Traffic Noise Analysis

Bryant Pkwy. Extension (S) – ARDOT No. 061705
Highway 183 to Shobe Road
Bryant, Saline County, AR

Prepared For:

City of Bryant

July 2020

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1.0 Executive Summary

This traffic noise analysis was conducted as a result of partial funding and approvals provided by the Arkansas Department of Transportation (ARDOT) and Federal Highway Administration (FHWA) and included as an attachment to an Environmental Assessment (EA) for Alternative 2 of Bryant Parkway, located in Bryant, Saline County, Arkansas. Refer to the Site Location Map in **Appendix A**.

The analysis included FHWA Traffic Noise Model (TNM) 2.5 model validation, ambient field measurements, and noise predictions based on future growth patterns for Alternative B. Detailed analysis of Alternatives B and D are included in the EA. The noise sensitive land uses for this project are considered to be residential dwellings located in Cherry Creek and Hidden Forest subdivisions and Alcoa 40 Park. Four ambient noise measurements were collected between existing Highway (Hwy.) 183 and Shobe Road at representative locations adjacent to these subdivisions to document the ambient noise levels and for model validation purposes. Predicted noise levels were determined and compared to the FHWA Noise Abatement Criteria (NAC) and ARDOT's Policy on Highway Traffic Noise Abatement for determination of impacts.

A noise screening was conducted for EA Alternatives B and D, which indicated no impacts within the 63 decibel (dB) threshold for NAC Activity Categories B and C. However, substantial increase impacts, as defined by ARDOT, had reasonable potential to occur. As a result, a detailed traffic noise analysis was performed. For screening analysis purposes, the ARDOT noise policy requires determining noise levels within 4 dBA of the NAC value. The screening analysis threshold would therefore be 63 dBA for Activity Categories B and C.

Under current conditions, no residential dwellings are impacted (66 dB(A) Leq(h) or greater). Additionally, based on the proposed project and the 2040 design year traffic volumes, no residential dwellings or park facilities will approach, meet, or exceed the 67 dB(A) Leq(h) for NAC Categories B and C or experience substantial increase impacts.

2.0 Project Description

This proposed roadway would improve the north/south flow of traffic and emergency vehicle response time between the south side of Bryant and the northeast side of Bryant by providing an alternate route to the heavily congested Hwy. 183 (also designated as Reynolds Road). The project would also provide enhanced connectivity and development potential for the Saline County Regional Airport (SUZ).

Alternative B is 2.57 miles in length and begins 0.37 mile east of the intersection of Hwy. 183 and Hill Farm Road. The alignment extends to the south end of Mustang Trail, then continues north of Mustang Trail on new alignment along the western boundary of SUZ to Shobe Road. In order to provide enhanced access to SUZ, a new airport entrance road is proposed between Bryant Pkwy. and the airport terminal building. Alternative B includes portions of a bike/pedestrian trail,

avoids SUZ Runway Protection Zones (RPZ), and crosses the Union Pacific Railroad (UPRR) and Crooked Creek before tying into Shobe Road in the same manner as Alternative D. Construction is planned to begin in the fall of 2020 and be completed in the spring of 2022.

3.0 Fundamentals of Noise and Sound Theory

Noise, defined as unwanted or excessive sound, is an undesirable by-product of our modern way of life. From these known effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on such known impacts of noise on people as speech interference, sleep interference, physiological responses, hearing loss and annoyance. Highway traffic noise is a major contributor to overall transportation noise and is considered to be a line source of energy from which the energy levels dissipate vertically and laterally from the roadway. Traffic noise is not constant; it varies as each vehicle passes a point. The time-varying characteristics of environmental noise are analyzed statistically to determine the duration and intensity of noise exposure. In an urban environment, noise is made up of two distinct parts. One is ambient or background noise. Wind noise and distant traffic noise make up the acoustical environment surrounding the project. These sounds are not readily recognized but combine to produce a nonirritating ambient sound level. This background sound level varies throughout the day, being lowest at night and highest during the day. The other component of urban noise is that it can be intermittent and louder than background noises due to a number of sources such as manufacturing, railroads, and local airports. It is for these reasons that environmental noise is analyzed statistically.

Sound from highway traffic is generated primarily from a vehicle's tires, engine and exhaust. Sound intensity decreases in proportion with the square of the distance from the source. Generally, sound levels for a point source will decrease by 6 dB(A) for each doubling of distance. Sound levels for a highway line source vary differently with distance because sound pressure waves propagate along the line and overlap at the point of measurement. Sound is commonly measured in decibels (dB) which are logarithmic units and are not added arithmetically as opposed to the more common linear units such as temperature. Sound pressure level from two equal sources is 3 dB greater than the sound pressure level of just one source. So, two trucks producing 90 dB each combine to produce 93 dB, not 180 dB. In other words, a doubling of the noise source produces only a 3 dB increase in the sound pressure level. Studies have shown that this increase is barely perceptible by the human ear. Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by the human ear; therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as dBA. In addition, because traffic sound levels are never constant due to the changing number, type and speed of vehicles, this noise analysis will discuss noise levels as Leq(h). Leq is defined as the steady-state sound level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same period. Leq(h) is the hourly value of Leq and is based on the dBA unit.

4.0 Methodology and Criteria for Determining Impacts

Traffic noise analysis consists of a comparison of physically measured or modeled noise levels for the existing condition with projected noise levels for the future condition. The analysis was performed using TNM 2.5 to model existing and future noise levels based on traffic data, roadway geometry, and receiver site locations. A receiver is a location, usually representing a dwelling unit, where frequent exterior human activity occurs. The chosen receiver is modeled for noise levels and evaluated for noise impacts. The noise analysis conducted for this project was consistent with FHWA and ARDOT policy and 23 CFR Part 772. Methodology included identification of sensitive noise receptors, recording ambient noise levels at four (4) locations along the proposed project, and predicting no-action, existing, and design year build noise levels. Traffic data was recorded during one set of noise measurements to validate the TNM model.

The FHWA has seven noise activity categories based on land use and sound levels, each of which has its own Noise Abatement Criteria (NAC). The NAC categories are listed in **Table 1**. If a project would result in higher Leq(h) values than the NAC values for a given location, then noise abatement or mitigation measures must be evaluated.

Table 1: FHWA Noise Abatement Criteria (NAC)
Hourly A-Weighted Sound Level, decibels dB(A)

Activity Category	Activity Criteria[1] Leq(h) [2]	Activity Description
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67 (Exterior)	Residential
C[3]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios

Table 1: FHWA Noise Abatement Criteria (NAC) *Hourly A-Weighted Sound Level, decibels dB(A)*		
Activity Category	**Activity Criteria[1] Leq(h) [2]**	**Activity Description**
E[3]	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	- -	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	- -	Undeveloped lands that are not permitted

[1] The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

[2] The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

[3] Includes undeveloped lands permitted for this activity category.

5.0 Noise-Sensitive Land Uses

The project area is surrounded by residential, airport, park and undeveloped properties. There are two adjacent residential subdivisions (Cherry Creek and Hidden Forest), which were evaluated as NAC Activity Category B receptors and Alcoa 40 Park, which was evaluated as a NAC Activity Category C receptor. The airport property would be considered a NAC Activity Category F property. No other sensitive receptors associated with NAC activity categories A, D, and E were evaluated.

Twenty-one (21) receptor locations representing thirty-two (32) receptors were selected for modeling purposes to identify noise levels for the no-action, existing and design year conditions. Receptor locations are shown in **Figure 1**.

6.0 Determination of Existing Sound Levels

Garver conducted noise measurement readings on June 2, June 22, and July 21, 2020 in the PM peak traffic hours of 4pm to 7pm for use in the noise model validation and documenting ambient noise conditions.

6.1 Validation

Existing noise measurements were recorded at one model validation (MV) location adjacent to the study area along Shobe Road for validation purposes. This location was chosen as a result of being the only major connecting roadway within the project limits with appreciable traffic to correlate to TNM predictions. A total of four measurements were collected at in the same location. Refer to **Figure 1** for measurement and receptor locations and **Table 2** for model validation results. TNM-predicted noise levels differed from actual measured levels by -2.2 to -2.3 dB(A) for two of the four measurements at the validation location, which is within the required 3dBA validation criteria. Therefore, the TNM model was validated. A Larson Davis LxT Model 831 noise meter was utilized to record model validation measurements for a duration of 15 minutes each.

