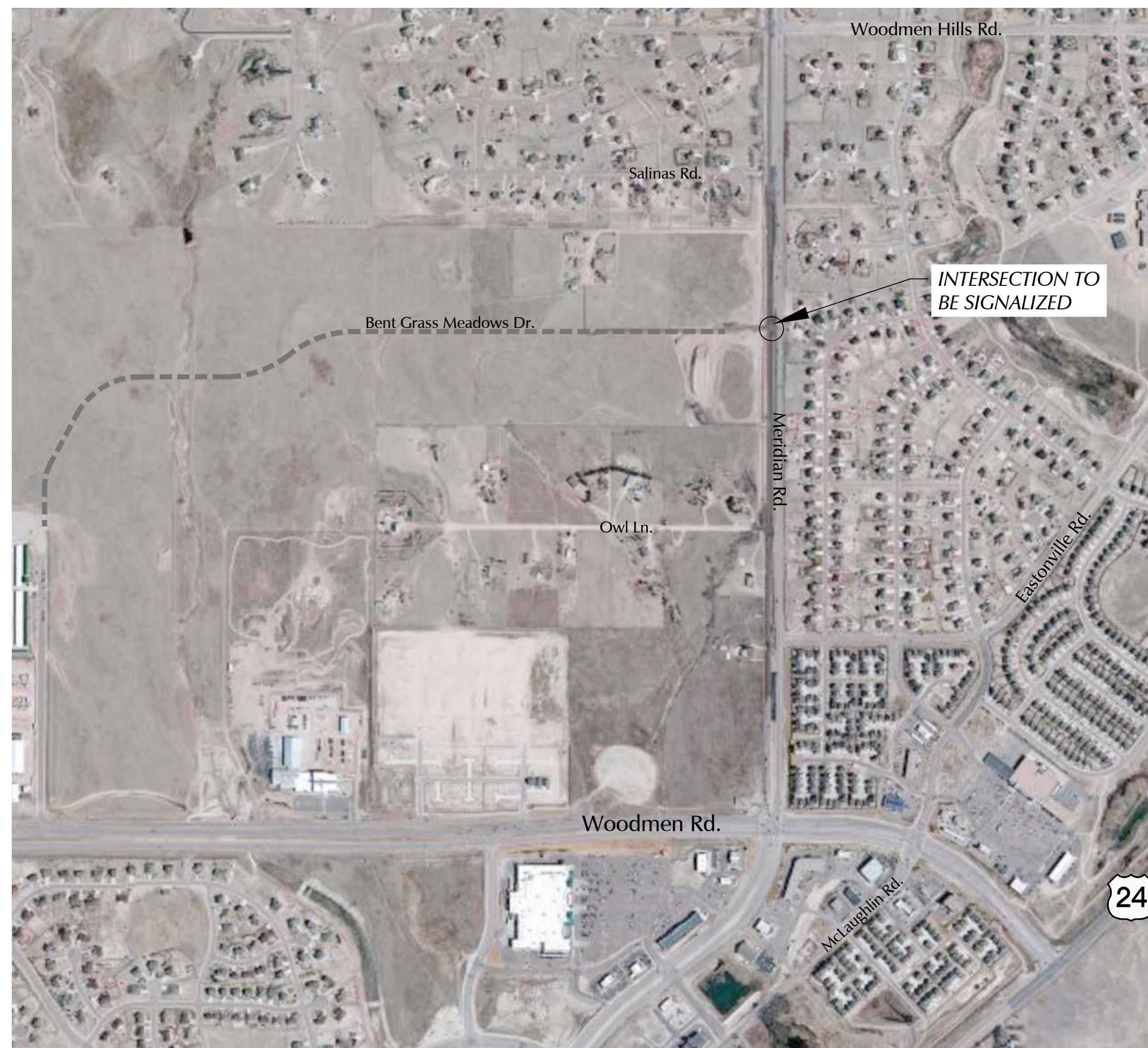


Construction Drawings for Meridian Rd./Bent Grass Meadows Dr. Intersection Improvements

Bent Grass Metro District, County of El Paso, State of Colorado

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- 6 MERIDIAN RD. ADVANCE STREET NAME SIGN PLAN



VICINITY

Engineering Review
07/17/2020 9:22:23 AM
dsdrice
JeffRice@elpasoco.com
(719) 520-7877
EPC Planning & Community
Development Department

Also see comment letter.

List of agencies (stakeholder) with addresses & points of contact
 Applicant: Bent Grass Metropolitan District c/o Randy Case II 102 E. Pikes Peak, Colorado Springs, Co. 80903
 Civil Engineer: Classic Consulting, 619 N. Cascade Ave. Suite 200 Colorado Springs, CO 80903
 Traffic Engineer: LSC Transportation Consultants, Inc., 2504 E. Pikes Peak Ave., Suite 304 Colorado Springs, CO 80909, Jeff Hoddsdon, 719-633-2898
 Local Improvement District: Bent Grass Metropolitan District: c/o Randy Case II, 102 E Pikes Peak Ave, Colorado Springs, CO 80903; Phone: (719) 633-2700.
 El Paso County Engineering: EPC Public Services, 3275 Akers Drive, Colorado Springs, CO 80922, [Jennifer Irvine, P.E., County Engineer]
 Fire District or Department: Falcon Fire Protection District, Chief Trent Harwig, 7030 N. Meridian Road, Falcon, CO 80831 719-495-4050
 Utility Company (Electric): Mountain View Electric, Jim Kenne, 11140 E. Woodmen Road Falcon, CO 80831, 719-495-2283
 Utility Company (Telephone): Falcon Broadband, Randy BeYoung, 555 Hathaway Drive Colorado Springs, CO 80915, 719-886-7901
 Utility Company (Gas): CSU, Todd Sturtevant, John Pinkerton Location, 7710 Durant Dr Colorado Springs, CO 80920, 719-668-3556
 Utility Company (Water): Cherokee Metro District, Art Sintas, 6250 Palmer Park Blvd. Colorado Springs CO 80915, 719-597-5080
 Utility Company (Cable): Cherokee Metro District, Art Sintas, 6250 Palmer Park Blvd. Colorado Springs CO 80915, 719-597-5080

Design Engineer's Signature & Stamp:
 These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specifications, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications.

 Jeffrey C. Hoddsdon, P.E. #31684 Date

Owner/Developer's Statement:
 I, the owner/developer have read and will comply with all of the requirements specified in these detailed plans and specifications.
 Title: Randy Case II Date
 Business Name: Bent Grass Metropolitan District
 Address: 102 E. Pikes Peak, Colorado Springs, CO. 80903

El Paso County:
 County plan review is provided only for general conformance with County Design Criteria. The County is not responsible for the accuracy and adequacy of the design, dimensions, and/or elevations which shall be confirmed at the job site. The County through the approval of this document assumes no responsibility for completeness and/or accuracy of this document.
 Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual, Volumes 1 and 2, and Engineering Criteria Manual as amended.
 In accordance with ECM Section 1.12, these construction documents will be valid for construction for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within those 2 years, the plans will need to be resubmitted for approval, including payment of review fees at the Planning and Community Development Directors discretion.
 Jennifer Irvine, P.E. Date
 County Engineer / ECM Administrator

Should this be Challenger Communities, LLC or is the district providing financial assurances and agreements to ensure completion?

**TRAFFIC CONTROL
 SIGNAL PLANS**
Bent Grass Meadows Dr./Meridian Rd.

545 East Pikes Peak Avenue Suite 210 Colorado Springs, CO 80909
LSC TRANSPORTATION CONSULTANTS
 2504 E. Pikes Peak Ave. Suite 304 Colorado Springs, Co. 80909
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**Project Manager
 JEFFREY C. HODSDON, PE**

REVISIONS	DATE
Revisions #3	5/4/20
Span Wire Signal	5/1/18
Revisions #2	9/29/17

DATE: 3/17/16
 SCALE: 1" = 600'
 DRAWN BY: MR
 JOB NO.: 154560
 DWG: 194900_Signal Plan Sheet

SHT NO. : 1
 OF 6

GENERAL NOTES

PROJECT DESCRIPTION

TRAFFIC SIGNAL INSTALLATION, SIGNING AND MARKING AT BENT GRASS MEADOWS DRIVE AND MERIDIAN ROAD.

GENERAL NOTES

- THE OWNER / DEVELOPER / DISTRICT SHALL CONTRACT WITH A QUALIFIED PROFESSIONAL ENGINEERING CONSULTANT FOR THE DESIGN, DEVELOPMENT, AND PROGRAMMING OF ALL TRAFFIC SIGNAL TIMING AND CONTROLLER OPERATIONAL PARAMETERS, SETTINGS, ADJUSTMENTS, AND EQUIPMENT THAT WILL ACHIEVE SATISFACTORY TRAFFIC SIGNAL OPERATION, INCLUDING ISOLATED, INDEPENDENT, FULLY-ACTUATED SIGNAL OPERATION AND SIGNAL SYSTEM COORDINATION TIMING PLANS OPERATION WITH EXISTING ADJACENT SIGNALIZED INTERSECTIONS, WHERE DOCUMENTED TO BE NECESSARY DURING VARIOUS TIMES OF THE DAY.
- TRAFFIC SIGNAL MATERIALS AND INSTALLATION SHALL COMPLY WITH THE SPECIFICATIONS FOR THIS PROJECT, THE PROJECT SPECIAL PROVISIONS, "STATE OF COLORADO STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", "COLORADO STANDARD PLANS", "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", "THE NATIONAL ELECTRIC CODE", AND ALL LOCAL ORDINANCES AND REGULATIONS.
- THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD PLAN SHEET S-614-40" TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS" ARE TO BE USED TO CONSTRUCT THIS PROJECT. EXCEPT THAT ALL POLES, MAST ARMS, AND EQUIPMENT SHALL BE PAINTED BLACK.
- ALL SUBMITTALS SHALL BE MADE TO EL PASO COUNTY FOR APPROVAL. OBTAIN ALL REQUIRED PERMITS FOR THE WORK. PREPARE AND SUBMIT TRAFFIC CONTROL PLAN FOR THE WORK. CONTACT EL PASO COUNTY 96 HOURS IN ADVANCE OF BEGINNING CONSTRUCTION.
- LOCATIONS OF ALL CONDUIT RUNS, DETECTORS, POLES, CONTROLLER CABINETS, PULL BOXES, AND FOUNDATIONS SHALL BE FIELD APPROVED BY EL PASO COUNTY. THE CONTRACTOR SHALL VERIFY POLE FOUNDATION AND ANCHOR BOLT ELEVATIONS WITH RESPECT TO TOP OF EXISTING OR FUTURE CURB AND SLOPE OF SIDEWALK PRIOR TO INSTALLATION OF ANY EQUIPMENT.
- ALL PAVING, SIDEWALK, LANDSCAPING AND LAWN IRRIGATION SYSTEMS DISTURBED BY THE CONTRACTOR SHALL BE REPLACED IN KIND, EQUAL TO OR EXCEEDING ORIGINAL CONDITIONS OR AS DIRECTED BY THE OWNER.
- PAVEMENT MARKINGS ARE SHOWN FOR INFORMATION ONLY. REFER TO STRIPING PLANS FOR DETAILS.
- CONTRACTOR TO VERIFY POWER SOURCE AND COORDINATE HOOK - UP WITH ELECTRIC UTILITY PROVIDER.
- CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

