Building EV Charging Infrastructure: Lessons Learned and Funding Incentives

City of Palo Alto

Future Proof Your City For Electric Vehicles

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Outline

- EVSE ordinance background
- Overview of new proposed EVSE requirements
- Example Scenarios
- Questions

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Background

1. Mobile sources account for 40% of GHG in CA
2. Governor Brown's Executive Order March 2012
   - 2025 Goal 1.5 million ZEVs on California roadways
3. California Center for Sustainable Energy Study
   - 1,000 new plug-in vehicles sold in CA every month
   - Californians own more than 12,000 plug-in EVs
   - Californians account for 35% of all US plug-in EVs

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Past and Future

1. Single-family EVSE ordinance adopted 12/9/13
2. Regulations adopted 06/16/14 EV requirements
   - § New multi-family residential structures
   - § New non-residential structures
   - § New hotels
3. Next Steps
   - § Look to require retrofit of (E)
   - § Look to install new EVSE on public streets
   - § Seek grants to install more EVSE in public spaces

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Loading Order

1. Single Family
2. Multi-family residential construction
   - § Resident & Guest Parking
3. Mixed use parking facilities
4. Non-Residential (Other than Hotels)
5. Hotels

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EVSE Types

1. EVSE
   - § Fully-functional electric vehicle chargers
2. EVSE Ready Outlet
   - § Conduit Only + electrical capacity
3. Conduit Only
   - § Underground or in wall conduit

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Single Family Residential

- One parking space ready with one of the following:
  - Conduit only
  - EVSE Ready
  - EVSE

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Multi-Family Residential

- Resident Parking:
  - 1 EVSE Ready per Unit
- Guest Parking:
  - EVSE installed for 5% of spaces (minimum 1)
  - Conduit Only for 20% of spaces

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Mixed Use Facilities

- EVSE installed for 5% of spaces
- Conduit Only for 20% of spaces
- Multi-family requirements apply when residential units are present

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Non-Residential

1. Non-Residential other than hotels
   - 5% of spaces have installed EVSE
   - 20% of spaces shall have conduit only
2. Hotels
   - 10% of spaces shall have installed EVSE
   - 20% of spaces shall have conduit only

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Scenario 1 – Commercial Diagram

30,000 sq. ft. Commercial Office Building

Entrance

Parking Assumptions:
100 Parking Spaces, 4 Accessible Spaces

Parking (100): 5% EVSE = 5 Spaces
20% conduit = 20 Spaces

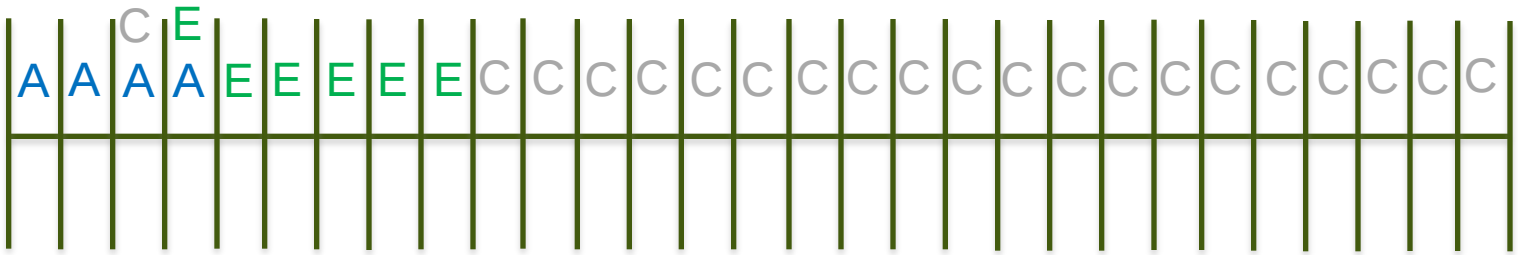
Accessible Parking (4): 5% EVSE* = 1 Spaces
20% Conduit* = 1 Spaces

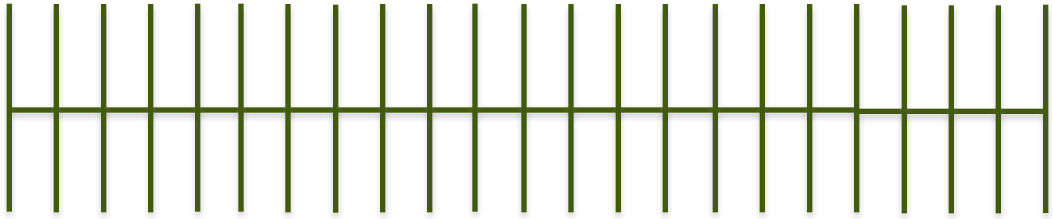
* *Minimum of 1 space.*
Based on Scope of Project

