



181 WEST HIGH STREET
SOMERVILLE, NJ 08876

908 927 0100 p
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TRAFFIC IMPACT ANALYSIS

FOR

PROPOSED

DUNKIN'

RENOVATION

BLOCK 318, LOT 22
333 NORTH AVENUE EAST (NJ ROUTE 28)
TOWNSHIP OF CRANFORD
UNION COUNTY, NEW JERSEY

MAY 19, 2022

ELIZABETH DOLAN, P.E.
NJ LICENSE No. 37071

RIANNA S. KIRCHHOF, P.E.
NJ LICENSE No. 54558

INTRODUCTION

To support a Use Variance Application, this study has been prepared to evaluate the traffic impacts associated with renovation of the Dunkin' located on westbound North Avenue East in Cranford, Union County. The existing Dunkin' will be razed and a smaller building will be constructed, providing two drive-thru lanes. Interconnection with the adjacent property will be eliminated. The existing full-movement driveway will be maintained on North Avenue East.

Dolan & Dean Consulting Engineers, LLC (D&D) has been commissioned by the applicant to prepare this Traffic Impact Analysis for the proposed Dunkin' renovation. While any redevelopment of the subject property may affect traffic conditions, both the volume and characteristics of that traffic are of important consideration in the evaluation of this application. This report therefore addresses the critical morning peak hour trip generation and driveway operations, and reviews site access, drive-thru design, parking and on-site circulation.



EXISTING CONDITIONS

EXISTING CONDITIONS

The subject property is designated as Block 318, Lot 22 and is also known as 333 North Avenue East. The site is developed with an 1,831 square foot Dunkin' with a full movement driveway on North Avenue East and an interconnection with adjacent Lot 21, which is developed with Dairy Queen, with driveways on both North Avenue East and Elizabeth Avenue. As such, the existing Dunkin' also has access on Elizabeth Avenue.

North Avenue East (herein after referred to as North Avenue) is under NJDOT jurisdiction and is designated as Route 28, an east-west Urban Principal Arterial. One lane is provided per direction and the posted speed limit is 35 miles per hour in the site vicinity. Sidewalks are provided on both sides of North Avenue. NO STOPPING OR STANDING signs are posted along the westbound side of the street, and there is a NJ Transit bus stop on westbound North Avenue just west of the site.

EXISTING TRAFFIC VOLUMES

D&D performed manual turning movement counts at the existing site driveways during weekday mornings when Dunkin' is busiest. Counts were initially conducted on Wednesday, June 16, 2021, from 6:00 a.m. to 9:00 a.m. Figure 1 shows the 2021 morning peak hour Dunkin' trip generation.

An updated count was performed on Wednesday, January 26, 2022 from 6:00 a.m. to 9:00 a.m. The 2022 count included volumes along North Avenue and at the Dairy Queen and Starbucks driveways, as shown on Figure 2.



TRAFFIC CHARACTERISTICS OF THE EXISTING AND PROPOSED USE

Morning peak hour trip generation for the existing Dunkin' is summarized in Table I, based on the two counts performed by D&D.

TABLE I
EXISTING MORNING PEAK HOUR TRIP GENERATION
1,831 SF DUNKIN'

YEAR	ENTER	EXIT	TOTAL
2021	83	81	164
2022	96	95	191

For new developments, and for NJDOT access permitting, trip generation rates compiled by the Institute of Transportation Engineers (ITE) in the 11th Edition of the Trip Generation Manual are referenced. Using ITE data, the following estimates result for the existing 1,831 square foot "Coffee/Donut Shop without Drive-Through Window" and the proposed 648 square foot "Coffee/Donut Shop with Drive-Through Window"

TABLE II
ESTIMATED MORNING PEAK HOUR TRIP GENERATION

USE	ENTER	EXIT	TOTAL
1,831 SF Coffee/Donut Shop Without Drive-Thru (Land Use 936)	93	93	186
648 SF Coffee/Donut Shop With Drive-Thru (Land Use 937)	32	32	64

The actual trip generation recorded at the site is comparable to the estimates derived from the ITE rates. However, the estimates for the proposed, smaller building are unrealistically low. The existing Dunkin' has an established customer base that is not likely to decline with the site renovation. Instead, a slight increase in activity may result with the added convenience of a drive-thru.



However, any additional peak hour traffic will not be significant because many trips to Dunkin are “pass-by” trips. Pass-by trips are trips drawn from the traffic already “passing-by” the site on the adjacent street. ITE and NJDOT provide the following pass-by credits for a coffee/donut shops:

- Morning Peak Hour 63%
- Evening Peak Hour 66%
- Saturday Peak Hour 50%

From a traffic engineering perspective, the site renovation will have a negligible effect on the surrounding roadway network because the site is already generating traffic and any additional trips will primarily consist of pass-by trips.



FUTURE CONDITIONS

An analysis of future driveway activity was performed because alternative access to Elizabeth Avenue will be eliminated.

FUTURE TRAFFIC VOLUMES

Future roadway volumes were projected assuming some level of continued “background” projected development in the area using an annual growth rate as developed by NJDOT for urban accessible principal arterials within Union County. The 2022 existing volumes were increased by 1.0% for a two year build out to develop the 2024 “no-build” volumes, shown in Figure 3. Site traffic was next added to compile the projected “build” volumes, shown in Figure 4.

As shown on Figure 4, future morning peak hour trip generation has been rounded up to 100 entering and 100 exiting trips.

