, and Horizon Year 2045 without and with Project conditions. Appendix 8.1 includes a summary of the dBA CNEL traffic noise level contours for each of the traffic scenarios.

TABLE 8-1: EXISTING WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	71.0	RW	190	410
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	74.2	RW	312	671
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	74.8	104	223	481
4	Washington St.	n/o Van Buren Bl.	Sensitive	76.6	120	260	559
5	Washington St.	s/o Van Buren Bl.	Sensitive	72.3	RW	135	292
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	54.2	RW	RW	RW
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	58.2	RW	RW	RW
8	Gamble Av.	s/o Iris Av.	Sensitive	44.4	RW	RW	RW
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	RW	RW	156
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	68.7	RW	RW	189
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	RW	167	361
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	70.8	RW	121	261
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.5	RW	86	186
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	66.9	RW	RW	107
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	71.8	RW	216	465
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	72.7	RW	249	537
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	RW	249	537
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.5	RW	241	519
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.3	RW	232	500
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	71.9	RW	220	474
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	RW	RW	RW
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	48.0	RW	RW	RW
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	RW	RW	RW

[1] Based on a review of existing aerial imagery.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-2: EXISTING WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	71.1	RW	193	415
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	74.3	RW	315	679
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	74.9	106	228	490
4	Washington St.	n/o Van Buren Bl.	Sensitive	76.6	121	261	563
5	Washington St.	s/o Van Buren Bl.	Sensitive	72.4	RW	136	293
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	58.0	RW	RW	RW
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	58.4	RW	RW	RW
8	Gamble Av.	s/o Iris Av.	Sensitive	52.6	RW	RW	RW
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	RW	RW	157
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	68.7	RW	RW	191
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	RW	168	363
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	70.8	RW	122	262
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.6	RW	87	187
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	67.0	RW	RW	108
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	71.9	RW	220	473
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	72.9	RW	254	547
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.8	RW	251	540
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	RW	246	530
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.4	RW	236	508
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	72.0	RW	223	480
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	RW	RW	RW
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	51.6	RW	RW	RW
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	RW	RW	RW

[1] Based on a review of existing aerial imagery.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-o[f-way of the road.]

TABLE 8-3: EAPC (2030) WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	71.5	RW	205	442
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	75.0	163	351	755
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	75.7	120	258	555
4	Washington St.	n/o Van Buren Bl.	Sensitive	77.8	145	313	674
5	Washington St.	s/o Van Buren Bl.	Sensitive	73.1	RW	153	329
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	54.2	RW	RW	RW
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	58.7	RW	RW	RW
8	Gamble Av.	s/o Iris Av.	Sensitive	46.6	RW	RW	RW
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	RW	RW	156
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	69.1	RW	RW	202
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	RW	167	361
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	71.2	RW	129	279
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.5	RW	86	186
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	66.9	RW	RW	107
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	72.3	RW	234	503
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	73.3	RW	272	585
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	RW	249	537
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.5	RW	241	519
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.3	RW	232	500
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	71.9	RW	220	474
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	RW	RW	RW
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	48.0	RW	RW	RW
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	RW	RW	RW

[1] Based on a review of existing aerial imagery.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-4: EAPC (2030) WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	71.5	RW	207	446
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	75.0	164	354	763
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	75.8	121	262	563
4	Washington St.	n/o Van Buren Bl.	Sensitive	77.8	146	314	677
5	Washington St.	s/o Van Buren Bl.	Sensitive	73.1	RW	154	331
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	58.0	RW	RW	RW
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	58.8	RW	RW	RW
8	Gamble Av.	s/o Iris Av.	Sensitive	53.0	RW	RW	RW
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	RW	RW	157
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	69.2	RW	RW	204
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	RW	168	363
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	71.2	RW	130	280
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.6	RW	87	187
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	67.0	RW	RW	108
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	72.4	RW	237	511
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	73.4	RW	276	595
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.8	RW	251	540
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	RW	246	530
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.4	RW	236	508
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	72.0	RW	223	480
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	RW	RW	RW
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	51.6	RW	RW	RW
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	RW	RW	RW

[1] Based on a review of existing aerial imagery.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-5: HORIZON (2045) WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	72.3	RW	233	503
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	75.3	173	372	801
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	76.1	127	273	588
4	Washington St.	n/o Van Buren Bl.	Sensitive	78.4	161	346	745
5	Washington St.	s/o Van Buren Bl.	Sensitive	73.5	RW	162	349
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	55.1	RW	RW	RW
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	59.1	RW	RW	RW
8	Gamble Av.	s/o Iris Av.	Sensitive	47.0	RW	RW	RW
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	68.7	RW	RW	191
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	70.2	RW	112	241
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	74.4	RW	213	459
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	72.4	RW	155	334
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	71.4	RW	98	212
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	67.8	RW	RW	122
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	73.1	RW	262	565
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	74.1	RW	305	657
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	73.6	RW	284	611
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	73.4	RW	274	591
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	73.3	RW	271	583
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	72.8	RW	251	540
21	Iris Av.	w/o Gamble Av.	Sensitive	41.9	RW	RW	RW
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	48.9	RW	RW	RW
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	48.3	RW	RW	RW

[1] Based on a review of existing aerial imagery.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-6: HORIZON (2045) WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	72.4	RW	235	507
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	75.4	174	375	809
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	76.1	128	276	596
4	Washington St.	n/o Van Buren Bl.	Sensitive	78.6	166	357	769
5	Washington St.	s/o Van Buren Bl.	Sensitive	73.5	RW	163	351
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	58.3	RW	RW	RW
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	59.2	RW	RW	RW
8	Gamble Av.	s/o Iris Av.	Sensitive	53.1	RW	RW	RW
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	68.8	RW	RW	193
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	70.3	RW	113	243
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	74.5	RW	214	461
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	72.4	RW	155	335
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	71.4	RW	99	213
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	67.8	RW	RW	123
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	73.2	RW	266	573
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	74.1	RW	309	666
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	73.6	RW	285	614
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	73.5	RW	279	602
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	73.4	RW	274	591
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	72.8	RW	253	545
21	Iris Av.	w/o Gamble Av.	Sensitive	41.9	RW	RW	RW
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	51.9	RW	RW	RW
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	48.3	RW	RW	RW

[1] Based on a review of existing aerial imagery.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

8.2 EXISTING TRAFFIC NOISE LEVEL INCREASES

Table 8-1 shows the Existing without Project conditions CNEL noise levels. The Existing without Project exterior noise levels are expected to range from 41.0 to 76.6 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 8-2 shows the Existing plus Project conditions will range from 41.0 to 76.6 dBA CNEL. Table 8-7 shows that the Project off-site traffic noise level increases will range from 0.0 to 8.2 dBA CNEL. The land uses adjacent to the study area roadway of Gamble Avenue south of Iris Avenue (Segment #8) would experience significant noise level increases due to unmitigated Project-related traffic noise level increases. Traffic noise increases along all other segments would be less than significant.

While Table 8-7 indicates a substantial increase in existing noise levels, the data presented in Table 8-2 show that with the addition of Project traffic, sensitive receptors along this roadway segment would only be exposed to traffic-related noise of 52.6 dBA CNEL. As indicated in Table N-1 of the General Plan Noise Element, residential uses are considered "Normally Acceptable" at noise levels up to 60 dBA CNEL; thus, the Project's traffic-related noise increases along this segment of Gamble Avenue would not expose nearby sensitive receptors to unacceptable noise levels.

Additionally, the "No Project" noise levels presented in Table 8-1 show lower noise levels along Gamble Avenue than the noise measurements that Urban Crossroads collected and presented in Table 5-1. The existing noise measurements collected by Urban Crossroads near the intersection of Iris Avenue and Gamble Avenue (Location L5) shows an existing ambient noise level of 56.7 dBA CNEL, whereas the data presented in Table 8-1 shows that traffic-related noise along this segment of Gamble without the addition of Project traffic would be 44.4 dBA. (56.7 dBA CNEL) in evaluating Project-related traffic noise levels (52.6 dBA CNEL), noise level increases due to Project traffic along this roadway segment would be less than 2.0 dBA CNEL, which would be below the significance criteria. Furthermore, the scenario in which Project traffic is added to existing traffic volumes would not actually occur, as Phase 1 of the Project would not be fully constructed and operated until 2028, while the "Existing" conditions evaluated in the NIA reflects existing traffic as of April 2025, when traffic count data was collected. Thus, this scenario is provided for information purposes only in order to fully analyze all of the traffic scenarios identified in the Project's Traffic Study. Accordingly, and for the reasons noted above, Project-related traffic increases under Existing plus Project conditions would be *less than significant*.

8.3 EAPC (2030) TRAFFIC NOISE LEVEL INCREASES

Table 8-3 presents the EAPC Year 2030 without Project conditions CNEL noise levels. The EAPC Year 2030 without Project exterior noise levels are expected to range from 41.0 to 77.8 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 8-4 shows the EAPC Year 2030 with Project conditions will range from 41.0 to 77.8 dBA CNEL. Table 8-8 shows that the Project off-site traffic noise level increases will range from 0.0 to 6.4 dBA CNEL. As with the Exiting plus Project condition, land uses adjacent to the study area roadway of Gamble Avenue south of Iris Avenue (Segment #8) would experience significant noise

level increases due to unmitigated Project-related traffic noise level increases. Traffic noise increases along all other segments would be less than significant.

Although Project-related traffic noise increases along Segment #8 would exceed the identified threshold of significance, the data presented in Table 8-4 indicates that with the addition of Project traffic, sensitive receptors along this roadway segment only would be exposed to traffic-related noise of 53.0 dBA CNEL. As indicated in Table N-1 of the General Plan Noise Element, residential uses are considered "Normally Acceptable" at noise levels up to 60 dBA CNEL; thus, the Project's traffic-related noise increases along this segment of Gamble Avenue would not expose nearby sensitive receptors to unacceptable noise levels.

In addition, as with the existing conditions, the existing noise level measurements collected by Urban Crossroads near the intersection of Iris Avenue and Gamble Avenue (Location L5) shows an existing ambient noise level of 56.7 dBA CNEL, whereas the data presented in Table 8-3 shows that traffic-related noise along this segment of Gamble without the addition of Project traffic would be 46.6 dBA. Thus, accounting for the measured ambient noise levels (56.7 dBA CNEL) in evaluating Project-related traffic noise levels (53.0 dBA CNEL), noise level increases due to Project traffic along this roadway segment would be less than 2.0 dBA CNEL, which would be below the significance criteria. Therefore, project-related traffic noise increases under EAPC (2030) conditions would be *less than significant*.

8.4 HORIZON (2045) TRAFFIC NOISE LEVEL INCREASES

Table 8-5 presents the Horizon Year 2045 without Project conditions CNEL noise levels. The Horizon Year 2045 without Project exterior noise levels are expected to range from 41.0 to 78.4 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 8-6 shows that the Horizon Year 2045 with Project conditions will range from 41.0 to 78.4 dBA CNEL. Table 8-9 shows that the Project off-site traffic noise level increases will range from less than 0.1 to 6.1 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway of Gamble Avenue south of Iris Avenue (Segment #8) would experience significant noise level increases due to unmitigated Project-related traffic noise level increases. Traffic noise increases along all other segments would be less than significant.

Although Project-related traffic noise increases along Segment #8 would exceed the identified threshold of significance, the data presented in Table 8-4 indicates that with the addition of Project traffic, sensitive receptors along this roadway segment only would be exposed to traffic-related noise of 53.1 dBA CNEL. As indicated in Table N-1 of the General Plan Noise Element, residential uses are considered "Normally Acceptable" at noise levels up to 60 dBA CNEL; thus, the Project's traffic-related noise increases along this segment of Gamble Avenue would not expose nearby sensitive receptors to unacceptable noise levels.

As with the previous analysis, the existing noise level measurements collected by Urban Crossroads near the intersection of Iris Avenue and Gamble Avenue (Location L5) shows an existing ambient noise level of 56.7 dBA CNEL, whereas the data presented in Table 8-3 shows that traffic-related noise along this segment of Gamble without the addition of Project traffic would be 46.6 dBA. Thus, accounting for the measured ambient noise levels (56.7 dBA CNEL) in

evaluating Project-related traffic noise levels (53.1 dBA CNEL), noise level increases due to Project traffic along this roadway segment would be less than 2.0 dBA CNEL, which would be below the significance criteria. Therefore, project-related traffic noise increases under EAPC (2030) conditions would be *less than significant*.

TABLE 8-7: EXISTING WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Noise-Sensitive Land Use?	Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition		Limit	Exceeded?
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	71.0	71.1	0.1	Yes	1.5	No
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	74.2	74.3	0.1	Yes	1.5	No
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	74.8	74.9	0.1	Yes	1.5	No
4	Washington St.	n/o Van Buren Bl.	Sensitive	76.6	76.6	0.0	Yes	1.5	No
5	Washington St.	s/o Van Buren Bl.	Sensitive	72.3	72.4	0.0	Yes	1.5	No
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	54.2	58.0	3.8	Yes	5.0	No
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	58.2	58.4	0.2	Yes	5.0	No
8	Gamble Av.	s/o Iris Av.	Sensitive	44.4	52.6	8.2	Yes	5.0	**Yes**
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	67.4	0.1	Yes	1.5	No
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	68.7	68.7	0.1	Yes	1.5	No
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	72.9	0.0	Yes	1.5	No
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	70.8	70.8	0.0	Yes	1.5	No
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.5	70.6	0.0	Yes	1.5	No
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	66.9	67.0	0.1	Yes	1.5	No
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	71.8	71.9	0.1	Yes	1.5	No
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	72.7	72.9	0.1	Yes	1.5	No
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	72.8	0.0	Yes	1.5	No
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.5	72.7	0.1	Yes	1.5	No
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.3	72.4	0.1	Yes	1.5	No
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	71.9	72.0	0.1	Yes	1.5	No
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	41.0	0.0	Yes	5.0	No
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	48.0	51.6	3.5	Yes	5.0	No
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	47.4	0.0	Yes	5.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

TABLE 8-8: EAPC 2030 WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Noise-Sensitive Land Use?	Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition		Limit	Exceeded?
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	71.5	71.5	0.0	Yes	1.5	No
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	75.0	75.0	0.0	Yes	1.5	No
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	75.7	75.8	0.1	Yes	1.5	No
4	Washington St.	n/o Van Buren Bl.	Sensitive	77.8	77.8	0.0	Yes	1.5	No
5	Washington St.	s/o Van Buren Bl.	Sensitive	73.1	73.1	0.0	Yes	1.5	No
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	54.2	58.0	3.8	Yes	5.0	No
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	58.7	58.8	0.1	Yes	5.0	No
8	Gamble Av.	s/o Iris Av.	Sensitive	46.6	53.0	6.4	Yes	5.0	**Yes**
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	67.4	0.0	Yes	1.5	No
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	69.1	69.2	0.1	Yes	1.5	No
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	72.9	0.0	Yes	1.5	No
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	71.2	71.2	0.0	Yes	1.5	No
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.5	70.6	0.1	Yes	1.5	No
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	66.9	67.0	0.1	No	n/a	No
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	72.3	72.4	0.1	No	3.0	No
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	73.3	73.4	0.1	No	3.0	No
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	72.8	0.1	Yes	1.5	No
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.5	72.7	0.2	Yes	1.5	No
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.3	72.4	0.1	No	3.0	No
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	71.9	72.0	0.1	Yes	1.5	No
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	41.0	0.0	Yes	5.0	No
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	48.0	51.6	3.6	Yes	5.0	No
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	47.4	0.0	Yes	5.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

TABLE 8-9: HORIZON 2045 WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Noise-Sensitive Land Use?	Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition		Limit	Exceeded?
1	Van Buren Bl.	n/o Victoria Av.	Sensitive	72.3	72.4	0.1	Yes	1.5	No
2	Van Buren Bl.	s/o Victoria Av.	Sensitive	75.3	75.4	0.1	Yes	1.5	No
3	Mockingbird Canyon Rd.	s/o Van Buren Bl.	Sensitive	76.1	76.1	0.0	Yes	1.5	No
4	Washington St.	n/o Van Buren Bl.	Sensitive	78.4	78.6	0.2	Yes	1.5	No
5	Washington St.	s/o Van Buren Bl.	Sensitive	73.5	73.5	0.0	Yes	1.5	No
6	Chicago Av./Alta Cresta Av.	n/o Van Buren Bl.	Sensitive	55.1	58.3	3.2	Yes	5.0	No
7	Chicago Av./Alta Cresta Av.	s/o Van Buren Bl.	Sensitive	59.1	59.2	0.1	Yes	5.0	No
8	Gamble Av.	s/o Iris Av.	Sensitive	47.0	53.1	6.1	Yes	5.0	**Yes**
9	Wood Rd.	n/o Van Buren Bl.	Sensitive	67.4	67.4	0.0	Yes	1.5	No
10	Wood Rd.	s/o Van Buren Bl.	Sensitive	69.1	69.2	0.1	Yes	1.5	No
11	Trautwein Rd./Cole Av.	n/o Van Buren Bl.	Sensitive	72.9	72.9	0.0	Yes	1.5	No
12	Trautwein Rd./Cole Av.	s/o Van Buren Bl.	Sensitive	71.2	71.2	0.0	Yes	1.5	No
13	Victoria Av.	w/o Van Buren Bl.	Sensitive	70.5	70.6	0.1	Yes	1.5	No
14	Victoria Av.	e/o Van Buren Bl.	Non-Sensitive	66.9	67.0	0.1	No	n/a	No
15	Van Buren Bl.	w/o Washington St.	Non-Sensitive	72.3	72.4	0.1	No	3.0	No
16	Van Buren Bl.	e/o Washington St.	Non-Sensitive	73.3	73.4	0.1	No	3.0	No
17	Van Buren Bl.	w/o Chicago Av./Alta Cresta Av.	Sensitive	72.7	72.8	0.1	Yes	1.5	No
18	Van Buren Bl.	e/o Chicago Av./Alta Cresta Av.	Sensitive	72.5	72.7	0.2	Yes	1.5	No
19	Van Buren Bl.	e/o Wood Rd.	Non-Sensitive	72.3	72.4	0.1	No	3.0	No
20	Van Buren Bl.	e/o Trautwein Rd./Cole Av.	Sensitive	71.9	72.0	0.1	Yes	1.5	No
21	Iris Av.	w/o Gamble Av.	Sensitive	41.0	41.0	0.0	Yes	5.0	No
22	Iris Av.	w/o Chicago Av./Alta Cresta Av.	Sensitive	48.0	51.6	3.6	Yes	5.0	No
23	Iris Av.	e/o Chicago Av./Alta Cresta Av.	Sensitive	47.4	47.4	0.0	Yes	5.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

This page was intentionally left blank.

9 SENSITIVE RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive receiver locations, as shown on Exhibit 9-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, five receiver locations in the vicinity of the Project site were identified. All distances are measured from the Project site boundary to the outdoor living areas (e.g., private backyards) or at the building façade, whichever is closer to the Project site. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the Project boundary to each receiver location.

R1: Location R1 represents existing noise sensitive residence at 17795 Twin Lakes Drive., approximately 75 feet north of the Project site. Receiver R1 is placed in the private outdoor living area (backyard) facing the project site. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents the existing noise sensitive residence at 18019 Twin Lakes Drive, approximately 187 feet northeast of the Project site. Receiver R1 is placed in the private outdoor living area (backyard) facing the project site A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

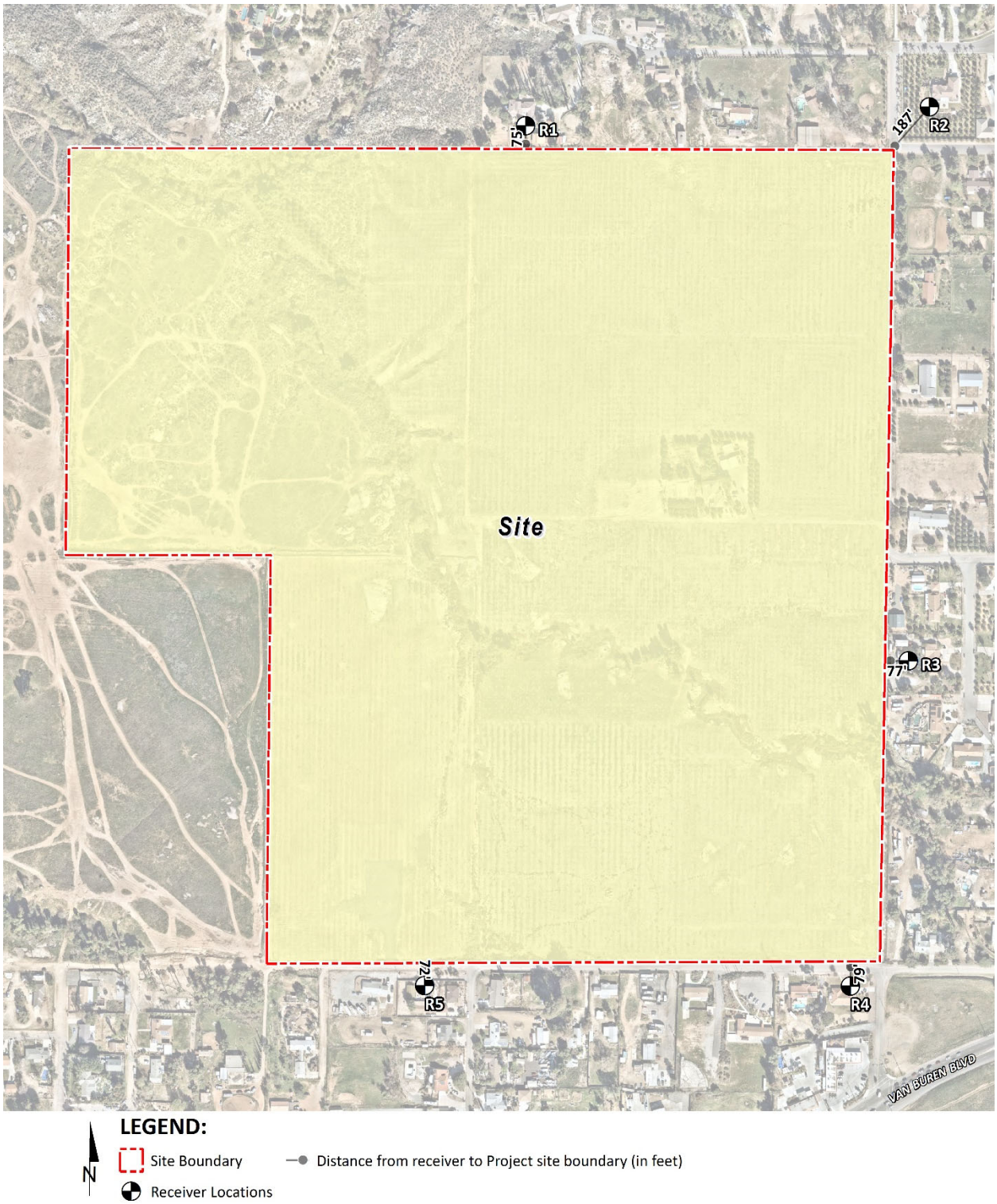
R3: Location R3 represents the existing noise sensitive residence at 15795 Cartwright Street, approximately 77 feet east of the Project site. Receiver R3 is placed in the private outdoor living area (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the existing noise sensitive residence at 17975 Iris Avenue, approximately 79 feet south of the Project site. Receiver R4 is placed in the private outdoor living area (front yard) facing the Project site. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

R5: Location R5 represents the existing noise sensitive residence at 16015 Gamble Avenue, approximately 72 feet west of the Project site. Receiver R5 is placed in the private

outdoor living area (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L5, to describe the existing ambient noise environment.

EXHIBIT 9-A: RECEIVER LOCATIONS



10 OPERATIONAL NOISE IMPACTS

The Project has not been designed beyond lot lines at this stage of Project development. The proposed development is considered a noise-sensitive receiving land use and is not expected to include any specific type of operational noise levels beyond those typically associated with residential land uses in the Project study area, such as people and children, parking lot activity, garage doors, small air conditioners, and trash collection, and is considered a noise-sensitive receiving land use. However, to be conservative, this section analyzes the potential operational noise impacts resulting from the operation of air conditioning units associated with the Project, as shown on Exhibit 10-A.

10.1 OPERATIONAL NOISE SOURCES

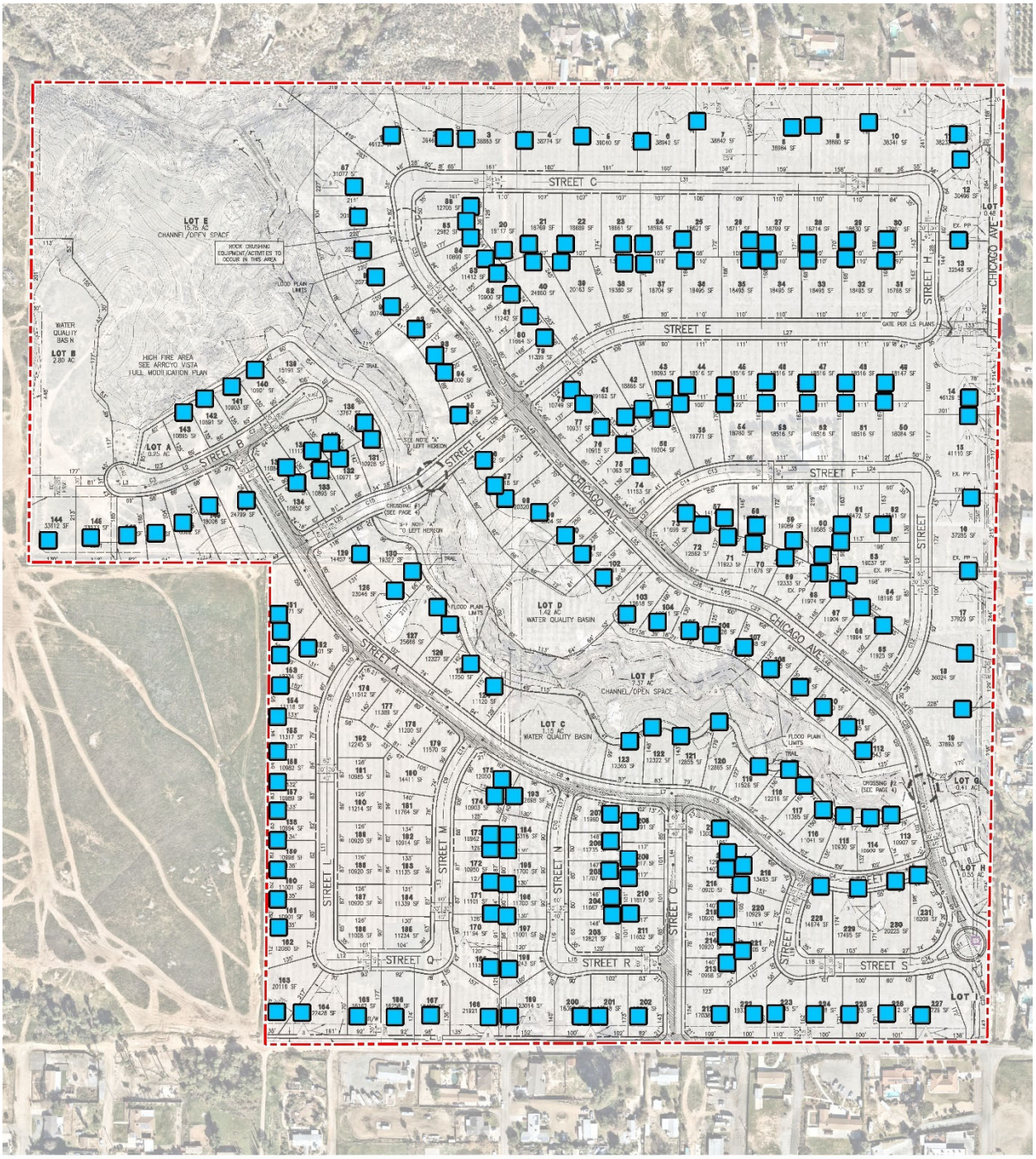
The County of Riverside has set stationary-source hourly average L_{eq} exterior noise limits to control air conditioning units associated with the development of the proposed Arroyo Vista. These air conditioning-related noises, as projected to any portion of any surrounding property containing a *habitable dwelling, hospital, school, library or nursing home*, must not exceed the following worst-case noise levels.

Policy N 4.1 of the County of Riverside General Plan Noise Element sets a stationary-source average L_{eq} exterior noise limit not to be exceeded for a cumulative period of more than ten minutes in any hour of 65 dBA L_{eq} for daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. (16)

The County of Riverside County Code Section 9.52.040 *General sound level standards* (included in Appendix 3.1) identify lower, more restrictive exterior noise level standards, which for the purpose of this report, are used to evaluate potential Project-related operational noise level limits instead of the higher the General Plan exterior noise level standards previously identified. The County of Riverside County Code identifies exterior noise level limits of 55 dBA L_{eq} during the daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{eq} during the noise-sensitive nighttime hours of 10:00 p.m. to 7:00 a.m. for most noise-sensitive uses. (17)

Based on several discussions with the County of Riverside Department of Environmental Health (DEH), Office of Industrial Hygiene (OIH), it is important to recognize that the County of Riverside County Code noise level standards, incorrectly identify maximum noise level (L_{max}) standards that should instead reflect the average L_{eq} noise levels. Moreover, the County of Riverside DEH OIH's April 15th, 2015, *Requirements for determining and mitigating, non-transportation noise source impacts to residential properties* also identifies operational (stationary-source) noise level limits using the L_{eq} metric, consistent with the direction of the County of Riverside General Plan guidelines and standards provided in the Noise Element. Therefore, this report has been prepared consistent with direction of the County of Riverside DEH OIH guidelines and standards using the average L_{eq} noise level metric for stationary-source (operational) noise level evaluation.

EXHIBIT 10-A: STATIONARY NOISE SOURCE LOCATIONS



10.2 REFERENCE NOISE LEVELS

To assess the noise levels created by the air conditioning units, reference noise levels from a Carrier model 25HBC5 were used as representative of the air conditioning units that could be used on the Project and have a range of capacity from 1.5 tons to 5 tons. According to the product data sheet a Carrier model 25HBC5, which produces a maximum sound power level of 76 dBA, see Appendix 10.1, as shown in Table 10-1.

While operating at full power air conditioners operate approximately 15-30 minutes out of an hour in multiple cycles during the nighttime as compared to the daytime where the units typically operate 20-40 minutes in multiple cycles, depending on the ambient temperature. For purposes of this analysis, it was assumed the air conditioners would operate 45 minutes out of an hour during the day and 30 minutes out of an hour at night. The acoustic center of each unit will be located three feet above ground elevation. As the final location of air conditioning units has not been finalized, the units were placed generally located in the side yard of each lot.

TABLE 10-1: REFERENCE NOISE LEVELS

Noise Source	Noise Source Height (Feet)	Min./Hour[2]		Reference Noise Level (dBA L_{eq})		Sound Power Level (dBA)[6]
		Day	Night	@ Ref. Dist.	@ 50 Feet	
Air Conditioning Units[1]	3'	45	30	77.2	44.4	76.0

[1] Carrier 25HBC5 air conditioning unit, Appendix 10.1.
[2] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site.
"Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

10.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source.

Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment. The operational noise level calculations provided in this noise study account

for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 10.1 includes the detailed noise model inputs.

10.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include air condition units, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 10-2 shows the Project operational noise levels during the daytime hours of 7:01 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 29.6 to 35.5 dBA L_{eq}.

TABLE 10-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{eq})				
	R1	R2	R3	R4	R5
Air Conditioning Units	33.7	29.6	34.5	32.9	35.5
Total (All Noise Sources)	**33.7**	**29.6**	**34.5**	**32.9**	**35.5**

[1] See Exhibit 10-A for the noise source locations. CadnaA noise model calculations are included in Appendix 10.2.

Table 10-3 shows the Project operational noise levels during the nighttime hours of 10:01 p.m. to 7:00 a.m. The nighttime hourly noise levels at the off-site receiver locations are expected to range from 26.8 to 32.8 dBA L_{eq}.

TABLE 10-3: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{eq})				
	R1	R2	R3	R4	R5
Air Conditioning Units	31.0	26.8	31.8	30.2	32.8
Total (All Noise Sources)	**31.0**	**26.8**	**31.8**	**30.2**	**32.8**

[1] See Exhibit 10-A for the noise source locations. CadnaA noise model calculations are included in Appendix 10.2.

10.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the County of Riverside exterior noise level standards at nearby noise-sensitive receiver locations. Table 10-4 shows the operational noise levels associated with Arroyo Vista Project will not exceed the County of Riverside 55 dBA L_{eq} daytime and 45 dBA L_{eq} nighttime exterior noise level standards at all nearby receiver locations. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 10-4: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA L_{eq})[2]		Exterior Noise Level Standards (dBA L_{eq})[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	33.7	31.0	55	45	No	No
R2	29.6	26.8	55	45	No	No
R3	34.5	31.8	55	45	No	No
R4	32.9	30.2	55	45	No	No
R5	35.5	32.8	55	45	No	No

[1] See Exhibit 9-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Tables 10-2 and 10-3.
[3] Exterior noise level standard for residential land use as shown on Table 4-1.
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
[5] Non-residential land use with no expected nighttime occupancy.
"Daytime" = 7:01 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:00 a.m.

10.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (6) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 10-5 and 10-6, respectively. As indicated on Table 10-5, the Project will generate a daytime operational noise level increases ranging from 0.0 to 0.4 dBA L_{eq} at the nearest receiver locations. Table 10-6 shows that the Project will generate a nighttime operational noise level increases ranging from 0.0 to 0.4 dBA L_{eq} at the nearest receiver locations. Project-related operational noise level increases will satisfy the operational noise level increase significance criteria presented in Table 4-1, and the increases at the sensitive receiver locations will be *less than significant.*

TABLE 10-5: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	33.7	L1	46.3	46.5	0.2	5	No
R2	29.6	L2	51.0	51.0	0.0	5	No
R3	34.5	L3	44.6	45.0	0.4	5	No
R4	32.9	L4	55.0	55.0	0.0	5	No
R5	35.5	L5	55.0	55.0	0.0	5	No

[1] See Exhibit 9-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 10-2.
[3] Reference noise level measurement locations as shown on Exhibit 10-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 10-6: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	31.0	L1	42.4	42.7	0.3	5	No
R2	26.8	L2	46.8	46.8	0.0	5	No
R3	31.8	L3	42.3	42.7	0.4	5	No
R4	30.2	L4	53.0	53.0	0.0	5	No
R5	32.8	L5	48.2	48.3	0.1	5	No

[1] See Exhibit 9-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 10-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibits 11-A (General Construction), 11-B (Rock Crushing), and 11-C (Blasting) show the noise source locations in relation to the nearest sensitive receiver locations previously described in Section 9.

Section 9.52.020 of the County of Riverside Code, states that construction activities are exempted from the noise ordinance if located ¼ mile or greater from inhabited dwelling units; or if with a quarter mile, it occurs between the hours of 6:00 a.m. to 6:00 p.m. Monday through Friday from June 1st to September 30th, 7:00 a.m. to 6:00 p.m. Monday through Friday from October 1st to May 30th. In addition, since the County of Riverside has not established a numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes, a numerical construction threshold based on Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual is used for analysis of daytime construction impacts. The FTA considers a daytime exterior construction noise level of 80 dBA Leq as a reasonable threshold for noise sensitive residential land use. (18 p. 179)

11.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. The number and mix of construction equipment are expected to occur in the following stages:

- Site Preparation
- Grading
- Rock Crushing
- Building Construction
- Paving
- Architectural Coating

11.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (2) The RCNM equipment database, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation. The reference noise level summary shown in Table 11-1 describes construction activity noise levels with multiple pieces of equipment operating simultaneously. Rock crushing and includes source noise levels for a hoe ram or breaker representing a percussion hammer fitted to an excavator for breaking rock and a rock crushing activity including jaw crushers, a cone crusher, screens, and a conveyor system (30).

EXHIBIT 11-A: CONSTRUCTION NOISE SOURCE AND RECEIVER LOCATIONS

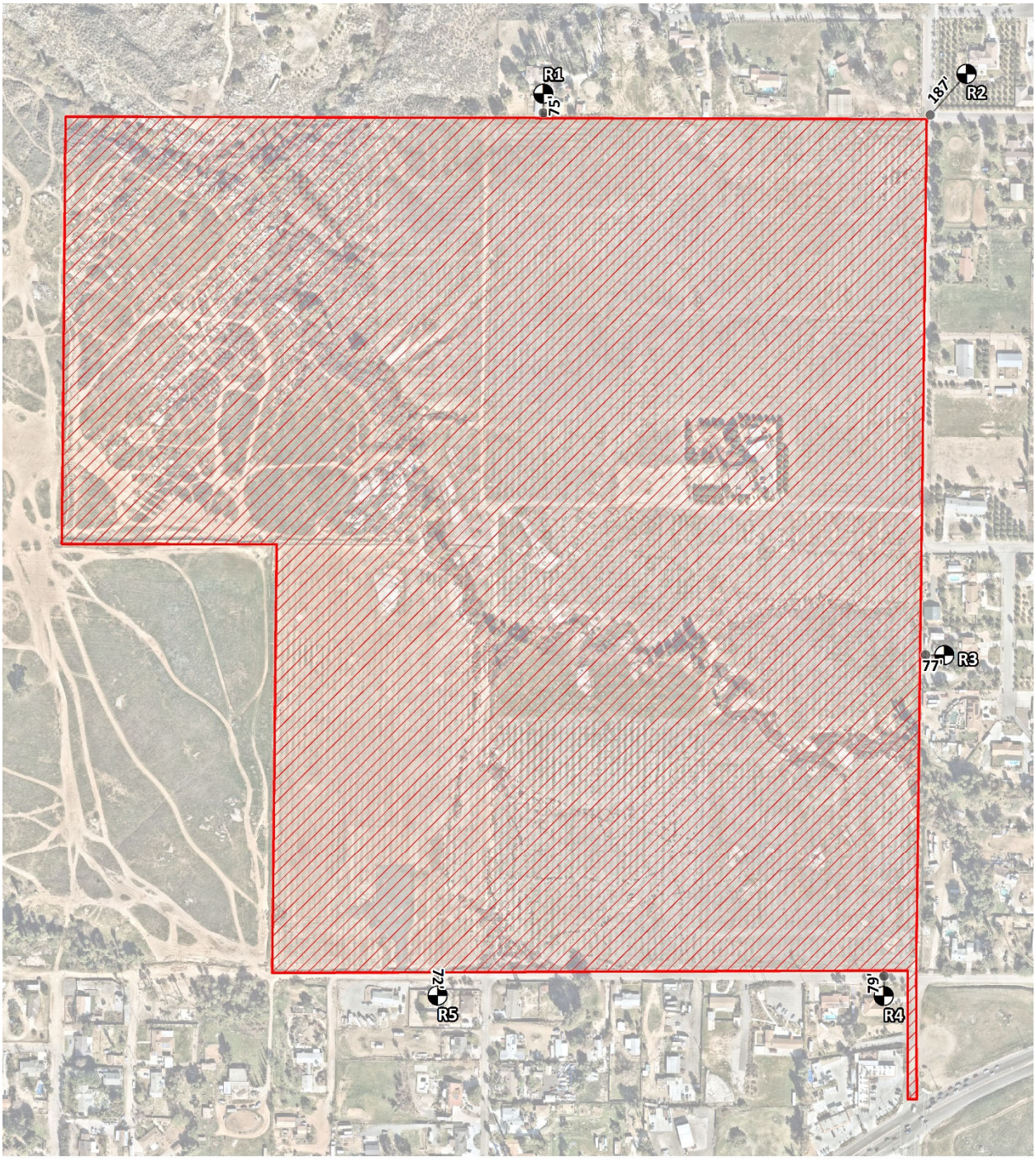


EXHIBIT 11-B: ROCK CRUSHING ACTIVITY AND RECEIVER LOCATIONS

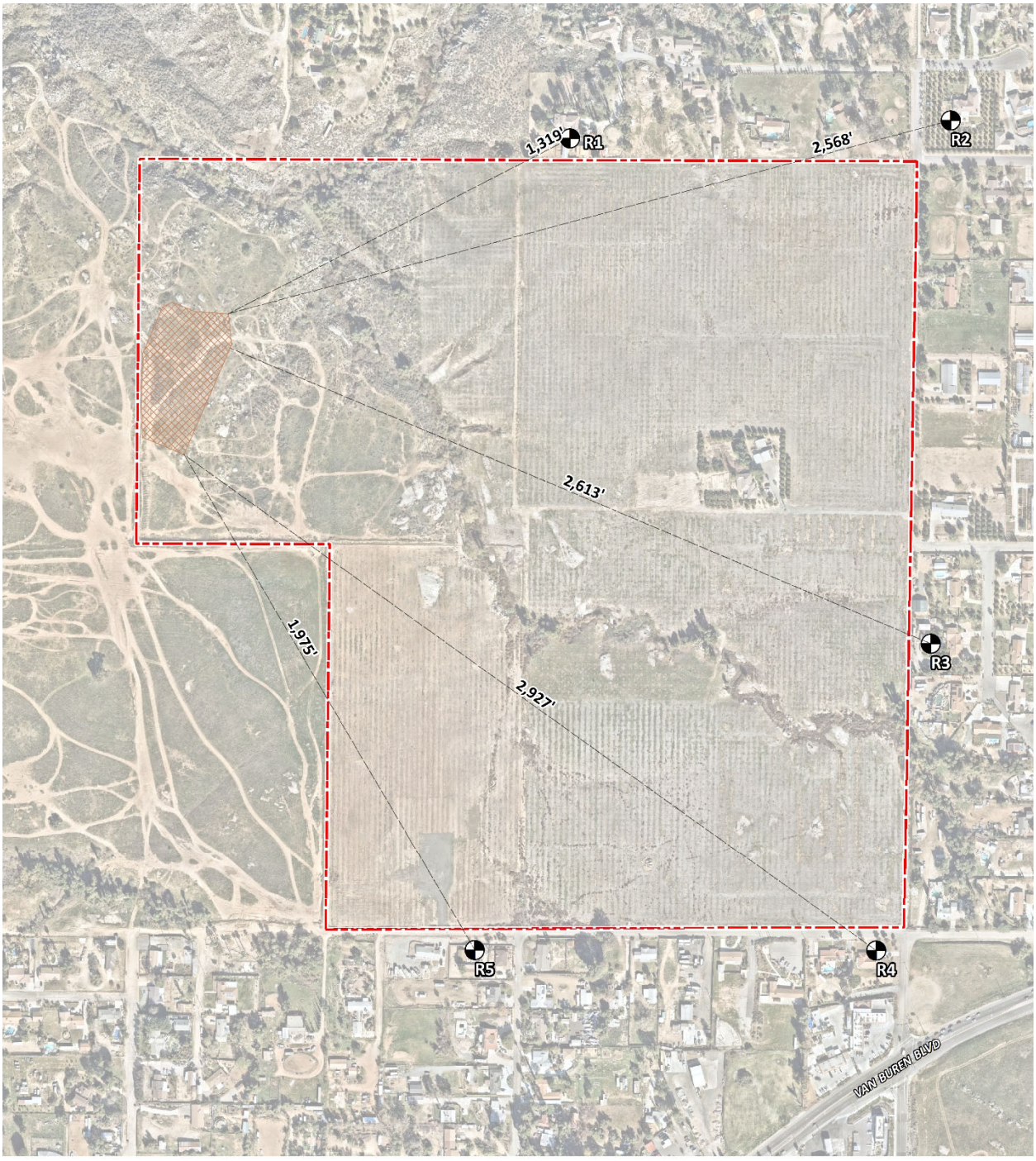


EXHIBIT 11-C: BLASTING ACTIVITY AND RECEIVER LOCATIONS

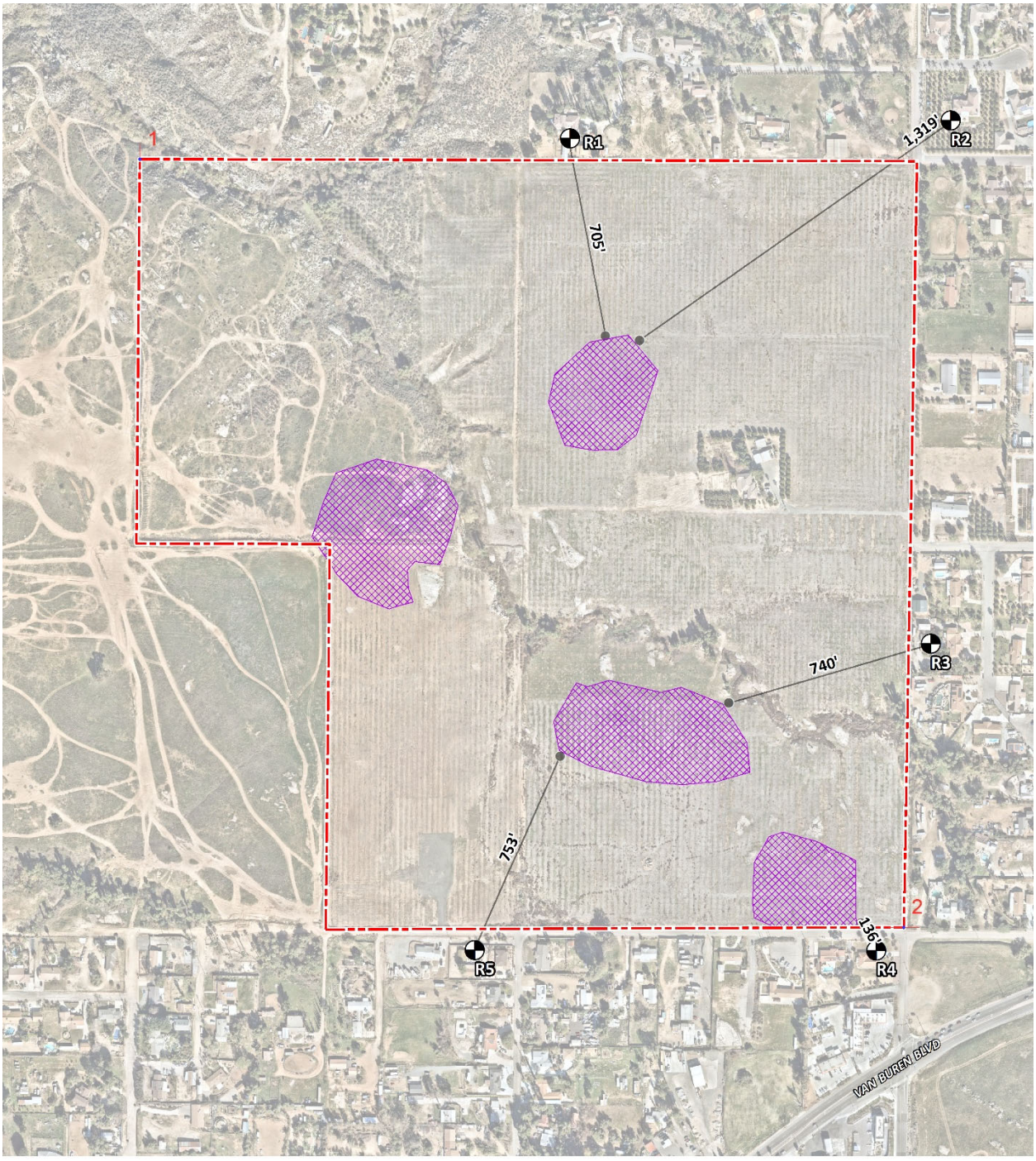


TABLE 11-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Equipmnet[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})	Reference Power Level (dBA L_w)
Demolition	Concrete Saw	83	86.8	118.4
	Grapple (on backhoe)	83		
	Gradall	79		
Site Preparation	Tractor	80	84.0	115.6
	Backhoe	74		
	Grader	81		
Grading	Scraper	80	83.3	114.9
	Excavator	77		
	Dozer	78		
Rock Crushing	Rock Crusher[2]	89	89.8	121.4
	Front End Loader	75		
	Hydra Break Ram	80		
Building Construction	Crane	73	80.6	112.2
	Generator	78		
	Front End Loader	75		
Paving	Paver	74	77.8	109.5
	Dump Truck	72		
	Roller	73		
Architectural Coating	Man Lift	68	76.2	107.8
	Compressor (air)	74		
	Generator (<25kVA)	70		
Blasting	Blasting	94	94.1	125.7
	Rock Drill	74		
	Front End Loader	75		

[1] FHWA Road Construction Noise Model.
[2] University District Rock Crusher Conditional Use Permit, San Marcos

11.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. To assess a reasonable worst-case construction scenario Project rock crushing is assumed to be conducted during site preparation and grading stages. However, this analysis conservatively combines rock crushing noise with all construction stages.

To account for the dynamic nature of construction activities, the Project construction noise analysis models the typical construction equipment as combination of the highest reference level as multiple moving points within the construction area (Project site boundary). Rock crushing

activity is modeled simultaneously with general construction activities as a stationary activity. Construction impacts are based on the highest noise level calculated at each receiver location. As shown on Table 11-2, the overall construction noise levels are expected to range from 45.8 to 61.3 dBA L_{eq}, and the highest construction levels are expected to range from 56.4 to 61.3 dBA L_{eq} at the nearby receiver locations. Appendix 11.1 includes the detailed CadnaA construction noise model inputs.

TABLE 11-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})						
	Demolition	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	61.3	58.5	57.8	55.1	52.3	50.7	61.3
R2	56.4	53.6	52.9	50.2	47.4	45.8	56.4
R3	60.3	57.5	56.8	54.1	51.3	49.7	60.3
R4	59.3	56.5	55.8	53.1	50.3	48.7	59.3
R5	60.4	57.6	56.9	54.2	51.4	49.8	60.4

[1] Construction noise source and receiver locations are shown on Exhibit 11-A.
[2] Construction noise level calculations based on distance from the project site boundaries (construction activity area) to nearby receiver locations. CadnaA construction noise model inputs are included in Appendix 11.1.

11.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 80 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities as shown on Table 11-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 11-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	61.3	80	No
R2	56.4	80	No
R3	60.3	80	No
R4	59.3	80	No
R5	60.4	80	No

[1] Noise receiver locations are shown on Exhibits 11-A and 11-B.
[2] Highest construction noise level operating at the Project site boundary to nearby receiver locations (Table 11-2).
[3] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

11.5 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. Ground-borne vibration levels resulting from typical construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). (18) Ground vibration levels associated with various types of construction equipment are summarized in Table 11-4. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential Project construction vibration levels using the following vibration assessment methods defined by Caltrans. To calculate the vibration of equipment at distance Caltrans provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 11-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Crane	0.008
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Hoe Ram (Breaker)	0.089

Caltrans, Transportation and Construction Vibration Guidance Manual, 2020.

Using the vibration source level of construction equipment provided on Table 11-4 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 11-5 presents the expected Project related vibration levels at the nearby receiver locations. At distances ranging from 72 to 187 feet from Project construction activities, construction vibration velocity levels are estimated to range from less than 0.01 to 0.02 in/sec PPV and will not exceed the County of Riverside threshold of 0.30 in/sec PPV at off-site receivers, as shown in Table 11-5. Therefore, the Project-related vibration impacts are considered *less than significant*.

11.6 ROCK CRUSHING CONSTRUCTION REFERENCE NOISE LEVELS

An additional analysis was completed to assess potential noise level impacts due to on-site rock crushing activities planned near the western project site boundary. Exhibit 11-B shows the location of the planned rock crushing activity area in relation to the nearest receiver locations. The rock crushing construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published in the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels (2). Table 11-1 provides a summary of the reference average L_{eq} noise levels used to describe rock crushing construction activities.

TABLE 11-5: PROJECT GENERAL CONSTRUCTION VIBRATION LEVELS

Receiver Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Crane	Jack-hammer	Loaded Trucks	Large Bulldozer	Highest Vibration Level		
R1	75'	0.00	0.00	0.01	0.01	0.02	0.02	0.30	No
R2	187'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R3	77'	0.00	0.00	0.01	0.01	0.02	0.02	0.30	No
R4	79'	0.00	0.00	0.01	0.01	0.02	0.02	0.30	No
R5	72'	0.00	0.00	0.01	0.02	0.02	0.02	0.30	No

[1] Construction receiver locations are shown on Exhibit 11-A.
[2] Distance from receiver location to Project construction boundary.
[3] Based on the Vibration Source Levels of Construction Equipment (Table 11-4).
[4] Caltrans 2020.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

The reference noise level summary describes construction activity noise levels with multiple pieces of construction equipment operating simultaneously in the same location and includes source noise levels for a rock crusher unit with conveyor and screens, a loader for loading the rock, and a hoe ram/breaker/hydraulic hammer fitted to an excavator for breaking rock. This is considered conservative since this equipment is typically spaced further apart, and occurs in different locations. A default ground attenuation factor of 0.5 was used in the CadnaA noise prediction model to account for mixed ground representing a combination of hard and soft surfaces.

11.6 ROCK CRUSHING CONSTRUCTION REFERENCE NOISE LEVELS

An additional analysis was completed to assess potential noise level impacts due to on-site rock crushing activities planned near the western project site boundary. Exhibit 11-B shows the location of the planned rock crushing activity area in relation to the nearest receiver locations. The rock crushing construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published in the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels (2). Table 11-1 provides a summary of the reference average L_{eq} noise levels used to describe rock crushing construction activities. The reference noise level summary describes construction activity noise levels with multiple pieces of construction equipment operating simultaneously in the same location and includes source noise levels for a rock crusher unit with conveyor and screens, a loader for loading the rock, and a hoe ram/breaker/hydraulic hammer fitted to an excavator for breaking rock. This is considered conservative since this equipment is typically spaced further apart, and occurs in different locations. A default ground attenuation factor of 0.5 was used in the CadnaA noise prediction model to account for mixed ground representing a combination of hard and soft surfaces.

11.7 ROCK CRUSHING CONSTRUCTION NOISE ANALYSIS AND COMPLIANCE

Using the reference RCNM rock crushing construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearest sensitive receiver locations were completed. As shown in Table 11-7, the rock crushing construction noise levels are estimated to range from 49.0 to 55.7 dBA L_{eq} at the nearest receiver locations. The rock crushing construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold. Therefore, the noise impacts due to the Project's rock crushing activity are considered *less than significant* at all receiver locations. Appendix 11.2 includes the detailed CadnaA rock crushing construction equipment noise model inputs.

TABLE 11-6: ROCK CRUSHING EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Rock Cushing Noise Levels (dBA L_{eq})		
	Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	55.7	80	No
R2	50.1	80	No
R3	50.3	80	No
R4	49.0	80	No
R5	52.4	80	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] CadnaA construction noise model inputs are included in Appendix 11.2.
[3] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

11.8 ROCK CRUSHING CONSTRUCTION VIBRATION ANALYSIS AND COMPLIANCE

Using the vibration source level of construction equipment list provided on Table 10-4 that includes source levels for a rock crusher unit with conveyor and screens, a loader for loading the rock, and a hoe ram/breaker/hydraulic hammer fitted to an excavator for breaking rockand the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project rock crushing construction vibration impacts. Table 10-8 presents the expected rock crushing construction equipment vibration levels when the equipment with the highest reference vibration activity operates at the closest point from the edge of the rock crushing activity to each receiver location.

At distances ranging from 1,319 feet to 2.927 from the Project rock crushing construction activities as shown on Exhibit 11-B, construction vibration levels are estimated to be less than 0.01 PPV (in/sec) and will be below the 0.3 in/sec PPV threshold for vibration at all receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during Project rock crushing construction activities at the Project site.

