EXHIBIT A

City of Cupertino
Fiber Optic Master Plan &
Wireless Siting Processes & Standards

CTC Technology &
Energy September 2020

Fiber Optic Master Plan

Overview

Assessment of existing infrastructure

Identification of needs for fiber

Potential fiber use cases

Fiber design & cost estimates

Potential business models
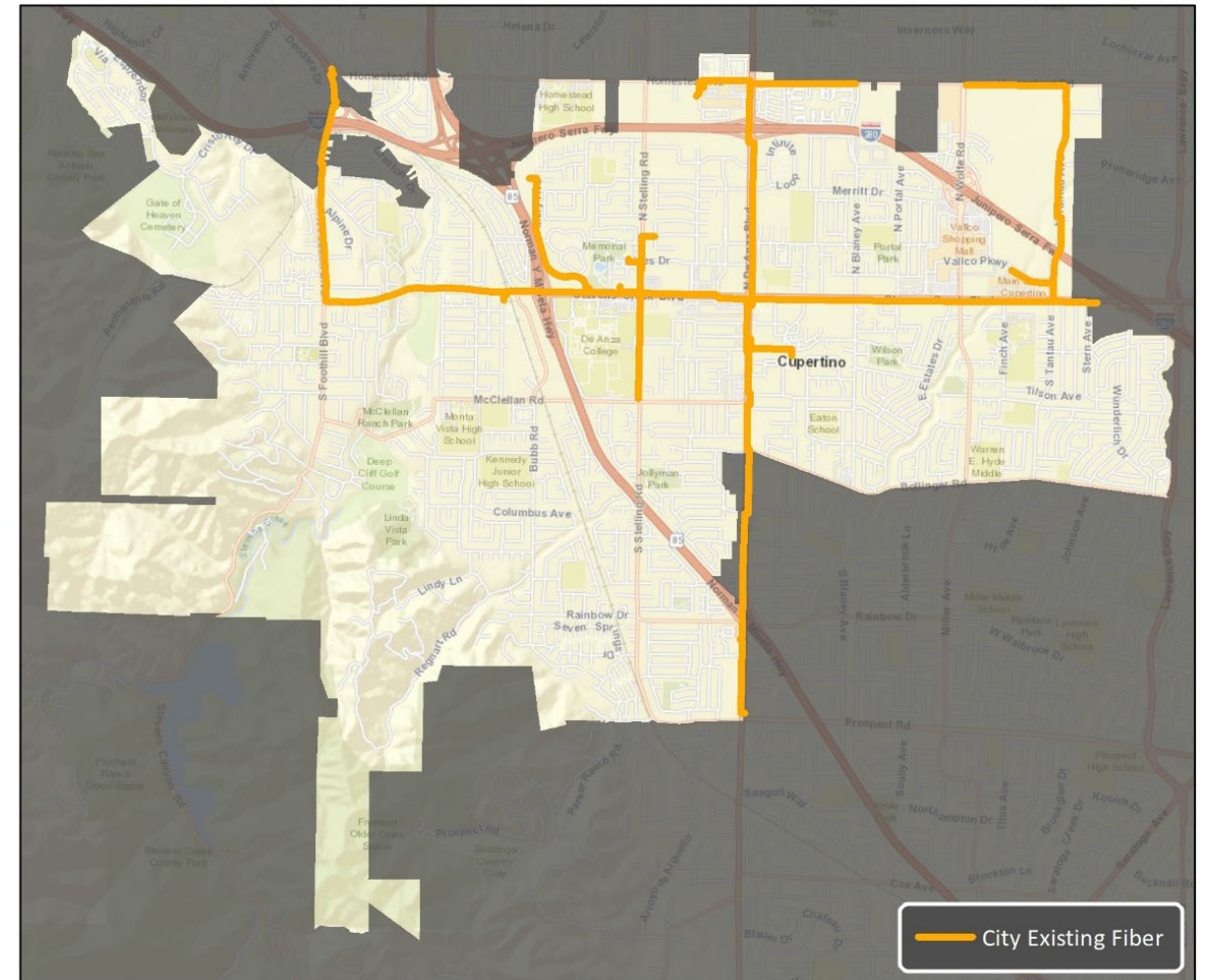
Dig Once policy recommendations

Existing Infrastructure

Existing City-owned fiber

12.7-mile network interconnects government buildings & traffic system

Construction leveraged State & federal funds

Built with Santa Clara County in 2008: Silicon Valley Intelligent Transportation System (SV-ITS) project

City Existing Fiber

The City has successfully owned & operated its fiber network for more than 10 years

The network has created real value for the City	Has offset the cost of leased circuits
	Provides more capacity, at a higher level of reliability and transparency, than commercial services
	Appears to be in good condition, with many years of useful life
	Can scale to higher speeds by upgrading equipment; has flexibility & capacity to add new locations

Other significant infrastructure

Emergency Operations Center	ARKnet wireless emergency internet	Smart City pilot (planned 2021)
Public Wi-Fi	Traffic communications center	Conduit & handholes

Fiber Needs Assessment

Needs assessment reflects wide range of inputs

City project staff	Representatives of City departments	Cupertino Communications Risk Report
Maps of infrastructure & facilities	Cupertino Citizen Corps/ ARKnet	Traffic Operations Center

Key fiber need: Replace leased services

Five City facilities

- Blackberry Farms Golf Course
- Blackberry Farms
- McClellan Ranch
- Monta Vista Recreation Center
- Human Resources Department

Key fiber need: Construct redundant fiber paths to City network's two core sites

City Hall & the Service Center

- Reduce risk of outages on the City's network
- Ensure that a single fiber break or loss of a single site will not cut off the City's fiber network
- Critical for City IT operations

