

Dig Smart



California Department of Transportation

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Introduction

Caltrans is researching existing broadband coordination policy and practices. This document summarizes existing broadband planning and communication policies from various cities and states throughout the country. This document is an information tool that highlights best practices for future Caltrans guidance and policy development.

Background

A variety of federal and state policies across the nation encourage wide-scale deployment of advanced telecommunications capabilities to improve wireline broadband access. The Federal Communications Commission (FCC) reports that 53 percent of Americans in rural areas lack access to high-speed services¹.

These statistics are reflected in California where only 47 percent of households in rural areas have access to broadband speeds of at least 6 Megabits per second (Mbps)². Deploying high-speed broadband infrastructure in underserved regions remains a challenge in California. The FCC reports that 90 percent of the cost to deploy broadband is associated with burying the conduit and fiber optic cables underground³.

Assembly Bill 1549

Assembly Bill 1549 (AB-1549), Statutes of 2016 requires the California Department of Transportation (Caltrans) to assist in closing the Digital Divide by notifying broadband companies of roadway projects for broadband collocation opportunities. This creates great potential to connect local anchor institutions – public safety agencies, government offices, schools and hospitals – and tie communities together while connecting them to the rest of the world. It is a tool used for education, health, emergency services and an essential component of a thriving economy. Closing the Digital Divide in California will increase economic growth, global competitiveness and improve the quality of life across the state.

In compliance with AB-1549, Caltrans has developed a user guide on how to incorporate broadband into transportation projects entitled “Incorporating Wired Broadband Facilities on State Highway Right-of-

¹ “2015 Broadband Progress Report,” Federal Communications Commission, <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report>, (February 4, 2015)

² “California Public Utilities Commission: Annual Report,” California Public Utilities Commission, http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Annual_Reports/2016%20Annual%20Report.pdf, (2016)

³ “Executive Order: Accelerating Broadband Infrastructure Deployment,” Federal Highway Administration, <https://www.fhwa.dot.gov/policy/otps/workpla.cfm>, (December 2012)

Way⁴.” Additionally, Caltrans provides a contact list and a map of proposed transportation projects on the State Highway System as a communication tool with broadband providers. The goal of this paper is to identify policies which improve broadband coordination and communication beyond AB-1549 requirements.

This paper identifies cities and states across the U.S. with policies and practices which facilitate joint highway and broadband planning. This information will serve as the basis for developing future broadband coordination policy.

State Policy

This section identifies States with policies and practices that facilitate joint highway and broadband planning.

Maryland

Summary: Maryland Department of Transportation (DOT) coordinates with nonprofit internet providers and local utilities to install conduit for future use and provides right-of-way access without charge to entities such as the Maryland Broadband Cooperative. The state achieves interoperability and reduces capital costs for communications infrastructure through resource sharing which allows for the cooperative to provide fiber internet as an in-kind payment for use of the right of way.

- Agreements with Nonprofit Internet Service Providers (ISPs)
 - Nonprofit ISPs install the conduit while saving in Right-of-way costs.
- Sharing highway right-of-way use:
 - Providing the ISPs shared use of the highway’s right-of-way results in monetary and in-kind compensation such as developing and expanding broadband networks while satisfying both the State and Federal requirements.
- Right-of-way value:
 - The fair market value or rent of right-of-way is difficult to quantify. Currently, the Maryland DOT receives an in-kind payment of meeting Federal and State broadband mandates.
- Recommendations provided by the State

⁴ “Wired Broadband Facilities on State Highway Right of Way,” Caltrans, <https://dot.ca.gov/programs/design/wired-broadband>, (2019)

- Encourage the use of trenchless technologies (e.g. Maryland uses horizontal directional drilling methods for most construction projects)
- Install conduit for future use
- If the conduit is installed and owned by a private entity, leasing rates remain competitive may request the private entity install additional conduit to be owned by the city/state (as in the Boston approach), so that the public entity may rent out the conduit at competitive rates
- Identify environmentally-sensitive areas early
- Develop a comprehensive inventory of State and locally owned assets that could be used to implement a broadband system.

Minnesota

Summary: The state promotes broadband conduit coordination between the Minnesota DOT and private entities, connects broadband infrastructure to Intelligent Transportation Systems (ITS) and co-locates fiber/conduit in the same trench with other utilities. Their policy includes a competitive process which allows providers to install infrastructure when the right-of-way is open for utility work.

