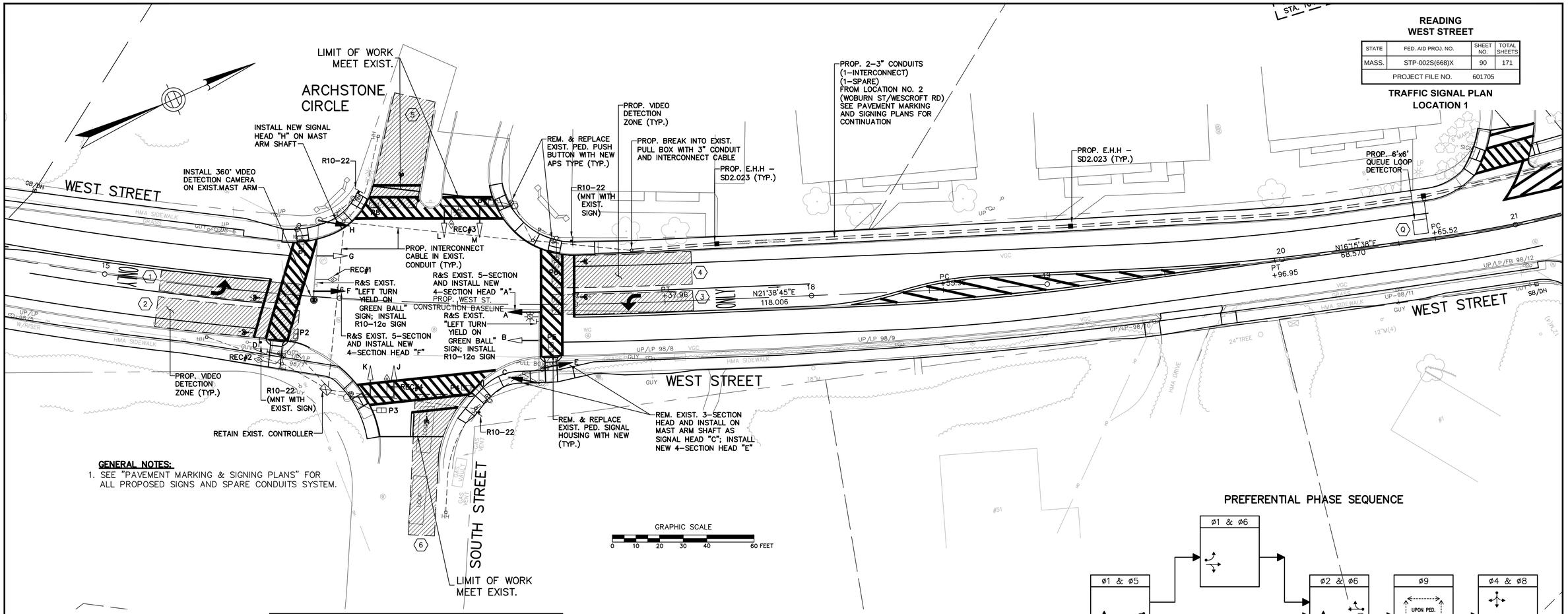


READING
WEST STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	STP-002S(668)X	90	171
PROJECT FILE NO.	601705		

TRAFFIC SIGNAL PLAN
LOCATION 1

GENERAL NOTES:

1. SEE "PAVEMENT MARKING & SIGNING PLANS" FOR ALL PROPOSED SIGNS AND SPARE CONDUITS SYSTEM.

EXIST. EMERGENCY VEHICLE PREEMPTION

NB	SB	WB	EB
PREEMPT#1	PREEMPT#2	PREEMPT#3	PREEMPT#4
REC#1	REC#2	REC#3	REC#4

EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3, REC#4), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

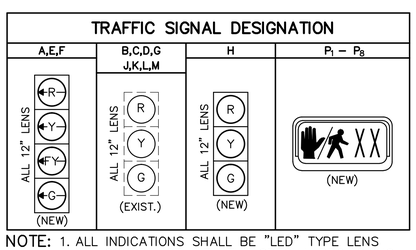
MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFICATION TO EXIST. CONTROLLER FOR INSTALLATION OF VIDEO DETECTION SYSTEM, COUNTDOWN PED. SIGNALS WITH APS PUSH BUTTONS AND IMPLEMENTATION OF FLASHING YELLLOW ARROW FOR PROTECTED/PERMISSIVE LEFT TURN PHASE
1	360° VIDEO DETECTION CAMERA SYSTEM WITH VDP & CABLES
1	SIGNAL HEAD, 3 SECTION
3	SIGNAL HEAD, 4 SECTION
8	PEDESTRIAN HOUSING GRAPHIC LED WITH COUNTDOWN TIMER
8	AUDIBLE & VIBRO-TACTILE PEDESTRIAN PUSH BUTTON INTEGRATED R10-3e(L/R) SIGN & SADDLE w/LED CONFIRMATION LIGHT
1	ROADWAY VEHICLE LOOP DETECTOR (6'x6')
1	DUAL CHANNEL LOOP DETECTOR AMPLIFIER
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

TRAFFIC CONTROLLER DATA

PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2 & ø6) (ø4 & ø8)
SIMULTANEOUS GAP OUT DISABLED	YES (ø2 & ø6) (ø4 & ø8)
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED
TYPE OF INTERCONNECT TO MASTER	WIRE
REMOTE MUTCD FLASH BY MASTER	YES

TRAFFIC SIGNAL DESIGNATION



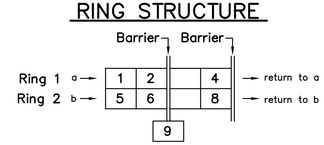
NOTE:
1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL BACKPLATES SHALL INCLUDE A 3" RETROREFLECTIVE BORDER IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
3. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.

