F H W A REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
3	MD			

PROJECT DESCRIPTION

I. GENERAL

This project involves the reconstruction of the existing Traffic Control Signal at the intersection of MD 390 (16th Street) and MD 410 (East-West Highway) in Montgomery County. The signal shall be constructed in two phases. MD 390 (16th Street) is assumed to run in a north-south direction.

II. INTERSECTION OPERATION

1.) Maintenance of Traffic Signal - Phases 1 & 2

a.) The intersection shall operate in a NEMA five-phase fixed time mode, with the MD 410 (East-West Highway) approaches running concurrently. An Exclusive/Permissive left turn phase shall be provided for Eastbound MD 410. The MD 390 (16th Street) approaches shall operate as a split phase. The Eastbound MD 410 right turn movement shall operate concurrently with norhtbound MD 390. The pedestrian phases across all legs of the intersection shall be on recall.

b.) A full-traffic-actuated, eight-phase controller with L.A.U., L.A.U. Panel and associated harnesses housed in a NEMA size "6" base-mounted cabinet shall be installed at this intersection.

c.) SPECIAL NOTES

1.) The Contractor shall be responsible for terminating all signal cables, excluding interconnect, to the appropriate terminals and shall properly label each cable.

2.) Disconnecting and splicing of interconnect cable shall be performed by Montgomery County Forces. The contractor shall be responsible for routing or relocating of interconnect cable into the cabinet as shown on the plans and shall properly label each cable. Contact Emil Wolanin of MCDPW&T at (301) 217-2208 seventy-two hours in advance of any intended interconnect work to coordinate with the County.

3.) Due to the grade at the pole location on the southeast quadrant, the top of the foundation should be set at the top of the curb and a 12' deep foundation poured.

2.) Ultimate Signal

a.) The intersection shall operate in a NEMA seven-phase, semi actuated mode, with the MD 390 (16th Street) approaches running concurrently. The westbound MD 410 (East-West Highway) right turn movement shall run concurrently with the left turn phase for the southbound approach of MD 390 (16th Street). Exclusive/Permissive left turn phases shall be provided for both the north and southbound approaches of MD 390 (16th Street). Left turns will be prohibited for westbound MD 410 (East-West Highway). A leading Exclusive/Permissive left turn phase shall be provided for the eastbound approach of MD 410 (East-West Highway). The pedestrian phases across all legs of the intersection shall be on recall. Farside sampling stations will be provided on all legs of the intersection. The MD 410 (East-West Highway) approaches shall also run concurrently.

b.) Eight (8) four-channel, rack mount loop detector amplifiers and two (2) detector rack power supply units shall be installed into the existing NEMA size "6" base-mounted cabinet.

c.) SPECIAL NOTE

The Contractor shall route all field wiring into the base of the existing cabinet and properly tag each cable. MCDPW&T shall shall be responsible for the terminating the field wiring and any internal cabinet wiring. Call Mr. Robert Gonzales at (301) 217-2182 Seventy-two (72) hours in advance of the intended work.

