California Local Jurisdiction Broadband Permitting Playbook

Updated July 2025

Acknowledgements

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Given the importance of permitting, its role in deploying broadband infrastructure, and how permitting will affect the ability at all levels of government to capitalize on federal funding, the State has collaborated to create guidance on how local governments can support middle-mile and last-mile broadband deployment in their communities.

Introduction

The California Local Permitting Playbook offers strategies designed to enable communities to prepare for broadband investment—recognizing that an unprecedented amount of state and federal funding has been allocated to expanding broadband infrastructure in California,[1] and that local government permitting and planning staffs have varying degrees of experience with and knowledge of broadband deployment.

This playbook reflects a commitment by the State of California to advance the California Broadband for All Action Plan, which identified the support of enhanced permitting processes at the local level as a way the State can help "ensure all Californians have high-performance broadband available at home, schools, libraries, and businesses."[2]

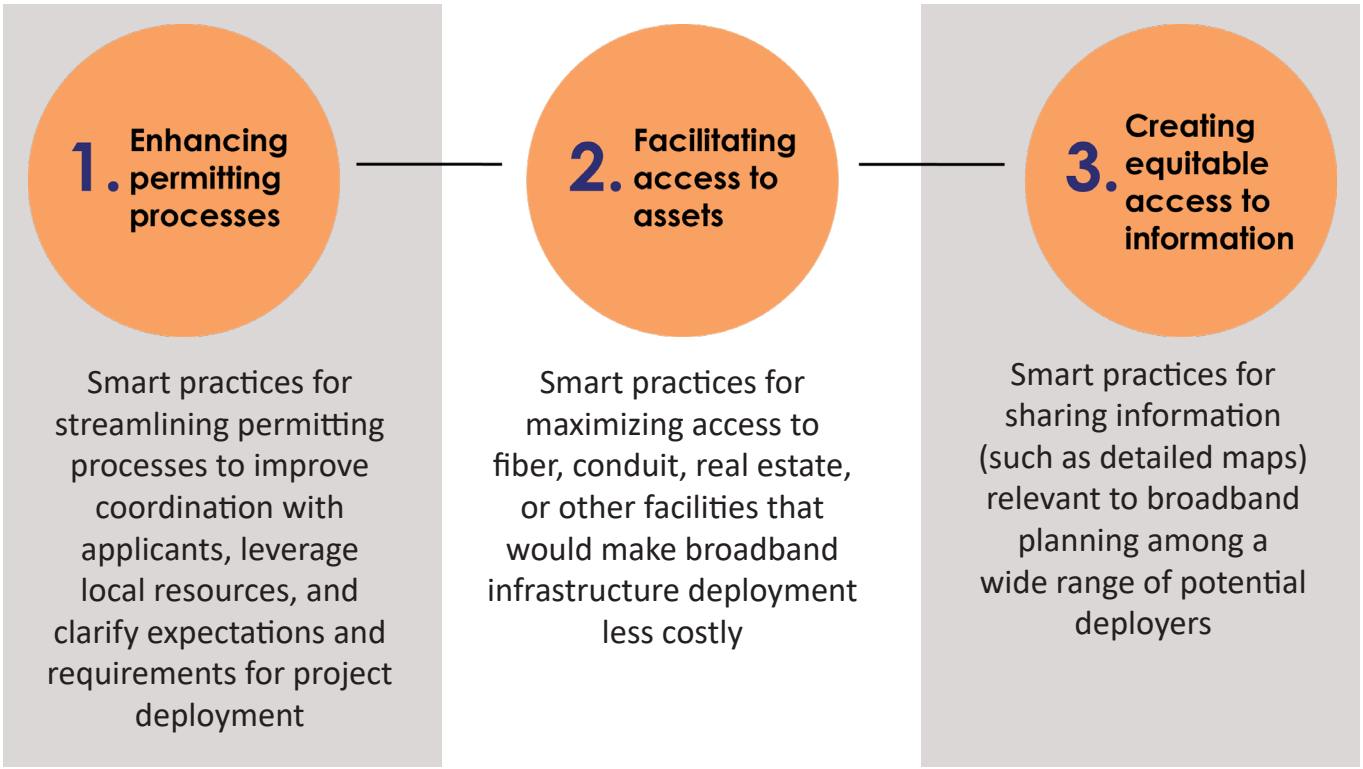
The potential actions and strategies in this playbook are reflective of smart practices, and it is acknowledged that every locality has unique resources and challenges which may preclude implementation of some or all of these practices.

This permitting playbook focuses on efforts local governments can make to facilitate broadband project development—with or without public funding, and at varying levels of complexity. It presents a menu of options that are considered smart practices for permitting and related processes under certain circumstances. These approaches are not all appropriate for all communities—nor would any given community be likely to adopt every practice described here. Rather, the playbook presents a set of options a local government can evaluate in light of its public policy priorities, its community's unique circumstances, and its residents' needs.

1 Including funding allocated in SB 156 for the Middle-Mile Broadband Initiative (https://middle-mile-broadband-initiative.cdt.ca.gov/) and last-mile and adoption programs administered by the California Public Utilities Commission (https://broadbandforall.cdt.ca.gov/last-mile-broadband/).

2 "Broadband for All Action Plan," California Broadband Council, 2020, https://broadbandcouncil.ca.gov/wp-content/uploads/sites/68/2020/12/BB4All-Action-Plan-Final.pdf. See also: "Action plan progress tracker" (Goal 1, Action 6), Broadband for All, https://broadbandforall.cdt.ca.gov/progress-tracker/.

The smart practices are organized within a framework of three primary strategies for improving a broadband deployer's costs and timelines:



A final note: The strategies and smart practices presented in this playbook are intended to enable localities to receive value in return for the efforts they make to enable a broadband deployer's efforts. That value may be financial (such as a lease payment in return for access to a city's fiber network) or it may be less tangible (such as a commitment by the partner to deliver broadband service to low-income residents in return for access to a city's excess conduit). Either way, the locality will facilitate broadband deployment in partnership with the deployer; the relationship should not favor the deployer over the public interest.

Broadband glossary

Access to assets – facilitating the use of existing infrastructure, such as utility poles and ducts, to reduce the cost and time required for broadband deployment.

Aerial construction – fiber cables installed on utility poles in a dedicated vertical space near other telecommunications cables and physically separated from electric power cables.

Broadband deployer – an entity responsible for constructing and operating broadband infrastructure, such as ISPs or public agencies.

California Environmental Quality Act (CEQA) – State law requiring environmental review of projects to assess potential impacts and identify mitigation measures.

Conduit – a tube installed underground to protect fiber optic cables; conduit can be physically subdivided using innerduct.

Construction moratorium – a temporary halt on certain types of construction activities, often implemented to prevent conflicts with planned infrastructure projects or to limit the negative impacts of construction on the roads and rights-of-way in a community.

Deployment timeline – the projected schedule outlining the phases and milestones of a broadband infrastructure project, from planning to completion.

Dig Once – a policy of coordinating the installation of multiple entities' fiber or conduit in certain circumstances when underground construction occurs in a community.

Fiber – a fiber optic cable is an extremely high-capacity broadband technology; a fiber cable can include hundreds of individual fiber optic strands—each of which has the capacity to deliver high-speed broadband services. The fiber is "lit" when network electronics are installed at both ends of a network route; cables installed without electronics are called "dark fiber."

General plan – a comprehensive, long-term planning document that outlines a city or county's vision, policies, and strategies for land use and development.

Geographic information system (GIS) – a computer application that enables users to create and analyze maps based on geographic location data; the California Interactive Broadband Map (https://www.broadbandmap.ca.gov/) is an example of a GIS-based tool.

Hub site – a small standalone hut or a secure room in an existing building that houses network electronics.

Infrastructure asset mapping – the process of creating detailed maps that document existing infrastructure, such as fiber optic lines and utility poles, to aid in planning and deployment of new broadband infrastructure.

Internet service provider (ISP) – a public or private entity that delivers broadband service to customers.

Last-mile – in networking, the final part of a network connection to a home, business, or community institution.

Make-ready – the work required to create space on a utility pole for the attachment of a new fiber optic cable; make-ready includes physically moving other cables that are already attached to a pole to create the vertical clearances required by national safety standards. Make-ready may require replacing a utility pole with a new, taller pole to accommodate the new fiber cable.

Middle-mile – in networking, the connection from the global internet networks (e.g., located at a data center or point of presence, often in a large city) to a last-mile network segment (e.g., at a network hub near a community served by an ISP); California's Middle Mile Broadband Initiative identified 10,000 miles of proposed middle-mile routes that would enable ISPs to connect currently unserved customers to the internet.[3]

Permit application portal – an online platform where applicants can submit and track the status of their broadband infrastructure permit applications.

3 "Middle Mile Broadband Initiative," California Broadband for All, https://middle-mile-broadband-initiative.cdt.ca.gov/

Permit fee waivers – exemptions from standard permit fees, which might be granted to encourage or facilitate broadband infrastructure deployment in underserved areas.

Public-private partnerships (PPP) – collaborative agreements between government entities and private companies to share the risks and rewards of infrastructure projects; a broadband PPP might allocate responsibility for funding, construction, and long-term operations of a network.

Public right-of-way (ROW) – land areas, typically streets or sidewalks, that are legally designated for public use and may be utilized for installing broadband infrastructure.

Stakeholder engagement – conducting outreach to involve residents, local organizations, business representatives, and other interested parties in the planning and decision-making processes for broadband deployment projects.

Underground construction – fiber or conduit installed in the ground, typically in the public right-of-way.

Utility coordination – the process of collaborating with utility providers to streamline broadband deployment efforts (such as using utility poles for aerial attachments) and to ensure that broadband infrastructure deployment does not interfere with existing or planned utility services.

Zoning ordinance – local laws that regulate land use and development, specifying how properties in certain geographic areas within a city or county can be used.

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Smart practices for enhancing permitting processes to improve coordination with applicants, leverage local resources, and clarify expectations and requirements for project deployment

Smooth permitting processes enhance broadband buildout and deployment, whether by a locality itself or by a private or public partner. Most localities have experience in this regard, whether in terms of broadband or some other type of public infrastructure like roads or school buildings or traffic cameras. An efficient procurement process is enormously helpful in any public project.

Similarly, efficient and transparent processes around permitting, rights-of-way access, and inspections can help with broadband construction. Subject—of course—to the needs of the community to protect public interests and public safety, as well as the resources available to the locality—the strategies presented here focus on enhancing existing processes for the benefit of the community and broadband deployers.

Smart practice 1A: Developing and sharing information about relevant permitting and processes

Action: Developing clear construction design standards and regularly updating the standards with industry and expert input

Developing design standards for aerial and underground fiber and conduit promotes consistent and safe construction practices across wired broadband deployments. Standards can help enhance the permitting application and review processes. And design requirements can help a community maintain certain aesthetic standards. Standards for small wireless facilities ("small cell" antennas) can have the same benefits for that category of wireless infrastructure.

These design standards should follow engineering smart practices and industry input. They should also be publicly accessible and transparent.

For example, Santa Clara County sought to facilitate safe and consistent construction, and to reduce design review timelines. To that end, the County published design standards including:

- Right-of-way diagrams and typical utility locations
- Typical utility trench construction and pavement restoration
- Pole and conduit bonding

Following the publication of the standard, County staff reported quicker review times, and that the standards led to uniform aesthetics.

In late 2024, the City of San Mateo amended its municipal code and adopted a new policy related to small cell wireless facilities in the public right-of-way. The City's clear intent was to "provide reasonable and consistent guidelines to help streamline the permitting review and approval process, convey design preferences, and minimize visual impacts."[4]

4 "Small Cell Infrastructure," City of San Mateo, https://www.cityofsanmateo.org/3865/Small-Cell-Infrastructure.

As with any standard, broadband-related infrastructure design requirements need periodic reviews (e.g., every three or five years) to ensure they remain strong. Regularly updating design standards with industry and expert input will help ensure the standards adapt to evolving construction smart practices. This approach also promotes efficient and cost-effective construction practices. This approach also promotes efficient and cost-effective construction practices.

Considerations

1. How to allocate staff and resources to updates
2. Process for gathering industry and expert input

Action: Developing a telecommunications permitting manual

Collecting all telecommunications deployment information in a broadband permitting manual (which could also take the form of a website or online portal that aggregates requirements, application forms, standards, process workflows, fee lists, and so on) will allow ISPs, subcontractors, administrators, and the public to understand broadband deployment from start to finish. For example, the City of Los Angeles developed a policy manual for all types of permit applications that clearly explains the rationale behind certain permits and how to apply for them.

Full transparency about these processes is perhaps the single most effective means by which to enable the communications industry to expeditiously plan and deploy networks. Centralizing this information also improves the process for updating technical details.

Full transparency about these processes is perhaps the single most effective means by which to enable the communications industry to expeditiously plan and deploy networks.

Considerations

1. Developing a manual may take considerable time and resources

2. How to develop mechanisms to routinely update the manual with industry and public feedback

Action: Publishing permit timeline expectations and metrics

Publishing expected durations for each step in the permitting process—along with average and maximum timelines in practice—creates transparency and accountability. The City of Oakland, for example, publishes average and maximum timelines for each step in its encroachment permit process (see Figure 1). As a result, applicants and the City have a shared understanding of typical permit processing timelines.

For example, whether your community commits to review permit applications within three days or 10 days or 20 days, that commitment should be publicized and then consistently met. Localities have limited resources—and sometime many different companies and industries can simultaneously require local permit review and other types of local support. Thus, local needs and resources will determine how long that process will take—while transparency about the amount of time, and a firm commitment to adhering to that timeframe, will meet the needs of the private sector broadband provider. The provider may wish for a faster process, but at a minimum it will have the benefit of a transparent and open process—with a predictable timeframe under which it can plan its project.

The need for transparency and communication is mutual: much as the locality should be open about its processes, the private deployer should do the same and should stage its buildout to maximize cooperation with the locality. Pre-construction conferences, for example, allow private providers and localities to understand and coordinate each other's plans and timelines. This kind of cooperative planning enables a willing provider to stage permit and inspection requests rather than filing for an overwhelming number of permits at one time.

For localities where this approach may be feasible, establishing expected timelines can help the local government assess its permitting timelines and measure the impact of changes in permitting policy and procedure.

Considerations

1. Need to allocate staff or hire a consultant to assess permitting timelines
2. Need to map the permitting process workflow
3. Need to understand provider's staffing

Action: Creating a mechanism for receiving feedback from applicants on the application process

Seeking feedback on the permitting process is a way that localities can foster relationships with broadband deployers—and also gather valuable information about how it might further optimize its processes. A local government might include survey questions in the permit application, send applicants a post-application survey after a permit is issued, convene focus groups, or conduct one-on-one interviews with applicants to inform process improvement.

These approaches might enable a locality to receive direct, formal feedback on the permitting process—with a goal of identifying inefficiencies (which affect both the local government staff and the applicants).

Considerations

1. Establish key performance indicators to track processes
2. Develop a series of standard questions with measurable outcomes
3. Embed the survey in the application process
4. Assess staffing and capacity requirements so as to be able to sufficiently resource the effort
5. Consider whether technology supports such as online portals for communication can address capacity issues

Smart practice 1B: Optimizing permitting for broadband projects

Every locality knows from experience that a government project in which certain processes are made as efficient as possible can be more expeditiously initiated, executed, and concluded. For example, a technology project that requires services or equipment will to some degree turn on the efficiency of the procurement process. The same is true in a broadband project. And that is the case whether the entity building the broadband facilities is the locality itself or a private entity.

However, a locality, unlike a private sector partner, cannot focus its internal processes and efforts on one single end goal. Localities that are considering broadband-related permits are simultaneously juggling a range of considerations, including that:

1. broadband projects can impact other areas of local responsibility, such as the need to manage rights-of-way so commerce and movement are not disrupted;
2. broadband process efficiency efforts will entail public costs, such as for hiring of new staff; and
3. other local interests and projects compete with broadband projects for localities' resources and attention.

In this context of understanding the totality of local needs and projects, all clamoring for the same resources, the strategies presented here are intended to enable localities to facilitate broadband projects without sacrificing the localities' ability to simultaneously attend to other projects and priorities.

Action: Establishing a single point of contact for broadband permitting

Assigning one staff member (or, potentially, a small team within the relevant government agency or department) can optimize elements of the permitting process for both the locality and applicants—while retaining the protections and critical value of the permitting process.

By clearly identifying a single point of contact for broadband permit planning and applications, a locality can reduce the time applicants wait for responses to questions; increase the efficiency of the permit application review process; develop expertise among the locality's permit technicians; and potentially reduce the impact of the permit application caseload on staff members who do not have direct responsibility—but who previously would have fielded calls and spent time tracking down answers for applicants.

The City of Riverside, for example, developed a one-stop permitting approach for broadband (and non-broadband) applications.

Considerations

1. Organizational structure
2. Training and professional development
3. Funding

Action: Developing an online permitting portal

An online location for all permit submissions can enhance applicants' experience with the permitting process and create opportunities for departmental and interdepartmental collaboration. By eliminating the manual processes associated with permit intake and data entry, an online portal—if it is feasible for a locality to implement, given the budgetary and staffing resources required—could decrease permitting timelines and speed time to deployment. Further, because an online portal could be configured to capture all elements of an application in a central database, such an approach would have additional benefits in terms of the locality's record-keeping, mapping, and planning.

As one example, Santa Clara County's electronic permitting system is shared by its Department of Roads and Airports and Department of Regional Planning. Having a single database for all project applications has led to easier collaboration, and enables applicants to submit all permit application materials in one place.

Considerations

1. Which permits, departments, and jurisdictions to include under one roof
2. Governance and data sharing

Action: Creating a dedicate telecommunications permit

A dedicated permit can facilitate permitting, communications, and data collection around telecommunications projects. For localities with the capacity to do so, a dedicated permit can create a separation and specialization in staffing for permitting staff who focus on broadband-related permits and staff who focus on the other types of permitting common to local oversight. In tandem with a single point of contact for broadband permitting issues and some of the other smart practices identified here, a dedicated permit could optimize the permitting process for ISPs and other entities seeking to deploy broadband infrastructure.

As one example, the City of Campbell amended its municipal code to include all telecommunications projects in the public right-of-way under an encroachment permit, which centralized the City's permit application submission and review processes.

