Kimley»Horn

MEMORANDUM

To:	Clayton Comstock, AICP Planning Manager City of North Richland Hills
From:	C. Brian Shamburger, P.E., PTOE Jeff Whitacre, P.E., AICP Kimley-Horn and Associates, Inc. TBPE Registered Firm Number F-928
Date:	May 2, 2016
Subject:	Iron Horse Boulevard Cross Section Evaluation North Richland Hills, Texas

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Introduction

The purpose of this evaluation is to analyze future conditions and provide preliminary cross section recommendations for Iron Horse Boulevard from IH-820 to Rufe Snow Drive in the City of North Richland Hills, Texas.

The following sections document the data collection and methodology used in evaluating Iron Horse Boulevard.

Existing and 2025 Background Traffic Volumes

Existing (2015) turning movement volumes were obtained for the AM and PM peak hours from the recently completed TEX Rail Iron Horse Station traffic impact study at the following locations:

- Iron Horse Boulevard and IH-820 Frontage Roads
- Iron Horse Boulevard and Boulder Drive
- Iron Horse Boulevard and Browning Drive
- Iron Horse Boulevard and Eagle Crest Drive
- Iron Horse Boulevard and Rufe Snow Drive

Using tube count data collected in April 2016, the 2015 turning movement volumes were increased 20% to reflect additional traffic added as a result of the recently operational managed lanes along IH-820.

To obtain the year 2025 background traffic growth, the adjusted 2015 traffic volumes were grown at a rate of 2.2% for ten years. The growth rate used was obtained from the TEX Rail Iron Horse Station traffic impact study.

Year 2025 Total Traffic Volumes

The year 2025 total traffic volumes were calculated by adding site traffic from three proposed developments along Iron Horse Blvd to the 2025 background traffic volumes. These developments are known as Iron Horse Commons, The Fountains at Iron Horse, and the TEX Rail Iron Horse Station. Site-generated traffic data for the Iron Horse Commons and TEX Rail Iron Horse Station were obtained traffic impact studies performed for those sites.

To estimate the trips generated by the Fountains at Iron Horse development, average trip generation rates from the 9th edition of the *ITE Trip Generation Manual* were used. **Table 1** shows the trip generation rates for the proposed land uses.

Table 2 summarizes the total number of trips that are expected to be generated at build-out of the proposed development during the AM and PM peak periods and on a daily basis. The number of trips generated represents the number of vehicles entering and exiting the proposed development to and from the adjacent street system.

The distribution and assignment of site traffic to the study area roadway network were based on existing traffic patterns, the locations of the proposed driveway access to/from the site, and TEX Rail Iron Horse Station trip distribution. The following percentages of trip distribution are assumed on the surrounding roadway network:

- 60% - Iron Horse Boulevard, south of the study area
- 40% - Iron Horse Boulevard, north of the study area

These site generated traffic volumes were added to the 2025 background traffic volumes along with site traffic from Iron Horse Commons and the TEX Rail Iron Horse station site traffic to obtain the 2025 Total Traffic Volumes. These volumes are presented in **Exhibit 1** (attached).

Table 1. Estimated Trip Generation Rates

Land Use Description	Variable	Daily		AM Peak Hour		PM Peak Hour	
		Rate	Split	Rate	Split	Rate	Split
Apartments (ITE #220)	*Dwelling Units*	*6.65 * (X)*	*50% In 50% Out*	*0.51 * (X)*	*20% In 80% Out*	*0.62 * (X)*	*65% In 35% Out*
Number of trips generated = Trip Rate (Development Unit); X = Dwelling Units							

Table 2. Trip Generation Analysis

Land Use Description	ITE Code	Intensity / Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Build Out (2018) Total Trips									
Apartments	*220*	*300 DU*	*1,996*	*31*	*122*	*153*	*121*	*65*	*186*

Intersection Capacity Analysis

The evaluation of traffic operations in the study area was comprised of peak hour level of service analyses for each of the peak hours using the Synchro 9™ software. The purpose of this analysis was to determine if any deficiencies exist or are anticipated within the network short term so that recommendations for improvements can be made.

Capacity defines the volume of traffic that can be accommodated by a roadway at a specified "level of service." Capacity is affected by various geometric factors including roadway type (e.g. divided or undivided), number of lanes, lane widths, and grades. Level of service (LOS), which is a measure of the degree of congestion, ranges from LOS A (free flowing) to LOS F (a congested, forced flow condition). A description of each operational state for both signalized and unsignalized intersections is presented in **Table 3**.

