Appendix L2

DWR GHG Emissions Reduction Plan Consistency Determination Forms

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Print Form

DWR GHG Emissions Reduction Plan Consistency Determination Form

For Projects Using Contractors or Other Outside Labor

This form is to be used by DWR project managers to document a DWR CEQA project's consistency with the DWR Greenhouse Gas Emissions Reduction Plan. This form is to be used only when DWR is the Lead Agency and when contractors or outside labor and equipment are use to implement the project.

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California Department of Water Resources
1416 9th Steet
Sacramento, CA
95814
dwrclimatechange.water.ca.gov
www.water.ca.gov/climatechange

Project Name:	Yolo Bypass Salmonid Habitat Restoration and Fish Passage
Environmental Document type:	Draft EIS/EIR
Manager's Name:	
Manager's email:	
Division:	
Office, Branch, or Field Division	

Short Project Description:

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The gated notch would create an opening in Fremont Weir, that is deeper than Fremont Weir, with gates to control water going through the facility into the Yolo Bypass. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Water would be able to flow through the notch during periods when the river elevations are not high enough to go over the crest of Fremont Weir (at an elevation of 32 feet).

Alternative 1 would connect the new gated notch to Tule Pond with a channel that parallels the existing east levee of the Yolo Bypass. Alternative 1 would have the shortest and most direct access to the Tule Canal for migrating fish. Alternative 1 would allow flows up to 6,000 cfs, depending on Sacramento River elevation, through the gated notch to provide open channel flow for adult fish passage, juvenile emigration, and floodplain inundation. This alternative would include a supplemental fish passage facility on the west side of Fremont Weir and improvements to allow fish to pass through Agricultural Road Crossing 1 and the channel north of Agricultural Road Crossing 1.

Project GHG Emissions Summary

Total Construction Emissions	4,866	$mtCO_2e$
Maximum Annual Construction Emissions	4,866	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction.

○ Yes - Addition analysis is required, consult with C4

◉ No - Additional analysis not required

Project GHG Reduction Plan Checklist

☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures)

Or

☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and and Measures not incorporated have been listed and determined not be apply to the proposed project (include as an attachment)

☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)

Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater?

◯ Yes ◉ No

If you answered Yes, attach a Renewable Power Procurement Plan update approval letter from the DWR SWP Power and Risk Office.

Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan?

◯ Yes ◉ No

If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that the proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gasses emitted by the project are covered by the plan's analysis.

Project Manager Signature:		Date:
C4 Approval Signature:		Date:

Attachments:

☒ GHG Emissions Inventory

☐ List and Explanation of excluded Project Level GHG Emissions Reduction Measures

☐ Plan to update Renewable Energy Procurement Plan from DWR SWP Power and Risk Office

Print Form

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Project Name:	Yolo Bypass Salmonid Habitat Restoration and Fish Passage
Environmental Document type:	Draft EIS/EIR
Manager's Name:	
Manager's email:	
Division:	
Office, Branch, or Field Division	

Short Project Description:

Alternative 2, Central Gated Notch, would provide a new gated notch through Fremont Weir similar to the notch described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gated notch would be similar in size to Alternative 1 but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location. This location is on an outside bend of the river. Studies have indicated that juvenile fish may be found in greater numbers on the outside edge of river bends (DWR 2017). The new gated notch would allow flow to pass into the Yolo Bypass at lower river elevations than under existing conditions, where flows only enter the Yolo Bypass when Fremont Weir overtops.

Alternative 2 would include facilities to connect the gated notch to the existing Tule Pond. Alternative 2 would allow flows up to 6,000 cfs, depending on Sacramento River elevation, through the gated notch to provide open channel flow for adult fish passage, juvenile emigration, and floodplain inundation. This alternative would also include a supplemental fish passage facility on the western end of Fremont Weir and improvements downstream of Tule Pond.

Project GHG Emissions Summary

Total Construction Emissions	9,924	$mtCO_2e$
Maximum Annual Construction Emissions	9,924	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction.

- ○ Yes - Addition analysis is required, consult with C4
- ◉ No - Additional analysis not required

Project GHG Reduction Plan Checklist

☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures)

Or

☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and and Measures not incorporated have been listed and determined not be apply to the proposed project (include as an attachment)

☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)

Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater?

◯ Yes ◉ No

If you answered Yes, attach a Renewable Power Procurement Plan update approval letter from the DWR SWP Power and Risk Office.

Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan?

◯ Yes ◉ No

If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that the proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gasses emitted by the project are covered by the plan's analysis.

Project Manager Signature:		Date:
C4 Approval Signature:		Date:

Attachments:

☒ GHG Emissions Inventory

☐ List and Explanation of excluded Project Level GHG Emissions Reduction Measures

☐ Plan to update Renewable Energy Procurement Plan from DWR SWP Power and Risk Office

Print Form

DWR GHG Emissions Reduction Plan Consistency Determination Form

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Project Name:	Yolo Bypass Salmonid Habitat Restoration and Fish Passage
Environmental Document type:	Draft EIS/EIR
Manager's Name:	
Manager's email:	
Division:	
Office, Branch, or Field Division	

Short Project Description:

Alternative 3, West Side Gated Notch, would provide a new gated notch through Fremont Weir similar to the notch described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gated notch would be similar in size to Alternative 1 but would have an invert elevation that is higher (16.1 feet) because the river is higher at this location. The western location is on the outside of a river bend, similar to Alternative 2, but would be easier to access for operations and maintenance (O&M) than a central location. The new gated notch would allow flow to pass into the Yolo Bypass at lower river elevations than under existing conditions where flows only enter the Yolo Bypass when Fremont Weir overtops.

Alternative 3 would include facilities to connect the gated notch to the existing Tule Pond. Alternative 3 would allow flows up to 6,000 cfs, depending on Sacramento River elevation, through the gated notch to provide open channel flow for adult fish passage, juvenile emigration, and floodplain inundation. This alternative would also include a supplemental fish passage facility on the eastern side of Fremont Weir and improvements downstream of Tule Pond.

Project GHG Emissions Summary

Total Construction Emissions	9,008	$mtCO_2e$
Maximum Annual Construction Emissions	9,008	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction.

- ○ Yes - Addition analysis is required, consult with C4
- ◉ No - Additional analysis not required

Project GHG Reduction Plan Checklist

☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures)

Or

☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and and Measures not incorporated have been listed and determined not be apply to the proposed project (include as an attachment)

☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)

Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater?

◯ Yes ◉ No

If you answered Yes, attach a Renewable Power Procurement Plan update approval letter from the DWR SWP Power and Risk Office.

Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan?

◯ Yes ◉ No

If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that the proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gasses emitted by the project are covered by the plan's analysis.

Project Manager Signature:		Date:
C4 Approval Signature:		Date:

Attachments:

☒ GHG Emissions Inventory

☐ List and Explanation of excluded Project Level GHG Emissions Reduction Measures

☐ Plan to update Renewable Energy Procurement Plan from DWR SWP Power and Risk Office

Print Form

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Project Name:	Yolo Bypass Salmonid Habitat Restoration and Fish Passage
Environmental Document type:	Draft EIS/EIR
Manager's Name:	
Manager's email:	
Division:	
Office, Branch, or Field Division	

Short Project Description:

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than the other alternatives, but it would incorporate water control structures to maintain inundation in defined areas for longer periods of time within the northern Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3. However, it would be operated to limit the maximum inflow to approximately 3,000 cfs.

Alternative 4 includes two water control structures on Tule Canal to extend periods of inundation locally. A bypass channel would be constructed around each water control structure to provide adult fish passage when the water control structures are controlling flow. This alternative would also provide means for fish passage on the eastern side of Fremont Weir through a supplemental fish passage facility. In addition, improvements to Agricultural Road Crossing 1 and the downstream channel would be implemented under this alternative.

Project GHG Emissions Summary

Total Construction Emissions	18,034	$mtCO_2e$
Maximum Annual Construction Emissions	18,034	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction.

- (•) Yes - Addition analysis is required, consult with C4
- ( ) No - Additional analysis not required

Project GHG Reduction Plan Checklist

☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures)

Or

☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and and Measures not incorporated have been listed and determined not be apply to the proposed project (include as an attachment)

☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)

Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater?

◯ Yes ◉ No

If you answered Yes, attach a Renewable Power Procurement Plan update approval letter from the DWR SWP Power and Risk Office.

Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan?

◯ Yes ◉ No

If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that the proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gasses emitted by the project are covered by the plan's analysis.

Project Manager Signature:		Date:
C4 Approval Signature:		Date:

Attachments:

☒ GHG Emissions Inventory

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Environmental Document type:	Draft EIS/EIR
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Short Project Description:

Through the strategy of using multiple gates and intake channels at Fremont Weir, Alternative 5, Central Multiple Gated Notches, has the goal of increasing the number of out-migrating juvenile fish that enter the Yolo Bypass. Trapezoidal channels create some limitations for fish passage because they have smaller flows at lower river elevations (because the channel is smaller at this elevation) when winter-run Chinook salmon are out-migrating. Alternative 5 includes multiple gates so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows while maintaining fish passage conditions.

Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. As the river rises, the deeper gate would close and the next gate would open. This alternative would include a supplemental fish passage facility on the western side of Fremont Weir and improvements to allow fish to pass through Agricultural Road Crossing 1.

Project GHG Emissions Summary

Total Construction Emissions	21,179	$mtCO_2e$
Maximum Annual Construction Emissions	20,672	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction.

- (•) Yes - Addition analysis is required, consult with C4
- ( ) No - Additional analysis not required

Project GHG Reduction Plan Checklist

☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures)

Or

☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and and Measures not incorporated have been listed and determined not be apply to the proposed project (include as an attachment)

☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)

Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater?

◯ Yes ◉ No

If you answered Yes, attach a Renewable Power Procurement Plan update approval letter from the DWR SWP Power and Risk Office.

Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan?

◯ Yes ◉ No

If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that the proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gasses emitted by the project are covered by the plan's analysis.

Project Manager Signature:		Date:
C4 Approval Signature:		Date:

Attachments:

☒ GHG Emissions Inventory

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Environmental Document type:	Draft EIS/EIR
Manager's Name:	
Manager's email:	
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Short Project Description:

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs to enter the Yolo Bypass. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. Typically, winter-run Chinook salmon move downstream during the first high flow event of the season. This flow event is sometimes not high enough to result in what would be considered substantial flows into the bypass under Alternatives 1 through 5. The gated notch could allow more flow to enter during winter-run Chinook salmon out-migration, potentially maximizing fish entrainment. This alternative would include a supplemental fish passage facility on the eastern side of Fremont Weir and improvements to allow fish passage through Agricultural Road Crossing 1 and the channel north of Agricultural Road Crossing 1. The alignment is the same as shown for Alternative 3.

Project GHG Emissions Summary

Total Construction Emissions	17,669	$mtCO_2e$
Maximum Annual Construction Emissions	17,669	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction.

- (•) Yes - Addition analysis is required, consult with C4
- ( ) No - Additional analysis not required

Project GHG Reduction Plan Checklist

☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures)

Or

☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and and Measures not incorporated have been listed and determined not be apply to the proposed project (include as an attachment)

☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)

Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater?

◯ Yes ◉ No

If you answered Yes, attach a Renewable Power Procurement Plan update approval letter from the DWR SWP Power and Risk Office.

Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan?

◯ Yes ◉ No

If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that the proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gasses emitted by the project are covered by the plan's analysis.

Project Manager Signature:		Date:
C4 Approval Signature:		Date:

Attachments:

☒ GHG Emissions Inventory

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☐ Plan to update Renewable Energy Procurement Plan from DWR SWP Power and Risk Office

Table ~~L~~M-1. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	28	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Earthen Backfill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86

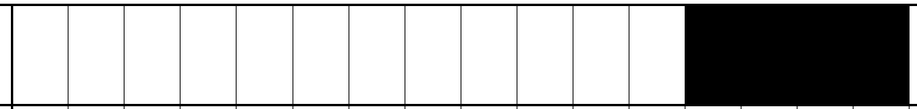
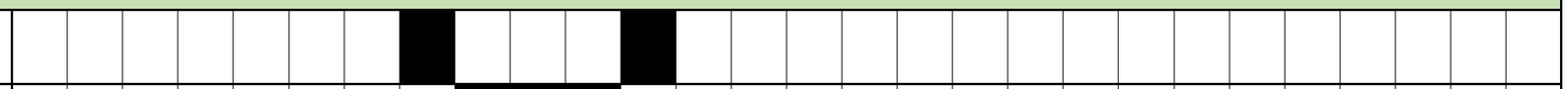
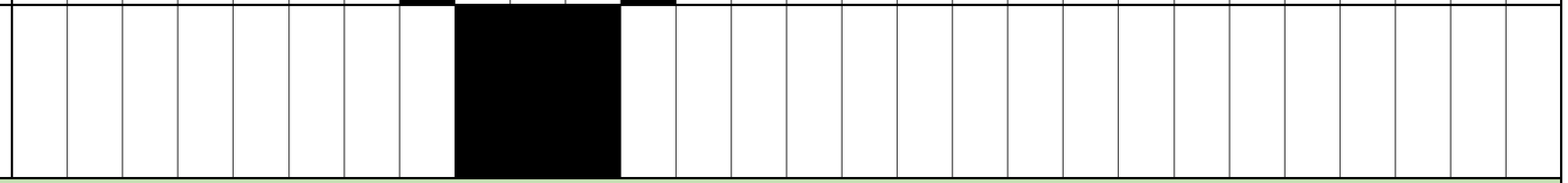
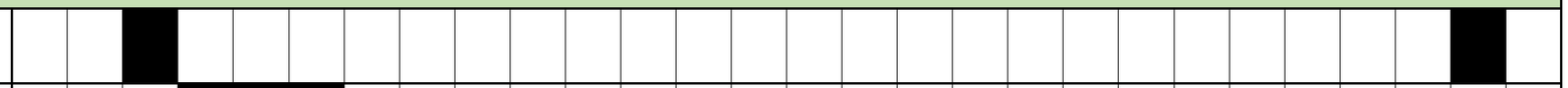
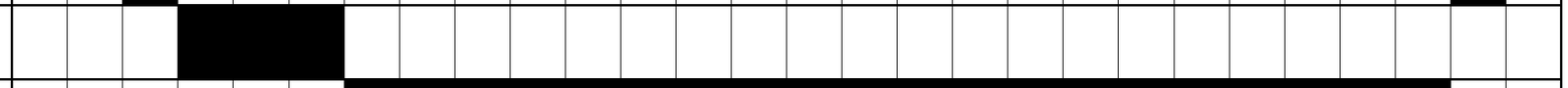
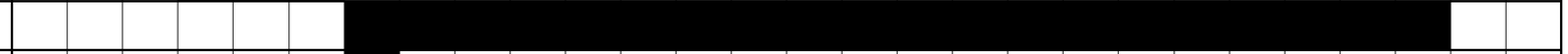
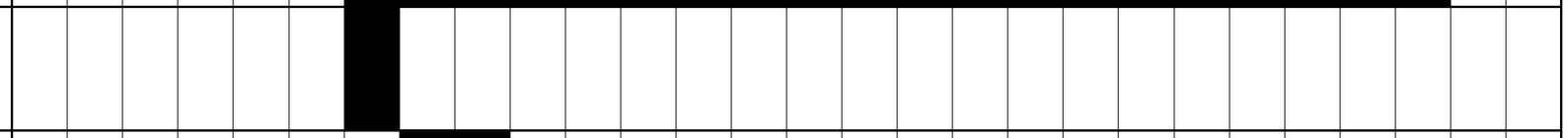
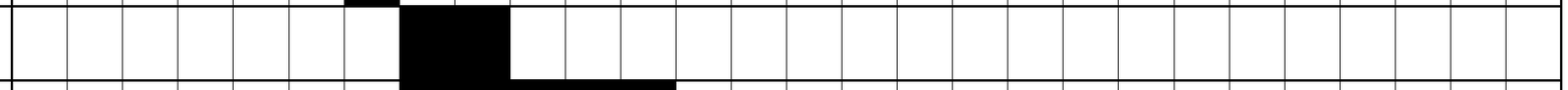
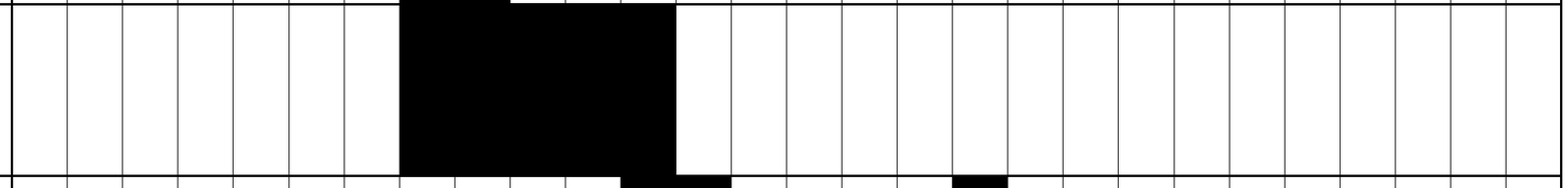
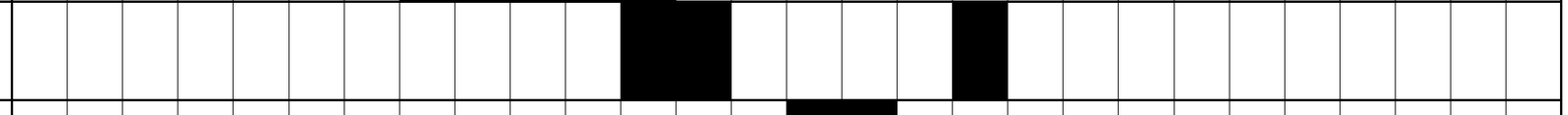
Construction Noise - Equipment
Alternative 1 - East Alignment

Table ~~L~~M-1. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																										■		
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																		■									
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■															■									
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■	■																
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■																			
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)						■	■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■											
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																	■	■										

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
11-Levees and Floodwalls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	7	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	2.5 CY Hydraulic Excavators (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Flash Mixer (1)	Soil Mix Drill Rig	50%	80	77	1	0	77
	Slurry Pump (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	14	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Concrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77

Construction Noise - Equipment
Alternative 1 - East Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
11-Levees and Floodwalls		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (1) 2.5 CY Hydraulic Excavators (1) 16 CY 3 Axle Dump Truck (1) Flash Mixer (1) Slurry Pump (1) Pickup Truck Conventional (5)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	

08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 GAL Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 1 - East Alignment

08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 GAL Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-2. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total Construction Leq(h) @ 50'	88	94	94	97	96	96	93	96	97	93	91	91	90	91	93	92	91	92	86	80	83	87	87	87	86	85	87	80
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690
Distance Divergence (dBA)	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8
Atmospheric Attenuation (dBA)	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
1-Hour Construction Noise Level at the Receptor (dBA)	64	71	71	74	73	73	70	73	73	70	68	67	66	68	69	69	68	69	63	57	59	63	63	63	63	62	64	57
CNEL (Construction Noise + Existing) (dBA)	62	67	68	70	69	69	66	69	70	66	65	64	63	65	66	66	65	65	61	58	59	61	61	61	61	60	61	58
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	CA	CA	CA	CA	CA	CA	NA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230
Distance Divergence (dBA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Atmospheric Attenuation (dBA)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
1-Hour Construction Noise Level at the Receptor (dBA)	74	81	81	84	83	83	80	83	83	79	78	77	76	78	79	79	78	79	73	67	69	73	73	73	73	72	74	67
CNEL (Construction Noise + Existing) (dBA)	71	77	77	80	79	79	76	79	79	76	74	74	72	74	75	75	74	75	69	64	66	70	70	70	69	68	70	64
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	7500

Source: Google Earth

Construction Noise - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-3. 8-Hour Construction Noise Level at 50 Feet (dBA)

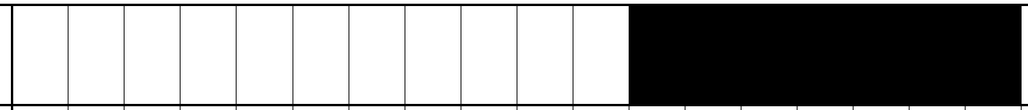
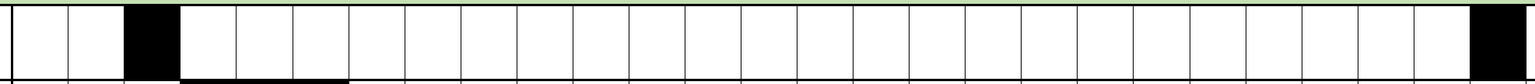
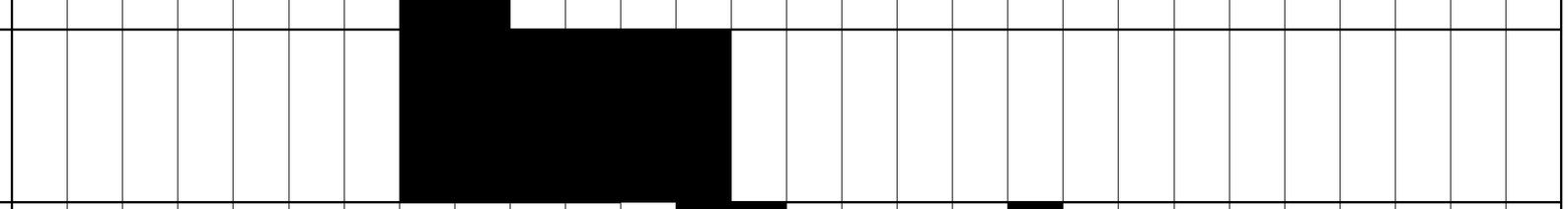
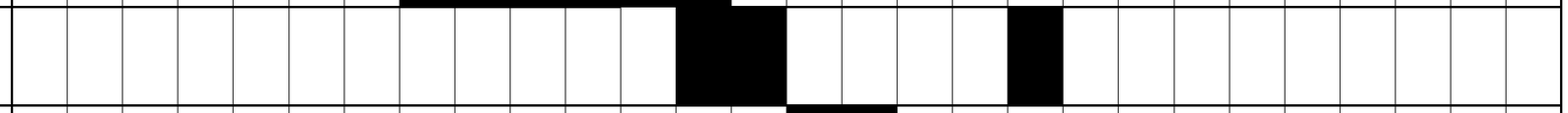
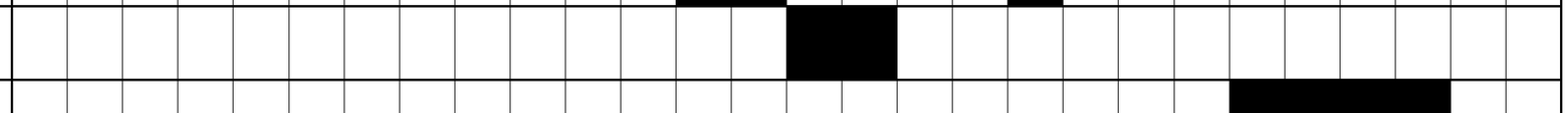
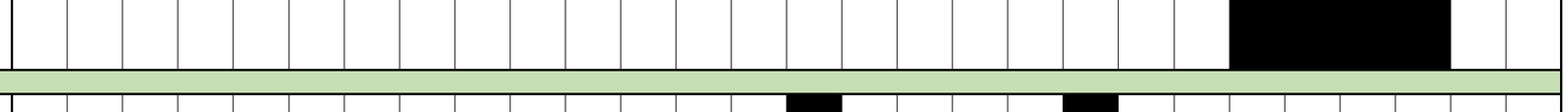
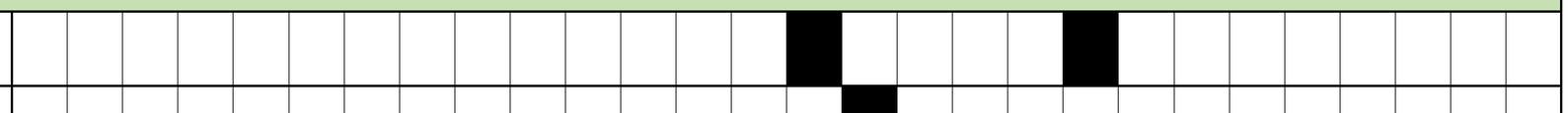
Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	28	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Earthen Backfill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86

Table ~~L~~M-3. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																			■								
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■																	
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■																			
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)													■	■	■	■	■	■	■									
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																		■										

Construction Noise - Equipment
Alternative 2 - Center Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	14	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
(Temporary Cofferdam)	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Concrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Construction Noise - Equipment
Alternative 2 - Center Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-4. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	88	94	94	97	96	96	93	96	96	92	90	90	93	92	92	93	92	91	92	87	83	85	87	87	86	86	87	80
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690	690
Distance Divergence (dBA)	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8
Atmospheric Attenuation (dBA)	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
1-Hour Construction Noise Level at the Receptor (dBA)	64	71	71	74	73	73	70	73	73	69	66	67	69	68	69	69	68	68	69	64	59	62	63	63	63	63	64	57
CNEL (Construction Noise + Existing) (dBA)	62	67	68	70	69	69	66	69	69	65	63	64	66	65	65	66	65	65	65	61	59	60	61	61	61	61	61	58
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	CA	CA	CA	NA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230
Distance Divergence (dBA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Atmospheric Attenuation (dBA)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
1-Hour Construction Noise Level at the Receptor (dBA)	74	81	81	84	83	82	80	83	83	79	76	77	79	78	78	79	78	78	79	74	69	72	73	73	73	73	74	67
CNEL (Construction Noise + Existing) (dBA)	71	77	77	80	79	79	76	79	79	75	72	73	75	75	75	75	75	74	75	70	66	68	70	70	69	69	70	64
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	NA	CA	NA	NA	CA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level (dBA)
Residential
Normally Acceptable 60
Conditionally Acceptable 70
Agricultural
Normally Acceptable 75
Conditionally Acceptable 80

Existing Noise Levels
Land Use Type Normal Suburban Residential
Background Noise (dBA)
Daytime 55
Nighttime 45