VIDEO DETECTION DATA

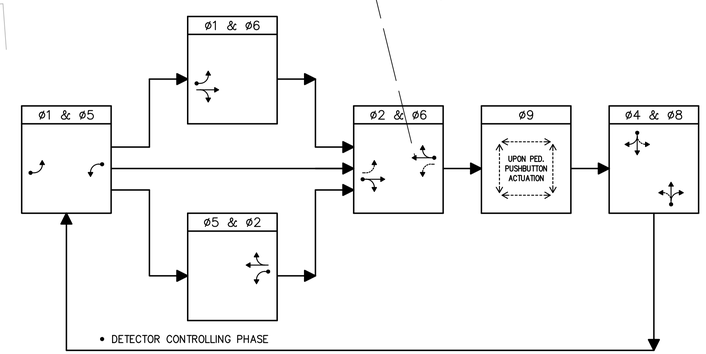
DETECTION ZONE NO.	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
1	5	5 & 2	B	–	–
2	2	2	B	–	–
3	1	1 & 6	B	–	–
4	6	6	B	–	–
5	4	4	B	–	–
6	8	8	B	–	–
Q	QUEUE DETECTOR** (LOW PREEMPTION)		B	10 SEC.	–

**QUEUE DETECTOR Q SHALL CAUSE THE FOLLOWING:
1. FORCE OFF ALL OTHER PHASES.
2. PREEMPT TO ø6 AND TIME ø6 NORMALLY.

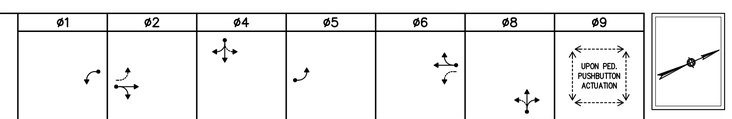
RING STRUCTURE



PREFERENTIAL PHASE SEQUENCE



FULLY-ACTUATED ☑ ISOLATED ☐
SEMI-ACTUATED ☐ INTERCONNECTED ☑
PRE-TIMED ☐ WIRE ☑ TBCU ☐

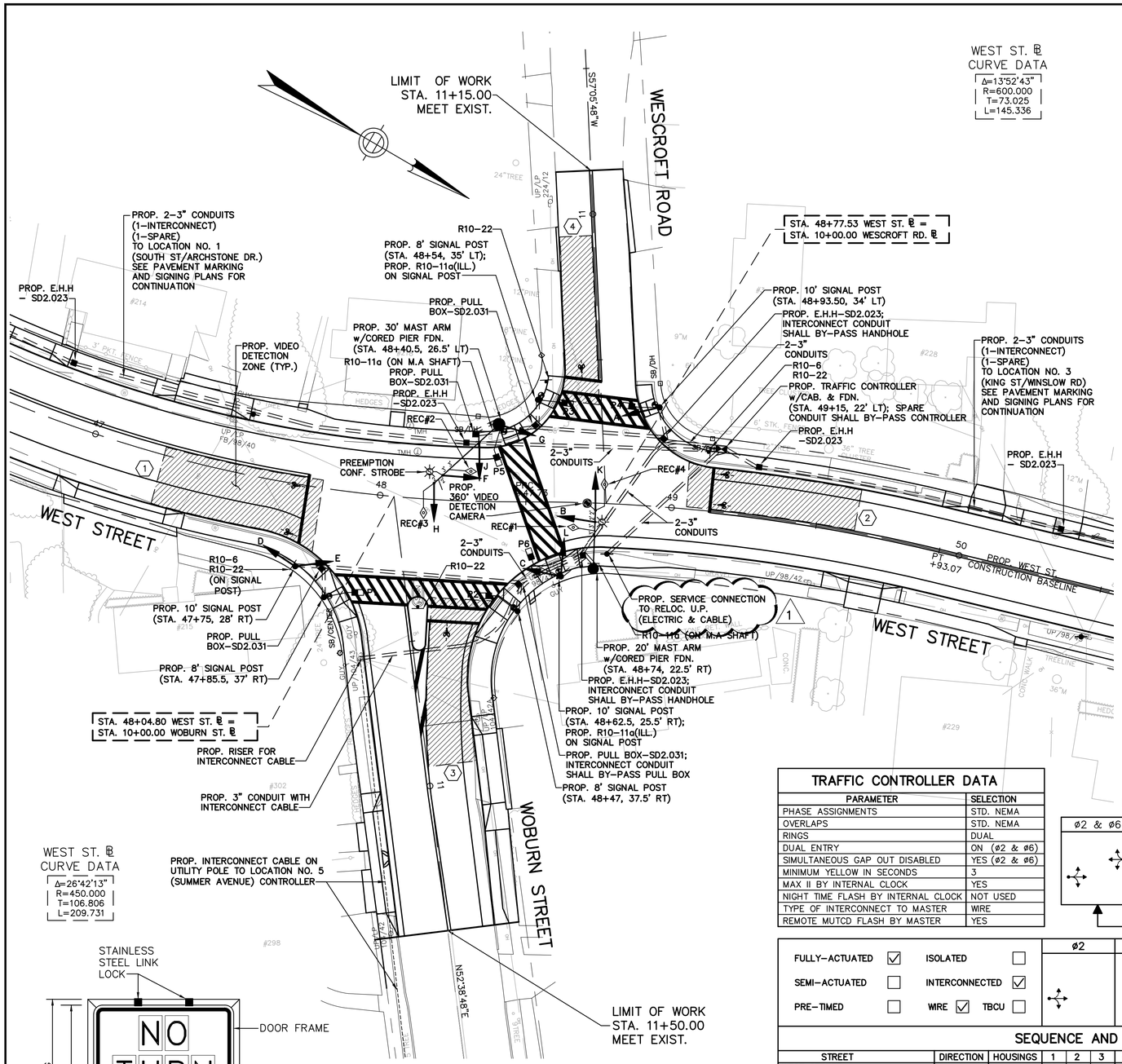


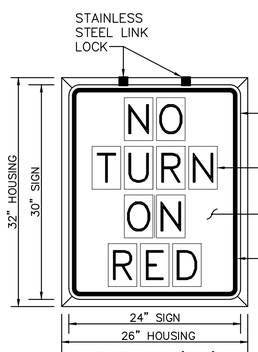
SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	FLASH OPER.
WEST STREET	NB	A	RL	RL	RL	FYL	YL	RL	RL	RL	RL	GL	YL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	FRL
WEST STREET	NB	B,C,D	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
WEST STREET	SB	E,F	GL	YL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	FYL	YL	RL	RL	RL	RL	RL	RL	RL	FRL
WEST STREET	SB	G,H	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY
ARCHSTONE DRIVEWAY	EB	J,K	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
SOUTH STREET	WB	L,M	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
PEDESTRIAN		P1–P8	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
TIMING IN SECONDS																								
MINIMUM INITIAL			6			10			6			6			10			6						EMERGENCY
PASSAGE			2			2			2			2			2			2						
MAXIMUM 1			10			50			20			10			50			20						
MAXIMUM 2			10			50			20			10			50			20						
CHANGE				4	2		4	2		4	1.5		4	2		4	2		4.5	1.5				
PEDESTRIAN																					7	16	3	
RECALL			OFF			SOFT			OFF			OFF			SOFT			OFF			OFF			
MEMORY			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			LOCKING			

IN CHARGE OF GJH
DESIGNED BY TQN
DRAWN BY TQN
CHECKED BY GJH/JWD

1 ADDENDUM NO. 1, SEPTEMBER 26, 2014





R10-11a(ILL)
ILLUMINATED SIGN

NOTES:

1. SIGN SHALL BE LIGHTED DURING PHASE 9 (PEDESTRIAN PHASE) AND BLANKOUT ALL OTHER TIMES.
2. SEE ITEM 824.63 IN THE SPECIAL PROVISIONS FOR DETAILS.

IN CHARGE OF GJH
DESIGNED BY TQN
DRAWN BY TQN
CHECKED BY GJH/JWD

