

PHASE AND SEQUENCE DIAGRAM	Traffic Signal Head						Min. Green	Passage	Yellow	Red Clear	Max. 1	Special Per-Actuation	Time To Red	Time Before Reduction	Min. Gap	Recall	Memory
	1	2	3, 4	5, 6	7	8											
Phase A Clear	G _A , G	G	R	R	10	1	20									OFF	OFF
Phase B Clear	G	G	G	R	10	5	10	20	5.0	10.0	3.5	OFF	ON				
Phase C Clear	R	R	R	G	10	1	16									OFF	OFF
Flash	Y	Y	Y	R													

G_A = Green Arrow Y_A = Yellow Arrow * = Left On Green With Caution

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.
- 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.
- 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.
- All disturbed areas shall be properly restored in accordance with Section 4.20 of the General Specifications.

CONTROLLER AND ACCESSORIES

- NEMA three phase modular controller with solid state circuitry and digital timing, similar to the Crouse-Hinds DM 400 Series Digital Controller unit, equivalent manufactured by Econolite Control Products, Inc., Eagle Signal Corporation 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.
- Ground mounted traffic controller Cabinet large enough to accommodate the above control equipment and detectors, and the future installation of coordination equipment. Coordination equipment may include a master traffic responsive coordination unit, secondary coordination unit and/or required interconnection equipment. 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 vandal proof enclosure provided by the contractor.

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, and pedestrian push button detectors.
- In addition to above, the conduit between the proposed traffic controller and the handbox opposite loop detector number 2 shall be sized to accommodate additional wires required for the traffic signal interconnection of proposed systems at Cradlerock Way (East) and Cradlerock Way (West).
- The contractor shall furnish an "as-built" drawing as per "General Specifications - 4.02b".

LOOPS AND DETECTORS

The following new loops shall be installed:

Number	Dimensions	Phase
1	6' x 40' *	A
2	6' x 20'	B
3	6' x 10'	C
4, 5	6' x 40' *	C

* Loops to be installed with 6' x 3' powerhead for detection of small vehicles.

- Loop 1 shall be wired to standard detector.
- Loops 2 and 3 shall be wired in parallel to a standard detector.
- Loops 4 and 5 shall be wired in parallel to a standard detector.
- All wiring shall be in accordance with manufacturer's recommendations for correct operation.
- Loops 1, 4, and 5 shall operate in presence mode.
- Loops 2 and 3 shall operate in pulse mode.
- Standard detectors shall be Sarasota 215B/MS, equivalent as manufactured by Crouse-Hinds, Econolite Control Products, Inc. or approved equal.

SIGNAL HEADS

- The contractor shall provide the following new signal heads:

Signal Number	Description
1	12" Diameter Red, Amber, and Green Indications. 12" Yellow and Green Left Turn Arrows.
2, 3, 4	12" Diameter Indications
5, 6	12" Diameter Red Indication
	8" Diameter Amber and Green Indication
- All signals shall be painted bronze with M.A. Bruder & Sons, Inc. Seashore Gloss Trim 27721 Durable Bronze Code 7557581 or equal.
- All signals shall be vertically mounted on the signal pole mast arms with an adjustable signal bracket equivalent to the "ASTRO-BRAC" Model 0-AB-101 by VePed Traffic Controls, Inc. or approved equal.

