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DRAFT MEMORANDUM

Date: October 12, 2021

Project #: 22521.05

To: Emily Ehlers, Oakland Department of Transportation

From: Laurence Lewis, AICP and Grace Carsky

Project: Telegraph Ave. Before/After Evaluation

Subject: Post-Construction Analysis Results

INTRODUCTION

Kittelson & Associates, Inc. (Kittelson) is assisting the Oakland Department of Transportation (OakDOT) in evaluating the performance of Telegraph Avenue improvements relative to community and City goals. Following the selection of evaluation metrics with OakDOT staff, the project team collected data for each metric before and after project construction. This memorandum summarizes the results of the post-construction analysis and compares results to the pre-construction (baseline) conditions.

EVALUATION OVERVIEW

Study Corridor Sections

The study area comprises Telegraph Avenue from 52nd Street to 20th Street. OakDOT has constructed or is in the process of implementing four projects in three sections (**bolded**) of the study area:

- **Temescal** Repairing Telegraph project from 52nd Street to MacArthur Boulevard (*completed Summer 2021*)
- **Connecting** Telegraph from MacArthur Boulevard to 29th Street (*in process*)
- **KONO** Interim Telegraph project from 29th Street to 20th Street (*completed Summer 2020*)
- **KONO** Permanent Telegraph project from 29th Street to 20th Street (*in process*)

The **Temescal** section encompasses Telegraph Avenue from 52nd Street to MacArthur Boulevard. Land uses adjacent to the corridor are predominantly commercial. The MacArthur BART station is located west of Telegraph Avenue at 40th Street. Prior to construction, this section had a 30 mph posted speed limit and had two vehicle travel lanes in each direction with parking on both sides of the street. The Temescal section now has a 25 mph speed limit and has one through travel lane in each direction, except between Temescal Plaza and 52nd Street, where there are two travel lanes in the northbound

direction. A Class IV protected bike lane that is separated by parking is constructed on both sides of the street. Concrete bus boarding islands were also constructed along the section.

The **Connecting** section encompasses Telegraph Avenue from MacArthur Boulevard to 29th Street and runs primarily through Oakland's Pill Hill neighborhood. Land uses adjacent to Telegraph Avenue are predominantly commercial and residential, and there are several medical facilities east of the corridor between 34th Street and 30th Street. This section has a 30 mph speed limit and typically has two vehicle travel lanes in each direction with parking on both sides of the street. Interstate 580 passes over the corridor between 36th Street and 34th Street. While this section does not have bike lanes, concrete bus boarding islands have been constructed since the baseline evaluation.

The **KONO** section encompasses Telegraph Avenue from 29th Street to 20th Street. Along this section, an initial improvement project was completed in 2016. Interim improvements were implemented Summer 2020 and permanent improvements are slated for a future date. This section has a 25-mph speed limit and now has one travel lane in each direction with parking and protected bike lanes on both sides of the street. Temporary bus boarding islands are installed at AC Transit bus stops. Land uses adjacent to the corridor are primarily commercial, featuring many businesses serving Oakland's Korean community.

Evaluation Metrics

An overview of all evaluation metrics is provided in Table 1. For the baseline evaluation, data was collected in February 2020 and for post-construction evaluation, data was collected in August 2021. Data for each metric, except for Metric 4 (Bicycle/Pedestrian Conflicts at the Boarding Island)[1], were collected at the same locations for both the baseline and post-construction conditions. It is important to note that post-construction data was collected during the COVID-19 pandemic, so data may not reflect the true travel patterns of vehicles, pedestrians, cyclists, and trucks in the area.

Data collected for Metrics 1 through 6 are the focus of this memo. Data collection for Metrics 7 (Transit Boarding and Alighting) and 8 (Public Opinion) is ongoing and will be summarized by OakDOT at a future date.

[1] A concrete bus boarding island at Telegraph Avenue and 40th Street were constructed in spring and summer 2021 and was not included in the baseline evaluation.

Table 1: Evaluation Metrics

Metric		Intended Outcome	Evaluation Tools	Data Collection Time Periods	Movements
1	Multimodal Counts	To understand changes in travel patterns due to the road diet	Video with Manual Reduction	One Weekday: 2-Hour AM and PM Peak Periods	All
2	Vehicle ADT	To understand changes in travel patterns due to the road diet	Pneumatic Tubes with Manual Reduction	24 Hours	N/A
3	Speed	To demonstrate reductions in vehicle speeds due to the project	Pneumatic Tubes with Manual Reduction	24 Hours	Northbound Southbound
4	Bicycle/Pedestrian Conflicts at the Boarding Island*	To demonstrate the effectiveness of project design in minimizing conflict	Video with Manual Reduction	One Weekday: 2-Hour PM Peak Period	Northbound
5	Drivers Yielding to Pedestrians	To demonstrate increased yield rates due to the project	Video with Manual Reduction	One Weekday: 2-Hour AM and PM Peak Periods	Northbound Southbound
6	Vehicle Loading Behavior	To demonstrate greater compliance with curbside vehicle loading	Video with Manual Reduction	One Weekday: 2-Hour AM and PM Peak Periods	Northbound Southbound
7	Transit Boarding and Alighting	To evaluate changes in transit activity	Automated Passenger Count (APC) Data	24 Hours; Continuous	N/A
8	Public Opinion	To evaluate levels of community support of the project	Meetings and focus groups with community members	Continuous	N/A

* Data on this metric was only collected after the project was implemented.

