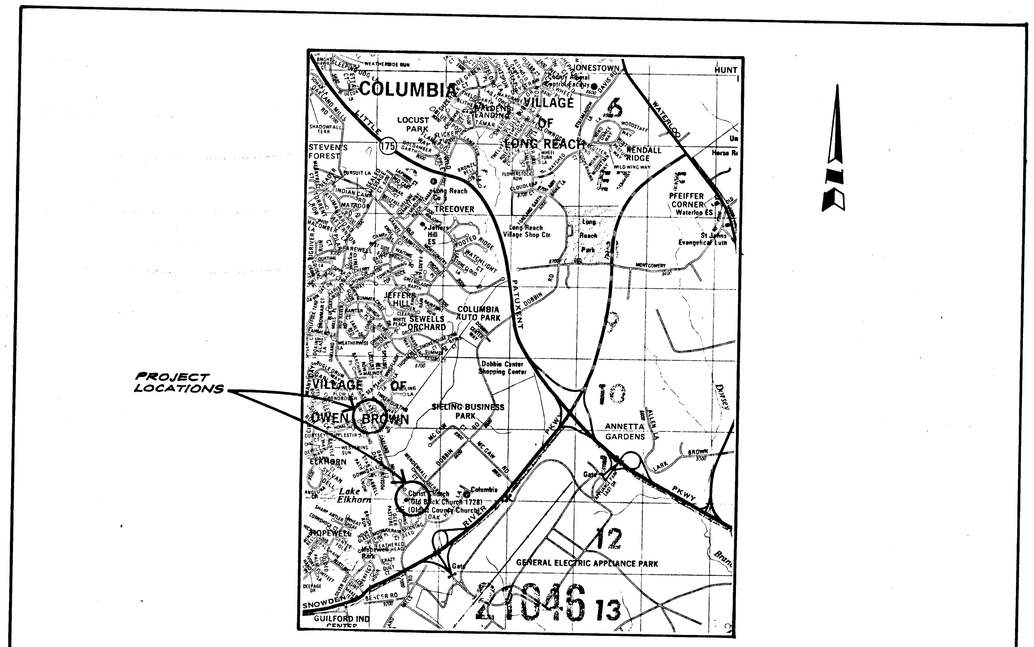
HOWARD COUNTY, MARYLAND

DEPARTMENT OF PUBLIC WORKS

OAKLAND MILLS ROAD
INTERSECTION IMPROVEMENT

CAPITAL PROJECT NO. T-7038



LOCATION MAP

SCALE : 1" = 2000'

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 1-27-87

CHIEF, BUREAU OF ENGINEERING — DATE 2-24-87

CHIEF, ROADS, BRIDGES & STORM DRAINAGE DIVISION — DATE 4/26/87

ARI ENGINEERING
8150 Leesburg Pike Suite 503
Vienna, Virginia 22180
(703) 442-0202

