Middle Mile Broadband Network (MMBN) Infrastructure Projects – Installation

TR – 0448 (Rev. 06/2025)

In addition to the attached Encroachment Permit General Provisions (TR-0045), the following special provisions are also applicable to Middle Mile Broadband Network (MMBN) projects:

1. GENERAL: The California Department of Technology (CDT) is partnering with joint builders, including private broadband providers, to install broadband infrastructure within the State highway right-of-way as part of the MMBN infrastructure. "Joint Builder" refers to MMBN partners, whether the infrastructure is owned or leased by CDT.

2. APPLICABILITY: These provisions apply to CDT MMBN joint build projects. The trench and vault requirements only apply to the non-Interstate highway system. An exception by the Federal Highway Administration (FHWA) is required for alternative trench or vault locations on the Interstate Highway System.

3. TRENCH LOCATION: For freeways and expressways with controlled access right-of-way, the preferred location for fiber optic conduit paths is within 10 feet of the right-of-way. Fiber optic conduit may be placed closer to the edge of pavement, between 4 feet from the edge of pavement to the right of way line, when it is determined to be more cost effective. Choose the fiber optic conduit path from the following sequential order of options:

1) Within 10 feet of the right-of-way
2) Between 4 feet from the edge of the pavement to 10 feet of the right-of-way
3) Within the outside paved shoulder

For Interstate Highway System, the installation of longitudinal fiber optic path requires FHWA approval on a project-by-project basis. Refer to Chapter 17, Section 2, Article 4, "Federal Highway Administration Approvals," of the *Project Delivery Procedures Manual (PDPM)* for projects on the Interstate Highway System.

For conventional highways, the preferred location for fiber optic conduit paths is from 4 feet from the edge of the pavement to the right-of-way line. Where the terrain or environmental conditions are not suitable for fiber optic conduit installation, placement of the fiber optic conduit within the outside paved shoulder may be considered. There are rural highways that do not have shoulders, and it may be necessary to place the fiber optic conduit within the traveled lane for some segments.

Fiber optic conduit should not be placed less than 4 feet from the edge of pavement because this area outside the pavement contains signs, guardrail, Caltrans electrical conduit, and Caltrans irrigation lines. This area is considered the no-fiber-optic-cable zone that allows for traffic control and traffic safety devices to operate properly and helps to prevent any future damage to the fiber optic cable by Caltrans maintenance forces or

contractors installing or maintaining these roadside elements. For installation of MMBN less than 4 feet from the edge of pavement**, the permittee must work with Caltrans District Staff for an encroachment policy exception.**

For freeways, expressways and conventional highways, installation of MMBN within the pavement, the permittee must work with Caltrans District Staff for an encroachment policy exception. Caltrans' broadband longitudinal encroachment policy prohibits broadband fiber optic cable installation within the pavement area, within 3 feet of the edge of pavement, or within 4 feet of the face of guardrail. On roadways with limited right-of-way or other physical and environmental constraints, an encroachment policy exception must be requested. The criteria in the "Wired Broadband Facility Accommodation in Access-Controlled State Highway Right-of-Way" memorandum dated March 25, 2022, replaces the existing wired broadband accommodation criteria within access-controlled highway rights-of-way in Chapter 17, Section 2, Article 2, "Encroachment Policies," of the *PDPM*. Exceptions to the criteria will be considered on a case-by-case basis in accordance with Chapter 17, Section 4, "Exception Requests," of the *PDPM*.

For more information on locating the fiber optic cable path within the right-of-way, refer to the "Wired Broadband Facility Accommodation in Access-Controlled State Highway Right-of-Way" memorandum dated March 25, 2022, and attachments, available at:

https://dot.ca.gov/-/media/dot-media/programs/traffic-operations/documents/encroachment-permits/broadband-accommodation-memo-a11y.pdf

https://dot.ca.gov/-/media/dot-media/programs/design/documents/attachment-a-wired-broadband-facility-accommodation.pdf

https://dot.ca.gov/-/media/dot-media/programs/design/documents/attachment-b-guidance-broadband-installation-bridges.pdf

Fiber optic conduit paths should be straight where possible. When fiber optic conduit path is located more than 4 feet from the pavement, maintain a consistent offset from the roadway centerline where possible. When a fiber optic conduit path is located within paved outside shoulder or travel lane, maintain a consistent offset from the roadway centerline. Conduit within a traveled lane must be placed at the center of the outside lane.

For the trench method, the depth of fiber optic conduit path in unpaved areas must be a minimum of 42 inches to the top of conduit. For horizontal directional drilling method, depth of conduit must be a minimum of 4 feet and maximum of 10 feet. If a cost analysis determines a cost savings, the depth of the fiber optic conduit in unpaved areas may be reduced as follows:

- Trench Method: When encountering rock, the trench depth to the top of the conduits can be reduced to:
    - 36 inches without additional mitigations
    - 30 inches with trench backfill of colored slurry and flexible post delineators placed at intervals of 250 feet
    - 24 inches with trench backfill of colored slurry and flexible post delineators placed at intervals of 250 feet
- Horizontal Directional Drilling Method: When encountering rock, the depth to the top of the conduits can be reduced to 36 inches.

The cost analysis must account for possible shoulder backing, extra traffic control, street sweeping, minimal disturbance of aerial deposited lead, and handling of surplus excavated material necessitated by utilizing 24- or 36-inch depth alternatives. Use of the 24-inch or 30-inch minimum conduit cover alternatives should not be used in areas where there is potential for encountering regulated Type Z-2 aerial deposited lead material.

For the install conduit trench method, if the fiber optic conduit minimum depth is less than 42 inches, then permittee must confirm with Caltrans District Staff if there is any future widening proposed for the highway to assure there will not be any future conflict between the conduit and the new roadway structural section.

In addition to the minimum conduit cover, the following requirements for fiber optic conduit path apply:

- Culverts – Must be a minimum 24 inches above or below the culvert.
- Lined channels – Must be a minimum 24 inches below the channel.
- Unlined channels or ditches – Must be a minimum 30 inches below the channel or ditch.
- Railroads – Must comply with the railroad company requirements.

If the fiber optic conduit path is proposed to go above the existing culverts, then permittee must consult with the Caltrans District Staff for concurrence to go above existing culverts. Refer to the PDPM Chapter 17 Section 3, Article 4, "Clearance and Offset Requirements."

Permittee must consult with the owners of channels not owned by Caltrans about the minimum clearance required below the channel. Channels crossing the highway right-of-way may be owned by a Flood Protection Board or Irrigation District. Fiber optic conduit crossings beneath a stream, river, canal, or channel may be governed by the Army Corps of Engineers or other permitting agencies.

The depth of fiber optic conduit in asphalt pavement must be a minimum of 24 inches

from the pavement surface to the top of conduit or at least 12 inches below the bottom of the structural section, including subbase, **whichever depth is greater**. The structural section depth can be found by coring, looking at district core records, or seeing if core data has been stored in the Ground Penetrating Radar iGPR-Core data base.

District pavement core data is available at:

https://www.ucprc.ucdavis.edu/igpr-core/

Ground Penetrating Radar iGPR data is available at:

http://www.ucprc.ucdavis.edu/iGPR/

Caltrans District Staff will consult with the Headquarters Pavement Program and District Materials Engineer to help review the structural section depth where the conduit path is being proposed by the MMBN Joint Build project.

When trenching in asphalt pavement, concrete slurry must be used for backfilling the trench. Concrete slurry backfill material must be placed within 0.25 foot of surface and hot mix asphalt layer placed over tack coat. Cold planing and repaving in traveled lane and paved shoulder must follow the MMBN Details.

Permittee must not trench in concrete pavement, use horizontal direction drilling for conduit placement under concrete pavement.

Permittee shall be responsible for any maintenance or repair when the MMBN infrastructure has failures or causes issues related to highway operations, maintenance, or damages directly to transportation infrastructure.

Permittee acknowledges the increased risk and is accountable for damages suffered by it or the MMBN infrastructure stemming from the installation of the MMBN infrastructure at a depth shallower than 42-inches and/or located within four feet to six feet from the edge of pavement. Permittee shall be responsible for the cost of any maintenance or the repair of any damage to the MMBN infrastructure that occurs. Caltrans shall not be responsible for any damages resulting from the interruption or diminishment of network service to MMBN customers caused by installation of the MMBN infrastructure, or for any damages and injuries incurred due to damage to the MMBN infrastructure.

Permittee shall be responsible for the cost of repair of transportation facilities when MMBN infrastructure fails or causes issues to highway infrastructure or its operation, such as but not limited to settlement, potholes, longitudinal cracking of pavement, etc. that result in necessary maintenance and repair work by Caltrans. Further, permittee shall be responsible for the cost of repair of the MMBN infrastructure installed via trench in pavement that sustains damage to the fiber optics or disruption of service due to vibrations resulting from vehicular traffic use of the pavement, pavement failure or slope

failure in an embankment.

