

PHASE AND SEQUENCE DIAGRAM	TRAFFIC SIGNAL HEADS					Min. Green	Passage Yellow	Red Clear	Max. I Seconds Per Actuation	Time to Red Before Reduction	Minimum Gap	Recall	Memory	
	1,2	3,4	5,6,7,8	9										
	Phase A	G	R	R	G	5	1	12				off	off	
	Phase A Clear	G	R	R	Y		4	1						
	Phase B	G	G	R	R	12	5	27	1.9	5	10	3.5	off	on
	Phase B Clear	Y	Y	R	R		4	1						
	Phase C	R	R	G	R	9	1	21				off	off	
	Phase C Clear	R	R	Y	R		4	1						
	FLASH	Y	Y	R	R									

GENERAL NOTES

- All highway marking 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 included in the unit prices bid for excavation and backfill for traffic signal appurtenances.
 - 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
 - State Highway Administration - 531-5533
 - 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 included in the unit prices bid for excavation and backfill for traffic signal appurtenances.
- 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.
- All disturbed areas shall be properly restored in accordance with the Contract Specifications.
- The existing traffic signal system shall be maintained and remain operational during the entire construction period of the new signal system. The contractor shall schedule the work such that the time between the total shut down of the existing signal heads and the turn on of the new signal system shall not be more than 1 calendar day. All new signal heads shall be securely wrapped and/or bagged in burlap, when not in use.
- The reconstruction of the center median islands shall be coordinated with the removal of the existing traffic signal system and installation of the new traffic signal system.

EQUIPMENT LIST

CONTROLLER AND ACCESSORIES

- NEMA three phase modular thumbwheel programmable controller with solid state circuitry and digital timing, equivalent to the Crosse Hinds DM-400 Series Digital Controller unit, equivalent manufactured by Eagle Signal Corporation or Econolite, or approved equal. The controller shall be capable of expansion to four phase operation.
 - Equipped with two (2) vehicular actuated modules.
 - Equipped with one (1) vehicular actuated module with volume density controls.

- 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.
 - Vehicular actuated phase module with volume density controls shall be capable of the following functions: Minimum Green, Passage Time, Yellow, All Red Clearance, Dual Maximum, Pedestrian Timing, Seconds Per Actuation, Time to Reduce, Time Before Reduction, Minimum Gap, Recall and Memory.
 - Four phase signal overlap capability.
- Conflict Monitor and Solid State load switches.
 - Solid State flasher and switch accessible through police door panel.
 - 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.

LOOPS AND DETECTORS

- The existing loops, as indicated on the contract drawings, shall be abandoned. The following new loops shall be installed:

Number	Dimensions	Phase
1, 2	6' x 18'	B
3	6' x 40'	A
4, 5, 7, 8	6' x 40'	C
6	6' x 10'	C

