FrontRunner Forward Technical Memorandum

To: Utah Transit Authority

From: Lance Meister, Cross-Spectrum Acoustics, Inc.

Date: May 20, 2025

Subject: FrontRunner Forward Corridor Level Noise and Vibration Analysis Addendum

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Introduction

The FrontRunner Forward program has expanded since 2023 when the *FrontRunner Forward Corridor Level Noise and Vibration Analysis Technical Memorandum*, dated May 18, 2023, was completed by Cross-Spectrum Acoustics, Inc. (CSA) for the Utah Transit Authority (UTA) FrontRunner Forward program. The purpose of this memo is to provide an addendum to the 2023 memo. The FrontRunner Forward program proposes to increase FrontRunner service from 30-minute headways to 15-minute headways during peak periods between Provo and Ogden. This memo provides the updated results of the assessments for service increase to 15-minute headways at the 11 proposed double track sections (including new and modified project sections).

Summary

The original assessment concluded that there would be no noise impacts due to the combined efforts of FrontRunner strategic double track projects and the service increase. The only locations with vibration impacts would be near new or relocated crossovers or turnouts associated with the new or lengthened double tracking locations, which would be identified in the individual double-track noise and vibration assessments to be completed for each project-specific environmental review.

The updated noise analysis resulted in moderate noise impacts in the double track projects listed below, due to the combined effects of the double track and service increase. Noise mitigation should be considered during final design at these locations. Additional noise assessments will be completed for each project-specific environmental review.

- North of Woods Cross – 5 single-family residences
- North of American Fork – 4 single-family residences
- North of Orem – 1 single-family residence
- North of Provo – 1 single-family residence and 22 multi-family units in 6 buildings

There were no new vibration impacts related to the combined effects of the projects. Any vibration impacts in the double track sections would be included in the individual double track assessment to be completed as part of the project-specific environmental review. Because of the high frequency and length of Union Pacific freight trains in the corridor, the additional FrontRunner trains would not be enough to double the total train volume in the corridor, and therefore there would be no vibration impacts due to the service increase throughout the corridor, including the combination with the double

tracking sections. No additional vibration assessment, per FTA guidance, was conducted for the service change.

Project Updates

The 2023 technical memorandum provided corridor level noise and vibration impact assessment for the service increase from 30-minute headways to 15-minute headways, along with the combined effects of four proposed double track sections as shown in Table 1. Five of the originally proposed nine projects were mistakenly omitted and have been included in this 2025 assessment along with the changes proposed for those project sections.

Table 1. Double Track Projects Analyzed in 2023

Double Track and Rail Realignment Project Sections	*North UTA Milepost*	*South UTA Milepost*	*Length (Miles)*	*County*
North of Clearfield Double Track	N 29.9	N 26.2	3.7	Davis
North of Woods Cross Double Track	N 11	N 8.9	1.9	Davis
North of Lehi Double Track	S 23	S 24.6	1.4	Utah
North of American Fork Double Track	S 25.85	S 30.2	4.2	Utah

Source: FrontRunner Forward Strategic Double Track Recommended Service Alternative Overview – A Planning and Environmental Linkage Study, Table 7.1. UTA, May 2023.

In 2024 and early 2025, the following corridor-level changes were made to the program:

- Purchase of 10 diesel multiple units (DMUs)
- Addition of a new maintenance facility at Beck Yard, located on the border of Davis and Salt Lake Counties
- Addition of a new station in Bluffdale, which resulted in the following changes to double-track sections:
    - Extensions to North of Lehi and North of American Fork sections
    - New North of Orem and North of Provo sections
    - Modification to the South of Draper section to accommodate the new station
- Design progress leading to changes to the Woods Cross section.

In 2025, the corridor level noise and vibration assessment was updated to address the service increase at 11 proposed double track sections shown in Table 2 which included new and modified project sections.

Table 2. Double Track Projects Analyzed in 2025

Double Track and Rail Realignment Project Sections	*North UTA Milepost*	*South UTA Milepost*	*Length (Miles)*	*County*
North of Clearfield Double Track	N 29.9	N 26.2	3.7	Davis
North of Woods Cross Double Track	N 11	N 8.3	2.7	Davis
Beck Yard Double Track (with new maintenance facility)	N 5.3	N 3.5	1.8	Salt Lake and Davis
Warm Springs Rail Realignment	N 2.6	N 1.5	1.1	Salt Lake
South of Salt Lake Double Track	S 2.0	S 4.2	2.2	Salt Lake
South of Murray Double Track	S 7.25	S 8.8	1.55	Salt Lake
South of Draper Double Track (with new Bluffdale station)	S 17.3	S 20.4	3.1	Salt Lake
North of Lehi Double Track	S 22.5	S 24.6	2.1	Salt Lake and Utah
North of American Fork Double Track	S 25.85	S 34.1	8.25	Utah
North of Orem Double Track	S 36.8	S 38.5	1.7	Utah
North of Provo Double Track	S 43.2	S 43.9	0.7	Utah

Source: FrontRunner Forward Strategic Double Track Recommended Service Alternative Overview – A Planning and Environmental Linkage Study, Table 7.1. UTA, May 2025.

The noise and vibration methodology used for this addendum to incorporate additional double track sections is the same as the methodology described in the 2023 corridor-wide noise and vibration assessment and the individual double track noise and vibrations assessments. Distances to noise impact were calculated for each double track section for the assessment. The distances were approximately 50 feet from the existing track on the side where the new track would be added and approximately 35 feet from the existing track on the side opposite the new track, with exceptions near the new Bluffdale station and in Provo where buildings are being removed as a part of the project, which are both discussed below. Where the distances were close to or included sensitive receivers, an assessment was conducted to confirm the impacts at those locations. If the distances were not close to any sensitive receivers, no further analysis was conducted.

All locations with special trackwork would be evaluated in the individual double track assessments to be completed for each project-specific environmental review. Adding trains as a result of service changes at special trackwork (i.e. crossovers) does not change the noise assessment, nor does it change the need for crossover mitigation at those locations.