Action: Leveraging a program environmental impact report

Creating a program environmental impact report (program EIR) is a smart practice to streamline environmental review activities while ensuring compliance with the California Environmental Quality Act (CEQA). By creating a program EIR, a local government can include broadband infrastructure deployment actions within its jurisdiction under one project. This process allows for a proactive environmental review of a broadband program or policy to study and address potential cumulative environmental impacts upfront. Because a program EIR involves community review and consideration of alternative programs and policies, the process enables robust community engagement and discussion.

CEQA sets out procedural requirements that govern how a local government must assess and inform the public of the environmental impact of certain triggering actions. Under the law, a "lead agency" (typically the agency responsible for the triggering action) completes a documentation process to demonstrate that it followed the framework set out by the CEQA process to reach a conclusion on—and solutions for—the project's impact on the environment.

CEQA requires one of three levels of documentation, in order of escalating complexity: an exemption, an Initial Study, or an EIR (which could be fulfilled by a program EIR). State law (Cal. Code Regs. Tit. 14, § 15168) defines a program EIR as "an EIR which may be prepared on a series of actions that can be characterized as one large project and are related either:

1. **Geographically,**
2. **As logical parts in the chain of contemplated actions,**
3. **In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or**
4. **As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways."**

By leveraging one program EIR for broadband deployments, municipalities can create efficiencies in the environmental review process required to issue permits for construction. Nevada County, for example, created an EIR for the Nevada County Broadband Program[5] that considers future projects throughout the County. Individual projects can be evaluated according to a checklist developed by the County to determine whether they fall within the scope of the program EIR; if so, the lead agency does not need to prepare an additional environmental document.

The Santa Barbara County Association of Governments (SBCAG) drafted a CEQA-compliant programmatic EIR for the Santa Barbara County Last-Mile Broadband Program. Designed to streamline the deployment of infrastructure in nine priority communities, the EIR "describes potentially significant environmental impacts, identifies mitigation measures to avoid or reduce the significance of potential impacts, and evaluates the comparative effects of potentially feasible alternatives to the proposed project."[6]

Tuolumne County also developed a program EIR for countywide broadband deployment.[7] The RFP[8] for its project included several procurement best practices for a program EIR—including a clear framework for scope and a required flat fee cost proposal to reduce the risk of scope creep and timetable extensions—while leaving flexibility for contractors to produce innovative methodologies.

5 "Draft Environmental Impact Report: Nevada County Broadband Program," Nevada County, September 2022, https://www.nevadacountyca.gov/DocumentCenter/View/45617/Broadband-Program-Draft-Environmental-Impact-Report--September-2022

6 "Santa Barbara County Last-Mile Broadband Program: Program Environmental Impact Report," SBCAG, November 2024, p. 1-1, https://www.sbcag.org/project/santa-barbara-county-last-mile-broadband-program-environmental-impact-report/

7 "County of Tuolumne Broadband Infrastructure Environmental Impact Report," County of Tuolumne, https://www.tuolumnecounty.ca.gov/DocumentCenter/View/28103/Full-Final-EIR?bidId=

8 "Tuolumne County Broadband Environmental Assessment," Tuolumne County, January 2023, https://procurement.opengov.com/portal/tuolumnecountyca/projects/22912#:~:text=Summary%20Tuolumne%20County%20is%20soliciting%20Requests%20for%20Proposals,including%20both%20underground%20and%20aerial%20fiber%20optic%20cable

Action: Distinguishing between major and minor broadband permits

Distinguishing between major and minor permits allows the permitting agency to expedite smaller or routine broadband projects. The City of Oakland, for example, distinguishes between major and minor permits as follows:

- Minor encroachment: "…an encroachment into the public right-of-way resting on or projecting into the sidewalk area, but which is not structurally attached to a building, such as flowerpots, planter boxes, clocks, flagpole sockets, bus shelters, phone booths, bike racks, fences, non-advertising benches, curbs around planter areas, displays of flowers, fresh fruits and vegetables."

- Major encroachment: "…anything attached to a structure or constructed in place so that it projects into the public right-of-way such as basement vaults, kiosks, covered conveyors, crane extensions, earth retaining structures, and structure connected planter boxes, fences, or curbs. Projections over any public street, alley or sidewalk in excess of the limitations specified in the Oakland Building Code shall also be classified as major encroachments, including theater marquees, signs suspended above the sidewalk, oriel windows, balconies, cornices and other architectural projections."

This approach has enabled an enhanced permitting process that reduces the application timeline while still protecting local interests (e.g., distinguishing between commercial arteries and residential roads).

Another type of difference in construction that should be addressed while considering the permitting process is the difference between broadband projects undertaken within the public road right-of-way (often accomplished through an encroachment permit) and those outside the right-of-way – and among the latter, the difference between projects on public property (often accomplished through a lease) and those on private property (often accomplished through a building and/or grading permit).

Considerations

1. How to determine the threshold between major and minor (e.g., cost, type of project, mileage)

2. How to allocate alternative staff for application review (e.g., field offices)

3. How to optimize the different processes necessary for permits associated with construction in any of the following: in the public rights-of-way, on other public property, and on private property

Action: Developing a batch permitting process

For localities anticipating large broadband-related projects that will require extensive but potentially repetitive permit applications, batch permitting might allow applicants to request a single permit that would cover a project typically subject to multiple permit applications. As with some of the other strategies presented here, a batch permitting process might reduce the permit application caseload, decrease the permit processing timeline, and improve a broadband deployer's timeline.

The City of Long Beach, for example, developed a bulk permitting process in 2020 for small cell wireless facilities that allows up to 10 sites to be grouped under a single permit. Applicants must negotiate specifications before submitting the application, and sites must all be either Tier A (commercial arterial) or Tier B (residential roads). This enhanced permitting process has improved the City's timeline while still protecting local interests (e.g., distinguishing between siting locations proposed on commercial arteries and residential roads).

With a batch permitting process in place, local governments and other permitting entities are also well-positioned to engage with applicants to streamline the permitting process. Recognizing this, the California Department of Transportation (Caltrans) published "Coastal Zone Guidelines for Programmatic Permitting" for the state's Middle-Mile Broadband Network effort. The guidelines note, "A key initial ingredient for streamlining permits will be to bundle … project segments that require Coastal Development Permits (CDPs) and work with the California Coastal Commission's and local government's staff to submit a consolidated permit application for processing."[9]

Considerations

1. Encouraging applicants to engage with local government permitting agencies as an early step in their planning processes
2. Determining permit boundaries (i.e., limiting bulk permits to a certain number of projects or a certain geographic area)
3. Allocating staff for dedicated application review

9 "MMBN Coastal Zone Guidelines for Programmatic Permitting," Caltrans, December 2022, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ser/mmbn-coastal-zone-guidelines-a11y.pdf.

Action: Coordinating permitting policies and procedures among jurisdictions in the region

Regional alignment on permitting policies and procedures is an innovative opportunity to standardize permitting processes, thereby enhancing the application process. For example, the San Diego Association of Governments is adding broadband to the Regional Standards Drawing Book.

A primary benefit of this approach, to the extent it is feasible to implement, is that it creates a straightforward and predictable permitting process for applicants—which might otherwise apply for a single permit they believe will meet all requirements, only to discover at a later point that their project actually requires additional permits from other local, regional, or state entities.

Considerations

1. How to promote regional collaboration (e.g., a resource hub on the locality's website, a regional taskforce, leadership from elected officials)
2. How to incorporate localities, special jurisdictions, and councils of government
3. How to resolve policy disagreements

Smart practice 1C: Revisiting all policies periodically to comply with changing state and federal rules

Regularly revisiting permitting processes can help ensure compliance with current federal and state requirements. Such periodic reviews and revisions may also minimize delays related to questions from applicants. This approach also will help ensure that permitting processes and timelines follow the evolving set of state and federal regulations.

Considerations

1. Identify a staff or department to be tasked with following developments in telecommunications law, such as a City Attorney's Office or County Counsel

2. Resources available from the California League of Cities, California State Association of Counties, and Rural County Representatives of California

Smart practice 1D: Developing strategies for scaling up staffing and support

Attempts to streamline local processes frequently conflict with the need for resources to enable the processes—particularly for massive short-term projects such as a broadband network deployment. The need to issue thousands of permits and assess thousands of job sites in a very short timeframe challenge localities without sufficient staff to support such enormous short-term efforts. Also, it is not financially feasible for localities to maintain sufficient staff for such intensive short-term efforts, because those staff members will have little or nothing to do during the interim periods when large projects are not underway.

This significant public sector challenge affects both the locality and the private broadband provider, with both needing deployment to proceed as quickly and efficiently as possible. One potential solution is for the locality to find means by which local processes are respected but the broadband provider can use its own resources to supplement public sector staff.

For example, a locality can undertake a procurement process in which it prequalifies contractors with the experience and the independence to serve as third-party inspectors of new broadband facilities. Through the preclearance process, the locality qualifies companies that can be contracted by a broadband provider to supplement the locality's own inspection staff.

The locality's own staff can check a sample of the contractor's inspection work and verify its quality and validity—to ensure that the contractors remain independent and meet the locality's needs, even as the contractor is hired and paid by the provider. Any contractor whose inspections do not meet the locality's standards must be removed from the list of approved vendors—a penalty that incents the vendor to work appropriately and enables the locality to maintain quality control and quality assurance.

This mechanism was used effectively during the large cable upgrades of the late 1990s. Some local governments allowed cable operators to pay third parties (either directly or by reimbursing the locality) to independently verify compliance with design and construction standards, thus enabling fast approval of the operator's design and construction even where the locality did not have the necessary internal resources for the entire process.

Considerations

1. Administration to negotiate agreement terms
2. Oversight of independent inspectors
3. Concerns of small companies that cannot afford inspectors

2. Strategies for facilitating access to key assets

Smart practices:

A. Creating access to public assets for new deployment

B. Creating conditions that make deployment of private assets more likely

C. Encouraging deployment of public and private assets

Smart practices for maximizing access to fiber, conduit, real estate, or other facilities that would make broadband infrastructure deployment less costly

One of the primary challenges to deploying broadband infrastructure is the high capital cost of network construction. Localities own assets that can reduce the need to construct some elements of new networks and thereby reduce total up-front capital costs. A locality may improve the investment scenario for a potential deployer if the locality can make assets like fiber optic cables, conduit (i.e., a protective tube installed underground through which fiber can be pulled at low cost), and secure space in government-owned buildings (i.e., for locating a provider's network electronics) available for private use.

As with all of the strategies and smart practices presented in this playbook, the intent here is for the locality to receive value in return for the efforts it makes to enable a broadband deployer's efforts. That value may be financial (such as a lease payment in return for access to a city's fiber network) or it may be less tangible (such as a commitment by the partner to deliver broadband service to low-income residents in return for access to a city's excess conduit). Either way, the locality will facilitate broadband deployment in partnership with the deployer; the relationship should not favor the deployer over the public interest.

Smart practice 2A: Creating access to public assets for new deployment

The capital cost of deploying broadband can be reduced through access to three types of public assets:

1. **Unlit (dark) fiber optic strands**, either underground or on utility poles, such as excess fiber that a city may have constructed to meet its public safety or internal networking needs; because each fiber cable has dozens or hundreds of separate fiber strands, and each fiber optic strand holds enormous capacity, a locality can sell or lease excess strands within a fiber bundle without compromising the original purpose of the fiber

2. **Excess capacity in underground communications conduit,** which a deployer could use to install new fiber

3. **Real estate,** such as public buildings with secure rooms or cabinets where networking equipment can be located—or small parcels of land where network equipment huts can be constructed

Fiber and conduit are particularly valuable assets where construction is most costly or difficult, such as urban areas; crossings of bridges, waterways, and rail lines; key building entries; and alongside major roads.

Action: Enabling leasing of public assets to ISPs

Leasing excess strands in a local network can help in establishing an internet service provider's (ISP) network backbone. If the locality's fiber widely covers the community, it can provide an immediate way to establish a point of presence in key areas (such as near unserved apartment buildings or on the edge of rural, unincorporated land).

A locality's available conduit can also assist in broadband deployment. Pulling new fiber cables through a locality's existing

conduit can reduce a provider's need for construction[10] —lowering its capital costs and time to build.

In leasing existing fiber or conduit, the locality benefits by speeding broadband deployment, reducing damage and disruption to the rights-of-way, and minimizing impacts on vehicular and pedestrian traffic; it may also earn lease revenue.

And while not all communities have built their own fiber or conduit, almost all localities own real estate in locations that can help make a new broadband network more feasible. Localities may be able to reduce the cost and complexity of an ISP's deployment by providing access to secure spaces for network equipment. For example, a secure room in a city building with sufficient power access and ventilation might be used for a data center or network operations center. A county-owned plot of land or right-of-way might host a hut—designed to blend in to the neighborhood's aesthetics—for the network equipment and edge computing devices that must be placed in or near the neighborhoods where homes and businesses are connected to a new fiber or wireless network.

Experience indicates that access to assets such as these may decrease a network deployer's initial capital costs by up to about 10 percent, depending on the extent of the community's infrastructure. In all such cases, however, it is important to note the locality's need to consider present and future uses of public property before making it available to any private party. Similarly, any asset leases must comply with state laws and local ordinances pertaining to leasing public property—and improvements installed on public property must also comply with all applicable legal requirements (such as prevailing wage and/or competitive bidding, when triggered).

Considerations

1. Requires a database[11] of public assets' locations and other criteria needed by telecommunications providers
2. Project management staffing may be needed
3. Requires a leasing agreement and term sheet

10 Pulling new fiber through an existing conduit route is significantly less expensive than the underground construction required to install new conduit and fiber.

11 A GIS database is ideal but not critical.

Leasing fiber and conduit

Fiber and conduit leasing represents another smart practice and successful strategy used by many localities and states. A leasing program is designed to create access to broadband infrastructure where none otherwise exists on the market—often in the "middle-mile" that extends from a global internet connection point (typically in a large city) to a local community—thus reducing the cost for ISPs to build "last-mile" connections to customers' homes and businesses.

A fiber or conduit leasing program can be structured to be competitively neutral and open to all providers. To protect the locality's own long-term flexibility and use of the assets, and to ensure opportunity by the private sector, leasing of available assets by any single entity can be limited to a fixed percentage of available capacity.

Leasing programs can be managed internally or through contractors. To further broadband public policy goals, pricing for assets can be developed to encourage investment in unserved areas or credits can be given following private investment in such areas.

An ISP does not necessarily require a large number of middle-mile fiber strands to enable it to serve customers in a new area. For this reason, leasing excess capacity on an existing public network—even where there may only be a dozen or so spare fibers—is frequently one of the most feasible, effective steps a community can take to help a broadband deployer.

Similarly, a locality can lease conduit and provide considerable capacity for a network provider (which would install its own fiber in the conduit). For example, a 3-inch conduit can be physically segmented into three parts by installing innerducts (basically a tube within the tube), each of which can carry a cable with hundreds of strands of fiber.

Conduit can be made available to an ISP by granting access at a designated manhole or in a public building. The service provider or the locality can be responsible for the maintenance of the conduit.

As with fiber, a conduit system with community-wide continuity can provide an immediate, cost-effective way to reach throughout the locality, even if a partner's construction is starting in another part of the locality. Also, like fiber, conduit is more valuable if it helps avoid expensive construction across a major road or bridge, or in another costly or difficult-to-build area.

One advantage of leasing conduit, relative to fiber, is that it affords the locality more separation from the operations of the ISPs

that might use that infrastructure. Once the locality assigns a conduit and access points, it coordinates with the ISP less frequently for maintenance or repair than it would with a fiber lease.

However, conduit leases also pose disadvantages relative to leasing fiber. One is that conduit and conduit banks are less able to be segmented and therefore provide less flexibility than fiber. A fiber cable has dozens and potentially hundreds of fiber strands, any of which can be used by the locality, leased, or kept in reserve. In contrast, there are rarely more than a few conduits in a route (sometimes only one) and only a few possible segmentations of each conduit—so it is easier to run out of conduit over a given route.

The conduit strategy has been used effectively by the City of Mesa, Arizona, which pioneered underground communications conduit infrastructure in the 1990s. The city's joint trenching projects enabled construction of conduit in the least disruptive manner and offered low-cost construction opportunities for commercial providers and businesses. The city also capitalized on every opportunity to add new conduit; it evaluated the feasibility of construction cost-sharing for all underground trenching and boring opportunities, such as roadway widening, gas or utility pipeline installation, and commercial fiber optic construction (such "dig-once" strategies are discussed in detail below). As a result, the city cost-effectively built robust conduit rings in key parts of the city—then made the conduit available to private parties.

Leasing facility space

Network providers require secure, accessible, and suitable spaces for their electronic equipment. Ideally, these spaces should be evenly geographically distributed through a service area. Availability of secure space relatively near customers' homes and businesses enables greater performance and variety of service—and offers the provider more flexibility to cost-effectively build or upgrade its network. For these reasons, local governments that lease such space (or create a mechanism for predictably and cost-effectively obtaining space) can reduce providers' deployment costs and enable new technology benefits.

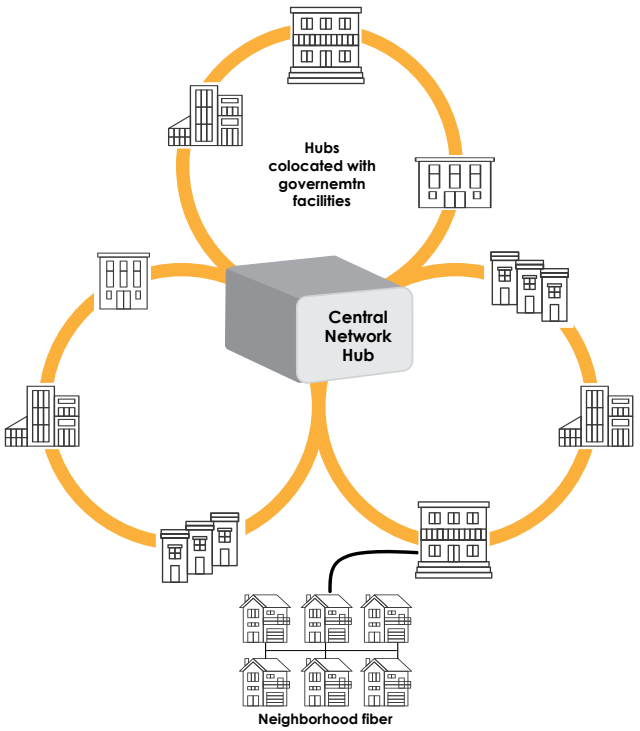
Local government-owned buildings and their adjacent land can be logical locations for communications infrastructure. Such buildings include public safety buildings, schools, and libraries—all of which tend to be located in neighborhoods throughout a community, in a geographically even manner.