Key fiber need: Connect 14 intersections

Support traffic operations & enable future Smart City applications

- North Wolfe Road (multiple)
- Perimeter Road & Vallco Parkway
- Miller Avenue & Calle De Barcelona
- Miller Avenue & Phil Lane
- Rainbow Drive at Stelling Road
- Bubb Road & McClellan Road
- Bubb Road & Results Way
- Stelling Road & Greenleaf Drive
- Homestead Road & Heron Avenue
- Foothill Boulevard & Voss Avenue

Key fiber need: Connect 13 parks & three downtown locations

Enable free public Wi-Fi

- Creekside Park
- Franco Park
- Hoover Park
- Jollyman Park
- Linda Vista Park
- Memorial Park
- Monta Vista Park
- Portal Park
- Somerset Square Park
- Sterling Barnhart Park
- Three Oaks Park
- Varian Park
- Wilson Park

Key fiber need: Construct fiber to sites used by Cupertino Citizen Corps (CCC)

Support emergency personnel & free public Wi-Fi during emergencies

- ARKs
- Fire stations
- Senior Center
- Other sites used by CARES, CERT, & MRC

Key fiber need: Construct new fiber segments

Increase City network's redundancy

- Eliminate single points of failure
- Improve resilience

Use Cases

Use cases for fiber & wireless networking

Address the City's identified needs

Maximize the use & benefit of the City's existing fiber

Build incrementally on each other
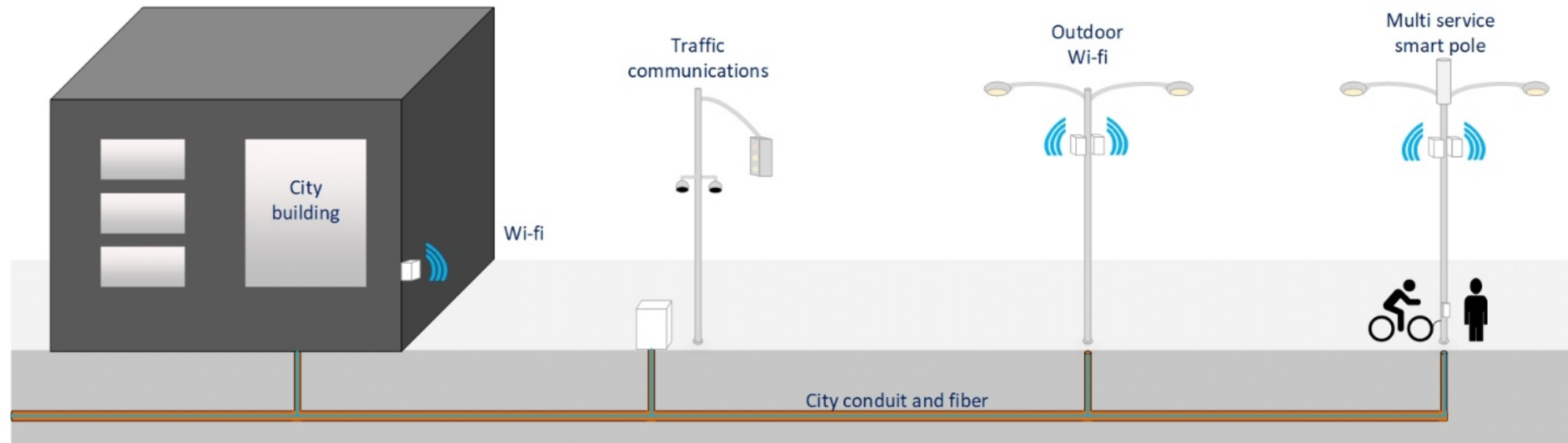
Informed by use cases in other cities

Use case 1: Expand fiber & Wi-Fi network for City & public-facing services

Connect buildings & traffic infrastructure

Enable public-facing Wi-Fi

Enable future City monitoring & functionality

Use case 2: Create resilient fiber & Wi-Fi network for City & public-facing services in emergencies

New, resilient fiber routes & power sources

Deliver communications to City staff, Santa Clara County first-responders, & the public

Enable communications during extended power outages, quarantines, post-earthquake recovery periods, etc.
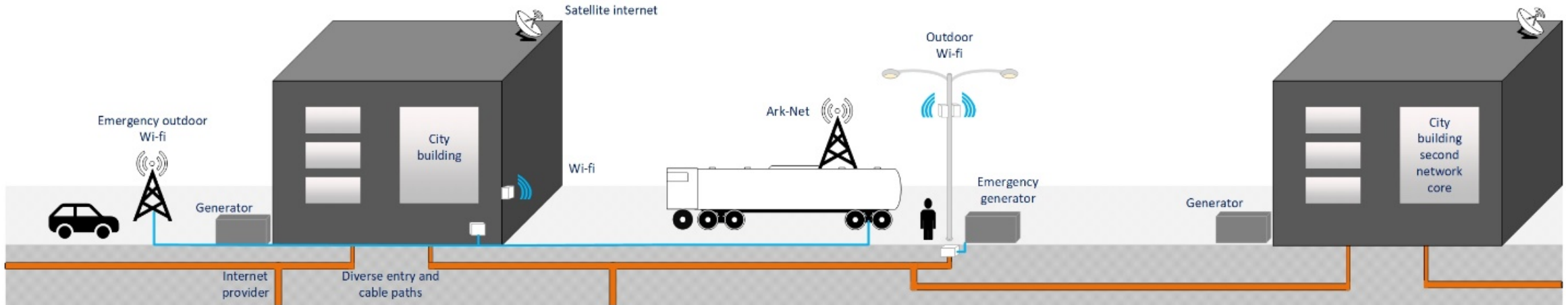
Use case 3: Expand fiber for City use & lease excess fiber to wireless providers & large businesses