4. VAULT LOCATIONS: Vaults are typically preferred to be placed as close to the edge of the highway right-of-way as possible. For the safety of motorist and fiber optic maintenance personnel there are limitations on the locations where vaults may be placed. FHWA considers vaults to be maintenance access points (MAPs), which for Interstate Highways require an FHWA exception. Last-mile service connections directly off the mainline are not allowed and will not be approved by FHWA.

Pull vaults, commonly referred to as "hand holes," facilitate pulling cables for long distances. Future access is usually limited to fiber optic cable repairs due to damage or installation of additional fiber optic cables.

Pull vault installation locations:

1. Are required at the end of structures to allow for conduit transitions and to allow for easier installation of the fiber optic cable because of the number of conduit bends required at a structure.
2. For freeways and expressways, pull vaults wherever possible must be installed outside the access-controlled state highway right-of-way at these locations:
    a. On local street overcrossing or undercrossing
    b. Local streets at at-grade intersections on expressways
    c. Along a frontage road
    d. On other roads adjacent to the highway that are outside the right-of-way
3. For freeways and expressways pull vaults may be installed inside the access-controlled State Highway System right-of-way if a locked gate is provided in the access control fence to access the vault from outside the right-of-way. For gates in the access-control fence, FHWA approval for the gate is required for a project on the Interstate Highway System. Chapter 17, Section 2, Article 3, of the *PDPM* states that installation of a locked gate on other access-controlled highways may be approved by the district director.

Pull vault installation near highways must:

1. Be installed a minimum of 5 feet from the edge of pavement. When it is impossible to install the pull vault more than 5 feet from the edge of pavement, a traffic rated pull vault must be installed.
2. Not be located within a gore area or median.
3. For conventional highways, pull vaults may be installed either adjacent to an 8-foot minimum width shoulder or where a vehicle can park completely off the pavement for accessing the vault. After installation, limited access is only needed to repair a fiber optic cable or install an additional fiber optic cable in the network, so a maintenance vehicle pullout is not required.
4. For freeways and expressways, pull vaults installed within the access-controlled State Highway System right-of-way:

a. Can be installed either adjacent to an 8-foot minimum width shoulder or where a vehicle can park completely off the pavement for accessing the vault, with an approved encroachment policy exception. Only limited access to pull vaults is necessary after installation to either repair fiber optic cable or install an additional fiber optic cable in the network, so a maintenance vehicle pullout is not required.
b. FHWA approval is required for pull vaults requiring access from the freeway mainline or ramps on the Interstate Highway System. **Permittee must work with Caltrans District Staff to obtain FHWA approval for pull vault exceptions.**
c. For non-interstate access-controlled state highways, except for pull vaults installed within 10 feet of the right-of-way, pull vault installations require a Caltrans exception to encroachment policy. **Permittee must work with Caltrans District Staff for an encroachment policy exception.**

A splice vault allows for the splicing of the fiber optic cable segments based on the maximum spool length, and it serves as a demarcation point for a trunk cable.

Splice vault installation locations:

1. Must allow a vehicle to be no more than 25 feet from the splice vault to allow for splicing to be done within the vehicle.
2. For freeways and expressways, splice vaults wherever possible must be installed outside the access-controlled State Highway System right-of-way at these locations:
   a. On local street overcrossing or undercrossing
   b. Local streets at at-grade intersections on expressways
   c. Along a frontage road
   d. On other roads adjacent to the highway that are outside the right-of-way
3. For freeways and expressways with splice vaults installed inside the access-controlled State Highway System right-of–way, if a locked gate in the access control fence will be necessary to allow for access to the vault from outside the right-of-way, FHWA approval is required for a project on the Interstate Highway System. In accordance with Chapter 17, Section 2, Article 3, "Access Restrictions," of the *PDPM*, installation of a locked gate on other access-controlled highways may be approved by the district director.

Splice vault installation near highways must:

1. Be a minimum of 5 feet from the edge of pavement.
2. For conventional highways:
   a. Splice vaults should be located near public road intersections to make it easier for the last-mile broadband provider to connect to and provide a safe location for the broadband maintenance vehicles to park off the state highway.

b. Be installed either adjacent to an 8-foot-wide shoulder or a maintenance vehicle pull out. When placed next to a maintenance vehicle pull out, the splice vault should be placed at the upstream end of the maintenance pull out so that a truck with splicing trailer can be used for performing the fiber optic splicing. Refer to standard detail sheet MMBND-4, "MIDDLE MILE BROADBAND NETWORK DETAILS (MAINTENANCE VEHICLE PULLOUT)," for a typical splice vault at a maintenance vehicle pullout.

3. For freeways and expressways, splice vaults within the access-controlled right of way:
   a. Must only be installed at a maintenance vehicle pull out if installed along the highway. The splice vault should be placed at the upstream end of the maintenance vehicle pull out so that a truck with splicing trailer can be used for the fiber optic splicing. Refer to standard detail MMBND-4 "MIDDLE MILE BROADBAND NETWORK DETAILS (MAINTENANCE VEHICLE PULLOUT)," for a typical splice vault at a maintenance vehicle pullout.
   b. Installation of splice vaults requiring access from the freeway mainline or ramps on the Interstate Highways System require FHWA approval. **Permittee must work with Caltrans District Staff to obtain FHWA approval for a vault exception.**
4. For non-Interstate access-controlled highways, installation of splice vaults without a maintenance vehicle pullout, except for splice vaults installed within 10 feet of the right-of-way, require a Caltrans exception to encroachment policy. **Permittee must work with Caltrans District Staff for an encroachment policy exception.**

For access gates installed to access vaults on the Interstate Highway System, Federal Highway Administration (FHWA) approval is required. The permittee must work with Caltrans District Staff for FHWA approval. For broadband installations on the Interstate Highway System, FHWA approval is required. Refer to Chapter 17, Section 2, Article 4, "Federal Highway Administration Approvals," of the *PDPM* for projects on the Interstate Highway System.

For freeways and expressways, installation of vaults, also known as maintenance access points, within non-Interstate access-controlled State Highway System right-of-way, the permittee must work with Caltrans District Staff for an encroachment policy exception. The current wired broadband facility accommodation policy does not allow for the installation of vaults adjacent to the highway. Refer to the criteria in, "Wired Broadband Facility Accommodation in Access-Controlled State Highway Right-of-Way" memorandum dated March 25, 2022, which replaces the existing wired broadband accommodation criteria within access-controlled highway right-of-way in Chapter 17, Section 2, Article 2, "Encroachment Policies," of the *PDPM*. Exceptions to the criteria will be considered on a case-by-case basis in accordance with Chapter 17, Section 4, "Exception Requests" of the *PDPM*.

When vaults must be buried underground, they must be buried a minimum of 6-8 inches below the surface. A marker must be placed at the location of the buried vault for locating the vault, and a handhold or marker with test leads should be placed at the surface with the tracer wire from the vault for locating the fiber optic conduit. A buried vault does not constitute a Maintenance Access Point in accordance with Caltrans policy in, "Wired Broadband Facility Accommodation in Access-Controlled Highway Right-of-Way".

5. STRUCTURES: Caltrans has standard MMBN details for attachment of conduits to bridge structures. Permittee may use MMBN standard details for fiber optic conduit attachment to structures.

Permittee must work with Caltrans District Staff to use appropriate structure details for conduit attachment to structures. The *User Guide to Bridge Standard Detail Sheets,* Section 20 – 2", "Communication Conduit Attached to Structures" is available at https://dot.ca.gov/programs/engineering-services/manuals/bridge-standard-details.

6. CONSTRUCTION PROVISIONS: The following modifications apply to the Standard Specifications for conduit installation:

Add to the beginning of section 87-1.03B(3)(b)(i):

For fiber optic conduit trench method with a minimum cover depth of 36-inches or deeper, backfill trench with:

1. Minimum 2-inch sand bedding before installing the conduit
2. Minimum 4-inch sand cover above upper conduit top after installing multiple conduits, or minimum 1-inch sand cover above conduit top for single conduit
3. Native material free of debris, roots, organic matter, and rocks larger than 1 inch in diameter, over the remaining open trench

For fiber optic conduit trench method with a minimum cover depth of 24- or 30-inches, backfill trench with:

1. Minimum 2-inch sand bedding before installing the conduit
2. Minimum 4-inch sand cover above upper conduit top after installing multiple conduits, or minimum 1-inch sand cover above conduit top for single conduit
3. Minimum 18-inches of colored slurry over sand
4. Native material free of debris, roots, organic matter, and rocks larger than 1 inch in diameter, over the remaining open trench

Add to the beginning of section 87-1.03B(3)(b)(iii):

You may use the trench-in-pavement method for fiber optic conduit when authorized. Place trench in pavement in shoulder or in the center of the outside lane of the traveled way.

For concrete pavement do not use the trench in pavement method.