The results of the 2025 conditions traffic analyses are presented in **Table 4**. Note, based on recommendations provided in the TEX Rail Iron Horse Station and Iron Horse Commons traffic impact studies, both intersections were assumed to be signalized in 2025 conditions.

Based on the results of the intersection capacity analysis, both intersections within the study area are projected to operate at level of service D or better during the AM and PM peak hours in 2025 conditions.

Table 3. Definition of Level of Service for Intersections

Level of Service	Average Control Delay per Vehicle (sec/veh)		Description
	Signalized	Unsignalized	
A and B	≤ 10 (A) > 10 and ≤ 20 (B)	≤ 10 (A) > 10 and ≤ 15 (B)	No delays at intersections with continuous flow traffic. Uncongested operations; high frequency of long gaps available for all left and right-turning traffic; no observable queues.
C	> 20 and ≤ 35	> 15 and ≤ 25	Moderate delays at intersections with satisfactory to good traffic flow. Light congestion; infrequent backups on critical approaches.
D	> 35 and ≤ 55	> 25 and ≤ 35	Increased probability of delays along every approach. Significant congestion on critical approaches, but intersection functional. No long standing lines formed.
E	> 55 and ≤ 80	> 35 and ≤ 50	Heavy traffic flow condition. Heavy delays probable. No available gaps for cross-street traffic or main street turning traffic. Limit of stable flow.
F	> 80	> 50	Unstable traffic flow. Heavy congestion. Traffic moves in forced flow condition. Average delays greater than one minute highly probable. Total breakdown.

Table 4. Intersection Capacity Analysis

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Iron Horse Blvd and Browning Dr.	Overall	22.9	C	41.1	D
Iron Horse Blvd and Boulder Dr.	Overall	9.2	A	18.4	B

Thoroughfare Capacity Analysis

Roadway capacity analysis was completed using level of service criteria outlined by the North Central Texas Council of Governments (NCTCOG). The traffic condition criteria are based on the volume-to-capacity ratio for traffic volumes and roadway capacity. **Table 5** provides a description of this criterion as it applies to roadways. It should be noted that Iron Horse Boulevard was assumed to be a Minor Arterial with a per lane directional capacity of 650 vehicles per hour per lane (per NCTCOG).

Table 6 provides a summary of directional and two-way thoroughfare capacity analysis for Iron Horse Boulevard in 2025 conditions. Based upon the results of the thoroughfare capacity analysis, all roadway segments are projected to operate at a two-way level of service D or better during the AM and PM peak hours. The segment from Browning Drive to Boulder Drive is projected to operate at LOS E with a v/c ratio of 0.87-0.88 in the peak hour direction of traffic flow. While nearing capacity, this is generally considered a tolerable operating condition for thoroughfares.

Table 5. Level of Service Criteria for Thoroughfare Capacity Analysis

V/C Ratio	**0.00–0.20**	**0.20–0.45**	**0.45–0.65**	**0.65–0.80**	**0.80–1.00**	**1.00 →**
Level of Service	**A**	**B**	**C**	**D**	**E**	**F**

V = Peak Hour Directional Volume (vehicles per hour)
C = Per Lane Directional Capacity (vehicles per hour)

Per lane directional capacity is assumed to be the following:
Minor Arterial: 650 per hour per lane (per NCTCOG)

Table 6. Thoroughfare Capacity Analysis Summary

Roadway	**Segment**	**Class (Section)**	**Number of Lanes**	**Direction**	**AM Peak Hour**			**PM Peak Hour**		
					Vol	**V/C Ratio**	**LOS**	**Vol**	**V/C Ratio**	**LOS**
Iron Horse Blvd.	Rufe Snow Dr. to Browning Dr.	Minor Arterial	2	NB	406	0.31	B	603	0.46	C
			2	SB	290	0.22	B	495	0.38	B
			4	Total	696	0.27	B	1,098	0.42	B
Iron Horse Blvd.	Browning Dr. to Boulder Dr.	Minor Arterial	2	NB	315	0.24	B	1,150	0.88	E
			2	SB	1,132	0.87	E	598	0.46	C
			4	Total	1,447	0.56	C	1,748	0.67	D
Iron Horse Blvd.	Boulder Dr. to NE Loop 820	Minor Arterial	2	NB	285	0.24	B	838	0.69	D
			2	SB	874	0.67	D	462	0.36	B
			4	Total	1,159	0.45	C	1,300	0.50	C