The current FrontRunner train schedule (implemented in August 2023) is virtually identical to the FrontRunner train schedule (April 2022) used in the original assessment. The minor changes in the schedule do not affect the assessment of existing noise in the corridor.

Noise Assessment Update

From North to South, the results of the assessment for the combined double track projects and service change to 15-minute headways include:

- North of Clearfield – There were no noise impacts identified in 2023 and there are no design changes.
- North of Woods Cross – There were no noise impacts identified in 2023. However, there are five moderate noise impacts at single-family residences identified in the southern extension of double track added in 2025. The locations of the impacts are shown in Figure 1.
- Beck Yard – There are no noise sensitive receptors near the section.
- Warm Springs – This section is already double tracked. The nearest receiver is over 300 feet from the tracks, and therefore there would be no noise impacts.
- South of Salt Lake – There are no noise sensitive receptors near the section.
- South of Murray – There are no noise impacts identified.
- South of Draper – There are no noise sensitive receptors located within 100 feet of the alignment for the areas outside of the proposed Bluffdale station, and no noise impacts are identified. The receivers near the future Bluffdale Station are over 200 feet from the tracks, and the distance to noise impact in this area is calculated to be 115 feet, so no impacts are identified near the station.
- North of Lehi – There were no noise impacts identified in 2023. There are no noise sensitive receptors near the northern extension of double track added in 2025.
- North of American Fork – There are four moderate noise impacts at single-family residences identified in the section. The locations of the impacts are shown in Figure 2 and Figure 3. The remainder of the receivers in the North of American Fork section are further from the tracks and would not be impacted.
- North of Orem – There is one moderate noise impact at a single-family-residence identified in the section. The location of the impact is shown in Figure 4.
- North of Provo – There are moderate noise impacts at one single-family residence and at 22 multi-family units in six buildings identified in the section. The majority of the impacts in this section are attributed to an increase in noise due to the removal of buildings which would provide shielding from train noise for buildings behind them relative to the track. The locations of the impacts are shown in Figure 5.

Noise Mitigation

UTA has adopted a noise mitigation policy[1] which identifies when noise impacts qualify for noise mitigation considerations. At the moderate impact level, noise impacts with an existing noise level of 65 dBA Ldn or greater would be considered for noise mitigation. All of the moderate impacts identified have an existing noise level that meets or exceeds this threshold.

[1] Utah Transit Authority Office of Capital Services SOP No. OCS.0101, Noise Assessment and Mitigation.

Noise barriers would be the first option for mitigation. At locations where barriers are not feasible, sound insulation testing and implementation at moderate impacts is also an option for noise mitigation. Sound insulation will be examined during final design with further assessment of the noise impacts with the final track locations and design of the project. The FTA has an interior noise criterion of 45 dBA Ldn, and sound insulation testing can determine whether a building already meets that criterion. If the building does not meet the interior criterion, improvements (typically acoustically rated windows) would be considered for mitigation.

North of Woods Cross Double Track Project – The noise impacts at single-family residences would not by themselves qualify for a noise barrier, based on the cost threshold ($30,000 per receptor) for constructing a noise barrier. However, if the barrier were designed to provide noise mitigation for the adjacent residences in the neighborhood, the barrier might meet the cost threshold. A noise barrier or other noise mitigation should be examined during final design.

North of American Fork Double Track Project – The noise impacts are at single-family residences, and none of the residences would qualify for a noise barrier, based on the cost threshold ($30,000 per receptor) for constructing a noise barrier. Sound insulation should be examined during final design.

North of the Orem Double Track Project – The noise impact is identified for a single-family-residence, and the residence would not qualify for a noise barrier, based on the cost threshold ($30,000 per receptor) for constructing a noise barrier. Sound insulation should be examined during final design.

North of Provo Double Track Project – In this section, noise barriers may not be feasible due to a combination of engineering feasibility, safety concerns due to sight lines at nearby grade crossings and not meeting the cost threshold due to the required height of the barriers. Sound insulation should be examined during final design.