BASELINE AND POST-CONSTRUCTION EVALUATION RESULTS

Collecting data before and after project construction provides a baseline of how people travel on Telegraph Avenue prior to implementing the project and allows us to compare travel patterns after project construction. Each metric's purpose, relevance to the project, methodology, and comparison of baseline vs. project results are detailed in this section. Graphics, charts, and tables supplement written findings.

1. Multimodal Counts

Multimodal counts were collected to capture the volumes of vehicles, bicycles, pedestrians, and heavy vehicles on Telegraph Avenue. Counts were collected at five intersections on Telegraph Avenue: Grand Avenue, 27th Street, MacArthur Boulevard, 40th Street, and 51st Street. Peak hour bicycle and pedestrian counts at these locations are shown in Figure 1. Peak hour vehicle and heavy vehicle counts are shown in Figure 2.

Data Collection

- Video data collection
- Manual data reduction to count the number of each mode
- Weekday data collection in the AM and PM peak hours
- Observed number of modes by directions of travel

Findings

- **Pedestrian counts generally stayed the same in Temescal but decreased significantly in all other locations.** At the 51st Street intersection in Temescal, pedestrian counts increased by 24% in the PM peak hour but decreased by 9% in the AM peak hour. At the 40th Street intersection, pedestrian counts decreased by 65-67% in the AM and PM peak hours. Pedestrian counts decreased by 52-66% in the AM and PM peak hours in KONO and by 63-84% in the AM and PM peak hours in the Connecting Area. As noted, pre-construction counts were completed before COVID-19 restrictions were instituted, while post construction counts were completed while some COVID-19 restrictions were in place.
- **Bicycle counts generally stayed the same in Temescal but decreased significantly in all other locations.** At the 51st Street intersection in Temescal, bicycle counts increased by 4% in the PM peak hour but decreased by 6% in the AM peak hour. At the 40th Street intersection, bicycle counts decreased by 35 to 62% in the AM and PM peak hours. Bicycle counts decreased by 45 to 70% in the AM and PM peak hours in KONO and by 46 to 60% in the AM and PM peak hours in the Connecting Area.
- **Peak hour AM and PM vehicle counts decreased between baseline and post-construction conditions in all three segments.** Vehicle counts decreased by 12 to 48% in the AM peak hour and by 19 to 35% in the PM peak hour.

- **Heavy vehicle counts[2] increased slightly for some time periods in Temescal, but generally decreased across all three areas.** At the 40th Street intersection in Temescal, truck counts increased by 3% in the AM peak hour but decreased by 27% in the PM peak hour. At the 51st Street intersection, truck counts increased by 18% in the PM period but decreased by 31% in the AM peak hour. In KONO, truck counts decreased between 6 to 36% in the AM and PM peak hours. In the Connecting area, truck counts decreased between 34% and 50% in the AM and PM peak hours, respectively.

[2] Heavy vehicles include any vehicle with 3 or more axles, buses, and commercial vehicles with 2 axles and 6 tires (dual rear tires).