Localities can inventory their infrastructure to determine where space and access may be available for use by broadband providers, and then make this information available to private deployers. In addition, in planning areas of new development, localities can plan in light of the need for suitable locations in or near public buildings where a provider can locate equipment, in the same way it might plan for power transformers or water or sewer locations.

In an optimal scenario, the locality can identify and lease secure, accessible space for the hub locations in government facilities (primarily government buildings, public safety facilities, public housing, libraries, and schools). In some scenarios, the locality may also be able to provide rooftop access for wireless antennas that a provider can use to extend wireless internet service to customers living where fiber cannot be cost-effectively built.

The benefits to the new broadband provider can be significant. First, if it is able to collocate its central hub facility or data center with a hardened government facility such as an emergency communications

Figure 1: Sample scenario for government-provided facilities

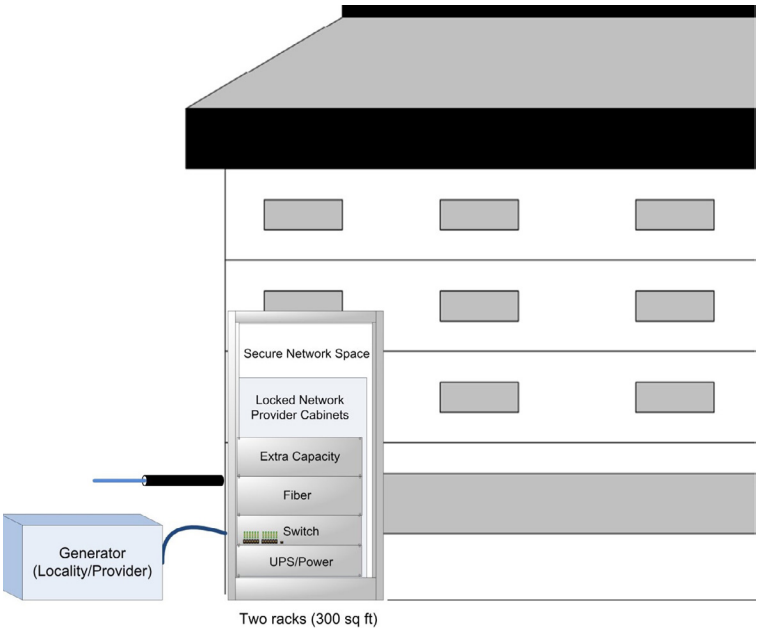


center, the provider has the benefits of a secure facility; backup generator and battery power; multiple utility entry/exit points; and proximity to external networks.

To activate a hub facility that is collocated with a government facility, the provider would need only to place racks, upgrade and expand power and cable distribution, and purchase the network-specific equipment. A hub facility can house electronics, management and content servers, and the network's interconnection with external backbone networks (see Figure 1). It requires 1,000 to 3,000 square feet, depending on the system size and services provided.

Second, the new provider also benefits if it can lease space in public buildings to serve as remote hub locations. In each of these, a smaller amount of space is necessary (see Figure 2), ideally collocated with the local government facility's network room or telecommunications closet. The service provider can install local switching and routing equipment capable of providing any speed service.

Figure 2: Illustration of private provider use of government buildings



The locality also benefits from this leasing arrangement: speeding new network deployment; maximizing use of government facilities that are optimized for such benefits as backup power and security; and potentially realizing lease revenues.

There exist operational benefits for the local government, too: because the network provider's hub infrastructure is present in many major government facilities, the locality can inexpensively connect individual buildings to the network and can locate its servers and data on the provider's network (i.e., "on-net"). As a result, access to public buildings can be a boon to providers.

Absent access to public buildings, providers may encounter difficulty obtaining permission to install generators or may not be able to secure appropriate in-building space at all.

Leasing real estate

Where public buildings are not available, a locality might also lease land suitable for a provider to construct a standalone hub facility. This would achieve the same ends as leasing space in an existing facility—and could even make access easier for the ISP.

In the absence of publicly owned space for lease, a new provider would need to lease indoor space from private landlords or build huts on leased private land. This can be more challenging than leasing public property: Premium space, well located, must be found and leased or purchased in the private marketplace. The network provider needs also to install generators, backup power, racks, interconnection with external backbone networks, core electronics, management and content servers, and staff offices.

Action: Trading or swapping access to public assets for access to private infrastructure

As a means of making public assets available where leasing is not feasible, consider how in-kind payment could make the locality's assets accessible to broadband deployers while advancing public goals. Trades or swaps for fiber, conduit, or real estate could be considered as alternatives to monetary payments.

A trading strategy would allow providers to use the locality's conduit or fiber in exchange for the providers allowing the locality to use a negotiated amount of conduit or fiber from the provider's network in areas where needs facilities for its own internal use. Trading between entities does not necessarily have to entail conduit or fiber, though these may be the most common form of trade. Access to other local government facilities, such as hub sites, could also be explored as trade opportunities.

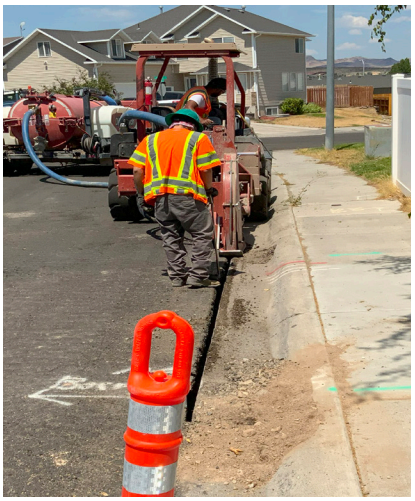
An asset swapping or trading strategy can enable the efficiencies of a multi-use infrastructure environment and effectively multiply the impact of every mile that the locality constructs, because excess capacity in government-constructed areas can be traded for capacity that other providers have constructed, or that they will construct in the future. Security and control issues can be managed through contract terms and robust enforcement, based on engineering smart practices and industry standards.

Considerations

1. May require an enabling local ordinance
2. Benefits from the development of a broadband office, broadband strategic plan, public asset portfolio, and public asset lease program

Action: Microtrenching

Figure 3: Example of a microtrench in a residential neighborhood



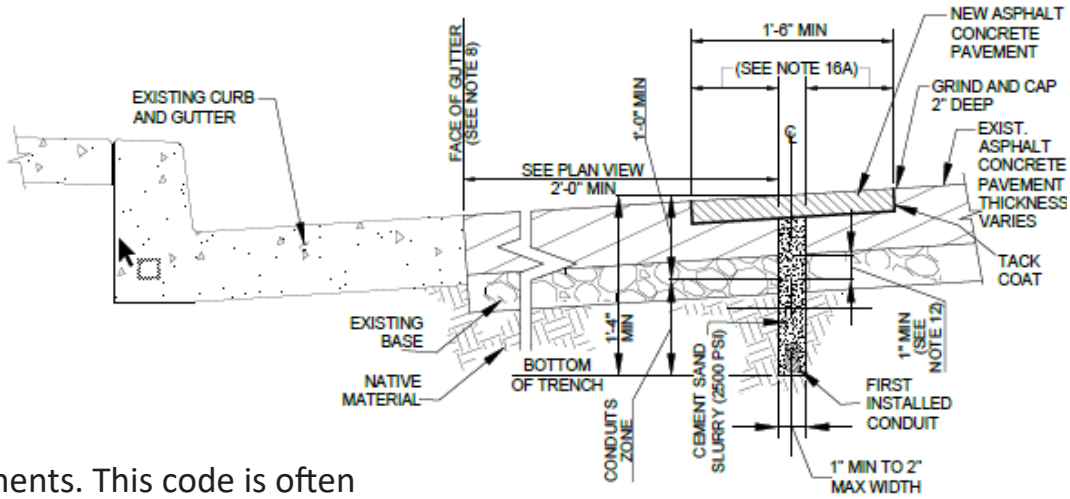
Microtrenching is typically a more cost-effective and efficient method of underground facility construction than the conventional techniques of trenching, horizontal drilling, or plowing. Jobs of up to 3,000 feet can be completed in one day, thus causing only short-term disruption to the surroundings. As a result, microtrenching has increasingly become the fiber construction method of choice in urban settings, where it is employed in a variety of underground construction situations—ranging from direct burials of thin fiber optic drop cables under driveways to installations of conduits of up to 2 inches in diameter under paved roadways and sidewalks.

Microtrenching is usually performed with a rotary cutting saw that opens a slit or a narrow trench of ½ inch to 2 inches in width and no more than 2 feet in depth. Ground material excavated during construction is removed instantaneously. Once fiber cables are placed in the ground, the trench is typically backfilled and sealed with a concrete slurry or polymer substances, depending on the existing surface conditions. As microtrenching is usually conducted on previously disturbed grounds, temporary and long-term environmental impacts and disturbance to the surroundings are minimal.

Senate Bill 378, which was introduced in 2018 and signed into law by the governor of California on October 8, 2021, updated regulations around microtrenching to facilitate accelerated fiber broadband infrastructure deployment across the state. The bill mandates that local agencies allow the installation of fiber by microtrenching—defined as the excavation of a trench of up to 4 inches in width and a depth of 12 to 26 inches below grade—unless the agencies identify and document adverse impacts on public health or safety. The bill also requires agencies to amend existing construction policies and ordinances accordingly. However, the text of the bill and its addition to the California Government Code (Section 65964.5) do not impose any construction standards, safety measures, general restrictions, or guidelines for permitting fees, thus providing local authorities with leeway in adopting the law.

Some cities have already incorporated standards and requirements for microtrenching into their public works codes. Los Angeles County, for example, is known for its well-established microtrenching code, which is mostly applicable to commercial network implementation

Figure 4: Cross-section of a typical microtrench



in urban environments. This code is often referenced as one of the most clearly defined microtrenching policies. Updates to the code in 2019 refined the initial requirements, lowering the barriers to fiber installation by means of shallow trenching. Many local jurisdictions, however, have no prior experience with microtrenching. Consequently, their public works codes do not include special provisions for this type of fiber construction.

Municipalities tend to embrace microtrenching as a viable construction choice when insufficient broadband connectivity becomes a pressing public issue. In the absence of specific standards for microtrenching, collaborative partnerships between fiber operators and motivated authorities have proved most beneficial to support expedient permitting and successful project execution. Lessons learned in the process may help city engineers tailor the public works code to address microtrenching.

In Culver City, Fullerton, and Loma Linda, for example, inadequate and unreliable internet service for many residents and businesses spurred city officials to form collaborative relationships with incoming service providers SiFi and Ting and adopt microtrenching as a solution to expedite construction.

San Antonio, Texas, among other out-of-state cities, has been cited as "microtrench-friendly." In 2017, the city launched a well-orchestrated pilot project that was coordinated with city officials and closely monitored by city engineers. This pilot provided an education on the process and paved the way to expedited permitting for microtrenching in the years following.

Despite its many advantages, however, the use of microtrenching must be carefully weighed against potential risk factors jeopardizing the infrastructure's longevity. For example, placing cables in deteriorating pavements may lead to stress in the fiber or to water intrusion in the conduit system—possibly causing service impairments in the future. Also, fiber cables placed in very shallow trenches tend to be pushed up closer to the surface over time, leaving them vulnerable to the environment.

Action: Building new assets where feasible

To the extent possible, localities should consider constructing fiber and conduit where it anticipates a need for capacity, including in conjunction with other planned capital improvements in the rights-of-way. By taking advantage of these opportunities, a locality can create over time an asset that can support the local government's internal needs and the ability of broadband deployers to serve the community.

Building middle-mile fiber

Excess fiber strands in a local network can help in establishing a network backbone. If the locality's fiber covers the key parts of the community, it can provide an immediate way to establish a point of presence in those key areas. A middle-mile model provides fiber in a backbone configuration, instead of comprehensively on every street to every home and business. A network provider will need middle-mile connectivity from the internet (that is, the public network backbone) to its key network facilities, and to connect its network to new service areas. The network provider then constructs "last-mile" fiber to homes and businesses—or, in some cases, provides wireless last-mile services. The network provider can access the fiber at outdoor enclosures (see Figure 5) or locate its equipment in public buildings (see Figure 6).

Figure 5: Transition between government and provider fiber at outdoor enclosure

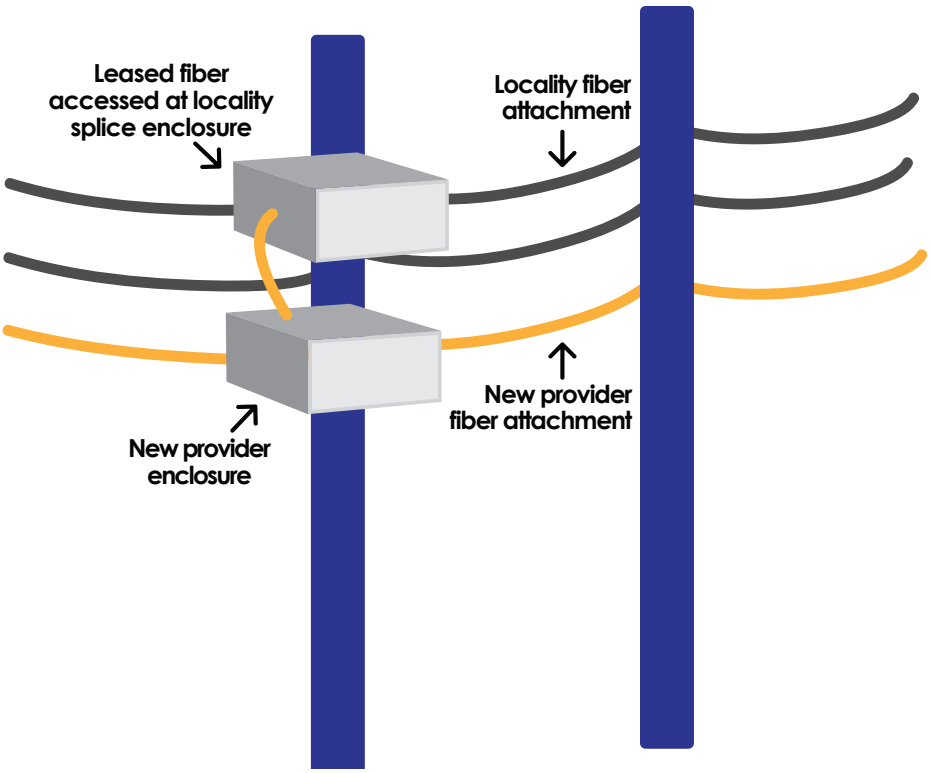
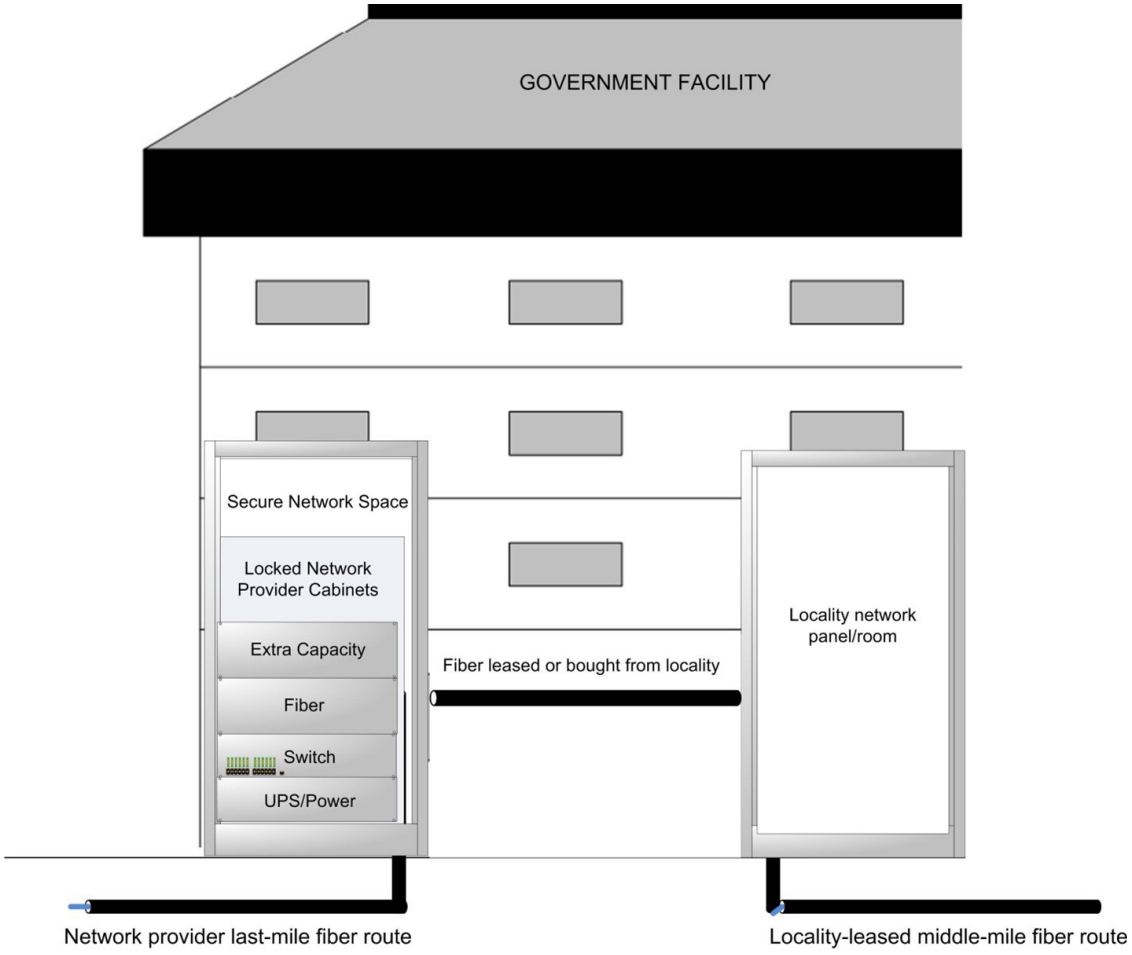


Figure 6: Transition between government and provider fiber inside government facility



If a community is building new fiber, it could consider installing a higher count than would be justified by its immediate needs in order to ensure there is capacity for growth. For example, the relatively low incremental cost of additional fiber in a cable may justify constructing a 288-count fiber cable instead of a 144-count cable in some cases.