EQUIPMENT LISTS

A. EQUIPMENT TO BE SUPPLIED BY S.H.A. AND INSTALLED BY THE CONTRACTOR.

CATEGORY CODE	QUANTITY	SPEC. SECTION	DESCRIPTION
960022	5 Each	814	12", one-way, three-section (R,Y,G) traffic signal head with adjustable bracket for mast arm mounting and tunnel visors.
960028	7 Each	814	12", one-way, five-section (R,YA,Y,GA,G) (left arrows) traffic signal head with adjustable bracket for mast arm mounting and tunnel visors.
960027	4 Each	814	12", one-way, four-section (R,Y,G,GA) (left arrow) traffic signal head with adjustable bracket for mast arm mounting and tunnel visors.
960028	2 Each	814	12", one-way, five-section (R,Y,YA,G,GA) (right arrows) traffic signal head with adjustable bracket for mast arm mounting and tunnel visors.
960068	8 Each	814	12", one-way, two-section (DW,W) symbolic pedestrian signal head with adjustable bracket for pole mounting and cutaway visors.
973023	[5] 115.5 S.F. (116.3)	813	Sheet aluminum signs to consist of:
	4 Each		Pedestrian education sign (9" x 12").
	3 Each		R10-12 "LEFT TURN YIELD ON GREEN (BALL)" sign, (36" x 42") mast arm mounted.
	1 Each		R3-5R "RIGHT TURN ONLY" sign, (30" x 36") mast arm mounted.
	[5] ~~2 Each~~		~~R3-3C "NO LEFT AND NO "U" TURN" symbolic sign, (30" x 30") mast arm mounted with "NEW" panel (24" x 24").~~
	2 Each		D3-2 '16th St <8400' sign, (variable x 16") mast arm mounted.
	2 Each		D3-2 '16th St <8400' sign, (variable x 16") mast arm mounted.
	2 Each		D3-2 'East-West Hwy 1600> sign, (variable x 16") mast arm mounted.
	2 Each		D3-2 'East-West <1600' sign, (variable x 16") mast arm mounted.
[5] 971017	1 EA.	816	Eight-phase, full-traffic-actuated, solid state digital controller with eight (8) four-channel, rack mount loop detector amplifiers, two (2) detector rack power supply units L.A.U., L.A.U. panel and associated harnesses housed in a NEMA size "6" base-mounted cabinet.

EQUIPMENT LISTS (CON'T.)

[5] ~~A. EQUIPMENT TO BE SUPPLIED BY S.H.A. AND INSTALLED BY THE CONTRACTOR (CON'T.).~~
B. EQUIPMENT TO BE FURNISHED AND/OR INSTALLED BY THE CONTRACTOR

CATEGORY CODE	QUANTITY	SPEC. SECTION	DESCRIPTION
[5] ~~973023~~ 813014	~~117 S.F.~~ 164.3 S.F.	813	Sheet aluminum signs to consist of:
	3 Each		R3-7 "RIGHT LANE MUST TURN RIGHT" sign, (30" x 30") ground mounted with hardware.
	[5] 4 ~~5~~ Each		R4-7 "KEEP RIGHT (SYMBOLIC)" sign, (24" x 30") ground mounted with hardware.
	[5] 3 ~~2~~ Each		R6-1R "ONE WAY (RIGHT ARROW)" sign, (36" x 12") ground mounted with hardware.
	1 Each		R6-1L "ONE WAY (LEFT ARROW)" sign, (36" x 12") ground mounted with hardware.
	2 Each		R8-3 "NO PARKING (Right and Left Arrow)" sign, (12" x 18") ground mounted with hardware.
	[5] 1 ~~2~~ Each		R10-7 "DO NOT BLOCK INTERSECTION" sign, (24" x 30") ground mounted with hardware.
	~~1 Each~~		~~R3-3C "NO LEFT AND NO "U" TURN" symbolic sign, (30" x 30") ground mounted with "NEW" panel (24" x 24").~~
	~~1 Each~~		~~R3-3C "NO LEFT AND NO "U" TURN" symbolic sign, (30" x 30") ground mounted with "AHEAD" panel (12" x 30").~~
	[5] 4 ~~1~~ Each		~~R16-1~~ R95-3 "SNOW EMERGENCY ROUTE" sign, (24" x 24") ground mounted with hardware.
	[5] 4 ~~2~~ Each		R5-1 "DO NOT ENTER" sign, (30" x 30") ground mounted with hardware.
	[5] 1 Each		~~Associated Shield Assembly~~ "M3-2 "WEST" (24"x12"), M1-6 "MARYLAND 410" (30"x24") ground mounted with hardware.
	[5] 1 Each		~~Associated Shield Assembly~~ "M3-2 "EAST" (24"x12"), M1-6 "MARYLAND 410" (30"x24") ground mounted with hardware.
[5] ~~971017~~	~~1 Each~~	~~816~~	~~Eight-phase, full-traffic-actuated, solid state digital controller with eight (8) four-channel, rack mount loop detector amplifiers, two (2) detector rack power supply units L.A.U., L.A.U. Panel and associated harnesses housed in a NEMA size "6" base-mounted cabinet.~~
	[5] 2 Each		R3-7(1)(R) "RIGHT LANE MUST TURN RIGHT AT DRAPER LANE" sign (30"x 42") ground mounted with hardware.
	1 Each		"M3-4" "WEST" (24"x12"), M1-5 " MARYLAND 410" (30"x24"), M6-1 (21"x15") ground mounted with hardware.
	1 Each		"M3-2" "EAST" (24"x12"), M1-5 " MARYLAND 410" (30"x24"), M6-1 (21"x15") ground mounted with hardware.
	1 Each		"M3-3" "SOUTH" (24"x12"), M1-5 " MARYLAND 390" (30"x24") ground mounted with hardware.
	1 Each		"M2-1" "JCT" (21"x15"), M1-5 " MARYLAND 390" (30"x24") ground mounted with hardware.

