

TIMING PLAN SCHEDULE

TS- 251-H

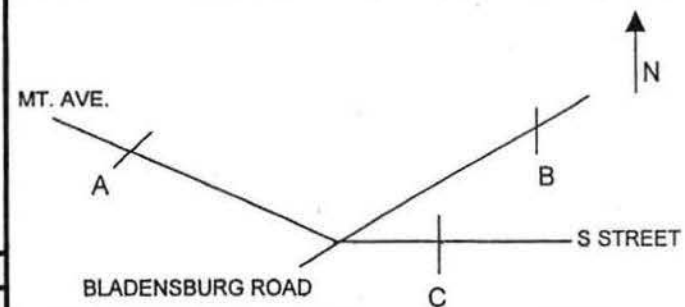
BLADENSBURG ROAD, MONTANA AVENUE, AND S STREET N.E.

LOCATION

PLAN	PERIOD	DATE
1	OFF PEAK - 80	
2	AM PEAK - 100	
3	PM PEAK - 80	
4	OFF PEAK - 100	
5	AM PEAK - 100	
6	PM PEAK - 100	
7	AM PEAK - 120	
8	PM PEAK - 120	

DEPARTMENT OF PUBLIC WORKS
WASHINGTON, D.C.
BUREAU OF TRAFFIC SERVICES

S-DRAWING NO: 149-B SHEET: 1



CONTROLLER INSUM ACISA

170 613 3142

TIMING PLAN NUMBER

DESCRIPTION

INTERVAL

BLAD ROAD		MT. AVE	S ST.	PEDESTRIANS			TYPE	NUMBER	1		2		3		4		5		6		7		8					
NB	SB			A	B	C			S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C
← G	R	R →	R	DW	DW	FW	F	1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
← G	R	R →	R	DW	DW	FW	V	2	10	16	19	25	13	19	10	16	19	25	13	19	19	25	13	19				
G ← Y	R	R →	R	DW	DW	FW	F	3	4	20	4	29	4	23	4	20	4	29	4	23	4	29	4	23				
G	G	R	R	FW	DW	FW	F	4	6	26	6	35	6	29	6	26	6	35	6	29	6	35	6	29				
G	G	R	R	FW	DW	FW	V	5	9	35	18	53	8	37	19	45	18	53	28	57	38	73	48	77				
G	G	R	R	FDW	DW	FW	F	6	7	42	7	60	7	44	7	52	7	60	7	64	7	80	7	84				
G	G	R	R	FDW	DW	FDW	F	7	4	46	4	64	4	48	4	56	4	64	4	68	4	84	4	88				
Y	Y	R	R	DW	DW	DW	F	8	4	50	4	68	4	52	4	60	4	68	4	72	4	88	4	92				
R	R	R	R	DW	DW	DW	F	9	2	52	2	70	2	54	2	62	2	70	2	74	2	90	2	94				
R	R	G	G	DW	FW	DW	F	10	6	58	6	76	6	60	6	68	6	76	6	80	6	96	6	100				
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R	R	G	G	DW	FDW	DW	F	12	14	74	14	94	14	74	14	94	14	94	14	94	14	114	14	114				
R	R	Y →	Y	DW	DW	DW	F	13	4	78	4	98	4	78	4	98	4	98	4	98	4	118	4	118				
R	R	R →	R	DW	DW	DW	F	14	2	80	2	100	2	80	2	100	2	100	2	100	2	120	2	120				

CYCLE LENGTH

80 100 80 100 100 100 120 120

OFFSET

56 92 19 56 89 46 74 46

PREPARED BY:

EDMOND SHEFFIELD

DATE TO SHOP:

NJ NJ NJ NJ NJ

WORK OR SHOP ORDER NO.

Q-3209-A

APPROVED BY:

WM WM WM WWM WWM WWM WWM WWM

DATE INSTALLED:

2/23/04 2/23/04 2/23/04 2/23/04 2/23/04

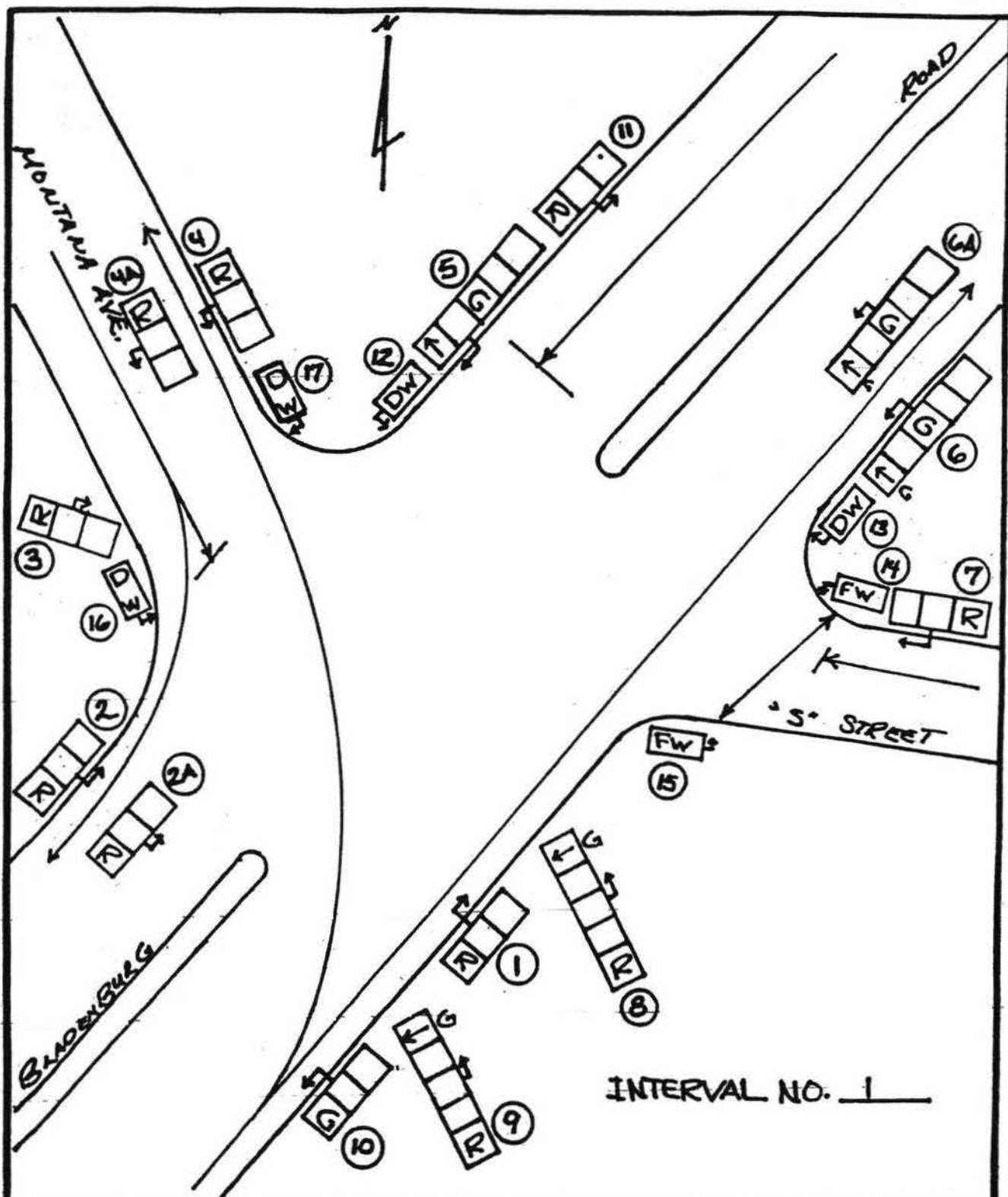
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TRP TRP TRP TRP TRP

S=Seconds C=Cummulative secs

○ = Force Off (circle the interval)

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BLADENBURG ROAD, MOUNTAIN AVENUE & S STREET N.E.