TABLE 11-7: ROCK CRUSHING EQUIPMENT VIBRATION LEVELS

Receiver Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Crane	Jack-hammer	Loaded Trucks	Large Bulldozer	Highest Vibration Level		
R1	1,319'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R2	2,568'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R3	2,613'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R4	2,927'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R5	1,975'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No

[1] Construction receiver locations are shown on Exhibit 11-A.
[2] Distance from receiver location to Project construction boundary.
[3] Based on the Vibration Source Levels of Construction Equipment (Table 11-4).
[4] County of Riverside General Plan.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

11.9 BLASTING NOISE ANALYSIS

A blasting contractor would be required to complete all blasting-related activities in compliance with applicable regulations of the Riverside County Sheriff's Department, the U.S. Bureau of Mines, the California Division of Occupational Safety and Health (Cal-OHSA), the Department of Homeland Security, and the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). As required by law a licensed blasting contractor would be responsible for performing and supervising all blasting activities, including the following:

- Drill pattern design;
- Pre-blast inspection;
- Loading of explosives;
- Pre-blast notifications and warning signaling;
- Blasting safety procedures;
- Blasting site security;
- Post-blast inspections and re-entry procedures; and
- Blast log and history.

Explosives used for blasting usually consist of a primer, secondary explosive, and an initiator. The blasting contractor would most likely use a high explosive Ammonia Gelatin as a primer for each shot and ammonium nitrate mixed with fuel oil (ANFO) as the primary blasting agent. Non-electric blasting caps are typically used to initiate the blasting agent. The charges are time delayed by at least 8-milliseconds. Delays between charges are used to decouple changes and reduce vibration.

Pattern blasting is a common technique used in blasting for construction. This method is used when rock materials occur over a wide area. Pattern blasting involves drilling holes in a pre-

designed pattern. The depth and spacing of holes is controlled to provide the maximum fracture with the minimum amount of ground shaking.

Blasting patterns typically consist of drill holes between two and five inches in diameter. Depth of the drill holes would be determined by the blasting contractor and is specific to each application. Blasting patterns on construction sites typically range from three feet by three feet to 12 feet by 12 feet.

The Blasting Engineer would control blasting-induced vibration and noise. General control measures include:

- Stemming shall be of uniform size in order to ensure consistency between individual shots;
- The weight of explosives used per delay shall be determined by adherence to the Scaled Distance Equation;
- Independent delays shall be used for each blast hole to control vibration; and
- Blasting shall not take place when wind velocity equals or exceeds 15 miles per hour. A licensed blasting contractor will determine wind speed through the use of a recording anemometer located a minimum of ten feet above ground level.

In addition, ground vibrations and air overpressure shall be monitored during each blast for compliance with the limits by the U.S. Bureau of Mines. Following each blast, seismographs shall be checked to ensure that the blasting has not exceeded relevant standards. The relevant standards are as follows:

- Pursuant to 30 CFR Ch. VII, §816.67(b)(1)(i) of U.S. Bureau of Mines publication RI8485, airblasts shall not exceed 133 dB at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.
- Pursuant to 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508, the maximum ground vibration shall not exceed the limits in said section at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.

To evaluate the potential noise levels from blasting activities during Project construction, the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) reference noise level of 94 dBA L_{max} is used at a reference distance of 50 feet. (2) Each blast represents a point-source of noise which attenuates at a rate of 6 dB for each doubling of distance from the source. The closest residential homes to the Project construction area are represented by receiver location R1 at a distance of 136 feet. With the distance attenuation from the closest blasting activities, the unmitigated noise levels at nearby receiver locations would range from approximately 70.2 dBA L_{max} based on the RCNM reference noise level, as shown in Table 11-6. However, since the type of blasting techniques planned within the Project site are unknown at the time of this analysis, the noise levels presented at the nearby sensitive receiver locations represent the worst-case conditions based on the RCNM reference noise level.

TABLE 11-8: BLASTING CONSTRUCTION NOISE LEVELS

Receiver Location	Distance To Construction Activity (Feet)[2]	Construction Noise Level (dBA L_{max})
R1	705'	61.1
R2	1,319'	57.1
R3	740'	62.4
R4	136'	70.2
R5	753'	61.8

[1] FHWA Roadway Construction Noise Model.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

The County of Riverside General Plan and County Code of Ordinances do not identify specific construction noise level limits for blasting activities. Therefore, the OSMRE and CFR lowest maximum Airblast Limit (30 CFR 816.67(b)) of 129 dBA L_{max} at nearby sensitive uses is used in this analysis as discussed in Section 3.7. (3) Based on the reference blasting noise level, the closest residential receiver will experience noise levels approaching 70.2 dBA L_{max} over the course of the blast, which will likely occur for only a few seconds. While some blasting noise may be noticeable by nearby residents, the single-event, temporary noise levels generated by the blast will not exceed the OSMRE and the CFR standards for airblasts. Therefore, the noise levels due to blasting activities will result in a *less than significant* noise impact.

11.10 BLASTING VIBRATION IMPACTS

Blasting operations can have unacceptable noise and vibration impacts if not conducted correctly. Excessive levels of structural vibration due to ground vibration from blasting can cause substantial damage to structures. A blasting contractor would be required to complete all blasting-related activities in compliance with applicable regulations of the Riverside County Sheriff's Department, the U.S. Bureau of Mines, the California Division of Occupational Safety and Health (Cal-OHSA), the Department of Homeland Security, and the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), which have many requirements for the safe handling, use, and storage of explosives and recommend various measures and controls, including, but not limited to monitoring and reporting of each blast to verify no damage has occurred at nearby structures, notifications to surrounding neighbors, limitations on the amounts and times blast may occur.

Detonating as little as 25 pounds of explosives may be perceived up to 500 feet from a charge. Therefore, without vibration controls and measures, blasting could exceed thresholds at the areas near existing residential homes surrounding the Project site, shown on Exhibit 11-C. Noise-1 would mitigate potential vibration impacts. With the implementation of the identified vibration controls blasting activities at sensitive receivers would be *less than significant*.

11.10.1 BLASTING VIBRATION MITIGATION MEASURES

The following practices would reduce any vibration level impacts produced by the proposed blasting activities at the nearby noise-sensitive residential land uses:

MM Noise-1: Blasting Limitations

Prior to approval of any grading permits that require blasting activities and a blasting permit, the Project Applicant shall prepare and submit for County review and approval of a Blasting Noise and Vibration Monitoring and Abatement Plan ("Noise and Vibration Abatement Plan"). The required Noise and Vibration Abatement Plan shall include the name and qualifications of the person(s) responsible for monitoring and reporting blast vibrations. In addition, the Noise and Vibration Abatement Plan shall require a minimum of three seismographs for monitoring peak ground vibration and air-overpressure. The Noise and Vibration Abatement Plan also shall require that equipment and its use shall conform fully to the standards developed by the Vibration Section of the International Society of Explosive Engineers (ISEE). For all blasts, the Noise and Vibration Abatement Plan shall require monitoring of ground motion and air-overpressure at the nearest residential properties or other structure of concern. The Noise and Vibration Abatement Plan also shall specify a minimum trigger level for monitoring of 0.05 in/s for ground motion and 120 dB for air-overpressure. Additionally, the Noise and Vibration Abatement Plan shall require regular reporting of blasting and measurements to Riverside County, and shall include a copy of the instrument/software-generated blast monitoring report at each instrument location that includes measured peak particle velocity in inches per second, peak air-overpressure in linear-scale decibels, and vibration and air-overpressure event plots, with date and time of event recording. In addition, the Noise and Vibration Abatement Plan shall include the following requirements:

- Prior to commencement of any blasting, a pre-blast survey of the conditions of all existing property and aboveground utilities located within 300 feet of any potential blasting areas shall be conducted. The pre-blast survey shall include a photographic record of all visible and accessible structures, facilities, utilities, or other improvements. The survey shall document the interior and exterior conditions of all residential property and associated structures located within 500 feet of blasting areas. If property owners refuse surveys, provide copies of certified-mail letters documenting attempts to provide the survey by a third-party professional survey company. The required surveys shall include a description of the interior and exterior condition of the various structures examined. Descriptions shall include the locations of any cracks, damage, or other existing defects and shall include information needed to identify and describe the defect, if any, and to evaluate the construction operations on the defect. Survey records shall include photos of all cracks and other damaged, weathered, or otherwise deteriorated structural conditions. If necessary, macro lenses and flash illumination shall be used to ensure defects are shown clearly in the photographs. Photos shall contain an accurate date stamp. No blasting shall occur prior to completion of surveys of surrounding residential properties. Surveys also shall be repeated at facilities or properties where damage concerns have been expressed by individual residents, property owners, or other concerned parties. Details of any observed changes to surveyed structures and documenting photos shall be reported and submitted to Riverside County.
- Blasting only shall be allowed Monday through Friday only between the hours of 8:00 a.m. and 5:00 p.m.

- No blasting shall occur closer than 100 feet from residential structures. In the event that non-rippable materials are encountered within 100 feet from any residential structure, alternative methods shall be employed to reduce blasting-related noise and vibration impacts. Alternative rock blasting within 100 feet of residential homes may include methods such as the drilling of holes in the largest area of rock, inserting expansive grout or small charges into each whole to fragment the rock into smaller pieces, and then crushing the pieces for transport or other use.
- No more than a total of 2,000 pounds of explosive shall be detonated each day, excluding detonators.
- All blasts located within 500 feet of any structures or above ground utilities shall be covered with woven steel cable or steel-cable and rubber-tire blasting mats with a minimum weight of 30 pounds per square foot. Woven polypropylene or similar weed-barrier fabric, covered with at least 6 inches of soil or sand shall be placed over blast areas to protect initiators before mats are placed. Mats shall be overlapped at least 3 feet and shall completely cover the blast area and extend at least three feet beyond the blast area in all directions. If any flyrock or blasted material is thrown more than 10 feet or half the distance to the nearest structure, whichever is less, blasting shall be suspended until the County's has approved a revised blasting plan showing revisions to assure adequate ground movement control.
- Before blasts are covered, all loose soils above the blast shall be removed where feasible. Remaining ground located within 20 feet of the blast shall be thoroughly wetted with water to suppress airborne dust. Sand or soils placed over weed-barrier fabric shall be similarly wetted before placing blast mats.
- If specified vibration limits are exceeded, blasting operations shall cease immediately and a revised blasting plan shall be submitted to the County. Blasting shall not resume until a revised blasting plan has been reviewed and the Contractor has expressed in writing the conditions that will be applied to further blasting work.

Project grading and blasting contractors shall be required to ensure compliance with the Noise and Vibration Abatement Plan requirements and shall permit periodic inspection of the construction site by County of Riverside staff or its designee to confirm compliance. The requirements of the Noise and Vibration Abatement Plan also shall be specified in bid documents issued to prospective construction contractors. Riverside County shall review all monitoring reports to ensure compliance with the Noise and Vibration Abatement Plan, and shall have the authority to stop all blasting activities on site if it is determined that blasting activities are not being conducted in conformance with Noise and Vibration Abatement Plan and/or the above-listed requirements.

12 REFERENCES

1. **Urban Crossroads, Inc.** *Arroyo Vista Traffic Analysis.* 2025.
2. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.
3. **Regulations, Code of Federal.** *30 CFR 816.67 - Use of Explosives: Contorl of Adverse Effects.* July 2013.
4. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123.* September 2018.
5. **Harris, Cyril M.** *Noise Control in Buildings.* s.l. : McGraw-Hill, Inc., 1994.
6. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
7. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
8. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
9. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
10. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
11. **California Department of Transportation.** *Technical Noise Supplement.* November 2009.
12. —. *Transportation and Construction Vibration Guidance Manual.* April 2020.
13. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual, FTA-VA-90-1003-06.* May 2006.
14. **Office of Planning and Research.** *State of California General Plan Guidelines.* October 2017.
15. **State of California.** California Code of Regulations, Title 24, Part 2, Volume 1, Chapter 12, Section 1206.4, Allowable Interior Noise Level. *ICC Digital Coes.* [Online] 2019. https://codes.iccsafe.org/content/CABCV12019/chapter-12-interior-environment.
16. **County of Riverside.** *General Plan Noise Element.* December 2015.
17. —. *County Code of Ordinances , Chapter 9.52 Noise Regulation.* 2006.
18. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual.* September 2018.
19. **State of California.** *California Environmental Quality Act, Appendix G.* 2018.
20. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
21. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.

22. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.

23. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*

24. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.

25. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.

26. **County of Riverside.** *General Plan Circulation Element.* December 2015.

27. **County of Riverside Office of Industrial Hygiene.** *Requirements for determining and mitigating traffic noise impacts to residential structures.* July 2, 2012.

28. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.

29. **California Department of Transportation.** *Traffic Noise Analysis Protocol.* May 2011.

30. **Ldn Consulting.** *University District Rock Crusher Conditional Use Permit, San Marcos.* San Marcos : Ldn Consulting, 2011.

31. **County of Riverside.** *General Plan Noise Element.* December 2015.

32. **California Department of Transportation.** *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects.* May 2011.

13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Arroyo Vista Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (619) 788-1971.

William Maddux, INCE
Senior Associate
URBAN CROSSROADS, INC.
(619) 788-1971
bmaddux@urbanxroads.com

EDUCATION

Bachelor of Science in Urban and Regional Planning
California Polytechnic State University, Pomona • June 2000

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
APA – American Planning Association
AWMA – Air and Waste Management Association
INCE – Institute of Noise Control Engineers

PROFESSIONAL CERTIFICATIONS

INCE Membership – Certification, June 2024
Approved Acoustical Consultant • County of San Diego
FHWA Traffic Noise Model of Training • November 2004
CadnaA Basic and Advanced Training Certificate • October 2008.

This page was intentionally left blank.

APPENDIX 3.1:

COUNTY OF RIVERSIDE OFFICE OF INDUSTRIAL HYGIENE NOISE STUDY REQUIREMENTS

This page was intentionally left blank.

Chapter 9.52 - NOISE REGULATION

Sections:

9.52.010 - Intent.

At certain levels, sound becomes noise and may jeopardize the health, safety or general welfare of Riverside County residents and degrade their quality of life. Pursuant to its police power, the board of supervisors declares that noise shall be regulated in the manner described in this chapter. This chapter is intended to establish county-wide standards regulating noise. This chapter is not intended to establish thresholds of significance for the purpose of any analysis required by the California Environmental Quality Act and no such thresholds are established.

(Ord. 847 § 1, 2006)

9.52.020 - Exemptions.

Sound emanating from the following sources is exempt from the provisions of this chapter:

A. Facilities owned or operated by or for a governmental agency;

B. Capital improvement projects of a governmental agency;

C. The maintenance or repair of public properties;

D. Public safety personnel in the course of executing their official duties, including, but not limited to, sworn peace officers, emergency personnel and public utility personnel. This exemption includes, without limitation, sound emanating from all equipment used by such personnel, whether stationary or mobile;

E. Public or private schools and school-sponsored activities;

F. Agricultural operations on land designated "Agriculture" in the Riverside County general plan, or land zoned A-l (light agriculture), A-P (light agriculture with poultry), A-2 (heavy agriculture), A-D (agriculture-dairy) or C/V (citrus/vineyard), provided such operations are carried out in a manner consistent with accepted industry standards. This exemption includes, without limitation, sound emanating from all equipment used during such operations, whether stationary or mobile;

G. Wind energy conversion systems (WECS), provided such systems comply with the WECS noise provisions of Riverside County Ordinance No. 348;

H. Private construction projects located one-quarter of a mile or more from an inhabited dwelling;

I. Private construction projects located within one-quarter of a mile from an inhabited dwelling,

provided that:

1. Construction does not occur between the hours of six p.m. and six a.m. during the months of June through September, and
2. Construction does not occur between the hours of six p.m. and seven a.m. during the months of October through May;

J. Property maintenance, including, but not limited to, the operation of lawnmowers, leaf blowers, etc., provided such maintenance occurs between the hours of seven a.m. and eight p.m.;

K. Motor vehicles, other than off-highway vehicles. This exemption does not include sound emanating from motor vehicle sound systems;

L. Heating and air conditioning equipment;

M. Safety, warning and alarm devices, including, but not limited to, house and car alarms, and other warning devices that are designed to protect the public health, safety, and welfare;

N. The discharge of firearms consistent with all state laws.

(Ord. 847 § 2, 2006)

9.52.030 - Definitions.

As used in this chapter, the following terms shall have the following meanings:

"Audio equipment" means a television, stereo, radio, tape player, compact disc player, mp3 player, I-POD or other similar device.

"Decibel (dB)" means a unit for measuring the relative amplitude of a sound equal approximately to the smallest difference normally detectable by the human ear, the range of which includes approximately one hundred thirty (130) decibels on a scale beginning with zero decibels for the faintest detectable sound. Decibels are measured with a sound level meter using different methodologies as defined below:

1. "A-weighting (dBA)" means the standard A-weighted frequency response of a sound level meter, which de-emphasizes low and high frequencies of sound in a manner similar to the human ear for moderate sounds.
2. "Maximum sound level (L_{max})" means the maximum sound level measured on a sound level meter.

"Governmental agency" means the United States, the state of California, Riverside County, any city within Riverside County, any special district within Riverside County or any combination of these agencies.

"Land use permit" means a discretionary permit issued by Riverside County pursuant to Riverside County Ordinance No. 348.

"Motor vehicle" means a vehicle that is self-propelled.

"Motor vehicle sound system" means a stereo, radio, tape player, compact disc player, mp3 player, I-POD or other similar device.

"Noise" means any loud, discordant or disagreeable sound.

"Occupied property" means property upon which is located a residence, business or industrial or manufacturing use.

"Off-highway vehicle" means a motor vehicle designed to travel over any terrain.

"Public or private school" means an institution conducting academic instruction at the preschool, elementary school, junior high school, high school, or college level.

"Public property" means property owned by a governmental agency or held open to the public, including, but not limited to, parks, streets, sidewalks, and alleys.

"Sensitive receptor" means a land use that is identified as sensitive to noise in the noise element of the Riverside County general plan, including, but not limited to, residences, schools, hospitals, churches, rest homes, cemeteries or public libraries.

"Sound-amplifying equipment" means a loudspeaker, microphone, megaphone or other similar device.

"Sound level meter" means an instrument meeting the standards of the American National Standards Institute for Type 1 or Type 2 sound level meters or an instrument that provides equivalent data.

(Ord. 847 § 3, 2006)

9.52.040 - General sound level standards.

No person shall create any sound, or allow the creation of any sound, on any property that causes the exterior sound level on any other occupied property to exceed the sound level standards set forth in Table 1.

TABLE 1

Sound Level Standards (Db L_{max})

GENERAL PLAN FOUNDATION COMPONENT	GENERAL PLAN LAND USE DESIGNATION	GENERAL PLAN LAND USE DESIGNATION NAME	DENSITY	MAXIMUM DECIBEL LEVEL	
				7 am—10 pm	10 pm—7 am

Community Development	EDR	Estate Density Residential	2 AC	55	45
	VLDR	Very Low Density Residential	1 AC	55	45
	LDR	Low Density Residential	1/2 AC	55	45
	MDR	Medium Density Residential	2—5	55	45
	MHDR	Medium High Density Residential	5—8	55	45
	HDR	High Density Residential	8—14	55	45
	VHDR	Very High Density Residential	14—20	55	45
	H'TDR	Highest Density Residential	20+	55	45
	CR	Retail Commercial		65	55
	CO	Office Commercial		65	55
	CT	Tourist Commercial		65	55
	CC	Community Center		65	55
	LI	Light Industrial		75	55
	HI	Heavy Industrial		75	75

	BP	Business Park		65	45
	PF	Public Facility		65	45
	SP	Specific Plan-Residential		55	45
		Specific Plan-Commercial		65	55
		Specific Plan-Light Industrial		75	55
		Specific Plan-Heavy Industrial		75	75
Rural Community	EDR	Estate Density Residential	2 AC	55	45
	VLDR	Very Low Density Residential	1 AC	55	45
	LDR	Low Density Residential	1/2 AC	55	45
Rural	RR	Rural Residential	5 AC	45	45
	RM	Rural Mountainous	10 AC	45	45
	RD	Rural Desert	10 AC	45	45
Agriculture	AG	Agriculture	10 AC	45	45
Open Space	C	Conservation		45	45
	CH	Conservation Habitat		45	45

	REC	Recreation		45	45
	RUR	Rural	20 AC	45	45
	W	Watershed		45	45
	MR	Mineral Resources		75	45

(Ord. 847 § 4, 2006)

9.52.050 - Sound level measurement methodology.

Sound level measurements may be made anywhere within the boundaries of an occupied property. The actual location of a sound level measurement shall be at the discretion of the enforcement officials identified in Section 9.52.080 of this chapter. Sound level measurements shall be made with a sound level meter. Immediately before a measurement is made, the sound level meter shall be calibrated utilizing an acoustical calibrator meeting the standards of the American National Standards Institute. Following a sound level measurement, the calibration of the sound level meter shall be re-verified. Sound level meters and calibration equipment shall be certified annually.

(Ord. 847 § 5, 2006)

9.52.060 - Special sound sources standards.

The general sound level standards set forth in Section 9.52.040 of this chapter apply to sound emanating from all sources, including the following special sound sources, and the person creating, or allowing the creation of, the sound is subject to the requirements of that section. The following special sound sources are also subject to the following additional standards, the failure to comply with which constitutes separate violations of this chapter:

A. Motor Vehicles.

1. Off-Highway Vehicles.

a. No person shall operate an off-highway vehicle unless it is equipped with a USDA-qualified spark arrester and a constantly operating and properly maintained muffler. A muffler is not considered constantly operating and properly maintained if it is equipped with a cutout, bypass or similar device.

b. No person shall operate an off-highway vehicle unless the noise emitted by the vehicle

is not more than ninety-six (96) dBA if the vehicle was manufactured on or after January 1, 1986 or is not more than one hundred one (101) dBA if the vehicle was manufactured before January 1, 1986. For purposes of this subsection, emitted noise shall be measured a distance of twenty (20) inches from the vehicle tailpipe using test procedures established by the Society of Automotive Engineers under Standard J-1287.

2. Sound Systems. No person shall operate a motor vehicle sound system, whether affixed to the vehicle or not, between the hours of ten p.m. and eight a.m., such that the sound system is audible to the human ear inside any inhabited dwelling. No person shall operate a motor vehicle sound system, whether affixed to the vehicle or not, at any other time such that the sound system is audible to the human ear at a distance greater than one hundred (100) feet from the vehicle.

B. Power Tools and Equipment. No person shall operate any power tools or equipment between the hours of ten p.m. and eight a.m. such that the power tools or equipment are audible to the human ear inside an inhabited dwelling other than a dwelling in which the power tools or equipment may be located. No person shall operate any power tools or equipment at any other time such that the power tools or equipment are audible to the human ear at a distance greater than one hundred (100) feet from the power tools or equipment.

C. Audio Equipment. No person shall operate any audio equipment, whether portable or not, between the hours of ten p.m. and eight a.m. such that the equipment is audible to the human ear inside an inhabited dwelling other than a dwelling in which the equipment may be located. No person shall operate any audio equipment, whether portable or not, at any other time such that the equipment is audible to the human ear at a distance greater than one hundred (100) feet from the equipment.

D. Sound-Amplifying Equipment and Live Music. No person shall install, use or operate sound-amplifying equipment, or perform, or allow to be performed, live music unless such activities comply with the following requirements. To the extent that these requirements conflict with any conditions of approval attached to an underlying land use permit, these requirements shall control:

1. Sound-amplifying equipment or live music is prohibited between the hours of ten p.m. and eight a.m.

2. Sound emanating from sound-amplifying equipment or live music at any other time shall not be audible to the human ear at a distance greater than two hundred (200) feet from the equipment or music.

(Ord. 847 § 6, 2006)

9.52.070 - Exceptions.

Exceptions may be requested from the standards set forth in Section 9.52.040 or 9.52.060 of this chapter and may be characterized as construction-related, single-event or continuous-events exceptions.

A. Application and Processing.

1. Construction-Related Exceptions. An application for a construction-related exception shall be made to and considered by the director of building and safety on forms provided by the building and safety department and shall be accompanied by the appropriate filing fee. No public hearing is required.
2. Single-Event Exceptions. An application for a single-event exception shall be made to and considered by the planning director on forms provided by the planning department and shall be accompanied by the appropriate filing fee. No public hearing is required.
3. Continuous-Events Exceptions. An application for a continuous-events exception shall be made to the planning director on forms provided by the planning department and shall be accompanied by the appropriate filing fee. Upon receipt of an application for a continuous-events exception, the planning director shall set the matter for public hearing before the planning commission, notice of which shall be given as provided in Section 18.26c of Riverside County Ordinance No. 348. Notwithstanding the above, an application for a continuous-events exception that is associated with an application for a land use permit shall be processed concurrently with the land use permit in the same manner that the land use permit is required to be processed.

B. Requirements for Approval. The appropriate decisionmaking body or officer shall not approve an exception application unless the applicant demonstrates that the activities described in the application would not be detrimental to the health, safety or general welfare of the community. In determining whether activities are detrimental to the health, safety or general welfare of the community, the appropriate decisionmaking body or officer shall consider such factors as the proposed duration of the activities and their location in relation to sensitive receptors. If an exception application is approved, reasonable conditions may be imposed to minimize the public detriment, including, but not limited to, restrictions on sound level, sound duration and operating hours.

C. Appeals. The director of building and safety's decision on an application for a construction-related exception is considered final. The planning director's decision on an application for a single-event exception is considered final. After making a decision on an application for a continuous-events exception, the appropriate decisionmaking body or officer shall mail notice of the decision to the applicant. Within ten (10) calendar days after the mailing of such notice, the applicant or an interested person may appeal the decision to the board of supervisors. Upon receipt of an appeal and payment of the appropriate appeal fee, the clerk of the board

shall set the matter for hearing not less than five days nor more than thirty (30) days thereafter and shall give written notice of the hearing in the same manner as notice of the hearing was given by the appropriate hearing officer or body. The board of supervisors shall render its decision within thirty (30) days after the appeal hearing is closed.

D. Effect of a Pending Continuous-Events Exception Application. For a period of one hundred eighty (180) days from the effective date of this chapter, no person creating any sound prohibited by this chapter shall be considered in violation of this chapter if the sound is related to a use that is operating pursuant to an approved land use permit, if an application for a continuous-events exception has been filed to sanction the sound and if a decision on the application is pending.

(Ord. 847 § 7, 2006)

9.52.080 - Enforcement.

The Riverside County sheriff and code enforcement shall have the primary responsibility for enforcing this chapter; provided, however, the sheriff and code enforcement may be assisted by the public health department. Violations shall be prosecuted as described in Section 9.52.100 of this chapter, but nothing in this chapter shall prevent the sheriff, code enforcement or the department of public health from engaging in efforts to obtain voluntary compliance by means of warnings, notices, or educational programs.

(Ord. 847.1 § 1, 2007: Ord. 847 § 8, 2006)

9.52.090 - Duty to cooperate.

No person shall refuse to cooperate with, or obstruct, the enforcement officials identified in Section 9.52.080 of this chapter when they are engaged in the process of enforcing the provisions of this chapter. This duty to cooperate may require a person to extinguish a sound source so that it can be determined whether sound emanating from the source violates the provisions of this chapter.

(Ord. 847 § 9, 2006)

9.52.100 - Violations and penalties.

Any person who violates any provision of this chapter once or twice within a one hundred eighty (180) day period shall be guilty of an infraction. Any person who violates any provision of this chapter more than twice within a one hundred eighty (180) day period shall be guilty of a misdemeanor. Each day a violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. Penalties shall not exceed the following amounts:

A. For the first violation within a one hundred eighty (180) day period, the minimum mandatory

fine shall be five hundred dollars ($500.00).

B. For the second violation within a one hundred eighty (180) day period, the minimum mandatory fine shall be seven hundred fifty dollars ($750.00).

C. For any further violations within a one hundred eighty (180) day period, the minimum mandatory fine shall be one thousand dollars ($1,000.00) or imprisonment in the county jail for a period not exceeding six months, or both.

(Ord. 847 § 10, 2006)

This page was intentionally left blank.

APPENDIX 5.1:

STUDY AREA PHOTOS

This page was intentionally left blank.

JN: 14577 Study Area Photos

L1_E
33, 53' 38.250000"117, 20' 57.850000"

L1_N
33, 53' 38.290000"117, 20' 57.820000"

L1_S
33, 53' 38.280000"117, 20' 57.820000"

L1_W
33, 53' 38.240000"117, 20' 57.850000"

L2_E
33, 53' 43.240000"117, 20' 54.970000"

L2_N
33, 53' 43.220000"117, 20' 54.970000"

JN: 14577 Study Area Photos

L2_S
33, 53' 43.270000"117, 20' 54.970000"

L2_W
33, 53' 43.220000"117, 20' 54.970000"

L3_E
33, 53' 25.270000"117, 20' 56.450000"

L3_N
33, 53' 25.230000"117, 20' 56.400000"

L3_S
33, 53' 25.320000"117, 20' 56.480000"

L3_W
33, 53' 25.230000"117, 20' 56.450000"

JN: 14577 Study Area Photos

L4_E
33, 53' 13.710000"117, 20' 54.780000"

L4_N
33, 53' 13.730000"117, 20' 54.860000"

L4_S
33, 53' 13.680000"117, 20' 54.780000"

L4_W
33, 53' 13.680000"117, 20' 54.860000"

L5_E
33, 53' 14.000000"117, 21' 10.760000"

L5_N
33, 53' 14.070000"117, 21' 10.790000"

JN: 14577 Study Area Photos

L5_S
33, 53' 14.010000"117, 21' 10.760000"

L5_W
33, 53' 14.030000"117, 21' 10.790000"

This page was intentionally left blank.

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

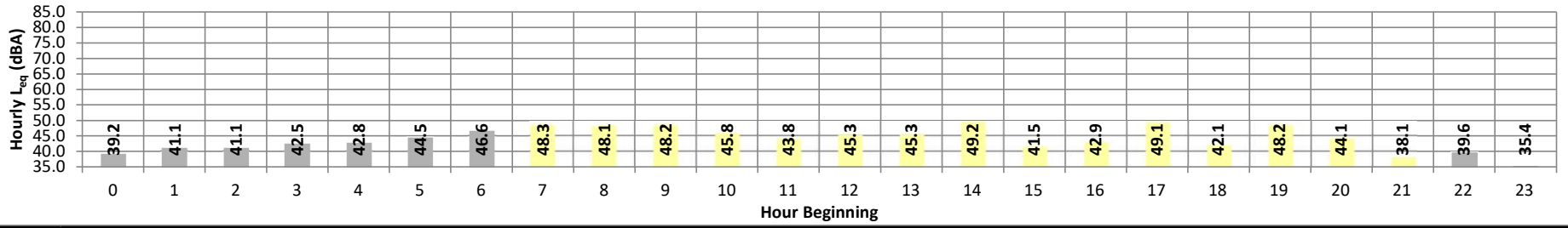
This page was intentionally left blank.

24-Hour Noise Level Measurement Summary

Date: Wednesday, March 23, 2022 *Location:* L1 - Located north of the Project site near single-family *Meter:* Piccolo II *JN:* 14577

Project: Chicago 139 *Source:* residence at 17975 Twin Lakes Drive. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	39.2	46.5	34.8	45.9	45.5	44.0	42.8	39.5	37.3	35.4	35.1	34.9	39.2	10.0	49.2
	1	41.1	49.0	34.6	47.9	47.1	45.7	44.9	42.0	39.3	35.9	35.3	34.8	41.1	10.0	51.1
	2	41.1	47.2	36.7	46.4	45.8	44.6	44.0	41.9	40.0	37.7	37.3	36.9	41.1	10.0	51.1
	3	42.5	49.0	38.3	48.0	47.3	46.0	45.3	43.3	41.6	39.3	38.9	38.4	42.5	10.0	52.5
	4	42.8	49.0	39.0	48.0	47.2	46.1	45.4	43.5	41.9	39.9	39.5	39.1	42.8	10.0	52.8
	5	44.5	50.1	40.8	49.7	49.3	48.2	47.3	45.1	43.6	41.6	41.3	41.0	44.5	10.0	54.5
	6	46.6	51.3	43.8	50.9	50.4	49.4	48.8	47.1	46.1	44.5	44.3	43.9	46.6	10.0	56.6
Day	7	48.3	53.2	45.2	52.7	52.1	51.0	50.5	48.9	47.7	46.0	45.7	45.3	48.3	0.0	48.3
	8	48.1	54.0	44.2	53.5	52.8	51.7	51.0	49.0	47.0	45.0	44.7	44.3	48.1	0.0	48.1
	9	48.2	56.4	41.6	55.8	55.1	53.6	52.5	48.9	45.4	42.7	42.2	41.7	48.2	0.0	48.2
	10	45.8	53.4	39.6	52.6	51.9	50.4	49.6	46.8	44.3	40.5	40.1	39.7	45.8	0.0	45.8
	11	43.8	51.2	37.1	50.6	50.0	49.0	48.1	45.0	41.5	38.0	37.6	37.2	43.8	0.0	43.8
	12	45.3	55.3	34.5	54.7	54.0	52.2	50.9	44.2	39.5	35.5	35.2	34.8	45.3	0.0	45.3
	13	45.3	54.7	34.8	53.9	53.1	52.0	51.1	45.4	39.8	35.7	35.3	35.0	45.3	0.0	45.3
	14	49.2	59.5	34.4	58.8	57.4	55.5	54.7	50.3	39.7	35.6	35.1	34.5	49.2	0.0	49.2
	15	41.5	48.1	33.7	47.6	47.1	46.0	45.5	43.0	40.1	34.5	34.1	33.8	41.5	0.0	41.5
	16	42.9	50.3	34.9	49.5	48.6	47.7	47.1	44.6	41.2	35.5	35.3	35.0	42.9	0.0	42.9
	17	49.1	57.0	36.1	56.7	56.3	55.5	54.2	50.8	43.5	37.2	36.7	36.3	49.1	0.0	49.1
	18	42.1	49.1	35.2	48.5	48.1	47.5	46.7	43.3	39.4	35.9	35.6	35.3	42.1	0.0	42.1
	19	48.2	56.5	36.0	56.0	55.5	54.2	53.8	49.2	42.2	37.3	36.7	36.2	48.2	5.0	53.2
	20	44.1	50.7	33.8	50.2	49.9	49.4	48.9	46.2	40.9	34.7	34.2	33.9	44.1	5.0	49.1
	21	38.1	42.9	34.6	42.7	42.4	41.7	41.2	39.2	36.9	35.1	34.9	34.7	38.1	5.0	43.1
Night	22	39.6	44.9	34.8	44.6	44.3	43.8	43.2	41.0	37.7	35.4	35.2	34.9	39.6	10.0	49.6
	23	35.4	40.4	32.7	40.0	39.6	38.6	38.0	35.8	34.5	33.2	33.0	32.8	35.4	10.0	45.4

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	38.1	42.9	33.7	42.7	42.4	41.7	41.2	39.2	36.9	34.5	34.1	33.8
	Max	49.2	59.5	45.2	58.8	57.4	55.5	54.7	50.8	47.7	46.0	45.7	45.3
Energy Average		46.3	Average:		52.3	51.6	50.5	49.7	46.3	41.9	37.9	37.6	37.2
Night	Min	35.4	40.4	32.7	40.0	39.6	38.6	38.0	35.8	34.5	33.2	33.0	32.8
	Max	46.6	51.3	43.8	50.9	50.4	49.4	48.8	47.1	46.1	44.5	44.3	43.9
Energy Average		42.4	Average:		46.8	46.3	45.1	44.4	42.1	40.2	38.1	37.8	37.4

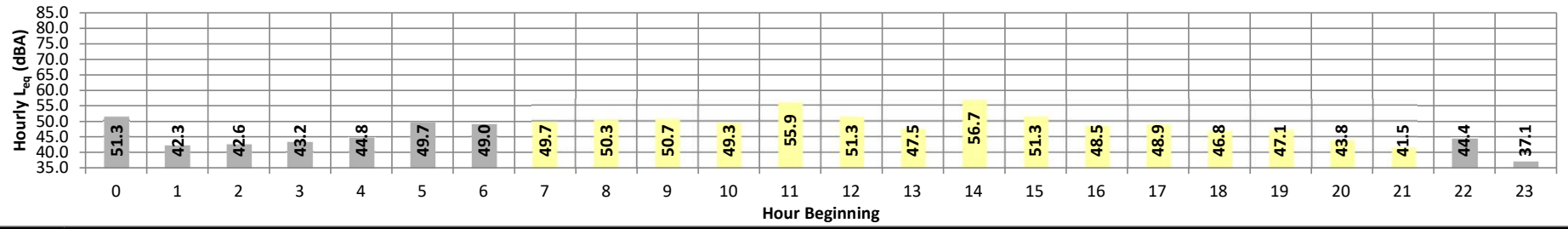
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
45.2	46.3	42.4
CNEL		50.0

24-Hour Noise Level Measurement Summary

Date: Wednesday, March 23, 2022 *Location:* L2 - Located northeast of the Project site near single-family *Meter:* Piccolo II *JN:* 14577

Project: Chicago 139 *Source:* residence at 18019 Twin Lakes Drive. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	51.3	62.6	36.8	61.9	61.7	60.8	58.8	44.9	40.1	37.6	37.3	36.9	51.3	10.0	61.3
	1	42.3	49.5	36.6	48.6	47.9	46.5	45.8	43.2	40.9	37.8	37.3	36.8	42.3	10.0	52.3
	2	42.6	48.7	38.9	47.8	47.1	46.2	45.5	43.4	41.7	39.6	39.4	39.0	42.6	10.0	52.6
	3	43.2	48.3	40.5	47.5	46.9	45.8	45.2	43.8	42.7	41.2	40.9	40.6	43.2	10.0	53.2
	4	44.8	51.5	40.8	50.9	50.2	48.8	47.9	45.2	43.6	41.6	41.3	40.9	44.8	10.0	54.8
	5	49.7	60.9	41.6	60.5	59.9	57.0	53.6	47.2	44.2	42.3	42.0	41.7	49.7	10.0	59.7
	6	49.0	75.9	44.1	75.5	74.8	71.9	67.0	51.2	46.9	44.8	44.6	44.2	49.0	10.0	59.0
Day	7	49.7	57.1	46.2	56.8	56.5	55.1	53.4	49.0	48.1	46.9	46.6	46.3	49.7	0.0	49.7
	8	50.3	58.4	45.9	57.8	57.4	55.7	54.4	50.0	48.2	46.6	46.2	46.0	50.3	0.0	50.3
	9	50.7	58.4	45.3	58.0	57.5	56.1	54.8	51.0	48.6	46.1	45.8	45.4	50.7	0.0	50.7
	10	49.3	58.7	43.5	58.0	57.0	54.6	53.2	49.2	46.9	44.4	44.0	43.6	49.3	0.0	49.3
	11	55.9	69.2	40.6	69.0	68.1	64.2	59.2	49.1	44.8	41.6	41.2	40.7	55.9	0.0	55.9
	12	51.3	62.4	38.0	61.9	61.5	59.5	57.2	48.9	44.0	39.1	38.6	38.1	51.3	0.0	51.3
	13	47.5	57.5	37.7	57.0	56.4	54.5	52.7	47.2	42.2	38.6	38.2	37.8	47.5	0.0	47.5
	14	56.7	68.6	37.7	68.3	68.0	65.6	61.6	50.4	43.5	39.2	38.7	37.9	56.7	0.0	56.7
	15	51.3	61.7	40.8	61.5	60.9	58.1	56.7	50.7	44.7	41.7	41.3	41.0	51.3	0.0	51.3
	16	48.5	58.6	41.4	58.2	57.6	55.1	53.3	47.0	44.7	42.3	42.0	41.5	48.5	0.0	48.5
	17	48.9	57.5	41.3	57.0	56.2	54.3	53.4	49.6	45.3	42.1	41.7	41.4	48.9	0.0	48.9
	18	46.8	56.4	39.8	55.9	55.1	53.9	52.8	45.9	43.0	40.6	40.2	39.9	46.8	0.0	46.8
	19	47.1	56.8	38.4	56.3	56.0	54.8	53.1	45.8	42.0	39.1	38.8	38.5	47.1	5.0	52.1
	20	43.8	51.0	36.4	50.8	50.4	49.3	48.3	44.8	41.4	37.4	37.0	36.5	43.8	5.0	48.8
	21	41.5	49.1	37.8	48.7	48.3	46.9	45.5	41.4	39.5	38.3	38.1	37.9	41.5	5.0	46.5
Night	22	44.4	54.5	38.5	54.0	53.4	51.4	48.2	43.2	40.7	39.2	38.9	38.7	44.4	10.0	54.4
	23	37.1	41.8	35.0	41.2	40.7	39.5	39.0	37.6	36.5	35.5	35.3	35.1	37.1	10.0	47.1

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	41.5	49.1	36.4	48.7	48.3	46.9	45.5	41.4	39.5	37.4	37.0	36.5
	Max	56.7	69.2	46.2	69.0	68.1	65.6	61.6	51.0	48.6	46.9	46.6	46.3
Energy Average		51.0	Average:		58.4	57.8	55.8	54.0	48.0	44.4	41.6	41.2	40.8
Night	Min	37.1	41.8	35.0	41.2	40.7	39.5	39.0	37.6	36.5	35.5	35.3	35.1
	Max	51.3	75.9	44.1	75.5	74.8	71.9	67.0	51.2	46.9	44.8	44.6	44.2
Energy Average		46.8	Average:		54.2	53.6	52.0	50.1	44.4	41.9	40.0	39.7	39.3

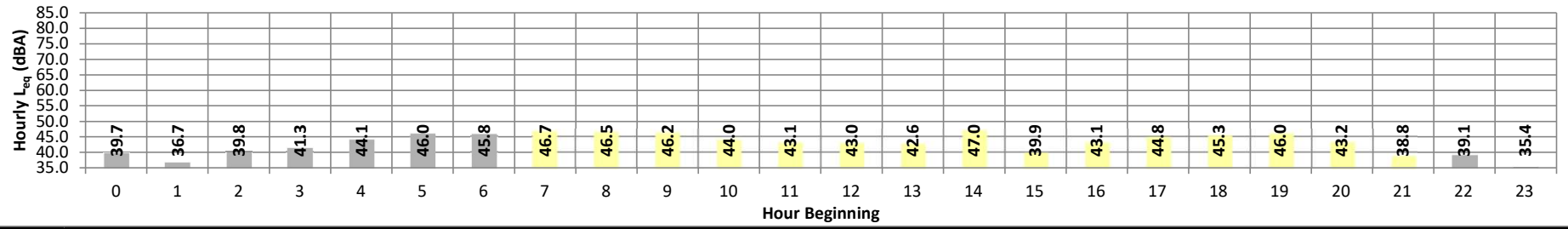
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
49.8	51.0	46.8
CNEL		54.2

24-Hour Noise Level Measurement Summary

Date: Wednesday, March 23, 2022 | *Location:* L3 - Located east of the Project site near single-family | *Meter:* Piccolo II | *JN:* 14577

Project: Chicago 139 | *Source:* residence at 15765 Cartwright Street. | *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	39.7	45.3	35.9	44.9	44.5	43.5	42.8	40.5	38.6	36.6	36.3	36.0	39.7	10.0	49.7
	1	36.7	40.9	34.2	40.6	40.3	39.4	39.0	37.3	36.2	34.7	34.5	34.3	36.7	10.0	46.7
	2	39.8	44.9	36.6	44.5	44.0	43.0	42.4	40.5	39.0	37.4	37.0	36.7	39.8	10.0	49.8
	3	41.3	45.2	38.2	44.9	44.5	43.7	43.3	42.0	40.9	39.0	38.7	38.3	41.3	10.0	51.3
	4	44.1	48.0	40.9	47.7	47.4	46.7	46.3	44.9	43.6	41.7	41.4	41.1	44.1	10.0	54.1
	5	46.0	50.2	42.0	49.9	49.7	49.1	48.7	47.0	45.5	43.0	42.6	42.1	46.0	10.0	56.0
	6	45.8	49.6	42.9	49.3	48.9	48.2	47.8	46.5	45.4	43.8	43.4	43.0	45.8	10.0	55.8
Day	7	46.7	51.1	43.8	50.7	50.3	49.4	48.9	47.2	46.1	44.6	44.3	43.9	46.7	0.0	46.7
	8	46.5	51.5	42.8	51.0	50.6	49.8	49.2	47.3	45.6	43.6	43.3	42.9	46.5	0.0	46.5
	9	46.2	52.5	41.0	52.0	51.6	50.5	49.7	47.3	44.9	42.0	41.6	41.1	46.2	0.0	46.2
	10	44.0	49.8	39.3	49.2	48.6	47.6	47.1	45.3	42.6	40.2	39.9	39.4	44.0	0.0	44.0
	11	43.1	50.6	37.0	49.8	49.0	47.7	46.9	44.0	41.5	38.0	37.6	37.1	43.1	0.0	43.1
	12	43.0	50.9	34.2	50.3	49.7	48.1	47.3	44.0	40.7	35.0	34.6	34.3	43.0	0.0	43.0
	13	42.6	50.0	34.9	49.5	48.9	47.8	47.0	44.0	39.8	35.8	35.5	35.1	42.6	0.0	42.6
	14	47.0	53.8	34.8	53.4	53.0	52.3	51.6	49.6	43.8	36.7	36.1	35.1	47.0	0.0	47.0
	15	39.9	46.6	33.6	46.1	45.7	44.7	44.1	41.1	38.2	34.2	34.0	33.7	39.9	0.0	39.9
	16	43.1	51.4	36.1	50.7	50.1	48.7	47.7	43.8	40.2	36.9	36.6	36.3	43.1	0.0	43.1
	17	44.8	52.6	37.1	52.0	51.7	50.5	49.6	45.2	41.6	38.4	37.8	37.3	44.8	0.0	44.8
	18	45.3	53.2	36.0	52.8	52.6	51.9	51.2	46.1	40.5	36.7	36.4	36.1	45.3	0.0	45.3
	19	46.0	54.5	36.2	54.1	53.6	52.7	51.5	45.7	41.3	37.0	36.7	36.3	46.0	5.0	51.0
	20	43.2	49.6	34.5	49.2	48.7	48.1	47.6	45.2	40.7	35.7	35.0	34.6	43.2	5.0	48.2
	21	38.8	43.7	35.4	43.3	43.0	42.4	42.0	40.1	37.5	36.0	35.7	35.5	38.8	5.0	43.8
Night	22	39.1	45.4	34.9	44.8	44.4	43.3	42.3	40.2	37.5	35.5	35.3	35.0	39.1	10.0	49.1
	23	35.4	40.3	33.0	39.9	39.5	38.4	37.7	35.9	34.5	33.4	33.3	33.1	35.4	10.0	45.4

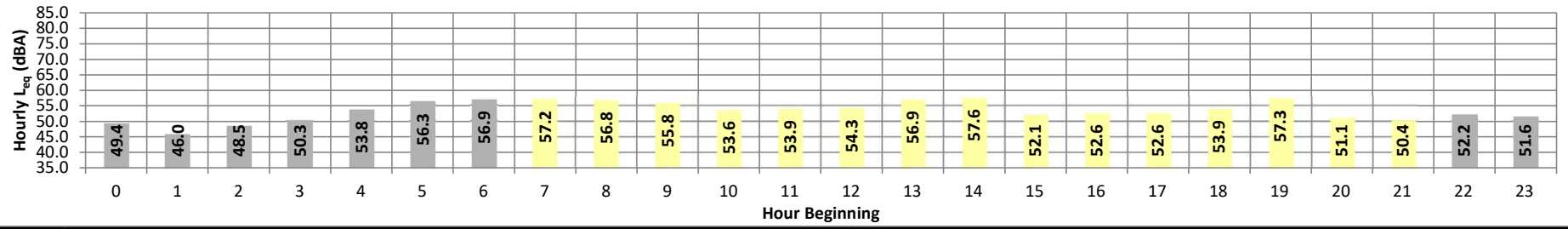
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	38.8	43.7	33.6	43.3	43.0	42.4	42.0	40.1	37.5	34.2	34.0	33.7
	Max	47.0	54.5	43.8	54.1	53.6	52.7	51.6	49.6	46.1	44.6	44.3	43.9
Energy Average		44.6	Average:		50.3	49.8	48.8	48.1	45.1	41.7	38.1	37.7	37.2
Night	Min	35.4	40.3	33.0	39.9	39.5	38.4	37.7	35.9	34.5	33.4	33.3	33.1
	Max	46.0	50.2	42.9	49.9	49.7	49.1	48.7	47.0	45.5	43.8	43.4	43.0
Energy Average		42.3	Average:		45.2	44.8	43.9	43.4	41.6	40.1	38.3	38.1	37.7

L_{eq} (dBA)		
24-Hour	*Daytime (7am-10pm)*	*Nighttime (10pm-7am)*
43.8	**44.6**	**42.3**
CNEL		**49.4**

24-Hour Noise Level Measurement Summary

Date: Wednesday, March 23, 2022 *Location:* L4 - Located southeast of the Project site near single-family *Meter:* Piccolo II *JN:* 14577
Project: Chicago 139 *Source:* residence at 17975 Iris Avenue. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	*Hour*	*L_{eq}*	*L_{max}*	*L_{min}*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*	*L_{eq}*	*Adj.*	*Adj. L_{eq}*
Night	0	49.4	57.2	42.4	56.9	56.5	55.0	53.7	49.9	47.4	43.6	43.0	42.5	49.4	10.0	59.4
	1	46.0	53.1	38.8	52.8	52.5	51.2	50.2	46.7	44.1	40.2	39.6	38.9	46.0	10.0	56.0
	2	48.5	55.9	41.1	55.6	55.3	54.2	53.0	49.3	45.9	42.3	41.8	41.2	48.5	10.0	58.5
	3	50.3	56.2	43.8	55.9	55.5	54.5	53.9	51.3	49.0	45.2	44.6	43.9	50.3	10.0	60.3
	4	53.8	60.6	46.9	60.3	60.0	59.0	58.0	54.4	52.0	48.5	47.8	47.1	53.8	10.0	63.8
	5	56.3	63.6	49.6	63.3	63.1	61.9	60.3	56.5	54.6	51.1	50.5	49.8	56.3	10.0	66.3
	6	56.9	63.7	50.1	63.4	63.1	62.1	61.3	58.2	54.5	51.4	50.8	50.2	56.9	10.0	66.9
Day	7	57.2	65.0	52.1	64.5	63.8	62.1	60.9	57.5	55.4	53.1	52.7	52.3	57.2	0.0	57.2
	8	56.8	65.7	51.1	65.3	64.6	62.4	60.5	56.6	54.7	52.2	51.8	51.3	56.8	0.0	56.8
	9	55.8	65.1	49.5	64.6	63.4	61.1	59.6	55.7	53.6	50.8	50.3	49.7	55.8	0.0	55.8
	10	53.6	60.0	48.4	59.7	59.3	58.1	57.3	54.2	52.3	49.5	49.0	48.6	53.6	0.0	53.6
	11	53.9	62.3	46.8	61.9	61.4	59.9	58.7	53.8	50.9	48.0	47.5	47.0	53.9	0.0	53.9
	12	54.3	64.4	46.0	64.1	63.5	60.8	58.9	53.0	50.3	47.1	46.6	46.2	54.3	0.0	54.3
	13	56.9	68.9	46.9	68.1	67.5	64.4	61.3	53.9	51.1	48.2	47.6	47.1	56.9	0.0	56.9
	14	57.6	67.3	44.6	67.0	66.3	64.5	63.0	57.5	51.1	46.2	45.5	44.8	57.6	0.0	57.6
	15	52.1	59.7	45.4	59.3	58.9	57.8	56.7	52.5	49.6	46.5	46.0	45.6	52.1	0.0	52.1
	16	52.6	60.9	44.3	60.6	60.1	58.5	57.1	53.2	49.4	45.5	44.9	44.5	52.6	0.0	52.6
	17	52.6	61.6	44.9	61.1	60.5	58.8	57.4	52.5	49.5	46.1	45.5	45.0	52.6	0.0	52.6
	18	53.9	65.5	43.4	64.9	63.9	61.3	59.1	52.3	48.1	44.4	43.9	43.5	53.9	0.0	53.9
	19	57.3	68.3	43.4	68.0	67.6	65.4	62.9	55.1	49.7	45.0	44.1	43.5	57.3	5.0	62.3
	20	51.1	59.0	42.4	58.7	58.3	57.2	56.1	51.9	47.8	43.7	43.1	42.5	51.1	5.0	56.1
	21	50.4	59.0	42.5	58.7	58.3	56.9	55.2	50.2	47.3	43.6	43.0	42.6	50.4	5.0	55.4
Night	22	52.2	61.7	43.3	61.4	60.8	59.1	56.7	51.8	48.2	44.5	43.9	43.5	52.2	10.0	62.2
	23	51.6	63.5	41.4	62.7	62.0	57.4	55.4	49.9	46.9	42.9	42.2	41.6	51.6	10.0	61.6

Timeframe	*Hour*	*L_{eq}*	*L_{max}*	*L_{min}*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	50.4	59.0	42.4	58.7	58.3	56.9	55.2	50.2	47.3	43.6	43.0	42.5
	Max	57.6	68.9	52.1	68.1	67.6	65.4	63.0	57.5	55.4	53.1	52.7	52.3
Energy Average		55.0	Average:		63.1	62.5	60.6	59.0	54.0	50.7	47.3	46.8	46.3
Night	Min	46.0	53.1	38.8	52.8	52.5	51.2	50.2	46.7	44.1	40.2	39.6	38.9
	Max	56.9	63.7	50.1	63.4	63.1	62.1	61.3	58.2	54.6	51.4	50.8	50.2
Energy Average		53.0	Average:		59.1	58.7	57.2	55.8	52.0	49.2	45.5	44.9	44.3

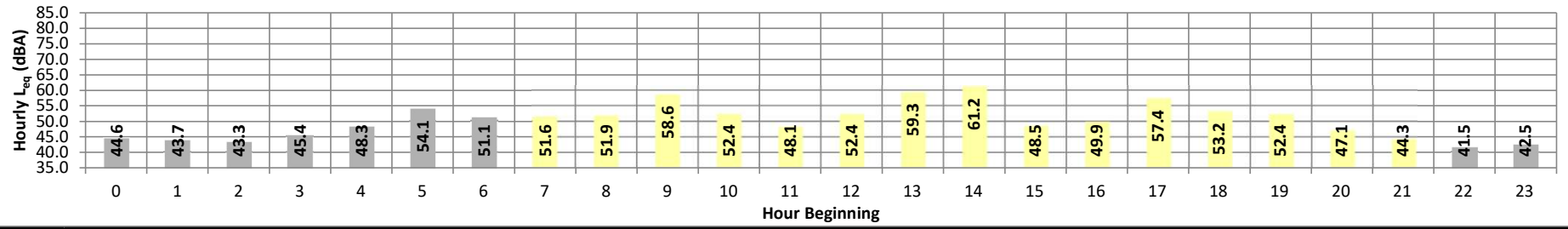
L_{eq} (dBA)		
24-Hour	*Daytime (7am-10pm)*	*Nighttime (10pm-7am)*
54.3	**55.0**	**53.0**
CNEL		**60.0**

24-Hour Noise Level Measurement Summary

Date: Wednesday, March 23, 2022 | *Location:* L5 - Located south of the Project site near single-family | *Meter:* Piccolo II | *JN:* 14577

Project: Chicago 139 | *Source:* residence at 16016 Gamble Avenue. | *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	44.6	54.5	38.4	53.8	52.9	50.2	48.1	44.2	42.1	39.4	39.0	38.6	44.6	10.0	54.6
	1	43.7	53.8	36.6	53.4	52.8	50.2	47.9	42.7	39.9	37.4	37.1	36.7	43.7	10.0	53.7
	2	43.3	49.6	38.3	49.2	48.8	47.8	46.8	44.0	41.8	39.2	38.8	38.4	43.3	10.0	53.3
	3	45.4	51.0	40.3	50.6	50.1	49.0	48.4	46.5	44.4	41.3	40.8	40.4	45.4	10.0	55.4
	4	48.3	54.1	43.4	53.8	53.3	52.1	51.4	49.3	47.4	44.6	44.1	43.5	48.3	10.0	58.3
	5	54.1	63.6	47.7	63.2	62.6	60.4	57.8	53.3	51.3	48.8	48.3	47.8	54.1	10.0	64.1
	6	51.1	57.4	46.5	57.0	56.7	55.3	54.3	51.4	49.9	47.6	47.1	46.7	51.1	10.0	61.1
Day	7	51.6	56.7	48.0	56.3	55.8	54.9	54.1	52.2	50.8	49.0	48.6	48.1	51.6	0.0	51.6
	8	51.9	60.4	47.1	60.1	59.3	56.9	55.2	51.7	50.1	48.0	47.7	47.3	51.9	0.0	51.9
	9	58.6	67.7	47.6	66.9	66.1	64.5	63.4	59.3	54.9	51.2	50.4	48.3	58.6	0.0	58.6
	10	52.4	61.6	44.0	60.8	60.2	58.7	57.5	52.5	48.8	45.4	44.8	44.2	52.4	0.0	52.4
	11	48.1	57.2	41.0	56.9	56.4	54.2	52.2	47.8	45.3	42.2	41.8	41.2	48.1	0.0	48.1
	12	52.4	64.2	37.4	63.8	62.9	61.0	58.6	48.4	43.2	39.5	38.1	37.5	52.4	0.0	52.4
	13	59.3	71.8	38.1	71.2	70.4	68.1	65.5	52.6	44.8	39.0	38.6	38.2	59.3	0.0	59.3
	14	61.2	73.7	37.3	73.4	72.4	69.3	66.4	55.3	47.2	39.4	38.2	37.4	61.2	0.0	61.2
	15	48.5	60.6	37.0	60.3	59.6	56.6	53.3	44.6	41.0	37.8	37.5	37.1	48.5	0.0	48.5
	16	49.9	60.7	38.9	60.3	59.6	57.4	55.4	48.4	43.6	39.7	39.4	39.0	49.9	0.0	49.9
	17	57.4	70.0	41.1	69.3	68.2	65.5	62.7	53.1	48.2	43.6	42.4	41.3	57.4	0.0	57.4
	18	53.2	65.1	38.9	64.2	63.3	61.8	57.8	51.1	44.2	40.1	39.6	39.0	53.2	0.0	53.2
	19	52.4	60.7	39.9	60.0	59.5	58.6	57.6	52.7	49.1	43.7	42.1	40.5	52.4	5.0	57.4
	20	47.1	57.2	36.6	56.8	56.2	53.7	51.8	47.1	42.5	37.6	37.1	36.7	47.1	5.0	52.1
	21	44.3	56.6	36.9	56.1	54.6	50.9	47.7	41.7	39.2	37.6	37.3	37.1	44.3	5.0	49.3
Night	22	41.5	49.3	36.5	48.9	48.3	46.7	45.4	41.8	39.4	37.2	37.0	36.7	41.5	10.0	51.5
	23	42.5	53.7	35.2	53.1	52.1	48.9	46.5	41.1	38.6	35.9	35.6	35.3	42.5	10.0	52.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	44.3	56.6	36.6	56.1	54.6	50.9	47.7	41.7	39.2	37.6	37.1	36.7
	Max	61.2	73.7	48.0	73.4	72.4	69.3	66.4	59.3	54.9	51.2	50.4	48.3
Energy Average		55.0	Average:		62.4	61.6	59.5	57.3	50.6	46.2	42.3	41.6	40.9
Night	Min	41.5	49.3	35.2	48.9	48.3	46.7	45.4	41.1	38.6	35.9	35.6	35.3
	Max	54.1	63.6	47.7	63.2	62.6	60.4	57.8	53.3	51.3	48.8	48.3	47.8
Energy Average		48.2	Average:		53.7	53.1	51.2	49.6	46.0	43.9	41.3	40.9	40.5

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
53.5	55.0	48.2
CNEL		56.7

This page was intentionally left blank.