ANALYSIS OF FUTURE CONDITIONS

While traffic volumes provide a measure of activity on the area roadway system, it is also important to evaluate how well that system can accommodate those volumes – i.e., a comparison of peak hour traffic volumes with available roadway capacity. By definition capacity represents the maximum number of vehicles that can be accommodated given the constraints of roadway geometry, environment, traffic characteristics, and controls. Intersections are usually the critical point in any road network since it is at such points that conflicts exist between through, crossing, and turning traffic. It is at these locations where congestion is most likely to occur. A description of intersection Levels of Service is noted below:



INTERSECTION LEVELS OF SERVICE AND DELAY

Level of Service	Signalized Delay per Vehicle (seconds)	Unsignalized Delay per Vehicle (seconds)
A	< 10.0	<0-10
B	>10 and <20	> 10 to <15
C	>20 and < 35	> 15 to <25
D	>35 and < 55	> 25 to <35
E	>55 and < 80	> 35 to <50
F	> 80	>50

A volume/capacity, Level of Service analysis was conducted for the future morning peak hour driveway volumes using the Highway Capacity Manual computer software. As shown on the appended printout, egress movements from the site driveway will operate at an acceptable Level of Service “E” during the weekday morning peak hour. Level of Service “E” translates to a 95th percentile queue of 2 vehicles, which can be fully accommodated at the driveway without impeding on-site traffic flow.

The left-turn movements into the site driveway operate at a Level of Service A, meaning little or no delay for motorists entering the site. As a result, queuing will not result on eastbound North Avenue and there will be limited impact to the eastbound motorists.

Based on this analysis, there is ample capacity available to accommodate site generated traffic.



SITE PLAN REVIEW

The Site Plan by Harbor Consultants Inc. was reviewed with regard to access, on-site circulation and parking.

- Access will be maintained via the existing full-movement driveway on North Avenue. Because alternative access along Elizabeth Avenue will be eliminated, a Major Access Permit is required from NJDOT.
- Upon entering the site, drivers will follow a counterclockwise travel path, to enter the drive-thru lanes or select a parking space. The one-way travel aisle on the east side of the building (between the drive-thru lanes and parking spaces) will measure 24-feet. This is the appropriate width to accommodate movements into and out of the parking spaces without encroaching into the drive-thru queueing area.
- The one-way circulation aisle will measure 12 feet on the west side of the building, to accommodate vehicular travel, where no parking is proposed. The one-way aisle will provide a bypass of the drive-thru operations.
- The loading zone on the north side of the parking lot will allow delivery vehicles to park without obstructing site circulation.
- The Ordinance requires 1 parking space per employee. 5 employees are proposed, and therefore 5 spaces are required. The site plan proposes 8 parking spaces.
- A dual drive-thru has been designed for the Dunkin' to support 15 cars. Such queuing is more than the 8 spaces historically recommended by the ITE and will accommodate higher demands as have occurred due to COVID-19.



ACCIDENT ANALYSIS

Our office requested 5 years (January 2017- January 2022) of crash report data within the general site vicinity (along North Avenue E between Jones Street and Elizabeth Avenue, including the driveways for Dunkin, Dairy Queen, & Starbucks as well as at the intersection of North Avenue East and Elizabeth Avenue), the following has been confirmed:

- In 2017, there were 8 collisions within the site vicinity; 3 sideswipes, 2 rear ends, 2 fixed object and 1 head on. Only 1 of which resulted in injury and 0 collisions occurred at the Dunkin driveway.
- In 2018, there were 10 collisions within the site vicinity; 5 rear ends, 2 sideswipes, 1 rear end/head on, 1 fixed object, and 1 right angle. 3 of these collisions resulted in injury and 0 collisions occurred at the Dunkin driveway.
- In 2019, there were 11 collisions within the site vicinity; 3 sideswipes, 3 rear ends, 3 right angles, 1 head on, and 1 backing. Of the 11 collisions, 1 resulted in injury and 4 of the 11 occurred in or directly in front of the Starbucks driveway. 0 collisions occurred at the Dunkin driveway.
- In 2020, there were 4 collisions within the vicinity of the site; 2 right angles, 1 sideswipe, and 1 rear end. 2 of these collisions resulted in injury and 0 collisions occurred at the Dunkin driveway.
- In 2021, there were 4 collisions within the vicinity of the site; 2 sideswipe, 1 right angle, and 1 rear end. 2 of these collisions resulted in injury and 0 collisions occurred at the Dunkin driveway.

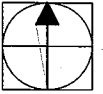


The high number of sideswipes were mostly due to a lane merge that occurs when heading westbound on North Avenue East along the Starbucks site frontage.

No accidents were reported at the Dunkin' during the study period.