DEPARTMENT OF PUBLIC WORKS, D.C.
 BUREAU OF TRAFFIC SERVICES
 TRAFFIC SIGNAL SYSTEM DIVISION

CHECKED BY _____ DATE _____

DRAWN BY S. S. BABRA DATE _____

IN SERVICE _____ SCALE NONE

DESIGNED BY: EDWARD K. SHEFFIELD

SUBMITTED BY: _____
 CHIEF, SIGNAL DESIGN BRANCH

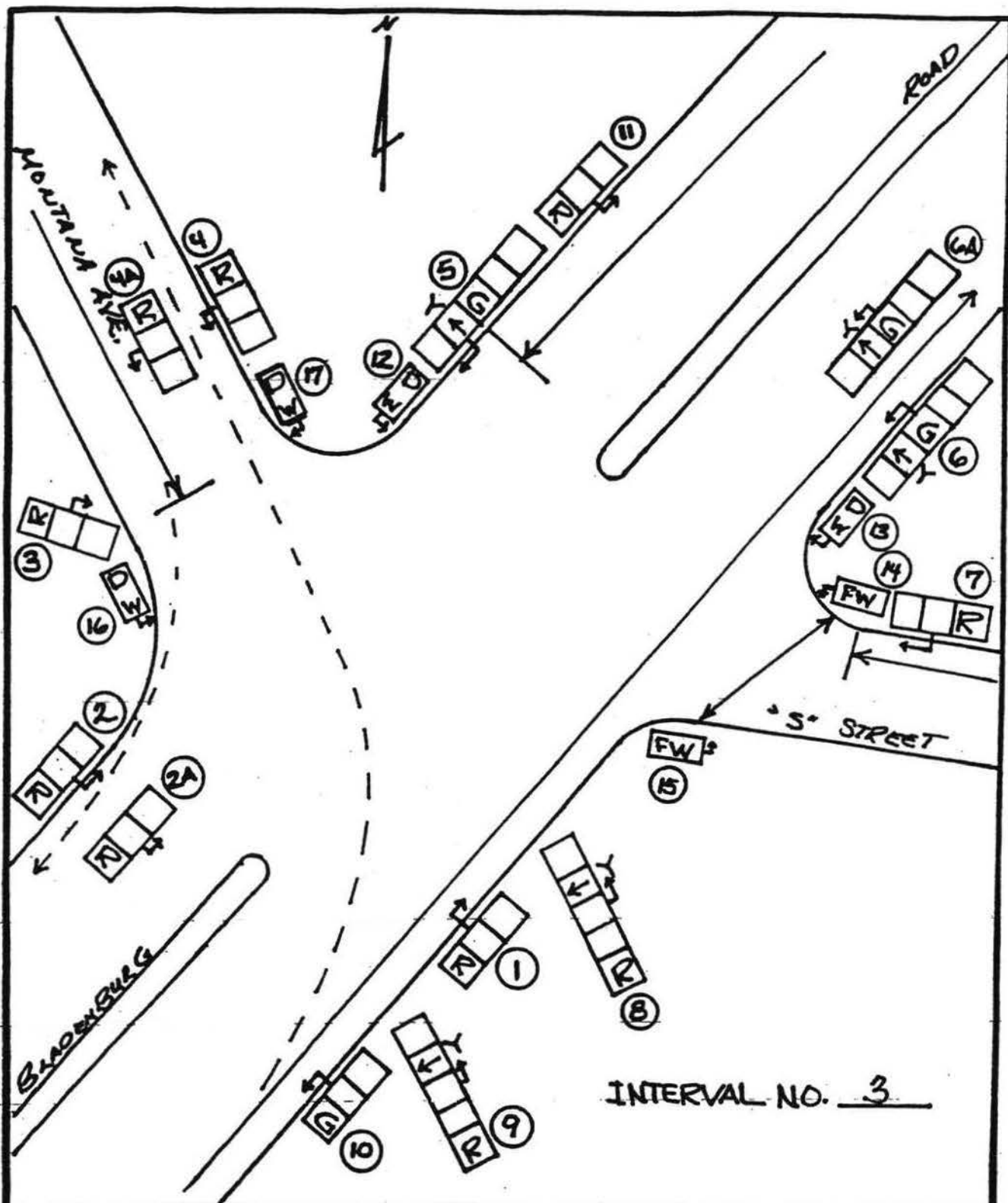
APPROVED BY: William W. McLaughlin 8/31/93
 DIVISION CHIEF

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1 of 14



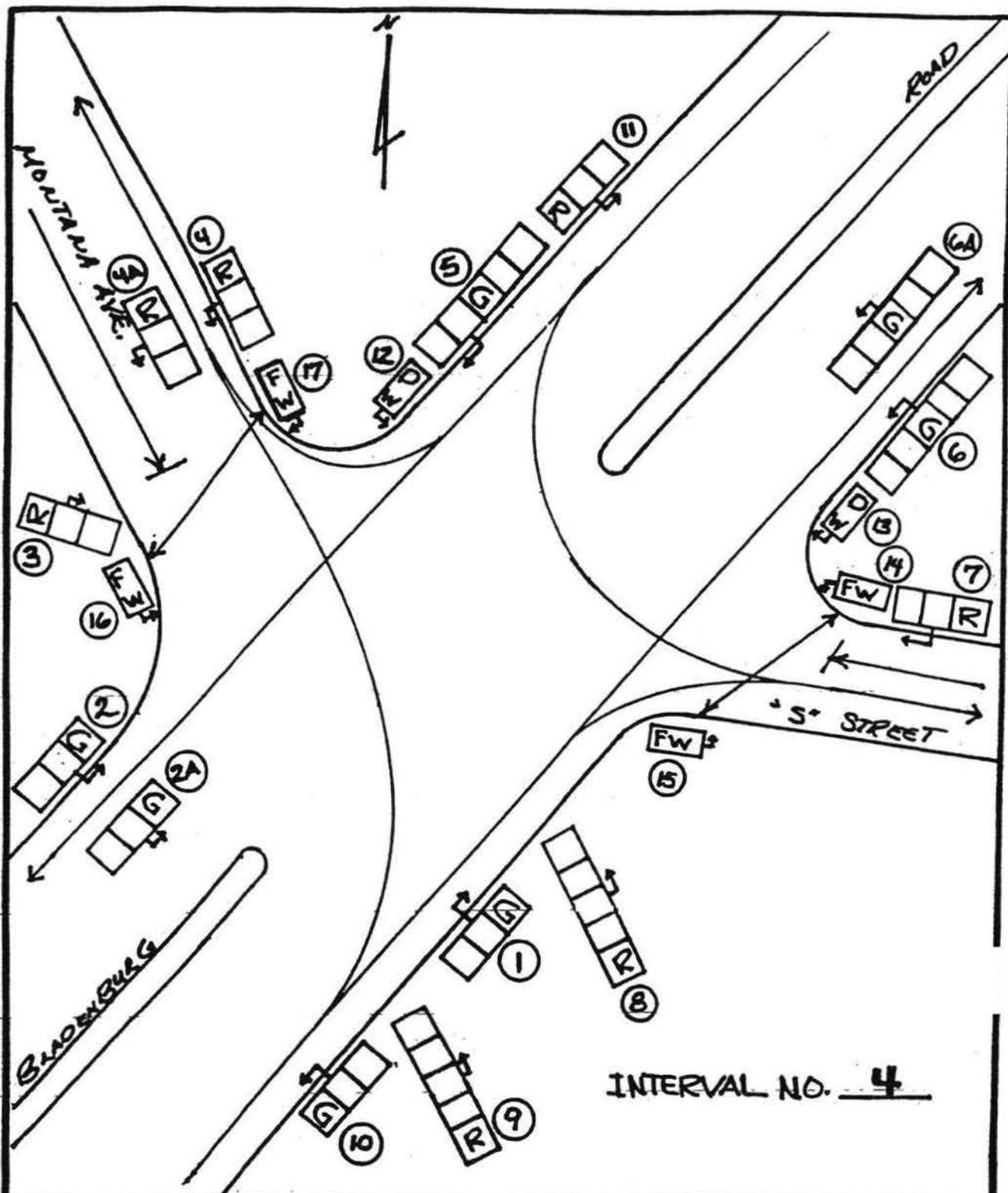
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SUBMITTED BY:	CHIEF, SIGNAL DESIGN BRANCH
APPROVED BY:	DIVISION CHIEF