APPENDIX 7.1:

ON-SITE TRAFFIC NOISE CALCULATIONS

This page was intentionally left blank.

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□□□rd N□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□ *Job Number:* □□□□□
Lot No: □□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□
Centerline Dist. to Barrier:	□□□ □□□
Centerline Dist. to Observer:	□□□ □□□
Barrier Distance to Observer:	□□□ □□□
Observer Height (Above Pad):	□□ □□□
Pad Elevation:	□□□□□ □□□
Road Elevation:	□□□□□ □□□
Barrier Elevation:	□□□□□ □□□
Road Grade:	□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□	□□□□	□□□
Heavy Trucks:	□□□□	□□□	□□□□	□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□	
Medium Trucks:	□□□□□□□	
Heavy Trucks:	□□□□□□□	*Grade Adjustment:* □□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*0.00*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-0.09*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-1.23*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□□□rd N□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.18*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.52*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-2.04*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□□□rd N□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.12*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.46*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-2.09*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□□□rd N□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.05*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.19*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.97*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□□□rd □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□ *Job Number:* □□□□□
Lot No: □□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*0.00*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-0.09*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-1.23*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backya rd w ith Wall
Road Name: Iri A.
Lot No: 227

Project Name: Arr Vista
Job Number: 14577
Analyst: B. M dd

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000 veh icles
Peak Hour Percentage:	10%
Peak Hour Volume:	800 veh icles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.
Centerline Dist. to Barrier:	22. feet
Centerline Dist. to Observer:	40. feet
Barrier Distance to Observer:	18. feet
Observer Height (Above Pad):	5. feet
Pad Elevation:	1,566. feet
Road Elevation:	1,565. feet
Barrier Elevation:	1,566. feet
Road Grade:	0. %

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,565.0		
Medium Trucks:	1 67		
Heavy Trucks:	1,573.0	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	34.00
Medium Trucks:	33.67
Heavy Trucks:	33.52

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	62.5	-1.1	.4	-1.2	*-0.18*	0.00	.00
Medium Trucks:	73.1	8	2		*-0.52*	0 0	0 0
Heavy Trucks:	78.7	-22.3	2.5	-1.2	*-2.04*	0.00	0.00

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.	60.	59.	53.	61.	62.
Medium Trucks:	56.	52.	44.	53.	59.	59.
Heavy Trucks:	57	53	50	54	61	61
Vehicle Noise:	64.	61.	59.	58.	65.	65.

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.	60.	59.	53.	61.	62.
Medium Trucks:	56.	52.	44.	53.	59.	59.
Heavy Trucks:	57.	53.	50.	54.	61.	61.
Vehicle Noise:	64.	61.	59.	58.	65.	65.

dn d F r r 8 2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backya rd w ith Wall
Road Name: Iri A.
Lot No: 200

Project Name: Arr Vista
Job Number: 14577
Analyst: B. M dd

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000 veh icles
Peak Hour Percentage:	10%
Peak Hour Volume:	800 veh icles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.
Centerline Dist. to Barrier:	20. feet
Centerline Dist. to Observer:	40. feet
Barrier Distance to Observer:	20. feet
Observer Height (Above Pad):	5. feet
Pad Elevation:	1,521. feet
Road Elevation:	1,522. feet
Barrier Elevation:	1,522. feet
Road Grade:	0. %

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,522.5		
Medium Trucks:	1 24		
Heavy Trucks:	1,530.5	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	33.64
Medium Trucks:	33.48
Heavy Trucks:	33.76

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	62.5	-1.1	.4	-1.2	*-0.12*	0.00	.00
Medium Trucks:	73.1	8	2		*-0.46*	0 0	0 0
Heavy Trucks:	78.7	-22.3	2.4	-1.2	*-2.09*	0.00	0.00

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.	60.	59.	53.	61.	62.
Medium Trucks:	56.	52.	44.	53.	59.	59.
Heavy Trucks:	57	53	50	54	61	61
Vehicle Noise:	64.	61.	59.	58.	65.	65.

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.	60.	59.	53.	61.	62.
Medium Trucks:	56.	52.	44.	53.	59.	59.
Heavy Trucks:	57.	53.	50.	54.	61.	61.
Vehicle Noise:	64.	61.	59.	58.	65.	65.

dn d F r r 8 2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backya rd w ith Wall
Road Name: Iri A.
Lot No: 165

Project Name: Arr Vista
Job Number: 14577
Analyst: B. M dd

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000 veh icles
Peak Hour Percentage:	10%
Peak Hour Volume:	800 veh icles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.
Centerline Dist. to Barrier:	30. feet
Centerline Dist. to Observer:	50. feet
Barrier Distance to Observer:	20. feet
Observer Height (Above Pad):	5. feet
Pad Elevation:	1,511. feet
Road Elevation:	1,507. feet
Barrier Elevation:	1,511. feet
Road Grade:	0. %

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,507.3		
Medium Trucks:	1 09		
Heavy Trucks:	1,515.3	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	44.44
Medium Trucks:	44.05
Heavy Trucks:	43.59

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	62.5	-1.1	.6	-1.2	*-0.05*	0.00	.00
Medium Trucks:	73.1	8	0		*-0.19*	0 0	0 0
Heavy Trucks:	78.7	-22.3	0.7	-1.2	*-0.97*	0.00	0.00

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.	58.	57.	51.	59.	60.
Medium Trucks:	54.	50.	42.	51.	57.	57.
Heavy Trucks:	56	52	48	53	59	59
Vehicle Noise:	62.	60.	58.	56.	63.	64.

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.	58.	57.	51.	59.	60.
Medium Trucks:	54.	50.	42.	51.	57.	57.
Heavy Trucks:	56.	52.	48.	53.	59.	59.
Vehicle Noise:	62.	60.	58.	56.	63.	64.

dn d F r r 8 2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Fir□□F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □i□□□□ A□□ *Job Number:* □□□□□
Lot No: □□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□	
Medium Trucks:	□□□□□□□	
Heavy Trucks:	□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*0.05*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-0.02*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-1.02*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Fir□□F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.07*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.33*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-1.82*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Fir□□F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□	
Medium Trucks:	□□□□□□□	
Heavy Trucks:	□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.06*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.37*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-2.06*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Fir□□F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□	*0.00*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□□	□□□□□	*-0.07*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□□	□□□□□	*-0.78*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□nd F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□ *Job Number:* □□□□□
Lot No: □□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.14*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-0.51*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-2.57*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□nd F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.83*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-1.53*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-4.13*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□nd F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-0.74*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-1.49*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□□	□□□□	□□□□□	*-4.30*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□F□□r□□r□ □□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: □□□□nd F□□□r □ i□□ □ □□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Lot No: □□□ *Analyst:* □□M□dd□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□□ □□□□
Observer Height (Above Pad):	□□□□ □□□□
Pad Elevation:	□□□□□□□ □□□□
Road Elevation:	□□□□□□□ □□□□
Barrier Elevation:	□□□□□□□ □□□□
Road Grade:	□□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□□□□	
Medium Trucks:	□□□□□□□□	
Heavy Trucks:	□□□□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□	*-0.55*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□□	□□□□□	*-0.97*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□□	□□□□□	*-2.57*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

□ □dn□□d□□□F□□r□□r□ □□□□□□□

This page was intentionally left blank.

APPENDIX 8.1:

OFF-SITE TRAFFIC NOISE LEVEL CALCULATIONS

This page was intentionally left blank.

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: n□□ □i□□□ri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ □i□□□ri□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: M□□□in□□ird □□n□□n Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□i□□□□ A□□□A□□□ □r□□□□ A□□ *Job Number:* □□□□□□

Road Segment: n□□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□□	□□
CNEL:	□	□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□A□□□ □r□□□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □ □□ □□□ A□□ *Job Number:* □□□□□

Road Segment: □□□ lri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□

Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□

Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□

Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ □ □i□□□□ A□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□d Rd□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□in□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ Tr□□□□ □in Rd□□□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: Iri□A□□ *Job Number:* □□□□□

Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□i□□in□ *Project Name:* Arr□□□ □i□□□

Road Name: Iri□A□□ *Job Number:* □□□□□

Road Segment: □□□ □ □i□□□□ A□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: n□□ □i□□□ri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□

Road Segment: □□□ □i□□□ri□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□□	□□□□□	*-4.73*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□□	□□□□□	*-4.88*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□□	□□□□□	*-5.25*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: M□□□in□□ird □□n□□n Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□i□□□□ A□□A□□□ □r□□□□ A□□ *Job Number:* □□□□□

Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□A□□□ □r□□□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ lri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □ □□d Rd□ *Job Number:* □□□□□

Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□

Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□

Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□

Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□

Road Segment: □□□ □ □i□□□□ A□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□

Road Segment: □□□ □ □□d Rd□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□

Road Segment: □□□ Tr□□□□ □in Rd□□□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: Iri□A□□ *Job Number:* □□□□□

Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E□□ *Project Name:* Arr□□□ □i□□□

Road Name: Iri□A□□ *Job Number:* □□□□□

Road Segment: □□□ □ □i□□□□ A□□A□□ □r□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□
Peak Hour Percentage:	□□□□
Peak Hour Volume:	□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□ □□□
Centerline Dist. to Observer:	□□□ □□□
Barrier Distance to Observer:	□□□ □□□
Observer Height (Above Pad):	□□□ □□□
Pad Elevation:	□□□ □□□
Road Elevation:	□□□ □□□
Road Grade:	□□□
Left View:	□□□ d□□r□□□
Right View:	□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□

Noise Source Elevations (in feet)

Autos:	□□□		
Medium Trucks:	□□□		
Heavy Trucks:	□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□
Medium Trucks:	□□□
Heavy Trucks:	□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□	□□□	□□□	□□□	*-4.49*	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	*-4.86*	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	*-5.77*	□□□	□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□	□□□	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Vehicle Noise:	□□□	□□□	□□□	□□□	□□□	□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: n□□ □i□□□ri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □i□□□ri□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: M□□□in□□ird □□n□□n Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.61*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.50*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□
Centerline Dist. to Observer:	□□□□ □□□
Barrier Distance to Observer:	□□□ □□□
Observer Height (Above Pad):	□□□ □□□
Pad Elevation:	□□□ □□□
Road Elevation:	□□□ □□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□A□□ □r□□□□ A□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□□	□□
CNEL:	□	□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□A□□ □r□□□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ lri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □i□□□□ A□□A□□ □r□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□d Rd□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ Tr□□□□ □in Rd□□□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Road Segment: □□□ □ □□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Road Segment: □□□ □ □i□□□□ A□□A□□ □r□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□
Peak Hour Percentage:	□□□□
Peak Hour Volume:	□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□ □□□
Centerline Dist. to Observer:	□□□ □□□
Barrier Distance to Observer:	□□□ □□□
Observer Height (Above Pad):	□□□ □□□
Pad Elevation:	□□□ □□□
Road Elevation:	□□□ □□□
Road Grade:	□□□
Left View:	□□□ d□□r□□□
Right View:	□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□

Noise Source Elevations (in feet)

Autos:	□□□	
Medium Trucks:	□□□	
Heavy Trucks:	□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□
Medium Trucks:	□□□
Heavy Trucks:	□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□	□□□	□□□	□□□	*-4.49*	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	*-4.86*	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	*-5.77*	□□□	□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□	□□□	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Vehicle Noise:	□□□	□□□	□□□	□□□	□□□	□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: n□□□ □i□□□ri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□□
Peak Hour Volume:	□□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □i□□□ri□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: M□□□in□□ird □□n□□n Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.61*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.50*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□□in□□□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□A□□ □r□□□□ A□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□i□□□□ A□□A□□□ □r□□□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ lri□A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□
Peak Hour Percentage:	□□□□
Peak Hour Volume:	□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□ □□□
Centerline Dist. to Observer:	□□□ □□□
Barrier Distance to Observer:	□□□ □□□
Observer Height (Above Pad):	□□□ □□□
Pad Elevation:	□□□ □□□
Road Elevation:	□□□ □□□
Road Grade:	□□□
Left View:	□□□ d□□r□□□
Right View:	□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□

Noise Source Elevations (in feet)

Autos:	□□□	
Medium Trucks:	□□□	
Heavy Trucks:	□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□
Medium Trucks:	□□□
Heavy Trucks:	□□□

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	□□□	□□□	□□□	□□□	-4.49	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	-4.86	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	-5.77	□□□	□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	□□□	□□□	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Vehicle Noise:	□□□	□□□	□□□	□□□	□□□	□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	□	□	□□	□□
CNEL:	□	□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □ □□d Rd□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: n□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □i□□□ri□ A□□ *Job Number:* □□□□□
Road Segment: □□□ □□n □□r□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □ □□□in□□□n □□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□□
Peak Hour Volume:	□□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□
Road Segment: □□□ □ □i□□□□ A□□A□□ □r□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ □ □□d Rd□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: □□n □□r□n □□□ *Job Number:* □□□□□□
Road Segment: □□□ Tr□□□□ □in Rd□□□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□

Road Name: Iri□A□□ *Job Number:* □□□□□

Road Segment: □□□ □ □□ □□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□
Road Name: Iri□A□□ *Job Number:* □□□□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA□□ □□□□□□□ *Project Name:* Arr□□□ □i□□□

Road Name: Iri□A□□ *Job Number:* □□□□□

Road Segment: □□□ □ □i□□□□ A□□A□□ □r□□□ A□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□ □□□
Centerline Dist. to Observer:	□□□ □□□
Barrier Distance to Observer:	□□□ □□□
Observer Height (Above Pad):	□□□ □□□
Pad Elevation:	□□□ □□□
Road Elevation:	□□□ □□□
Road Grade:	□□□
Left View:	□□□ d□□r□□□
Right View:	□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□

Noise Source Elevations (in feet)

Autos:	□□□	
Medium Trucks:	□□□	
Heavy Trucks:	□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□
Medium Trucks:	□□□
Heavy Trucks:	□□□

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	□□□	□□□	□□□	□□□	-4.49	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	-4.86	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	-5.77	□□□	□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	□□□	□□□	□□□	□□□	□□□	□□□
Medium Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Heavy Trucks:	□□□	□□□	□□□	□□□	□□□	□□□
Vehicle Noise:	□□□	□□□	□□□	□□□	□□□	□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: n□□ □i□□□ri□A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □i□□□ri□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: M□□□in□□ird □□n□□n Rd□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□□in□□□n □□□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.61*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.50*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□□in□□□n □□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□i□□□□ A□□A□□ □r□□□□ A□□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□□	□□
CNEL:	□	□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□i□□□□ A□□A□□□ □r□□□□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□ □□□ A□□
Road Segment: □□□ lri□A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□d Rd□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□d Rd□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Tr□□□□ □in Rd□□ □□ A□□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □i□□□ri□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □i□□□ri□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □□□in□□□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □□□in□□□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□□
Peak Hour Volume:	□□□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □i□□□□ A□□A□□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □□d Rd□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ Tr□□□□ □in Rd□□□ □□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□
Medium Trucks:	□□□□
Heavy Trucks:	□□□□
Grade Adjustment:	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Iri□A□□
Road Segment: □□□ □ □□ □□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Iri□A□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Iri□A□□
Road Segment: □□□ □ □i□□□□ A□□A□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: n□□ □i□□□ri□A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □i□□□ri□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: M□□□in□□ird □□n□□n Rd□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□□in□□□n □□□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.61*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.50*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□□in□□□n □□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.61*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.50*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□i□□□□ A□□A□□ □r□□□□ A□□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□i□□□□ A□□A□□□ □r□□□□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□□	□□	□□
CNEL:	□	□□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□ □□□ A□□
Road Segment: □□□ lri□A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□	□□□□□	□□□□□

Noise Source Elevations (in feet)

Autos:	□□□□□	
Medium Trucks:	□□□□□	
Heavy Trucks:	□□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□□
Medium Trucks:	□□□□□□
Heavy Trucks:	□□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□□	□□
CNEL:	□	□	□□	□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□d Rd□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □ □□d Rd□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Tr□□□□ □in Rd□□ □□□ A□□
Road Segment: n□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.65*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.87*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.43*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Tr□□□□ □in Rd□□□ □□□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.65*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.43*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□□	□□□	□□□
CNEL:	□□	□□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □i□□□ri□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □i□□□ri□ A□□
Road Segment: □□□ □□n □□r□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.56*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.87*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.61*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□	□□	□□□	□□□
CNEL:	□□	□□	□□□	□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □□□in□□□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □□□in□□□n □□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □□i□□□□ A□□□A□□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □i□□□□ A□□A□□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□
CNEL:	□□□	□□□	□□□	□□□□

T□□□d□□□A□ri□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ □ □□d Rd□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: □□n □□r□n □□□
Road Segment: □□□ Tr□□□□ □in Rd□□□ □□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□□□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□	□□□□	□□□□	*-4.73*	□□□□	□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-4.88*	□□□□	□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□	*-5.25*	□□□□	□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□□□	□□□	□□□	□□□□□
CNEL:	□□□	□□□	□□□	□□□□□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Iri□A□□
Road Segment: □□□ □ □□ □□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□		
Medium Trucks:	□□□□		
Heavy Trucks:	□□□□	*Grade Adjustment:*	□□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□
CNEL:	□	□	□	□

T□□□d□□□A□ri□□□□□□□□□

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Iri A
Road Segment: r A

Project Name: Arr i
Job Number:

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	i
Peak Hour Percentage:	
Peak Hour Volume:	i
Vehicle Speed:	
Near/Far Lane Distance:	

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	
Centerline Dist. to Barrier:	
Centerline Dist. to Observer:	
Barrier Distance to Observer:	
Observer Height (Above Pad):	
Pad Elevation:	
Road Elevation:	
Road Grade:	
Left View:	d r
Right View:	d r

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	
Medium Trucks (2 Axles):	
Heavy Trucks (3+ Axles):	

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:				
Medium Trucks:				
Heavy Trucks:				

Noise Source Elevations (in feet)

Autos:		
Medium Trucks:		
Heavy Trucks:		*Grade Adjustment:*

Lane Equivalent Distance (in feet)

Autos:	
Medium Trucks:	
Heavy Trucks:	

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:					*-4.49*		
Medium Trucks:					*-4.86*		
Heavy Trucks:					*-5.77*		

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:						
Medium Trucks:						
Heavy Trucks:						
Vehicle Noise:						

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:				
CNEL:				

T d A ri

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario:
Road Name: Iri□A□□
Road Segment: □□□ □ □i□□□□ A□□A□□□ □r□□□□ A□□

Project Name: Arr□□□ □i□□□
Job Number: □□□□□

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	□□□ □□□i□□□□
Peak Hour Percentage:	□□□□□
Peak Hour Volume:	□□ □□□i□□□□
Vehicle Speed:	□□ □ □□
Near/Far Lane Distance:	□□ □□□□

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	□□□
Centerline Dist. to Barrier:	□□□□ □□□□
Centerline Dist. to Observer:	□□□□ □□□□
Barrier Distance to Observer:	□□□ □□□□
Observer Height (Above Pad):	□□□ □□□□
Pad Elevation:	□□□ □□□□
Road Elevation:	□□□ □□□□
Road Grade:	□□□□
Left View:	□□□□ d□□r□□□
Right View:	□□□□ d□□r□□□

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	□□
Medium Trucks (2 Axles):	□□
Heavy Trucks (3+ Axles):	□□

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	□□□□□	□□□□□	□□□□	□□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□

Noise Source Elevations (in feet)

Autos:	□□□□	
Medium Trucks:	□□□□	
Heavy Trucks:	□□□□	*Grade Adjustment:* □□□

Lane Equivalent Distance (in feet)

Autos:	□□□□□
Medium Trucks:	□□□□□
Heavy Trucks:	□□□□□

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	□□□□□	□□□□□	□□□□	□□□□□	*-4.49*	□□□□□	□□□□□
Medium Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-4.86*	□□□□□	□□□□□
Heavy Trucks:	□□□□□	□□□□□	□□□□	□□□□□	*-5.77*	□□□□□	□□□□□

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Medium Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Heavy Trucks:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
Vehicle Noise:	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	□	□	□	□□
CNEL:	□	□	□	□□

T□□□d□□□A□ri□□□□□□□□□

This page was intentionally left blank.

APPENDIX 10.1:

OPERATIONS NOISE CALCULATIONS

This page was intentionally left blank.

14577 - Arroyo Vista

CadnaA Noise Prediction Model: 14577-02_Operation.cna
Date: 11.04.23
Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
R1		R1	33.7	31.0	37.7	0.0	0.0	0.0		x	Total	5.00	r	6227063.78	2270948.36	5.00
R2		R2	29.6	26.8	33.5	0.0	0.0	0.0		x	Total	5.00	r	6228371.46	2271009.86	5.00
R3		R3	34.5	31.8	38.5	0.0	0.0	0.0		x	Total	5.00	r	6228303.46	2269214.00	5.00
R4		R4	32.9	30.2	36.9	0.0	0.0	0.0		x	Total	5.00	r	6228115.94	2268158.46	5.00
R5		R5	35.5	32.8	39.5	0.0	0.0	0.0		x	Total	5.00	r	6226736.83	2268160.29	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
AC001		AC001	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6225628.05	2269617.96	3.00
AC002		AC002	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6225745.15	2269625.13	3.00
AC003		AC003	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6225845.53	2269632.30	3.00
AC004		AC004	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6225924.39	2269637.08	3.00
AC005		AC005	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6225998.48	2269665.75	3.00
AC006		AC006	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226070.18	2269713.55	3.00
AC007		AC007	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226261.36	2269414.82	3.00
AC008		AC008	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226268.53	2269367.02	3.00
AC009		AC009	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226342.62	2269321.61	3.00
AC010		AC010	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226266.14	2269302.50	3.00
AC011		AC011	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226266.14	2269218.85	3.00
AC012		AC012	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2269132.81	3.00
AC013		AC013	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2269037.22	3.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
AC014		AC014	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2268953.57	3.00
AC015		AC015	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2268874.71	3.00
AC016		AC016	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2268793.45	3.00
AC017		AC017	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2268709.81	3.00
AC018		AC018	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226258.97	2268628.55	3.00
AC019		AC019	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226261.36	2268552.08	3.00
AC020		AC020	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226256.58	2268320.26	3.00
AC021		AC021	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226325.89	2268317.87	3.00
AC022		AC022	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226478.84	2268308.31	3.00
AC023		AC023	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226581.61	2268305.92	3.00
AC024		AC024	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226679.59	2268310.70	3.00
AC025		AC025	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226839.71	2268305.92	3.00
AC026		AC026	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226844.49	2268442.14	3.00
AC027		AC027	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226846.88	2268590.31	3.00
AC028		AC028	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226844.49	2268676.35	3.00
AC029		AC029	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226844.49	2268767.16	3.00
AC030		AC030	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226844.49	2268810.18	3.00
AC031		AC031	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226856.44	2268915.34	3.00
AC032		AC032	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226875.56	2268960.74	3.00
AC033		AC033	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226909.02	2268915.34	3.00
AC034		AC034	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226892.29	2268807.79	3.00
AC035		AC035	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226892.29	2268764.78	3.00
AC036		AC036	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226889.90	2268671.57	3.00
AC037		AC037	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226889.90	2268583.15	3.00
AC038		AC038	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226894.68	2268437.36	3.00
AC039		AC039	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226897.07	2268308.31	3.00
AC040		AC040	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227093.04	2268308.31	3.00
AC041		AC041	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227143.23	2268308.31	3.00
AC042		AC042	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227250.77	2268308.31	3.00
AC043		AC043	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227174.29	2268865.15	3.00
AC044		AC044	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227226.87	2268846.03	3.00
AC045		AC045	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227174.29	2268791.06	3.00
AC046		AC046	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227224.48	2268740.88	3.00
AC047		AC047	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227171.90	2268707.42	3.00
AC048		AC048	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227224.48	2268688.30	3.00
AC049		AC049	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227176.68	2268635.72	3.00
AC050		AC050	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227179.07	2268585.54	3.00
AC051		AC051	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227229.26	2268590.31	3.00
AC052		AC052	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227475.42	2268313.09	3.00
AC053		AC053	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227494.54	2268454.09	3.00
AC054		AC054	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227537.55	2268487.55	3.00
AC055		AC055	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227492.15	2268528.18	3.00
AC056		AC056	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227492.15	2268602.26	3.00
AC057		AC057	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227532.77	2268669.18	3.00
AC058		AC058	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227539.94	2268721.76	3.00
AC059		AC059	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227492.15	2268712.20	3.00
AC060		AC060	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227496.93	2268760.00	3.00
AC061		AC061	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227475.42	2268824.52	3.00
AC062		AC062	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227568.62	2268313.09	3.00
AC063		AC063	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227628.37	2268315.48	3.00
AC064		AC064	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227735.91	2268313.09	3.00
AC065		AC065	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227831.51	2268313.09	3.00
AC066		AC066	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227934.27	2268315.48	3.00
AC067		AC067	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228029.87	2268310.70	3.00
AC068		AC068	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227752.64	2268664.40	3.00
AC069		AC069	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227855.41	2268659.62	3.00
AC070		AC070	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227958.17	2268678.74	3.00
AC071		AC071	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228020.31	2268695.47	3.00
AC072		AC072	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227946.22	2268862.76	3.00
AC073		AC073	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227888.86	2268855.59	3.00
AC074		AC074	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227817.17	2268860.37	3.00
AC075		AC075	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227759.81	2268877.10	3.00
AC076		AC076	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227707.23	2268944.02	3.00
AC077		AC077	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227666.61	2268987.03	3.00
AC078		AC078	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227582.96	2268996.59	3.00
AC079		AC079	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227473.03	2269118.48	3.00
AC080		AC080	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227367.87	2269080.24	3.00
AC081		AC081	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227289.01	2269104.14	3.00
AC082		AC082	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227226.87	2269065.90	3.00
AC083		AC083	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226854.05	2269216.46	3.00
AC084		AC084	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226789.52	2269278.60	3.00
AC085		AC085	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226732.17	2269386.14	3.00
AC086		AC086	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226698.71	2269433.94	3.00
AC087		AC087	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226629.40	2269531.92	3.00
AC088		AC088	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226581.61	2269479.35	3.00
AC089		AC089	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226486.01	2269579.72	3.00
AC090		AC090	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226311.55	2269775.69	3.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
AC091		AC091	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226282.87	2269818.71	3.00
AC092		AC092	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226354.57	2269864.11	3.00
AC093		AC093	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226376.08	2269811.54	3.00
AC094		AC094	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226428.66	2269842.60	3.00
AC095		AC095	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226404.76	2269885.62	3.00
AC096		AC096	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226497.96	2269940.59	3.00
AC097		AC097	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226517.08	2269895.18	3.00
AC098		AC098	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226000.87	2269969.27	3.00
AC099		AC099	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226058.23	2270007.51	3.00
AC100		AC100	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226132.31	2270040.96	3.00
AC101		AC101	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226196.84	2270086.37	3.00
AC102		AC102	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227219.70	2269414.82	3.00
AC103		AC103	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227303.35	2269393.31	3.00
AC104		AC104	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227391.77	2269369.41	3.00
AC105		AC105	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227451.52	2269357.46	3.00
AC106		AC106	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227542.33	2269324.00	3.00
AC107		AC107	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227614.03	2269264.26	3.00
AC108		AC108	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227695.28	2269214.07	3.00
AC109		AC109	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227759.81	2269159.10	3.00
AC110		AC110	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227826.73	2269104.14	3.00
AC111		AC111	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227869.74	2269039.61	3.00
AC112		AC112	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226758.46	2269962.10	3.00
AC113		AC113	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226717.83	2270079.20	3.00
AC114		AC114	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226691.54	2270127.00	3.00
AC115		AC115	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226638.96	2270198.70	3.00
AC116		AC116	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227155.17	2269515.19	3.00
AC117		AC117	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227095.43	2269579.72	3.00
AC118		AC118	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227050.02	2269632.30	3.00
AC119		AC119	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226978.32	2269694.43	3.00
AC120		AC120	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226885.12	2269732.67	3.00
AC121		AC121	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226856.44	2269768.52	3.00
AC122		AC122	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226825.37	2269837.83	3.00
AC123		AC123	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226572.05	2270260.83	3.00
AC124		AC124	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226529.03	2270342.09	3.00
AC125		AC125	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226493.18	2270416.17	3.00
AC126		AC126	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226481.23	2270506.99	3.00
AC127		AC127	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226469.28	2270590.63	3.00
AC128		AC128	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226572.05	2270731.64	3.00
AC129		AC129	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226717.83	2270724.47	3.00
AC130		AC130	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226777.58	2270722.08	3.00
AC131		AC131	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226937.70	2270717.30	3.00
AC132		AC132	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227095.43	2270729.25	3.00
AC133		AC133	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227260.33	2270714.91	3.00
AC134		AC134	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227413.28	2270769.87	3.00
AC135		AC135	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227673.78	2270753.14	3.00
AC136		AC136	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227731.13	2270757.92	3.00
AC137		AC137	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227884.08	2270767.48	3.00
AC138		AC138	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228130.24	2270734.03	3.00
AC139		AC139	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228137.41	2270664.72	3.00
AC140		AC140	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228132.63	2270442.46	3.00
AC141		AC141	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226789.52	2270535.67	3.00
AC142		AC142	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226777.58	2270495.04	3.00
AC143		AC143	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226789.52	2270449.63	3.00
AC144		AC144	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226830.15	2270392.27	3.00
AC145		AC145	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226863.61	2270351.65	3.00
AC146		AC146	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226901.85	2270294.29	3.00
AC147		AC147	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226952.04	2270234.54	3.00
AC148		AC148	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226992.66	2270174.80	3.00
AC149		AC149	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226961.60	2270382.71	3.00
AC150		AC150	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226880.34	2270416.17	3.00
AC151		AC151	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226949.65	2270432.90	3.00
AC152		AC152	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227038.07	2270382.71	3.00
AC153		AC153	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227050.02	2270432.90	3.00
AC154		AC154	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227212.53	2270380.32	3.00
AC155		AC155	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227207.75	2270432.90	3.00
AC156		AC156	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227265.11	2270432.90	3.00
AC157		AC157	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227267.50	2270377.94	3.00
AC158		AC158	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227379.82	2270387.49	3.00
AC159		AC159	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227372.65	2270444.85	3.00
AC160		AC160	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227556.67	2270442.46	3.00
AC161		AC161	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227556.67	2270389.88	3.00
AC162		AC162	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227609.25	2270387.49	3.00
AC163		AC163	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227604.47	2270435.29	3.00
AC164		AC164	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227716.79	2270435.29	3.00
AC165		AC165	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227716.79	2270387.49	3.00
AC166		AC166	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227821.95	2270392.27	3.00
AC167		AC167	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227824.34	2270442.46	3.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
AC168		AC168	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227934.27	2270444.85	3.00
AC169		AC169	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227931.88	2270387.49	3.00
AC170		AC170	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227066.75	2270031.40	3.00
AC171		AC171	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227100.21	2269993.17	3.00
AC172		AC172	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227148.00	2269928.64	3.00
AC173		AC173	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227212.53	2269880.84	3.00
AC174		AC174	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227257.94	2269821.10	3.00
AC175		AC175	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227315.30	2269952.54	3.00
AC176		AC176	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227214.92	2269957.32	3.00
AC177		AC177	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227262.72	2269978.83	3.00
AC178		AC178	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227322.47	2270033.79	3.00
AC179		AC179	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227365.48	2269993.17	3.00
AC180		AC180	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227384.60	2270043.35	3.00
AC181		AC181	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227489.76	2270043.35	3.00
AC182		AC182	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227487.37	2269993.17	3.00
AC183		AC183	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227602.08	2269995.56	3.00
AC184		AC184	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227602.08	2270052.91	3.00
AC185		AC185	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227714.40	2270050.52	3.00
AC186		AC186	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227716.79	2269995.56	3.00
AC187		AC187	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227821.95	2270050.52	3.00
AC188		AC188	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227821.95	2269995.56	3.00
AC189		AC189	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227929.49	2270050.52	3.00
AC190		AC190	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227927.10	2269997.95	3.00
AC191		AC191	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228161.31	2270009.90	3.00
AC192		AC192	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228158.92	2269959.71	3.00
AC193		AC193	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228166.09	2269735.06	3.00
AC194		AC194	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228158.92	2269534.31	3.00
AC195		AC195	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228149.36	2269307.27	3.00
AC196		AC196	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6228142.19	2269154.32	3.00
AC197		AC197	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227487.37	2269680.09	3.00
AC198		AC198	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227575.79	2269658.59	3.00
AC199		AC199	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227678.56	2269617.96	3.00
AC200		AC200	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227757.42	2269577.33	3.00
AC201		AC201	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227810.00	2269660.98	3.00
AC202		AC202	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227807.61	2269613.18	3.00
AC203		AC203	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227922.32	2269660.98	3.00
AC204		AC204	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227829.12	2269522.36	3.00
AC205		AC205	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227924.71	2269383.75	3.00
AC206		AC206	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227864.96	2269433.94	3.00
AC207		AC207	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227800.44	2269484.12	3.00
AC208		AC208	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227747.86	2269527.14	3.00
AC209		AC209	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227654.66	2269570.16	3.00
AC210		AC210	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227568.62	2269608.40	3.00
AC211		AC211	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227496.93	2269627.52	3.00
AC212		AC212	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227425.23	2269660.98	3.00
AC213		AC213	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6227382.21	2269692.04	3.00
AC214		AC214	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	3.00	a	6226172.94	2269727.89	3.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
				left	right		horz.	vert.	Begin	End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates			
							Begin	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)

Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin	End	x	y	z
					(ft)	(ft)	(ft)	(ft)	(ft)

Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day	Night		Track	
				(dBA)	(dBA)		(dB)	(km(mph)

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)											Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	

Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
				Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
				(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(mph)	(mph)		(dB)		(%)	(dB)	(ft)	(ft)

RoadsGeo

Name	Height				Coordinates				Dist	LSlope
	Begin		End		x	y	z	Ground	(ft)	(%)
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)		

This page was intentionally left blank.

APPENDIX 11.1:

CONSTRUCTION NOISE CALCULATIONS

This page was intentionally left blank.

14577 - Arroyo Vista

CadnaA Noise Prediction Model: 14577-02_Construction.cna
Date: 02.05.23
Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
R1		R1	52.8	49.4	56.6	0.0	0.0	0.0		x	Total	5.00	r	6227063.78	2270948.36	5.00
R2		R2	47.2	43.7	50.9	0.0	0.0	0.0		x	Total	5.00	r	6228371.46	2271009.86	5.00
R3		R3	51.0	43.9	52.2	0.0	0.0	0.0		x	Total	5.00	r	6228303.46	2269214.00	5.00
R4		R4	50.3	42.6	51.1	0.0	0.0	0.0		x	Total	5.00	r	6228115.94	2268158.46	5.00
R5		R5	51.5	46.0	53.7	0.0	0.0	0.0		x	Total	5.00	r	6226736.83	2268160.29	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
MainConstructionArea		CA1	115.6	15.6	15.6	58.0	-42.0	-42.0	PWL-Pt	115.6					0	a
RockCrushing		CA2	121.4	121.4	121.4	81.2	81.2	81.2	Lw	121.4					0.	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
MainConstructionArea	CA1	0.00	a			6225585.73	2270877.17	0.00	0.00
						6228248.13	2270869.58	0.00	0.00
						6228215.15	2268213.75	0.00	0.00
						6228217.50	2267840.19	0.00	0.00
						6228189.03	2267840.19	0.00	0.00
						6228189.01	2268237.65	0.00	0.00
						6226224.57	2268230.22	0.00	0.00
						6226238.26	2269556.02	0.00	0.00
						6225574.20	2269557.22	0.00	0.00
RockCrushing	CA2	0.00	a			6225697.03	2270386.64	0.00	0.00
						6225774.07	2270354.09	0.00	0.00
						6225890.17	2270346.49	0.00	0.00
						6225901.02	2270241.24	0.00	0.00
						6225737.17	2269863.64	0.00	0.00
						6225595.03	2269922.23	0.00	0.00
						6225589.60	2270056.78	0.00	0.00
						6225596.11	2270210.86	0.00	0.00
						6225663.39	2270369.28	0.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
				left	right		horz.	vert.	Begin	End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates				
							Begin	x	y	z	Ground	
							(ft)	(ft)	(ft)	(ft)	(ft)	

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)

Vertical Area Source(s)

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)

Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day	Night		Track	
				(dBA)	(dBA)		(dB)	(km(mph)

This page was intentionally left blank.

APPENDIX 11.2:

ROCK CRUSHING NOISE CALCULATIONS

This page was intentionally left blank.

14577 - Arroyo Vista

CadnaA Noise Prediction Model: 14577-02_Rockcrushing.cna
Date: 23.06.25
Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (ft)	**6561.70**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (ft)	**3280.80**
Min. Length of Section (ft)	**3.30**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**328.08**
Search Radius Rcvr	**328.08**
Max. Distance Source - Rcvr	**3280.84 3280.84**
Min. Distance Rvcr - Reflector	**3.28 3.28**
Min. Distance Source - Reflector	**0.33**
Industrial (ISO 9613 (1996))	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (°F)	**50**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (mph)	**6.7**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
R1		R1	55.7	-44.3	52.7	0.0	0.0	0.0		x	Total	5.00	r	6227063.78	2270948.36	5.00
R2		R2	50.1	-49.9	47.1	0.0	0.0	0.0		x	Total	5.00	r	6228371.46	2271009.86	5.00
R3		R3	50.3	-49.7	47.3	0.0	0.0	0.0		x	Total	5.00	r	6228303.46	2269214.00	5.00
R4		R4	49.0	-51.0	46.0	0.0	0.0	0.0		x	Total	5.00	r	6228115.94	2268158.46	5.00
R5		R5	52.4	-47.6	49.4	0.0	0.0	0.0		x	Total	5.00	r	6226736.83	2268160.29	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
Rock Crushing		RockCrushing01	121.4	21.4	21.4	81.2	-18.8	-18.8	PWL-Pt	121.4					8	a

Name	ID	Height			Coordinates			
		Begin		End	x	y	z	Ground
		(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
Rock Crushing	RockCrushing01	8.00	a		6225697.03	2270386.64	8.00	0.00
					6225774.07	2270354.09	8.00	0.00
					6225890.17	2270346.49	8.00	0.00
					6225901.02	2270241.24	8.00	0.00
					6225737.17	2269863.64	8.00	0.00
					6225595.03	2269922.23	8.00	0.00
					6225589.60	2270056.78	8.00	0.00
					6225596.11	2270210.86	8.00	0.00
					6225663.39	2270369.28	8.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
				left	right		horz.	vert.	Begin	End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates				
							Begin	x	y	z	Ground	
							(ft)	(ft)	(ft)	(ft)	(ft)	

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)

Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin	End	x	y	z
					(ft)	(ft)	(ft)	(ft)	(ft)

Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day	Night		Track	
				(dBA)	(dBA)		(dB)	(km(mph)

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)											Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	

Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
				Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
				(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(mph)	(mph)		(dB)		(%)	(dB)	(ft)	(ft)

RoadsGeo

Name	Height			Coordinates				Dist	LSlope
	Begin		End	x	y	z	Ground	(ft)	(%)
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)		

This page was intentionally left blank.

APPENDIX 11.3:

BLASTING NOISE CALCULATIONS

This page was intentionally left blank.

14577 - Arroyo Vista

CadnaA Noise Prediction Model: 14577-02_Blasting.cna
Date: 23.06.25
Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (ft)	**6561.70**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (ft)	**3280.80**
Min. Length of Section (ft)	**3.30**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**328.08**
Search Radius Rcvr	**328.08**
Max. Distance Source - Rcvr	**3280.84 3280.84**
Min. Distance Rvcr - Reflector	**3.28 3.28**
Min. Distance Source - Reflector	**0.33**
Industrial (ISO 9613 (1996))	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (°F)	**50**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (mph)	**6.7**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
R1		R1	61.1	61.1	67.8	0.0	0.0	0.0		x	Total	5.00	r	6227063.78	2270948.36	5.00
R2		R2	57.1	57.1	63.8	0.0	0.0	0.0		x	Total	5.00	r	6228371.46	2271009.86	5.00
R3		R3	62.4	62.4	69.1	0.0	0.0	0.0		x	Total	5.00	r	6228303.46	2269214.00	5.00
R4		R4	70.2	70.2	76.9	0.0	0.0	0.0		x	Total	5.00	r	6228115.94	2268158.46	5.00
R5		R5	61.8	61.8	68.5	0.0	0.0	0.0		x	Total	5.00	r	6226736.83	2268160.29	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
Blasting1		Blasting1	125.7	125.7	125.7	85.7	85.7	85.7	Lw	125.7					1	a
Blasting2		Blasting2	125.6	125.6	125.6	83.0	83.0	83.0	Lw	125.6					0.	a
Blasting3		Blasting3	125.6	125.6	125.6	83.3	83.3	83.3	Lw	125.6					0.	a
Blasting4		Blasting4	125.6	125.6	125.6	85.9	85.9	85.9	Lw	125.6					0.	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
Blasting1	Blasting1	1.00	a			6227262.94	2270273.03	1.00	0.00
						6227364.94	2270151.50	1.00	0.00
						6227291.15	2269930.14	1.00	0.00
						6227226.05	2269880.23	1.00	0.00
						6227141.41	2269878.06	1.00	0.00
						6227045.93	2269895.42	1.00	0.00
						6226989.50	2270042.99	1.00	0.00
						6227011.20	2270138.48	1.00	0.00
						6227130.56	2270249.16	1.00	0.00
Blasting2	Blasting2	0.00	a			6226603.22	2269819.47	0.00	0.00
						6226640.11	2269802.11	0.00	0.00
						6226700.87	2269665.39	0.00	0.00
						6226650.96	2269489.61	0.00	0.00
						6226579.35	2269385.44	0.00	0.00
						6226505.56	2269346.38	0.00	0.00
						6226418.76	2269344.21	0.00	0.00
						6226334.12	2269376.76	0.00	0.00
						6226262.51	2269452.71	0.00	0.00
						6226177.87	2269580.75	0.00	0.00
						6226214.76	2269697.94	0.00	0.00
						6226260.34	2269799.94	0.00	0.00
						6226399.23	2269847.68	0.00	0.00
Blasting3	Blasting3	0.00	a			6227681.78	2268773.46	0.00	0.00
						6227566.76	2268740.91	0.00	0.00
						6227449.57	2268730.06	0.00	0.00
						6227323.70	2268740.91	0.00	0.00
						6227130.56	2268795.16	0.00	0.00
						6227026.40	2268847.25	0.00	0.00
						6227006.86	2268947.07	0.00	0.00
						6227084.99	2269079.45	0.00	0.00
						6227124.05	2269066.43	0.00	0.00
						6227197.84	2269088.13	0.00	0.00
						6227375.79	2269046.90	0.00	0.00
						6227445.23	2269064.26	0.00	0.00
						6227586.29	2269007.84	0.00	0.00
						6227670.93	2268875.46	0.00	0.00
Blasting4	Blasting4	0.00	a			6228046.36	2268241.78	0.00	0.00
						6227768.58	2268237.44	0.00	0.00
						6227696.97	2268269.99	0.00	0.00
						6227690.46	2268322.07	0.00	0.00
						6227696.97	2268460.96	0.00	0.00
						6227746.88	2268552.11	0.00	0.00
						6227794.62	2268567.30	0.00	0.00
						6227911.81	2268534.75	0.00	0.00
						6228044.19	2268467.47	0.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
				left	right		horz.	vert.	Begin	End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates				
							Begin	x	y	z	Ground	
							(ft)	(ft)	(ft)	(ft)	(ft)	

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)

Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin	End	x	y	z
					(ft)	(ft)	(ft)	(ft)	(ft)

Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day	Night		Track	
				(dBA)	(dBA)		(dB)	(km(mph)

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)											Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	

Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
				Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
				(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(mph)	(mph)		(dB)		(%)	(dB)	(ft)	(ft)

RoadsGeo

Name	Height		Coordinates				Dist	LSlope
	Begin	End	x	y	z	Ground	(ft)	(%)
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		

MEMORANDUM

URBAN | CROSSROADS

DATE: January 12, 2023
TO: Matt Maehara, TTLC Riverside Chicago, LLC
FROM: Alex So, Urban Crossroads, Inc.
JOB NO: 14577-01 VMT

ARROYO VISTA VEHICLE MILES TRAVELED (VMT) ANALYSIS

Urban Crossroads, Inc. is pleased to provide the following Vehicle Miles Traveled (VMT) Analysis for the Arroyo Vista (**Project**), which is located on the northwest corner of Chicago Avenue and Iris Avenue in the County of Riverside.

PROJECT OVERVIEW

It is our understanding that the proposed Project is 233 single family detached residential dwelling units. A preliminary site plan for the proposed Project is shown on Attachment A.

BACKGROUND

Changes to California Environmental Quality Act (CEQA) Guidelines were adopted in December 2018, which require all lead agencies to adopt VMT as a replacement for automobile delay-based level of service (LOS) as the measure for identifying transportation impacts for land use projects. This statewide mandate went into effect July 1, 2020, consistent with Senate Bill 743 (SB 743). To comply with SB 743 the County of Riverside adopted their Transportation Analysis Guidelines for Level of Service Vehicle Miles Traveled (December 2020) (**County Guidelines**) (1). The adopted County Guidelines have been utilized to prepare this VMT analysis.

PROJECT LEVEL SCREENING

County Guidelines states that a project may be determined to have a less than significant impact and screen from the need to prepare a project level VMT analysis if it meets one or more eligible screening criteria. The County's adopted VMT screening criteria are described in Table 1 along with a determination of each screening criteria's applicability to the Project.

TABLE 1: SCREENING FOR LAND USE PROJECTS EXEMPT FROM VMT CALCULATIONS

Screening Criteria	Description	Result
Small Projects Screening	Projects that generate fewer than 110 daily vehicle trips or projects that are below 3,000 Metric Tons of Carbon Dioxide Equivalent ($MTCO_2e$) per year.	Does not meet.
High Quality Transit Areas (HQTA) Screening	High quality transit provides a viable option for many to replace automobile trips with transit trips resulting in an overall reduction in VMT.	Does not meet.
Local Serving Retail	The introduction of new Local serving retail has been determined to reduce VMT by shortening trips that will occur.	Does not meet.
Affordable Housing	Lower-income residents make fewer trips on average, resulting in lower VMT overall.	Does not meet.
Local Essential Service	As with Local-Serving Retail, the introduction of new Local Essential Services shortens non-discretionary trips by putting those goods and services closer to residents, resulting in an overall reduction in VMT.	Does not meet.
Map-Based Screening	This method eliminates the need for complex analyses, by allowing existing VMT data to serve as a basis for the screening smaller developments. Note that screening is limited to residential and office projects.	Does not meet.
Redevelopment Project	Projects with lower VMT than existing on-site uses, can under limited circumstances, be presumed to have a non-significant impact. In the event this screening does not apply, projects should be analyzed as though there is no existing uses on site (project analysis cannot take credit for existing VMT).	Does not meet.

As the Project was not found to meet any of the applicable screening criteria, consistent with the County Guidelines a project level VMT analysis should be prepared.

VMT ANALYSIS

VMT MODELING

The County Guidelines identifies the Riverside Transportation Analysis Model (**RIVTAM**) as the appropriate tool for conducting VMT analysis for land development projects in the County of Riverside. RIVTAM is a useful tool to estimate VMT as it considers interaction between different land uses based on socio-economic data such as population, households, and employment. RIVTAM is a travel forecasting model that represents a sub-area (Riverside County) of the Southern California Association of Governments (SCAG) regional traffic model. RIVTAM was designed to provide a greater level of detail and sensitivity in the Riverside County area as compared to the regional SCAG model.

VMT METRIC AND SIGNIFICANCE THRESHOLD

County Guidelines state residential land uses should be evaluated based on the efficiency metric VMT per capita[1] and utilize an impact threshold of **existing countywide average VMT per capita.** In other words, the Project would result in a significant VMT impact if Project generated VMT per capita exceeds the existing countywide average VMT per capita. For the County of Riverside, the countywide average VMT per capita is noted in the County Guidelines as **15.2 VMT per capita**[2]**.**

PROJECT LAND USE CONVERSION

To estimate Project generated VMT, land use information such as dwelling units must first be converted into a RIVTAM compatible dataset. The RIVTAM model utilizes socio-economic data (**SED**) (e.g., population and households) instead of land use information for the purposes of vehicle trip estimation. Table 2 summarizes the SED inputs used to reflect the proposed Project.

TABLE 2: PROJECT LAND USE DATA INPUTS

Land Use	Quantity	Conversion Factor	Estimated Population
Residential	233 DU	3.34 people per household[3]	778 population

Project SED information was then coded into a RIVTAM traffic analysis zone (TAZ) that would represent the Project. The RIVTAM model was then run inclusive of the Project's SED inputs.

PROJECT'S VMT CALCULATION AND COMPARISON TO IMPACT THRESHOLD

As stated previously, for residential land uses the efficiency metric VMT per capita is used to evaluate Project VMT. VMT per capita is derived by dividing Project generated home-based (HB) VMT by the Project's population. VMT is obtained from the RIVTAM model using the Production/Attraction (PA) method for calculating VMT, which sums all weekday VMT generated by trips with at least one trip end in the study area (i.e., Project's TAZ). Productions are land use types that generate trips (residences) and attractions are land use types that attract trips (employment). To calculate VMT productions and attractions are converted from person trips to vehicle trips and are then multiplied by the distance skims. Table 3 presents Project generated PA HB VMT from the RIVTAM model, along with the Project's population estimate and the resulting VMT per capita metric.

[1] County Guidelines; Figure 4; Page 21
[2] County Guidelines; Figure 6; Page 22
[3] Population Density Factor was obtained from the County of Riverside General Plan Appendix E-2: Socioeconomic Build-Out Assumptions and Methodology (see Table E-2, Average Household Size by Area Plan, Page 2, Lake Matthews/Woodcrest Planning Area).

TABLE 3: PROJECT VMT PER CAPITA

	Project
HB VMT	16,210
Population	778
Project VMT per Capita	20.8
County Threshold	15.2
Percent Above Threshold	30.8%
Potentially Significant?	Yes

As shown in Table 3, Project generated VMT per capita exceeds the County's impact threshold by 30.8%.

VMT REDUCTION MEASURES

As noted by the County Guidelines, Transportation Demand Management (TDM) strategies have been evaluated for the purpose of reducing VMT impacts determined to be potentially significant through use of the California Air Pollution Control Officers Association (CAPCOA) Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity (CAPCOA, 2021) (**2021 Handbook**). For residential land use projects, the 2021 Handbook provides a list of Neighborhood Design measures that reduce VMT. However, the maximum achievable reduction for these measures as noted in the 2021 Handbook is limited to 10%[4]. Therefore, even with implementation of all feasible trip reduction measures listed below, the Project would be unable to reduce its VMT impact to below the impact threshold. The following design elements should be considered by the Project in an effort to reduce HB VMT to the extent feasible:

- Provide pedestrian and bicycle network improvements within the development connecting to existing off-site facilities.
- Collaborate with the Riverside Transit Authority (RTA) to determine the feasibility of providing new or re-route existing transit services to the site.
- Incorporate bicycle lanes, routes, and shared-use paths into street systems, new subdivisions, and large developments.

It is also recognized that as the Project area and surrounding communities develop as envisioned under the County of Riverside's General Plan, new residential, retail, and other development would be implemented. These actions could collectively alter transportation patterns, improve the region's jobs/housing ratio, reduce VMT, and support implementation of new or alternative TDM measures. There is no means currently, however, to quantify any VMT reductions that could result.