This model has been extensively used in hundreds of communities in Sweden—most notably in Stockholm, where the city built extensive fiber over 15 years to most of its multi-dwelling buildings and made that fiber available to the private sector—substantially reducing the cost to private sector competitors of providing service in that market.

Building conduit

Conduit exists in a wide range of sizes, deployment scenarios, and topologies. Localities install conduit for a wide range of connectivity purposes, including:

- Community-wide communications
- Power
- Traffic signals (both from the signal to the cabinet, and from the cabinet to the communications network)
- Antennas and sensors (traffic, SCADA)
- CCTV cameras

Conduit is also installed to interconnect buildings (e.g., in a campus environment) and to provide capacity alongside public infrastructure, such as roads and canals.

The ideal conduit for communications networks has the following characteristics:

- Continuity over a long distance
- Sufficient size (diameter)
- Proximity to locations of interest
- Handholes or manholes at regular intervals
- Empty, or segmented with spare innerduct
- Unobstructed
- Sealed
- Separated from power
- Accessible
- Accurately and completely documented

Smart practice 2B: Creating conditions that make deployment of private assets more likely

Action: Requiring conduit installation in new developments and during major renovations

Providing broadband services to homes and businesses requires extension of high-speed networking infrastructure to and within the premises. In apartment buildings and multi-tenant office buildings, this requires extension of fiber optic cables from the right-of-way to a central telecommunications distribution point in the building, and from there to individual units. Lack of an affordable cable pathway from the right-of-way or to an apartment or office unit increases the cost of serving potential customers in a large building—and constructing a pathway during other construction or renovation can be done at a small percentage of the cost of retrofitting later.

For these reasons, a government can improve services to its residents and businesses if it requires by code—or creates an incentive for developers to build—additional pathways from the public rights-of-way to a demarcation point in apartment and office buildings. Furthermore, it can require standards-compliant cabling or cable pathways inside new construction or major renovations to cost-effectively connect each unit.

Case Studies:

The City of Brentwood issued an ordinance requiring developers to install two conduits dedicated to the City with new developments

The City of Gonzales requires all excavators to install conduit

A City of Santa Cruz ordinance requires excavators to include provisions for the installation of telecommunications cable, conduit, and related equipment

This approach effectively lays the foundation for last-mile broadband deployment by reducing the cost of construction. By extension, it may reduce future public investment, such as grant funding, which might otherwise be needed to incentivize broadband buildout in unserved and underserved areas.

Considerations

1. Can be required by code or encouraged by incentives to developers

2. Requires standards-compliant cabling or cable pathways inside new construction or major renovations to cost-effectively connect each unit

3. Local decision needed as to whether to mandate or incentivize buildout

4. Local decision needed as to whether to support conduit installation with new developments through public-private partnerships and/or require it through a statute

Ensuring the availability of conduit from the street to the building

One significant factor for deployment by a new network provider is the physical entry into buildings. Ensuring the availability of spare conduit into buildings can reduce installation time, risk, and cost for new service providers.

Developers and builders are already accustomed to providing pathways for telephone, power, and cable TV from the property line to a room designated for utility services within the building. Typical practice for many developers is to coordinate with incumbent ISPs at the time of construction or renovation. The developer installs conduit from the room location to the exterior of the building, typically either encased in the slab or under floors, to and through the exterior wall. The developer then trenches conduit to the property line, where it is properly marked so the various utilities can determine which conduit is for their service.

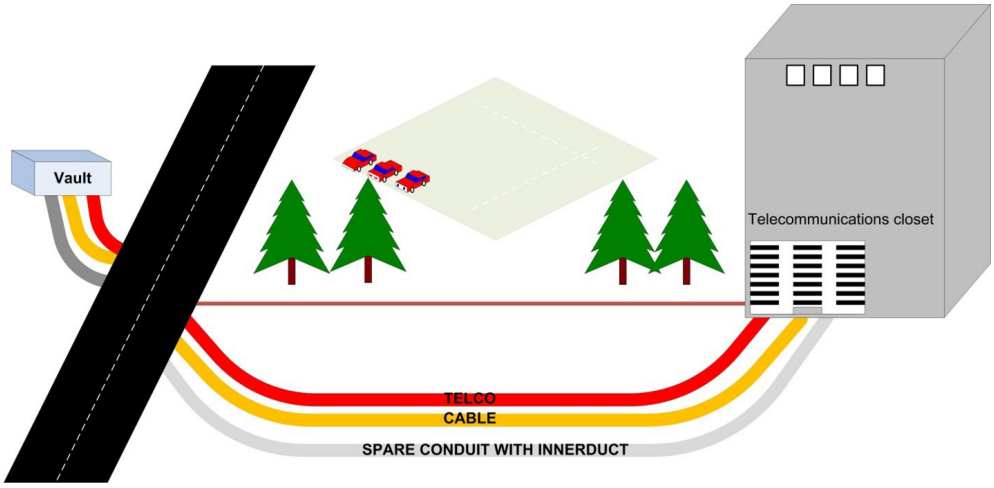
Although the conduit requirements will vary by the size of the building, a typical approach might be the installation of two 4-inch conduits for the phone and cable companies, and up to three 4-inch conduits for the electric utility. Conduit counts should reflect, to the extent feasible, anticipated future needs for fiber capacity.

The developer's incremental cost is minimal to add an additional 4-inch conduit for fiber optic cable in the same trench as the other utilities' conduit (see Figure 7). To make the conduit even more valuable, an innerduct can be installed during construction to subdivide the conduit into cells to create spare capacity.

In contrast, the cost for new construction of the same route might be up to five times as much if a network provider needs to create a new entry path that is not coordinated with initial construction. The higher cost is realistic if the right-of-way is on the opposite side of a major road, if the provider needs to cross under a parking lot or driveway, and if restoration (both in the outdoors and the building) is sensitive and expensive.

Constructing a new route into a building may also involve days or weeks of delay for permitting, engineering, design, utility location, and coordination with the building owner. These are delays that would be avoided if conduit already exists when a provider is ready to begin connecting customers.

Figure 7: Example of requirement for developers to install conduit from public right-of-way to building



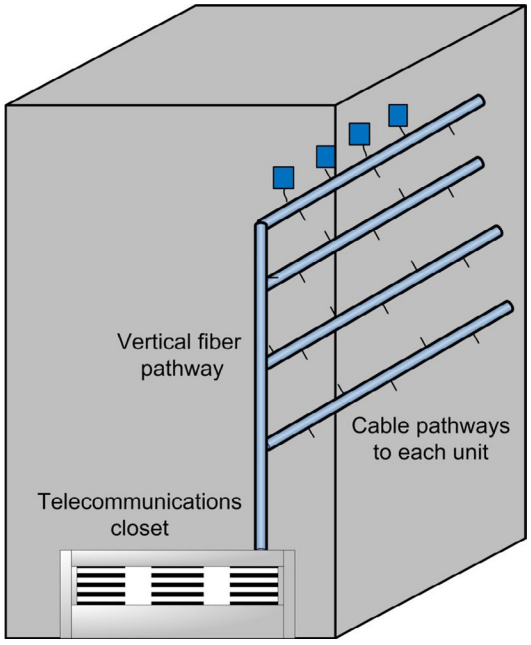
Ensuring the installation of in-building pathways and cabling

Indoor cabling is one of the largest costs and areas of uncertainty for a network service provider. This problem is especially pronounced in apartment buildings and office buildings, where the provider must cable long distances to reach individual customers.

A locality can reduce costs and speed deployment by requiring in its code that developers or building owners place cable pathways or standardized cabling to each unit as part of construction or renovations (see Figure 8). The pathways need to meet industry standards (such as TIA/ANSI) so that bend radius, distances, clearances, and locations of termination points are correct for the potential range of technologies that might be installed. Also, there should be secure telecommunications closets of appropriate size and number, based on the number of units and the distances between the units and risers.

Indoor fiber optic cabling in an apartment building costs from $300 to $750 per unit, depending on the design of the building, the availability of false ceilings and cable pathways, the existence of wiring closets, and permission to attach moldings or other materials. The cost per unit can be reduced by half if there is sufficient capacity for the new fiber in

Figure 8: Example of requirement for developers to install cable pathways to apartments or offices



the horizontal riser, and there is conduit, duct, or raceway from the riser to individual units. Pricing and challenges are similar in multi-tenant office buildings. For both apartments and offices, each building is different and requires new strategies.

Another strategy is to require developers or building owners to install fiber optic or other broadband cable as part of new construction or renovations. As with installing conduit, this strategy reduces costs by eliminating the need for a new provider to pull cables through a raceway or conduit—but it is better suited to communities where broadband providers are already connecting customers according to a specific standard (e.g., single-mode fiber pair to each unit). Given the diversity of potential service approaches (e.g., non-fiber technologies to the unit), installing fiber to every unit may lead to a significant stranded investment if no fiber provider serves the building, or if the service provider insists on using another type of cabling to the unit.

See the appendix for a case study on the City of Loma Linda's "Connected Community Standard," which requires developers to install conduit and in-building wiring.

Action: Facilitating aerial construction by encouraging pole owners to facilitate make-ready

A critical item for anyone building new broadband facilities is access to utility poles,[12] which allows for aerial construction that is much less costly than underground construction. However, many existing utility poles either do not have sufficient space for attachment of new communications providers or have existing communications providers attached in an inefficient manner, requiring those attachments to be moved to accommodate the new provider.

Moving existing utilities as part of the "make-ready" process is costly and time-consuming, requiring weeks or months to coordinate providers and perform the move. Furthermore,

12 Access to poles is the subject of a California Public Utilities Commission proceeding as of the wiring of this document. "Order Instituting Rulemaking into Access by Competitive Communications Providers to California Utility Poles and Conduit, Consistent with the Commission's Safety Regulations," CPUC, R.17-06-028, Proceeding Details (ca.gov).

the inefficient make-ready process has to be repeated each time a new entity wants to attach.

Permitting departments may be able to improve the availability of broadband by encouraging pole owners to partner with deployers to facilitate make-ready.[13] Localities have relationships with the pole owners that frequently allow them some influence. Localities can use that influence on behalf of their broadband goals by encouraging pole owners to facilitate the process of the new broadband provider attaching to the poles.

Some broadband advocates believe that new network buildout can be eased through state or local requirements that new entrants be allowed to attach to privately owned poles. Indeed, some cities require shared use of facilities in the localities' rights-of-way as a function of their authority to promote the health and welfare of citizens and their authority to adopt reasonable requirements for right-of-way occupants to minimize disruption and hazards. From a technical standpoint, such shared access opportunities would assist both localities and broadband deployers in cost-effectively and quickly constructing new broadband facilities.

There exist considerable benefits to quick and efficient make-ready or easily available pole space. A service provider can enter a community and begin constructing its infrastructure in a matter of weeks instead of months. The provider can focus its construction purely on meeting customer need and demand, rather than being heavily biased toward areas of easier construction. It can also potentially double its speed of deployment, especially at the outset of construction. Finally, efficient make-ready can reduce costs by as much as 50 to 75 percent, according to engineers working on fiber construction in California.

Pole attachment by a new broadband builder can be expedited if the pole owner:

1. Has a standard, predictable process for attachment
2. Commits to a schedule for each part of the process
3. Provides reasonable and consistent pricing for make-ready
4. Consolidates its own infrastructure on the poles and removes unused attachments
5. Requires existing attachers to consolidate attachments and remove unused attachments
6. Allows use of extension arms or overlash to increase capacity

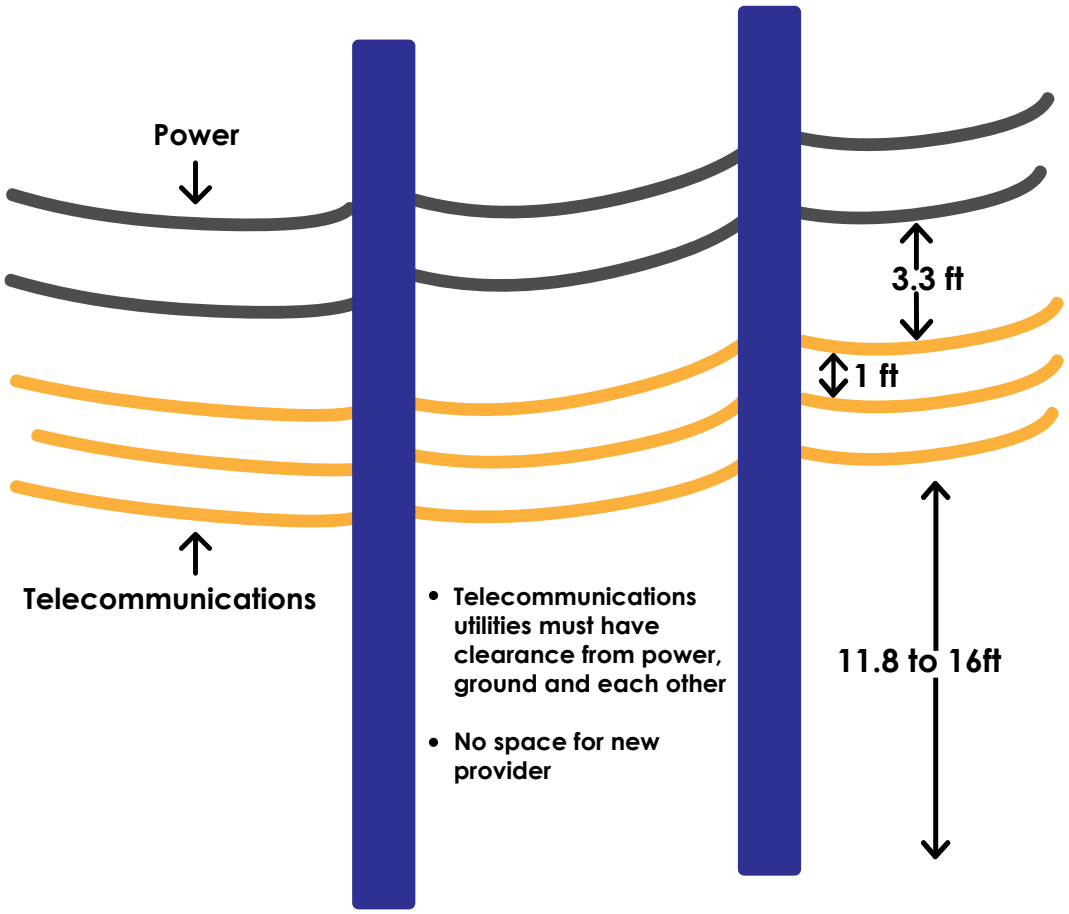
The following sections suggest strategies and smart practices that can help lower per pole costs.

13 Pole owners control the timetable, cost, and procedures of attaching to their poles. In most American communities, the locality does not own the poles and has little or no control over those poles; rather, the poles are owned by electric utilities and telephone companies that do not answer to the locality.

Facilitating make-ready to enhance pole access

"Make-ready" is an essential step in being able to attach new cables to existing poles. The term refers to the process of preparing utility poles for the attachment of an additional utility in compliance with electrical code. In most cases, this means that existing utilities must be moved to accommodate a new entrant with the required clearance from electrical lines and the ground, and clearance between the communications utilities. If there is insufficient space to add a new attachment, a pole may need to be replaced, usually at the expense of the new entrant.[14] Figure 9 illustrates a pole with required clearances between power, telecommunications utilities, and the ground.

Figure 9: Basic pole diagram for make-ready



14 In some cases where the pole owner requires replacement of the entire pole, costs can be so excessive that the network deployer chooses to change the design to underground or reroute the fiber rather than pay for replacing the pole.

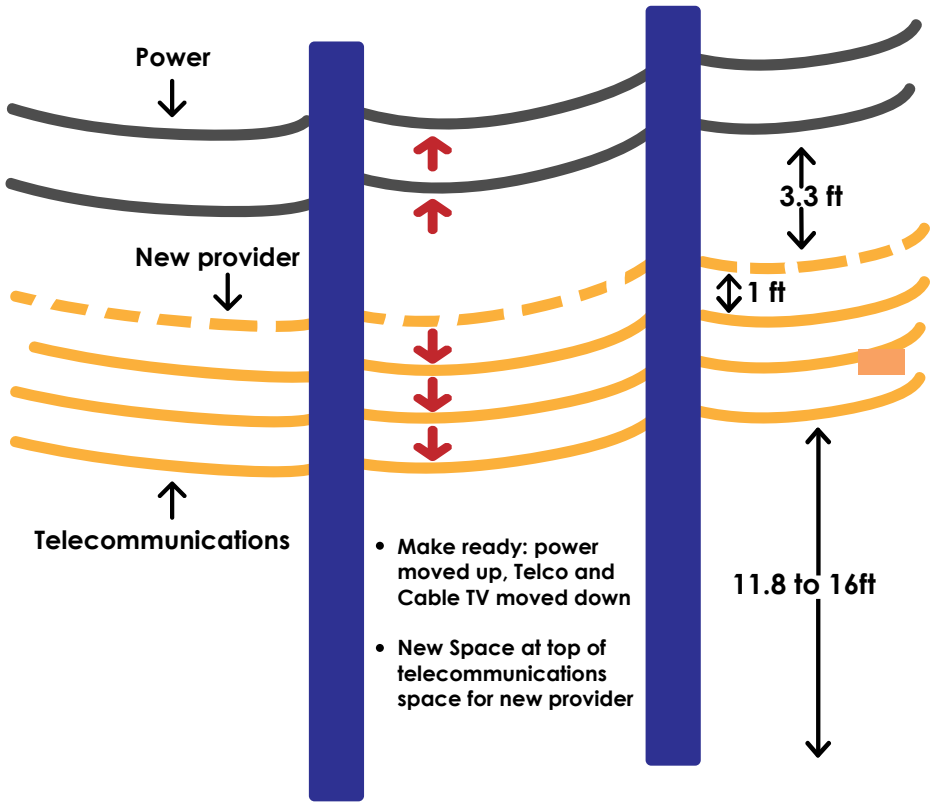
The make-ready process typically starts with the entity seeking attachment (i.e., the new service provider) applying for and obtaining an agreement to attach to the poles, and meeting with the staff of the pole-owning utility. This establishes an understanding of the timeline, the process, the fees, and the likely speed at which the necessary work will be completed.
At the same general time, the new provider works on network design and routing. Sometimes, in early stages of network design, the provider may encounter "show-stopper" problems—these include exorbitant pricing for make-ready, a very slow or uncertain schedule, or, in the worst case, a refusal to allow attachment.