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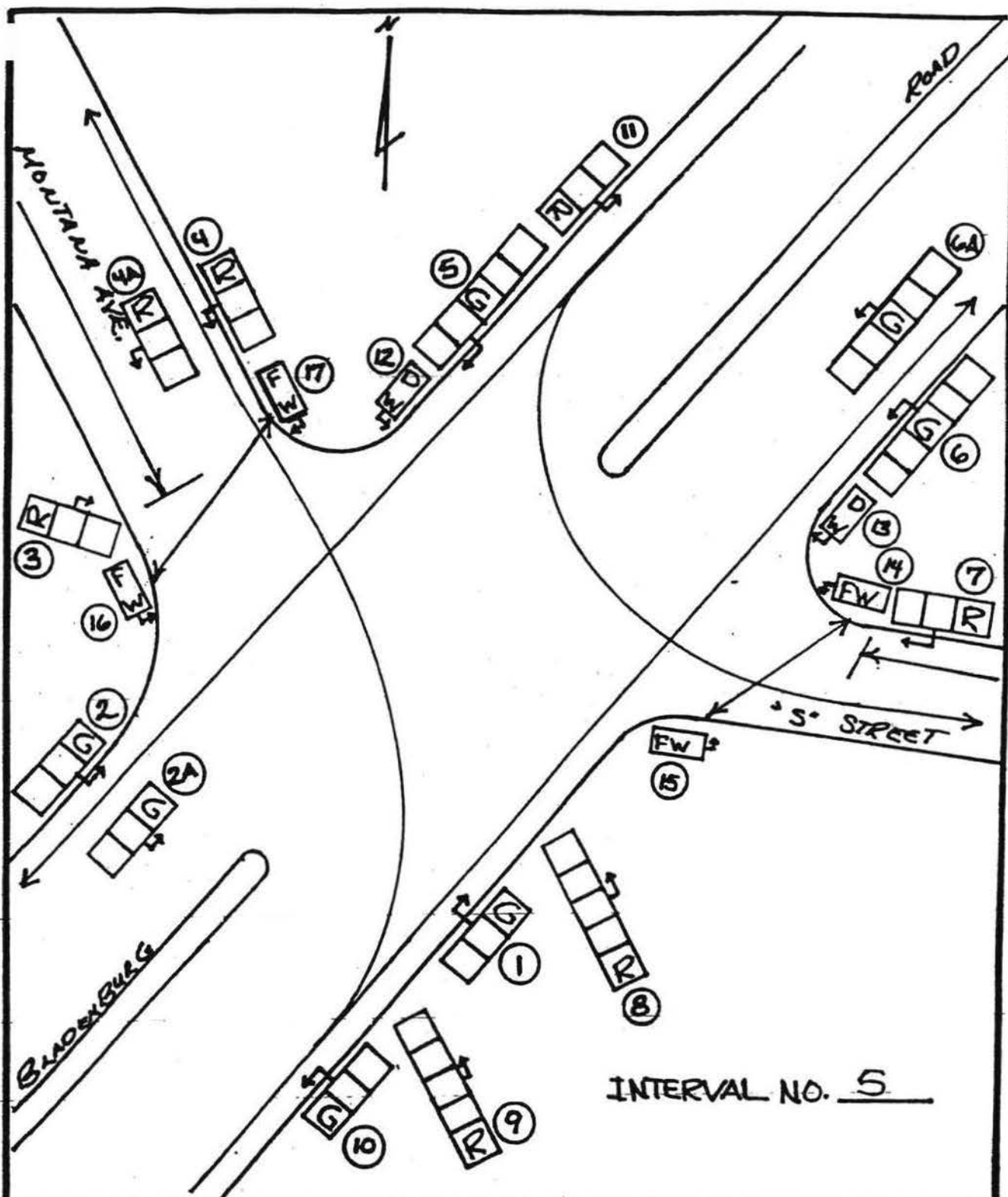
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APPROVED BY:	DIVISION CHIEF

