

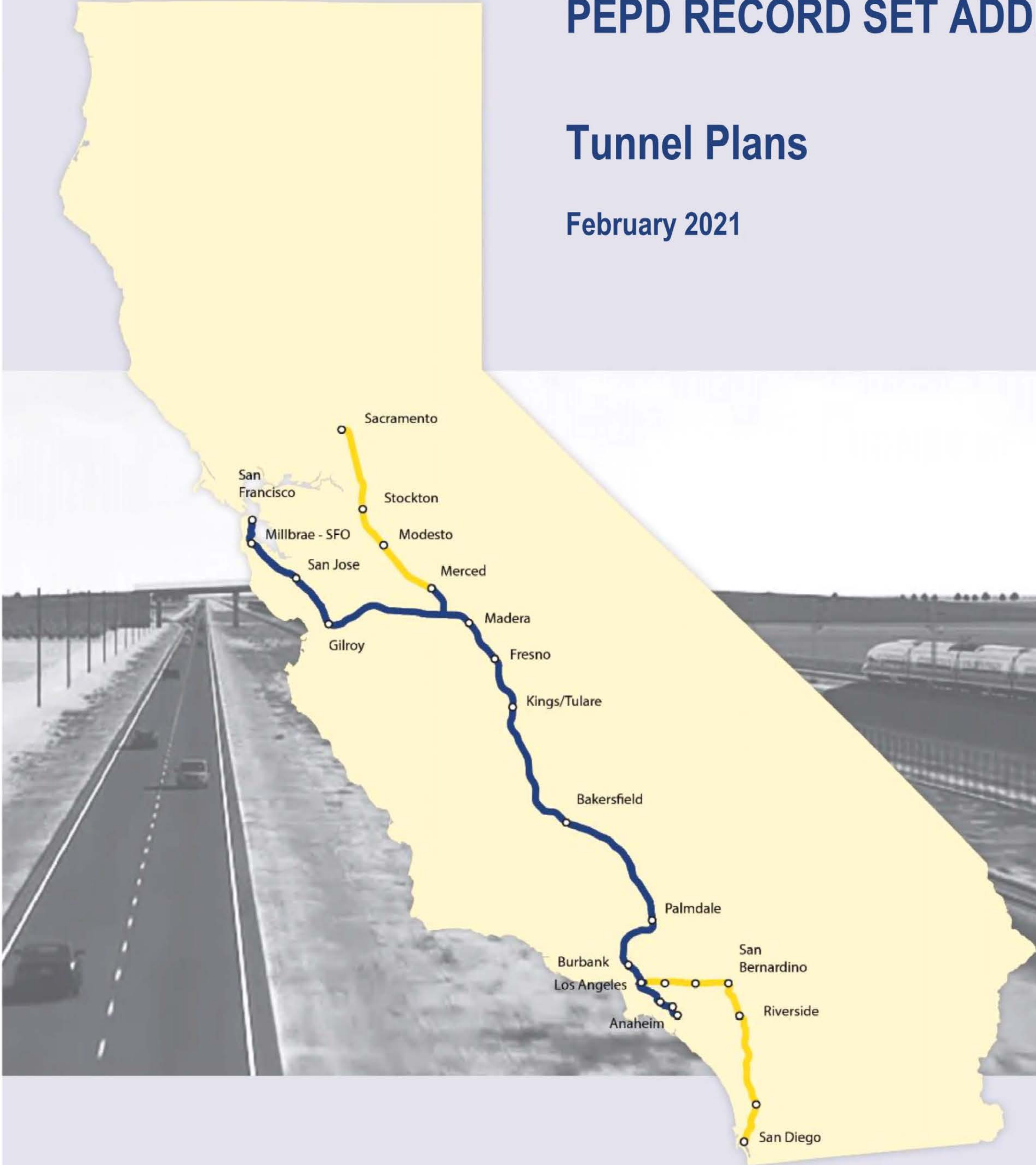
California High-Speed Rail Authority

# Palmdale to Burbank Project Section

PEPD RECORD SET ADDENDUM SR14A / E1A / E2A

## Tunnel Plans

February 2021



The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 23, 2019, and executed by the Federal Railroad Administration and the State of California.



**GENERAL**

| DRAWING NO. | DESCRIPTION   | SHEET NO. |
|-------------|---|-----------|
| TN-B0010    | GENERAL. ALIGNMENT E1A/E2A/SR14A. INDEX OF DRAWINGS                           |           |
| TN-B0014    | GENERAL. ALIGNMENT E1A/E2A/SR14A. ABBREVIATIONS AND LEGEND                    |           |
| TN-B0015    | GENERAL. ALIGNMENT E1A/E2A/SR14A. FAULT KEY MAP                               |           |
| TN-B0016    | GENERAL. ALIGNMENT E1A/E2A/SR14A. GEOTECHNICAL RISKS AT PORTALS, IW AND ADITS |           |
| TN-B0017    | GENERAL. ALIGNMENT E1A/E2A/SR14A. SCHEMATIC LINEAR DIAGRAMS                   |           |

**SR14A (CENTRAL SUBSECTION)**

| DRAWING NO.  | DESCRIPTION   | SHEET NO. |
|--------------|---|-----------|
| TN-B6001-14A | HIGH SPEED RAIL TUNNEL PLANS - KEY MAP                              |           |
| TN-D4001-14A | PLAN STA 450+00.00 TO STA 500+00.00                                 |           |
| TN-D4002-14A | PLAN STA 500+00.00 TO STA 550+00.00                                 |           |
| TN-D4003-14A | PLAN STA 550+00.00 TO STA 600+00.00                                 |           |
| TN-D4004-14A | PLAN STA 600+00.00 TO STA 650+00.00                                 |           |
| TN-D4005-14A | PLAN STA 650+00.00 TO STA 700+00.00                                 |           |
| TN-D4006-14A | PLAN STA 700+00.00 TO STA 750+00.00                                 |           |
| TN-D4007-14A | PLAN STA 750+00.00 TO STA 800+00.00                                 |           |
| TN-D4008-14A | PLAN STA 800+00.00 TO STA 850+00.00                                 |           |
| TN-D4009-14A | PLAN STA 850+00.00 TO STA 900+00.00                                 |           |
| TN-D4010-14A | PLAN STA 900+00.00 TO STA 950+00.00                                 |           |
| TN-D4011-14A | PLAN STA 950+00.00 TO STA 1000+00.00                                |           |
| TN-D4012-14A | PLAN STA 1000+00.00 TO STA 1050+00.00                               |           |
| TN-D4013-14A | PLAN STA 1050+00.00 TO STA 1100+00.00                               |           |
| TN-D4014-14A | PLAN STA 1100+00.00 TO STA 1150+00.00                               |           |
| TN-D4015-14A | PLAN STA 1150+00.00 TO STA 1200+00.00                               |           |
| TN-D4016-14A | PLAN STA 1211+00.00 TO STA 1261+00.00                               |           |
| TN-D4017-14A | PLAN STA 1261+00.00 TO STA 1311+00.00                               |           |
| TN-Y1001-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 450+00.00 TO STA 550+00.00   |           |
| TN-Y1002-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 550+00.00 TO STA 650+00.00   |           |
| TN-Y1003-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 650+00.00 TO STA 750+00.00   |           |
| TN-Y1004-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 750+00.00 TO STA 850+00.00   |           |
| TN-Y1005-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 850+00.00 TO STA 950+00.00   |           |
| TN-Y1006-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 950+00.00 TO STA 1050+00.00  |           |
| TN-Y1007-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 1050+00.00 TO STA 1150+00.00 |           |
| TN-Y1008-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 1150+00.00 TO STA 1261+00.00 |           |
| TN-Y1009-14A | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 1261+00.00 TO STA 1311+00.00 |           |
| TN-D7001-14A | PORTAL 1A PLAN AND PROFILE FOR CONSTRUCTION                         |           |
| TN-D7002-14A | INTERMEDIATE WINDOW IWA   |           |
| TN-D7003-14A | PORTAL 2A PLAN AND PROFILE FOR CONSTRUCTION                         |           |
| TN-D7004-14A | PORTAL 3A PLAN AND PROFILE FOR CONSTRUCTION                         |           |
| TN-D7005-14A | PORTAL 4A PLAN AND PROFILE FOR CONSTRUCTION                         |           |

**E1A/E2A (CENTRAL SUBSECTION)**

| DRAWING NO. | DESCRIPTION   | SHEET NO. |
|-------------|---|-----------|
| TN-B6001-EA | HIGH SPEED RAIL TUNNEL PLANS. KEY MAP                             |           |
| TN-D4001-EA | PLAN STA 440+00.00 TO STA 490+00.00                               |           |
| TN-D4002-EA | PLAN STA 490+00.00 TO STA 540+00.00                               |           |
| TN-D4003-EA | PLAN STA 540+00.00 TO STA 590+00.00                               |           |
| TN-Y1001-EA | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 440+00.00 TO STA 540+00.00 |           |
| TN-Y1002-EA | TUNNEL PROFILE. SOUTH BOUND TUNNEL STA 540+00.00 TO STA 590+00.00 |           |
| TN-D7001-EA | PORTAL 1A PLAN AND PROFILE FOR CONSTRUCTION                       |           |
| TN-D7001-EA | PORTAL 2A-3A PLAN AND PROFILE FOR CONSTRUCTION                    |           |

**TYPICAL SECTIONS AND DETAILS**

| PORTAL FACILITIES AND TUNNEL GAUGES |  |           |
|-------------------------------------|--|-----------|
| DRAWING NO.                         | DESCRIPTION  | SHEET NO. |
| TN-C0001                            | TYPICAL TUNNEL PORTAL FACILITIES. AT GRADE TWIN TUNNEL CONFIGURATION. PLAN           |           |
| TN-C0002                            | TYPICAL TUNNEL PORTAL FACILITIES. AT GRADE TWIN TUNNEL CONFIGURATION. ELEVATION      |           |
| TN-C0003                            | TYPICAL TUNNEL PORTAL FACILITIES. AT GRADE TWIN TUNNEL CONFIGURATION. LONG SECTION   |           |
| TN-C0004                            | COMPOSITE VEHICLE. STATIC AND DYNAMIC ENVELOPE. TANGENT TRACK                        |           |
| TN-C0005                            | COMPOSITE VEHICLE. STATIC AND DYNAMIC ENVELOPE. SUPERELEVATED TRACK                  |           |
| TN-C0006                            | COMPOSITE VEHICLE. FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE. TANGENT TRACK       |           |
| TN-C0007                            | COMPOSITE VEHICLE. FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE. SUPERELEVATED TRACK |           |

| MINED TUNNELS IN ROCK |   |           |
|-----------------------|---|-----------|
| DRAWING NO.           | DESCRIPTION   | SHEET NO. |
| TN-C0100              | MINED TWIN TUNNELS. TANGENT TRACK - CLEARANCE DIAGRAM                           |           |
| TN-C0101              | MINED TWIN TUNNELS. SUPERELEVATED TRACK - CLEARANCE DIAGRAM                     |           |
| TN-C0102              | MINED TWIN TUNNELS. TYPICAL CONSTRUCTION SEQUENCE AND SUPPORT MEASURES (1 of 3) |           |
| TN-C0103              | MINED TWIN TUNNELS. TYPICAL CONSTRUCTION SEQUENCE AND SUPPORT MEASURES (2 of 3) |           |
| TN-C0104              | MINED TWIN TUNNELS. TYPICAL CONSTRUCTION SEQUENCE AND SUPPORT MEASURES (3 of 3) |           |

| TBM TUNNELS |   |           |
|-------------|---|-----------|
| DRAWING NO. | DESCRIPTION   | SHEET NO. |
| TN-C0200    | TBM BORED TWIN TUNNELS. CLEARANCE DIAGRAM - TANGENT TRACK       |           |
| TN-C0201    | TBM BORED TWIN TUNNELS. CLEARANCE DIAGRAM - SUPERELEVATED TRACK |           |
| TN-C0202    | TBM BORED TWIN TUNNELS. ONE-PASS LINING GEOMETRY                |           |

| CROSS-PASSAGES FOR EMERGENCY EGRESS AND TECHNICAL EQUIPMENT |  |           |
|---|--|-----------|
| DRAWING NO.   | DESCRIPTION  | SHEET NO. |
| TN-C0401  | TBM TUNNELS. TYPICAL CROSS PASSAGEWAY FOR EMERGENCY EGRESS OR TECHNICAL ROOMS. CROSS AND LONGITUDINAL SECTION GEOMETRY |           |
| TN-C0402  | TBM TUNNELS. TYPICAL CROSS PASSAGEWAY. SUPPORT MEASURES FOR MEDIUM ROCK QUALITY  |           |
| TN-C0403  | TBM TUNNELS. TYPICAL CROSS PASSAGEWAY. SUPPORT MEASURES FOR POOR ROCK QUALITY  |           |
| TN-C0410  | LIST OF EMERGENCY EGRESS CROSS-PASSAGES AND EXITS, TECHNICAL ROOMS, AND UNDERGROUND TRACTION POWER FACILITIES          |           |

| UNDERGROUND TRACTION POWER FACILITIES |   |           |
|---------------------------------------|---|-----------|
| DRAWING NO.                           | DESCRIPTION   | SHEET NO. |
| TN-C0500                              | UNDERGROUND TRACTION POWER PARALLELING STATION (PS). TYPICAL GEOMETRY (1 of 2)          |           |
| TN-C0501                              | UNDERGROUND PARALLELING STATION (PS). TYPICAL GEOMETRY (2 of 2)                         |           |
| TN-C0502                              | UNDERGROUND SWITCHING STATION (SWS). TYPICAL GEOMETRY (1 of 2). ELEVATION CROSS-SECTION |           |
| TN-C0503                              | UNDERGROUND SWITCHING STATION (SWS). TYPICAL GEOMETRY (2 of 2). PLAN                    |           |

| INTERMEDIATE WINDOWS/LAUNCHING SHAFTS |   |           |
|---------------------------------------|---|-----------|
| DRAWING NO.                           | DESCRIPTION                                       | SHEET NO. |
| TN-C0810                              | ALIGNMENT SR14A. INTERMEDIATE WINDOW IWA (1 OF 2) |           |
| TN-C0811                              | ALIGNMENT SR14A. INTERMEDIATE WINDOW IWA (2 OF 2) |           |

| INTERMEDIATE WINDOWS/LAUNCHING SHAFTS |  |           |
|---------------------------------------|--|-----------|
| DRAWING NO.                           | DESCRIPTION  | SHEET NO. |
| TN-C1110                              | ALIGNMENT E1A/E2A/SR14A. ARCH SHAPED CUT&COVER. TANGENT TRACK. CLEARANCE DIAGRAM |           |

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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
GENERAL  
INDEX OF DRAWINGS

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-B0010**  
SCALE  
**NO SCALE**  
SHEET NO.



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|        |  |  |
|--------|--|--|
|        | <u>A</u>   |  |
| ANF    | ANGELES NATIONAL FOREST  |  |
| APPROX | APPROXIMATE  |  |
|        | <u>B</u>   |  |
| BLVD   | BOULEVARD  |  |
| BAR    | PRESSURE UNIT  |  |
|        | <u>C</u>   |  |
| C      | CANYON   |  |
| CHSR   | CALIFORNIA HIGH-SPEED RAIL   |  |
| CHSTP  | CALIFORNIA HIGH-SPEED TRAIN PROJECT  |  |
| CL     | CENTER LINE  |  |
| C&C    | CUT-AND-COVER  |  |
| CGS    | CALIFORNIA GEOLOGICAL SURVEY   |  |
| CP     | CROSS-PASSAGE, FOR EMERGENCY EGRESS  |  |
| CT     | COMMUNICATION TOWER  |  |
|        | <u>E</u>   |  |
| E      | EASTING, EAST  |  |
| E.G.   | FOR EXAMPLE  |  |
| EQ     | EARTHQUAKE   |  |
| ET     | EMERGENCY TELEPHONE  |  |
| ETD    | ENLARGED TUNNEL DIAMETER   |  |
|        | <u>F</u>   |  |
| FH     | FIRE HYDRANT   |  |
| FT     | FEET   |  |
| FWY    | FREEWAY  |  |
|        | <u>G</u>   |  |
| GC     | ONE OF THE TSI REFERENCE GAUGES, USED IN DEVELOPING CLEARANCES FOR THE CHSTP |  |
| GWP    | GROUND WATER PRESSURE  |  |
|        | <u>H</u>   |  |
| HFZ    | HAZARDOUS FAULT ZONE   |  |
| HSR    | HIGH SPEED RAIL  |  |
| HWY    | HIGHWAY  |  |
|        | <u>I</u>   |  |
| ID     | INNER DIAMETER   |  |
| IW     | INTERMEDIATE WINDOW (FOR CONSTRUCTION PURPOSES ONLY)                         |  |
| I-210  | I-210 FREEWAY  |  |
|        | <u>K</u>   |  |
| KG     | KILOGRAM   |  |
|        | <u>L</u>   |  |
| L      | FLOOD LIGHTS, LENGTH   |  |
|        | <u>M</u>   |  |
| M      | METER  |  |
| MI     | MILE, MINED TUNNEL IN ROCK   |  |
| MIN    | MINIMUM  |  |
| MPH    | MILES PER HOUR   |  |

|          |   |  |
|----------|---|--|
|          | <u>N</u>  |  |
| N        | NORTHING, NORTH   |  |
| NATM     | NEW AUSTRIAN TUNNELING METHOD   |  |
| NB       | NORTH BOUND   |  |
| NFPA     | NATIONAL FIRE PROTECTION ASSOCIATION                                    |  |
|          | <u>O</u>  |  |
| OCS      | OVERHEAD CATENARY SYSTEM  |  |
| OG       | ORIGINAL GROUND   |  |
|          | <u>P</u>  |  |
| P        | TUNNEL PORTAL WITH PERMANENT FACILITIES                                 |  |
| PERM.    | PERMANENT   |  |
| PROP.    | PROPOSED  |  |
| PHFZ     | POTENTIALLY HAZARDOUS FAULT ZONE  |  |
| POT      | POINT OF TANGENT (ALIGNMENT RELATED)                                    |  |
| PS       | TRACTION POWER PARALLELLING STATION                                     |  |
|          | <u>R</u>  |  |
| R        | RADIUS  |  |
| RC       | REINFORCED CONCRETE   |  |
| RD       | ROAD  |  |
| R/W, ROW | RIGHT OF WAY  |  |
|          | <u>S</u>  |  |
| S        | SOUTH   |  |
| SB       | SOUTH BOUND   |  |
| SEM      | SEQUENTIAL EXCAVATION METHOD  |  |
| SQFT     | SQUARE FEET   |  |
| SS       | TRACTION POWER SUBSTATION   |  |
| ST       | STREET, SINGLE TUNNEL   |  |
| STA      | STATION   |  |
| SGFZ     | SAN GABRIEL FAULT ZONE  |  |
| SCRRA    | SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY                             |  |
|          | <u>T</u>  |  |
| T,+      | THICKNESS   |  |
| TBD      | TO BE DECIDED   |  |
| TBM      | TUNNEL BORING MACHINE   |  |
| TCSA     | TEMPORARY CONSTRUCTION STAGING AREA FOR TUNNELS                         |  |
| TH-21,   | STEEL ARCHES IN OMEGA PROFILE.  |  |
| TH-29    | FOR GROUND SUPPORT IN MINED/SEM TUNNELS                                 |  |
| TM       | TECHNICAL MEMORANDUM  |  |
| TOR      | TOP OF RAIL   |  |
| TPPS     | TRACTION POWER PARALLELLING STATION                                     |  |
| TR       | CROSS-PASSAGE, FOR TECHNICAL EQUIPMENT                                  |  |
| TSEFZ,   | TRAIN SURFACE EVACUATION AND  |  |
| TSEFCZ   | FIRE CONTROL ZONE   |  |
| TSI      | THE EUROPEAN UNION'S (EU) TECHNICAL SPECIFICATIONS FOR INTEROPERABILITY |  |
| TYP      | TYPICAL   |  |
|          | <u>U</u>  |  |
| USGS     | U.S. GEOLOGICAL SURVEY  |  |
| UPS      | UNDERGROUND PARALLELING STATION   |  |

|     |                                    |  |
|-----|------------------------------------|--|
|     | <u>V</u>                           |  |
| V   | VIADUCT                            |  |
| VCP | VENTILATION CONTROL PANEL          |  |
| VC  | VERTICAL CURVE (ALIGNMENT RELATED) |  |
|     | <u>W</u>                           |  |
| WPC | WAYSIDE POWER CONTROL CUBICLE      |  |
| W   | WASH                               |  |
| WWM | WELDED WIRE MESH                   |  |

**GENERAL NOTES**

1. STRUCTURE DIMENSIONS ARE INDICATIVE. TO BE CONFIRMED.
2. TUNNEL DIMENSIONS ARE INDICATIVE. TO BE CONFIRMED.
3. TUNNEL SURFACE FACILITIES ARE INDICATIVE. TO BE CONFIRMED.
4. RAILWAY INSTALLATIONS ARE INDICATIVE. TO BE CONFIRMED.
5. FINAL SLOPES TO BE DEFINED AT A LATER STAGE, WHEN THE GEOTECHNICAL STUDY IS AVAILABLE.
6. FAULTS AND EXTENT OF FAULT ZONES SHOWN ARE ONLY ORIENTATIVE AND, ARE SUBJECT TO CHANGE, SOURCE: FAULT - USGS QUATERNARY FAULT AND FOLD DATABASE AND CGS GEOLOGIC MAP DATA BASES  
FAULT ZONE ACTIVITY CLASSIFICACION - CHSR 15% DRAFT FAULT HAZARD EVALUATION REPORT, 2015.
7. ALL DIMENSIONS ARE IN FEET UNLESS NOTED OTHERWISE.
8. TWIN TUNNELS CROSS-PASSAGES DISTRIBUTED ALONG ALIGNMENTS: CP FOR EMERGENCY EGRESS, EVERY 800 FT. CP FOR TECHNICALROOMS, EVERY MILE.
9. STA 296+82.67 (SPRUCE CT) IS THE NORTHERN LIMIT OF THE PALMDALE-BURBANK ENVIRONMENTAL DOCUMENT. NORTH OF THIS POINT REFER TO BAKERSFIELD-PALMDALE ENVIRONMENTAL DOCUMENT. DESIGN FEATURES BETWEEN STA 265+00.00 AND STA 296+82.67 (SPRUCE CT) SHOWN FOR REFERENCE ONLY.

**LEGEND**

| <u>PLAN</u>  | <u>PROFILE</u>   |
|--|--|
| <p>----- PROPOSED PERMANENT ENVIRONMENTAL FOOTPRINT</p> <p>----- CONSTRUCTION STAGING AREA / PROPOSED TEMPORARY ENVIRONMENTAL FOOTPRINT</p> <p>----- FENCE LINE / HSR ROW</p> <p>----- LIMITS OF EMBANKMENT (FILL)</p> <p>----- LIMITS OF EXCAVATION (CUT)</p> <p>----- PROPOSED RETAINING WALL</p> <p>----- PROPOSED TUNNEL</p> <p>===== INCLINED DESCENDING GALLERY</p> <p>----- UNDERGROUND EASEMENT FOR EMERGENCY/RESCUE STATION</p> <p>□ TRACTION POWER FACILITY</p> <p>----- 100 YEAR FLOOD ZONE</p> <p>----- ANGELES NATIONAL FOREST BOUNDARY</p> <p>CONTROL LINE EXAMPLE "A" LINE<br/>255+00      260+00      265+00</p> | <p>----- PROPOSED TRACK ELEVATION ( SB TRACK)</p> <p>----- ORIGINAL GROUND (OG)</p> <p>----- PROPOSED TUNNEL HEADWALL</p> <p>----- PROPOSED TUNNEL</p> |

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|                                  |
|----------------------------------|
| DESIGNED BY<br><b>E.VELASCO</b>  |
| DRAWN BY<br><b>F.J.DOMINGUEZ</b> |
| CHECKED BY<br><b>C.RECHEA</b>    |
| IN CHARGE<br><b>A.RELAÑO</b>     |
| DATE<br><b>02/26/2021</b>        |

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT E1A/E2A/SR14A  
GENERAL  
ABBREVIATIONS AND LEGEND

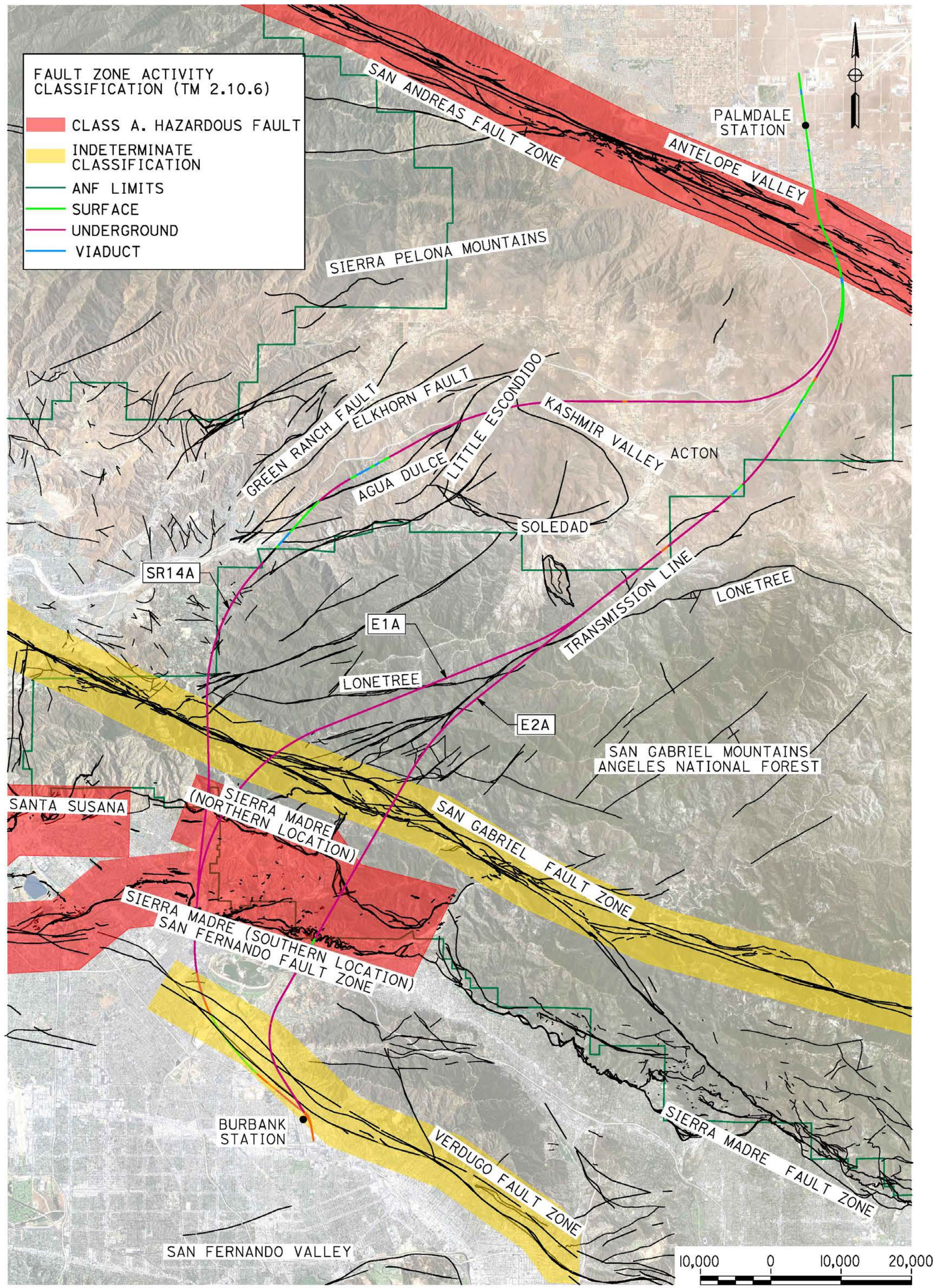
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| DRAWING NO.<br>TN-B0014  |
| SCALE<br>NO SCALE        |
| SHEET NO.                |



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**NOTE:**

PRELIMINARY DRAFT/SUBJECT TO CHANGE

**SOURCE:**

FAULTS - USGS QUATERNARY FAULT AND FOLD DATABASE AND CGS GEOLOGIC MAP DATABASES  
 FAULT SCREENING REPORT - PALMDALE TO BURBANK SEGMENT. SEISMIC SPECIALIST TEAM -  
 FAULT DISPLACEMENT. DRAFT. MAY 2017

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**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
 ALIGNMENT E1A/E2A/SR14A  
 GENERAL  
 FAULT KEY MAP

CONTRACT NO.  
HSR14-42  
 DRAWING NO.  
TN-B0015  
 SCALE  
AS SHOWN  
 SHEET NO.



NOTE:

P: Portal

IW: Adit/Intermediate window (temporary, only for construction)

Numbering of tunnels done from the Operational point of view, not from the construction method p.o.v

**GEOTECHNICAL RISKS AT PORTALS, INTERMEDIATE WINDOWS AND ADITS**

| ALIGNMENT | TUNNEL    | TUNNEL CONFIGURATION       | TUNNEL LENGTH (miles) | PORTAL/ADIT | STA.       | PORTAL TYPE                  | GEOTECHNICAL RISKS   | GROUNDWATER DEPTH (FEET) |
|-----------|-----------|----------------------------|-----------------------|-------------|------------|------------------------------|--|--------------------------|
| E1A/E2A   | Tunnel 1A | Twin tunnels, single track | 1.66                  | P1A         | 462+18.55  | Mountain portal              | Portal is located within area mapped as Vasquez Formation andesite and basalt. Rock Excavations may require heavy ripping or blasting. Portal may require retaining walls and rockfall protection in addition to rock cuts.  | ~80                      |
|           |           |                            |                       | P2A         | 549+68.84  | Mountain portal              | Portal is located within area mapped as alluvium. This portal will likely require constructing permanent retaining walls and will require further evaluation of the potential for liquefaction.  | ~50                      |
|           |           |                            |                       | P3A         | 554+68.84  | Arch-shaped Cut&Cover Tunnel |  |                          |
| SR14A     | Tunnel 1A | Twin tunnels, single track | 13.21                 | P1A         | 725+19.18  | Mountain portal              | Portal is located within area mapped as older alluvium. The older alluvium overlies Syenite. Syenite depth unknown due to its uplift by nearby San Andreas fault splay (Nadeau fault)  | ~50                      |
|           |           |                            |                       | IWA         | 870+00.00  | "Open trench 160 ft deep"    | Shaft is located in young alluvium and older alluvium approximately 250 feet thick filling an alluvial basin underlying Acton. Groundwater head over the bottom of the shaft excavation is estimated to be 120 to 130 feet.  | ~70                      |
|           |           |                            |                       | P2A         | 1681+95.32 | Mountain portal              | Vasquez Formation conglomerate and siltstone with bedding structures dipping less than 45 degrees to the west. West-facing excavations may daylight bedding. Rock Excavations may require ripping or blasting. Portal may require retaining walls, slope reinforcing and rockfall protection in addition to rock cuts.   | Unknown, possibly deep   |
|           | Tunnel 2A | Twin tunnels, single track | 1.03                  | P3A         | 1233+50.00 | Mountain portal              | Vasquez Formation sedimentary rocks with bedding structures dipping less than 45 degrees to the northwest. West-facing excavations may daylight bedding. Rock Excavations may require ripping or blasting. Portal may require retaining walls, slope reinforcing and rockfall protection in addition to rock cuts.   | Unknown, possibly deep   |
|           |           |                            |                       | P4A         | 1288+00.00 | Mountain portal              | Interbedded layers of conglomerate, siltstone, sandstone, belonging to Vasquez Formation. The layers are dipping out-of-slope at the portal face. Slopes are mapped as potential seismically-induced landslide area. The Little Escondido and Agua Dulce faults are present at the portal. Rock Excavations may require ripping or blasting. Portal may require retaining walls, slope reinforcing and rockfall protection in addition to rock cuts. | Unknown, possibly deep   |

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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT E1A/E2A/SR14A  
GENERAL  
GEOTECHNICAL RISKS AT PORTALS, IW AND ADITS

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-B0016  
SCALE  
NO SCALE  
SHEET NO.



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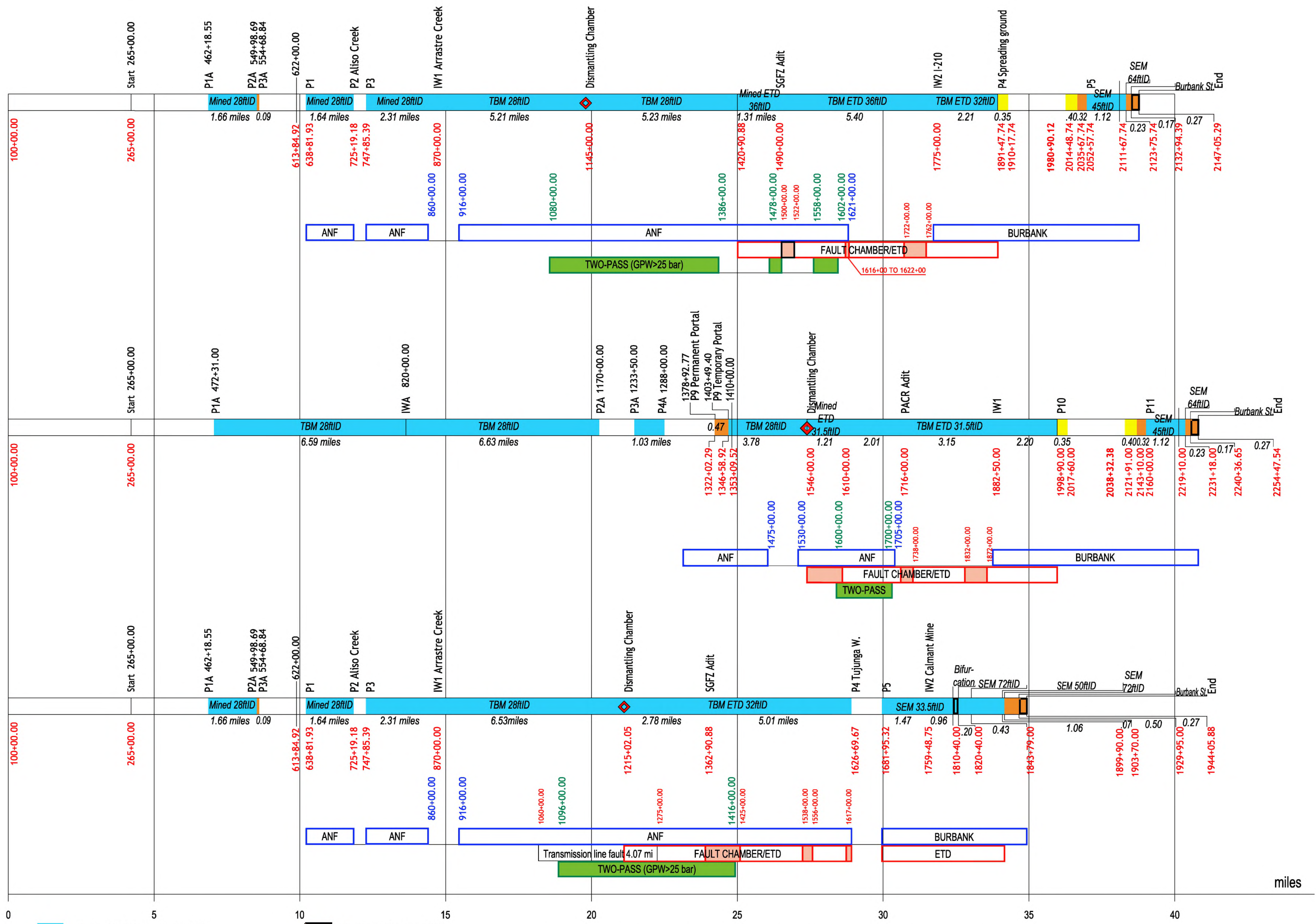
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E1A+E1  
38.92 miles

SR14A+  
REFINED SR14  
41.88 miles

E2A+E2  
35.08 miles



- Tunnel (TOR depth >100ft)
- Open trench (TOR depth <35ft)
- Cut-and-Cover (35ft< TOR depth <100ft)
- Burbank Station C&C
- Fault chamber

- ETD Enlarged Tunnel Diameter
- ID Internal diameter
- GW Groundwater Pressure
- ST Single Tunnel, double track
- ANF Angeles National Forest
- ISGFZ San Gabriel Fault Zone
- TBM Tunnel Boring Machine
- SEM Sequential Excavation Method
- PACR Pacoima reservoir
- P Tunnel portal with permanent facilities
- IW Tunnel Intermediate Window (for construction)
- ◆ TBM underground dismantling chamber

1500+00.00 Stations of SR14A, E1A, E2A  
1500+00.00 Stations of REFINED SR14, E1, E2

| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/ E1A/ E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
ALIGNMENT E1A/E2A/SR14A  
GENERAL  
SCHEMATIC LINEAR DIAGRAMS

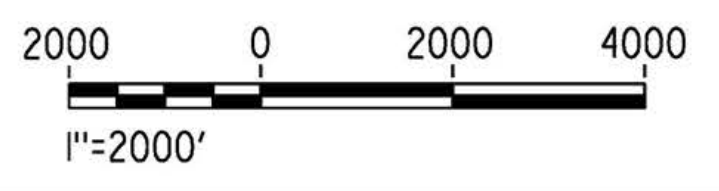
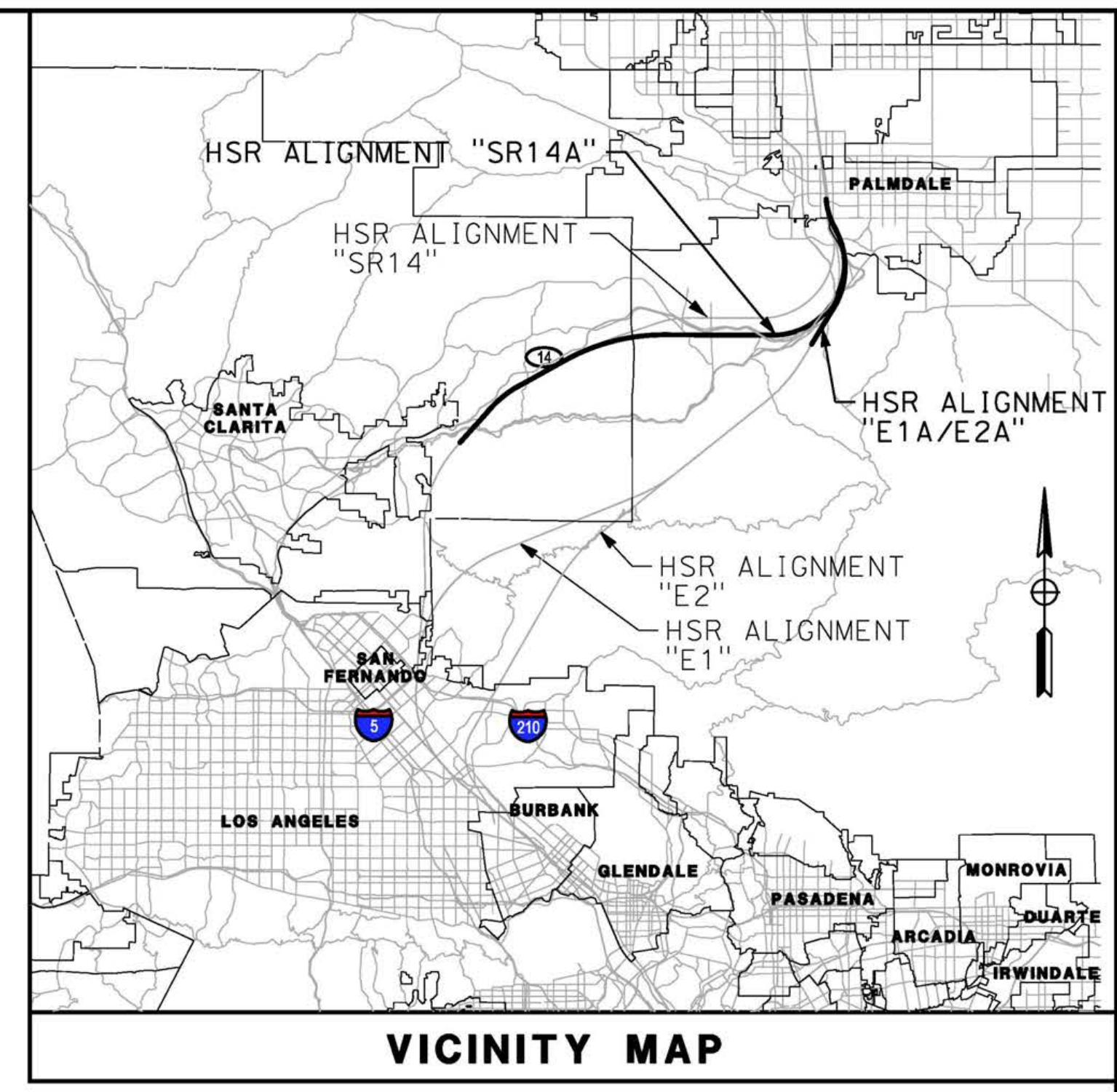
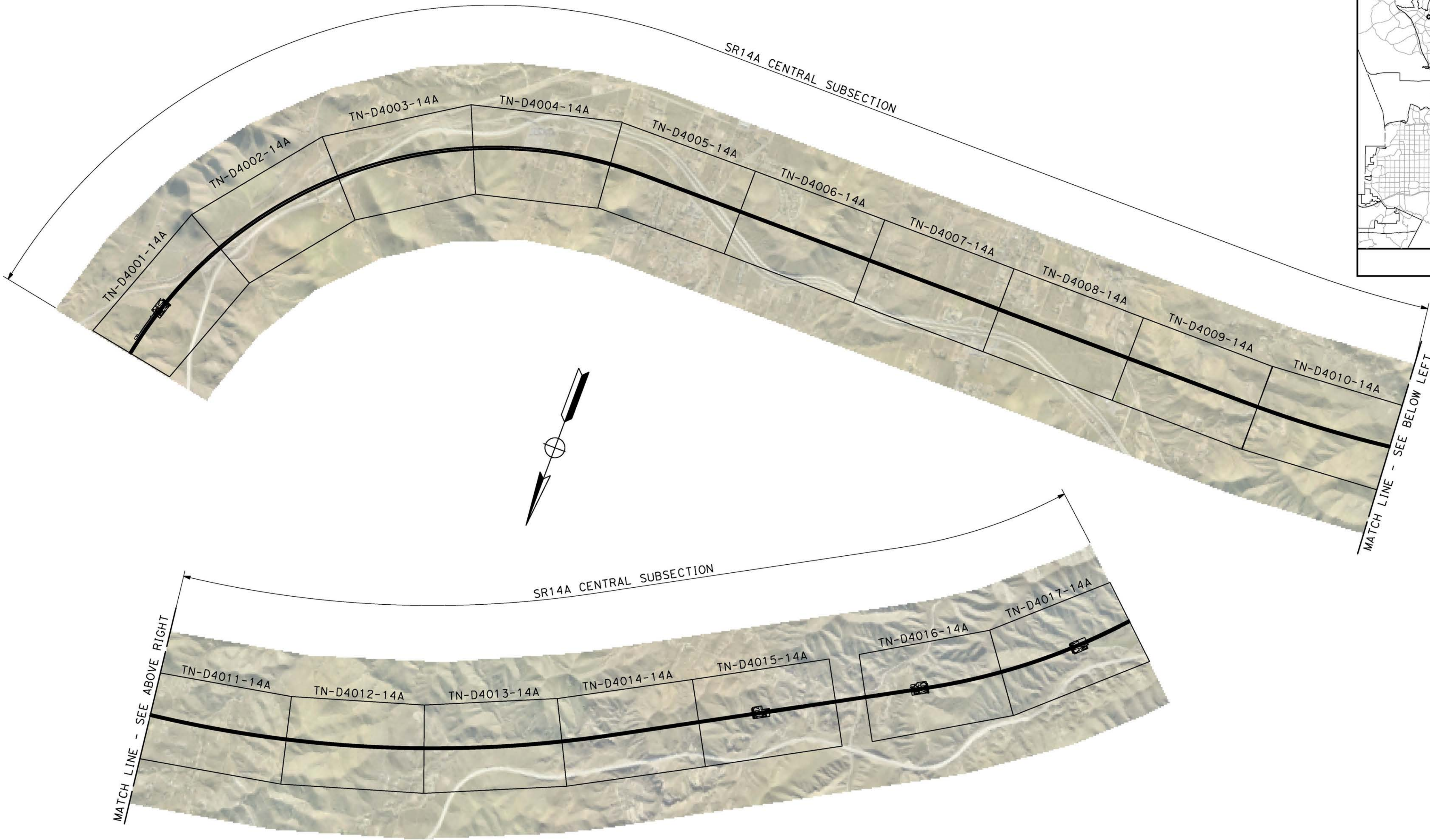
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DRAWING NO.  
TN-B0017  
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SHEET NO.



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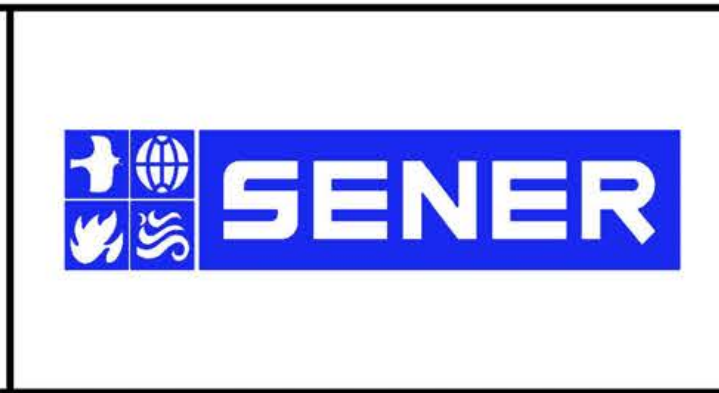


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IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
ALIGNMENT "SR14A"

HIGH SPEED RAIL TUNNEL PLANS  
KEY MAP

CONTRACT NO.  
HSR14-42

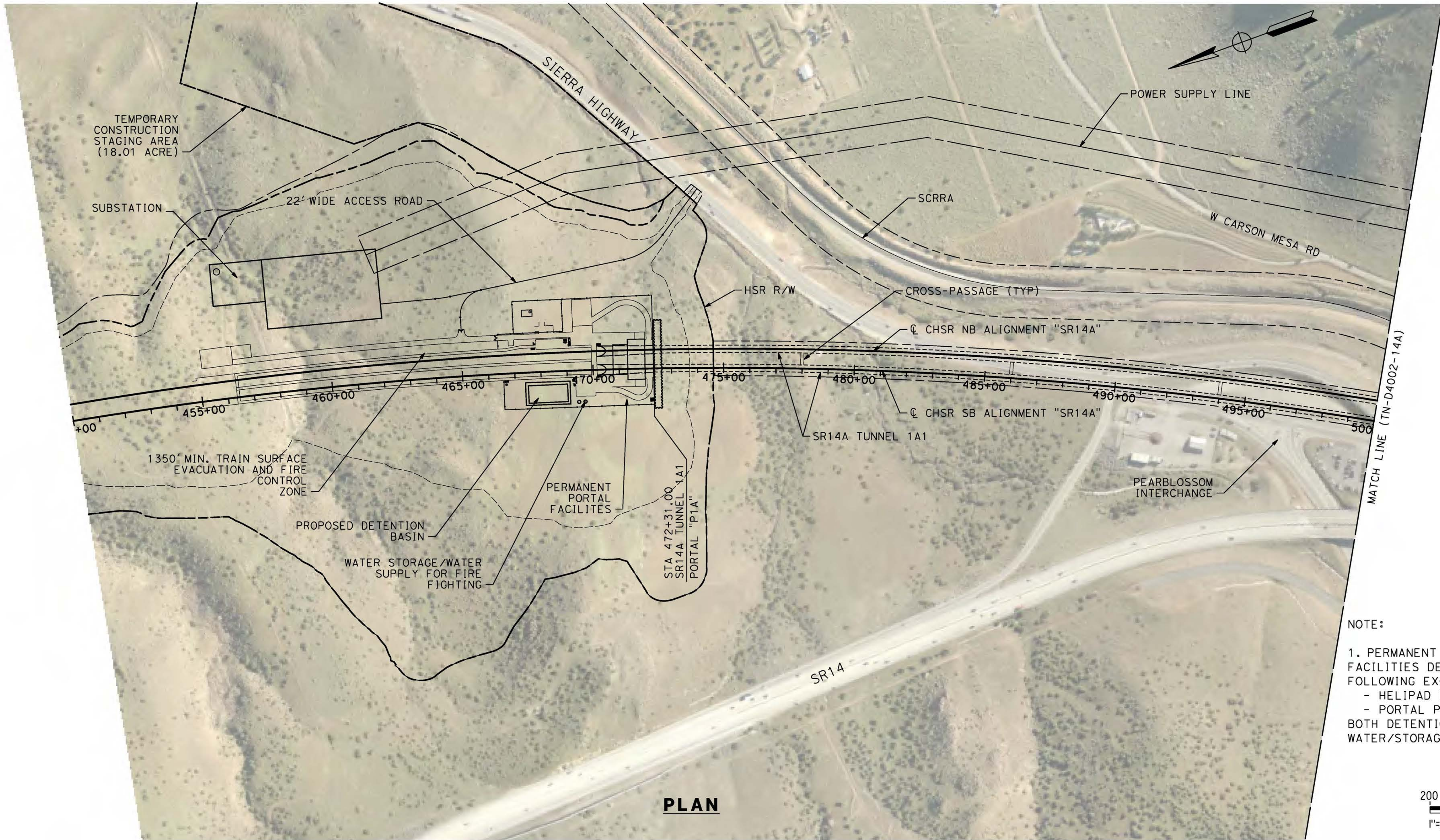
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SCALE  
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SHEET NO.

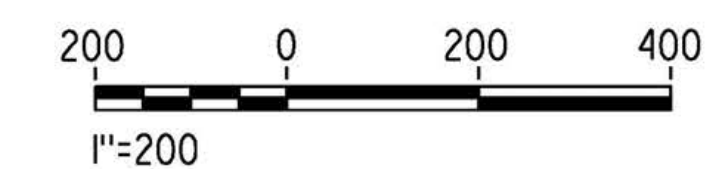


# TUNNEL 1A1



**PLAN**

NOTE:  
 1. PERMANENT FOOTPRINT INCLUDES SPACE FOR FACILITIES DESCRIBED IN TM 2.4.6, WITH THE FOLLOWING EXCEPTIONS:  
 - HELIPAD NOT INCLUDED  
 - PORTAL P1A INCLUDES SPACE RESERVED FOR BOTH DETENTION POND/BASIN (LOW POINT) AND WATER/STORAGE SUPPLY



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DESIGNED BY  
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 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A  
 NOT FOR  
 CONSTRUCTION**

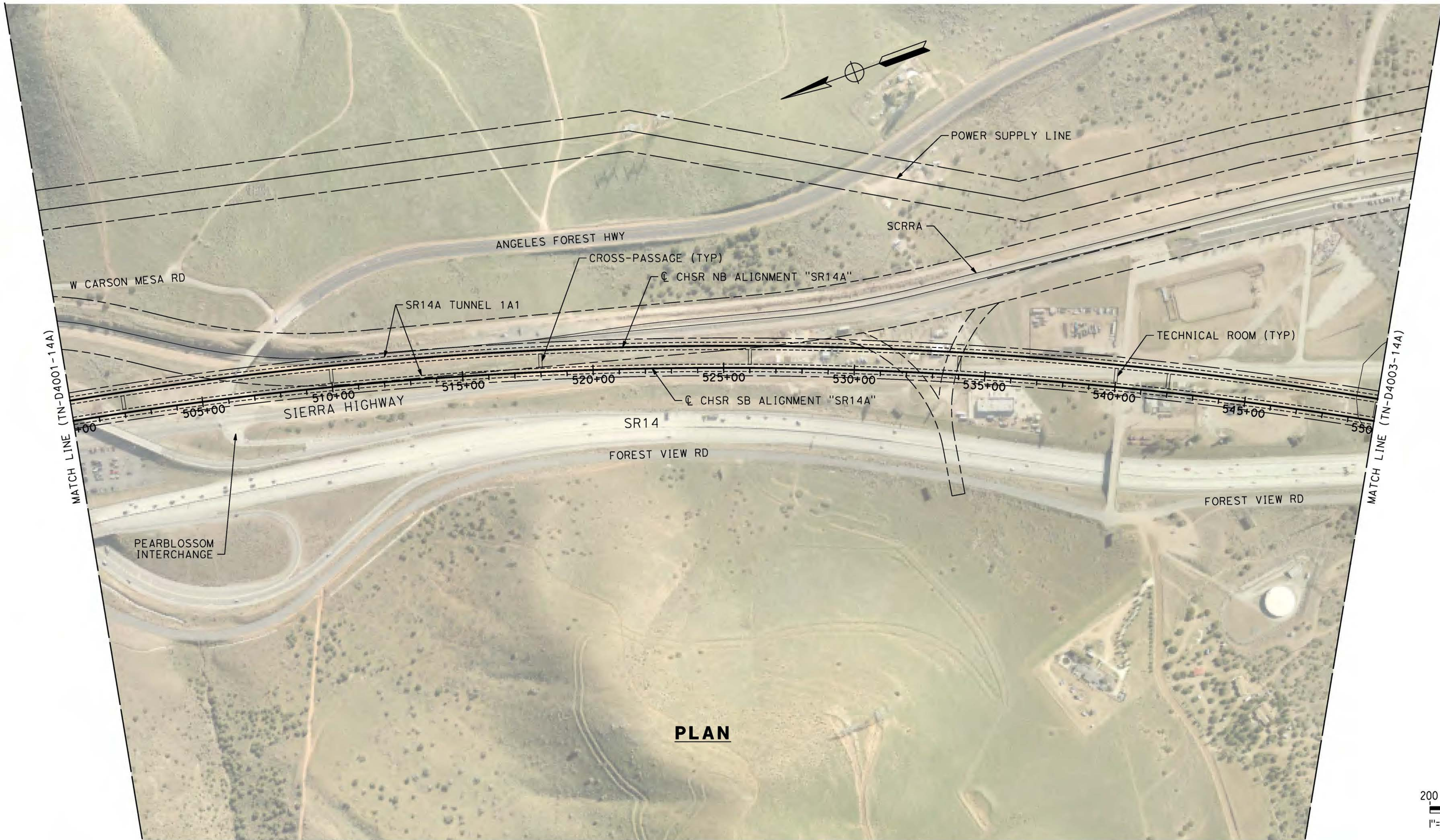


**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK**  
 ALIGNMENT "SR14A"  
 PLAN  
 STA 450+00.00 TO STA 500+00.00

CONTRACT NO.  
**HSR14-42**  
 DRAWING NO.  
**TN-D4001-14A**  
 SCALE  
**AS SHOWN**  
 SHEET NO.



# TUNNEL 1A1



**PLAN**



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DRAWN BY  
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CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A  
  
NOT FOR  
CONSTRUCTION**

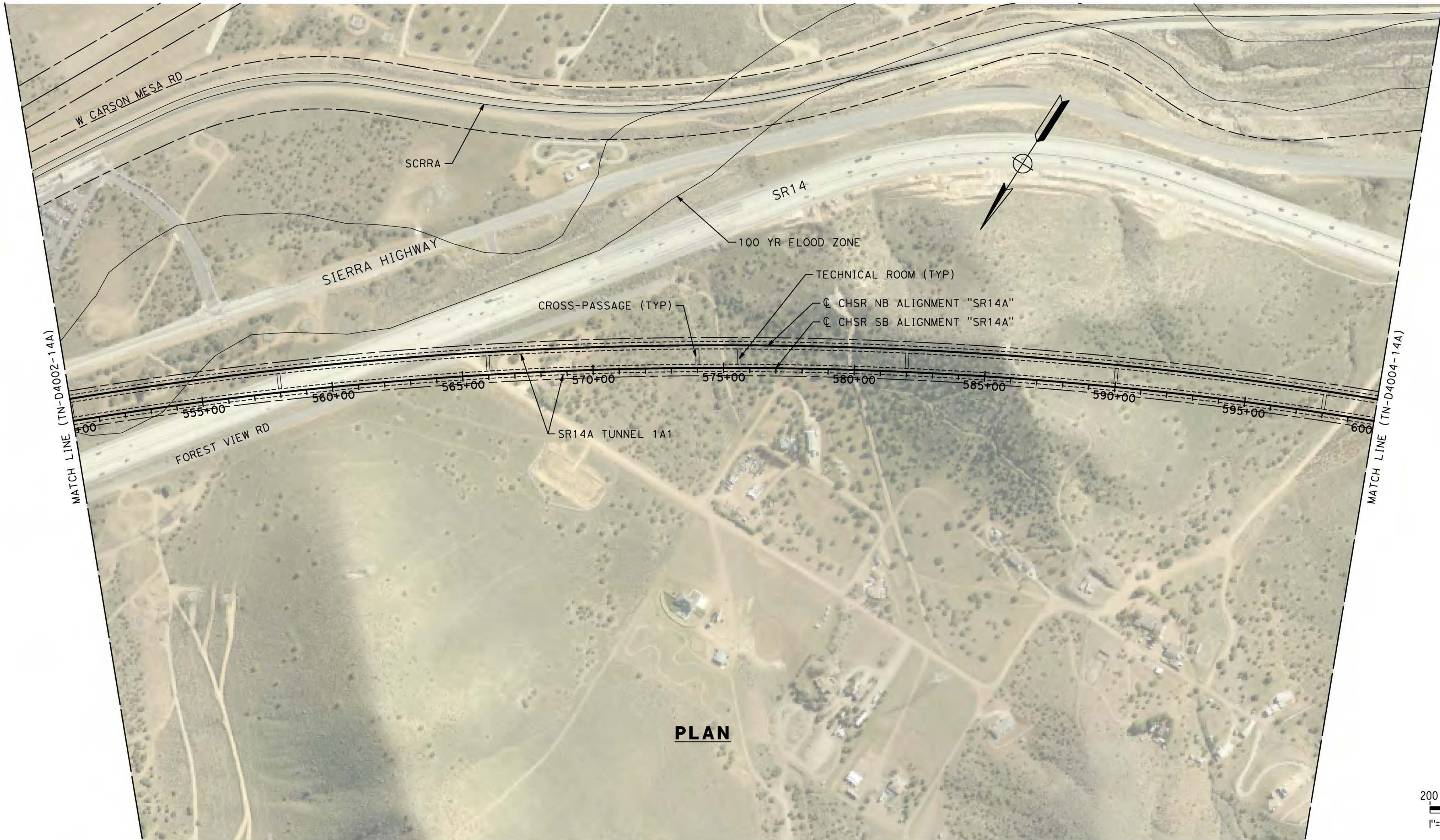


**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 500+00.00 TO STA 550+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4002-14A  
SCALE  
AS SHOWN  
SHEET NO.



# TUNNEL 1A1



**PLAN**



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DRAWN BY  
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**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A  
  
NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 550+00.00 TO STA 600+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4003-14A  
SCALE  
AS SHOWN  
SHEET NO.



**TUNNEL 1A1**



**PLAN**



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**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
PLAN  
STA 600+00.00 TO STA 650+00.00

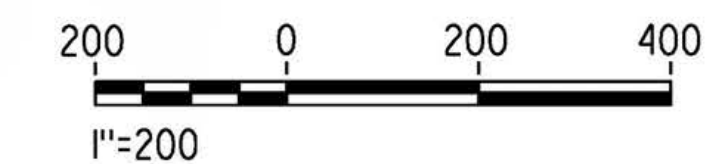
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DRAWING NO.  
TN-D4004-14A  
SCALE  
AS SHOWN  
SHEET NO.



**TUNNEL 1A1**



**PLAN**



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DESIGNED BY  
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DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



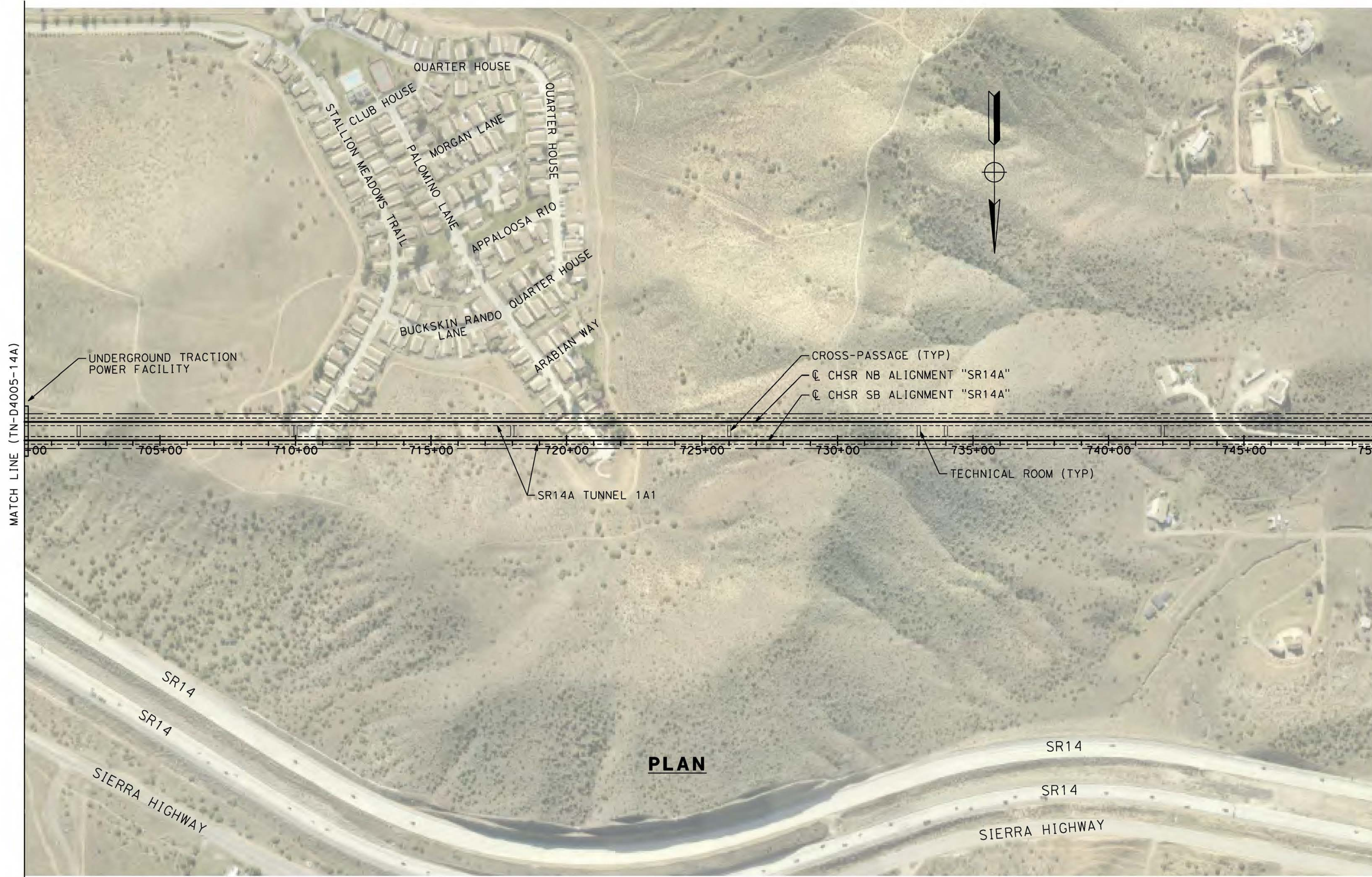
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PALMDALE TO BURBANK**

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STA 650+00.00 TO STA 700+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4005-14A  
SCALE  
AS SHOWN  
SHEET NO.



