

Microtrenching and Your Pavements: What to Know Now

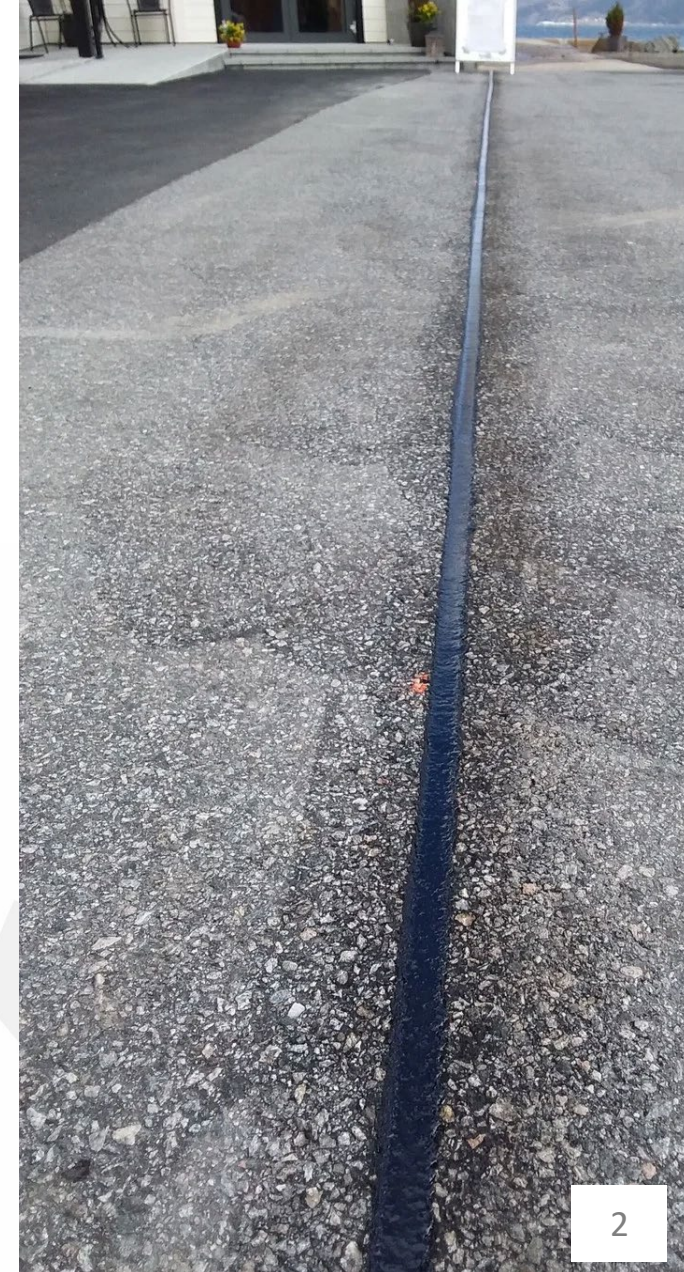
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November 7, 2024



Outline

- Background
 - Why Microtrenching Became Popular
- Typical Trench vs Microtrenching
- Impact of Pavement Cuts
- Microtrenching in California
- Microtrenching Overview
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 - Potential Challenges
- Microtrenching Standards
 - Typical Trenching Restoration vs Microtrenching Restoration
 - Microtrenching Standard Comparison
 - Typical Microtrenching Details
 - Typical Microtrenching Requirements
- Summary



Why Microtrenching Became Popular

Before 2020 (Pre-Pandemic)

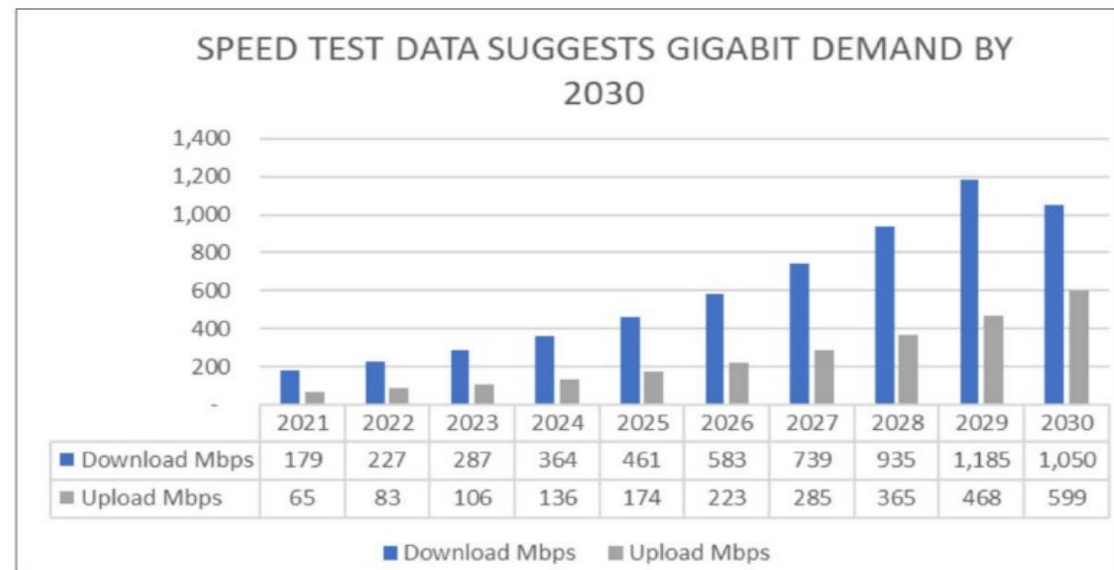
- Remote work was uncommon.
- Broadband demand was growing steadily due to entertainment, e-commerce, and business use.
- Broadband deployment slowed due to limited funding.
- Materials, installation equipment, and labor were readily available.

In 2022 (Post-Pandemic)

- Broadband demand surged across the globe due to remote work, e-learning, e-commerce, telehealth, etc.
- Fiber industry faced resource constraints amid rapid digital service growth.
- Major ISP deployment goals were missed, leading to downward forecast adjustments.

Over past 5 years, US fixed broadband download speed and upload speed have increased at compound annual growth rate of 27% and 28%

To meet the target/demand, unprecedented level of fiber deployment is needed



Source: FBA Technology Committee- The Rural Digital Divide, Fiber Broadband Can Eliminate the North American Rural Digital Divide

Why Microtrenching Became Popular

A narrow (max 4" wide and up to 18") trench is dug

A hole (3'-5' deep) is dug and a tunnel is created

Cuts into the ground and shakes the earth

Involves digging a deep and long trench

Horizontal/underground pneumatic/impact boring

Deployment Type	Equipment	Spoil Creation	Avg Feet Per Day	~ Max Depth (inches)	Utility (all) Strikes Per Mile
<u>Microtrench</u>		Low	1,500	16	0.03
Directional Bore/HDD		Low	750	48	0.11
Plow/Vibratory Plow		Medium	5,000	48	0.29
Trench/Conventional Trench		High	400	48	13.97
Missile Bore		High	750	24	0.05

Source: FBA Deployment Specialists Committee

Microtrenching
offers



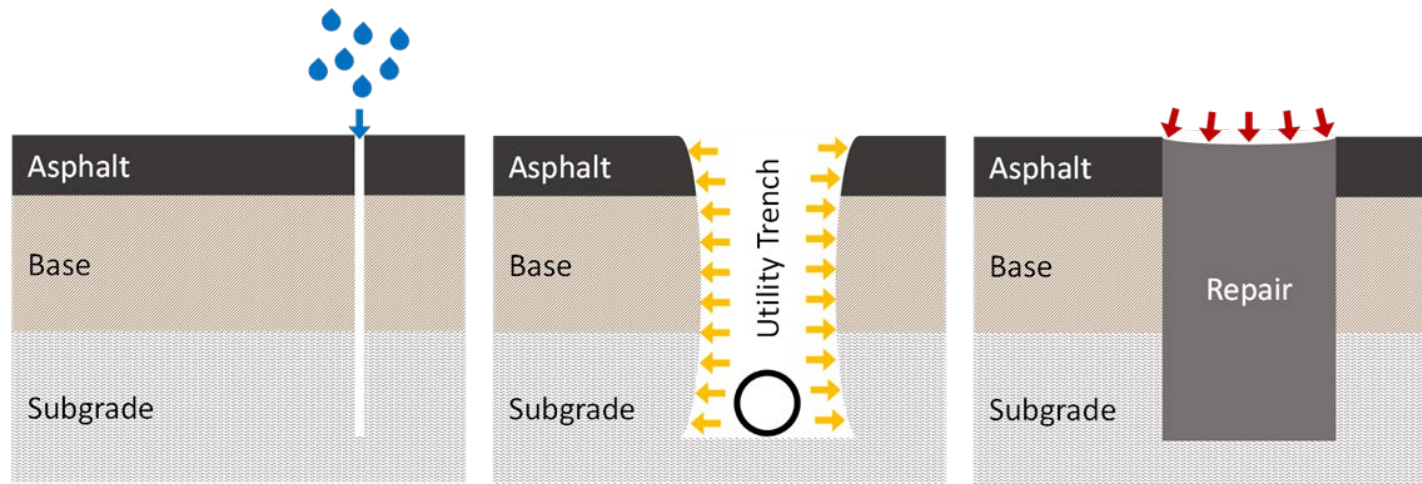
- Minimal Disruption
- Cost-Effectiveness
- Faster Installation