GENERAL NOTES:

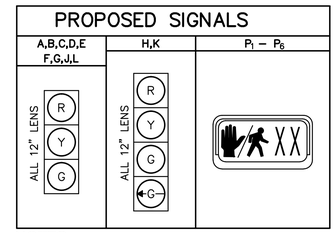
1. REMOVE AND STACK EXIST. FLASHING WARNING BEACON SYSTEM COMPLETE.
2. OPTICAL RECEIVERS MAY BE RELOCATED BY THE SIGNAL CONTRACTOR FOR OPTIMUM LINE OF SIGHT DETECTION. REMOTE RECEIVERS MAY BE INSTALLED WITH THE APPROVAL OF THE RESIDENT ENGINEER.
3. SEE "PAVEMENT MARKING & SIGNING PLANS" FOR ALL PROPOSED SIGNS AND SPARE CONDUITS SYSTEM.

READING
WEST STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	STP-002S(668)X	91	171
PROJECT FILE NO.	601705		

TRAFFIC SIGNAL PLAN
LOCATION 2

PROPOSED SIGNALS



NOTES:

1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL OVERHEAD SIGNALS SHALL BE RIGIDLY MOUNTED. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS AND 5" LOUVERED BACKPLATES.
3. ALL BACKPLATES SHALL INCLUDE A 3" RETROREFLECTIVE BORDER IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
4. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.

MAJOR ITEMS REQUIRED

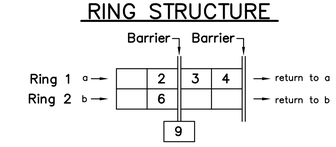
QUANTITY	DESCRIPTION
1	TRAFFIC CONTROLLER & CABINET NEMA TS2-TYPE 1 w/FDN.
1	ON-STREET MASTER CONTROLLER
1	ELECTRICAL SERVICE CONNECTION (OVERHEAD FROM U.P.)
1	CABLE SERVICE CONNECTION (OVERHEAD FROM U.P.)
1	20' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
1	30' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
3	10' SIGNAL POST, BASE & FDN. (ORNAMENTAL TYPE)
3	8' SIGNAL POST, BASE & FDN. (ORNAMENTAL TYPE)
9	SIGNAL HEAD, 3 SECTION
2	SIGNAL HEAD, 4 SECTION
6	PEDESTRIAN HOUSING GRAPHIC LED WITH COUNTDOWN TIMER
6	AUDIBLE & VIBRO-TACTILE PEDESTRIAN PUSH BUTTON INTEGRATED R10-3e(L/R) SIGN & SADDLE w/LED CONFIRMATION LIGHT
1	360° VIDEO DETECTION CAMERA SYSTEM WITH VDP & CABLES
2 *	ELECTRIC HANDHOLE 24"x24" – SD2.023 (PAY SEPARATELY UNDER ITEM 811.23)
4	PULL BOX 12"x12" – SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)
4	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL DETECTOR (RECEIVER)
1	PREEMPTION 4-CHANNEL PHASE SELECTOR
2	PREEMPTION CONFIRMATION STROBE (CLEAR)
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

* NOT INCLUDING HANDHOLES USE IN THE INTERCONNECT SYSTEM.