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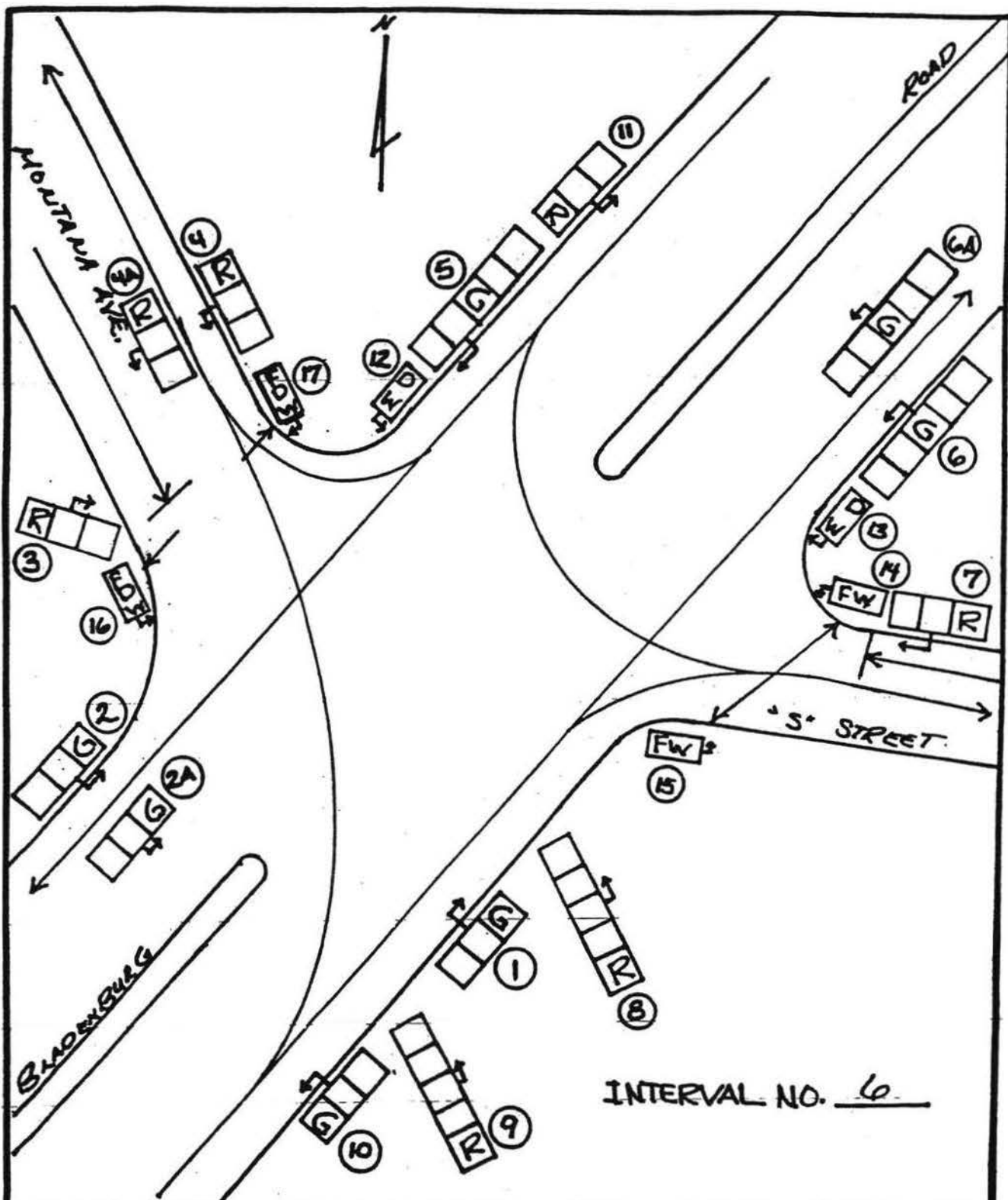
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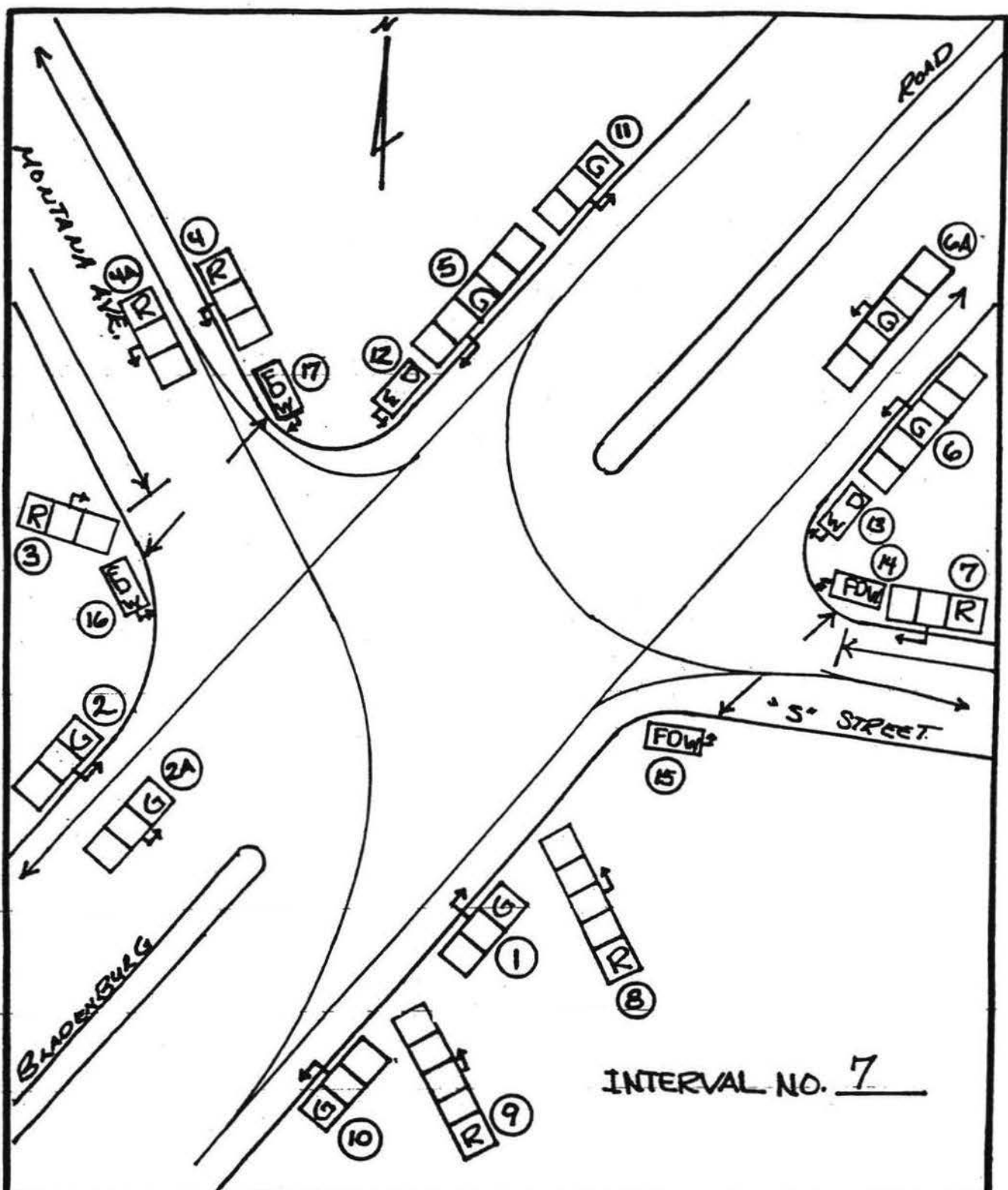
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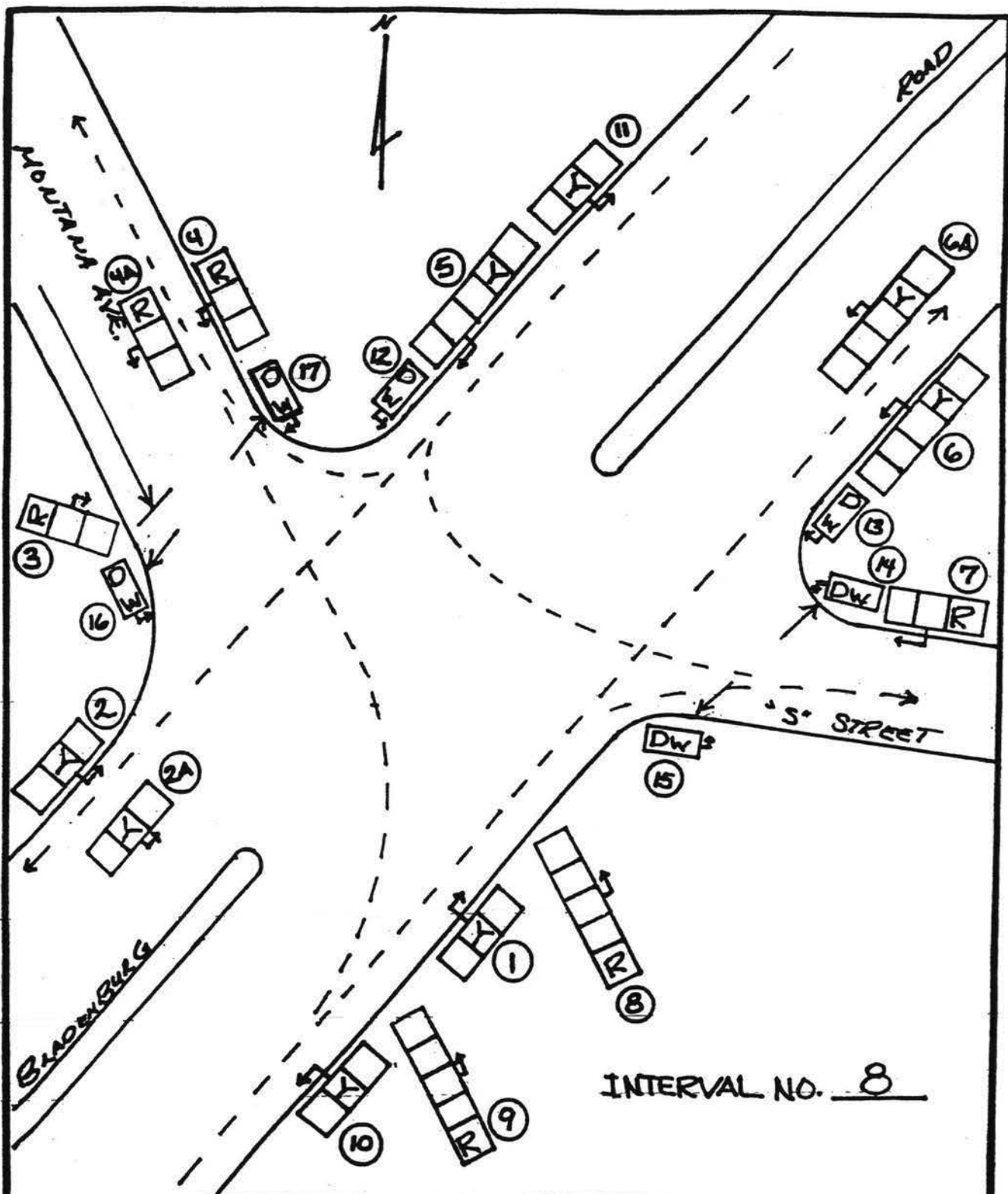
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APPROVED BY:	DIVISION CHIEF

