

California High-Speed Rail Authority



RFP No.: HSR 14-32

**Request for Proposals for Design-Build
Services for Construction Package 4**

**Book II, Part B.1
Directive Drawings**

CIVIL DIRECTIVE NOTES

A. GENERAL SITE NOTES

1. FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE AUTHORITY'S REPRESENTATIVE.
2. ALL CONSTRUCTION ACTIVITIES AFFECTING THIRD PARTY FACILITIES SHALL BE COORDINATED WITH THE PROPER JURISDICTION AUTHORITY.
3. FOR ABBREVIATIONS, SEE GENERAL DIRECTIVE DRAWINGS.
4. FOR SYMBOLS, SEE GENERAL DIRECTIVE DRAWINGS.
5. "ORIGINAL GROUND" SHOWN ON CROSS SECTIONS REFERS TO THE APPROXIMATE EXISTING GROUND LINE AT THE DESIGNATED CENTERLINE, BASELINE, LAYOUT LINE OR SECTION LINE.
6. ALL WORK SHALL CONFORM TO ALL LOCAL, STATE AND FEDERAL CODES AND ORDINANCES IN EFFECT.
7. PROVIDE AND MAINTAIN PROPER BARRICADES, RAILINGS, GUARDS, FLAGGING, LIGHTING, OR OTHER DEVICES NECESSARY FOR THE PROTECTION OF LIFE AND PROPERTY.
8. VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING MATERIALS.

B. GRADING

1. DO NOT PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATION OCCUR THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
2. KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE.
3. PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.
4. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.
5. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS CONTAINED IN THE LATEST CALTRANS STORM WATER QUALITY HANDBOOKS.

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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY S. MILITELLO
DRAWN BY R. MINCIO
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 01/24/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
CIVIL

CONTRACT NO.
DRAWING NO. DD-GE-001
SCALE NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT

TRACK DIRECTIVE NOTES

1. THE GENERAL BASIS FOR TRACK STANDARDS AND MATERIALS SHALL BE THE AREMA MANUAL.
2. TRACK AND TRACK COMPONENTS SHALL BE DESIGNED AND FABRICATED TO PERFORM UNDER THE PREVAILING AND EXTREME CLIMATIC AND ENVIRONMENTAL CONDITIONS OCCURRING WITHIN THE GEOGRAPHIC EXTENT OF THE SYSTEM.
3. THE PROFILE GRADE LINE IS CARRIED ON THE TOP OF LOW RAIL THROUGH HORIZONTAL CURVES AND SPIRALS FOR THE DESIGNATED TRACK.
4. THE LENGTHS OF TRACK IS BASED ON CENTER OF TRACK ALIGNMENT.
5. UNLESS SEPARATE TRACK PROFILES ARE GIVEN, TRACK PARALLEL TO THE DESIGNATED TRACK ARE AT THE SAME TOP OF RAIL ELEVATIONS PROJECTED ON EITHER PERPENDICULAR OR RADIAL LINES FROM THE DESIGNATED TRACK CENTERLINES.
6. BALLASTED TRACKS ARE GENERALLY PREFERRED FOR YARD TRACKS. DESIGNERS SHALL FOLLOW THE REQUIREMENTS ASSOCIATED WITH CONSTRUCTION OF BALLASTED TRACK IN THE CALIFORNIA HIGH SPEED TRAIN DESIGN MANUAL.

RFP No: HSR 14-32 - REVIEW DRAFT

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DATE 01/24/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
TRACK

CONTRACT NO.
DRAWING NO. DD-GE-002
SCALE NO SCALE
SHEET NO.

STRUCTURAL DIRECTIVE NOTES:

A. SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

1. CONSTRUCTION SPECIFICATION SHALL BE THE DESIGN-BUILD STANDARD SPECIFICATION, CALIFORNIA HIGH SPEED TRAIN.
2. THE STRUCTURAL DESIGN OF STRUCTURES SUPPORTING HIGH SPEED TRAINS SHALL BE BASED ON THE REQUIREMENTS OF THE CALIFORNIA HIGH SPEED RAIL AUTHORITY.
3. DESIGN CRITERIA FOR HIGHWAY BRIDGES SHALL BE THE CALIFORNIA BRIDGE DESIGN SPECIFICATION. FOR HIGHWAY BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.
4. DESIGN CRITERIA FOR RAILROAD STRUCTURES NOT SUPPORTING HIGH SPEED TRAINS SHALL BE THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA) MANUAL FOR RAILWAY ENGINEERING (APRIL 2008). FOR RAILROAD BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.

B. DESIGN METHOD

1. DESIGN SHALL BE PERFORMED TO THE LOAD AND RESISTANCE FACTOR (LRFD) DESIGN METHOD.
2. THE DESIGN OF PRESTRESSING AND PARTIAL PRESTRESSING SHALL CONFORM TO THE REQUIREMENTS OF SUBSECTION 5.9 OF AASHTO LRFD WITH CALIFORNIA AMENDMENTS WITH THE FOLLOWING EXCEPTION: NET TENSION STRESSES ARE NOT ALLOWED IN THE PRECOMPRESSED TENSILE ZONE AFTER ALL LOSSES HAVE OCCURRED.

C. GENERAL

1. SEE GENERAL DIRECTIVE DRAWINGS FOR ACRONYMS AND ABBREVIATIONS.
2. ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL OTHER DRAWINGS RELATED TO THE WORK.
3. EMBEDDED ITEMS SUCH AS PIPES, INSERTS, SLEEVES AND CONDUITS, AND ANY RECESSES, NICHES OR OPENINGS REQUIRED FOR UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL INSTALLATIONS ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS. CONTRACTOR SHALL REFER TO THE UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR THE LOCATIONS AND DETAILS OF THESE ITEMS. CONTRACTOR SHALL REVIEW AND APPROVE ALL PENETRATIONS PRIOR TO CONSTRUCTION. PENETRATIONS WHICH LOCAL THICKENING OF CONCRETE OR STEEL MEMBERS AND /OR SUPPLEMENTAL REINFORCING SHALL BE SHOWN ON THE STRUCTURAL DRAWINGS.
4. THE VERTICAL CONTROL OF ALL TRACK STRUCTURES IS BASED ON THE TOP OF LOW RAIL ELEVATION IN SUPERELEVATED STRUCTURES.

5. CONTRACTORS ATTENTION IS DIRECTED TO THE AREAS OF SAG VERTICAL CURVES. IN SUCH AREAS CAUTION SHOULD BE EXERCISED THAT THE DIMENSION TO THE INVERT OF CONCRETE OF GUIDEWAY IS NEVER LESS THAN THAT SHOWN FOR INVERT DETAILS.

6. ALL CONSTRUCTION JOINTS IN EARTH RETAINING STRUCTURES AND IN STRUCTURES BELOW THE FINISH GRADE SHALL CONTAIN CONTINUOUS WATERSTOPS, AND SHALL HAVE REINFORCEMENT CONTINUOUS ACROSS ALL JOINTS. HYDROSWELLING STRIPS SHALL BE INSTALLED ON ALL JOINT SURFACES WHICH WILL BE EXPOSED TO EARTH AND PERMANENTLY UNDER THE GROUNDWATER ELEVATION.

7. ALL WATERSTOPS SHALL BE INSTALLED SECURELY IN ACCORDANCE WITH THE SPECIFICATIONS. THE WATERSTOPS SHALL BE PLACED CONTINUOUSLY THROUGHOUT THE LENGTH OF THE CONSTRUCTION JOINT. LAPPING OF WATERSTOPS SHALL NOT BE PERMITTED. SPLICING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

8. UNLESS INDICATED OTHERWISE, CONCRETE SURFACES LEADING TO DRAINS SHALL BE SLOPED A MINIMUM OF 1/8 INCH PER FOOT TOWARD THE DRAIN AND THE ADJACENT SURFACES WARPED AS REQUIRED TO SATISFY AN ADEQUATE DRAINAGE FLOW.

D. MATERIAL PROPERTIES

1. CONCRETE 28 DAY COMPRESSIVE STRENGTH (MINIMUM)
 - a) DRILLED SHAFTS: $f'c=4,000$ PSI
 - b) PRECAST-PRESTRESSED PILES: $f'c=6,000$ PSI
 - c) FORMED CAST-IN-PLACE STRUCTURAL CONCRETE:
 - $f'c$ (UNDER GROUND)=4000 PSI
 - $f'c$ (ABOVE GROUND)=5000 PSI
 - d) PRECAST GIRDERS OR SEGMENTS OF GIRDERS: $f'c=6,000$ PSI
 - e) UNLESS NOTED OTHERWISE ON THE DRAWINGS, OR SPECIFIED, MINIMUM STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
 - f) ALL EXPOSED CONCRETE EDGES AND CORNERS SHALL BE CHAMFERED WITH A 3/4 INCH, 45 DEGREE CHAMFER UNLESS NOTED OTHERWISE.

2. REINFORCING STEEL SHALL CONFORM TO THE SPECIFICATIONS OF ASTM A 706 GRADE 60.

3. PRESTRESSING STEEL

- a) STRAND: ASTM A416/AASHTO M203, GRADE 270, LOW RELAXATION
 FRICTION COEFFICIENT: 0.25
 WOBBLE COEFFICIENT: 0.0002 PER FT
 ANCHOR SET: 0.375"
 APPARENT MODULUS: 28,500 KSI
 MINIMUM JACKING STRESS: 216 KSI (80% ULTIMATE)
 MAXIMUM ANCHORING STRESS: 189 KSI (70% ULTIMATE)
 MAXIMUM STRESS AFTER ANCHOR SET: 202 KSI (75% ULTIMATE)
 STRAND DIAMETER: 0.6" (AREA=0.216 SQ IN)

- b) POST TENSIONING BARS:
 ASTM A722/AASHTO M275, GRADE 150, TYPE II
 ANCHOR SET: 0.0625"
 APPARENT MODULUS: 30,000 KSI
 MAXIMUM JACKING STRESS: 113 KSI
 MAXIMUM ANCHORING STRESS: 105 KSI
 MAXIMUM STRESS AFTER LOSSES: 96 KSI

4. STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A6 WITH A YIELD STRENGTH OF $FY = 50$ KSI UNLESS NOTED OTHERWISE. THE FOLLOWING MATERIAL PROPERTIES SHALL APPLY:

- a) WIDE FLANGE SHAPES: ASTM A992
- b) M-SHAPES, S-SHAPES, HP SHAPES: ASTM A572
- c) ANGLES, CHANNELS: ASTM A572
- d) RECTANGULAR AND SQUARE HSS: ASTM A500 GR B (46 KSI)
- e) ROUND HSS: ASTM A500 GR B (42 KSI)
- f) STEEL PIPE: ASTM A53 GR B (35 KSI)
- g) PLATES, BARS: ASTM A36 (36 KSI)
- h) BOLTS: ASTM A325
- i) NUTS: ASTM A563
- j) WASHERS: ASTM F436

5. STEEL FABRICATIONS

- a) WELDING OF BUILT UP MEMBERS AND STEEL FABRICATIONS SHALL COMPLY WITH AASHTO/AWS D 1.5
- b) WELDING OF HSS SECTIONS AND PIPES SHALL COMPLY WITH AWS D 1.1
- c) MISCELLANEOUS STEEL ITEMS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION UNLESS COMPLETELY EMBEDDED IN CONCRETE AND UNLESS NOTED OTHERWISE.

6. FASTENERS

- a) ALL HIGH STRENGTH BOLTS NUTS AND WASHERS SHALL BE ZINC COATED
- b) ALL BOLTED CONNECTIONS SHALL COMPLY WITH RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".
- c) ALL BOLTS ARE ASTM A325 HIGH STRENGTH SLIP CRITICAL WITH THREADS EXCLUDED FROM THE SHEAR PLANE

E. CONCRETE COVER

1. UNLESS OTHERWISE NOTED, MINIMUM CONCRETE COVER SHALL CONFORM TO AASHTO LRFD WITH CALTRANS AMENDMENTS TABLE 5.12.3-1 WITH THE FOLLOWING EXCEPTIONS:
 - a) UNCASSED DRILLED SHAFTS: 6 INCHES
 - b) CASSED DRILLED SHAFTS WITH TEMPORARY CASING: 4 INCHES

F. SEISMIC LOADING AND DESIGN

1. THERE ARE TWO LEVELS OF DESIGN EARTHQUAKES:
 - a) MAXIMUM CONSIDERED EARTHQUAKE (MCE): GROUND MOTIONS CORRESPONDING TO GREATER OF (1) A PROBABILISTIC SPECTRUM BASED UPON A 10% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 950 YEARS) AND (2) A DETERMINISTIC SPECTRUM BASED UPON THE LARGEST MEDIAN RESPONSE RESULTING FROM THE MAXIMUM RUPTURE (CORRESPONDING TO M_{max}) OF ANY FAULT IN THE VICINITY OF THE STRUCTURE.
 - b) OPERATING BASIS EARTHQUAKE (OBE): GROUND MOTIONS CORRESPONDING TO A PROBABILISTIC SPECTRUM BASED UPON AN 86% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 50 YEARS).

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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
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DATE 08/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
 STRUCTURAL

CONTRACT NO.
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SCALE NO SCALE
SHEET NO.

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AT
ARCHITECTURAL AND ENGINEERING
AT-GRADE
AVERAGE ANNUAL DAILY TRAFFIC
AGGREGATE BASE,
ANCHOR BOLT
ASBESTOS BONDED BITUMINOUS COATED
AIR-BLOWN MORTAR
ABANDON
ABUTMENT
ABOVE
ALTERNATING CURRENT,
ASPHALT CONCRETE
ASPHALT CONCRETE BASE
AC DISTRIBUTION PANEL MAIN BREAKER
ACOUSTICAL
ASBESTOS CEMENT PIPE
ACCESS CONTROL ROOM
ALUMINUM CONDUCTOR STEEL REINFORCED
AREA DRAIN,
ACCESS DETERRING
ADJACENT,
ADJUST,
ADJUSTABLE
ADDED DEAD LOAD
AC DISTRIBUTION PANEL
AVERAGE DAILY TRAFFIC
AERIAL EARTH (GROUND) CONDUCTOR
AUTOMATED EXTERNAL DEFIBRILLATOR
AUTOMATIC FARE COLLECTION
ALTERNATIVE FLARED END SECTION
AERIAL GROUND WIRE
AHEAD
ALUMINUM
ALIGNMENT
ALTERNATE
TIME FROM MIDNIGHT TO NOON
ANCHOR
AUTOMATIC NUMBER IDENTIFICATION
ANNUNCIATOR
AMBIENT NOISE SENSOR
ALTERNATIVE PIPE
ALTERNATIVE PIPE CULVERT
AREA OF POTENTIAL EFFECTS
ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE
APPLICATION PROGRAMMING INTERFACE
APPROXIMATE
ALTERNATIVE PIPE UNDERDRAIN
ACCESS RESTRICTION
ARCHITECTURAL
ACCELERATION RESPONSE SPECTRUM
AGGREGATE SUBBASE
ASPHALT
ALUMINUM SPIRAL RIB PIPE
ASSEMBLY
AUTOTRANSFORMER,
AUTOMATIC TENSION
AUTOMATIC TRAIN CONTROL
ADMINISTRATIVE TELEPHONE
ALONG TRACK MOVEMENT
AUTOMATIC TRAIN OPERATION
AUTOMATIC TRAIN PROTECTION
ASPHALT TREATED PERMEABLE BASE
ASPHALT TREATED PERMEABLE MATERIAL
ABOVE TOP OF RAIL
AUTOMATIC TRAIN SUPERVISION,
AUTOTENSIONED SYSTEM
AUXILIARY
AVENUE
AVERAGE
AUTOMATIC VEHICLE LOCATION
AMERICAN WIRE GAUGE

B

B/SPAN
B/W
BAGR
BAR
BAT
BB
B-B
BC

BODY SPAN
BLACK & WHITE
BRIDGE APPROACH GUARD RAILING
BARRIER
BATTERY
BEGINNING OF BRIDGE
BACK-TO-BACK
BOLT CIRCLE

B CONTINUED

BCR
BD
BDA
BDD
BDP
BDS
BEC
BEG
BFA
BIL
BITUM
BK
BKF
BKR
BL
BLDG
BLKG
BLM
BLST
BLVD
BM
BN
BND
BOC
BOCC
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BOW
BR
BRG
BRKT
BRS
BRT
BS
BSC
BT
BTM
BTS
BTWN
BW
BWA
BWLAN
BZ

BEGIN CURB RETURN
BOARD
BI-DIRECTIONAL AMPLIFIER
BRIDGE DESIGN DETAILS (CALTRANS)
BRIDGE DESIGN PRACTICE (CALTRANS)
BRIDGE DESIGN SPECIFICATIONS (CALTRANS)
BURIED EARTH (GROUND) CONDUCTOR
BEGIN
BY PASS FEEDER ANCHOR
BASIC IMPULSE INSULATION LEVEL
BITUMINOUS
BACK
BACKFILL
BREAKER
BASE LINE
BUILDING
BLOCKING
BRIDGE-LOG MILE
BALLAST
BOULEVARD
BENCH MARK
BACKBONE NETWORK
BOUND
BOTTOM OF CURB
BACK-UP OPERATIONAL CONTROL CENTER
BOTTOM OF SLOPE
BOTTOM
BOTTOM OF WALL
BRIDGE
BEARING
BRACKET
BROADBAND RADIO SYSTEM
BUS RAPID TRANSIT
BODY SPAN WIRE
BASE STATION CONTROLLER
BUS TIE
BOTTOM
BASE TRANSCEIVER STATION
BETWEEN
BARBED WIRE,
BALANCE WEIGHT
BALANCE WEIGHT ANCHOR
BROADBAND WIRELESS LOCAL AREA NETWORK
BRONZE

C

C
CA
CAA
CAB
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CAP
CAPA
CAS
CAT
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CATP
CB
CBTC
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C-C
CCO
CCS
CCTV
CCVT
CEG

CLOSE,
CONTACT,
CONTROL
CERTIFICATION ACCEPTANCE
CABLE ANCHOR ASSEMBLY
CABINET
COMPUTER-AIDED DESIGN AND DRAFTING
CONTROLLED ACCESS HIGHWAY
CUSTOMER ASSISTANCE INTERCOM
CORRUGATED ALUMINUM PIPE
CANTILEVER
CAPACITY,
CAPACITOR,
CORRUGATED ALUMINUM PIPE
CORRUGATED ALUMINUM PIPE ARCH
CONSTRUCTION AREA SIGN
CATEGORY,
CATEGORY SPECIFICATION FOR
TWISTED PAIR CABLING,
CATENARY
CANTENARY FOUNDATION
CATENARY POLE
CATCH BASIN,
CIRCUIT BREAKER
CONCRETE BARRIER
COMMUNICATIONS BASED TRAIN CONTROL
CONCRETE BLOCK WALL
CENTER LINE TO CENTER LINE
CONTRACT CHANGE ORDER
CALIFORNIA COORDINATE SYSTEM
CLOSED CIRCUIT TELEVISION
COUPLING CAPACITOR VOLTAGE TRANSFORMER
CERTIFIED ENGINEERING GEOLOGIST

C CONTINUED

CEM
CER
C&G
CG
CGS
CHNL
CI
CIC
CIDH
CIF
CIP
C-I-P
CIPCP
CIS
CISS
CJ
CJP
CKT
CL
CL2
CL-6
CLG
CLK
CLKG
CLO
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CM
CMP
CMU
CNTR
CO
COL
COMM
CONC
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COORD
CORR
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CPU
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CSPA
CT
CTB
CTPB
CTPM
CTR
CTSK
CTVT
CTW
CU
CULV
CV
CVR
CW
CWA
CWH
CWR
CWT

CEMENT
COMMUNICATIONS EQUIPMENT ROOM
CURB & GUTTER
CENTER OF GRAVITY
CALIFORNIA GEOLOGICAL SURVEY
CHANNEL
CAST IRON
COMMUNICATIONS INTERFACE CABINET
CAST-IN-DRILLED-HOLE
COMMON INTERMEDIATE FORMAT
CAST IRON PIPE
CAST-IN-PLACE
CAST-IN-PLACE CONCRETE PIPE
CUSTOMER INFORMATION SIGN
CAST-IN-STEEL-SHELL
CONSTRUCTION JOINT
COMPLETE JOINT PENETRATION
CIRCUIT
CLASS
CLASS 2
CHAIN LINK FENCE (6 FT)
CEILING
CHAIN LINK
CAULKING
CLOSET
CLEAR,
CLEARANCE
CONTROL MODULE,
CORRUGATED METAL
CORRUGATED METAL PIPE
CONCRETE MASONRY UNIT
COUNTER
CLEANOUT,
COUNTY
COLUMN
COMMUNICATIONS
CONCRETE
CONDUIT
CONNECTOR,
CONNECTION
CONSTRUCT,
CONSTRUCTION
CONTINUOUS,
CONTINUATION
CONTRACTOR
COORDINATE
CORRIDOR
CONTROL POINT
CONE PENETRATION TEST,
CONTROL POWER TRANSFORMER
CENTRAL PROCESSING UNIT
CREEK,
CONDUIT RISER
COMBINED RELAY AND CONTROL PANEL
CONTINUOUS REINFORCED CONCRETE PAVEMENT
CONCRETED ROCK SLOPE PROTECTION
CLEAR RECOVERY ZONE
CONTROL SWITCH
CONSTRUCTION STAGING AREA
CORRUGATED STEEL PIPE
CORRUGATED STEEL PIPE ARCH
CERAMIC TILE,
COURT,
CURRENT TRANSFORMER/TRANSDUCER
CEMENT TREATED BASE
CEMENT TREATED PERMEABLE BASE
CEMENT TREATED PERMEABLE MATERIAL
CENTER
COUNTERSUNK
COMBINED CURRENT TRANSFORMER AND
VOLTAGE TRANSFORMER
COUNTERWEIGHT TAIL WIRE
COPPER
CULVERT
CURVE
COVER
CONTACT WIRE
CONTACT WIRE ANCHOR
CONTACT WIRE HEIGHT
CONTINUOUSLY WELDED RAIL
COUNTER WEIGHT

D

D
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DSG
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DWY
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DEPTH-BUILD
DESIGN BASIS EARTHQUAKE
DOUBLE
DIRECT CURRENT
Dc DISTRIBUTION PANEL MAIN BREAKER
Dc DISTRIBUTION PANEL
DOWNDRAIN,
DEVICE DRIVER
DEAD END
DELINEATOR
DEMOLISH
DEPARTMENT
DETOUR
DIRECT FIXATION,
DRINKING FOUNTAIN
DOWN GUY ANCHOR
DESIGN HOURLY VOLUME
DRAINAGE INLET
DIAGONAL
DIAPHRAGM
DIFFERENTIAL
DIMENSION
DROP INLET
DIRECTION
DISCONNECT
DISPENSER
DISTANCE
DISTRIBUTION
DOUBLE METAL BEAM BARRIER
DOWN
DOMAIN NAME SYSTEM
DOOR OPENING
DOUBLE-POLE DOUBLE-THROW
DRIVE
DOWNSPOUT,
DISCONNECT SWITCH
DIFFERING SITE CONDITIONS
DIRECT SUSPENSION CONTACT WIRE
DISCONNECT SWITCH GROUP
DETERMINISTIC SEISMIC HAZARD ANALYSIS
DISTRICT
DOUBLE THRIE BEAM BARRIER
DIGITAL TERRAIN MODEL
DIGITAL VIDEO RECORDERS
DRAWING
DRIVEWAY
DOUBLE CROSSOVER

E

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EAST
EACH
EASTBOUND,
END OF BRIDGE
END HORIZONTAL CURVE,
ELECTRICAL CONDUCTOR
END CURB RETURN
EACH END
EACH FACE
EMERGENCY GROUND SWITCH
EXTRA HIGH STRENGTH
EMERGENCY INTERCOM
EXPANSION JOINT
ETHERNET LAN
ELASTOMERIC
ELECTRICAL,
ELECTRIC
ELECTROLIER
ELEVATION
ELECTRONIC LOCK
EMBANKMENT
ELECTROMAGNETIC COMPATIBILITY
EMERGENCY
ELECTROMAGNETIC FIELD
ELECTRO MAGNETIC INTERFERENCE
ELEMENT MANAGEMENT SYSTEM
ELECTRIC MULTIPLE UNIT
ENCLOSURE
ENGINEER,
ENGINEERING
END OF BRIDGE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. LAVERDE
CHECKED BY S. MILITELLO
IN CHARGE G. LUSHEROVICH
DATE 08/29/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING**

ACRONYMS AND ABBREVIATIONS 1

CONTRACT NO.
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SHEET NO.

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E CONTINUED

EOD EDGE OF DECK
 EOS ELECTRICAL OPERATED SWITCH
 EOW END OF WALL
 EP EDGE OF PAVEMENT
 EPBM EARTH PRESSURE BALANCING MACHINE
 EPR ETHYLENE PROPYLENE RUBBER
 EQ EQUAL,
 EQUILATERAL
 EQN EQUATION
 EQUIP EQUIPMENT
 ES EDGE OF SHOULDER,
 EXTRA STRENGTH,
 ELECTRICAL SECTION
 ENVIRONMENTALLY SENSITIVE AREA
 ESC ESCALATOR
 ESEW EMERGENCY SHOWER / EYE WASH
 ESMT EASEMENT
 ETCS EUROPEAN TRAIN CONTROL SYSTEM
 ETEL EMERGENCY TELEPHONE
 ETS EMERGENCY TRIP SYSTEM
 ETW EDGE OF TRAVELED WAY
 EW EACH WAY,
 ENDWALL
 EXC EXCAVATION
 EXIST EXISTING
 EXP EXPANSION
 EXPO EXPOSED
 EXWY EXPRESSWAY
 EXT EXTERIOR

F

F/F FACE TO FACE
 F&C FRAME AND COVER
 F&G FRAME AND GRATE
 FA FIRE ALARM
 FACP FIRE ALARM CONTROL PANEL
 FAS FIRE ALARM SYSTEM
 FB FLAT BAR,
 FLOOR BEAM,
 FEEDER BREAKER
 FURNISHED BY OTHERS
 FBO FARE COLLECTION
 FC FLOOR DRAIN
 FDC FIRE DEPARTMENT CONNECTION
 FDN FOUNDATION
 FDP FIBER DISTRIBUTION PANEL
 FDR FEEDER
 FDU FIBER DISTRIBUTION UNIT
 FE FIRE EXTINGUISHER
 FES FLARED END SECTION
 FF FILTER FABRIC
 FFJ FULL FEEDING JUMPER
 FFL FINISHED FLOOR LEVEL
 FG FINISHED GRADE
 FH FIRE HYDRANT
 FHC FIRE HOSE CABINET
 FID FIRE INITIATING DEVICE
 FIG FIGURE
 FIN FINISH
 FIRM FLOOD INSURANCE RATE MAPS
 FJ FEEDER JUMPER
 FL FLOW LINE
 FLB FLOOR BEAM
 FLH FLAT HEAD
 FLR FLOOR
 FNA FIRE NOTIFICATION APPLIANCE
 FO FIBER OPTIC
 FOC FIBER OPTIC CABLE,
 FACE OF CURB
 FOCN FIBER OPTIC CABLING NETWORK
 FOF FACE OF FINISH
 FOP FACE OF POLE
 FOS FACE OF STUDS,
 FACTOR OF SAFETY
 FP FULL PENETRATION
 FPLM FULL SPAN PRECAST LAUNCHING
 FPRF FIREPROOF
 FPS FRAMES PER SECOND
 FR FRAME
 FREQ FREQUENCY
 FS FINISHED SURFACE

F CONTINUED

FTEL FIRE TELEPHONE
 FOOTING
 FTP FILE TRANSFER PROTOCOL
 FTW FIXED END TAIL WIRE
 FUT FUTURE
 FW FEEDER WIRE
 FWY FREEWAY

G

G1 ENTRANCE GRADE
 G2 EXIT GRADE
 G/L GROUND LINE
 GALV GALVANIZED
 GCL GRADING CONTROL LINE
 GD GRADE
 GHS GALVANIZED HIGH STRENGTH
 GIGE GIGABIT ETHERNET
 GIS GAS INSULATED SWITCH,
 GEOGRAPHIC INFORMATION SYSTEM
 GLASS
 GMA GROUND MOTION ANALYSIS
 GND GROUND
 GO-95 PUC GENERAL ORDER 95
 GP GRADING PLANE
 GPS GLOBAL POSITIONING SYSTEM
 GR GUARDRAIL,
 GROUND ROD
 GRP GLASS REINFORCED PLASTIC ROD
 GRS GALVANIZED RIGID STEEL
 GRX GRADE CROSSING
 GSHA GEOLOGIC AND SEISMIC HAZARDS
 ANALYSIS
 GSP GALVANIZED STEEL PIPE
 GT GENERAL INFORMATION
 GTGM GEOTECHNICAL TECHNICAL GUIDANCE
 MANUAL (FHWA)
 GTR GUTTER
 GW GUY WIRE
 GYP GYPSUM
 GYPBD GYPSUM BOARD

H

H/SPAN HEADSPAN
 HAZ HAZARDOUS
 HB HARDNESS BRINELL,
 HOSE BIBB
 HC HANDICAP
 HD HARD DRAWN,
 HORIZONTAL DRAIN
 HDG HOT DIP GALVANIZED
 HDPE HIGH DENSITY POLYETHYLENE
 HDWE HARDWARE
 HDWL HEADWALL
 HEX HEXAGONAL
 HH HANDHOLE,
 HEAD HARDENED
 HI HIGH
 HI-RAIL HIGHWAY TO RAILROAD VEHICLE
 HM HOLLOW METAL
 HMA HOT MIXED ASPHALT
 HMI HUMAN MACHINE INTERFACE
 HO HAND OPERATED
 HOR HORIZONTAL
 HOV HIGH-OCCUPANCY VEHICLE
 HP HIGH POINT,
 HINGE POINT
 HP&R HIGHWAY PLANTING AND RESTORATION
 HPS HIGH PERFORMANCE STEEL
 HR HANDRAIL
 HRL HIGH RAIL LEVEL
 HS HIGH STRENGTH
 HSR HIGH-SPEED RAIL
 HST HIGH-SPEED TRAIN
 HT HIGH TEMPERATURE
 HTR HEATER
 HV HIGH VOLTAGE

H CONTINUED

HVAC HEATING VENTILATION AND AIR CONDITIONING
 HW HIGH WATER
 HWM HIGH WATER MARK
 HWY HIGHWAY
 I/O INPUT/OUTPUT
 IB IMPEDANCE BOND
 IBC INTERNATIONAL BUILDING CODE
 IDS INTRUSTION DETECTION CODE
 IIMP INTEGRATED INFORMATION MANAGEMENT PLATFORM
 IJ INSULATED JOINT
 IJP INSULATED JOINT PLUG
 INSR INSULATOR
 INST INSTANTANEOUS
 INSUL INSULATION
 INT INTERIOR
 Inter-LATA INTER-LOCAL ACCESS AND TRANSPORT
 AREA
 INV INVERT
 IR IN-RUNNING (RIDING CONTACT WIRE)
 IRR IRRIGATION
 I/S IN-SPAN
 I/SJ IN-SPAN JUMPER
 J JUMPER
 JAN JANITOR
 JB JUNCTION BOX
 JCT JUNCTION
 JP JOINT POLE
 JT(S) JOINT(S)
 LA LANDSCAPE ARCHITECT,
 LIGHTNING ARRESTER
 LAM LAMINATE
 LAN LOCAL AREA NETWORK
 LAT LATITUDE
 LAV LAVATORY
 LC LANDSCAPE CONTRACTOR
 LCB LEAN CONCRETE BASE
 LCX LOWER-LEVEL DESIGN BASIS EARTHQUAKE
 LD BE LEAKY COAXIAL RADIO CABLE
 LED LIGHT EMITTING DIODE
 LF LINEAR FEET
 LG LONG
 LGT LIGHT,
 LIGHTING
 LH LEFT-HAND
 LKR LOCKER
 LL LIGHT LOADING
 LLT LAST LONG TIE
 LN LANE
 LO LOCKOUT
 LOC LOCATION
 LOL LAYOUT LINE
 LONG LONGITUDE,
 LONGITUDINAL
 LOS LEVEL OF SERVICE
 LOTB LOGS OF TEST BORINGS
 LP LOW POINT,
 LOW PROFILE
 LPL LIGHT POLE
 LR LOW RAIL
 LRFD LOAD AND RESISTANCE FACTOR DESIGN
 LRT LIGHT RAIL TRANSIT
 LRV LIGHT RAIL VEHICLE
 LS LANDSCAPING,
 LUMP SUM
 LT LEFT
 LV LOW VOLTAGE
 LVL LEVEL
 LVT LOW VIBRATION TRACK
 LWP LOWER WORKING POINT

I

J

L

M

M MEDIUM LOADING
 MAINT MAINTENANCE
 MAT MATERIAL
 MAX MAXIMUM
 MB METAL BEAM
 MBB METAL BEAM BARRIER
 MBGR METAL BEAM GUARD RAILING
 MCC MAINTENANCE CONTROL CENTER
 MCE MAXIMUM CONSIDERED EARTHQUAKE
 MCR MASTER CONTROL ROOM
 MDS MOBILE DATA SYSTEM
 MECH MECHANICAL
 MED MEDIAN
 MEM MEMBRANE
 MESSGR MESSENGER WIRE
 MET METAL
 MFR MANUFACTURER
 MH MANHOLE
 MHHW MEAN HIGHEST HIGH WATER
 MI MILD IRON
 MIN MINIMUM
 MISC MISCELLANEOUS
 MKR MARKER
 ML MAIN LINE
 MLLW MEAN LOWER LOW WATER
 MMIS MAINTENANCE MANAGEMENT INFORMATION SYSTEM
 MO MASONRY OPENING
 MOC MOTOR OPERATED CONTRACTOR
 MOD MODIFIED,
 MODIFY
 MODC MOTOR OPERATED DISCONNECT SWITCH
 MOI MAINTENANCE OF INFRASTRUCTURE
 MON MONUMENT
 MOP MOTOR OPERATED
 MOS MANUALLY OPERATED SWITCH
 MOV METAL-OXIDE VARISTOR
 MOW MAINTENANCE OF WAY
 MP MILEPOST
 MPA MIDPOINT ANCHOR
 MPLS MULTI-PROTOCOL LABEL SWITCHING
 MR MOVEMENT RATING
 MSE MECHANICALLY STABILIZED EMBANKMENT
 MSF MAINTENANCE AND STORAGE FACILITY
 MSL MEAN SEA LEVEL
 MTD MEMO TO DESIGNERS (CALTRANS),
 MOUNTED
 MUL MULLION
 MVC MINIMUM VERTICLE CLEARANCE
 MW MESSENGER WIRE

N

N NORTH
 N/A NOT APPLICABLE
 NAVD NORTH AMERICAN VERTICAL DATUM
 NB NORTHBOUND
 NBR NONBRIDGING
 NCL NO COLLAPSE PERFORMANCE LEVEL
 NDP NONLINEAR DYNAMIC PROCEDURE
 NEC NATIONAL ELECTRICAL CODE
 NEG NEGATIVE
 NEUT NEUTRAL
 NF NEGATIVE FEEDER,
 NEAR FACE
 NGVD NATIONAL GEODETIC VERTICAL DATUM
 NI NETWORK INTERFACE
 NIC NOT IN CONTRACT
 NMS NETWORK MANAGEMENT SYSTEM
 NO. NUMBER
 NO NORMALLY OPEN
 NOM NOMINAL
 NP NETWORK PORT
 NPRM NOTICE OF PROPOSED RULE MAKING
 NPS NOMINAL PIPE SIZE
 NR NOT REGISTERED
 NS NOT SUPPORTED
 NT NETWORK
 NTP NETWORK TIME PROTOCOL,
 NOTICE TO PROCEED
 NTS NETWORK TIME SERVER,
 NOT TO SCALE

REV	DATE	BY	CHK	APP	DESCRIPTION

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O

O&M OPERATIONS AND MAINTENANCE
 OA OVERALL
 OBLR OBLITERATE
 OC ON CENTER,
 OCC OPERATIONS CONTROL CENTER
 OCS OVERHEAD CONTACT SYSTEM
 OF OUTSIDE FACE
 OFF OFFSET
 OG ORIGINAL GROUND
 OH OVERHEAD
 O-O OUT TO OUT
 OOR OUT-OF-RUNNING (NONRIDING CONTACT WIRE)
 OP OVERPASS
 OPL OPERABILITY PERFORMANCE LEVEL
 OPNG OPENING
 OPP OPPOSITE
 ORS OPERATIONS RADIO SYSTEM
 OSP OUTSIDE PLANT
 OVERTEMP OVERTEMPERATURE

P

P/L PROPERTY LINE
 PA PUBLIC ADDRESS
 PACIS PUBIC ADDRESS / CUSTOMER INFORMATION SYSTEM
 PAN PANTOGRAPH
 PAP PERFORATED ALUMINUM PIPE
 PB PULL BOX,
 PBX PRIVATE BRANCH EXCHANGE
 PC PRECAST CONCRETE
 PCC PORTLAND CEMENT CONCRETE
 PCP PERFORATED CONCRETE PIPE
 PCPT PIEZOCONE PENETROMETER TEST
 PE PORCELAIN ENAMEL
 PED PEDESTRIAN
 PERF PERFORATED
 PERM PERMEABLE
 PET POTENTIAL EQUALIZING JUMPER
 PF POWER FACTOR
 PFDHA PROBABILISTIC FAULT DISPLACEMENT
 HAZARD ANALYSIS
 PG PROFILE GRADE
 PH PHASE
 PHE POTHOLE
 PID PASSENGER INFORMATION DISPLAY
 PITO POINT OF INTERSECTION TURNOUT
 PJP PARTIAL JOINT PENETRATION
 PL PLATE
 PLAM PLASTIC LAMINATE
 PLAS PLASTER
 PLC PROGRAMMABLE LOGIC CONTROLLER
 PLYWD PLYWOOD
 PM POST MILE,
 TIME FROM NOON TO MIDNIGHT
 PMS PAVEMENT MANAGEMENT SYSTEM
 PN PAVING NOTCH
 PNL PANEL
 PNT POINT
 PO PULL OFF
 POC POINT OF CONNECTION
 POE POINT OF ENDING
 POS POSITIVE
 POTS PLAIN ORDINARY TELEPHONE SERVICE
 PP PLASTIC PIPE,
 POWER POLE
 PPL PREFORMED PERMEABLE LINER
 PPP PERFORATED PLASTIC PIPE
 PR PAIR
 PRI PRIMARY RATE INTERFACE (ISDN SERVICE)
 PROP PROPOSED
 PS PARALLELING STATION
 P/S PRESTRESSED,
 PERFORATED STEEL PIPE
 PSP PRODUCT SAFETY PLAN
 PSTN PUBLIC SWITCHED TELEPHONE NETWORK
 PSTTWS PUBLIC SAFETY TRENCH AND
 TUNNEL WIRELESS SYSTEM
 PSU POWER SUPPLY UNIT
 PT POTENTIAL TRANSFORMER
 PTC POSITIVE TRAIN CONTROL

P CONTINUED

PTD/R PAPER TOWEL DISPENSER & RECEPTACLE
 PTEL PASSENGER ASSISTANCE TELEPHONE
 PTM PARKING TICKET MACHINE
 PTT PUSH TO TALK
 PTZ PAN-TILT-ZOOM
 PUE PUBLIC UTILITY EASEMENT
 PVC POLYVINYL CHLORIDE
 PVMT PAVEMENT
 PWR POWER

Q

QOS QUALITY OF SERVICE
 QT QUARRY TILE
 QTY QUANTITY

R

R RADIUS,
 RED
 R/A ROCK ANCHOR
 R/W, ROW RIGHT OF WAY
 R&D REMOVE AND DISPOSE
 R&S REMOVE AND SALVAGE
 RA REMOTE ANNUNCIATOR
 RAID REDUNDANT ARRAY OF INDEPENDENT DISKS
 RB RESILIENT BASE
 RBM RAILBOUND MANGANESE FROG
 RC REGIONAL CONSULTANT,
 REINFORCED CONCRETE
 RCA REINFORCED CONCRETE ARCH
 RCB REINFORCED CONCRETE BOX
 RCC REGIONAL CONTROL CENTER
 RCE REGISTERED CIVIL ENGINEER
 RCP REINFORCED CONCRETE PIPE
 RCPA REINFORCED CONCRETE PIPE ARCH
 RD ROAD,
 ROOF DRAIN
 ROADWAY
 RDWY RUNNING EDGE OF RAIL
 RE CONCRETE REINFORCING BAR
 RECT RECTANGULAR
 REF REFERENCE
 REFP REFERENCE POINT
 REINF REINFORCED,
 REINFORCEMENT,
 REINFORCING
 REL RELOCATE,
 RELOCATED
 REM REMOTE
 REPL REPLACEMENT
 REQD REQUIRED
 RESIL RESILIENT
 RET RETAINING
 REV REVISED,
 REVISION
 RF RADIO FREQUENCY
 RFI REQUEST FOR INFORMATION
 RGS RIGID GALVANIZED STEEL
 RH RIGHT-HAND
 R-M ROAD-MIXED
 RM RESTRICTED MANUAL,
 ROOM
 RO ROUGH OPENING
 RP RADIUS POINT
 RR RAILROAD,
 RUNNING RAIL
 RRR RESURFACING, RESTORATION, REHABILITATION (3R)
 RRRR RESURFACING, RESTORATION, REHABILITATION,
 RECONSTRUCTION (4R)
 RRX RAILROAD GRADE CROSSING
 RSP ROCK SLOPE PROTECTION
 RT RESILIENT TILE,
 RIGHT
 RTE ROUTE
 RTU REMOTE TERMINAL UNIT
 RW RETAINING WALL
 RWL RAIN WATER LEADER
 RWY RAILWAY

S

S SOUTH,
 SLOPE
 SAE STRUCTURE APPROACH EMBANKMENT
 SALV SALVAGE
 SAPP STRUCTURAL ALUMINUM PLATE PIPE
 SB SOUTHBOUND
 SC SWITCH CABLE
 SCADA SUPERVISORY CONTROL AND DATA
 ACQUISITION
 SCAT SIMPLE CATENARY-AUTO TENSION
 SCB SUBSTATION CONTROL BUILDING
 SCC STATION CONTROL CENTER
 SCD SEAT COVER DISPENSER
 SCFT SIMPLE CATENARY-FIXED TENSION
 SCHED SCHEDULE
 SCN SECURITY CLASSIFICATION NUMBERS
 SCPE SEISMIC CAPACITY AND PERFORMANCE
 EVALUATION
 SCSP SLOTTED CORRUGATED STEEL PIPE
 SD STORM DRAIN
 SDB SYSTEM DUCT BANK
 SDC SEISMIC DESIGN CRITERIA
 SDOF SINGLE DEGREE OF FREEDOM
 SE SUPER ELEVATION
 SECTLEG SECTIONALIZING
 SECT SECTION
 SEP SEPARATION
 SERV SERVICE
 SF SPRING FROG
 SG SUBGRADE
 SHA SEISMIC HAZARDS ANALYSIS
 SHLD SHOULDER
 SHS STATE HIGHWAY SYSTEM
 SHT SHEET
 SI SECTION INSULATOR,
 SITE INVESTIGATION
 SIG SIGNAL
 SIM SIMILAR
 SLAN PASSENGER STATION LOCAL AREA NETWORK
 SM SELECTED MATERIAL
 SMF SOLID MANGANESE FROG,
 SINGLE MODE FIBER
 SNF SWING NOSE FROG
 SNTP SIMPLE NETWORK TIME PROTOCOL
 SP SPARE
 SPC SPECIAL
 SPEC SPECIFICATION
 SPKR SPEAKER
 SPL SAFETY PERFORMANCE LEVEL
 SPS SMALL PART STEELWORK
 SPST SINGLE POLE SINGLE THROW
 SPT STANDARD PENETRATION TEST
 SQ SQUARE
 SR SYSTEM REQUIREMENT,
 STATE ROUTE
 SRRR SAFETY ROADSIDE REST AREA
 SRSS SQUARE ROOT OF SUM OF SQUARES
 S/SPAN STEADY SPAN
 SS SLOPE STAKE,
 SUB STATION
 SSCOM SEISMIC SAFETY COMMISSION
 SSI SOIL STRUCTURE INTERACTION
 SSK SERVICE SINK
 SSPA STRUCTURAL STEEL PLATE ARCH
 SSPP STRUCTURAL STEEL PLATE PIPE
 SSPPA STRUCTURAL STEEL PLATE PIPE ARCH
 SSRP STEEL SPIRAL RIB PIPE
 SST STAINLESS STEEL
 SSW STEADY SPAN WIRE
 SSWR SANITARY SEWER
 ST STREET
 STA STATION,
 STATIONING
 STBB SINGLE THRIE BEAM BARRIER
 STD STANDARD
 STC SINGLE TRACK CANTILEVER
 STIFF STIFFENER
 STL STEEL
 STOR STORAGE
 STP SHIELDED TWISTED PAIR CABLE
 STR STRUCTURAL,
 STRUCTURE
 STS SPIRAL TANGENT SPIRAL
 STW STATIC WIRE
 SUPV SUPERVISORY

S CONTINUED

SURF SURFACING
 SUSP SUSPENDED
 SWK SIDEWALK
 SW SOUND WALL,
 SOFTWARE
 SWA SINGLE WIRE ANCHOR
 SWAT SINGLE WIRE AUTO TENSIONED
 SWFT SINGLE WIRE-FIXED TERMINATION
 SWGR SWITCHGEAR
 SWT SWITCH
 SWPPP STORM WATER POLLUTION PREVENTION PLAN
 SWR SEWER
 SWS SWITCHING STATION
 SYM SYMMETRICAL

T

T TREAD
 T&B TOP AND BOTTOM
 TAN TANGENT
 TASAS TRAFFIC ACCIDENT SURVEILLANCE
 ANALYSIS SYSTEM
 TBD TO BE DETERMINED
 TBM TUNNEL BORING MACHINE
 TCL TRACK CENTERLINE
 TC TRAIN CONTROL
 TCB TRAFFIC CONTROL BOX
 TCC TRAIN CONTROL AND COMMUNICATIONS
 TCCR TRAIN CONTROL AND COMMUNICATIONS ROOM
 TCCT TRACK CIRCUIT
 TCE TEMPORARY CONSTRUCTION EASEMENT
 TCP/IP TRANSMISSION CONTROL PROTOCOL/
 INTERNET PROTOCOL
 TCR TRANSMISSION COMMUNICATIONS ROOM
 TD TRENCH DRAIN,
 TIME DELAY
 TDA TIRE DERIVED AGGREGATE
 TDD TELECOMMUNICATIONS DEVICE FOR THE DEAF
 TDM TIME DIVISION MULTIPLEXING
 TEL TELEPHONE
 TEMP TEMPORARY
 TERM TERMINATION
 TES TRACTION ELECTRIFICATION SYSTEM
 TESC TEMPORARY EROSION AND SETTLEMENT CONTROL
 TETEL TRAIN EMERGENCY TELEPHONE/SPEAKERPHONE
 TFE TETRAFLUOROETHYLENE
 TG TOP OF GRADE
 THK THICK
 TIS TELEPHONE AND INTERCOM SYSTEM
 TL TENSION LENGTH
 TM TECHNICAL MEMORANDUM
 TMP TEMPERATURE
 TO TURNOUT,
 TELECOM OUTLET
 TOC TOP OF CURB
 TOG TOP OF GRATE
 TOL TOLERANCE
 TOLR TOP OF LOW RAIL
 TOF TOP OF FOUNDATION
 TOFG TOP OF FINISH GRADE
 TOP TOP OF PAVEMENT
 TOR TOP OF RAIL
 TOS TOP OF SLOPE
 TOT TOP OF TIE,
 TOTAL
 TOW TOP OF WALL
 TP TELEPHONE POLE,
 TRACTION POWER
 TPB TREATED PERMEABLE BASE
 TPD TOILET PAPER DISPENSER
 TPF TRACTION POWER FACILITY
 TPM TREATED PERMEABLE MATERIAL
 TPS TRACTION POWER SUPPLY SYSTEM
 TRANS TRANSVERSE,
 TRANSITION
 TRK TRACK
 TS TRAFFIC SIGNAL
 TUBULAR STEEL
 TSI TECHNICAL SPECIFICATIONS FOR
 INTEROPERABILITY
 TSM TRAFFIC SYSTEMS MANAGEMENT
 TSMP TRAFFIC SYSTEMS MANAGEMENT PLAN

REV	DATE	BY	CHK	APP	DESCRIPTION

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 DIRECTIVE DRAWING**

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T CONTINUED

W CONTINUED

TRACK GEOMETRY - HORIZONTAL

UNITS OF MEASUREMENT

TTC TWO TRACK CANTILEVER
 TTEL TRAIN EMERGENCY SPEAKERPHONE
 TV TELEVISION
 TVM(S) TICKET VENDING MACHINE(S)
 TW TIE WIRE
 TYP TYPICAL

WS WATER SURFACE,
 WORK STATION
 WSP WELDED STEEL PIPE
 WT WEIGHT
 WV WATER VALVE
 WW WINGWALL,
 WALKWAY
 WWF WELDED WIRE FABRIC
 WWLOL WINGWALL LAYOUT LINE
 WWM WELDED WIRE MESH

BC BEGIN HORIZONTAL CURVE
 CC COMPOUND CURVE
 CS POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
 K1 TANGENT DISTANCE PF SHIFT PC
 REFERENCE TO THE TS
 K2 TANGENT DISTANCE PF SHIFT PT
 REFERENCE TO THE ST

Ac ACRES
 AMP AMPERES
 BTU BRITISH THERMAL UNIT
 CAL CALIPER
 CF CUBIC FEET
 CP CANDLE POWER
 CY CUBIC YARD

U

X

U/S UNDERSIDE
 UB UTILITY BOX
 UC UNDERCROSSING
 UD UNDERDRAIN
 UG UNDERGROUND,
 UNDER GRADE
 UGB UNDERGRADE BRIDGE
 UI USER INTERFACE
 UNF UNFINISHED
 UNINS UNINSULATED
 UON UNLESS OTHERWISE NOTED
 UP UNDERPASS
 UPS UNINTERRUPTIBLE POWER SUPPLY
 UR URINAL
 UrEDAS URGENT EARTHQUAKE DETECTION AND
 ALARM SYSTEM
 USCS UNITED SOIL CLASSIFICATION SYSTEM
 UTIL UTILITY
 UTP UNSHIELDED TWISTED PAIR
 UWP UPPER WORKING POINT

X/CAT CROSS CANTENARY
 X/SPAN CROSS SPAN
 XD TRANSDUCER
 XFMR TRANSFORMER
 XO CROSSOVER
 XO ST CROSSOVER SPRING TENSIONER
 XSEC CROSS SECTION
 XING CROSSING
 XMITTER TRANSMITTER

Lc LENGTH OF CIRCULAR CURVE
 Ls1 LENGTH OF SPIRAL
 Ls2 LENGTH OF SPIRAL FROM TS TO SC
 LSC LENGTH OF SPIRAL FROM CS TO ST
 LVC LENGTH OF COMPOUND SPIRAL FROM CS TO SC
 p1 OFFSET FROM INITIAL TANGENT TO PC OF THE SHIFTED
 CIRCLE OF SPIRALIZED CURVE
 p2 OFFSET FROM INITIAL TANGENT TO PT OF THE SHIFTED
 CIRCLE OF SPIRALIZED CURVE
 PC POINT OF CURVATURE
 PCC POINT OF COMPOUND CURVE
 PF POINT OF FROG
 PI POINT OF INTERSECTION
 PITO POINT OF INTERSECTION TURNOUT
 POC POINT ON HORIZONTAL CURVE
 POE POINT OF ENDING
 POS POINT ON SPIRAL,
 POVC POINT ON VERTICAL CURVE
 POVT POINT ON VERTICAL TANGENT
 PRC POINT OF REVERSE CURVE
 PRVC POINT OF REVERSE VERTICAL CURVE
 PS POINT OF SWITCH
 PT POINT OF TANGENT

dB DECIBEL
 DEG DEGREE
 DIA DIAMETER
 Eu UNBALANCED SUPERELEVATION
 F FARENHEIT
 FT FOOT,
 FEET
 g ACCELERATION DUE TO GRAVITY
 GA GAUGE
 GAL GALLON
 GB GIGABYTE
 GBPS GIGABITS PER SECOND
 GHZ GIGAHERTZ
 HR HOUR
 HT HEIGHT
 HZ HERTZ
 ID INSIDE DIAMETER
 IF INSIDE FACE
 IN INCHES
 IR INSIDE RADIUS

V

V DESIGN SPEED,
 VALVE
 VAC VOLTS ALTERNATING CURRENT
 VAR VARIABLE,
 VARIES,
 VOLT-AMPERE REACTIVE
 VCAT VIRTUAL CONCATENATION
 VCP VITRIFIED CLAY PIPE
 VCT VINYL COMPOSITION TILE
 VDC VOLT DC
 VE VALUE ENGINEERING
 VERT VERTICAL
 VEST VESTIBULE
 VIA VIADUCT
 VLAN VIRTUAL LOCAL AREA NETWORK
 VMS VARIABLE MESSAGE SIGN,
 VARIABLE MESSAGE SYSTEM,
 VOLTIMETER
 VOLUME
 VOIP VOICE OVER INTERNET PROTOCOL
 VPN VIRTUAL PRIVATE NETWORK
 VRCS VOICE RADIO COMMUNICATIONS SYSTEM
 VS VOLTAGE SWITCH
 VT VOLTAGE TRANSFORMER/TRANSDUCER

SC POINT OF CHANGE FROM SPIRAL TO
 CIRCULAR CURVE
 SPO POINT ON ORIGIN OF COMPOUND SPIRAL
 SS POINT OF CHANGE BETWEEN SPIRALS
 SSC SPIRAL TO SPIRAL POINT OF CURVATURE
 ST POINT OF CHANGE FROM SPIRAL TO TANGENT
 TC POINT OF CHANGE FROM TANGENT TO CURVE
 TS POINT OF CHANGE FROM TANGENT TO SPIRAL
 Ts1 TANGENT DISTANCE FROM TS TO PI
 Ts2 TANGENT DISTANCE FROM ST TO PI
 Xs1 TANGENT OFFSET AT THE SC
 Xs2 TANGENT OFFSET AT THE CS
 Ys1 TANGENT DISTANCE AT THE SC
 Ys2 TANGENT DISTANCE AT THE CS
 Δ TOTAL CENTRAL ANGLE OF THE SPIRALIZED CURVE
 Δc CENTRAL ANGLE OF CIRCULAR CURVE (Lc) FROM
 SC TO CS
 Δc1 CENTRAL ANGLE OF FIRST CIRCULAR CURVE OF
 COMPOUND CURVATURE
 Δc2 CENTRAL ANGLE OF SECOND CIRCULAR CURVE OF
 COMPOUND CURVATURE
 θs1 CENTRAL ANGLE OF SPIRAL LENGTH Ls1 OR SPIRAL
 ANGLE OF FIRST SPIRAL IN SPIRALIZED CURVE
 θs2 CENTRAL ANGLE OF SPIRAL LENGTH Ls2 OR SPIRAL
 ANGLE OF SECOND SPIRAL IN SPIRALIZED CURVE
 θsc CENTRAL ANGLE OF COMPOUND SPIRAL OR COMPOUND
 SPIRAL ANGLE FROM CS TO SC

K KIPS (1000 POUNDS)
 KCMIL THOUSAND CIRCULAR MILS
 KHZ KILOHERTZ
 KSF KIPS PER SQAURE FOOT
 KSI KIPS PER SQUARE INCH
 kV KILOVOLTS
 KVA KILOVOLT-AMPERE
 KVAR KILOVOLT-AMPERE REACTIVE
 KW KILOWATT
 KWH/D KILOWATT HOUR / DEMAND
 L LENGTH
 LB POUNDS
 LB/FT POUNDS PER FOOT
 LF LINEAR FEET
 m METER
 MBPS MEGA-BITS PER SECOND
 MCM THOUSAND CIRCULAR MILS
 MHZ MEGAHERTZ
 mm MILLIMETER
 MPH MILES PER HOUR
 MVA MEGAVOLT-AMPERE
 MW MEGA WATT
 OD OUTSIDE DIAMETER
 PSF POUNDS PER SQUARE FOOT
 PSI POUNDS PER SQUARE INCH
 PSIG POUNDS PER SQUARE INCH GAUGE

W

W WEST,
 WIDTH
 W/ WITH
 W/O WITHOUT
 WA WORK AREA
 WB WESTBOUND
 WC WATER CLOSET
 WCS WIRELESS COMMUNICATIONS SYSTEM
 WD WOOD
 WLAN WIRELESS LOCAL AREA NETWORK
 WM WIRE MESH
 WP WORK POINT,
 WOOD POLE
 WPF WATERPROOF
 WPC WAYSIDE POWER CUBICLES
 WR WIRE RUN
 WRT WITH RESPECT TO

TRACK GEOMETRY - VERTICAL

BVC BEGIN VERTICAL CURVE
 Ea ACTUAL SUPERELEVATION
 EVC END VERTICAL CURVE
 PCVC POINT OF COMPOUND VERTICAL CURVE
 POVC POINT OF VERTICAL INTERSECTION
 POVT POINT ON VERTICAL CURVE
 PVI POINT ON VERTICAL TANGENT
 VC VERTICAL CURVE
 VPI VERTICAL POINT OF INTERSECTION

SEC SECOND
 SF SQUARE FEET
 SY SQUARE YARD
 TF TRACK FEET
 VA VOLTS
 VAC VOLT-AMPERE
 Y YARDS
 YR(S) YEAR(S)

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RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 01/24/2014



**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

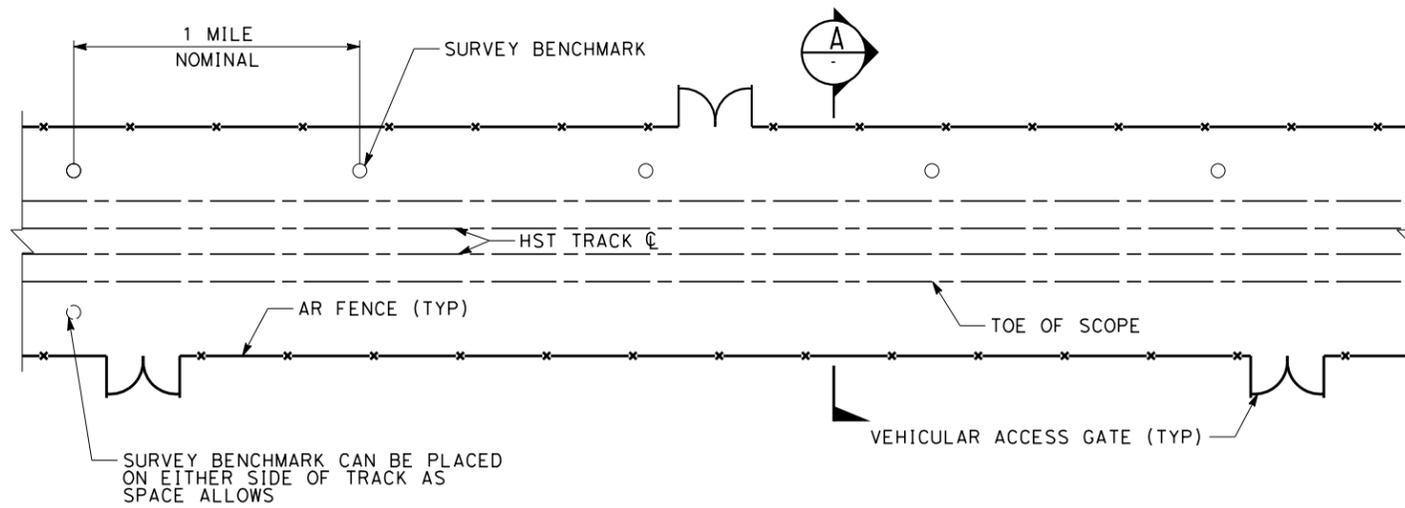
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING**

ACRONYMS AND ABBREVIATIONS 4

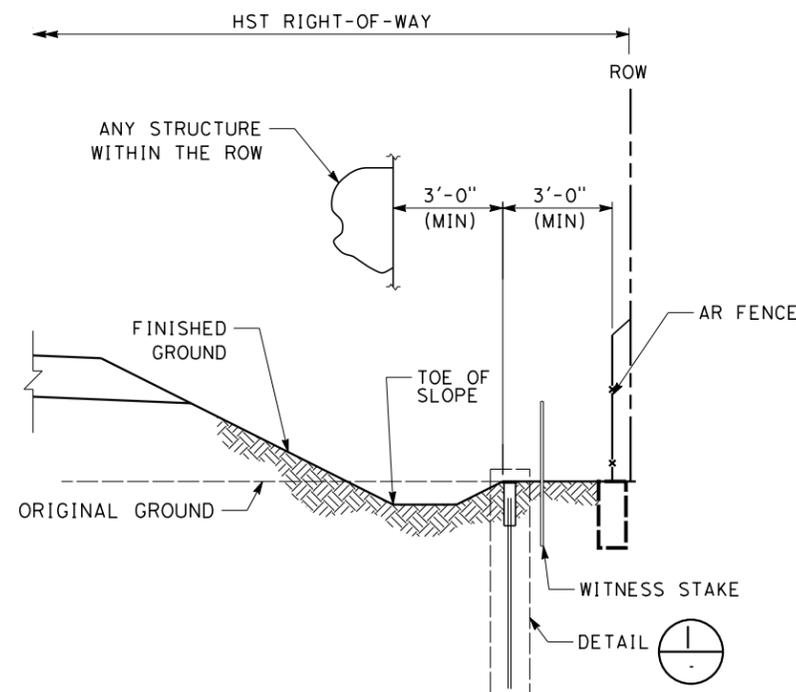
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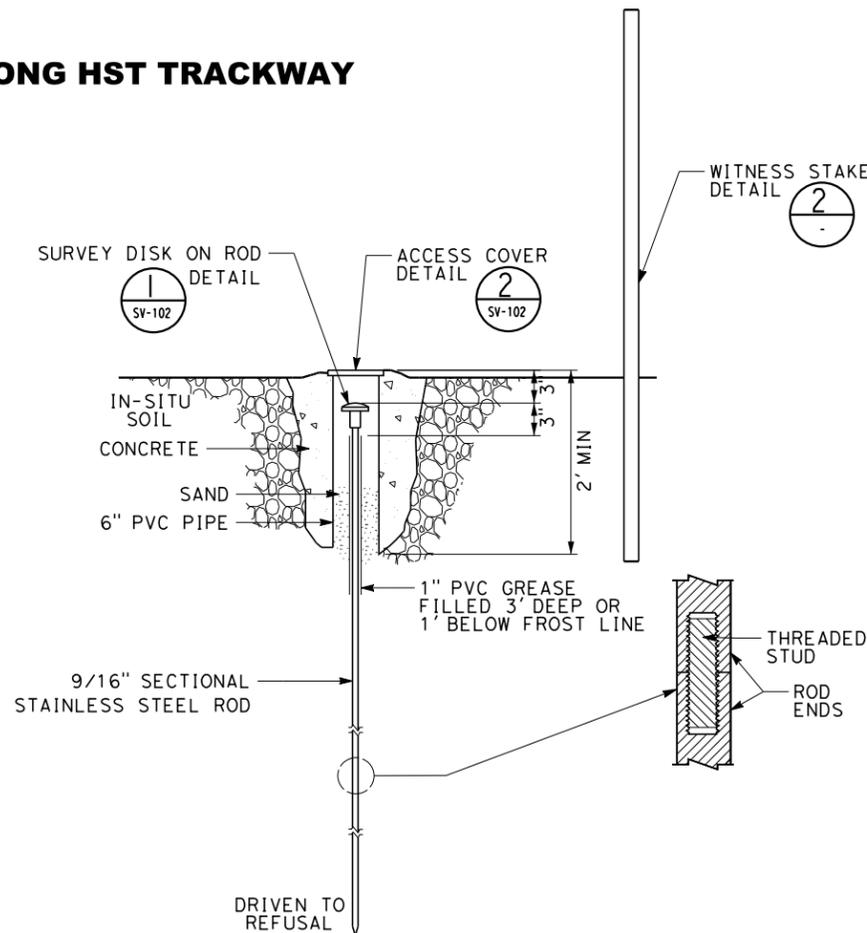
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2. FOR ADDITIONAL INFORMATION ON BENCHMARK INSTALLATION REFER TO SURVEY MARKERS AND DOCUMENTATION, US ARMY CORPS OF ENGINEERS, EM 1110-1-1002, TYPE B MONUMENT-DEEP ROD.



