SEE SHEET 2

LOCATION MAP

LATITUDE: 40°00'00" LONGITUDE: 83°00'00"

STATE OF OHIO

DEPARTMENT OF TRANSPORTATION

FRA-RAMP METER UPGRADE

CITY OF GAHANNA
CITY OF COLUMBUS
FRANKLIN COUNTY

INDEX OF SHEETS:

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PROJECT DESCRIPTION

RAMP METER UPGRADES FOR THE COLUMBUS FREEWAY MANAGEMENT SYSTEM.

PROJECT EARTH DISTURBED AREA: N/A (MAINTENANCE PROJECT)

ESTIMATED CONTRACTOR EARTH DISTURBED AREA: N/A (MAINTENANCE PROJECT)

NOTICE OF INTENT EARTH DISTURBED AREA: N/A (MAINTENANCE PROJECT)

LIMITED ACCESS

THIS IMPROVEMENT IS ESPECIALLY DESIGNED FOR THROUGH TRAFFIC AND HAS BEEN DECLARED A LIMITED ACCESS HIGHWAY OR FREEWAY BY ACTION OF THE DIRECTOR IN ACCORDANCE WITH THE PROVISIONS OF SECTION 5511.02 OF THE OHIO REVISED CODE.

2013 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

FEDERAL PROJECT NO. E131 (083)

PID NO. 92381

CONSTRUCTION PROJECT NO.

RAILROAD INVOLVEMENT NONE

FRA-RAMP METER UPGRADE

1 / 41

UNDERGROUND UTILITIES

CONTACT BOTH SERVICES
CALL TWO WORKING DAYS
BEFORE YOU DIG

CALL
1-800-362-2764
(TOLL FREE)
OHIO UTILITIES PROTECTION SERVICE
NON-MEMBERS
MUST BE CALLED DIRECTLY

OIL & GAS PRODUCERS UNDERGROUND PROTECTION SERVICE CALL: 1-800-925-0988

PLAN PREPARED BY:
OFFICE OF TRAFFIC OPERATIONS
OHIO DEPARTMENT OF TRANSPORTATION
1980 WEST BROAD STREET
COLUMBUS, OH 43223

ENGINEERS SEAL:

STATE OF OHIO
RYAN JOSEPH LOWE
E-74276
REGISTERED
PROFESSIONAL ENGINEER

SIGNED: Ryan J. Lowe
DATE: 4/9/14

STANDARD CONSTRUCTION DRAWINGS

RL-10.11	1/17/14	TC-52.10	10/18/13				
RL-10.12	1/17/14	TC-52.20	1/17/14				
RL-10.13	1/17/14	TC-82.10	10/18/13				
RL-20.11	1/17/14	TC-83.10	1/17/14				
RL-30.11	1/17/14	TC-85.10	10/18/13				
RL-30.21	1/17/14						
RL-30.22	1/17/14						
MT-95.30	7/19/13						
MT-95.32	7/19/13						
MT-98.28	7/19/13						
TC-22.20	1/17/14						
TC-41.20	10/18/13						
TC-41.40	10/18/13						
TC-42.20	10/18/13						

SUPPLEMENTAL SPECIFICATIONS

800-2013	7/18/14		
632	1/17/14		
604	7/19/13		
904	7/19/13		

SPECIAL PROVISIONS

ITS	4/8/13

APPROVED _____ DISTRICT DEPUTY DIRECTOR
DATE 6-2-14

APPROVED _____ DIRECTOR, DEPARTMENT OF TRANSPORTATION
DATE 7-1-14

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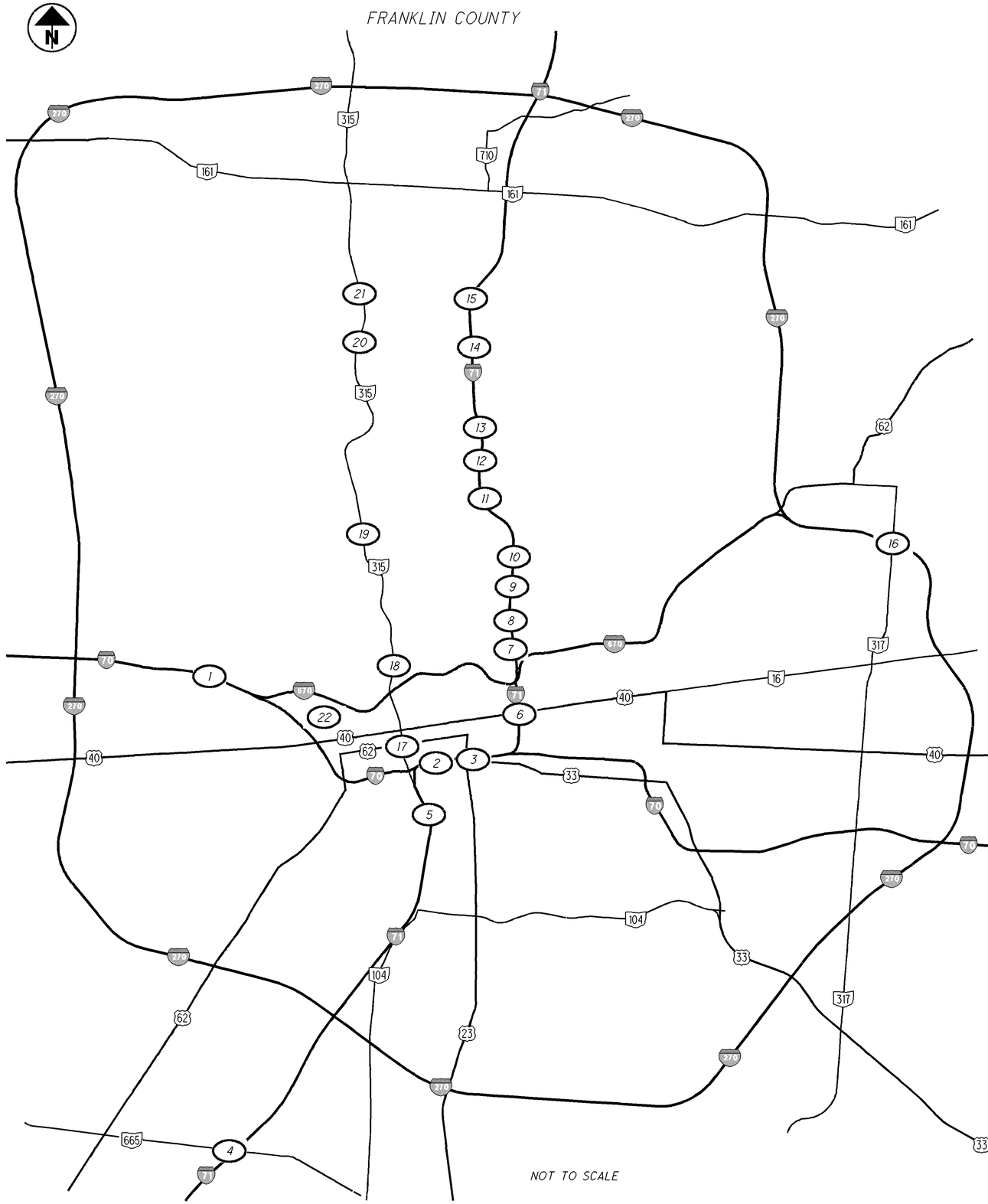
FRA - RAMP METER UPGRADE
140475 PID - 92381
Dist 6 9/18/2014

Contract Proposal Available @ www.contracts.dot.state.oh.us/home



SITE ID	PLAN SHEET	DEVICE TYPE	WORK	LOCATION	DESCRIPTION	S.L.M.*
1	16	RMS	UPGRADE	I-70 AT FISHER RD	EB ENT. RAMP	9.275
		SFVD	INSTALL	I-70 AT FISHER RD	EB ENT. RAMP	9.297
2	17	RMS	UPGRADE	I-70 AT W MOUND ST	WB ENT. RAMP	13.824
		SFVD	INSTALL	I-70 AT W MOUND ST	I-70 WB	13.825
3	18	RMS	UPGRADE	I-70 AT THIRD ST	WB ENT. RAMP	14.119
		SFVD	INSTALL	I-70 AT THIRD ST	I-70 WB	14.137
4	19	RMS	UPGRADE	I-71 AT SR 665	NB ENT. RAMP	6.180
5	20	RMS	UPGRADE	I-71 AT GREENLAWN AVE	NB ENT. RAMP	14.395
6	21	SFVD	INSTALL	I-71 AT US-40/BROAD ST	I-71 SB	17.448
		RMS	UPGRADE	I-71 AT US-40/BROAD ST	SB ENT. RAMP	17.489
7	22	SFVD	INSTALL	I-71 AT 2ND AVE	I-71 SB	18.766
8	23	RMS	UPGRADE	I-71 AT 5TH AVE	SB ENT. RAMP	18.953
		SFVD	INSTALL	I-71 AT 5TH AVE	I-71 NB	19.155
		RMS	UPGRADE	I-71 AT 5TH AVE	NB ENT. RAMP	19.183
9	24	SFVD	INSTALL	I-71 AT 11TH AVE	I-71 NB	19.494
		RMS	UPGRADE	I-71 AT 11TH AVE	NB ENT. RAMP	19.698
	25	SFVD	INSTALL	I-71 AT 11TH AVE	I-71 SB	19.856
		SFVD	INSTALL	I-71 AT 11TH AVE	I-71 NB	19.856
10	26	RMS	UPGRADE	I-71 AT 17TH AVE	SB ENT. RAMP	20.003
		SFVD	INSTALL	I-71 AT 17TH AVE	I-71 NB	20.196
		RMS	UPGRADE	I-71 AT 17TH AVE	NB ENT. RAMP	20.210
11	27	SFVD	INSTALL	I-71 AT HIAWATHA PARK DR	I-71 NB	20.566
		SFVD	INSTALL	I-71 AT HUDSON AVE	I-71 SB	21.067
		RMS	UPGRADE	I-71 AT HUDSON AVE	SB ENT. RAMP	21.073
	28	RMS	UPGRADE	I-71 AT HUDSON AVE	NB ENT. RAMP	21.367
		SFVD	INSTALL	I-71 AT HUDSON AVE	I-71 NB	21.399
		SFVD	INSTALL	I-71 AT HUDSON AVE	I-71 NB	21.633
12	29	RMS	UPGRADE	I-71 AT WEBER RD	SB ENT. RAMP	21.779
		SFVD	INSTALL	I-71 AT WEBER RD	I-71 SB	21.792
		SFVD	INSTALL	I-71 AT WEBER RD	I-71 NB	21.970
13	30	RMS	UPGRADE	I-71 AT E NORTH BROADWAY	SB ENT. RAMP	22.295
		SFVD	INSTALL	I-71 AT E NORTH BROADWAY	I-71 SB	22.295
		SFVD	INSTALL	I-71 AT E NORTH BROADWAY	I-71 NB	22.795
14	31	SFVD	INSTALL	I-71 AT E COOKE RD	I-71 SB	23.372
		RMS	UPGRADE	I-71 AT E COOKE RD	SB ENT. RAMP	22.373
		SFVD	INSTALL	I-71 AT E COOKE RD	I-71 NB	23.599
15	32	RMS	UPGRADE	I-71 AT MORSE RD	SB ENT. RAMP	24.418
		SFVD	INSTALL	I-71 AT MORSE RD	I-71 SB	24.360
	33	SFVD	INSTALL	I-71 AT SINCLAIR RD	I-71 SB	24.680
		RMS	UPGRADE	I-71 AT SINCLAIR RD	SB ENT. RAMP	24.674
16	34	SFVD	REPLACE	I-270 AT SR-317/HAMILTON RD	I-270 EB	37.240
		RMS	UPGRADE	I-270 AT SR-317/HAMILTON RD	WB ENT. RAMP	37.239
	35	SFVD	REPLACE	I-270 AT SR-317/HAMILTON RD	I-270 WB	37.461
		RMS	UPGRADE	I-270 AT SR-317/HAMILTON RD	EB ENT. RAMP	37.457
17	36	RMS	UPGRADE	SR-315 AT TOWN ST	NB ENT. RAMP	0.727
		SFVD	INSTALL	SR-315 AT TOWN ST	SR-315 NB	0.731
18	37	SFVD	INSTALL	SR-315 AT GOODALE ST	NB ENT. RAMP	-
		RMS	UPGRADE	SR-315 AT GOODALE ST	NB ENT. RAMP	-
19	38	SFVD	REPLACE	SR-315 AT LANE AVE	SR 315 SB	4.223
		RMS	UPGRADE	SR-315 AT LANE AVE	SB ENT. RAMP	4.230
20	39	SFVD	REPLACE	SR-315 AT HENDERSON RD	SR 315 SB	7.785
		RMS	UPGRADE	SR-315 AT HENDERSON RD	SB ENT. RAMP	7.960
21	40	RMS	UPGRADE	SR-315 AT BETHEL RD	SB ENT. RAMP	8.475
		SFVD	INSTALL	SR-315 AT BETHEL RD	SR 315 SB	8.870
22	41	-	INSTALL	1606 W. BROAD ST		-

*S.L.M. FOR RMS IS RAMP METER STATION CABINET, S.L.M. FOR SFVD IS AT SIDE-FIRE VEHICLE DETECTOR UNIT

RMS = RAMP METER STATION
SFVD = SIDE-FIRE VEHICLE DETECTOR

DEVICE LOCATIONS

FRA-CCTV & RAMP METER UPGRADE

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TERMS

SFVD = SIDE-FIRE VEHICLE DETECTOR
RMS = RAMP METER STATION
VDS = VEHICLE DETECTION STATION

PLAN AND SPECIFICATION COMPLIANCE

THE CONTRACTOR SHALL FURNISH AND INSTALL RAMP METERING STATIONS IN COMPLIANCE WITH THE CONSTRUCTION PLANS AND MATERIAL SPECIFICATIONS, INCLUDING ALL SUPPLEMENTAL SPECIFICATIONS AND IN ACCORDANCE WITH THE SPECIFICATIONS LISTED BELOW.

EXISTING PLANS

EXISTING PLANS ENTITLED "(COLUMBUS FREEWAY MANAGEMENT SYSTEM - PHASE 1", "COLUMBUS METRO FREEWAY MANAGEMENT SYSTEM", "FRA-270-37.04", AND "FRA-71-6.09" MAY BE INSPECTED IN THE ODOT DISTRICT 6 OFFICE IN DELAWARE.

REMOVAL ITEMS

IN THE EVENT THE ITEMS STORED ON THE PROJECT FOR SALVAGE BY THE ODOT ITS LAB ENGINEER ARE NOT REMOVED, THE CONTRACTOR SHALL, WHEN DIRECTED BY THE ENGINEER IN WRITING, REMOVE AND DISPOSE OF THE ITEMS AT NO ADDITIONAL COST TO THE PROJECT. ALL DISPOSAL SHALL BE DONE SO IN AN ENVIRONMENTALLY FRIENDLY MANNER. THE ITS ENGINEER, NICK HEGEMIER, CAN BE CONTACTED AT 614-387-4099 OR 740-272-8462.

SURVEYING PARAMETERS - FRANKLIN COUNTY

VERTICAL POSITIONING
ORTHOMETRIC HEIGHT DATUM: NAVD88
GEOID: GEOID 09

HORIZONTAL POSITIONING
REFERENCE FRAME: NAD 83 (CORS96)
ELLIPSOID: GRS80
MAP PROJECTION: LAMBERT CONFORMAL CONIC
COORDINATE SYSTEM: OHIO SOUTH ZONE (SPC 3402)
COMBINED SCALE FACTOR: 1.00000000
SCALE FACTOR ORIGIN: 0,0

UNITS ARE IN U.S. SURVEY FEET. USE THE FOLLOWING CONVERSION FACTOR: 1 METER = 3.280833333 U.S. SURVEY FEET.

SEEDING AND MULCHING

SEEDING AND MULCHING SHALL BE APPLIED TO EXPOSED SOIL TWO FEET (2') BEYOND THE DISTURBED EARTH FOR INSTALLATION AND REMOVAL OF ALL CONDUIT, POLES, PULLBOXES, CABINET FOUNDATIONS, ETC... QUANTITY CALCULATIONS ARE BASED ON THESE LIMITS.

THE FOLLOWING QUANTITIES ARE PROVIDED TO PROMOTE GROWTH AND CARE OF PERMANENT SEEDED AREAS:

659, TOPSOIL.....112 CU. YD.
659, SEEDING AND MULCHING.....1000 SQ. YD.
659, COMMERCIAL FERTILIZER.....0.14 TON
659, WATER.....6 M. GAL.

SEEDING AND MULCHING SHALL BE APPLIED TO ALL AREAS OF EXPOSED SOIL BETWEEN THE RIGHT-OF-WAY LINES, AND WITHIN THE CONSTRUCTION LIMITS FOR AREAS OUTSIDE THE RIGHT-OF-WAY LINES COVERED BY WORK AGREEMENT OR SLOPE EASEMENT. QUANTITY CALCULATIONS FOR SEEDING AND MULCHING ARE BASED ON THESE LIMITS.

ITEM 632, SIGNALIZATION, MISC.: CDMA MODEM, FURNISH ONLY

FURNISH A CDMA MODEM, ANTENNA, CABLES, AND ETHERNET CABLE FOR REMOTE WIRELESS CELLULAR COMMUNICATION. FOR NETWORK CONSISTENCY CDMA MODEMS SHALL BE SIERRA WIRELESS (RAVEN X) OR GETWIRELESS (AIRLINK GX400.

THE CDMA MODEM EQUIPMENT SHALL BE DELIVERED TO THE ODOT ITS LAB FOR PROGRAMMING AND INSTALLATION.

ODOT ITS LAB
ATTN: PAUL LUNDSTROM
1606 W. BROAD STREET
COLUMBUS, OH 43223

THE CONTRACTOR SHALL PROVIDE THE MODEM SERIAL NUMBERS AND NECESSARY ESN NUMBERS FOR ODOT TO ESTABLISH WIRELESS SERVICE.

THE DEPARTMENT WILL MEASURE "SIGNALIZATION, MISC.: CDMA MODEM, FURNISH ONLY" BY THE NUMBER OF COMPLETE UNITS FURNISHED AND RECEIVED BY THE ODOT ITS LAB.

ITEM 632, SIGNALIZATION, MISC.: RAMP METER STATION

SEE SPECIAL PROVISIONS FOR ITS.

PRIOR TO BEGINNING WORK ON A RAMP METER STATION, FIELD VERIFY THE EXISTING FIELD ITEMS AND PROVIDE TO THE ENGINEER, IN WRITING, THE EXTENT OF THE PROPOSED RAMP METER STATION WORK. RAMP METERS MAY REQUIRE THE ADDITION OF A 4" SIGNAL HEAD POLE AND BASE, DUE TO ACCIDENTS AND DAMAGE. ALL EQUIPMENT AND MATERIAL NEEDED IN ORDER TO BRING THE RAMP METER UP TO CURRENT SPECIFICATIONS SHALL BE INCIDENTAL TO "ITEM 632, SIGNALIZATION, MISC.: RAMP METER STATION" UNLESS A SEPARATE PAY ITEM HAS BEEN CREATED FOR SPECIFIC ITEMS. ALL SIGNAL HEAD MOUNTING HARDWARE SHALL BE ALUMINUM.

UNDERDRAINS FOR PULLBOXES

REFERENCE IS MADE TO THE STANDARD CONSTRUCTION DRAWING FOR DETAILS OF DRAINING PULL BOXES. UNDERDRAINS FOR PULL BOXES SHALL BE USED AS DIRECTED BY THE ENGINEER AND SHALL BE PROVIDED WHERE THE LENGTH REQUIRED FOR A SATISFACTORY OUTLET DOES NOT EXCEED 20 FEET. THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY FOR THIS PURPOSE:

ITEM 611 4" CONDUIT, TYPE E.....50 FT.

ITEM 642, PAVEMENT MARKING, MISC.: STOP LINE

IN ACCORDANCE WITH CMS 641 AND CMS 642, REMOVE THE EXISTING RAMP METER STOP LINE AND REPAINT THE RAMP METER STOP LINE IN ACCORDANCE WITH CMS 644 (STOP LINE, TYPE 1).

ITEM 633 CONTROLLER ITEM, MISC.: CENTRAL SYSTEM SOFTWARE

SEE SPECIAL PROVISIONS, ITS, FOR CONTROLLER ITEM, MISC.: CENTRAL SYSTEM SOFTWARE.

ITEM 633, CONTROLLER ITEM, MISC.: CENTRAL SYSTEM SOFTWARE, ALTERNATE BID (MCCAIN)

SEE SPECIAL PROVISIONS, ITS, FOR CONTROLLER ITEM, MISC.: CENTRAL SYSTEM SOFTWARE, ALTERNATE BID (MCCAIN).

.RAMP METER CONTROLLER SETTINGS

RAMP METER CONTROLLERS SHALL BE PROGRAMMED WITH THE FOLLOWING DATA:

Traffic Responsive Setting			
Level	**Rate**	**Occupancy**	**Speed**
1	19	15	45
2	17	17	40
3	15	19	35
4	13	21	30
5	11	23	25
6	8	25	20
7	5	27	15

ADDITIONAL CONTROLLER SETTINGS WILL BE PROVIDED TO THE CONTRACTOR AT THE PRECONSTRUCTION MEETING.

ITEM 632, SIGNALIZATION MISC.: REMOVAL OF TRAFFIC MICROWAVE SENSOR

REMOTE TRAFFIC MICROWAVE SENSOR UNIT SHALL BE REMOVED IN ACCORDANCE WITH CMS 632 AND AS INDICATED ON THE PLANS.

REMOVED ITEMS SHALL BE STORED ON THE PROJECT FOR SALVAGE BY THE ODOT ITS LAB (1606 W. BROAD STREET, COLUMBUS, OH 43223). EXISTING POLES AND FOUNDATIONS SHALL REMAIN. IN THE EVENT THE ITEMS STORED ON THE PROJECT FOR SALVAGE BY THE ODOT ITS LAB ARE NOT REMOVED, THE CONTRACTOR SHALL, WHEN DIRECTED BY THE ENGINEER IN WRITING, REMOVE AND DISPOSE OF THE ITEMS AT NO ADDITIONAL COST TO THE PROJECT.

ITEM 625, PULL BOX REMOVED AND REPLACED, AS PER PLAN

THE CONTRACTOR SHALL REMOVE THE EXISTING PULL BOX AND REPLACE WITH A 32" PULL BOX, 725.08 AS DETAILED ON SHEET 11.

ITEM 625, CONDUIT, 2", 725.05, AS PER PLAN

CONDUIT SHALL BE CMS 725.051 (PVC) TYPE.

ITEM 632 - DETECTOR LOOP, AS PER PLAN

ALL INDUCTANCE DETECTOR LOOPS SHOWN IN THE PLANS SHALL BE OF THE CONFIGURATION, LENGTH, AND WIDTH AS SHOWN ON SHEET 8 AND PER SCD TC-82.10. NEW STOP LINE QUADRAPOLE DETECTOR LOOPS SHALL NOT BE WIRED TO ANY OTHER LOOPS AND SHALL HAVE ITS OWN DETECTOR CHANNEL.

ALL DETECTION SHALL BE TESTED FOR A MOTORCYCLE TARGET. THE FOLLOWING QUANTITY IS CARRIED TO THE GENERAL SUMMARY FOR THIS PURPOSE AND SHALL BE USED AS DIRECTED BY THE ENGINEER:

ITEM 632, DETECTOR LOOP, AS PER PLAN.....15 EACH

CALCULATED RJL CHECKED NAH

GENERAL NOTES

FRA-RAMP METER UPGRADE

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ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR

THIS WORK CONSISTS OF INSTALLING A SIDE-FIRE VEHICLE DETECTOR SYSTEM, COMPLETE AND READY FOR SERVICE. GENERAL FURNISH AND INSTALL ONE OF THE FOLLOWING UNITS, OR AN APPROVED EQUAL:

1. EIS MODEL G4 WITH ONE (1) ETHERNET CONNECTION, AND ONE (1) RS485/RS422 COMMUNICATION AS WELL AS BLUETOOTH COMMUNICATIONS.
   - A. RS 485 CABLE SHALL BE INSTALLED TO THE RAMP METER STATION OR VEHICLE DETECTION STATION AS INDICATED IN THE PLANS. ALL PROPER CABLING SHALL BE PROVIDED BY THE CONTRACTOR FOR CONNECTION OF ALL SERIAL COMMUNICATIONS OF THE SIDE-FIRE RADAR VEHICLE DETECTOR TO THE TERMINAL SERVER AND NETWORK SWITCH TO THE SERIAL TERMINAL SERVER. ANY DB9 PLUGS NEEDED SHALL BE HEAVY DUTY AND SHALL BE AMP CONNECTOR D9RCTKPC, L-COM SDC9AG, OR EQUIVALENT.
   - B. IF RVD IS TO BE USED FOR RAMP METERING, LOOP DETECTOR CONTACT CLOSURE CABLE SHALL BE RAN FROM UNIT TO RAMP METERING CONTROL CABINET. IN THE MAINLINE ROADWAY.
   - C. ETHERNET COMMUNICATION CABLE CONNECTION SHALL BE LEFT IN NEMA 4X CABINET (KEYED FOR CORBIN #2 LOCKS) AT BOTTOM OF DETECTOR POLE IF ITS CABINET IS GREATER THAN 250 FT AWAY FROM RADAR UNIT (VERTICAL DISTANCE AND HORIZONTAL DISTANCE SHALL BE COMBINED) (TO BE USED FOR LOCAL TESTING).
   - D. IF RADAR IS NOT MOUNTED ON THE SAME POLE AS A CAMERA, IT SHALL BE EQUIPPED WITH INTERNAL CAMERA FOR USE WITH REMOTE FIELD VERIFICATION OF THE RADAR UNIT.

   ALL CONNECTORS, PLUGS, AND WIRING NEEDED TO MAKE THE DETECTION SYSTEM FULLY OPERATIONAL SHALL BE CONSIDERED PART OF THIS WORK. THIS SHALL INCLUDE WIRING TO POLE OR GROUND MOUNTED ITS CABINET.

INSTALLATIONS WILL BE NEW INSTALLATIONS. INSTALLATION WILL INCLUDE ALL MOUNTING HARDWARE NECESSARY FOR ATTACHMENT TO POLES.

REQUIREMENTS

GENERAL REQUIREMENTS:

1. THE DETECTORS WILL OPERATE IN LOOP EMULATION MODE.
2. PROVIDE NEMA 4X CABINETS AS NECESSARY FOR EACH UNIT.
3. 120VAC POWER WILL BE PROVIDED TO EACH SITE. SIDE-FIRE RADAR UNITS SHALL OPERATE AT 24 VDC. THE CONTRACTOR SHALL PROVIDE A POWER TRANSFORMER/CONVERTER FROM 120VAC TO 24VDC OR EQUIPMENT AS OTHERWISE REQUIRED BY THE OEM OF THE SIDE-FIRE RADAR UNIT TO OPERATE AT 24VDC.
4. PRIMARY COMMUNICATIONS WITH THE VDU SHALL BE ETHERNET

COMPLIANCE AND WARRANTY:

1. ALL MATERIALS INSTALLED SHALL BE FULLY COMPLIANT WITH NTCIP AND NEMA TS-4 STANDARDS WHERE THE STANDARDS ARE APPLICABLE.
2. EQUIPMENT FURNISHED UNDER THIS SPECIFICATION SHALL BE GUARANTEED TO PERFORM ACCORDING TO THESE SPECIFICATIONS AND TO THE MANUFACTURER'S PUBLISHED SPECIFICATIONS. EQUIPMENT SHALL BE WARRANTED FOR A MINIMUM OF FIVE (5) YEARS FROM TIME OF INSTALLATION AGAINST MANUFACTURER'S DEFECTS AND/OR FAILURE IN DESIGN, MATERIALS OR WORKMANSHIP. UNLESS OTHERWISE SPECIFIED IN THE INVITATION FOR BIDS, WARRANTY COVERAGE SHALL BECOME EFFECTIVE ON THE DATE OF FINAL ACCEPTANCE OF THE SYSTEM BY THE DEPARTMENT. THE MANUFACTURER SHALL ASSIGN TO THE DEPARTMENT ALL MANUFACTURER'S NORMAL WARRANTIES OR GUARANTEES, ON ALL SUCH ELECTRONIC, ELECTRICAL AND MECHANICAL EQUIPMENT, MATERIALS, TECHNICAL DATA, AND PRODUCTS FURNISHED FOR AND INSTALLED ON THE PROJECT. DEFECTIVE EQUIPMENT SHALL BE REPAIRED OR REPLACED, AT THE MANUFACTURER'S OPTION, DURING THE WARRANTY PERIOD AT NO COST TO THE DEPARTMENT. THE MANUFACTURER SHALL PROVIDE REPLACEMENT PARTS AND/OR COMPLETE UNIT(S) WITHIN TEN (10) BUSINESS DAYS AFTER NOTIFICATION BY THE DEPARTMENT.

INSTALLATION

1. THE DETECTOR WILL BE MOUNTED IN A SIDE-FIRED CONFIGURATION. IT WILL BE MOUNTED ON POLES OR STRUCTURES AT THE SPECIFIED LOCATIONS, USING MOUNTING BRACKETS RECOMMENDED BY THE MANUFACTURER FOR ATTACHMENT TO STEEL OR ALUMINUM POLES.
2. THE CONTRACTOR SHALL INSTALL THE DETECTOR UNIT ON A POLE AT THE HEIGHT, AS DETERMINED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, ABOVE THE ROAD SURFACE SO THAT THE MASKING OF VEHICLES IS MINIMIZED AND THAT ALL DETECTION ZONES ARE CONTAINED WITHIN THE SPECIFIED ELEVATION ANGLE AS SUGGESTED BY THE MANUFACTURER. THE DETECTION ZONES SHALL BE SET UP USING THE PROVIDED SOFTWARE AND A LAPTOP PC.

TESTING

1. UPON COMPLETION OF THE RTMS EQUIPMENT INSTALLATION AT A ROADSIDE SITE, AN ACCEPTANCE TEST SHALL BE CONDUCTED BY THE CONTRACTOR AT THE SITE ACCORDING TO THE APPROVED TESTING PLAN FOR RTMS EQUIPMENT. THE CONTRACTOR SHALL PROVIDE SEVEN-CALENDAR DAYS NOTICE TO ENGINEER, REQUESTING PERMISSION TO CONDUCT A SITE ACCEPTANCE TEST ON A SPECIFIC WORKDAY. NO MORE THAN TWO ACCEPTANCE TESTS SHALL BE SCHEDULED IN ANY GIVEN FOUR-HOUR PERIOD PER DAY. AT THE DISCRETION OF THE ENGINEER, THE ENGINEER OR A DESIGNATED REPRESENTATIVE MAY WITNESS THE STAND ALONE SITE ACCEPTANCE TEST. THE CONTRACTOR SHALL ARRANGE, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT, THE ATTENDANCE OF A QUALIFIED TECHNICAL REPRESENTATIVE OF THE EQUIPMENT MANUFACTURER TO ATTEND EACH TEST UNTIL TEN PERCENT (10%) OR A MINIMUM OF TWO (2) SITES OF THAT PARTICULAR TYPE ARE APPROVED, WHICHEVER IS GREATER. THE CONTRACTOR IS REQUIRED TO SUBMIT A STAND ALONE SITE ACCEPTANCE TEST PLAN FOR REVIEW AND APPROVAL. AT A MINIMUM THIS TEST PLAN SHALL INCLUDE BASIC TESTS FOR VOLUME AND SPEED. THE TEST METHODOLOGY SHOULD COMPARE TRAFFIC COUNT AND SPEED DATA COLLECTED BY THE RTMS AGAINST DATA COLLECTED USING BOTH MANUAL AND AUTOMATED DATA COLLECTION METHODS. ALL RAW DATA MUST BE PLACED IN A FORM SUITABLE FOR ANALYSIS. THE TEST PLAN IS REQUIRED TO BE DEVELOPED TO ENSURE A 95% CONFIDENCE LEVEL THAT THE AVERAGE SPEED MEASURED IS WITHIN ` 5 MPH.

SEE PLAN SHEETS FOR ADDITIONAL DETAILS. PAYMENT WILL BE MADE AT THE UNIT BID PRICE OF "ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR" PER EACH, FURNISHED AND INSTALLED IN PLACE, COMPLETED AND ACCEPTED BY THE ENGINEER.

ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR (FURNISH ONLY)

THIS WORK CONSISTS OF FURNISHING A SIDE-FIRE VEHICLE DETECTOR SYSTEM IN ACCORDANCE WITH THE "ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR" NOTE ON THIS SHEET, WITH 60 FEET OF CABLE. THE SIDE-FIRE VEHICLE DETECTOR SHALL BE DELIVERED TO THE ODOT ITS LAB FOR TESTING PURPOSES.

ODOT ITS LAB
ATTN: NICK HEGEMIER
1606 W. BROAD STREET
COLUMBUS, OH 43223
PHONE: 614.387.4099

THE DEPARTMENT WILL MEASURE "ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR (FURNISH ONLY)" BY THE NUMBER OF COMPLETE UNITS FURNISHED AND RECEIVED BY THE ODOT ITS LAB.

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY FOR THIS PURPOSE:

ITEM 632 SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR (FURNISH ONLY).....1 EACH

ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR WITH POLE

THIS WORK CONSISTS OF INSTALLING A SIDE-FIRE VEHICLE DETECTOR SYSTEM, LIGHT POLE, AND LIGHT POLE FOUNDATION COMPLETE AND READY FOR SERVICE.

FURNISH AND INSTALL A MONOARM TYPE CONVENTIONAL LIGHT POLE (WITHOUT A BRACKET ARM) WITH A SUPPORT HEIGHT OF 30 FEET AND WITH A BLIND HALF COUPLING ON AN ALUMINUM TRANSFORMER BASE AND A LIGHT POLE FOUNDATION, 24" X 6' DEEP, IN CONFORMANCE WITH CMS 625, THE STANDARD CONSTRUCTION DRAWINGS, AND AS FURTHER DETAILED IN THE PLANS. POLE, FOUNDATION, AND ANCHOR BOLTS SHALL BE INCIDENTAL TO THIS ITEM OF WORK.

FURNISH AND INSTALL A SIDE-FIRE VEHICLE DETECTOR IN ACCORDANCE WITH THE "ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR" NOTE ON THIS SHEET AND MOUNT THE REMOTE SIDE-FIRE VEHICLE DETECTOR TO THE NEW LIGHT POLE PER THE NOTE ON THIS PAGE.

FURNISH AND INSTALL A GROUND ROD AT THE LIGHT POLE FOUNDATION IN CONFORMANCE WITH CMS 625, THE STANDARD CONSTRUCTION DRAWINGS, AND AS FURTHER DETAILED IN THE PLANS.

FURNISH AND INSTALL A GROUND ROD AT THE LIGHT POLE FOUNDATION IN CONFORMANCE WITH CMS 625, THE STANDARD CONSTRUCTION DRAWINGS, AND AS FURTHER DETAILED IN THE PLANS. PROVIDE A LIGHTNING ARRESTOR ON EACH NEW LIGHT POLE.

PRIOR TO ORDERING THE POLES THE CONTRACTOR SHALL CONTACT OUPS TO HAVE ALL THE UTILITIES LOCATED IN THE FIELD THEN MEET WITH THE PROJECT ENGINEER TO LOCATE THE PROPOSED POLE LOCATIONS TO INSURE THERE ARE NO CONFLICTS WITH UTILITIES OR ANY OTHER SITE CONSTRAINT. IF THERE ARE ISSUES THE PROJECT ENGINEER SHALL PROVIDE GUIDANCE AS TO THE RELOCATION OF THE POLES.

PAYMENT WILL BE MADE AT THE UNIT BID PRICE OF "ITEM 632, SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR WITH POLE" PER EACH, FURNISHED AND INSTALLED IN PLACE, COMPLETED AND ACCEPTED BY THE ENGINEER.

ALTERNATE BIDS

THE CONTRACTOR SHALL SUBMIT TWO BIDS FOR EACH PAY ITEM THAT SPECIFIES AN ALTERNATE BID. ONE BID SHALL BE BASED ON THE GENERIC BID ITEM AND ONE BID SHALL BE BASED ON THE PROPRIETARY BID ITEM.