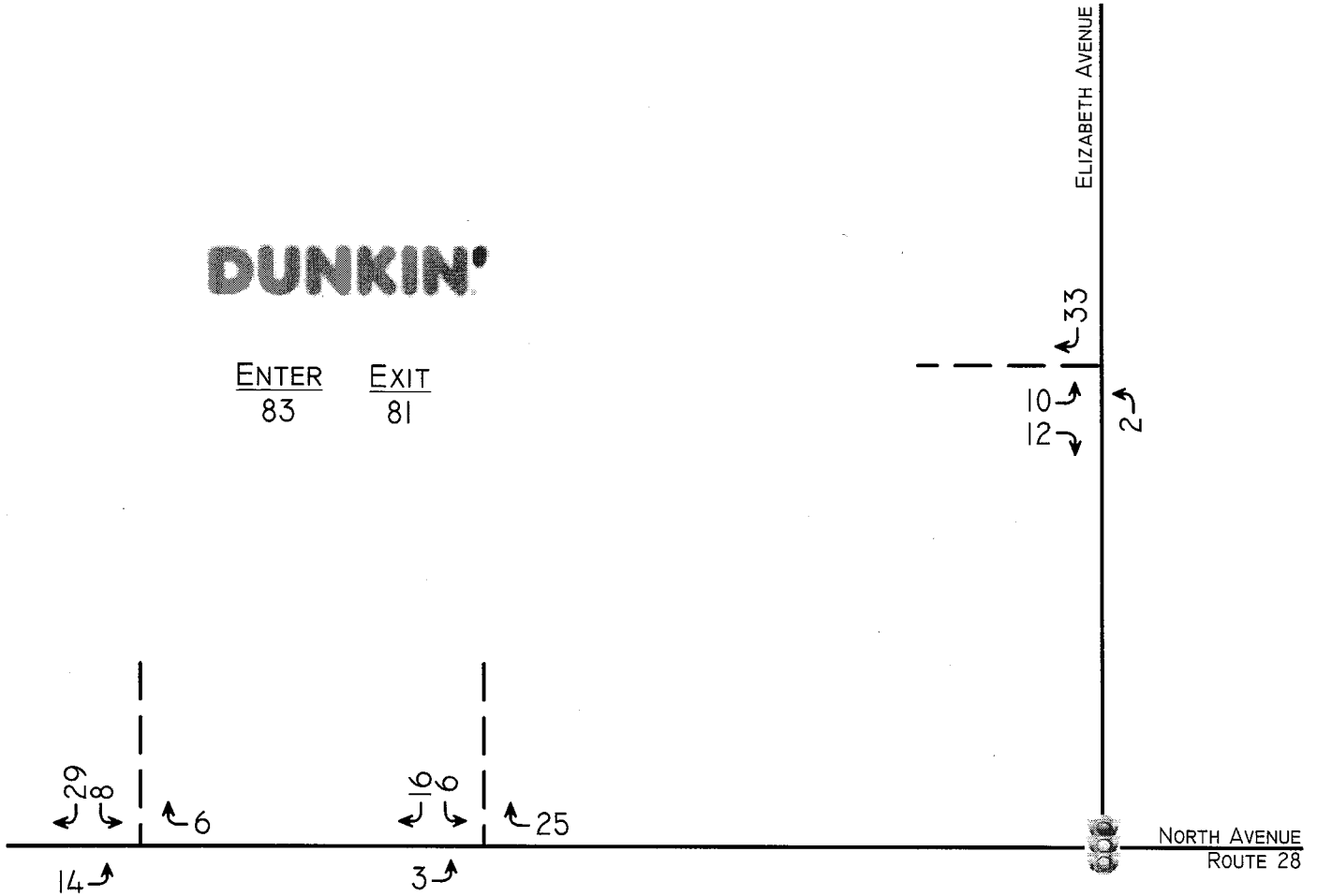
See appended Figures A1 through A5.

TECHNICAL APPENDIX



DUNKIN'

ENTER	EXIT
83	81



Legend

- = Existing Roadway
- = Proposed/Existing Driveway

DUNKIN'
 TOWNSHIP OF CRANFORD
 UNION COUNTY, NEW JERSEY

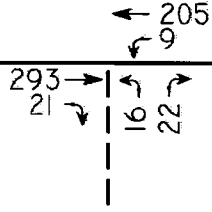
FIGURE I



2021 EXISTING DUNKIN' TRIP GENERATION
 MORNING PEAK HOUR



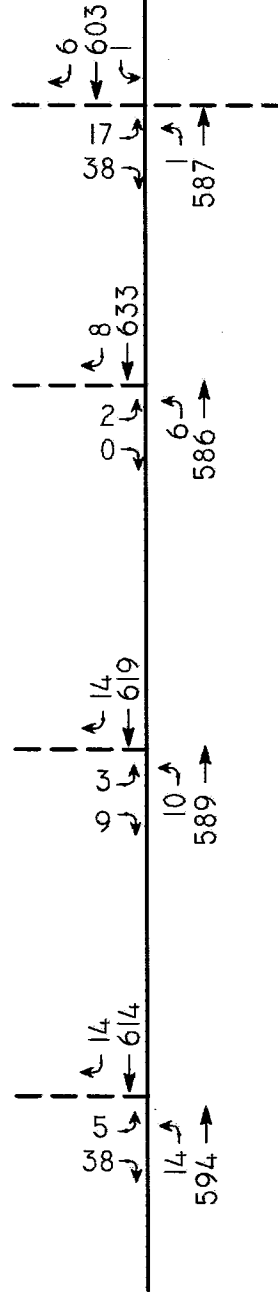
ELIZABETH AVENUE



DUNKIN'
DAIRY
QUEEN

ENTER 96 EXIT 95

STARBUCKS
ENTER 73 EXIT 63



NORTH AVENUE
ROUTE 28

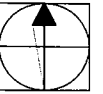
Legend
 — Existing Roadway
 - - - Proposed/Existing Driveway