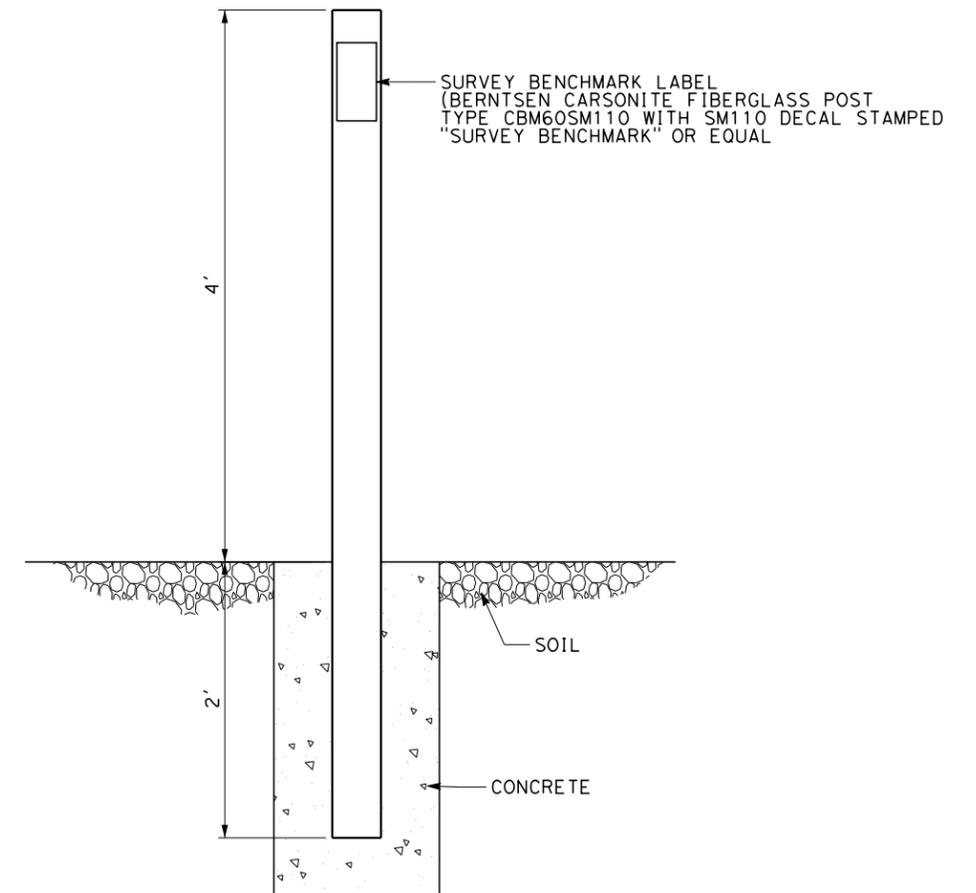
SURVEY BENCHMARK LOCATION ALONG HST TRACKWAY EMBANKMENT



SECTION A
SURVEY BENCHMARK EMBANKMENT



DETAIL 1
TYPE B SURVEY BENCHMARK DEEP ROD



DETAIL 2
WITNESS STAKE

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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. VALENTI
DRAWN BY V. LAVERDE
CHECKED BY T. LEE
IN CHARGE J. ELLIOT
DATE 02/18/2015



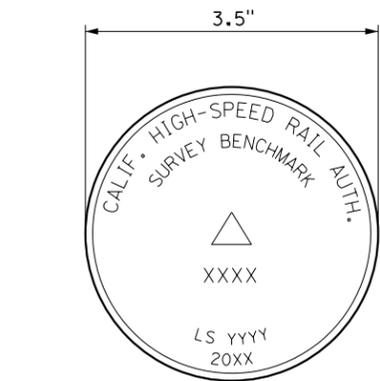
CALIFORNIA HIGH-SPEED TRAIN PROJECT
SURVEY DIRECTIVE

SURVEY BENCHMARK

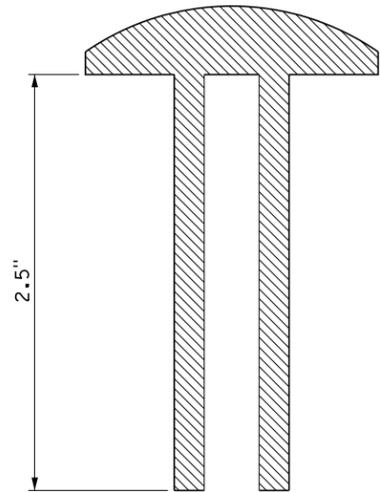
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SCALE NO SCALE
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RFP No.: HSR 14-32 - REVIEW DRAFT

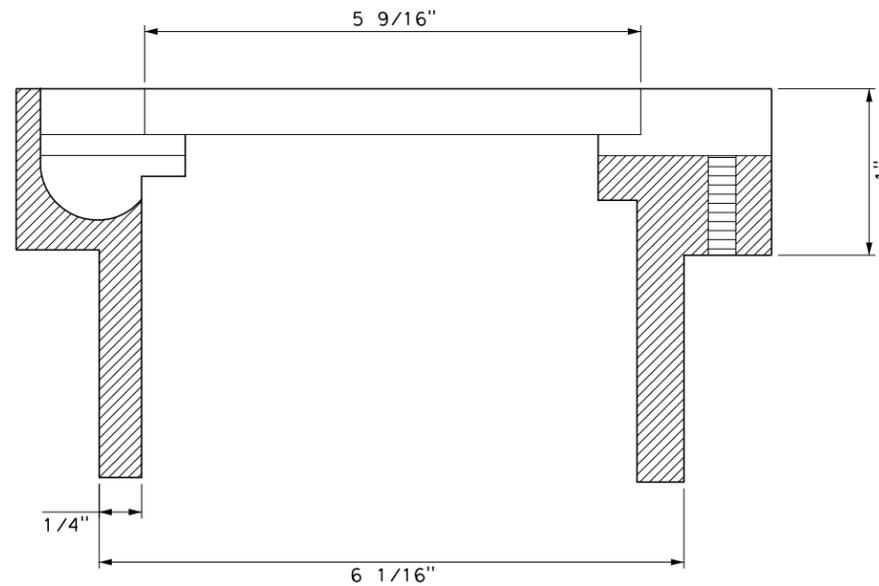
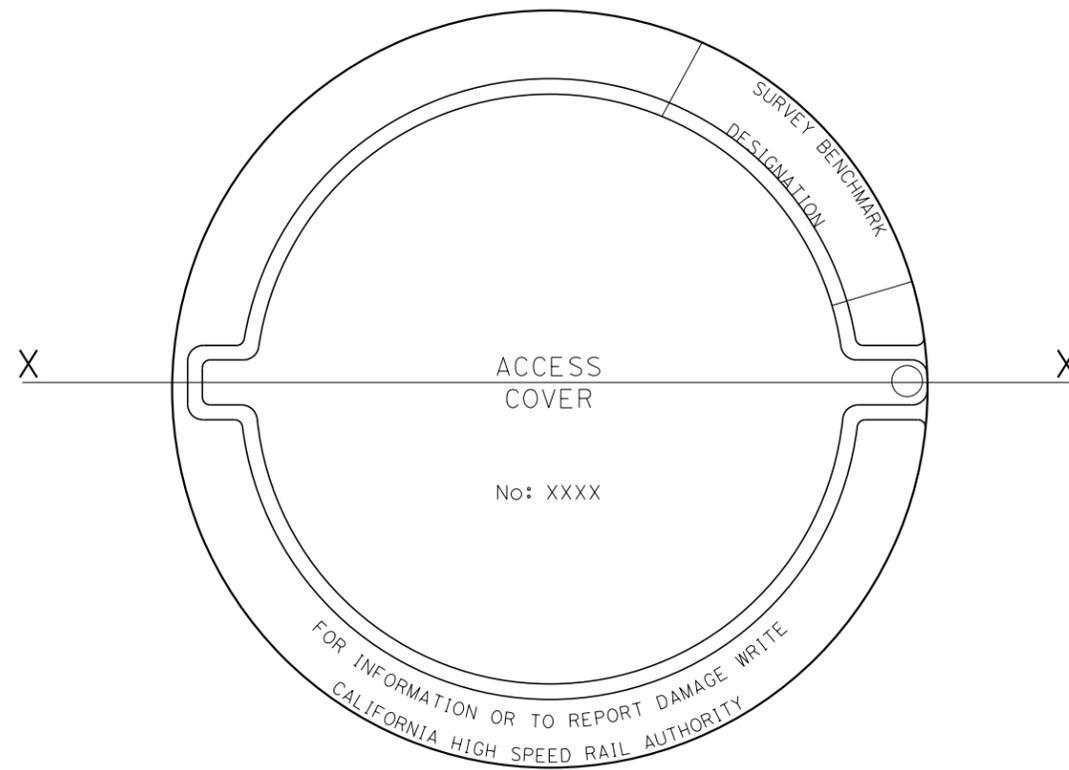
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RFP No: HSR 14-32 - REVIEW DRAFT



XXXX INDICATES POINT DESIGNATION (NAME)
 YYYY LAND SURVEYOR NUMBER
 20XX INDICATES YEAR



DETAIL 1
SURVEY DISK ON ROD



SECTION X-X

DETAIL 2
ACCESS COVER

NOTES:

1. THIS DRAWING DEPICTS THE REQUIREMENTS OF PLACING SURVEY BENCHMARKS WITHIN THE AUTHORITIES ROW DUE TO THE POSSIBLE PRESENCE OF GROUND SUBSIDENCE.
2. FOR ADDITIONAL INFORMATION ON BENCHMARK INSTALLATION REFER TO SURVEY MARKERS AND DOCUMENTATION, US ARMY CORPS OF ENGINEERS, EM 1110-1-1002, TYPE B MONUMENT-DEEP ROD.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
B. VALENTI
 DRAWN BY
V. LAVERDE
 CHECKED BY
T. LEE
 IN CHARGE
J. ELLIOT
 DATE
02/09/2015

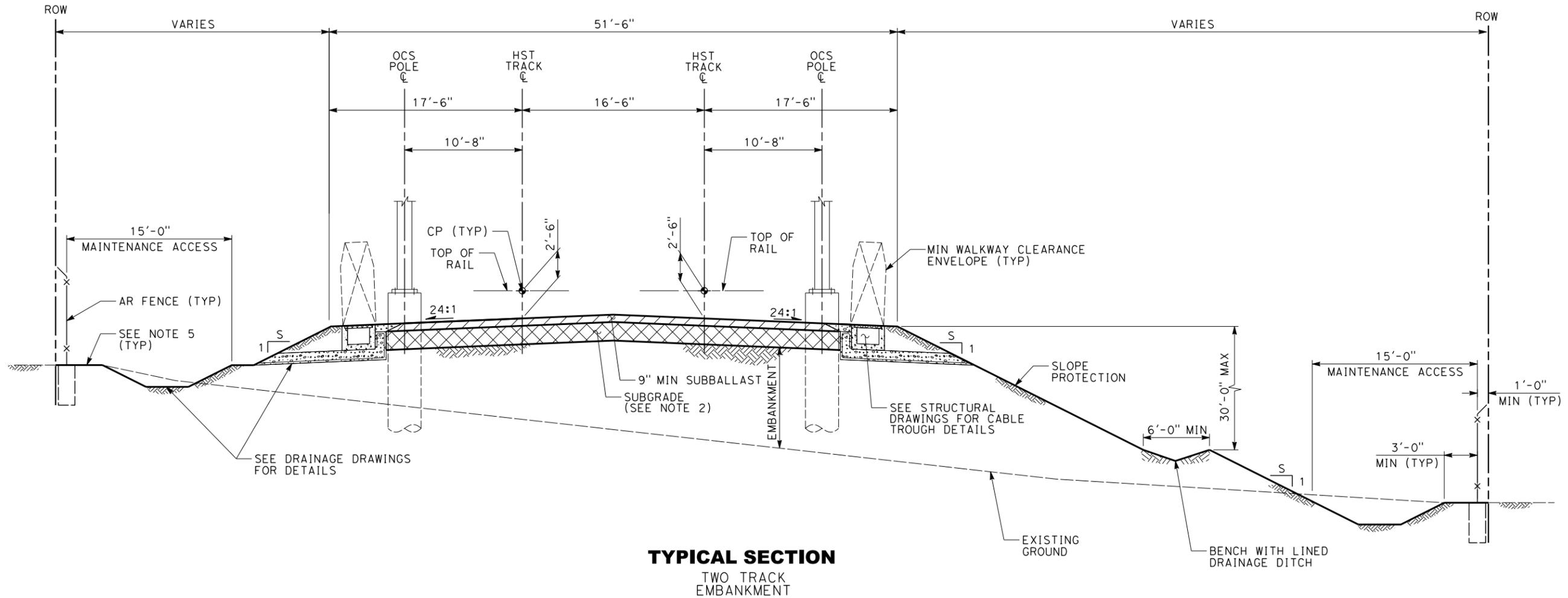


CALIFORNIA HIGH-SPEED TRAIN PROJECT
SURVEY DIRECTIVE
 SURVEY BENCHMARK

CONTRACT NO.
DRAWING NO. DD-SV-102
SCALE NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



TYPICAL SECTION
TWO TRACK
EMBANKMENT



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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
D. MANITI
DRAWN BY
V. HUANTE
CHECKED BY
G. HARRIS
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE
TYPICAL CROSS SECTION
TWO TRACK
EMBANKMENT

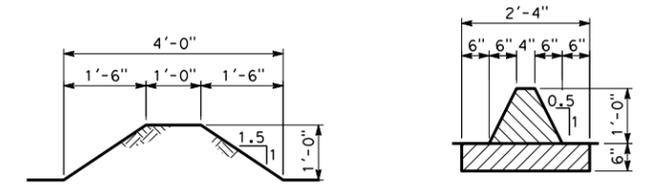
CONTRACT NO.
DRAWING NO.
DD-CV-100
SCALE
AS SHOWN
SHEET NO.

RFP No. HSR 14-32 - REVIEW DRAFT

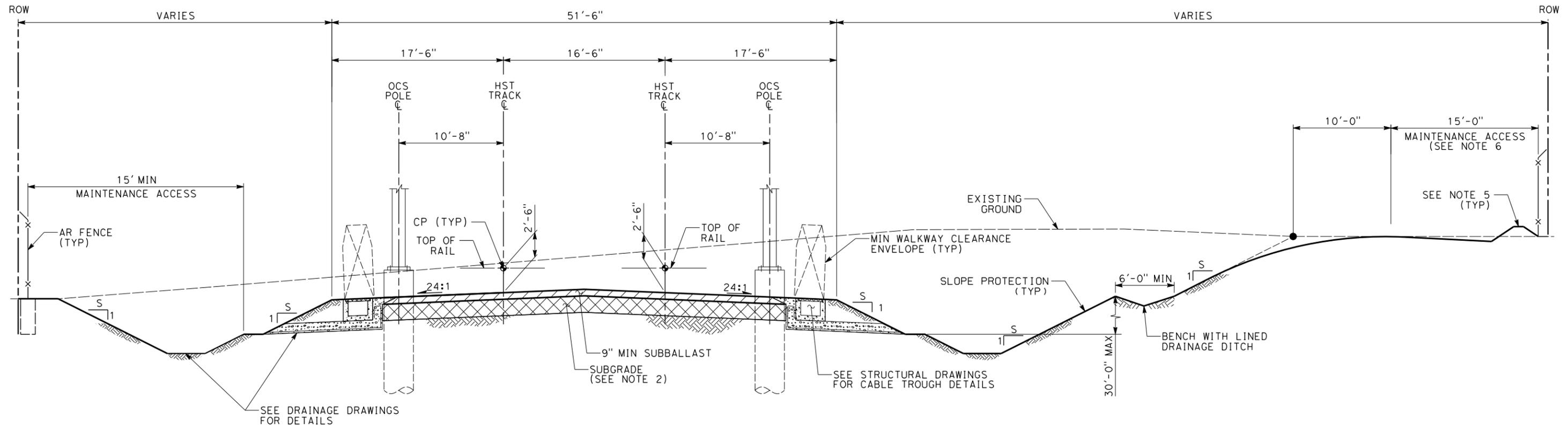
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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
6. A 20-FOOT MAINTENANCE ACCESS IS REQUIRED FOR CUT SLOPES HIGHER THAN 30 FEET.



PROTECTIVE BARRIER DETAILS
(SEE NOTE 5)

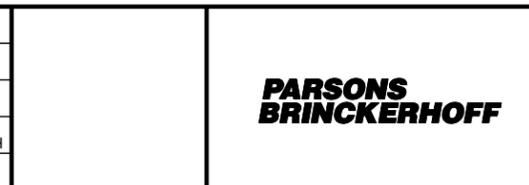


TYPICAL SECTION
TWO TRACK
OPEN CUT



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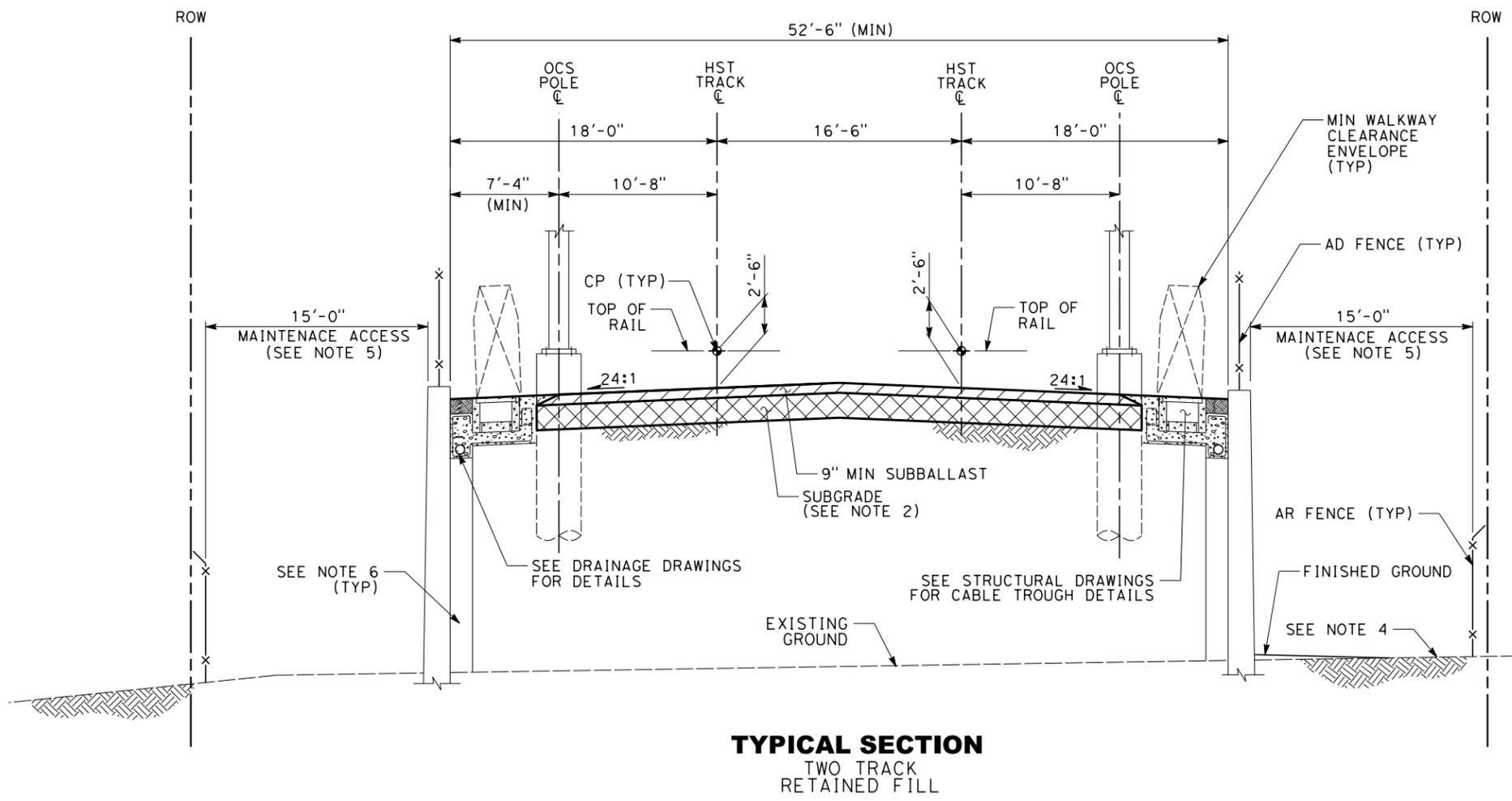
DESIGNED BY D. MANITI
DRAWN BY R. MINCIO
CHECKED BY G. HARRIS
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

TYPICAL CROSS SECTION
TWO TRACK
OPEN CUT

CONTRACT NO.
DRAWING NO. DD-CV-101
SCALE AS SHOWN
SHEET NO.



- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
 3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
 4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
 5. 10' MIN MAINTENANCE ACCESS REQUIRED WHEN THERE IS NO FENCE OR CONTINUOUS OBSTRUCTION.
 6. PROVIDE APPROPRIATE DRAINAGE SYSTEM FOR THE TYPE OF RETAINING WALL.



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DESIGNED BY
S. MILITELLO

DRAWN BY
R. MINCIO

CHECKED BY
G. HARRIS

IN CHARGE
G. LUSHEROVICH

DATE
08/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

TYPICAL CROSS SECTION
TWO TRACK
RETAINED FILL

CONTRACT NO.

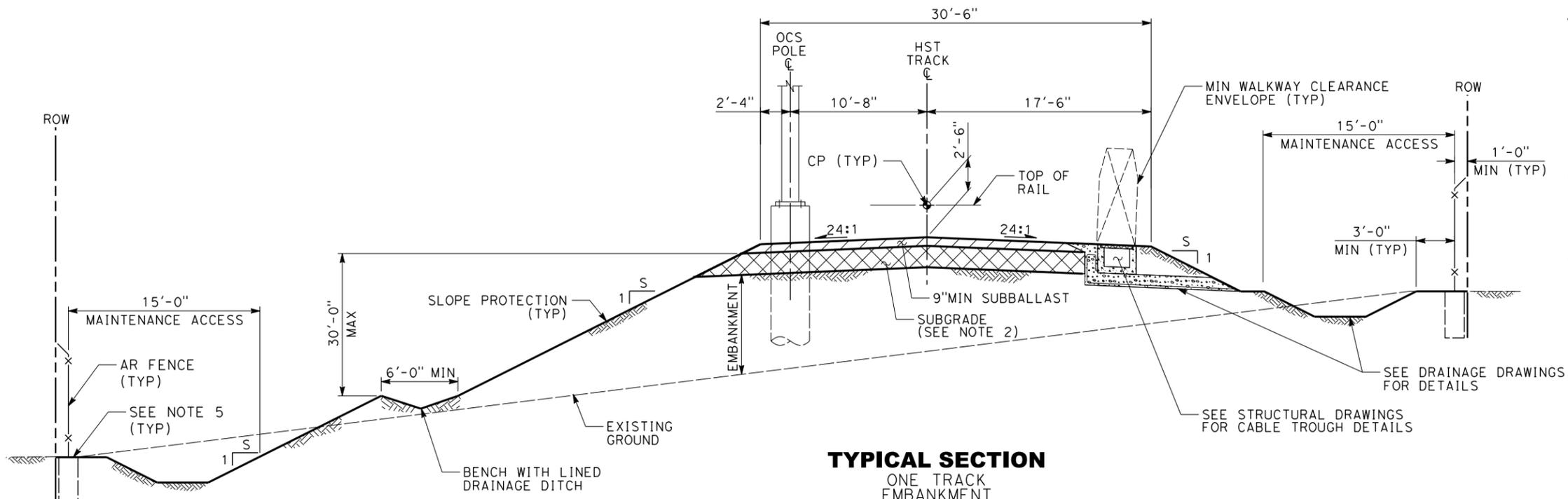
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DD-CV-102

SCALE
AS SHOWN

SHEET NO.

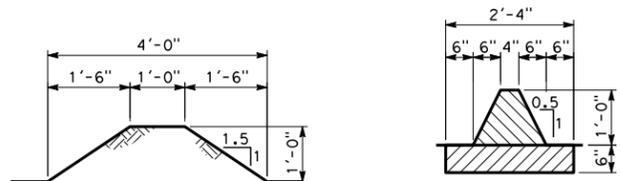
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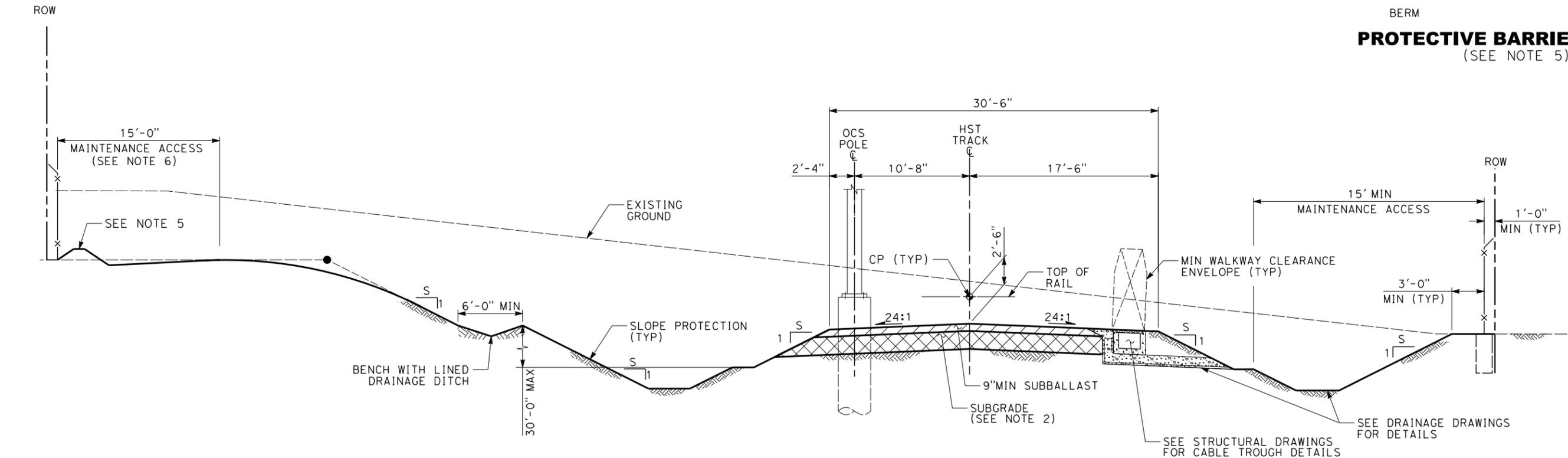


TYPICAL SECTION
ONE TRACK
EMBANKMENT

- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
 3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
 4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
 5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.
 6. A 20-FOOT MAINTENANCE ACCESS IS REQUIRED FOR CUT SLOPES HIGHER THAN 30 FEET.



PROTECTIVE BARRIER DETAILS
(SEE NOTE 5)



TYPICAL SECTION
ONE TRACK
OPEN CUT



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D. MANITI
DRAWN BY
R. MINCIO
CHECKED BY
G. HARRIS
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



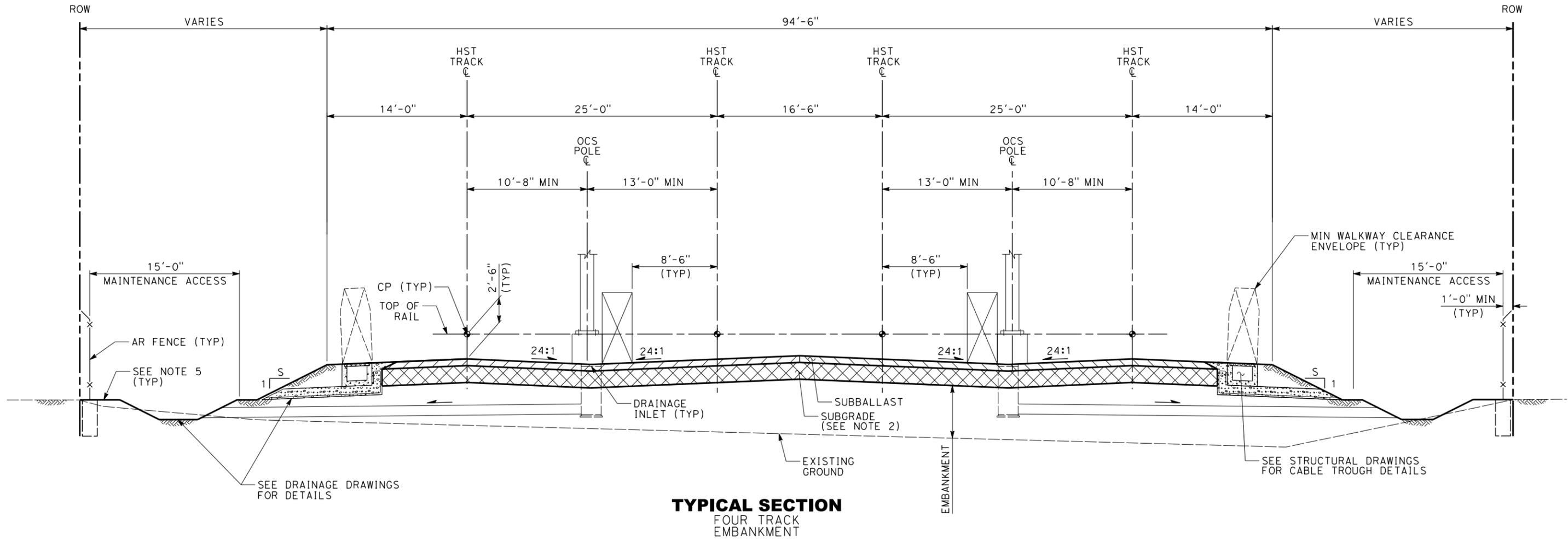
CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

TYPICAL CROSS SECTION
ONE TRACK
EMBANKMENT AND OPEN CUT

CONTRACT NO.
DRAWING NO.
DD-CV-103
SCALE
AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
4. FOR EMBANKMENT SLOPE GRADING, S=2 (MIN).
5. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



TYPICAL SECTION
FOUR TRACK
EMBANKMENT

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DESIGNED BY
D. MANITI
DRAWN BY
R. MINCIO
CHECKED BY
G. HARRIS
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014

**PARSONS
BRINCKERHOFF**

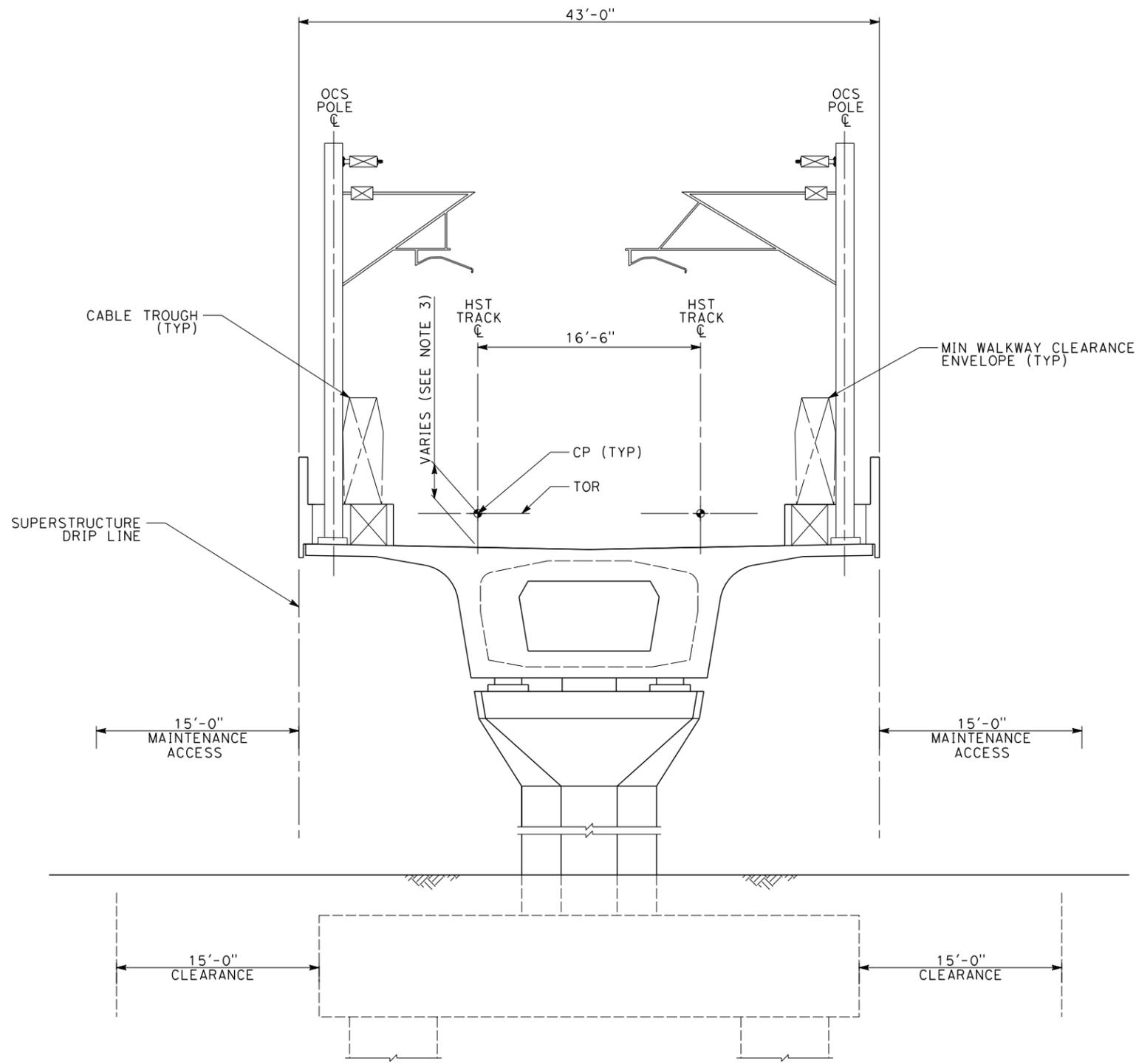


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

TYPICAL CROSS SECTION
FOUR TRACK
EMBANKMENT

CONTRACT NO.
DRAWING NO.
DD-CV-104
SCALE
AS SHOWN
SHEET NO.





TYPICAL SECTION
AERIAL TRACKWAY

NOTES:

1. STRUCTURE, TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF STRUCTURE WITH NON-BALLASTED TRACK. FOR BALLASTED TRACK THE CONTROL POINT (CP) SHALL BE LOCATED ABOVE STRUCTURE DECK AT A DISTANCE 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER (IF REQUIRED).
4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.

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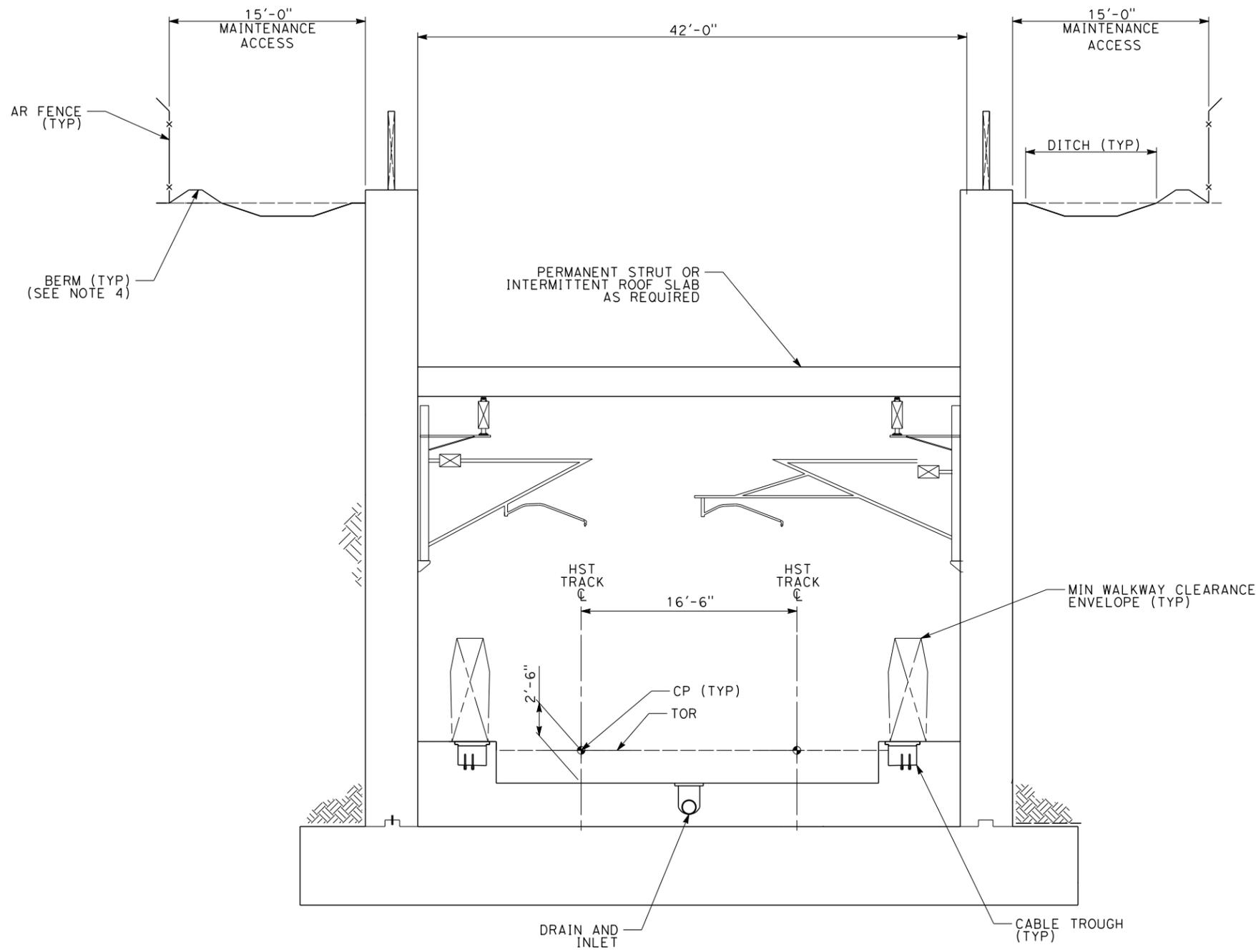
DESIGNED BY D. MANITI
DRAWN BY R. MINCIO
CHECKED BY G. HARRIS
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014



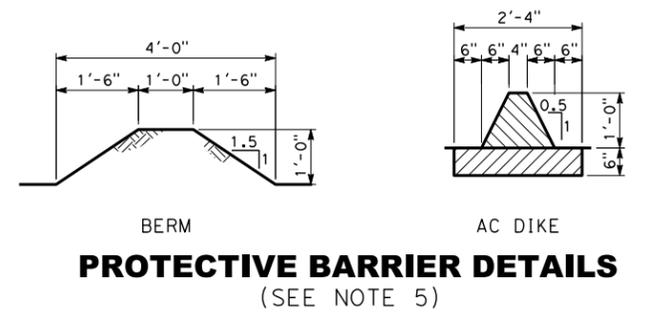
CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

TYPICAL CROSS SECTION
TWO TRACK
AERIAL TRACKWAY

CONTRACT NO.
DRAWING NO. DD-CV-105
SCALE AS SHOWN
SHEET NO.



- NOTES:**
1. STRUCTURE, TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
 3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.
 4. PROTECTIVE BARRIER, SUCH AS A BERM OR A DIKE, SHALL BE INSTALLED AT THE RIGHT-OF-WAY BOUNDARY TO INTERCEPT STORM WATER RUN OFF, WHERE THERE IS A POTENTIAL FOR STORM WATER RUN OFF TO ENTER CHST RIGHT-OF-WAY FROM ADJACENT PROPERTY.



TYPICAL SECTION
TRENCH

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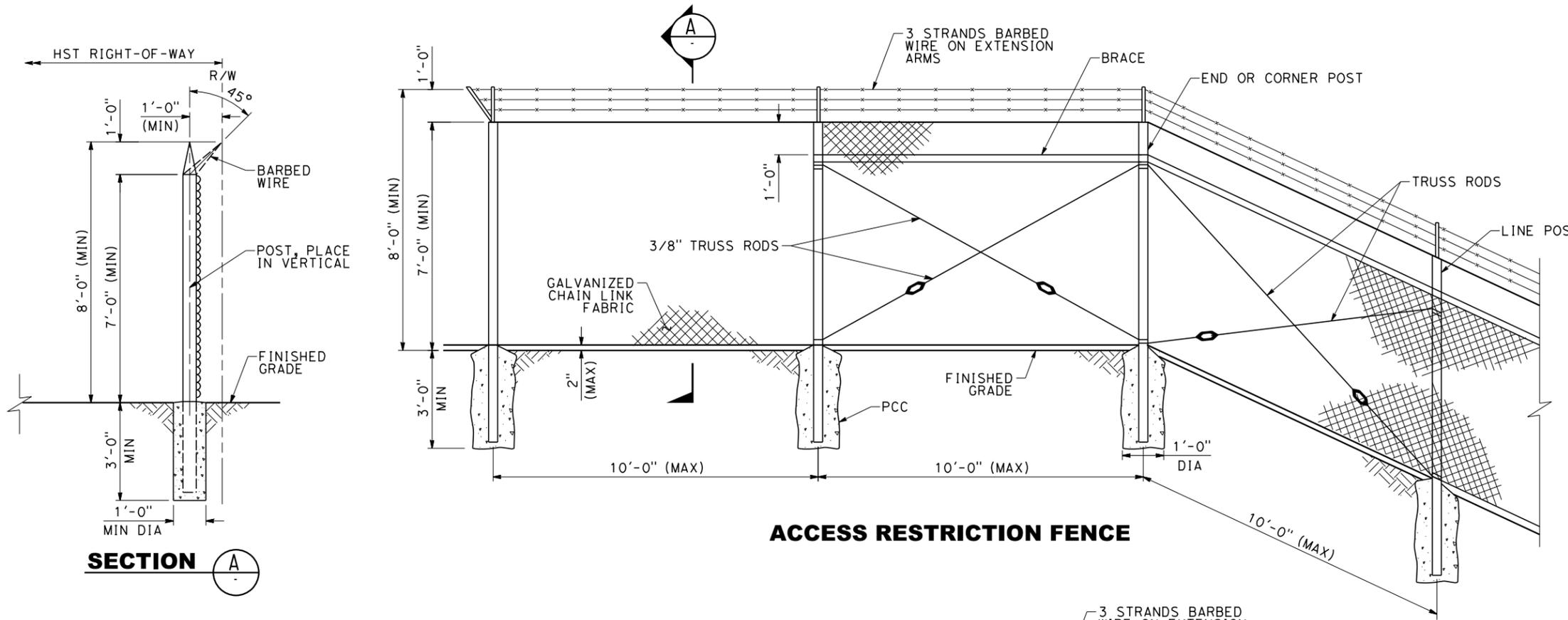
DESIGNED BY
D. MANITI
DRAWN BY
R. MINCIO
CHECKED BY
G. HARRIS
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE
TYPICAL CROSS SECTION
TWO TRACK
TRENCH STRUCTURE

CONTRACT NO.
DRAWING NO. DD-CV-106
SCALE AS SHOWN
SHEET NO.

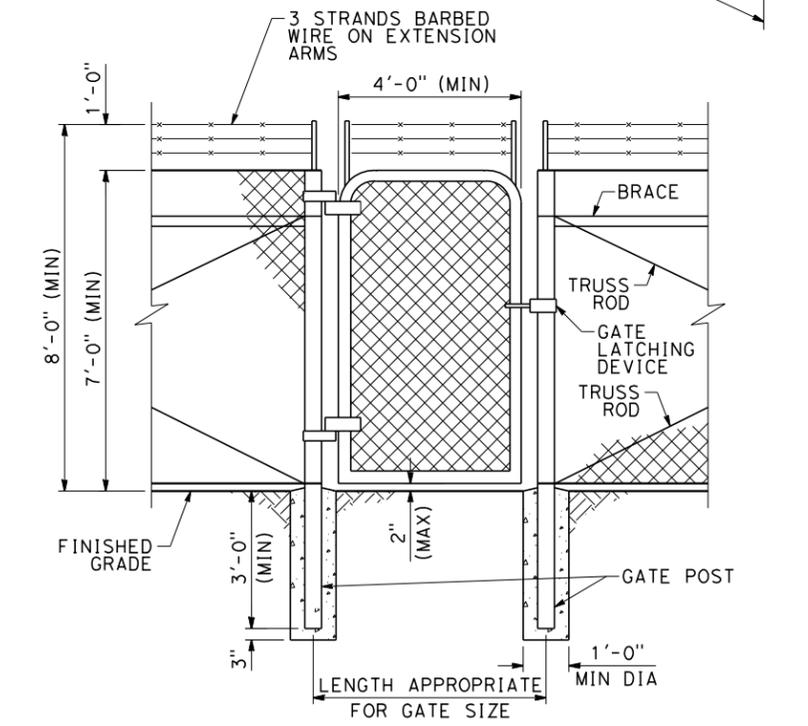
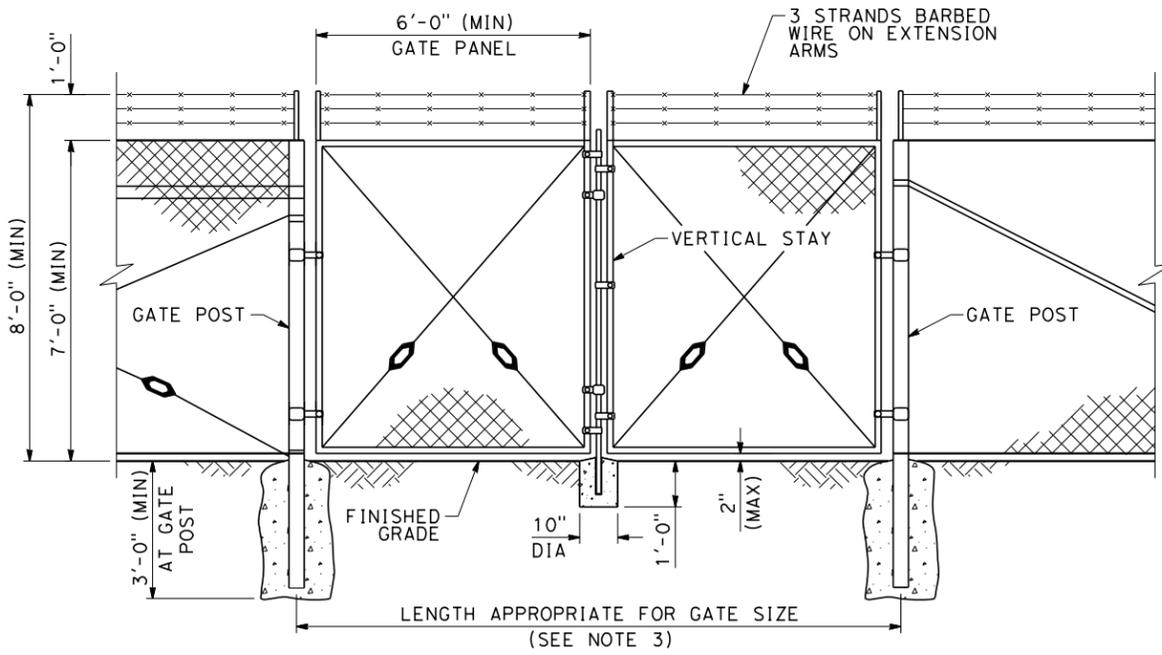
RFP No.: HSR 14-32 - REVIEW DRAFT



SECTION A

NOTES:

1. ALL PERMANENT FENCING AND GATES SHALL BE BONDED, GROUNDED AND INSULATED TO PREVENT ELECTRIC SHOCK.
2. ACCESS RESTRICTION (AR) FENCING SHALL BE 8 FEET HIGH MINIMUM (AS SHOWN HERE). ACCESS DETERRING (AD) FENCING (NOT SHOWN) SHALL BE 6 FEET HIGH, WITH NO BARBED WIRE.
3. GATES FOR VEHICULAR ACCESS (DRIVING GATES) SHALL BE SIZED IN COORDINATION WITH EMERGENCY RESPONDERS AND MAINTENANCE EQUIPMENT. IF NO OTHER INFORMATION IS AVAILABLE THESE GATES SHOULD HAVE A MINIMUM WIDTH OF 12 FEET.
4. GATES CAN EITHER BE SWINGING OR SLIDING TYPE. VEHICULAR ACCESS SWINGING GATES SHALL BE A PAIR AND SHALL BE HINGED FROM THE INSIDE. PROVISIONS SHALL BE MADE FOR SWINGING GATES TO SWING NOT LESS THAN 90 DEGREES AWAY FROM THE HST FACILITIES.
5. THIS DRAWING DEPICTS MINIMUM STANDARDS FOR RIGHT-OF-WAY FENCING AND GATE. ALTERNATIVE FENCE TYPE OF EQUIVALENT OR ENHANCED KIND MAY BE ALLOWED UPON APPROVAL OF THE AUTHORITY.
6. FENCE AND GATES SHALL BE DESIGNED AND INSTALLED TO NOT PRECLUDE FUTURE INSTALLATION OF TYPICAL FENCE MOUNTED ELECTRONIC ACCESS CONTROL.
7. FOR ADDITIONAL FENCE INSTALLATION DETAILS SEE CALTRANS STANDARD PLANS.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
S. MILITELLO
DRAWN BY
V. LAVERDE
CHECKED BY
A. ABTAHI
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014

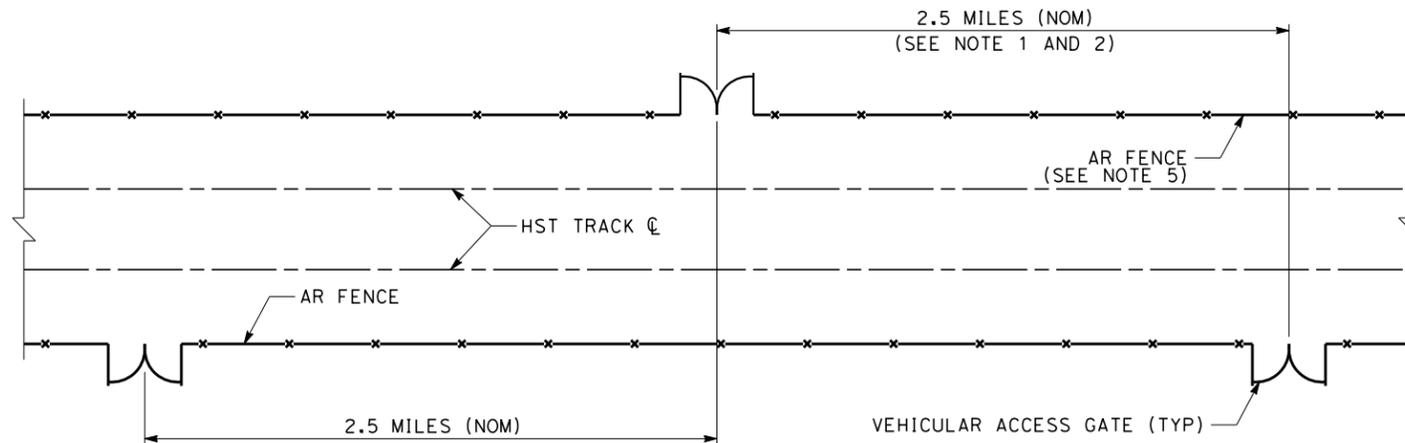


CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

ACCESS RESTRICTION
FENCE AND GATE DETAILS

CONTRACT NO.	
DRAWING NO.	DD-CV-900
SCALE	AS SHOWN
SHEET NO.	

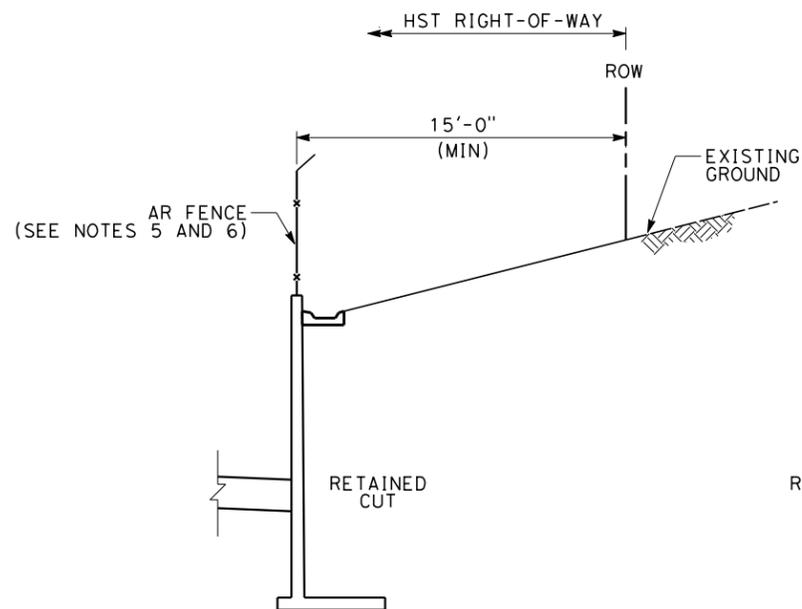
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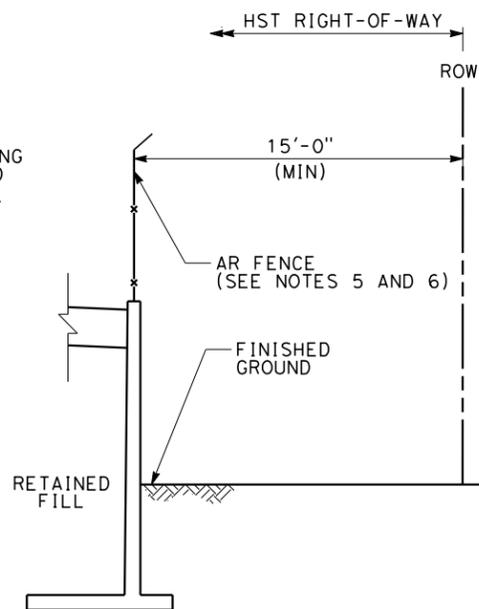
**GATE LOCATIONS ALONG HST TRACKWAY
AT GRADE**

NOTES:

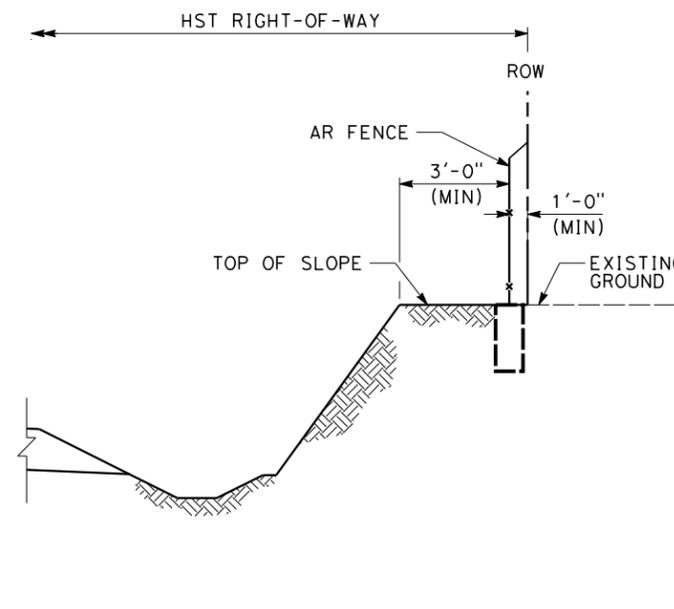
1. LOCATION OF GATES ALONG RIGHT-OF-WAY FENCING MAY REQUIRE COORDINATION WITH THE LOCAL FIRE PROTECTION AGENCY AND EMERGENCY RESPONDERS.
2. IN GENERAL VEHICULAR ACCESS GATE ALONG AT-GRADE TRACKWAY, SHALL BE LOCATED NOMINALLY AT 2.5 MILE INTERVALS AND COORDINATED WITH THE LOCATION OF HST WAYSIDE FACILITIES.
3. GATE LOCATIONS ALONG FENCING WITHIN FREEWAY RIGHT-OF-WAY REQUIRE CALTRANS APPROVAL.
4. VEHICULAR ACCESS GATES SHALL BE PROVIDED IN CONJUNCTION WITH EITHER ACCESS ROADS OR AT LOCATIONS WHERE EXISTING ROADS MAKE IT PRACTICABLE FOR MAINTENANCE AND EMERGENCY VEHICLE TO ACCESS THE TRACKWAY.
5. FOR ADDITIONAL DETAILS SEE CIVIL DRAWING "ACCESS RESTRICTION FENCE AND GATE DETAILS".
6. AD FENCE CAN BE USED IF AR FENCE IS PLACED ALONG THE RIGHT-OF-WAY OR THE HEIGHT OF THE WALL IS GREATER THAN 10 FEET. 15 FOOT MINIMUM REQUIRED TO THE FENCE WHEN AD FENCE IS PLACED ALONG THE RIGHT-OF-WAY.



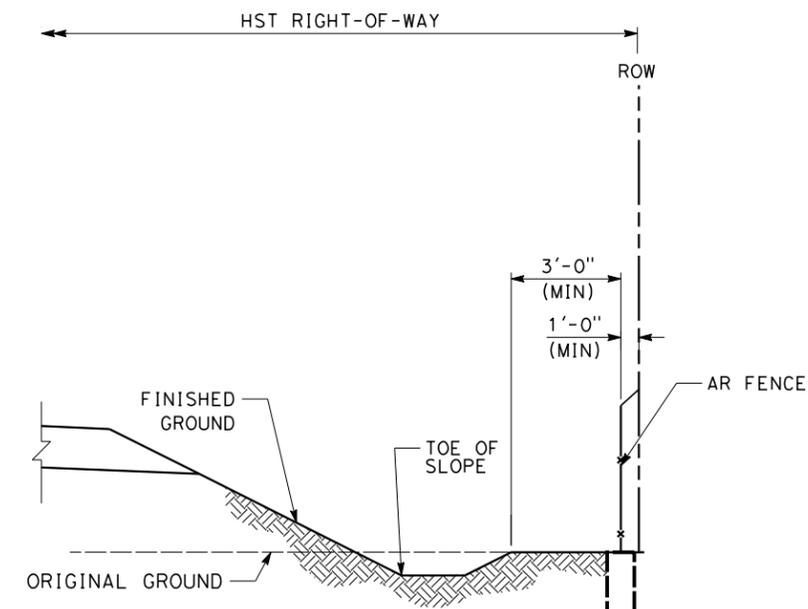
**FENCE LOCATION ALONG
HST TRACKWAY
RETAINED CUT SECTION**



**FENCE LOCATION ALONG
HST TRACKWAY
RETAINED FILL SECTION**



**FENCE LOCATION ALONG
HST TRACKWAY
OPEN CUT SECTION**



**FENCE LOCATION ALONG
HST TRACKWAY
EMBANKMENT SECTION**

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
S. MILITELLO
DRAWN BY
V. LAVERDE
CHECKED BY
A. ABTAHI
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014

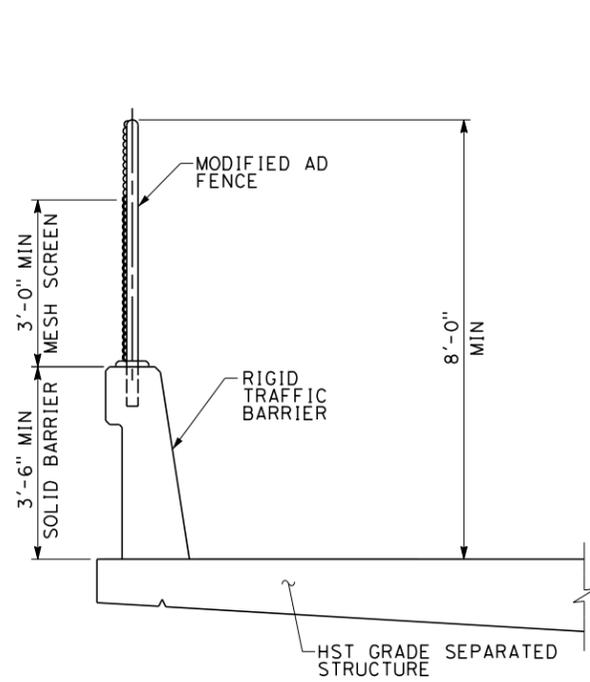


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE**

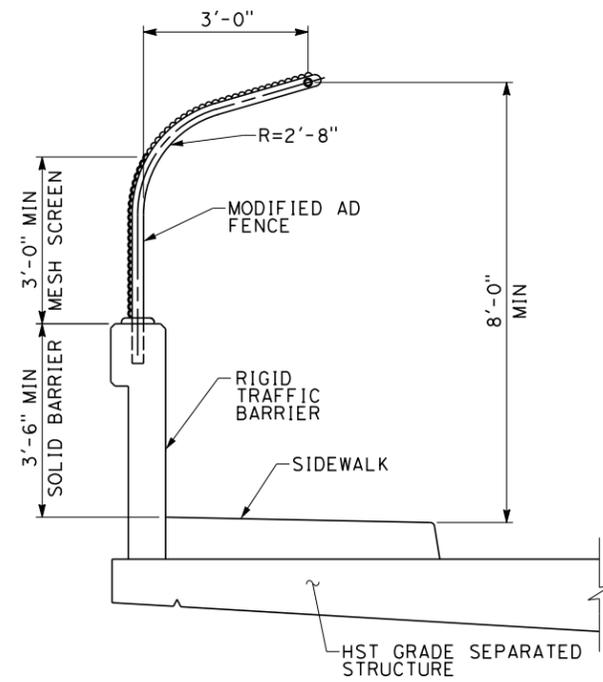
ACCESS RESTRICTION
FENCE AND GATE LOCATIONS

CONTRACT NO.
DRAWING NO. DD-CV-901
SCALE NO SCALE
SHEET NO.

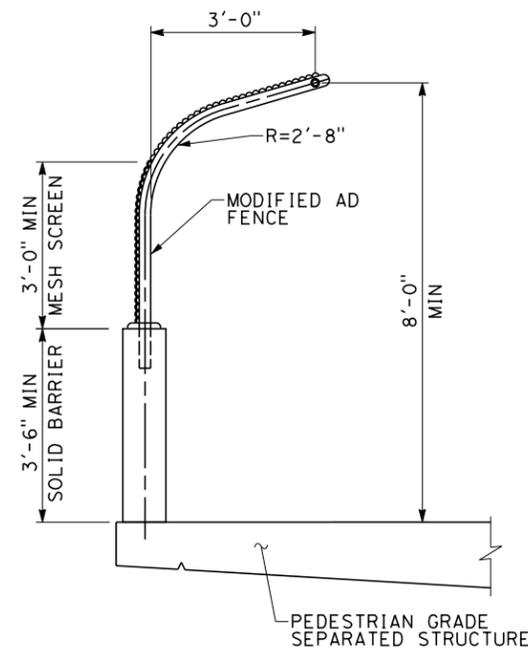
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CROSS SECTION
 FENCE AT GRADE SEPARATED STRUCTURES
 WITHOUT SIDEWALK



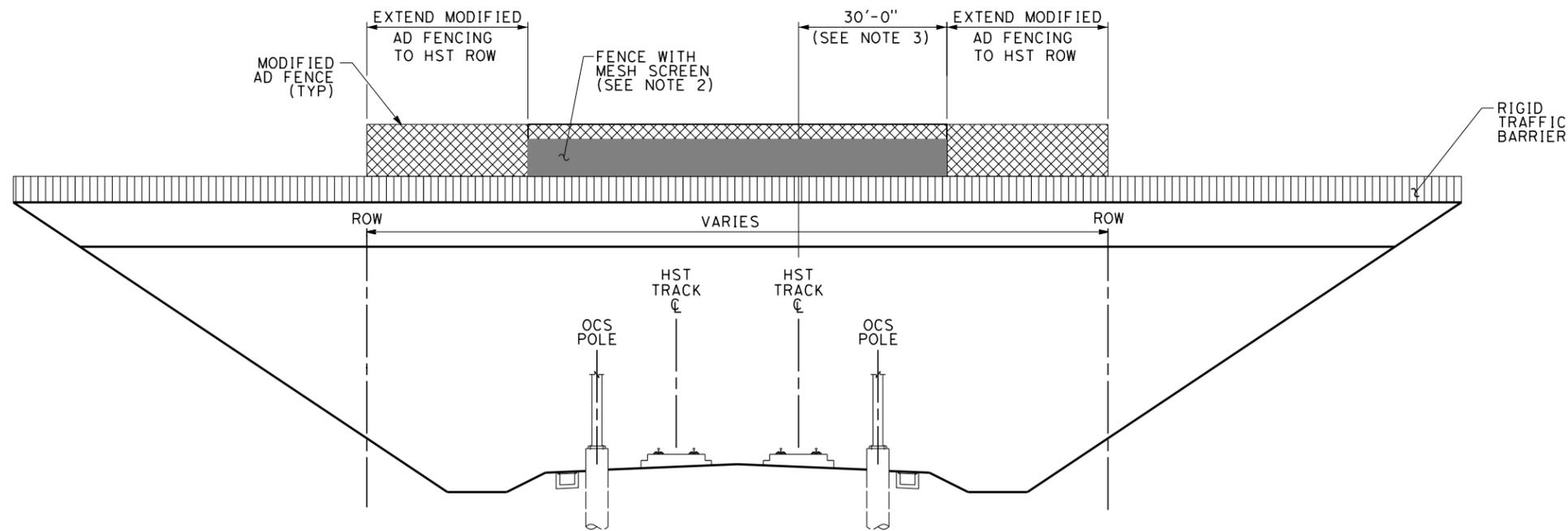
CROSS SECTION
 FENCE AT GRADE SEPARATED STRUCTURES
 WITH SIDEWALK



CROSS SECTION
 FENCE AT PEDESTRIAN
 GRADE SEPARATED STRUCTURE

NOTES:

1. TRACK, SYSTEMS, STRUCTURES AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR MESH SCREEN REQUIREMENT, SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM CHAPTER OF THE DESIGN CRITERIA.
3. EXTEND MESH SCREEN 30 FEET FROM CENTERLINE OF OUTERMOST TRACK, OR 10 FEET BEYOND THE OUTERMOST ENERGIZED CONDUCTOR OR COMPONENT, WHICHEVER IS GREATER.



OVERHEAD STRUCTURE ELEVATION

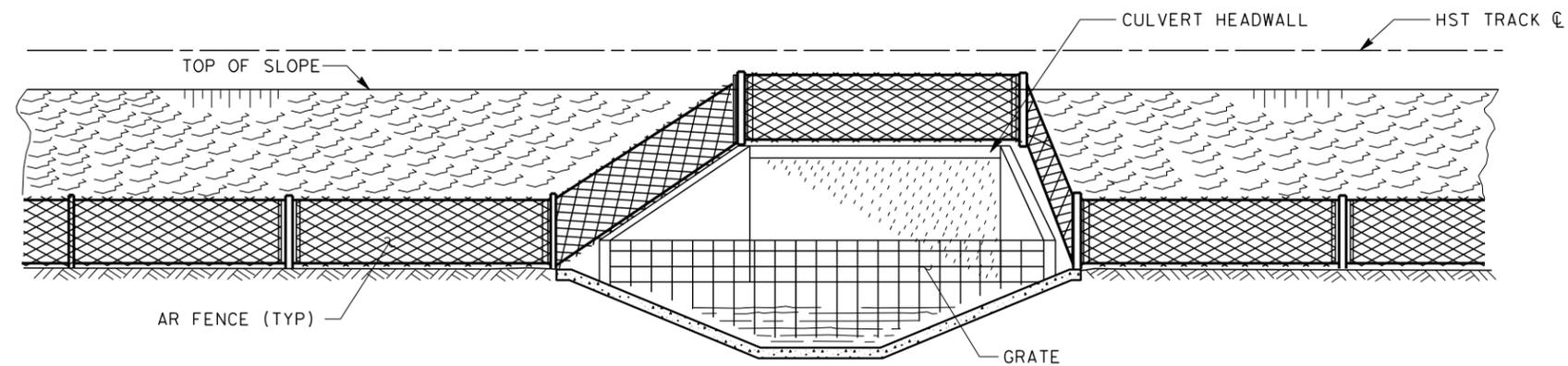
REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
 A. ABTAHI
 DRAWN BY
 V. LAVERDE
 CHECKED BY
 S. MILITELLO
 IN CHARGE
 G. LUSHEROVICH
 DATE
 08/29/2014

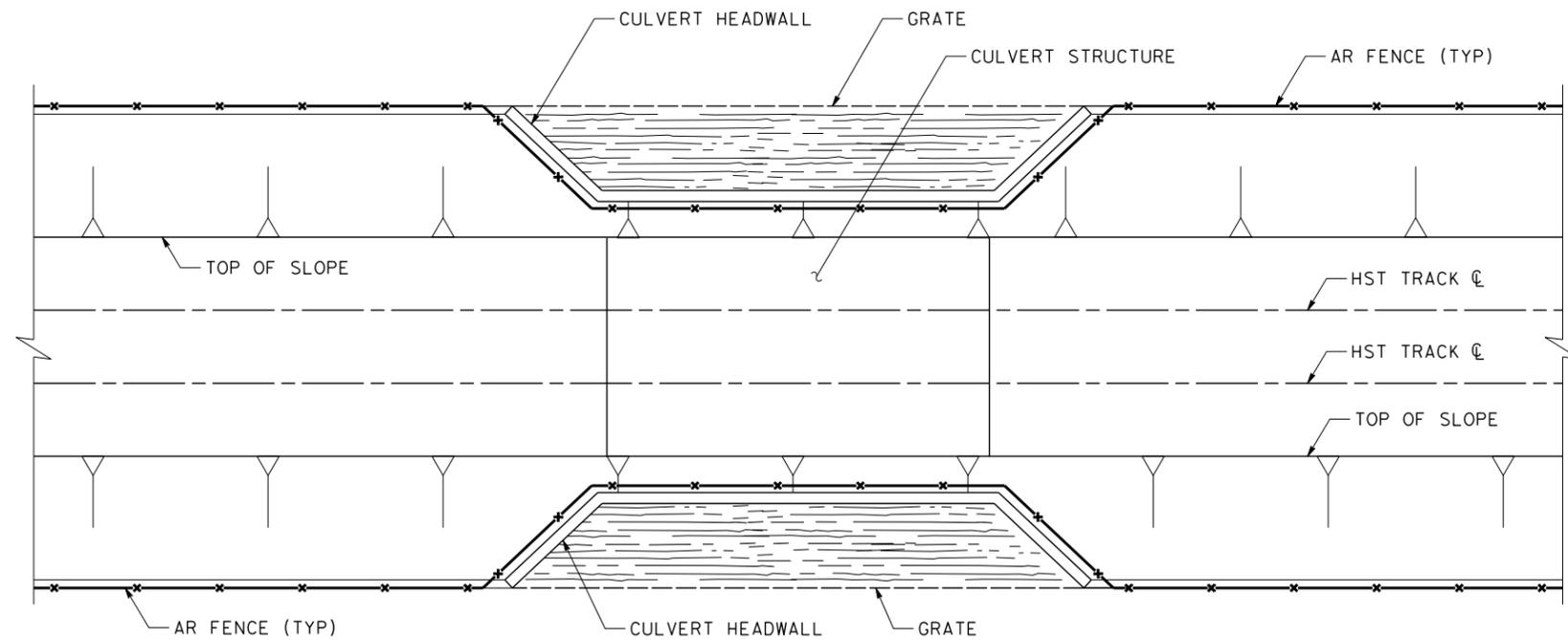


CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE
 ACCESS DETERRING
 FENCING ON GRADE SEPARATED STRUCTURES

CONTRACT NO.
 DRAWING NO.
 DD-CV-902
 SCALE
 NO SCALE
 SHEET NO.