THE CONTRACTOR SHALL PROVIDE THE NAME OF THE MANUFACTURER WITH EACH BID FOR THE EACH OF THE FOLLOWING GENERIC BID ITEMS:

ITEM 633, CONTROLLER ITEM MISC.: RAMP METERING CONTROLLER

ITEM 633, CONTROLLER ITEM MISC.: CENTRAL CONTROL SOFTWARE

CALCULATED RJL CHECKED NAH

GENERAL NOTES

FRA-RAMP METER UPGRADE

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ITEM 633 CONTROLLER ITEM, MISC.: NETWORK SWITCH

THE CONTRACTOR SHALL FURNISH ONE NEW CISCO IE 3000 LAYER 3 NETWORK SWITCH MODEL IE-3000-8TC-E. IN ADDITION TO THE SWITCH, THE FOLLOWING MODULES SHALL BE PROVIDED WITH EACH SWITCH:

- QTY 1 - PWR-IE3000-AC = EXPANSION POWER MODULE
- QTY 1 - IEM-3000-4SM = EXPANSION MODULE INCLUDING 4 100M SFP PORTS
- QTY 3 – GLC-SX-MM-RGD = GIGABIT ETHERNET SFP, LC CONNECTOR, SX (1GPS MULTIMODE) TRANSCEIVER
- QTY 3 – FIBER PATCH CABLES 2 METERS – MULTIMODE (ST TO LC)

THE SWITCH AND ALL EXPANSION MODULES SHALL BE WARRANTED FOR A PERIOD OF FIVE YEARS STARTING AT THE TIME OF FINAL PROJECT ACCEPTANCE.

THE CONTRACTOR SHALL ALSO FURNISH ONE NEW SERIAL TERMINAL SERVER. ALL PROPER CABLING SHALL BE PROVIDED BY THE CONTRACTOR FOR THE FUTURE CONNECTION OF ALL SERIAL COMMUNICATIONS OF THE RADAR VEHICLE DETECTOR TO THE TERMINAL SERVER AND NETWORK SWITCH TO THE SERIAL TERMINAL SERVER. ANY DB9 PLUGS NEEDED SHALL BE HEAVY DUTY AND SHALL BE AMP CONNECTOR D9RCTKPC, L-COM SDC9AG, OR EQUIVALENT. THE TERMINAL SERVER SHALL BE ONE OF THE FOLLOWING MODELS:

- COMNET, MODEL CNFE2DOE2
- ETHERWAN, MODEL SE6302-00B
- COMTROL, MODEL DEVICE MASTER RTS, DB9M, 2 PORT, 2E
- DIGI, MODEL PORTSERVER TS 2 H MEI

THE NETWORK SWITCH, TERMINAL SERVER, AND ASSOCIATED CABLES SHALL BE DELIVERED TO THE ODOT ITS LAB FOR PROGRAMMING AND INSTALLATION.

ODOT ITS LAB
ATTN: PAUL LUNDSTROM
1606 W. BROAD STREET
COLUMBUS, OH 43223

PAYMENT FOR EACH TERMINAL SERVER, NETWORK SWITCH, AND ASSOCIATED CABLES SHALL BE MADE BY "ITEM 633 CONTROLLER ITEM, MISC.: NETWORK SWITCH"

WARRANTY

ALL RAMP METERING, SIDE-FIRE RADAR, AND NETWORKING EQUIPMENT SHALL BE WARRANTED FOR A MINIMUM OF FIVE (5) YEARS FROM TIME OF INSTALLATION AGAINST MANUFACTURER'S DEFECTS AND/OR FAILURE IN DESIGN, MATERIALS OR WORKMANSHIP. UNLESS OTHERWISE SPECIFIED IN THE INVITATION FOR BIDS, WARRANTY COVERAGE SHALL BECOME EFFECTIVE ON THE DATE OF FINAL ACCEPTANCE OF THE SYSTEM BY THE DEPARTMENT. THE EQUIPMENT MANUFACTURER(S) SHALL ASSIGN TO THE DEPARTMENT ALL MANUFACTURER'S NORMAL WARRANTIES OR GUARANTEES, ON ALL SUCH ELECTRONIC, ELECTRICAL AND MECHANICAL EQUIPMENT, MATERIALS, TECHNICAL DATA, AND PRODUCTS FURNISHED FOR AND INSTALLED ON THE PROJECT. DEFECTIVE EQUIPMENT SHALL BE REPAIRED OR REPLACED, AT THE MANUFACTURER'S OPTION, DURING THE WARRANTY PERIOD AT NO COST TO THE DEPARTMENT. THE MANUFACTURER SHALL PROVIDE REPLACEMENT PARTS AND/OR COMPLETE UNIT(S) WITHIN TEN BUSINESS DAYS AFTER NOTIFICATION BY THE DEPARTMENT. FURNISH MATERIALS ACCORDING TO THIS SPECIFICATION.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LABOR AND EQUIPMENT COSTS FOR INSTALLATION OF THE NEW COMPONENT IN YEAR ONE (1) OF THE WARRANTY PERIOD. ADDITIONALLY THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PREVENTIVE MAINTENANCE ACTIVITIES DURING YEAR ONE (1) OF THE WARRANTY PERIOD. IN YEAR(S) 2-5 THE CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT OF THE DEFECTIVE COMPONENT(S) OR DEVICE(S) TO BE INSTALLED BY THE DEPARTMENT. A FIVE (5) YEAR TRANSFERRABLE WARRANTY FROM THE MANUFACTURER FOR THE ABOVE STATED CONDITIONS AND WARRANTY ITEMS AND SHALL REPLACE THE CONTRACTOR'S WARRANTY RESPONSIBILITY, IF CONTRACTOR, MANUFACTURER, AND ODOT AGREE TO TERMS. IF ALL PARTIES AGREE, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ODOT WITH THE NECESSARY PAPERWORK SHOWING THE OWNERSHIP CHANGE OF THE WARRANTY TO THE MANUFACTURER. ODOT SHALL NOT BE LIABLE FOR ANY REPLACEMENT PARTS PROVIDED BY THE CONTRACTOR THAT ARE DAMAGED DURING INSTALLATION OR ARE INCORRECTLY DIAGNOSED AS THE PROBLEM DURING DIAGNOSTIC CHECKS AND/OR UPGRADES.

AIRWAY/HIGHWAY CLEARANCE FOR AIRPORTS AND HELIPORTS (SITE #16 – I-270 AT SR-317/HAMILTON RD)

THIS PROJECT SITE HAS BEEN IDENTIFIED AS BEING WITHIN THE INFLUENCE AREA OF A PUBLIC USE AIRPORT OR HELIPORT. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT AT MAXIMUM OPERATING HEIGHT SHALL EXCEED A HEIGHT OF 36 FT.. IF ANY TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT WILL EXCEED THIS HEIGHT, FURTHER COORDINATION WITH THE FEDERAL AVIATION ADMINISTRATION (FAA), AND ODOT OFFICE OF AVIATION, WILL BE NECESSARY PRIOR TO ERECTING SUCH TEMPORARY STRUCTURES OR OPERATING SUCH EQUIPMENT ON THE PROJECT. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT FORM 7460-1 TO THE FAA. A COPY OF THE SUBMISSION AND TWO COPIES OF FORM 7460-1 SHALL BE FORWARDED TO THE ODOT OFFICE OF AVIATION. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT SHALL EXCEED THE PERMISSIBLE HEIGHT, UNTIL A COPY OF THE FAA APPROVAL AND ODOT OFFICE OF AVIATION PERMIT HAS BEEN FURNISHED TO THE PROJECT ENGINEER.

EXPRESS PROCESSING CENTER
THE FEDERAL AVIATION ADMINISTRATION
SOUTHWEST REGIONAL OFFICE
AIR TRAFFIC AIRSPACE BRANCH ASW-520
2601 MEACHAN BLVD.
FORT WORTH, TX 76137-4298

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF AVIATION
2829 WEST DUBLIN-GRANVILLE ROAD
COLUMBUS, OHIO 43235
614-387-2346

AIRWAY/HIGHWAY CLEARANCE FOR AIRPORTS AND HELIPORTS (SITE #20 – SR-315 AT HENDERSON)

THIS PROJECT SITE HAS BEEN IDENTIFIED AS BEING WITHIN THE INFLUENCE AREA OF A PUBLIC USE AIRPORT OR HELIPORT. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT AT MAXIMUM OPERATING HEIGHT SHALL EXCEED A HEIGHT OF 265 FT.. IF ANY TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT WILL EXCEED THIS HEIGHT, FURTHER COORDINATION WITH THE FEDERAL AVIATION ADMINISTRATION (FAA), AND ODOT OFFICE OF AVIATION, WILL BE NECESSARY PRIOR TO ERECTING SUCH TEMPORARY STRUCTURES OR OPERATING SUCH EQUIPMENT ON THE PROJECT. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT FORM 7460-1 TO THE FAA. A COPY OF THE SUBMISSION AND TWO COPIES OF FORM 7460-1 SHALL BE FORWARDED TO THE ODOT OFFICE OF AVIATION. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT SHALL EXCEED THE PERMISSIBLE HEIGHT, UNTIL A COPY OF THE FAA APPROVAL AND ODOT OFFICE OF AVIATION PERMIT HAS BEEN FURNISHED TO THE PROJECT ENGINEER.

EXPRESS PROCESSING CENTER
THE FEDERAL AVIATION ADMINISTRATION
SOUTHWEST REGIONAL OFFICE
AIR TRAFFIC AIRSPACE BRANCH ASW-520
2601 MEACHAN BLVD.
FORT WORTH, TX 76137-4298

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF AVIATION
2829 WEST DUBLIN-GRANVILLE ROAD
COLUMBUS, OHIO 43235
614-387-2346

AIRWAY/HIGHWAY CLEARANCE FOR AIRPORTS AND HELIPORTS (SITE #21 – SR-315 AT BETHEL)

THIS PROJECT SITE HAS BEEN IDENTIFIED AS BEING WITHIN THE INFLUENCE AREA OF A PUBLIC USE AIRPORT OR HELIPORT. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT AT MAXIMUM OPERATING HEIGHT SHALL EXCEED A HEIGHT OF 218 FT.. IF ANY TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT WILL EXCEED THIS HEIGHT, FURTHER COORDINATION WITH THE FEDERAL AVIATION ADMINISTRATION (FAA), AND ODOT OFFICE OF AVIATION, WILL BE NECESSARY PRIOR TO ERECTING SUCH TEMPORARY STRUCTURES OR OPERATING SUCH EQUIPMENT ON THE PROJECT. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT FORM 7460-1 TO THE FAA. A COPY OF THE SUBMISSION AND TWO COPIES OF FORM 7460-1 SHALL BE FORWARDED TO THE ODOT OFFICE OF AVIATION. NO TEMPORARY STRUCTURES OR CONSTRUCTION EQUIPMENT SHALL EXCEED THE PERMISSIBLE HEIGHT, UNTIL A COPY OF THE FAA APPROVAL AND ODOT OFFICE OF AVIATION PERMIT HAS BEEN FURNISHED TO THE PROJECT ENGINEER.

EXPRESS PROCESSING CENTER
THE FEDERAL AVIATION ADMINISTRATION
SOUTHWEST REGIONAL OFFICE
AIR TRAFFIC AIRSPACE BRANCH ASW-520
2601 MEACHAN BLVD.
FORT WORTH, TX 76137-4298

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF AVIATION
2829 WEST DUBLIN-GRANVILLE ROAD
COLUMBUS, OHIO 43235
614-387-2346

CALCULATED RJL CHECKED NAH

GENERAL NOTES

FRA-RAMP METER UPGRADE

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ITEM 633 CONTROLLER ITEM, MISC.: ROUTER

THE CONTRACTOR SHALL FURNISH ONE NEW CISCO 1941 ROUTER WITH 2 ONBOARD GE, 2 EHWIC SLOTS, 1 ISM SLOT, 256MB CF DEFAULT, 512MB DRAM DEFAULT, IP BASE (MODEL: CISCO1941/K9). THE FOLLOWING ITEMS SHALL BE PROVIDED WITH EACH ROUTER:

QTY	ITEM NAME	DESCRIPTION
1	CON-SNTP-1941	SMARTNET 24X7X4 CISCO 1941 W/2 GE2
1	S190UK9-15204M	CISCO 1900 IOS UNIVERSAL
1	EHWIC-4G-LTE-A	4G LTE EHWIC FOR ATT 700 MHZ BAND 17 / HSPA+
1	PWR-1941-AC	CISCO 1941 AC POWER SUPPLY
1	CAB-AC	AC POWER CORD (NORTH AMERICA) C13 NEMA 5-15P 2.1M
1	SL-19-IPB-K9	IP BASE LICENSE FOR CISCO 1900
1	ISR-CCP-EXP	CISCO CONFIG PRO EXPRESS ON ROUTER FLASH
1	MEM-1900-512MB-DEF	512MB DEFAULT DRAM FOR CISCO 1941 ISR
1	MEM-CF-256MB	256MB COMPACT FLASH FOR CISCO 1900 2900 3900 ISR
1	PI-MSE-PRMO-INSRT	INSERT PACKOUT - PI-MSE
1	ANT-4G-SR-OUT-TNC	MULTIBAND LOW-PROFILE SAUCER OUTDOOR 4G ANTENNA

THE ROUTER AND ALL ITEMS NOTED ABOVE SHALL BE WARRANTED FOR A PERIOD OF FIVE YEARS STARTING AT THE TIME OF FINAL PROJECT ACCEPTANCE.

THE ROUTER, APPURTENANCES, AND ASSOCIATED CABLES SHALL BE DELIVERED TO THE ODOT ITS LAB FOR PROGRAMMING AND INSTALLATION.

ODOT ITS LAB
ATTN: PAUL LUNDSTROM
1606 W. BROAD STREET
COLUMBUS, OH 43223

PAYMENT FOR EACH ROUTER, CABLES, AND APPURTENANCES, SHALL BE MADE BY "ITEM 633 CONTROLLER ITEM, MISC.: ROUTER"

ITEM 633 CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER

SEE SPECIAL PROVISIONS, ITS, FOR CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER. THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY FOR THIS PURPOSE: ITEM 633, CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER, 5 EACH.

ITEM 633 CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER, ALTERNATE BID (MCCAIN)

SEE SPECIAL PROVISIONS, ITS, FOR CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER, ALTERNATE BID (MCCAIN). THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY FOR THIS PURPOSE: ITEM 633, CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER, ALTERNATE BID (MCCAIN), 5 EACH.

GROUNDING AND BONDING

IN ADDITION TO THE REQUIREMENTS OF **CMS 625 & 725**, THE FOLLOWING SHALL APPLY:

1) ALL METALLIC PARTS CONTAINING ELECTRICAL CONDUCTORS SHALL BE PERMANENTLY JOINED TO FORM AN EFFECTIVE GROUND FAULT CURRENT PATH BACK TO THE GROUNDED CONDUCTOR IN THE POWER SERVICE DISCONNECT SWITCH.
   - A. PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR IN METALLIC CONDUITS (725.04) IN ADDITION TO THE CONDUCTORS SPECIFIED AND BOND THE CONDUIT TO THIS GROUNDING CONDUCTOR.
   - B. WHEN AN EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED IN PLASTIC CONDUIT (725.05), THE INSTALLATION SHALL INCLUDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR IN ADDITION TO THE CONDUCTORS SPECIFIED.
   - C. METALLIC CONDUIT CARRYING THE LOOP WIRES FROM IN THE PAVEMENT TO THE PULL BOX SPLICE LOCATION WILL ONLY BE BONDED AT THE PULL BOX END, AND WILL NOT CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR.
   - D. METAL PULL BOX LIDS SHALL BE BONDED BY ATTACHMENT OF THE EQUIPMENT GROUNDING CONDUCTOR TO THE FRAME DIAGONAL AS PROVIDED ON HL-30.11.
   - E. IF MULTIPLE CONDUIT RUNS BEGIN AND END AT THE SAME POINTS, ONLY ONE EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED.
   - F. IF AN EQUIPMENT GROUNDING CONDUCTOR IS NEEDED IN CONDUIT BETWEEN SIGNALIZED INTERSECTIONS FOR UNDERGROUND INTERCONNECT CABLE, THE GROUNDING SYSTEM FOR EACH SIGNALIZED INTERSECTION WILL BE SEPARATED ABOUT MIDWAY BETWEEN THE INTERSECTIONS.
   - G. THE MESSENGER WIRE AT SIGNALIZED INTERSECTIONS WILL BE USED AS THE CONDUCTIVE PATH FROM CORNER TO CORNER IF CONDUIT IS NOT PROVIDED UNDER THE ROADWAY. WHEN CONDUIT CONNECTS THE CORNERS OF AN INTERSECTION, AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE USED IN THE CONDUIT.

2) CONDUITS.
   - A. THE 725.04 CONDUIT SHALL HAVE GROUNDING BUSHINGS INSTALLED AT ALL TERMINATION POINTS. THE BUSHING MATERIAL SHALL BE COMPATIBLE WITH GALVANIZED STEEL CONDUIT AND THE GROUNDING LUG MATERIAL SHALL BE COMPATIBLE FOR USE WITH COPPER WIRE. THREADED OR COMPRESSION TYPE BUSHINGS MAY BE USED.
   - B. THE 725.05 CONDUIT SHALL HAVE THE INSIDE AND OUTSIDE DIAMETERS OF THE CONDUIT DEBURRED AT ALL TERMINATION POINTS.
   - C. BOTH ENDS OF METALLIC CONDUIT SHALL BE BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.
   - D. METALLIC CONDUIT MAY BE BONDED TO METALLIC BOXES THROUGH THE USE OF CONDUIT FITTINGS UL APPROVED FOR THIS TYPE OF CONNECTION, WITH THE BOX BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.

3) WIRE FOR GROUNDING AND BONDING.
   - A. USE INSULATED, COPPER WIRE FOR THE EQUIPMENT GROUNDING CONDUCTOR. BONDING JUMPERS IN BOXES AND ENCLOSURES MAY BE BARE OR INSULATED COPPER WIRE. WIRE SIZE SHALL BE AS FOLLOWS:
     - I) USE 4 AWG BETWEEN THE POWER SERVICE AND SUPPORTS, POLES, PEDESTALS, CONTROLLER OR FLASHER CABINETS.
     - II) USE A MINIMUM 8 AWG BETWEEN LOOP DETECTOR PULL BOXES AND THE FIRST CONDUIT THAT REQUIRES A LARGER SIZE AS SPECIFIED IN 3.A.I ABOVE.
     - III) USE A MINIMUM 8 AWG BETWEEN THE "PREPARE TO STOP WHEN FLASHING" INSTALLATION (INCLUDING SUPPORT) AND THE FIRST CONDUIT THAT REQUIRES A LARGER SIZE AS SPECIFIED IN 3.A.I ABOVE.
     - IV) THE INSULATION SHALL BE GREEN OR GREEN WITH YELLOW STRIPE(S). FOR 4 AWG OR LARGER, INSULATION MAY ALSO BE BLACK WITH GREEN TAPE/LABELS INSTALLED AT ALL ACCESS POINTS.
   - B. IN A HIGHWAY LIGHTING SYSTEM, THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE THE SAME WIRE SIZE AS THE DUCT CABLE OR DISTRIBUTION CABLE CIRCUIT CONDUCTORS, WITH THE MINIMUM CONDUCTOR SIZE OF 4 AWG. BONDING JUMPERS WILL BE MINIMUM SIZE 4 AWG.

4) GROUND ROD.
   - A. A 3/4 INCH SCHEDULE 40 PVC CONDUIT WILL BE USED IN FOUNDATIONS AND CONCRETE WALLS FOR THE GROUNDING CONDUCTOR (GROUND WIRE) RACEWAY TO THE GROUND ROD. SHOULD METALLIC CONDUIT BE USED, BOTH ENDS OF THE CONDUIT SHALL BE BONDED TO THE GROUNDING CONDUCTOR.
   - B. THE TYPICAL GROUNDING CONDUCTOR (GROUND WIRE) SHALL BE 4 AWG INSULATED, COPPER.

5) THE GREEN CONDUCTOR IN SIGNAL CABLES (CONDUCTOR #4) SHALL NOT BE USED TO SUPPLY POWER TO A SIGNAL INDICATION. IT WILL BE CONNECTED TO THE SIGNAL BODY AS AN EQUIPMENT GROUND IN ALUMINUM HEADS AND IT WILL BE UNUSED IN PLASTIC HEADS. UNUSED CONDUCTORS SHALL BE GROUNDED IN THE CABINET. TYPICAL USE OF CONDUCTORS IS AS FOLLOWS:

COND. NO.	COLOR	VEHICLE SIGNAL	PEDESTRIAN SIGNAL
1	BLACK	GREEN BALL	#1 WALK
2	WHITE	AC NEUTRAL	AC NEUTRAL
3	RED	RED BALL	#1 DW/FDW
4	GREEN	EQUIPMENT GROUND	EQUIPMENT GROUND
5	ORANGE	YELLOW BALL	#2 DW/FDW
6	BLUE	GREEN ARROW	# 2 WALK
7	WHITE/BLACK STRIPE	YELLOW ARROW	NOT USED

6) POWER SERVICE AND DISCONNECT SWITCH.
   - A. AT THE POWER SERVICE LOCATION, THE GROUNDING CONDUCTOR (GROUND WIRE) FROM THE DISCONNECT SWITCH NEUTRAL (AC-) BAR TO THE GROUND ROD SHALL BE A CONTINUOUS, UNSPLICED CONDUCTOR. IF SPLICED, IT SHALL BE AN EXOTHERMIC WELD BUTT SPLICE.
   - B. THE SERVICE NEUTRAL (AC-) SHALL ONLY BE CONNECTED TO GROUND AT THE PRIMARY POWER SERVICE DISCONNECT SWITCH.
     - I) NEMA CONTROLLER CABINETS: IF A POWER SERVICE DISCONNECT SWITCH IS LOCATED BEFORE THE CONTROLLER CABINET, THE NEUTRAL (AC-) AND THE GROUNDING BARS IN THE CONTROLLER CABINET SHALL NOT BE CONNECTED TOGETHER AS SHOWN IN NEMA TS-2, FIGURE 5-4.
     - II) IF SECONDARY DISCONNECT SWITCHES ARE CONNECTED AFTER THE PRIMARY DISCONNECT SWITCH, THE NEUTRAL (AC-) SHALL ONLY BE GROUNDED AT THE PRIMARY SWITCH. EQUIPMENT GROUNDING CONDUCTORS SHALL BE BROUGHT TO THE PRIMARY SWITCH, BUT SHALL BE GROUNDED AT BOTH SECONDARY AND PRIMARY SWITCHES.

7) STRUCTURE GROUNDING: HL-50.21 SHOWS A 1/0 AWG STRANDED COPPER CABLE USED FOR STRUCTURE GROUNDING. ADDITIONALLY, THIS SAME CABLE SHALL BE INSULATED AND ANY CONNECTIONS AND BARE COPPER STRANDS EXPOSED TO CONCRETE SHALL BE COVERED WITH MASTIC TO PREVENT CONTACT WITH THE CONCRETE.

8) PAYMENT.
   - A. ALL MATERIALS AND WORK REQUIRED TO COMPLETE THE EFFECTIVE GROUND FAULT CURRENT PATH SYSTEM ARE INCIDENTAL TO THE CONDUCTORS INSTALLED BY CONTRACT.
   - B. WORK ON BRIDGES MAY BE INCLUDED IN THE BID ITEM FOR "ITEM 625, STRUCTURE GROUNDING."
   - C. IN A 3-WIRE HIGHWAY LIGHTING SYSTEM, THE THIRD CONDUCTOR OF THE DUCT CABLE OR DISTRIBUTION CABLE WILL BE USED AS THE EQUIPMENT GROUNDING CONDUCTOR AND MAY AS SUCH BE PART OF THE CABLE BID ITEM.

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UTILITIES

THE IDENTITY AND THE LOCATION OF SOME OF THE EXISTING UNDERGROUND FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA HAVE BEEN IDENTIFIED. THE ONTRACTOR SHALL GIVE NOTICE OF INTENT TO CONSTRUCT TO THE OHIO UTILITIES PROTECTION SERVICE, THE OHIO OIL AND GAS PRODUCERS UNDERGROUND PROTECTION SERVICE, AND OWNERS OF UNDERGROUND FACILITIES THAT ARE NOT MEMBERS OF A REGISTERED PROTECTION SERVICE IN ACCORDANCE WITH SECTION 153.64 OF THE OHIO REVISED CODE. THE ABOVE MENTIONED NOTICE SHALL BE GIVEN AT LEAST TWO WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. THE FOLLOWING UTILITIES ARE LOCATED WITHIN THE WORK LIMITS OF THE PROJECT AND THE OWNERS SUBSCRIBE TO REGISTERED UNDERGROUND PROTECTION SERVICE. OHIO UTILITY PROTECTION SERVICE 1-800-362-2764. OHIO OIL & GAS PRODUCERS UNDERGROUND PROTECTION SERVICE 1-800- 925-0988. NON-MEMBERS MUST BE CALLED DIRECTLY.

THE LOCATION OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE AS OBTAINED FROM THE OWNERS AS REQUIRED BY SECTION 153.64 O.R.C.

LISTED BELOW ARE ALL UTILITIES LOCATED WITHIN THE PROJECT LIMITS TOGETHER WITH THEIR RESPECTIVE OWNERS:

AEP
PAUL PAXTON
850 TECH CENTER DRIVE
GAHANNA, OH 43230-6605
PHONE: 614.883.6831
EMAIL: PTPAXTON@AEP.COM

AEP
MIKE FRALEY
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215
PHONE: 614.716.2531
EMAIL: JMFRALEY@AEP.COM

AEP
MS. TINA HAIRSTON
700 MORRISON ROAD
GAHANNA, OH 43230
PHONE: 614.552.1801
EMAIL: TLHAIRSTON@AEP.COM

AEP
ROY MIDDLETON
1 RIVERSIDE PLAZA - 12TH FLOOR
COLUMBUS, OH 43215
PHONE: 614.716.5844
EMAIL: RLMIDDLETON@AEP.COM

AT&T LEGACY/LNS
ED HUGHES
5980-G WILCOX PLACE
DUBLIN, OH 43016
PHONE: 614.760.8320
EMAIL: EHUGHES@HLGENGINEERING.COM

AT&T
ROGER MIKESELL
111 NORTH FOURTH STREET – ROOM 802
COLUMBUS, OH 43215
PHONE: 614.223.7162
EMAIL: RX8936@ATT.COM

BP OIL COMPANY
CARL YARLBOROUGH
DAMAGE PREVENTION TEAM LEADER
4421 BRADLEY ROAD
CLEVELAND, OH 44109
PHONE: 216.912.2559

BUCKEYE PARTNERS, L.P.
FIVE TEK PARK
9999 HAMILTON BOULEVARD
BREINIGSVILLE, PA 18031
PHONE: 610.904.4000; FAX 610.904.4541
PHONE: 610.904.4138 (JO MARIE JENKINS)
EMAIL: JJENKINS@BUCKEYE.COM

CITY OF COLUMBUS
MARCELLAS STEWART
DIVISION OF COMMUNICATIONS
220 GREENLAWN AVENUE
COLUMBUS, OH 43223
PHONE: 614.645.7345 - EXTENSION 124
EMAIL: MGSTEWART@COLUMBUS.GOV

CITY OF COLUMBUS
ROBERT SCHNEIDER
DIVISION OF POWER AND WATER (POWER)
3500 INDIANOLA AVENUE
COLUMBUS, OH 43214
PHONE: 614.645.7534
EMAIL: RSCHNEIDER@COLUMBUS.GOV

CITY OF COLUMBUS
DANELLA PETTENSKI
DIVISION OF POWER AND WATER (WATER)
910 DUBLIN ROAD
COLUMBUS, OH 43215
PHONE: 614.645.7677
EMAIL: DDPETTENSKI@COLUMBUS.GOV

CITY OF COLUMBUS
ROBERT C. HERR, P. E.
DIVISION OF SEWERAGE AND DRAINAGE
1250 FAIRWOOD AVENUE
COLUMBUS, OH 43206-3372
PHONE: 614.645.0483
EMAIL: RCHERR@COLUMBUS.GOV

CITY OF COLUMBUS
DAVE MCNALLY
DIVISION OF TELECOMMUNICATIONS
90 WEST BROAD STREET - ROOM 316
COLUMBUS, OH 43215-9006
PHONE: 614.645.1501
EMAIL: DWMCNALLY@COLUMBUS.GOV

CITY OF COLUMBUS
DENNY MCELROY
1820 EAST 17TH AVENUE
COLUMBUS, OH 43219
PHONE: 614.645.7393
EMAIL: DMCELROY@COLUMBUS.GOV
MUST FAX REQUESTS TO:
614.645.5967, ATTN: LOCATOR

CITY OF COLUMBUS (INCLUDES TRAFFIC CAMERAS, ETC.)
TRAFFIC MANAGEMENT SECTION
109 NORTH FRONT STREET
COLUMBUS, OH 43215
PHONE: 614.645.7249

COLUMBIA GAS OF OHIO
1600 DUBLIN ROAD - EW 2
COLUMBUS, OH 43215
PHONE: JON AMSTUTZ - 614.481.1056 (SW)
EMAIL: JAMSTUTZ@NISOURCE.COM
PHONE: DAVE KELLY - 614.481.1058 (NW)
EMAIL: DRKELLY@NISOURCE.COM

COLUMBIA GAS OF OHIO
BRYAN KOPACHY
3550 JOHNNY APPLESEED COURT
COLUMBUS, OH 43231
PHONE: 614.818.2133 (SE)
EMAIL: BKOPACHY@NISOURCE.COM
PHONE: MATT COYNE - 614.818.2107 (NE)
EMAIL: MCOYNE@NISOURCE.COM

COLUMBIA GAS TRANSMISSION CORPORATION
JAMES SCOTT
301 MAPLE STREET
P. O. BOX 330
SUGAR GROVE, OH 43155
PHONE: 740.746.2234
EMAIL: JSCOTT@NISOURCE.COM

COLUMBUS FIBERNET
IAN E. SMITH
1366 DUBLIN ROAD
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RICHARDSON, TX 75082
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WOW! INTERNET - CABLE - PHONE
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ROCHESTER, NY 14618
PHONE: 585.697.5145

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CITY OF GROVE CITY
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CITY OF COLUMBUS
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RYAN BOLLO
109 N. FRONT ST.
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CALCULATED RJL
CHECKED NAH

GENERAL NOTES

FRA-RAMP METER UPGRADE

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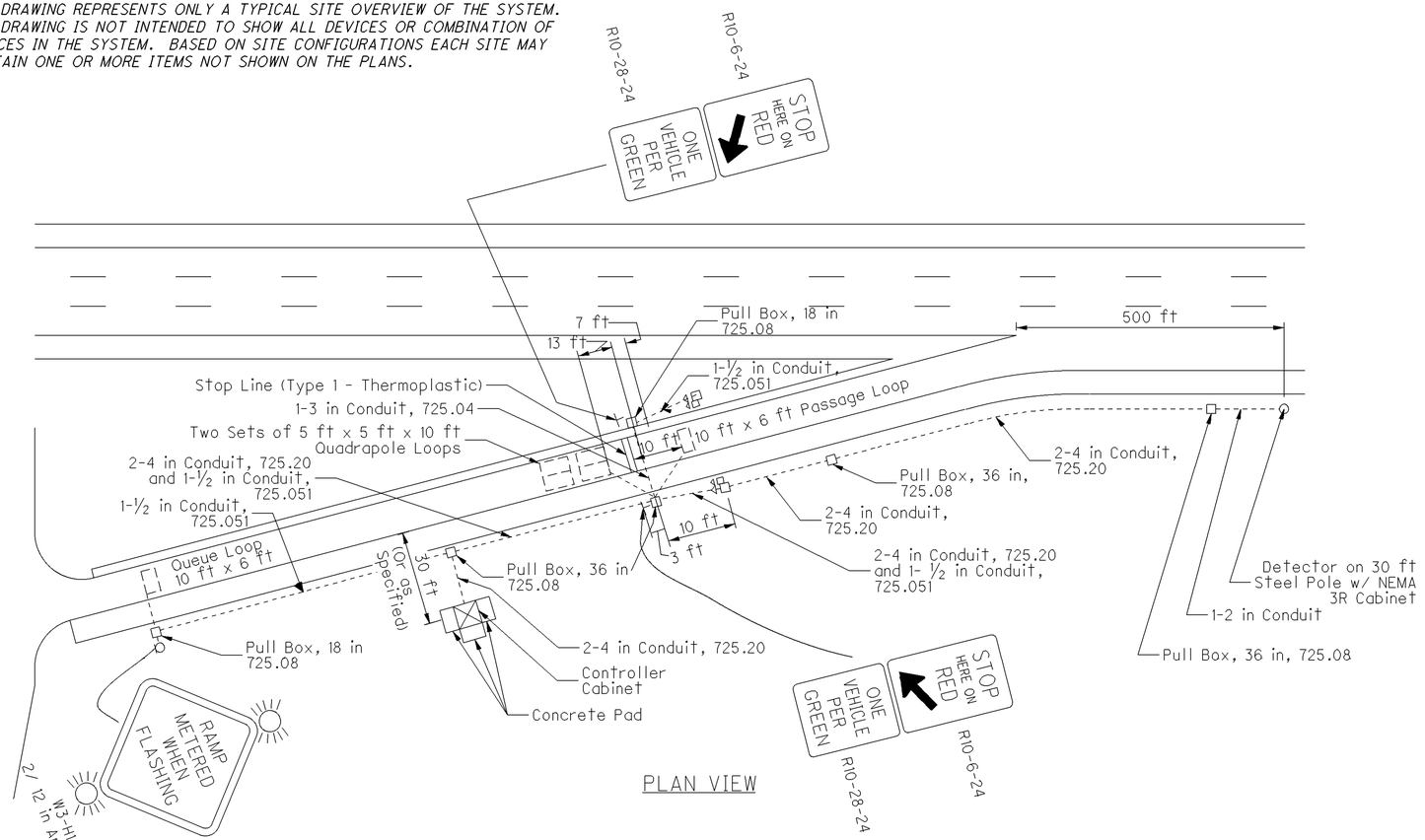
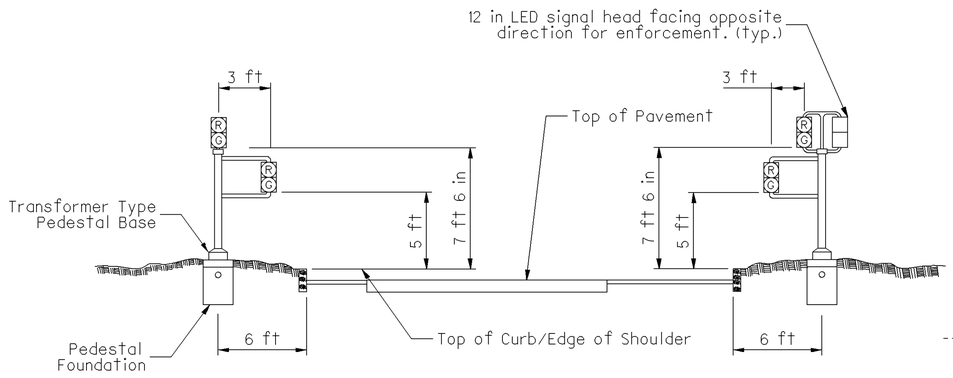
DRAWINGS NOT TO SCALE

NOTE:
THIS DRAWING REPRESENTS ONLY A TYPICAL SITE OVERVIEW OF THE SYSTEM. THIS DRAWING IS NOT INTENDED TO SHOW ALL DEVICES OR COMBINATION OF DEVICES IN THE SYSTEM. BASED ON SITE CONFIGURATIONS EACH SITE MAY CONTAIN ONE OR MORE ITEMS NOT SHOWN ON THE PLANS.

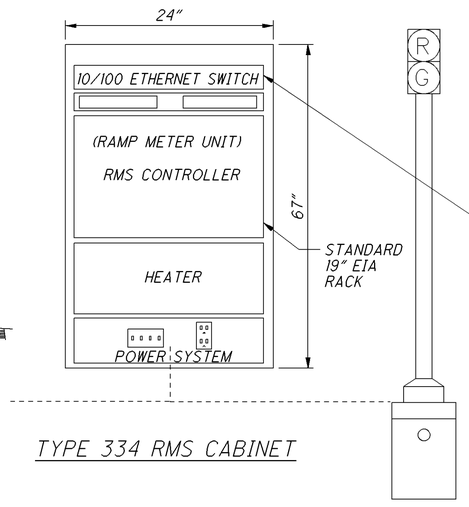


PLAN VIEW



ELEVATION VIEW

Mount Signal Heads Per Standard Construction Drawing TC-85.10
(Brackets To Be Yellow)



TYPE 334 RMS CABINET

NOTES

ITEM 632 - RAMP METER SIGNAL DISPLAY

Ramp meter signal displays shall be located as shown in the plans. The foundation, transformer base and pedestal shaft shall conform to Standard Construction Drawing TC -83.20. Signal heads shall be 12 inch LED, two section, red over green, polycarbonate housing with aluminum visor, and shall conform to 732.01. The low mounted signal head shall be mounted as shown on Standard Construction Drawing TC - 85.10.

ITEM 632 - RAMP METER SIGN

Ramp meter signs and warning flashers shall be located as shown in the plans.