Typical Trench vs Microtrenching

Features	Typical Trench	Microtrench
Size	Usually more than 4" and min 18" deep	2"-4" wide and max 18" deep
Installation Method	Involves extensive restoration	specialized cutting equipment to create a narrow trench
Impact on Surrounding Environment	Significant disturbance of roadways	Minimal disruption and quicker restoration
Cost and Time Efficiency	Large areas, more labor and materials	Small areas, less labor and materials
Applications	Water, sewer, power line	Telecommunication infrastructure



Impact of Pavement Cuts



1. Increased Water Access to Pavement Structure

2. Reduced Lateral Support

3. Increased Surface Roughness

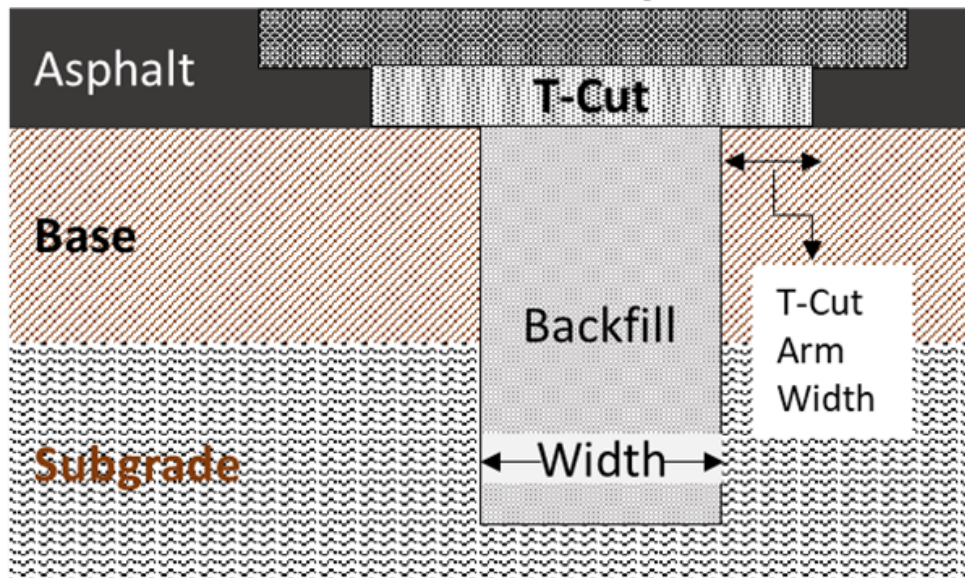
- Surface Cracking and Deformation
 - Stress Concentration
- Base and Subbase Damage
 - Material Displacement/Uneven Support
 - Load Bearing Capacity Reduction
- Soil Settlement and Compaction
 - Settlement over time
 - Potholes/Sagging/Depression
- Edge Failure and Raveling
 - Reduction in Lateral Load Transfer
 - Erosion/Raveling
- Drainage Disruption
 - Water Accumulation
 - Pothole
- Surface Layer Degradation
 - Bond Weakening Between Layers

Impact of Pavement Cuts



- Proper Equipment Use
- Support and Reinforcement
- Quality Backfilling and Compaction
 - Prevent settlement
 - Prevent voids
- Proper Restoration
 - T-Cut
 - Restoration beyond T-Cut
 - Patching
 - Overlay
 - Surface Seal

Restoration Beyond T-Cut



Right
Restoration
after cut is very
crucial

Microtrenching in California

- Increased variety of demands → Improved access to high-speed internet is needed
- High-speed internet → wireline and wireless broadband infrastructure needed
- Broadband infrastructure is installed either aerially or underground.
- Wireless broadband service relies on wireline facilities, especially fiber backhaul lines.
- Deployment of fiber is critical
- Quick and cost-effective ways to install fiber is needed.
- Local agencies can help promote the deployment of fiber by expediting fiber permit applications

In California, the combination of **Government Code § 65964.5**, **Assembly Bill 1449** and **Senate Bill 378** represent proactive approach to enhancing telecommunications infrastructure through microtrenching.

Microtrenching in California

California Government Code § 65964.5, 2018

- Facilitates small wireless facility deployment
- Encourages microtrenching for utility lines
- Requires reasonable local regulations without delays
- Establishes clear guidelines for permitting and maintenance
- Sets timelines for local application reviews
- Promotes coordination between providers and local governments

Cal. Gov. Code § 65964.5

[Download PDF](#)

Current through the 2024 Legislative Session.

Section 65964.5 - Microtrenching for the installation of underground fiber

(a) For purposes of this section, the following definitions apply:

(1) "Fiber" means fiber optic cables, and related ancillary equipment such as conduit, ancillary cables, hand holes, vaults, and terminals.

(2) "Local agency" means a city, county, city and county, charter city, special district, or publicly owned utility.

(3) "Microtrench" means a narrow open excavation trench that is less than or equal to 4 inches in width and not less than 12 inches in depth and not more than 26 inches in depth and that is created for the purpose of installing a subsurface pipe or conduit.

(4) "Microtrenching" means excavation of a microtrench.

(b)

(1) The local agency with jurisdiction to approve excavations shall allow microtrenching for the installation of underground fiber if the installation in the microtrench is limited to fiber,

Microtrenching in California

Assembly Bill 1449, 2019

- Streamlines local permitting for wireless facilities, particularly small cell installations.
- Promotes 5G deployment and broadband expansion in underserved areas.
- Establishes statewide standards for wireless infrastructure permitting.
- Limits the fees that local governments can charge for wireless facility installations.
- Encourages use of existing infrastructure to minimize the need for new towers.
- Ensures compliance with public health and safety standards regarding wireless facilities.
- Aims to accelerate broadband deployment, especially for rural areas.

AMENDED IN ASSEMBLY APRIL 22, 2019

CALIFORNIA LEGISLATURE—2019–20 REGULAR SESSION

ASSEMBLY BILL

No. 1449

Introduced by Assembly Member Cristina Garcia

February 22, 2019

An act to amend Section 13956 of the Government Code, relating to victim's restitution, and making an appropriation therefor.

LEGISLATIVE COUNSEL'S DIGEST

AB 1449, as amended, Cristina Garcia. California Victim Compensation Board: victim restitution: eligibility for compensation.

Existing law authorizes, under certain conditions, the compensation of victims and derivative victims of specified types of crimes by the California Victim Compensation Board from the Restitution Fund, a continuously appropriated fund, for specified losses suffered as a result of being a victim of those crimes. Existing law sets forth eligibility requirements and limits on the amount of compensation the board may award, and requires the application for compensation to be verified under penalty of perjury.

An act to add and repeal Section 21080.40 of the Public Resources Code, relating to housing.

Microtrenching in California

- **Senate Bill 378, 2021**
- Simplifies application processes for small wireless facilities.
- Ensures reasonable, non-discriminatory fees based on actual costs.
- Establishes specific timeframes for application reviews and approvals.
- Promotes collaboration between providers and local governments.
- Requires consistent standards for installation and maintenance.
- Mandates clear documentation of fee structures and rationale.



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overnment: broadband infrastructure development project permit processing: microtrenching permit processing c

itory	Bill Analysis	Today's Law As Amended	Compare Versions	Status	Comments To Author
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Senate Bill No. 378

CHAPTER 677

An act to add Section 65964.5 to the Government Code, relating to lo

[Approved by Governor October 08, 2021. Filed with Secretary of St

LEGISLATIVE COUNSEL'S DIGEST

ez. Local government: broadband infrastructure development project permit processing: microtrenching permit processing ordinance.

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a wireless telecommunications facility.

require a local agency to allow, except as provided, microtrenching for the installation of underground fiber if the installation in the microtrench is limited to t
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r its reasonable costs on an application for a permit to install fiber, as provided. By imposing new duties on local agencies with regard to the installation of fiber,

nclude findings that changes proposed by this bill address a matter of statewide concern rather than a municipal affair and, therefore, apply to all cities, includin

Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures

provide that no reimbursement is required by this act for a specified reason.

Microtrenching in California

Senate Bill 378, 2021

Requirements:

- **Local agencies must allow microtrenching** for underground fiber installations, limited to fiber use.
- **Agencies must approve excavations** and amend existing policies to facilitate microtrenching as needed.