STATE OF MARYLAND — Robert H. Plonk No. 11979 — REGISTERED PROFESSIONAL ENGINEER

DES: P.A.P.			
DRN: A.C.M.			
CHK: R.H.P.			
DATE: FEB.87	BY NO.	REVISION	DATE

600' SCALE MAP NO. _____ BLOCK NO. _____

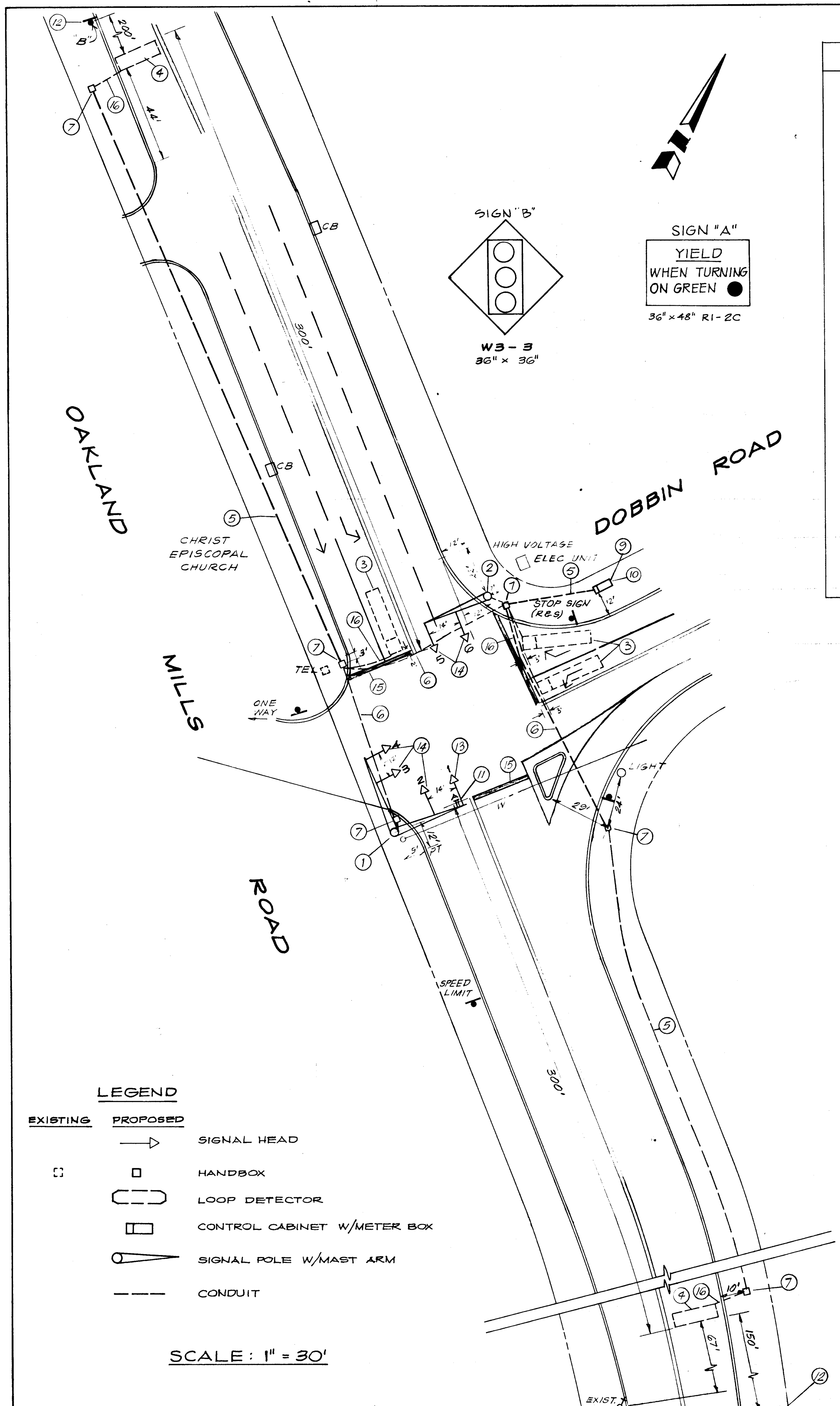
C128BZ01

OAKLAND MILLS ROAD
INTERSECTION IMPROVEMENT
CAPITAL PROJECT NO. T-7038

ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE AS SHOWN

SHEET 1 OF 4



SIGN "B"

W3-3
36" × 36"

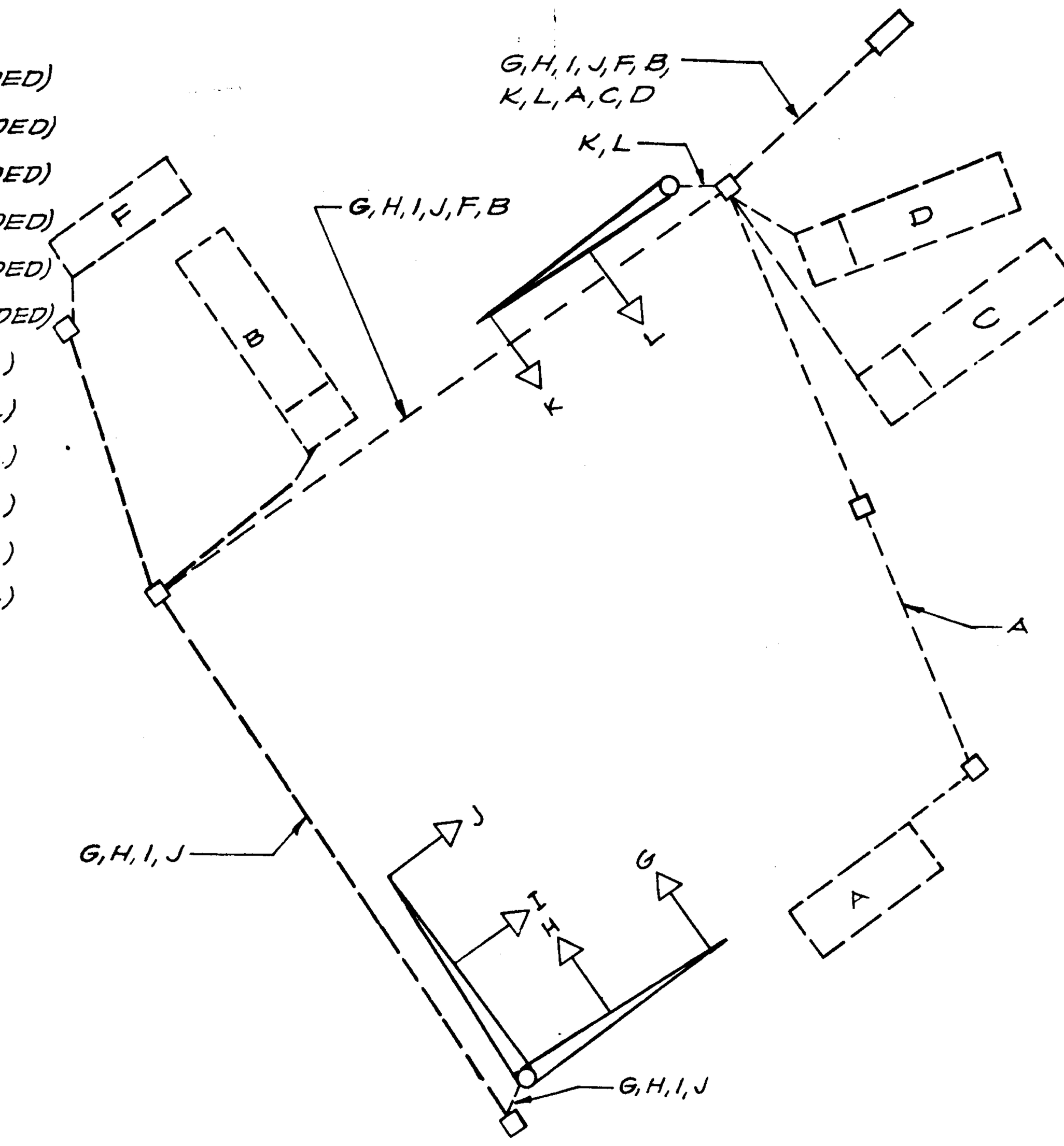
SIGN "A"

YIELD
WHEN TURNING ON GREEN ●

36" × 48" R1-2C

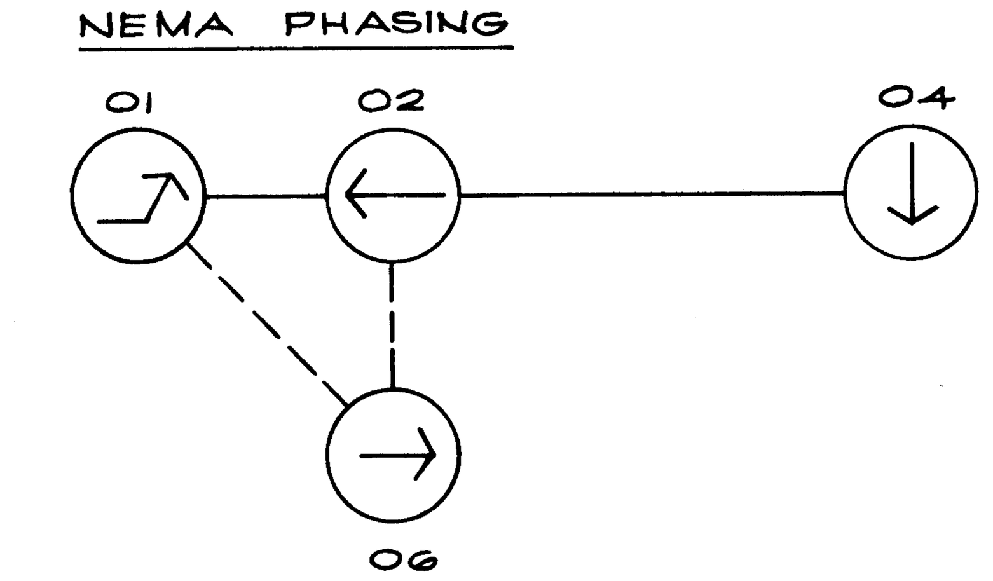
WIRING DIAGRAM
(NOT TO SCALE)