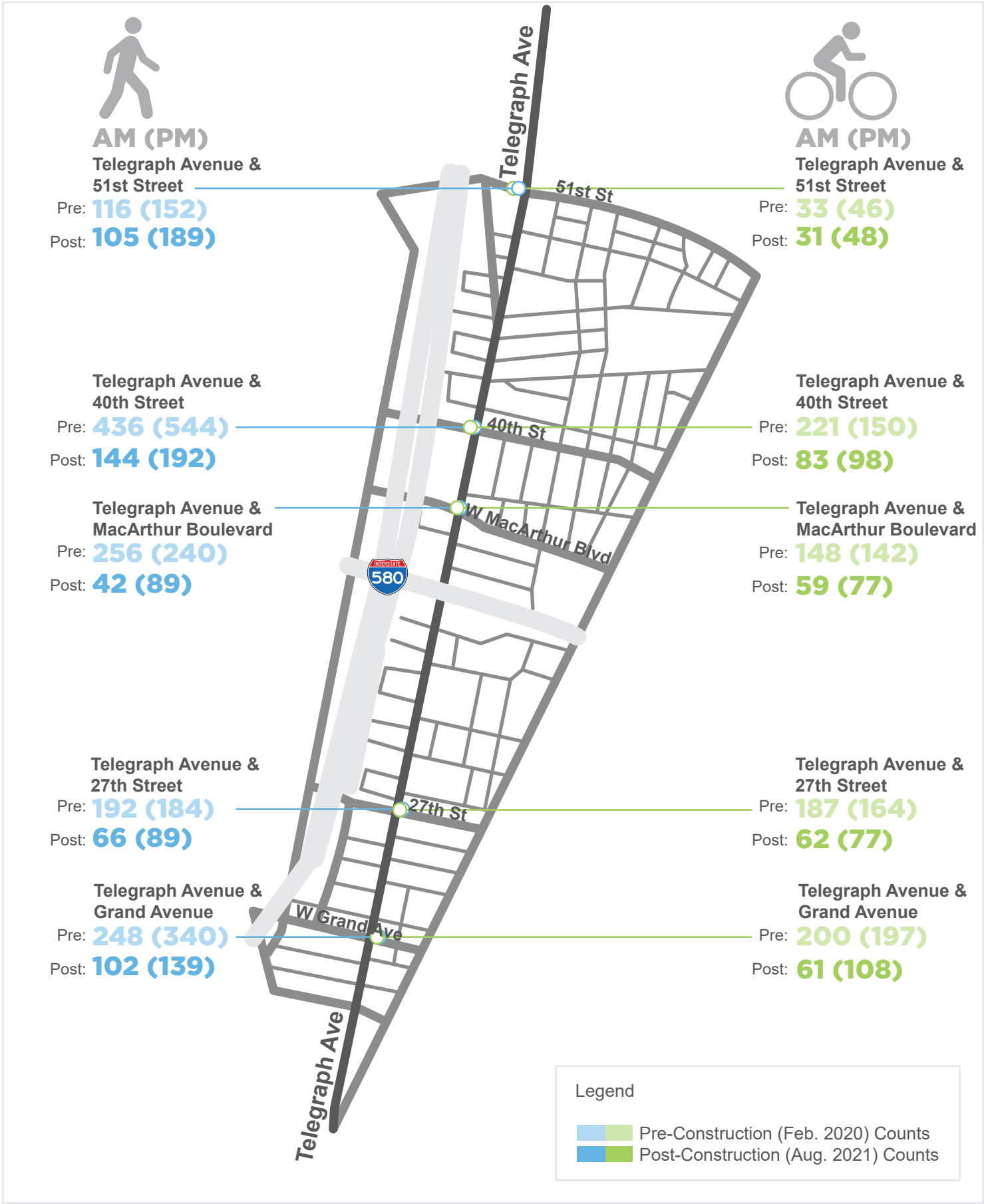

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Figure 1
Pedestrian and Bicycle Peak Hour Intersection Counts
February 2020 vs. August 2021

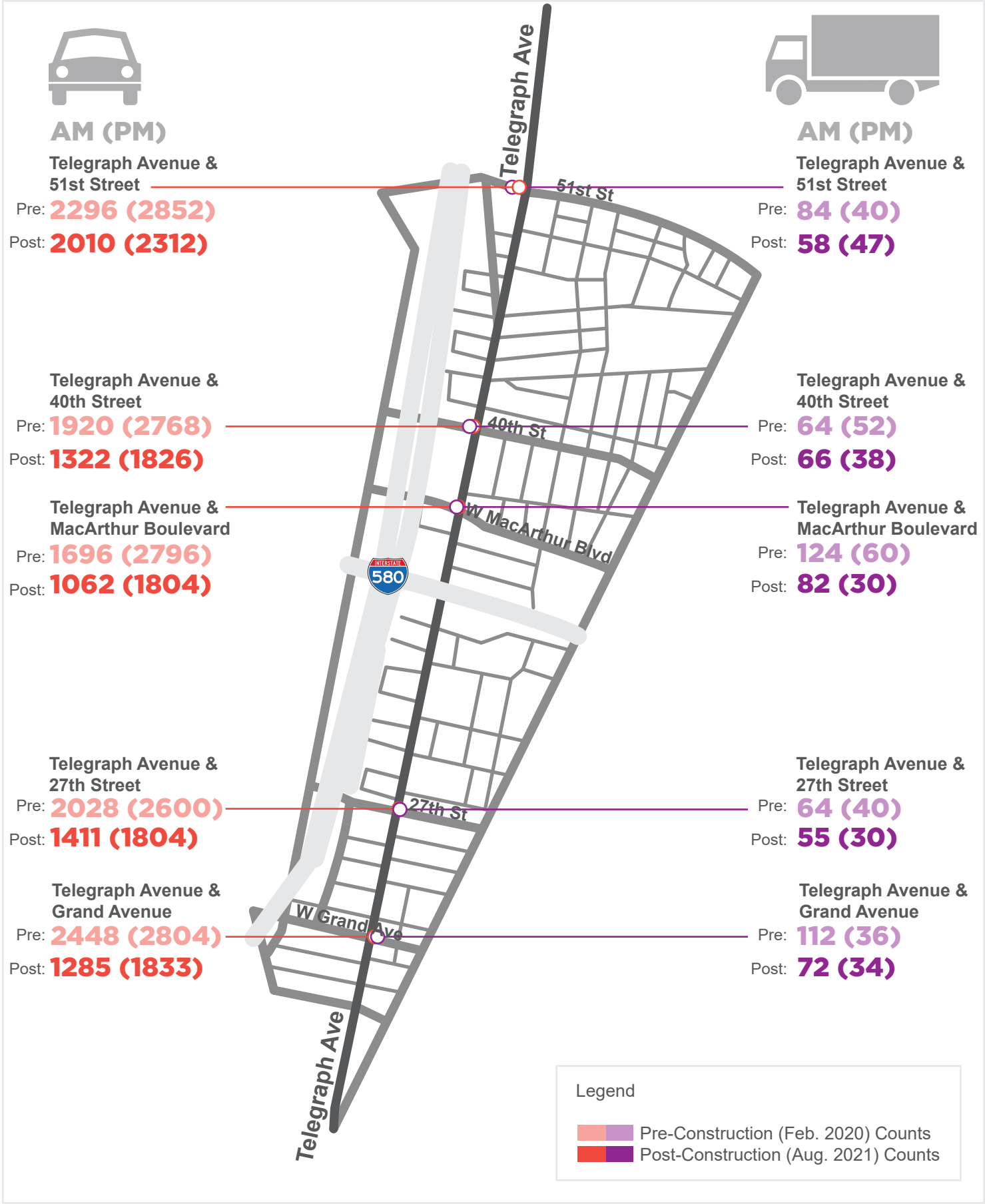

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Figure 2
Vehicle and Heavy Vehicle Peak Hour Intersection Counts
February 2020 vs. August 2021