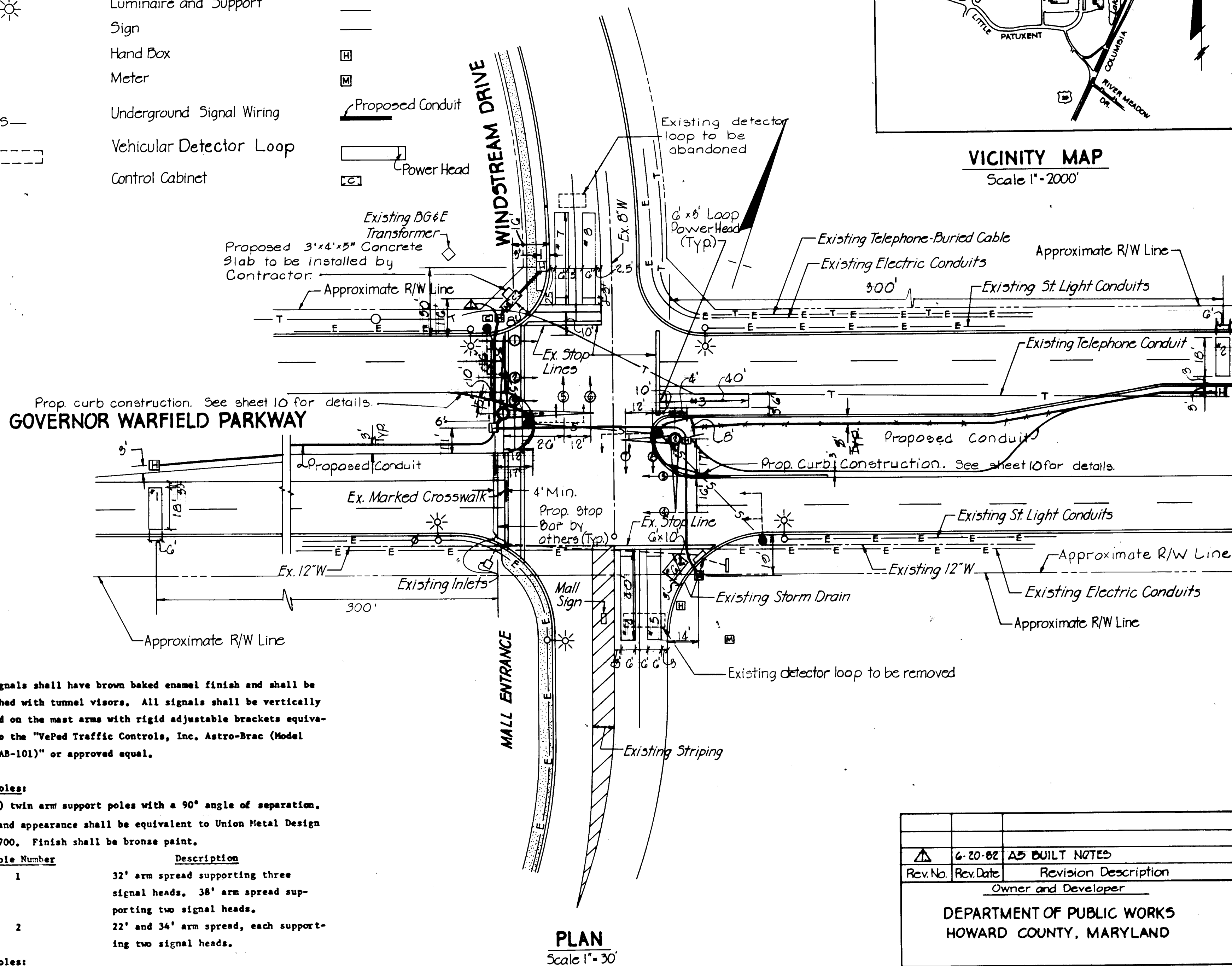
- *Loops to be installed with 6' x 3' power head for detection of small vehicles.
- Loops 1 and 2 shall be wired separately to a common standard detector.
 - Loop 3 shall be wired to a standard detector.
 - Loops 4 and 8 shall be wired separately to a common standard detector.
 - Loops 5, 6, and 7 shall be wired separately to a common delayed timer vehicle loop detector in accordance with manufacturer's recommendations for correct operation. Delayed timer shall be set at 10 seconds.
 - Loops 1 and 2 shall operate in pulse mode, and loops 3, 4, 5, 6, 7, 8 in presence mode.
 - Delayed timer vehicle loop detectors shall be Sarasota 235T/MS or approved equal. Standard detectors shall be Sarasota 215B/MS or approved equal.
 - All wiring shall be in accordance with manufacturer's recommendations for correct operation.

SIGNAL HEADS

- The existing signal heads shall be removed and shall be delivered to a location designated by the Traffic Engineer. The Contractor shall provide the following new signal heads:

Signal Number	Description
1, 2, 3, 4, 5, 6, 7, 8	12" diameter red indication; 8" amber and green
9	12" red indication; 8" amber indication, and 12" green left turn arrow.

SYMBOLS	
Existing	Proposed



- All signals shall have brown baked enamel finish and shall be furnished with tunnel visors. 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. O-AB-101)" or approved equal.

POLES

Proposed Poles:

- Two (2) twin arm support poles with a 90° angle of separation.
 - Style and appearance shall be equivalent to Union Metal Design No. 50700. Finish shall be bronze paint.
- | Pole Number | Description |
|-------------|---|
| 1 | 32' arm spread supporting three signal heads. 38' arm spread supporting two signal heads. |
| 2 | 22' and 34' arm spread, each supporting two signal heads. |

Existing Poles:

- The existing traffic signal support poles shall be removed and delivered to a location designated by the Traffic Engineer. The existing foundations are to be removed to a depth of 1' below grade and backfilled and sodded.

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.
- All existing direct buried cable shall be abandoned.
- 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.

Approved: *Elizabeth Anderson Palia* 12/15/80
 Chief - Division of Road & Bridge (Storm Drainage) Date

Approved: *James E. Hendon* 12/16/80
 Chief - Division of Traffic Engineering Date

Approved: DEPARTMENT OF PUBLIC WORKS

Walter F. Neumeier 12-16-80
 Date
 DIRECTOR OF PUBLIC WORKS

Approved: *William E. Rely* 12-16-80
 Date
 Chief - Bureau of Engineering

Rev. No.	Rev. Date	Revision Description
1	6-20-82	AS BUILT NOTES
		Owner and Developer
DEPARTMENT OF PUBLIC WORKS HOWARD COUNTY, MARYLAND		
Project Area		
GOVERNOR WARFIELD PARKWAY AT INTERSECTION OF WINDSTREAM DRIVE AND MALL ENTRANCE		
Project Title		
PLAN RECONSTRUCTION OF TRAFFIC SIGNAL AND EQUIPMENT LIST CAPITAL PROJECT NO T-G-7003		
Designed: D.Chang	Scale: As Noted	
Drawn: D.Griffin	Date: Dec. 16, 80	
Checked: K.Evans	Sheet: 9 of 10	
Prepared By		
THE WILSON T. BALLARD CO. CONSULTING ENGINEERS OWINGS MILLS, MARYLAND		

AS BUILT 62082

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