**TUNNEL 1A1**



**PLAN**

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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/ E1A/ E2A**

**NOT FOR  
CONSTRUCTION**



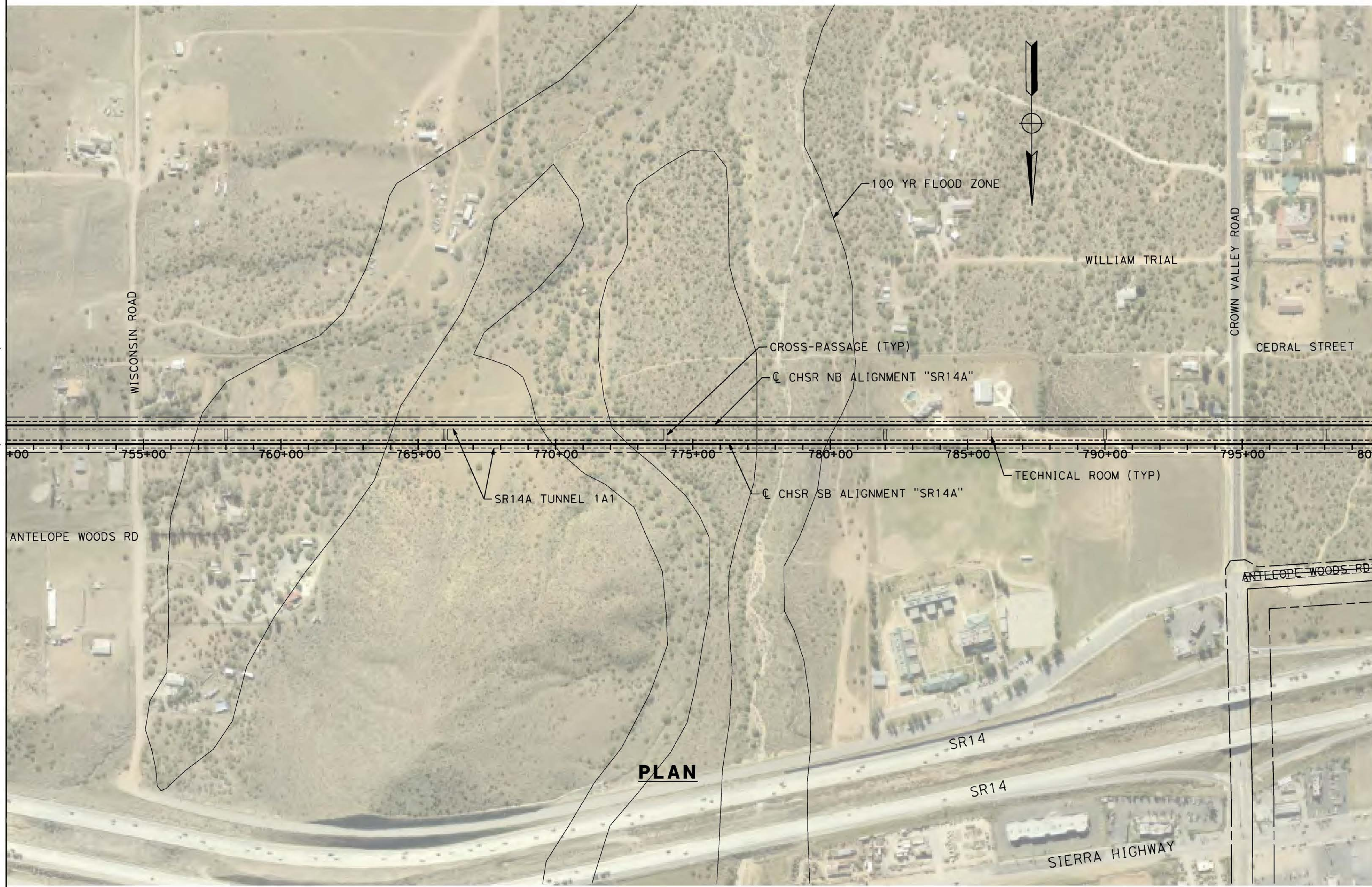
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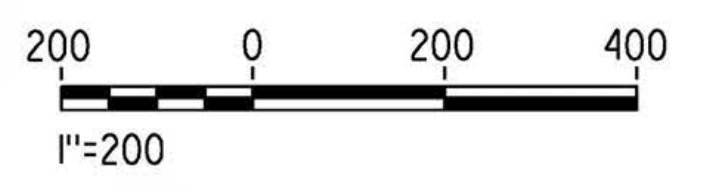
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SCALE  
AS SHOWN  
SHEET NO.



**TUNNEL 1A1**



**PLAN**



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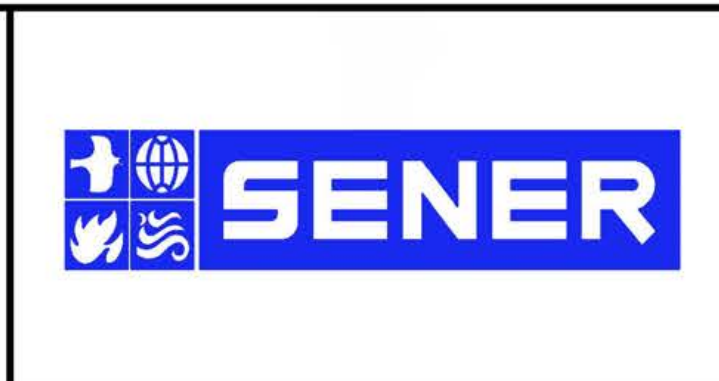
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DESIGNED BY  
**E.VELASCO**  
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**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



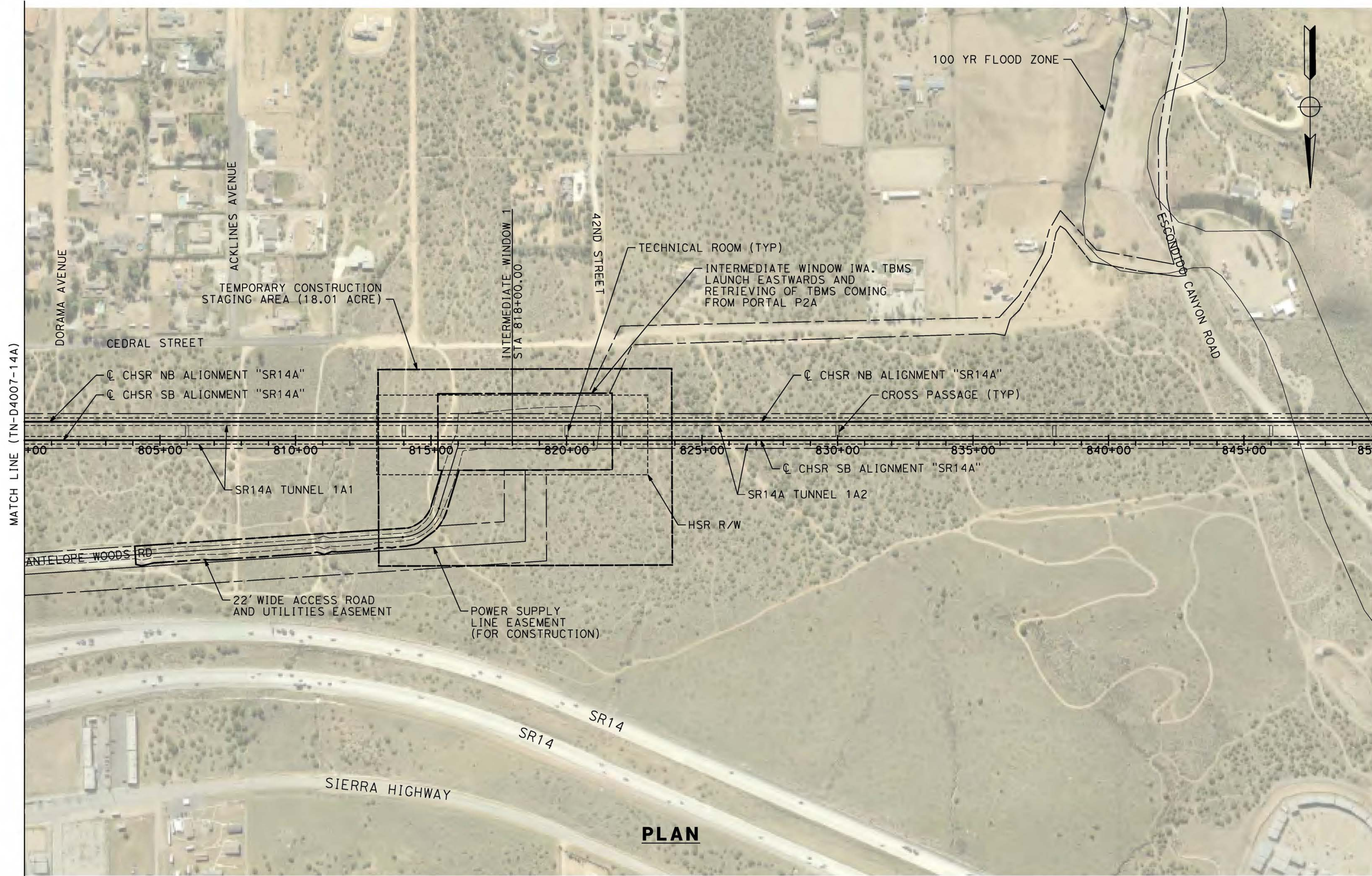
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PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
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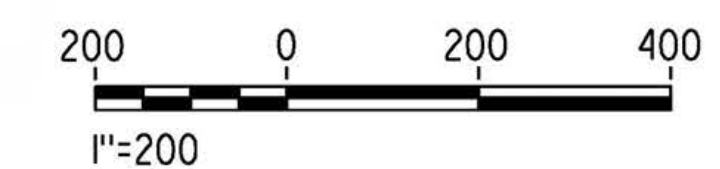
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AS SHOWN  
SHEET NO.



**TUNNEL 1A1/1A2**



**PLAN**



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DESIGNED BY  
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DRAWN BY  
**F.J.DOMINGUEZ**  
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**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A  
  
NOT FOR  
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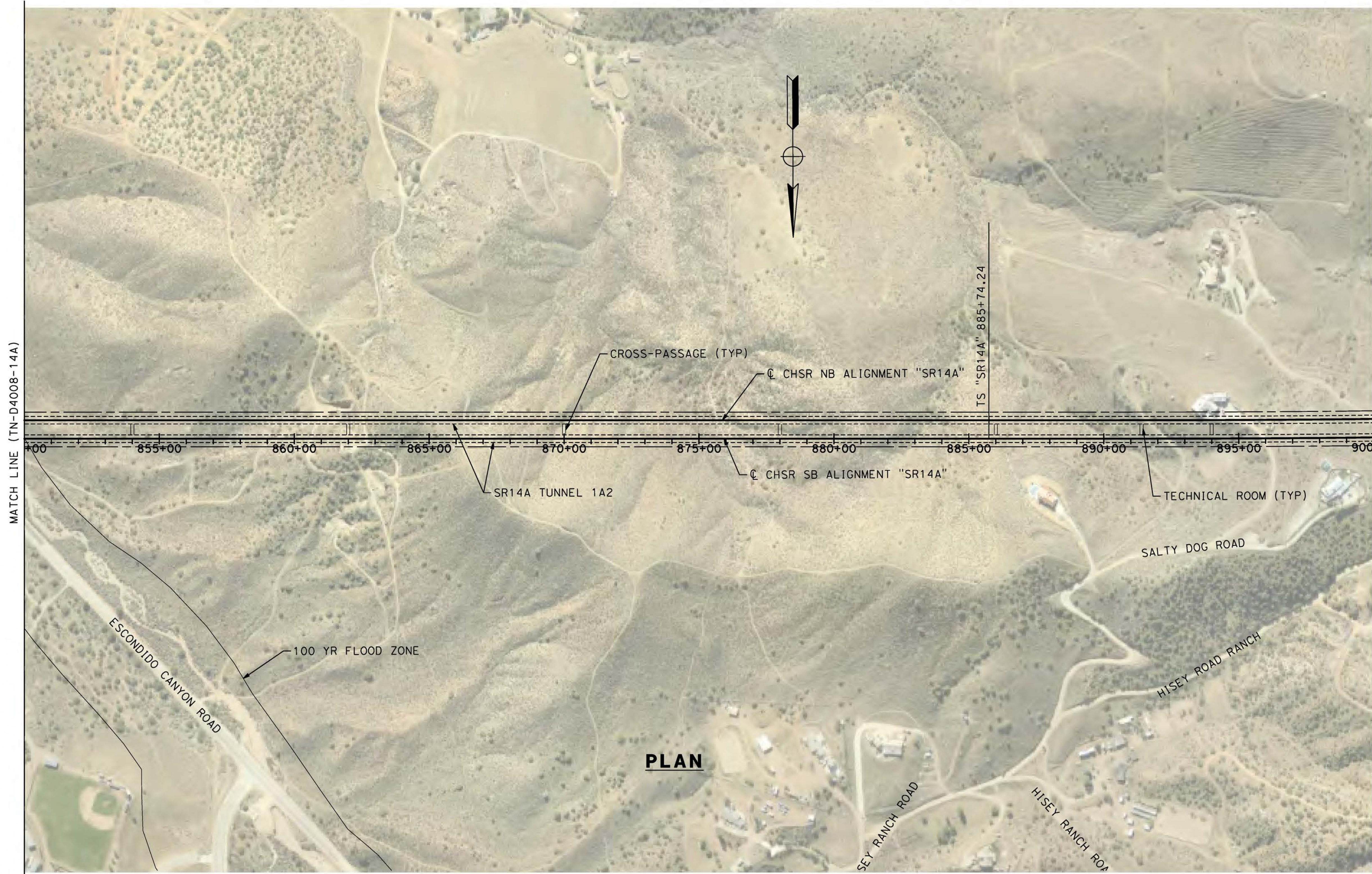
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PALMDALE TO BURBANK**

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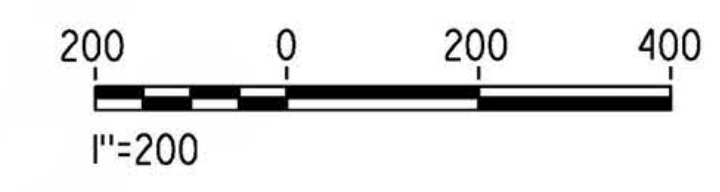
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**TN-D4008-14A**  
SCALE  
**AS SHOWN**  
SHEET NO.



**TUNNEL 1A2**



**PLAN**



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DESIGNED BY  
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DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A  
  
NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 850+00.00 TO STA 900+00.00

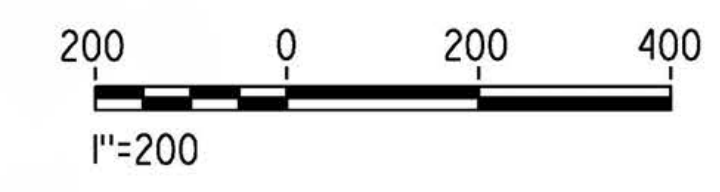
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HSR14-42  
DRAWING NO.  
TN-D4009-14A  
SCALE  
AS SHOWN  
SHEET NO.



# TUNNEL 1A2



**PLAN**



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IN CHARGE  
**A.RELAÑO**

DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
PLAN  
STA 900+00.00 TO STA 950+00.00

CONTRACT NO.  
HSR14-42

DRAWING NO.  
TN-D4010-14A

SCALE  
AS SHOWN

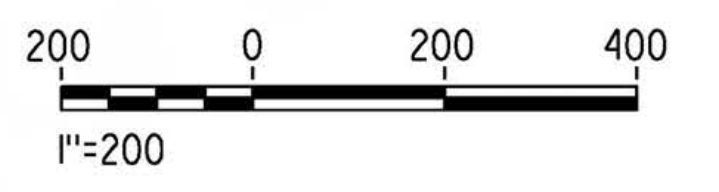
SHEET NO.



**TUNNEL 1A2**



**PLAN**



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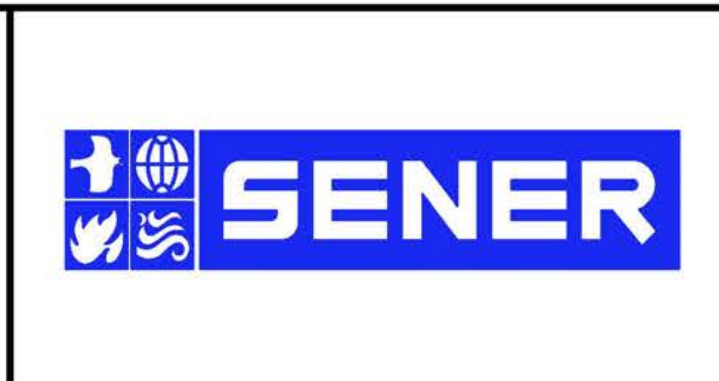
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**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**

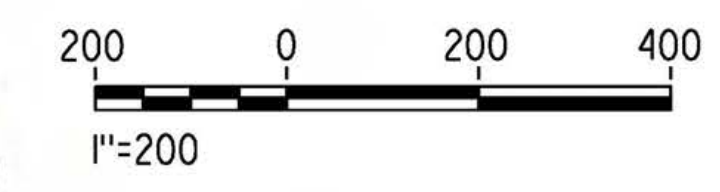
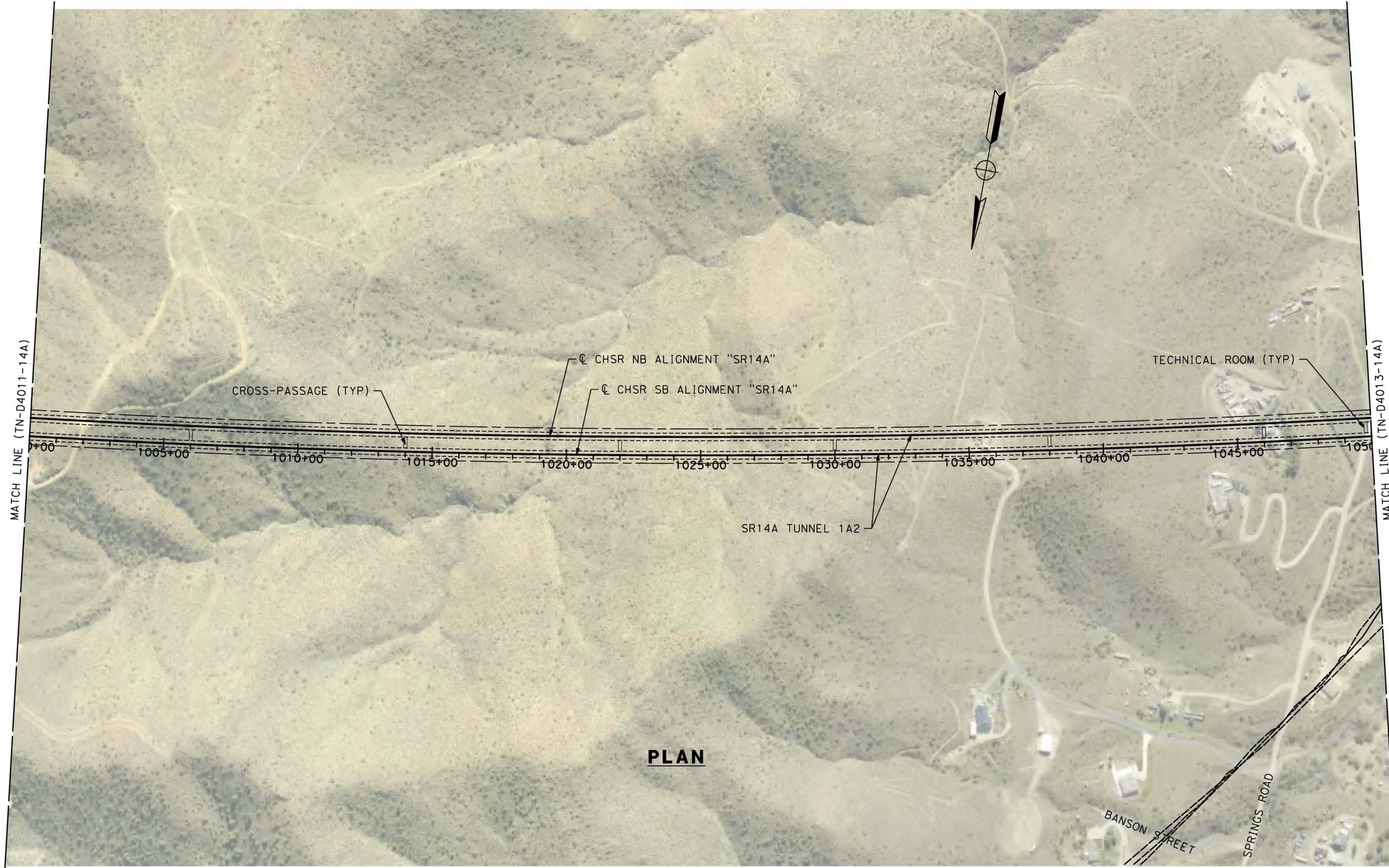


**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 950+00.00 TO STA 1000+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4011-14A  
SCALE  
AS SHOWN  
SHEET NO.



**TUNNEL 1A2**



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DESIGNED BY  
**E.VELASCO**

DRAWN BY  
**F.J.DOMINGUEZ**

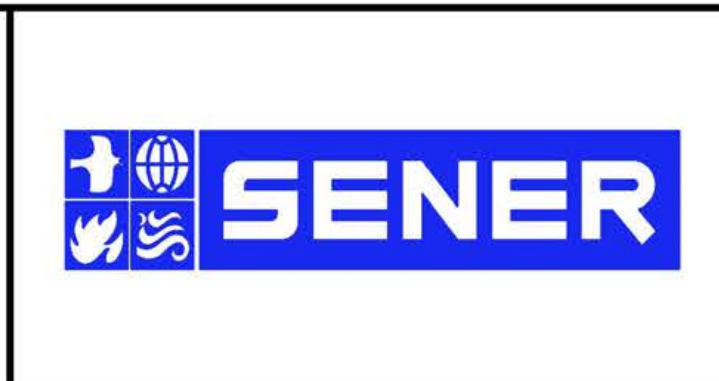
CHECKED BY  
**C.RECHEA**

IN CHARGE  
**A.RELAÑO**

DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
PLAN  
STA 1000+00.00 TO STA 1050+00.00

CONTRACT NO.  
HSR14-42

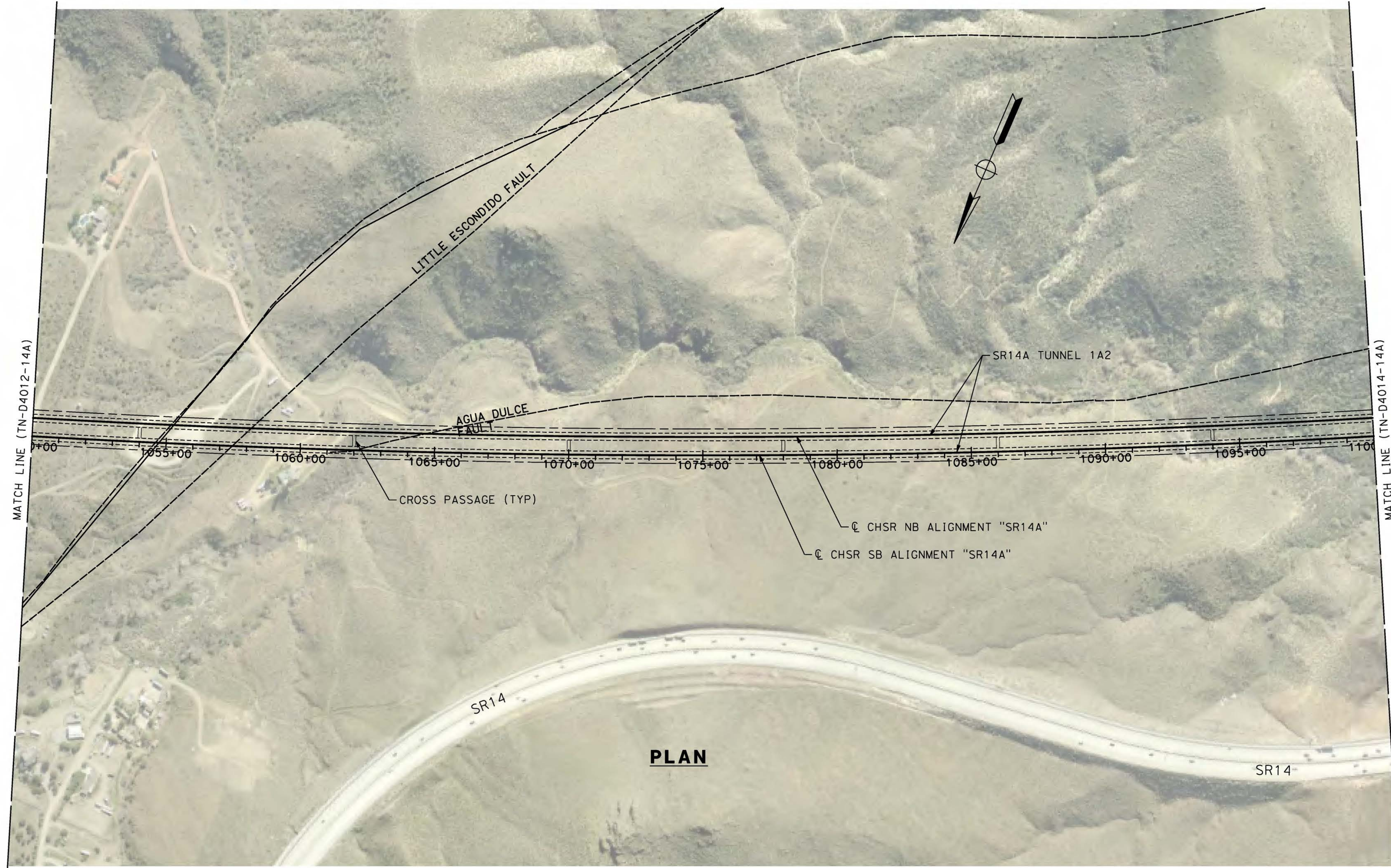
DRAWING NO.  
TN-D4012-14A

SCALE  
AS SHOWN

SHEET NO.



**TUNNEL 1A2**



**PLAN**



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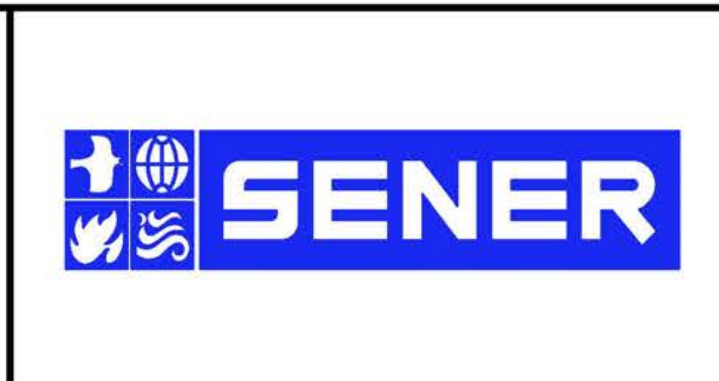
0205240

| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



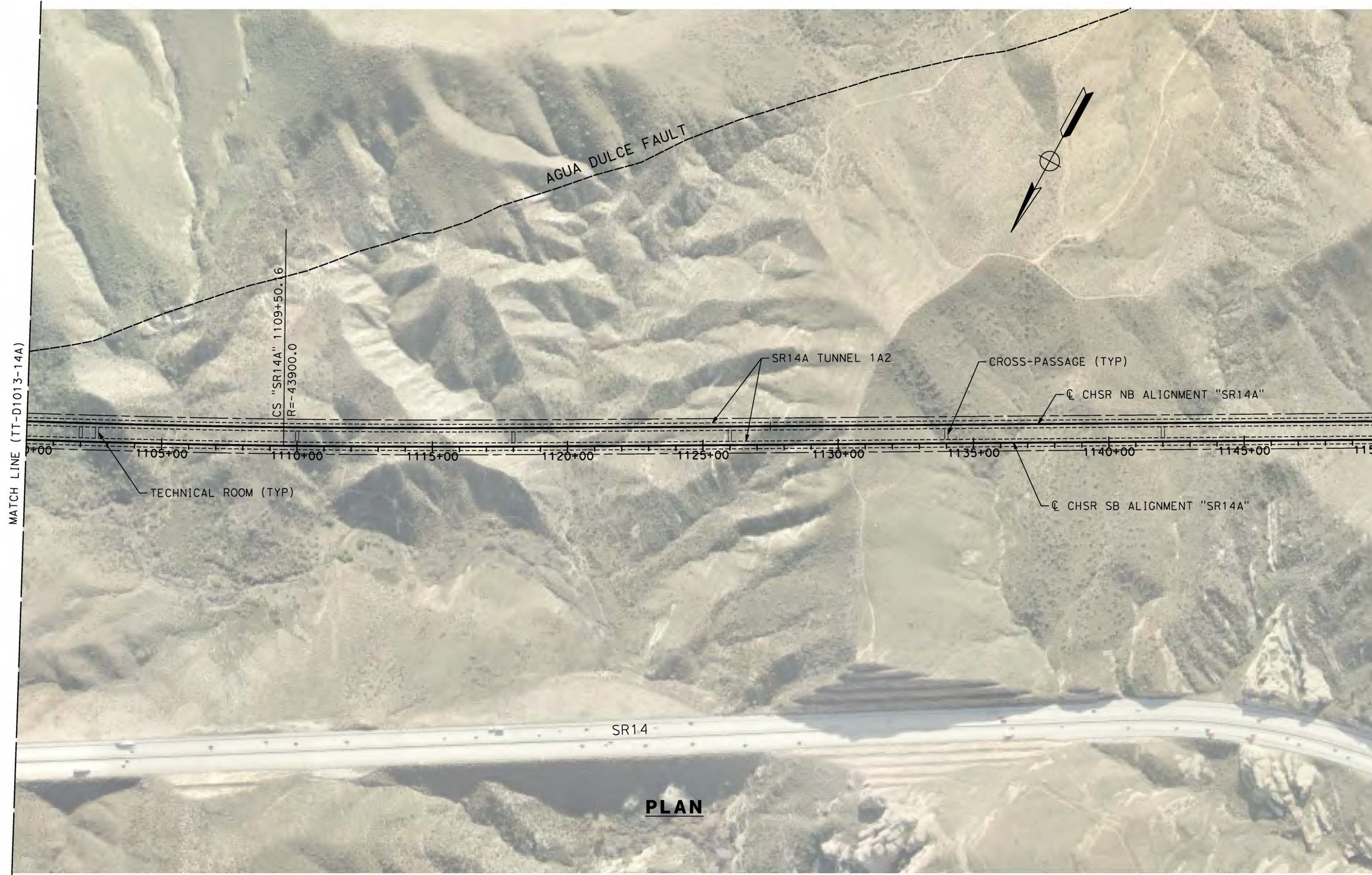
**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
PLAN  
STA 1050+00.00 TO STA 1100+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4013-14A  
SCALE  
AS SHOWN  
SHEET NO.



**TUNNEL 1A2**



**PLAN**



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09/12/2020 15:13:13

0205240

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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 1100+00.00 TO STA 1150+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4014-14A  
SCALE  
AS SHOWN  
SHEET NO.

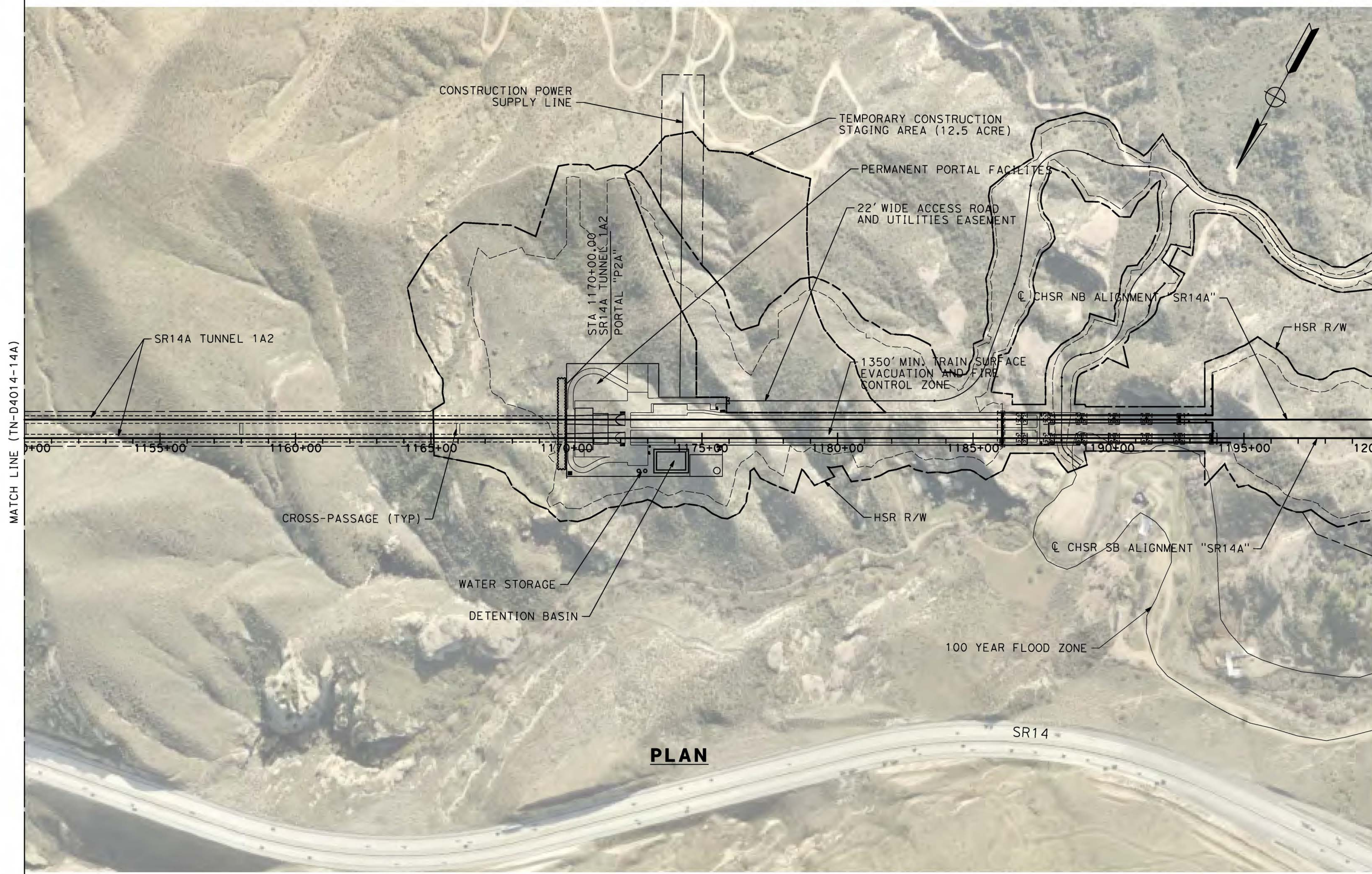


# TUNNEL 1A2

NOTE:

1. PERMANENT FOOTPRINT INCLUDES SPACE FOR FACILITIES DESCRIBED IN TM 2.4.6, WITH THE FOLLOWING EXCEPTIONS:

- HELIPAD NOT INCLUDED
- SPACE RESERVED FOR WATER/STORAGE SUPPLY



**PLAN**



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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 1150+00.00 TO STA 1200+00.00

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-D4015-14A**  
SCALE  
**AS SHOWN**  
SHEET NO.

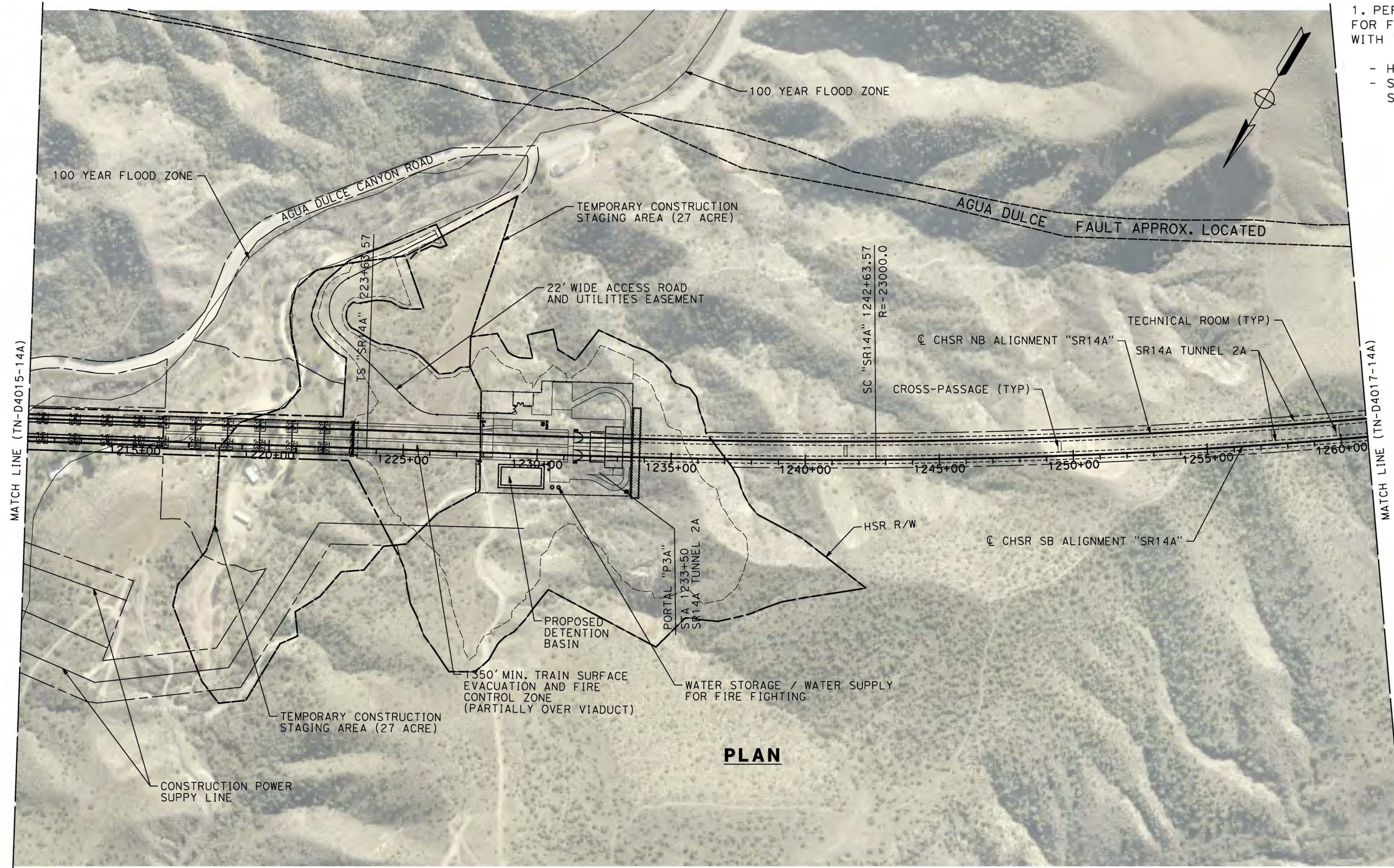


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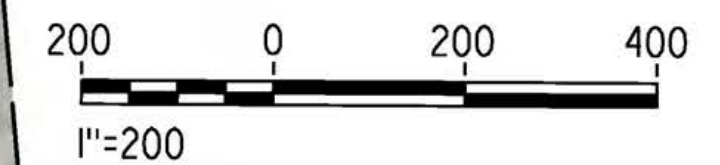
NOTE:

1. PERMANENT FOOTPRINT INCLUDES SPACE FOR FACILITIES DESCRIBED IN TM 2.4.6, WITH THE FOLLOWING EXCEPTIONS:

- HELIPAD NOT INCLUDED
- SPACE RESERVED FOR WATER/STORAGE SUPPLY



**PLAN**



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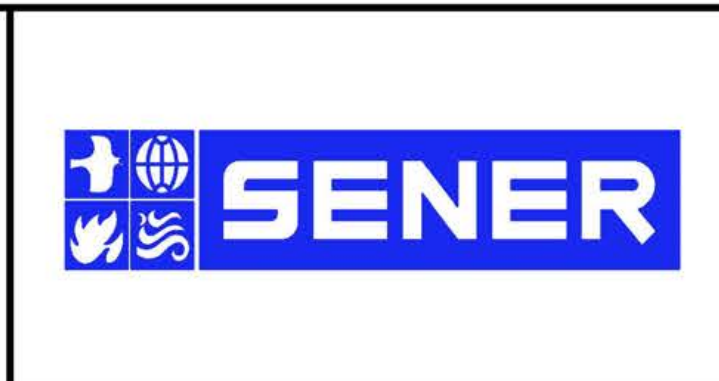
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0205240

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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
ALIGNMENT "SR14A"  
PLAN  
STA 1211+00.00 TO STA 1261+00.00

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-D4016-14A  
SCALE  
AS SHOWN  
SHEET NO.

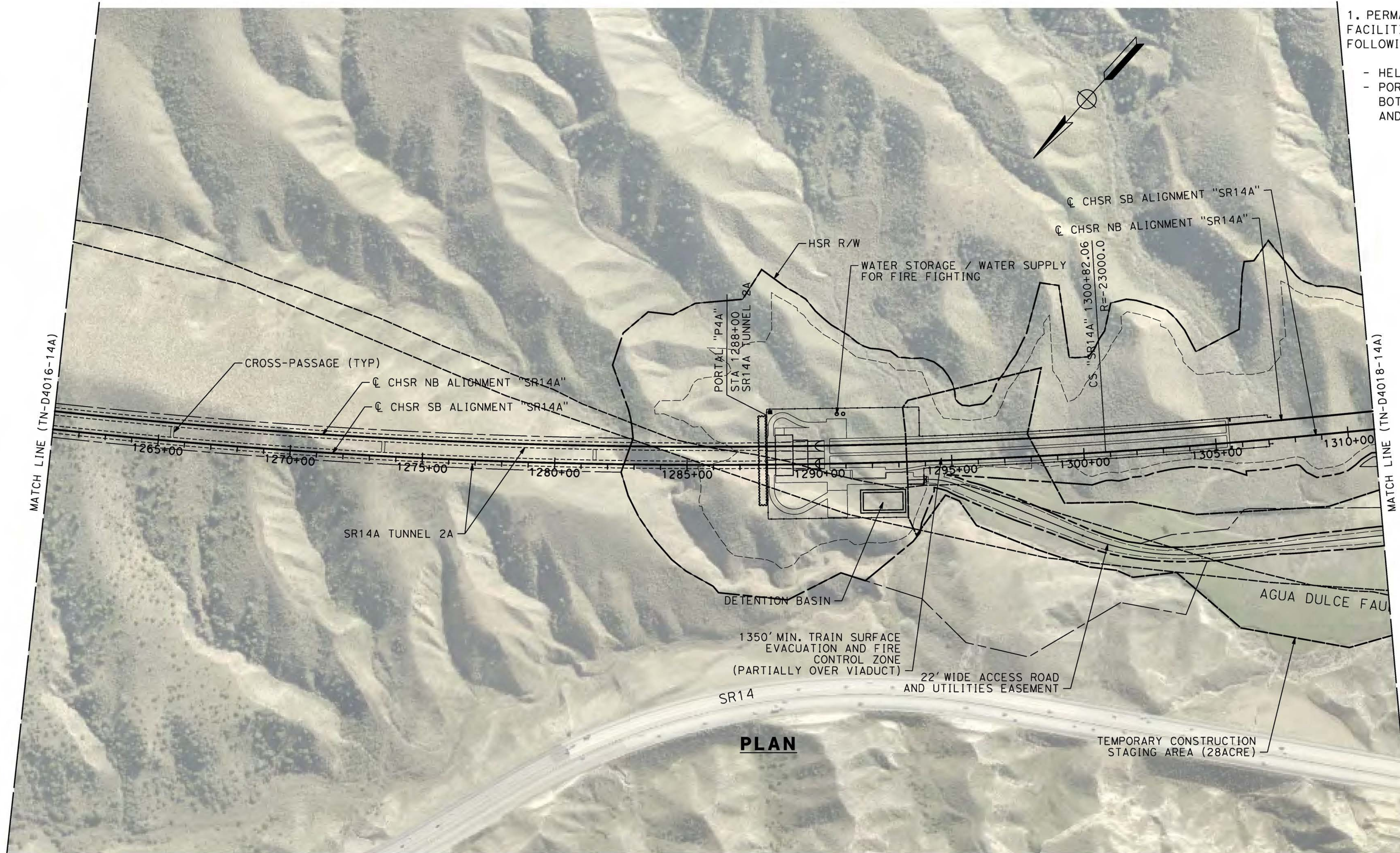


# TUNNEL 2A

NOTE:

1. PERMANENT FOOTPRINT INCLUDES SPACE FOR FACILITIES DESCRIBED IN TM 2.4.6, WITH THE FOLLOWING EXCEPTIONS:

- HELIPAD NOT INCLUDED
- PORTAL P4A INCLUDES SPACE RESERVED FOR BOTH DETENTION POND/BASIN (LOW POINT) AND WATER/STORAGE SUPPLY



**PLAN**

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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
PLAN  
STA 1261+00.00 TO STA 1311+00.00

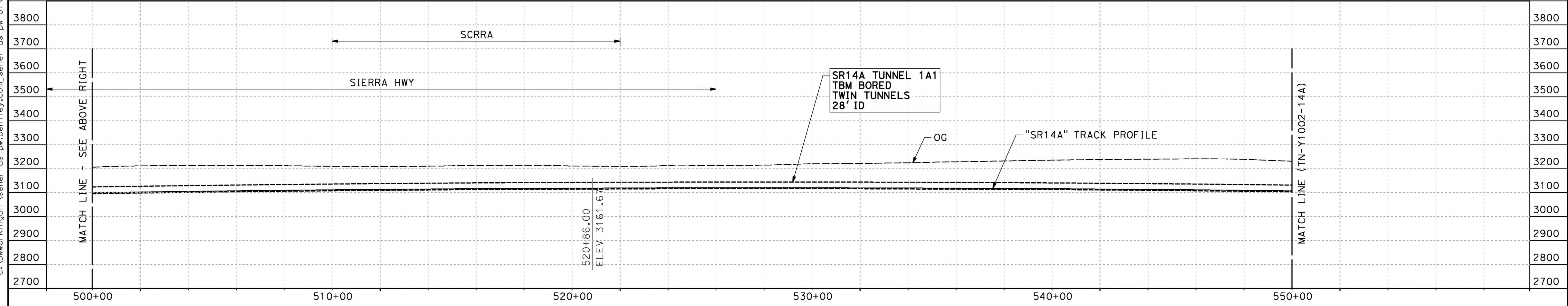
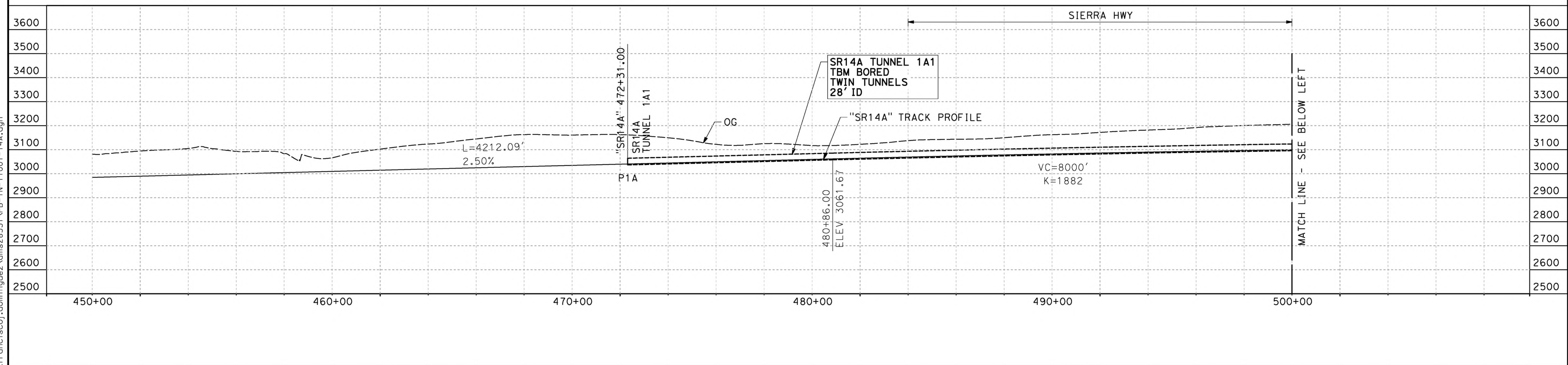
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DRAWING NO.  
**TN-D4017-14A**  
SCALE  
**AS SHOWN**  
SHEET NO.



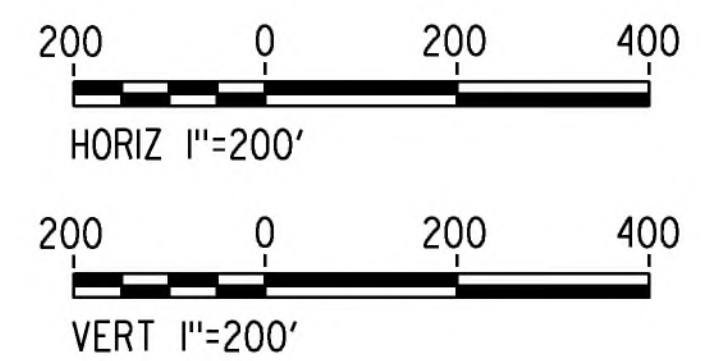
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09/12/2020 15:16:18

0205240



**PROFILE**

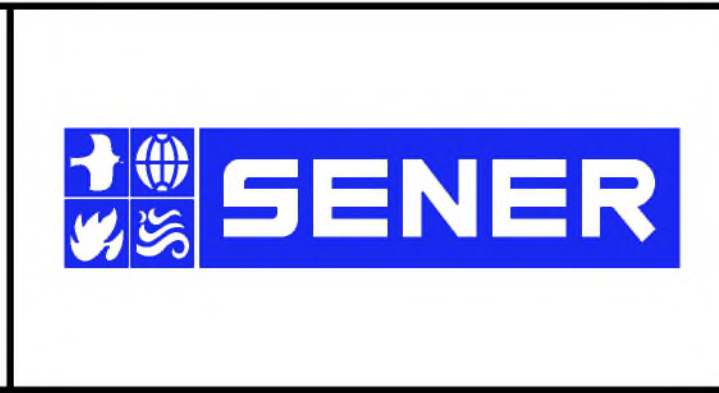


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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/ E1A/ E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 450+00.00 TO STA 550+00.00

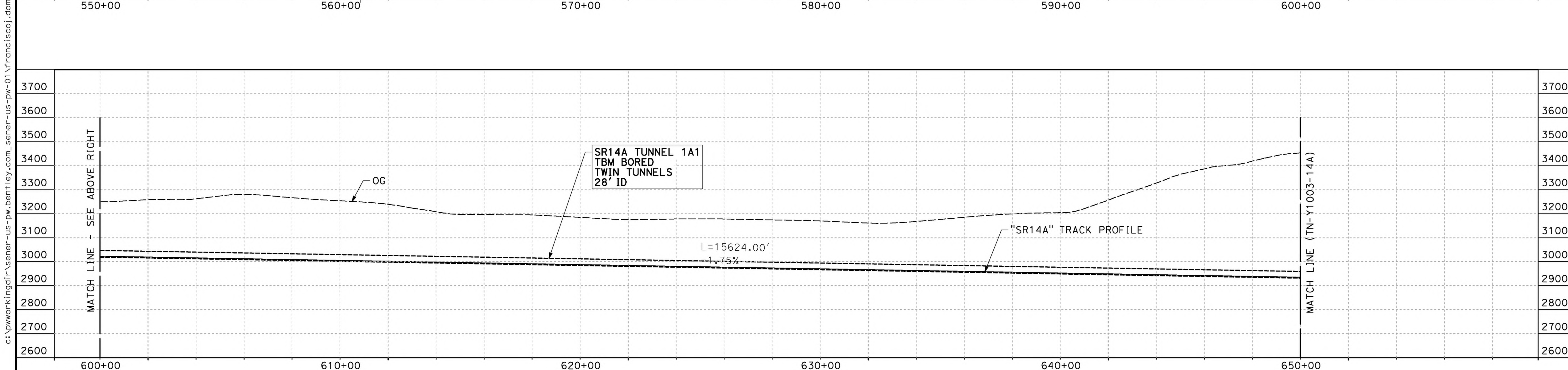
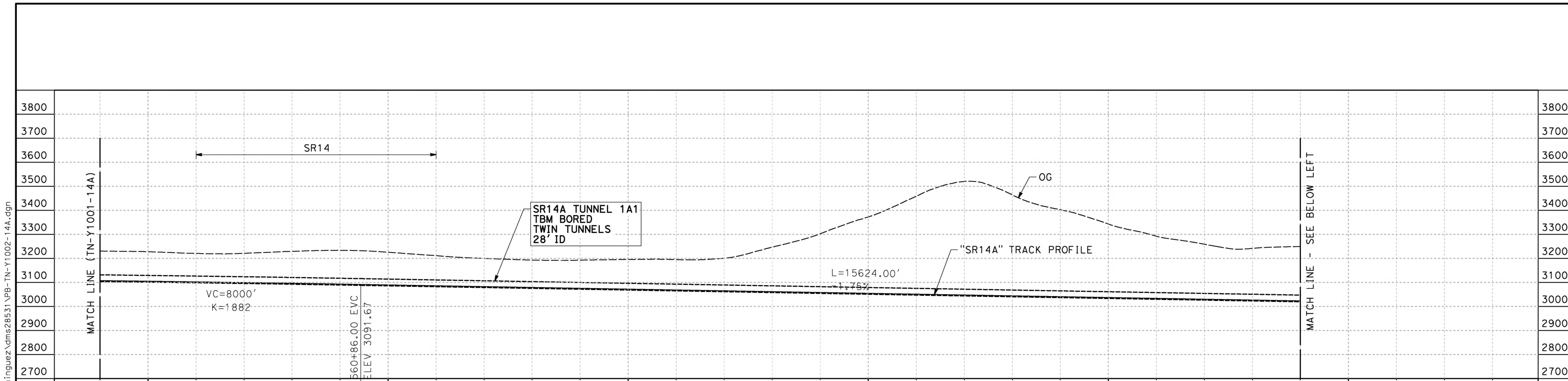
CONTRACT NO.  
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DRAWING NO.  
**TN-Y1001-14A**

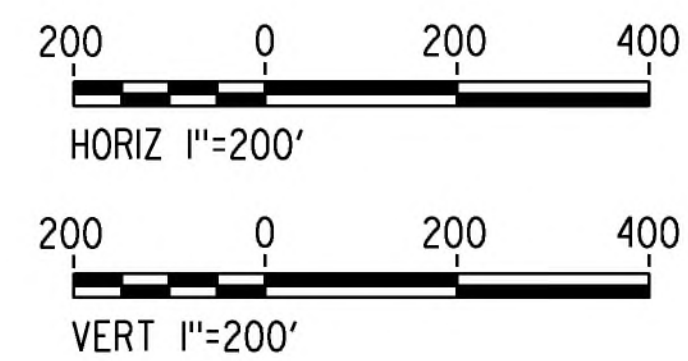
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SHEET NO.





**PROFILE**

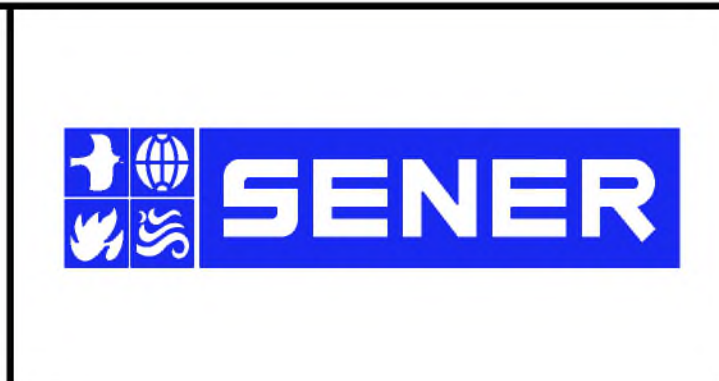


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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 550+00.00 TO STA 650+00.00

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-Y1002-14A**

SCALE  
**AS SHOWN**

SHEET NO.