FIGURE 2

DUNKIN'
TOWNSHIP OF CRANFORD
UNION COUNTY, NEW JERSEY



2022 EXISTING TRAFFIC VOLUMES
MORNING PEAK HOUR



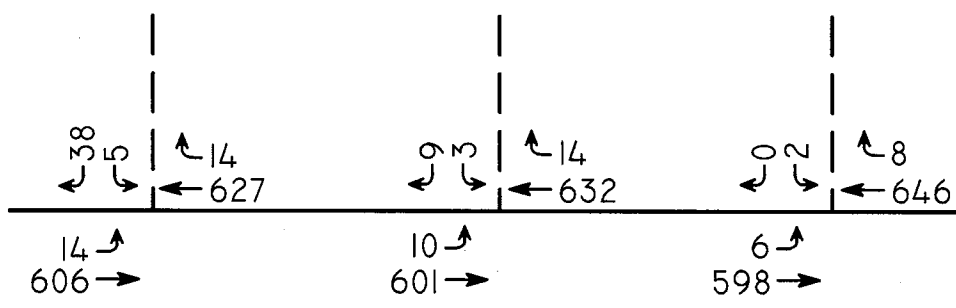
DUNKIN'

ENTER	EXIT
96	95

ELIZABETH AVENUE

21
299
16
22
9
209

NORTH AVENUE
ROUTE 28



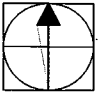
Legend
 — = Existing Roadway
 - - = Proposed/Existing Driveway

DUNKIN'
 TOWNSHIP OF CRANFORD
 UNION COUNTY, NEW JERSEY

FIGURE 3

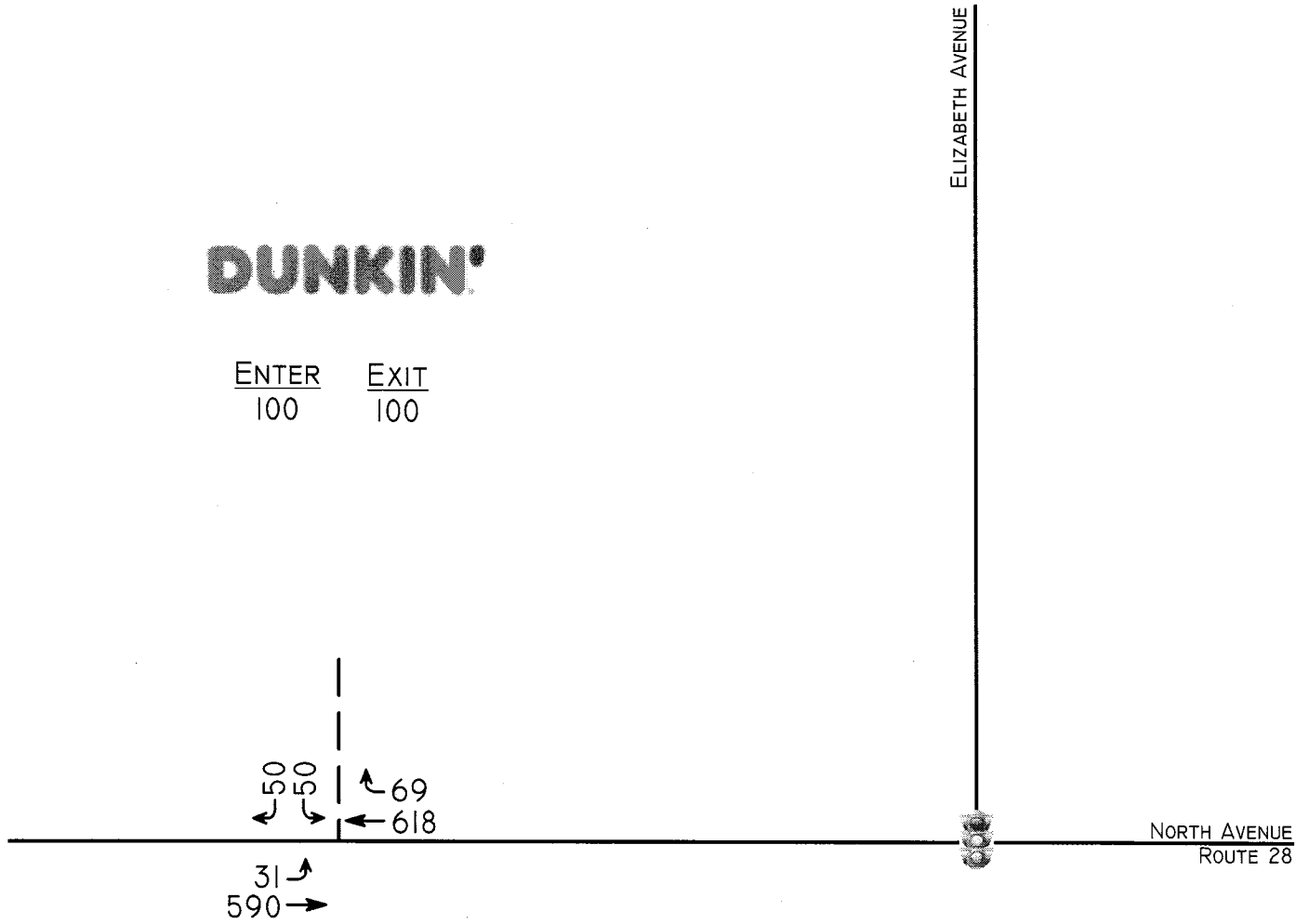


2024 NO BUILD TRAFFIC VOLUMES
 MORNING PEAK HOUR



DUNKIN'

