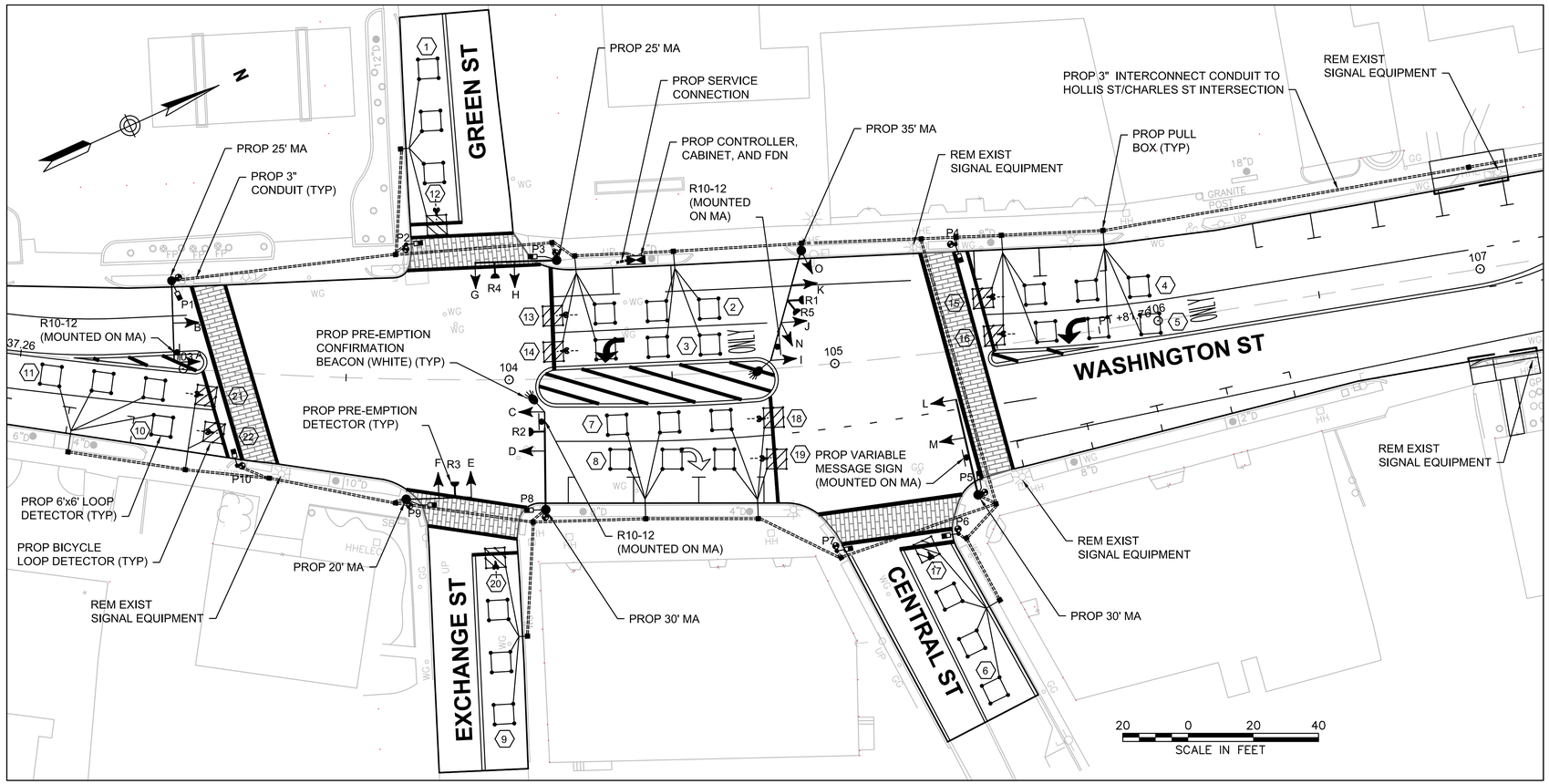
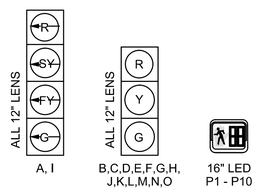