[4] 2021 Handbook, Page XX

CONCLUSION

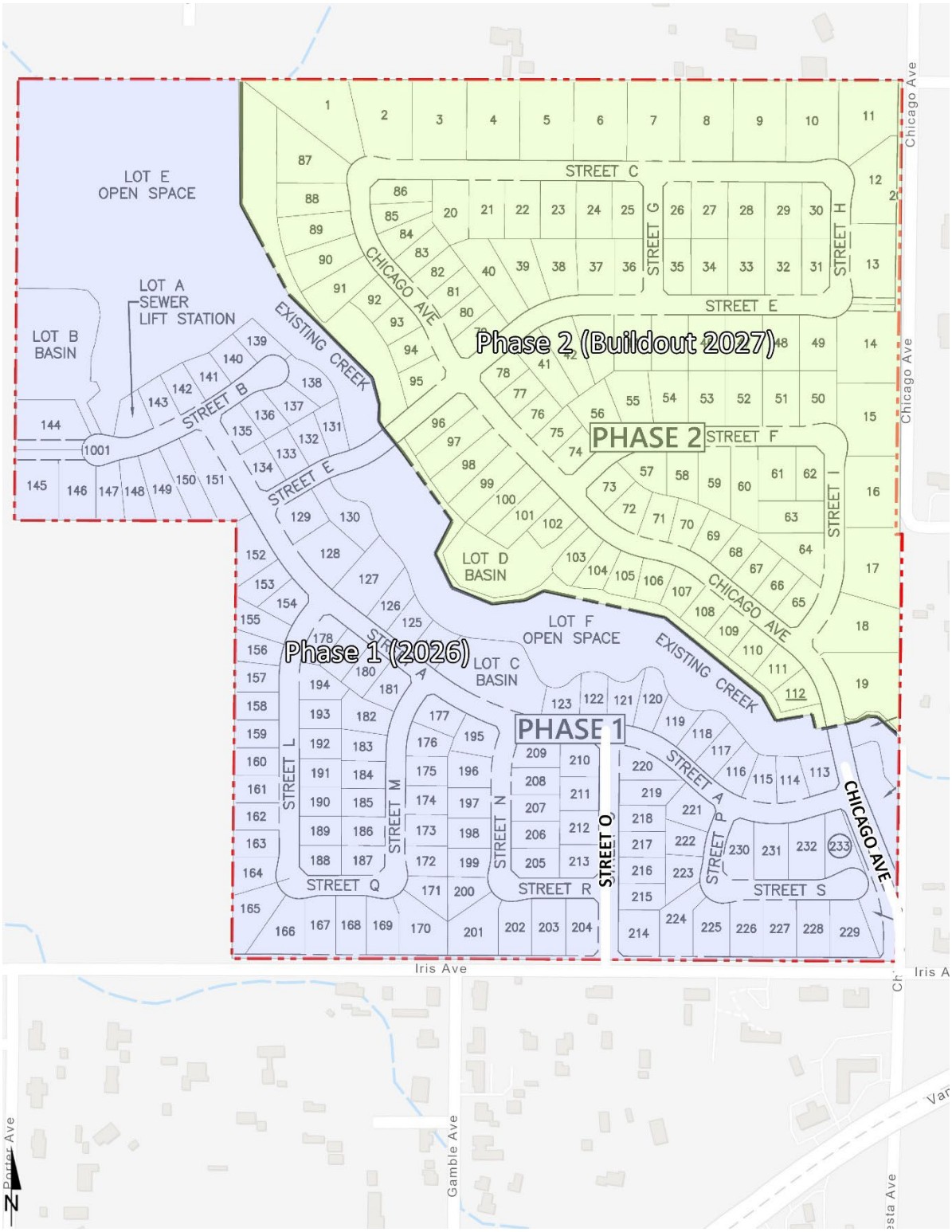
- The Project was evaluated against the County's applicable VMT screening criteria and did not screen from the need to prepare a project level VMT analysis.
- A VMT analysis was performed consistent with the County Guidelines. The analysis found that Project generated VMT per capita would exceed the County's impact threshold 30.8%.
- Potential trip reduction strategies to reduce Project generated VMT were considered using CAPCOA's 2021 Handbook. Based on an examination of feasible mitigation measures the Project is unable to fully mitigate its VMT impact to a level of less than significant and is therefore considered to be significant and unavoidable.

If you have any questions, please contact me directly at aso@urbanxroads.com.

REFERENCES

1. **County of Riverside.** *Transportation Analysis Guidelines for Level of Service Vehicle Miles Traveled.* County of Riverside : s.n., December 2020.

ATTACHEMENT A
PRELIMINARY SITE PLAN


LOT E
OPEN SPACE
LOT A
SEWER
LIFT STATION
LOT B
BASIN
EXISTING CREEK
STREET B
STREET E
STREET C
STREET G
STREET H
STREET F
STREET I
CHICAGO AVE
Chicago Ave
Phase 2 (Buildout 2027)
PHASE 2
LOT D
BASIN
LOT F
OPEN SPACE
Phase 1 (2026)
LOT C
BASIN
PHASE 1
STREET A
STREET L
STREET M
STREET N
STREET O
STREET P
STREET Q
STREET R
STREET S
Iris Ave
Porter Ave
Gamble Ave
N

URBAN | CROSSROADS

ARROYO VISTA

TRAFFIC ANALYSIS

PREPARED BY: Charlene So, PE | cso@urbanxroads.com
Connor Paquin, PE | cpaquin@urbanxroads.com
Jared Brawner | jbrawner@urbanxroads.com
Aric Evatt | aevatt@urbanxroads.com

Reference Number	Agency	Date
14577-04 TA Report	County of Riverside	April 27, 2023

TABLE OF CONTENTS

Table of Contents ii

Appendices iv

List of Exhibits v

List of Tables vi

List of Abbreviated Terms vii

1 Introduction 9

1.1 Summary of Findings 9
1.2 Project Overview 9
1.3 Analysis Scenarios 13
1.4 Study Area 14
1.5 Deficiencies 15
1.6 Recommendations 16
1.7 Queuing Analysis 18

2 Methodologies 21

2.1 Level of Service 21
2.2 Intersection Capacity Analysis 21
2.3 Traffic Signal Warrant Analysis Methodology 23
2.4 Minimum Acceptable Levels of Service (LOS) 24
2.5 Deficiency Criteria 25
2.6 Project Fair Share Calculation Methodology 26

3 Area Conditions 27

3.1 Existing Circulation Network 27
3.2 County of Riverside General Plan Circulation Element 27
3.3 Bicycle & Pedestrian Facilities 31
3.4 Transit Service 31
3.5 Existing (2022) Traffic Counts 31
3.6 Intersection Operations Analysis 35
3.7 Traffic Signal Warrants Analysis 35
3.8 Project Deficiencies and Recommended Improvements 37

4 Projected Future Traffic 39

4.1 Project Trip Generation 39
4.2 Project Trip Distribution 40
4.3 Modal Split 40
4.4 Project Trip Assignment 40
4.5 Background Traffic 40
4.6 Cumulative Development Traffic 44
4.7 Near-Term Traffic Conditions 44
4.8 Horizon Year Traffic Forecasts 49
5.1 Roadway Improvements 51
5.2 EAP (2026) Growth Traffic Volume Forecasts 51

5.3 EAP (2027) Traffic Volume Forecasts 51
5.4 Intersection Operations Analysis 51
5.5 Traffic Signal Warrants Analysis 54
5.6 Project Deficiencies and Recommended Improvements 54
6 EAPC (2027) Traffic Conditions 55
6.1 Roadway Improvements 55
6.2 Background Plus Project Plus Cumulative Projects Traffic Volume Forecasts 55
6.3 Intersection Operations Analysis 55
6.4 Traffic Signal Warrants Analysis 57
6.5 Project Deficiencies and Recommended Improvements 57
7 Horizon Year (2045) Traffic Conditions 59
7.1 Roadway Improvements 59
7.2 Horizon Year (2045) Traffic Volume Forecasts 59
7.3 Intersection Operations Analysis 59
7.4 Traffic Signal Warrants Analysis 63
7.5 Project Deficiencies and Recommended Improvements 63
8 Local and Regional Funding Mechanisms 66
8.1 County of Riverside Development Impact Fee (DIF) Program 66
8.2 Riverside County Transportation Uniform Mitigation Fee (TUMF) 66
8.3 Measure A 66
8.4 Fair Share Contribution 67
9 References 68

APPENDICES

Appendix 1.1: Approved Traffic Study Scoping Agreement

Appendix 1.2: Site Adjacent Queues

Appendix 3.1: Traffic Counts – May 2022

Appendix 3.2: Existing (2022) Conditions Intersection Operations Analysis Worksheets

Appendix 3.3: Existing (2022) Conditions Traffic Signal Warrant Analysis Worksheets

Appendix 4.1: Post Processing Worksheets

Appendix 5.1: EAP (2026) Conditions Intersection Operations Analysis Worksheets

Appendix 5.2: EAP (2027) Conditions Intersection Operations Analysis Worksheets

Appendix 5.3: EAP (2026) Conditions Traffic Signal Warrant Analysis Worksheets

Appendix 5.4: EAP (2027) Conditions Traffic Signal Warrant Analysis Worksheets

Appendix 6.1: EAPC (2027) Conditions Intersection Operations Analysis Worksheets

Appendix 6.2: EAPC (2027) Conditions Traffic Signal Warrant Analysis Worksheets

Appendix 6.3: EAPC (2027) Conditions Intersection Operations Analysis Worksheets With Improvements

Appendix 7.1: Horizon Year (2045) Without Project Conditions Intersection Operations Analysis Worksheets

Appendix 7.2: Horizon Year (2045) With Project Conditions Intersection Operations Analysis Worksheets

Appendix 7.3: Horizon Year (2045) Without Project Conditions Traffic Signal Warrant Analysis Worksheets

Appendix 7.4: Horizon Year (2045) With Project Conditions Traffic Signal Warrant Analysis Worksheets

Appendix 7.5: Horizon Year (2045) Without Project Conditions Intersection Operations Analysis Worksheets With Improvements

Appendix 7.6: Horizon Year (2045) With Project Conditions Intersection Operations Analysis Worksheets With Improvements

LIST OF EXHIBITS

Exhibit 1-1: Location Map....10
Exhibit 1-2: Preliminary Site Plan....11
Exhibit 1-3: Study Area....12
Exhibit 1-4: Site Access Recommendations....17
Exhibit 3-1: Existing Number of Through Lanes and Intersection Controls....28
Exhibit 3-2: Lake Mathews/Woodcrest Area Plan Circulation Element....29
Exhibit 3-3: County of Riverside General Plan Roadway Cross-Sections....30
Exhibit 3-4: Lake Mathews/Woodcrest Area Plan Bicycle Facilities....32
Exhibit 3-5: Existing Pedestrian Facilities....33
Exhibit 3-6: Existing Transit Routes....34
Exhibit 3-8: Existing (2022) Traffic Volumes....36
Exhibit 4-1: Project Trip Distribution....41
Exhibit 4-2: Project Only (Phase 1) Traffic volumes....42
Exhibit 4-3: Project Only (Project Buildout) Traffic volumes....43
Exhibit 4-4: Cumulative Development Location Map....45
Exhibit 4-5: Cumulative Only Traffic Volumes....46
Exhibit 5-1: EAP (2026) Traffic Volumes....52
Exhibit 5-2: EAP (2027) Traffic Volumes....53
Exhibit 6-1: EAPC (2027) Traffic Volumes....56
Exhibit 7-1: Horizon Year (2045) Without Project Traffic Volumes....60
Exhibit 7-2: Horizon Year (2045) With Project Traffic Volumes....61

LIST OF TABLES

Table 1-1: Intersection Analysis Locations 15
Table 1-2: Summary of LOS 15
Table 1-3: Summary of Improvements by Analysis Scenario 19
Table 1-4: Queuing Analysis for Horizon Year (2045) Conditions 20
Table 2-1: Signalized Intersection LOS Thresholds 22
Table 2-2: Unsignalized Intersection LOS Thresholds 23
Table 2-3: Traffic Signal Warrant Analysis Locations 24
Table 2-4: City of Riverisde Intersection Deficiency Criteria 26
Table 3-1: Intersection Analysis for Existing (2022) Conditions 35
Table 4-1: Trip Generation Summary 39
Table 4-2: Cumulative Development land use Summary (1 of 2) 47
Table 4-2: Cumulative Development land use Summary (2 of 2) 48
Table 5-1: Intersection Analysis for EAP (2026 & 2027) Conditions 54
Table 6-1: Intersection Analysis for EAPC (2027) Conditions 57
Table 6-2: EAPC (2027) Conditions Intersection Operations Analysis With Improvements 58
Table 7-1: Intersection Analysis for Horizon Year (2045) Conditions 63
Table 7-2: Horizon Year (2045) Conditions Intersection Operations Analysis With Improvements 64
Table 8-1: Project Fair Share Calculations 67

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
CA MUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CMP	Congestion Management Program
DIF	Development Impact Fee
EAP	Existing plus Ambient Growth plus Project
EAPC	Existing plus Ambient Growth plus Project plus Cumulative
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
NCHRP	National Cooperative Highway Research Program
PHF	Peak Hour Factor
Project	Arroyo Vista
RCTC	Riverside County Transportation Commission
RIVCOM	Riverside County Model
RTA	Riverside Transit Agency
TA	Traffic Analysis
TUMF	Transportation Uniform Mitigation Fee
v/c	Volume to Capacity
vphgpl	Vehicles per Hour Green per Lane
WRCOG	Western Riverside Council of Governments

This page intentionally left blank

1 INTRODUCTION

This report presents the results of the Traffic Analysis (TA) for Arroyo Vista ("Project"), which is located on the northwest corner of Chicago Avenue and Iris Avenue in the Woodcrest area of unincorporated County of Riverside, as shown on Exhibit 1-1. The purpose of this TA is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and where necessary recommend improvements to achieve acceptable operations consistent with General Plan level of service goals and policies. This traffic study has been prepared in accordance with the County of Riverside's Traffic Impact Analysis Guidelines and consultation with County staff during the traffic study scoping process. (1) The County approved Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TA.

1.1 SUMMARY OF FINDINGS

The Project is to construct the following improvement as a design feature in conjunction with development of the site:

- Project to construct Iris Avenue along the Project's frontage at its ultimate half-section width as a Local Street (60-foot right-of-way) from Chicago Avenue to the Project's western boundary consistent with the County's standards.
- Project to construct Chicago Avenue along the Project's frontage at its ultimate half-section width as a Local Street (60-foot right-of-way) from the emergency vehicle access to Gentian Avenue, consistent with the County's standards.

Additional details and intersection lane geometrics are provided in Section 1.6 *Recommendations* of this report.

1.2 PROJECT OVERVIEW

A preliminary site plan for the proposed Project is shown on Exhibit 1-2. The Project is anticipated to be developed in two phases with an opening year of 2026 for Phase 1 and Project Buildout in 2027. Phase 1 is proposed to consist of 121 single family detached residential dwelling units. Project Buildout is proposed to consist of an additional 112 dwelling units, for a total of 233 single family detached residential dwelling units. As indicated on Exhibit 1-2, vehicular access will be provided via the following driveways:

- Street O on Iris Avenue: full access
- Chicago Avenue on Iris Avenue: full access

Regional access to the Project site is available from the SR-91 and I-215 Freeways via Van Buren Boulevard. Exhibit 1-3 depicts the location of the proposed Project in relation to the existing roadway network and the study area intersections.

EXHIBIT 1-1: LOCATION MAP

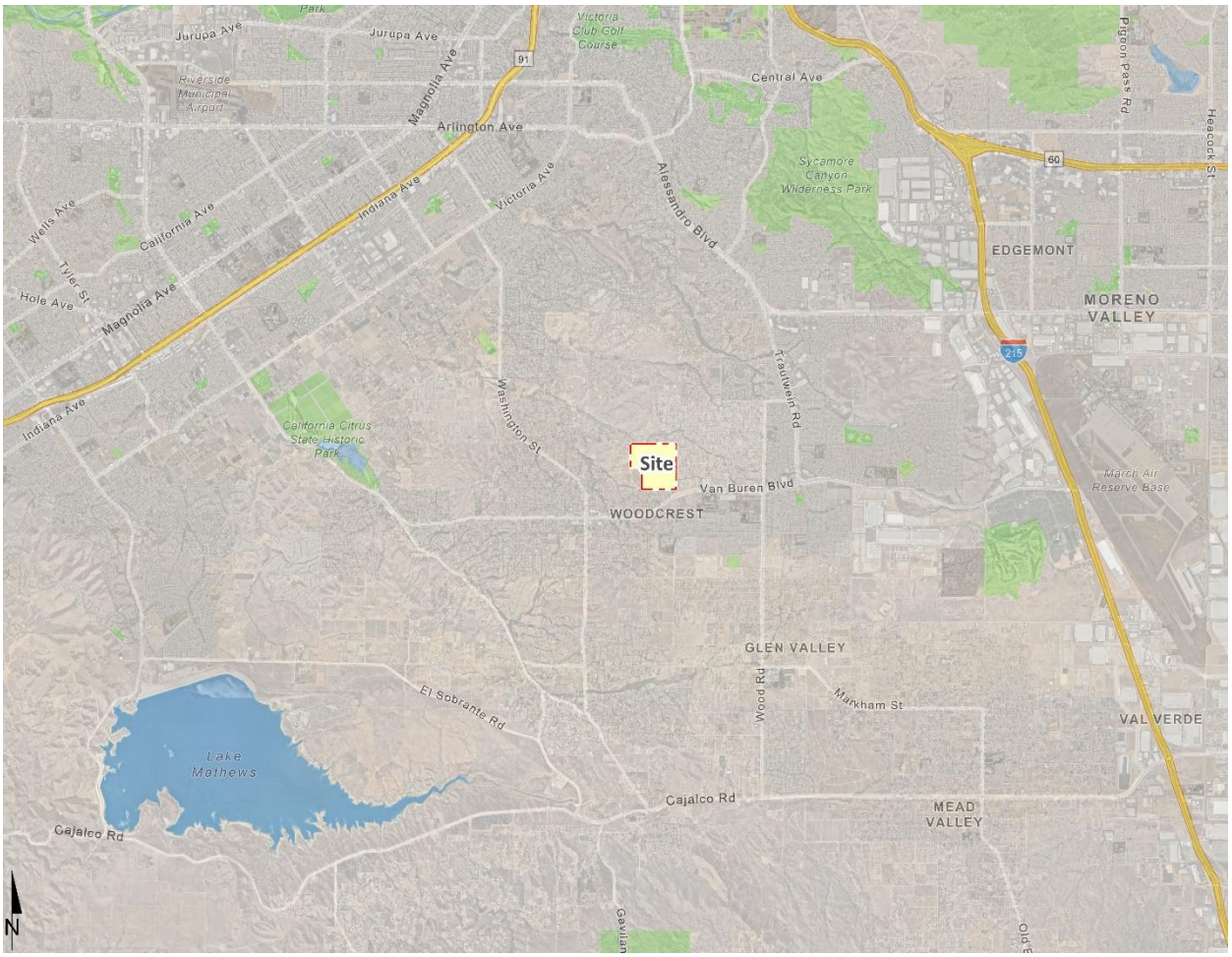


EXHIBIT 1-2: PRELIMINARY SITE PLAN

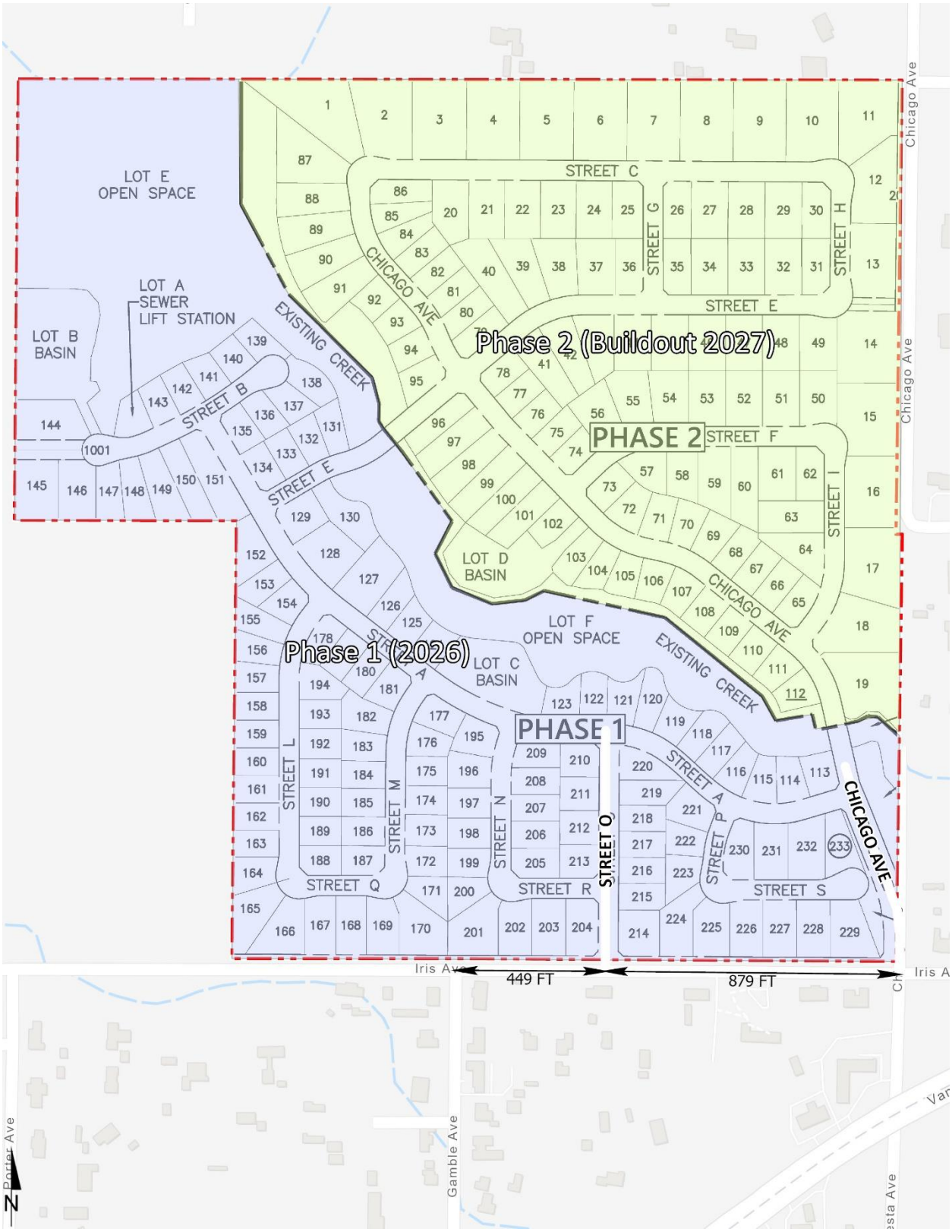
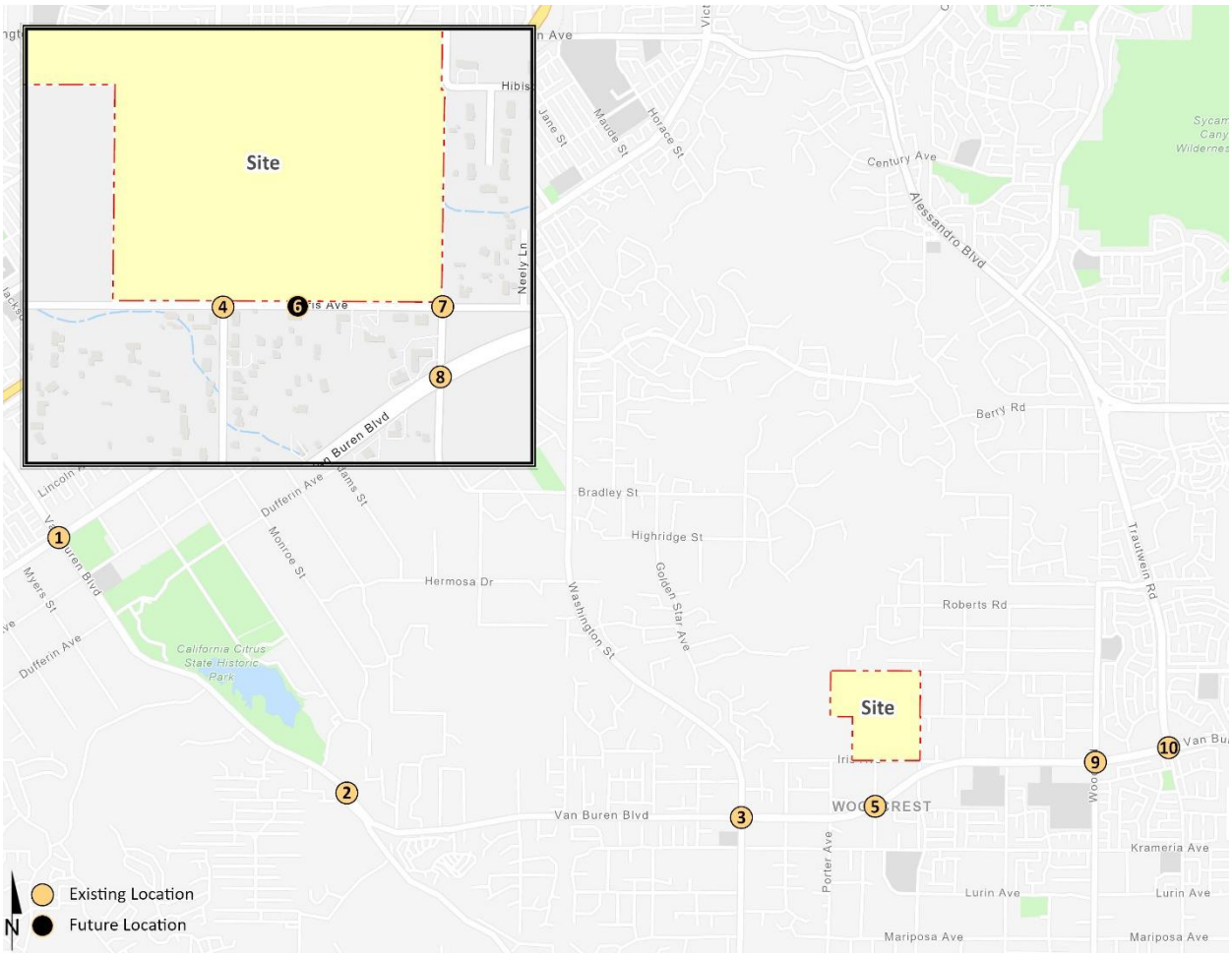


EXHIBIT 1-3: STUDY AREA



In order to develop the traffic characteristics of the proposed project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021) for the Single Family Detached Residential (ITE Land Use Code 210) has been utilized. (2) The proposed Project is anticipated to be developed in the following phases:

- Phase 1 (2026): 121 single family residential dwelling units
- Project Buildout (2027): 112 single family residential dwelling units

With the development of Phase 1, the Project is anticipated to generate a total of 1,142 vehicle trip-ends per day with 85 AM peak hour trips and 114 PM peak hour trips. Under Project Buildout, the Project is anticipated to generate a total of 2,198 vehicle trip-ends per day with 163 AM peak hour trips and 219 PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

1.3 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential deficiencies to traffic and circulation have been assessed for each of the following conditions:

- Existing (2022) Conditions
- Existing plus Ambient Growth plus Project (EAP) (2026) Conditions – Phase 1
- EAP (2027) – Project Buildout
- Existing plus Ambient Growth plus Project plus Cumulative (EAPC) (2027) Conditions – Project Buildout
- Horizon Year (2045) Without Project
- Horizon Year (2045) With Project (Project Buildout)

1.3.1 EXISTING (2022) CONDITIONS

Information for Existing (2022) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.3.2 EAP (2026 & 2027) CONDITIONS

The EAP (2026) and EAP (2027) conditions analyses determines the potential circulation system deficiencies based on a comparison of the EAP traffic conditions to Existing conditions. The roadway network is similar to Existing conditions except for new connections to be constructed by the Project. To account for background traffic growth, an ambient growth factor from Existing (2022) conditions of 8.24% (2 percent per year, compounded over 4 years) is included for EAP (2026) traffic conditions and 10.41% (2 percent per year, compounded over 5 years) is included for EAP (2027) traffic conditions. The assumed ambient growth factor is based on the requirements per the County of Riverside traffic study guidelines. Consistent with Riverside County traffic study guidelines, the EAP analysis is intended to identify "Opening Year" deficiencies associated with the development of the proposed Project based on the expected background growth within the study area.

1.3.3 EAPC (2027) CONDITIONS

The EAPC (2027) traffic conditions analysis determines the potential near-term cumulative circulation system deficiencies. The roadway network is similar to Existing conditions except for new connections to be constructed by the Project. To account for background traffic growth, an ambient growth factor from Existing (2022) conditions of 10.41% (2 percent per year, compounded over 5 years) is included for EAPC (2027) traffic conditions.

Conservatively, this TA estimates the area ambient traffic growth and then adds traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed ambient growth rates; and some of these related projects may not be implemented and operational within the 2027 Opening Year time frame assumed for the Project. The resulting traffic growth utilized in this traffic study (ambient growth factor plus traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic deficiencies under 2027 conditions.

1.3.4 HORIZON YEAR (2045) CONDITIONS

Traffic projections for Horizon Year (2045) conditions were derived from the County of Riverside refined version of the Riverside County Model (RIVCOM) using accepted procedures for model forecast refinement and smoothing. The Horizon Year conditions analysis has been utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the Western Riverside Council of Governments (WRCOG) Transportation Uniform Mitigation Fee (TUMF) program, can accommodate the long-range cumulative traffic at the target Level of Service (LOS) identified in the County of Riverside (lead agency) General Plan. (3) Each of these regional transportation fee programs are discussed in more detail in Section 9 *Local and Regional Funding Mechanisms*.

1.4 STUDY AREA

To ensure that this TA satisfies the County of Riverside's traffic study requirements, Urban Crossroads, Inc. prepared a Project traffic study scoping package for review by County of Riverside staff prior to the preparation of this report. This agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The agreement approved by the County is included in Appendix 1.1 of this TA.

The 10 study area intersections shown on Exhibit 1-3 and listed in Table 1-1 were selected for evaluation in this TA based on consultation with County of Riverside staff. At a minimum, the study area includes intersections where the Project is anticipated to contribute 50 or more peak hour trips per the County's traffic study guidelines. (1) The "50 peak hour trip" criteria represents a minimum number of trips at which a typical intersection would have the potential to be substantively affected by a given development proposal. The 50 peak hour trip criterion is a traffic engineering rule of thumb that is accepted and widely used within Riverside County for estimating a potential area of influence (i.e., study area).

The intent of a Congestion Management Program (CMP) is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related deficiencies, and improve air quality. The County of Riverside CMP became effective with the passage of Proposition 111 in 1990 and updated most recently updated in 2011. The Riverside County Transportation Commission (RCTC) adopted the 2011 CMP for the County of Riverside in December 2011. (5) CMP intersections are identified in Table 1-1. There are no study area intersections identified as a Riverside County CMP facility.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

#	Intersections	Jursidiction	CMP?
1	Van Buren Bl. & Victoria Av.	Riverside	No
2	Van Buren Bl. & Mockingbird Canyon Rd.	County of Riverside	No
3	Washington St. & Van Buren Bl.	County of Riverside	No
4	Gamble Av. & Iris Av.	County of Riverside	No
5	Gamble Av. & Van Buren Bl.	County of Riverside, Riverside	No
6	Street O & Iris Av.	County of Riverside	No
7	Chicago Av. & Iris Av.	County of Riverside	No
8	Chicago Av./Alta Cresta Av. & Van Buren Bl.	County of Riverside, Riverside	No
9	Wood Rd. & Van Buren Bl.	Riverside	No
10	Trautwein Rd./Cole Av. & Van Buren Bl.	Riverside	No

1.5 DEFICIENCIES

This section provides a summary of deficiencies by analysis scenario. Section 2 *Methodologies* provides information on the methodologies used in the analysis and Section 3 *Area Conditions*, Section 5 *EAP (2026 & 2027) Traffic Conditions*, Section 6 *EAPC (2027) Conditions*, and Section 7 *Horizon Year (2045) Traffic Conditions* includes the detailed analysis. A summary of LOS results for all analysis scenarios is presented in Table 1-2.

TABLE 1-2: SUMMARY OF LOS

		Existing		EAP (2026)		EAP (2027)		2027 Without Project		2045 Without Project		2045 With Project	
#	Intersection	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Van Buren Bl. & Victoria Av.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	F	A - D	F
2	Van Buren Bl. & Mockingbird Canyon Rd.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
3	Washington St. & Van Buren Bl.	A - D	A - D	A - D	A - D	A - D	A - D	E	E	F	F	F	F
4	Gamble Av. & Iris Av.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
5	Gamble Av. & Van Buren Bl.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
6	Street O & Iris Av.	N/A	N/A	A - D	A - D	A - D	A - D	A - D	A - D	N/A	N/A	A - D	A - D
7	Chicago Av. & Iris Av.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
8	Chicago Av./Alta Cresta Av. & Van Buren Bl.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
9	Wood Rd. & Van Buren Bl.	A - D	A - D	A - D	A - D	A - D	A - D	F	F	F	F	F	F
10	Trautwein Rd./Cole Av. & Van Buren Bl.	A - D	A - D	A - D	A - D	A - D	A - D	F	E	F	F	F	F

A - D = A - D E = E F = F

1.5.1 EXISTING (2022) CONDITIONS

The study area intersections are currently operating at an acceptable LOS during the peak hours.

1.5.2 EAP (2026 & 2027) CONDITIONS

The study area intersections are anticipated to continue to operate at an acceptable LOS during the peak hours with the addition of Project (Phase 1) and Project (Project Buildout) traffic under both EAP (2026) and EAP (2027) traffic conditions.

1.5.3 EAPC (2027) CONDITIONS

The following study area intersections are anticipated to operate at an unacceptable LOS under EAP (2027) traffic conditions:

- Washington Street & Van Buren Boulevard (#3) – LOS E AM and PM peak hours
- Wood Road & Van Buren Boulevard (#9) – LOS F AM and PM peak hours
- Trautwein Road/Cole Avenue. & Van Buren Boulevard (#9) – LOS F AM peak hour; LOS E PM peak hour

1.5.4 HORIZON YEAR (2045) CONDITIONS

The following study area intersections are anticipated to operate at an unacceptable LOS under Horizon Year (2045) Without Project and With Project traffic conditions:

- Van Buren Boulevard & Victoria Avenue (#1) – LOS F PM peak hour only
- Washington Street & Van Buren Boulevard (#3) – LOS F AM and PM peak hours
- Wood Road & Van Buren Boulevard (#9) – LOS F AM and PM peak hours
- Trautwein Road/Cole Avenue & Van Buren Boulevard (#10) – LOS F AM and PM peak hours

1.6 RECOMMENDATIONS

1.6.1 SITE ADJACENT AND SITE ACCESS RECOMMENDATIONS

The following recommendations are based on the minimum improvements needed to accommodate site access and maintain acceptable peak hour operations for the proposed Project. The site adjacent recommendations are shown on Exhibit 1-4.

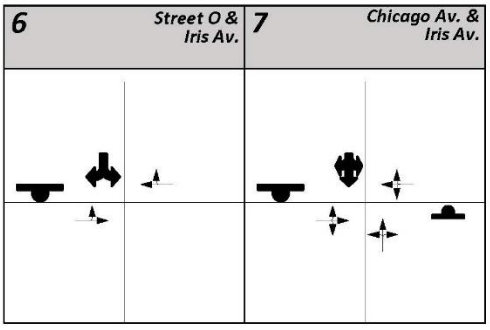
Recommendation 1 – Street O & Iris Avenue (#6) – The following improvements are necessary to accommodate site access:

- Project to install a stop sign on the southbound approach (Project driveway).
- Project to construct a southbound shared left-right turn lane.

EXHIBIT 1-4: SITE ACCESS RECOMMENDATIONS

LINE AND CURVE TABLE		
LENGTH	BEARING/DELTA	RADIUS
207.51'	039°37'53"	300.00'
223.26'	042°37'40"	300.00'
23.63'	004°31'02"	300.00'
231.18'	044°08'50"	300.00'
183.04'	034°56'05"	300.00'
261.58'	038°29'38"	300.00'
202.86'	038°43'57"	300.00'
78.69'	009°01'00"	500.00'
187.69'	035°52'11"	300.00'
112.91'	021°33'51"	300.00'
304.83'	058°13'54"	300.00'
209.35'	039°58'56"	300.00'
504.83'	036°09'30"	800.00'
91.27'	017°25'51"	300.00'
183.28'	034°25'52"	300.00'
201.26'	038°24'00"	300.00'
268.96'	022°00'32"	700.00'
302.37'	018°49'28"	1200.00'
82.99'	015°50'53"	300.00'
86.01'	016°25'17"	300.00'
59.66'	011°23'00"	300.00'
142.77'	027°16'00"	300.00'
131.53'	025°11'46"	300.00'
132.61'	031°31'24"	300.00'
1441.00	S59°36'01"E	
386.03	S27°49'24"W	
399.82	N70°03'00"E	
784.54	N69°00'00"W	
90.30	N72°37'59"E	
215.33	N39°37'53"W	
350.01	N41°08'55"W	

PARCEL LINE AND CURVE TABLE			
LINE #/CURVE #	LENGTH	BEARING/DELTA	RADIUS
L35	302.67	N07°00'00"W	
L36	373.56	N70°09'06"E	
L37	117.09	S45°51'56"W	
L39	79.91	N38°43'57"E	
L40	265.07	N12°46'04"W	
L41	214.06	N21°47'04"W	
L42	89.50	N07°30'07"E	
L43	417.63	N69°00'00"E	
L44	73.89	S07°00'00"E	
L45	84.83	S21°33'51"W	
L46	153.85	N73°27'44"E	
L47	132.57	S48°28'22"E	
L48	80.46	S68°27'31"E	
L49	346.27	S82°17'51"E	
L50	333.25	S07°00'00"E	
L51	321.82	N69°00'00"E	
L52	694.66	S07°21'40"W	
L53	386.92	S07°40'35"W	
L54	314.68	N07°00'00"W	
L55	670.76	N07°00'00"E	
L56	78.09	N38°24'30"E	
L58	38.82	N69°00'30"E	
L59	202.91	S59°43'02"W	
L61	143.10	N42°16'40"W	
L62	40.82	N23°11'40"W	
L63	40.56	N78°30'38"W	
L64	78.74	S17°23'31"W	
L65	70.87	S35°11'17"W	
L66	537.71	S50°23'07"W	
L67	427.46	S36°16'58"E	
L68	66.22	N68°05'36"E	



6 = Intersection Analysis Location

= Existing Stop Sign

= Stop Sign Improvement

= Existing Lane

= Lane Improvement

Recommendation 2 – Chicago Avenue & Iris Avenue (#7) – The following improvements are necessary to accommodate site access:

- Project to install a stop sign on the southbound approach (Project driveway).
- Project to construct a southbound shared left-through-right turn lane.

Recommendation 3 – Iris Avenue is an east-west oriented roadway located on the Project's southern boundary. Project to construct Iris Avenue along the Project's frontage at its ultimate half-section width as a Local Street (60-foot right-of-way) from Chicago Avenue to the Project's western boundary consistent with the County's standards.

Recommendation 4 – Chicago Avenue is a north-south oriented roadway located on the Project's eastern boundary. Project to construct Chicago Avenue along the Project's frontage at its ultimate half-section width as a Local Street (60-foot right-of-way) from the emergency vehicle access to Gentian Avenue, consistent with the County's standards.

On-site traffic signing and striping should be implemented agreeable with the provisions of the California Manual on Uniform Traffic Control Devices (CA MUTCD) and in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard California Department of Transportation (Caltrans) and County of Riverside sight distance standards at the time of preparation of final grading, landscape, and street improvement plans.

1.6.2 OFF-SITE RECOMMENDATIONS

A summary of the off-site intersection improvements is provided in Table 1-3. As shown in Table 1-3, the Project will construct the improvements identified, as discussed in Section 1.6.1 *Site Adjacent and Site Access* Recommendations. Improvements that appear under EAP traffic conditions would be the Project's responsibility to construct to maintain acceptable LOS, if not also required to address Existing deficiencies.

For those improvements listed in Table 1-3 and not constructed as part of the Project, the Project Applicant's responsibility for the Project's contributions towards deficient intersections is fulfilled through payment of fair share or fees (applicable pre-existing fee programs) that would be assigned to construction of the identified recommended improvements. The Project Applicant would be required to pay fair share and fees consistent with the County's requirements (see Section 9 *Local and Regional Funding Mechanisms*).

1.7 QUEUING ANALYSIS

A queuing analysis was conducted for Gamble Avenue & Iris Avenue (#4) and the Project driveways for Horizon Year (2045) With Project traffic conditions to determine the lengths necessary to accommodate near-term 95th percentile queues. The site adjacent intersections are anticipated to operate without queueing issues, as shown in Table 1-4. The site adjacent queuing analysis worksheets are provided in Appendix 1.2.

TABLE 1-3: SUMMARY OF IMPROVEMENTS BY ANALYSIS SCENARIO

#	Intersection Location	Jurisdiction	EAP (2026)	EAP (2027)	EAPC (2027)	2045 Without Project	2045 With Project	Improvements in County TUMF/DIF? [1,2]	Project Responsibility	Project Fair Share %
3	Washington St. & Van Buren Bl.	County of Riverside	None	None	Add EB 3rd through lane	Same	Same	Yes (TUMF)	Fees	4.7%
					Add WB 3rd through lane	Same	Same	Yes (TUMF)	Fees	
						Add 2nd EB left turn lane	Same	No	Fair Share	
						Add EB right turn lane	Same	No	Fair Share	
						Add 2nd WB left turn lane	Same	No	Fair Share	
						Modify the traffic signal to implement overlap phasing for the WB right turn lane	Same	No	Fair Share	
9	Wood Rd. & Van Buren Bl.	Riverside	None	None	Add EB 3rd through lane	Same	Same	Yes (TUMF)	Fees	--
					Add WB 3rd through lane	Same	Same	Yes (TUMF)	Fees	
10	Trautwein Rd./Cole Av. & Van Buren Bl.	Riverside	None	None	Add EB 3rd through lane	Same	Same	No	Fair Share	4.3%

[1] Improvements included in regional/County fee programs have been identified as such.

[2] Program improvements constructed by project may be eligible for fee credit, at discretion of City. See Table 8-1 for fair share calculations.

TABLE 1-4: QUEUING ANALYSIS FOR HORIZON YEAR (2045) CONDITIONS

#	Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)		Acceptable? [1]	
				AM Peak Hour	PM Peak Hour	AM	PM
4	Gamble Av. & Iris Av.	WBL	449	0	0	Yes	Yes
6	Street O & Iris Av.	EBL	449	7	10	Yes	Yes
7	Chicago Av. & Iris Av.	NBL/T/R	335	46	57	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown in this table, where applicable.

2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with County of Riverside's Traffic Study Guidelines.

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors, such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The 6th Edition Highway Capacity Manual (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (4) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The County of Riverside requires signalized intersection operations analysis based on the methodology described in the HCM. (4) Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections LOS is related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0[1]
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	80.01 and up	F

Source: HCM, 6th Edition

[1] If V/C is greater than 1.0 then LOS is F per HCM.

Consistent with the Riverside County CMP, a saturation flow rate of 1900 vehicles per hour green per lane (vphgpl) has been utilized for all intersections for all scenarios.

The traffic modeling and signal timing optimization software package Synchro (Version 11) has been utilized to analyze signalized intersections. Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Customary practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g., PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak

hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (4)

2.2.2 UNSIGNALIZED INTERSECTIONS

The County of Riverside requires the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (4) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2). At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. Delay for the intersection is reported for the worst individual movement at a two-way stop-controlled intersection. For all-way stop controlled intersections, LOS is computed for the intersection as a whole (average delay).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0[1]
Little or no delays.	0 to 10.00	A
Short traffic delays.	10.01 to 15.00	B
Average traffic delays.	15.01 to 25.00	C
Long traffic delays.	25.01 to 35.00	D
Very long traffic delays.	35.01 to 50.00	E
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F

Source: HCM, 6th Edition

[1] If V/C is greater than 1.0 then LOS is F per HCM.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or determine the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD). (5)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (5) Specifically, this TA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions and for all future analysis scenarios for existing unsignalized intersections. Warrant 3 is appropriate to use for this TA because it provides specialized warrant criteria for intersections with rural characteristics. For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection. Urban warrants have been used as posted speed limits on the major roadways with unsignalized intersections are 40 miles per hour or below and rural warrants have been used where speeds exceed 40 miles per hour.

Future intersections that do not currently exist have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets. Similarly, the speed limit has been used as the basis for determining the use of Urban and Rural warrants. Traffic signal warrant analyses were performed for the following study area intersection shown in Table 2-3:

TABLE 2-3: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

#	Intersections	Jursidiction
4	Gamble Av. & Iris Av.	County of Riverside
6	Street O & Iris Av.	County of Riverside
7	Chicago Av. & Iris Av.	County of Riverside

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Area Conditions* of this report. The traffic signal warrant analyses for future conditions are presented in Section 5 *EAP (2026 & 2027) Traffic Conditions*, Section 6 *EAPC (2027) Traffic Conditions*, and Section 7 *Horizon Year (2045) Traffic Conditions* of this report. It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.4 MINIMUM ACCEPTABLE LEVELS OF SERVICE (LOS)

Minimum Acceptable LOS and associated definitions of intersection deficiencies has been obtained from each of the applicable surrounding jurisdictions.

2.4.1 COUNTY OF RIVERSIDE

The definition of an intersection deficiency has been obtained from the County of Riverside General Plan. Riverside County General Plan Policy C 2.1 states that the County will maintain the following County-wide target LOS:

The following minimum target levels of service have been designated for the review of development proposals in the unincorporated areas of Riverside County with respect to transportation impacts on roadways designated in the Riverside County Circulation Plan which are currently County maintained, or are intended to be accepted into the County maintained roadway system:

- *LOS C shall apply to all development proposals in any area of the Riverside County not located within the boundaries of an Area Plan, as well as those areas located within the following Area Plans: REMAP, Eastern Coachella Valley, Desert Center, Palo Verde Valley, and those non-Community Development areas of the Elsinore, Lake Mathews/Woodcrest, Mead Valley and Temescal Canyon Area Plans.*
- *LOS D shall apply to all development proposals located within any of the following Area Plans: Eastvale, Jurupa, Highgrove, Reche Canyon/Badlands, Lakeview/Nuevo, Sun City/Menifee Valley, Harvest Valley/Winchester, Southwest Area, The Pass, San Jacinto Valley, Western Coachella Valley and those Community Development Areas of the Elsinore, Lake Mathews/Woodcrest, Mead Valley and Temescal Canyon Area Plans.*

- *LOS E may be allowed by the Board of Supervisors within designated areas where transit-oriented development and walkable communities are proposed.*

The applicable minimum LOS utilized for the purposes of this analysis is LOS D per the County-wide target LOS for projects located within the Woodcrest area plan. (1)

2.4.2 CITY OF RIVERSIDE

The City of Riverside General Plan states the City will strive to maintain LOS D or better on arterial streets wherever possible. At some key locations, such as City arterial roadways, which are used as freeway bypass by regional through traffic and at heavily traveled freeway intersections, LOS E may be acceptable as determined on a case-by-case basis. Locations that may warrant the LOS E standard include portions of Arlington Avenue/Alessandro Boulevard, Van Buren Boulevard throughout the City, portions of La Sierra Avenue, and selected freeway interchanges. A higher standard, such as LOS C or better, may be adopted for Local and Collector streets in residential areas. The City recognizes that along key freeway feeder segments during peak commute hours, LOS F may be expected due to regional travel patterns.

At the City's request, the analysis for all study area intersections and roadway segments that lie within the City of Riverside will be evaluated based on the guidelines outlined in the City's Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment (July 2020). As such, the minimum LOS utilized for the purposes of this analysis is LOS D for intersections located partially or wholly within the City of Riverside.

2.5 DEFICIENCY CRITERIA

2.5.1 COUNTY OF RIVERSIDE

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies. The following deficiency criteria has been utilized for the County of Riverside. To determine whether the addition of project-related traffic at a study intersection would result in a deficiency, the following will be utilized:

- A deficiency occurs at study area intersections if the pre-Project condition is at or better than LOS D (i.e., acceptable LOS), and the addition of project trips causes the peak hour LOS of the study area intersection to operate at unacceptable LOS (i.e., LOS E or F). Per the County of Riverside traffic study guidelines, for intersections currently operating at unacceptable LOS (LOS E or F), a deficiency will occur if the Project contributes peak hour trips to pre-project traffic conditions.

2.5.2 CITY OF RIVERSIDE

To determine whether the addition of Project traffic at a study intersection would result in a project-specific traffic deficiency, the following will be utilized:

- When the pre-Project condition is at or better than LOS D (i.e., acceptable LOS), and project-generated traffic, as measured by 50 or more peak hour trips, causes deterioration below LOS D (i.e., unacceptable LOS) or increases to the peak hour delay as defined in Table 2-4, a deficiency is deemed to occur.

TABLE 2-4: CITY OF RIVERISDE INTERSECTION DEFICIENCY CRITERIA

Pre-Project LOS	Project-Related Delay Increase	Recommended Improvements
A/B	10.0 Seconds or More	Achieve Pre-project delay or better
C	8.0 Seconds or More	Achieve Pre-project delay or better
D	5.0 Seconds or More	Achieve Pre-project delay or better
E	2.0 Seconds or More	Achieve Pre-project delay or better
F	1.0 Second or More	Achieve Pre-project delay or better

2.6 PROJECT FAIR SHARE CALCULATION METHODOLOGY

Improvements found to be included in the WRCOG TUMF and/or Development Impact Fee (DIF) programs will be identified as such. For improvements that do not appear to be in either of the pre-existing fee programs, a fair share contribution based on the Project's proportional share may be imposed in order to address the Project's share of deficiencies in lieu of construction. It should be noted that fair share calculations are for informational purposes only and the County Traffic Engineer will determine the appropriate improvements to be implemented by a project (to be identified in the conditions of approval). The Project's fair share cost of improvements would be determined based on the following equation, which is the ratio of Project traffic to new traffic, where new traffic is total future traffic less existing baseline traffic:

Project Fair Share % = Project (Buildout) Traffic / (Horizon Year (2045) Total Traffic – Existing (2022) Traffic)

3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the County of Riverside General Plan Circulation Network, and a review of existing peak hour intersection operations and traffic signal warrant analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the agreement with County of Riverside staff (Appendix 1.1), the study area includes a total of 10 existing and future intersections as shown previously on Exhibit 1-3. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 COUNTY OF RIVERSIDE GENERAL PLAN CIRCULATION ELEMENT

Exhibit 3-2 shows the County of Riverside Lake Mathews/Woodcrest Area Plan Circulation Element and Exhibit 3-3 illustrates the County of Riverside General Plan roadway cross-sections.

Urban Arterials are six-lane divided roadways (typically divided by a raised median or painted two-way turn-lane) with a 152-foot right-of-way and a 110-foot curb-to-curb measurement. These roadways serve both regional through-traffic and inter-city traffic and typically direct traffic onto and off-of the freeways. The following study area roadway within the County of Riverside is classified as an Urban Arterial:

- Van Buren Boulevard

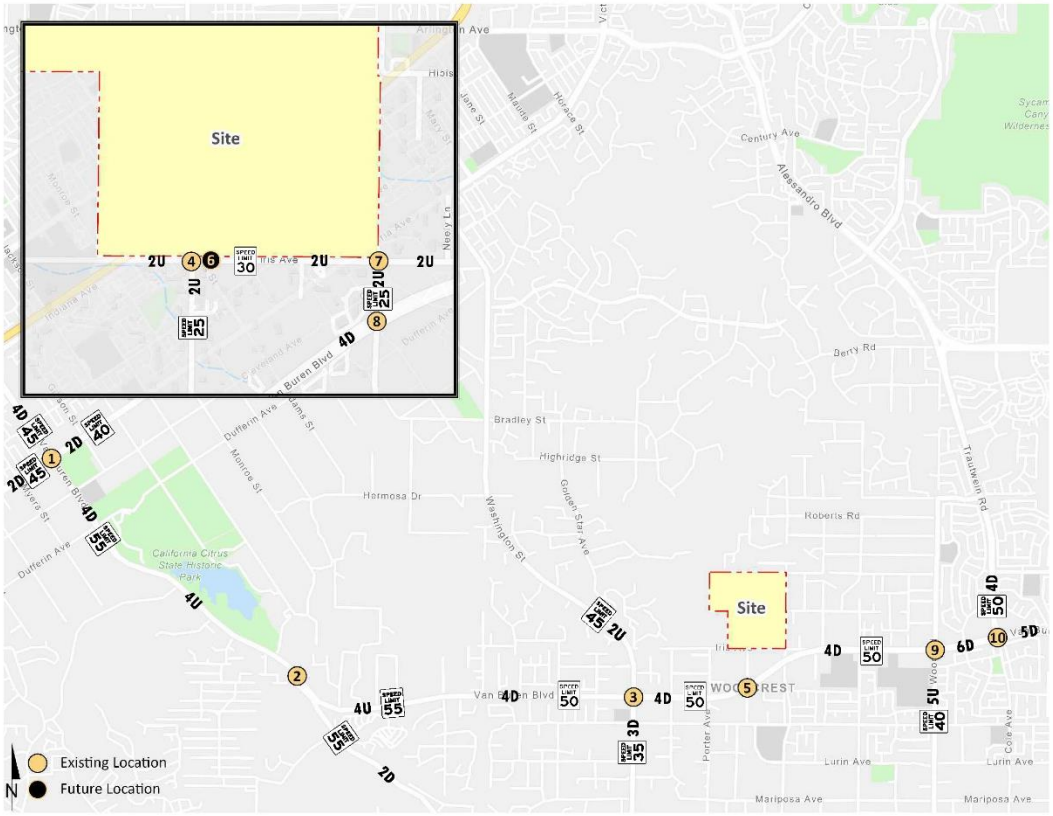
Arterials are four-lane roadways and may include a painted median. These roadways typically have a 128-foot right-of-way and an 82-to-86-foot curb-to-curb measurement. These roadways typically direct traffic through major development areas and a lesser capacity than Urban Arterials. The following study area roadway within the County of Riverside is classified as an Arterial:

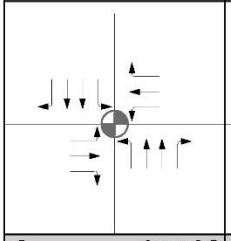
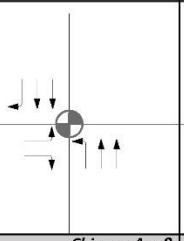
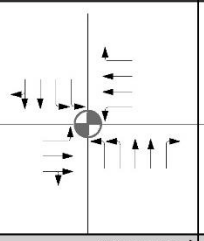
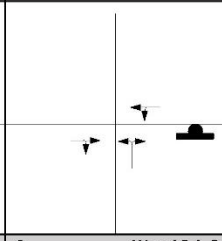
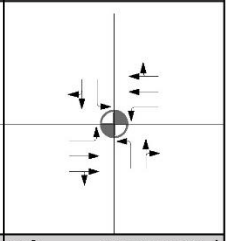
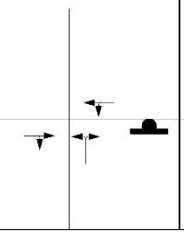
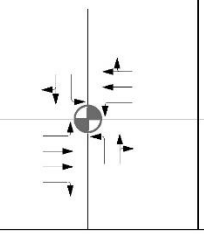
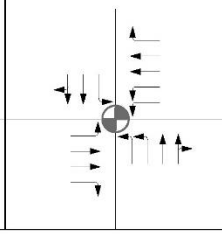
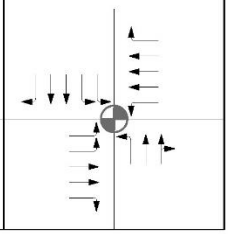
- Washington Street, north of Van Buren Boulevard

Major Roadways are four-lane roadways and may include a painted median. These roadways typically have a 118-foot right-of-way and a 76-foot curb-to-curb measurement. These roadways typically direct traffic through major development areas. The following study area roadways within the County of Riverside are classified as a Major Roadway:

- Washington Street, south of Van Buren Boulevard

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



1 Van Buren Bl. & Victoria Av.	2 Van Buren Bl. & Mockingbird Canyon Rd.	3 Washington St. & Van Buren Bl.	4 Gamble Av. & Iris Av.	5 Ganble Av. & Van Buren Bl.
				