ENTER	EXIT
100	100



NORTH AVENUE
ROUTE 28

Legend

- = Existing Roadway
- = Proposed/Existing Driveway

DUNKIN'
TOWNSHIP OF CRANFORD
UNION COUNTY, NEW JERSEY

FIGURE 4

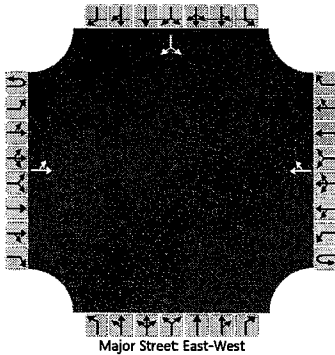


2024 BUILD TRAFFIC VOLUMES
MORNING PEAK HOUR

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	SF	Intersection	North Ave & Site Driveway
Agency/Co.	D&D	Jurisdiction	
Date Performed	4/14/2022	East/West Street	North Avenue East
Analysis Year		North/South Street	Site Driveway
Time Analyzed	Future AM	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

Lanes



Vehicle Volumes and Adjustments

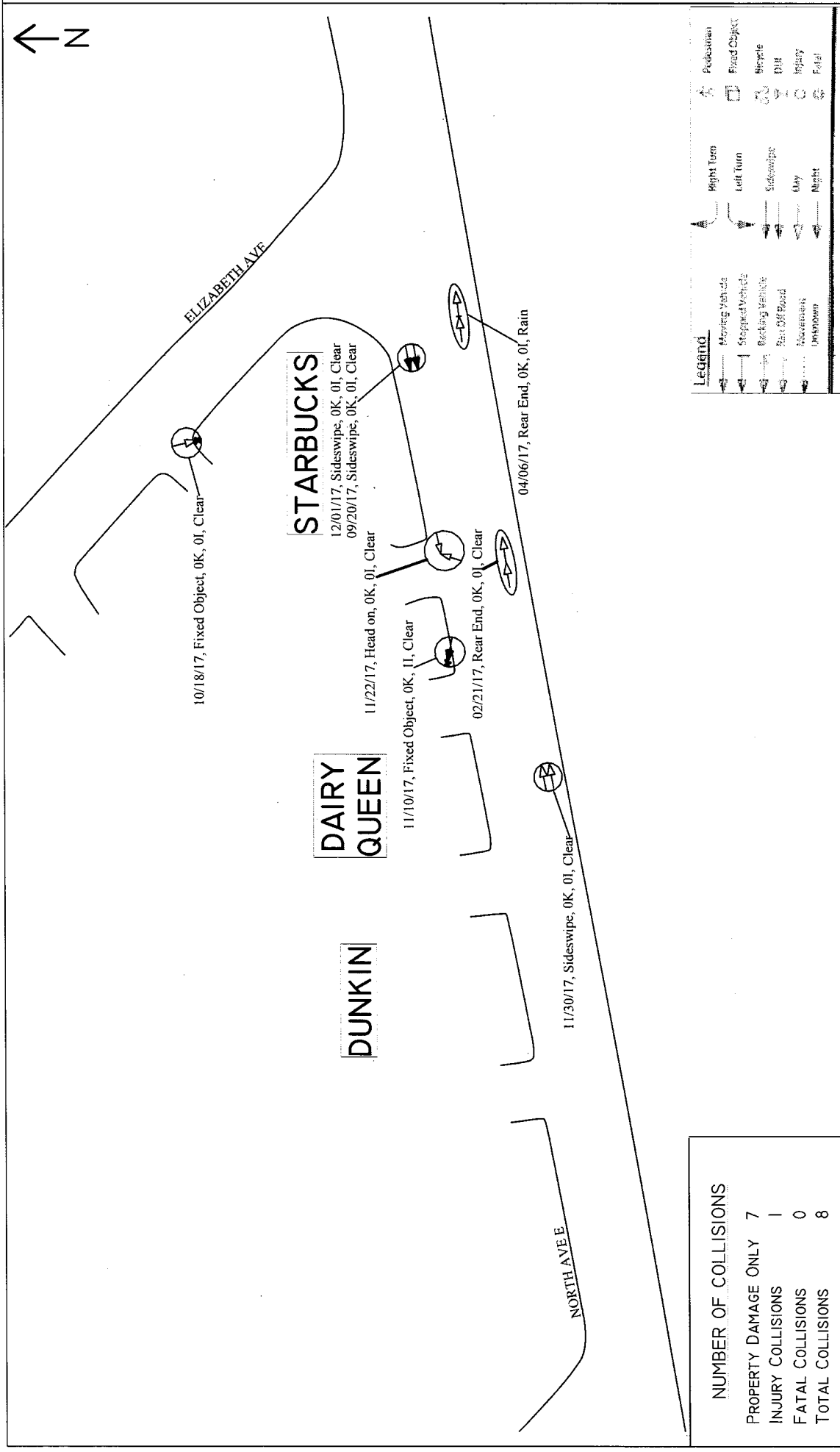
Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		31	590				618	69						50		50
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked		0.000												0.000		0.000
Percent Grade (%)	0															
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		33														106	
Capacity, c (veh/h)		869														221	
v/c Ratio		0.04														0.48	
95% Queue Length, Q ₉₅ (veh)		0.1														2.4	
Control Delay (s/veh)		9.3														35.5	
Level of Service (LOS)		A														E	
Approach Delay (s/veh)		1.0												35.5			
Approach LOS														E			