Receptors:
Nearest residential receptor (ft) 4200
Source: Google Earth

Table ~~L~~M-5. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	28	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Earthen Backfill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86

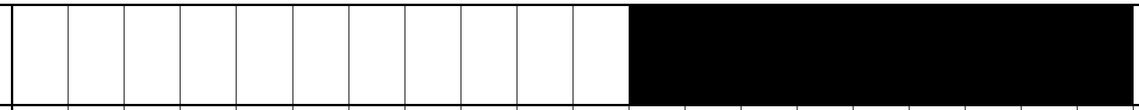
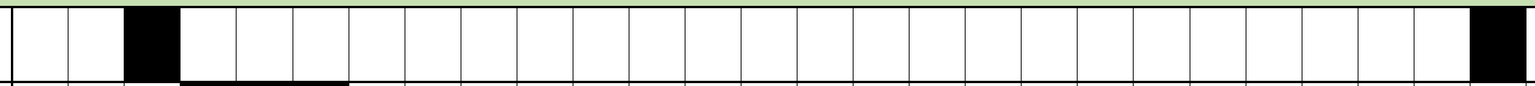
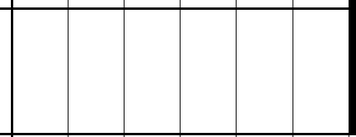
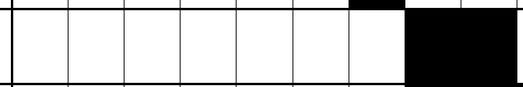
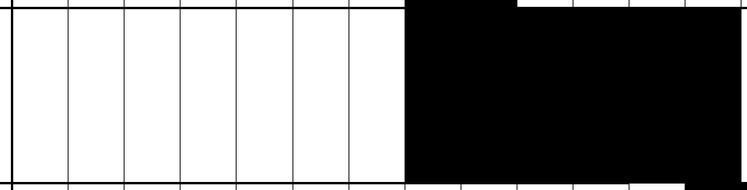
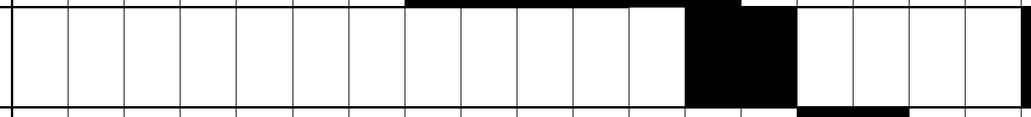
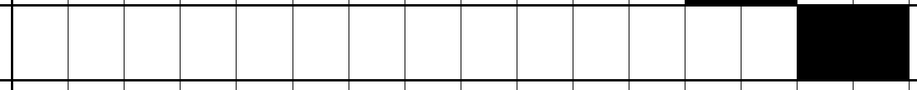
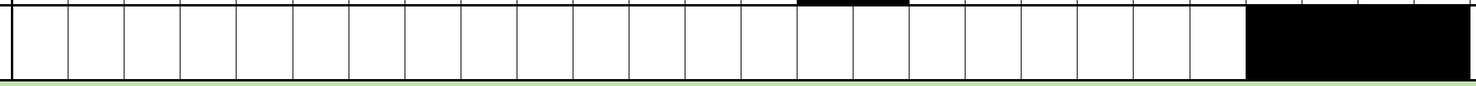
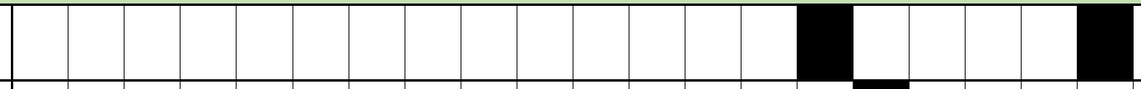
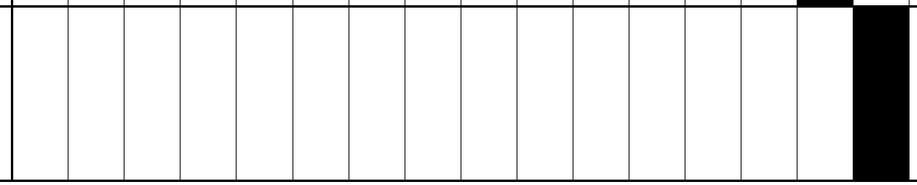
Construction Noise - Equipment
Alternative 3 - West Alignment

Table ~~L~~M-5. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																			■								
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■	■	■	■														
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■	■	■	■	■														
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■	■	■	■	■	■																
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■	■	■	■	■						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																		■										

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	14	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
(Temporary Cofferdam)	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Concrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80

Construction Noise - Equipment
Alternative 3 - West Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 3 - West Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-6. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total Construction Leq(h) @ 50'	88	94	94	97	96	96	93	96	96	92	92	93	94	94	92	93	92	91	93	92	89	90	87	87	86	86	87	80
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
Atmospheric Attenuation (dBA)	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
1-Hour Construction Noise Level at the Receptor (dBA)	64	71	71	73	73	72	70	73	73	69	69	70	70	71	68	69	68	68	70	69	65	66	63	63	63	63	64	57
CNEL (Construction Noise + Existing) (dBA)	62	67	67	70	69	69	66	69	69	66	66	67	67	67	65	66	65	65	66	66	63	63	61	61	61	61	61	58
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230
Distance Divergence (dBA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Atmospheric Attenuation (dBA)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
1-Hour Construction Noise Level at the Receptor (dBA)	74	81	81	84	83	82	80	83	83	79	79	80	80	81	78	79	78	78	80	79	75	76	73	73	73	73	74	67
CNEL (Construction Noise + Existing) (dBA)	71	77	77	80	79	79	76	79	79	75	75	76	77	77	75	75	75	74	76	75	72	72	70	70	69	69	70	64
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	NA	NA	CA	CA	NA	NA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level (dBA)
Residential
Normally Acceptable 60
Conditionally Acceptable 70
Agricultural
Normally Acceptable 75
Conditionally Acceptable 80

Existing Noise Levels
Land Use Type Normal Suburban Residential
Background Noise (dBA)
Daytime 55
Nighttime 45

Receptors:
Nearest residential receptor (ft) 700
Source: Google Earth

Construction Noise - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-7. 8-Hour Construction Noise Level at 50 Feet (dBA)

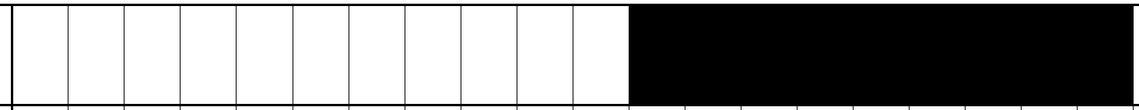
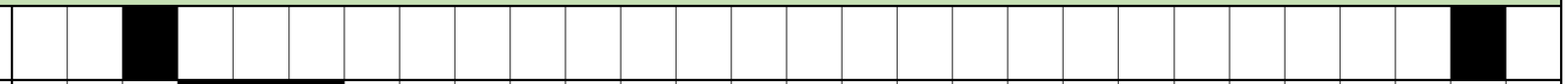
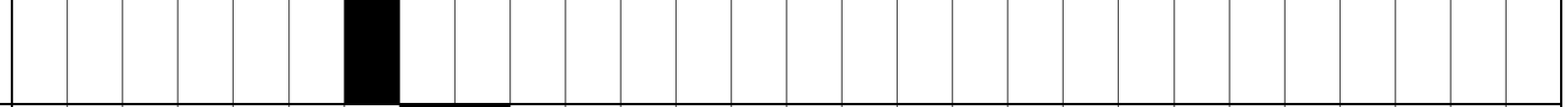
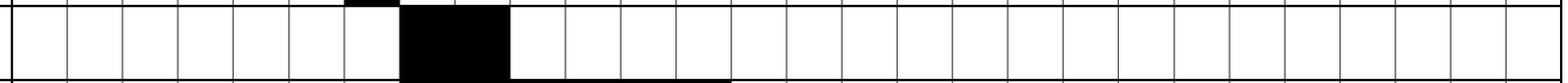
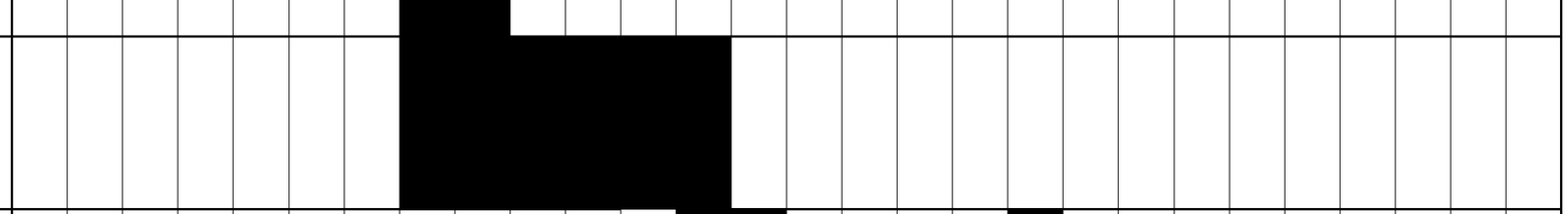
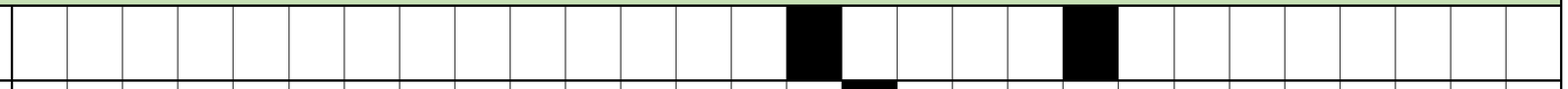
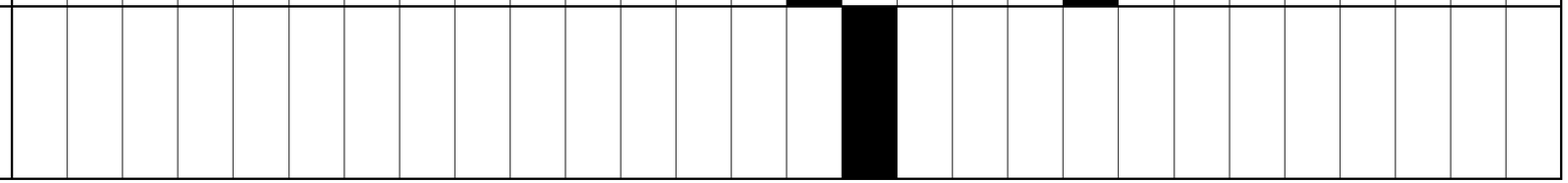
Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	28	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Earthen Backfill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86

Table ~~L~~M-7. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																			■								
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■	■	■	■														
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■	■	■	■	■														
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■	■	■	■	■	■																
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■	■	■	■	■						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																		■										

Construction Noise - Equipment
Alternative 4 - West Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	14	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
(Temporary Cofferdam)	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Concrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Construction Noise - Equipment
Alternative 4 - West Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construct	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construct	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-8. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	88	94	94	97	96	96	93	96	96	92	92	93	94	94	92	93	92	91	93	92	89	90	87	87	86	86	87	80
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
Atmospheric Attenuation (dBA)	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
1-Hour Construction Noise Level at the Receptor (dBA)	64	71	71	73	73	72	70	73	73	69	69	70	70	71	68	69	68	68	70	69	65	66	63	63	63	63	64	57
CNEL (Construction Noise + Existing) (dBA)	62	67	67	70	69	69	66	69	69	66	66	67	67	67	65	66	65	65	66	66	63	63	61	61	61	61	61	58
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230
Distance Divergence (dBA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Atmospheric Attenuation (dBA)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
1-Hour Construction Noise Level at the Receptor (dBA)	74	81	81	84	83	82	80	83	83	79	79	80	80	81	78	79	78	78	80	79	75	76	73	73	73	73	74	67
CNEL (Construction Noise + Existing) (dBA)	71	77	77	80	79	79	76	79	79	75	75	76	77	77	75	75	75	74	76	75	72	72	70	70	69	69	70	64
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	NA	NA	CA	CA	NA	NA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level (dBA)
Residential
Normally Acceptable 60
Conditionally Acceptable 70
Agricultural
Normally Acceptable 75
Conditionally Acceptable 80

Existing Noise Levels
Land Use Type Normal Suburban Residential
Background Noise (dBA)
Daytime 55
Nighttime 45

Receptors:
Nearest residential receptor (ft) 700
Source: Google Earth

Table ~~L~~M-9. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	23	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77

Construction Noise - Equipment
Alternative 5 - Multipe Gates/Center Alignment

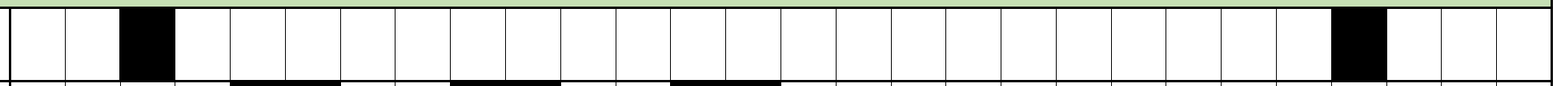
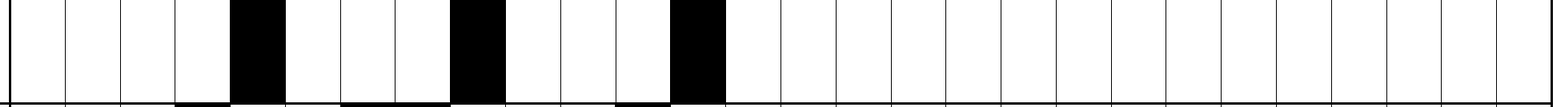
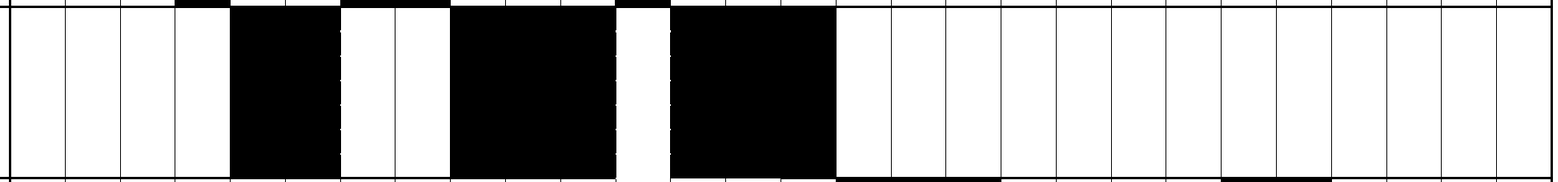
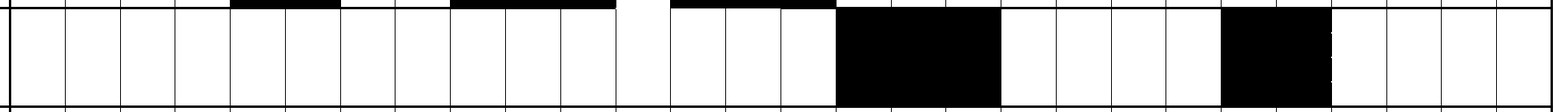
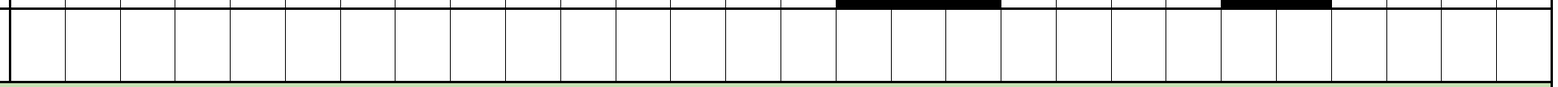
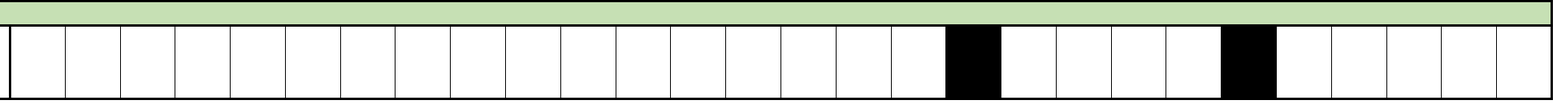
Table ~~L~~M-9. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																									■		
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)	■	■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																										■		
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																						■					
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■																										
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)				■	■	■	■	■																					
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)			■	■	■	■	■	■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)									■	■	■	■	■	■	■	■	■												
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)								■	■	■	■	■	■	■	■	■	■												
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)											■	■						■											

Table ~~L~~M-9. 8-Hour Construction Noise Level at 50 Feet (dBA)		Estimated Duration, Week												
Phase	**Equipment Description**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**
02 - Relocations														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)													
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)													
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)													
09 - Channels and Canals														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)													
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)													
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)													
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)													
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)													
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)													

Construction Noise - Equipment
Alternative 5 - Multipe Gates/Center Alignment

15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	13	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Concrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	

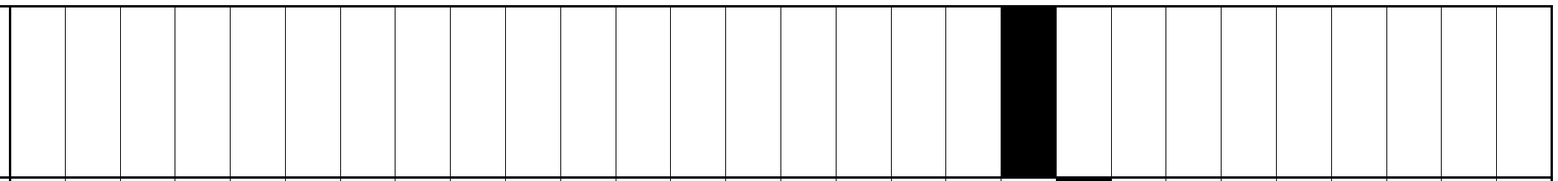
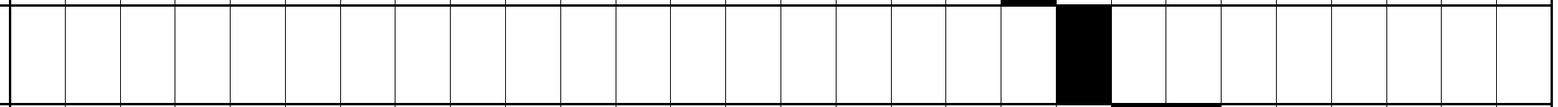
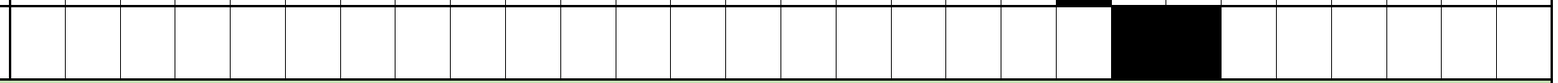
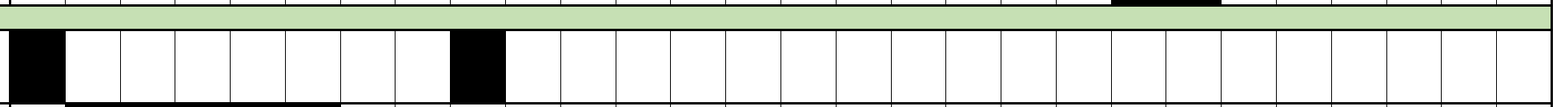
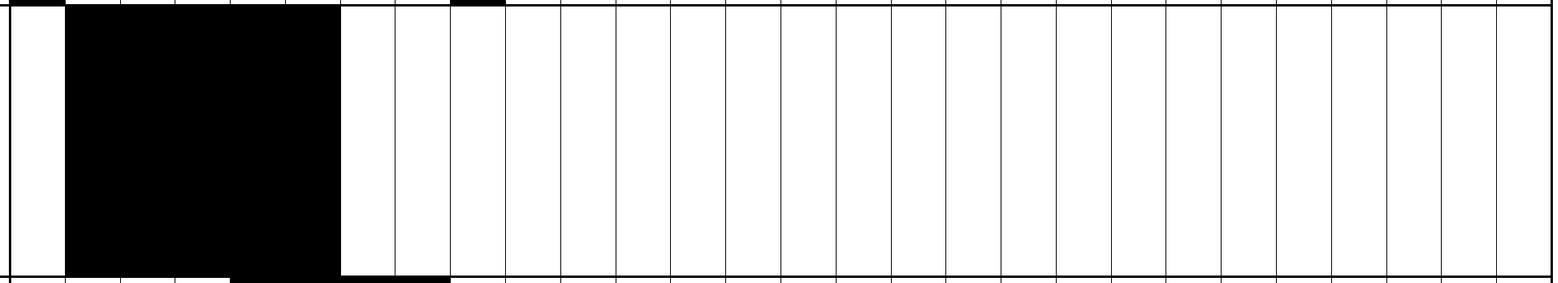
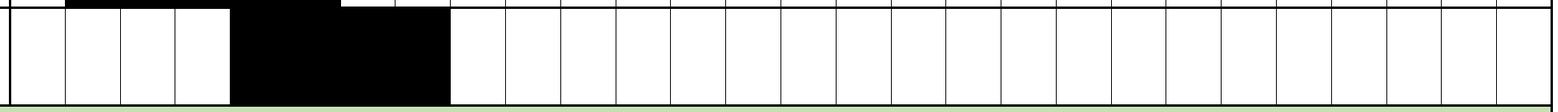
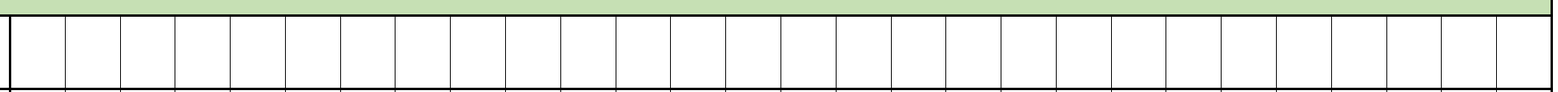
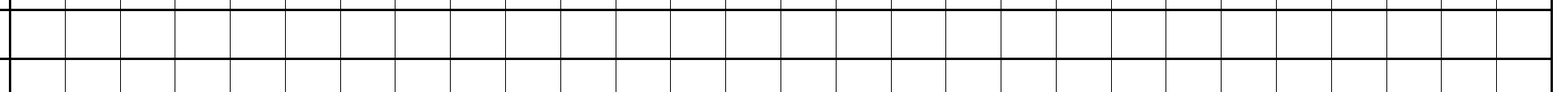
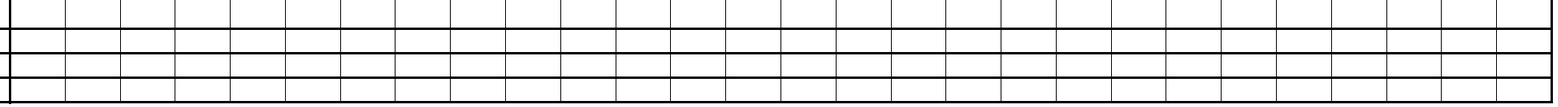
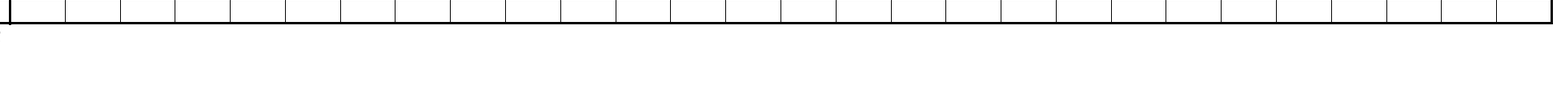
Construction Noise - Equipment
Alternative 5 - Multipe Gates/Center Alignment

15 - Floodway Control and Diversion Structures														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)													
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)													
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)													
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)													
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)													
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)													
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)													
08 - Roads, Railroads, and Bridges														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													

Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)													
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)													
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)													
19 - Buildings, Grounds, and Utilities														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)													
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)													
20 -Permanent Operating Equipment														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)													
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)													
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)													
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)													
Communication Equipment	Pickup Truck Conventional (3)													

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-10. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total Construction Leq(h) @ 50'	89	94	92	96	97	97	96	97	97	96	92	96	97	96	92	92	92	87	87	85	83	83	88	85	82	85	n/a	n/a
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720	720
Distance Divergence (dBA)	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
Atmospheric Attenuation (dBA)	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
1-Hour Construction Noise Level at the Receptor (dBA)	65	70	68	73	74	73	72	73	73	73	69	72	73	73	68	68	68	63	63	61	59	59	64	61	59	62	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	62	67	65	69	70	70	69	69	70	69	65	69	69	69	65	65	65	61	61	60	59	59	62	60	59	60	n/a	n/a
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	NA	CA	NA	NA	NA	n/a	n/a
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
Distance Divergence (dBA)	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Atmospheric Attenuation (dBA)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1-Hour Construction Noise Level at the Receptor (dBA)	75	80	78	83	84	83	82	83	83	82	79	82	83	82	78	78	78	73	73	71	69	69	74	71	69	71	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	71	76	75	79	80	79	78	79	79	79	75	78	79	79	75	74	74	69	69	67	66	66	71	67	65	68	n/a	n/a
Impact to Agricultural Uses	NA	CA	NA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	n/a

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels	
Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:	
Nearest residential receptor (ft)	3800

Source: Google Earth

Table ~~L~~M-10. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week												
	29	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**
Total Construction Leq(h) @ 50'	84	86	86	86	86	86	86	86	86	87	85	84	n/a
Residential Receptor													
Distance from the Center of Construction Activity to a Receptor (ft)	720	720	720	720	720	720	720	720	720	720	720	720	720
Distance Divergence (dBA)	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
Atmospheric Attenuation (dBA)	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
1-Hour Construction Noise Level at the Receptor (dBA)	60	62	62	62	62	62	62	62	62	63	62	60	n/a
CNEL (Construction Noise + Existing) (dBA)	59	61	61	61	61	61	61	61	61	61	60	59	n/a
Impact to Residential Uses	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	n/a
Agricultural Receptor													
Distance from the Center of Construction Activity to a Receptor (ft)	240	240	240	240	240	240	240	240	240	240	240	240	240
Distance Divergence (dBA)	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Atmospheric Attenuation (dBA)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1-Hour Construction Noise Level at the Receptor (dBA)	70	72	72	72	72	72	72	72	72	73	72	70	n/a
CNEL (Construction Noise + Existing) (dBA)	67	69	69	69	69	69	69	69	69	69	68	67	n/a
Impact to Agricultural Uses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	n/a