6 Street O & Iris Av.	**7 Chicago Av. & Iris Av.**	**8 Chicago Av./ Alta Cresta Av. & Van Buren Bl.**	**9 Wood Rd. & Van Buren Bl.**	**10 Trautwein Rd./ Cole Av. & Van Buren Bl.**
Future Intersection				

4 = Number of Lanes
D = Divided
U = Undivided
45 = Speed Limit (MPH)
= Traffic Signal
= Stop Sign
= Existing Lane

EXHIBIT 3-2: LAKE MATHEWS/WOODCREST AREA PLAN CIRCULATION ELEMENT

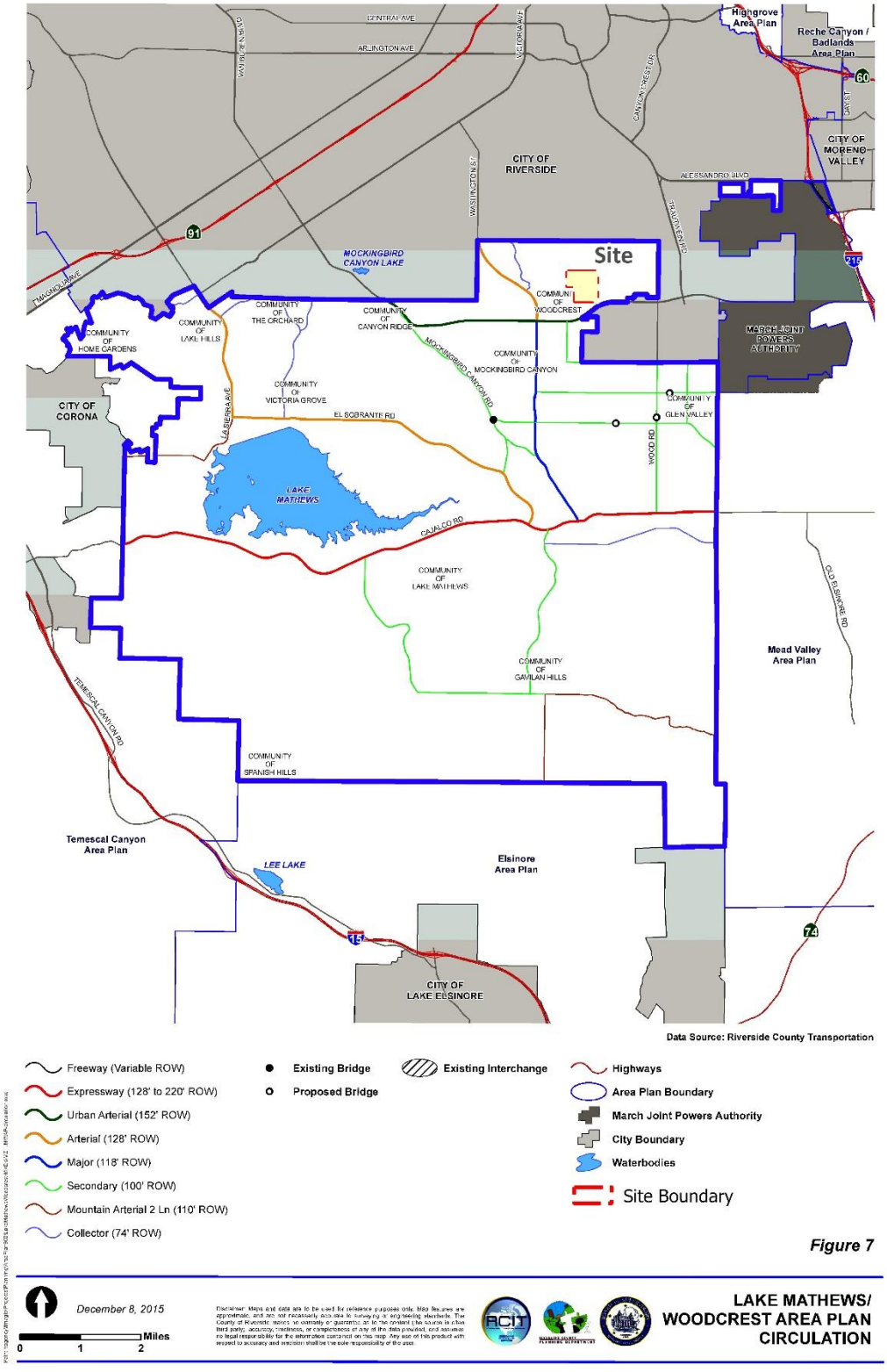
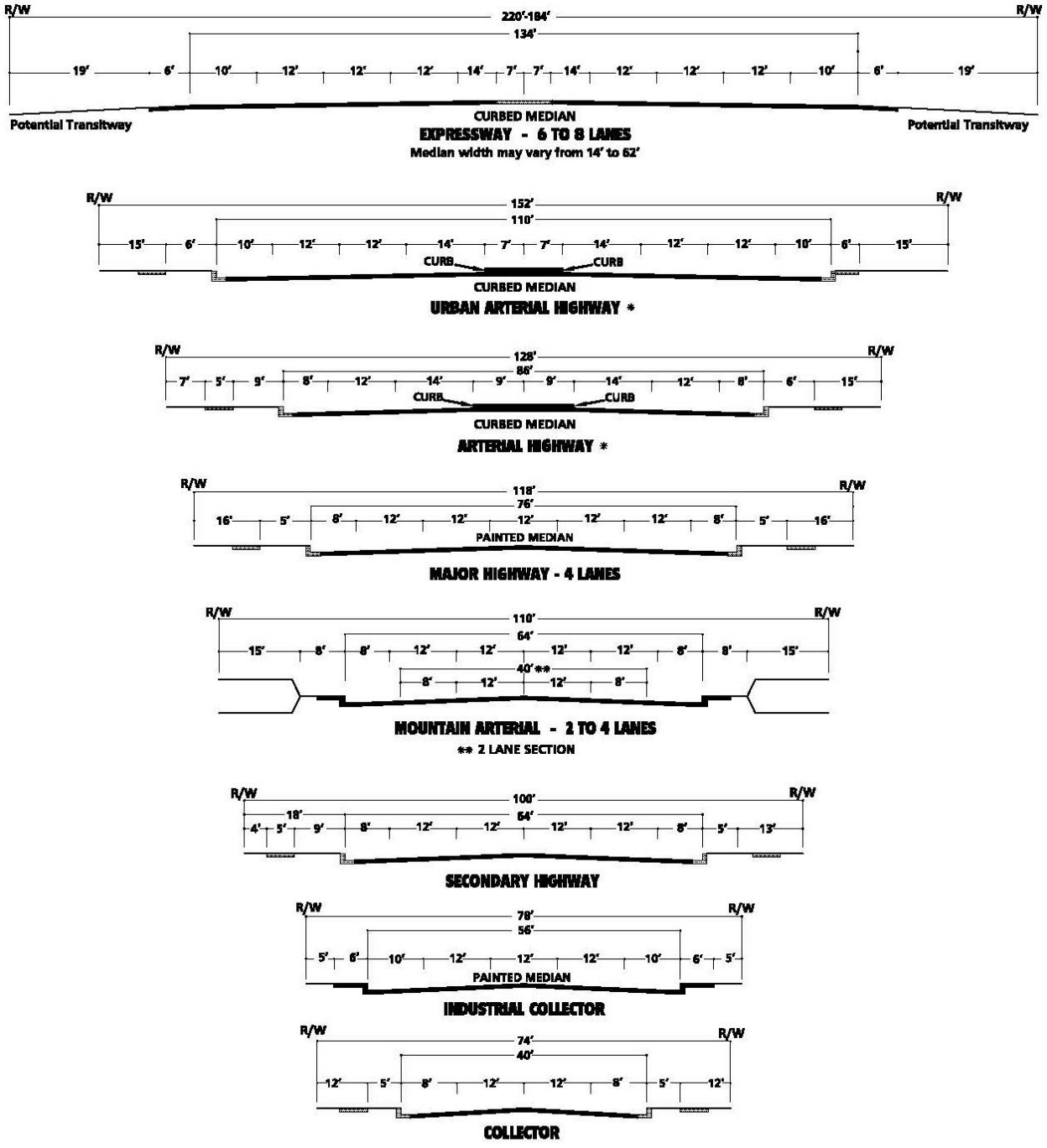


EXHIBIT 3-3: COUNTY OF RIVERSIDE GENERAL PLAN ROADWAY CROSS-SECTIONS



* IMPROVEMENTS MAY BE RECONFIGURED TO ACCOMMODATE EXCLUSIVE TRANSIT LANES OR ALTERNATIVE LANE ARRANGEMENTS ADDITIONAL RIGHT OF WAY MAY BE REQUIRED AT INTERSECTIONS TO ACCOMMODATE ULTIMATE IMPROVEMENTS FOR STATE HIGHWAYS SHALL CONFORM TO CALTRANS DESIGN STANDARDS.

NOT TO SCALE

SOURCE: COUNTY OF RIVERSIDE
July 7, 2020

3.3 BICYCLE & PEDESTRIAN FACILITIES

Exhibit 3-4 illustrates the Lake Mathews/Woodcrest Area Plan bicycle facilities. Existing pedestrian facilities within the study area are shown on Exhibit 3-5. As shown on Exhibit 3-5, there are limited pedestrian facilities in the vicinity of the Project site. Field observations and traffic counts conducted in May 2022 indicate light pedestrian and bicycle activity within the study area.

3.4 TRANSIT SERVICE

The study area within the County of Riverside is currently served by Riverside Transit Agency (RTA), a public transit agency serving various jurisdictions within Riverside County. Existing transit routes in the vicinity of the study area are illustrated on Exhibit 3-6. As shown, the existing RTA Route 27 runs along Van Buren Boulevard to the south of the Project. There is an existing bus stop on Van Buren Boulevard near Gamble Avenue. Transit service is reviewed and updated by RTA periodically to address ridership, budget, and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate. As such, it is recommended that the Project Applicant work in conjunction with RTA to potentially extend the existing routes to accommodate bus service to the site.

3.5 EXISTING (2022) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in May 2022. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

The 2022 weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules. As such, no additional adjustments were made to the traffic counts to establish the baseline condition. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1.

Existing weekday ADT volumes are shown on Exhibit 3-8. Where actual 24-hour tube count data was not available, Existing ADT volumes were based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 11.81 = Leg Volume

EXHIBIT 3-4: LAKE MATHEWS/WOODCREST AREA PLAN BICYCLE FACILITIES

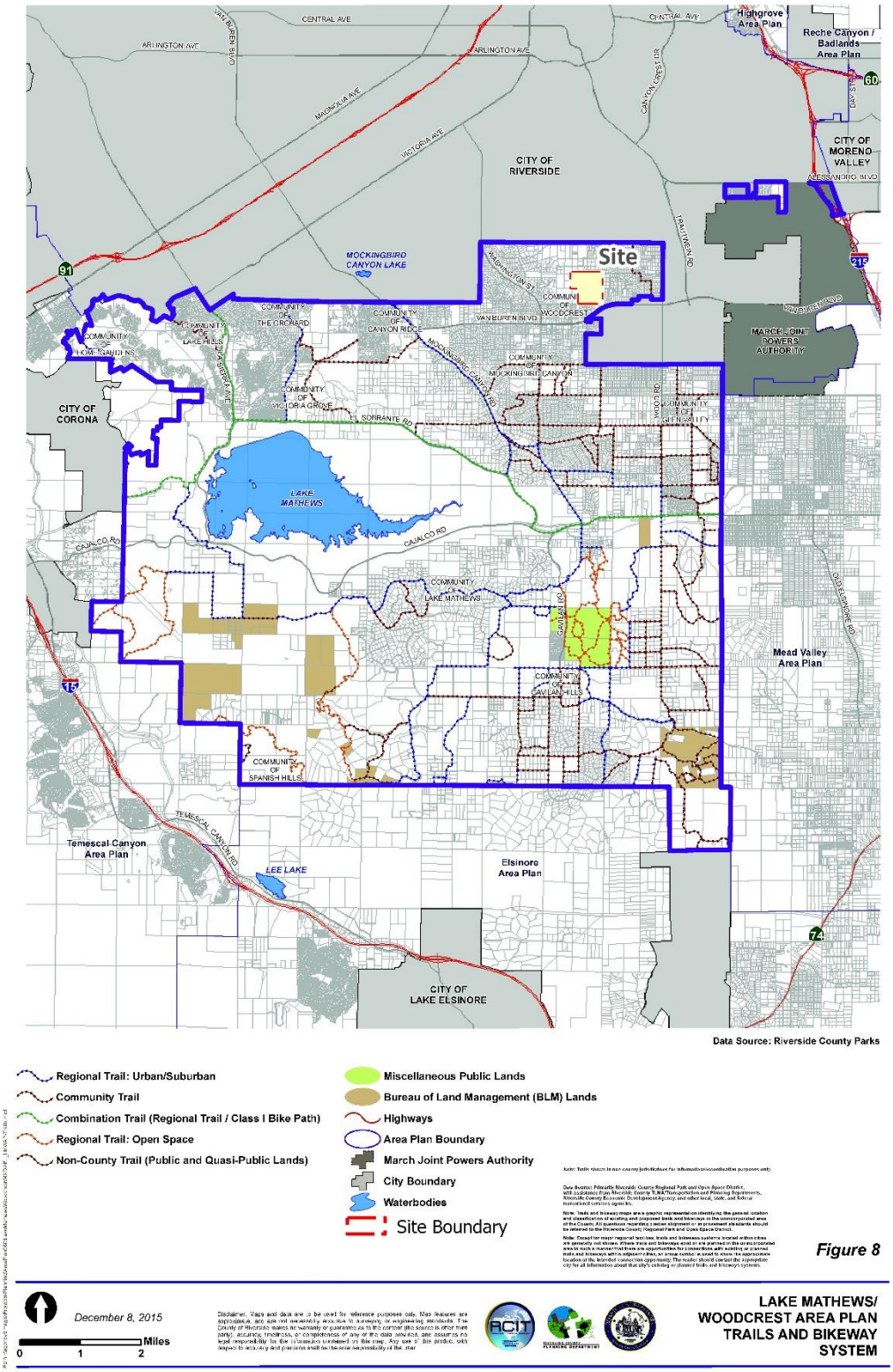


EXHIBIT 3-5: EXISTING PEDESTRIAN FACILITIES

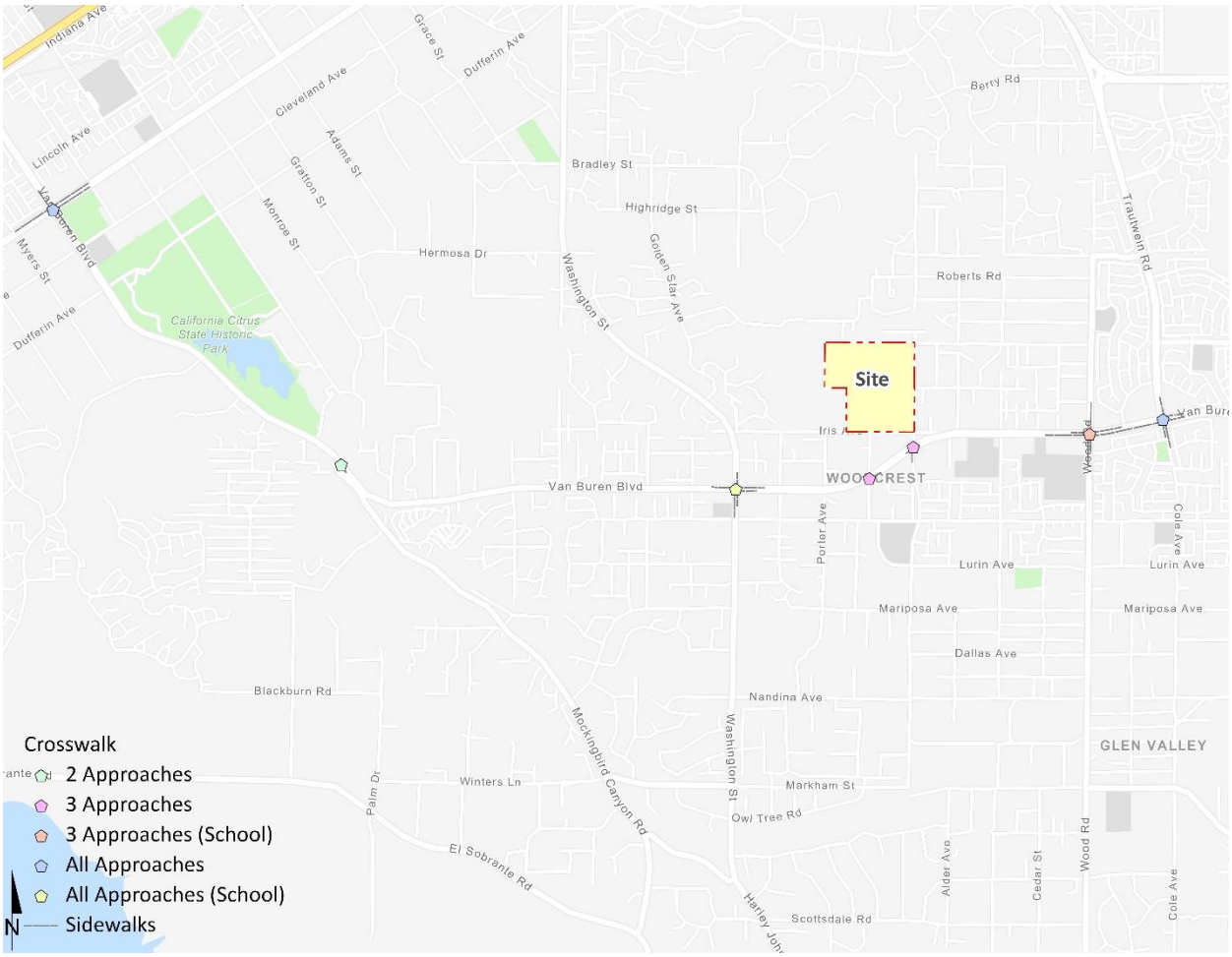
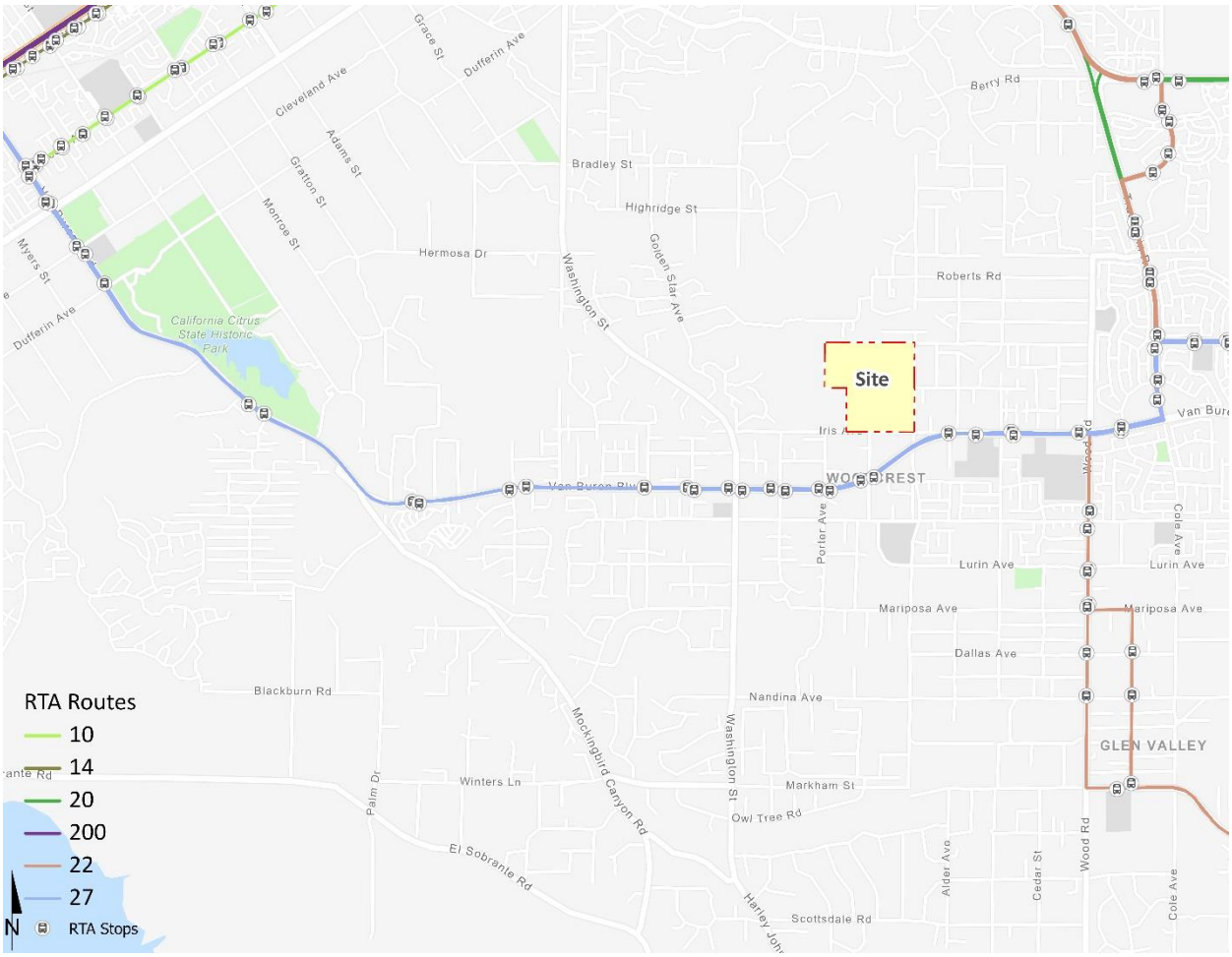


EXHIBIT 3-6: EXISTING TRANSIT ROUTES



A comparison of the PM peak hour and daily traffic volumes of various roadway segments within the study area indicated that the peak-to-daily relationship is approximately 8.46 percent. As such, the above equation utilizing a factor of 11.81 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 8.46 percent (i.e., 1/0.0846 = 11.81) and was assumed to sufficiently estimate average daily traffic (ADT) volumes for planning-level analyses. Existing weekday peak hour intersection volumes are also shown on Exhibit 3-8.

3.6 INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1, which indicates that all of the study area intersections are currently operating at an unacceptable LOS during the peak hours. The intersection operations analysis worksheets are included in Appendix 3.2 of this TA.

TABLE 3-1: INTERSECTION ANALYSIS FOR EXISTING (2022) CONDITIONS

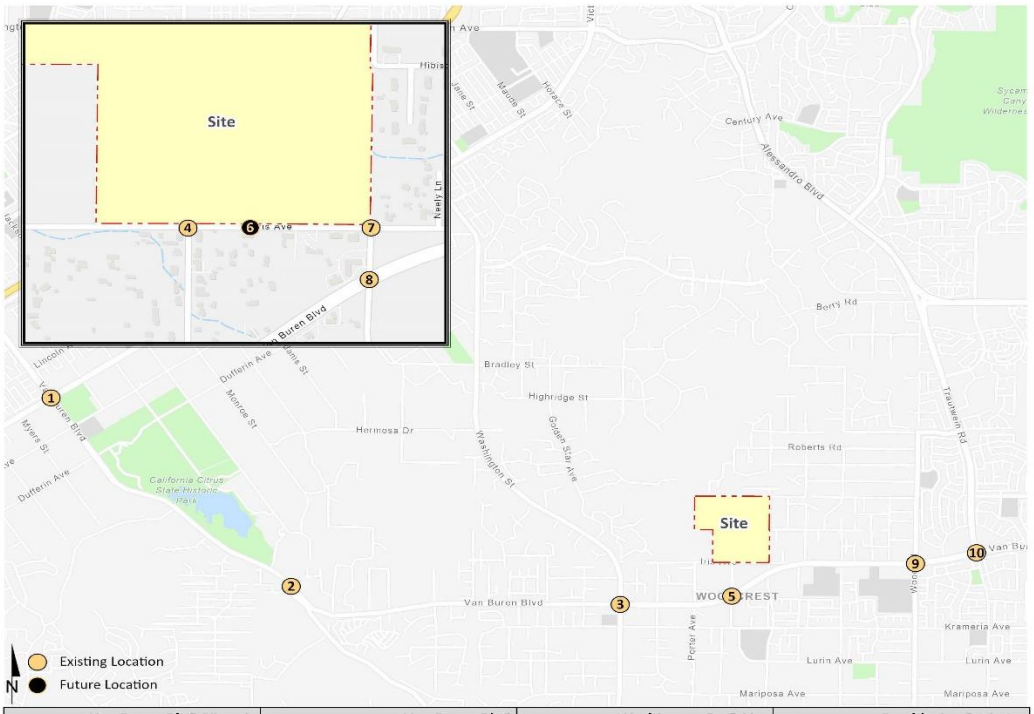
#	Intersection	Traffic Control [1]	Delay[2] (secs.)		Level of Service	
			AM	PM	AM	PM
1	Van Buren Bl. & Victoria Av.	TS	18.3	29.7	B	C
2	Van Buren Bl. & Mockingbird Canyon Rd.	TS	7.2	5.6	A	A
3	Washington St. & Van Buren Bl.	TS	29.4	35.5	C	D
4	Gamble Av. & Iris Av.	CSS	8.4	8.4	A	A
5	Gamble Av. & Van Buren Bl.	TS	5.1	4.8	A	A
6	Street O & Iris Av.		Future Intersection			
7	Chicago Av. & Iris Av.	CSS	8.5	8.5	A	A
8	Chicago Av./Alta Cresta Av. & Van Buren Bl.	TS	13.2	11.4	B	B
9	Wood Rd. & Van Buren Bl.	TS	37.7	26.3	D	C
10	Trautwein Rd./Cole Av. & Van Buren Bl.	TS	27.0	23.1	C	C

[1] TS = Traffic Signal; CSS = Cross-Street Stop

3.7 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. There are no study area intersections that currently meet a traffic signal warrant under Existing (2022) traffic conditions. Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

EXHIBIT 3-8: EXISTING (2022) TRAFFIC VOLUMES



1 Van Buren Bl. & Victoria Av.

30,300 | 24(85) ↲ | 770(1456) ↓ | 27(82) ↳ | 5,750
12(22) ↰
108(132) ←
77(121) ↖
29(31) ⇀
157(160) →
125(323) ↱
218(123) ↑ | 1335(887) ↑ | 168(76) ↗
10,100 | 39,750

2 Van Buren Bl. & Mockingbird Canyon Rd.

32,650 | 126(358) ↲ | 832(1414) ↓ | 26,500
370(180) ⇀
6(3) ↱
4(12) ↑ | 1241(813) ↑
6,500

3 Washington St. & Van Buren Bl.

15,750 | 64(76) ↲ | 148(288) ↓ | 268(435) ↳ | 35,550
451(231) ↰
1159(924) ←
78(149) ↖
113(132) ⇀
821(1198) →
99(33) ↱
112(66) ↑ | 405(169) ↑ | 112(73) ↗
28,700 | 9,200

4 Gamble Av. & Iris Av.

150
1(1) ←
3(6) ↖
4(1) ↱
0(1) ↑ | 3(7) ↑
Nominal | 200

5 Gamble Av. & Van Buren Bl.

5(0) ↲ | 1(0) ↳ | 40,250
3(0) ↰
1634(1263) ←
2(7) ↖
1210(1757) →
2(1) ↱
0(1) ↑ | 1(7) ↑
35,700 | 200

6 Street O & Iris Av.

150
4(7) ←
3(7) →
150

7 Chicago Av. & Iris Av.

150
0(1) ←
5(3) ↖
0(1) →
0(7) ↱
3(6) ↑ | 2(8) ↑
200 | 300

8 Chicago Av./Alta Cresta Av. & Van Buren Bl.

1,100 | 4(12) ↲ | 0(5) ↓ | 5(14) ↳ | 33,800
10(27) ↰
1541(1181) ←
41(34) ↖
27(36) ⇀
1130(1593) →
43(141) ↱
87(46) ↑ | 1(1) ↑ | 43(13) ↗
35,550 | 2,850

9 Wood Rd. & Van Buren Bl.

9,250 | 140(184) ↲ | 405(183) ↓ | 65(61) ↳ | 32,000
97(56) ↰
1036(1070) ←
356(189) ↖
141(147) ⇀
721(1197) →
283(194) ↱
295(196) ↑ | 348(151) ↑ | 197(134) ↗
35,300 | 12,350

10 Trautwein Rd./Cole Av. & Van Buren Bl.

19,600 | 235(208) ↲ | 305(467) ↓ | 151(277) ↳ | 29,500
278(183) ↰
1153(982) ←
132(97) ↖
220(270) ⇀
688(930) →
70(99) ↱
135(75) ↑ | 135(75) ↑ | 81(29) ↗
30,300 | 12,050

##(##) AM(PM) Peak Hour Intersection Volumes
Average Daily Trips

3.8 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

As shown in Table 3-1, all study area intersections are currently operating at an acceptable LOS during the peak hours for Existing (2022) traffic conditions. As such, no improvements have been identified.

This Page Intentionally Left Blank

4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. A preliminary site plan for the proposed Project is shown previously on Exhibit 1-2. The Project is anticipated to be developed in two phases with an opening year of 2026 and 2027. As indicated on Exhibit 1-2, vehicular access will be provided via the following driveways:

- Street O on Iris Avenue: full access
- Chicago Avenue on Iris Avenue: full access

Regional access to the Project site is available from the I-215 Freeway via Scott Road interchange (to the west). The proposed Project is anticipated to be developed in the following phases:

- Phase 1 (2026): 121 single family residential dwelling units
- Project Buildout (2027): 233 single family residential dwelling units

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development.

With the development of Phase 1, the Project is anticipated to generate a total of 1,142 vehicle trip-ends per day with 85 AM peak hour trips and 114 PM peak hour trips (see Table 4-1). Under Project Buildout, the Project is anticipated to generate a total of 2,198 vehicle trip-ends per day with 163 AM peak hour trips and 219 PM peak hour trips (see Table 4-1).

TABLE 4-1: TRIP GENERATION SUMMARY

Land Use[1]	ITE Code	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Single Family Detached Residential	210	DU	0.18	0.52	0.70	0.59	0.35	0.94	9.43

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).

[2] DU = dwelling units

Land Use	Quantity	Units[1]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Phase 1 (2026)	121	DU	22	63	85	72	42	114	1,142
Phase 2 (2027)	112	DU	20	58	78	66	39	105	1,056
Total	233	DU	**42**	**121**	**163**	**138**	**81**	**219**	**2,198**

[1] DU = dwelling units

4.2 PROJECT TRIP DISTRIBUTION

The Project trip distribution and assignment process represents the directional orientation of traffic to and from the Project site. The trip distribution pattern is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system. Exhibit 4-1 illustrates the proposed Project distribution patterns for the proposed Project.

4.3 MODAL SPLIT

The potential for Project trips to be reduced by the use of public transit, walking or bicycling have not been included as part of the Project's estimated trip generation. Essentially, the Project's traffic projections are "conservative" in that these alternative travel modes would reduce the forecasted traffic volumes.

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project (Phase 1) weekday ADT and weekday peak hour intersection turning movement volumes are shown on Exhibit 4-2. Project (Project Buildout) weekday ADT and weekday peak hour intersection turning movement volumes are shown on Exhibit 4-3.

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 2% per year, compounded annually, for 2026 and 2027 traffic conditions. The total ambient growth is 8.24% for 2026 traffic conditions and 10.41% for 2027 traffic conditions. The ambient growth factor is intended to approximate regional traffic growth. This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in conjunction with traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies. 2026 and 2027 traffic volumes are provided in Section 5 and Section 6 of this report. The traffic generated by the proposed Project was then manually added to the base volume to determine With Project forecasts.

EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION

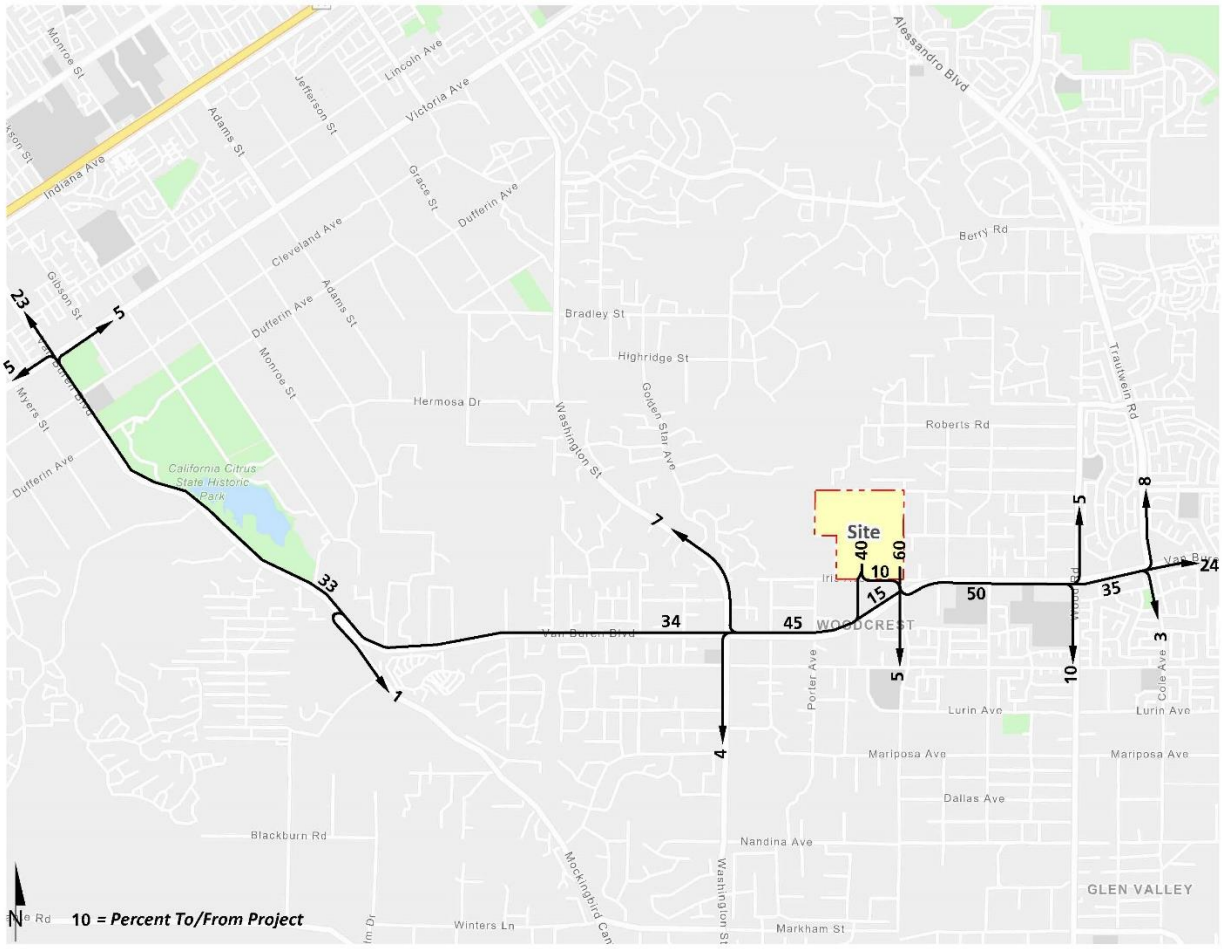
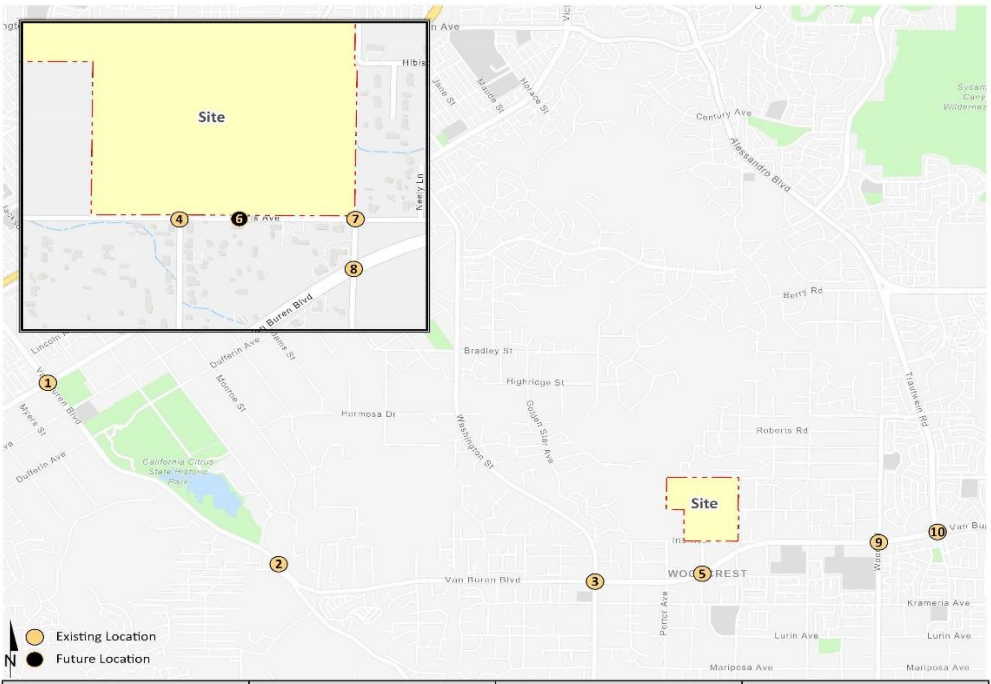


EXHIBIT 4-2: PROJECT ONLY (PHASE 1) TRAFFIC VOLUMES



1 Van Buren Bl. & Victoria Av. — *Nominal*

	5(17) ←	
		1(4) ↰
1(4) ↴	3(2) ↰ 14(10) ↑ 3(2) ↱	

Nominal / *400*

2 Van Buren Bl. & Mockingbird Canyon Rd. — *400*

	7(24) ←	
0(1) ↲	1(0) ↰ 21(14) ↑	

400

3 Washington St. & Van Buren Bl. — *500*

	2(5) ↳	↱ 4(3) ← 21(14) ↰ 3(2)
7(24) →		1(3) ↱

400 / *Nominal*

4 Gamble Av. & Iris Av. — *350*

	↰ 19(13)
	7(22) ↱

350

5 Gamble Av. & Van Buren Bl. — *150*

19(13) ↲	← 9(6)
7(22) ↴ 3(11) →	

350 / *500*

6 Street O & Iris Av. — *100*

19(13) ↲ 6(4) ↳	↱ 2(7)
7(22) ↳	

450 / *350*

7 Chicago Av. & Iris Av. — *800*

38(25) ↓	
6(4) ↲	↰ 2(7) 13(43) ↑

700 / *100*

8 Chicago Av./Alta Cresta Av. & Van Buren Bl. — *Nominal*

9(6) ↲ 3(2) ↓ 32(21) ↳	↱ 11(36)
3(11) ↳	↑ 1(4)

800 / *150*

9 Wood Rd. & Van Buren Bl. — *100*

1(4) ↲	← 8(25)
3(2) ↴ 22(15) → 6(4) ↴	↰ 2(7)

Nominal / *550*

10 Trautwein Rd./Cole Av. & Van Buren Bl. — *Nominal*

2(6) ↲	← 5(17)
5(3) ↳ 15(10) → 2(1) ↴	↰ 1(2) ↑ 1(2)

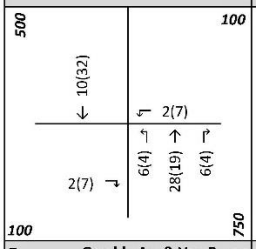
100 / *400*

##(##) AM(PM) Peak Hour Intersection Volumes

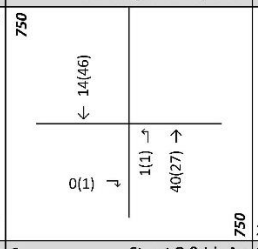
***Average Daily Trips***

EXHIBIT 4-3: PROJECT ONLY (PROJECT BUILDOUT) TRAFFIC VOLUMES

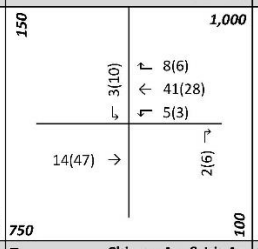
1 Van Buren Bl. & Victoria Av.



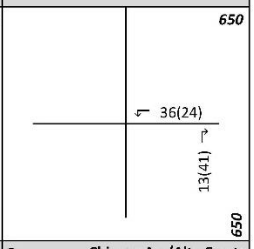
2 Van Buren Bl. & Mockingbird Canyon Rd.



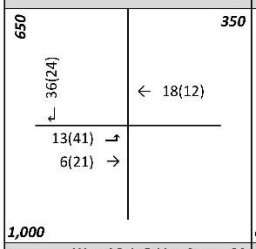
3 Washington St. & Van Buren Bl.



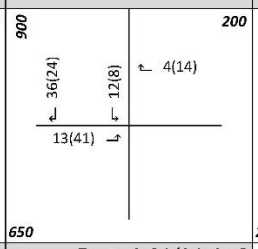
4 Gamble Av. & Iris Av.



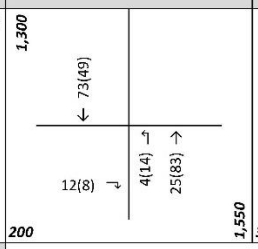
5 Gamble Av. & Van Buren Bl.



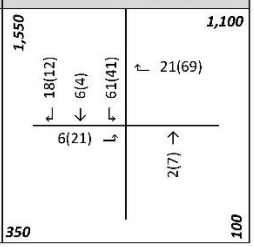
6 Street O & Iris Av.



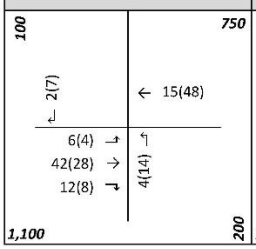
7 Chicago Av. & Iris Av.



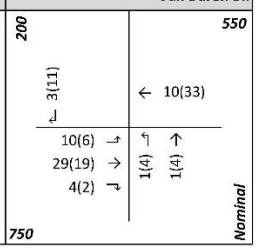
8 Chicago Av./Alta Cresta Av. & Van Buren Bl.



9 Wood Rd. & Van Buren Bl.



10 Trautwein Rd./Cole Av. & Van Buren Bl.



##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the County of Riverside. The cumulative projects listed are those that would generate traffic and would contribute traffic to study area intersections. Exhibit 4-4 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown in Table 4-2. If applicable, the traffic generated by individual cumulative projects was manually added to the Without Project forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-2 are reflected as part of the background traffic. In an effort to conduct a conservative analysis, the cumulative projects are added in conjunction with the ambient growth identified in Section 4.5 *Background Traffic*. Although it is unlikely that all of these cumulative projects would be fully built and occupied by Year 2028, they have been included in an effort to conduct a conservative analysis and overstate as opposed to understate potential traffic deficiencies. Any other cumulative projects located beyond the cumulative study area that are not expected to contribute measurable traffic to study area intersections have not been included since the traffic would dissipate due to the distance from the Project site and study area intersections. Cumulative Only ADT and weekday peak hour intersection turning movement volumes are shown on Exhibit 4-5.

4.7 NEAR-TERM TRAFFIC CONDITIONS

The "buildup" approach combines existing traffic counts with a background ambient growth factor to forecast EAP (2026), EAP (2027), and EAPC (2027) traffic conditions. An ambient growth factor accounts for background (area-wide) traffic increases that occur over time up to the year 2026 and 2027 from the year 2022. Traffic volumes generated by the Project are then added to assess the near-term traffic conditions. The 2026 and 2027 roadway networks are similar to the Existing conditions roadway network, with the exception of future driveways proposed to be developed by the Project.

The near-term traffic analysis includes the following traffic conditions, with the various traffic components:

- Existing Plus Ambient Growth Plus Project (2026)
  - Existing 2022 counts
  - Ambient growth traffic (8.24%)
  - Project (Phase 1) traffic

- Existing Plus Ambient Growth Plus Project (2027)
  - Existing 2022 counts
  - Ambient growth traffic (10.41%)
  - Project (Project Buildout) traffic

- Existing Plus Ambient Growth Plus Project Plus Cumulative (2027)
  - Existing 2022 counts
  - Ambient growth traffic (10.41%)
  - Cumulative Development traffic
  - Project (Project Buildout) traffic

EXHIBIT 4-4: CUMULATIVE DEVELOPMENT LOCATION MAP

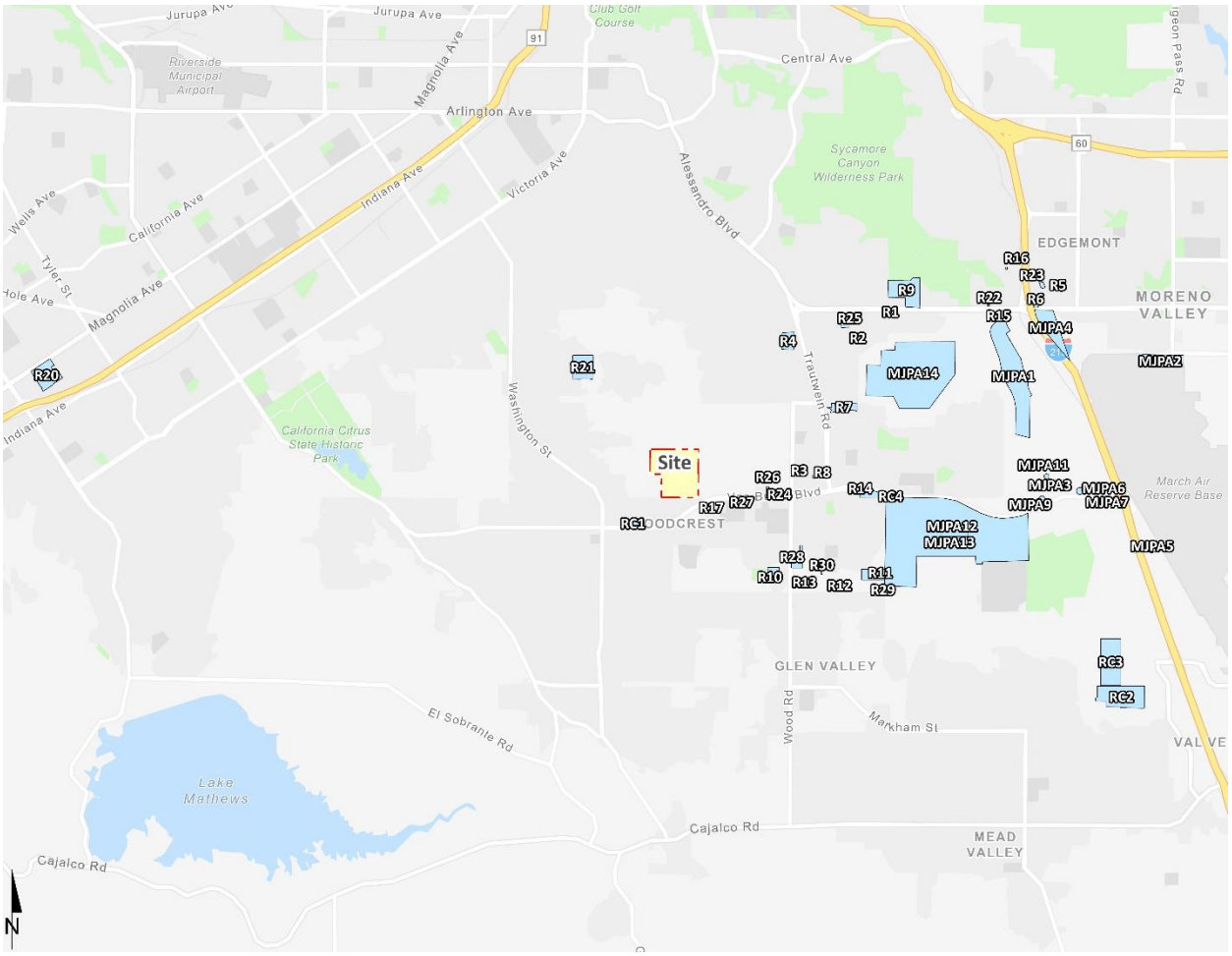
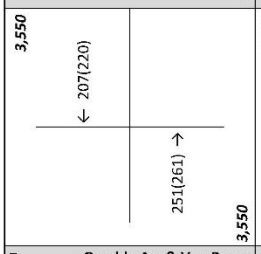
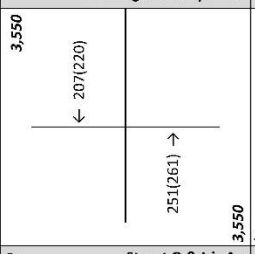


EXHIBIT 4-5: CUMULATIVE ONLY TRAFFIC VOLUMES

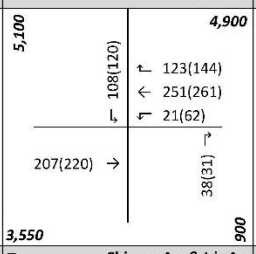
1 Van Buren Bl. & Victoria Av.



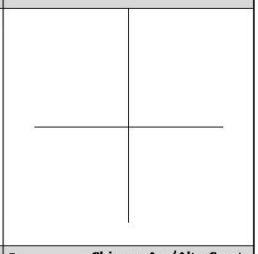
2 Van Buren Bl. & Mockingbird Canyon Rd.



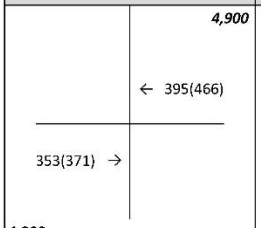
3 Washington St. & Van Buren Bl.



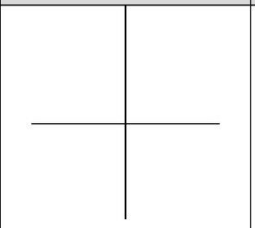
4 Gamble Av. & Iris Av.



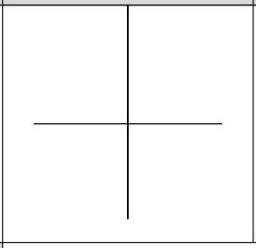
5 Gamble Av. & Van Buren Bl.



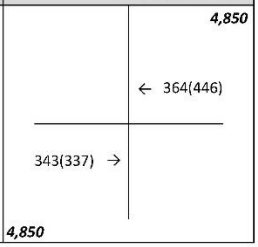
6 Street O & Iris Av.



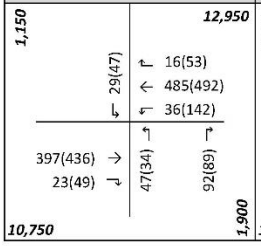
7 Chicago Av. & Iris Av.



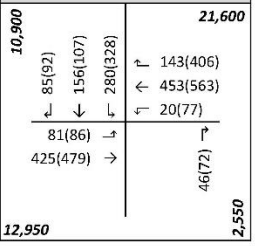
8 Chicago Av./Alta Cresta Av. & Van Buren Bl.



9 Wood Rd. & Van Buren Bl.



10 Trautwein Rd./Cole Av. & Van Buren Bl.



##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

TABLE 4-2: CUMULATIVE DEVELOPMENT LAND USE SUMMARY (1 OF 2)

#	Project/Location	Land Use	Quantity	Units[1]
City of Riverside:				
R1	P17-0419/20/21	Fast Food w/ Drive Thru	2	TSF
R2	P16-0578	Warehouse	82.2	TSF
R3	P19-0151/P19-0152/P19-0153	Health and Fitness Club	22	TSF
R4	P13-0665	SFDR	8	DU
R5	P15-1035/P16-0556/P16-0567	Warehouse	176	TSF
R6	P14-0841 to P14-0848/P16-0472/P16-0474	Warehouse	73.2	TSF
		Commercial Retail	15	TSF
R7	P14-0472/P14-0473/P15-0321/P15-0322	SFDR	85	DU
R8	P19-0022/P19-0024/P19-0026/P19-0027/P19-0028	Fast Food w/ Drive Thru	4.319	TSF
R9	Sycamore Hills Distribution Center	Warehouse	603	TSF
R10	PR-2021-00073	Single Family Detatched Housing	41	DU
R11	P06-1355	Single Family Detatched Housing	20	DU
R12	P06-1396	Single Family Detatched Housing	20	DU
R13	P03-1404	Single Family Detatched Housing	20	DU
R14	P10-0113, P10-0118, P10-0449	Free-Standing Discount Superstore	139	TSF
		Home Improvement Superstore	155.433	TSF
		Shopping Plaza	126	TSF
R15	P12-0360	Vocational School	12	TSF
R16	P12-0507 through P12-0510	Warehouse/Industrial	235.741	TSF
R17	P13-0263, P13-0264, P13-0769	Retail	11	TSF
		Day Care	10	TSF
		Drive-Thru Restaurant	3	TSF
		Office	10.000	TSF
		Medical Office	8.000	TSF
R18	P20-0013, P20-0014, P20-0015, P20-0016	Residential	81	DU
R19	P20-0018, P20-0019, P20-0020, P20-0021	Residential	138	DU
R20	PR-2021-000713	Medical Center	180.474	TSF
R21	P16-0774	Single Family Detatched Housing	46	DU
R22	P14-0600, P14-0601, P14-0602, P15-044	Industrial	121.390	TSF
R23	P14-1070	Warehousing	240.080	TSF
R24	P15-0075, P15-0076, P15-0819	Auto Repair	11.738	TSF
		Fast Food w/ Drive Thru	2.2	TSF
R25	P15-0983, P15-0984	Child Care	15	TSF
R26	P17-0688, P17-0689	Car Wash	5.440	TSF
R27	P19-0042	Restaurant	4.300	TSF
		Office	9.920	TSF
R28	PR-2021-001053	Single Family Detatched Housing	96	DU
County of Riverside:				
RC1	CUP03766	Automated Car Wash	1	TUN
RC2	Knox Business Park	Warehouse	1259.05	TSF
RC3	Oleander Business Park	Warehouse	711	TSF
RC4	PP25382	Commercial Office Building	10.275	TSF

TABLE 4-2: CUMULATIVE DEVELOPMENT LAND USE SUMMARY (2 OF 2)

March Joint Powers Authority:				
MJPA1	Meridian Business Park (West Campus)	Industrial Park	2,278.852	TSF
MJPA2	K4 Parcel	Warehouse	718	TSF
MJPA3	Economic Business Center	Warehouse	124.523	TSF
MJPA4	Freeway Business Center	Warehouse	709.083	TSF
MJPA5	Veteran's Industrial Plaza/VIP 215	Warehouse	2000	TSF
MJPA6	Veteran's Plaza	Commercial Retail	198.000	TSF
MJPA7	MS Van Buren I	Warehouse	176.396	TSF
MJPA8	MS Van Buren II	Warehouse	162	TSF
MJPA9	MS Prime Six	General Office	74.922	TSF
MJPA10	Meridian Distribution Center IV	Warehouse	90.000	TSF
MJPA11	Meridian Distribution Center III	Warehouse	262	TSF
MJPA12	Eagle Business Park	Business Park	390.480	TSF
MJPA13	South Campus	Office	388	TSF
		Commercial Retail	283	TSF
		Business Park	1764.180	TSF
		Industrial Park	1774.437	TSF
MJPA14	West Campus Upper Plateau	High-Cube Fulfillment Warehouse	1,837.000	TSF
		Cold Storage Warehouse	725.561	TSF
		Buisness Park	2,997.386	TSF
		Retail	160.921	TSF
		Park	60.280	AC

[1] AC = Acres; TSF = Thousand Square Feet; DU = Dwelling Unit

4.8 HORIZON YEAR TRAFFIC FORECASTS

Traffic projections for Horizon Year conditions were derived from the RIVCOM regional model using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing and Horizon Year traffic conditions. The base model year for the RIVCOM regional model is Year 2018 and the future year model is Year 2045.