Table 2: Validation Measurements

Field Recorded and Model Noise Levels Comparison
Alternative B

Receptor	**Field Record Noise Level** *dB(A) Leq(h)*	**TNM Predicted Noise Level** *dB(A) Leq(h)*	**Difference (Model-Field)**
MV-1a	64.5	61.1	-3.4
MV-1b	63.2	61.0	-2.2
MV-1c	63.7	59.8	-3.9
MV-1d	63.5	61.2	-2.3

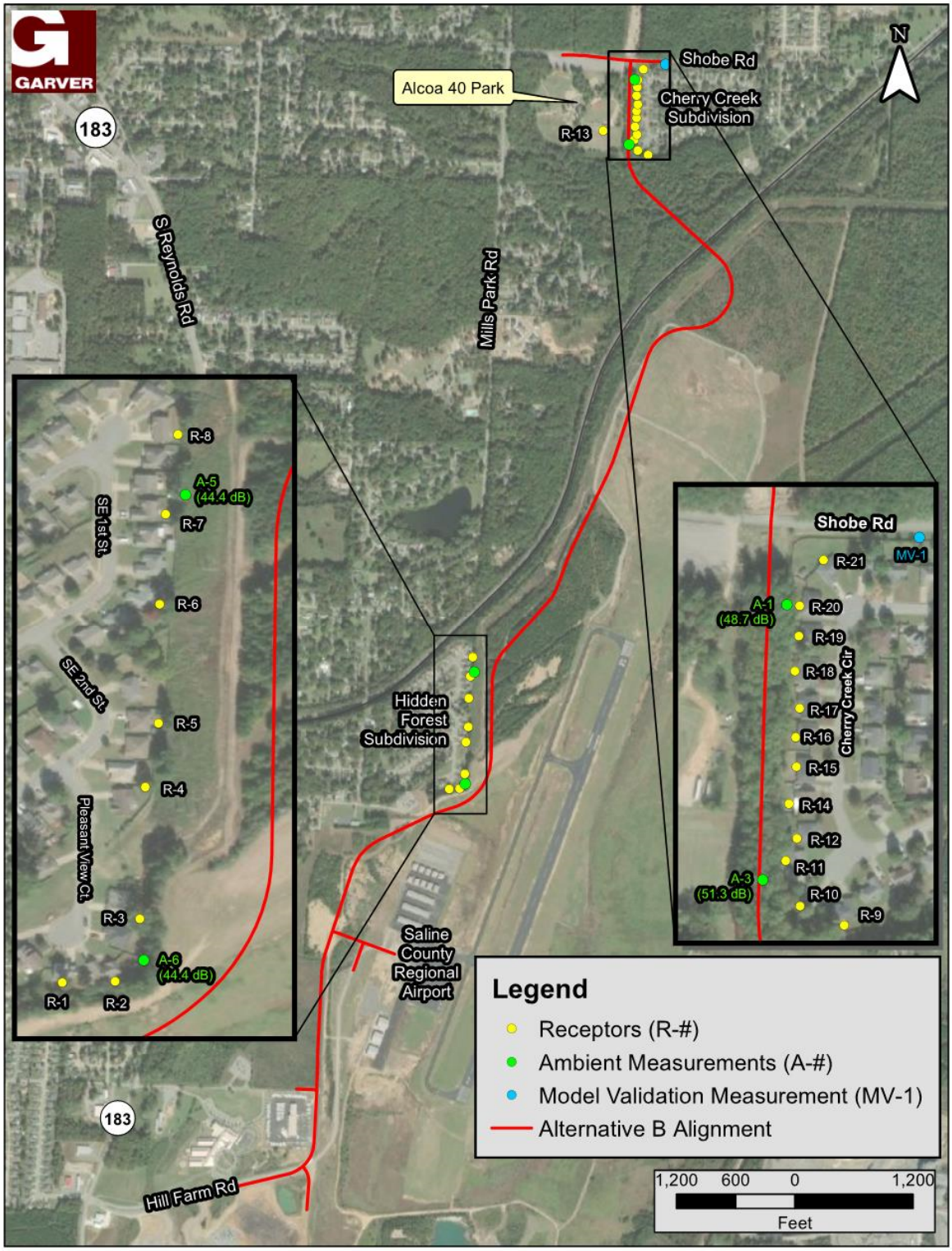
6.2 Ambient Measurements

Due to the entire project being on new alignment, ambient noise level measurements were collected for 20 minutes at four locations in close proximity to adjacent residential subdivisions, as shown in **Figure 1**. Trains, airplanes, weather conditions, resident interaction, and other noise sources were also documented during the recording sessions. SUZ and the UPRR, which crosses the proposed alignment, also contribute to the existing noise environment. Ambient measurement results are contained in **Table 4** with overall modeling results.

6.3 Traffic Data

Traffic volumes were analyzed using traffic data from the ARDOT and travel demand outputs from the Central Arkansas Regional Transportation Study (CARTS) developed by Metroplan (Garver Feasibility Study, 2017). The existing year of 2020 and future design year was determined to be 2040. The unit of measure for roadway traffic is the average annual daily traffic (AADT), which is defined as the estimate of traffic volumes in vehicles per day on a roadway, averaged from the

Figure 1 - Noise Measurement and Receptor Locations



seven annual average days of the week, for a calendar year. TNM utilizes the design hourly volume (DHV) to determine the existing traffic noise levels and calculates the predicted noise levels that occur when the highest volume for an hour is combined with the highest speeds and considered as the "worst hour for noise." DHV data is based on the percentage of hourly vehicular traffic present on the facility at the design capacity consisting of cars, medium trucks, and heavy trucks. **Table 3** depicts the DHV values utilized in the modeling. TNM modeling assume vehicles were traveling 30 mph on Shobe Road during both existing and future conditions. Existing traffic conditions in the area are predominantly car traffic with very few medium and heavy trucks. The proposed speed limit is 35 mph for Alternative B and therefore the modeling assumed all vehicles were traveling at 35 mph for design year conditions.

Table 3: Noise Model Traffic Volumes

Year	AADT	DHV	Cars	Medium Trucks	Heavy Trucks
Shobe Road West of Bryant Parkway					
Existing (2020)	4,585	504	489	11	5
Future (2040)	5,135	565	548	12	5
Shobe Road East of Bryant Parkway					
Existing (2020)	3,310	364	353	8	3
Future (2040)	4,063	447	434	9	4
Alternative B					
Existing (2020)	--	--	--	--	--
Future (2040	4,622	508	493	11	5
Bryant Parkway North of Shobe Road					
Existing (2020)	5,120	563	546	12	5
Future (2040)	7,750	853	827	18	8
No-Action Alternative – Bryant Parkway North of Shobe Road					
Existing (2020)	5,120	563	546	12	5
Future (2040)	5,144	566	549	12	5
No-Action Alternative – Shobe Road West of Bryant Parkway					
Existing (2020)	4,701	517	501	11	5
Future (2040)	5,267	580	563	12	5
No-Action Alternative – Shobe Road East of Bryant Parkway					
Existing (2020)	3,706	408	396	9	4
Future (2040)	4,549	500	485	11	5

7.0 Determination of Future Sound Levels

The 2040 design year traffic was utilized to determine if future noise levels would exceed the NAC activity category thresholds. Traffic directional splits reviewed for the project indicated that 70% of the traffic would occur in the PM heading northbound and 30% in the AM heading southbound. This directional split was utilized in TNM modeling. This traffic split was utilized to analyze impacts to the Cherry Creek subdivision, which places the higher traffic volumes closer to the subdivision. The opposite peak traffic flow (70% AM southbound and 30% PM northbound) was utilized in analyzing potential impacts to the Hidden Forest subdivision near the south end of the project. **Table 3** identifies the future traffic data utilized and **Appendix B** contains the traffic worksheets showing the directional split traffic data.

The results of the future 2040 Alternative B indicated that none of the residences or facilities within Alcoa 40 park will approach, meet or exceed the 67 dB(A) Leq(h) for NAC Activity Categories B and C. Additionally, there are no substantial increase impacts (i.e., an increase of 10 dBA or more) associated with Alternative B. No future no-action alternative impacts are anticipated. **Appendix C** contains TNM results and layouts and **Appendix D** contains alternative comparisons.

Under Alternative B, twenty receivers may experience minor increases in noise levels (i.e., 0-5 dB increase) and twelve receivers may experience moderate traffic noise increases (i.e., 6-9 dB increase) over existing noise levels.

The no-action alternative will allow for the continued ambient noise levels to remain unchanged and coincide with the increase in traffic on surrounding roadways and development in the area.

Table 4: Future Traffic Noise Results, dB(A) Leq (h)
Alternative B

Receptor*	Dwelling Units	Type	Distance/Location from Roadway Centerline	Existing 2020 Noise Levels**	Future 2040 Noise Levels	Change (+/-)	Noise Impact?
R-1	2	SFR	135+80, 188' west	44.4	50.0	5.6	N
R-2	1	SFR	137+19' 146 west	44.4	52.1	7.7	N
R-3	2	SFR	139+65, 221' west	44.4	47.4	3.0	N
R-4	2	SFR	143+94, 257' west	44.4	47.0	2.6	N
R-5	3	SFR	145+49, 234' west	44.4	48.2	3.8	N
R-6	3	SFR	148+40, 233' west	44.4	48.9	4.5	N
R-7	3	SFR	150+43, 227' west	44.4	48.8	4.4	N
R-8	3	SFR	151+77, 244' west	44.4	47.1	2.7	N
R-9	1	SFR	216+25, 203' east	51.5	50.7	-0.8	N
R-10	1	SFR	217+40, 97' east	51.6	57.1	5.5	N

Table 4: Future Traffic Noise Results, dB(A) Leq (h) Alternative B							
R-11	1	SFR	218+50, 60' east	51.7	60.3	8.6	N
R-12	1	SFR	219+07, 87' east	51.7	58.3	6.6	N
R-13	1	P	219+45, 254' west	51.9	50.1	-1.8	N
R-14	1	SFR	219+93, 72' east	51.8	60.0	8.2	N
R-15	1	SFR	220+75, 79' east	51.9	59.0	7.1	N
R-16	1	SFR	221+46, 76' east	52.1	59.2	7.1	N
R-17	1	SFR	222+18, 85' east	50.4	58.3	7.9	N
R-18	1	SFR	223+04, 71' east	51.2	58.4	7.2	N
R-19	1	SFR	223+89, 78' east	52.3	57.6	5.3	N
R-20	1	SFR	224+61, 76' east	54.2	58.9	4.7	N
R-21	1	SFR	225+70, 129' east	55.0	58.5	3.5	N

* Ambient measurements were utilized to account for background noise levels and were applied as follows:
R-1 through R-8 used 44.4 dB; R-9 through R-16 used 51.3 dB; R-17 through R-18 used 48.7.
** Four ambient measurements were collected for a duration of 20 minutes each.
Type: SFR-Single family residential. P-Park

8.0 Consideration of Abatement

Noise abatement would be investigated upon future predicted impacts of receptors receiving noise levels at or above 66 dBA or if noise levels increased 10 dBA or more. The highest noise receptor reading was predicted to be 60.3 dBA in 2040 and the highest predicted increase in traffic noise levels was predicted to be 8.6 dBA for the future design year as shown in **Table 4**. As a result, noise mitigation measures are not considered for Alternative B.