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	3800

Source: Google Earth

Construction Noise - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-11. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	28	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Earthen Backfill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86

Table ~~L~~M-11. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																							■				
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)										■	■	■	■	■	■	■	■	■	■	■	■							
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)											■	■	■	■	■	■	■	■	■	■	■	■	■					
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																			■	■								

Construction Noise - Equipment
Alternative 6 - West Alignment

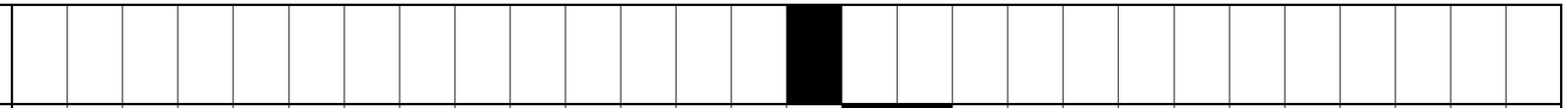
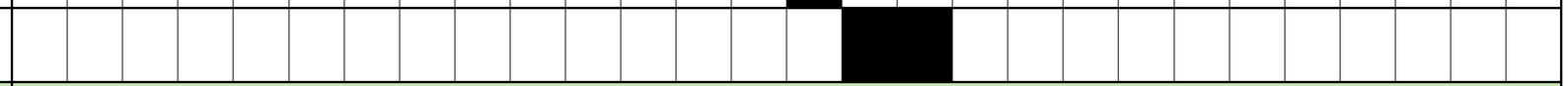
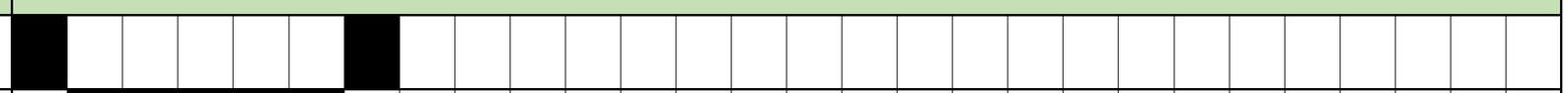
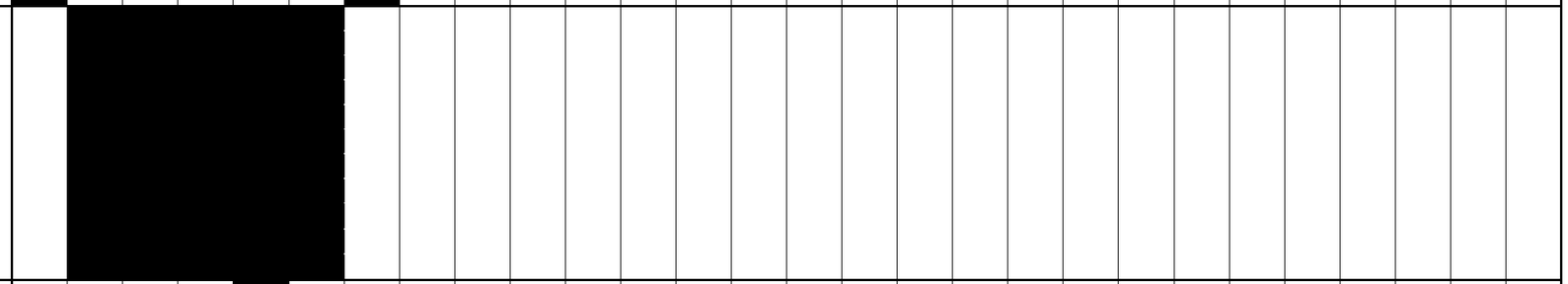
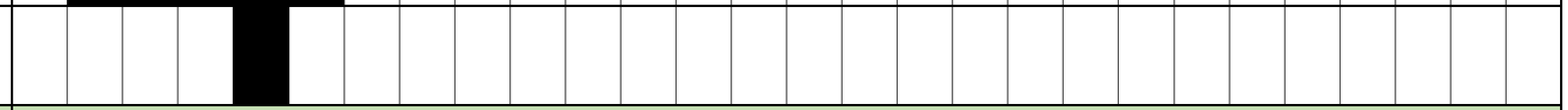
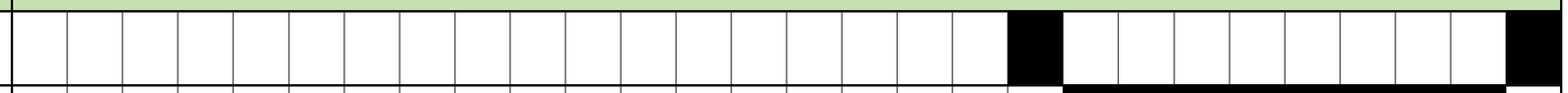
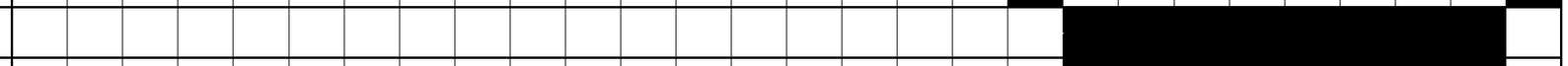
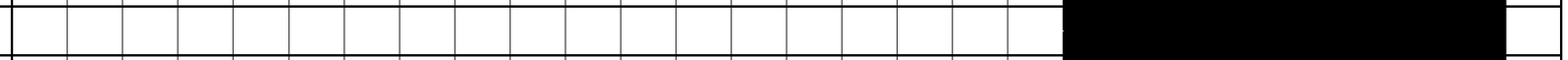
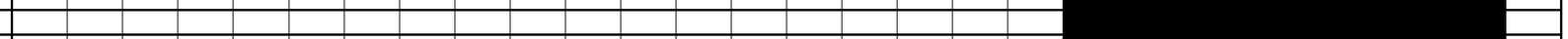
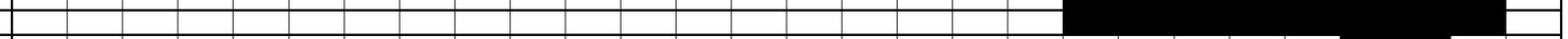
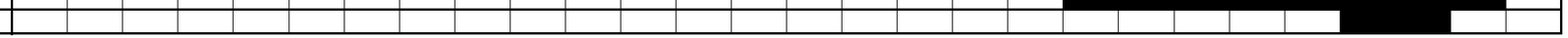
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	14	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
(Temporary Cofferdam)	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Concrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Construction Noise - Equipment
Alternative 6 - West Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-12. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	88	94	97	97	93	93	96	96	91	91	94	94	94	95	94	94	94	94	94	95	94	90	90	89	86	86	87	86
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
Atmospheric Attenuation (dBA)	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
1-Hour Construction Noise Level at the Receptor (dBA)	64	71	74	73	70	69	73	72	67	68	71	71	71	71	71	71	71	71	71	72	71	66	67	66	63	63	64	62
CNEL (Construction Noise + Existing) (dBA)	62	67	70	70	66	66	69	69	64	65	67	67	67	68	67	67	67	67	67	68	67	63	64	63	61	61	62	60
Impact to Residential Uses	CA	CA	S	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230	230
Distance Divergence (dBA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Atmospheric Attenuation (dBA)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
1-Hour Construction Noise Level at the Receptor (dBA)	74	81	84	84	80	79	83	82	77	78	81	81	81	81	81	81	81	81	81	82	81	76	77	76	73	73	74	72
CNEL (Construction Noise + Existing) (dBA)	71	77	80	80	76	75	79	79	73	74	77	77	77	77	77	77	77	77	77	78	77	72	73	72	69	69	70	69
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	NA	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level (dBA)
Residential
Normally Acceptable 60
Conditionally Acceptable 70
Agricultural
Normally Acceptable 75
Conditionally Acceptable 80

Existing Noise Levels
Land Use Type Normal Suburban Residential
Background Noise (dBA)
Daytime 55
Nighttime 45

Receptors:
Nearest residential receptor (ft) 700
Source: Google Earth

Table ~~L~~M-13. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	19	13	83
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Earthen Backfill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
11-Levees and Floodwalls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	7	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	2.5 CY Hydraulic Excavators (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Flash Mixer (1)	All Other Equipment > 5 hp	50%	85	82	1	0	82
	Slurry Pump (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Downstream (Alternatives 1-4, 6)

Table ~~L~~M-13. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																							■				
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																							■					
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																					■						
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■	■																							
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)						■	■	■	■	■	■	■																	
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■	■																				
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■	■										
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)													■	■	■	■	■	■										
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)																				■	■							
11-Levees and Floodwalls																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)									■				■															
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (1) 2.5 CY Hydraulic Excavators (1) 16 CY 3 Axle Dump Truck (1) Flash Mixer (1) Slurry Pump (1) Pickup Truck Conventional (5)										■	■	■																

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-14. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	85	93	93	93	93	87	88	88	88	90	90	90	89	91	91	91	91	91	88	79	79	84	84	79	n/a	n/a	n/a	n/a
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
Distance Divergence (dBA)	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7
Atmospheric Attenuation (dBA)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
1-Hour Construction Noise Level at the Receptor (dBA)	66	73	73	73	73	68	69	69	69	71	71	71	69	72	72	72	72	72	69	60	60	65	65	60	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	63	70	70	70	70	64	65	65	65	67	67	67	66	68	68	68	68	68	65	59	59	62	62	59	n/a	n/a	n/a	n/a
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	CA	CA	NA	n/a	n/a	n/a	n/a
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Distance Divergence (dBA)	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Atmospheric Attenuation (dBA)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
1-Hour Construction Noise Level at the Receptor (dBA)	76	83	83	83	83	78	79	79	79	81	81	81	79	82	82	82	82	82	79	70	70	75	75	70	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	73	80	80	80	80	74	75	75	75	77	77	77	76	78	78	78	78	78	75	67	67	71	71	66	n/a	n/a	n/a	n/a
Impact to Agricultural Uses	NA	CA	CA	CA	CA	NA	NA	NA	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels	
Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:	
Nearest residential receptor (ft)	7000

Source: Google Earth

Construction Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-15. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	23	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77

Table ~~L~~M-15. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■																										
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)			■						■																			
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)				■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)					■																							
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)						■																						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■																					
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)							■																					
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)								■																				

Construction Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Excavation/Grading (Dry Conditions)	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Excavation/Grading (Dry Conditions)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-16. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	81	83	84	93	87	88	91	79	86	94	94	83	84	79	80	79	78	78	79	n/a	n/a	n/a	n/a	n/a	n/a	n/a	84	80
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Distance Divergence (dBA)	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1
Atmospheric Attenuation (dBA)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
1-Hour Construction Noise Level at the Receptor (dBA)	49	51	52	60	54	56	58	47	53	62	62	50	51	46	48	46	46	46	46	n/a	n/a	n/a	n/a	n/a	n/a	n/a	51	48
CNEL (Construction Noise + Existing) (dBA)	56	57	57	59	57	57	58	56	57	60	60	57	57	56	56	56	56	56	56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	57	56
Impact to Residential Uses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	NA	NA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Distance Divergence (dBA)	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
Atmospheric Attenuation (dBA)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
1-Hour Construction Noise Level at the Receptor (dBA)	71	73	74	82	76	78	80	68	75	83	83	72	73	68	69	68	68	68	68	n/a	n/a	n/a	n/a	n/a	n/a	n/a	73	69
CNEL (Construction Noise + Existing) (dBA)	67	69	70	78	72	74	76	65	71	80	80	69	69	65	66	65	65	65	65	n/a	n/a	n/a	n/a	n/a	n/a	n/a	69	66
Impact to Agricultural Uses	NA	NA	NA	CA	NA	NA	CA	NA	NA	CA	CA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	1800

Source: Google Earth

Table ~~L~~M-17. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	3.5 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	0.8 CY Loader/Backhoe, Wheel (1)	Backhoe	40%	78	74	1	0	74
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	23	14	84
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Haul Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77

Construction Noise - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

Table ~~L~~M-17. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																										■		
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)			■						■																			
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)				■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)					■																							
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)						■																						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■																					
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)							■																					
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)								■																				

15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	6	8	78
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Excavation/Grading (Dry Conditions)	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Excavation/Grading (Dry Conditions)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-18. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total Construction Leq(h) @ 50'	81	83	84	93	87	88	91	79	86	94	94	83	84	79	80	79	78	78	79	n/a	n/a	n/a	n/a	n/a	n/a	n/a	84	80
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510
Distance Divergence (dBA)	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2
Atmospheric Attenuation (dBA)	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
1-Hour Construction Noise Level at the Receptor (dBA)	61	63	64	72	66	68	70	59	65	74	74	62	63	58	60	58	58	58	58	n/a	n/a	n/a	n/a	n/a	n/a	n/a	63	60
CNEL (Construction Noise + Existing) (dBA)	60	61	61	68	63	65	67	58	63	70	70	60	61	58	59	58	58	58	58	n/a	n/a	n/a	n/a	n/a	n/a	n/a	61	59
Impact to Residential Uses	NA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	CA	CA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	CA	NA
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Distance Divergence (dBA)	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
Atmospheric Attenuation (dBA)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
1-Hour Construction Noise Level at the Receptor (dBA)	71	73	74	82	76	78	80	68	75	83	83	72	73	68	69	68	68	68	68	n/a	n/a	n/a	n/a	n/a	n/a	n/a	73	69
CNEL (Construction Noise + Existing) (dBA)	67	69	70	78	72	74	76	65	71	80	80	69	69	65	66	65	65	65	65	n/a	n/a	n/a	n/a	n/a	n/a	n/a	69	66
Impact to Agricultural Uses	NA	NA	NA	CA	NA	NA	CA	NA	NA	CA	CA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft) 8600

Source: Google Earth

Construction Noise - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Table ~~L~~M-19. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	11	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	9	81
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
11 - Levees and Flood walls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Reinforced AG Berm	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	12	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79

Table ~~L~~M-19. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																						■						
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																						■							
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																												
09 - Channels and Canals																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■					■																							
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■																											
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)			■																										
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)				■	■																								
11 - Levees and Flood walls																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)							■		■																				
Reinforced AG Berm	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)								■																					
15 - Floodway Control and Diversion Structures																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)										■								■											
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)											■	■	■	■	■	■	■												
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)											■																		

Construction Noise - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Concrete Turnout Structure	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
36-Inch RCP	25 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
Trashrack	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Screw Gate	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Outlet Fish Screen	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Concrete Emergency Spillway	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Concrete Connection Vault	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	5	7	77
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	100 FT Auger Track Mounted Drill Rig (1)	Auger Drill Rig	20%	84	77	1	0	77
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	Cocnrete Mixer Truck (3)	Concrete Mixer Truck	40%	79	75	3	5	80
	0.8 CY Backhoe Loader (1)	Backhoe	40%	78	74	1	0	74
	24 TN Truck End Dump (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (8)	Pickup Truck	40%	75	71	8	9	80
Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Concrete Turnout Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
36-Inch RCP	25 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (1) Pickup Truck Conventional (4)	
Trashrack	Flatbed Truck (1) Pickup Truck Conventional (2)	
Screw Gate	Flatbed Truck (1) Pickup Truck Conventional (2)	
Outlet Fish Screen	Flatbed Truck (1) Pickup Truck Conventional (2)	
Concrete Emergency Spillway	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Concrete Connection Vault	40 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (3)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Table ~~L~~M-20. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	84	93	87	79	79	82	80	81	80	82	88	85	83	83	83	86	83	87	83	80	n/a	85	79	n/a	n/a	n/a	n/a	n/a
Residential Receptor																														
Distance from the Center of Construction Activity to a Receptor (ft)	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
Distance Divergence (dBA)	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7
Atmospheric Attenuation (dBA)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
1-Hour Construction Noise Level at the Receptor (dBA)	65	73	68	60	60	63	61	62	61	63	69	66	64	64	64	67	64	68	64	61	n/a	66	60	n/a	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	62	70	64	59	59	61	60	60	60	61	65	63	61	61	62	64	62	65	62	60	n/a	63	59	n/a	n/a	n/a	n/a	n/a
Impact to Residential Uses	CA	CA	CA	NA	NA	CA	NA	CA	NA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	n/a	CA	NA	n/a	n/a	n/a	n/a	n/a
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Distance Divergence (dBA)	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Atmospheric Attenuation (dBA)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
1-Hour Construction Noise Level at the Receptor (dBA)	75	83	78	70	70	73	71	72	71	73	79	76	74	74	74	77	74	78	74	71	n/a	76	70	n/a	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	71	80	74	67	67	69	68	69	68	70	75	72	70	70	70	73	70	74	70	68	n/a	72	66	n/a	n/a	n/a	n/a	n/a
Impact to Agricultural Uses	NA	CA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	NA	NA	n/a	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	8000

Source: Google Earth

Table ~~L~~M-21. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	15	12	82
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
11 - Levees and Flood walls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Berm/ Levee Fill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	12	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Construction Noise - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (A

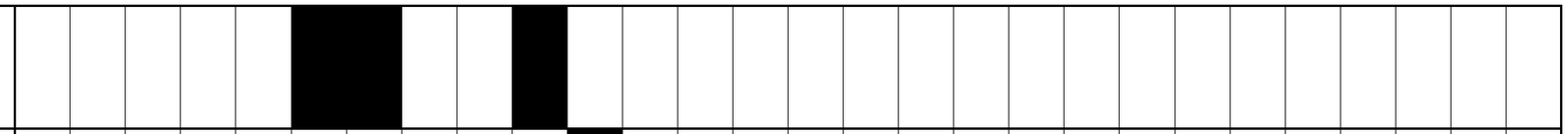
Table ~~L~~M-21. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																						■						
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																						■							
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																												
09 - Channels and Canals																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■												■																
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■																										
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)				■	■	■																							
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■	■	■	■	■	■																	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)												■																	
11 - Levees and Flood walls																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)			■									■																	
Berm/ Levee Fill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)				■	■	■	■	■	■	■	■	■																	
15 - Floodway Control and Diversion Structures																														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)					■													■											
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)								■																					
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)									■	■	■	■	■	■	■	■	■												

Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Culvert head Wall	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
Water Control Structure	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construct	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (A

Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Culvert head Wall	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (4)	
Water Control Structure	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construct	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-22. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	87	94	94	91	92	93	91	95	89	91	95	87	86	84	83	84	84	84	78	80	80	85	79	n/a	n/a	n/a	n/a	n/a
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580
Distance Divergence (dBA)	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3
Atmospheric Attenuation (dBA)	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
1-Hour Construction Noise Level at the Receptor (dBA)	65	72	72	70	71	71	70	73	67	69	74	65	64	62	61	62	62	62	57	59	59	63	57	n/a	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	62	68	69	66	67	67	66	70	64	66	70	62	62	61	60	60	60	60	58	58	58	61	58	n/a	n/a	n/a	n/a	n/a
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	NA	CA	NA	n/a	n/a	n/a	n/a	n/a
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
Distance Divergence (dBA)	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
Atmospheric Attenuation (dBA)	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
1-Hour Construction Noise Level at the Receptor (dBA)	75	82	82	80	81	81	80	83	77	79	84	75	74	72	71	72	72	72	67	69	69	73	67	n/a	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	71	78	78	76	77	77	76	80	74	76	80	71	70	69	67	69	69	68	64	65	65	70	64	n/a	n/a	n/a	n/a	n/a
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	2600

Source: Google Earth

Construction Noise - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (Alternative 4)

Table ~~L~~M-23. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
	16 CY 3 Axle Dump Truck (5)	Dump Truck	40%	76	72	5	7	79
Temporary Electrical Power	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	15	12	82
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	Trailer Mounted Brush Chipper (1)	Shears (on backhoe)	40%	96	92	1	0	92
	Chainsaw (1)	Chain Saw	20%	84	77	1	0	77
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	21 CY Scrapers (4)	Scraper	40%	84	80	4	6	86
	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
	4000 GAL Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	Excavator	40%	81	77	2	3	80
	300 HP Dozer Crawler (1)	Dozer	40%	82	78	1	0	78
	Pickup Truck Conventional (5)	Pickup Truck	40%	75	71	5	7	78
	16 CY 3 Axle Dump Trucks (23)	Dump Truck	40%	76	72	23	14	86
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
11 - Levees and Flood walls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	4	6	76
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Berm/ Levee Fill	300 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	12	11	81
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	Pumps	50%	81	78	1	0	78
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

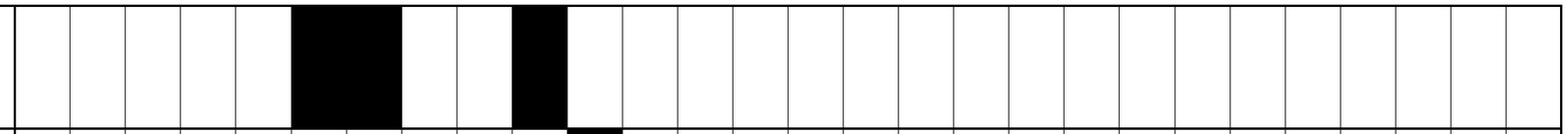
Table ~~L~~M-23. 8-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (2)	■																						■					
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																						■						
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																				■							
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 GAL Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■																			
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■	■	■	■	■	■	■	■	■	■	■	■	■									
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)																				■								
11 - Levees and Flood walls																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)			■																	■								
Berm/ Levee Fill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■									
15 - Floodway Control and Diversion Structures																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)					■													■										
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)								■																				
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)									■	■	■	■	■	■	■	■	■											

Construction Noise - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (Alternative 4)

Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	300 HP Dozer (2)	Dozer	40%	82	78	2	3	81
	3.5 CY Front End Loader, Wheel (2)	Front End Loader	40%	79	75	2	3	78
	16 CY 3 Axle Dump Truck (9)	Dump Truck	40%	76	72	9	10	82
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
Sheet Pile Wall	Flatbed Truck (1)	Flat Bed Truck	40%	74	70	1	0	70
	75 TN Crane Crawler Pile Hammer (1)	Impact Pile Driver	20%	101	94	1	0	94
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Culvert head Wall	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Flatbed Truck (2)	Flat Bed Truck	40%	74	70	2	3	73
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
Water Control Structure	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (6)	Pickup Truck	40%	75	71	6	8	79
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1)	Crane	16%	81	73	1	0	73
	Haul Truck Oversize Transport (1)	Flat Bed Truck	40%	74	70	1	0	70
	Pickup Truck Conventional (4)	Pickup Truck	40%	75	71	4	6	77
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	10	10	80
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Dozer	40%	82	78	1	0	78
	Scraper (1)	Scraper	40%	84	80	1	0	80
	Motor Grader (1)	Grader	40%	85	81	1	0	81
	Compactor (1)	Compactor (ground)	20%	83	76	1	0	76
	4000 Gal Water Truck (1)	Dump Truck	40%	76	72	1	0	72
	10 TN Smooth Roller (1)	Roller	20%	80	73	1	0	73
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Concrete Mixer Truck (1)	Concrete Mixer Truck	40%	79	75	1	0	75
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	Concrete Pump Truck	20%	81	74	1	0	74
	2.5" Dia. Concrete Vibrator (1)	Vibratory Concrete Mixer	20%	80	73	1	0	73
	Concrete Mixer Truck (2)	Concrete Mixer Truck	40%	79	75	2	3	78
	Pickup Truck Conventional (7)	Pickup Truck	40%	75	71	7	8	79
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Flat Bed Truck	40%	74	70	3	5	75
	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1)	Front End Loader	40%	79	75	1	0	75
	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76
Communication Equipment	Pickup Truck Conventional (3)	Pickup Truck	40%	75	71	3	5	76

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Culvert head Wall	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (4)	
Water Control Structure	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Noise - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (A

Table ~~L~~M-24. 8-Hour Construction Noise Level at the Receptor (dBA)

	Estimated Duration, Week																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Construction Leq(h) @ 50'	87	94	94	94	92	93	93	96	92	91	95	90	90	90	90	90	90	90	89	85	85	85	79	n/a	n/a	n/a	n/a	n/a
Residential Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630	630
Distance Divergence (dBA)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Atmospheric Attenuation (dBA)	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
1-Hour Construction Noise Level at the Receptor (dBA)	64	71	71	71	70	70	71	74	69	69	73	67	67	67	67	67	67	67	67	62	62	62	57	n/a	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	62	68	68	68	67	67	67	70	66	65	69	64	64	64	64	64	64	64	64	60	60	60	58	n/a	n/a	n/a	n/a	n/a
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	n/a	n/a	n/a	n/a	n/a
Agricultural Receptor																												
Distance from the Center of Construction Activity to a Receptor (ft)	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
Distance Divergence (dBA)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Atmospheric Attenuation (dBA)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
1-Hour Construction Noise Level at the Receptor (dBA)	74	81	81	81	80	80	80	83	79	79	83	77	77	77	77	77	77	77	76	72	72	72	67	n/a	n/a	n/a	n/a	n/a
CNEL (Construction Noise + Existing) (dBA)	70	77	77	78	76	76	77	80	75	75	79	74	73	74	73	74	74	73	73	69	69	69	64	n/a	n/a	n/a	n/a	n/a
Impact to Agricultural Uses	NA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	n/a	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels	
Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:
Nearest residential receptor (ft) 800
Source: Google Earth

Equipment Description	Impact Device?	Acoustical Use Factor	Spec 721.560 Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50 ft (dBA, slow)
All Other Equipment > 5 hp	No	50%	85	N/A
Auger Drill Rig	No	20%	85	84
Backhoe	No	40%	80	78
Bar Bender	No	20%	80	N/A
Blasting	Yes	1%	94	N/A
Boring Jack Power Unit	No	50%	80	83
Chain Saw	No	20%	85	84
Clam Shovel (dropping)	Yes	20%	93	87
Compactor (ground)	No	20%	80	83
Compressor (air)	No	40%	80	78
Concrete Batch Plant	No	15%	83	N/A
Concrete Mixer Truck	No	40%	85	79
Concrete Pump Truck	No	20%	82	81
Concrete Saw	No	20%	90	90
Crane	No	16%	85	81
Dozer	No	40%	85	82
Drill Rig Truck	No	20%	84	79
Drum Mixer	No	50%	80	80
Dump Truck	No	40%	84	76
Excavator	No	40%	85	81
Flat Bed Truck	No	40%	84	74
Front End Loader	No	40%	80	79
Generator	No	50%	82	81
Generator (<25KVA, VMS signs)	No	50%	70	73
Gradall	No	40%	85	83
Grader	No	40%	85	N/A
Grapple (on backhoe)	No	40%	85	87
Horizontal Boring Hydr. Jack	No	25%	80	82
Hydra Break Ram	Yes	10%	90	N/A
Impact Pile Driver	Yes	20%	95	101
Jackhammer	Yes	20%	85	89
Man Lift	No	20%	85	75
Mounted Impact Hammer (hoe ram)	Yes	20%	90	90
Pavement Scarifier	No	20%	85	90
Paver	No	50%	85	77
Pickup Truck	No	40%	55	75
Pneumatic Tools	No	50%	85	85
Pumps	No	50%	77	81
Refrigerator Unit	No	100%	82	73
Rivit Buster/Chipping Gun	Yes	20%	85	79
Rock Drill	No	20%	85	81
Roller	No	20%	85	80
Sand Blasting (Single Nozzle)	No	20%	85	96
Scraper	No	40%	85	84
Shears (on backhoe)	No	40%	85	96
Slurry Plant	No	100%	78	78
Slurry Trenching Machine	No	50%	82	80
Soil Mix Drill Rig	No	50%	80	N/A
Tractor	No	40%	84	N/A
Vacuum Excavator (vac-truck)	No	40%	85	85
Vacuum Street Sweeper	No	10%	80	82
Ventilation Fan	No	100%	85	79
Vibrating Hopper	No	50%	85	87
Vibratory Concrete Mixer	No	20%	80	80
Vibratory Pile Driver	No	20%	95	101
Warning Horn	No	5%	85	83
Welder/Torch	No	40%	73	74

Source: FHWA. RCNM User's Guide - Table 1. CA/T equipment noise emissions and acoustical usage fac

Note: Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power. In case of construction blasting, the equipment gives a very short duration blast and can be quantified by using a 1% usage factor in the RCNM to allow for some prediction.