In most instances the traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed. Therefore, the Horizon Year peak hour forecasts were refined using the model derived long-range forecasts, base (validation) year model forecasts, along with existing peak hour traffic count data collected at each analysis location.

The refined future peak hour approach and departure volumes obtained from these calculations are then entered into a spreadsheet program consistent with the National Cooperative Highway Research Program (NCHRP Report 765), along with initial estimates of turning movement proportions. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment forecast volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg.

Typically, the model growth is prorated and is subsequently added to the existing (base validation) traffic volumes to represent Horizon Year traffic conditions. However, review of the resulting model growth indicates negative growth for some of the study area intersections. In an effort to conduct a conservative analysis, reductions to traffic forecasts from either Existing or EAPC traffic conditions were not assumed as part of this analysis. As such, in conjunction with the addition of cumulative projects that are not consistent with the General Plan, additional growth has also been applied on a movement-by-movement basis, where applicable, to estimate reasonable Horizon Year forecasts. Horizon Year turning volumes were compared to EAPC volumes in order to ensure a minimum growth as a part of the refinement process. The minimum growth includes any additional growth between EAPC and Horizon Year traffic conditions that is not accounted for by the traffic generated by cumulative development projects and ambient growth rates assumed between Existing (2022) and Horizon Year traffic conditions. Future estimated peak hour traffic data was used for new intersections and intersections with an anticipated change in travel patterns to further refine the Horizon Year peak hour forecasts. The only instance when the EAPC forecasts would not be used to manually adjust the Horizon Year forecasts is if there are new proposed roadway connections/facilities that would explain the change in travel patterns within the study area.

The future Horizon Year Without Project peak hour turning movements were then reviewed by Urban Crossroads for reasonableness, and in some cases, were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes. Flow conservation checks ensure that traffic flow between two closely spaced intersections, such as two freeway ramp locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there is no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

This Page Intentionally Left Blank

5 EAP (2026 & 2027) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for EAP (2026) and EAP (2027) conditions and the resulting intersection operations and traffic signal warrant analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for EAP (2026) and EAP (2027) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project (Phase 1) to provide site access are also assumed to be in place for EAP (2026) conditions (e.g., intersection and roadway improvements at the Project's frontage and driveways).
- Project driveways and those facilities assumed to be constructed by the Project (Project Buildout) to provide site access are also assumed to be in place for EAP (2027) conditions (e.g., intersection and roadway improvements at the Project's frontage and driveways).

5.2 EAP (2026) GROWTH TRAFFIC VOLUME FORECASTS

This scenario includes Existing (2022) traffic volumes plus an ambient growth factor of 8.24% and the addition of Project (Phase 1) traffic. The weekday ADT volumes and peak hour volumes which can be expected for EAP (2026) traffic conditions are shown on Exhibits 5-1.

5.3 EAP (2027) TRAFFIC VOLUME FORECASTS

This scenario includes Existing (2022) traffic volumes plus an ambient growth factor of 10.41% and the addition of Project (Buildout) traffic. The weekday ADT volumes and peak hour volumes which can be expected for EAP (2027) traffic conditions are shown on Exhibits 5-2.

5.4 INTERSECTION OPERATIONS ANALYSIS

EAP (2026 & 2027) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TA. The intersection analysis results are summarized in Table 5-1 for EAP (2026 & 2027) traffic conditions, which indicates that there are no study area intersections anticipated to operate at an unacceptable LOS during the peak hours under both EAP (2026) and EAP (2027) traffic conditions, consistent with Existing (2022) traffic conditions.

The intersection operations analysis worksheets for EAP (2026) and EAP (2027) traffic conditions are included in Appendices 5.1 and 5.2 of this TA, respectively.

EXHIBIT 5-1: EAP (2026) TRAFFIC VOLUMES

1 Van Buren Bl. & Victoria Av.

33,050 | 26(92) ↲ 838(1593) ↓ 29(89) ↳ | 6,300 | ↱ 13(24) ← 117(143) ↰ 84(135)
31(34) ↳ | ↰ ↑ ↱
170(173) → | 239(135) 1459(970) 185(84)
136(354) ↲ |
11,000 | 43,400

2 Van Buren Bl. & Mockingbird Canyon Rd.

35,750 | 136(388) ↲ 908(1555) ↓ | | 29,050
400(195) ↳ | ↰ ↑
6(4) ↲ | 5(13) 1364(894)
7,050

3 Washington St. & Van Buren Bl.

17,100 | 69(82) ↲ 160(312) ↓ 292(476) ↳ | 39,000 | ↱ 492(253) ← 1276(1014) ↰ 87(163)
122(143) ↳ | ↰ ↑ ↱
896(1321) → | 121(71) 438(183) 122(82)
107(36) ↲ | 10,000
31,450

4 Gamble Av. & Iris Av.

500 | ← 1(1) ↰ 22(19)
4(1) ↲ | ↰ ↱
0(1) 10(30)
Nominal | 550

5 Gamble Av. & Van Buren Bl.

350 | 24(13) ↲ 1(0) ↳ | 43,750 | ↱ 3(0) ← 1778(1373) ↰ 2(8)
7(22) ↳ | ↰ ↱
1313(1913) → | 0(1) 1(8)
2(1) ↲ | 200
39,150

6 Street O & Iris Av.

450 | 19(13) ↲ 6(4) ↳ | 300 | ↱ 2(7) ← 4(8)
7(22) ↳
3(8) →
500

7 Chicago Av. & Iris Av.

700 | 38(25) ↲ | 150 | ← 0(1) ↰ 5(3)
↰ ↑ ↱
0(1) → | 5(13) 13(43) 2(9)
6(12) ↲ | 1,100
300

8 Chicago Av./Alta Cresta Av. & Van Buren Bl.

2,000 | 13(19) ↲ 3(7) ← 37(36) ↳ | 37,150 | ↱ 22(65) ← 1668(1278) ↰ 44(37)
32(50) ↳ | ↰ ↑ ↱
1223(1724) → | 94(50) 2(5) 47(14)
47(153) ↲ | 3,150
38,650

9 Wood Rd. & Van Buren Bl.

10,050 | 153(203) ↲ 438(198) ↓ 70(66) ↳ | 35,000 | ↱ 105(61) ← 1129(1183) ↰ 385(205)
156(161) ↳ | ↰ ↑ ↱
802(1311) → | 321(219) 377(163) 213(145)
312(214) ↲ | 13,500
38,800

10 Trautwein Rd./Cole Av. & Van Buren Bl.

21,300 | 256(231) ↲ 330(505) ↓ 163(300) ↳ | 32,200 | ↱ 301(198) ← 1253(1080) ↰ 143(105)
243(295) ↳ | ↰ ↑ ↱
760(1017) → | 147(83) 147(83) 88(31)
78(108) ↲ | 13,100
33,200

##(##) AM(PM) Peak Hour Intersection Volumes
Average Daily Trips

EXHIBIT 5-2: EAP (2027) TRAFFIC VOLUMES

1 Van Buren Bl. & Victoria Av.

33,950 | 6,450
26(94) ↲ 860(1640) ↓ 30(91) ↳
13(24) ↱
119(146) ←
87(141) ↰
32(34) ↳ | ↰ ↑ ↱
173(177) → | 247(140) | 1502(998) | 191(88)
140(364) ↲
11,250 | 44,600

2 Van Buren Bl. & Mockingbird Canyon Rd.

36,800
139(395) ↲ 933(1607) ↓
409(199) ↳ | ↰ ↑
7(4) ↲ | 5(14) | 1410(925)
7,200 | 30,000

3 Washington St. & Van Buren Bl.

17,500 | 40,250
71(84) ↲ 163(318) ↓ 299(490) ↳
506(261) ↱
1321(1048) ←
91(168) ↰
125(146) ↳ | ↰ ↑ ↱
920(1370) → | 124(73) | 447(187) | 126(87)
109(36) ↲
32,450 | 10,250

4 Gamble Av. & Iris Av.

850
1(1) ←
39(31) ↰
4(1) ↲ | ↰ | ↱
0(1) | 16(49)
Nominal | 850

5 Gamble Av. & Van Buren Bl.

650 | 44,800
42(24) ↲ 1(0) ↳
3(0) ↱
1822(1406) ←
2(8) ↰
13(41) ↳ | ↰ ↱
1342(1961) → | 0(1) | 1(8)
2(1) ↲
40,400 | 200

6 Street O & Iris Av.

900 | 400
36(24) ↲ 12(8) ↳
4(14) ↱
4(8) ←
13(41) ↳
3(8) →
850

7 Chicago Av. & Iris Av.

1,300 | 150
73(49) ↓
0(1) ←
6(3) ↰
↰ ↑ ↱
0(1) → | 7(21) | 25(83) | 2(9)
12(16) ↲
400 | 1,850

8 Chicago Av./Alta Cresta Av. & Van Buren Bl.

2,800 | 38,450
22(25) ↲ 6(10) ← 67(56) ↳
32(99) ↱
1701(1304) ←
45(38) ↰
36(61) ↳ | ↰ ↑ ↱
1248(1759) → | 96(51) | 3(8) | 47(14)
47(156) ↲
39,600 | 3,250

9 Wood Rd. & Van Buren Bl.

10,300 | 36,100
157(210) ↲ 447(202) ↓ 72(67) ↳
107(62) ↱
1159(1229) ←
393(209) ↰
162(166) ↳ | ↰ ↑ ↱
838(1350) → | 330(230) | 384(167) | 218(148)
324(222) ↲
40,100 | 13,900

10 Trautwein Rd./Cole Av. & Van Buren Bl.

21,800 | 33,100
262(241) ↲ 337(516) ↓ 167(306) ↳
307(202) ↱
1283(1117) ←
146(107) ↰
253(304) ↳ | ↰ ↑ ↱
789(1046) → | 150(87) | 150(87) | 89(32)
81(111) ↲
34,200 | 13,350

##(##) AM(PM) Peak Hour Intersection Volumes
Average Daily Trips

TABLE 5-1: INTERSECTION ANALYSIS FOR EAP (2026 & 2027) CONDITIONS

#	Intersection	Traffic Control[1]	Existing (2022) Delay (secs.) AM	Existing (2022) Delay (secs.) PM	Existing (2022) Level of Service AM	Existing (2022) Level of Service PM	EAP (2026) Delay (secs.) AM	EAP (2026) Delay (secs.) PM	EAP (2026) Level of Service AM	EAP (2026) Level of Service PM	EAP (2027) Delay (secs.) AM	EAP (2027) Delay (secs.) PM	EAP (2027) Level of Service AM	EAP (2027) Level of Service PM
1	Van Buren Bl. & Victoria Av.	TS	18.3	29.7	B	C	20.8	38.9	C	D	21.9	43.7	C	D
2	Van Buren Bl. & Mockingbird Canyon Rd.	TS	7.2	5.6	A	A	7.8	6.0	A	A	8.0	6.2	A	A
3	Washington St. & Van Buren Bl.	TS	29.4	35.5	C	D	34.4	42.6	C	D	36.7	46.2	D	D
4	Gamble Av. & Iris Av.	CSS	8.4	8.4	A	A	8.4	8.5	A	A	8.5	8.5	A	A
5	Gamble Av. & Van Buren Bl.	TS	5.1	4.8	A	A	6.0	6.7	A	A	6.2	7.3	A	A
6	Street O & Iris Av.	CSS	Future Intersection				8.5	8.6	A	A	8.6	8.7	A	A
7	Chicago Av. & Iris Av.	CSS	8.5	8.5	A	A	9.4	9.3	A	A	9.7	9.7	A	A
8	Chicago Av./Alta Cresta Av. & Van Buren Bl.	TS	13.2	11.4	B	B	16.5	13.0	B	B	18.9	14.7	B	B
9	Wood Rd. & Van Buren Bl.	TS	37.7	26.3	D	C	45.9	30.9	D	C	49.2	32.9	D	C
10	Trautwein Rd./Cole Av. & Van Buren Bl.	TS	27.0	23.1	C	C	30.2	25.5	C	C	31.3	26.6	C	C

[1] TS = Traffic Signal; CSS = Cross-Street Stop

5.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

The traffic signal warrant analysis for EAP (2026 & 2027) traffic conditions are based on the peak hour volumes or planning level ADT volume-based traffic signal warrants. There are no study area intersections anticipated to meet a traffic signal warrant under EAP (2026) and EAP (2027) traffic conditions (see Appendices 5.3 and 5.4, respectively).

5.6 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

As shown in Table 5-1, all study area intersections are anticipated to continue to operate at an acceptable LOS during the peak hours for both EAP (2026) and EAP (2027) traffic conditions. As such, no improvements have been identified.

6 EAPC (2027) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for EAPC (2027) traffic conditions and the resulting intersection operations and traffic signal warrant analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Background Plus Project Plus Cumulative Projects conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project (Project Buildout) to provide site access are also assumed to be in place for EAPC (2027) conditions (e.g., intersection and roadway improvements at the Project's frontage and driveways).
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for EAPC (2027) conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages).

6.2 BACKGROUND PLUS PROJECT PLUS CUMULATIVE PROJECTS TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 10.41%, the addition of traffic generated by cumulative development projects, and the addition of Project (Buildout) traffic. The weekday ADT and weekday peak hour intersection turning movement volumes which can be expected for EAPC (2027) traffic conditions are shown on Exhibit 6-1.

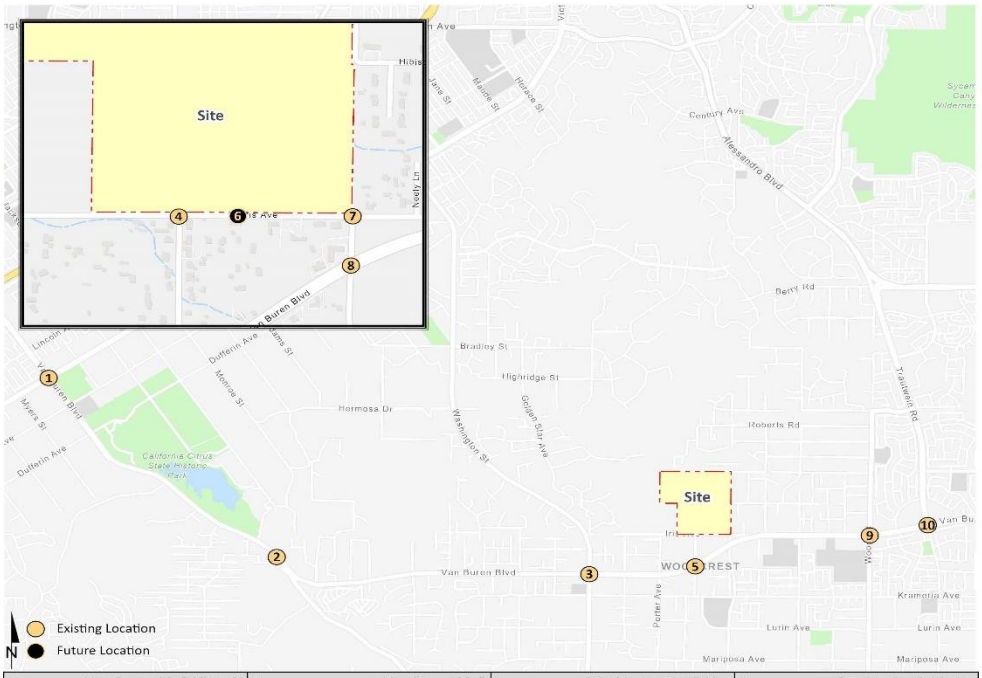
6.3 INTERSECTION OPERATIONS ANALYSIS

EAPC (2027) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TA. The intersection analysis results are summarized in Table 6-1 for EAPC (2027) traffic conditions, which indicates that the following study area intersection is anticipated to continue to operate at an unacceptable LOS during the peak hours:

- Washington Street & Van Buren Boulevard (#3) – LOS E AM and PM peak hours
- Wood Road & Van Buren Boulevard (#9) – LOS F AM and PM peak hours
- Trautwein Road/Cole Avenue & Van Buren Boulevard (#10) – LOS F AM peak hour; LOS E PM peak hour

The intersection operations analysis worksheets for EAPC (2027) traffic conditions are included in Appendix 6.1.

EXHIBIT 6-1: EAPC (2027) TRAFFIC VOLUMES



1 Van Buren Bl. & Victoria Av.

								5,850
							↱ 13(24)	
							← 119(146)	
							↰ 87(141)	
							32(34) ↳	
							173(177) →	
							140(364) ↲	
34,350								
	26(94)	1067(1860)	30(91)					
	↲	←	↳	↰	↑	↱		
				247(140)	1753(1259)	191(88)		
10,200								**48,200**

2 Van Buren Bl. & Mockingbird Canyon Rd.

			409(199) ↳		
			7(4) ↲		
36,950					
	139(395)	1140(1827)			
	↲	←	↰	↑	
			5(14)	1661(1185)	
6,500					**33,550**

3 Washington St. & Van Buren Bl.

								41,500
							↱ 629(405)	
							← 1572(1309)	
							↰ 112(230)	
							125(146) ↳	
							1127(1590) →	
							109(36) ↲	
20,950								
	71(84)	163(318)	407(610)					
	↲	←	↳	↰	↑	↱		
				124(73)	447(187)	164(118)		
33,000								**11,100**

4 Gamble Av. & Iris Av.

								850
							← 1(1)	
							↰ 39(31)	
							4(1) ↲	

TABLE 6-1: INTERSECTION ANALYSIS FOR EAPC (2027) CONDITIONS

#	Intersection	Traffic Control[1]	EAPC (2027) Delay (secs.) AM	EAPC (2027) Delay (secs.) PM	EAPC (2027) Level of Service AM	EAPC (2027) Level of Service PM
1	Van Buren Bl. & Victoria Av.	TS	25.8	52.9	C	D
2	Van Buren Bl. & Mockingbird Canyon Rd.	TS	8.8	6.6	A	A
3	Washington St. & Van Buren Bl.	TS	**59.7**	**79.6**	**E**	**E**
4	Gamble Av. & Iris Av.	CSS	8.6	8.8	A	A
5	Gamble Av. & Van Buren Bl.	TS	8.2	11.1	A	B
6	Street O & Iris Av.	CSS	8.6	8.7	A	A
7	Chicago Av. & Iris Av.	CSS	9.7	9.7	A	A
8	Chicago Av./Alta Cresta Av. & Van Buren Bl.	TS	30.7	23.7	C	C
9	Wood Rd. & Van Buren Bl.	TS	**114.9**	**87.6**	**F**	**F**
10	Trautwein Rd./Cole Av. & Van Buren Bl.	TS	**92.0**	**77.0**	**F**	**E**

* **BOLD** = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] TS = Traffic Signal; CSS = Cross-Street Stop; AWS = All-Way Stop; CSS = Improvemer

6.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

The traffic signal warrant analysis for EAPC (2027) traffic conditions are based on the peak hour volumes or planning level ADT volume-based traffic signal warrants. There are no study area intersections anticipated to meet a traffic signal warrant under EAPC (2027) traffic conditions (see Appendix 6.2).

6.5 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections that have been identified as deficient under EAPC (2027) traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better). The effectiveness of the recommended improvement strategies to address EAPC (2027) traffic deficiencies are presented in Table 6-2. Worksheets for EAPC (2027), with improvements, HCM calculation worksheets are provided in Appendix 6.3.

TABLE 6-2: EAPC (2027) CONDITIONS INTERSECTION OPERATIONS ANALYSIS WITH IMPROVEMENTS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1] Northbound L	T	R	Southbound L	T	R	Eastbound L	T	R	Westbound L	T	R	Delay (secs.) AM	PM	Level of Service AM	PM
3	Washington St. & Van Buren Bl.																	
	- Without Improvements	TS	2	2	1	2	2	0	1	2	0	1	2	1	**59.7**	**79.6**	**E**	**E**
	- With Improvements	TS	2	2	1	2	2	0	1	**3**	0	1	**3**	1	35.9	52.8	D	D
9	Wood Rd. & Van Buren Bl.																	
	- Without Improvements	TS	2	2	0	1	2	0	1	2	1	2	2	1	**114.9**	**87.6**	**F**	**F**
	- With Improvements	TS	2	2	0	1	2	0	1	**3**	1	2	**3**	1	50.5	39.6	D	D
10	Trautwein Rd./Cole Av. & Van Buren Bl.																	
	- Without Improvements	TS	1	2	0	2	2	1	2	2	1	1	3	1	**92.0**	**77.0**	**F**	**E**
	- With Improvements	TS	1	2	0	2	2	1	2	**3**	1	1	3	1	53.9	51.4	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1 = Improvement

[2] Per the Highway Capacity Manual 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal

7 HORIZON YEAR (2045) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Horizon Year (2045) conditions and the resulting intersection operations and traffic signal warrant analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year (2045) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project (Project Buildout) to provide site access are also assumed to be in place for Horizon Year (2045) conditions (e.g., intersection and roadway improvements at the Project's frontage and driveways).
- Other parallel facilities, that although not evaluated for the purposes of this analysis, are anticipated to be in place for Horizon Year traffic conditions and would affect the travel patterns within the study area.

7.2 HORIZON YEAR (2045) TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-process volumes obtained from the RIVCOM, plus the traffic generated by the proposed Project for With Project conditions only. The weekday ADT and weekday AM and PM peak hour volumes, in actual vehicles, which can be expected for Horizon Year (2045) Without and With Project traffic conditions are shown on Exhibits 7-1 and 7-2, respectively.

7.3 INTERSECTION OPERATIONS ANALYSIS

Horizon Year (2045) conditions peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TA. The intersection analysis results are summarized in Table 7-1 for Horizon Year (2045) conditions which indicates the following study area intersections are anticipated to operate at an unacceptable LOS under Horizon Year (2045) Without Project traffic conditions:

- Van Buren Boulevard & Victoria Avenue (#1) – LOS F PM peak hour only
- Washington Street & Van Buren Boulevard (#3) – LOS F AM and PM peak hours
- Wood Road & Van Buren Boulevard (#9) – LOS F AM and PM peak hours
- Trautwein Road/Cole Avenue & Van Buren Boulevard (#10) – LOS F AM and PM peak hours

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic, under Horizon Year (2045) With Project traffic conditions. The intersection operations analysis worksheets for Horizon Year (2045) Without and With Project traffic conditions are included in Appendices 7.1 and 7.2, respectively.

EXHIBIT 7-1: HORIZON YEAR (2045) WITHOUT PROJECT TRAFFIC VOLUMES

1 Van Buren Bl. & Victoria Av.

41,150 | 30(228) ↲ 1142(1989) ↓ 36(114) ↳ | 7,000
↰ 16(27)
← 131(160)
↰ 94(147)
39(54) ↳
191(194) →
152(392) ↴
↰ 265(162) → 1873(1338) ↱ 204(92)
12,250 | 51,850

2 Van Buren Bl. & Mockingbird Canyon Rd.

43,250 | ↲ 187(456) ↓ 1217(1938)
449(230) ↳
7(4) ↴
↰ 6(15) → 1758(1248)
12,100 | 35,750

3 Washington St. & Van Buren Bl.

24,200 | 92(92) ↲ 209(553) ↓ 433(648) ↳ | 48,100
↰ 670(425)
← 1659(1383)
↰ 116(264)
172(178) ↳
1204(1675) →
152(84) ↴
↰ 325(117) → 1144(254) ↱ 233(120)
38,400 | 12,050

4 Gamble Av. & Iris Av.

200
← 1(1)
↰ 4(7)
5(1) ↴
↰ 0(1) ↱ 4(9)
Nominal | 200

5 Gamble Av. & Van Buren Bl.

6(0) ↲ 1(0) ↳ | 53,800
↰ 4(0)
← 2379(2000)
↰ 2(9)
1823(2505) →
2(1) ↴
↰ 0(1) ↱ 1(9)
48,300 | 250

6 Street O & Iris Av.

200
← 5(9)
4(9) →
200

7 Chicago Av. & Iris Av.

200
← 0(1)
↰ 6(4)
0(1) →
0(9) ↴
↰ 4(7) ↱ 2(10)
200 | 350

8 Chicago Av./Alta Cresta Av. & Van Buren Bl.

1,350 | 5(15) ↲ 0(6) ↓ 6(17) ↳ | 41,050
↰ 12(33)
← 2236(1880)
↰ 50(41)
33(44) ↳
1715(2272) →
52(171) ↴
↰ 106(56) → 1(1) ↱ 52(16)
43,150 | 3,450

9 Wood Rd. & Van Buren Bl.

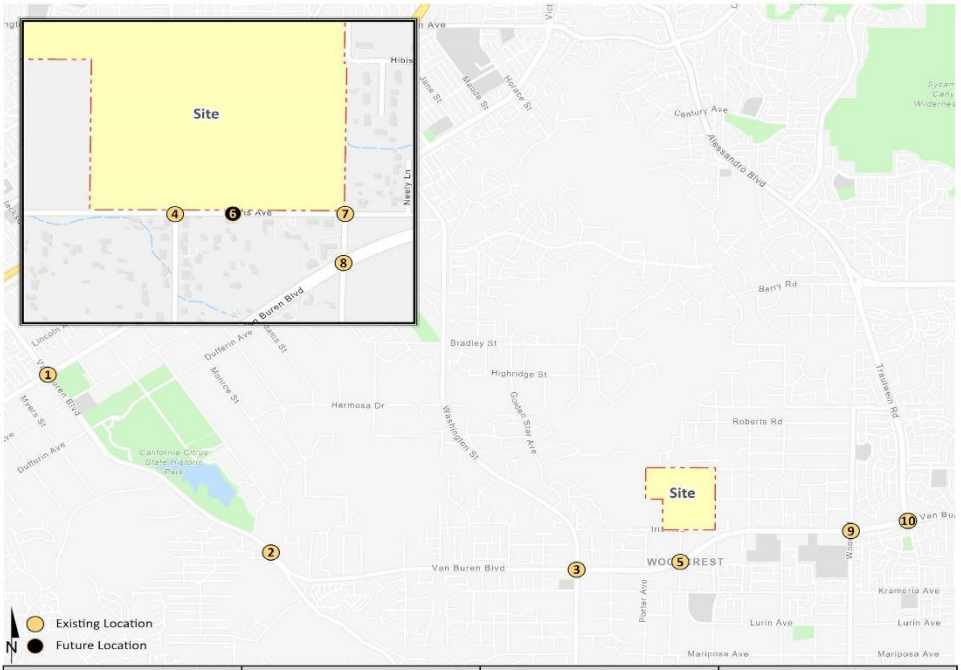
12,600 | 240(223) ↲ 552(305) ↓ 108(166) ↳ | 40,250
↰ 134(201)
← 1743(1792)
↰ 468(372)
181(211) ↳
1273(1890) →
367(285) ↴
↰ 405(272) → 423(237) ↱ 331(252)
45,300 | 17,850

10 Trautwein Rd./Cole Av. & Van Buren Bl.

28,150 | ↲ 370(345) ↓ 526(674) ↳ 463(664) | 35,850
↰ 481(628)
← 1853(1756)
↰ 207(195)
348(414) ↳
1261(1608) →
104(120) ↴
↰ 164(94) → 164(94) ↱ 144(107)
40,250 | 17,450

##(##) AM(PM) Peak Hour Intersection Volumes
Average Daily Trips

EXHIBIT 7-2: HORIZON YEAR (2045) WITH PROJECT TRAFFIC VOLUMES



1 Van Buren Bl. & Victoria Av.

	41,650	7,100
30(228) ↲	1152(2021) ←	36(114) ↳
39(54) ↳		↰ 16(27)
191(194) →		← 131(160)
154(399) ↲		↰ 96(154)
	↰ 271(166)	↑ 1901(1357) ↱ 210(96)
12,350		52,550

2 Van Buren Bl. & Mockingbird Canyon Rd.

	43,950	
187(456) ↲	1231(1984) ←	
449(230) ↳		
7(5) ↲		
	↰ 7(16)	↑ 1798(1275)
12,100		36,500

3 Washington St. & Van Buren Bl.

	24,350	49,100
92(92) ↲	209(553) ←	436(658) ↳
172(178) ↳		↰ 678(431)
1218(1722) →		← 1700(1411)
152(84) ↲		↰ 121(267)
	↰ 325(117)	↑ 1144(254) ↱ 235(126)
39,150		12,150

4 Gamble Av. & Iris Av.

		850
		← 1(1)
		↰ 40(31)
5(1) ↲		
	↰ 0(1)	↱ 17(50)
Nominal		900

5 Gamble Av. & Van Buren Bl.

650		54,150
42(24) ↲	1(0) ↳	↰ 4(0)
13(41) ↳		← 2397(2012)
1829(2526) →		↰ 2(9)
2(1) ↲		
	↰ 0(1)	↱ 1(9)
49,300		250

6 Street O & Iris Av.

900		400
36(24) ↲	12(8) ↳	↰ 4(14)
13(41) ↳		← 5(9)
4(9) →		
850		

7 Chicago Av. & Iris Av.

1,300		200
	73(49) ←	← 0(1)
		↰ 6(4)
0(1) →		
12(17) ↲		
	↰ 8(21)	↑ 25(83) ↱ 2(10)
450		1,900

8 Chicago Av./Alta Cresta Av. & Van Buren Bl.

2,900		42,150
23(27) ↲	6(10) ↳	67(58) ↰ 33(102)
39(65) ↳		← 2236(1880)
1715(2272) →		↰ 50(41)
52(171) ↲		
	↰ 106(56)	↑ 3(8) ↱ 52(16)
43,500		3,550

9 Wood Rd. & Van Buren Bl.

12,750		41,050
242(230) ↲	552(305) ←	108(166) ↳
187(215) ↳		↰ 134(201)
1315(1918) →		← 1758(1840)
379(293) ↲		↰ 468(372)
	↰ 409(286)	↑ 423(237) ↱ 331(252)
46,400		18,050

10 Trautwein Rd./Cole Av. & Van Buren Bl.

28,350		36,350
373(356) ↲	526(674) ←	463(664) ↳
358(420) ↳		↰ 481(628)
1290(1627) →		← 1863(1789)
108(122) ↲		↰ 207(195)
	↰ 165(98)	↑ 165(98) ↱ 144(107)
41,050		17,500

##(##) AM(PM) Peak Hour Intersection Volumes
Average Daily Trips

TABLE 7-1: INTERSECTION ANALYSIS FOR HORIZON YEAR (2045) CONDITIONS

#	Intersection	Traffic Control[1]	2045 Without Project Delay (secs.) AM	2045 Without Project Delay (secs.) PM	2045 Without Project Level of Service AM	2045 Without Project Level of Service PM	2045 With Project Delay (secs.) AM	2045 With Project Delay (secs.) PM	2045 With Project Level of Service AM	2045 With Project Level of Service PM	Difference in Delay AM	Difference in Delay PM	Project-Related Traffic Deficiency?[2]
1	Van Buren Bl. & Victoria Av.	TS	32.7	**85.6**	C	**F**	34.6	**86.5**	C	**F**	1.9	0.9	No
2	Van Buren Bl. & Mockingbird Canyon Rd.	TS	9.9	7.6	A	A	10.1	7.9	B	A	--	--	No
3	Washington St. & Van Buren Bl.	TS	**138.4**	**116.1**	**F**	**F**	**143.6**	**123.6**	**F**	**F**	**--**	**--**	**Yes**
4	Gamble Av. & Iris Av.	CSS	8.4	8.4	A	A	8.5	8.5	A	A	--	--	No
5	Gamble Av. & Van Buren Bl.	TS	6.7	13.0	A	B	10.6	16.2	B	B	--	--	No
6	Street O & Iris Av.	CSS	Future Intersection				8.6	8.7	A	A	--	--	No
7	Chicago Av. & Iris Av.	CSS	8.6	8.5	A	A	7.3	9.7	A	A	--	--	No
8	Chicago Av./Alta Cresta Av. & Van Buren Bl.	TS	31.0	32.4	C	C	44.7	37.9	A	D	--	--	No
9	Wood Rd. & Van Buren Bl.	TS	**135.6**	**137.0**	**F**	**F**	**140.1**	**148.3**	**F**	**F**	**4.5**	**11.3**	**Yes**
10	Trautwein Rd./Cole Av. & Van Buren Bl.	TS	**118.3**	**101.0**	**F**	**F**	**122.8**	**106.5**	**F**	**F**	**4.5**	**5.5**	**Yes**

[1] TS = Traffic Signal; CSS = Cross-Street Stop

[2] Project-related traffic deficiency occurs if the deficiency thresholds for each applicable agency are met.

7.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

The traffic signal warrant analysis for Horizon Year (2045) traffic conditions are based on the peak hour volumes or planning level ADT volume-based traffic signal warrants. There are no unsignalized study area intersections anticipated to meet a traffic signal warrant under Horizon Year (2045) Without and With Project conditions (see Appendices 7.3 and 7.4).

7.5 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections that have been identified as deficient under Horizon Year (2045) traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better). The effectiveness of the recommended improvement strategies to address Horizon Year (2045) traffic deficiencies are presented in Table 7-2. Worksheets for Horizon Year (2045) Without Project and With Project, with improvements, HCM calculation worksheets are provided in Appendices 7.5 and 7.6, respectively.

TABLE 7-2: HORIZON YEAR (2045) CONDITIONS INTERSECTION OPERATIONS ANALYSIS WITH IMPROVEMENTS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
3	Washington St. & Van Buren Bl.																	
	- Without Project	TS	2	2	1	2	2	0	**2**	**3**	**1**	**2**	**3**	**1>**	52.3	38.9	D	D
	- With Project	TS	2	2	1	2	2	0	**2**	**3**	**1**	**2**	**3**	**1>**	52.7	39.4	D	D
9	Wood Rd. & Van Buren Bl.																	
	- Without Project	TS	2	2	0	1	2	0	1	**3**	1	2	**3**	1	53.2	48.9	D	D
	- With Project	TS	2	2	0	1	2	0	1	**3**	1	2	**3**	1	54.8	51.5	D	D
10	Trautwein Rd./Cole Av. & Van Buren Bl.																	
	- Without Project	TS	1	2	0	2	2	1	2	**3**	1	1	3	1	**63.8**	53.9	**E**	D
	- With Project	TS	1	2	0	2	2	1	2	**3**	1	1	3	1	**65.2**	54.5	**E**	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1 = Improvement; > = Right-Turn Overlap

[2] Per the Highway Capacity Manual 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal

This Page Intentionally Left Blank

8 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the County of Riverside are funded through a combination of improvements constructed by the Project, development impact fee programs or fair share contributions. Fee programs applicable to the Project are described below.

8.1 COUNTY OF RIVERSIDE DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The Project is located within the County's Woodcrest Area Plan and therefore will be subject to County of Riverside DIF in an effort by the County to address development throughout its unincorporated area. The DIF program consists of two separate transportation components: the Roads, Bridges and Major Improvements component and the Traffic Signals component. Eligible facilities for funding by the County DIF program are identified on the County's Public Needs List, which currently extends through the year 2020. (6) A comprehensive review of the DIF program is now planned in order to update the nexus study. This will result in development of a revised "needs list" extending the program time horizon from 2010 to 2030.

The cost of signalizing DIF network intersections is identified under the Traffic Signals component of the DIF program. County staff generally defines DIF eligible intersections as those consisting of two intersecting general plan roadways. If the intersection meets this requirement, it is potentially eligible for up to $235,000 of credit, which is subject to negotiations with the County.

8.2 RIVERSIDE COUNTY TRANSPORTATION UNIFORM MITIGATION FEE (TUMF)

The TUMF program is administered by the WRCOG based upon a regional Nexus Study most recently updated in 2016 to address major changes in right of way acquisition and improvement cost factors. (3) This regional program was put into place to ensure that development pays its fair share, and that funding is in place for construction of facilities needed to maintain the requisite level of service and critical to mobility in the region. TUMF is a truly regional mitigation fee program and is imposed and implemented in every jurisdiction in Western Riverside County.

8.3 MEASURE A

Measure A, Riverside County's half-cent sales tax for transportation, was adopted by voters in 1988 and extended in 2002. It will continue to fund transportation improvements through 2039. Measure A funds a wide variety of transportation projects and services throughout the County. RCTC is responsible for administering the program. Measure A dollars are spent in accordance with a voter-approved expenditure plan that was adopted as part of the 1988 election.

8.4 FAIR SHARE CONTRIBUTION

Project improvements may include a combination of fee payments to established programs, construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the County's discretion). When off-site improvements are identified with a minor share of responsibility assigned to proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements. Detailed fair share calculations, for each peak hour, have been provided in Table 7-1 for the applicable deficient study area intersection and for each applicable phase. These fees are collected with the proceeds solely used as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected population increases.

TABLE 8-1: PROJECT FAIR SHARE CALCULATIONS

#	Intersection		Existing	Project Buildout	2045 With Project	Total New Traffic	Project % of New Traffic[1]
3	Washington St. & Van Buren Bl.						
		AM:	3,830	73	6,483	2,653	2.8%
		PM:	3,774	100	5,893	2,119	**4.7%**
9	Wood Rd. & Van Buren Bl.						
		AM:	4,084	81	6,306	2,222	3.6%
		PM:	3,762	109	6,314	2,552	**4.3%**

[1] **BOLD =** Highest fair share percentage is highlighted.

9 REFERENCES

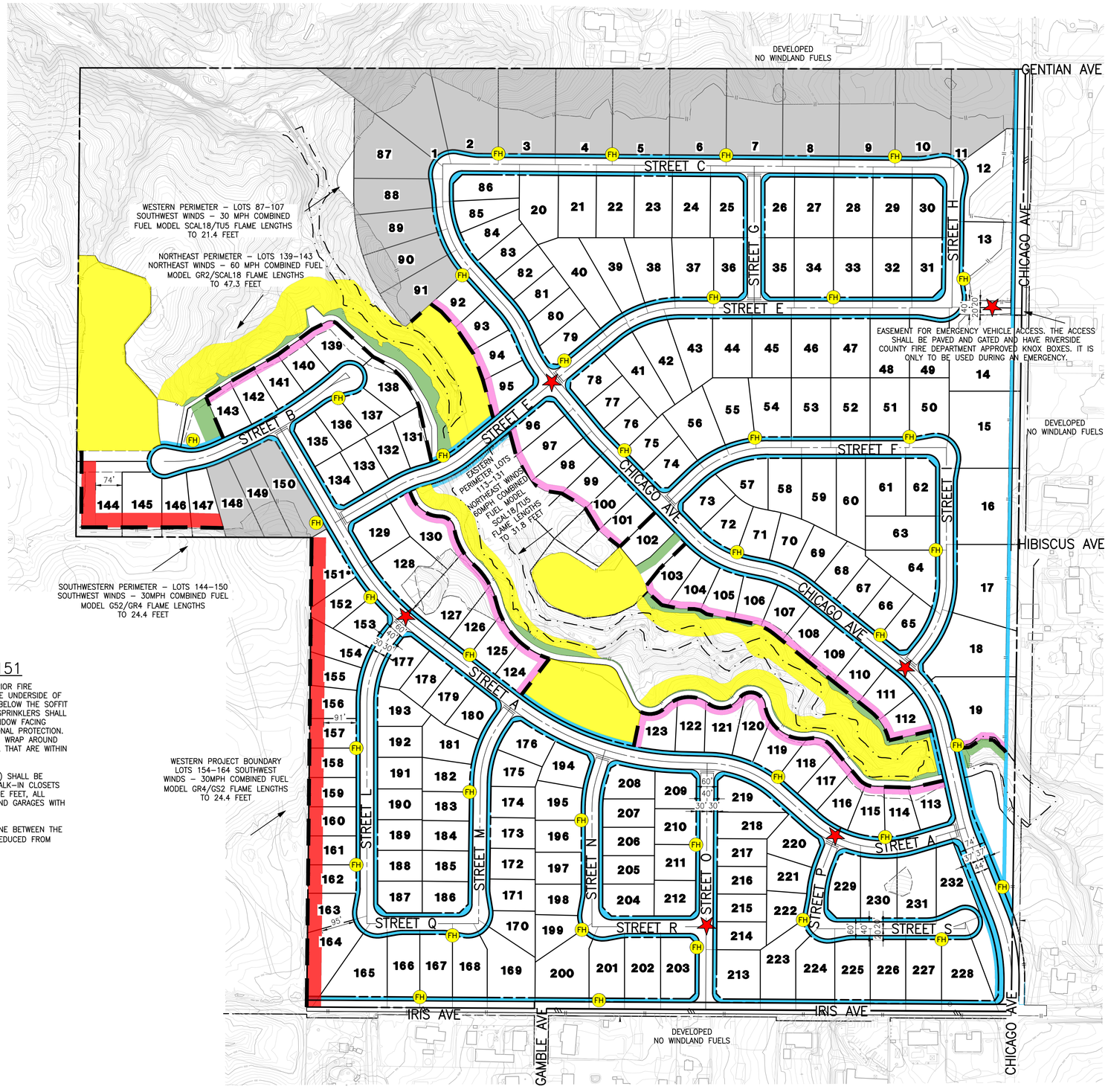
1. **County of Riverside.** *Transportation Analysis Guidelines.* County of Riverside : s.n., December 2020.
2. **Institute of Transportation Engineers.** *Trip Generation Manual.* 11th Edition. 2021.
3. **Western Riverside Council of Governments.** *TUMF Nexus Study, 2016 Program Update.* July 2017.
4. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 6th Edition. s.l. : National Academy of Sciences, 2016.
5. **California Department of Transportation.** California Manual on Uniform Traffic Control Devices (CA MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CA MUTCD).* 2014, Updated March 30, 2021 (Revision 6).
6. **Willdan Financial Services.** *County of Riverside Development Impact Fee Study Update.* County of Riverside : s.n., 2013.

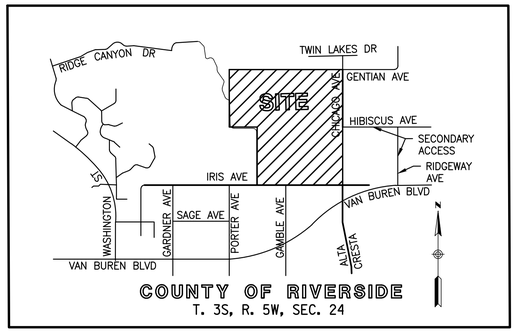
This page intentionally left blank

IN THE COUNTY OF RIVERSIDE, CALIFORNIA

ARROYO VISTA FUEL MODIFICATION PLAN

TRACT MAP 38510





VICINITY MAP

NOT TO SCALE

OWNER

P & F INVESTMENT COMPANY
17100 PIONEER BLVD., SUITE 290
ARTESIA, CA 90701
PHONE (562) 775-4262
CONTACT: KWANG-TIEN HO

APPLICANT

TTLC RIVERSIDE CHICAGO, LLC
4350 VON KARMAN AVE., SUITE 200
NEWPORT BEACH, CA 92660
PHONE (925) 331-7006
CONTACT: MICHAEL TORRES

ENGINEER

RICK ENGINEERING COMPANY
1770 IOWA AVE., SUITE 100
RIVERSIDE, CA 92507
(951) 782-0707
CONTACT: RICHARD O'NEILL

ARROYO VISTA DEVELOPMENT - TTM 38510

LEGEND - FIRE PROTECTION PLAN MAP

UNINCORPORATED RIVERSIDE COUNTY, CALIFORNIA

Symbol	Description
Not Shown	**FUEL TREATMENT ZONE 0 (LOT OWNER MAINTAINED) -** An irrigated zone that is cleared of all existing plants that is 5 feet in width beginning at the outer wall of each structure. No combustible material or plants are allowed in this zone. Plants are limited to small plants typically less than 1 foot in height and that will not spread more than 1 foot. Usually these plants are placed in containers that are located between windows and doors. See written Fire Protection Plan for additional information.
No Color	**FUEL TREATMENT ZONE 1A (LOT OWNER MAINTAINED) -** The lot owner shall plant their lot with fire resistant vegetation and maintain it to Zone 1A criteria. Plants listed in the Prohibited Plant List found in Appendix A of the Fire Protection Plan shall not be planted. Zone 1A shall extend outward from Zone 0 for a distance of 45 feet. Maintenance will be on-going throughout the year as needed. Zone 0 plus Zone 1A will result in 50 feet of irrigated landscaping. The area is permanently irrigated and regularly maintained. See Fire Protection Plan for details. In larger lots that have over 50 feet between the rear of the home and the lot boundary, the area within 100 feet of the home shall be treated to Zone 2 criteria by the lot owner.
	FUEL TREATMENT ZONE 1B (HOA MAINTAINED) - A common area that is maintained to Irrigated Zone 1A criteria shown above by the HOA. It includes all manufactured slopes and level areas located within 50 feet of a home. This zone is often located in and surrounding water quality basins designed to retain runoff from precipitation. See written Fire Protection Plan for details.
	FUEL TREATMENT ZONE 2 (HOA MAINTAINED) - Areas located within 50 and 100 feet from each structure that are thinned within an owners lot or to protect an adjacent structure. This zone will frequently interlink to adjacent lot owners Zone 1A or HOA Zone 1B. This area may include small clusters of trimmed fire resistance native plants up to 18 inches in height and trimmed native trees limbed up to 6 feet from the ground where 50% of the vegetation is removed. The zone may include irrigated or temporarily irrigation needed for specimen shrub and tree establishment for revegetation. Selected native plant clusters over 18 inches in height must be separated by at least 1 1/2 times the mature height of the retained plants. Ground cover, native plants and grasses shall be weed whipped or mowed to 4" or less in stubble height each year once they dry out. See written Fire Protection Plan for additional details.
	ROADSIDE FUEL TREATMENT (HOA MAINTAINED) - This zone shall be maintained as described in Zone 1b above. This zone is permanently irrigated and is the most critical to safe ingress and egress. Should water supplies become limited, this zone should be the last to have its irrigation stopped. See written Fire Protection Plan for additional for details.
	NO BUILD ZONE (LOT OWNER MAINTAINED) - An area that is 20-feet in width that is maintained to Zone 1A criteria. It is located adjacent to wildland vegetation. No combustible construction including the home shall be located in this zone. The zone is suitable for walkways, water features, gardens, and similar non-combustible uses.
	NO BUILD ZONE 40 FEET (LOT OWNER MAINTAINED) - An area located at the rear of the lot adjacent to wildland fuels that is 40 feet in width that is maintained to Zone 1A criteria.No combustible construction including the home shall be located in this zone.
	SETBACK ZONE (ESTABLISHED BY BUILDER) - Homes built on these lots shall be setback from the rear property line and or from the Project boundary a minimum of 100 feet. This will provide space for 100 feet of fuel treatment within each lot.
	SOLID NON-COMBUSTIBLE WALL - A solid non-combustible radiant and convective heat deflection wall 6 feet in height shall be located as shown to both intercept radiant and convective heat from a wildfire. It shall also serve to trap a large number of wind blown embers and reduce fire behavior adjacent to it. See written Fire Protection Plan for details.

Prepared for: TTLC Riverside Chicago, LLC.
4350 Von Karmon Ave., Suite 200
Newport Beach, CA 92660

Prepared By: FIREWISE2000, LLC.
PO Box 339
Lower Lake, CA 95457
Telephone: 760-745-3947
Info@firewise 2000.com

SYMBOL LEGEND

SYMBOL	DESCRIPTION
★	Emergency/Fire Access Way Entrance
FH	The FH (Fire Hydrant) symbol is shown for reference only. Each fire hydrant is to be installed per Riverside County Fire Department requirements.

*NOTES FOR LOT 151

1. THE HOME SHALL HAVE THE INTERIOR FIRE SPRINKLER SYSTEM EXTENDED TO THE UNDERSIDE OF THE SOFFIT OR HIGH ON THE WALL BELOW THE SOFFIT THAT FACES WILDLAND FUELS. FIRE SPRINKLERS SHALL ALSO BE INSTALLED ABOVE EACH WINDOW FACING WILDLAND FUELS TO PROVIDE ADDITIONAL PROTECTION. THESE FIRE SPRINKLERS SHALL ALSO WRAP AROUND THE STRUCTURE ON EACH SIDE WALL THAT ARE WITHIN 40 FEET OF WILDLAND FUELS.

2. FIRE SPRINKLERS (PER NFPA 13D) SHALL BE INSTALLED – THIS SHALL INCLUDE WALK–IN CLOSETS OR ROOMS IN EXCESS OF 55 SQUARE FEET, ALL BATHROOMS REGARDLESS OF SIZE, AND GARAGES WITH LIVING SPACES ABOVE THE GARAGE.

3. CREATE A 20 FOOT NO BUILD ZONE BETWEEN THE STRUCTURE AND WILDLAND FUELS (REDUCED FROM THE CURRENT 40 FEET).

150 75 0 150 300

GRAPHIC SCALE: 1"=150'

Certified By

January 20, 2023

Mel Johnson, Owner — Date

FIREWISE2000, LLC
PO Box 339
Lower Lake, CA 95457
Phone: (760) 745-3947
Info@firewise 2000.com

RICK ENGINEERING COMPANY
1770 IOWA AVE, SUITE 100
RIVERSIDE, CA 92507
951.782.0707
rickengineering.com

TTLC ARROYO VISTA
FUEL MODIFICATION PLAN
TRACT MAP 38510

PROJECT NO:	19427	SCALE:	1"=150'
DRAWN BY:	JMA/ARC	DATE:	1/11/2023

C:\RICK\Projects\C19000\19427_Chicago Ave_DD\19427-AC_Prelim. Engineering\Civil\Exhibits\19427A-EXB011-FireProtectionPlan.dwg – plotted by: arroyoscalfo, ON 2023-01-18 @ 09:53 – ctbrrec_acs.ctb – © 2023 Rick Engineering Company

ARROYO VISTA DEVELOPMENT
FIRE PROTECTION PLAN
Tentative Tract Map 38510
APNs: 245-300-001, 245-300-004
WOODCREST, CALIFORNIA

January 20, 2023

Owner: **TTLC Arroyo Vista , LLC**
4350 Von Karman Ave, Suite 200
Newport Beach, CA 92660

Prepared by: **Herbert Spitzer, Senior Wildland Fire Associate**
***Fire*wise2000, LLC**

Certified by:

Mel Johnson, Owner
***Fire*wise2000, LLC**
PO Box 339
Lower Lake, CA 95457
760-745-3947

Arroyo Vista Development – TTM 38510
Fire Protection Plan
Table of Contents

Section	Page
1.0 General Description	**1**
1.1 General Information	**2**
1.2 Relevant Codes and Standards	**3**
1.3 Hazardous Vegetation and Fuels – Laws and Regulations	**3**
2.0 Wildland Fire Hazard and Risk Assessment	**3**
2.1 On & Off-Site Fire Hazard and Risk Assessment	**3**
2.2 Critical Wildfire Concerns	**11**
2.3 Fire History	**12**
2.4 Weather Review and Assessment	**13**
2.5 Predicting Wildland Fire Behavior	**13**
2.6 Wildland Fire Behavior Calculations for the Off-site and On-site Vegetative Fuels	**14**
3.0 Assessing Structure Ignitions in the Wildland/Urban Interface	**17**
3.1 Firebrands	**17**
3.2 Radiant Heat/Direct Flame Impingement	**18**
3.3 Fire Resistant Plant Palette	**19**
4.0 Fire Department Response Times	**19**
5.0 Fire Protection Zone Descriptions and Recommended Treatments	**20**
5.1 Fuel Treat Zone 0	**22**
5.2 Fuel Treatment Zone 1A - Lot Owner Maintained	**22**
5.3 Fuel Treatment Zone 1B – HOA Maintained	**24**
5.4 Fuel Treatment Zone 2 – HOA Maintained	**25**
5.5 Roadside Fuel Treatment – HOA Maintained	**25**
5.6 No Build Zone	**25**
5.7 No Build Zone 40 Feet	**26**
5.8 Setback Zone	**26**
6.0 Construction Standards	**26**
6.1 Pre-Construction Requirements	**27**
6.2 Additonal Construction Requirements - All Lots	**27**
6.3 Additional Construction Requirements – Lots 19, 91-127, 130, 131, 138-149 and 152-155	**27**

7.0 Mandated Inclusions in the Arroyo Vista Covenants and Agreements 29

8.0 Infrastructure 30
8.1 Water Supply 30
8.2 Access Roads/Driveways and Gates 30
8.3 Fire Protection Access Ways 31

9.0 Homeowner Education & Requirements 31

10.0 Conclusions 33

11.0 Fire Protection Plan Map 34

APPENDICES

Prohibited Plant List APPENDIX 'A'

Literature Referenced APPENDIX 'B'

Non-combustible & Fire-Resistant Building Materials APPENDIX 'C'

Ignition Resistant Construction Requirements APPENDIX 'D'

Site Plan APPENDIX 'E'

Example of a View Wall APPENDIX 'F'

Evacuation Checklist – What to Take APPENDIX 'G'

ARROYO VISTA DEVELOPMENT
Tentative Tract Map 38510
FIRE PROTECTION PLAN
WOODCREST, CALIFORNIA
JANUARY 20, 2023

Executive Summary

This Fire Protection Plan (FPP) evaluated the proposed Arroyo Vista Development to ensure it does not unnecessarily expose people or structures to fire risks and hazards. The FPP has identified and prioritized the measures necessary to mitigate those impacts. The FPP has considered the property location, topography, geology, combustible vegetation (fuel types), climatic conditions and fire history. It has also considered water supply, access, structure ignitability and ignition resistant building materials, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management.

The project was analyzed to identify potential adverse impacts and to identify adequate measures for impacts resulting from wildland fire hazards. The evaluation determined that the Riverside County Fire Department (RCFD) and the California Department of Forestry and Fire Protection (CAL FIRE) along with nearby fire departments will be able to provide adequate emergency services. CAL FIRE (under the State Responsibility Area Agreement) as well as other fire departments and fire protection districts, can be requested under a Mutual Aid agreement to respond in the event of a wildfire event in the area. Response times and the proximity of the development to the Wildland Urban Interface (WUI), in a Very High Fire Hazard Zone require that fire sprinklers be installed in all new residences.

In addition, this FPP lists fuel treatment requirements to mitigate the exposure of people or structures from a significant risk of loss, injury, or death from wildland fires. Zones 0, 1A, and 1B will be irrigated landscaped zones consisting of fire resistant and maintained plantings. Zone 1B is a permanently irrigated zone that is maintained by the HOA which includes manufactured slopes and areas with water quality basins located in proximity to structures.

Finally, this plan and its requirements will be incorporated by reference into the final project Conditions of Approval to ensure compliance with all current codes/regulations and significant standards.