Figure 1. Woods Cross Noise Impact Locations

Figure 2. North of American Fork Noise Impact Locations 1 of 2

Figure 3. North of American Fork Noise Impact Locations 2 of 2

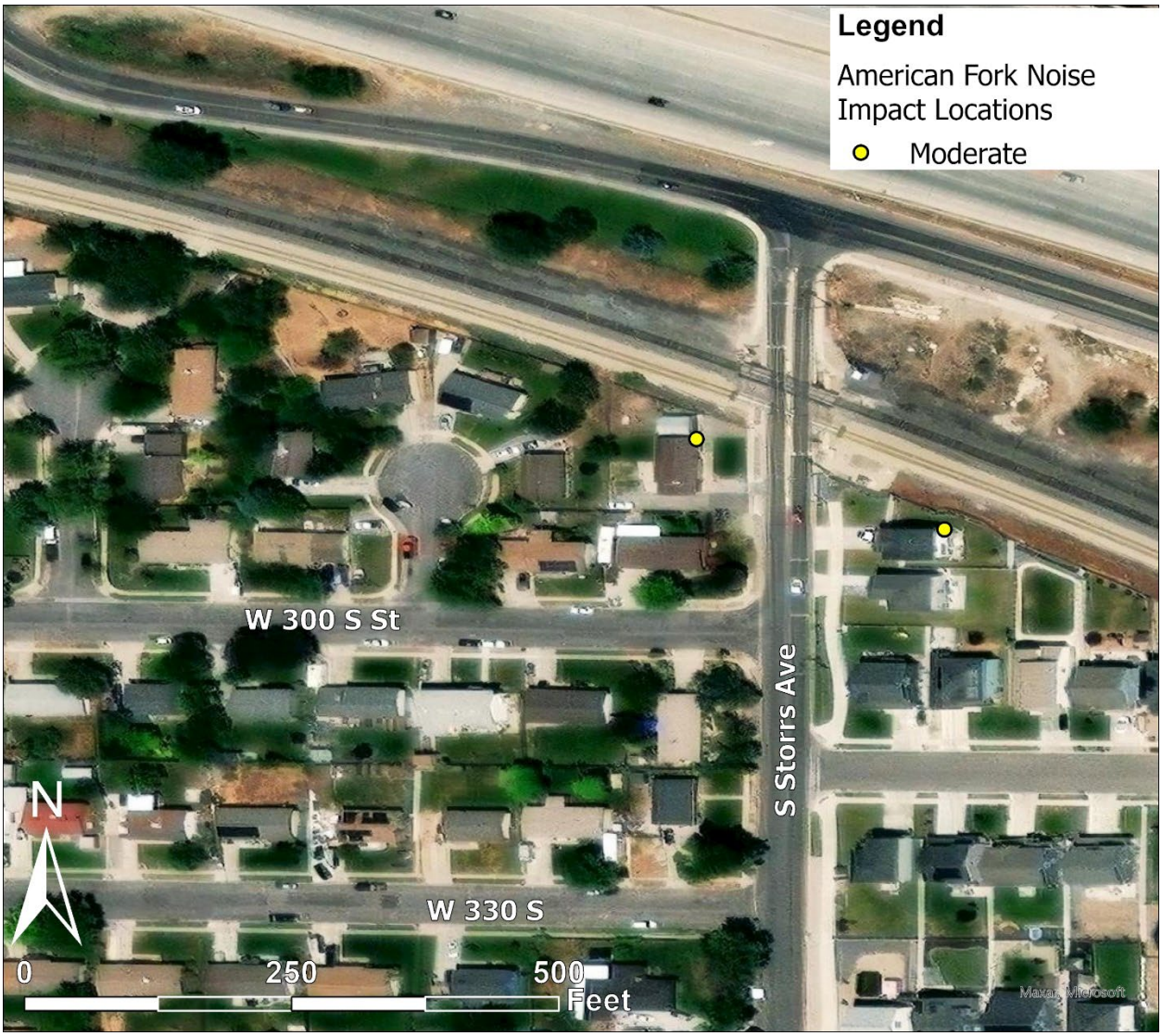

Figure 4. North of Orem Noise Impact Locations

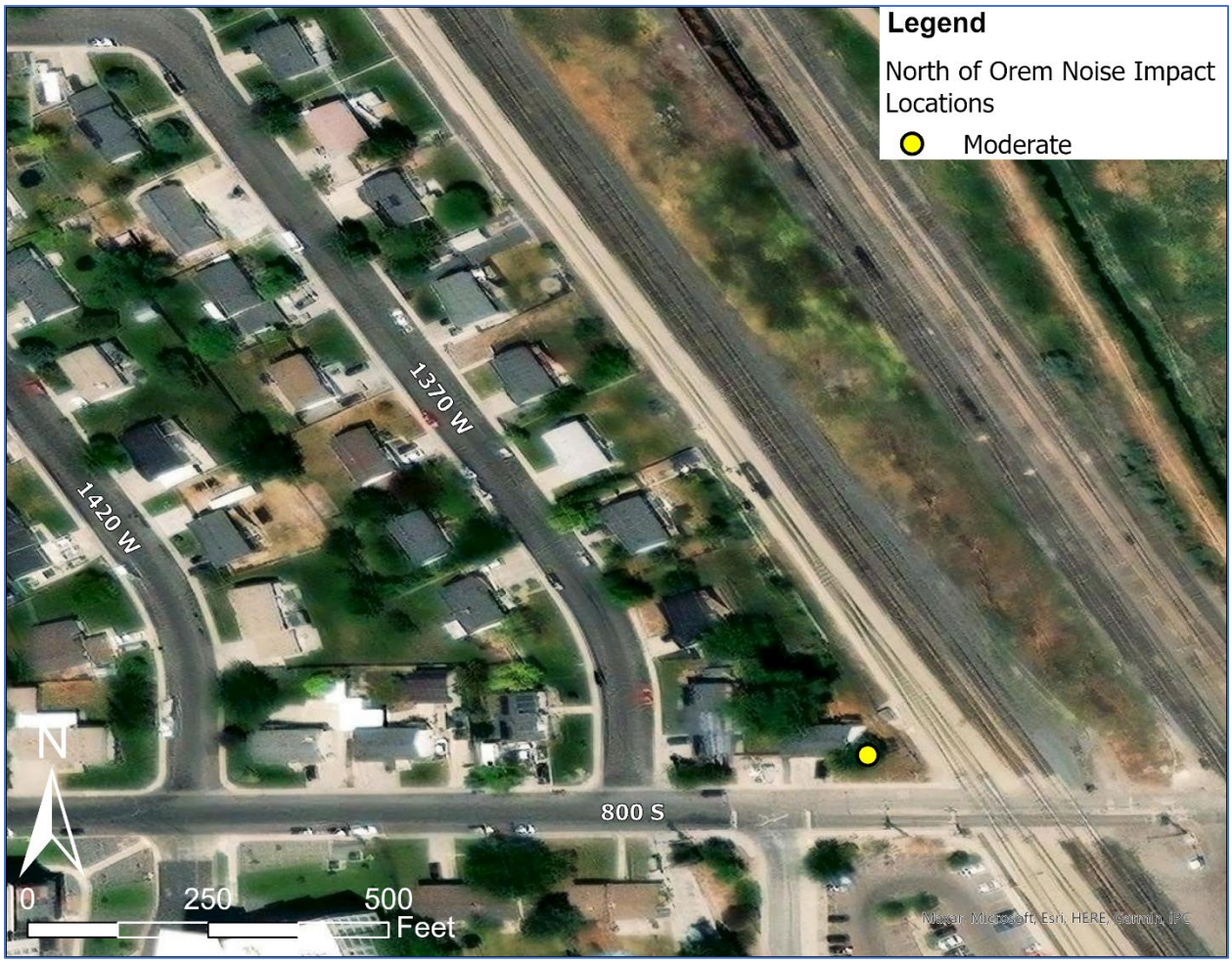

Figure 5. North of Provo Noise Impact Locations

North of American Fork Inputs and Outputs

North of American Fork - Assessment Inputs and Outputs

Receiver Number	Land Use Information	Building Row	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track	Distance to Existing UTA Track	Distance to UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
300	Single-family	1		2	1		American Fork	34	50	70	N	71.1	1.0	5.6	1.1	Moderate
301	Single-family	1		2	1		American Fork	35	50	73	N	70.9	1.0	5.6	1.1	Moderate
302	Single-family	1		2	1		American Fork	127	142	168	N	64.5	1.5	7.3	0.5	--
303	Single-family	1		2	1		American Fork	99	114	140	N	65.9	1.3	6.9	0.6	--
304	Single-family	1		2	1		American Fork	222	237	263	N	61.2	1.9	8.5	0.4	--
305	Single-family	1		2	1		American Fork	34	49	74	N	70.8	1.0	5.6	1.2	Moderate
306	Single-family	1		2	1		American Fork	60	75	101	N	68.4	1.1	6.2	0.8	--
307	Single-family	1		2	1		American Fork	73	88	114	N	67.4	1.2	6.4	0.7	--
308	Single-family	1		2	1		American Fork	155	170	196	N	63.4	1.6	7.7	0.5	--
309	Single-family	1		2	1		American Fork	35	50	76	N	70.7	1.0	5.7	1.1	Moderate
310	Single-family	1		2	1		American Fork	42	57	83	N	70.0	1.1	5.8	1.0	--
311	Single-family	1		2	1		American Fork	49	64	90	N	69.3	1.1	6.0	0.9	--
312	Single-family	1		2	3		American Fork	107	122	148	N	65.5	1.4	7.0	0.6	--
313	Single-family	1		2	1		American Fork	44	59	85	N	69.8	1.1	5.9	1.0	--
314	Single-family	1		2	1		American Fork	83	98	119	N	67.0	1.2	6.5	0.6	--
315	Single-family	1		2	1		American Fork	97	112	131	N	66.3	1.3	6.8	0.5	--
316	Single-family	1		2	1		American Fork	264	280	298	N	60.3	2.0	8.9	0.4	--
317	Single-family	1		2	1		American Fork	214	229	247	N	61.6	1.8	8.3	0.4	--
318	Single-family	2		2	1		American Fork	344	359	377	N	55.6	3.0	11.2	0.4	--
319	Single-family	1		2	1		American Fork	319	334	351	N	59.1	2.2	9.4	0.4	--
320	Single-family	1		2	1		American Fork	239	254	271	N	60.9	1.9	8.6	0.4	--
321	Single-family	1		2	1		American Fork	96	111	130	N	66.3	1.3	6.7	0.5	--
322	Single-family	1		2	1		American Fork	155	170	190	N	63.5	1.6	7.6	0.5	--
323	Single-family	1		2	1		American Fork	94	109	127	N	66.5	1.3	6.7	0.5	--