Replace bullet 1 of the last paragraph of section 87-1.03B(3)(b)(iii) with:

1. Cold plane under section 39-3, a minimum 2 feet wide and 0.15-feet in depth along the trench in shoulder or 4 feet wide and 0.25-feet in depth along the trench in traveled way.

Add to the beginning of section 87-1.03B(3)(c):

Install fiber optic conduit to a minimum depth of 4 feet and maximum depth of 10 feet unless otherwise authorized. To avoid drilling through rock, you may install conduit at a minimum 36-inch depth.

7. MMBN DETAILS:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — Ignacio Sanchez del Real — No. E14926 — Exp. 6-30-25 — ELECTRICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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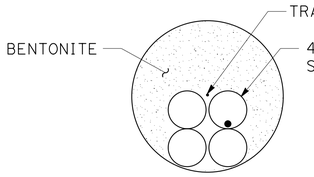
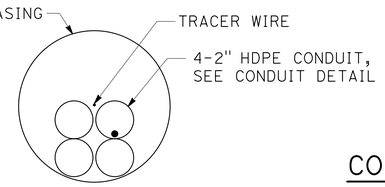
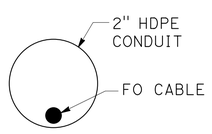


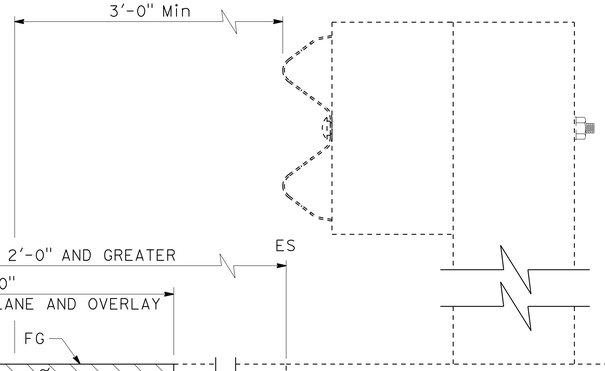
SECTION A-A

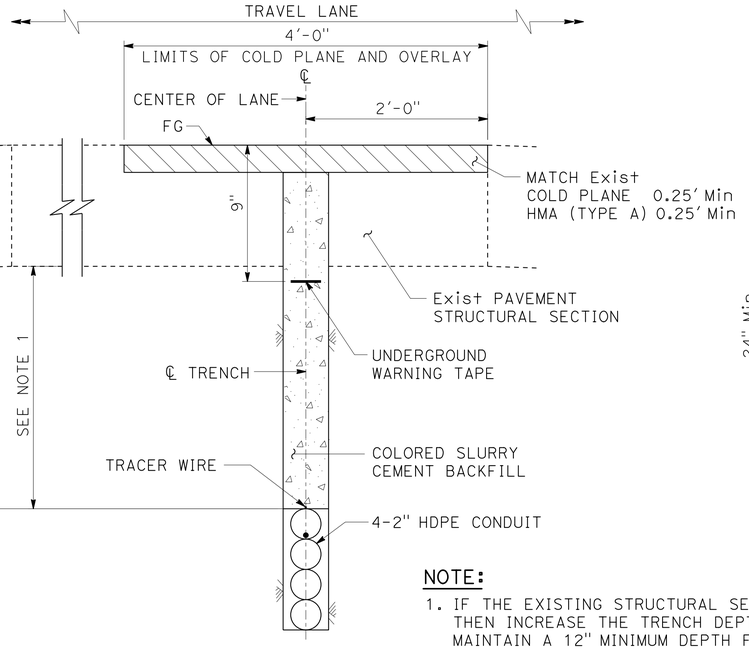


SECTION B-B



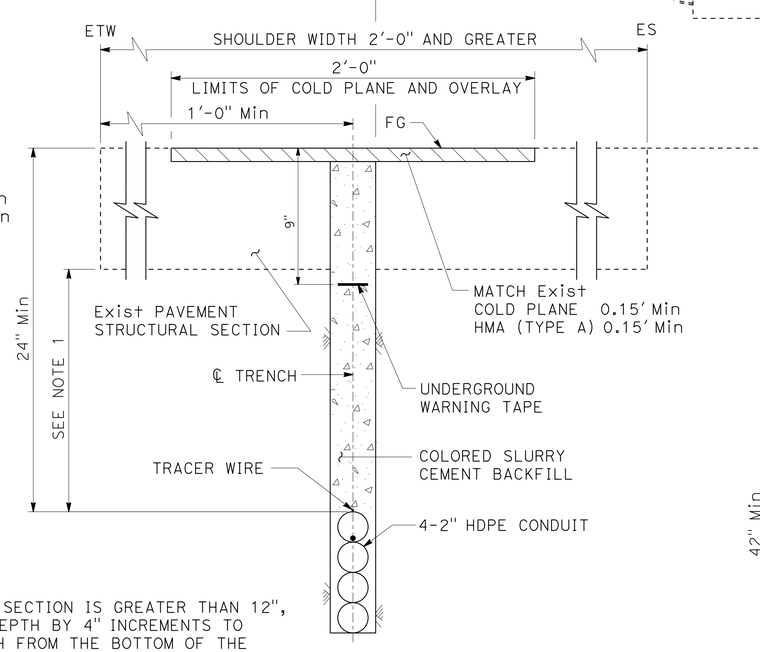
CONDUIT DETAIL





DETAIL A

TRENCH IN TRAVEL LANE



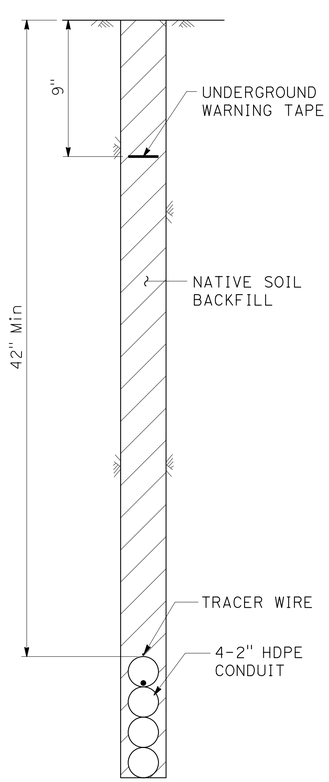
DETAIL B

TRENCH IN SHOULDER

NOTE:

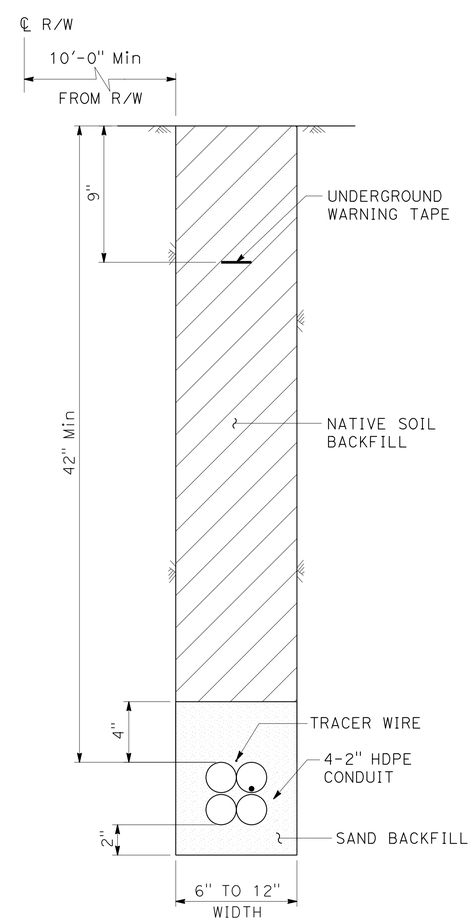
1. IF THE EXISTING STRUCTURAL SECTION IS GREATER THAN 12", THEN INCREASE THE TRENCH DEPTH BY 4" INCREMENTS TO MAINTAIN A 12" MINIMUM DEPTH FROM THE BOTTOM OF THE STRUCTURAL SECTION TO THE TOP OF THE CONDUIT.

