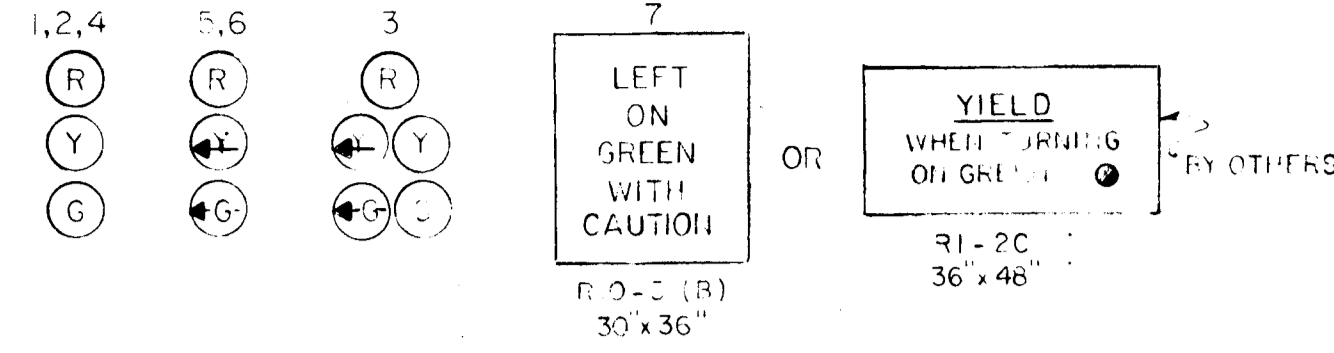
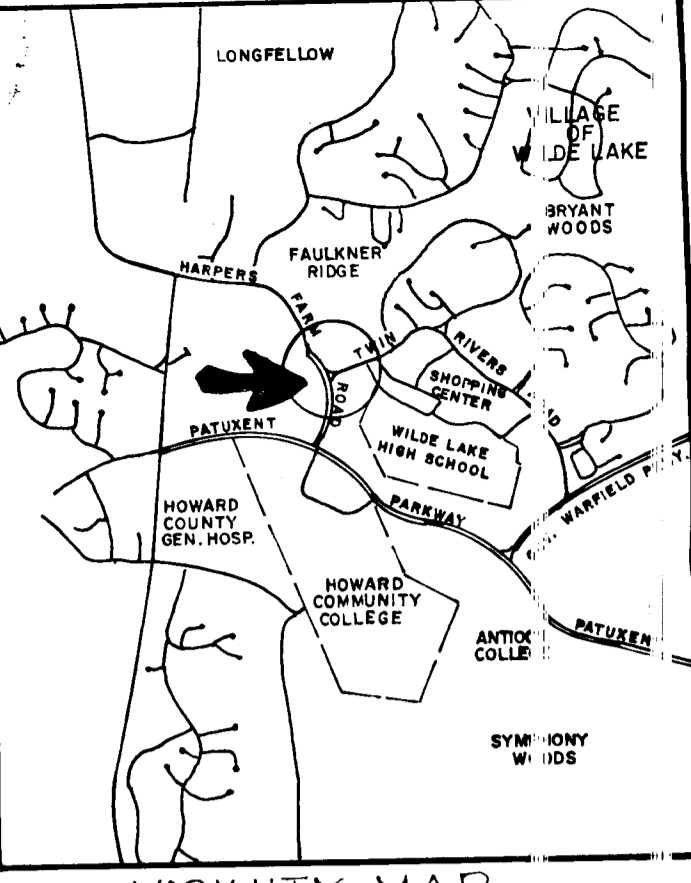
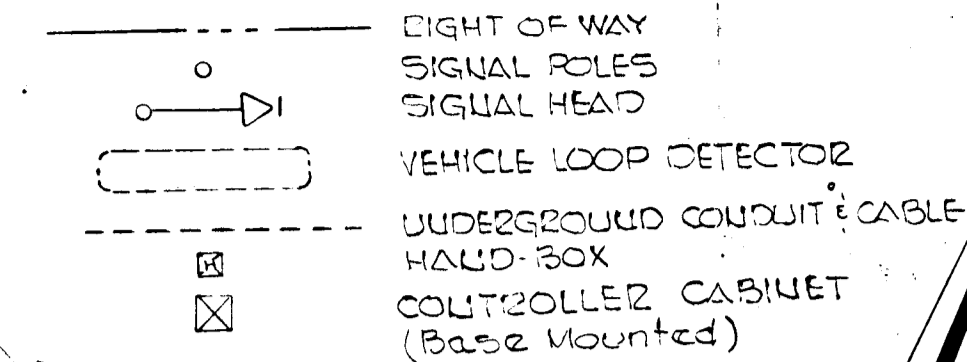