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SB-378 Local government: broadband infrastructure development project permit processing: microtrenching permit processing ordinance. (2021-2022)

Text Votes History Bill Analysis Today's Law As Amended Compare Versions Status Comments To Author

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Senate Bill No. 378

CHAPTER 677

An act to add Section 65964.5 to the Government Code, relating to local government.

[Approved by Governor October 08, 2021. Filed with Secretary of State October 08, 2021.]

LEGISLATIVE COUNSEL'S DIGEST

SB 378, Gonzalez. Local government: broadband infrastructure development project permit processing: microtrenching permit processing ordinance.

Existing law, the Permit Streamlining Act, governs the approval process that a city or county is required to follow when approving, among other things, a permit for construction or reconstruction for a development application for a wireless telecommunications facility.

This bill would require a local agency to allow, except as provided, microtrenching for the installation of underground fiber if the installation in the microtrench is limited to fiber. The bill would also require, if the local agency does not have a policy, to adopt or amend existing policies, ordinances, codes, or construction rules to allow for microtrenching. The bill would provide that these provisions do not supersede, nullify, or otherwise alter the requirements to impose a fee for its reasonable costs on an application for a permit to install fiber, as provided. By imposing new duties on local agencies with regard to the installation of fiber, the bill would impose a state-mandated local program.

The bill would include findings that changes proposed by this bill address a matter of statewide concern rather than a municipal affair and, therefore, apply to all cities, including charter cities.

The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

Microtrenching Overview

- Definition: Technique for installing utility lines and fiber optics with minimal disruption.
- Benefits:
 - Reduces traffic impact.
 - Enables quicker high-speed internet access in urban areas
 - Approx. 1,500 ft of deployment per day
- Key Features:
 - 2 to 4 inches wide, up to 12 inches deep.
 - Used for fiber optics and other utilities.
- Installation Guidelines:
 - Continuous, uniform edges required.
 - Prohibited in sensitive areas (e.g., sidewalks).
 - Must meet street paving standards for materials.
- Restoration:
 - Surfaces must be restored to original or better condition.
 - Ensure durability and aesthetic consistency



What to Know Before Microtrenching

- Regulatory Compliance
 - Permits
 - Local Guidelines
- Site Assessment
 - Utility Mapping
 - Soil Conditions
 - Surface Type
- Equipment and Technology
 - Specialized Tools
 - Technology Requirements
- Installation Planning
 - Trench Design
 - Cable Selection
- Traffic Management
 - Public Safety
 - Community Communication
- **Restoration Procedures**
 - **Surface Repair**
 - **Post Installation Assessment**
- Environmental Considerations
 - Erosion Control
 - Biodiversity
 - Wildlife Habitat
 - Vegetation and Trees
 - Waterways and Wetlands

Potential Challenges

- ❑ Effectiveness can vary based on soil conditions; rocky or hard soils may pose challenges.
 - Settlement of trenches overtime because of poor compaction or under traffic
 - Public hazard if on bike lane due to dip



- ❑ Installation and surface restoration could be challenging
 - Matching the color of their trench fill material to the adjacent pavement material
 - Keeping the trench backfill material contained within trench
 - Maintaining uniformity of trench cuts on older/fatigued pavement



Potential Challenges

- ❑ Existing underground utilities can complicate the process, requiring careful planning and coordination.
- ❑ Local regulations may impose restrictions on the times and methods of installation.
- ❑ Cracks could form around the edge of the microtrench and thus a proper restoration of the cut is very crucial.
- ❑ Right way to restore the pavement after cut is very crucial

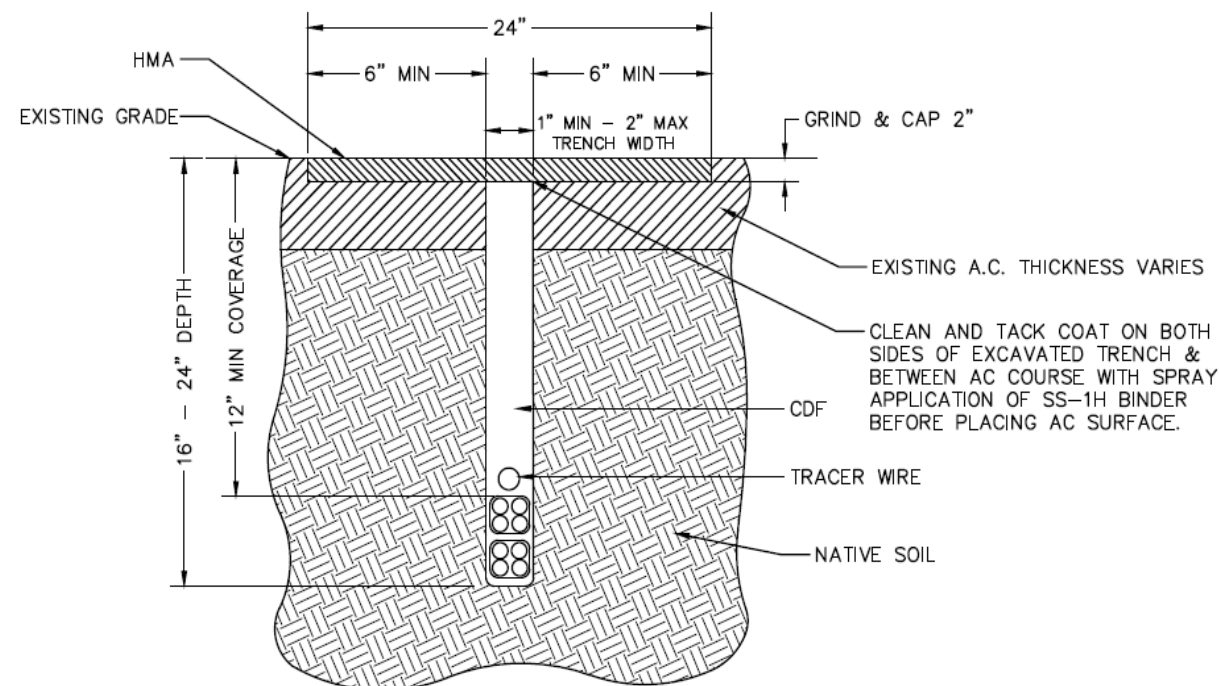
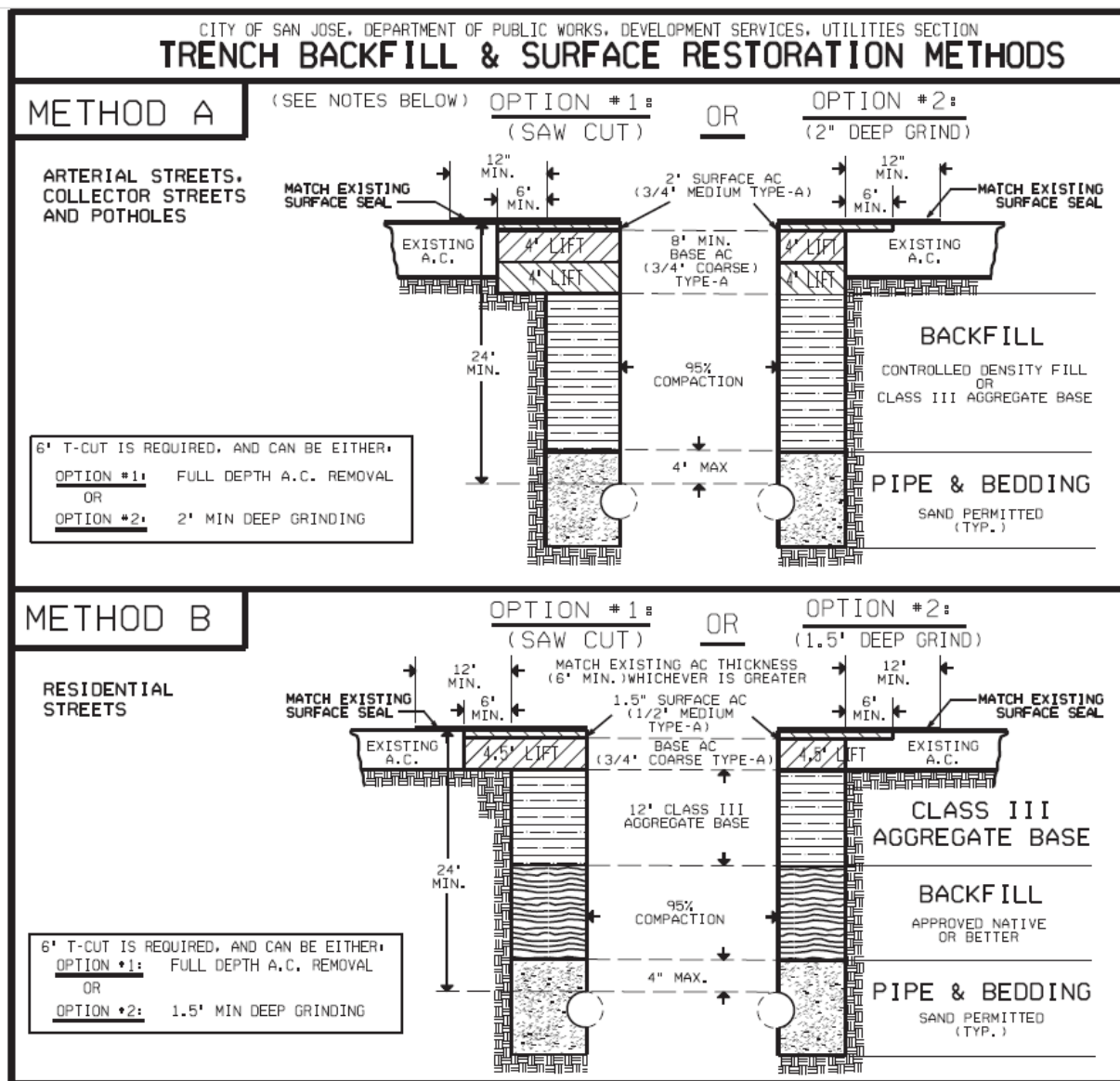