TRAFFIC SIGNAL NOTES

- THE CONTRACTOR SHALL PROVIDE, FOR REVIEW, BY THE ENGINEER, A COMPLETE TRAFFIC SIGNAL MATERIAL SUBMITTAL PACKAGE THAT CONTAINS . ALL OF THE PROPOSED TRAFFIC SIGNAL EQUIPMENT, INCLUDING MATERIAL SPECIFICATIONS AND DESCRIPTIONS THAT WILL BE NECESSARY TO COMPLETE THE TRAFFIC SIGNAL WORK. THE CONTRACTOR SHALL ALLOW FOR A MINIMUM THREE WEEK SUBMITTAL REVIEW PERIOD AND SHALL NOT ORDER ANY SIGNAL EQUIPMENT UNTIL AFTER A REVIEW OF ALL SUBMITTALS HAVE BEEN COMPLETED BY THE ENGINEER AND VERIFIED BY THE CONTRACTOR.
- FUNCTIONAL AND OPERATIONAL RESPONSIBILITY FOR ALL NEWLY INSTALLED AND EXISTING TRAFFIC SIGNAL EQUIPMENT WILL BECOME THE RESPONSIBILITY OF THE CONTRACTOR UNTIL FINAL ACCEPTANCE OF THE PROJECT. THE CONTRACTOR SHALL CONSIDER THIS WORK INCIDENTAL TO THE OVERALL WORK BEING PERFORMED AND SHALL BE INCLUDED AS PART OF THE PROJECT.
- SEE COLORADO DEPARTMENT OF TRANSPORTATION SIGNAL DETAILS FOR CONSTRUCTION/ INSTALLATION DETAILS NOT SHOWN ON THESE PLANS.
- ALL SIGNAL EQUIPMENT REMOVED BY THE CONTRACTOR SHALL BE SALVAGED AND BECOME THE PROPERTY OF EL PASO COUNTY. THE SALVAGED EQUIPMENT SHALL BE DELIVERED AS DIRECTED BY THE ENGINEER. DELIVERY OF SIGNAL EQUIPMENT WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE INCLUDED IN THE WORK FOR REMOVAL OF TRAFFIC SIGNAL EQUIPMENT.
- OVERHEAD STREET NAME SIGN DESIGN AND LAYOUT INFORMATION SHALL BE PER THE STREET NAME SIGN DETAIL CONTAINED IN THE PROJECT PLANS.
- TRAFFIC SIGNS MOUNTED ON SIGNAL POLES, MAST ARMS, AND PEDESTALS SHALL BE MOUNTED USING BANDING, ALUMINUM CHANNELS, AND BACKING ZEES PER APPLICABLE CDOT STANDARD PLANS, OR SIMILAR RIGID SIGN BRACING MOUNTING ASSEMBLY.
- ONCE THE PROFESSIONAL ENGINEERING CONSULTANT HAS COMPLETED ALL TRAFFIC SIGNAL CONTROLLER TIMING DEVELOPMENT AND CONTROLLER PROGRAMMING, THE CONTRACTOR WILL COORDINATE THE DELIVERY DATE OF THE PROGRAMMED TRAFFIC SIGNAL CONTROLLER FOR REVIEW BY THE EPC DEPARTMENT OF PUBLIC WORKS, HIGHWAY DIVISION SIGNAL SHOP AND SHALL ALLOW FOR A MINIMUM TWO WEEK REVIEW PERIOD, AFTER WHICH TIME THE CONTRACTOR MAY MAKE ARRANGEMENTS FOR PICKING UP THE SIGNAL CONTROLLER.

TRAFFIC SIGNAL NOTES (CONTINUED)

- CONTROLLER CABINET SHALL BE FURNISHED WITH A "BEST" DOOR LOCK KIT LOCK AND CORE IS "BEST": 5L6R LEFT AND RIGHT.
- CONDUIT IS TO BE REPLACED IN THE EVENT THAT EXISTING CONDUIT IS DAMAGED AND AS DIRECTED BY THE ENGINEER.
- ELECTRICAL SERVICE DISCONNECT BOXES SHALL BE LOCKABLE AND WEATHER PROOF WITH THE NEMA TYPE CIRCUIT BREAKER. ENCLOSURES SHALL BE PROVIDED AT THE CONNECTION POINT OF EACH POWER SOURCE OR POINT OF SERVICE AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR SHALL FURNISH AND INSTALL ALL WIRING REQUIRED TO COMPLETE THE INSTALLATION AND ESTABLISH THE FUNCTIONALITY OF ALL TRAFFIC SIGNAL EQUIPMENT.
- ALL INCIDENTAL ITEMS NOT SHOWN IN THE SUMMARY OF APPROXIMATE QUANTITIES OR TABULATION OF SIGNAL EQUIPMENT SHALL BE CONSIDERED TO BE INCLUDED AS PART OF THE TRAFFIC SIGNAL INSTALLATION AND WILL NOT BE MEASURED AND PAID FOR SEPARATELY. ALL QUANTITIES ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK NECESSARY TO COMPLETE THE CONSTRUCTION SHOWN ON THESE PLANS.
- THE SIGNAL SHALL NOT BE TURNED ON OR STARTED UNTIL DIRECTED BY THE ENGINEER. PRIOR TO SIGNAL ACTIVATION, THE ENGINEER SHALL CONFIRM THAT THE APPROPRIATE PAVEMENT MARKINGS AND SIGNING ARE IN PLACE AND THAT ALL WORK NECESSARY FOR PROPER SIGNAL OPERATION HAS BEEN COMPLETED.
- THE SIGNAL CONTROLLER SHALL BE A MODEL I70E-HC11 AND THE CONFLICT MONITOR SHALL BE A MODEL 2018. THE CONTROLLER CABINET SHALL BE A CDOT SPECIFICATION MODEL 332 THAT INCLUDES ONE FULL SIZE FRONT DOOR AND ONE FULL SIZE REAR DOOR AND SHALL CONTAIN ANTI -GRAFFITI SILVER FINISH COATING. THE CABINET SHALL BE MOUNTED ON A CAST-IN-PLACE CONCRETE FOUNDATION PER APPLICABLE CDOT'S STANDARDS STANDARD PLAN AND THE CABINET SHALL BE POSITIONED SUCH THAT, WITH THE FRONT DOOR OPEN, BOTH THE CONTROLLER DISPLAY AND THE SIGNAL INSTALLATION WILL BE VISIBLE.
- LUMINAIRES SHALL CONSIST OF AN ASSEMBLY THAT UTILIZES LEDS AS THE LIGHT SOURCE. IN ADDITION, A COMPLETE LUMINAIRE SHALL CONSIST OF A HOUSING, LED ARRAY, AND ELECTRONIC DRIVER (POWER SUPPLY). ALL LUMINAIRES SHALL BE WIRED 240 WITH MULTI-TAP HEADS. THE LED FIXTURE MUST HAVE A COLOR TEMPERATURE OF 4100K (+/- 500K), MUST BE DESIGNED TO OPERATE AT A TEMPERATURE RANGE OF -40°F TO 105°F (-40°C TO 40°C), AND PROVIDE A MINIMUM OF 70,000 HOURS OF OPERATION. LUMINAIRES SHALL BE **DIALIGHT** **STREETSENSE LED STREET LIGHT, OR** APPROVED EQUAL. THE CONTRACTOR SHALL PROVIDE A RECOMMENDATION FOR THE TYPE OF STREET LIGHT BASED ON THE CONSTRUCTION PLANS AND MANUFACTURER'S SPECIFICATIONS, TO BE APPROVED BY THE ENGINEER. THE FIXTURE MUST BE CAST ALUMINUM, PROVIDED WITH FUSING, SURGE SUPPRESSION AND MUST BE UL LISTED FOR WET LOCATIONS. THE FIXTURE MUST HAVE AN INTERNAL, WEATHER-TIGHT LED DRIVE. NO ACTIVE COOLING FEATURES (FANS, ETC.) WILL BE ALLOWED. THE FINISH SHALL MATCH THE EXTENSION ARM SHAFTS. THE LUMINAIRES WILL BE INSTALLED ON 15 FOOT EXTENSION ARM SHAFTS AT A NOMINAL HEIGHT OF 40 FEET AND SHALL BE WELDED TO THE SIGNAL POLE PER CDOT TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS STAND PLAN S-614-40. LUMINAIRE ARM SHAFT PLACEMENT AND ORIENTATION SHALL BE IN ACCORDANCE WITH THE PROJECT PLANS..
- THE INTERSECTION DETECTION SYSTEM (MICROWAVE RADAR) CONTRACT ITEM INCLUDES DEVICE INSTALLATION (I.E., DETECTOR UNIT, HARDWARE, WIRING, PROCESSOR MODULE, ETC.), AND VERIFICATION OF SUCCESSFUL IN-FIELD DETECTION ZONE OPERATION BASED ON SEVERAL VEHICLE ACTUATIONS IN ALL DETECTION ZONES.
- THE CONTRACTOR SHALL COORDINATE THE SCHEDULES OF THE CONTRACTED PROFESSIONAL ENGINEERING CONSULTANT AND THE EPC DEPARTMENT OF PUBLIC WORKS, HIGHWAY DIVISION TRAFFIC SIGNAL STAFF FOR SCHEDULING THE ON-SITE FIELD IMPLEMENTATION OF ALL TRAFFIC SIGNAL TIMING AND OPERATIONAL PROGRAMMING, VEHICLE DETECTION ZONE PLACEMENT, AND DETECTION EQUIPMENT POSITIONING. THIS WORK SHALL BE SCHEDULED NEAR THE END OF THE PROJECT, PRIOR TO PROJECT ACCEPTANCE, AND ONLY AFTER ALL FINAL PAVEMENT MARKINGS, SIGNING, AND TRAFFIC SIGNAL WORK HAS BEEN COMPLETED.
- THE MICROWAVE RADAR DETECTION SYSTEM SHALL UTILIZE MS SEDCO INTERSECTOR TC-CK1-SBE WITH INTERFACE BOARD)
- PEDESTRIAN SIGNAL HEAD INSTALLATION SHALL INCLUDE ALUMINUM AND POWDER COATED GLOSS BLACK SIGNAL HEAD WITH APPROVED LED COUNTDOWN DISPLAY, ALUMINUM OPEN VISOR WITH THE OUTSIDE POWDER COATED GLOSS BLACK, PUSHBUTTON, AND INSTRUCTIONAL R10-3E COUNTDOWN PEDESTRIAN ACTUATION SIGN. PUSHBUTTON SHALL BE VANDAL-RESISTENT PIEZO DRIVEN SOLID STATE TECHNOLOGY SWITCH, BULLDOG MOMENTARY LED TYPE.
- ALL TRAFFIC SIGNAL POLES, MAST ARMS, PEDESTALS, AND LUMINAIRE ARMS SHALL HAVE A GLOSS BLACK COAT FINISH OVER HOT DIP GALVANIZED BASE COAT, INSTALLED IN ACCORDANCE WITH THE PAINT MANUFACTURER' S INSTRUCTIONS .
- ALL SIGNAL POLE AND CONTROLLER LOCATIONS SHOWN ARE APPROXIMATE ONLY. MAST ARMS SHALL BE OF SUFFICIENT LENGTH AND DESIGN TO ALLOW PROPER PLACEMENT OF SIGNAL HEADS AND OVERHEAD SIGNING PER THE PLANS. ACTUAL LOCATIONS SHALL BE STAKED IN THE FIELD AND FIELD VERIFIED BY THE ENGINEER PRIOR TO DRILLING, EXCAVATION, AND ORDERING THE SIGNAL EQUIPMENT AND MAST ARMS. THE LOCATION OF EACH SIGNAL POLE FOUNDATION SHALL BE POTHOLED PRIOR TO DRILLING TO CONFIRM WHETHER OR NOT ANY UTILITY CONFLICTS EXIST.