9.0 Construction Noise

Construction noise sources may include heavy machinery such as dozers, trackhoes, scrapers, cranes and large material transport trucks. Noise generated by construction are temporary and often can be minimized by implementing time of day restrictions limited to daylight hours. Temporary noise increases at the Alcoa 40 Park are anticipated; however, construction scheduling and other measures will be considered to minimize potential impacts to users of the park.

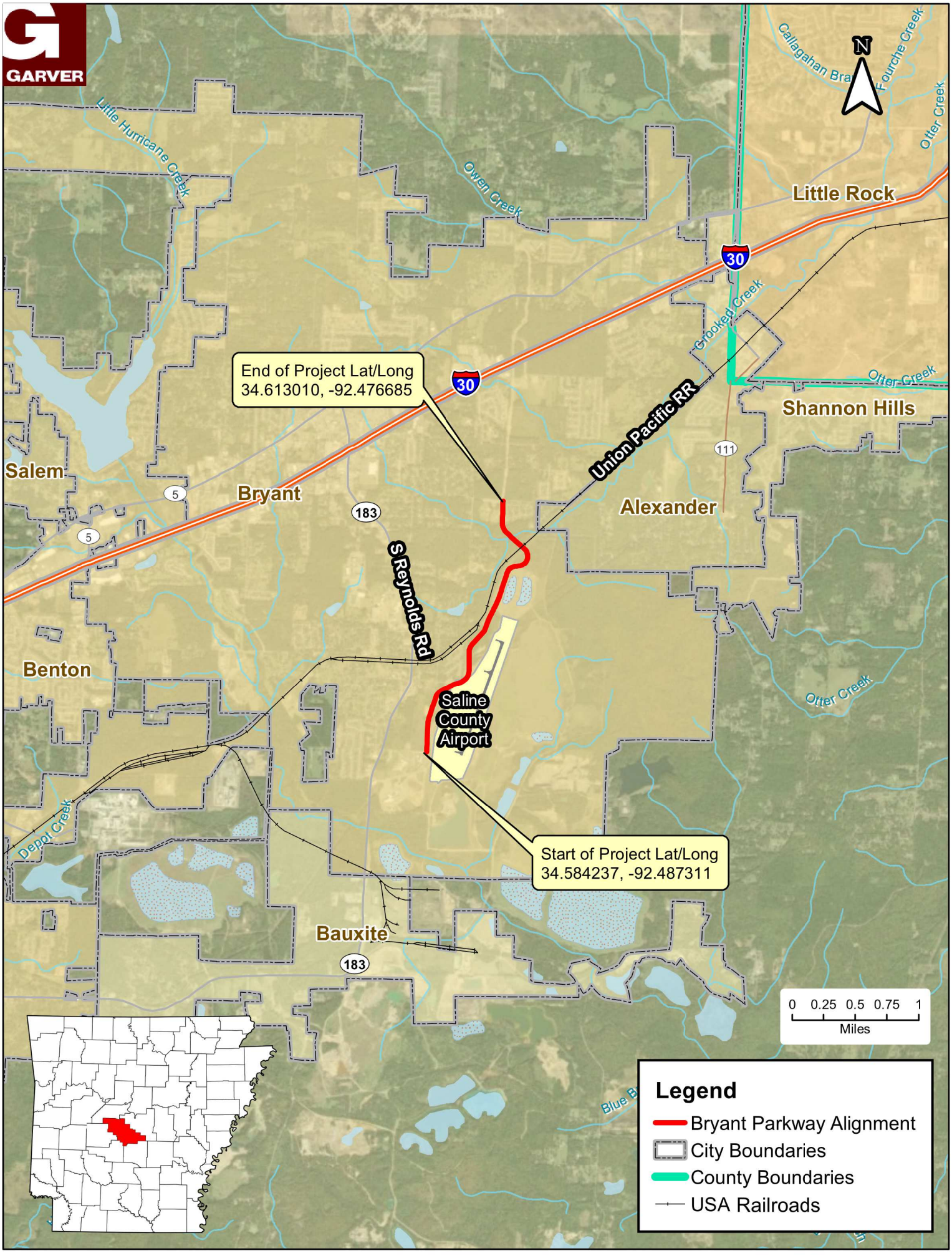
10.0 Coordination with Local Officials

Noise levels approaching and/or exceeding the 66 dBA were identified to fall within the proposed right-of-way along the entire project. Therefore, no future land use impacts are anticipated as a result of the project. Public comments that may arise due to the noise study should be coordinated with local officials.

APPENDICES

APPENDIX A

Site Location Map


GARVER
N
Little Hurricane Creek
Owen Creek
Callagahan Bra
Fourche Creek
Otter Creek
Little Rock
30
Crooked Creek
Otter Creek
Shannon Hills
End of Project Lat/Long
34.613010, -92.476685
30
Union Pacific RR
111
Salem
5
Bryant
183
Alexander
5
S Reynolds Rd
Benton
Saline
County
Airport
Otter Creek
Depot Creek
Start of Project Lat/Long
34.584237, -92.487311
Bauxite
183
0 0.25 0.5 0.75 1
Miles
Legend
Bryant Parkway Alignment
City Boundaries
County Boundaries
USA Railroads

APPENDIX B

Traffic Data Worksheets

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Bryant Parkway - Proposed

County: Saline

Design Year: **2040**

Year(s) To Be Modeled: **2020** **2040**

			Y-Coordinates
Roadway Cross-Sections:	**2020**		
	2040	**Proposed**	

Operating Speed: 35

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	3,210	3%	353	342	7	3	171	4	2
2040	4,622	3%	508	493	11	5	246	5	2

TNM 2.5 VALUES

Northbound & Southbound			
2040	**CARS**	**MT70%**	**HT30%**
70%	345	7	3
30%	148	3	1

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway

Roadway Reference: Bryant Parkway Project 1 North of Shobe Rd.

County: Saline

Design Year: 2040

Year(s) To Be Modeled: 2020 2040

			Y-Coordinates
Roadway Cross-Sections:	**2020**	**Existing**	
	2040		

Operating Speed: 35

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	5,120	3%	563	546	12	5	273	6	3
2040	7,750	3%	853	827	18	8	414	9	4

TNM 2.5 VALUES

PROPOSED			
2040	**CARS**	**MT70%**	**HT30%**
70%	579	13	5
30%	248	5	2

EXISTING			
2020	**CARS**	**MT70%**	**HT30%**
70%	382	8	4
30%	164	4	2

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Shobe Rd. East (Existing)

County: Saline

Design Year: 2040

Year(s) To Be Modeled: 2020 2040

			Y-Coordinates
Roadway Cross-Sections:	**2020**	**Existing**	
	2040		

Operating Speed: 30

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	3,310	3%	364	353	8	3	177	4	2
2040	4,063	3%	447	434	9	4	217	5	2

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Shobe Rd. East (Future)

County: Saline

Design Year: **2040**

Year(s) To Be Modeled: **2020** **2040**

Roadway Cross-Sections:

		Y-Coordinates
2020		
2040	**Proposed**	

Operating Speed: 30

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	3,310	3%	364	353	8	3	177	4	2
2040	4,063	3%	447	434	9	4	217	5	2

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Shobe Rd. West (Existing)

County: Saline

Design Year: 2040

Year(s) To Be Modeled: 2020 2040

			Y-Coordinates
Roadway Cross-Sections:	**2020**	**Existing**	
	2040		

Operating Speed: 30

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	4,585	3%	504	489	11	5	245	5	2
2040	5,135	3%	565	548	12	5	274	6	3

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Shobe Rd. West (Future)

County: Saline

Design Year: **2040**

Year(s) To Be Modeled: **2020** **2040**

Roadway Cross-Sections:

		Y-Coordinates
2020		
2040	**Proposed**	

Operating Speed: 30

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	4,585	3%	504	489	11	5	245	5	2
2040	5,135	3%	565	541	12	12	271	6	6

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Bryant Parkway Proejct 1 North of Shobe Rd.-No-Action

County: Saline

Design Year: **2040**

Year(s) To Be Modeled: **2020** **2040**

Roadway Cross-Sections:		Y-Coordinates	
	2020		
	2040	**Proposed**	

Operating Speed: 35

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	5,120	3%	563	546	12	5	273	6	3
2040	5,144	3%	566	549	12	5	275	6	3

TNM 2.5 VALUES

PROPOSED			
2040	**CARS**	**MT70%**	**HT30%**
70%	384	8	4
30%	165	4	2

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Shobe Rd. East - No-Action

County: Saline

Design Year: **2040**

Year(s) To Be Modeled: **2020** **2040**

			Y-Coordinates
Roadway Cross-Sections:	**2020**		
	2040	**Proposed**	

Operating Speed: 30

Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	3,706	3%	408	396	9	4	198	4	2
2040	4,549	3%	500	485	11	5	243	5	2

NOISE DATA WORKSHEET

Job No: 061705

Job Name: Bryant Parkway - Hwy. 183 to Shobe Rd.