Microtrenching Standards

- ❑ **CPUC:** Oversees utility regulations, including telecommunications.
- ❑ **Caltrans:** Sets standards for state highway rights-of-way, including microtrenching guidelines.
- ❑ **Utility Companies:** Entities like AT&T and Comcast may have specific standards.
- ❑ **Industry Organizations:** TIA and FOA provide best practices and recommendations.
- ❑ **Local Public Works Departments:** Cities have guidelines for utility installations, including microtrenching.
- ❑ **Local Municipalities:** Standards may vary widely across cities and counties.

Restoration Standards

Restoration Comparison –San Jose

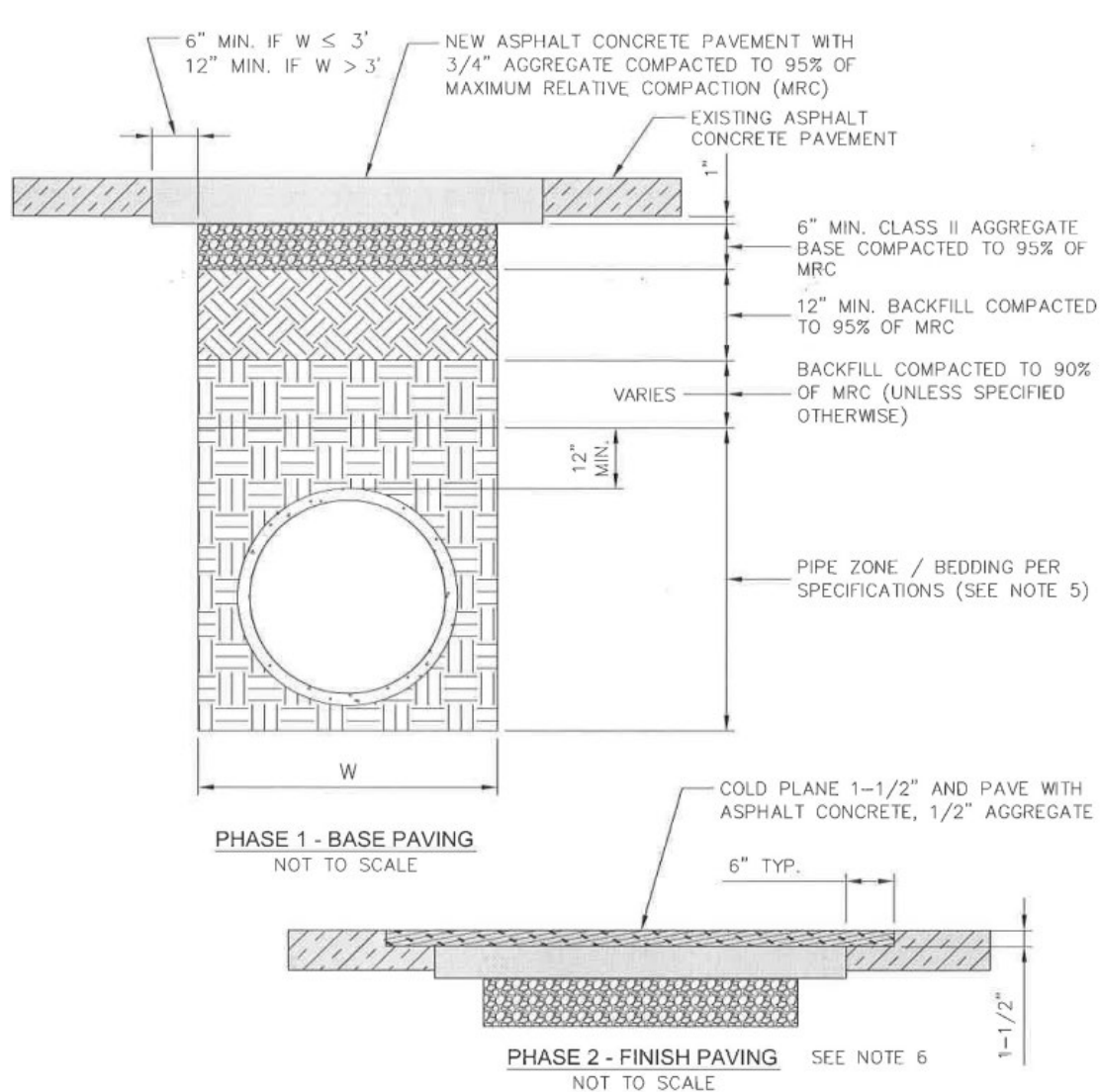


Microtrenching Restoration

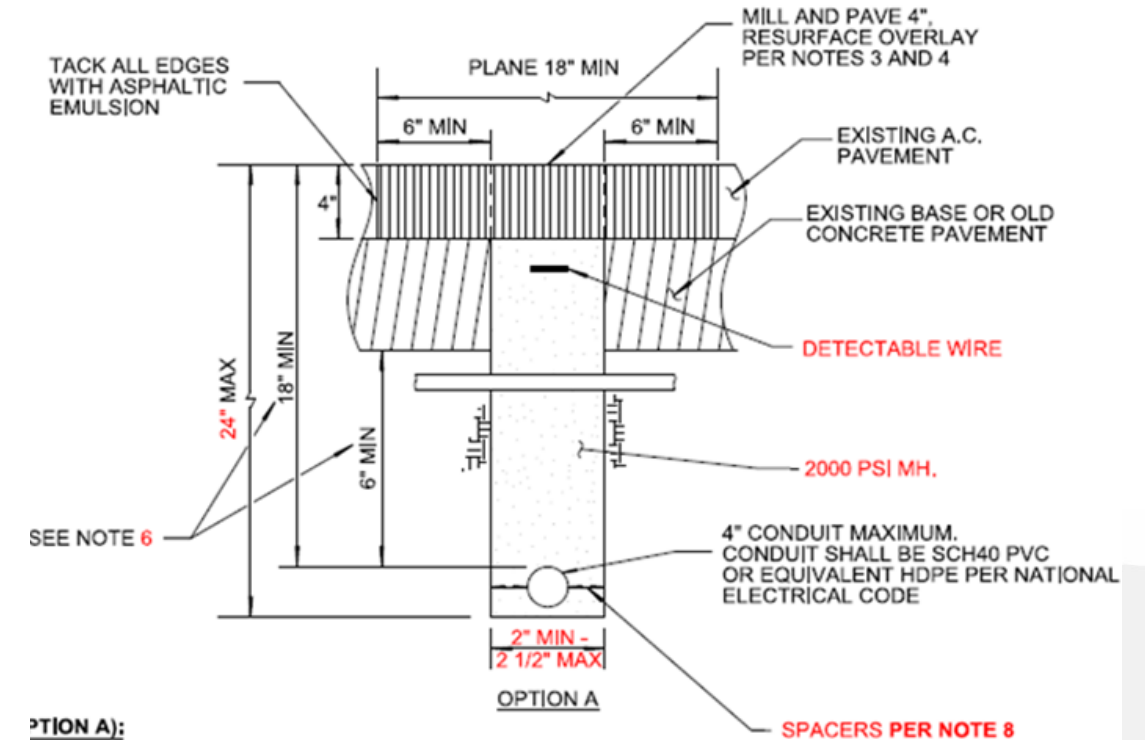
- Surface seal vs no surface seal
- Backfill Material