**12" SIGNALS**



**LEGEND**



- REQUIRED CONSTRUCTION**
1. Install steel pole with 32' and 38' twin mast arms with signals and sign as shown (Note: 1-2" 90° elbow).
  2. Install steel pole with 30' mast arm with signals as shown (Note: 1-2" 90° elbow).
  3. Install handbox (frame and cover).
  4. Install 6' x 30' loop detector (2 turns).
  5. Install 1" galvanized steel electrical conduit for detector lead in.
  6. Install 2" galvanized steel electrical conduit (pushed).
  7. Install 2" galvanized steel electrical conduit (trenched).
  8. Install base mounted cabinet on concrete pad and all necessary controller equipment (Note: 3-2" 90° elbows galvanized). Install 3'x4'x5' concrete slab in front of the controller cabinet.
  9. Install 6' x 20' loop detector (2 turns).
  10. Install 2" P.V.C. electrical conduit - trenched in grass median.

- GENERAL NOTES**
1. All highway marking and signing shall be the responsibility of the Division of Traffic Engineering of the Bureau of Engineering, Department of Public Works, Howard County, Maryland, and is not to be considered a part of this contract.
  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. See Section 4.09 of the General Specifications. 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 Company - 752-9976
    - Traffic Division - 992-2072
    - Howard County Cable T.V. - 461-1156
  3. All materials and workmanship employed under this contract shall conform with the "GENERAL SPECIFICATIONS FOR INSTALLATION OF EQUIPMENT FOR TRAFFIC SIGNALS FOR HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS" dated October 7, 1974; revised February 18, 1976.
  4. All disturbed areas shall be properly restored in accordance with Section 4.20 of the General Specifications.
  5. All new signal heads shall be securely wrapped and/or bagged in burlap, prior to signal being placed in service.

- CONTROLLER AND ACCESSORIES**
1. NEMA four phase modular controller with solid state circuitry and digital timing, similar to the Econolite KMC 4000 Series Digital Controller unit, equivalent manufactured by Crouse-Hinds, Eagle Signal Corporation or approved equal.
    - a. Equipped with two (2) vehicular actuated modules.
    - b. Equipped with one (1) vehicular actuated module with volume density controls.
    - c. 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.
    - d. 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.
    - e. Four phase signal overlap capability.
  2. Conflict Monitor for all phases and Solid State load switches fully wired in cabinet.
  3. 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.
  4. Finish of the cabinet shall be all-weather bronze paint.
  5. The controller shall be wired with four loop detector amplifiers (delay output type) and harnesses.
  6. Meter box shall be installed in vandal proof enclosure provided by the contractor.
  7. A minimum of six (6) vehicle loop detector harnesses (plug type) shall be wired in the cabinet.
  8. All phases shall be skippable.