TRAFFIC SIGNAL NOTES (CONTINUED) (Notes 22-38 will be checked on the next review)

- LATERAL OFFSETS FROM THE NEAR EDGE OF TRAFFIC SIGNAL POLES, PEDESTALS, AND CABINETS TO THE FACE OF CURB OR THE EDGE OF A PAVED SHOULDER SHOULD BE AT LEAST SIX FEET. HOWEVER, A MINIMUM LATERAL OFFSET OF AT LEAST FOUR FEET MAY BE PROVIDED FOR CURB OFFSETS. IF NO PAVED SHOULDER EXISTS, A MINIMUM LATERAL OFFSET OF AT LEAST EIGHT FEET SHOULD BE PROVIDED FROM THE EDGE OF PAVEMENT FOR AN AUXILIARY LANE AND A MINIMUM LATERAL OFFSET OF AT LEAST TWELVE FEET SHOULD BE PROVIDED FROM THE EDGE OF PAVEMENT FOR A THROUGH LANE.
- SHOULD THE CONTRACTOR ENCOUNTER WATER IN THE CAISSON, ANY DE-WATERING METHODS AND NECESSARY PERMITS SHALL BE INCLUDED IN THE COST OF THE CAISSON AND WILL BE CONSIDERED INCIDENTAL TO THE WORK.
- ALL TRAFFIC SIGNAL COMPONENT PULL BOXES SHALL BE PRE CAST HIGH DENSITY POLYMER CONCRETE (HDPC) MATERIAL WITH THE FOLLOWING SIZES: 30 INCH X 48 INCH X 18 INCH FOR THE PULL BOX ADJACENT TO THE CONTROLLER CABINET FOUNDATION AND 24 INCH X 36 INCH X 18 INCH FOR THE REMAINING PULL BOXES.
- TRAFFIC PULL BOX LOCATIONS SHOWN IN THE PROJECT PLANS ARE APPROXIMATE. ACTUAL LOCATIONS SHALL BE VERIFIED IN THE FIELD BY THE ENGINEER. PULL BOXES SHALL BE FLUSH WITH THE FINISHED GROUND SURFACE AND SHALL NOT BE PLACED IN AREAS THAT ARE SUSCEPTIBLE TO WATER RUN OFF OR STANDING WATER. CONDUIT RUNS BETWEEN PULL BOXES SHALL NOT EXCEED APPROXIMATELY 200 FEET AND PULL BOXES SHALL NOT BE LOCATED IN HANDICAP RAMPS, PEDESTRIAN LANDING AREAS, SIDEWALKS, PRIMARY SIDEWALK PATHS, OR ROADWAY PAVEMENT AREAS.
- THE CONDUIT NUMBERS AND SIZES FOR TYPICAL CONDUIT RUNS INCLUDE THE FOLLOWING FOR A PERMANENT, MAST ARM SIGNAL INSTALLATION: A.) BETWEEN THE SIGNAL POLE FOUNDATION AND ADJACENT SIGNAL POLE PULL BOX: TWO (2) 2 INCH AND ONE (1) - 3 INCH; B.) BETWEEN SIGNAL POLE PULL BOXES: TWO (2) - 2 INCH AND THREE (3) - 3 INCH; C.) BETWEEN THE CONTROLLER CABINET FOUNDATION AND ADJACENT PULL BOX: THREE (3) - 2 INCH AND FOUR (4) 3 INCH; D.) BETWEEN THE SECONDARY SERVICE PEDESTAL METER FOUNDATION AND THE CONTROLLER FOUNDATION: ONE (1) - 2 INCH FOR THE ELECTRICAL SERVICE FEED.
- ALL CONDUIT AND FITTINGS SHALL BE SCHEDULE 80 PVC AND ALL CONDUIT SHALL HAVE A PULL ROPE LEFT IN THEM WHEN CONSTRUCTION IS COMPLETED. ALL CONDUIT ENTERING THE CABINET FOUNDATION AND PULL BOXES SHALL HAVE BELL END STYLE COUPLINGS ON ALL CONDUIT ENDS.
- ALL CONDUIT THAT IS DIRECTIONALLY BORED SHALL BE A MINIMUM OF THREE FEET BELOW THE EXISTING PAVEMENT. THIS WORK SHALL AVOID DISTURBING OR DAMAGING EXISTING FACILITIES AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROMPT RECONSTRUCTION, ALTERATION, REPAIR, OR MAINTENANCE OF THE HIGHWAY PROPERLY, AS NECESSARY, TO REPAIR ANY DAMAGE CAUSED BY THE ACCOMMODATION OF THE UTILITY, AND TO RESTORE THE HIGHWAY TO PRE-EXISTING OR BETTER CONDITIONS.
- ALL SIGNAL CABLE SHALL BE CONTINUOUS FROM CONNECTIONS MADE IN THE HAND HOLE COMPARTMENT OF THE SIGNAL POLE BASE TO THE TERMINAL COMPARTMENT IN THE CONTROLLER CABINET AND SHALL CONTAIN NO SPLICES. EACH SIGNAL HEAD SHALL CONTAIN SEPARATE AND CONTINUOUS SIGNAL CABLE THE SIGNAL HEAD TO THE ABOVE GROUND HAND HOLE AT THE BASE OF THE SIGNAL POLE AND SHALL CONTAIN NO SPLICES.
- A SEPARATE AND CONTINUOUS 21 CONDUCTOR CABLE SHALL RUN FROM THE CONTROLLER CABINET TO THE HAND HOLE AT EACH SIGNAL POLE AND SHALL CONTAIN NO SPLICES.
- ALL SIGNS MOUNTED ON SIGNAL POLES, MAST ARMS, AND PEDESTALS SHALL BE MOUNTED USING BANDING ALUMINUM CHANNELS, AND BACKING ZEES PER CDOT TYPICAL POLE MOUNT SIGN INSTALLATIONS STANDARD PLAN S-614-20, OR SIMILAR RIGID SIGN BRACING MOUNTING ASSEMBLY, AS DIRECTED BY THE ENGINEER. MAST ARM SIGNS THAT REQUIRE Z-BRACKETS SHALL BE MOUNTED ON ASTRO-STYLE BRACKETS AND RISERS. THE COST OF ALL HARDWARE, FITTING, TOOLS, AND EQUIPMENT NECESSARY FOR A COMPLETE INSTALLATION OF MAST ARM SIGNS WILL NOT BE MEASURED AND PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
- ALL CONDUCTORS AND CABINET WIRING SHALL BE COLOR CODED AND PERMANENTLY TAGGED PER ENGINEER DIRECTION AND IN ACCORDANCE WITH THE SIGNAL PHASE NUMBERING AND VIDEO DETECTION ZONE PHASE NUMBERING INFORMATION CONTAINED IN THE PROJECT PLANS.
- ALL VEHICLE SIGNAL HEADS SHALL HAVE APPROVED 12 INCH LED INDICATIONS AND SHALL BE ALUMINUM WITH POWDER COATED GLOSS BLACK FINISH AND SHALL CONTAIN 12 INCH ALUMINUM TUNNEL VISORS WITH THE OUTSIDE POWDER COATED GLASS BLACK. ALL VEHICLE SIGNAL HEADS SHALL HAVE ALUMINUM LOUVERED BACK PLATES WITH POWDER COATED GLOSS BLACK FINISH. MAST ARM SIGNAL HEADS SHALL USE ASTRO-TYPE MOUNTING ASSEMBLIES AND SHALL BE INSTALLED APPROXIMATELY LEVEL WITH ONE ANOTHER AT A 17 TO 19 FOOT VERTICAL CLEARANCE ABOVE THE HIGH POINT OF THE PAVEMENT GRADE.
- FINAL VEHICLE DETECTION ZONE PLACEMENT AND DIMENSIONS, IN ACCORDANCE WITH THE PROJECT PLANS, AND FINAL SIGNAL PROGRAMMING SHALL BE COMPLETED IN THE FIELD AND THE CONTRACTOR SHALL CONTACT THE ENGINEER FOR COORDINATING AND SCHEDULING THIS WORK.
- ALL VEHICLE AND PEDESTRIAN SIGNAL HEADS THAT HAVE NOT BEEN PLACED IN SERVICE SHALL BE COVERED WITH A PREFABRICATED WEATHER RESISTANT NYLON FORM FITTING SIGNAL FACE COVER MATERIAL. THE SIGNAL FACE SHALL REMAIN COMPLETELY COVERED UNTIL THE SIGNAL HEAD IS PLACED IN SERVICE AND IS FULLY FUNCTIONAL AND OPERATIONAL.

GENERAL NOTES
Bent Grass Meadows Dr./Meridian Rd.



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REVISIONS	DATE
Revisions #3	5/4/20
Span Wire Signal	5/1/18
Revisions #2	9/29/17
DATE:	3/17/16
SCALE:	NTS
DRAWN BY:	MR
JOB NO.:	154560
DWG.:	194900_Signal Plan Shee

SHT NO. 2
OF 6

GENERAL NOTES (CONT.)

TRAFFIC SIGNAL NOTES (CONTINUED)

36 ALL DETECTION EQUIPMENT, DETECTION ZONES, AND SIGNAL TIMING OPERATION SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTED PROFESSIONAL ENGINEERING CONSULTANT TO BE ACHIEVING SATISFACTORY TRAFFIC SIGNAL OPERATION.

37 RADIO TELEMETRY AND COMMUNICATION SYSTEM SHALL CONSIST OF A FREQUENCY HT-PE ETHERNET 900 MHZ RADIO TRANSMITTER/RECEIVER, PCTEL BLUEWAVE YAGI ANTENNA (890-960 MHZ, 6.5 DBD GAIN), BLUEWAVE SENTINEL SURGE SUPPRESSOR, AND ALL REQUIRED HARDWARE, AND WIRING. THE RADIO SHALL MEET THE FOLLOWING SPECIFICATIONS:

TRANSMITTER:

- FREQUENCY RANGE - 902 TO 928 MHZ (FHSS/FCC DTS)
- OUTPUT POWER - 5 MW TO 870 MW
- DATA LINK RANGE - 15 MILES, CLEAR LOS, HIGH SPEED
- MODULATION - 2 LEVEL GFSK
- RF DATA RATE - 614 KBPS STANDARD SPEED - 867 KBPS AT HIGH SPEED
- OCCUPIED BANDWIDTH - 611.2 KHZ
- HOPPING PATTERNS - 15 PER BAND, 105 TOTAL, USER-SELECTABLE
- HOPPING CHANNELS - 41
- FREQUENCY ZONES - 16 ZONES, 2-3 CHANNELS PER ZONE

RECEIVER:

- SENSITIVITY: -102DBM FOR BER 10-6 AT 614 KBPS; -96 DBM FOR BER 10-6 AT 867 KBPS

DATA TRANSMISSION:

- ERROR DETECTION: 32 BIT CRC, RETRANSMIT ON ERROR
- DATA SECURITY: AES 128 BIT ENCRYPTION FHSS TECHNOLOGY RADIUS
- SERIAL INTERFACE: RS232/RS422/RS485, PROGRAMMABLE; RJ-45 CONNECTORS
- ETHERNET INTERFACE: 802.3, IPV4, TCP, UDP, ICMP, ARP, MULTICAST, TFTP, DNP3 OVER TCP, VLAN, (2) 802.3U, FAST ETHERNET, RJ-45

POWER REQUIREMENTS:

- OPERATING VOLTAGE: +6 VDC TO +30 VDC
- TYPICAL POWER: TRANSMIT: 6.6 W RECEIVE: 1.7 W - IDLE: 0.8 W

38 THE CONTRACTED PROFESSIONAL ENGINEERING TRAFFIC SIGNAL TIMING, CONTROLLER PROGRAMMING AND OPERATION, AND OVERALL TRAFFIC SIGNAL OPERATIONAL CONSULTANT SERVICES THAT ARE TO BE RETAINED BY THE OWNER / DEVELOPER / DISTRICT SHALL INCLUDE, BUT NOT BE LIMITED TO:

- DEVELOPING ALL TRAFFIC SIGNAL TIMING AND OPERATIONAL PARAMETERS FOR ACHIEVING ISOLATED, FULL-ACTUATED VEHICLE AND PEDESTRIAN INTERSECTION OPERATION AND, WHEN DOCUMENTED TO BE NECESSARY, COORDINATED SIGNAL SYSTEM TIMING PLAN OPERATION DURING VARIOUS TIMES OF THE DAY.
- PROGRAMMING ALL SIGNAL TIMING PARAMETERS INTO THE TRAFFIC SIGNAL CONTROLLER.
- FIELD IMPLEMENTING AND FINE-TUNING / ADJUSTING ALL TRAFFIC SIGNAL TIMING PARAMETERS, INCLUDING FOLLOW-UP FIELD REVIEWS AS MAY BE NECESSARY.
- DEVELOPING, PROGRAMMING, FIELD IMPLEMENTING, AND FINE-TUNING ALL VEHICLE DETECTION ZONE DIMENSIONS, ZONE LOCATIONS, AND OPERATIONAL PARAMETERS.