Proposed Cross Sections

Based on the results of the intersection and thoroughfare capacity analyses, cross section recommendations were prepared for each segment of Iron Horse Boulevard. These recommendations are presented in the sheets attached to this memorandum. For adherence to the City of North Richland Hills Transit-Oriented Development (TOD) code, angled or parallel on-street parking is recommended on all segments which are not adjacent to existing surface parking lots. It is generally recommended that angled parking be considering adjacent to high density, mixed-use development, while parallel parking is recommended adjacent to residential development.

Effects of On-Street Parking

It is generally accepted that the presence of on-street parking has many different impacts on a roadway, including the portion of right-of-way not used for vehicular travel. On-street parking is widely recommend as a method of enhancing a street because it provides a barrier between vehicular and pedestrian traffic, acts as a traffic calming measure, and can help to boost the economic activity of the surrounding area.

The impact of on-street parking on traffic flow can vary widely depending on the type of parking that is provided and the expected hourly turnover. Studies have estimated that on-street parking can decrease roadway capacity by up to 17% in areas with high-turnover and parking configurations requiring reverse maneuvers. This reduction in capacity can also be as little as 2% in areas with low turnover and parking configurations that result in fewer reverse maneuvers. Based on the results of the thoroughfare capacity analysis, all segments of Iron Horse Boulevard are projected to have adequate capacity to withstand minor reductions due to the presence of on-street parking.

Back-in Angled Parking

In areas where angled parking is recommended, back-in angled parking may be considered as an alternative to traditional angled parking. The advantages of back-in angled parking include greater visibility of the road when pulling out of parking spaces and safer unloading of passengers and cargo.

Attachments

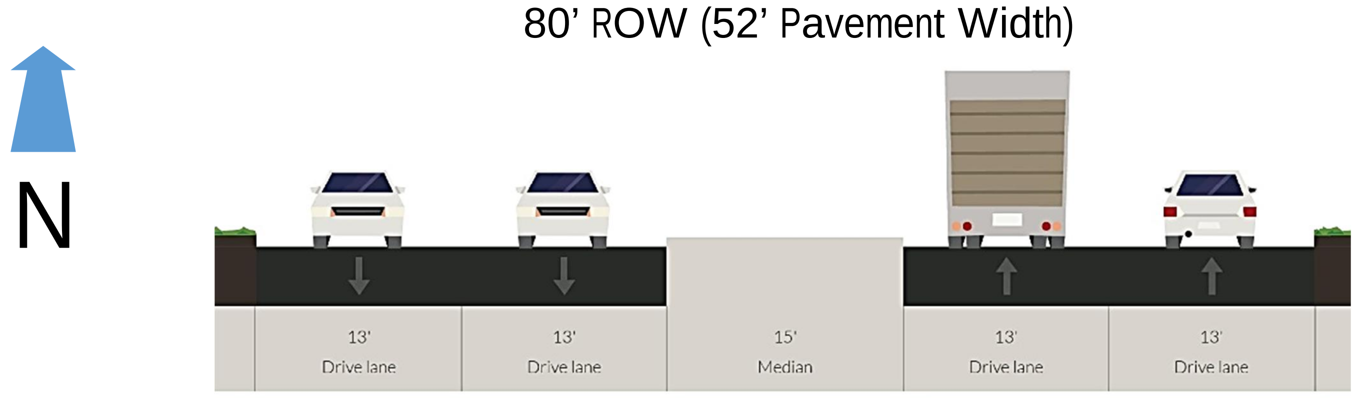
1. Exhibit 1 – Traffic Volume Map (2025)
2. Proposed Cross Sections (Sections 1-3)