- Statutes on Broadband: See 116J.39 – 116J.40⁵
- The Office of Broadband Development’s Coordination of Broadband Infrastructure Development (2013)
 - “The office shall, in collaboration with the Department of Transportation and private entities, encourage and coordinate "dig once" efforts for the planning, relocation, installation, or improvement of broadband conduit within the right-of-way in conjunction with any current or planned construction, including, but not limited to, trunk highways and bridges.”
 - Encourage and assist local units of government to adopt and implement similar policies.
 - One trench may include conduit/fiber for city, county, state, school levels and additional unused strands for future use
 - Connects fiber infrastructure to city/county ITS

⁵ “2017 Minnesota Statutes,” The Office of the Revisor of Statutes, <https://www.revisor.mn.gov/statutes/?id=116J>, (2017)

Illinois

Summary: Illinois DOT and ISPs collaborate to install fiber in new state-funded construction. The DOT issues public bidding notices that emphasize the installation of conduit or cable. The state has also successfully combined water and broadband projects to reduce costs.

- DOT is required to install conduit in road excavation projects
 - Three 1.5” diameter conduits: two reserved for the DOT and the third is excess
- Public bidding notices must describe the need for fiber-optic conduit or cable
- Either the Illinois Department of Transportation or the Department of Central Management may permit a third party to manage the fiber and conduit leasing⁶
- The departments must take reasonable steps to ensure market-based, non-discriminatory pricing.⁷
- Found that multiple vendors will not pull their cable through the same duct and suggests exploring a micro-duct system
- Successful coordination with the National Telecommunications and Information Administration (NTIA)

Utah

Summary: Utah DOT successfully facilitated cooperative fiber and conduit trades with broadband service providers to expand its communications network across the state without major capital investment. Utah DOT's approach to deploying broadband has also advanced ITS initiatives in the state, as well as promoted economic growth by enabling access to broadband in both urban and rural areas. Through frequent meetings with telecommunication companies, creating open right-of-way, extensive information sharing and trading assets with telecommunication companies, the state has doubled their network, which now includes 900 miles of conduit owned by the DOT and about 1,000 miles obtained through trades. These public-private partnerships have saved the state and taxpayers millions of dollars and expanded their network to rural areas across the state.

- Install empty conduit along major routes during highway construction
- Telecommunication companies have access to highway right-of-way for build-outs
- Extensive mapping of fiber locations
- Detailed Utility Coordination Manual of Instruction:

⁶ “Installation of fiber-optic network conduit,” Illinois General Assembly. <http://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=060500050K9-131>, (July 13, 2009)

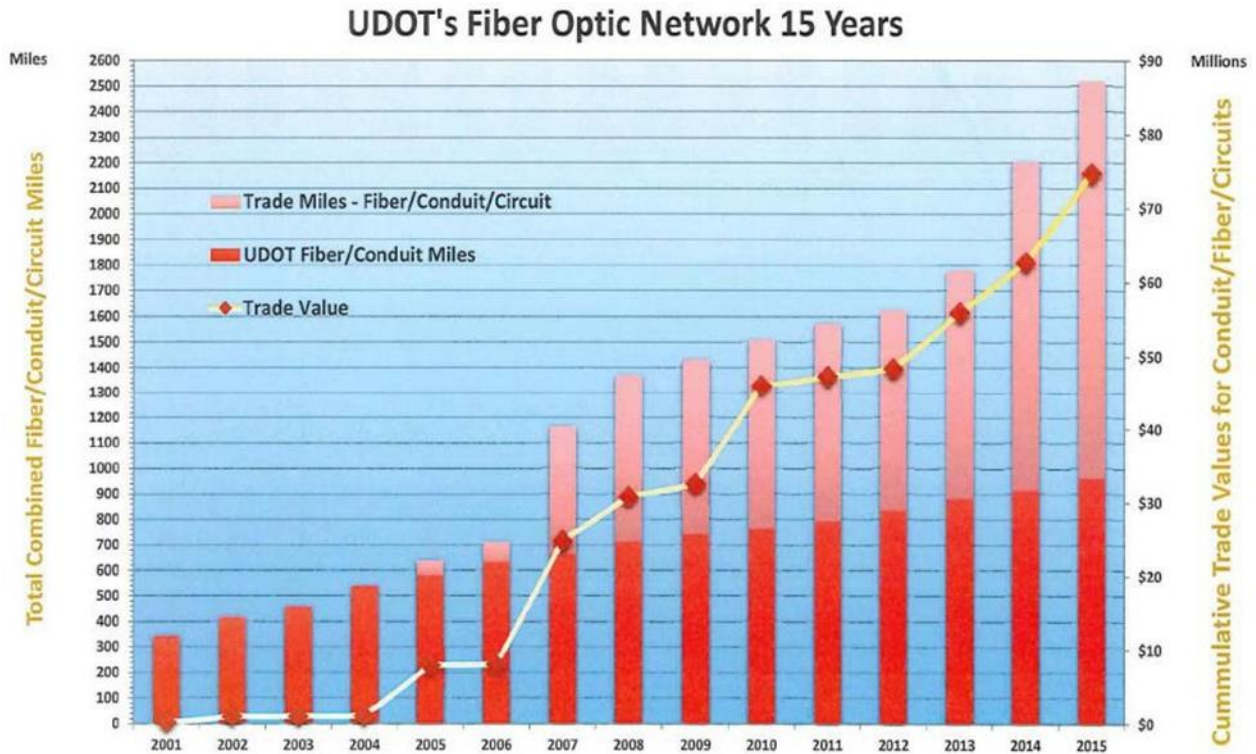
⁷ “Installation of fiber-optic network conduit,” Illinois General Assembly, <http://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=060500050K9-131>, (July 13, 2009)