ALL OF THE AFOREMENTIONED CONTRACTED PROFESSIONAL ENGINEERING TRAFFIC SIGNAL OPERATIONAL CONSULTANT SERVICES DELIVERABLES SHALL BE CONSISTENT WITH NATIONAL PUBLICATIONS, INCLUDING, BUT NOT LIMITED TO: MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) LATEST EDITION / REVISION, FHWA-HOP-08-024 "TRAFFIC SIGNAL TIMING MANUAL" (JUNE 2008), FHWA-HRT-04-091 "SIGNALIZED INTERSECTIONS: INFORMATIONAL GUIDE" (AUGUST 2004), FHWA-HOP-06-006 "TRAFFIC CONTROL SYSTEMS HANDBOOK" (OCTOBER 2005), FHWA-DTFH61-01-C-00183 "SIGNAL TIMING PROCESS FINAL REPORT" (DECEMBER 2003), NCHRP REPORT 731 "GUIDELINES FOR TIMING YELLOW AND ALL-RED INTERVALS AT SIGNALIZED INTERSECTIONS" (2012), NCHRP REPORT 812 "SIGNAL TIMING MANUAL SECOND EDITION" (2015)

SIGNING AND STRIPING NOTES

- ALL SIGNS AND PAVEMENT MARKINGS SHALL BE IN COMPLIANCE WITH THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
- REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED BY A METHOD THAT DOES NOT MATERIALLY DAMAGE THE PAVEMENT. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY WILL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS. AT NO TIME WILL IT BE ACCEPTABLE TO PAINT OVER EXISTING PAVEMENT MARKINGS.
- ANY DEVIATION FROM THE STRIPING AND SIGNING PLAN SHALL BE APPROVED BY EL PASO COUNTY **DEVELOPMENT SERVICES**.
- ALL SIGNS SHOWN ON THE SIGNING AND STRIPING PLAN SHALL BE NEW SIGNS. EXISTING SIGNS MAY REMAIN OR BE REUSED IF THEY MEET CURRENT EL PASO COUNTY AND MUTCD STANDARDS.
- STREET NAME AND REGULATORY STOP SIGNS SHALL BE ON THE SAME POST AT INTERSECTIONS.
- ALL REMOVED SIGNS SHALL BE DISPOSED OF IN A PROPER MANNER BY THE CONTRACTOR.
- ALL STREET NAME SIGNS SHALL HAVE "D" SERIES LETTERS, WITH LOCAL ROADWAY SIGNS BEING 4" UPPER-LOWER CASE LETTERING ON 8" BLANK AND NON-LOCAL ROADWAY SIGNS BEING 6" LETTERING, UPPER-LOWER CASE ON 12" BLANK, WITH A WHITE BORDER THAT IS NOT RECESSED. MULTI-LANE ROADWAYS WITH SPEED LIMITS OF 40 MPH OR HIGHER SHALL HAVE 8" UPPER-LOWER CASE LETTERING ON 18" BLANK WITH A WHITE BORDER THAT IS NOT RECESSED. THE WIDTH OF THE NON-RECESSED WHITE BORDERS SHALL MATCH PAGE 255 OF THE 2012 MUTCD "STANDARD HIGHWAY SIGNS"
- ALL TRAFFIC SIGNS SHALL HAVE A MINIMUM HIGH INTENSITY PRISMATIC GRADE SHEETING.
- ALL LOCAL RESIDENTIAL STREET SIGNS SHALL BE MOUNTED ON A 1.75" X 1.75" SQUARE TUBE SIGN POST AND STUB POST BASE. FOR OTHER APPLICATIONS, REFER TO THE CDOT STANDARD S-614-8 REGARDING USE OF THE P2 TUBULAR STEEL POST SLIPBASE DESIGN.
- ALL SIGNS SHALL BE SINGLE SHEET ALUMINUM WITH 0.100" MINIMUM THICKNESS.
- ALL LIMIT LINES/STOP LINES, CROSSWALK LINES, PAVEMENT LEGENDS, AND ARROWS SHALL BE A MINIMUM 125 MIL THICKNESS PREFORMED THERMOPLASTIC PAVEMENT MARKINGS WITH TAPERED LEADING EDGES PER CDOT STANDARD S-627-1. WORD AND SYMBOL MARKINGS SHALL BE THE NARROW TYPE. STOP BARS SHALL BE 24" IN WIDTH. CROSSWALKS LINES SHALL BE 12" WIDE AND 8' LONG PER CDOT S-627-1.
- THE CONTRACTOR SHALL NOTIFY EL PASO COUNTY **DEVELOPMENT SERVICES** (719) 520-6819 PRIOR TO AND UPON COMPLETION OF SIGNING AND STRIPING.
- THE CONTRACTOR SHALL OBTAIN A WORK IN THE RIGHT OF WAY PERMIT FROM THE EL PASO COUNTY PUBLIC **SERVICE** DEPARTMENT (**PSD**) PRIOR TO ANY SIGNAGE OR STRIPING WORK WITHIN AN EXISTING EL PASO COUNTY ROADWAY.

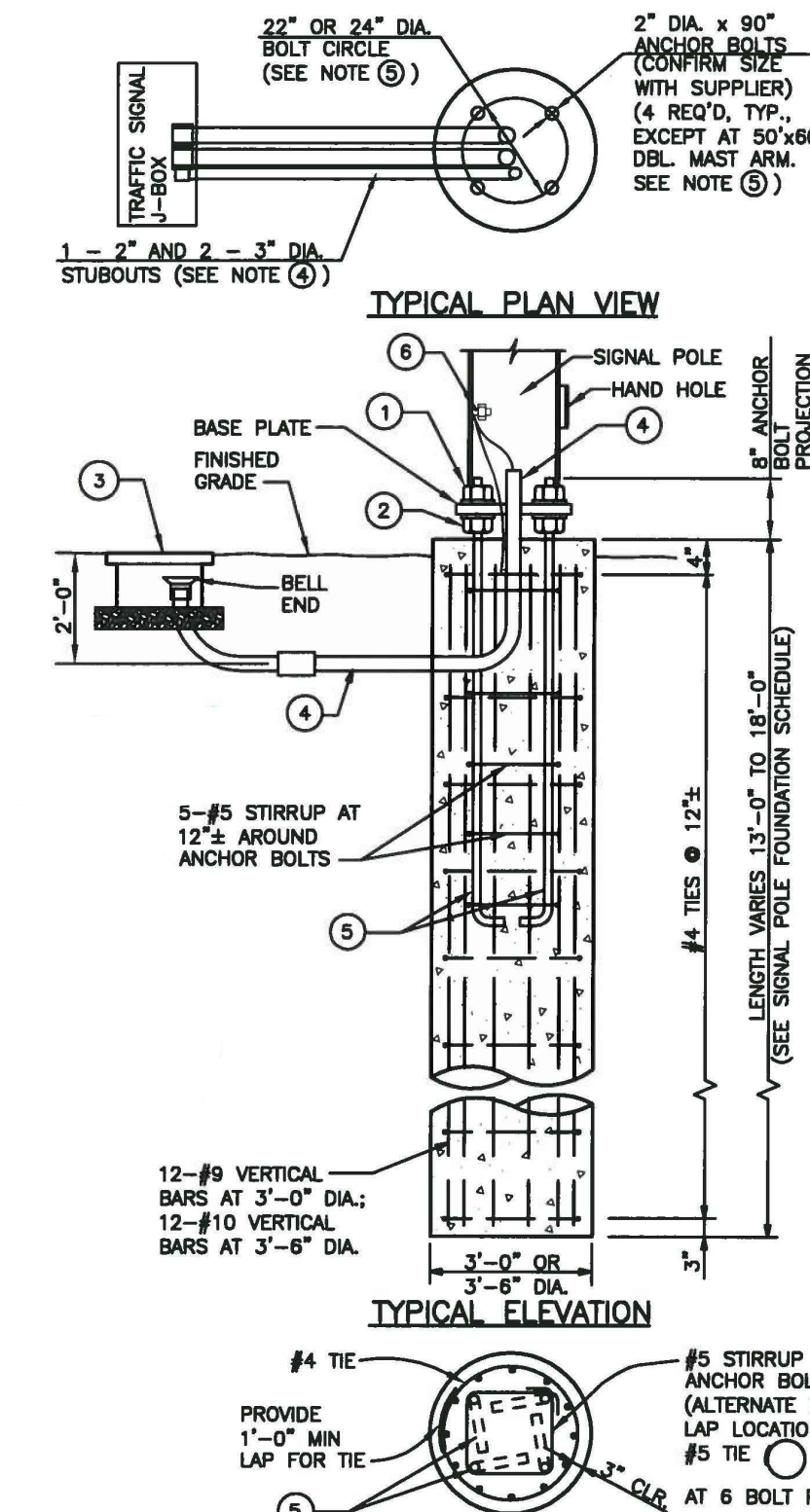
PCD

DPW

Works

CITY OF COLORADO SPRINGS TRAFFIC SIGNAL FOUNDATION SPECIFICATIONS

13.14 TRAFFIC SIGNAL FOUNDATION (TYPICAL) (20' TO 65' SINGLE & 20'x35' TO 50'x60' DOUBLE MAST ARMS)



SINGLE MAST ARM SIGNAL POLE FOUNDATION SCHEDULE				DOUBLE MAST ARM SIGNAL POLE FOUNDATION SCHEDULE			
MAST ARM LENGTH (FT)	BOLT CIRCLE DIA. (IN)	CAISSON DIA. (IN)	CAISSON LENGTH (FT)	MAST ARM LENGTHS (FT x FT)	BOLT CIRCLE DIA. (IN)	CAISSON DIA. (IN)	CAISSON LENGTH (FT)
20	22	36	13	20 to 50	22	36	18
25	22	36	13	x	(4 BOLTS)		
30	22	36	14	30 to 50	24	42	18
35	22	36	14	30 x 60			
40	22	36	15	35 x 60			
45	22	36	15	40 x 60			
50	22	36	16	45 x 55 (4 BOLTS)			
55	22	36	16	45 x 60			
60	22	36	17	50 x 55			
65	22	36	17	50 x 60 (6 BOLTS)	24	42	18
SPAN WIRE POLE FOUNDATION SCHEDULE				SPAN WIRE POLE FOUNDATION SCHEDULE			
MAX. SPAN WIRE LENGTH (FT)				MAX. SPAN WIRE LENGTH (FT)			
150				175			
BOLT CIRCLE DIA. (IN)				BOLT CIRCLE DIA. (IN)			
22				24			
CAISSON DIA. (IN)				CAISSON DIA. (IN)			
36				42			
CAISSON LENGTH (FT)				CAISSON LENGTH (FT)			
16				17			

DETAIL NOTES

- HEAVY HEX NUTS & FLAT WASHERS
- HEAVY HEX LEVELING NUTS & WASHERS
- U-BOLTS
- PROVIDE ONE (1) - 2" DIAMETER SCHEDULE 40 PVC CONDUIT (24" MIN. DEPTH, 30" MIN. DEPTH UNDER ROADWAY) & TWO (2) - 3" DIAMETER SCHEDULE 40 PVC CONDUITS TO THE TRAFFIC SIGNAL U-BOLT. INSTALL BELL ENDS ON EACH CONDUIT.
- INSTALL ANCHOR BOLTS (FURNISHED WITH POLE) PER MANUFACTURER'S TEMPLATE (FURNISHED WITH ORDER), ORIENT HOOKS SUCH THAT A CONCRETE PUMP HOSE CAN ACCESS THE BOTTOM OF THE EXCAVATION.
- GROUNDING NUT. SEE SECTION 13.12 FOR INFORMATION ON GROUNDING REQUIREMENTS.