EMERGENCY VEHICLE PREEMPTION

NB	SB	WB	EB
PREEMPT#1	PREEMPT#2	PREEMPT#3	PREEMPT#4
REC#1	REC#2	REC#3	REC#4

RING STRUCTURE



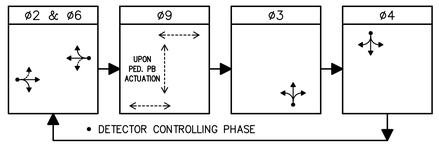
EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3, REC#4), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

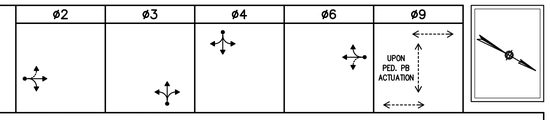
TRAFFIC CONTROLLER DATA

PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2 & ø6)
SIMULTANEOUS GAP OUT DISABLED	YES (ø2 & ø6)
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED
TYPE OF INTERCONNECT TO MASTER	WIRE
REMOTE MUTCD FLASH BY MASTER	YES

PREFERENTIAL PHASE SEQUENCE



FULLY-ACTUATED ☑ ISOLATED ☐
SEMI-ACTUATED ☐ INTERCONNECTED ☑
PRE-TIMED ☐ WIRE ☑ TBCU ☐



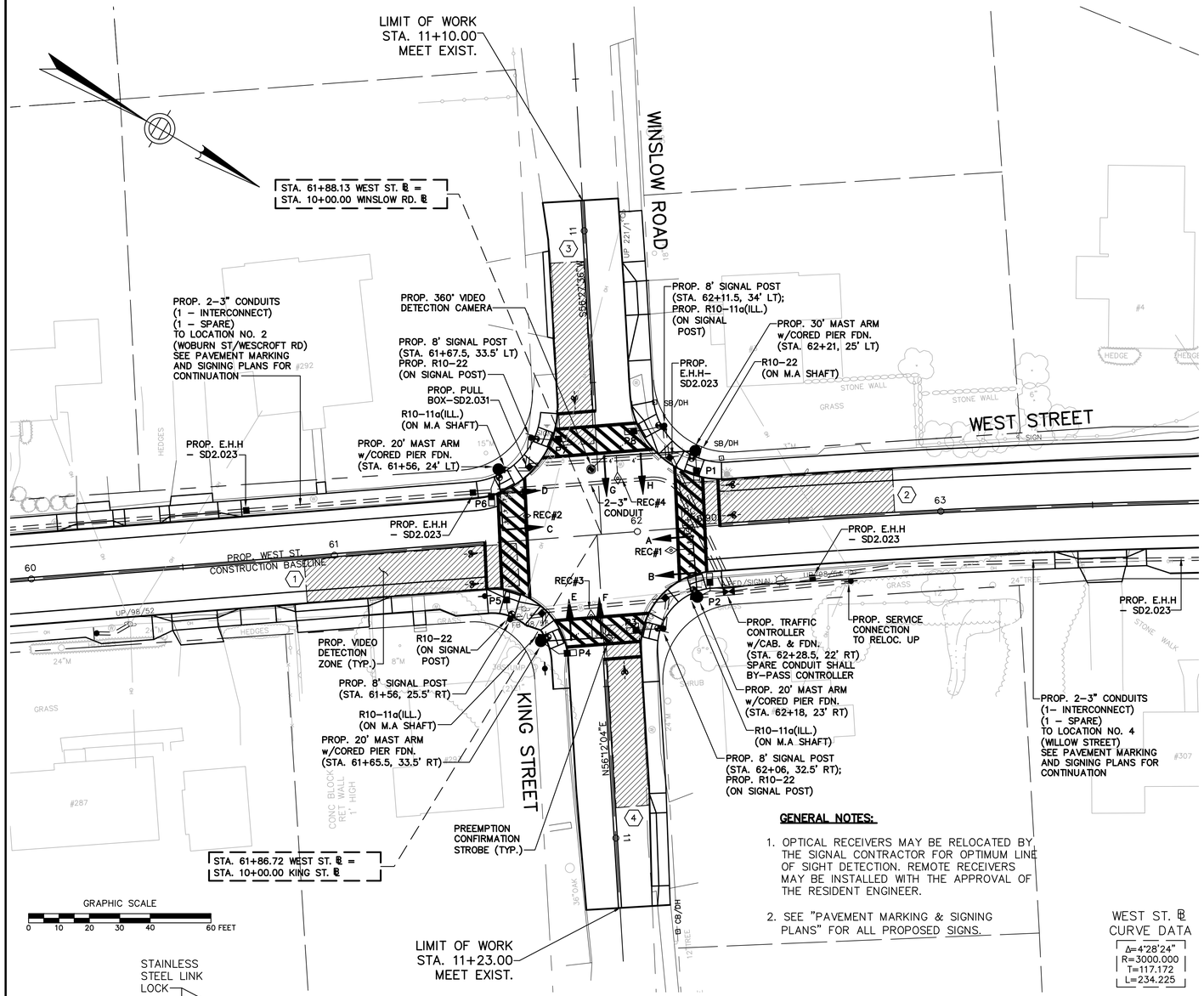
SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	FLASH OPER.
WEST STREET	NB	A,B,C,D	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
WEST STREET	SB	E,F,G	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FY
WOBURN STREET	WB	H	R	R	R	G/GL	Y	R	R	R	R	R	R	R	R	R	R	FR
WOBURN STREET	WB	J	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
WESCROFT ROAD	EB	K	R	R	R	R	R	R	G/GL	Y	R	R	R	R	R	R	R	FR
WESCROFT ROAD	EB	L	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FR
PEDESTRIAN		P1-P6	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
TIMING IN SECONDS																		
MINIMUM INITIAL			10			6			6			10						EMERGENCY
PASSAGE			2			2			2			2						
MAXIMUM 1 (M-F: 7am-9am)			34			20			8			34						
MAXIMUM 2 (ALL OTHER TIMES)			24			10			8			24						
CHANGE				4.0	1.5		4.0	1.0		3.5	1.0		4.0	1.5				
PEDESTRIAN															7	14	3	
RECALL			SOFT			OFF			OFF			SOFT			OFF			
MEMORY			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			LOCKING			

VIDEO DETECTION DATA

DETECTION ZONE NO.	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
1	2	2	B	–	–
2	6	6	B	–	–
3	3	3	B	–	–
4	4	4	B	–	–