B. EQUIPMENT TO BE FURNISHED AND/OR INSTALLED BY THE CONTRACTOR.

CATEGORY CODE	QUANTITY	SPEC. SECTION	DESCRIPTION
120510	15 U.D.	104	Maintenance of traffic.
203030	19 C.Y.	204	Test pit excavation.
801004	15 C.Y.	801	Furnish and install concrete foundation.
837001	5 Each	804	Furnish and install ground rod, 3/4" diameter x 10' length.
800000	1 Each	818	Furnish and install 27' (decorative bronze) steel pole with a 50' (decorative bronze) mast arm. (Note: Anchor bolts will be 1 3/4" x 90".)
800000	2 Each	818	Furnish and install 27' (decorative bronze) steel pole with a 60' (decorative bronze) mast arm. (Note: Anchor bolts will be 2" x 90".)
800000	1 Each	818	Furnish and install 27' (decorative bronze) steel pole with a 64' (decorative bronze) mast arm. (Note: Anchor bolts will be 2" x 90".)
860220	18 Each	814	Install traffic signal head, mast arm mounted.
860068	8 Each	814	Install 12", one-way, two-section pedestrian signal head, pole mounted.
871202	1 Each	816	Install base-mounted cabinet and controller.
[5] 813015	~~115.5~~ 116.0 S.F.	813	Install overhead mounted sheet aluminum signs.
[5] 813014	~~117~~ 164.3 S.F.	813	Install ground mounted sheet aluminum signs.
862102	1560 L.F.	815	Furnish and install sawcut.
869102	310 L.F.	819	Furnish and 3/8" steel span wire.
805011	35 L.F.	805	Furnish and install 1" galvanized steel electrical conduit (detector wire sleeve).
805160	50 L.F.	805	Furnish and install 1" liquid tight flexible non-metallic electrical conduit (detector wire sleeve).
800000	15 L.F.	805	Furnish and install 2" polyvinyl chloride (Schedule 80) electrical conduit (trenched).
805155	375 L.F.	805	Furnish and install 4" polyvinyl chloride (Schedule 80) electrical conduit (slotted).
805125	40 L.F.	805	Furnish and install 2" polyvinyl chloride (Schedule 40) electrical conduit (trenched).
805135	125 L.F.	805	Furnish and install 3" polyvinyl chloride (Schedule 40) electrical conduit (trenched).
805140	110 L.F.	805	Furnish and install 4" polyvinyl chloride (Schedule 40) electrical conduit (trenched).
807205	1 Each	807	Furnish and install control and distribution equipment.
862101	4600 L.F.	810	Furnish and install loop wire (No. 14 A.W.G.) encased in 1/4" flexible tubing.
861106	2385 L.F.	810	Furnish and install 3-conductor electrical cable (No. 14 A.W.G.).
861107	240 L.F.	810	Furnish and install 5-conductor electrical cable (No. 14 A.W.G.).
861108	3800 L.F.	810	Furnish and install 7-conductor electrical cable (No. 14 A.W.G.).
800000	4 Each	801	Furnish and install grout.
811001	15 Each	811	Furnish and install handhole (frame and cover).
861104	1840 L.F.	810	Furnish and install 2-conductor electrical cable (No. 14 A.W.G.) (aluminum shielded).

EQUIPMENT LISTS (CON'T.)

