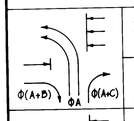
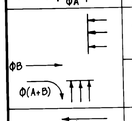
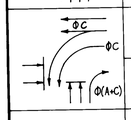
PHASE AND SEQUENCE DIAGRAM

		TRAFFIC SIGNAL HEADS 1	2	3	4	6	7	Min Green	Passage	Yellow	Red Clear	Max I	Seconds Per Actuation	Time to Reduce	Time Before Reduction	Minimum Gap	Recall	Memory	5
	Phase A	G	G	R	G1	R	R	10	7			22	14	5	10	35	OFF	ON	R
	Phase A Clear	Y,R	Y,R	R	G1	R	R			4	2								R
	Phase B	R	R	G	G	R	R	10	5			20	18	5	10	35	OFF	ON	R
	Phase B Clear	R	R	Y,R	Y,R	R	R			4	1								R
	Phase C	R	G2	R	R	G	G	10	1			21	20	5	10	35	OFF	ON	G
	Phase C Clear	R	G2	R	R	Y,R	Y,R			4	2								Y,R
	FLASH	R	R	Y	Y	Y	R												Y

1 Green Arrow Only $\phi(A+B)$ Overlap
2 Green Arrow Only $\phi(A+C)$ Overlap

GENERAL NOTES

1. 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.
2. a. 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.
   b. 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.
   c. 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
   d. 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.
3. 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.
4. All disturbed areas shall be properly restored in accordance with the Contract Specifications.
5. 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.
6. 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.
7. The use of direct lay cable or a combination of conduit and direct lay shall not be acceptable.

EQUIPMENT LIST

CONTROLLER AND ACCESSORIES

1. NEMA three phase modular thumbwheel programmable controller with solid state circuitry and digital timing, equivalent to the Crouse 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.
   a. Equipped with three (3) vehicular actuated modules with volume density controls.
   b. Vehicular actuated phase modules 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.
   c. Four phase signal overlap capability.
2. Conflict Monitor and Solid State load switches.
3. Solid State flasher and switch accessible through police door panel.
4. Manual operating control and manual switch accessible through police door panel.
5. Ground mounted traffic controller cabinet large enough to accomodate the above control equipment, detectors, and any future coordination equipment. A 2" spare conduit elbow for future interconnection shall be provided in the controller cabinet foundation and plugged 2' ± beyond the foundation. The cabinet shall be furnished with a thermostatically controlled cabinet vent fan.
6. Finish of the cabinet shall be all-weather bronze paint.
7. Install 3' x 4' x 5" concrete slab in front of the controller cabinet.
8. The existing controller and equipment shall be removed and delivered to a location designated by the Traffic Engineer. The existing concrete base shall be removed, and the area backfilled and sodded.
9. Meter box shall be installed in a vandal proof enclosure supplied by the contractor.

LOOPS AND DETECTORS

1. The existing loops, as indicated on the Contract Drawings, shall be abandoned or removed as noted. The following new loops shall be installed:

Number	Dimensions	Phase
1	6' x 16'	A
2	6' x 18'	B
3	6' x 18'	C

2. Loop 1 shall be wired to a standard detector.
3. Loop 2 shall be wired to a standard detector.
4. Loop 3 shall be wired to a standard detector.
5. All wiring shall be in accordance with manufacturer's recommendations for correct operation.
6. Loops 1, 2, and 3 shall operate in pulse mode.
7. Standard detectors shall be Sarasota 215B/MS or approved equal.

SIGNAL HEADS

1. 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, 3, 5	12" diameter red indication; 8" diameter amber and green indications
2, 4	12" diameter red indication; 8" diameter amber and green indications; 12" right turn arrow
6	12" diameter red indication; 8" diameter amber and green indications; 12" left turn arrow
7	12" diameter red indication; 8" diameter amber indication; 12" left turn arrow

2. 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

1. One (1) single arm support pole, and one (1) twin arm support pole with a 90° angle of separation.
2. Style and appearance shall be equivalent to Union Metal Design No. 50700. Finish shall be bronze paint.
3.

Pole Number	Description
1	32' arm spread supporting two signal heads and 44' arm spread supporting three signal heads.
2	30' arm spread, supporting two signal heads.

Existing Poles:

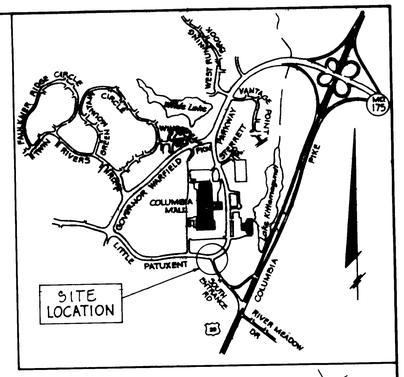
1. The existing traffic signal support poles shall be removed and delivered to a location designated by the Traffic Engineer. The existing foundations are to be removed to a depth of 1' below grade and backfilled and sodded.