TRENCH IN PAVEMENT



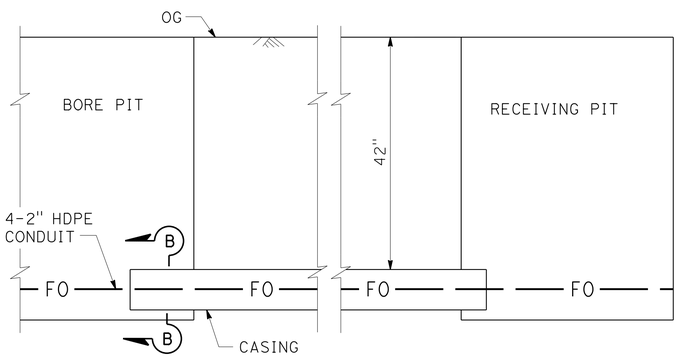
DETAIL C

PLOWING DETAIL



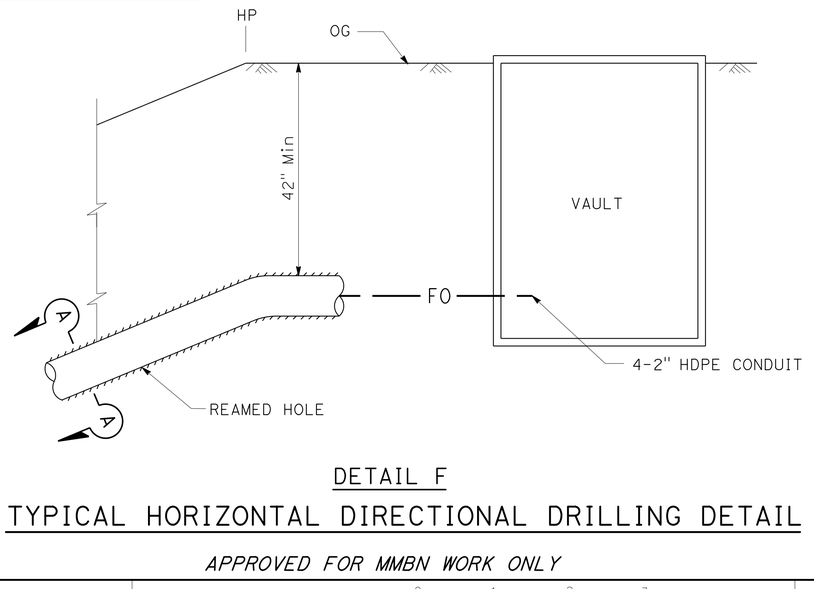
DETAIL D

TRENCH DETAIL



DETAIL E

TYPICAL JACK AND DRILL DETAIL



DETAIL F

TYPICAL HORIZONTAL DIRECTIONAL DRILLING DETAIL

APPROVED FOR MMBN WORK ONLY

MIDDLE MILE BROADBAND NETWORK DETAILS
(CONDUIT INSTALLATION METHODS)

NO SCALE

MMBND-1

LAST REVISION 2-18-25
DATE PLOTTED => 19-FEB-2025
TIME PLOTTED => 08:58

REVISED BY | DATE REVISED
CALCULATED-DESIGNED BY | CHECKED BY
FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® ELECTRICAL DESIGN

BORDER LAST REVISED 7/2/2010

USERNAME => s128843
DGN FILE => 01of21-ub001_ConduitInstallationMethods_MMBND1.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — Ignacio Sanchez del Real — No. E14926 — Exp. 6-30-25 — ELECTRICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

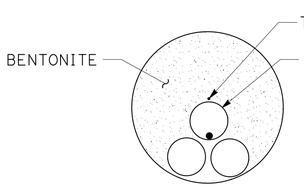
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REVISED BY | DATE REVISED

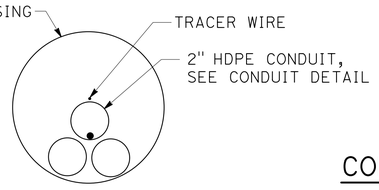
CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
ELECTRICAL DESIGN

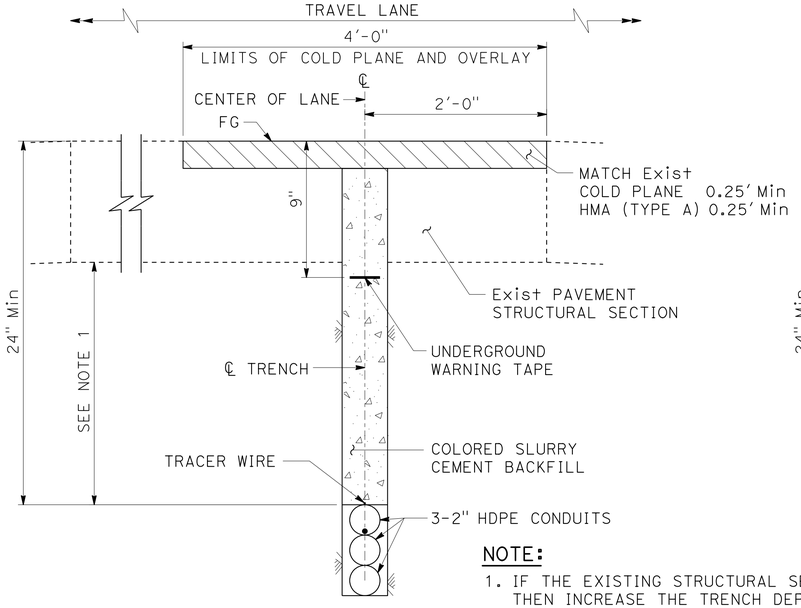


SECTION A-A



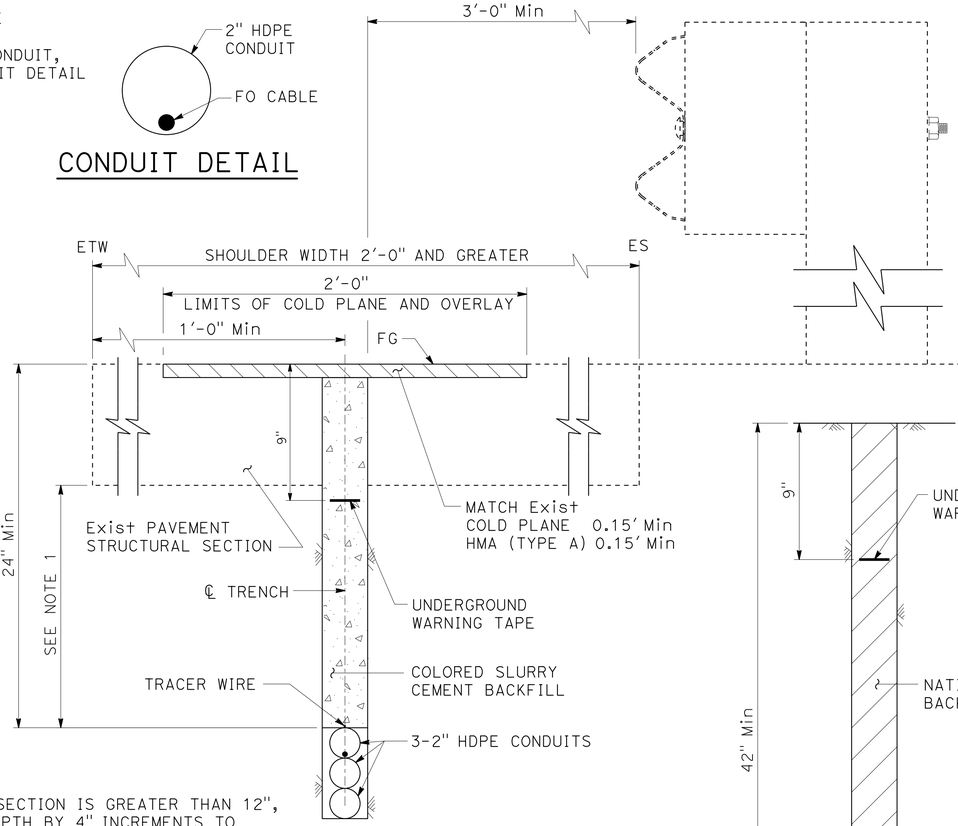
SECTION B-B

CONDUIT DETAIL



DETAIL A

TRENCH IN TRAVEL LANE



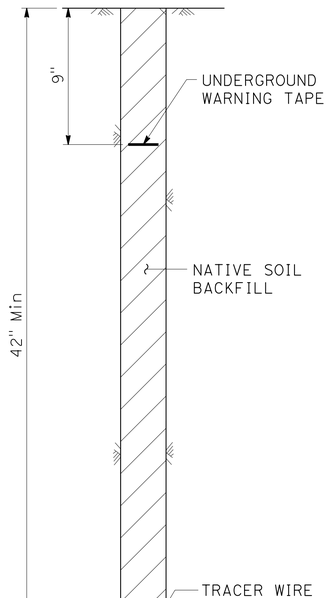
DETAIL B

TRENCH IN SHOULDER

NOTE:

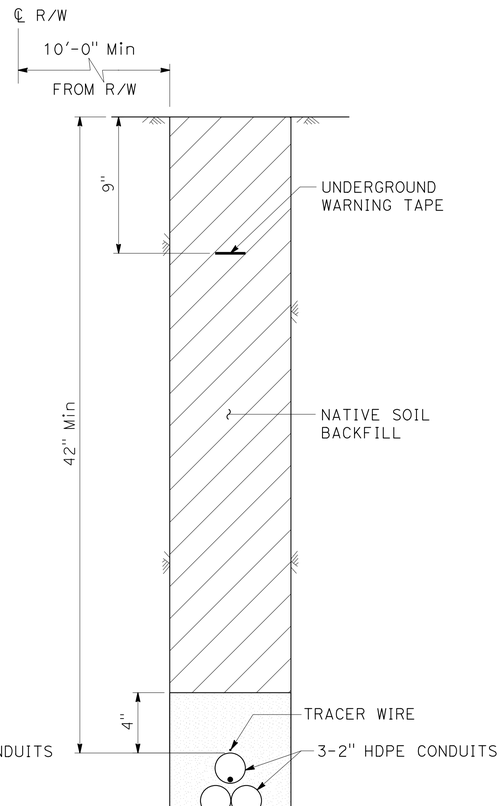
1. IF THE EXISTING STRUCTURAL SECTION IS GREATER THAN 12", THEN INCREASE THE TRENCH DEPTH BY 4" INCREMENTS TO MAINTAIN A 12" MINIMUM DEPTH FROM THE BOTTOM OF THE STRUCTURAL SECTION TO THE TOP OF THE CONDUIT.