Table ~~L~~M-26. Atmospheric Attenuation

Assumptions	
Ambient pressure (kPa)	101.3
Temperature (F)	68
Relative humidity (%)	90
Frequency of noise source (Hz)	500
Air Attenuation Coefficient (α, dB/km)	2.7
(dB/ft)	0.0008

$A_{air} = \alpha d$

Conversion:
0.3048 m/ft
1000 m/km

Weather in Yolo County
Average temperature 60.8 °F
Average relative humidity 81.35 %

Reference:
Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control. 3rd ed. - Chapter 3 Calculation of Attenuation
https://www.ncdc.noaa.gov/cdo-web/datatools/normals, Sacramento Metropolitan Airport annual average temperature 1981-2010
http://www.usa.com/yolo-county-ca-weather.htm

Land Use Description	Average Ldn (dBA)	Daytime Leq (dBA)	Nighttime Leq (dBA)
Wilderness	35	35	25
Rural Residential	40	40	30
Quiet Suburban Residential	50	50	40
Normal Suburban Residential	55	55	45
Urban Residential	60	60	50
Noisy Urban Residential	65	65	55
Very Noisy Urban Residential	70	70	60

Source: U.S. EPA, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974.

Table ~~L~~M-28. Noise Reductions from Mitigation Measures

Mitigation Type	Reduction (dBA)
Noise barrier or other obstruction just barely breaks the line-of-sight between the noise source and the receptor	3
Noise source completely enclosed or completely shielded with solid barrier located close to the source	8
Enclosure and/or barrier with some gaps	5
Noise source completely enclosed and completely shielded with a solid barrier located close to the source	10
Noise source enclosed or shielded with heavy vinyl noise curtain material	5

Source: FHWA. RCNM User's Guide Appendix A Best Practices for Calculating Estimated Shielding for Use in the RCNM

Type	Roadway	Segment	2015 AADT without Construction Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	682	404	55	10.4	7,495	63,895	1.1	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	682	404	55	10.4	7,495	63,695	1.1	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table ~~L~~M-30. Alt 1 Peak Hourly Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	682	202	55	10.4	7,293	12,933	2.3	4	12	No
Interstate	I-5	CR 117 to CR 102	5,620	682	202	55	10.4	7,293	12,913	2.3	4	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table ~~L~~M-31. Alt 2 Daily Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without Construction Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	599	446	55	10.4	6,676	63,076	1.1	0	12	No
Interstate	I-5	CR 117 to CR 102	56,200	599	446	55	10.4	6,676	62,876	1.1	0	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table ~~L~~M-32. Alt 2 Peak Hourly Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	599	223	55	10.4	6,453	12,093	2.1	3	12	No
Interstate	I-5	CR 117 to CR 102	5,620	599	223	55	10.4	6,453	12,073	2.1	3	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table ~~L~~M-33. Alt 3 Daily Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without Construction Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	597	554	55	10.4	6,768	63,168	1.1	0	12	No
Interstate	I-5	CR 117 to CR 102	56,200	597	554	55	10.4	6,768	62,968	1.1	0	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table ~~L~~M-34. Alt 3 Peak Hourly Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	597	277	55	10.4	6,491	12,131	2.2	3	12	No
Interstate	I-5	CR 117 to CR 102	5,620	597	277	55	10.4	6,491	12,111	2.2	3	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table ~~L~~M-35. Alt 4 Daily Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without Construction Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	1,645	726	55	10.4	17,836	74,236	1.3	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	1,645	726	55	10.4	17,836	74,036	1.3	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table ~~L~~M-36. Alt 4 Peak Hourly Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	1,645	363	55	10.4	17,473	23,113	4.1	6	12	No
Interstate	I-5	CR 117 to CR 102	5,620	1,645	363	55	10.4	17,473	23,093	4.1	6	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Type	Roadway	Segment	2015 AADT without Construction Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	634	598	55	10.4	7,190	63,590	1.1	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	634	598	55	10.4	7,190	63,390	1.1	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table ~~L~~M-38. Alt 5 Peak Hourly Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	634	299	55	10.4	6,891	12,531	2.2	3	12	No
Interstate	I-5	CR 117 to CR 102	5,620	634	299	55	10.4	6,891	12,511	2.2	3	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table ~~L~~M-39. Alt 6 Daily Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without Construction Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	895	828	55	10.4	10,137	66,537	1.2	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	895	828	55	10.4	10,137	66,337	1.2	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table ~~L~~M-40. Alt 6 Peak Hourly Construction Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	895	414	55	10.4	9,723	15,363	2.7	4	12	No
Interstate	I-5	CR 117 to CR 102	5,620	895	414	55	10.4	9,723	15,343	2.7	4	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Traffic Calculations

Maximum Daily Haul Trucks

Table M-41. Alternative 1 Maximum Daily Truck Trips by Component

Alternative 1	Estimated Duration, Week																																											Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
Channel E	88	43	71	38	10	0	20	14	602	602	602	35	198	279	295	301	180	211	56	0	8	0	0	0	0	0	105	12														602
Downstream	44	0	0	0	0	0	120	120	14	0	0	0	105	182	182	182	182	182	91	0	0	38	69	6	0	0	0	0														182
Fish Passage West	12	5	46	0	0	230	130	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														230
Ag Crossing 1	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0														89
Total	172	48	137	38	10	252	278	223	682	626	602	41	316	461	490	494	372	418	165	0	8	74	75	6	0	0	174	24														**682**
East Alternative Route	160	43	91	38	10	22	148	223	624	626	602	35	303	461	478	488	372	418	159	0	8	74	75	6	0	0	105	12														626
West Alternative Route	12	5	46	0	0	230	130	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														230

Table M-42. Alternative 2 Maximum Daily Truck Trips by Component

Alternative 2	Estimated Duration, Week																																											Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
Channel C	88	44	72	39	12	0	84	0	0	0	0	183	389	389	405	395	377	367	277	66	8	0	0	0	0	0	105	12														405
Downstream	44	0	0	0	0	0	120	120	14	0	0	0	105	182	182	182	182	182	91	0	0	38	69	6	0	0	0	0														182
Fish Passage West	12	5	46	0	0	230	130	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														230
Ag Crossing 1	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0														89
Total	172	49	138	39	12	252	342	209	80	24	0	189	507	572	599	587	570	574	386	66	8	74	75	6	0	0	174	24														**599**
Option 1																																											
East Alternative Route	160	44	92	39	12	22	212	209	22	24	0	183	494	572	587	581	570	574	380	66	8	74	75	6	0	0	105	12														587
West Alternative Route	12	5	46	0	0	230	130	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														230
Option 2																																											
East Alternative Route	72	0	20	0	0	22	128	209	22	24	0	0	105	182	182	186	192	206	103	0	0	74	75	6	0	0	0	0														209
West Alternative Route	100	49	118	39	12	230	214	0	58	0	0	189	402	389	417	401	377	367	283	66	8	0	0	0	0	0	174	24														417
Option 3																																											
East Alternative Route	116	22	56	19	6	22	170	209	22	24	0	92	300	377	385	384	381	390	242	33	4	74	75	6	0	0	53	6														390
West Alternative Route	56	27	82	19	6	230	172	0	58	0	0	98	208	195	214	203	189	184	145	33	4	0	0	0	0	0	122	18														230

Table M-43. Alternative 3 Maximum Daily Truck Trips by Component

Alternative 3	Estimated Duration, Week																																											Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
Channel W	88	5	33	0	12	0	143	123	123	123	123	184	206	387	403	393	376	366	471	432	190	182	0	0	0	0	105	12														471
Downstream	44	0	0	0	0	0	120	120	14	0	0	0	105	182	182	182	182	182	91	0	0	38	69	6	0	0	0	0														182
Fish Passage E	12	5	46	0	0	260	127	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														260
Ag Crossing 1	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0														89
Total	172	10	99	0	12	282	398	332	203	147	123	190	324	570	597	585	568	572	580	432	190	256	75	6	0	0	174	24														**597**
East Alternative Route	84	5	66	0	0	282	255	209	80	24	0	6	118	182	194	192	192	206	109	0	0	74	75	6	0	0	69	12														282
West Alternative Route	88	5	33	0	12	0	143	123	123	123	123	184	206	387	403	393	376	366	471	432	190	182	0	0	0	0	105	12														471

Table M-44. Alternative 4 Maximum Daily Truck Trips by Component

Alternative 4	Estimated Duration, Week																																											Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
Channel W	88	5	33	0	12	0	143	123	123	123	123	184	206	387	403	393	376	366	471	432	190	182	0	0	0	0	105	12														471
Downstream	44	0	0	0	0	0	120	120	14	0	0	0	105	182	182	182	182	182	91	0	0	38	69	6	0	0	0	0														182
Fish Passage E	12	5	46	0	0	260	127	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														260
Ag Crossing 1	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0														89
Northern	56	20	28	677	709	677	359	339	339	339	339	8	36	14	0	6	0	24	0	0	0	87	6	0	0	0	0	0														709
Southern	56	39	47	288	716	684	888	868	868	433	433	433	439	447	433	439	433	457	433	8	30	90	6	0	0	0	0	0														888
Total	284	69	174	965	1,437	1,643	1,645	1,539	1,410	919	895	631	799	1,030	1,030	1,030	1,001	1,053	1,013	440	220	433	87	6	0	0	174	24														**1,645**
East Alternative Route	140	25	94	677	709	959	614	548	419	363	339	14	154	196	194	198	192	230	109	0	0	161	81	6	0	0	69	12														959
West Alternative Route	144	44	80	288	728	684	1,031	991	991	556	556	617	644	834	836	832	809	823	904	440	220	272	6	0	0	0	105	12														1,031

Table M-45. Alternative 5 Maximum Daily Truck Trips by Component

	Estimated Duration, Week																																									
Alternative 5	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**Maximum**
Channel C	92	14	40	0	12	12	12	286	568	548	548	548	548	548	548	619	619	81	0	6	0	0	127	71	26	81	0	0	34	0	0	0	0	0	0	0	0	0	0	34	0	619
Fish Passage W	12	5	46	0	0	230	130	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12	--	--	--	--	--	--	--	--	--	--	--	--	--	230
Ag Crossing 1	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	89
Tule Canal	54	120	120	120	152	120	140	1,732	1,843	1,843	2,288	2,288	2,183	2,193	2,169	2,169	2,169	2,204	445	445	10	28	85	6	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	2,288
Total (w/o Tule Canal)	132	19	106	0	12	264	150	375	634	572	548	554	561	548	560	629	629	105	18	6	0	36	133	71	26	81	69	12	34	0	0	0	0	0	0	0	0	0	0	34	0	**634**
Option 1 (w/o Tule Canal)	186	139	226	120	163	383	289	2,106	2,477	2,415	2,836	2,842	2,744	2,741	2,729	2,798	2,798	2,310	463	451	10	64	219	77	26	81	69	12	34	0	0	0	0	0	0	0	0	0	0	34	0	
East Alternative Route	120	14	60	0	12	34	20	375	576	572	548	548	548	548	548	623	629	105	12	6	0	36	133	71	26	81	0	0	34	0	0	0	0	0	0	0	0	0	0	34	0	629
West Alternative Route	12	5	46	0	0	230	130	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12	0	0	0	0	0	0	0	0	0	0	0	0	0	230
Option 2 (w/o Tule Canal)																																										
East Alternative Route	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89
West Alternative Route	104	19	86	0	12	242	142	286	626	548	548	554	561	548	560	625	619	81	6	6	0	0	127	71	26	81	69	12	34	0	0	0	0	0	0	0	0	0	0	34	0	626
Option 3 (w/o Tule Canal)																																										
East Alternative Route	74	7	40	0	6	28	14	232	292	298	274	274	274	274	274	314	320	65	12	3	0	36	70	36	13	41	0	0	17	0	0	0	0	0	0	0	0	0	0	17	0	320
West Alternative Route	58	12	66	0	6	236	136	143	342	274	274	280	287	274	286	316	310	41	6	3	0	0	64	36	13	41	69	12	17	0	0	0	0	0	0	0	0	0	0	17	0	342

Table M-46. Alternative 6 Maximum Daily Truck Trips by Component

	Estimated Duration, Week																																									
Alternative 6	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**Maximum**
Channel W	88	38	10	0	12	0	112	0	0	22	667	667	694	672	682	644	667	689	652	733	733	368	368	56	0	0	69	48														733
Downstream	44	0	0	0	0	0	120	120	14	0	0	0	105	182	182	182	182	182	91	0	0	38	69	6	0	0	0	0														182
Fish Passage E	12	5	46	0	0	260	127	0	58	0	0	6	13	0	12	6	0	0	6	0	0	0	0	0	0	0	69	12														260
Ag Crossing 1	28	0	20	0	0	22	8	89	8	24	0	0	0	0	0	4	10	24	12	0	0	36	6	0	0	0	0	0														89
Total	172	42	76	0	12	282	367	209	80	46	667	673	812	854	876	837	859	895	762	733	733	442	443	62	0	0	138	60														**895**
East Alternative Route	84	5	66	0	0	282	255	209	80	24	0	6	118	182	194	192	192	206	109	0	0	74	75	6	0	0	69	12														282
West Alternative Route	88	38	10	0	12	0	112	0	0	22	667	667	694	672	682	644	667	689	652	733	733	368	368	56	0	0	69	48														733

Traffic Calculations

Maximum Daily Employee Trips

Table M-47. Alternative 1 Maximum Daily Construction Worker Trips by Component

	Estimated Duration, Week																																								
Alternative 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**Maximum**
Channel E	48	38	88	35	34	29	64	58	59	52	44	70	86	92	116	112	66	91	34	3	5	29	29	29	29	23	60	5														116
Downstream	18	9	9	9	9	20	24	24	27	28	28	28	35	56	56	56	56	56	28	4	4	13	8	2	0	0	0	0														56
Fish Passage West	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5														56
Ag Crossing 1	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0														31
Total	89	66	135	57	55	79	147	90	125	106	102	119	144	163	202	191	134	182	73	14	9	55	39	31	29	23	68	10														**202**
East Alternative Route	81	56	117	48	47	59	91	86	89	98	95	110	130	157	184	189	130	178	71	14	9	55	39	31	29	23	60	5														189
West Alternative Route	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5														56

Maximum Trips **378**

Table M-48. Alternative 2 Maximum Daily Construction Worker Trips by Component

	Estimated Duration, Week																																								
Alternative 2	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**Maximum**
Channel C	70	38	88	35	50	41	100	87	87	80	56	72	155	142	136	144	124	122	121	61	5	19	29	29	29	29	60	5														155
Downstream	18	9	9	9	9	20	24	24	27	28	28	28	35	56	56	56	56	56	28	4	4	13	8	2	0	0	0	0														56
Fish Passage West	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5														56
Ag Crossing 1	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0														31
Total	111	66	135	57	71	91	183	119	153	134	114	121	213	213	222	223	192	213	160	72	9	45	39	31	29	29	68	10														**223**
Option 1																																										
East Alternative Route	103	56	117	48	63	71	127	115	117	126	107	112	199	207	204	221	188	209	158	72	9	45	39	31	29	29	60	5														221
West Alternative Route	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5														56
Option 2																																										
East Alternative Route	33	18	29	13	13	30	27	28	30	46	51	40	44	65	68	77	64	87	37	11	4	26	10	2	0	0	0	0														87
West Alternative Route	78	48	106	44	58	61	156	91	123	88	63	81	169	148	154	146	128	126	123	61	5	19	29	29	29	29	68	10														169
Option 3																																										
East Alternative Route	68	37	73	31	38	51	77	72	74	86	79	76	122	136	136	149	126	148	98	42	7	36	25	17	15	15	30	3														149
West Alternative Route	43	29	62	27	33	41	106	48	80	48	35	45	92	77	86	74	66	65	63	31	3	10	15	15	15	15	38	8														106

Maximum Trips **442**

Table M-49. Alternative 3 Maximum Daily Construction Worker Trips by Component

	Estimated Duration, Week																																								
Alternative 3	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**Maximum**
Channel W	70	38	88	35	50	41	100	91	91	84	84	136	163	206	136	144	124	122	177	173	61	75	29	29	29	29	60	5														206
Downstream	18	9	9	9	9	20	24	24	27	28	28	28	35	56	56	56	56	56	28	4	4	13	8	2	0	0	0	0														56
Fish Passage E	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5														56
Ag Crossing 1	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0														31
Total	111	66	135	57	71	91	183	123	157	138	142	185	221	277	222	223	192	213	216	184	65	101	39	31	29	29	68	10														**277**
East Alternative Route	41	28	47	22	21	50	83	32	66	54	58	49	58	71	86	79	68	91	39	11	4	26	10	2	0	0	8	5														91
West Alternative Route	70	38	88	35	50	41	100	91	91	84	84	136	163	206	136	144	124	122	177	173	61	75	29	29	29	29	60	5														206

Maximum Trips **412**

Table M-50. Alternative 4 Maximum Daily Construction Worker Trips by Component

	Estimated Duration, Week																																								
Alternative 4	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**Maximum**
Channel W	70	38	88	35	50	41	100	91	91	84	84	136	163	206	136	144	124	122	177	173	61	75	29	29	29	29	60	5														206
Downstream	18	9	9	9	9	20	24	24	27	28	28	28	35	56	56	56	56	56	28	4	4	13	8	2	0	0	0	0														56
Fish Passage E	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5														56
Ag Crossing 1	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0														31
Northern	26	19	24	26	44	46	65	43	39	59	46	20	21	11	9	11	13	13	4	8	8	10	2	0	0	0	0	0														65
Southern	30	28	33	36	44	46	101	79	75	87	74	75	73	75	73	75	77	77	68	17	24	10	2	0	0	0	0	0														101
Total	167	113	192	119	159	183	349	245	271	284	262	280	315	363	304	309	282	303	288	209	97	121	43	31	29	29	68	10														**363**
East Alternative Route	67	47	71	48	65	96	148	75	105	113	104	69	79	82	95	90	81	104	43	19	12	36	12	2	0	0	8	5														148
West Alternative Route	100	66	121	71	94	87	201	170	166	171	158	211	236	281	209	219	201	199	245	190	85	85	31	29	29	29	60	5														281

Maximum Trips **562**

Table M-51. Alternative 5 Maximum Daily Construction Worker Trips by Component

Alternative 5	Estimated Duration, Week																																														Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41							
Channel C	148	130	183	120	202	182	119	203	260	231	214	182	251	231	210	225	225	65	16	12	10	10	156	57	103	19	0	0	105	43	43	43	43	43	43	43	43	47	23	105	0							260
Fish Passage W	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5	--	--	--	--	--	--	--	--	--	--	--	--								56
Ag Crossing 1	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--								31
Tule Canal	50	64	64	64	82	84	83	42	39	59	86	87	84	88	94	94	94	92	51	51	13	44	16	4	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--								94
Total w/o Tule Canal	171	149	221	133	214	212	178	211	299	257	244	203	274	246	240	248	237	100	27	19	10	23	158	57	103	19	8	5	105	43	43	43	43	43	43	43	43	47	23	105	0							**299**
Option 1 (w/o Tule Canal)																																															
East Alternative Route	163	139	203	124	206	192	122	207	263	249	237	194	260	240	222	246	233	96	25	19	10	23	158	57	103	19	0	0	105	43	43	43	43	43	43	43	43	47	23	105	0							263
West Alternative Route	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0							56
Option 2 (w/o Tule Canal)																																															
East Alternative Route	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							31
West Alternative Route	156	140	201	129	210	202	175	207	296	239	221	191	265	237	228	227	229	69	18	12	10	10	156	57	103	19	8	5	105	43	43	43	43	43	43	43	43	47	23	105	0							296
Option 3 (w/o Tule Canal)																																															
East Alternative Route	89	74	112	64	105	101	63	106	133	134	130	103	135	125	117	134	121	64	17	13	5	18	80	29	52	10	0	0	53	22	22	22	22	22	22	22	22	24	12	53	0							135
West Alternative Route	82	75	110	69	109	111	116	106	166	124	114	100	140	122	123	115	117	37	10	6	5	5	78	29	52	10	8	5	53	22	22	22	22	22	22	22	22	24	12	53	0							166
																																														Maximum Trips	**592**

Table M-52. Alternative 6 Maximum Daily Construction Worker Trips by Component

Alternative 6	Estimated Duration, Week																																														Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41							
Channel W	96	134	71	51	74	65	94	81	74	101	318	318	312	320	316	298	325	323	293	335	303	131	147	111	35	35	27	87																				335
Downstream	18	9	9	9	9	20	24	24	27	28	28	28	35	56	56	56	56	56	28	4	4	13	8	2	0	0	0	0																				56
Fish Passage E	8	10	18	9	8	20	56	4	36	8	7	9	14	6	18	2	4	4	2	0	0	0	0	0	0	0	8	5																				56
Ag Crossing 1	15	9	20	4	4	10	3	4	3	18	23	12	9	9	12	21	8	31	9	7	0	13	2	0	0	0	0	0																				31
Total	137	162	118	73	95	115	177	113	140	155	376	367	370	391	402	377	393	414	332	346	307	157	157	113	35	35	35	92																				**414**
East Alternative Route	41	28	47	22	21	50	83	32	66	54	58	49	58	71	86	79	68	91	39	11	4	26	10	2	0	0	8	5																				91
West Alternative Route	96	134	71	51	74	65	94	81	74	101	318	318	312	320	316	298	325	323	293	335	303	131	147	111	35	35	27	87																				335
																																														Maximum Trips	**670**

Construction Vibration - Equipment
Alternative 1 - East Alignment

Table ~~L~~M-53. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 GAL Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	28	0.076	2.128	86	29	115
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Earthen Backfill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0	0	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113

Table ~~L~~M-53. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 GAL Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																		■									
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■	■																
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■																		
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)						■	■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■										
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																	■	■										

Construction Vibration - Equipment
Alternative 1 - East Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
11-Levees and Floodwalls				-	-	-	-	-
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	7	0.076	0.532	86	17	103
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	2.5 CY Hydraulic Excavators (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dumpt Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Flash Mixer (1)	n/a	1	-	-	-	0	-
	Slurry Pump (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
11-Levees and Floodwalls		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (1) 2.5 CY Hydraulic Excavators (1) 16 CY 3 Axle Dumpt Truck (1) Flash Mixer (1) Slurry Pump (1) Pickup Truck Conventional (5)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	

Construction Vibration - Equipment
Alternative 1 - East Alignment

08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 GAL Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	Temp. Mobile Office Building (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 GAL Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1) Temp. Mobile Office Building (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Alternative 1 - East Alignment

Table ~~L~~M-54. Construction Vibration Level at the Receptor

	Estimated Duration, Week																											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Building Damage																												
Total PPV @ 25'	3.42	0.55	1.61	1.11	1.28	1.29	2.81	2.75	2.38	1.66	1.5	2.02	1.99	4.05	4.3	3.98	3.83	4.21	2.13	n/a	0.3	0.08	0.08	0.08	0.08	n/a	1.82	0.46
Distance from the Center of Construction Activity to a Receptor (ft)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
PPV at the Receptor (in/sec)	0.15	0.02	0.07	0.05	0.06	0.06	0.12	0.12	0.11	0.07	0.07	0.09	0.09	0.18	0.19	0.18	0.17	0.19	0.09	n/a	0.01	0.00	0.00	0.00	0.00	n/a	0.08	0.02
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	no	no	no	no	no	n/a	no	no
Human Annoyance																												
Total Lv @ 25'	119	103	112	109	110	110	117	117	116	113	112	114	114	121	121	120	120	121	115	n/a	98	86	86	86	86	n/a	114	102
Distance from the Center of Construction Activity to a Receptor (ft)	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080
Distance Divergence (dBA)	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1
Lv at the Receptor (VdB)	70	54	63	60	61	61	68	68	67	64	63	65	65	71	72	71	71	72	66	n/a	49	37	37	37	37	n/a	65	52
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	no	no	no	no	no	n/a	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building
0.2 in/sec