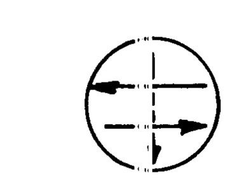
- A 2-CONDUCTOR CABLE (ALUM. SHIELDED)
- B 2-CONDUCTOR CABLE (ALUM. SHIELDED)
- C 2-CONDUCTOR CABLE (ALUM. SHIELDED)
- D 2-CONDUCTOR CABLE (ALUM. SHIELDED)
- E 2-CONDUCTOR CABLE (ALUM. SHIELDED)
- F 2-CONDUCTOR CABLE (ALUM. SHIELDED)
- G 7-CONDUCTOR CABLE (NO. 14 A.W.G.)
- H 5-CONDUCTOR CABLE (NO. 14 A.W.G.)
- I 5-CONDUCTOR CABLE (NO. 14 A.W.G.)
- J 5-CONDUCTOR CABLE (NO. 14 A.W.G.)
- K 5-CONDUCTOR CABLE (NO. 14 A.W.G.)
- L 5-CONDUCTOR CABLE (NO. 14 A.W.G.)



PHASE, SEQUENCE & TIMING DIAGRAM		TRAFFIC SIGNAL HEADS 1	2	3	4	5	6	MIN. GREEN	PASSAGE	YELLOW	PED. CLEARANCE	MAX. I	MAX. II	SECONDS PER ACTUATION	TIME TO REDUCTION	TIME BEFORE REDUCTION	MIN. GAP	RECALL	MEMORY
	Ø A	←G G	G	R	R	R	R	3	3			15	10					OFF	NON LOCK
	Ø A CLEAR	←Y G	G	R	R	R	R			4									
	Ø B	G	G	R	R	G	G	15	3			35	25	1.5	15	20	3.0	ON	LOCK
	Ø B CLEAR	Y	Y	R	R	Y	Y			4									
	Ø C	R	R	←G	G	R	R	10	3			30	15					OFF	NON LOCK
	Ø C CLEAR	R	R	←Y	Y	R	R			3									
	FLASH OP.	FL/Y	FL/Y	FL/R	FL/R	FL/Y	FL/Y												

NEMA PHASING





FLASHING OPERATION

1. PHASES ASSOCIATED BY A SOLID LINE WILL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.

LEGEND

EXISTING	PROPOSED	
	⟶▷	SIGNAL HEAD
⊏⊐	▫	HANDBOX
	⊂⊃	LOOP DETECTOR
	▭	CONTROL CABINET W/METER BOX
	⊂⊃—	SIGNAL POLE W/MAST ARM
	— — —	CONDUIT

SCALE: 1" = 30'

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 2-27-87
CHIEF, BUREAU OF ENGINEERING — DATE 2/26/87
CHIEF, ROADS, BRIDGES & STORM DRAINAGE DIVISION — DATE 2/26/87

ARI ENGINEERING
8150 Leesburg Pike Suite 503
Vienna, Virginia 22180
(703) 442-0202

STATE OF MARYLAND — Robert H. Plank — No. 11979 — REGISTERED PROFESSIONAL ENGINEER

DES: R.A.P.
DRN: A.C.M.
CHK: R.H.P.
DATE:

BY	NO.	REVISION	DATE

TRAFFIC SIGNAL PLAN
OAKLAND MILLS ROAD AT DOBBIN ROAD
TF 253

600' SCALE MAP NO. ______ BLOCK NO. ______

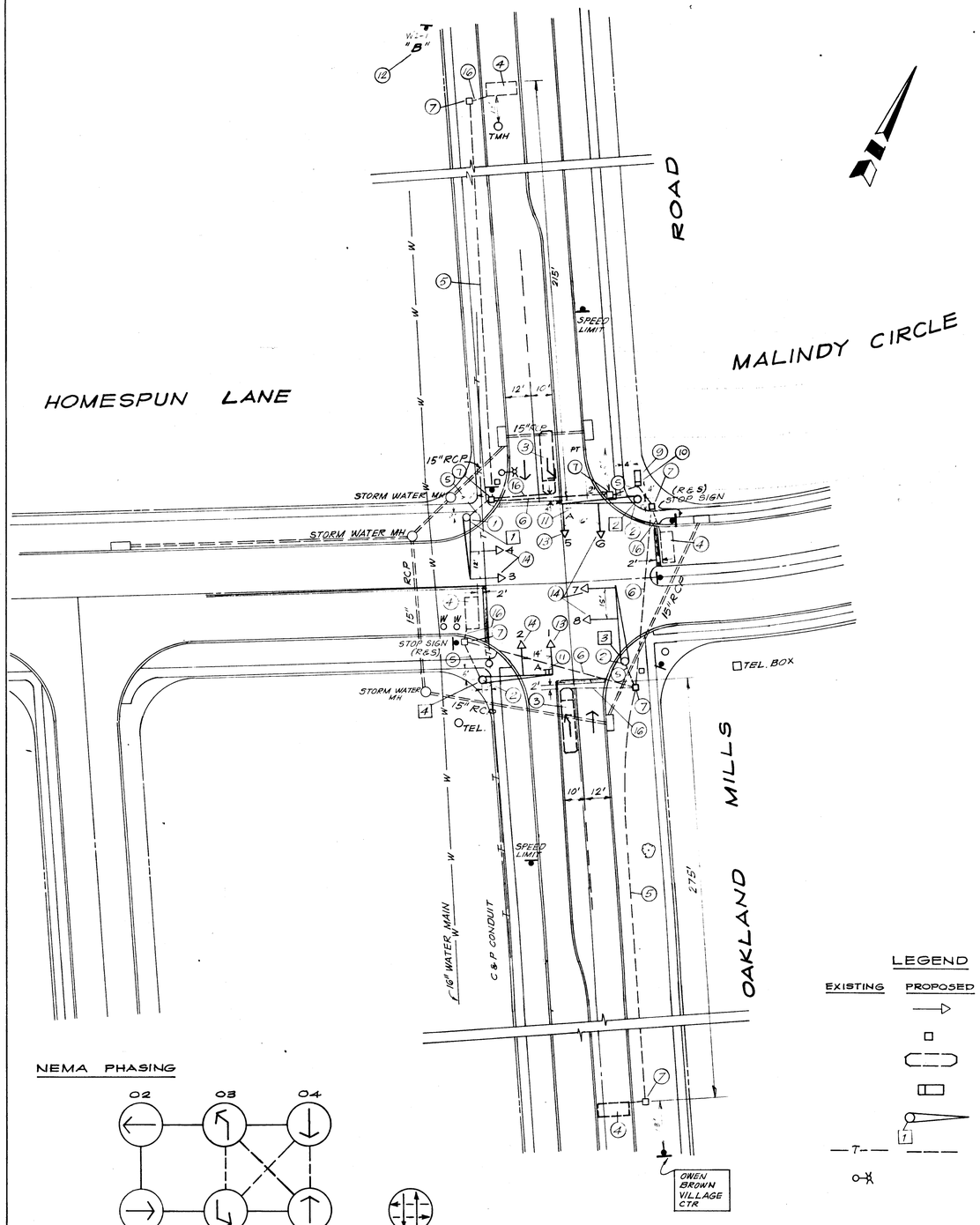
OAKLAND MILLS ROAD INTERSECTION IMPROVEMENT
CAPITAL PROJECT NO. T-7038

ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE AS SHOWN

SHEET 2 OF 4

BRUNING 44-132 69150



SIGN "A"

YIELD
WHEN TURNING
ON GREEN ●

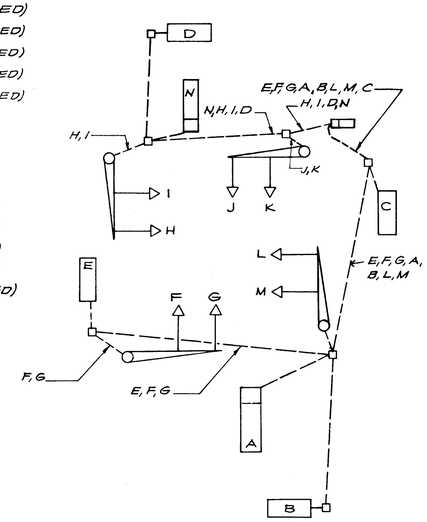
36" x 48" R1-2C

SIGN "B"

W3-3
36" x 36"

WIRING DIAGRAM
(NOT TO SCALE)

A	2- CONDUCTOR	CABLE	(ALUM. SHIELDED)
B	2- CONDUCTOR	CABLE	(ALUM. SHIELDED)
C	2- CONDUCTOR	CABLE	(ALUM. SHIELDED)
D	2- CONDUCTOR	CABLE	(ALUM. SHIELDED)
E	2- CONDUCTOR	CABLE	(ALUM. SHIELDED)
F	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
G	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
H	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
I	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
J	7- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
K	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
L	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
M	5- CONDUCTOR	CABLE	(NO. 14 A.W.G.)
N	2- CONDUCTOR	CABLE	(ALUM. SHIELDED)



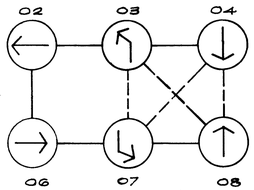
PHASE, SEQUENCE & TIMING DIAGRAM		TRAFIC SIGNAL HEADS 1	2	3	4	5	6	7	8	MIN. GREEN	PASSAGE	YELLOW	PED. CLEARANCE	MAX. I	MAX. II	SECONDS PER ACTUATION	TIME TO REDUCTION	TIME BEFORE REDUCTION	MIN. GAP	RECALL	MEMORY
	ØA	~~G~~ R	R	R	R	G R	R	R	R	3	3			15	10					OFF	NON LOCK
	ØA CLEAR	~~Y~~[1] R	R	R	R	~~Y~~[2] R	R	R	R			4									
	ØB	~~G~~ G	G	R	R	R	R	R	R	3	3			15	10					OFF	NON LOCK
	ØB CLEAR	~~Y~~ Y	Y	R	R	R	R	R	R			4									
	ØB ALT	R	R	R	R	~~G~~ G	G	R	R	3	3			15	10					OFF	NON LOCK
	ØB ALT CLR	R	R	R	R	~~Y~~ G	Y	R	R			4									
	ØC	G	G	R	R	G	G	R	R	10	3			35	25	1.5	15	20	3.0	ON	LOCK
	ØC CLEAR	Y	Y	R	R	Y	Y	R	R			4									
	ØD	R	R	G	G	R	R	G	G	10	3			30	15					OFF	NON LOCK
	ØD CLEAR	R	R	Y	Y	R	R	Y	Y			3									
	FLASH OP.	FL/Y	FL/Y	FL/R	FL/R	FL/Y	FL/Y	FL/R	FL/R												

~~Y~~[1] REMAINS ~~G~~ IF ØB FOLLOWS ØA.
~~Y~~[2] REMAINS ~~G~~ IF ØB ALT. FOLLOWS ØA.