ELEVATION



PLAN

NOTES:

1. CULVERT STRUCTURE IS SCHEMATIC AND DOES NOT REPRESENT DESIGN.
2. INSTALL GRATE IN THE CULVERT IF REQUIRED BY THREAT AND VULNERABILITY ANALYSIS, USING THE FOLLOWING CRITERIA:
 - A. GRATES SHALL BE INSTALLED UPSTREAM AND DOWNSTREAM OF CULVERT HEADWALLS.
 - B. GRATES SHALL HAVE BARS SPACED 6 INCHES APART AND SHALL BE DESIGNED TO WITHSTAND MAXIMUM IMPACT FROM LARGEST EXPECTED FLOATING DEBRIS.
 - C. THE MAXIMUM DISTANCE FROM THE BOTTOM OF THE GRATE TO THE BOTTOM AND SIDE SLOPES OF THE WATERWAY CROSSING SHALL BE 6 INCHES.
 - D. THE MINIMUM HEIGHT OF THE GRATES SHALL BE SUCH THAT IT RESTRICTS ACCESS DURING ALL CONDITIONS (DRY, HIGH WATER, ETC).
 - E. GRATE INSTALLATIONS SHALL BE COORDINATED WITH THE HYDRAULIC ENGINEER TO ENSURE PRESERVATION OF THE CULVERT FLOW CAPACITY.
3. INSTALLATION OF GRATES IN DESIGNATED WILDLIFE CORRIDORS ARE SUBJECT TO APPROVAL BY THE APPROPRIATE REGULATORY AGENCY.

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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
S. MILITELLO
 DRAWN BY
V. HUANTE
 CHECKED BY
A. ABTAHI
 IN CHARGE
G. LUSHEROVICH
 DATE
01/24/2014



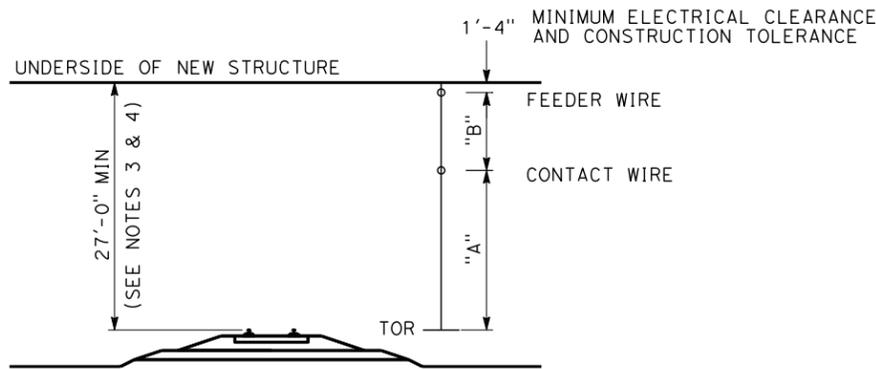
CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE
 FENCE AT CULVERT CROSSINGS

CONTRACT NO.
DRAWING NO. DD-CV-903
SCALE NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT

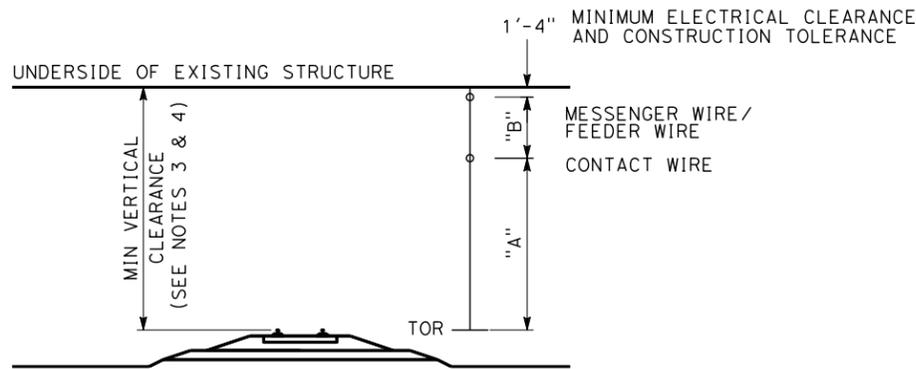
RFP No.: HSR 14-32 - REVIEW DRAFT

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NEW STRUCTURE OVER HST TRACKS

	HEIGHT "A"	HEIGHT "B"	MIN VERTICAL CLEARANCE
DEDICATED HST TRACK	17'-5"	8'-3"	27'-0"
SHARED USE TRACK	18'-9"	6'-11"	27'-0"



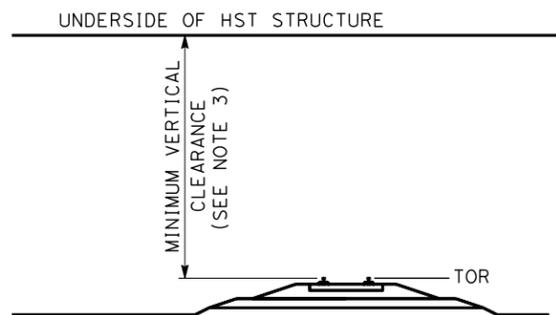
EXISTING STRUCTURE OVER HST TRACKS

	HEIGHT "A"	HEIGHT "B"	MIN VERTICAL CLEARANCE
DEDICATED HST TRACK	17'-5"	8'-3"	27'-0"
DEDICATED HST TRACK (V ≤ 125 MPH)	17'-5"	5'-3"	24'-0"*
SHARED USE TRACK	18'-9"	4'-0"	24'-6"***

* SEE NOTE 4
 *** PER CALTRAIN

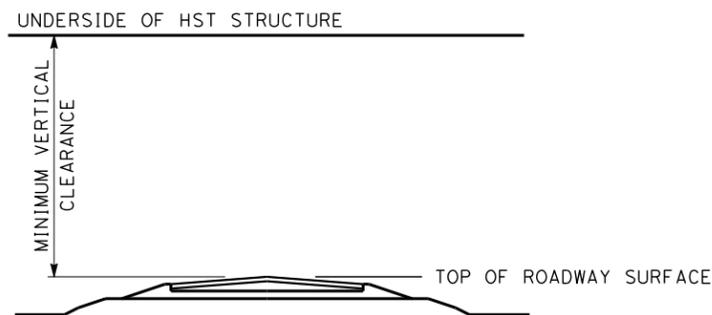
NOTES:

- TOLERANCES ARE NOT ADDITIVE FOR INCREMENTAL DISTANCES.
- HST TRACKFORM IS SCHEMATIC AND DOES NOT REPRESENT THE DESIGN.
- AT LOCATIONS WHERE SUPERELEVATION IS PRESENT, VERTICAL CLEARANCES SHALL BE MEASURED FROM THE HIGH RAIL.
- DEFINED CLEARANCES ASSUMES GRADE SEPARATED STRUCTURE LENGTH ALONG TRACK IS NO MORE THAN 160 FEET FOR HST TRACK OVER 125 MPH. THE OCS SHALL BE FREE RUNNING UNDER GRADE SEPARATED STRUCTURES WITH NO SUPPORTS. STRUCTURES WIDER THAN 160 FEET REQUIRE FURTHER APPROVAL.
- PROTECTIVE PANEL IS REQUIRED FOR VERTICAL CLEARANCES LESS THAN THE PANTOGRAPH ZONE HEIGHT (26 FEET - 3 INCHES) FOR STRUCTURES OVER HST TRACKS.
- FOR LOCAL ROADWAYS, 15 FEET MINIMUM VERTICAL CLEARANCE SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.
- PROTECTIVE STRUCTURE IS REQUIRED IF SIDE CLEARANCE IS LESS THAN 25 FEET. SEE THE AREMA MANUAL FOR RAILWAY ENGINEERING FOR PIER PROTECTION REQUIREMENTS.
- PROTECTIVE TRAFFIC BARRIER REQUIREMENTS SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.
- SIDE CLEARANCE DESIGN CRITERIA SHALL BE CONFIRMED BY AGENCY HAVING JURISDICTION.



NEW HST STRUCTURE OVER TRACK

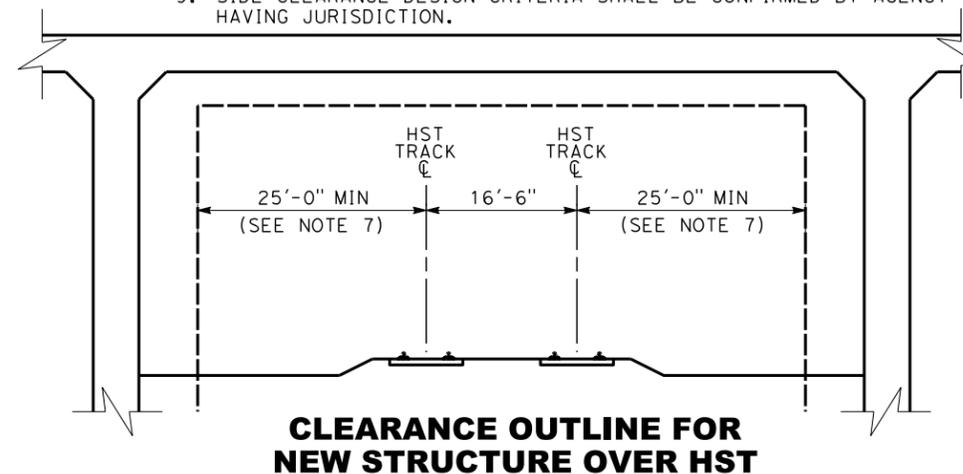
	MIN VERTICAL CLEARANCE
FREIGHT TRACKS	
BNSF	23'-4"
UPRR	23'-0"
NON-FREIGHT TRACKS	
METROLINK	24'-0"
CALTRAIN	24'-6"



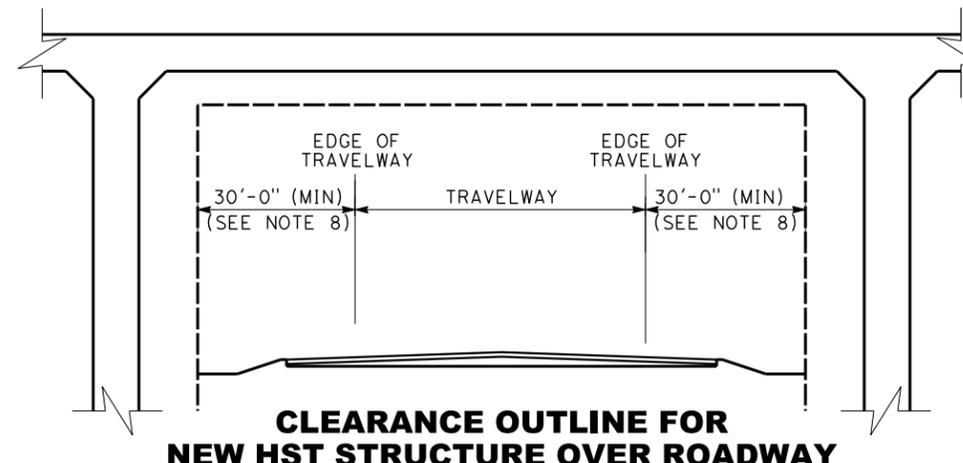
NEW HST STRUCTURE OVER ROADWAY

	MIN VERTICAL CLEARANCE
FREEWAY/EXPRESSWAY	16'-6"
LOCAL ROADWAY	15'-0" *
EXTRA LEGAL LOAD NETWORK(ELLN)	20'-3"

* SEE NOTE 6



CLEARANCE OUTLINE FOR NEW STRUCTURE OVER HST



CLEARANCE OUTLINE FOR NEW HST STRUCTURE OVER ROADWAY

	MIN SIDE CLEARANCE
FREEWAY/EXPRESSWAY	30'-0"
OTHER	SEE NOTE 9

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY S. MILITELLO
DRAWN BY V. HUANTE
CHECKED BY H. NGUYEN
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014

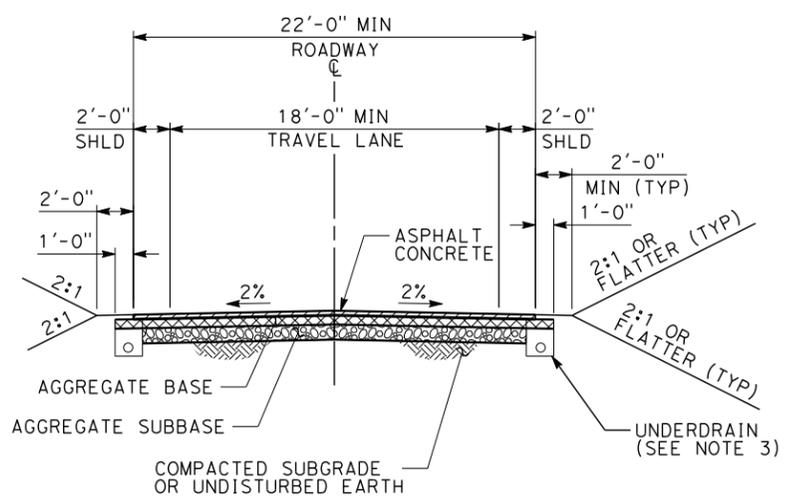


CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

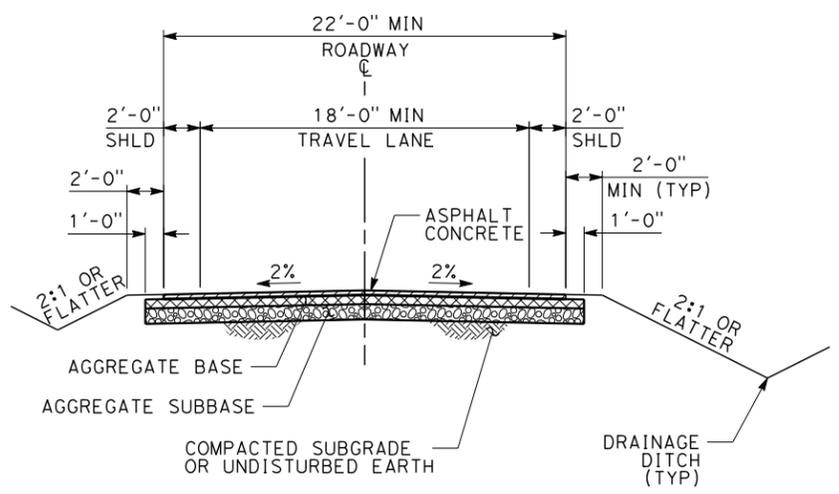
MINIMUM CLEARANCE
 GRADE SEPARATED STRUCTURES

CONTRACT NO.
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SCALE NO SCALE
SHEET NO.

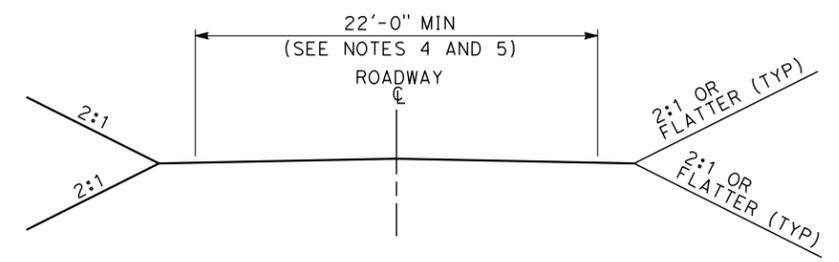
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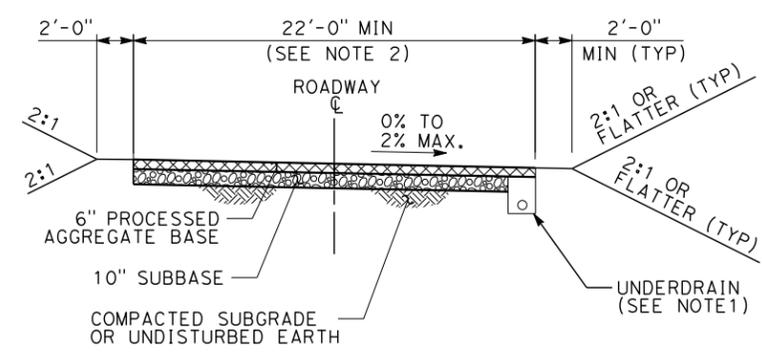
TYPICAL 22 FT ROADWAY SECTION-PAVED
CLOSED DRAINAGE



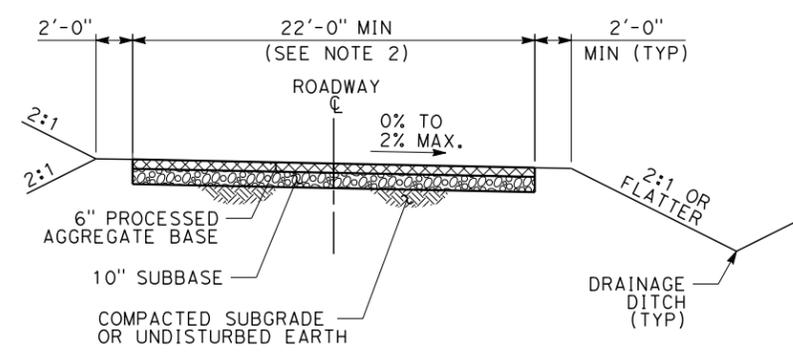
TYPICAL 22 FT ROADWAY SECTION-PAVED
OPEN DRAINAGE



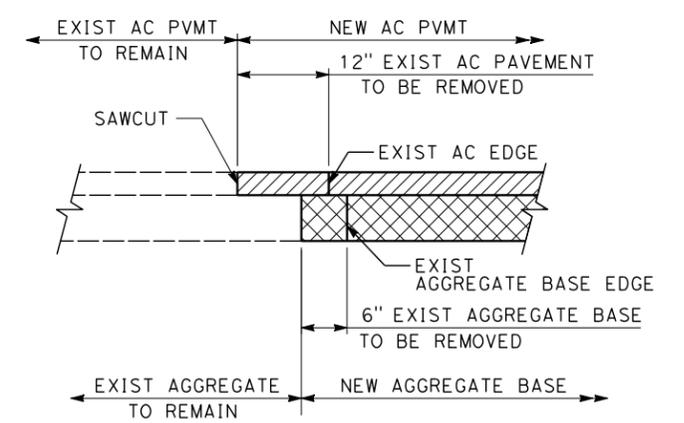
AUTHORITY ROADWAYS WIDTH



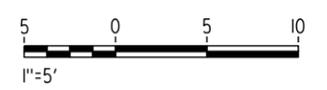
TYPICAL 22 FT ROADWAY SECTION-UNPAVED
CLOSED DRAINAGE



TYPICAL 22 FT ROADWAY SECTION-UNPAVED
OPEN DRAINAGE



PAVEMENT CONNECTION DETAIL
SCALE: 1"=1'-0"



- NOTES:**
1. AUTHORITY ROADWAYS ARE REFERRED TO AS ACCESS ROADS AND SERVICE ROADS.
 2. UNPAVED ROADWAYS CAN BE USED AS TEMPORARY ACCESS TO SITES.
 3. REFER TO CALTRANS STANDARD PLANS FOR:
 - A) CURBS AND DRIVEWAYS (A87A)
 - B) UNDERDRAINS (D102)
 4. IF FIRE HYDRANT IS LOCATED ON ROAD, MINIMUM ROADWAY WIDTH SHALL BE 26 FEET.
 5. TWO-WAY SERVICE ROADS SHALL BE 24 FEET WIDE WITH NO SHOULDERS.
 6. COMPACT SUBGRADE TO 95% COMPACTION.

RFP No.: HSR 14-32 - REVIEW DRAFT

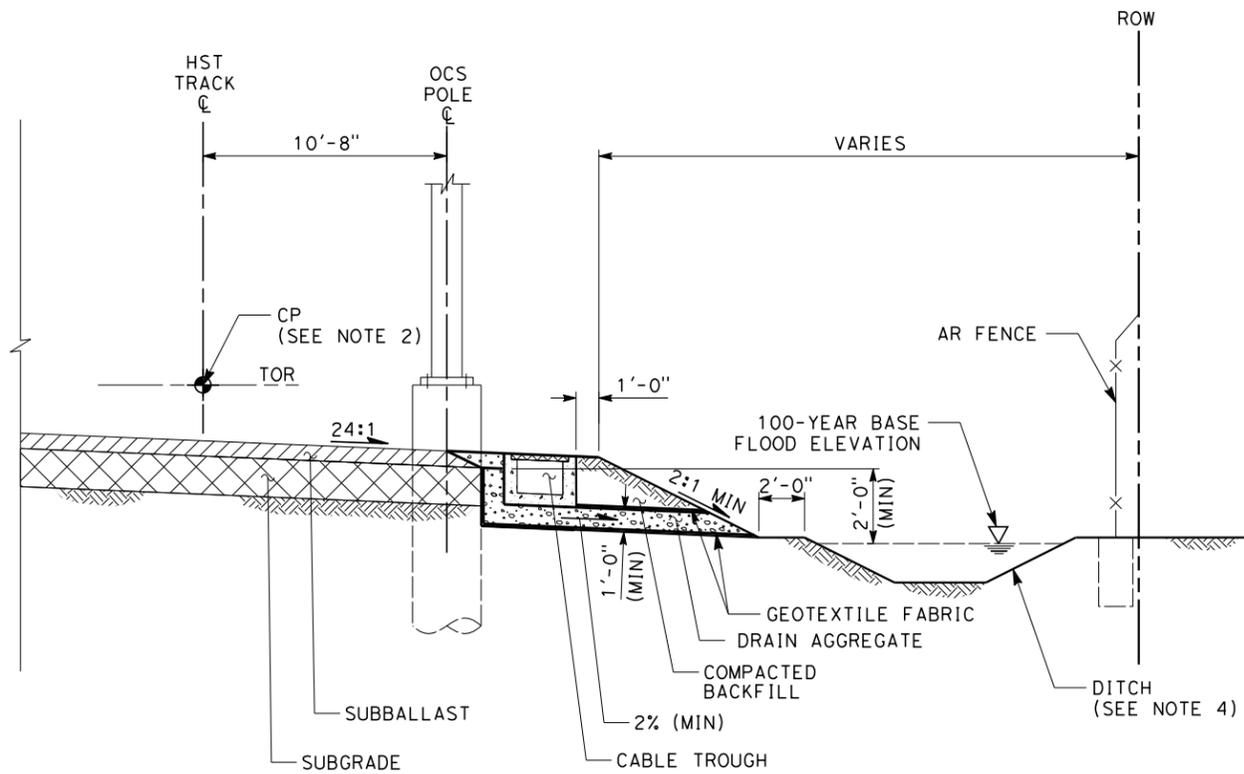
REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
S. MILITELLO
 DRAWN BY
V. HUANTE
 CHECKED BY
A. ABTAHI
 IN CHARGE
G. LUSHEROVICH
 DATE
01/24/2014

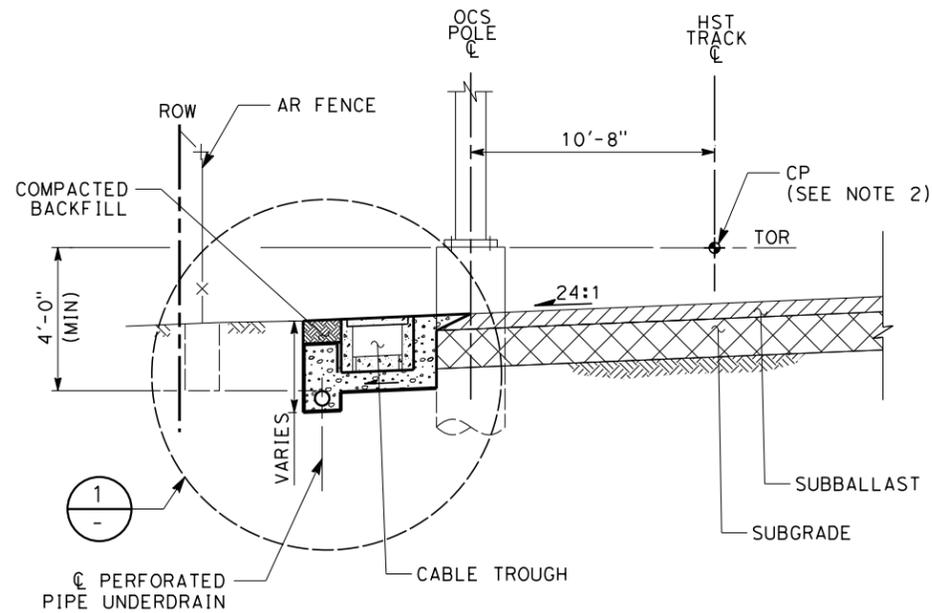


CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE
 AUTHORITY ROADWAYS

CONTRACT NO.
 DRAWING NO.
DD-CV-905
 SCALE
AS SHOWN
 SHEET NO.



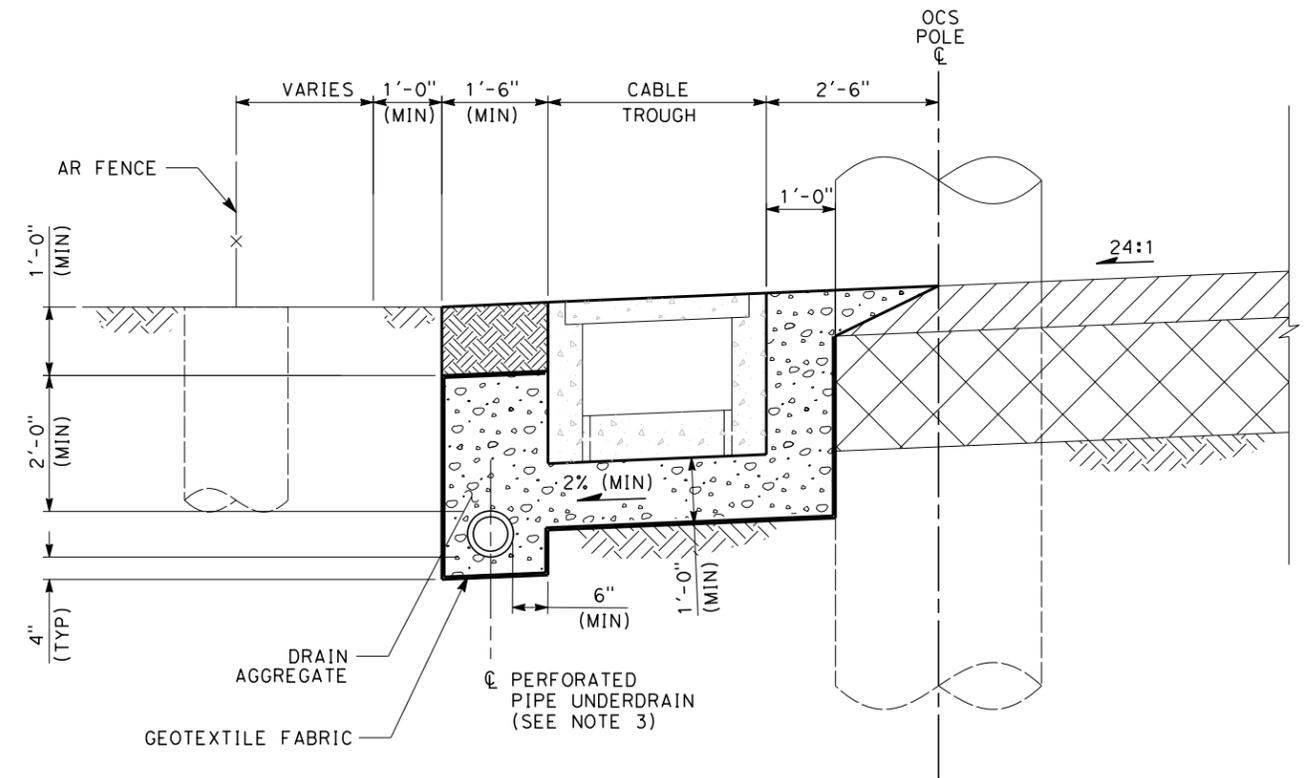
TYPICAL SECTION
AT GRADE TRACK OPEN DRAINAGE SYSTEM



TYPICAL SECTION
AT GRADE TRACK CLOSED DRAINAGE SYSTEM

NOTES:

1. TRACK AND SYSTEMS ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE CONTROL POINT (CP) IS THE INTERSECTION OF THE CENTERLINE OF TRACK AND THE TOP OF THE RAIL, FOR SUPERELEVATED TRACK SECTIONS THE CP IS THE INTERSECTION OF THE CENTERLINE OF THE TRACK AND THE TOP OF THE LOW RAIL.
3. TRACK DRAINAGE SYSTEM SHALL BE CONNECTED AND DISCHARGE TO THE LOCAL STORM DRAIN SYSTEM.
4. DITCH SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
DEPTH OF DITCH = 1' MINIMUM
SIDE SLOPE =
2:1 MAXIMUM FOR CONCRETE LINED DITCH AND
3:1 MAXIMUM FOR GRASS LINED DITCH
WIDTH OF FLAT BOTTOM = 4' MINIMUM



DETAIL 1
NO SCALE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY K. SISTLA
DRAWN BY V. HUANTE
CHECKED BY A. ABTAHI
IN CHARGE G. LUSHEROVICH
DATE 05/09/2014

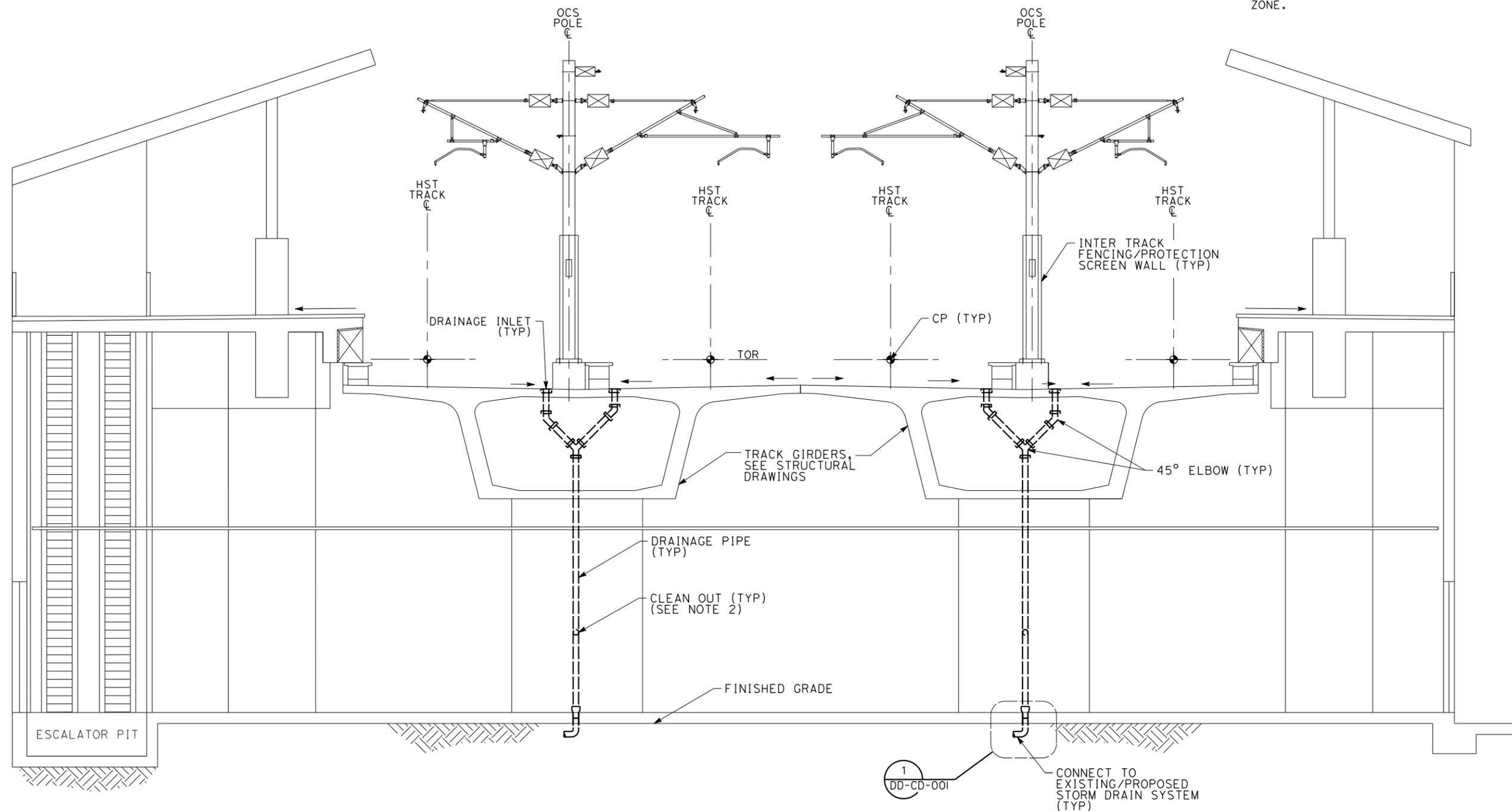


CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE

AT-GRADE TRACK
DRAINAGE SYSTEM

CONTRACT NO.
DRAWING NO. DD-CD-003
SCALE NO SCALE
SHEET NO.

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- NOTES:**
1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. CLEANOUTS AND PIPE PENETRATIONS FROM THE COLUMNS SHALL BE OUTSIDE OF THE PLASTIC HINGE ZONE.



RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
K. SISTLA
DRAWN BY
V. HUANTE
CHECKED BY
A. ABTAHI
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



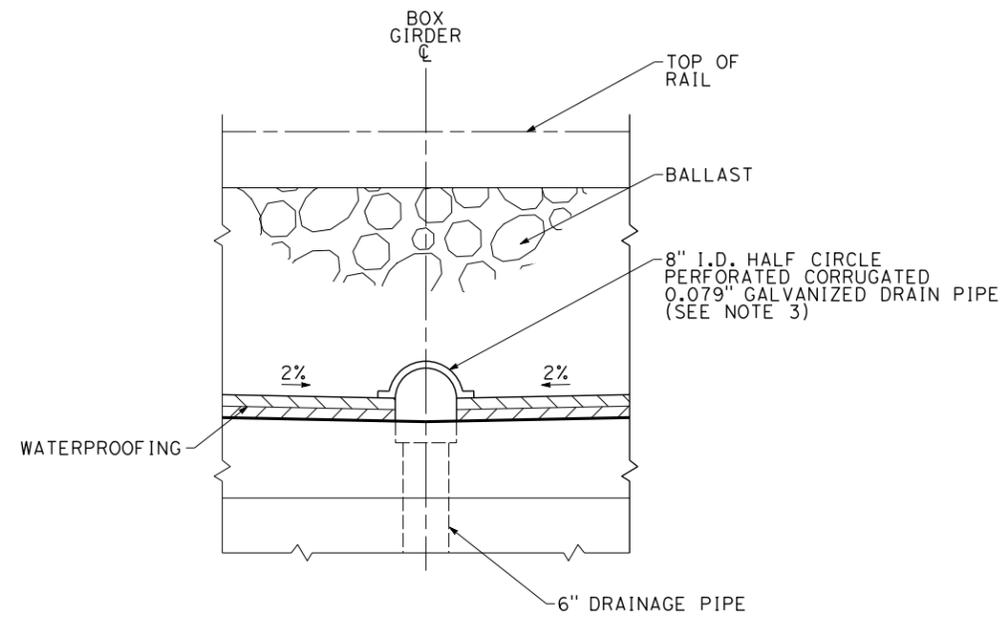
CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE

ELEVATED STATION PLATFORM
DRAINAGE SYSTEM

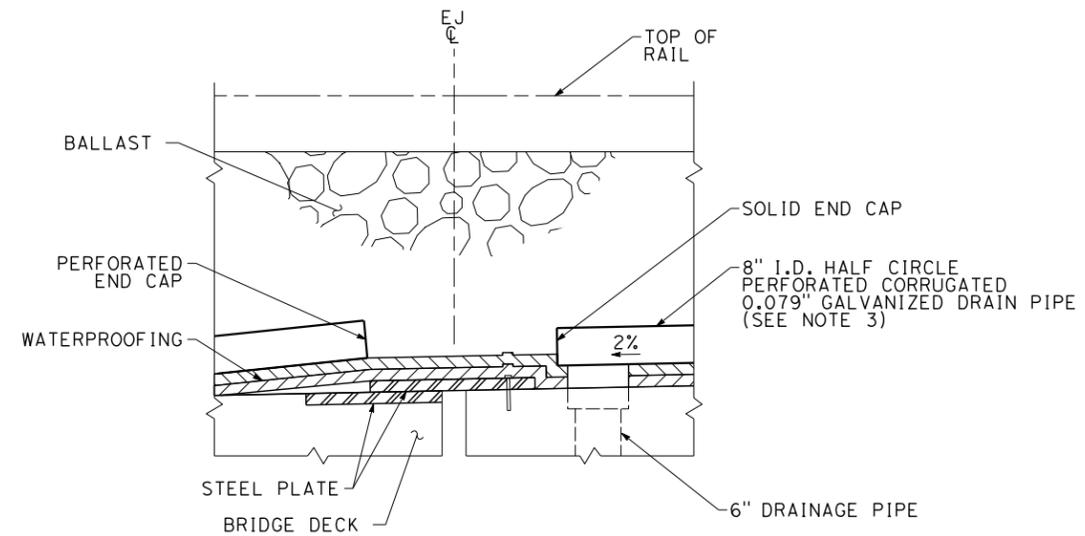
CONTRACT NO.
DRAWING NO.
DD-CD-010
SCALE
AS SHOWN
SHEET NO.

NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR DRAINAGE SYSTEM DETAILS SEE DD-CD-001.
3. THE 8" HALF CIRCLE PERFORATED PIPE SHALL BE INSTALLED ALONG THE ENTIRE INVERTED CROWN OF THE BRIDGE DECK, EXCEPT AT THE EXPANSION JOINT.



1 **DRAIN DETAIL**
ON CONCRETE DECK



2 **EXPANSION JOINT DETAIL**
ON BALLASTED AERIAL STRUCTURE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY V. HUANTE
CHECKED BY H. NGUYEN
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE**

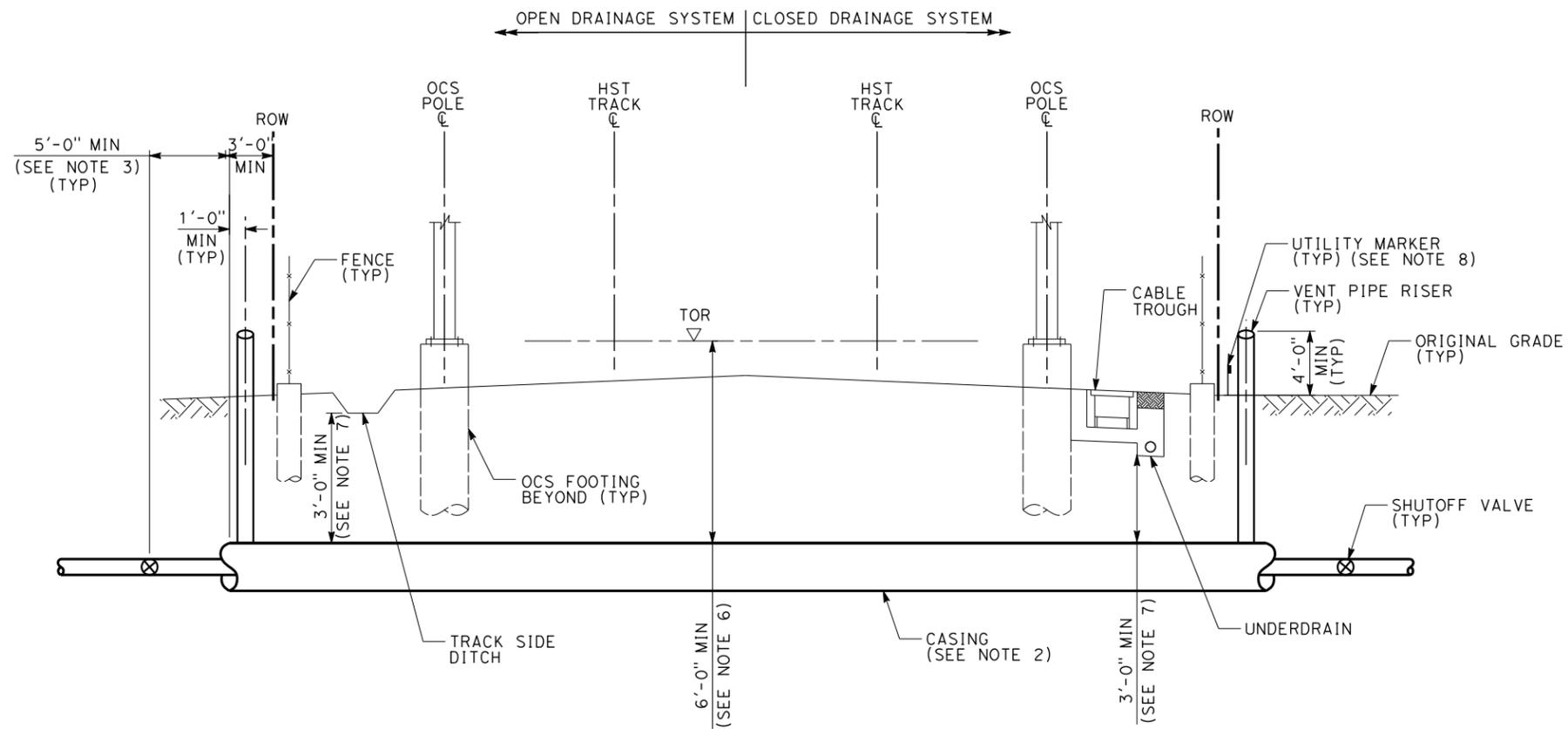
BALLASTED AERIAL STRUCTURE
DECK DRAINAGE SYSTEM DETAILS

CONTRACT NO. 13259
DRAWING NO. DD-CD-901
SCALE NO SCALE
SHEET NO.

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NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
3. SHUTOFF VALVE MUST BE ACCESSIBLE FROM OUTSIDE THE RIGHT OF WAY. IT MAY NOT BE REQUIRED ON BOTH SIDES.
4. THE CASING SHALL CONTINUE 3'-0" BEYOND THE RIGHT OF WAY.
5. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HST SUBSURFACE ELEMENTS.
6. MINIMUM CLEARANCE FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 10'-6" BELOW TOP OF RAIL.
7. MINIMUM CLEARANCE FOR UNDERGROUND WIRE LINE CROSSING, OVER 750 VOLTS, SHALL BE 4'-0" AND FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 6'-0" BELOW DRAINAGE FACILITIES.
8. UTILITY MARKER TO INDICATE LOCATION OF UTILITY CROSSING AT RIGHT-OF-WAY.

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



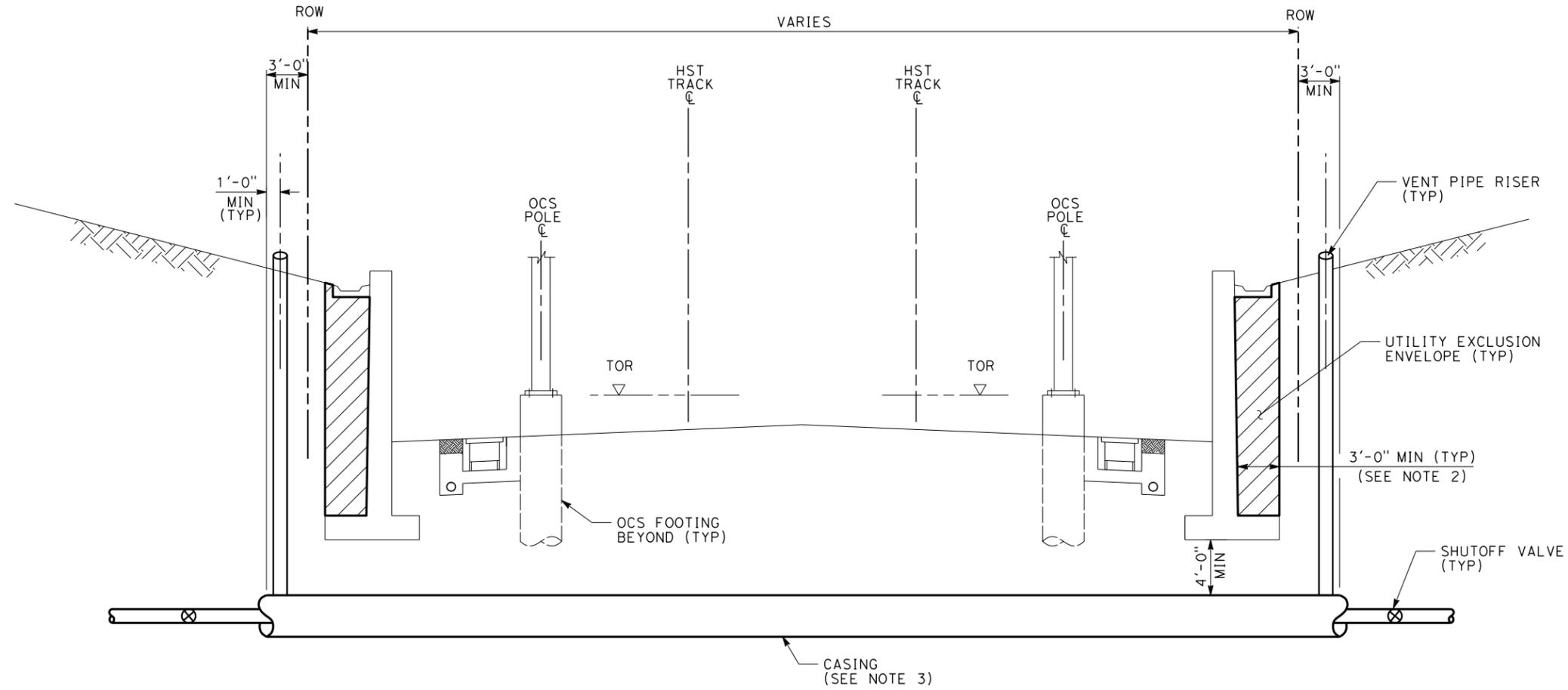
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE**

UTILITY CROSSING CLEARANCES
AT GRADE

CONTRACT NO.
DRAWING NO.
DD-UT-001
SCALE
NO SCALE
SHEET NO.

NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. NO UTILITIES ABOVE THE WALL FOOTINGS.
3. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
4. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HST SUBSURFACE ELEMENTS.



REV	DATE	BY	CHK	APP	DESCRIPTION

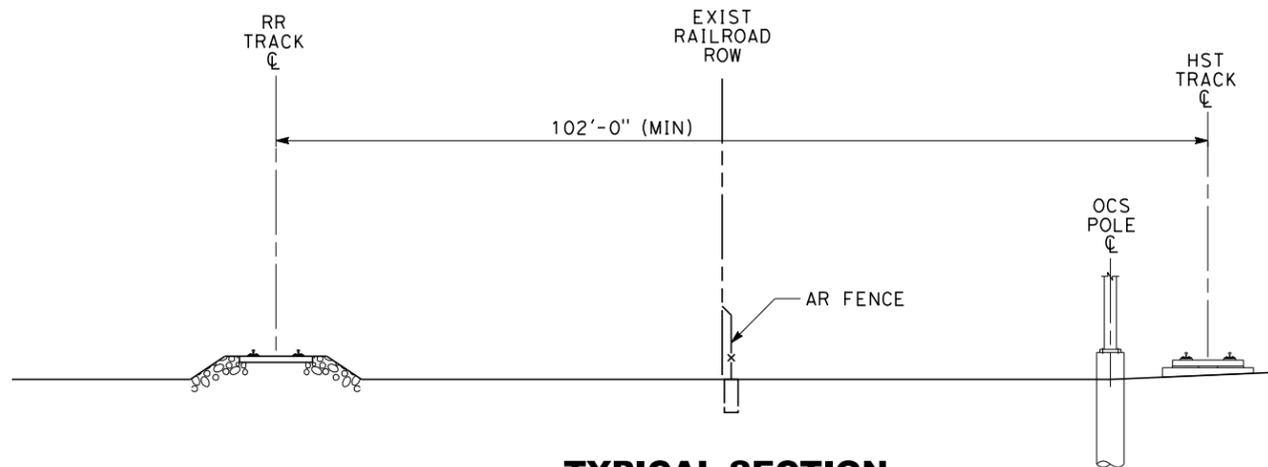
DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



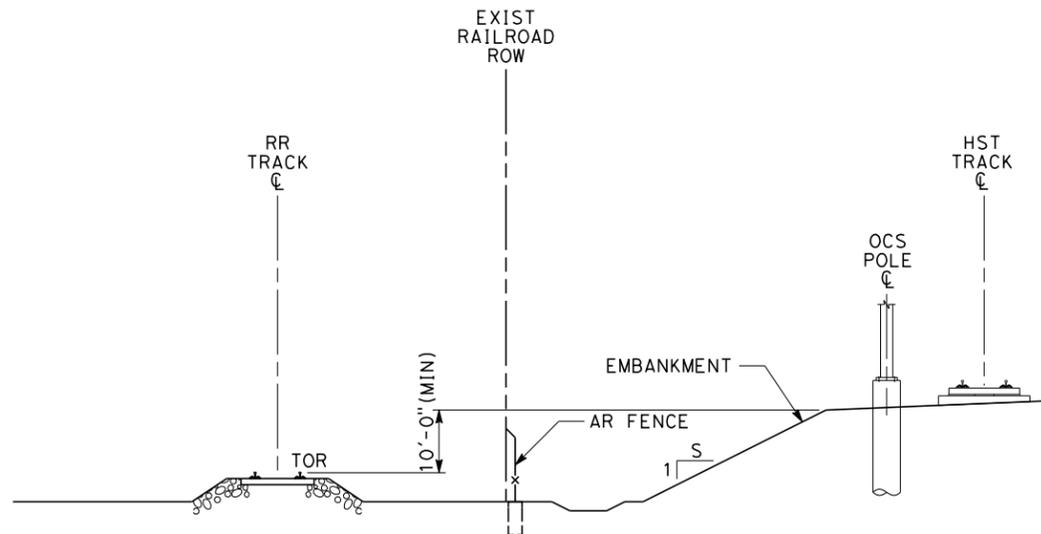
CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE
UTILITIES CROSSING CLEARANCES
RETAINED CUT TRENCH

CONTRACT NO.
DRAWING NO.
DD-UT-002
SCALE
NO SCALE
SHEET NO.

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TYPICAL SECTION
102' LATERAL SEPARATION
NO INTRUSION PROTECTION REQUIRED



TYPICAL SECTION
MINIMUM 10' HIGH HST EMBANKMENT
NO INTRUSION PROTECTION REQUIRED

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. AR FENCE AND ITS FOUNDATION SHALL BE INSTALLED INSIDE AUTHORITY RIGHT-OF-WAY.
3. FOR COMMON EMBANKMENT FILL ONLY, USE 2:1 SIDE SLOPES.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
05/09/2014



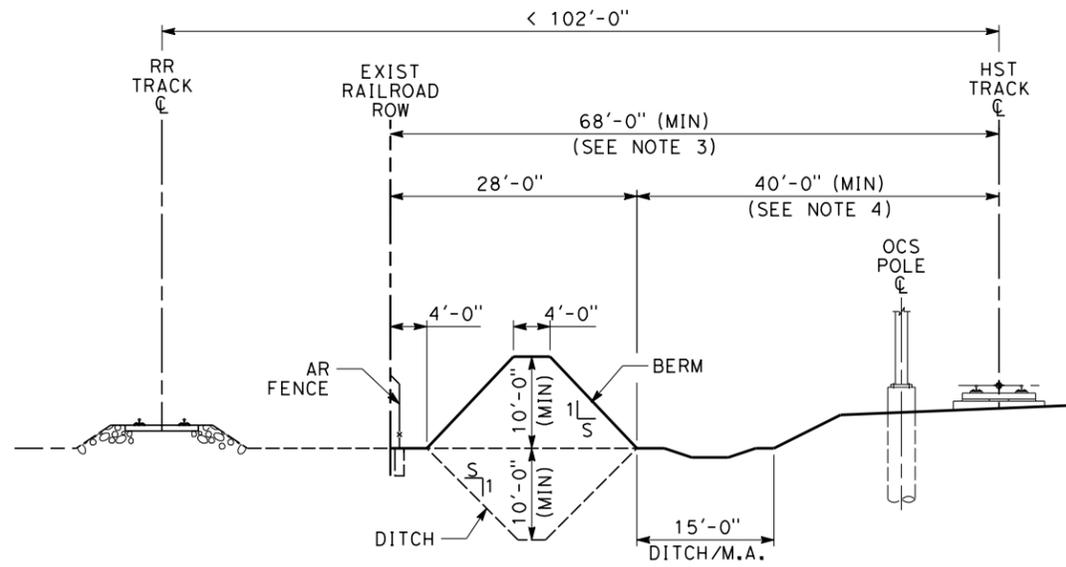
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

RAILROAD ADJACENT TO HST
AT-GRADE WITHOUT INTRUSION PROTECTION

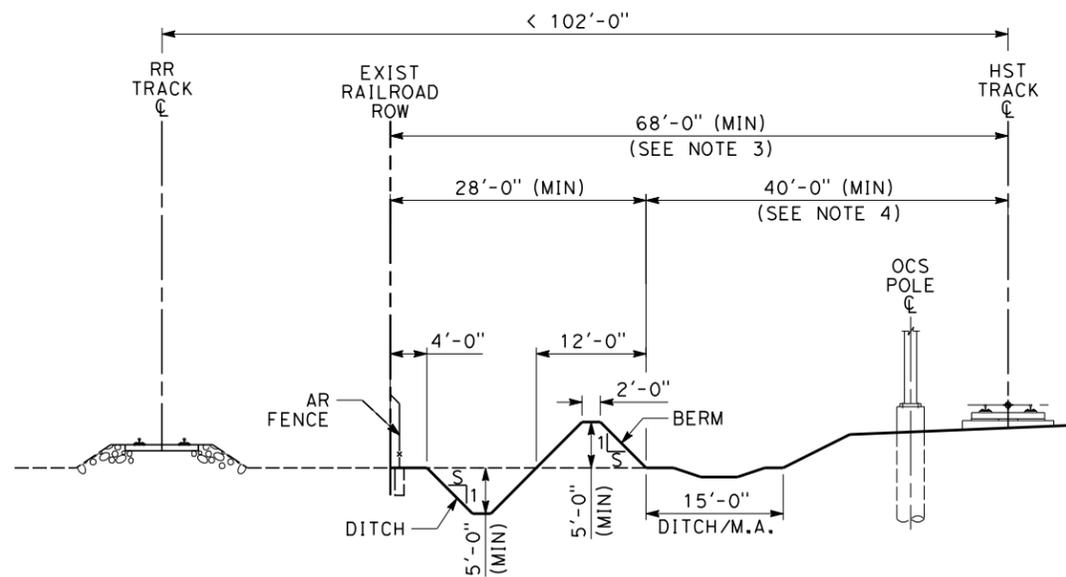
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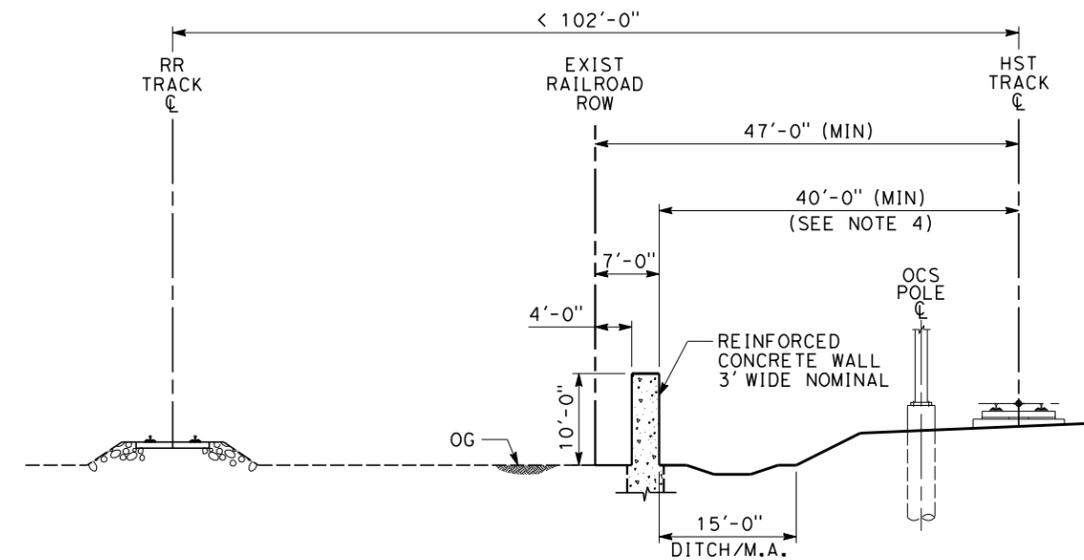
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TYPICAL SECTION
EARTHEN BERM OR DITCH



TYPICAL SECTION
EARTHEN BERM AND DITCH



TYPICAL SECTION
CONCRETE WALL BARRIER

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SIDE SLOPES (S:1) DETERMINED THROUGH SLOPE STABILITY ANALYSIS. FOR COMMON EMBANKMENT FILL ONLY, USE 2:1 SIDE SLOPES.
3. MINIMUM DISTANCE IS BASED ON S=1.
4. MINIMUM DISTANCE CONSIDERS A MINIMUM OF 3'-6" HIGH EMBANKMENT, INCLUSIVE OF SUBBALLAST.
5. BERM MATERIAL AND COMPACTION SHALL BE SIMILAR TO EMBANKMENT.

REV	DATE	BY	CHK	APP	DESCRIPTION

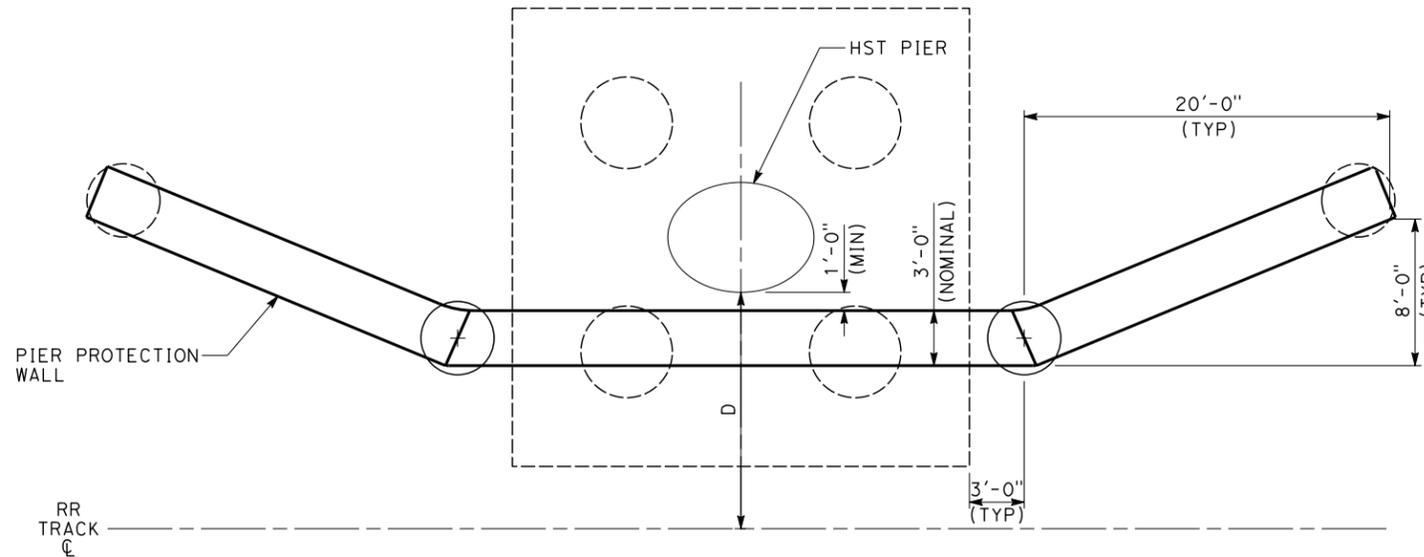
DESIGNED BY A. ABTAHI
DRAWN BY V. HUANTE
CHECKED BY H. NGUYEN
IN CHARGE G. LUSHEROVICH
DATE 05/09/2014



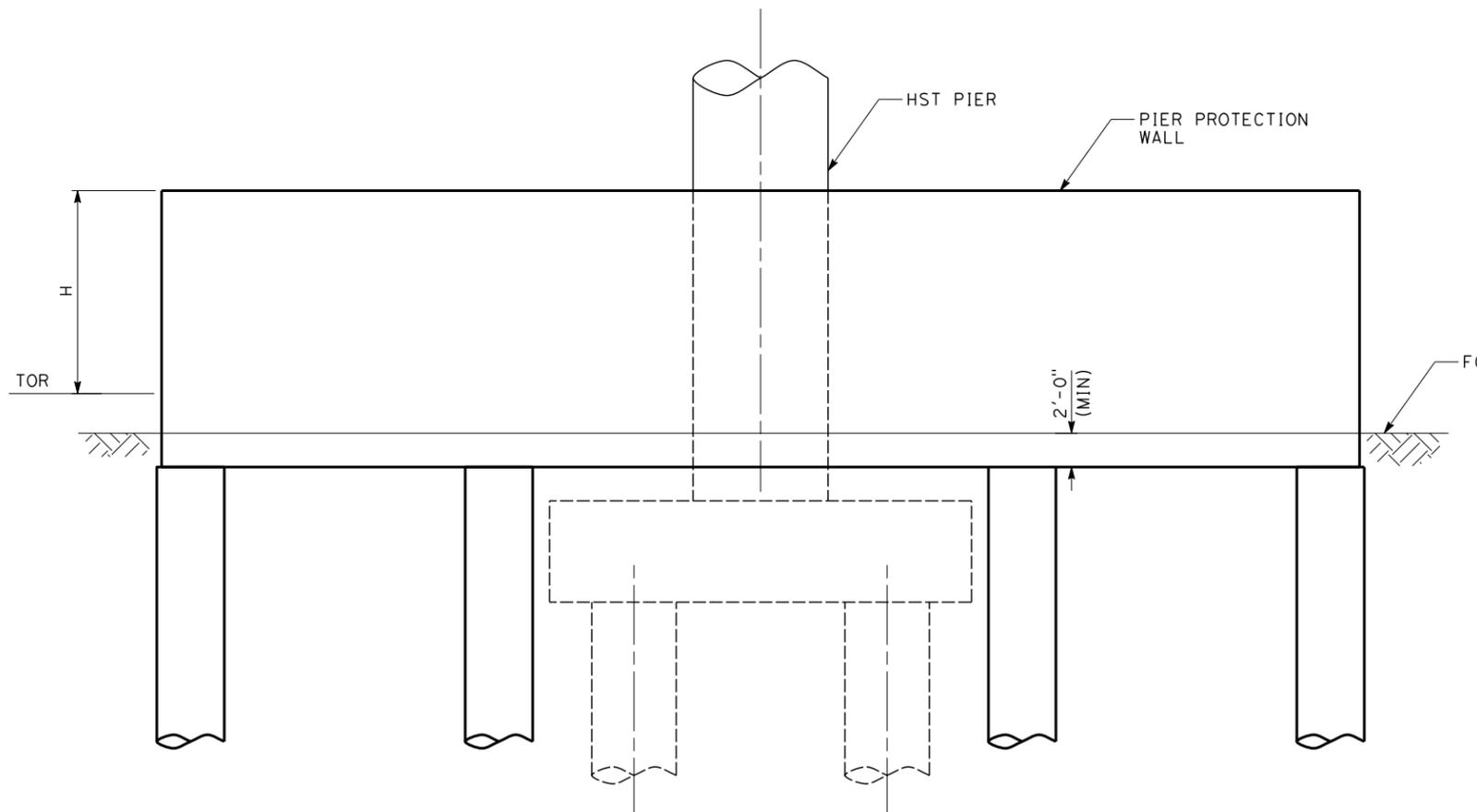
CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

 RAILROAD ADJACENT TO HST
 AT-GRADE WITH INTRUSION PROTECTION

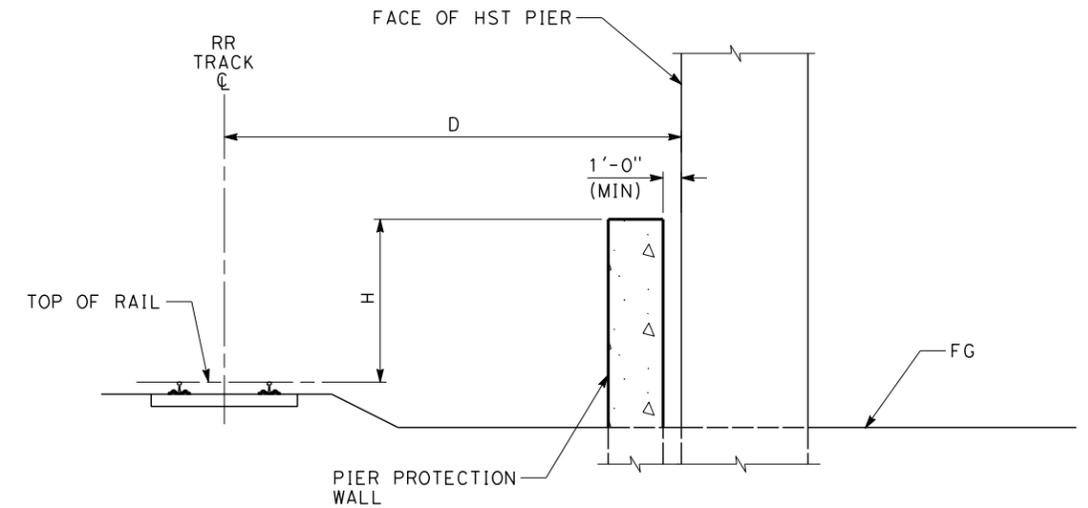
CONTRACT NO.
DRAWING NO. DD-IP-101
SCALE NO SCALE
SHEET NO.



PLAN



ELEVATION



HST STRUCTURE PIER - PROTECTION WALL

CLEARANCE (D)	WALL HEIGHT ABOVE TOP OF RAIL (H)
≥ 25 FT	N/A
12 FT - 25 FT	6 FT
≤ 12 FT	12 FT

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. PIER PROTECTION WALL IS REQUIRED IF CLEARANCE FROM FACE OF HST STRUCTURE TO NEAREST RAILROAD TRACK CENTERLINE IS LESS THAN 25'-0".
3. LOCATION WHERE PIER PROTECTION WALL IS REQUIRED SHALL BE DETERMINED THROUGH SITE SPECIFIC HAZARD ANALYSES.