Typical Trench Restoration

Restoration Comparison –San Diego



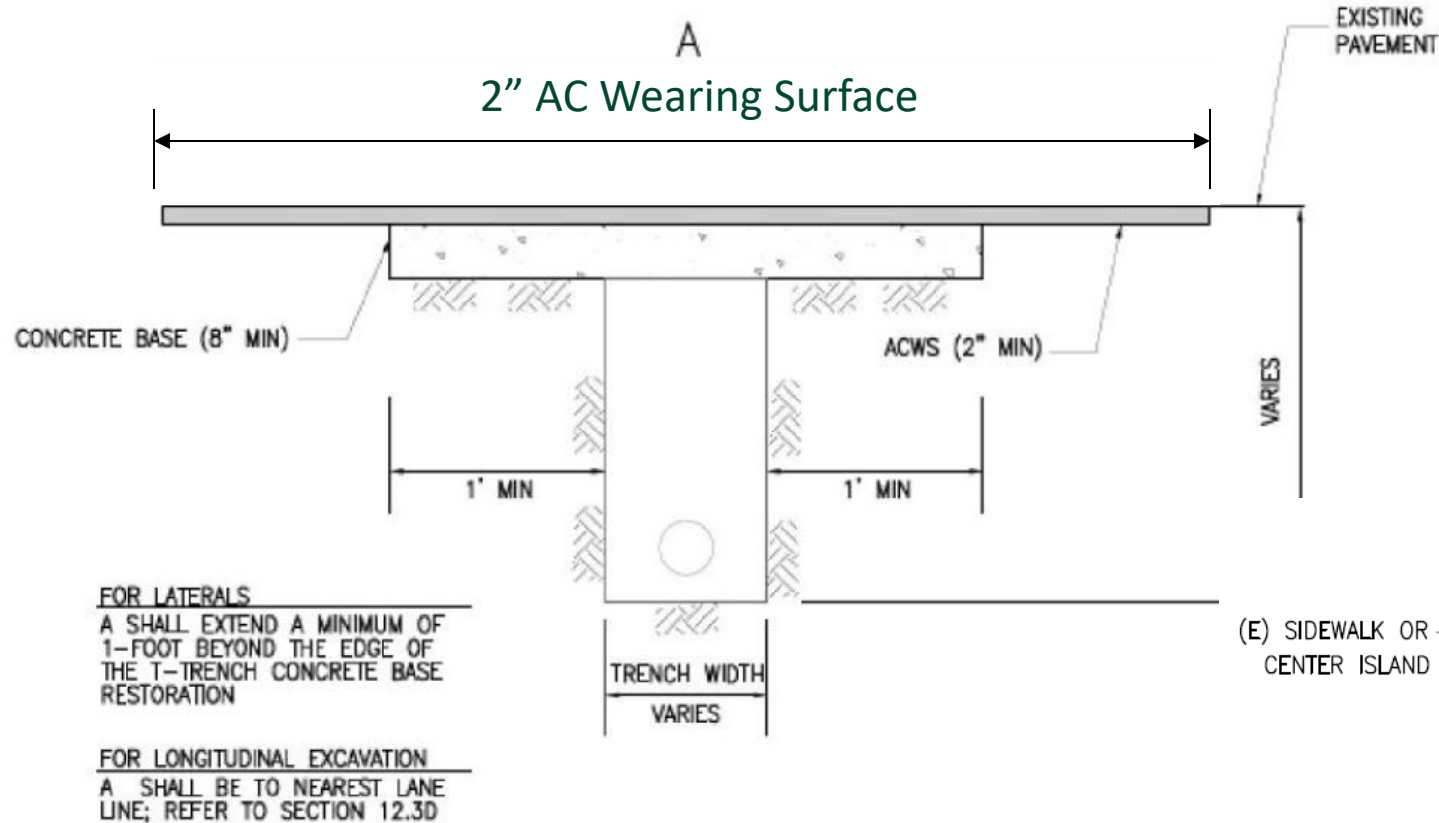
Typical Trench Restoration



Microtrenching Restoration

Extended T-arm with paving vs no paving

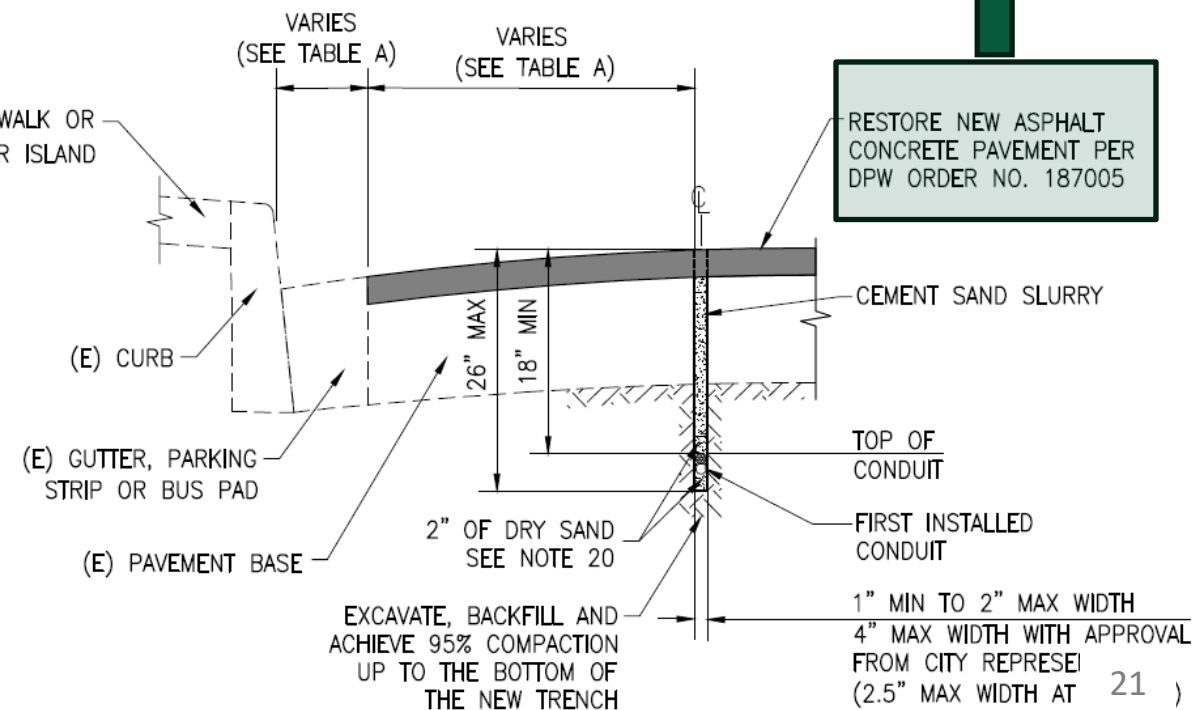
Restoration Comparison –San Francisco



Typical Trench Restoration

Same restoration for typical trench and microtrenching

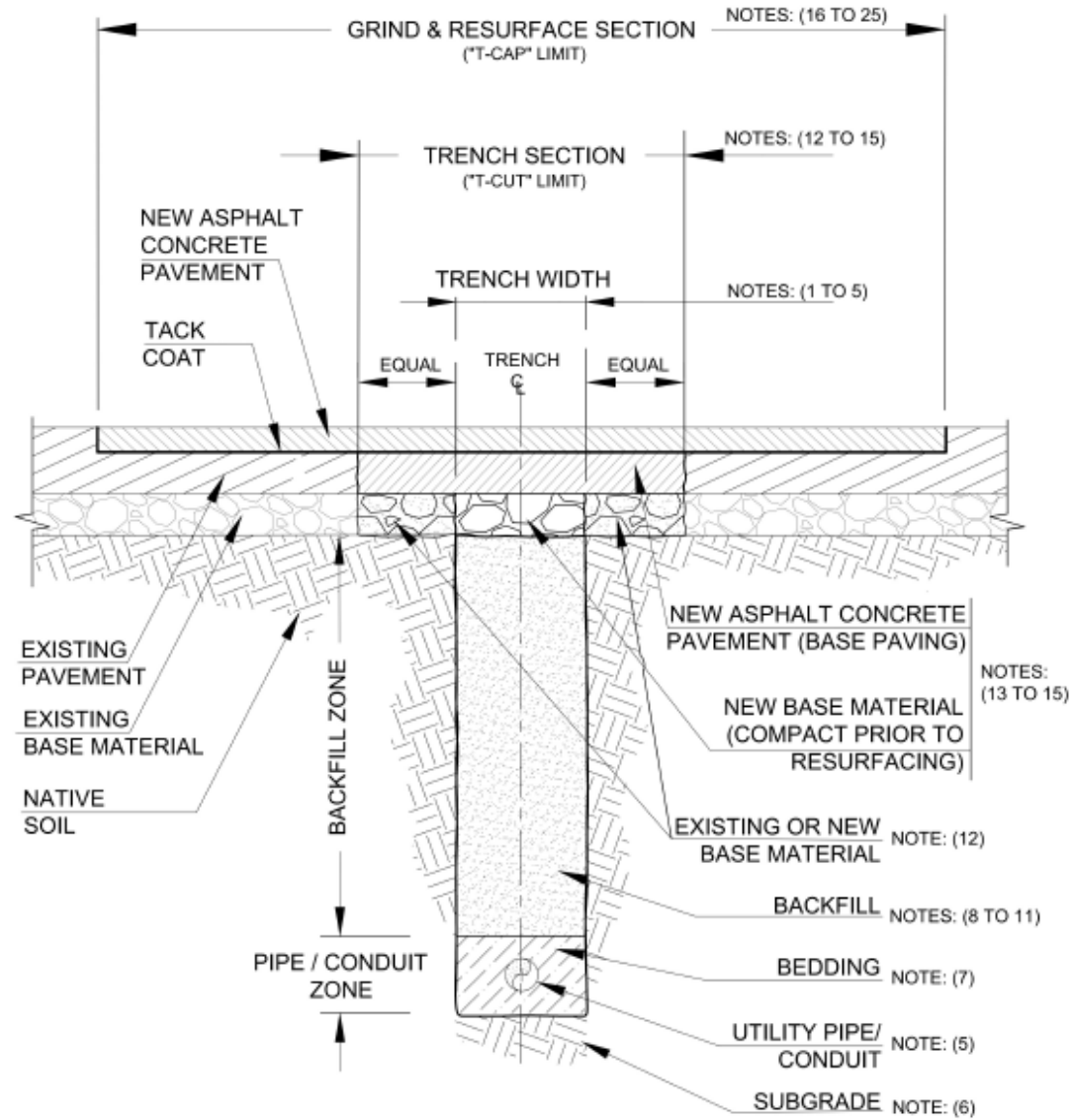