- UNDERGROUND WIRING**
1. Underground wiring shall be placed in new galvanized conduits pushed under the road surface. P.V.C. electrical conduit in grass median shall be trenched as specified and shown on the Contract Drawings.
  2. The Contractor shall furnish an "as-built" drawing as per "General Specifications 4.02b".
- LOOPS AND DETECTORS**
1. The following new loops shall be installed:

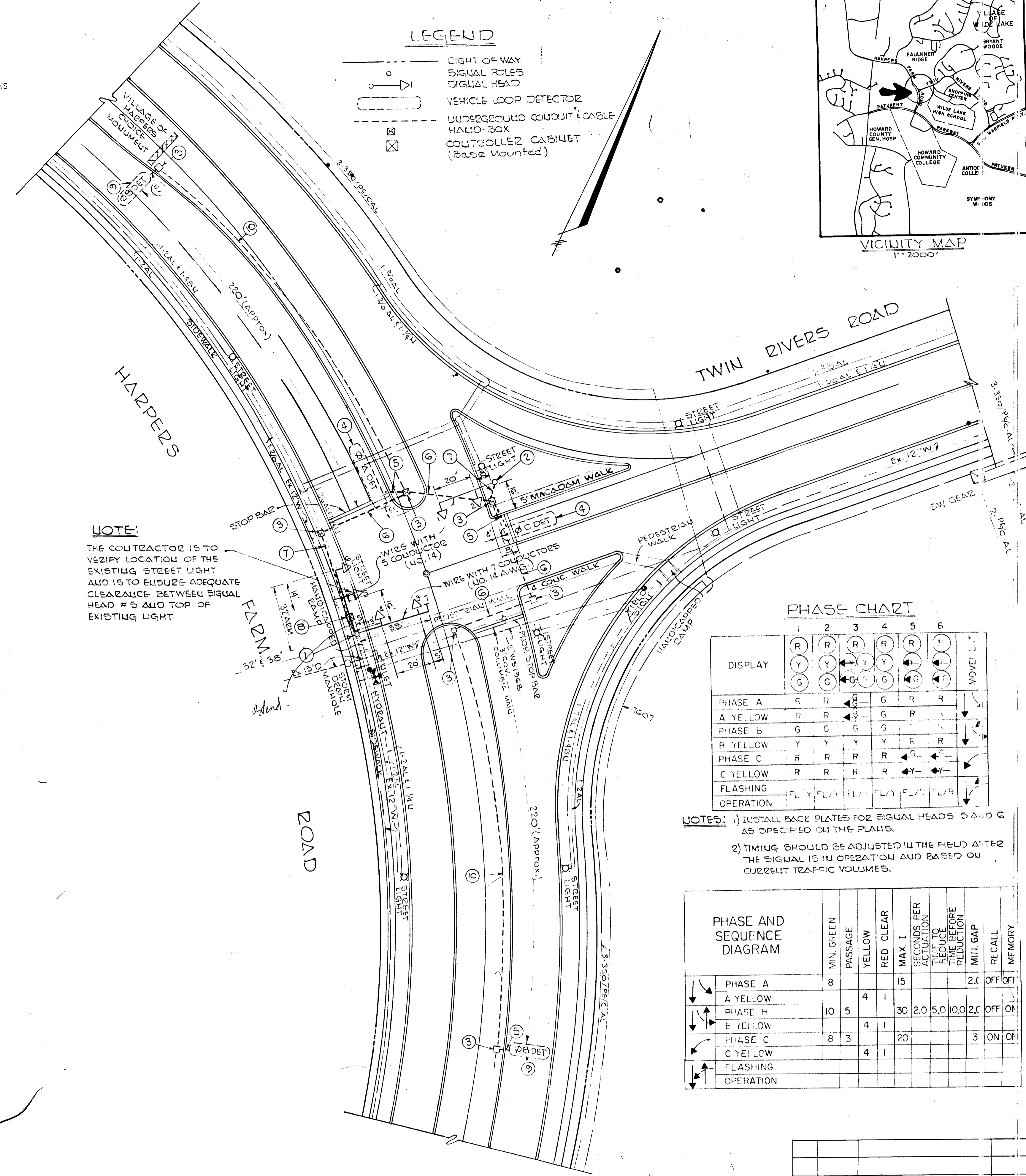
Phase	Dimensions	No. of Loops Required
A	6' x 30'	1
B	6' x 20'	2
C	6' x 30'	1

2. All wiring shall be in accordance with manufacturer's recommendations for correct operation.
3. Phase A and C loop detectors shall operate in presence mode. Phase B loops shall operate by (extension) point detection.
4. Detector amplifiers shall be Sarasota 235-T or equivalent manufactured by Econolite Control Products, Inc., Crouse-Hinds, or approved equal.