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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY V. HUANTE
CHECKED BY H. NGUYEN
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014

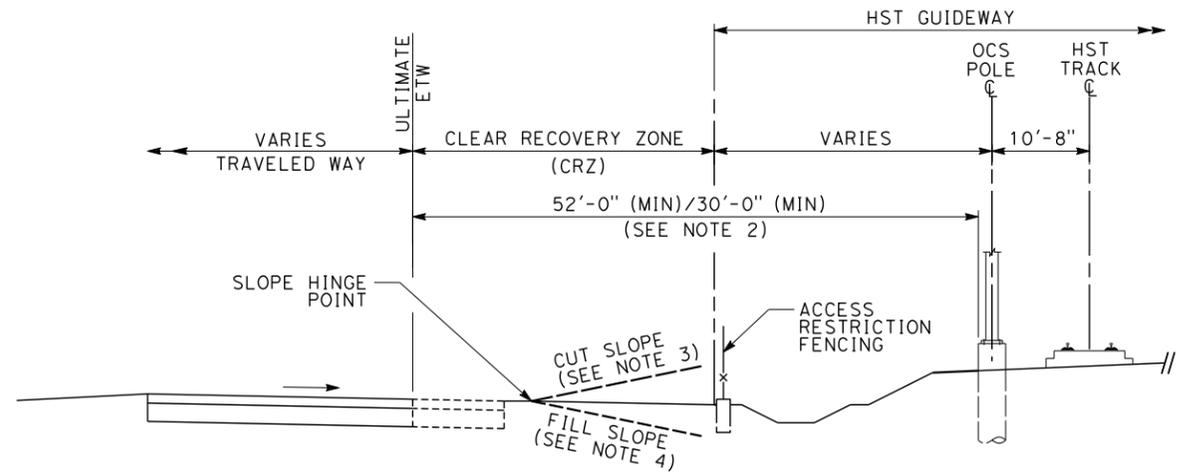


CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

 HST PIER PROTECTION
 IN RAILROAD RIGHT OF WAY

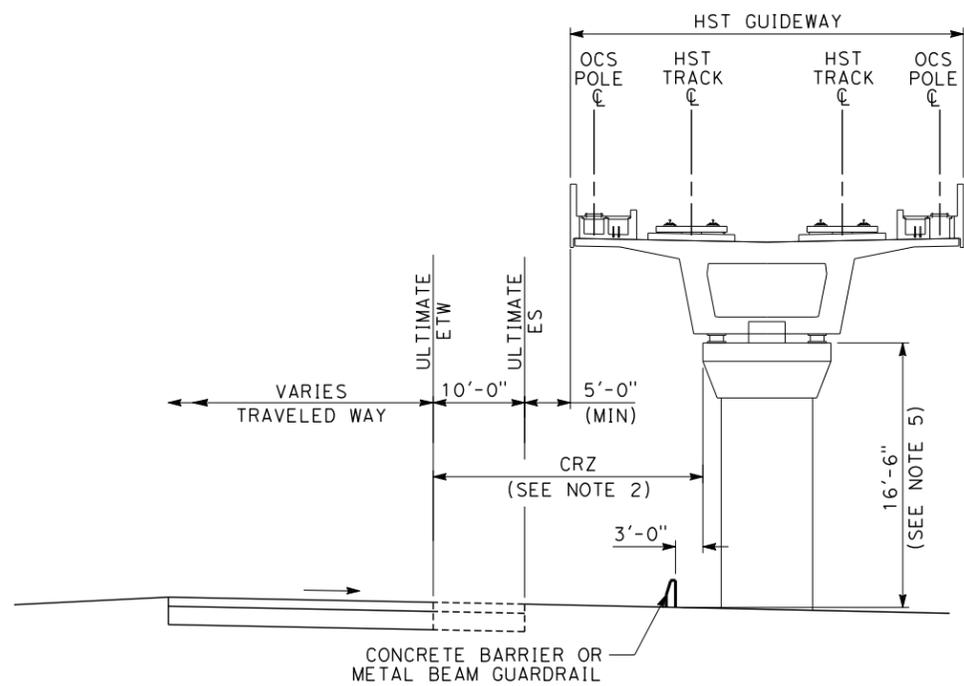
CONTRACT NO.
DRAWING NO. DD-IP-102
SCALE NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT

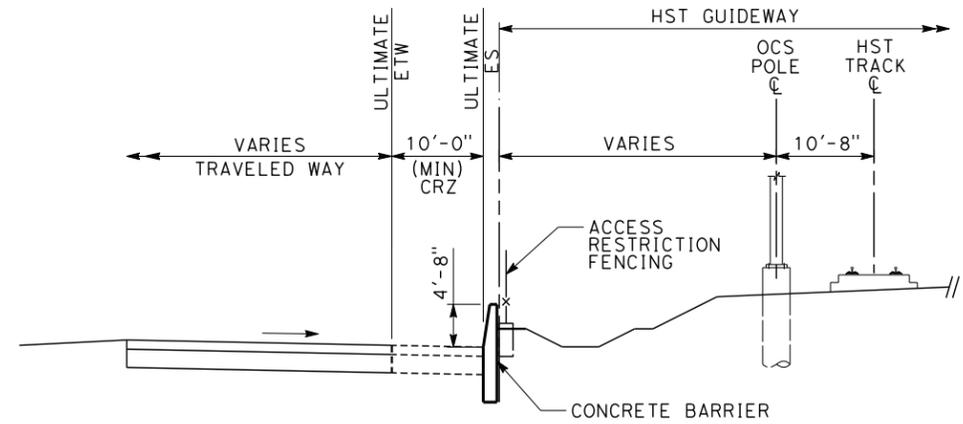


HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY

- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. WHEN HST CORRIDOR IS CONSTRUCTED LONGITUDINALLY TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, METAL BEAM GUARDRAIL OR CONCRETE BARRIER SHALL BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST AERIAL STRUCTURE COLUMN, OR ANY HST FIXED OBJECT IS LESS THAN 52'-0". IF HST CORRIDOR IS NOT LONGITUDINAL TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, THE CLEARANCE REQUIREMENT TO A HST FIXED OBJECT IS 30'-0".
 3. IF HEIGHT DIFFERENTIAL AT ROADWAY CUT SLOPE HINGE POINT AND HST ROW FENCE IS GREATER THAN 7'-0", NO GUARDRAIL OR CONCRETE BARRIER IS REQUIRED.
 4. IF THE HEIGHT DIFFERENTIAL AT ROADWAY FILL HINGE POINT AND HST ROW FENCE IS GREATER THAN 10'-0", GUARDRAIL WILL BE REQUIRED AT ROADWAY FILL HINGE POINT.
 5. IF THE VERTICAL CLEARANCE BETWEEN THE RECOVERY AREA AND THE HST STRUCTURE BENT CAP IS LESS THAN 16'-6", METAL BEAM GUARDRAIL OR CONCRETE BARRIER WILL BE REQUIRED 3'-0" FROM EDGE OF HST BENT CAP.



HST AERIAL STRUCTURE ADJACENT TO HIGHWAY/ROADWAY



HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY WITH 10 FEET CLEAR RECOVERY ZONE (CRZ)

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014

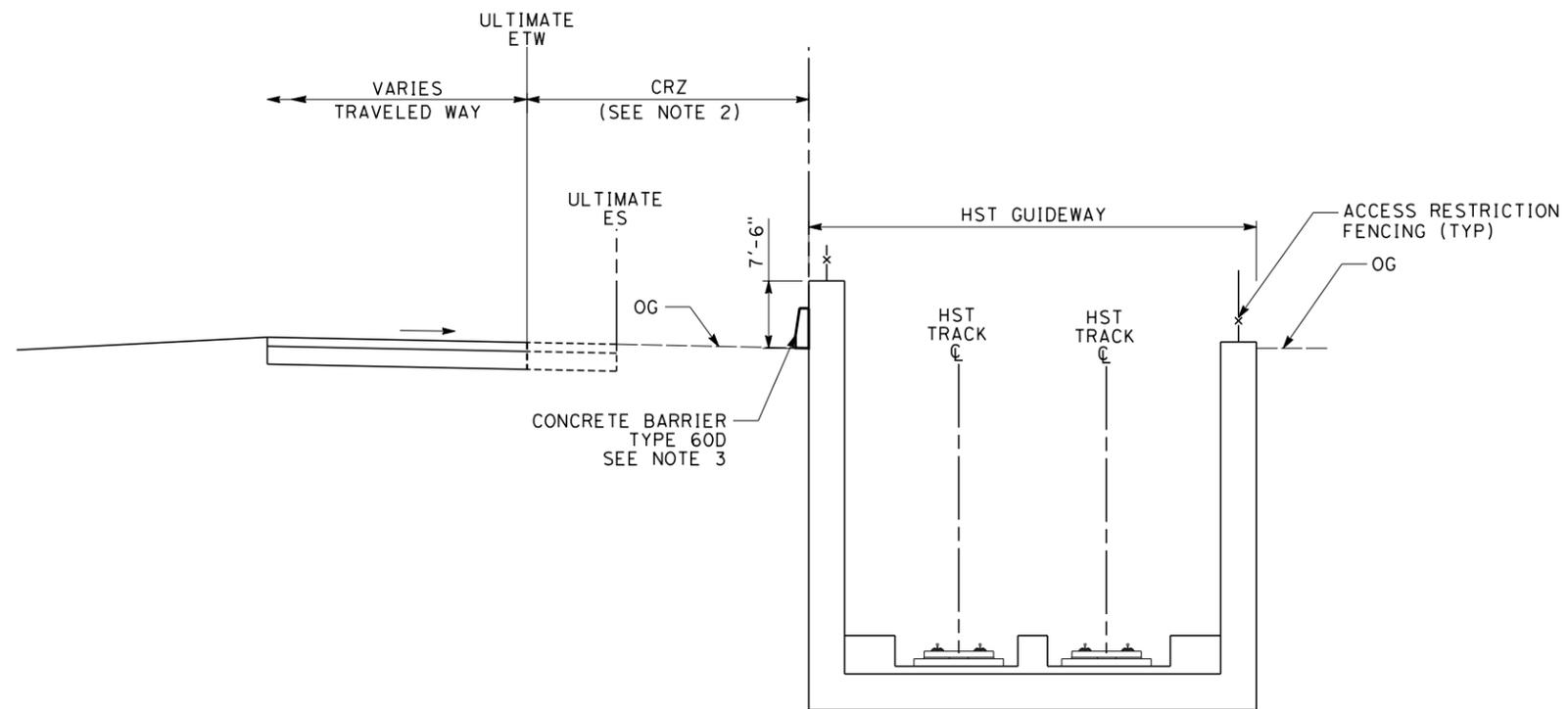


CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

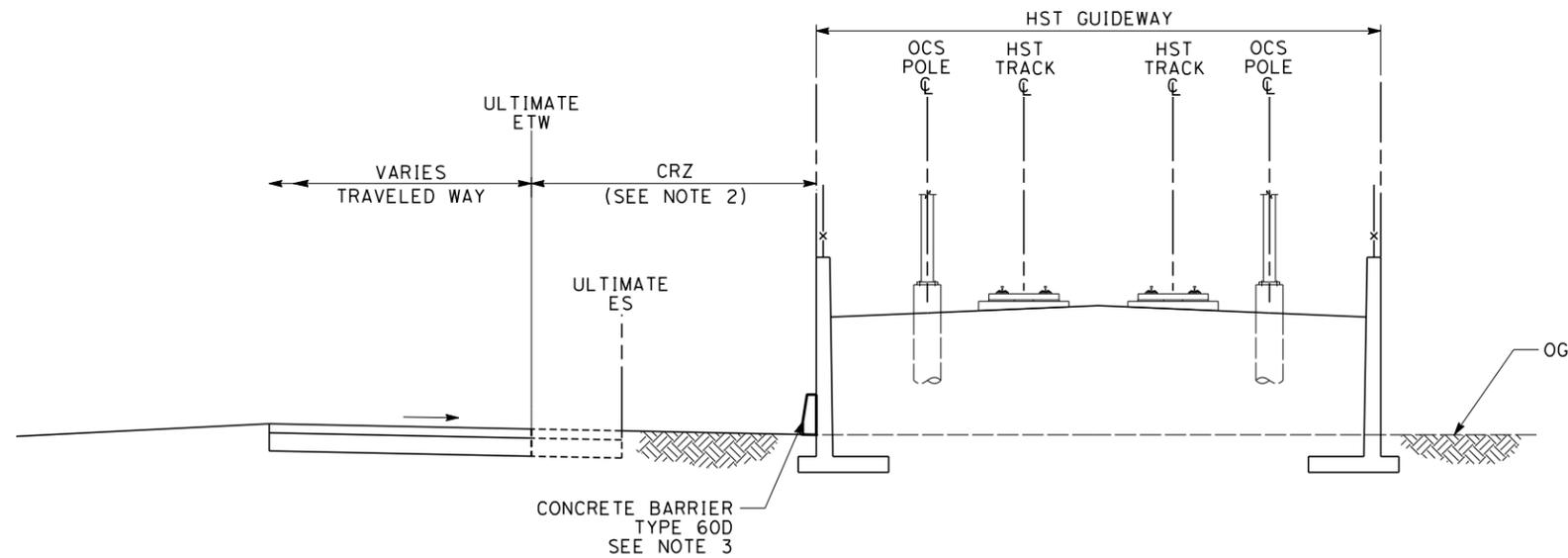
HST ADJACENT TO HIGHWAY/ROADWAY

CONTRACT NO.
DRAWING NO.
DD-IP-103
SCALE
NO SCALE
SHEET NO.

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HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST TRENCH



HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST RETAINED FILL

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. IF THE DISTANCE BETWEEN HST WALL AND THE ULTIMATE ETW IS LESS THAN 52'-0", THE WALL HEIGHT SHALL BE 7'-6" ABOVE THE GROUND SURFACE AND CALTRANS CONCRETE BARRIER TYPE 60D SHALL BE INCLUDED IN CONSTRUCTION OF THE WALL.
3. FOR CONCRETE BARRIER TYPE AND THE END TREATMENT OF THE CONCRETE BARRIER REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL AND CALTRANS STANDARD PLANS.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014



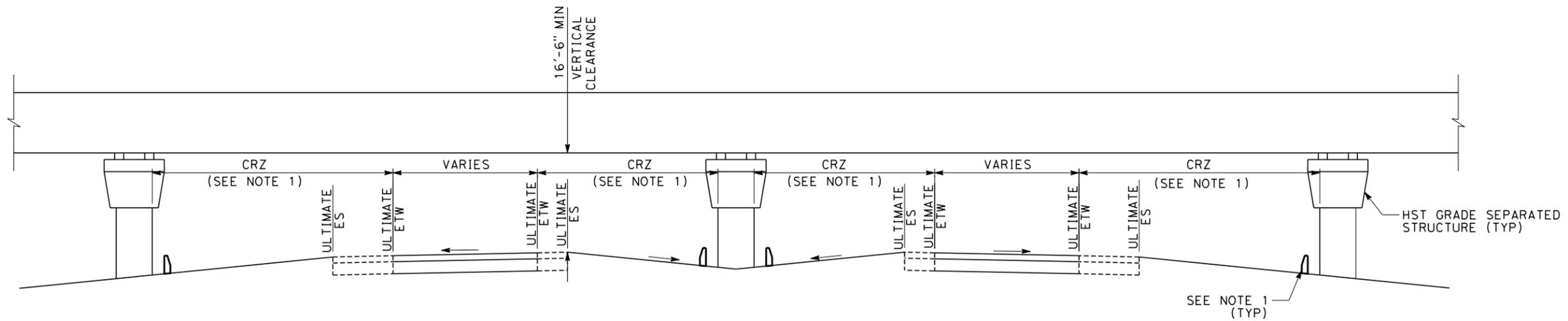
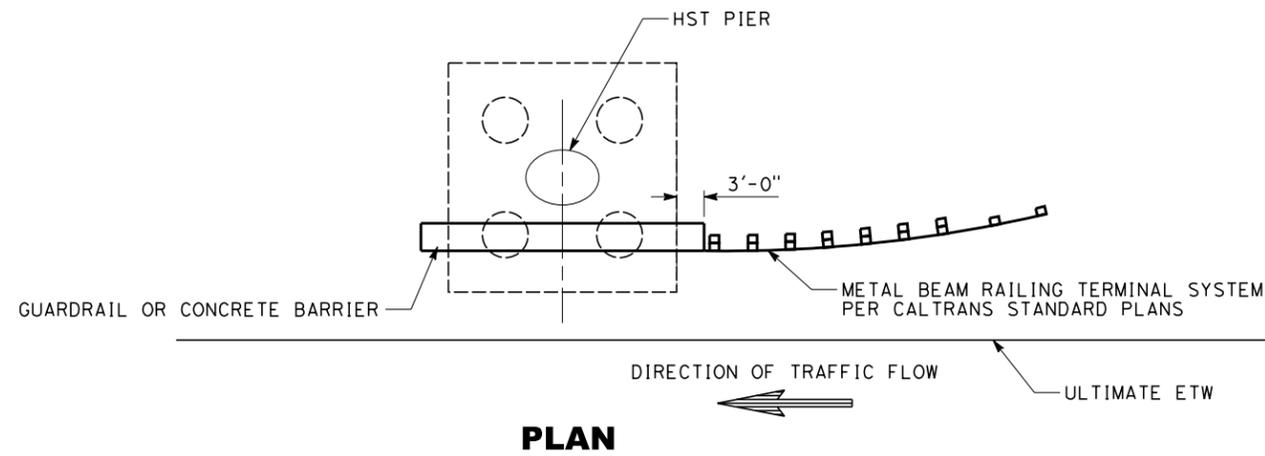
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**
HST TRENCH AND RETAINING WALL PROTECTION

CONTRACT NO.
DRAWING NO.
DD-IP-104
SCALE
NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT

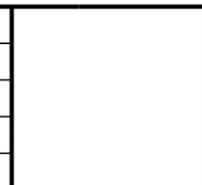
NOTES:

- METAL BEAM GUARDRAIL OR CONCRETE BARRIER SHALL BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST FIXED OBJECT IS LESS THAN 30'-0". REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL AND CALTRANS STANDARD PLANS.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
DRAWN BY
V. HUANTE
CHECKED BY
H. NGUYEN
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014

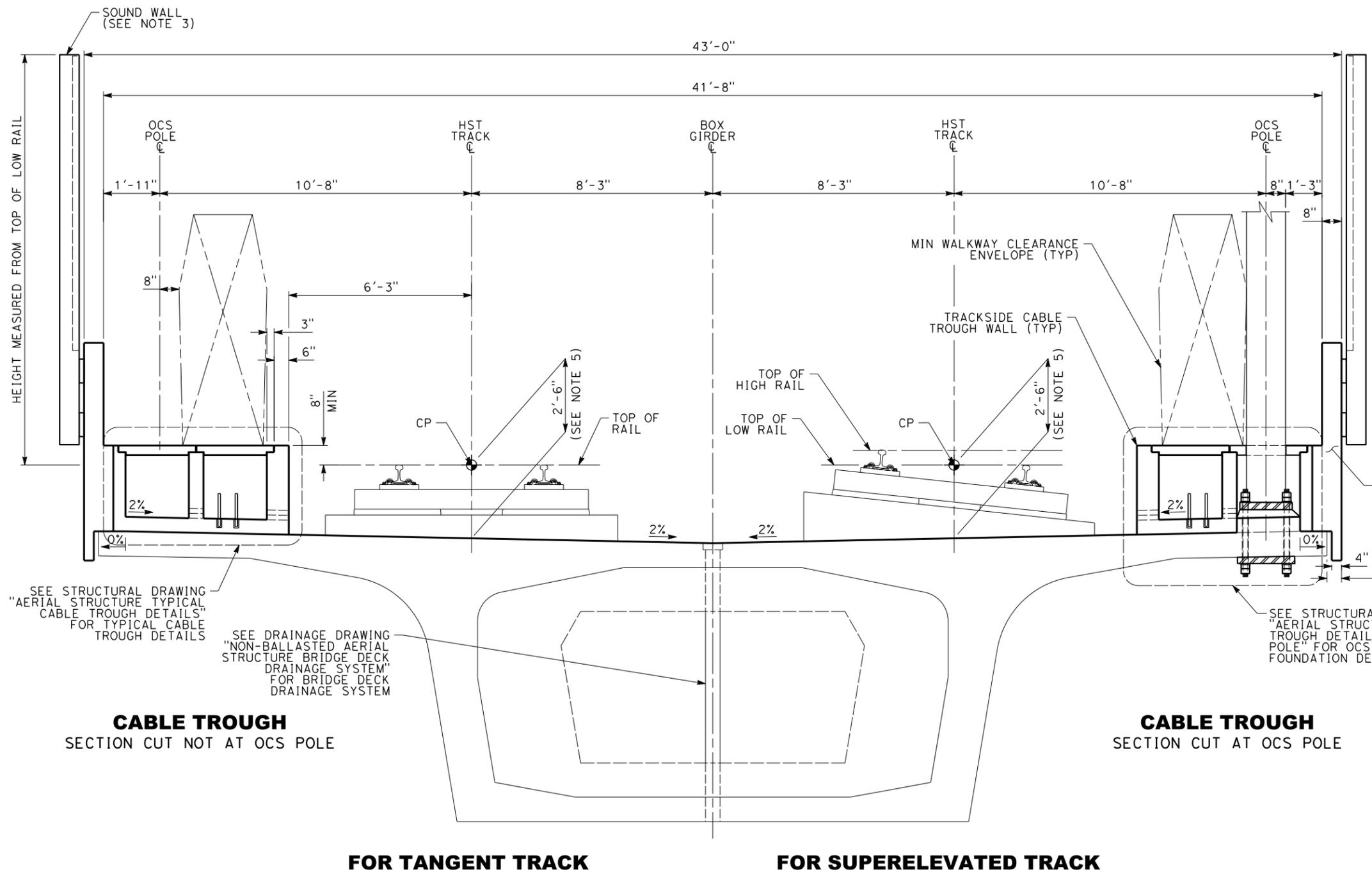


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE**

HST PIER PROTECTION
IN HIGHWAY/ROADWAY RIGHT-OF-WAY

CONTRACT NO.
DRAWING NO. DD-IP-105
SCALE NO SCALE
SHEET NO.

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DESIGN AND INSTALL SHEAR REINFORCEMENTS OR CONNECTORS, WHICH ARE CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA, IN THE STRUCTURAL DECK BELOW THE TRACK SLAB IN ACCORDANCE WITH THE PROVISIONS PROVIDED BY THE TRACK WORK DESIGNER THROUGH SYSTEM INTERFACE WORKSHOP MEETINGS. THE TOP SURFACE OF STRUCTURAL DECK BELOW THE TRACK SLAB SHALL BE PROPERLY ROUGHENED BY THE CONTRACTOR. SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE HOT-DIP GALVANIZED. THE DESIGN AND INSTALLATION OF SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE CONSIDERED AS PART OF THE CONTRACTOR'S SCOPE OF WORK.
5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.

SEE STRUCTURAL DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS" FOR TYPICAL CABLE TROUGH DETAILS

SEE DRAINAGE DRAWING "NON-BALLASTED AERIAL STRUCTURE BRIDGE DECK DRAINAGE SYSTEM" FOR BRIDGE DECK DRAINAGE SYSTEM

SEE STRUCTURAL DRAWING "AERIAL STRUCTURE CONCRETE PARAPET" FOR CONCRETE PARAPET DETAILS

SEE STRUCTURAL DRAWING "AERIAL STRUCTURE CABLE TROUGH DETAILS AT OCS POLE" FOR OCS POLE FOUNDATION DETAILS

CABLE TROUGH SECTION CUT NOT AT OCS POLE

CABLE TROUGH SECTION CUT AT OCS POLE

FOR TANGENT TRACK

FOR SUPERELEVATED TRACK



REV	DATE	BY	CHK	APP	DESCRIPTION

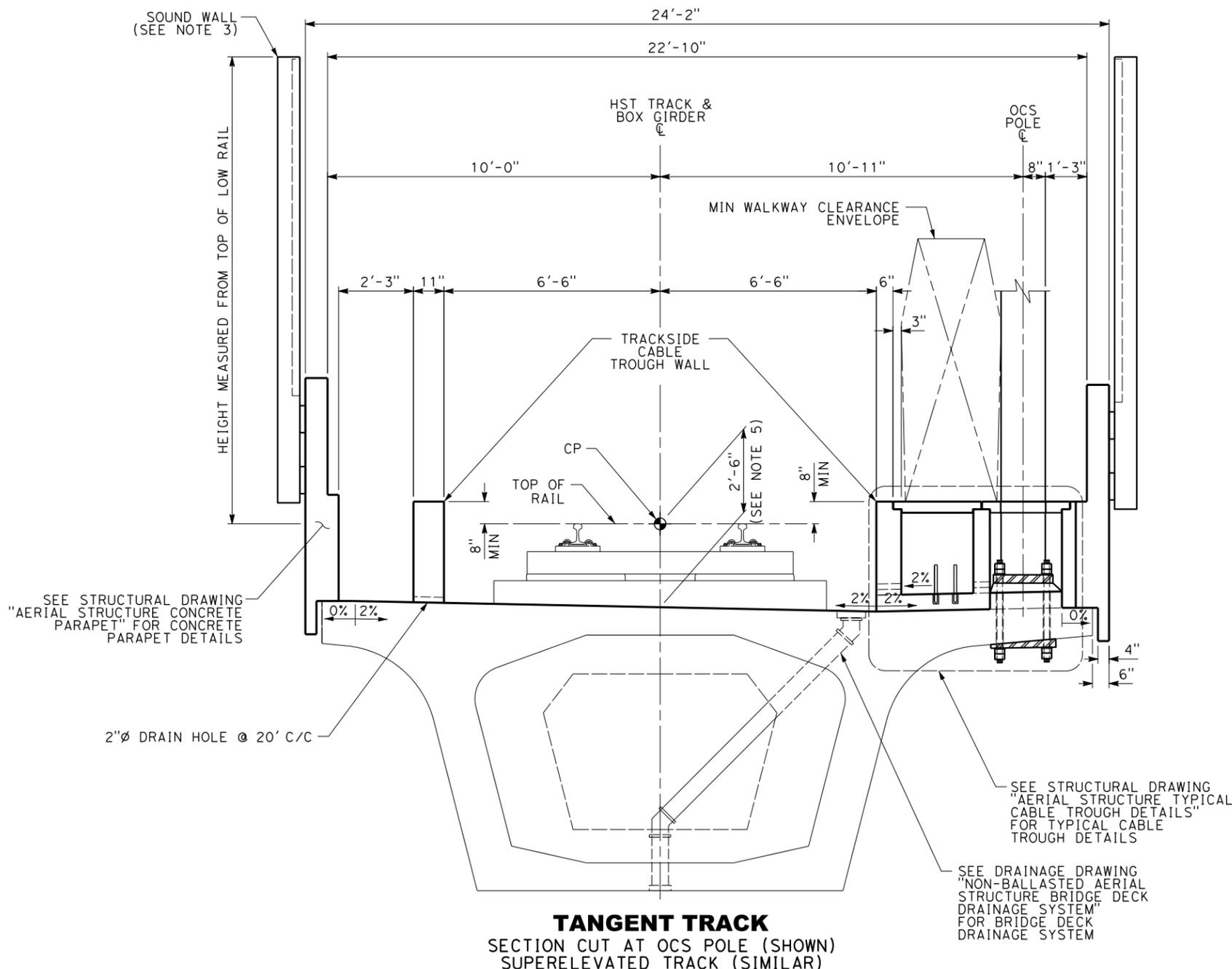
DESIGNED BY
P. LIN
DRAWN BY
V. HUANTE
CHECKED BY
K. PUGASAP
IN CHARGE
G. LUSHEROVICH
DATE
07/18/2014



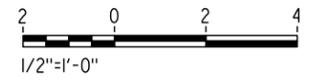
CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE
TYPICAL CROSS SECTION
AERIAL STRUCTURE
TWO TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

CONTRACT NO.
DRAWING NO.
DD-ST-100
SCALE
AS SHOWN
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT



- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
 3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
 4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DESIGN AND INSTALL SHEAR REINFORCEMENTS OR CONNECTORS, WHICH ARE CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA, IN THE STRUCTURAL DECK BELOW THE TRACK SLAB IN ACCORDANCE WITH THE PROVISIONS PROVIDED BY THE TRACK WORK DESIGNER THROUGH SYSTEM INTERFACE WORKSHOP MEETINGS. THE TOP SURFACE OF STRUCTURAL DECK BELOW THE TRACK SLAB SHALL BE PROPERLY ROUGHENED BY THE CONTRACTOR. SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE HOT-DIP GALVANIZED. THE DESIGN AND INSTALLATION OF SHEAR REINFORCEMENTS OR CONNECTORS SHALL BE CONSIDERED AS PART OF THE CONTRACTOR'S SCOPE OF WORK.
 5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
DRAWN BY
V. HUANTE
CHECKED BY
K. PUGASAP
IN CHARGE
G. LUSHEROVICH
DATE
07/18/2014

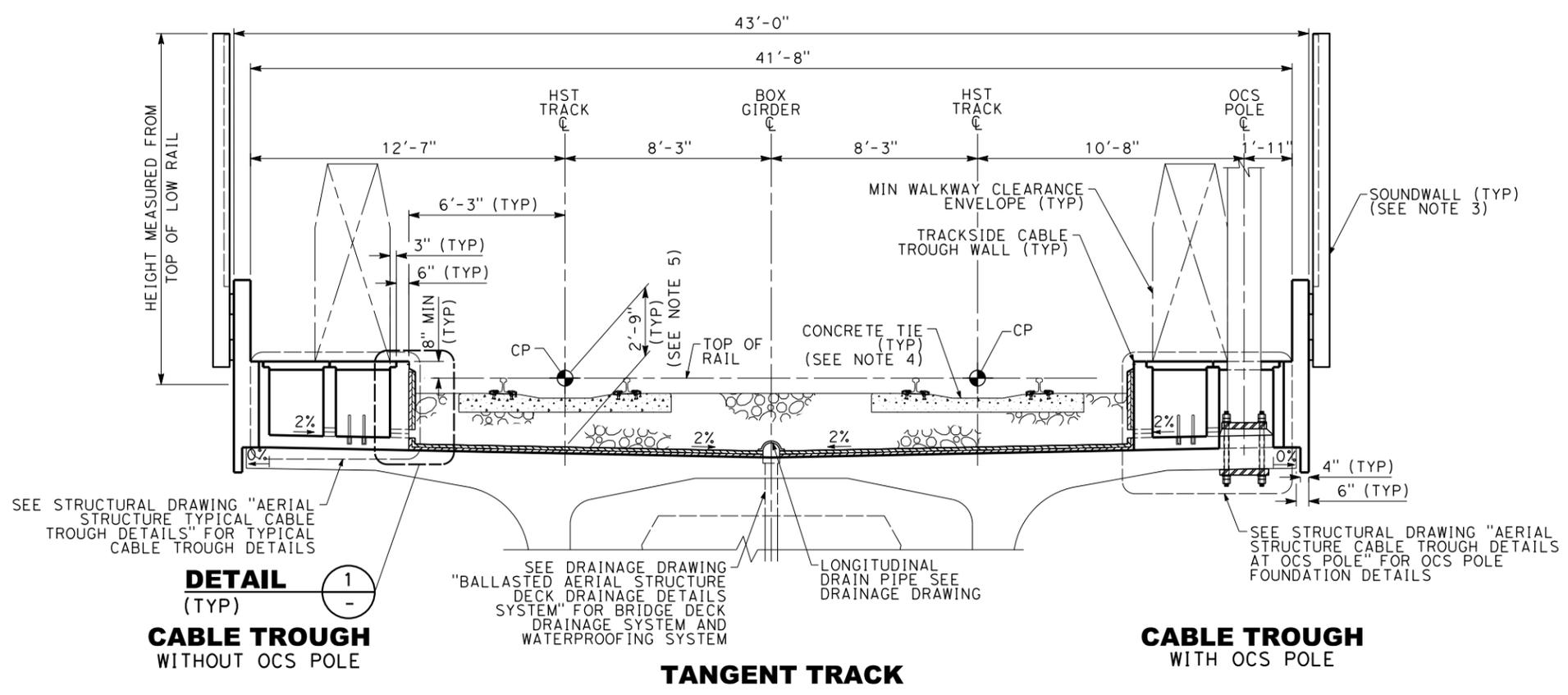


CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE
TYPICAL CROSS SECTION
AERIAL STRUCTURE
ONE TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

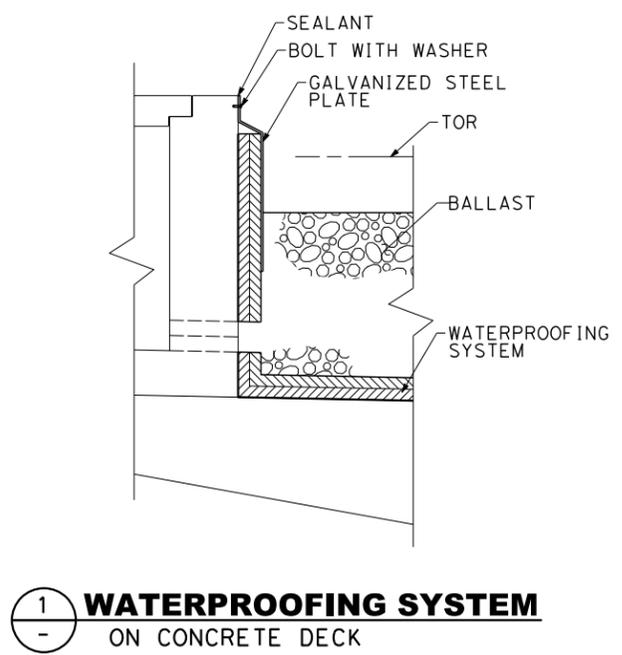
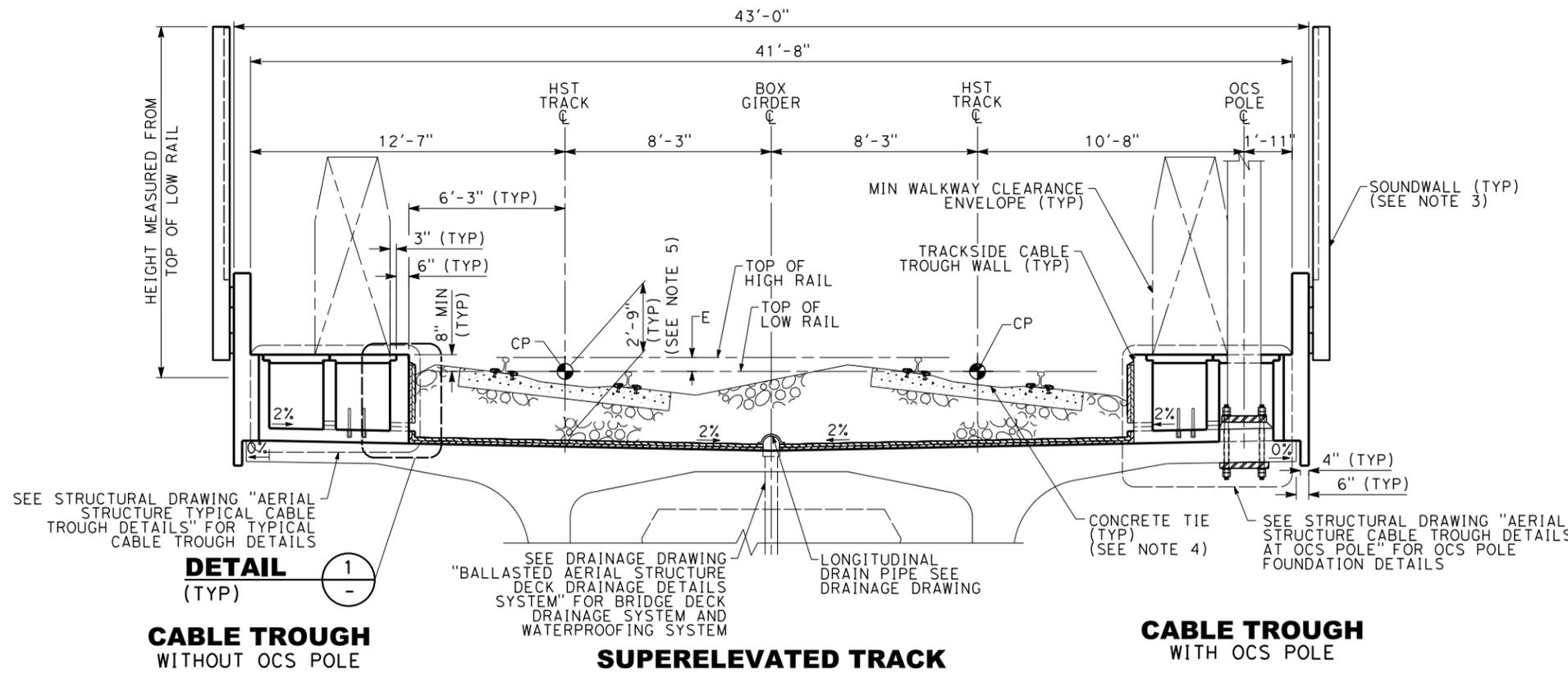
CONTRACT NO.
DRAWING NO.
DD-ST-101
SCALE
AS SHOWN
SHEET NO.

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RFP No.: HSR 14-32 - REVIEW DRAFT



- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
 3. THE HEIGHT OF SOUND WALLS SHALL BE AS DEFINED IN THE TABLE 12-1 OF THE DESIGN CRITERIA. THE STRUCTURE AND CONNECTION BETWEEN PARAPET AND STRUCTURE DECK SHALL BE DESIGNED TO RESIST THE LOAD COMBINATIONS AS DESCRIBED IN TABLE 12-4 OF THE DESIGN CRITERIA TO ACCOMMODATE INSTALLATION OF SOUND WALLS. NO LONGITUDINAL GAPS SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE PARAPET OR DECK, NOR ANY VERTICAL GAPS BETWEEN ADJACENT SOUND WALL PANELS.
 4. CONCRETE TIES SHOWN ARE FOR ILLUSTRATION ONLY.
 5. FOR BALLASTED STRUCTURES, THE DESIGN DEPTH FROM TOP OF RAIL TO THE STRUCTURE DECK OR INVERT SHALL BE SET EQUAL TO 2'-9" PLUS ALLOWANCE FOR WATER PROOFING MEMBRANE AND PROTECTION LAYER.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
 DRAWN BY
V. HUANTE
 CHECKED BY
G. HARRIS
 IN CHARGE
G. LUSHEROVICH
 DATE
07/18/2014

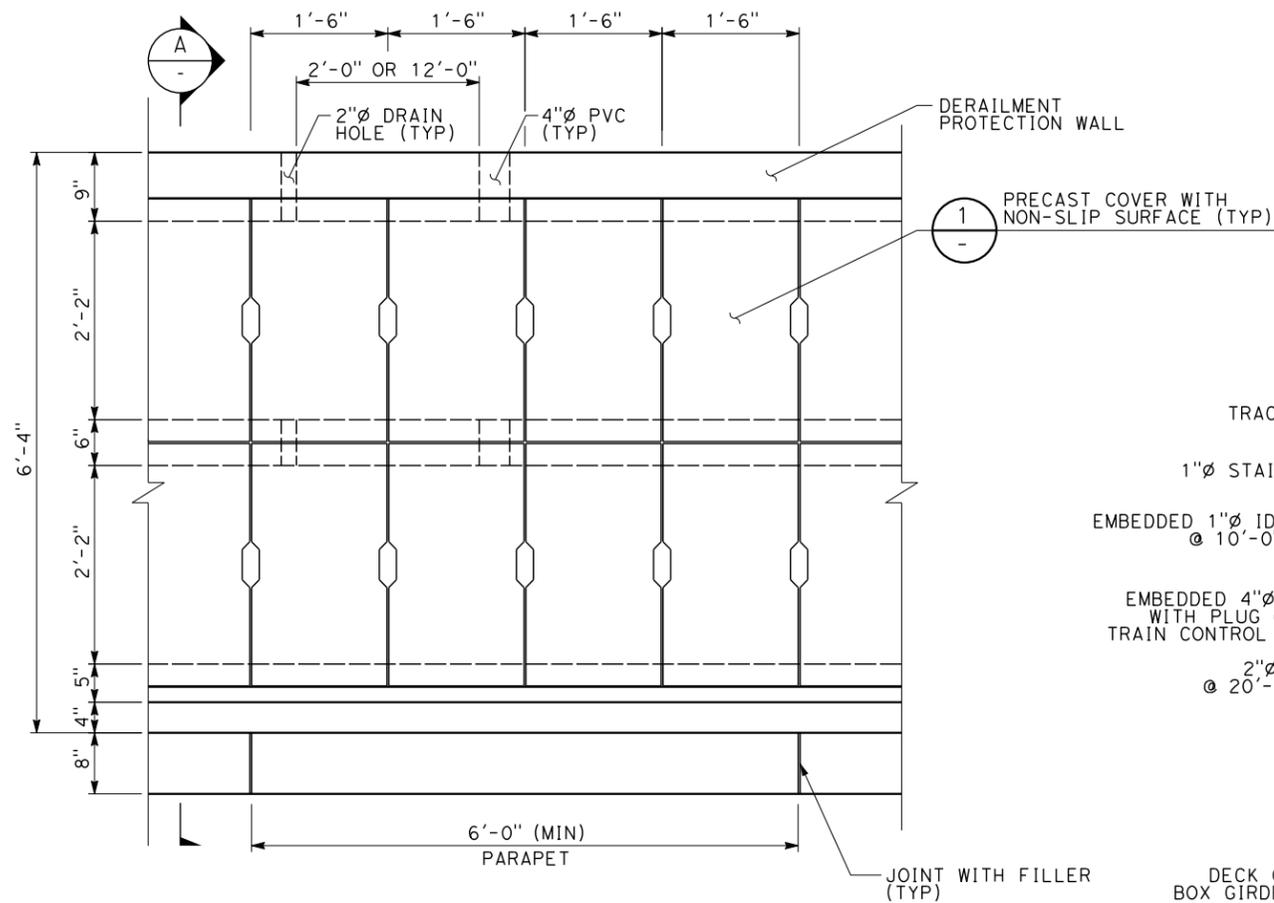


CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE
 TYPICAL CROSS SECTION
 AERIAL STRUCTURE
 TWO TRACK BALLASTED
 TYPICAL CONFIGURATION ON TOP OF DECK

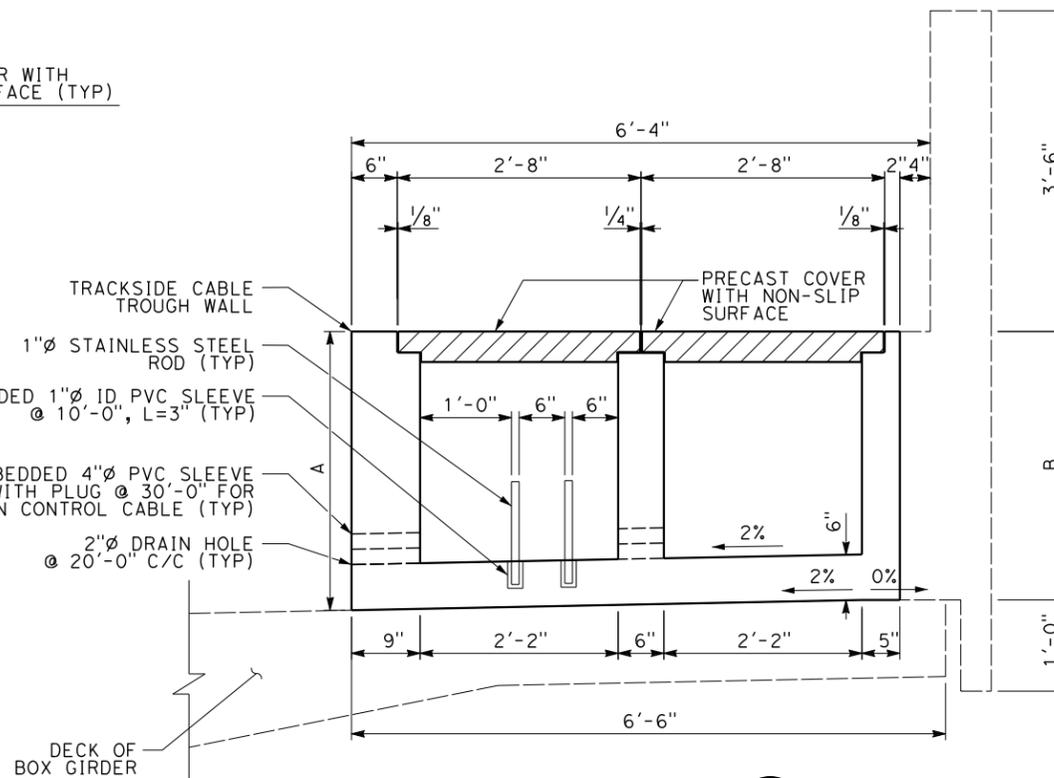
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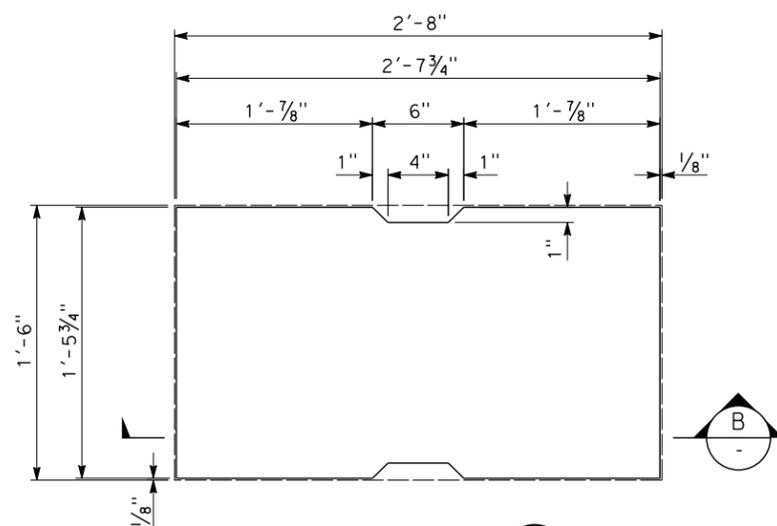
CABLE TROUGH PLAN
SCALE: 1"=1'-0"



SECTION A
SCALE: 1"=1'-0"

NOTES:

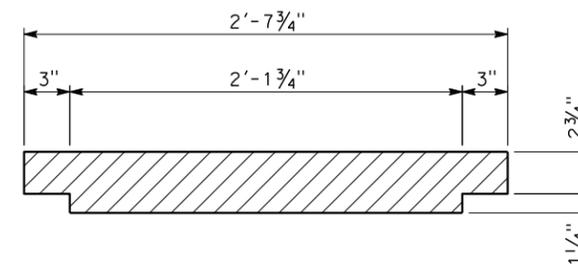
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE CABLE TROUGH DETAIL IS FOR STANDARD TWO TRACK. FOR CABLE TROUGH INFORMATION IN SPECIAL TRACK AREA, THE CONTRACTOR SHALL COORDINATE WITH THE INTERFACED TRACK WORK DESIGNER FOR DETAILED INFORMATION.



DETAIL 1
SCALE: 1/2"=1'-0"

	NON-BALLASTED TRACK		BALLASTED TRACK	
	TWO TRACK	ONE TRACK	TWO TRACK	ONE TRACK
A	3'-1/2"	3'-3 3/16"	3'-3 1/2" + T*	3'-6 3/16" + T*
B	2'-11 1/8"	3'-2 1/4"	2'-2 1/8" + T*	3'-5 1/4" + T*

T* = SUM OF WATERPROOFING MEMBRANE THICKNESS AND PROTECTION LAYER THICKNESS



SECTION B
SCALE: 1/2"=1'-0"

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
DRAWN BY
V. HUANTE
CHECKED BY
K. PUGASAP
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014

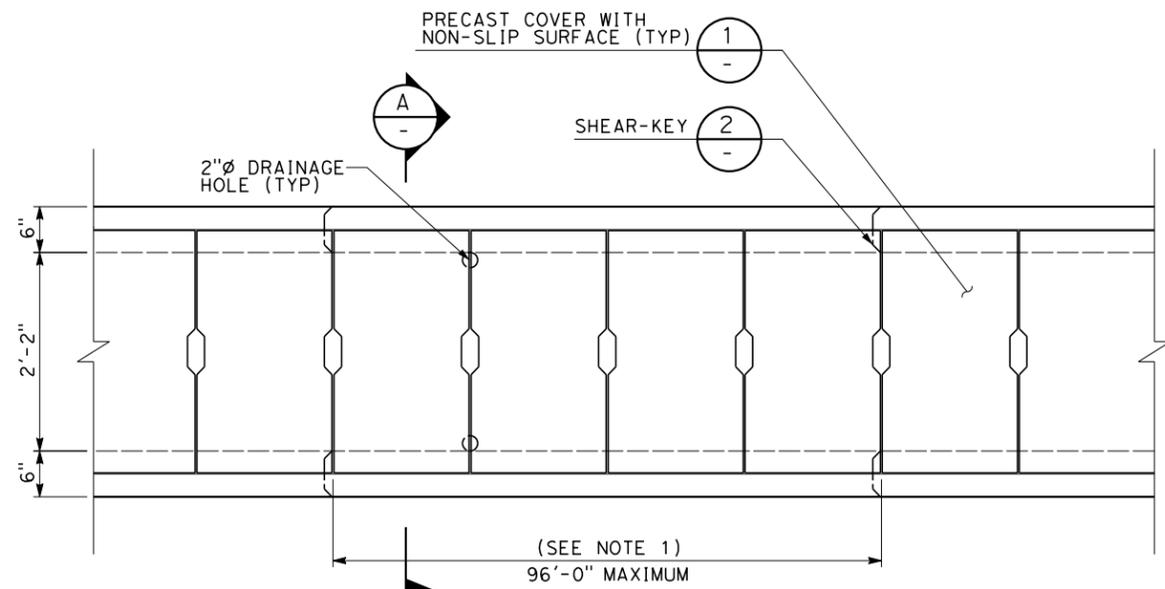


CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

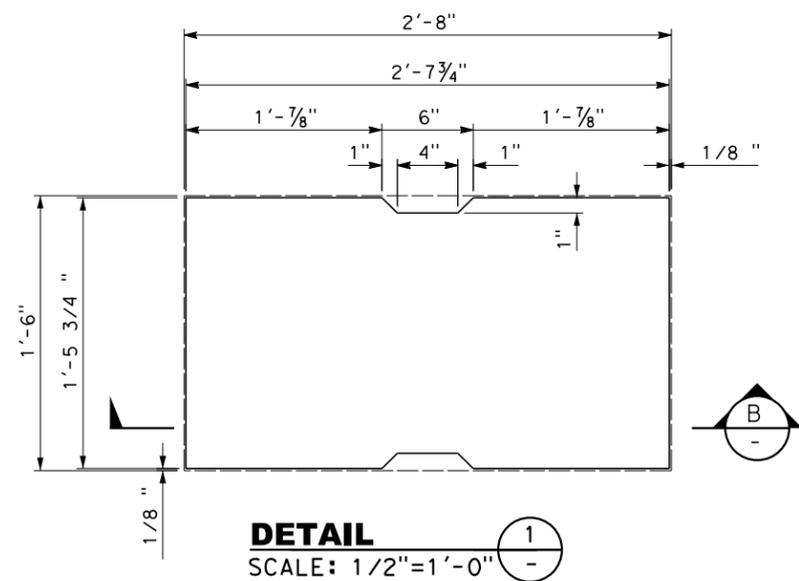
AERIAL STRUCTURE
TYPICAL CABLE TROUGH DETAILS

CONTRACT NO.
DRAWING NO.
DD-ST-900
SCALE
AS SHOWN
SHEET NO.

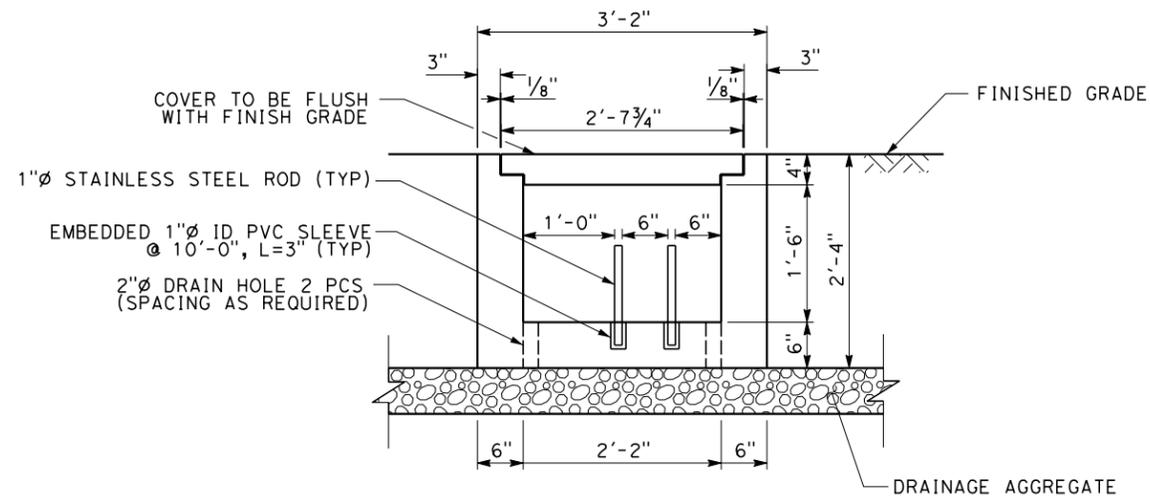
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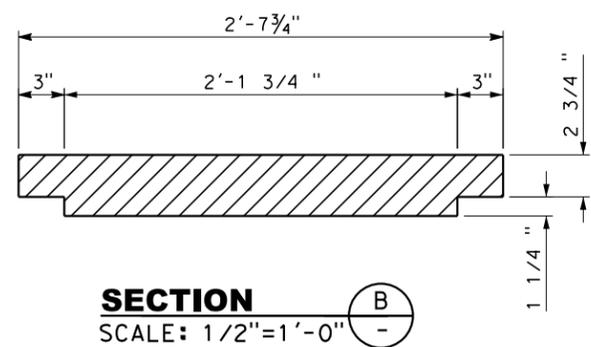
PRECAST CABLE TROUGH PLAN
SCALE: 1"=1'-0"



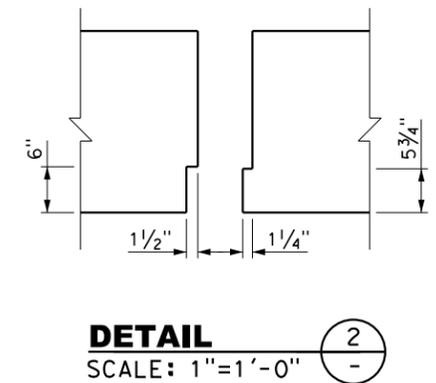
DETAIL 1
SCALE: 1/2"=1'-0"



SECTION A-A
SCALE: 1"=1'-0"



SECTION B-B
SCALE: 1/2"=1'-0"



DETAIL 2
SCALE: 1"=1'-0"

NOTES:
1. CONTRACTOR SHALL DETERMINE WORK SEGMENT LENGTH BASED ON CONSTRUCTION METHOD.

RFP No.: HSR 14-32 - REVIEW DRAFT

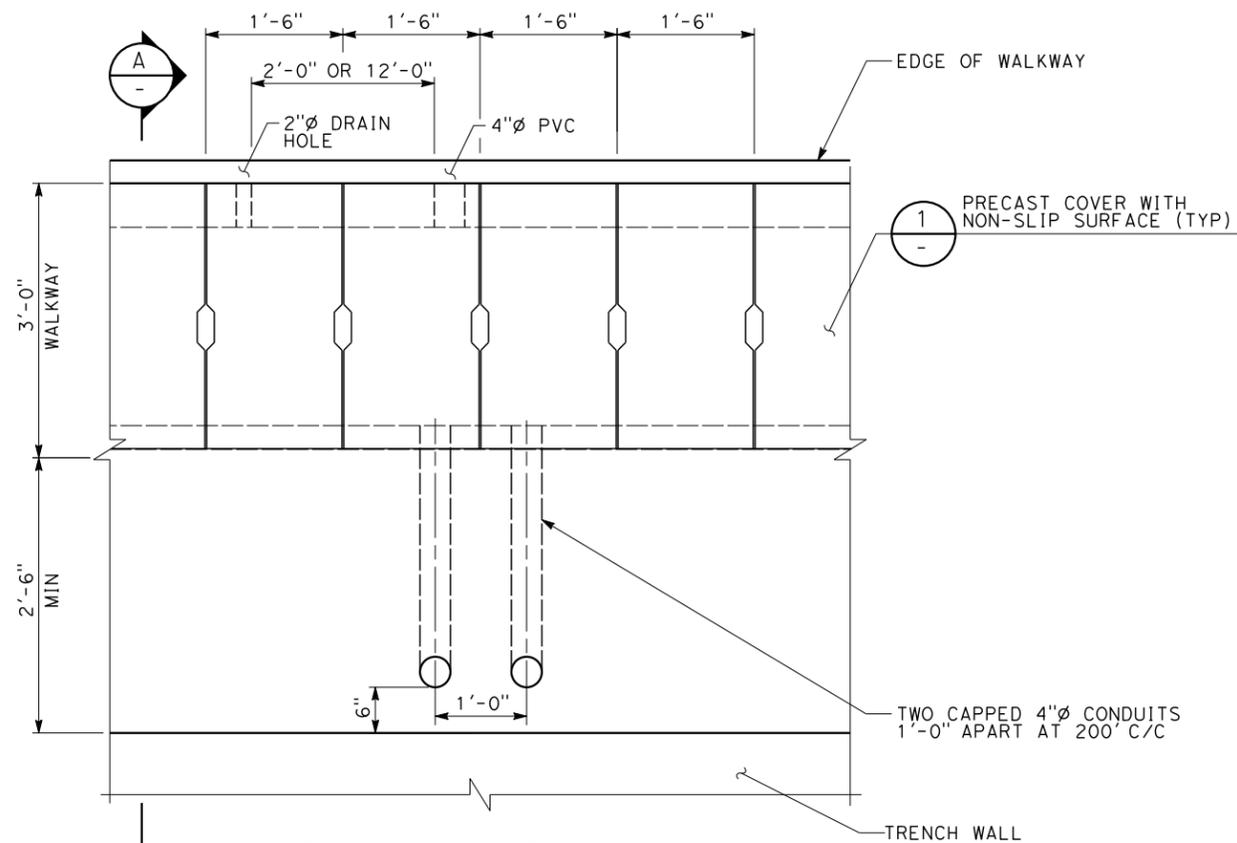
REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
B. VALENTI
DRAWN BY
V. LAVERDE
CHECKED BY
P. LIN
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014



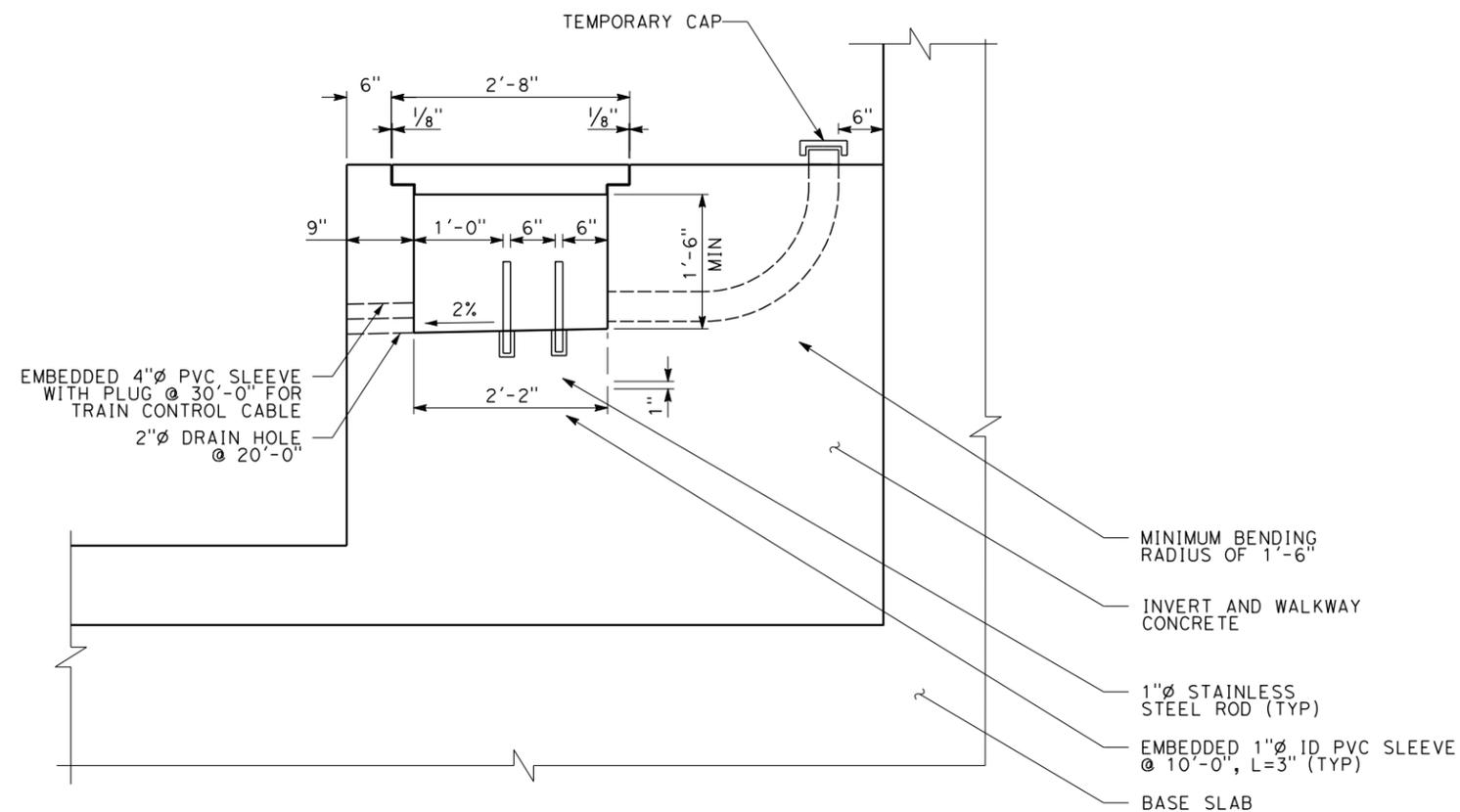
CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE
TYPICAL CABLE TROUGH DETAILS
EMBANKMENT/CUT

CONTRACT NO.
DRAWING NO.
DD-ST-901
SCALE
AS SHOWN
SHEET NO.



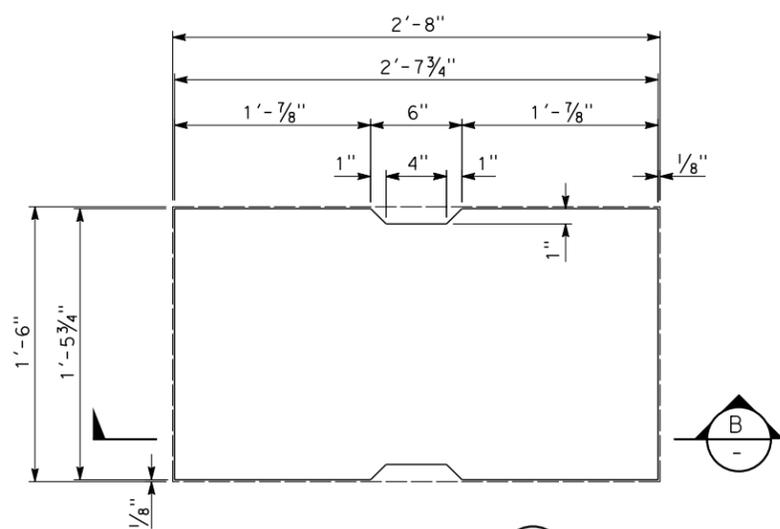
CABLE TROUGH PLAN AND CONDUIT DETAIL

SCALE: 1"=1'-0"



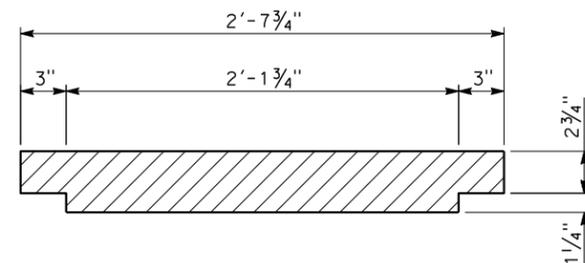
SECTION A

SCALE: 1"=1'-0"



DETAIL 1

SCALE: 1/2"=1'-0"



SECTION B

SCALE: 1/2"=1'-0"

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. VALENTI
DRAWN BY V. HUANTE
CHECKED BY P. LIN
IN CHARGE J. CHIRCO
DATE 01/24/2014

PARSONS BRINCKERHOFF

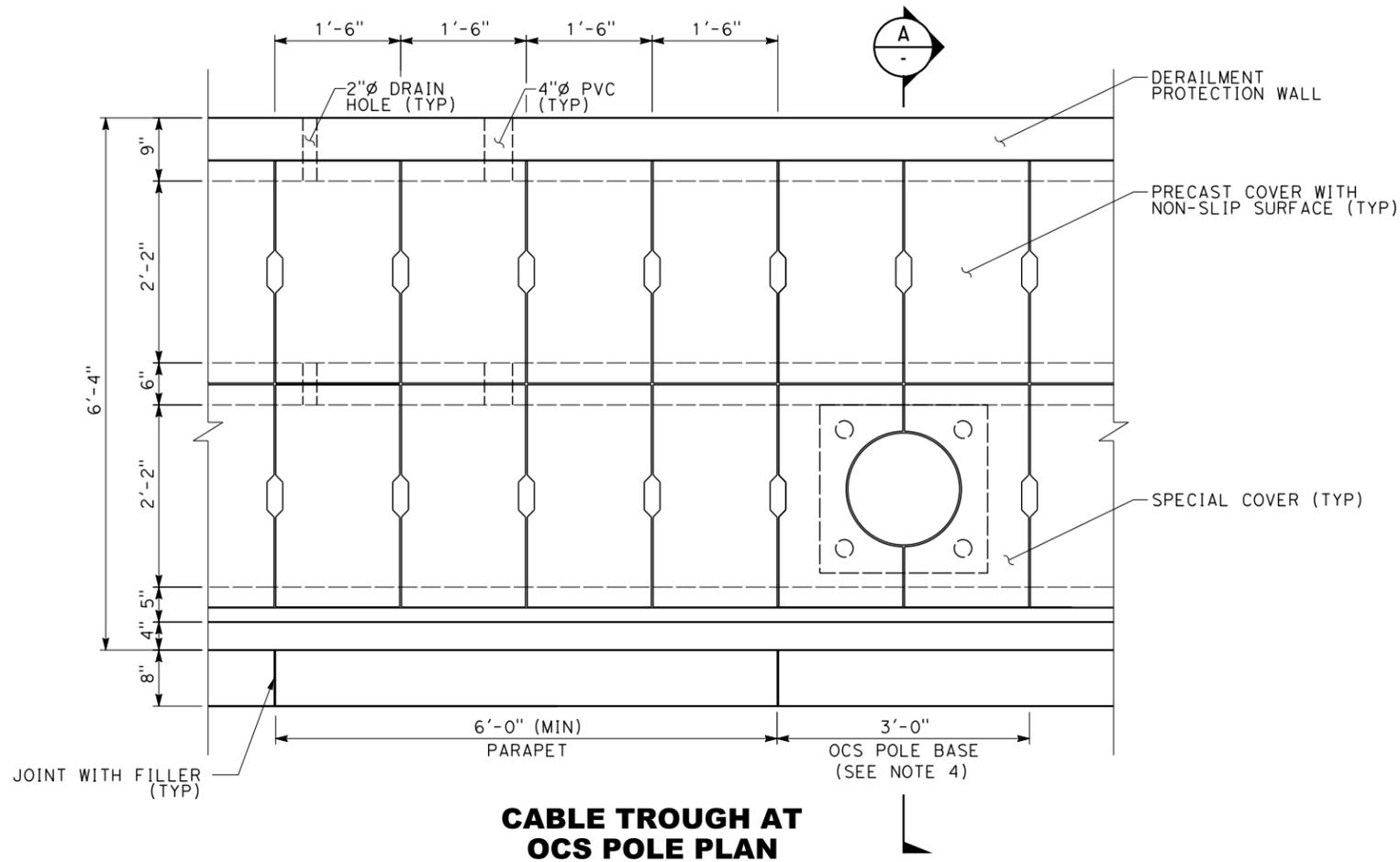
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

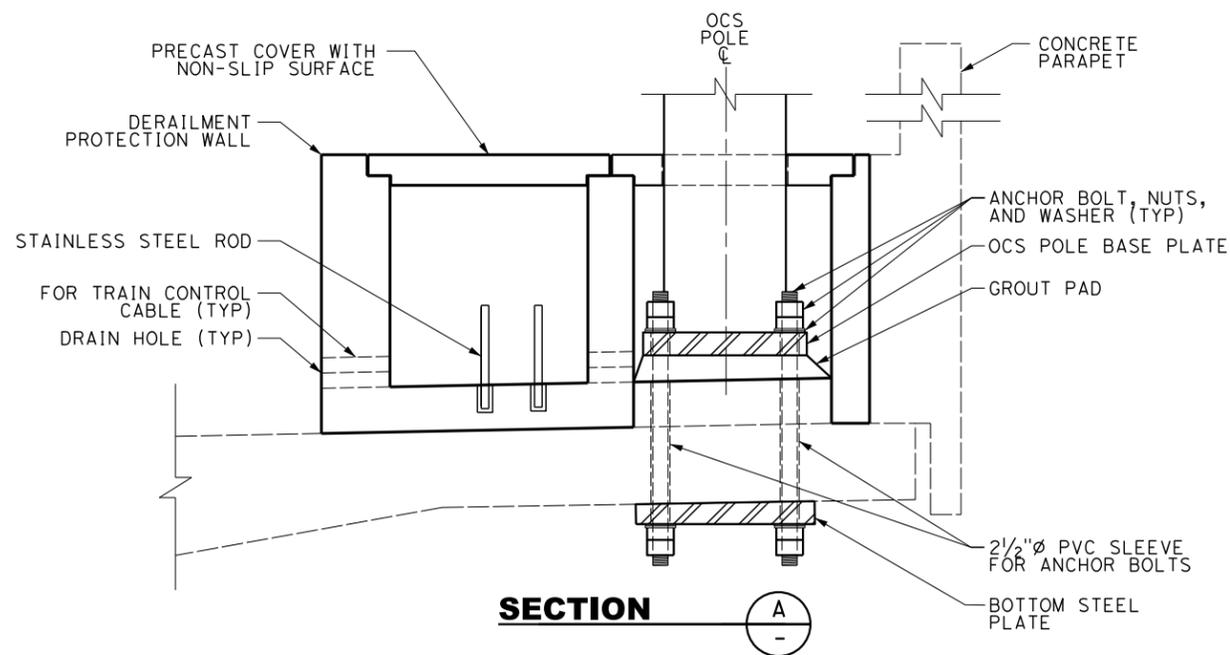
CABLE TROUGH DETAILS
TRENCH/CUT AND COVER TUNNEL

CONTRACT NO.
DRAWING NO. DD-ST-902
SCALE AS SHOWN
SHEET NO.