Microtrenching Restoration



Regulations for
Excavating and
Restoring Streets in
San Francisco

RESTORE NEW ASPHALT
CONCRETE PAVEMENT PER
DPW ORDER NO. 187005

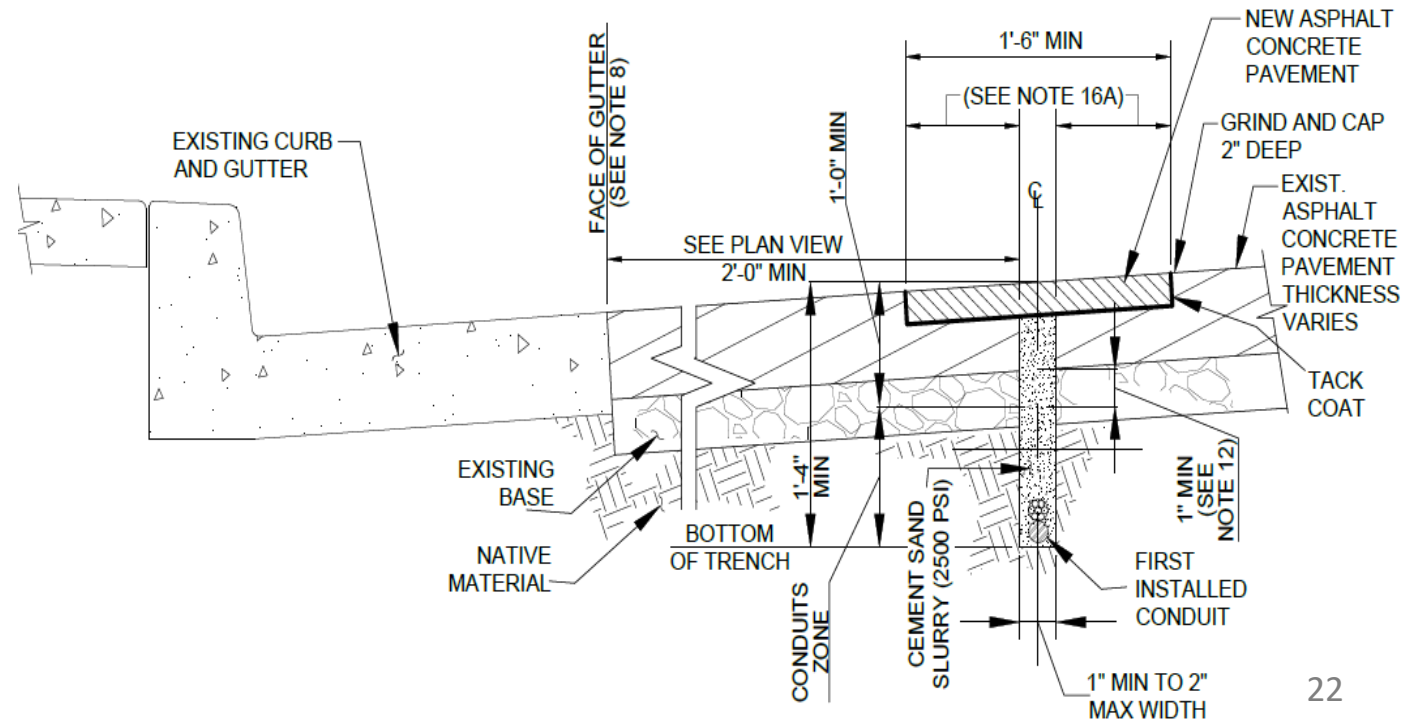
Restoration Comparison –LA City



Typical Trench Restoration

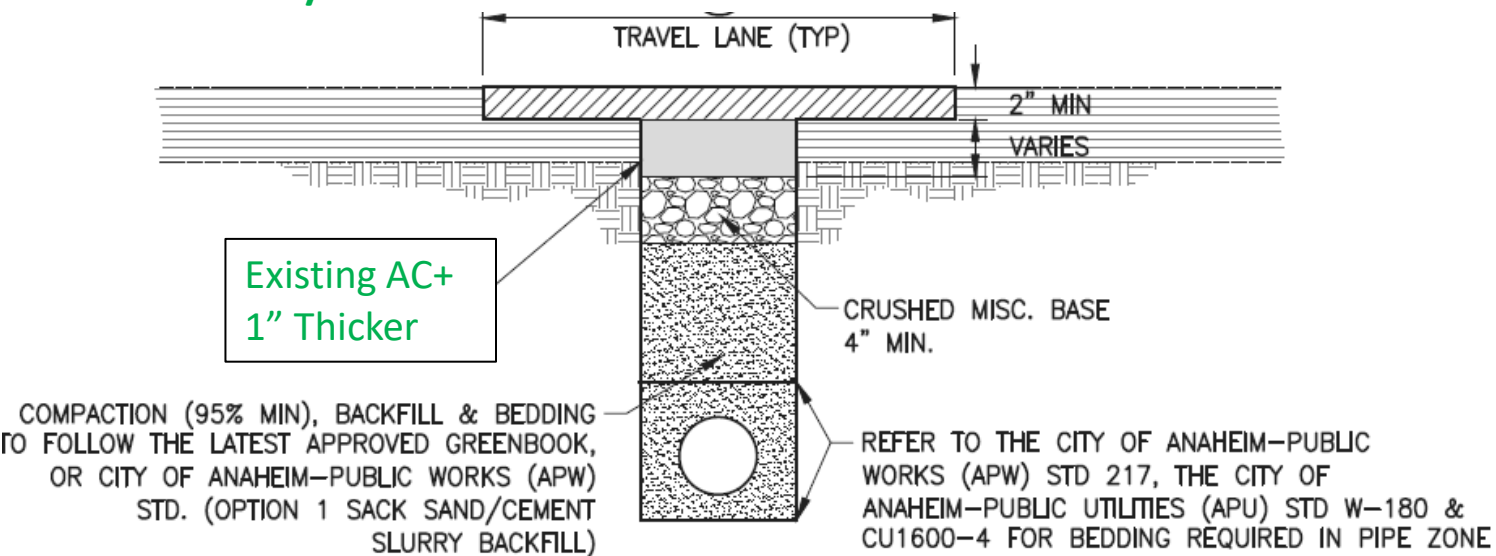
- Restoration beyond T-Cut vs No Restoration
- AB along T-Cut vs no AB