POLES

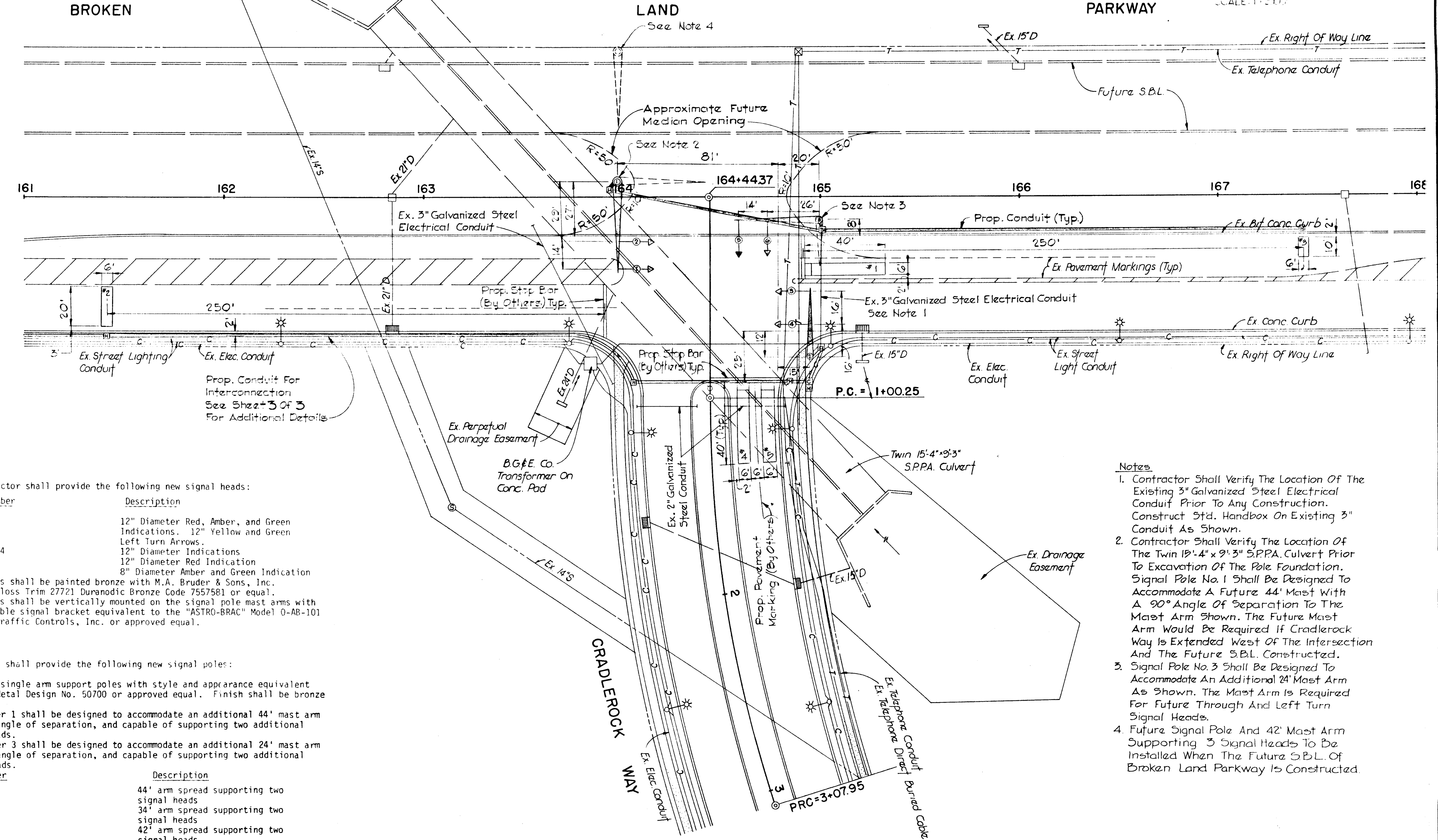
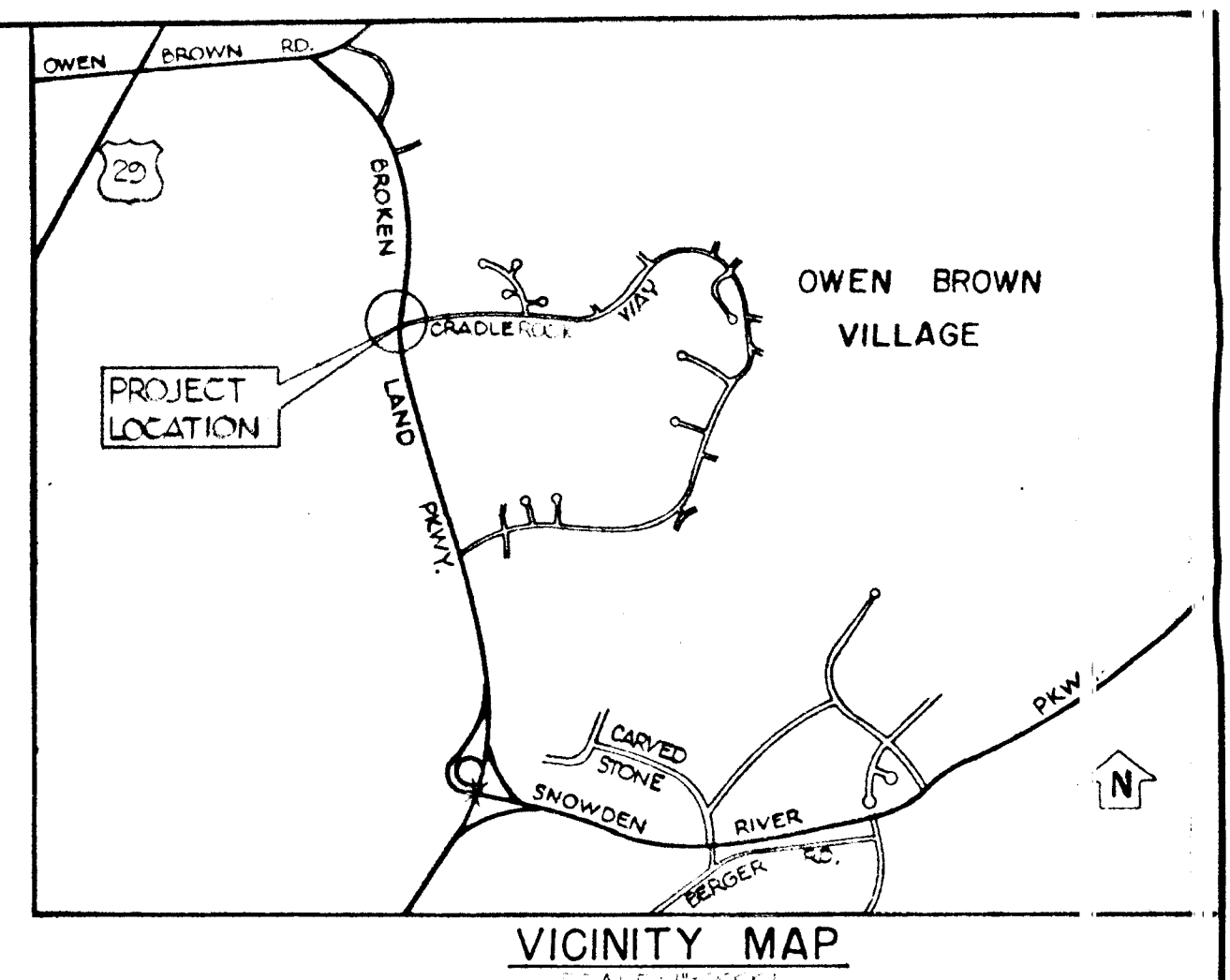
The Contractor shall provide the following new signal poles:

- Three (3) single arm support poles with style and appearance equivalent to Union Metal Design No. 50700 or approved equal. Finish shall be bronze paint.
 - Pole Number 1 shall be designed to accommodate an additional 44' mast arm with 90° angle of separation, and capable of supporting two additional signal heads.
 - Pole Number 3 shall be designed to accommodate an additional 24' mast arm with 90° angle of separation, and capable of supporting two additional signal heads.
 - Pole Number

Pole Number	Description
1	44' arm spread supporting two signal heads
2	34' arm spread supporting two signal heads
3	42' arm spread supporting two signal heads
- ** The 44' mast arm will be removed in the future if Cradlerock Way is extended west of the intersection and the Future S.B.L. is constructed. A future 44' mast arm would be installed as indicated on the Plan.
- Mast arms shall be mounted on the signal poles 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 the "ASTRO-BRAC" adjustable signal bracket.

LEGEND

- | | | |
|---------------------------|-----------------|---------------|
| EXISTING | PROPOSED | FUTURE |
| Steel Pole | ② | ○ |
| Mast Arm | → | → |
| Signal Head | ⊙ | ⊙ |
| Luminaire and Support | ⊙ | ⊙ |
| Sign | ⊙ | ⊙ |
| Handbox | ⊙ | ⊙ |
| Underground Signal Wiring | — Prop. Conduit | — |
| Vehicular Loop Detector | ⊙ | ⊙ |
| Control Cabinet | ⊙ | ⊙ |
| Meter Box | ⊙ | ⊙ |



PLAN
SCALE: 1"=30'