LOOP DETECTOR DATA

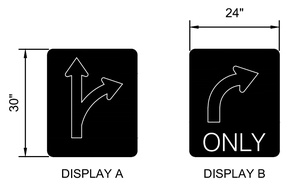
DETECTOR NUMBER	AMPLIFIER NUMBER	CHANNEL NUMBER	LOOP SIZE	NUM OF TURNS	Ø CALLED	Ø EXT	MODE A=PULSE B=PRES	DELAY TIME	EXT TIME
1	1	1	3@6'X6"	3	4	4	B	5	0
2	1	2	3@6'X6"	3	6	6	B	0	0
3	2	1	3@6'X6"	3	1	1	B	0	0
4	2	2	3@6'X6"	3	6	6	B	0	0
5	3	1	3@6'X6"	3	1	1	B	0	0
6	3	2	3@6'X6"	3	8	8	B	5	0
7	4	1	3@6'X6"	3	2	2	B	0	0
8	4	2	3@6'X6"	3	2	2	B	0	0
9	5	1	3@6'X6"	3	4	4	B	5	0
10	5	2	1@6'X6"	3	2	2	B	0	0
11	6	1	3@6'X6"	3	2	2	B	0	0
12	6	2	1@6'X6"	D-2	4	4	BICYCLE	5	0
13	7	1	1@6'X6"	D-2	6	6	BICYCLE	0	0
14	7	2	1@6'X6"	D-2	1	1	BICYCLE	0	0
15	8	1	1@6'X6"	D-2	6	6	BICYCLE	0	0
16	8	2	1@6'X6"	D-2	1	1	BICYCLE	0	0
17	9	1	1@6'X6"	D-2	8	8	BICYCLE	5	0
18	9	2	1@6'X6"	D-2	2	2	BICYCLE	0	0
19	10	1	1@6'X6"	D-2	2	2	BICYCLE	0	0
20	10	2	1@6'X6"	D-2	4	4	BICYCLE	5	0
21	11	1	1@6'X6"	D-2	2	2	BICYCLE	0	0
22	11	2	1@6'X6"	D-2	2	2	BICYCLE	0	0

SIGNAL IDENTIFICATION



NOTES:
1. ALL SIGNALS SHALL HAVE CUT AWAY VISORS.
2. ALL SIGNALS SHALL HAVE 12" LED WITH 5" LOUVERED BACK PLATES WITH 3" RETROREFLECTIVE BORDERS.

VARIABLE MESSAGE SIGN



NOTES:
1. VARIABLE MESSAGE SIGN TO BE OVERHEAD MOUNTED.
2. DISPLAY A SHALL BE SHOWN 7:00 AM - 9:00 AM AND 4:00 PM - 6:00 PM.
3. DISPLAY B SHALL BE SHOWN AT ALL OTHER TIMES.

	MAJOR ITEMS REQUIRED	
PAY ITEM	QUANTITY	ITEM
815.1	1	NEMA TS2 (TYPE 1) CONTROLLER, CABINET AND FDN
	1	SERVICE CONNECTION
	1	20 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	2	25 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	2	30 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	1	35 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	10	PEDESTRIAN SIGNAL HEAD, SINGLE SECTION W/ COUNTDOWN TIMER
	5	8' SIGNAL POLE, BASE AND FDN
	10	APS PUSH BUTTON ASSEMBLY
	13	1 WAY, 3 SECTION, SIGNAL HOUSING (12" LED)
	2	1 WAY, 4 SECTION, SIGNAL HOUSING (12" LED)
	15	5" LOUVERED SIGNAL BACKPLATES W/ RETROREFLECTIVE BORDERS
	11	DUAL CHANNEL LOOP DETECTOR AMPLIFIER
	31	LOOP DETECTOR (6'x6')
	11	BICYCLE LOOP DETECTOR (6'x6')
	5	OPTICOM OPTICAL DETECTOR, UNIDIRECTIONAL, SINGLE CHANNEL
	4	OPTICOM PHASE SELECTOR MODULE-DUAL CHANNEL
	2	OPTICOM CARD RACK
	2	EMERGENCY PREEMPTION CONFIRMATION BEACON (WHITE)

PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION.