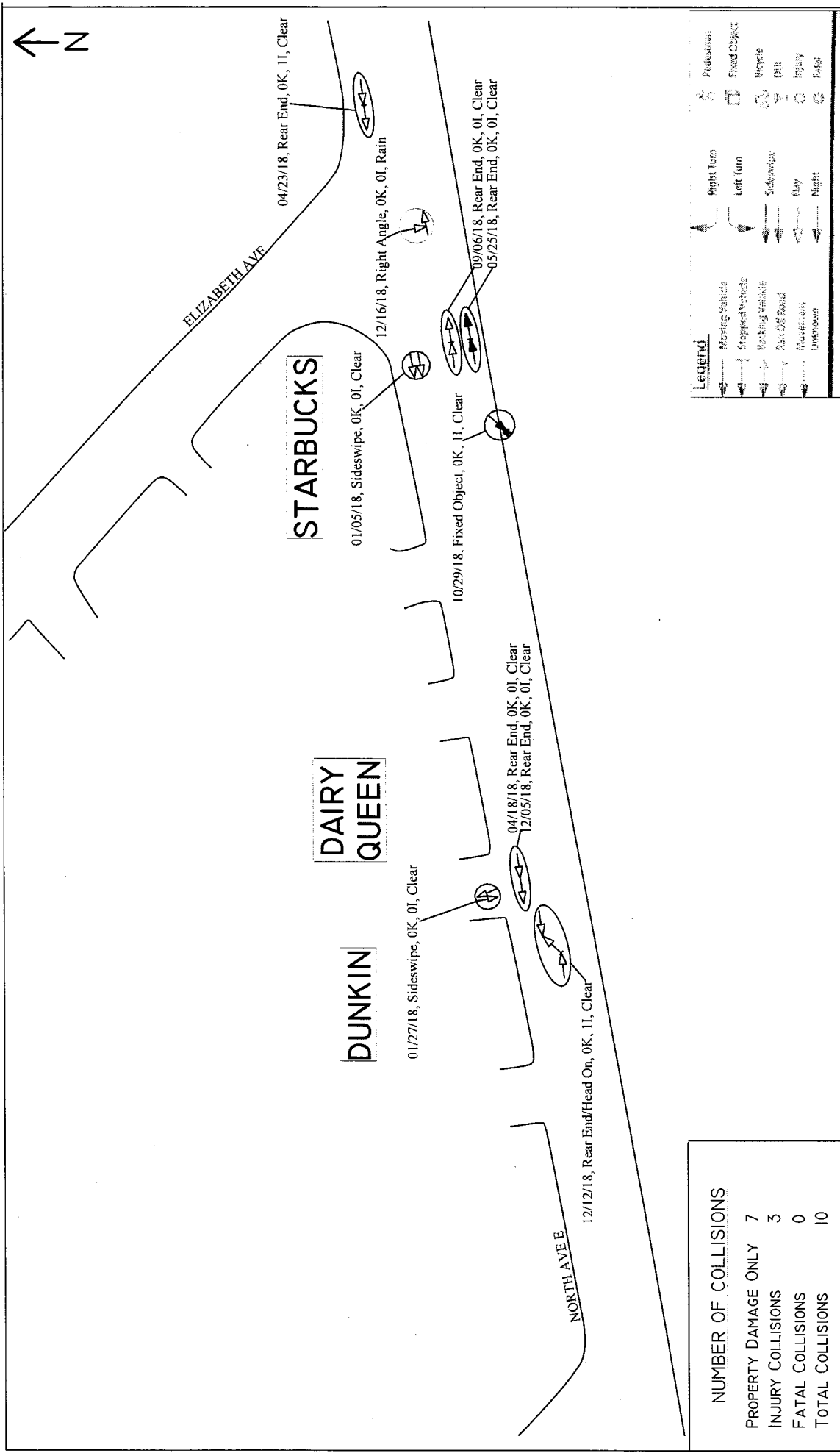
NUMBER OF COLLISIONS	
PROPERTY DAMAGE ONLY	7
INJURY COLLISIONS	1
FATAL COLLISIONS	0
TOTAL COLLISIONS	8

FIGURE A1

COLLISION DIAGRAM
JANUARY 2017 - JANUARY 2018

DUNKIN'
 TOWNSHIP OF CRANFORD
 UNION COUNTY, NJ





Legend

	Moving Vehicle		Pedestrian
	Stopping Vehicle		Fixed Object
	Backing Vehicle		Bicycle
	Set Off Road		Hit
	Movement		Injury
	Unknown		Fatal
	Night Turn		
	Left Turn		
	Sideswipe		
	Blay		
	Night		