B. EQUIPMENT TO BE FURNISHED AND/OR INSTALLED BY THE CONTRACTOR (CON'T.).

CATEGORY CODE	QUANTITY	SPEC. SECTION	DESCRIPTION
802501	700 L.F.	810	Furnish and install stranded bare copper ground wire (No. 6 A.W.G.).
861117	60 L.F.	810	Furnish and install 3-wire electrical cable (No. 4 A.W.G.).
800000	580 L.F.	810	Furnish and install 2" polyvinyl chloride electrical conduit (2nd conduit within 3" conduit trench).
800000	580 L.F.	810	Furnish and install 3" polyvinyl chloride electrical conduit (trenched extra depth for 2nd conduit).
860265	3 Each		Relocate existing signal head.
800000	60 L.F.		Reroute existing interconnect cable.
873001	1 Each	822	Removal and salvage of existing signal equipment.
500000	1575 L.F.		Furnish and install Heat applied permanent thermoplastic marking material, white (12" width for crosswalks and crosshatching within crosswalks).
500000	190 L.F.		Furnish and install Heat applied thermoplastic marking material, white (24" width for stoplines).
[5] 500000	~~4000~~ 3960 L.F.		Furnish and install Heat applied permanent thermoplastic marking material, yellow (5" width for centerlines, edgelines).
500000	375 L.F.		Furnish and install Heat applied permanent thermoplastic marking material, white (10" width for channelizing lines).
500000	85 L.F.		Furnish and install Heat applied permanent thermoplastic marking material, yellow (10" width for crosshatching).
[5] 500000	~~2600~~ 3518 L.F.		Furnish and install Heat applied permanent thermoplastic marking material, white (5" width for lanelines, puppy tracks, skip lines).
500000	3 Each		Thermoplastic pavement marking letter "O".
500000	3 Each		Thermoplastic pavement marking letter "N".
500000	3 Each		Thermoplastic pavement marking letter "L".
500000	3 Each		Thermoplastic pavement marking letter "Y".
500000	6 Each		Furnish and install curved arrow (symbol) Heat applied permanent Thermoplastic pavement marking (right).
500000	1 Each		Furnish and install curved arrow (symbol) Heat applied permanent Thermoplastic pavement marking (left).
[5] 801104	~~162~~ 378 L.F.	812	Furnish and install wood sign supports (4" x 4").
800000	12 Each	812	Furnish and install U-post for the installation of ground mounted signs.
813005	43 Each		Relocate existing ground mounted signs.
813021	24 S.F.		Remove existing ground mounted signs.

C. EXISTING EQUIPMENT TO BE REMOVED BY THE CONTRACTOR AND DELIVERED TO: MONTGOMERY COUNTY SIGNAL SHOP, BUILDING "C" 1283 SEVEN LOCKS ROAD, ROCKVILLE, MARYLAND 20854. CONTACT MR. KEITH LORD @ (301) 217-1291, FORTY-EIGHT (48) HOURS IN ADVANCE OF RETURNING EQUIPMENT.