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CABLE TROUGH AT OCS POLE PLAN



SECTION



NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR PRECAST COVER DETAIL, SEE DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS".
3. SEE STRUCTURAL DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS" FOR DIMENSIONS NOT SHOWN.
4. OCS POLE, ANCHOR BOLT ASSEMBLIES, BASE PLATES, AND GROUT PAD FOR OCS POLE FOUNDATION ARE SHOWN FOR ILLUSTRATION ONLY. THE LOCATION OF EMBEDDED PVC SLEEVES AND LOADS FOR DESIGN OF OCS POLE FOUNDATION SHALL CONFORM TO THE REQUIREMENTS IN THE STRUCTURAL CHAPTER OF THE DESIGN CRITERIA.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
 DRAWN BY
V. HUANTE
 CHECKED BY
K. PUGASAP
 IN CHARGE
G. LUSHEROVICH
 DATE
01/24/2014

**PARSONS
BRINCKERHOFF**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

AERIAL STRUCTURE
CABLE TROUGH DETAILS
AT OCS POLE

CONTRACT NO.
DRAWING NO. DD-ST-903
SCALE AS SHOWN
SHEET NO.

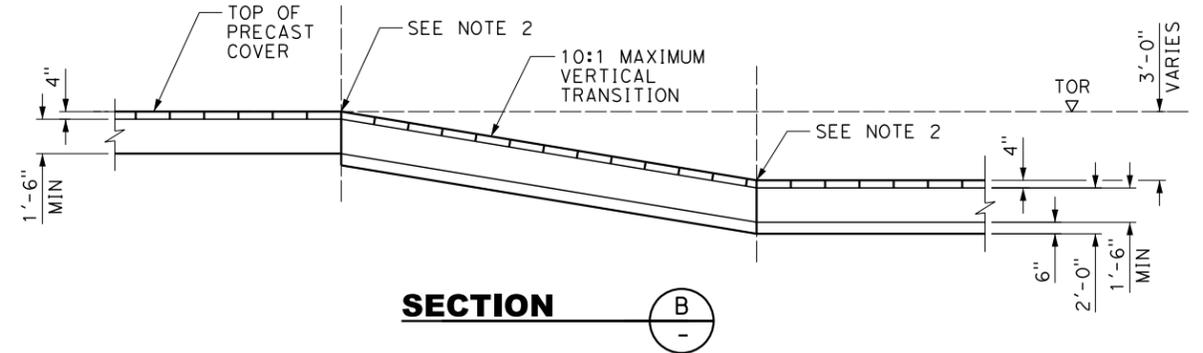
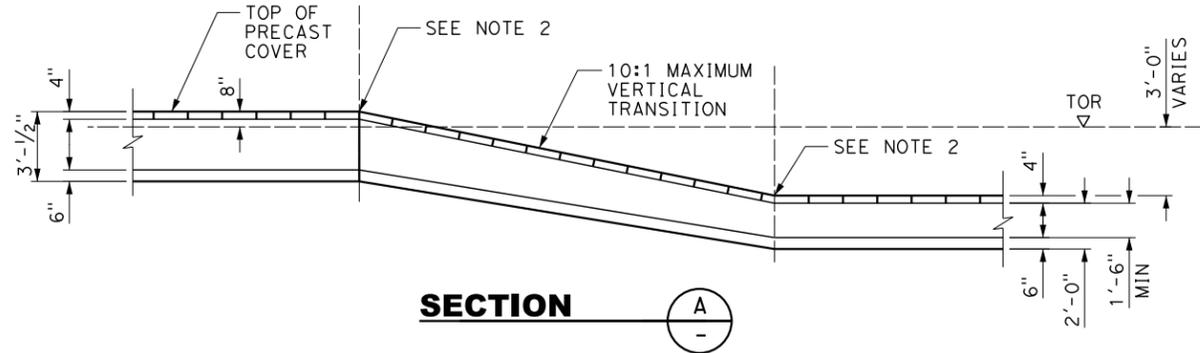
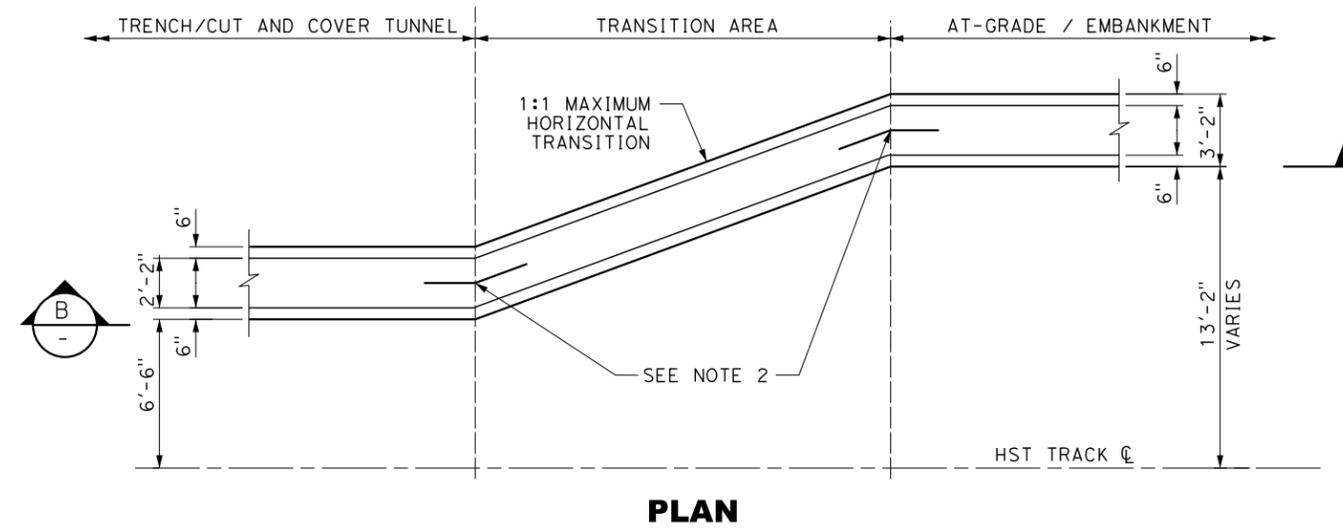
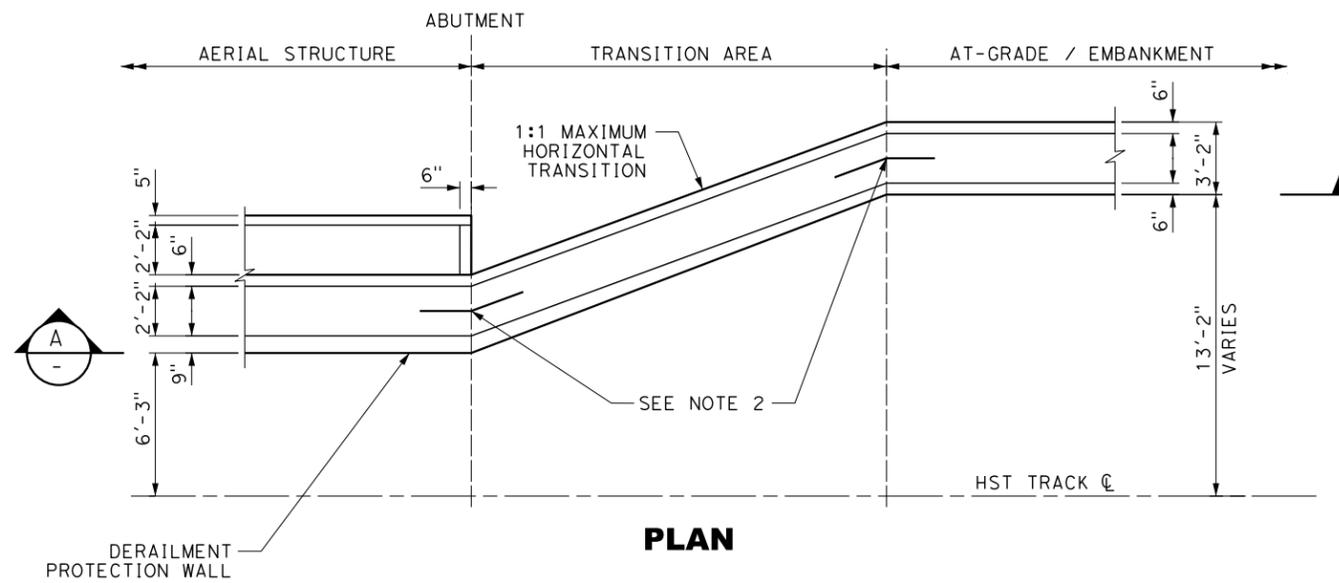
RFP No.: HSR 14-32 - REVIEW DRAFT

RFP No: HSR 14-32 - REVIEW DRAFT

3/30/2014 11:41:40 AM CAHSRP.tbl CHSR_half_black.plt

NOTES:

- BOTH HORIZONTAL AND VERTICAL TRANSITION OF THE CABLE TROUGH SHALL OCCUR WITHIN THE LONGITUDINAL STRUCTURAL TRANSITION ZONE.
- SPECIAL TRANSITION TROUGH AND COVER WILL BE REQUIRED AT ANGLE POINTS. MAXIMIZE EXTENT OF STANDARD PIECES.



AERIAL STRUCTURE TO AT-GRADE/EMBANKMENT

TRENCH/CUT AND COVER TUNNEL TO AT-GRADE/EMBANKMENT



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY V. HUANTE
CHECKED BY B. VALENTI
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

CABLE TROUGH LAYOUT TRANSITION AREAS

CONTRACT NO.
DRAWING NO. DD-ST-904
SCALE AS SHOWN
SHEET NO.

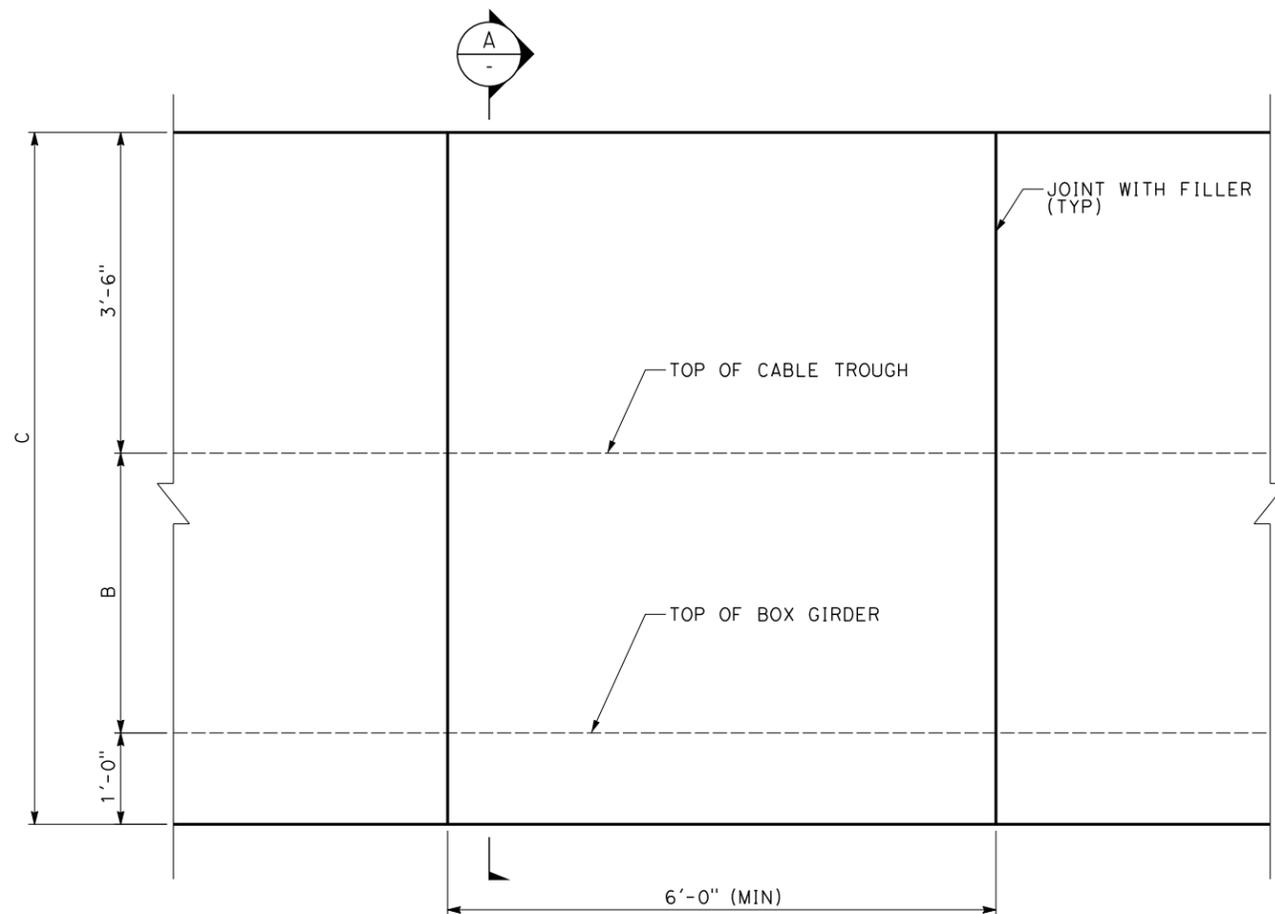
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CHSR_half_black.plt

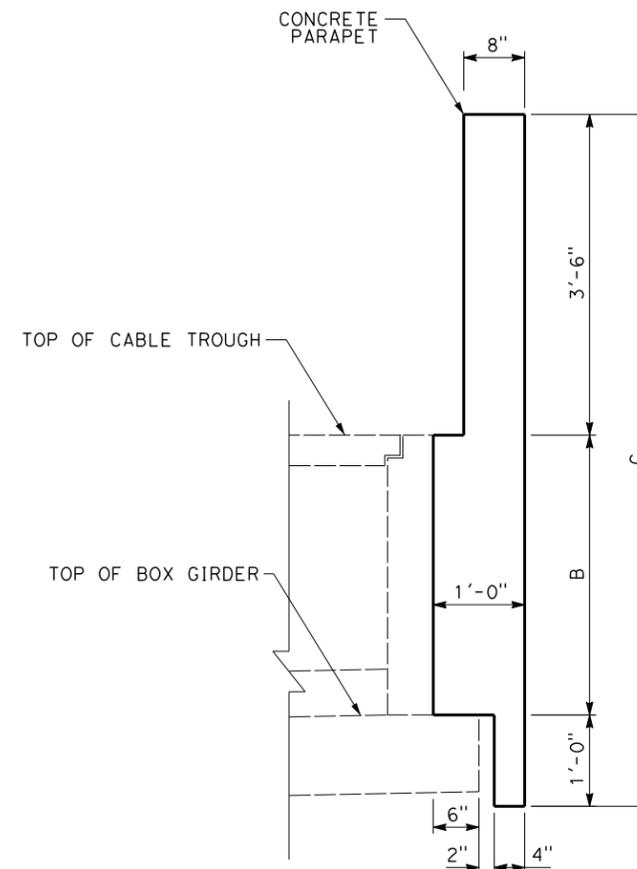
CAHSRP.tbl

3/30/2014 11:42:59 AM

mincio



CONCRETE PARAPET
ELEVATION VIEW



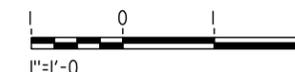
SECTION A-A

NOTES:

1. PARAPETS SHALL BE PROVIDED ALONG EDGES OF AERIAL STRUCTURES, BRIDGES, AND HST GRADE SEPARATIONS.
2. PARAPETS SHALL BE DESIGNED FOR WIND LOADS, SLIPSTREAM EFFECTS, AND OTHER LOADS REQUIRED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
3. PARAPETS SHALL BE DESIGNED TO ACCOMMODATE FUTURE INSTALLATION OF SOUND WALLS.
4. AT CONSTRUCTION JOINTS OF CONCRETE PARAPETS, A JOINT WITH FILLER SHALL BE PROVIDED. IN ADDITION, A PARAPET EXPANSION JOINT SHALL BE DESIGNED AND PROVIDED AT EVERY AERIAL STRUCTURE AND BRIDGE EXPANSION JOINT LOCATION. THE INSIDE FACE OF JOINT OPENING SHALL BE COVERED WITH A GALVANIZED STEEL PLATE SECURELY FASTENED TO THE INSIDE FACE OF THE PARAPET ON ONE SIDE OF THE EXPANSION JOINT WITH A LENGTH OF THREE INCHES MORE THAN THE MAXIMUM JOINT MOVEMENT LENGTH.

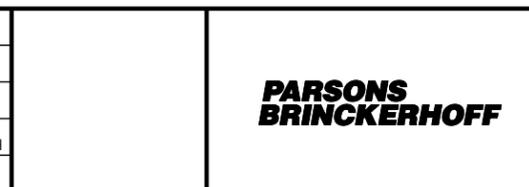
	NON-BALLASTED TRACK		BALLASTED TRACK	
	TWO TRACK	ONE TRACK	TWO TRACK	ONE TRACK
B	2'-11 ¹ / ₈ "	3'-2 ¹ / ₄ "	3'-2 ¹ / ₈ " + T*	3'-5 ¹ / ₄ " + T*
C	7'-5 ⁵ / ₈ "	7'-8 ¹ / ₄ "	7'-8 ⁵ / ₈ " + T*	7'-11 ¹ / ₄ " + T*

T* = SUM OF WATERPROOFING MEMBRANE THICKNESS AND PROTECTION LAYER THICKNESS



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
DRAWN BY
V. HUANTE
CHECKED BY
K. PUGASAP
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014

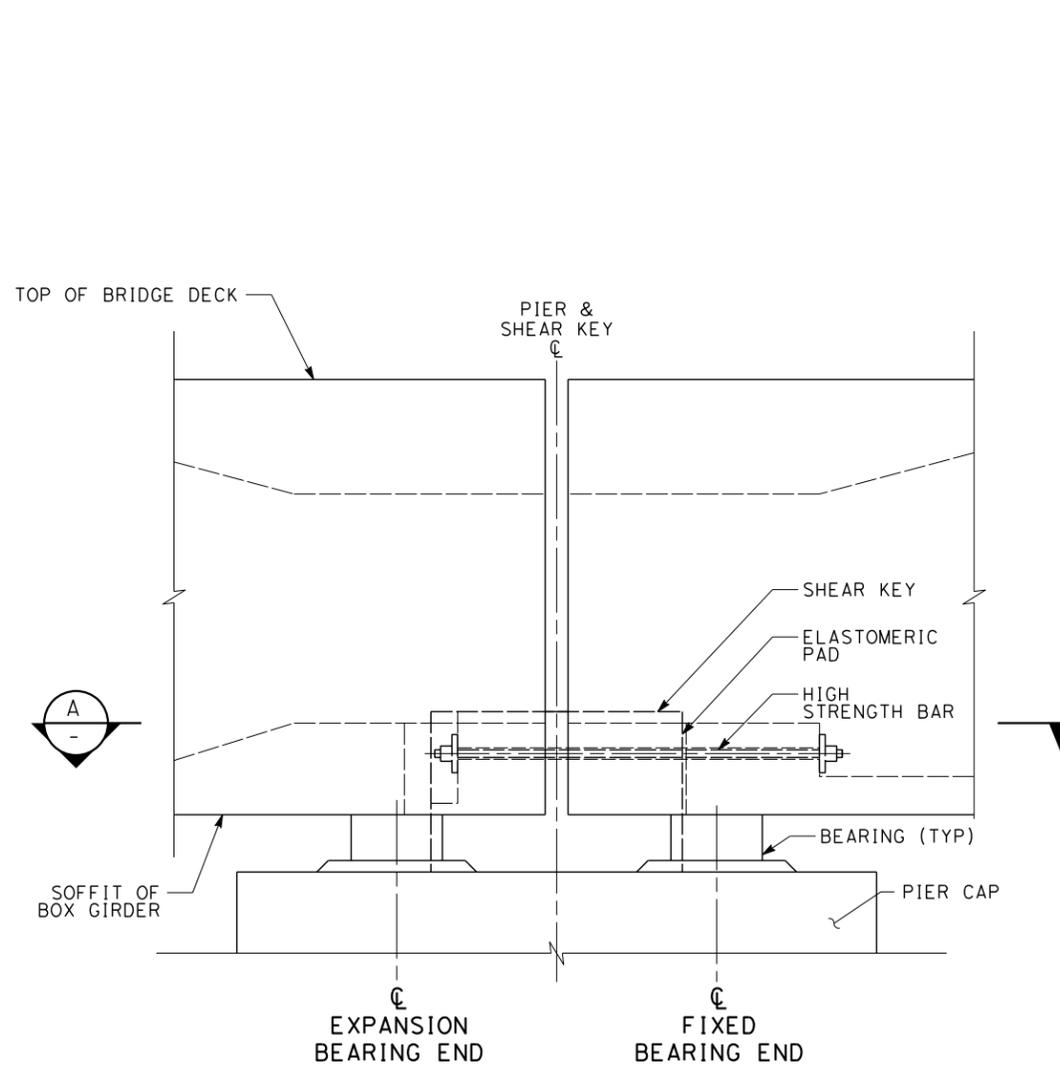


CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

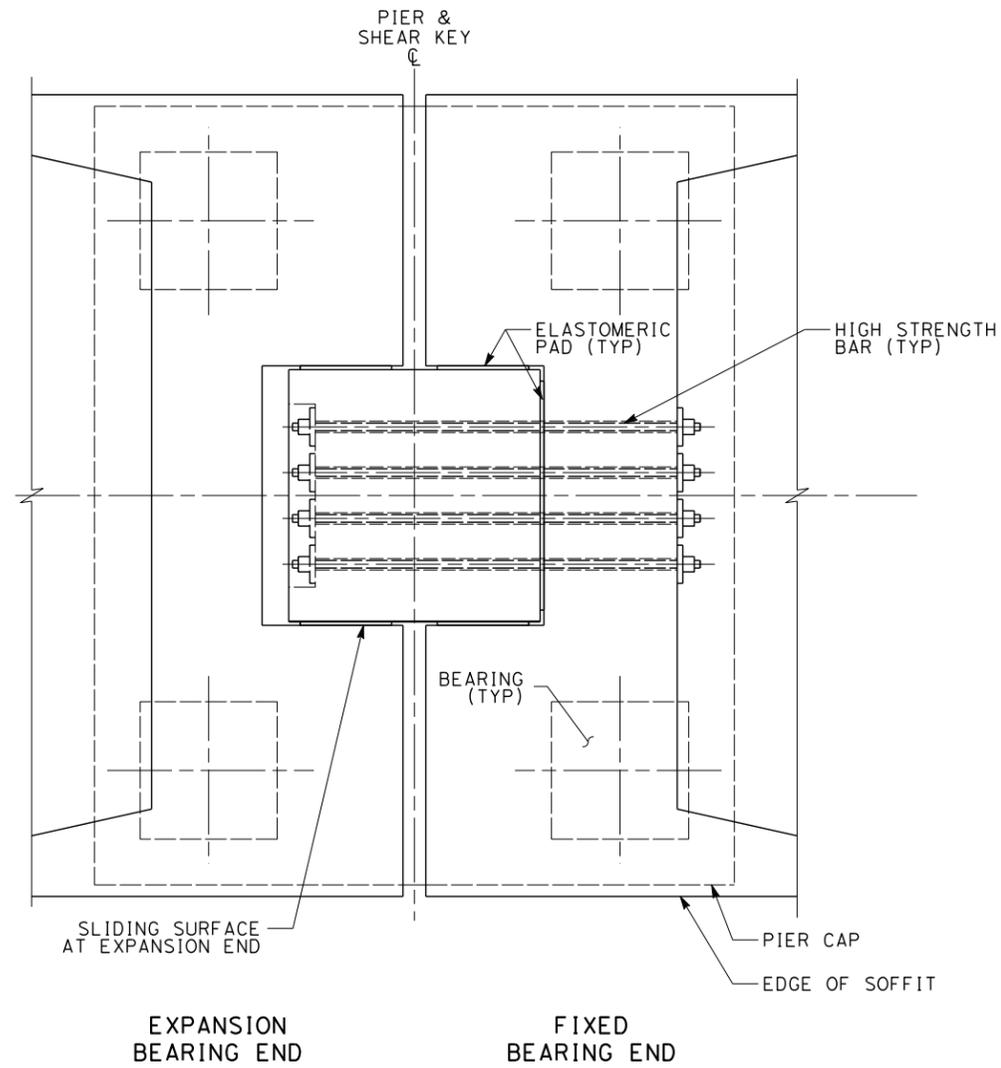
AERIAL STRUCTURE
CONCRETE PARAPET

CONTRACT NO.
DRAWING NO.
DD-ST-910
SCALE
AS SHOWN
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT



ELEVATION
CONCRETE PARAPET NOT SHOWN



SECTION
1/2" = 1'-0"

NOTES:

1. THE SHEAR KEY DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP A SHEAR KEY SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. BEARINGS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. BEARINGS SHALL BE ADJUSTABLE AND REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
3. THE PROCEDURES FOR BEARING REPLACEMENT, INCLUDING THE LOCATIONS OF JACKS AND THE ALLOWED JACKING FORCES SHALL BE SPECIFIED ON THE DRAWINGS.



REV	DATE	BY	CHK	APP	DESCRIPTION

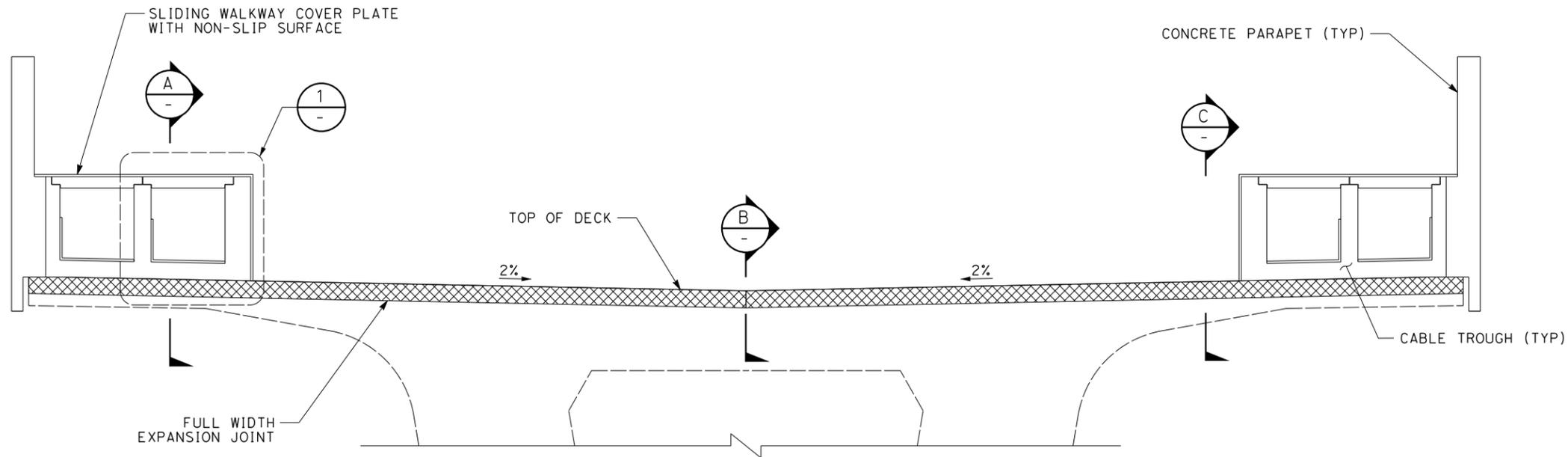
DESIGNED BY P. LIN
DRAWN BY V. HUANTE
CHECKED BY K. PUGASAP
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

AERIAL STRUCTURE
TYPICAL SPAN
SHEAR KEY DETAILS

CONTRACT NO.
DRAWING NO. DD-ST-911
SCALE AS SHOWN
SHEET NO.

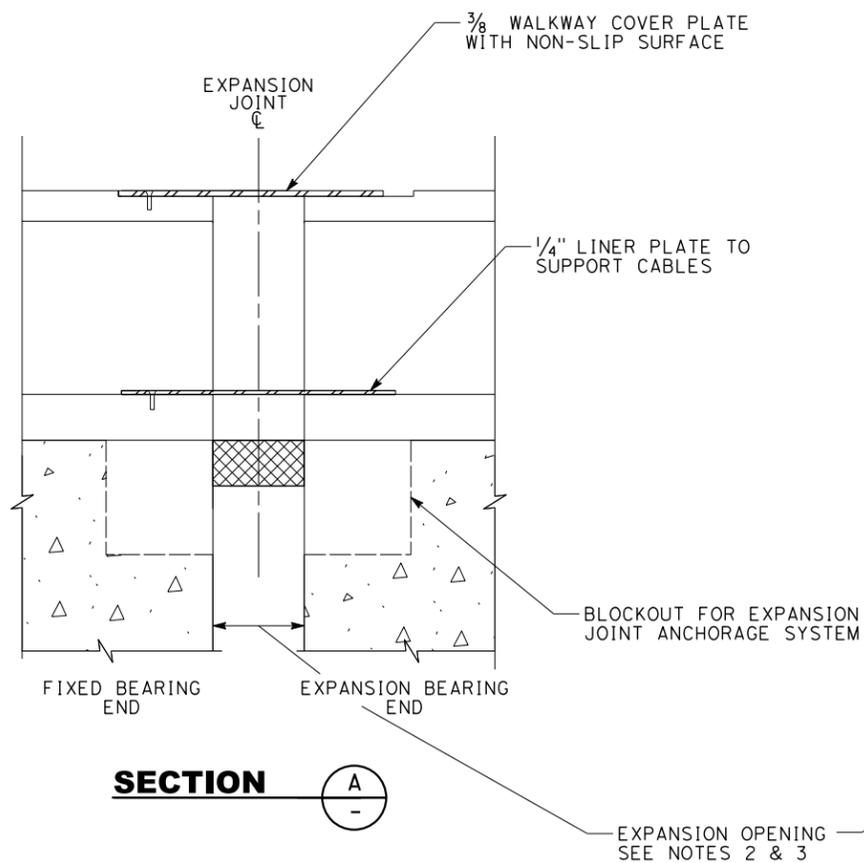
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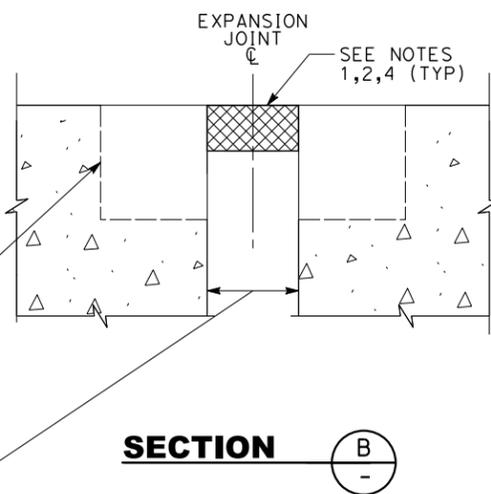
EXPANSION JOINT SECTION

NOTES:

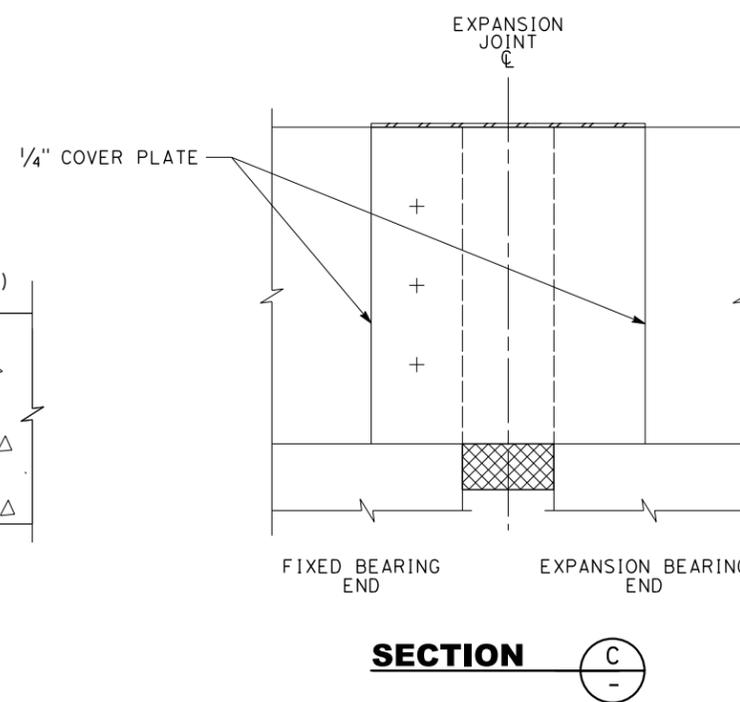
1. THE EXPANSION JOINT DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP AN EXPANSION JOINT SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. THE EXPANSION OPENING BETWEEN THE ENDS OF BRIDGE DECK AND ABUTMENT SHALL ACCOMMODATE THE MOVEMENT RANGE AS SPECIFIED.
3. EXPANSION JOINTS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. EXPANSION JOINTS SHALL BE REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
4. THE EXPANSION JOINT SHALL BE WATERTIGHT.
5. ALL STRUCTURAL STEEL PLATES SHALL BE GALVANIZED.



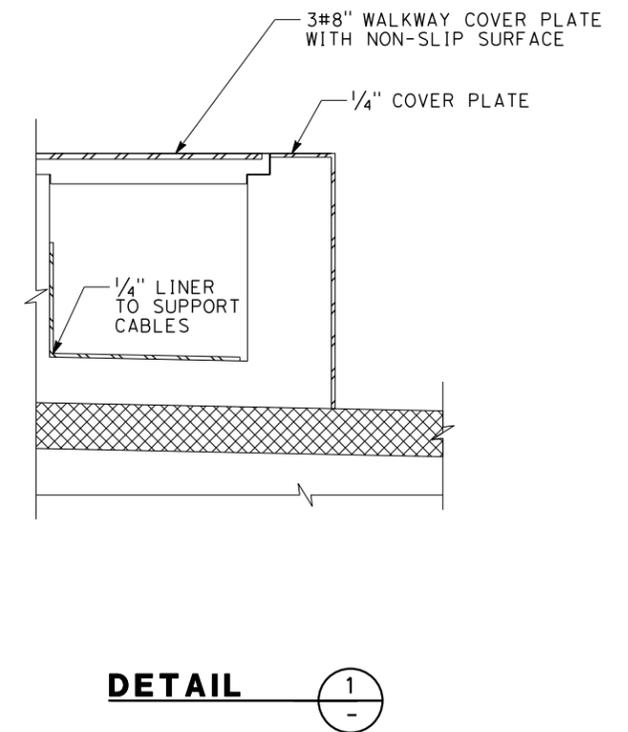
SECTION A



SECTION B



SECTION C



DETAIL 1

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY V. HUANTE
CHECKED BY K. PUGASAP
IN CHARGE G. LUSHEROVICH
DATE 01/24/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE**

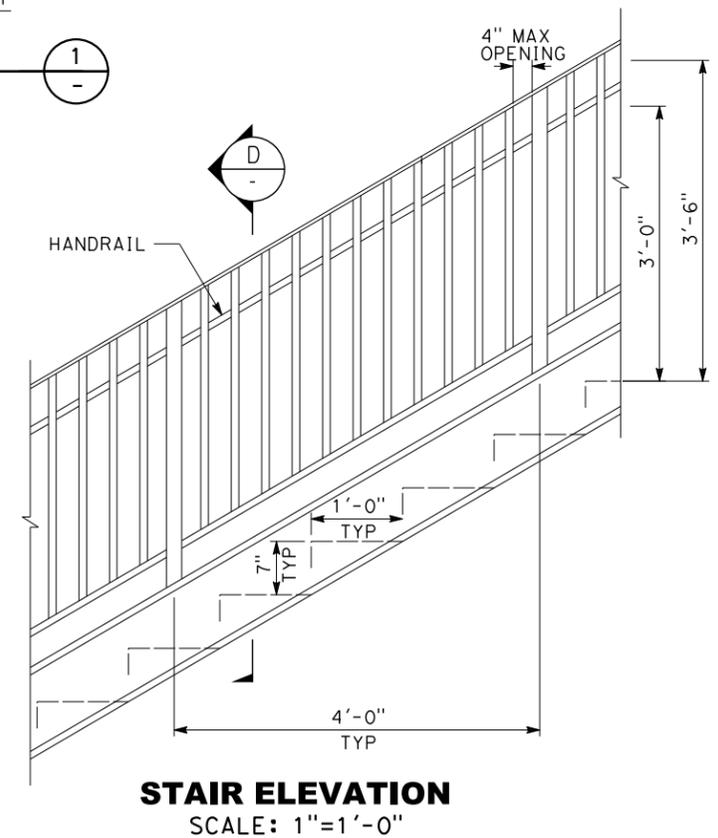
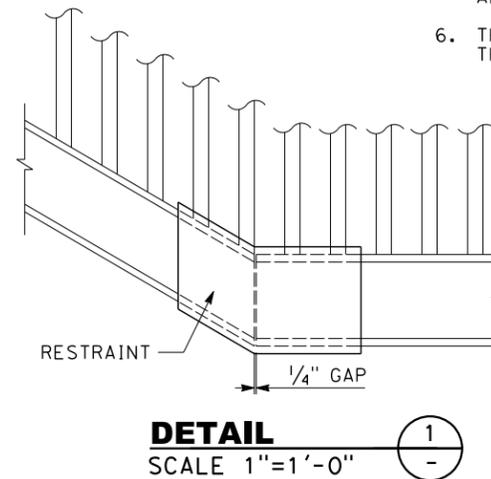
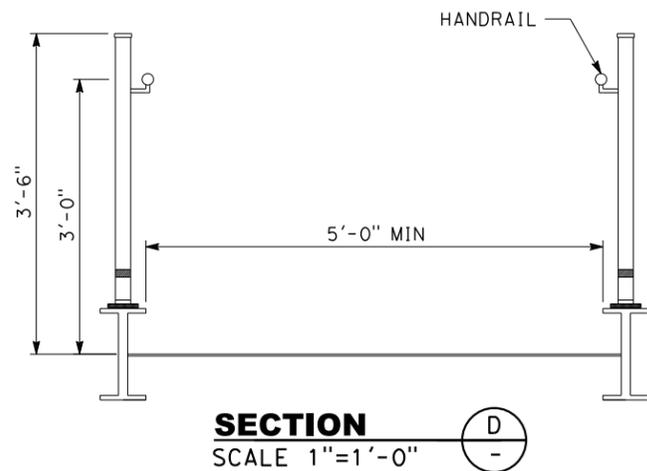
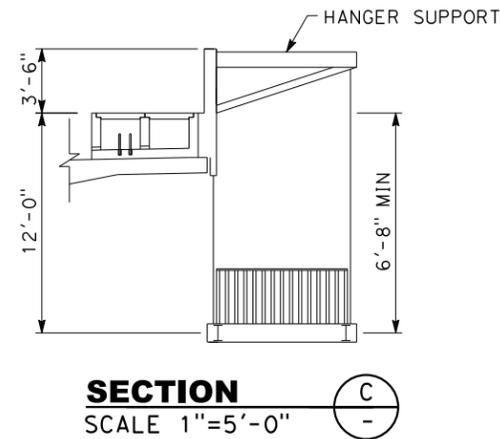
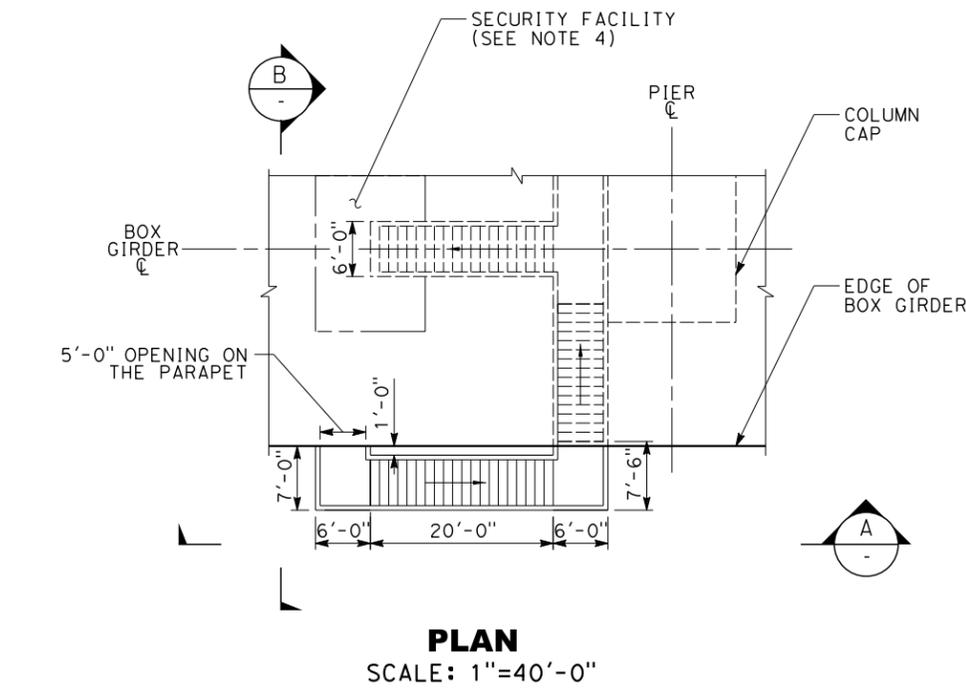
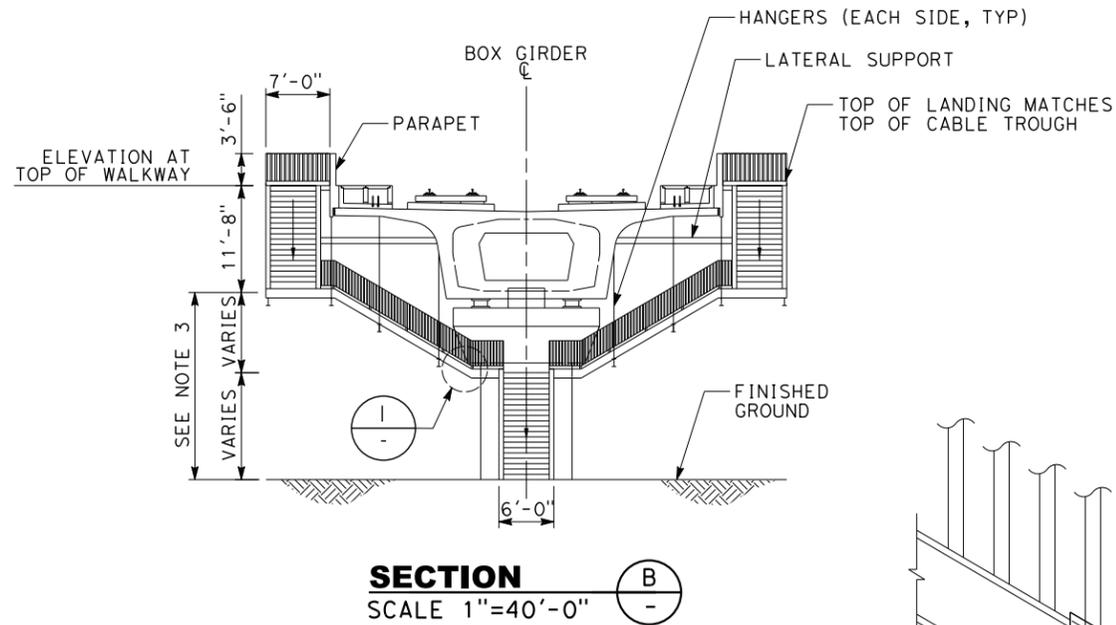
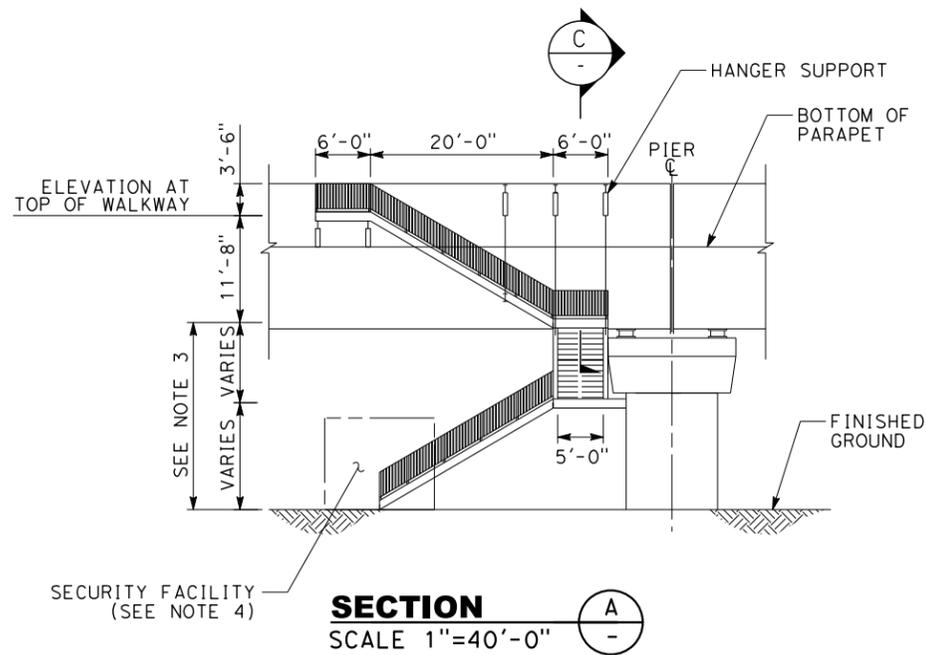
AERIAL STRUCTURE
TYPICAL SPAN
EXPANSION JOINT DETAILS

CONTRACT NO.
DRAWING NO. DD-ST-912
SCALE NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT

RFP No: HSR 14-32 - REVIEW DRAFT

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS MUST BE PROVIDED.
4. THE DESIGN OF THE SECURITY FACILITY SHALL MEET THE REQUIREMENTS OF THE EMERGENCY ACCESS/EGRESS POINTS, AS SPECIFIED IN THE SYSTEM SAFETY AND SECURITY CHAPTER OF THE DESIGN CRITERIA.
5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
DRAWN BY
V. HUANTE
CHECKED BY
K. PUGASAP
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014

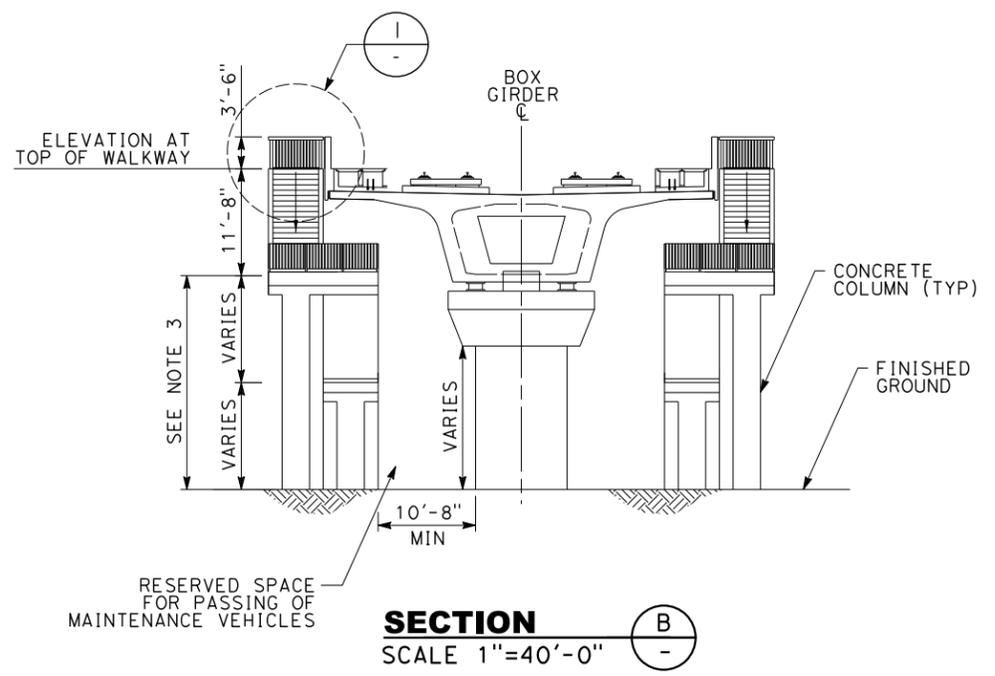
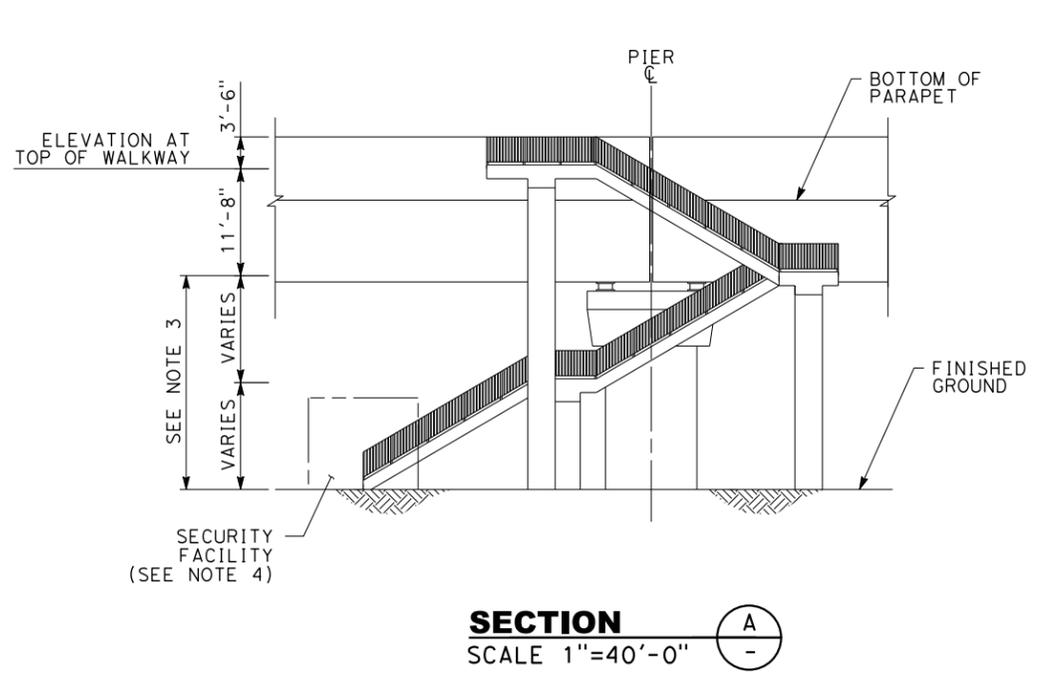


CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

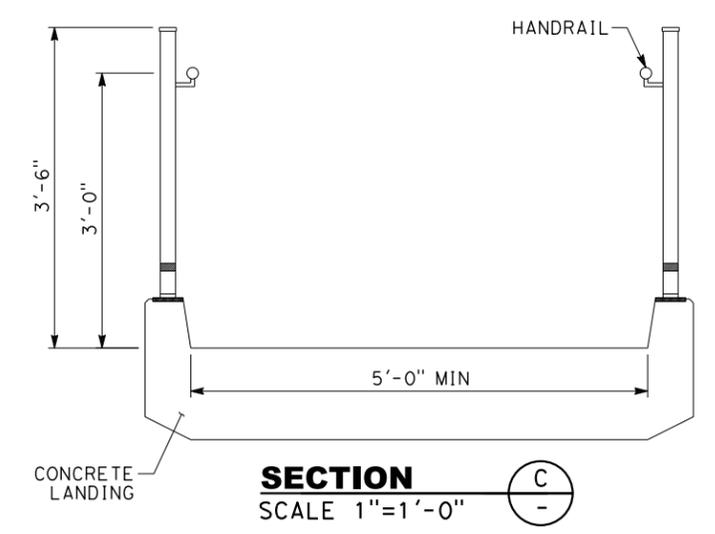
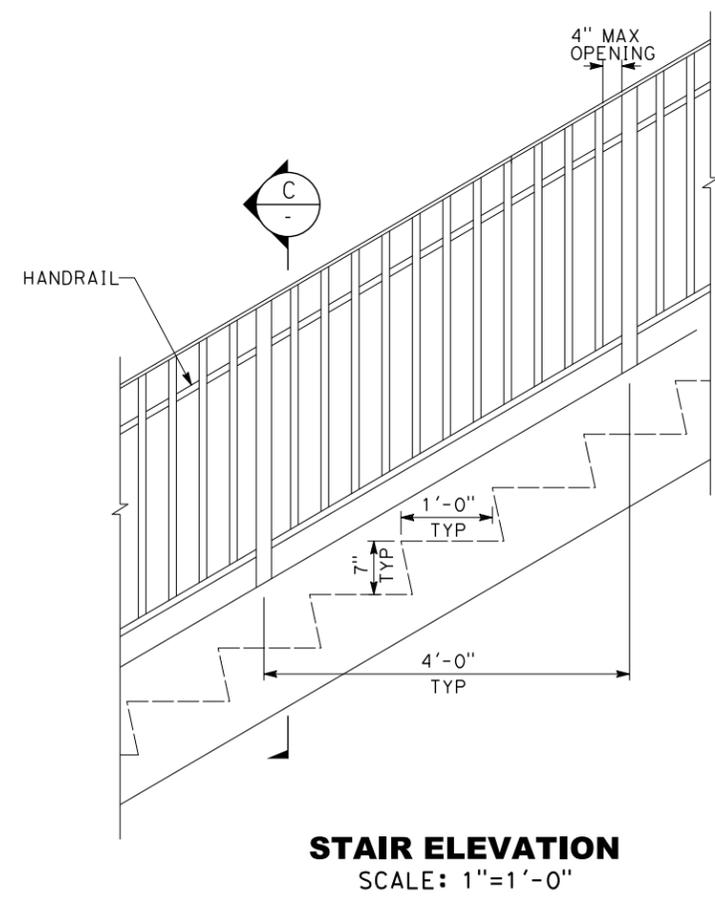
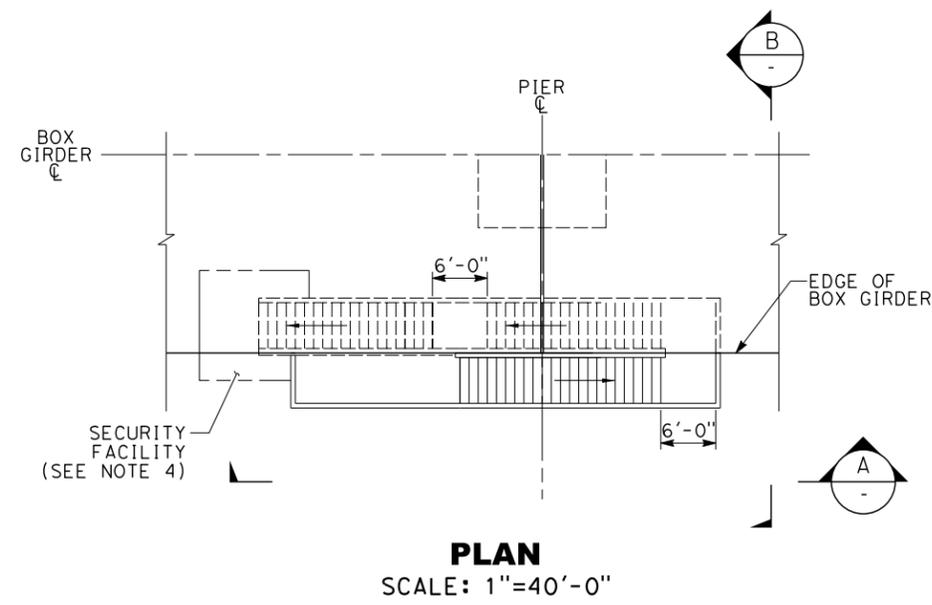
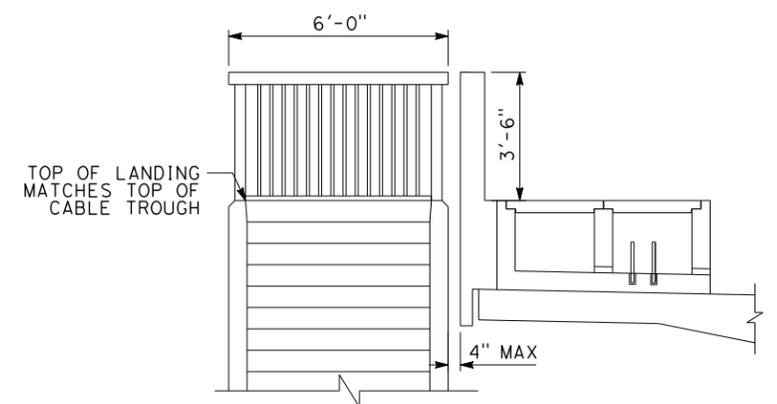
AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 1

CONTRACT NO.
DRAWING NO.
DD-ST-913
SCALE
AS SHOWN
SHEET NO.

3/30/2014 11:51:16 AM CAHSRP.tbl CHSR_half_black.plt c:\projectwise\pb\projectwise\int\mincio\dms32172\DD-ST-914.dgn



- NOTES:**
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
 2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
 3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS SHALL BE PROVIDED.
 4. THE DESIGN OF THE SECURITY FACILITY SHALL MEET THE REQUIREMENTS OF THE EMERGENCY ACCESS/EGRESS POINTS, AS SPECIFIED IN THE SYSTEM SAFETY AND SECURITY CHAPTER OF THE DESIGN CRITERIA.
 5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
 6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.



RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
P. LIN
DRAWN BY
V. HUANTE
CHECKED BY
K. PUGASAP
IN CHARGE
G. LUSHEROVICH
DATE
01/24/2014



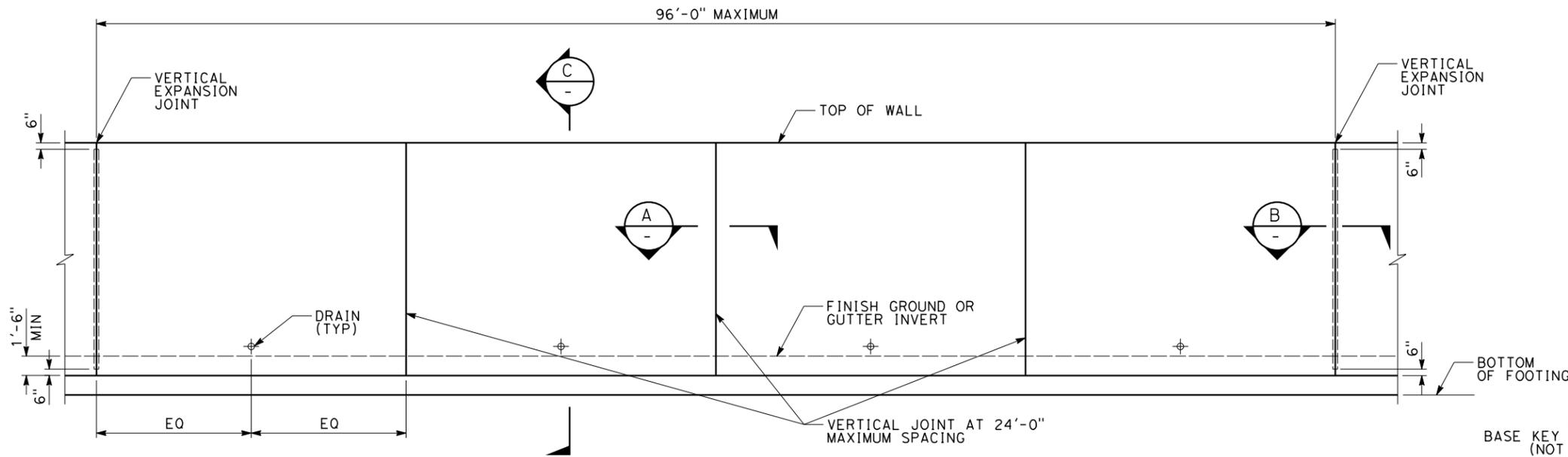
CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 2

CONTRACT NO.
DRAWING NO.
DD-ST-914
SCALE
AS SHOWN
SHEET NO.

RFP NO. HSR 14-32 - REVIEW DRAFT

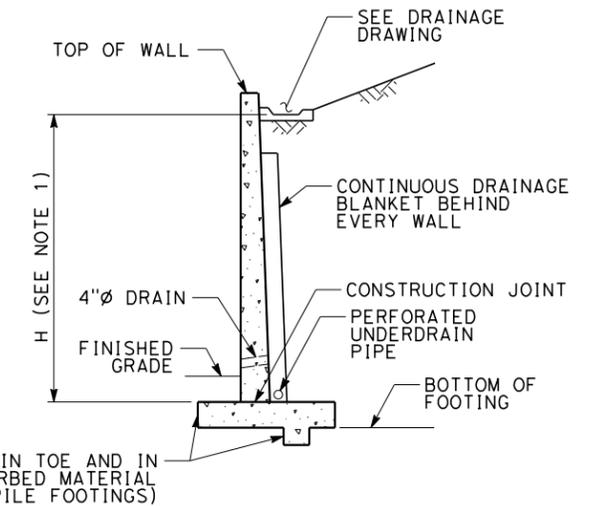
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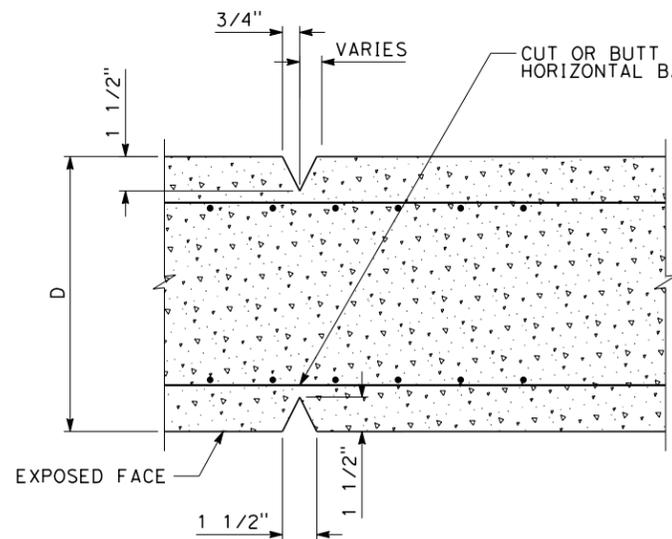
RETAINING WALL ELEVATION

NOTES:

- ELEVATION OF TOP OF WALL AND BOTTOM OF FOOTING SHALL BE AS SHOWN ON OTHER CONTRACT DRAWINGS, VALUES OF H ARE DESIGN HEIGHTS ONLY.
- WALL OFFSET SHALL BE DETERMINED BY THE PROJECT STRUCTURAL ENGINEER IN CONSULTATION WITH THE PROJECT GEOTECHNICAL ENGINEER BASED ON THE CONSTRUCTION METHOD AND SEQUENCING AND IN ACCORDANCE WITH PROJECT DESIGN CRITERIA.
- WHEN A RETAINING WALL IS USED AS A CUT WALL (INCLUDING TRENCH WALLS) ALL JOINTS INCLUDING THE WEAKENED PLANE JOINTS SHALL CONTAIN A WATER STOP.