Human annoyance
72 VdB

Receptors:

Nearest residential receptor (ft) 7500

Source: Google Earth

Table ~~L~~M-55. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	28	0.076	2.128	86	29	115
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Earthen Backfill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113

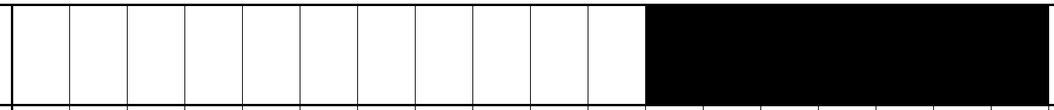
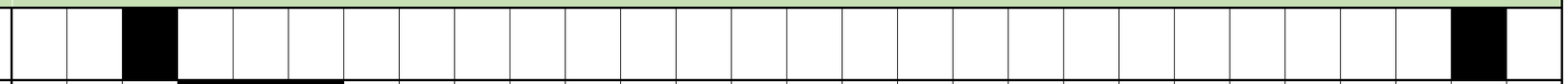
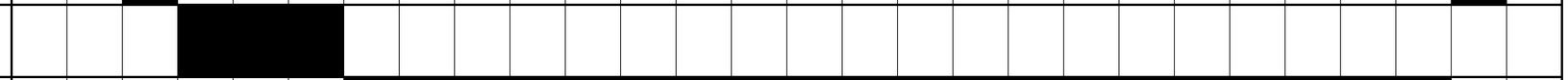
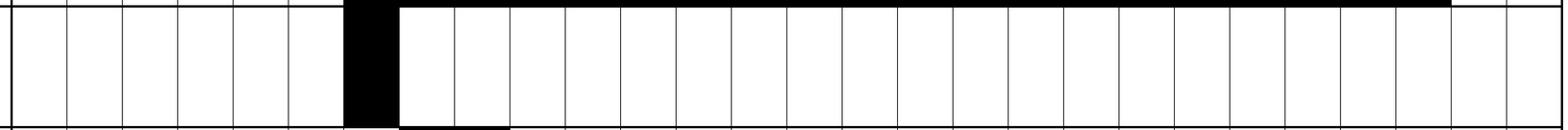
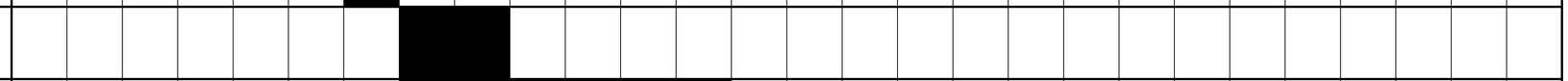
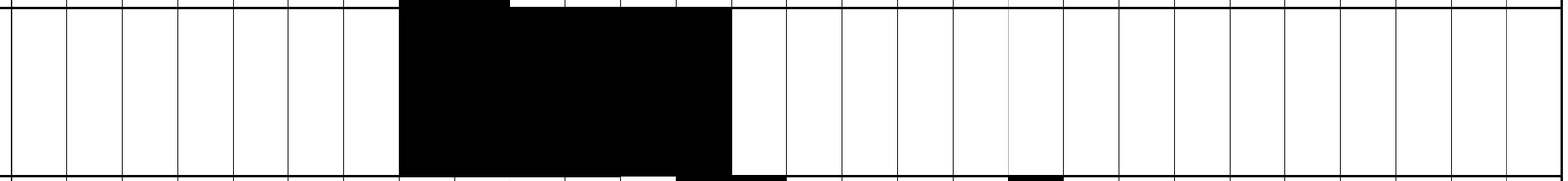
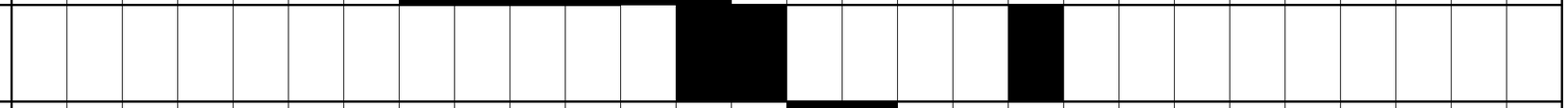
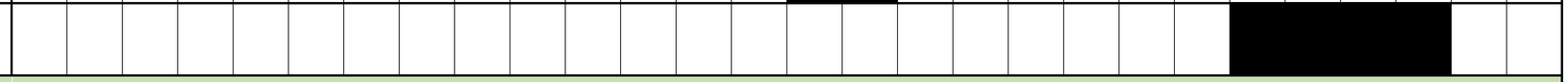
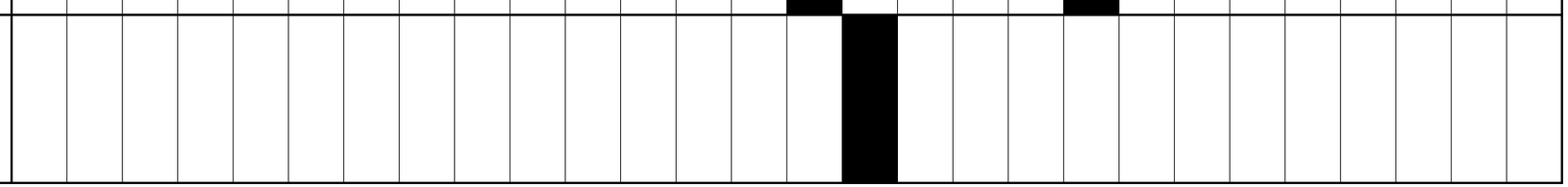
Construction Vibration - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-55. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																			■								
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■																	
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■																		
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)													■	■	■	■	■	■	■									
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																			■									

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-

Construction Vibration - Equipment
Alternative 2 - Center Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Alternative 2 - Center Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~LM~~-56. Construction Vibration Level at the Receptor	Estimated Duration, Week																											
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	3.42	0.55	1.61	1.11	1.28	1.13	2.81	2.22	2.22	1.5	1.33	2.31	4.3	3.83	4.21	4.3	3.83	3.83	3.98	2.51	0.3	n/a	0.08	0.08	0.08	0.08	1.82	0.46
Distance from the Center of Construction Activity to a Receptor (ft)	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194
PPV at the Receptor (in/sec)	0.16	0.03	0.07	0.05	0.06	0.05	0.13	0.10	0.10	0.07	0.06	0.11	0.20	0.18	0.19	0.20	0.18	0.18	0.18	0.12	0.01	n/a	0.00	0.00	0.00	0.00	0.08	0.02
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no
Human Annoyance																												
Total Lv @ 25'	119	103	112	109	110	109	117	115	115	112	111	116	121	120	121	121	120	120	120	116	98	n/a	86	86	86	86	114	102
Distance from the Center of Construction Activity to a Receptor (ft)	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090
Distance Divergence (dBA)	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2
Lv at the Receptor (VdB)	70	54	63	60	61	60	68	66	66	63	62	66	72	71	72	72	71	71	71	67	49	n/a	37	37	37	37	64	52
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 4200

Source: Google Earth

Construction Vibration - Equipment
Alternative 3 - West Alignment

Table ~~L~~M-57. Construction Vibration and Ground-Borne Vibration

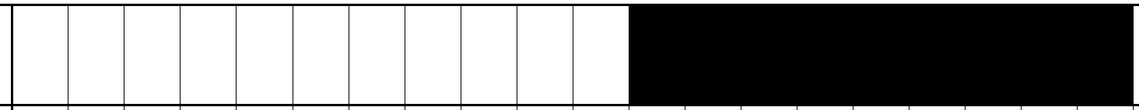
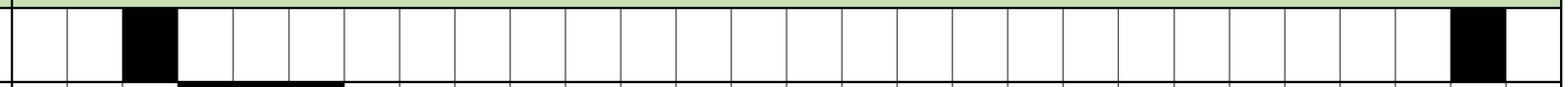
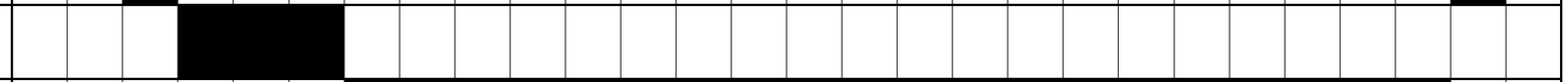
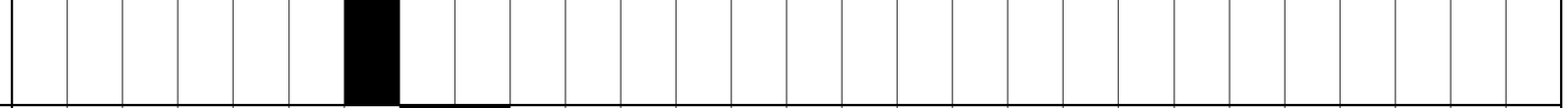
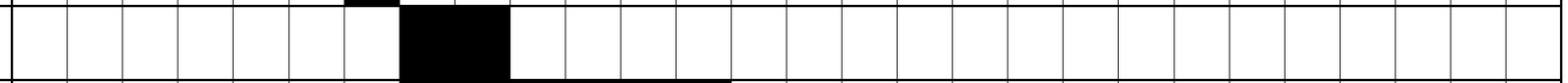
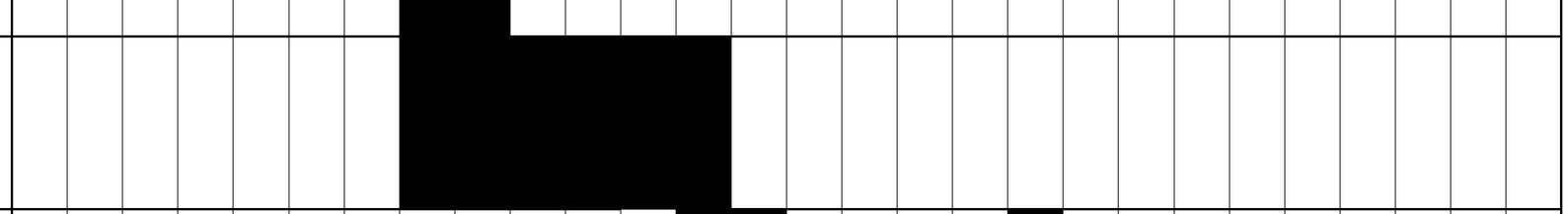
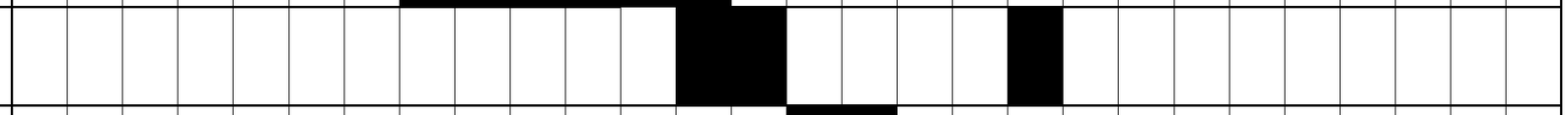
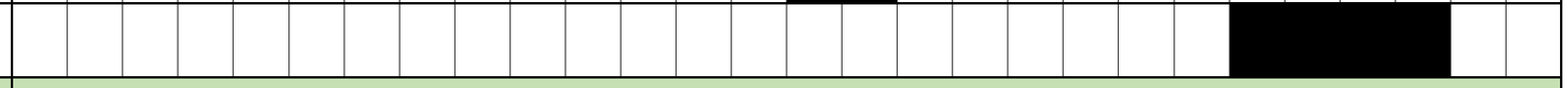
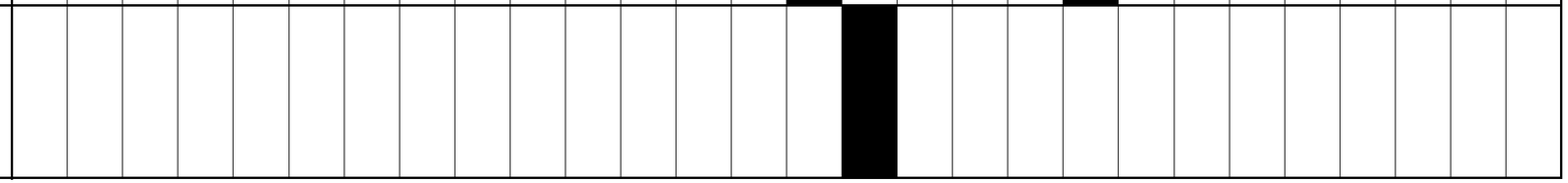
Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	28	0.076	2.128	86	29	115
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Earthen Backfill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113

Table ~~L~~M-57. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																			■								
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■	■	■	■														
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■	■	■	■	■														
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■	■	■	■	■	■																
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)													■	■	■	■	■	■	■	■	■	■						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																		■										

Construction Vibration - Equipment
Alternative 3 - West Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
(Temporary Cofferdam)	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Construction Vibration - Equipment
Alternative 3 - West Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	Temp. Mobile Office Building (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1) Temp. Mobile Office Building (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Alternative 3 - West Alignment

Table ~~LM~~-58. Construction Vibration Level at the Receptor	Estimated Duration, Week																												
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	3.42	0.55	1.61	1.11	1.28	1.13	2.81	2.38	2.38	1.66	1.66	3.33	3.49	4.85	4.21	4.3	3.83	3.83	5.82	6.18	2.14	1.84	0.08	0.08	0.08	0.08	1.82	0.46
Distance from the Center of Construction Activity to a Receptor (ft)	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
PPV at the Receptor (in/sec)	0.11	0.02	0.05	0.04	0.04	0.04	0.09	0.08	0.08	0.05	0.05	0.11	0.11	0.15	0.13	0.14	0.12	0.12	0.18	0.20	0.07	0.06	0.00	0.00	0.00	0.00	0.06	0.01
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Human Annoyance																												
Total Lv @ 25'	119	103	112	109	110	109	117	116	116	113	113	119	119	122	121	121	120	120	124	124	115	114	86	86	86	86	114	102
Distance from the Center of Construction Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4
Lv at the Receptor (VdB)	76	60	69	66	67	66	74	72	72	69	69	75	76	79	77	78	77	77	80	81	72	70	43	43	43	43	70	58
Impact to Receptor	YES	no	no	no	no	no	YES	YES	YES	no	no	YES	YES	YES	YES	YES	YES	YES	YES	YES	no	no	no	no	no	no	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 700
Source: Google Earth

Table ~~L~~M-59. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	28	0.076	2.128	86	29	115
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Earthen Backfill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113

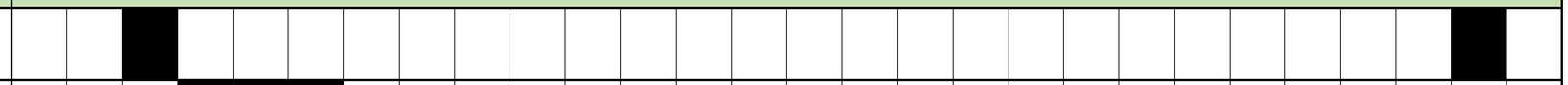
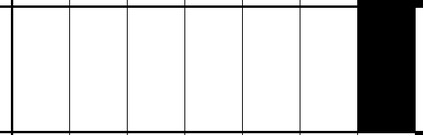
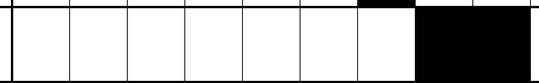
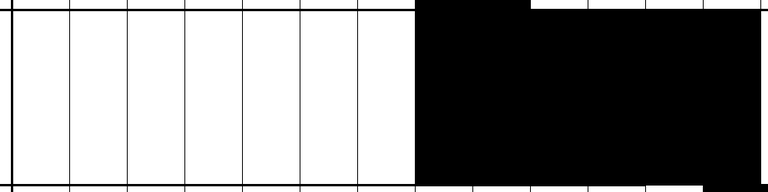
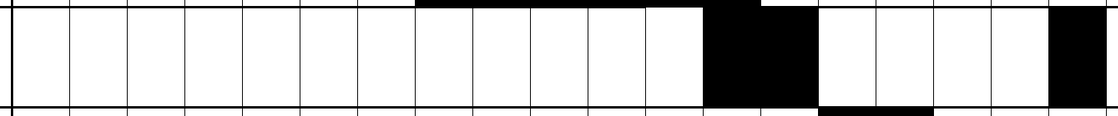
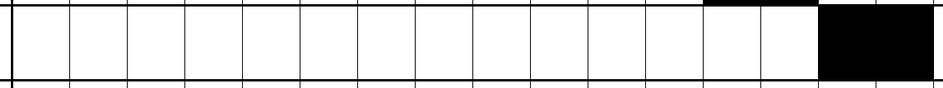
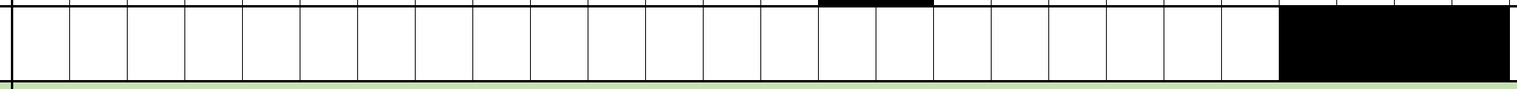
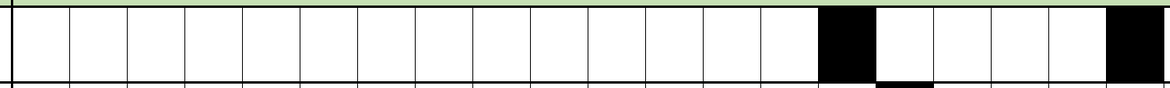
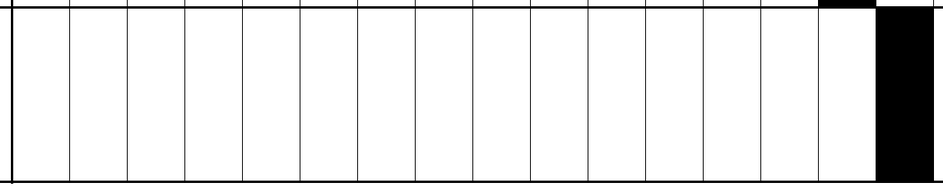
Construction Vibration - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-59. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																								
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																										■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																										
09 - Channels and Canals																												
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																			■							
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																							
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)							■	■	■	■	■	■	■														
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■	■	■	■														
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■	■	■	■	■	■															
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■	■	■	■						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																		■									

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-

Construction Vibration - Equipment
Alternative 4 - West Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Alternative 4 - West Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~LM~~-60. Construction Vibration Level at the Receptor	Estimated Duration, Week																											
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	3.42	0.55	1.61	1.11	1.28	1.13	2.81	2.38	2.38	1.66	1.66	3.33	3.49	4.85	4.21	4.3	3.83	3.83	5.82	6.18	2.14	1.84	0.08	0.08	0.08	0.08	1.82	0.46
Distance from the Center of Construction Activity to a Receptor (ft)	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
PPV at the Receptor (in/sec)	0.11	0.02	0.05	0.04	0.04	0.04	0.09	0.08	0.08	0.05	0.05	0.11	0.11	0.15	0.13	0.14	0.12	0.12	0.18	0.20	0.07	0.06	0.00	0.00	0.00	0.00	0.06	0.01
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Human Annoyance																												
Total Lv @ 25'	119	103	112	109	110	109	117	116	116	113	113	119	119	122	121	121	120	120	124	124	115	114	86	86	86	86	114	102
Distance from the Center of Construction Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4
Lv at the Receptor (VdB)	76	60	69	66	67	66	74	72	72	69	69	75	76	79	77	78	77	77	80	81	72	70	43	43	43	43	70	58
Impact to Receptor	YES	no	no	no	no	no	YES	YES	YES	no	no	YES	YES	YES	YES	YES	YES	YES	YES	YES	no	no	no	no	no	no	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 700

Source: Google Earth

Construction Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-61. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	23	0.076	1.748	86	27	113
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-

Table ~~L~~M-61. Construction Vibration and Ground-Borne Vibration

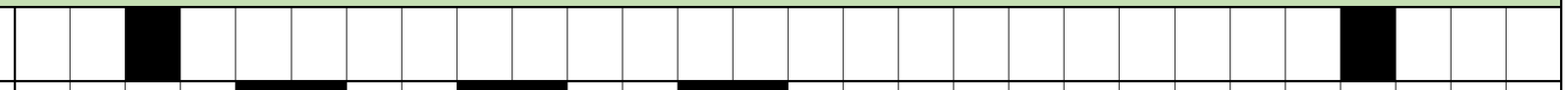
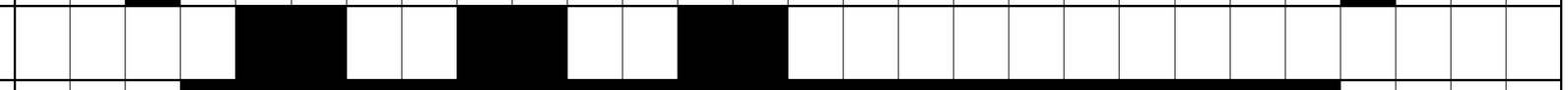
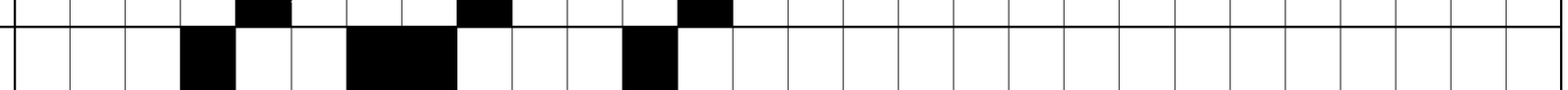
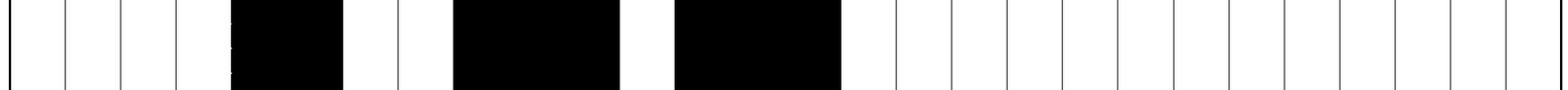
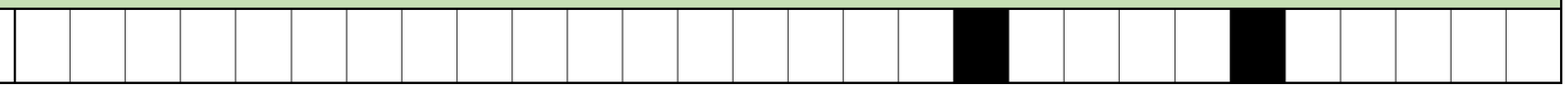
Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																									■		
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)	■	■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																										■		
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																						■					
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■																					■					
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)				■	■	■	■	■																					
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)			■	■	■	■	■	■	■																			
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)									■	■	■	■	■	■	■	■	■											
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)								■	■	■	■	■	■	■	■	■	■											
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)											■							■										

Construction Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-61. Construction Vibration and Ground-Borne Vibration		Estimated Duration, Week												
Phase	**Equipment Description**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**
02 - Relocations														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)													
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)													
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)													
09 - Channels and Canals														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)													
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)													
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)													
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)													
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)													
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)													

15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	13	0.076	0.988	86	22	108
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Construction Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	

15 - Floodway Control and Diversion Structures														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)													
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)													
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)													
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)													
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)													
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)													
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)													
08 - Roads, Railroads, and Bridges														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													

Construction Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)													
Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)													
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)													
19 - Buildings, Grounds, and Utilities														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)													
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)													
20 -Permanent Operating Equipment														
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)													
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)													
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)													
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)													
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)													
Communication Equipment	Pickup Truck Conventional (3)													

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-62. Construction Vibration Level at the Receptor	Estimated Duration, Week																											
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	3.19	0.55	1.55	1.99	3.47	2.61	1.9	3.74	6.49	4.86	4.14	4.39	5.73	4.86	4.14	3.83	3.83	0.53	0.47	0.15	0.15	0.15	2.28	0.15	0.99	0.91	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
PPV at the Receptor (in/sec)	0.10	0.02	0.05	0.06	0.10	0.08	0.06	0.11	0.19	0.14	0.12	0.13	0.17	0.14	0.12	0.11	0.11	0.02	0.01	0.00	0.00	0.00	0.07	0.00	0.03	0.03	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a
Human Annoyance																												
Total Lv @ 25'	118	103	112	114	119	117	114	120	125	122	121	121	123	122	121	120	120	103	102	92	92	92	116	92	108	108	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420
Distance Divergence (dBA)	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6
Lv at the Receptor (VdB)	66	50	59	61	66	64	61	67	72	69	68	69	71	69	68	67	67	50	49	39	39	39	63	39	56	55	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 3800

0

Construction Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-62. Construction Vibration Level at the Receptor	Estimated Duration, Week												
Building Damage	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**
Total PPV @ 25'	1.29	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	n/a	1.29	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	260	260	260	260	260	260	260	260	260	260	260	260	260
PPV at the Receptor (in/sec)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n/a	0.04	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	n/a	no	n/a
Human Annoyance													
Total Lv @ 25'	111	92	92	92	92	92	92	92	92	92	n/a	111	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420	1420
Distance Divergence (dBA)	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6
Lv at the Receptor (VdB)	58	39	39	39	39	39	39	39	39	39	n/a	58	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 3800
0

Table ~~L~~M-63. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	28	0.076	2.128	86	29	115
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Earthen Backfill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113