Roadway Reference: Shobe Rd. West - No-Action

County: Saline

Design Year: **2040**

Year(s) To Be Modeled: **2020** **2040**

			Y-Coordinates
Roadway Cross-Sections:	**2020**		
	2040	**Proposed**	

Operating Speed: 30

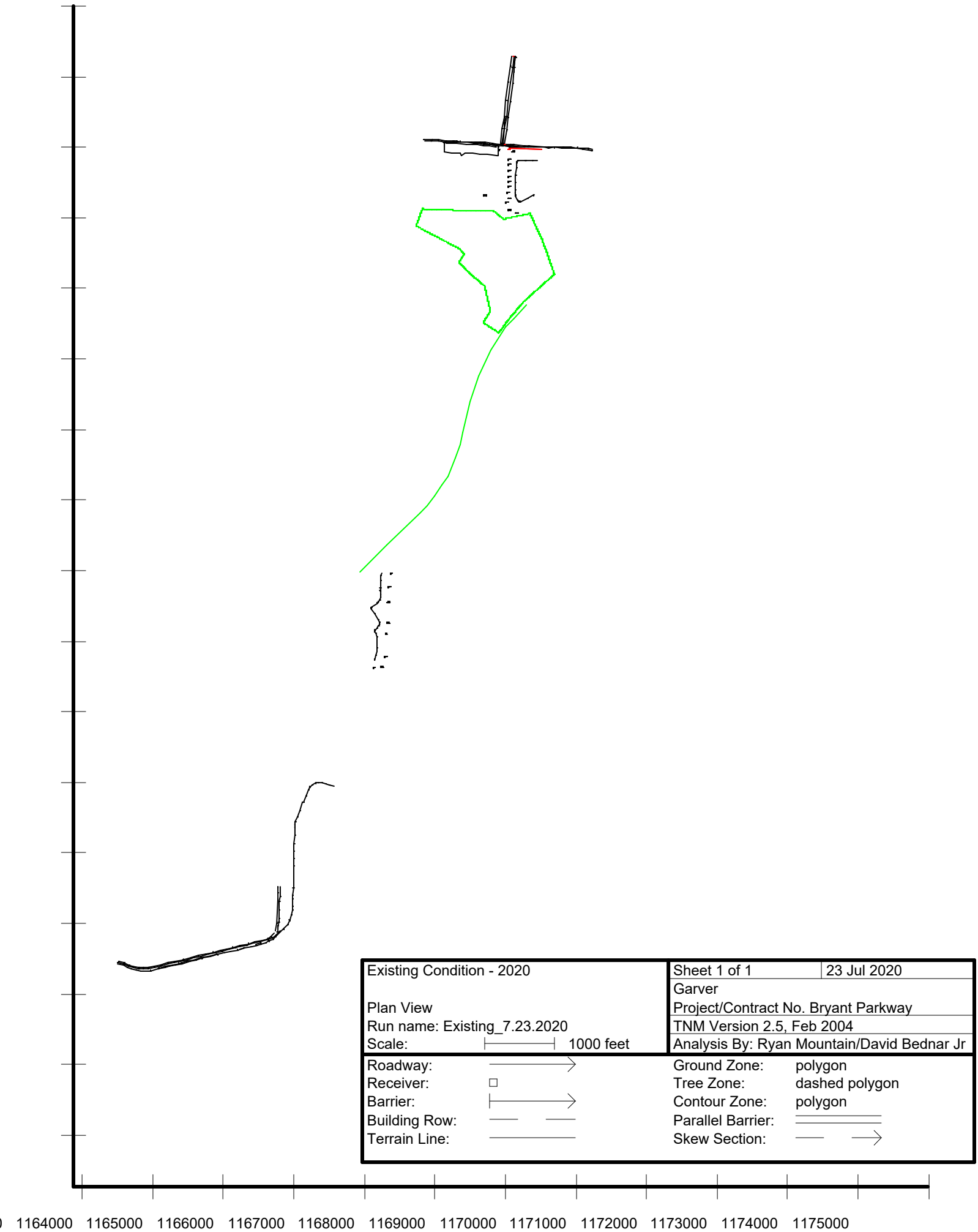
Note: DHV = (ADT)(K)
DDHV = (ADT)(K)(D)
11%
K - Percent of ADT occuring in design hour
D - Directional Distribution

Traffic Data:

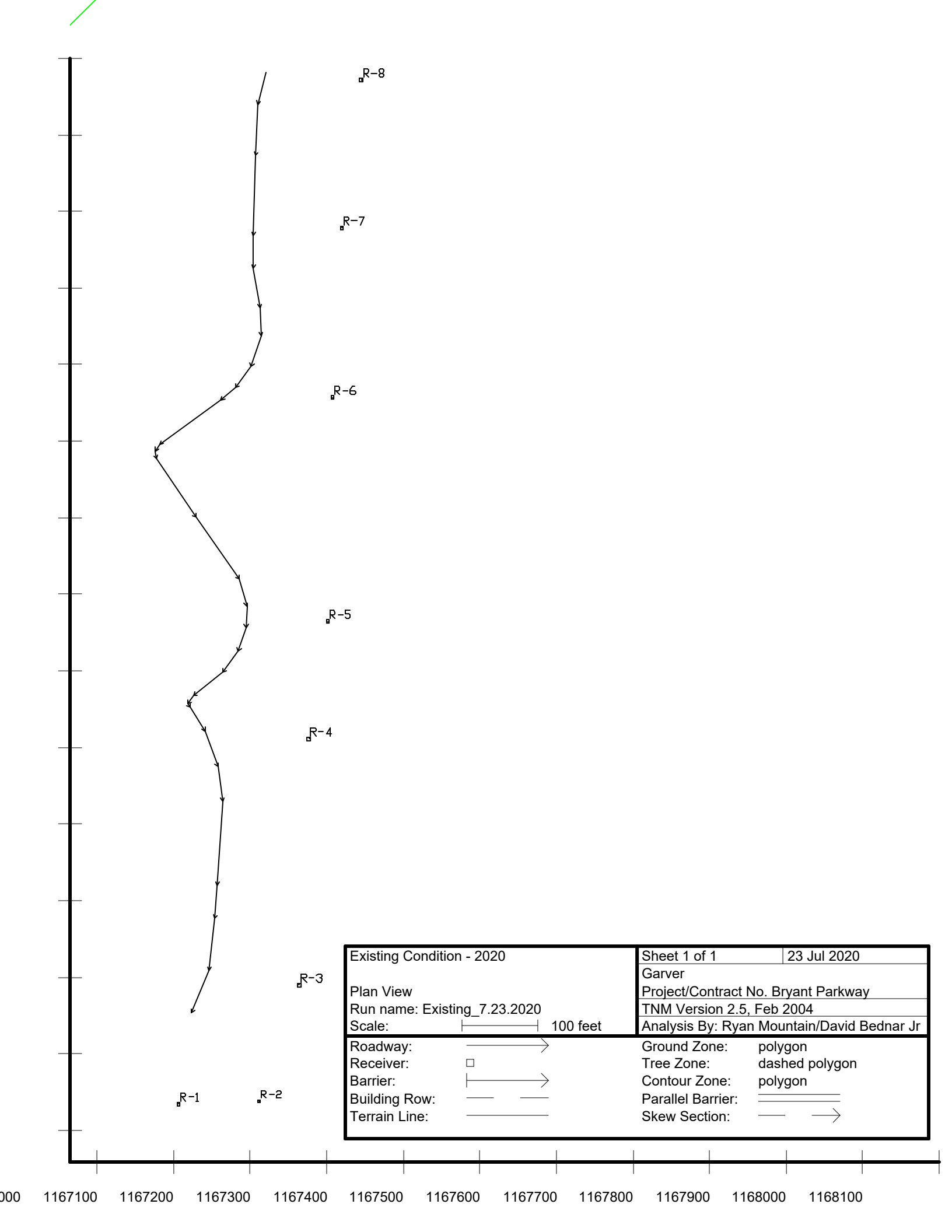
YEAR	ADT	%TRUCK	DHV	CARS	MT	HT	CARS/2	MT/2	HT/2
					70%	30%			
2020	4,701	3%	517	501	11	5	251	5	2
2040	5,267	3%	580	563	12	5	281	6	3