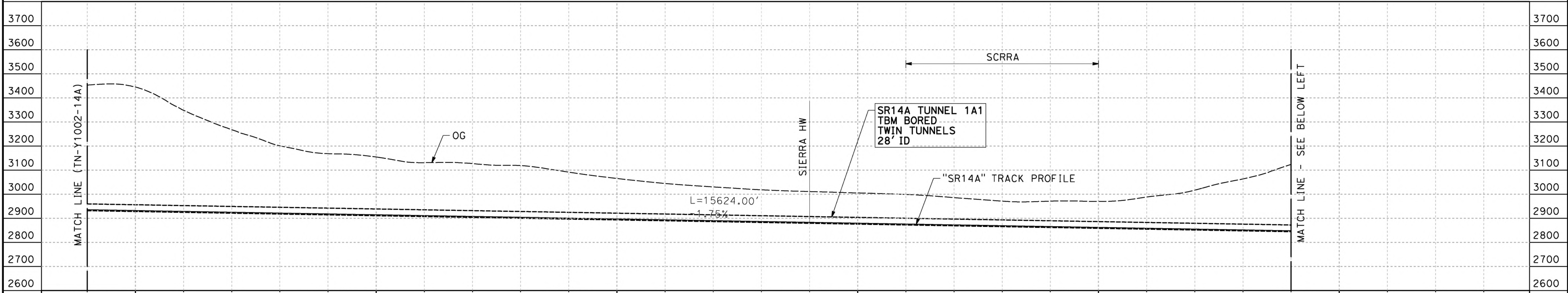
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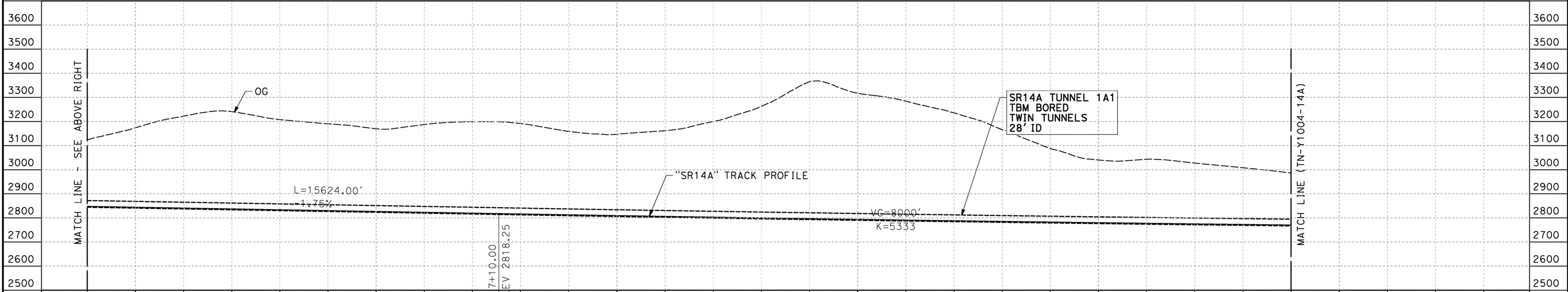
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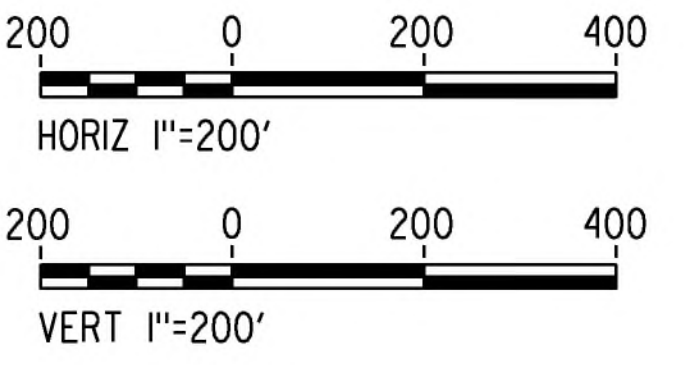


650+00 660+00 670+00 680+00 690+00 700+00



700+00 710+00 717+10.00 ELEV 2818.25 720+00 730+00 740+00 750+00

**PROFILE**

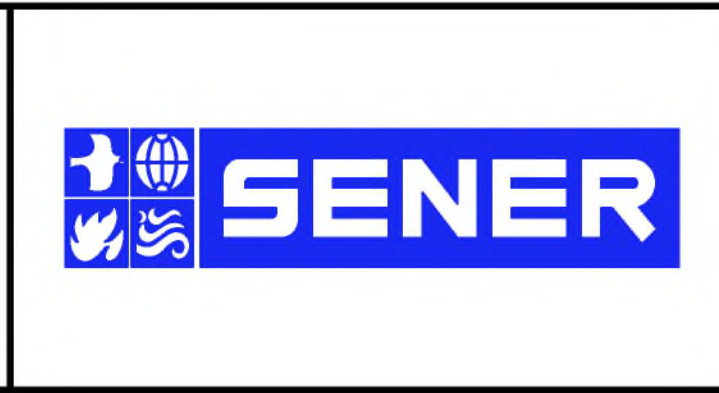


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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 650+00.00 TO STA 750+00.00

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-Y1003-14A**

SCALE  
**AS SHOWN**

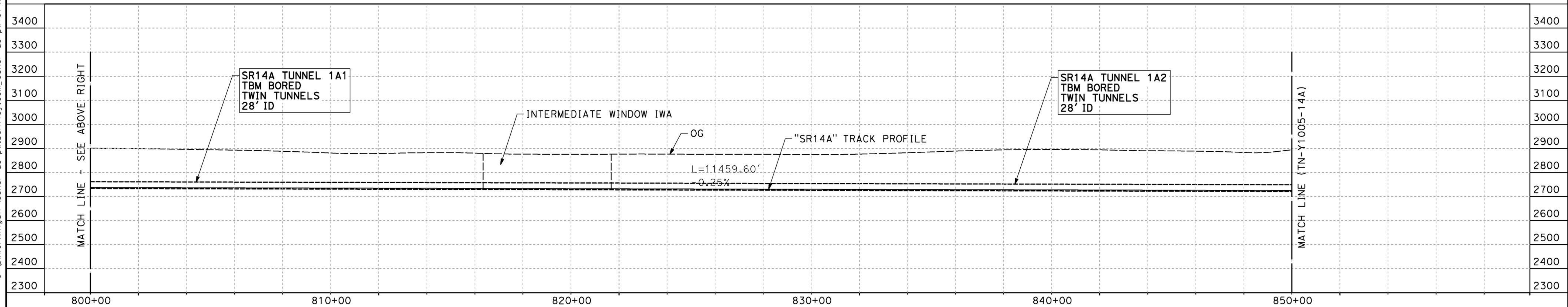
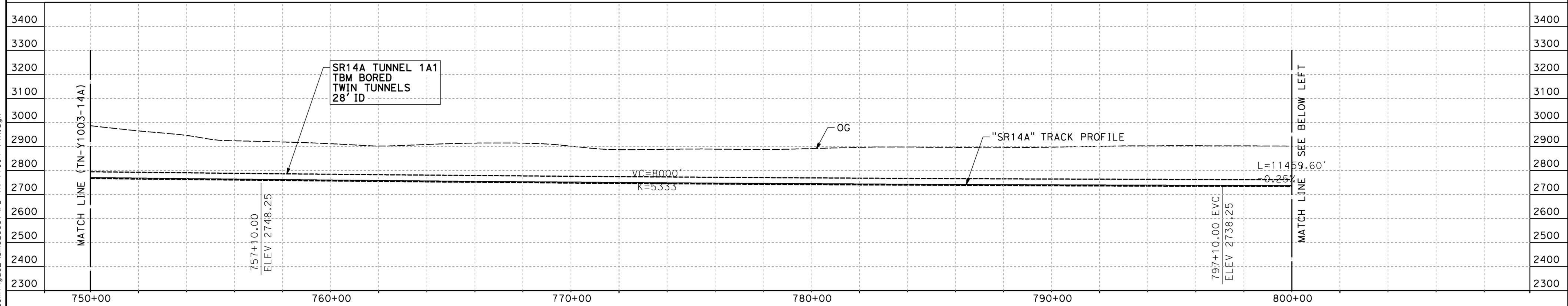
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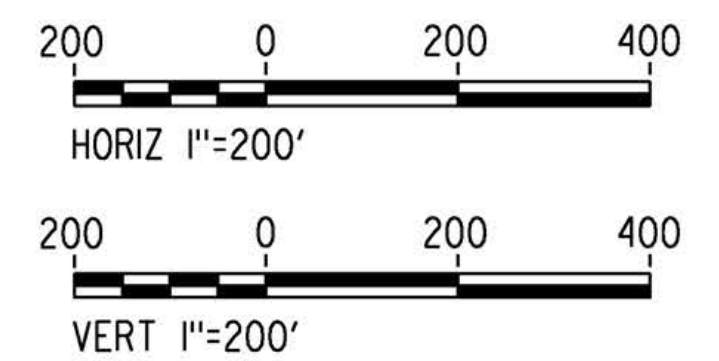
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09/12/2020 15:17:00

0205240



**PROFILE**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 750+00.00 TO STA 850+00.00

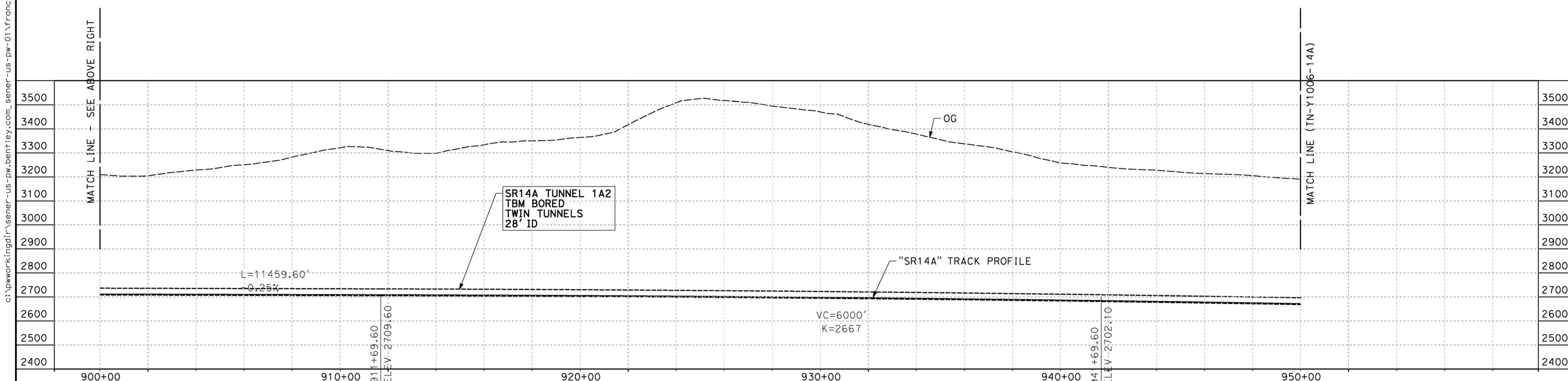
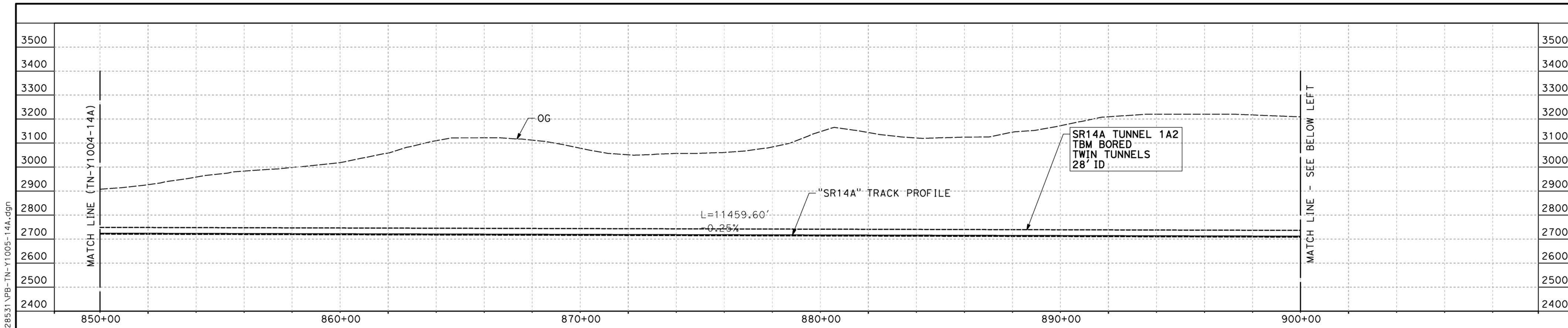
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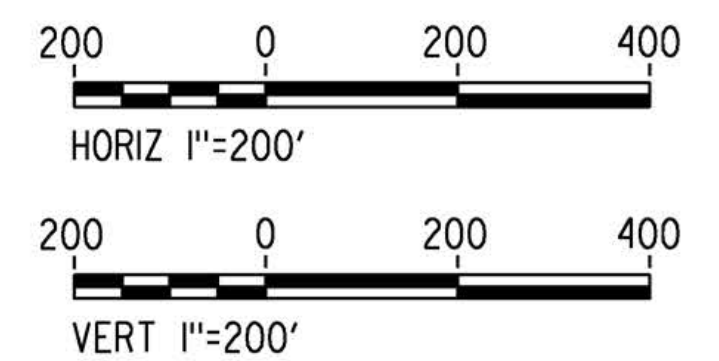
SCALE  
**AS SHOWN**

SHEET NO.





**PROFILE**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
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**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A  
  
NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 850+00.00 TO STA 950+00.00

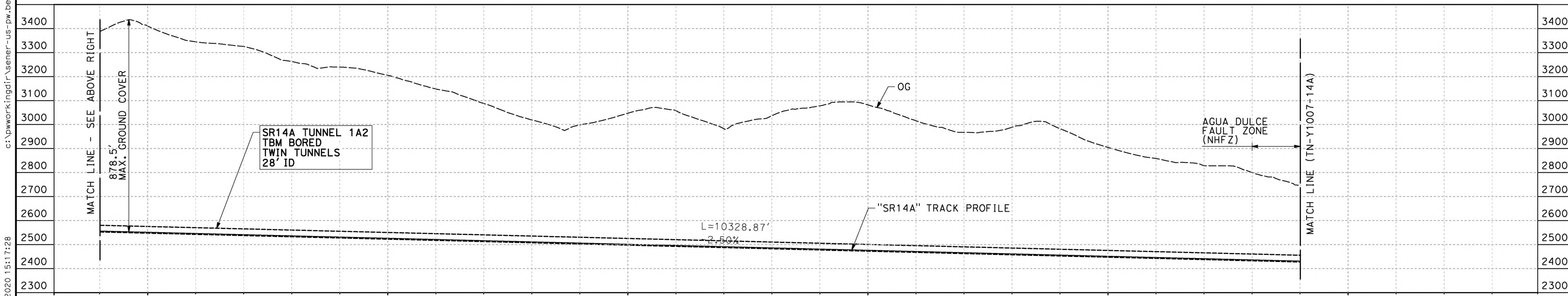
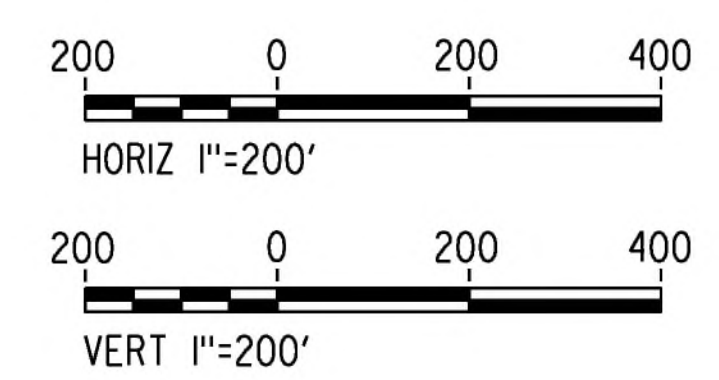
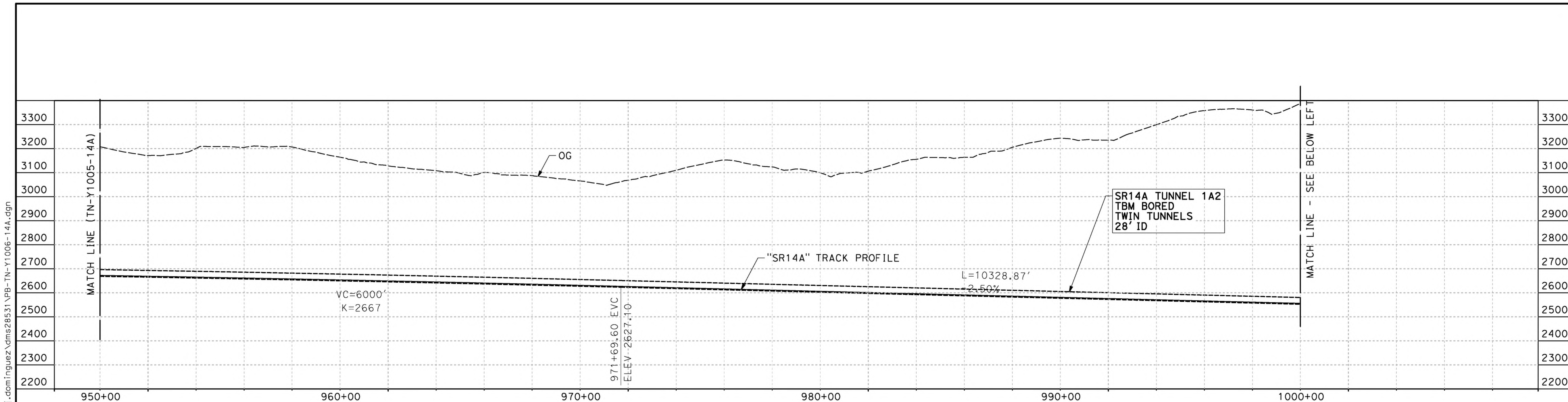
CONTRACT NO.  
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DRAWING NO.  
**TN-Y1005-14A**  
SCALE  
**AS SHOWN**  
SHEET NO.

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09/12/2020 15:17:14

0205240





**PROFILE**

| REV | DATE | BY | CHK | APP | DESCRIPTION |
|-----|------|----|-----|-----|-------------|
|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 950+00.00 TO STA 1050+00.00

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-Y1006-14A**

SCALE  
**AS SHOWN**

SHEET NO.

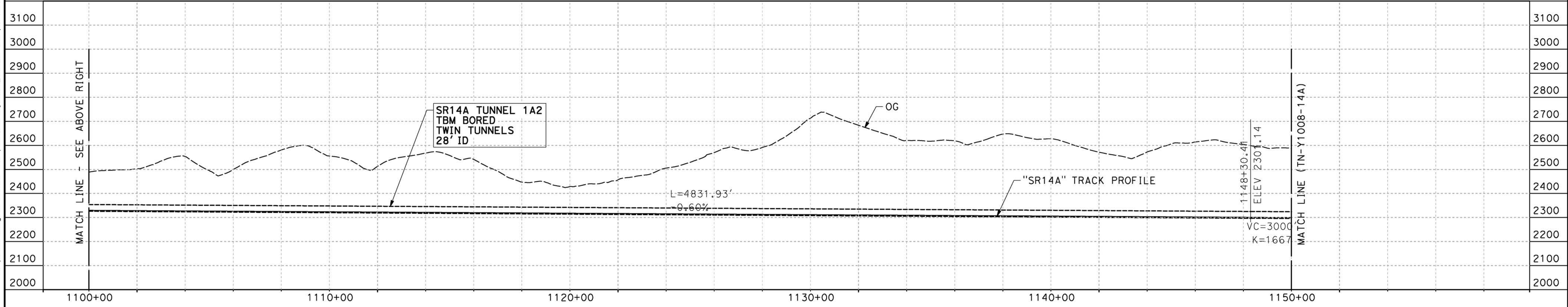
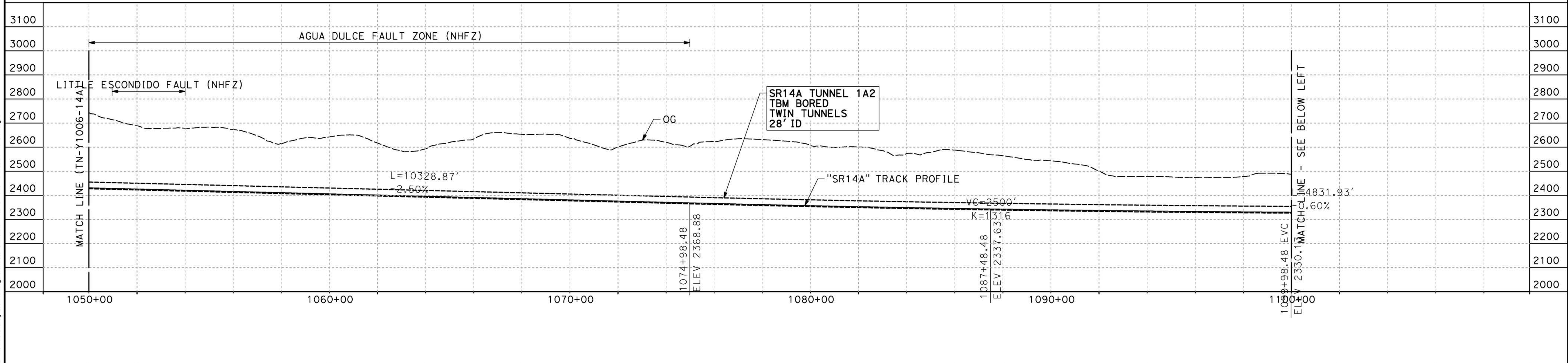
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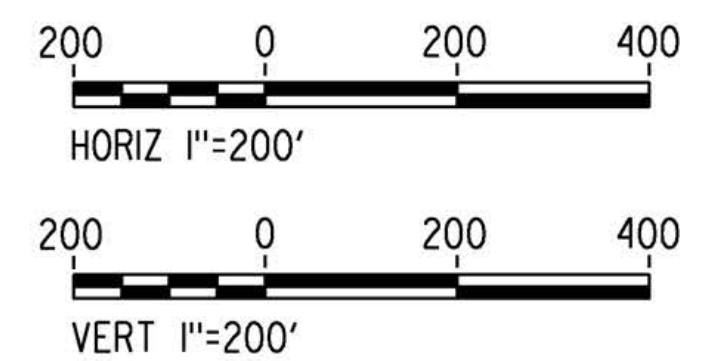
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09/12/2020 15:17:42

0205240



**PROFILE**



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 1050+00.00 TO STA 1150+00.00

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-Y1007-14A**

SCALE  
**AS SHOWN**

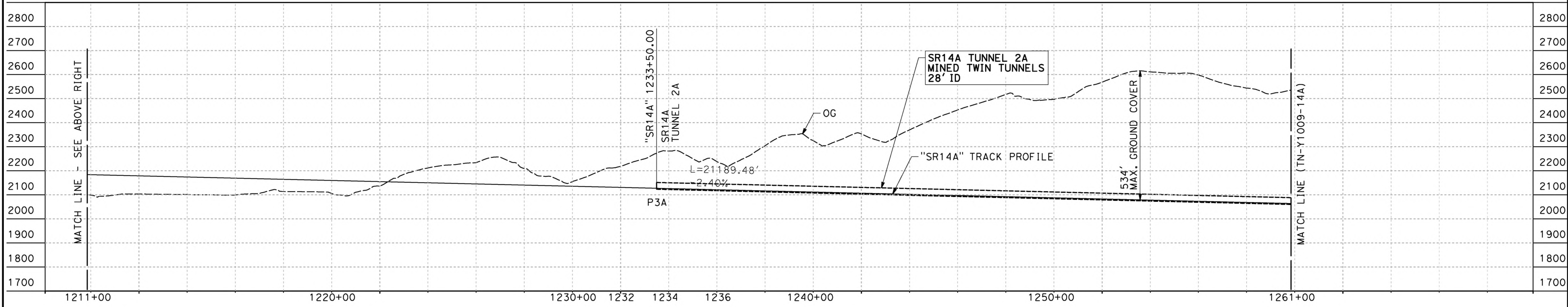
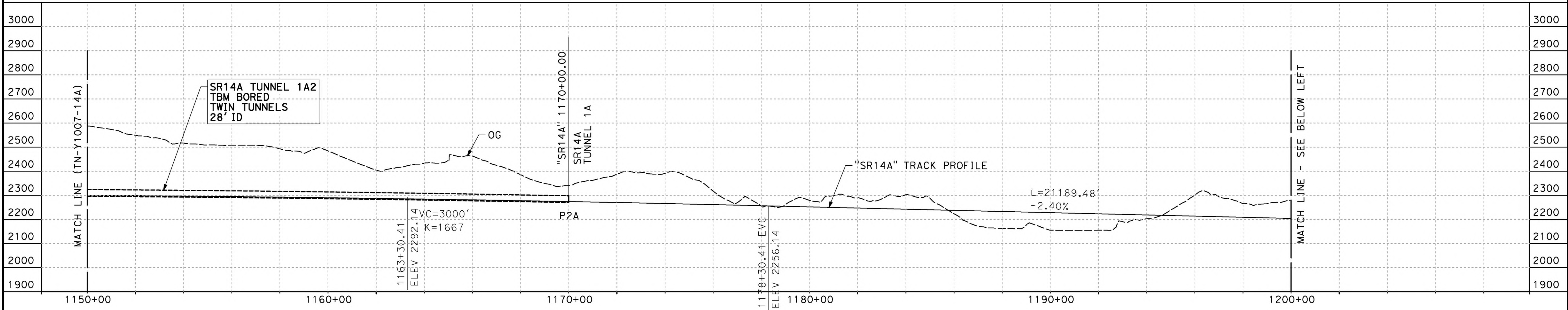
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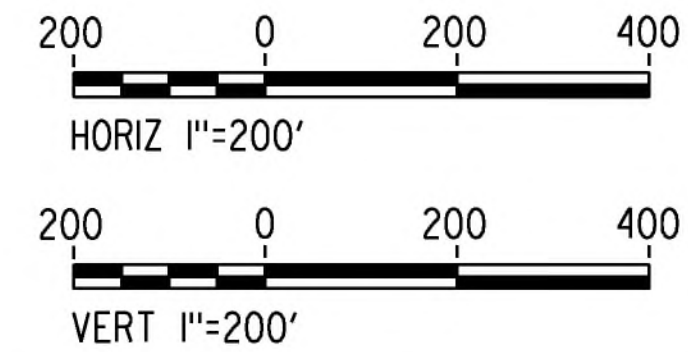
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0205240



**PROFILE**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 1150+00.00 TO STA 1261+00.00

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-Y1008-14A**

SCALE  
**AS SHOWN**

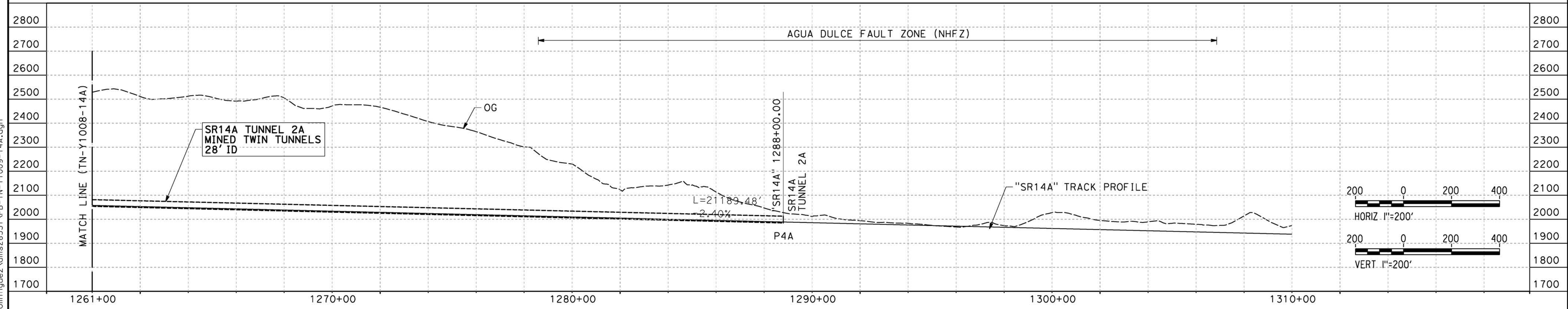
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0205240



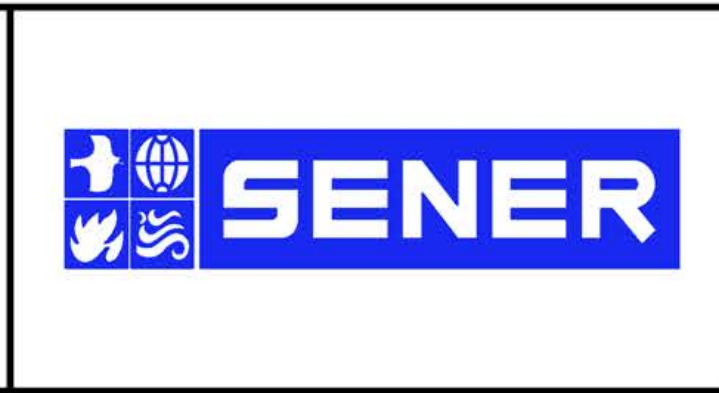
**PROFILE**

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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 1261+00.00 TO STA 1311+00.00

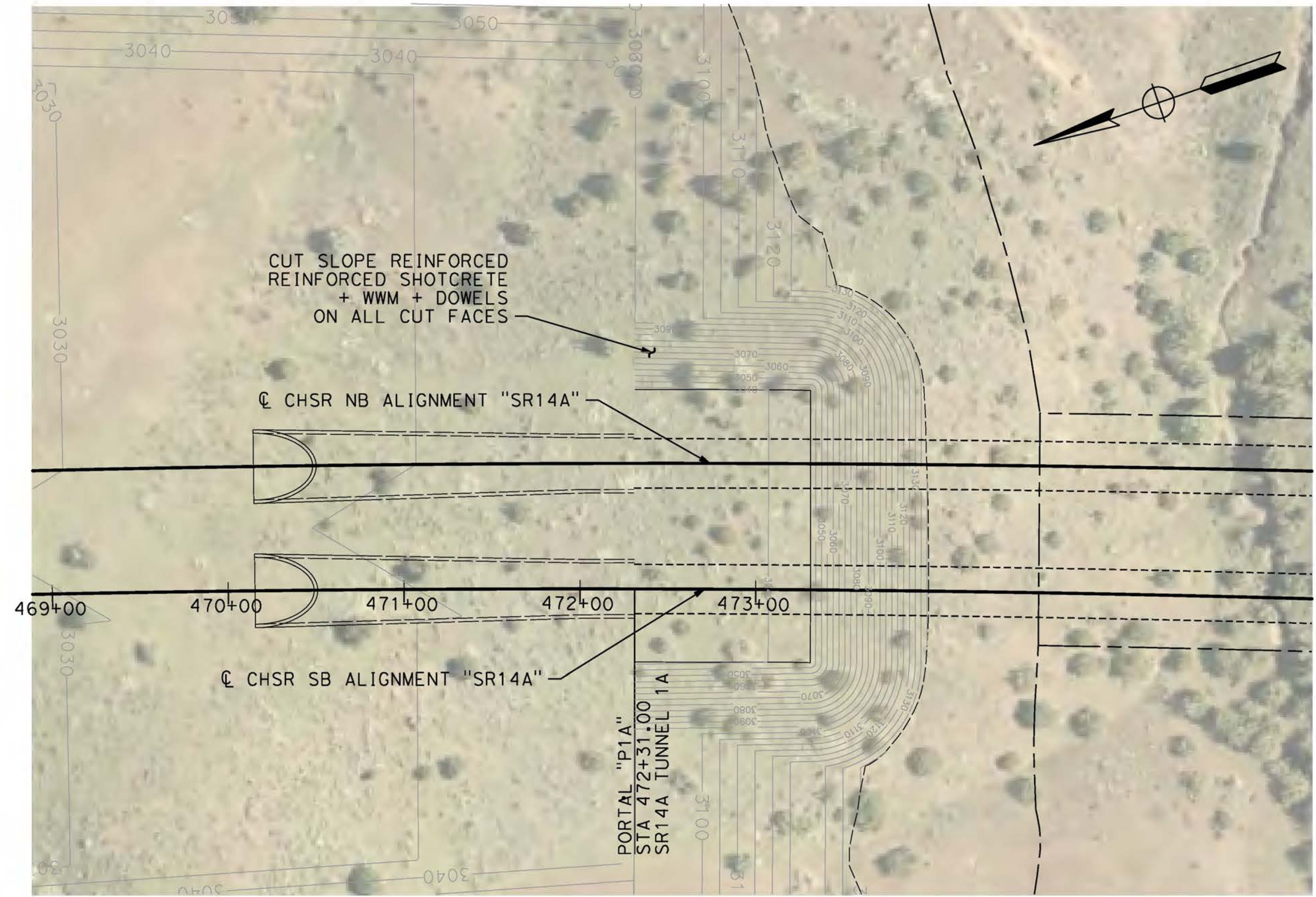
CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-Y1009-14A  
SCALE  
AS SHOWN  
SHEET NO.



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09/12/2020 15:14:41

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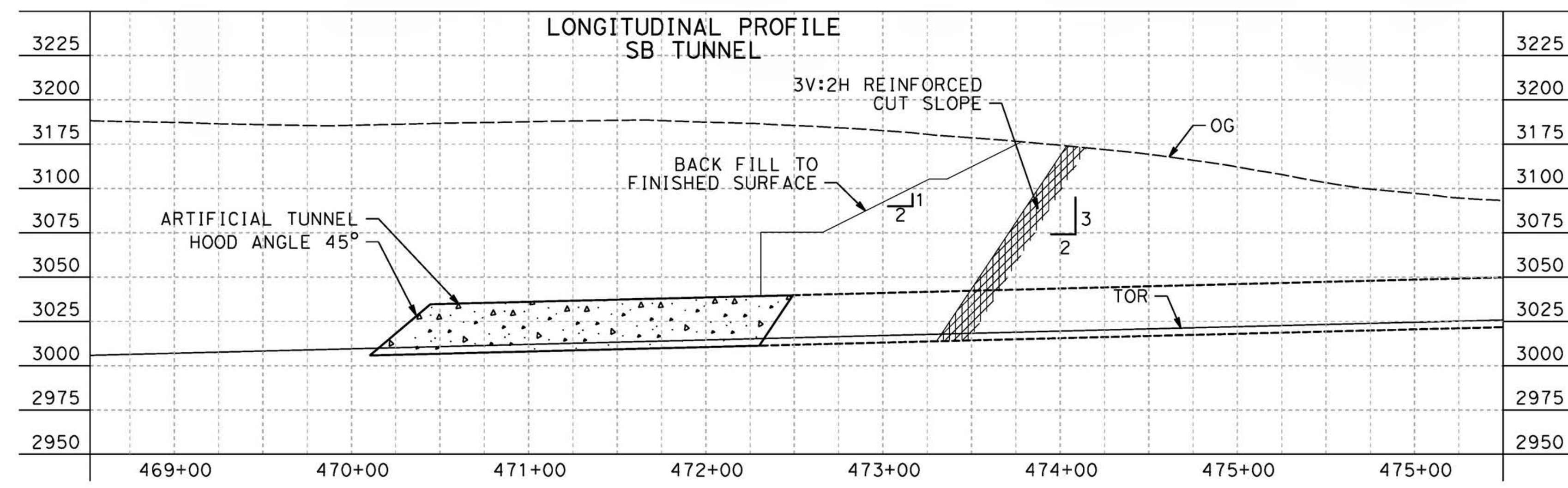


**PLAN**

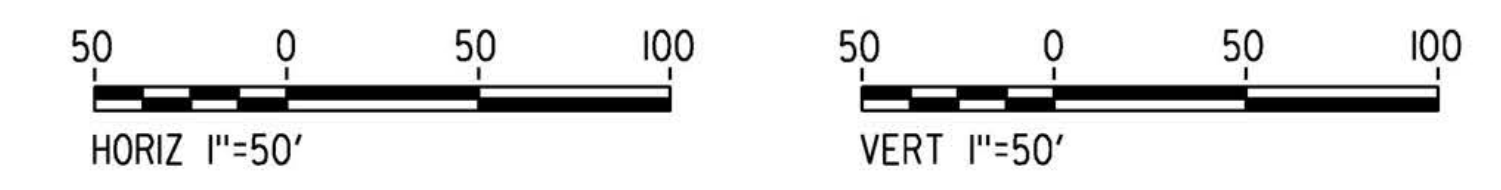
**NOTE :**

- EXAMPLE OF ROCK CUT SLOPE REINFORCEMENT AT PORTAL MOUTH  
 - 2 IN OF SHOTCRETE WITH STEEL FIBERS (50 KG/ M<sup>3</sup>)  
 - WELDED WIRE MESH 6X6 - W4.0 X W4.0  
 - 20FT LONG CEMENT GROUTED DOWELS ON 4' BY 4' PATTERN  
 - WEEP AS DIRECTED
- GEOTECHNICAL RISKS AND CONSTRUCTABILITY ISSUES  
 SEE DRAWING TN-B0006
- THE DRAWING SHOWS THE TEMPORARY PORTAL CUT PLAN AND LONG SECTION FOR CONSTRUCTION AT THE PORTAL MOUTH ALONG WITH TEMPORARY SUPPORT FOR THE PORTAL CUT SLOPE, AND THE FINISHED FILL.
- THE DRAWING DOES NOT SHOW THE OVERALL GRADING (2H:1V) OF THE WIDER PORTAL AREA. THE EXTENT OF WHICH IS SHOWN ON THE GENERAL PLAN (SEE LIMITS OF EXCAVATION-CUT).

|                   |             |
|-------------------|-------------|
| EXCAVATION VOLUME | 77,749 CY   |
| FILL VOLUME       | 54,150 CY   |
| CUT SLOPE SURFACE | 46,793 SQFT |



**PROFILE**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
|-----|------|----|-----|-----|-------------|
|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**

DRAWN BY  
**F.J.DOMINGUEZ**

CHECKED BY  
**C.RECHEA**

IN CHARGE  
**A.RELAÑO**

DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "SR14A"

PORTAL 1A  
PLAN AND PROFILE FOR CONSTRUCTION

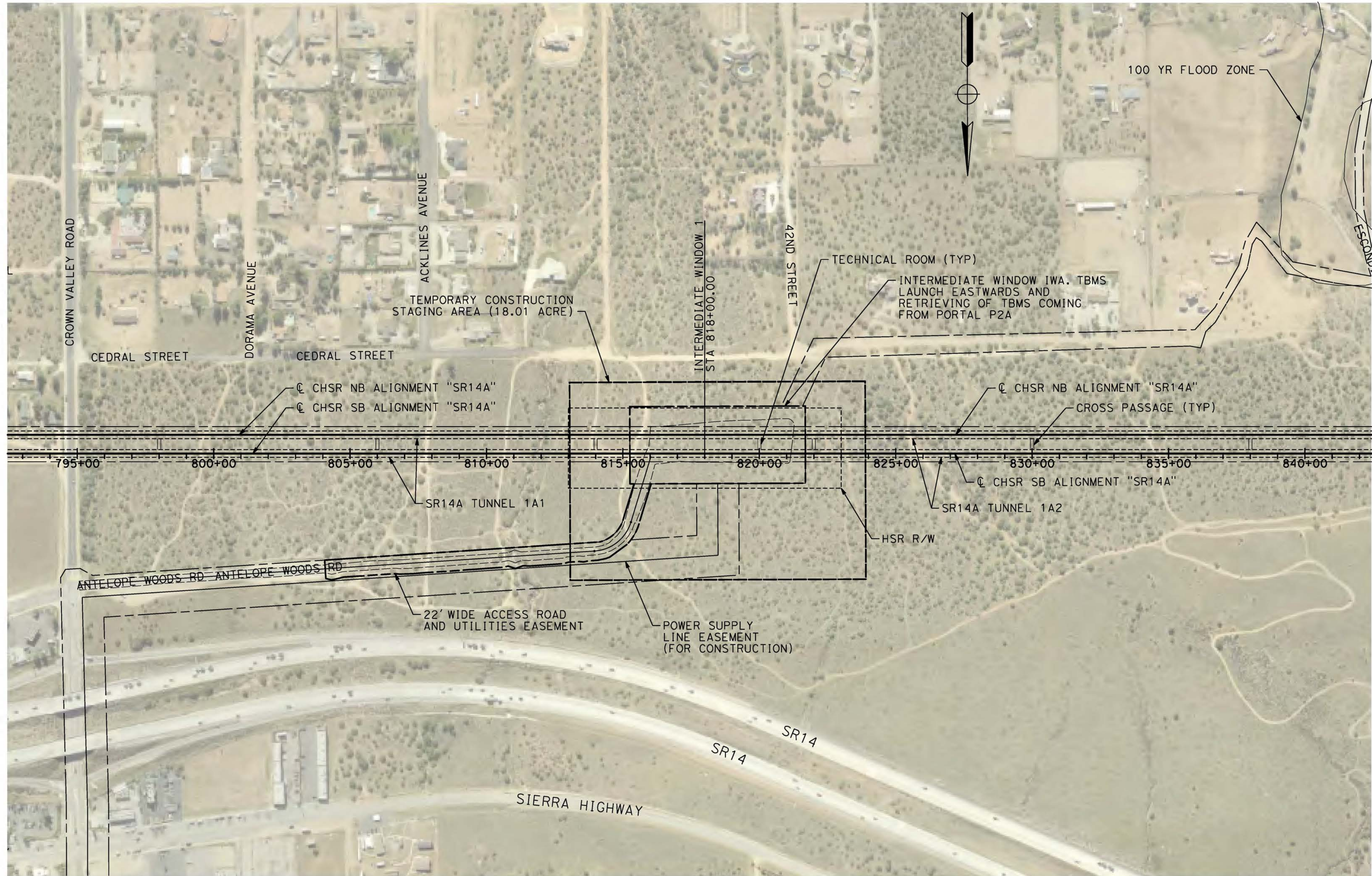
CONTRACT NO.  
HSR14-42

DRAWING NO.  
TN-D7001-14A

SCALE  
AS SHOWN

SHEET NO.





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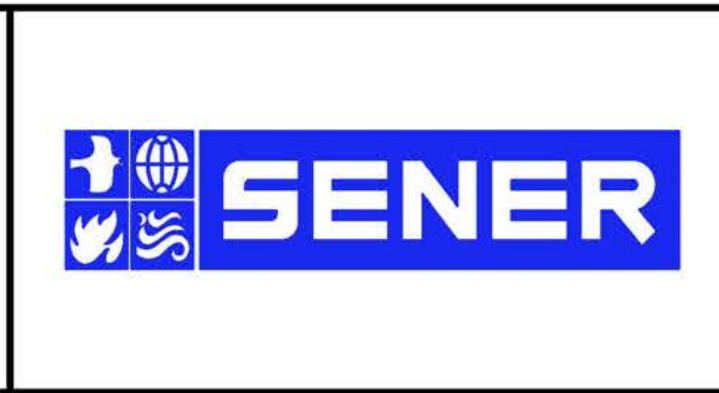
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0205240

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|     |      |    |     |     |             |

DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT "SR14A"  
INTERMEDIATE WINDOW IWA  
PLAN

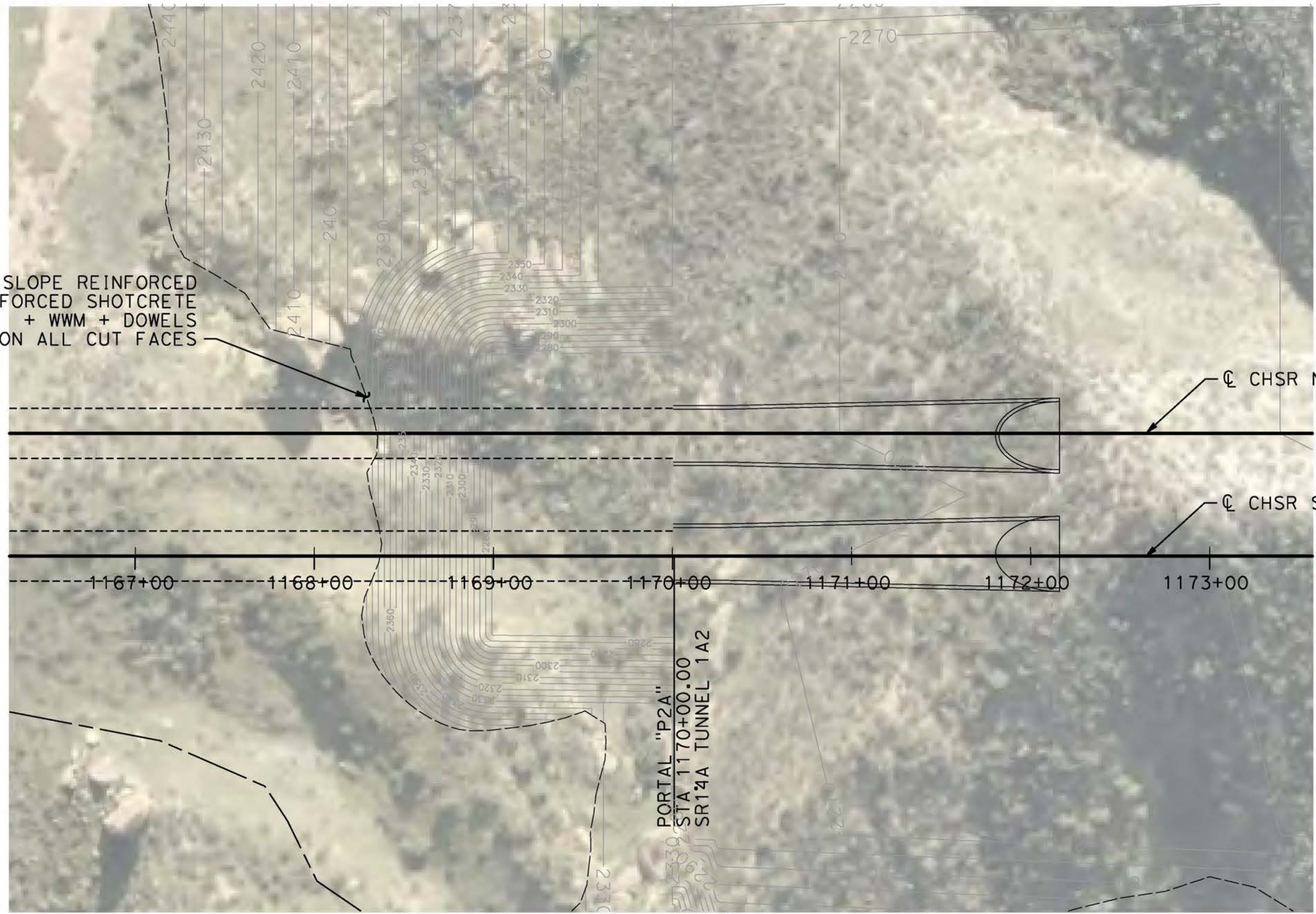
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HSR14-42  
DRAWING NO.  
TN-D7002-14A  
SCALE  
AS SHOWN  
SHEET NO.



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0205240

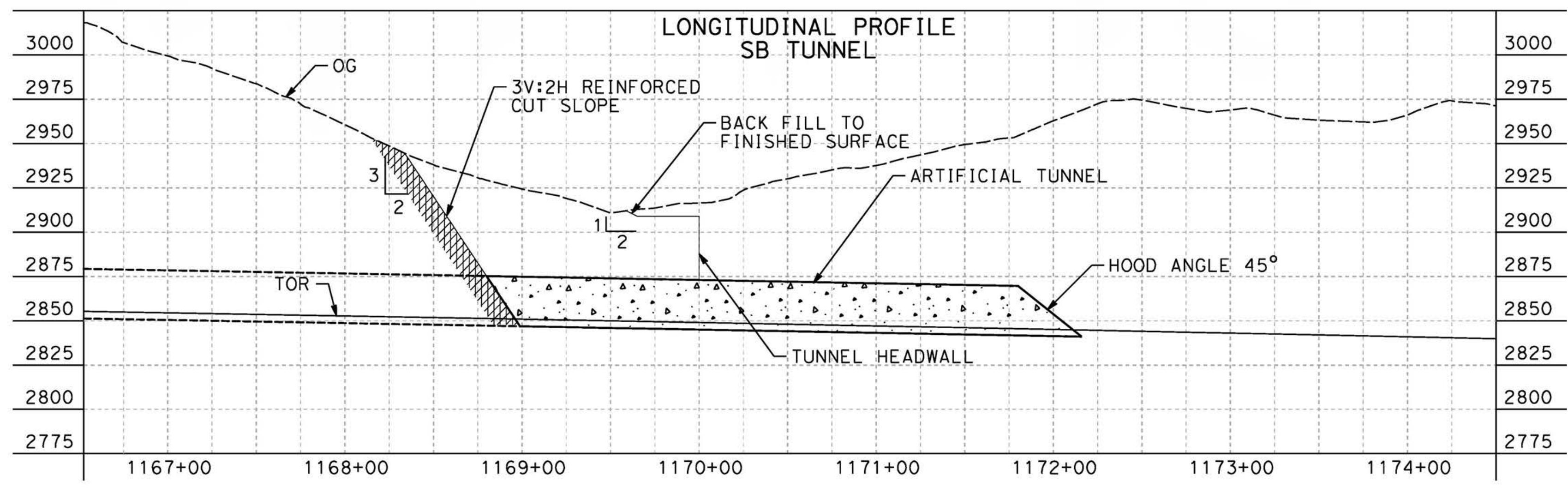


**PLAN**

**NOTE :**

1. EXAMPLE OF ROCK CUT SLOPE REINFORCEMENT AT PORTAL MOUTH  
 - 2 IN OF SHOTCRETE WITH STEEL FIBERS (50 KG/ M<sup>3</sup>)  
 - WELDED WIRE MESH 6X6 - W4.0 X W4.0  
 - 20FT LONG CEMENT GROUTED DOWELS ON 4' BY 4' PATTERN  
 - WEEP AS DIRECTED
2. GEOTECHNICAL RISKS AND CONSTRUCTABILITY ISSUES  
 SEE DRAWING TN-B0006
3. THE DRAWING SHOWS THE TEMPORARY PORTAL CUT PLAN AND LONG SECTION FOR CONSTRUCTION AT THE PORTAL MOUTH ALONG WITH TEMPORARY SUPPORT FOR THE PORTAL CUT SLOPE, AND THE FINISHED FILL.
4. THE DRAWING DOES NOT SHOW THE OVERALL GRADING (2H:1V) OF THE WIDER PORTAL AREA. THE EXTENT OF WHICH IS SHOWN ON THE GENERAL PLAN (SEE LIMITS OF EXCAVATION-CUT).

|                   |             |
|-------------------|-------------|
| EXCAVATION VOLUME | 65,546 CY   |
| FILL VOLUME       | 45,533 CY   |
| CUT SLOPE SURFACE | 50,552 SQFT |



**PROFILE**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
|-----|------|----|-----|-----|-------------|
|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
 DRAWN BY  
**F.J.DOMINGUEZ**  
 CHECKED BY  
**C.RECHEA**  
 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

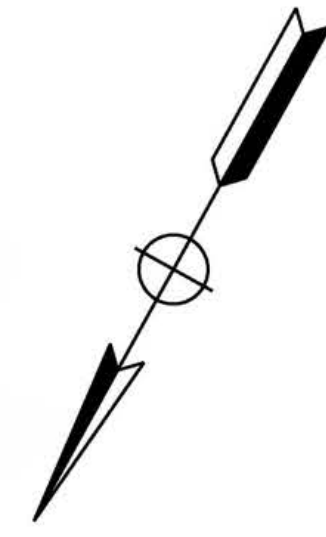
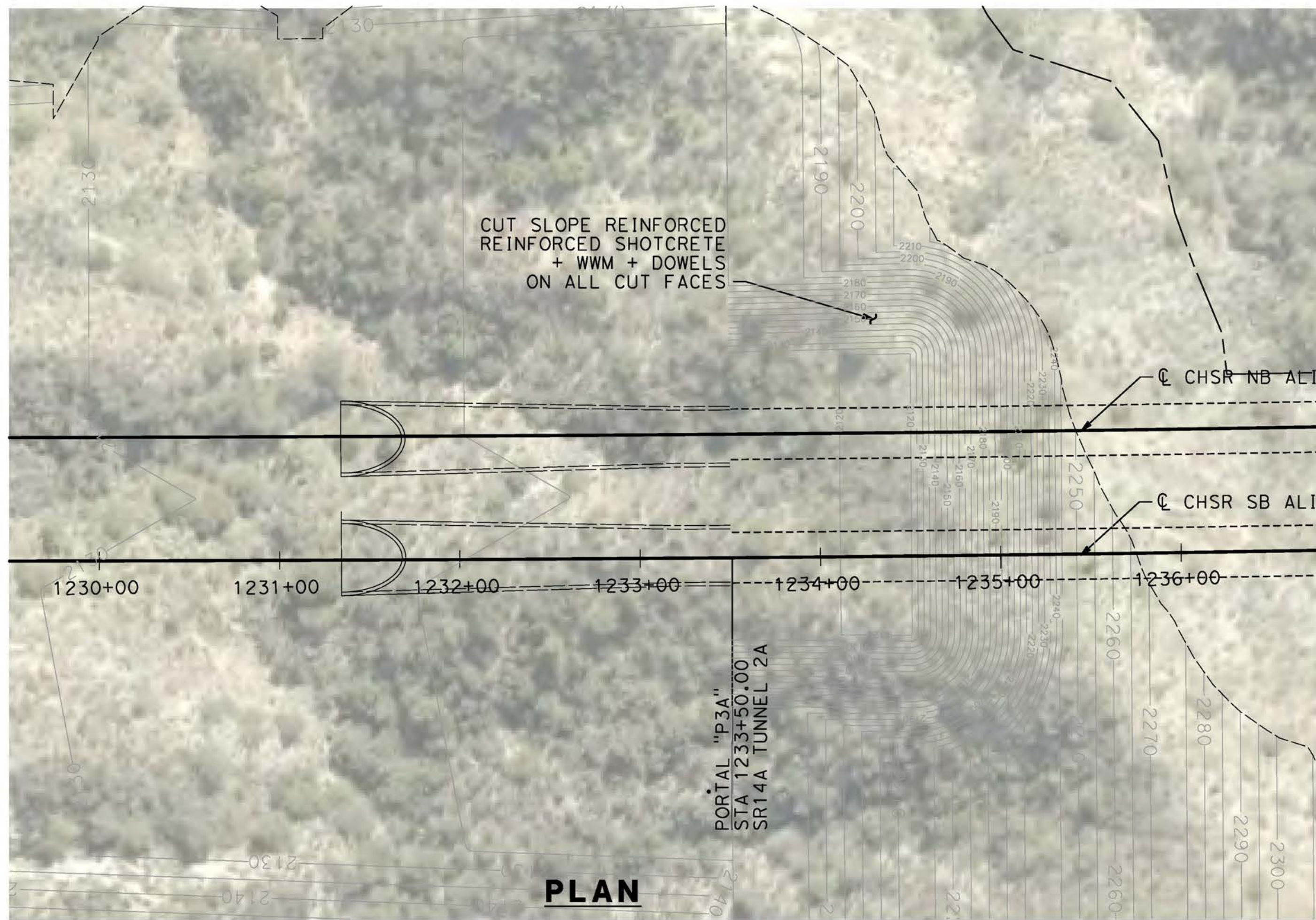
**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A  
 NOT FOR  
 CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK  
 ALIGNMENT "SR14A"  
 PORTAL 2A  
 PLAN AND PROFILE FOR CONSTRUCTION**

CONTRACT NO.  
**HSR14-42**  
 DRAWING NO.  
**TN-D7003-14A**  
 SCALE  
**AS SHOWN**  
 SHEET NO.

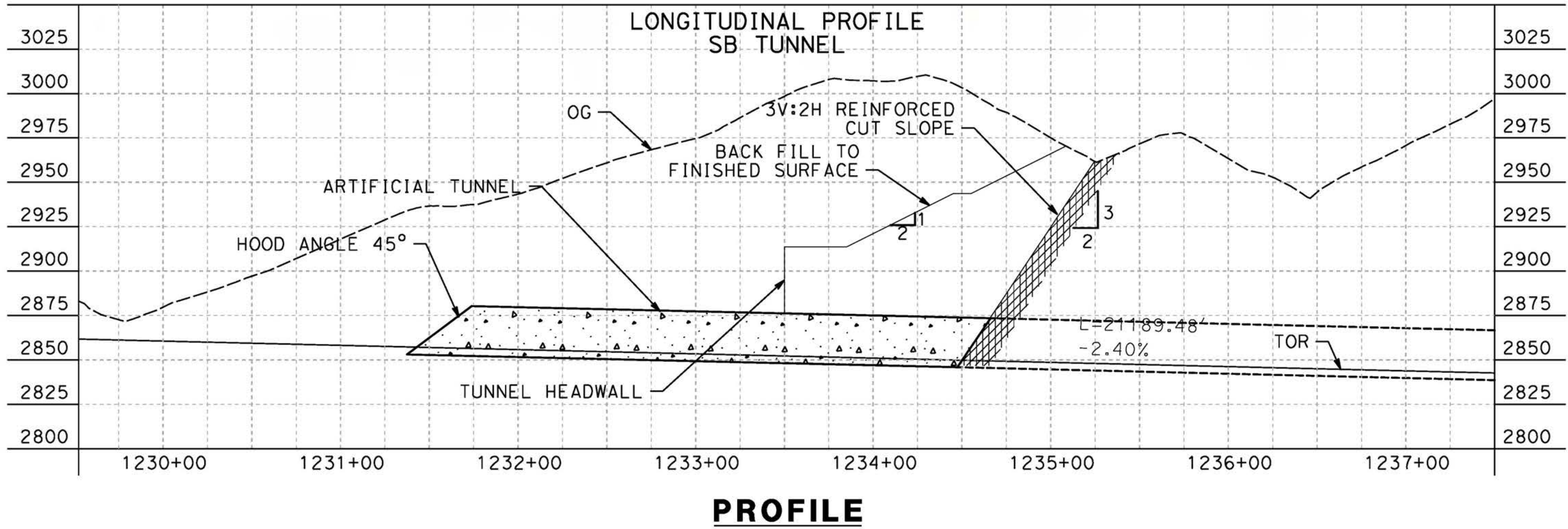




**NOTE :**

1. EXAMPLE OF ROCK CUT SLOPE REINFORCEMENT AT PORTAL MOUTH  
 - 2 IN OF SHOTCRETE WITH STEEL FIBERS (50 KG/ M<sup>3</sup>)  
 - WELDED WIRE MESH 6X6 - W4.0 X W4.0  
 - 20FT LONG CEMENT GROUTED DOWELS ON 4' BY 4' PATTERN  
 - WEEP AS DIRECTED
2. GEOTECHNICAL RISKS AND CONSTRUCTABILITY ISSUES  
 SEE DRAWING TN-B0006
3. THE DRAWING SHOWS THE TEMPORARY PORTAL CUT PLAN AND LONG SECTION FOR CONSTRUCTION AT THE PORTAL MOUTH ALONG WITH TEMPORARY SUPPORT FOR THE PORTAL CUT SLOPE, AND THE FINISHED FILL.
4. THE DRAWING DOES NOT SHOW THE OVERALL GRADING (2H:1V) OF THE WIDER PORTAL AREA. THE EXTENT OF WHICH IS SHOWN ON THE GENERAL PLAN (SEE LIMITS OF EXCAVATION-CUT).

|                   |             |
|-------------------|-------------|
| EXCAVATION VOLUME | 80,179 CY   |
| FILL VOLUME       | 69,802 CY   |
| CUT SLOPE SURFACE | 57,956 SQFT |



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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
 DRAWN BY  
**F.J.DOMINGUEZ**  
 CHECKED BY  
**C.RECHEA**  
 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A**

**NOT FOR  
 CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
 ALIGNMENT "SR14A"

PORTAL 3A  
 PLAN AND PROFILE FOR CONSTRUCTION

CONTRACT NO.  
HSR14-42

DRAWING NO.  
TN-D7004-14A

SCALE  
AS SHOWN

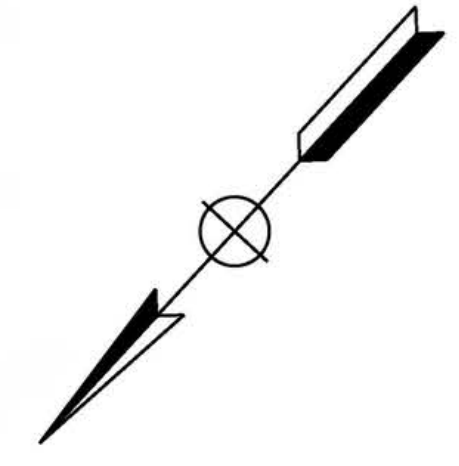
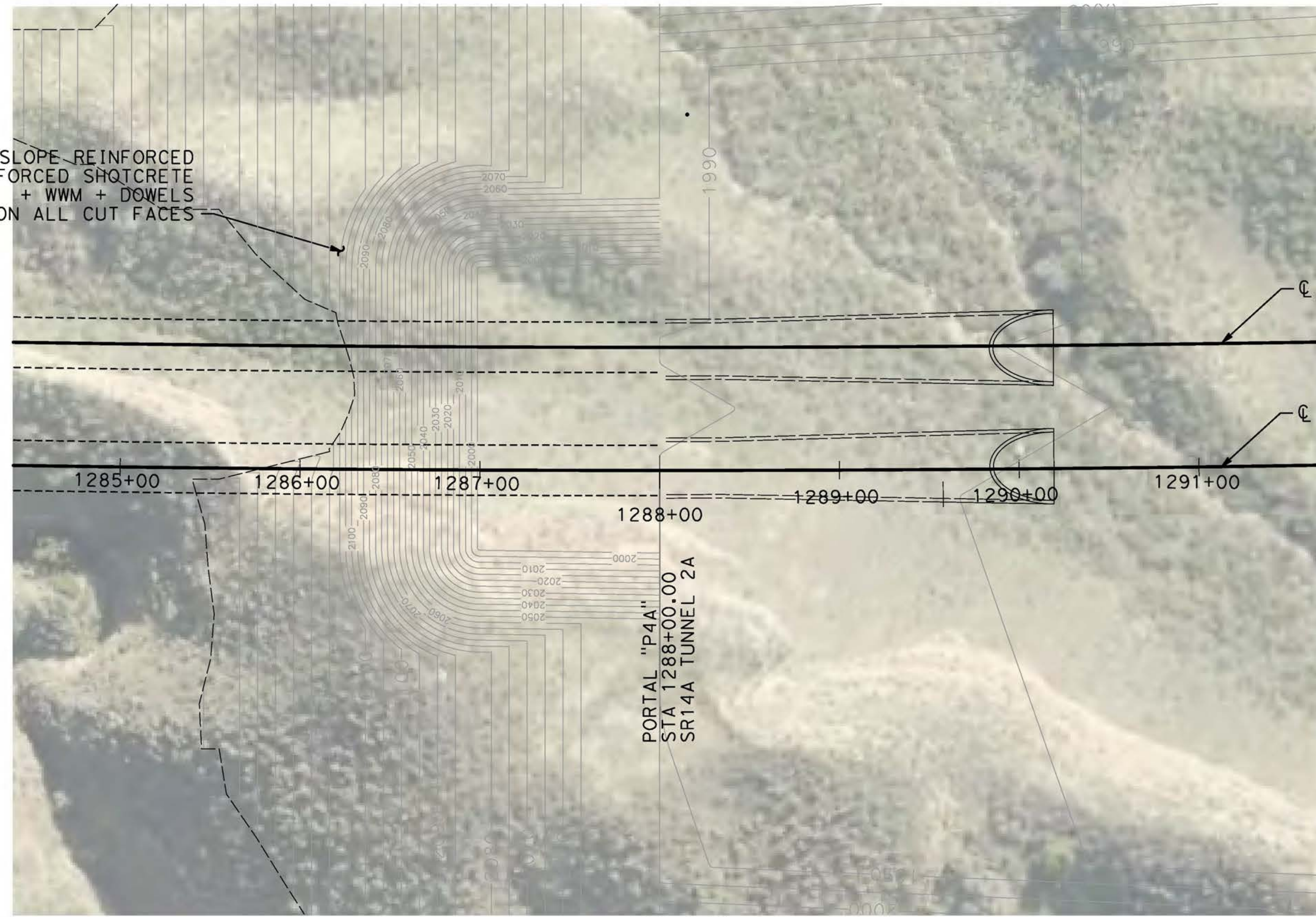
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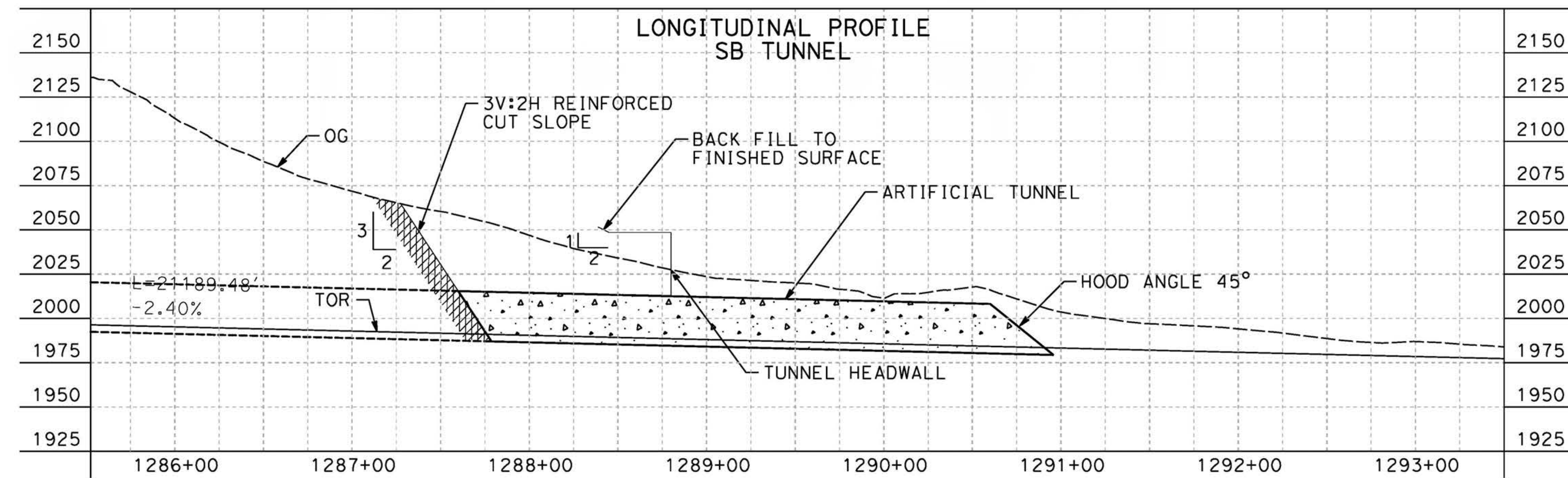