ITEM 632 - RAMP METER CONTROLLER

Ramp meter control equipment shall be located as shown in the plans. Control equipment, cabinet and cabinet items shall conform to Traffic Signal Control Equipment Specifications, current edition, published by the California Business, Transportation & Housing Agency, Department of Transportation, P.O. Box 942874, Sacramento, CA 94272-001. Each ramp meter controller shall consist of all hardware needed to be fully functional. For full specification, see ramp meter specification in plan set. At a minimum, the following hardware shall be furnished:

1 Each Model 2070E Controller
3 Each Model 200 Switch Pack
1 Each Model 204 Flasher Unit
2 Each Model 222 Two Channel Loop Detector Units
1 Each Model 334 Cabinet
1 Each Model 208 Conflict Monitor
1 Each Model 206 Power Supply Module

The ramp metering software shall be furnished by the Contractor. The software shall be capable of operating in a traffic responsive mode. Downstream mainline radar detection and ramp loops shall be monitored for freeway and ramp traffic conditions. The software shall be capable of selecting metering rates based upon freeway traffic flow. Metering rates shall also be adjustable on the basis of ramp queues. The ramp metering software shall be capable of actuating the ramp metering sign flashers when in the metering mode. The ramp metering soffware must be a finished product, currently in use in the United States or Canada. No prototypes will be accepted.

In addition to the hardware documentation required by the CALTRANS specifications five (5) copies of the ramp metering software operation manuals and documentation shall be furnished six (6) weeks prior to delivery of the controller. One copy of the hardware and software documentation shall be furnished to the Engineer. The remaining copies shall be furnished to the maintaining agency. Upon receipt of their copies, the maintaining agency will furnish the Engineer with the data needed to start up the system.

The Contractor shall furnish the maintaining agency with at least sixteen (16) hours of training on the operation of the software. The training is to be presented by the software supplier. A working model 2070 controller shall be used to demonstrate the software and to provide "hands on" training. The presentation shall cover the theory of operation, data base and table of creation, troubleshooting, modification of data base and tables, and preservation of the data base and tables. This presentation shall be made between the time of the delivery of the manuals and turning on the system.

RAMP METERING DETAIL SHEET

RAMP

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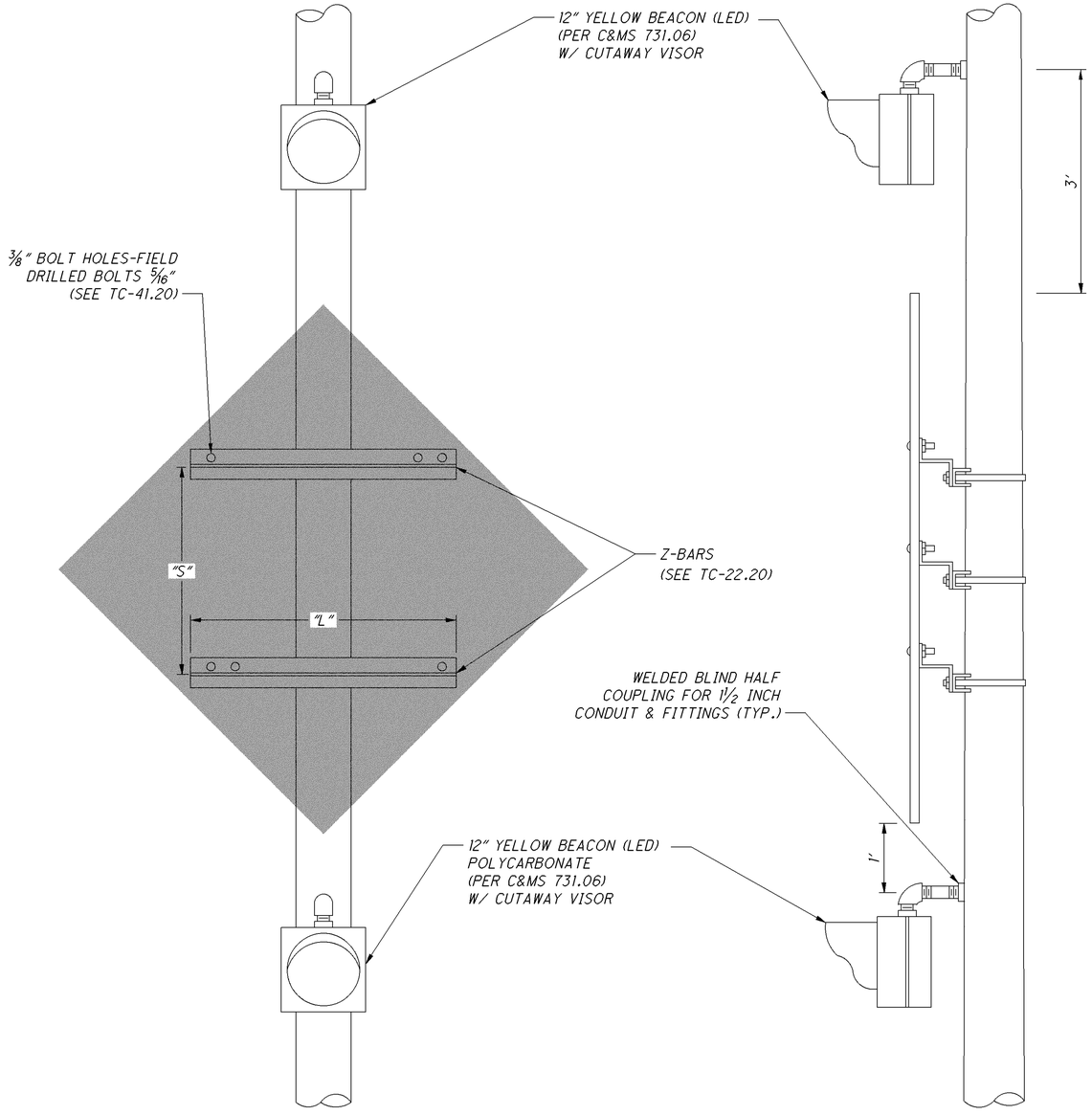
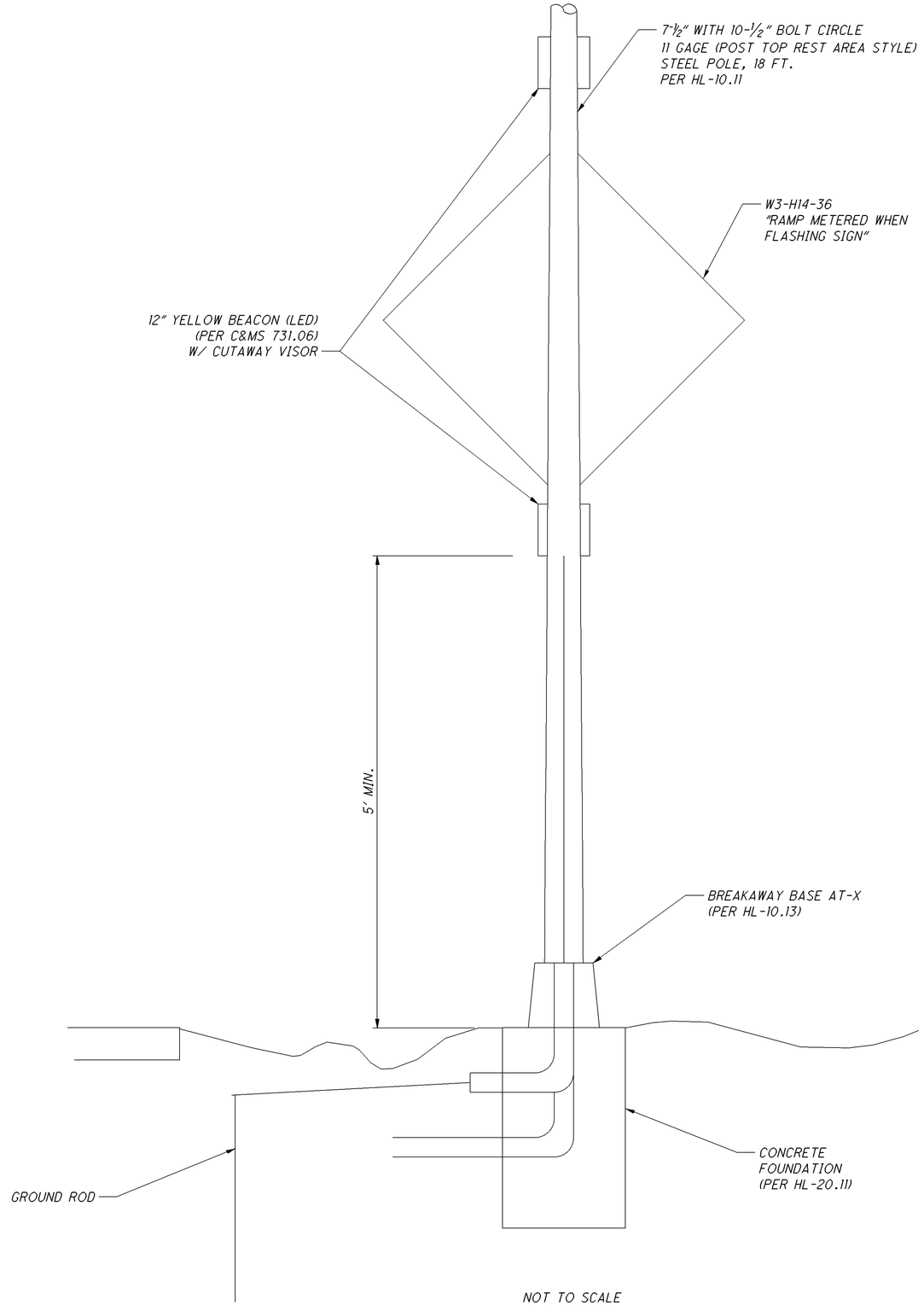


NOT TO SCALE

SIGN SIZE	NO. OF BRACKETS	SPACING "S"	LENGTH OF BRACKETS "L"
36"	2	25"	24"

NOTES:
THIS DRAWING REPRESENTS ONLY A TYPICAL SITE OVERVIEW OF THE SYSTEM. THIS DRAWING IS NOT INTENDED TO SHOW ALL DEVICES OR COMBINATION OF DEVICES IN THE SYSTEM. BASED ON SITE CONFIGURATIONS EACH SITE MAY CONTAIN ONE OR MORE NOT SHOWN ON THE PLANS.



NOT TO SCALE

RAMP METER SIGN DETAIL

FRA-RAMP METER UPGRADE

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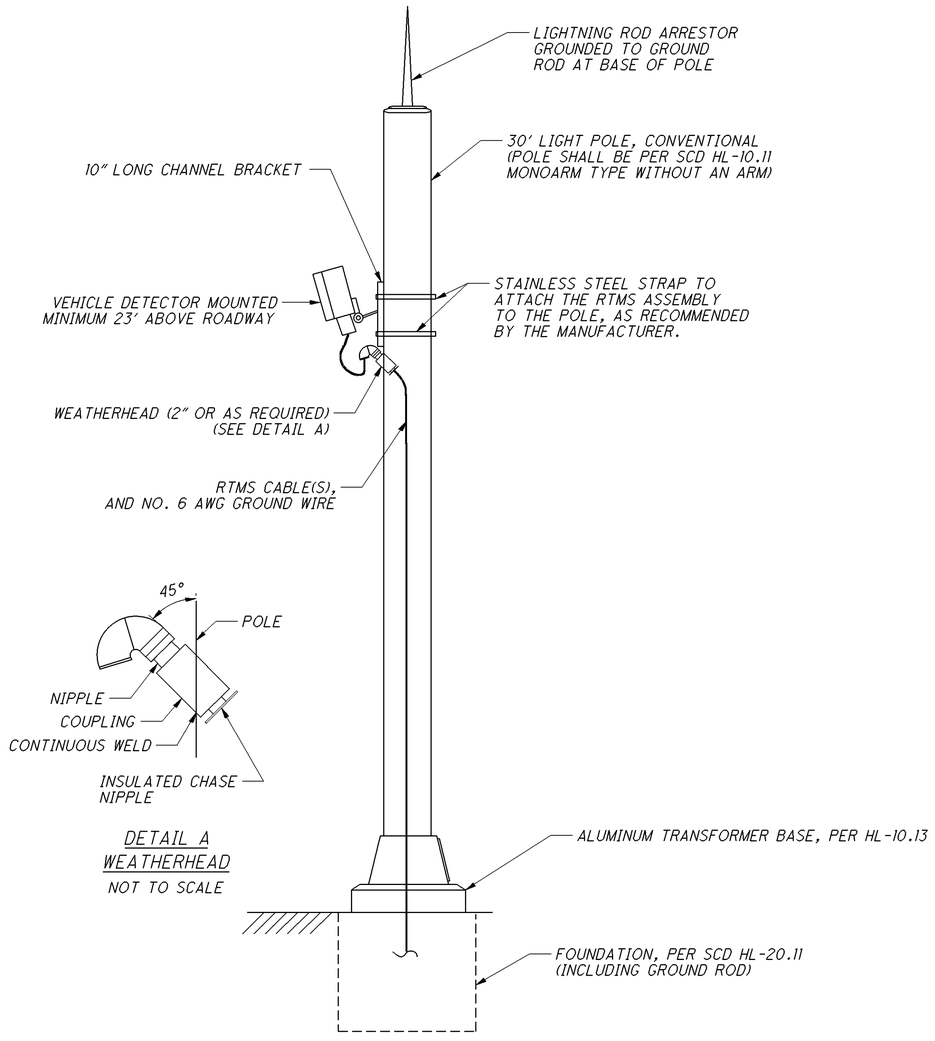


DETAIL A
WEATHERHEAD
NOT TO SCALE

VEHICLE DETECTOR ASSEMBLY
MOUNTED TO CONTRACTOR INSTALLED POLE

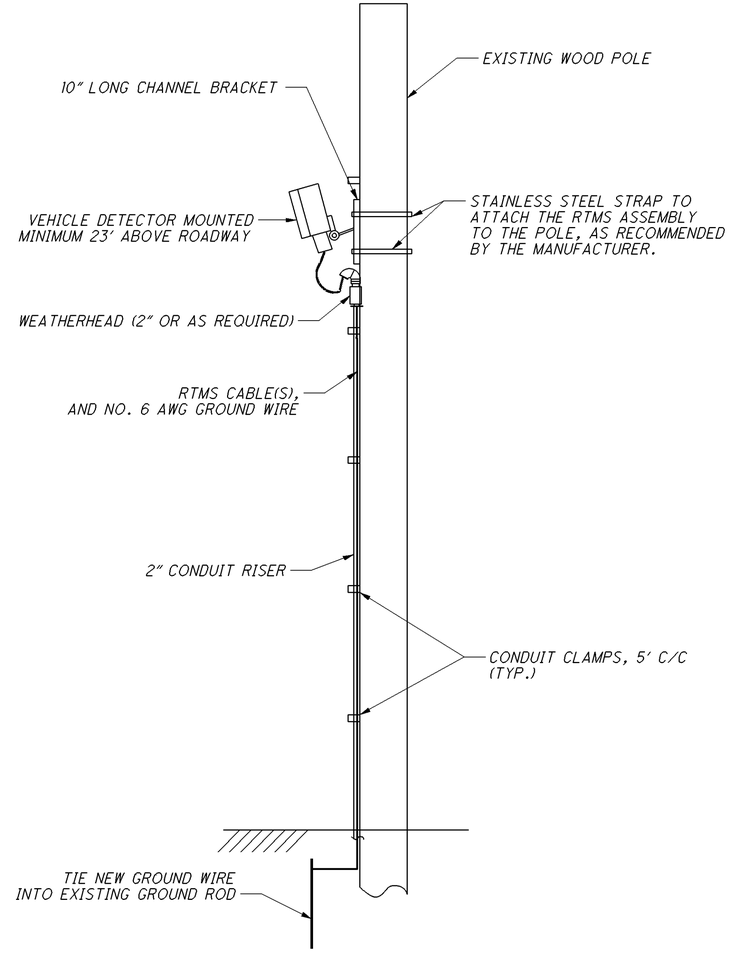
NOT TO SCALE

VEHICLE DETECTION ASSEMBLY TO INCLUDE THE FOLLOWING:

1 - REMOTE TRAFFIC MICROWAVE SENSOR (RTMS) AND ATTACHMENTS
1 - GROUND ROD
1 - LIGHT POLE, CONVENTIONAL (ALUMINUM TRANSFORMER BASE, 30' SUPPORT HEIGHT, MONOARM TYPE, NO BRACKET ARM)
1 - LIGHT POLE FOUNDATION, 24" X 6' DEEP
- ALL ASSOCIATED CONDUIT AND CABLES AT THE SITE NECESSARY FOR THE CONNECTIONS TO PRODUCE A WORKING DEVICE

NOTES:

1. MOUNT RTMS SO THAT THE DETECTOR IS ON THE ROADWAY SIDE OF POLE.
2. SUPPORT HOOKS SHOULD BE APPROPRIATELY SIZED FOR THE NUMBER AND SIZE OF CONDUCTORS TO BE SUPPORTED.
3. RUN ALL WIRING INSIDE THE POLE AND PROVIDE STRAIN RELIEF SUPPORT FOR ALL CONTROL CABLES.
4. WHEN INSTALLING THE RTMS, MAINTAIN MINIMUM CLEARANCES ON ROADWAYS.
5. WHEN INSTALLING THE MOUNTING BRACKETS FOR RTMS, ALIGN AND ANGLE THE DETECTORS TO COVER THE DETECTION ZONE(S) AS INDICATED AND SPECIFIED.



VEHICLE DETECTOR ASSEMBLY
MOUNTED TO EXISTING WOOD POLE

NOT TO SCALE

VEHICLE DETECTION ASSEMBLY TO INCLUDE THE FOLLOWING:

1 - REMOTE TRAFFIC MICROWAVE SENSOR (RTMS) AND ATTACHMENTS
- ALL ASSOCIATED CONDUIT AND CABLES AT THE SITE NECESSARY FOR THE CONNECTIONS TO PRODUCE A WORKING DEVICE

NOTES:

1. MOUNT RTMS SO THAT THE DETECTOR IS ON THE ROADWAY SIDE OF POLE.
2. WHEN INSTALLING THE RTMS, MAINTAIN MINIMUM CLEARANCES ON ROADWAYS.
3. WHEN INSTALLING THE MOUNTING BRACKETS FOR RTMS, ALIGN AND ANGLE THE DETECTORS TO COVER THE DETECTION ZONE(S) AS INDICATED AND SPECIFIED.

REMOTE TRAFFIC MICROWAVE SENSOR DETAILS

FRA-RAMP METER UPGRADE

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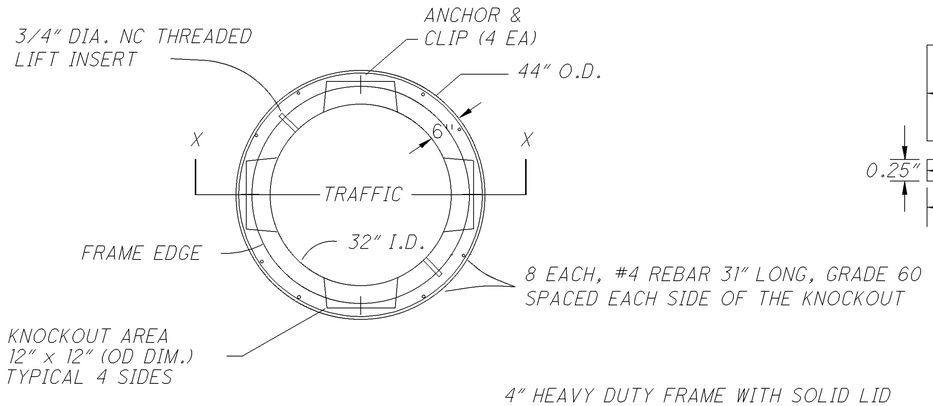
ITEM 625, PULL BOX, 725.08, 32", AS PER PLAN

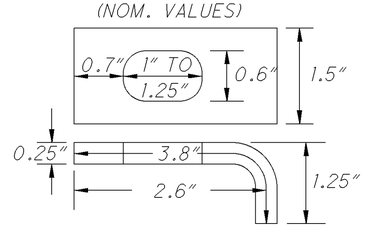
PULL BOX SHALL BE 32" CONCRETE (CMS 725.08), AND AS FURTHER DETAILED ON THIS SHEET.
HD GALV (ASTM A123) AND IN THE SHAPE SHOWN.

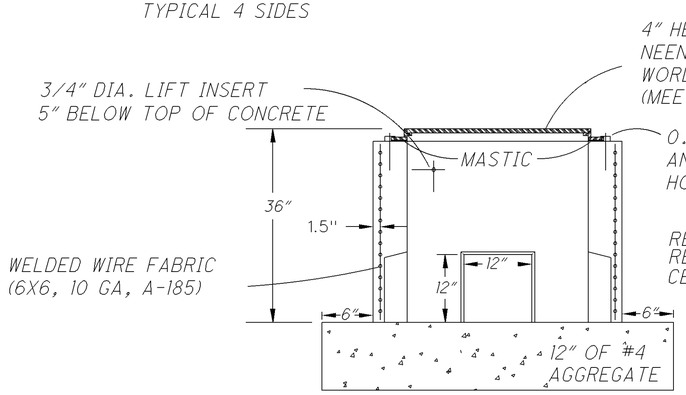
THE CLIP SHALL BE MADE FROM A36 METAL,
HD GALV (ASTM A123) AND IN THE SHAPE SHOWN.

TOP VIEW OF CONCRETE PULLBOX



CLIP PROFILE
(NOM. VALUES)





SECTION X-X PULLBOX
WITH FRAME AND LID

THE WEDGE ANCHOR ASSEMBLY SHALL BE OMITTED WHENEVER THE ENTIRE AREA ABOVE THE KNOCKOUT (1/4 OF THE CASTING) IS EITHER ENCASED IN CONCRETE OR ASPHALT. THE ENCASEMENT SHALL BE CENTERED AROUND THE KNOCKOUT.

CONCRETE SHALL HAVE AIR ENTRAPMENT OF 6% * 2%
AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS.

LID RING LOAD TRANSFER IS TO BE DISTRIBUTED BY USE
OF A PREFORMED MASTIC JOINT MATERIAL.

CONCRETE MATERIALS SHALL MEET ODOT SPECIFICATIONS.
STANDARD PLACEMENT FOR WIRE MESH & REBAR SHALL BE USED.

CUT OFF CONDUITS SO THEY EXTEND THREE INCHES BEYOND
THE INSIDE PULLBOX WALL.

PULLBOX BEARING CAPACITY TO EXCEED 40,000#

PULL BOX UNDERDRAIN AS PER SCD HL-30.11

AFTER THE CONDUITS HAVE BEEN INSTALLED, ANY OPENING IN THE PULLBOX WALL SHALL BE TOTALLY FILLED WITH MORTAR OR CONCRETE AND FINISHED FLUSH WITH THE INSIDE PULLBOX WALL. (NO VOIDS)

A PULL LINE (POLYOLEFIN, #14 CU WIRE OR NYLON ROPE) SHALL BE INSTALLED IN EACH CONDUIT (USED OR UNUSED) AND SHALL BE SECURELY FASTENED AT BOTH CONDUIT ENDS. ALL UNUSED CONDUITS SHALL BE CAPPED AND THE CAPS SECURED TO THE CONDUIT WITH TAPE.

ANY CONDUIT THAT EXITS A PULLBOX, CONTAIN CABLE(S) AND DIRECTLY ENTERS THE CONTROLLER CABINET SHALL BE DUCT SEALED IN THE PULLBOX.

COIL 6 TURNS (50') OF CABLE IN EACH PULLBOX. PLACE CABLE AROUND THE INSIDE BOX PERIMETER. TIE WRAP THE COILS. COAX CABLE SHALL NOT BE COILED UNLESS SPECIFIED.

32" ROUND CONCRETE PULLBOX

FRA-RAMP METER UPGRADE

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ITEM 614, MAINTAINING TRAFFIC

THE SAME NUMBER OF LANES THAT EXISTED PRIOR TO CONSTRUCTION IN EACH DIRECTION SHALL BE MAINTAINED AT ALL TIMES BY USE OF THE EXISTING PAVEMENT, EXCLUDING THE FOLLOWING:

- LANES MAY BE CLOSED IN ACCORDANCE WITH PERMITTED LANE CLOSURE NOTE.

LANE CLOSURE/REDUCTIONS

LENGTH AND DURATION OF LANE CLOSURES AND RESTRICTIONS SHALL BE AT THE APPROVAL OF THE ENGINEER. IT IS THE INTENT TO MINIMIZE THE IMPACT TO THE TRAVELING PUBLIC. LANE CLOSURES OR RESTRICTIONS OVER SEGMENTS OF THE PROJECT IN WHICH NO WORK IS ANTICIPATED WITHIN A REASONABLE TIME FRAME, AS DETERMINED BY THE ENGINEER, SHALL NOT BE PERMITTED. THE LEVEL OF UTILIZATION OF MAINTENANCE OF TRAFFIC DEVICES SHALL BE COMMENSURATE WITH THE WORK IN PROGRESS.

NOTIFICATION OF TRAFFIC RESTRICTIONS

THROUGHOUT THE DURATION OF THE PROJECT, THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER IN WRITING OF ALL TRAFFIC RESTRICTIONS AND UPCOMING MAINTENANCE OF TRAFFIC CHANGES. THE CONTRACTOR SHALL ENSURE THE WRITTEN NOTIFICATION IS SUBMITTED IN A TIMELY MANNER TO ALLOW THE PROJECT ENGINEER TO MEET THE REQUIRED TIME FRAMES SET FORTH IN THE TABLE BELOW. THIS NOTIFICATION SHALL BE RECEIVED BY THE PROJECT ENGINEER PRIOR TO THE PHYSICAL SETUP OF ANY APPLICABLE SIGNS OR MESSAGE BOARDS.

INFORMATION SHOULD INCLUDE BUT IS NOT LIMITED TO ALL CONSTRUCTION ACTIVITIES THAT IMPACT OR INTERFERE WITH TRAFFIC AND SHOULD LIST THE SPECIFIC LOCATION, TYPE OF WORK, ROAD STATUS, DATE AND TIME OF RESTRICTION, DURATION OF RESTRICTION, NUMBER OF LANES MAINTAINED, DETOUR ROUTES IF APPLICABLE, AND ANY OTHER INFORMATION REQUESTED BY THE PROJECT ENGINEER.

NOTIFICATION TIME FRAME TABLE

ITEM	DURATION OF CLOSURE	NOTIFICATION DUE TO DISTRICT 6 COMMUNICATIONS OFFICE
RAMP & ROAD CLOSURES	>= 2 WEEKS	14 CALENDAR DAYS PRIOR TO CLOSURE
	> 12 HOURS & < 2 WEEKS	7 CALENDAR DAYS PRIOR TO CLOSURE
	< 12 HOURS	2 BUSINESS DAYS PRIOR TO CLOSURE
LANE CLOSURES & RESTRICTIONS	>= 2 WEEKS	7 CALENDAR DAYS PRIOR TO CLOSURE
	< 2 WEEKS	2 BUSINESS DAYS PRIOR TO CLOSURE

ANY UNFORESEEN CONDITIONS NOT SPECIFIED IN THE PLANS REQUIRING TRAFFIC RESTRICTIONS SHALL ALSO BE REPORTED TO THE PROJECT ENGINEER USING THE NOTIFICATION TIME FRAME TABLE.

NOTIFICATION OF CONSTRUCTION INITIATION

AT LEAST FOURTEEN DAYS PRIOR TO STARTING INITIAL CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL ADVISE THE DISTRICT OFFICE OF COMMUNICATIONS VIA EMAIL AT d06.pio@dot.state.oh.us AND THE DISTRICT WORK ZONE TRAFFIC MANAGER VIA EMAIL AT d06.mot@dot.state.oh.us OF THE ANTICIPATED START DATE OF ANY CONSTRUCTION ACTIVITIES, INCLUDING BUT NOT LIMITED TO THE PLACING OF WORK ZONE SIGNS. THE NOTIFICATION SHALL ALSO INCLUDE THE PROJECT NUMBER, PID, NAME AND PHONE NUMBER OF THE CONTRACTOR, A POINT OF CONTACT AND THE ANTICIPATED IMPACT ON TRAFFIC. THE CONTRACTOR WILL IMMEDIATELY INFORM THE DISTRICT OFFICE OF COMMUNICATIONS AND THE DISTRICT WORK ZONE TRAFFIC MANAGER OF ANY AND ALL DELAYS AND/OR CHANGES REGARDING THE CONSTRUCTION INITIATION DATE.

PERMITTED LANE CLOSURES

THE EXISTING NUMBER OF LANES IN EACH DIRECTION SHALL BE MAINTAINED DURING THE HOURS LISTED IN THE LANE CLOSURE CHART FOR EACH LOCATION UNLESS OTHERWISE SHOWN IN THE PLANS.

LENGTH AND DURATION OF LANE CLOSURES AND RESTRICTIONS SHALL BE AT THE APPROVAL OF THE ENGINEER. IT IS THE INTENT TO MINIMIZE THE IMPACT TO THE TRAVELING PUBLIC. LANE CLOSURES OR RESTRICTIONS OVER SEGMENTS OF THE PROJECT IN WHICH NO WORK IS ANTICIPATED WITHIN A REASONABLE TIME FRAME, AS DETERMINED BY THE ENGINEER, SHALL NOT BE PERMITTED. THE LEVEL OF UTILIZATION OF MAINTENANCE OF TRAFFIC DEVICES SHALL BE COMMENSURATE WITH THE WORK IN PROGRESS.

SEE PERMITTED LANE CLOSURE TABLE ON THIS SHEET.

SHOULD THE CONTRACTOR FAIL TO MEET ANY OF THESE REQUIREMENTS, THE CONTRACTOR SHALL BE ASSESSED A DISINCENTIVE IN THE AMOUNT SHOWN IN THE LANE CLOSURE CHART FOR EACH MINUTE THE LANE CLOSURE RESTRICTIONS ARE VIOLATED.

LANES OPEN DURING HOLIDAYS AND SPECIAL EVENTS

NO WORK SHALL BE PERFORMED AND THE SAME NUMBER OF LANES AS WERE AVAILABLE AT THE START OF THE PROJECT SHALL BE OPEN TO TRAFFIC DURING THE FOLLOWING DESIGNATED HOLIDAYS OR EVENTS:

CHRISTMAS — FOURTH OF JULY
NEW YEAR'S EVE — LABOR DAY
MEMORIAL DAY — THANKSGIVING

THE PERIOD OF TIME THAT THE LANES ARE TO BE OPEN DEPENDS ON THE DAY OF THE WEEK ON WHICH THE HOLIDAY FALLS. THE FOLLOWING SCHEDULE SHALL BE USED TO DETERMINE THIS PERIOD:

DAY OF HOLIDAY	TIME ALL LANES MUST BE OPEN TO TRAFFIC
SUNDAY	12:00 NOON FRIDAY THROUGH 6:00 AM MONDAY
MONDAY	12:00 NOON FRIDAY THROUGH 6:00 AM TUESDAY
TUESDAY	12:00 NOON MONDAY THROUGH 6:00 AM WEDNESDAY
WEDNESDAY	12:00 NOON TUESDAY THROUGH 6:00 AM THURSDAY
THURSDAY	12:00 NOON WEDNESDAY THROUGH 6:00 AM FRIDAY
THANKSGIVING	5:00 AM WEDNESDAY THROUGH 6:00 AM MONDAY
FRIDAY	12:00 NOON THURSDAY THROUGH 6:00 AM MONDAY
SATURDAY	12:00 NOON FRIDAY THROUGH 6:00 AM MONDAY

SPECIAL EVENTS:
OSU HOME FOOTBALL GAMEDAYS (SR 315)

NO EXTENSIONS OF TIME SHALL BE GRANTED FOR DELAYS IN MATERIAL DELIVERIES, UNLESS SUCH DELAYS ARE INDUSTRY WIDE, OR FOR LABOR STRIKES, UNLESS SUCH STRIKES ARE AREA WIDE.

SHOULD THE CONTRACTOR FAIL TO MEET ANY OF THESE REQUIREMENTS, THE CONTRACTOR SHALL BE ASSESSED A DISINCENTIVE IN ACCORDANCE WITH THE LANE CLOSURE CHART.

PERMITTED LANE CLOSURE TABLE

LANE CLOSURE CHARTS

Section (SLM)	Existing Number of Lanes per Direction	Lane closures are permitted anytime except: Lane Reduction	Mon to Fri	Sat	Sun	Disincentive Amounts per minute per lane
FRA-270						
US 40 (40.90) to Livingston A venue (42.13) Main line	2	2 to 1	5A M-8PM	6AM-7PM	6AM-7PM	$200
US 40 (40.90) to Livingston A venue (42.13) Collector Distributor	4	4 to 3	5AM-9AM & 3PM-7PM	No Restriction	No Restriction	$200
		4 to 2	5A M-8PM	7AM-9AM & 2PM-7PM	7AM-9A M & 2PM-7PM	$200
		4 to 1	5AM-11PM	6A M-10PM	6AM-10PM	$200
Livingston A venue (42.13) to Noe Bixby Road (43.65) Main line	2	2 to 1	5A M-8PM	6AM-7PM	6AM-7PM	$200
Livingston A venue (42.13) to Noe Bixby Road (43.65) Collector Distributor	2	2 to 1	5AM-11PM	6A M-10PM	6AM-10PM	$200
FRA-70						
Broad Street (11.21) to Central Avenue (11.98)	3	3 to 2	5AM-9AM & 3PM-6PM	No Restriction	No Restriction	$100
		3 to 1	5AM-10PM	6AM-8PM	6AM-8PM	$100
Alum Creek Drive (17.00) to College Avenue (18.67) (EB)	4	4 to 3	2PM-7PM	No Restriction	No Restriction	$200
		4 to 2	8A M-8PM	11AM-7PM	11AM-7PM	$200
		4 to 1	5A M-12M	7AM-12M	7AM-12M	$200
FRA-315						
Rich Street (0.59) to US 33-Spring Street (1.34)	3	3 to 2	5A M-7PM	7AM-9AM & 3PM-6PM	7AM-9AM & 3PM-6PM	$100
		3 to 1	5AM-10PM	6AM-9PM	6AM-9PM	$100
US 33 - Spring Street (1.34) to 3rd Avenue (2.61)	2	2 to 1	5AM-10PM	6AM-9PM	6AM-9PM	$100
DEL-71						
Powell Road overpass (1.42) to 1/2 mile north of Berkshire Road overpass (11.50)	3	3 to 2	6AM-8AM & 3PM-6PM	No Restriction	No Restriction	$75
		3 to 1	6A M-8PM	6AM-7PM	6AM-10PM	$75
Shoulder closures are permitted any time except 5AM-9AM & 3PM-6PM Monday-Friday						
Should the contractor fail to meet any of these requirements, the Contractor shall be assessed a disincentive in the amount shown above for each minute the above described lane closure restrictions are violated.						

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH CMS 614 AND OTHER APPLICABLE PORTIONS OF THE SPECIFICATIONS, AS WELL AS THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS SHALL BE INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR ITEM 614, MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

CALCULATED RJL CHECKED NAH

MAINTENANCE OF TRAFFIC GENERAL NOTES

FRA-RAMP METER UPGRADE

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TRUCK MOUNTED ATTENUATOR (TMA)

WHEN WORKING IN A CLOSED LANE OR SHOULDER ON A MULTI-LANE HIGHWAY WITHOUT POSITIVE, A TRUCK MOUNTED ATTENUATOR (TMA) SHALL BE PROVIDED TO PROTECT THE WORK AREA IN ACCORDANCE WITH STANDARD DRAWINGS MT-95.30, MT-95.31, MT-95.32 OR OMUTCD TYPICAL APPLICATION (TA) 4 AND TA-6. THE TMA SHALL BE PLACED IN SUCH A WAY TO ADEQUATELY PROTECT THE WORKERS INSIDE THE WORK ZONE. THE TMA IS NOT INTENDED TO BE USED AS OR SUBSTITUTED FOR THE FLASHING ARROW PANEL AT THE BEGINNING OF THE MERGE TAPER. THE TMA SHALL MEET NCHRP 350 TEST LEVEL 3 CRITERIA FOR STANDARD AND OPTIONAL TESTS AT 100 KM/H (62 MPH) FOR DESIGN IMPACTS. THE COST FOR PROVIDING THE TMA SHALL INCLUDE ALL MATERIAL, LABOR, EQUIPMENT, AND HARDWARE REPLACEMENT AND IS TO BE INCLUDED IN THE LUMP SUM BID PRICE FOR ITEM 614 - MAINTAINING TRAFFIC.

USE OF WEIGHTED CHANNELIZERS

THE WEIGHTED CHANNELIZER MAY BE USED IN ACCORDANCE WITH THIS SECTION. THE WEIGHTED CHANNELIZER SHALL BE PREDOMINANTLY ORANGE IN COLOR AND SHALL BE MADE OF LIGHTWEIGHT, FLEXIBLE, AND DEFORMABLE MATERIAL. THEY SHALL BE AT LEAST 42 INCHES IN HEIGHT WITH A WEIGHTED BASE. THEY MAY HAVE A HANDLE OR LIFTING DEVICE WHICH EXTENDS ABOVE THE 42 INCHES MINIMUM HEIGHT.