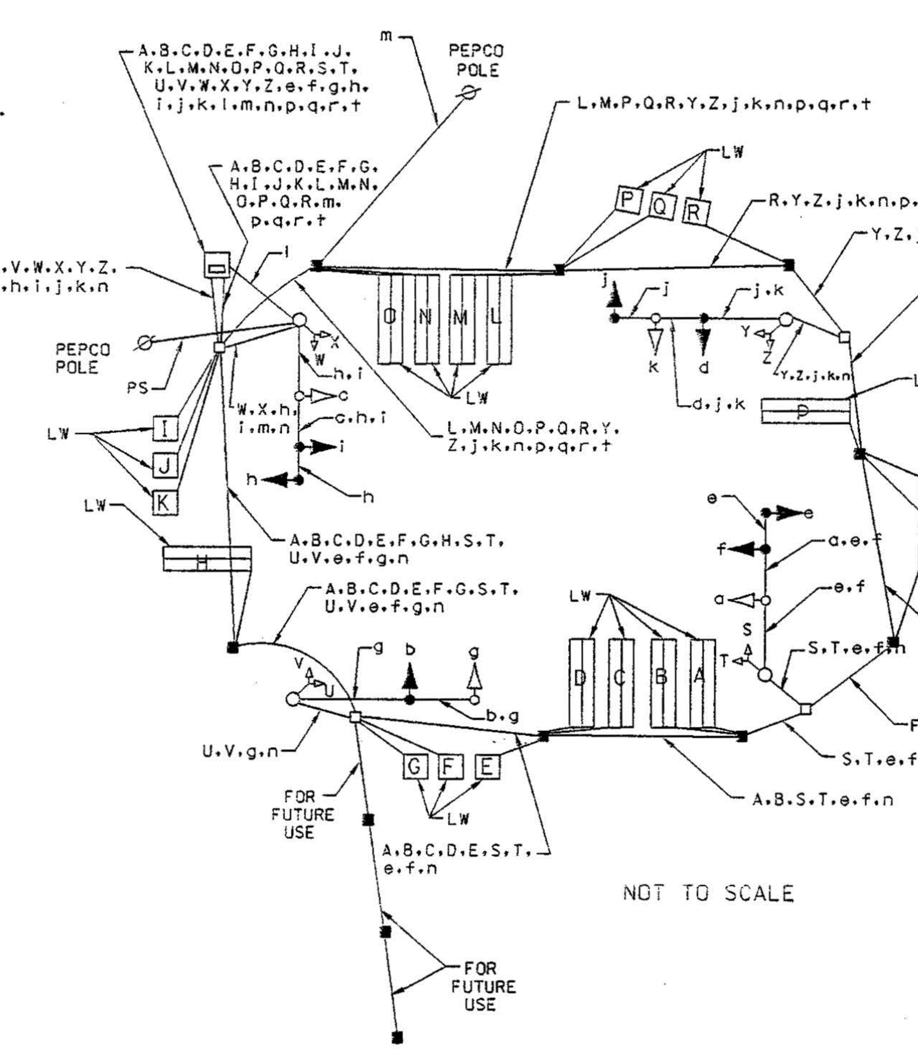
QUANTITY	DESCRIPTION
1 Each	8-phase controller and base-mounted cabinet.

NOTE: All equipment and/or materials to be removed by the Contractor but not listed above are to become the property of the Contractor.

MAINTENANCE OF TRAFFIC SPECIAL PROVISIONS

The following Traffic Control Standard Numbers shall be referenced for the project.

Standard 105.00	Standard 105.01
Standard 105.02	Standard 105.03
Standard 105.302	Standard 105.304
Standard 105.306	Standard 105.308
Standard 105.310	Standard 105.312



WIRING KEY

A B C D E F G H I J K L M N O P Q R p q r t	2-CONDUCTOR ELECTRICAL CABLE (NO. 14 AWG) (ALUMINUM SHIELDED)
S T U V W X Y Z	3-CONDUCTOR ELECTRICAL CABLE (NO. 14 A.W.G.)
a b c d	5-CONDUCTOR ELECTRICAL CABLE (NO. 14 A.W.G.)
e f g h i j k	7-CONDUCTOR ELECTRICAL CABLE (NO. 14 A.W.G.)
l -	3-WIRE ELECTRICAL CABLE (NO. 4 A.W.G.)
m -	EXISTING 12-PAIR, VOICE-GRADE INTERCONNECT CABLE TO BE PULLED BACK AND REROUTED
n -	STRANDED BARE COPPER GROUND WIRE (NO. 8 A.W.G.)
LW -	LOOP WIRE (NO. 14 A.W.G.)
PS -	PROPOSED OVERHEAD SERVICE TO BE INSTALLED BY PEPCO