**PLAN**

**NOTE :**

1. EXAMPLE OF ROCK CUT SLOPE REINFORCEMENT AT PORTAL MOUTH  
 - 2 IN OF SHOTCRETE WITH STEEL FIBERS (50 KG/ M<sup>3</sup>)  
 - WELDED WIRE MESH 6X6 - W4.0 X W4.0  
 - 20FT LONG CEMENT GROUTED DOWELS ON 4' BY 4' PATTERN  
 - WEEP AS DIRECTED
2. GEOTECHNICAL RISKS AND CONSTRUCTABILITY ISSUES  
 SEE DRAWING TN-B0006
3. THE DRAWING SHOWS THE TEMPORARY PORTAL CUT PLAN AND LONG SECTION FOR CONSTRUCTION AT THE PORTAL MOUTH ALONG WITH TEMPORARY SUPPORT FOR THE PORTAL CUT SLOPE, AND THE FINISHED FILL.
4. THE DRAWING DOES NOT SHOW THE OVERALL GRADING (2H:1V) OF THE WIDER PORTAL AREA. THE EXTENT OF WHICH IS SHOWN ON THE GENERAL PLAN (SEE LIMITS OF EXCAVATION-CUT).

|                   |             |
|-------------------|-------------|
| EXCAVATION VOLUME | 56,116 CY   |
| FILL VOLUME       | 34,529 CY   |
| CUT SLOPE SURFACE | 51,422 SQFT |



**PROFILE**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
 DRAWN BY  
**F.J.DOMINGUEZ**  
 CHECKED BY  
**C.RECHEA**  
 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A  
 NOT FOR  
 CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK  
 ALIGNMENT "SR14A"  
 PORTAL 4A  
 PLAN AND PROFILE FOR CONSTRUCTION**

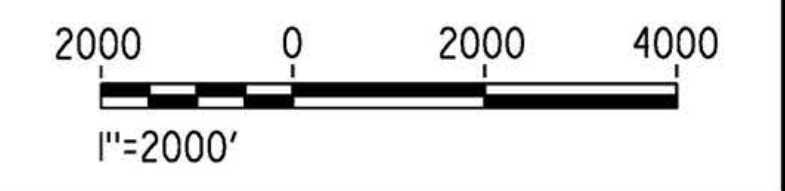
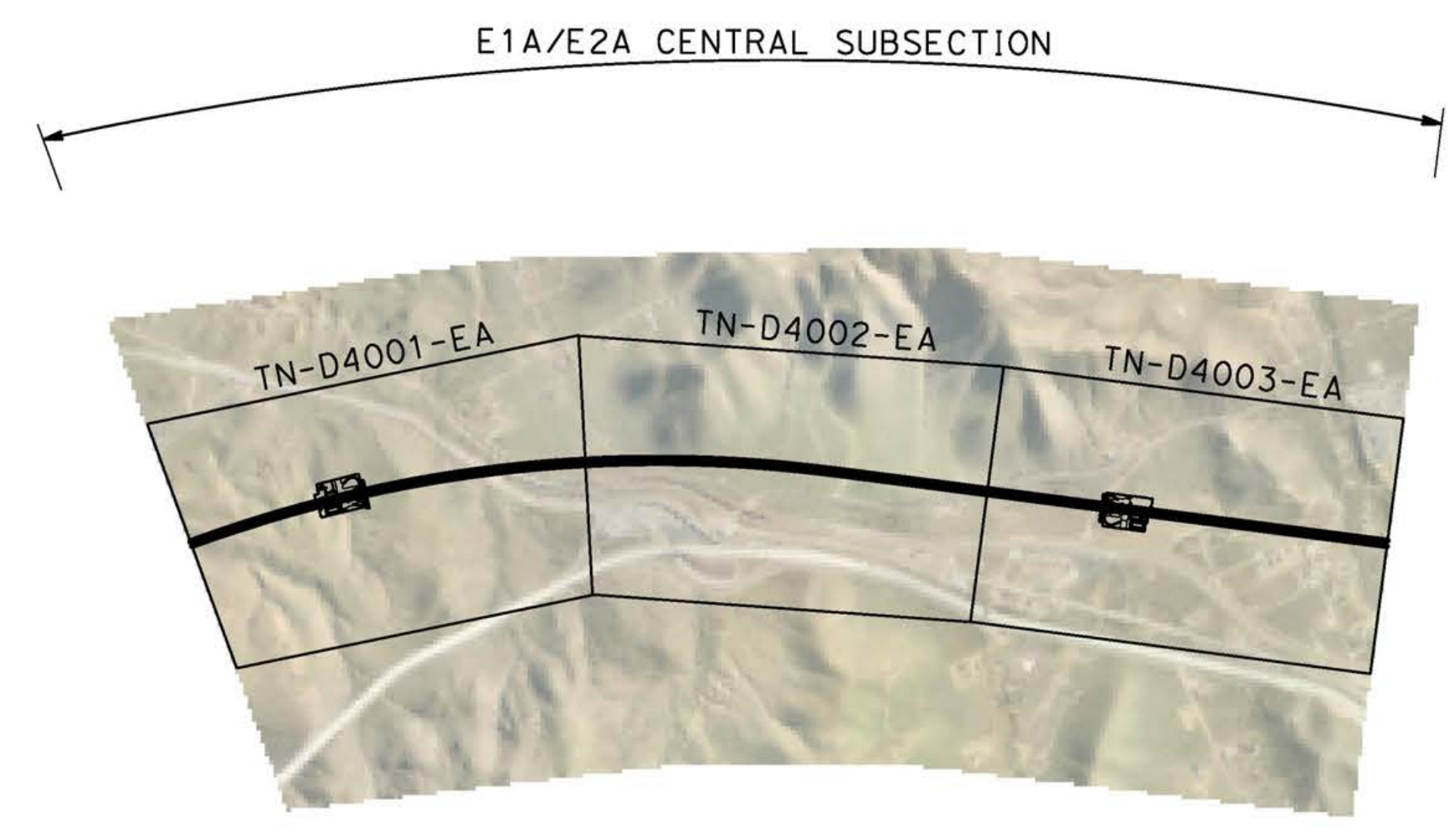
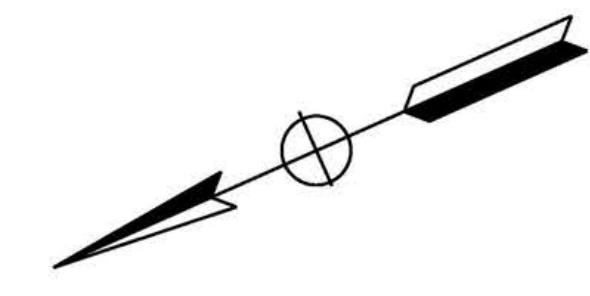
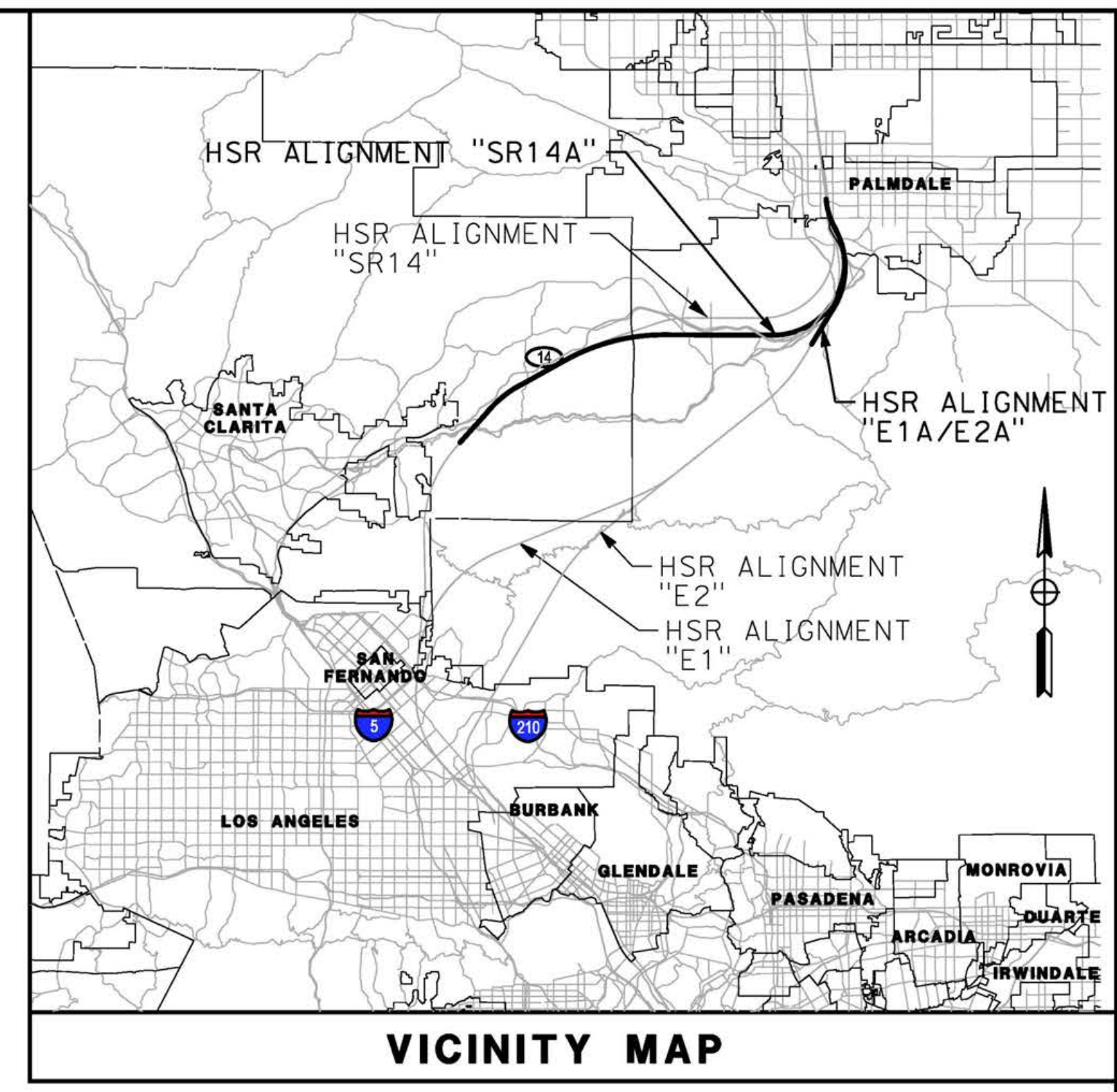
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 SHEET NO.



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DESIGNED BY  
**E.VELASCO**

DRAWN BY  
**F.J.DOMINGUEZ**

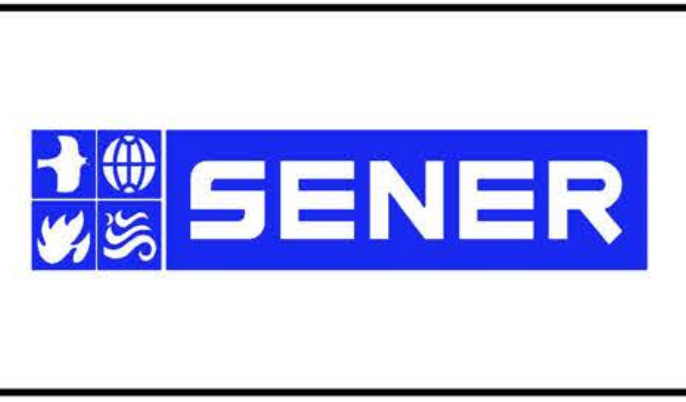
CHECKED BY  
**C.RECHEA**

IN CHARGE  
**A.RELAÑO**

DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**

**PALMDALE TO BURBANK**

ALIGNMENT "E1A/E2A"

HIGH SPEED RAIL TUNNEL PLANS  
KEY MAP

CONTRACT NO.  
HSR14-42

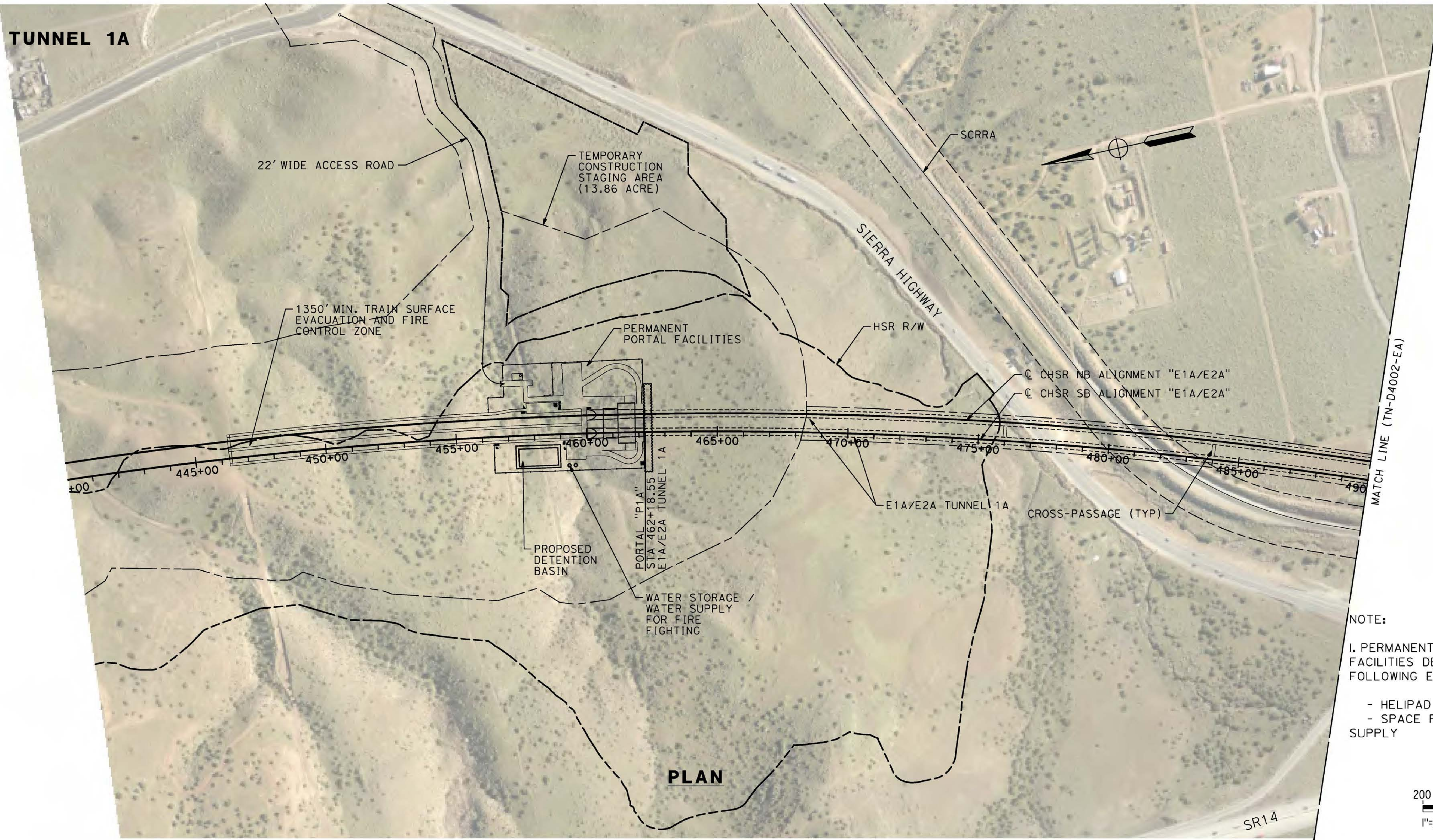
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TN-B6001-EA

SCALE  
AS SHOWN

SHEET NO.

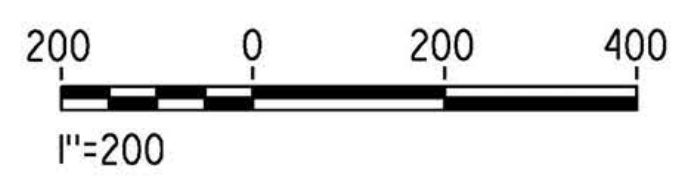


# TUNNEL 1A



**PLAN**

NOTE:  
 1. PERMANENT FOOTPRINT INCLUDES SPACE FOR FACILITIES DESCRIBED IN TM 2.4.6, WITH THE FOLLOWING EXCEPTIONS:  
 - HELIPAD NOT INCLUDED  
 - SPACE RESERVED FOR WATER/STORAGE SUPPLY



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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
 DRAWN BY  
**F.J.DOMINGUEZ**  
 CHECKED BY  
**C.RECHEA**  
 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A  
 NOT FOR  
 CONSTRUCTION**

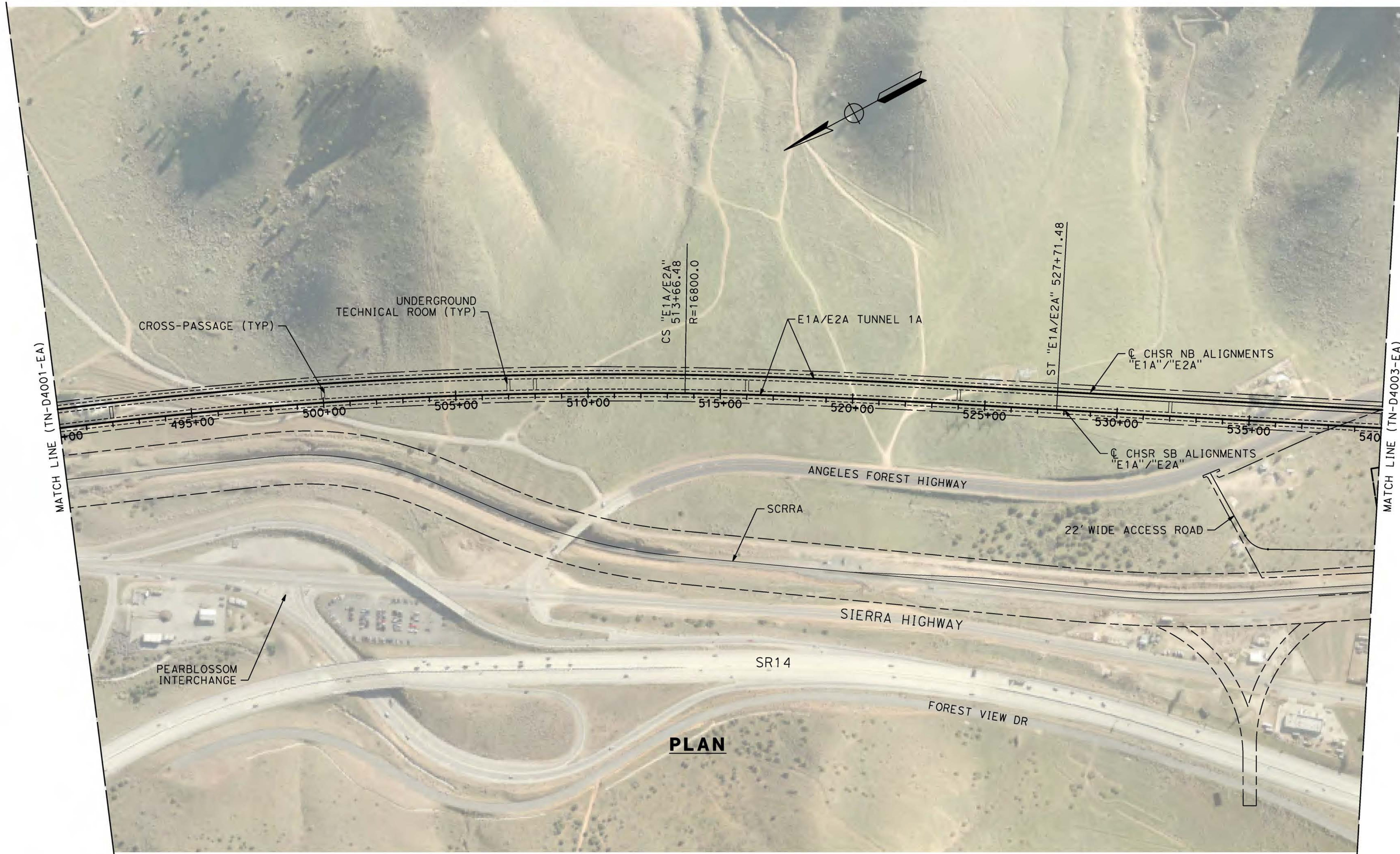


**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK**  
 ALIGNMENT "E1A/E2A"  
 PLAN  
 STA 440+00.00 TO STA 490+00.00

CONTRACT NO.  
**HSR14-42**  
 DRAWING NO.  
**TN-D4001-EA**  
 SCALE  
**AS SHOWN**  
 SHEET NO.



# TUNNEL 1A



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09/12/2020 15:43:49

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DESIGNED BY  
**E.VELASCO**

DRAWN BY  
**F.J.DOMINGUEZ**

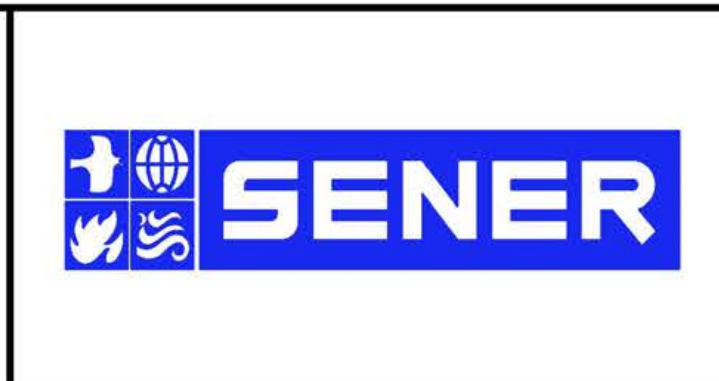
CHECKED BY  
**C.RECHEA**

IN CHARGE  
**A.RELAÑO**

DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "E1A/E2A"  
PLAN  
STA 490+00.00 TO STA 540+00.00

CONTRACT NO.  
HSR14-42

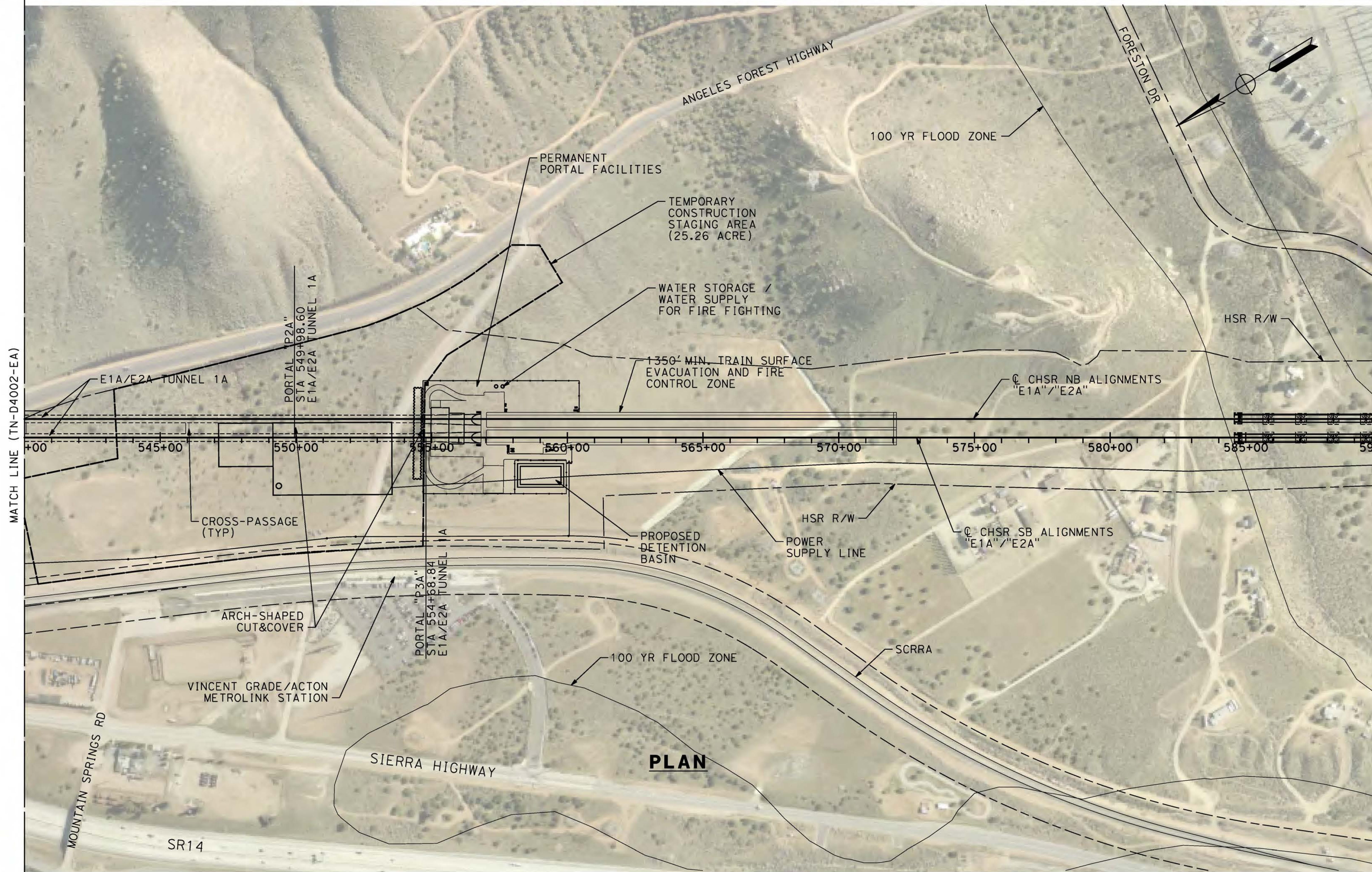
DRAWING NO.  
TN-D4002-EA

SCALE  
AS SHOWN

SHEET NO.



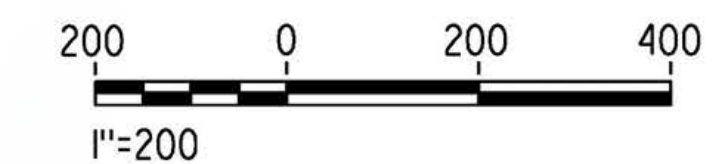
# TUNNEL 1A



**NOTE:**

1. PERMANENT FOOTPRINT INCLUDES SPACE FOR FACILITIES DESCRIBED IN TM 2.4.6, WITH THE FOLLOWING EXCEPTIONS:

- HELIPAD NOT INCLUDED
- SPACE RESERVED FOR WATER/STORAGE SUPPLY



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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "E1A/E2A"  
PLAN  
STA 540+00.00 TO STA 590+00.00

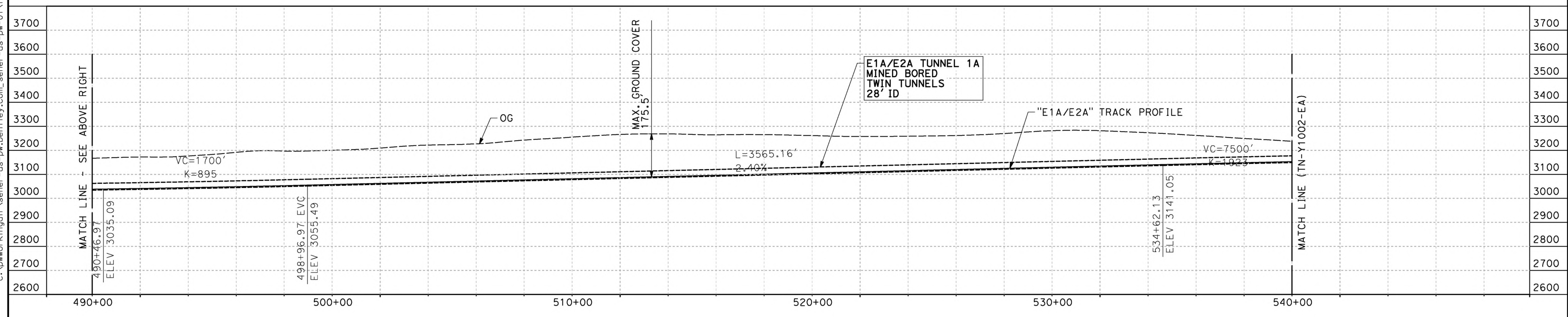
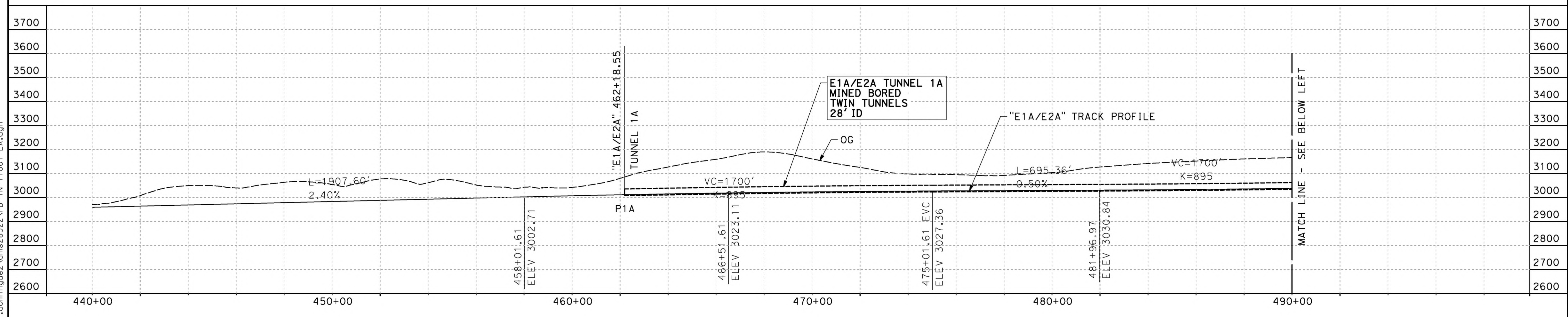
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DRAWING NO.  
TN-D4003-EA  
SCALE  
AS SHOWN  
SHEET NO.



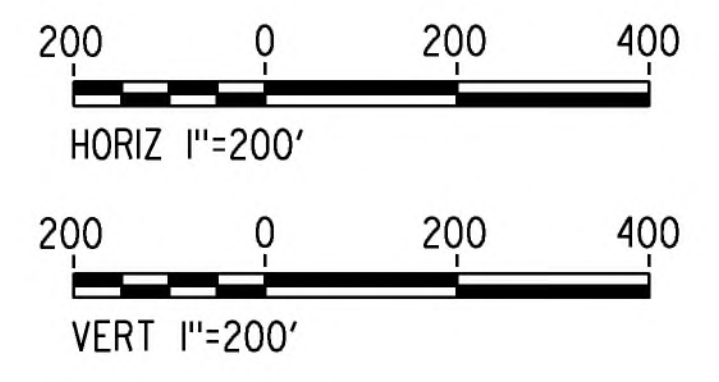
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**PROFILE**



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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
ALIGNMENT "E1A"/"E2A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 440+00.00 TO STA 540+00.00

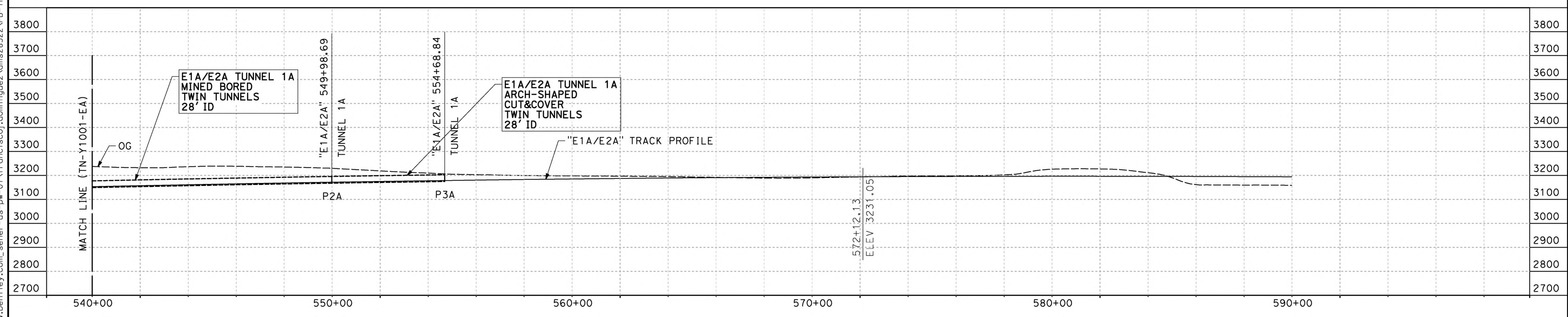
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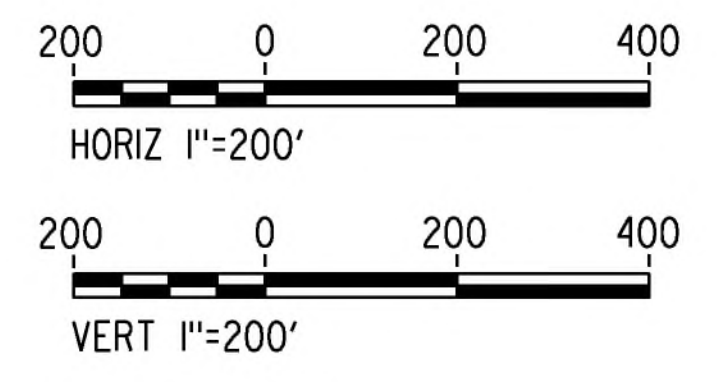
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**PROFILE**

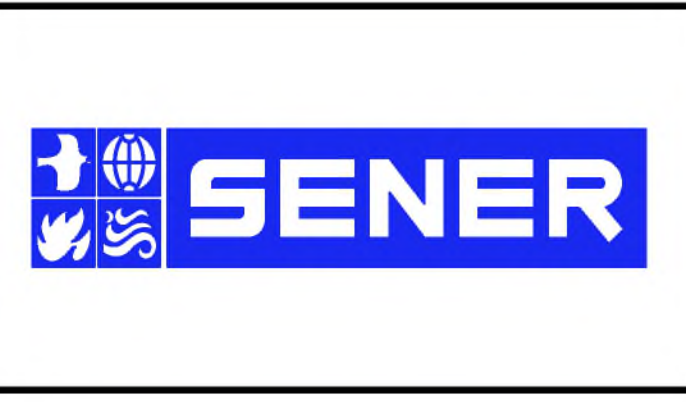


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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT "E1A"/"E2A"  
TUNNEL PROFILE  
SOUTH BOUND TUNNEL  
STA 540+00.00 TO STA 590+00.00

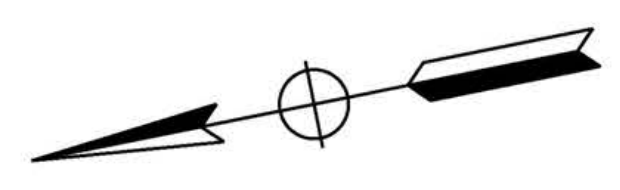
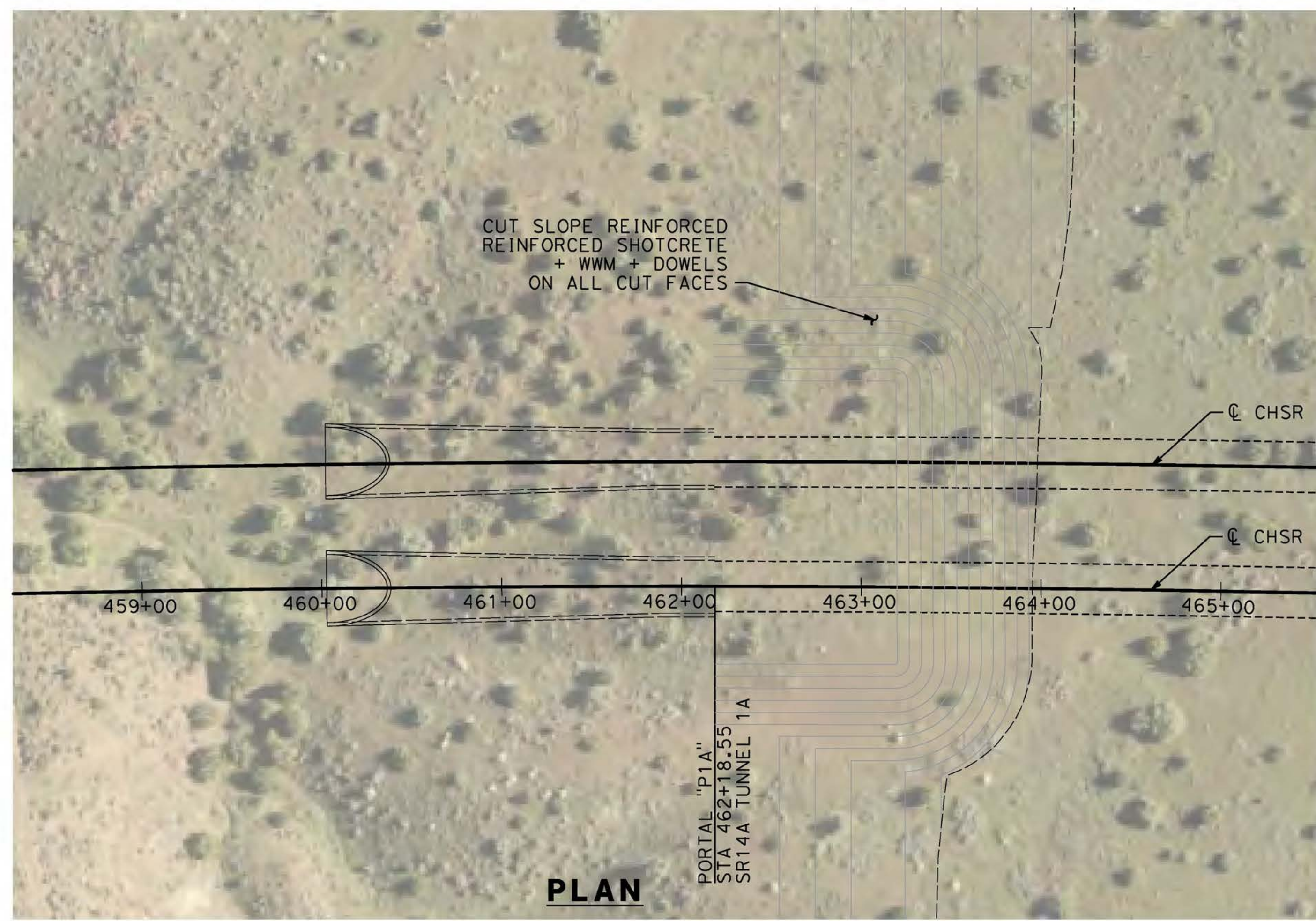
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DRAWING NO.  
**TN-Y1002-EA**  
SCALE  
**AS SHOWN**  
SHEET NO.



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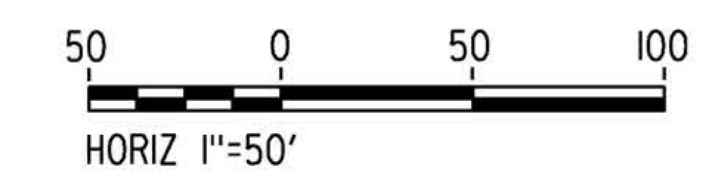
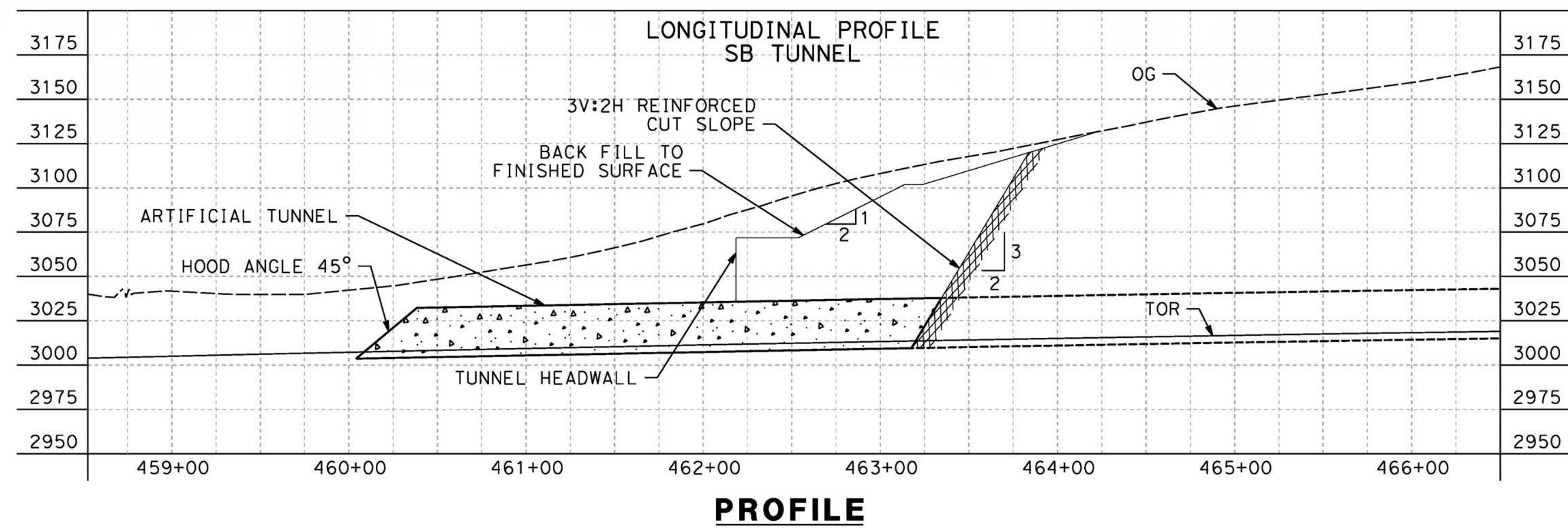
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**NOTE :**

1. EXAMPLE OF ROCK CUT SLOPE REINFORCEMENT AT PORTAL MOUTH  
 - 2 IN OF SHOTCRETE WITH STEEL FIBERS (50 KG/ M<sup>3</sup>)  
 - WELDED WIRE MESH 6X6 - W4.0 X W4.0  
 - 20FT LONG CEMENT GROUTED DOWELS ON 4' BY 4' PATTERN  
 - WEEP AS DIRECTED
2. GEOTECHNICAL RISKS AND CONSTRUCTABILITY ISSUES  
 SEE DRAWING TN-B0006
3. THE DRAWING SHOWS THE TEMPORARY PORTAL CUT PLAN AND LONG SECTION FOR CONSTRUCTION AT THE PORTAL MOUTH ALONG WITH TEMPORARY SUPPORT FOR THE PORTAL CUT SLOPE, AND THE FINISHED FILL.
4. THE DRAWING DOES NOT SHOW THE OVERALL GRADING (2H:1V) OF THE WIDER PORTAL AREA. THE EXTENT OF WHICH IS SHOWN ON THE GENERAL PLAN (SEE LIMITS OF EXCAVATION-CUT).

|                   |             |
|-------------------|-------------|
| EXCAVATION VOLUME | 73,320 CY   |
| FILL VOLUME       | 50,555 CY   |
| CUT SLOPE SURFACE | 37,642 SQFT |



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**

DRAWN BY  
**F.J.DOMINGUEZ**

CHECKED BY  
**C.RECHEA**

IN CHARGE  
**A.RELAÑO**

DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

ALIGNMENT "E1A/E2A"

PORTAL 1A  
PLAN AND PROFILE FOR CONSTRUCTION

CONTRACT NO.  
HSR14-42

DRAWING NO.  
TN-D7001-EA

SCALE  
AS SHOWN

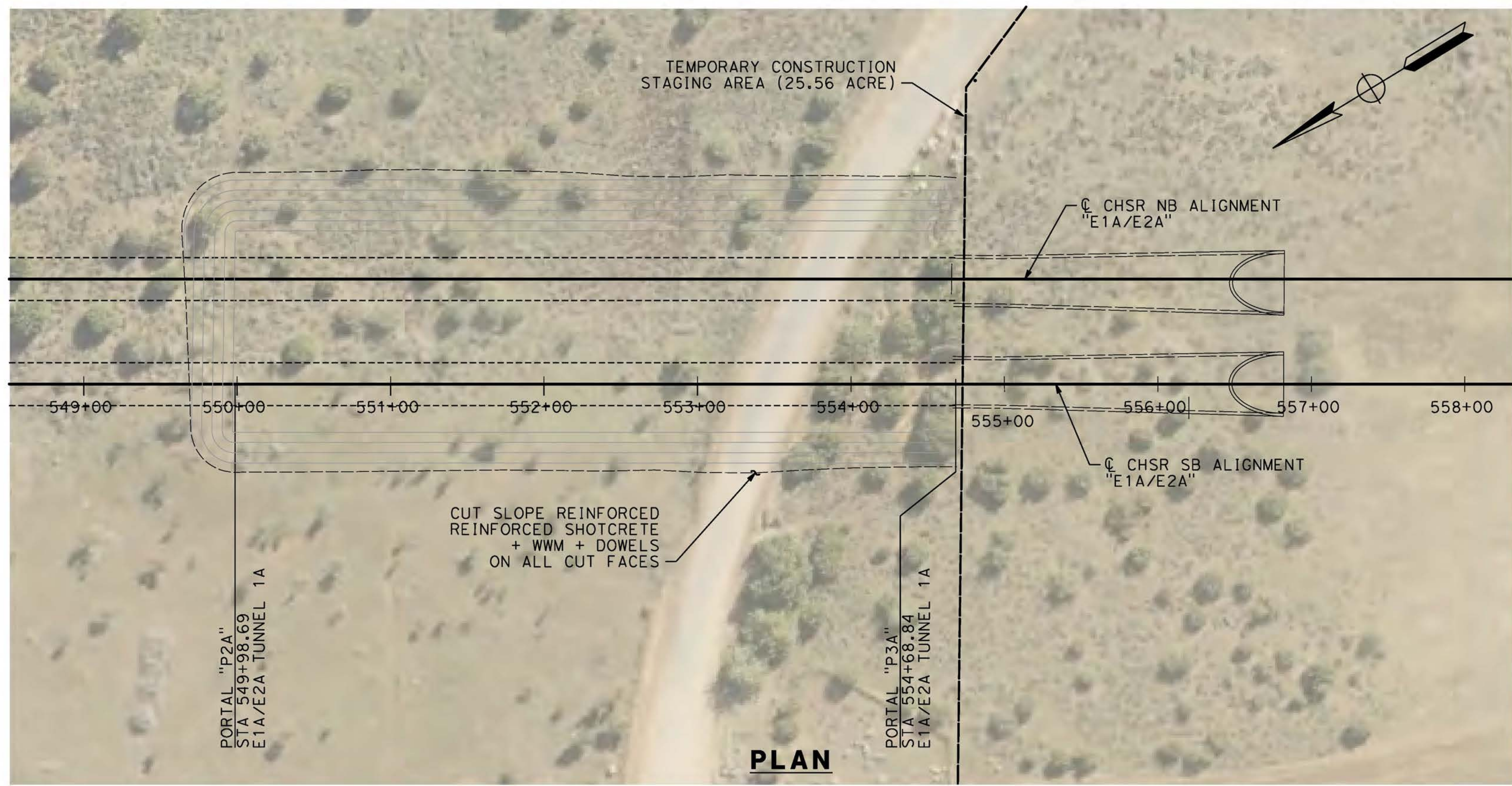
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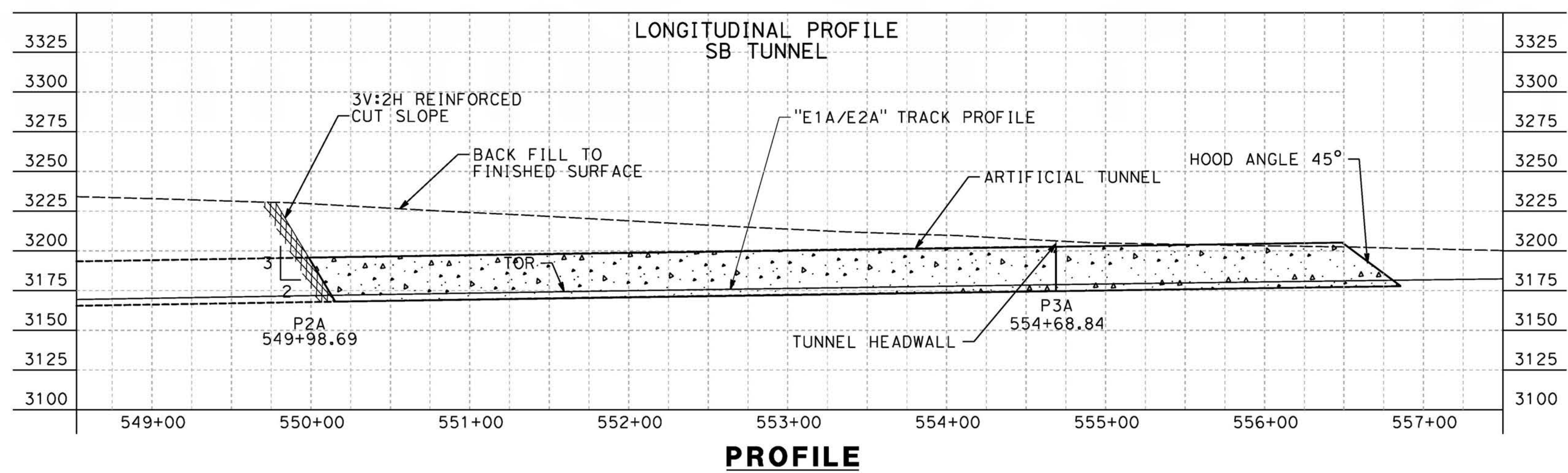
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NOTE :

- EXAMPLE OF ROCK CUT SLOPE REINFORCEMENT AT PORTAL MOUTH  
 - 2 IN OF SHOTCRETE WITH STEEL FIBERS (50 KG/ M<sup>3</sup>)  
 - WELDED WIRE MESH 6X6 - W4.0 X W4.0  
 - 20FT LONG CEMENT GROUTED DOWELS ON 4' BY 4' PATTERN  
 - WEEP AS DIRECTED
- GEOTECHNICAL RISKS AND CONSTRUCTABILITY ISSUES  
 SEE DRAWING TN-B0006
- THE DRAWING SHOWS THE TEMPORARY PORTAL CUT PLAN AND LONG SECTION FOR CONSTRUCTION AT THE PORTAL MOUTH ALONG WITH TEMPORARY SUPPORT FOR THE PORTAL CUT SLOPE, AND THE FINISHED FILL.
- THE DRAWING DOES NOT SHOW THE OVERALL GRADING (2H:1V) OF THE WIDER PORTAL AREA. THE EXTENT OF WHICH IS SHOWN ON THE GENERAL PLAN (SEE LIMITS OF EXCAVATION-CUT).

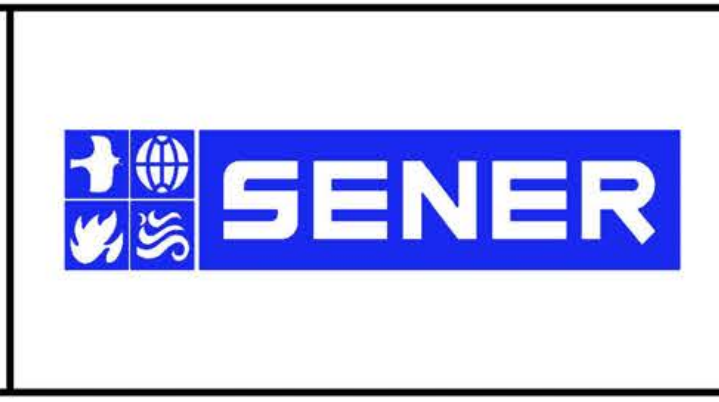
|                   |             |
|-------------------|-------------|
| EXCAVATION VOLUME | 445,170 CY  |
| FILL VOLUME       | 309,713 CY  |
| CUT SLOPE SURFACE | 12,376 SQFT |



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DESIGNED BY  
**E.VELASCO**  
 DRAWN BY  
**F.J.DOMINGUEZ**  
 CHECKED BY  
**C.RECHEA**  
 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A  
 NOT FOR  
 CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK**  
 ALIGNMENT "E1A/E2A"  
 PORTAL 2A-3A  
 PLAN AND PROFILE FOR CONSTRUCTION

CONTRACT NO.  
HSR14-42  
 DRAWING NO.  
TN-D7002-EA  
 SCALE  
AS SHOWN  
 SHEET NO.

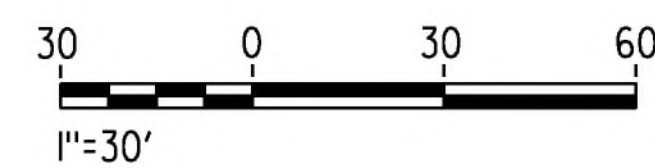
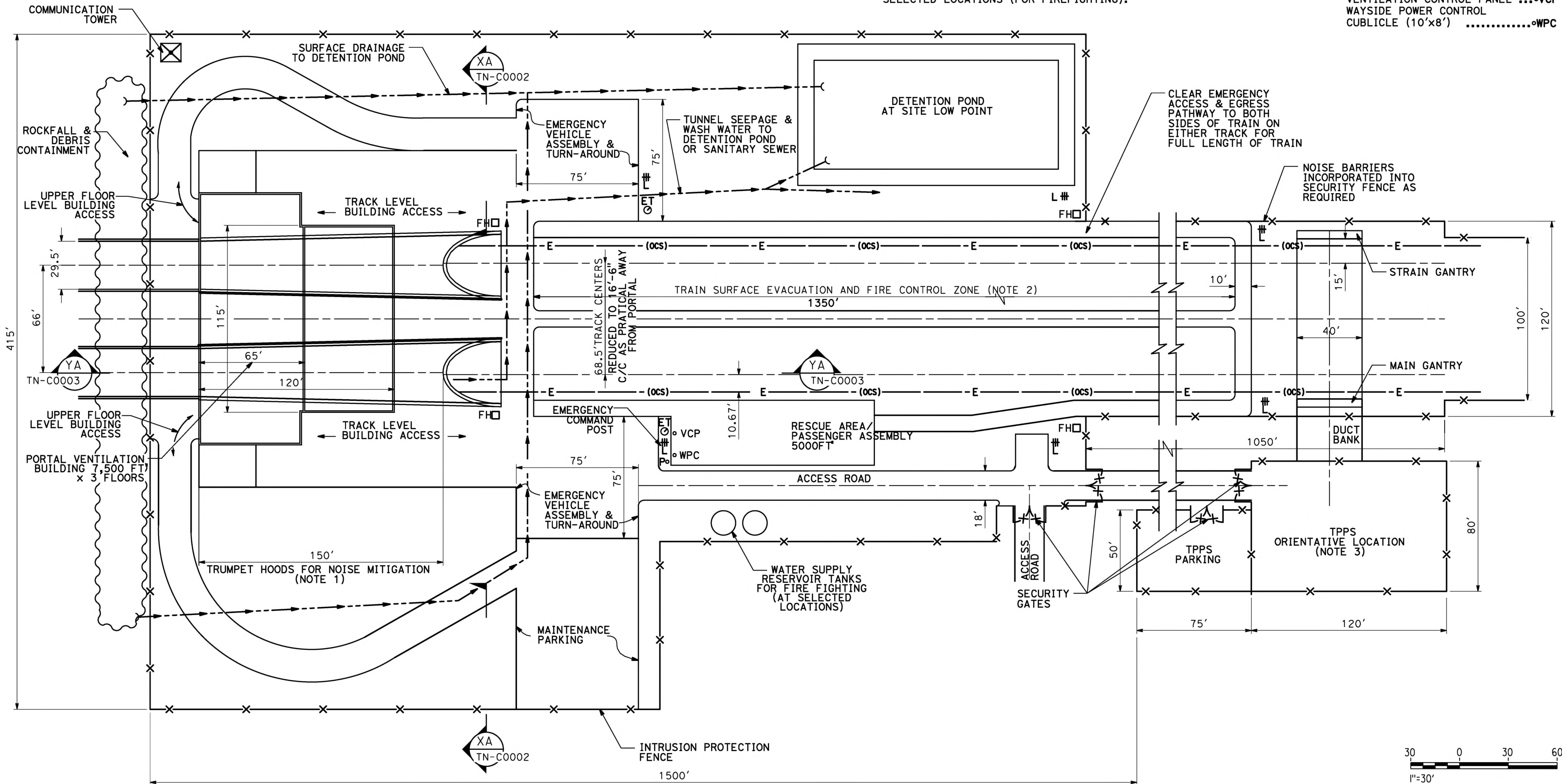


**NOTES:**

1. ADDITIONAL PROVISION OF SPACE OF 150' HAS BEEN ADDED TO PLAN DRAWINGS TO STAGGER PORTAL ENTRANCES IN ORDER TO PREVENT SMOKE RE-CIRCULATION IN CASE OF TUNNEL FIRE, AND FOR TUNNEL CLIMATE CONDITIONS.
2. TSEFCZ AT SELECTED PORTALS ONLY. MAY BE SHARED BETWEEN CLOSE PORTALS.
3. TPPS AND PARKING AT SELECTED PORTALS ONLY.
4. DIMENSIONS AS PER TM 2.4.6.
5. ADDITIONAL SPACE FOR WATER SUPPLY RESERVOIR TANKS ADDED AT SELECTED LOCATIONS (FOR FIREFIGHTING).

**LEGEND:**

- EMERGENCY TELEPHONE ..... ET ⊙
- FLOOD LIGHTS ..... L #
- FIRE HYDRANT ..... FH ⊠
- OVERHEAD CATENARY ---E--- (ocs)
- OCs POWER CUT-OFF SWITCH ... Po
- TP PARALLELING STATION .... TPPS\*
- VENTILATION CONTROL PANEL ... VCP
- WAYSIDE POWER CONTROL CUBICLE (10'x8') ..... WPC



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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



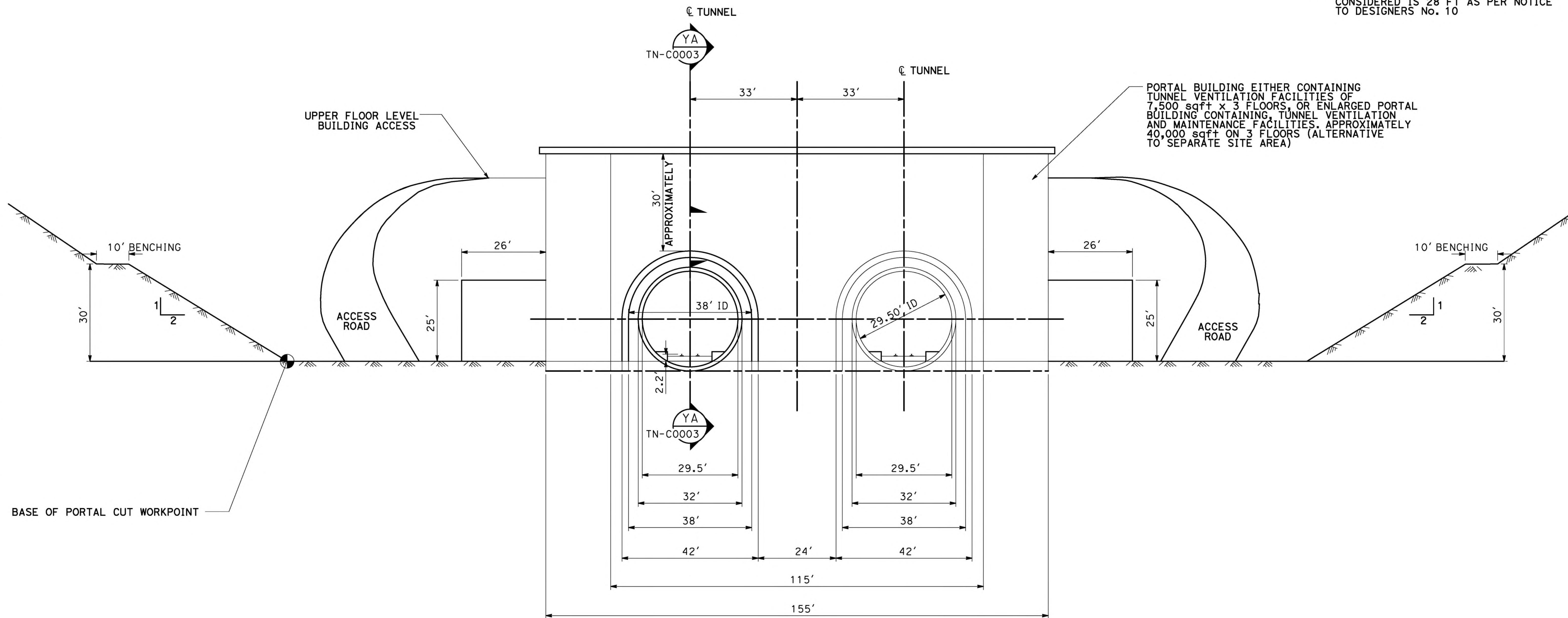
**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
TYPICAL TUNNEL PORTAL FACILITIES AT GRADE  
TWIN TUNNEL CONFIGURATION  
PLAN

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0001**  
SCALE  
**AS SHOWN**  
SHEET NO.



