

PHASE AND SEQUENCE DIAGRAM	TRAFFIC SIGNAL HEADS										Min. Green	Added Initial (per Actuation)	Yellow	Red Clearance	Veh. Ext	Time Before Reduction	Time to Reduce	Minimum Gap	Max. Green I	Max. Green II	Recall
	1,2	3,4	5,6	7,8	9,10	11,12															
	Phase 1	G	G	R	R	R	R	R	R	R	15	-	-	-	-	-	-	15	25	12	Off
	Phase 1 Clear to Phase 2	G	G	R	R	Y,R	R	R	R	R	4	-	-	-	-	-	-	4	15	12	Off
	Phase 1 Clear to Phase 3	Y,R	Y,R	R	R	Y,R	R	R	R	R	4	-	-	-	-	-	-	4	15	12	Off
	Phase 2	G	G	R	R	R	R	R	R	R	15	-	-	-	-	-	-	15	25	12	Off
	Phase 2 Clear to Phase 1	G	G	R	R	Y,R	R	R	R	R	4	-	-	-	-	-	-	4	15	12	Off
	Phase 2 Clear to Phase 3	Y,R	Y,R	R	R	Y,R	R	R	R	R	4	-	-	-	-	-	-	4	15	12	Off
	Phase 3	R	R	G	G	G	G	G	G	G	15	-	-	-	-	-	-	15	25	12	Off
	Phase 3 Clear	R	R	Y	Y	Y	Y	Y	Y	Y	4	-	-	-	-	-	-	4	15	12	Off
	To Phase 1 Only	R	R	R	R	R	R	R	R	R	1	-	-	-	-	-	-	1	15	12	Off
FLASH	Y	Y	R	R	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-	-	-	-

- LOOPS AND DETECTORS**
- The following new loops shall be installed:
 

Number	Dimensions	Phase	Mode
1	6' x 18'	3	Pulse, lock
2, 3	6' x 18'	3	Presence, lock
4	6' x 40'	2	Presence, non-lock
  - Loops 1, 2, 3 and 4 shall be wired to timing loop amplifiers. Each loop shall have a separate amplifier. The delay on loops 1, 2 and 4 shall be zero and the delay for loop 3 shall be 10 seconds.
  - During phases 1 and 2, a single actuation of loop 1, 2, or 3 shall disconnect loops 2 and 3. Loops 2 and 3 shall also be inactive during the green portion of phase 3.
  - Loop amplifiers shall be Sarasota 2357/MS or approved equal.
  - All wiring shall be in accordance with manufacturer's recommendations for correct operation.

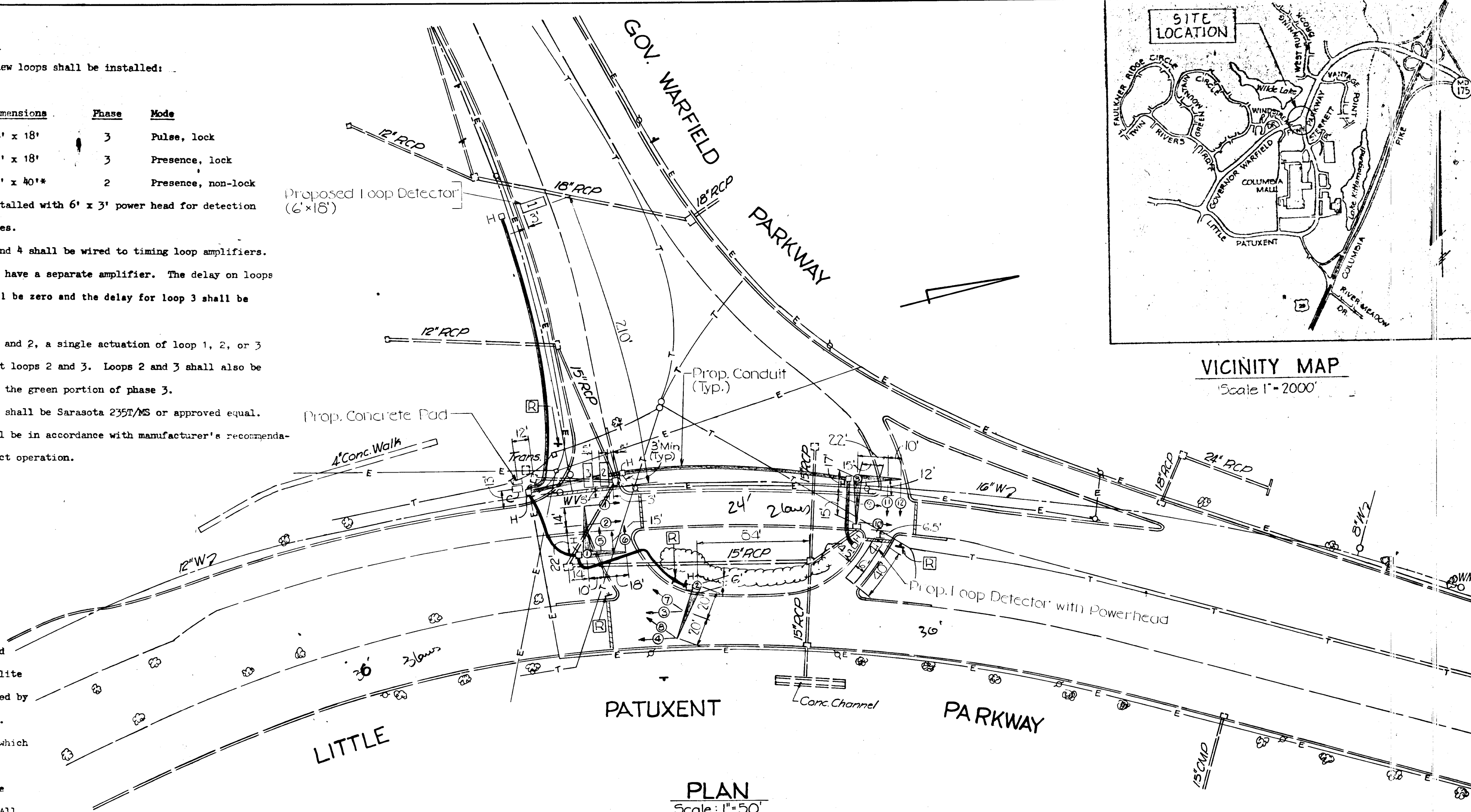
- NOTES:**
- The above times are in seconds.
  - The controller shall rest in Phase 1 unless there is a call in Phase 2 or 3.
  - The timing of maximum shall start at the beginning of the green phase.
  - MAX. I shall be in effect between 10:30 a.m. and 7:30 p.m. MAX. II shall be in effect between 7:30 a.m. and 10:30 p.m.