Add a revenue-generating element to other use cases

Enable wireless providers to more quickly deploy advanced services

Small cells connected over wireless provider fiber

Wireless provider small cells connected over city-leased fiber

Meet-me in manhole

City conduit and fiber

Wireless provider conduit and fiber
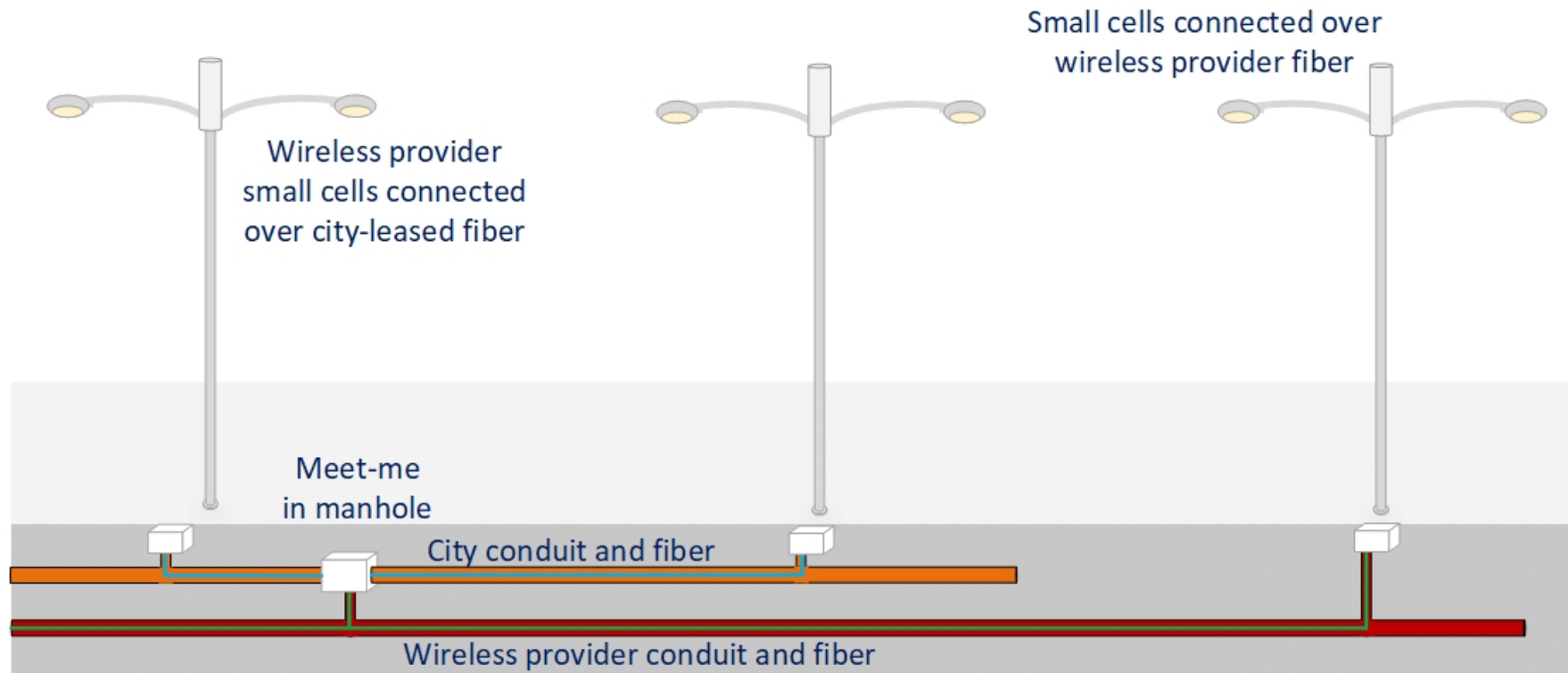
Fiber Design
& Cost Estimate

Cost estimate for expanding the City's fiber (use cases 1 & 2): $4.8M - $9.2M

Phase	Use Case	Miles of New Construction	Low Estimate	High Estimate
Connect City Facilities/ Create Redundancy to Core Sites	1	3.3	$900,000	$1.7 million
Connect Major Traffic Intersections	1	3.3	$880,000	$1.8 million
Connect City Parks & Downtown Wi-Fi	1	6.2	$1.7 million	$3.1 million
Use Case 1 Subtotal		12.8	$3.5 million	$6.6 million
Add Redundancy to the City's Fiber Network	2	2.4	$640,000	$1.3 million
Connect CCC Emergency Sites	2	2.5	$700,000	$1.3 million
Use Case 2 Subtotal		4.9	$1.3 million	$2.6 million
Total		17.7	$4.8 million	$9.2 million

Alternative to fiber construction: Lease dark fiber

Issue an RFI to fiber providers

May not save money

Analysis indicates providers would need to construct fiber

Might be good strategic approach for connecting individual facilities

Phase 1: Connect City facilities & create redundancy to core sites

Construct 3.3 miles of fiber to connect five City facilities & create redundancy for City Hall & the Service Center