GRAPHIC SCALE
0 10 20 30 40 60 FEET



EMERGENCY VEHICLE PREEMPTION

NB	SB	EB	WB
PREEMPT#1	PREEMPT#2	PREEMPT#3	PREEMPT#4
REC#1	REC#2	REC#3	REC#4

EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3, REC#4), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

TRAFFIC CONTROLLER DATA

PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2 & ø6) (ø4 & ø8)
SIMULTANEOUS GAP OUT DISABLED	YES (ø2 & ø6) (ø4 & ø8)
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED
TYPE OF INTERCONNECT TO MASTER	WIRE
REMOTE MUTCD FLASH BY MASTER	YES

READING
WEST STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	STP-002S(668)X	92	171
PROJECT FILE NO.	601705		

TRAFFIC SIGNAL PLAN
LOCATION 3

MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	TRAFFIC CONTROLLER & CABINET NEMA TS2-TYPE 1 w/FDN.
1	ELECTRICAL SERVICE CONNECTION (OVERHEAD FROM U.P.)
3	20' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
1	30' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
4	8' SIGNAL POST, BASE & FDN. (ORNAMENTAL TYPE)
8	SIGNAL HEAD, 3 SECTION
8	PEDESTRIAN HOUSING GRAPHIC LED WITH COUNTDOWN TIMER
8	AUDIBLE & VIBRO-TACTILE PEDESTRIAN PUSH BUTTON INTEGRATED R10-3e(L/R) SIGN & SADDLE w/LED CONFIRMATION LIGHT
1	VIDEO DETECTION SYSTEM WITH 4 CAMERAS, VDP AND CABLES
1 *	ELECTRIC HANDHOLE 24"x24" - SD2.023 (PAY SEPARATELY UNDER ITEM 811.22)
3	PULL BOX 12"x12" - SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)
4	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL RECEIVER
1	PREEMPTION 4-CHANNEL PHASE SELECTOR
2	PREEMPTION CONFIRMATION STROBE (CLEAR)

PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.

* NOT INCLUDING HANDHOLES USE IN THE INTERCONNECT SYSTEM.

PROPOSED SIGNALS

A,B,C,D,E,F,G,H	P_1 - P_8
ALL 12" LENS: R, Y, G	

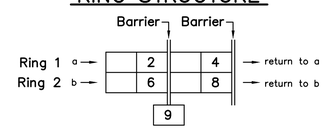
NOTES:
1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL OVERHEAD SIGNALS SHALL BE RIGIDLY MOUNTED. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS AND 5" LOUVERED BACKPLATES.
3. ALL BACKPLATES SHALL INCLUDE A 3" RETROREFLECTIVE BORDER IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
4. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.

GENERAL NOTES:

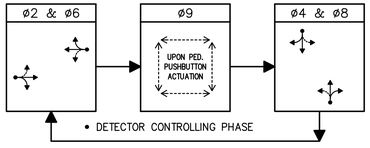
1. OPTICAL RECEIVERS MAY BE RELOCATED BY THE SIGNAL CONTRACTOR FOR OPTIMUM LINE OF SIGHT DETECTION. REMOTE RECEIVERS MAY BE INSTALLED WITH THE APPROVAL OF THE RESIDENT ENGINEER.
2. SEE "PAVEMENT MARKING & SIGNING PLANS" FOR ALL PROPOSED SIGNS.

WEST ST. ℄ CURVE DATA
Δ=4°28'24"
R=3000.000
T=117.172
L=234.225

RING STRUCTURE



PREFERENTIAL PHASE SEQUENCE



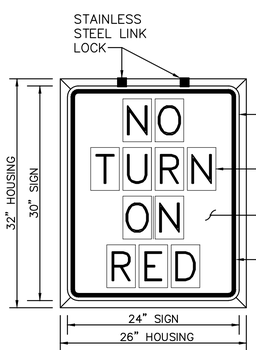
FULLY-ACTUATED ☑	ISOLATED ☐	ø2	ø4	ø6	ø8	ø9
SEMI-ACTUATED ☐	INTERCONNECTED ☑					UPON PED. PUSHBUTTON ACTUATION
PRE-TIMED ☐	WIRE ☑ TBCU ☐					

SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	FLASH OPER.
WEST STREET	NB	A,B	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
WEST STREET	SB	C,D	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY
WINSLOW ROAD	EB	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
KING STREET	WB	G,H	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
PEDESTRIAN		P1-P8	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
TIMING IN SECONDS																		
MINIMUM INITIAL			10			6			10			6						EMERGENCY
PASSAGE			2			2			2			2						
MAXIMUM 1 (M-F: 7am-9am)			40			20			40			20						
MAXIMUM 2 (ALL OTHER TIMES)			40			20			40			20						
CHANGE				4.0	1.0		4.5	1.0		4.0	1.0		4.5	1.0				
PEDESTRIAN															7	10	3	
RECALL			SOFT			OFF			SOFT			OFF			OFF			
MEMORY			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			LOCKING			

VIDEO DETECTION DATA

DETECTION ZONE NO.	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
1	2	2	B	-	-
2	6	6	B	-	-
3	4	4	B	-	-
4	8	8	B	-	-