- <https://www.udot.utah.gov/main/uconowner.gf?n=2989808693862464>
- Receives annual “wish list” from telecommunication companies
- Meets with the telecommunication companies frequently about broadband projects. The state has a single point of contact for all telecommunication companies in the state
- Right-of-way is open at all times, allowing for easy access to complete continuous build-outs, and ensuring that no single company has exclusive access and used to reduce permit processing times
- Information sharing with telecommunication companies
 - Fiber and conduit locations, plans for economic development, contact information and web links are also available online to provide the telecommunication companies with information about the area they are servicing
 - Project Database:
http://maps.udot.utah.gov/uplan_data/documents/apps/UDOTProjectsApp/
- How they trade:
 - Utah DOT installs conduit for its own network – sometimes coordinating conduit installation with road construction – and allows private companies to use excess state-owned conduit in exchange for the use of company-owned conduit in areas where the state does not have broadband infrastructure. Utah DOT trades existing or planned fiber/conduit/circuit on a foot by foot basis for 30 years with automatic 5-year renewals. Ownership and maintenance of fiber varies between Utah DOT and telecoms. Resulted in large cost savings since they were able to extensively expand their infrastructure without major investment, as shown in Figure 1
- Success
 - Trading assets with the telecommunication companies has resulted in significant savings for the state
 - Utah DOT, in comparing two rural broadband deployment projects, estimated cost savings of roughly 15.5 percent per mile when conduit and fiber were installed during a road project rather than being installed independent of a road project⁸

⁸ “Expected Life Study: Telecommunications and Cable Assets,” Nevada Department of Taxation, <https://tax.nv.gov/uploadedFiles/taxnv.gov/Content/Meetings/Expected%20Life%20Study-Telecommunications%20and%20Cable%20Assets.pdf>, (April 2015)

Figure 1

Trade values grow as Utah increases amount of fiber/conduit/circuit miles traded. The state successfully doubled their network size through this infrastructure trading program.



Nevada

Summary: Nevada promotes the policy through local model guidelines and recently passed legislation which allows the DOT to enter into agreements with telecommunication companies and establishes procedures for the valuation of in-kind compensation paid by telecommunication companies to the department for the right-of-way access they receive. Nevada passed Senate Bill 53 on May 25, 2017⁹:

- Authorizes the DOT to grant longitudinal access to right-of-way for telecommunication companies
- Telecommunication companies required to fairly compensate DOT
 - In-kind compensation for right-of-way access
 - DOT agreements for telecommunication companies to use excess conduit

⁹ "Senate Bill 53," Nevada Legislature, <https://www.leg.state.nv.us/App/NELIS/REL/79th2017/Bill/4693/Text>, (May 25, 2017)

City Policy

This section identifies Cities with policies and practices that facilitate joint highway and broadband planning.