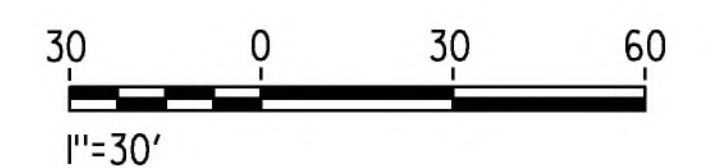
**NOTES:**

1. DIMENSIONS AS PER TM 2.4.6.
2. TUNNEL INNER DIAMETER TO BE CONSIDERED IS 28 FT AS PER NOTICE TO DESIGNERS No. 10



PORTAL BUILDING EITHER CONTAINING TUNNEL VENTILATION FACILITIES OF 7,500 sqft x 3 FLOORS, OR ENLARGED PORTAL BUILDING CONTAINING, TUNNEL VENTILATION AND MAINTENANCE FACILITIES. APPROXIMATELY 40,000 sqft ON 3 FLOORS (ALTERNATIVE TO SEPARATE SITE AREA)

**SECTION** XA  
SCALE 1"=15'



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



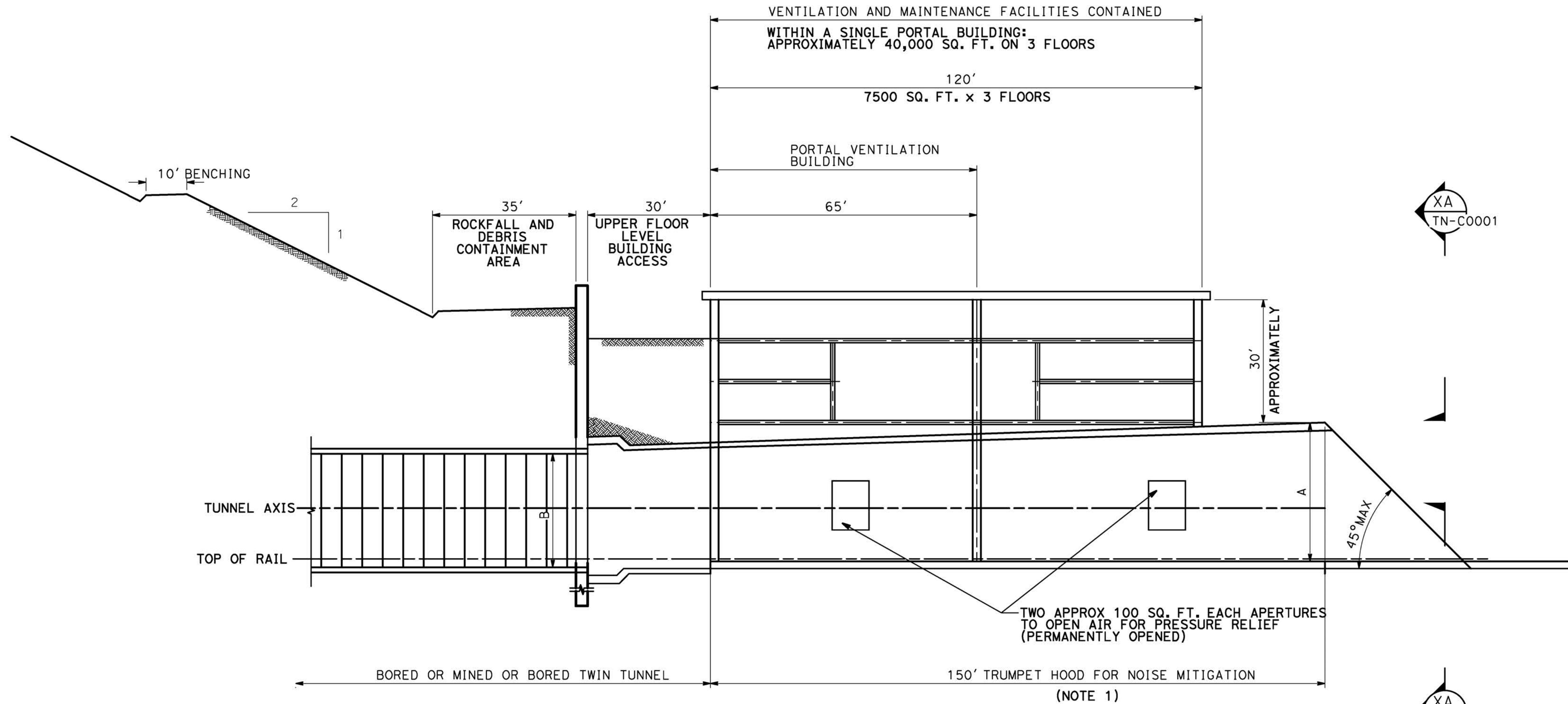
**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
TYPICAL TUNNEL PORTAL FACILITIES  
AT GRADE TWIN TUNNEL  
CONFIGURATION  
ELEVATION

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-C0002  
SCALE  
AS SHOWN  
SHEET NO.

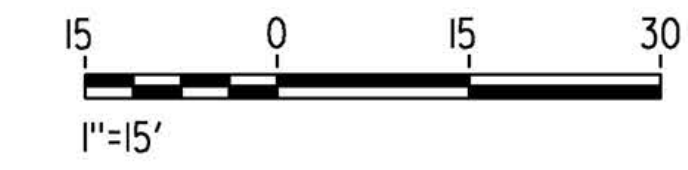


**NOTES:**

1. ADDITIONAL PROVISION OF SPACE OF 150' HAS BEEN ADDED IN PLAN DRAWINGS TO STAGGER PORTAL ENTRANCES TO PREVENT SMOKE RE-CIRCULATION IN CASE OF TUNNEL FIRE, AND FOR TUNNEL CLIMATE CONDITIONS.
2. FREE AREA (A)=150% OF FREE AREA (B).
3. VENTILATION AND AERODYNAMICS TBD.
4. DIMENSIONS AS PER TM 2.4.6.



**SECTION** YA TN-C0003  
SCALE 1"=15'



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



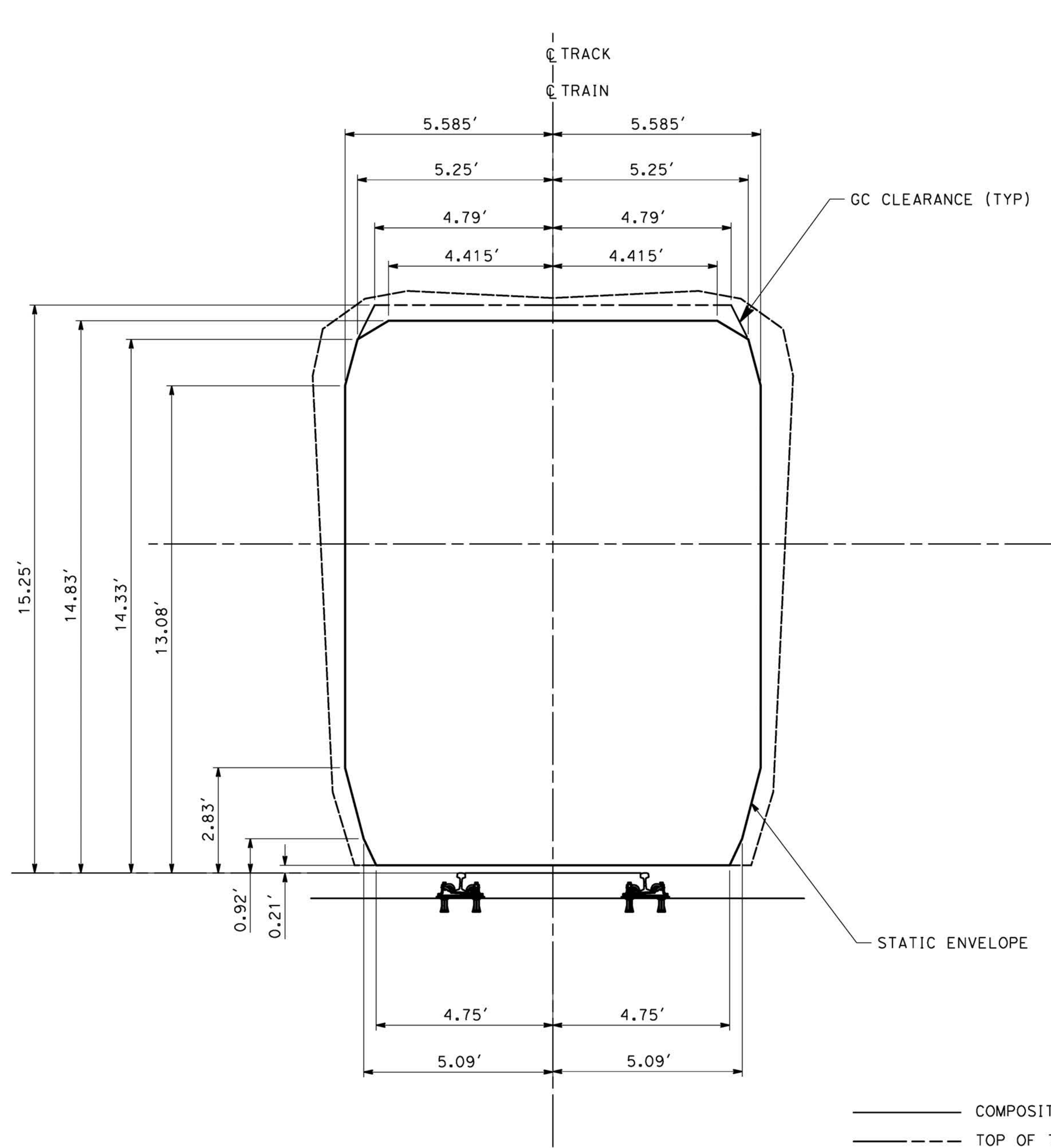
**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
TYPICAL TUNNEL PORTAL FACILITIES AT GRADE  
TWIN TUNNEL CONFIGURATION  
LONG SECTION

CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-C0003  
SCALE  
AS SHOWN  
SHEET NO.

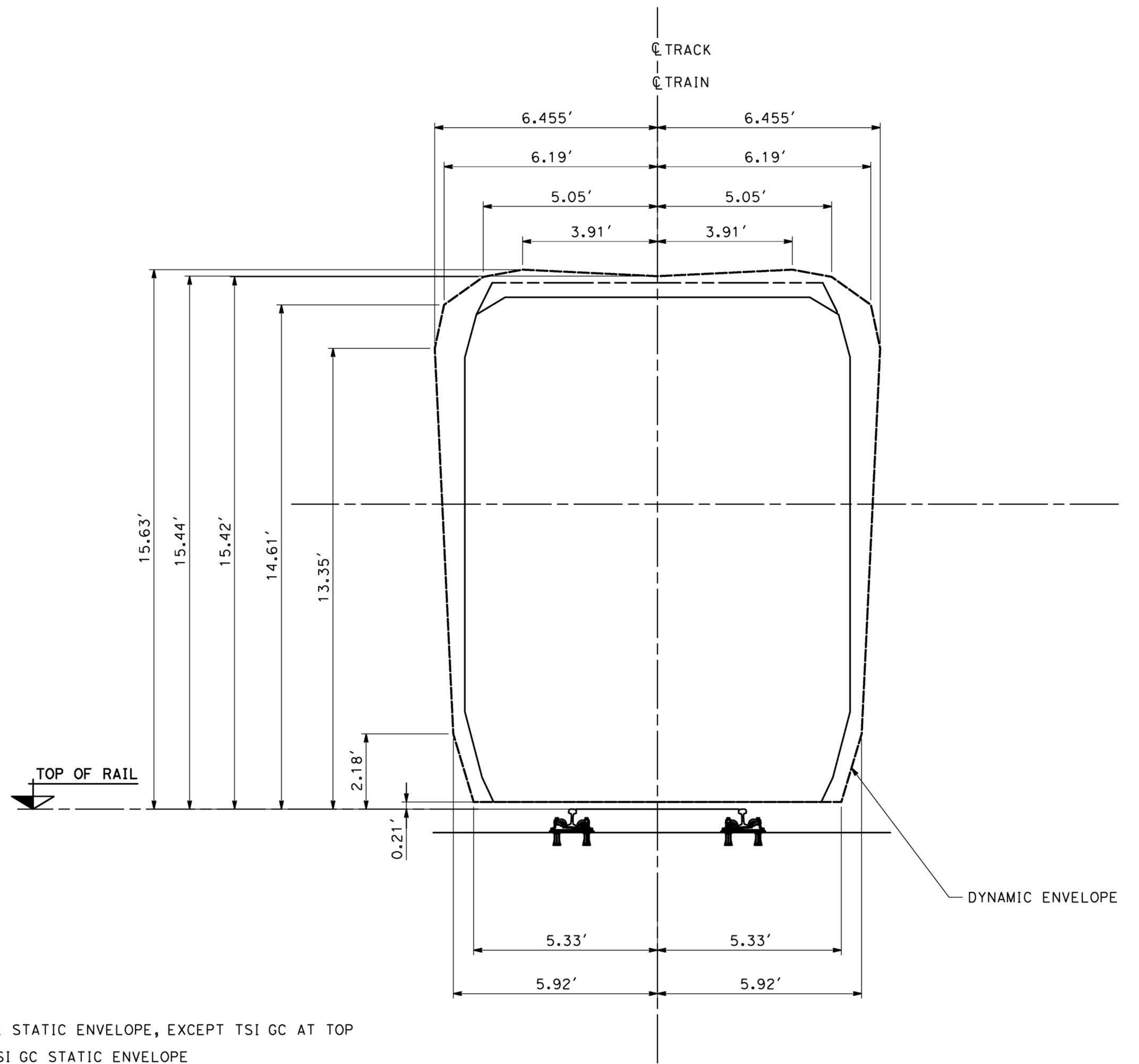


**NOTES OF ASSUMPTIONS:**

1. REFER TO TM 1.1.10 FOR ASSUMPTIONS ON GAUGES.
2. HIGH-SPEED EQUIPMENT ONLY.



**COMPOSITE STATIC ENVELOPE**



**COMPOSITE DYNAMIC ENVELOPE**

——— COMPOSITE STATIC ENVELOPE, EXCEPT TSI GC AT TOP  
 - - - - - TOP OF TSI GC STATIC ENVELOPE  
 - - - - - COMPOSITE DYNAMIC ENVELOPE



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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
 DRAWN BY  
**F.J.DOMINGUEZ**  
 CHECKED BY  
**C.RECHEA**  
 IN CHARGE  
**A.RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A**  
  
**NOT FOR  
 CONSTRUCTION**



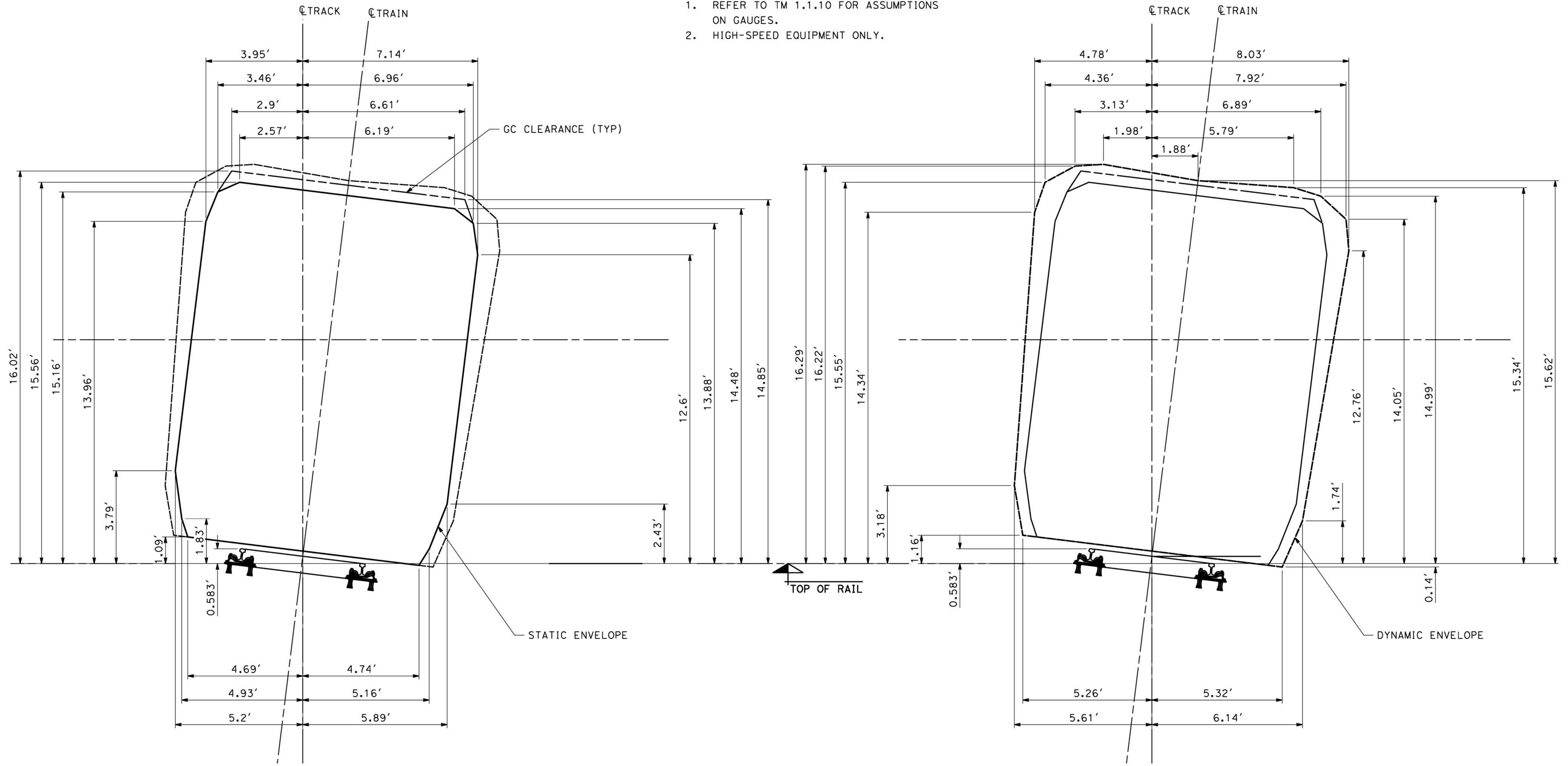
**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK**  
  
 COMPOSITE VEHICLE  
 STATIC AND DYNAMIC ENVELOPE  
 TANGENT TRACK

CONTRACT NO.  
**HSR14-42**  
 DRAWING NO.  
**TN-C0004**  
 SCALE  
**AS SHOWN**  
 SHEET NO.



**NOTES OF ASSUMPTIONS:**

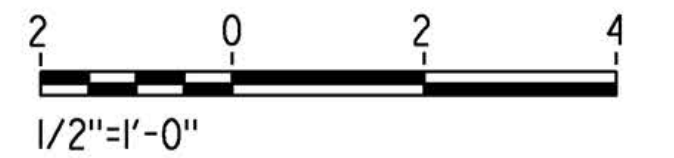
1. REFER TO TM 1.1.10 FOR ASSUMPTIONS ON GAUGES.
2. HIGH-SPEED EQUIPMENT ONLY.



**COMPOSITE STATIC ENVELOPE**

**COMPOSITE DYNAMIC ENVELOPE**

- COMPOSITE STATIC ENVELOPE, EXCEPT TSI GC AT TOP
- - - - - TOP OF TSI GC STATIC ENVELOPE
- · - · - · COMPOSITE DYNAMIC ENVELOPE



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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

COMPOSITE VEHICLE  
STATIC AND DYNAMIC ENVELOPE  
SUPERELEVATED TRACK

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-C0005**

SCALE  
**AS SHOWN**

SHEET NO.



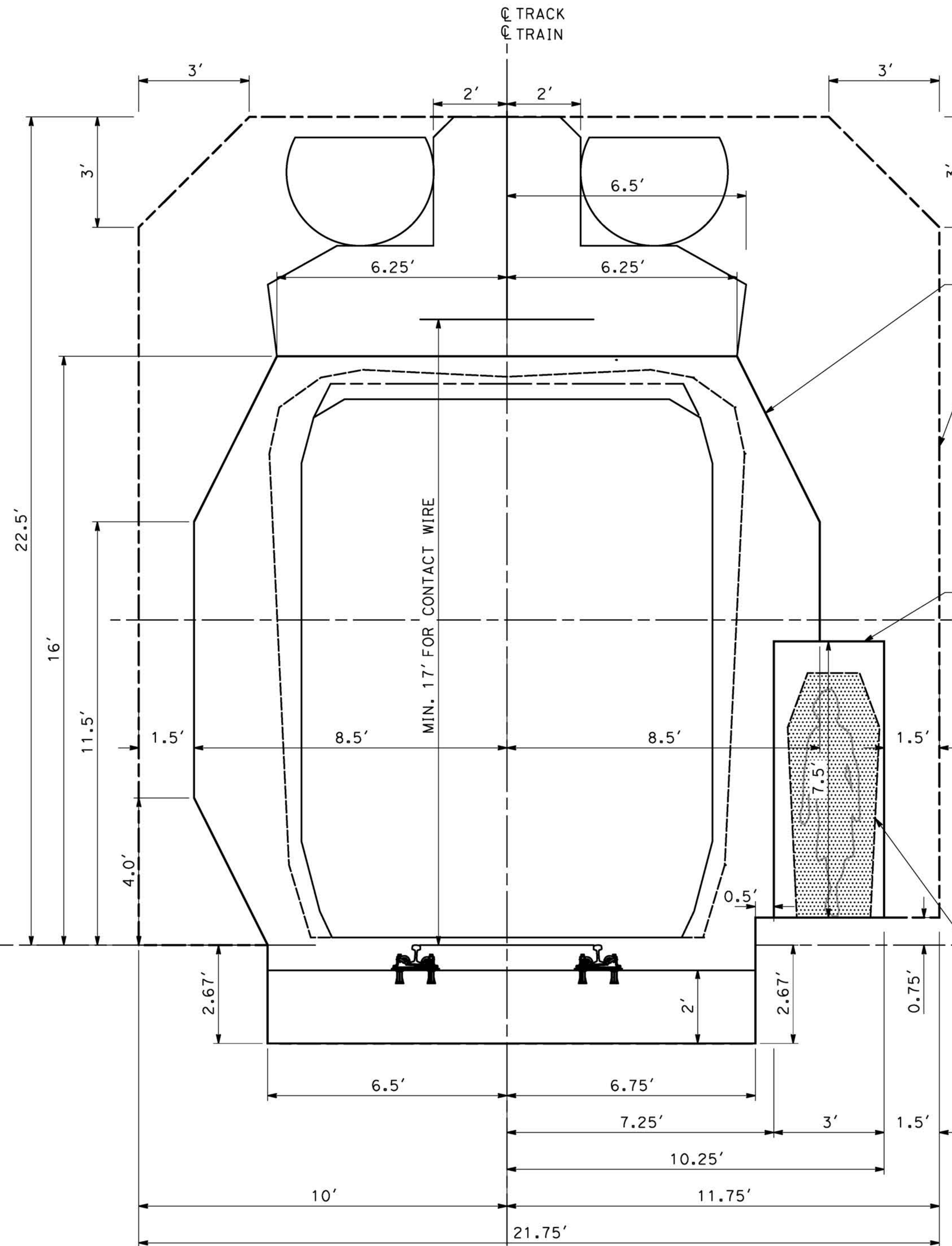
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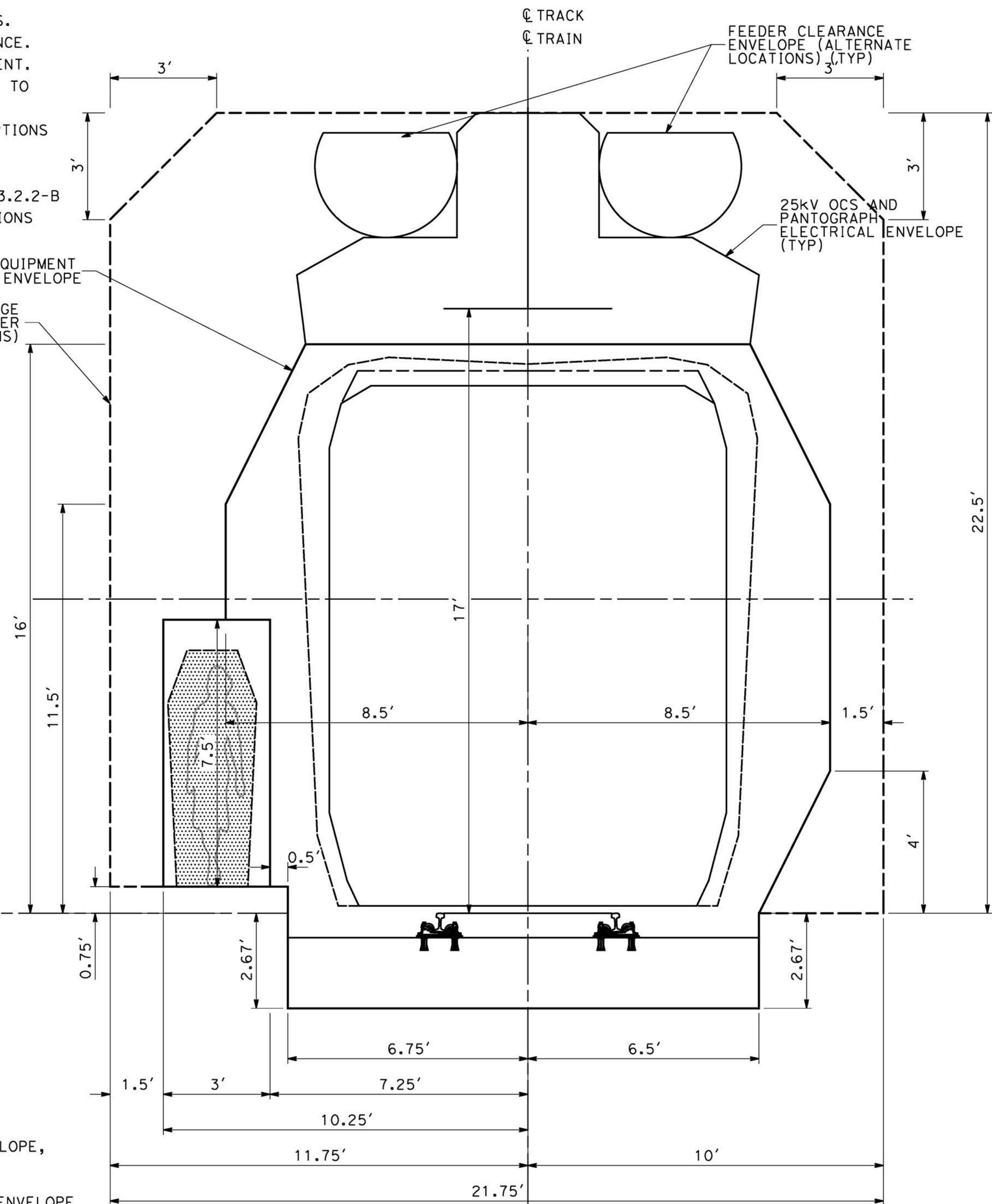
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**NOTES OF ASSUMPTIONS:**

1. NO ALLOWANCE FOR AERODYNAMICS.
2. EXCLUDES CONSTRUCTION TOLERANCE.
3. NO ALLOWANCE FOR VENT EQUIPMENT.
4. FOR PANTOGRAPH DETAILS, REFER TO TM 3.2.3
5. REFER TO TM 1.1.10 FOR ASSUMPTIONS ON STATIC & DYNAMIC GAUGES.
6. HIGH-SPEED EQUIPMENT ONLY.
7. FOR FEEDER CLEARANCE SEE TM 3.2.2-B
8. STRUCTURE GAUGE FOR C&C SECTIONS ACCORDING TO TM 2,4,2-E



**FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE TANGENT TRACK WALKWAY RIGHT SIDE**



**FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE TANGENT TRACK WALKWAY LEFT SIDE**

FIXED EQUIPMENT ENVELOPE  
 STRUCTURE GAUGE (ONLY FOR CUT-AND-COVER SECTIONS)  
 WALKWAY ENVELOPE

NFPA 130 UNOBSTRUCTED CLEAR WIDTH FOR TRAINWAY WALKWAY (TYP)

—— COMPOSITE STATIC ENVELOPE, EXCEPT TSI GC AT TOP  
 - - - - TOP OF TSI GC STATIC ENVELOPE  
 - - - - COMPOSITE DYNAMIC ENVELOPE  
 ——— FIXED EQUIPMENT ENVELOPE  
 - - - - STRUCTURE GAUGE FOR C&C SECTIONS



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E. VELASCO**  
 DRAWN BY  
**F.J. DOMINGUEZ**  
 CHECKED BY  
**C. RECHEA**  
 IN CHARGE  
**A. RELAÑO**  
 DATE  
**02/26/2021**

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A**

**NOT FOR  
 CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK**

COMPOSITE VEHICLE  
 FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE  
 TANGENT TRACK

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-C0006**

SCALE  
**AS SHOWN**

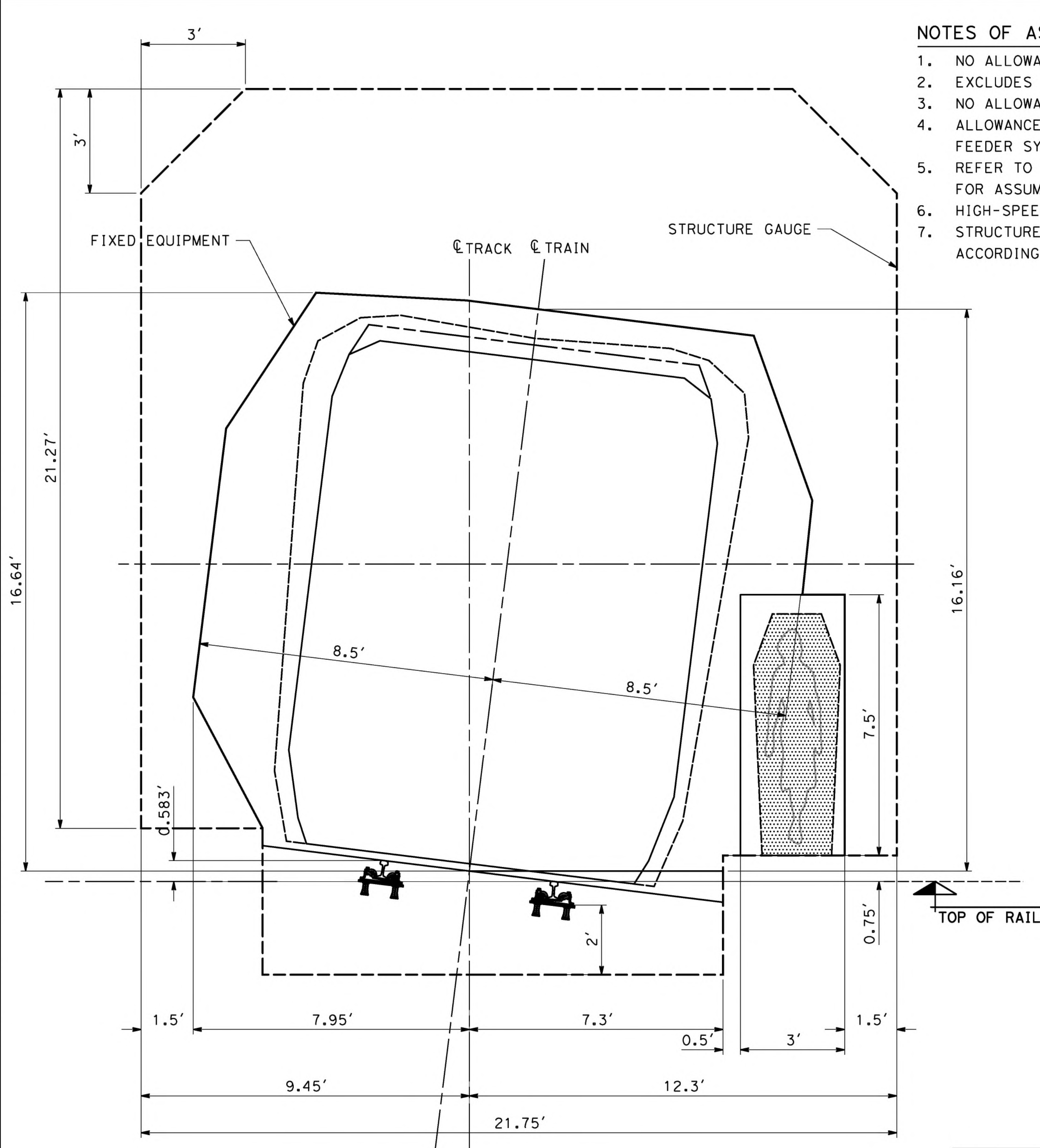
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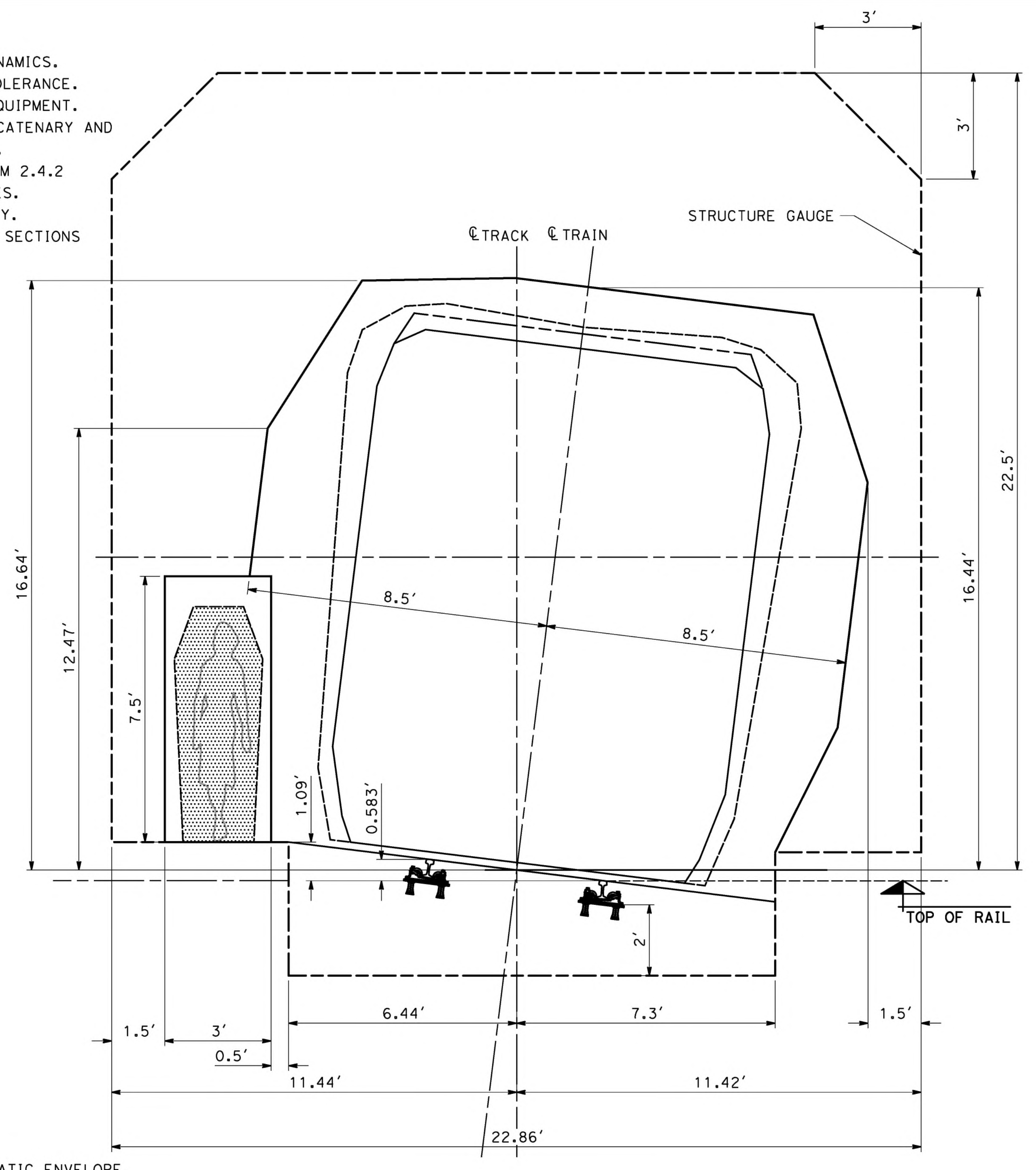
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**FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE SUPERELEVATED TRACK WALKWAY RIGHT SIDE**

**NOTES OF ASSUMPTIONS:**

1. NO ALLOWANCE FOR AERODYNAMICS.
2. EXCLUDES CONSTRUCTION TOLERANCE.
3. NO ALLOWANCE FOR VENT EQUIPMENT.
4. ALLOWANCE FOR OVERHEAD CATENARY AND FEEDER SYSTEM NOT SHOWN.
5. REFER TO TM 1.1.10 AND TM 2.4.2 FOR ASSUMPTIONS ON GAUGES.
6. HIGH-SPEED EQUIPMENT ONLY.
7. STRUCTURE GAUGE FOR C&C SECTIONS ACCORDING TO TM 2.4.2-E



**FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE SUPERELEVATED TRACK WALKWAY LEFT SIDE**

- COMPOSITE STATIC ENVELOPE, EXCEPT TSI GC AT TOP
- TOP OF TSI GC STATIC ENVELOPE
- COMPOSITE DYNAMIC ENVELOPE
- FIXED EQUIPMENT ENVELOPE
- STRUCTURE GAUGE FOR CUT AND COVER SECTIONS



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A  
  
NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

COMPOSITE VEHICLE  
FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE  
SUPERELEVATED TRACK

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
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SCALE  
**AS SHOWN**  
SHEET NO.



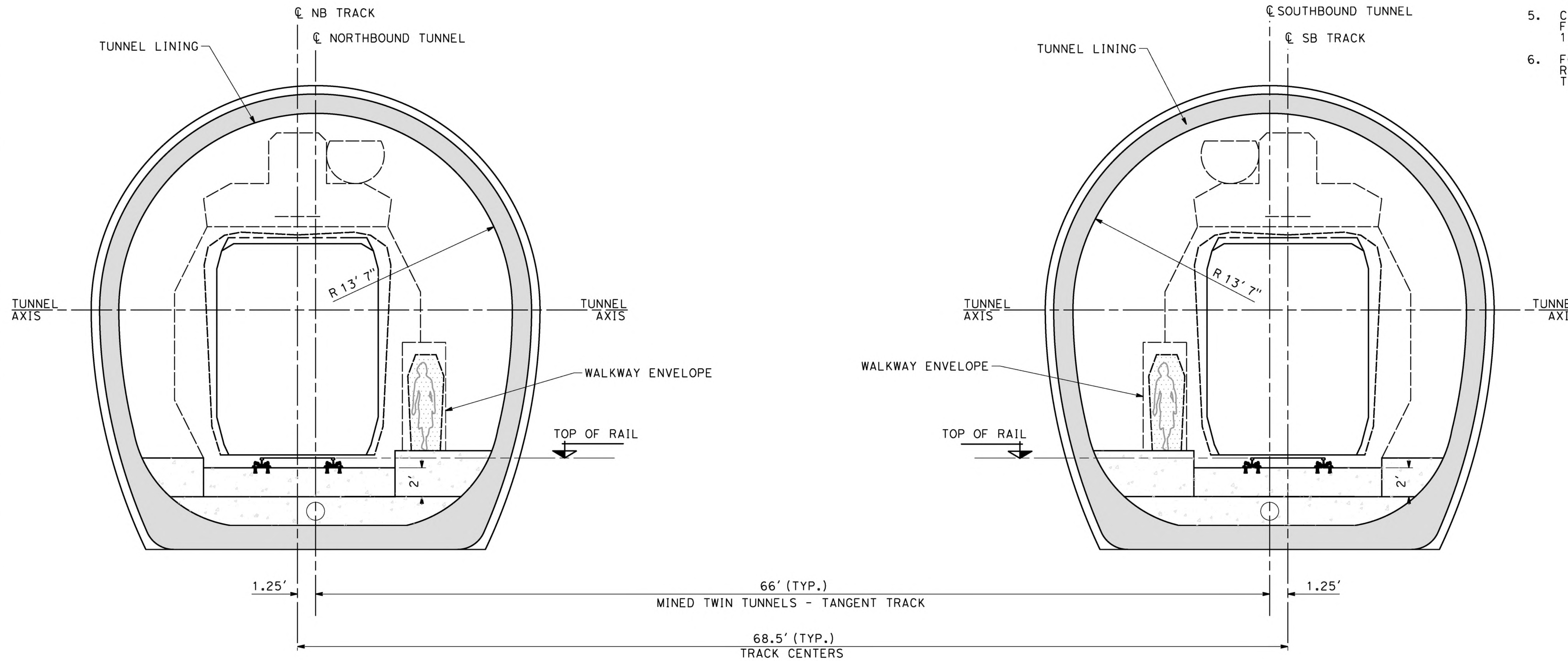
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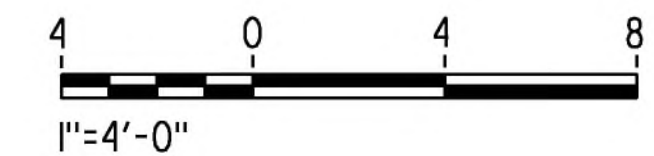
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**NOTES:**

1. MINED TWIN TUNNELS ARE AN OPTION FOR SHORT TUNNELS LOCATED BETWEEN ANF AND PALMDALE.
2. EXCAVATION, GROUND SUPPORT, PILLAR WIDTH, DRAINAGE, TUNNEL LINING DESIGN AND WATER AND GAS TIGHTNESS PROVISIONS TBD.
3. PILLAR WIDTH BETWEEN TUNNELS TO BE ONE TUNNEL DIAMETER OR MORE BASED ON GUIDANCE IN TM 2.4.6.
4. SPACE PROOFING REQUIRES FURTHER STUDY TO EVALUATE DYNAMIC AIRFLOW/PRESSURE LEVELS UNDER HIGH-SPEED OPERATING CONDITIONS, AND TO FURTHER DEFINE SPACE ALLOTTED FOR STRUCTURES, EQUIPMENT AND EGRESS.
5. CROSS-PASSAGEWAYS SHALL NOT BE FARTHER THAN 800 FT APART (NFPA 130).
6. FOR EQUIPMENT STRUCTURE GAUGES, REFER TO DRAWINGS TN-C0004 TO TN-C0007.



**TUNNEL TYPICAL SECTION  
MINED TWIN TUNNELS  
TANGENT TRACK**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
MINED TWIN TUNNELS  
TANGENT TRACK  
CLEARANCE DIAGRAM

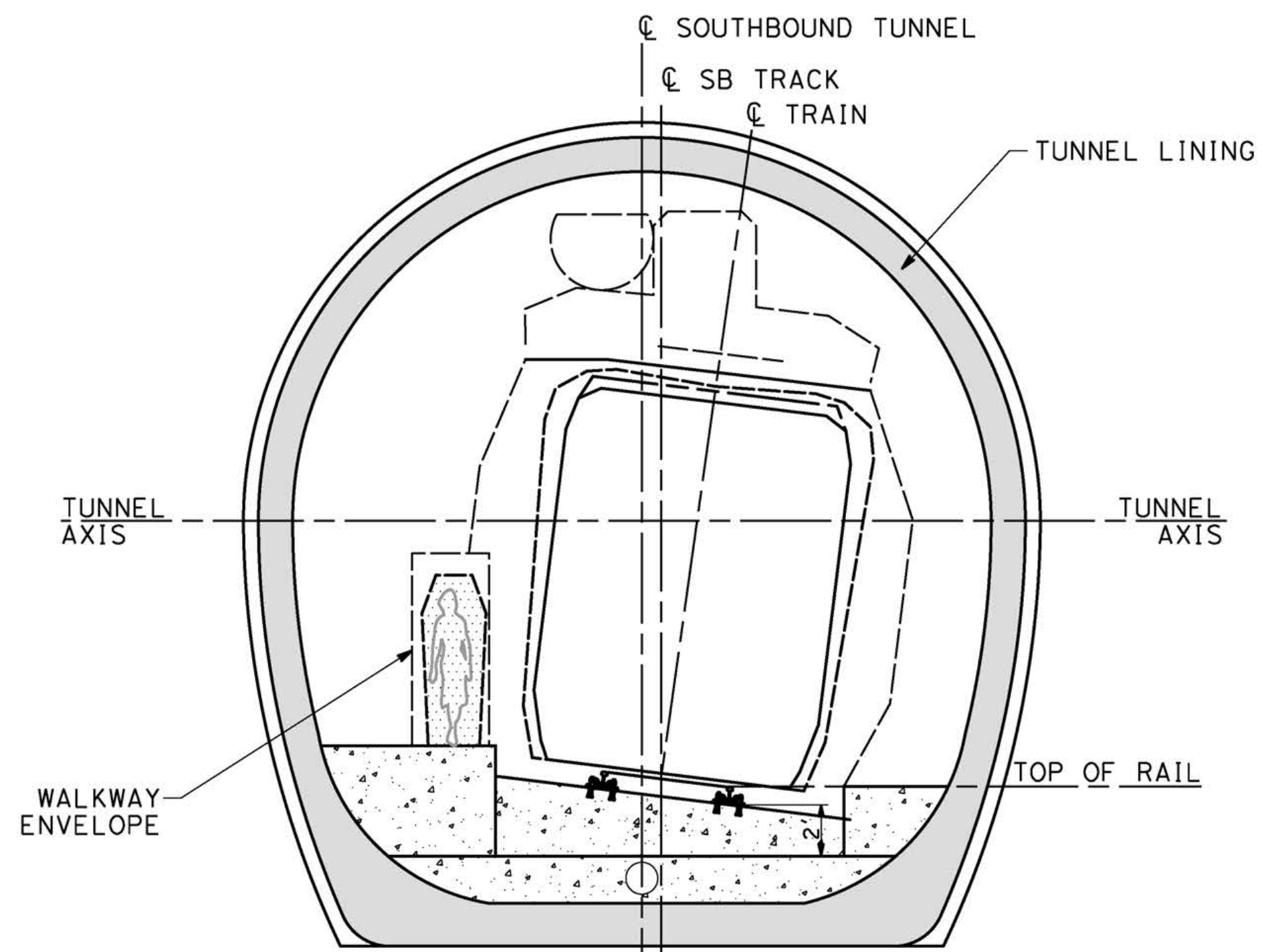
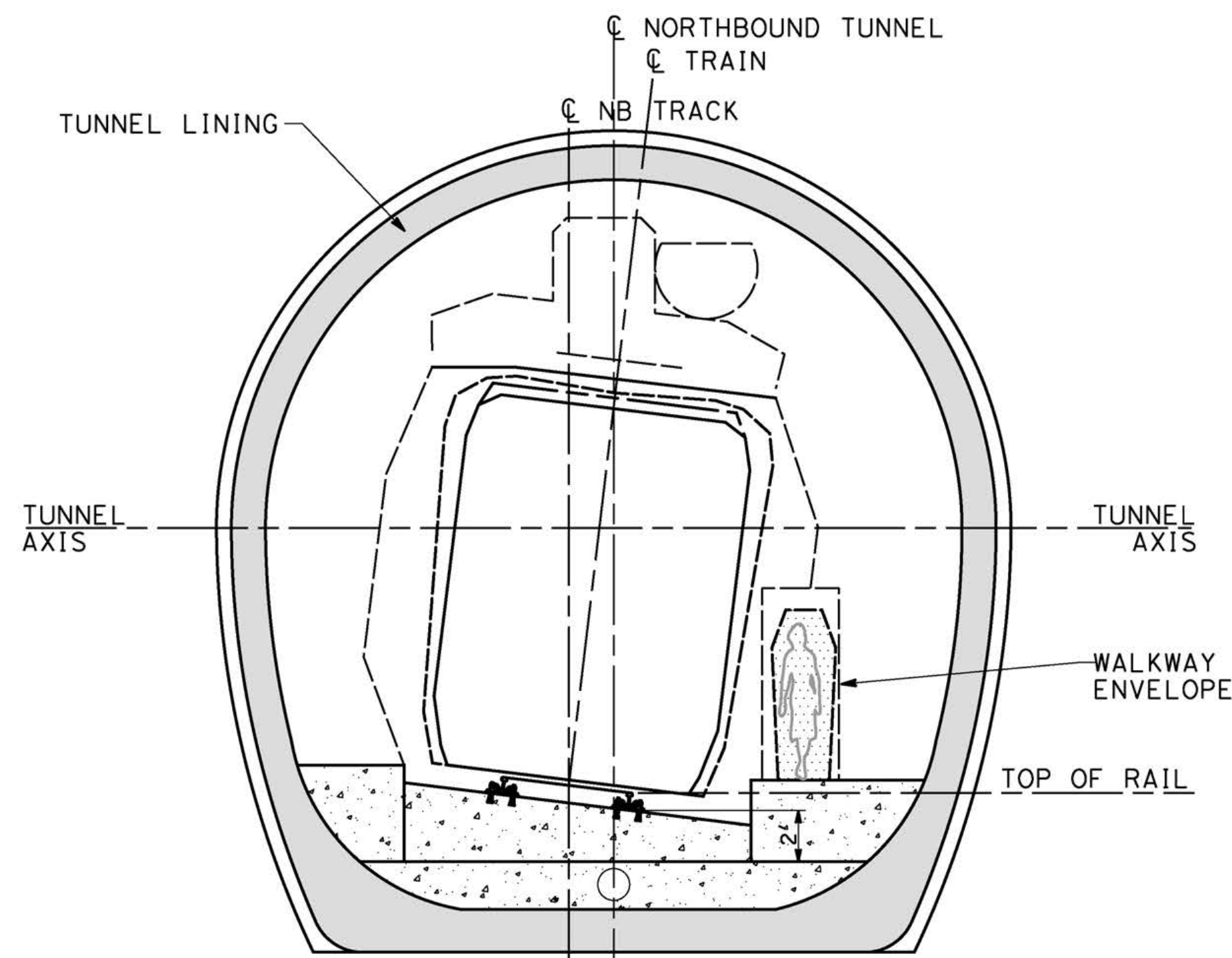
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DRAWING NO.  
**TN-C0100**  
SCALE  
**AS SHOWN**  
SHEET NO.



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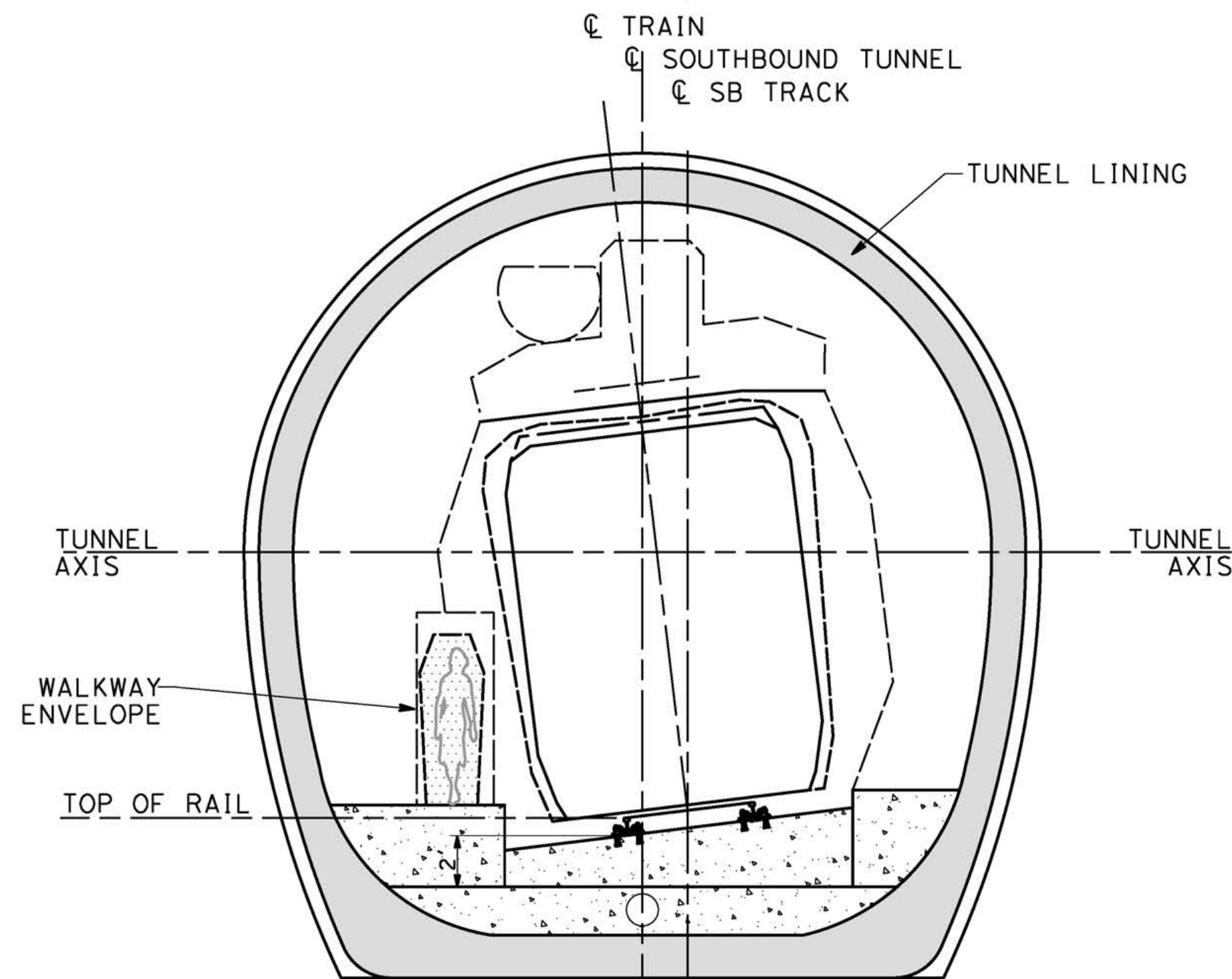
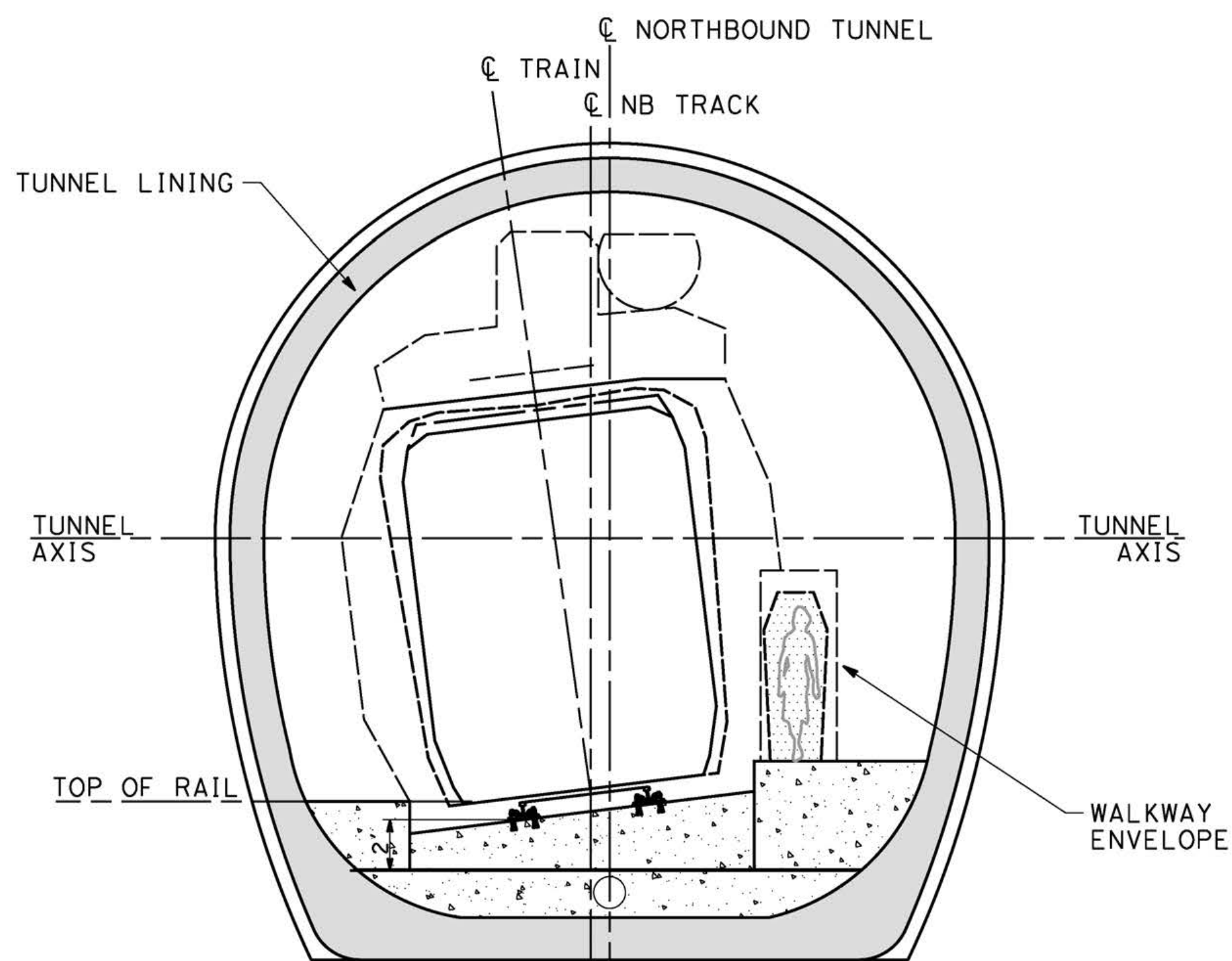
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VARIES ← 66' (TYP) MINED TWIN TUNNELS - SUPERELEVATED TRACK → VARIES  
 ← 68.5' (TYP) TRACK CENTERS →

- NOTES:**
1. MINED TWIN TUNNELS ARE AN OPTION FOR SHORT TUNNELS LOCATED BETWEEN ANF AND PALMDALE.
  2. EXCAVATION, GROUND SUPPORT, PILLAR WIDTH, DRAINAGE, TUNNEL LINING DESIGN AND WATER AND GAS TIGHTNESS PROVISIONS TBD.
  3. PILLAR WIDTH BETWEEN TUNNELS TO BE ONE TUNNEL DIAMETER OR MORE BASED ON GUIDANCE IN TM 2.4.6.
  4. SPACE PROOFING REQUIRES FURTHER STUDY TO EVALUATE DYNAMIC AIRFLOW/PRESSURE LEVELS UNDER HIGH-SPEED OPERATING CONDITIONS, AND TO FURTHER DEFINE SPACE ALLOTTED FOR STRUCTURES, EQUIPMENT AND EGRESS.
  5. CROSS-PASSAGEWAYS SHALL NOT BE FARTHER THAN 800 FT APART (NFPA 130).
  6. FOR EQUIPMENT STRUCTURE GAUGES, REFER TO DRAWINGS TN-C0004 TO TN-C0007.



VARIES ← 66' (TYP) MINED TWIN TUNNELS - SUPERELEVATED TRACK → VARIES  
 ← 68.5' (TYP) TRACK CENTERS →

**TUNNEL TYPICAL SECTION  
 MINED TWIN TUNNELS  
 SUPERELEVATED TRACK**



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
E.VELASCO  
 DRAWN BY  
F.J.DOMINGUEZ  
 CHECKED BY  
C.RECHEA  
 IN CHARGE  
A.RELAÑO  
 DATE  
02/26/2021

**PEPD RECORD SET  
 ADDENDUM  
 SR14A/E1A/E2A  
 NOT FOR  
 CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
 PALMDALE TO BURBANK**  
 MINED TWIN TUNNELS  
 SUPERELEVATED TRACK  
 CLEARANCE DIAGRAM

CONTRACT NO.  
HSR14-42  
 DRAWING NO.  
TN-C0101  
 SCALE  
AS SHOWN  
 SHEET NO.



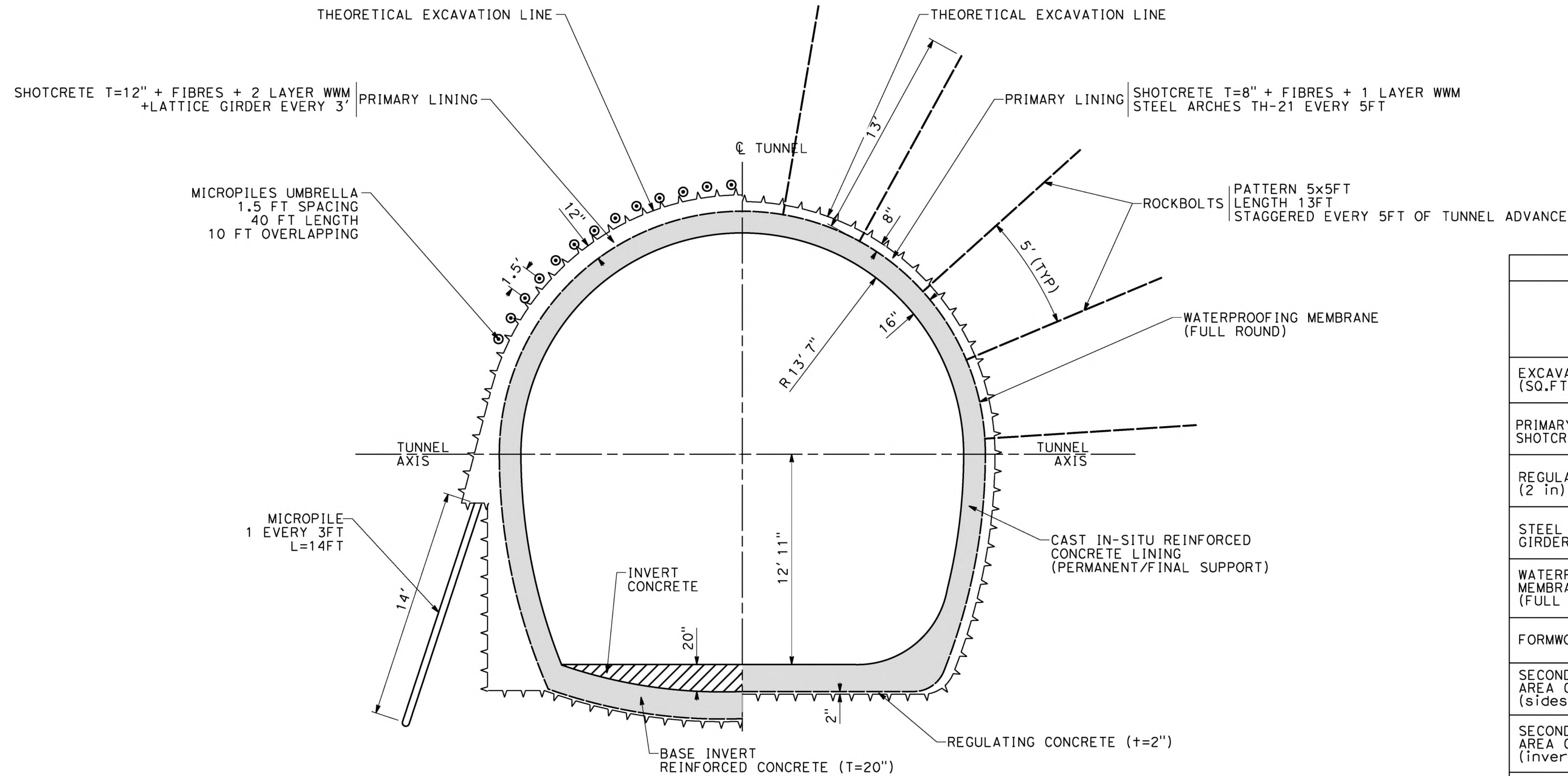
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**NOTES:**

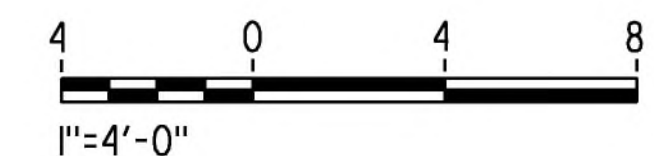
1. SUPPORT MEASURES SHOWN ARE ORIENTATIVE ONLY AND FOR PEPD COST ESTIMATION. THEY MUST BE CALCULATED WHEN DETAILED GEOTECHNICAL INFORMATION IS AVAILABLE.
2. THE SECTIONS SHOWN ON THIS DRAWING ARE ONLY APPLICABLE IN THE ROCK QUALITY CONDITIONS SHOWN. OTHER POSSIBLE SCENARIOS ARE INCLUDED IN TABLES ON DRAWINGS TN-C0704 AND TN-C0705
3. BASE INVERT NECESSARY IN CASE OF RMR<40 OR IN PRESENCE OF HIGH WATER TABLE. THE EXACT LOCATION OF THE AREAS WHERE IT WILL HAVE TO BE APPLIED MUST BE FORESEEN WHEN DETAILED GEOTECHNICAL INFORMATION IS AVAILABLE.