**GENERAL NOTES**

- All highway marking and sign removal shall be the responsibility of the Division of Traffic Engineering of the Bureau of Engineering, Department of Public Works, of Howard County, Maryland, and is not to be considered a part of this contract.
- Approximate location of existing utilities is shown. The Contractor shall take all necessary precautions to protect existing utilities and to maintain uninterrupted service. Any damage incurred shall be repaired immediately to the satisfaction of the Engineer by the Contractor at the Contractor's expense.
  - The Contractor shall locate existing utilities a minimum of two weeks in advance of construction operations in vicinity of utilities. Cost shall be incidental to the items in the Proposal Itemization.
  - Contractor shall notify the following utilities or agencies at least five (5) days before starting work shown on these plans:
    - Miss. Utility (Collect) 1-559-0100
    - Baltimore Gas & Electric Company - Underground Electric Distribution Engineering "Damage Control" - 234-5691
    - Baltimore Gas & Electric Company - Underground Gas Distribution Engineering "Damage Control" - 234-5533
    - Chesapeake and Potomac Telephone Co. - 725-9976
  - Clear all utilities by a minimum of 6". Clear all poles 2'-0" minimum or tunnel as required. Cost for tunneling or bracing at poles shall be incidental to the items in the Proposal Itemization.
- All materials and workmanship employed under this contract shall conform with the "GENERAL SPECIFICATIONS FOR INSTALLATION OF AND EQUIPMENT FOR TRAFFIC SIGNALS FOR HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS" dated October 7, 1974; revised February 18, 1976, and included in the contract specifications as the General Provisions.
- All disturbed areas shall be properly restored in accordance with the Contract Specifications.
- All signal heads shall be securely wrapped and/or bagged in burlap, when not in use.

**EQUIPMENT LIST**

- CONTROLLER AND ACCESSORIES**
- NEMA three phase modular programmable controller with solid state circuitry and digital timing, equivalent to the Econolite NMC 4 Series Digital Controller unit, equivalent manufactured by Eagle Signal Corporation or Crouse Hinds, or approved equal.
    - Equipped with three vehicular actuated modules, one of which shall have volume density controls.
    - Vehicular actuated phase modules shall be capable of the following functions: Minimum Green, Extension, Yellow, All Red Clearance, Dual Maximum, Recall and Memory.
    - Vehicular actuated phase module with volume density controls shall be capable of the following functions: Minimum Green, Extension, Yellow, All Red Clearance, Dual Maximum, Added Initial, Time to Reduce, Time Before Reduction, Minimum Gap, Recall and Memory.
    - Three phase signal overlap capability.
  - Conflict Monitor and Solid State load switches.
  - Solid State flasher and switch accessible through police door panel.
  - Solid state digital timer for switching between MAX I and MAX II. Timer shall have a 7-day program, automatic daylight savings time adjustment, display of current time and a 48 hour reserve battery.
  - Ground mounted traffic controller cabinet large enough to accommodate the above control equipment and detectors. The cabinet shall be furnished with a thermostatically controlled cabinet vent fan.
  - Finish of the cabinet shall be all-weather bronze paint.
  - Meter Box shall be installed in a vandal proof enclosure supplied by the contractor.
  - Install 3' x 4' x 5" concrete slab in front of the controller cabinet.