TRENCH IN PAVEMENT



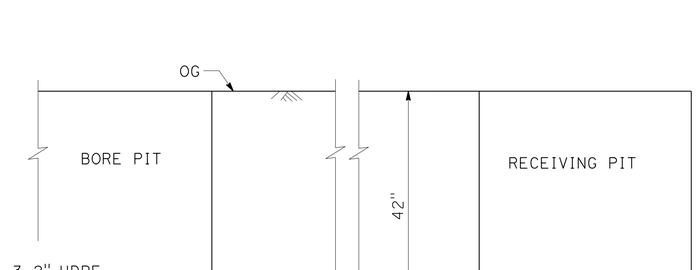
DETAIL C

PLOWING DETAIL



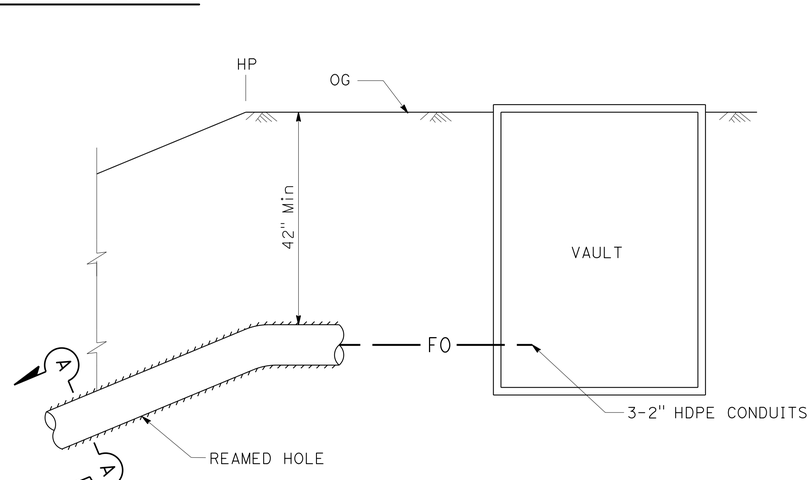
DETAIL D

TRENCH DETAIL



DETAIL E

TYPICAL JACK AND DRILL DETAIL



DETAIL F

TYPICAL HORIZONTAL DIRECTIONAL DRILLING DETAIL

TRENCH IN PAVEMENT

MIDDLE MILE BROADBAND NETWORK DETAILS
(CONDUIT INSTALLATION METHODS)

NO SCALE

MMBND-1A

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LAST REVISION | DATE PLOTTED => 19-FEB-2025
2-18-25 | TIME PLOTTED => 08:58

BORDER LAST REVISED 7/2/2010

USERNAME => s128843
DGN FILE => 02of21-ub001a_ConduitInstallationMethods_MMBND1A.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE | 00000000001

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
Ignacio Sanchez del Real
No. E14926
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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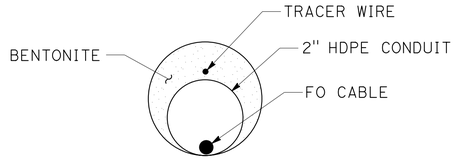
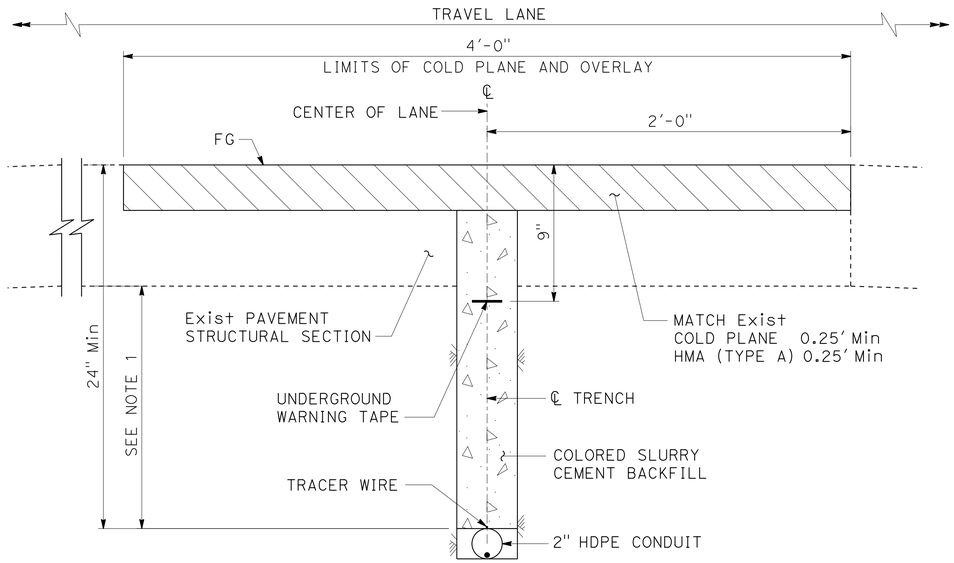
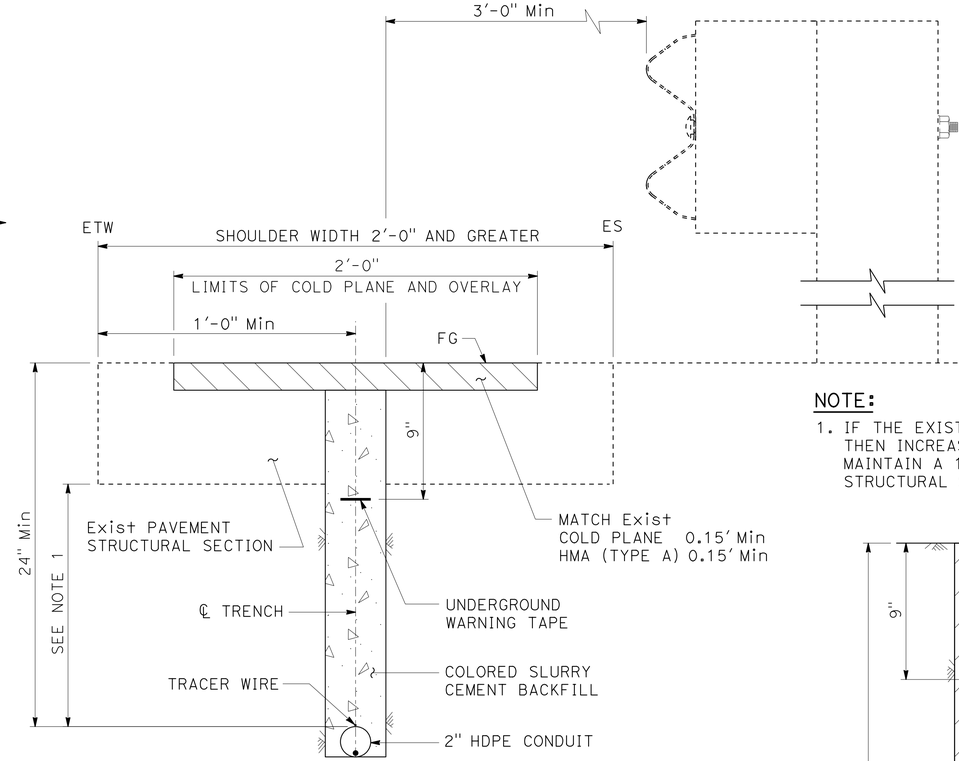