It is at this stage that local government intervention can be critical—because the problem is not technical, it is a matter of the pole owner's business decisions. Even though the locality is not typically a direct regulator of the pole owner, the relationship with the local government is usually important to the pole owner, and the locality can have significant influence—either directly or through the state (because regulation of the pole owner is often at the state level). Local influence may encourage the pole owner to work cooperatively with the new entity or may lead to a creative resolution of the problem—such as a strategy to share costs to augment the utility's staff in the event that the utility is burdened by the new entrant's needs.

Assuming the show-stopper problems are addressed, the new entrant then performs a survey of the poles. This process will differ in complexity depending on such local circumstances as the age of the poles, the density of the area, and other matters. To facilitate the process, new providers sometimes seek out an engineer who has worked with this utility—who knows both the formal and informal rules of the pole owner and the geographic area, and who has relationships with the appropriate individuals at the pole-owning entity. The locality can often help a new network entrant understand the unwritten customs and practices in the area and identify individuals who have been helpful in the past.

The engineer identifies the types of moves that need to happen on each pole. Figure 10 illustrates a typical set of moves required to make room for a new attachment.

Figure 10: Example of make-ready requirement for new provider



Make-ready timing is another hurdle for new entrants. While the make-ready process differs from community to community, it typically includes a multiparty walk-out of the route with representatives of all utilities on the poles. The walk-out may take weeks or months to schedule. Because some pole owners may not be incented to expedite a competitor's construction, the locality can encourage all parties to expedite their work, both for the walk-out and the moves. (Make-ready timing may be impacted by state or federal requirements and other terms of access, so these issues may be addressed through existing regulations.)

The actual make-ready work may also take weeks or months to complete. The individual attachers sometimes move their own facilities, or the pole owner can have a third party perform the work and pass the costs on to each attacher.

Federal, state, and local regulators have been adopting one-touch make ready rules.[15] In general, these focus on "simple" moves, which do not involve proximity to power or moving power infrastructure. In many parts of California, pole owners and attachees have 45 days to review a proposal for simple make-ready, in which the pole owner or attachee can respond with an alternative approach. If there is no response within 45 days, the proposed move is deemed acceptable, and the attacher can carry out the move.

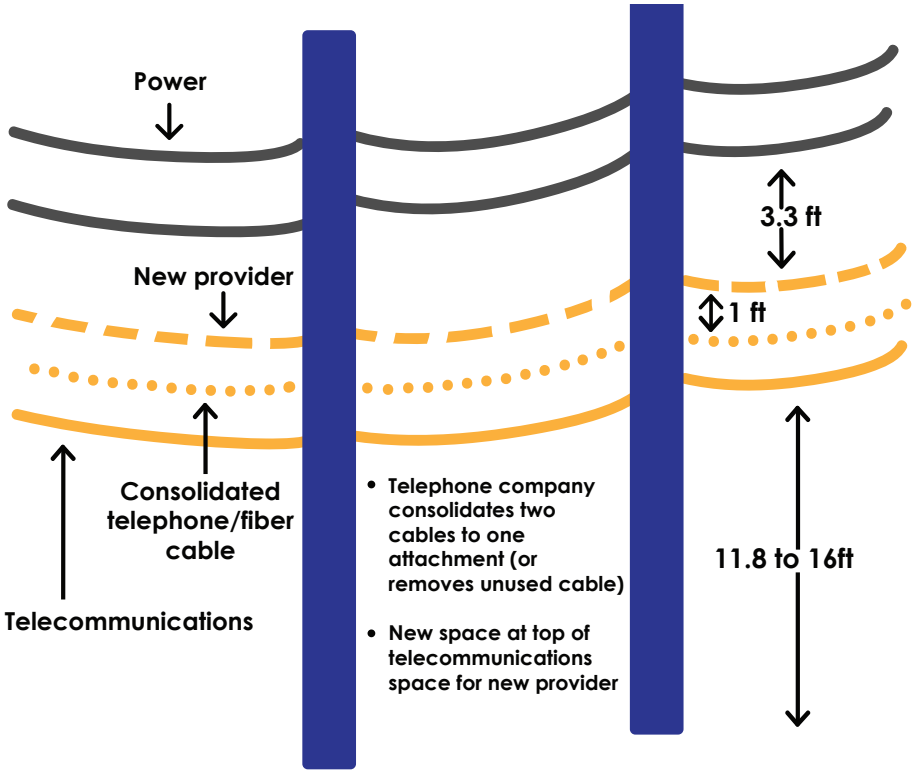
15 See, for example: "One-Touch-Make-Ready Rules for Pole Attachments Effective May 20, 2019," Federal Communications Commission, DA-19-445, https://www.fcc.gov/document/one-touch-make-ready-rules-pole-attachments-effective-may-20-2019.

Eliminating the need for make-ready to speed pole access

Even more efficiency results if additional space is already available on the pole. There are a number of relatively simple strategies that can enable this: first, "housekeeping" and consolidation of existing attachments to make space for new entrants; second, reservation of space for new entrants; third, allowing new attachers to use extension arms that create new room on the pole; and fourth, allowing and requiring "overlash" of new cables on existing attachments so as to efficiently use existing space.

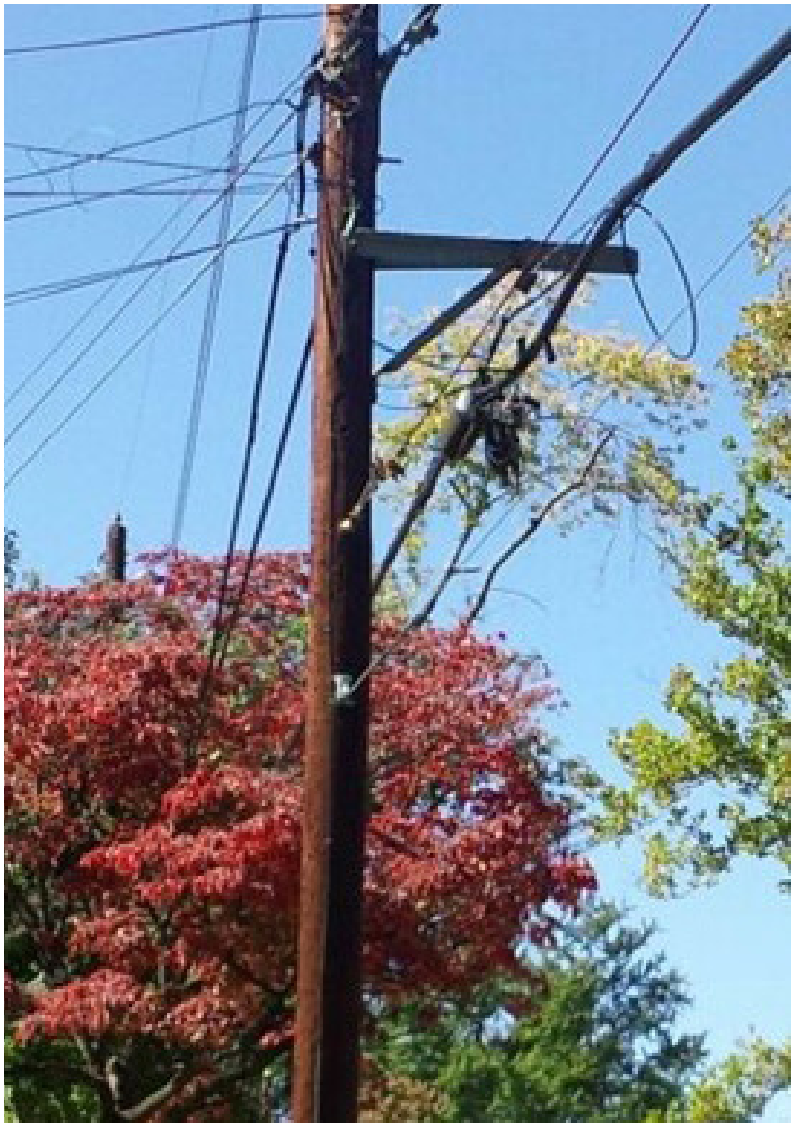
First, pole owners can make space by undertaking "housekeeping" of its own infrastructure—for example, by consolidating power conductors, removing unused telephone cables, and consolidating telephone and fiber cables to the same attachment (see Figure 11). The pole owner can require other attachers to do the same or can create incentives for them to do so; for example, it can structure attachment fees to encourage efficient use of space and consolidation.

Figure 11: Example of make-ready involving cable consolidation



Second, pole owners can designate a space of at least 12 vertical inches, intended specifically for attachment by new service providers. If poles are full and space does not exist, this policy can be implemented when poles are replaced, or as part of regular maintenance. In many older neighborhoods, this will require the pole owner to install taller poles.

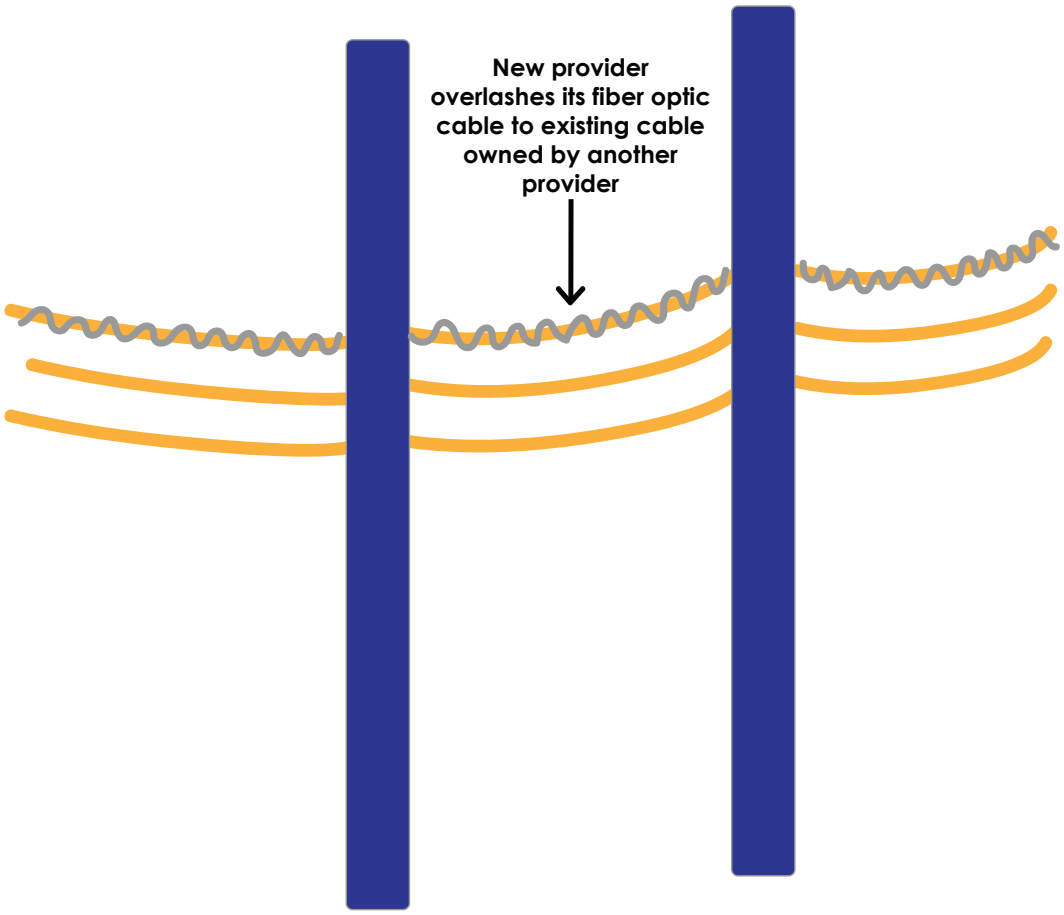
Figure 12: Example of extension arm on pole, enabling horizontal expansion of capacity



Third, new entrant construction can be greatly facilitated if pole owners allow use of extension arms to increase capacity in the communications space. Because the National Electrical Safety Code (NESC) requirements for clearance allow for horizontal as well as vertical clearance, one way to increase communications capacity on a utility pole is to install horizontal extension arms from the pole and install cables on the arm (see Figure 12). Extension arms are about 2 feet to 5 feet in length and are bolted to the utility pole. They are strong enough to support communications cables and are commonly used in congested environments. Not all pole owners allow extension arms despite their compliance with NESC requirements and their widespread successful use.

Fourth, make-ready can also be avoided if new providers are able to "overlash" their cables to existing cables on the utility poles (see Figure 13). Overlash is significantly less costly than creating a new attachment on the poles. It also does not typically require make-ready, so it entails significantly less time and coordination with the pole owner. Overlashing new cable to existing aerial strand costs on average about $15,000 to $60,000 per mile (materials and labor) depending on the fiber count. In comparison, new construction can cost as much as hundreds of thousands of dollars per mile depending on labor costs and the complexity of the build.[16]

Figure 13: New provider overlashes new cable to existing cable



16 Management of overlashing can be complex and the pole owners may not look favorably upon it. The integrity of the poles and the attached cables requires a clear model of responsibility for the attachment. These issues are, however, manageable and, in our experience, a number of models exist for this allocation of responsibility. In one model, which is most consistent with current attachment practices, the first provider to attach in this space is responsible to the pole owner for the attachment, including fees and compliance with loading, clearance rules, and maintenance; entities that overlash to the first cables are sub-lessors. In another model, a pro rata fee model is created in advance by the pole owner or the government managing the rights-of-way, and the overlashing entities coordinate their work and maintenance with the pole owner, or a joint pole authority.

Smart practice 2C: Encouraging deployment of public and private assets

Action: Developing a "Build Once" policy

To the extent that such approaches align with a localities' needs and resources, there exist strategies for identifying opportunities to invest in conduit and fiber infrastructure assets to meet a local government's own operational requirements while potentially facilitating broadband expansion goals by enabling private sector use of excess capacity.

Importantly, this "Build Once" approach is distinct from the "Dig Once" policies discussed later; Build Once focuses on the locality planning the construction of its own communications infrastructure, while Dig Once types of policies seek to enable the locality to obtain conduit or fiber capacity from entities building in the rights-of-way.

The primary purpose of a Build Once approach is to support the locality's internal communications and technology requirements. But with foresight and planning, the Build Once approach can expand the benefit of those communications infrastructure projects, and increase the return on the locality's investment, by adding capacity at low incremental cost that can then serve a range of other purposes and support external stakeholder requirements.

A locality's investment in new infrastructure in its rights-of- could connect last-mile providers to unserved markets more reliably and cost-effectively; support expansion of existing middle-mile networks; accommodate connectivity requirements for other State agencies; and support wireless providers' expansion or improvement of mobile services.

Action: Developing a "Dig Once" policy to promote conduit and fiber construction

Many localities have adopted some form of "dig-once" policy that opens streets and rights-of-way to utility construction when related projects are underway. Such policies protect roads and sidewalks and minimize traffic and other disruptions related to utility construction—but also create a more uniform and efficient means of constructing network infrastructure by giving multiple entities, including the locality itself, the opportunity to place fiber or conduit inexpensively.

"Dig Once" policies open rights-of-way to utility construction when related projects are underway. Dig Once policies can reduce construction costs, reduce crowding in the rights-of-way, and minimize traffic and other disruptions. When it works for a given locality, Dig Once can incentivize infrastructure growth and provide a uniform and efficient means of constructing network infrastructure.

To build or expand a fiber footprint, localities can place conduit during all capital improvement projects to dramatically lower the cost of network construction.[17] Most communities are well situated to install conduit any time a capital improvement project requires breaking ground in the public right-of-way. To maximize the benefit of this strategy, localities can maintain awareness of opportunities to install or obtain fiber and conduit through activities in the rights-of-way and discover and pursue these opportunities by way of explicit, formal procedures.

Localities can also adopt guidelines addressing conduit construction so that they can quickly work with a potential partner to add conduit to a project and integrate with existing community conduit. Standards should be prescriptive, but there should be sufficient flexibility to modify them if impractical or unsuitable in certain circumstances. These documents can serve as references in developing, for instance, site plan conditions for utility- or developer-provided infrastructure.

17 See "Brief Engineering Assessment: Efficiencies available through simultaneous construction and co-location of communications conduit and fiber," White Paper, CTC, 2009. http://www.ctcnet.us/CoordinatedConduitConstruction.pdf.

New development areas, for example, offer important fiber and conduit placement opportunities. As the roads are developed, conduit can be installed and documented, enabling the locality to place fiber when needed at very low cost relative to the cost of retrofitting those roads for fiber infrastructure. Conduit burial during construction could enable the community to lease fiber to private providers or deploy services itself, as the need arises. The incremental cost of the conduit during construction is negligible relative to the cost of building fiber later, after the development is complete.

The City of Gonzalez, California, for example, has used this strategy for a number of years. As the opportunities have arisen, the city has expanded its network infrastructure by requiring excavators in the public rights-of-way to install communications conduit. In Gonzalez, the public works department has demonstrated, through collaborative effort and cooperation, the potential to realize efficiencies by placing conduit during other projects. The city's policy takes advantage of public works projects in the rights-of-way to place conduit at a low additional cost, and allows for exceptions if the cost benefit is insufficient. The city also developed common specifications for installation of the conduit.

Localities can also watch for opportunities to install or obtain fiber and conduit through activities in the rights-of-way and discover and pursue these opportunities by way of explicit, formal procedures or ordinance. These opportunities may include grant-funded initiatives for particular departments; road construction; road widening; undergrounding of utilities; and construction of new and existing utility infrastructure (electric, telephone, cable, water, sewer).

Localities can maintain contact with local utilities and service providers to be aware of their upcoming plans. Likewise, entities performing construction in the rights-of-way can provide sufficient information in the permitting process for the locality to judge if a co-location opportunity is available, and provide sufficient time for the locality to coordinate adding conduit and vaults as part of the construction.

To ensure that all entities have the opportunity to place conduit or fiber during other entities' construction, localities can put in place processes to alert itself as to the opportunities. It can set up capture points to bring new construction to the attention of the appropriate party—including through requests for permitting antennas, permits for rights-of-way construction, discussions

in trade or business journals, coordination with other governments in the region, and discussions with regional economic development entities.