FOUNDATION DESIGN AND CONSTRUCTION NOTES

- THE STANDARD SIGNAL FOUNDATIONS SHOWN ON THIS DRAWING SHALL ONLY BE USED WITH THE CITY OF COLORADO SPRINGS STANDARD SIGNAL PLANS, AS DEVELOPED BY VILAMONT INDUSTRIES.
- ALL WORK SHALL BE IN ACCORDANCE WITH THE COLORADO SPRINGS CITY TRAFFIC SIGNAL INSTALLATION AND PARTS SPECIFICATIONS.
- ALL CAISSON CONCRETE SHALL BE CDOT CLASS BZ, f'c = 4000 psi.
- ALL REINFORCING STEEL SHALL BE GRADE 60, fr = 60,000 psi.
- ANCHOR BOLTS SHALL BE ASTM F1554 MODIFIED TO 55 ksi YIELD STRENGTH. ANCHOR BOLTS SHALL BE FURNISHED BY SIGNAL POLE MANUFACTURER.
- THE SIGNAL FOUNDATION DESIGN SHOWN ON THIS DRAWING ASSUMES THE MINIMUM SOIL CHARACTERISTICS AS WOULD BE TYPICALLY ENCOUNTERED IN COLORADO SPRINGS WHICH ARE NOTED BELOW. IN THE EVENT THAT SOFT SOIL CONDITIONS (A BLOW COUNT OF 4-8) ARE ENCOUNTERED, A SITE SPECIFIC GEOTECHNICAL EVALUATION AND FOUNDATION DESIGN WILL BE NECESSARY.

ASSUMED GEOTECHNICAL DESIGN PARAMETERS:

- SOIL DENSITY (γ) = 120 pcf
 - SOIL COHESION = 750 psf
 - ANGLE OF INTERNAL FRICTION (φ) = 28°
 - HORIZONTAL MODULUS OF SUBGRADE REACTION (K) = 77 Tcf
 - E₅₀ = 0.01 in/in
- IF THE FOLLOWING SITUATIONS ARE ENCOUNTERED DURING DRILLING, CONTACT THE CITY OF COLORADO SPRINGS ENGINEER:
 - SIGNALS WILL NOT BE INSTALLED WITHIN THE ROADWAY PRISM.
 - THE SOIL HAS A HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY.
 - THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG.
 - THE FOUNDATION SOILS ARE NOT HOMOGENEOUS.
 - FIRM BEDROCK IS ENCOUNTERED.

CONSTRUCTION NOTES:

- PRIOR TO POURING CONCRETE, ANCHOR BOLT THREADS SHALL BE OILED. BOLT POSITIONS SHALL BE ACCURATE TO 1/8" +/-.
- BOLTS SHALL BE ACCURATELY SQUARE WITH CURB LINE.
- PRIOR TO POURING CONCRETE, CONDUITS SHALL BE TAPED. CONDUIT DIRECTIONS ARE TO BE DETERMINED BY THE TRAFFIC ENGINEER OR FIELD REPRESENTATIVE. MARK ALL CONDUIT RUNS ON TOP OF THE CONCRETE BASE. MARKS SHOULD BE 2" FROM THE PERIMETER OF THE BASE.
- CAISSONS SHALL BE PLACED AGAINST UNDISTURBED EARTH.
- CONCRETE SHALL BE VIBRATED.
- A MINIMUM OF 3" CONCRETE COVER SHALL BE MAINTAINED AROUND THE STEEL CAGE. A MAXIMUM OF 4" OF COVER IS ALLOWED AT THE TOP OF THE CAGE.
- ALL CONDUIT STUBS SHALL EXTEND FREELY BEYOND THE POUR AND SHALL BE FITTED WITH A COUPLING ON EACH STUB. STUBS SHALL BE TAPED TO PREVENT ENTRY OF DIRT OR CONCRETE.
- LOOSE DIRT SHALL BE REMOVED FROM THE BOTTOM OF THE HOLE PRIOR TO POURING CONCRETE.
- TRASH SHALL NOT BE THROWN INTO THE HOLE.
- THE BASE SURFACE SHALL BE SMOOTH FINISHED WITH A STEEL TROWEL AND HAVE A LIGHT BROOM FINISH.
- THE BASE TOP SHALL BE FLUSH TO SIDEWALK GRADE OR, IF NOT ATTACHED TO SIDEWALK, 1" ABOVE GRADE.
- NO COLD JOINTS ARE ALLOWED IN CAISSONS. POUR CAISSONS CONTINUOUSLY TO FINISHED GRADE.
- POLE FOUNDATION MAY ALTER IN DEPTH AND/OR DIAMETER, AS APPROVED BY THE CITY'S TRAFFIC ENGINEER. THE CITY SHALL APPROVE MODIFICATIONS NEEDED FOR THE CAISSONS DUE TO UNFORESEEN CONDITIONS.
- BASE DIMENSIONS AND BOLT CIRCLE PATTERN MAY VARY FROM THE STANDARD, BUT ONLY UPON APPROVAL BY THE CITY TRAFFIC ENGINEER.

Verify no conflicts with EPC notes / CDOT specs.

GENERAL NOTES
Bent Grass Meadows Dr./Meridian Rd.

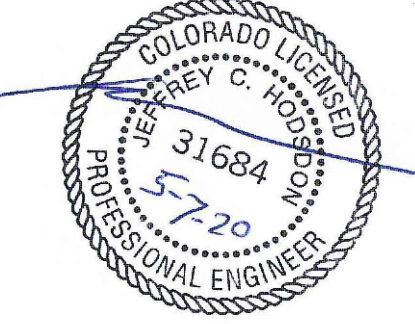


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Project Manager
JEFFREY C. HODSDON, PE

REVISIONS	DATE
Revisions #3	5/4/20
Span Wire Signal	5/1/18
Revisions #2	9/29/17

DATE: 3/17/16
SCALE: NTS
DRAWN BY: MR
JOB NO.: 154560
DWG: 194900_Signal Plan Sheet



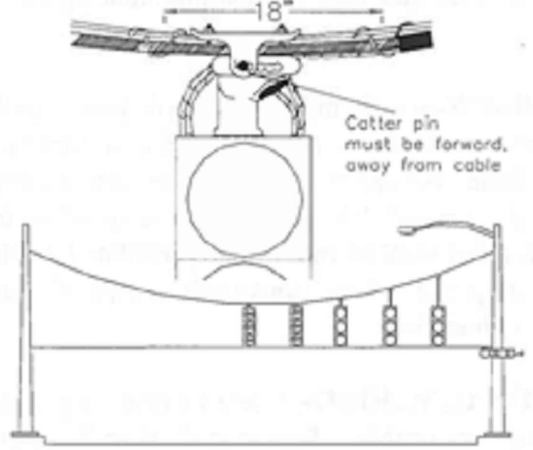
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OF 6

GENERAL NOTES (CONT.)

Verify no conflicts with EPC notes / CDOT specs (not reviewed in detail by Staff)

This Page shows applicable notes from the Colorado Springs City Traffic Signal Installation and Parts Specification (10/10/2018)

- 2.8 Concrete to be State Class BZ poured against virgin (undisturbed) soil. All bases shall be vibrated to eliminate air pockets. A copy of signal batch ticket must accompany billing.
- 2.9 Signal foundations shall be finished with stubout directions scribed at edge. (See Fig.1-3)
- 2.10 Contractor shall contact the Traffic Engineer, or Designee, for inspection of form, bolts and stub out layout 24 hours prior to intent of pour, and (2-hour minimum conformation) prior to pouring concrete. **(Pouring a base without an inspection may result in contractor's immediate removal of base and installation of a new one at contractor expense).** Exposed bolt threads and nuts shall be free of concrete and debris. Only 1" of thread exposed between caisson and bottom anchor bolt nut.
- 2.11 Contractor must supply verification of pole data when furnishing poles.
- 4.6 **OVERHEAD SIGNAL WIRING**- A service drip loop shall be provided at the signal head in the individual head's feed cable. This loop shall be 2 coils of cable 12 inches in diameter and taped to the main cable at the top. Slack in the main cable shall be pulled out and the cable taped to the span wire grips at ends of the span with 2" electrical tape. Drip loop shall be provided next to the poles for the overhead cables. These loops also shall be about 12 inches in diameter and also taped to span wire grips. **Always wire the inside head as if it would have a left turn movement, i.e., use a 7-conductor.**
- 4.8 **CABLE SUPPORT RINGS**-All cable support rings shall be 18" apart.
- 4.9 Cables entering signal pole shall have the smaller cables lay on top of the heavier cables. Drilled hole in pole shall be deburred with file to remove sharp edges. 3" chase nipples shall be used where the wires enter the span poles. 3" Lock ring shall be installed on the outside of pole.
- 4.10 **HANGING HEAD**- Heads shall be installed at a minimum of 17 feet from street to the bottom of the tether clamp. Heads should be installed with each head attached to the tether. Tether shall look level across the bottom of all heads from one side to the other. Pole mount and Ped head equipment must be bolted onto signal poles. Banding type ASTRO-BRAC assembly or approved equivalent shall attach heads to the mast-arm.
- 4.12 **OVERHEAD SIGNS**-Overhead signs such as lane usage or school crossing signs hung on span and tether shall be installed with a minimum of 2 vertical supports. Each support shall be attached to both span and tether. Each sign support shall be made of aluminum medium extrusion, or large corner angle extrusion channels. Signs are bolted to each vertical channel using 4 lip-lock bolts. Flat backing plate must be used with each span wire clip.
- All signs that are greater than 30" wide shall be mounted with a Astro type bracket on the pole or mast arm.
- 5.0 **Span Wire Profile (Typical standard)**



- 10.1 **GENERAL**-Poles shall consist of tapered pole, round, curved tapered traffic signal mast arm (if required), luminaries arm, hand hole covers, anchor bolts, washers / nuts for anchor bolts and base plate. Traffic signal poles, lighting poles, pedestals, mast arms, luminaire arms shall be of the general configuration shown in the City's Traffic Signal Standard Drawings. Pole should be designed to accommodate the minimum loads as shown on the standard plan drawing.
- 10.2 **CALCULATIONS**- Calculations and detailed drawings shall include mast arm, luminaries arm, pole, base plate, and anchor bolt analysis. Maximum loads and stresses shall be determined for the most critical wind direction. The pole shall be analyzed in its final deflected position, at the arm to pole connection(s) and pole base. Maximum arm and pole loads, stresses and combined stress ratios (CSR) shall be provided for the specified loading combinations, as well as maximum top of pole dead load rotation. Shaft dimensions shall be equivalent in strength for the loads shown on the drawings.
- 10.3 **POLE**-The pole shall be fabricated from coil or plate conforming to ASTM A572 or A595 Grade A with a minimum yield strength of 55 ksi, and have a constant linear taper of 0.14 in/ft. The shaft shall be one piece, and contain no circumferential welded butt splices. Laminated tubes are not permitted. The pole shall have a reinforced 6.50" x 10.0" handhole with cover located 1'-6" from the pole base. Each pole shall be provided with a decorative end cap secured in place with setscrews. The pole shall be anodized black.
- 10.5 **BASE PLATE**-Base plates shall conform to ASTM A36 or ASTM A572. Plates shall be integrally welded to the tubes with a telescopic joint or a full penetration weld joint with a backed ring and is hot dip galvanized and powder coated as specified in the contract documents.
- 10.6 **ANCHOR BOLTS**-Anchor bolts shall conform to the requirements of ASTM F1554. The upper 12" of the bolts shall be hot dip galvanized per ASTM A153. Each anchor bolt shall be supplied with two hex nuts and two flat washers. The strength of the nuts shall equal or exceed the proof load of the bolts. A decorative cast aluminum nut cover shall be provided for each anchor bolt. Each nut cover shall be attached to the pole with a 0.25" stainless steel, self-tapping, hex head screw.
- 10.7 **DESIGN**-Design shall be in accordance with the 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals." Calculations and detailed drawings shall be submitted demonstrating compliance with the AASHTO specification.
- 10.8 **FABRICATOR**-The Fabricator shall be certified under Category I, "Conventional Steel Structures" as set forth by the American Institute of Steel Construction Quality Certification Program. Proof of this certification will be required prior to bid opening to ensure that the fabricator has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to fabricate quality Traffic Pole Structures.
- 10.9 **WELDING**-All welding shall be in accordance with Sections 1 through 8 of the American Welding Society (AWS) D1.1 Structural Welding Code. Tacklers and welders shall be qualified in accordance with the code. Tube longitudinal seam welds shall be free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Longitudinal welds suspected to contain defects shall be magnetic particle inspected. All circumferential butt-welded pole and arm splices shall be ultrasonically or radiographically inspected.
- 10.10 **MATERIAL CERTIFICATIONS**-All materials and products shall be manufactured in the United States of America, and comply with ASTM or AASHTO specifications. Mill certifications shall be supplied as proof of compliance with the specifications.
- 11.0 Typical Traffic Signal Standards.