THE MARKINGS ON THE WEIGHTED CHANNELIZER SHALL BE HORIZONTAL, CIRCUMFERENTIAL, ALTERNATING ORANGE AND WHITE RETROREFLECTIVE STRIPES 6 INCHES WIDE. EACH WEIGHTED CHANNELIZER SHALL HAVE A MINIMUM OF TWO ORANGE AND TWO WHITE STRIPES. ANY NONRETROREFLECTIVE SPACES BETWEEN THE HORIZONTAL ORANGE AND WHITE STRIPES SHALL NOT EXCEED 2 INCHES WIDE. THE WEIGHTED CHANNELIZER SHALL HAVE A 4-INCH MINIMUM WIDTH, REGARDLESS OF ORIENTATION.

USE OF WEIGHTED CHANNELIZERS ON FREEWAYS AND MULTI-LANE HIGHWAYS SHALL BE LIMITED TO SHORT-TERM OPERATIONS FOR EITHER DAY OR NIGHT. UPON COMPLETION OF WORK, THE WEIGHTED CHANNELIZERS SHALL BE REMOVED. THE WEIGHTED CHANNELIZERS MAY AGAIN BE PLACED ON THE HIGHWAY WHEN THE WORK IS TO RESUME ON THE FOLLOWING DAY OR NIGHT. ANY LANE CLOSURE USING CHANNELIZATION DEVICES, EXPECTED TO REMAIN FOR MORE THAN TWELVE HOURS, SHALL REQUIRE THE USE OF DRUMS OR BARRICADES.

WHEN USED AT NIGHT, WEIGHTED CHANNELIZERS SHALL ONLY BE PLACED IN THE TANGENT AREA AND AT A MAXIMUM SPACING OF 40 FEET. THE TANGENT AREA IS DEFINED AS THE AREA AFTER THE TRANSITION TAPER WHERE THE WORK TAKES PLACE. DRUMS SHALL BE USED IN THE TRANSITION TAPERS FOR NIGHT OPERATIONS.

STEPS SHOULD BE TAKEN TO ENSURE THAT THE WEIGHTED CHANNELIZERS WILL NOT BE BLOWN OVER OR DISPLACED BY WIND OR MOVING TRAFFIC. BALLASTS SHOULD NOT PRESENT A HAZARD IF THE WEIGHTED CHANNELIZERS ARE IN ADVERTENTLY STRUCK, NOR SHOULD THEY AFFECT THE VISIBILITY OF THE WEIGHTED CHANNELIZERS. ALL BALLASTS USED SHOULD BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

PAYMENT SHALL BE INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR ITEM 614 MAINTAINING TRAFFIC.

ITEM 614 - LAW ENFORCEMENT OFFICER (WITH PATROL CAR) FOR ASSISTANCE DURING CONSTRUCTION OPERATIONS

USE OF LAW ENFORCEMENT OFFICERS (LEOS) BY CONTRACTORS OTHER THAN THE USES SPECIFIED BELOW WILL NOT BE PERMITTED AT PROJECT COST. LEOS SHOULD NOT BE USED WHERE THE OMUTCD INTENDS THAT FLAGGERS BE USED.

IN ADDITION TO THE REQUIREMENTS OF CMS 614 AND THE OMUTCD, A UNIFORMED LEO WITH AN OFFICIAL PATROL CAR (CAR WITH TOP-MOUNTED EMERGENCY FLASHING LIGHTS AND COMPLETE MARKINGS OF THE APPROPRIATE LAW ENFORCEMENT AGENCY) SHALL BE PROVIDED FOR THE FOLLOWING TRAFFIC CONTROL TASKS:

- DURING THE ENTIRE ADVANCE PREPARATION AND CLOSURE SEQUENCE WHERE COMPLETE BLOCKAGE OF TRAFFIC IS REQUIRED.

IN ADDITION TO THE REQUIREMENT OF CMS 614 AND THE OMUTCD, A UNIFORMED LEO WITH AN OFFICIAL PATROL CAR (CAR WITH TOP-MOUNTED EMERGENCY FLASHING LIGHTS AND COMPLETE MARKINGS OF THE APPROPRIATE LAW ENFORCEMENT AGENCY) SHOULD BE PROVIDED FOR THE FOLLOWING TRAFFIC CONTROL TASKS:

- FOR LANE CLOSURES: DURING INITIAL SET-UP PERIODS, TEAR DOWN PERIODS, SUBSTANTIAL SHIFTS OF A CLOSURE POINT OR WHEN NEW LANE CLOSURE ARRANGEMENTS ARE INITIATED FOR LONG-TERM LANE CLOSURES/SHIFTS (FOR THE FIRST AND LAST DAY OF MAJOR CHANGES IN TRAFFIC CONTROL SETUP). IN GENERAL, LEOS SHOULD BE POSITIONED AT THE POINT OF LANE RESTRICTION OR ROAD CLOSURE AND TO MANUALLY CONTROL TRAFFIC MOVEMENTS THROUGH INTERSECTIONS IN WORK ZONES.
- WHEN CONSTRUCTION VEHICLES ARE ENTERING/EXITING THE ZONE DIRECTLY FROM/INTO AN OPEN LANE OF TRAFFIC. IF A LANE HAS BEEN CLOSED TO PROVIDE AN ACCELERATION/DECELERATION LANE FOR THE VEHICLE, THE LEO WILL NOT BE REQUIRED.

LEOS SHOULD NOT FORGO THEIR TRAFFIC CONTROL RESPONSIBILITIES TO APPREHEND MOTORISTS FOR ROUTINE TRAFFIC VIOLATIONS. HOWEVER, IF A MOTORIST'S ACTIONS ARE CONSIDERED TO BE RECKLESS, THEN PURSUIT OF THE MOTORIST IS APPROPRIATE.

THE LEOS WORK AT THE DIRECTION OF THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR SECURING THE SERVICES OF THE LEOS WITH THE APPROPRIATE AGENCIES AND COMMUNICATING THE INTENTIONS OF THE PLANS WITH RESPECT TO DUTIES OF THE LEOS. THE ENGINEER SHALL HAVE FINAL CONTROL OVER THE LEOS' DUTIES AND PLACEMENT, AND WILL RESOLVE ANY ISSUES THAT MAY ARISE BETWEEN THE TWO PARTIES.

THE LEO SHALL REPORT IN TO THE CONTRACTOR PRIOR TO THE START OF THE SHIFT, IN ORDER TO RECEIVE INSTRUCTIONS REGARDING SPECIFIC WORK ASSIGNMENTS DURING HIS/HER SHIFT. THE LEO IS EXPECTED TO STAY AT THE PROJECT SITE FOR THE ENTIRE DURATION OF HIS/HER SHIFT. THE LEO SHALL REPORT TO THE CONTRACTOR AT THE END OF HIS/HER SHIFT. ONCE THE LEO HAS COMPLETED THE DUTIES DESCRIBED ABOVE AND STILL HAS TIME REMAINING ON HIS/HER SHIFT, THE LEO MAY BE ASKED TO PATROL THROUGH THE WORK ZONE (WITH FLASHING LIGHTS OFF) OR BE PLACED AT A LOCATION TO DETER MOTORISTS FROM SPEEDING. SHOULD IT BE NECESSARY TO LEAVE THE PROJECT SITE, THE LEO SHALL NOTIFY THE ENGINEER. THE CONTRACTOR SHALL PROVIDE THE LEO WITH A TWO-WAY COMMUNICATION DEVICE WHICH SHALL BE RETURNED TO THE CONTRACTOR AT THE END OF HIS/HER SHIFT.

LEOS (WITH PATROL CAR) REQUIRED BY THE TRAFFIC MAINTENANCE TASKS ABOVE SHALL BE PAID FOR ON A UNIT PRICE (HOURLY) BASIS UNDER ITEM 614, LAW ENFORCEMENT OFFICER (WITH PATROL CAR) FOR ASSISTANCE. THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY.

ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE 60 HOURS

THE HOURS PAID SHALL INCLUDE ANY MINIMUM SHOW-UP TIME REQUIRED BY THE LAW ENFORCEMENT AGENCY INVOLVED.

ANY ADDITIONAL COSTS (ADMINISTRATIVE OR OTHERWISE) INCURRED BY THE CONTRACTOR TO OBTAIN THE SERVICES OF AN LEO ARE INCLUDED WITH THE BID UNIT PRICE FOR ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE.

CALCULATED RJL | CHECKED NAH

OFFICE OF TRAFFIC GENERAL NOTES

MAINTENANCE

FRA-RAMP METER UPGRADE

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SHEET NUMBER														ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
	3	4	6		11	13										01/SAE/OT			
																		ROADWAY	
														201	11000	LUMP		CLEARING AND GRUBBING	
																		EROSION CONTROL	
	112													659	00300	112	CU YD	TOPSOIL	
	1000													659	10000	1000	SQ YD	SEEDING AND MULCHING	
	0.14													659	20000	0.14	TON	COMMERCIAL FERTILIZER	
	6													659	35000	6	M GAL	WATER	
														832	30000	5000	EACH	EROSION CONTROL	
																		TRAFFIC SURVEILLANCE	
	50													611	00400	50	FT	4" CONDUIT, TYPE E	
						1697								625	25403	1697	FT	CONDUIT, 2", 725.05, AS PER PLAN	3
						100								625	25740	100	FT	CONDUIT, MULTICELL, 4", 725.20	
						1747								625	29010	1747	FT	TRENCH, 30" DEEP	
						5								625	30711	5	EACH	PULL BOX, 725.08, 32", AS PER PLAN	
						1								625	31507	1	EACH	PULL BOX REMOVED AND REPLACED, AS PER PLAN	3
	15													632	26501	15	EACH	DETECTOR LOOP, AS PER PLAN	3,7
																			5
						2								632	90400	2	EACH	SIGNALIZATION, MISC.: CDMA MODEM, FURNISH ONLY	3
						25								632	90400	25	EACH	SIGNALIZATION, MISC.: RAMP METERING STATION	3,7,8
						6								632	90400	6	EACH	SIGNALIZATION, MISC.: SIDE-FIRE RADAR DETECTOR	4,9
		1												632	90400	1	EACH	SIGNALIZATION, MISC.: SIDE-FIRE RADAR DETECTOR (FURNISH ONLY)	4
						24								632	90400	24	EACH	SIGNALIZATION, MISC.: SIDE-FIRE RADAR DETECTOR WITH POLE	4,9
						5								632	90400	5	EACH	SIGNALIZATION, MISC.: REMOVAL OF TRAFFIC MICROWAVE SENSOR	3
			5											633	99000	5	EACH	CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER	6
						30								633	99000	30	EACH	CONTROLLER ITEM, MISC.: NETWORK SWITCH	5
						2								633	99000	2	EACH	CONTROLLER ITEM, MISC.: ROUTER	6
	LUMP													633	99300	LUMP		CONTROLLER ITEM, MISC.: CENTRAL CONTROL SOFTWARE	3
																		TRAFFIC CONTROL	
						22								642	50010	22	EACH	PAVEMENT MARKING, MISC.: STOP LINE	3
																		MAINTENANCE OF TRAFFIC	
					60									614	11110	60	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE	11
														614	11000	LUMP		MAINTAINING TRAFFIC	
														623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
														624	10000	LUMP		MOBILIZATION	
																		ALTERNATE BIDS	
			5											633	99000	5	EACH	CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER (MCCAIN)	6
	LUMP													633	99300	LUMP		CONTROLLER ITEM, MISC.: CENTRAL CONTROL SOFTWARE (MCCAIN)	3

CALCULATED RJL
CHECKED NAH

GENERAL SUMMARY

FRA-RAMP METER UPGRADE

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SHEET NO.	LOCATION		625						632						633			642	
			CONDUIT, 2", 725.05, AS PER PLAN	CONDUIT, MULTICELL, 4", 725.20	TRENCH, 30" DEEP	PULL BOX, 32", 725.08, AS PER PLAN	PULL BOX REMOVED AND REPLACED, AS PER PLAN		SIGNALIZATION, MISC.: CDMA MODEM, FURNISH ONLY	SIGNALIZATION, MISC.: RAMP METERING STATION	SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR	SIGNALIZATION, MISC.: SIDE-FIRE VEHICLE DETECTOR WITH POLE	SIGNALIZATION, MISC.: REMOVAL OF TRAFFIC MICROWAVE SENSOR		CONTROLLER ITEM, MISC.: NETWORK SWITCH	CONTROLLER ITEM, MISC.: ROUTER		PAVEMENT MARKING, MISC.: STOP LINE	
			FOOT	FOOT	FOOT	EACH	EACH		EACH	EACH	EACH	EACH	EACH		EACH	EACH		EACH	
16	SITE 1	I-70 AT FISHER RD	30		30					1		1			1			1	
17	SITE 2	I-70 AT W MOUND ST	40		40					1		1			1			1	
18	SITE 3	I-70 AT THIRD ST	100		100	1				1		1			1			1	
19	SITE 4	I-71 AT SR 665								1					1				
20	SITE 5	I-71 AT GREENLAWN								1	1		1		1			1	
21	SITE 6	I-71 AT US-40/BROAD ST	50		50				1	1		1				1		1	
22	SITE 7	I-71 AT 2ND AVE	15		15							1			1				
23	SITE 8	I-71 AT 5TH AVE	25		25					2		1			2			2	
24	SITE 9	I-71 AT 11TH AVE	350		350					1		1			2			1	
25			563		563	2						2			1				
26	SITE 10	I-71 AT 17TH AVE	25		25					2		1			3			2	
27	SITE 11	I-71 AT HUDSON AVE	66		66					1		2			2			1	
28			200		200	2				1		2			2			1	
29	SITE 12	I-71 AT WEBER RD	40		40					1		2			1			1	
30	SITE 13	I-71 AT E NORTH BROADWAY	35		35					1		2			1			1	
31	SITE 14	I-71 AT E COOKE RD	40		40					1		2			2			1	
32	SITE 15	I-71 AT MORSE RD	15		15					1		1			1			1	
33		I-71 AT SINCLAIR RD	28		28					1		1			1			1	
34	SITE 16	I-270 AT SR-317/HAMILTON RD								1	1		1		1				
35										1	1		1		1				
36	SITE 17	SR-315 AT TOWN ST								1	1				1			1	
37	SITE 18	SR-315 AT GOODALE ST	15		15				1	1		1				1		1	
38	SITE 19	SR-315 AT LANE AVE								1	1		1		1			1	
39	SITE 20	SR-315 AT HENDERSON RD								1	1		1		1			1	
40	SITE 21	SR-315 AT BETHEL RD	50		50					1		1			1			1	
41	SITE 22	1606 W. BROAD ST	10	100	60		1												
	TOTALS CARRIED TO GENERAL SUMMARY		1697	100	1747	5	1		2	25	6	24	5		30	2		22	

CALCULATED RJL
CHECKED NAH

SUBSUMMARY

FRA-RAMP METER UPGRADE

15
41

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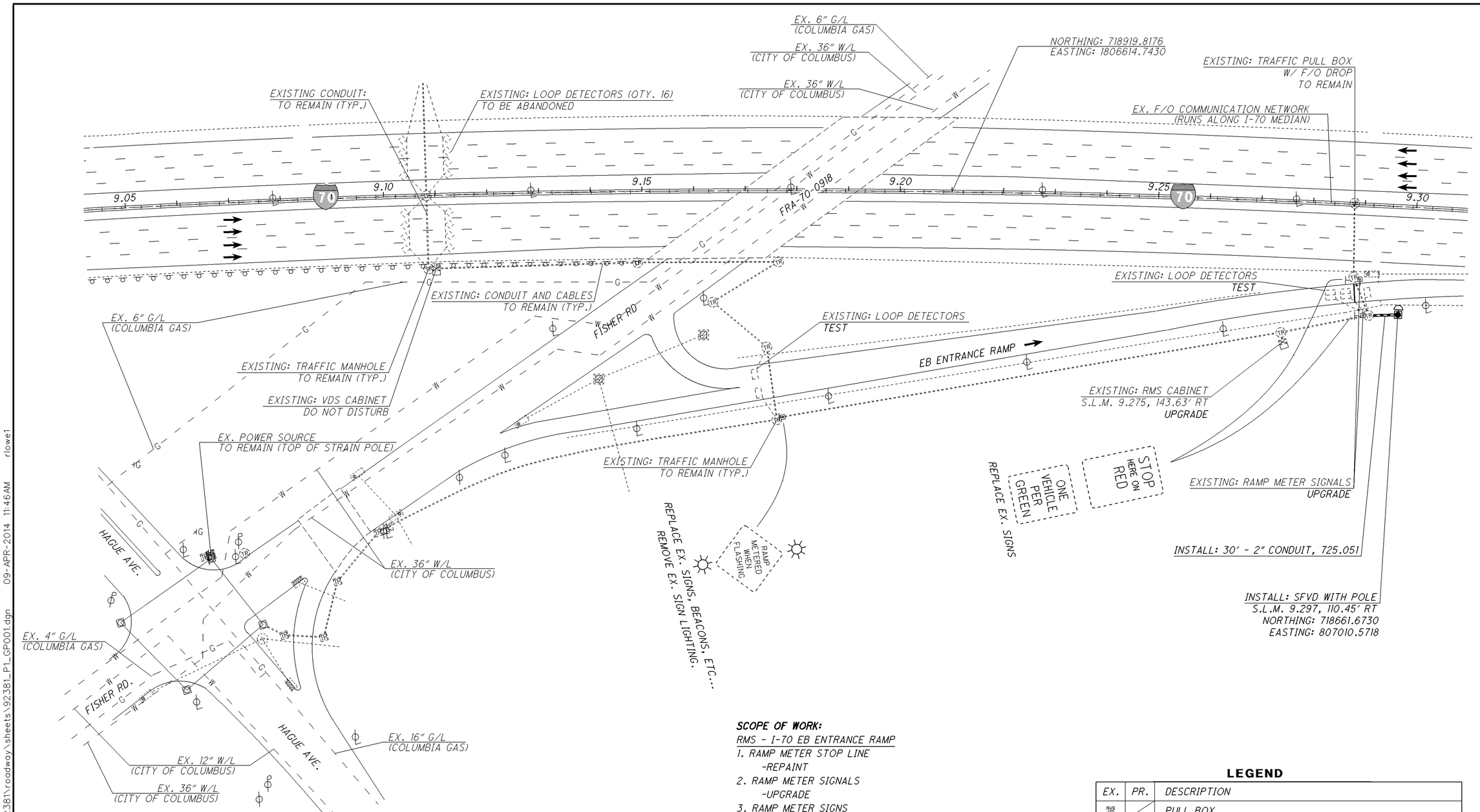

SCOPE OF WORK:

RMS - I-70 EB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

LEGEND

EX.	PR.	DESCRIPTION
		PULL BOX
TR		PULL BOX/MANHOLE
		CONDUIT
		RAMP METER SIGNAL
		RAMP METER FLASHING SIGN
		SIDE-FIRE RADAR VEHICLE DETECTOR (SFVD)
		GROUND MOUNTED CABINET
		STEEL POLE
		SIGN

NOTES:
1. ALL EXISTING ITEMS TO REMAIN, UNLESS OTHERWISE NOTED

NOTES:
1. EXISTING VDS COMMUNICATIONS IS THROUGH AN EXISTING 72 FIBER, SINGLE MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-70.

N

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-70 & FISHER RD. SITE 1

FRA-RAMP METER UPGRADE

16
41

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SEE SHEET 16 FOR LEGEND.

15" COMBINED SEWER (CITY OF COLUMBUS)
36" STORM (CITY OF COLUMBUS)
BURIED ELECTRIC (AEP)
4" G/L (COLUMBIA GAS)
20" W/L (CITY OF COLUMBUS)
3" G/L (COLUMBIA GAS)
3" G/L (COLUMBIA GAS)
REPLACE EX. SIGNS, BEACONS, ETC... REMOVE EX. SIGN LIGHTING.
RAMP METERED WHEN FLASHING
W MOUND ST
REPLACE EX. SIGNS
ONE VEHICLE PER GREEN
STOP HERE ON RED
9" STORM (CITY OF COLUMBUS)
36" W/L (CITY OF COLUMBUS)
EXISTING: LOOP DETECTORS TEST
EXISTING: POWER SOURCE
EXISTING: TRAFFIC PULL BOX TO REMAIN (TYP.)
EXISTING: LOOP DETECTORS TEST
STOP LINE REPAINT
EXISTING: RAMP METER SIGNALS UPGRADE
36" STORM (CITY OF COLUMBUS)
EXISTING: RMS CABINET S.L.M. 13.824, 110.55' LT UPGRADE
EX. LIGHTING CONDUIT (CITY OF COLUMBUS)
EX. SIGN
INSTALL: 40' - 2" CONDUIT, 725.051
INSTALL. SFVD WITH POLE S.L.M. 13.825, 69.09' LT NORTHING: 711924.8745 EASTING: 1827496.9573
WB ENTRANCE RAMP
13.75
13.80
13.85
13.90
13.95
FRA-70-13.95
EX. 16" W/L (CITY OF COLUMBUS)
EX. 36" W/L (CITY OF COLUMBUS)
16" G/L (COLUMBIA GAS)
EXISTING 4" MEDIAN RACEWAY W/ F/O TRUNK LINE TO REMAIN
EX. 24" W/L (CITY OF COLUMBUS)
EX. 20" W/L (CITY OF COLUMBUS)
20" G/L (COLUMBIA GAS)
S FRONT ST
W FULTON ST
EX. 8" W/L (CITY OF COLUMBUS)
NORTHING: 711884.0545 EASTING: 1827146.7923
4" G/L (COLUMBIA GAS)
EX. 6" W/L (CITY OF COLUMBUS)
SHORT ST.
2ND ST.
EXISTING: POWER SOURCE
EXISTING: VDS CABINET DO NOT DISTURB
EX. 6" W/L (CITY OF COLUMBUS)
EX. 20" W/L (CITY OF COLUMBUS)

SCOPE OF WORK:

RMS - I-70 EB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-70 AT W MOUND ST SITE 2

FRA-RAMP METER UPGRADE

17
41

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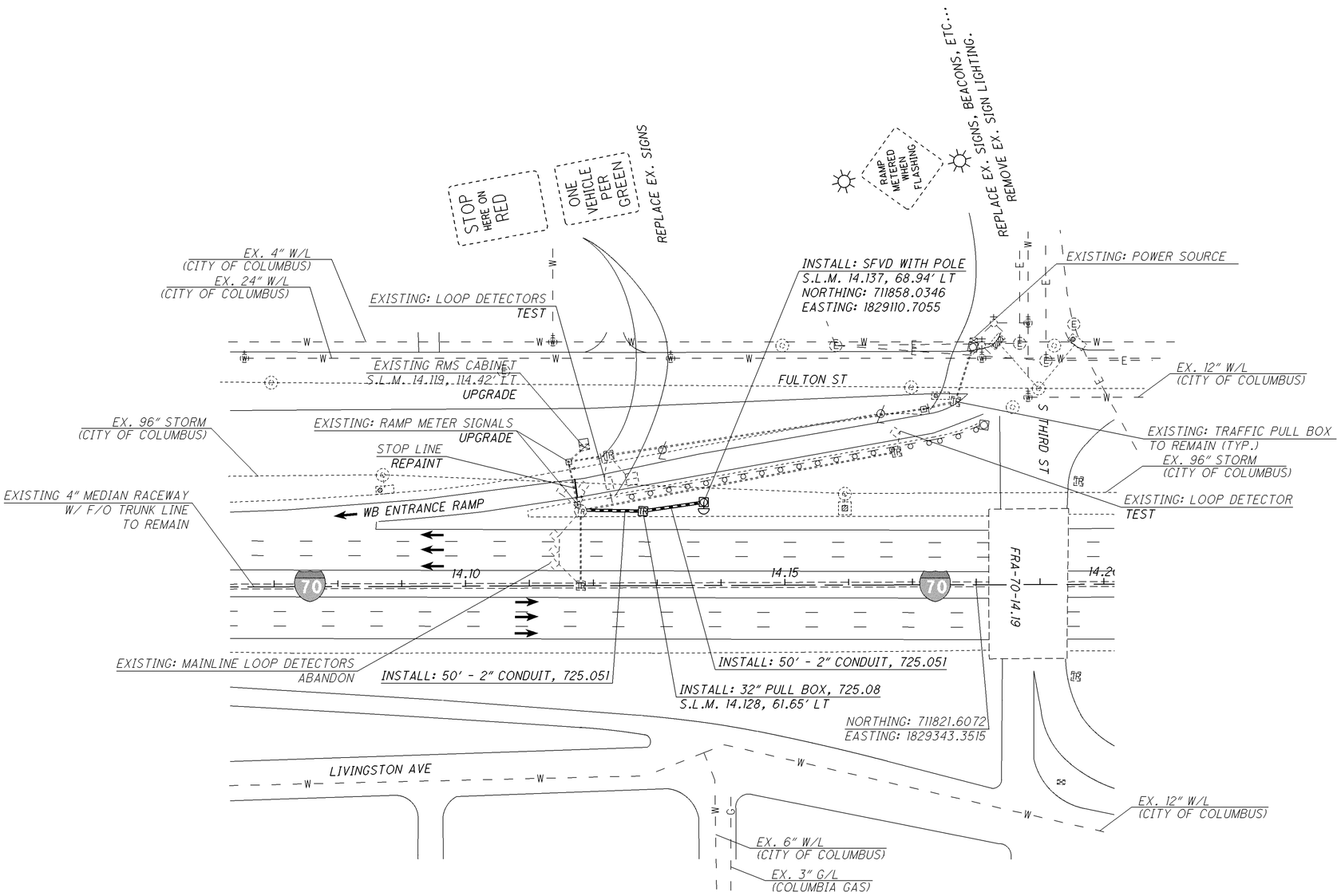
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

RMS - I-70 EB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
6. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-70 AT THIRD ST
SITE 3

FRA-RAMP METER UPGRADE

18
41

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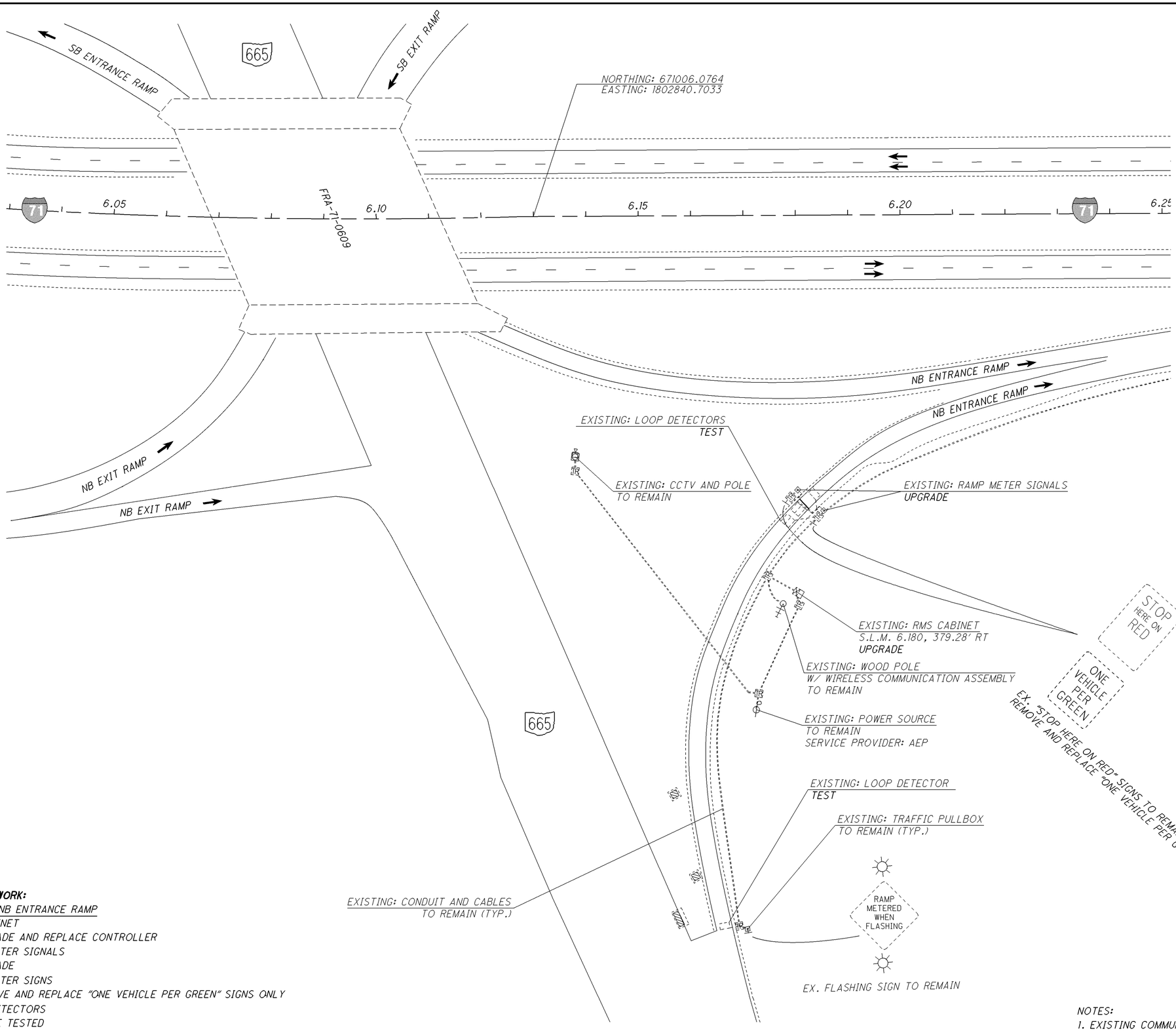
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

RMS - I-71 NB ENTRANCE RAMP

1. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REMOVE AND REPLACE "ONE VEHICLE PER GREEN" SIGNS ONLY
4. LOOP DETECTORS
   - -TO BE TESTED

NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH WIRELESS RADIO.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT SR-665 SITE 4

FRA-RAMP METER UPGRADE

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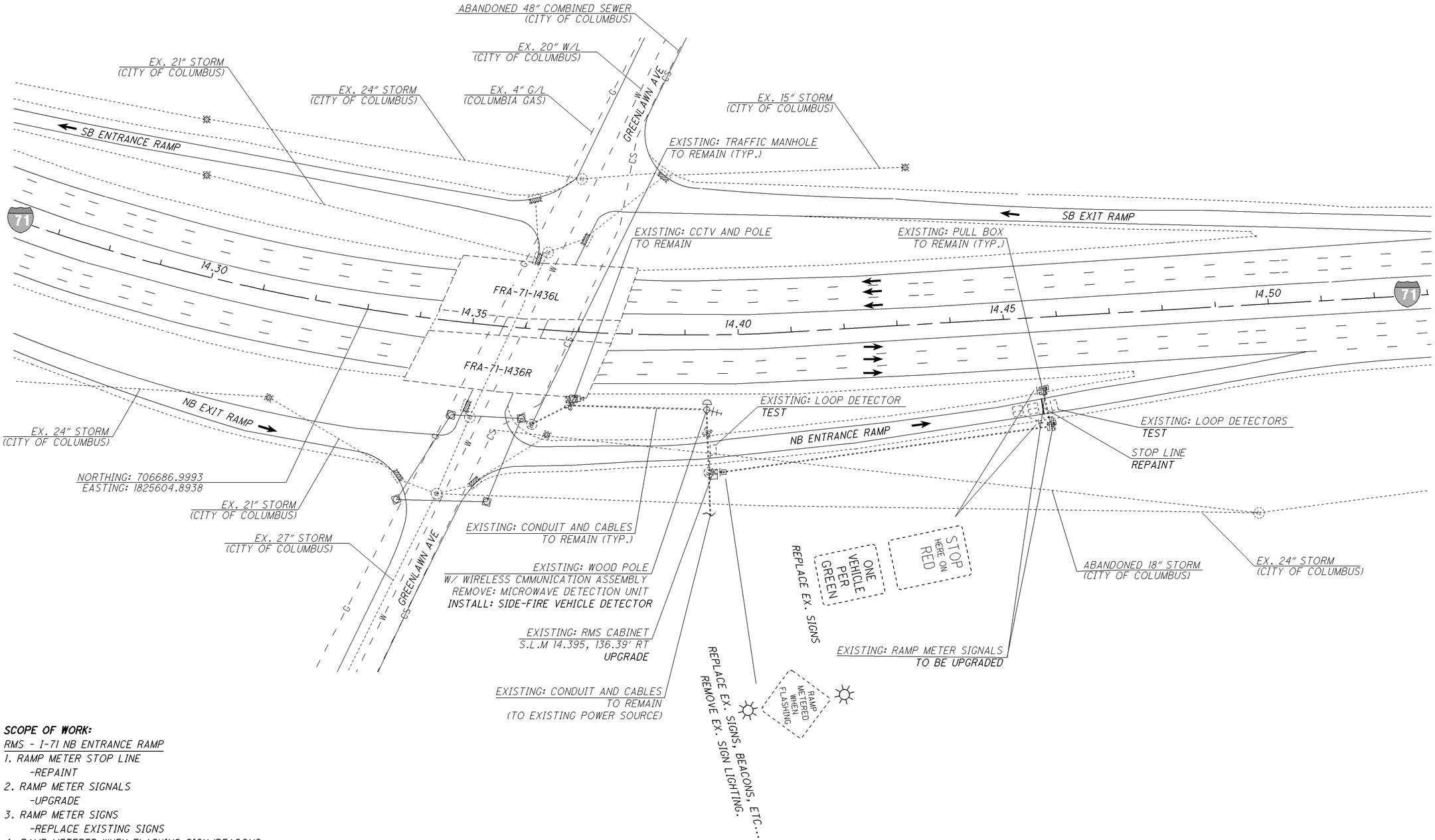
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

RMS - I-71 NB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD
   - -REMOVE EXISTING MICROWAVE DETECTION UNIT
   - -INSTALL SFVD ON EXISTING WOOD POLE

NOTES:
1. EXISTING COMMUNICATIONS IS THROUGH WIRELESS RADIO.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT GREENLAWN AVE
SITE 5

FRA-RAMP METER UPGRADE

20
41

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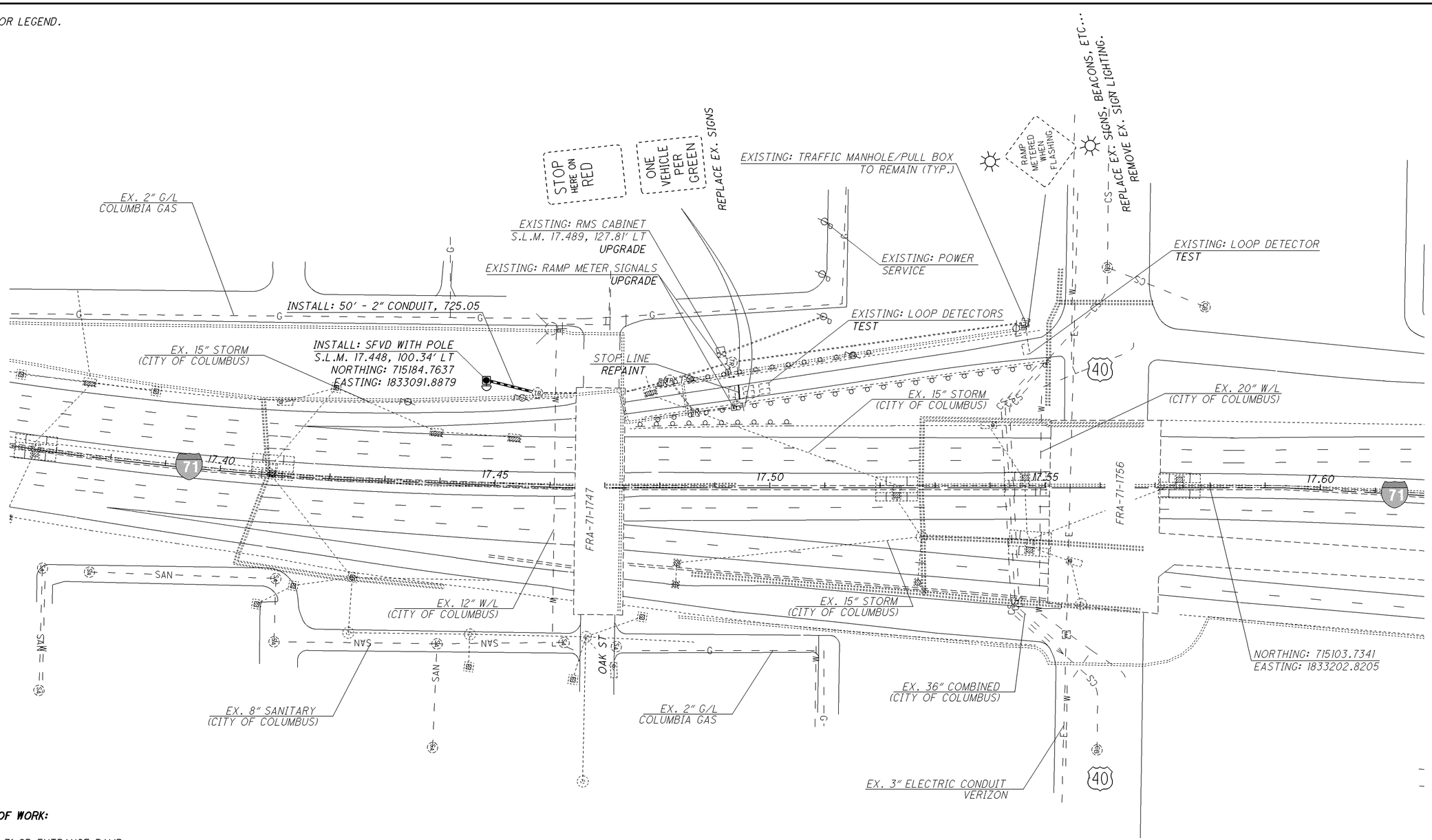
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT US-40/ BROAD ST
SITE 6