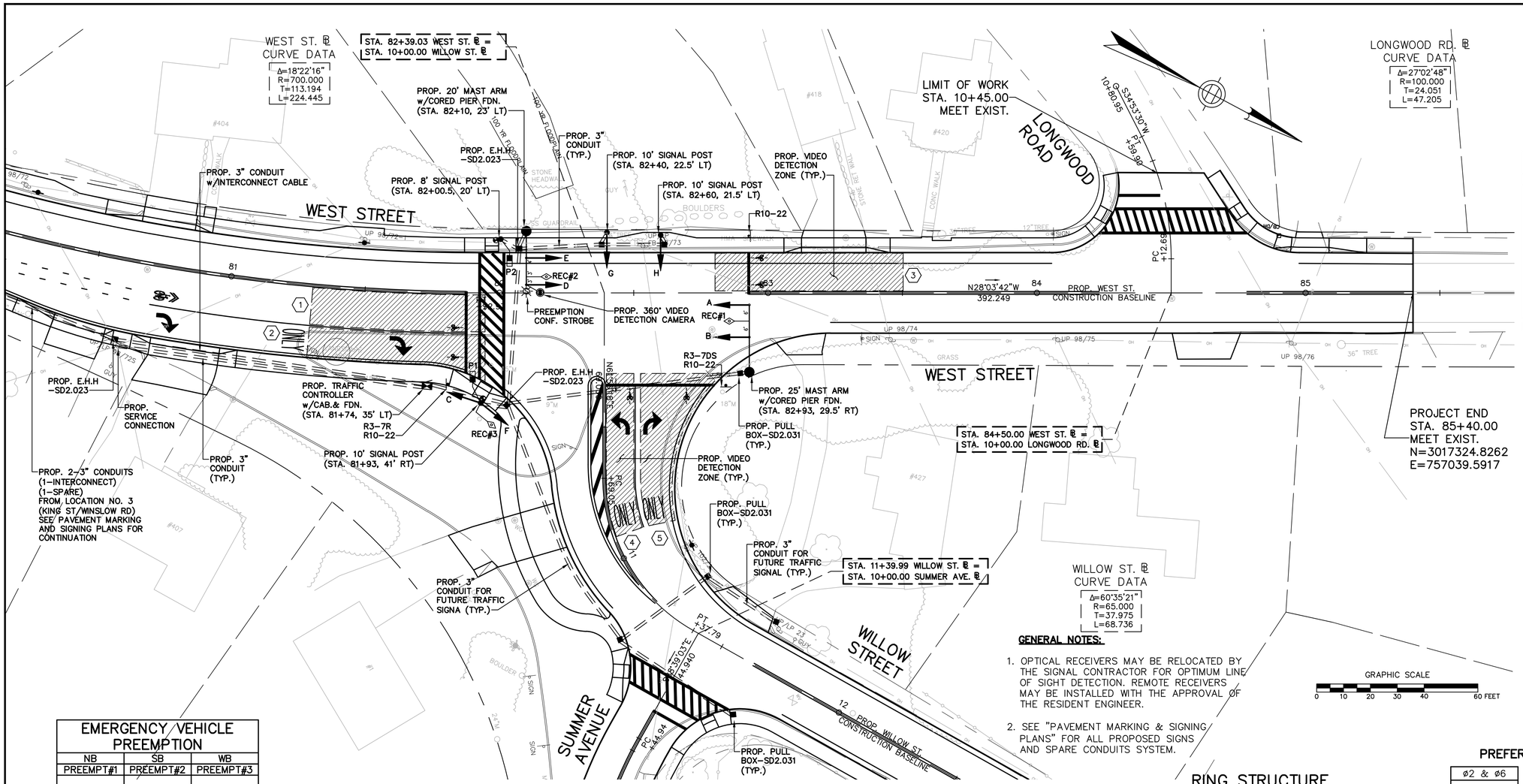


R10-11a(ILL)
ILLUMINATED SIGN

NOTES:

1. SIGNS SHALL BE LIGHTED DURING PHASE 9 (PEDESTRIAN PHASE) AND BLANKOUT ALL OTHER TIMES.
2. SEE ITEM 824.62 IN THE SPECIAL PROVISIONS FOR DETAILS.
3. SIGNS ARE LOCATED ON THE FAR, RIGHT SIDE OF THE RESPECTIVE APPROACH.

IN CHARGE OF GJH
DESIGNED BY TQN
DRAWN BY TQN
CHECKED BY GJH/JWD



READING
WEST STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	STP-002S(668)X	93	171
PROJECT FILE NO.	601705		

TRAFFIC SIGNAL PLAN
LOCATION 4

PROPOSED SIGNALS

A,D,E,F,G,H	B,C	$P_1 - P_2$
ALL 12" LENS: R, Y, G	ALL 12" LENS: R, Y, Y→, G, G→	XX

NOTES:

1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL OVERHEAD SIGNALS SHALL BE RIGIDLY MOUNTED. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS AND 5" LOUVERED BACKPLATES.
3. ALL BACKPLATES SHALL INCLUDE A 3" RETROREFLECTIVE BORDER IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
4. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.

EMERGENCY VEHICLE PREEMPTION

NB	SB	WB
PREEMPT#1	PREEMPT#2	PREEMPT#3
REC#1	REC#2	REC#3

EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	TRAFFIC CONTROLLER & CABINET NEMA TS2–TYPE 1 w/FDN.
1	SERVICE CONNECTION (OVERHEAD FROM UTILITY POLE)
1	20' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
1	25' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
3	10' SIGNAL POST, BASE & FDN. (ORNAMENTAL TYPE)
1	8' SIGNAL POST, BASE & FDN. (ORNAMENTAL TYPE)
6	SIGNAL HEAD, 3 SECTION
2	SIGNAL HEAD, 5 SECTION
2	PEDESTRIAN HOUSING GRAPHIC LED WITH COUNTDOWN TIMER
2	AUDIBLE & VIBRO–TACTILE PEDESTRIAN PUSH BUTTON INTEGRATED R10–3e(L/R) SIGN & SADDLE w/LED CONFIRMATION LIGHT
1	360° VIDEO DETECTION CAMERA SYSTEM WITH VDP & CABLES
2 *	ELECTRIC HANDHOLE 24"x24" – SD2.023 (PAY SEPARATELY UNDER ITEM 811.23)
7	PULL BOX 12"x12" – SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)
3	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL RECEIVER
1	PREEMPTION 4–CHANNEL PHASE SELECTOR
1	PREEMPTION CONFIRMATION STROBE (CLEAR)
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

* NOT INCLUDING HANDHOLES USE IN THE INTERCONNECT SYSTEM.