The potential benefits of this coordinated approach to conduit and fiber installation accrues not only to public agencies but also to private providers. A coordinated fiber network design can provide capacity for dozens of separate service providers. This strategy has the benefit of maximizing long-term value and minimizing the potential for future disruption.

One approach is to construct a high-capacity conduit bank connected to manholes at regular intervals according to a standardized design. The primary manholes in turn would connect to lower-capacity conduit connected to residential or business service drops or to wireless infrastructure. Small manholes or handholes can be managed by particular service providers for their proprietary access and service to particular customers.

Considerations

1. Developing criteria for Dig Once opportunities (i.e., project length and location requirements)
2. Identifying priority areas for Dig Once policies (e.g., road projects)
3. Developing a notification system to coordinate with excavators
4. Recording as-built information after construction is complete
5. Enabling all qualified parties, including government agencies, to take advantage of Dig Once opportunities

Enabling all parties to take advantage of "Dig Once" opportunities

Once a provider initiates construction in an area covered by a dig-once plan, all providers and the locality should be made aware so that they can be ready to take advantage of the opportunity. Each individual provider can place its infrastructure while the "trench" is open (or use directional boring techniques to place the conduit), and the locality can build infrastructure for future growth (or require that another provider do so).

Providers can reduce both costs and the use of underground space by placing conduit as part of the same construction project. By placing their conduit at the same time, the providers can also reduce the instances of one conduit "wrapping around" another one—which occurs when a bore operator avoids existing conduit that is not readily seen. This reduces the complexity of repairs and reduces the risk of damaging infrastructure.

Once construction is complete, a multi-year moratorium along the path reduces disruption and wear-and-tear to the rights-of-way—and simultaneously incenting private carriers to place conduit efficiently and promptly while the road is open.

This notification strategy has been successful in the City of South San Francisco and the City of Salinas, which require private providers to be notified when excavations in the public rights-of-way present an opportunity to install telecommunications facilities. Those entities are then provided with a set time interval in which they can place their own underground infrastructure. Once construction is complete, a multi-year moratorium or enhanced remediation requirement along the path reduces disruption and wear-and-tear to the rights-of-way—and simultaneously incents private carriers to place conduit efficiently and promptly while the road is open.

Placing conduit bank in congested areas

In highly congested and valuable areas, localities can construct uniform conduit bank with sufficient capacity for all current and future providers. Uniform conduit banks use space more efficiently because conduit can be more tightly packed together and share manholes and handholes. Such banks can be maintained and managed by a single entity, whether the locality or a designated contractor.

Banks of conduits constructed simultaneously, or large conduits segmented with innerduct, provide multiple pathways for the installation of multiple fiber optic cables located in close proximity, as well as the ability to remove, add, or replace fiber optic cables without disturbing neighboring cables. Providers can select different colors for easier identification and repair. In contrast, rights-of-way that are crowded with conduit offer limited space and more costly options for adding infrastructure.

3. Strategies for creating equitable access to information

Smart practices:

A. Making public GIS datasets available where possible

B. Documenting public fiber assets

C. Documenting public conduit assets

D. Coordinating telecommunications infrastructure mapping across permitting agencies

Smart practices for sharing information (such as detailed maps) relevant to broadband planning among a wide range of potential deployers

Local governments routinely collect and maintain maps, permitting data, and other information related to their rights-of-way and other infrastructure in their communities. Some larger cities and counties collect extensive data and share it on open data portals, accessible to anyone; smaller communities tend not to collect as much information—and not to have the resources to make it publicly available.

The strategies presented here focus on gathering data that might help facilitate broadband planning and design—and making the data available to ISPs or other potential partners. (Local governments themselves also benefit from developing and maintaining detailed, accurate information about broadband-enabling infrastructure.)

These steps include documenting existing infrastructure and planning to capture details on future expansions. Examples include the location of existing fiber and conduit, the condition of that infrastructure, and how fiber strands are being used.

In each of these approaches, the locality would ensure that appropriate privacy and security standards are maintained.

Smart practice 3A: Making public GIS datasets available where possible

An organized government database of geographic information greatly increases efficiencies and reduces costs for the government itself and for the organizations with which it does business. Access to relevant data reduces the cost and time required to plan and build broadband infrastructure—whether by the locality itself or a broadband deployer. The California Public Utilities Commission developed and maintains the California Interactive Broadband Map[18] in part to achieve these same ends at a state level.

Geographic information systems (GIS) are advanced mapping systems with high-resolution detail. GIS databases can be accessed for a range of purposes—many never considered by the creators of the system or the individuals who entered particular resource information (e.g., the location of streetlights or characteristics of private property in the locality).

While local data are not necessarily collected for the primary purpose of facilitating broadband construction, the following data sets can be extremely helpful in that regard:

- Addresses
- Streets
- Rights-of-way and easements (local government, Caltrans, and others)
- Building footprints
- Streetlights
- Neighborhood boundaries
- Parcels
- Utility poles
- Overhead strand
- Conduit (both locality-owned and belonging to other utilities)
- Fiber (both locality-owned and belonging to other utilities)
- Manholes and handholes
- Zoning
- Existing underground utilities

18 California Interactive Broadband Map, https://www.broadbandmap.ca.gov/.

With this information, it becomes easier, faster, and cheaper to conduct the high-level planning phase of a large-scale broadband construction project in which the prospective builder examines options and determines what assets are needed to plan and to build.

This kind of detailed and transparent information can enable a prospective broadband provider to plan efficiently in a range of areas. First, the provider can learn what resources exist (such as space in the rights-of-way space, manholes, poles, and conduits) that are usable and leasable for the project and who to contact about leasing those resources. Second, the provider can develop more accurate forecasts of construction costs and schedules and identify in advance areas of risk and critical path items, such as easement access and bridge crossings. Third, the builder can create a large percentage of the outside plant design from the existing information, reducing the time and effort needed for fieldwork.

Incumbent broadband providers frequently are reluctant to add their data to such databases for business reasons. GIS systems enable the locality to protect particular layers of a map for internal use only, or limit access to authorized individuals and keep proprietary information from potential competitors.

Smart practice 3B: Documenting public fiber assets

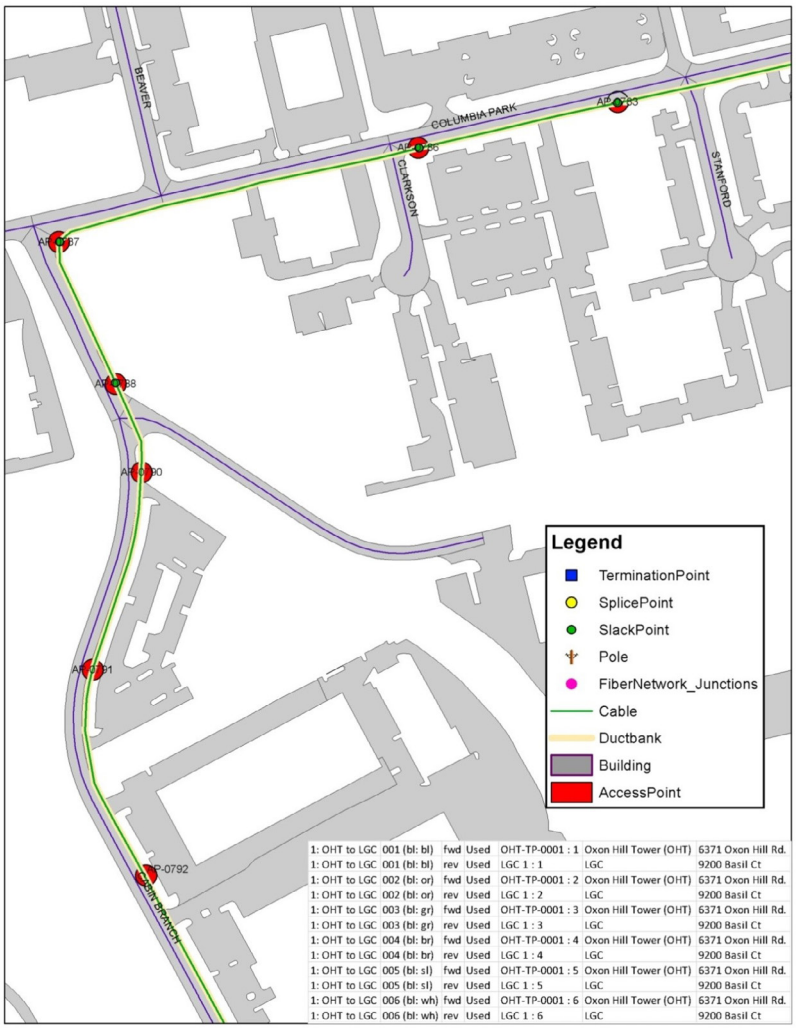
Public fiber's utility is frequently only as good as the documentation that enables the locality (or a broadband deployer) to understand where and how it is built and maintained. Initiatives such as community fiber optic construction, utility improvements, and community development require high-quality documentation and GIS mapping as part of the initial and lifecycle budgets. For example, a public fiber network is a classic example of an asset that benefits from appropriate documentation from the outset, and loses reliability if it ages without that documentation.

Local government-owned fiber is often documented on paper maps, in computer-aided-design (CAD) drawings, and with ad-hoc spreadsheets. At first, when there are only a few routes and no real complexity, these techniques appear to suffice. However, after a few changes, re-routings, and additions, the de facto documentation is only in the memories of the fiber team. The result may be re-work, fiber damage, accidental service outages, wasted time and money, and lack in confidence in the community's own infrastructure.

Lack of documentation has led some communities to doubt their own fiber assets to the point that they decline to use it for public safety purposes because of concerns regarding failure rate and reliability. These same communities decline to lease their fiber because of concerns that they could not meet contract terms for managing it or for uptime. And they sometimes find that their fiber counts are insufficient to meet their needs because lack of documentation has led to over-leasing or use of inefficient electronics.

In order to create value, fiber documentation should indicate where the fiber is, whether it is aerial or underground, and where it is located spatially on a pole or underground. Effective documentation also includes conduit color, fiber count, pole locations, and location of asset points.

Figure 14: Comprehensive GIS mapping of fiber route



1: OHT to LGC 001 (bl: bl)	fwd	Used	OHT-TP-0001 : 1	Oxon Hill Tower (OHT)	6371 Oxon Hill Rd.
1: OHT to LGC 001 (bl: bl)	rev	Used	LGC 1 : 1	LGC	9200 Basil Ct
1: OHT to LGC 002 (bl: or)	fwd	Used	OHT-TP-0001 : 2	Oxon Hill Tower (OHT)	6371 Oxon Hill Rd.
1: OHT to LGC 002 (bl: or)	rev	Used	LGC 1 : 2	LGC	9200 Basil Ct
1: OHT to LGC 003 (bl: gr)	fwd	Used	OHT-TP-0001 : 3	Oxon Hill Tower (OHT)	6371 Oxon Hill Rd.
1: OHT to LGC 003 (bl: gr)	rev	Used	LGC 1 : 3	LGC	9200 Basil Ct
1: OHT to LGC 004 (bl: br)	fwd	Used	OHT-TP-0001 : 4	Oxon Hill Tower (OHT)	6371 Oxon Hill Rd.
1: OHT to LGC 004 (bl: br)	rev	Used	LGC 1 : 4	LGC	9200 Basil Ct
1: OHT to LGC 005 (bl: sl)	fwd	Used	OHT-TP-0001 : 5	Oxon Hill Tower (OHT)	6371 Oxon Hill Rd.
1: OHT to LGC 005 (bl: sl)	rev	Used	LGC 1 : 5	LGC	9200 Basil Ct
1: OHT to LGC 006 (bl: wh)	fwd	Used	OHT-TP-0001 : 6	Oxon Hill Tower (OHT)	6371 Oxon Hill Rd.
1: OHT to LGC 006 (bl: wh)	rev	Used	LGC 1 : 6	LGC	9200 Basil Ct

Figure 14 illustrates a sample GIS map of a fiber route, including physical fiber placement, termination points, splice points, poles, duct banks, access points, and the endpoints of each strand of fiber. Even more detailed information can be generated within the GIS system, including the path of a single strand of fiber through the entire network. GIS systems also offer localities the ability to determine the optimal fiber assignment and splicing for a particular route, and the ability to quickly generate "what-if" scenarios for future planning.

Considerations

1. Develop an in-house fiber management system or outsource the responsibility

Smart practice 3C: Documenting public conduit assets

Underground fiber optic conduit is a valuable asset, particularly where construction is costly or difficult, such as urban areas, bridge crossings, rail crossings, and key building entries.

Many localities have conduit available as part of telecommunications, traffic, or other utility efforts. These range from mature, communitywide networks with consistent design and substantial capacity, to scattered conduit near traffic cabinets.

Well-documented conduit, like well-documented fiber, requires effort and consistency, and needs to be regularly updated. Effective conduit documentation includes the path, size, location (vertical and horizontal), access points, and design specifications (bends, availability of pull strings, composition).

While some communities may have a regularly maintained, reliable inventory of their conduit and a clear assessment of its usefulness and value, others, as with fiber, have only scattered documentation. Conduit information might be stored on paper maps or standalone CAD files of individual site plans or traffic intersections, or may be on separate permit applications (which may not be retained over time).

Moreover, the conduit itself might be crushed, blocked, full, or otherwise inaccessible. Also, conduit built for one purpose (twisted-pair copper, power) might not be suitable for broadband. In the case of conduit built for copper, the bend radius might not support fiber cables. In the case of conduit built for power, there may not be sufficient clearance from power lines to safely use for fiber.

Sufficient documentation can enable localities to track and understand these issues and plan accordingly.

Smart practice 3D: Coordinating telecommunications infrastructure mapping across permitting agencies

Coordination of telecommunications mapping can support the broadband planning and deployment process through enhanced information availability on the part of public and private entities—and strategic planning among participating public entities.

The California Public Utilities Commission has taken a lead role in this regard at the state level by developing and maintaining the California Interactive Broadband Map.[19] At a local level, to the extent that multiple agencies or departments are involved in permitting processes, a concerted effort to identify and aggregate data and maps can have the same types of benefits. At the local level, too, coordinated mapping can create benefits for the permitting process itself.

Where it is feasible for a locality to coordinate its infrastructure mapping and record-keeping, the aggregated data can help simplify permit applications (for the applicants and the government reviewers) and permit record-keeping. Longer-term, maintaining a clearer record of the location of infrastructure in the right-of-way (including broadband and non-broadband-related underground installations) can enable the assessment of broadband infrastructure availability in the community. This, in turn, could enable the locality to identify areas of low broadband investment for strategic planning purposes.

Once it has a process for gathering and collating map data, a locality would have options for creating maps with various levels of access, depending on the user. For example, it could create:

- A public map that shows the location of jurisdiction-owned infrastructure
- A map that is only accessible by permit applicants that shows the location of pending and approved permits
- An internal map that shows more detailed information about each pending and approved permit application

Considerations

1. Local decision as to what entity will maintain the infrastructure map
2. How to encourage buy-in among participating public entities
3. Determining what level of detail is appropriate for public view
4. Incorporating the findings of the map into broadband strategic planning

19 California Interactive Broadband Map, https://www.broadbandmap.ca.gov/.

4. Approaches to undertaking these strategies

Local government leaders and their staffs are accustomed to long-term strategic planning around infrastructure investments to meet their residents' economic, social, public safety, and other needs. As with any initiative of this import, smart practices related to broadband deployment require analysis to ensure they are appropriate to a locality's own needs and requirements.

Smart practice 4A: Creating a cross-agency taskforce with executive leadership

Broadband planning at the local government level also requires strong executive leadership. A mayor, county executive, or similar leadership role will be a critical player in implementing these strategies—with collaboration and coordination among relevant agencies and departments, potentially including the development of a programmatic environmental impact report.

As an example, the Los Angeles County Department of Public Works and the Los Angeles County Internal Services Department, at the direction of the elected leadership of the County, are engaged in a comprehensive review effort to analyze and optimize a range of permitting and related processes.

Effective leadership will ensure that a locality's staff are aligned in their understanding of public policy goals and their focus on a given set of outcomes.

Smart practice 4B: Making broadband part of local government strategic planning and coordination

Action: Initiating collaborative big-picture planning

A local government permitting agency can be a catalyst among local and regional government agencies, ISPs, and unserved communities by facilitating discussion and information sharing regarding broadband deployment efforts. Consultation with critical stakeholders could include existing and potential new-entrant ISPs, as well as public and nonprofit entities that may want to meet the needs of their communities and stakeholders as last-mile broadband providers.

The City of San José, for example, facilitated regular weekly meetings between the broadband point of contact and ISPs, and quarterly meetings between telecommunications executives and departmental leaders. This regular feedback mechanism led to the development of permit application templates and other process efficiencies. The City better understood ISPs' concerns about permitting timelines—and the City had a platform for suggesting infrastructure builds that aligned with its digital equity initiatives.

Integrating broadband into a local government's overall strategic planning (whether as part of a broadband strategic plan or a more general planning approach) creates a platform for collaboration, process improvement, and investment. Such an approach can prioritize broadband as a policy goal, with implications for access to public and private resources.

Considerations

1. Frequency of meetings
2. Levels of interaction (high-level, strategic conversations between executives; tactical conversations between permitting staff and applicants)
3. How to coordinate mapping efforts
4. Whether to initiate one-on-one information sharing agreements

Action: Building broadband into planning and staffing of all relevant agencies

Another strategy is to address organizational silos within the locality—separations between information technology, permitting, engineering, and utility departments, for example—and again require that local infrastructure be documented as part of upgrade and improvement projects and regular maintenance.

As with fiber, the entities and agencies managing conduit may be separated from broadband and network planning agencies by internal reporting structures, and there may need to be leadership intervention for these entities to share and collaborate.

Localities might consider developing processes and structures that formalize the roles of department leadership in broadband planning, and ensure that any broadband opportunity is identified, receives proper review, and is acted upon promptly. Similarly, localities that take this approach might establish a single point of contact and durable reporting and accountability structures that do not rely on successful working relationships and ad-hoc communications of existing staff.

Processes and structures will work best if they are mandated by the community's legislative body, and the process is widely understood as a means of getting more for the locality as a whole. To that end, a smart practice is to inform elected leaders and staff about progress or activity in broadband, which can create a positive feeling about the value of the process.