2. Vehicle ADT

Vehicle average daily traffic (ADT) was measured to identify patterns of vehicle volumes in the three portions of the study area. Counts were collected in each section of the corridor and are representative of each section's ADT. Figure 3 provides an overview of vehicle volumes and speeds collected on the corridor.

Data Collection

- Pneumatic tubes placed between the intersections of 43rd Street and 44th Street (Temescal), 33rd Street and 34th Street (Connecting), and 23rd Street and 24th Street (KONO)
- Manual data reduction to provide an hourly and directional data set of vehicle volumes and to calculate ADT
- Two 24-hour weekday data collection periods

Findings

- **Daily volumes decreased for all three segments.** The largest decrease in ADT was in Temescal, with a 35% decrease in daily volume. Daily volumes decreased in the Connecting Area by 23% and in the KONO area by 26%.
- **The highest ADT of 10,965 was counted in the Temescal segment between 51st Street and MacArthur Boulevard.** Previously, ADT was also highest in the Temescal segment, between 51st Street and MacArthur Boulevard, at 16,809 ADT.

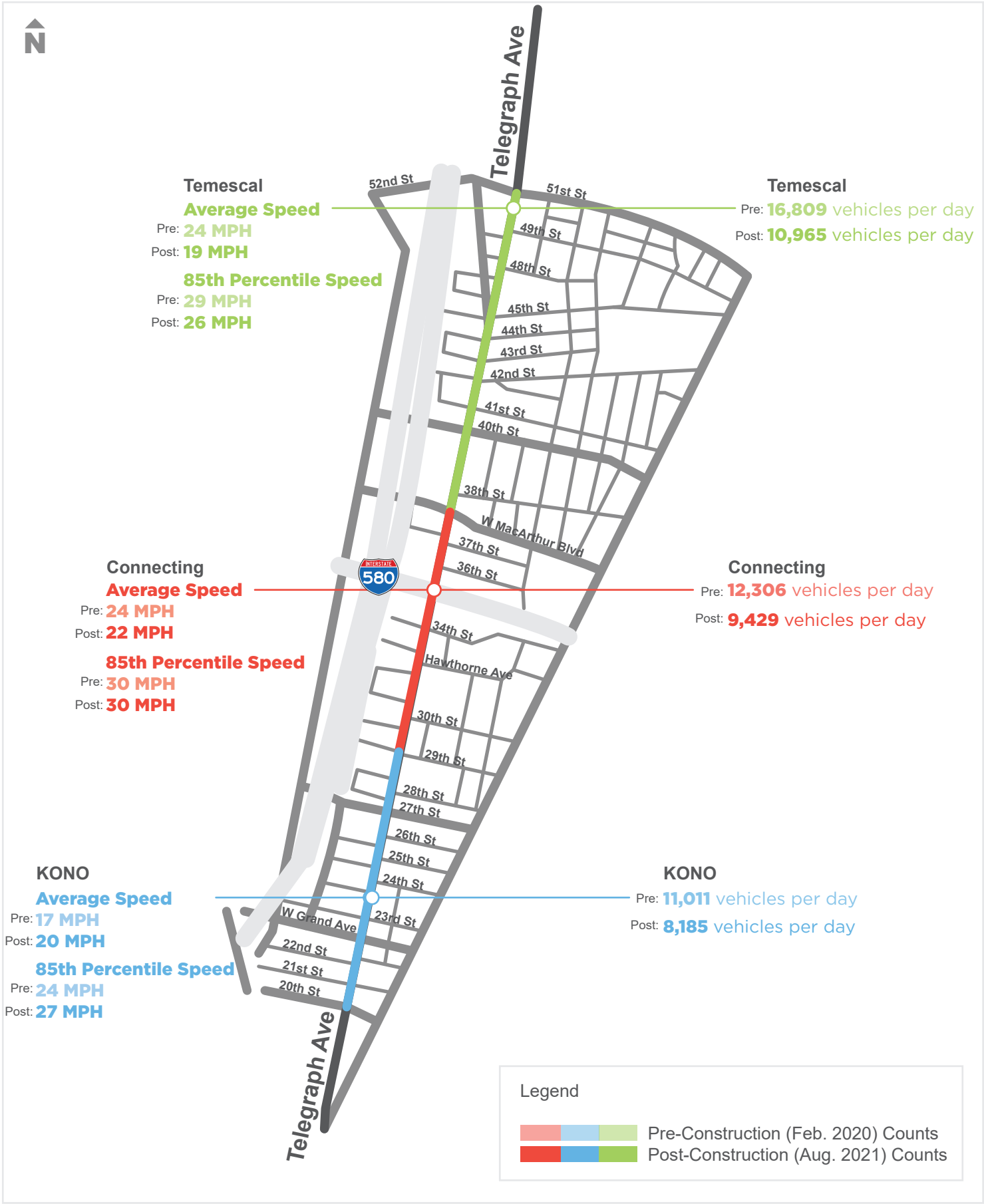

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Figure 3
Vehicle Volumes and Speed
February 2020 vs. August 2021