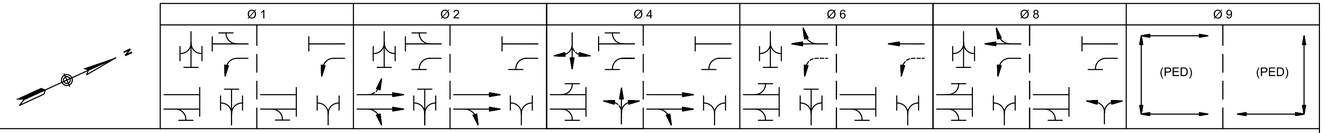
McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

WASHINGTON STREET
CORRIDOR IMPROVEMENTS

HOLLISTON, MA

TRAFFIC SIGNAL PLAN
WASHINGTON ST/EXCHANGE ST/
GREEN ST/ CENTRAL ST

PRELIMINARY DESIGN
NOVEMBER 2016
SHEET 1 OF 3



SEQUENCE AND TIMING FOR FULL ACTUATED CONTROL (ISOLATED)

STREET	DIRECTION	HSGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	FLASH OP
WASHINGTON ST AT EXCHANGE ST	SB LEFT	A	◄ G —	◄SY—	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄FY—	◄SY—	◄ R —	◄ G —	◄SY—	◄ R —	◄ R —	◄ R —	◄ R —	◄FR—
WASHINGTON ST AT CENTRAL ST	SB LEFT	I	◄ G —	◄SY—	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ G —	◄ Y —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄ R —	◄FR—
WASHINGTON ST AT EXCHANGE ST	SB	B	R	R	R	R	R	R	R	R	R	G	Y	R	G	Y	R	R	R	R	FR
WASHINGTON ST AT CENTRAL ST	SB	J,K	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FR
WASHINGTON ST AT EXCHANGE ST	NB	C,D	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
WASHINGTON ST AT CENTRAL ST	NB	L,M	R	R	R	G	Y	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
GREEN ST	EB	E,F	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
EXCHANGE ST	WB	G,H	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
CENTRAL ST	WB	N,O	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
PEDESTRIAN	P1 - P10	ALL	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	DW	FDW	OUT
TIMING IN SECONDS																					
MINIMUM GREEN (INITIAL)																					EMERGENCY ONLY
PASSAGE TIME (VEHICLE)																					
MAXIMUM 1																					
MAXIMUM 2																					
YELLOW CLEARANCE																					
RED CLEARANCE																					
WALK (W)																					
PEDESTRIAN CLEARANCE																					
RECALL																					
MEMORY																					

EMERGENCY PREEMPTION SCHEDULE

APPROACH	PREEMPTION PHASE	NEXT PHASE CALLED
NORTHBOUND	Ø 2	Ø 4
SOUTHBOUND	Ø 1 & Ø 6	Ø 2 & Ø 6
EASTBOUND	Ø 4	Ø 8
WESTBOUND	Ø 8	Ø 1 & Ø 6

EMERGENCY PREEMPTION OPERATION:

1. EMERGENCY VEHICLE PREEMPTION SHALL BE ACTUATED BY AN OPTICAL SIGNAL FROM AN OPTICAL EMITTER MOUNTED ON AN EMERGENCY VEHICLE AND RECEIVED BY AN OPTICAL DETECTOR LOCATED AT INTERSECTION. A SEPARATE RECEIVING DETECTOR IS REQUIRED FOR EACH DETECTED APPROACH.
2. PREEMPTION SIGNALS FROM MULTIPLE APPROACHES SHALL BE SERVICED ON A FIRST DETECTED FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED AT AN INTERSECTION BY AN OPTICAL DETECTOR, THE CONTROLLER SHALL TIME THE CLEARANCE INTERVALS OF THE ACTIVE PHASE (IF DIFFERENT THAT TO BE SERVICED) AND ADVANCE TO AND/OR HOLD IN EMERGENCY VEHICLE PREEMPTION PHASE UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME CLEARANCES AND SIMILARLY SERVICE OTHER EMERGENCY VEHICLE PREEMPTION SEQUENCES IN THE ORDER RECEIVED (IF RECEIVED). OTHERWISE, RESUME NORMAL PREFERENTIAL PHASE SEQUENCE.
4. PREEMPTION MINIMUM GREENS SHALL BE 6 SECONDS.
5. NORMAL CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TERMINATED BY PREEMPTION DEMAND.
6. ACTUAL TIMING FOR PREEMPTION SHALL BE DETERMINED IN THE FIELD IN COORDINATION WITH THE FIRE DEPARTMENT.