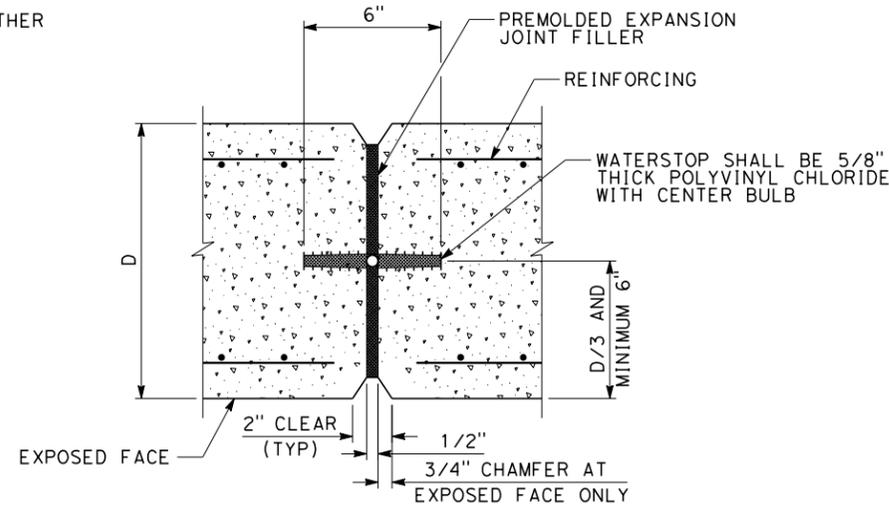


TYPICAL SECTION

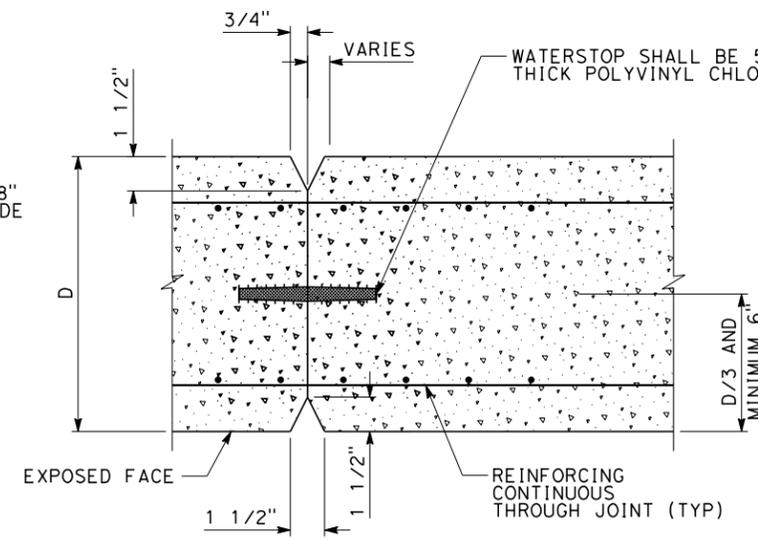


TYPICAL WEAKEND PLANE JOINT

(SEE NOTE 3)

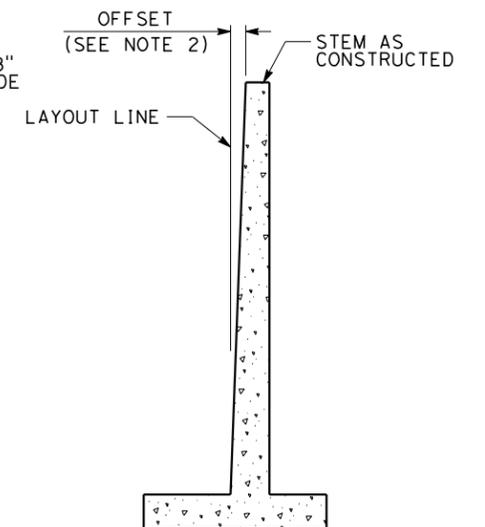


TYPICAL EXPANSION JOINT



TYPICAL CONSTRUCTION JOINT

LOCATE AS REQUIRED TO SUITE CONSTRUCTION SEQUENCE



WALL OFFSET VALUES

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
B. VALENTI
DRAWN BY
V. LAVERDE
CHECKED BY
P. LIN
IN CHARGE
G. LUSHEROVICH
DATE
08/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

RETAINING WALL
LAYOUT AND DETAILS

CONTRACT NO.
DRAWING NO.
DD-ST-920
SCALE
NO SCALE
SHEET NO.

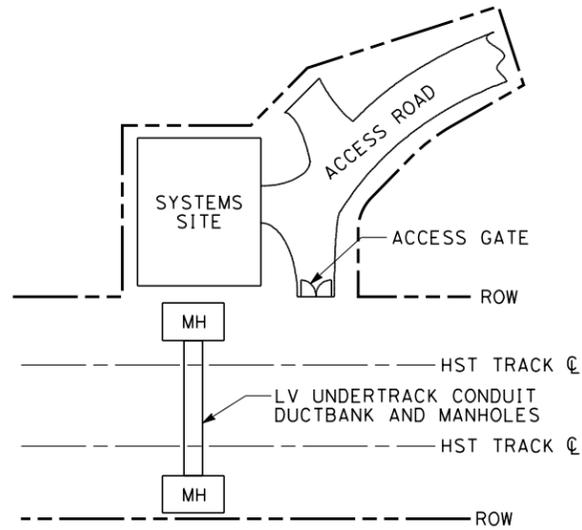


DIAGRAM A
AT-GRADE LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES AT SYSTEMS SITE

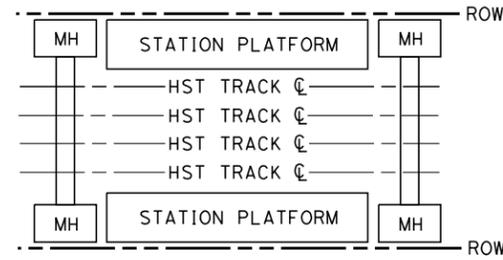


DIAGRAM B
LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK AT STATION PLATFORMS

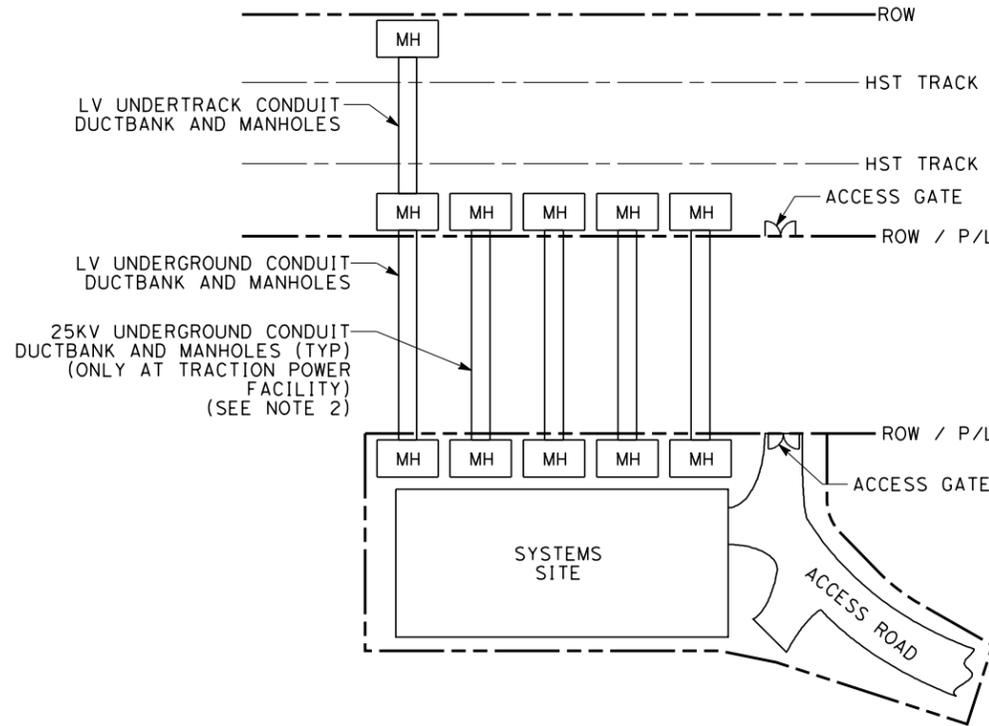


DIAGRAM C
AT-GRADE LOW-VOLTAGE UNDERTRACK AND UNDERGROUND CONDUIT DUCT BANK, 25KV UNDERGROUND CONDUIT DUCT BANK, ACCESS ROADS AND GATES AT SYSTEMS SITE LOCATED AWAY FROM HSR ROW

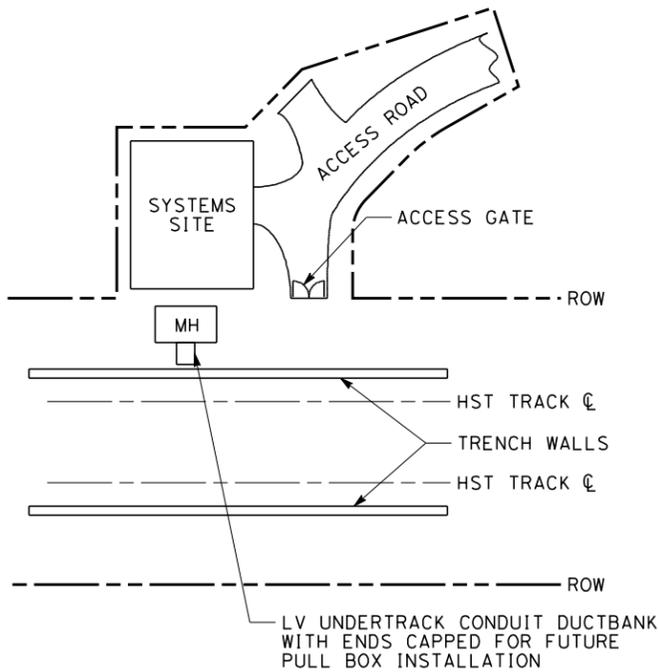


DIAGRAM D
TRENCH LOW-VOLTAGE UNDERTRACK CONDUIT DUCT BANK AND ACCESS ROADS AND GATES AT SYSTEMS SITE

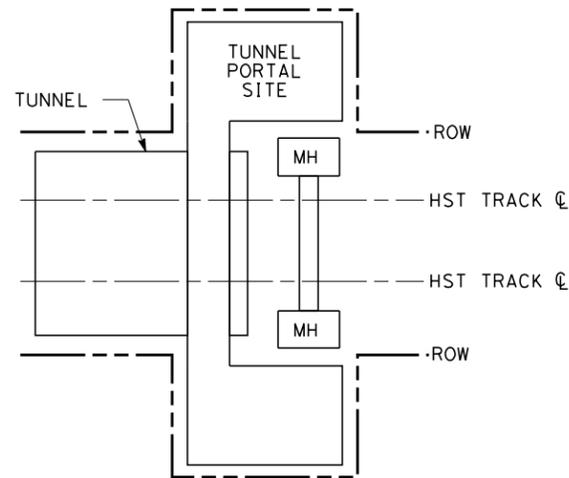


DIAGRAM E
AT-GRADE LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK AT TUNNEL PORTAL SITES

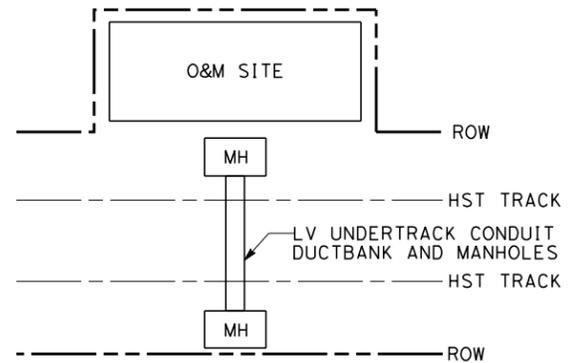


DIAGRAM F
AT-GRADE LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK AT O&M FACILITIES UNDIVIDED

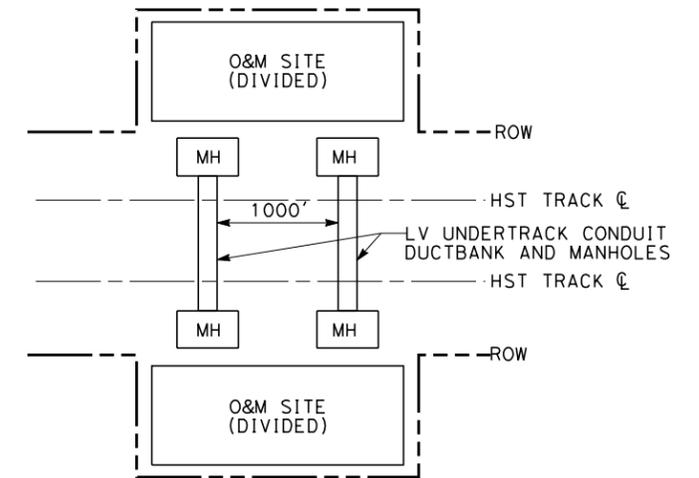


DIAGRAM G
AT-GRADE LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK AT O&M FACILITIES DIVIDED BY MAINLINE TRACK

NOTES:

1. SYSTEM SITES INCLUDE TRACTION POWER FACILITIES, TRAIN CONTROL HOUSES, STANDALONE RADIO SITES.
2. TYPICALLY THERE ARE FOUR 25KV UNDERGROUND CONDUIT DUCTBANKS AND ACCOMPANYING MANHOLES PER TRACTION POWER SITE.
3. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. CONSULT CIVIL DESIGN CRITERIA AND PRELIMINARY DESIGN PLANS FOR REQUIREMENTS AND DETAILS.
4. SEE TRACTION POWER AND COMMUNICATIONS DRAWINGS FOR DUCTBANK, MANHOLE CROSS SECTIONS, DETAILS AND ELEVATIONS.
5. FOR NUMBERS OF CONDUITS SEE COMMUNICATION DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
6. INTERMEDIATE MANHOLES TO BE INCLUDED BASED UPON APPLICABLE STANDARDS, REGULATIONS AND CODES.

11/19/2013 10:24:35 AM CAHSR_PDF_half_black.plt c:\projectwise\pb\projectwise\int\huante\dms32178\DD-SY-010.dgn

DESIGNED BY	B. BANKS
DRAWN BY	V. HUANTE
CHECKED BY	C. DALOIA
IN CHARGE	R. SCHEMDES
DATE	11/19/2013

REV	DATE	BY	CHK	APP	DESCRIPTION
B	TBD				POST CP01 CONFORMED SET
A	05/31/13				EXECUTION VERSION

DESIGNED BY
B. BANKS
DRAWN BY
V. HUANTE
CHECKED BY
C. DALOIA
IN CHARGE
R. SCHEMDES
DATE
11/19/2013



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
SYSTEMS DIRECTIVE**

TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS AT SYSTEM SITES, STATIONS, TUNNEL PORTAL FACILITIES AND O&M FACILITIES

CONTRACT NO.	
DRAWING NO.	DD-SY-010
SCALE	NO SCALE
SHEET NO.	

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
G. SPADAFORE
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



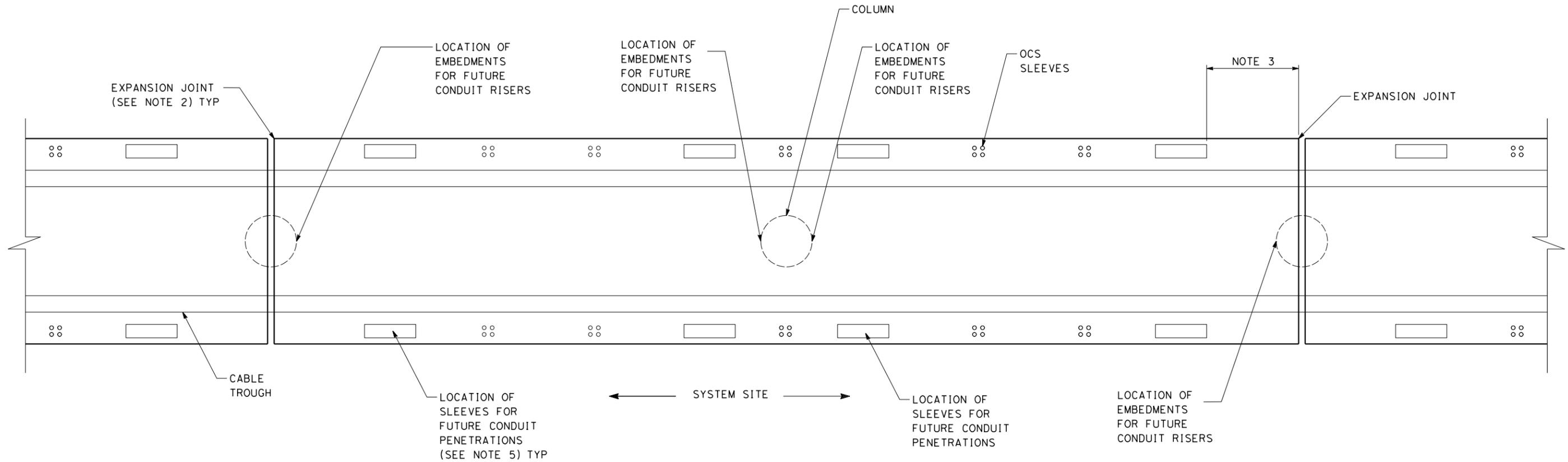
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

SYSTEMS SITE LOCATION AT AERIAL STRUCTURE
EMBEDMENTS AND KNOCKOUTS

CONTRACT NO.
DRAWING NO.
DD-SY-030
SCALE
NO SCALE
SHEET NO.

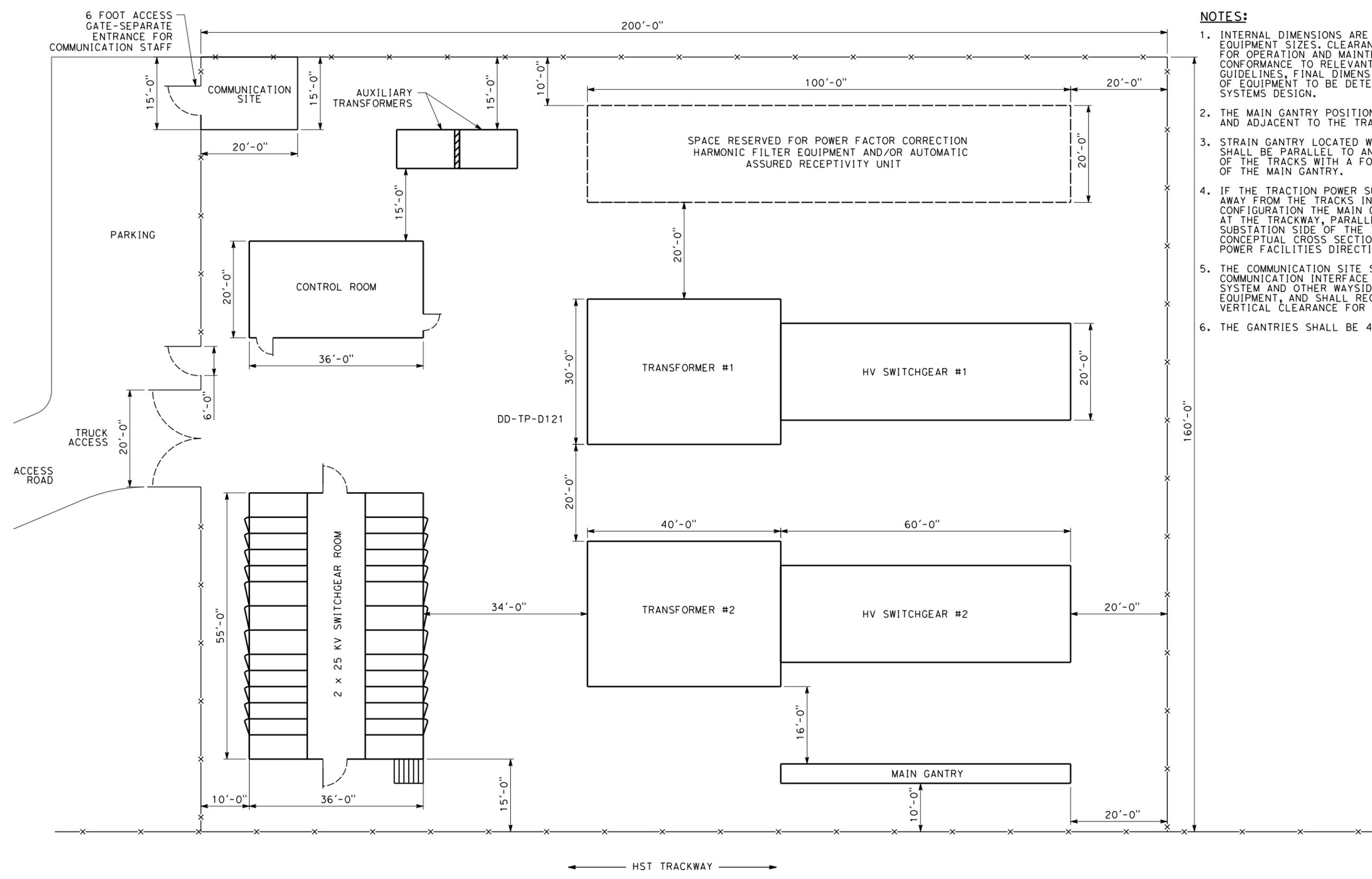
NOTES:

1. STRUCTURAL DESIGN DETAILS, CABLE TROUGH AND OCS SLEEVES SHOWN HERE ARE SCHEMATIC ONLY.
2. SLEEVE PENETRATION LOCATIONS SHALL BE LOCATED NOMINALLY 10³/₃₂ FROM THE EXPANSION JOINT.
3. SLEEVE PENETRATION LOCATIONS FOR FUTURE CONDUIT PENETRATIONS SHALL BE PROVIDED IN LINE WITH THE OCS POLE FOUNDATIONS.
4. FOR EACH SLEEVE PENETRATION, AREA SHALL BE SIZED TO HOUSE 10 TRADE SIZE 4 CONDUITS.
5. FOR CONDUIT RISER EMBEDMENTS AND PENETRATIONS ON AERIAL STRUCTURE REQUIREMENTS, REFER TO STRUCTURES CHAPTER OF THE DESIGN CRITERIA. PENETRATIONS SHALL BE PLACED AT THE NEAREST 3 COLUMNS TO THE SYSTEMS SITE OR FACILITY AS SHOWN.



PLAN

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- NOTES:**
- INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
 - THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKWAY.
 - STRAIN GANTRY LOCATED WITHIN THE RIGHT-OF-WAY, SHALL BE PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH A FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
 - IF THE TRACTION POWER SUBSTATION IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRABLE CONFIGURATION THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS SUBSTATION SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES DIRECTIVE DRAWINGS.
 - THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE MINIMUM 100' VERTICAL CLEARANCE FOR RADIO TOWER.
 - THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

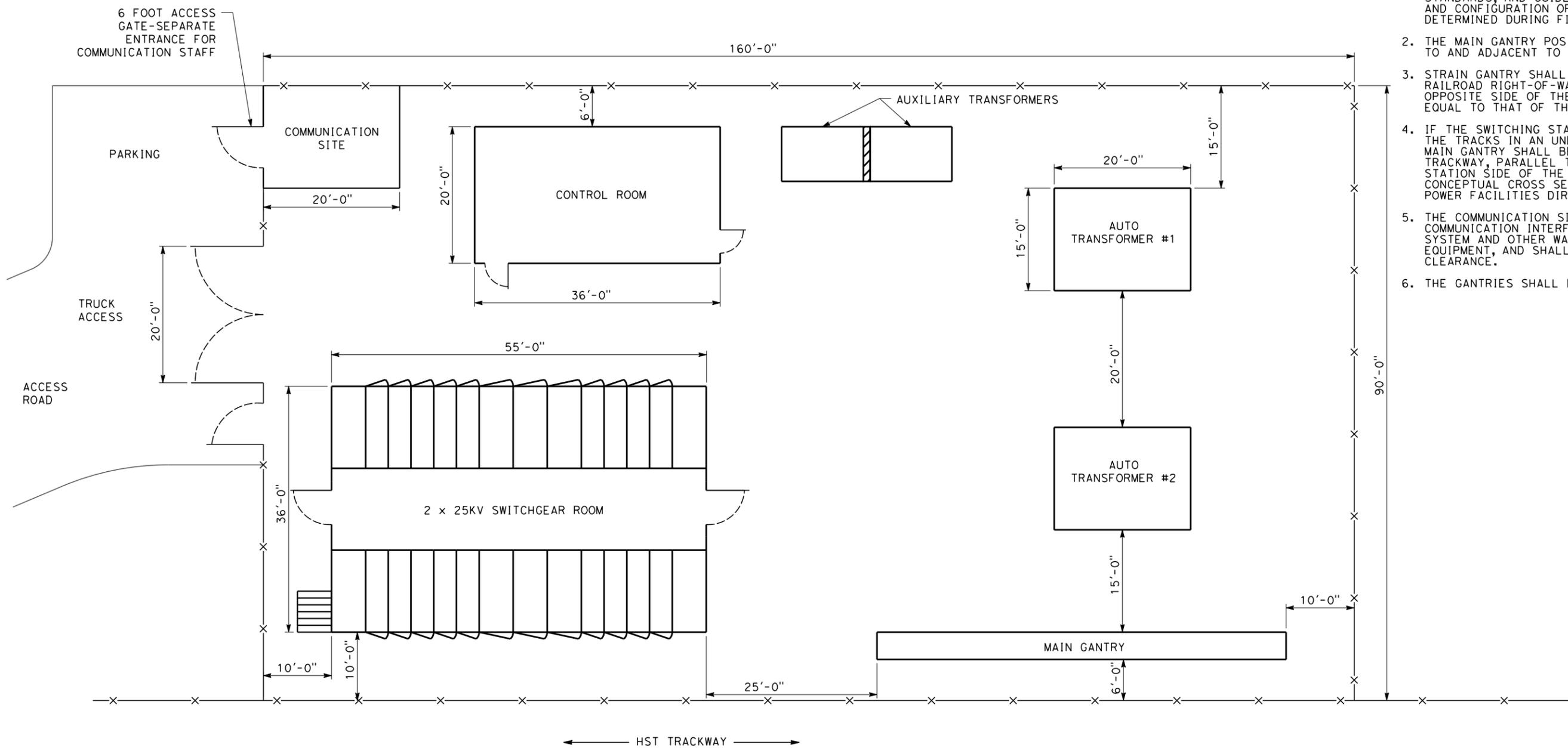
CONCEPTUAL LAYOUT
TRACTION POWER SUBSTATION
WITH TWO HIGH-VOLTAGE TRANSFORMERS

CONTRACT NO.
DRAWING NO.
DD-TP-D101
SCALE
NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT

RFP No: HSR 14-32 - REVIEW DRAFT

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- NOTES:**
- INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
 - THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKS.
 - STRAIN GANTRY SHALL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY, PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH A FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
 - IF THE SWITCHING STATION IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRABLE CONFIGURATION, THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS SWITCH STATION SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES DIRECTIVE DRAWINGS.
 - THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE 100' VERTICAL CLEARANCE.
 - THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014

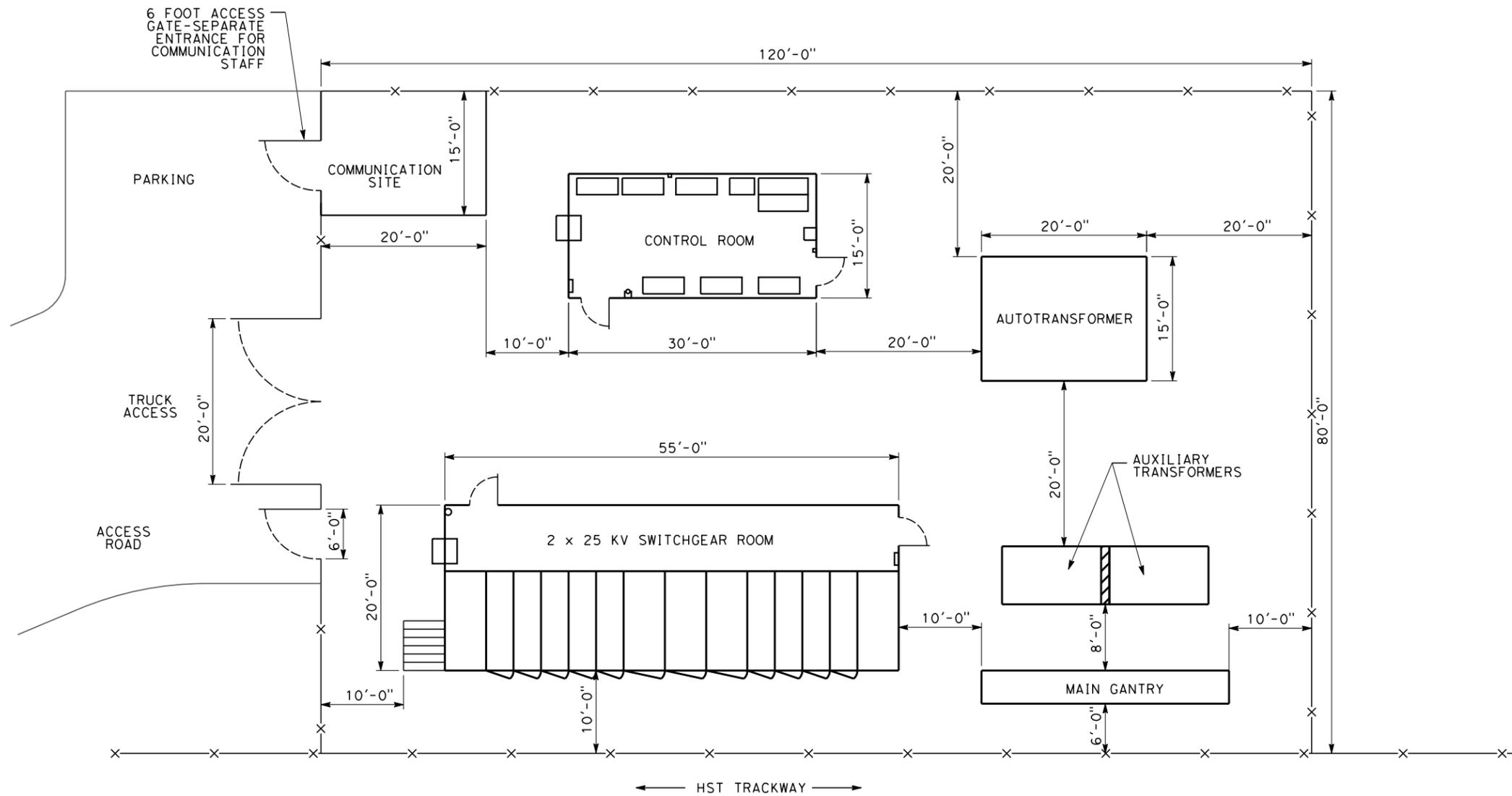


CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

CONCEPTUAL LAYOUT
SWITCHING STATION

CONTRACT NO.
DRAWING NO.
DD-TP-D201
SCALE
NO SCALE
SHEET NO.

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NOTES:

1. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.
2. THE MAIN GANTRY POSITION SHALL BE PARALLEL TO AND ADJACENT TO THE TRACKS.
3. STRAIN GANTRY SHALL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY, PARALLEL TO AND ON THE OPPOSITE SIDE OF THE TRACKS WITH FOOTPRINT EQUAL TO THAT OF THE MAIN GANTRY.
4. IF THE PARALLELING STATION (PS) IS LOCATED AWAY FROM THE TRACKS IN AN UNDESIRE CONFIGURATION, THE MAIN GANTRY SHALL BE LOCATED AT THE TRACKWAY, PARALLEL TO AND TOWARDS PS SIDE OF THE TRACKS. REFER TO CONCEPTUAL CROSS SECTIONS OF AWAY TRACTION POWER FACILITIES.
5. THE COMMUNICATION SITE SHALL HOUSE COMMUNICATION INTERFACE EQUIPMENT FOR SCADA SYSTEM AND OTHER WAYSIDE COMMUNICATION EQUIPMENT, AND SHALL REQUIRE 100' VERTICAL CLEARANCE.
6. THE GANTRIES SHALL BE 40 FEET HIGH (TYP).

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
DRAWN BY
V. LAVERDE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE**

CONCEPTUAL LAYOUT
PARALLELING STATION

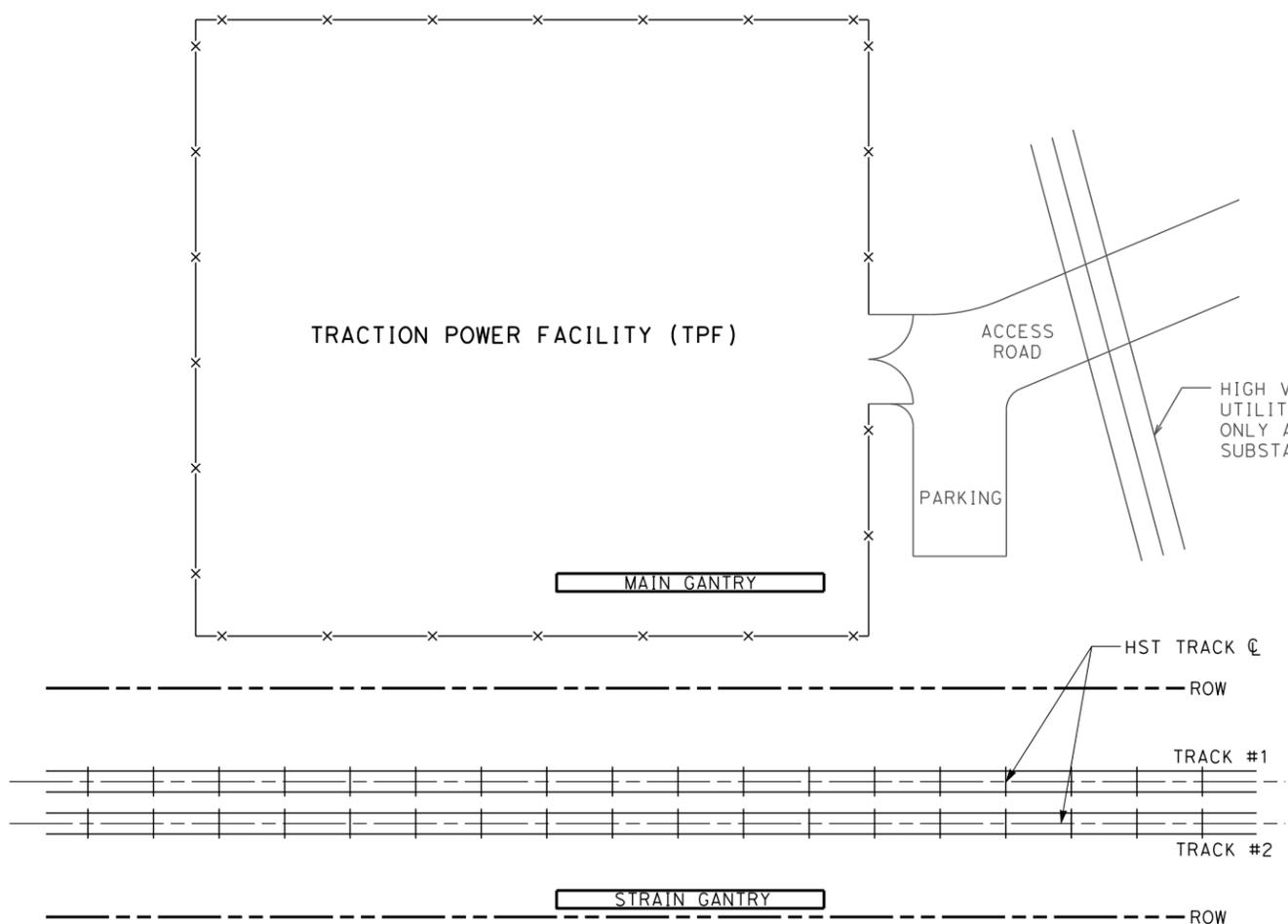
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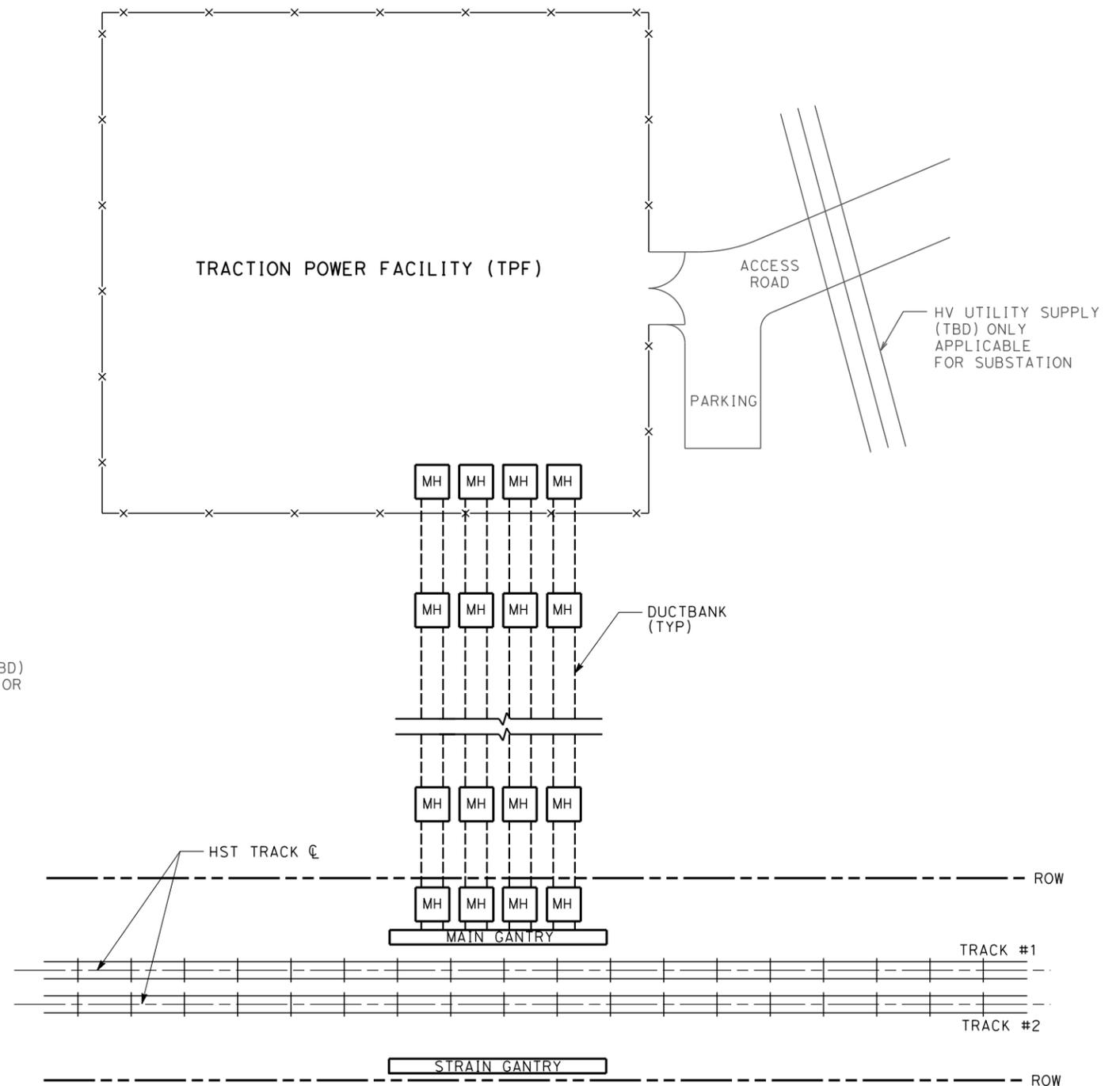
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NOTES:

1. THIS DRAWING SHOWS GANTRY ARRANGEMENT FOR AT-GRADE CONFIGURATION FOR TWO ALTERNATIVE OPTIONS:
 - 1) TPF LOCATED ADJACENT TO TRACK ALIGNMENT;
 - 2) TPF LOCATED AWAY FROM TRACK ALIGNMENT;
 ALTERNATIVE 1 IS THE PREFERRED OPTION. ALTERNATIVE 2 MAY BE USED IF ADEQUATE LAND IS NOT AVAILABLE ADJACENT TO RAILROAD ROW.
2. ALTERNATIVE 2 SHALL BE USED FOR TRACK ALIGNMENT ON AERIAL STRUCTURES. SEE "TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE" DRAWING.
3. THE SPACING AND NUMBER OF MANHOLES IS INDICATIVE ONLY. ACTUAL LAYOUT WILL DEPEND UPON THE SITE CONDITIONS.
4. THE MAIN GANTRY AND THE STRAIN GANTRY SHALL BE TYPICALLY 4' WIDE AND 40' HIGH.
5. SEE "TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT" AND "TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT" DIRECTIVE DRAWINGS FOR GANTRY LOCATION DETAILS.
6. CONCEPTUAL DIMENSIONS FOR MAIN AND STRAIN GANTRY FOUNDATIONS ARE APPROXIMATELY 40' LONG AND 4' WIDE.



ALTERNATIVE #1
 TPF LOCATED ADJACENT TO AT-GRADE HST TRACKWAY
 WITH EMBANKMENT HEIGHT (TOR-OG) ≤ 10 FEET



ALTERNATIVE #2
 TPF LOCATED AWAY FROM AT-GRADE HST TRACKWAY
 OR EMBANKMENT HEIGHT (TOR-OG) > 10 FEET

REV	DATE	BY	CHK	APP	DESCRIPTION

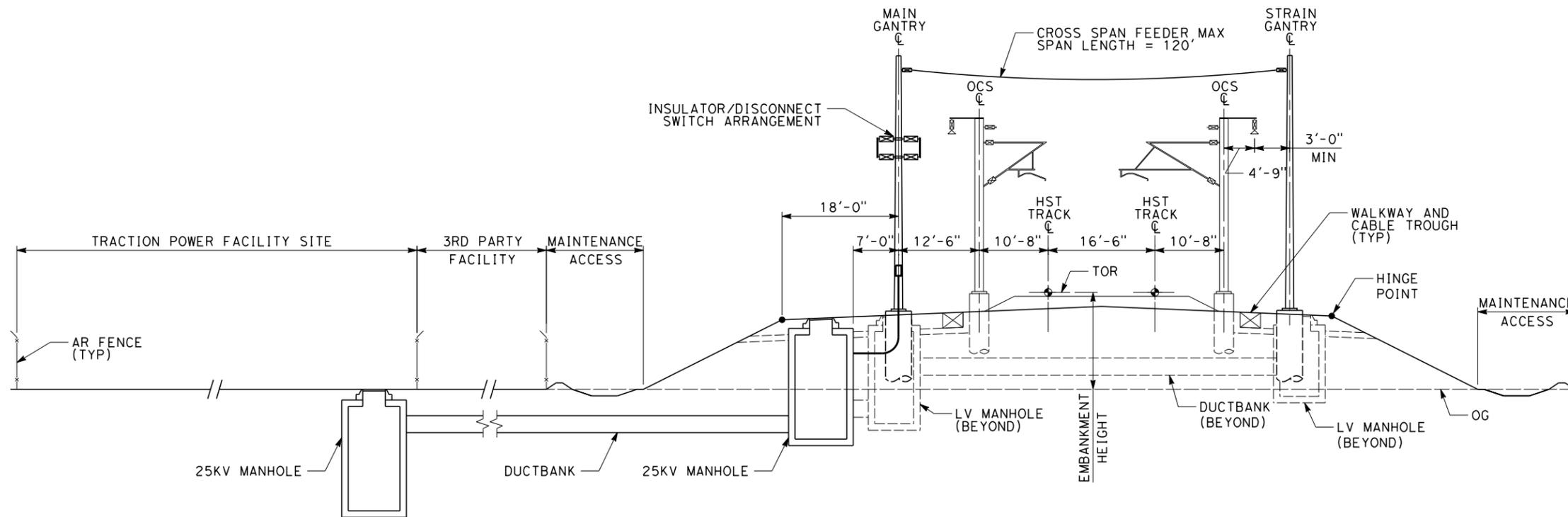
DESIGNED BY M. PAZ
DRAWN BY V. HUANTE
CHECKED BY V. SIBAL
IN CHARGE B. BANKS
DATE 01/24/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

CONCEPTUAL LOCATIONS OF
 TRACTION POWER FACILITIES

CONTRACT NO. 13341
DRAWING NO. DD-TP-D401
SCALE NO SCALE
SHEET NO.



TYPICAL SECTION
 TRACTION POWER FACILITY SITE AWAY FROM AT-GRADE HST TRACKWAY OR
 EMBANKMENT HEIGHT (TOR-OG) >10 FEET

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
2. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA. FOR SITE REQUIREMENTS REFER TO TRACTION POWER SITE REQUIREMENTS.
3. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
4. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.
5. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANK WITH 2 25KV MANHOLES, PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
6. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
7. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
8. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
9. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
10. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
 DRAWN BY
V. HUANTE
 CHECKED BY
V. SIBAL
 IN CHARGE
B. BANKS
 DATE
8/29/2014

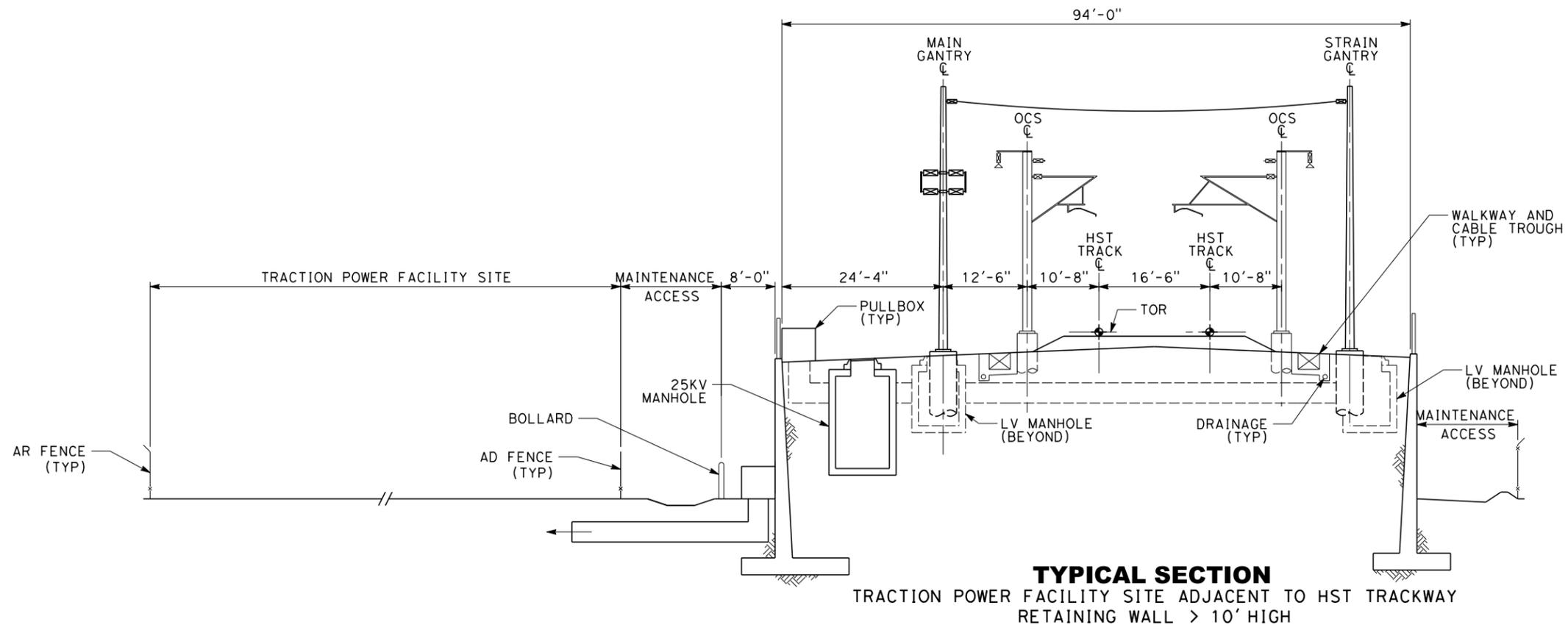


CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

TYPICAL CATENARY FEEDING GANTRY ARRANGEMENT
 TRACTION POWER FACILITY SITE
 AWAY FROM TRACKWAY

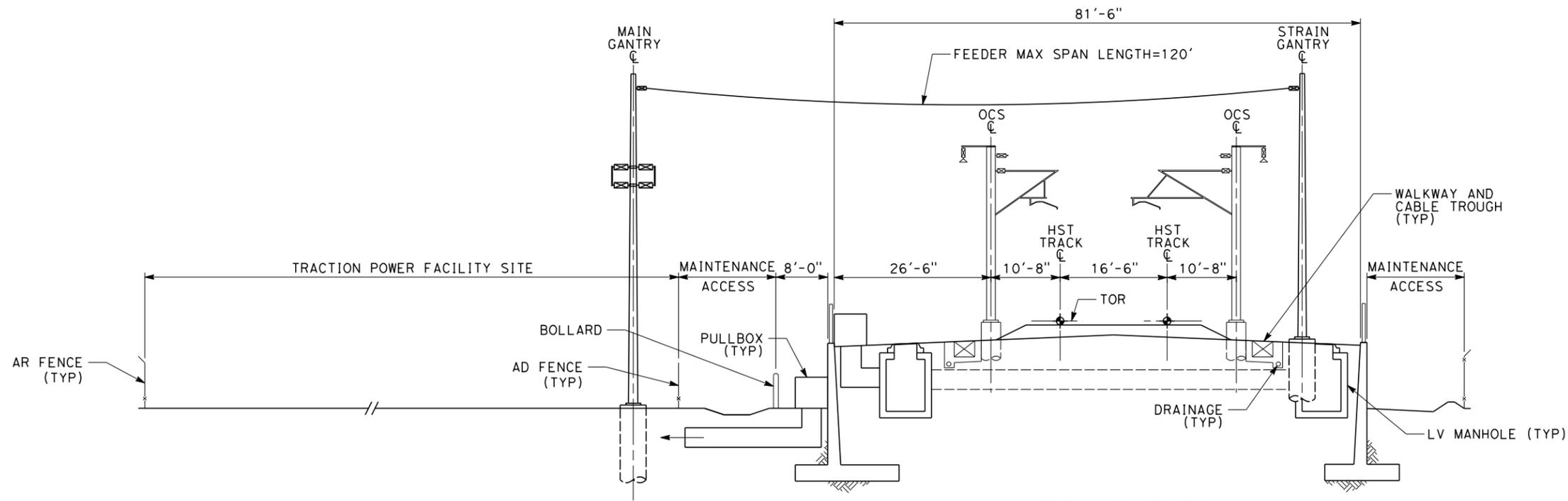
CONTRACT NO.
DRAWING NO. DD-TP-F102
SCALE NO SCALE
SHEET NO.

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TYPICAL SECTION
TRACTION POWER FACILITY SITE ADJACENT TO HST TRACKWAY
RETAINING WALL > 10' HIGH

- NOTES:**
1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
 3. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
 4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
 5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
 6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
 7. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
 8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.



TYPICAL SECTION
TRACTION POWER FACILITY SITE ADJACENT TO HST TRACKWAY
RETAINING WALL ≤ 10' HIGH

RFP No.: HSR 14-32 - REVIEW DRAFT

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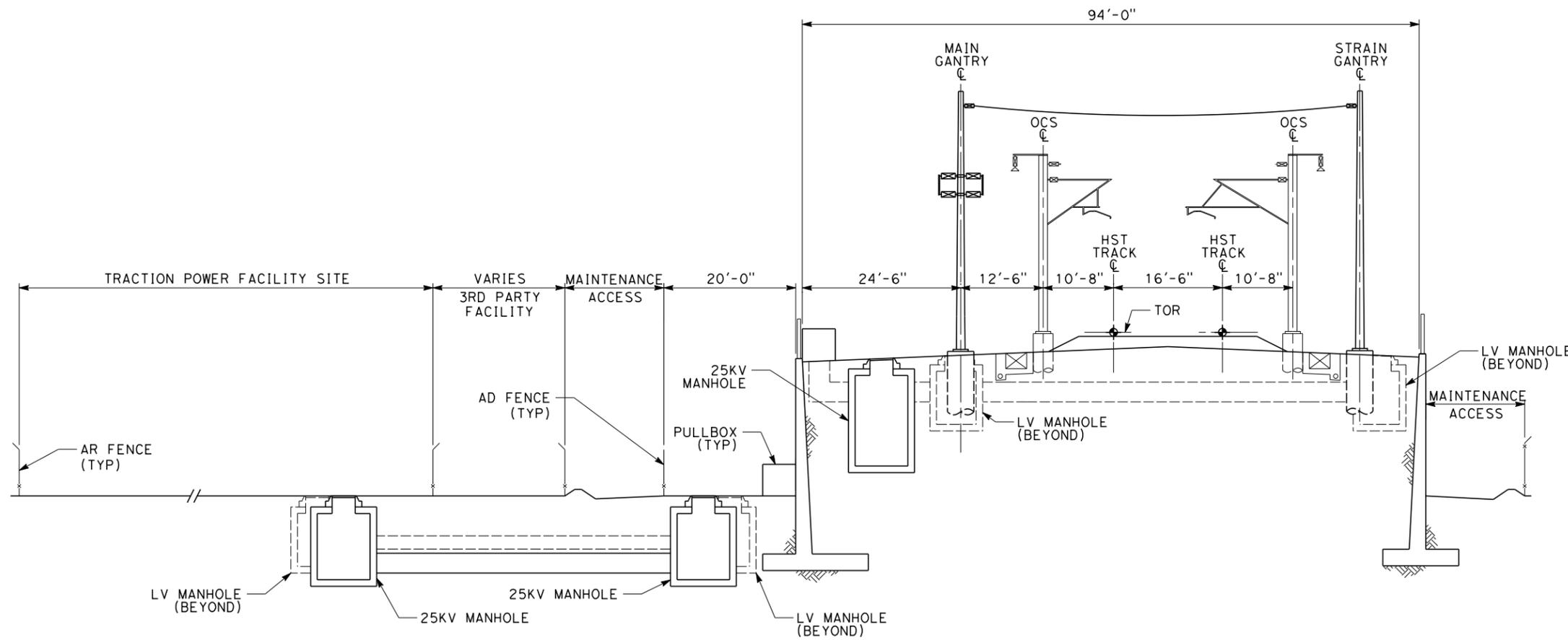
DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

TYPICAL CATENARY FEEDING ARRANGEMENT
IN RETAINED-FILL FOR TRACTION POWER FACILITIES
ADJACENT TO TRACKWAY

CONTRACT NO.
DRAWING NO.
DD-TP-F103
SCALE
NO SCALE
SHEET NO.



TYPICAL SECTION
TRACTION POWER FACILITY SITE AWAY FROM RETAINED-FILL HST TRACKWAY

- NOTES:**
1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
 3. SYSTEM SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 4. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
 5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL AND TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
 6. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES SHALL BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
 7. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY.
 8. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANKS WITH 2 25KV MANHOLES, PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
 9. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
 10. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
 11. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
 12. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
8/29/2014

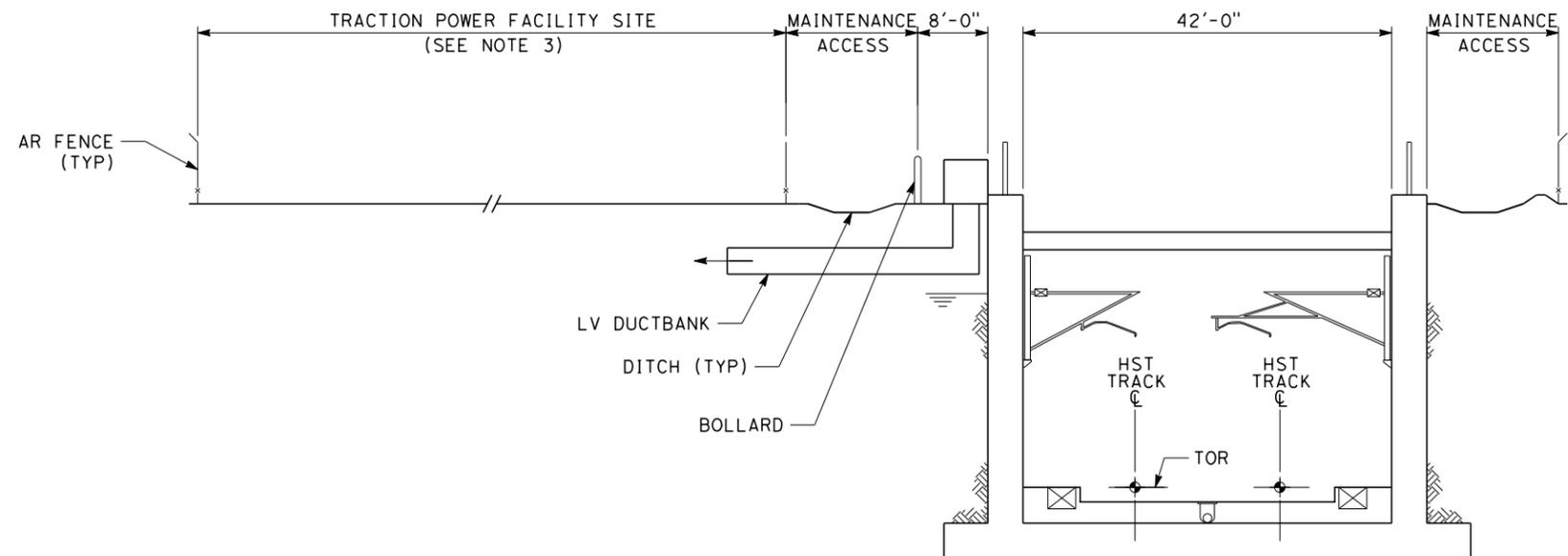


CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

TYPICAL CATENARY FEEDING ARRANGEMENT
FOR TRACTION POWER FACILITIES
IN RETAINED-FILL AWAY FROM TRACKWAY

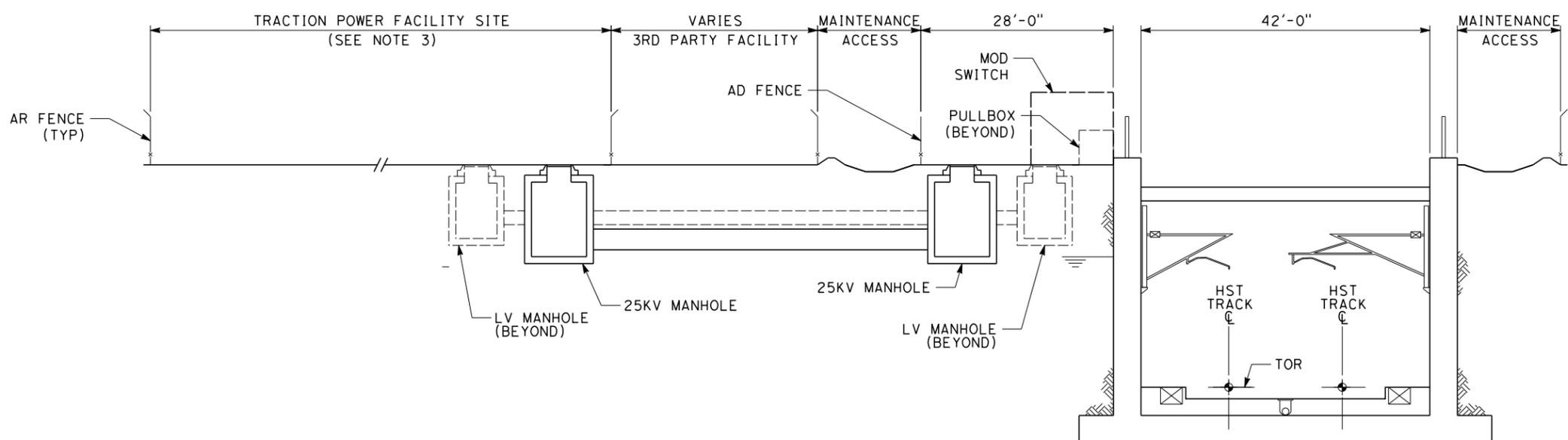
CONTRACT NO.
DRAWING NO.
DD-TP-F104
SCALE
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SHEET NO.

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TYPICAL SECTION

TRACTION POWER FACILITY SITE ADJACENT TO TRENCH HST TRACKWAY



TYPICAL SECTION

TRACTION POWER FACILITY SITE AWAY FROM TRENCH HST TRACKWAY

NOTES:

1. SYSTEM SITES AT TRENCH TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS FACILITY SITES.
3. SYSTEM SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
4. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE SYSTEMS SITE.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE SHALL BE PROVIDED UNDERNEATH THIRD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
7. FOUR ASSEMBLIES EACH CONSISTING OF 25KV UNDERGROUND DUCTBANKS WITH 2 25KV MANHOLES PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
9. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
10. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
11. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
 DRAWN BY
V. HUANTE
 CHECKED BY
V. SIBAL
 IN CHARGE
B. BANKS
 DATE
8/29/2014



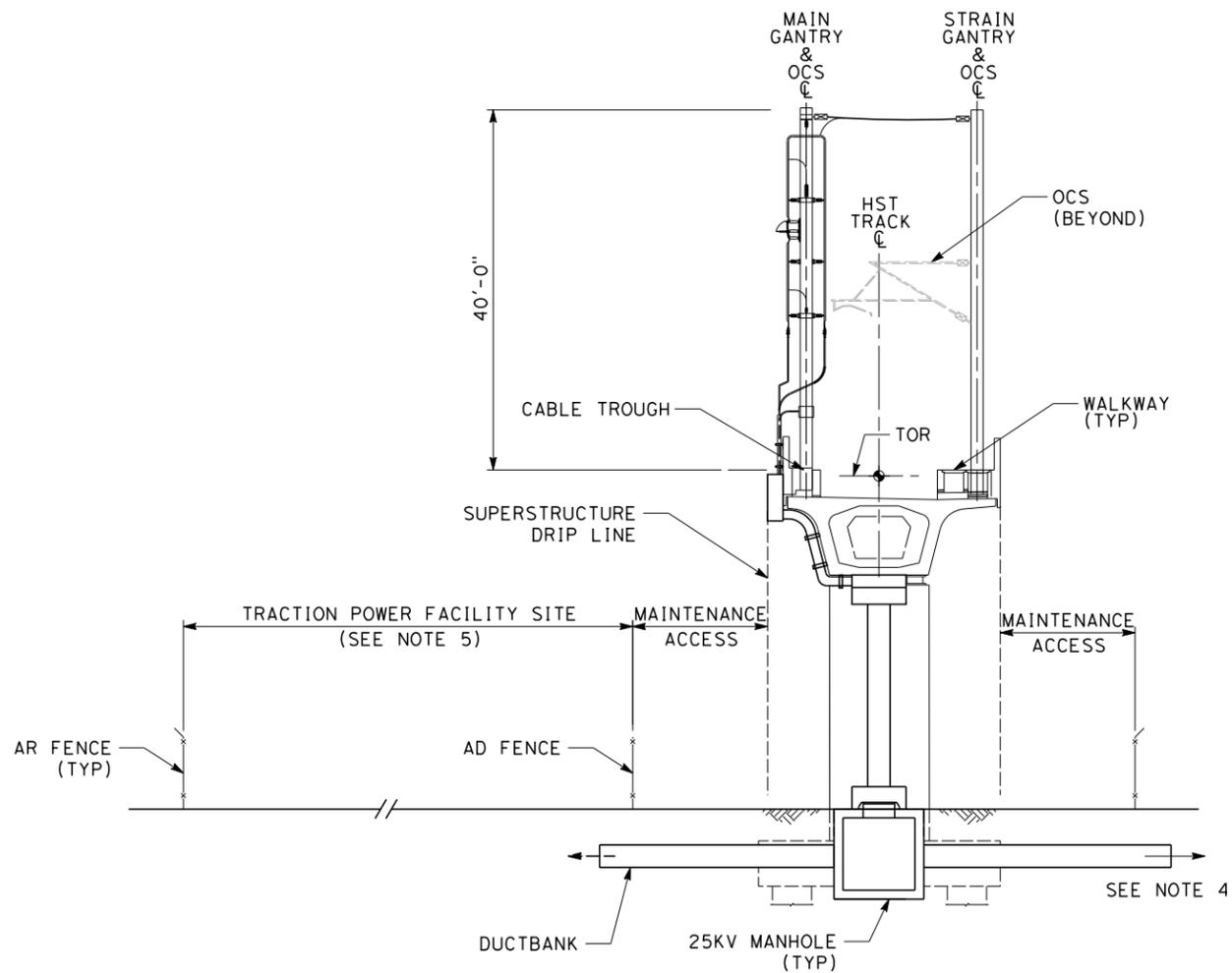
CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE
 SYSTEMS SITE
 TRACTION POWER FACILITY
 TRENCH

CONTRACT NO.
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DD-TP-F105
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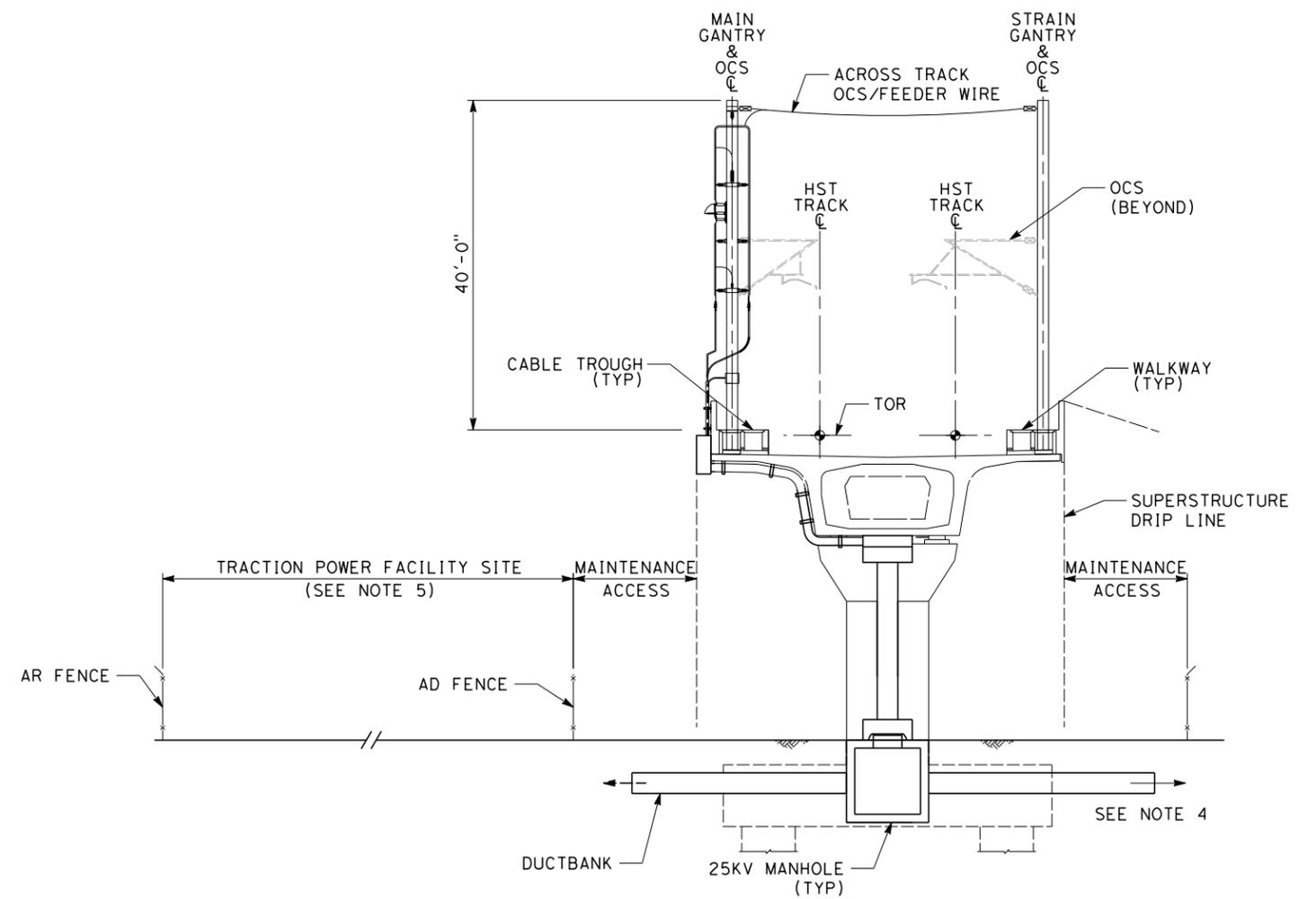
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NOTES:

1. TRACTION POWER FACILITY SITES ALONG 2 TRACK OR SINGLE TRACK AERIAL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA. ADDITIONAL DUCTBANKS AND MANHOLES REQUIRED BETWEEN SINGLE TRACK AERIAL STRUCTURES AND BETWEEN TRACTION POWER FACILITY SITE AND AERIAL TRACKWAY(S).
2. DRAWING SHOWS CROSS SECTION OF TYPICAL CATENARY FEEDING ARRANGEMENT AT TRACTION POWER FACILITY AND TRACKWAY TYPICAL GANTRY FEEDING ARRANGEMENT ON AERIAL STRUCTURES AT TRACTION POWER FACILITY LOCATIONS SHOWN. HIGH VOLTAGE CABLING ROUTED OUTSIDE OF STRUCTURE.
3. THE GANTRIES WILL BE LOCATED ON THE AERIAL STRUCTURES ALONG THE ALIGNMENT AND BETWEEN ADJACENT OCS POLES.
4. TRACTION POWER FACILITY SITES AWAY FROM TRACKWAY SEPARATED BY A THIRD PARTY RIGHT-OF-WAY ARE NOT DESIRABLE. SUCH A CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
5. FOR TRACTION POWER DUCT BANKS AND MANHOLE DETAILS, REFER TO "TYPICAL 25KV DUCT BANK DETAIL" AND "TYPICAL 25KV MANHOLE DETAIL" DIRECTIVE DRAWINGS.
6. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE SHALL BE PROVIDED UNDERNEATH THIRD PARTY RIGHT-OF-WAY.
7. FOUR ASSEMBLIES, EACH CONSISTING OF A 25KV UNDERGROUND DUCTBANKS WITH 2 25KV MANHOLES, SHALL BE PROVIDED AT EACH TRACTION POWER FACILITY SEPARATED FROM THE TRACKWAY BY THIRD PARTY RIGHT-OF-WAY.
8. FOR TRACTION POWER SITE REQUIREMENTS, REFER TO TRACTION POWER CONCEPTUAL SITE LAYOUT DIRECTIVE DRAWINGS.
9. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
10. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
11. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
 TRACTION POWER FACILITY SITE AT SINGLE-TRACK AERIAL TRACKWAY



TYPICAL SECTION
 TRACTION POWER FACILITY SITE AT TWO-TRACK AERIAL TRACKWAY

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. PAZ
DRAWN BY V. HUANTE
CHECKED BY V. SIBAL
IN CHARGE B. BANKS
DATE 8/29/2014

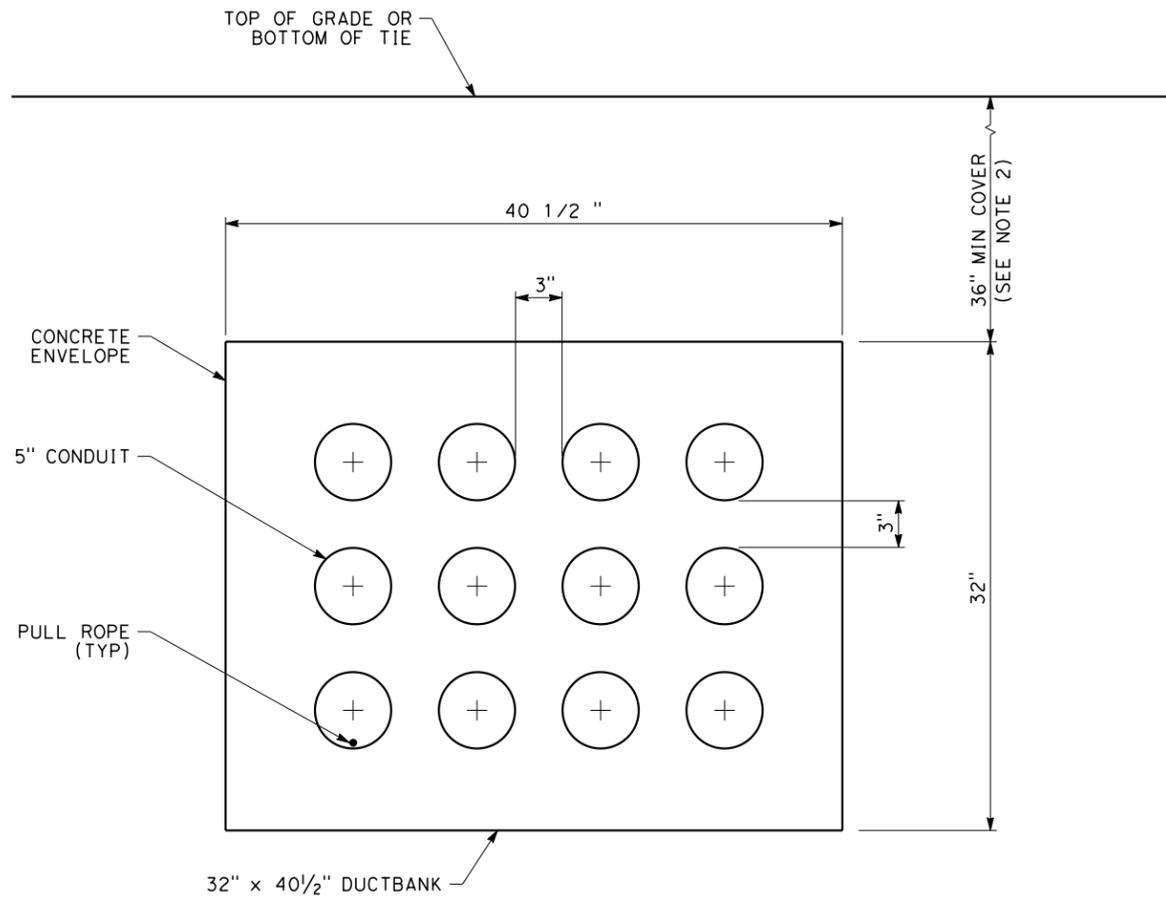


CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

TYPICAL CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE

CONTRACT NO.
DRAWING NO. DD-TP-F201
SCALE NO SCALE
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3x4-WAY DUCT BANK (1)
NO SCALE

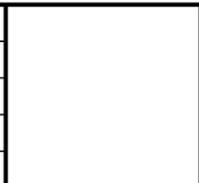
NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK DETAILS FOR 5" CONDUIT FOR ILLUSTRATION PURPOSES ONLY. DESIGN THE DUCT BANK TO SITE AND EQUIPMENT SPECIFIC REQUIREMENTS CONFORMING TO RELEVANT CODES, SPECIFICATIONS AND DESIGN CRITERIA.
2. A 36" MINIMUM COVER SHALL BE MAINTAINED FROM TOP OF GRADE TO TOP OF DUCT BANK, WHEN NOT GOING UNDER RAILROAD TRACK, AND A MINIMUM 5'-6" UNDER RAILROAD TRACKS FROM THE BOTTOM OF TIE.
3. THE CONDUIT MATERIAL SHALL BE PVC OR FRE.
4. 25KV CATENARY FEEDER, 25KV NEGATIVE FEEDER, TRACTION RETURN CABLING, HV/MV CABLES FOR FACILITY/AUXILIARY POWER SUPPLY, AND LOW VOLTAGE CABLES (AUXILIARY POWER SUPPLY, COMMUNICATIONS, SIGNALING AND TRAIN CONTROL) MAY BE ROUTED IN THE SAME DUCTBANK BUT IN SEPARATE CONDUITS.