UNDERGROUND WIRING

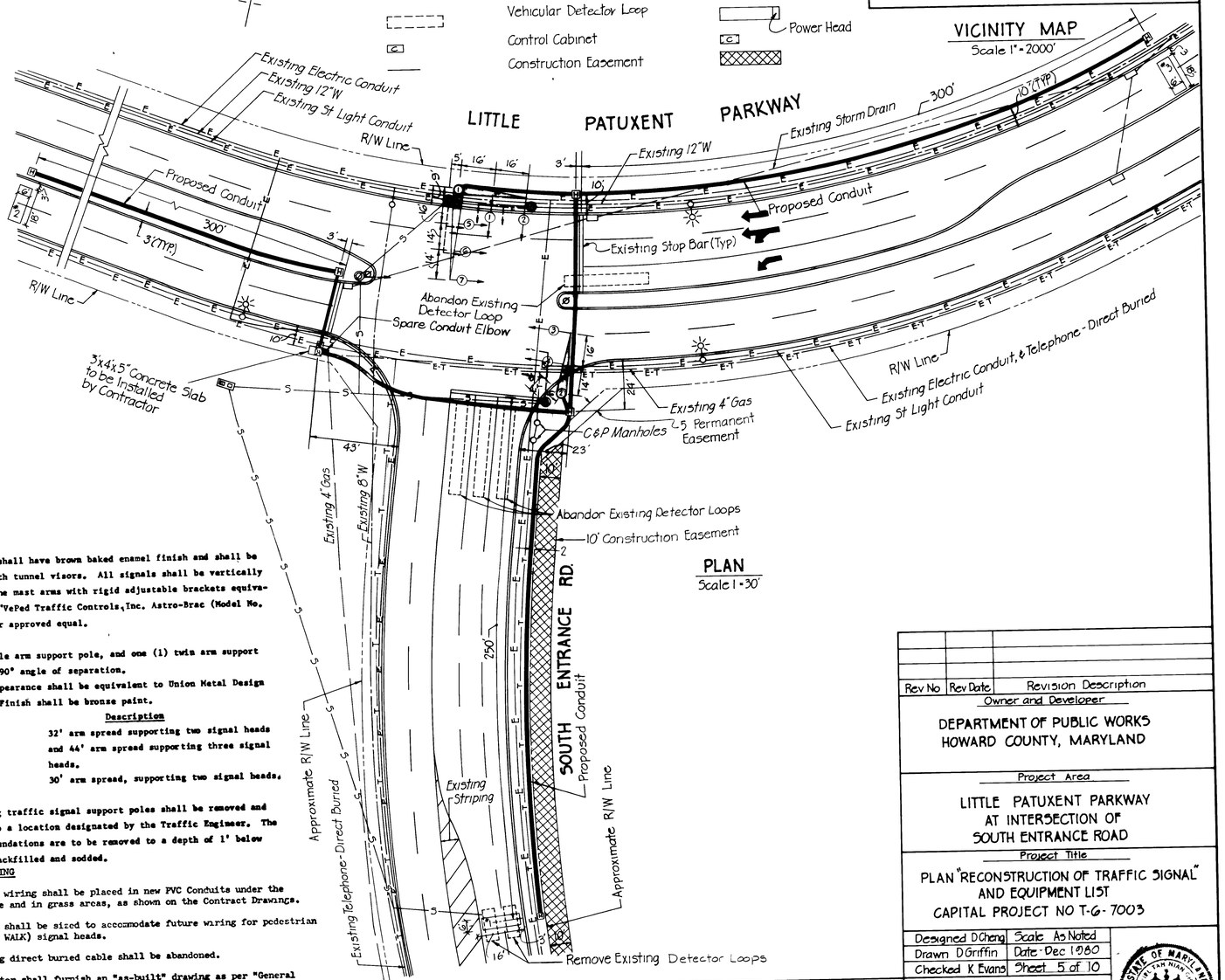
1. Underground wiring shall be placed in new PVC Conduits under the road surface and in grass areas, as shown on the Contract Drawings.
2. The conduit shall be sized to accommodate future wiring for pedestrian (WALK/DON'T WALK) signal heads.
3. All existing direct buried cable shall be abandoned.
4. The Contractor shall furnish an "as-built" drawing as per "General Specifications - 4.020".

SYMBOLS

Existing		Proposed
	Steel Pole	
	Ground Mounted Traffic Signal	
	Mast Arm	
	Signal Head	
	Luminaire and Support	
	Sign	
H	Hand Box	H
M	Meter	M
—S—	Underground Signal Wiring	Proposed Conduit
	Vehicular Detector Loop	Power Head
C	Control Cabinet	C
	Construction Easement	



VICINITY MAP
Scale 1" = 2000'



PLAN
Scale 1 · 30'

Rev No	Rev Date	Revision Description

Owner and Developer
DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Project Area
LITTLE PATUXENT PARKWAY
AT INTERSECTION OF
SOUTH ENTRANCE ROAD

Project Title
PLAN "RECONSTRUCTION OF TRAFFIC SIGNAL" AND EQUIPMENT LIST
CAPITAL PROJECT NO T-6-7003

Designed D Cheng	Scale As Noted
Drawn D Griffin	Date Dec 1980
Checked K Evans	Sheet 5 of 10

Prepared By
THE WILSON T BALLARD CO
CONSULTING ENGINEERS
OWINGS MILLS, MARYLAND

STATE OF MARYLAND — DANIEL SAN NIEN CHENG — No. 10997 — REGISTERED PROFESSIONAL ENGINEER
Daniel S Cheng 12-10-80

Approved
Elizabeth Anderson Colaiz 12/15/80
Chief-Division of Roads, Bridges & Storm Drainage — Date

Approved
James Franklin 12-16-80
Chief-Division of Traffic Engineering — Date

Approved DEPARTMENT OF PUBLIC WORKS
Henry F. Nemeyer 12-16-80
DIRECTOR OF PUBLIC WORKS — Date

Approved
O'Connor E. Ray 12 16 80
Chief-Bureau of Engineering — Date

#746

LPPSENT 1