- SIGNAL HEADS**
1. The Contractor shall provide the following signal heads:
- | Signal Number | Description                                                                                                                                                                                  |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1,2,4         | 1 way, 3 section 12" signal, having red, yellow and green indications with tunnel visors and proper adjustable mounting brackets for mast arm installation.                                  |
| 5,6           | 1 way, 3 section 12" signal, having red, yellow and green arrow indications with tunnel visors and back plates and with proper adjustable rigid mounting brackets for mast arm installation. |
| 3             | 1 way, 5 section 12" signal, having red, yellow, green, yellow arrow and green arrow indications with tunnel visors and proper adjustable rigid mounting brackets for mast arm installation. |
2. All signals shall be painted bronze with M.A. Brider and Sons, Inc. Seashore Gloss Trim 27721, Duranodic Bronze Cost 7557581 or equal.

- POLES**
- The Contractor shall provide the following new steel signal poles:
1. One (1) twin arm support pole with 90° angle of separation, pole height 21', "T" dimension 18.5".
  2. One (1) mast 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 32' arm will support two (2) signal heads and 38' arm supporting two (2) signal heads and one (1) sign.
    - 2 30' arm spread supporting two (2) signal heads.
  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.

**NOTE:**  
THE CONTRACTOR IS TO VERIFY LOCATION OF THE EXISTING STREET LIGHT AND IS TO ENSURE ADEQUATE CLEARANCE BETWEEN SIGNAL HEAD # 5 AND TOP OF EXISTING LIGHT.



**PHASE CHART**

DISPLAY	1	2	3	4	5	6	7
PHASE A	R	R	G	R	R		
A YELLOW	R	R	G	R	R		
PHASE B	G	G	R	R			
B YELLOW	Y	Y	Y	Y	R	R	
PHASE C	R	R	R	R			
C YELLOW	R	R	R	R			
FLASHING OPERATION	FL	FL	FL	FL	FL	FL	

**NOTES:** 1) INSTALL BACK PLATES FOR SIGNAL HEADS 5 AND 6 AS SPECIFIED ON THE PLANS.  
2) TIMING SHOULD BE ADJUSTED IN THE FIELD AFTER THE SIGNAL IS IN OPERATION AND BASED ON CURRENT TRAFFIC VOLUMES.

**PHASE AND SEQUENCE DIAGRAM**

	MIN. GREEN PASSAGE	YELLOW	RED CLEAR	MAX. I SECONDS PER REDUCION TIME	TIME BEFORE REDUCTION	MIN. GAP	RECALL	MEMORY
PHASE A	8			15		2.0	OFF	OFF
A YELLOW			4	1	30	2.0	5.0	10.0
PHASE B	10	5						2.0
B YELLOW			4	1				
PHASE C	8	3						3
C YELLOW			4	1				
FLASHING OPERATION								

DEPARTMENT OF PUBLIC WORKS HOWARD COUNTY, MARYLAND DIRECTOR OF PUBLIC WORKS DATE CHIEF-BUREAU OF ENGINEERING DATE CHIEF-ROADS, BRIDGES, STORM DRAINAGE DIVISION DATE	JOHN E. HARMS, JR. & ASSOC., INC. CONSULTING ENGINEERS P.O. BOX 5 PASADENA, MARYLAND	TRAFFIC SIGNAL PLAN	TWIN RIVERS ROAD & HARPERS FARM ROAD CAPITAL PROJECT T-7015 HOWARD COUNTY, MARYLAND	SCALE: 1" = 30' DATE:	4.5 C OF SIGNED BY E.W.H OF APTED BY 4.5 C CHECKED BY
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