NUMBER OF COLLISIONS	
PROPERTY DAMAGE ONLY	7
INJURY COLLISIONS	3
FATAL COLLISIONS	0
TOTAL COLLISIONS	10

FIGURE A2

COLLISION DIAGRAM
JANUARY 2018 - JANUARY 2019

DUNKIN'
TOWNSHIP OF CRANFORD
UNION COUNTY, NJ



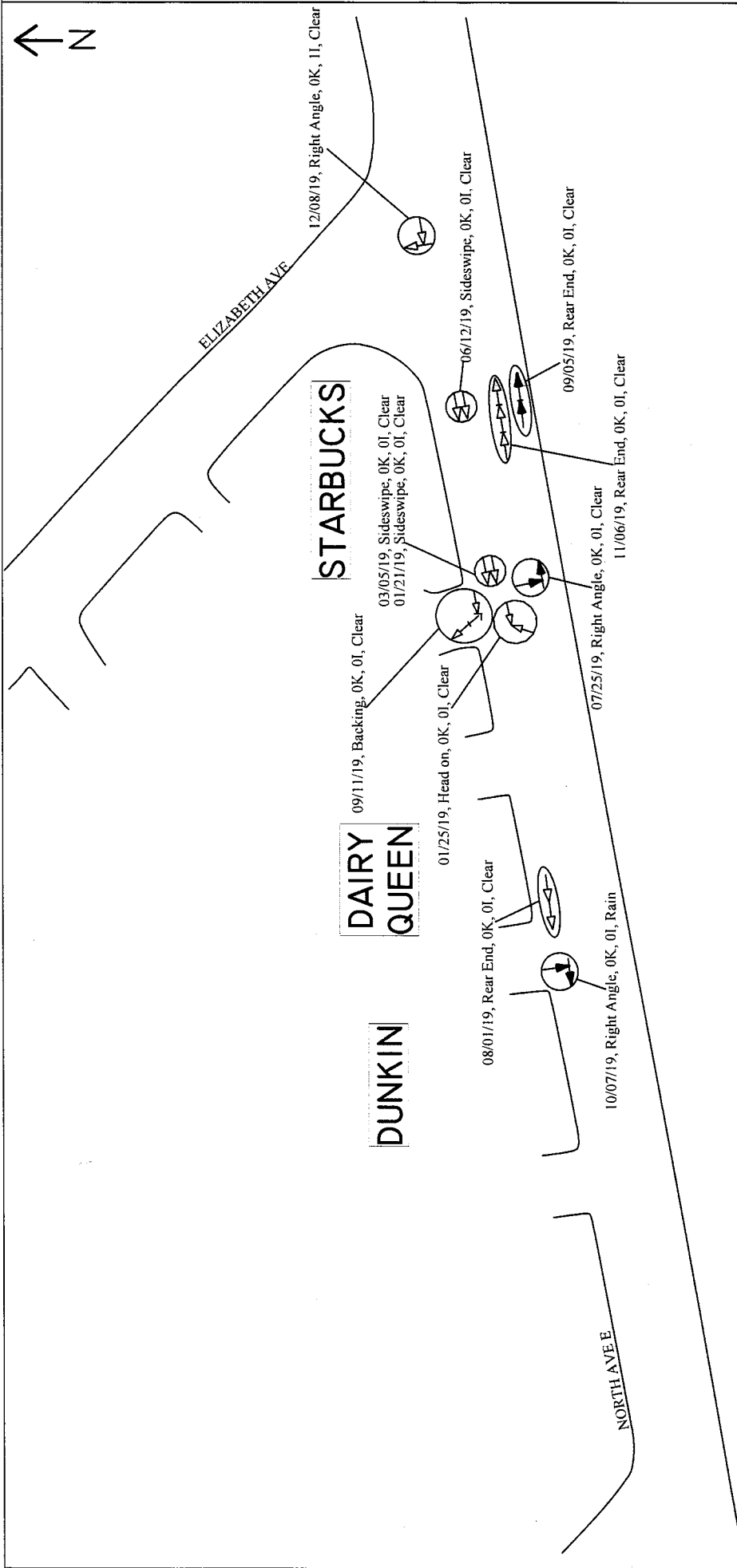


FIGURE A3

COLLISION DIAGRAM
JANUARY 2019 - JANUARY 2020

DUNKIN'