324	Single-family	1		2	1		American Fork	97	112	128	N	66.4	1.3	6.7	0.5	--
325	Single-family	1		2	1		American Fork	54	69	85	N	69.5	1.1	5.9	0.7	--
326	Single-family	1		2	1		American Fork	187	172	212	N	62.9	1.6	7.8	0.3	--
327	Single-family	1		2	1		American Fork	121	106	146	N	65.8	1.3	6.9	0.3	--
328	Single-family	1		2	1		American Fork	93	78	118	N	67.5	1.2	6.4	0.3	--
329	Single-family	1		2	1		American Fork	84	69	109	N	68.2	1.2	6.3	0.3	--
330	Single-family	1		2	1		American Fork	78	63	103	N	68.6	1.1	6.1	0.3	--
331	Single-family	1		2	1		American Fork	83	68	108	N	68.3	1.2	6.2	0.3	--
332	Single-family	1		2	1		American Fork	184	169	153	N	64.8	1.4	7.2	0.2	--
333	Multi-family	1		2	3		American Fork	126	112	92	N	68.4	1.1	6.2	0.2	--
334	Multi-family	1		2	2		American Fork	116	102	83	N	69.1	1.1	6.0	0.2	--
335	Single-family	1		2	1		American Fork	198	198	173	N	63.9	1.5	7.5	0.3	--
336	Daycare	1	Bright Beginnings Childcare Center	3	1		American Fork	263	257	289	N	62.0	4.1	4.4	-0.5	--
337	Single-family	1		2	1		American Fork	336	338	311	N	59.8	2.1	9.1	0.3	--
338	Single-family	1		2	1		American Fork	439	442	414	N	57.7	2.5	10.0	0.3	--
339	Single-family	1		2	1		American Fork	530	532	505	N	56.3	2.8	10.8	0.3	--
340	Single-family	1		2	1		American Fork	574	577	549	N	55.8	3.0	11.1	0.3	--
341	Single-family	1		2	1		American Fork	171	186	145	N	65.0	1.4	7.1	0.3	--
342	Single-family	1		2	1		American Fork	163	178	138	N	65.4	1.4	7.0	0.3	--
343	Single-family	1		2	1		American Fork	257	272	232	N	61.8	1.8	8.3	0.3	--
344	Single-family	1		2	1		American Fork	219	234	194	N	63.0	1.6	7.8	0.3	--
345	Single-family	1		2	1		American Fork	364	379	339	N	59.1	2.2	9.4	0.3	--
346	Single-family	1		2	1		American Fork	242	257	216	N	62.3	1.7	8.1	0.3	--
347	Single-family	1		2	1		American Fork	203	218	178	N	63.6	1.6	7.6	0.3	--
348	Single-family	1		2	1		American Fork	181	196	156	N	64.6	1.5	7.3	0.3	--
349	Single-family	1		2	1		American Fork	257	272	232	N	61.8	1.8	8.3	0.3	--
350	Single-family	1		2	1		American Fork	198	213	173	N	63.8	1.5	7.5	0.3	--
351	Single-family	1		2	1		American Fork	63	51	91	N	69.8	1.1	5.9	0.3	--
352	Single-family	1		2	1		American Fork	205	198	238	N	62.0	1.7	8.2	0.4	--
353	Single-family	1		2	1		American Fork	150	138	178	N	64.2	1.5	7.4	0.3	--
354	Single-family	1		2	1		American Fork	129	144	168	N	64.5	1.5	7.3	0.5	--
355	Single-family	1		2	1		American Fork	103	118	143	N	65.7	1.3	6.9	0.6	--