COORDINATION DATA

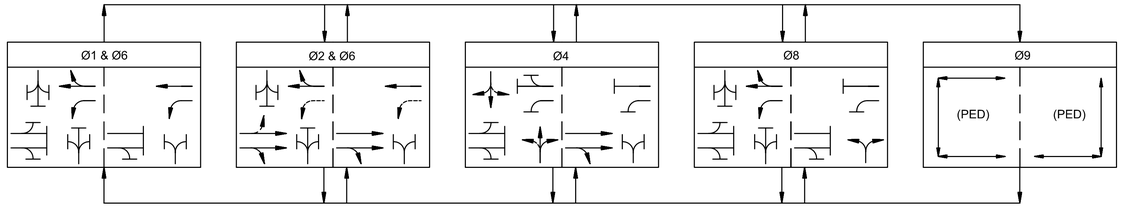
WASHINGTON ST / EXCHANGE ST / GREEN ST / CENTRAL ST

	PLAN 1	PLAN 2
CYCLE LENGTH		
OFFSET		
SPLIT		
SPLIT		
COOR. PHASE		

WASHINGTON ST / CHARLES ST / HOLLIS ST

	PLAN 1	PLAN 2
CYCLE LENGTH		
OFFSET		
SPLIT		
SPLIT		
COOR. PHASE		

PREFERENTIAL PHASING SEQUENCE



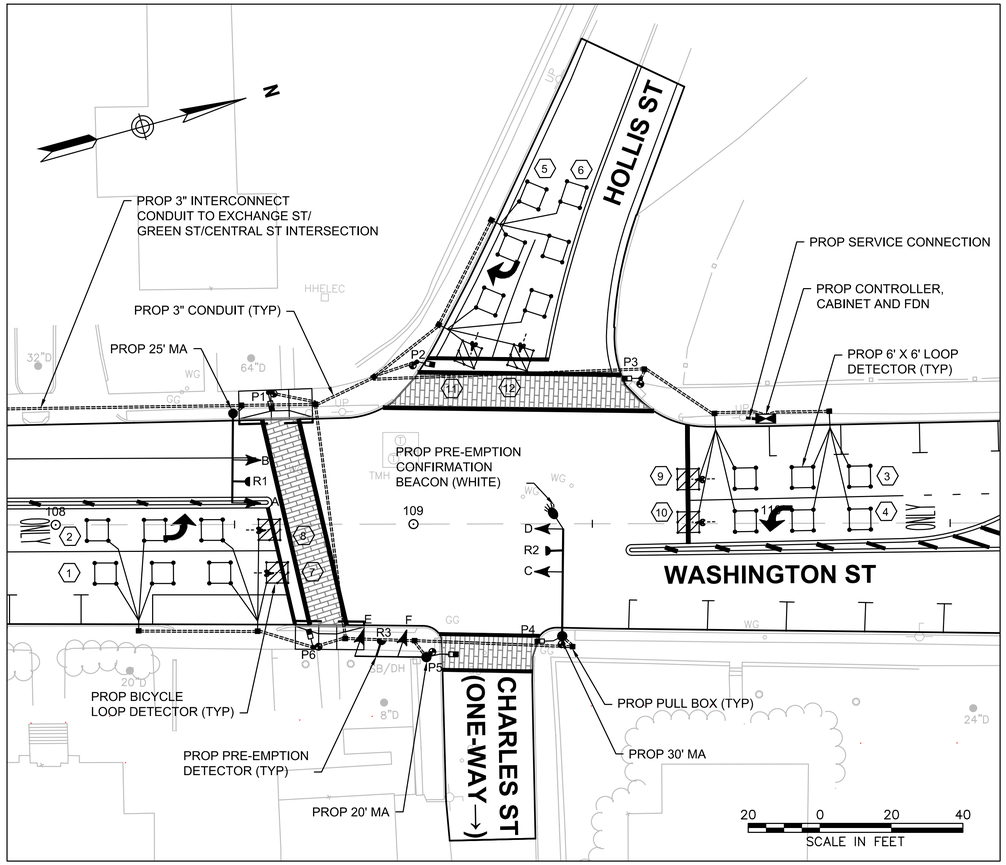
McMAHON TRANSPORTATION ENGINEERS & PLANNERS