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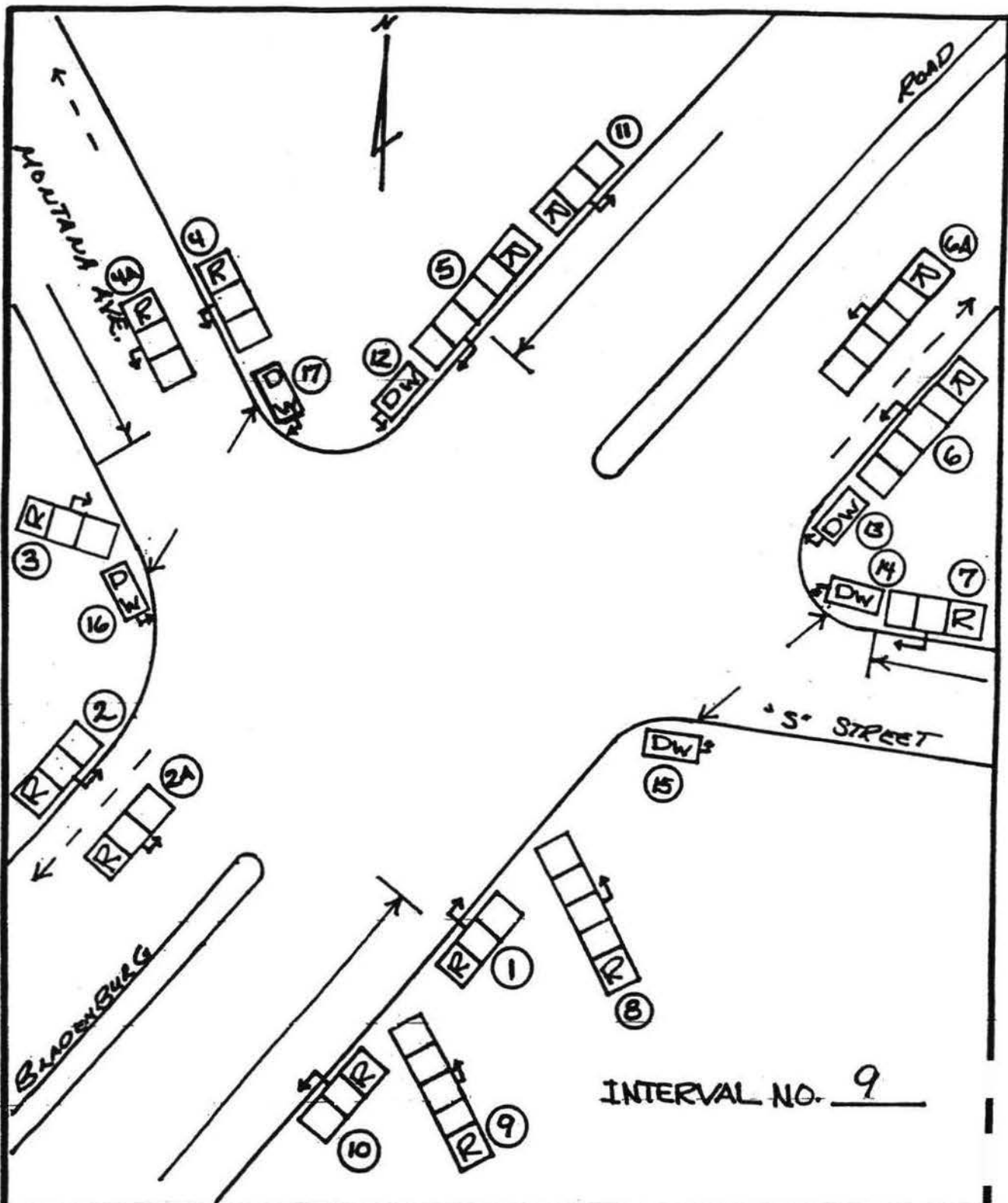
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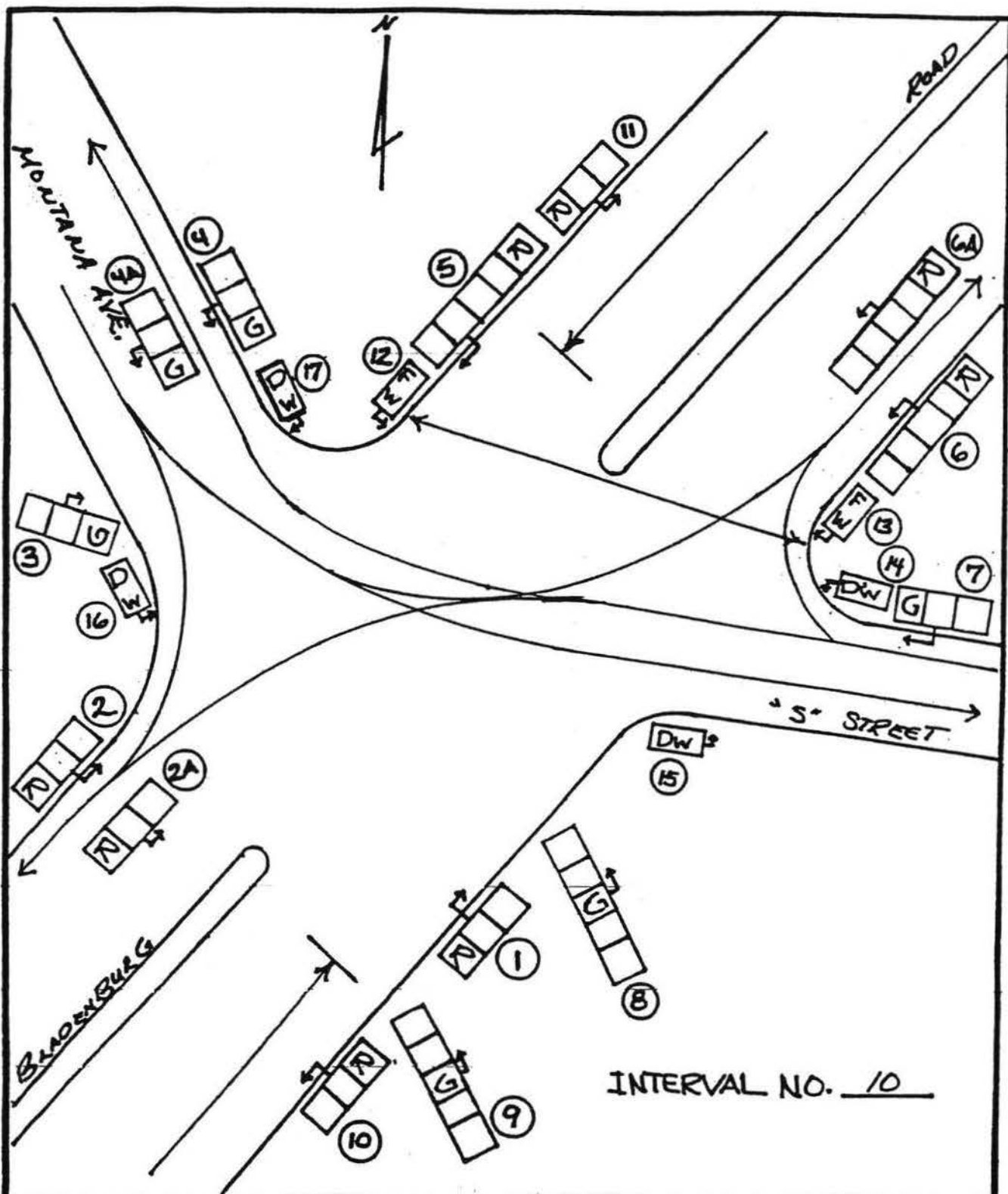
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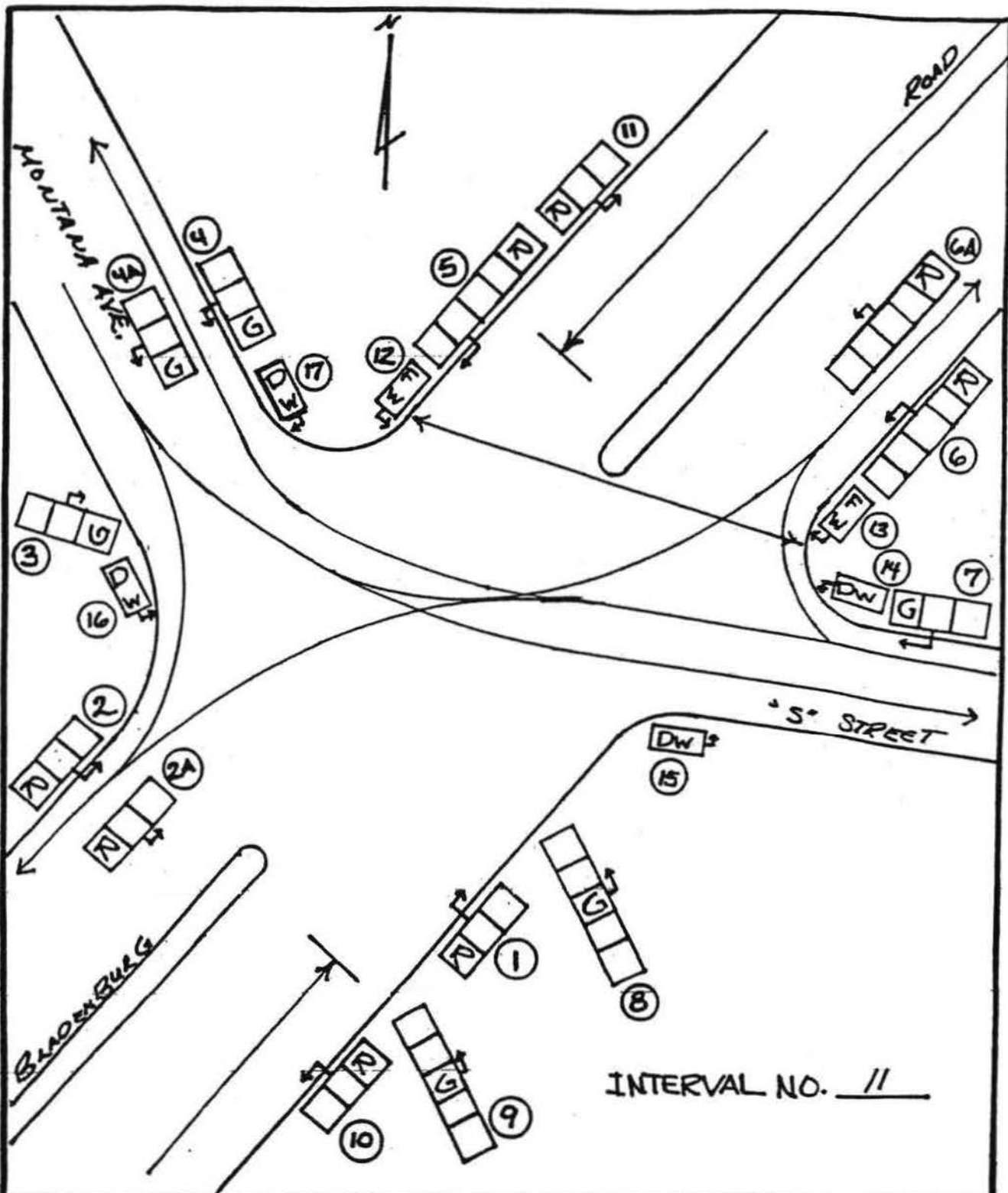