Microtrenching Restoration

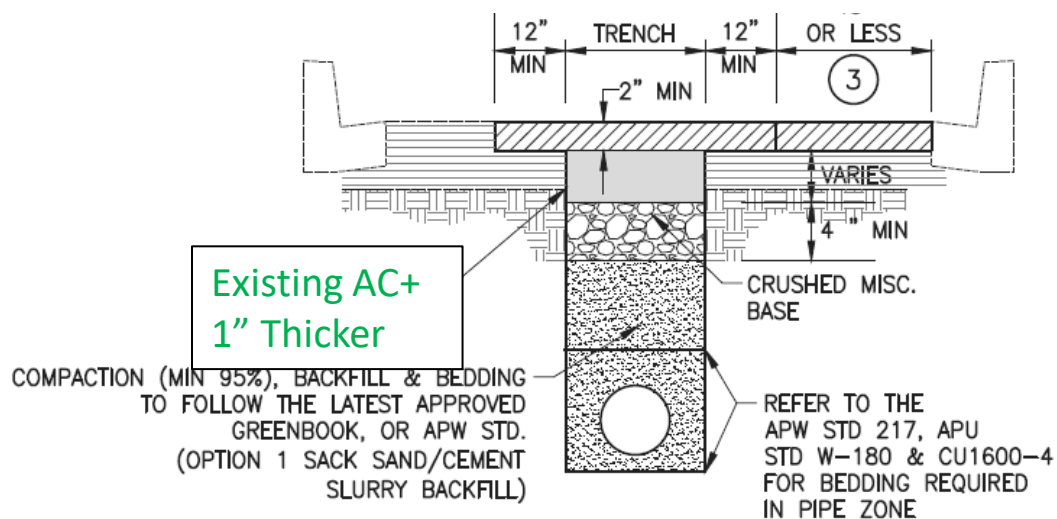


Restoration Comparison –Anaheim

Art/Col: Entire Lane Width- 2" Grind and Pave



Local Street: T-Cut- 2" Grind and Pave

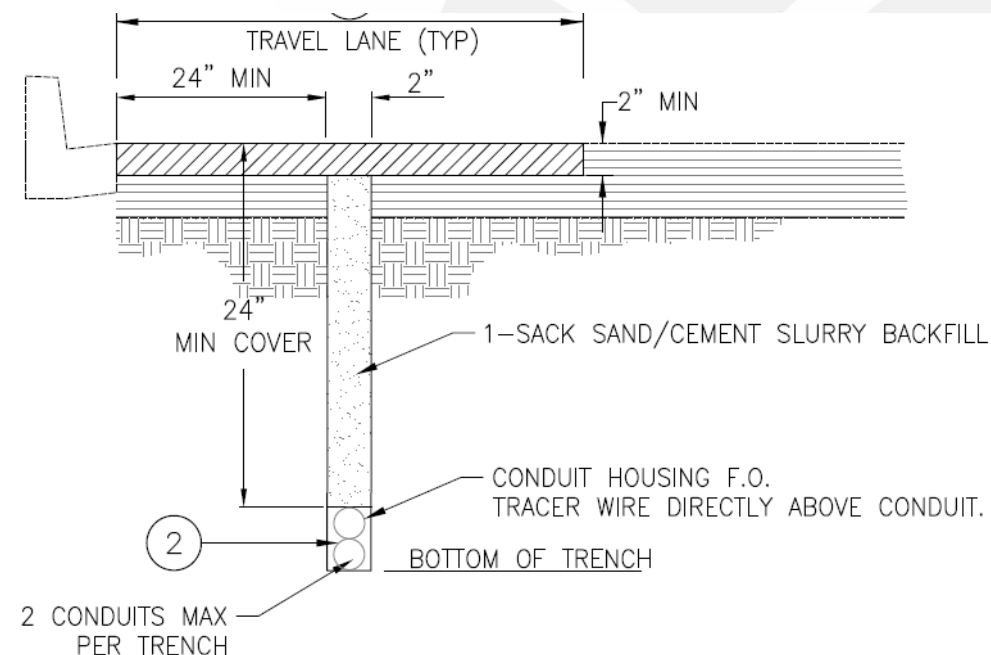


Typical Trench Restoration

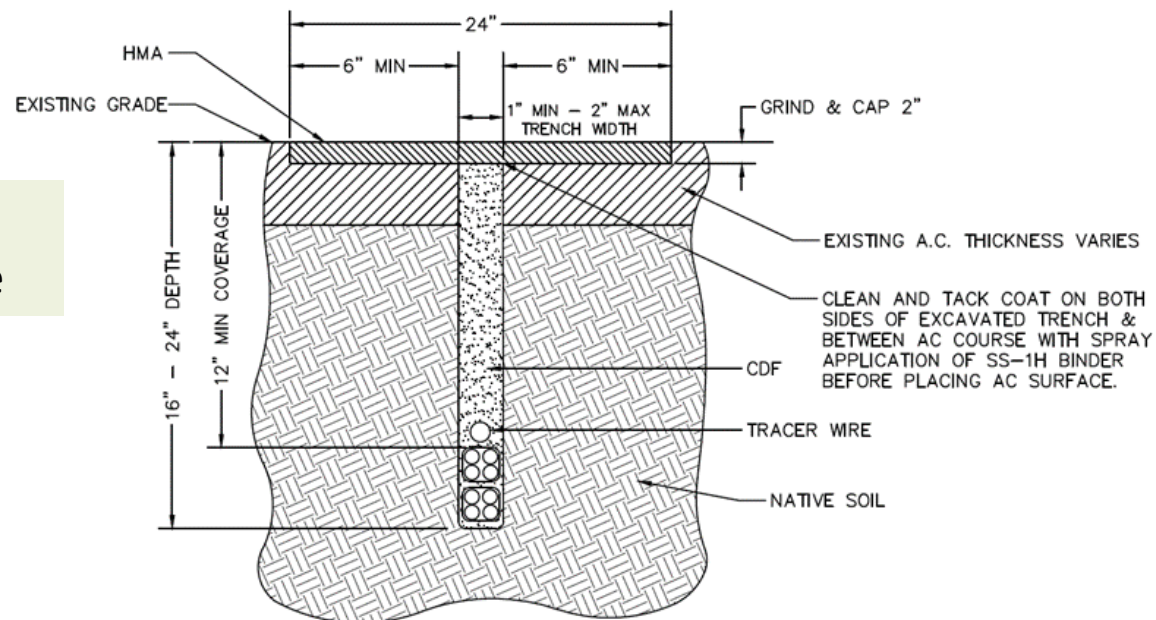
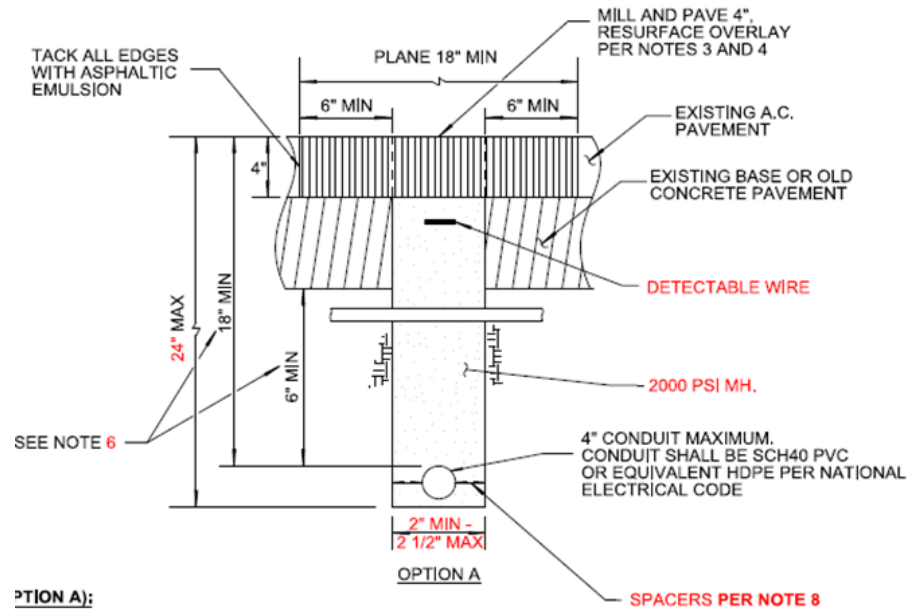
- Restoration by FC vs General Restoration
- 1" Thicker AC than existing vs None