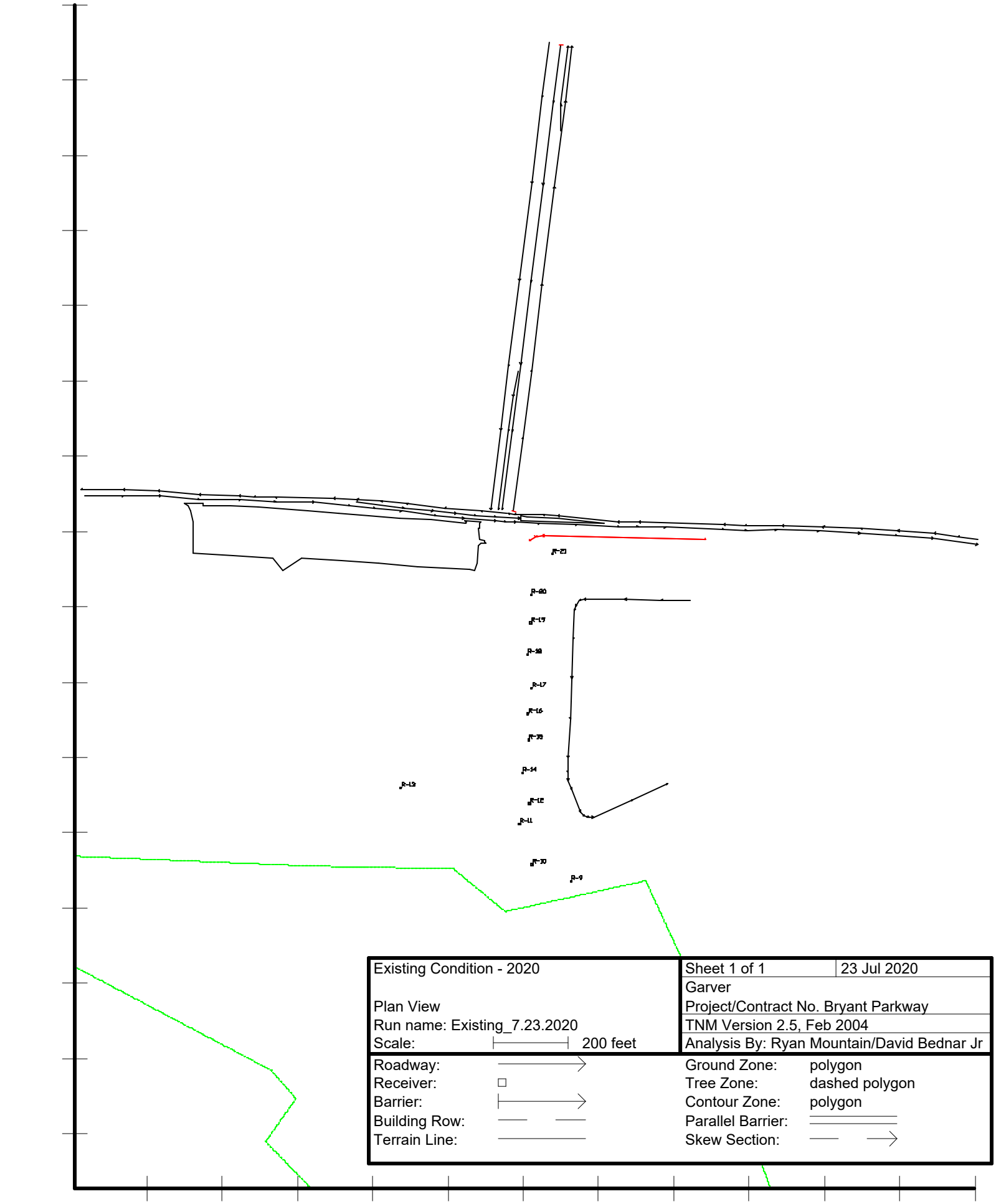
APPENDIX C

TNM Output Files



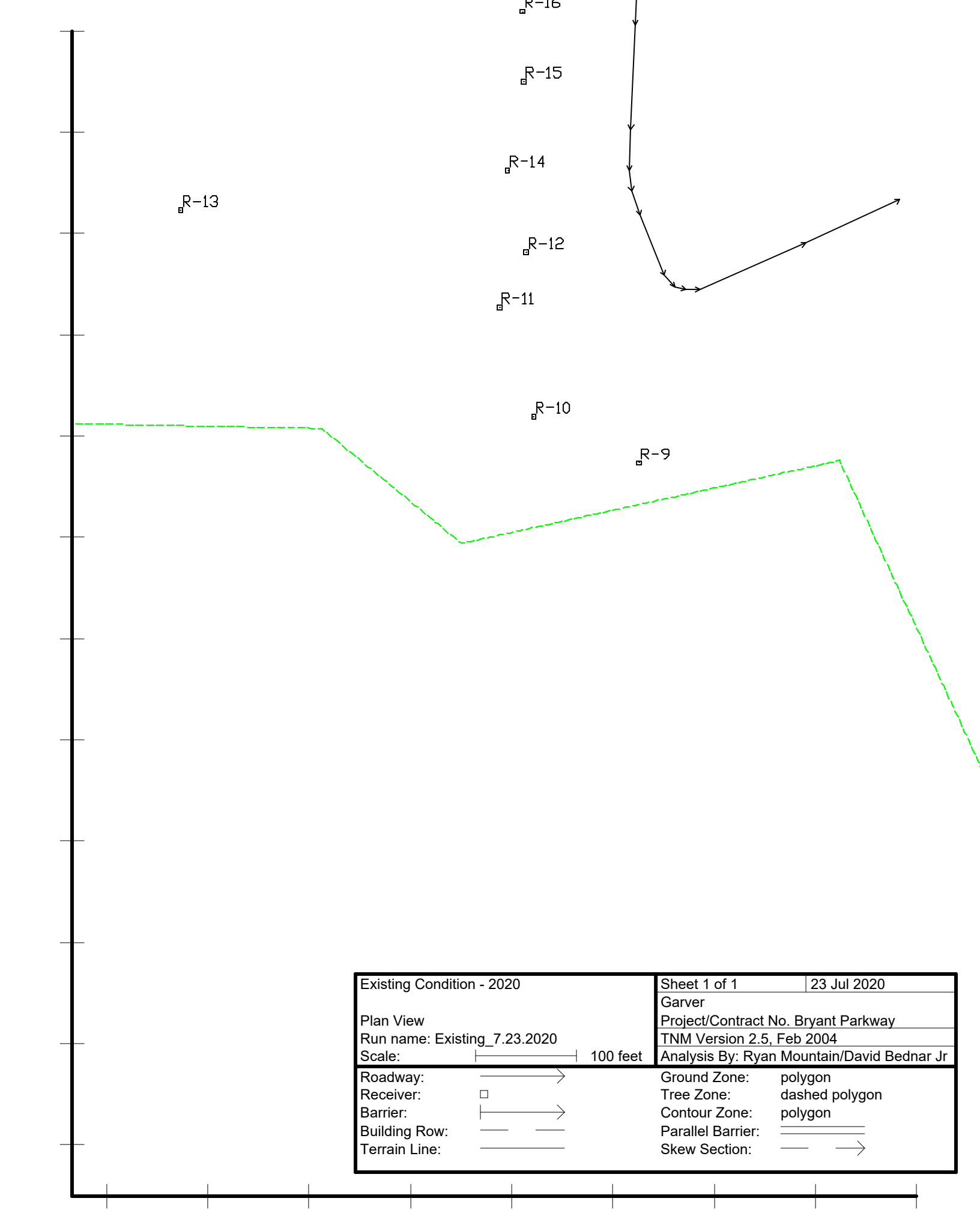
Existing Condition - 2020		Sheet 1 of 1	23 Jul 2020
		Garver	
Plan View		Project/Contract No. Bryant Parkway	
Run name: Existing_7.23.2020		TNM Version 2.5, Feb 2004	
Scale:	1000 feet	Analysis By: Ryan Mountain/David Bednar Jr	
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

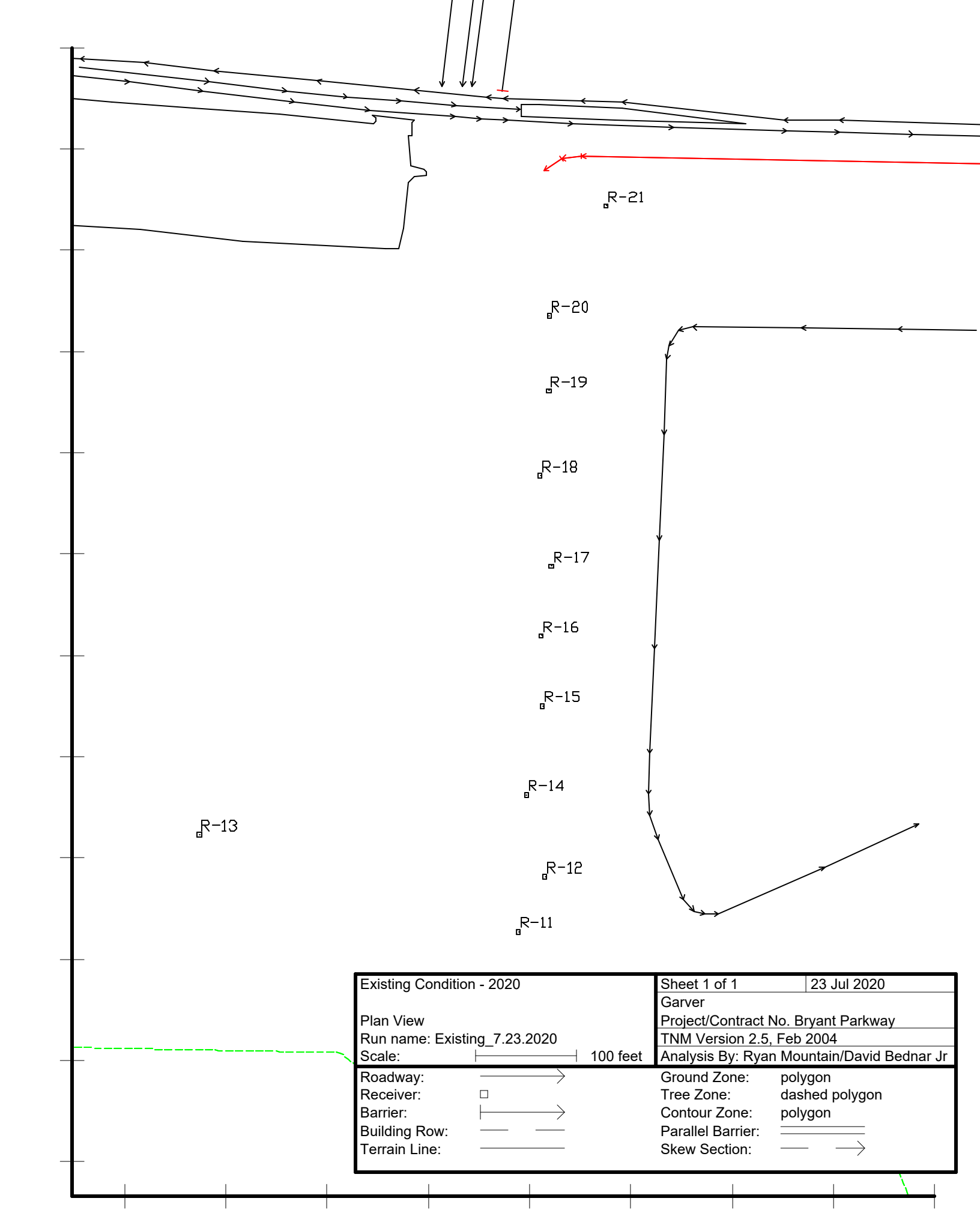

R-8
R-7
R-6
R-5
R-4
R-3
R-2
R-1
Existing Condition - 2020
Plan View
Run name: Existing_7.23.2020
Scale: 100 feet
Sheet 1 of 1
23 Jul 2020
Garver
Project/Contract No. Bryant Parkway
TNM Version 2.5, Feb 2004
Analysis By: Ryan Mountain/David Bednar Jr
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
000
1167100
1167200
1167300
1167400
1167500
1167600
1167700
1167800
1167900
1168000
1168100