SECTION A-A



DETAIL A

TRENCH IN TRAVEL LANE



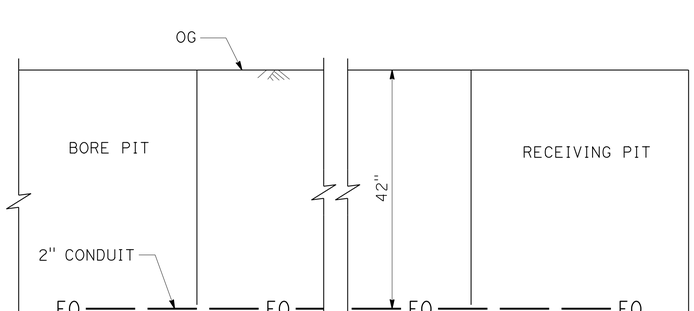
DETAIL B

TRENCH IN SHOULDER

TRENCH IN PAVEMENT

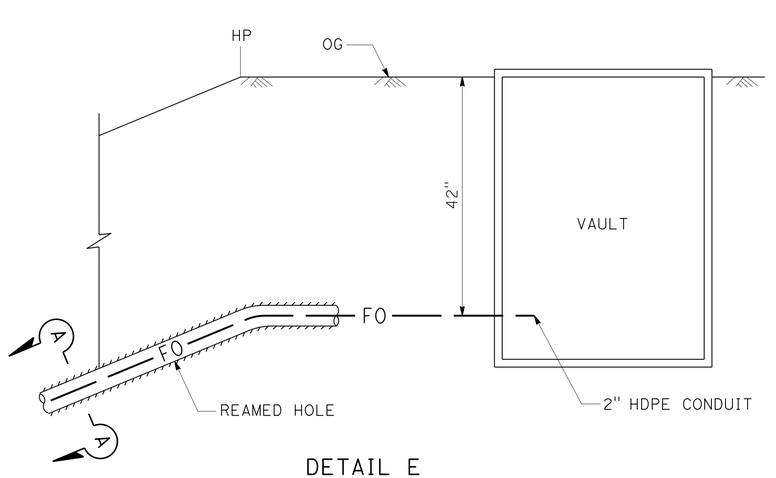
NOTE:

1. IF THE EXISTING STRUCTURAL SECTION IS GREATER THAN 12", THEN INCREASE THE TRENCH DEPTH BY 4" INCREMENTS TO MAINTAIN A 12" MINIMUM DEPTH FROM THE BOTTOM OF THE STRUCTURAL SECTION TO THE TOP OF THE CONDUIT.



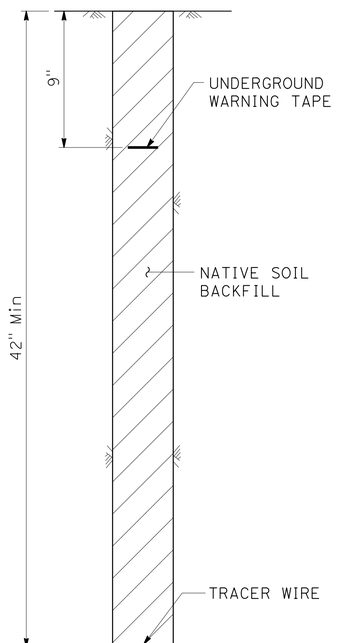
DETAIL D

TYPICAL JACK AND DRILL DETAIL



DETAIL E

TYPICAL HORIZONTAL DIRECTIONAL DRILLING DETAIL



DETAIL C

PLOWING DETAIL

MIDDLE MILE BROADBAND NETWORK DETAILS
(SINGLE CONDUIT INSTALLATION METHODS)

NO SCALE

MMBND-1B

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
Ignacio Sanchez del Real
No. E14926
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

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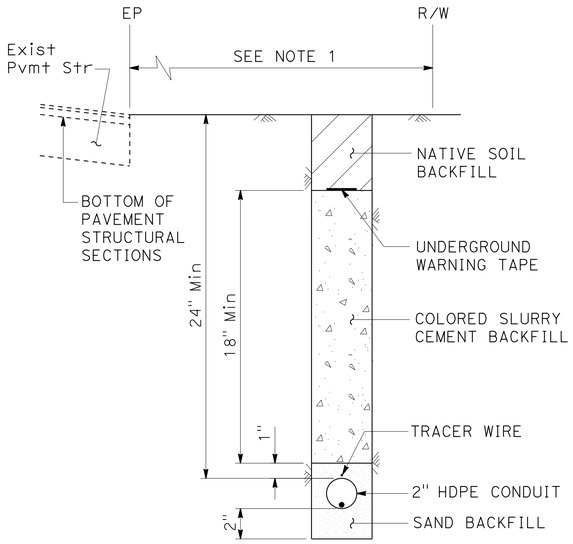
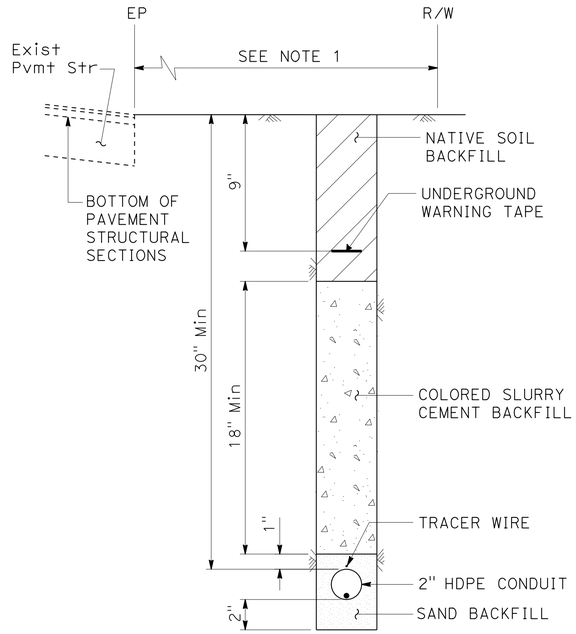
NOTE:

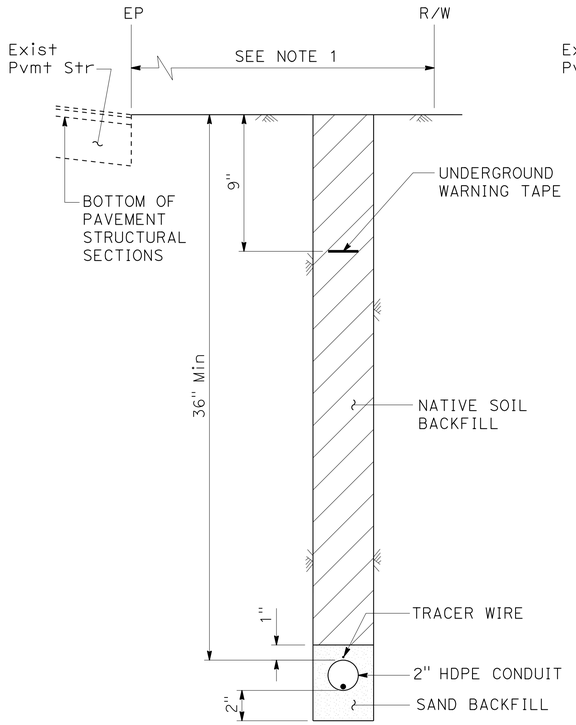
1. TRENCH MUST BE LOCATED A MINIMUM OF 4'-0" FROM THE EDGE OF PAVEMENT. CONDUIT INSTALLATION MUST BE INSIDE THE RIGHT OF WAY.



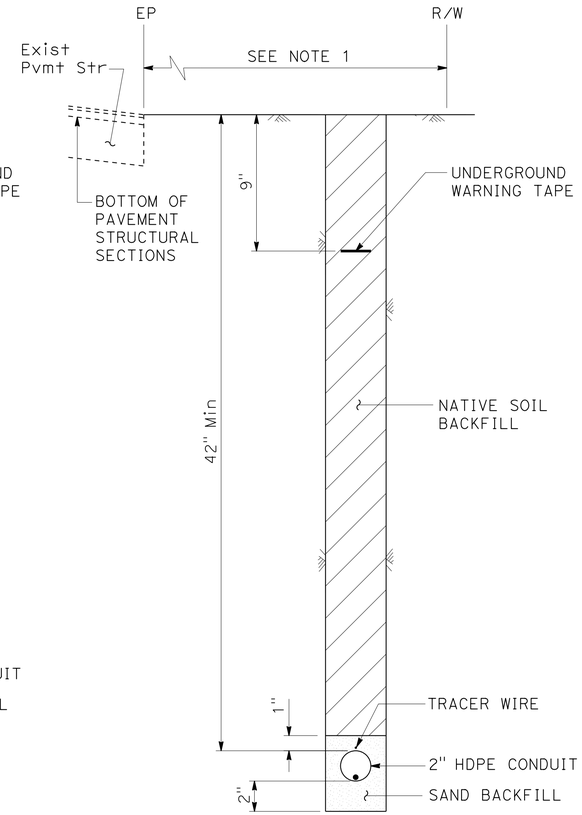
DETAIL F



DETAIL G



DETAIL H



DETAIL J

TRENCH DETAILS

MIDDLE MILE BROADBAND NETWORK DETAILS
(SINGLE CONDUIT INSTALLATION METHODS)

NO SCALE

MMBND-1C

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2-18-25 | TIME PLOTTED => 08:58

BORDER LAST REVISED 7/2/2010 | USERNAME => s128843 | DGN FILE => 04of21-ub001c_ConduitInstallationMethods_MMBND1C.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
Ignacio Sanchez del Real
No. E14926
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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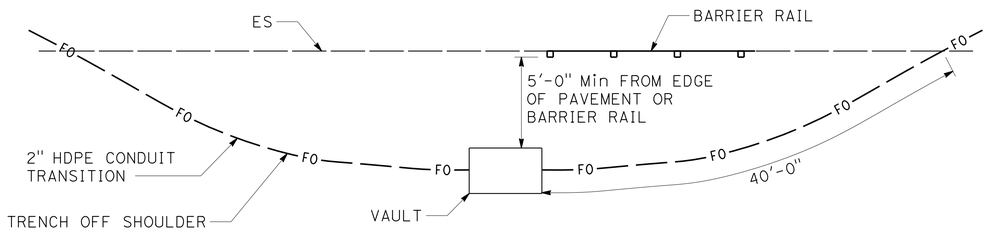
LEGEND:

1 2" HDPE CONDUIT.