North of American Fork - Assessment Inputs and Outputs (continued)

Receiver Number	Land Use Information	Building Row	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track	Distance to Existing UTA Track	Distance to UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
356	Single-family	1		2	1		American Fork	77	92	117	N	67.2	1.2	6.5	0.6	--
357	Single-family	1		2	1		American Fork	59	74	99	N	68.5	1.1	6.2	0.8	--
358	Single-family	1		2	1		American Fork	49	64	89	N	69.3	1.1	6.0	0.9	--
359	Single-family	1		2	1		American Fork	39	54	79	N	70.3	1.0	5.8	1.0	--
360	Single-family	1		2	1		American Fork	67	82	107	N	67.9	1.2	6.3	0.7	--
361	Single-family	1		2	1		American Fork	53	68	96	N	68.8	1.1	6.1	0.8	--
362	Single-family	1		2	1		American Fork	60	75	98	N	68.6	1.1	6.2	0.7	--
363	Single-family	1		2	1		American Fork	93	108	130	N	66.4	1.3	6.7	0.6	--
364	Single-family	1		2	1		American Fork	62	78	98	N	68.5	1.1	6.2	0.7	--
365	Single-family	1		2	1		American Fork	50	66	86	N	69.5	1.1	5.9	0.8	--

North of American Fork - Train Inputs

Union Pacific Inputs

Source	Ref SEL at 50ft, dBA	
Freight Cars	85.4	From Create Model
Loco - Diesel	97	From Create Model
Loco - Electric	90	
DMU	85	
Loco Horn	113	

Trains/Day	Pk Hour		Day	Night
3.5	1	Schedule:	0.145833	0.145833
^^In EACH Direction			Locos	Cars
26		Consist:	5	120

Front Runner Inputs

Source	Ref SEL at 50ft, dBA
Commuter Rail Car	82
Loco - Diesel	92
Loco - Electric	90
DMU	85
Loco Horn	103

Existing

Trains/Day	Pk Hour		Day	Night
27	2	Schedule:	1.466667	0.555556
^^In EACH Direction			Locos	Cars
		Consist:	1	4

Future

Trains/Day	Pk Hour		Day	Night
44	2	Schedule:	2.5	0.722222
^^In EACH Direction			Locos	Cars
		Consist:	1	4

South of Murray Inputs and Outputs

South of Murray - Assessment Inputs and Outputs

Receiver Number	Land Use Information	Building Row	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track	Distance to Existing UTA Track	Distance to Shifted UP Track	Distance to Existing UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
1	Single-family	1		2	1	W 6100 S to 5900 S	Murray	276	261	313	298	N	60.5	2.0	8.8	-0.1	--
2	Single-family	1		2	1	W 6100 S to 5900 S	Murray	327	312	364	349	N	59.3	2.2	9.3	-0.1	--
3	Single-family	2		2	1	W 6100 S to 5900 S	Murray	392	377	429	414	N	55.1	3.2	11.5	-0.1	--
4	Single-family	2		2	1	W 6100 S to 5900 S	Murray	458	443	495	480	N	54.0	3.5	12.1	0.0	--
5	Single-family	2		2	1	W 6100 S to 5900 S	Murray	355	370	318	333	N	56.4	2.8	10.8	0.4	--
6	Single-family	2		2	1	W 6100 S to 5900 S	Murray	381	396	345	360	N	55.8	2.9	11.0	0.4	--
7	Single-family	2		2	1	W 6100 S to 5900 S	Murray	227	242	192	207	N	59.7	2.1	9.2	0.6	--
8	Single-family	2		2	1	W 6100 S to 5900 S	Murray	227	242	191	206	N	59.7	2.1	9.1	0.6	--
9	Single-family	1		2	1	W 6100 S to 5900 S	Murray	179	194	143	158	N	64.6	1.5	7.3	0.7	--
10	Single-family	2		2	1	W 6100 S to 5900 S	Murray	374	389	339	354	N	55.9	2.9	11.0	0.4	--
11	Single-family	2		2	1	W 6100 S to 5900 S	Murray	362	377	326	341	N	56.2	2.9	10.9	0.4	--
12	Single-family	3		2	1	W 6100 S to 5900 S	Murray	446	461	411	426	N	53.1	3.8	12.6	0.4	--
13	Single-family	3		2	1	W 6100 S to 5900 S	Murray	496	511	460	475	N	52.4	4.0	13.1	0.3	--
14	Single-family	3		2	1	W 6100 S to 5900 S	Murray	444	459	408	423	N	53.2	3.8	12.6	0.4	--
15	Single-family	3		2	1	W 6100 S to 5900 S	Murray	454	439	489	474	N	52.6	4.0	13.0	0.0	--

South of Murray - Train Inputs

Union Pacific Inputs

Source	Ref SEL at 50ft, dBA	
Freight Cars	85.4	From Create Model
Loco - Diesel	97	From Create Model
Loco - Electric	90	
DMU	85	
Loco Horn	113	

Trains/Day	Pk Hour		Day	Night
3.5	1	Schedule:	0.145833	0.145833
^^In EACH Direction			Locos	Cars
		Consist:	5	120

Front Runner Inputs

Source	Ref SEL at 50ft, dBA
Commuter Rail Car	82
Loco - Diesel	92
Loco - Electric	90
DMU	85
Loco Horn	103

Existing

Trains/Day	Pk Hour		Day	Night
29.5	2	Schedule:	1.566667	0.666667
^^In EACH Direction			Locos	Cars
		Consist:	1	4

Future

Trains/Day	Pk Hour		Day	Night
44	2	Schedule:	2.5	0.722222
^^In EACH Direction			Locos	Cars
		Consist:	1	4