3. Speed

Vehicle speeds were measured to identify where vehicles were driving at high or unsafe speeds. Speeds were collected in each of the three areas between intersections. Figure 3 provides an overview of vehicle volumes and speeds collected on the corridor. Findings regarding vehicle speeds for each area of the corridor are provided in Table 2 and shows the percentages of vehicles driving either above or below the speed limit. Before construction, the posted speed limit was 25 mph in KONO and 30 mph in Temescal and the Connecting area. With project construction in Temescal, the posted speed limit was reduced to 25 mph in Temescal.

Data Collection

- Pneumatic tubes
- Manual data reduction to provide an hourly and directional breakdown of vehicle speeds
- Two 24-hour weekday data collection periods

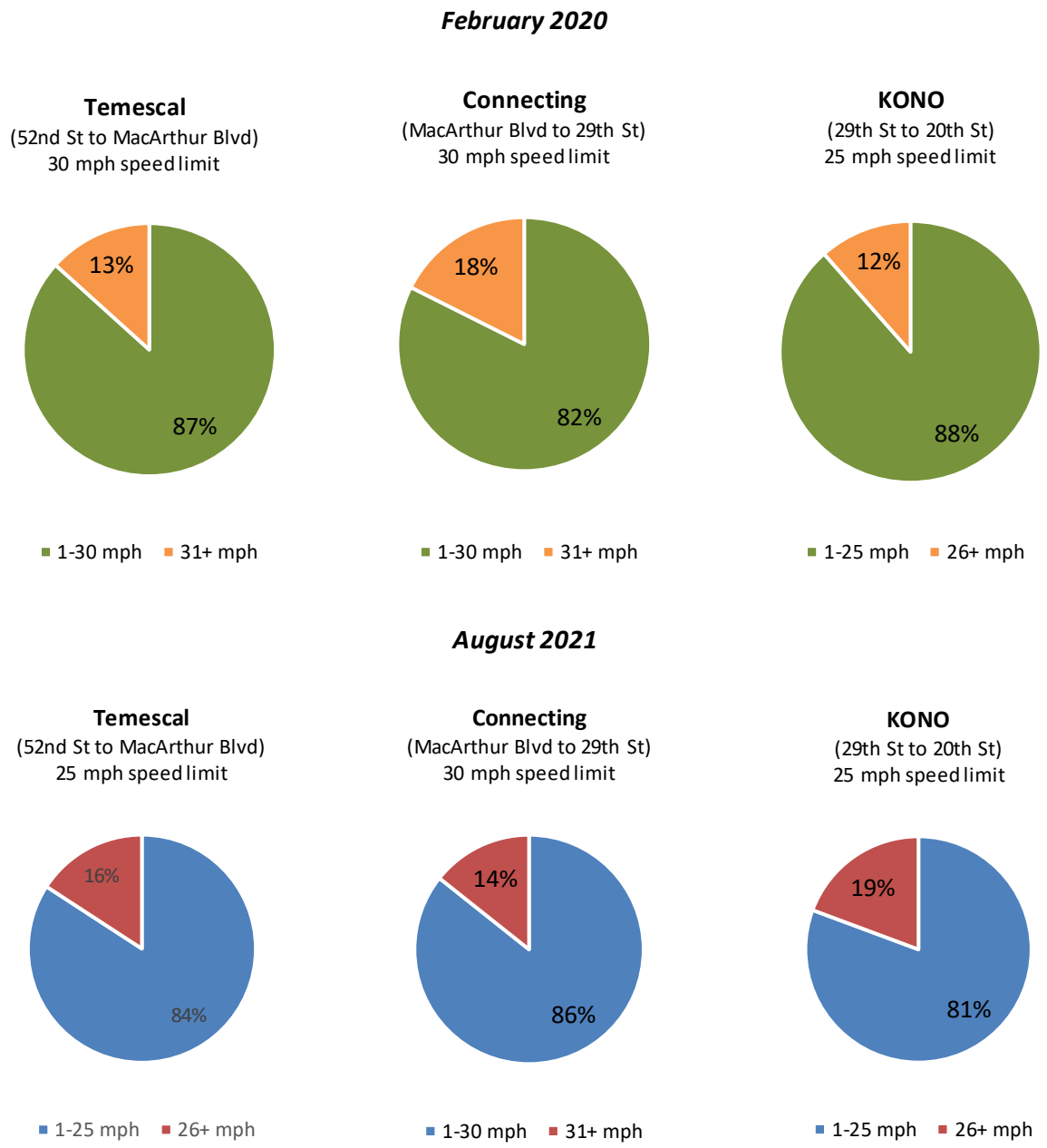
Findings

- **The average speed decreased in the Temescal and the Connecting areas but increased in KONO.** In Temescal, the average speed decreased from 24 mph to 19 mph between pre- and post-construction conditions. In the Connecting area, the average speed decreased from 24 mph to 22 mph between pre- and post-construction conditions. In KONO, the average speed increased from 17 mph to 20 mph between pre- and post-construction conditions.
- **The 85th percentile speed decreased in Temescal, did not change in the Connecting area, and increased in KONO.** In Temescal, the 85th percentile speed decreased from 29 mph to 26 mph between pre- and post-construction conditions. In the Connecting area, the 85th percentile speed was 30 mph in both pre- and post-construction conditions. In KONO, the 85th percentile speed increased from 24 mph to 27 mph between February 2020 and August 2021 conditions.
- **The top recorded speed increased in all three sections of Telegraph Avenue.** Two vehicles were recorded traveling at the top speed, 55 mph, in KONO, compared to two vehicles recorded at 50 mph in February 2020. One vehicle was recorded traveling at the top speed of 65 mph in the Connecting area, compared to seven vehicles recorded at 55 mph pre-construction. One vehicle was recorded traveling at 75 mph in Temescal, compared to two vehicles recorded at 55 mph pre-construction.
- **A greater percentage of vehicles drove at or below the speed limit in the Connecting area compared to the baseline conditions.** In the Connecting area, about 86% of vehicles traveled at or under the speed limit of 30 mph, a slight increase from the baseline evaluation. 84% of vehicles in Temescal and 81% of vehicles in the KONO area drove at or under these areas' speed limit of 25 mph, a slight decrease from baseline conditions. As noted, the posted speed limit was decreased in Temescal as part of project construction.

Table 2: Speed Findings Overview, Pre-Construction (February 2020) vs. Post-Construction (August 2021)

Area	Data Collection Period	Average Speed	85th Percentile Speed	Top Speed (approx.)	Number of Vehicles Driving at Top Speed