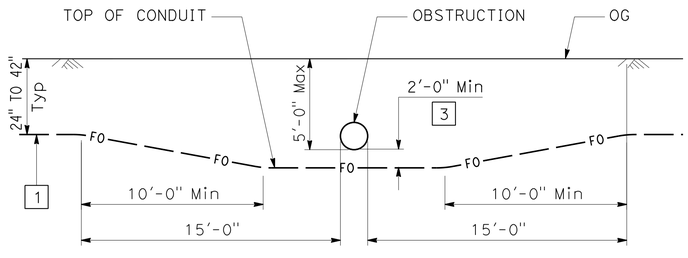
2 MAINTAIN 30 INCHES Min CLEARANCE BELOW THE FLOW LINE OF UNLINED DITCHES.

3 FOR HIGH RISK UTILITIES, MAINTAIN 4'-0" Min CLEARANCE.



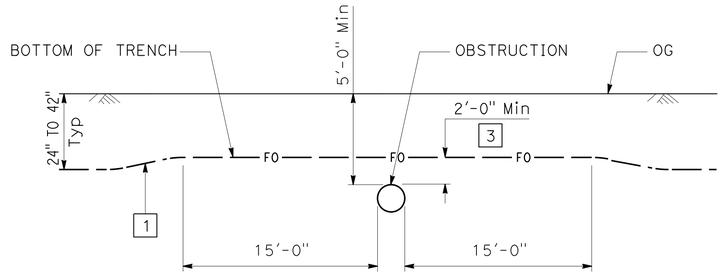
PLAN

CONDUIT TRANSITION



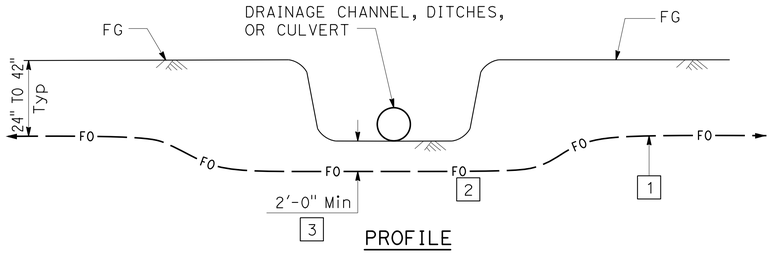
PROFILE

SHALLOW UNDERGROUND OBSTRUCTION DETAIL



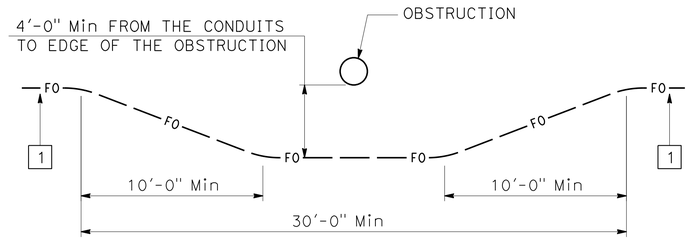
PROFILE

DEEP UNDERGROUND OBSTRUCTION DETAIL



PROFILE

BELOW DRAINIAGE CHANNEL, DITCHES, OR CULVERT INSTALLATION



PLAN

SURFACE OBSTRUCTION DETAIL

MIDDLE MILE BROADBAND NETWORK DETAILS
(CONDUIT INSTALLATION)

NO SCALE

MMBND-2

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TIME PLOTTED => 08:59
2-18-25

BORDER LAST REVISED 7/2/2010
USERNAME => s128843
DGN FILE => 05of21-ub002_ConduitInstallation_MMBND2.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0000
PROJECT NUMBER & PHASE 00000000001

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
Ignacio Sanchez del Real
No. E14926
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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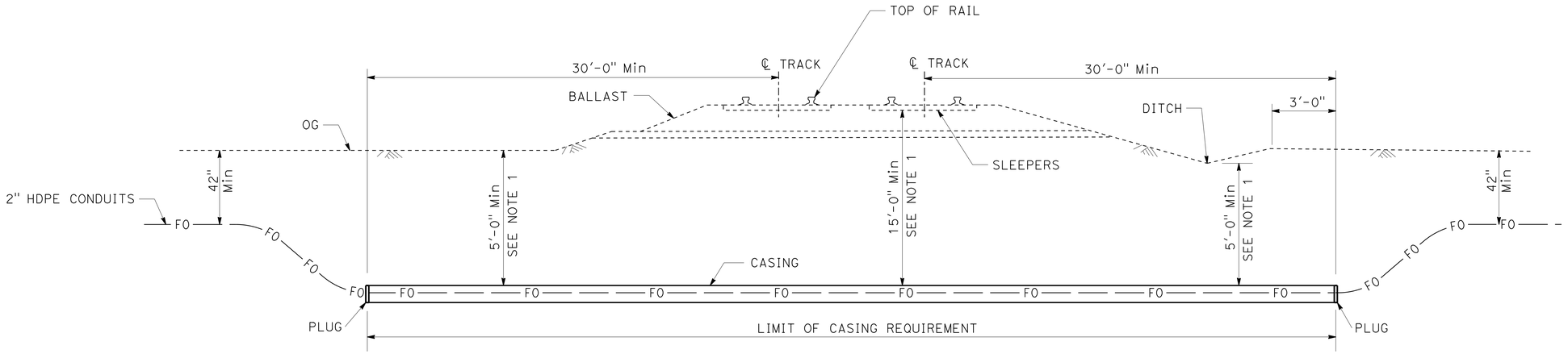
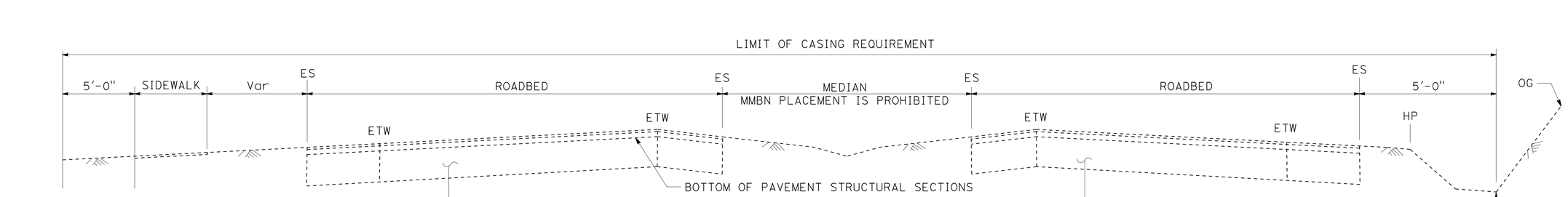
NOTE:

1. MAINTAIN THE LARGEST OF THE FOLLOWING MINIMUM CLEARANCES:
   a. 15'-0" BETWEEN THE BOTTOM OF A SLEEPER AND THE TOP OF THE CONDUIT CASING.
   b. 5'-0" BETWEEN THE TOP OF EXISTING GROUND AND THE TOP OF THE CONDUIT CASING.
   c. 5'-0" BETWEEN THE BOTTOM OF A DITCH AND THE TOP OF THE CONDUIT CASING.