- Notes**
- Contractor Shall Verify The Location Of The Existing 3" Galvanized Steel Electrical Conduit Prior To Any Construction. Construct Std. Handbox On Existing 3" Conduit As Shown.
 - Contractor Shall Verify The Location Of The Twin 18'-4" x 9'-3" S.P.P.A. Culvert Prior To Excavation Of The Pole Foundation. Signal Pole No. 1 Shall Be Designed To Accommodate A Future 44' Mast With A 90° Angle Of Separation To The Mast Arm Shown. The Future Mast Arm Would Be Required If Cradlerock Way Is Extended West Of The Intersection And The Future S.B.L. Constructed.
 - Signal Pole No. 3 Shall Be Designed To Accommodate An Additional 24' Mast Arm As Shown. The Mast Arm Is Required For Future Through And Left Turn Signal Heads.
 - Future Signal Pole And 42' Mast Arm Supporting 3 Signal Heads To Be Installed When The Future S.B.L. Of Broken Land Parkway Is Constructed.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Director of Public Works: Elizabeth A. Cain
Date: 5/1/83

Chief, Bureau of Engineering: [Signature]
Date: [Blank]

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800 LENOXES CT. • BALTIMORE, MARYLAND • 21204 • (301) 921-6500

Daniel J. Clong
5-3-83

PLAN
CONSTRUCTION OF TRAFFIC SIGNAL AND EQUIPMENT LIST

BROKEN LAND PARKWAY AT CRADLEROCK WAY (WEST)
CAPITAL PROJECT NO. T-7017
ELECTION DISTRICT NO. 6
HOWARD COUNTY, MARYLAND

DRAWING NO. 1 OF 3

SCALE: 1"=30'

DESIGNED BY: J.T.C.

DRAWN BY: J.C.S.

DATE: MAY 24 1983

JOHNSON, MIRMIAN & THOMPSON, P.A.

PHASE AND SEQUENCE DIAGRAM	Traffic Signal Head				Min Green	Passage Yellow	Red Clear	Max I	Seconds Per Actuation	Time To Reduce	Time Before Reduction	Min. Gap	Recall	Memory
	1,2,3,4	5,6,7,8	9,10											
	R	R	GA		10	1		3					Off	Off
	R	R	YA			4	2							
	G	R	R		10	5		21	1.0	50	100	35	Off	On
	Y	R	R			4	1							
	R	G	R		10	1							Off	Off
	R	Y	R			4	2							
	Y	R	Y											

GA = Green Arrow YA = Yellow Arrow * = Left On Green With Caution

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.
- 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. In addition, the contractor shall verify the location of the existing 30" water line in the vicinity of poles nos. 1 and 3 prior to excavation for the mast arm pole foundations. A minimum 5' lateral clearance shall be maintained between the proposed foundation and the existing water main.
- 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.
- All disturbed areas shall be properly restored in accordance with Section 4.20 of the General Specifications.

CONTROLLER AND ACCESSORIES

- NEMA three phase modular controller with solid state circuitry and digital timing, similar to the Crouse-Hinds DM 400 Series Digital Controller unit, equivalent manufactured by Econolite Control Products, Inc., Eagle Signal Corporation 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.
- Ground mounted traffic controller Cabinet large enough to accommodate the above control equipment and detectors, and the future installation of coordination equipment. Coordination equipment may include a master traffic responsive coordination unit, secondary coordination unit and/or required interconnection equipment. 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 vandal proof enclosure provided by the contractor.

SIGNAL HEADS

- The contractor shall provide the following new signal heads:

Signal Number	Description
1, 2, 3, 4	12" Diameter Red, Amber and Green Indications
5, 6, 7, 8	12" Diameter Red Indication
9, 10	8" Diameter Amber and Green Indications.
	12" Diameter Red Indication
	12" Diameter Amber and Green Left Turn Arrows.
- Signals 1, 2, 9, and 10 shall be furnished with back-plates.
- Signals 9 and 10 shall be optically programmed traffic signal heads equivalent to Model M-131 offered by Minnesota Mining and Manufacturing Co., or approved equal.
- All signals shall be painted bronze with M.A. Bruder & Sons, Inc. Seashore Gloss Trim 27721 Duranodic Bronze Code 7557581 or equal.
- All signals shall be vertically mounted on the signal pole mast arms with an adjustable signal bracket equivalent to the "ASTRO-BRAC" Model 0-AR-101 or 0-AB-103 (for optically programmed signals) by VePed Traffic Controls, Inc., or approved equal.