$900,000 to $1.7 million
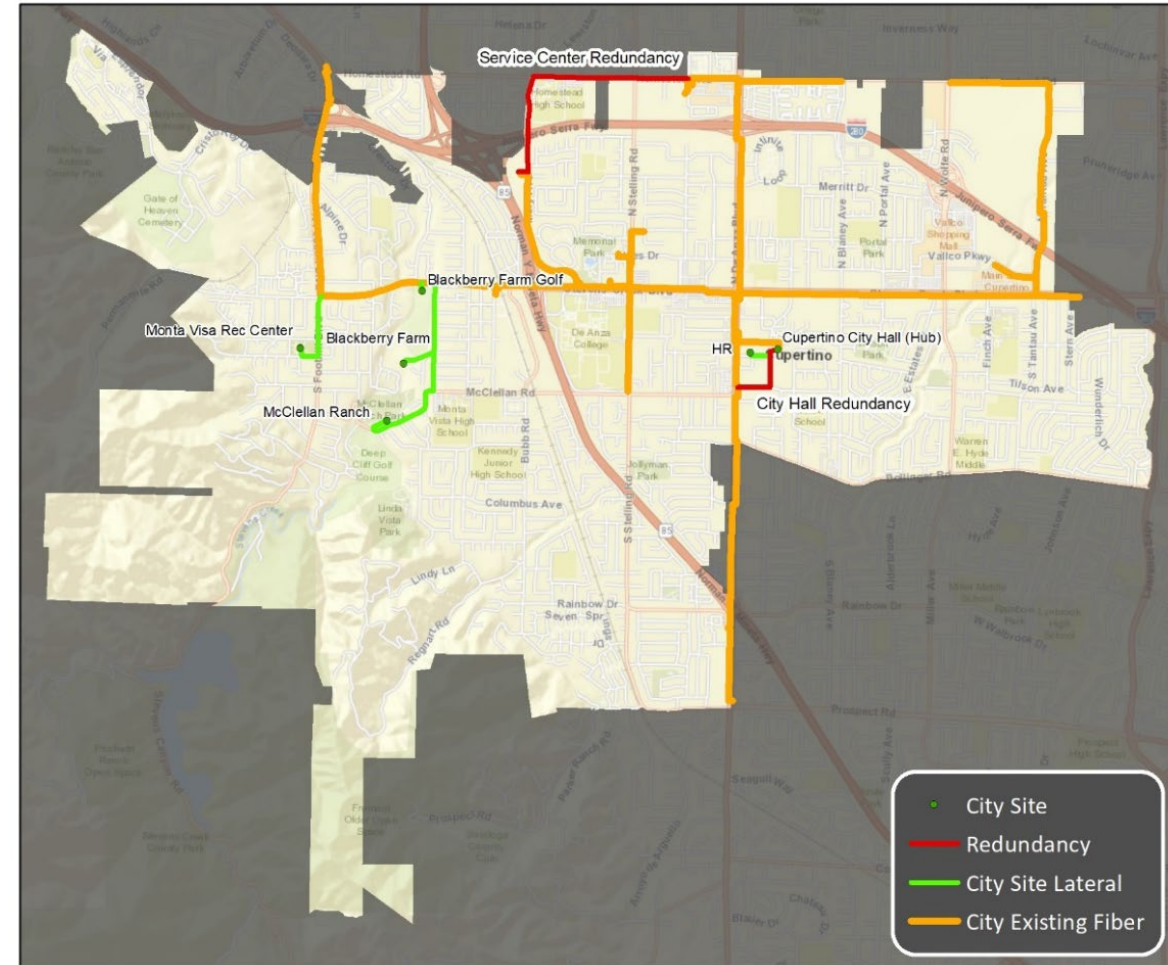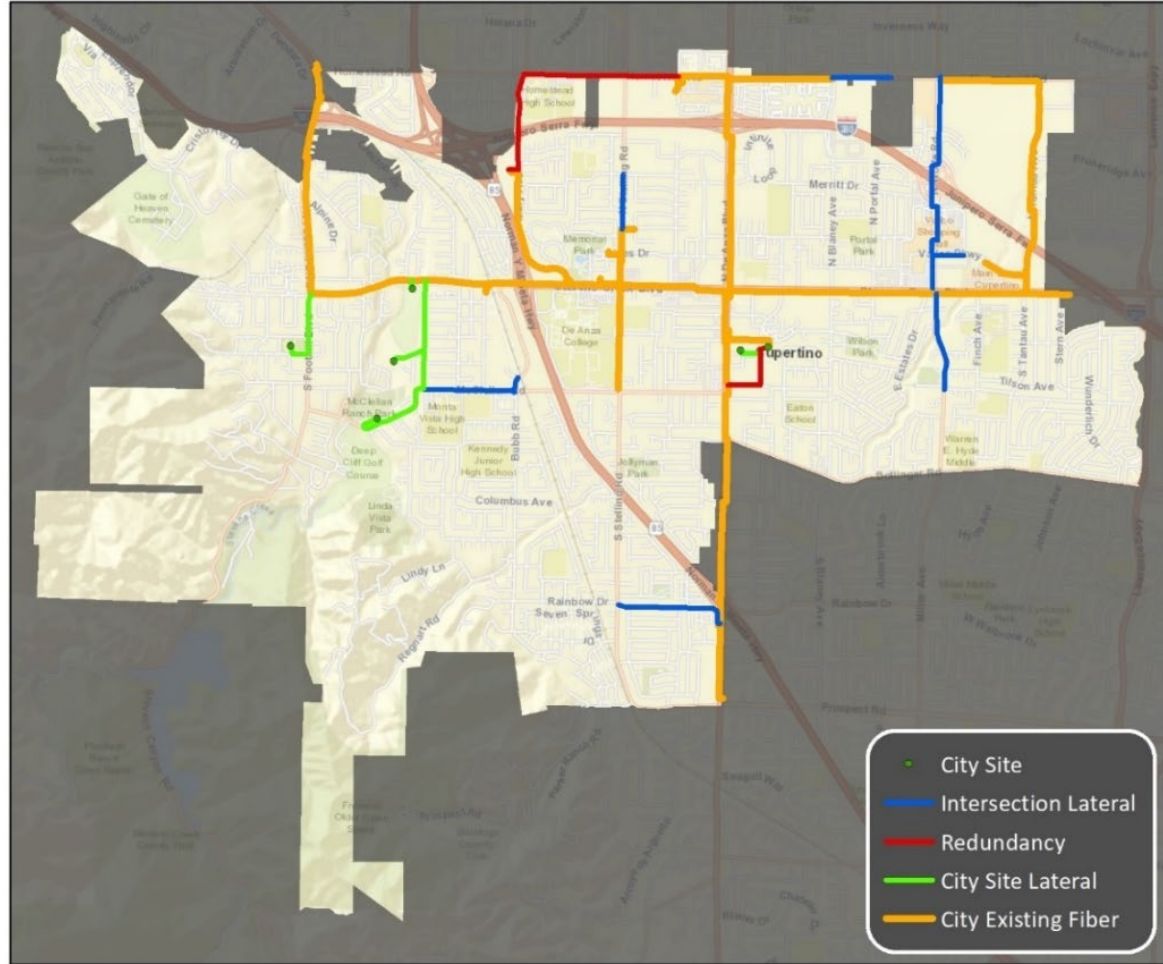
Phase 2: Connect major traffic intersections