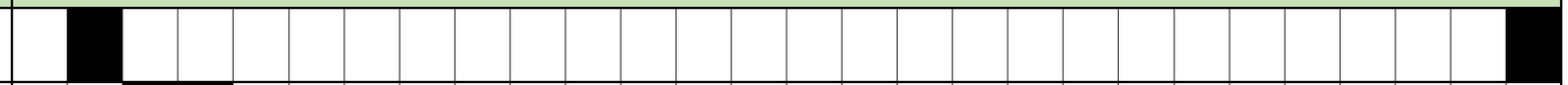
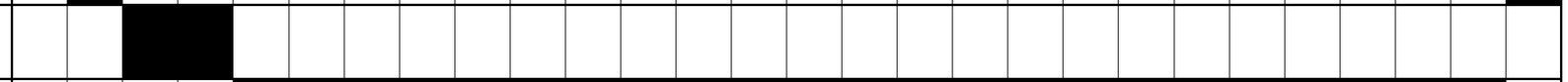
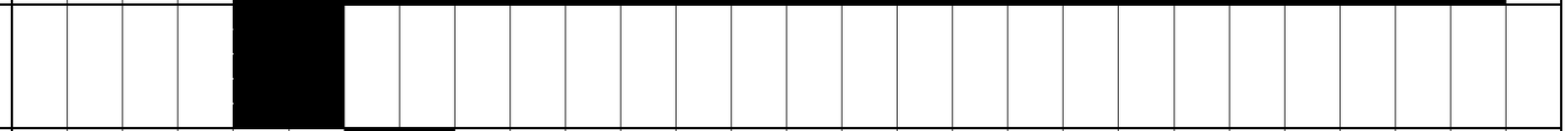
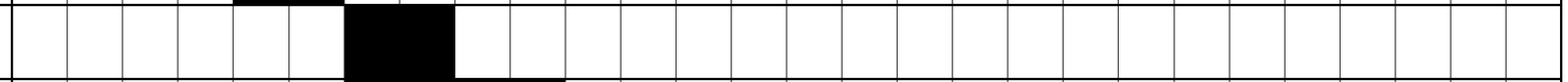
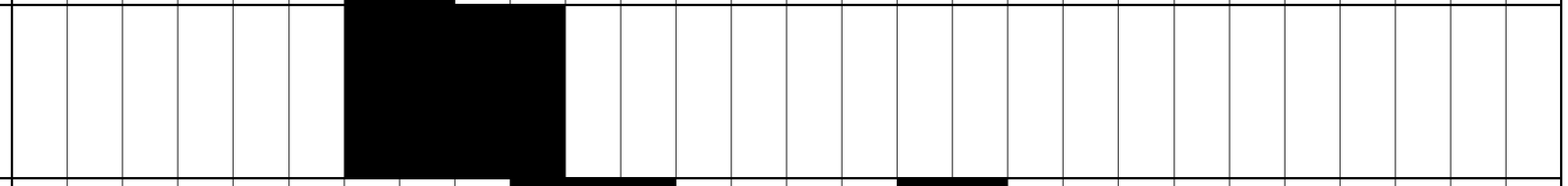
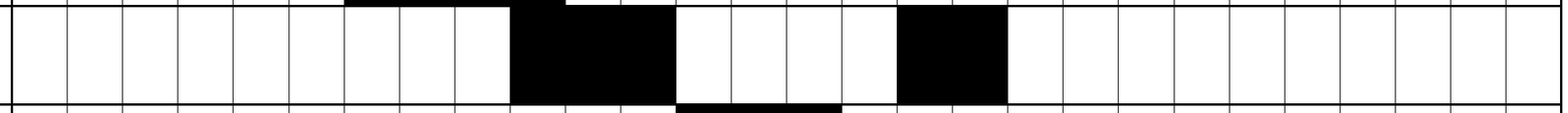
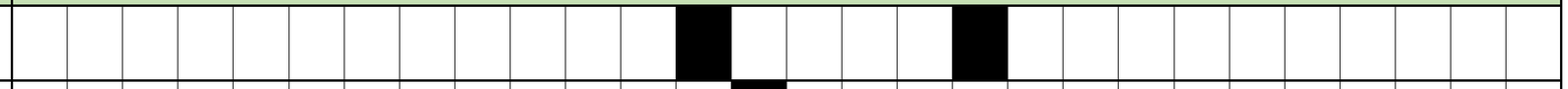
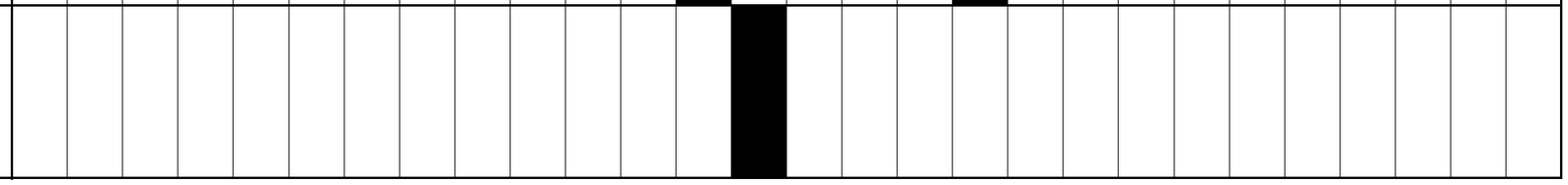
Construction Vibration - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-63. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■	■																								
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																							■				
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)										■	■	■	■	■	■	■	■	■	■	■	■							
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■																					
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)											■	■	■	■	■	■	■	■	■	■	■	■	■					
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)																				■	■							

RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-

Construction Vibration - Equipment
Alternative 6 - West Alignment

RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)	
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)	
15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Concrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Pedestrian Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Alternative 6 - West Alignment

Pedestrian Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Pedestrian Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
CMU Building Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Electrical Control Equipment CMU Building	Pickup Truck Conventional (3)	
Electrical Power Equipment CMU Building	Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~LM~~-64. Construction Vibration Level at the Receptor	Estimated Duration, Week																												
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	3.42	1.61	1.27	1.11	1.42	1.27	2.28	1.35	0.63	0.79	4.85	4.85	5.23	5.32	5.01	4.85	5.01	5.23	5.01	6.54	6.37	1.84	1.91	2.2	0.08	0.08	0.46	1.82
Distance from the Center of Construction Activity to a Receptor (ft)	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
PPV at the Receptor (in/sec)	0.10	0.05	0.04	0.03	0.04	0.04	0.07	0.04	0.02	0.02	0.14	0.14	0.16	0.16	0.15	0.14	0.15	0.16	0.15	0.19	0.19	0.05	0.06	0.07	0.00	0.00	0.01	0.05
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Human Annoyance																												
Total Lv @ 25'	119	112	110	109	111	110	115	111	104	106	122	122	123	123	122	122	122	123	122	125	124	114	114	115	86	86	102	114
Distance from the Center of Construction Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4
Lv at the Receptor (VdB)	76	69	67	66	68	67	72	67	61	63	79	79	79	79	79	79	79	79	79	81	81	70	71	72	43	43	58	70
Impact to Receptor	YES	no	no	no	no	no	no	no	no	no	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	no	no	no	no	no	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 700

Source: Google Earth

Construction Vibration - Equipment
Downstream (Alternatives 1-4, 6)

Table ~~L~~M-65. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	108	0.076	8.208	86	41	127
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Earthen Backfill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
11-Levees and Floodwalls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	14	0.076	1.064	86	23	109
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	2.5 CY Hydraulic Excavators (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Flash Mixer (1)	n/a	1	-	-	-	0	-
	Slurry Pump (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-65. Construction Vibration and Ground-Borne Vibration		Estimated Duration, Week																											
Phase	**Equipment Description**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																							■				
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																							■					
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																					■						
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■	■	■																							
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)						■	■	■	■	■	■	■																	
Earthen Backfill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)							■	■																				
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)														■	■	■	■	■	■									
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)													■	■	■	■	■	■										
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)																				■	■							
11-Levees and Floodwalls																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)									■				■															
Soil Cement Bentonite Cutoff Wall	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (1) 2.5 CY Hydraulic Excavators (1) 16 CY 3 Axle Dump Truck (1) Flash Mixer (1) Slurry Pump (1) Pickup Truck Conventional (5)										■	■	■																

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Downstream (Alternatives 1-4, 6)

Table ~~L~~M-66. Construction Vibration Level at the Receptor	Estimated Duration, Week																											
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	9.35	0.15	0.15	0.15	0.15	0.86	1.03	1.03	1.93	1.03	1.03	1.03	2.9	3.67	3.67	3.67	3.67	3.67	1.84	n/a	n/a	8.21	0.46	1.06	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
PPV at the Receptor (in/sec)	0.19	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.06	0.08	0.08	0.08	0.08	0.08	0.04	n/a	n/a	0.17	0.01	0.02	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a	no	no	no	n/a	n/a	n/a	n/a
Human Annoyance																												
Total Lv @ 25'	128	92	92	92	92	107	109	109	107	107	107	107	114	120	120	120	120	120	114	n/a	n/a	127	102	109	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820	1820
Distance Divergence (dBA)	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Lv at the Receptor (VdB)	72	36	36	36	36	51	53	53	51	51	51	51	58	64	64	64	64	64	58	n/a	n/a	71	46	53	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a	no	no	no	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 7000
Source: Google Earth

Table ~~L~~M-67. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	23	0.076	1.748	86	27	113
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-

Construction Vibration - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-67. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■	■																									
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)			■						■																			
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)				■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)					■																							
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)						■																						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■																					
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)							■																					
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)								■																				

15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Excavation/Grading (Dry Conditions)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Excavation/Grading (Dry Conditions)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~LM~~-68. Construction Vibration Level at the Receptor	Estimated Duration, Week																												
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	0.53	0.15	1.75	0.15	0.86	0.17	3.67	n/a	2.2	0.72	0.72	0.15	0.23	0.08	0.46	0.23	n/a	n/a	0.23	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.46	0.46
Distance from the Center of Construction Activity to a Receptor (ft)	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
PPV at the Receptor (in/sec)	0.03	0.01	0.09	0.01	0.04	0.01	0.19	n/a	0.11	0.04	0.04	0.01	0.01	0.00	0.02	0.01	n/a	n/a	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.02	0.02
Impact to Receptor	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	no	no	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	no	no
Human Annoyance																												
Total Lv @ 25'	103	92	113	92	107	93	120	n/a	115	105	105	92	96	86	102	96	n/a	n/a	96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	102	102
Distance from the Center of Construction Activity to a Receptor (ft)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Distance Divergence (dBA)	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7
Lv at the Receptor (VdB)	47	36	58	36	51	37	64	n/a	60	49	49	36	40	30	46	40	n/a	n/a	40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	46	46
Impact to Receptor	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	no	no	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 1800

Source: Google Earth

Construction Vibration - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

Table ~~L~~M-69. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	3.5 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	0.8 CY Loader/Backhoe, Wheel (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	23	0.076	1.748	86	27	113
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Riprap - Class 3	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
RSP Bedding Material	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Haul Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-

Table ~~L~~M-69. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																											■
Fremont Weir Demo	3.5 CY Hydraulic Excavator (1) 3.5 CY Front End Loader, Wheel (1) 0.8 CY Loader/Backhoe, Wheel (1) 4000 Gal Water Truck (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (6)		■																										
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																											■	
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)			■						■																			
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)				■																								
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)					■																							
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)						■																						
Riprap - Class 3	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■																					
RSP Bedding Material	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Haul Trucks (23)							■																					
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)								■																				

Construction Vibration - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	6	0.076	0.456	86	16	102
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Excavation/Grading (Dry Conditions)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Headworks Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

15 - Floodway Control and Diversion Structures		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Excavation/Grading (Dry Conditions)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Headworks Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Headworks Channel Transition	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Hinged Bottom Gates	40 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Mechanical Hydraulic Cylinders & Housing	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

Table ~~L~~M-70. Construction Vibration Level at the Receptor	Estimated Duration, Week																												
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	0.53	0.15	1.75	0.15	0.86	0.17	3.67	n/a	2.2	0.72	0.72	0.15	0.23	0.08	0.46	0.23	n/a	n/a	0.23	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.46	0.46
Distance from the Center of Construction Activity to a Receptor (ft)	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
PPV at the Receptor (in/sec)	0.03	0.01	0.09	0.01	0.04	0.01	0.19	n/a	0.11	0.04	0.04	0.01	0.01	0.00	0.02	0.01	n/a	n/a	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.02	0.02
Impact to Receptor	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	no	no	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	no	no
Human Annoyance																												
Total Lv @ 25'	103	92	113	92	107	93	120	n/a	115	105	105	92	96	86	102	96	n/a	n/a	96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	102	102
Distance from the Center of Construction Activity to a Receptor (ft)	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980
Distance Divergence (dBA)	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8
Lv at the Receptor (VdB)	55	44	65	44	59	45	72	n/a	67	57	57	44	48	38	54	48	n/a	n/a	48	n/a	n/a	n/a	n/a	n/a	n/a	n/a	54	54
Impact to Receptor	no	no	no	no	no	no	no	n/a	no	no	no	no	no	no	no	no	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 8600
Source: Google Earth

Table ~~L~~M-71. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	11	0.076	0.836	86	21	107
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
11 - Levees and Flood walls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Reinforced AG Berm	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	12	0.076	0.912	86	22	108
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-

Construction Vibration - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Table ~~L~~M-71. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																						■					
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																						■						
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■					■																						
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■																										
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)			■																									
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)				■	■																							
11 - Levees and Flood walls																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)							■		■																			
Reinforced AG Berm	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)								■																				
15 - Floodway Control and Diversion Structures																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)										■								■										
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)											■	■	■	■	■	■	■											
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)											■																	

Concrete Turnout Structure	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
36-Inch RCP	25 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
Trashrack	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Screw Gate	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Outlet Fish Screen	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Concrete Emergency Spillway	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Concrete Connection Vault	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
08 - Roads, Railroads, and Bridges								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	5	0.076	0.38	86	14	100
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	100 FT Auger Track Mounted Drill Rig (1)	Caisson Drilling	1	0.089	0.089	87	0	87
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	Cocnrete Mixer Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	0.8 CY Backhoe Loader (1)	n/a	1	-	-	-	0	-
	24 TN Truck End Dump (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (8)	n/a	8	-	-	-	18	-
Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Concrete Turnout Structure	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
36-Inch RCP	25 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (1) Pickup Truck Conventional (4)	
Trashrack	Flatbed Truck (1) Pickup Truck Conventional (2)	
Screw Gate	Flatbed Truck (1) Pickup Truck Conventional (2)	
Outlet Fish Screen	Flatbed Truck (1) Pickup Truck Conventional (2)	
Concrete Emergency Spillway	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Concrete Connection Vault	40 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (3)	
08 - Roads, Railroads, and Bridges		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Bridge Concrete Piles	40 TN Truck Mounted Hydraulic Crane (1) 100 FT Auger Track Mounted Drill Rig (1) Concrete Pump Boom Truck Mounted (1) Cocnrete Mixer Truck (3) 0.8 CY Backhoe Loader (1) 24 TN Truck End Dump (2) Pickup Truck Conventional (8)	
Bridge Concrete Abutments and Wingwalls	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
Bridge Span Installation	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (5)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-72. Construction Vibration Level at the Receptor	Estimated Duration, Week																										
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	1.14	0.15	0.86	n/a	n/a	0.84	0.3	0.17	0.3	0.91	0.86	0.15	0.08	0.08	0.23	0.23	0.38	1.38	0.15	0.15	n/a	0.84	0.23	n/a	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
PPV at the Receptor (in/sec)	0.14	0.02	0.11	n/a	n/a	0.10	0.04	0.02	0.04	0.11	0.11	0.02	0.01	0.01	0.03	0.03	0.05	0.17	0.02	0.02	n/a	0.10	0.03	n/a	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	n/a	n/a	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	no	no	n/a	n/a	n/a	n/a	n/a
Human Annoyance																												
Total Lv @ 25'	110	92	107	n/a	n/a	107	98	93	98	108	107	92	86	86	96	96	100	111	92	92	n/a	107	96	n/a	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510
Distance Divergence (dBA)	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3
Lv at the Receptor (VdB)	70	53	68	n/a	n/a	68	59	53	59	68	68	53	47	47	56	56	61	72	53	53	n/a	68	56	n/a	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	n/a	n/a	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	no	no	n/a	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 8000

Source: Google Earth

Construction Vibration - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (Alternative 4)

Table ~~L~~M-73. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	15	0.076	1.14	86	24	110
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
11 - Levees and Flood walls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Berm/ Levee Fill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	12	0.076	0.912	86	22	108
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
(Temporary Cofferdam)	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-

Table ~~L~~M-73. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																						■					
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																						■						
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■												■															
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) 16 CY 3 Axle Dump Truck (1)		■	■																									
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (7)				■	■	■																						
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■	■	■	■	■	■																
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)												■																
11 - Levees and Flood walls																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)			■									■																
Berm/ Levee Fill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)				■	■	■	■	■	■	■	■	■																
15 - Floodway Control and Diversion Structures																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)					■													■										
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)								■																				

Construction Vibration - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (Alternative 4)

Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Culvert Head Wall	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
Water Control Structure	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	Temp. Mobile Office Building (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)	
Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Culvert Head Wall	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (4)	
Water Control Structure	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1) Temp. Mobile Office Building (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (A

Table ~~L~~M-74. Construction Vibration Level at the Receptor	Estimated Duration, Week																											
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	2.2	0.39	0.7	0.57	1.64	1.43	3.62	2.72	2	2.86	2.72	0.46	1.29	0.15	0.08	0.3	0.08	0.91	n/a	n/a	n/a	0.68	0.23	n/a	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
PPV at the Receptor (in/sec)	0.11	0.02	0.04	0.03	0.08	0.07	0.19	0.14	0.10	0.15	0.14	0.02	0.07	0.01	0.00	0.02	0.00	0.05	n/a	n/a	n/a	0.04	0.01	n/a	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a	n/a	no	no	n/a	n/a	n/a	n/a	n/a
Human Annoyance																												
Total Lv @ 25'	115	100	105	103	113	111	120	117	114	117	117	102	111	92	86	98	86	108	n/a	n/a	n/a	105	96	n/a	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970	970
Distance Divergence (dBA)	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7	47.7
Lv at the Receptor (VdB)	68	53	58	56	65	64	72	69	67	70	69	54	63	44	38	50	38	60	n/a	n/a	n/a	57	48	n/a	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a	n/a	no	no	n/a	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 2600
Source: Google Earth

Table ~~L~~M-75. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
02 - Relocations								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (5)	Loaded Trucks	5	0.076	0.38	86	14	100
Temporary Electrical Power	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
09 - Channels and Canals								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	15	0.076	1.14	86	24	110
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	Trailer Mounted Brush Chipper (1)	n/a	1	-	-	-	0	-
	Chainsaw (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
	Temp. Mobile Office Building (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Excavation/Grading (Dry Conditions)	300 HP Dozer (1)	large Bulldozer	1	0.089	0.089	87	0	87
	21 CY Scrapers (4)	n/a	4	-	-	-	12	-
	12' Blade Grader (1)	n/a	1	-	-	-	0	-
	4000 GAL Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Riprap - Class 2	2.5 CY Hydraulic Excavators (2)	n/a	2	-	-	-	6	-
	300 HP Dozer Crawler (1)	large Bulldozer	1	0.089	0.089	87	0	87
	Pickup Truck Conventional (5)	n/a	5	-	-	-	14	-
	16 CY 3 Axle Dump Trucks (23)	Loaded Trucks	23	0.076	1.748	86	27	113
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
11 - Levees and Flood walls								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	4	0.076	0.304	86	12	98
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Berm/ Levee Fill	300 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
15 - Floodway Control and Diversion Structures								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	12	0.076	0.912	86	22	108
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Construction Vibration - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (A

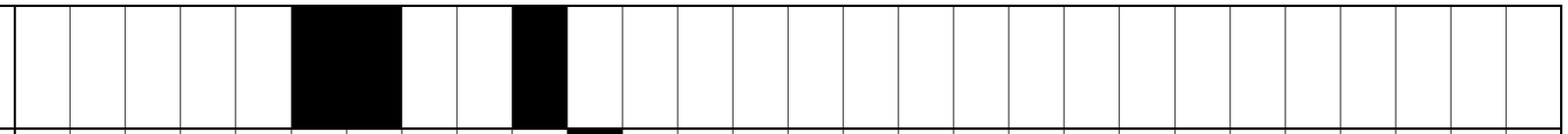
Table ~~L~~M-75. Construction Vibration and Ground-Borne Vibration

Phase	Equipment Description	Estimated Duration, Week																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
02 - Relocations																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (2)	■																						■					
Levee O&M Road Regrading (6" AB)	12' Blade Grader (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (1) 16 CY 3 Axle Dump Truck (5)																						■						
Temporary Electrical Power	Flatbed Truck (1) Pickup Truck Conventional (2)	■																											
09 - Channels and Canals																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	■																				■							
Clearing and Grubbing	1.5 CY Front End Loader Crawler (1) Trailer Mounted Brush Chipper (1) Chainsaw (1) 4000 Gal Water Truck (1) Pickup Truck Conventional (6) Temp. Mobile Office Building (1)		■	■	■																								
Excavation/Grading (Dry Conditions)	300 HP Dozer (1) 21 CY Scrapers (4) 12' Blade Grader (1) 4000 GAL Water Truck (1) Pickup Truck Conventional (7)					■	■	■	■	■																			
Riprap - Class 2	2.5 CY Hydraulic Excavators (2) 300 HP Dozer Crawler (1) Pickup Truck Conventional (5) 16 CY 3 Axle Dump Trucks (23)							■	■	■	■	■	■	■	■	■	■	■	■	■									
Erosion Control Seeding	0.8 CY Front End Loader, Wheel (1) Pickup Truck Conventional (4)																				■								
11 - Levees and Flood walls																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)			■																	■								
Berm/ Levee Fill	300 HP Dozer (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (3)				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■									
15 - Floodway Control and Diversion Structures																													
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)					■													■										
Construction Site Dewatering (Temporary Cofferdam)	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)								■																				
Construction Site Dewatering (Pumping)	6" Dia. Pump Engine Drive (1) Pickup Truck Conventional (3)									■	■	■	■	■	■	■	■	■	■										

Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	300 HP Dozer (2)	Large Bulldozer	2	0.089	0.178	87	6	93
	3.5 CY Front End Loader, Wheel (2)	n/a	2	-	-	-	6	-
	16 CY 3 Axle Dump Truck (9)	Loaded Trucks	9	0.076	0.684	86	19	105
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
Sheet Pile Wall	Flatbed Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	75 TN Crane Crawler Pile Hammer (1)	Pile Driver (impact)	1	0.644	0.644	104	0	104
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Culvert Head Wall	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Flatbed Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
Water Control Structure	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (6)	n/a	6	-	-	-	16	-
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1)	n/a	1	-	-	-	0	-
	Haul Truck Oversize Transport (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (4)	n/a	4	-	-	-	12	-
19 - Buildings, Grounds, and Utilities								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	10	0.076	0.76	86	20	106
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
CMU Building and Earthwork Pad Construction	165 HP Dozer (1)	Large Bulldozer	1	0.089	0.089	87	0	87
	Scraper (1)	n/a	1	-	-	-	0	-
	Motor Grader (1)	n/a	1	-	-	-	0	-
	Compactor (1)	n/a	1	-	-	-	0	-
	4000 Gal Water Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	10 TN Smooth Roller (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1)	n/a	1	-	-	-	0	-
	2.5" Dia. Concrete Vibrator (1)	n/a	1	-	-	-	0	-
	Concrete Mixer Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (7)	n/a	7	-	-	-	17	-
20 -Permanent Operating Equipment								
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment)	Loaded Trucks	3	0.076	0.228	86	10	96
	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1)	n/a	1	-	-	-	0	-
	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-
Communication Equipment	Pickup Truck Conventional (3)	n/a	3	-	-	-	10	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Construction Vibration - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (A

Excavation (Wet Conditions)	4.5 CY Hydraulic Excavator (1) 300 HP Dozer (2) 3.5 CY Front End Loader, Wheel (2) 16 CY 3 Axle Dump Truck (9) Pickup Truck Conventional (7)	
Sheet Pile Wall	Flatbed Truck (1) 75 TN Crane Crawler Pile Hammer (1) Pickup Truck Conventional (6)	
Culvert Head Wall	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Precast Box Culvert 10'x8'x30'	90 TN Truck Mounted Hydraulic Crane (1) Flatbed Truck (2) Pickup Truck Conventional (4)	
Water Control Structure	2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (6)	
Inflatable Obermeyer Gates	90 TN Truck Mounted Hydraulic Crane (1) Haul Truck Oversize Transport (1) Pickup Truck Conventional (4)	
19 - Buildings, Grounds, and Utilities		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
CMU Building and Earthwork Pad Construction	165 HP Dozer (1) Scraper (1) Motor Grader (1) Compactor (1) 4000 Gal Water Truck (1) 10 TN Smooth Roller (1) Pickup Truck Conventional (7) Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Extended Boom Pallet Loader (1) Concrete Mixer Truck (1)	
Concrete Duct Bank	Concrete Pump Boom Truck Mounted (1) 2.5" Dia. Concrete Vibrator (1) Concrete Mixer Truck (2) Pickup Truck Conventional (7)	
20 -Permanent Operating Equipment		
Mobilization and Demobilization	Flatbed Truck (1 per piece of equipment) Extended Boom Pallet Loader (1) Pickup Truck Conventional (1)	
Power, Electrical, & Mechanical Equipment	Extended Boom Pallet Loader (1) Pickup Truck Conventional (3)	
Communication Equipment	Pickup Truck Conventional (3)	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Constructability and Construction Considerations. March 10.