A strong coordination process has the following elements:

- A clear point of entry
- Applicability to small and large projects
- Review by expert individuals
- Consultation with all relevant departments
- Speed
- Accountability
- Transparency
- Support of local leaders

A successful identification, review, and action plan may have the following elements:

1. Relevant broadband opportunities—such as new public facilities, new opportunities involving telecommunications available through grants, new applications that intensively use public networks, new services to be offered through the community networks (for example, substantial upgrades to GIS), and new construction projects and build opportunities in the locality—must be submitted as soon as possible to a central clearinghouse, such as a help desk. In the case of build opportunities, a smart practice is for local government departments to inform the help desk as soon as they are aware of a service provider or developer. (Some construction projects considered "targets of opportunity," such as emergency repairs on utilities and co-location opportunities discovered close to the time of construction, must be acted on more quickly than others.)

2. The clearinghouse identifies items for technical review by a team representing the relevant departments (e.g., information technology, public safety, public works, facilities, transportation). Team members will be informed of the key facts, along with the urgency level of the review.

3. The clearinghouse identifies items for policy and legal review as needed and again forwards those to a team handling these issues.

4. On the due date of the review, the technical and policy/legal teams convene and present the review to project manager, who review the information, request supplementary information, and approve the completed analysis.

5. Project management submits the reviewed information to the appropriate decision-makers—the council, the manager, or department directors—for approval.

The end result of the process is a qualified technical review within a specified interval of time. There is accountability for the proposed initiative at each stage. The individuals who review the initiative provide written feedback, and decision-makers can see what was considered in the review and why.

Appendix: Broadband strategies checklist

1. Strategies for enhancing permitting processes

Smart practice 1A: Developing and sharing information about relevant permitting and processes

- Action: Developing clear construction design standards and regularly updating the standards with industry and expert input
- Action: Developing a telecommunications permitting manual
- Action: Publishing permit timeline expectations and metrics
- Action: Creating a mechanism for receiving feedback from applicants on the application process

Smart practice 1B: Optimizing permitting for broadband projects

- Action: Establishing a single point of contact for broadband permitting
- Action: Developing an online permitting portal
- Action: Creating a dedicated telecommunications permit
- Action: Leverage a program Environmental Impact Report
- Action: Distinguishing between major and minor broadband permits
- Action: Developing a batch permitting process
- Action: Coordinating permitting policies and procedures among jurisdictions in the region

Smart practice 1C: Revisiting all policies periodically to comply with changing state and federal rules

Smart practice 1D: Developing strategies for scaling up staffing and support

2. Strategies for facilitating access to key assets

Smart practice 2A: Creating access to public assets for new deployment

- Action: Enabling leasing of public assets to ISPs
- Action: Trading or swapping access to public assets for access to private infrastructure
- Action: Microtrenching

Action: Building new assets where feasible

Smart practice 2B: Creating conditions that make deployment of private assets more likely
Action: Requiring conduit installation in new developments and during major renovations
Action: Facilitating aerial construction by encouraging pole owners to facilitate make-ready

Smart practice 2C: Encouraging deployment of public and private assets
Action: Developing a "Build Once" policy
Action: Developing a "Dig Once" policy to promote conduit and fiber construction

3. Strategies for creating equitable access to information

Smart practice 3A: Making public GIS datasets available where possible

Smart practice 3B: Documenting public fiber assets

Smart practice 3C: Documenting public conduit assets

Smart practice 3D: Coordinating telecommunications infrastructure mapping across permitting agencies

4. Approaches to undertaking these strategies

Smart practice 4A: Creating a cross-agency taskforce with executive leadership

Smart practice 4B: Making broadband part of local government strategic planning and coordination

Appendix: Case studies and resources

City of Los Angeles: Permitting and ordinances

With a population of roughly 10 million residents, Los Angeles County is California's largest county.[20] The County incorporates 88 municipalities, including the City of Los Angeles, the United States' second-largest city.[21] In terms of transportation, the County's Department of Public Works (Public Works) serves as the primarily transportation authority for the approximately 1 million residents who live in unincorporated areas of the County and maintains roughly 3,200 miles of roadway itself in these areas.[22]

Public Works has five local permitting offices in addition to two teams of permit technicians at its headquarters. Permit applications are submitted through Public Works' electronic permitting system, EPIC-LA, and filtered between the closest local permitting office and headquarters depending on the application's specifications. Most permits related to telecommunications projects are reviewed by the two permitting teams at headquarters: Flood Control and Road Projects. Both permitting offices cover telecommunications applications with an encroachment permit or an excavation permit.

Encroachment permits are required if a project will take place in County-owned rights-of-way (including underground and aerial fiber or conduit, small cell facilities, and all other wireless facilities), while excavation permits are required when a utility will be installed underground in County-owned rights-of-way. The County also has an extensive network of Flood Control Districts, which are owned and maintained by the County. Projects that propose to deploy on Flood Control District property (including rights-of-way, land, and facilities) are filtered through the Flood Control permit team at headquarters, while all other applications go through the Road Project permit team.

Public Works recently developed a microtrenching ordinance, a small cell wireless facilities ordinance, and a wireless ordinance. The small cell ordinance is

20 "QuickFacts: Los Angeles County, California," United Sates Census Bureau, https://www.census.gov/quickfacts/losangelescountycalifornia.

21 "The 200 largest cities in the United States by population 2022," (n.d.). World Population Review, https://worldpopulationreview.com/us-cities.

22 "Population of Unincorporated Communities, Los Angeles County," Los Angeles Almanac, http://www.laalmanac.com/population/po28.php; "Miles of Public Roads, Los Angeles County," Los Angeles Almanac, http://www.laalmanac.com/transport/tr01.php.

facilities and wireless facilities ordinances were also accompanied by a wireless facilities design manual that outlines Public Works' construction and design standards. Public Works has not yet developed a design standard manual for wireline telecommunications infrastructure.

Public Works does not have a formal dig once policy, although they do have a Joint Trench Utility permit that allows developers to apply for multiple dry utilities to share an open trench, generally in new developments. Public Works issues a Blanket Utility Permit that allows a city, municipal utility district, municipal water district, or public utility to apply for a single, annual permit for the installation of service connections and routine maintenance of facilities.

On the wireless side of telecommunications permits, Public Works is in the process of both acquiring tens of thousands of new poles and of executing new Master Lease Agreements with carriers to allow for the installation and maintenance of new small cell wireless facilities on County poles.

San Diego Association of Governments: Regional broadband master plan

In an illustration of a smart practice described in this playbook ("making broadband part of local government strategic planning and coordination"), the San Diego Association of Governments (SANDAG) published its "Regional Broadband and Digital Infrastructure Master Plan" in October 2024.

The Plan "aims to enhance regional broadband infrastructure through an equitable and comprehensive planning document. Its goals include connecting public facilities to support mobility and sustainability, expanding broadband infrastructure to fill network gaps, and fostering economic development by supporting diverse internet service providers (ISPs)."[23]

According to the Plan, SANDAG's efforts are in support of the many regional government agencies that are interested in future fiber-sharing agreements. The Plan notes that there are existing interagency agreements between Caltrans, the Metropolitan Transit System (MTS), the North County Transit District (NCTD), and SANDAG—and that several cities in the region have partnerships with private companies. Further, for the past decade, "MTS and the City of San Diego have maintained a fiber use agreement for network redundancy, while MTS and NCTD have various lease and fiber exchange agreements with private communications companies to expand network communications and generate revenue."

SANDAG created a "toolbox" of resources designed to streamline efforts to implement a planned regional broadband infrastructure network. The resources, which are part of the Plan, include:

- A fiber sharing agreement
- An ISP service cost repository
- A dark fiber lease calculator
- A decision flowchart

23 Regional Broadband and Digital Infrastructure Master Plan," SANDAG, October 2024, https://www.sandag.org/-/media/SANDAG/Documents/PDF/projects-and-programs/regional-initiatives/digital-equity/braodband-infrastructure/final-regional-digital-infrastructure-network--masterplan-2024.pdf.

Southern California Association of Governments: Model broadband permit ordinance

In collaboration with SANDAG, the Southern California Association of Governments (SCAG) published a broadband permit streamlining report[24] and model ordinance[25] as guidance for Southern California communities, including SCAG's six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura) and 191 cities, as well as other local governments across the state.[26]

SCAG's intent in publishing the report and model ordinance, in September 2024, was to "provide model permitting standards and practices to help local governments and permitting agencies streamline deployment of broadband infrastructure in underserved areas."[27]

The broadband permit streamlining report highlights recommendations intended to streamline the broadband permitting process; these include establishing uniform permitting fees, developing inclusive zoning practices, leveraging public and utility facilities, enhancing utility mapping, and creating digital broadband permit applications to replace paper-based filing.

The companion model ordinance, which reflects the report's findings and recommendations, includes chapters on wireless facilities, small cell wireless facilities in public rights-of-way, and fiber deployments (both aerial and underground).

24 "Broadband Permit Streamlining: Report," SCAG, September 2024, https://pcbroadband.org/wp-content/uploads/2025/03/24-3190-permit-streamlining-broadband-report_final-2024-09.pdf.

25 "Broadband Permit Streamlining: Ordinance," SCAG, September 2024, https://scag.ca.gov/sites/default/files/2025-02/24-3190-permit-streamlining-broadband_ordinance_final-2024-09.pdf.

26 SCAG, https://scag.ca.gov/about-us.

27 "Broadband permit streamlining," SCAG, https://scag.ca.gov/broadband-permit-streamlining.

Tribal Resource Center: Centralized broadband planning resources for tribal governments

The nonprofit Tribal Resource Center (TRC)[28] describes itself as "is a hub of validated articles, links, videos, and people to assist tribal nations with adopting broadband technologies." Centered around a resource-rich website, the TRC operates a volunteer-staffed help desk, conducts multi-day broadband bootcamps, and facilitates an online community for sharing best practices and learning. In California, the TRC reports working with the Hoopa Valley, Fort Bidwell, and York tribes.

Among the TRC's resources for enabling tribal entities' broadband deployment efforts are pages on "key standards and best practices for broadband constructions" and "FAST-41 tribal permitting assistance." The center also highlighted the National Telecommunications and Information Administration's (NITA) measures to streamline environmental impact permitting review for "Internet for All" program projects.

28 "Tribal Resource Center," https://tribalresourcecenter.net/.

City of Loma Linda: Broadband-ready buildings ordinance

Loma Linda was one of California's pioneers in requiring broadband infrastructure in new buildings. The city's Connected Community Standard (established by Ordinance 629 in 2004) amended the local building code to mandate that all new development projects – residential and commercial – be constructed "fiber-ready."[29] In practice, this means any new building (or any major remodel over 50 percent of its size in certain areas) must include both a fiber-optic interface to connect with the city's fiber network and structured internal cabling throughout the building.

Developers in Loma Linda are required to install fiber all the way to a designated demarcation point in each building and wire the premises with modern data cabling to each room. Key features of Loma Linda's program include a network cabinet in each home, bundled drops in every living space, fiber optic cable from the street into that cabinet, and a neighborhood "main distribution frame."

Once constructed and tested, the outdoor fiber and conduit infrastructure are deeded to the City, which integrates it into the citywide municipal fiber system. This ordinance effectively ensures that every new home or business in Loma Linda comes with fiber-to-the-premises (FTTP) connectivity and internal wiring for broadband. Loma Linda's broadband-ready building requirement has been internationally recognized for closing the digital divide in the community.

29 "The LLCCP Standard," City of Loma Linda, https://www.lomalinda-ca.gov/services/llccp/the_l_l_c_c_p_standard. See also: "Connected Community Program," Loma Linda Municipal Code, Chapter 15.54, https://ecode360.com/42459389#42459389.

San Diego County: Telecommunications project permits and standards

San Diego County has a population of roughly 3.3 million residents and is the state's second-largest county.[30] The County has 18 incorporated cities within its boundaries, including the City of San Diego, which is the United States' eighth-largest city with a population of roughly 1.5 million residents.[31]

The County divides permit applications for telecommunications projects between encroachment, excavations, and small cell wireless facilities. These permits are clearly defined on the County's website and are accompanied by brochures that neatly outline what these permits are, when they apply to projects, and how much to expect in associated permit fees. Applications are submitted by email using a PDF application.

The County published a Design Standards manual for public works projects that includes diagrams for construction in certain areas and situations. However, the manual does not include a telecommunications-specific section or specifications for telecommunications infrastructure.

30 "QuickFacts: San Diego County, California." (n.d.). United States Census Bureau, https://www.census.gov/quickfacts/fact/table/ sandiego-countycalifornia/PST045221.

31 "The 200 largest cities in the United States by population 2022," (n.d.). World Population Review, https://worldpopulationreview. com/us-cities.

City of San José: Electronic permitting system

The City of San José has a population of roughly 1 million residents, placing it as the tenth-largest city in the United States and the most populous city in the Bay Area.[32] The City's telecommunications permits are controlled by the Department of Public Works, which offers encroachment permits for telecommunications infrastructure.

The City has an intuitive electronic permitting system, SJePlans, that allows applicants to submit encroachment permits through an online portal. The City also has a robust GIS web application that includes layers of small cell eligible poles, streetlights, pavement conditions, planning permits that have at least one antenna or monopole, and capital improvement projects.[33]

The City distinguishes between major and minor permits along the lines of major and minor streets and the type of work being proposed.[34] Minor permits for "standard" projects charge a $501 fee per permit, while minor permits for fiber or small cell projects charge the cost of time and materials.[35]

The City provides design standards and application guidelines for encroachment permits that are easily accessible on Public Works' website. These standards include figures for underground fiber and conduit and small cell facilities but not for aerial fiber or other wireless facilities.

32 Ibid.

33 "City of San José Maps Gallery," https://gis.sanjoseca.gov/apps/mapsgallery/.

34 Department of Public Works. (n.d.). "Major/Minor Permit Chart," City of San José, https://www.sanjoseca.gov/home/showpublisheddocument/33139/637507980695970000.

35 Department of Public Works. (n.d.). "Utility Permit Fees," City of San José, https://www.sanjoseca.gov/home/showpublisheddocument/38569/637647102419900000.

City of Campbell: Telecommunications permitting

The City of Campbell is a small city in Santa Clara County that encompasses roughly 44,000 residents and 6 square miles of land.[36] Telecommunications permitting is under the purview of the City's Department of Public Works.

Unlike many other jurisdictions in California, Public Works' encroachment permit encompasses the activities typically split between encroachment and excavations permits. Public Works' encroachment permits are then divided between the following types of activities:[37]

- Utility Work – includes all utility companies as well as private contractors hired by property owners to do the trenching or boring for the placement of these facilities
- R-1 Residential – minor frontage work for existing single-family homes, which must be homeowner-occupied
- Land Development – construction of frontage improvements required by a Building or Planning permit
- Miscellaneous Work – temporary use of the right-of-way for activities not listed above
- Small Cell – for small cell wireless facilities in the right-of-way

Public Work's website clearly describes the activities that fall under each of these subcategories and includes additional webpages for each type of activity. The City enforces a five-year moratorium for trenching in recently resurfaced streets.

Public Work's utility work webpage outlines what category of companies—which include utility companies, fiber companies, and trenching contractors—and activities require an

36 "QuickFacts: Campbell City, California." (n.d.). United States Census Bureau, https://www.census.gov/quickfacts/fact/table/campbellcitycalifornia/PST045221.

37 "Encroachment Permits." (n.d.). Campbell, California. https://www.campbellca.gov/186/Encroachment-Permits.

encroachment permit for utility work. It also lists the preliminary items needed for this type of encroachment permit, including a Master Encroachment Agreement, which is required for fiber companies applying for an encroachment permit.[38] Public Works uses an electronic permitting system, MyGovernmentOnline, to process these permits.[39]

Similarly, Public Work's small cell webpage includes accessible links to published small cell design standards, application guidelines (including an application checklist), and relevant municipal code sections. This webpage also includes a description of small cell wireless facilities with reference to the FCC's regulation of the technology.[40]

Public Works charges an application fee of $584 per application for utility/fiber projects, plus a minimum of $84 for inspection. For small cell wireless facilities, Public Works charges $270 per pole for an annual license fee a minimum of $8,137.76 permit review and inspection, and $8,000 for a Master License Agreement.[41]

38 "Utility Work." (n.d.). Campbell, California. https://www.campbellca.gov/653/Utility-Permit.

39 MyGovernmentOnline, https://www.mygovernmentonline.org/apply/?SectionID=1&State=CA&JurisdictionID=187&ProjectTypeID=63.

40 "Small Cell Wireless Facilities Deployment in Public Right-Of-Way." (n.d.). Campbell, California. https://www.campbellca.gov/969/Small-Cell-Wireless-Facilities-Deployment.

41 "Master Fee Schedule." (2021, July 1). City of Campbell. https://www.campbellca.gov/DocumentCenter/View/505/Public-Works-Fees?bidId=.

City of Oakland: Telecommunications permitting

The City of Oakland is the third-largest city in the Bay Area with a population of roughly 440,000. The City of Oakland's Department of Planning and Building holds the City's One-Stop Permit Center, through which all permits are directed.[42]

The City divides telecommunications activities between encroachment and utility excavation permits. Each permit has a dedicated webpage with embedded detailed descriptions of the permit and permit process. Encroachment permits are divided between major and minor permits along the following definitions:[43]

- Minor encroachment: "…an encroachment into the public right-of-way resting on or projecting into the sidewalk area, but which is not structurally attached to a building, such as flowerpots, planter boxes, clocks, flagpole sockets, bus shelters, phone booths, bike racks, fences, non-advertising benches, curbs around planter areas, displays of flowers, fresh fruits and vegetables."
- Major encroachment: "…anything attached to a structure or constructed in place so that it projects into the public right-of-way such as basement vaults, kiosks, covered conveyors, crane extensions, earth retaining structures, and structure connected planter boxes, fences, or curbs. Projections over any public street, alley or sidewalk in excess of the limitations specified in the Oakland Building Code shall also be classified as major encroachments, including theater marquees, signs suspended above the sidewalk, oriel windows, balconies, cornices and other architectural projections."

As shown on the next page in Figure 15, in terms of permitting process, the difference between major and minor permits is that the City Council must review major projects. Otherwise, the encroachment permit follows a standard workflow that involves an engineer's review with acceptance or rejection. The City also includes the estimated duration of each step in the process.