Construct 3.3 miles of fiber to connect 14 intersections

$880,000 to $1.8 million

Legend:
- City Site
- Intersection Lateral
- Redundancy
- City Site Lateral
- City Existing Fiber

Phase 3: Connect parks & downtown Wi-Fi

Construct 6.2 miles of fiber to connect parks & downtown

$1.7 million to $3.1 million
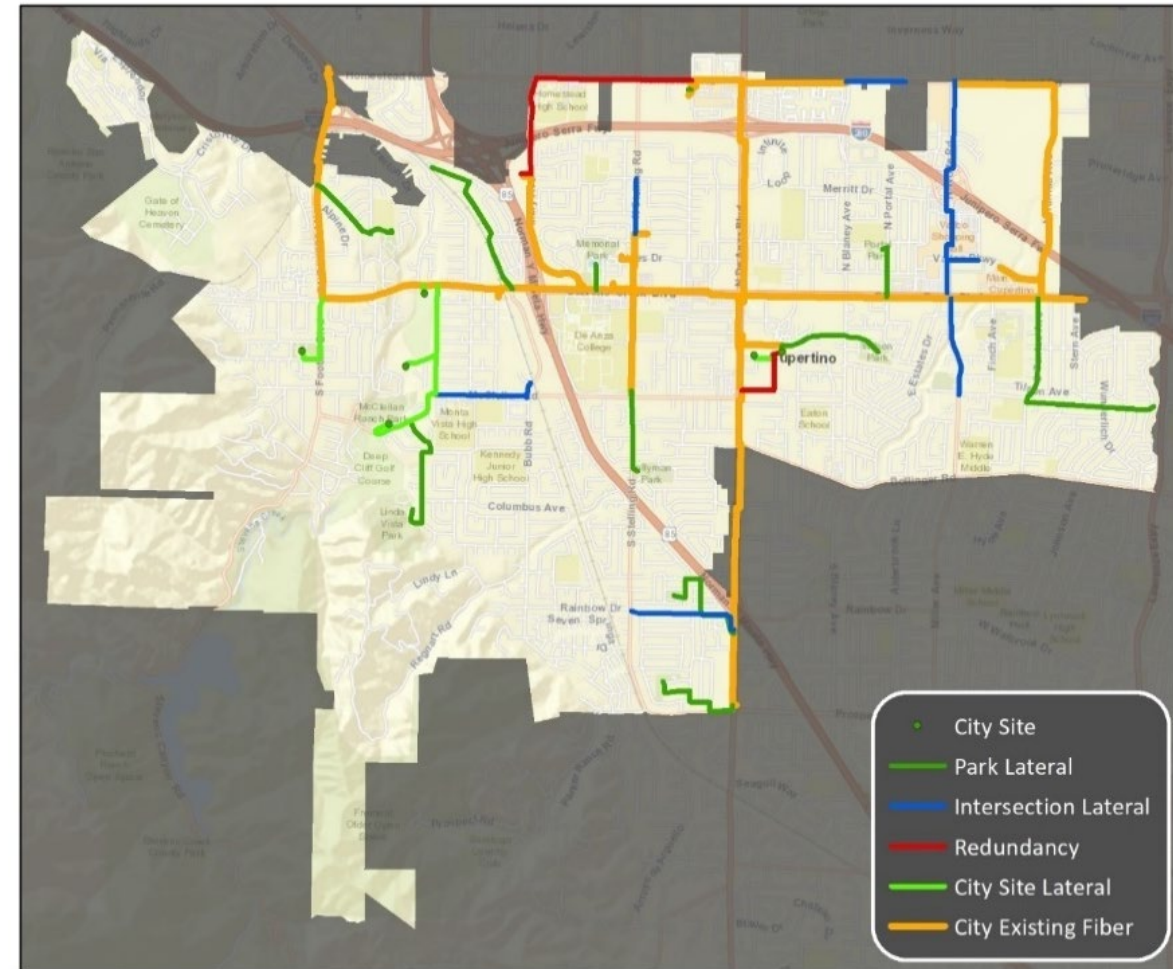
Phase 4: Expand network redundancy

Construct 2.4 miles of fiber

Could mostly be accomplished without earlier fiber construction to parks

$640,000 to $1.3 million

Legend:

City Site		Redundant Link	
Park Lateral		1	
Intersection Lateral		2	
Redundancy		3	
City Site Lateral		4	
City Existing Fiber			
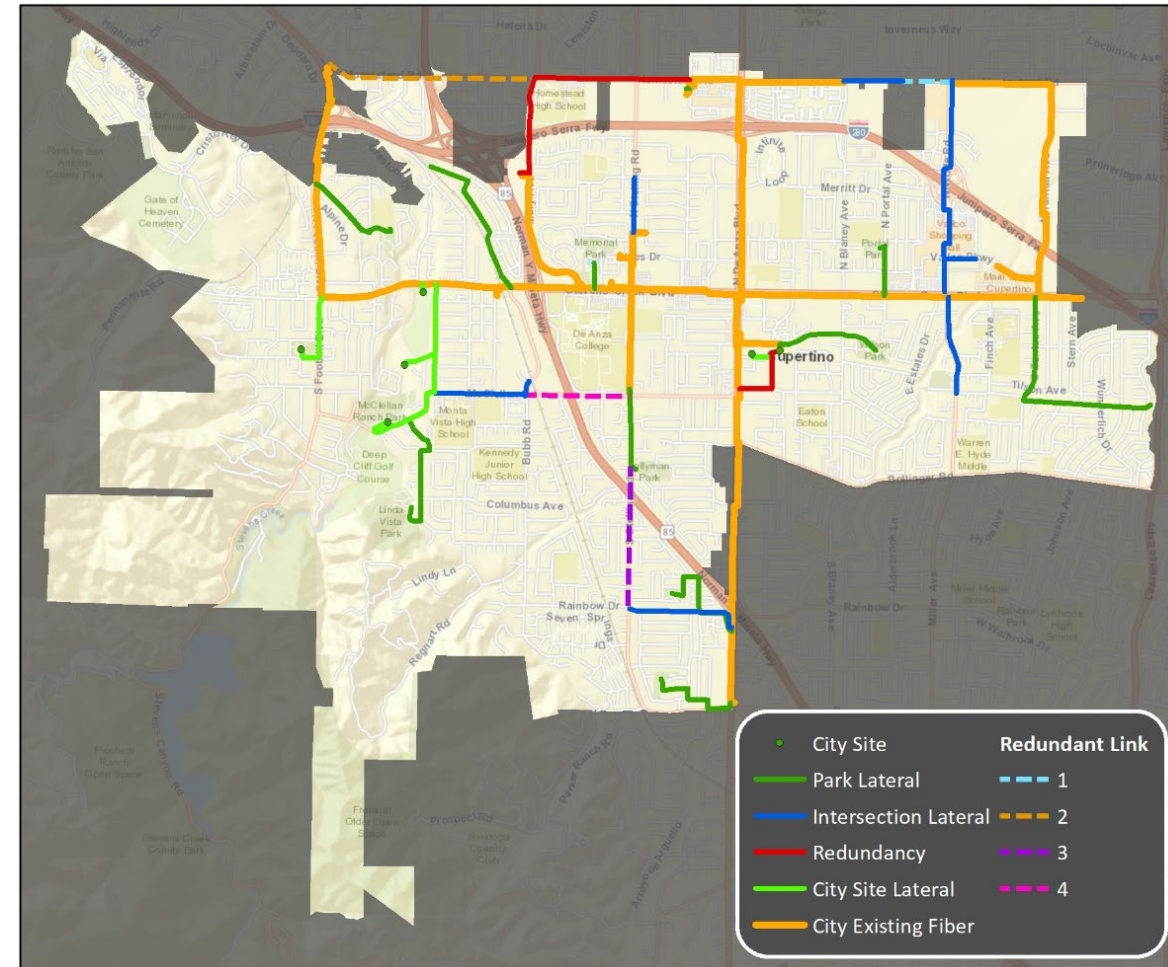
Phase 5: Connect CCC emergency sites

Construct 2.5 miles of fiber, independent of other fiber expansion

$700,000 to $1.3 million
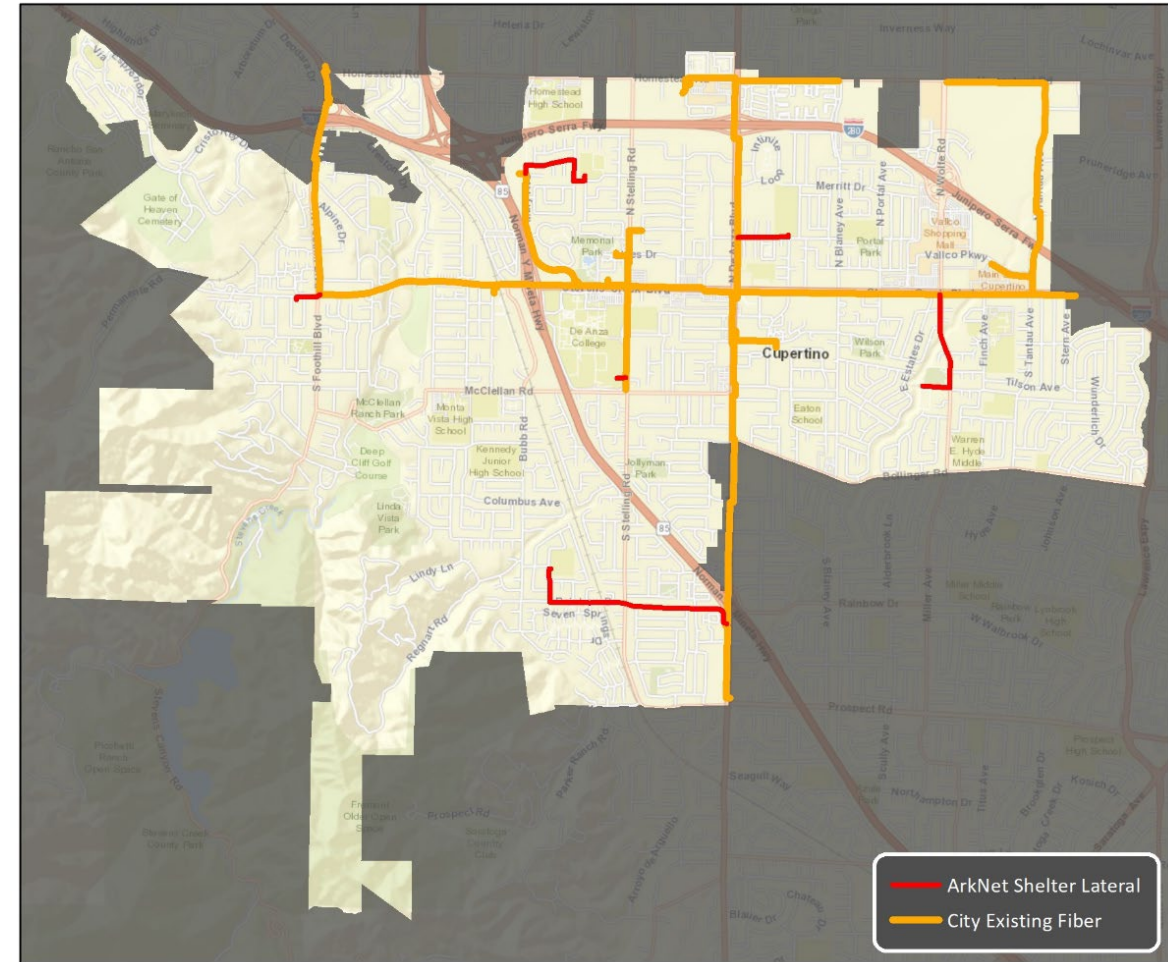
Potential Business Models