North of Orem Inputs and Outputs

North of Orem- Assessment Inputs and Outputs

Receiver Number	Land Use Information	Building Row	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track	Distance to Existing UTA Track	Distance to Existing UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
500	Single-family	1		2	1		Orem	48	63	63	N	72.2	0.8	5.4	0.5	--
501	Single-family	1		2	1		Orem	44	59	59	N	72.7	0.7	5.3	0.5	--
502	Single-family	1		2	1		Orem	45	60	60	N	72.5	0.7	5.3	0.5	--
503	Single-family	1		2	1		Orem	46	61	61	N	72.4	0.7	5.3	0.5	--
504	Single-family	1		2	1		Orem	46	61	61	N	72.5	0.7	5.3	0.5	--
505	Single-family	1		2	1		Orem	49	64	64	N	72.1	0.8	5.4	0.5	--
506	Single-family	1		2	1		Orem	47	62	62	N	72.3	0.7	5.3	0.5	--
507	Single-family	1		2	1		Orem	48	62	62	N	72.3	0.8	5.4	0.5	--
508	Single-family	1		2	1		Orem	47	62	62	N	72.4	0.7	5.3	0.5	--
509	Single-family	1		2	1		Orem	46	61	61	N	72.4	0.7	5.3	0.5	--
510	Single-family	1		2	1		Orem	48	63	63	N	72.2	0.8	5.4	0.5	--
511	Single-family	1		2	1		Orem	46	61	61	N	72.4	0.7	5.3	0.5	--
512	Single-family	1		2	1		Orem	47	62	62	N	72.4	0.7	5.3	0.5	--
513	Single-family	1		2	1		Orem	48	63	63	N	72.2	0.8	5.4	0.5	--
514	Single-family	1		2	1		Orem	50	64	64	N	72.0	0.8	5.4	0.5	--
515	Single-family	1		2	1		Orem	46	61	61	N	72.4	0.7	5.3	0.5	--
516	Single-family	1		2	1		Orem	51	66	66	N	71.9	0.8	5.4	0.5	--
517	Single-family	1		2	1		Orem	49	64	64	N	72.1	0.8	5.4	0.5	--
518	Multi-family	1		2	8		Orem	200	185	185	N	64.5	1.5	7.3	0.2	--
519	Multi-family	1		2	16		Orem	205	190	190	N	64.3	1.5	7.4	0.2	--
520	Single-family	1		2	1		Orem	64	79	79	N	70.6	1.0	5.7	0.4	--
521	Single-family	1		2	1		Orem	54	69	69	N	71.5	0.9	5.5	0.5	--
522	Single-family	1		2	1		Orem	72	87	87	N	69.9	1.1	5.8	0.4	--
523	Single-family	1		2	1		Orem	43	58	58	N	72.8	0.7	5.3	0.5	--
524	Single-family	1		2	1		Orem	69	84	84	N	70.2	1.0	5.8	0.4	--
525	Single-family	1		2	1		Orem	68	83	83	N	70.2	1.0	5.8	0.4	--
526	Single-family	1		2	1		Orem	67	82	82	N	70.3	1.0	5.7	0.4	--
527	Single-family	1		2	1		Orem	57	72	72	N	71.3	0.9	5.6	0.4	--
528	Single-family	1		2	1		Orem	65	80	80	N	70.5	1.0	5.7	0.4	--
529	Single-family	1		2	1		Orem	60	75	75	N	71.0	1.0	5.6	0.4	--
530	Single-family	1		2	1		Orem	62	77	77	N	70.8	1.0	5.6	0.4	--
531	Single-family	1		2	1		Orem	67	82	82	N	70.3	1.0	5.7	0.4	--
532	Single-family	1		2	1		Orem	64	79	79	N	70.6	1.0	5.7	0.4	--
533	Single-family	1		2	1		Orem	55	70	70	N	71.4	0.9	5.5	0.5	--
534	Single-family	1		2	1		Orem	65	80	80	N	70.5	1.0	5.7	0.4	--
535	Single-family	1		2	1		Orem	78	93	93	N	69.4	1.1	5.9	0.4	--
536	Multi-family	1		2	15		Orem	209	194	194	N	64.2	1.5	7.4	0.2	--
537	Multi-family	1		2	15		Orem	224	209	209	N	63.6	1.6	7.6	0.2	--
538	Multi-family	1		2	15		Orem	228	213	213	N	63.5	1.6	7.7	0.2	--
539	Multi-family	1		2	15		Orem	224	209	209	N	63.6	1.6	7.6	0.2	--
540	Single-family	1		2	1		Orem	55	70	70	N	71.5	0.9	5.5	0.5	--
541	Single-family	1		2	1		Orem	76	91	91	N	69.6	1.1	5.9	0.4	--
542	Single-family	1		2	1		Orem	77	92	92	N	69.5	1.1	5.9	0.4	--
543	Single-family	1		2	1		Orem	78	93	93	N	69.4	1.1	5.9	0.4	--
544	Single-family	1		2	1		Orem	78	93	93	N	69.4	1.1	5.9	0.4	--
545	Single-family	1		2	1		Orem	75	90	90	N	69.6	1.1	5.9	0.4	--
546	Single-family	1		2	1		Orem	55	70	70	N	71.5	0.9	5.5	0.5	--
547	Single-family	1		2	1		Orem	77	92	92	N	69.5	1.1	5.9	0.4	--
548	Single-family	1		2	1		Orem	58	73	73	N	71.2	1.0	5.6	0.4	--
549	Single-family	1		2	1		Orem	77	92	92	N	69.5	1.1	5.9	0.4	--
550	Single-family	1		2	1		Orem	73	88	88	N	69.8	1.1	5.9	0.4	--

North of Orem- Assessment Inputs and Outputs (continued)