Accessible (2)
1 EVSE
1 Conduit Only

5 EVSE

20 Conduit Only





A = Accessible
E = EVSE
C = Conduit Only

Scenario 1 – Commercial Costs

240V/50A conduit & wiring for 6 parking spots	$8,408
Panel capacity for 6 parking spots	$2,160
Protective requirements per 240V/50A circuit (disconnect)	$2,430
Three fully featured dual-head Level 2 chargers serving 6 parking spots	$22,500
City permits for the installation of 3 chargers	$648
Subtotal	**$36,145**
150' of average distance to the 21 parking spots that have conduit-only	
Conduit for 21 parking spots	$5,393
Installation for 21 parking spots	$16,279
Subtotal	**$21,672**
Total	**$57,817**

Summary:

Estimated Construction Cost* = **$250/sf**

Estimated Total Construction Costs @ 30,000 sf* = **$7,500,000**

Estimated EV Parking Costs = **$57,817**

EV Parking Percent of Total Costs= **0.80%**

**Data Source = RS Means, Reed Construction Data 2012*

Scenario 2 – Multi-Family Diagram

30-unit 30,000 sq. ft. Multi-Family Residential

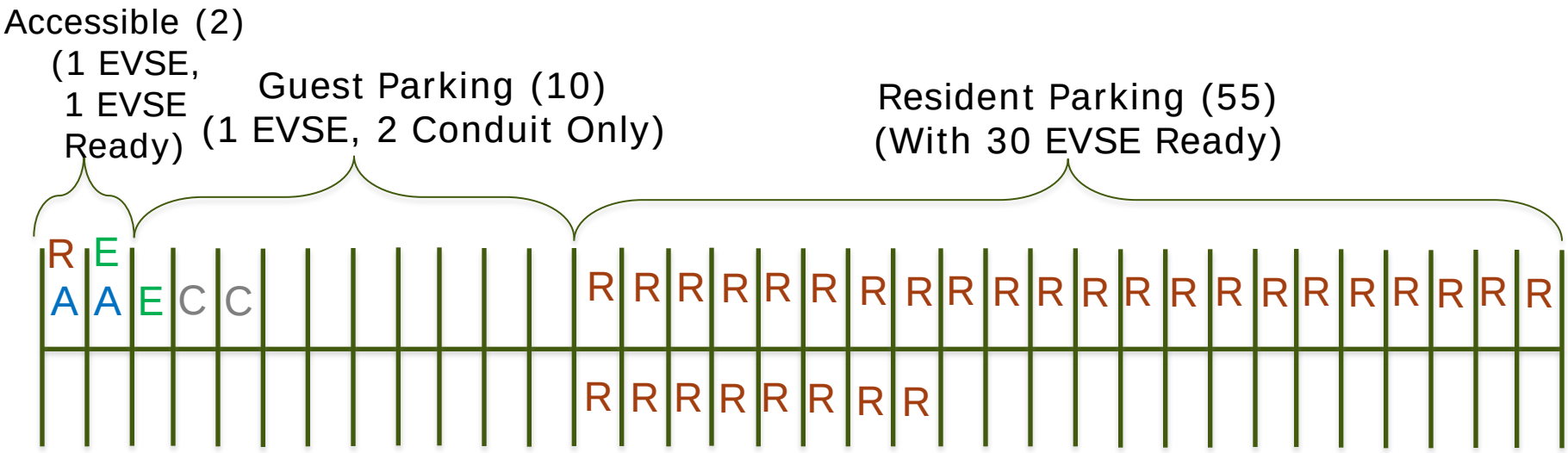
Entrance

Parking Assumptions:
55 Resident, 10 Guest, 2 Accessible Spaces

Resident: 1 EVSE Ready/unit = 30 EVSE Ready Spaces

Guest: 25% EVSE/EVSE/ or Conduit Only (min 1 must be EVSE) = 1 EVSE and 2 Conduit Only

Accessible: 1 EVSE Ready Space, 1 EVSE



A= Accessible
E= EVSE
C= Conduit Only
R= EVSE Ready

*Based on scope of project

Scenario 2 – Multi-Family Costs

240V/50A conduit & wiring for 32 parking spots	$44,842
Panel capacity for 32 parking spots	$12,240
Protective requirements per 240V/50A circuit (disconnect)	$12,960
One fully featured dual-head Level 2 chargers serving 2 parking spots	$7,500
City permits for the installation of 1 charger	$370
Subtotal	**$77,912**
150' of average distance to the 3 parking spots that have conduit-only	
Conduit for 3 parking spots	$770
Installation for 3 parking spots	$2,326
Subtotal	**$3,096**
Total	**$81,008**

Summary:

Estimated Construction Cost* = **$300/sf**

Estimated Total Construction Costs @ 30,000 sf* = **$9,000,000**

Estimated EV Parking Costs = **$81,008**

EV Parking Percent of Total Costs= **0.90%**

**Data Source = RS Means, Reed Construction Data 2012*

Challenges

Feedback from the design community

Transformer capacity

- Will be unique to each project - requirements may trigger an upgrade
- Location of transformer should to be coordinated with entitlement/planning approval
- Early coordination with the local electrical utility is critical to project design team success

Accessibility Requirements

- Updated 2016 Building Standards are currently being analyzed for applicability to the ordinance

Thank you

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