Temescal (51st St to MacArthur Blvd)	Feb. 2020	24 mph	29 mph	55 mph	2
	Aug. 2021	19 mph	26 mph	75 mph	1
Connecting (MacArthur Blvd to 29th St)	Feb. 2020	24 mph	30 mph	55 mph	7
	Aug. 2021	22 mph	30 mph	65 mph	1
KONO (29th St to 21st St)	Feb. 2020	17 mph	24 mph	50 mph	2
	Aug. 2021	20 mph	27 mph	55 mph	2

Figure 4: Percentages of Vehicles Driving Above or Below the Speed Limit, Pre-Construction (February 2020) vs. Post-Construction (August 2021)



4. Bicycle-Pedestrian Conflicts at the Boarding Island

Conflicts between bicyclists and pedestrians were evaluated to identify potential points of conflict between them at the boarding island. Bicycle/pedestrian conflicts were observed at the boarding island north of 23rd Street (KONO) and at the boarding island north of 40th Street (Temescal), where AC Transit Lines 6 and 800 stop. Pre-construction data was not collected at the boarding island north of 40th Street and therefore cannot be compared to post-construction results. Table 3 presents the results of bicycle-pedestrian conflicts at boarding islands.

Data Collection

- Video data collection using six camera angles
- Manual data reduction to count the number of pedestrians and bicyclists and interactions between them
- Two-hour weekday data collection in the PM (5pm-7pm) period in August 2021
- Observed number of pedestrians and bicyclists, number of interactions, and interaction types

Findings

- **Only one pedestrian-bicyclist interaction was recorded at either boarding island.** The interaction occurred at the KONO boarding island. There were no close calls at either location. Given the limited number of observations, this analysis was inconclusive.

Table 3. Bicycle and Pedestrian Conflict Results

Area	Data Collection Period	Number of Pedestrians	Number of Bicyclists	Number of Pedestrian-Bicyclist Interactions	Number of Close Calls
Temescal (north of 40th St)	Feb. 2020	--	--	--	--
	Aug. 2021	18	52	0	0
KONO (north of 23rd St)	Feb. 2020	40	82	2	1
	Aug. 2021	24	44	1	0

Note: Pre-construction data was not collected at the boarding island in Temescal.

5. Drivers Yielding to Pedestrians

The instances and rate of drivers yielding to pedestrians was evaluated to understand risks pedestrians face crossing Telegraph Avenue. Driver yielding to pedestrians was observed in marked crosswalks in each area of the corridor. Yielding was measured whenever a pedestrian was in the crosswalk or at the curb ramp facing the street.

In addition to yielding observations, close calls between vehicles and pedestrians were also measured. A close call is an instance when drivers and/or pedestrians make sudden, reactive moves to avoid a collision with one another. Close calls are reported separate from when drivers yield or do not yield and can indicate the degree of safety that pedestrians experience when crossing the street.[3]

Table 4 provides the details of driver yields and close calls in both the AM and PM peak hours. Figure 5 shows the rates of how often drivers yield to pedestrians in each area of the corridor.