**PLAN**  
Scale: 1"=50'

**LEGEND**

- |                                      |                 |
|--------------------------------------|-----------------|
| <b>EXISTING</b>                      | <b>PROPOSED</b> |
| Steel Pole                           | ②               |
| Mast Arm                             | ③               |
| Signal Head                          | ④               |
| Street Light                         | ⑤               |
| Sign (Ⓚ indicates removal by others) | ⑥               |
| Hand Box                             | ⑦               |
| Stop Bar (By Others)                 | ⑧               |
| Controller with Electric Meter       | ⑨               |
| Underground Signal Wiring            | ⑩               |
| Underground Electric Line            | ⑪               |
| Underground Telephone Line           | ⑫               |
| Water Line                           | ⑬               |
| Storm Drain                          | ⑭               |
| Curb                                 | ⑮               |
| Bush Or Tree                         | ⑯               |
| Water Meter                          | ⑰               |
| Water Valve                          | ⑱               |

**SIGNAL HEADS**

- The Contractor shall provide the following new signal heads:
 

Signal Number	Description
1, 2, 3, 4, 5, 6, 9, 10, 11, 12	12" diameter red indication and 8" amber and green indications (non-optimally programmed)
7, 8	12" red indication; 8" amber and green indications (optimally programmed)
- All signals shall have baked enamel finish and shall be furnished with tunnel visors. Color shall be M.A. Bruder & Sons, Inc. Seashore Gloss trim 27721, Duradonic Bronze Code 7557581 or equal. All signals shall be vertically mounted on the mast arms with rigid adjustable brackets equivalent to the "Veped Traffic Controls, Inc. Astro-Brac (Model No. 0-AB-101)" or approved equal.

**POLES**

- Proposed Poles:**
- Two twin arm support poles with a 90° angle of separation. One single arm support pole.
  - Style and appearance shall be equivalent to Union Metal Design No. 50700. Finish shall be bronze paint.
  - | Pole Number | Description   |
|-------------|---|
| 1           | 36" arm spread supporting two signal heads. 28" arm spread supporting two signal heads. |
| 2           | 40" arm spread supporting four signal heads.  |
| 3           | 32" arm spread supporting two signal heads. 32" arm spread supporting two signal heads. |

**UNDERGROUND WIRING**

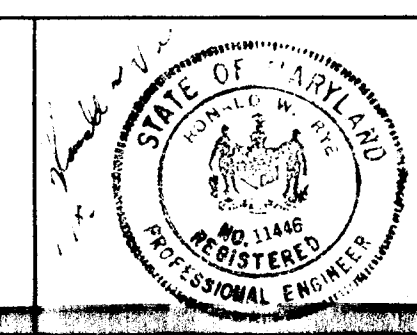
- Underground wiring shall be placed in new PVC Conduits under the road surface and in grass areas, as shown on the Contract Drawings.
- The conduit shall be sized to accommodate future wiring for pedestrian (WALK/DON'T WALK) signal heads.
- The contractor shall furnish an "as-Built" drawing as per "General Specifications - 4.02 b."
- The use of direct lay cable or a combination of conduit and direct lay shall not be acceptable.

**NOTE:**  
This Plan has been derived from record plans and is not based upon field surveys.

C7944201

**DEPARTMENT OF PUBLIC WORKS**  
 HOWARD COUNTY, MARYLAND  
 11-28-83  
 DATE: 11/28/83  
 DATE: 11/28/83

PREPARED BY:  
 THE WILSON T. BALLARD COMPANY  
 CONSULTING ENGINEERS  
 OWINGS MILLS, MARYLAND



**TRAFFIC SIGNAL SYSTEM**  
 AT  
 LITTLE PATUXENT PARKWAY AND GOVERNOR WARFIELD PARKWAY  
**PLAN AND EQUIPMENT LIST**

NO.	DATE	DESCRIPTION OF REVISION	SIGNATURE

DRAWING NO. 1 OF 1  
 SCALE: 1" = 50'  
 R.W.R. DESIGNED BY  
 T.S. DRAFTED BY  
 R.W.R. CHECKED BY