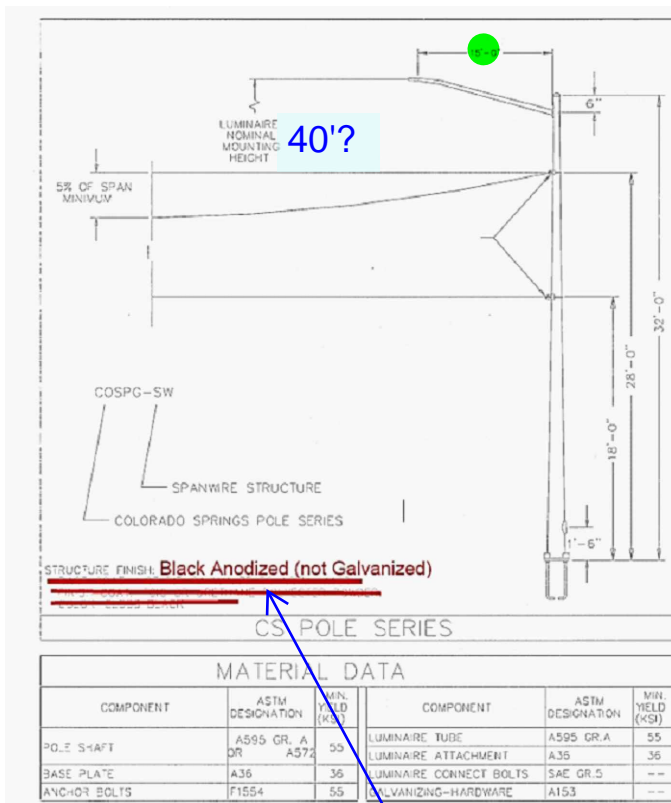
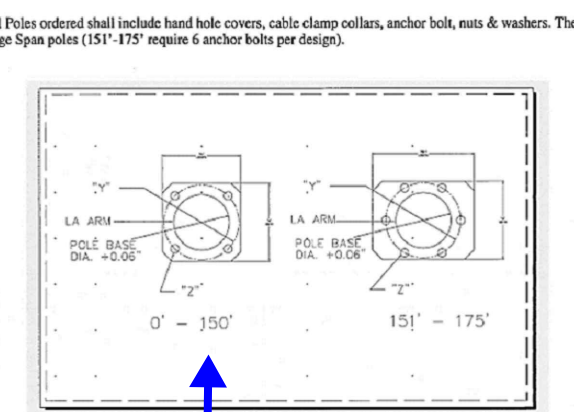
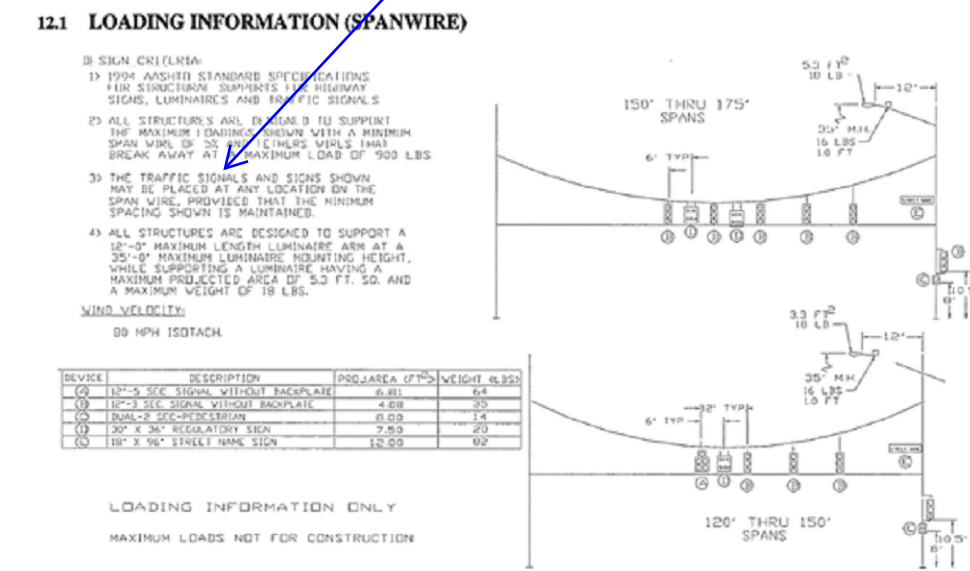


TABLE 3: TAPERED ROUND POLES											
Signal Size (in)	Pole Size (in)	Pole Length (ft)	Pole Data				Anchor Bolt Data				
			CSR	CSR	CSR	CSR	CSR	CSR	CSR	CSR	
14	14	15.0	32.00	0.350	13.00	32.00	3.00	2.00	84.00	6.00	16.00
15	15	15.0	32.00	0.350	13.00	32.00	3.00	2.00	84.00	6.00	16.00
16	16	15.0	32.00	0.350	13.00	32.00	3.00	2.00	84.00	6.00	16.00



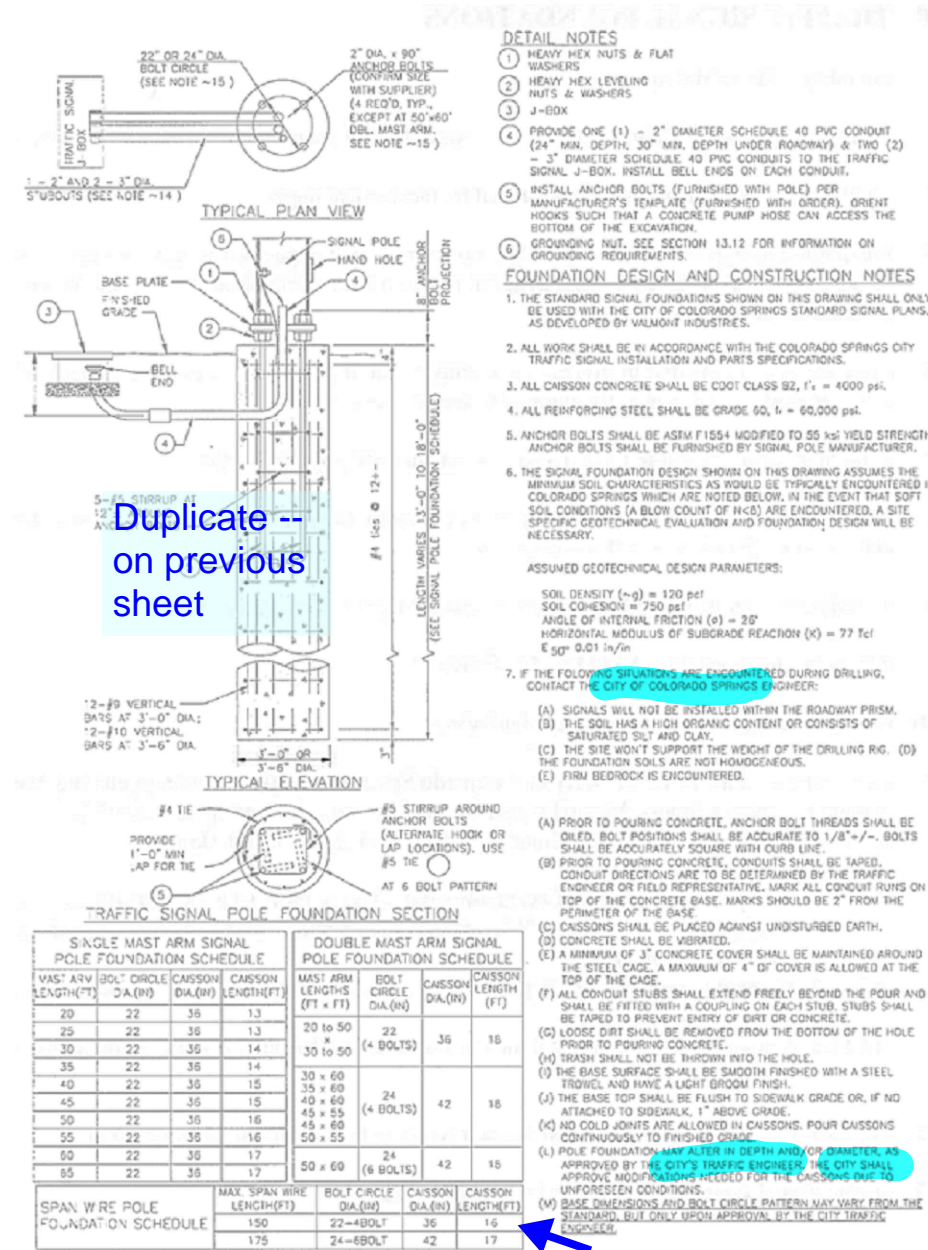
All Poles ordered shall include hand hole covers, cable clamp collars, anchor bolt, nuts & washers. The large span poles (151'-175' require 6 anchor bolts per design).



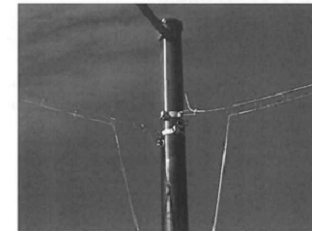
- DESIGN CRITERIA:**
- 1) 1094 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS
 - 2) ALL STRUCTURES ARE DESIGNED TO SUPPORT THE MAXIMUM LOADINGS SHOWN WITH A MINIMUM SPAN WIRE OF 5% AND TETHERS WIRES THAT BREAK AWAY AT A MAXIMUM LOAD OF 900 LBS.
 - 3) THE TRAFFIC SIGNALS AND SIGNS SHOWN MAY BE PLACED AT ANY LOCATION ON THE SPAN WIRE, PROVIDED THAT THE MINIMUM SPACING SHOWN IS MAINTAINED.
 - 4) ALL STRUCTURES ARE DESIGNED TO SUPPORT A 12' - 0" MAXIMUM LENGTH LUMINAIRE ARM AT A 35' - 0" MAXIMUM LUMINAIRE MOUNTING HEIGHT, WHILE SUPPORTING A LUMINAIRE HAVING A MAXIMUM PROJECTED AREA OF 5.3 FT. SQ. AND A MAXIMUM WEIGHT OF 18 LBS.

WIND VELOCITY:
80 MPH ISOTACH.
LOADING INFORMATION ONLY
MAXIMUM LOADS NOT FOR CONSTRUCTION

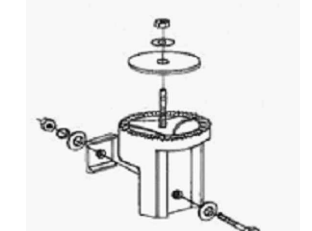
- 13.0 **TRAFFIC SIGNAL FOUNDATIONS**
- 13.1 Foundation General notes:
- 13.2 Concrete = class BZ. Reinforced steel per ASTM A615 specification, grade 60 for all bars.
 - 13.3 Shaft for concrete foundation to be drilled by mechanical auger.
 - 13.4 Foundation design requires that the shaft be founded in compact sand, clay, or sandy clay. If by visual inspection of the hole other material is present, the foundation design shall be modified as determined by the engineer.
 - 13.5 Concrete shall be poured in lifts not exceeding 3 feet in depth. At the pouring of each lift, concrete shall be mechanically vibrated to remove air pockets.
 - 13.6 Foundation shall be poured 7 to 10 days in advance of pole installation.
 - 13.7 When ambient temperature is below (40 deg F) poured foundations shall be covered with blankets and/or straw per direction of the Engineer.
 - 13.8 Foundation shall be poured monolithic to finished grade-(No cold joints).
 - 13.9 All anchor bolts shall be ASTM F1554 Grade 55.
 - 13.10 Foundation depths vary, per the standard sheet.
 - 13.11 Grounding Details. Refer to "City of Colorado Springs Traffic Signal Grounding Methods" manual for greater details. Manual is located on City web site: Springsgov.com/City engineering/Reference Materials/Standard Specifications & Traffic Manuals.
 - 13.11.1 Equipment Grounding Conductor (EGC) Use at least 10 gauge, insulated, green, stranded copper. Refer to "City of Colorado Springs Traffic Signal Grounding Methods" manual.
 - 13.11.2 Ground pole using UFER grounding electrode conductor (GEC)- at least 6gauge, Bare, stranded copper.
 - 13.11.3 Connect to rebar cage of concrete foundation using clamp suitable for submersion in concrete.
 - 13.12 Contractor shall install J-boxes next to each signal pole foundation when required.
 - 13.13 Traffic Signal Foundations-(Typical).