Iron Horse Boulevard Cross Sections

Section 1 - Browning Drive to Rufe Snow Drive

Existing – 4 Lanes with Raised Median

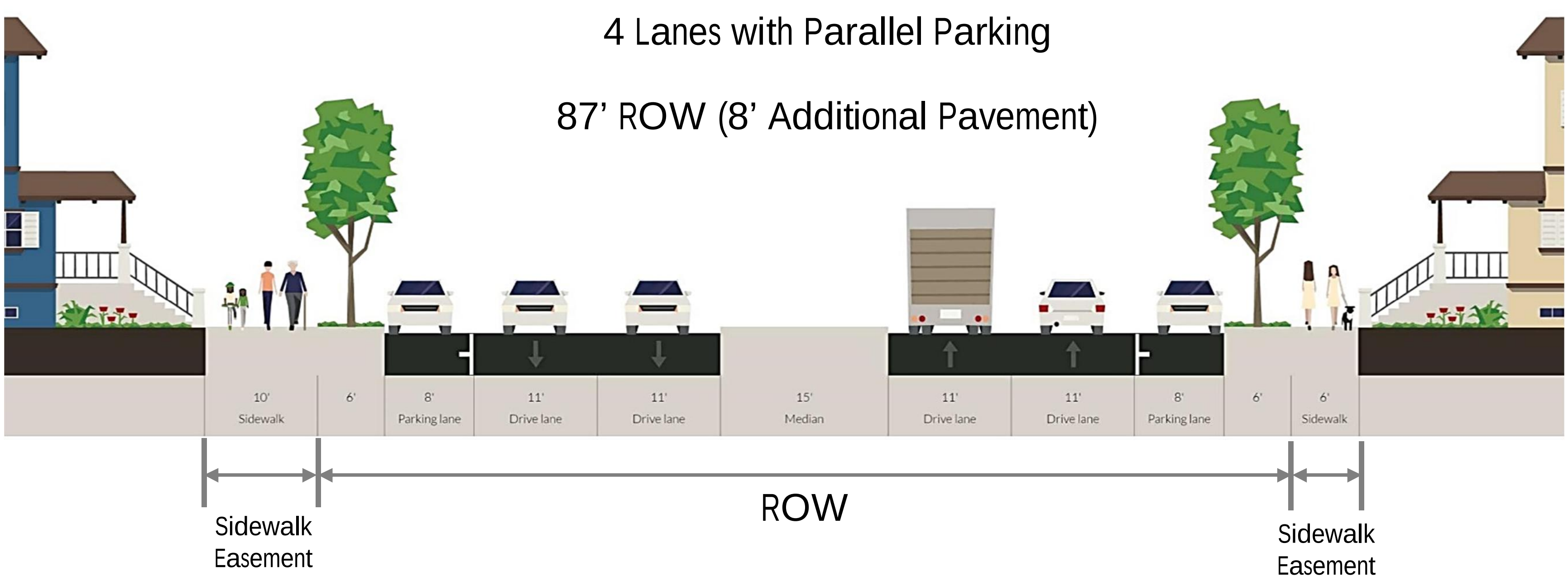
80’ ROW (52’ Pavement Width)