Receiver Number	Land Use Information	Building Row	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track	Distance to Existing UTA Track	Distance to Existing UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
551	Single-family	1		2	1		Orem	85	100	100	N	68.9	1.1	6.1	0.4	--
552	Single-family	1		2	1		Orem	70	85	85	N	70.0	1.0	5.8	0.4	--
553	Single-family	1		2	1		Orem	79	94	94	N	69.4	1.1	6.0	0.4	--
554	Single-family	1		2	1		Orem	71	86	86	N	70.0	1.1	5.8	0.4	--
555	Single-family	1		2	1		Orem	77	92	92	N	69.5	1.1	5.9	0.4	--
556	Single-family	1		2	1		Orem	70	85	85	N	70.1	1.0	5.8	0.4	--
557	Single-family	1		2	1		Orem	71	85	85	N	70.1	1.0	5.8	0.4	--
558	Multi-family	1		2	34		Orem	194	179	179	N	64.8	1.4	7.2	0.2	--
559	Multi-family	1		2	34		Orem	198	183	183	N	64.6	1.5	7.3	0.2	--
560	Multi-family	1		2	34		Orem	206	191	191	N	64.3	1.5	7.4	0.2	--
561	Multi-family	1		2	34		Orem	178	164	164	N	65.4	1.4	7.0	0.2	--
562	Multi-family	1		2	12		Orem	185	199	199	N	64.0	1.5	7.5	0.3	--
563	Multi-family	1		2	12		Orem	188	202	202	N	63.9	1.5	7.5	0.3	--
564	Multi-family	1		2	12		Orem	189	204	204	N	63.8	1.5	7.5	0.3	--
565	Multi-family	1		2	12		Orem	184	199	199	N	64.0	1.5	7.5	0.3	--
566	Multi-family	1		2	12		Orem	181	196	196	N	64.1	1.5	7.4	0.3	--
567	Multi-family	1		2	12		Orem	179	194	194	N	64.2	1.5	7.4	0.3	--
568	Multi-family	1		2	12		Orem	184	199	199	N	64.0	1.5	7.5	0.3	--
569	Single-family	1		2	1		Orem	125	110	110	N	68.2	1.2	6.2	0.2	--
570	Single-family	1		2	1		Orem	127	112	112	N	68.1	1.2	6.3	0.2	--
571	Single-family	1		2	1		Orem	127	112	112	N	68.1	1.2	6.3	0.2	--
572	Single-family	1		2	1		Orem	109	94	94	N	69.3	1.1	6.0	0.2	--
573	Single-family	1		2	1		Orem	53	38	38	N	75.8	0.3	4.8	0.1	--
574	Single-family	1		2	1		Orem	63	47	47	N	74.3	0.5	5.0	0.1	--
575	Single-family	1		2	1		Orem	54	39	39	N	75.6	0.4	4.8	0.1	--
576	Single-family	1		2	1		Orem	59	44	44	N	74.8	0.4	4.9	0.1	--
577	Single-family	1		2	1		Orem	58	42	42	N	75.1	0.4	4.9	0.1	--
578	Single-family	1		2	1		Orem	64	49	49	N	74.0	0.5	5.1	0.1	--
579	Single-family	1		2	1		Orem	82	67	67	N	71.8	0.8	5.5	0.1	--
580	Single-family	1		2	1		Orem	98	83	83	N	70.2	1.0	5.8	0.2	--
581	Single-family	1		2	1		Orem	89	74	74	N	71.1	1.0	5.6	0.1	--
582	Single-family	1		2	1		Orem	94	78	78	N	70.7	1.0	5.7	0.1	--
583	Single-family	1		2	1		Orem	95	80	80	N	70.5	1.0	5.7	0.1	--
584	Single-family	1		2	1		Orem	139	124	124	N	67.4	1.2	6.5	0.2	--
585	Single-family	1		2	1		Orem	85	70	70	N	71.4	0.9	5.5	0.1	--
586	Single-family	1		2	1		Orem	67	52	52	N	73.5	0.6	5.1	0.1	--
587	Single-family	1		2	1		Orem	87	74	74	N	71.1	1.0	5.6	0.2	--
588	Single-family	1		2	1		Orem	79	70	70	N	71.4	0.9	5.5	0.2	--
589	Single-family	1		2	1		Orem	84	76	76	N	70.9	1.0	5.6	0.2	--
590	Single-family	1		2	1		Orem	71	81	81	N	70.4	1.0	5.7	0.4	--
591	Single-family	1		2	1		Orem	70	81	81	N	70.4	1.0	5.7	0.4	--
592	Single-family	1		2	1		Orem	68	81	81	N	70.4	1.0	5.7	0.4	--
593	Single-family	1		2	1		Orem	64	79	79	N	70.6	1.0	5.7	0.4	--
594	Single-family	1		2	1		Orem	70	87	87	N	69.9	1.1	5.8	0.4	--
595	Single-family	1		2	1		Orem	62	80	80	N	70.5	1.0	5.7	0.5	--
596	Single-family	1		2	1		Orem	69	90	90	N	69.7	1.1	5.9	0.5	--
597	Single-family	1		2	1		Orem	87	110	110	N	68.2	1.2	6.2	0.4	--
598	Single-family	1		2	1		Orem	36	60	60	N	72.5	0.7	5.3	0.8	Moderate

North of Orem - Train Inputs

Union Pacific Inputs

Source	Ref SEL at 50ft, dBA	
Freight Cars	85.4	From Create Model
Loco - Diesel	97	From Create Model
Loco - Electric	90	
DMU	85	
Loco Horn	113	

Trains/Day	Pk Hour		Day	Night
4.5	1	Schedule:	0.1875	0.1875
^^In EACH Direction			Locos	Cars
9		Consist:	5	120

Front Runner Inputs

Source	Ref SEL at 50ft, dBA
Commuter Rail Car	82
Loco - Diesel	92
Loco - Electric	90
DMU	85
Loco Horn	103

Existing

Trains/Day	Pk Hour		Day	Night
27	2	Schedule:	1.466667	0.555556
^^In EACH Direction			Locos	Cars
		Consist:	1	4

Future

Trains/Day	Pk Hour		Day	Night
44	2	Schedule:	2.5	0.722222
^^In EACH Direction			Locos	Cars
		Consist:	1	4