**MINED TWIN TUNNELS  
TYPICAL GEOMETRY  
PRIMARY LINING TYPE FOR  
POOR QUALITY ROCK (RMR <30)**

**MINED TWIN TUNNELS  
TYPICAL GEOMETRY  
PRIMARY LINING TYPE FOR  
MEDIUM QUALITY ROCK (RMR 40-50)**

| BASIC QUANTITIES PER FT OF TUNNEL                     |                     |                        |
|---|---------------------|------------------------|
| TWIN TUNNELS  | PRIMARY LINING TYPE |                        |
|   | MEDIUM QUALITY ROCK | POOR QUALITY ROCK (II) |
| EXCAVATION AREA (SQ.FT.)                              | 806                 | 900                    |
| PRIMARY LINING - SHOTCRETE AREA (SQ.FT.)              | 46                  | 110                    |
| REGULATING CONCRETE (2 in) (SQ.FT.)                   | 4                   | 4                      |
| STEEL ARCH/LATTICE GIRDER (FT)                        | 75/5=15             | 76/3=25.3              |
| WATERPROOFING MEMBRANE (FT) (FULL ROUND)              | 100                 | 105                    |
| FORMWORK (FT)   | 75                  | 76                     |
| SECONDARY LINING AREA CONCRETE (sides&crow) (SQ.FT.)  | 98                  | 98                     |
| SECONDARY LINING AREA CONCRETE (invert&slab) (SQ.FT.) | 40                  | 42                     |
| ROCKBOLTS (FT)  | 10x13/5=26          | -                      |
| MICROPILES UMBRELLA (FT)                              | -                   | 26x40/30=34.6          |
| MICROPILES FOR ELEPHANT'S FOOT (FT)                   | -                   | 28/3=9.3               |
| INVERT CONCRETE (SQ.FT.)                              | -                   | 26.7                   |



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
MINED TWIN TUNNELS  
TYPICAL CONSTRUCTION SEQUENCE AND SUPPORT MEASURES  
(1 of 3)

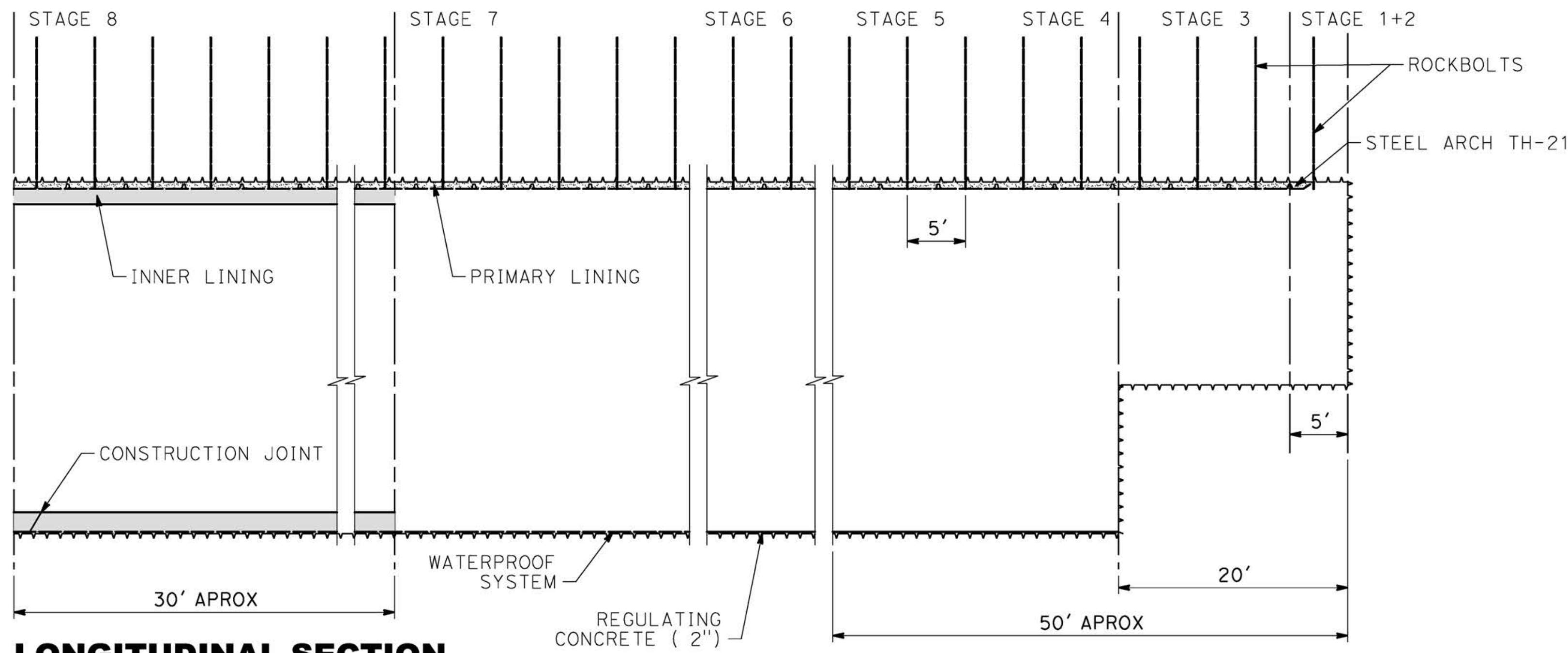
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DRAWING NO.  
**TN-C0102**  
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**AS SHOWN**  
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**LONGITUDINAL SECTION**

**MINED TWIN TUNNELS  
PRIMARY LINING FOR  
MEDIUM QUALITY ROCK**

**LEGEND:**

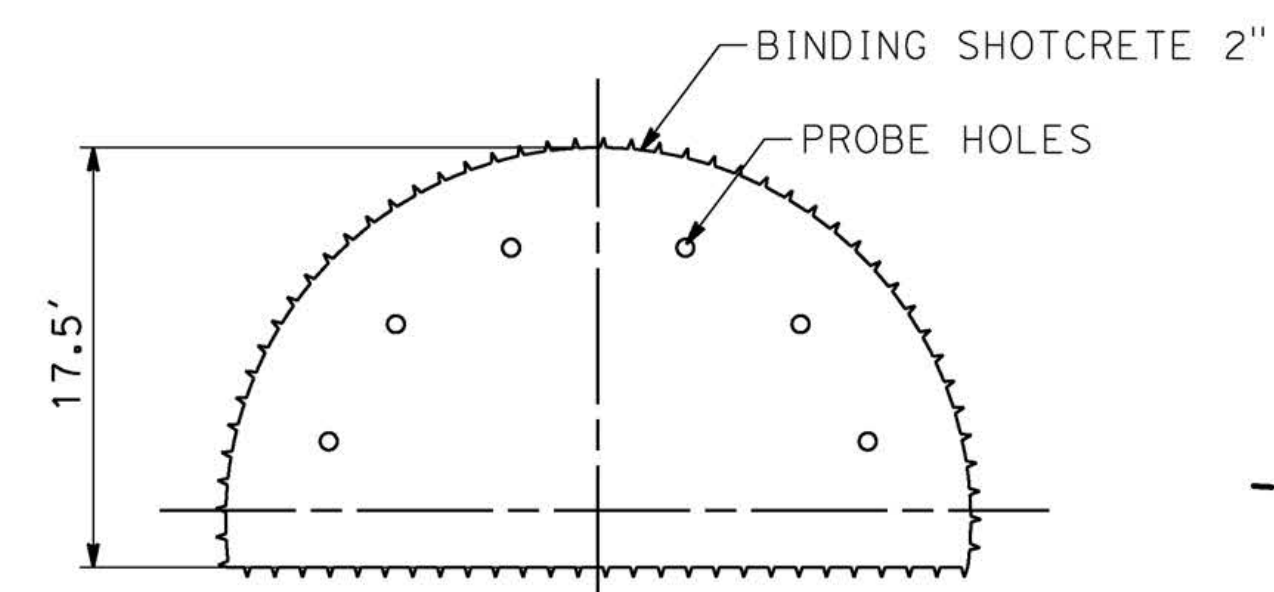
- NATM EXCAVATION
- STEEL ARCH TH-21
- REINFORCED SHOTCRETE PRIMARY LINING +1 LAYER WWM
- REINFORCED INNER / SECONDARY LINING

PRIMARY LINING (EXAMPLE ONLY, NOT ACTUAL DESIGN)

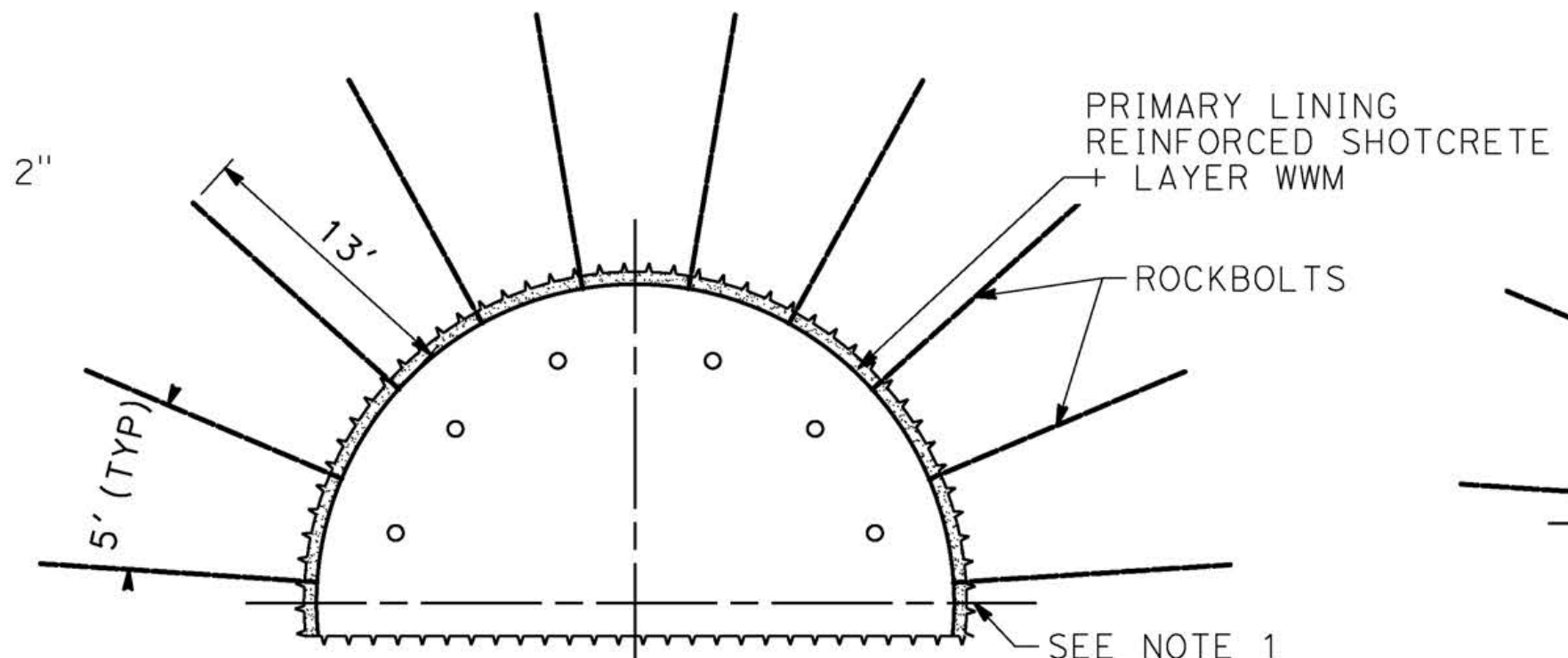
| DENOMINATION           | RMR   | SHOTCRETE THICKNESS (in) | STEEL ARCHES   | FIBRES & WWM          | ADVANCE LENGTH (FT) | ROCKBOLT PATTERN AND LENGTH (FT) | PIPE UMBRELLA |
|------------------------|-------|--------------------------|----------------|-----------------------|---------------------|----------------------------------|---------------|
| GOOD QUALITY ROCK      | 50-60 | 6                        | NO             | FIBRES & 1 LAYER WWM  | 5 FULL FACE         | 5x5FT 13FT                       | -             |
| MEDIUM QUALITY ROCK    | 40-50 | 8                        | TH-21          | FIBRES & 1 LAYER WWM  | 5 TOP HEADING       | 5x5FT 13FT                       | -             |
| POOR QUALITY ROCK (I)  | 30-40 | 10                       | TH-29          | FIBRES & 2 LAYERS WWM | 3.5 TOP HEADING     | 3.5x3.5FT 15FT                   | *             |
| POOR QUALITY ROCK (II) | <30   | 12                       | LATTICE GIRDER | FIBRES & 2 LAYERS WWM | 3 TOP HEADING       | -                                | YES           |

\* SELF DRILLING BOLTS INSTEAD OF ROCKBOLTING IF RMR<35

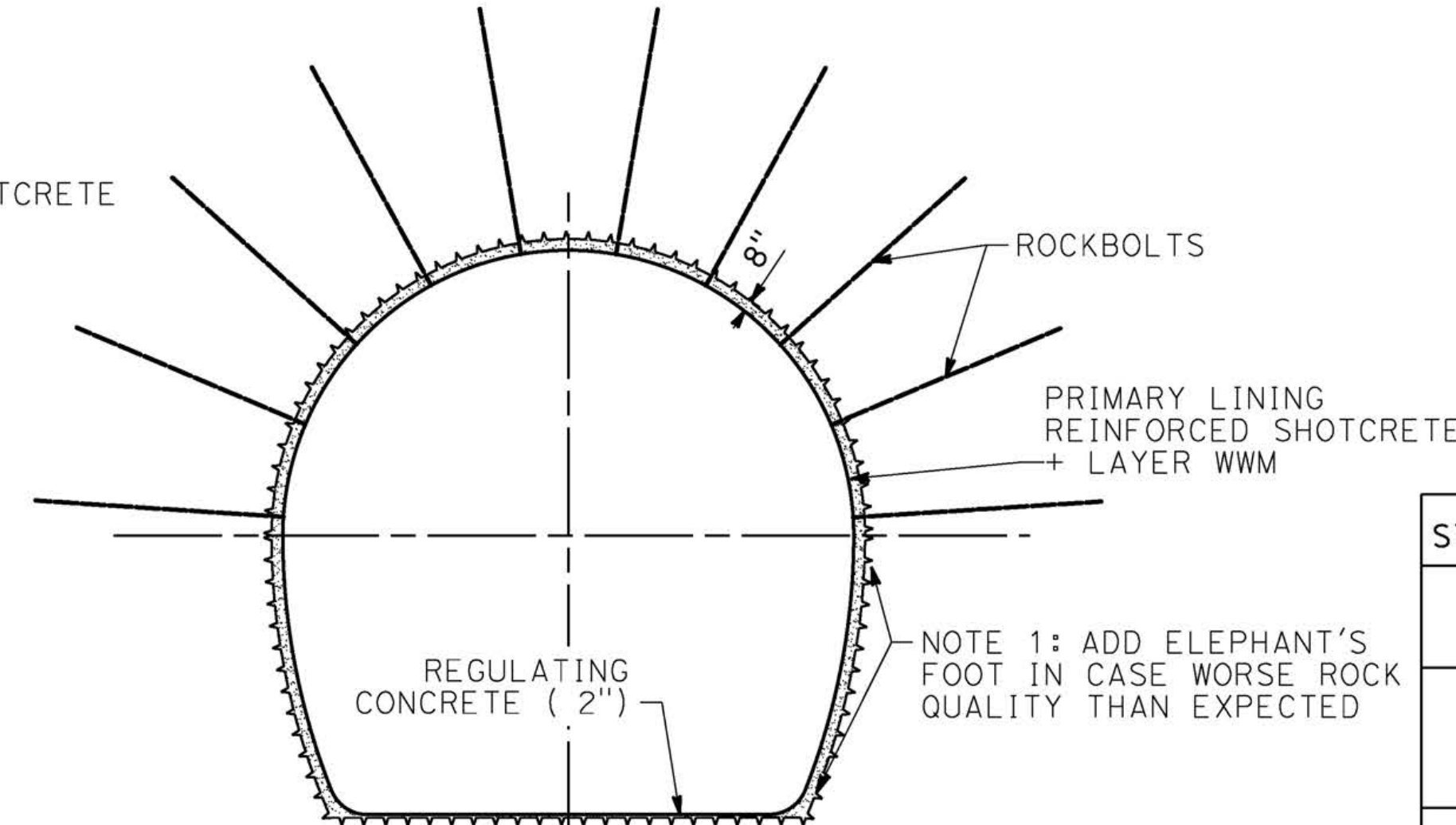
- NOTES:**
- SUPPORT MEASURES SHOWN ARE ORIENTATIVE ONLY AND FOR PEPD COST ESTIMATION. THEY MUST BE CALCULATED WHEN DETAILED GEOTECHNICAL INFORMATION IS AVAILABLE.
  - POOR QUALITY ROCK CAN OCCUR AT PORTALS AND FAULT ZONES AMONG OTHER.
  - SQUEEZING GROUND CONDITIONS UNDER OVERBURDEN OF MORE THAN 300FT WILL REQUIRE THE STUDY OF DIFFERENT MULTIPLE EXCAVATION AND LINING TECHNIQUES IN ORDER TO COPE WITH THE EXTREME CONDITIONS.
  - TUNNELS DIMENSIONS ACCORDING TO USUAL MACHINERY USED IN MINED TUNNELS. THESE DIMENSIONS MUST BE ADJUSTED TO THE MACHINERY THAT WILL BE USED IN CONSTRUCTION.



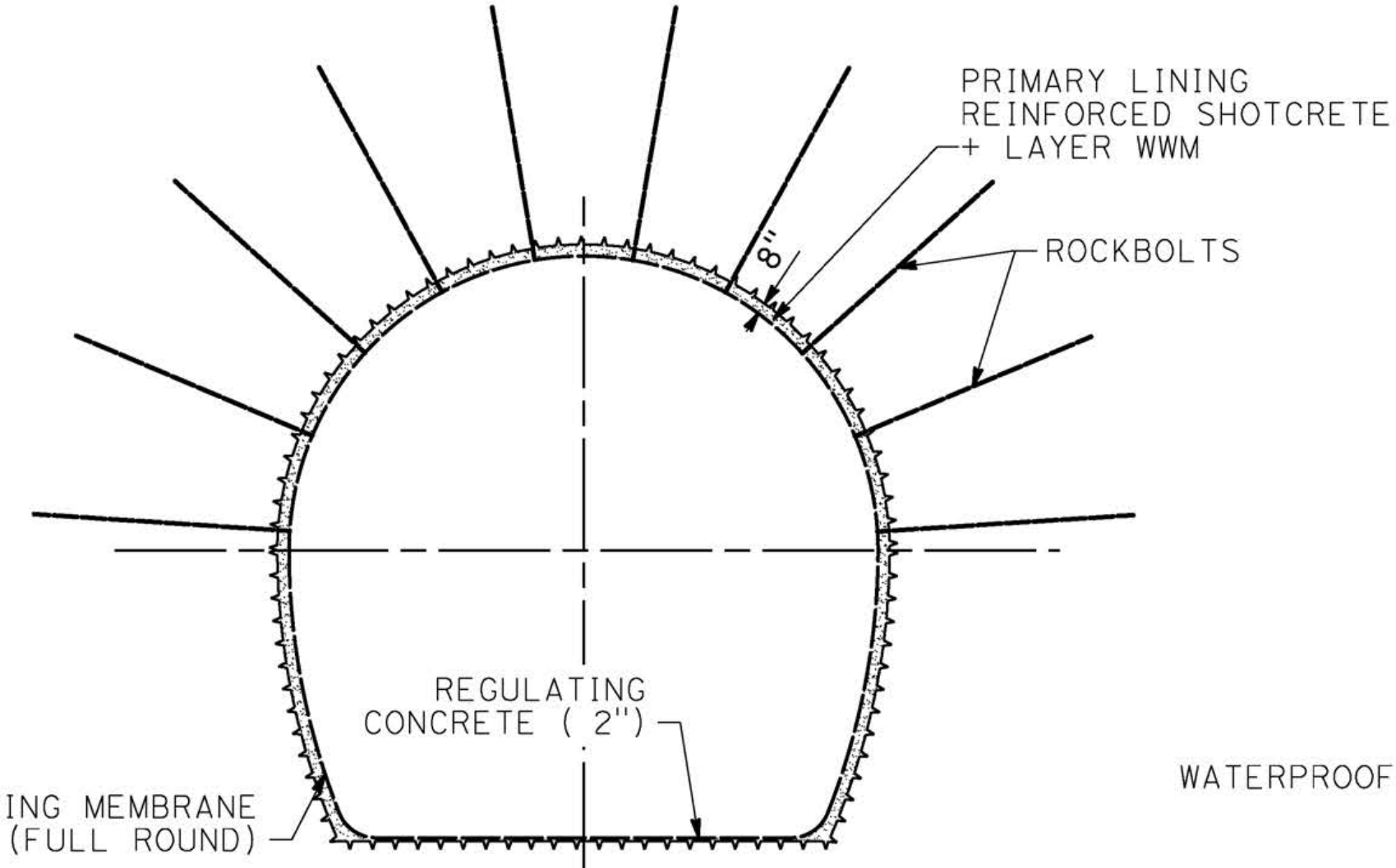
- STAGE 0: PROBE DRILLING
- STAGE 1: EXCAVATION OF TOP HEADING AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.



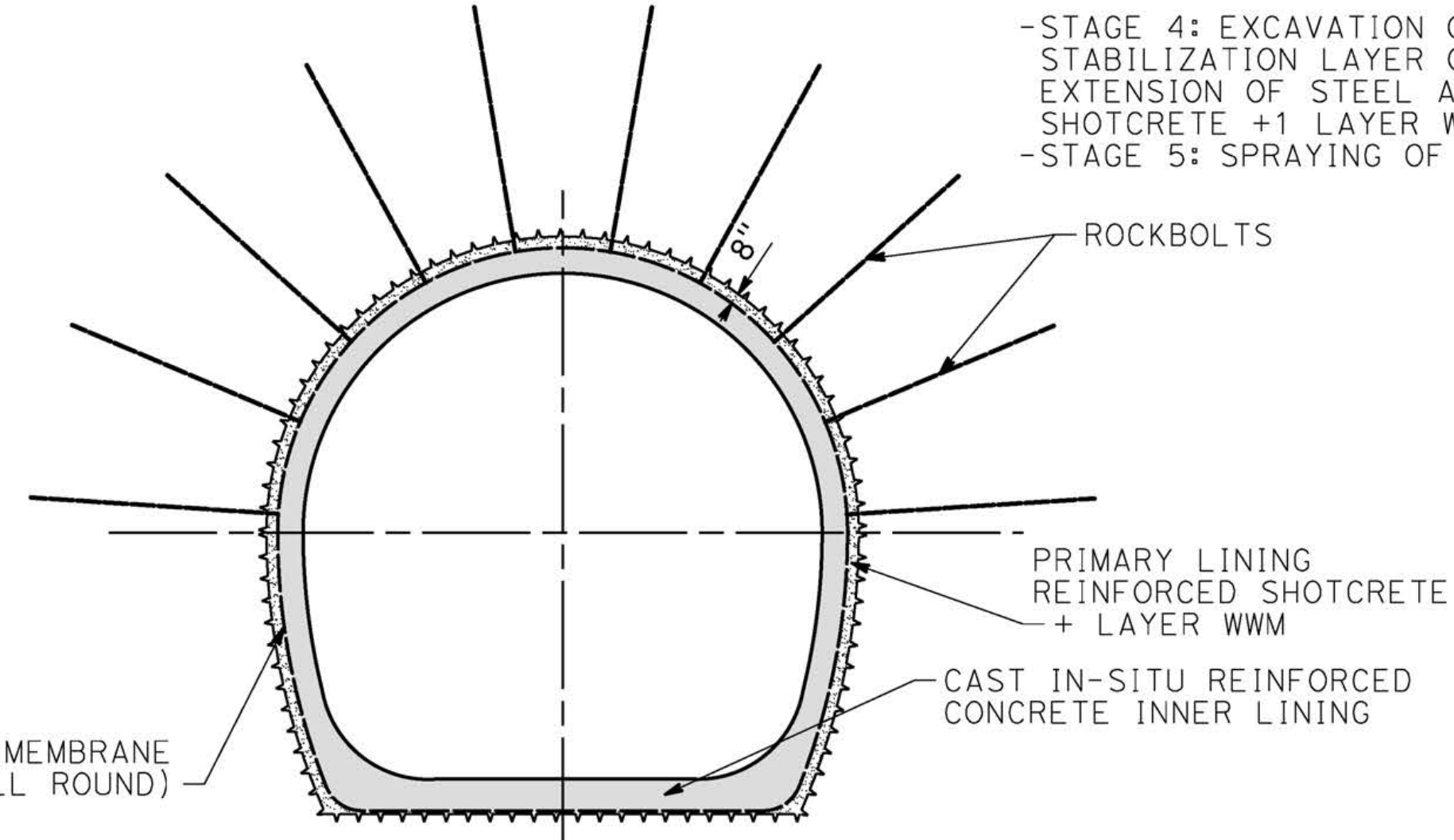
- STAGE 2: INSTALLATION OF STEEL ARCH AND ROCKBOLTING.
- STAGE 3: SPRAYING OF REINFORCED SHOTCRETE +1 LAYER WWM.



- STAGE 4: EXCAVATION OF THE BENCH AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE. EXTENSION OF STEEL ARCH AND SPRAYING OF REINFORCED SHOTCRETE +1 LAYER WWM ON THE SIDES.
- STAGE 5: SPRAYING OF REGULATING CONCRETE-INVERT.

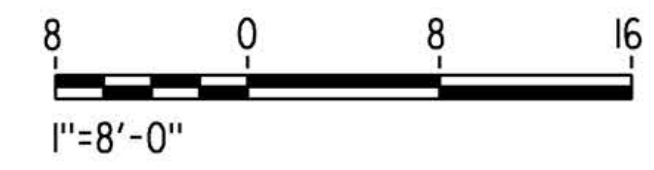


- STAGE 6: GROUTING OF FLOW ZONES FROM WITHIN TUNNEL.
- STAGE 7: INSTALLATION OF WATERPROOFING MEMBRANE.



- STAGE 8: INSTALLATION OF INNER (SECONDARY) LINING.

| STAGE | DESCRIPTION  |
|-------|--|
| 0     | -PROBE DRILLING TO ESTIMATE WATER INGRESS  |
| 1     | -EXCAVATION OF TOP HEADING AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.  |
| 2     | -INSTALLATION OF STEEL ARCH.<br>-ROCKBOLTING.  |
| 3     | -SPRAYING OF REINFORCED SHOTCRETE +1 LAYER WWM.  |
| 4     | -EXCAVATION OF THE BENCH AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.<br>-EXTENSION OF STEEL ARCH AND SPRAYING OF REINFORCED SHOTCRETE + 1 LAYER WWM ON THE SIDES. |
| 5     | -SPRAYING OF REGULATING CONCRETE INVERT  |
| 6     | -GROUTING OF FLOW ZONES FROM WITHIN TUNNEL.  |
| 7     | -INSTALLATION OF WATERPROOFING MEMBRANE  |
| 8     | -INSTALLATION OF INNER (SECONDARY) LINING<br>-(FIRST, INNER; SECOND, SIDES AND CROWN)  |



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
MINED TWIN TUNNELS  
TYPICAL CONSTRUCTION SEQUENCE AND SUPPORT MEASURES  
(2 of 3)

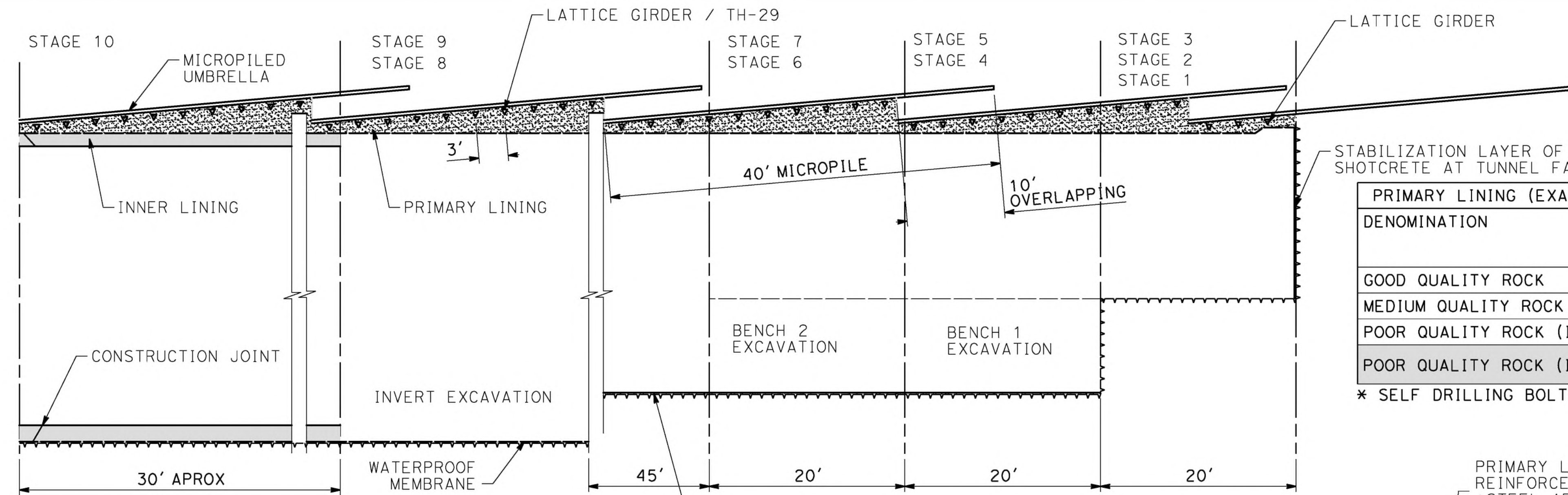
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SHEET NO.



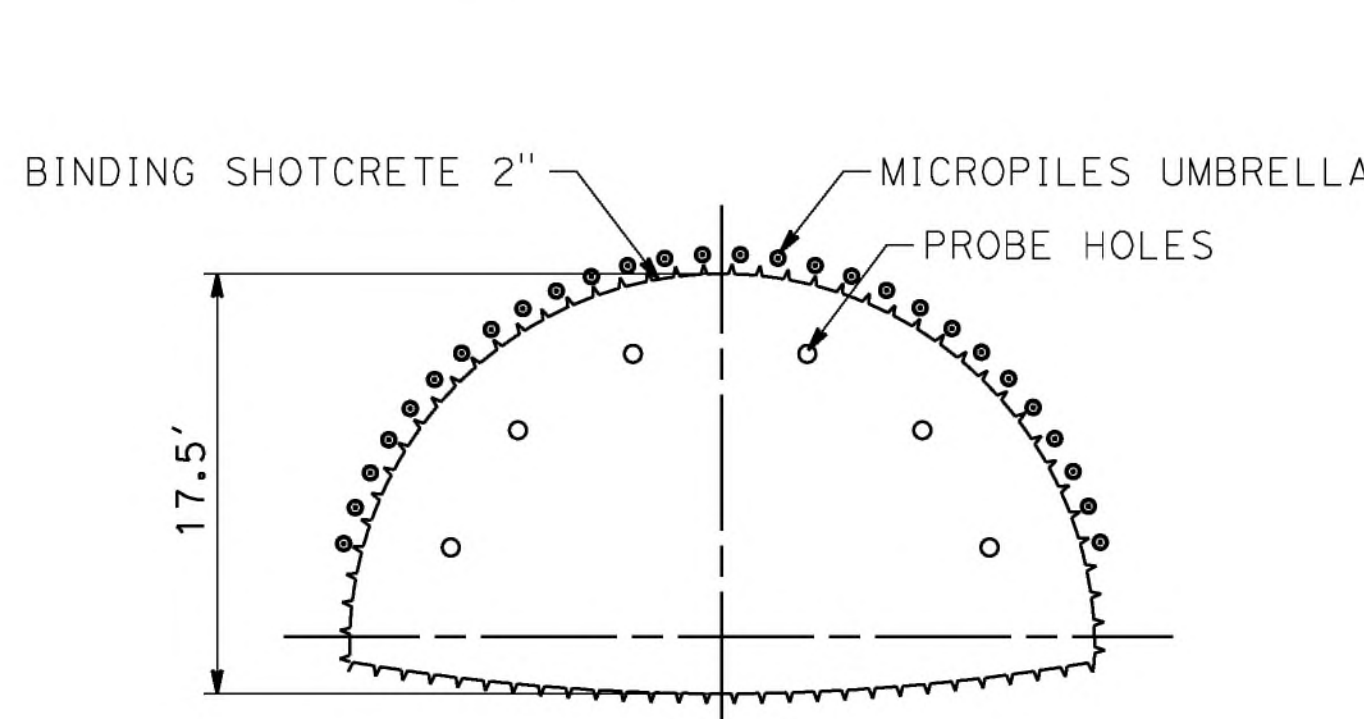
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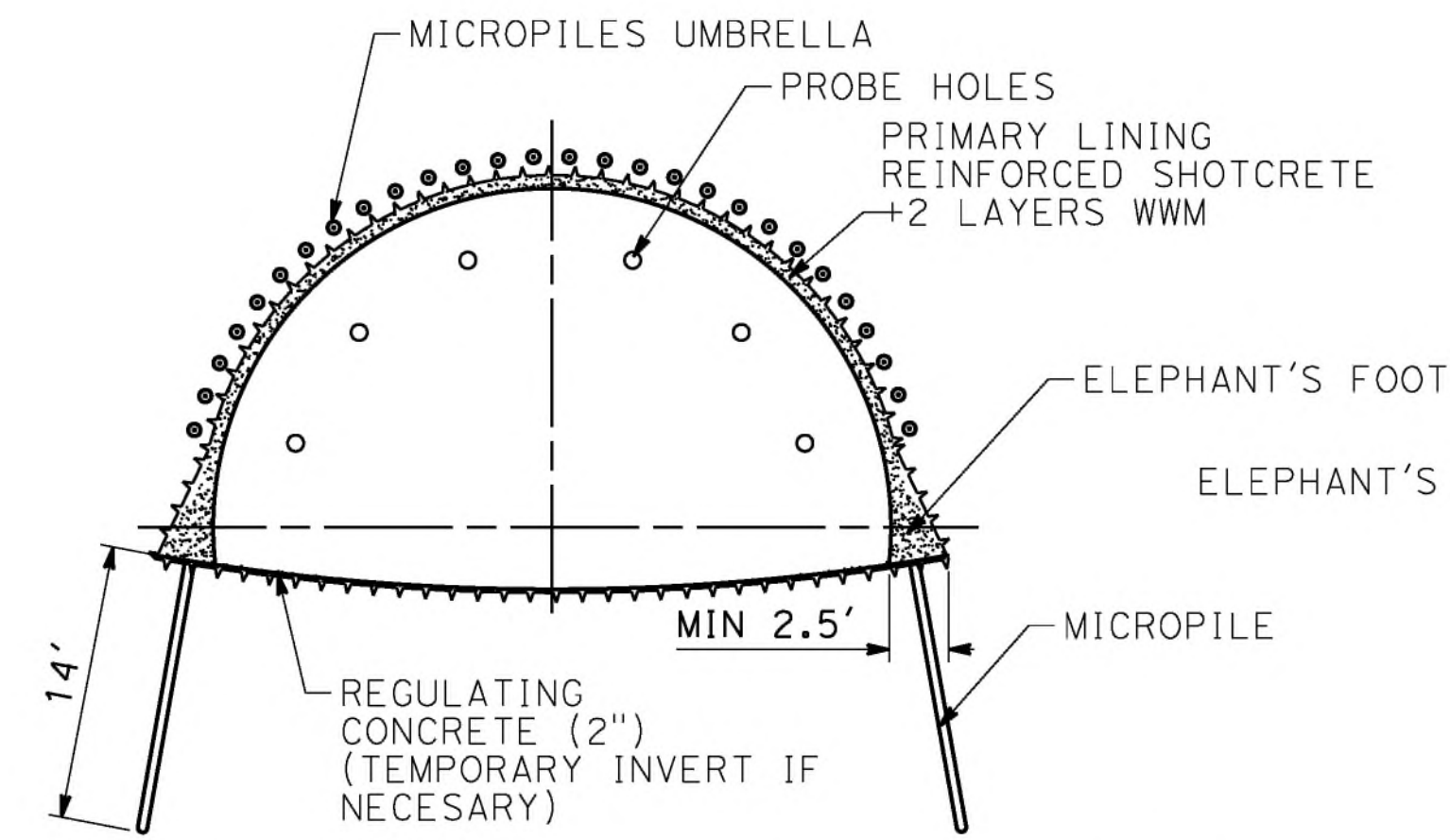
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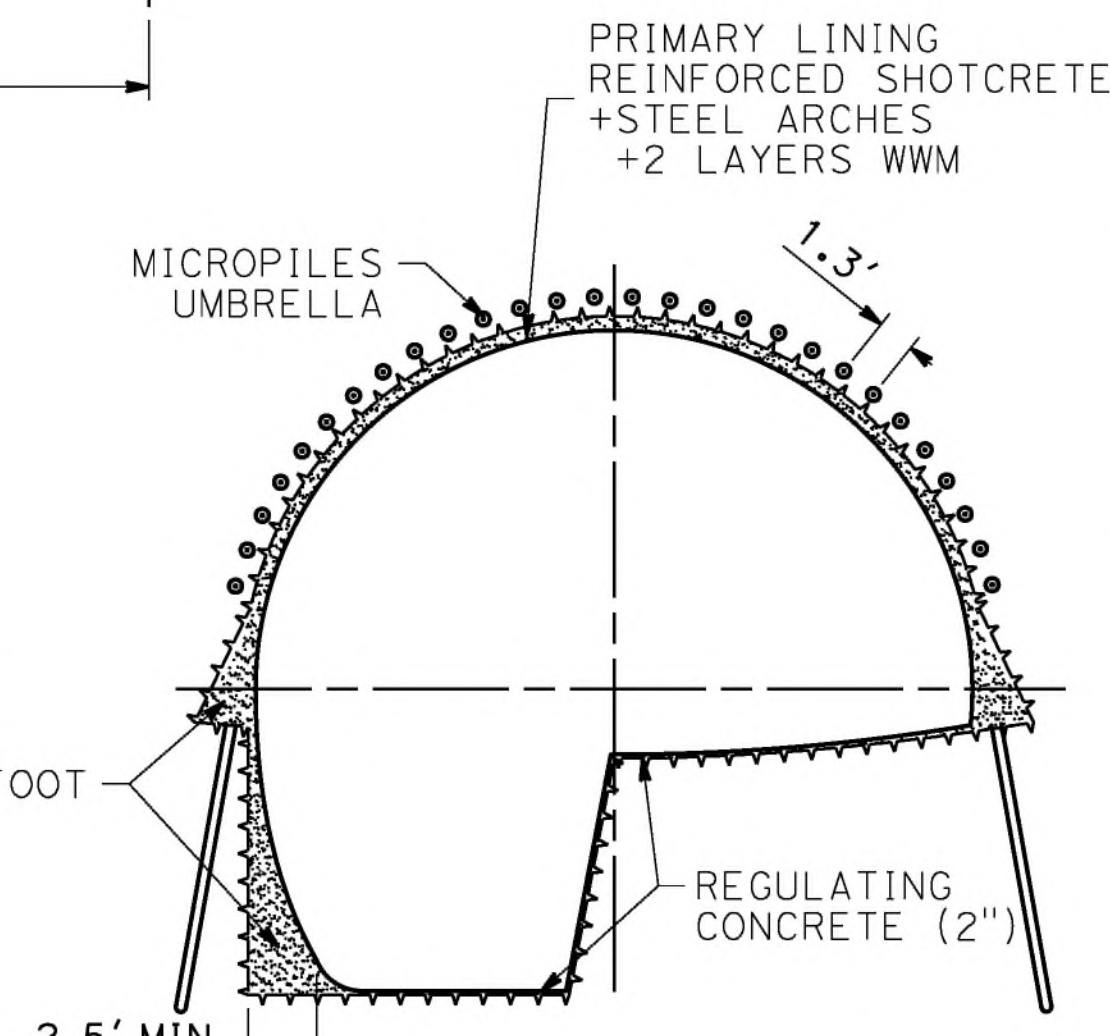
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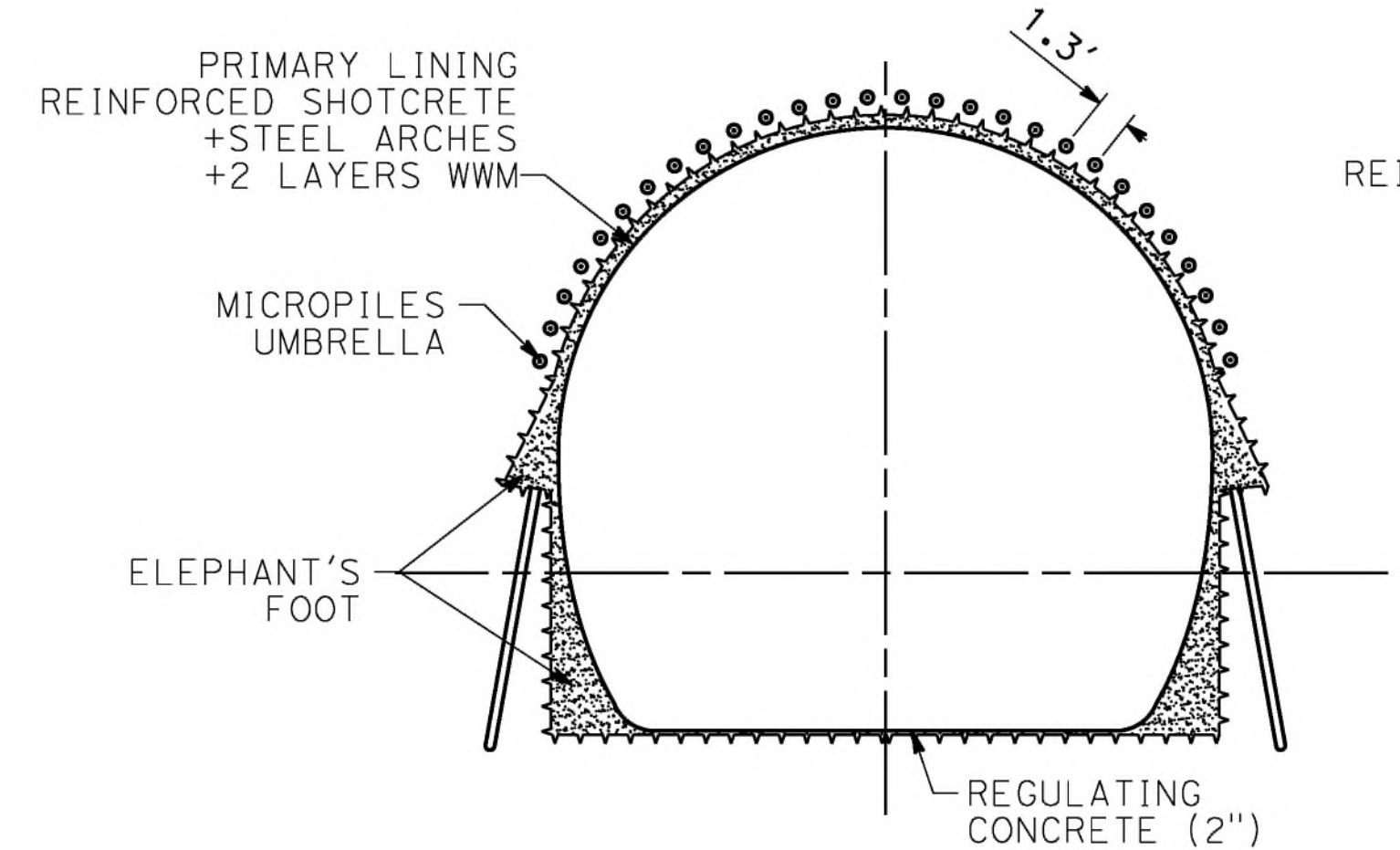
-STAGE 0: PROBE DRILLING AND MICROPILE UMBRELLA INSTALLATION.  
-STAGE 1: EXCAVATION OF TOP HEADING AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.



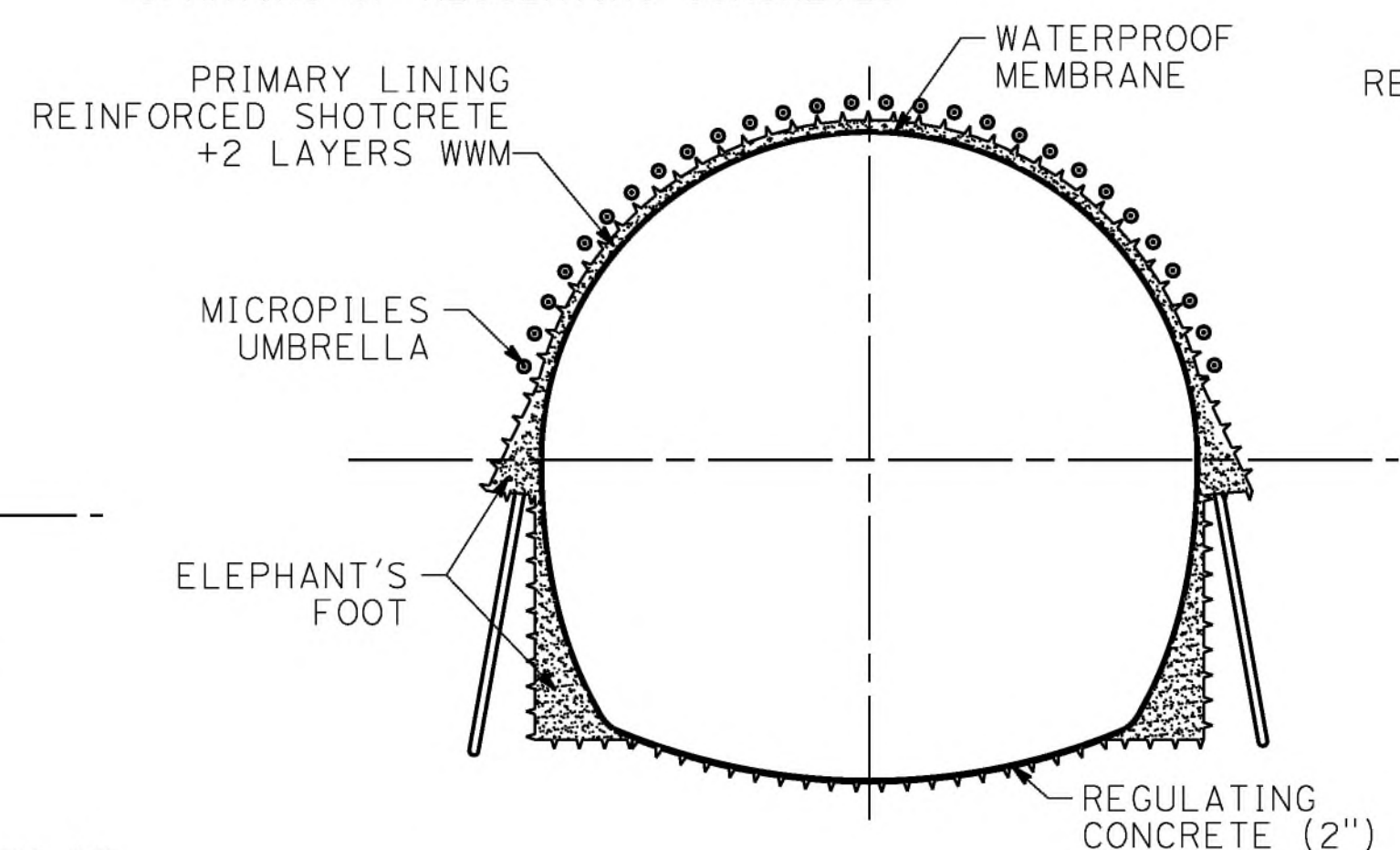
-STAGE 2: INSTALLATION OF LATTICE GIRDER + UNDERPINNING WITH MICROPILES.  
-STAGE 3: SPRAYING OF REINFORCED SHOTCRETE +2 LAYERS WWM  
-STAGE 4: BENCH 1 EXCAVATION AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.



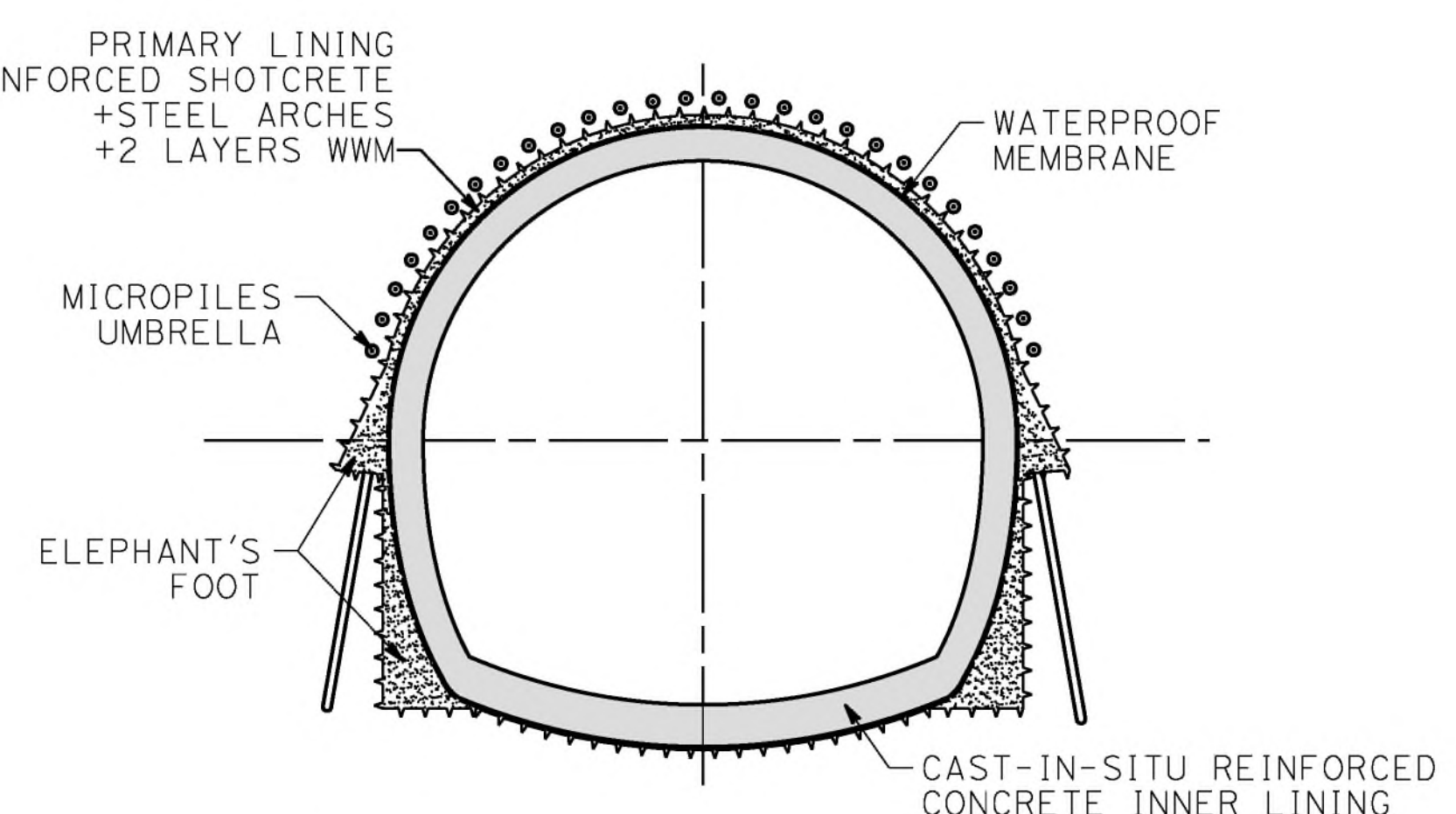
-STAGE 5: EXTENSION OF LATTICE GIRDER AND SPRAYING OF REINFORCED SHOTCRETE ON THE LEFT SIDE. SPRAYING OF REGULATING CONCRETE.



-STAGE 6: BENCH 2 EXCAVATION AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.  
-STAGE 7: EXTENSION OF LATTICE GIRDER AND SPRAYING OF REINFORCED SHOTCRETE ON THE RIGHT SIDE. SPRAYING OF REGULATING CONCRETE.



-STAGE 8: INVERT EXCAVATION AND APPLICATION OF STABILIZATION LAYER OF CONCRETE  
-STAGE 9: GROUTING OF FLOW ZONES FROM WITHIN THE TUNNEL.  
-STAGE 10: INSTALLATION OF WATERPROOFING MEMBRANE.



-STAGE 11: INSTALLATION OF INNER (SECONDARY) LINING.

**MINED TWIN TUNNELS  
PRIMARY LINING FOR  
POOR QUALITY ROCK (II)**

**LEGEND:**

- NATM EXCAVATION
- LATTICE GIRDER
- REINFORCED SHOTCRETE PRIMARY LINING +2 LAYERS WWM
- REINFORCED INNER / SECONDARY LINING

PRIMARY LINING (EXAMPLE ONLY, NOT ACTUAL DESIGN)

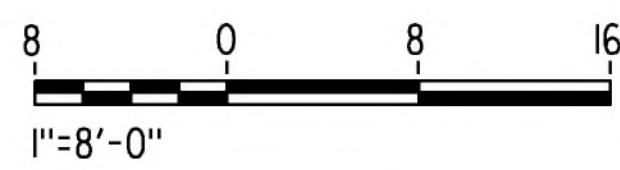
| DENOMINATION           | RMR   | SHOTCRETE THICKNESS (in) | STEEL ARCHES   | FIBRES & WWM          | ADVANCE LENGTH (FT) | ROCKBOLT PATTERN AND LENGTH (FT) | PIPE UMBRELLA |
|------------------------|-------|--------------------------|----------------|-----------------------|---------------------|----------------------------------|---------------|
| GOOD QUALITY ROCK      | 50-60 | 6                        | NO             | FIBRES & 1 LAYER WWM  | 5 FULL FACE         | 5x5FT 13FT                       | -             |
| MEDIUM QUALITY ROCK    | 40-50 | 8                        | TH-21          | FIBRES & 1 LAYER WWM  | 5 TOP HEADING       | 5x5FT 13FT                       | -             |
| POOR QUALITY ROCK (I)  | 30-40 | 10                       | TH-29          | FIBRES & 2 LAYERS WWM | 3.5 TOP HEADING     | 3.5x3.5FT 15FT                   | *             |
| POOR QUALITY ROCK (II) | <30   | 12                       | LATTICE GIRDER | FIBRES & 2 LAYERS WWM | 3 TOP HEADING       | -                                | YES           |

\* SELF DRILLING BOLTS INSTEAD OF ROCKBOLTING IF RMR<35

**NOTES:**

- SUPPORT MEASURES SHOWN ARE ORIENTATIVE ONLY AND FOR PEPCD COST ESTIMATION. THEY MUST BE CALCULATED WHEN DETAILED GEOTECHNICAL INFORMATION IS AVAILABLE.
- POOR QUALITY ROCK CAN OCCUR AT PORTALS AND FAULT ZONES AMONG OTHER.
- SQUEEZING GROUND CONDITIONS UNDER OVERBURDEN OF MORE THAN 300FT WILL REQUIRE THE STUDY OF DIFFERENT MULTIPLE EXCAVATION AND LINING TECHNIQUES IN ORDER TO COPE WITH THE EXTREME CONDITIONS.
- TUNNELS DIMENSIONS ACCORDING TO USUAL MACHINERY USED IN MINED TUNNELS THESE DIMENSIONS MUST BE ADJUSTED TO THE MACHINERY THAT WILL BE USED IN CONSTRUCTION.
- SHOTCRETE AND/OR FIBER GLASS BOLTS MIGHT BE REQUIRED TO ENSURE FACE STABILITY. STUDY OF FACE STABILITY MUST BE CARRIED OUT IN DETAILED DESIGN.

| STAGE | DESCRIPTION   |
|-------|---|
| 0     | -PROBE DRILLING TO ESTIMATE WATER INGRESS<br>-MICROPILE UMBRELLA INSTALLATION (EVERY 30FT)  |
| 1     | -EXCAVATION OF TOP HEADING AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.   |
| 2     | -INSTALLATION OF LATTICE GIRDER + UNDERPINNING WITH MICROPILES.   |
| 3     | -SPRAYING OF REINFORCED SHOTCRETE +2 LAYERS WWM.  |
| 4/6   | -EXCAVATION OF INVERT AND APPLICATION OF STABILIZATION LAYER OF SHOTCRETE.<br>-EXTENSION OF LATTICE GIRDER AND SPRAYING OF REINFORCED SHOTCRETE + 1 LAYER WWM ON THE SIDES. |
| 5/8   | -SPRAYING OF REGULATING CONCRETE INVERT   |
| 9     | -GROUTING OF FLOW ZONES FROM WITHIN TUNNEL.   |
| 10    | -INSTALLATION OF WATERPROOFING MEMBRANE   |
| 11    | -INSTALLATION OF INNER (SECONDARY) LINING<br>-(FIRST, INNER; SECOND, SIDES AND CROWN)   |



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT**  
**PALMDALE TO BURBANK**  
MINED TWIN TUNNELS  
TYPICAL CONSTRUCTION SEQUENCE AND SUPPORT MEASURES  
(3 of 3)

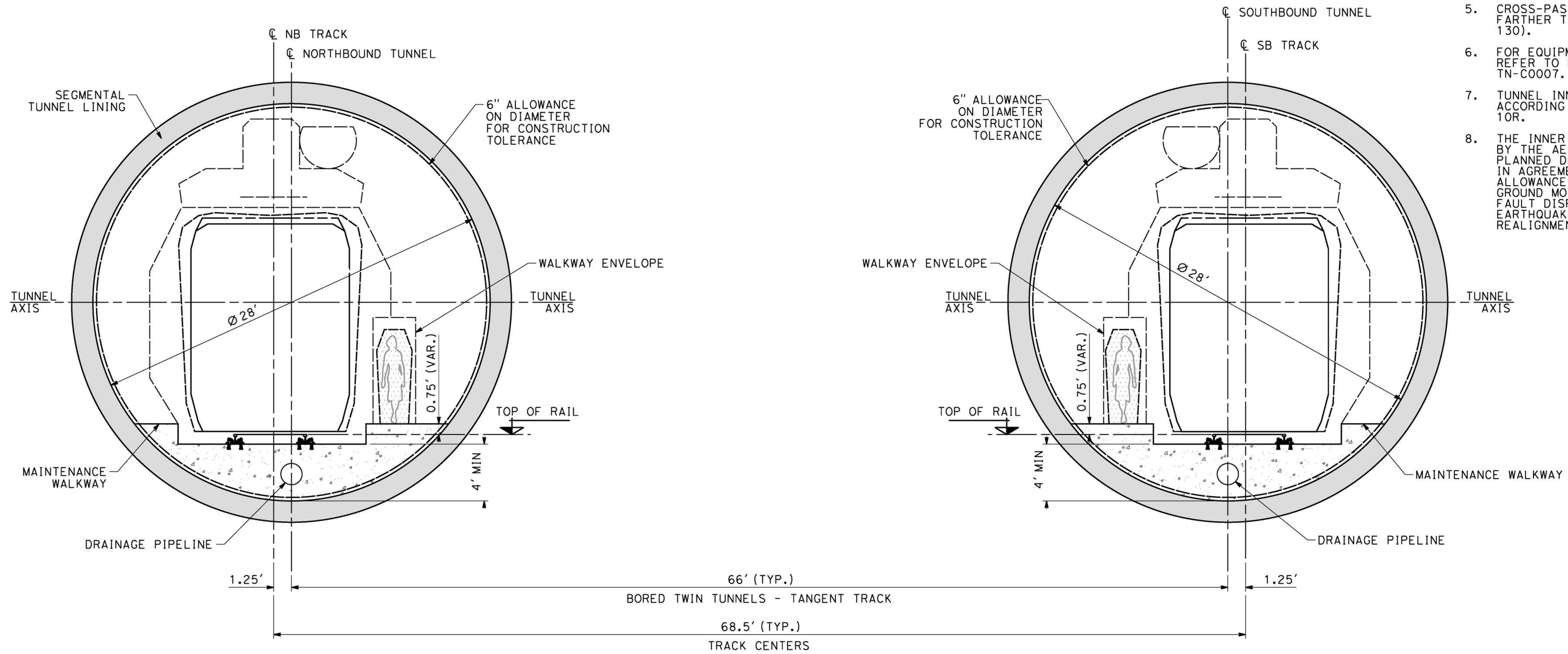
CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0104**  
SCALE  
**AS SHOWN**  
SHEET NO.