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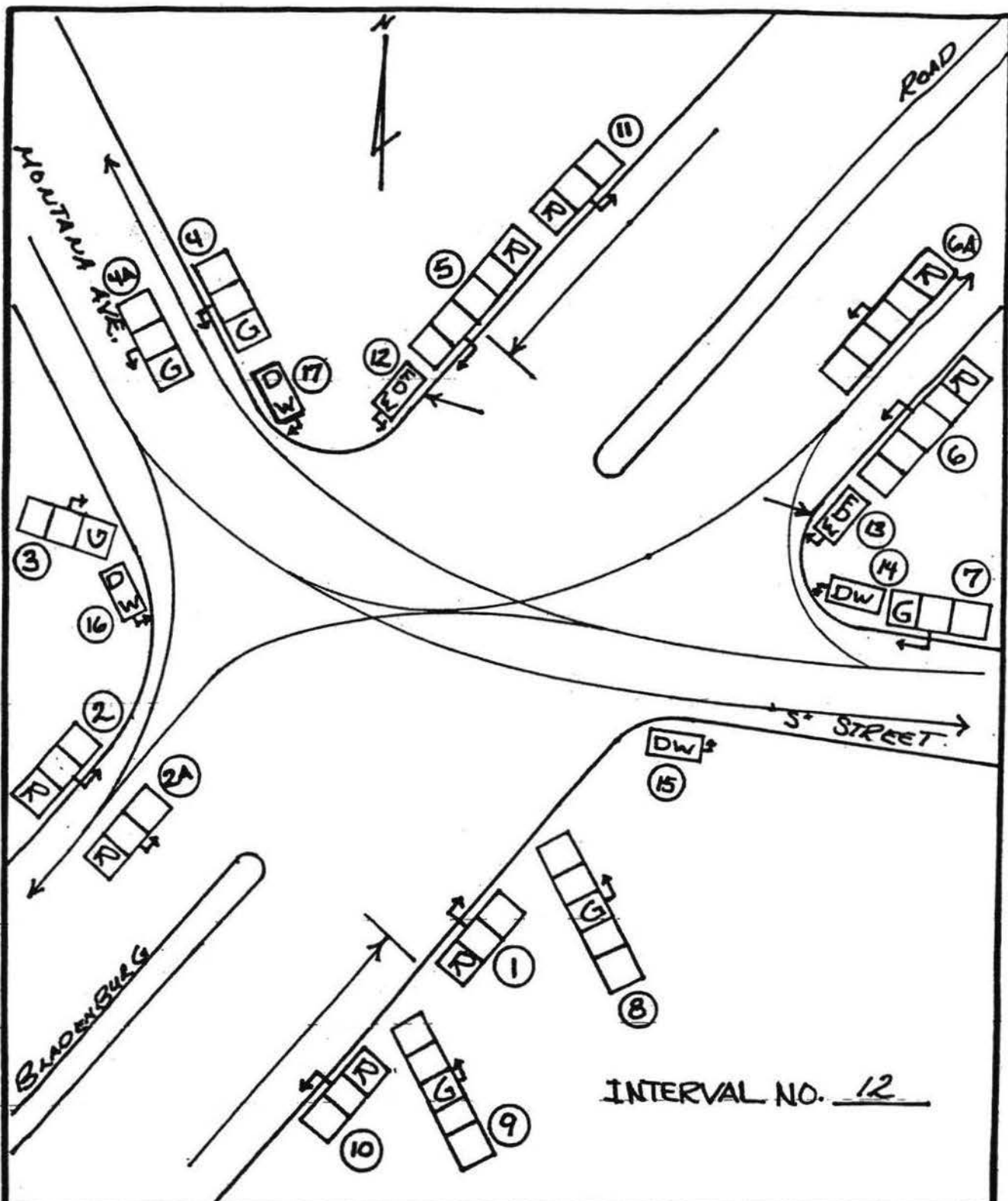
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TRAFFIC SIGNAL OPERATION
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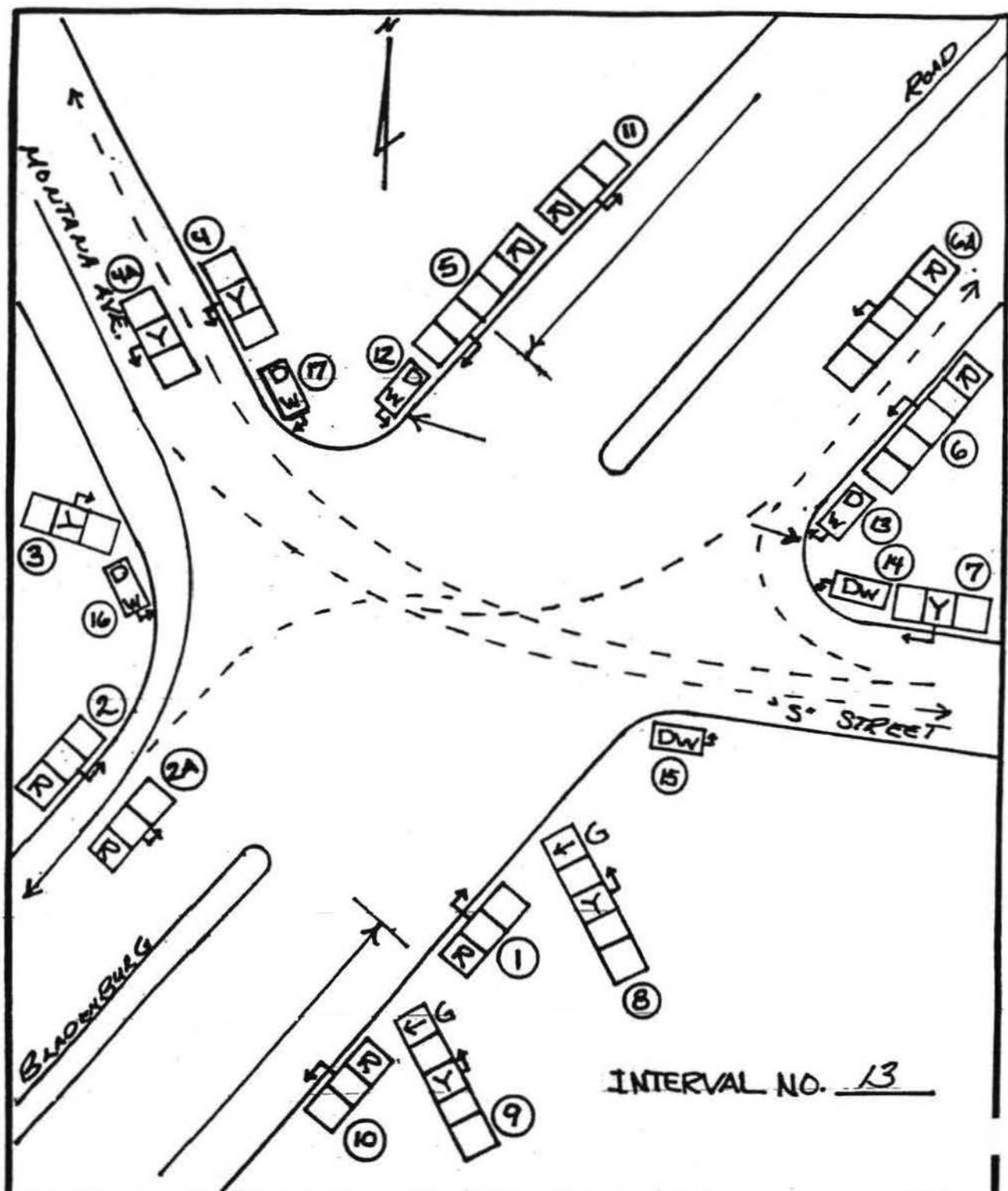
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APPROVED BY:	DIVISION CHIEF