- 18.0 **SPECIFICATIONS FOR WIRE**
- 18.1 **PPB-Paired Cable-Tray cable** shall be equivalent to IMSA specification 19-1. Cable shall be minimum 6 conductors of 18 AWG. Cable shall be black PVC jacketed (.030 inches) overall with polyethylene insulation. Cable shall be shipped on sturdy wooden spools of 1,000 non-interrupted feet. Cable shall be equipped with a ripcord.
- 18.2 **Signal Cables**; shall comply with IMSA specification 19-1. Conductors are to be 14 AWG, comprised of no less than 7 strands and will be untinned. Conductor insulation shall be polyethylene. The cable jacket shall be of polyvinyl chloride only, and may not be unduly rigid. Tracer colors shall be painted onto the wire insulation but must be unremovable and a spiral design is preferred. Cable shall be shipped 1,000 non-interrupted feet on spools. Larger shall be approved by installer or signal supervisor. Spools shall be sturdy and constructed of wood. Spools shall be non-returnable. Cable shall be equipped with a ripcord.
- 19.0 **GALVANIZED STEEL CABLE**
- 19.1 Cable is to be comprised of seven (7) strands of galvanized steel wire of gauge required to bring outside nominal diameter to specifications. Galvanizing must be class "A" (.9 oz. zinc per square foot) and each wire must be individually galvanized prior to cable assembly. Steel cable is to be Siemans-Martin Grade and minimum breaking strengths are to be:
(3/16" 2,200 pounds)
(1/2" 12,100 pounds)
- 19.2 Cable is to meet ASTM A475 Specifications. Cable shall be shipped on sturdy, non-returnable spools of 1,000 feet each; coils of wire not on spools shall be unacceptable.
- 20.0 **TRAFFIC SIGNALS ACCESSORIES-**
- 20.1 CONDUIT RUNNING THREAD-1 1/2" x 3' Galvanized steel or aluminum conduit running thread (NPSM) used to space between top of signal head and entrance fittings attached to the 1/2" span wire.
 - 20.2 STRAND VISES-1/2" with long bale (Reliable #5254). To be used for 1/2", 7 strand galvanized steel cable.
 - 20.3 3/16" with long bale (Reliable #5199). To be used for 3/16", 7 strand galvanized steel cable.
 - 20.4 NOTE: Strand Vises to be attached to pole using supplied collars from manufacturer for span cables. One 5/8" Thimble eye bolts shall be used for each tether stand wire.
 - 20.5 Typical attachment points for span wire connections. (1/2" strand vises to clamp on collars).



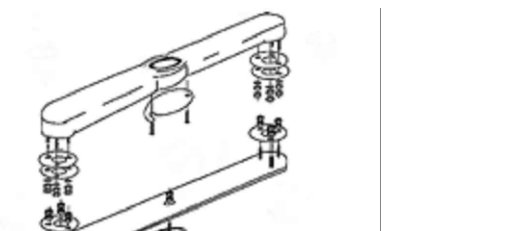
- 25.0 **Break-away tether assembly (Pelco SE-5058-PNC)**
- 25.1 Consists of cast aluminum threaded assembly to fit bottom of signal head. Assembly unit shall have single stud for tightening.



- 26.0 **ENTRANCE FITTING/SIGNAL HEAD HANGERS**
- 26.1 Entrance fitting is a casting that couples to signal head to lower end and has a drilled rib at top to connect to cable suspension clamp. Rib is to have a series of holes beginning at centerline of signal head connector to allow for correct positioning of off-balance signal head assemblies. Pinholes are to be designed for 5/8" pin. Rib shall not be more than .625 in thickness. Integral path for wire shall be free of sharp edges and constrictions and shall have a plastic bushing at its head. Threads in entrance fitting shall also be 1 1/2" NPSM. Fitting shall have 5/16" NC set screw inside to prevent chase nipple loosening. Bottom of entrance fitting shall either bear serration's for standard 72 position signal grip or shall be equipped with locking washer bearing standard 72 position signal grip. **Shurlock rings shall be constructed out of metal or aluminum. Plastic shurlock rings shall not be used.** Chase nipple shall be grooved and shall include O_Ring to seal signal head. Both entrance fitting and chase nipple shall be malleable iron and shall be painted **gloss black**.
- 27.0 **SPECIFICATIONS FOR SUSPENSION CLAMPS**
- 27.1 Suspension clamps must be at least 7 inches long and is to be of malleable iron. Clamp and pin shall be galvanized (Class "A", .9 oz. zinc per square foot). Hole drilled in tangs for pin shall be 5/8" and 5/8" pin shall be supplied. Width between tangs shall be .70" +/- .025". Clamp bolts shall be "U" bolts with four (4) nuts and washers. "U" bolts, nuts, and lock washers shall be cadmium plated. 5/8" pin shall be drilled for minimum 1/8" diameter cotter pin, which shall be, supplied cadmium plated. Minimum ultimate strength shall be 16,000 pounds. Clamp is to be usable on either 3/8" or 1/2" stranded steel cable. Entrance fittings shall accept City of Colorado Springs standard all thread stock.

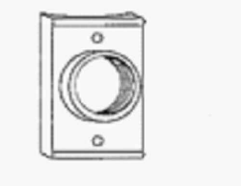


- 28.0 **UPPER ARM ASSEMBLY (Pelco SE-5061-P)**
- 28.1 Upper Arm Assembly must be used to mount five section left turn heads in a span wire configuration. This unit shall be universal to all signal heads with a 1 1/2" serrate for Standard 72 position signal grip. Grip is to be compatible with Eagle Brand Signal Heads. Unit shall be complete as shown. Unit shall be metal and painted to specified color. **Upper arm assembly shall not be constructed of 1 1/2" conduits with set screws.**



- 29.0 **SINGLE HEAD-Side of pole Mounts**
- 29.1 This bracket consists of a 1 1/2" pipe nipple with an elbow at its end and a nipple and nut to retain the signal head. The pipe nipples are to be 1 1/2" cast aluminum with 1 1/2" NPSM threads. The nuts are to be hexagonal, 2 9/16" across the flats, threaded 1 1/2" NPSM, and shall be constructed of cast aluminum. One nut shall be supplied for each nipple of the bracket. Conduit lock rings or nuts or chase nipples requiring special tools are not acceptable. The minimum overall length of the arm should be 12" c/c including hub. The elbows shall be cast aluminum, threaded 1 1/2" NPSM and will have set screws to lock in place. The elbows shall be cast with serration's to position the head, or washers with serration's are to be supplied. Serrations are to be compatible with 72-position serrations on Eagle Brand signal heads. Brackets are to be shipped assembled and are to be painted. Each pair of brackets is considered a unit, as it requires two (2) for each mounting.

- 30.0 **POLE MOUNT FITTINGS (BANDIT BRACKETS-Hub Plate)**
- 30.1 Fittings to be cast aluminum, painted **gloss black**, with guides for 1" or 3/4" steel bands. Radius of standard bracket to accommodate large diameter poles. Single threaded hub to be 1 1/2" NPSM, threaded completely through. Guides shall be drilled with a 1/2" hole for mounting the bandit bracket with 3/8" bolts.



Project Manager
JEFFREY C. HODSON, PE

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REVISIONS	DATE
Revisions #3	5/5/20
Span Wire Signal	5/1/18
Revisions #2	9/29/17

DATE: 3/17/16
SCALE: NTS
DRAWN BY: MR
JOB NO.: 154560
DWG: 194900_Signal Plan Sheet

SHT NO. 4
OF 6

Same as gloss black?

STREET NAME SIGNS

A Meridian Rd

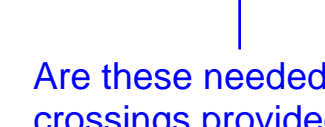
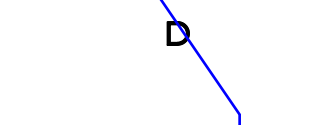
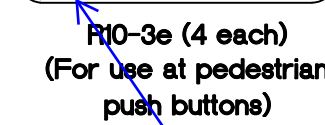
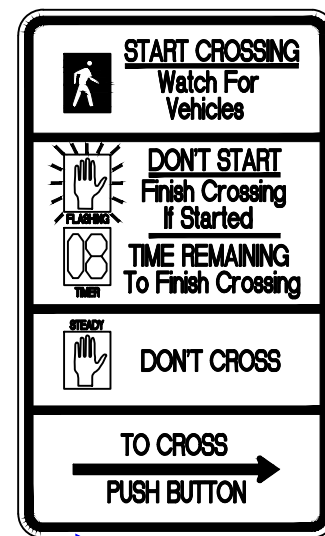
B Bent Grass Meadows Dr

Sign details to be included with shop drawing submittals

LEGEND

ITEM	NEW
TRAFFIC SIGNAL HEAD (NO BACKPLATE)	
TRAFFIC SIGNAL HEAD WITH BACKPLATE	
SIGNAL POLE, SPAN WIRE & FOUNDATION	
PEDESTAL POST	
ELECTRICAL CONDUIT RUN	
PEDESTRIAN PUSH BUTTON & INFO SIGN	
POWER METER	
PULL BOX	
LUMINAIRE W/ MAST ARM	
CONTROLLER CABINET	
16" LED PED SIGNAL HEAD	
SIGN, SIGNAL-POLE-MOUNTED	
VIDEO IMAGE VEHICLE DETECTOR (CAMERA)	
VIDEO DETECTION ZONE (TYPICAL)	

SIGNS



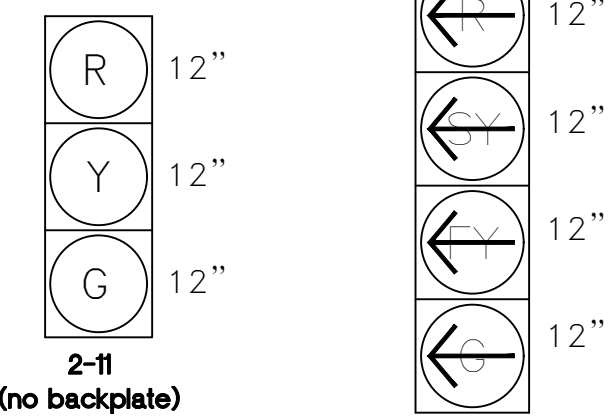
R10-3e (4 each)
(For use at pedestrian push buttons)

Are these needed? (Any crossings provided?)
Staff will check with DPW also.