Analysis of three business models identified by the City

The City owns & operates the fiber network

The City outsources operation & management of the network, with City or third-party ownership—a "commercial approach"

A hybrid approach

Analysis of City-owned & operated network

The City has successfully owned & operated its fiber network for more than 10 years—& has created real value for the City

The City used best practices in funding & obtaining value from the network

The network would be more valuable & reliable if the City had a contract for fiber outside plant repairs

The City may wish to consider leasing or trading its limited excess fiber capacity

The high cost of fiber construction in the City means connecting new facilities may not be cost-effective

Analysis of full commercial approach

It is not clear that a fully commercial approach would address the City's challenges or open new opportunities

The City could seek to sell its fiber or provide a long-term lease to an entity to maintain the fiber & sell & operate the unused fiber

The City may obtain revenue or a one-time windfall of less than $2M in transferring the asset

This would be technically challenging & would likely produce relatively little value to the City

Analysis of hybrid approach

The City can realize some advantages of commercializing the fiber by adopting a mixed approach

Trade excess fiber for strands the City wants, & offer fiber for lease if the City believes it does not need the excess capacity on a route & is technically able to commit to commercial performance standards

Develop a Dig Once policy to cost-effectively expand fiber if new opportunities come from new construction—either by the City or by other communications providers & utilities

Incorporate fiber build cost in City capital projects such as new buildings—so that fiber location becomes a factor in facilities' locations

Recommendation: Hybrid approach

City maintains ownership of fiber

City contracts with on-call repair company

Repairs occur within a specified time

City considers leasing fiber strands instead of building fiber to new locations

Fiber construction decisions guided by comparison of total cost of operations (City vs. provider)

Dig Once Recommendation

Dig Once could deliver a range of benefits

Reduce high cost of fiber construction to add new sites

Capitalize on fiber builds by wireless providers or other excavators

Reduce pavement cuts

Preserve limited area within the public right-of-way

Request in-kind contributions of fiber in agreements with wireless providers or in exchange for construction in the right-of-way

City might also pay only the incremental cost for adding fiber strands during other entities' fiber construction

Wireless Siting Processes & Standards

Overview

Baseline for analysis (existing guidelines)

City's achievements

Changes in wireless technology & carrier industry

Recommendations

Existing standards & guidelines analyzed

Wireless Facilities Master Plan

Guidelines for City-owned poles

FAQs for wireless facilities on wooden utility poles & streetlight poles

Small Wireless Facility design standards

License agreements with service & infrastructure providers

Also benchmarked against City of Palo Alto's processes

Achievements in wireless siting

The City has accomplished significant gains since the adoption of its previous Wireless Facilities Master Plan

City developed Small Wireless Facility design standards that outline requirements to potential applicants

City staff maintain ongoing, informal communications channels with applicants & share long-term plans to mutual benefit

City has approved permits for wireless facility siting in locations agreeable both to applicants & the City

No unresolved issues relating to damage to the City's rights-of-way or private property

City's current process for wireless facility siting application review & approval

City has transparent process

- Ensures that members of the public are aware of applications & related radio frequency (RF) emissions assessments

- Ensures applications are reviewed in a reasonable amount of time (in light of FCC requirements)

Changes in wireless technology & the carrier industry will require the City's processes & standards to evolve

Need to accommodate processes & designs of all applicants

Need to accommodate providers' interest in placing infrastructure in neighborhoods

Need to accommodate a greater volume of applications within the 10-day requirement for determining each application's completeness

Need to review & approve requested modifications to already-installed Small Wireless Facilities in the City

Recommendations

Develop application forms that request all necessary information

Modify the City's exiting application review process to increase efficiency

Adopt clear technical & aesthetic standards for wireless facility siting

Conduct a cost analysis to justify the City's application fees & yearly fees

Elements presented to support recommendations

General definitions related to Small Wireless Facilities, applications, review processes, & standards

Detailed descriptions of application type & requirements

Detailed descriptions of separate application review processes, including a process flowchart & modified personnel roles

Detailed aesthetic & technical standards for wireless facilities

Draft standard pre-approved designs

Draft fields for expanded applications

A site completion checklist

Lists of tasks by process

Wireless siting review process

Cupertino Wireless Siting Review Process – Business Day Processing Targets by Task