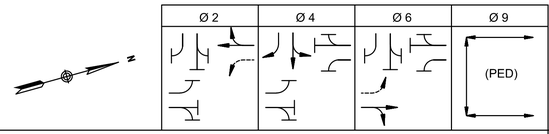
WASHINGTON STREET
CORRIDOR IMPROVEMENTS

HOLLISTON, MA

TRAFFIC SIGNAL PLAN
WASHINGTON ST/EXCHANGE ST/
GREEN ST/ CENTRAL ST

PRELIMINARY DESIGN
NOVEMBER 2016
SHEET 2 OF 3





SEQUENCE AND TIMING FOR FULL ACTUATED CONTROL (ISOLATED)

STREET	DIRECTION	HSGS	1	2	3	4	5	6	7	8	9	10	11	12	FLASH OP
WASHINGTON ST	SB	A,B	G	Y	R	R	R	R	R	R	R	R	R	R	FY
WASHINGTON ST	NB	C,D	R	R	R	R	R	R	G	Y	R	R	R	R	FY
HOLLIS ST	EB	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	FR
PEDESTRIAN	P1 - P6	ALL	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
MINIMUM GREEN (INITIAL)															EMERGENCY ONLY
PASSAGE TIME (VEHICLE)															
MAXIMUM 1															
MAXIMUM 2															
YELLOW CLEARANCE															
RED CLEARANCE															
WALK (W)															
PEDESTRIAN CLEARANCE															
RECALL															
MEMORY															

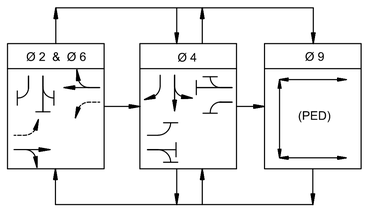
EMERGENCY PREEMPTION SCHEDULE

APPROACH	PREEMPTION PHASE	NEXT PHASE CALLED
NORTHBOUND	Ø 6	Ø 2 & Ø 6
SOUTHBOUND	Ø 2	Ø 2 & Ø 6
EASTBOUND	Ø 4	Ø 2 & Ø 6

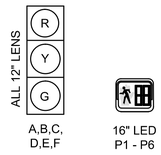
EMERGENCY PREEMPTION OPERATION:

1. EMERGENCY VEHICLE PREEMPTION SHALL BE ACTUATED BY AN OPTICAL SIGNAL FROM AN OPTICAL EMITTER MOUNTED ON AN EMERGENCY VEHICLE AND RECEIVED BY AN OPTICAL DETECTOR LOCATED AT THE INTERSECTION. A SEPARATE RECEIVING DETECTOR IS REQUIRED FOR EACH DETECTED APPROACH.
2. PREEMPTION SIGNALS FROM MULTIPLE APPROACHES SHALL BE SERVICED ON A FIRST DETECTED FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED AT AN INTERSECTION BY AN OPTICAL DETECTOR, THE CONTROLLER SHALL TIME THE CLEARANCE INTERVALS OF THE ACTIVE PHASE (IF DIFFERENT FROM THAT TO BE SERVICED) AND ADVANCE TO AND/OR HOLD IN EMERGENCY VEHICLE PREEMPTION PHASE UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME CLEARANCES AND SIMILARLY SERVICE OTHER EMERGENCY VEHICLE PREEMPTION SEQUENCES IN THE ORDER RECEIVED (IF RECEIVED). OTHERWISE, RESUME NORMAL PREFERENTIAL PHASE SEQUENCE.
4. PREEMPTION MINIMUM GREENS SHALL BE 6 SECONDS.
5. NORMAL CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TERMINATED BY PREEMPTION DEMAND.
6. ACTUAL TIMING FOR PREEMPTION SHALL BE DETERMINED IN THE FIELD IN COORDINATION WITH THE FIRE DEPARTMENT.