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**TUNNEL TYPICAL SECTION  
TBM TWIN TUNNELS  
TANGENT TRACK**

**NOTES:**

1. TBM CONSTRUCTION METHOD IDENTIFIED FOR TUNNELS LONGER THAN 3 MILES.
2. EXCAVATION, GROUND SUPPORT, PILLAR WIDTH, DRAINAGE, TUNNEL LINING DESIGN AND WATER AND GAS TIGHTNESS PROVISIONS TBD.
3. PILLAR WIDTH BETWEEN TUNNELS TO BE ONE TUNNEL DIAMETER OR MORE BASED ON GUIDANCE IN TM 2.4.6.
4. SPACE PROOFING REQUIRES FURTHER STUDY TO EVALUATE DYNAMIC AIRFLOW/PRESSURE LEVELS UNDER HIGH-SPEED OPERATING CONDITIONS, AND TO FURTHER DEFINE SPACE ALLOTTED FOR STRUCTURES, EQUIPMENT, DRAINAGE AND EGRESS.
5. CROSS-PASSAGeways SHALL NOT BE FARTHER THAN 800 FT APART (NFPA 130).
6. FOR EQUIPMENT STRUCTURE GAUGES, REFER TO DRAWINGS TN-C0004 TO TN-C0007.
7. TUNNEL INNER DIAMETER SHOWN IS 28FT, ACCORDING TO NOTICE TO DESIGNERS No. 10R.
8. THE INNER DIAMETER WILL BE GOVERNED BY THE AERODYNAMIC CRITERIA FOR THE PLANNED DESIGN SPEEDS FOR EACH TUNNEL, IN AGREEMENT TO TM 2.4.2, AND ALLOWANCES FOR POST-CONSTRUCTION GROUND MOVEMENTS DUE TO PERMANENT FAULT DISPLACEMENT, TO ALLOW FOR POST-EARTHQUAKE CLEAR PASSAGE AND TRACK REALIGNMENT.



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

TBM BORED TWIN TUNNELS  
CLEARANCE DIAGRAM-TANGENT TRAK

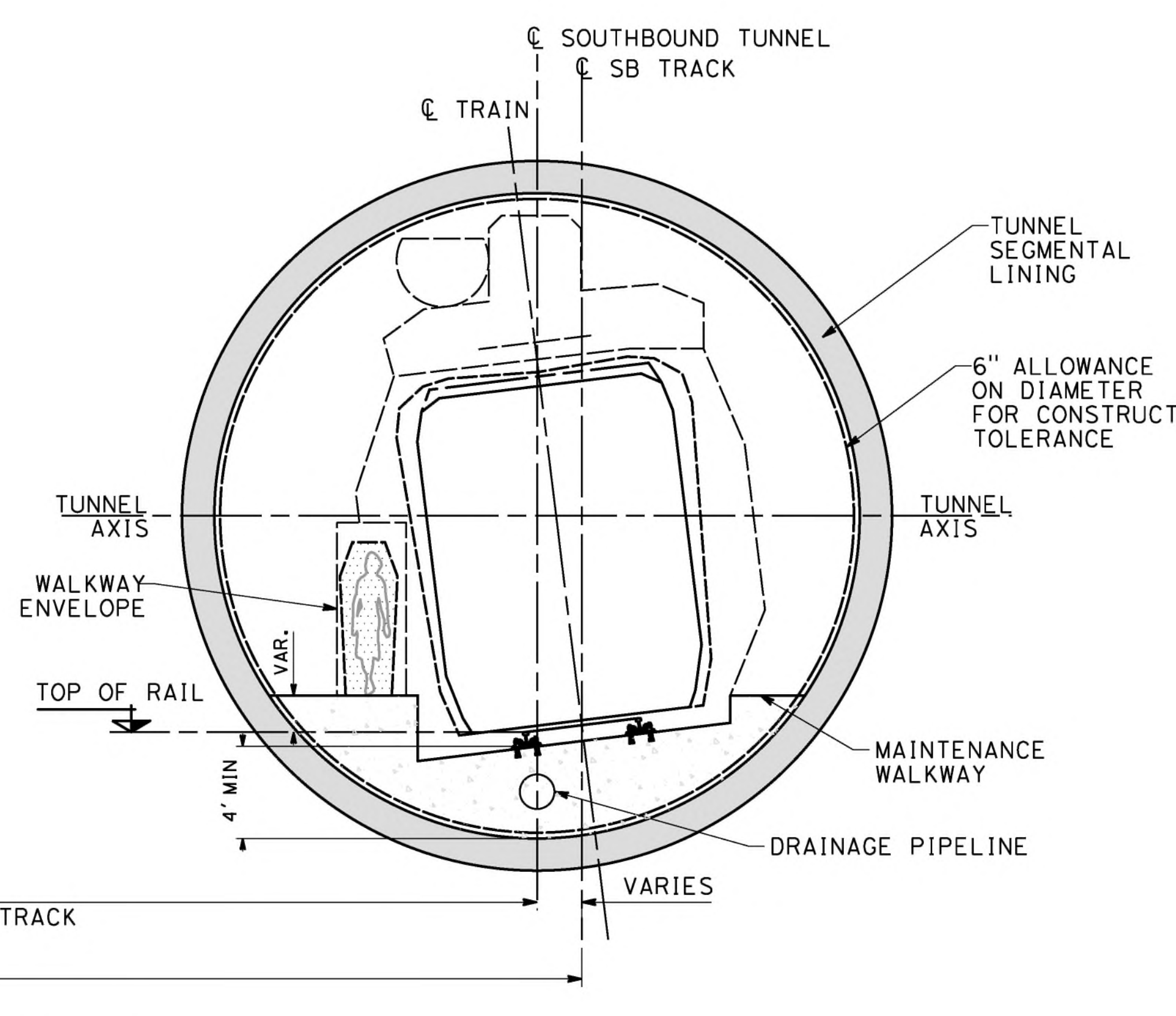
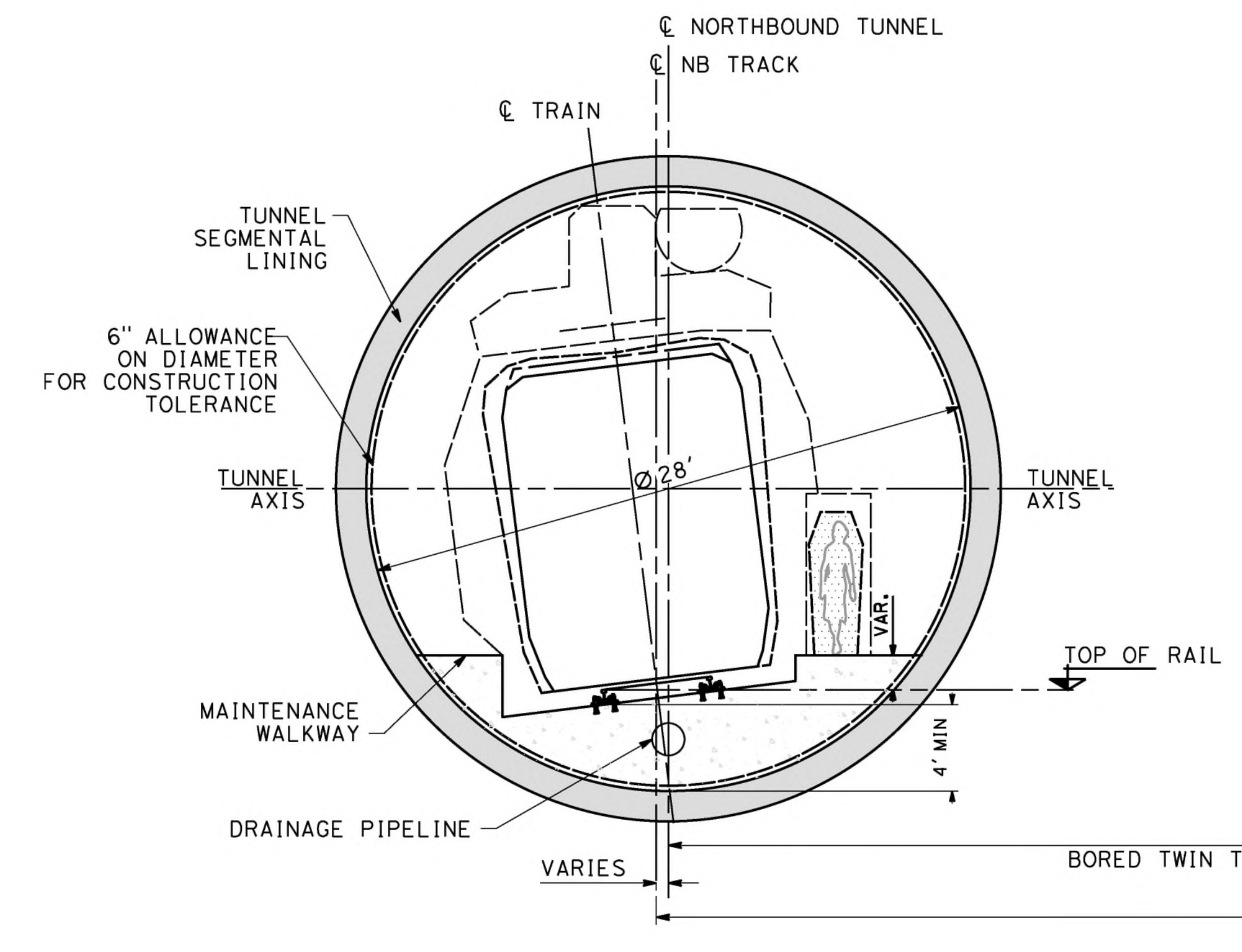
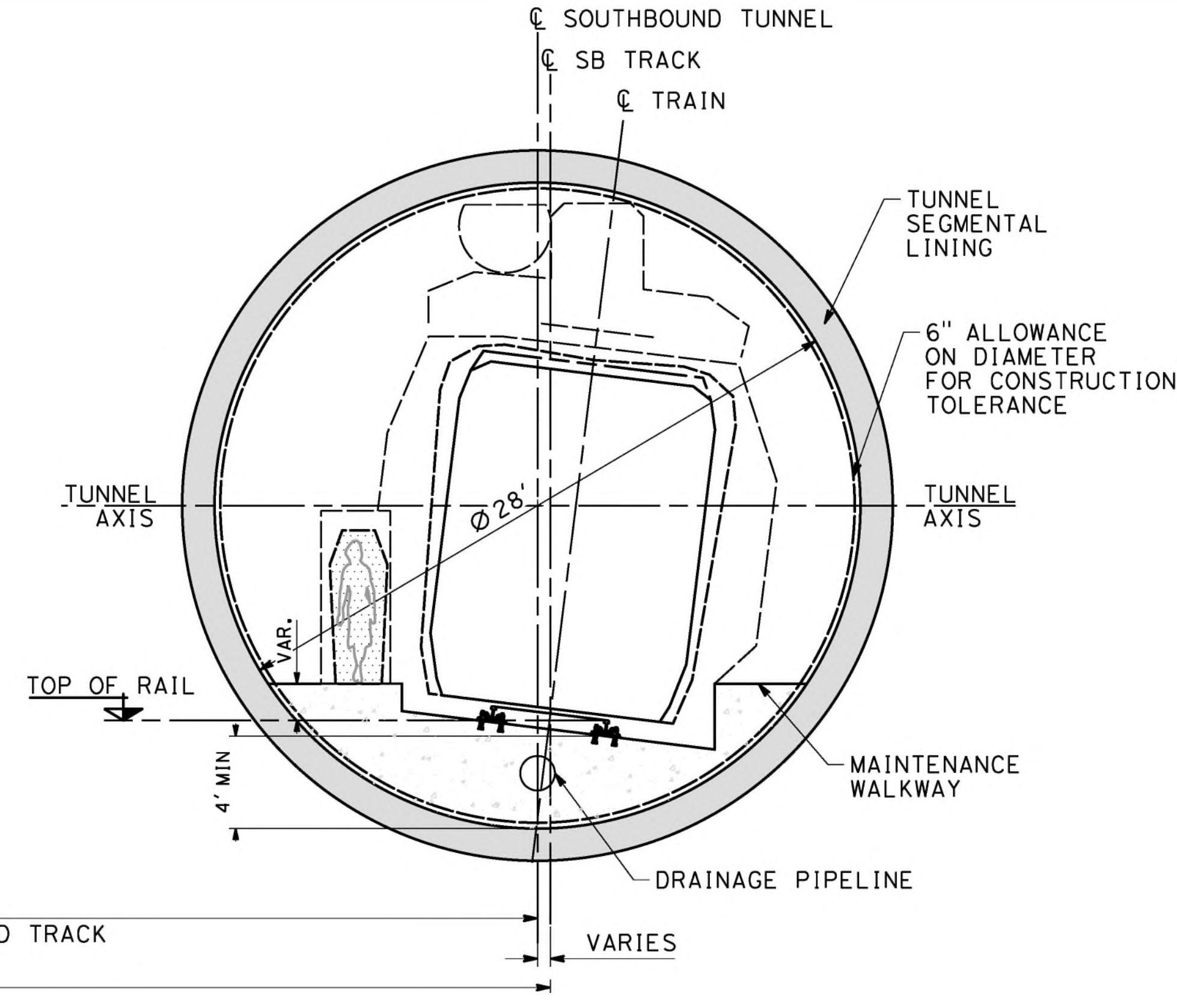
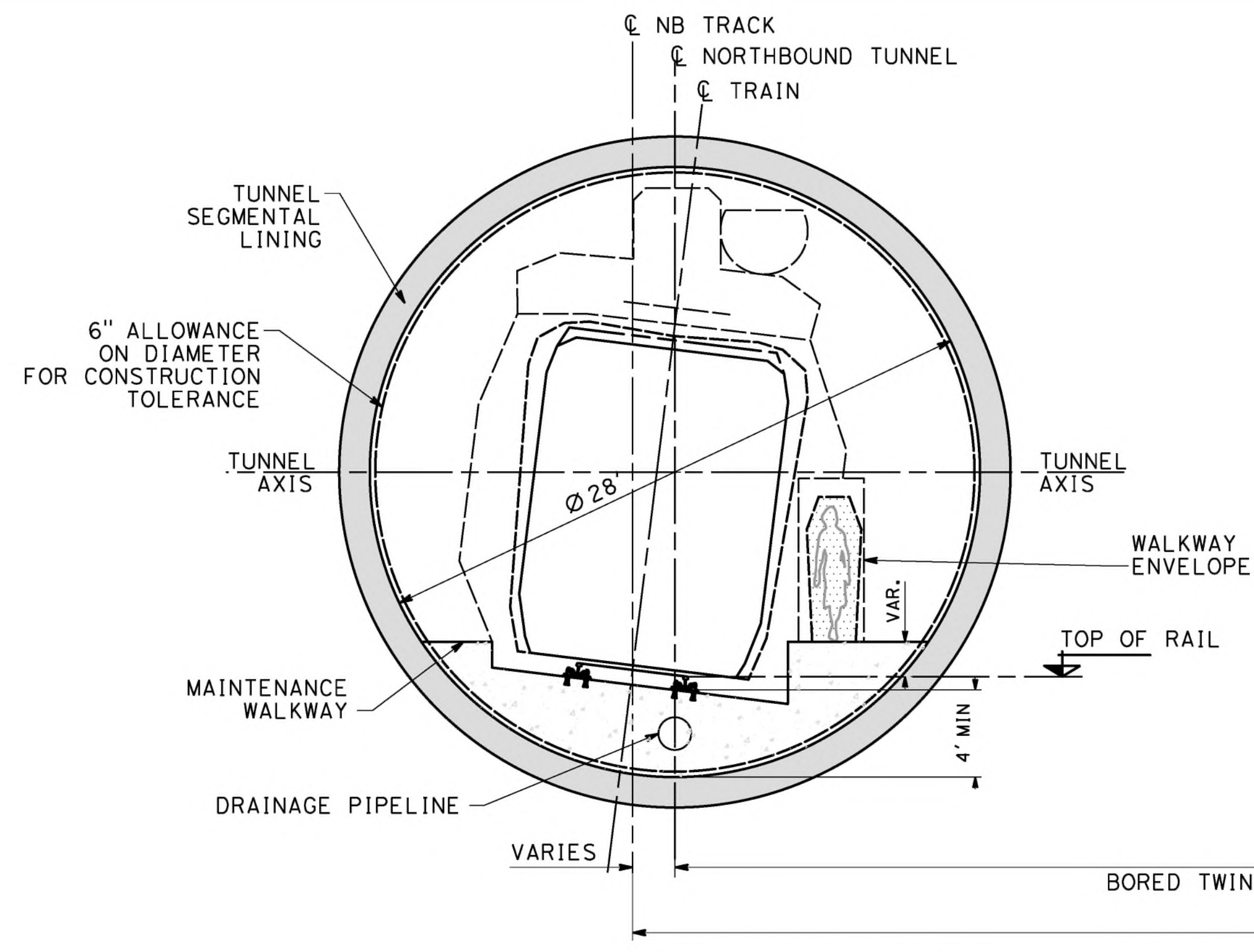
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**HSR14-42**  
DRAWING NO.  
**TN-C0200**  
SCALE  
**AS SHOWN**  
SHEET NO.



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**TUNNEL TYPICAL SECTION  
TBM TWIN TUNNELS  
SUPERELEVATED TRACK**

- NOTES:**
1. TBM CONSTRUCTION METHOD IDENTIFIED FOR TUNNELS LONGER THAN 3 MILES.
  2. EXCAVATION, GROUND SUPPORT, PILLAR WIDTH, DRAINAGE, TUNNEL LINING DESIGN AND WATER AND GAS TIGHTNESS PROVISIONS TBD.
  3. PILLAR WIDTH BETWEEN TUNNELS TO BE ONE TUNNEL DIAMETER OR MORE BASED ON GUIDANCE IN TM 2.4.6
  4. SPACE PROOFING REQUIRES FURTHER STUDY TO EVALUATE DYNAMIC AIRFLOW/PRESSURE LEVELS UNDER HIGH-SPEED OPERATING CONDITIONS, AND TO FURTHER DEFINE SPACE ALLOTTED FOR STRUCTURES, EQUIPMENT, DRAINAGE AND EGRESS.
  5. CROSS-PASSAGeways SHALL NOT BE FARTHER THAN 800 FT APART (NFPA 130).
  6. FOR EQUIPMENT STRUCTURE GAUGES, REFER TO DRAWINGS TN-C0004 TO TN-C0007.
  7. TUNNEL INNER DIAMETER SHOWN IS 28FT, ACCORDING TO NOTICE TO DESIGNERS No. 10R.
  8. THE INNER DIAMETER WILL BE GOVERNED BY THE AERODYNAMIC CRITERIA FOR THE PLANNED DESIGN SPEEDS FOR EACH TUNNEL, IN AGREEMENT TO TM 2.4.2, AND ALLOWANCES FOR POST-CONSTRUCTION GROUND MOVEMENTS DUE TO PERMANENT FAULT DISPLACEMENT, TO ALLOW FOR POST-EARTHQUAKE CLEAR PASSAGE AND TRACK REALIGNMENT.



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|     |      |    |     |     |             |

DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

TBM BORED TWIN TUNNELS  
CLEARANCE DIAGRAM - SUPERELEVATED TRACK

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-C0201**

SCALE  
**AS SHOWN**

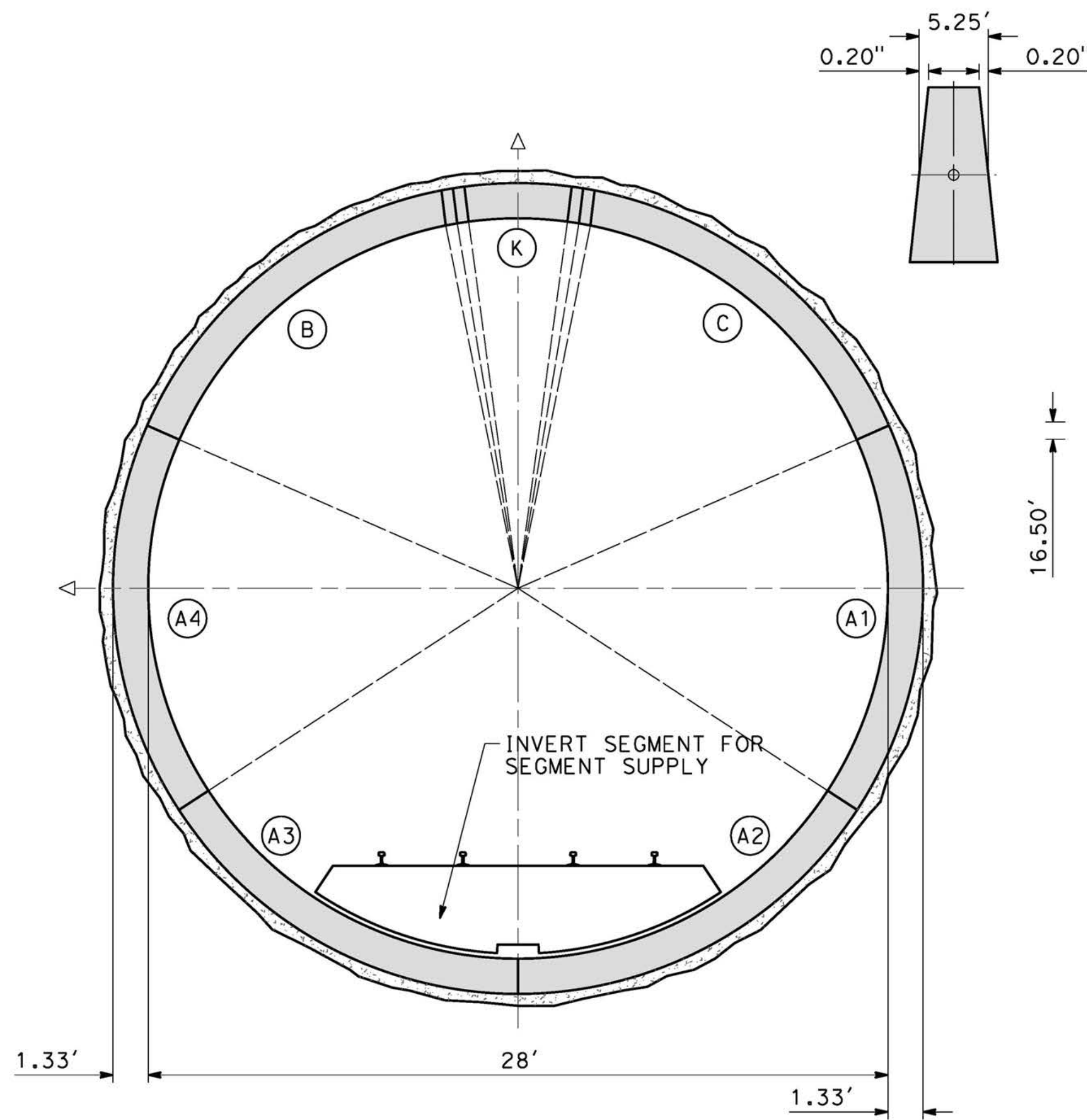
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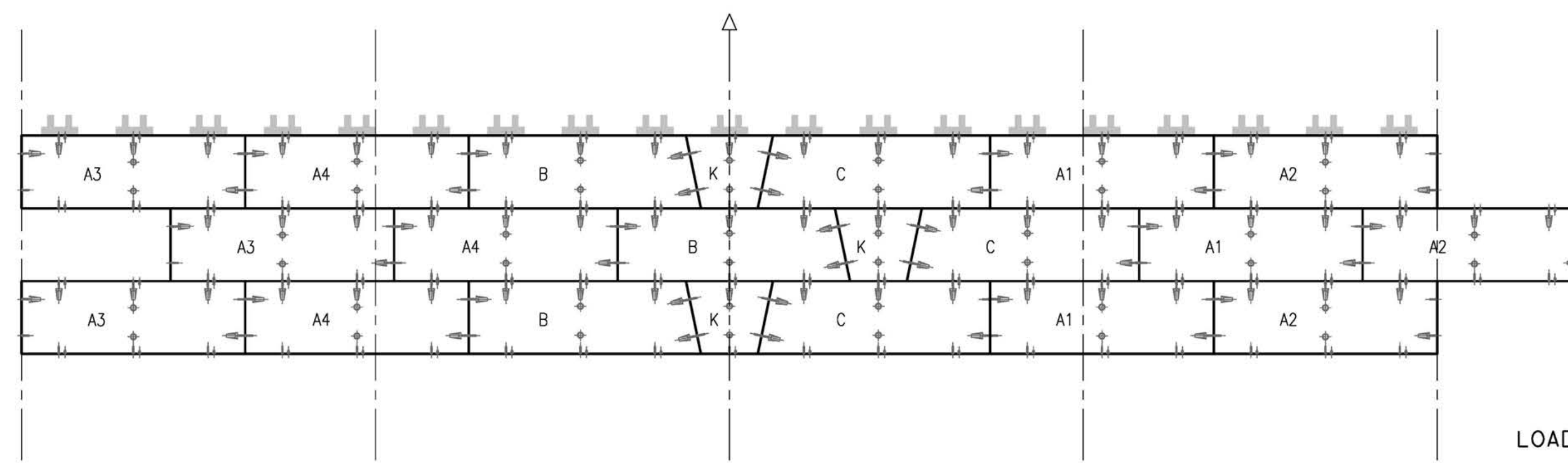
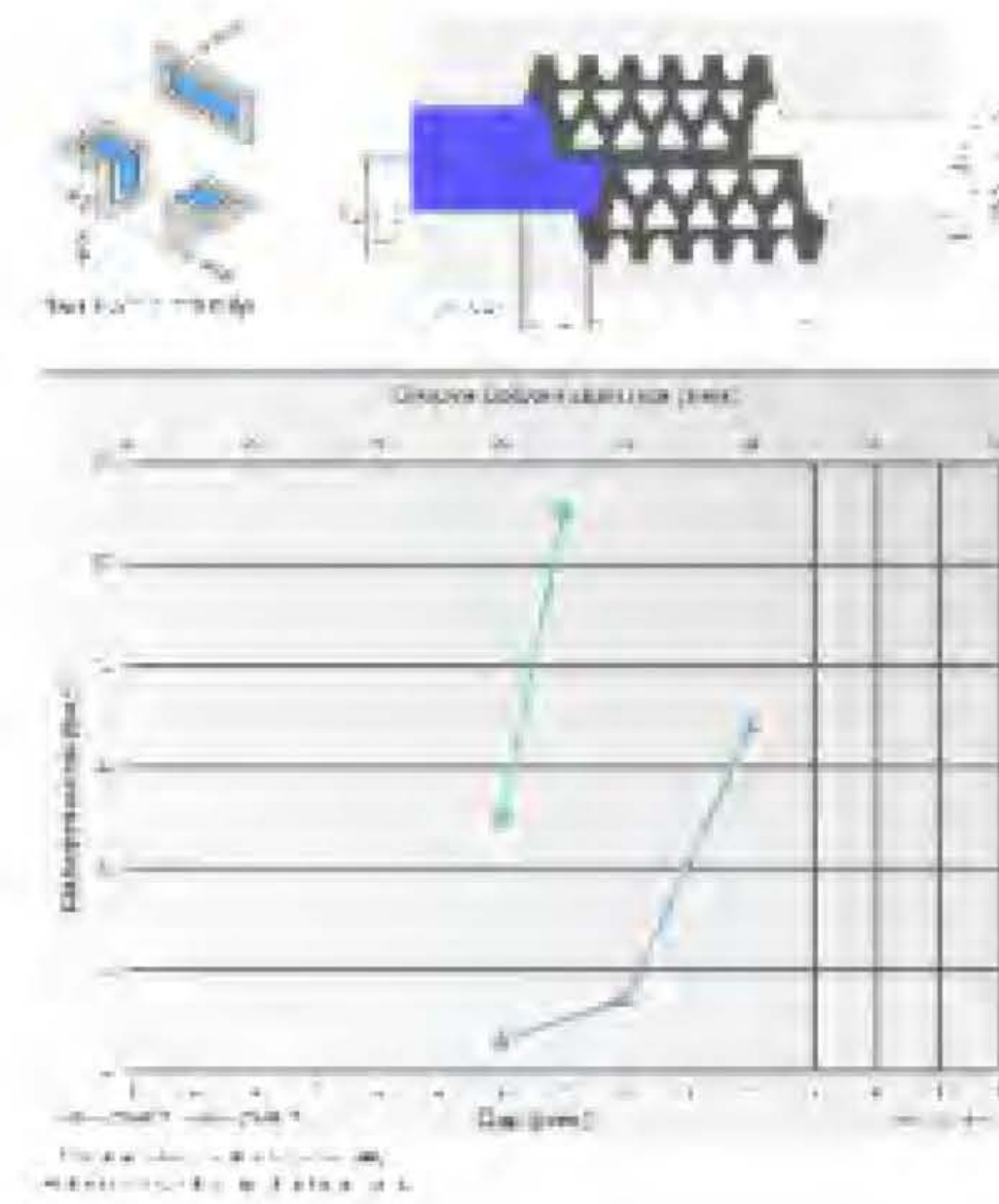
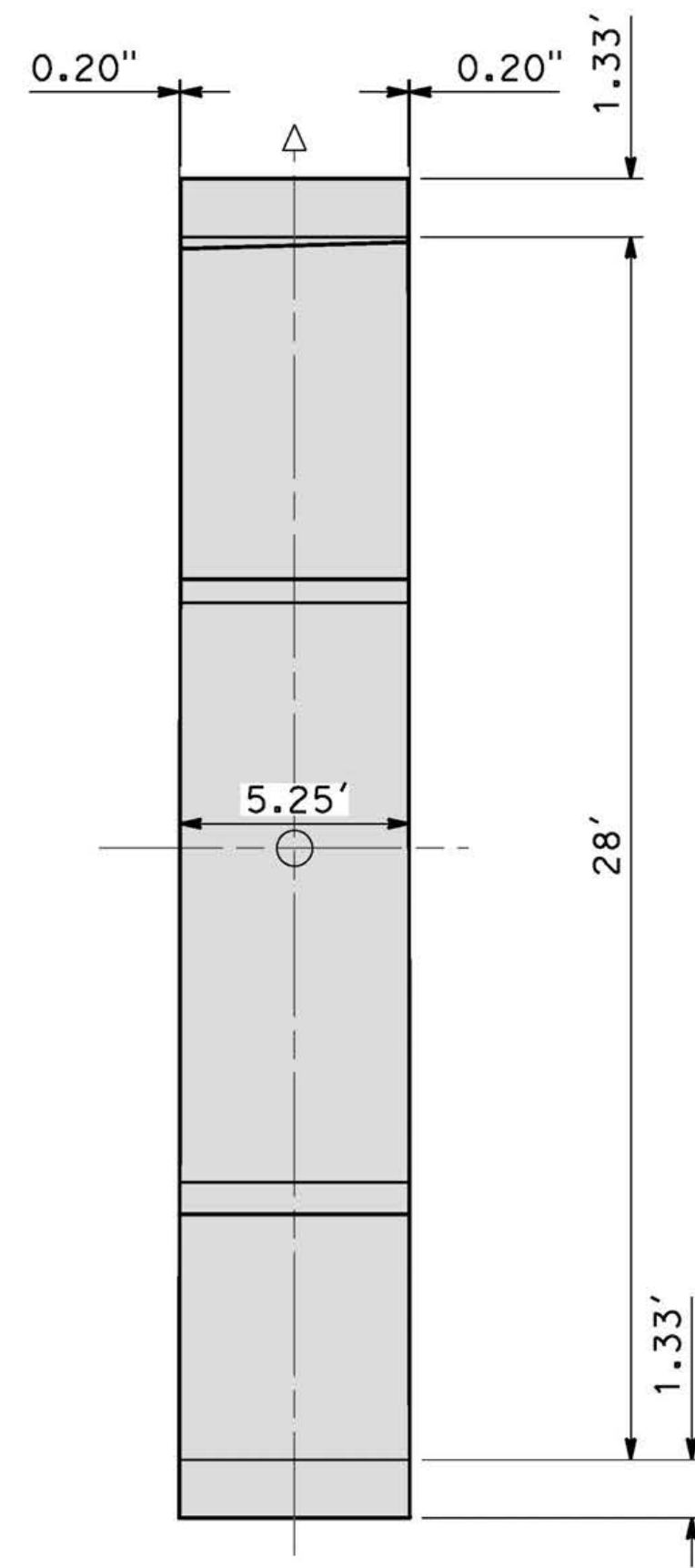
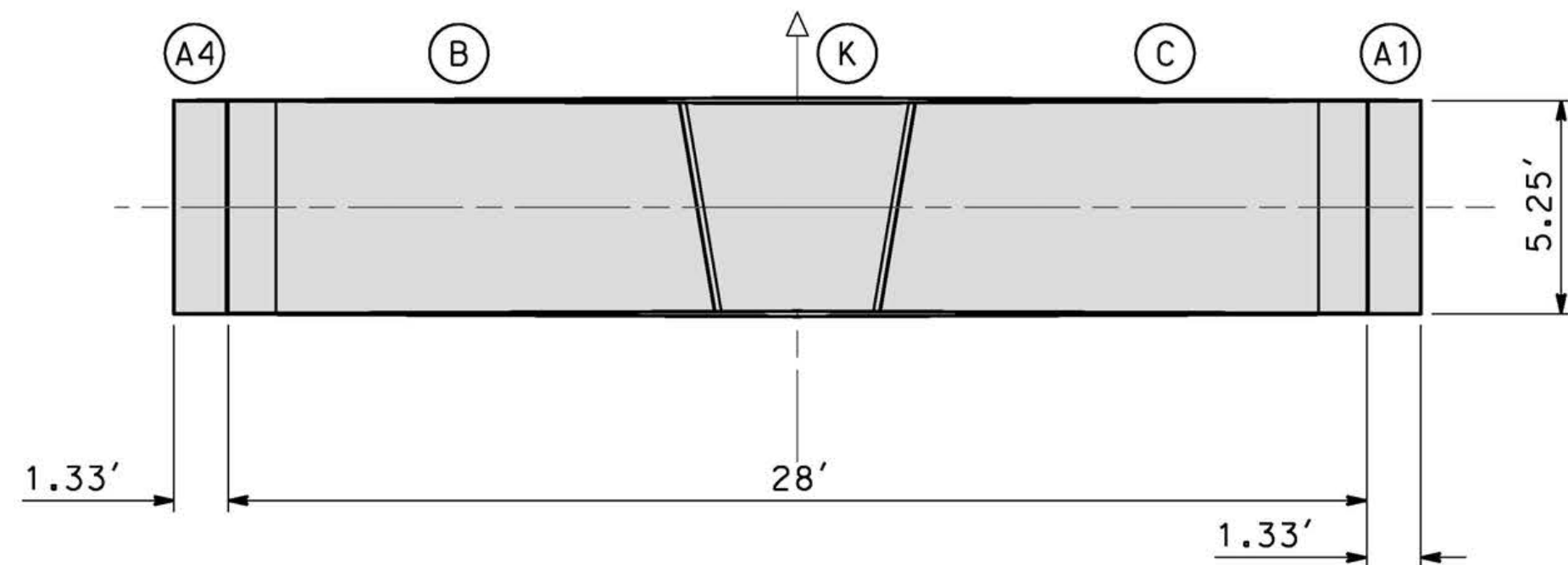
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**TUNNEL TYPE SECTION**



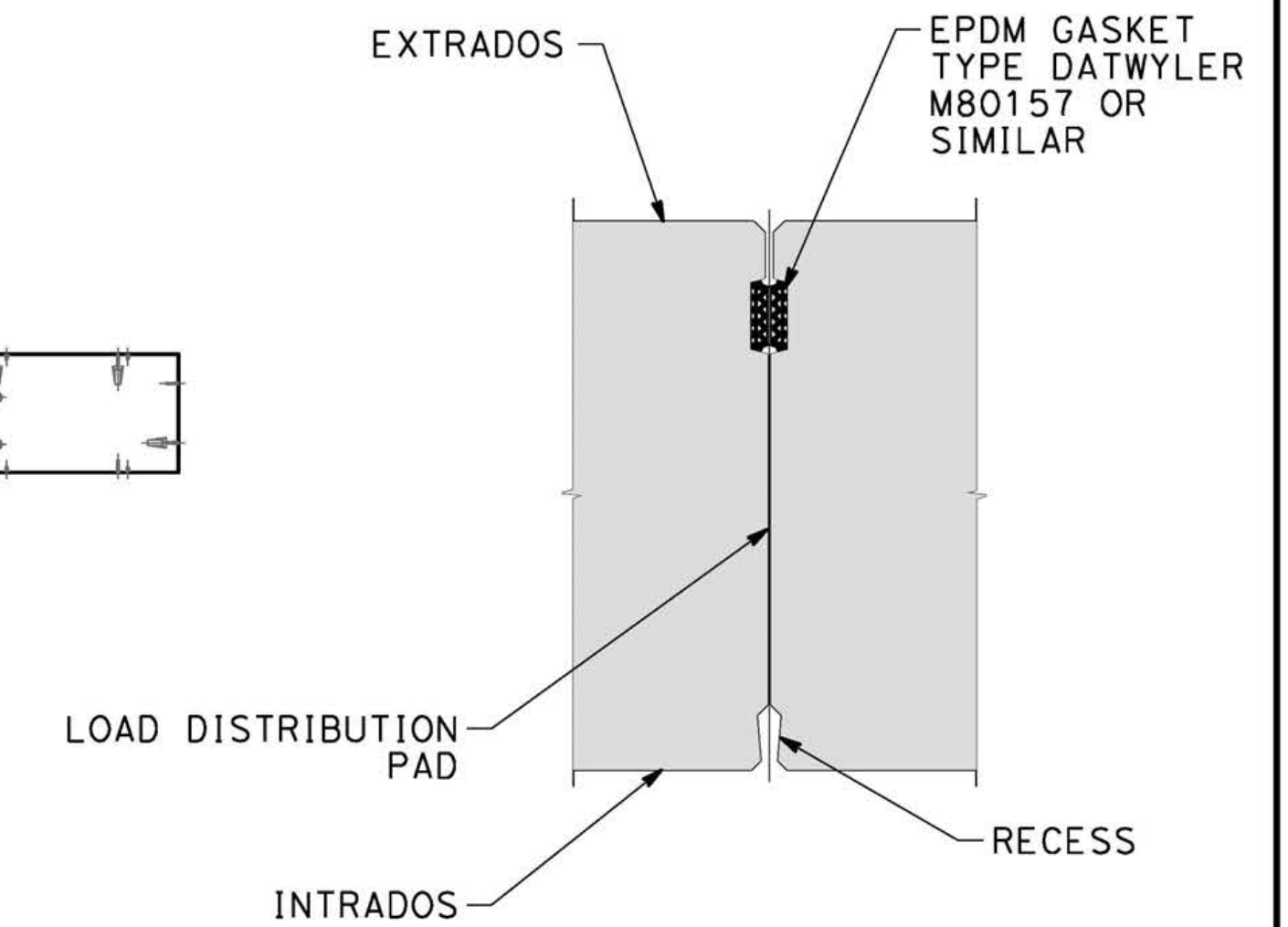
**INTRADOS DEVELOPED VIEW**

**DISCLAIMER:**

THE DESIGN SHOWN IN THIS DRAWING CORRESPONDS TO THE CONCEPTUAL PEPD OF DESIGN AND NEEDS TO BE DEVELOPED FURTHER TO BE VALIR FOR CONSTRUCTION

**NOTES:**

1. THE DESIGN REPRESENTS THE ONE PASS LINING FOR THE TBM TUNNEL WITH WATER PRESSURE BELOW 25 bar (=362.5943 psi).
2. TAPERED UNIVERSAL RING WITH PRE MANUFACTURED SEGMENTS TO BE PLACED BY FOR TBM.
3. THE LINING SEGMENTS SHALL BE EQUIPPED WITH A WATER TIGHT GASKET ABLE TO PREVENT THE ENTRY OF WATER FOR THE MAXIMUM EXPECTED WATER PRESSURE WITH A SAFETY FACTOR OF 2.0.
4. ALL RINGS AND SEGMENTS SHALL BE EQUIPPED WITH BOLTS. BOLTS MAY BE TEMPORARY EXCEPT WHERE PERMANENTLY REQUIRED TO GUARANTEE THE PRECOMPRESSION OF THE GASKETS.
5. LINING SEGMENTS SHALL FURTHER BE EQUIPPED WITH GROUTING INSERTS, GUIDING RODS, PACKERS, DOVELS, IDENTIFICATION MARKS AND ALL OTHER NECESSARY ITEMS TO ACHIEVE A HIGH QUALITY TUNNEL LINING.
6. MINIMUM COMPRESSION STRENGTH OF CONCRETE AT 28 DAYS  $f'c = 8000$  psi
7. THE CONCRETE MIX SHALL BE CHEMICAL RESISTANT AGAINST THE LOCAL GROUND AND GROUNDWATER CONDITIONS.
8. A QUANTITY OF 0.125 pcf OF POLYPROPYLENE MICROFIBERS SHALL BE ADDED TO THE CONCRETE MIX TO REDUCE CONCRETE SPALLING IN CASE OF FIRE.
9. FOR THE PURPOSE OF COST ESTIMATION, THE NECESSARY QUANTITY OF REINFORCEMENT FOR THE LINING SEGMENTS CAN BE ASSUMED AS 8 pcf OF CONVENTIONAL REBAR, GRADE 60. THIS ASSUMPTION NEEDS TO BE VERIFIED DURING THE FINAL DESIGN STAGE.



**DETAIL AT RING JOINT** 1  
SCALE N.T.S.



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
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CONSTRUCTION**



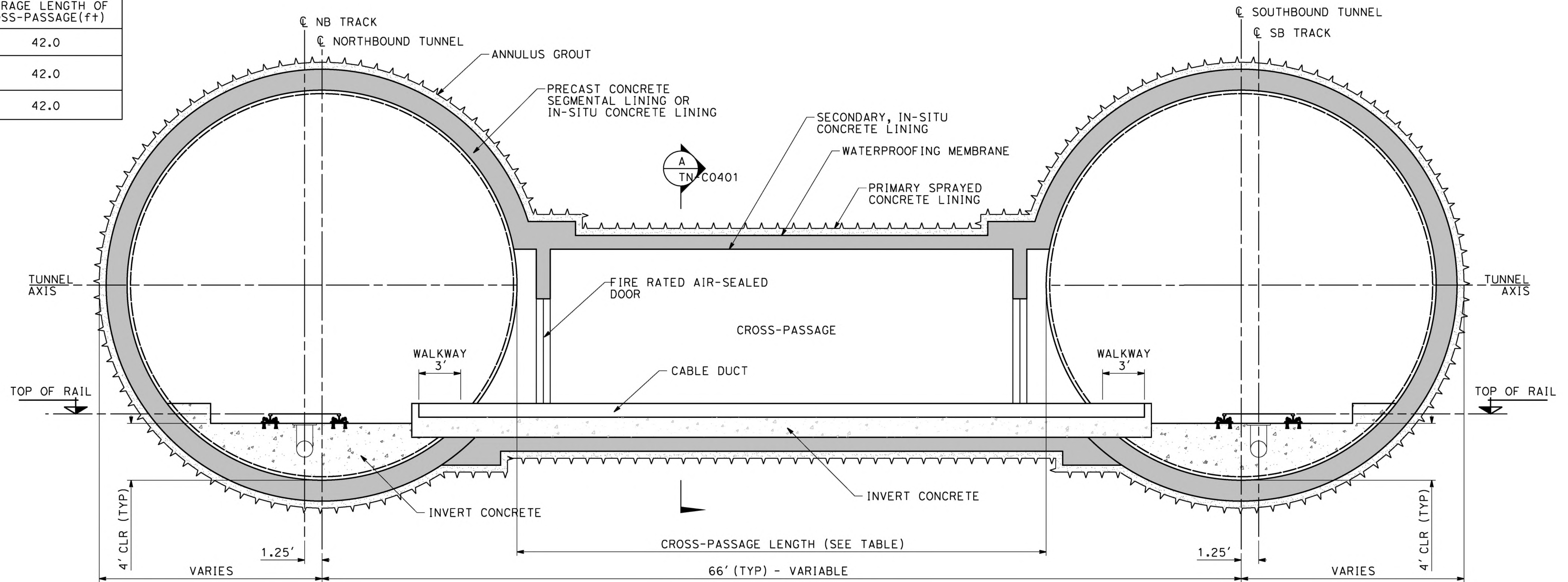
**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

TBM BORED TWIN TUNNELS  
ONE-PASS LINING GEOMETRY

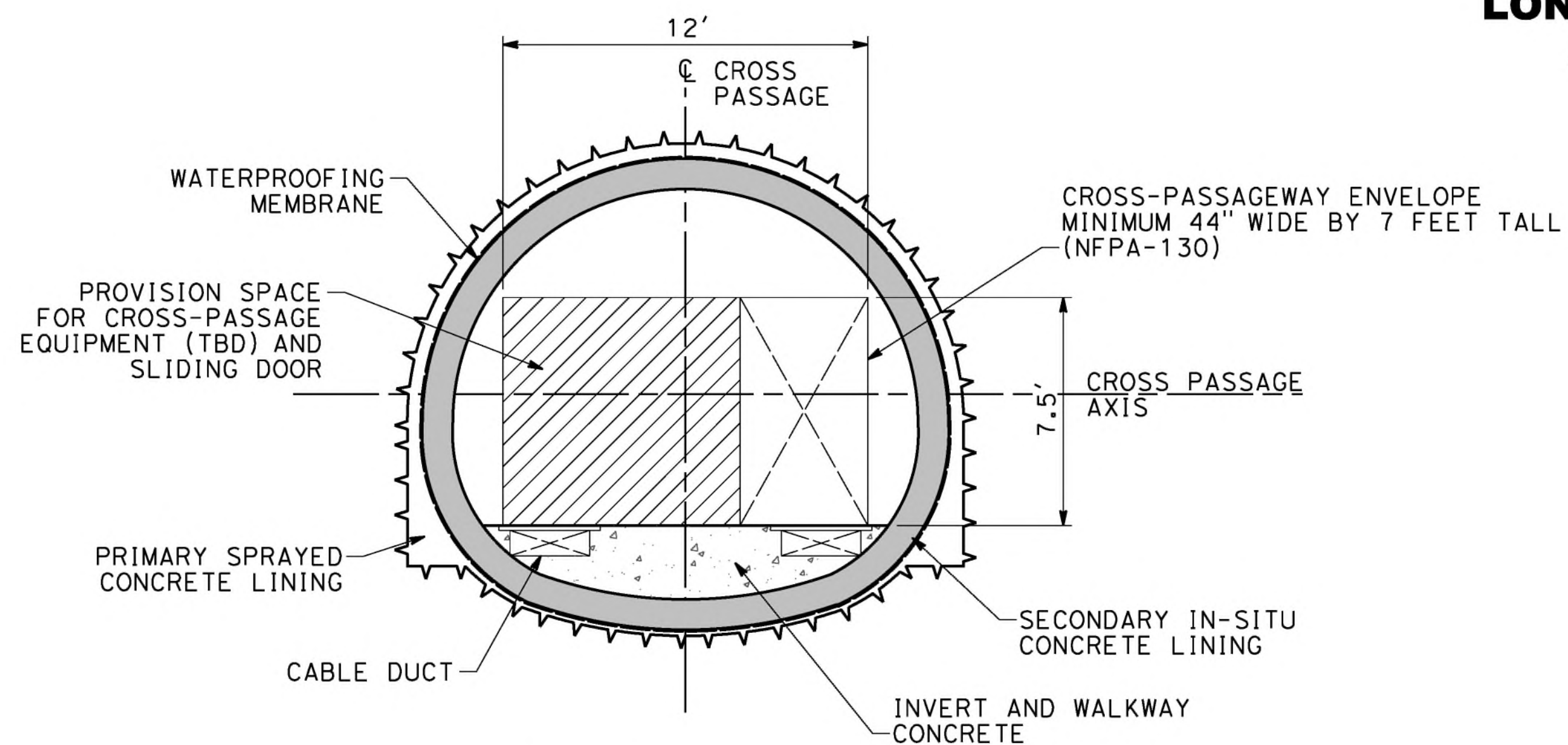
CONTRACT NO.  
HSR14-42  
DRAWING NO.  
TN-C0202  
SCALE  
AS SHOWN  
SHEET NO.



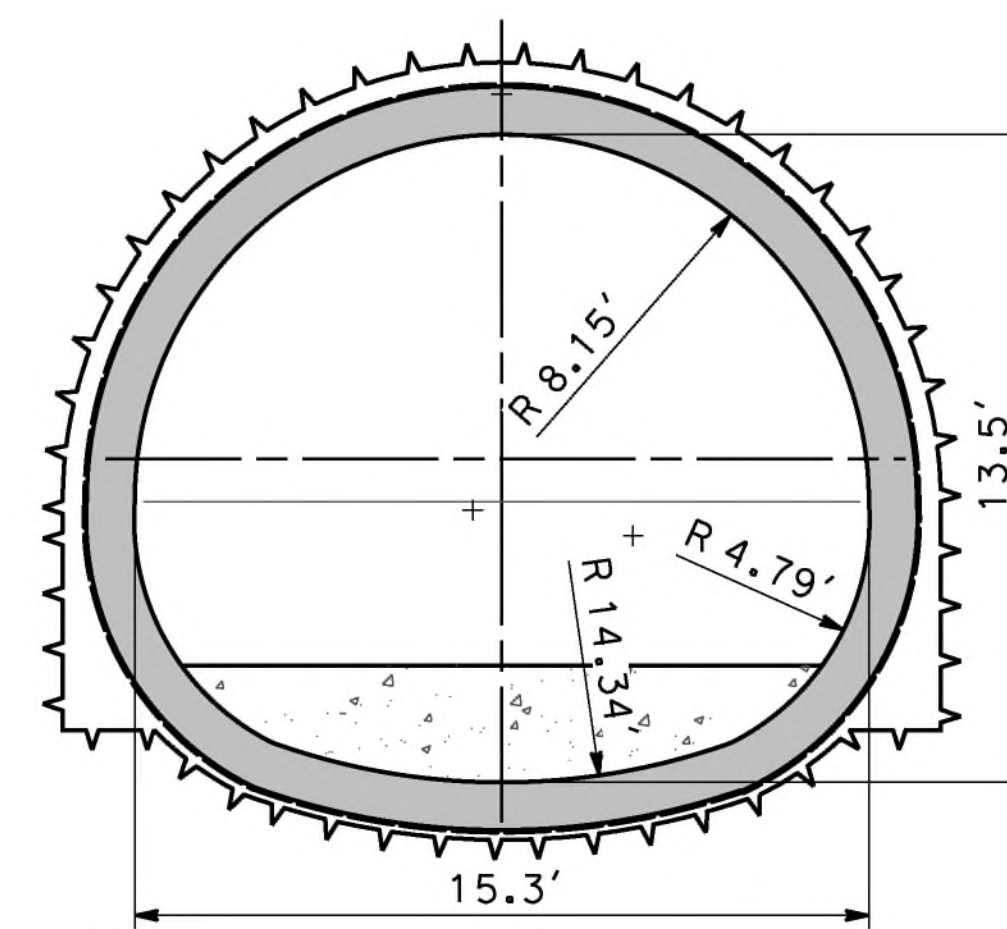
| ALIGNMENT | AVERAGE LENGTH OF CROSS-PASSAGE(ft) |
|-----------|-------------------------------------|
| E1A       | 42.0                                |
| E2A       | 42.0                                |
| SR14A     | 42.0                                |



**LONGITUDINAL SECTION  
CROSS-PASSAGE**



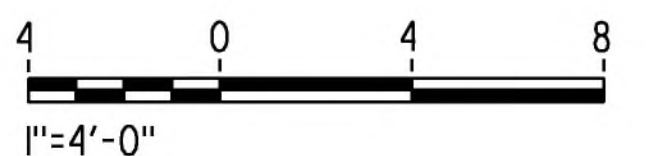
**SECTION A**  
SPACEPROOFING TN-C0401



**SECTION A**  
INNER GEOMETRY TN-C0401

**NOTES:**

- CROSS-PASSAGES FOR EMERGENCY EGRESS SHALL NOT BE FURTHER THAN 800 FT APART. NFPA-130 (6.3.1.6)
- CROSS-PASSAGES FOR EMERGENCY EGRESS SHALL BE A MINIMUM OF 44" IN CLEAR WIDTH AND 7 FT IN HEIGHT NFPA-130 (6.3.2.2)
- CROSS-PASSAGES FOR EMERGENCY EGRESS EQUIPMENT TBD. EQUIPMENT IN CROSS-PASSAGES WILL COMPLY WITH NFPA-130 (6.3.1.7)
  - THE USE OF CROSS-PASSAGES FOR THE INSTALLATION OF NON-COMBUSTIBLE EQUIPMENT IS ALLOWED.
  - INSTALLED EQUIPMENT DOES NOT INTRUDE INTO THE REQUIRED CLEAR WIDTH OF THE CROSS-PASSAGE.
- CROSS-PASSAGES FOR TECHNICAL EQUIPMENT WILL HAVE THE SAME STRUCTURE AND DIMENSIONS BUT WILL BE LOCATED ELSEWHERE IN THE TUNNELS, ONE EVERY MILE APPROXIMATELY.



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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



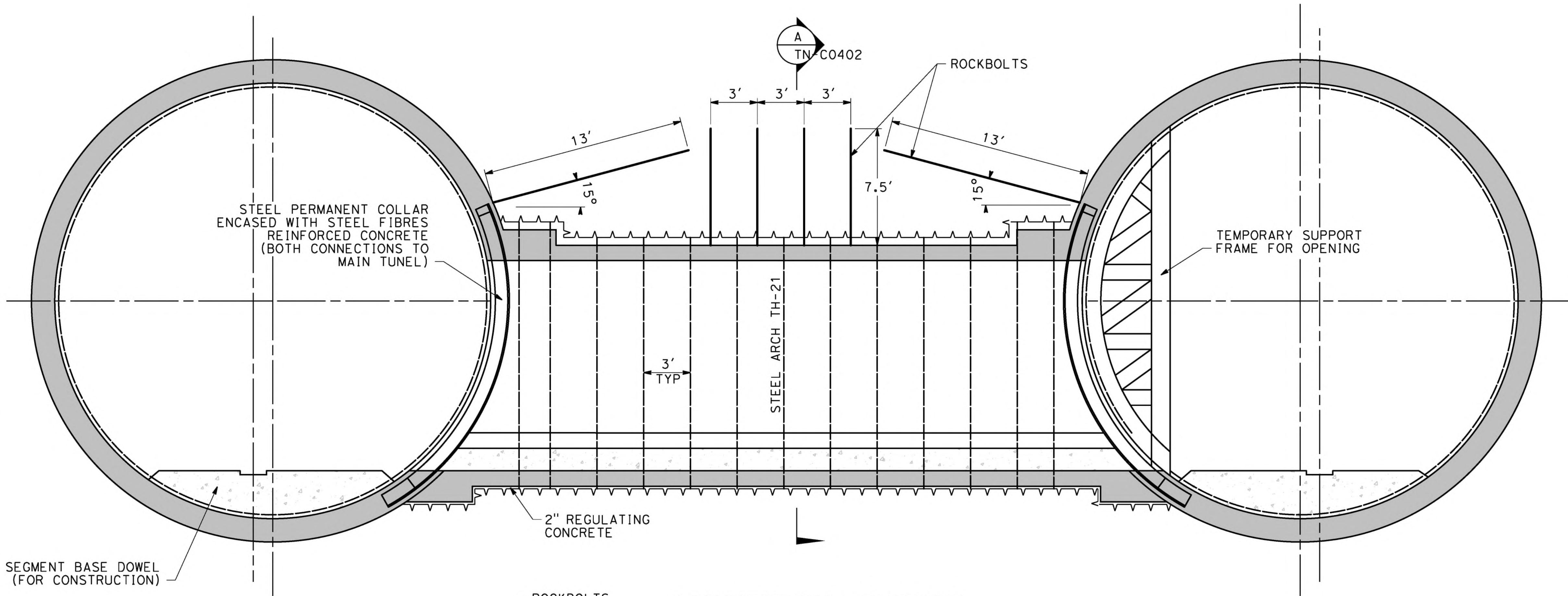
**CALIFORNIA**  
HIGH-SPEED RAIL AUTHORITY

**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
TBM TUNNELS  
TYPICAL CROSS PASSAGEWAY  
FOR EMERGENCY EGRESS OR TECHNICAL ROOMS  
CROSS AND LONGITUDINAL SECTION GEOMETRY

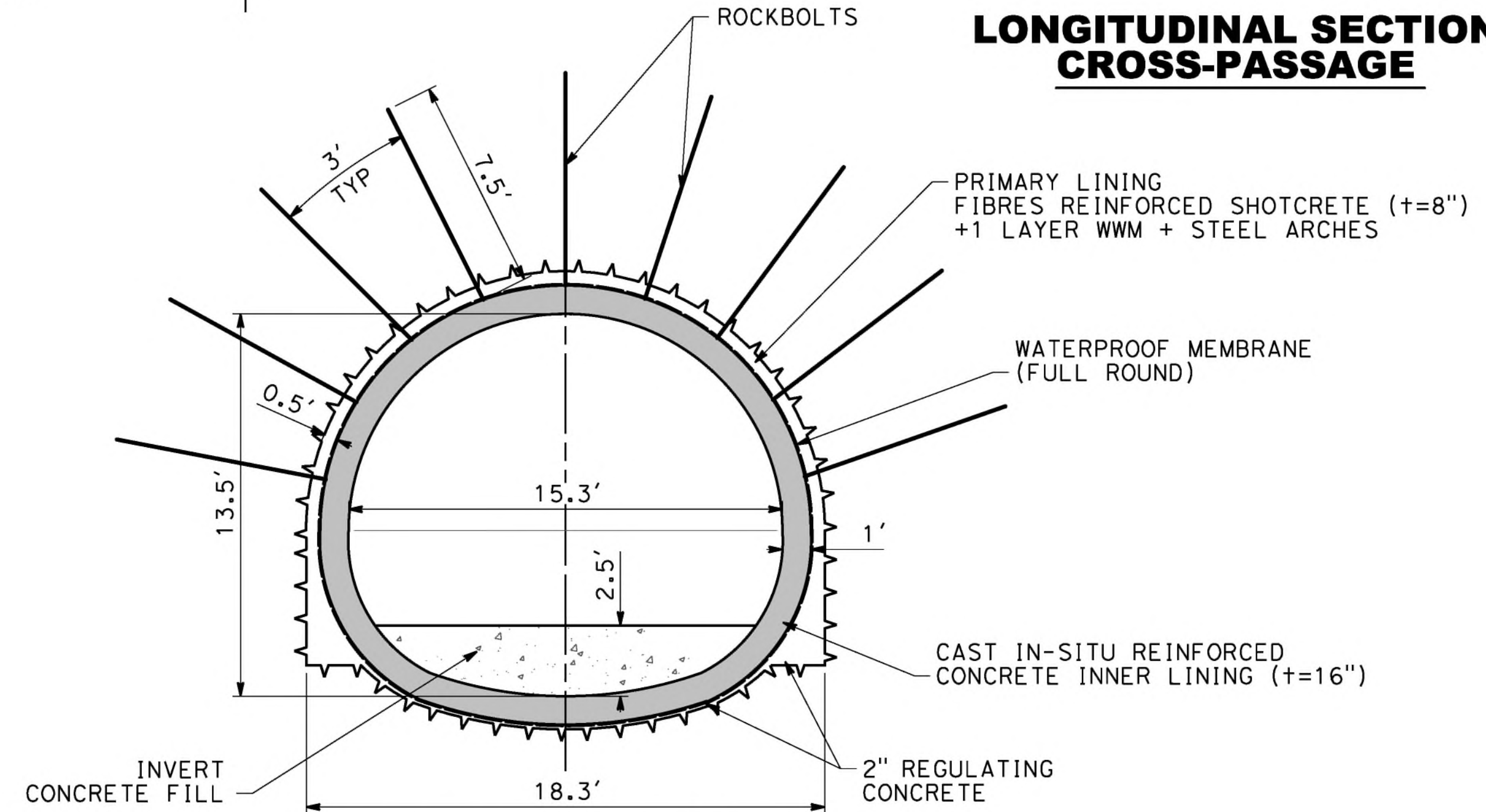
CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0401**  
SCALE  
**AS SHOWN**  
SHEET NO.



**CROSS-PASSAGE  
PRIMARY LINING FOR  
MEDIUM QUALITY ROCK**



**LONGITUDINAL SECTION  
CROSS-PASSAGE**



**SECTION**  
SCALE 1"=4'-0" A TN-C0402

| CROSS PASSAGE  | BASIC QUANTITIES PER FT OF CROSS-PASSEGE |  |
|--|--|--|
|  | PRIMARY LINING TYPE                      |  |
|  | MEDIUM QUALITY ROCK                      |  |
| EXCAVATION AREA (SQ.FT.)                             | 242                                      |  |
| PRIMARY LINING AREA (SQ.FT.)                         | 26                                       |  |
| REGULATING CONCRETE (2 in) (SQ.FT.)                  | 5  |  |
| STEEL ARCH (FT)                                      | 34.5/3=11.5'                             |  |
| WATERPROOFING MEMBRANE (FT)                          | 52                                       |  |
| FORMWORK (FT)  | 30                                       |  |
| SECONDARY LINING AREA CONCRETE (sides&crow) (SQ.FT.) | 32                                       |  |
| SECONDARY LINING (INVERT) (SQ.FT.)                   | 13                                       |  |
| INVERT CONCRETE FILL (SQ.FT.)                        | 25                                       |  |
| ROCKBOLTS (TOTAL LENGTH PER C.P. [FT])               | 655*                                     |  |
| STEEL PERMANENT COLLAR (lbs)                         | 5550lbs (x2)                             |  |

\* FOR A 46FT LONG (AVERAGE) CP

| PRIMARY LINING (EXAMPLE ONLY, NOT ACTUAL DESIGN) |       |                          |               |                       |                     |                                  |               |
|--|-------|--------------------------|---------------|-----------------------|---------------------|----------------------------------|---------------|
| DENOMINATION                                     | RMR   | SHOTCRETE THICKNESS (in) | STEEL ARCHES  | FIBRES & WWM          | ADVANCE LENGTH (ft) | ROCKBOLT PATTERN AND LENGTH (ft) | PIPE UMBRELLA |
| GOOD QUALITY ROCK                                | >50   | 6                        | NO            | FIBRES                | 9' FULL FACE        | 4.5'x4.5' 7.5ft                  | -             |
| MEDIUM QUALITY ROCK                              | 35-50 | 8                        | TH-21 EACH 3' | FIBRES & 1 LAYER WWM  | 6' FULL FACE        | 3x3ft 7.5ft                      | -             |
| POOR QUALITY ROCK E.G. FAULT ZONES               | <35   | 10                       | TH-29 EACH 3' | FIBRES & 2 LAYERS WWM | 3' TOP HEADING      | 3x3ft 7.5ft                      | *             |

\* IN CASE GROUND IS SOIL TYPE, INSTEAD OF ROCKBOLTS

**NOTES:**

1. TYPICAL SUPPORT MEASURES GIVEN WITH ORIENTATIVE PURPOSES ONLY. ACTUAL DESIGN WILL REQUIRE RESULTS OF GEOTECHNICAL INVESTIGATION.
2. SQUEEZING GROUND CONDITIONS UNDER OVERBURDEN OF MORE THAN 300 FT WILL REQUIRE THE STUDY OF DIFFERENT EXCAVATION AND LINING TECHNIQUES IN ORDER TO COPE WITH THE EXTREME CONDITIONS.
3. THIS DRAWING IS NOT ACTUAL DESIGN. ITS ONLY PURPOSE IS TO BUILD UNIT PRICES AT PEPD LEVEL.