LEGEND

EXISTING	PROPOSED	
—→—	—→—	SIGNAL HEAD
□	□	HANDBOX
⊂—⊃	⊂—⊃	LOOP DETECTOR
▭	▭	CONTROL CABINET W/METER BOX
	—→ 1	SIGNAL POLE W/MAST ARM
—T—	———	CONDUIT
O—X		LIGHT STANDARD

NEMA PHASING



FLASHING OPERATION

1. PHASES ASSOCIATED BY A SOLID LINE WILL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.

SCALE: 1" = 30'

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 1-27-87
CHIEF, BUREAU OF ENGINEERING — DATE 2/26/87
CHIEF, ROADS, BRIDGES AND STORM DRAINAGE DIVISION — DATE 2/26/87

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STATE OF MARYLAND — Robert H. Plack No. 11979 — REGISTERED PROF. ENGR. ENGINEER

DES: P.A.P.
DRN: A.C.M.
CHK: R.H.P.
DATE:

BY	NO.	REVISION	DATE

TRAFFIC SIGNAL PLAN
OAKLAND MILLS ROAD
AT HOMESPUN DRIVE
TF 252

600' SCALE MAP NO. _____ BLOCK NO. _____

OAKLAND MILLS ROAD INTERSECTION IMPROVEMENT
CAPITAL PROJECT NO. T-7038

ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE AS SHOWN

SHEET 3 OF 4

BRUNING 44.132.69150

DOBBIN ROAD

CONSTRUCTION DETAILS

1. INSTALL ONE DOUBLE MAST ARM (35') SIGNAL SUPPORT, AND FOUNDATION
2. INSTALL ONE SINGLE MASTARM (30') SIGNAL SUPPORT, AND FOUNDATION
3. INSTALL THREE 6' X 30' LOOP DETECTOR (QUADRUPOLE)
4. INSTALL TWO 6' X 20' LOOP DETECTOR (QUADRUPOLE)
5. INSTALL 2" PVC CONDUITS (TRENCHED)
6. INSTALL GALVANIZED CONDUITS (PUSHED)
7. INSTALL SIX HANDBOXES
8. INSTALL CONDUCTOR CABLE AS PER WIRING DIAGRAM
9. INSTALL CONTROLLER CABINET AND FOUNDATION
10. INSTALL POWER FEED TO CONTROLLER
11. INSTALL SIGN "A" NEXT TO SIGNAL HEAD #1
12. INSTALL TWO SIGNS "B" AS NOTED
13. INSTALL ONE FIVE-LENS SIGNAL HEAD
14. INSTALL FIVE THREE-LENS SIGNAL HEADS
15. PAINT PAVEMENT MARKINGS AS SHOWN
16. INSTALL 1" GALVANIZED CONDUITS FOR DETECTOR WIRE LEAD-IN TO HANDBOX

GENERAL NOTES

1. THE HIGHWAY MARKING AND SIGNING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AS NOTED.
2. THE UTILITIES SHOWN ON THE CONSTRUCTION PLAN ARE SCHEMATIC ONLY AND ARE NOT TO BE CONSIDERED COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION SO THAT ALL UTILITIES CAN BE LOCATED IN THE FIELD. THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES A MINIMUM OF TWO (2) WEEKS IN ADVANCE OF THE CONSTRUCTION OPERATIONS IN THE VICINITY OF THE UTILITIES. ANY DAMAGE INCURRED BY THE CONTRACTOR SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITIES OR AGENCIES AT LEAST FIVE (5) DAYS BEFORE STARTING WORK SHOWN ON THESE PLANS:
   - o MISS UTILITY (COLLECT) 1-559-0100
   - o BALTIMORE GAS & ELECTRIC COMPANY - UNDERGROUND ELECTRIC DISTRIBUTION ENGINEERING "DAMAGE CONTROL" 234-5691
   - o BALTIMORE GAS & ELECTRIC COMPANY - UNDERGROUND GAS DISTRIBUTION ENGINEERING "DAMAGE CONTROL" 234-5533
   - o CHESAPEAKE AND POTOMAC TELEPHONE COMPANY 752-9976
   - o TRAFFIC DIVISION 992-2072
   - o HOWARD COUNTY CABLE T.V. 461-1156
   - o BUREAU OF UTILITIES - HOWARD COUNTY 992-2366
3. CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH HOWARD COUNTY STANDARD SPECIFICATIONS AND DETAILS FOR CONSTRUCTION DESIGN MANUAL VOLUME IV.
4. ALL NEW SIGNAL HEADS SHALL BE SECURELY WRAPPED AND/OR BAGGED IN BURLAP, PRIOR TO SIGNAL BEING PLACED IN SERVICE.
5. THE CONTRACTOR SHALL COMPLY WITH OSHA AND MOSHA CODES
6. THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING: MAINTAIN SIX (6) INCHES MINIMUM CLEARANCE WITH ALL UNDERGROUND UTILITIES AND ALL OVERHEAD CLEARANCES SHALL BE IN ACCORDANCE WITH THE MARYLAND HIGH VOLTAGE ACT.
7. THE CONTRACTOR WILL SUPPLY ALL OTHER HARDWARE AND AUXILIARY EQUIPMENT REQUIRED FOR THE COMPLETION OF THE PROJECT AND ENSURE PROPER SIGNAL OPERATION AS DESIGNED AND SHOWN ON THE PLANS.
8. THE ELECTRICAL FEED AND SOURCE FOR THE TRAFFIC SIGNALS SHOULD BE SEPARATE FROM POWER FOR THE LUMINAIRES.