EXISTING

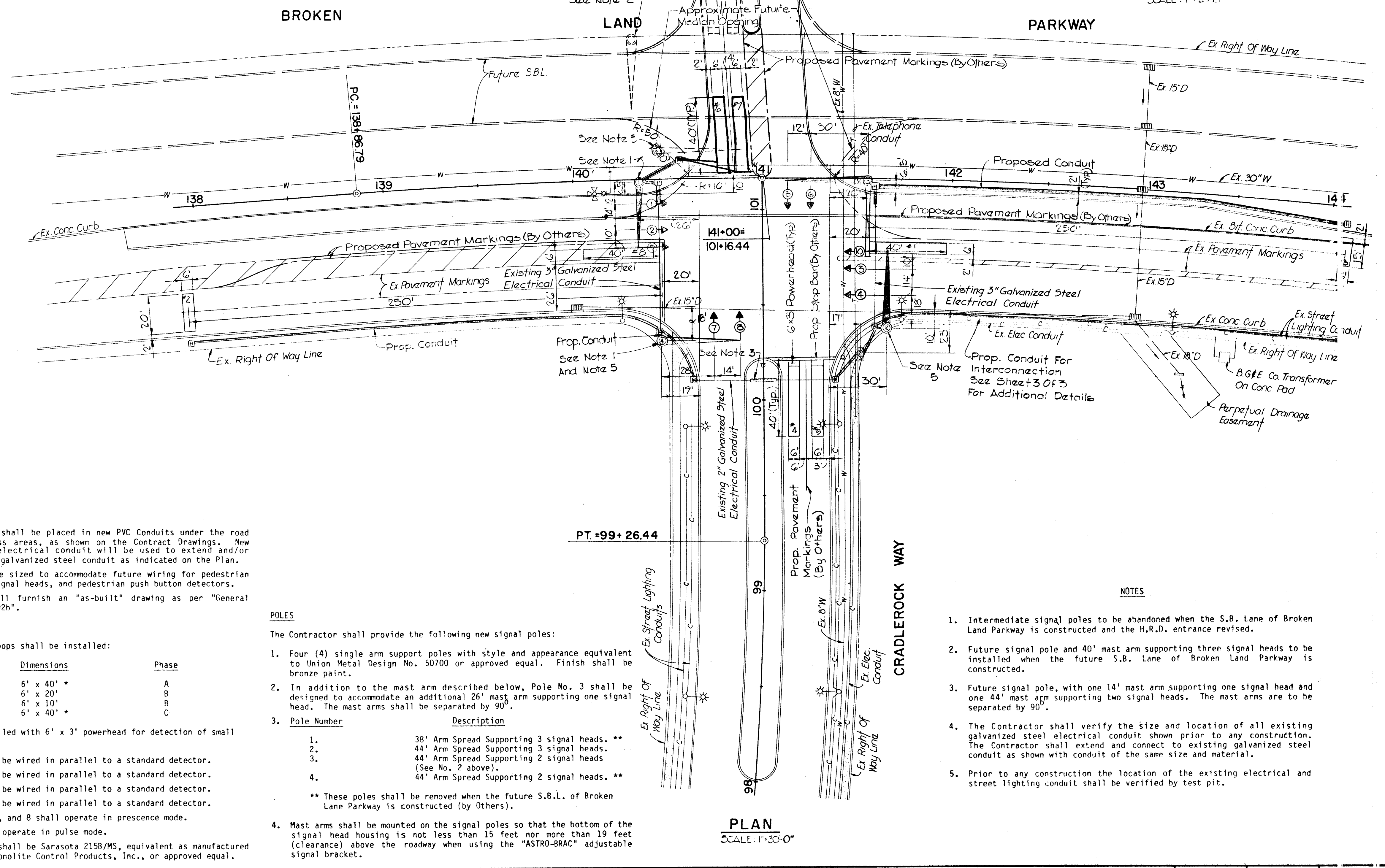
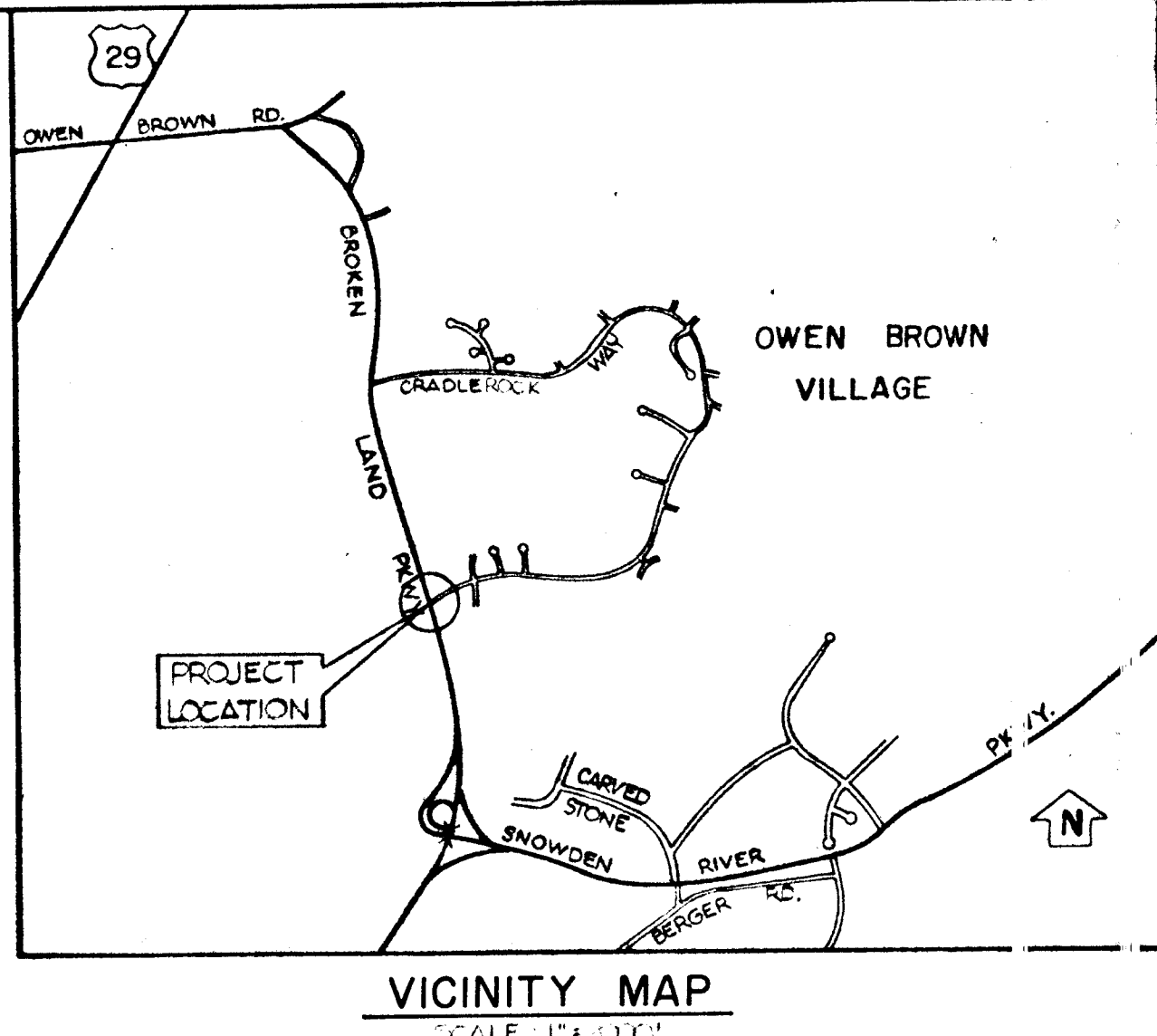
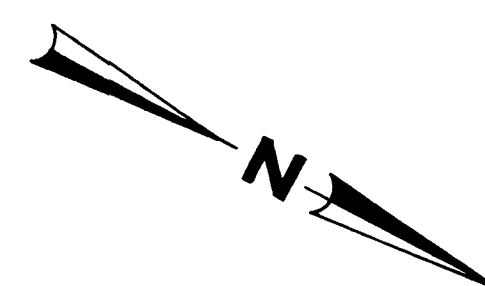
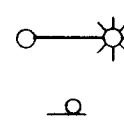
LEGEND