North of Provo Inputs and Outputs

North of Provo - Assessment Inputs and Outputs

Receiver Number	Land Use Information	Building Row	Change in Shielding (Y/N)	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track	Distance to Existing UTA Track	Distance to Existing UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
600	Multi-family	1	N		2	4		Provo	102	119	145	N	66.7	1.3	6.6	0.4	--
601	Multi-family	1	N		2	3		Provo	119	137	163	N	65.9	1.3	6.9	0.4	--
602	Multi-family	1	N		2	5		Provo	120	138	164	N	65.8	1.3	6.9	0.4	--
603	Multi-family	1	N		2	4		Provo	124	142	169	N	65.6	1.4	6.9	0.4	--
604	Single-family	1	N		2	1		Provo	146	163	192	N	64.7	1.4	7.3	0.3	--
605	Single-family	1	N		2	1		Provo	110	128	157	N	66.2	1.3	6.8	0.4	--
606	Multi-family	1	N		2	4		Provo	56	74	99	N	69.6	1.1	5.9	0.6	--
607	Multi-family	1	Y		2	4		Provo	95	112	136	N	64.2	1.5	7.4	3.4	Moderate
608	Multi-family	1	N		2	6		Provo	79	97	118	N	68.2	1.2	6.2	0.4	--
609	Multi-family	1	N		2	12		Provo	42	59	82	N	71.0	1.0	5.6	0.7	--
610	Multi-family	1	N		2	2		Provo	29	47	66	N	72.5	0.7	5.3	0.9	Moderate
611	Multi-family	1	N		2	4		Provo	33	51	69	N	72.2	0.8	5.4	0.8	--
612	Multi-family	1	N		2	4		Provo	33	51	69	N	72.2	0.8	5.4	0.8	--
613	Multi-family	1	N		2	4		Provo	35	53	71	N	71.9	0.8	5.4	0.7	--
614	Multi-family	1	N		2	4		Provo	34	52	70	N	72.1	0.8	5.4	0.7	--
615	Single-family	1	Y		2	1		Provo	94	111	129	N	64.5	1.5	7.3	3.4	Moderate
616	Multi-family	1	Y		2	4		Provo	194	211	229	N	60.4	2.0	8.9	3.3	Moderate
617	Multi-family	1	Y		2	4		Provo	193	211	229	N	60.4	2.0	8.9	3.3	Moderate
618	Multi-family	1	Y		2	4		Provo	196	214	232	N	60.3	2.0	8.9	3.3	Moderate
619	Multi-family	1	Y		2	4		Provo	106	124	141	N	63.9	1.5	7.5	3.4	Moderate
620	Single-family	1	N		2	1		Provo	67	84	102	N	69.3	1.1	6.0	0.5	--
621	Multi-family	1	N		2	2		Provo	66	83	101	N	69.3	1.1	6.0	0.5	--
622	Multi-family	1	N		2	2		Provo	107	124	142	N	66.8	1.3	6.6	0.4	--
623	Single-family	1	N		2	1		Provo	146	167	184	N	64.9	1.4	7.2	0.3	--
624	Single-family	1	N		2	1		Provo	100	135	161	N	66.0	1.3	6.9	0.5	--

North of Provo - Train Inputs

Union Pacific Inputs

Source	Ref SEL at 50ft, dBA	
Freight Cars	85.4	From Create Model
Loco - Diesel	97	From Create Model
Loco - Electric	90	
DMU	85	
Loco Horn	113	

Trains/Day	Pk Hour		Day	Night
5	1	Schedule:	0.208333	0.208333
^^In EACH Direction			Locos	Cars
10		Consist:	5	120

Front Runner Inputs

Source	Ref SEL at 50ft, dBA
Commuter Rail Car	82
Loco - Diesel	92
Loco - Electric	90
DMU	85
Loco Horn	103

Existing

Trains/Day	Pk Hour		Day	Night
27	2	Schedule:	1.466667	0.555556
^^In EACH Direction			Locos	Cars
		Consist:	1	4

Future

Trains/Day	Pk Hour		Day	Night
44	2	Schedule:	2.5	0.722222
^^In EACH Direction			Locos	Cars
		Consist:	1	4

North of Woods Cross Inputs and Outputs

North of Woods Cross - Assessment Inputs and Outputs

Receiver Number	Land Use Information	Building Row	Name	Land Use Category	Dwelling Units	Segment	Section	Distance to New UTA Track SB	Distance to Existing UTA Track NB	Distance to UP Track	New Crossover (Y/N)	Calculated Existing Noise	Moderate Impact Criteria	Severe Impact Criteria	Change in Noise	Impact
19	Single-family	1		2	1		Woods Cross	35	49	81	N	74.8	0.4	4.9	0.5	Moderate
20	Single-family	1		2	1		Woods Cross	36	51	83	N	74.7	0.5	5.0	0.5	Moderate
21	Single-family	1		2	1		Woods Cross	34	49	82	N	74.8	0.4	4.9	0.5	Moderate
22	Single-family	1		2	1		Woods Cross	29	44	76	N	75.4	0.4	4.9	0.6	Moderate
23	Single-family	1		2	1		Woods Cross	33	48	81	N	74.9	0.4	4.9	0.5	Moderate
24	Single-family	1		2	1		Woods Cross	40	55	89	N	74.2	0.5	5.0	0.5	--
25	Single-family	1		2	1		Woods Cross	39	55	91	N	74.1	0.5	5.1	0.5	--

North of Woods Cross - Train Inputs

Union Pacific Inputs

Source	Ref SEL at 50ft, dBA	
Freight Cars	85.4	From Create Model
Loco - Diesel	97	From Create Model
Loco - Electric	90	
DMU	85	
Loco Horn	113	

Trains/Day	Pk Hour		Day	Night
13	1	Schedule:	0.541667	0.541667
^^In EACH Direction			Locos	Cars
		Consist:	5	120

Front Runner Inputs

Source	Ref SEL at 50ft, dBA
Commuter Rail Car	82
Loco - Diesel	92
Loco - Electric	90
DMU	85
Loco Horn	103

Existing

Trains/Day	Pk Hour		Day	Night
26	2	Schedule:	1.4	0.555556
^^In EACH Direction			Locos	Cars
		Consist:	1	4

Future

Trains/Day	Pk Hour		Day	Night
40	2	Schedule:	2.2	0.777778
^^In EACH Direction			Locos	Cars
		Consist:	1	4