Existing Condition - 2020	Sheet 1 of 1 | 23 Jul 2020
	Garver
Plan View	Project/Contract No. Bryant Parkway
Run name: Existing_7.23.2020	TNM Version 2.5, Feb 2004
Scale: 200 feet	Analysis By: Ryan Mountain/David Bednar Jr

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	


R-16
R-15
R-14
R-13
R-12
R-11
R-10
R-9
Existing Condition - 2020
Plan View
Run name: Existing_7.23.2020
Scale:
100 feet
Sheet 1 of 1
23 Jul 2020
Garver
Project/Contract No. Bryant Parkway
TNM Version 2.5, Feb 2004
Analysis By: Ryan Mountain/David Bednar Jr
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
1168600
1168700
1168800
1168900
1169000
1169100
1169200
1169300
1169400


R-21
R-20
R-19
R-18
R-17
R-16
R-15
R-14
R-13
R-12
R-11
Existing Condition - 2020
Plan View
Run name: Existing_7.23.2020
Scale: 100 feet
Sheet 1 of 1
23 Jul 2020
Garver
Project/Contract No. Bryant Parkway
TNM Version 2.5, Feb 2004
Analysis By: Ryan Mountain/David Bednar Jr
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
1168600
1168700
1168800
1168900
1169000
1169100
1169200
1169300
1169400

Garver
Ryan Mountain/David Bednar Jr

24 July 2020
TNM 2.5
Calculated with TNM 2.5

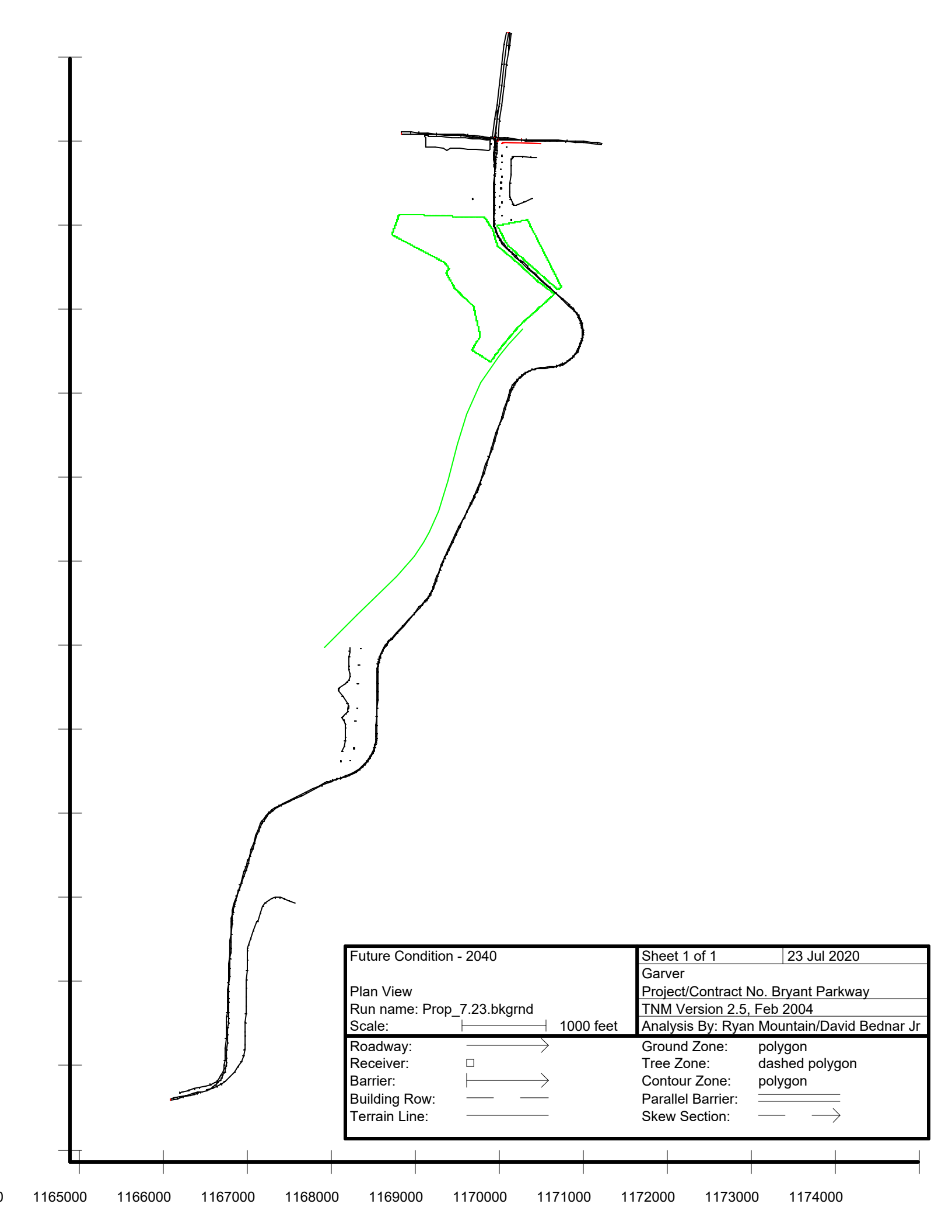
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Bryant Parkway
RUN: Existing Condition - 2020
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

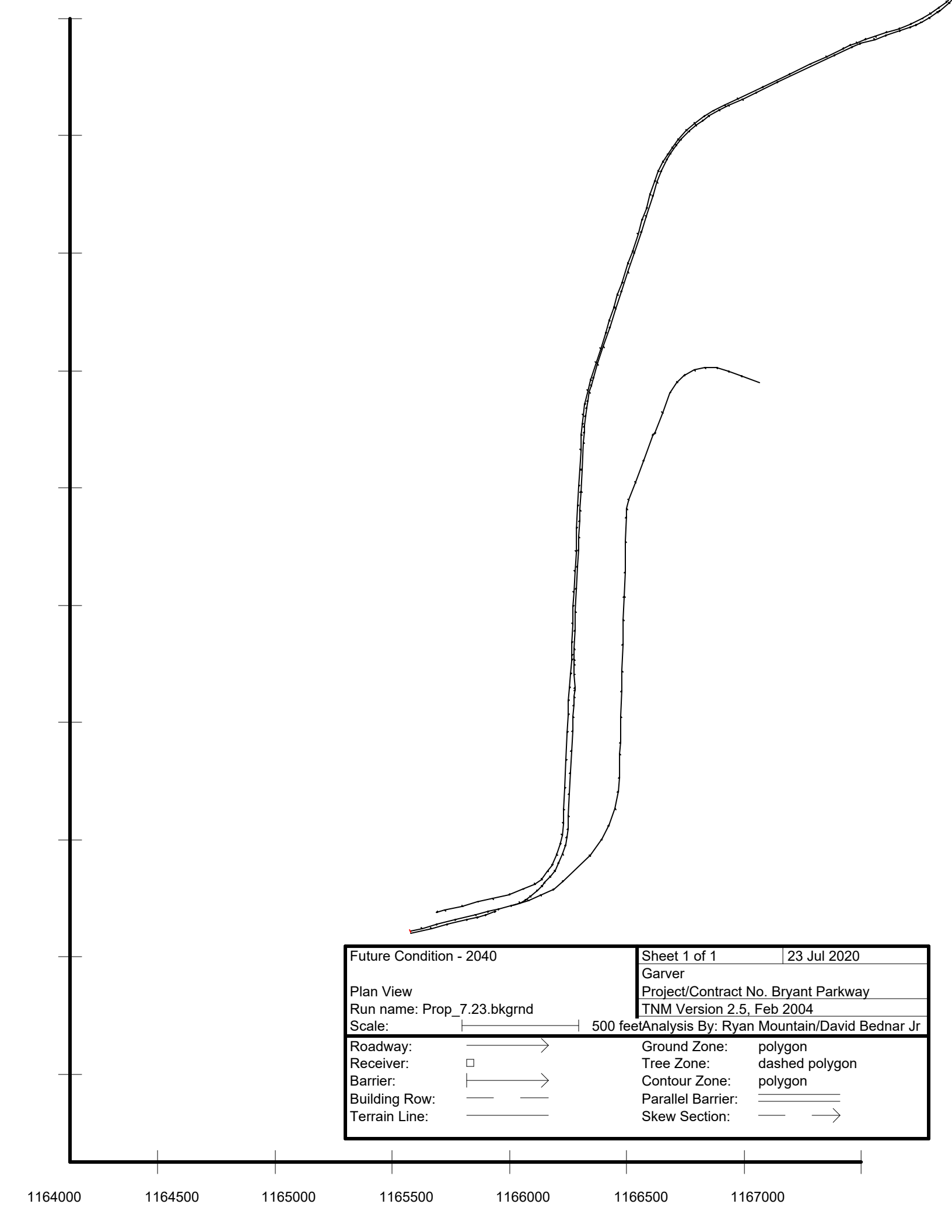
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