ARROYO VISTA DEVELOPMENT
FIRE PROTECTION PLAN
Woodcrest, California

1.0 GENERAL DESCRIPTION

The Arroyo Vista Project (Project) is located northwest of the intersection of Chicago Ave and Iris Ave in the unincorporated area of Woodcrest, Riverside County, California. The proposed project is located within a declared High Fire Hazardous Zone. Arroyo Vista is a planned community (see Photo No. 1) for which this plan was developed. Once the project is completed, over 233 residential lots will be added to Riverside County. The Riverside County Fire Department (RCFD) contracts with CalFire for wildland fire protection and is the fire authority for the Project.

Photo 1 – Aerial photo of the Project area. *The arrow points to the approximate center of the Project. Note the eastern and southern sides of the project abuts existing development. To the Northwest and west, wildland fuels exist that are a wildland fire concern.*

A Fire Protection Plan (FPP) must be submitted to and approved by the RCFD. The FPP assesses the overall on-site and off-site wildland fire hazards and risks that may threaten life and property associated with the proposed Arroyo Vista development. In addition, the FPP establishes both short-term and long-term fuel treatment actions required to minimize any projected wildland fire hazards and assigns annual maintenance responsibilities for each of the required fuel treatment actions. Maintenance of fuel treatment zones will be performed by the lot owner within their lot and the Arroyo Vista Homeowners Association (HOA) for common areas.

1.1 General Information

Developer/Applicant:	TTLC Arroyo Vista, LLC 4350 Von Karmon Ave., Suite 200 Newport Beach, CA 92660
Approving Departments:	
Fire Authority:	Riverside County Fire Department
Water:	Western Municipal Water District

The proposed planned development calls for the building of 233 single-family homes on 140.8 gross acres. These homes will be a combination of one- and two-story structures. A vicinity map can be seen in Figure 1 below:

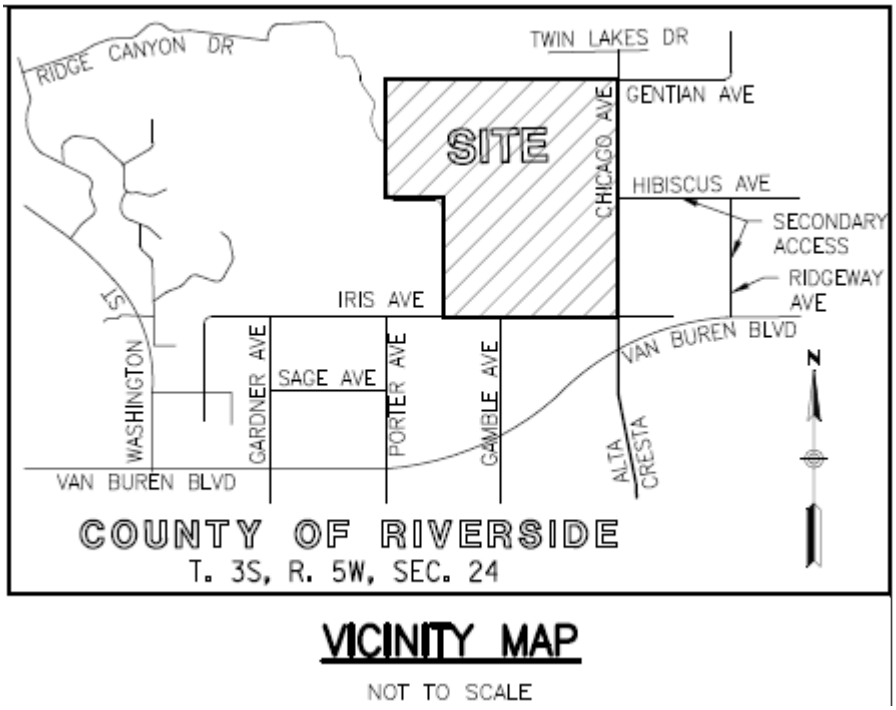


Figure 1 – Vicinity Map

1.2 Relevant Building Codes and Standards

Requirements of this FPP are based upon requirements listed in the 2019 California Fire Code, Chapter 49, Public Resources Code, Sections 4201 through 4204, and Government Code, Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires. It is also based on other codes and standards with Local Amendments as required; Chapter 7A-California Building Code; 2019 California Residential Code sections R337; National Fire Protection Association Standards (NFPA) 13-D, 2019 Edition, Riverside County Health, and Safety Code - Declaration of Nuisance 6.15.020, and supporting guidelines, the California State and Local Responsibility Area Fire Hazard Severity Zone Map; and NFPA Standard 1140.

1.3 Hazardous Vegetation and Fuels Around Buildings - Laws and Regulations

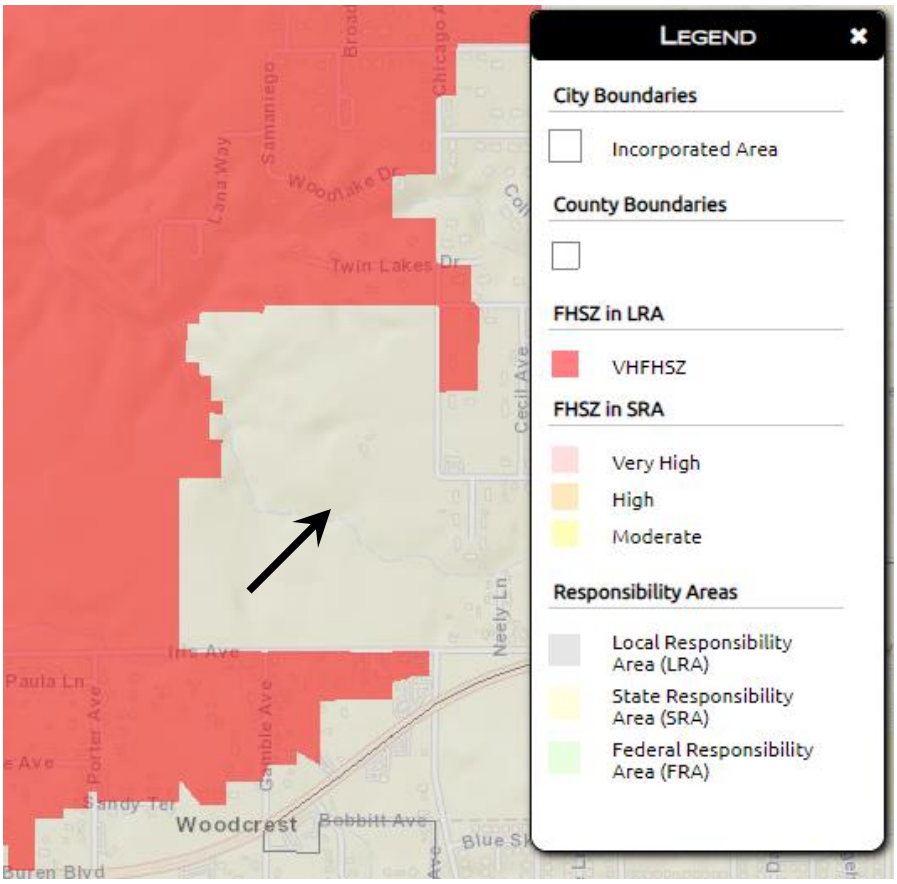
The following laws and regulations guide the requirements for Fire Protection. These include the following: Public Resources Code, Section 4291. California Code of Regulations, Title 14, Division 1.5, Chapter 7, Subchapter 3, Section 1299 (see guidance for implementation "General Guideline to Create Defensible Space"). California Government Code, Section 51182. California Code of Regulations, Title 19, Division 1, Chapter 7, Subchapter 1, Section 3.07, and Riverside County Ordinances; 787.9 and 460.154.

2.0 WILDLAND FIRE HAZARD AND RISK ASSESSMENT

The following hazard and risk assessment is based upon historical weather data and existing and forecasted vegetation that would exist in a climax plant community. Wildfire risk is a measure of the chance of a fire starting, as determined by the presence and activity of causative agents. The fire hazard is the result of a combination of vegetation, topography, weather, and the threat of fire to life and property that create difficult and dangerous conditions. The primary focus of this document is mitigation of the fire hazard and to a lesser extent, the reduction of risk of a fire starting within the tract.

2.1 On and Off-Site Fire Hazard and Risk Assessment

A portion of the project is located in a designated Very High Fire Hazard Severity Zone (VHFHSZ) as shown in the map below. It should be noted that at the time this map was created, nearly all the project site was agricultural with a large citrus orchard being present. Thus, at the time of this map's creation, the orchard did not present a wildland fire problem. That orchard has since been removed. The site, if not disturbed, will over time grow back from seed disseminated from adjacent wildlands or lying dormant in the soil. The Riverside County Fire Department Strategic Planning Division would at some point in the future reevaluate the entire County wildland fire hazard and would at that time most likely change the project area to either a high or a VHFHSZ designation. The County is thus justified in securing a FPP for the entire project site at this time.



Map of the Very High Fire Hazard Severity Zone for the Project as it was evaluated previously by the State. This map was based on the prior presence of a large orchard covering most of the Project site. As a result, most of the area is not shown as being in a VHFHSZ. The arrow points to the approximate center of the Project.

The Proposed Arroyo Vista development is located in lightly sloping terrain with short drainages with moderately steep slopes. To the northwest corner of the project is an area of approximately 16 acres that contains a proposed open space and a Water Quality Basin. In most cases, this area will be located over 100 feet from any structure. Fuel treatment on portions of the perimeter will be required to provide adequate fire protection. When the required 100 feet of fuel treatment cannot be established, additional building features are required. See Appendix 'F' for a site plan of the Project to aid in the visualization of the layout and descriptions that follow.

An intermittent stream with associated trees and shrubs runs from the southeast to the northwest. Hillsides to the northwest consist of primarily undisturbed vegetation (see Photo 2). On-site vegetation within lot boundaries and roadways will be completely removed during grading.

In assessing the wildland fire hazard to the proposed Project, it is necessary to consider plant succession and the climax plant communities. The fire behavior vegetation types described below, in the cardinal directions of north through west, are the most likely climax plant communities that

will exist without human intervention and the ones utilized for planning purposes. Several of the descriptions include interior wildland fire exposures such as those that will exist along the intermittent streambed where undeveloped land abuts several interior lots.

***Photo 2 – Undisturbed* Vegetation Located Northwest of the Project** *- primarily consists primarily of Scattered Sage and Buckwheat with grass located within the openings. Due to current drought conditions, grass species are likely stunted and would likely be larger under normal rainfall. Most of the Project site consists of disturbed vegetation.*

Northern Exposure

The Northern Project Boundary abuts both developed and undeveloped land as shown in Photo 3. Fuels on the nearby land to the north consist of a combination of Sage/buckwheat, grass, and weeds. Most of the perimeter lots along the northern boundary area are nearly an acre in size that will provide ample room for onsite fuels treatment if the homes are sited in the southern portion of each lot.

Interior Lots 138-143 will all have wildland fire exposure from the north. These lots abut Channel/Open Space Lot 'E' as shown on the Fire Protection Plan Map, Section 11.0. Several interior lots are to be located adjacent to wildland fuels located adjacent to the Channel/Open Space Lot 'F'. A trail is to be located along the south side of the lot above the streambed which will provide a means of performing fuel treatment maintenance and create a small barrier to wildland fire spread.

Photo 3 – Aerial Photo of the Northern Project Boundary. *All lots that abut the adjacent community will be approximately 1 acre in size allow ample space for fuel modification. The area within the Project that is located to the northwest, not in view, is currently undeveloped. A portion of this land including the intermittent streambed designated by the arrow will be designated as open space within the Project.*

The climax vegetation likely to exist along the northern exposure of the interior lots can be best described as a combined fuel model of Fuel Model gs2 – Moderate load, dry climate grass-shrub (70%) and SCAL18 – Sage/Buckwheat (30%). Slopes in this area range up to 25 percent and uphill which increases fire behavior.

Eastern Exposure

The eastern boundary of the project abuts existing development as shown in Photo 4. No wildland fire behavior calculations are thus presented for the eastern boundary of the project. However, within the project, Lot 'F' described as a Channel/Open Space lot exists. This interior lot runs from the southeast toward the northwest as shown in the site plan (Appendix E). All the homes that abut this lot will have wildland fire exposures from the east that will need to be mitigated.

Photo 4 *– North view along the eastern project boundary from Iris Ave. toward the future eastern entrance of Chicago Ave. The area to the east of the Project is developed. The group of palm trees seen in the photo above is located in an intermittent streambed within Lot F, designated as Channel/Open Space.*

Existing trees within Lot F can be seen in Photos 3 and 4. Tree species growing include a variety of palms, willows, and California Pepper Trees. Below this canopy are found a variety of shrubs including but not limited to Coyote Bush, buckwheat, sage, and Tree Tobacco.

Photo 5*- View of the tree canopy growing within the intermittent stream channel in what will be Lot F. Trees that exist in the channel include but are not limited to a variety of palms, willow and California Pepper. Willows, being deciduous trees, are typically fire resistant when properly maintained.*

The worst-case vegetation types are likely to exist as climax vegetation along the west side of Lot F, that is subject to a wildland fire from the east includes lots 113 – 131, 138 and 139. The likely fuels can be best described as a combined fuel model of SCAL18 – Sage/Buckwheat (70%) and tu5 – Very high load, dry climate timber-scrub (30%). Hillside slopes within the channel range from 15 to 35 percent.

Photo 6– *Looking north along the eastern project boundary (Chicago Avenue). Note the existing development along the right side of this photo. This development creates a barrier to wildfire establishment and spread.*

.

Southern Exposure

A large portion of the southern boundary will abut Iris Ave, a paved roadway that extends from Chicago Ave. westward to Gamble Avenue for a distance of approximately a quarter of a mile. Beyond Gamble Ave., the roadway narrows and eventually turns into a dirt roadway. Along this portion of Iris Ave, existing homes and development exist along the south side of the roadway (See Photo 7). As a result, few wildland fuels remain as the existing property owners maintain their property. A view of the southern boundary can be seen in Photo 7.

To the south of lots 145-151 on adjacent property, wildland fuels will remain. The land is currently lightly vegetated due to a combination of ATV use and drought. The dominant plants

consist of grass, mustard, tumbleweed, and other herbaceous native and non-native species. The topography in this area is nearly level to downhill into the project with 10 percent slopes.

The worst-case vegetation types likely to exist as climax vegetation along the south side of lots 145-151 is a combined fuel model of gr4 – Moderate load, dry climate grass (70%) and gs1 – Low load, dry climate grass-shrub (30%).

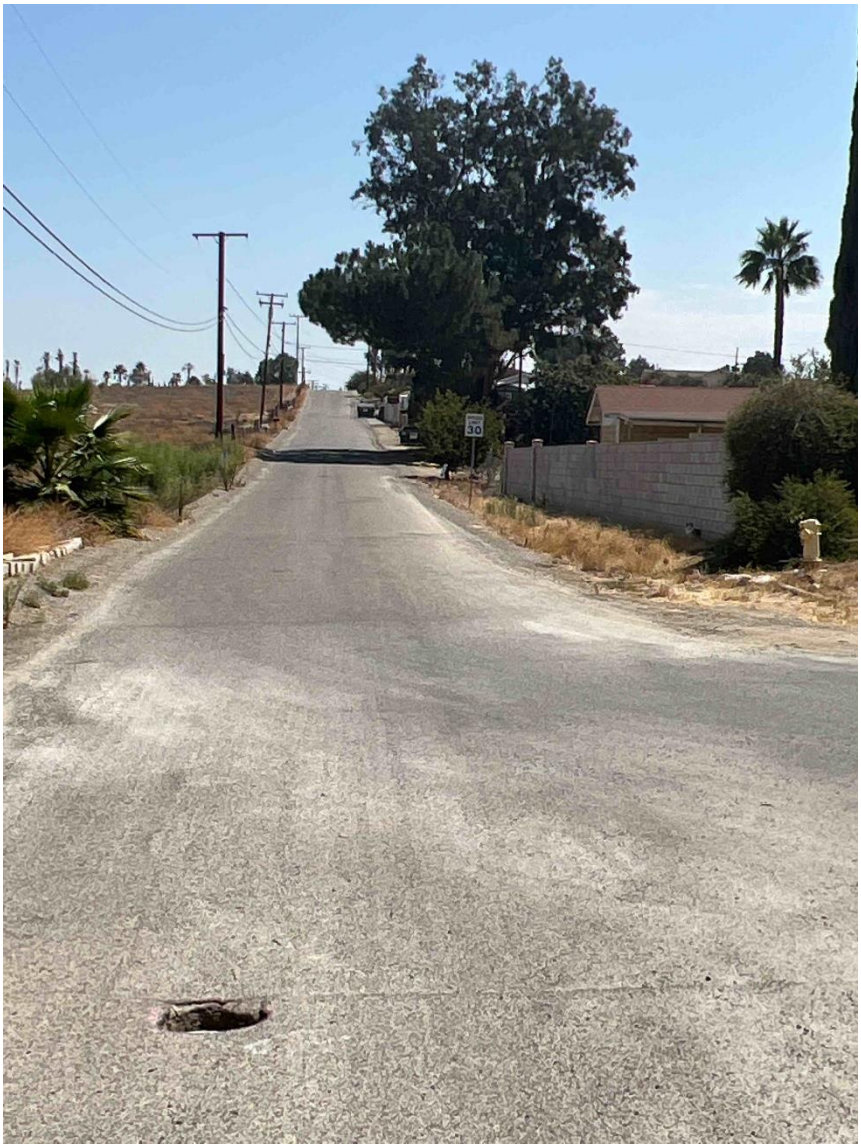


Photo 7 – *Looking east along Iris Ave. and a portion of the southern side of the Project. Homes are to be built along the left side of the photo or the north side of Iris Ave. There is sufficient room within the project for on-site fuel treatments to abate the fire hazard for a fire spreading to the north..*

Western Exposure

The entire western project boundary abuts wildland fuels as can be seen in Photo 8. To the Project's benefit, the repeated disturbance by ATV's has currently reduced wildland fuels and thus potential fire behavior but also increases the risk of a wildfire starting.

The western portion of the Project perimeter includes lots 144, 145 152, 153, and 155-165 have wildland exposures from the west. The likely climax vegetation type is a combined fuel model of gr4 – Moderate Load, Dry Climate Grass (70%) and gs2 – Moderate load, Dry Climate Grass-shrub (30%) for fire behavior planning purposes. The moderate load grass would likely occur following above average rainfall winters. Slopes range from level to 5 percent.

Photo 8 – Aerial Photo of Western Project Boundary. *The white arrow indicates where the homes will exist and be exposed to wildfires from the south and from the west. Note the high ATV activity which has resulted in bare ground. The black arrow points to where lots 87-91 will exist,also exposed to wildfire from the west. Note the intermittent streambed adjacent to where these lot will exist.*

Within the Project, west of lots 1 and 87-113, the most likely climax wildland vegetation consists of a combined fuel model of SCAL18 – Sage/Buckwheat (80%) and tu5 – Very high load, dry climate timber-grass-shrub (20%). Slopes in this area range up to 45 percent within the drainage formed by the intermittent streambed.

2.2 Critical Wildfire Concerns

The most critical weather pattern to the Project area is a hot, dry offshore wind, typically called a Santa Ana. Such wind conditions are usually associated with strong (60 MPH), hot, dry winds

with very low (<15%) relative humidity. Santa Ana winds originate over the dry desert land and can occur anytime of the year; however, they generally occur in the late fall (September through November). This is also when non-irrigated vegetation is at its lowest moisture content. Perimeter homes located on the northern and eastern boundaries (See Fire Protection Plan Map, Section 11.0) are subject to these winds and fire behavior.

The undeveloped areas adjacent to and within the project can contribute to a damaging wildland fire event. Any wind or topography driven wildfire burning under a northeastern (*Santa Ana*) wind to the north and east of the development or a wildfire burning under a typical southwestern wind to the west or south of the development can create a wildland fire hazard to the proposed structures due to wind-blown embers. Wildland fires starting north of the proposed residences on a typical fire day with a southwest wind will burn away from the proposed structures and will generally not be a significant wildland fire hazard. A wildland fire starting to the west of the development on a Santa Ana wind event day will also burn away from the development.

The installation of Chapter 7A of the California Building Code construction features will mitigate against the wind-blown ember threat (see Section 6.0 for a discussion of these features). The goal of this FPP is to prevent the loss of lives, buildings, and personal property when wildfires occur with the challenge of developing well planned home sites adjacent to wildland vegetation located within protected habitat. This goal is accomplished by requiring homes to be built with ignition resistant materials, as described in Chapter 7A of the California Building Code, and properly designing and maintaining fuel treatments that will safely mitigate the fire hazard to insignificant levels. When the required fuel treatments cannot be met, additional construction features shall be required.

2.3 Fire History

There has been a history of a large wildland fire burning in the area. A large wildland fire being defined is one that burns over 100 acres. Shown in Figure 2 is the fire history for the past 51 years for the project and surrounding area. The most recent fire shown burned to the west of the project. Fire history data was obtained from Cal Fire. Note, not all wildland fires are mapped. There were very likely other smaller fires. Fires of less than 100 acres are not shown unless they do significant damage or loss of life. It is likely that there were other wildland fires that have occurred, they just did not become large enough or very significant to be included in this data.

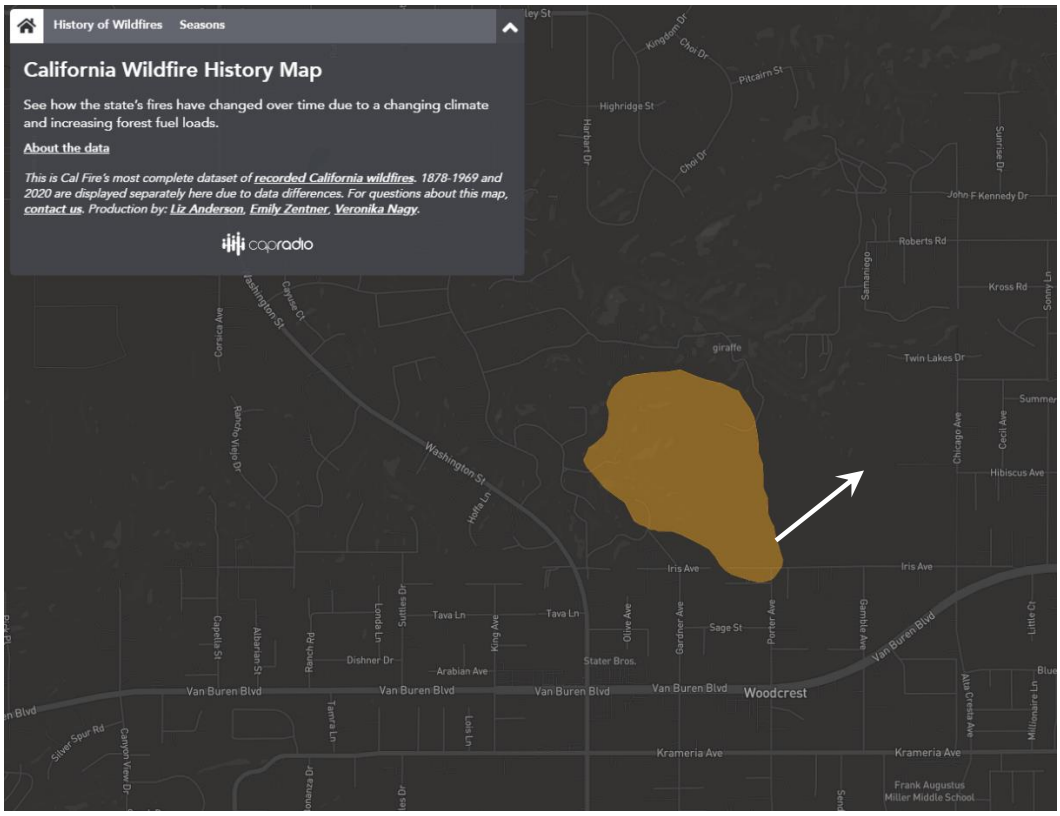


Figure 2 – ***Large Fire history*** *- on and surrounding the project site. The white arrow points to the project site. This is data for the period 1970 to 2021. The most recent fire burned the orange shape located west of the project site. It was not named but occurred in 1979.*

2.4 Weather Review and Assessment

Weather data was obtained from the RAWS (Remote Automatic Weather Station) network. The closest station to the project area is the Clark RAWS. RAWS are installed for the purpose of monitoring wildland fire weather. The Clark RAWS is located at an elevation of 1,720 feet at Latitude 33° 52' 36" and Longitude 117° 18' 32". This station is approximately 200 feet higher in elevation and located approximately 3.0 miles from the project. This station is thus an excellent choice for historic weather.

2.5 Predicting Wildland Fire Behavior

The BEHAVE 6.0.0 Fire Behavior Prediction and Fuel Modeling System developed by USDA–Forest Service research scientists Patricia L. Andrews and Collin D. Bevins at the Intermountain Forest Fire Laboratory, Missoula, Montana, is one of the best systematic methods for predicting wildland fire behavior. The BEHAVE Plus fire behavior computer modeling system is utilized by wildland fire experts nationwide.

Wildland fire managers use the BEHAVE modeling system to project the expected fire intensity, rate-of-spread and flame lengths with a reasonable degree of certainty for use in Fire Protection Planning purposes. ***FIREWISE2000, LLC.*** used the BEHAVE 6.0.0 Fire Behavior Prediction Model to make the fire behavior assessments for the Arroyo Vista development which are presented below.

2.6 Wildland Fire Behavior Calculations for the On- Site and Off-Site Hazardous Vegetative Fuels

Wildland fire behavior calculations have been projected for the hazardous vegetative fuels on the undeveloped areas that are located in proximity to proposed perimeter structures or structures within the project exposed to wildland fuels. These structures have the highest exposure to radiant and convective heat and therefore the most hazard (see the Fire Protection Plan Map). These projections are based on scenarios that are "worst case" Riverside County fire weather assumptions in the vicinity of the project area.

Over the past decade, California and much of the Western United States has been experiencing increased fire behavior from what was typically seen in the past as documented by firefighters from multiple agencies. It is due in part to our warming climate, which frequently results in lower relative humidity over prolonged periods of time in turn resulting in lower moisture content in both living and dead wildland fuels. When fuels are drier, they burn hotter and are easier to ignite, especially on hot days as the fuel temperature is closer to its ignition temperature. The fire behavior calculation inputs for anticipated fuel moistures have been adjusted to account for climate change and thus, better represent "worst case" weather. The downward fuel moisture adjustment results in approximately a 5 foot increase in flame lengths in fuels that contain brush and related species.

The scenarios which follow include the projected fire behavior under worst case wildland fuel and weather conditions and the expected fire behavior following the herein described fuel treatments required in a Vegetation Management Zone 2 described in greater detail in Section 5.4.

Fire Scenario #1, Northern Exposure Lots 139-143 ***Fire Approaching from the North or Northeast*** ***(Late Fire Season With 60 MPH North of Northeast Wind Conditions)***	
Fire Behavior Calculation Input Data • 25 percent slope • 60 mph 20-foot wind speed • 320º slope aspect from north • 45º wind direction from north	**Anticipated Fuel Moistures** * 1-Hour Fine Fuel Moisture of..…….. 2% * 10-Hour Fuel Moisture of.…….…. 2% * 100-Hour Fuel Moisture of...…..…..…... 4% * Live Herbaceous Fuel Moisture of..…. 30% * Live Woody Fuel Moisture of..……. 45%
Expected Fire Behavior **Combined Fuel Model [gs2 – Moderate Load, Dry Climate Grass-shrub (70%) and SCAL18 – Sage/Buckwheat (30%)]**	
Rate of Spread - 488 ft/min	
Fireline Intensity - 24,867 BTU/ft/s	
Flame Length - 47.3 feet	
Expected Fire Behavior in Treated Fuels **Combined Fuel Model - [gr1 – Short Sparse Dry Climate Grass (50%) and tl2 – Low Load Broadleaf Litter (50%)]**	
Rate of Spread - 25 ft/min	
Fireline Intensity - 67 BTU/ft/s	
Flame Length - 3.1 feet	

Fire Scenario #2, Eastern Exposure Lots 113-131, 138 and 139 ***Fire approaching from the North or Northeast*** ***(Late Fire Season With 60 MPH North of Northeast Wind Conditions)***	
Fire Behavior Calculation Input Data • 35 percent slope • 60 mph 20-foot wind speed • 45º slope aspect from north • 45º wind direction from north	**Anticipated Fuel Moistures** * 1-Hour Fine Fuel Moisture of..…….. 2% * 10-Hour Fuel Moisture of.…….…... 2% * 100-Hour Fuel Moisture of.....…….…..…. 4% * Live Herbaceous Fuel Moisture of..… 30% * Live Woody Fuel Moisture of.……..... 45%
Expected Fire Behavior **Combined Fuel Model [SCAL18 – Sage/Buckwheat (80%) and tu5 – Very high load, dry climate timber-grass-shrub (20%)]**	
Rate of Spread - 123 ft/min	
Fireline Intensity - 10,475 BTU/ft/s	
Flame Length - 31.8 feet	
Expected Fire Behavior in Treated Fuels **Combined Fuel Model - [gr1 – Short Sparse Dry Climate Grass (60%) and tl2 – Low Load Broadleaf Litter (40%)]**	
Rate of Spread - 30 ft/min	
Fireline Intensity - 67 BTU/ft/s	
Flame Length - 3.1 feet	

Fire Scenario #3, Southern Exposure adjacent to Lots 145-151 ***Fire Approaching from the South or Southwest*** ***(Late Fire Season With 30 MPH West or Southwest Wind Conditions)***	
Fire Behavior Calculation Input Data • 10 percent slope • 30 mph 20-foot wind speed • 0º slope aspect from north • 225º wind direction from north	**Anticipated Fuel Moistures** * 1-Hour Fine Fuel Moisture of..……. 2% * 10-Hour Fuel Moisture of..…… 3% * 100-Hour Fuel Moisture of.....…….. 4% * Live Herbaceous Fuel Moisture of..… 30% * Live Woody Fuel Moisture of…..... 55%
Expected Fire Behavior **Combined Fuel Model [gr4 – Moderate load, dry climate grass (70%) and Gs2 – Moderate load, dry climate grass-shrub (30%)]**	
Rate of Spread - 513 ft/min	
Fireline Intensity - 5,871 BTU/ft/s	
Flame Length - 24.4 feet	
Expected Fire Behavior in Treated Fuels **Combined Fuel Model - [gr1 – Short Sparse Dry Climate Grass (50%) and Tl2 – Lo2 Load Broadleaf Litter (50%)]**	
Rate of Spread - 25 ft/min	
Fireline Intensity - 67 BTU/ft/s	
Flame Length - 3.1 feet	

Fire Scenario #4, Western Project Boundary Lots 152, 153 & 155-165 ***Fire Approaching from the South or Southwest*** ***(Late Fire Season With 30 MPH South or Southwest Wind Conditions)***		
Fire Behavior Calculation Input Data • 5 percent slope • 30 mph 20-foot wind speed • 220º slope aspect from north • 225º wind direction from north	**Anticipated Fuel Moistures** * 1-Hour Fine Fuel Moisture of..……. 2% * 10-Hour Fuel Moisture of..…… 3% * 100-Hour Fuel Moisture of.....…….. 4% * Live Herbaceous Fuel Moisture of..… 30% * Live Woody Fuel Moisture of…..... 55%	
Expected Fire Behavior **Combined Fuel Model [gr4 – Moderate Load, Dry Climate Grass (70%) and gs2 – Moderate load, Dry Climate Grass-shrub (30%)]**		
Rate of Spread - 529 ft/min		
Fireline Intensity - 5,881 BTU/ft/s		
Flame Length - 24.4 feet		
Expected Fire Behavior in Treated Fuels **Combined Fuel Model - [gr1 – Short Sparse Dry Climate Grass (50%) and Tl2 – Low Load Broadleaf Litter (50%)]**		
Rate of Spread - 25 ft/min		
Fireline Intensity - 67 BTU/ft/s		
Flame Length - 3.1 feet		

Fire Scenario #5, Lots 1 & 87-112 West Exposure ***Fire Approaching from the South or Southwest*** ***(Late Fire Season With 30 MPH South or Southwest Wind Conditions)***	
Fire Behavior Calculation Input Data • **35 percent slope** • **30 mph 20-foot wind speed** • **225º slope aspect from north** • **225º wind direction from north**	**Anticipated Fuel Moistures** * **1-Hour Fine Fuel Moisture of..……. 2%** * **10-Hour Fuel Moisture of..…… 3%** * **100-Hour Fuel Moisture of.....…….. 4%** * **Live Herbaceous Fuel Moisture of….. 30%** * **Live Woody Fuel Moisture of……..... 55%**
Expected Fire Behavior **Combined Fuel Model [SCAL18 – Sage/Buckwheat (80%) and tu5 – Very high load, dry climate timber-grass-shrub (20%)]**	
Rate of Spread - 57 ft/min	
Fireline Intensity - 4,441 BTU/ft/s	
Flame Length - 21.4 feet	
Expected Fire Behavior in Treated Fuels **Combined Fuel Model - [gr1 – Short Sparse Dry Climate Grass (50%) and Tl2 – Low Load Broadleaf Litter (50%)]**	
Rate of Spread - 17 ft/min	
Fireline Intensity - 48 BTU/ft/s	
Flame Length - 2.7 feet	

3.0 ASSESSING STRUCTURE IGINITIONS IN THE WILDLAND/URBAN INTERFACE

Structure ignitions from wildland wildfires basically come from three sources of heat: convective firebrands (flying embers), direct flame impingement, and radiant heat. The Behave Plus Fire Behavior Computer Modeling Program does not address windblown embers or firebrands from a structure ignition perspective. However, ignition resistant exterior building materials will be used in the construction of the Arroyo Vista homes (see APPENDIX 'D' for the description of Ignition Resistant Construction). Wind driven embers and radiant heat issues are addressed in this FPP.

3.1 Firebrands

Firebrands or embers as they are often referred to are pieces of burning materials that detach from burning fuels due to the strong convection fire drafts in the flaming zone. Firebrands can be carried a long distance (one mile or more) by fire drafts and strong winds. Severe wildland/urban interface fires can produce heavy showers of firebrands. The chance of these firebrands igniting a structure will depend on the number and size of the firebrands, how long they burn after contact, and the type of building materials, building design, and construction features of the structure. Firebrands landing on combustible roofing and decks and adjacent flammable vegetation are common sources for structure ignition. They can also enter a structure through unscreened vents, decks and chimneys, unprotected skylights, and overhangs.

Even with non-combustible roofing, firebrands landing on leaves, needles, and other combustibles located on a roof (due to lack of maintenance) or adjacent to a structure can cause structure ignition. Any open windows, doors or other types of unscreened openings are sources for embers to enter a structure during a wildland fire. If landscape guidelines are followed and the above-mentioned maintenance issues are addressed on a regular basis through HOA inspections and enforcement as outlined in the CCR's (see Section 7), firebrands should not be a concern for the Arroyo Vista residences, as the buildings will be constructed with ignition resistant building materials.

3.2 Radiant Heat/Direct Flame Impingement

Radiation and convection involve the transfer of heat directly from the flame. Unlike radiation heat transfer, convection requires that the flames or heat column contact the structure. An ignition from radiation (given an exposed flammable surface) heat transfer depends on two aspects of the flame: 1) the radiant heat flux to a combustible surface and, 2) the duration (length of time) of the radiant flux. The radiant heat flux depends on the flame zone size, flame-structure distance, and how much the combustible material of the structure is exposed to the flame. While the flame from a wildfire may approach 1,800 degrees Fahrenheit, it is the duration of heat that is more critical. For example, a blow torch flame typically approaches 2,100 degrees Fahrenheit, yet a person can easily pass their hand through the flame. Heat duration only becomes critical to a home with a wood exterior surface if the heat is allowed to remain for 30-90 seconds.

Research scientist Jack Cohen of the USDA-Forest Service has found that a home's characteristics (its exterior materials and design in relation to the immediate area around a home within 100 feet) principally determine the home's ignition potential. He calls the home and its immediate surroundings the 'home ignition zone'. In a study of ignition of wood wallboard, tests by a USDA Forest Service research team described in the Proceedings, 1st International Fire and Materials Conference showed that flame impingement for sufficient length of time (approximately 1 min.) ignites a typical hardboard siding material. The ignition temperature of wood is generally between 450°-500°F.

Fire agencies consider fuel treatment as a principal approach to wildland fire hazard reduction. Whenever the flame length is equal to or more than the separation of combustible vegetation from a combustible structure for 1-2 minutes in duration or more, there is a high probability of structure ignition. Contact with a fire's convection heat column also may cause ignition but the temperature of the column's gases are generally not hot enough or of long enough duration to sustain the ignition of the structure.

Comparing the expected wildland fire behavior projections in each of the scenarios in Section 2.6 against the required fuel treatment zones outlined in Section 5.0, demonstrates substantial reductions in the expected flame length. By requiring the structures exposed to the threat of wildfire to incorporate the following guidelines, those structures will be provided with the most effective treatment for minimizing losses from flame impingement and associated radiant heat intensities.

By requiring the structures exposed to the threat of wildfire to incorporate the following guidelines, those structures will be provided with the most effective treatment for minimizing losses from flame impingement and associated radiant heat intensities□

- Each structure is constructed of ignition resistant building materials as required by Chapter 7A of the California Building Code.
- The area surrounding each structure contains an Irrigated Zone (defensible space).

The eventual homeowners shall be required to maintain their properties to fuel treatment standards Zones 0 and 1A. Residents shall keep the roof and any rain gutters free of leaves, needles, and other combustible debris. All firewood and other combustible materials must be properly stored away from structures so that burning embers falling on or near structures have no suitable host. The Arroyo Vista lot owners are responsible for maintaining their homes and for keeping all doors and windows tightly closed whenever a wildland fire is reported in the vicinity. Under its authority in the CC&R's, the HOA shall conduct regular inspections to ensure that these requirements are met (see Section 7).

3.3 Fire Resistant Plant Palette

Wildland fire research has shown that some types of plants, including many natives, are more fire resistant than others. These low fuel volume, non-oily, non-resinous plants are commonly referred to as "fire resistant". This term comes with the proviso that each year these plants are pruned, all dead wood is removed, and all grasses or other plant material are removed from beneath the circumference of tree and shrub canopies. Some native species are not considered "undesirable" from a wildfire risk management perspective provided they are properly maintained year-round. Refer to APPENDIX 'A' for a list of prohibited plant species.

4.0 FIRE DEPARTMENT RESPONSE TIMES

The Arroyo Vista project is within the response area of the Riverside County Fire Department. The closest fire engine will be from the Riverside County Fire Station No 8 (Woodcrest), located at 16533 Trisha Way, Riverside, CA 92504. This Station is located approximately 2.5 miles away with a response time of approximately 6 minutes (travel and getaway) according to Google Maps. The second closest engine is RCFD Fire Station #11 located at 19595 Orange Terrace Parkway, Riverside CA 92508, approximately 2.7 miles from the furthest planned residences and 7 minutes travel time using Google Maps. The response time for the first in Fire Station is within NFPA Standard 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, for the area.

There is no assurance that either of the nearby RCFD engines will be in their stations when a wildfire threatens the Arroyo Vista development from an ignition in the adjacent wildlands. RCFD engines may respond from other stations located further away or from other incidents. Additional agencies such as other nearby fire departments would likely respond equipment under mutual aid agreements but may arrive after the RCFD engines were on-scene. On high/extreme fire danger days there often may be multiple fire starts and engine companies may be already deployed on other incidents. This is

why projects designed for wildfire, use *"defensible space"*, ignition resistant building features, and key fuel treatment strategies that enable residents to substantially increase their ability to survive a wildfire on their own without the loss of their structure until firefighting equipment arrives. The goal of this FPP, therefore, is to make the Arroyo Vista development and its occupants as safe as possible and able to survive on their own until firefighting equipment arrives and/or residents can be safely evacuated.

5.0 FIRE PROTECTION ZONE DESCRIPTIONS & REQUIRED TREATMENTS

Described below are the required treatments for the Fire Protection Zones. All distances in this report are measured horizontally. The required 100 feet of Fire Protection can be achieved on most of the perimeter lots facing wildland vegetation. Zones 0, 1A, & 1B together provide 50 feet or more of irrigated treated area depending on location. When less than 100 feet of total fuel treatment is provided, additional construction features, outlined in Section 6.1 are required. The combined effect of fuel treatment and where required additional construction features, should mitigate for the less than 100 feet of required Fire Protection, and alleviate any radiant heat or direct flame impingement issues from the maximum projected **47.3**-foot flame lengths from the north under the worst-case weather and fuel moisture scenarios (see the Fire Protection Plan Map).

The area of greatest concern from a wildland fire perspective is in the northwest corner of the Project where the most extreme fire behavior has been calculated (See Fire Scenario 1). ***FIRE*WISE2000, LLC** prefers that fuel treatment from a residence be at least 1.5 times the flame length which allows for unforeseen fire behavior. The minimum fuel treatment recommended is therefore 71 feet (1.5 X 47.3 feet).

Each homeowner shall be responsible for maintaining Fuel Modification Zones within their lot and the HOA shall be responsible for maintaining fuel treatments outside the property owners lot boundaries. The HOA shall enforce the requirements of Zone 0 and 1A on private lots. In the event a lot is repossessed, the unit/agency holding title to the lot will be responsible for Fuel Modification Zone maintenance.

Basic fuel modification zones are shown in Figure 4 on the following page. This shows each of the fuel treatment zones that surround each home. Note that on smaller lots or when located adjacent to the property lines, these zones may interlink or be required on the adjacent property to provide adequate protection. When fuel modification is restricted, additional building features will likely be required to provide an equivalent level of protection.

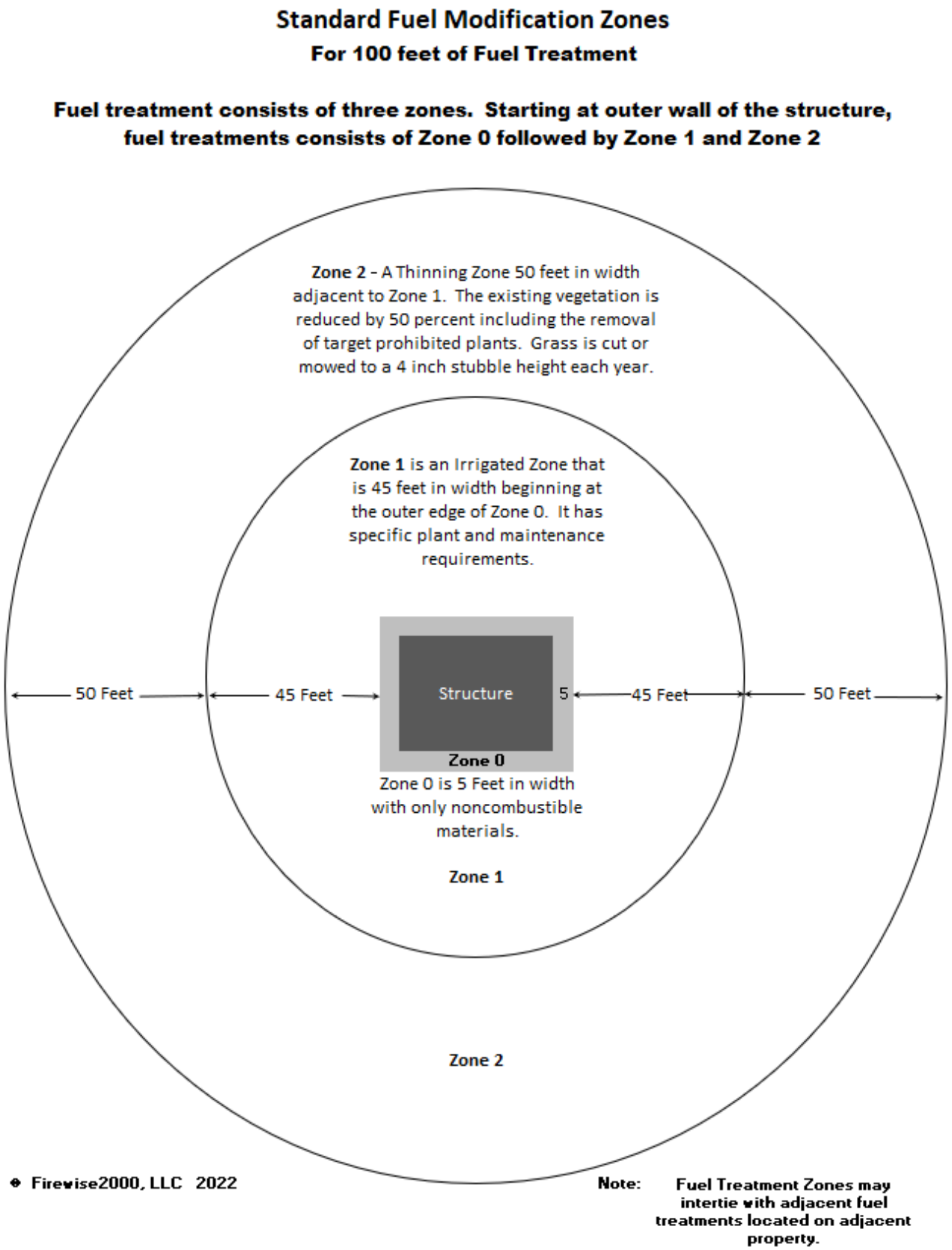


Figure 3 – *Standard Fuel Modification Zones for 100 feet of fuel* treatment.

5.1 Ember Resistant Zone 0 - Lot Owner Maintained (Location within 5 feet of each building to be determined by the building envelope). Not shown on the Fire Protection Plan Map. Defined

In Zone 0, the intent is to create a landscape absent of all combustible materials. This zone includes the area under and around all decks, and requires the most stringent wildland fire fuel reduction and maintainenace. This area shall be kept clear of combustibles, plant based landscaping mulch, and all shrubs and trees. It may have a few plants, generally confined to pots or containers, that are low growing and nonwoody. No plants shall be grown beneath windows or adjacent to doorways. Each plant shall be properly irrigated and maintained and may include species such as sedges, lilys, and succulents. Plants that grow in water are also a good choice.

Place plastic garage and recycling containers outside this zone. Combustible fencing shall not exist within the zone nor be attached to any structure. Store firewood in Zone 2 described in Section 5.4 or inside a fully enclosed storage shed.

The soil surface may be bare ground or covered with hardscape features such as pavers, gravel, concrete, rock, or other non-combustible material. Water features are also a good choice for this zone.

5.2 Fuel Modification Zone 1A - Maintained by the Lot Owner of Single-Family Homes Located on Numbered Lots *(Shown as NO COLOR on the Fire Protection Plan Map)* Defined

Fire Protection Zone 1A is an irrigated zone, beginning at the outer edge of Zone O and extending to the lot boundary or a minimum of 50 feet from a home. This zone shall be privately maintained by each homeowner. Commonly called the defensible space zone, it shall be free of all combustible construction and materials. It is measured from the exterior walls of the structure or from the most distal point of a combustible projection, an attached accessory structure, or an accessory structure located within 10 feet of a habitable structure. It provides the best protection against the high radiant heat produced by wildfire. It also provides a generally open area in which fire suppression forces can operate during wildfire events. This zone includes a level or level-graded area around the structure.

For lots where the home is located more than 50 feet from the rear property line, the portion of the lot located over 50 feet of the home shall be maintained to the criteria described in Section 5.4 Fuel Modification Zone 2A. In this case, the zone shall be maintained by the property owner. Zone 2A is a thinning zone that includes native vegetation. Irrigation is not required in Zone 2A.

As a way to reduce water use, artificial turf may be installed in place of water consuming grass In Zone 1A as long as the turf material is installed on a sand or noncombustible material and has a Class A fire rating of between 0 and 25 as measured by the ASTM E84, standard testing method for assessing the surface burning characteristics of building products. Artificial turf melts when exposed to extreme heat but does not burn and contribute to fire spread. The

intent of this zone is to significantly reduce the probability of fire coming in contact with a structure.

Required Landscaping

- Plants in this zone need to be fire resistant and shall not include any pyrophytes that are high in oils and resins such as pines, eucalyptus, cedar, cypress, or juniper species. Plants used in fuel treatment zones should exhibit the following qualities to be the most "fire resistant": thick, succulent, or leathery leaf species with high moisture content; tendency to produce limited litter; the presence of high salt levels or similar compounds which may contribute to fire resistance; ability to withstand drought and frost; and the ability to withstand severe pruning.
- Zone 1A will be cleared of all fire prone and undesirable plant species (see APPENDIX 'A').
- Landscape designs using hardscape features such as driveways, swimming pools, concrete, rock, pavers, trails, and similar non-combustible features to break up fuel continuity within Zone A1 are encouraged.
- Landscaping shall be permanently irrigated and consist of fire-resistant, maintained native or ornamental plantings, such as turf, approved groundcovers, etc.
- Plants shall be low-growing and acceptable to the Riverside County Fire Department. The mature height of most shrubs shall not exceed 18 inches. Small groups of 3-5 shrubs over 18 inches in height are allowed if the grouping is located 20 feet or more from a structure and not located within the dripline of any tree.
- Trees shall be single specimens or groupings of not more than three trees selected from the approved plant list. Trees are to be planted such that the mature canopies will be at least 10 feet from the exterior walls of the structure or from the most distal point of a combustible projection, an attached accessory structure, or an accessory structure located within 10 feet of a habitable building.
- Landscape plans that incorporate trees shall provide for a minimum of six feet of vertical separation from low growing, irrigated vegetation beneath the canopy of each tree.
- No combustible mulch shall be used in Zone 1A.
- While not visually advisable, bare ground also meets the non-combustible requirement and is therefore acceptable.

Required Maintenance

- Lots shall be maintained year-round by each individual property owner within their property boundary (lot lines) as required by this FPP and the RCFD.
- Remove and replace any dead or dying plant material monthly.
- Trees must be maintained to have a minimum of six feet of vertical separation from low growing, irrigated vegetation beneath the canopy of each tree.
- Irrigation systems shall be tested for proper coverage and flow rates bimonthly. Drip irrigation may be utilized to reduce water use, prevent disease by minimizing plant water contact, allowing the space between plants to remain dry thus reducing weed growth.

- Irrigation systems shall not be turned off other than for required maintenance and or during periods of extended rainfall. Restart the system when the soil dries out.
- All trees and shrubs must be maintained to the current ANSI A300 standards [*Tree, Shrub, and Other Woody Plant Maintenance —Standard Practices (Pruning)] see the following link:* *https://www.tcia.org/TCIA/Build_Your_Business/A300_Standards/A300_Standards.aspx*

5.3 Fuel Modification Zone 1B - HOA Maintained *(Shown as Green on the Fire Protection Plan Map)*

Defined

Zone 1B is an irrigated zone beginning at the outer edge of Zone 1A and is up to 50 feet in width that is permanently irrigated and maintained on graded land. It includes all manufactured slopes and common areas where the HOA is to maintain the landscaping to the criteria described in Section 5.2. As shown on the Fire Protection Plan Map, Section 11.0, Zone 1B will extend into open space for a distance of 30 feet from the side or rear lot line. This action is needed as the location of the home within the lot is unknown at the time of the writing of this FPP. See Photo 6 for an example of a landscaped manufactured slope.

Required Landscaping

Same as Zone 1A

Required Maintenance

Same as Zone 1A

***Photo 7** – An example of an irrigated manufactured slope (Zone 1B) that is planted with fire resistant vegetation.*

5.4 Fuel Modification Zone 2 - HOA Maintained *(Shown as Yellow on the Fire Protection Plan Map)*

Defined

Fire Protection Zone 2, often called a thinning zone, is a non-irrigated area typically covered in wildland fuels but also includes debris basins and is designed to reduce any existing or future wildfire threat. Zone 2A shall be located between 50 and 100 feet of any structure located within the development. This zone is designed to reduce the fuel load in native vegetation or vegetation growing in debris basins to reduce the radiant and convective heat of a wildland fire by reducing flame length, ember production, and slowing the rate of fire spread. Periodic maintenance of debris basins to remove sediments can also be utilized to maintain any encroaching vegetation.

Required Landscaping

Removal of all dead, woody, and flammable debris, and exotic flammable vegetation found in APPENDIX 'A'.

Required Maintenance

- As grasses and weeds begin to cure (dry out) each year, they shall be cut to 4 inches or less in height.
- Annually remove all dead and dying vegetation, highly flammable exotic species, and flammable trash (see APPENDIX 'A').
- Special consideration will be given to rare and endangered species, geologic hazards and tree ordinances, or other conflicting restrictions.

- Individual shrubs shall be thinned to reduce their foliage mass or fuel loading.
- Efforts shall be made to retain root systems that provide for erosion control.
- Debris and trimmings produced by thinning and pruning shall be removed from the site. Recycling debris and trimmings helps reduce weed growth and protect the soil from erosion.

5.5 Roadside Fuel Treatment (HOA Maintained) Shown as *Blue* on the Fire Protection Plan Map.

Defined

The area located 20 feet on either side of any access road that is landscaped and maintained to Irrigated Zone 1A criteria described above in Section 5.2 or it shall free of all vegetation. All of this zone is located in common areas, not within any residential lot. Should water availability become an issue at any time in the future, this zone is critical to maintain and continue to irrigate should it be planted.

5.6 No Build Zone *(Shown as Pink on the Fire Protection Plan Map)*

Defined

The No Build Zone is located adjacent to wildland fuels and within 20 feet of the rear or side yard lot line or begins at the limits of grading as shown on the Fire Protection Plan Map, Section 11.0. The No Build Zone is an irrigated zone where no construction can occur, including the home. The lot owner shall perform the required Zone 1A Fuel Modification as well as not allow any combustible construction within this zone. This zone when combined with Zone O, 1A, 1B and Zone 2A or 2B thinning located within the common area that is maintained by the HOA will result in 100 feet of fuel treatment for each home. When 100 feet of fuel treatment cannot be provided, see Section 6.0 regarding additional construction features.

This area is suitable for recreational uses, gardens, pools, animal kennels and similar features. The zone is needed to create a 20-foot wide space between the adjacent open space/channel and the structures.

5.7 No Build Zone 40 Feet *(Shown as Red on the Fire Protection Plan Map)*

Defined

The No Build Zone 40 Feet is located adjacent to wildland fuels and is located within 40 feet of the rear yard lot line as shown on the Fire Protection Plan Map, Section 11.0. The requirements within this zone are the same as those described for Section 5.6

5.8 Setback Zone *(Shown as Grey on the Fire Protection Plan Map)*

On larger lots numbered 1-11, 87-91, and 148-150, the builder shall construct the homes on these lots a minimum of 100 feet from the rear lot boundary and or Project boundary. This space will provide an area for 100 feet of fuel treatment within each lot. These treatments are described in Sections 5.1 and 5.2.

6.0 CONSTRUCTION STANDARDS

All structures within the Arroyo Vista shall meet all wildland/interface standards to the satisfaction of the RCFD and be designed and constructed with ignition resistant construction requirements. All homes located along the perimeter and exposed to wildland fuels shall be located a minimum of 20 feet from the rear and in several cases also the side yard property line where no combustible construction will be allowed. All construction and ignition resistant requirements shall meet the 2019 CA Fire and Building Code, and Chapter 7A-California Building Code or the current codes in force at the time of permit application. For a description of the current construction requirements as of the date of this report, see APPENDIX 'D'. The fire protection features described herein shall be maintained to equivalent or greater ignition resistance.

All non-habitable accessory structures such as decks, balconies, patios, covers, gazebos, and fences shall be built from non-combustible materials. The owners are not restricted from having concrete/brick patios, walkways, or a swimming pool within the Fuel Treatment Zones in compliance with other codes. Homeowners shall check with the Riverside County Building Department to determine if construction permits are required. Refer to APPENDIX 'C' for photos and examples of non-combustible decks, patio covers, and railings for these non-habitable accessory structures.