- Steel Pole
- Mast Arm
- Signal Head
- Luminaire and Support
- Sign
- Handbox
- Underground Signal Wiring
- Vehicular Loop Detector
- Control Cabinet
- Meter Box

PROPOSED

FUTURE

- Prop. Conduit
- Powerhead



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. New galvanized steel electrical conduit will be used to extend and/or connect to existing galvanized steel conduit as indicated on the Plan.
- The conduit shall be sized to accommodate future wiring for pedestrian (WALK/DON'T WALK) signal heads, and pedestrian push button detectors.
- The contractor shall furnish an "as-built" drawing as per "General Specifications - 4.02b".

LOOPS AND DETECTORS

- The following new loops shall be installed:

Number	Dimensions	Phase
1, 8	6' x 40' *	A
2	6' x 20'	B
3	6' x 10'	B
4,5,6,7	6' x 40' *	C
- * Loops to be installed with 6' x 3' powerhead for detection of small vehicles.
- Loops 1 and 8 shall be wired in parallel to a standard detector.
- Loops 2 and 3 shall be wired in parallel to a standard detector.
- Loops 4 and 5 shall be wired in parallel to a standard detector.
- Loops 6 and 7 shall be wired in parallel to a standard detector.
- Loops 1, 4, 5, 6, 7, and 8 shall operate in presence mode.
- Loops 2 and 3 shall operate in pulse mode.
- Standard Detectors shall be Sarasota 2158/MS, equivalent as manufactured by Crouse-Hinds, Econolite Control Products, Inc., or approved equal.

POLES

- The Contractor shall provide the following new signal poles:
- Four (4) single arm support poles with style and appearance equivalent to Union Metal Design No. 50700 or approved equal. Finish shall be bronze paint.
 - In addition to the mast arm described below, Pole No. 3 shall be designed to accommodate an additional 26' mast arm supporting one signal head. The mast arms shall be separated by 90°.
 - Pole Number Description
 - 38' Arm Spread Supporting 3 signal heads. **
 - 44' Arm Spread Supporting 3 signal heads.
 - 44' Arm Spread Supporting 2 signal heads (See No. 2 above).
 - 44' Arm Spread Supporting 2 signal heads. **
- ** These poles shall be removed when the future S.B.L. of Broken Land Parkway is constructed (by Others).

PLAN
SCALE: 1"=30'-0"

NOTES

- Intermediate signal poles to be abandoned when the S.B. Lane of Broken Land Parkway is constructed and the H.R.D. entrance revised.
- Future signal pole and 40' mast arm supporting three signal heads to be installed when the future S.B. Lane of Broken Land Parkway is constructed.
- Future signal pole, with one 14' mast arm supporting one signal head and one 44' mast arm supporting two signal heads. The mast arms are to be separated by 90°.
- The Contractor shall verify the size and location of all existing galvanized steel electrical conduit shown prior to any construction. The Contractor shall extend and connect to existing galvanized steel conduit as shown with conduit of the same size and material.
- Prior to any construction the location of the existing electrical and street lighting conduit shall be verified by test pit.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DATE: 5/4/83
CHIEF, BUREAU OF ENGINEERING