CONTROLLER AND ACCESSORIES

1. NEMA EIGHT PHASE MODULAR CONTROLLER WITH SOLID STATE CIRCUITRY AND DIGITAL TIMING, SIMILAR TO ECONOLITE KMC E-8000 SERIES DIGITAL CONTROLLER UNIT, EQUIVALENT MANUFACTURED BY CROUSE-HINDS, EAGLE SIGNAL CORPORATION OR APPROVED EQUAL SHALL BE INSTALLED WITH THE FOLLOWING:
   - A. FOUR PHASE SIGNAL OVERLAP CAPABILITY
   - B. VEHICULAR ACTUATED MODULE WITH VOLUME DENSITY CONTROLS FOR TWO APPROACHES
   - C. VEHICULAR ACTUATED MODULES (CAPABLE OF CONTROLLING THREE TRAFFIC MOVEMENTS).
   - D. VEHICULAR ACTUATED PHASE MODULES SHALL BE CAPABLE OF THE FOLLOWING FUNCTIONS: MINIMUM GREEN, PASSAGE TIME, YELLOW, ALL RED CLEARANCE, DUAL MAXIMUM, PEDESTRIAN TIMING, RECALL AND MEMORY.
   - E. VEHICULAR ACTUATED PHASE MODULE WITH VOLUME DENSITY CONTROLS SHALL BE CAPABLE OF FOLLOWING THE FUNCTIONS: MINIMUM GREEN, PASSAGE TIME, YELLOW, ALL RED CLEARANCE, DUAL MAXIMUM, PEDESTRIAN TIMING, SECONDS PER ACTUATION, TIME TO REDUCE, TIME FOR REDUCTION, MINIMUM GAP, RECALL AND MEMORY.
2. A CONFLICT MONITOR FOR ALL PHASES AND SOLID STATE LOAD SWITCHES SHALL BE FULLY WIRED IN THE CABINET.
3. A GROUND MOUNTED TRAFFIC CONTROLLER CABINET LARGE ENOUGH TO ACCOMODATE THE ABOVE CONTROL EQUIPMENT AND DETECTORS SHALL BE INSTALLED. THE CABINET SHALL BE FURNISHED WITH A THERMOSTATICALLY CONTROLLED CABINET VENT FAN.
4. THE FINISH OF THE CABINET SHALL BE ALL-WEATHER BRONZE PAINT.
5. THE CONTROLLER SHALL BE WIRED WITH FIVE 2 CHANNEL LOOP DETECTOR AMPLIFIERS (DELAY OUTPUT TYPE) AND HARNESSES.
6. A METER BOX SHALL BE INSTALLED IN A VANDAL PROOF ENCLOSURE PROVIDED BY THE CONTRACTOR. THE FINISH OF THE METER BOX, HOUSING AND CONDUITS SHALL BE ALL-WEATHER BRONZE PAINT.
7. ALL PHASES SHALL BE SKIPPABLE.

UNDERGROUND WIRING

1. UNDERGROUND WIRING UNDER ROAD SURFACES SHALL BE PLACED IN NEW GALVANIZED CONDUITS PUSHED UNDER THE ROAD SURFACE. P.V.C. ELECTRICAL CONDUIT IN GRASS AREAS SHALL BE TRENCHED AS SPECIFIED AND AS SHOWN ON THE CONTRACT DRAWINGS.

LOOPS AND DETECTORS

1. THE FOLLOWING LOOPS SHALL BE INSTALLED:

PHASE	DIMENSIONS	NO. OF LOOPS REQUIRED
1	6 x 30	1
2	6 x 20	1
4	6 x 30	2
6	6 x 20	1

2. ALL WIRING AND SAW CUTS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS FOR CORRECT OPERATION.
3. PHASES 1 AND 4 SHALL OPERATE IN THE PRESENCE MODE. PHASE 2 AND 6 SHALL OPERATE IN THE PULSE MODE.
4. DETECTOR AMPLIFIERS SHALL BE SARASOTA 235-T OR EQUIVALENT MANUFACTURED BY ECONOLITE CONTROL PRODUCTS, INC., CROUSE-HINDS, OR APPROVED EQUAL.
5. DETECTORS OPERATING IN THE PRESENCE MODE SHALL BE EQUIPPED WITH 6' x 6' POWER HEAD LOOP AS SHOWN ON THE PLANS.
6. LOOPS ARE TO BE INSTALLED CENTERED IN THE TRAVEL LANES FOR WHICH THEY ARE DESIGNED.

SIGNAL HEADS

1. THE CONTRACTOR SHALL PROVIDE THE FOLLOWING SIGNAL HEADS:

   HEAD NO. 1 - ONE-WAY, FIVE SECTION 12" SIGNAL HEAD HAVING RED, YELLOW, GREEN, YELLOW ARROW, GREEN ARROW INDICATIONS WITH TUNNEL VISORS INCLUDING PROPER ADJUSTABLE RIGID MOUNTING BRACKETS FOR MASTARM MOUNTED INSTALLATION

   HEAD NO. 2, 4, 5, 6 - ONE-WAY, THREE SECTION 12" SIGNAL HEAD HAVING RED, YELLOW, GREEN INDICATIONS WITH TUNNEL VISORS INCLUDING PROPER ADJUSTABLE RIGID MOUNTING BRACKETS FOR MASTARM MOUNTED INSTALLATION.

   HEAD NO. 3 - ONE-WAY, THREE SECTION 12" SIGNAL HEAD HAVING RED, YELLOW ARROW, GREEN ARROW INDICATIONS WITH TUNNEL VISORS INCLUDING PROPER ADJUSTABLE RIGID MOUNTING BRACKETS FOR MASTARM MOUNTED INSTALLATION.

2. ALL SIGNALS SHALL BE PAINTED BROWN BAKED ENAMEL WITH M.A. BRUDER AND SONS, INC. SEASHORE GLOSS TRIM 27721, DURANODIC BRONZE, CODE 7557581 OR EQUAL.
3. SIGNAL HEAD LOCATIONS AND AIMING TO BE DETERMINED IN THE FIELD WITH THE ENGINEER.

CONSTRUCTION SEQUENCE

1. INSTALL NEW SIGNAL HEADS, CABLES, SIGNS, CONDUIT, LOOP DETECTORS, CONTROLLER, CABINET AND FOUNDATION. NEW SIGNAL HEADS AND SIGNS SHALL BE SECURELY WRAPPED OR BAGGED IN BURLAP.
2. UNCOVER NEW SIGNAL HEADS AND SIGNS.
3. ENERGIZE SIGNALS.

POLES

THE CONTRACTOR SHALL PROVIDE THE FOLLOWING NEW STEEL SIGNAL POLES:

1. ONE (1) SINGLE ARM SUPPORT POLES, POLE HEIGHT 21', "T" DIMENSION 18.5'.
2. ONE (1) TWIN ARM SUPPORT POLE, POLE HEIGHT 21', "T" DIMENSION 18.5'.
3. STYLE AND APPEARANCE SHALL BE EQUIVALENT TO UNION METAL DESIGN NO. 50700. FINISH SHALL BE BRONZE PAINT.
4.