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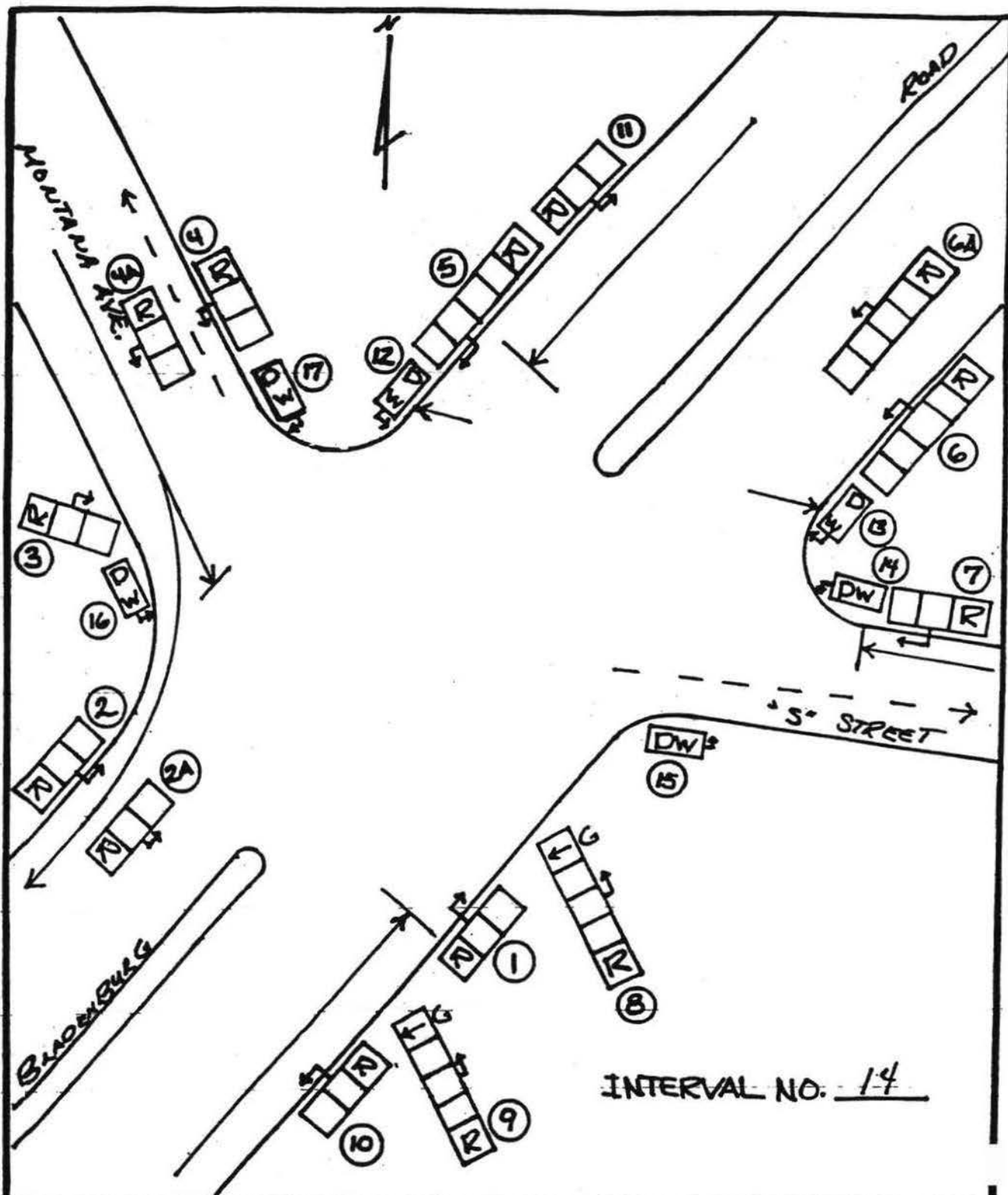
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SUBMITTED BY:	CHIEF, SIGNAL DESIGN BRANCH
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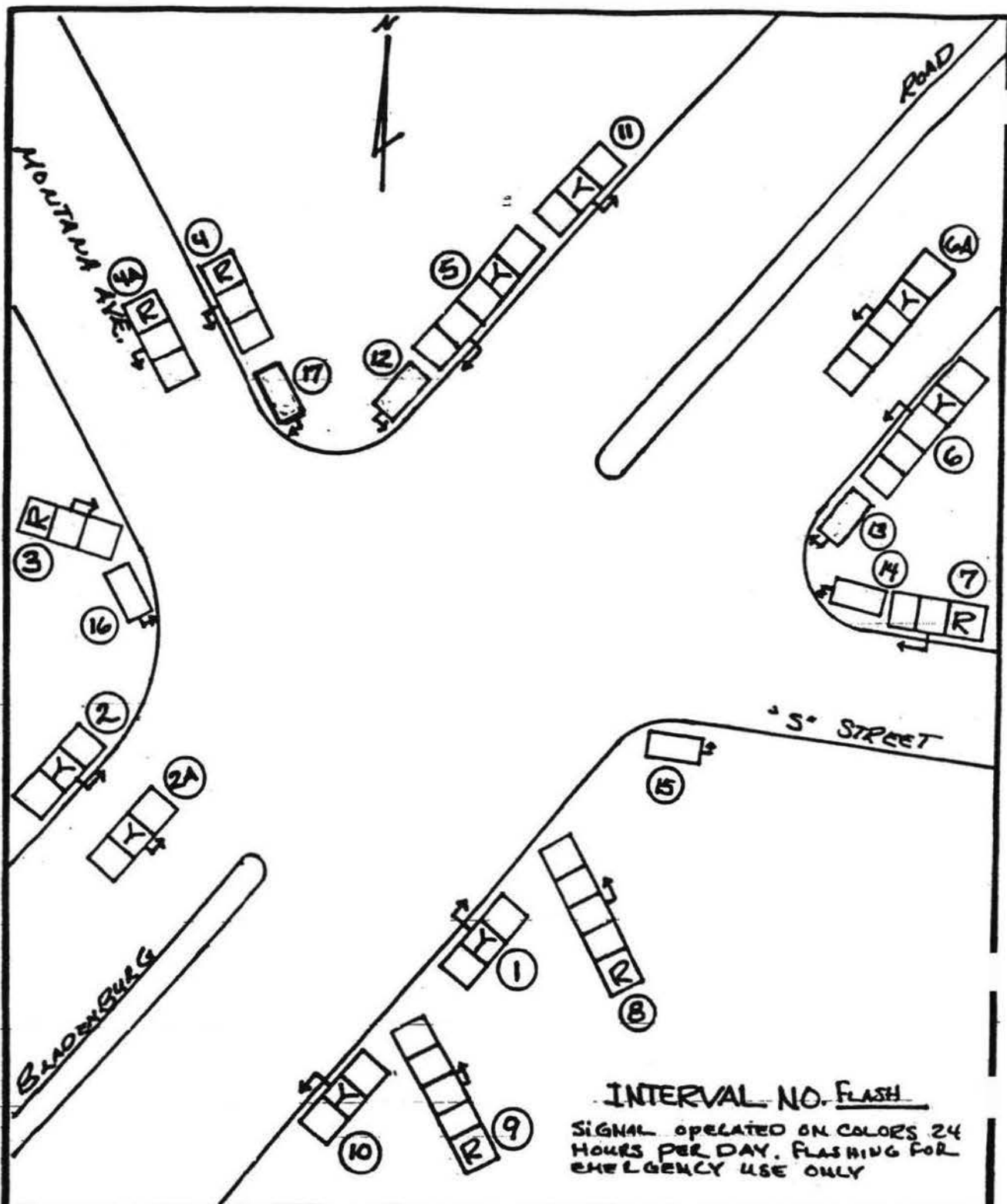
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APPROVED BY:	DIVISION CHIEF