Proposed (North of Bold Ruler Ln) –

4 Lanes with Parallel Parking

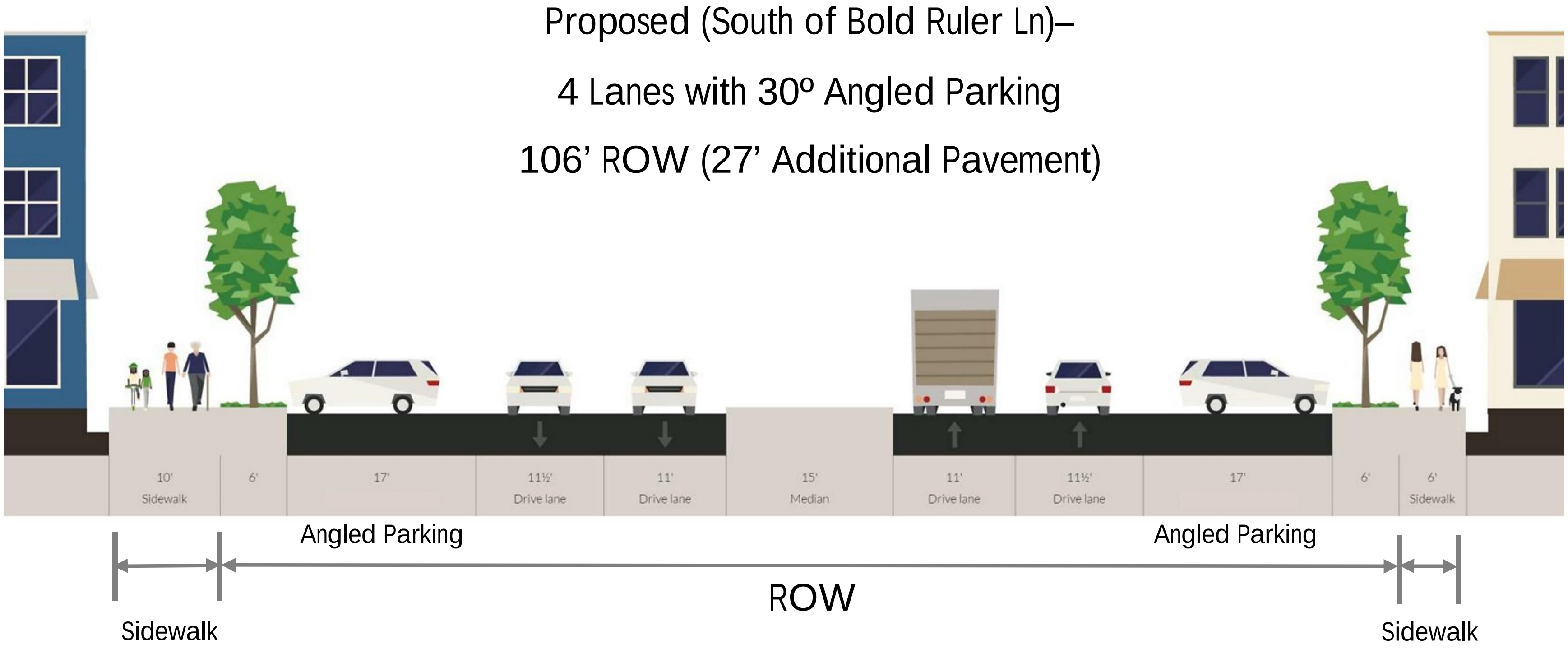
87’ ROW (8’ Additional Pavement)



Proposed (South of Bold Ruler Ln)–

4 Lanes with 30º Angled Parking

106’ ROW (27’ Additional Pavement)