POLE NUMBER	DESCRIPTION
1	30' ARM WILL SUPPORT TWO (2), 3 SECTION SIGNAL HEADS.
2	35' ARM WILL SUPPORT TWO (2), 3 SECTION SIGNAL HEADS.
2	35' ARM WILL SUPPORT ONE (1), 3 SECTION SIGNAL HEAD, AND ONE (1), 5 SECTION SIGNAL HEAD.

5. SIGNALS SHALL BE MOUNTED ON THE MAST ARMS SO THAT THE BOTTOM OF THE SIGNAL HEAD HOUSING IS NOT LESS THAN 15 FEET NOR MORE THAN 19 FEET CLEARANCE ABOVE THE ROADWAY WHEN USING A RIGID MOUNTING, "ASTRO-BRAC" TYPE ADJUSTABLE SIGNAL BRACKET.

HOMESPUN LANE

CONSTRUCTION DETAILS

1. INSTALL ONE SINGLE MASTARM (30') SIGNAL SUPPORT, AND FOUNDATIONS
2. INSTALL THREE SINGLE MASTARMS (35') SIGNAL SUPPORT, AND FOUNDATIONS
3. INSTALL TWO 6' X 30' LOOP DETECTOR (QUADRUPOLE)
4. INSTALL FOUR 6' X 20' LOOP DETECTOR (QUADRUPOLE)
5. INSTALL 2" PVC CONDUITS (TRENCHED)
6. INSTALL GALVANIZED CONDUITS (PUSHED)
7. INSTALL SEVEN HANDBOXES
8. INSTALL CONDUCTOR CABLE AS PER WIRING DIAGRAM
9. INSTALL CONTROLLER CABINET AND FOUNDATION
10. INSTALL POWER FEED TO CONTROLLER
11. INSTALL SIGN "A" NEXT TO SIGNAL HEAD #5 & #1
12. INSTALL SIGN "B" ON EXISTING W2-1 SIGN POST. REMOVE & SALVAGE EXISTING SIGN.
13. INSTALL TWO FIVE-LENS SIGNAL HEAD
14. INSTALL SIX THREE-LENS SIGNAL HEADS
15. PAINT PAVEMENT MARKINGS AS SHOWN
16. INSTALL 1" GALVANIZED CONDUITS FOR DETECTOR LEAD-IN TO HANDBOX

GENERAL NOTES

1. THE HIGHWAY MARKING AND SIGNING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AS NOTED.
2. THE UTILITIES SHOWN ON THE CONSTRUCTION PLAN ARE SCHEMATIC ONLY AND ARE NOT TO BE CONSIDERED COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION SO THAT ALL UTILITIES CAN BE LOCATED IN THE FIELD. THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES A MINIMUM OF TWO (2) WEEKS IN ADVANCE OF THE CONSTRUCTION OPERATIONS IN THE VICINITY OF THE UTILITIES. ANY DAMAGE INCURRED BY THE CONTRACTOR SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITIES OR AGENCIES AT LEAST FIVE (5) DAYS BEFORE STARTING WORK SHOWN ON THESE PLANS:
   - o MISS UTILITY (COLLECT) 1-559-0100
   - o BALTIMORE GAS & ELECTRIC COMPANY - UNDERGROUND ELECTRIC DISTRIBUTION ENGINEERING "DAMAGE CONTROL" 234-5691
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4. ALL NEW SIGNAL HEADS SHALL BE SECURELY WRAPPED AND/OR BAGGED IN BURLAP, PRIOR TO SIGNAL BEING PLACED IN SERVICE.
5. THE CONTRACTOR SHALL COMPLY WITH OSHA AND MOSHA CODES
6. THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING: MAINTAIN SIX (6) INCHES MINIMUM CLEARANCE WITH ALL UNDERGROUND UTILITIES AND ALL OVERHEAD CLEARANCES SHALL BE IN ACCORDANCE WITH THE MARYLAND HIGH VOLTAGE ACT.
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8. THE ELECTRICAL FEED AND SOURCE FOR THE TRAFFIC SIGNALS SHOULD BE SEPARATE FROM POWER FOR THE LUMINAIRES.

CONTROLLER AND ACCESSORIES

1. NEMA EIGHT PHASE MODULAR CONTROLLER WITH SOLID STATE CIRCUITRY AND DIGITAL TIMING, SIMILAR TO ECONOLITE KMC E-8000 SERIES DIGITAL CONTROLLER UNIT, EQUIVALENT MANUFACTURED BY CROUSE-HINDS, EAGLE SIGNAL CORPORATION OR APPROVED EQUAL SHALL BE INSTALLED WITH THE FOLLOWING:
   - A. FOUR PHASE SIGNAL OVERLAP CAPABILITY
   - B. VEHICULAR ACTUATED MODULE WITH VOLUME DENSITY CONTROLS FOR TWO APPROACHES
   - C. VEHICULAR ACTUATED MODULES (CAPABLE OF CONTROLLING THREE TRAFFIC MOVEMENTS).
   - D. VEHICULAR ACTUATED PHASE MODULES SHALL BE CAPABLE OF THE FOLLOWING FUNCTIONS: MINIMUM GREEN, PASSAGE TIME, YELLOW, ALL RED CLEARANCE, DUAL MAXIMUM, PEDESTRIAN TIMING, RECALL AND MEMORY.
   - E. VEHICULAR ACTUATED PHASE MODULE WITH VOLUME DENSITY CONTROLS SHALL BE CAPABLE OF FOLLOWING THE FUNCTIONS: MINIMUM GREEN, PASSAGE TIME, YELLOW, ALL RED CLEARANCE, DUAL MAXIMUM, PEDESTRIAN TIMING, SECONDS PER ACTUATION, TIME TO REDUCE, TIME FOR REDUCTION, MINIMUM GAP, RECALL AND MEMORY.
2. A CONFLICT MONITOR FOR ALL PHASES AND SOLID STATE LOAD SWITCHES SHALL BE FULLY WIRED IN THE CABINET.
3. A GROUND MOUNTED TRAFFIC CONTROLLER CABINET LARGE ENOUGH TO ACCOMODATE THE ABOVE CONTROL EQUIPMENT AND DETECTORS SHALL BE INSTALLED. THE CABINET SHALL BE FURNISHED WITH A THERMOSTATICALLY CONTROLLED CABINET VENT FAN.
4. THE FINISH OF THE CABINET SHALL BE ALL-WEATHER BRONZE PAINT.
5. THE CONTROLLER SHALL BE WIRED WITH THREE 2 CHANNEL LOOP DETECTOR AMPLIFIERS (DELAY OUTPUT TYPE) AND HARNESSES.
6. A METER BOX SHALL BE INSTALLED IN A VANDAL PROOF ENCLOSURE PROVIDED BY THE CONTRACTOR. THE FINISH OF THE METER BOX, HOUSING AND CONDUITS SHALL BE ALL-WEATHER BRONZE PAINT.
7. ALL PHASES SHALL BE SKIPPABLE.