FRA-RAMP METER UPGRADE

21
41

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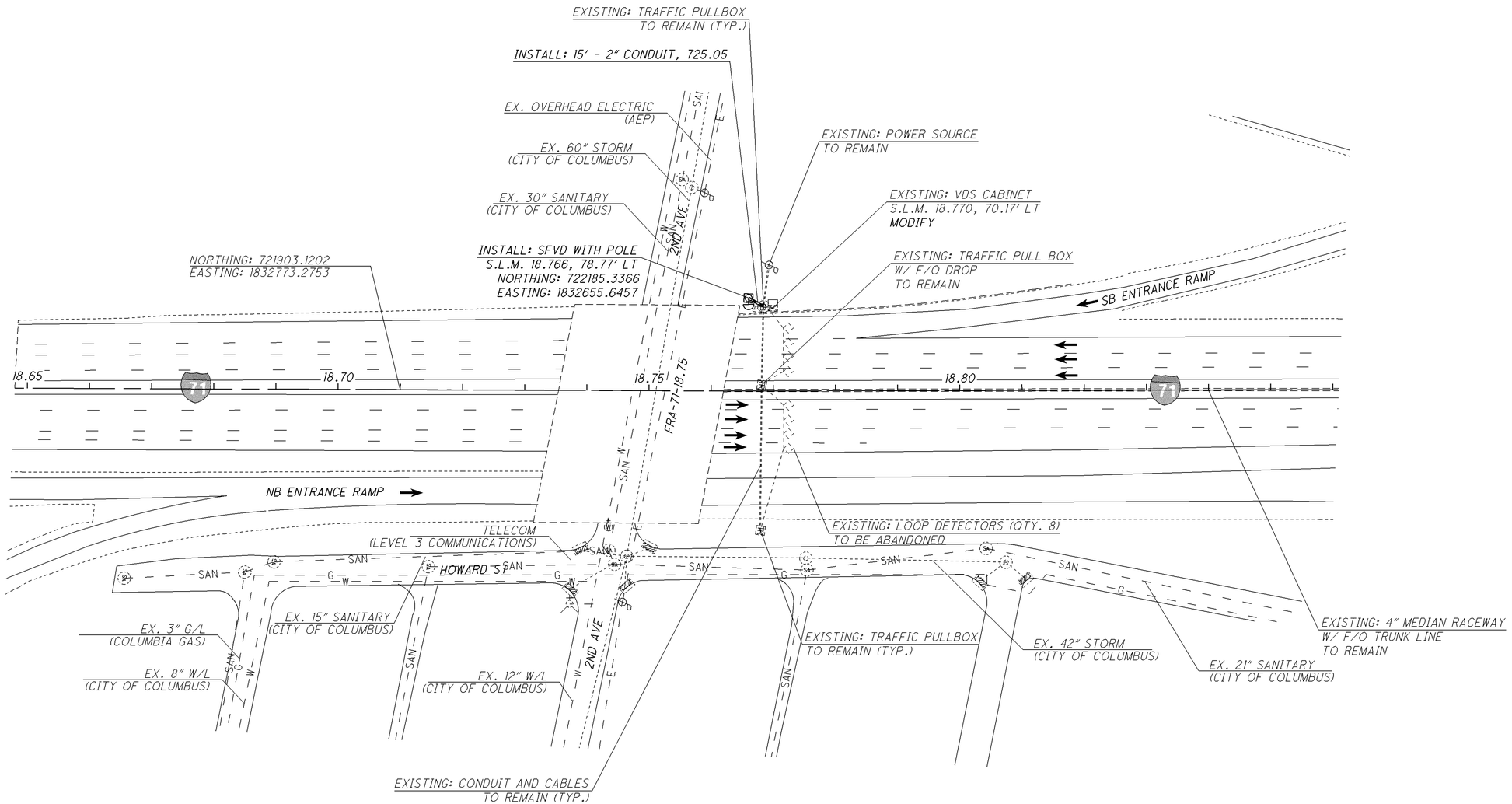
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

VDS - I-71 MAINLINE (S.L.M. 18.770 LT)

1. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO VDS CABINET
2. VDS CABINET
   -ABANDON EXISTING CONTROLLER

NOTES:

1. EXISTING VDS COMMUNICATIONS IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE VDS CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT 2ND AVE
SITE 7 - SFVD

FRA-RAMP METER UPGRADE

22
41

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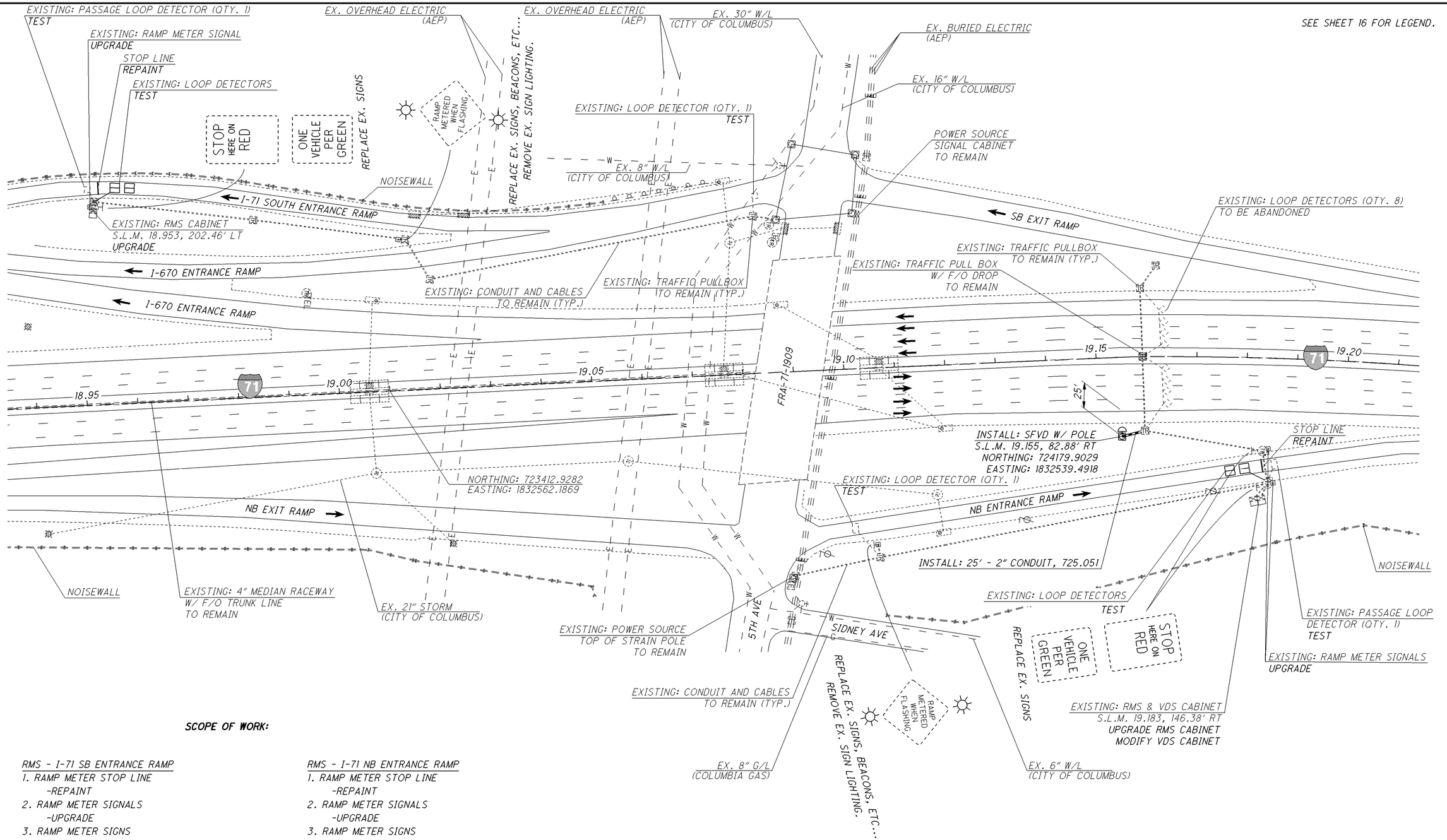

SEE SHEET 16 FOR LEGEND.

SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP
1. RAMP METER STOP LINE
   -REPAINT
2. RAMP METER SIGNALS
   -UPGRADE
3. RAMP METER SIGNS
   -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   -REPLACE EXISTING SIGN AND BEACONS
   -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   -TO BE TESTED

RMS - I-71 NB ENTRANCE RAMP
1. RAMP METER STOP LINE
   -REPAINT
2. RAMP METER SIGNALS
   -UPGRADE
3. RAMP METER SIGNS
   -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   -REPLACE EXISTING SIGN AND BEACONS
   -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   -TO BE TESTED
7. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO RMS
8. VDS CABINET
   -ABANDON EXISTING CONTROLLER

NOTES:
1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT 5TH AVE
SITE 8

FRA-RAMP METER UPGRADE

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SEE SHEET 16 FOR LEGEND.

EXISTING: OVERHEAD ELECTRIC (CITY OF COLUMBUS)

EXISTING: OVERHEAD ELECTRIC (AEP)

11TH AVE

EXISTING: TRAFFIC PULLBOX TO REMAIN (TYP.)

EXISTING: CONDUIT AND CABLES TO REMAIN (TYP.)

EXISTING: LOOP DETECTORS (QTY. 16) TO BE ABANDONED

EXISTING: TRAFFIC PULL BOX W/ F/O DROP TO REMAIN

EX. 54" STORM (CITY OF COLUMBUS)

SB ENTRANCE RAMP

SB EXIT RAMP

EXISTING: 4" MEDIAN RACEWAY W/ F/O TRUNK LINE TO REMAIN

NORTHING: 726625.8072
EASTING: 1832585.1327

71 19.50 19.55 19.60 19.65 19.70 71

FRA-71-1961

MATCH LINE I-71, S.L.M. 19.74
SEE SHEET 25

EXISTING: RAMP METER SIGNALS UPGRADE

EX. 8" SANITARY (ABANDONED) (CTIY OF COLUMBUS)

STOP LINE REPAINT

EXISTING: LOOP DETECTOR TEST

EXISTING: TRAFFIC PULLBOX TO REMAIN (TYP.)

NB EXIT RAMP

NB ENTRANCE RAMP

KINGRY ST

INSTALL: 335' - 2" CONDUIT, 725.051

EX. 1.5" W/L (CITY OF COLUMBUS)

EX. 4" G/L (COLUMBIA GAS)

TO EXISTING POWER SOURCE

INSTALL: 15' - 2" CONDUIT, 725.051

INSTALL: SFVD W/ POLE
S.L.M. 19.494, 89.33' RT
NORTHING: 725953.4457
EASTING: 1832620.1396

EX. 8" SANITARY (ABANDONED) (CITY OF COLUMBUS)

EX. 18" SANITARY (CITY OF COLUMBUS)

EX. 12" SANITARY (CTIY OF COLUMBUS)

EX 8" W/L (CITY OF COLUMBUS)

EX. 15" STORM (CITY OF COLUMBUS)

EXISTING: VDS CABINET
S.L.M. 19.484, 85.22' RT
MODIFY

EXISTING: TRAFFIC MANHOLE TO REMAIN (TYP.)

EX. 36" STORM (ABANDONED) (CITY OF COLUMBUS)

ONE VEHICLE PER GREEN

STOP HERE ON RED

REPLACE EX. SIGNS

REPLACE EX. SIGNS, BEACONS, ETC... REMOVE EX. SIGN LIGHTING.

RAMP METERED WHEN FLASHING

EXISTING: RMS CABINET
S.L.M. 19.698, 140.99' RT
UPGRADE

EXISTING: POWER SOURCE

EXISTING: LOOP DETECTORS TEST

SCOPE OF WORK:

RMS - I-71 NB ENTRANCE RAMP
1. RAMP METER STOP LINE
   -REPAINT
2. RAMP METER SIGNALS
   -UPGRADE
3. RAMP METER SIGNS
   -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   -REPLACE EXISTING SIGN AND BEACONS
   -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   -TO BE TESTED

VDS - I-71 MAINLINE (S.L.M. 19.484 RT)
1. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO VDS CABINET
2. MODIFY VDS CABINET
   -ABANDON EXISTING CONTROLLER

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT 11TH AVE
FRA-RAMP METER UPGRADE
SITE 9

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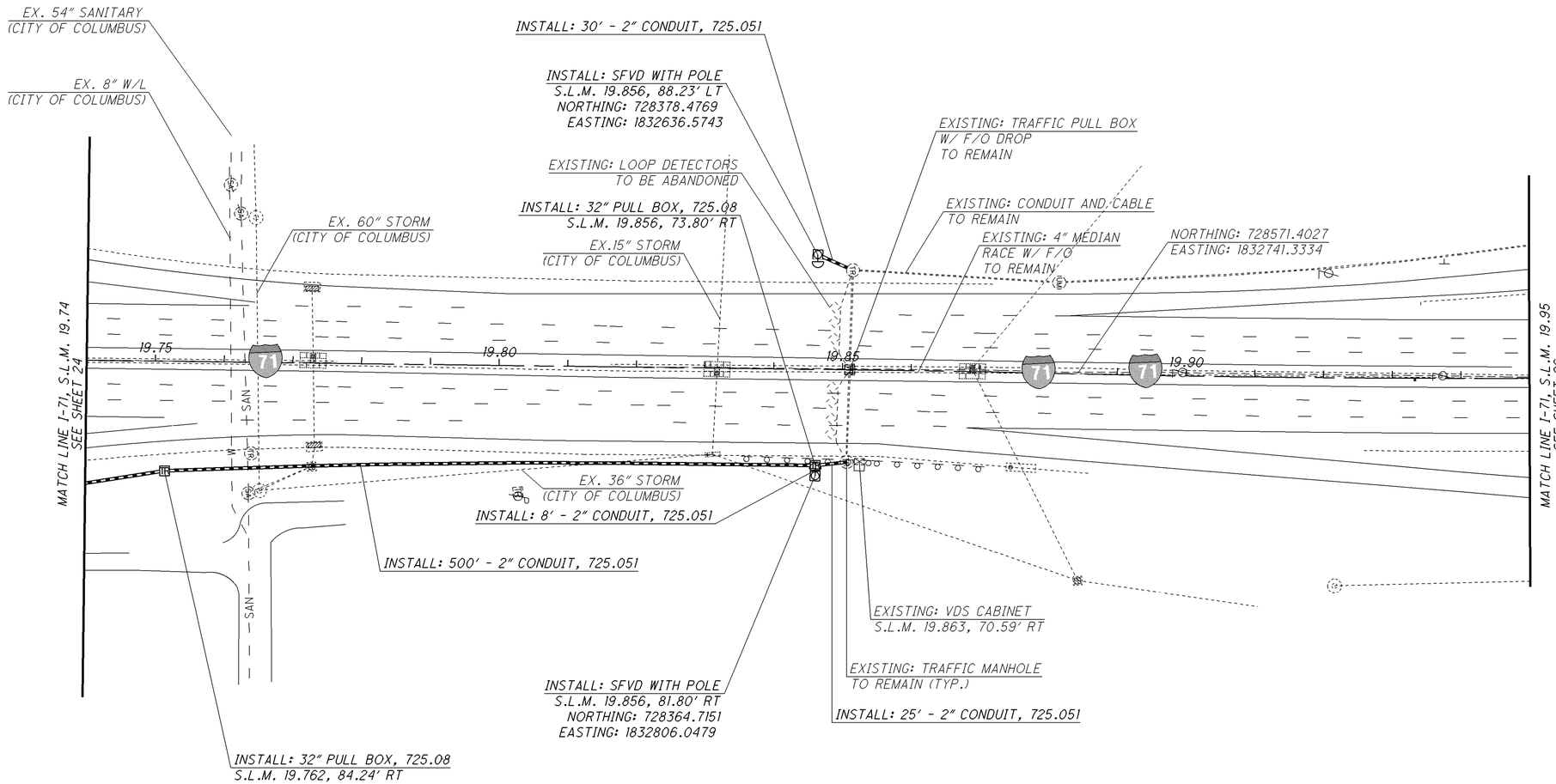
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

VDS - I-71 MAINLINE (S.L.M. 19.856 RT)

1. SFVD WITH POLE (S.L.M. 19.856 RT)
   - -INSTALL AND WIRE BACK TO BOTH THE VDS CABINET AND RMS CABINET AT IR-71 NB @ 11TH AVE. (S.L.M. 19.698 RT)
   - -DROP ETHERNET PORTION OF THE CABLE INTO THE VDS CABINET
2. SFVD WITH POLE (S.L.M. 19.856 LT)
   - -INSTALL AND WIRE BACK TO BOTH THE VDS CABINET AND RMS CABINET AT IR-71 SB @ 17TH AVE. (S.L.M. 20.003 LT)
   - -DROP ETHERNET PORTION OF THE CABLE INTO THE VDS CABINET
3. VDS CABINET
   - -ABANDON EXISTING CONTROLLER

NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT 11TH AVE
SITE 9

FRA-RAMP METER UPGRADE

25
41

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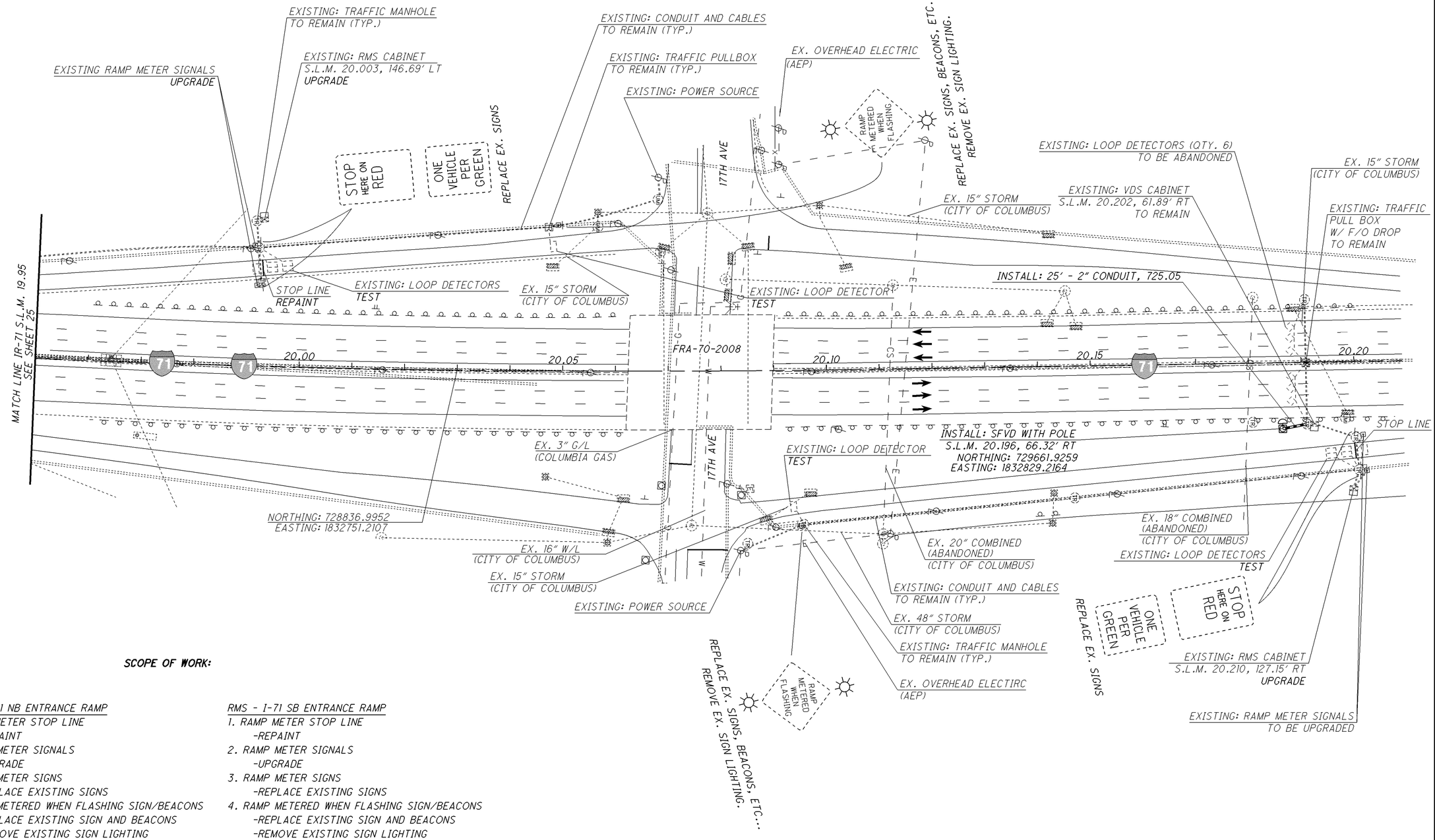
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

RMS - I-71 NB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

VDS - I-71 MAINLINE (S.L.M. 20.202 RT)

1. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO VDS CABINET AND RMS CABINET
2. VDS CABINET
   - -ABANDON EXISTING CONTROLLER

RMS - I-71 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED

NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT 17TH AVE
SITE 10

FRA-RAMP METER UPGRADE

26
41

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SEE SHEET 16 FOR LEGEND.

EXISTING: RAMP METER SIGNALS
UPGRADE

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

EXISTING: RMS CABINET
S.L.M. 21.073, 109.45' LT
UPGRADE

STOP HERE ON RED

ONE VEHICLE PER GREEN

REPLACE EX. SIGNS

RAMP METERED WHEN FLASHING

REPLACE EX. SIGNS, BEACONS, ETC...
REMOVE EX. SIGN LIGHTING.

EX. OVERHEAD ELECTRIC
(AEP)

EX. 12" W/L
(CITY OF COLUMBUS)

EXISTING: TRAFFIC PULLBOX
TO REMAIN (TYP.)

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

SB ENTRANCE RAMP

EXISTING: LOOP DETECTOR
TEST

EX. 21" STORM
(CITY OF COLUMBUS)

EXISTING: LOOP DETECTORS (QTY. 6)
DO NOT DISTURB

EXISTING: 4" MEDIAN RACEWAY
W/ F/O TRUNK LINE
TO REMAIN

NORTHING: 731582.1484
EASTING: 1832543.1573

EXISTING: LOOP DETECTORS
TEST

STOP LINE

EX. 12" STORM
(CITY OF COLUMBUS)

21.15

21.10

21.20

21.25

FRA-71-21.26

0.55

20.58

INSTALL: 26' - 2" CONDUIT, 725.05

EX. 21" STORM
(CITY OF COLUMBUS)

INSTALL: SFVD WITH POLE
S.L.M. 21.067, 62.38' LT

NORTHING: 734051.1061
EASTING: 1830159.2395

NB EXIT RAMP

EXISTING: TRAFFIC
PULL BOX
W/ F/O DROP
TO REMAIN

EXISTING: VDS CABINET
DO NOT DISTURB

HUDSON AVE

EXISTING: VDS CABINET
S.L.M. 20.574, 58.66' RT
MODIFY

EXISTING: LOOP DETECTORS (QTY. 12)
TO BE ABANDONED

INSTALL: 40' - 2" CONDUIT, 725.05

INSTALL: SFVD WITH POLE
S.L.M. 20.566, 60.35' RT
NORTHING: 733210.3363
EASTING: 1830777.4834

EX. 16" W/L
(CITY OF COLUMBUS)

EXISTING: CONDUIT AND CABLES
TO REMAIN (TO POWER SOURCE)

SCOPE OF WORK:

RMS - I-71 NB ENTRANCE RAMP

1. RAMP METER STOP LINE
   -REPAINT
2. RAMP METER SIGNALS
   -UPGRADE
3. RAMP METER SIGNS
   -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   -REPLACE EXISTING SIGN AND BEACONS
   -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   -TO BE TESTED
7. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO RMS CABINET

VDS - I-71 MAINLINE (S.L.M. 21.574 RT)

1. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO VDS CABINET
2. MODIFY VDS CABINET
   -ABANDON EXISTING CONTROLLER

NOTES:
1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT HUDSON AVE
SITE 11

FRA-RAMP METER UPGRADE

27
41

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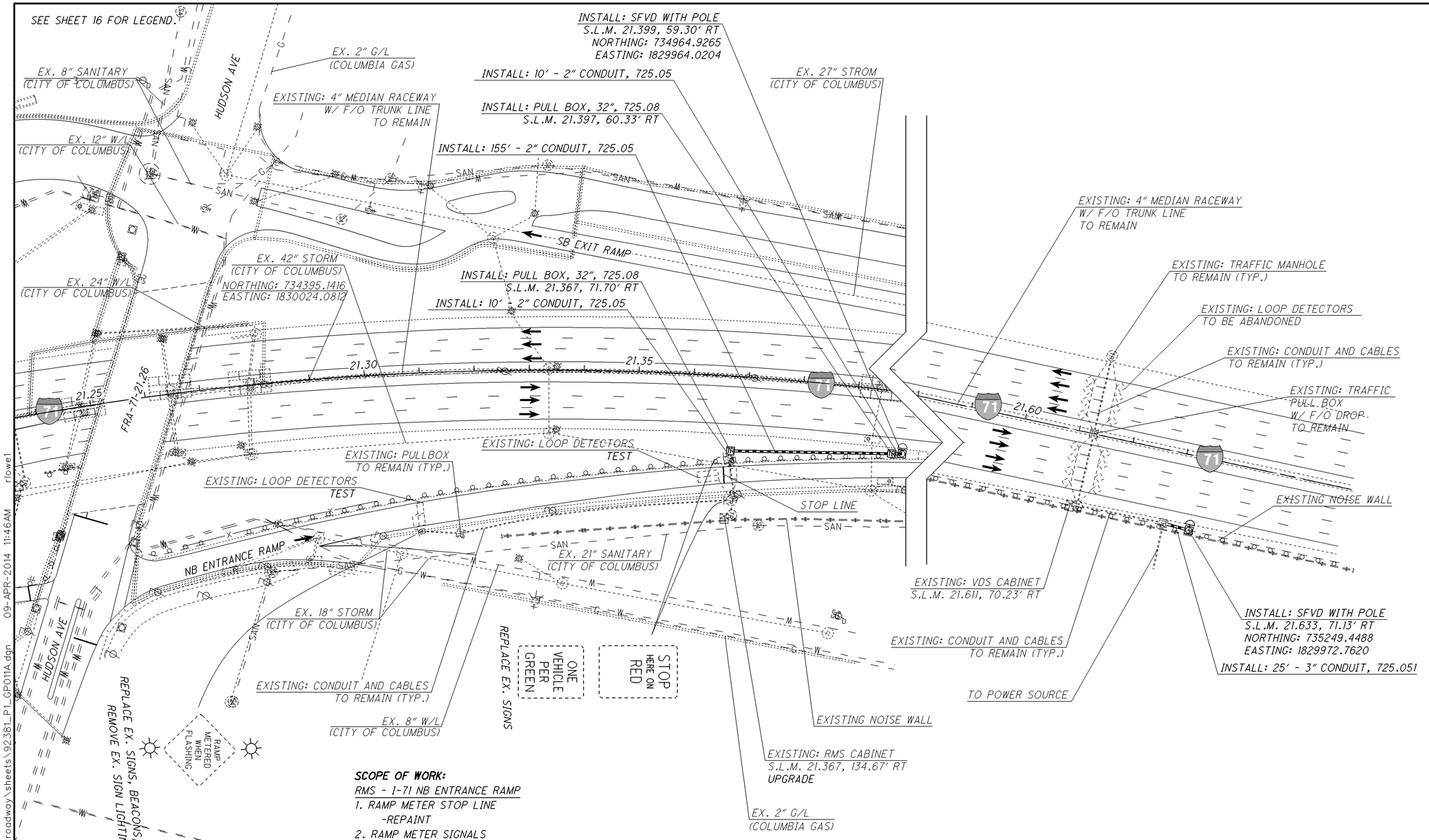

SCOPE OF WORK:

RMS - I-71 NB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

VDS - I-71 MAINLINE (S.L.M. 21.611 RT)

1. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO VDS CABINET
2. VDS CABINET
   - -ABANDON EXISTING CONTROLLER

NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT HUDSON AVE SITE 11

FRA-RAMP METER UPGRADE

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SEE SHEET 16 FOR LEGEND.

EXISTING: POWER SOURCE
TO REMAIN
(PROVIDER: AEP)

EXISTING: RMS CABINET
S.L.M. 21.779, 133.58' LT
UPGRADE

EXISTING: RAMP METER SIGNALS
UPGRADE

STOP HERE ON RED

ONE VEHICLE PER GREEN

REPLACE EX. SIGNS

RAMP METERED WHEN FLASHING

REPLACE EX. SIGNS, BEACONS, ETC...
REMOVE EX. SIGN LIGHTING.

EX. 3" G/L
(COLUMBIA GAS)

EX. 8" W/L
(CITY OF COLUMBUS)

EX. 18" G/L
(COLUMBIA GAS)

EX. 42" SANITARY
(CITY OF COLUMBUS)

EX. 96" STORM
(CITY OF COLUMBUS)

EXISTING: LOOP DETECTOR
TEST

WEBER RD

EX. 3" GL
(COLUMBIA GAS)

EX. 42" SANITARY
(CITY OF COLUMBUS)

EX. 8" W/L
(CITY OF COLUMBUS)

EX. 4" G/L
(COLUMBIA GAS)

EXISTING: TRAFFIC PULLBOX
TO REMAIN (TYP.)

EX. 18" STORM
(CITY OF COLUMBUS)

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

STOP LINE
REPAINT

SB ENTRANCE RAMP

EXISTING: PULLBOX
TO REMAIN (TYP.)

EXISTING: LOOP DETECTORS
TEST

INSTALL: SFVD WITH POLE
S.L.M. 21.792, 75.91' LT
NORTHING: 736996.3551
EASTING: 1829771.4917

NORTHING: 737192.8893
EASTING: 1829860.4884

EX. 8" W/L
(CITY OF COLUMBUS)

SB EXIT RAMP

EX. 12" STORM
(CITY OF COLUMBUS)

EXISTING: LOOP DETECTORS (QTY. 6)
TO BE ABANDONED

EX. 96" STORM
(CITY OF COLUMBUS)

21.80

21.85

21.90

21.91

21.95

FRA-71-21.91

71

INSTALL: 15' - 2" CONDUIT, 725.051

EX. OVERHEAD ELECTRIC
(AEP)

EXISTING: 4" MEDIAN RACEWAY
W/ F/O TRUNK LINE
TO REMAIN

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

NB EXIT RAMP

EXISTING: TRAFFIC PULL BOX
W/ F/O DROP
TO REMAIN

BEULAH DR

EX. 8" W/L
(CITY OF COLUMBUS)

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

NB ENTRANCE RAMP

EXISTING: VDS CABINET
S.L.M. 21.966, 76.19' RT

WEBER RD

INSTALL: 25' - 2" CONDUIT, 725.05

EX. 8" W/L
(CITY OF COLUMBUS)

INSTALL: SFVD WITH POLE
S.L.M. 21.970, 66.44' RT
NORTHING: 737910.3844
EASTING: 1830030.2003

EX. 12" W/L
(CITY OF COLUMBUS)

SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

VDS - I-71 MAINLINE (S.L.M. 21.966 RT)

1. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO VDS CABINET
2. VDS CABINET
   - -ABANDON EXISTING CONTROLLER

NOTES:

1. EXISTING COMMUNICATION IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

N

0 25 50 100 HORIZONTAL SCALE IN FEET

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT WEBER RD
SITE 12

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SEE SHEET 16 FOR LEGEND.

EXISTING: POWER SOURCE TO REMAIN

EXISTING: TRAFFIC PULLBOX TO REMAIN (TYP.)

EXISTING: CONDUIT AND CABLES TO REMAIN (TYP.)

EXISTING: TRAFFIC MANHOLE TO REMAIN (TYP.)

EXISTING: RMS CABINET
S.L.M. 22.295, 127.86' LT
UPGRADE

EX. UNDERGROUND ELECTRIC (AEP)

EX. OVERHEAD ELECTRIC (AEP)

EX. 42" SANITARY (CITY OF COLUMBUS)

EX. 30" W/L (CITY OF COLUMBUS)

STOP HERE ON RED

ONE VEHICLE PER GREEN

REPLACE EX. SIGNS

RAMP METERED WHEN FLASHING

REPLACE EX. SIGNS, BEACONS, ETC... REMOVE EX. SIGN LIGHTING.

EXISTING: LOOP DETECTOR (QTY. 1)
TEST

EX. 4" W/L (COLUMBIA GAS)

EX. 4" G/L (COLUMBIA GAS)

EX. 15" STORM (CITY OF COLUMBUS)

EXISTING: RAMP METER SIGNALS
UPGRADE

STOP LINE
REPAINT

SB ENTRANCE RAMP

EXISTING: LOOP DETECTORS
INSTALL: 10' - 2" CONDUIT, TEST
T25.051

EX. 24" STORM (CITY OF COLUMBUS)

E NORTH BROADWAY

EXISTING: TRAFFIC PULL BOX W/ F/O DROP TO REMAIN

EXISTING: 4" MEDIAN RACEWAY W/ F/O TRUNK LINE TO REMAIN

EXISTING: CONDUIT AND CABLES TO REMAIN (TYP.)

EXISTING: TRAFFIC PULL BOX W/ F/O DROP TO REMAIN

22.25

22.30

22.35

22.40

22.80

FRA-70-2239

EX. 12" STORM (CITY OF COLUMBUS)

NORTHING: 739542.3313
EASTING: 1830068.6289

INSTALL: SFVD WITH POLE
S.L.M. 22.295, 67.40' LT
NORTHING: 739614.9787
EASTING: 1829992.1510

EXISTING: LOOP DETECTORS, CABLE, AND CONDUIT
DO NOT DISTURB

EXISTING: VDS CABINET
DO NOT DISTURB

NB EXIT RAMP

NB ENTRANCE RAMP

E NORTH BROADWAY

EXISTING: 4" MEDIAN RACEWAY
W/ F/O TRUNK LINE TO REMAIN

NORTHING: 742100.4079
EASTING: 1829439.6675

INSTALL: SFVD WITH POLE
S.L.M. 22.795, 85.82' RT
NORTHING: 740504.9074
EASTING: 1829985.3778

INSTALL: 25' - 2" CONDUIT, 725.051

EXISTING: VDS CABINET
S.L.M. 22.798, 96.01' RT

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

EXISTING: 6 LOOP DETECTORS (QTY. 12)
TO BE ABANDONED

EXISTING: CONDUIT AND CABLES
TO POWER SOURCE

SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
6. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

VDS - I-71 MAINLINE (S.L.M. 22.798 RT)

1. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO VDS CABINET
2. VDS CABINET
   - -ABANDON EXISTING CONTROLLER

NOTES:

1. EXISTING COMMUNICATIONSIS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT E NORTH BROADWAY
SITE 13

FRA-RAMP METER UPGRADE

30
41

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SEE SHEET 16 FOR LEGEND.

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

EXISTING: RMS CABINET
S.L.M. 22.373, 144.88' LT
UPGRADE

STOP HERE ON RED

ONE VEHICLE PER GREEN

REPLACE EX. SIGNS

RAMP METERED WHEN FLASHING

REPLACE EX. SIGNS, BEACONS, ETC...
REMOVE EX. SIGN LIGHTING.