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DESIGNED BY:	_____
SUBMITTED BY:	CHIEF, SIGNAL DESIGN BRANCH
APPROVED BY:	DIVISION CHIEF

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APPENDIX D

Level of Service Descriptions

Level of Service Criteria¹

Level of service (LOS) for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level of service criteria is stated in terms of the average control delay per vehicle. The criteria for signalized intersections are given in Table 1. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio and the volume to capacity ratio for the lane group in question.

Table 1
Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (SEC/VEH)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

LOS A describes operations with very low delay, up to 10 seconds per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 seconds per vehicle. This level generally occurs with good progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher levels of average delay.

LOS C describes operations with delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from a combination of unfavorable progression, long cycle lengths or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 seconds per vehicle. These high delay values generally indicate poor progression, long cycle lengths and high volume to capacity ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 seconds per vehicle. This level, considered to be unacceptable to most drivers, often occurs with over saturation, that is, when arrival flow rates exceed the capacity of the intersection. It also may occur at high volume to capacity ratios with many individual cycle failures. Poor progression and long cycle lengths also may be major contributing causes to such delay levels.

The level of service criteria for stop controlled intersections is given in Table 2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Table 2
Level of Service Criteria for Stop Controlled Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (SEC/VEH)
A	≤ 10
B	$> 10 \text{ and } \leq 15$
C	$> 15 \text{ and } \leq 25$
D	$> 25 \text{ and } \leq 35$
E	$> 35 \text{ and } \leq 50$
F	> 50

The level of service criteria for stop controlled intersections is somewhat different from the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections.

For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection.

¹ Highway Capacity Manual, Transportation Research Board, Washington D.C., 2000.