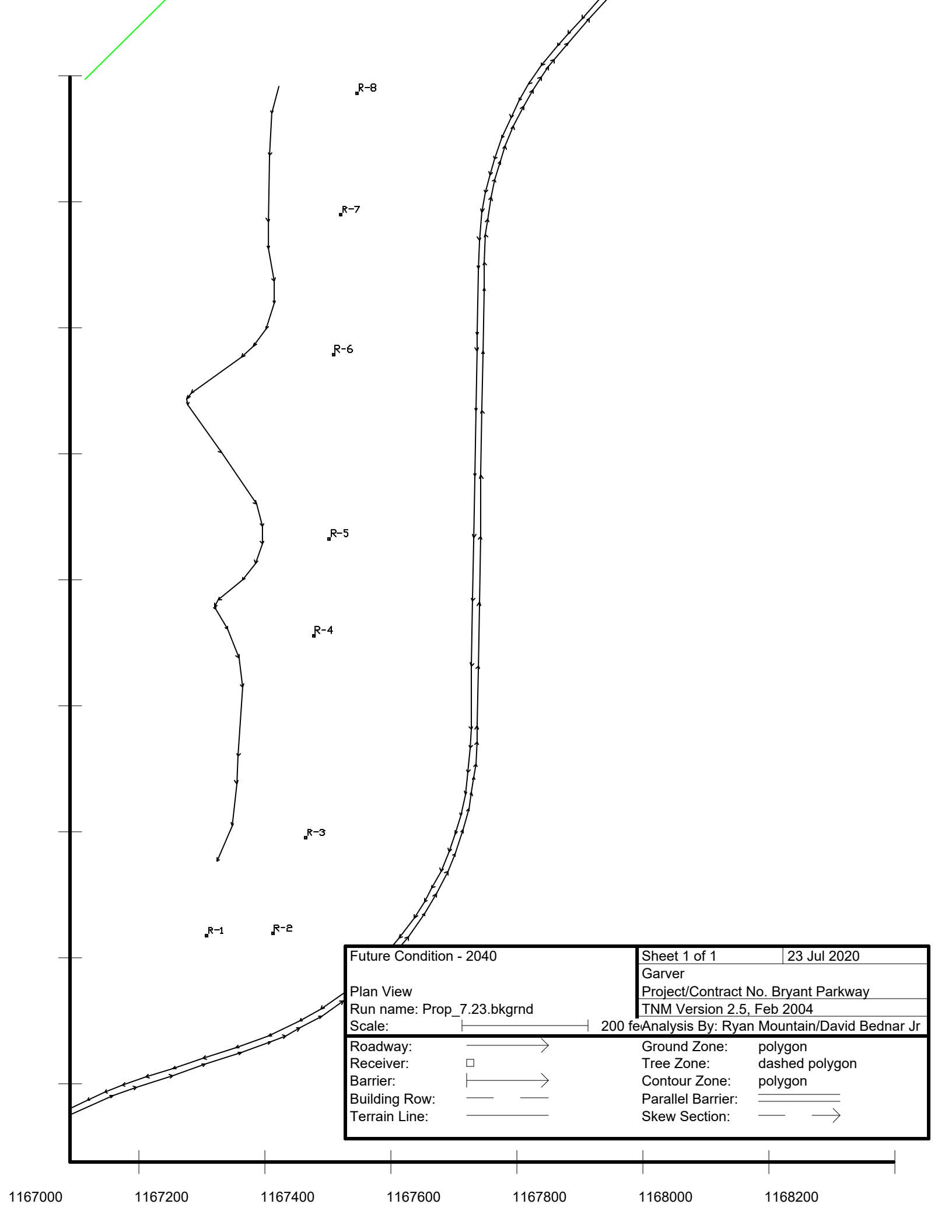
Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		Type Impact	With Barrier Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R-1	2	2	0.0	19.6	66	19.6	10	----	19.6	0.0	8	-8.0
R-2	4	1	0.0	19.7	66	19.7	10	----	19.7	0.0	8	-8.0
R-3	8	2	0.0	19.9	66	19.9	10	----	19.9	0.0	8	-8.0
R-4	13	2	0.0	20.4	66	20.4	10	----	20.4	0.0	8	-8.0
R-5	16	3	0.0	20.6	66	20.6	10	----	20.6	0.0	8	-8.0
R-6	17	3	0.0	21.0	66	21.0	10	----	21.0	0.0	8	-8.0
R-7	18	3	0.0	21.4	66	21.4	10	----	21.4	0.0	8	-8.0
R-8	21	3	0.0	21.4	66	21.4	10	----	21.4	0.0	8	-8.0
R-9	36	1	0.0	38.5	66	38.5	10	----	38.5	0.0	8	-8.0
R-10	42	1	0.0	39.3	66	39.3	10	----	39.3	0.0	8	-8.0
R-11	44	1	0.0	40.7	66	40.7	10	----	40.7	0.0	8	-8.0
R-12	46	1	0.0	41.0	66	41.0	10	----	41.0	0.0	8	-8.0
R-13	47	1	0.0	42.9	66	42.9	10	----	42.9	0.0	8	-8.0
R-14	50	1	0.0	42.3	66	42.3	10	----	42.3	0.0	8	-8.0
R-15	51	1	0.0	43.3	66	43.3	10	----	43.3	0.0	8	-8.0
R-16	53	1	0.0	44.3	66	44.3	10	----	44.3	0.0	8	-8.0
R-17	55	1	0.0	45.5	66	45.5	10	----	45.5	0.0	8	-8.0
R-18	57	1	0.0	47.7	66	47.7	10	----	47.7	0.0	8	-8.0
R-19	59	1	0.0	49.8	66	49.8	10	----	49.8	0.0	8	-8.0
R-20	60	1	0.0	52.7	66	52.7	10	----	52.7	0.0	8	-8.0
R-21	67	1	0.0	53.8	66	53.8	10	----	53.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max

			dB	dB	dB							
All Selected		32	0.0	0.0	0.0							
All Impacted		0	0.0	0.0	0.0							
All that meet NR Goal		0	0.0	0.0	0.0							

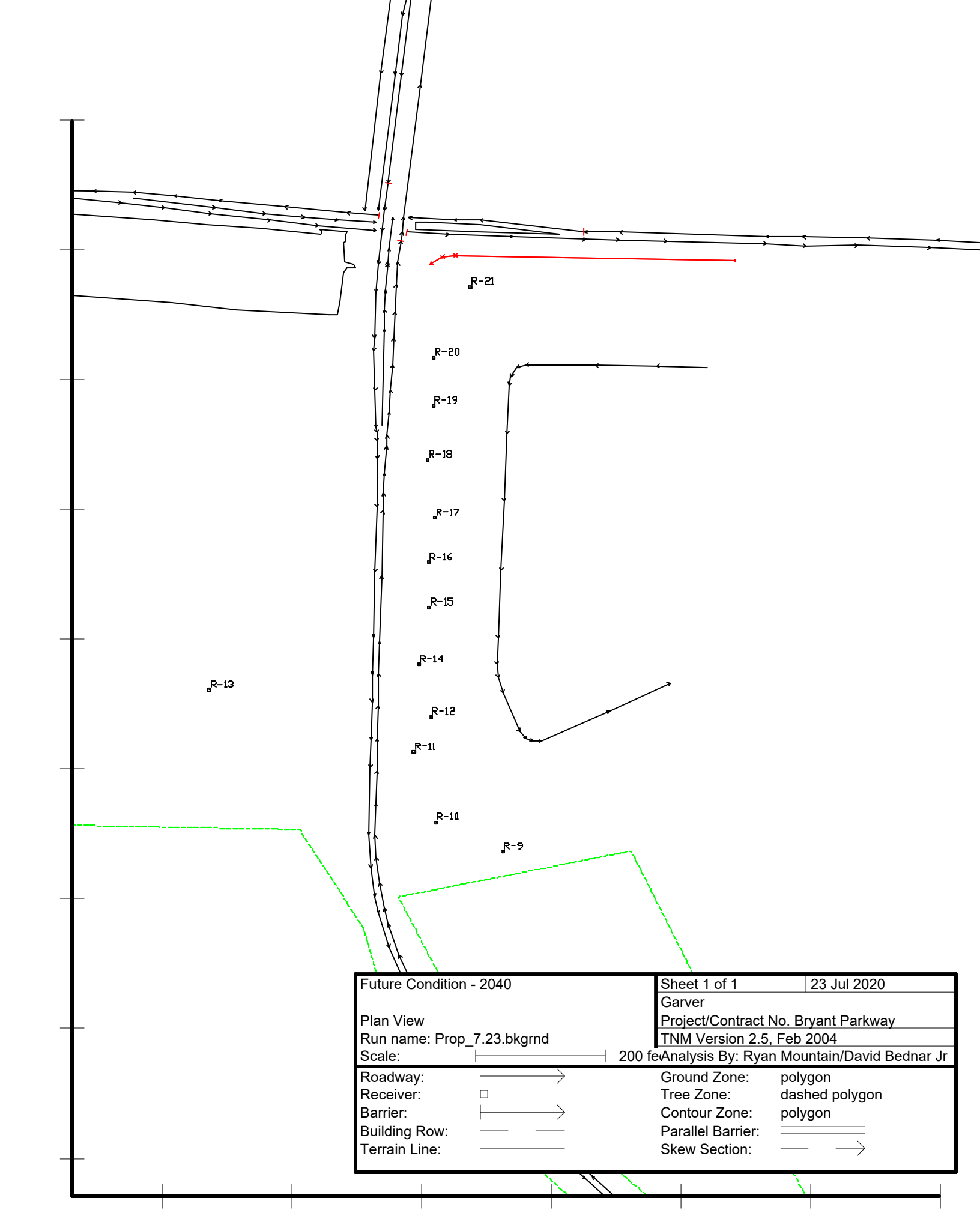

Future Condition - 2040
Plan View
Run name: Prop_7.23.bkgrnd
Scale: 1000 feet
Sheet 1 of 1
23 Jul 2020
Garver
Project/Contract No. Bryant Parkway
TNM Version 2.5, Feb 2004
Analysis By: Ryan Mountain/David Bednar Jr
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
1165000
1166000
1167000
1168000
1169000
1170000
1171000
1172000
1173000
1174000