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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

TBM TUNNELS  
TYPICAL CROSS PASSAGEWAY  
SUPPORT MEASURES FOR MEDIUM ROCK QUALITY

CONTRACT NO.  
**HSR14-42**

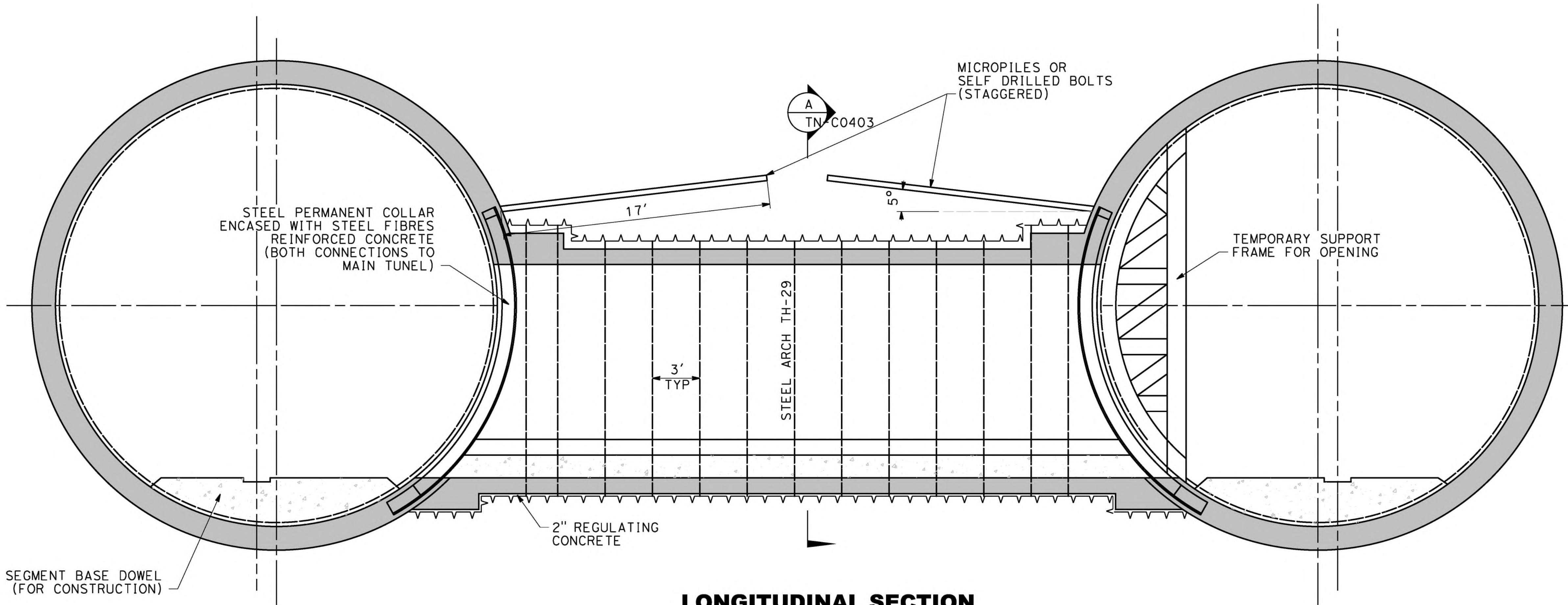
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**TN-C0402**

SCALE  
**AS SHOWN**

SHEET NO.



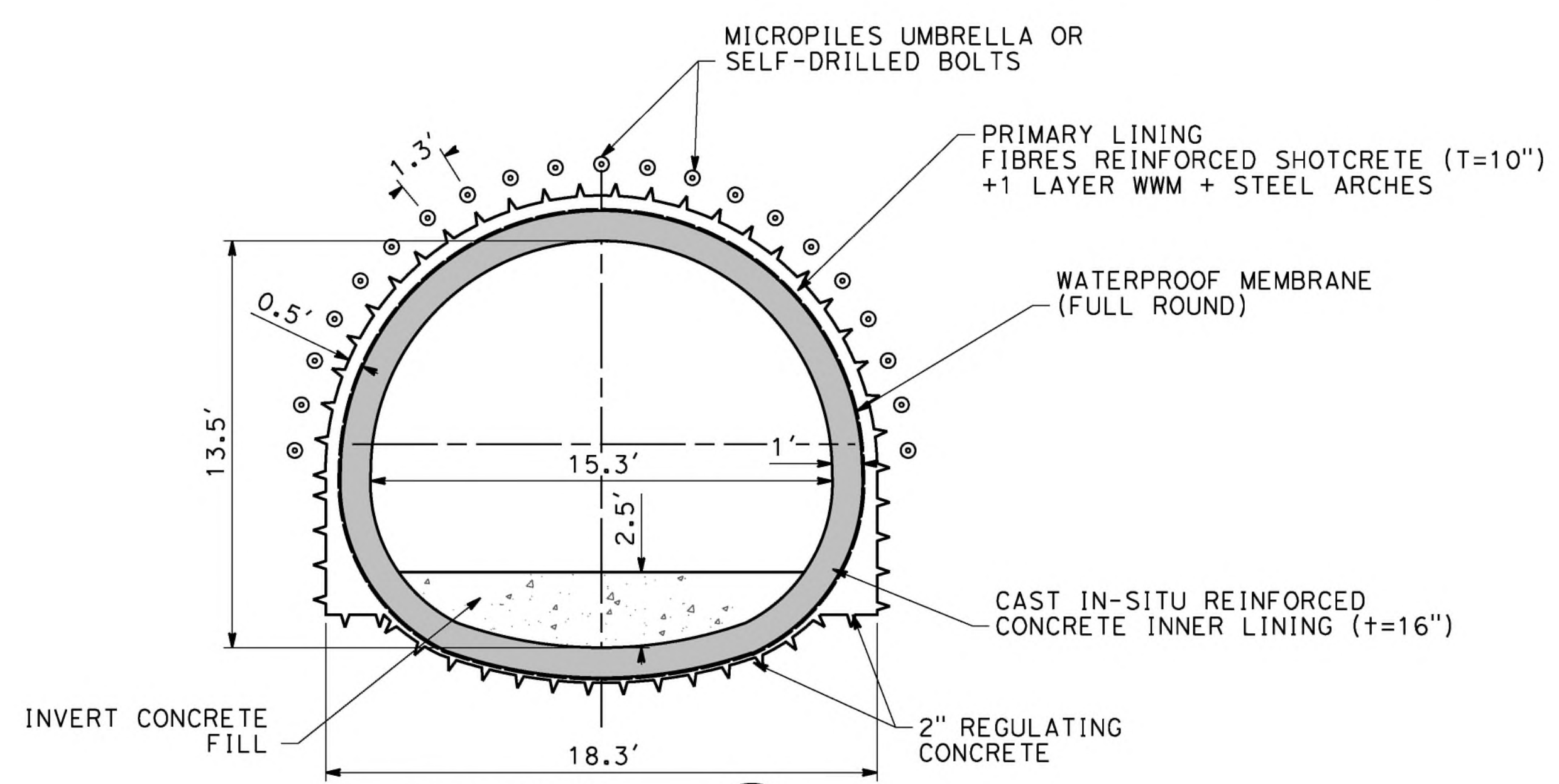
**CROSS-PASSAGE  
PRIMARY LINING FOR  
POOR QUALITY ROCK**



**LONGITUDINAL SECTION  
CROSS-PASSAGE**

| BASIC QUANTITIES PER FT OF CROSS-PASSAGE             |                       |
|--|-----------------------|
| CROSS-PASSAGE  | PRIMARY LINING TYPE   |
|  | III POOR QUALITY ROCK |
| EXCAVATION AREA (SQ.FT.)                             | 242                   |
| PRIMARY LINING AREA (SQ.FT.)                         | 26                    |
| REGULATING CONCRETE (2 in) (SQ.FT.)                  | 5                     |
| STEEL ARCH (FT)                                      | 34.5/3=11.5           |
| WATERPROOFING MEMBRANE (FT)                          | 52                    |
| FORMWORK (FT)  | 30                    |
| SECONDARY LINING AREA CONCRETE (sides&crow) (SQ.FT.) | 32                    |
| SECONDARY LINING (INVERT) (SQ.FT.)                   | 13                    |
| INVERT CONCRETE FILL (SLAB) (SQ.FT.)                 | 25                    |
| MICROPILES (TOTAL LENGTH PER C.P. [FT])              | 924*                  |
| STEEL PERMANENT COLLAR (lbs)                         | 5550lbs(x2)           |

\*FOR A 46FT LONG (AVERAGE) CP

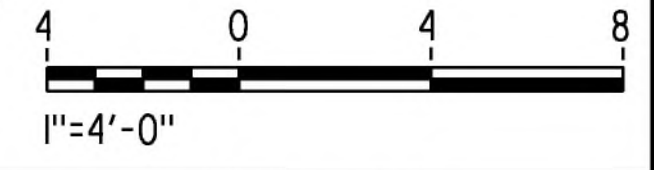


**SECTION**  
SCALE 1"=4'-0" A TN-C0403

| PRIMARY LINING (EXAMPLE ONLY, NOT ACTUAL DESIGN) |       |                          |               |                       |                     |                                  |               |
|--|-------|--------------------------|---------------|-----------------------|---------------------|----------------------------------|---------------|
| DENOMINATION                                     | RMR   | SHOTCRETE THICKNESS (in) | STEEL ARCHES  | FIBRES & WWM          | ADVANCE LENGTH (ft) | ROCKBOLT PATTERN AND LENGTH (ft) | PIPE UMBRELLA |
| GOOD QUALITY ROCK                                | >50   | 6                        | NO            | FIBRES                | 9' FULL FACE        | 4.5'x4.5' 7.5ft                  | -             |
| MEDIUM QUALITY ROCK                              | 35-50 | 8                        | TH-21 EACH 3' | FIBRES & 1 LAYER WWM  | 6' FULL FACE        | 3x4.5/3x3ft 7.5ft                | -             |
| POOR QUALITY ROCK E.G. FAULT ZONES               | <35   | 10                       | TH-29 EACH 3' | FIBRES & 2 LAYERS WWM | 3' TOP HEADING      | 3x3ft 7.5ft                      | YES           |

**NOTES:**

1. TYPICAL SUPPORT MEASURES GIVEN WITH ORIENTATIVE PURPOSES ONLY. ACTUAL DESIGN WILL REQUIRE RESULTS OF GEOTECHNICAL INVESTIGATION.
2. SQUEEZING GROUND CONDITIONS UNDER OVERBURDEN OF MORE THAN 300 FT WILL REQUIRE THE STUDY OF DIFFERENT EXCAVATION AND LINING TECHNIQUES IN ORDER TO COPE WITH THE EXTREME CONDITIONS.
3. EXCAVATION COULD BE DIVIDED IN TOP HEADING AND BENCH IF GEOTECHNICAL CONDITIONS ARE WORSE THAN EXPECTED. FINAL DESIGN WILL BE PROVIDED ONCE THE GEOTECHNICAL INFORMATION IS COMPLETE.
4. THIS DRAWING IS NOT ACTUAL DESIGN. ITS ONLY PURPOSE IS TO BUILD UNIT PRICES AT PEPD LEVEL.
5. SHOTCRETE AND/OR FIBER GLASS BOLTS MIGHT BE REQUIRED TO ENSURE FACE STABILITY IN SOME AREAS. A FURTHER STUDY OF FACE STABILITY MUST BE CARRIED OUT IN DETAILED DESIGN.



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
TBM TUNNELS  
TYPICAL CROSS PASSAGEWAY  
SUPPORT MEASURES FOR POOR ROCK QUALITY

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0403**  
SCALE  
**AS SHOWN**  
SHEET NO.



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**CROSS PASSAGES ALIGNMENT E1A:**

| CROSS-PASSAGE | STATION   |
|---------------|-----------|
| CP 01A        | 468+00.00 |
| CP 02A        | 476+00.00 |
| CP 03A        | 484+00.00 |
| CP 04A        | 492+00.00 |
| CP 05A        | 500+00.00 |
| CP 06A        | 508+00.00 |
| CP 07A        | 516+00.00 |
| CP 08A        | 524+00.00 |
| CP 09A        | 532+00.00 |
| CP 10A        | 540+00.00 |
| CP 11A        | 548+00.00 |

**CROSS PASSAGES ALIGNMENT E2A:**

| CROSS-PASSAGE | STATION   |
|---------------|-----------|
| CP 01A        | 468+00.00 |
| CP 02A        | 476+00.00 |
| CP 03A        | 484+00.00 |
| CP 04A        | 492+00.00 |
| CP 05A        | 500+00.00 |
| CP 06A        | 508+00.00 |
| CP 07A        | 516+00.00 |
| CP 08A        | 524+00.00 |
| CP 09A        | 532+00.00 |
| CP 10A        | 540+00.00 |
| CP 11A        | 548+00.00 |

**CROSS PASSAGES ALIGNMENT SR14A:**

| CROSS-PASSAGE | STATION   |
|---------------|-----------|
| CP 01A        | 478+00.00 |
| CP 02A        | 486+00.00 |
| CP 03A        | 494+00.00 |
| CP 04A        | 502+00.00 |
| CP 05A        | 510+00.00 |
| CP 06A        | 518+00.00 |
| CP 07A        | 526+00.00 |
| CP 08A        | 534+00.00 |
| CP 09A        | 542+00.00 |
| CP 10A        | 550+00.00 |
| CP 11A        | 558+00.00 |
| CP 12A        | 566+00.00 |
| CP 13A        | 574+00.00 |
| CP 14A        | 582+00.00 |
| CP 15A        | 590+00.00 |
| CP 16A        | 598+00.00 |
| CP 17A        | 606+00.00 |
| CP 18A        | 614+00.00 |
| CP 19A        | 622+00.00 |
| CP 20A        | 630+00.00 |
| CP 21A        | 638+00.00 |
| CP 22A        | 646+00.00 |
| CP 23A        | 654+00.00 |
| CP 24A        | 662+00.00 |
| CP 25A        | 670+00.00 |
| CP 26A        | 678+00.00 |
| CP 27A        | 686+00.00 |
| CP 28A        | 694+00.00 |
| CP 29A        | 702+00.00 |
| CP 30A        | 710+00.00 |
| CP 31A        | 718+00.00 |
| CP 32A        | 726+00.00 |
| CP 33A        | 734+00.00 |
| CP 34A        | 742+00.00 |
| CP 35A        | 750+00.00 |
| CP 36A        | 758+00.00 |
| CP 37A        | 766+00.00 |
| CP 38A        | 774+00.00 |
| CP 39A        | 782+00.00 |
| CP 40A        | 790+00.00 |
| CP 41A        | 798+00.00 |
| CP 42A        | 806+00.00 |
| CP 43A        | 814+00.00 |
| CP 44A        | 822+00.00 |
| CP 45A        | 830+00.00 |
| CP 46A        | 838+00.00 |

**CROSS PASSAGES ALIGNMENT SR14A:**

| CROSS-PASSAGE | STATION    |
|---------------|------------|
| CP 47A        | 846+00.00  |
| CP 48A        | 854+00.00  |
| CP 49A        | 862+00.00  |
| CP 50A        | 870+00.00  |
| CP 51A        | 878+00.00  |
| CP 52A        | 886+00.00  |
| CP 53A        | 894+00.00  |
| CP 54A        | 902+00.00  |
| CP 55A        | 910+00.00  |
| CP 56A        | 918+00.00  |
| CP 57A        | 926+00.00  |
| CP 58A        | 934+00.00  |
| CP 60A        | 942+00.00  |
| CP 60A        | 950+00.00  |
| CP 61A        | 958+00.00  |
| CP 62A        | 966+00.00  |
| CP 63A        | 974+00.00  |
| CP 64A        | 990+00.00  |
| CP 65A        | 998+00.00  |
| CP 66A        | 1006+00.00 |
| CP 67A        | 1014+00.00 |
| CP 68A        | 1022+00.00 |
| CP 69A        | 1030+00.00 |
| CP 70A        | 1038+00.00 |
| CP 71A        | 1046+00.00 |
| CP 72A        | 1054+00.00 |
| CP 73A        | 1062+00.00 |
| CP 74A        | 1070+00.00 |
| CP 75A        | 1078+00.00 |
| CP 76A        | 1086+00.00 |
| CP 77A        | 1094+00.00 |
| CP 78A        | 1102+00.00 |
| CP 79A        | 1110+00.00 |
| CP 80A        | 1118+00.00 |
| CP 81A        | 1126+00.00 |
| CP 82A        | 1134+00.00 |
| CP 83A        | 1142+00.00 |
| CP 84A        | 1150+00.00 |
| CP 85A        | 1158+00.00 |
| CP 86A        | 1166+00.00 |
| CP 87A        | 1241+50.00 |
| CP 88A        | 1249+50.00 |
| CP 89A        | 1257+50.00 |
| CP 90A        | 1265+50.00 |
| CP 91A        | 1273+50.00 |
| CP 92A        | 1281+50.00 |

**TECHNICAL ROOMS E1A:**

| POWER STATION | STATION   |
|---------------|-----------|
| TR 01A        | 507+00.00 |

**TECHNICAL ROOMS E2A:**

| POWER STATION | STATION   |
|---------------|-----------|
| TR 01A        | 507+00.00 |

**UNDERGROUND TRACTION POWER STATIONS SR14A:**

| POWER STATION | STATION   |
|---------------|-----------|
| PS 2          | 700+00.00 |
| PS 3          | 940+00.00 |

**TECHNICAL ROOMS SR14A:**

| POWER STATION | STATION     |
|---------------|-------------|
| TR 01A        | 540+00.00   |
| TR 02A        | 575+60.00   |
| TR 03A        | 628+40.00   |
| TR 04A        | 681+20.00   |
| TR 05A        | 733+00.00   |
| TR 06A        | 785+80.00   |
| TR 07A        | 820+00.00   |
| TR 08A        | 891+40.00   |
| TR 09A        | 944+20.00   |
| TR 10A        | 997+00.00   |
| TR 11A        | 1049+80.00  |
| TR 12A        | 1102+60.00  |
| TR 13A        | 1259+90.000 |

**NOTES:**

- CROSS-PASSAGES FOR EMERGENCY EGRESS SHALL NOT BE FARTHER THAN 800FT APART. NFPA-130 (6.3.1.6)
- TECHNICAL ROOMS EVERY MILE.

| REV | DATE | BY | CHK | APP | DESCRIPTION |
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|                                  |
|----------------------------------|
| DESIGNED BY<br><b>E.VELASCO</b>  |
| DRAWN BY<br><b>F.J.DOMINGUEZ</b> |
| CHECKED BY<br><b>C.RECHEA</b>    |
| IN CHARGE<br><b>A.RELAÑO</b>     |
| DATE<br><b>02/26/2021</b>        |

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

LIST OF EMERGENCY EGRESS CROSS-PASSAGES AND EXITS,  
TECHNICAL ROOMS AND  
UNDERGROUND TRACTION POWER FACILITIES

|                          |
|--------------------------|
| CONTRACT NO.<br>HSR14-42 |
| DRAWING NO.<br>TN-C0410  |
| SCALE<br>NO SCALE        |
| SHEET NO.                |



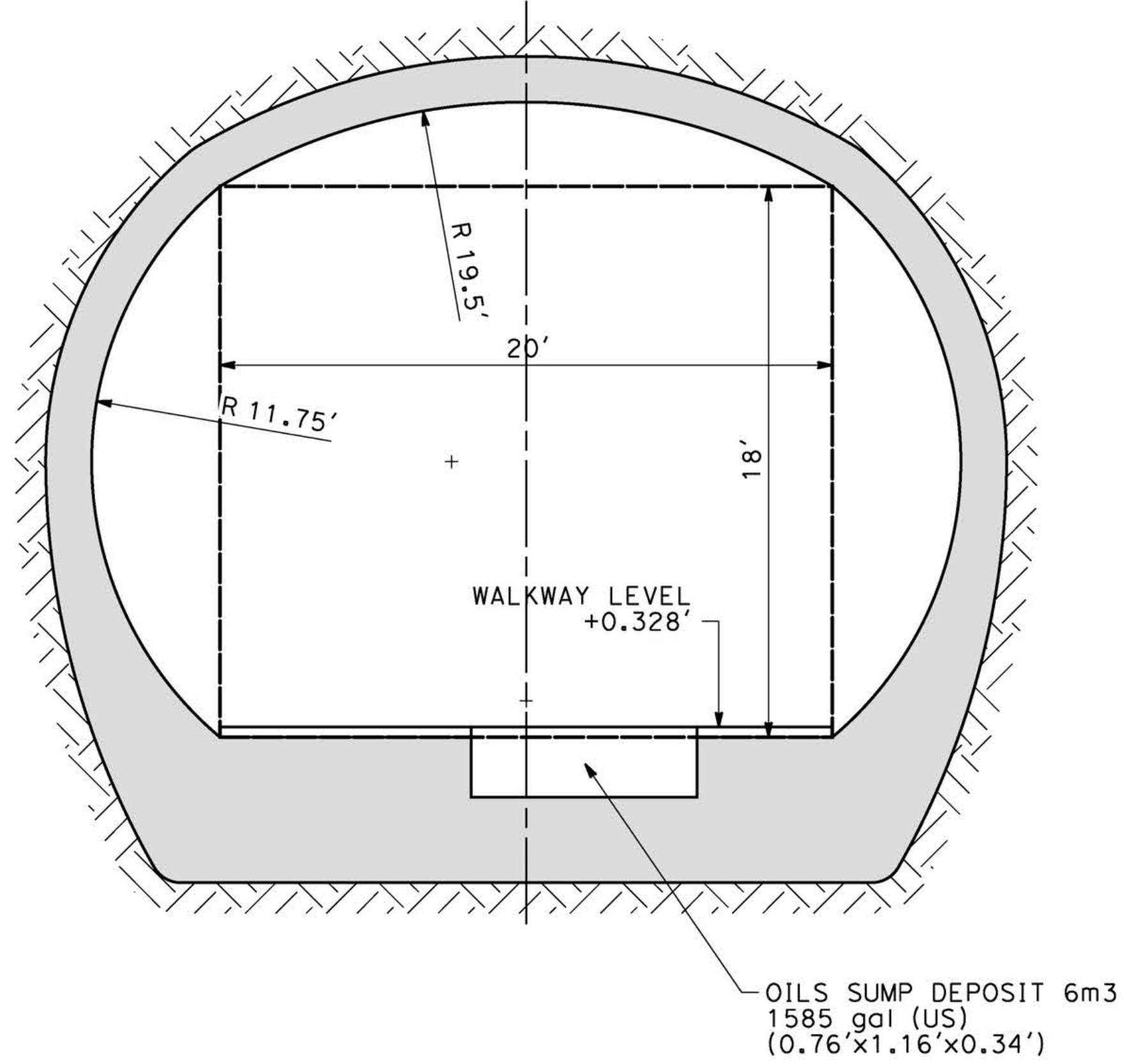
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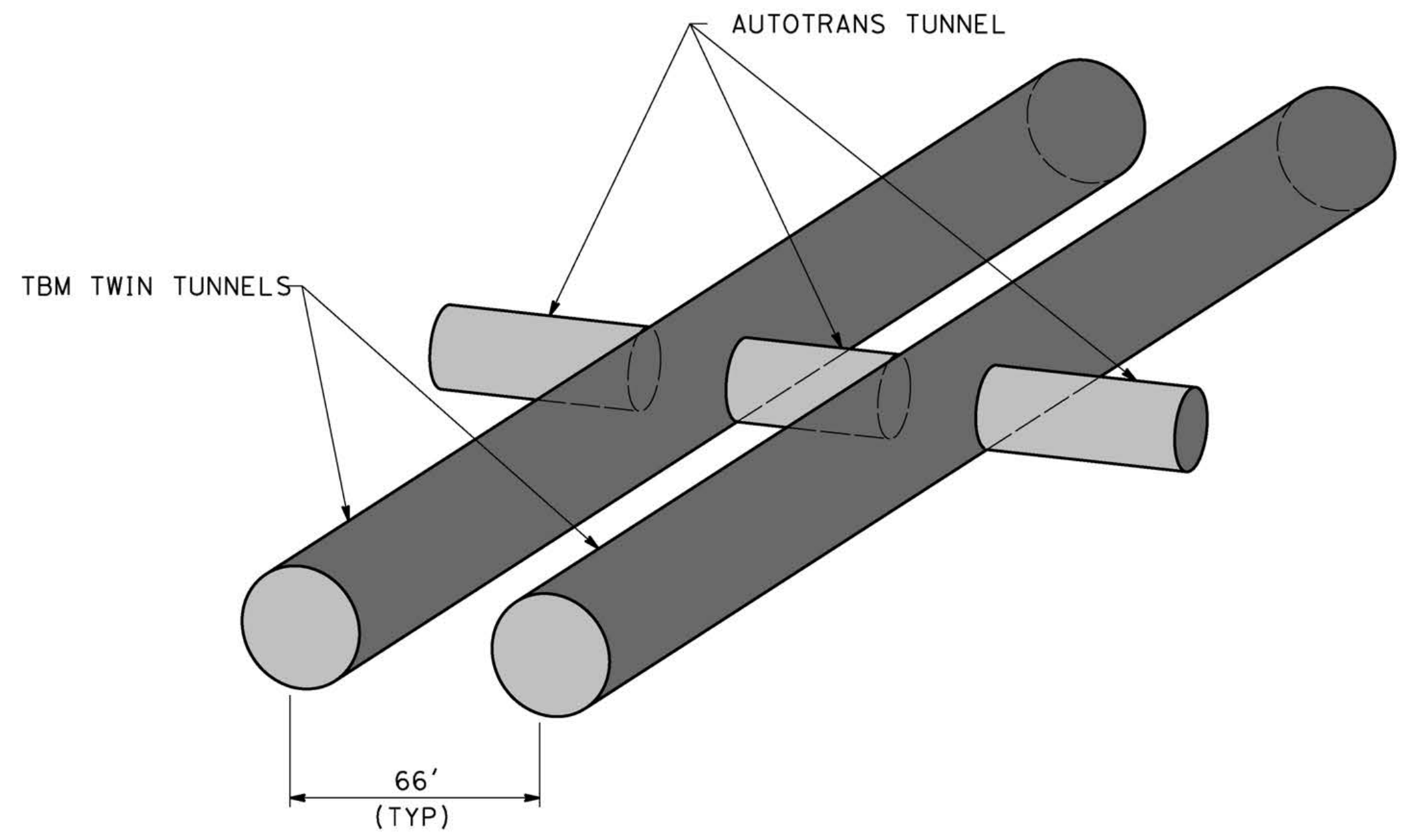
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**NOTES:**

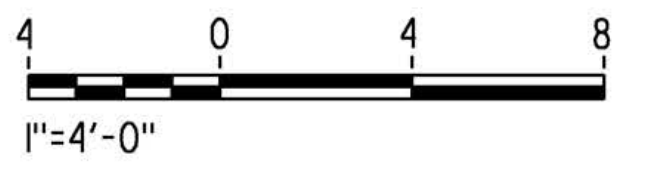
1. CONSTRUCTION PROCEDURES AND SUPPORT MEASURES SIMILAR TO CROSS-PASSAGES (TN-C0402, TN-C0403)
2. DRAWINGS TN-C0500 AND TN-C0501 ARE INTENDED TO FOR SPACE PROOFING ONLY.
3. THE DESIGN OF THE STRUCTURE REQUIRES RESULTS OF GEOTECHNICAL INVESTIGATION



**SECTION B**  
SCALE 1"=4'  
TN-C0500



**GUIDANCE VIEW DETAIL**  
SCALE N.T.S.



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



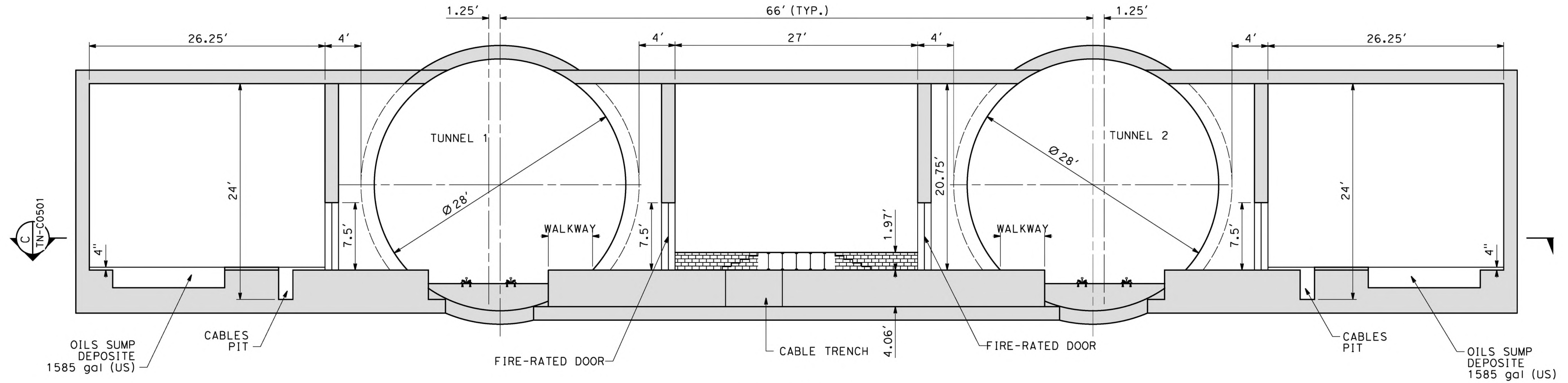
**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
  
UNDERGROUND TRACTION POWER PARALLELING STATION (PS)  
TYPICAL GEOMETRY (1 OF 2)

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0500**  
SCALE  
**AS SHOWN**  
SHEET NO.

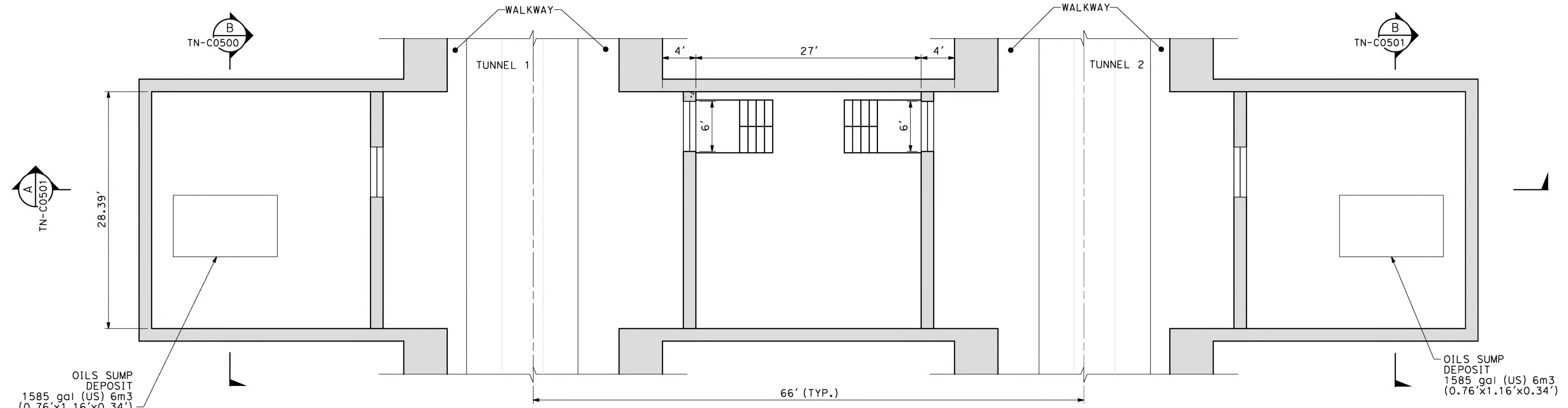


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**SECTION A**  
SCALE 1"=6' TN-C0501



**PLAN PARALLELING STATION C**  
SCALE 1"=6' TN-C0501



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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

UNDERGROUND PARALLELING STATION (PS)  
TYPICAL GEOMETRY (2 of 2)

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-C0501**

SCALE  
**AS SHOWN**

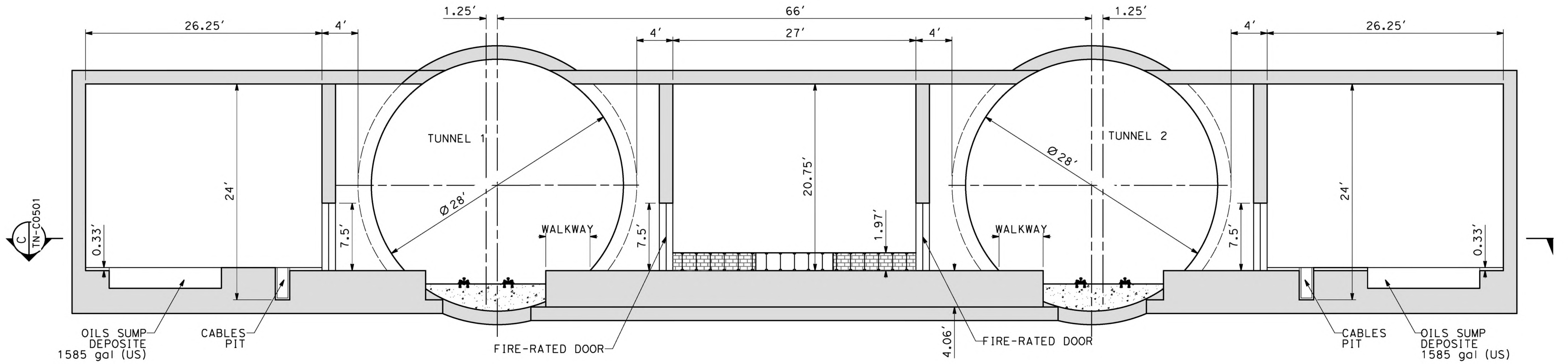
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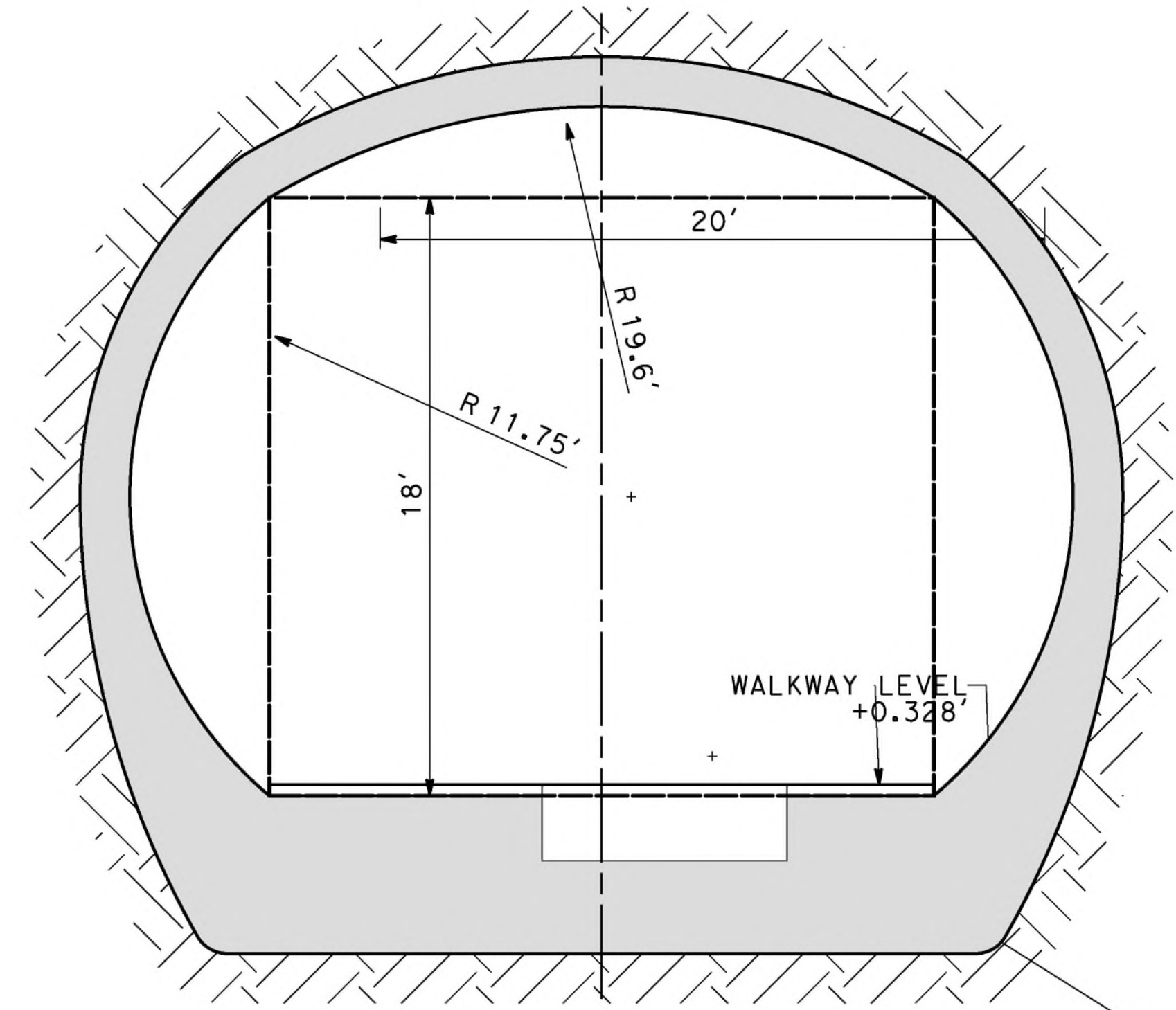
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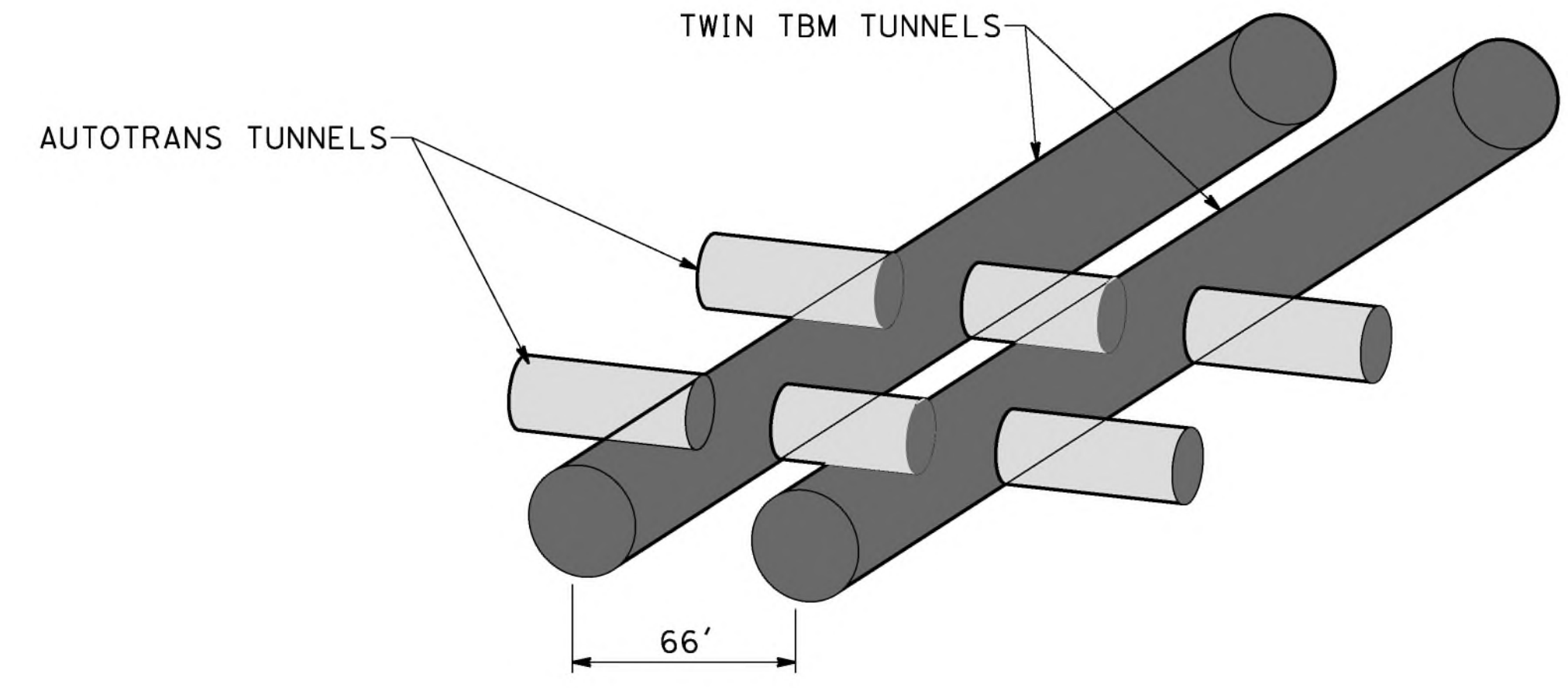
**SECTION A**  
SCALE 1"=6'

- NOTES:**
1. CONSTRUCTION PROCEDURES AND SUPPORT MEASURES SIMILAR TO CROSS PASSAGES (TN-C0402, TN-C0403)
  2. DRAWINGS TN-C0502 AND TN-C0503 ARE INTENDED FOR SPACEPROOFING ONLY.
  3. THE DESIGN OF THE STRUCTURE WILL REQUIRE RESULTS OF GEOTECHNICAL INVESTIGATION.

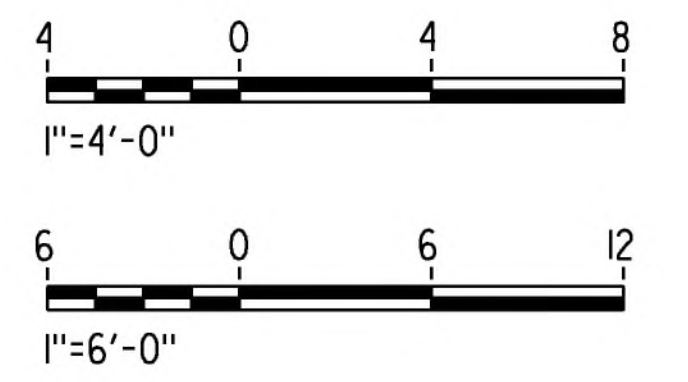


**SECTION B**  
SCALE 1"=4'

OILS SUMP DEPOSIT 6m3  
1585 gal (US)  
(0.76'x1.16'x0.34')



**GUIDANCE VIEW DETAIL**  
SCALE N.T.S.



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DESIGNED BY  
**E. VELASCO**  
DRAWN BY  
**F.J. DOMINGUEZ**  
CHECKED BY  
**C. RECHEA**  
IN CHARGE  
**A. RELANO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

UNDERGROUND SWITCHING STATION (SWS)  
TYPICAL GEOMETRY (1 of 2)  
ELEVATION CROSS-SECTION

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-C0502**

SCALE  
**AS SHOWN**

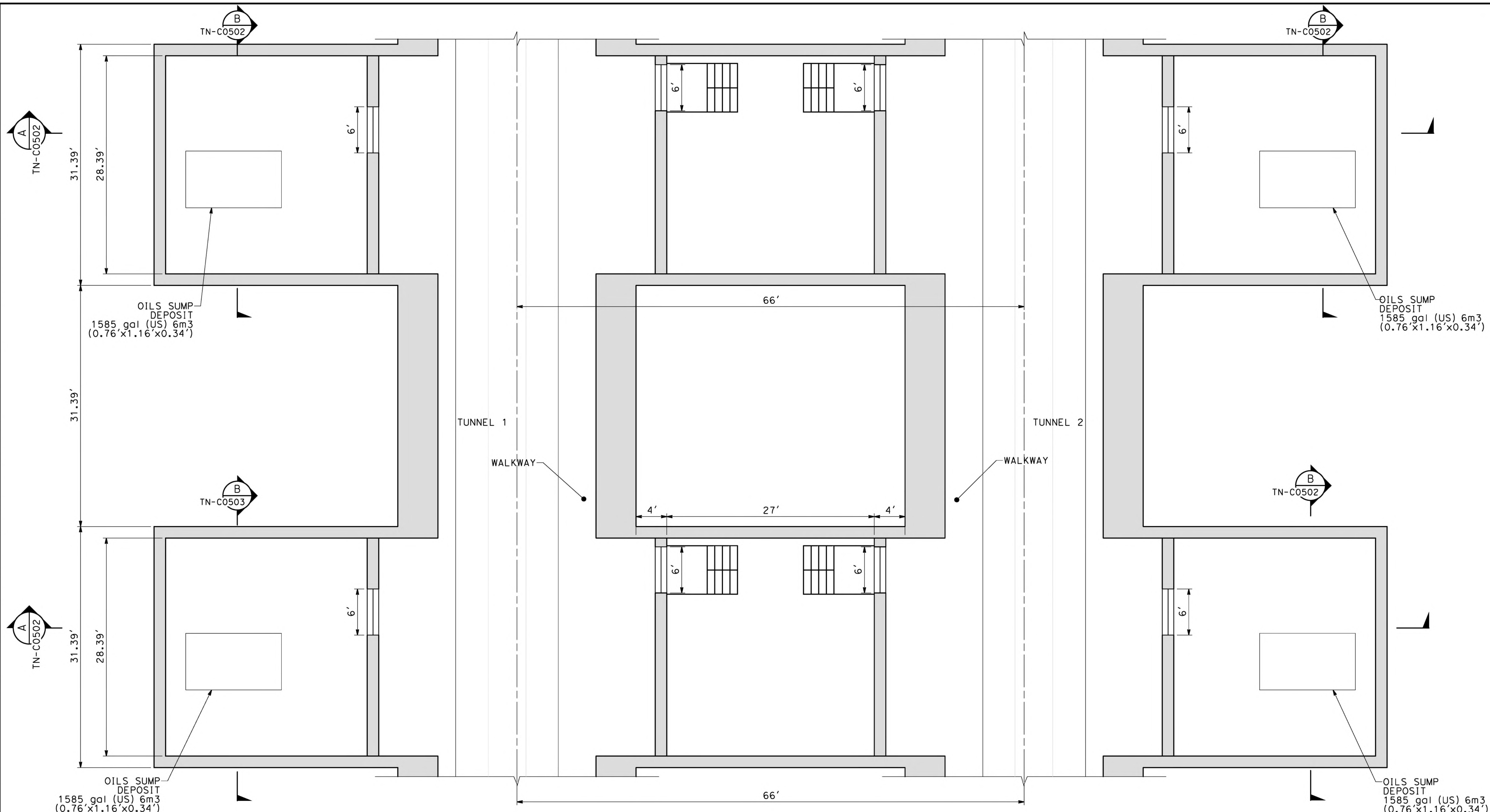
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**PLAN SWITCHING STATION**  
SCALE 1"=6'



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**

**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**

UNDERGROUND SWITCHING STATION (SWS)  
TYPICAL GEOMETRY (2 of 2)  
PLAN

CONTRACT NO.  
**HSR14-42**

DRAWING NO.  
**TN-C0503**

SCALE  
**AS SHOWN**

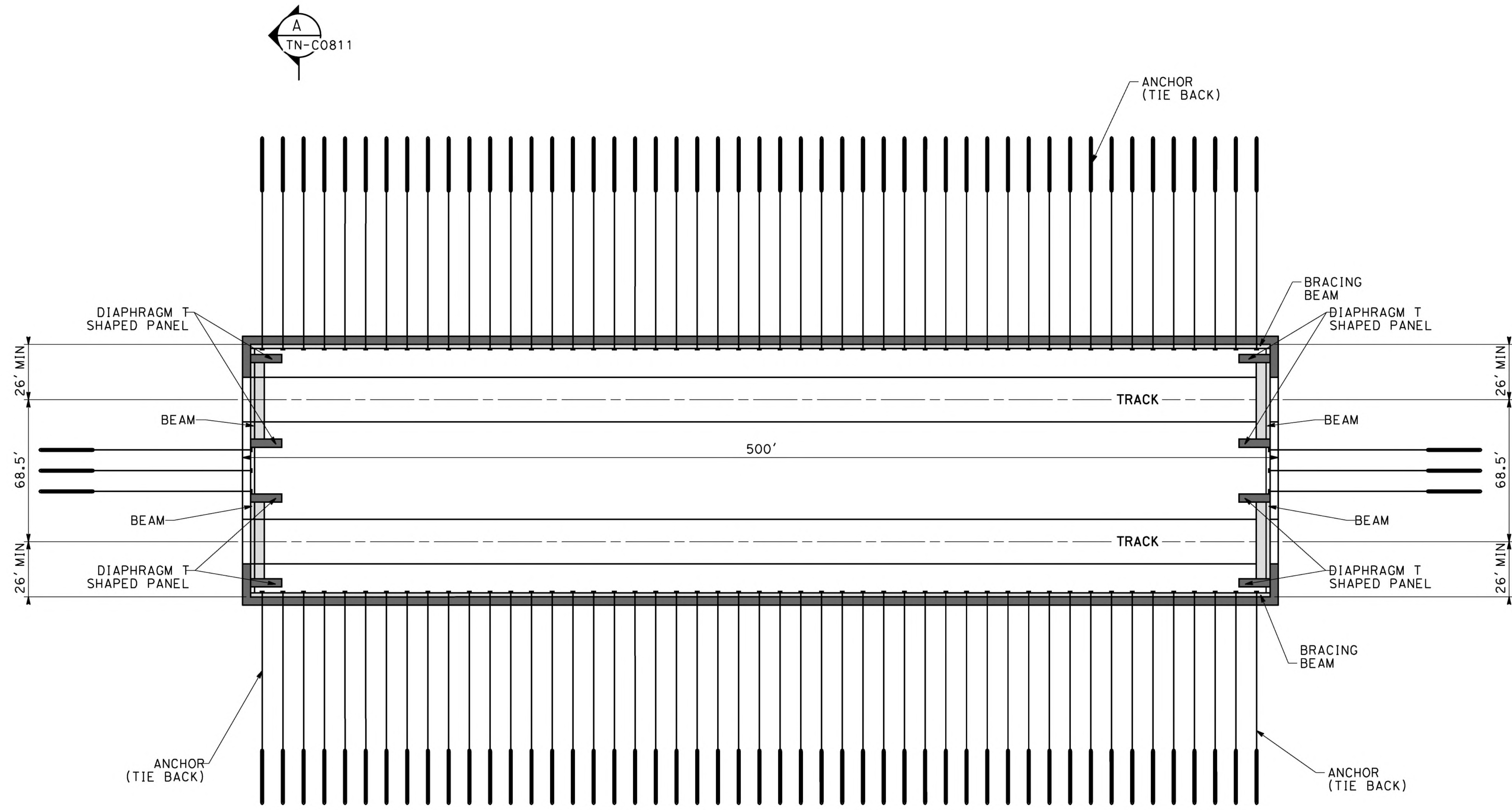
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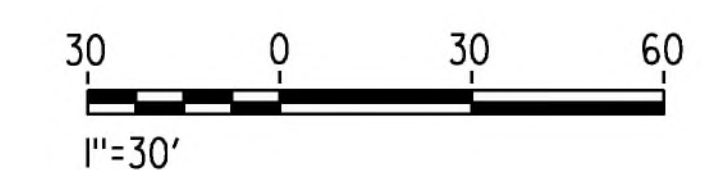
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**PLAN**

**NOTES:**

1. THIS DRAWING IS CONCEPTUAL AND NOT AN ACTUAL DESIGN. ITS PURPOSE IS TO BE A GUIDE TO BUILD UNIT PRICES AT PEPD LEVEL.
2. THE CONSTRUCTION TRENCH IS INTENDED FOR ASSEMBLY AND LAUNCH OF TUNNEL BORING MACHINES NORTHWARDS. AND RECEPTION OF TBM COMING FROM THE SOUTH.
3. THE DESIGN OF THIS SOE TO BE DONE AT A MORE ADVANCED STAGE OF DESIGN, WHEN SPECIFIC GEOTECHNICAL INFORMATION, SEISMIC DESIGN CRITERIA AND SITE RESPONSE ANALYSIS ARE AVAILABLE.
4. GENERAL DIMENSIONS AND THICKNESSES ARE GIVEN WITH ORIENTATIVE PURPOSES ONLY.



| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



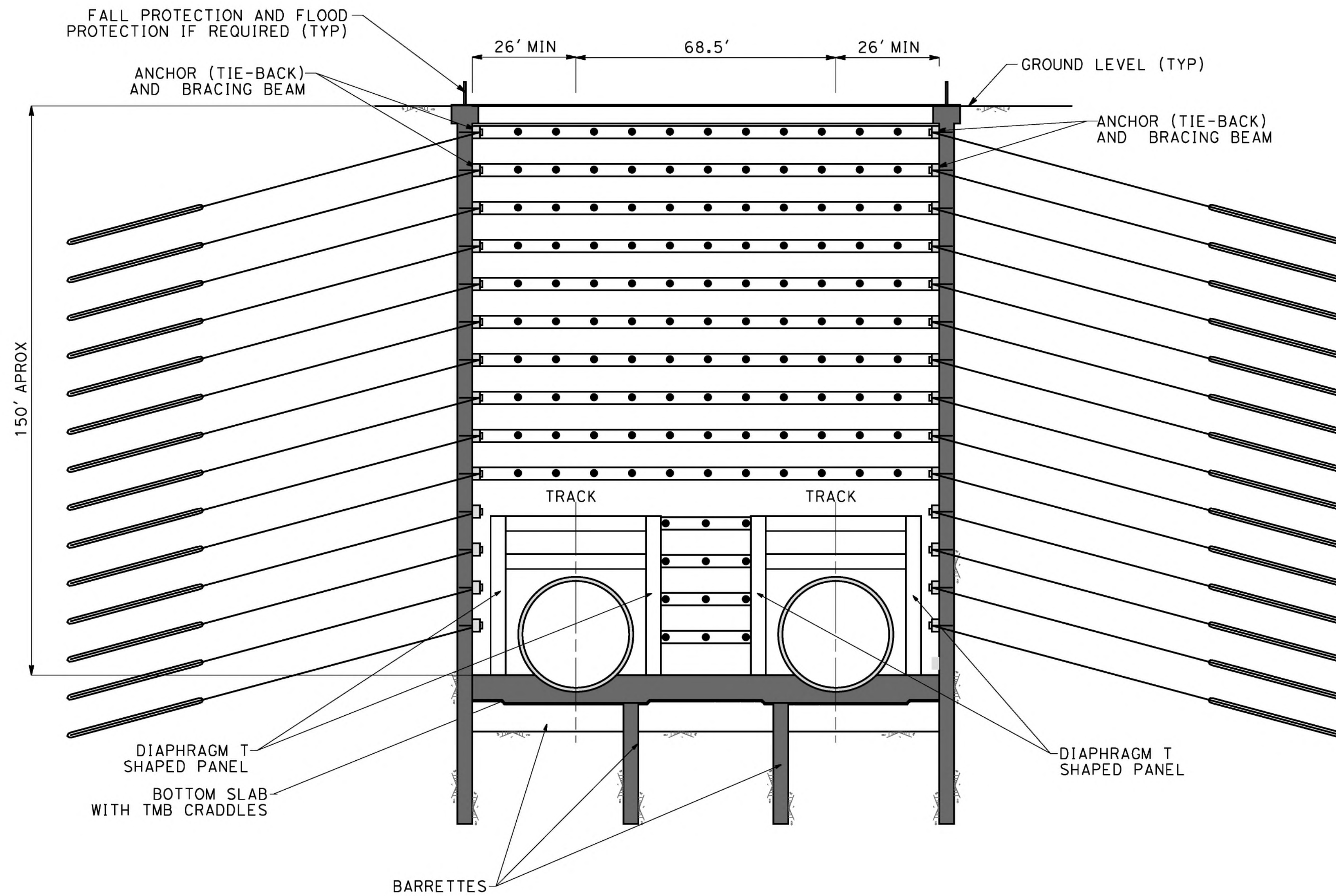
**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT SR14A  
INTERMEDIATE WINDOW IWA (1 OF 2)

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0810**  
SCALE  
**AS SHOWN**  
SHEET NO.



**NOTES:**

1. THIS DRAWING IS CONCEPTUAL AND NOT AN ACTUAL DESIGN. ITS PURPOSE IS TO BE A GUIDE TO BUILD UNIT PRICES AT PEPD LEVEL.
2. THE CONSTRUCTION TRENCH IS INTENDED FOR ASSEMBLY AND LAUNCH OF TUNNEL BORING MACHINES NORTHWARDS.
3. THE DESIGN OF THIS SOE TO BE DONE AT A MORE ADVANCED STAGE OF DESIGN, WHEN SPECIFIC GEOTECHNICAL INFORMATION, SEISMIC DESIGN CRITERIA AND SITE RESPONSE ANALYSIS ARE AVAILABLE.
4. GENERAL DIMENSIONS AND THICKNESSES ARE GIVEN WITH ORIENTATIVE PURPOSES ONLY.



**TRANSVERSE SECTION** (A)  
SCALE 1"=20'-0" TN-C0811



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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT SR14A  
INTERMEDIATE WINDOW IWA (2 OF 2)

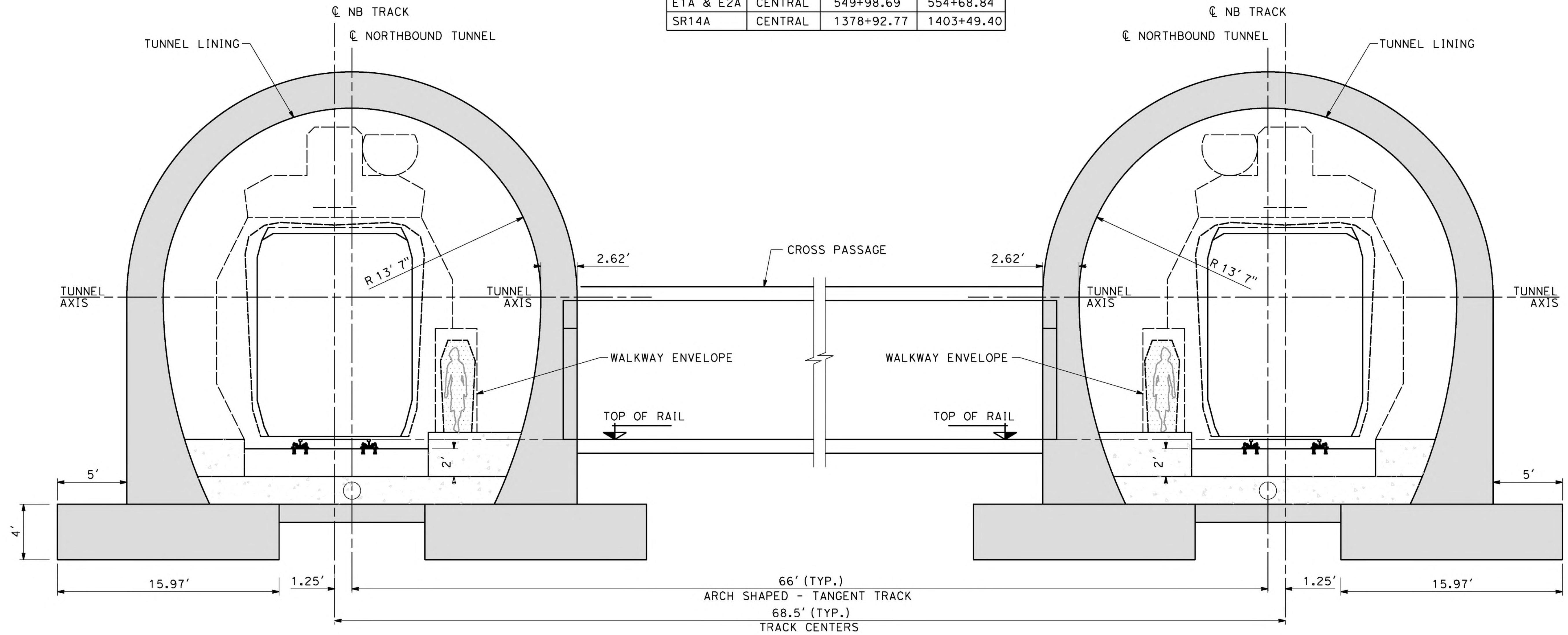
CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C0811**  
SCALE  
**AS SHOWN**  
SHEET NO.



**NOTES:**

1. PERMANENT LINING ASSUMED WATERTIGHT/UNDRAINED IN PERMANENT CASE.
2. STRUCTURE COMPONENTS ARE NOT DESIGNED. DRAWINGS NOT BASED ON ACTUAL DESIGN AND ARE DEVELOPED FOR PRELIMINARY COST ESTIMATE.
3. TRACK, CABLE DUCTS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
4. EQUIPMENT AND STRUCTURE GAUGES NOT SHOWN. REFER TO DRAWINGS TN-C0006 AND TN-C0007 FOR FIXED EQUIPMENT ENVELOPE AND STRUCTURE GAUGE.
5. TYPICAL SECTION ON THIS SHEET IS APPLICABLE AT THE FOLLOWING LOCATIONS:

| ALIG.     | SUB-SECT. | BEGIN STA  | END STA    |
|-----------|-----------|------------|------------|
| E1A & E2A | CENTRAL   | 549+98.69  | 554+68.84  |
| SR14A     | CENTRAL   | 1378+92.77 | 1403+49.40 |



**TUNNEL TYPICAL SECTION  
ARCH-SHAPED CUT & COVER  
TWIN TUNNEL 28"**



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| REV | DATE | BY | CHK | APP | DESCRIPTION |
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DESIGNED BY  
**E.VELASCO**  
DRAWN BY  
**F.J.DOMINGUEZ**  
CHECKED BY  
**C.RECHEA**  
IN CHARGE  
**A.RELAÑO**  
DATE  
**02/26/2021**

**PEPD RECORD SET  
ADDENDUM  
SR14A/E1A/E2A**  
  
**NOT FOR  
CONSTRUCTION**



**CALIFORNIA HIGH-SPEED RAIL PROJECT  
PALMDALE TO BURBANK**  
ALIGNMENT E1A/E2A/SR14A  
ARCH SHAPED CUT & COVER  
TANGENT TRACK  
CLEARANCE DIAGRAM

CONTRACT NO.  
**HSR14-42**  
DRAWING NO.  
**TN-C1110**  
SCALE  
**AS SHOWN**  
SHEET NO.