UNDERGROUND WIRING

1. UNDERGROUND WIRING UNDER ROAD SURFACES SHALL BE PLACED IN NEW GALVANIZED CONDUITS PUSHED UNDER THE ROAD SURFACE. P.V.C. ELECTRICAL CONDUIT IN GRASS AREAS SHALL BE TRENCHED AS SPECIFIED AND AS SHOWN ON THE CONTRACT DRAWINGS.

LOOPS AND DETECTORS

1. THE FOLLOWING LOOPS SHALL BE INSTALLED:

PHASE	DIMENSIONS	NO. OF LOOPS REQUIRED
2	6 x 20	1
3	6 x 30	1
4	6 x 20	1
6	6 x 20	1
7	6 x 30	1
8	6 X 20	1

2. ALL WIRING AND SAW CUTS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS FOR CORRECT OPERATION.
3. PHASES 2, 4, 6, & 8 SHALL OPERATE IN THE PULSE MODE. PHASE 3 & 7 SHALL OPERATE IN THE PRESENCE MODE.
4. DETECTOR AMPLIFIERS SHALL BE SARASOTA 235-T OR EQUIVALENT MANUFACTURED BY ECONOLITE CONTROL PRODUCTS, INC., CROUSE-HINDS, OR APPROVED EQUAL.
5. DETECTION LOOPS OPERATING IN THE PRESENCE MODE SHALL BE CONSTRUCTED WITH A 6' x 6' POWER HEAD LOOP.
6. LOOPS ARE TO BE INSTALLED CENTERED IN THE TRAVEL LANES FOR WHICH THEY ARE DESIGNED.

SIGNAL HEADS

1. THE CONTRACTOR SHALL PROVIDE THE FOLLOWING SIGNAL HEADS:

   HEAD NO.1,5 - ONE-WAY, FIVE SECTION 12" SIGNAL HEAD HAVING RED, YELLOW, GREEN, YELLOW ARROW, GREEN ARROW INDICATIONS WITH TUNNEL VISORS INCLUDING PROPER ADJUSTABLE RIGID MOUNTING BRACKETS FOR MASTARM MOUNTED INSTALLATION

   HEAD NO. 2,3,4,6, 7,8 - ONE-WAY, THREE SECTION 12" SIGNAL HEAD HAVING RED, YELLOW, GREEN INDICATIONS WITH TUNNEL VISORS INCLUDING PROPER ADJUSTABLE RIGID MOUNTING BRACKETS FOR MASTARM MOUNTED INSTALLATION.

2. ALL SIGNALS SHALL BE PAINTED FEDERAL YELLOW WITH M.A. BRUDER AND SONS, INC. SEASHORE GLOSS TRIM 27721, DURANODIC BRONZE, CODE 7557581 OR EQUAL.
3. SIGNAL HEAD LOCATIONS AND AIMING TO BE DETERMINED IN THE FIELD WITH THE ENGINEER.

CONSTRUCTION SEQUENCE

1. INSTALL NEW SIGNAL HEADS, CABLES, SIGNS, CONDUIT, LOOP DETECTORS, CONTROLLER, CABINET AND FOUNDATION. NEW SIGNAL HEADS AND SIGNS SHALL BE SECURELY WRAPPED OR BAGGED IN BURLAP.
2. UNCOVER NEW SIGNAL HEADS AND SIGNS.
3. ENERGIZE SIGNALS.

POLES

THE CONTRACTOR SHALL PROVIDE THE FOLLOWING NEW STEEL SIGNAL POLES:

1. FOUR (4) SINGLE ARM SUPPORT POLES, POLE HEIGHT 21', "T" DIMENSION 18.5'.
2. STYLE AND APPEARANCE SHALL BE EQUIVALENT TO UNION METAL DESIGN NO. 50700. FINISH SHALL BE BRONZE PAINT.
3.

POLE NUMBER	DESCRIPTION
1	30' ARM WILL SUPPORT TWO (2), 3 SECTION SIGNAL HEADS
2 & 4	EACH 35' ARM WILL SUPPORT ONE (1), 3 SECTION SIGNAL HEAD, AND ONE (1), 5 SECTION SIGNAL HEAD.
3	35' ARM WILL SUPPORT TWO (2), 3 SECTION SIGNAL HEADS.

4. SIGNALS SHALL BE MOUNTED ON THE MAST ARMS SO THAT THE BOTTOM OF THE SIGNAL HEAD HOUSING IS NOT LESS THAN 15 FEET NOR MORE THAN 19 FEET CLEARANCE ABOVE THE ROADWAY WHEN USING A RIGID MOUNTING, "ASTRO-BRAC" TYPE ADJUSTABLE SIGNAL BRACKET.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND
CHIEF - ROADS, BRIDGES & STORM DRAINAGE DIVISION
DATE 4/26/87

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STATE OF MARYLAND
Robert H. Plank
No. 11979
REGISTERED PROFESSIONAL ENGINEER

F.A.P.
A.C.M.
R.H.P.

OAKLAND MILLS ROAD
INTERSECTION IMPROVEMENT
CAPITAL PROJECT NO. T-7038

ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE AS SHOWN

SHEET 4 OF 4