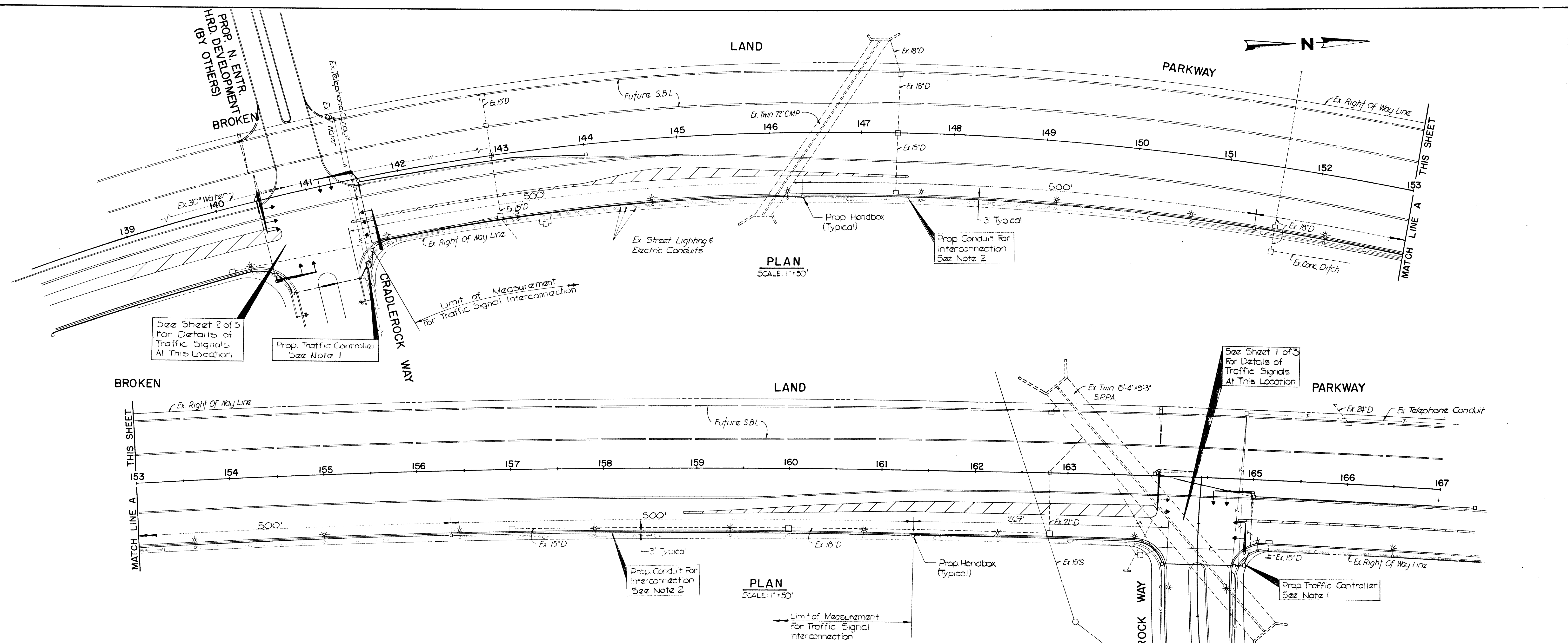
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Daniel T. Chong
5-3-83

PLAN
CONSTRUCTION OF TRAFFIC
SIGNAL AND EQUIPMENT LIST

BROKEN LAND PARKWAY AT CRADLEROCK WAY (EAST)
CAPITAL PROJECT NO. T-7017
ELECTION DISTRICT NO. 6
HOWARD COUNTY, MARYLAND

DRAWING	SCALE	DES.	D.T.C.
NO. 2	1"=30'	DRW.	D.C.S.
OF 3		CHK.	

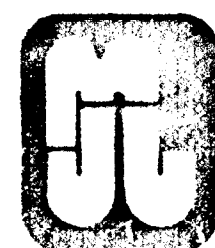


TRAFFIC SIGNAL INTERCONNECTION NOTES

1. The proposed conduit shall be installed to provide a direct interconnection between future coordination equipment to be installed in traffic controller cabinets at Cradlerock Way (West) and Cradlerock Way (East). The coordination equipment may include a master traffic responsive coordination unit, secondary coordination units, interface modules, and other required coordination equipment.
2. The contractor shall exercise extreme caution when installing the proposed conduit for interconnection. Street lighting and primary electrical conduits are adjacent and parallel to the proposed conduit and the location of these facilities shall be field located prior to any construction. See Section 4.09 of the General Specifications.
3. The proposed conduit shall be new PVC conduit and shall be sized to accommodate wiring for a standard "hard wire" interconnect (7-12 conductors).
4. Hand boxes have been space at a maximum distance of 500'. Pull lines shall be furnished and installed in the proposed conduit and a sufficient length left in each handbox to accommodate the future installation of the interconnect wiring.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

John E. ...
DIRECTOR OF PUBLIC WORKS DATE
Robert A. ...
CHIEF, BUREAU OF ENGINEERING DATE
CHIEF DIVISION OF ROADS
BRIDGES AND STORM DRAINAGE



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Daniel J. ...
5-3-03

**PLAN
CONSTRUCTION OF TRAFFIC
SIGNAL INTERCONNECTION**

**BROKEN LAND PARKWAY AT CRADLEROCK WAY
CAPITAL PROJECT NO. T-7017
ELECTION DISTRICT NO. 6
HOWARD COUNTY, MARYLAND**

DRAWING	SCALE	DES. D. J. C.
NO. 3	1"=50'	DRW. D. J. S.
OF. 3		CHK. _____