Future Condition - 2040
Plan View
Run name: Prop_7.23.bkgrnd
Scale: 500 feet
Sheet 1 of 1
23 Jul 2020
Garver
Project/Contract No. Bryant Parkway
TNM Version 2.5, Feb 2004
Analysis By: Ryan Mountain/David Bednar Jr
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
1164000
1164500
1165000
1165500
1166000
1166500
1167000



Future Condition - 2040		Sheet 1 of 1	23 Jul 2020
		Garver	
Plan View		Project/Contract No. Bryant Parkway	
Run name: Prop_7.23.bkgrnd		TNM Version 2.5, Feb 2004	
Scale:	200 fe	Analysis By: Ryan Mountain/David Bednar Jr	

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	



Future Condition - 2040		Sheet 1 of 1	23 Jul 2020
		Garver	
Plan View		Project/Contract No. Bryant Parkway	
Run name: Prop_7.23.bkgrnd		TNM Version 2.5, Feb 2004	
Scale:	200 fe	Analysis By: Ryan Mountain/David Bednar Jr	

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

Garver
Ryan Mountain/David Bednar Jr

24 July 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Bryant Parkway
RUN: Future Condition - 2040
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 85 deg F, 59% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		Type Impact	With Barrier Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R-1	2	2	44.4	50.0	66	5.6	10	----	50.0	0.0	8	-8.0
R-2	4	1	44.4	52.1	66	7.7	10	----	52.1	0.0	8	-8.0
R-3	8	2	44.4	47.4	66	3.0	10	----	47.4	0.0	8	-8.0
R-4	13	2	44.4	47.0	66	2.6	10	----	47.0	0.0	8	-8.0
R-5	16	3	44.4	48.2	66	3.8	10	----	48.2	0.0	8	-8.0
R-6	17	3	44.4	48.9	66	4.5	10	----	48.9	0.0	8	-8.0
R-7	18	3	44.4	48.8	66	4.4	10	----	48.8	0.0	8	-8.0
R-8	21	3	44.4	47.1	66	2.7	10	----	47.1	0.0	8	-8.0
R-9	36	1	51.5	50.8	66	-0.7	10	----	50.8	0.0	8	-8.0
R-10	42	1	51.6	57.1	66	5.5	10	----	57.1	0.0	8	-8.0
R-11	44	1	51.7	60.3	66	8.6	10	----	60.3	0.0	8	-8.0
R-12	46	1	51.7	58.3	66	6.6	10	----	58.3	0.0	8	-8.0
R-13	47	1	51.9	50.1	66	-1.8	10	----	50.1	0.0	8	-8.0
R-14	50	1	51.8	60.0	66	8.2	10	----	60.0	0.0	8	-8.0
R-15	51	1	51.9	59.0	66	7.1	10	----	59.0	0.0	8	-8.0
R-16	53	1	52.1	59.2	66	7.1	10	----	59.2	0.0	8	-8.0
R-17	55	1	50.4	58.3	66	7.9	10	----	58.3	0.0	8	-8.0
R-18	57	1	51.2	58.4	66	7.2	10	----	58.4	0.0	8	-8.0
R-19	59	1	52.3	57.6	66	5.3	10	----	57.6	0.0	8	-8.0
R-20	60	1	54.2	58.9	66	4.7	10	----	58.9	0.0	8	-8.0
R-21	67	1	55.0	58.5	66	3.5	10	----	58.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max

			dB	dB	dB							
All Selected		32	0.0	0.0	0.0							
All Impacted		0	0.0	0.0	0.0							
All that meet NR Goal		0	0.0	0.0	0.0							

Garver
Ryan Mountain/David Bednar Jr

24 July 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Bryant Parkway
RUN: No-Action Alternative
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R-1	2	2	19.6	19.9	66	0.3	10	----	19.9	0.0	8	-8.0
R-2	4	1	19.7	20.1	66	0.4	10	----	20.1	0.0	8	-8.0
R-3	8	2	19.9	20.3	66	0.4	10	----	20.3	0.0	8	-8.0
R-4	13	2	20.4	20.8	66	0.4	10	----	20.8	0.0	8	-8.0
R-5	16	3	20.6	21.0	66	0.4	10	----	21.0	0.0	8	-8.0
R-6	17	3	21.0	21.4	66	0.4	10	----	21.4	0.0	8	-8.0
R-7	18	3	21.4	21.8	66	0.4	10	----	21.8	0.0	8	-8.0
R-8	21	3	21.4	21.8	66	0.4	10	----	21.8	0.0	8	-8.0
R-9	36	1	38.5	39.1	66	0.6	10	----	39.1	0.0	8	-8.0
R-10	42	1	39.3	39.8	66	0.5	10	----	39.8	0.0	8	-8.0
R-11	44	1	40.7	41.2	66	0.5	10	----	41.2	0.0	8	-8.0
R-12	46	1	41.0	41.5	66	0.5	10	----	41.5	0.0	8	-8.0
R-13	47	1	42.9	43.4	66	0.5	10	----	43.4	0.0	8	-8.0
R-14	50	1	42.3	42.8	66	0.5	10	----	42.8	0.0	8	-8.0
R-15	51	1	43.3	43.7	66	0.4	10	----	43.7	0.0	8	-8.0
R-16	53	1	44.4	44.7	66	0.3	10	----	44.7	0.0	8	-8.0
R-17	55	1	45.5	45.9	66	0.4	10	----	45.9	0.0	8	-8.0
R-18	57	1	47.7	48.1	66	0.4	10	----	48.1	0.0	8	-8.0
R-19	59	1	49.8	50.2	66	0.4	10	----	50.2	0.0	8	-8.0
R-20	60	1	52.7	53.0	66	0.3	10	----	53.0	0.0	8	-8.0
R-21	67	1	53.8	54.2	66	0.4	10	----	54.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max

			dB	dB	dB							
All Selected		32	0.0	0.0	0.0							
All Impacted		0	0.0	0.0	0.0							
All that meet NR Goal		0	0.0	0.0	0.0							

APPENDIX D

Alternatives Comparison

Appendix D — Alternatives Traffic Noise Levels Comparison, *dB(A) Leq(h)*												
	Existing Condition*	Ambient/ Background Levels	Alternative B			Alternative D**			No-Action			
Modeled Receiver	Existing Level		Existing Level*	Future Level	Change (+/-)	Existing Level*	Future Level	Change (+/-)	Existing Level*	Future Level	Change (+/-)	Noise Impact?
R-1	19.6	44.4	44.4	50	5.6	These receivers are signficantly far away (over 0.25 mile) from Alternative D and were not evaluated.			19.6	19.9	0.3	N
R-2	19.7	44.4	44.4	52.1	7.7				19.7	20.1	0.4	N
R-3	19.9	44.4	44.4	47.4	3				19.9	20.3	0.4	N
R-4	20.4	44.4	44.4	47	2.6				20.4	20.8	0.4	N
R-5	20.6	44.4	44.4	48.2	3.8				20.6	21	0.4	N
R-6	21	44.4	44.4	48.9	4.5				21	21.4	0.4	N
R-7	21.4	44.4	44.4	48.8	4.4				21.4	21.8	0.4	N
R-8	21.4	44.4	44.4	47.1	2.7				21.4	21.8	0.4	N
R-9	38.5	51.3	51.5	50.8	-0.7	51.5	50.8	-0.7	38.5	39.1	0.6	N
R-10	39.3	51.3	51.6	57.1	5.5	51.6	57.1	5.5	39.3	39.8	0.5	N
R-11	40.7	51.3	51.7	60.3	8.6	51.7	60.3	8.6	40.7	41.2	0.5	N
R-12	41	51.3	51.7	58.3	6.6	51.7	58.3	6.6	41	41.5	0.5	N
R-13	42.9	51.3	51.9	50.1	-1.8	51.9	50.1	-1.8	42.9	43.4	0.5	N
R-14	42.3	51.3	51.8	60	8.2	51.8	60	8.2	42.3	42.8	0.5	N
R-15	43.3	51.3	51.9	59	7.1	51.9	59	7.1	43.3	43.7	0.4	N
R-16	44.4	51.3	52.1	59.2	7.1	52.1	59.2	7.1	44.4	44.7	0.3	N
R-17	45.5	48.7	50.4	58.3	7.9	50.4	58.3	7.9	45.5	45.9	0.4	N
R-18	47.7	48.7	51.2	58.4	7.2	51.2	58.4	7.2	47.7	48.1	0.4	N
R-19	49.8	48.7	52.3	57.6	5.3	52.3	57.6	5.3	49.8	50.2	0.4	N
R-20	52.7	48.7	54.2	58.9	4.7	54.2	58.9	4.7	52.7	53	0.3	N
R-21	53.8	48.7	55	58.5	3.5	55	58.5	3.5	53.8	54.2	0.4	N

*Decibel addition was used to incorporate background (ambient) noise into the model as noted below:
R-1 through R-8 used 44.4 dB; R-9 through R-16 used 51.3 dB; R-17 through R-21 used 48.7 dB.
**Alternative D would have the same impacts as Alternative B due to the partial shared alignment.


GARVER