Boston

Summary: Boston's 1994 "joint build" policy successfully reduced costs, number of excavations and project delivery times through information sharing, micro-trenching, and sharing costs between all companies involved in the build-out. They implemented a "shadow conduit policy" where the first company to request a trench takes a lead role and invites other entities to add additional conduit for future use by the city or other later entrants¹⁰. These procedures worked well in Boston's dense urban setting, however, may be difficult to replicate success in a rural setting.

- Mandated all telecommunication companies to install underground conduits "in the same trench, at the same time on a shared-cost basis"
- Requires lead company and participants to install, at their own expense, extra conduit referred to as "city shadow" alongside the private conduit network, and becomes the property of the City to be used for City purposes
 - Can rent conduit to private telecommunication companies if conduit space is needed
- The lead company and participating telecoms work together to draft the engineering plans, estimate construction costs and submit the built-out application to the City's Public Improvement Commission, the body that reviews and approves the application.¹¹
- Shared Costs
 - Construction costs, including digging the trench, installing the conduit and repaving, are shared by all companies participating in the build-out
- Micro-trenching successful in reducing costs and number of excavations

Chicago

Summary: The City of Chicago's Project Coordination Office coordinates meetings and utilizes a database for scheduled utility work to find opportunities to combine work. The City's initiatives resulted in faster, more complete repairs and \$10 million in DOT savings during its first year (2012).

¹⁰ "Connecting America: The National Broadband Plan," Federal Communications Commission, <https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf>, (March 17, 2010)

¹¹ "Executive Order: Accelerating Broadband Infrastructure Deployment," Federal Highway Administration, <https://www.fhwa.dot.gov/policy/otps/successprac.cfm>, (May 2013)

- The Chicago DOT Office of Underground Coordination is the distribution agency for all requests regarding existing utility information and the review/approval of construction work in or adjacent to the public right-of-way. They process the projects before permits are issued¹²
- Public and private utilities enter their scheduled work into a Project Coordination Office database geocoded onto the street grid
 - Cross-departmental reports are generated to improve coordination and communication
 - Weekly meetings resolve conflicts and find opportunities to combine work

San Francisco

Summary: The City and County of San Francisco requires the installation of City-owned communications infrastructure in excavation projects when technically and financially feasible (Ordinance 220-14). A moratorium on road excavation exists for five years after project completion. This is the most stringent policy and may not be feasible at the state level due to inflexibility.

- Criteria to define eligible utility coordination opportunities¹³:
 - Supports Information and Communication Technology Goals: When determining which utility coordination opportunities to seek, the City must consider potential utilization for the fiber network. Prioritize projects by accounting for existing fiber and conduit routes available to the City; the cost of constructing alternative fiber paths (e.g. attaching to utility poles or directional boring); and current and future needs of the City and public
 - Market Demand: When determining which Dig Once opportunities to seek, the City must consider potential market demand that supports efficient delivery of telecommunications services for the public
- Moratorium on street excavation to preserve new roadway construction for 5 years after road repaving
 - Caution: Could impede broadband deployment in future circumstances
- Reduces the cost of conduit installed from \$128,000 per street mile for the first installation (including excavation of the trench) to \$71,000 for the second¹⁴

¹² “Office of Underground Construction,” City of Chicago, https://www.cityofchicago.org/city/en/depts/cdot/provdrs/construction_information/svcs/office_of_undergroundcoordination.html, (August 2018)

¹³ “Connectivity Plan,” San Francisco Department of Technology, <http://tech.sfgov.org/sites/default/files/Document/SFDT%20CONNECTIVITY%20PLAN.PDF>, (June 1, 2017)

¹⁴ “Dig Once: Using Public Rights-of-Way to Bridge the Digital Divide,” The Council of State Governments, http://www.csg.org/pubs/capitolideas/enevs/cs41_1.aspx, (May 2017)

- Only applies to a street or sidewalk excavation that is 900 linear feet or longer

Santa Monica

Summary: The City of Santa Monica built a municipal fiber network resulting in a successful example for utility coordination policy. The city coordinates water and power utilities with transportation project schedules for fiber installs and shares a single documentation software. The incremental process identified key locations for fiber and over time coordinated multiple capital projects which laid extra fiber for future use. This resulted in \$700,000 per year in ongoing savings.¹⁵