EXISTING POWER SOURCE (CABINET)
TO REMANI

NORTHING: 746357.6687
EASTING: 1829212.9240

EX. OVERHEAD ELECTRIC
(AEP)

EX. 20" W/L
(CITY OF COLUMBUS)

EXISTING: LOOP DETECTOR (QTY. 1)
TO BE ABANDONED

EXISTING: LOOP DETECTORS (QTY. 12)
TO BE ABANDONED

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

EXISTING: RAMP METER SIGNALS
UPGRADE

EX. 21" STORM
(CITY OF COLUMBUS)

EXISTING: TRAFFIC PULL BOX
W/ F/O DROP
TO REMAIN

STOP LINE
REPAINT

R/W FENCE

EXISTING: LOOP DETECTORS
TEST

R/W FENCE

SB ENTRANCE RAMP

SB EXIT RAMP

EXISTING: TRAFFIC PULLBOX
TO REMAIN (TYP.)

EXISTING: LOOP DETECTOR
TEST

COOKE RD

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

SB EXIT RAMP

INSTALL: 15' - 2" CONDUIT, 725.051

FRA-71-2346L

22.30 71 22.35 22.40 22.45 22. 71 71 22.60

FRA-71-2346R

INSTALL: SFVD WITH POLE
S.L.M. 23.372, 75.99' LT
NORTHING: 745256.5221
EASTING: 1829192.1108

NORTHING: 745619.3981
EASTING: 1829249.9801

EXISTING: TRAFFIC MANHOLE
DO NOT DISTURB

EXISTING: 4" MEDIAN RACEWAY
W/ F/O
TO REMAIN

COOKE RD

EX. 18" STORM
(CITY OF COLUMBUS)

EX. 18" STORM
(CITY OF COLUMBUS)

COOKE RD

NB ENTRANCE RAMP

EXISTING: VDS CABINET
S.L.M. 23.605, 72.32' RT

EX. 6" G/L
(COLUMBIA GAS)

NB EXIT RAMP

NOISE WALL

EXISTING: LOOP DETECTORS
DO NOT DISTURB

EXISTING: CONDUIT AND CABLES
DO NO DISTURB

EXISTING: TRAFFIC MANHOLE
DO NO DISTURB

EXISTING: LOOP DETECTOR
DO NOT DISTURB

EXISTING: VDS CABINET
DO NOT DISTURB

R/W FENCE

GLENMAWR AVE

EXISTING: TRAFFIC PULL BOX
W/ F/O DROP
TO REMAIN

EXISTING: LOOP DETECTOR (QTY. 1)
TO BE ABANDONED

EX. 12" STORM
(CITY OF COLUMBUS)

EX. 8" W/L
(CITY OF COLUMBUS)

EXISTING: POWER SOURCE
TO REMAIN

INSTALL: SFVD WITH POLE
S.L.M. 23.599, 75.17' RT
NORTHING: 746088.3698
EASTING: 1829298.9940

INSTALL: 25' - 2" CONDUIT, 725.05

SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP
1. RAMP METER STOP LINE
   -REPAINT
2. RAMP METER SIGNALS
   -UPGRADE
3. RAMP METER SIGNS
   -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   -REPLACE EXISTING SIGN AND BEACONS
   -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   -TO BE TESTED
7. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO RMS CABINET

VDS - I-71 MAINLINE (S.L.M. 23.605 RT)
1. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO VDS CABINET
2. VDS CABINET
   -ABANDON EXISTING CONTROLLER

UTILITY NOTE:

THE CONTRACTOR SHALL CONTACT THE OHIO UTILITIES PROTECTION SERVICE (BOTH MEMBERS AND NON-MEMBERS) AND THE OHIO OIL AND GAS PRODUCERS UNDERGROUND PROTECTION SERVICE (OGPUPS) AT LEAST TWO WORKING DAYS BEFORE DIGGING. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY AND RESOLVE POTENTIAL CONFLICTS WITH EXISTING UTILITIES NOT SHOWN IN THESE PLANS PRIOR TO CONSTRUCTION.

N

0 25 50 100
HORIZONTAL
SCALE IN FEET

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT E COOKE RD
SITE 14

FRA-RAMP METER
UPGRADE

31
41

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SEE SHEET 16 FOR LEGEND.

EXISTING: RMS CABINET
S.L.M. 24.418, 202.06' LT
UPGRADE

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

INSTALL: 15' - 2" CONDUIT, 725.051

INSTALL: SFVD WITH POLE
S.L.M. 24.360, 75.93' LT'
NORTHING: 750494.5233
EASTING: 1828944.6528

STOP HERE ON RED

ONE VEHICLE PER GREEN

REPLACE EX. SIGNS

RAMP METERED WHEN FLASHING

REPLACE EX. SIGNS, BEACONS, ETC...
REMOVE EX. SIGN LIGHTING.

EX. 12" W/L
(CITY OF COLUMBUS)

EX. 30" STORM
(CITY OF COLUMBUS)

EX. 30" STORM
(CITY OF COLUMBUS)

EX. 18" STORM
(CITY OF COLUMBUS)

STOP LINE
REPAINT

EXISTING: RAMP METER SIGNALS
UPGRADE

EX. 15" STORM
(CITY OF COLUMBUS)

EXISTING: TRAFFIC PULL BOX
W/ F/O DROP
TO REMAIN

EXISTING: 4" MEDIAN RACEWAY
W/ F/O TRUNK LINE
TO REMAIN

SB ENTRANCE RAMP

EXISTING: LOOP DETECTOR
TEST

EX. 15" STORM
(CITY OF COLUMBUS)

EX. 24" STORM
(CITY OF COLUMBUS)

SINCLAIR RD

EXISTING: LOOP DETECTORS
TEST

EX. 15" STORM
(CITY OF COLUMBUS)

EX. 21" STORM
(CITY OF COLUMBUS)

MORSE RD

EX. 42" STORM
(CITY OF COLUMBUS)

24.35
24.40
24.45
24.50

FRA-71-245IL

FRA-71-245IR

NORTHING: 751068.2742
EASTING: 1829082.5612

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

EXISTING POWER SOURCE
TO REMAIN

EXISTING: VDS CABINET
S.L.M. 24.364, 92.49' RT
TO REMAIN

NB EXIT RAMP

EX. OVERHEAD ELECTRIC
(AEP)

NB ENTRANCE RAMP

MORSE RD

EX. 2" W/L
(CITY OF COLUMBUS)

EX. 2" W/L
(CITY OF COLUMBUS)

SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO RMS CABINET

NOTES:

1. EXISTING COMMUNICATION IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-71 AT MORSE RD
SITE 15

FRA-RAMP METER UPGRADE

32
41

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SEE SHEET 16 FOR LEGEND.

EXISTING: 6" GAS
(COLUMBIA GAS)

EX. 4" G/L
(COLUMBIA GAS)

EX. 10" SANITARY
(CITY OF COLUMBUS)

EXISTING: TRAFFIC PULLBOX
TO REMAIN (TYP.)

EX. OVERHEAD LINES
(AEP)

EX. 12" W/L
(CITY OF COLUMBUS)

EX. 4" G/L
(COLUMBIA GAS)

EXISTING: LOOP DETECTOR
TEST

EX. 30" STORM
(CITY OF COLUMBUS)

EXISTING: POWER SOURCE
TOP OF SIGNAL POLE
TO REMAIN

REPLACE EX. SIGNS, BEACONS, ETC...
REMOVE EX. SIGN LIGHTING.

REPLACE EX. SIGNS

ONE VEHICLE PER GREEN

STOP HERE ON RED

EX. 30" W/L
(CITY OF COLUMBUS)

SINCLAIR RD

EX. 6" G/L
(COLUMBIA GAS)

RAMP METERED WHEN FLASHING

EX. 10" SANITARY
(CITY OF COLUMBUS)

SB EXIT RAMP

EX. 15" STORM
(CITY OF COLUMBUS)

EX. 8" SANITARY
(CITY OF COLUMBUS)

EXISTING: RAMP METER SIGNAL
UPGRADE

EX. 8" STORM
(CITY OF COLUMBUS)

EXISTING: RMS CABINET
S.L.M. 24.674, 124.96' LT
UPGRADE

EX. 15" STORM
(CITY OF COLUMBUS)

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

EXISTING: CCTV POLE AND EQUIPMENT
DO NOT DISTURB

EXISTING: LOOP DETECTORS
TEST

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

NORTHING: 751478.6336
EASTING: 1829181.8001

EXISTING: 4" MEDIAN RACEWAY
W/ F/O TRUNK LINE
TO REMAIN

EXISTING: VDS CABINET
S.L.M. 24.721, 162.22' LT

STOP LINE
REPAINT

MORSE RD

MORSE RD

SB ENTRANCE RAMP

INSTALL: 20' - 2"
CONDUIT, 725.051

INSTALL: SFVD WITH POLE
S.L.M. 24.680, 82.88' LT

FRA-71-2451L

24.50

24.70

FRA-71-2451R

71

71

MOREL

MOREL

MORSE RD

NB ENTRANCE RAMP

EXISTING: RAMP METER SIGNAL FOUNDATION
INSTALL: RAMP METER SIGNAL ON EXIST. FOUNDATION
(INSTALL PEDESTAL, SIGNALS, ETC...)

EXISTING: LOOP DETECTORS (QTY. 3)
TO BE ABANDONED

INSTALL: SFVD WITH POLE
S.L.M. 24.680, 82.88' LT
NORTHING: 752153.3802
EASTING: 1829363.3514

EXISTING: CONDUIT AND CABLES
TO REMAIN (TYP.)

EXISTING: TRAFFIC PULL BOX
W/ F/O DROP
TO REMAIN

SCOPE OF WORK:

RMS - I-71 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
   - -INSTALL NEW PEDESTAL, SIGNAL HEADS, ETC... ON EXISTING SB ENTRANCE RAMP FOUNDATION, RT
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED

VDS - I-71 SB

1. SFVD WITH POLE
   - -INSTALL AND WIRE BACK TO VDS CABINET
2. VDS CABINET
   - -ABANDON EXISTING CONTROLLER

NOTES:
1. EXISTING COMMUNICATION IS THROUGH AN EXISTING 48 FIBER, MULTI MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-71.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL MODEM IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED R.J.L
CHECKED N.A.H

PLAN - I-71 AT SINCLAIR RD
SITE 15

FRA-RAMP METER UPGRADE

33
41

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SEE SHEET 16 FOR LEGEND.

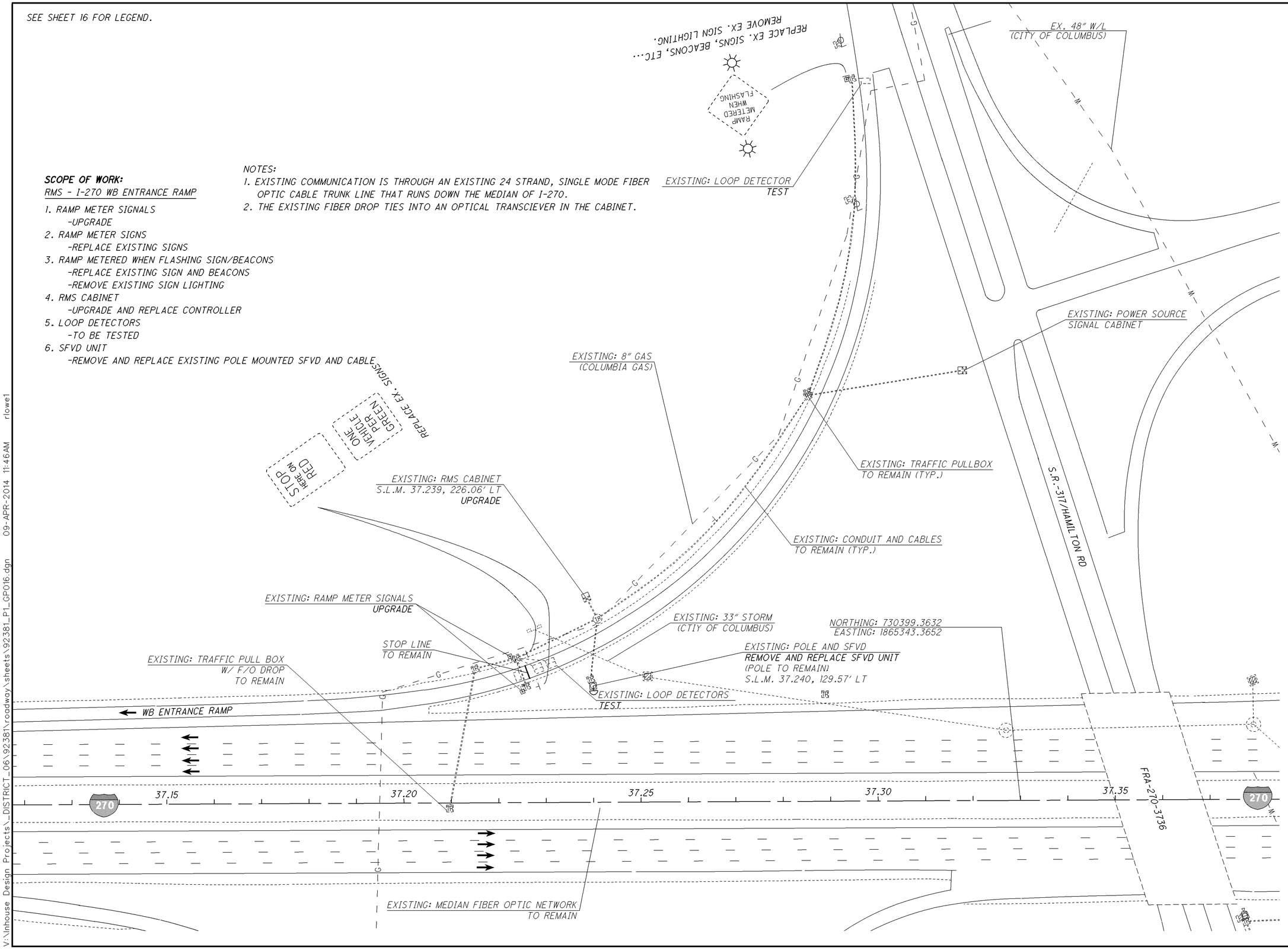
SCOPE OF WORK:

RMS - I-270 WB ENTRANCE RAMP

1. RAMP METER SIGNALS
   - -UPGRADE
2. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
3. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
4. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
5. LOOP DETECTORS
   - -TO BE TESTED
6. SFVD UNIT
   - -REMOVE AND REPLACE EXISTING POLE MOUNTED SFVD AND CABLE

NOTES:

1. EXISTING COMMUNICATION IS THROUGH AN EXISTING 24 STRAND, SINGLE MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-270.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL TRANSCIEVER IN THE CABINET.



HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-270 AT SR-317/HAMILTON RD
SITE 16

FRA-RAMP METER UPGRADE

34
41

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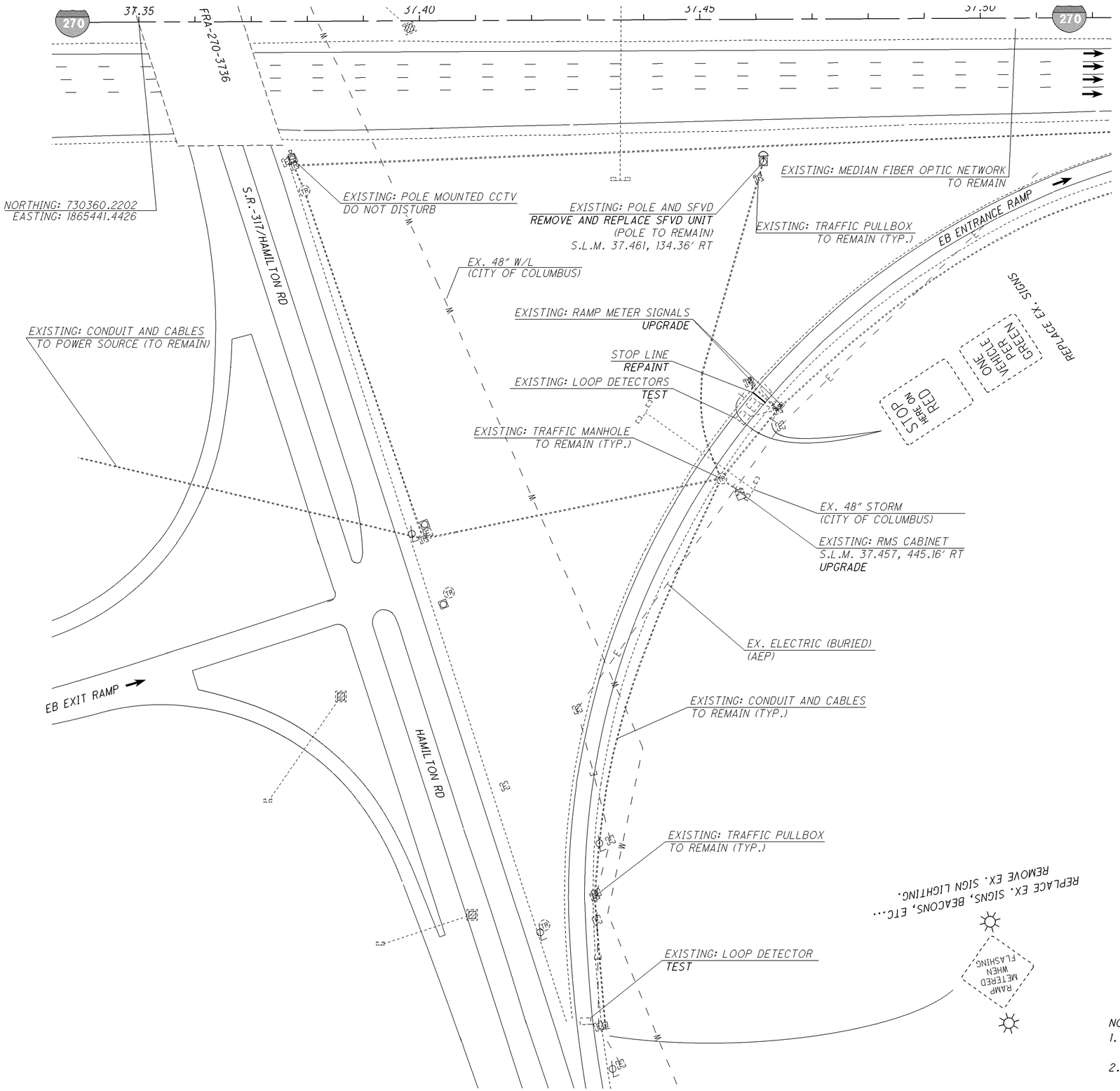
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

RMS - I-270 EB ENTRANCE RAMP

1. RAMP METER SIGNALS
   - -UPGRADE
2. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
3. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
4. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
5. LOOP DETECTORS
   - -TO BE TESTED
6. SFVD UNIT
   - -REMOVE AND REPLACE EXISTING POLE MOUNTED SFVD AND CABLE

NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 24 STRAND, SINGLE MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF I-270.
2. THE EXISTING FIBER DROP TIES INTO AN OPTICAL TRANSCIEVER IN THE CABINET.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - I-270 AT SR-317/HAMILTON RD SITE 16

FRA-RAMP METER UPGRADE

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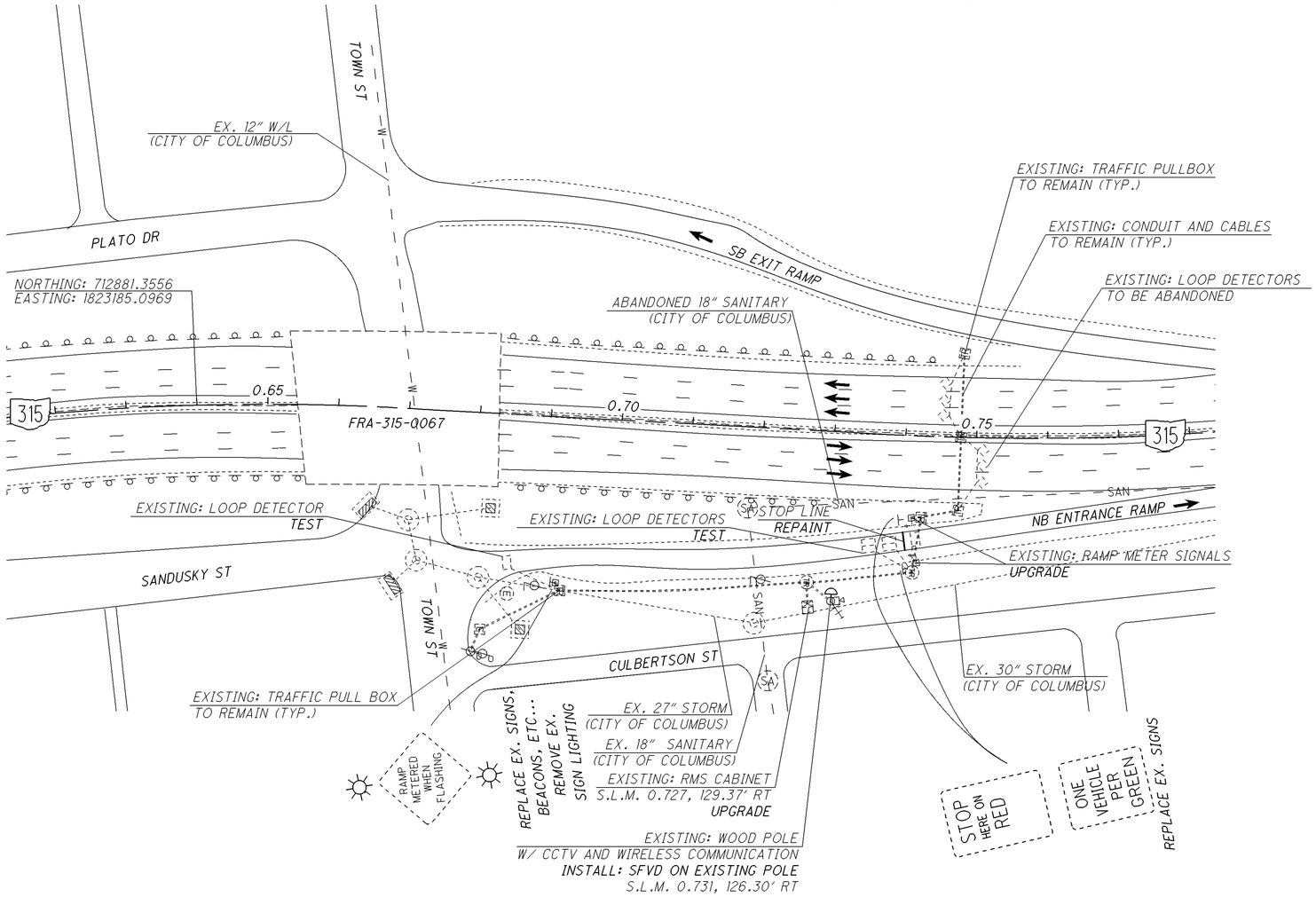
SEE SHEET 16 FOR LEGEND.

SCOPE OF WORK:

RMS - SR-315 NB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD
   - -ATTACH TO EXISTING WOOD POLE



NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH WIRELESS RADIO.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - SR-315 AT TOWN ST
SITE 17

FRA-RAMP METER UPGRADE

36
41

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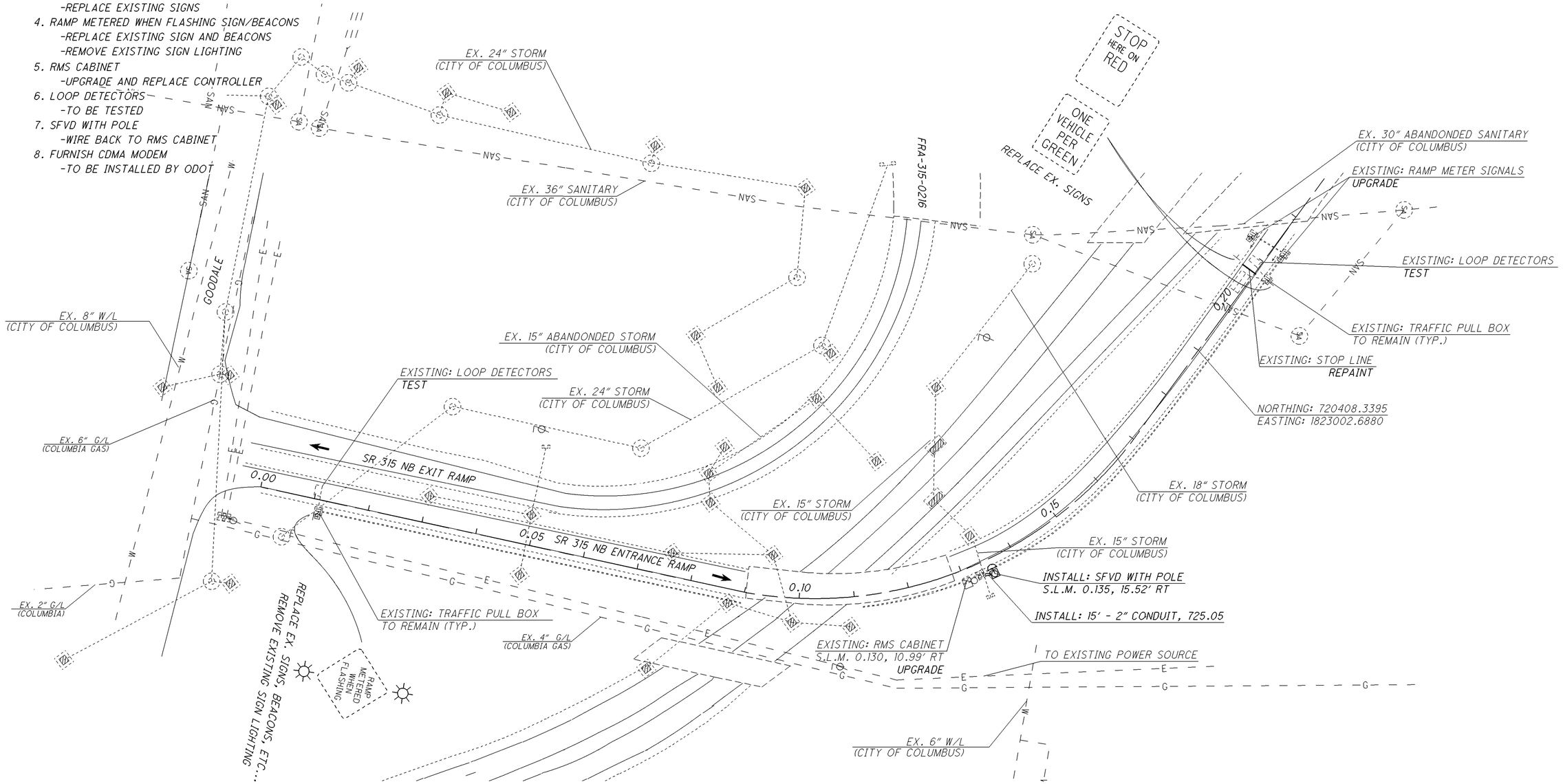
SEE SHEET 16 FOR LEGEND.

SCOPE OF WORK:

RMS - SR 315 NB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
7. SFVD WITH POLE
   - -WIRE BACK TO RMS CABINET
8. FURNISH CDMA MODEM
   - -TO BE INSTALLED BY ODOT



HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - SR-315 AT GOODALE
SITE 18

FRA-RAMP METER UPGRADE

37
41

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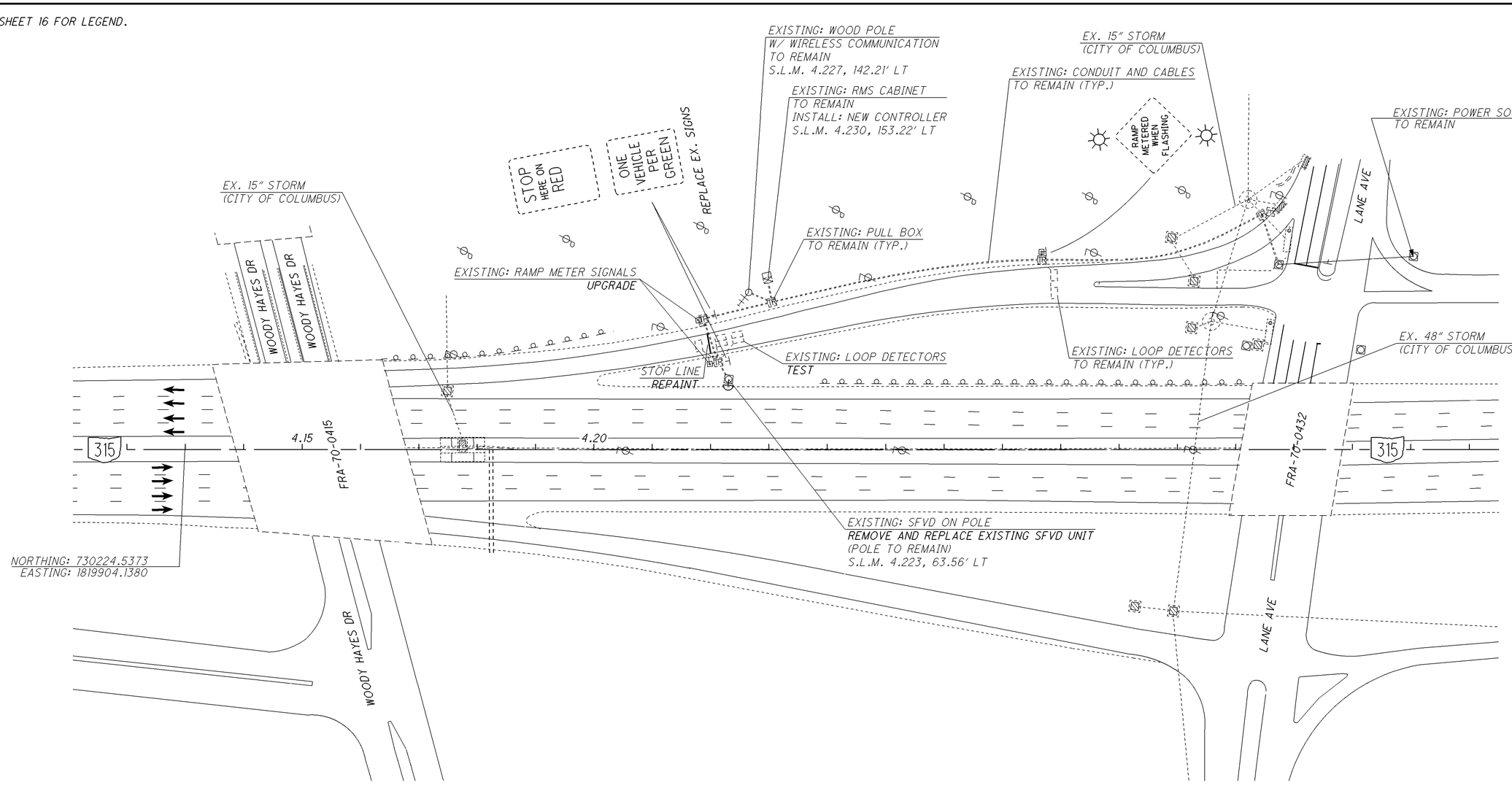

SCOPE OF WORK:

RMS - SR-315 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED
6. SFVD ON EXISTING POLE
   - -REMOVE AND REPLACE SFVD UNIT (REWIRE BACK TO RMS CABINET)

NOTES:
1. EXISTING COMMUNICATIONS IS THROUGH WIRELESS RADIO.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - SR-315 & LANE AVE
SITE 19

FRA-RAMP METER UPGRADE

38
41

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SEE SHEET 16 FOR LEGEND.

SCOPE OF WORK:

RMS - SR-315 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   - -REPAINT
2. RAMP METER SIGNALS
   - -UPGRADE
3. RAMP METER SIGNS
   - -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   - -REPLACE EXISTING SIGN AND BEACONS
   - -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   - -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   - -TO BE TESTED

SFVD - SR-315 SB

1. SFVD
   - -INSTALL ON EXISTING CCTV POLE AND WIRE BACK TO RMS CABINET
   - -DROP ETHERNET PORTION OF THE CABLE INTO THE CCTV CABINET

EXISTING: POWER SOURCE

EX. 24" W/L (CITY OF COLUMBUS)

EX. 4" GL (COLUMBIA GAS)

OLENTANGY RIVER RD

EX. 30" SANITARY (CITY OF COLUMBUS)

EXISTING: CONDUIT AND CABLES TO REMAIN (TYP.)

EXISTING: LOOP DETECTOR TEST

RAMP METERED WHEN FLASHING

EX. 24" W/L (CITY OF COLUMBUS)

BURIED ELECTRIC (CITY OF COLUMBUS)

EX. 18" STORM (CITY OF COLUMBUS)

EXISTING: RMS CABINET S.L.M. 7.960, 165.13' LT UPGRADE

EXISTING: PULL BOX TO REMAIN (TYP.)

EXISTING: TRAFFIC PULL BOX TO REMAIN (TYP.)

EXISTING: CONDUIT W/ F/O DROP CABLE W/ POWER CABLE TO REMAIN (TYP.)

EXISTING: POLE MOUNTED CCTV AND CABINET TO REMAIN
INSTALL: SFVD (ON EXISTING CCTV POLE)
S.L.M. 7.785, 72.96' LT

STOP HERE ON RED

ONE VEHICLE PER GREEN

REPLACE EXISTING SIGNS

EXISTING: LOOP DETECTORS TEST

STOP LINE REPAINT

EXISTING: RAMP METER SIGNALS UPGRADE

HENDERSON RD

FRA-70-0778

315

7.80 7.85 7.90 7.95 8.00

NORTHING: 748058.2939
EASTING: 1819450.5198

EX. 72" STORM (CITY OF COLUMBUS)

EXISTING: LOOP DETECTORS (QTY. 6) TO BE ABANDONED

EXISTING: CONDUIT TIES INTO EX. F/O COMMUNICATION NETWORK TO REMAIN

EXISTING: TRAFFIC PULL BOX W/ F/O DROP TO REMAIN

NOTES:

1. EXISTING VDS COMMUNICATIONS IS THROUGH AN EXISTING 72 STRAND, SINGLE MODE FIBER OPTIC CABLE TRUNK LINE EAST SIDE OF SR-315.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - SR-315 & HENDERSON RD SITE 20

FRA-RAMP METER UPGRADE

39
41

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SEE SHEET 16 FOR LEGEND.

315 8.65

8.60

EXISTING: VDS CABINET
TO REMAIN

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

EXISTING: STRAIN POLE
POWER SOURCE (TOP OF POLE)
TO REMAIN

EXISTING: CCTV AND POLE
TO REMAIN

EXISTING: CONDUIT
W/ F/O CABLE
TO REMAIN

EXISTING: LOOP DETECTORS (QTY. 6)
TO REMAIN

EXISTING: CONDUIT
TO REMAIN (TYP.)

EXISTING: PULL BOX
TO REMAIN (TYP.)

FRA-315-0857

8.55

EXISTING: CONDUIT
W/ F/O TRUNK LINE TO REMAIN

EXISTING: SFVD SUPPORT FOUNDATION
TO REMAIN

EX. OVERHEAD ELECTRIC
(AEP)

EX. 15" STORM
(CITY OF COLUMBUS)

8.50

8.45

315

BETHEL RD

STOP
HERE ON
RED

ONE
VEHICLE
PER
GREEN

REPLACE
EX. SIGNS

EX. 30" W/L
(CITY OF COLUMBUS)

STOP LINE
REPAINT

EXISTING: LOOP DETECTORS
TEST

EXISTING: RAMP METER SIGNALS
UPGRADE

EXISTING: TRAFFIC MANHOLE
TO REMAIN (TYP.)

INSTALL: 55' - 2" CONDUIT, 725.051

EXISTING: RMS CABINET
S.L.M. 8.475, 208.36' LT
UPGRADE

INSTALL: SFVD WITH POLE
S.L.M. 8.870, 122.00' RT
NORTHING: 751121.1677
EASTING: 1819745.7495

EXISTING: CONDUIT
W/ POWER AND SIGNAL CABLE
TO REMAIN (TYP.)

EXISTING: CONDUIT
TO REMAIN (TYP.)

EXISTING: LOOP DETECTOR
TEST

EXISTING: PULL BOX
TO REMAIN (TYP.)

EXISTING: LIGHTING STATION
POWER SOURCE
TO REMAIN

RAMP
METERED
WHEN
FLASHING

SCOPE OF WORK:

RMS - SR-315 SB ENTRANCE RAMP

1. RAMP METER STOP LINE
   -REPAINT
2. RAMP METER SIGNALS
   -UPGRADE
3. RAMP METER SIGNS
   -REPLACE EXISTING SIGNS
4. RAMP METERED WHEN FLASHING SIGN/BEACONS
   -REPLACE EXISTING SIGN AND BEACONS
   -REMOVE EXISTING SIGN LIGHTING
5. RMS CABINET
   -UPGRADE AND REPLACE CONTROLLER
6. LOOP DETECTORS
   -TO BE TESTED
7. SFVD WITH POLE
   -INSTALL AND WIRE BACK TO RMS CABINET

NOTES:

1. EXISTING COMMUNICATIONS IS THROUGH AN EXISTING 72 STRAND, SINGLE MODE FIBER OPTIC CABLE TRUNK LINE THAT RUNS DOWN THE MEDIAN OF SR-315.

HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - SR-315 & BETHEL RD
SITE 21

FRA-RAMP METER UPGRADE

40
41

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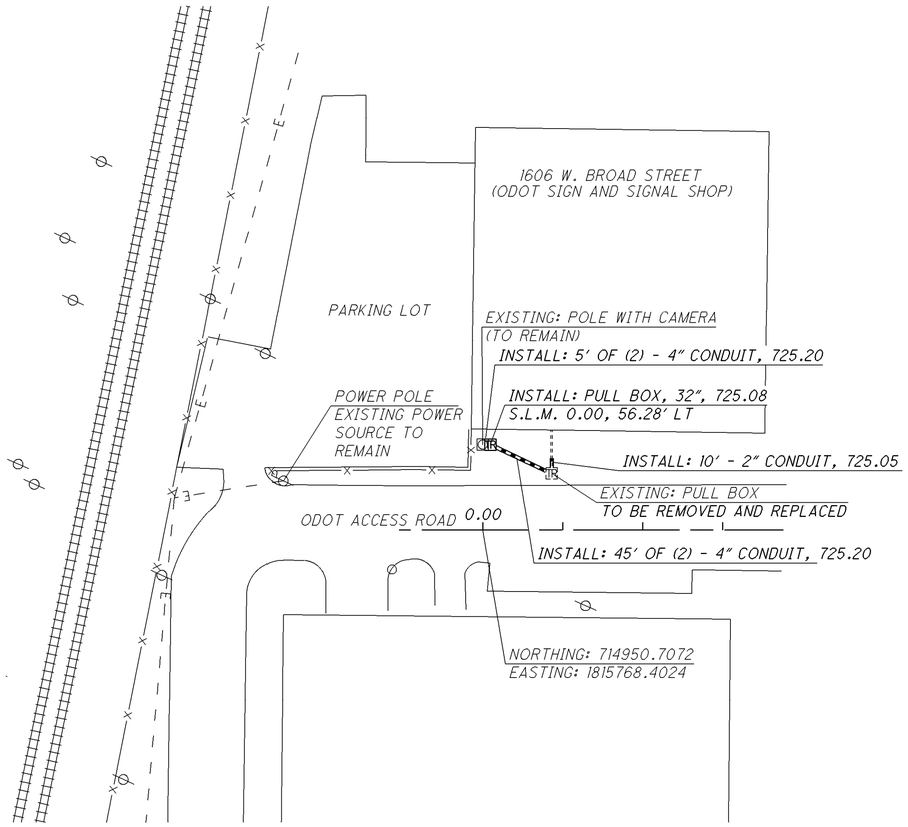
SEE SHEET 16 FOR LEGEND.



SCOPE OF WORK:

1606 W. BROAD STREET
1. INSTALL NEW PULL BOX AND CONDUIT TO EXISTING CAMERA POLE
2. REMOVE AND REPLACE EXISTING PULL BOX

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HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED RJL
CHECKED NAH

PLAN - 1606 W. BROAD ST
SITE 22

FRA-RAMP METER UPGRADE

SPECIAL PROVISIONS

ITS
4/8/2013

FRA-RAMP METER UPGRADE

PID: 92381

Item 631 632E90300 Signalization, Misc.: Radar Vehicle Data Detector Interface ..... Pages 2-3

Item 632 632E90400 Signalization Misc: Ramp Metering Station ..... Pages 4-12

Item 633 633E99000 Controller Item, Misc.: Ramp Metering Controller ..... Pages 13-14

Item 633 633E99000 Controller Item, Misc.: Ramp Metering Controller, Alternate Bid (McCain) ..... Pages 15-16

Item 633 633E99300 Controller Item, Misc.: Central System Software ..... Pages 17-34

Item 633 633E99300 Controller Item, Misc.: Central System Software, Alternate Bid (McCain) ..... Pages 35-36

SPECIAL PROVISIONS

Item 632E90300
Signalization, Misc.: Radar Vehicle Detector Interface

FRA-RAMP METER UPGRADE

PID: 92381

4/8/2013

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

ITEM 632, SIGNALIZATION, MISC.: RADAR VEHICLE DETECTOR DATA INTERFACE

April 8, 2013

GENERAL

The CONTRACTOR shall provide a complete data interface package to ODOT as specified below:

The data interface shall be Econolite RTMS WATER, Wavetronix Command, or approved equal and shall provide real-time traffic measurement and data collection over ethernet and serial networks. The data interface shall be capable of monitoring traffic networks from multiple locations. Data shall be sent from the rvd over the ODOT network to the head-end data interface system for storage in a real-time database. Shall be configured to show a real-time speed map for the locations where detection is being installed on this project. Training shall be provided to odot personnel for adding additional rvd station information to the speed map so that they update accordingly. The data interface shall support tcp/ip communications, as well as serial communications. The data interface shall be capable of communicating and storing data (volume, occupancy, classification, speed, etc.) On a lane by lane basis from a minimum of 1000 detectors of the type EIS RTMS model G4, EIS RTMS model x3, Wavetronix Smartsensor 105, and Wavetronix Smartsensor HD in a real-time and archival SQL database. The database shall create reports based on the time period requested by the user for the following time periods: (real-time per 30 seconds, aggregate 15 minute monthly data period, aggregate 15 minute yearly data period, aggregate hourly monthly data period, aggregate hourly yearly data) and shall include only the specific data types (volume, speed, occupancy, classification, etc.) That the user is requesting. The data interface shall be configured to allow for specialized queries and reports to be generated based on the user requested information and shall be capable of being accessed over the ODOT network via webpage query and report. The data interface shall be windows based and shall use the real-time mapping system generated by BING.

HARDWARE

The CONTRACTOR shall provide to ODOT a hardware server with the following minimum specifications to house the ramp meter database package and the radar vehicle detector data interface:

- Dual 24 inch flat panel monitors
- 2 – quad-core Intel processors (2.33 GHZ or higher)
- Memory – 128 GB
- DVD ROM drive
- 2 – 146 GB 15k RPM - hot swappable hard drives to be mirrored for operating system install
- 2 – hot pluggable redundant power supplies
- 6 – 300 GB 15k RPM – hot swappable hard drives to be mirrored for database system – data storage
- Embedded gigabit network adapter
- 3 year, 4 hour response time, 24x7 parts and on-site labor warranty

BASIS OF PAYMENT

All miscellaneous equipment and supplies necessary for the proper function of the radar vehicle detector data interface package shall be incidental to the bid item "Item 632, Signalization, Misc.: Radar Vehicle Detector Data Interface", each.

Item 632E90400
Signalization Misc.: Ramp Metering Station

FRA-RAMP METER UPGRADE

PID: 92381

4/8/2013

ITEM 632 SIGNALIZATION MISC.: RAMP METERING STATION

GENERAL
This item of work shall consist of furnishing, installing, and testing of existing ramp metering stations to conform to the new specifications as described within. This specification describes the minimum requirement for the ramp metering signal, hardware, and software as furnished and installed by the Contractor. The ramp meter signal shall be capable of being operated by the Ohio Department of Transportation's Intelligent Transportation System (ITS). The ramp meter shall also be capable of operating locally in a traffic responsive operation. This shall be performed by means of loop detectors, side-fired radar detectors, and traffic responsive ramp metering software installed locally in the ramp metering signal controller.

PLAN AND SPECIFICATION COMPLIANCE
The Contractor shall provide all services and equipment necessary to bring the existing ramp metering stations in compliance with the construction plans and material specifications, including all supplemental specifications and in accordance with the specifications listed below.

1. ODOT, Bureau of Design Services, Standard Construction Drawings TC-82.10, TC-83.10, TC-83.20, TC-85.10, HL-30.11.

2. ODOT, Construction and Material Specifications, 2008.

3. CALTRANS, Transportation Electrical Equipment Specifications, TEES, published March 2009.

4. Traffic Signal Control Equipment Specifications, current edition, published by the California Business, Transportation & Housing Agency, Department of Transportation, P.O. 942874, Sacramento, CA 94274-0001.

5. Human Engineering Design Criteria for Military Systems, Equipment, and Facilities. MIL-STD-1472D.

6. National Electrical Manufacturers Association Standards Publication TS-1, Parts 1, 2, 5, 6, 8, 13, and 14.

7. National Electric Code.

8. International Municipal Signal Association, Inc.

In case of any conflicting specification statements, the specification document hierarchy shall be in the order of "Supplemental Specifications and then follow the order listed above from 1 (highest) to 8 (lowest).

USER CHARACTERISTICS
All field programming shall be accomplished through the use of a plug in laptop computer and downloaded to the field processor. All data shall be in a user friendly form, not requiring the use of hexadecimal input nor frequent references to either printed material or other screens on the loading program.

HARDWARE REQUIREMENTS
RAMP METER STATION

a. Ramp meter control equipment shall be located as per plan, and per the typical drawing.

b. Mean time between failures for the controller and cabinet hardware shall be 30,000 hours. This shall be documented and certified by the manufacturer(s) of the various hardware items.

c. The CONTRACTOR shall install 2 – 4" Multi-cell, Schedule 40 conduit and one 2" conduit between the closest 32"/36" pull box and the Ramp Meter Station cabinet as shown in the plans.

d. The CONTRACTOR shall install communication path and hardware as reflected and specified in the plans.

e. The PRIME CONTRACTOR shall hire an EIS representative (800-668-9385) to perform a site visit to direct on the exact placement of the Microwave Radar poles and detector mounting height. The Microwave Radar units shall be placed in a position that is downstream from the merge-point of the ramp with the mainline.

f. The Ramp Metering Station controller and related hardware shall be housed in a cabinet, Type 334, as per Ohio Department of Transportation Material and Construction Specifications, 2008, Section 733.03 and the CALTRANS TEES 2009. Cabinet shall be included with Work Pads per ODOT Specification 633.11.

g. Each ramp meter station shall consist of all hardware needed to be fully functional. At a minimum, the following hardware shall be furnished, installed, and included in the bid price for ITEM 632 "Signalization, Miscellaneous: Ramp Meter Station each:

- Model 2070E Controller w/ 7A Serial Module, 1E or 1C CPU, and 2E Field I/O Module
- Model 206 Power Supply Module.
- Model SSS-86IO Flasher Module, Model 204, or equivalent.
- Model 200 Load Switch, or Model SSS-88, or equivalent shall be used to power signal heads (Qty. 3 per Ramp Meter Station)
- Model 222 Two (2) Channel Loop Detectors units to cover all detector loops in the plans as wired per wiring diagram and input file software requirements.
- If testing results show that ramp detector loops need replaced, Contractor has the option of utilizing Sensys Equipment (Sensor, APCC, Access Point, Repeater, CC Card, EX Card) (Software must be supplied to communicate with these units remotely) (Any poles needed to mount Access point and Repeaters shall be incidental to this item)
- Vehicular Signal Heads, Miscellaneous: 12", 2-section LED per ODOT standard Specification, five (5) units, polycarbonate housing with aluminum visors (Yellow).
- Pedestals, 8', Transformer Base per ODOT Standard Specification, two (2) units.
- Pedestals, Foundations per TC-83.20 per ODOT Standard Specification, two (2) units.
- "Stop Here on Red" right arrow 24" x 30" sign including support.
- "Stop Here on Red" left arrow 24" x 30" sign including support.
- "One Vehicle per Green" 24" x 24" sign, two (2) units.
- Ramp Meter Sign, per ODOT Standard Specification, including:
  - Pole, breakaway, foundation, and anchor bolts.
  - Sign, signal beacons, and all mounting hardware.
- Microwave Detector support, located a minimum of 500 feet downstream from the ramp merge point with the mainline, as detailed within including:
  - Pole, foundation, and anchor bolts
  - Microwave Detector, Model
    - EIS Model X3/G4, with loop emulation option or other approved method, one (1) Ethernet connection, and one (1) RS485/RS422 communications with following options
      - EIS loop emulation detector units to cover all lanes in the mainline roadway.
      - Cable shall be installed from microwave detector to ramp meter cabinet for Loop Emulation and RS485/RS422 communications.
      - Shall be equipped with internal camera for use with remote field verification of the ramp meter
      - Bluetooth Module

- 2 EDCO PC642C020 surge suppressor w/ compatible PCB1B base, Qty. 2 per Ramp Meter Station, or equivalent
- Detector Loop Terminal Strip shall be located on the inside of the cabinet so as to provide easy access to the Loop Detector Connections.

- 19" Rack-mount pull-out drawer to house spare parts and any technical drawings/information per ODOT Construction and Material Specification 733.03.D.4
- There shall be enough power outlets installed in each cabinet to power all devices and provide ITS engineers with two additional GFCI outlets for testing equipment.
- Qty. 1 – 16 Mbit Datakey per controller installed.

Additional Cabinet Power Surge Suppression

In addition to the surge suppression provided on the incoming power to the cabinet, Surge Suppression shall be installed, in order to provide protected power outlets to all devices placed in the cabinet. This surge suppression shall be capable of being plugged into a standard 5-15 outlet. This device shall meet the following minimum specifications:

- 9 NEMA 5-15 outlets
- Shall mount in a standard 19" rack
- Energy Handling – 1280 Joules
- UL 1499 let through rating – 400 Volts
- Surge Current Rating – 50,000 Amps
- Output Current – 15 A

This secondary Surge Protection shall be included in the bid price for the Ramp Metering System.

h. In addition to the hardware documentation required by the CalTrans Specifications, five (5) copies of the ramp metering software operation manuals and documentation shall be delivered to the Intelligent Transportation Systems (ITS) Engineer six (6) weeks prior to delivery of the controller.

i. Upon receipt of these copies, the ITS Engineer will furnish the CONTRACTOR with the data needed to start up the system. An ITS Engineer (614-387-4013) shall be contacted three (3) days prior to the activation of the ramp meter, in order for the Engineer to perform on-site testing when the activation starts.

RAMP METER SIGNAL DISPLAY

a. Ramp meter signal displays shall be located as shown on the plans and on the typical in the plans.

b. The foundation, transformer base, and pedestal shaft shall conform to Standard Construction Drawing TC-83.20.

c. Signal heads shall be 12", two section, red over green, LED and shall conform to 732.01. The signal housings shall be polycarbonate with aluminum visors. The low mounted signal head shall be mounted as shown on Standard Construction Drawing TC-85.10. All signal head mounting hardware shall be aluminum.

d. The signal display shall be bid as part of the Ramp Meter Station item. It includes the foundation excavation, foundation concrete, anchor bolts, transformer base, pedestal shaft, signal heads complete with bulbs, reflectors and lenses, attaching hardware and all other items necessary for complete installation. Electrical cable will be paid as a separate item.

RAMP METER SIGN

a. Ramp meter sign and warning flashers shall be installed as per the Ramp Meter Sign drawing. All signs shall be of the high-visibility retro-reflective type.

b. This item shall include the foundation excavation, foundation concrete, anchor bolts, breakaway base, pole, sign, sign brackets, sign luminaire, flashers, cabinet installed flasher module, mounting hardware, and all other items necessary for a complete installation.

c. Electrical cable will be paid as a separate item. A quantity of signal cable, five (5) conductors, #14 AWG will be provided – two (2) conductors of which is for the flashers and two (2) conductors for the luminaire.
Electrical cable shall be paid under ITEM 632E40500 SIGNAL CABLE, 5 CONDUCTOR, NO.14 AWG

SOFTWARE REQUIREMENTS

RAMP METERING CONTROLLER PROCESSOR

a. Shall be compatible with the Ohio Department of Transportation's specified data protocol for communications with the Traffic Management Center (1980 W. Broad St, Columbus, Ohio)/ ITS Lab (1606 W. Broad St, Columbus, Ohio) for both (accepts and transmits)

b. Processes all local detector data.

c. Turn advanced warning sign beacons on 20 seconds prior to metering operation displaying first RED signal

d. Ramp loop monitoring and error flagging.

e. Dwell in steady green during all non-metering periods.

LOCAL METERING CAPABILITY

a. Local parameters can be entered, modified, and viewed using a laptop computer and on-screen display:
   - Table appears on the screen.
   - Type over to enter or modify local database.
   - Direct numerical input to PC.
   - No direct Hexadecimal or machine input required by the person entering the data.
   - Ramp Meter Controller Status Display showing minimum of the following real-time data:
     1. Ramp Meter Operation
        a. Implemented Action
        b. Metered Lane Interval
        c. Command Source
        d. Metering Level
        e. Metering Rate
        f. Minimum Metering Time
        g. Minimum Non-Metering Time
        h. Interval Timer
     2. Mainline Data
        a. Station Average Speed, Occupancy, and Flow Rate
        b. Average Mainline Station Speed, Occupancy, and Flow Rate per Lane
        c. Historical Station Average Speed, Occupancy, and Flow Rate

b. The ramp metering software shall utilize a NTCIP 2070 controller and shall be capable of setting the following parameters with minimal effort:
   - Operational Minimum Metering Rate
   - Operational Maximum Metering Rate
   - Startup Warning Time
   - Minimum Green Time
   - Maximum Green Time
   - Minimum Red Time
   - Short Stop Time
   - Red Violation Clearance Time
   - Red Violation Adjustment Time
   - Shutdown Warning Time

- Shutdown Time
- Post Metering Green Time

c. The ramp metering software shall be capable of performing the following user-defined ramp metering modes:
   - Fixed Time-of-Day Metering
   - Local Traffic Responsive Metering based on downstream mainline conditions communicated from the Side-fired radar vehicle detector.
     i. Capable of utilizing both Speed and/or Occupancy Mainline Data as defined by the End-User on a lane-by-lane basis
   - Dwell in Green during all non-metering periods.
   - Emergency Green and/or Pre-emption green
   - Rest in Dark

d. The ramp meter shall have the capability of being controlled/programmed by the following sources (Prioritized from Highest Priority to Lowest Priority):
   - Central Command
   - Manual Control (Locally)
   - Time-Based (Local Controller Settings)

e. The ramp meter shall have the following loop detector inputs:
   - Demand
   - Passage
   - Intermediate Queue
   - Excessive Queue

f. Metering Modes:
   - Fixed rate metering.
   - Local traffic responsive metering based upon:
     1. Volume and Occupancy thresholds.
     2. Volume only threshold.
     3. Occupancy only threshold.

SOFTWARE

The following up-to-date documentation shall be furnished with each ramp meter cabinet:
- Full operating instructions.
- Full software documentation

TRAINING

GENERAL

The CONTRACTOR shall supply a 16 hour classroom and hands-on training session for maintenance personnel in the operation and maintenance of all field equipment.. The personnel shall be designated from ODOT.

Training in proper maintenance and operating procedure is a key element in the success of any traffic control system. The CONTRACTOR shall provide all maintenance and local operations training prior to any equipment being made operational in the field.

Training shall be provided by personnel thoroughly familiar with the equipment operation. This may be the CONTRACTOR's personnel, equipment manufacturer representatives, or a combination of the two. A complete course outline and summary of the experience and qualifications of the instructional personnel shall be submitted and approved by the ITS ENGINEER prior to the start of training. Training sessions may be combined and/or shortened with the agreement of the ITS ENGINEER and the CONTRACTOR.

Recommended test equipment, literature, and drawings for the classes shall be furnished by the CONTRACTOR. At the conclusion of classes all items furnished, which are not currently owned by ODOT, shall be turned over to the ITS ENGINEER.

MAINTENANCE PERSONNEL TRAINING

Training for maintenance personnel shall consist of two separate and identical courses of 16 classroom and system demonstration hours each. Training shall be as follows:

Part 1: 8 hours: The objective of Part 1 is to provide operational description, troubleshooting procedures, recommendations for test equipment, test equipment use, repair procedures, design data, and drawings for Ramp Meter Cabinets and equipment furnished as part of this project. This training shall be provided before the first ramp meter is installed.

Part 2: 8 hours: The objective of Part 2 is to provide "hands on" experience with trouble shooting software, manuals, drawings, and test equipment for all Ramp Metering and communications equipment furnished as part of this project.

Training shall be conducted at ODOT Central Office. The training shall, when possible, make use of and be centered around test equipment presently owned by the owner agencies. The CONTRACTOR is responsible for determining the test equipment available at each of the various maintenance agencies. Class size for each of the two courses shall be limited to fifteen (15) persons to afford maximum individual experience.

All training class time (indoors or outdoors) shall be videotaped by the CONTRACTOR on standard format. The media shall be turned over to the ITS ENGINEER following the training.

TESTING AND CERTIFICATION

1. All loops installed by the CONTRACTOR shall be tested for continuity (paragraph 3) and insulation (paragraph 4) as per 632.27. The insulation resistance measured to ground shall not be less than one hundred (100) megohms. A copy of the test records shall be furnished to the ODOT ENGINEER. Any loops which test open or less than one hundred (100) megohms to ground shall be re-cut at the CONTRACTOR's expense.

2. California Standard Specifications, July 1992, test number 658, 659, and 667.

3. Ramp Meter Testing, Local and Remote Operation.

   Each ramp meter installed under this project, including all hardware and software components, warning sign, and loop detectors, shall be tested for operational completeness. Testing shall be performed in the presence of an ITS ENGINEER and/or his/her designated representative and shall consist of Pre-Test check-out Test and a Ramp Meter Sixty-day Performance Test.

   The CONTRACTOR shall state, to the ENGINEER, in writing, that the ramp meter is complete and ready for local testing. Within five (5) days upon receiving this notification the ENGINEER shall begin the Pre-test Check-out.

   a. Pre-test Check-out
      The ENGINEER and/or his/her representative shall thoroughly exercise the system, using and test or procedure that would demonstrate the capabilities of each component. All hardware, software, and performance functions, including the maintenance and troubleshooting software, shall be individually checked for compliance with the specifications. Training is considered a system component and shall have been furnished before the tests can begin.
      Any portion of the project which does not meet these specifications shall be corrected by the CONTRACTOR and rechecked by the ITS ENGINEER. The CONTRACTOR shall demonstrate that the field equipment can meet the requirements as specified in this document.

   b. Ramp Meter Sixty-day (60) Performance Test – Local Control.

Following successful completion of the Pre-test Check-out, and the correction, repair and/or replacement of identified deficiencies, the CONTRACTOR shall demonstrate that the system satisfies the specified operational requirements as an integrated unit by operating the system continuously for ten (10) consecutive days without major malfunction or failure.

The CONTRACTOR shall notify the ENGINEER, in writing, that the Ramp Meter Sixty-day (60) Performance Test will begin on a date and time mutually acceptable to all parties, including the City.

During the Ramp Meter Sixty-day (60) Performance Test the ITS ENGINEER shall exercise the system and document the performance of all specified features and any other events, which could be expected to occur in an operational Traffic Management System, including the simulation of failures. During the system exercise, the Ramp Meter Sixty-day Performance Test may be suspended or terminated by the ENGINEER or the CONTRACTOR. Suspension is defined as halting the test progress, the CONTRACTOR or City taking necessary corrective action, and the test being resumed from the point of suspension. Termination is defined as halting the test. In the event of termination, the CONTRACTOR shall take necessary corrective action, ant the test shall be restarted from the beginning. Any corrective action shall be by mutual agreement between the CONTRACTOR and the ENGINEER.

The Ramp Meter Sixty-day (60) Performance Test may be suspended for the following reasons, including but not limited to:

- Failure of interference due to conditions beyond the control of the CONTRACTOR, such as vandalism, traffic accidents, power failures, and similar occurrences.
- Communications noise from an outside source.
- Failure of any support or diagnostic equipment necessary to successfully test the system.
- Failure of any communications hub.
- A hardware failure of the computer or associated critical peripheral equipment, or a computer software error, which causes the system to crash or behave erratically.

The Ramp Meter Sixty-day (60) Performance Test may be terminated for the following reasons, including but not limited to:

- Failure of any hardware or performance item to meet these specifications.
- Communications noise from an outside source.
- Failure of software to change timing patterns or go from metering to non-metering in the local mode of operation.
- Failure of the warning sign to operate properly, except for lamp outages.
- Intermittent or catastrophic failure of any ramp meter loop detectors.
- Failure of any electronic component in the ramp meter cabinet.
- The appearance of any problem, which, in the opinion of ODOT or its representative, has a significant effect upon the reliability, safety, or operation of the system.

Each ramp meter will be tested for proper operation from the ODOT ITS Lab, 1606 West Broad St., Columbus, Ohio.

BASIS OF PAYMENT

The testing report shall be turned into the ENGINEER and all deficiencies corrected before payment of any "Item 632", "Signalization, Miscellaneous: Ramp Metering Station" item. The pay item will pay for each station that furnish and install and approved by the ENGINEER.

WARRANTY

Following successful completion of the sixty-day (60) Performance Test and Construction Acceptance, a Warranty Period shall commence. The purpose of this period is to ensure that all components of the Ramp Meter function in

accordance with the specification over an extended length of time, and to provide continuing assistance to the City in all phases of system operation as required. This consists of the Five Year Warranty Period. For a Five (5) year period, beginning at construction acceptance of the system, the CONTRACTOR shall be responsible for the proper performance of all equipment, except lamps. The CONTRACTOR is also responsible for obtaining technical assistance from the equipment manufacturers / Head-End software integrators and/or suppliers in cases where programming, operational or adjustment difficulties are encountered; the CONTRACTOR shall be responsible from providing training to the ODOT on any ramp meter equipment if new or unusual problems/repairs are discovered during the Warranty Period. The CONTRACTOR shall be responsible for correcting any problems attributable to poor workmanship and/or equipment.

Item 633E99000 Controller Item, Misc.: Ramp Metering Controller

FRA-RAMP METER UPGRADE

PID: 92381

4/8/2013

ITEM 633 CONTROLLER ITEM, MISC.: RAMP METERING CONTROLLER

GENERAL
This item of work shall consist of furnishing a ramp meter controller conforming to the ramp meter controller specifications further described in the ITEM 632 SIGNALIZATION, MISC.: RAMP METERING STATION in the document.

BASIS OF PAYMENT
The Department will measure per each "Item 633, Controller Item, Misc.: Ramp Metering Controller" by the number of complete units furnished, installed, and accepted by the ODOT ITS LAB.

Item 633E99000 Controller Item, Misc.: Ramp Metering Controller, Alternate Bid (McCain)

FRA-RAMP METER UPGRADE

PID: 92381

4/8/2013

RAMP METERING CONTROLLER

The CONTRACTOR shall provide a bid price for each of the following alternate bid options:

Item 633 633E99000 Controller Item, Misc.: Ramp Metering Controller, Alternate Bid (McCain)

The CONTRACTOR shall furnish a MCCAIN 2070 E controller loaded with MCCAIN Ramp Meter Software, Program 2042.

GENERAL
This item of work shall consist of furnishing a ramp meter controller conforming to the ramp meter controller specifications further described in the ITEM 632 SIGNALIZATION, MISC.: RAMP METERING STATION in the document.

BASIS OF PAYMENT
The Department will measure per each "Item 633, Controller Item, Misc.: Ramp Metering Controller, Alternate Bid (McCain)" by the number of complete units furnished, installed, and accepted by the ODOT ITS LAB.

Item 633E99300 Controller Item, Misc.: Central System Software

FRA-RAMP METER UPGRADE

PID: 92381

4/8/2013

ITEM 633 CONTROLLER, MISC.: CENTRAL SYSTEM SOFTWARE

GENERAL
This document functionally specifies the Central System Software (CSS) for the proposed Statewide Ramp Metering System, SRMS.

CENTRAL SYSTEM SOFTWARE
The SRMS will provide the basis for the future direction of ramp metering for the Ohio Department of Transportation. The NTCIP/AB3418E compliant central system software that will be procured under the SRMS will be the system software that will be utilized to ultimately monitor and control all ramp meters that will eventually be connected to the ODOT network. The system shall be capable of communicating all NTCIP functions with multiple different versions of software based upon NTCIP requirements. Also, the software shall be capable of providing the requirements of this specification through the use of the CalTrans AB3418E protocol. The software shall be certified off-the-shelf software with no further integration/development required to meet these specifications. The only changes allowable for the software are once the project sells are for configurations of the software based on user-defined reports, appearance, etc.

The primary goals of the central system software shall be to provide the ODOT with real-time ramp meter and radar vehicle detector communications feedback monitoring (in graphical and text formats), general operational configuration, and database management for all interconnected ramp meter stations and/or intelligent communications devices. The server(s) shall use Microsoft Windows 2007 Server or newer and shall be capable of running fully-functional software clients on Windows 7 64-bit workstations. Radar vehicle detectors shall be one of the following types: EIS Model X3, EIS Model G4.

The system shall provide a fully operational ramp meter operation and management system capable of coordinating and/or monitoring all new 2070E controllers in existing cabinets. The RESPONDENT shall list in tabular form which controllers and firmware version/s for each controller type the proposed CSS shall communicate with and control.

The central software shall be modular in design and be capable of accepting (without changes to the basic system modules) additional functional modules. The following modules are desired:

- System Detector Station Software;
- Monitoring of Controller Access;
- Corridor-based Ramp Metering Plan Development and Implementation;
- Equipment Inventory Tracking;
- Radar Detector Station Software;
- Adaptive Ramp Metering Software (as it becomes available and ODOT chooses to use)

All software purchased, if any, under this contract shall include at least four (4) copies of the software's documentation, unless stated otherwise.

The central system integrates all software modules into a unified and comprehensive ramp meter control system. The software must use object-oriented, knowledge-based techniques to monitor and control ITS devices including ramp meter system software.

No sole-source devices or hardware components shall be permitted in the central system and associated hardware; all critical components shall be available from at least two sources. The system shall be built around commercially available, off-the-shelf personal computer hardware and software. The system shall also allow the ODOT to upgrade the performance as the PC industry advances.

SYSTEM SIZING REQUIREMENTS
The server must be designed to communicate with local ramp meter controllers, radar vehicle detector count stations, (hereinafter referred to collectively as "Devices") on a real-time basis. The capabilities the server PC shall provide:

- Support of up to10,000 Devices (ramp meters, radar vehicle detector count stations, local ramp meter detectors).

- Support for 2,000 system detectors and 40,000 local detectors.
- Real-time feedback (e.g. all status is processed and returned to the server system at one second intervals when monitoring specific devices). Applies to database logs and single ramp meter status displays.
- A historical log of all real-time events that occur.

GEOGRAPHIC AND FUNCTIONAL EXPANSION
The system is to be designed to provide for expandability, both geographical and functional. The system must provide for the easy addition of ramp meters, system detectors, and other field elements, as determined by ODOT.

SOFTWARE INSTALLATION
The installation of the software from storage media shall be completely automated. From the operating system command line, no more than two typed commands should be required to fully install all software. Once the software is installed, configuration screens shall allow the system administrator to set distinct operating features of the system. This does not apply to naming schemes of the system databases, files, etc.

DATABASE GENERATION AND MAINTENANCE
The data server shall be responsible for maintaining all of the databases that implement the user interface and system operations. The database format shall support SQL and shall allow the database files and indexes to be accessed by third-party utilities. There shall be no significant limitations on the size of the databases or database record fields other than that imposed by the hardware storage capacity.

Data-entry formats shall be designed for easy data preparation by the operators. All tables in the database shall be ODOT defined printable format for use by the traffic engineers and maintenance technicians in the field. Software shall also provide a means to export data tables to spreadsheet programs in comma-separated variable format (csv) and as text files. All columns and rows shall be clearly labeled using terms consistent with those used in the central software, local controller software, documentation, and training materials. In order to alleviate repetitive data entry, the system shall allow the operator to copy data tables for use with other devices.

Database generation of traffic control operations shall include safeguards to preclude dangerous or undesirable ramp meter operation. These safeguards shall, as a minimum, include that minimum non-metering and metering operation times have elapsed prior to the ramp meter returning the opposing operational mode. The minimum metering and non-metering operation times shall be configured by the administrator of the central control software and then when the central system compares local controller settings with the central system, a flag shall be generated if the local controller minimum operating time is less than that specified in the central software.

At a minimum, metering plan diagnostics shall check for the following:
- Metering Rates which violate minimum and maximum metering rates for a particular ramp metering station;
- Local metering plans that override the central control system commands (without administrator authorization);

When errors occur, the results shall be displayed clearly and concisely with information sufficient for timely correction by the operator.

The central system shall be capable of copying one controllers programming into a different controller of the same type in instances where the ramps are similar and may lie in the same region.

The central system shall also provide a means of recording device-specific text information. The ODOT wishes to have a simple way of documenting explanations of why changes were made to the programming of a particular ramp meter, for example. One way this could be accomplished is by providing a menu item which opens a text editor, permits the user to document changes, and save them to a text file specific to the ramp meter controller in question.

Similarly, the ODOT also wishes to have a means to produce graphics files, associated with specific devices, in jpeg or Windows™ bitmap format for the purpose of documenting unusual metering patterns, etc.

DATABASE RECOVERY

The Server software shall provide all the necessary utility operations for backing up, restoring, and repairing the databases to Blue-ray Disc or other external portable hard drives. There shall be only one operational set of the database files. This set shall reside on the data Server and shall be shared rather than copied by the workstations. This approach shall ensure database consistency and integrity among multiple users.

If the contractor's system configuration calls for the notebook computers to hold copies of the database, a means shall be provided to enforce regular updating by the user. The system administrator (and only the system administrator) shall have the means to decide how long a database may be considered valid. This period of time should be adjustable to a period of time of one week or less to a period of time as long as thirty days. The administrator shall have the authority to disable this feature if desired.

No less than forty-eight hours before the expiration of a database's validity (or the first time the user attempts to access the database when the remaining valid time is less than forty-eight hours), the software shall display a warning message to the user. This message shall be contained in a modal dialog box (e.g. one that must be acknowledged by the user) before operations can resume. This message shall be displayed every time the user attempts to access the database until it is updated from the central system.

If the deadline for updating passes and the database has still not been updated, the system shall display a message alerting the system operator that the update has not been performed and that an update must be completed before the operator can continue.

It shall be possible to update the database via dial-up or VPN connection to the server.

PERIODIC UPLOAD AND ARCHIVING OF FIELD DATABASES
The system shall perform periodic and operator scheduled upload of all field databases and compare such field databases with the central database, which shall be considered to be the master database.

In the event that a change is made to controller settings through the keypad or by means of a portable computer, controller should automatically upload any and all changes to the data server in the TMC. After uploading, this change will be logged and stored in the appropriate tables in the database.

This upload shall occur without operator intervention, and shall occur not more than thirty minutes after the last change was made. It shall be possible for this feature to be deactivated at the system operator's discretion. Operator may also choose to upload and compare databases manually, if desired.

In order to maintain a permanent record of every change made to the operation of a ramp meter or other field device, the management system shall create an archive file every time one or more changes are made to the settings. When requested, the management software shall display a list of all archived files. Next to each file on the list shall appear the date and time on which each archive file was created. These archives shall be easily accessible, viewable, and printable in the same format that current data would use. When viewed on a monitor or printed on paper, archived file shall show the date and time at which the archive file was created (as opposed to the date on which it was displayed or printed). These archives shall be grouped by ramp meter and sorted by date of change. These changes shall log the username of the operator making the change.

CORRECTION OF DATABASE DISCREPANCIES
Whenever a discrepancy is discovered between a field database and the central database, the software shall initiate one of three actions as defined by the operator:
- Automatically download the central database, overwriting the local controller; or
- Alert the operator of a discrepancy; or
- Alert the administrator and await authorization (authorization shall be granted by the following ways (simple text from administrator, simple email from administrator, system authorization by administrator)

When comparing field and central database parameters, the software shall highlight the discrepancies between the two data sets. The operator shall have the option of saving the uploaded field database or downloading the central database, or any part thereof, to the field. No changes shall be made without the system administrator's approval.

SYSTEM STARTUP AND SHUTDOWN

The ability of the system components to interact with each other shall not be governed by a structured start-up order. That is, if a component fails to operate or is powered down, the remainder of the system will not have to be shut down and restarted to re-establish a working system. The unaffected components will simply wait for the missing component to be returned to the system. When returned, all components will automatically revert to normal operations.

The system must be designed such that it will not need to be shut down. Hardware that is removed from active duty by power-down or cable-disconnect shall be reported by other components of the system to be non-responsive. When such equipment is powered up or reconnected, the system will respond by recognizing the return to normalcy and resume regular operations without operator interaction.

MULTI-USER ACCESS

The system software must support a multi-terminal, multi-user interface and allow access to multiple levels of the system simultaneously. The software package must support at least up to 20 user workstations for the ODOT simultaneously. A separate web-access feature shall allow the system operations to be viewable anywhere on the ODOT network, including VPN, but shall not allow any changes to be made to the system.

The system software must support Center-to-Center (C2C) operation with other jurisdictions by using NTCIP C2C protocols using the NTCIP Traffic Management Data Dictionary (TMDD) interface. If another jurisdiction is running the same system software as being provided for the ODOT, a Server-to-Server interface may be provided in lieu of a C2C interface for interfacing with that jurisdiction.