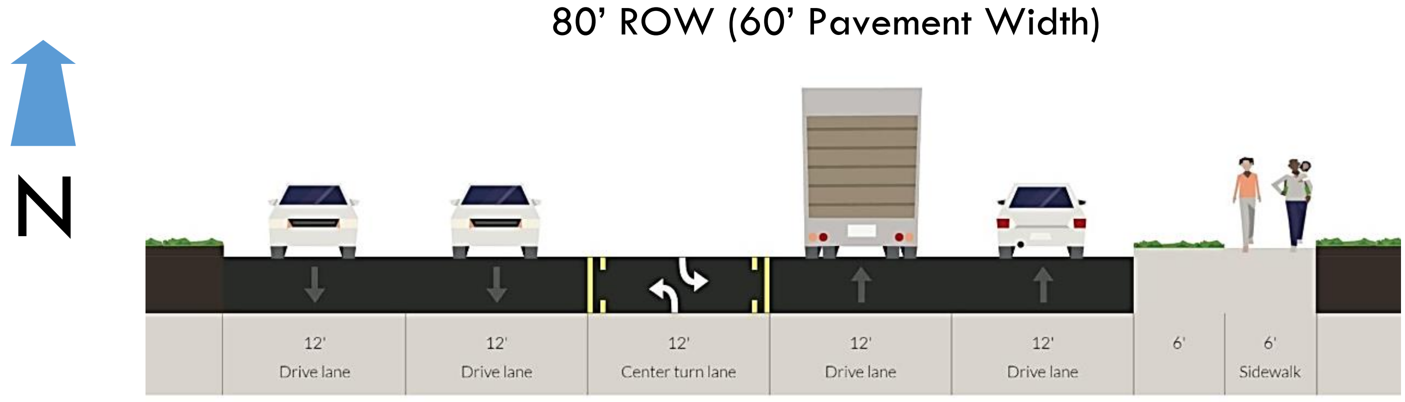


Iron Horse Boulevard Cross Sections

Section 2 - Boulder Drive to Browning Drive

Existing – 4 Lanes with a Two-Way Left-Turn lane

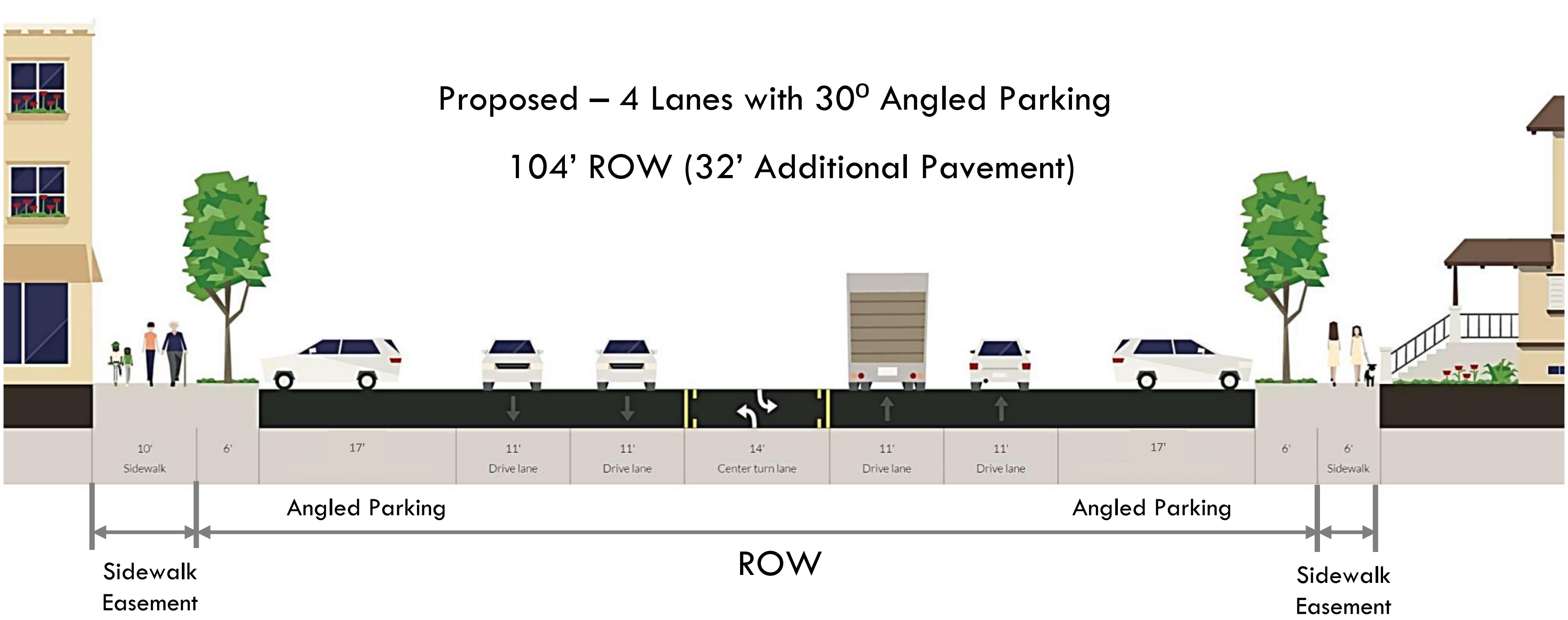
80’ ROW (60’ Pavement Width)



*Sidewalk adjacent to existing apartments

Proposed – 4 Lanes with 30⁰ Angled Parking

104’ ROW (32’ Additional Pavement)