PROFILE
RAILROAD CROSSING



PROFILE
ROADWAY CROSSING

MIDDLE MILE BROADBAND NETWORK DETAILS
(CONDUIT ENCASEMENT CROSSINGS)

NO SCALE

MMBND-3

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TIME PLOTTED => 08:59

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

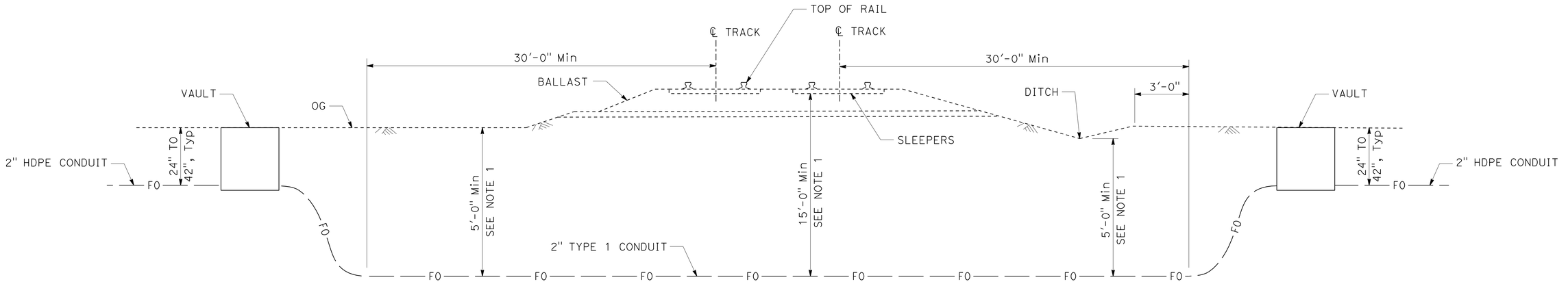
Ignacio Sánchez del Real 2-18-25
REGISTERED ELECTRICAL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
Ignacio Sanchez del Real
No. E14926
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

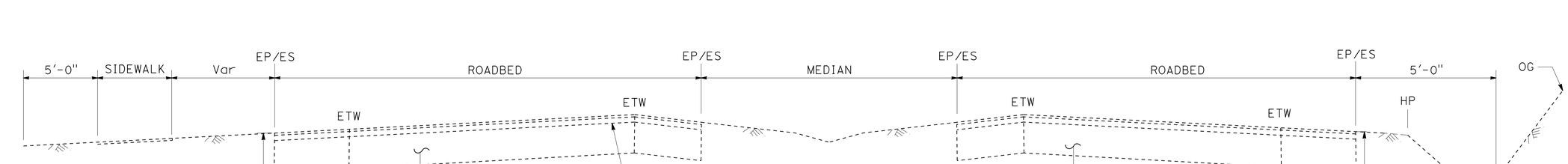
PLANS APPROVAL DATE

NOTE:

1. MAINTAIN THE LARGEST OF THE FOLLOWING MINIMUM CLEARANCES:
   a. 15'-0" BETWEEN THE BOTTOM OF A SLEEPER AND THE TOP OF THE CONDUIT.
   b. 5'-0" BETWEEN THE TOP OF EXISTING GROUND AND THE TOP OF THE CONDUIT.
   c. 5'-0" BETWEEN THE BOTTOM OF A DITCH AND THE TOP OF THE CONDUIT.



PROFILE
RAILROAD CROSSING



PROFILE
ROADWAY CROSSING

MIDDLE MILE BROADBAND NETWORK DETAILS
(SINGLE CONDUIT CROSSINGS)

NO SCALE

MMBND-3A

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LAST REVISION 2-18-25
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BORDER LAST REVISED 7/2/2010
USERNAME => s128843
DGN FILE => 07of21-ub003a_ConduitEncasementCrossings_MMBND3A.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0000
PROJECT NUMBER & PHASE 00000000001

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko — 2-18-25
REGISTERED CIVIL ENGINEER — DATE

REGISTERED PROFESSIONAL ENGINEER
Charles D. Suszko
No. C43029
Exp. 3-31-26
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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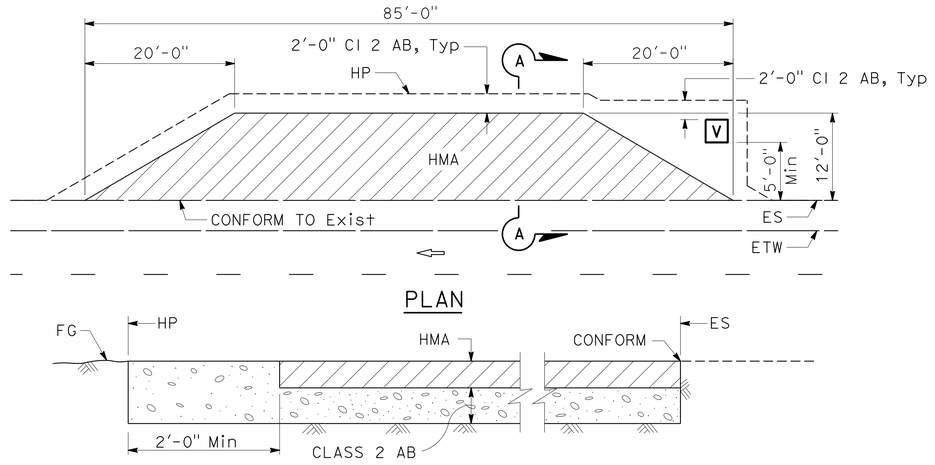
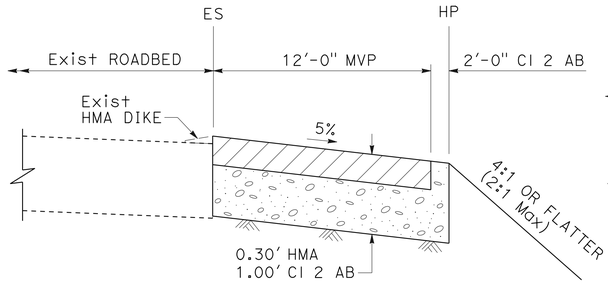


PLAN

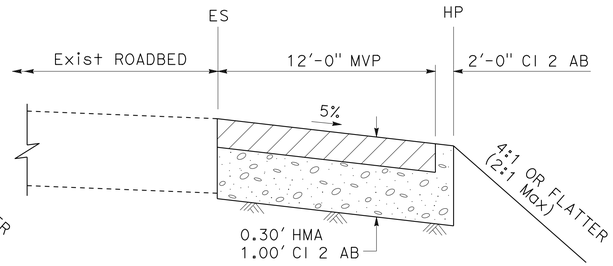
SECTION A-A

TYPICAL MAINTENANCE VEHICLE PULLOUT (MVP) AND VAULT LOCATION



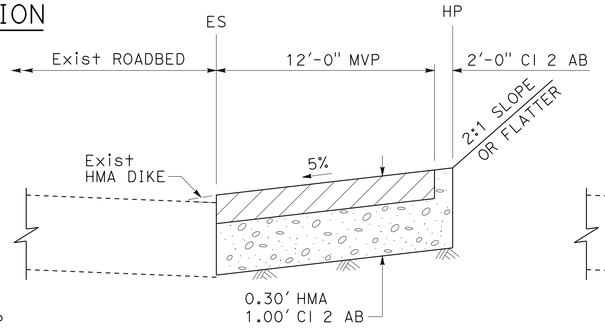
SECTION A-A

IN FILL SLOPE WITH Exist DIKE



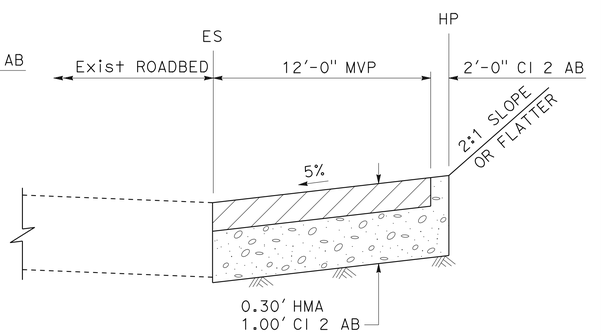
SECTION A-A

IN FILL SLOPE



SECTION A-A

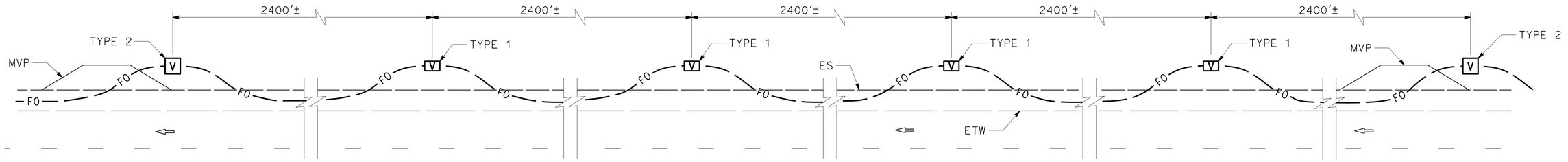
IN CUT SLOPE WITH Exist DIKE



SECTION A-A

IN CUT SLOPE

SLOPED MAINTENANCE VEHICLE PULLOUT (MVP) DETAILS



PLAN

TYPICAL TRENCH IN SHOULDER CONDUIT INSTALLATION AND VAULT SPACING

MIDDLE MILE BROADBAND NETWORK DETAILS

(MAINTENANCE VEHICLE PULLOUT)

NO SCALE

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