Table ~~L~~M-76. Construction Vibration Level at the Receptor	Estimated Duration, Week																											
Building Damage	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Total PPV @ 25'	2.2	0.39	0.7	0.56	1.64	1.43	3.79	2.89	2.17	2.86	2.72	2.15	2.15	2.15	2.08	2.31	2.08	2.91	2	0.3	1.14	0.68	0.23	n/a	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
PPV at the Receptor (in/sec)	0.11	0.02	0.04	0.03	0.08	0.07	0.20	0.15	0.11	0.15	0.14	0.11	0.11	0.11	0.11	0.12	0.11	0.15	0.10	0.02	0.06	0.04	0.01	n/a	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	n/a	n/a	n/a	n/a	n/a
Human Annoyance																												
Total Lv @ 25'	115	100	105	103	113	111	120	117	115	117	117	115	115	115	115	116	115	118	114	98	110	105	96	n/a	n/a	n/a	n/a	n/a
Distance from the Center of Construction Activity to a Receptor (ft)	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Distance Divergence (dBA)	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
Lv at the Receptor (VdB)	70	55	60	58	67	66	75	72	70	72	72	70	70	70	70	70	70	72	69	53	64	60	50	n/a	n/a	n/a	n/a	n/a
Impact to Receptor	no	no	no	no	no	no	YES	YES	no	YES	no	no	no	no	no	no	no	YES	no	no	no	no	no	n/a	n/a	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 800

Source: Google Earth

Table ~~L~~M-77. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate Lv† at 25 ft
Pile Driver (impact)	0.644	104
Pile Driver (sonic)	0.17	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall) - in soil	0.008	66
Hydromill (slurry wall) - in rock	0.017	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May.
Note:
Values for pile drivers are based on the typical vibration source levels.
† RMS velocity in decibels (VdB) re 1 micro-inch/second

Table ~~L~~M-78. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74

Operational Noise - Equipment
Alternative 1 - East Alignment

Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-78. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
O&M Road Regrading	12' Blade Grader (1)																		
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)																		
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)																		
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)																		
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)																		
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)																		
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)																		
Channel Inspection	Pickup Truck Conventional (1)																		
Headworks Structure																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)																		
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)																		
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)																		
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)																		
Buildings																			
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)																		

Operational Noise - Equipment
Alternative 1 - East Alignment

Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)																	
Test Operate Gates	Pickup Truck Conventional (1)																	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-79. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76	76
Residential Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	330	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.4	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.27	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	7500

Source: Google Earth

Operational Noise - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-80. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-80. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■														
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■													
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■												
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■											
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■										

Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-81. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76	76
Residential Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	330	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.4	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.27	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft) 4200

Source: Google Earth

Table ~~L~~M-82. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 3 - West Alignment

Table ~~L~~M-82. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■														
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■													
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■												
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■											
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■										
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■									
Channel Inspection	Pickup Truck Conventional (1)	■		■							■								
Headworks Structure																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■						
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■					
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■				
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■			
Buildings																			
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■		
Headworks Structure Operating Equipment																			
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																	■
Test Operate Gates	Pickup Truck Conventional (1)	■																	■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-83. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76	76
Residential Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	330	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.4	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.27	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	700

Source: Google Earth

Operational Noise - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-84. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-84. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■														
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■													
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■												
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■											
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■										

Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-85. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76	76
Residential Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	700	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	22.9	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.58	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	67	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	64	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	700

Source: Google Earth

Table ~~L~~M-86. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-86. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■														
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■													
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■												
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■											
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■										
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■									
Channel Inspection	Pickup Truck Conventional (1)	■		■							■								
Headworks Structure																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■						
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■					
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■				
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■			
Buildings																			
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■		
Headworks Structure Operating Equipment																			
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																	■
Test Operate Gates	Pickup Truck Conventional (1)	■																	■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-87. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76	76
Residential Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	330	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.4	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.27	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	3800

Source: Google Earth

Operational Noise - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-88. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-88. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■														
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■													
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■												
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■											
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■										

Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-89. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76	76
Residential Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	330	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.4	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.27	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																	
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	700

Source: Google Earth

Table LM-90. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Downstream (Alternatives 1-4, 6)

Table LM-90. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel							
O&M Road											
Levee O&M Road Regrading	12' Blade Grader (1)	■	■								
Main Channel											
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■						
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■				
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■			
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■		
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■	
Channel Inspection	Pickup Truck Conventional (1)	■		■							■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table LM-91. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel							
Total O&M Leq(h) @ 50'	88	81	88	78	81	81	78	78	81	71
Residential Receptor										
Distance from the Center of O&M Activity to a Receptor (ft)	270	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	14.6	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	74	67	73	64	67	67	64	64	67	57
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA
Agricultural Receptor										
Distance from the Center of O&M Activity to a Receptor (ft)	90	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	5.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67
CNEL (O&M Noise + Existing) (dBA)	80	73	80	70	73	73	70	70	73	64
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within
Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels	
Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:	
Nearest residential receptor (ft)	7000

Source: Google Earth

Operational Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-92. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-92. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf	Headworks Structure	HW Op Eq
O&M Road						
Levee O&M Road Regrading	12' Blade Grader (1)	■	■			
Main Channel and Intake Shelf						
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■ ■		
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■ ■		
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■ ■		
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■ ■		
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■ ■		
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■ ■		
Channel Inspection	Pickup Truck Conventional (1)	■		■ ■		

Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-93. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76
Residential Receptor																
Distance from the Center of O&M Activity to a Receptor (ft)	320	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.1	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.26	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	74	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA
Agricultural Receptor																
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	1800

Source: Google Earth

Table ~~L~~M-94. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Operational Noise - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-94. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					HW Op Eq
O&M Road																	
Levee O&M Road Regrading	12' Blade Grader (1)																
Main Channel and Intake Shelf																	
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)																
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)																
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)																
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)																
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)																
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)																
Channel Inspection	Pickup Truck Conventional (1)																

Operational Noise - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

Headworks Structure																	
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■				
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■			
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■		
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■	
Headworks Structure Operating Equipment																	
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■															■
Test Operate Gates	Pickup Truck Conventional (1)	■															■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-95. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					HW Op Eq
Total O&M Leq(h) @ 50'	90	81	88	78	81	81	78	78	81	71	84	78	81	74	74	76
Residential Receptor																
Distance from the Center of O&M Activity to a Receptor (ft)	320	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.1	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.26	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	74	67	73	64	67	67	64	64	67	57	70	64	67	60	60	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	66	61	64	59	59	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	NA	NA	CA
Agricultural Receptor																
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	83	77	83	74	77	77	74	74	77	67	80	74	77	70	70	72
CNEL (O&M Noise + Existing) (dBA)	79	73	80	70	73	73	70	70	73	64	76	70	73	66	66	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft) 8600

Source: Google Earth

Operational Noise - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Table ~~L~~M-96. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Agricultural Channel and Intake								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Clearing and Grubbing	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Bridge								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Bridge Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Bridge Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-96. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Agricultural Channel and Intake						Bridge
O&M Road										
Levee O&M Road Regrading	12' Blade Grader (1)	■	■							
Agricultural Channel and Intake										
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■					
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■				
Clearing and Grubbing	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■			
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■				■		
Channel Inspection	Pickup Truck Conventional (1)	■		■					■	
Bridge										
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■								■
Bridge Upkeep	Pickup Truck Conventional (2)	■								■
Bridge Inspection	Pickup Truck Conventional (2)	■								■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Table ~~L~~M-97. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Agricultural Channel and Intake						Bridge
Total O&M Leq(h) @ 50'	88	81	87	78	81	81	81	71	80
Residential Receptor									
Distance from the Center of O&M Activity to a Receptor (ft)	270	220	220	220	220	220	220	220	220
Distance Divergence (dBA)	14.6	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
Atmospheric Attenuation (dBA)	0.22	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
1-Hour O&M Noise Level at the Receptor (dBA)	73	68	73	65	68	68	68	58	67
CNEL (O&M Noise + Existing) (dBA)	70	65	70	62	65	65	65	58	64
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	NA	CA
Agricultural Receptor									
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70
Distance Divergence (dBA)	5.1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Atmospheric Attenuation (dBA)	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
1-Hour O&M Noise Level at the Receptor (dBA)	83	78	84	75	78	78	78	68	77
CNEL (O&M Noise + Existing) (dBA)	79	74	80	71	74	74	74	65	74
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	8000

Source: Google Earth

Table ~~L~~M-98. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Berm/Levee								
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Water Control Structure & Culvert								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Water Control Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (Al

Table ~~L~~M-98. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert						Bldg	Op Eq
O&M Road																				
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																	
Main Channel																				
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■															
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■														
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■													
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■												
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■											
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■										
Channel Inspection	Pickup Truck Conventional (1)	■		■							■									
Berm/Levee																				
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■								
Water Control Structure & Culvert																				
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■											■	■						
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■											■		■					
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■											■			■				
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■											■				■			
Buildings																				
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■																■		
Water Control Structure Operating Equipment																				
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																		■
Test Operate Gates	Pickup Truck Conventional (1)	■																		■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-99. 8-Hour Operation & Maintenance Noise Level at the Receptor

	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert					Bldg	Op Eq
Total O&M Leq(h) @ 50'	91	81	88	78	81	81	78	78	81	71	81	84	78	81	74	74	76	76
Residential Receptor																		
Distance from the Center of O&M Activity to a Receptor (ft)	350	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.9	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.29	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	67	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	64	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																		
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	84	77	83	74	77	77	74	74	77	67	77	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	80	73	80	70	73	73	70	70	73	64	73	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	2600

Source: Google Earth

Operational Noise - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (Alternative 4)

Table ~~L~~M-100. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Leq(h) @ 50'
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	Grader	40%	85	81	1	0	81
Main Channel								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Vegetation Removal	56 HP Tractor Rotary Mower (1)	Tractor	40%	84	80	1	0	80
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	Crane	16%	81	73	1	0	73
	16 CY 3 Axle Dump Truck (2)	Dump Truck	40%	76	72	2	3	75
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Channel Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Channel Inspection	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Berm/Levee								
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Water Control Structure & Culvert								
Debris Removal	1.5 CY Front End Loader Crawler (1)	Front End Loader	40%	79	75	1	0	75
	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	Excavator	40%	81	77	1	0	77
	16 CY 3 Axle Dump Truck (3)	Dump Truck	40%	76	72	3	5	77
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Dump Truck	40%	76	72	1	0	72
	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Water Control Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	Pickup Truck	40%	75	71	2	3	74
Test Operate Gates	Pickup Truck Conventional (1)	Pickup Truck	40%	75	71	1	0	71

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-100. 8-Hour Operation & Maintenance Noise Level at 50 Feet (dB

Phase	Equipment Description	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert						Bldg	Op Eq
O&M Road																				
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																	
Main Channel																				
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■															
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■														
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■													
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■												
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■											
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■										
Channel Inspection	Pickup Truck Conventional (1)	■		■							■									
Berm/Levee																				
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■								
Water Control Structure & Culvert																				
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■											■	■						
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■											■		■					
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■											■			■				
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■											■				■			
Buildings																				
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■																■		
Water Control Structure Operating Equipment																				
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																	■	
Test Operate Gates	Pickup Truck Conventional (1)	■																	■	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Noise - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (A

Table ~~L~~M-101. 8-Hour Operation & Maintenance Noise Level at the Recepto

	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert					Bldg	Op Eq
Total O&M Leq(h) @ 50'	91	81	88	78	81	81	78	78	81	71	81	84	78	81	74	74	76	76
Residential Receptor																		
Distance from the Center of O&M Activity to a Receptor (ft)	350	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Distance Divergence (dBA)	16.9	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Atmospheric Attenuation (dBA)	0.29	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
1-Hour O&M Noise Level at the Receptor (dBA)	73	67	73	64	67	67	64	64	67	57	67	70	64	67	60	60	62	62
CNEL (O&M Noise + Existing) (dBA)	70	64	70	61	64	64	62	62	64	58	64	66	61	64	59	59	60	60
Impact to Residential Uses	CA	CA	CA	CA	CA	CA	CA	CA	CA	NA	CA	CA	CA	CA	NA	NA	CA	CA
Agricultural Receptor																		
Distance from the Center of O&M Activity to a Receptor (ft)	110	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Distance Divergence (dBA)	6.8	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Atmospheric Attenuation (dBA)	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-Hour O&M Noise Level at the Receptor (dBA)	84	77	83	74	77	77	74	74	77	67	77	80	74	77	70	70	72	72
CNEL (O&M Noise + Existing) (dBA)	80	73	80	70	73	73	70	70	73	64	73	76	70	73	66	66	68	68
Impact to Agricultural Uses	CA	NA	CA	NA	NA	NA	NA	NA	NA	NA	NA	CA	NA	NA	NA	NA	NA	NA

*Distances are the minimum distances that can still achieve noise levels within
Conditionally Acceptable limits, except when there is a closer receptor.

Significance Level	(dBA)
Residential	
Normally Acceptable	60
Conditionally Acceptable	70
Agricultural	
Normally Acceptable	75
Conditionally Acceptable	80

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise	(dBA)
Daytime	55
Nighttime	45

Receptors:

Nearest residential receptor (ft)	800

Source: Google Earth

Type	Roadway	Segment	2015 AADT without O&M Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	801	112	55	10.4	8,438	64,838	1.1	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	801	112	55	10.4	8,438	64,638	1.2	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table LM-103. Alt 1 Peak Hourly O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	801	56	55	10.4	8,382	14,022	2.5	4	12	No
Interstate	I-5	CR 117 to CR 102	5,620	801	56	55	10.4	8,382	14,002	2.5	4	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table LM-104. Alt 2 Daily O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without O&M Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	802	112	55	10.4	8,456	64,856	1.1	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	802	112	55	10.4	8,456	64,656	1.2	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table LM-105. Alt 2 Peak Hourly O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	802	56	55	10.4	8,400	14,040	2.5	4	12	No
Interstate	I-5	CR 117 to CR 102	5,620	802	56	55	10.4	8,400	14,020	2.5	4	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table ~~L~~M-106. Alt 3 Daily O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without O&M Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	840	114	55	10.4	8,848	65,248	1.2	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	840	114	55	10.4	8,848	65,048	1.2	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table LM-107. Alt 3 Peak Hourly O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	840	57	55	10.4	8,791	14,431	2.6	4	12	No
Interstate	I-5	CR 117 to CR 102	5,620	840	57	55	10.4	8,791	14,411	2.6	4	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table ~~L~~M-108. Alt 4 Daily O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without O&M Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	1,719	178	55	10.4	18,058	74,458	1.3	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	1,719	178	55	10.4	18,058	74,258	1.3	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table LM-109. Alt 4 Peak Hourly O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	1,719	89	55	10.4	17,969	23,609	4.2	6	12	No
Interstate	I-5	CR 117 to CR 102	5,620	1,719	89	55	10.4	17,969	23,589	4.2	6	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Type	Roadway	Segment	2015 AADT without O&M Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	784	114	55	10.4	8,271	64,671	1.1	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	784	114	55	10.4	8,271	64,471	1.1	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table LM-111. Alt 5 Peak Hourly O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	784	57	55	10.4	8,214	13,854	2.5	4	12	No
Interstate	I-5	CR 117 to CR 102	5,620	784	57	55	10.4	8,214	13,834	2.5	4	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Table LM-112. Alt 6 Daily O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	2015 AADT without O&M Traffic	Peak Daily Truck Trips	Peak Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	56,400	1,247	138	55	10.4	13,105	69,505	1.2	1	12	No
Interstate	I-5	CR 117 to CR 102	56,200	1,247	138	55	10.4	13,105	69,305	1.2	1	12	No

Source: *Caltrans. 2015 AADT Volumes.*
Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September.

Table LM-113. Alt 6 Peak Hourly O&M Traffic - Equivalent Noise Levels

Type	Roadway	Segment	Peak Hourly Volume	Peak Hour Truck Trips	Peak Hour Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total with Project	Increase Ratio	Noise Level Increase (dBA)	Substantial Noise Increase (dBA)	Above Threshold?
Interstate	I-5	Sacramento/Yolo County Line to CR 117	5,640	1,247	69	55	10.4	13,036	18,676	3.3	5	12	No
Interstate	I-5	CR 117 to CR 102	5,620	1,247	69	55	10.4	13,036	18,656	3.3	5	12	No

Assume 10% of daily traffic occurs during peak hour.
Assume half of worker trips and all truck trips occur during a peak hour.

Traffic Calculations
Maximum Daily Trips

Table M-114. Alternative 1 Maximum Daily Trips by Component

Alternative 1	Haul Trucks	Employees	Haul Routes
Channel E	394	20	East Alternative Route
Downstream	31	6	East Alternative Route
Fish Passage West	288	20	West Alternative Route
Ag Crossing 1	8	20	East Alternative Route
Maximum	394	20	
East Alternative Route	394	20	
West Alternative Route	288	20	

Table M-115. Alternative 2 Maximum Daily Trips by Component

Alternative 2	Maximum	Employees	Haul Routes
Channel C	394	20	Trucks could use either West or East Route per Ch. 17
Downstream	31	6	East Alternative Route
Fish Passage West	288	20	West Alternative Route
Ag Crossing 1	8	20	East Alternative Route
Maximum	394	20	
East Alternative Route	394	20	
West Alternative Route	394	20	

Table M-116. Alternative 3 Maximum Daily Trips by Component

Alternative 3	Maximum	Employees	Haul Routes
Channel W	394	20	West Alternative Route
Downstream	31	6	East Alternative Route
Fish Passage E	326	20	East Alternative Route
Ag Crossing 1	8	20	East Alternative Route
Maximum	394	20	
East Alternative Route	326	20	
West Alternative Route	394	20	

Table M-117. Alternative 4 Maximum Daily Trips by Component

Alternative 4	Maximum	Employees	Haul Routes
Channel W	394	20	West Alternative Route
Downstream	31	6	East Alternative Route
Fish Passage E	326	20	East Alternative Route
Ag Crossing 1	8	20	East Alternative Route
Northern	388	20	East Alternative Route
Southern	399	20	West Alternative Route
Maximum	399	20	
East Alternative Route	388	20	
West Alternative Route	399	20	

Table M-118. Alternative 5 Maximum Daily Trips by Component

Alternative 5	Maximum	Employees	Haul Routes
Channel C	394	20	Trucks could use either West or East Route per Ch. 17
Fish Passage W	288	20	West Alternative Route
Ag Crossing 1	8	20	East Alternative Route
Tule Canal	360	20	West Alternative Route
Maximum	394	20	
East Alternative Route	394	20	
West Alternative Route	394	20	

Table M-119. Alternative 6 Maximum Daily Trips by Component

Alternative 6	Maximum	Employees	Haul Routes
Channel W	788	40	West Alternative Route
Downstream	31	6	East Alternative Route
Fish Passage E	326	20	East Alternative Route
Ag Crossing 1	8	20	East Alternative Route
Maximum	788	40	
East Alternative Route	326	20	
West Alternative Route	788	40	

Maintenance Schedule

Table M-120. Alternative 1 - Main Channel and Headworks Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Assumptions/Notes
O&M Road																									
1	O&M Road Regrading	1	3,200	1	3,200	3	1														■				Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																									
2	Permits and mitigation		-	-	-	-																			Every year
Main Channel and Intake Shelf																									
3	Debris Removal	1	2	1	2	15	3	■	■	■															Estimated $500 per acre every year
4	Vegetation Removal	1	1	1	1	30	6	■	■	■	■	■	■												Estimated $300 per acre every year
5	Sediment Removal (Wet conditions)	1	320	10	3,200	60	12	■	■	■	■	■	■	■	■	■	■	■	■						Estimated removal every 5 years
6	Rock Replacement (Minor Repair)	1	64	1	64	2	1	■																	Assumed 0.25% of initially placed quantity every year
7	Rock Replacement (Major Repair)	1	64	1	64	14	3	■	■	■															Assumed 2.5% of initially placed quantity every 10 years
8	Channel Repairs	1	320	1	320	6	2	■	■																Assumed 1% of initially placed volume every 5 years
9	Channel Inspection	1	1	1	1	4	1	■																	Four times per year
Headworks Structure																									
10	Debris Removal	1	80	1	80	3	1													■					Assumed 7 logs (30 ft long, 3' diameter)/opening, every year
11	Sediment Removal (Wet conditions)	1	320	10	3,200	3	1													■					Assumed 5% of channel sediment volume, every 5 years
12	Hinged Bottom Gates Upkeep	2		1		5	1													■					Assumed 1% of initial gate cost, every 5 years
13	Gates and Concrete Structure Inspection	2		1		3	1													■					Assumed inspection needed every 5 years
Buildings																									
14	Equipment Building (Major Repair)	1																				■			Assumed 2.5% of initial cost every 10 years
Headworks Structure Operating Equipment																									
15	Mechanical Hydraulic Equipment Upkeep	2		1		5	1																■		Assumed same as for gates upkeep every 5 years
16	Test Operate Gates	1		1		1	1																■		$1,000 per test once a year

Table M-121. Alternative 2 - Main Channel and Headworks Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
O&M Road																								
1	Levee O&M Road Regrading	1	3,200	1	3,200	8	2														■	■		
Environmental Permits and Mitigation																								
2	Permits and mitigation		-	-	-	-																		
Main Channel and Intake Shelf																								
3	Debris Removal	1	2	1	2	29	6	■	■	■	■	■	■											
4	Vegetation Removal	1	1	1	1	57	12	■	■	■	■	■	■	■	■	■	■	■	■					
5	Sediment Removal (Wet conditions)	1	320	10	3,200	60	12	■	■	■	■	■	■	■	■	■	■	■	■					
6	Rock Replacement (Minor Repair)	1	64	1	64	3	1	■																
7	Rock Replacement (Major Repair)	1	64	1	64	30	6	■	■	■	■	■	■											
8	Channel Repairs	1	320	1	320	15	3	■	■	■														
9	Channel Inspection	1	1	1	1	4	1	■																
Headworks Structure																								
10	Debris Removal	1	80	1	80	3	1													■				
11	Sediment Removal (Wet conditions)	1	320	10	3,200	3	1													■				
12	Hinged Bottom Gates Upkeep	2		1		5	1													■				
13	Gates and Concrete Structure Inspection	2		1		3	1													■				
Buildings																								
14	Equipment Building (Major Repair)	1					0																■	
Headworks Structure Operating Equipment																								
15	Mechanical Hydraulic Equipment Upkeep	2		1		5	1																	■
16	Test Operate Gates	1		1		1	1																	■

Table M-122. Alternative 3 - Main Channel and Headworks Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
O&M Road																								
1	Levee O&M Road Regrading	1	3,200	1	3,200	10	2														■	■		
Environmental Permits and Mitigation																								
2	Permits and mitigation		-	-	-	-																		
Main Channel and Intake Shelf																								
3	Debris Removal	1	2	1	2	35	7	■	■	■	■	■	■	■										
4	Vegetation Removal	1	1	2	2	35	7	■	■	■	■	■	■	■										
5	Sediment Removal (Wet conditions)	1	320	10	3,200	60	12	■	■	■	■	■	■	■	■	■	■	■	■					
6	Rock Replacement (Minor Repair)	1	64	1	64	5	1	■																
7	Rock Replacement (Major Repair)	1	64	1	64	40	8	■	■	■	■	■	■	■	■									
8	Channel Repairs	1	620	1	320	24	5	■	■	■	■	■												
9	Channel Inspection	1	1	1	1	4	1	■																
Headworks Structure																								
10	Debris Removal	1	80	1	80	3	1													■				
11	Sediment Removal (Wet conditions)	1	320	10	3,200	3	1													■				
12	Hinged Bottom Gates Upkeep	2		1		5	1													■				
13	Gates and Concrete Structure Inspection	2		1		3	1													■				
Buildings																								
14	Equipment Building (Major Repair)	1					0																■	
Headworks Structure Operating Equipment																								
15	Mechanical Hydraulic Equipment Upkeep	2		1		5	1																	■
16	Test Operate Gates	1		1		1	1																	■

Table M-123. Alternative 4 - Main Channel and Headworks Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
O&M Road																								
1	Levee O&M Road Regrading	1	3,200	1	3,200	10	2										■	■						
Environmental Permits and Mitigation																								
2	Permits and mitigation		-	-	-	-																		
Main Channel and Intake Shelf																								
3	Debris Removal	1	2	1	2	35	7	■	■	■	■	■	■	■										
4	Vegetation Removal	1	1	2	2	35	7	■	■	■	■	■	■	■										
5	Sediment Removal (Wet conditions)	1	320	10	3,200	30	6	■	■	■	■	■	■											
6	Rock Replacement (Minor Repair)	1	64	1	64	5	1	■																
7	Rock Replacement (Major Repair)	1	64	1	64	40	8	■	■	■	■	■	■	■	■									
8	Channel Repairs	1	320	1	320	24	5	■	■	■	■	■												
9	Channel Inspection	1	1	1	1	4	1	■																
Headworks Structure																								
10	Debris Removal	1	80	1	80	3	1									■								
11	Sediment Removal (Wet conditions)	1	320	10	3,200	2	1									■								
12	Hinged Bottom Gates Upkeep	2		1		5	1									■								
13	Gates and Concrete Structure Inspection	2		1		3	1									■								
Buildings																								
14	Equipment Building (Major Repair)	1					0												■					
Headworks Structure Operating Equipment																								
15	Mechanical Hydraulic Equipment Upkeep	2		1		5	1													■				
16	Test Operate Gates	1		1		1	1													■				

Table M-124. Alternative 5 - Main Channel and Headworks Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
O&M Road																																	
1	Levee O&M Road Regrading	1	3,200	1	3,200	48	10																	■	■	■	■	■	■	■	■	■	
Environmental Permits and Mitigation																																	
2	Permits and mitigation		-	-	-	-																											
Main Channel and Intake Shelf																																	
3	Debris Removal	1	2	4	8	56	12	■	■	■	■	■	■	■	■	■	■	■	■														
4	Vegetation Removal	1	1	8	8	56	12	■	■	■	■	■	■	■	■	■	■	■	■														
5	Sediment Removal (Wet conditions)	1	320	10	3,200	30	6	■	■	■	■	■	■																				
6	Rock Replacement (Minor Repair)	1	64	1	64	5	1	■																									
7	Rock Replacement (Major Repair)	1	64	1	64	40	8	■	■	■	■	■	■	■	■																		
8	Channel Repairs	1	320	2	640	60	12	■	■	■	■	■	■	■	■	■	■	■	■														
9	Channel Inspection	1	1	1	1	4	1	■																									
Headworks Structure																																	
10	Debris Removal	1	80	1	80	19	4													■	■	■	■										
11	Sediment Removal (Wet conditions)	1	320	10	3,200	2	1													■													
12	Hinged Bottom Gates Upkeep	2		1		5	1													■													
13	Gates and Concrete Structure Inspection	2		1		3	1													■													
Buildings																																	
14	Equipment Building (Major Repair)	1					0																									■	
Headworks Structure Operating Equipment																																	
15	Mechanical Hydraulic Equipment Upkeep	2		1		5	1																										■
16	Test Operate Gates	1		1		1	1																										■