Microtrenching Restoration

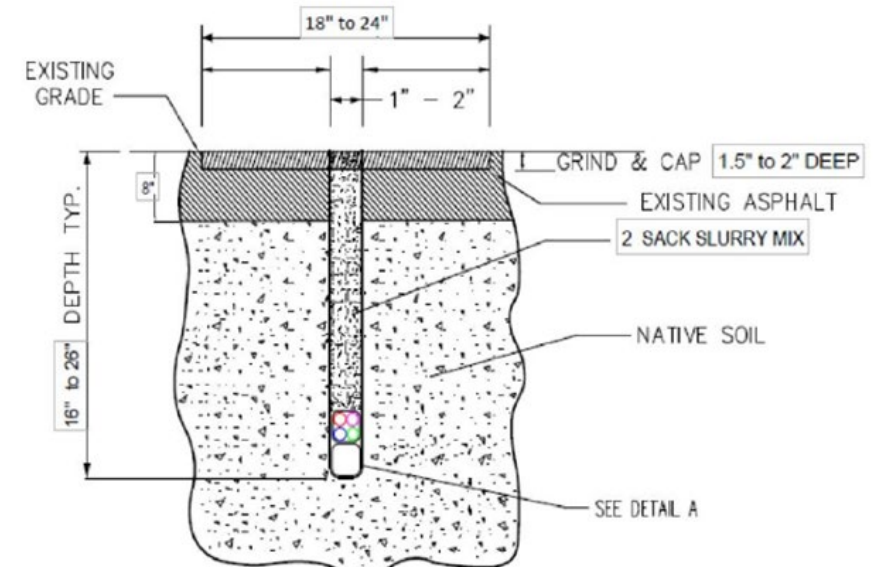
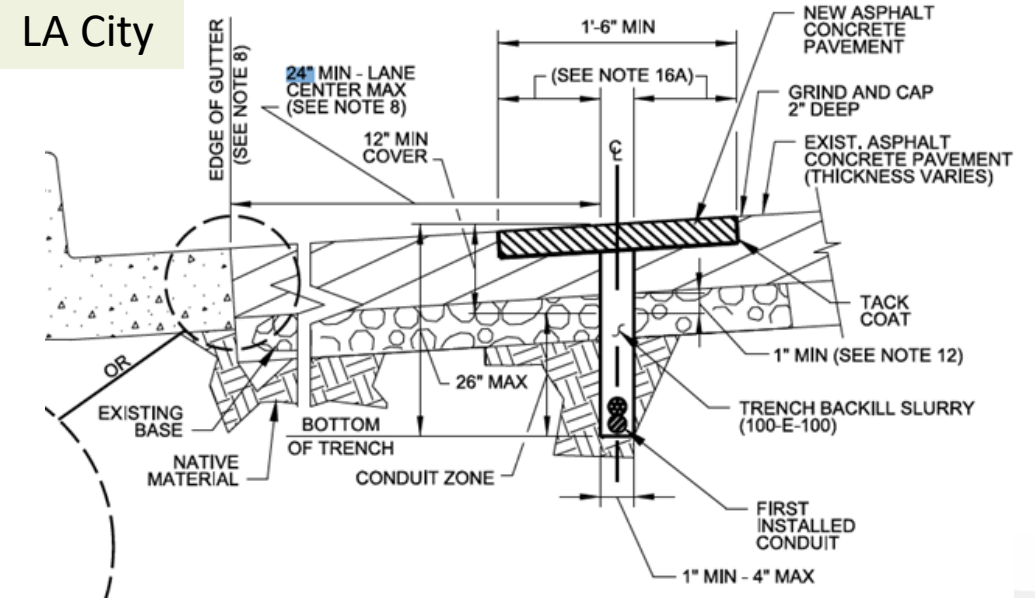
Entire Lane Width- 2" Grind and Pave



San
Diego



San
Jose



Proposed by Verizon

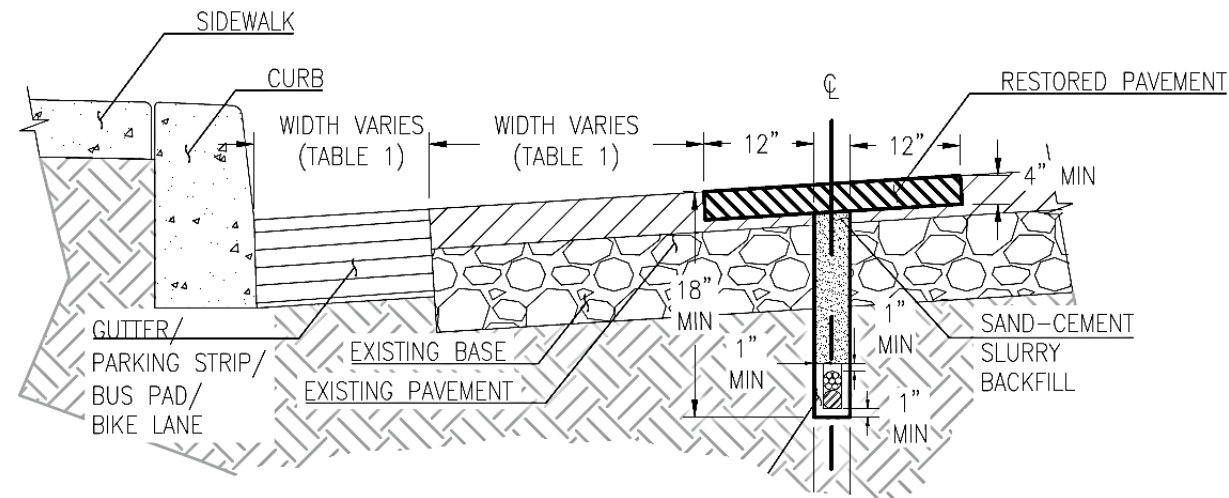
Existing Microtrench Standard Comparison

Agency	Proposed Trench Width	Proposed Trench Depth	Distance from Curb/Gutter	T-Cut Depth	T-Cut Width	Restoration Requirement	Backfill Material
Verizon	1"-2"	16"-26"	8"-9"	1.5"-2" Grind and Cap	18"-24"	None	2 Sack Slurry Mix
LA County March 2022	1"-4"	Max. 26"	Min. 24"	2" Grind and Cap	Min. 18"	Bike lane: full width If within less than 24" of curb/gutter: full width	Trench backfill slurry (100-E-100)
San Jose Dec 2021	1"-2"	16"-24"	Min 36"	2" Grind and Cap	Min. 24"	None	Control Density Fill (CDF) that meets the below requirements: a. 24 hour minimum strength: 100 psi b. Fully cured (28 day) maximum strength: 1000 psi Mix design is required
San Diego July 2021	2"-2.5"	Max. 24"	Against curb-gutter lip OR Min. 24" 36" (if Bike lane)	4" Grind and Cap	min. 18" width or 12" wider than the trench width (whichever is greater)	Bike lane: full width	2000 PSI Slurry Trench Backfill
San Francisco 2023	2"-4"	18"-26"	Min. 48"	Min. 8" Concrete	Min. 12" on each side	2" Grind and Pave beyond T-Cut; Bike lane: Full width	Fiber reinforced backfill material
Anaheim 2022	Max. 2"	24"	Min. 24"	2" Grind and Cap	Pave Full Width Travel Lane	Pave Full Width Travel Lane	1- Sack Sand + Cement Slurry

Typical Microtrenching Details

GENERAL

- Width- Min. 2" to Max. 4".
- Depth- Min. 18" to Max. 26".
- Location - Outside of the wheel path to the extent possible to minimize vehicular loading.



RESTORATION TECHNIQUE

- T-Cut: T-arm width- Min. 12"
- Restoration along T-cut : Min. 4" mill and overlay.

Feature	Typical Width from Face of Curb	Distance to Left Side Edge of Microtrenching
Curb Only	n/a	Min 24" from face of curb; Max center of travel lane
Gutter	Typical 24" (varies)	Min 24" from gutter lip; Max center of travel lane
Parking Strip	7' to 10'	Min 24" from gutter lip or face of curb if no gutter; Max center of parking strip
Bus Pad (Asphalt)	10'	Min 48" from gutter lip or face of curb if no gutter; Max center of bus pad
Bus Pad (Concrete)	10'	No microtrench is allowed along concrete bus pad; Min 24" from inside edge of concrete bus pad Max center of travel lane
Bike Lane	5' to 6'	Min 24" from gutter lip or face of curb if no gutter; Max bike lane center Pave entire bike lane width

Typical Microtrenching Requirements

- **Edges:** Must have continuous, uniform, and neat edges.
- **Prohibited Areas:** Not allowed in sidewalks, parkways, bus pads, curbs, gutters, decorative asphalt, signalized intersections, or moratorium streets.
- **Bike Lanes:** Entire width must be paved with a 4-inch mill and overlay.
- **Compaction and Materials:** Specifications must align with street paving standards (e.g., AC density, mix properties, tack coat).
- **Documentation:** The location of the microtrenching to avoid future construction complications.

Microtrenching Pilot Projects

- **Los Angeles, CA**
 - Downtown Los Angeles: Focused on high-traffic zones to evaluate the impact on urban infrastructure.
 - Westside: Areas like Santa Monica Boulevard were included, targeting neighborhoods with high broadband demand.
 - Hollywood: Selected to assess the effectiveness of microtrenching in a densely populated environment.
- **San Francisco, CA**
 - Market Street: A key thoroughfare in the city with significant pedestrian and vehicular traffic.
 - Mission District: An area known for its vibrant community and increased demand for digital connectivity.
 - South of Market (SoMa): A tech-centric neighborhood that serves as a hub for many startups and tech companies.
- **San Jose, CA**
 - Downtown
 - Neighborhoods with Limited Broadband Access
- **Seattle , WA**
 - South Lake Union, Capitol Hill, Downtown
- **Austin, Texas**
- **Chicago, IL**

Summary

- Be prepared for increased microtrenching
- Standards need to be balanced between agency and provider
- Coordination between agencies and providers is important
- Permitting process needs to be simple and less time-consuming
- Surface restoration is crucial and needs to follow local guidelines
- Quality of backfill materials needs to be ensured
- If microtrenching in a bikelane, the full width bikelane needs to be paved
- T-Cut is a common restoration practice to enhance pavement performance

THANK YOU

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