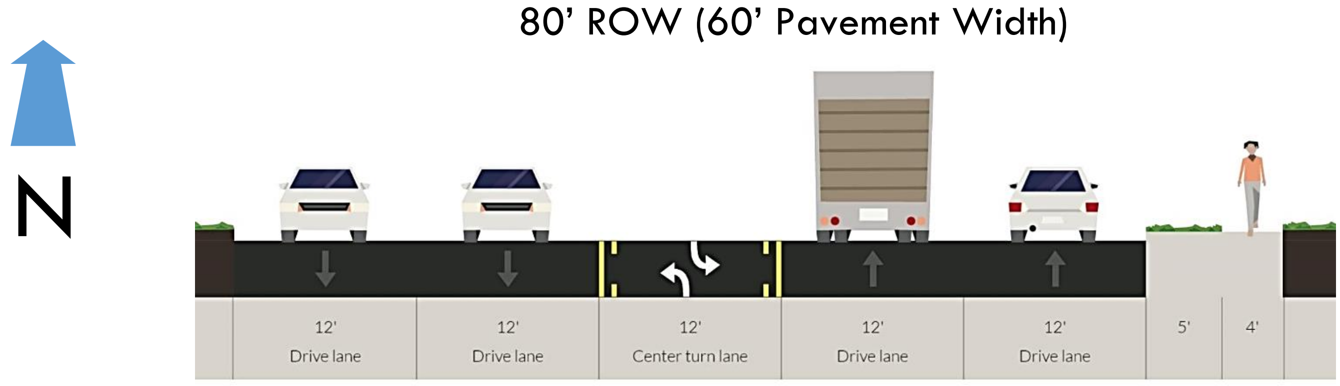


Iron Horse Boulevard Cross Sections

Section 3 – IH 820 to Boulder Drive

Existing – 4 Lanes with a Two-Way Left-turn Lane

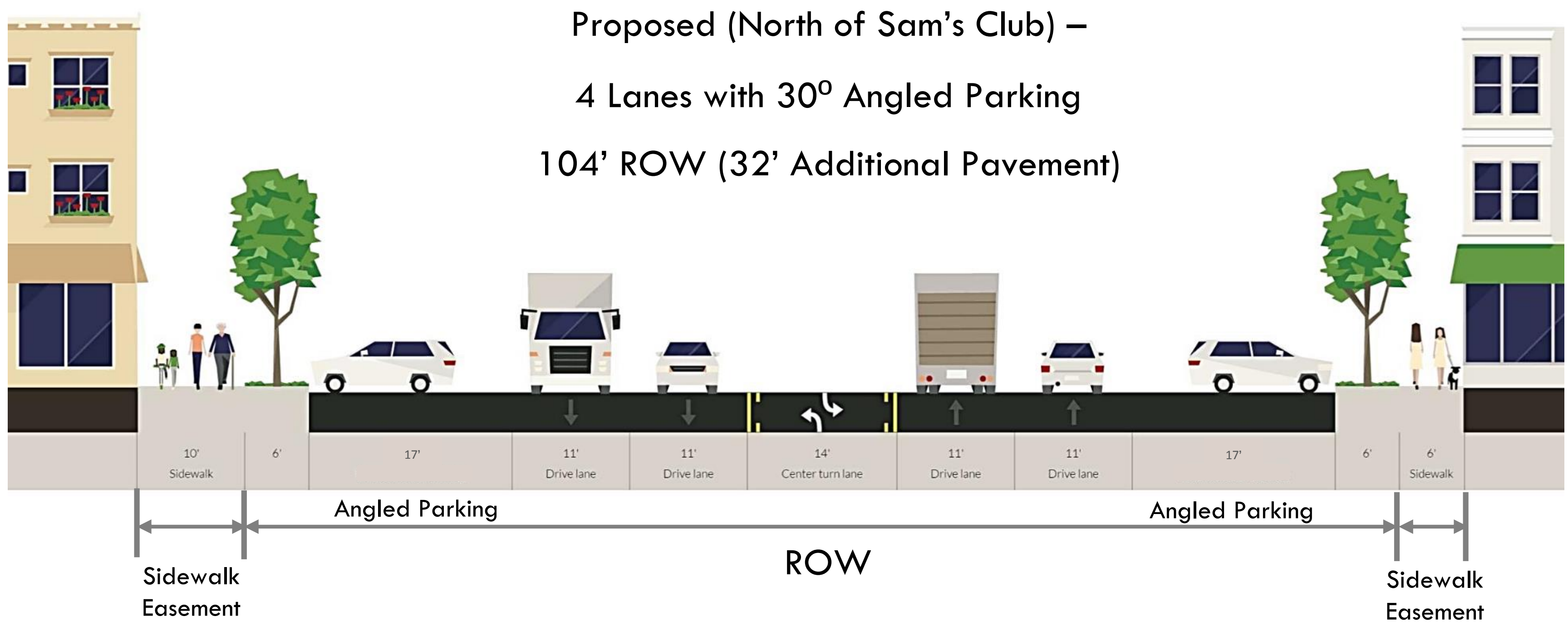
80’ ROW (60’ Pavement Width)



Proposed (North of Sam’s Club) –

4 Lanes with 30° Angled Parking

104’ ROW (32’ Additional Pavement)



Proposed (Adjacent to Sam’s Club) –

4 Lanes with 30° Angled Parking on West Side

88’ ROW (16’ Additional Pavement)