Table M-125. Alternative 6 - Main Channel and Headworks Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
O&M Road																									
1	Levee O&M Road Regrading	1	3,200	1	3,200	10	2															■	■		
Environmental Permits and Mitigation																									
2	Permits and mitigation		-	-	-	-																			
Main Channel and Intake Shelf																									
3	Debris Removal	1	2	1	2	48	10	■	■	■	■	■	■	■	■	■	■								
4	Vegetation Removal	1	1	2	2	48	10	■	■	■	■	■	■	■	■	■	■								
5	Sediment Removal (Wet conditions)	1	320	20	6,400	60	12	■	■	■	■	■	■	■	■	■	■	■	■						
6	Rock Replacement (Minor Repair)	1	64	1	64	13	3	■	■	■															
7	Rock Replacement (Major Repair)	1	64	3	192	43	9	■	■	■	■	■	■	■	■	■									
8	Channel Repairs	1	320	1	320	51	11	■	■	■	■	■	■	■	■	■	■	■							
9	Channel Inspection	1	1	1	1	4	1	■																	
Headworks Structure																									
10	Debris Removal	1	80	1	80	3	1													■					
11	Sediment Removal (Wet conditions)	1	320	10	3,200	6	2													■	■				
12	Hinged Bottom Gates Upkeep	2		1		5	1													■					
13	Gates and Concrete Structure Inspection	2		1		3	1													■					
Buildings																									
14	Equipment Building (Major Repair)	1					0																	■	
Headworks Structure Operating Equipment																									
15	Mechanical Hydraulic Equipment Upkeep	2		1		5	1																		■
16	Test Operate Gates	1		1		1	1																		■

Table M-126. Downstream Reach, Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Assumptions/Notes
O&M Road																										
1	Levee O&M Road Regrading	1	3200	1	3200	4	1			■																Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																										
2	Permits and mitigation		-	-	-	-																				Every year
Main Channel and Intake Shelf																										
3	Debris Removal	1	2	1	2	7	2	■	■																	Estimated $500 per acre every year
4	Vegetation Removal	1	1	2	2	7	2	■	■																	Estimated $300 per acre every year
5	Sediment Removal (Wet conditions)	1	320	1	320	0	0																			Refer to the main channel volumes for each alternative
6	Rock Replacement (Minor Repair)	1	64	1	64	2	1	■																		Assumed 0.25% of initially placed quantity every year
7	Rock Replacement (Major Repair)	1	64	3	192	5	1	■																		Assumed 2.5% of initially placed quantity every 10 years
8	Channel Repairs	1	320	1	320	3	1	■																		Assumed 1% of initially placed volume every 5 years
9	Channel Inspection	1	1	1	1	4	1	■																		$1,500 per inspection twice a year

Table M-127. Supplemental Fish Passage East, Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Assumptions/Notes
O&M Road																										
1	Levee O&M Road Regrading	1	3200	1	3200	1	1			■																Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																										
2	Permits and mitigation		-	-	-	-																				Every year
Main Channel and Intake Shelf																										
3	Debris Removal	1	2	1	2	1	1	■																		Estimated $500 per acre every year
4	Vegetation Removal	1	1	1	1	1	1	■																		Estimated $300 per acre every year
5	Sediment Removal (Wet conditions)	1	320	10	3,200	1	1	■																		Estimated channel 100% filled within 5 years; Removal every 5 years
6	Rock Replacement (Minor Repair)	1	64	1	64	1	1	■																		Assumed 0.25% of initially placed quantity every year
7	Rock Replacement (Major Repair)	1	64	1	64	1	1	■																		Assumed 2.5% of initially placed quantity every 10 years
8	Channel Repairs	1	320	1	320	1	1	■																		Assumed 1% of initially placed volume every 5 years
9	Channel Inspection	1	1	1	1	4	1	■																		Four times per year
Headworks Structure																										
10	Debris Removal	1	80	1	80	1	1		■																	Assumed 7 logs (30 ft long, 3' diameter)/opening, every year
11	Sediment Removal (Wet conditions)	1	320	10	3,200	1	1		■																	Assumed 5% of channel sediment volume, every 5 years
12	Hinged Bottom Gates Upkeep	2		1		5	1		■																	Assumed 1% of initial gate cost, every 5 years
13	Gates and Concrete Structure Inspection	2		1		3	1		■																	Assumed inspection needed every 5 years
Headworks Structure Operating Equipment																										
14	Mechanical Hydraulic Equipment Upkeep	2		1		5	1				■															Assumed same as for gates upkeep every 5 years
15	Test Operate Gates	1		1		1	1				■															$1,000 per test once a year

Table M-128. Supplemental Fish Passage West, Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Assumptions/Notes
O&M Road																										
1	Levee O&M Road Regrading	1	3,200	1	3,200	1	1			■																Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																										
2	Permits and mitigation		-	-	-	-																				Every year
Main Channel and Intake Shelf																										
3	Debris Removal	1	2	1	2	1	1	■																		Estimated $500 per acre every year
4	Vegetation Removal	1	1	1	1	1	1	■																		Estimated $300 per acre every year
5	Sediment Removal (Wet conditions)	1	320	10	3,200	1	1	■																		Estimated channel 100% filled within 5 years; Removal every 5 years
6	Rock Replacement (Minor Repair)	1	64	1	64	1	1	■																		Assumed 0.25% of initially placed quantity every year
7	Rock Replacement (Major Repair)	1	64	1	64	1	1	■																		Assumed 2.5% of initially placed quantity every 10 years
8	Channel Repairs	1	320	1	320	1	1	■																		Assumed 1% of initially placed volume every 5 years
9	Channel Inspection	1	1	1	1	4	1	■																		Four times per year
Headworks Structure																										
10	Debris Removal	1	80	1	80	1	1		■																	Assumed 7 logs (30 ft long, 3' diameter)/opening, every year
11	Sediment Removal (Wet conditions)	1	320	10	3,200	1	1		■																	Assumed 5% of channel sediment volume, every 5 years
12	Hinged Bottom Gates Upkeep	2	-	1	-	5	1		■																	Assumed 1% of initial gate cost, every 5 years
13	Gates and Concrete Structure Inspection	2	-	1	-	3	1		■																	Assumed inspection needed every 5 years
Headworks Structure Operating Equipment																										
14	Mechanical Hydraulic Equipment Upkeep	2	-	1	-	5	1				■															Assumed same as for gates upkeep every 5 years
15	Test Operate Gates	1	-	1	-	1	1				■															$1,000 per test once a year

Table M-129. Agricultural Crossing 1, Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Assumptions/Notes
O&M Road																										
1	Levee O&M Road Regrading	1	3,200	1	3,200	1	1		■																	Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																										
2	Permits and mitigation		-	-	-	-																				Every year
Agricultural Channel and Intake																										
3	Debris Removal	1	2	1	2	1	1	■																		Estimated $500 per acre every year
4	Vegetation Removal	1	1	1	1	1	1	■																		Estimated $950 per acre every year
5	Pipe Flush	1	320	10	3,200	1	1	■																		Estimated pipe flushing is needed every year
6	Channel Repairs	1	320	1	320	1	1	■																		Assumed 1% of initially placed volume every 5 years
7	Channel Inspection	1	1	1	1	4	1	■																		Four times per year
Rail Car Bridge																										
8	Debris Removal	1	80	1	80	1	1			■																Assumed 7 logs (30 ft long, 3' diameter)/opening, every year
9	Rail Car Bridge Upkeep	2	-	1	-	5	1			■																Assumed 2.5% of initial bridge cost, every year
10	Rail Car Bridge Inspection	2	-	1	-	3	1			■																Assumed inspection needed every year

Table M-130. Northern Water Control Structure, Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Assumptions/Notes
O&M Road																										
1	Levee O&M Road Regrading	1	3,200	1	3,200	33	7							■	■	■	■	■	■	■						Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																										
2	Permits and mitigation		-	-	-	-																				Every year
Main Channel and Intake Shelf																										
3	Debris Removal	1	2	1	2	9	2	■	■																	Estimated $500 per acre every year
4	Vegetation Removal	1	1	1	1	17	4	■	■	■	■															Estimated $300 per acre every year
5	Sediment Removal (Wet conditions)	1	320	10	3,200	5	1	■																		Estimated removal every 5 years
6	Rock Replacement (Minor Repair)	1	64	1	64	2	1	■																		Assumed 0.25% of initially placed quantity every year
7	Rock Replacement (Major Repair)	1	64	1	64	13	3	■	■	■																Assumed 2.5% of initially placed quantity every 10 years
8	Channel Repairs	1	320	1	320	2	1	■																		Assumed 1% of initially placed volume every 5 years
9	Channel Inspection	1	1	1	1	4	1	■																		Four times per year
Berm/Levee																										
10	Berm/Levee Repairs	1	320	1	320	3	1					■	■													Assumed 1% of initially excavated volume every 5 years
Water Control Structure and Culvert																										
11	Debris Removal	1	80	1	80	1	1						■													Assumed 7 logs (30 ft long, 3' diameter)/opening, every year
12	Sediment Removal (Wet conditions)	1	320	10	3,200	1	1						■													Assumed 5% of channel sediment volume, every 5 years
13	Inflatable Gates Upkeep	2		1		5	1						■													Assumed 1% of initial gate cost, every 5 years
14	Gates and Concrete Structure Inspection	2		1		3	1						■													Assumed inspection needed every 5 years
Buildings																					■					
15	Equipment Building (Major Repair)	1																								Assumed 2.5% of initial cost every 10 years
Water Control Structure Operating Equipment																										
16	Mechanical Hydraulic Equipment Upkeep	2		1		5	1															■				Assumed same as gates upkeep every 5 years
17	Test Operate Gates	1		1		1	1															■				$1,000 per test once a year

Table M-131. Southern Water Control Structure, Operations and Maintenance

Item #	WBS Description	Quantity	Crew Daily Output	Number of Crews	Total Daily Output	Estimated Duration, Days	Weeks	Estimated Duration, Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Assumptions/Notes
O&M Road																															
1	Levee O&M Road Regrading	1	3,200	1	3,200	29	6																■	■	■	■	■	■			Needed after sediment removal every 5 years.
Environmental Permits and Mitigation																															
2	Permits and mitigation		-	-	-	-																									Every year
Main Channel and Intake Shelf																															
3	Debris Removal	1	2	1	2	22	5	■	■	■	■	■																			Estimated $500 per acre every year
4	Vegetation Removal	1	1	1	1	43	9	■	■	■	■	■	■	■	■	■															Estimated $300 per acre every year
5	Sediment Removal (Wet conditions)	1	320	10	3,200	8	2	■																							Estimated removal every 5 years
6	Rock Replacement (Minor Repair)	1	64	1	64	6	2	■																							Assumed 0.25% of initially placed quantity every year
7	Rock Replacement (Major Repair)	1	64	1	64	56	12	■	■	■	■	■	■	■	■	■	■	■	■												Assumed 2.5% of initially placed quantity every 10 years
8	Channel Repairs	1	320	1	320	4	1	■																							Assumed 1% of initially placed volume every 5 years
9	Channel Inspection	1	1	1	1	4	1	■																							Four times per year
Berm/Levee																															
10	Berm/Levee Repairs	1	320	1	320	6	2													■	■										Assumed 1% of initially excavated volume every 5 years
Water Control Structure and Culvert																															
11	Debris Removal	1	80	1	80	1	1															■									Assumed 7 logs (30 ft long, 3' diameter)/opening, every year
12	Sediment Removal (Wet conditions)	1	320	10	3,200	1	1															■									Assumed 5% of channel sediment volume, every 5 years
13	Inflatable Gates Upkeep	2		1		5	1															■									Assumed 1% of initial gate cost, every 5 years
14	Gates and Concrete Structure Inspection	2		1		3	1															■									Assumed inspection needed every 5 years
Buildings																															
15	Equipment Building (Major Repair)	1																										■			Assumed 2.5% of initial cost every 10 years
Water Control Structure Operating Equipment																															
16	Mechanical Hydraulic Equipment Upkeep	2		1		5	1																							■	Assumed same as gates upkeep every 5 years
17	Test Operate Gates	1		1		1	1																							■	$1,000 per test once a year

Operational Vibration - Equipment
Alternative 1 - East Alignment

Table ~~L~~M-132. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-132. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
O&M Road																		
O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Alternative 1 - East Alignment

Table ~~L~~M-133. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Building Damage																	
Total PPV @ 25'	1.29	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a
Human Annoyance																	
Total Lv @ 25'	111	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	490	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	38.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	62	50	60	n/a	n/a	50	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 7500
Source: Google Earth

Table ~~L~~M-134. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Alternative 2 - Center Alignment

Table ~~L~~M-134. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-135. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Building Damage																	
Total PPV @ 25'	1.29	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a
Human Annoyance																	
Total Lv @ 25'	111	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	490	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	38.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	62	50	60	n/a	n/a	50	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 4200

Source: Google Earth

Operational Vibration - Equipment
Alternative 3 - West Alignment

Table ~~L~~M-136. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-136. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Alternative 3 - West Alignment

Table ~~L~~M-137. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Building Damage																	
Total PPV @ 25'	1.29	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a
Human Annoyance																	
Total Lv @ 25'	111	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4
Lv at the Receptor (VdB)	67	n/a	64	43	43	52	49	49	52	n/a	55	43	52	n/a	n/a	43	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 700

Source: Google Earth

Table ~~L~~M-138. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Alternative 4 - West Alignment

Table ~~L~~M-138. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-139. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Building Damage																	
Total PPV @ 25'	1.29	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a
Human Annoyance																	
Total Lv @ 25'	111	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4
Lv at the Receptor (VdB)	67	n/a	64	43	43	52	49	49	52	n/a	55	43	52	n/a	n/a	43	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 700

Source: Google Earth

Operational Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-140. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-140. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Buildings																		
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■	
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Alternative 5 - Multipe Gates/Center Alignment

Table ~~L~~M-141. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Building Damage																	
Total PPV @ 25'	1.29	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a
Human Annoyance																	
Total Lv @ 25'	111	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	490	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	38.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	62	50	60	n/a	n/a	50	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 3800

Source: Google Earth

Table ~~L~~M-142. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Alternative 6 - West Alignment

Table ~~L~~M-142. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						Bldg	HW Op Eq
O&M Road																			
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																
Main Channel and Intake Shelf																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■														
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■													
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■												
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■											
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■										
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■									
Channel Inspection	Pickup Truck Conventional (1)	■		■							■								
Headworks Structure																			
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■						
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■					
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■				
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■			
Buildings																			
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■															■		
Headworks Structure Operating Equipment																			
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																	■
Test Operate Gates	Pickup Truck Conventional (1)	■																	■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-143. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					Bldg	HW Op Eq
Building Damage																	
Total PPV @ 25'	1.29	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a
Human Annoyance																	
Total Lv @ 25'	111	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Distance Divergence (dBA)	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4
Lv at the Receptor (VdB)	67	n/a	64	43	43	52	49	49	52	n/a	55	43	52	n/a	n/a	43	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 700

Source: Google Earth

Operational Vibration - Equipment
Downstream (Alternatives 1-4, 6)

Table ~~L~~M-144. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)	Tot	O&M Road	Main Channel
O&M Road											
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-			
Main Channel											
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-			
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86			
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-			
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-			
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86			
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-			
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-			
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96			
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-			
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-			
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92			
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-			
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-			
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92			
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-			
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-			
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96			
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-			
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-			

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-145. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel						
Building Damage									
Total PPV @ 25'	0.912	n/a	0.912	0.076	0.076	0.228	0.152	0.23	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.05	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	n/a
Human Annoyance									
Total Lv @ 25'	108	n/a	108	86	86	96	92	96	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	60	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 7000

Source: Google Earth

Operational Vibration - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-146. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-146. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						HW Op Eq
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Supplemental Fish Passage West (Alternatives 1, 2, and 5)

Table ~~L~~M-147. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					HW Op Eq
Building Damage																
Total PPV @ 25'	1.22	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.18	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	n/a
Human Annoyance																
Total Lv @ 25'	110	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	470	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	38.2	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	62	50	60	n/a	n/a	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 1800
Source: Google Earth

Table ~~L~~M-148. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-
Main Channel and Intake Shelf								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Headworks Structure								
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Headworks Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Supplemental Fish Passage East (Alternatives 3, 4, and 6)

Table ~~L~~M-148. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure						HW Op Eq
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	■	■															
Main Channel and Intake Shelf																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■													
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■												
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■											
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■										
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■									
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■								
Channel Inspection	Pickup Truck Conventional (1)	■		■							■							
Headworks Structure																		
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■										■	■					
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■		■				
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■										■			■			
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■										■				■		
Headworks Structure Operating Equipment																		
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																■
Test Operate Gates	Pickup Truck Conventional (1)	■																■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-149. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel and Intake Shelf								Headworks Structure					HW Op Eq
Building Damage																
Total PPV @ 25'	1.22	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.3	0.08	0.23	n/a	n/a	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	90	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.18	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.06	0.02	0.05	n/a	n/a	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	n/a
Human Annoyance																
Total Lv @ 25'	110	n/a	108	86	86	96	92	92	96	n/a	98	86	96	n/a	n/a	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	470	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	38.2	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	62	50	60	n/a	n/a	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	n/a	n/a	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building
0.2 in/sec

Human annoyance
72 VdB

Receptors:

Nearest residential receptor (ft) 8600
Source: Google Earth

Operational Vibration - Equipment
Agricultural Crossing 1 (Alternatives 1-6)

Table ~~L~~M-150. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)	Tot	O&M Road	Agricultural Channel and Intake							Bridge
O&M Road																		
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-										
Agricultural Channel and Intake																		
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-										
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86										
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-										
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-										
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86										
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-										
Clearing and Grubbing	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-										
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96										
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-										
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-										
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96										
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-										
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-										
Bridge																		
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-										
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86										
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-										
Bridge Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-										
Bridge Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-										

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-151. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Agricultural Channel and Intake					Bridge
Building Damage								
Total PPV @ 25'	0.684	n/a	0.608	0.076	0.076	0.228	0.228	0.08
Distance from the Center of O&M Activity to a Receptor (ft)	60	60	60	60	60	60	60	60
PPV at the Receptor (in/sec)	0.18	n/a	0.16	0.02	0.02	0.06	0.06	0.02
Impact to Receptor	no	n/a	no	no	no	no	no	no
Human Annoyance								
Total Lv @ 25'	105	n/a	104	86	86	96	96	86
Distance from the Center of O&M Activity to a Receptor (ft)	320	300	300	300	300	300	300	300
Distance Divergence (dBA)	33.2	32.4	32.4	32.4	32.4	32.4	32.4	32.4
Lv at the Receptor (VdB)	72	n/a	72	54	54	63	63	54
Impact to Receptor	no	n/a	no	no	no	no	no	no

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 8000
Source: Google Earth

Operational Vibration - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (Alternative 4)

Table ~~L~~M-152. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)	
O&M Road									
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-	-
Main Channel									
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92	3.99E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92	3.99E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Berm/Levee									
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Water Control Structure & Culvert									
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Buildings									
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Water Control Structure Operating Equipment									
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-152. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert						Bldg	Op Eq
O&M Road																				
Levee O&M Road Regrading	12' Blade Grader (1)	■	■																	
Main Channel																				
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■	■															
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■		■														
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■			■													
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				■												
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■					■											
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■						■										
Channel Inspection	Pickup Truck Conventional (1)	■		■							■									
Berm/Levee																				
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■										■								
Water Control Structure & Culvert																				
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■											■	■						
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■											■		■					
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■											■			■				
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■											■				■			
Buildings																				
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■																■		
Water Control Structure Operating Equipment																				
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■																	■	
Test Operate Gates	Pickup Truck Conventional (1)	■																	■	

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Northern Water Control Structure and Sturgeon Bypass Channel (Al

Table ~~L~~M-153. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert					Bldg	Op Eq
Building Damage																		
Total PPV @ 25'	1.52	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.228	0.3	0.08	0.23	n/a	n/a	0.076	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	100	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.05	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	no	n/a	n/a	no	n/a
Human Annoyance																		
Total Lv @ 25'	112	n/a	108	86	86	96	92	92	96	n/a	96	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	540	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	40.0	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	60	62	50	60	n/a	n/a	50	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels
within the significance thresholds, except when there is a closer receptor.

Significance Level
Non-engineered timber & masonry building
0.2 in/sec
Human annoyance
72 VdB

Receptors:
Nearest residential receptor (ft) 2600
Source: Google Earth

Table ~~L~~M-154. Operation & Maintenance Vibration and Ground-Borne Vibration

Phase	Equipment Description	Lookup Equipment Types	Number of Equipment	Single Equipment PPV at 25 ft (in/sec)	Total PPV at 25 ft (in/sec)	Single Equipment Lv at 25 ft (VdB)	Add to Single Source Level (VdB)	Total Lv at 25 ft (VdB)	
O&M Road									
Levee O&M Road Regrading	12' Blade Grader (1)	n/a	1	-	-	-	0	-	-
Main Channel									
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Vegetation Removal	56 HP Tractor Rotary Mower (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92	3.99E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Rock Replacement (Major Repair)	17 TN Crane Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (2)	Loaded Trucks	2	0.076	0.152	86	6	92	3.99E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Channel Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Channel Inspection	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Berm/Levee									
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Water Control Structure & Culvert									
Debris Removal	1.5 CY Front End Loader Crawler (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1)	n/a	1	-	-	-	0	-	-
	16 CY 3 Axle Dump Truck (3)	Loaded Trucks	3	0.076	0.228	86	10	96	5.99E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Buildings									
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1)	Loaded Trucks	1	0.076	0.076	86	0	86	2.00E+04
	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Water Control Structure Operating Equipment									
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	n/a	2	-	-	-	6	-	-
Test Operate Gates	Pickup Truck Conventional (1)	n/a	1	-	-	-	0	-	-

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Operational Vibration - Equipment
Southern Water Control Structure and Sturgeon Bypass Channel (A

Table ~~L~~M-154. Operation & Maintenance Vibration and Ground-Borne Vibra

Phase	Equipment Description	Tot	O&M Road	Main Channel	Berm	Water Control Structure & Culvert	Bldg	Op Eq
O&M Road								
Levee O&M Road Regrading	12' Blade Grader (1)	■	■					
Main Channel								
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■				
Vegetation Removal	56 HP Tractor Rotary Mower (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■		■				
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■				
Rock Replacement (Minor Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				
Rock Replacement (Major Repair)	17 TN Crane Crawler (1) 16 CY 3 Axle Dump Truck (2) Pickup Truck Conventional (1)	■		■				
Channel Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■		■				
Channel Inspection	Pickup Truck Conventional (1)	■		■				
Berm/Levee								
Berm/ Levee Repairs	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■			■			
Water Control Structure & Culvert								
Debris Removal	1.5 CY Front End Loader Crawler (1) 16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (1)	■				■		
Sediment Removal (Wet Conditions)	0.75 CY Hydraulic Excavator (1) 16 CY 3 Axle Dump Truck (3) Pickup Truck Conventional (2)	■				■		
Hinged Bottom Gates Upkeep	Pickup Truck Conventional (2)	■				■		
Gates and Concrete Structure Inspection	Pickup Truck Conventional (2)	■				■		
Buildings								
Equipment Building (Major Repair)	16 CY 3 Axle Dump Truck (1) Pickup Truck Conventional (2)	■					■	
Water Control Structure Operating Equipment								
Mechanical Hydraulic Equipment Upkeep	Pickup Truck Conventional (2)	■						■
Test Operate Gates	Pickup Truck Conventional (1)	■						■

Source: HDR. 2017. Yolo Bypass Salmonid Habitat Restoration & Fish Passage Project – Ten Percent Design: Draft Technical Memorandum Operations and Maintenance. February 14.

Table ~~L~~M-155. Operation & Maintenance Vibration Level at the Receptor

	Tot	O&M Road	Main Channel								Berm	Water Control Structure & Culvert					Bldg	Op Eq
Building Damage																		
Total PPV @ 25'	1.52	n/a	0.91	0.08	0.08	0.23	0.15	0.15	0.23	n/a	0.228	0.3	0.08	0.23	n/a	n/a	0.08	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	100	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
PPV at the Receptor (in/sec)	0.19	n/a	0.19	0.02	0.02	0.05	0.03	0.03	0.05	n/a	0.05	0.06	0.02	0.05	n/a	n/a	0.02	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	no	n/a	n/a	no	n/a
Human Annoyance																		
Total Lv @ 25'	112	n/a	108	86	86	96	92	92	96	n/a	96	98	86	96	n/a	n/a	86	n/a
Distance from the Center of O&M Activity to a Receptor (ft)	540	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Distance Divergence (dBA)	40.0	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Lv at the Receptor (VdB)	72	n/a	72	50	50	60	56	56	60	n/a	60	62	50	60	n/a	n/a	50	n/a
Impact to Receptor	no	n/a	no	no	no	no	no	no	no	n/a	no	no	no	no	n/a	n/a	no	n/a

*Distances are the minimum distances that can still achieve vibration levels within the significance thresholds, except when there is a closer receptor.

Significance Level

Non-engineered timber & masonry building

0.2 in/sec

Human annoyance

72 VdB

Receptors:

Nearest residential receptor (ft) 800

Source: Google Earth

Table ~~L~~M-156. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate $Lv^{\dagger}$ at 25 ft
Pile Driver (impact)	0.644	104
Pile Driver (sonic)	0.17	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall) - in soil	0.008	66
Hydromill (slurry wall) - in rock	0.017	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May.

Note:

Values for pile drivers are based on the typical vibration source levels.

† RMS velocity in decibels (VdB) re 1 micro-inch/second