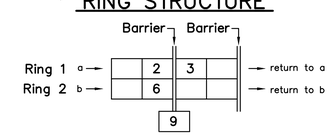
TRAFFIC CONTROLLER DATA

PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2 & ø6)
SIMULTANEOUS GAP OUT DISABLED	YES (ø2 & ø6)
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED
TYPE OF INTERCONNECT TO MASTER	WIRE
REMOTE MUTCD FLASH BY MASTER	YES

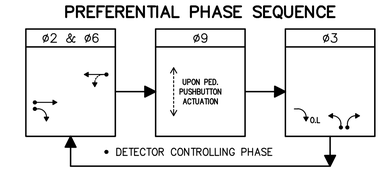
VIDEO DETECTION DATA

DETECTION ZONE NO.	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
1	2	2	B	–	–
2	2	2	B	5 SEC	–
3	6	6	B	–	–
4	3	3	B	–	–
5	3	3	B	5 SEC	–

RING STRUCTURE



PREFERENTIAL PHASE SEQUENCE



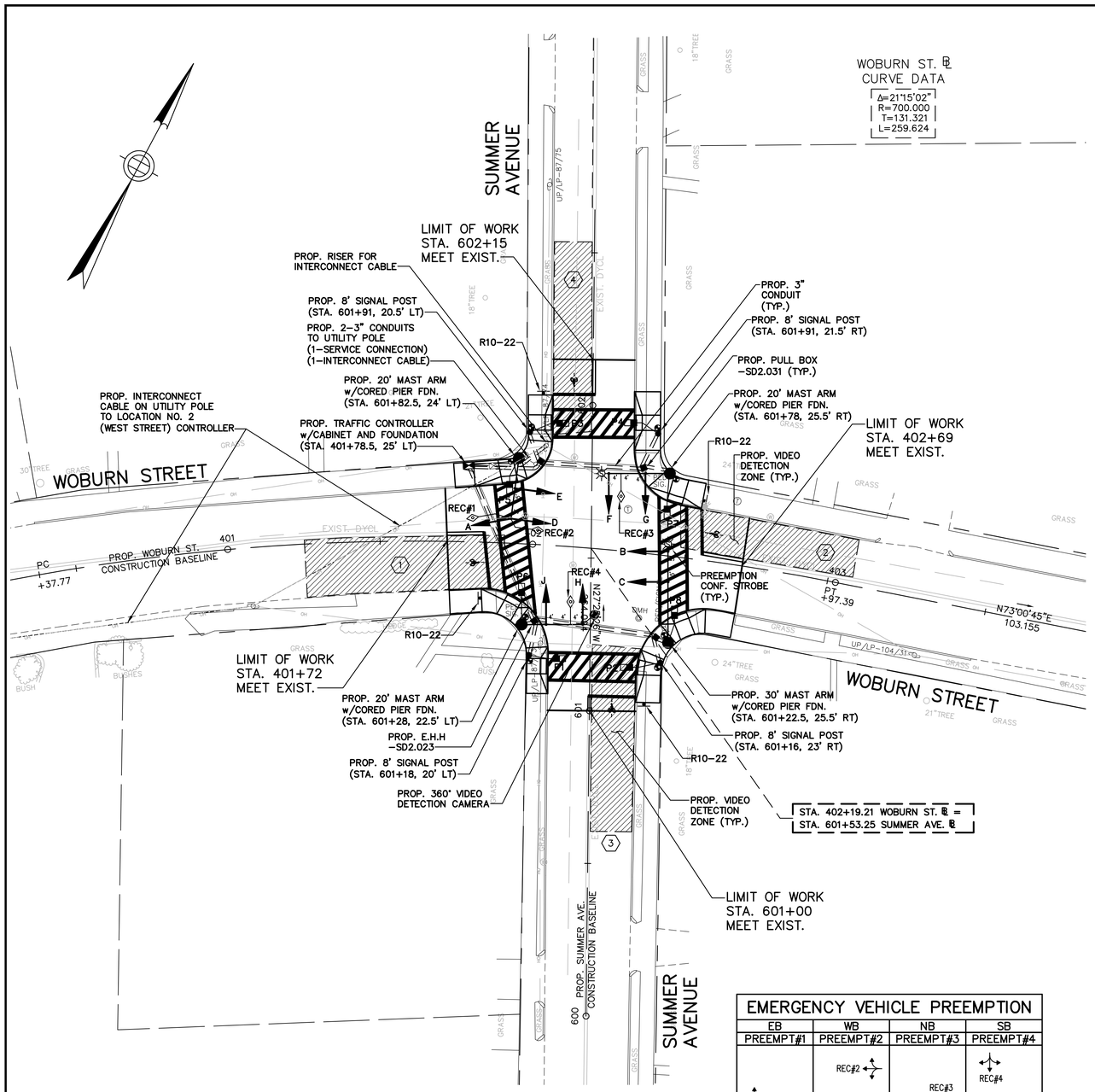
FULLY–ACTUATED	☑	ISOLATED	☐
SEMI–ACTUATED	☐	INTERCONNECTED	☑
PRE–TIMED	☐	WIRE ☑ TBCU	☐

ø2 | ø3 (OL) | ø6 | ø9 (UPON PED. PUSHBUTTON ACTUATION)

SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	FLASH OPER.
WEST STREET	NB	A	G	Y	R	R	R	R	R	R	R	R	R	R	FY
WEST STREET	NB	B,C	G	Y	R	R/GR	R/YR	R	R	R	R	R	R	R	FY
WEST STREET	SB	D,E	R	R	R	R	R	R	G	Y	R	R	R	R	FY
WILLOW STREET	WB	F,G,H	R	R	R	G	Y	R	R	R	R	R	R	R	FR
PEDESTRIAN		P1–P2	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
TIMING IN SECONDS															
MINIMUM INITIAL			10			6			10						EMERGENCY
PASSAGE			2			2			2						
MAXIMUM 1 (M–F: 7am–9am)			20			30			20						
MAXIMUM 2 (ALL OTHER TIMES)			28			22			28						
CHANGE				4.0	1.0		3.5	1.0		4.0	1.0				
PEDESTRIAN												7	14	3	
RECALL			SOFT			OFF			SOFT			OFF			
MEMORY			NON–LOCKING			NON–LOCKING			NON–LOCKING			LOCKING			

IN CHARGE OF GJH
DESIGNED BY TON
DRAWN BY TON
CHECKED BY GJH/JWD



GENERAL NOTES:

1. OPTICAL RECEIVERS MAY BE RELOCATED BY THE SIGNAL CONTRACTOR FOR OPTIMUM LINE OF SIGHT DETECTION. REMOTE RECEIVERS MAY BE INSTALLED WITH THE APPROVAL OF THE RESIDENT ENGINEER.
2. SEE "PAVEMENT MARKING & SIGNING PLANS" FOR ALL PROPOSED SIGNS.
3. R&S ALL EXIST. TRAFFIC SIGNAL EQUIPMENT COMPLETE. ABANDON ALL EXIST. PULL BOXES (R&S FRAMES AND COVERS).

READING
WEST STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	STP-002S(668)X	94	171
PROJECT FILE NO.	601705		

TRAFFIC SIGNAL PLAN
LOCATION 5

PROPOSED SIGNALS

A,B,C,D,E F,G,H,J	P_1 – P_8
ALL 12" LENS: R, Y, G	XX

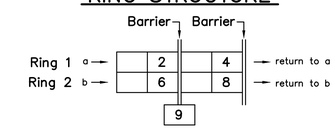
NOTES:

1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL OVERHEAD SIGNALS SHALL BE RIGIDLY MOUNTED. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS AND 5" LOUVERED BACKPLATES.
3. ALL BACKPLATES SHALL INCLUDE A 3" RETROREFLECTIVE BORDER IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
4. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.

MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	TRAFFIC CONTROLLER & CABINET NEMA TS2–TYPE 1 w/FDN.
1	SERVICE CONNECTION (OVERHEAD FROM UTILITY POLE)
1	30' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
3	20' MAST ARM ASSEMBLY, BASE & FDN. (ORNAMENTAL TYPE)
4	8' SIGNAL POST, BASE & FDN. (ORNAMENTAL TYPE)
9	SIGNAL HEAD, 3 SECTION
8	PEDESTRIAN HOUSING GRAPHIC LED WITH COUNTDOWN TIMER
4	AUDIBLE & VIBRO–TACTILE PEDESTRIAN PUSH BUTTON INTEGRATED R10–3e(L/R) SIGN & SADDLE w/LED CONFIRMATION LIGHT
1	360° VIDEO DETECTION CAMERA SYSTEM WITH VDP & CABLES
1	ELECTRIC HANDHOLE 24"x24" – SD2.023 (PAY SEPARATELY UNDER ITEM 811.23)
3	PULL BOX 12"x12" – SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)
4	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL DETECTOR (RECEIVER)
1	PREEMPTION 4–CHANNEL PHASE SELECTOR
1	PREEMPTION CONFIRMATION STROBE (CLEAR)
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

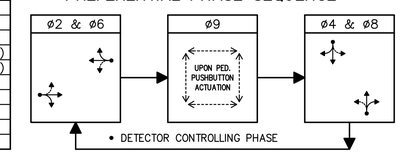
RING STRUCTURE



TRAFFIC CONTROLLER DATA

PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2 & ø6) (ø4 & ø8)
SIMULTANEOUS GAP OUT DISABLED	YES (ø2 & ø6) (ø4 & ø8)
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED
TYPE OF INTERCONNECT TO MASTER	WIRE
REMOTE MUTCD FLASH BY MASTER	YES

PREFERENTIAL PHASE SEQUENCE



FULLY–ACTUATED ☑ ISOLATED ☐
SEMI–ACTUATED ☐ INTERCONNECTED ☑
PRE–TIMED ☐ WIRE ☑ TBCU ☐

ø2	ø4	ø6	ø8	ø9
				UPON PED. PUSHBUTTON ACTUATION

SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	FLASH OPER.
WOBURN STREET	EB	A,B,C	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
WOBURN STREET	WB	D,E	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY
SUMMER AVENUE	NB	F,G	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
SUMMER AVENUE	SB	H,J	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
PEDESTRIAN		P1–P8	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT

TIMING IN SECONDS	ø2			ø4			ø6			ø8			ø9			
MINIMUM INITIAL	10			6			10			6						EMERGENCY
PASSAGE	2			2			2			2						
MAXIMUM 1 (M–F: 7am–9am)	24			24			24			24						
MAXIMUM 2 (ALL OTHER TIMES)	26			22			26			22						
CHANGE		4.0	1.0		4.0	1.0		4.0	1.0		4.0	1.0				
PEDESTRIAN													7	10	3	
RECALL	SOFT			OFF			SOFT			OFF			OFF			
MEMORY	NON–LOCKING			NON–LOCKING			NON–LOCKING			NON–LOCKING			LOCKING			

EMERGENCY VEHICLE PREEMPTION

EB	WB	NB	SB
PREEMPT#1	PREEMPT#2	PREEMPT#3	PREEMPT#4
REC#1	REC#2	REC#3	REC#4

EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3, REC#4), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

VIDEO DETECTION DATA

DETECTION ZONE NO.	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
1	2	2	B	–	–
2	6	6	B	–	–
3	8	8	B	–	–
4	4	4	B	–	–

IN CHARGE OF GJH
DESIGNED BY TQN
DRAWN BY TQN
CHECKED BY GJH/JWD