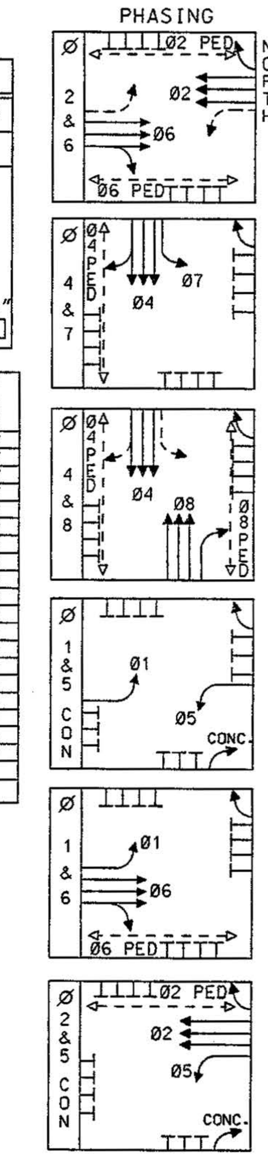
SEQUENCE OF OPERATION SHEET

SIGNAL HEAD INDICATIONS						
SIGNAL NO.	3,6,9,10	11	1,2,4,5,7,8			12-19
TOTAL:	4	1	6			8
LEGEND: OPTICALLY LIMITED; R RED; Y YELLOW; G GREEN; ← ARROW; F FLASHING	R, Y, G 12"	R, Y Y→, G G→ 12"	R, ←Y Y, ←G G 12"	R, Y, G 8"	R, Y, G 12"	9" or 12" X

SIGNAL NO.	1	2	3	4	5	6	7	8	9	10	11	12	10	11	12	13	14	15	16	17	18		FLASH
1	G	G	Y	R	R	R	R	R	R	R	R	R	←G/R	←Y/R	R	←G/G	←Y/G	G	R	R	R		Y
2	G	G	Y	R	R	R	R	R	R	R	R	R	←G/R	←Y/R	R	←G/G	←Y/G	G	R	R	R		Y
3	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	G	G	G	R	R	R		Y
4	G	G	Y	R	R	R	R	R	R	R	R	R	←G/R	←Y/R	R	R	R	R	←G/G	←Y/G	G		Y
5	G	G	Y	R	R	R	R	R	R	R	R	R	←G/R	←Y/R	R	R	R	R	←G/G	←Y/G	G		Y
6	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	G	G		Y
7	R	R	R	R	←G/G	←Y/G	G	G	G	G	Y	R	R	R	R	R	R	R	R	R	R		R
8	R	R	R	R	←G/G	←Y/G	G	G	G	G	Y	R	R	R	R	R	R	R	R	R	R		R
9	R	R	R	R	G	G	G	G	G	G	Y	R	R	R	R	R	R	R	R	R	R		R
10	R	R	R	R	R	R	R	G	G	G	Y	R	R	R	R	R	R	R	R	R	R		R
11	R	R	R	R	R	R	R	G	G	G	Y	R	R/G→	R/Y→	R	R	R	R	R/G→	R/Y→	R		R
12	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	WK	WK	WK		-
13	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	WK	WK	WK	DW	DW	DW		-
14	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	WK	WK	WK	DW	DW	DW		-
15	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	WK	WK	WK		-
16	DW	DW	DW	DW	DW	DW	DW	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW		-
17	DW	DW	DW	DW	WK	WK	WK	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW		-
18	DW	DW	DW	DW	WK	WK	WK	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW		-
19	DW	DW	DW	DW	DW	DW	DW	WK	FL/DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW		-
PHASE	2 & 6			ALL RED	4 & 7		ALL RED	4 & 8				ALL RED	1 & 5		ALL RED	1 & 6		ALL RED	2 & 5		ALL RED		

NOTES:

PHASING



SUBMITTED: R.R.ZACHERL	CHECKED:	APPROVED:
IN SERVICE BY:	DATE:	TIME:

STREET TRAFFIC STUDIES, LTD.
Gateway International
1302 Concourse Drive, Suite 104
Linthicum, Maryland 21090
(410) 859-3553
2905SPC

REVISIONS
[5] REDLINE No. 5 03/11/03
MM

APPROVALS
ASST. CHIEF TEDD SECTION
ASST. DISTRICT ENGINEER, TRAFFIC
CHIEF, TRAFFIC ENGINEERING DESIGN DIVISION
DIRECTOR, TRAFFIC & SAFETY

MARYLAND DOT - STATE HIGHWAY ADMINISTRATION
Office of Traffic & Safety
TRAFFIC ENGINEERING DESIGN DIVISION
GENERAL INFORMATION
MD 390 (16th ST) AND MD 410 (EAST-WEST HWY)

DRAWN BY: THACKER	COUNTY: MONTGOMERY	TS NO. ~~1485AGI~~ 1696A5GI	SHEET NO. 27 OF 31
CHECK BY:	LOG MILE:		
DATE: 9-12-2000	F.A.P. NO.		
SCALE: N/A	S.H.A. NO.		

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