TOWNSHIP OF CRANFORD
UNION COUNTY, NJ



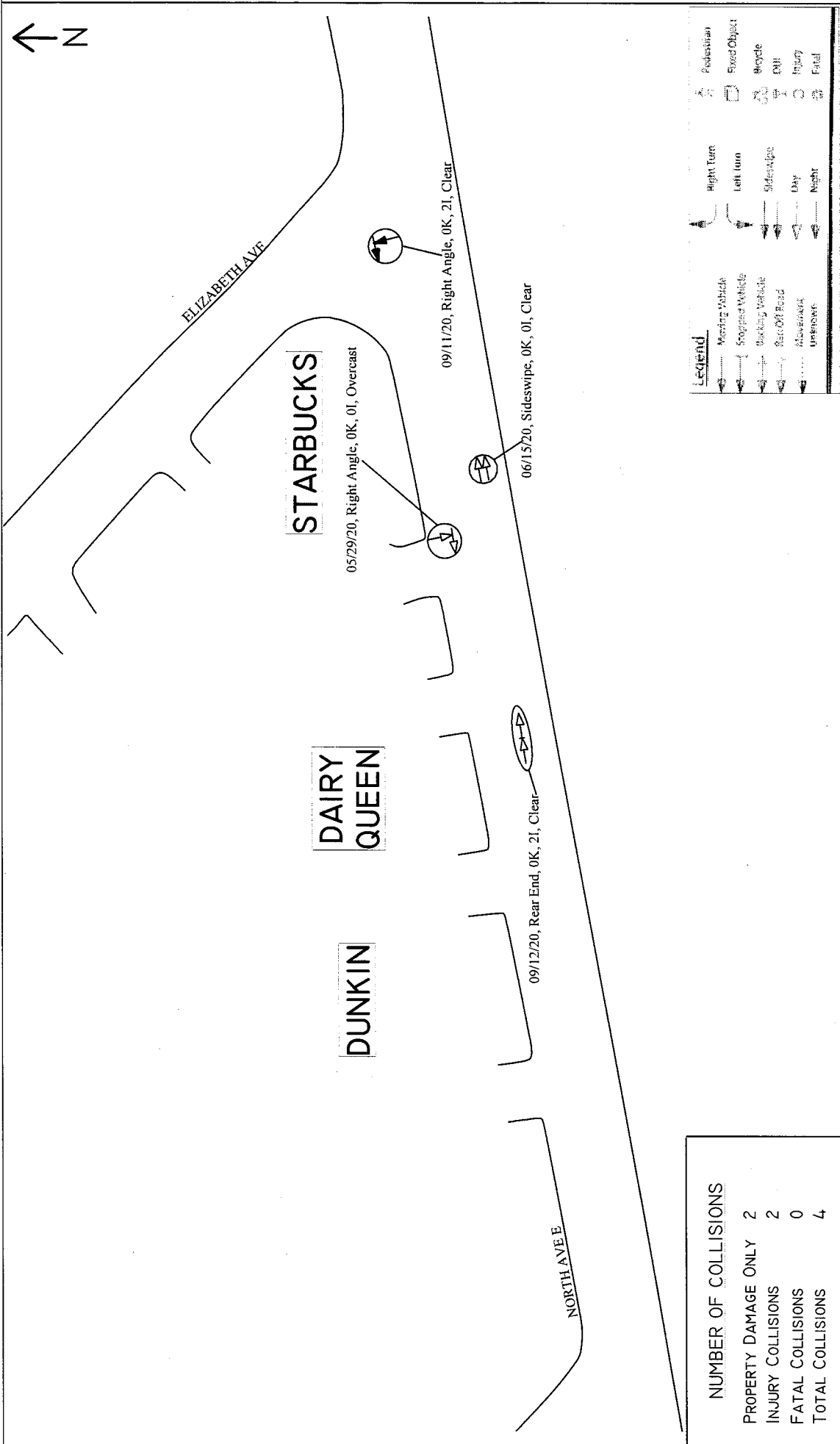


FIGURE A4

COLLISION DIAGRAM
JANUARY 2020 - JANUARY 2021

DUNKIN'
TOWNSHIP OF CRANFORD
UNION COUNTY, NJ



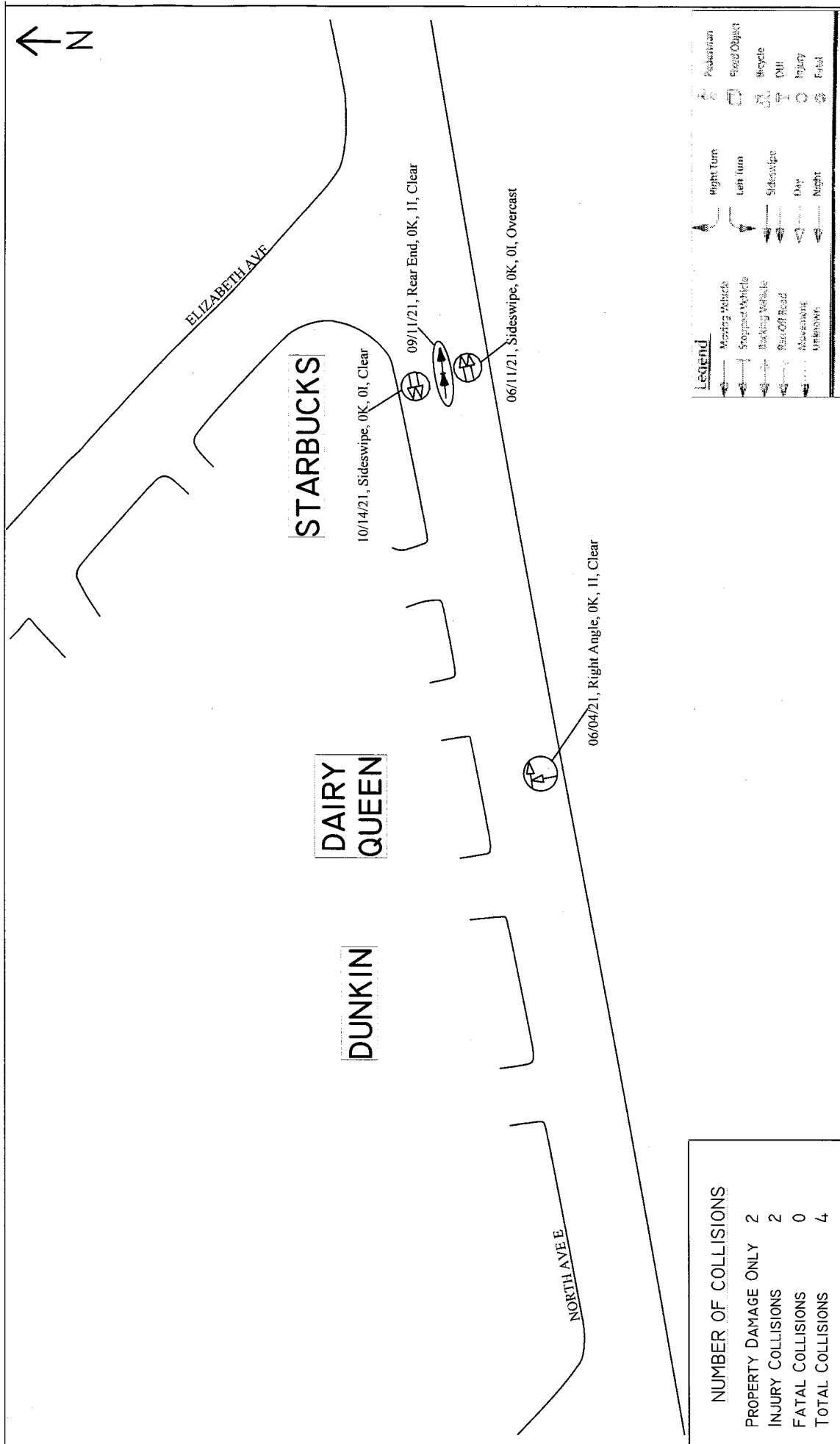


FIGURE A5

COLLISION DIAGRAM
JANUARY 2021 - JANUARY 2022

DUNKIN'
TOWNSHIP OF CRANFORD
UNION COUNTY, NJ