C

SIGNAL FACES



2-11
(no backplate)

1 12
(no backplate)

PI-P2
16"

Signal Notes:

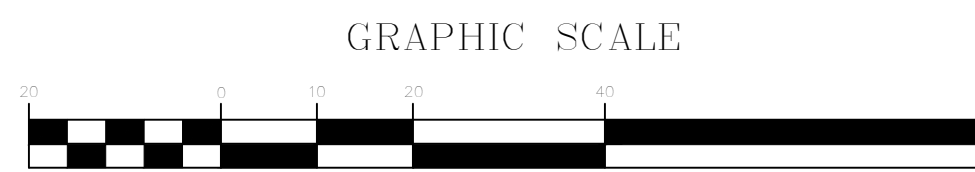
- INSTALL NEW FOUNDATIONS, SIGNAL POLES, PEDESTAL POLES AND LUMINAIRE ARMS PER CITY OF COLORADO SPRINGS SPECIFICATIONS AT THE LOCATIONS SHOWN ON THIS PLAN SHEET. NORTHING/EASTING IS TO CENTER OF CAISSON. REFER TO SIGNAL POLE AND PEDESTAL POLE SCHEDULE TABLES SHOWN ON THIS SHEET. PLEASE REFER TO SHEET # WHICH INCLUDES EXPERTS FROM "COLORADO SPRINGS CITY TRAFFIC SIGNAL INSTALLATION & PARTS SPECIFICATIONS" DATED 10/10/2018. THESE ARE TO BE USED FOR THE TRAFFIC SIGNAL POLE AND CAISSON INSTALLATION FOR THIS PROJECT. THIS INCLUDES THE SPAN WIRE CABLE AND TETHER CABLE INSTALLATION, FASTENING SIGNAL HEADS TO THE SPAN WIRE AND TETHER CABLES AND OTHER ASSOCIATED INSTALLATION DETAILS SPECIFIC TO THE SPAN WIRE TYPE SIGNAL, OTHER EQUIPMENT PER CDOT SPECIFICATIONS AND 5414-40.
- VEHICLE DETECTION UNITS SHALL BE INSTALLED USING A MOUNTING ASSEMBLY IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS WITH PLACEMENT AND ORIENTATION IN ACCORDANCE WITH THE PROJECT PLANS OR PER MANUFACTURER INSTRUCTIONS.

Bent Grass Meadows Dr.

Extend conduit to power source located at the SE corner of the intersection of Bent Grass Meadows and Meridian Park Drive.

7-11 Access - Right OUT only - no entry.

This appears to be in the future sidewalk/trail location. See Galloway exhibit.

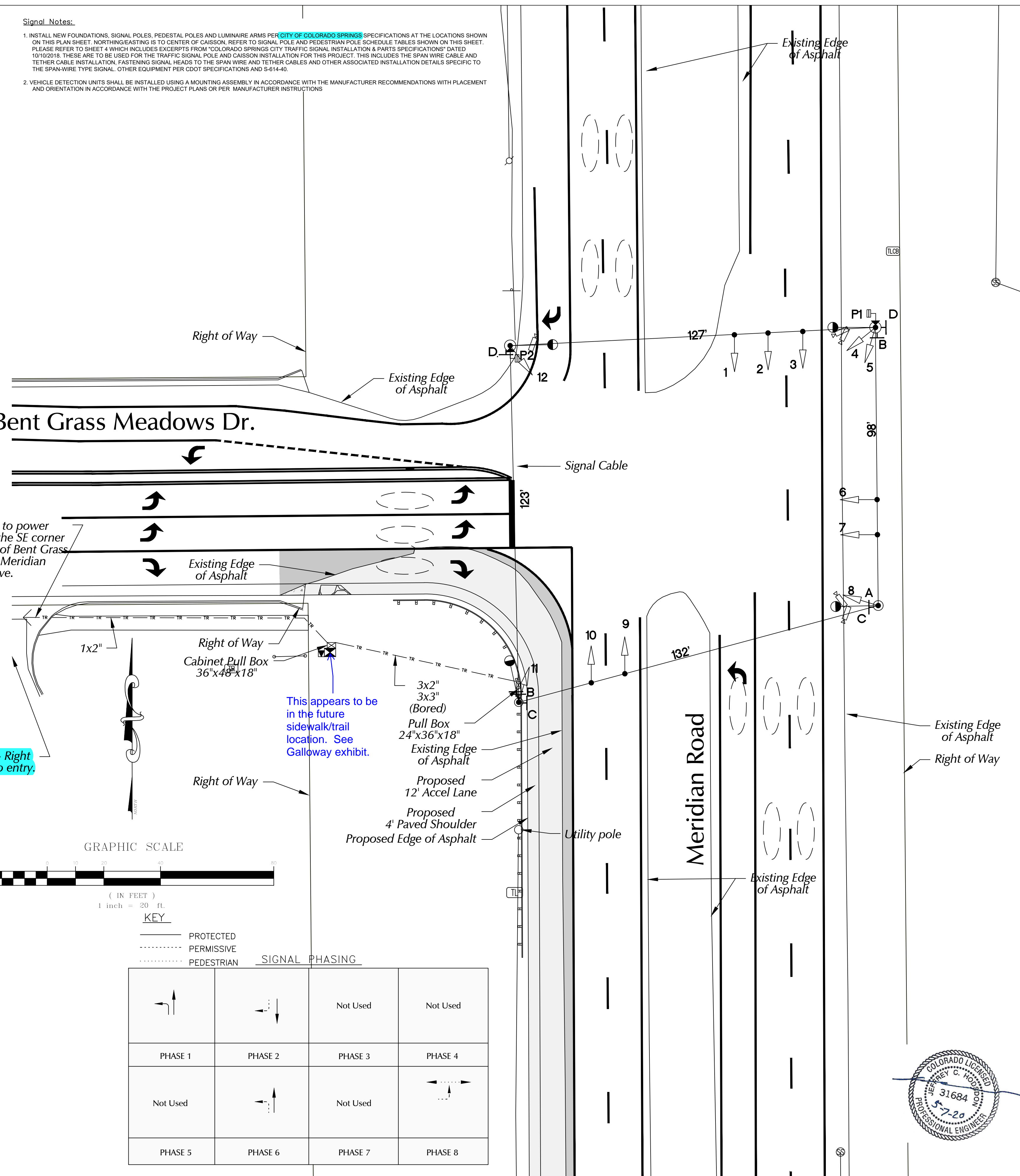


KEY

- PROTECTED
- PERMISSIVE
- PEDESTRIAN

SIGNAL PHASING

PHASE 1	PHASE 2	PHASE 3	PHASE 4
		Not Used	Not Used
Not Used		Not Used	
PHASE 5	PHASE 6	PHASE 7	PHASE 8



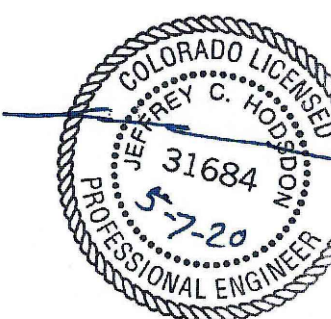
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Project Manager
JEFFREY C. HODSDON, PE

REVISIONS	DATE
Revisions #4	5/4/2020
Span Wire Signal	5/1/18
Revisions #2	9/29/17

DATE: 3/17/16
SCALE: 1"=20'
DRAWN BY: MR
JOB NO.: 194900/154560
DWG: 194900_Signal Plan Sheet

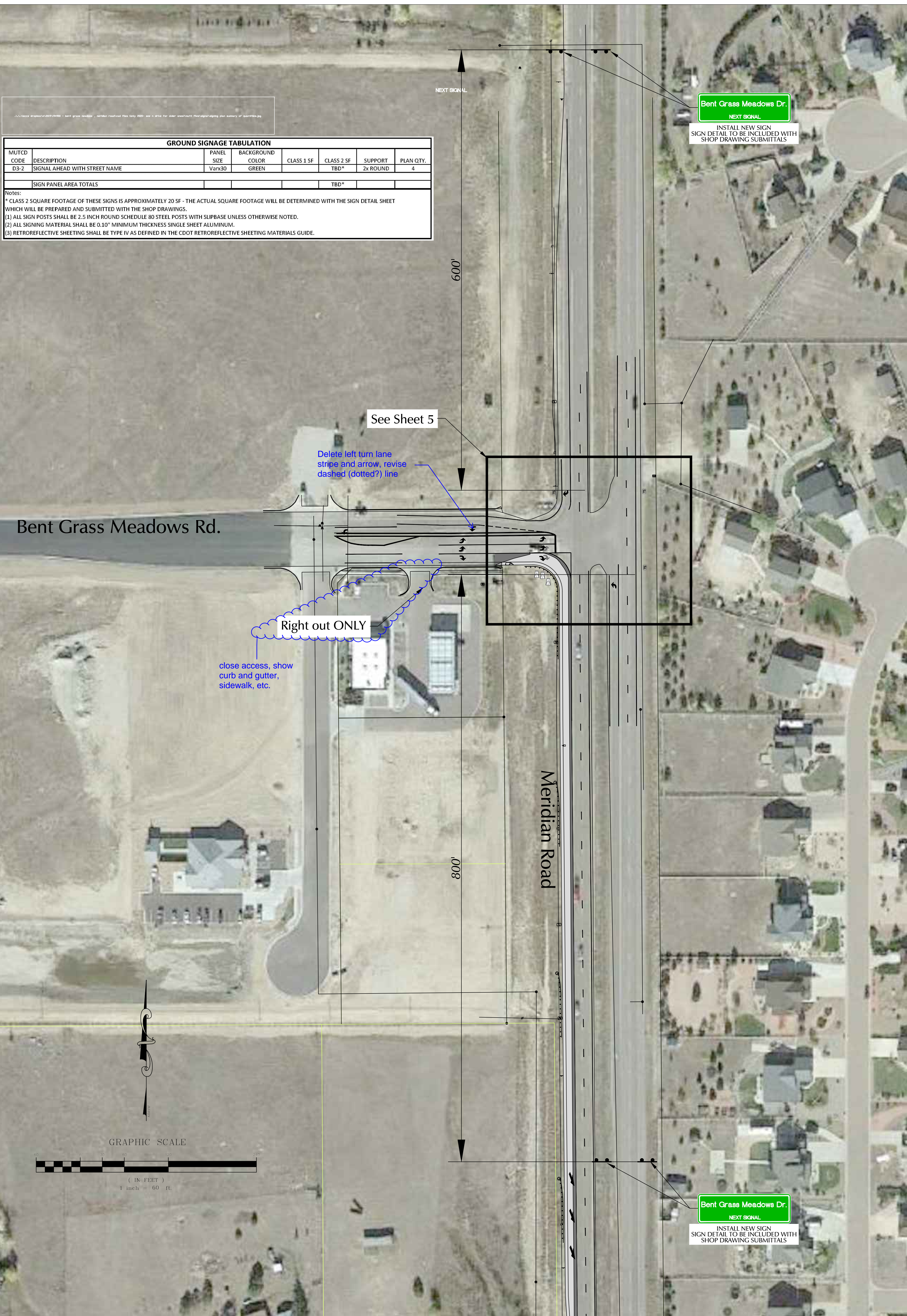


SHT NO. 5
OF 6

\\nas01\proj\201708\Bent Grass Meadows - Signal Plan\Bent Grass Meadows - Signal Plan.dwg

GROUND SIGNAGE TABULATION						
MUTCD CODE	DESCRIPTION	PANEL SIZE	BACKGROUND COLOR	CLASS 1 SF	CLASS 2 SF	SUPPORT
D3-2	SIGNAL AHEAD WITH STREET NAME	Varx30	GREEN		TBD*	2x ROUND
SIGN PANEL AREA TOTALS					TBD*	

Notes:
 * CLASS 2 SQUARE FOOTAGE OF THESE SIGNS IS APPROXIMATELY 20 SF - THE ACTUAL SQUARE FOOTAGE WILL BE DETERMINED WITH THE SIGN DETAIL SHEET WHICH WILL BE PREPARED AND SUBMITTED WITH THE SHOP DRAWINGS.
 (1) ALL SIGN POSTS SHALL BE 2.5 INCH ROUND SCHEDULE 80 STEEL POSTS WITH SLIPBASE UNLESS OTHERWISE NOTED.
 (2) ALL SIGNING MATERIAL SHALL BE 0.10" MINIMUM THICKNESS SINGLE SHEET ALUMINUM.
 (3) RETROREFLECTIVE SHEETING SHALL BE TYPE IV AS DEFINED IN THE CDOT RETROREFLECTIVE SHEETING MATERIALS GUIDE.



REVISIONS	DATE
Revisions #3	5/7/20
Span Wire Signal	5/1/18
Revisions #2	9/29/17

DATE: 3/17/16
 SCALE: 1"=60'
 DRAWN BY: JLR
 JOB NO.: 154560
 DWG: 194000_Signal Plan Sheet

Project Manager
 JEFFREY C. HODSDON, PE

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ADVANCE STREET NAME SIGNING PLAN

Bent Grass Meadows Dr./Meridian Rd.

SHT NO. 6 OF 6