PREFERENTIAL PHASING SEQUENCE



SIGNAL IDENTIFICATION



NOTES:
1. ALL SIGNALS SHALL HAVE CUT AWAY VISORS.
2. ALL SIGNALS SHALL HAVE 12" LED WITH 5" LOUVERED BACK PLATES WITH 3" RETROREFLECTIVE BORDERS.

COORDINATION DATA

WASHINGTON ST / EXCHANGE ST / GREEN ST / CENTRAL ST

	PLAN 1	PLAN 2
CYCLE LENGTH		
OFFSET		
SPLIT		
SPLIT		
COOR PHASE		

WASHINGTON ST / CHARLES ST / HOLLIS ST

	PLAN 1	PLAN 2
CYCLE LENGTH		
OFFSET		
SPLIT		
SPLIT		
COOR PHASE		

LOOP DETECTOR DATA

DETECTOR NUMBER	AMPLIFIER NUMBER	CHANNEL NUMBER	LOOP SIZE	NUM OF TURNS	Ø CALLED	Ø EXT	MODE A=PULSE B=PRES	DELAY TIME	EXT TIME
1	1	1	3@6'X6"	3	6	6	B	0	0
2	1	2	3@6'X6"	3	6	6	B	0	0
3	2	1	3@6'X6"	3	2	2	B	0	0
4	2	2	3@6'X6"	3	2	2	B	0	0
5	3	1	3@6'X6"	3	4	4	B	0	5
6	3	2	3@6'X6"	3	4	4	B	0	0
7	4	1	1@6'X6"	D-2	6	6	BICYCLE	0	0
8	4	2	1@6'X6"	D-2	6	6	BICYCLE	0	0
9	5	1	1@6'X6"	D-2	2	2	BICYCLE	0	0
10	5	2	1@6'X6"	D-2	2	2	BICYCLE	0	0
11	6	1	1@6'X6"	D-2	4	4	BICYCLE	0	5
12	6	2	1@6'X6"	D-2	4	4	BICYCLE	0	0

		MAJOR ITEMS REQUIRED
PAY ITEM	QUANTITY	ITEM
815.2	1	NEMA TS2 (TYPE 1) CONTROLLER, CABINET AND FDN
	1	SERVICE CONNECTION
	1	20 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	1	25 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	1	30 FT TYPE II, GALV STEEL MAST ARM ASSEMBLY, BASE AND FDN
	6	PEDESTRIAN SIGNAL HEAD, SINGLE SECTION W/ COUNTDOWN TIMER
	4	8' SIGNAL POLE, BASE AND FDN
	6	APS PUSH BUTTON ASSEMBLY
	6	1 WAY, 3 SECTION, SIGNAL HOUSING (12" LED)
	6	5" LOUVERED SIGNAL BACKPLATES W/ RETROREFLECTIVE BORDERS
	18	LOOP DETECTOR (6'X6')
	6	BICYCLE LOOP DETECTOR (6'X6')
	6	DUAL CHANNEL LOOP DETECTOR AMPLIFIER
	3	OPTICOM OPTICAL DETECTOR, UNIDIRECTIONAL, SINGLE CHANNEL
	2	OPTICOM PHASE SELECTOR MODULE-DUAL CHANNEL
	1	OPTICOM CARD RACK
	1	EMERGENCY PREEMPTION CONFIRMATION BEACON (WHITE)

PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION.

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CORRIDOR IMPROVEMENTS

HOLLISTON, MA

TRAFFIC SIGNAL PLAN
WASHINGTON ST/
HOLLIS ST/ CHARLES ST

PRELIMINARY DESIGN
NOVEMBER 2016
SHEET 3 OF 3