Any damaged or replacement window, siding, vent, roof covering, or non-combustible wall shall meet or exceed the original intent of the fire protection discussed in this plan.

6.1 Pre-Construction Requirements: Construction or building permits shall not be issued for the development until the fire code official inspects and approves required fire apparatus access, setbacks, and water supply including fire hydrants for the construction site. Prior to the delivery of combustible building construction materials to the construction site the following conditions shall be completed to the satisfaction of the RCFD:

- Zones 0, 1A and 1B shall be cleared of all vegetation prior to construction and subsequently planted to the requirements stated in Sections 5.1, 5.2 and 5.3 after construction is completed.
- Approved Zone 2A, and 2B fuel treatments shall be provided prior to combustible material arriving on the site and shall be maintained throughout the duration of construction.

6.2 Additional Construction Requirements – applies to all Lots

In the event of a wildfire in the adjacent wildlands, all the structures in the Project will be showered with embers. Embers are forecast to travel over one mile in the vegetation types located along the northern perimeter. To mitigate this hazard, the following additional construction features will be required:

1. Vents in the structures shall be "Brandguard", "O'Hagin Fire & Ice® Line – Flame and Ember Resistant" or equivalent ember resistant type vents.

2. Operable windows shall be provided with metal mesh bug screens over the operable opening to replace traditional vinyl bug screens to prevent embers from entering the structure during high wind conditions when windows may be inadvertently left open.

3. All houses shall have automatic door closers on all vehicle garage doors (standard on most new automatic garage door openers as a security feature), that can be set to close after a certain period of time with no activity□

6.3 Additional Construction Requirements – **<u>Required for Lots 19, 91-127, 130, 131, 138-147 and 151, 152, 154-164 located adjacent to wildland fuels:</u>**

The following additional construction feature shall be applied at the rear and or side lot boundary to the homes built with a reduced or lacking Zone 1A or Zone 2A Fire Protection zone as shown on the Fire Protection Plan Map (See Section.11.0)

- A six (6) foot solid non-combustible radiant and convective heat deflection wall shall be installed at the locations shown on the Fire Protection Map to aid in radiant and convective heat deflection. The upper half of said wall may be a view wall where tempered fire-rated glass is utilized as long as the wall remains solid and noncombustible (See Appendix 'F' for an example). Post and glass frame assemblies shall be composed of metal such as steel, and 6063T5 aluminum alloys or equivalent, respectively, which will not melt and allow the glass to fall out.

A solid wall located at the top of slopes or on flat land well away from a home will have tremendous impact on radiant and convective heat, ember collection, and reduction in wind speeds adjacent to the wall thus reducing fire behavior. These impacts are demonstrated in Figure 4.

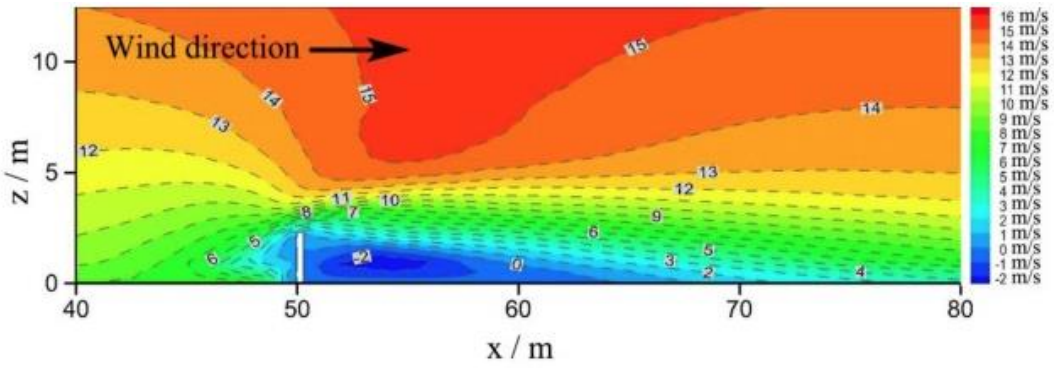


Figure 4 – Impacts on Wind Speed and Ember Deposition Resulting From a 6-foot Wall. *The above figure is based on a wind speed of 14 m/s (31 MPH). Note that the wind, both on the windward and leeward sides of the wall, is reduced. These areas will thus trap embers and blowing debris (area shown in blue and light green). The wind speed on the windward side of the wall is significantly reduced for a distance equal to several times the height of the wall. This reduces fire behavior including flame length, a critical factor in fire protection planning. Ref: Dong et al., 2007.*

7.0 MANDATED INCLUSION IN THE CC&R'S

The HOA CC & Rs shall be recorded on each parcel and include the following statements:

1) The HOA shall be responsible for all required fuel treatment and fire protection measures in the common areas. Homeowners shall be responsible for all required fuel treatment and fire protection measures on their respective lots.

2) The HOA shall have the authority for enforcing required fuel treatment measures around all structures and placing restrictions on combustible structures within fuel treatment zones.

3) Each lot owner shall annually financially contribute their fair share of HOA required fuel treatment costs.

4) The HOA has the authority to enforce a ban on trash dumping and disposal of green waste in open space areas or fuel treatment zones.

5) All landscaping plans, including additional structures, must be approved by the HOA.

6) The HOA is responsible to the Riverside County Fire Department for the completion of all required fuel treatment in the common areas. Required on-going maintenance will be accomplished on an as needed basis. Should maintenance not be performed in a manner consistent with the approved Fire Protection Plan, the Riverside County Fire Department shall have the right to abate any treatment zone they deem a threat to the Arroyo Vista Development or adjoining properties. In doing so, all cost incurred will be billed to the owner(s). At the discretion of the Riverside County Fire Department Fire Marshal, yearly inspection of treatment areas may be required.

7) The HOA is responsible for providing new property owners with recorded CC&R's or disclosure statements identifying the responsibilities for maintaining the Fire Protection zone within their property as defined in the approved Fire Protection Plan.

8) The Riverside County Fire Department or its designated representative shall decide any disputes related to individual lot landscaping or fuel treatment, with respect to interpretation of the fuel treatment Plan. The decision shall be final and binding on the lot owner.

9) Assembly Bill 38 requires a seller of property located in a High or Very High Fire Hazard Severity Zone to provide the buyer with documentation stating the property is in compliance with the defensible space requirements of the Riverside County Fire Department.

   If compliance cannot be obtained by the close of escrow, the seller and buyer can enter into a written agreement showing that the buyer agrees to obtain documentation of compliance within one year of closing escrow.

8.0 INFRASTRUCTURE

Infrastructure includes the basic systems needed to develop a property and support its use by its residents and or businesses. For Fire Protection planning purposes, these typically consist of the water supply for fire hydrants and fire sprinkler systems and accessways to and from the property.

8.1 Water Supply

The Western Municipal Water District (WMWD) will provide the Project with its water supply. An approved permanent water supply capable of supplying the required fire flow for fire protection shall be provided by the developer and accepted by WMWD prior to any combustible material placed on the site and the commencement of construction. The water supply system shall be a looped system served from a minimum of two points.

Water supplies for fire protection and hydrants shall be in accordance with APPENDIX 'B' and APPENDIX 'C' of the California Fire Code. Based on the total square footage of the largest proposed residence, the minimum fire flow shall be 1,500 GPM at 20 psi residual pressure for a 2-hour duration, since each building will be equipped with an automatic fire sprinkler system in accordance with NFPA Standard 13D.

Single family residences equipped with fire sprinklers shall have fire hydrants spaced a maximum of 500 feet apart, dead end streets or roads shall not exceed 400 feet from the end of the street or road.

8.2 Roads/Driveways and Gates

The primary ingress and egress for the Arroyo Vista will be from Chicago Avenue and Street N. An emergency access will be created in the northwest corner of the project between Chicago Avenue to Street H (See Section 8.3 for additional information). Should the access be solely for the purpose of Fire Protection access, at the end of the access, a pipe gate or similar RCFD approved gate that is noncombustible shall be installed with a Knox pad lock for Fire Department access.\

All access roads will be a minimum of 24 feet in width. The right of way for Chicago Ave. is planned to be 74 feet with 44 feet being paved. The Iris Ave access from Street N, a 40-foot-wide paved roadway located within a 60 foot right of way. The emergency vehicle access is to be located within a 40 foot wide easement extending from the existing Chicago Ave to the intersection of H and E streets. Within the travel way of each roadway will be the paved roadway, sidewalks, and irrigated Zone 1A landscaping. All driveways and access roads within the development shall be termed "Fire Access Roads". All fire access roads shall meet the requirements of the RCFD and shall be all weather surface capable of supporting loads of 75,000 lbs. gross vehicle weight.

Street J terminates at a cul-de-sac with a driveway that is in excess of 150 feet in length that leads to lots 139-142. The RCFD requires an approved turnaround if a driveway exceeds 150 feet in length. A hammerhead turnaround or an equivalent will be required at the end of this driveway.

The minimum access driveway width will be 24 feet. Along this roadway, no parking signage shall be installed to the satisfaction of the RCFD.

The access to all portions of each structure must be within 150 feet of the available fire department access. This is often referred to as a hose pull distance and represents the amount of hose that firefighters must pull from an engine to reach around each structure. The hose pull must be calculated based on the firefighter access paths, and cannot go through or over walls, hedges, cars, buildings, etc.

Any gates to be installed shall meet RCFD Standards and shall be approved by the RCFD prior to fabrication and installation. Gate entrances shall be at least two feet wider than the width of the traffic lanes serving that gate shall be a minimum of 14 feet in width. Any gate providing access from a road to the development shall be setback at least 30 feet from the roadway and shall open to allow a vehicle to stop without obstructing traffic on the road.

Should gates be installed at the entrances to the project, they shall be automatic and shall be equipped with a rapid entry system. Gates activated by the rapid entry system shall remain open until closed by the rapid entry system. A Knox override key switch or similar device acceptable to the RCFD must be installed outside the gate in an approved, readily visible, and unobstructed location at or near the gate to provide emergency access. Gates accessing more than four residences or residential lots, or gates accessing hazardous, institutional, educational or assembly occupancy group structures, shall also be equipped with approved emergency traffic control-activating strobe light sensor(s), or other devices approved by the Fire Chief, which will activate the gate on the approach of emergency apparatus with a battery back-up or manual mechanical disconnect in case of power failure.

8.3 Fire Protection Access Ways/Fuel Modification Maintenance

Fire Protection access ways are used not only in the community in the event of a need to evacuation but also will be utilized for fuel treatment zone maintenance and wildland fire suppression operations. Access for the maintenance of vegetation within Water Quality Basins can be performed from adjacent streets or via access easements. Maintenance of vegetation along the Channel/Open Space lots can be performed from Chicago Ave and Streets A and E (See Fire Protection Plan Map – Section 11.0)

For the purposes of fuel modification zone treatment, a trail of 16 feet in width will be located along the entire length of Lot F and north of the lots number 139-148 including Lot A. Maintenance residues can be easily removed using this access way.

9.0 HOMEOWNER/BUYER REQUIREMENTS AND EDUCATION

A copy of this Fire Protection Plan shall be available in the Arroyo Vista Sales Office for review by any potential homebuyer. Additionally, a copy of this FPP shall be signed by each homebuyer as part of their escrow papers acknowledging the requirements, restrictions and responsibilities outlined in

this FPP. This FPP (including Appendices A and D and the Map Exhibit) and all the requirements contained therein including but not limited to all fuel treatment maintenance and fire protection systems are an obligation that transfers to subsequent purchasers of said properties. Subsequent owners and sellers shall include copies of this FPP in all escrow papers. Each year prior to the onset of fire season, the HOA shall provide the lot owners with information regarding wildfire mitigation efforts necessary for community fire safety that are contained within this FPP.

By reviewing this FPP each homeowner shall be aware of the herein described fire protection measures, the requirements of this FPP (Figure 3), the types of non-combustible construction, additional required construction features; and the plant materials that are prohibited within their lot's boundaries. Of particular importance are Section 6.0 and APPENDIX 'D' which lists construction requirements, Section 5.0 and APPENDIX 'A' of this plan which provides guidance in the types of plants that are not allowed to be established in landscaped areas within Fire Protection Zones. Plant selection is critical as embers often travel over a mile during Santa Ana wind events.

Each homeowner further acknowledges that:

1) Dumping or disposal of trash or yard trimmings in fuel treatment zones is prohibited.

2) Each homeowner shall be responsible for keeping their home's roof area free of combustible debris including leaves, limbs, and similar materials.

3) Each homeowner shall remove all combustible outdoor furniture and combustible materials located within 20-feet of the structure into a garage or home in the advance of wildfire. Alternatively, these combustible materials may be placed within a pool.

4) All landscaping plans, proposed additional structures or conversion of existing structures to other uses, must be reviewed and approved under the guidance and approval of the HOA and RCFD.

When performing maintenance such as mowing or using a chainsaw, be especially careful as a spark can start a wildfire. Use of battery-operated equipment is less likely to cause a problem. Modern battery technology includes a heat sensor inside the electric motor and when it gets hot it flips a switch killing the motor until it has had a chance to cool down. This feature lessens the likelihood of a fire.

Homeowners should be aware that smoke is harmful to your health, especially if a person has asthma or chronic obstructive pulmonary disease, including bronchitis and emphysema. People with pre-existing health conditions related to the heart or circulatory systems may want to relocate to a safe area before official notification to relocate to avoid smoke impacts. It is recommended that people leave the area affected by wildfire smoke, if indoor air cannot be kept clean.

Ready, Set, Go is the evacuation strategy proposed for this project as described on the Cal Fire website and widely utilized by fire agencies and departments throughout the County. Should a wildfire exist that threatens the property or safety of people at the site, the following actions shall be implemented:

1. ***Ready – Preparing for the Fire Threat:*** *Take personal responsibility and prepare long before the threat of a wildfire so the home is ready in case of a fire. Maintain a defensible space by clearing brush away from all structures. Use fire-resistant landscaping and harden structures with fire-safe construction measures. Assemble emergency supplies and belongings in a safe spot. Make sure all individuals within the area are 'on the same page' in commitment to advance preparation. Plan escape routes.*

2. ***Set – Situational Awareness When a Fire Starts:*** *Pack vehicle(s) with emergency items. Stay aware of the latest news from local media and the local fire department for updated information on the fire and perform the following:*

    - ✓ *Close all windows and doors that lead outside to prevent sparks from entering the house.*
    - ✓ *Close all doors within the house in case the house does catch on fire; this will slow down the spread of the fire from room to room.*
    - ✓ *Move all combustible materials in the home away from windows to prevent the possibility of heat from a fire radiating through windows and glass doors and catching flammable materials inside the home on fire. This includes drapes, curtains, and furniture.*
    - ✓ *Close windows and all Venetian blinds or noncombustible window coverings.*
    - ✓ *Turn on the lights in each room, porch, and yard. This aids in visibility when the smoke gets thick and darkens the sky.*
    - ✓ *Fill all sinks, bathtubs, and buckets with water in case the power goes out.*
    - ✓ *Shut off any gas valves within the house or outside.*
    - ✓ *Open the damper on fireplaces to stabilize inside/outside pressure, but close fireplace screens to keep sparks from igniting the house.*

3. ***Go – Leave early!*** *Following an Action Plan makes one prepared and firefighters are now able to best maneuver the wildfire and ensuring everyone's safety. Follow instructions given by the Fire Department official on site.*

For assistance regarding evacuation, how to prepare and what to take, see Appendix G – Evacuation Checklist.

Evacuation from the Project can be accomplished via three routes. These include Chicago Ave from the southeast, Street O from the south and from a emergency vehicle access located in the northeast at the southern end of H street that extends to Chicago Avenue to the east. Resident should always follow evacuation orders issue by local authorities.

10.0 Conclusions

This FPP evaluated the adverse environmental effects that a residential development may have from wildland fire and properly mitigate those impacts to ensure that this development does not unnecessarily expose people or structures to a significant risk of loss, injury or death involving wildland fires.

The requirements of this FPP provide the fuel treatment standards required to mitigate the exposure of people or structures to a significant risk of loss, injury, or death. Fuel treatment zones provide 100 feet of fuel treatment that includes a defensible space zone for fire suppression forces and will protect structures from radiant and convective heat. These zones shall be a combination of landscaped zones that are permanently irrigated and consists of fire resistant and maintained plantings and thinning zones. The maintenance requirements include the removal of all prohibited highly combustible native vegetation but permit plantings with very specific criteria.

The Project will have adequate emergency access in terms of road access and construction standards for roadways and streets. The RCFD, CAL FIRE, and nearby fire departments will provide fire protection through mutual aid. Response times and the proximity of the development to the Wildland Urban Interface (WUI), and a subdivision in a High Fire Hazard Zone require fire sprinklers to be installed in all residences.

11.0 Fire Protection Plan Map

Attached to this FPP is a FIRE PROTECTION PLAN MAP or in a file that contains the Map. This map depicts the locations of all proposed fuel treatment locations as well as fire access roads, lot lines, and development boundaries and projected fire behavior at various locations.

APPENDIX 'A'

Prohibited (& Fire Prone) Plant Species List
For Fire Protection Zones in Moderate, High & Very High Hazard Areas

	Botanical Name	Common Name	Plant Form
1.	Acacia species •	Acacia	Shrub/Tree
2.	Adenostema fasciculatum	Chamise	Shrub
3.	Adenostema sparsifolium	Red Shank	Shrub/Tree
4.	Artemisia californica	California Sagebrush	Shrub
5.	Anthemis cotula	Mayweed	Weed
6.	Arundo donax	Giant reed	Grass/weed
7.	Brassica nigra	Black Mustard	Weed
8.	Brassica ropa	Yellow Mustard	Weed
9.	Cedrus species	Cedar	Tree
10.	Cirsim vugare	Wild Artichoke	Weed
11.	Conyza canadensis	Horseweed	Weed
12.	Cortaderia selloana	Pampas Grass	Tall Grass
13.	Cupressus species	Cypress	Tree
14.	Cytisus species	Broom	Shrub
15.	Eriogonum fasciculatum	Common Buckwheat	Shrub
16.	Eucalyptus species	Eucalyptus	Shrub/Tree
17.	Heterotheca grandiflora	Telegraph plant	Weed/shrub
18.	Juniperus species	Junipers	Succulent
19.	Lactuca serriola	Prickly lettuce	Weed
20.	Nicotiana bigelevil	Indian tobacco	Shrub
21.	Nicotiana glauca	Tree tobacco	Shrub
22.	Pennisetum species	Fountain Grass	Ground cover
23.	Pinus species	Pines	Tree
24.	Rosmarinus species	Rosemary	Shrub
25.	Retama monosperma	Broom	Shrub
26.	Salvia species • •	Sage	Shrub
27.	Silybum marianum	Milk thistle	Weed
28.	Spartium junceum	Spanish Broom	Shrub
29.	Urtica urens	Burning nettle	Weed
30.	Washingtonia species	Palms	Tree

• Except:
Acacia redolens desert carpet (Desert Carpet ground cover)

•• Except:
Salvia columbariae (chia)
Salvia sonomensis (Creeping Sage)

APPENDIX 'B'

Literature References

□□ *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model,* □ □n□r□□T□□□ni□□□R□□□r□RMR□□□TR□□□□□ □□n□ □□□□□□ □□□□ □ □□□□□□□□R□□□r□E□□□r□□n□□ni□□d □□□□□□□ D□□□r□□ □n□□□□A□ri□□□□□r□ □F□r□□□□□□r□i□□□R□□□□□ M□□n□□in R□□□□□r□□ □□□□i□n□Mi□□□□□□□□M□n□□n□□

□□ *BehavePlus: Fire Modeling System, version 5.0: Variables.* □ □n□r□□T□□□ni□□□R□□□r□RMR□□□TR□□□□□ □ □ R□□i□□d□ □□□□□□□ □□r □□□□□ □□□ri□i□ □□Andr□□ □□□□ni□□d □□□□□□□ D□□□r□□ □n□□□□A□ri□□□□□r□ □F□r□□□□□r□i□□□ R□□□□□ M□□n□□in R□□□□□r□□ □□□□i□n□Mi□□□□□□□□M□n□□n□□

□□ *Behave Plus Fire Modeling System, Version 5.0.4,* □ □n□r□□T□□□ni□□□R□□□r□RMR□□□RT□□□□□□ □ □ R□□i□□d□□□□□ □□□□□□□□□□□ri□i□ □□Andr□□ □□□□ □□in D□□ □□in□□R□□□r□□□□i□ □ni□□d □□□□□□□ D□□□r□□ □n□□□□ A□ri□□□□□r□ □F□r□□□□□r□i□□□R□□□□□ M□□n□□in R□□□□□r□□ □□□□i□n□Mi□□□□□□□□M□n□□n□□

□□ □□i□□rni□ □□d□ □□R□□□□□□□i□n□Ti□□□ □□□ □□□□i□n □□□□□ □nd Ti□□□ □□□ □□r□□

□□ □□i□□rni□ □□□□i□ R□□□□r□□□ □□d□ □□□□i□n□ □□□□□ □□r□□□□□ □□□□□

□□ □□i□□rni□ □ □□□rn□ □n□□□d□□□□□□i□n□ □□□□□□ □□r□□□□□ □□□□□□

□□ □□□□□ □□i□□rni□ Fir□ □□d□ □□ri□n □□□□□□ □ □□□ □in□□din□ □□□□□ndi□□□ □□ □□□□□□r□ □ □ □nd A□□□ndi□□□ □□F □ □ □nd □□□□□A□ □nd□ □n□□

□□ □□i□□rni□ □□i□din□ □□d□□□ □□□□□□r □A □*Materials and Construction Methods for Exterior Fire Exposure.*

□□ □□□□ □□i□□rni□ R□□id□n□i□□□ □d□ □□R□□□□□i□n R□□□

□□□*The California State and Local Responsibility Area Fire Hazard Severity Zone Map – Fire and Resource Assessment Program of CAL FIRE.* □ □□n□□ □□Ri□□r□id□ □rdin□n□□ N□□□□□ □□□ □□ □nd□d □□r□□□□ □□□□□□ *The California State and Local Responsibility Area Fire Hazard Severity Zone Map – Fire and Resource Assessment Program of CAL FIRE*□

□□□D□n□ □□□□□□□□□□□□D□n□□□ □□□□□□□ □□i□n□□ □□ □n□. **A wind tunnel simulation of the mean velocity fields behind upright porous fences.** A□ri□□F□r□M□□□□r□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□

□□□N□i□n□□Fir□ □r□□□□□i□n A□□□□i□i□n □NF□A □□ □□□nd□rd □□r □□□□ In□□□□□□□i□n □□□□□rin□□r □□□□□□ □in □n□ □nd T□ □□F□□i□□ D□ □□in□□ □nd M□n□□□□□□r□d □□□ □□□□□□R □□□□D□□□□□ Edi□i□n

□□□N□i□n□□Fir□ □r□□□□□i□n A□□□□i□i□n – NF□A □□□□ □□□nd□rd □□r □ i□d□□nd Fir□ □r□□□□□i□n□ □□□□ Edi□i□n□

□□□Ri□□r□id□ □ □□□n□□ Fir□ D□□□r□□ □n□□□□nd□rd□ □□□□□□□□r□□i□□d □□□□□□□□□□□□□□□□ r□□i□□d □□□□□□□□□□□□□□□□ r□□i□□d □□□□□□□□□nd □□□□□□□□□ r□□i□□d □□□□□□□□□□

□□□□ □ □□□□rn R□□i□n □i□ □□□ □ □n□□r□ *Historic Climate Data from Remote Automated Weather Stations.* RA□ □ □□A □i□ □□□ Ar□i□□□ R□n□□N□□ D□□□ □□r □□R□□ □□□ A□□□□ □□□d □ □□□□□□r □□□i□n□i□ □□□i□□□□□ □□□ □□□□□□□□□□□□□□□□□□□□

APPENDIX 'C'

Non-Combustible & Fire-Resistant Building Materials For Balconies, Carports, Decks, Patio Covers and Floors

Note: The Office of the State Fire Marshal (SFM) Fire Engineering Division administers licensing programs and performs engineering functions affecting consumer services and product evaluation, approval, and listing. The following link is to the State Fire Marshal's office for more information on the Building Material List for noncombustible and fire resistant building materials: https://osfm.fire.ca.gov/divisions/fire-engineeringand-investigations/building-materials-listing/bml-search-building-materials-listing.

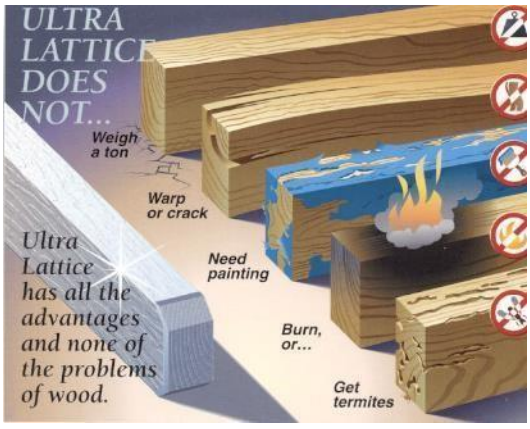
Examples of non-combustible & fire-resistant building materials for balconies, carports, decks, patio covers, and floors are as follows (these are only examples and materials listed here must meet local fire and building codes:

I. NON-COMBUSTIBLE HEAVY GAGE ALUMINUM MATERIALS - *Metals USA Building Products Group - Ultra-Lattice*

Ultra-Lattice Stand Alone Patio Cover

Ultra-Lattice Attached Patio Cover

Ultra-Lattice Solid Patio Cover



Ultra-Lattice Vs. Wood

II. FRX Exterior Fire-Retardant Treated Wood

Exterior Fire Retardant Treated (FRT) Wood

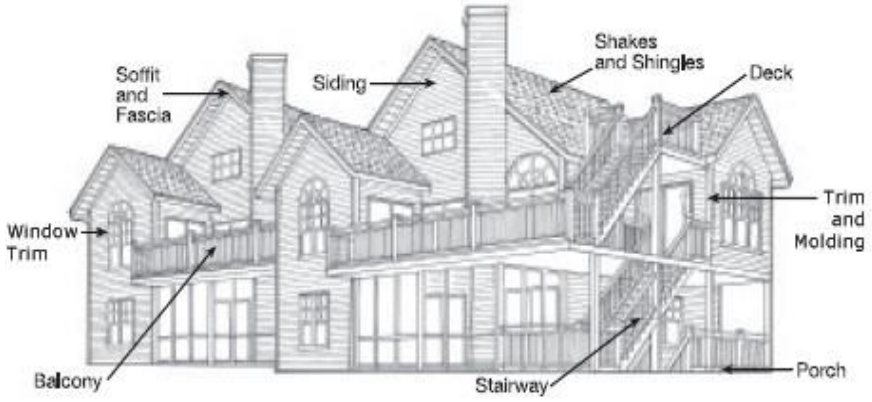
FRX® fire retardant treated wood may be used in exterior applications permitted by the codes where: public safety is critical, other materials would transfer heat or allow fires to spread, sprinkler systems cannot easily be installed, corrosive atmospheres necessitate excessive maintenance of other materials, or fire protection is inadequate or not readily available. Local Building, Residential and Urban-Wildland Interface Codes and regulations, permit the use of fire-retardant treated wood in specific instances. See below for typical exterior uses and typical residential uses.

Typical Exterior Uses

- Wall coverings
- Balconies
- Decks
- Stairways
- Fences
- Sheds
- Gazebos
- Roof coverings
- Open-air roof systems
- Canopies and awnings
- Storefronts and facades
- Eaves, soffits, and fascia
- Agricultural buildings and horse stalls
- Scaffolding and scaffold planks
- Construction staging
- Various other residential and commercial uses

Typical Residential Uses

Property owners and Architects: See this 2-minute video and the illustration below.

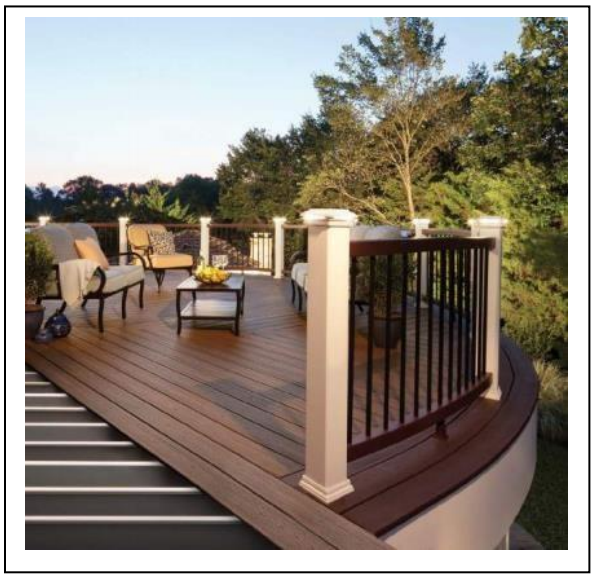


Rising concerns over fire damage and the adoption of urban-wildland interface codes have increased the use of FRT wood in residential structures.

For information on fire retardant treated wood for exterior uses, visit www.frxwood.com.

III. TREX COMPANY, INC. – "Trex Transcend®, Trex Select® and Trex Enhance® wood and polyethylene composite deck board, nominal ranging in size from 1" x 5-1/2" to 13/8" x 5-1/2" installed per manufacturer maximum edge-to-edge gap of 3/16". All Trex decking products meet or exceed the SFM 12-7A-4A testing protocol.

Trex combines both beauty and fire defense. A few examples of installations are shown below:



IV. SOLID "WOOD" DECKING

Company Name: Various Manufacturers
Product Description: Solid "Wood" decking, when installed over minimum 2" x 6" solid "Douglas Fire" or better joists, space 24" or less on center, and decking and joints comply with American Softwood Lumber Standard PS2o as follows:

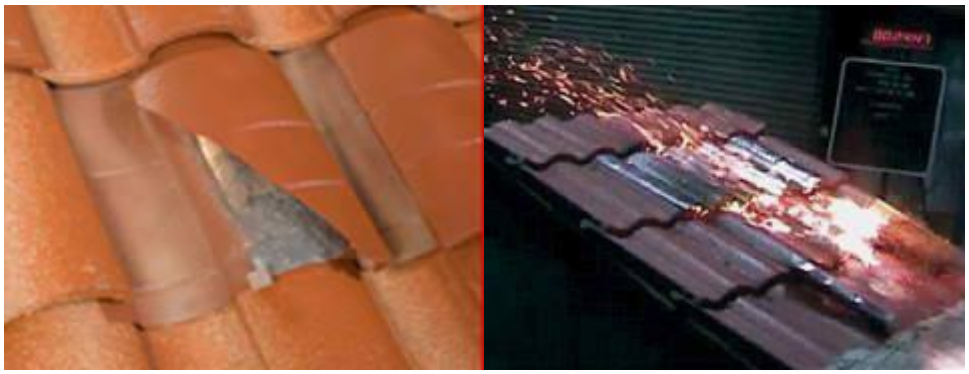
Minimum nominal 5/4"thick and nominal 6" wide decking boards with a maximum 3/8" radius edges made of solid wood species "Redwood", "Western Red Cedar", "Incense Cedar", "Port Orford Cedar", or "Alaska Yellow Cedar" having a Class B Flame Spread rating when tested in accordance with ASTM E84. Lumber grades; construction common, commercial, or better grade for Redwood; 3 common, commercial, or better grades for Cedars.

V. Vents

E□□□ □□□□ □□A□□r□□□d □□n□□

Brandguard

O'Hagin Fire & Ice® Line – Flame and Ember Resistant
An available option for all O'Hagin attic ventilation products, this attic vent not only features all the same design, construction elements and color choices as the O'Hagin Standard Line, but also features an interior stainless-steel matrix that resists the intrusion of flames and embers. This patent-pending attic vent is accepted for use by many local fire officials for installation in Wildland Urban Interface (WUI) zones.

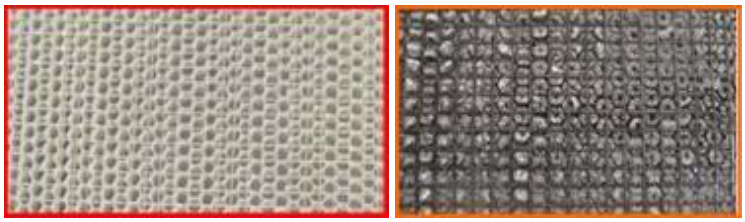


Vulcan Vents

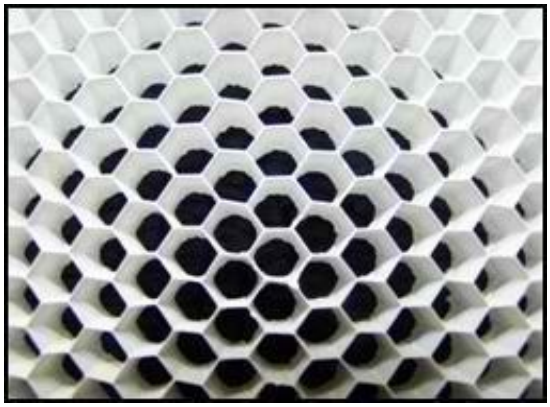
The founders of Gunter Manufacturing have been working closely over the last two years, with the scientists and inventors of Vulcan Technologies to bring to market this incredible product.

Combining our quality vent products with the fire-stopping honeycomb matrix core designed by Vulcan has produced unique and remarkable results.

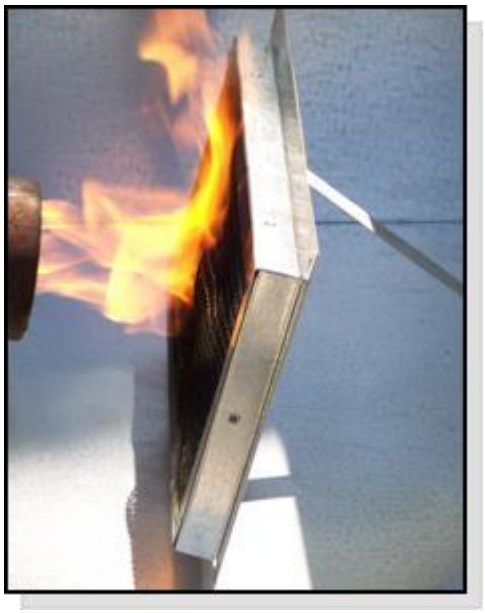
At Gunter manufacturing has over 50 years of combined sheet metal manufacturing experience. Special orders are not a problem. Their vent frames are industry standard frames so there is little or no learning curve for installers and contractors. Their stated goal is to provide people with the vents they need to secure their homes with additional safety against wildfires and give them piece of mind from knowing that their home or structure is protected by a product that works!



Before **After**



Close-up of the coated honeycomb matrix.



Fir□ □□□i□□ □□□□□□□ □□r□□□□ □ □□□nd□rd □□n□□□n □□□ □□□□□□□□□□□□□□ □□□d □ □□n i□□□□ □□ □□ □□□in□□□ □□□□□n □□n□ □□□□n □n ri□□□□

APPENDIX 'D'

Ignition Resistant Construction Requirements

The following is a summary of the current requirements for ignition resistant construction for high fire hazard areas under Chapter 7A of the California Building Code (CBC) 2019 edition and the current California Residential Code. However, the requirements listed below are not all inclusive and all exterior building construction including roofs, eaves, exterior walls, doors, windows, decks, and other attachments must meet the current CBC Chapter 7A ignition resistance requirements, the California Fire Code, and any additional County and/or City codes in effect at the time of building permit application. See the current applicable codes for a detailed description of these requirements and any exceptions.

1. All structures will be built with a Class A Roof Assembly and shall comply with the requirements of Chapter 7A and Chapter 15 of the California Fire Code. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.

2. Roof valley flashings shall be not less than 0.019-inch (0.48 mm) No. 26 gage galvanized sheet corrosion-resistant metal installed over not less than one layer of minimum 72-pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D3909, at least 36-inch-wide (914 mm) running the full length of the valley.

3. Attic or foundation ventilation louvers or ventilation openings in vertical walls shall be covered with a minimum of 1/16-inch and shall not exceed 1/8-inch mesh corrosion-resistant metal screening or other approved material that offers equivalent protection.

4. Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to resist the intrusion of flames and embers, be fire stopped with approved materials or have one layer of a minimum 72-pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.

5. Enclosed roof eaves and roof eave soffits with a horizontal underside, sloping rafter tails with an exterior covering applied to the under-side of the rafter tails, shall be protected by one of the following:
    - noncombustible material
    - Ignition-resistant material
    - One layer of $^{5}/_{8}$-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the rafter tails or soffit
    - The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the rafter tails or soffit including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual
    - Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in Section 707A.10 when tested in accordance with the test procedures set forth in ASTM E2957.

- Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3.
  Exceptions: The following materials do not require protection:
  1. Gable end overhangs and roof assembly projections beyond an exterior wall other than at the lower end of the rafter tails. 2. Fascia and other architectural trim boards.

6. The exposed roof deck on the underside of unenclosed roof eaves shall consist of one of the following:
   - Noncombustible material, or
   - Ignition-resistant material, or
   - One layer of 5/8-inch Type X gypsum sheathing applied behind an exterior covering on the underside exterior of the roof deck, or
   - The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the roof deck designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association fire Resistance Design Manual.
     Exceptions: The following materials do not require protection:
     1. Solid wood rafter tails on the exposed underside of open roof eaves having a minimum nominal dimension of 2 inch (50.8 mm).
     2. Solid wood blocking installed between rafter tails on the exposed underside of open roof eaves having a minimum nominal dimension of 2 inch (50.8 mm).
     3. Gable end overhangs and roof assembly projections beyond an exterior wall other than at the lower end of the rafter tails. 4. Fascia and other architectural trim boards.

7. Vents - ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation openings shall be fully covered with metal wire mesh, vents, other materials or other devices that meet one of the following requirements:
   A. Vents listed to ASTM E2886 and complying with all the following:
      i. There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
      ii. There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.
      iii. The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).
   B. Vents shall comply with all the following:
      i. The dimensions of the openings therein shall be a minimum of $^{1}/_{16}$-inch (1.6 mm) and shall not exceed $^{1}/_{8}$-inch (3.2 mm).
      ii. The materials used shall be noncombustible.
      Exception: Vents located under the roof covering, along the ridge of roofs, with the exposed surface of the vent covered by noncombustible wire mesh, may be of combustible materials.
      iii. The materials used shall be corrosion resistant.

8. Vents shall not be installed on the underside of eaves and cornices.

   Exceptions:
   1. Vents listed to ASTM E2886 and complying with all the following:
      - There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
      - There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.
      - The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).
   2. The enforcing agency shall be permitted to accept or approve special eave and cornice vents that resist the intrusion of flame and burning embers.
   3. Vents complying with the requirements of Section 706A.2 shall be permitted to be installed on the underside of eaves and cornices in accordance with either one of the following conditions:
      3.1.The attic space being ventilated is fully protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or,
      3.2.The exterior wall covering, and exposed underside of the eave are of noncombustible materials, or ignition-resistant materials, as determined in accordance with SFM Standard 12-7A-5 Ignition-Resistant Material and the requirements

9. All chimney, flue or stovepipe openings that will burn solid wood will have an approved spark arrester. An approved spark arrester is defined as a device constructed of nonflammable materials, having a heat and corrosion resistance equivalent to 12-gauge wire, 19-game galvanized steel or 24-gage stainless steel. or other material found satisfactory by the Fire Protection District, having ½-inch perforations for arresting burning carbon or sparks nor block spheres having a diameter less than 3/8 inch (9.55 mm). It shall be installed to be visible for the purposes of inspection and maintenance and removeable to allow for cleaning of the chimney flue.

10. All multi-family structures will have automatic interior fire sprinklers installed according to the National Fire Protection Association (NFPA) 13R 2019 edition - *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*.

11. All single-family structures will have automatic interior fire sprinklers installed according to the National Fire Protection Association (NFPA) 13D 2019 edition – Standard for the Installation of Sprinkler System in One- and Two-Family Dwellings and Manufactured Homes.7

12. The exterior wall covering, or wall assembly shall comply with one of the following requirements:
    - Noncombustible material, or
    - Ignition resistant material, or
    - Heavy timber exterior wall assembly, or
    - Log wall construction assembly, or
    - Wall assemblies that have been tested in accordance with the test procedures for a 10-minute direct flame contact expose test set forth in ASTM E2707 with the conditions of acceptance shown in Section 707A.3.1 of the California Building Code, or

- Wall assemblies that meet the performance criteria in accordance with the test procedures for a 10-minute direct flame contact exposure test set forth in SFM Standard 12-7A-1.

  Exception: Any of the following shall be deemed to meet the assembly performance criteria and intent of this section including;
  - One layer of 5/8-inch Type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, or
  - The exterior portion of a 1-hour fire resistive exterior wall assembly designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Associate Fire Resistance Design Manual.

13. Exterior walls shall extend from the top of the foundation to the roof and terminate at 2-inch nominal solid blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure.

14. Gutters shall be provided with the means to prevent the accumulation of leaf litter and debris within the gutter that contribute to roof edge ignition.

15. All rain gutters, down spouts and gutter hardware shall be constructed from metal or other noncombustible material to prevent wildfire ignition along eave assemblies.

16. No attic ventilation openings or ventilation louvers shall be permitted in soffits, in eave overhangs, between rafters at eaves, or in other overhanging areas.

17. All projections (exterior balconies, decks, patio covers, unenclosed roofs and floors, and similar architectural appendages and projections) or structures less than five feet from a building shall be of non-combustible material, one-hour fire resistive construction on the underside, heavy timber construction or pressure-treated exterior fire-retardant wood. When such appendages and projections are attached to exterior fire-resistive walls, they shall be constructed to maintain same fire-resistant standards as the exterior walls of the structure.

18. Deck Surfaces shall be constructed with one of the following materials:
    - Material that complies with the performance requirements of Section 709A.4 when tested in accordance with both ASTM E2632 and ASTM E2726, or
    - Ignition-resistant material that complies with the performance requirements of 704A.3 when tested in accordance with ASTM E84 or UL 723, or
    - Material that complies with the performance requirements of both SFM Standard 12-7A-4 and SFM Standard 12-7A-5, or
    - Exterior fire-retardant treated wood, or
    - Noncombustible material, or
    - Any material that complies with the performance requirements of SFM Standard 12-7A-4A when the attached exterior wall covering is also composed of noncombustible or ignition resistant material.

19. Accessory structures attached to buildings with habitable spaces and projections shall be in accordance with the Building Code. When the attached structure is located and constructed so that the structure or any portion thereof projects over a descending slope surface greater than 10

percent, the area below the structure shall have all underfloor areas and exterior wall construction in accordance with Chapter 7A of the Building Code.

20. Exterior windows, skylights and exterior glazed door assemblies shall comply with one of the following requirements:
    - Be constructed of multiplane glazing with a minimum of one tempered pane meeting the requirements of Section 2406 Safety Glazing, or
    - Be constructed of glass block units, or
    - Have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 257, or
    - Be tested to meet the performance requirements of SFM Standard 12-7A-2.

21. All eaves, fascia and soffits will be enclosed (boxed) with non-combustible materials. This shall apply to the entire perimeter of each structure. Eaves of heavy timber construction are not required to be enclosed as long as attic venting is not installed in the eaves. For the purposes of this section, heavy timber construction shall consist of a minimum of 4x6 rafter ties and 2x decking.

22. Detached accessory buildings that are less than 120 square feet in floor area and are located more than 30 feet but less than 50 feet from an applicable building shall be constructed of noncombustible materials or of ignition-resistant materials as described in Section 704A.2 of the California Building Code.

    Exception: Accessory structures less than 120 square feet in floor area located at least 30 feet from a building containing a habitable space.

23. All side yard fence and gate assemblies (fences, gate, and gate posts) when attached to the home shall be of non-combustible material. The first five feet of fences and other items attached to a structure shall be of non-combustible material.

24. Exterior garage doors shall resist the intrusion of embers from entering by preventing gaps between doors and door openings, at the bottom, sides, and tops of doors, from exceeding 1/8 inch. Gaps between doors and door openings shall be controlled by one of the methods listed in this section.
    - Weather-stripping products made of materials that:
        (a) have been tested for tensile strength in accordance with ASTM D638 (Standard Test Method for Tensile Properties of Plastics) after exposure to ASTM G155 (Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials) for a period of 2,000 hours, where the maximum allowable difference in tensile strength values between exposed and non-exposed samples does not exceed 10%; and
        (b) exhibit a V-2 or better flammability rating when tested to UL 94, Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
    - Door overlaps onto jambs and headers.
    - Garage door jambs and headers covered with metal flashing.

25. Exterior doors shall comply with one of the following:

1. The exterior surface or cladding shall be of noncombustible material or,
2. The exterior surface or cladding shall be of ignition-resistant material or,

3. The exterior door shall be constructed of solid core wood that complies with the following requirements:
   3.1. Stiles and rails shall not be less than 1-3/8 inches thick.
   3.2. Panels shall not be less than 1-1/4 inches thick, except for the exterior perimeter of the panel that shall be permitted to taper to a tongue not less than 3/8 inch thick.
4. The exterior door assembly shall have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 252 or,
5. The exterior surface or cladding shall be tested to meet the performance requirements of Section 707A.3.1 when tested in accordance with ASTM E2707 or,
6. The exterior surface or cladding shall be tested to meet the performance requirements of SFM Standard 12-7A-1.

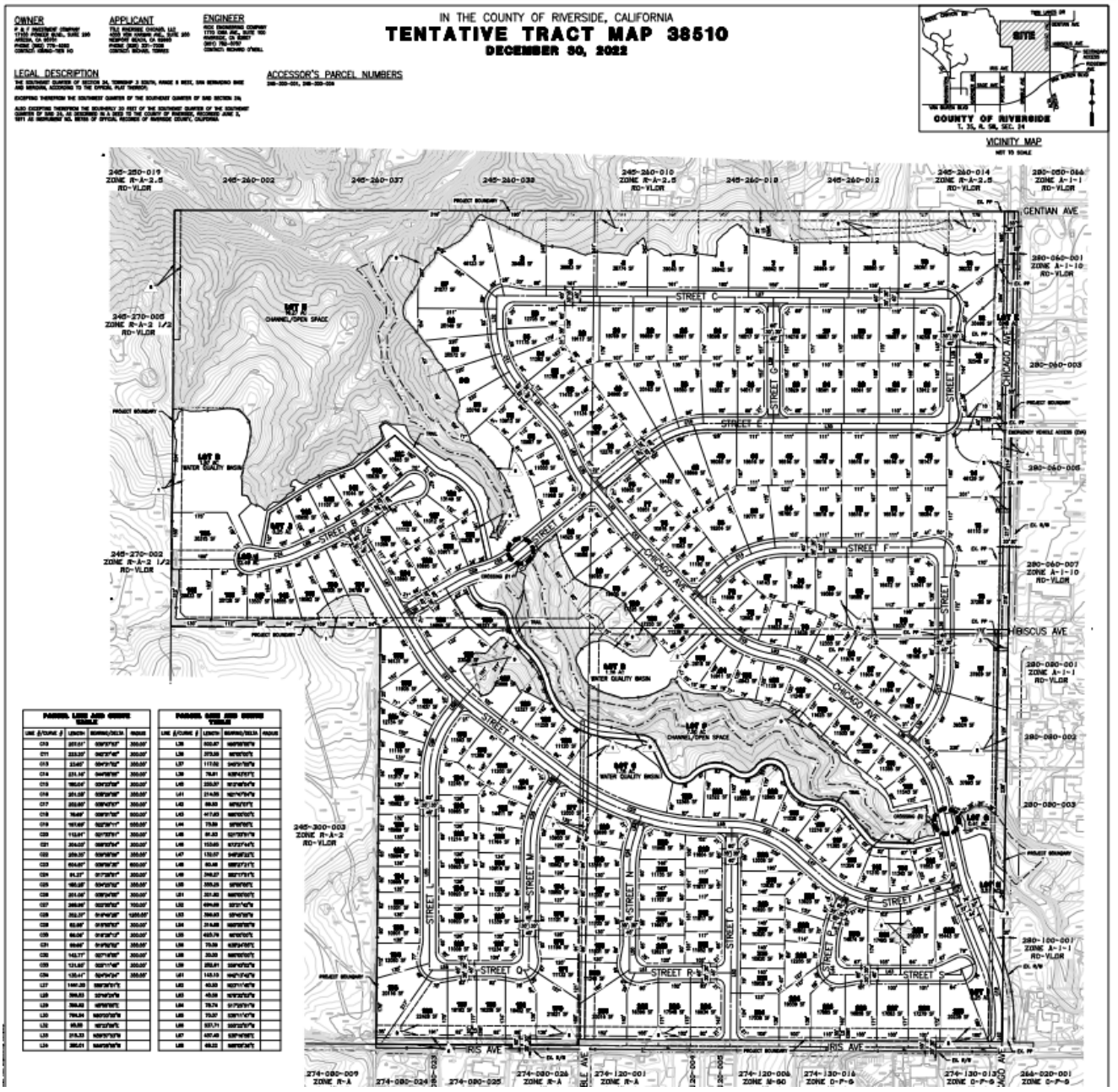
26. Fire access tunnels shall have two hour rated walls consisting of two layers of 5/8" Type 'X' gypsum wallboard panels on each side of the studs. The EZ Taping Systems "Fire Tape" product or equivalent should be used as an alternative to convention joint tape when:
    1. Two or more layers of listed Type 'X' gypsum wallboard are applied vertically with joints staggered and joints of the face board are":
       a. Tightly butted and taped with EZ Taping Systems "Fire Tape" or equivalent product or
       b. Finished with joint compound of EZ Taping Systems "Fire Tape" or equivalent product if the gap between gypsum wallboard panels are visible at the joint.
    2. Two or more layers of USG "Sheetrock" Fire code C gypsum wallboard are applied (horizontally or vertically).
    3. Gypsum panels shall be attached with Type S drywall screws, placed 8" oc to vertical edges and 12" oc to top and bottom runners and intermediate studs.
    4. Fire Tape shall be nominal 2" wide and applied on the vertical joints at studs.

** FAHJ – Fire Authority Having Jurisdiction
SFM – State Fire Marshal
NFPA – National Fire Protection Association

APPENDIX ‘E’

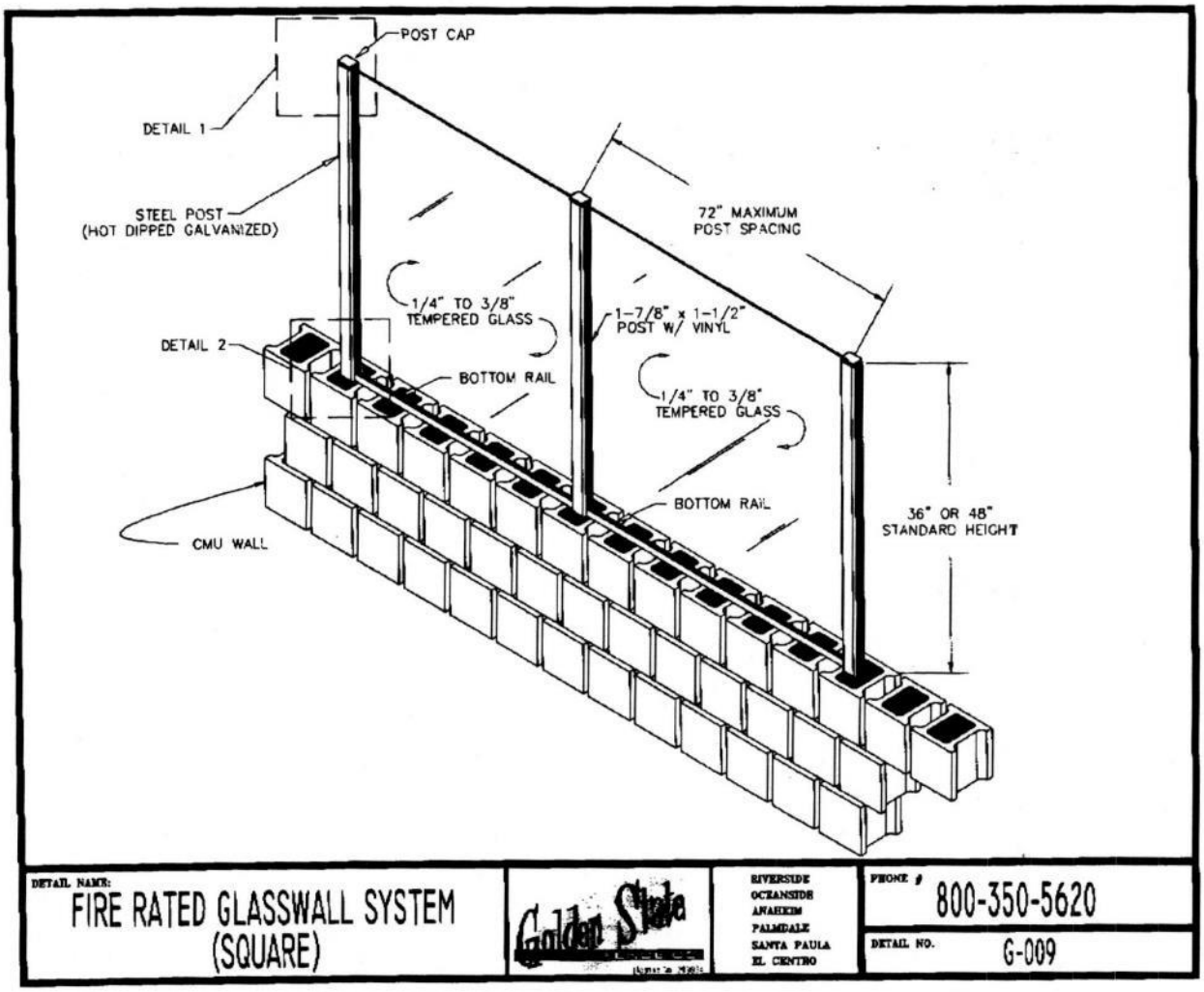
SITE PLAN – ARROYO VISTA PROJECT

Use for general layout purposes only.



APPENDIX 'F'

EXAMPLE OF A VIEW WALL



APPENDIX 'G'

EVACUATION CHECKLIST – WHAT TO TAKE

The following is a recommended list of items to take should a person or family expect that they could be evacuated due to a wildfire. It was adapted from numerous United States Forest Service, Bureau of Land Management and Cooperative Extension publications.

1. **Outside the Home:**
   - Move all flammable outdoor furniture or other combustibles away from the home, either place them inside the home, garage or throw it into a pool.
   - Turn off natural gas at the meter or propane gas at the tank, remove BBQ propane tank, take it with you or store it in a secure place such as the garage or away from your house.
   - Turn on outdoor lighting so in darkness, emergency responders will know where the home is located.
   - Close all exterior vents, doors, and windows.
   - Leave exterior doors and gates unlocked to allow emergency responder access.
   - Fill trash cans and buckets with water and place them where emergency responders can find them, preferably in a well-lit area.
   - Connect garden hoses to exterior faucets and attach nozzles if available.
   - If there is time, wet down landscaping to provide additional moisture, especially wet down flammable mulches.

2. **Inside the House:**
   - Close the Fireplace damper.
   - Close all windows and exterior vents, close all interior and exterior doors including the garage door, remove flammable curtains from windows.
   - Close fire-resistant drapes, shutters, and blinds.
   - Close and lock any cat or doggie doors that lead to the outside.
   - Move fabric covered furniture away from windows and toward the center of the room.
   - Leave a light on in each room.
   - Close all interior doors as you leave.

3. **Preparation of Family, Pets, and Livestock:**
   - Round up your pets: get them secure and ready to go into the car with no way of escape before they are loaded into the car (this is especially important with cats).