SYSTEM SECURITY

A dialog box shall be provided for the system administrator to set up a database of users and their privileges. Check boxes shall be shown for each defined area of system access, with separate entries for view and modify privileges. Several default sets shall be available, including such categories as "system administrator", "maintenance", and "traffic engineer". The software shall allow the system administrator to add additional categories. The software shall allow access to multiple levels of the system simultaneously. Each function of the system shall have separate privilege authorization.

The software shall establish and maintain a security system to prevent unauthorized access to the system. This shall apply to executable files as well as text files and database files. System security shall be ensured through the use of user-ID numbers, user-changeable passwords, and user specific view and modify privilege categories. The user shall be required to enter his or her user ID, while accessing the system by means of a work station or a remote terminal through an internet vpn connection. All significant operations performed by the user or occurring while the user is logged in shall be recorded in the Server's event log and shall be tagged with the user's ID, creating a system activity audit trail. All passwords shall be fully encrypted to help guard against outside "hacker" invasion. Successful completion of the log-in shall result in execution of a session start-up procedure.

The start-up procedure shall establish the privileges, object-menu options, windows, and tools an operator may utilize. Any functions to which an operator does not have access shall either not be shown or shall be grayed out. This will allow the operator to easily determine to which functions he has access. The system administrator must also be capable of setting an automated log-out for inactivity of a workstation.

REMOTE ACCESS

The software of the remote access computers should be the same version that is resident in the workstations and shall contain an active directory for assigning privileges as established by the system administrator. No scaled-down versions are acceptable. Each remote computer shall have all graphics files resident. All other database items shall reside only on the system server. Such software shall be capable of performing all operator-allowed command and monitoring functions available to operators within the TMC.

The software shall provide VPN security features designed to protect the system from unauthorized access by computer hackers capable of breaking sign-on password protection. The remote computers shall be able to monitor real-time operations of a minimum of 10 ramp meters simultaneously.

AUTOMATIC MALFUNCTION NOTIFICATION

The software shall have the capability of automatically sending alphanumeric messages (SMS – text messaging) to cellular phones and email addresses upon detecting problems with the system or from any device. The Server shall store up to sixty-four phone numbers and email addresses (recipients). The phone numbers/email addresses shall be used to alert a recipient or recipient/group when an alarm condition or event occurs. Each recipient shall have the following programmable parameters:

- Maximum retries if phone calls are unsuccessful;
- Wait period between retries;
- Next recipient to contact.

Notifications shall consist of at least three (3), user configurable, priority levels, to include low, medium and high alerts.

Acknowledgements of incoming malfunction alarms shall be required for all medium and high priority on-screen notifications. Low priority alarm notifications shall not require acknowledgements. Malfunction notifications shall be sent via text (SMS) or email notifications and shall be configurable by TOD/DOW, allowing recipients to be selected based upon severity or priority of event and to issue text/email messages sent to multiple devices or addresses. Notification shall allow a confirmation to assure that the malfunction has been acknowledged.

If no acknowledgment is received upon expiration of a user programmable wait period, and maximum retries, subsequent notification shall be configurable to be sent (or escalated) to alternate devices. The system shall log all malfunction notifications, retries, and acknowledgements with time and date stamps. The first acknowledgment shall be recorded; all others shall be ignored.

SYNCHRONIZATION WITH UNIVERSAL TIME

The Server shall provide the time stamp and adjust the real-time clock for each local ramp meter controller on an operator-selectable schedule. In addition, the Server shall also be responsible for synchronizing its own internal clock and the workstation clocks using the world standard time sync received from a GPS, WWV receiver, or a time server provided by the ODOT.

SYSTEM-WIDE CLOCK UPDATES

The system shall provide for the automatic downloading of clock updates to each field clock. The frequency of such updates shall be operator-programmable within a minimum range of once per day to once per hour. Additionally, unless the feature has been disabled by the operator, the system should transmit a clock update in conjunction with the command for implementation of a different metering plan.

VERIFICATION OF FIELD CLOCKS

The software should also upload, on a periodic basis selectable by the operator, the date/time from local controller and other field clock. If the controller time has drifted beyond an operator-defined amount, then:

- the system shall automatically download the true time to the controller; and,
- the system should report the clock drift to the operator; and,
- the event and action is logged to the event data base.

The frequency of this verification shall be set by the operator in the event scheduler.

ACCOMMODATION OF DAYLIGHT SAVINGS TIME, LEAP YEAR, ETC.

The software must have the ability to enable or disable daylight savings functions, handle leap years, and holidays and special events. All software must be capable of operating in the Eastern Time zone.

RAMP METERING PLAN IMPLEMENTATION AND MONITORING

CONTROL SECTIONS

The central software must be capable of dividing the traffic network into a minimum of 255 sections.

- Ramp meters and detectors shall be dynamically/on-line assignable to any section.

- The number of ramp meters in a particular subsystem shall be programmable from a minimum of one to a maximum of the total number of current ramp meters in the system.
- It shall be possible to have ramp meters/detectors assigned to different sections, for different times of the day, either by operator command or the TOD/DOW command scheduler.
- A dialog box shall be provided to define "control groups," which are groups of coordinated ramp meters. The parameters for a control group shall be the name and a user-defined text description of the control group. From the control group setup dialog the user shall also be able to run a particular metering plan for the entire control group and generate a report on the existing control groups in the system.

REMOTE ACCESS
The software must have the capability of providing access to the system for remote operators. The remote access capability includes workstations, mobile maintenance units and servers associated with the project which are physically connected to the LAN. All connected PCs, including those connected by VPN, are capable of concurrent operation up to the number of seats required by the specifications.

LOCAL RAMP METER CONTROL AND CONTROL MODES
Local ramp meter control functions shall be provided by the local controller firmware. The ramp meter controller shall determine the local traffic responsive pattern in coordination with the CSS.

Under normal operation, ramp meter control shall follow the local controller TOD/DOW schedule/local traffic responsive operation. When the operator or central software determines that a different metering plan should be implemented, the system shall download the metering plan, if required, and command the ramp meter to run the plan/metering rate. In the event that the CSS and the local controller are in conflict, the ramp meter shall run the more aggressive metering plan, unless operator takes manual control. If communication is lost between the ramp meter and the central software, the ramp meter shall revert back to its original TOD/DOW schedule/local traffic responsive operation. The downloaded special plan shall not overwrite any plans that are used by the TOD/DOW schedule. The operator shall be able to select controller metering plan slots to be used as temporary locations and the remaining slots for TOD/DOW usage.

NUMBER OF METERING PLANS
The system software shall provide for a number of metering plans equal to the maximum number of plans that can be stored in the local control (depending on controller) for each ramp meter to be stored in the central database. At any one time, it shall be possible for all of the plans to be stored in the local controller's database and implemented upon command by the central system.

The system shall handle special metering plans to accommodate unusual traffic flow patterns during special events, processions, etc. These special event metering plans will be included within the metering plans defined above.

EMERGENCY VEHICLES
The system software shall recognize the occurrence of locally initiated preemption by an emergency vehicle and thereby not erroneously diagnose a metering failure because the local controller has been preempted. The duration of a pre-emption cycle shall be capable of being configurable on a per ramp meter basis.

INPUT AND OUTPUT STATUS
The system software shall accommodate the control and monitoring of the on/off status of all of the inputs and outputs to be implemented by the local controller. This monitoring and control shall be available both from the central system and from notebook computers connected directly to controllers. It shall be possible for an operator to turn any input on or off while being monitored from a workstation or portable computer, either remotely (e.g. from the TMC or ITS Lab) or by direct connection between computer and controller.

METERING PLAN COMPLIANCE MONITORING
The system software must be able to be commanded from the event scheduler to monitor the real-time status of a ramp meter controller unit to ensure that its operation is within proper constraints of the metering plan that is in effect.

Through compliance monitoring, the error conditions, which shall be detected, include the following:

- The controller is not using the proper metering plan;
- The controller time clock is out of synchronization;

The software shall automatically inhibit monitoring if real-time feedback is not being received from the controller. Pre-emption occurrences shall not be interpreted as an error condition.

CONTROL MODES
The ramp meter control software shall operate in a distributed mode, fully making use of the intelligence in the local ramp meter controllers. The intelligent local controllers shall be programmed with metering plans, time-of-day/day-of-week (TOD/DOW) schedules, and all other parameters required to operate the local ramp meter. All ramp meter controllers shall be monitored on a real-time basis by the software. Upon system startup, the system software shall establish communications with all ramp meter controllers and begin real-time monitoring. The software shall start to process both incoming data and operator requests. Any upload, download, or time/date requests shall take precedence over real-time monitoring. The central software shall be designed for unattended operation 24 hours per day, seven days a week, without requiring an operator to be logged into the system.

Upon system startup, the control mode shall always be local TOD/DOW. If the event scheduler is calling for traffic responsive mode at the time of system restart, the system shall transfer to traffic-responsive mode after an operator-selectable amount of time.

For commanding a ramp meter to a metering plan different than the TOD/DOW, either by manual override or through the traffic-responsive algorithm, the controller shall be commanded to the appropriate plan. In the event that, while in software-commanded override, a controller does not receive a valid matering plan number from the central software within an operator-defined time frame, it shall revert back to its local TOD/DOW schedule. The central override shall be allowable on an ramp meter, section, or system-wide basis.

MANUAL CONTROL
The operator shall be able to manually override the plan that the system, section, or controller is operating. Manual selection of metering plans is of higher priority than all other modes of plan selection. The operator shall have two options for implementing manual override:

- set manual override and later release manual override via the GUI; or
- set manual override with a specified end time for termination.

If manual override is not given a specified end time, the controller shall be released from manual override upon all users logging out of the system. When manual override is terminated, the controller shall revert to one of the other modes of operation based on its normally scheduled operation.

TIME-OF-DAY/DAY-OF-WEEK CONTROL
TOD/DOW mode shall be used for controlling traffic conditions that occur regularly. In this mode, each controller shall automatically select and implement ramp metering plans in accordance with the defined schedule, locally stored, on a TOD/DOW basis. TOD/DOW plans shall be downloadable from the central software to the controller in the field. The system software shall provide for a number of metering plans equal to the maximum number of plans that can be stored in the local controller for the maximum number of ramp meter capable of being stored in the central database.

TRAFFIC-RESPONSIVE CONTROL
In the traffic-responsive mode of operation, the central system shall select the metering plan that is best suited to the existing traffic conditions as measured by the system detector occupancies and analyzed by the central system's traffic-responsive process. The system shall utilize a combination of local, fuzzy logic, and bottleneck ramp metering algorithms to determine the central ramp metering plan for each ramp meter station so that the metering is corridor-based. The algorithms shall be configurable so as to allow the administrator the capability of adjusting the occupancy levels that trigger a metered plan at different levels in the upstream corridor. The RESPONDANT shall present their algorithm and shall demonstrate the validity of its workings.

Once the traffic-responsive process has selected the appropriate metering plan, the plan number shall be commanded to the ramp meters on a continuous basis until the traffic-responsive process recognizes, based on sufficient change in traffic conditions, the need to command a different metering plan. All of the algorithms' plan changes are to be logged and accessible from the workstation for review at a later time. The traffic-responsive mode shall be user-selectable per ramp meter for the three following selections: a manual user command, on a TOD basis, and always.

Should communications be lost to one or more ramp meters in a section operating in Traffic-Responsive mode, for an operator-defined time frame, the remainder of the corridor will continue to operate as if the entire ramp meter corridor was still online.

EVENT SCHEDULER

GENERAL

The event scheduler dialog shall allow the user to configure the server's internal scheduler to perform specific actions based on time and date. Events must be scheduled to occur on any combination of the day of the week, a particular date, or whether the day is a (user-definable) holiday. The start time and stop time shall be able to be specified. The target of the operation shall be the complete traffic control network, a particular communications channel, a control group, a specific Device, or an internal operation such as a system backup or time synchronization.

The number of events scheduled shall be limited only by the database capacity. Each event can be configured to implement a plan or execute a function. The external device-oriented operations shall include:

1. Run a specific local controller coordination plan;
2. Enable the local controller to run in TOD mode;
3. Enable/disable responsive operation;
4. Override the current responsive plan;
5. Make a local controller active or inactive;
6. Place local controller in "on-line" mode;
7. Place local controller in "off-line" mode;
8. Generate an alarm report;
9. Clear a specific log;
10. Broadcast real-time to a group of Devices or all Devices.

All external events shall support an individual Device, a specific control group, or the entire system.

The available internally oriented operations shall include:

1. Turn paging on or off;
2. Synchronize the server and Device real-time clocks;
3. Fetch the failure log from the Server.
4. Automatically log out an inactive user after a defined period of time.
5. Perform a database backup on the Server.
6. Close all the currently open database files and update the disk archive.

The user shall also be able to edit the holiday list and generate an event report from this dialog box.

TEMPORARY AND PERMANENT COMMANDS

Commands entered into the event scheduler shall be of two types, permanent and temporary. Permanent commands shall be performed every time the matching of time parameters occurs. Temporary commands shall be performed once and then be deleted from the scheduler database. The operator shall be able to enter the following permanent and temporary command times as a minimum.

Permanent commands:

- Every day basis (i.e., every day of the year);
- Every week basis (i.e., on a given day or days of every week);
- Every time span basis (i.e., every hour);

- Every weekday (i.e., given weekday from Monday through Friday); and
- Every weekend (i.e., given weekend day such as Saturday or Sunday).

Temporary commands:

- Specific date basis (e.g. December 25, 2002);
- Specific time basis (e.g. at 2:00 PM or 1400 hours); and
- Specific date/time basis (e.g. on 4/15/98 at 11:00 AM).

Events must be programmed with a start time, stop time and event action. They shall also be programmable to be reoccurring (occurring every hour/day/year) or single shot (occurring only once unless reprogrammed).

GRAPHICAL USER INTERFACE

OVERVIEW

The system's graphical user interface (GUI) software shall provide the operator with a graphical operating environment of the type commonly found on today's desktop computers. The GUI shall be easy to use while providing a fast and efficient way to control and monitor the ramp meter system in real time. The GUI shall allow the operator to **intuitively** select objects on the screen by point, click, and scroll manipulation with the mouse, thereby minimizing typing and the need to memorize lengthy commands. The GUI shall incorporate the following:

- Pop-up multiple display objects and windows;
- Menu icons and controls;
- Dialog boxes;
- Push button and other active commands;
- Visual and audio alarms; and
- Use of object characteristics such as colors, highlighting, and flashing to alert operators of status changes.

Any workstation shall be able to display the status of the ramp meters at a ramp meter or multiple ramp meters using a graphical display that shows the approximate layout of the ramp meter with colored ramp meter heads and colored detectors, when actuated. The workstation shall also provide a subarea (group of related ramp meters) display, where a number of Devices can be observed (in real-time) in relation to each other.

All controller functions shall be accessible and editable by means of menus. All menu items shall be labeled in plain English. Likewise, all elements in data tables and displays shall also be clearly labeled in English according to metering rate, mode (TOD, LOCAL, MANUAL, CENTRAL, etc.) , metering plan number, etc. This data shall also include the data from the ramp detector loops as it is populated in the controller. This would include Loop Status, 20 second volume, and 20 second occupancy.

It shall also be possible to select a ramp meter from a list. It shall be possible to display the list of all ramp meters in the order of their identification number, or display the ramp meter list organized by communication channel. These lists shall be printable with time stamps, if desired. The list shall also be capable of displaying the current mode, metering plan number, and metering rate of all ramp meters.

PAN/ZOOM REQUIREMENTS

The dynamic mapping (Bing Maps) provided shall incorporate full pan/zoom capability, by use of the mouse click-and-drag and scroll wheel. The operator shall be able to set up both dynamic and static informational layers that are displayed at different view scale levels. By setting up the view scale range and appropriately enabled/disabled layers, the operator shall be able to control which layers display at the different view scales. For example, at the statewide scale level the operator might enable roadway centerlines (static information) as well as a communication status indication (dynamic information) for each ramp meter controller across the state. When zooming in to a group of ramp meters (i.e. changing the view scale), the roadway centerlines would be disabled from view and the roadway curb lines would be enabled (become visible), with, all detectors and ramp meter heads of the ramp meter in the displayed group.

REFRESH RATES

All real-time dynamic data that is to be displayed on a graphic map shall be refreshed as frequently as the feedback data is being returned from the field equipment. If feedback data is not received from the field because of higher priority communication, a message shall be displayed to the operator.

All graphic displays shall be designed and developed in such a way as to ensure near instantaneous redraw of the graphic display. The draw time for the largest map (system-wide) shall not take longer than two (2) seconds. All other displays shall not take longer than one (1) second.

REPORTING AND LOGGING CAPABILITIES

GENERAL

A flexible report generator shall be included in the software. All reports shall have the capability to be directed to any combination of output devices such as the monitor, an ASCII text file, or the printer. Where applicable, the report shall apply to the entire control network, or everything related to a server, a particular server channel, a control group, a local ramp meter, a radar vehicle detector count station, or a configuration table archive set. All reports shall be both available in the central system software and via a web-based interface. Report queries built upon the data requested by the user. Queries shall be capable of being scheduled for automatic processing and shall be available in the following standard formats: Access, Excel, CSV, etc..

TYPES OF REPORTS AVAILABLE

As a minimum, the following displays/reports shall be available. All information shall be in human-readable form with no binary, hexadecimal, or octal output. In other words there shall be no list of "trouble codes" to memorize. All ramp meters shall be identified by the names of the intersecting streets.

- **System Status.** This display is an overview of the present condition of all devices in the system including ramp meter controllers, radar vehicle detectors, communication channels, and other categories of devices. The conditions shall include all possible status conditions (e.g. on-line, failed, etc.) and modes (e.g. TOD/DOW, LOCAL Traffic Responsive, CENTRAL Traffic Responsive, etc.) as described in this specification. At the discretion of the operator, it may be displayed as a list, or displayed as a map with colors or symbols used to indicate the status of each device. Regardless of how this data is displayed, it should update continuously without operator intervention.

- **Real-time Monitor.** This display/report will show the request and reply to and from a single ramp meter. It shall display the command being sent to a ramp meter along with the feedback data received back from the ramp meter. The display shall be continuous until timed out by upward limit. Upward limit shall be operator-changeable to any value between five and sixty minutes. The data shall be displayed in an easily understood format, and shall be updated once per second. The data displayed shall not be displayed in hex format.

- **Communication Statistics.** This display/report shows the communications throughput. The display shall include number of communication attempts, number of successes, number of failures, and percentage of successful communications per ramp meter, per channel, and per system.

- **Ramp Meter Operation.** This display/report shows the detailed ramp meter operation in real-time mode. This display shall be available on a ramp meter basis only. When operating in this mode, polling shall occur at a minimum rate of once per second.

- **Ramp Meter Operation Recording.** The system shall be capable of recording the real-time operation of a ramp meter for a pre-determined period of time through the use of a scheduler. This recording operation shall be capable of displaying a data table as well as a graphical interface showing the entire operation of the ramp meter for the scheduled period of time. (Date and Time of start and ending recording times shall be available)

- **Detailed Ramp Meter Failure Status.** This display/report displays the failure information for all failed ramp meters. This information shall include as a minimum: ramp meter location, reason for failure, and time of failure.

- **Detailed Detector Failure Status.** This display/report displays the failure information for all failed detectors. This information shall include as a minimum: detector location, reason for failure, and time of failure.

- **Detailed Communication Failure Status.** This display/report displays the communication failure information for all failed devices. This information shall include as a minimum: I.P. address, associated ramp meters, reason for failure, and time of failure.

- **Emergency Preemption Monitor.** This report should display the time for all preemption calls at ramp meters in the system. System shall also alert operator when the number of preemption calls at a ramp meter exceed an operator-selectable threshold per unit time.

REPORT OUTPUT REQUIREMENT

Reports and displays may be output to the central system operator station monitors or any network printer. Remote computers may also request reports and displays, whether LAN-connected or dial-in.

RAMP METER SYSTEM LOG

The central software shall log, in order of occurrence, all traffic-related messages with date, time of day, and location. The log shall include:

- Operational events
- Traffic device failures/repairs;
- Communication failures/repairs;
- Traffic data transfer messages;
- Manual override changes; and
- Operator log-on and log-off.

An on-line file of all log messages shall be maintained with all messages logged to the on-line file. These logs shall be capable of being exported in a PDF format.

LOG OF CURRENT OPERATORS

The system software shall maintain a continuous record of the operators who are currently logged onto the system. The system shall add to this log any operator who logs onto the system and, upon log-off, shall delete the name of that operator from this log.

OPERATING SYSTEM LOG

The operating system log records all central system related events that occur in order of occurrence. As a minimum, it shall include the following:

- Internal system errors;
- System hardware failures;
- System network errors; and
- Software fatal errors.

Log messages shall be automatically output to a designated file or files.

RAMP METER MEASURES OF EFFECTIVENESS

The system software shall collect and store data on ramp meter measures of effectiveness (MOEs). Ramp meter feedback shall be stored on a per-mode basis. The ramp meter MOEs which are to be stored include, but are not to be limited to, the following:

- Occupancy before, during, and after metering operation;
- Percent of time Ramp Queue Detector is calling for meter adjustment

The system software shall automatically record ramp meter data in its database, and periodically archive the data onto removable storage device. Up to 1 year of ramp meter data for each ramp meter shall be stored on the system database by the database program. If bad data or no data is received from the ramp meter, the data will be tagged as questionable or not available in the database.

In case of failure during a database write process, the database program shall not leave a partially written block. Any missing blocks are tagged as unavailable. The operator shall have the capability to enable or disable data collection on an individual ramp meter basis.

The time increment between writing of data to the removable storage device and start time shall be operator-selectable with defaults of 24 hours and midnight, respectively. When the removable storage device does not have enough storage space left for a full time interval of ramp meter data, the system shall notify the operator that a larger storage device is required.

Ramp meter data shall be retrievable in both CSV and PDF user-defined formats from the removable storage devices for use with the relational database and traffic modeling packages.

UPLOAD REPORTS FROM AUXILIARY DEVICES

The radar vehicle detectors that shall be installed in the future by ODOT will contain Ethernet ports or serial terminal servers allowing them to be connected to the network. ODOT desires that the central software provide the capability of uploading this data directly from the units that support remote access and displaying it on work stations.

FAILURE MONITORING

Communications and controller hardware monitoring shall cause the system to fail individual components when operator-definable error thresholds are exceeded. Upon failure, the software shall log the event and also display a visual alarm to the operator. The system software shall continue to attempt communication with the failed component. Once a failed component is logged, it shall not be logged as failed again until it has regained operational status. Only one log shall be created per failure. If the failed component communicates successfully for an operator-specified amount of time, the component shall be considered operational. This event also shall be logged, along with the clearing of the alarm for the failed component. The operator shall be able to disable any component in the system through the user interface. When disabled the software shall not communicate with the component.

AUTOMATIC DETECTION OF SYSTEM MALFUNCTIONS

A ramp meter system's effectiveness is primarily a function of the metering plan that it ultimately imposes on the street. This effectiveness is increased when adequate provision is made for the early detection and efficient diagnosis of component malfunctions. The System shall maintain an extensive list of alarms that shall be logged at the System PC and to other Device assigned by the operator including cellular telephone/email.

SYSTEM FAILURE AND RECOVERY

The beginning and ending of the following system failures shall initiate notification of the appropriate personnel in addition to other reporting requirements detailed below.

- Non-fatal Failure. If the software detects a non-fatal error within one or more of its processes, it shall alert the operator via an alarm and logs a message to the system log. The system shall continue to operate in a degraded state. The operator has final determination on what is considered a non-fatal failure.
- Fatal Failure. If the system detects a fatal error within one or more of its processes, it shall alert the operator via an alarm and log a message to the system log. The system shall then attempt an orderly shutdown of the system.

DETECTOR SOFTWARE

GENERAL

The central software must be capable of using both system and local detectors for traffic counting, traffic-responsive operation, and computation of measures of effectiveness (MOEs). The software has to be capable of handling the maximum number of detectors allowable per controller.

The system shall process and maintain detector count data and occupancy data on a continuous basis to be used for various traffic control strategies, reporting tasks, and other functions. Detector feedback shall be obtained in an operator-selectable time frame in twenty-second increments.

DETECTOR DATA COLLECTION AND RETRIEVAL

The software shall automatically record detector data in a database, and periodically archive the data into the database archive. Raw detector data is to be stored in memory on a twenty-second basis and aggregated based on the twenty-second data. Up to one year of five-minute detector data for each ramp meter must be able to be stored in the database. If bad data or no data is received from the detector loops during any or all of the twenty-second time frames, the data shall be tagged as questionable or not available in the database. An operator-definable filter shall be used to set the thresholds regarding the usability of data.

Each twenty-second block shall be date/time tagged. In case of failure during a database write process, the database program shall not leave a partially-written twenty-second block. Any missing twenty-second blocks shall be tagged as unavailable for that twenty-second period. The operator shall have the ability to enable or disable the detector data collection function.

When scheduled/enabled by the operator, the twenty-second detector data shall be automatically written onto removable storage device. Each 24-hour history block shall be date/time tagged. The data storage feature shall have the ability to append 24-hour detector data to the removable storage device, enabling full usage of the media. When the removable storage device does not have enough storage space left for a full 24-hour block, the system shall notify the operator that a new storage device is required.

Detector data shall be retrievable in both CSV and PDF user-defined formats from the removable storage device for use with the relational database or traffic modeling packages.

DETECTOR MONITORING

The detector feedback from the field shall be continuously monitored for proper operation. Detectors shall be classified as acceptable, marginal, disabled, and failed. Detector failures shall be reported to the system log and operator alarm.

The software shall have operator-selectable filters that define the thresholds that a detector must exceed to be considered failed. The filter values shall be selectable on a TOD basis. As a minimum, the following four failure types shall be diagnosed:

- Maximum Presence: if an active detector exhibits continuous detection for a program entered period (0-255 minutes in one minute increments);
- No Activity: if an active detector does not exhibit an actuation during a program period (0- 255 minutes in one minute increments);
- Erratic Output: if an active detector exhibits excessive actuation (program entered maximum counts per minute 0-255 in increments of one); and
- Failed Communication: failed detectors shall not be available for traffic control strategies.

SYSTEM-WIDE DISPLAY

The Detector Module software shall be capable of displaying system detector (or link) icons at the area wide level. When the zoom level allows for the display of system detectors, the data shall be displayed instead of the corresponding link data. The operator shall be able to select the time interval to display the detector data. These data shall be displayable in either raw or smoothed form (operator-selectable). Reports and displays shall include:

Graphical representation of detector data including:

a. Counts/Speed/Occupancies over time up to five years;
b. Total counts;
c. Counts by time division (5, 10, 15, etc. minute intervals); and
d. Real-time acquisition.

Detector MOE Reports

a. Present volume versus historical volume;
b. Present occupancy versus historical occupancy;
c. Present speed versus historical speed; and
d. Present delay versus historical delay.

Printed reports by:
a. Count summaries;
b. Historical counts; and
c. Counts by lane, location, direction, placement, count station, etc.

MONITORING OF CONTROLLER ACCESS
Because field technicians have access to the ramp meter controllers, there is the opportunity for the local controller database to be changed without such change being commanded from the Administrator. If the local ramp meter controller has the ability to report four (4) feedback bits (door open, portable computers connected, front panel accessed, and power out), the central system software shall automatically respond as follows:

- Door Open - Log that the door is open and when the door returns to a closed position.
- Door Open and either the portable computer is connected or the front panel is accessed - The system software shall log the event. After door closed ramp meter is received, the software shall upload and compare the local controller's database with the central database, which shall be considered to be the master database. Any changes shall be uploaded, logged, and stored in the database after administrator approval.
- Power Out - Upon restoration of power, log that a power outage occurred and the time at which power was restored.

TRAINING
Training is an important element of the project. It will be conducted at ODOT by the System Integrator. There are four modules that are anticipated. The content of each module listed below is provide to describe the general level of detail and the System Integrator will be allowed the change the content with the approval of the ODOT.

The System Integrator shall provide the following training modules:

EXECUTIVE
The executive training module is a high-level training session intended for senior management staff. This training module should be approximately one hour in duration. The topic of the training will be directed by ODOT staff. For the purpose of responding to this PPP, the RESPONDENT should assume that this session is similar to a system demonstration.

SYSTEM INTRODUCTION
This module is meant as the first formal training to ODOT staff. There could be up to ten (10) staff attending this session. The following topics should be covered:

- User login, User rights,
- Assignment of controllers to groups
- Entity numbering
- Setting up controllers for IP communication
- Assign plan implementation w/in groups to TOD schedule
- Manual mode command, priority of commands.
- Communication protocols supported
- Communication status
- Ramp Meter status
- Graphical User Interface, maps, ramp meter graphics.
- How to create ramp meter graphics
- Scheduling; Metering lengths
- Holiday Schedules

INTERMEDIATE TRAINING

This module is meant as the first formal training to ODOT staff. There could be up to ten (10) staff attending this session. The following topics should be covered:

- System configuration
- System logging and events
- Status monitoring
- Ramp meter control operation (TOD, Manual, etc)
- Ramp Meter controller parameters editing and upload/download
- Alarms, e-mail, and text messaging notification based on user defined criteria on a per-user basis.
- System detector data collection
- Archiving VOS data
- View/manage VOS reports
- System startup and shutdown
- Customize buttons

ADVANCED TRAINING (SYSTEM ADMINISTRATOR)
This module is meant as the first formal training to ODOT staff. There could be up to seven (7) staff attending this session. The following topics should be covered:

- System configuration
- System installation
- Application Services
- Database Issues
- Time Clock
- Remote Access
- Troubleshooting
- Data backup and restoration
- Custom report generation
- System maintenance
- Creation and management of user rights, create user groups

WARRANTY
The System Integrator shall provide a five (5) year warranty for the central system software and hardware. The warranty shall cover all defects and bugs in the central system software, servers, and firmware provided by the System Integrator. The five year warranty shall begin from the date of final system acceptance.

MAINTENANCE
ODOT reserves the right to extend support and maintenance, to include all parts and labor as originally installed and, to include any additional components added to the system by the selected RESPONDENT at the ODOT's request. The RESPONDENTS shall include in their proposal proposed terms, conditions and duration for a maintenance agreement for providing ongoing support of the Central System Software and hardware provided by the RESPONDENTS.

The maintenance agreement shall start when the five-year warranty period has expired and be for a period of one year, renewable for up to ten years at the ODOT's option. The maintenance agreement shall provide telephone support during normal business hours and provide for up to three on-site visits per year if issues occur that cannot be supported remotely.

The maintenance agreement shall provide a minimum of one (1) software upgrade per year. The upgrade shall include versions that address software defects, bugs and new features. The upgrade shall be performed on-site by the RESPONDENT. ODOT's project manager and the system's System Administrator will be present at the time of the on-site upgrade. New updated manuals shall be provided in electronic form for any upgrades that occur.

ODOT will provide the System Integrator a secure access point into the central system software via Citrix or a virtual private network (VPN) connection. The System Integrator should state if other means of access is preferred or required. ODOT will administer all access privileges.

DOCUMENTATION

The RESPONDENT shall deliver the following documentation:

Central Control Software – Ten copies of the central system software documentation will be provided and will include the following components: User Manual. Three copies are required for the System Administrator documentation, if separate. An electronic file of these two documents shall be provided to the ODOT on a CD-ROM, labeled appropriately. The electronic file must be updated to the current and most complete version before final acceptance of the system.

Project Configuration – One copy of network and device configuration, which will comprise of the following information:

- Network schematics
- Device ID numbers
- Port assignments
- Baud rates
- Channel assignments
- IP addresses
- Cable labels

Manufacturer-Provided Manuals – The RESPONDENT will deliver one set of contractor-purchased manufacturer-provided equipment manuals.

Database object definitions - This document will describe and/or define the objects in the database.

TESTING AND CERTIFICATION

TESTING
Testing shall consist of two phases: operational and performance testing, and final acceptance testing. Prior to beginning factory acceptance testing, the System Integrator shall provide all submittals, certifications, and reports necessary to determine that the equipment to be tested will meet specifications.

OPERATIONAL AND PERFORMANCE TESTING
The System Integrator shall create a detailed test plan that clearly indicates the requirement(s) covered by each test case. The operational test shall include both stand-alone tests for each system component and system-level tests. The operational test shall be deemed complete when each component has passed a stand-alone test and the entire ramp meter system (software and hardware) are demonstrated to meet all requirements defined in these Proposed System Specifications when all components are working together as an integrated system. It will be the responsibility of the System Integrator to prepare detailed test procedures (as described later in this Section) and to procure all of the equipment necessary to perform the test.

Performance testing shall include criteria outlined below. The proposal must address at least these performance items:

- Time to upload the entire controller database over a wireless communications link
- Time to download the entire controller database over a wireless communications link
- Average time between recommended workstation application restarts (how often does the application need to be shutdown and restarted)
- Average time between recommended workstation reboots
- Average time between recommended server application restarts
- Average time between recommended server reboots
- Average time for workstation application to fully initialize
- Average time for all server applications to fully initialize
- Monitoring of ramp meter phase status;
- Monitoring of ramp meter alarm status;

- Monitoring of ramp meter preemption status;
- Monitoring of ramp meter communication status;
- Monitoring of ramp meter status; and
- Testing of any modifications or extensions to local and/or central software.

The System Integrator shall provide a test procedure and test data forms to the ODOT for approval at least 45 calendar days before the operational test is to begin. The System Integrator must also provide a requirement matrix that clearly maps each requirement to a specific test case(s). Performance testing must be included in the test cases and must be consistent with the values submitted in the proposal. The ODOT will review the test procedures and matrix and return them with comments or approval to the System Integrator within 30 calendar days after receipt. The test procedure proposed by the System Integrator shall be comprehensive, and in sufficient detail to allow the ODOT to determine whether or not the system provided fully complies with the system requirements included in these Proposed System Specifications. If the ODOT deems the test procedure to be unacceptable, the System Integrator Contractor shall revise the procedure according to the ODOT's comments without additional cost to the ODOT.

As a minimum the test procedures shall include the following:

- A step-by-step outline of the test sequence to be followed, showing a test of every system requirement.
- A description of the expected operation, output and test results.
- An estimation of the test duration proposed test schedule.
- A data form to be used to record all data and quantitative results obtained during the tests.
- A description of any special equipment, setup, manpower, or conditions required for the test.

The operational test shall be conducted in front of the ODOT and if necessary, the ODOT's Consultant. The ODOT shall review the test results for conformance with the system requirements specified in these Specifications. The ODOT shall score each test case on a pass/fail basis. The System Integrator shall provide all necessary assistance to ensure completion of this test. The System Integrator shall fix any problems encountered and add any omissions discovered during this test period without additional cost to the ODOT. If any of the equipment is rejected for failure to comply with the requirements of these Specifications, the System Integrator shall be responsible for all of the costs involved in re-testing the equipment after it has been rejected. Deductions to cover the costs of such re-testing will be made from any monies due or which may become due to the System Integrator.

FINAL ACCEPTANCE TESTING
The final acceptance test will verify that the entire system, with the changes and additions made during the operational testing in place, functions properly and in accordance with these requirements. The final acceptance test shall not be completed until all items conform to the requirements and training has been completed as approved by the ODOT. The System Integrator shall perform and document all necessary testing.

The formal start of the final acceptance test or "burn-in" period shall be documented by the System Integrator and approved by the ODOT. The final acceptance test will include the completion of a 90-day period, by the end of which the entire integrated system operates without failure. A failure is defined as failing any of the test cases defined in the operational test procedure referred to herein.

In the event of a failure during the burn-in acceptance-testing period, the System Integrator shall repair the equipment as necessary within two (2) working days of the time of notification by the ODOT and the final acceptance test must be restarted at zero hours. If the failure is a system emergency, a qualified representative from the software and hardware manufacturer shall respond within two hours of notification as required in the maintenance agreement described herein. System emergencies are defined as a condition related to the malfunctioning of the ramp meter hardware or software that impedes normal operation of the plans, such as metering plan changes under the allowed minimum time. The System Integrator shall be responsible for all of the cost involved in the repair of the equipment, including re-testing if necessary.

The manufacturer shall provide certification that the units supplied under these specifications are not units rejected by some other municipality or state.

Item 633E99300 Controller Item, Misc.: Central System Software, Alternate Bid (McCain)

FRA-RAMP METER UPGRADE

PID: 92381

4/8/2013

CENTRAL SYSTEM SOFTWARE
The CONTRACTOR shall provide a bid price for each of the following alternate bid options:

Item 633 633E99300 Controller Item, Misc.: Central System Software, Alternate Bid (McCain)

The CONTRACTOR shall furnish MCCAIN Transparity Central Software.

DESCRIPTION
This section defines furnishing Central System Software. The Software shall conform to the Departments Central System Software Specification.

BASIS OF PAYMENT
The Department will measure per each "Item 633 Controller Item, Misc.: Central System Software, Alternate Bid (McCain)" by the software, received, and accepted by the ODOT ITS LAB.