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
DRAWN BY
V. HUANTE
CHECKED BY
V. SIBAL
IN CHARGE
B. BANKS
DATE
01/24/2014

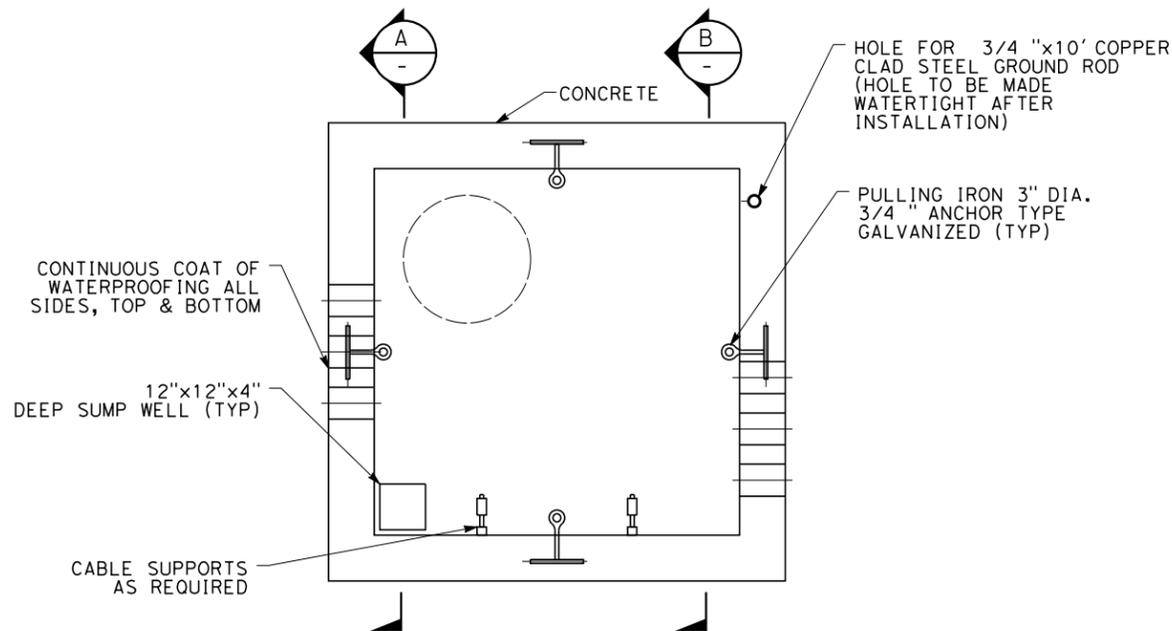


CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

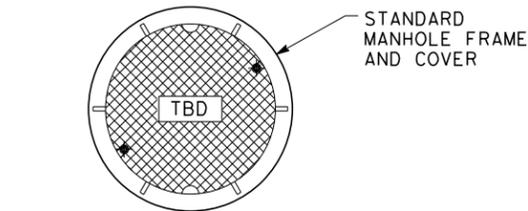
TYPICAL 25KV DUCT BANK DETAIL

CONTRACT NO.
DRAWING NO. DD-TP-N101
SCALE NO SCALE
SHEET NO.

RFP No: HSR 14-32 - REVIEW DRAFT
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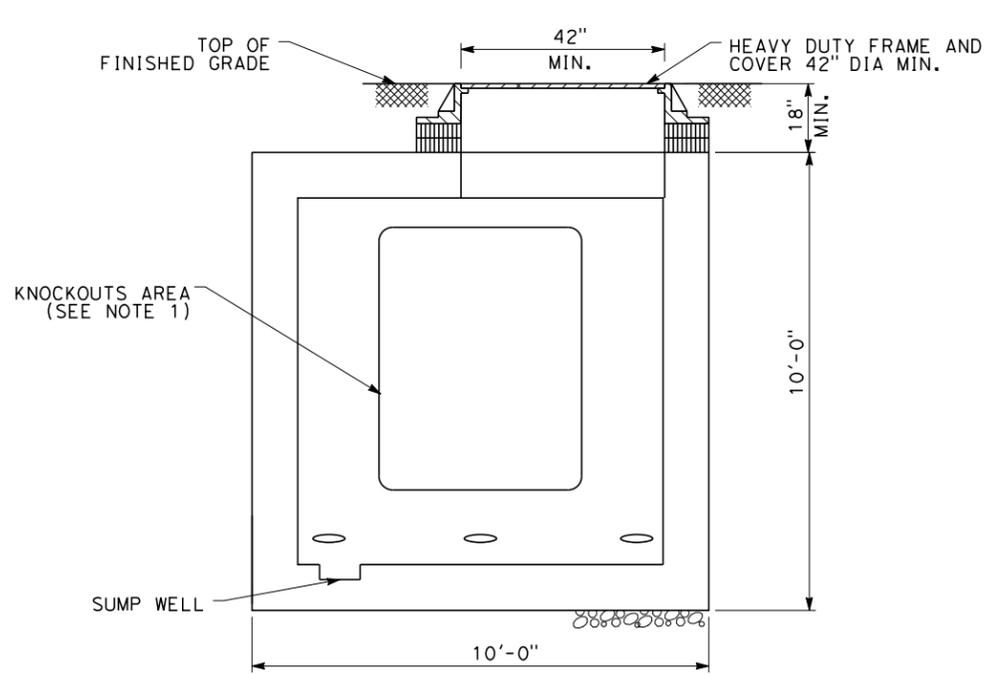


PLAN
TYPICAL PRECAST ELECTRIC MANHOLE

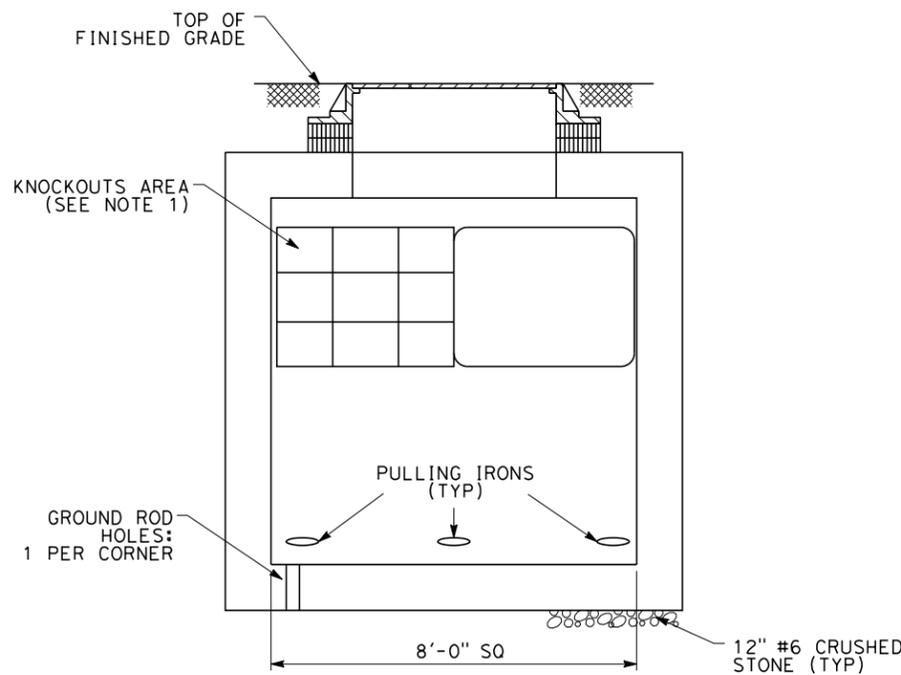


PLAN
ELECTRIC MANHOLE FRAME AND COVER DETAIL

- NOTES:**
- THIS DRAWING SHOWS TYPICAL DUCT BANK KNOCKOUTS IN A PRECAST MANHOLE. EXACT DETAILS TO BE WORKED OUT AT DETAILED DESIGN LEVEL.
 - ALL TRACTION POWER MANHOLES SHALL BE TYPICALLY 10'-0" L X 10'-0" W X 10'-0" DEEP AND BE WATERTIGHT WITH SILICON SEALING COMPOUND, OR APPROVED EQUAL.
 - THE MANHOLE FRAME SHALL BE GROUTED TO THE ROOF SLAB.
 - THICKNESS OF MANHOLE WALL SHALL BE 8" MINIMUM.
 - APPROVED CABLE RACK ARMS TO BE INSTALLED TO ACCOMMODATE CABLE, MINIMUM 2 RACKS PER WALL (TYP).
 - PULLING HOOKS SHALL BE GALVANIZED STEEL, SUPPLIED AND CAST INTO WALLS BY PRECASTER, AND ANCHORED BEHIND REINFORCEMENT. QUANTITY AND LOCATION TO SUIT.
 - CONNECT ALL METALLIC PARTS, FRAME, PULLING HOOKS, ETC., TO THE TRACTION POWER FACILITY GROUND GRID OR GROUND ROD.
 - PROVIDE FOR CONNECTION TO A PORTABLE PUMP TO REMOVE ACCUMULATED WATER FROM THE MANHOLE OR OTHER SITE SPECIFIC DRAINAGE SYSTEM.
 - 25KV CATENARY FEEDER, 25KV NEGATIVE FEEDER, TRACTION RETURN CABLING, HV/MV CABLES FOR FACILITY/AUXILIARY POWER SUPPLY, AND LOW VOLTAGE CABLES (AUXILIARY POWER SUPPLY, COMMUNICATIONS, SIGNALING AND TRAIN CONTROL) SHALL BE ROUTED IN SEPARATE MANHOLES.



TYPICAL PRECAST ELECTRIC MANHOLE
SECTION A
NO SCALE



TYPICAL PRECAST ELECTRIC MANHOLE
SECTION B
NO SCALE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
M. PAZ
 DRAWN BY
V. HUANTE
 CHECKED BY
V. SIBAL
 IN CHARGE
B. BANKS
 DATE
8/29/2014

**PARSONS
BRINCKERHOFF**



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE
 TYPICAL 25KV MANHOLE DETAILS

CONTRACT NO.
DRAWING NO. DD-TP-N111
SCALE NO SCALE
SHEET NO.

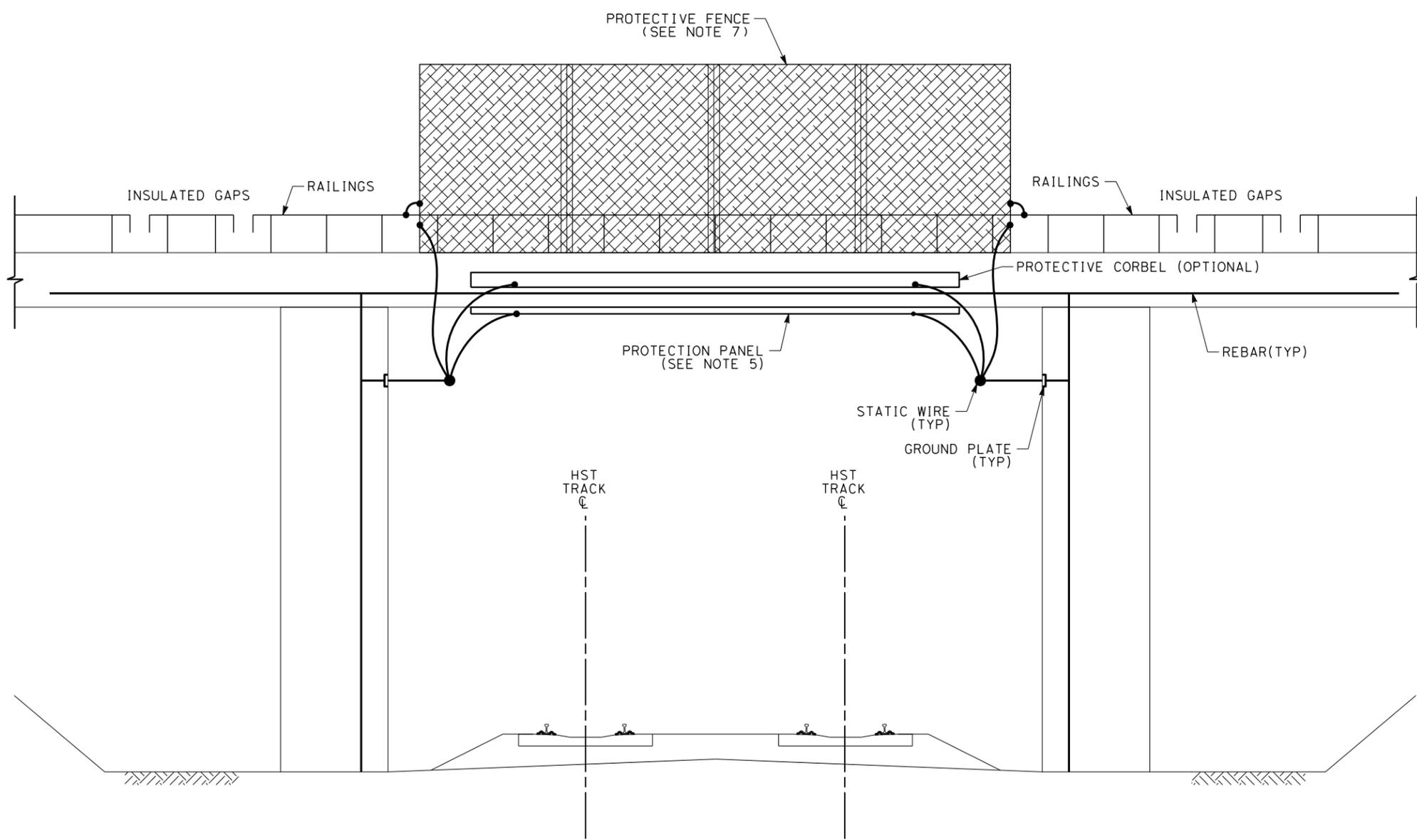
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TYPICAL OVERHEAD STRUCTURE GROUNDING AND BONDING

NOTES:

1. TRACK, STRUCTURES, AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SMALL METALLIC ITEMS, SUCH AS RAILING, FENCE ETC, BEYOND THE STEP AND TOUCH POTENTIAL LIMIT NEED NOT BE GROUNDED. THE STEP AND TOUCH POTENTIAL EXISTS WITHIN 8' OF A STANDING TRAIN, 8' FROM ANY ELECTRICALLY CONTINUOUS BONDED FENCE, AND 8' FROM ANY METALLIC ITEM BONDED TO STATIC WIRE.
3. GROUNDING AND BONDING DETAILS DESIGN SHALL BE COORDINATED WITH OVERPASS STRUCTURE DESIGNER.
4. OVERHEAD BRIDGE GROUNDING AND BONDING DETAILS SHOWN IN DRAWING ARE GENERIC IN NATURE. THE OCS DESIGNER SHALL PROVIDE DETAILED ASSEMBLIES AND COMPONENTS THAT MEET THE REQUIREMENT.
5. GALVANIZED STEEL STRIP OR ANGLE SECTION SHALL BE INSTALLED ABOVE THE OVERHEAD LINE AT EACH BRIDGE FACE, IF THE BRIDGE SOFFIT IS WITHIN THE PANTOGRAPH ZONE. WHEN THE VERTICAL CLEARANCE BETWEEN OCS CONDUCTORS AND CONCRETE OVERPASSES IS LESS THAN 3 FEET, PROTECTION PANELS (FLASH PLATES) SHALL BE INSTALLED ABOVE THE OCS, ATTACHED TO THE UNDERSIDE OF THE STRUCTURE, AND INTERCONNECTED TO THE STATIC WIRE AT NOT LESS THAN TWO LOCATIONS.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6" X 6" IN DIMENSION.
7. SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM AND CIVIL DESIGN CRITERIA CHAPTERS FOR PROTECTIVE FENCE CRITERIA.

RFP No.: HSR 14-32 - REVIEW DRAFT

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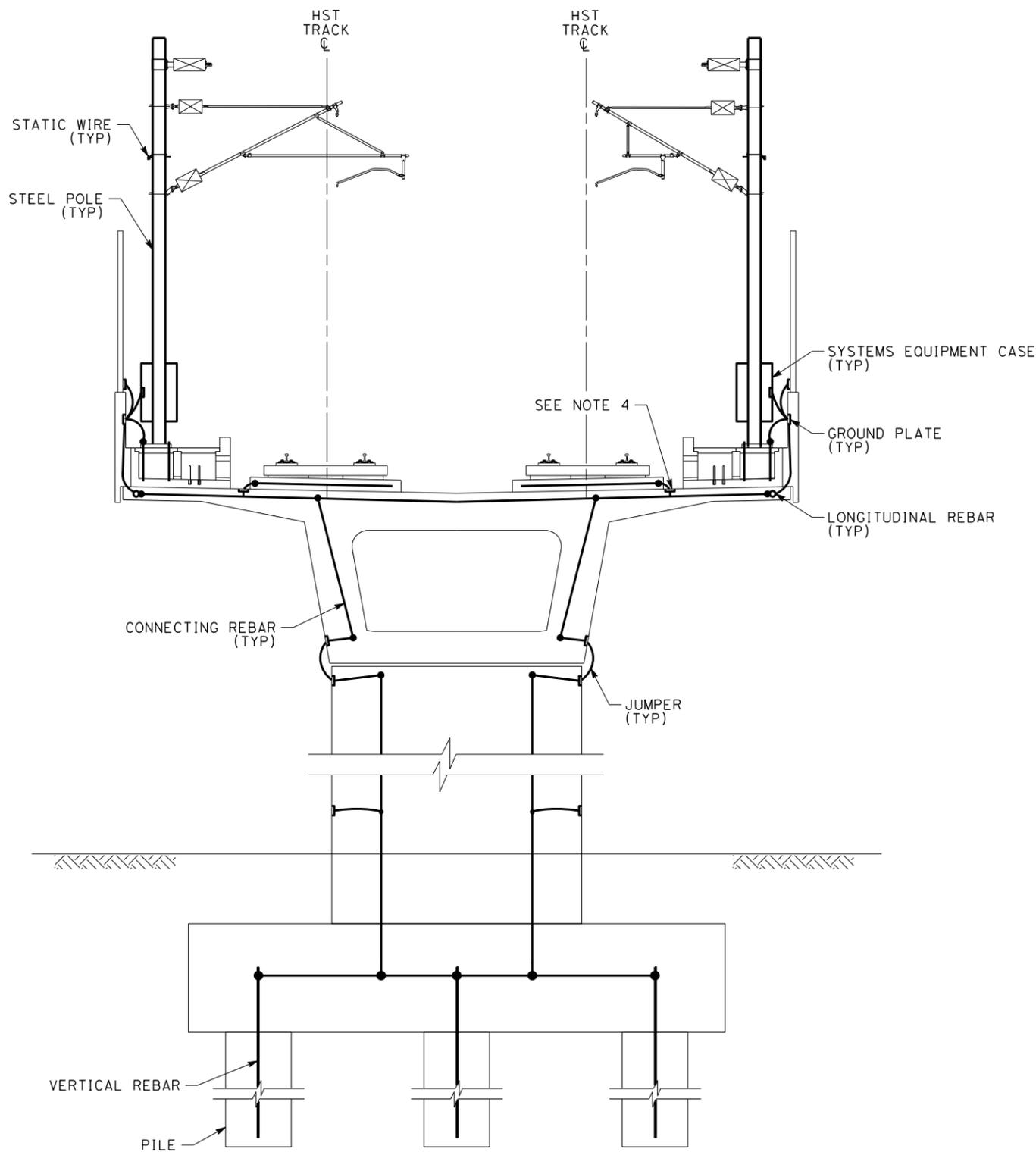
DESIGNED BY
J. LAU
DRAWN BY
V. HUANTE
CHECKED BY
M. HSIAO
IN CHARGE
B. BANKS
DATE
01/24/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE**

TYPICAL GROUNDING AND BONDING ARRANGEMENT
OVERHEAD BRIDGE STRUCTURE

CONTRACT NO.
13341
DRAWING NO.
DD-OC-2046
SCALE
NO SCALE
SHEET NO.



**TYPICAL OCS GROUNDING AND BONDING
AT AERIAL STRUCTURE**

NOTES:

1. TRACK, STRUCTURES, AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. GROUNDING AND BONDING DETAIL DESIGN SHALL BE COORDINATED WITH AERIAL STRUCTURE DESIGNER.
3. THE GROUNDING AND BONDING FOR THE EMERGENCY WALKWAY AREA AND OTHER PUBLICLY ACCESSIBLE AREAS SHALL BE DESIGNED TO AVOID INADMISSIBLE TOUCH AND STEP VOLTAGES AND ALSO MEET SIGNALING OPERATION REQUIREMENTS.
4. FOR LOCATIONS OF THE GROUND PLATES, SEE GROUNDING AND BONDING DESIGN CRITERIA FOR DETAIL.
5. THE GROUND PLATES ON THE AERIAL STRUCTURE SLAB SHALL BE PLACED BETWEEN THE EDGE OF THE TRACK SLAB AND DERAILMENT WALL.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6"X6" IN DIMENSION.
7. INDIVIDUAL CONCRETE TIES DO NOT NEED TO BE BONDED TO THE TRACTION POWER RETURN SYSTEM. STEEL REINFORCEMENT IN PRECAST CONCRETE PANELS FOR DIRECT FIXATION TRACK SHALL BE BONDED AND CONNECTED TO THE TRACTION POWER RETURN SYSTEM.
8. STEEL REINFORCED CONCRETE PARAPETS AND CONDUCTIVE SCREEN, NOISE, WIND OR SAFETY BARRIERS OR RAILINGS SHALL BE BONDED TO THE TRACTION POWER RETURN SYSTEM.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY J. LAU
DRAWN BY V. HUANTE
CHECKED BY M. HSIAO
IN CHARGE B. BANKS
DATE 01/24/2014

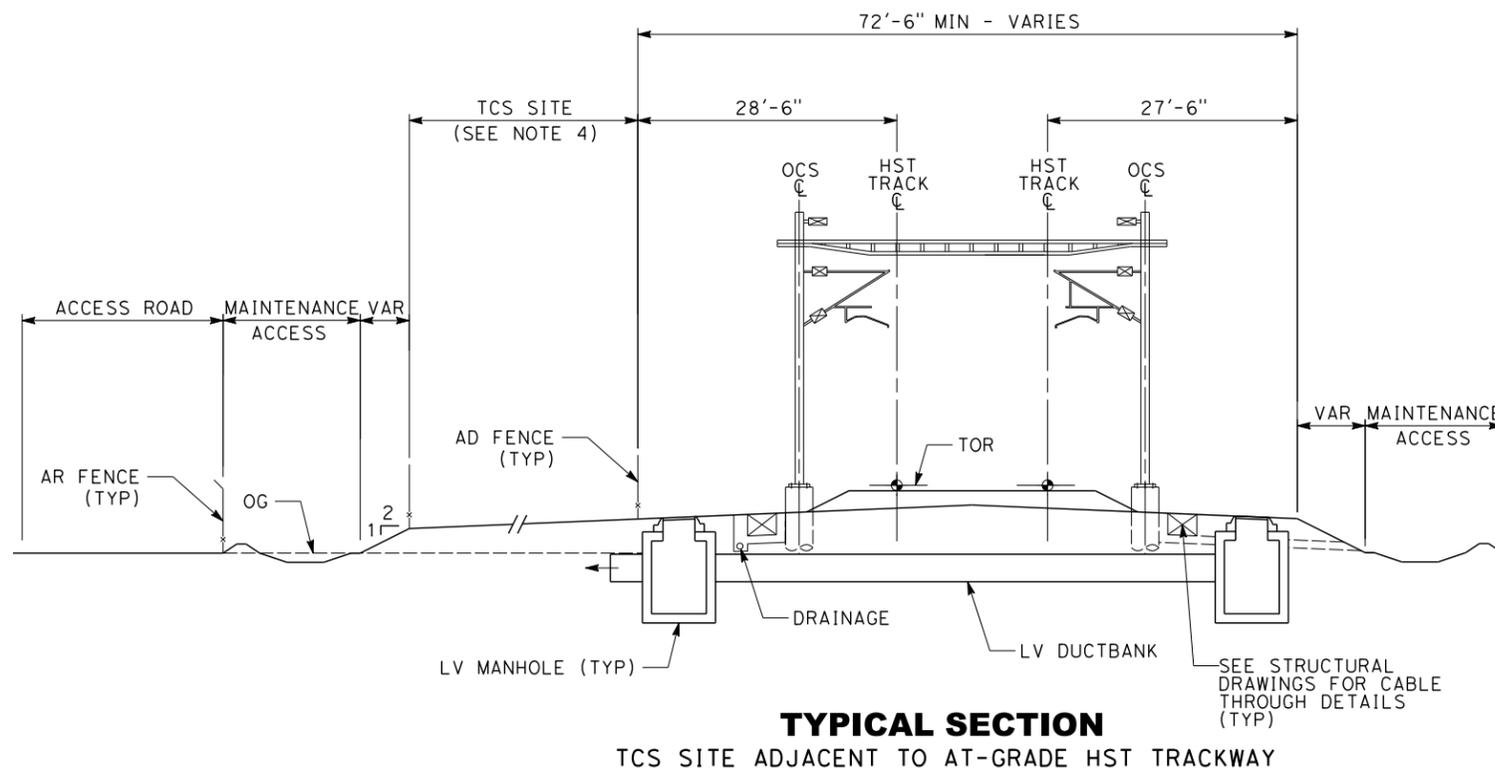


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE**

TYPICAL GROUNDING AND BONDING ARRANGEMENT
AERIAL STRUCTURE

CONTRACT NO.
DRAWING NO. DD-OC-2047
SCALE NO SCALE
SHEET NO.

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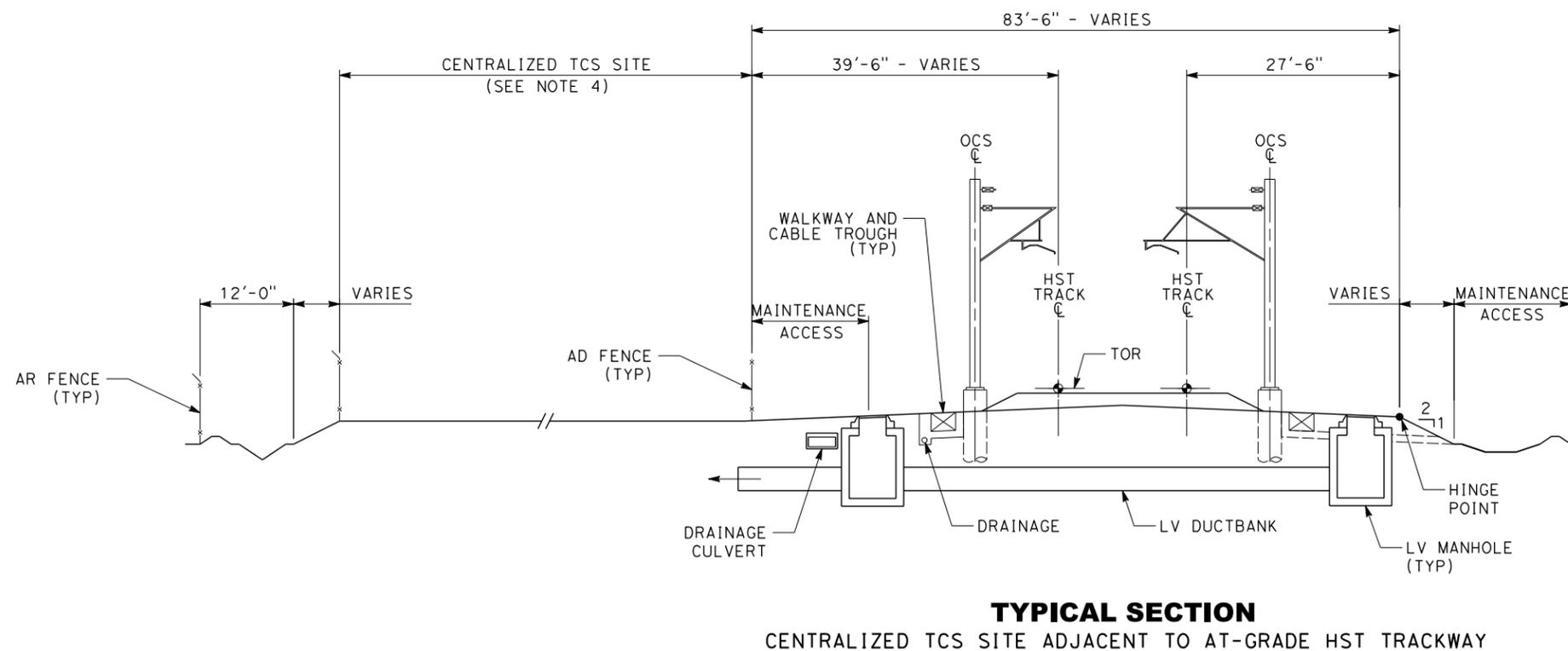


TYPICAL SECTION

TCS SITE ADJACENT TO AT-GRADE HST TRACKWAY

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
2. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.
3. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT EACH SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION

CENTRALIZED TCS SITE ADJACENT TO AT-GRADE HST TRACKWAY

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
I. MUFTIC
 DRAWN BY
V. LAVERDE
 CHECKED BY
B. MCNALLY
 IN CHARGE
B. BANKS
 DATE
8/29/2014



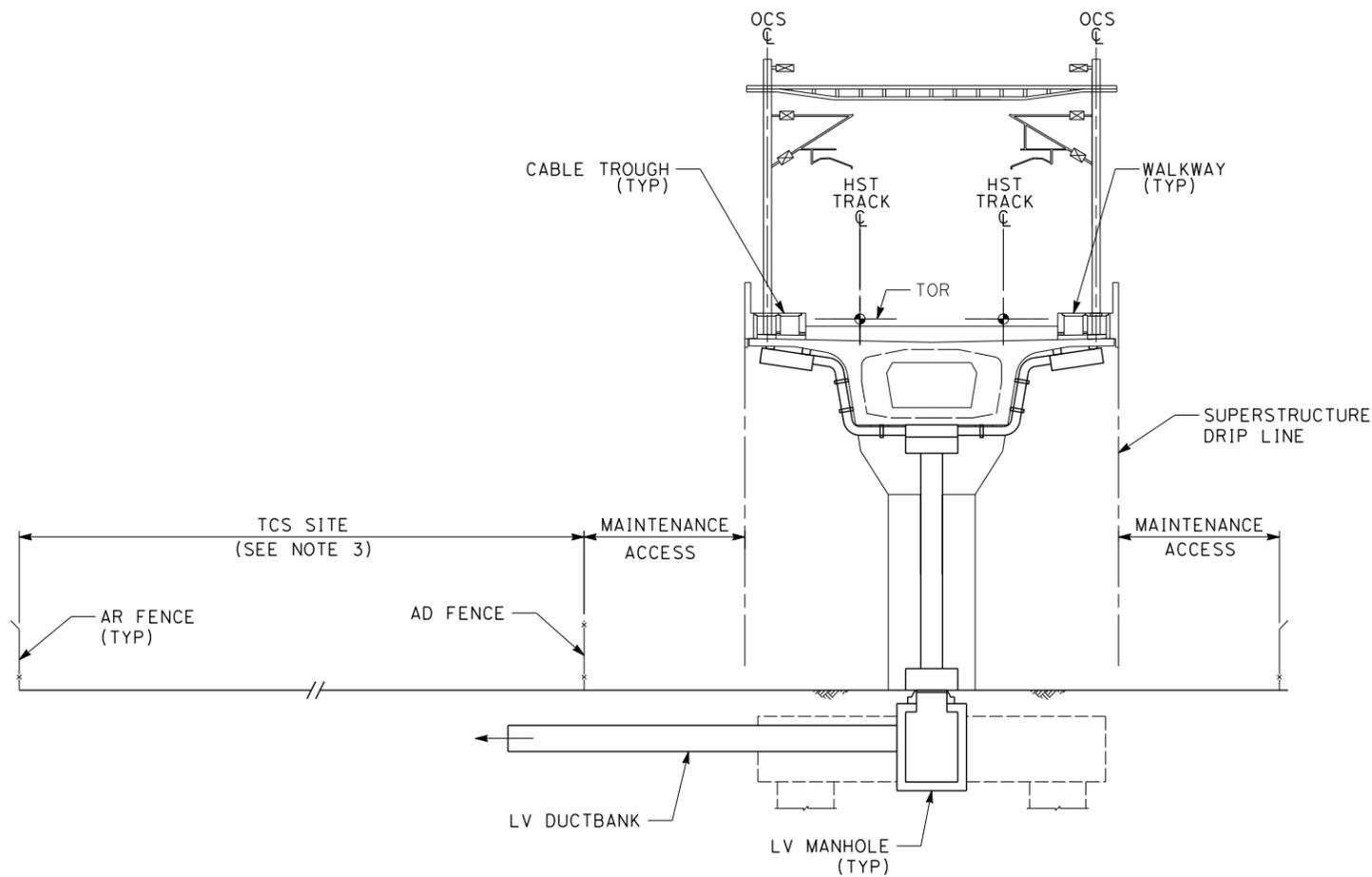
CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE

 SYSTEMS SITE
 TCS
 AT GRADE

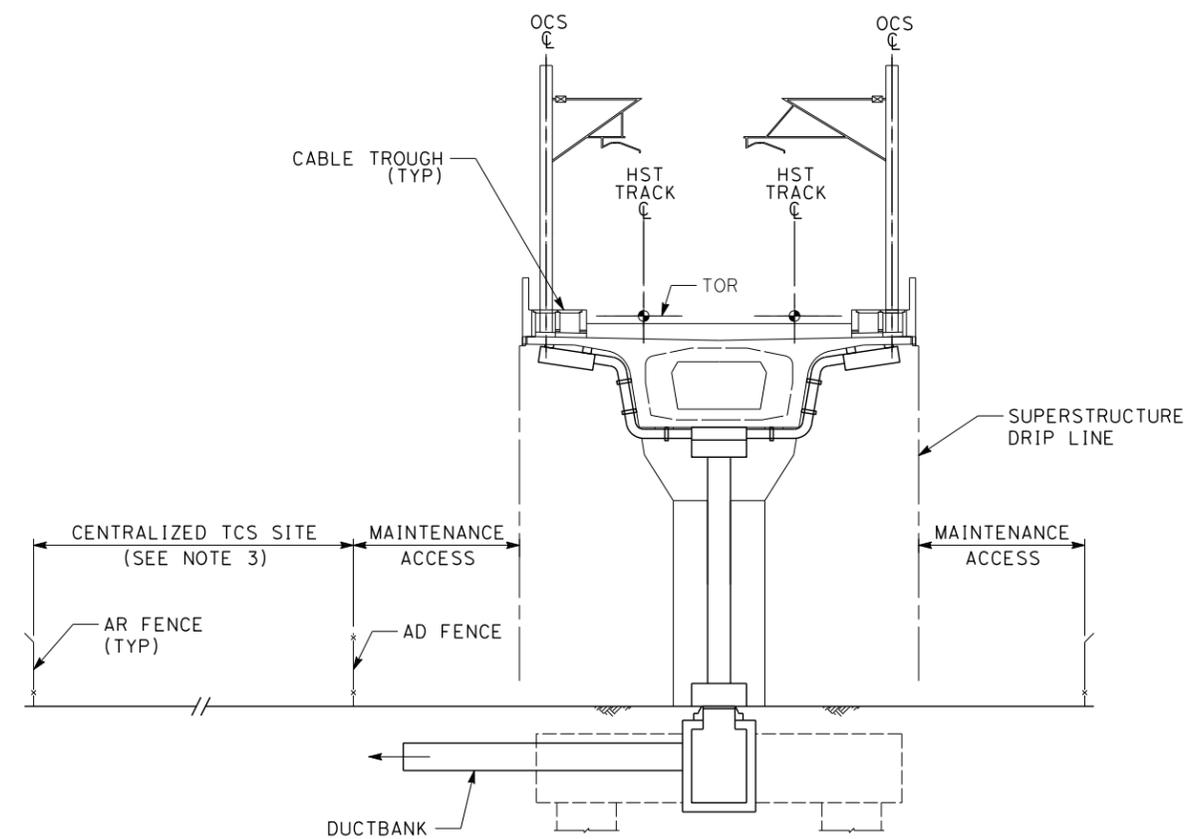
CONTRACT NO.
DRAWING NO. DD-TC-100
SCALE NO SCALE
SHEET NO.

NOTES:

1. SYSTEM SITES AT AERIAL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
3. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
4. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
5. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
6. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.



TYPICAL SECTION
TCS SITE AT AERIAL TRACKWAY



TYPICAL SECTION
CENTRALIZED TCS SITE AT AERIAL TRACKWAY

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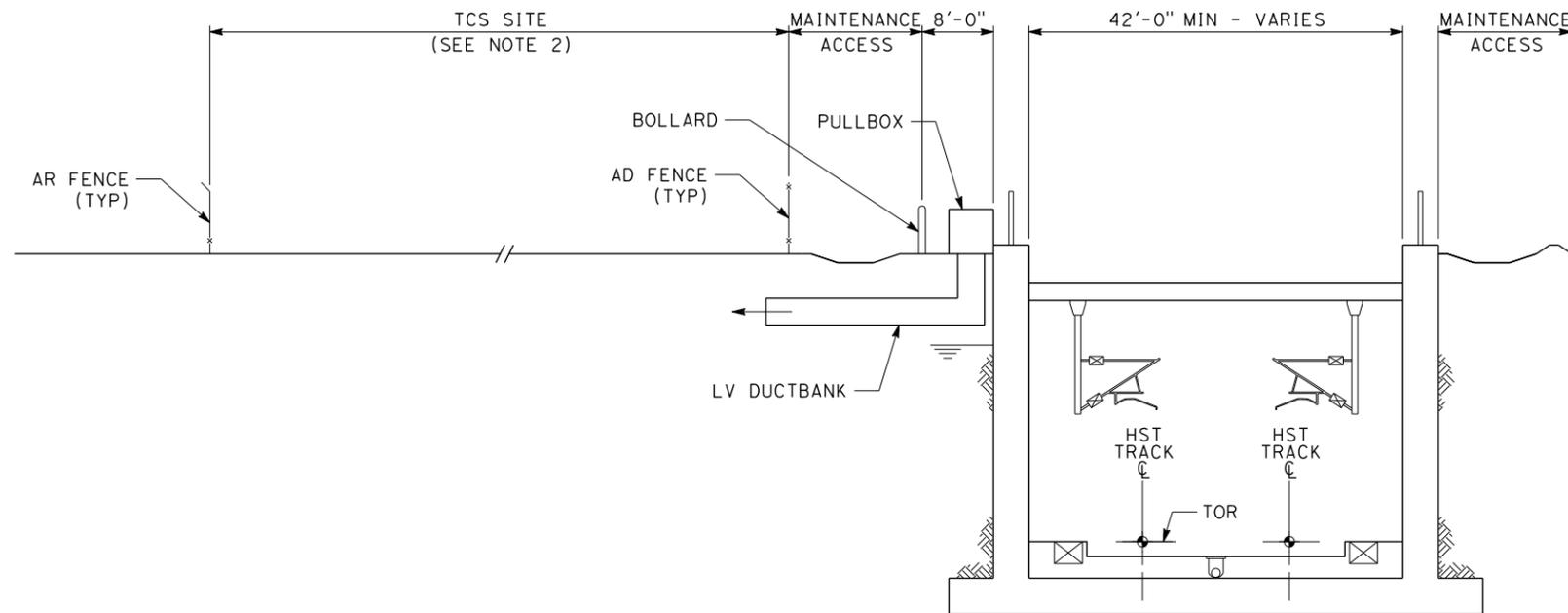
DESIGNED BY
I. MUF TIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE

SYSTEMS SITE
TCS
AERIAL

CONTRACT NO.	
DRAWING NO.	DD-TC-101
SCALE	NO SCALE
SHEET NO.	



TYPICAL SECTION
TCS SITE ADJACENT TO HST TRACKWAY TRENCH

NOTES:

1. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE TRAIN CONTROL SITE D OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST TRAIN CONTROL SITES AT AN INTERLOCKING.
2. FOR TRAIN CONTROL SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.

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RFP No.: HSR 14-32 - REVIEW DRAFT

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I. MUF TIC

DRAWN BY
V. HUANTE

CHECKED BY
B. MCNALLY

IN CHARGE
B. BANKS

DATE
8/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
AUTOMATIC TRAIN DIRECTIVE

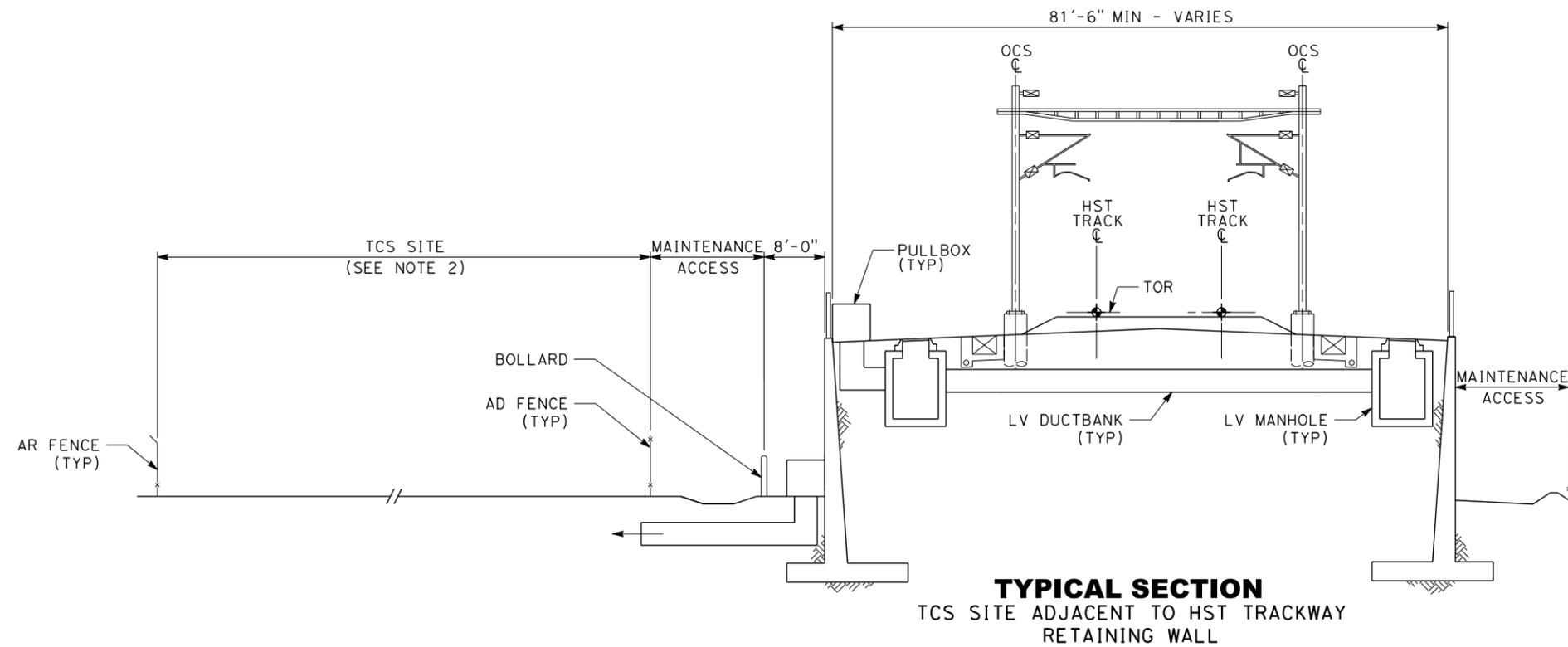
SYSTEMS SITE
TCS
TRENCH

CONTRACT NO.

DRAWING NO.
DD-TC-102

SCALE
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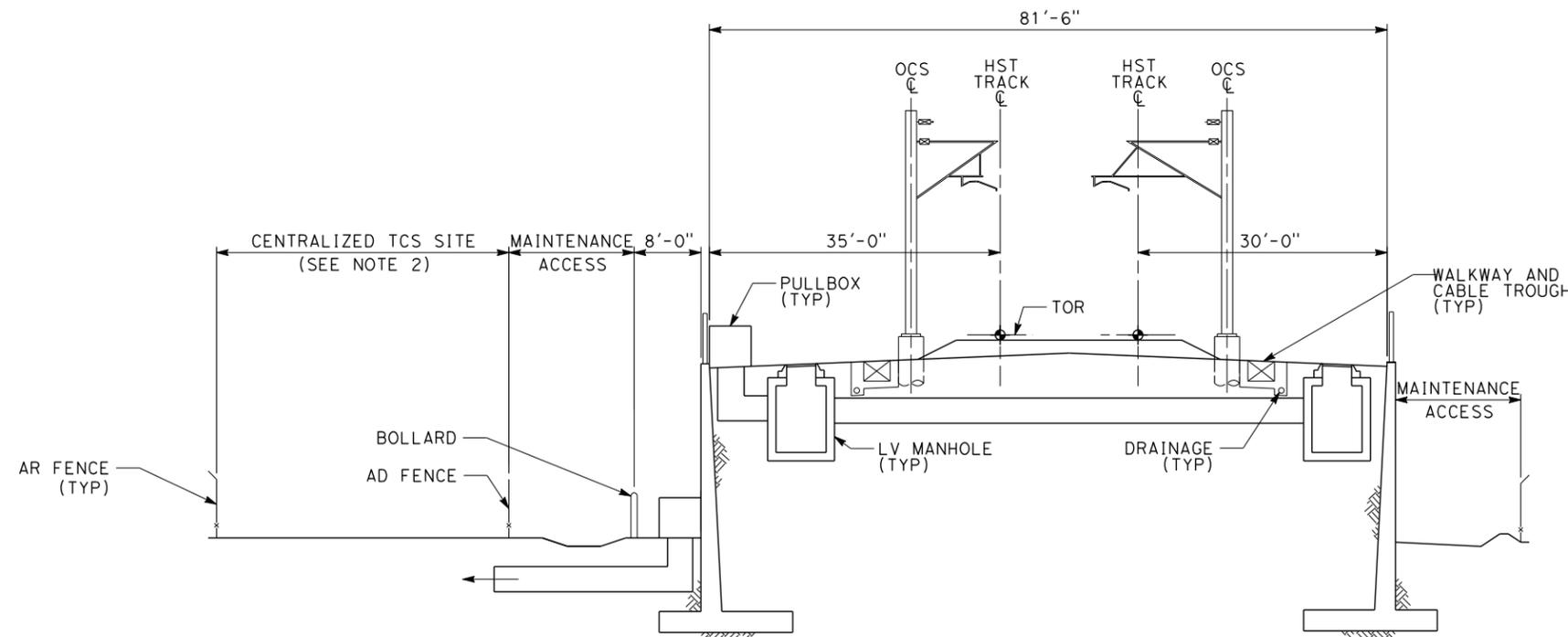
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TYPICAL SECTION
TCS SITE ADJACENT TO HST TRACKWAY
RETAINING WALL

NOTES:

1. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
2. TYPICAL CROSS SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR MINIMUM LENGTH EQUAL TO THE LONGITUDINAL WIDTH OF THE CENTRALIZED TRAIN CONTROL SITE OR FOR THE LONGITUDINAL DISTANCE BETWEEN FURTHEST AUTOMATIC TRAIN CONTROL SITES AT AN INTERLOCKING.
3. FOR TRAIN CONTROL SYSTEM SITE REQUIREMENTS REFER TO TYPICAL TRAIN CONTROL SITES LAYOUT DIRECTIVE DRAWINGS.
4. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES PROVIDED AT EACH SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.



TYPICAL SECTION
CENTRALIZED TCS SITE ADJACENT TO HST TRACKWAY
RETAINING WALL

REV	DATE	BY	CHK	APP	DESCRIPTION

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I. MUFTIC

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V. LAVERDE

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B. BANKS

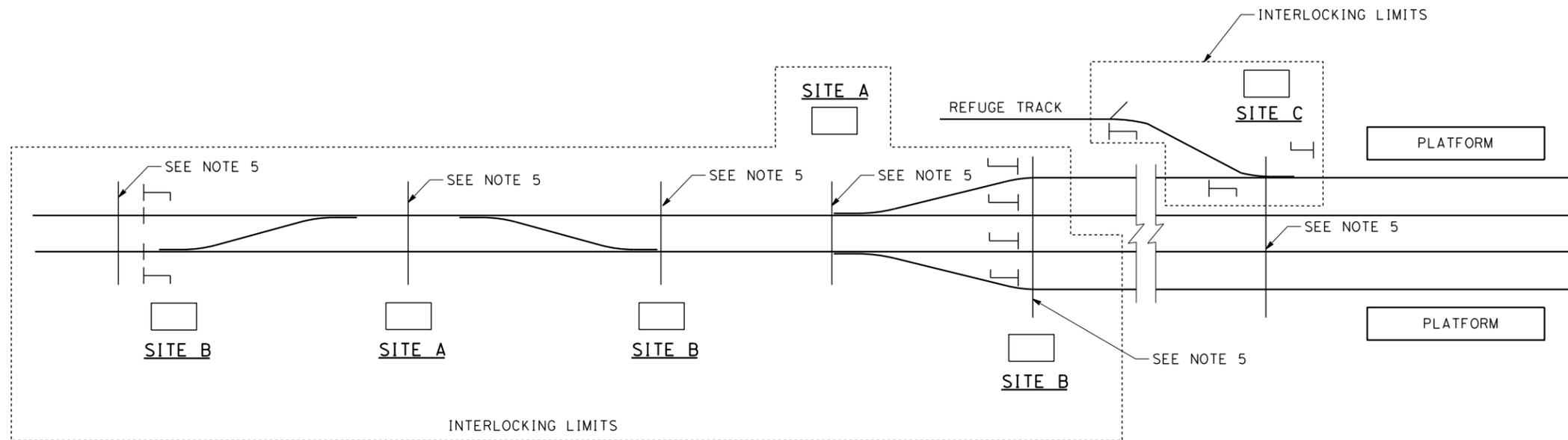
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CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL SYSTEM DIRECTIVE

SYSTEMS SITE
TCS
RETAINED FILL

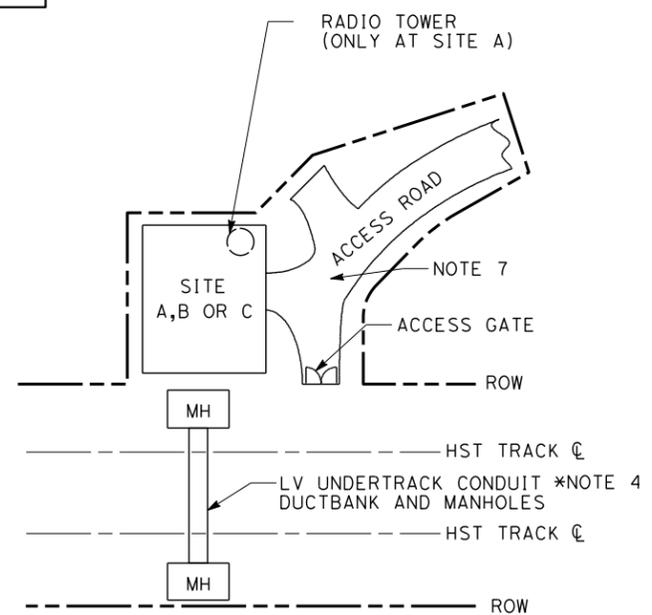
CONTRACT NO.
DRAWING NO. DD-TC-103
SCALE NO SCALE
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PLAN

NOTES:

1. SITES A AND B MAY BE LOCATED ON EITHER SIDE OF THE TRACK.
2. WHERE POSSIBLE, FOR SITES A AND B, ALTERNATIVES SHALL BE PROVIDED ON THE OPPOSITE SIDE OF THE TRACK.
3. SITE A WILL ACCOMMODATE TRAIN CONTROL SYSTEM EQUIPMENT, COMMUNICATIONS SYSTEM EQUIPMENT WITH THE RADIO TOWER, AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT.
4. AN ACCESS ROAD AND AN ACCESS GATE SHALL BE PROVIDED FOR EACH SITE PER THE CIVIL DESIGN CRITERIA.
5. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
6. FOR NUMBER OF CONDUITS REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
7. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.



SITE A, B OR C

WITH LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES

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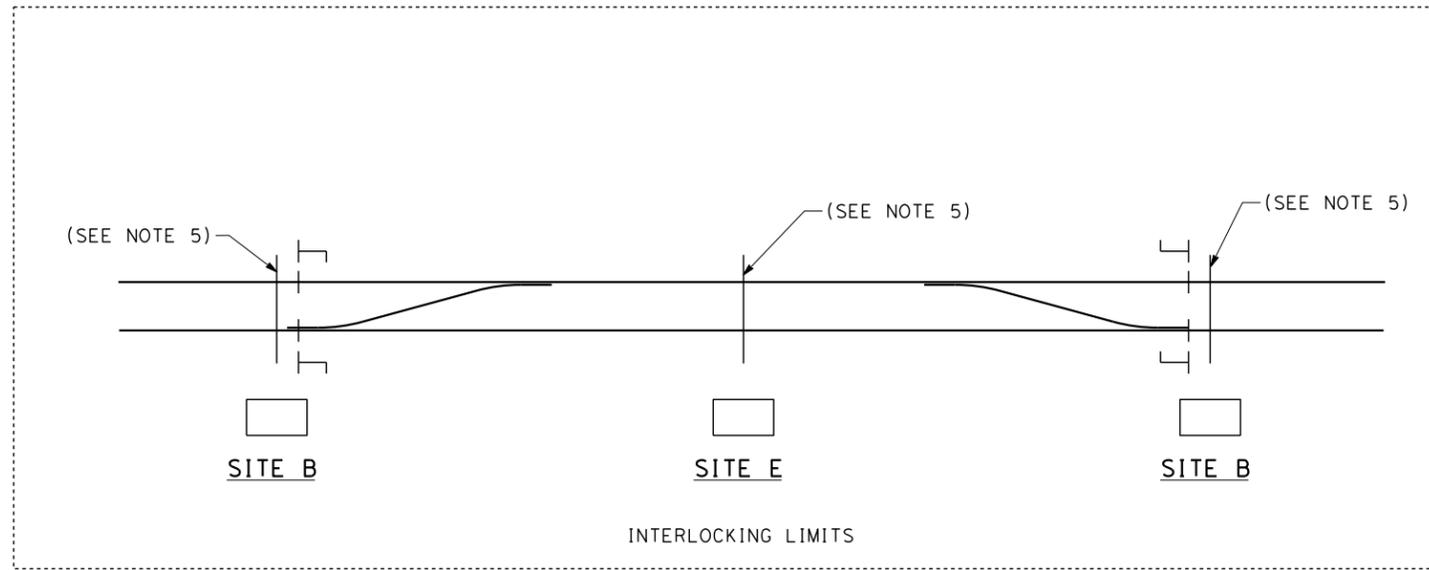
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I. MUF TIC
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V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

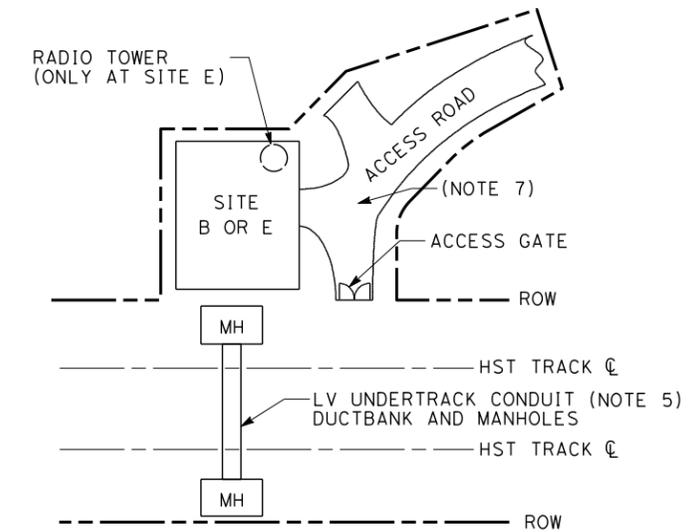
TYPICAL TCS SITES
LAYOUT AT STATION AND INTERLOCKINGS

CONTRACT NO.	
DRAWING NO.	DD-TC-200
SCALE	NO SCALE
SHEET NO.	



NOTES:

1. SITES B AND E MAY BE LOCATED ON EITHER SIDE OF THE TRACK.
2. WHERE POSSIBLE, FOR SITES B AND E, ALTERNATIVES SHALL BE PROVIDED ON THE OPPOSITE SIDE OF THE TRACK.
3. SITE E WILL ACCOMMODATE TRAIN CONTROL SYSTEM EQUIPMENT, COMMUNICATIONS SYSTEM EQUIPMENT WITH THE RADIO TOWER, AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT.
4. AN ACCESS ROAD AND AN ACCESS GATE SHALL BE PROVIDED FOR EACH SITE PER THE CIVIL DESIGN CRITERIA.
5. AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
6. FOR NUMBER OF CONDUITS REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
7. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.