Data Collection

- Video data collection using six camera angles
- Manual data reduction to count, time, and classify yield rate events
- Two-hour weekday data collection in the AM (7am-9am) and PM (4pm-6pm) peak period
- Observed number, type, and location of drivers yielding, not yielding, and close calls

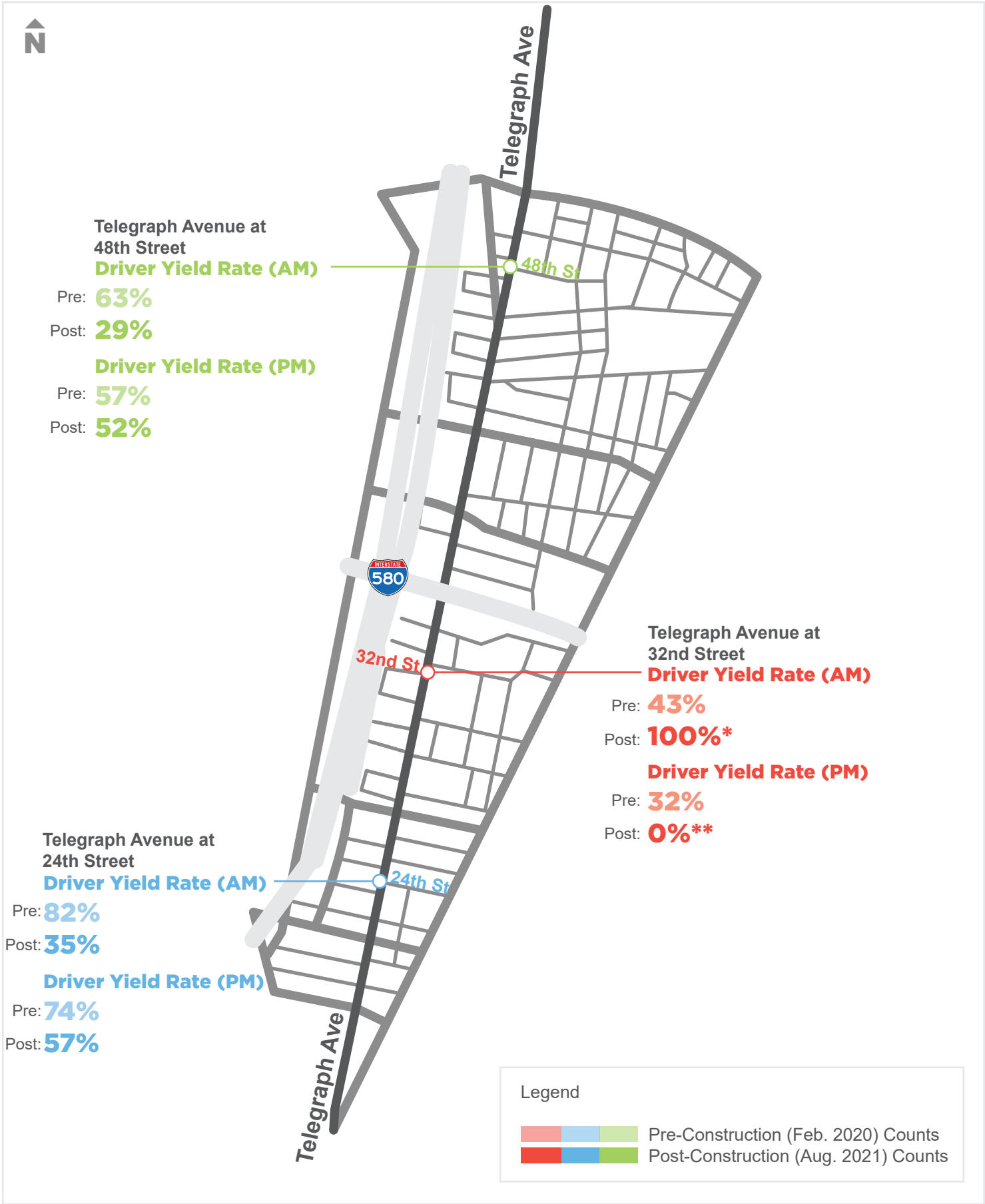
Findings

- **Driver yield rates decreased in Temescal and KONO.** In KONO, 35% of drivers yielded to pedestrians in the AM period, and 57% of drivers yielded to pedestrians in the PM period. This was a significant decrease in drivers yielding to pedestrians compared to baseline conditions, where 82% of drivers yielded to pedestrians in the AM period and 74% of drivers yielded to pedestrians in the PM period. In Temescal, 29% of drivers yielded to pedestrians in the AM period, a significant decrease compared to 63% of drivers who yielded to pedestrians in baseline conditions, and 52% of drivers yielded to pedestrians in the PM period, a small decrease from 57% of drivers who yielded in pedestrians in baseline conditions.
- **Fewer driver-pedestrian close calls were observed at all three locations**. For pre-construction conditions, at least one close call was observed at each location. For post-construction conditions, no close calls were observed at the Temescal and Connecting locations, and the number of close calls in the KONO location decreased significantly.