42 "QuickFacts: Oakland city, California." (n.d.). United States Census Bureau. https://www.census.gov/quickfacts/oaklandcitycalifornia.

43 "Planning and Building." (n.d.). City of Oakland. https://www.oaklandca.gov/departments/planning-and-building#planning-zoning.; "Online Permit Center." (n.d.). City of Oakland. https://aca-prod.accela.com/OAKLAND/Default.aspx.

Figure 15: City of Oakland major/minor encroachment permit process

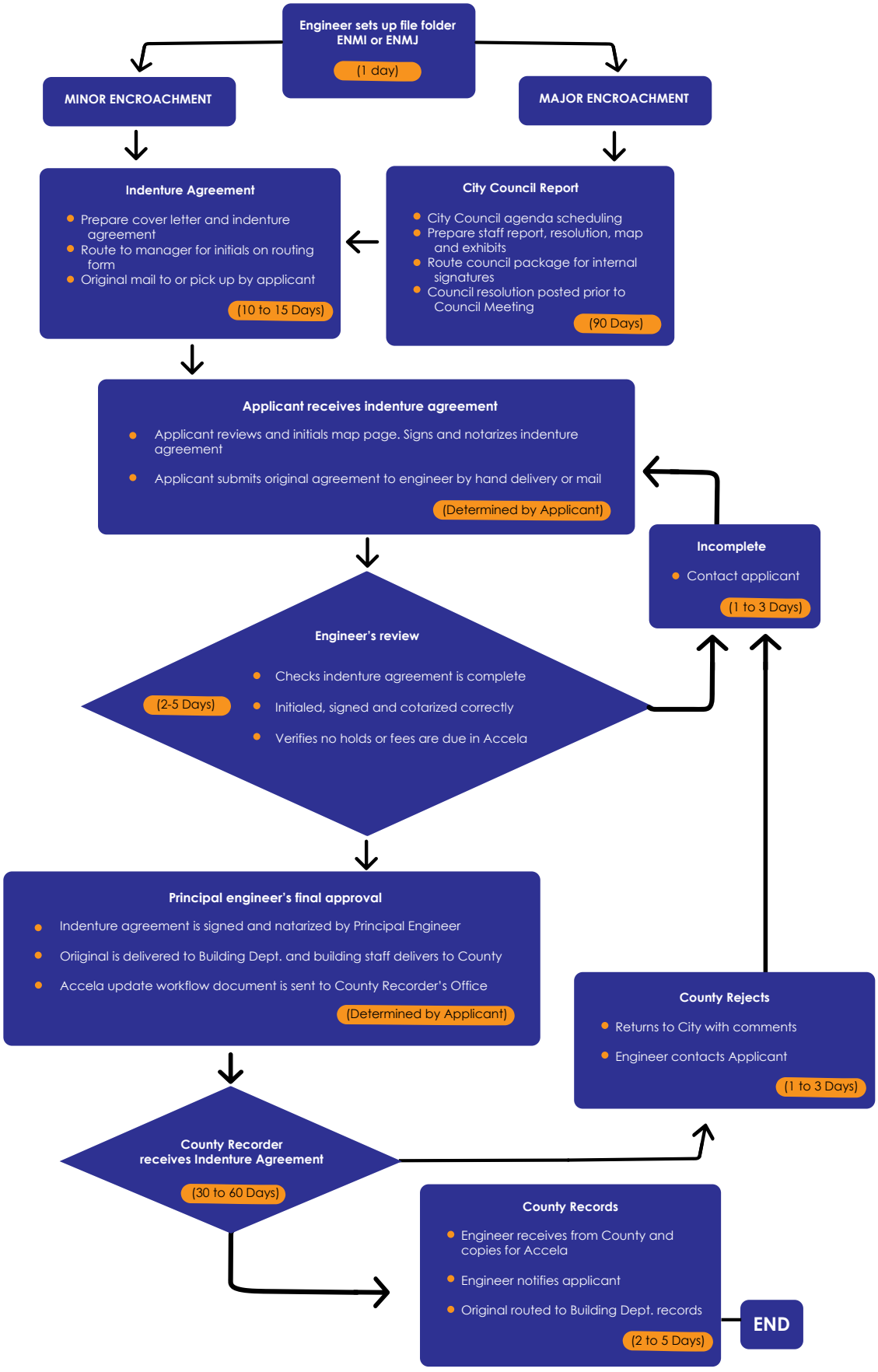
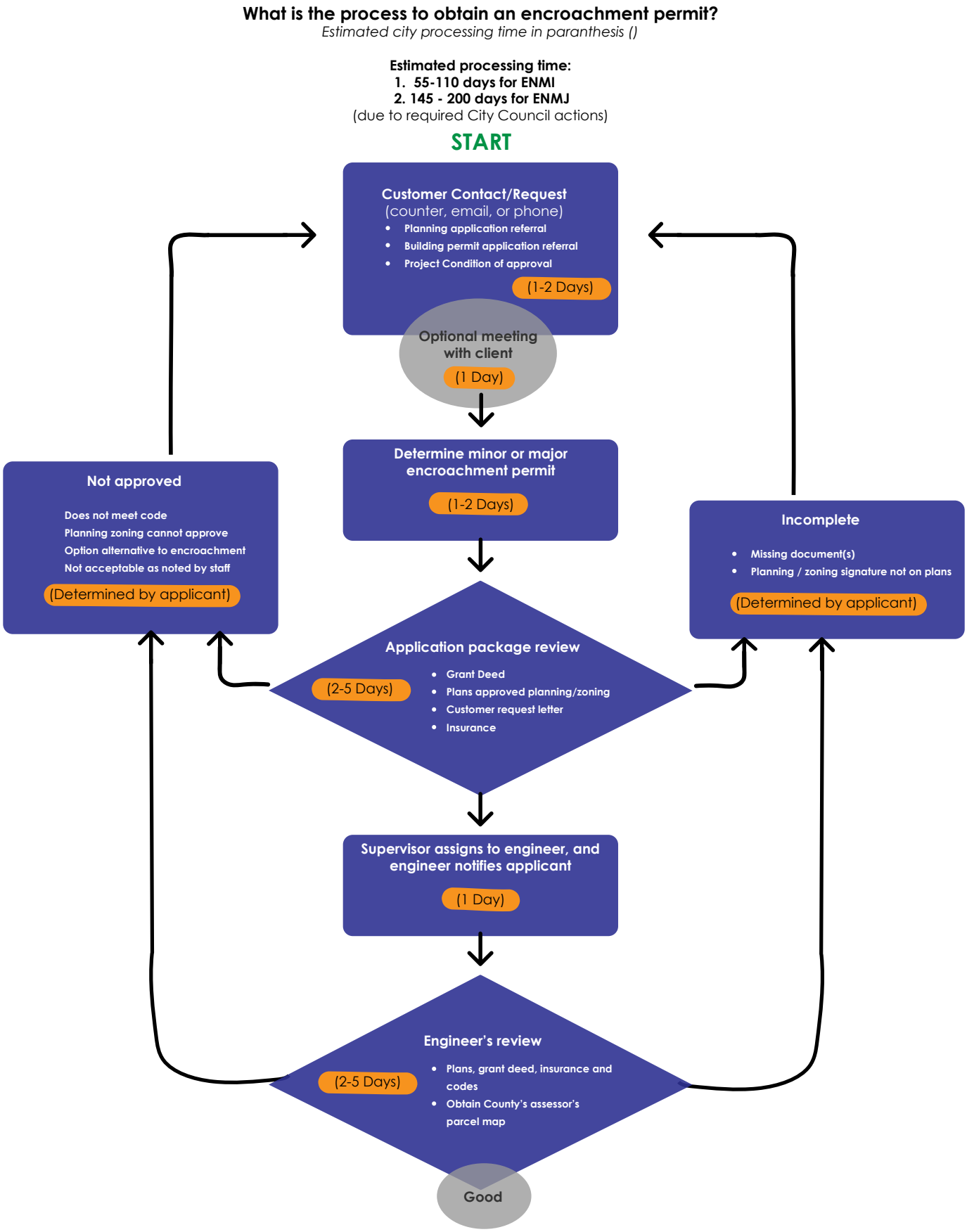


Figure 16: City of Oakland permitting process and timeline



The City also outlines the encroachment permit process and provides estimates for the duration of each step in the process. Utility excavation permits are required for activities such as boring or potholing, and the City has a similar webpage describing the permit as it does with encroachment permits. The figures below outline the excavation permit process with estimated timelines for each step.

Figure 17: City of Oakland utility excavation permit process

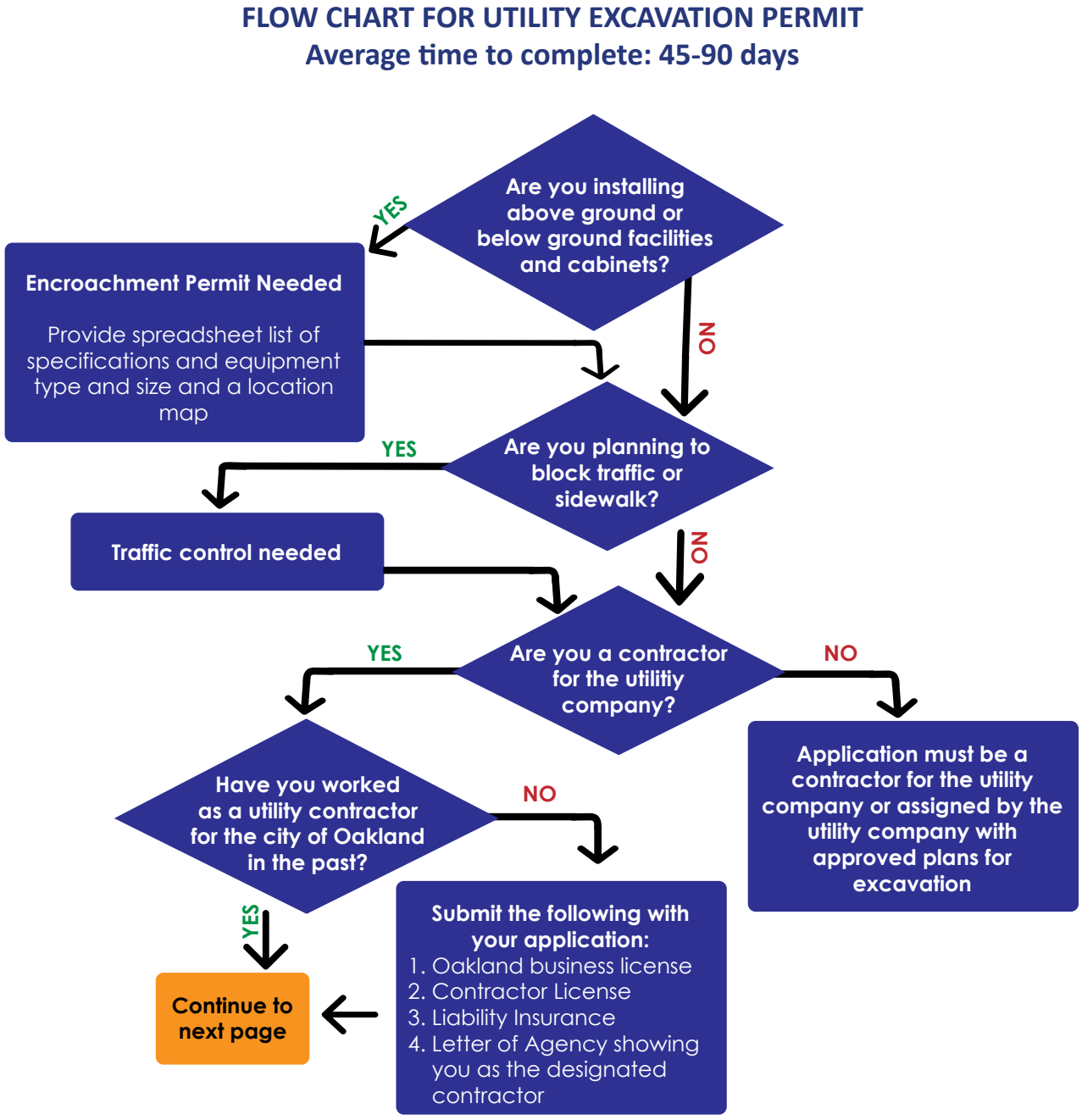
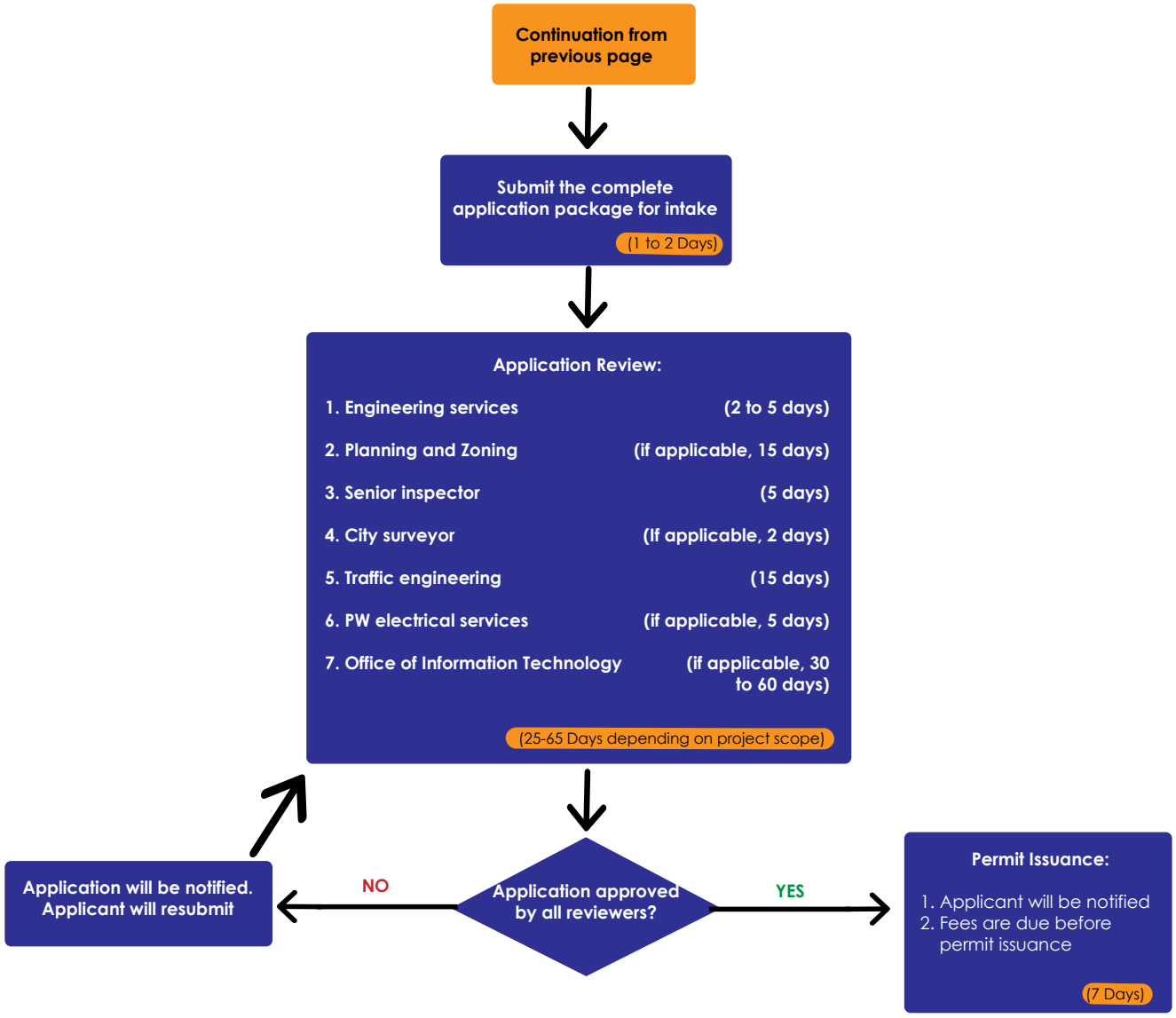


Figure 18: City of Oakland utility excavation permit process (continued)



The City charges $1,781 for permits on new encroachment and $3,176 for existing encroachment, plus a $13 filling fee and $57 application fee.[44] For major encroachment permits, the City charges $4,980 for City Council Action. Regarding excavation permits, the City charges $1,257.90 for projects exceeding 300 feet and $454.65 for projects no longer than 300 feet for permit review, $183.83 per hour for inspection, and $70 as an application fee.[45]

44 "Application for Encroachment Permit." (n.d.). City of Oakland. https://cao-94612.s3.amazonaws.com/documents/Application-for-Encroachment-Permit-ENMI-Permit-ENMJ-Permit.pdf.

45 "Application for Utility Company Excavation Permit." (n.d.). City of Oakland. https://cao-94612.s3.amazonaws.com/documents/2021-Utility-Permit-Application.pdf.

Appendix: Change log

This document is a revised version of the "California Local Jurisdiction Broadband Permitting Playbook" published in May 2023. Significant updates to the Playbook include the following:

Section	Description
Broadband Glossary	Added new terms including: Access to assets, broadband deployer, CEQA, construction moratorium, deployment timeline, general plan, infrastructure asset mapping, permit application portal, permit fee waivers, public-private partnerships, public right-of-way, stakeholder engagement, utility coordination, and zoning ordinance.
Smart Practice 1A	Added new guidance on standards for small wireless facilities. Added example from the City of San Mateo.
Smart Practice 1B	Revised the action item "Leverage a program environmental impact report" with details on the Santa Barbara County Association of Governments' EIR and details on Tuolumne County's EIR. Revised the action item "Developing a batch permitting process" with details on the California Department of Transportation's (Caltrans) "Coastal Zone Guidelines for Programmatic Permitting."
Smart Practice 2C	Revised the action item "Developing a 'Dig Once' policy to promote conduit and fiber construction" with details on the City of Gonzalez. Revised the action item "Developing a 'Dig Once' policy to promote conduit and fiber construction" with details on the City of South San Francisco and the City of Salinas.
Appendix	Added new case studies including: San Diego Association of Governments' Regional Broadband Master Plan, Southern California Association of Governments' Model Broadband Permit Ordinance, Tribal Resource Center, and City of Loma Linda's Broadband-ready Buildings Ordinance.
Throughout	Revised references to current California broadband initiatives including the Middle-Mile Broadband Initiative.