SITE B OR E

WITH LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
I. MUF TIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



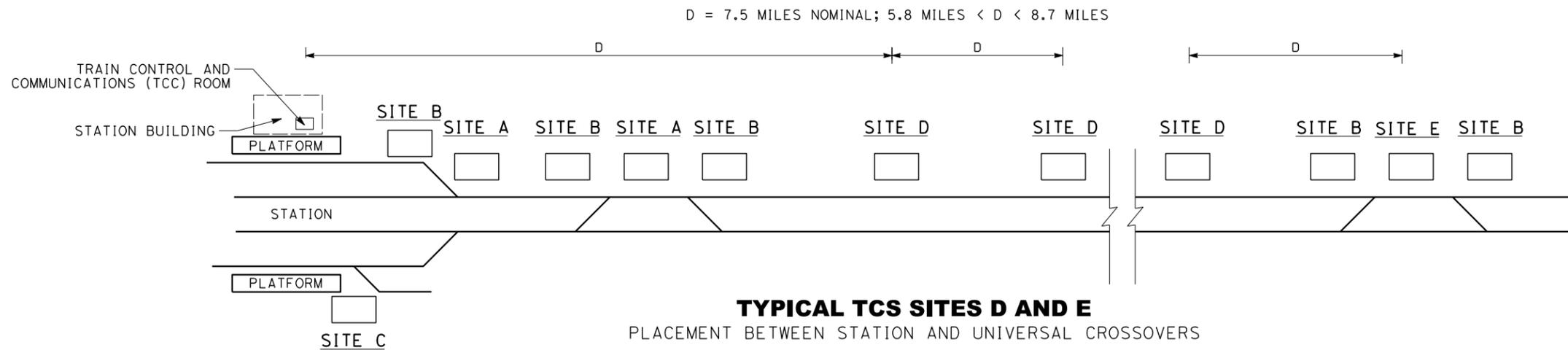
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITES AND
INTERLOCKINGS LAYOUT AT UNIVERSAL CROSSOVERS

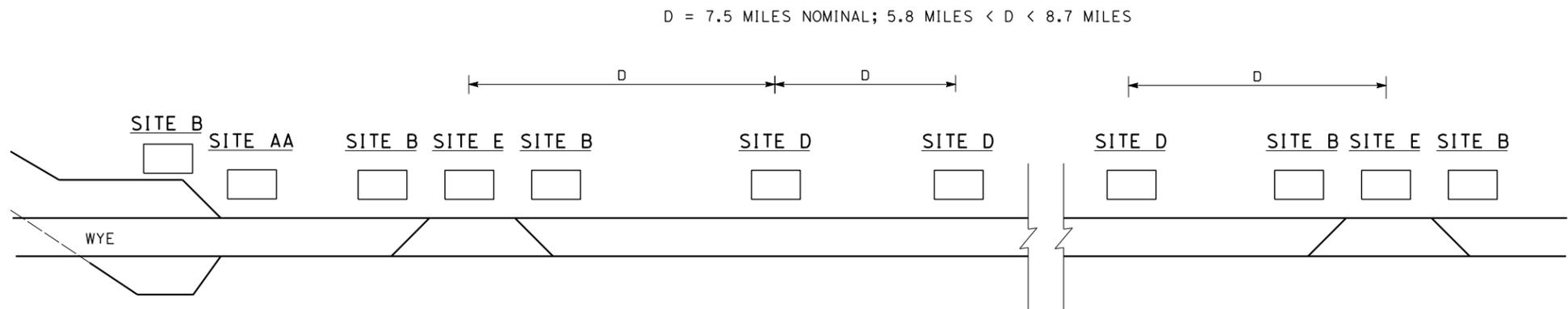
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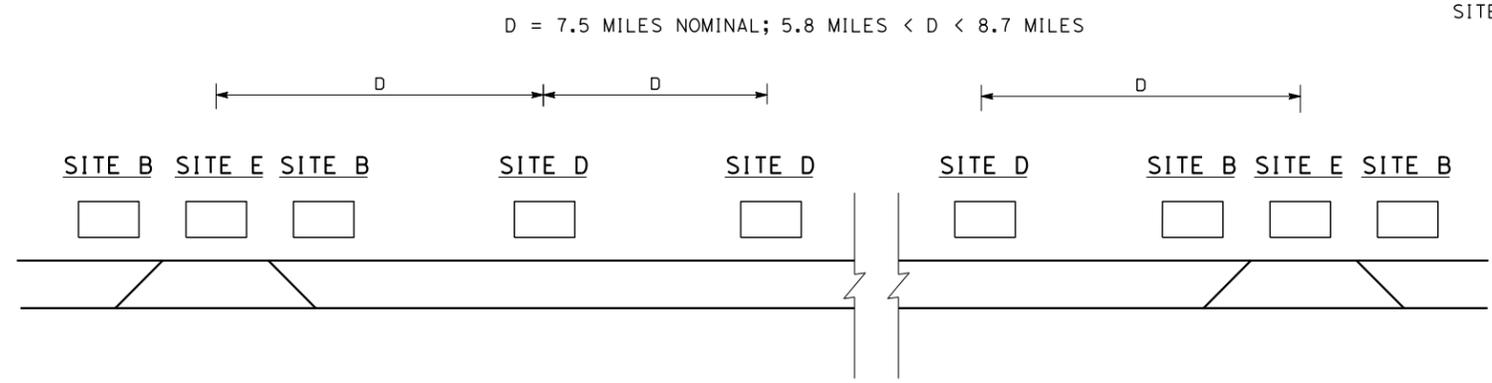
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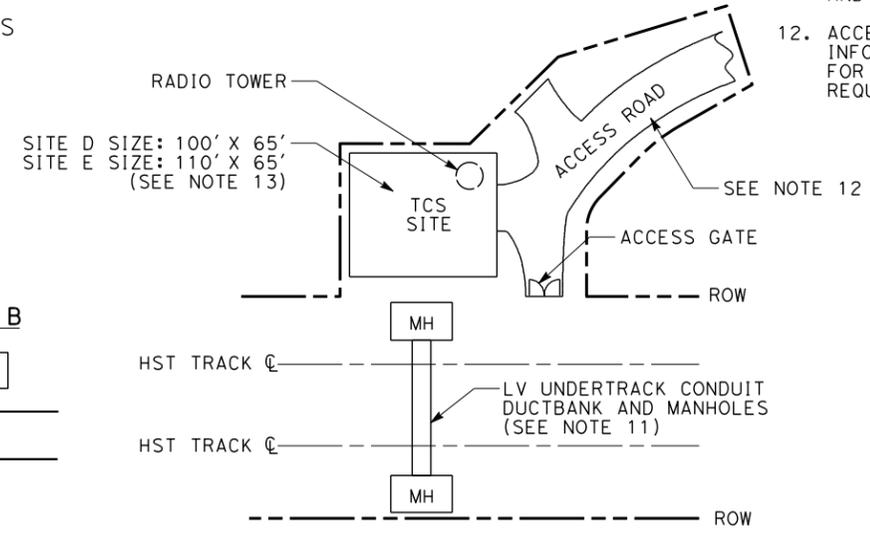
TYPICAL TCS SITES D AND E
PLACEMENT BETWEEN STATION AND UNIVERSAL CROSSOVERS



TYPICAL TCS SITES D AND E
PLACEMENT BETWEEN WYE AND UNIVERSAL CROSSOVERS



TYPICAL TCS SITES D AND E
PLACEMENT BETWEEN TWO ADJACENT UNIVERSAL CROSSOVERS



TYPICAL SITES D & E CONFIGURATION
WITH LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES

NOTES:

- THIS DRAWING SHOWS A TYPICAL SPACING BETWEEN STATION TRAIN CONTROL AND COMMUNICATIONS (TCC) ROOM, D SITES, AND E SITES AT UNIVERSAL CROSSOVERS.
- IF THE STATION DESIGN IS NOT AVAILABLE, THE CENTER LINE OF PLATFORM SHALL BE USED AS A REFERENCE POINT INSTEAD OF THE EXACT LOCATION OF THE TCC ROOM.
- D SITES SHALL BE PROVIDED AT THE NOMINAL DISTANCE OF 7.5 MILES BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS.
- MINIMUM SPACING BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS IS 5.8 MILES.
- MAXIMUM SPACING BETWEEN STATION TCC ROOM AND ADJACENT SITE D, BETWEEN 2 ADJACENT D SITES, AND BETWEEN ADJACENT D SITE AND E SITE AT UNIVERSAL CROSSOVERS IS 8.7 MILES.
- D SITES MAY BE LOCATED ON EITHER SIDE OF TRACK.
- FOR EACH D SITE, AN ALTERNATIVE SHALL BE PROVIDED.
- IF THERE IS AN EXISTING STAND ALONE RADIO SITE (SRS) WITHIN THE SPACING LIMITS FOR A D SITE, THE SRS CAN BE REPLACED WITH A NEW D SITE.
- IF THERE IS A TRACTION POWER FACILITY (TPF) WITHIN THE SPACING LIMITS FOR AN ATC D SITE, THE ATC D SITE CAN BE PLACED CLOSE TO THE TPF SITE TO UTILIZE THE SAME ACCESS ROAD.
- THIS CRITERIA IS NOT APPLICABLE FOR TUNNELS LONGER THAN 6 MILES AND THOSE WILL BE CONSIDERED AS A SPECIAL CASE.
- AN ASSEMBLY, CONSISTING OF A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES, SHALL BE PROVIDED AT EACH TRAIN CONTROL SITE. REFER TO COMMUNICATIONS DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE DETAIL REQUIREMENTS.
- ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. REFER TO CIVIL DESIGN CRITERIA FOR ACCESS ROADS AND ACCESS GATES DETAIL REQUIREMENTS.

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

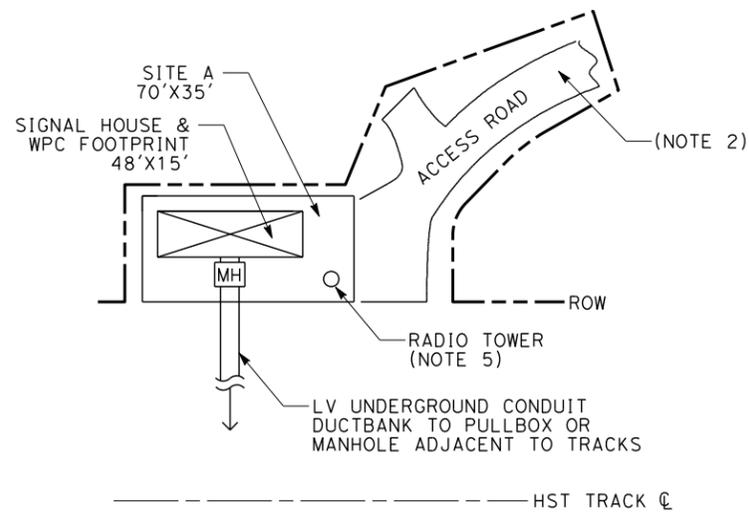
DESIGNED BY
I. MUF TIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



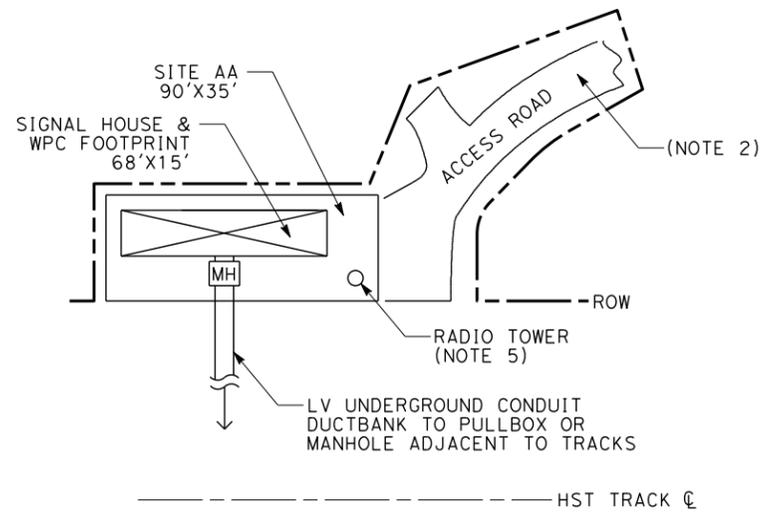
CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE

TYPICAL TCS
SITES D AND E CONFIGURATION

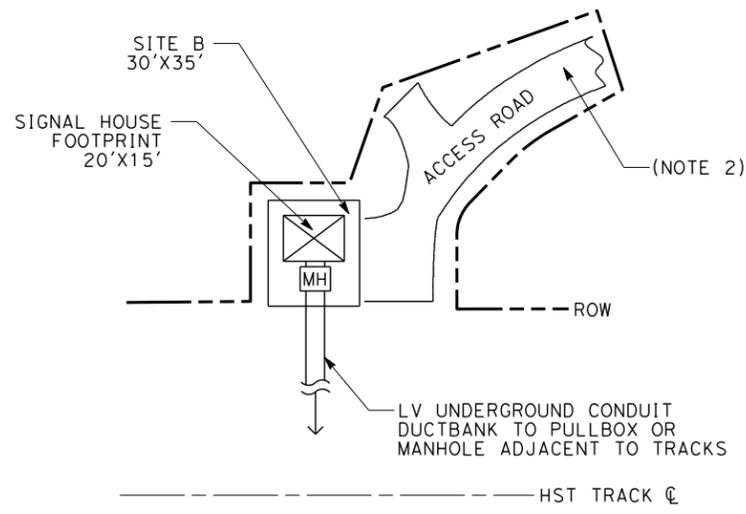
CONTRACT NO.	
DRAWING NO.	DD-TC-202
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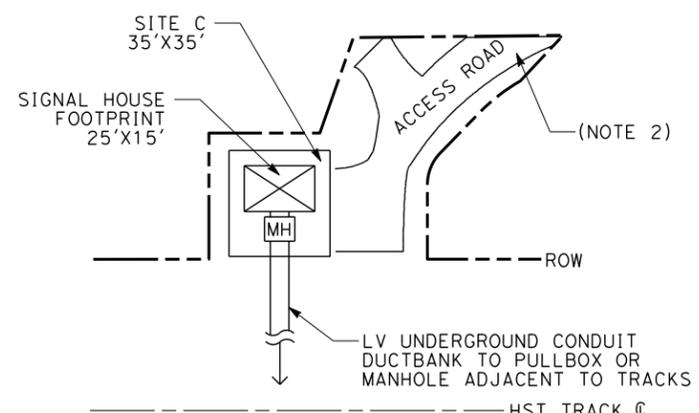
SITE A TYPICAL CONFIGURATION



SITE AA TYPICAL CONFIGURATION



SITE B TYPICAL CONFIGURATION



SITE C TYPICAL CONFIGURATION

NOTES:

1. SITES A AND AA WILL ACCOMMODATE TRAIN CONTROL, COMMUNICATIONS SYSTEM (WITH RADIO TOWER), AND WAYSIDE POWER CONTROL (WPC) EQUIPMENT. A SEPARATE ROOM OF 25 SQUARE FEET SHALL BE RESERVED FOR WPC WITHIN THE SIGNAL HOUSE.
2. REFER TO COMMUNICATIONS DRAWINGS FOR DUCTBANK, MANHOLE CROSS SECTIONS, DETAILS AND ELEVATIONS.
3. FOR NUMBERS OF CONDUITS REFER TO COMMUNICATION DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
4. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
I. MUF TIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

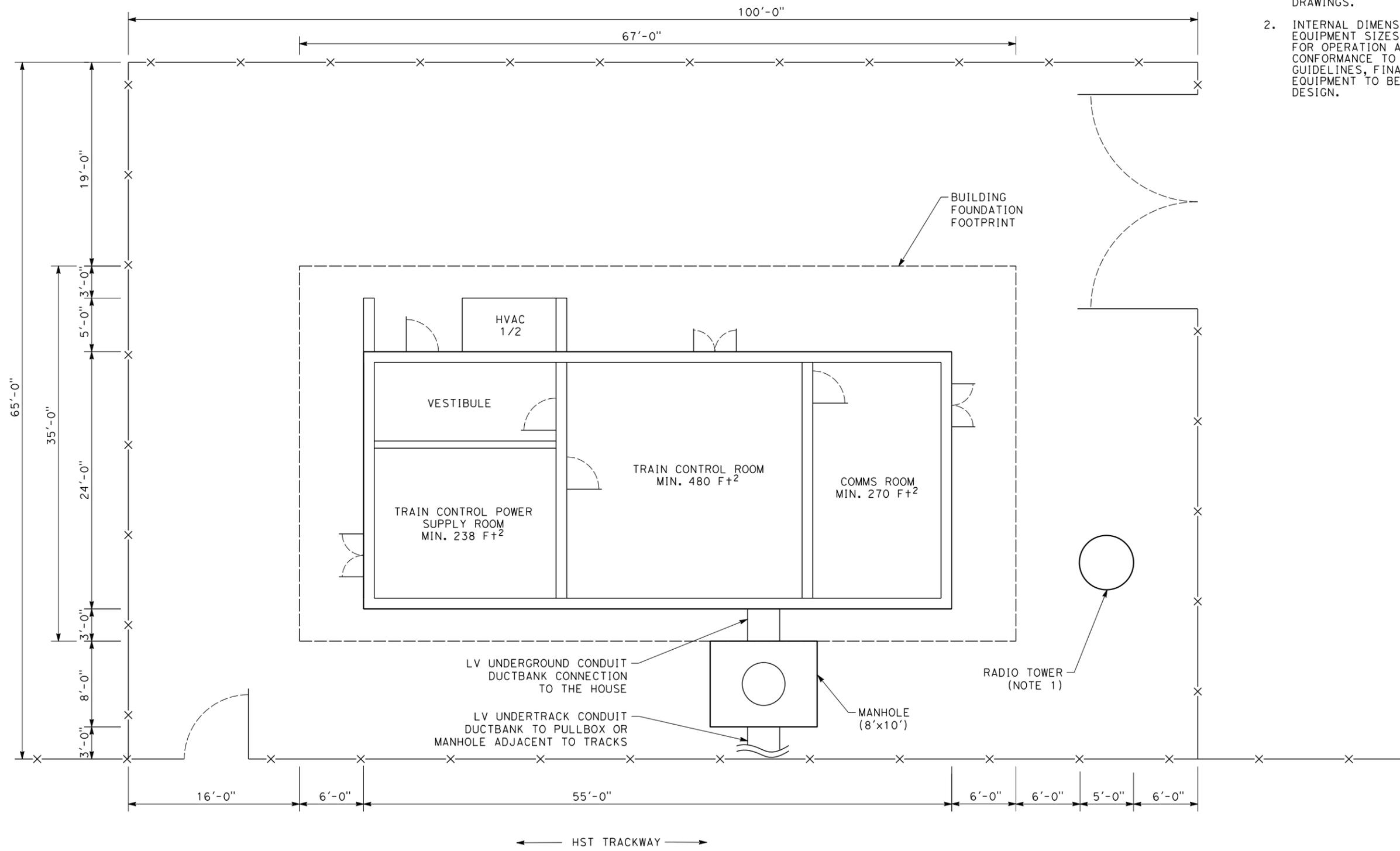


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITES
A, AA, B, & C LAYOUT

CONTRACT NO.
DRAWING NO. DD-TC-203
SCALE NO SCALE
SHEET NO.

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- NOTES:**
1. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.
 2. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES, CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

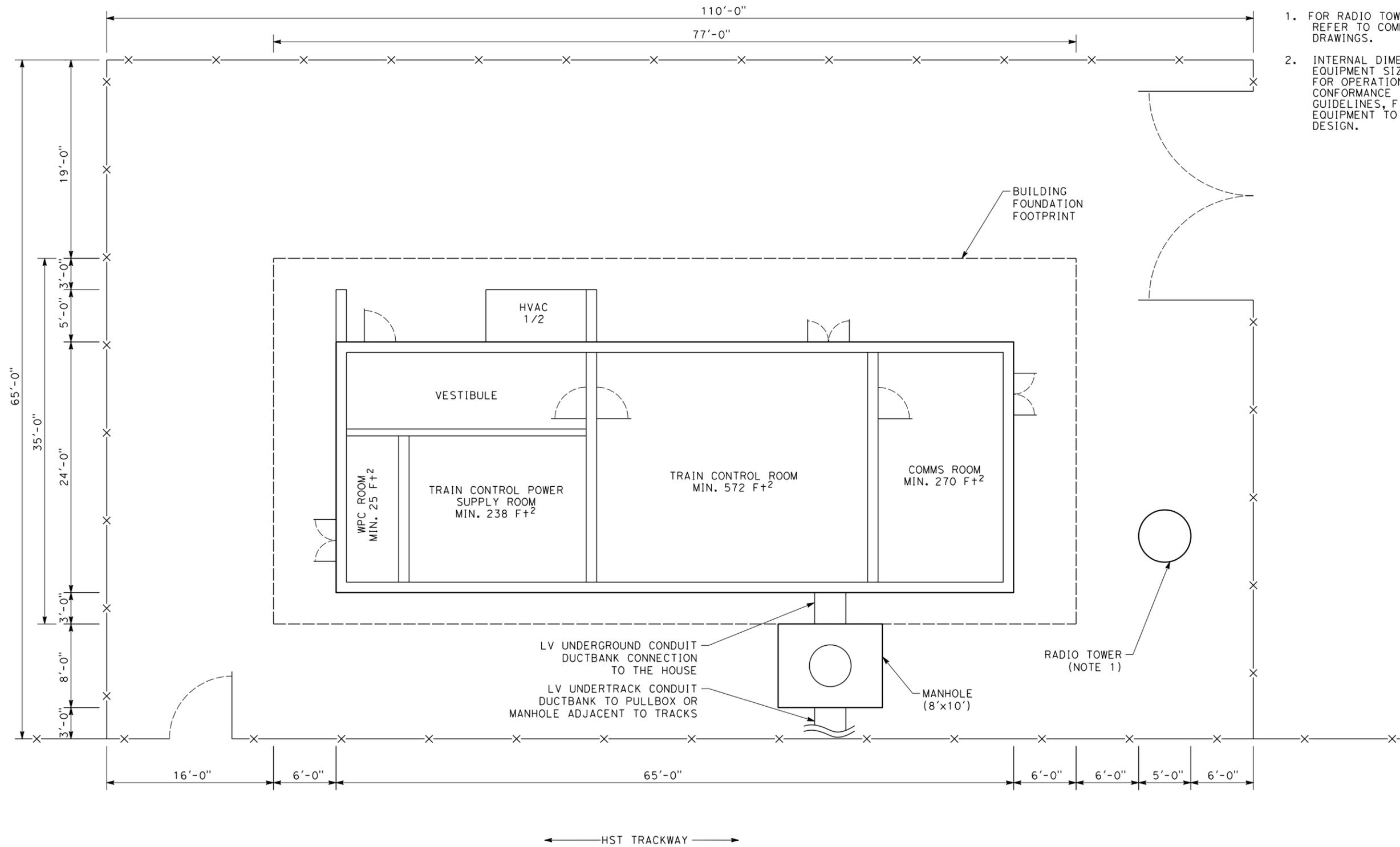
DESIGNED BY
I. MUF TIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITE D LAYOUT

CONTRACT NO.
DRAWING NO. DD-TC-204
SCALE NO SCALE
SHEET NO.



NOTES:

1. FOR RADIO TOWER REQUIREMENTS AND CLEARANCES REFER TO COMMUNICATIONS DESIGN CRITERIA AND DRAWINGS.
2. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES, CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
I. MUF TIC
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

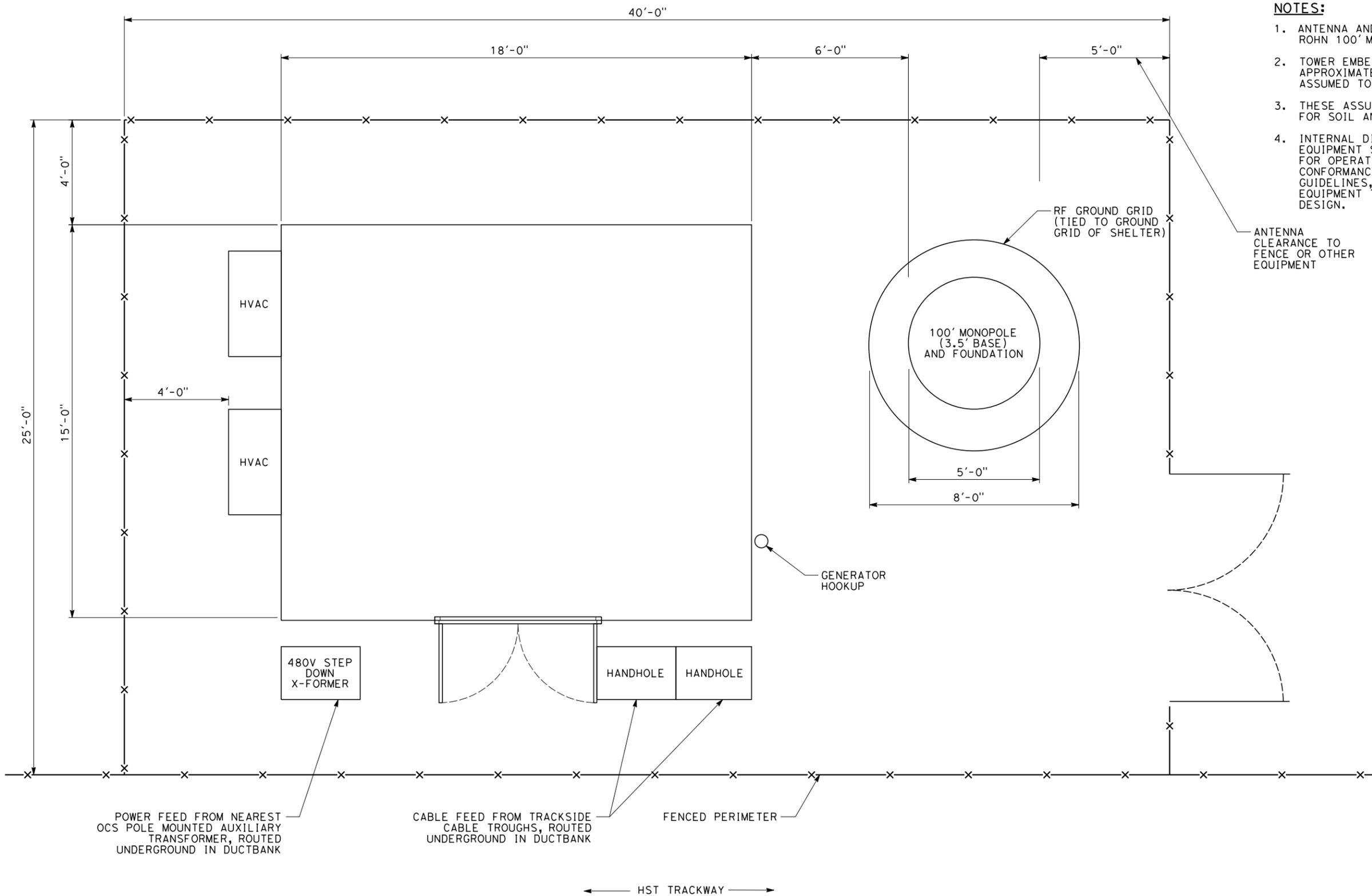


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRAIN CONTROL DIRECTIVE**

TYPICAL TCS SITE E LAYOUT

CONTRACT NO.
DRAWING NO. DD-TC-205
SCALE NO SCALE
SHEET NO.

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NOTES:

1. ANTENNA AND SUPPORT DIMENSIONS ARE BASED ON ROHN 100' MONOPOLE T100HA.
2. TOWER EMBEDMENT DEPTH ASSUMED TO BE APPROXIMATELY 25 FEET TOWER BASE AND FOUNDATION ASSUMED TO BE 5 FOOT DIAMETER.
3. THESE ASSUMPTIONS SHALL BE VALIDATED BY DESIGN FOR SOIL AND ENVIRONMENTAL CONDITIONS.
4. INTERNAL DIMENSIONS ARE SHOWN FOR TYPICAL EQUIPMENT SIZES. CLEARANCES AND ACCESSIBILITY FOR OPERATION AND MAINTENANCE OF EQUIPMENT AND CONFORMANCE TO RELEVANT CODES, STANDARDS, AND GUIDELINES, FINAL DIMENSIONS AND CONFIGURATION OF EQUIPMENT TO BE DETERMINED DURING FINAL SYSTEMS DESIGN.

ANTENNA CLEARANCE TO FENCE OR OTHER EQUIPMENT

RF GROUND GRID (TIED TO GROUND GRID OF SHELTER)

100' MONOPOLE (3.5' BASE) AND FOUNDATION

GENERATOR HOOKUP

480V STEP DOWN X-FORMER

HANDHOLE HANDHOLE

POWER FEED FROM NEAREST OCS POLE MOUNTED AUXILIARY TRANSFORMER, ROUTED UNDERGROUND IN DUCTBANK

CABLE FEED FROM TRACKSIDE CABLE TROUGHS, ROUTED UNDERGROUND IN DUCTBANK

FENCED PERIMETER

← HST TRACKWAY →

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

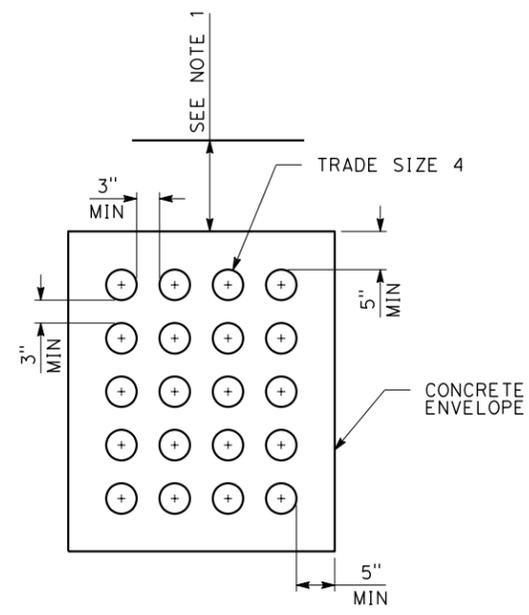


**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

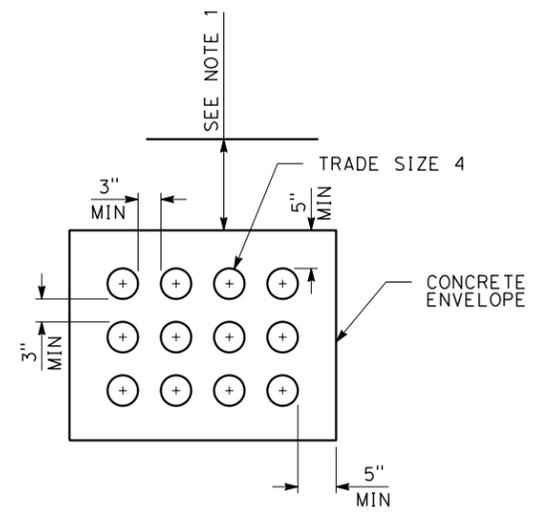
CONCEPTUAL LAYOUT
COMMUNICATIONS SPACES
PHYSICAL SITE LAYOUT

CONTRACT NO.
DRAWING NO. DD-CO-F080
SCALE NO SCALE
SHEET NO.

RFP No.: HSR 14-32 - REVIEW DRAFT



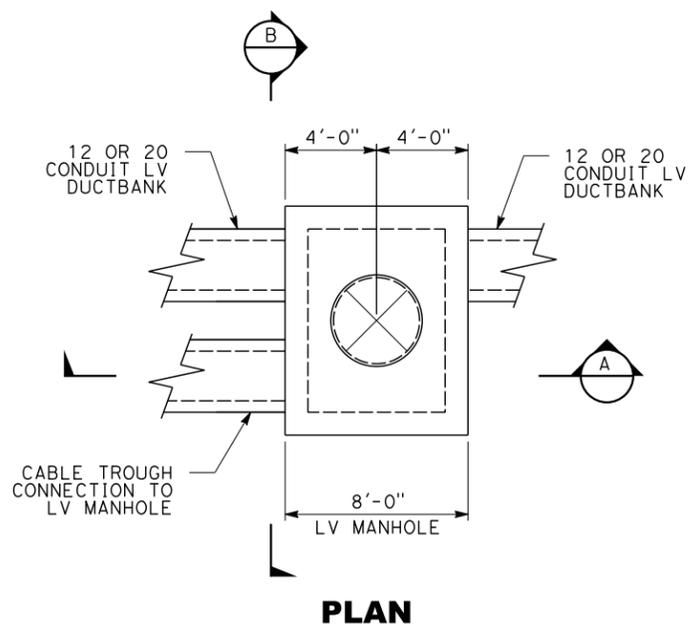
20 CONDUIT CONCRETE ENCASED DUCT BANK



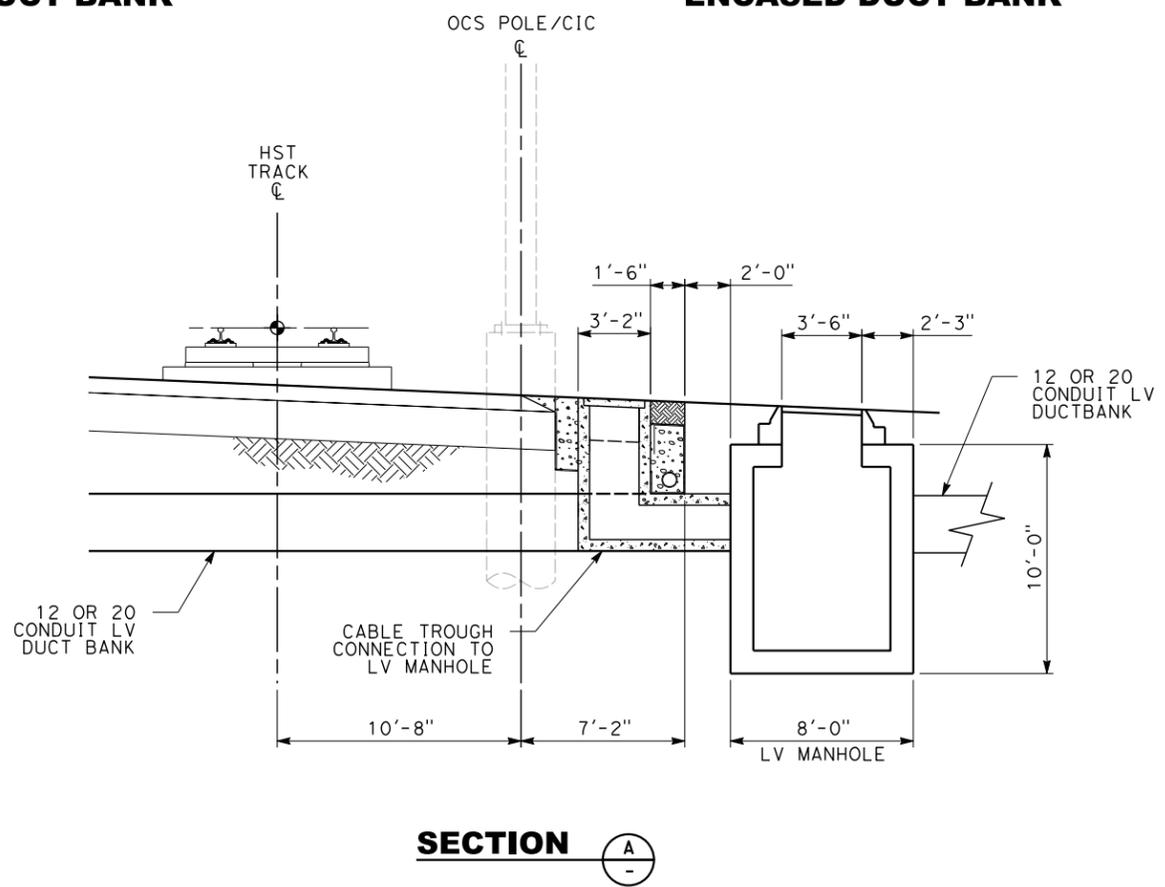
12 CONDUIT CONCRETE ENCASED DUCT BANK

NOTES:

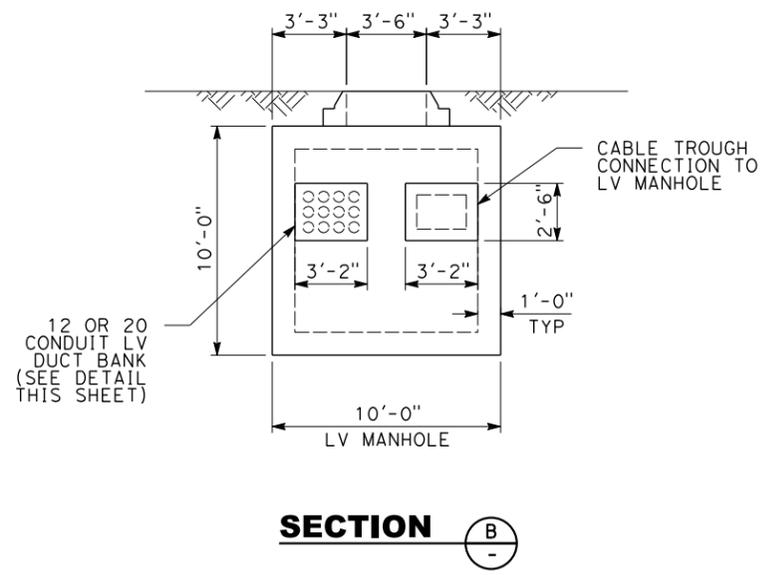
1. CONCRETE ENCASED DUCT BANK TO BE PLACED A MINIMUM 6' BELOW TOP OF RAIL AND MINIMUM 3' BELOW GRADE WHEN NO RAIL IS PRESENT.
2. LOW VOLTAGE DUCT BANK TO BE LOCATED PER THE CRITERIA LISTED IN THE COMMUNICATIONS DESIGN CRITERIA CHAPTER.



PLAN



SECTION A



SECTION B

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**

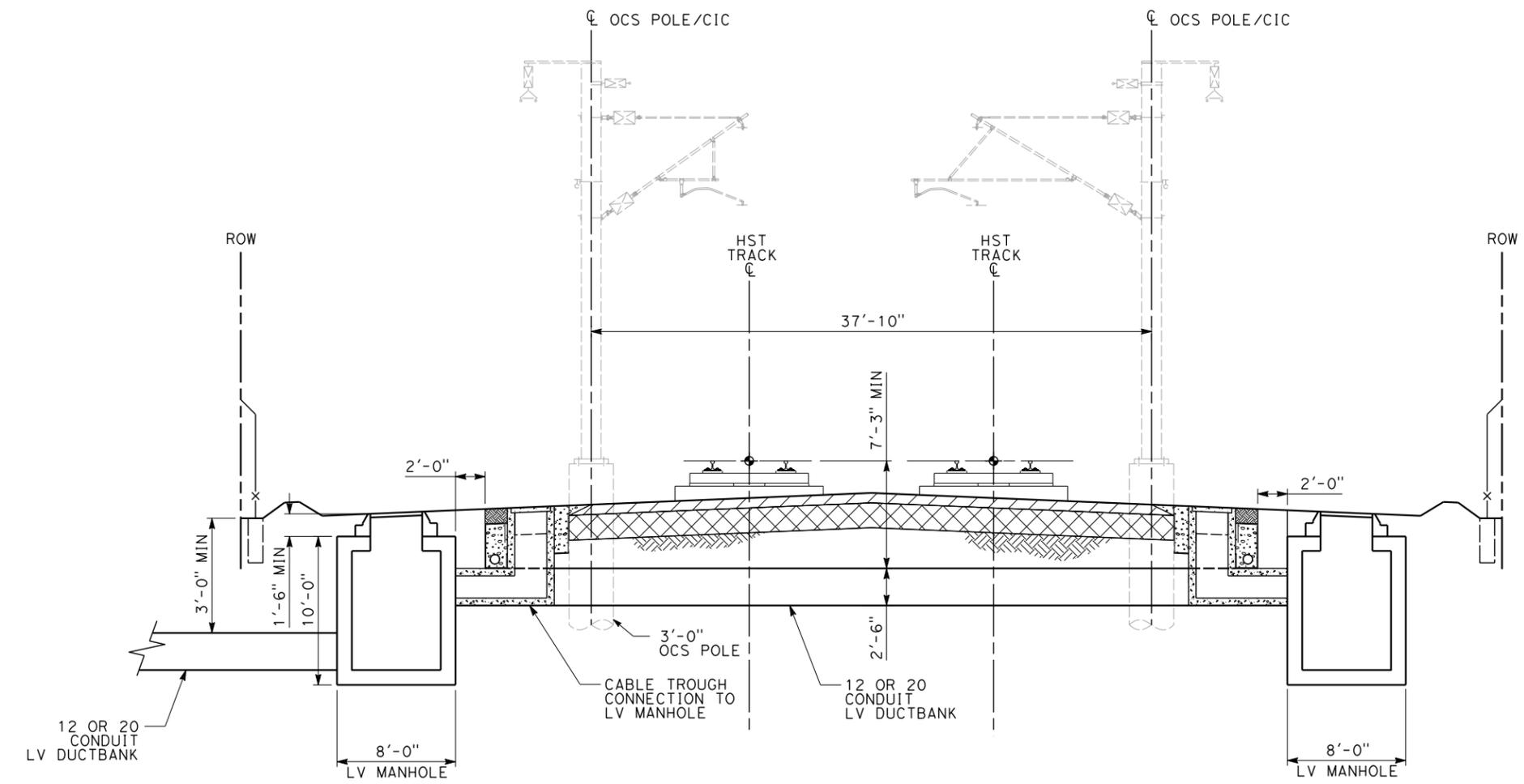
TYPICAL CROSS SECTION
LOW VOLTAGE MANHOLE / CABLE TROUGH / DUCTBANK
DETAILS

CONTRACT NO.
DRAWING NO. DD-CO-G023
SCALE NO SCALE
SHEET NO.

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. MANHOLE SHALL NOT BE ALIGNED WITH OCS FOUNDATION OR FENCE FOOTING.



RFP No.: HSR 14-32 - REVIEW DRAFT

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
B. BANKS
 DRAWN BY
V. HUANTE
 CHECKED BY
C. DALOIA
 IN CHARGE
R. SCHEDES
 DATE



CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE
 TYPICAL CROSS SECTION
 SYSTEMS LOW-VOLTAGE
 UNDERTRACK CONDUIT DUCT BANK
 AT-GRADE

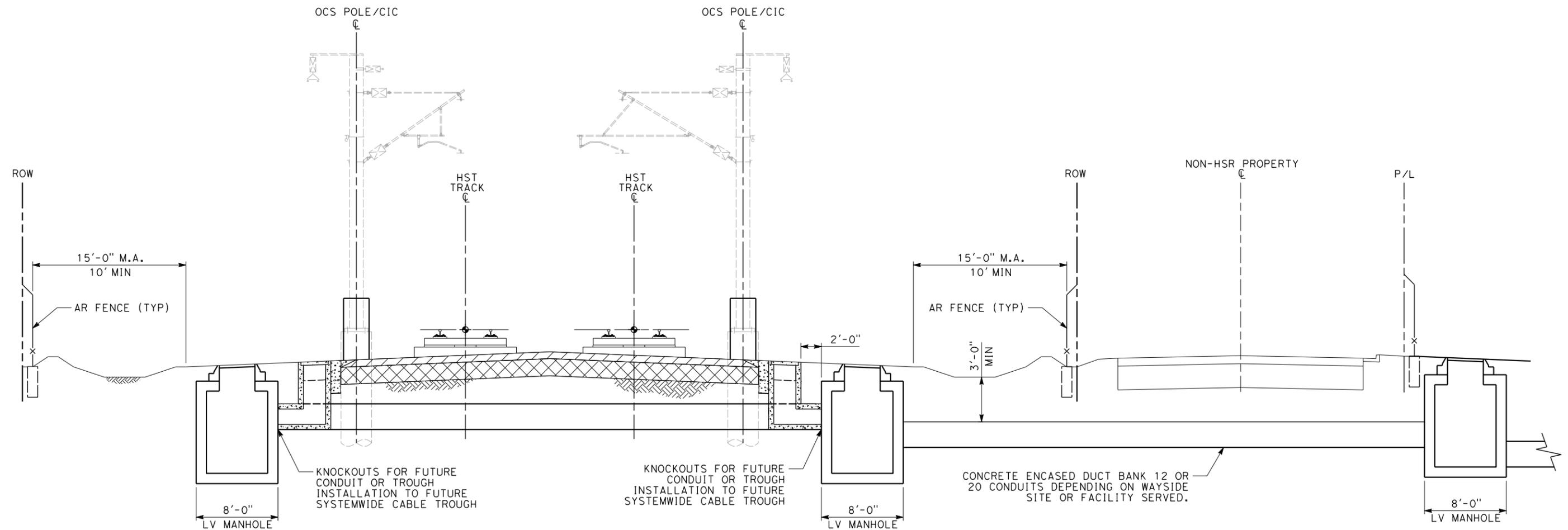
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SCALE NO SCALE
SHEET NO.

RFP No: HSR 14-32 - REVIEW DRAFT

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NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.



REV	DATE	BY	CHK	APP	DESCRIPTION

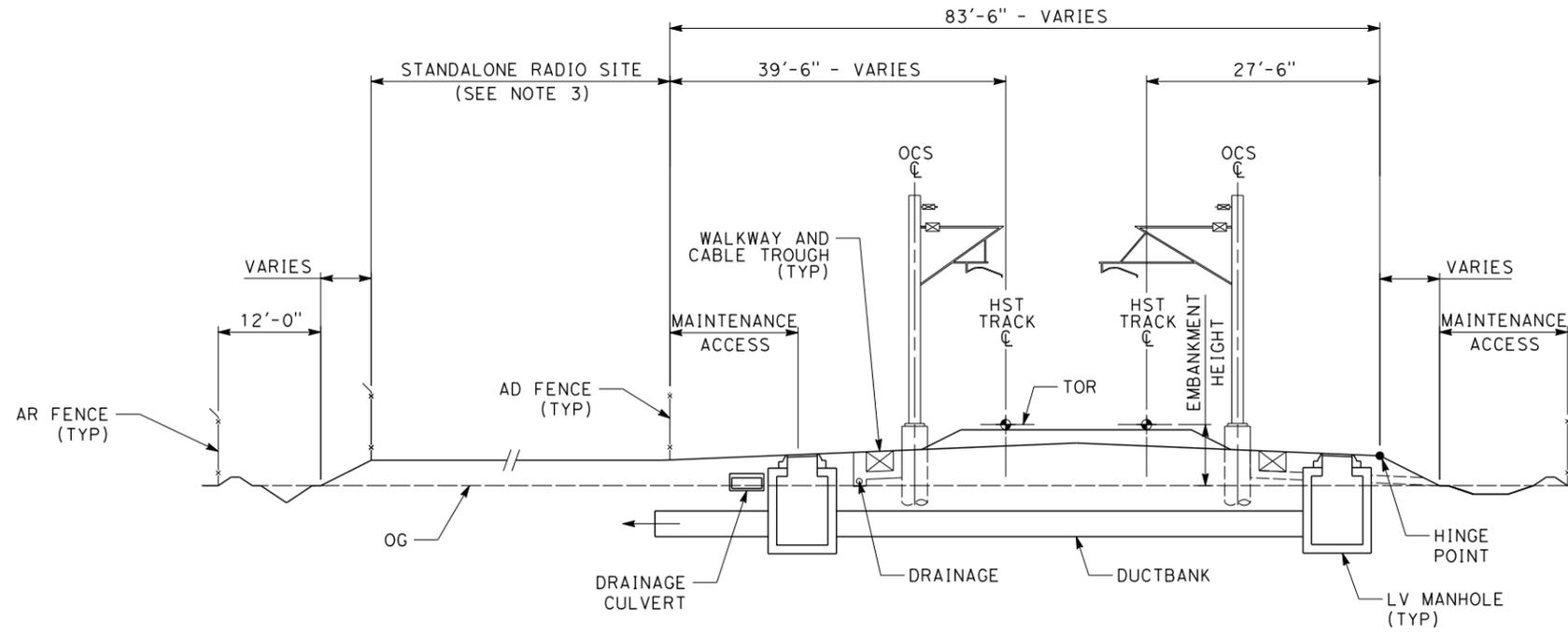
DESIGNED BY
B. BANKS
DRAWN BY
V. HUANTE
CHECKED BY
C. DALOIA
IN CHARGE
R. SCHMEDES
DATE
01/24/2014



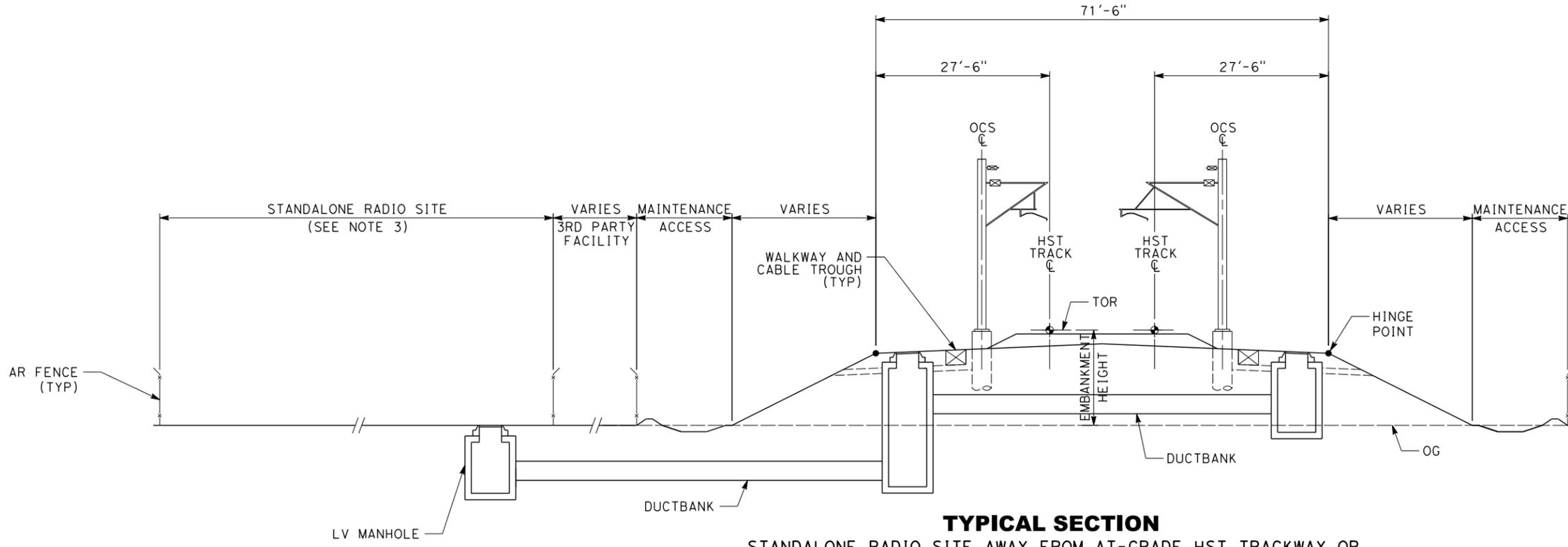
**CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE**
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
UNDER TRACK/UNDERGROUND CONDUIT DUCT BANK
AT-GRADE

CONTRACT NO.
DRAWING NO.
DD-CO-G041
SCALE
NO SCALE
SHEET NO.

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TYPICAL SECTION
 STANDALONE RADIO SITE ADJACENT TO AT-GRADE HST TRACKWAY
 WITH EMBANKMENT HEIGHT (TOR-OG) ≤ 10 FEET



TYPICAL SECTION
 STANDALONE RADIO SITE AWAY FROM AT-GRADE HST TRACKWAY OR
 EMBANKMENT HEIGHT (TOR-OG) > 10 FEET

- NOTES:**
1. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
 2. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
 3. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
 4. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
 5. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
 6. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES TO BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
 7. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
 8. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.

RFP No.: HSR 14-32 - REVIEW DRAFT

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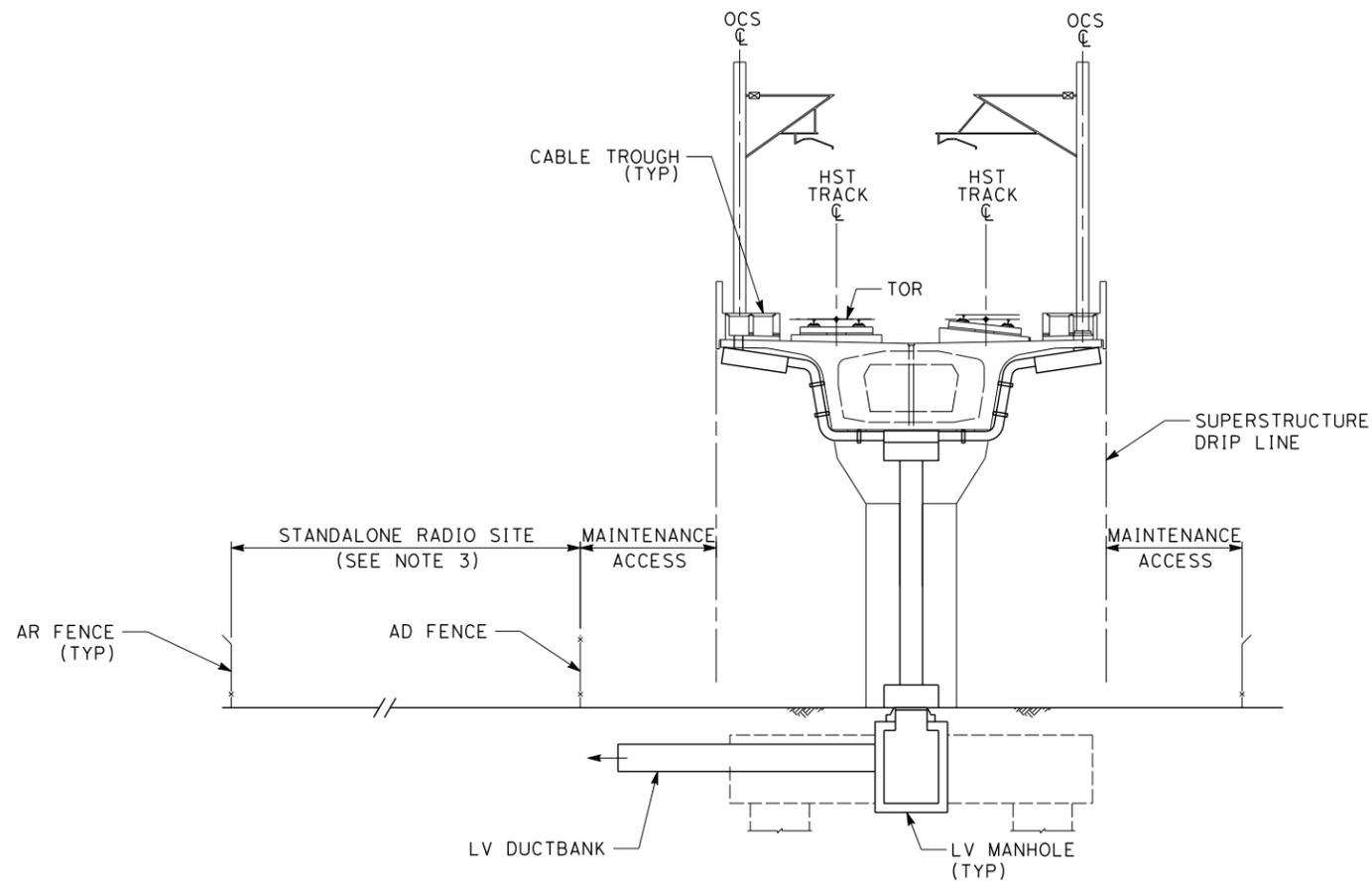
DESIGNED BY
C. DALOIA
 DRAWN BY
V. LAVERDE
 CHECKED BY
B. MCNALLY
 IN CHARGE
B. BANKS
 DATE
8/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE

 SYSTEMS SITE
 STANDALONE RADIO SITE
 AT-GRADE

CONTRACT NO.
DRAWING NO. DD-CO-G050
SCALE NO SCALE
SHEET NO.



TYPICAL SECTION
STANDALONE RADIO SITE AT AERIAL TRACKWAY

NOTES:

1. SYSTEM SITES AT AERIAL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
3. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
4. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
5. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
6. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.

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DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
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B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014

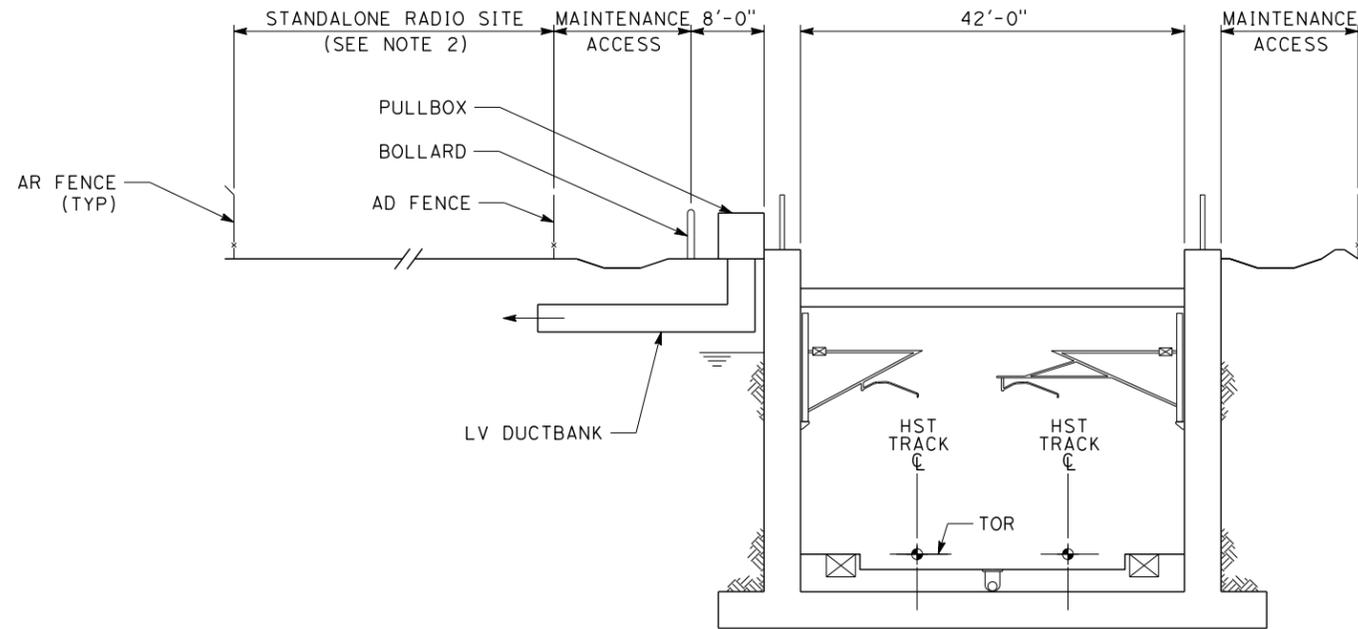


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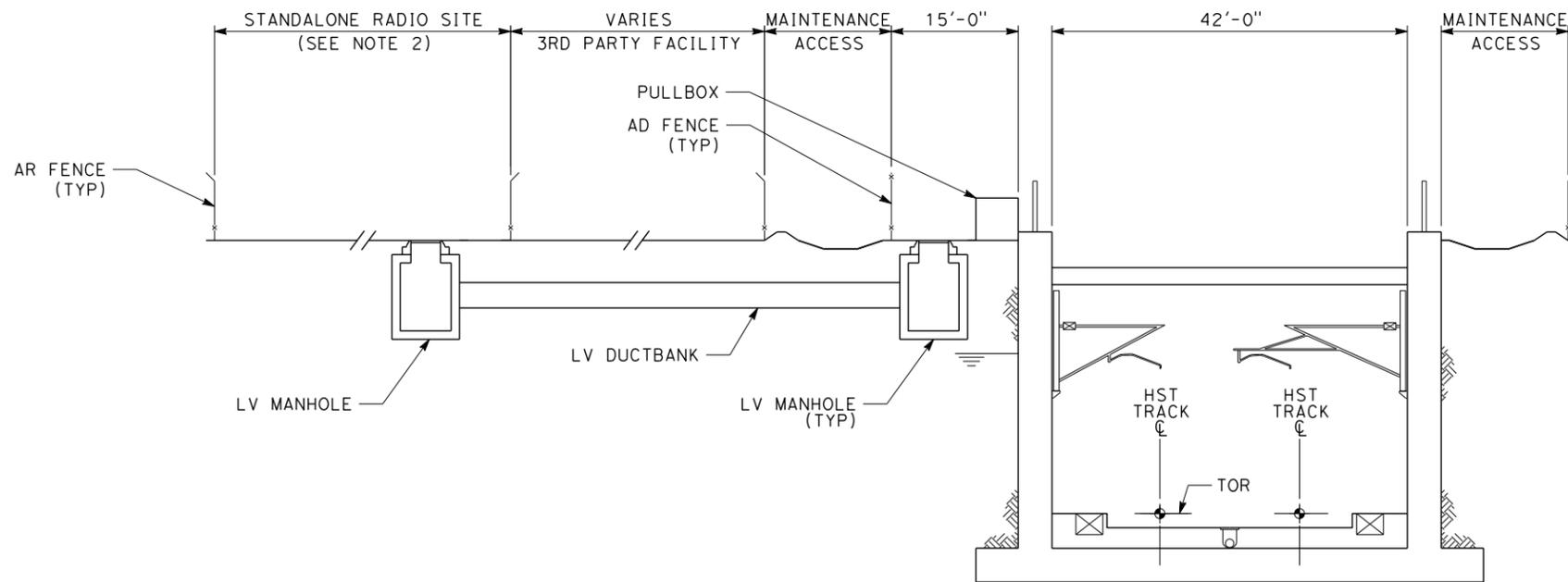
SYSTEMS SITE
STANDALONE RADIO SITE
AERIAL

CONTRACT NO.
DRAWING NO. DD-CO-G051
SCALE NO SCALE
SHEET NO.

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TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO TRENCH HST TRACKWAY



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM TRENCH HST TRACKWAY

NOTES:

1. SYSTEM SITES AT TRENCH TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
3. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
4. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
8. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
9. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLES TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY.

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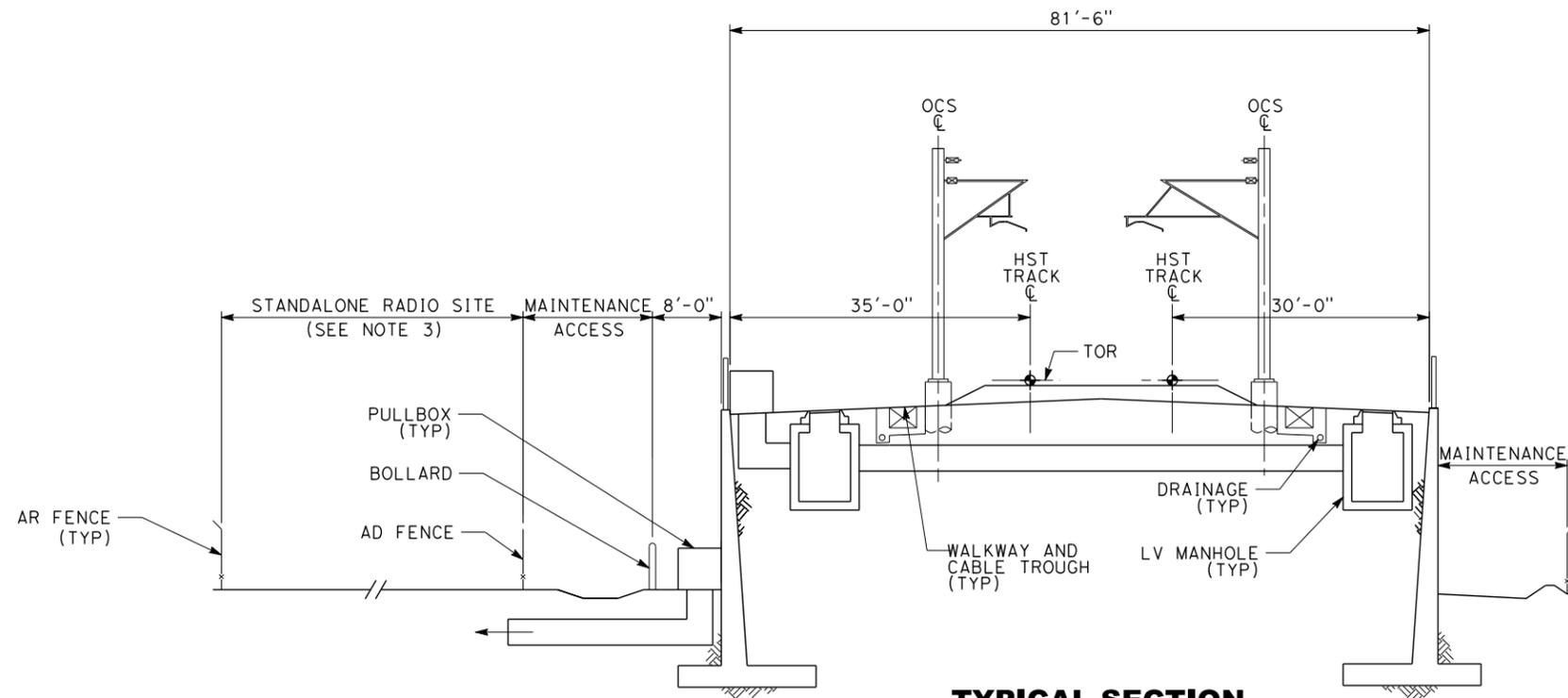
DESIGNED BY
C. DALOIA
 DRAWN BY
V. LAVERDE
 CHECKED BY
B. MCNALLY
 IN CHARGE
B. BANKS
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8/29/2014



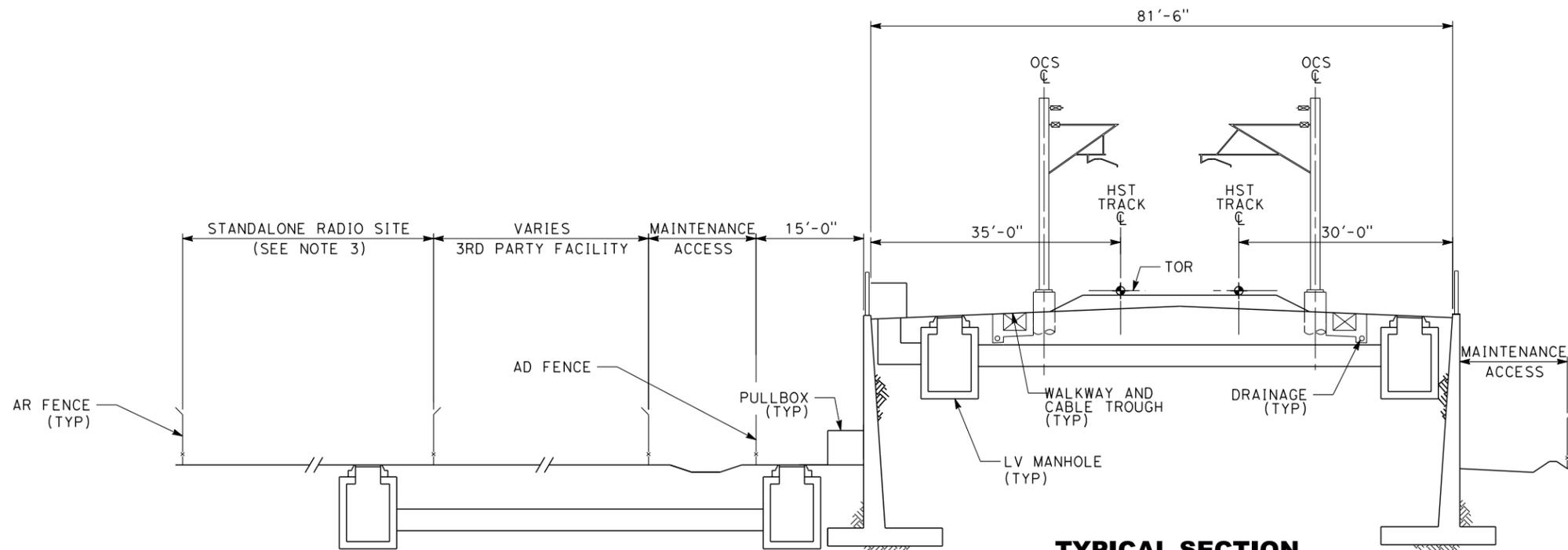
CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE

 SYSTEMS SITE
 STANDALONE RADIO SITE
 TRENCH

CONTRACT NO.
DRAWING NO. DD-CO-G052
SCALE NO SCALE
SHEET NO.



TYPICAL SECTION
STANDALONE RADIO SITE ADJACENT TO HST TRACKWAY
RETAINING WALL



TYPICAL SECTION
STANDALONE RADIO SITE AWAY FROM HST TRACKWAY
RETAINING WALL

NOTES:

1. SYSTEM SITES AT RETAINED FILL TRACKWAY ARE UNDESIRABLE. THESE CROSS-SECTIONS ARE ONLY APPLICABLE IF AT-GRADE SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
2. FOR RETAINED-FILLED TRACKWAYS, REINFORCED CONCRETE RETAINING WALLS SHALL BE USED AT SYSTEMS SITES.
3. TYPICAL CROSS-SECTIONAL WIDTH SHOWN SHALL BE PROVIDED FOR A MINIMUM LENGTH EQUAL TO THE LONGITUDINAL DIMENSION OF THE SYSTEMS SITE.
4. FOR STANDALONE RADIO SITE REQUIREMENTS REFER TO COMMUNICATIONS SYSTEMS SITE REQUIREMENTS.
5. FOR ACCESS RESTRICTION FENCING AND BERM DETAILS, REFER TO CIVIL DIRECTIVE DRAWINGS.
6. TRACK SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN. FOR SITE DRAINAGE REQUIREMENTS REFER TO DRAINAGE DIRECTIVE DRAWINGS.
7. FOR ACCESS ROADS, ACCESS GATE AND ACCESS TO TRACKWAY REQUIREMENTS REFER TO SAFETY AND SECURITY DESIGN REQUIREMENTS FOR INFRASTRUCTURE ELEMENTS AND CIVIL DESIGN CRITERIA.
8. A LOW VOLTAGE UNDERTRACK DUCTBANK WITH 2 LOW VOLTAGE MANHOLES TO BE PROVIDED AT SYSTEMS SITE. REFER TO COMMUNICATIONS DESIGN CRITERIA MANUAL AND DIRECTIVE DRAWINGS FOR LOW VOLTAGE UNDERTRACK CONDUIT DUCTBANK AND MANHOLE REQUIREMENTS.
9. SYSTEM SITES AWAY FROM TRACKWAY, SEPARATED BY A THIRD-PARTY RIGHT-OF-WAY ARE UNDESIRABLE. AWAY CROSS-SECTION IS ONLY APPLICABLE IF ADJACENT SOLUTION IS DEMONSTRATED TO VIOLATE SITE SPACING REQUIREMENTS OR OTHER CRITICAL CRITERIA.
10. LOW VOLTAGE UNDERGROUND DUCTBANK AND MANHOLE TO BE PROVIDED UNDERNEATH 3RD PARTY RIGHT-OF-WAY TO CONNECT TO LOW VOLTAGE UNDERTRACK MANHOLES AND DUCTBANK.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
C. DALOIA
DRAWN BY
V. LAVERDE
CHECKED BY
B. MCNALLY
IN CHARGE
B. BANKS
DATE
8/29/2014



CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE

SYSTEMS SITE
STANDALONE RADIO SITE
RETAINED-FILL

CONTRACT NO.	
DRAWING NO.	DD-CO-G053
SCALE	NO SCALE
SHEET NO.	