	Receive 1	Reviews 7	Resolve RFIs 6	Report 5	Final Decision 5
Permit Coordinator	Receive Application Enter Database 1	Intake Review 1	RFI (1X2) 2 RFIs + (2x2) 2 signoffs	Report 5	
Engineer		Engineering Review 5 / City Compliance 2			
Field Technician		Site Survey 5			
Final Approver					Final Decision 5
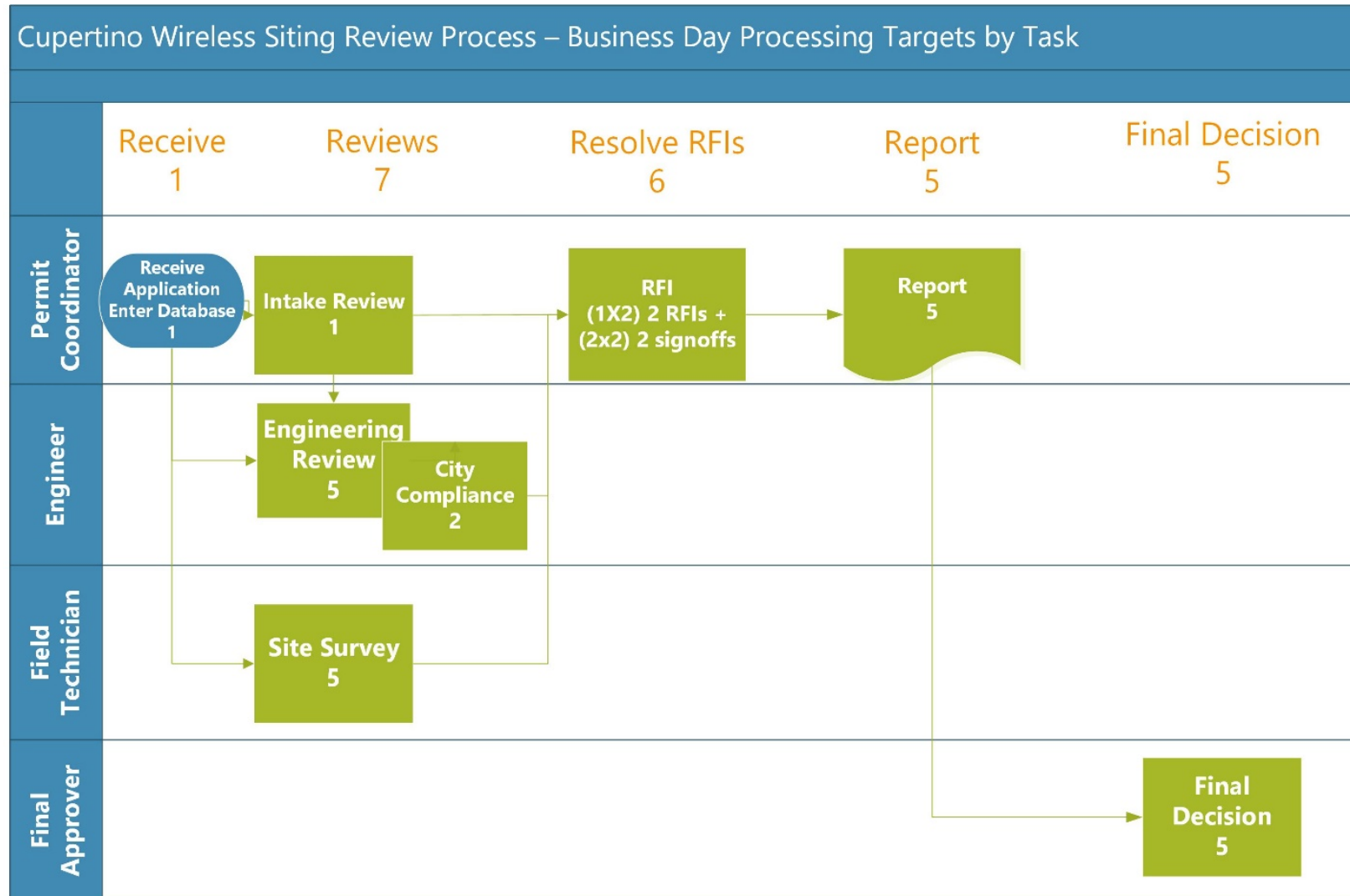
Standard streetlight designs and conduit typical

ANTENNA DIAMETER 1'3"

CANISTER MUST BE THE SAME COLOR AS THE POLE

CANISTER WITH ANTENNA INSIDE MAXIMUM HEIGHT 5'5"

TOP OF EXISTING POLE MAXIMUM HEIGHT 41 FEET

2'0"

APPROVED SIGNAGE FOR RF EMISSION

POLE-MOUNTED EQUIPMENT
MAXIMUM WIDTH: 1 FEET
CUMULATIVE MAXIMUM VOLUME: 9 CUBIC FEET
MINIMUM 10 FEET ABOVE GROUND LEVEL

SHAPES AND COLORS TO MATCH SURROUNDING INFRASTRUCTURE AND PLACED ON THE SIDE OF THE POLE FACING AWAY FROM THE ROADWAY, OR SCREENED WITH EXISTING STREET SIGNAGE

POWER DISCONNECT SWITCH

DISTINCT MARKER (TAG)
MARKER SHALL BE LIMITED TO A 3-INCH BY 2-INCH PLATE

FIBER BACKHAUL

EQUIPMENT POWER

LIGHT POWER

HAND HOLD

HAND HOLD

FINISH GRADE

FIBER BACKHAUL JUNCTION BOX

LIGHT POWER JUNCTION BOX

EQUIPMENT POWER JUNCTION BOX

CONDUIT

ANTENNA DIAMETER 1'3"

CANISTER MUST BE THE SAME COLOR AS THE POLE

CANISTER WITH ANTENNA INSIDE MAXIMUM HEIGHT 5'5"

TOP OF EXISTING POLE MAXIMUM HEIGHT 41 FEET

2'0"

APPROVED SIGNAGE FOR RF EMISSION

POWER DISCONNECT SWITCH

DISTINCT MARKER (TAG)
MARKER SHALL BE LIMITED TO A 3-INCH BY 2-INCH PLATE

BASE MOUNTED EQUIPMENT
MAXIMUM HEIGHT: 48 INCHES
MAXIMUM WIDTH: 30 INCHES
MAXIMUM VOLUME: 25 CUBIC FEET

MUST BE PAINTED OR SCREENED TO BE THE SAME COLOR OR DESIGN OF THE PRE-EXISTING STRUCTURE