[3] Close call definition based on the SFMTA Safe Streets Evaluation Handbook's (2018) definition available online: https://www.sfmta.com/sites/default/files/reports-and-documents/2018/10/safestreetsevaluationhandbook_july2018.pdf

Table 4: Drivers Yielding to Pedestrians by Peak Period, Pre-Construction (February 2020) vs. Post-Construction (August 2021)

Marked Crosswalk Location	Data Collection Period	AM Peak Period				PM Peak Period			
		Driver Yields	Driver Does Not Yield	Close Calls	Yield Rate	Driver Yields	Driver Does Not Yield	Close Calls	Yield Rate
Temescal 48th Street	Feb. 2020	5	3	0	63%	37	28	1	57%
	Aug. 2021	4	10	0	29%	23	21	0	52%
Connecting 32nd Street	Feb. 2020	3	4	0	43%	7	15	1	32%
	Aug. 2021	1	0	0	100%	0	2	0	0%
KONO 24th Street	Feb. 2020	18	4	1	82%	103	37	6	74%
	Aug. 2021	14	26	1	35%	48	36	0	57%



*Based on 1 vehicle-pedestrian interactions
**Based on 2 vehicle-pedestrian interactions

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Figure 5
Drivers Yielding to Pedestrians
February 2020 vs. August 2021

6. Vehicle Loading Activity

Vehicle loading activity was evaluated to understand the project's effects on where vehicles are currently loading and unloading on Telegraph Avenue. Vehicle loading activity was observed in the Temescal segment of Telegraph Avenue, between 48th Street and the Temescal Plaza signal. Details on vehicle loading activity findings between 48th Street and Temescal Plaza by the midday and PM peak periods are presented below.

Data Collection

- Video data collection using six camera angles
- Manual data reduction to count, time, and classify loading events
- Two-hour weekday data collection in the Midday (10am-12pm) and PM (5pm-7pm) peak periods
- Observed number, vehicle type, and duration of blockage events

Findings

- **The number of loading events decreased significantly between baseline and project conditions.** There were 16 midday loading events and 29 PM loading events post-construction, compared to 44 midday and 72 PM loading events during baseline conditions. More loading events were observed during the PM than the midday period for both baseline and post-construction conditions.
- **Of all vehicles observed loading, 40% were observed loading in the travel lane, a small decrease between baseline and project conditions.** Of these vehicles, approximately one-quarter were observed loading in the center turn lanes of the roadway, something not observed during baseline conditions. Previously, 48% of vehicles stopped in the travel lane for loading, most of which were on the west side.
- **Of all vehicles observed loading, 60% were observed loading at the curb or in a designated loading zone.** Of these vehicles, 33% were observed loading in designated loading zones and 27% were observed loading at the curb[4], a significant decrease between baseline and project conditions. Previously, 52% of vehicles were observed loading at the curb.
- **The longest loading time decreased significantly from baseline conditions, while median loading times decreased slightly.** Longest loading times in the midday and PM period were 31 minutes and 66 minutes respectively, compared to 113 minutes and 91 minutes during baseline conditions, respectively. Median loading times decreased by about half a minute in the midday and a minute in the PM (Table 5).
- **On average, vehicle loading times were longest at the curb and shortest in the travel lane.** Median loading times at the curb were about 4 minutes in the midday period and 24 minutes

[4] Post-construction, a curb is defined as the area at the parking spaces and flexible posts adjacent to the separated bicycle lanes.

in the PM peak period, while median loading times in the travel lane were under a minute in both the midday and PM peak period (Table 6).

Table 5: Vehicle Loading Activity Between 48th Street and Temescal Plaza by Peak Period, Baseline (February 2020) vs. Post-Construction (August 2021)

	Data Collection	Midday Peak Period	PM Peak Period
Total Loading Events	Feb. 2020	44	72
	Aug. 2021	16	29
Median Loading Time	Feb. 2020	2.61 minutes	2.62 minutes
	Aug. 2021	2.18 minutes	1.85 minutes
Longest Loading Time	Feb. 2020	113 minutes	91 minutes
	Aug. 2021	31 minutes	66 minutes
Share of Passenger Vehicles	Feb. 2020	52%	81%
	Aug. 2021	44%	72%

Table 6. Loading Duration by Location, Post-Construction (August 2021)

Location	Time Period	Minimum Loading Time	Maximum Loading Time	Median Loading Time
Travel Lane	Midday Peak	0.1 minutes	2.8 minutes	0.8 minutes
	PM Peak	0.1 minutes	2.4 minutes	0.5 minutes
Curb	Midday Peak	1.4 minutes	30.6 minutes	3.7 minutes
	PM Peak	5.6 minutes	65.6 minutes	23.5 minutes
Designated Loading Zone	Midday Peak	--	--	--
	PM Peak	0.5 minutes	29.6 minutes	2.0 minutes

Note: there were no vehicles observed loading in designated loading zones during the midday peak period.

SUMMARY

Data was collected in February 2020 and again in August 2021 to compare several metrics before and after construction along Telegraph Avenue. Data collected in August 2021 occurred during the COVID-19 pandemic and may not reflect typical travel patterns in the area, as seen in the significant decrease in total ADT, vehicle, bicycle, and pedestrian counts between the baseline and project conditions. Pedestrian and bicycle volumes remained consistent in Temescal for pre-construction and post-construction conditions, while pedestrian, bicycle, and vehicle volumes decreased significantly in other areas of the corridor. The average speed and 85th percentile speed also decreased in the Temescal compared to baseline conditions. Drivers yielding to pedestrians significantly decreased in the Temescal and KONO areas; however, close calls between drivers and pedestrians decreased in all three areas.

OakDOT recently voted to make the bicycle lanes permanent in the KONO area and should continue to evaluate the Telegraph Avenue corridor for bicycle, pedestrian, and vehicle performance.