- Outreach to rural utility districts
- Coordination with water and power utilities
- Recommendations for State and Federal agencies:
 - Designate one agency or vendor to manage national fiber cable operations
 - Coordinate timelines for fiber installs with transportation project schedules
 - Share a single documentation software
 - Plan fiber installations on roadways in proximity to regional data centers

¹⁵ “Santa Monica City Net: An Incremental Approach to Building a Fiber Network,” Institute for Local Self-Reliance, <https://ilsr.org/wp-content/uploads/2014/03/santa-monica-city-net-fiber-2014-2.pdf>, (March 2014)

Federal Highway Administration Guidelines

FHWA has policies and procedures which support installation practices that minimize excavation. The agency also strongly encourages states to work collaboratively with service providers on joint highway and utility planning and development.

FHWA Successful Practices Report 2013

- Initiatives that are favored support approaches that encourage cooperation and efficiency, but do not prevent excavation when needed
- When involving below-ground, wireline installations in the highway right-of-way, three main approaches by states and local areas have been identified:
 - Publicly-owned and operated network: The conduit is installed, owned and maintained by the state, and in some cases, fiber optic lines are state-owned and operated
 - Privately-owned and operated network: The conduit is installed, owned and maintained by a private entity, and fiber optic lines are also privately-owned and operated with minimal involvement by the public entity. In certain cases, as part of the agreement for using public right-of-way, the private entity may install extra conduit for the public entity to have for its own use
 - Network via public-private partnership: Through a cooperative agreement between public and private entities to expand the network, stretches of conduit are installed, owned and maintained by either the state or the private company providing the service. Fiber optic lines are most often privately-owned and operated and resource sharing is often involved

Pros

- Possible savings on costs incurred by repeated excavation in areas where the entire right-of-way is paved or developed
- Reduced deployment time by preventing the need to acquire duplicative reviews and permits for work done at the same location
- Key cost components that can be avoided or reduced through coordinated construction efforts include:
 - Overall reduction in incremental labor and material costs through reduced crew mobilization expenses and through larger bulk material purchases

Cons

- Trenching or boring costs, particularly when coordination enables lower cost methods (trenching as opposed to boring) or allows multiple entities to share a common trench or bore for their independent purposes
- Traffic control and safety personnel, particularly when constructing along roadways requiring lane closures
- Engineering and survey costs associated with locating existing utilities and environmental impact studies and approvals
- Lease fees for access to private easements, such as those owned by electric utilities
- Railroad/bridge crossing permit fees and engineering
 - Implementing utility coordination policies at the local level could be more effective given the complexities of implementing a policy that spans jurisdictions.
 - Savings are highest in densely populated areas (25-33 percent) where construction costs are highest.¹⁶
 - Utility coordination policies could result in little savings in rural areas
 - Increased administrative costs for state DOTs
 - Unused conduit

¹⁶ “Efficiencies in Communications Construction”. Columbia Telecommunications Corporation. <http://www.ctcnet.us/wp-content/uploads/2014/01/CoordinatedConduitConstruction.pdf>, August 2009.

Policy Development Considerations

States and cities throughout the country have policy which varies from general coordination initiatives to strict requirements for conduit deployment in street excavation projects. Caltrans will use the policies identified in this paper to inform future policy development. A list of policies which may be investigated are listed below. The list below is not a recommendation or establishment of Caltrans policy and is provided only as an informational tool for future policy development.

- Resource Sharing
 - State DOTs make agreements with service providers to exchange the use of right-of-way or existing conduit infrastructure for the use of fiber optic services
- Joint-Trench Agreements
 - Require providers of broadband services and other utilities to install infrastructure at the same time, in the same trench, or in the same conduit, and share the cost of installing the infrastructure
- Moratorium on excavation to preserve new roadway construction and encourage utility coordination planning
- Encourage the use of trenchless technologies, such as:
 - Horizontal Directional Drilling: A trenchless method of installing underground pipes, conduits and cables along a prescribed bore path by using a surface-launched drilling rig
 - Micro-Trenching: Digging a small trench just inches under the road surface along the curb line to install fiber optic lines
- Information Sharing
 - Provide access to fiber, conduit and projects maps
 - Notify telecommunication companies of projects where broadband infrastructure can be installed
- Reduce permitting costs and wait time for projects which implement coordinated utility planning

Next Steps

Caltrans will continue to investigate strategies and policies which improve broadband coordination. Information in this paper will inform the future broadband policy and guidance development.